



Boxley Valley Comprehensive Area Plan

FINAL DRAFT ENVIRONMENTAL ASSESSMENT



February 2020

This page intentionally blank.

CONTENTS

CHAPTER 1: PURPOSE AND NEED FOR THE PLAN	1
INTRODUCTION	1
PURPOSE AND NEED.....	1
PLANNING AREA	1
PLANNING ISSUES AND IMPACT TOPICS RETAINED FOR ANALYSIS.....	2
Key Issues.....	2
Impact Topics Retained for Further Analysis	4
IMPACT TOPICS DISMISSED FROM ANALYSIS.....	4
DESIRED CONDITIONS	5
NEXT STEPS IN THE PLANNING PROCESS	9
Finalizing the Plan	9
Implementing the Plan	9
CHAPTER 2: ALTERNATIVES.....	13
INTRODUCTION	13
ALTERNATIVE A (CURRENT MANAGEMENT).....	13
ALTERNATIVE B (PROPOSED ACTION AND PREFERRED)	13
ALTERNATIVES OR STRATEGIES CONSIDERED BUT DISMISSED	14
Dismissed Alternatives/Strategies.....	14
VISITOR USE MANAGEMENT: INDICATORS, THRESHOLDS, AND VISITOR CAPACITY.....	20
Visitor Capacity	22
MITIGATION MEASURES.....	22
CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES	25
VISITOR USE AND EXPERIENCE	26
Affected Environment	26
Characteristics of Visitor Use	28
Environmental Consequences of Alternative A (Current Management)	31
Environmental Consequences of Alternative B	34
CULTURAL LANDSCAPE.....	40
Affected Environment	40
Environmental Consequences of Alternative A (Current Management)	42
Environmental Consequences of Alternative B	44
ARCHEOLOGICAL RESOURCES	45
Affected Environment	45
Environmental Consequences of Alternative A (Current Management)	46
Environmental Consequences of Alternative B	47

FEDERALLY LISTED SPECIES	48
Affected Environment.....	48
Environmental Consequences of Alternative A (Current Management).....	51
Environmental Consequences of Alternative B	53
Cumulative Effects.....	54
VEGETATION IMPACT TOPIC	55
Affected Environment.....	55
Environmental Consequences under Alternative A (Current Management).....	58
Environmental Consequences under Alternative B	59
WATER QUALITY IMPACT TOPIC	60
Affected Environment.....	60
Environmental Consequences under Alternative A (Current Management).....	62
Environmental Consequences under Alternative B	62
CHAPTER 4: CONSULTATION AND COORDINATION	67
PUBLIC INVOLVEMENT	67
CONSULTATION AND COORDINATION TO DATE WITH OTHER AGENCIES, OFFICES, AND INDIAN TRIBES	67
Section 7 Consultation.....	67
Section 106 Consultation	68
Consultation with Native American Indian Tribes.....	68
LIST OF AGENCIES AND PERSONS CONTACTED	69
CHAPTER 5: REFERENCES	73
APPENDIX A: ALTERNATIVE SITE PLANS.....	A-1
APPENDIX B: ALTERNATIVE B INDICATORS AND THRESHOLDS	B-1
APPENDIX C: VISITOR CAPACITY IDENTIFICATION	C-1
APPENDIX D: MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES	D-1

FIGURES

Figure 1. Boxley Valley Comprehensive Area Plan Planning Area	3
Figure 2. Management Zones	6
Figure 3. New and Improved Pullouts (Under Alternative B).....	19
Figure 4. Buffalo National River Annual Visitation.....	27
Figure C-1. Commercial Use at Ponca and Steel Creek	C-3
Figure C-2. Weekend Day totals for Commercial Use at Ponca Access.....	C-3
Figure C-3. Average PAOT Four Use at Ponca Access	C-4
Figure C-4. Weekend Day Totals for Commercial Use at Steel Creek	C-7
Figure C-5. Average PAOT for Commercial Use at Steel Creek	C-7

TABLES

Table 1. Planning Area Management Zones and Detailed Desired Condition Descriptions	7
Table 2. Alternatives Comparison Matrix	15
Table 3a. NPS Projects and Activities in Boxley Valley and the General Region between 2015 and 2029	25
Table 3b. Non-NPS Projects and Activities in Boxley Valley and the General Region between 2015 and 2029	26
Table 4. Visitor-Reported Activities at Lost Valley	28
Table 5. Federal and State-Listed Species Known to Occur Within Buffalo National River.....	51

This page intentionally blank.



Chapter One

PURPOSE AND NEED FOR THE PLAN

This page intentionally blank.

CHAPTER 1: PURPOSE AND NEED FOR THE PLAN

INTRODUCTION

The Boxley Valley Comprehensive Area Plan and Environmental Assessment (Boxley CAP) includes strategies and site improvements to protect park resources and the quality of the visitor experience. This plan evaluates a range of alternatives and management actions that would enable Buffalo National River to anticipate changing use patterns and increasing visitation in one of the most popular areas of the park.

This plan also fulfills park planning priorities for resource, facility asset, and visitor use management in the Boxley Valley area of Buffalo National River and serves as a component of the park's planning portfolio. The park's planning portfolio consists of the individual plans, studies, and inventories, which together guide park decision making. The planning portfolio enables the use of targeted planning documents (such as this one) to meet a broad range of park planning needs and fulfill legal and policy requirements. This plan supplements the general guidance of Buffalo National River's 1975 Master Plan and helps the park to better meet the statutory requirements identified in 54 USC 100502.

PURPOSE AND NEED

Since Buffalo National River's establishment in 1972, the Boxley Valley area has been one of the primary visitor destinations. In 2011, the valley experienced a major flood that devastated a number of park facilities, including a bridge, campground, numerous trails, and other infrastructure, particularly in the vicinity of Lost Valley. While improvements to park facilities and infrastructure have been made since the flood, further improvements and site rehabilitation are necessary in Lost Valley and other locations within Boxley Valley. Compounding this issue is the need to address continued increases in visitor use, which places added strain on limited and aging park infrastructure.

Buffalo National River staff need updated guidance to help address some of these issues. Existing guidance for the Boxley Valley area is outdated and much has changed in the 34 years since completion of the 1985 Boxley Valley Land Use Plan and Cultural Landscape Report (NPS 1985). Today, the Boxley Valley area is home to reintroduced populations of elk, diverse land and water-based recreation opportunities, and cultural and historical properties like the Boxley Mill Pond area that help capture a moment in time and would benefit from increased interpretation.

The Boxley Valley Comprehensive Area Plan provides an overall vision for the future of the Boxley Valley area that aims to decrease crowding and user conflicts, responds to changing visitation preferences, protects cultural and natural resources, and addresses visitor safety concerns. The plan guides park management decision-making by identifying desired conditions for natural and cultural resources, defining appropriate types and kinds of visitor use at key locations in the valley, and proposing appropriate facility and infrastructure to support those uses. The plan seeks to improve the visitor experience through expanded interpretation and educational programs and additional visitor amenities and facilities.

PLANNING AREA

The Boxley Valley Comprehensive Area Plan planning area is located in northwest Arkansas within the westernmost portion of Buffalo National River. The planning area is bordered by two units of the Buffalo National River Wilderness—the Upper Buffalo Unit to the south and the Ponca Unit to the

north (see figure 1). Boxley Valley is listed as the Big Buffalo Valley Historic District in the National Register of Historic Places (referred to as the Boxley Valley Historic District). In addition to park property and park uses, the planning area is home to several cow-calf farming operations and other agricultural activities on privately-owned lands.

PLANNING ISSUES AND IMPACT TOPICS RETAINED FOR ANALYSIS

Several issues were identified during internal scoping and public listening sessions. Key planning issues and corresponding impact topics are noted in the following sections.

Key Issues

Congestion and Crowding at River Access Points. River access points are popular staging areas for visitors hoping to use and enjoy the river and nearby trails, but they are often congested during peak visitation times (which coincide with periods of high water flows). This crowding diminishes the visitor experience and can affect natural and cultural resources. Thus, there is a need to improve visitor circulation and better manage use at these locations, particularly as the area continues to grow in popularity.

Elk Viewing Traffic Jams on State Highways. Elk viewing has become increasingly popular, especially on busy fall weekends. The attraction can frequently cause dangerous traffic jams on State Highways 21 and 43 as designated pull-offs fill and visitors then park on roadsides. This congestion exposes visitors, as well as neighboring private landowners, to safety hazards and complicates access to private properties.

Limited Visitor Services and Opportunities for Interpretation and Education. The lack of an NPS presence and wayfinding in Boxley Valley and Lost Valley limits the ability of park staff to connect with visitors and provide information that will support their visit to Buffalo National River. As a result, many visitors are not fully aware of recreational opportunities, cultural and natural resources, proper etiquette related to human-wildlife interactions, and that private residents own many of the lands within the Boxley Valley. Currently, visitors frequently ask neighboring private landowners for directions or information. The general lack of visitor services and educational outreach in the area also affects visitor safety during times of high visitation. Although some current information on river conditions, safety, and “leave no trace” guidelines is available online, information should also be provided on-site.

Damaged Facilities and Infrastructure from Flooding. Although improvements to park facilities and infrastructure have been made since the 2011 flood, further improvements and site rehabilitation are needed at a number of areas in the vicinity of Lost Valley. Existing facilities and infrastructure, including those found near Ponca Access and Steel Creek, require updates to improve visitor access, reduce erosion, minimize corrective maintenance costs, improve visitor safety, and improve protection of natural and cultural resources.

Opportunities to Improve and Enhance Historic Structures. Existing historic sites and structures in the area, such as those found near the Boxley Mill and Boxley Mill Pond area and the Beaver Jim site just west of Ponca, could benefit from site-specific improvements including restoration of the historic mill race, a trail, viewing areas, as well as expanded interpretation and education.

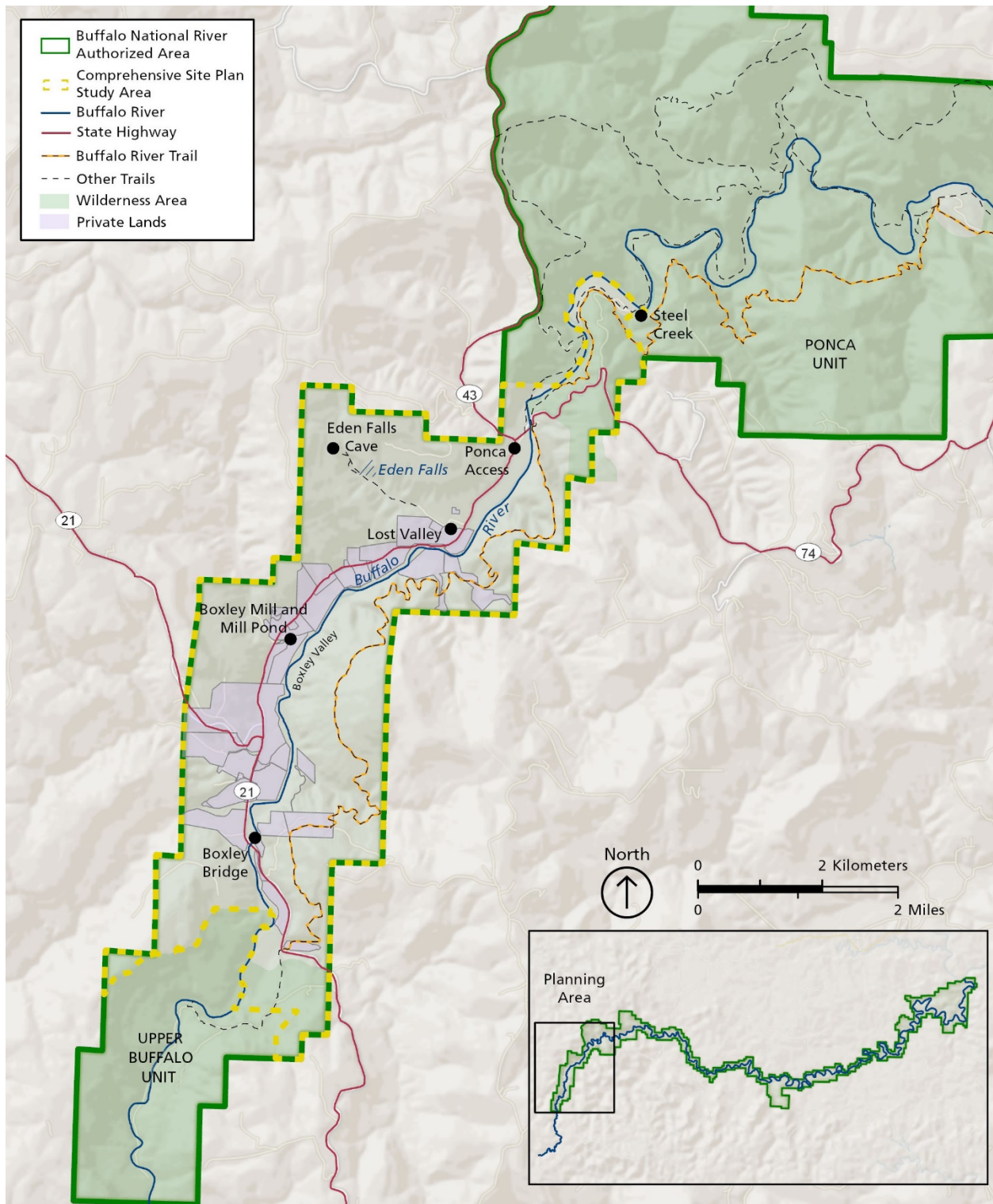


FIGURE 1. BOXLEY VALLEY COMPREHENSIVE AREA PLAN PLANNING AREA

Impact Topics Retained for Further Analysis

The following topics are carried forward for further analysis in this environmental assessment:

- Visitor Use and Experience
- Cultural Landscapes
- Archeological Resources
- Federally Listed Species
- Vegetation
- Water quality

IMPACT TOPICS DISMISSED FROM ANALYSIS

The impact topics described in this section were reviewed by the National Park Service planning team and were dismissed from further analysis because they were unlikely to be adversely affected by the activities proposed in this environmental assessment. A brief description of rationale for dismissing these resources is provided below.

Wetlands. While some actions proposed in the action alternative would occur adjacent to wetlands, most would have beneficial impacts to wetlands and water resources by reducing erosion and potential sedimentation within each management area. No management activities would occur in wetlands or are expected to have an adverse impact to wetlands or wetland buffers; therefore, no Clean Water Act permits would be required. In addition, the National Park Service would strive, through mitigation measures and best management practices included in appendix D, to implement proposed activities and develop facilities with sustainable designs and systems to minimize adverse effects to wetlands. The action alternative would not compete with or dominate the park's fundamental resources or interfere with natural wetland processes such as the seasonal migration of wildlife.

Wildlife. The National Park Service determined that management strategies and actions outlined in this plan would have negligible effects to wildlife. Anticipated effects noted during an assessment of preliminary impacts tied to wildlife were limited in scope and scale and sensitive species are not likely to be affected by actions included in either of the alternatives. Most facility and infrastructure improvements are situated within previously disturbed areas or in developed areas that currently experience higher concentrations of visitors and are not expected to impact wildlife.

Wilderness Character. The study area is situated between the two units of the Buffalo National River Wilderness—the Upper Buffalo Unit to the southern edge of the study area and the Ponca Unit to the north. Strategies identified in the plan would largely maintain current use levels within the area and would not adversely affect wilderness qualities on adjacent lands.

Socioeconomics. Based on an evaluation of preliminary impacts tied to socioeconomics, it was determined that this impact topic could be dismissed. There would be no noticeable socioeconomic effects across the alternatives and further analysis of this topic would not influence the selection of a preferred alternative. Use levels, including commercial use, in the study area, are not likely to be reduced from current levels given the management strategies outlined in the plan. Should use at river access points like Ponca Access and Steel Creek exceed thresholds in the future, adaptive strategies would be implemented only as thresholds are approached or exceeded, including actions designed to help manage visitation within identified visitor capacities. In addition, short-term effects from construction of facility improvements identified as part of the preferred alternative would have beneficial economic effects.

DESIRED CONDITIONS

The desired conditions are defined as statements of aspiration that describe resource conditions (including fundamental resources and values), visitor experiences and opportunities, and facilities and services that an agency strives to achieve and maintain in a particular area. Desired conditions describe what conditions, outcomes, and opportunities are to be achieved and maintained in the future, not necessarily what exists today. Desired condition descriptions help to outline what a particular area will look like, feel like, sound like, and function like in the future.

Desired conditions for the Boxley Valley planning area are linked to management zones and are presented in (figure 2). Desired conditions generally correspond to natural resources, cultural resources, visitor experience, types and levels of development, and commercial visitor services. Detailed descriptions of desired conditions included in table 1 were developed based on a review of earlier land classification efforts for Buffalo National River as part of the 1975 Buffalo National River Master Plan (NPS 1975), discussions with park staff, as well as information provided in the 2018 foundation document. Boxley Valley has been classified into three zones. Summary zone descriptions are provided below, and corresponding desired conditions are described in detail in table 1:

- **Developed Zone:** These are convenient, highly accessible developed areas. Developed zones accommodate concentrated visitor use, structured interpretive and recreational opportunities, and administrative needs. The natural environment may be modified to support such uses. Facilities may include visitor centers and contact stations, paved roads, parking areas, developed campgrounds, viewing areas, picnic areas, pavilions, trailheads, surfaced walkways, boat launches, and operational facilities. Encounters between visitors are moderate to high. This zone does not occur within designated wilderness.
- **Cultural/Historic Zone:** This zone emphasizes protection and interpretation of historic structures, archeological sites, and cultural landscapes. Moderate levels of visitor services such as orientation, interpretive, and educational programs related to cultural resources are provided, where appropriate. Facilities may include contact stations, paved and unpaved roads, parking areas, viewing areas, trailheads, surfaced walkways, and foot paths. Encounters between visitors are low to high. This zone does not occur within designated wilderness.
- **Natural Zone:** This zone is mostly natural. The natural environment is largely free of human influences and disturbance, and visitors have ample opportunities to enjoy the sights and sounds of nature. There are opportunities for solitude, contemplation, and self-reliance. Self-guided interpretive and educational opportunities are available. Some structured programs are offered during the peak season. Facilities may include gravel and unpaved roads, parking areas, interpretive waysides, semi-primitive campgrounds, river access / boat launches, unpaved designated trails, and trailheads. Encounters between visitors are low to moderate. This zone does not occur within designated wilderness.

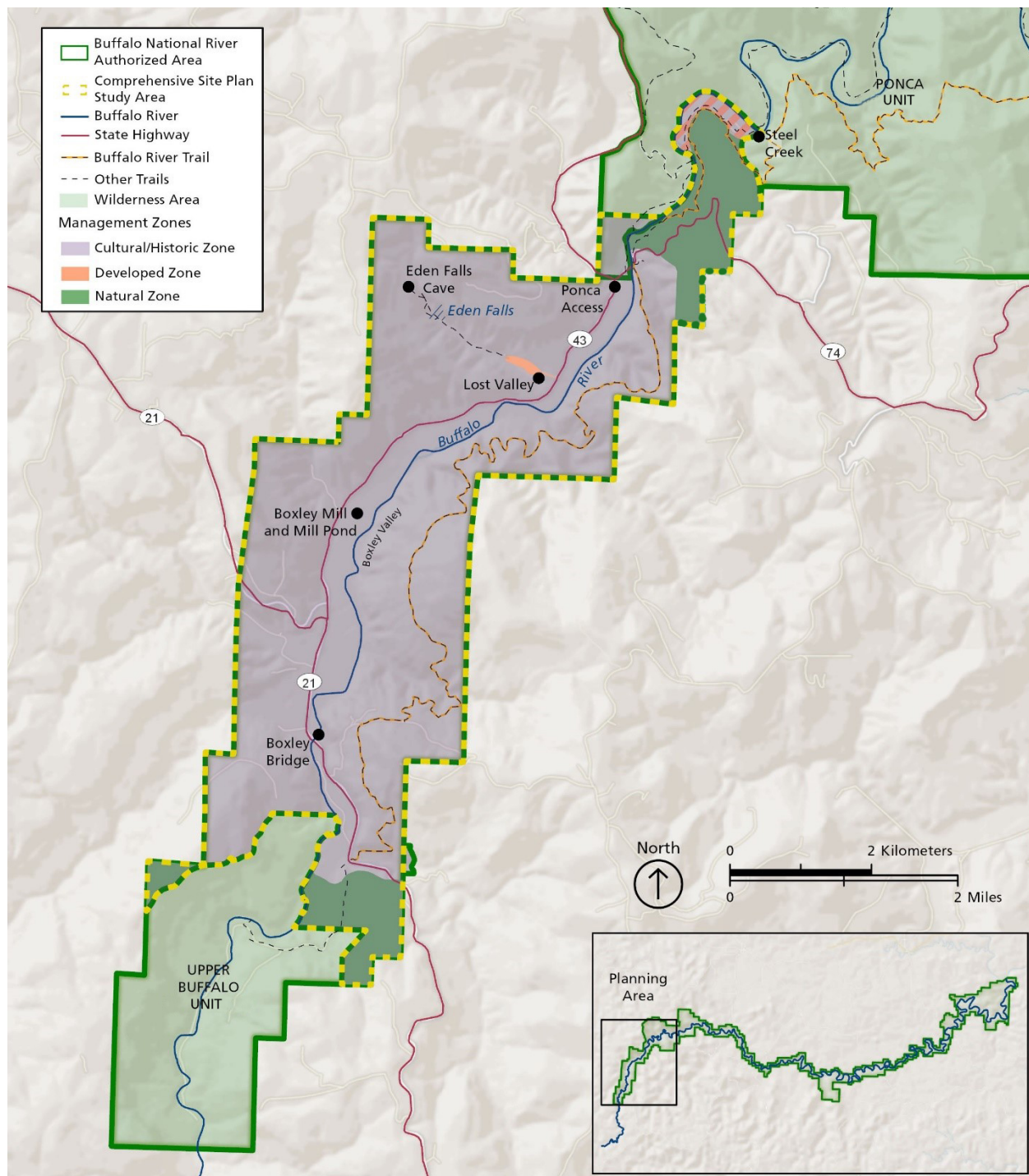


FIGURE 2. MANAGEMENT ZONES

Table 1. Planning Area Management Zones and Detailed Desired Condition Descriptions

Topic Area	Developed Zone	Cultural/Historic Zone	Natural Zone
Natural Resources	• Natural resources would be managed to accommodate facilities for NPS operations and concentrated visitor use. • The effects of developments and visitor use on the natural surroundings would be minimized through planning and design efforts. • Invasive species would be suppressed to prevent further spread or eradicated where feasible.	• This zone would be managed to restore natural features originally associated with cultural sites and landscapes. This could include habitat manipulation to achieve similar plant communities that were historically present. • Natural resources would be protected where consistent with cultural resource values. • Invasive species would be suppressed to prevent further spread or eradicated where feasible.	• Ecological integrity would be maintained by preserving and restoring natural resources and processes through an integrated natural resource management approach. • Emphasis would be placed on protecting outstanding natural features and habitats for rare and endangered species. • Invasive species would be suppressed to prevent further spread or eradicated where feasible.
Cultural Resources	• Cultural resources eligible for or listed on the National Register of Historic Places would be protected and managed consistent with NPS policies and the Secretary of the Interior's Standards and Guidelines. Appropriate treatments would include preservation, stabilization, restoration, and rehabilitation in accordance with Section 106 of NHPA. • Selected cultural resources would provide distinct visitor opportunities and experiences and would be the backdrop for interpretation, visitor use, and services where appropriate • All other cultural resources would be evaluated to determine if they should be preserved, stabilized, restored, or left unmaintained.	• This zone corresponds to areas having a substantial array of historic sites, structures, and landscapes that continue to evoke the historic setting. • Desired conditions would include an emphasis on protecting and managing cultural resources eligible for or listed on the National Register of Historic Places. Consistent with NPS policies and the Secretary of the Interior's Standards and Guidelines. Appropriate treatments would include preservation, stabilization, restoration, and rehabilitation in accordance with Section 106 of NHPA. • As appropriate, selected cultural resources would be adaptively used and/or incorporated into opportunities for visitor use and interpretation provided these actions do not compromise important resource values and character-defining features.	• Cultural resources eligible for or listed on the National Register of Historic Places would be protected and managed consistent with NPS policies and the Secretary of the Interior's Standards and Guidelines. Appropriate treatments would primarily include preservation and stabilization consistent with management efforts to promote natural processes and ecological integrity and in accordance with Section 106 of NHPA. • Selected cultural resources would be preserved or stabilized to provide interpretive opportunities for visitors. • All other cultural resources would be evaluated to determine if they should be preserved, stabilized, restored, or left unmaintained and documented based on Secretary of the Interior's Standards and Guidelines.

Topic Area	Developed Zone	Cultural/Historic Zone	Natural Zone
Visitor Experience	• Visitors would have opportunities to better understand the national river's significant resources and values; interact with other visitors and NPS staff; and recreate in a safe environment that is supported by a variety of visitor services. • Visitors would experience a modified natural environment that is designed to accommodate concentrated visitor use levels.	• Visitors would be provided with a wide range of interpretation and education opportunities. • Visitors would encounter cultural resources that provide opportunities for inspiration, contemplation, and education. • Opportunities to continue cultural connections to place would be developed.	• Visitors would encounter natural resources, features, and systems for personal inspiration, education, and recreation. • Experiences could include opportunities for solitude, contemplation, and self-reliance. • Motorized wheeled vehicles would only be allowed at designated areas, such as Highway 74.
Types and Levels of Development	• Moderate to high level of development and facilities would be provided to meet visitor use and administrative needs.	• Low to moderate level of development would be allowed in this zone to protect identified cultural resources in a manner that is consistent with the inherent cultural values of the area. • New construction and other development activities would be limited to preserve the historic setting and viewsheds.	• Developments would be limited to those essential for resource protection, research, monitoring, and basic visitor services. • Existing developments that are not consistent with the desired resource conditions could be removed or modified.
Commercial Visitor Services	• A moderate to high level of commercial visitor services that would include merchandise services, commercial shuttle services of private vehicles at river launch sites, and commercial shuttle services of visitors to and from river launch sites. • Commercial services would include canoe and kayak rentals, guided canoe trips, and land-based activities such as guided hiking, camping, firewood sales, and photography.	• A moderate level of commercial visitor services would be provided, such as canoe rentals, guided canoe trips, and limited land-based activities such as guided hiking, camping, firewood sales, and photography.	• Low level of commercial visitor services would be provided, such as guided hiking, camping, and photography.

NEXT STEPS IN THE PLANNING PROCESS

Finalizing the Plan

Following public review and assessment of public comments, either a finding of no significant impact (FONSI) or a notice of intent to prepare an environmental impact statement would be prepared. If a FONSI is prepared, it would document the NPS selection of an alternative for implementation, include any necessary errata sheet(s) for factual changes required in the draft environmental assessment, and include responses to substantive comments by agencies, organizations, and the general public.

Implementing the Plan

The approval of this plan does not guarantee that funding and staffing needed to implement the plan will be forthcoming. The implementation of the approved plan would depend on future funding and could also be affected by factors such as NPS staffing changes, visitor use patterns, and unanticipated environmental changes. Full implementation could be many years in the future. Once the plan has been approved, more detailed planning and environmental compliance will be needed before certain components of the selected alternative can be carried out.

This page intentionally blank.



Chapter Two

ALTERNATIVES



This page intentionally blank.

CHAPTER 2: ALTERNATIVES

INTRODUCTION

Below are descriptions of the two alternatives currently being considered by the National Park Service—Alternative A: No-Action Alternative and Alternative B: Proposed Actions and Preferred Alternative. Alternative A provides a benchmark from which the action alternative can be compared, magnitudes of proposed changes can be evaluated, and environmental impacts of those changes can be measured. Alternative B describes a range of strategies designed to improve the visitor experience and expand visitor opportunities and facilities within the Boxley Valley. Conceptual site plans for each of the proposed areas can be found in appendix A.

In addition to detailed descriptions of the alternatives, this chapter also describes alternatives considered but dismissed, indicators and thresholds for visitor use management, visitor capacity, and mitigation measures. The impacts of implementing each alternative are discussed in “Chapter 3: Affected Environment and Environmental Consequences.”

ALTERNATIVE A (CURRENT MANAGEMENT)

Alternative A reflects a continuation of current management direction in the Boxley Valley area planning area. Management of visitor use in the Boxley Valley area would largely continue to be reactive (responding to issues as they arise) rather than proactive. Overall, there would continue to be a reliance on indirect management strategies, such as improvements to education and interpretation to influence visitor behavior. In the Lost Valley area, once improvements to the new parking area are completed, additional, minor improvements would be made, including establishing a kiosk informing visitors of elk viewing opportunities and visitor safety at the Ponca Elk Education Center, building a new accessible trail, and permitting vehicle parking on hay-permit lands during busy periods. At Steel Creek, the National Park Service would renovate and define accessible tent campsites, update some restrooms, and more clearly delineate overflow parking areas.

ALTERNATIVE B (PROPOSED ACTION AND PREFERRED)

Alternative B was developed based on input from public listening sessions, NPS staff expertise, and knowledge and understanding of strategies that have proven successful at addressing similar issues at other parks throughout the national park system. Under alternative B, Buffalo National River would seek to improve the visitor experience, safety, and resource protection through increased interpretation and education in the area, expanded visitor services and amenities, and management strategies to secure additional partner support and funding. Additional facility investments would be made at key park locations in Boxley Valley, including Lost Valley, Boxley Mill, Ponca Access, Steel Creek, and Buffalo River Trail trailheads (appendix A). The National Park Service would accommodate increased visitor use in the area by developing a visitor center in Lost Valley in partnership with the Arkansas Game and Fish Commission, formalizing traffic flow and parking at key river access locations, expanding interpretation and education opportunities, and improving access to restored historic structures and cultural landscapes.

At Ponca Access, site improvements noted in appendix A would be phased in two stages to improve visitor access and circulation through the site. The National Park Service would also develop infrastructure (including working with the Arkansas Department of Transportation to ensure through access for commercial users (and eventually all visitors) following implementation of phase II. The National Park Service would also work closely with the Arkansas Department of Transportation to establish additional pull-off parking lot along Highway 43.

Table 2 outlines the management strategies and actions that were identified under alternatives A and B. Key site improvements at Steel Creek, Ponca Access, Boxley Valley, and Lost Valley are noted in table 2.

ALTERNATIVES OR STRATEGIES CONSIDERED BUT DISMISSED

This section discusses alternatives that have been considered but dismissed because of meeting one or more of the following criteria:

- technical or economic infeasibility;
- inability to meet project objectives or resolve need;
- duplication with other, less environmentally damaging or less expensive alternatives;
- conflict with an up-to-date and valid park plan, statement of purpose and significance, or other policy, such that a major change in the plan or policy would be needed to implement; and
- too great an environmental impact.

Dismissed Alternatives/Strategies

Specific alternatives or strategies that have been dismissed include the following.

Camping at Other Locations such as Lost Valley and Boxley Mill. Camping previously occurred at Lost Valley and was closed for a variety of reasons, including visitor resource concerns, logistical challenges, and conflict with desired conditions. Visitor safety was also jeopardized during flash flood events because rescuers were not able to safely reach stranded visitors. Logistical challenges make reintroducing camping into the Lost Valley area problematic such as topographic challenges with placement of a campground and compromising habitat for a protected plant of concern that began to grow back after campsites were removed. It is infeasible for the park to maintain the campground from a park operations perspective. Conflicts with desired conditions also exist related to camping at Lost Valley. By offering overnight camping at Lost Valley, it is inconsistent with desired conditions for the area to separate types of visitor use, day use, and overnight use. Providing an overnight camping experience near a potentially new visitor center could compromise the other values of Lost Valley as a premier day use area. Conversely, overnight camping that is offered at Steel Creek has grown in popularity in recent years and is more sustainable in the long term.

Camping in the vicinity of Boxley Mill was also dismissed because this activity would create a visual intrusion on the cultural landscape and would be inconsistent with desired conditions of the area, including maintenance of the historic setting.

Stabilization and/or Removal of Vegetation along the River. Any augmentation of natural river processes has the potential to degrade fundamental resources and values of the park and must be studied carefully. Redirection of stream channels or riverbank stabilization would require extensive Clean Water Act and NEPA compliance, may not be consistent with Public Law 92-237 (enabling legislation for Buffalo National River), and is not aligned with the purpose and need for taking action in this planning effort. The park will continue to explore this issue in future planning efforts. Resolving the river erosion issue is best suited for a separate, targeted planning effort that considers the hydrology and flow pattern of the Buffalo River and how these correspond to current land uses. The hydrology of the river has not been studied in detail for this project. This issue would require additional research that cannot be completed in the scope of this project and study.

Table 2. Alternatives Comparison Matrix

Management Area	Alternative A - Current Management	Alternative B (Proposed Action and Preferred Alternative)
Area-wide	The park would continue to coordinate with the State of Arkansas Department of Transportation to develop stream crossing designs; maintain culverts and proper stream function associated with Whiteley/Jimmy Creek, Boxley Bridge, and other areas. The National Park Service would continue to work with the Arkansas Game and Fish Commission to establish an information kiosk at Ponca Elk Education Center that would provide information related to wildlife viewing opportunities and visitor safety.	Same as alternative A. In addition, the park would: ▪ Increase signage about wildlife viewing and pull-off locations in Boxley Valley. ▪ Develop more clearly defined visitor infrastructure at the Buffalo River Trail trailheads (within the footprint of existing areas). ▪ Increase NPS staff presence to educate visitors, ensure a high-quality visitor experience, and protect park resources. ▪ At trailhead locations along the Buffalo River Trail, the park would improve wayfinding by adding messaging about permitted trail uses, designated access points, and Leave no Trace ethics.
Vehicle Pullouts	The park would continue to manage existing pullouts in partnership with the Arkansas Department of Transportation. The park would continue to partner with the State of Arkansas Department of Transportation to enhance (widen) existing pullouts to view wildlife.	Same as alternative A. In addition, the park would enhance existing and provide additional pullouts for wildlife viewing (figure 3). Additional details on these pullouts are noted below: ▪ The existing pullout shoulder adjacent to the wetland would be improved and an information kiosk added. Interpretation would focus on both wildlife viewing and pond/wetland themes. ▪ The existing pullout in Lost Valley would be improved and include a new information kiosk. ▪ A new pullout would be provided near Casey Place (pending landowner approval). ▪ An improved pullout and trailhead near Whiteley Cemetery would include a new vault toilet or portable toilet and new information kiosk within the existing footprint of the pullout and would be sited away from existing cultural features.

Management Area	Alternative A - Current Management	Alternative B (Proposed Action and Preferred Alternative)
Steel Creek	The park would clearly delineate the parking along the boundary of overflow parking areas and parking sites situated just east of the boat launch area. Additionally, the park would continue to: ▪ Include designated parking for concessioners. ▪ Replace highline posts near equestrian campsites. ○ Update select tent camping and restroom facilities to ensure compliance with the Architectural Barriers Act Accessibility Standards, where feasible. ○ Continue using the Rockhouse and immediate environs as a research learning and environmental education center. ▪ Allow visitor parking (overflow) below the existing drain field (leach field) with use of appropriate fencing (e.g., temporary T-post fencing).	Same as alternative A. In addition, the park would: ▪ Establish a group campsite that would accommodate up to 25 people (in existing hay permit area) and provide parking for up to 12 vehicles. The park would add appropriate flush or vault toilet restroom facilities for nearby group camping purposes (appendix A). The group campsite would be reserved through the online (Recreation.gov) reservation system. ▪ Near the new group campsite, develop an outdoor amphitheater for interpretive and educational programming. ▪ Redesign and delineate new campsites as shown in appendix A. Native trees and vegetation would be established to shield sites from one another. The campground would also be added to the reservation system. The existing horse campground (13 existing sites) would also be upgraded to include new horse paddocks and highline posts. ▪ Construct a mounded septic system and supporting infrastructure. Provide flush toilets in the vicinity of the improved campground, depending on engineering and hydrogeological technical studies. ▪ Clearly delineate the existing boat launch area. ▪ Formalize traffic flow with improved signage and clearly delineate parking spaces. ▪ Restore and use historic structures in the area as a research learning and environmental education center for additional classroom space, and/or temporary quarters for researchers and students (consistent with Secretary of Interior's Standards and Guidelines). ▪ Require concessioners to take boats off trailers and stockpile in designated parking and stockpiling areas. ▪ Add swales near launch area to direct stormwater away from road surface and allow it to dissipate away from the river. ▪ If thresholds are approached or exceeded at the site in the future, the park would rely on adaptive management strategies including actions designed to help manage visitation within identified visitor capacities.

Management Area	Alternative A - Current Management	Alternative B (Proposed Action and Preferred Alternative)
Ponca Access	The park would update restroom facilities to ensure compliance with the Architectural Barriers Act (ABA) accessibility standards, where feasible.	Same as alternative A. In addition, site improvements presented in appendix A would be phased over time, with Phase I occurring after plan approval (pending available funding) and with Phase II occurring if the Ponca low-water bridge is either damaged, removed, or destroyed by flooding. Details related to the two phases are noted below: <u>Phase I</u> at Ponca Access involves the following: ▪ Formalize and delineate trailer parking for three to four vehicles with trailers. ▪ Update existing access road and parking lot using a stable, permeable road surface. ▪ Ponca low-water bridge would be open to one-way vehicular concession access and public pedestrian use. An additional road egress would be established on the east side of the river that connects to State Highway 74. Visitors would park on west side and cross to east side of bridge by foot to launch boats. ▪ Formalize traffic flow and clearly delineate parking—road surface to be maintained using a stable, permeable road surface. ▪ Designate parking for wildlife viewing along the east side of the road into Ponca. Add a wildlife viewing area and connected trail to the edge of the hay field. Establish a new wildlife information kiosk. ▪ Revegetate select areas within previous parking footprint. ▪ To the extent possible, use the same development footprint for the improved boat launch area on east side of river. ▪ Provide two-way access from State Highway 74 to a new, accessible parking area that provides access for three to four vehicles near Beaver Jim's (with vehicle turnaround). ▪ Develop accessible trail from accessible parking area near Beaver Jim's to the main house and a few (but not all) outbuildings. The accessible path would be at least 3-feet wide and constructed with a firm and stable surface (likely gravel) and running slopes no greater than 12%. <u>During Phase II</u> — If the Ponca low-water bridge is either substantially damaged, removed, or destroyed by a storm event or flooding, it would not be rebuilt. In addition, the National Park Service would: ▪ Expand two-way road access on east side of the river from the parking area at Beaver Jim's south to the concession boat access on the east side of river. ▪ Provide for commercial use on the east side of the river by developing a turnaround at the east boat ramp for commercial use (providing room for concession-operated vans with trailers for kayak and client drop off). ▪ Provide access to private boaters from the existing west lot at a new put-in located on the west side of the river just upstream from the current bridge.

Management Area	Alternative A – Current Management	Alternative B (Proposed Action and Preferred Alternative)
Lost Valley	The park would continue to implement planned improvements at Lost Valley (appendix A) in partnership with the Federal Highway Administration including construction of parking for up to 75 vehicles including: - Improving the Lost Valley Road, and revegetating portions of the previous access road that will be removed. - Providing an accessible parking area. - Adding an ABA accessible trail. - The park would update select restroom facilities to ensure compliance with ABA accessibility standards, where feasible.	In addition to improvements noted in alternative A, the park would work with the Arkansas Game and Fish Commission to construct a new visitor center in the vicinity of the improved parking lot (appendix A) and outside of the 100-year flood plain. In addition, the park would: - Provide new, full-service restrooms in the visitor center (along with a packaged wastewater treatment plant system and supporting infrastructure). - Construct a new, outdoor amphitheater location in the vicinity of the new visitor center for interpretive and educational programming. - Modify one of the existing restroom facilities near the trailhead to be ABA compliant. An additional, accessible pavilion (group picnic area) would be provided to accommodate additional use in the area. - Provide parking for up to 10 additional vehicles as well as add oversized- vehicle/bus parking. - Picnic sites would be provided in the vicinity of the old amphitheater. - Provide more frequent interpretive hikes on the Lost Valley Trail as well as interpretation and education at the new visitor center.
Boxley Mill	The park would continue administering the historic lease in partnership with the Gorgas Foundation, including ongoing maintenance and restoration of the Boxley Mill and associated historic structures. The park would continue to monitor flood impacts to historic structures and continue any clean up, as needed, following flood events.	Same as alternative A. In addition, the park would implement site improvements presented in appendix A and noted below: - Work with the Gorgas Foundation to increase opportunities for visitor access to the Boxley Mill and Mill Pond and provide an overall vision for the area that is consistent with the historic setting (appendix A). - Construct an accessible, natural surface path that provides access to two viewing platforms (one on north side of pond and one on the east side). The accessible path would be at least 3-feet wide and constructed with a firm and stable surface (likely gravel) and running slopes no greater than 12%. At designated overlooks along this path, the park would provide added signage and education/interpretation opportunities related to the Boxley Mill and Mill Pond. Portions of the path would need to be elevated (such as the portion crossing the drainage and the mill race below the Mill Pond).

Management Area	Alternative A – Current Management	Alternative B (Proposed Action and Preferred Alternative)
Boxley Mill (cont.)	The park would continue administering the historic lease in partnership with the Gorgas Foundation, including ongoing maintenance and restoration of the Boxley Mill and associated historic structures. The park would continue to monitor flood impacts to historic structures and continue any clean up, as needed, following flood events.	- Secure the gate to the path leading up to the Boxley Mill and open only by reservation to prevent unauthorized vehicular access beyond the vehicular turnaround. - Rehabilitate and restore the mill race to provide connectivity between the river, Boxley Mill, and Mill Pond. - Restore historic cedar revetments to facilitate water outlet flow to the raceway and to more accurately reflect the site history. - Provide more frequent tours of the Boxley Mill and the Mill Pond.

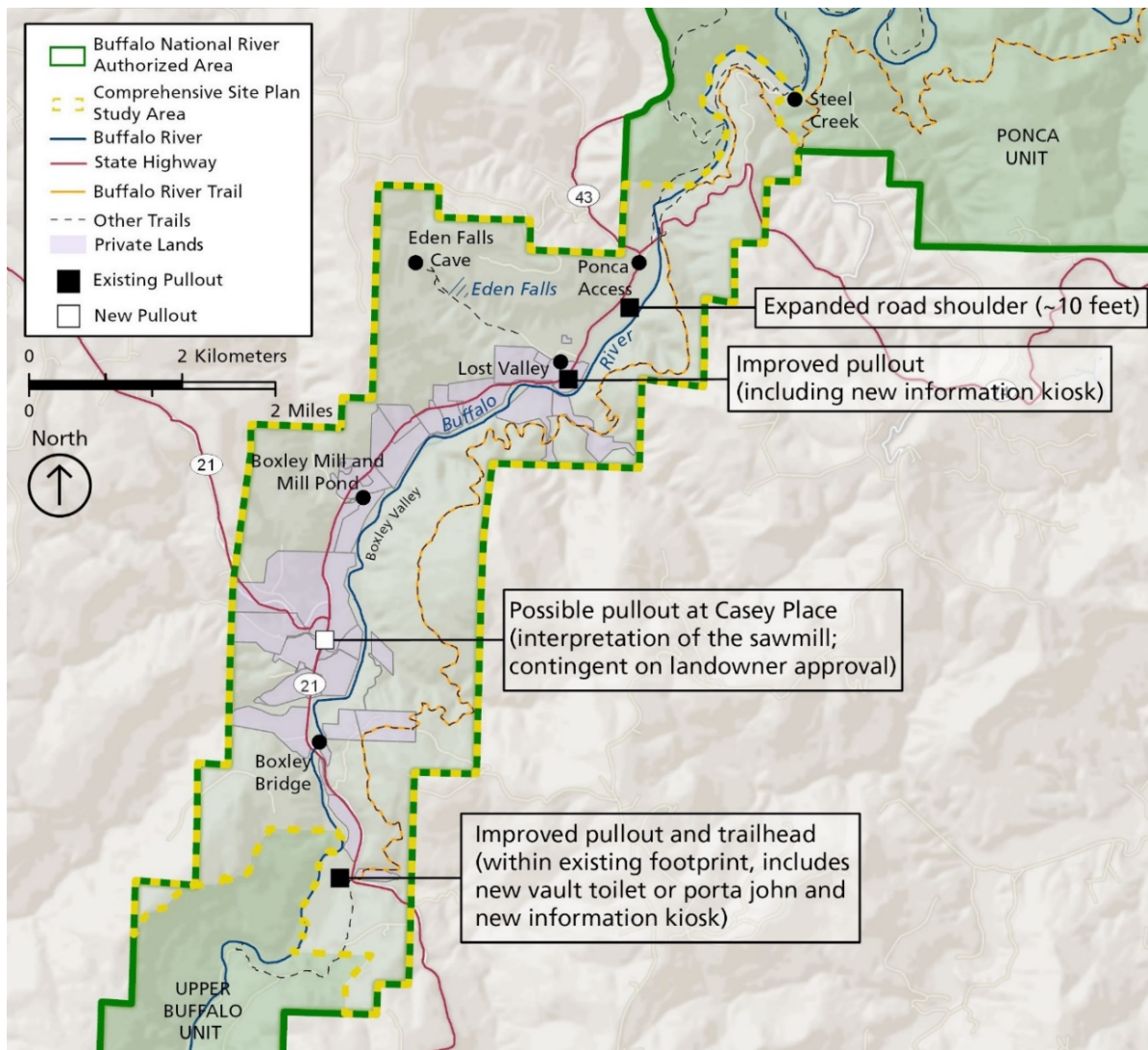


FIGURE 3. NEW AND IMPROVED PULLOUTS (UNDER ALTERNATIVE B)

Dredging the Boxley Mill Pond to Restore the 1940s Cultural Landscape. The pond, although not functioning like it did in 1940, still functions as a wetland and provides environmental benefits. The benefits of altering it at this time to restore the cultural aesthetic, may not outweigh the potential effects to the environment. Park staff concluded that dredging the Boxley Mill Pond and fully restoring the area to the 1940s cultural landscape would be too great of an environmental impact. This work would entail significant dredging and mitigation through the U.S. Army Corps of Engineers and could result in adverse impacts to wildlife. Such an effort would also require extensive permitting and site-specific environmental compliance. Partial restoration of the cultural landscape, combined with educational and interpretive strategies outlined as part of this plan, would result in cost savings and still allow the park to share information on multiple periods of the cultural landscape.

Allow Dogs at Lost Valley. The park has allowed dogs on the Lost Valley Trail and at the trailhead and parking area in the past; however, doing so led to visitor conflict and waste management issues. The number of people on the Lost Valley Trail at peak times is not compatible with dogs on leash since they may become tangled with other dogs and create conflict with other visitors. In addition, dogs are not appropriate in caves and stream environments. Allowing dogs in the parking area but not on the trail could encourage people to leave animals unattended in their vehicles posing a health and safety issue for the dogs.

Allow/Create New Camping Areas at the Buffalo River Trail Southern Trailhead, at the Boxley Mill, and at the Ponca Access. Planned improvements to the Steel Creek campground as well as other private campgrounds and lodging options fulfill the need for camping in this area of the park. Siting new campsites at the Buffalo River Trailhead and at Ponca Access is technically infeasible given exposure to regular flooding and could result in unnecessary duplication of this recreation opportunity.

Expand the Steel Creek Campground into Other Nearby, Currently Vacant Areas. While the National Park Service plans to improve camping at Steel Creek and add group camping, the remainder of the open hayfields in the area are largely situated in areas that are more prone to frequent flooding or within part of the Valley Y Ranch cultural landscape.

Move to Commercial Operation of the Steel Creek Campground. The National Park Service considered making camping at the Steel Creek Campground a commercial opportunity but determined it would not be economically feasible for private operators, based on the small size, extensive utilities, and amenities. The National Park Service will continue to manage this site.

Providing Additional Public Access to the River in the Boxley Valley. The National Park Service considered providing additional launch and recreation space upstream of the Ponca access. Existing access points are generally set up so that canoers can have an 8-mile trip down the river (when flows are sufficient)—a full day's excursion. Therefore, splitting Boxley into two sections is not necessary. Further, additional upstream access was determined to be infeasible based on current land uses and the extent of private land in the area. In addition, the river only flows seasonally in this area of the park.

VISITOR USE MANAGEMENT: INDICATORS, THRESHOLDS, AND VISITOR CAPACITY

Indicators translate desired conditions into measurable attributes (e.g., number of visitor-created trails) that when tracked over time may be used to evaluate change in resource or experiential conditions and are common to all action alternatives (alternative B). Indicators are critical components of monitoring the success of the plan and are considered common to all

action alternatives. The interdisciplinary NPS planning team considered the central issues and developed related indicators that would help identify when the level of impact becomes cause for concern and management action may be needed. Those described in the following sections were considered the most critical, given the importance and vulnerability of the resource or visitor experience affected by types of visitor use. The team also reviewed the experiences of other park units with similar issues to identify meaningful indicators.

Thresholds represent the minimum acceptable condition for each indicator and were established by considering qualitative descriptions of the desired conditions, data on existing conditions, relevant research studies, professional judgement of staff from management experience, and public preferences. Although defined as “minimally acceptable,” thresholds still represent acceptable conditions. Establishing thresholds does not imply that no action would be taken prior to reaching the threshold. Thresholds identify when conditions approach unacceptable levels and serve as mechanisms to alert managers and the public that corrective action should be taken to keep conditions acceptable. Ultimately, indicators and thresholds set managers up with good monitoring protocols to allow desired conditions to be met and tracked over time. For a complete description of indicators, thresholds, monitoring protocols and management strategies, refer to appendix B. Not all of the strategies related to the indicators, thresholds, and visitor capacity would be implemented immediately; instead, these would be implemented only as thresholds are approached or exceeded. Those strategies identified for use as needed are labeled as adaptive management strategies in each of the appendixes. The impact analysis is included in chapter 4 so that the park can employ those as necessary to achieve desired conditions.

Crowding and Congestion at River Access Locations

- **Indicator:** Number of people/boaters at one time at river access points during peak season at Ponca and Steel Creek Access locations.

Parking Lot Congestion

- **Indicator:** Number of vehicles at one time (VAOT) at parking lots.

Unauthorized Parking

- **Indicator:** Number of cars parking in undesignated areas.

Campsite Disturbance

- **Indicator:** Increase in the area of disturbance at a designated campsite.

Trail Condition Class

- **Indicator:** Percent change in trail condition classification.

Inappropriate Visitor Behavior

- **Indicator:** Number of reported cases of inappropriate behavior (i.e., off-leash dogs, dogs on trail, nuisance noise, unauthorized use on trails or in other areas, etc.).

Damage to Property

- **Indicator:** Number of reported incidents of damage to property (e.g., graffiti, vandalism, theft).

Septic System functionality

- **Indicator:** Daily water flow rate (gallons/day) into septic systems.

Visitor Capacity

Visitor capacity is a component of visitor use management defined as the maximum amount and types of visitor use that an area can accommodate while sustaining desired resource conditions and visitor experiences, consistent with the purpose for which the area was established (as well as goals and objectives for this plan).¹ By establishing and implementing visitor capacities, the National Park Service can help ensure that resources are protected and that visitors have the opportunity for a range of high-quality experiences.

Appendix C details visitor capacity considerations and the process used to identify visitor capacity for four distinct analysis areas within the study area including:

- Ponca Access
- Steel Creek
- Boxley Mill
- Lost Valley

MITIGATION MEASURES

The National Park Service has generated a list of mitigation measures as well as general best management practices for key topic areas related to the Boxley Valley Comprehensive Area Plan Environmental Assessment. These actions would minimize potential adverse impacts associated with implementation of alternative B and are provided in appendix D.

1. To fulfill the requirements of the 1978 National Parks and Recreation Act (54 U.S.C. 100502), visitor capacity identifications and implementation strategies are legally required for all destinations and areas that this planning effort addresses (IVUMC 2016).



Chapter Three

AFFECTED ENVIRONMENT AND
ENVIRONMENTAL CONSEQUENCES



This page intentionally blank.

CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter analyzes the environmental impacts of implementing alternative A (current management) and alternative B (the preferred alternative) on visitor use and experience, cultural landscapes, archeological resources, federally listed species, vegetation, and water quality. This analysis is the basis for comparing the beneficial and adverse effects of implementing the alternatives.

Cumulative Impacts Analysis Scenario. Cumulative impacts result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes such other actions. Cumulative impacts can result from individually minor, but collectively important, actions taking place over a period of time.

Cumulative impacts are determined by combining the impacts of the alternatives included in chapter 2 with the impacts of other past, present, and reasonably foreseeable future actions. These identified actions make up the cumulative impact scenario.

The geographic scope of the analysis includes actions in the planning area as well as other actions in the park or surrounding lands, including adjoining counties, where overlapping resource impacts are possible. Tables 3a and 3b include the temporal scope for projects and actions either completed within the past five years or planned within the next ten years.

Table 3a. Projects and Activities in Boxley Valley and the General Region between 2015 and 2029

NPS Action or Project	Brief Description	Past	Present (or ongoing)	Reasonably Foreseeable Future Action
Elk Management Plan	The 2019 Buffalo National River Elk Management Plan focuses on managing the elk herd in Boxley Valley (NPS 2019c). The plan identifies strategies designed to manage the elk population in the park to a level that is compatible with long-term protection of other park resource and reduce highway congestion resulting from elk viewing. Actions include opening to hunting, planting elk forage, and assisting landowners with protecting ornamental or garden plants. Hunting and other actions will reduce populations to between 70 and 100 animals in the valley.		X	
Agricultural Special Use Permitting or Historic Leasing	Buffalo National River continues to support permitting of hay production or historic leasing of USA-owned properties. Actions may include cutting and baling hay and/or grazing of livestock. This is a continuation of past practices into the future. The mechanism by which this is done depends upon whether it is an historic lease or an Agricultural Special Use Permit.	X	X	X
Prescribed Fire Management	Per the 2008 fire management plan, prescribed fire would continue to be used to manage some small areas within the valley. Actions include construction of firelines, ignition operations, structure protection, line patrol, and mopping up of firelines.		X	X
Streambank Management	Land ownership lines in Boxley are "hard," meaning they are deed lines. The Buffalo River is unconstrained and over time has moved and eroded some of these deed areas. Future planning will need to be conducted to identify streambank management priorities, but it is envisioned that reasonably foreseeable actions may include construction of streambank revetments in select locations and planting of larger riparian buffers.			X

NPS Action or Project	Brief Description	Past	Present (or ongoing)	Reasonably Foreseeable Future Action
Feral Hog Management	Feral hogs frequently graze on high-quality grasses in the valley. Present or ongoing actions include removal of hogs by baiting and trapping.		X	
Lost Valley Bridge Replacement and Trail Reroute	Buffalo National River would will continue to implement the recommendations outlined in the 2014 Lost Valley Trail Plan (NPS 2013). These include constructing a 70-foot pedestrian bridge across the channel adjacent to the parking lot, reducing trail erosion at drainage crossings, and continuing to bring up to 720 feet of trail to ABA standards.		X	

Table 3b. Projects and Activities in Boxley Valley and the General Region between 2015 and 2029

Non-NPS Action or Project	Brief Description	Past	Present (or ongoing)	Reasonably Foreseeable Future Action
Continued Regional Population Growth	The human population in Northwest Arkansas, centered upon Springdale, Arkansas, has increased over the past 40 years. According to the 2010 census, the population in Washington and Benton counties was 424,404, or 14.6% of the total population of Arkansas. In contrast, in the 1970 census of the same area, the population was 127,846, which accounted for only 6.6% of the statewide population. The mean household income in these two counties has increased by 124% in the same time period. These population and income increases have dramatically increased the number of visitors to the upstream sections of Buffalo National River. This is in large part an issue of proximity as Boxley Valley is only one-hour from Fayetteville, Arkansas. This visitation growth is expected to continue for the near future.			X

VISITOR USE AND EXPERIENCE

Affected Environment

The visitor experience at Buffalo National River and more specifically Boxley Valley is unique within the region. Boxley Valley is located near Ponca, Arkansas, and is one of the park's and region's primary visitor destinations. Established as America's first National River, Buffalo National River flows freely for 153 miles through remarkable bluffs of the Ozark Mountains—135 of those miles are within the national river (the first 18 miles run through the Upper Buffalo Wilderness in the Ozark National Forest). The Buffalo River is a popular draw for local, regional, and international visitors seeking outdoor opportunities such as hiking, canoeing, fishing, camping, backpacking, photography, and wildlife viewing.

As the surrounding area and nearby Bentonville shifted from a once primarily agricultural community to a thriving business and tourist community, visitation to the park reflected those changes. Since its establishment, visitation to the park has steadily increased. Average visitation in the 1980s was slightly more than 600,000 visitors per year, an amount that doubled by 1992 and grew to



FIGURE 4. BUFFALO NATIONAL RIVER ANNUAL VISITATION
 (Note: 2019 data presented here is preliminary as of January 2020.)

1,785,359 in 2016 (see figure 4). The rise in visitation in 2016 represented a 22% increase from 2015. Buffalo National River is one of five NPS units designated as a national river. Servicewide, national river visitation in 2016 represented 2% of total NPS recreation visits or 5,166,429 visitors. Buffalo National River's visitation represents approximately 35% of recreation visits to national rivers.

In 2016 and 2017, researchers from Kansas State and Clemson Universities conducted research to evaluate visitor perceptions of management preferences as well as temporal and spatial distribution of visitor use at Buffalo National River. The results of this research are reported in this section to provide context for the visitor experience in the study area (Cribbs et al. 2017). Survey results indicate that the typical visitor to Buffalo National River is on average 38 years old, from the Northwest Arkansas area, and with varying levels of total household income. Overall, 22% of visitors reported receiving some college, 30% received a four-year degree, and 19% received a graduate/professional degree (Cribbs et al. 2017). Most respondents (83%) self-identified as white, and 7% self-identified as Hispanic or Latino/Latina. Average travel party sizes are 4.38 with 32% of visitors traveling in groups of two (Cribbs et al. 2017). Other key results from this research related to past use and experience are noted below:

- 27% of visitors to the Eden Falls area reported being first-time visitors.
- 60% of visitors reported relatively low annual visitation (four days per year) and limited visitation history (four years since their first visit, on average).
- 12% of the visitors reported relatively low annual visitation (five days annually, on average) but a long visitation history (29 years since their first visit).
- The smallest visitor group (1% of visitors) reported high annual visitation (63 days annually, on average) and a long visitation history (20 years since their first visit, on average).
- The average visitor group had four people traveling together with 32% of visitors traveling in groups of two.

Characteristics of Visitor Use

Crowding. One type of social impact that has been extensively studied is crowding, which is a value judgment that the density of visitors or number of encounters with others is too great (Vaske and Shelby 2008). Research results reported generalized crowding throughout Buffalo National River as well as conditions related to crowding at Eden Falls. Study area results suggest that visitors do not perceive crowding at Buffalo National River. Despite the generalized crowding results indicating low perceived crowding, when visitors were asked specifically about desired conditions and possible management actions at Eden Falls based on People at One Time (PAOT), survey results indicated that as PAOT increases, visitors' acceptability of conditions decreases. This means that even though visitors report low perceived crowding, their acceptability of conditions decrease when more people are present in specific areas. Overall, visitors indicated in the survey that as the number of people at Eden Falls increases, the quality of their experience decreases (Cribbs et al. 2017). Visitors reported that greater than 38 people at Eden Falls is unacceptable. On average, 71% of visitors report that the National Park Service should take management action when 52 people are present at Eden Falls, and 64% of visitors report they would not return to the site when there are 60 people present (60 PAOT).

Visitor Activities. A trip to Buffalo National River offers a diverse array of activities. Parkwide, most visitors come to hike (81%), spend time in nature or view wildlife (33%) or to float (21%) the river by canoe, tube, or kayak. Others may choose camping, picnicking, horseback riding, fishing, hunting, wildlife viewing, visiting historic districts, and bird watching. Visitors to Lost Valley reported the activities in table 4 below as reasons they visit Buffalo National River (Cribbs et al. 2017).

Table 4. Visitor-Reported Activities at Lost Valley

Activity	Yes (% of sample)
Hiking	80.82
Nature/Wildlife	33.02
Camping	19.18
Canoeing	10.38
Visit Historical Sites	7.86
Kayaking	6.92
Tubing	3.14
Horseback Riding	2.20
Other	4.09

River Use. The Buffalo River is a fundamental resource and value, along with the recreational opportunities it affords visitors to experience and explore the natural setting and actively enjoy the water and surrounding landscape. The river zone and its surroundings support a wide variety of opportunities to enjoy the natural and cultural resources of the park during all four seasons. Ponca Access and Steel Creek are popular river access points, providing recreational opportunities including swimming, fishing, camping, and hiking, as well as launching points for canoes, kayaks, and

other watercraft. Commercial and private-use watercraft launch from these points. An elk herd of about 70 to 100 animals can be found along the river and are easily enjoyed from nearby roads and pullouts.

Wildlife Viewing. Elk viewing has become increasingly popular, especially on busy fall weekends. Visitor survey respondents at Lost Valley reported viewing nature/wildlife as the second most popular reason for visiting Buffalo National River (Cribbs et al. 2017). The attraction frequently causes dangerous traffic jams on State Highways 21 and 43 as visitors spill over from designated pull-offs and park on roadsides, particularly during the fall rutting season (mid-September through mid-November). This congestion exposes neighboring private landowners to additional safety hazards and complicates access to their properties.

Area-wide. Prior to visiting the Boxley Valley area of Buffalo National River, visitors can obtain information about the area and the available educational and interpretive opportunities from the NPS website (<<http://www.nps.gov/buff>>). They can learn about the river, river safety, and educational activities available in the area, including the *A Day by the Buffalo* series for student hikes at Lost Valley, tours of the Boxley Mill, and educational programs at Beaver Jim's farmstead. However, there is minimal NPS presence in this area, which reduces the ability for park staff to connect with visitors to provide natural and cultural resource education and share information on recreational opportunities. Visitors from far away are uncertain about what park areas are available to them, what activities and programs can be found at each distinct area, and which activities are permitted. This lack of visitor services and educational outreach affects visitor safety during high visitation times. Throughout the corridor, the park aims to improve orientation, interpretation, and education by increasing signage, some for identifying elk viewing and pull-off locations in the valley and others to orient visitors and provide clearly defined infrastructure at trailheads, as well as providing additional direct face-to-face contact and communication with park staff.

The Buffalo River Trail trailhead contains a small parking lot and a historic structure often used as a restroom by visitors. The need for visitor services and facilities to support a high-quality visitor experience is evident at this location.

Steel Creek. Steel Creek is another popular river access location that offers a swimming hole, open field camping, picnicking, and public and commercial access to enjoy the Buffalo River.

The visitor overnight experience is also important at Steel Creek and includes tent camping as well as equestrian camping. The campground is open year-round on a first come, first served basis. The flush restroom and water system in the tent campground and at the Steel Creek launch close November 15 to March 14, and no fees are charged during this time. The vault toilet in the tent campground is open but with very limited servicing during the winter months (trash pickup is provided). Camping opportunities are for tent sites only, no RVs. Visitor survey respondents reported camping as the third most popular reason for visiting Buffalo National River (Cribbs et al. 2017). However, despite the popularity of camping, current overnight experiences are less than desirable for visitors. Steel Creek provides 26 campsites that are open and exposed, providing a communal, open-field camping experience where noise carries beyond individual campsites. Each campsite has a picnic table, fire ring, and lantern hook. Oftentimes, sites are used as de facto group sites because of the lack of delineation and vegetative screening between sites. Overnight camping for horses and visitors also exists at Steel Creek. Existing equestrian sites allow trailers to be backed in and horses tied up on posts at the edge of the forest.

River Access Points such as Steel Creek are popular staging areas for park visitors hoping to access the river and nearby trails, but they are often congested during peak visitation times (which coincide with periods of high water flows). Current parking in the area lacks delineation of sites or designations for specific types of visitor use. The congestion leads to conflicts between user groups,

damaged resources, and a decrease in the overall quality of the visitor experience. The Steel Creek river access provides visitors the opportunity to travel through wilderness that is directly downstream from the launch site. This access to wilderness was a key consideration to identifying changes to the site as well as the visitor capacity. A thorough overview of the Steel Creek river access location can be found in the visitor capacity appendix (appendix C).

Visitor orientation, interpretation, and education at Steel Creek are generally limited, with most of it occurring at the small visitor contact station and by a roving ranger on detail in the area. The assumption is that the ranger is able to connect with a greater number of visitors by moving about the Upper District rather than remaining in one area. Concessioners are also obligated to provide educational outreach prepping clients on proper personal flotation device use, disposal of human waste, and other safety topics. The park offers personal flotation devices to visitors at the ranger station. Some orientation is available from the Steel Creek Campground host who answers visitor questions and orients them to the park and its services and activities.

Ponca Access. Ponca access is another popular river access location. A key feature providing access at Ponca is the historic Ponca low-water bridge that features a single lane that poses a safety concern for visitors and vehicles sharing the same space as they attempt to cross the river. The Buffalo River Trail can also be accessed on the east side of the river, again requiring visitors and vehicles to share the same single-lane road. Equestrian use also occurs at Ponca Access and the current parking is mostly undesignated and first-come, first-served. The Old River Trail (horse trail) is located on the west side of the river.

Visitors often park along the road to the Ponca access to view elk. While signs exist prohibiting overnight parking, visitors still engage in this behavior. Overnight parking is prohibited in this area because it is in a flash flood zone. Commercial operators are permitted to drive over the bridge and access the river from the east side per CUA conditions.

River access points such as the Ponca access are popular staging areas for park visitors hoping to access the river and nearby trails, but they are often congested during peak visitation times (which coincide with periods of high-water flows). The congestion leads to conflicts between user groups, damaged resources, and a decrease in the overall quality of the visitor experience. A thorough overview of the Ponca river access location can be found in the visitor capacity appendix (appendix C).

One of the most active areas of the valley, Ponca Access is a popular visitor destination. However, there are relatively few opportunities for orientation, interpretation, and education outside of the nearby Ponca Elk Education Center and historic Beaver Jim's farmstead. The historic farmstead is located up the hill east of the Ponca low-water bridge, and it is interpreted through exhibit panels and periodic educational programs. The park aims to improve orientation and interpretation in the Ponca area by increasing signage, installing new turnouts, and constructing a new trail and elk-viewing space.

The Ponca Elk Education Center, operated by the Arkansas Game and Fish Commission (AGFC), located on the outskirts of Ponca, houses exhibits, meeting space, and activities to introduce visitors to the wildlife and vegetation of the Ozarks. The center is a great place for visitors to collect information about the area and nearby amenities, view videos, shop for souvenirs, and purchase hunting and fishing licenses. Knowledgeable AGFC staff shares information on nearby attractions, with particular familiarity about the Arkansas elk herd; however, information on the national river and the National Park Service is generally absent. The center is loved by the surrounding

communities and visitors alike, particularly given its role in providing educational children's programming on area wildlife. The current building for the Ponca Elk Education Center is on lease to the Arkansas Game and Fish Commission from the Ponca Bible Camp.

Lost Valley. Lost Valley is a popular destination for visitors hiking the Lost Valley Trail. It is the most-used hiking trail in the park and is used for day use activities and exploring relics of the area's cultural past. The 2.4-mile out-and-back trail leads visitors along large bluffs and through a beech-maple forest, rewarding them with a natural bridge, a tall cascading waterfall (Eden Falls), wildflowers, bluff shelter used by American Indians, and a limestone cave with another waterfall. The trail can be hiked year-round and is especially popular during the summer and fall. During the winter, visitors can view ice along the walls of the creek and experience a peaceful and beautiful setting. During the NPS Centennial year, there were more than 200 visitors who attended a guided hike on New Year's Day at Lost Valley. Restrooms and picnic facilities serve visitors at the trailhead. Hiking at Lost Valley leads visitors to one of several destinations including Eden Falls and Cob Cave. Congestion at Lost Valley is high during the summer months and into the autumn during peak fall colors as reflected by parking lot overflow. Visitor survey respondents at Lost Valley reported hiking as the primary reason for visiting Buffalo National River (Cribbs et al. 2017).

Lost Valley experienced significant damage from the April 2011 flood that destroyed a bridge, scoured the trail, and eroded streambanks. The area has been subject to repeated flooding events that have damaged park infrastructure and limited visitor services and activities. Significant repairs were made after the flood and the area reopened June 2011, although accessibility upgrades to the lower portion of the hiking trail, a reconstructed bridge, and improvements to other areas to manage and avoid future flood events are needed. Alternative road access is being considered, and engineering work for a new bridge and short- and long-term repairs to the trail system have taken place. Because of these changes, the visitor experience has also been altered. The area no longer offers such a diverse range of visitor experiences to a variety of ability types, especially since the bridge providing access to the trail no longer exists.

As a primary visitor destination in Boxley Valley, the Lost Valley area affords some opportunities for visitor orientation, interpretation, and education. However, as visitation to the area has increased, the need for additional services and programs has spurred action. On a small scale, new interpretive signs that had not been installed prior to the 2011 flood are now in place to serve visitors and share information about the trail and its important features.

Boxley Mill. The Boxley Valley area serves as the first point of entry for many park visitors. Centrally located within Boxley Valley, the Boxley Mill has long been recognized as one of the primary historical attractions of Upper Buffalo River Valley. The partially-restored structure contributes to interpretation of the traditional cultural landscape of the area. Today the mill is generally open only during special events or guided tours. Other than exploration of the mill structure, relatively little interpretation of the area is provided. Across from the historic mill is the Mill Pond, a feature regularly used by waterfowl but overgrown and not interpreted. Commercial opportunities at Boxley Mill and the Mill Pond could be expanded, including full restoration, installation of wildlife viewing platforms and boardwalks, and other management strategies to increase interpretation and education.

Environmental Consequences of Alternative A (Current Management)

Area-wide. Improvements to visitor circulation under alternative A would enhance the visitor experience, as access/arrival information would assist with decision making. Accessibility improvements to programs and services would expand visitor opportunities and introduce new users to the park, providing beneficial impacts to visitor access.

Adverse impacts would occur to the visitor experience because of temporal and spatial crowding at river access locations. Visitor management throughout the study area would continue to be reactive rather than proactive in response to increasing visitation (see Affected Environment for visitation trends). This reactive visitor management would result in adverse impacts to the visitor experience, as actions may address immediate challenges but not provide longer-term solutions. This would result in an overall diminished visitor experience.

Commercial and public visitors would continue to share spaces at river access areas, resulting in decreased visitor use management efficiency lacking appropriate circulation and flow. This concentration of visitor use types in the same area would result in adverse impacts to the visitor experience as conflicts arise around competition for resources and access to key experiences. Some visitors may not be able to access the resource, while others might have less than satisfied experiences with the concentration of visitor use. While beneficial impacts exist, such as availability during off-peak times to access key resources, they are likely to diminish over time as increasing visitation and reactive visitor management only temporarily relieve challenges.

Adversely, the park would continue to rely on a roving park ranger in a large region where direct contact with staff is needed. Increased congestion and crowding, particularly at river access points, hinders the ability of staff to directly connect with visitors and reduces opportunities for interpretive and educational outreach. This adversely impacts visitors who instead rely on neighboring private landowners for directions and resource and safety information.

Steel Creek. Beneficial impacts such as enhanced visitor access would occur from a continuation of current management to delineate and designate visitor parking and improve accessibility. Accessibility improvements also would enhance the opportunities available for a diverse range of visitors with differing levels of ability.

Current configurations of campsites at Steel Creek provide the potential for individual campsites to become group sites, which could result in adverse impacts to the visitor experience, as increased noise and confusion can be created by large groups of visitors using individual campsites more like group sites. Equestrian camping conditions in the area are not ideal due to horses being staged directly upslope from the equestrian campsites. Horse waste that is not properly disposed of contributes to adverse impacts to the overall visitor experience.

Beneficial impacts would occur under this alternative, as half of the campsites remain available on a first-come, first-served basis where visitors would not have to secure a reservation ahead of time and the other half on the current reservation system. Both beneficial and adverse impacts would also occur since some visitors do not have the opportunity to plan in advance and reserve campsites (when the reservation only sites are filled), therefore, limiting their ability to comprehensively plan their visitor experience/trip. The current requirement of camping reservations for half of the sites via an online system provides the ability to manage campground congestion and visitor frustrations (for half the visitors).

Incremental increases to congestion and crowding at the shared commercial and private boater staging area would frustrate visitors, resulting in adverse impacts to the visitor experience. These impacts are already occurring and are likely to worsen over time with unmanaged increased visitation. Visitor circulation would continue to be a challenge causing traffic flow congestion especially without separation of visitor use types, resulting in adverse impacts to visitor access. Parking would continue to be confusing and lead to frustration, diminishing the overall visitor experience.

Under alternative A, underutilized historic areas, such as Valley Y Ranch, would continue to lack interpretation, and the cultural landscape values and character-defining features may be compromised. This is a missed opportunity and minor adverse impact to the visitor experience as visitors may be confused because of the lack of interpretation and unsure of the history and value of the buildings and their relationship to Steel Creek.

Ponca Access. The beneficial impacts are the same as the analysis for Steel Creek.

Beneficial impacts to park interpretation and education would result from establishing an information kiosk at the Ponca Elk Education Center. Visitors would learn about wildlife viewing opportunities and locations year-round without having to enter the education center. Under alternative A, access to Beaver Jim's Homestead would remain limited, particularly for visitors with disabilities who are unable to traverse the trail to the homestead. Though alternative A will continue to allow for limited access to Beaver Jim's, this adversely impacts visitors by limiting potential access to exploration of the homestead and interpretation of its history.

Compromised visitor safety would continue to result from vehicles and pedestrians sharing the Ponca low-water bridge and would contribute to adverse impacts to the visitor experience. Further, compromised visitor safety results without a designated loading and unloading zone with sufficient space to turn around. Visitor circulation would continue to be a challenge as trailer parking takes up several parking spaces for typical size vehicles contributing adverse impacts to visitor access and circulation.

Lost Valley. Overall visitor access would be improved as the park implements planned improvements that enhance the visitor experience. Trailhead access and parking improvements would provide for smoother trail experiences and a greater availability of access for a wide range of visitors. The hiking path would also provide additional access to the trail experience as well as expand the range of trail lengths to accommodate a variety of hiking experiences. This would result in beneficial impacts to the diversity of visitor experiences by expanding the range of opportunities, as does the addition of picnic opportunities.

Overall improvements to vehicular circulation at Lost Valley would enhance the visitor experience and contribute to safer ingress and egress for vehicles traveling to and from the site. Additionally, the new Eden Falls trailhead would include signs and a trail map sharing information on permitted trail uses and the characteristics of the trail. The information would contribute beneficial impacts to the visitor experience by enhancing opportunities to connect with fundamental resources and values in the park.

Boxley Mill. Under alternative A, the Boxley Mill Pond area would continue to be staffed seasonally, October and November, so visitors retain some access to direct communication with staff and interpretation of the mill. Guided group tours of the mill area would continue outside of the fall season. Self-guided tours of the mill would continue on weekends as would periodic educational events (e.g., 'Bio Blitz') for students. Since visitors would only be able to directly communicate with staff for a short season, this would result in adverse impacts to visitor access to orientation and interpretation throughout the year. Fisherman's cabins would remain open only during scheduled tours or during October/November, providing limited visitor access and adverse impacts during the times when the tours are not open. Access to and from the Boxley Mill site from Highway 43 can be a challenge for some vehicles because of limited site clearance, particularly once trees grow leaves in the spring.

Cumulative Impacts. Past, present, and reasonably foreseeable actions outlined earlier in this chapter are organized into two main categories—actions attributable to the National Park Service and non-NPS actions that are likely to affect the project area. An example of present and reasonably

foreseeable future actions that should have beneficial impacts are discussed in the draft elk management plan, which addresses visitor opportunities for elk viewing and interpretation as well as prescribed fire management, which includes visitor safety (NPS 2019c). Other examples of present and future actions with beneficial impacts to visitor use and experience include agricultural special use permitting, streambank management, and feral hog management.

Under alternative A, the continuation of current management would result in the park's continued inability to accommodate increased visitation and satisfy visitor needs, thereby adversely impacting visitor use and experience to a limited extent. Collectively, the actions included in the cumulative impacts scenario have some beneficial impacts to visitor use and experience by improving accessibility to facilities and services park wide, new picnicking opportunities at Lost Valley, and through the inclusion of new self-serve information kiosks and trailhead signage. This alternative would incrementally increase congestion and crowding because the continuation of current management would result in park infrastructure, facilities, and services that are unable to accommodate the increased visitation. In summary, the impacts of present and reasonably foreseeable future actions have some beneficial impacts to visitor use and experience; however, the limited adverse impacts of alternative A detract from the overall beneficial cumulative impacts. Consequently, the adverse impacts of the other actions described above, in combination with the impacts of the no-action alternative, would cumulatively result in long-term or permanent, limited, or minimal adverse impacts to the visitor experience. The impacts associated with the no-action alternative would represent a small component of the adverse cumulative impact.

Conclusion. Alternative A would likely result in some beneficial and limited adverse impacts to visitor access to diverse opportunities and interpretation and education. Visitor access to diverse experiences would be adversely impacted because of incremental increases in crowding and congestion at river access locations. Modest improvements to visitor access would result, as vehicular circulation would enhance the visitor experience at some of the popular locations such as Steel Creek, Ponca Access, and Lost Valley. However, visitor circulation and flow would not entirely be solved by the continuation of current management. Limited adverse impacts are still likely to occur without the separation of visitor use types at many locations in the project area. Adverse impacts to the visitor experience would continue at the Steel Creek Campground for equestrian and general visitor camping. Overall, the impacts of the actions associated with alternative A provide limited adverse impacts and slight beneficial impacts to the visitor experience.

Environmental Consequences of Alternative B

Area-wide. Overall management of river access locations would enhance the visitor experience by reducing crowding and congestion. Diversification of the range of visitor opportunities would enhance the visitor experience. Improvements to visitor circulation would provide beneficial impacts to visitor safety by reducing the amount of vehicular traffic sharing spaces with pedestrians. By informing the public of alternative locations to visit during historically crowded weekends, visitors would be less likely to have to navigate through congested areas and would be able to spend more time enjoying the water or other sites in the study area. Visitor safety would also be improved as congestion is reduced and law enforcement faces fewer obstacles to reach emergency situations.

While an increase in law enforcement would reduce inappropriate behaviors and increase visitor safety among some visitors and comfort others, some may find the increased presence uncomfortable and distracting as they try to experience and enjoy the park. The continued use of river rangers may also result in similar beneficial and adverse impacts. If other management strategies are needed to address concerns because of inappropriate visitor behavior (e.g., area closures), this would likely decrease the quality of the experience at the park.

Parking lot congestion would be reduced by implementing several different strategies project area wide. Beneficial impacts would occur as visitor safety improves at parking areas and popular locations as a result of implementing parking enforcement access restrictions and visitor capacity. If a VUA or volunteer is used to enforce parking restrictions, it creates an opportunity to suggest alternative locations or times to visitors, which both enhances the visitor experience by providing useful information and decreases the likelihood of illegally parking in another location. While short-term, temporary closures of crowded areas to relieve vehicle congestion may occur, those visitors who would be potentially turned away would be denied the experience altogether and result in adverse impacts. Unauthorized parking would be reduced under alternative B as well. With the dedication of short-term parking spaces at key locations (associated with strategies to manage within thresholds), more visitors would have a chance to experience multiple areas of the park because of parking space turnover being more frequent at locations where short-term parking was identified as a priority. Longer-term congestion of specific sites would decrease as more visitors would come and go in shorter intervals. The adverse impact of the proposed short-term parking spaces would be that fewer unrestricted parking stalls would be available for visitors that prefer to stay and experience one area for the day.

Visitors would benefit from improved trail conditions under alternative B at Lost Valley and on the Buffalo River Trail. Rocks, logs, or fences could be strategically placed in select areas to constrain the trail width or establish trail borders in areas where visitor-created trails are occurring. These improvements would enhance the visitor experience by creating a visually well-managed and intact natural environment and improved safety conditions. An adverse impact would be the potential displacement of such materials along the trail, causing a barrier to visitors who use wheelchairs, have other mobility restrictions, or suffer from vision loss. While reroutes and temporary trail closures would help to increase the quality of the trail experience for visitors, those visitors who are denied access to these trails or portions thereof would miss out on the intended experience of the original trail location. Installing viewscopes at key locations would enhance the visitor experience by getting them visually closer to areas of interest without impacting resources and increase access for those visitors with certain levels of vision loss.

Overall, the addition of a visitor center, amphitheaters, information kiosks, and signage would enhance visitor orientation, interpretation, and education by providing new opportunities to gather information and learn about the area. Diversifying the type of information at each location would further enhance the visitor experience. New wayfinding and trail information signs at trailheads along the Buffalo River Trail would provide visitors an understanding of allowed trail uses and characteristics. Restored structures and cultural landscapes, such as at Boxley Mill and Valley Y Ranch, would benefit visitors and provide unique interpretive and educational opportunities. Trail watch volunteers and new efforts to educate visitors on park regulations regarding dog leashes and authorized trail uses would also benefit visitors. Finally, updates to the website and an active social media presence would educate visitors on relevant topics (e.g., resource protection strategies, river safety, and parking strategies).

Steel Creek. Mostly beneficial impacts would occur to the visitor experience under alternative B. The range of types of visitor opportunities would expand as improvements to the campground expand the range for the types of visitors seeking the experience and larger groups are in the campground. The overall camping experience is enhanced greatly by adding privacy through delineated sites creating a sense of space within each site. Improvements to the campground also create a sense of a ‘developed campground’ experience rather than the current field camping experience. The developed campground provides new opportunities for visitors with limited camping knowledge to have safe and comfortable experiences. Development of the campground also places finite boundaries on the impacts to resources and other visitors by dedicating space for camping. This in turn provides a more peaceful experience. The proximity among users would be

managed through the delineation of sites, which enhances visitors' experience by decreasing crowding. Anchoring picnic tables would prevent campsite disturbance and as long as it is placed and anchored according to the Architectural Barriers Act standards, would ensure that it remains in an accessible location. By identifying and designating user-created trails between campsites, visitors traveling with other groups in adjacent campsites can enjoy a more group site setting. The potential adverse impact of connector trails between sites is the loss of privacy and autonomy between unrelated parties in adjacent sites. Improvements to equestrian camping would also contribute to enhancing the overall visitor experience. The paddock for equestrian horse camping enhances horse camping by separating horses from tent sites. In addition, the paddock helps to mitigate waste management. The requirement of camping reservations for all sites (half the sites are currently on a reservation system) via an online system would improve the ability to manage campground congestion and visitor frustrations over finding an available site. However, requiring reservations on all sites may prevent some visitors who did not reserve a site from camping.

In the launching area, visitor access would be enhanced, providing a higher-quality visitor experience through the separation of use type and reduction of the potential for visitor conflicts. By designating commercial use to one location, the opportunity to appreciate the cultural landscape would be provided. Smaller vehicles would park in the overflow area to protect the viewshed and provide the possibility for visitors to appreciate the cultural landscape. Visitor circulation would be improved by clarifying the traffic flow, enhancing a visitor's ability to access key park experiences.

A new amphitheater near the group campground would beneficially affect visitors through expanded interpretive and educational programming. Increased law enforcement, NPS staff, and/or a volunteer presence would provide additional opportunities for trip planning and educational outreach. Conversely, increased law enforcement could make some visitors feel uncomfortable, resulting in adverse impacts to the visitor experience. Adaptive reuse of the historic Valley Y Ranch would benefit visitors by creating a new separate venue for interpretive programs and allow for self-guided tours of the area. Further, important resource values and character-defining features of the historic ranch and cultural landscape would not be compromised during interpretation. Guided tours of the area would beneficially impact visitors by providing an opportunity to better understand the river's significant resources and values. Through press releases, the park website, and social media, visitors would be educated on activities, rules and regulations, and Leave No Trace practices. Additional maps and signage would provide new interpretive opportunities for visitors.

Environmental Consequences Associated with Indicator, Threshold, and Visitor Capacity Management Strategies. In addition to the strategies outlined in "Chapter 2: Alternatives," there are additional management strategies described in the "Indicators and Thresholds" section of "Appendix B: Alternative B Indicators and Thresholds" that would impact visitor use and experience. These strategies would be pursued if the action alternative is selected.

The Alternative B Indicators and Thresholds (appendix B) and Visitor Capacity Identification (appendix C) includes several management actions that would be triggered as needed by monitoring information to improve visitors' access to trip planning information before and during their visit. Not all of the strategies related to the indicators, thresholds, and visitor capacity would be implemented immediately, instead these would be implemented only as thresholds are approached or exceeded. Those strategies identified for use as needed are labeled as adaptive management strategies in each of the appendixes.

The continued use of short-term temporary closures, if needed, would ease congestion and provide a tool to manage crowds rather than impulsively reacting to the congestion. However, temporary closures may have an adverse impact on visitors who unexpectedly arrive at closed trail locations. Providing trail closure information early on can help visitors make informed decisions about how they would spend their time in the park. Overall, actions that proactively manage crowding and

congestion at launch sites have the ability to generate higher quality visitor experiences, resulting in beneficial impacts because visitors can access the key park experiences, fundamental resources and values, and ultimately achieve their desired visitor experiences.

Ponca Access. The beneficial impact analysis described for the Ponca access under alternative A would be identical for alternative B.

In addition, the beneficial impacts are the same as the analysis for Steel Creek regarding separating types of visitor use, alternative site identification, adaptive management strategy of temporary closures (adverse impacts are also the same as Steel Creek), and group size management.

In addition to the beneficial impact analysis at the launching area, at Ponca Access, separating uses would reduce vehicle traffic on the single-lane, Ponca low-water bridge and result in less congestion on the bridge and would contribute to enhancing visitor safety. The designated loading/unloading zone would contribute to enhancing visitor safety and circulation.

Outside of the immediate river launching area, actions under alternative B would reduce crowding and congestion by defining parking spaces for wildlife viewing. Expanded and safer opportunities for wildlife viewing would contribute to diversifying the range of visitor opportunities and enhancing the beneficial impacts to the visitor experience. The new wildlife viewing area would re-enforce safe viewing distance and contribute beneficial impacts to the visitor experience. Further, designated horse trailer parking would accommodate larger vehicles where a typical vehicle would park. This contributes to enhancing visitor access and circulation, resulting in beneficial impacts.

Actions under alternative B would reduce concession out-and-back traffic but not eliminate vehicle traffic on the bridge; therefore, pedestrians and vehicles would still share the bridge, but the impact would be reduced. The Ponca low-water bridge would be used for pedestrians and concessioner vehicles only with limited access to Beaver Jim's and limited access to the public. Visitors would be required to load and unload on the west side and cross to the east side of the river by foot, carrying kayaks and equipment across the bridge. This action would continue to adversely impact visitor safety. In addition to compromised visitor safety, carrying equipment across the bridge to launch is challenging for some visitors, so they may be likely to find another location to meet their desired experience.

In alternative B, visitors would be beneficially impacted because of actions to improve education and interpretation. Near the access to the historic-leased hayfield, a new sign would orient visitors where to park and of the wildlife viewing trailhead on their right. The new wildlife viewing trail and area at the edge of the hayfield would house a new wildlife information kiosk. The new accessible trail to Beaver Jim's Homestead would present opportunities for interpretation and education for visitors of all abilities through guided tours. Through press releases, the park website, and social media, visitors would be educated on activities, rules and regulations, and Leave No Trace practices. Additional maps and signage would provide new interpretive opportunities for visitors.

Alternative B Phase II. The beneficial impacts are the same as the analysis for Steel Creek regarding separating types of visitor use.

Following a natural event that removes the Ponca low-water bridge, actions related to the improved public boat launch area provides opportunities for river access on the same (west) side of the river as parking. These actions result in beneficial impacts for the visitor experience. However, the location of the new public boat launch may not be an ideal location for launching given variable river conditions. According to park staff, beginner and intermediate boaters may have difficulty launching in this area under certain river conditions, unlike the other side of the river, where an eddy creates calm waters for boat launching. It is uncertain how the river will change if the Ponca low-water bridge requires removal from damage or flooding. Therefore, actions related to the addition of a

west side launching location would likely result in some limited adverse impacts to the visitor experience given challenges for some visitors to access to the river.

Visitor safety would be enhanced as the bridge would become a pedestrian bridge until its potential removal under Phase II.

Designating distinct commercial and public use areas would reduce the potential for visitor conflict. Concessioner client parking would take up a majority of the parking in the public boat launch area unless management strategies are added that require concessioner to park client vehicles off-site. A decrease in parking availability would result in adverse impacts to visitor access and circulation for public visitors wanting to access key fundamental resources in the area.

Visitor circulation would be enhanced as the concessioner boat launch is improved, which provides more room for commercial operations. Vehicular access for the public to Beaver Jim's would only be allowed with a special permit and accessible parking needs, likely frustrating other visitors hoping to park near the structures and explore the area. Similarly, only permitted access to the historic structures to learn about their significance would not allow for a spontaneous visit.

Visitors with disabilities may experience short-term (during construction) adverse impacts to interpretation and education at Beaver Jim's during construction of Phase II. Accessibility to Beaver Jim's may be temporarily eliminated, and concessioners may have to interpret the building and its exhibits in a different manner.

Lost Valley. The vision for Lost Valley would be realized by creating a key destination for visitors thus contributing to enhancing the visitor experience. Alternative B would provide even greater beneficial impacts to the visitor experience from alternative A. The majority of the beneficial impacts are the same as the analysis for Lost Valley in alternative A.

In addition to the expansion of opportunities under alternative A, alternative B would provide even more beneficial impacts for visitor orientation, interpretation, and education. The new visitor center proposed at Lost Valley would provide a range of beneficial impacts. It would be the first place in this region of the park for visitors to receive park orientation. Direct staff and visitor contact, along with maps, exhibits, and films, would improve visitor orientation to the Boxley Valley and enrich visitor interpretation and education. Like alternative A, the new information kiosk off Highway 43 would provide information on wildlife-viewing opportunities and pond/wetland themes, and the new Eden Falls trailhead would include signs and a trail map sharing information on permitted trail uses and the characteristics of the trail. New bus facilities would accommodate larger groups and simplify visitor orientation.

Additional picnic opportunities and more improved circulation such as adequate parking to accommodate larger vehicles (e.g., RVs) would expand the range of diverse visitor experiences. The facilities would be designed to support a high level of visitation, which would provide beneficial impacts to the visitor experience.

The reduction of parking at the trailhead would require most visitors walk a longer distance to access the trail experience. This could restrict the range of visitors that can participate in this type of experience, which would result in adverse impacts to the visitor experience. There may be a short-term, adverse impacts during demolition and construction at the picnic area and trailhead resulting in temporary closures and possible road closures on Lost Valley Road. Management strategies associated with the indicators, thresholds, and visitor capacity include the potential for implementing temporary trail closures to alleviate congestion and disperse visitor use. These actions would enhance the experience for those visitors willing to wait, resulting in beneficial impacts. Other visitors may find waiting to hike an adverse impact on their anticipated experience at the park. Similar impacts would be expected while employing a "one in, one out" management strategy at the

trailhead. Directing visitors to other visitor experiences and opportunities would help to alleviate congestion at popular locations and provide visitors with an opportunity to explore lesser known areas and provide a more solitary experience.

Environmental Consequences Associated with Indicator, Threshold, and Visitor Capacity Management Strategies. Not all of the strategies related to the indicators, thresholds, and visitor capacity would be implemented immediately, instead these would be implemented only as thresholds are approached or exceeded. Those strategies identified for use as needed are labeled as adaptive management strategies in each of the appendixes. An adaptive management strategy attached to the indicators, thresholds, and visitor capacity would be the continued use of “temporary closures,” which would ease congestion and provide a tool to manage crowds rather than impulsively reacting to the congestion. However, temporary closures may have an adverse impact on visitors who unexpectedly arrive at closed trail locations. Providing trail closure information early on can help visitors make informed decisions about how they would spend their time in the park. Overall, actions that proactively manage crowding and congestion at launch sites have the ability to generate higher quality visitor experiences resulting in beneficial impacts because visitors can access the key park experiences, fundamental resources and values, and ultimately achieve their desired visitor experiences.

Boxley Mill. The beneficial impacts are the same as the analysis of Boxley Mill in alternative A.

In addition to the beneficial impacts of alternative A, alternative B would provide beneficial impacts to visitor interpretation and education at Boxley Mill. Restoration of the mill, the area around the Mill Pond, and Fishermen’s cabins and new accessible trails between them would create new opportunities for interpretation and education for visitors of all abilities. Self-guided tours of the mill and pond would take place on new paths. From new viewing platforms on the north and east side of the pond, visitors would learn about its early and recent history as well as the significance of the restored mill race and historic cedar revetments. Park guided group tours of the mill would continue during peak visitation season, but the tours would be more frequent and include access to and interpretation of the pond and restored Fisherman’s cabins. School group tours would be expanded to provide additional educational opportunities in the area.

Improving circulation and access would enhance visitor safety. Specifically, safer experiences would occur as visitors’ enter the highway and large vehicles could turn around in the parking area. Designated parking would provide visitors clear opportunities to access experiences. The new opportunity for walking around the Mill Pond contributes to expanding the range of experiences available to visitors, enhancing the visitor experience and resulting in beneficial impacts. The Boxley Mill would be open to guided tours with a maximum capacity of only 10 visitors per tour. While this action would provide a much better experience for a visitor on the tour, group sizes of the tours may potentially eliminate the opportunity for visitors that are present when no tours are provided or tour capacities have already been reached.

Cumulative Impacts. Examples of present and reasonably foreseeable future actions that should have beneficial impacts to visitor use and experience include agricultural special use permitting or historic leasing, as well as streambank management.

Under alternative B, new management strategies would collectively result in a range of beneficial impacts to visitor use and experience that would contribute a substantial beneficial increment to impacts that are already occurring. Alternative B actions would reduce crowding by improving visitor distribution and increasing overnight opportunities in addition to improving visitor access and introducing new interpretive and educational opportunities. In summary, when the effects of

alternative B are combined with other past, present, and reasonably foreseeable future impacts, the total cumulative impact on visitor use and experience would continue to be beneficial, with only minor adverse impacts to visitor experience.

Conclusion. Implementing actions proposed in alternative B would result in mostly beneficial impacts to the visitor experience and visitor interpretation and education. The beneficial impacts of alternative B are greater than those of alternative A. In alternative B, the visitor experience would be beneficially impacted by clarifying the traffic flow and access to key park experiences. Actions that proactively manage crowding and congestion at launch sites would have the ability to generate higher-quality visitor experiences resulting in beneficial impacts because visitors can access the key park experiences, fundamental resources and values, and ultimately achieve their desired visitor experience. Alternative B proposes many strategies to improve the camping experience for park visitors. Visitors would benefit from improved trail conditions under alternative B at Lost Valley and on the Buffalo River Trail. Desired conditions for visitor experiences are more likely to be achieved under alternative B than under alternative A. Overall, alternative B would likely result in greater beneficial impacts to the visitor experience, with some minor and temporary adverse impacts under the no-action alternative.

CULTURAL LANDSCAPE

Affected Environment

Boxley Valley is characterized by an array of cultural landscape features that reflect traditional regional settlement patterns and rural land use along this section of the Buffalo River. Agricultural fields and associated vernacular structures and features continue to evoke the valley's legacy of single-family farms, marked by a continuum of adaptive land use, architectural design, and habitation. Agricultural skills and practices that were employed by the valley's original 19th-century settlers were passed on to subsequent generations, enabling them to adapt to changing economic conditions and natural forces, such as flooding of the Buffalo River. Those who arrived in Boxley Valley during the early settlement period (1830 to 1870) were fiercely independent, subsistence farmers of primarily Scotch-Irish ancestry who migrated to the Ozarks from the eastern Appalachian region, particularly Tennessee. Descendants of these original settlers remain in the valley today. The continuity of land use combined with significant historical, architectural, cultural and scenic resources reinforce Boxley Valley's importance (NPS, CLI 2010).

The Boxley Valley Historic District was listed on the National Register of Historic Places in 1987 for its significance in the history of the Buffalo River area and as a significant cultural landscape of the Arkansas Ozarks. The district's original period of significance, 1840 to 1972, was subsequently modified to also recognize the valley's rich American Indian prehistory, with contributing resources from the Mississippian, Late Archaic/Early Woodland, and Middle Archaic periods. The cultural landscape is in good physical condition and exhibits many of the defining characteristics associated with early settlement and farming. Farming continues as a historic land use, and natural systems and features, spatial organization, cluster arrangement of buildings and structures, circulation patterns, and small-scale features retain integrity and contribute to the district's cultural landscape significance. A substantial portion of the material culture accumulated over the last 150 years still remains in the historic district (NPS, CLI 2010).

Available water and fertile bottomland along the river determined the location of farmsteads, fields, and pastures. The farm and field locations remain largely unchanged from the period of settlement and subsequent community development. The surrounding environment also reflects the early settlement period, and patterns of fields, farms, circulation, vegetation, and woodlands have not been substantially altered. Boxley Valley continues to convey the historic associations and aesthetic

feeling of a functioning farm community. Roads that originally connected farmsteads and other features of the district are still in use for pedestrian and vehicular circulation. Remaining small-scale features (e.g., fence lines and wooden fence posts, stone walls, wells, cisterns, and cemeteries) are enduring reminders of Boxley Valley's agricultural heritage (NPS, CLI 2010).

Although many aspects of Boxley Valley's cultural landscape retain good integrity, the valley's long-term integrity has been threatened by the shift of its residential population from traditional farming families to retirees and by the introduction of elk to the valley. Tourists often flock to the area for elk viewing rather than to gain further understanding or appreciation of the pastoral agricultural scene. The accompanying surge in visitation and vehicles can diminish the setting, feeling, and association of the cultural landscape. The National Park Service does not exercise control over the purchase of properties in Boxley Valley, and the park has difficulty enforcing existing covenants, design guidelines, and other restrictions intended to preserve the historic setting. It is also difficult to balance the more immediate needs of residents with NPS requirements to complete necessary planning and compliance for undertakings affecting historic properties. This poses an immediate threat to the historic landscape as buildings and structures are occasionally modified without planning or comprehensive oversight (NPS, CLI 2010).

In 1980, Boxley Valley became a case study for National Park Service planning as it was used to develop a manual for identifying and evaluating cultural landscapes. The management plan developed from this research proposed the concept that cultural landscapes should continue to organically evolve rather than be frozen in time. Recommendations included long-term cooperative partnerships with the Boxley Valley community, maintenance and rehabilitation of existing homes, and the possibility for compatible new construction to maintain a viable community. Consequently, certain commercial uses are permitted that include a small store, a bed-and-breakfast inn, and horse rentals. New construction is permitted that is compatible in location, size, scale, color and character with existing cultural landscape features. Fields are kept open through continued agricultural use, although they must be fenced to keep animals out of the river (NPS, CLI 2010; CRM Bulletin Vol. 9, No.4).

Historic Sites, Buildings, and Structures. While the oldest structures in Boxley Valley date to the 1850s, most of the extant, vernacular, historic structures were built between 1870 and 1930. During this time, Boxley Valley became an identifiable regional community with a distinct architectural style. This is evident in the valley's unusually high number of two-story houses (many with prominent front porches) that attest to Boxley Valley's emergence as a regional economic center and one of the Buffalo River's more prosperous regions. Several large and prominent homes were constructed along the valley's hills and hollows. Extant buildings reflect traditional building patterns and materials, and the arrangement and spatial organization of area farmsteads are representative of small family farms of the Arkansas Ozarks (NPS, CLI 2010).

The appearance and configuration of the home sites within the historic district have been strongly influenced by the valley's natural systems and features and reflect regional adaptations. Historic architectural designs and decorative elements convey a patterned similarity that is distinctive to the Ozarks. The district's buildings and structures retain integrity of design, and few alterations to the structures have been implemented that are out of character with their original designs. The majority of the structures exhibit original building fabric and materials, and most farm features remain unmodified since their initial construction and use (NPS, CLI 2010).

Many of the district's important historic buildings and structures are on the park's List of Classified Structures and are known by the names of former owners such as the J.T. Edgmon / Luallen property, the Troy Fowler property, the A.F. Casey / William Clark property, Orpheus Duty property, and the Clyde Villines property. The district's farmsteads often contain simple one- to two-story frame and log dwellings that reflect traditional architectural styles and construction techniques.

They also contain a variety of outbuildings such as barns, sheds, privies, smokehouses, wells, corn cribs, and root cellars. The Walnut Grove Church, constructed in the 1870s by local residents, served as both church and school and was a focal point of social and civic activity. The white, two-story frame church stands out among Boxley Valley's rolling landscape (NPS, CLI 2010).

The ca. 1870 Boxley Mill (listed on the national register in 1974), was one of several 19th-century mills that operated in the Buffalo River area primarily until the 1930s. The three-story, wood frame mill remained in operation until the early 1960s, operating at various times as a grist mill, flour mill, cotton gin, sawmill, and later as a hammer mill. Mill operations ended following a 1961 flood that washed out most of the mill race; the mill race was never repaired (NPS, CLI 2010). The last miller, Clyde Villines, then made use of the mill pond as a fishing destination and rented small fishing cabins and boats to tourists. Today the Boxley Mill, associated structures and pond are included in a historic lease with the Gorgas Foundation; the lease expires in 2042.

The historic home of James A. (Beaver Jim) Villines is preserved by the National Park Service as an interpretive site and contributes to the Boxley Valley historic district. Along with a single-story log house, other contributing site buildings include a barn, log outbuildings, privy, and root cellar. Another of the Boxley Valley Historic District's defining structures is the Ponca low-water bridge. Constructed in 1943 by the Works Progress Administration (WPA), this bridge has long enabled vehicles to cross the Buffalo River along the historic route connecting to Jasper. Today, the concrete, low-water bridge is primarily used by paddlers, hikers, anglers, and swimmers to access the Buffalo River and area trails. The bridge is recognized as a contributing feature of the historic district and very few WPA-era bridges of its kind remain in the state of Arkansas. Restoration and stabilization of the historic bridge were undertaken in the fall of 2018.

Beginning in the early 1950s, Provin W. Yarborough began purchasing agricultural acreage from small family homesteads along this section of the Buffalo River and eventually consolidated these parcels to establish the Valley Y Ranch. By 1964, Yarborough accumulated sufficient acreage to establish a headquarters area for raising Arabian and quarter horses. The ranch complex included a rock house (1954-1959) and an assemblage of other buildings, shops, and stables. The Yarboroughs expanded their ranching operation between 1968 and 1974, by which time the Valley Y Ranch had grown into a substantial agricultural operation and was nationally recognized for its champion Arabian horses. Many of the buildings used in the daily horse ranch operations exist today, while some are no longer extant. The Valley Y ranch complex was determined eligible for the National Register of Historic Places, and the Rock House as well as other supporting buildings and site features contribute to the integrity of the site's cultural landscape, with a period of significance of 1954 to 1974 (NPS, CLI 2015).

The development of the Valley Y Ranch in an unspoiled natural area along the Buffalo River also prompted environmental groups during the late 1960s and early 1970s to press for a protected park along this segment of the Buffalo River. Yarborough resisted this movement until his death in 1973. His wife Clara and daughter Sue Anna Yarborough sold the property to the National Park Service and the site was then used as a visitor area for the newly established Buffalo National River. The park has long explored adaptive reuse strategies for the Valley Y ranch buildings, possibly as part of the Steel Creek Research and Learning Center and for other purposes (NPS, CLI 2015).

Environmental Consequences of Alternative A (Current Management)

Under alternative A, no substantial changes would occur to alter the character-defining qualities contributing to the significance of the Boxley Valley Historic District's cultural landscape and its distinctive, vernacular historic structures and features. However, sensitive district resources would be at continued risk of diminished integrity as a result of wear and tear on the historic building fabric and contributing cultural landscape elements resulting from weathering and increasing visitation,

which would have a long-term limited adverse impact on the district's historic properties. NPS staff would likely continue to face the challenges of preserving the district's historic setting and enforcing existing covenants and design guidelines because the agency does not control the purchase or modifications of properties in Boxley Valley.

Among the actions identified under alternative A that have the potential to affect the cultural landscape are delineating parking and updating camping and restroom facilities at Steel Creek behind the Valley Y Ranch; updating restrooms at Ponca Access; Lost Valley parking, access road and trail improvements; and actions associated with ongoing maintenance and restoration of the Boxley Mill and associated historic structures. All new construction would be designed and carried out in conformance with provisions of the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, including the *Guidelines for the Treatment of Cultural Landscapes*, to maintain compatibility and minimize the alteration or loss of character-defining features and historic designed elements contributing to the significance of the historic district. With adherence to these provisions, limited or minimal adverse impacts are anticipated from new construction or development on the historic district's cultural landscapes and historic structures.

Beneficial impacts to the cultural landscape would result from measures to enhance visitor education and awareness regarding the importance of protecting and avoiding sensitive cultural resources. Continued monitoring of historic structures and cultural landscape features would provide long-term benefits, allowing the assessment of visitor use impacts and other factors on resource condition and integrity over time.

Cumulative Impacts. Some ongoing or foreseeable future actions have the potential to impact cultural landscape resources as a result of new construction. These include agricultural operations and livestock grazing on leased tracts, various fire management activities such as the construction of fire-lines and structural protection measures, and the construction of streambank revetments. The above projects and activities would not be expected to substantially alter the spatial organization, arrangement of buildings and structures, and circulation patterns that contribute to the integrity of the historic district's cultural landscape. These actions would be designed and carried out in conformance with provisions of the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, including the *Guidelines for the Treatment of Cultural Landscapes*, to maintain compatibility and minimize the alteration or loss of character-defining features and vernacular landscape elements. With adherence to these provisions, limited or minimal adverse impacts are anticipated from new construction or development on the Boxley Valley Historic District and its cultural landscape.

The impacts associated with implementation of the no-action alternative would have both beneficial and some limited adverse impacts on the Boxley Valley Historic District. Other ongoing or reasonably foreseeable actions would result primarily in limited adverse impacts. Consequently, the adverse impacts of the other actions described above, in combination with the impacts of the no-action alternative, would cumulatively result in long-term or permanent, limited or minimal adverse impacts on the historic district and its historic structures and cultural landscape. The impacts associated with the no-action alternative would represent a small component of the adverse cumulative impact.

Conclusion. Under alternative A, there is a possibility that some ongoing or proposed construction projects could affect architectural elements and cultural landscape features contributing to the significance of the Boxley Valley Historic District and cultural landscape. However, National Park Service staff would continue to assess all proposed design and construction projects and monitor construction as necessary to ensure that project actions avoid or minimize disturbance of sensitive resources and are conducted in accordance with existing laws and policies. Besides the possibility of construction-related impacts, long-term / permanent beneficial and minimal or limited adverse

impacts on the historic district's structures and cultural landscape features would occur from ongoing resource management, routine maintenance, visitor use, erosion, and other factors that could diminish resource integrity. Limited adverse cumulative impacts on the historic district would occur from implementation of the no-action alternative in conjunction with other primarily ongoing or reasonably foreseeable actions.

Environmental Consequences of Alternative B

In addition to the ongoing or proposed actions under alternative A, additional proposed undertakings under alternative B also have the potential to alter or adversely impact the historic district's cultural landscape and historic structures. The Ponca low-water bridge could be destroyed by a flood event or so greatly damaged as to necessitate the removal of its remains in the 20-year time frame of this plan. If this occurs, the bridge would not be reconstructed. Additional undertakings would include new and expanded vehicle pullouts; restoration and use of historic structures at Steel Creek as a research learning and environmental education center, along with construction of restroom facilities; septic tanks and leach field; parking, trail, and access improvements (including new river access points) at Ponca Access; construction of a new visitor center and wastewater treatment plant at Lost Valley along with a new picnic area, amphitheater, restrooms, and parking area; construction of elevated walkways to viewing platforms at Boxley Mill, and rehabilitation of the mill race. All new construction would be designed and carried out in conformance with provisions of the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, including the *Guidelines for the Treatment of Cultural Landscapes*, to maintain compatibility and minimize the alteration or loss of character-defining features and historic designed elements contributing to the significance of the historic district. With adherence to these provisions, limited or minimal adverse impacts are anticipated from new construction or development on the historic district's cultural landscapes and historic structures.

Beneficial impacts to the cultural landscape would result from park efforts to establish optimal visitor capacities for key locations to reduce the potential impacts of visitor-caused erosion and other site disturbances. Beneficial impacts would also be expected from measures to enhance visitor education and awareness regarding the importance of protecting and avoiding sensitive cultural resources. Continued monitoring of historic structures and cultural landscape features would provide long-term benefits allowing the assessment of visitor use impacts and other factors on resource condition and integrity over time. The park would continue to work with the Gorgas Foundation to increase opportunities for visitor access to the Boxley Mill and Mill Pond, helping to preserve the area's historic pastoral setting. Restoration of historic cedar revetments along the shore of the pond would facilitate outlet flow to the mill raceway and more accurately reflect the site's history. The mill race would be rehabilitated and restored between the river, mill, and pond. These undertakings would all have long-term beneficial impacts on preserving the character and contributing features of the historic district.

Cumulative Impacts. Some ongoing or foreseeable future actions have the potential to impact cultural landscape resources as a result of new construction. These include agricultural operations and livestock grazing on leased tracts, various fire management activities, such as the construction of fire-lines and structural protection measures, and the construction of streambank revetments. The above projects and activities would not be expected to substantially alter the spatial organization, arrangement of buildings and structures, and circulation patterns that contribute to the integrity of the historic district's cultural landscape. All new construction would be designed and carried out in conformance with provisions of the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, including the *Guidelines for the Treatment of Cultural Landscapes*, to maintain compatibility and minimize the alteration or loss of character-defining features and vernacular landscape elements. With adherence to these provisions, limited or minimal adverse impacts are

anticipated from new construction or development on the Boxley Valley Historic District and its cultural landscape.

The impacts associated with implementation of alternative B would have both beneficial and some limited adverse impacts on the Boxley Valley Historic District. Other ongoing or reasonably foreseeable actions would result primarily in limited adverse impacts. Consequently, the adverse impacts of the other actions described above, in combination with the impacts of alternative B, would cumulatively result in long-term or permanent, limited or minimal adverse impacts on the historic district and its historic structures and cultural landscape. The impacts associated with alternative B would represent a small component of the adverse cumulative impact.

Conclusion. Under alternative B, there would be a possibility that some ongoing or proposed construction projects could affect architectural elements and cultural landscape features contributing to the significance of the Boxley Valley Historic District and cultural landscape. However, National Park Service staff would continue to assess all proposed design and construction projects and monitor construction as necessary to ensure that project actions avoid or minimize disturbance of sensitive resources and are conducted in accordance with existing laws and policies. Besides the possibility of construction-related impacts, long-term / permanent beneficial and minimal or limited adverse impacts on the historic district's structures and cultural landscape features would occur from ongoing resource management, routine maintenance, visitor use, erosion, and other factors that could diminish resource integrity. Limited adverse cumulative impacts on the historic district would occur from implementation of alternative B in conjunction with other primarily ongoing or reasonably foreseeable actions.

ARCHEOLOGICAL RESOURCES

Affected Environment

The national register nomination for the Boxley Valley Historic District originally identified the district's period of significance as 1840 to 1972. The nomination was subsequently modified to recognize the valley's prehistory and expanded the period of significance to include contributing archeological sites and resources from the Middle Archaic Period (7000–3000 BP), Late Archaic/Early Woodland Period (3000–1800 BP), and the Mississippian Period (1000–300 BP). Of the 42 known prehistoric sites in the Boxley Valley district, 21 sites have been evaluated as individually eligible or potentially eligible for the National Register of Historic Places. Almost three-quarters of the recorded sites have been professionally surveyed or excavated. Because of Boxley Valley's relative isolation, flooding and depositional river processes, and the widespread site density noted to date, there exists a high potential for the identification of additional sites (NPS, CLI 2010; NPS 1990).

The archeological evidence supports continuous human occupation in this portion of the Arkansas Ozarks from prehistoric to historic times, marked by a similarity of subsistence lifestyles primarily by self-contained family groups. The earliest prehistoric inhabitants of Boxley Valley may reach back to the Paleo-Indian period (10,000–8,500 BP), although sites from the period have not yet been identified. The majority of tested sites are from the Archaic period, the period for which most known sites in the Ozarks are associated. However, six sites have Woodland components (Woodland sites are relatively scarce), and other sites have been identified as Mississippian (a period for which there are currently competing theories of cultural influence and migration patterns). During the protohistoric to historic period (between AD 1650 and 1940) the Buffalo River area was used as a hunting ground by the Osage. Cherokee entered the Arkansas Valley in the late 1700s and likely

occupied the Buffalo River area. From 1817 to 1828 the area was included as part of the Cherokee treaty lands; many present-day Buffalo River residents, including Boxley Valley residents, trace their ancestry to these Cherokee settlers (NPS, CLI 2010; NPS 1990).

Although an overall systematic survey has not been conducted for Boxley Valley, surveys and investigations have provided significant prehistoric data and also indicate areas having the probability for historic archeological information. A number of multi-component sites have been identified that include both prehistoric and historic elements. Prehistoric archeological sites have been found on stream terraces, open fields, talus slopes, and bluff shelters. These have included floodplain or open terrace sites; tool workshops on benches and slopes; bluff shelters or caves; and hunting/campsites by springs. Several sites have the potential for deeply buried intact deposits. Among the artifacts recovered by data recovery excavations are lithic reduction flakes and a variety of tools (e.g., scrapers, projectile points, axe heads, drills, spokeshaves, bifaces, and manos and metates). Corn cobs, carbonized nut and plant remains, animal bone, potsherds, and human skeletal remains have also been found, along with intact undisturbed features such as pits and earth ovens (NPS, CLI 2010; NPS 1990).

Anglo-American settlement along the Buffalo River began in earnest about 1830. The valley's historic settlement patterns appear to parallel those of earlier prehistoric inhabitants. The 45 farm or community units present in Boxley Valley today offer potential for historic archeological sites, and sites with 19th to 20th century components have been identified during previous archeological surveys (NPS, CLI 2010; NPS 1990).

Archeological sites are located in many areas throughout the current project. Approximately 60% of the Boxley Valley has had professional archeological surveys. The status of archeological data in the other 40% of the Valley are unknown. Other, identified, archaeological resources exist in the Valley.

Environmental Consequences of Alternative A (Current Management)

Limited changes to visitor use management or proposed construction of new park facilities would occur under alternative A, the no-action alternative. Consequently, known or potential archeological resources are unlikely to be affected by ground-disturbing construction activities. NPS archeologists would continue to monitor the condition of known archeological sites and would undertake appropriate measures as necessary to protect sites in situ and reduce or avoid adverse impacts to sites that could occur from natural erosion, visitor use, the illegal removal of artifacts, and other factors. Increasing visitation presents a potential for increased erosional exposure of sensitive archeological resources to vandalism and inadvertent impacts (e.g., the development of visitor-created trails) that can disturb or diminish the integrity and informational potential retained by subsurface archeological sites.

Among the actions identified under alternative A that could disturb potential archeological resources if these actions entailed ground disturbance are delineating parking and updating camping and restroom facilities at Steel Creek; Lost Valley parking, access road and trail improvements; and actions associated with ongoing maintenance and restoration of the Boxley Mill and associated historic structures. Because archeological sites have been identified in many of the proposed project areas that could be disturbed by project actions, all areas of proposed ground disturbance would require archeological assessments and surveys as necessary to ensure avoidance of sensitive resources. Should sites be identified during design development and construction, these would be assessed for significance and avoided to the extent possible by redesign or other appropriate mitigation measures developed and implemented in consultation with the state historic preservation office and associated tribes to reduce the loss of site information and integrity.

Beneficial impacts would be expected from measures to enhance visitor education and awareness regarding the importance of protecting and avoiding sensitive archeological and other cultural resources. Continued monitoring of archeological resources and sites would provide long-term benefits allowing the assessment of visitor use impacts and other factors on resource condition and integrity over time.

Cumulative Impacts. Some ongoing or foreseeable future actions have the potential to impact archeological resources in the project areas as a result of ground disturbance. These include agricultural operations and livestock grazing on leased tracts, various fire management activities such as the construction of fire-lines and structural protection measures, and the construction of streambank revetments. Because the above projects and activities would occur primarily in areas of prior ground disturbance, there is a limited potential for direct inadvertent disturbance of known or unknown archeological resources. However, in accordance with NPS policy requirements, all areas of proposed ground-disturbing construction would be assessed and surveyed by NPS cultural resources staff to ensure that significant sites, if identified in project areas, are avoided by project redesign and/or are clearly identified for avoidance. The actions presented above are anticipated to have only minimal or limited adverse impacts on significant archeological resources.

The impacts associated with implementation of alternative A would have both beneficial and some limited adverse impacts on potential archeological resources that may exist in project areas. Other ongoing or reasonably foreseeable actions would result primarily in limited adverse impacts. Consequently, the adverse impacts of the other actions described above, in combination with the impacts of the no-action alternative, would cumulatively result in long-term or permanent, limited or minimal adverse impacts on archeological resources. The impacts associated with the no-action alternative would represent a small component of the adverse cumulative impact.

Conclusion. Under alternative A, there is a possibility that known or unknown archeological resources could be disturbed by ground-disturbing construction activities. However, National Park Service staff would continue to survey and assess project areas and monitor and protect archeological resources under existing laws and policies. Besides the possibility of construction-related impacts, long-term minimal or limited adverse impacts on archeological resources could occur from ongoing resource management, routine maintenance activities, visitor use, erosion, and other factors that could diminish resource integrity. Long-term beneficial impacts would be expected from NPS efforts to expand public awareness for resource protection. Limited adverse cumulative impacts on archeological resources also would occur from implementation of the no-action alternative in conjunction with other primarily ongoing or reasonably foreseeable actions.

Environmental Consequences of Alternative B

Under alternative B, several proposed undertakings have the potential to adversely impact potential archeological resources because of ground disturbance. These include new and expanded vehicle pullouts; construction of group campsites, septic tanks, leach field, restroom facilities and wastewater treatment infrastructure at Steel Creek; parking, trail, and access improvements (including new river access points) at Ponca Access; construction of a new visitor center and wastewater treatment plant at Lost Valley along with a new picnic area, amphitheater, restrooms, parking area, and wastewater treatment infrastructure; construction of elevated walkways to viewing platforms at Boxley Mill, and rehabilitation of the mill race. Based on previous survey documentation, there is a high probability for archeological sites to exist in project areas that could be at risk of construction disturbance. Consequently, all areas of proposed ground disturbance would require archeological assessments and surveys as necessary to ensure avoidance of sensitive resources. Should sites be identified during design development and construction, these would be avoided to the extent possible by redesign, or other appropriate mitigation measures would be

developed and implemented in consultation with the state historic preservation office and associated tribes to reduce the loss of site information and integrity.

As under alternative A, beneficial impacts to archeological resources would result from park efforts to inform and educate visitors of the importance of protecting sensitive resources by increased NPS staff presence, improved interpretive signage, and other appropriate means. Actions taken to impart appreciation and awareness among visitors of the need to protect and preserve cultural resources would contribute to overall resource stewardship objectives.

Cumulative Impacts. Some ongoing or foreseeable future actions have the potential to impact archeological resources in the project areas as a result of ground disturbance. These include agricultural operations and livestock grazing on leased tracts, various fire management activities such as the construction of fire-lines and structural protection measures, and the construction of streambank revetments. Because the above projects and activities would occur primarily in areas of prior ground disturbance, there is a limited potential for direct inadvertent disturbance of known or unknown archeological resources. However, in accordance with NPS policy requirements, all areas of proposed ground-disturbing construction would be assessed and surveyed by NPS cultural resources staff to ensure that significant sites, if identified in project areas, are avoided by project redesign and/or are clearly identified for avoidance. The actions presented above are anticipated to have only minimal or limited adverse impacts on significant archeological resources.

The impacts associated with implementation of alternative B would have both beneficial and some limited adverse impacts on potential archeological resources that may exist in project areas. Other ongoing or reasonably foreseeable actions would result primarily in limited adverse impacts. Consequently, the adverse impacts of the other actions described above, in combination with the impacts of alternative B, would cumulatively result in long-term or permanent, limited or minimal adverse impacts on archeological resources. The impacts associated with alternative B would represent a small component of the adverse cumulative impacts.

Conclusion. Under alternative B, there is a possibility that known or unknown archeological resources could be disturbed by ground-disturbing construction activities. However, National Park Service staff would continue to survey and assess project areas and monitor and protect archeological resources under existing laws and policies. Besides the possibility of construction-related impacts, long-term minimal or limited adverse impacts on archeological resources could occur from ongoing resource management, routine maintenance activities, visitor use, erosion, and other factors that could diminish resource integrity. Long-term beneficial impacts would be expected from NPS efforts to expand public awareness for resource protection. Limited adverse cumulative impacts on archeological resources also would occur from implementation of alternative B in conjunction with other primarily ongoing or reasonably foreseeable actions.

FEDERALLY LISTED SPECIES

Affected Environment

Karst features, including extensive cave resources, are abundant because of the widespread nature of underlying limestone and dolomite within the park. They provide habitat for diverse wildlife and vegetation, including federally listed species. Buffalo National River is home to a host of federally listed animal species.² Mammal species include the endangered gray bat (*Myotis grisescens*), Indiana

2. The U.S. Fish and Wildlife Service uses the following categories to determine the federal status of species in Boxley Valley: **Endangered**—Any species which is in danger of extinction throughout all of a significant portion of its range (ESA §3(6)). **Threatened**—Any species which is likely to become an endangered species within the foreseeable future throughout all of a significant portion of its range (ESA §3(20)).

bat (*Myotis sodalis*), the Ozark big-eared bat (*Plecotus townsendii ingens*), and the threatened northern long-eared bat (*Myotis septentrionalis*). Federally listed mollusks include the endangered snuffbox mussel (*Epioblasma triquetra*) and the threatened rabbitsfoot (*Quadrula cylindrica cylindrica*). There are no critical habitats in the project area for any of the federally listed mammal and clam species (USFWS 2017a). NPS staff, working with the Arkansas Game and Fish Commission and the U.S. Fish and Wildlife Service (USFWS), monitors federally listed populations according to each species' respective recovery plan. Mapping caves in Boxley Valley (and parkwide), conducting biological surveys and extensive surveys for additional caves and bat populations, and delineating recharge areas remain important data needs.

Gray bats roost exclusively in caves and mines year-round where they form large colonies, sometimes in excess of 250,000 individuals. Because of these large colonies, the bats are very vulnerable to human disturbance at its roost sites. The roost caves are generally near streams or other water bodies such as reservoirs. This species prefers to forage over streams in wooded riparian habitats, especially slab-rock river bottoms where mayflies hatch. Gray bats use cave-type habitat year-round for roosting, rearing young, and hibernation. Habitat disturbance in the forms of forest conversion to agriculture, destruction of riparian forest, river impoundment, pesticides, river siltation, and roost disturbance are the most important factors seeming to affect this species. Gray bats continue to recover at remarkable levels throughout the region. Their recovery is attributed in large part to closing roosts to prevent human disturbance (2013 Lost Valley EA).

The entire Buffalo River is foraging habitat for the gray bat and Boxley Valley, specifically, includes hibernacula and several summer roost sites for gray bats (2013 Lost Valley EA). Caves and abandoned mines in the project area are known to support gray bats during some part of each year. The largest winter colony of gray bats in Arkansas is located 4 miles from Lost Valley, so the area is within the foraging range of gray bats (NPS 2018b).

Indiana bats roost in caves during the winter in colonies of up to 100,000 individuals. In the summer, they tend to roost and raise their young under the sloughing bark of snags and under the bark of shagbark hickory, green ash, elm, cottonwood, and other trees with large loose bark plates. These summer roosts tend to be in lowland habitats near water, with direct sun exposure for half the day or more. The colonies are most commonly located in bottomland or riparian areas but also have been found in pastures and upland hardwoods. The maternity roosts are usually found in larger diameter trees. They are not generally a cavity-roosting species. Primary maternity roosts are generally located where they receive considerable sunlight. This may assist with pup development. Typically, roosts will be higher in the tree if the canopy closure is greater. This may be an effort to get more sunlight on the roost (2013 Lost Valley Environmental Assessment). Two caves in or near the study area are considered important hibernacula for the Indiana bat (NPS 2018b, personal communication).

Ozark big-eared bats roost in caves and mines year-round. Colonies are small, generally under 1,000 individuals. They tend to roost near the entrances of caves and mines and have been found roosting in rock overhangs, talus piles, and other fairly exposed locations. These are large bats that prefer to forage in open forests or on forest edge. Ozark big-eared bats forage over fields, streams, forest edges, mountain slopes, cliff faces, and in clearings. They feed primarily on small moths, though they will also catch and eat beetles. Their summer roost requirements are variable. They may roost in caves proper or in fractures in limestone or sandstone bluffs. In winter, they require a cave that will act as a cold trap and maintain a temperature between 0 and 13 degrees Celsius. The humidity must be between 60 and 97 percent. There are known caves and mines within the greater park boundaries known to house one or two individuals of this species over the past several years. All of these roost sites are located outside the study area. None of the caves present near the proposed project locations are historically known to house this species (2013 Lost Valley EA).

Northern long-eared bats were listed as threatened in May 2015. They are medium-sized bats with noticeably long ears relative to other bats in the same genus. Northern long-eared bats are most common in the Eastern United States and the Atlantic coast states but also occur as far west as Oklahoma, Wyoming, and Montana. They typically spend winters hibernating in large, abandoned mines and caves with large entrances, constant temperatures, and high humidity. In summer months, the species roost in colonies or individually in tree cavities and occasionally in mines. They are nocturnal feeders in forest understories of hilly terrain and on waterbodies. Their diet focuses on beetles, flies, and moths. The Cave Mountain Cave within Boxley Valley provides habitat for northern long-eared bats. This cave is also considered an important year-round roost for the gray bat and provides important hibernaculum for the Indiana bat (NPS 2018b, personal communication).

White-nose syndrome is considered the predominant threat to the northern long-eared bat and has caused very large population reductions of this species in its historic hibernation sites in many areas of the Eastern United States. This threat contributed directly to the reasoning for the proposed listing, as the disease is spreading from the Eastern United States to several areas of the Midwest, where similar bat population reductions are expected.

Rabbitsfoot mussel inhabits medium-to-large rivers with sand/gravel or gravel substrates in Arkansas, Alabama, Georgia, Kansas, Kentucky, Illinois, Indiana, Louisiana, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, Tennessee, and West Virginia. It was federally listed as threatened in September 2013 and is widespread in Arkansas but is not typically found in great numbers at any site. Most of the existing rabbitsfoot populations are marginal to small and isolated (USFWS 2017c). In general, habitat modification of river banks and stream beds and sedimentation and nutrient loading from adjacent land users pose the biggest threats to mussel species. Within Boxley Valley, park staff have noted a tremendous increase in algal blooms on the river, primarily attributed to various land use activities and nutrient sources within the greater Boxley Valley area.

Snuffbox mussel is a small, triangular freshwater mussel that typically inhabits small to medium-sized creeks in areas with a swift current. Males can grow to nearly 3 inches and females to nearly 2 inches, respectively. Adults often burrow deep in sand, gravel or cobble substrates, except when they are spawning or when females attempt to attract host fish. They are suspension feeders, typically feeding on algae, bacteria, detritus, microscopic animals, and dissolved organic material. The snuffbox is currently found in Arkansas, Alabama, Illinois, Indiana, Kentucky, Michigan, Minnesota, Missouri, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, Wisconsin, and Ontario, Canada. Most populations are small and geographically isolated from one another, further increasing their risk of extinction (USFWS 2017b).

Other Special Status Species. In addition to federally listed species, *Management Policies 2006* and Director's Order-77: *Natural Resources Management Guidelines* require the National Park Service to examine the effects on state listed threatened, endangered, candidate, rare, declining, and sensitive species (NPS 2006). For the purposes of this analysis, the U.S. Fish and Wildlife Service, the Arkansas Natural Heritage Commission, and the Arkansas Game and Fish Commission were contacted with regard to federally- and state listed species to determine those species that could potentially occur on or near the project area. Responses were received from the Arkansas Natural Heritage Commission and the Arkansas Game and Fish Commission.

Six protected species are identified for Newton County on the USFWS Arkansas Field Office website (USFWS 2017a) and the Arkansas Natural Heritage Commission website (ANHC 2017) and are presented in table 5.

Table 5. Federal and State Listed Species Known to Occur Within Buffalo National River

Scientific Name	Common Name	Federal Status	State Status
Mammals: <i>Myotis grisescens</i>	Gray bat	E*	SE**
Mammals: <i>Myotis sodalis</i>	Indiana bat	E	SE
Mammals: <i>Corynorhinus townsendii ingens</i>	Ozark big-eared bat	E	SE
Mammals: <i>Myotis septentrionalis</i>	Northern long-eared bat	T***	SE
Invertebrates: <i>Epioblasma triquetra</i>	Snuffbox mussel	E	SE
Invertebrates: <i>Quadrula cylindrica</i>	Rabbitsfoot mussel	T	SE

* E = federally endangered

** SE = state endangered

*** T = federally threatened

Environmental Consequences of Alternative A (Current Management)

Area-wide. In general, establishing visitor capacities by area allows the park to manage the maximum amount and types of uses as well as modify capacities by season, which could be used as a tool to manage use near sensitive federally listed species habitat. Evaluating areas of erosion within the river corridor may help the park identify future sites to rehabilitate, which could lessen water quality impacts on the federally listed rabbitsfoot and snuffbox mussel. Increasing NPS presence, messaging, wayfinding, and interpretation and education efforts in Boxley Valley could include messaging regarding federally listed species and preserving sensitive habitat.

In general, increased visitor use supported by this alternative’s various development proposals would have cumulative and slightly adverse, long-term impacts on federally listed species. Small to negligible short-term construction impacts—mainly temporary noise associated with construction of facilities with regard to bat species—could also be expected. However, even these potentially small impacts would likely be mitigated by planning construction activities outside sensitive roosting times for listed bat species.

Steel Creek. Other than the small to negligible area-wide impacts mentioned above, there would be no additional beneficial or adverse effects to federally listed species at Steel Creek under alternative A.

Ponca Access. There would be no beneficial or adverse effects to federally listed species noted beyond those mentioned in “area-wide” management area.

Lost Valley. There would be no beneficial effects to federally listed species noted beyond those mentioned in “area-wide” management area above, and no additional impacts to federally listed species are noted for the Lost Valley management area. Visitor created, non-designated trails would continue to cause erosion and damage vegetation but would not likely result in a noticeable impact to listed species or their habitats.

Northern long-eared bats known to inhabit the Lost Valley area would be subject to a special rule under Section 4(d) of the Endangered Species Act (ESA). Specifically, the final 4(d) rule allows the U.S. Fish and Wildlife Service to protect habitat affected by white-nose syndrome during the bat’s most sensitive life stages, while minimizing regulatory requirements for land managers and landowners within the species’ range (USFWS 2016). Considerations include avoiding management activities near bat hibernacula (such as caves and mines) during winter months and other vulnerable

life stages (such as spring staging and fall swarming) to provide focused protection against the spread of white-nose syndrome. Similarly, protecting known, occupied maternity roost trees would be required by park managers under this rule, and all efforts to avoid disturbing roost and other sensitive habitat would be taken to minimize impacts to this threatened species.

Under alternative A, planned development would include removal of small patches of riparian forest, which may have a slight, indirect, and adverse effect to bat habitat (NPS 2018b).

Boxley Mill. A beneficial impact from ongoing discussions and coordination with the State of Arkansas may include stabilization efforts on Whiteley/Jimmy Creek that would maintain or improve hydrology of the Boxley Mill and Boxley Pond area. The specific area is thought by park resource staff and regional ecologists to provide an important food resource for federally listed bat populations. Potential short-term impacts to the Boxley pond area soundscape from paving and improvement activities within this management area may have a small impact on local bat habitat.

Cumulative Effects. Per the park's 2008 Fire Management Plan, prescribed fire would continue to be used to manage some small areas within the valley that include construction of firelines, ignition operations, structure protection, and fireline patrol and maintenance. The critical season to conduct prescribed fire use is usually in late spring and early summer when tree roosting bats have pups, versus vulnerable winter months when federal and state listed bat species have retreated to hibernacula. With the exception of the non-federally listed small-footed bat, which roosts under ledges on hillsides, listed bat species hibernacula are not likely to be badly impacted by fire, though they may draw in some smoke in certain circumstances (NPS 2019a). Such activities could have adverse, indirect impacts on listed bat species but would be mitigated by avoiding sensitive bat habitat and would not occur during vulnerable winter months.

The park would continue to implement the recommendations outlined in the 2014 Lost Valley Trail Plan, which include construction of a 70-foot pedestrian bridge across the channel adjacent to the parking lot, reducing trail erosion at drainage crossings, continuing to bring up to 720 feet of trail to ABA standards. Activities could have adverse, indirect impacts on listed bat species but would be mitigated by avoiding sensitive bat habitat and would not occur during vulnerable winter months.

Continuation of hay and cattle leases could contribute to a small level of erosion and associated water quality degradation. While an infrequent occurrence in Boxley Valley, cattle that escape lessees fences or are otherwise allowed access to the river or its tributaries, can contribute direct and more intensive, adverse impacts to the aquatic system. In particular, cattle movement on river banks and within the river and its tributaries can erode soil from trampling and impact water quality from fecal input. While these direct, mainly localized occurrences have varying adverse impacts to water quality, cumulative effects of continuing hay and cattle leases would not affect the federally listed rabbitsfoot and snuffbox mussels.

Critical habitat for rabbitsfoot mussel that extends along the Buffalo River from its intersection with Arkansas Highway 7 to U.S. Route 65 (within park boundaries) could be affected by existing upstream levels of erosion and periodic flood events. Erosion can be high and often unpredictable within Boxley Valley and throughout the park. On the other hand, mussels within the river may be experiencing slightly less sedimentation as a result of the trail improvements already completed. Ultimately, it is unlikely that erosion and flood events combined with trail improvements under the no-action alternative A would be measurable or perceptible for mussels.

Continuation of agricultural land use activities within the greater Boxley Valley area would continue to contribute high levels of nutrients (particularly phosphorus and nitrogen) that would likely increase algal blooms on the Buffalo River and its tributaries.

Conclusion. Under alternative A, there would be no change in effects to federally listed species, including bat species and rabbitsfoot mussels. The park would continue to implement ongoing mitigation measures and adhere to best practices to avoid greater than a small to negligible adverse impact to listed species and their habitat. Alternative A would result in a “may affect, but not likely to adversely affect” determination for federally listed bat species as impacts from planned development would include removal of small patches of riparian forest. Alternative A would result in a “no effect” determination for federally listed mussel species because of insignificant impacts from planned construction projects.

Environmental Consequences of Alternative B

Area-wide. Permeable, stabilized roads (shown as “gravel roads” in appendix A site plans) would have a low contribution to stormwater impacts and thus no effect to mussel habitat downstream and outside the planning study area. Similarly, the addition of a few short-term parking spaces and introduction of new permeable surfaces, combined with stormwater flows, could add slightly higher volumes of runoff and sediments entering waterways. These actions would not affect listed mussel habitat as potential increases to these developed footprints would cover comparatively small areas within Boxley Valley. Relatively small increases in runoff and sediments are expected to result from actions in the preferred alternative. Potential turbidity from the erosion generated by construction of the packaged sewage treatment plant at Lost Valley, for example, could have short-term, adverse impacts to water quality. These impacts would be minimized by the implementation of best management practices during construction activities. After project completion, water quality would improve through reduced erosion and sedimentation.

Overall, adverse impacts would be slightly greater in alternative B than in alternative A because of the construction of vehicle pullouts. Similarly, such facility development is not expected to impact federally listed bat species because construction activities would not occur when certain species such as Indiana bats are present within the study area. Similar to alternative A, small to negligible short-term construction impacts—mainly noise while building facilities with regard to bat species—could also be expected. However, even these potentially small impacts would likely be mitigated by planning construction activities outside sensitive roosting times for listed bat species. Protecting known, occupied maternity roost trees would be required by park managers under alternative B and all efforts to avoid disturbing roost and other sensitive habitat would be taken to minimize impacts to this threatened species.

Steel Creek. The beneficial effects from the proposed alternative include formalizing traffic flows, identifying appropriate amounts and types of commercial, and private use launching from Steel Creek Access. Adding flush toilets would have a small beneficial impact on local water quality at Steel Creek.

Ponca Access. Approximately 0.5 acres of vegetation would be permanently removed within the Ponca Access management area for the proposed parking lot in the first phase of project implementation. An additional 1.4 acres of vegetation would be removed in the second phase of construction for the proposed access road. Through the removal of an existing access road, approximately 0.13 acres would be revegetated within the Ponca Access management area. These impacts would represent a small to negligible impact to vegetation within the larger Boxley Valley study area and would not likely affect federally listed bat species or its habitat.

Infrastructure and traffic congestion improvements would have a small, adverse impact on water quality at Ponca. However, the use of vault toilets in this management area limit nitrates and phosphorus from entering the river and impacting sensitive habitat. Potential small, short-term turbidity impacts to water quality would be expected during repair work on the Ponca low-water bridge and construction of the accessible boat launch area.

Lost Valley. Beneficial impacts would be like those under alternative A, while adverse effects would include removal of small patches of forest and other vegetation (approximately 3.4 total acres within the Lost Valley management area) for development activities. As a small percentage of the overall management area, removing vegetation to support the proposed activities at Lost Valley would have a slight adverse effect to bat habitat due to the possibility that listed bat species may occasionally use forested resources in this area that would experience further development if the preferred alternative is ultimately chosen for this plan (NPS 2018b).

Like the no-action alternative, Northern long-eared bats known to inhabit the Lost Valley area would be subject to a special rule under Section 4(d) of the Endangered Species Act. Protecting known, occupied maternity roost trees would be required by park managers under alternative B, and all efforts to avoid disturbing roost and other sensitive habitat would be taken to minimize impacts to this threatened species.

Proposed construction of a visitor center would require permanently clearing approximately 3 acres of vegetation, representing a small to negligible impact to vegetation within the larger Boxley Valley study area. While this impact would represent a small to negligible impact to vegetation within the larger Boxley Valley study area, it would not likely affect federally listed bat species or its habitat. This facility will also play a role in expanding the interpretation, education, and long-term visitor appreciation of park wildlife in the Boxley Valley, including federally listed species.

Boxley Mill. Similar to impacts noted for the Lost Valley management area, beneficial impacts of alternative B would be similar to those in alternative A, while adverse effects would include removal of small patches of riparian forest for development activities. Proposed activities may have a slight, short-term effect on the gray bat in particular, whose hibernaculum, which is one of the largest in the state, is located a short distance from the Boxley Mill and Lost Valley management areas. However, the expected long-term increase in public presence during daylight hours would not have more than a negligible effect on listed bat species.

Proposed actions would not impact rabbitsfoot mussel because there is no known habitat for this species immediately within the Boxley Mill management area. While sedimentation may impact some aquatic habitat in this management area, it is likely that any additional sediment generated from proposed activities would settle out before they reach the Buffalo River, and long before they could potentially impact rabbitsfoot mussel beds further downstream.

Cumulative Effects. As noted in alternative A, prescribed fire management as outlined in the park's 2008 fire management plan would continue to be used to manage some small areas within Boxley Valley. Such activities could have adverse, indirect impacts on listed bat species but would be mitigated by avoiding sensitive bat habitat and would not occur during vulnerable winter months.

As noted in alternative A, the park would also continue to implement the recommendations outlined in the 2014 Lost Valley Trail Plan, which include construction of a 70-foot pedestrian bridge across the channel adjacent to the parking lot, reducing trail erosion at drainage crossings, continuing to bring up to 720 feet of trail to ABA standards. Activities could have adverse, indirect impacts on listed bat species, but would be mitigated by avoiding sensitive bat habitat and would not occur during vulnerable winter months.

Beneficial and adverse impacts would be similar to those under alternative A, with the increased visitor use supported by alternative B's various development proposals, adding a cumulative and slightly adverse, long-term impacts on federally listed species compared to the no-action alternative.

Similar to alternative A, increased visitor use supported by alternative B's various development proposals would have cumulative and slightly adverse, long-term impact on federally listed bat species. The implementation of Best Management Practices would all but eliminate the potential for

such erosion and sedimentation during construction, resulting in no effect on rabbitsfoot mussels in Buffalo River.

Continuation of hay and cattle leases could cause erosion in some areas and have a small contribution to water quality degradation as well.

Conclusion. Impacts on federally and state listed species would be more widespread under alternative B than alternative A because of proposed facilities development. Adverse impacts would be mainly limited to minor losses of vegetation at expanded pull-outs, trailheads, launch areas, and road egresses. Similarly, larger developed footprints, increased hardening of surfaces within management areas, higher visitation, and likely increases in chemicals that wash off vehicles in the additional parking lots would lead to increased nutrient loading in the valley. Protecting known, occupied maternity roost trees would be required by park managers under alternative B, and all efforts to avoid disturbing roost and other sensitive habitat would be taken to minimize impacts to this threatened species. Adverse effects from these activities are not expected to have more than minor impacts to federally listed species or habitat considering mitigation measures that would be implemented and the relatively small areas of new development within Boxley Valley as a whole.

For reasons stated above, alternative B would result in a “may affect, but not likely to adversely affect” determination for federally listed bat species as impacts because of more widespread facilities development compared to alternative A. Adverse impacts would be mainly limited to minor losses of vegetation at expanded pull-outs, trailheads, launch areas, and road egresses. Alternative B would result in a “no effect” determination for federally listed mussel species because proposed project activities would have insignificant impacts to mussel habitat, and is located outside the study area for this plan (NPS 2019b)

VEGETATION IMPACT TOPIC

Affected Environment

Located in the in the Ozarks physiographic region, Boxley Valley’s plant communities are rich and diverse due in part to primarily sandy and silty loam soils that are highly permeable. The area’s ridges, bluffs, hillsides, and valleys provide a variety of habitats that contribute to the park’s 1,500 vascular plant species. Boxley Valley is characterized by the following primary vegetation types, some of which support wetland communities (NPS 2019c):

- ***Forest upland*** includes forested land with greater than 50 percent canopy cover on non-alluvial soils generally not inundated by water. This community is comprised of an oak, hickory, black gum, and short-leaf pine overstory, with dogwood, mulberry and redbud in mid and understory levels. This vegetation type generally has a sparse, herbaceous ground cover and its upland nature generally does not include hydric (wet) soils associated with wetlands.
- ***Bottomland forest and wetlands*** include forested land with greater than 50 percent canopy cover on periodically flooded alluvial soils. This community is comprised of a sycamore, box elder, sweet gum, and silver maple overstory, with mid- and understory levels typified by pawpaw, witch hazel, inland sea oats, and Canada wild rye. Bottomland forest includes some wetland areas within Boxley Valley, such as those near Boxley Mill and Boxley Mill Pond.
- ***Open fields***, such as those that form Boxley Valley’s prolific landscapes, are split into two sub-units. “Early succession old fields” are open lands that have been relatively unmaintained since the federal government acquired parklands. They are in various stages of succession and are typically dominated by eastern red cedar and honey locust trees, fescue,

and *Sericea lespedeza*, a vigorous, nonnative legume that can smother native plants in its vicinity. “Special Use Permit fields” are fields that preserve the valley’s “pastoral” setting. They are primarily planted with hay, while fescue is the dominant grass found in these fields because of its ability to withstand extreme conditions. Both open field types are located primarily in upland areas, although wetlands and hydric soils may occur seasonally or near low-lying edges of fields.

- **Glades** are treeless or sparsely wooded openings in forests with bedrock at or near the surface and thin well-drained soils. The dominant trees in this vegetation type include eastern red cedar and Ashe’s juniper along with several species of oak, hickory, and shortleaf pine. These areas tend to support herbaceous cover including relict stands of big bluestem, little bluestem, Indian grass, switchgrass, prickly pear cactus, Arkansas yucca, and false aloë. Glades are highly important for many species of reptiles, amphibians, and birds as well as several glade restricted plant species. This vegetation type is almost entirely upland and rarely includes wetlands.
- **Woodlands** are characterized by canopy covering less than 50 percent of land area and exhibit diverse ground-cover vegetation. This vegetation type combines floristic characteristics of both grasslands and forests and is primarily located in upland areas.

Boxley Valley itself represents 2.2% (6.1 km²) of the Buffalo River watershed and its agricultural legacy has impacted water quality in the area. The river flows are often characterized by high fecal coliform and other bacteria levels, particularly during and immediately after precipitation and runoff events (2004 water resources management plan). Past efforts with landowners in Boxley Valley to exclude cattle from Buffalo River within the park’s private use zone, building fences, and providing access to alternative water sources (stock tanks) has shown progress in improving water quality within the Boxley Valley section of the watershed. Buffalo River’s Outstanding National Resource Water status for its extraordinary recreation and aesthetic values provides further impetus for the park, stakeholders, and partners to improve the river’s water quality.

Vegetation Management. Vegetation management is conducted through a variety of methods in Boxley Valley, including the use of leases, agreements, special use permits with private landowners, and cooperative projects with the Arkansas Fish and Game Commission, Rocky Mountain Elk Foundation, and others. Because of Boxley Valley’s unique emphasis on elk management, the park develops an annual work plan in consultation with the Arkansas Fish and Game commission to identify annual habitat management tasks as well. The park also uses multi-park resources such as the NPS FirePro program and the Heartland I&M Network Exotic Plant Management Team to assist vegetation management efforts (NPS 2019c).

In general, lands such as open fields located outside of Boxley Valley’s adjacent Upper Buffalo and Ponca Wilderness areas are considered candidate lands for restoration and maintenance. Restored areas are typically maintained as open fields through the use of agricultural leases or permits. Other open areas are maintained to promote early successional conditions by using fire and approved mechanical methods to support management. Agricultural activities are typically limited to haying and grazing. Areas maintained through prescribed burning are primarily aimed toward maintenance of a mosaic vegetation pattern for visual variety and improvement of wildlife habitat. Vegetative buffer strips may be used along field edges to reduce or prevent activities such as illegal hunting and vehicular access (NPS 2019c).

Riparian corridors are maintained or reestablished to reduce stream bank erosion and enhance habitat qualities. Similarly, wildlife corridors are established where practical to reduce the size of large, unbroken fields; these “lanes” as they’re known locally are planted (when possible) with

native, wildlife-friendly plant species. The park seeks to aggressively combat and control spread of exotic plants wherever such species threaten park resources or public health and when control is prudent and feasible (NPS 2019c).

Wetland and riparian areas in Boxley Valley serve important roles in protecting water quality within the Buffalo River watershed. In addition, because of its high social, resource, and economic value, Buffalo River waters are considered an Outstanding National Resource Water. Riparian buffers help decrease erosion, for example, as they reduce the speed of river flow and help sediments settle more consistently along river banks. They store nutrients and promote growth of forest and buffer vegetation. They also provide an energy source to streams in the form of dissolved carbon and organic debris particulates, which is a critical food source for the base of the food chain, including benthic invertebrates that feed on the detritus (2004 water resource management plan).

Increasing numbers of visitors strain vegetation within certain use areas. The Ponca access, for example, is a popular staging site for private boaters, hikers, and equestrians that is often congested during peak visitation times. Ponca Access also serves as one of the primary concession launch sites in the Boxley Valley, adding to an increasing number of private boaters, which has further added to vegetation trampling and indicative of similar trends at other management areas within the study area.

Past and current agricultural practices have accelerated normal erosional processes in many areas along the river. Farming techniques that use riparian areas have resulted in the removal of trees, shrubs, and other vegetation that provided bank stabilization. Loss of forest cover within the watershed has possibly increased both flood peaks and the amount of stream bed gravel in the river channel. These changes have been linked to increased stream bank erosion and water quality degradation, especially in tributaries (1999 NPS RMP).

Similarly, agricultural practices among the many Boxley Valley residents can affect water quality of the Buffalo River, tributaries, wetland and riparian areas, including nutrient and pesticide runoff. Existing agricultural practices are also affected by stream bank erosion in some areas because of the lateral migration of the river channel over time. The park would continue to work with landowners to minimize agricultural runoff and streambank erosion, while preserving the free-flowing nature of the Buffalo River. Vegetation plantings have been suggested in key riparian areas to stabilize certain banks and slow lateral river erosion on the Buffalo River and tributaries. Because of elevated fecal coliform concentrations recorded at certain water quality monitoring stations in Boxley Valley through the years, the park continues to work with Boxley Valley landowners to exclude cattle from the Buffalo River within this private use zone of the park. The cattle in Boxley Valley were fenced out of the Buffalo River by 2000. Continued monitoring will determine the effectiveness of this action on the bacteria concentrations at Ponca (2004 Water Resource Management Plan).

Other management areas in this plan, such as Boxley Mill, have long been recognized as one of the primary historical attractions of the Boxley Valley Historic District (see cultural resources affected environment section for more information). The mill's pond, located nearby, served as a fishing pond for tourists in the late 1800s and early 1900s. In more recent decades, the pond has become filled with sediment, dense aquatic vegetation, and is regularly used by waterfowl. A total of five palustrine wetland features encompassing nearly 1.5 acres and six stream features totaling 0.84 acres were identified and delineated from June 12-14, 2018, within the 28.8-acre Boxley Mill study area (NPS 2018a). The majority of the palustrine wetlands (i.e., fresh water, non-flowing, inland systems) exhibited features indicative of palustrine, emergent, persistent, seasonally flooded/saturated, farmed habitats.

Environmental Consequences under Alternative A (Current Management)

Area-wide. Beneficial activities to vegetation include coordinating with the Arkansas Department of Transportation to develop stream crossing designs and maintain culverts and proper stream function in the vicinity of Whiteley/Jimmy Creek, Boxley Bridge, and other areas in Boxley Valley. These evaluations would assist stabilizing vulnerable banks with native vegetation and support wetland functionality.

Steel Creek. Effects to vegetation and wetlands would be similar to those mentioned in the “area-wide” management area. Proposed paddocks and more concentrated equestrian use would contribute additional, small impacts to vegetation as some erosion is expected to occur.

Ponca Access. Ongoing visitor trampling to vegetation at parking areas and adjacent to the low-water bridge would continue to have noticeable, localized impacts to this often-congested management area. Impacts to vegetation would be small relative to Boxley Valley as a whole.

Lost Valley. Ongoing trailhead access and parking improvements (in partnership with the Federal Highway Administration) benefit vegetation by encouraging visitors to stay within maintained areas and on designated trails. Scheduled improvements also include revegetating portions of the previous Lost Valley access road, which would add to the localized, beneficial effect to vegetation within this management area.

Boxley Mill. Coordinating with the State of Arkansas on stabilization efforts associated with Whiteley/Jimmy Creek could maintain or improve hydrology and riparian vegetation of the Boxley Mill and Boxley Pond area. Park resource staff and regional ecologists indicate these sites provide important wildlife habitat and forage. In addition, planned parking improvements in the parking area off Arkansas Highway 43 as well as the path to Boxley Mill would involve permanently removing a small amount of vegetation in this management area.

Cumulative Effects. Reduced streambank erosion and vegetation trampling by visitors along segments of designated trails where previous drainage improvements have been made has helped reestablish vegetation in formerly eroded and compacted areas in Boxley Valley. These improvements would have an indirect, site-specific, long-term, and slightly beneficial effect on vegetation.

Managing the valley’s elk herd would be guided by the park’s elk management plan (in prep), which includes proposals to open Boxley Valley to elk hunting; plant forage for elk; and reduce the total population to between 70 and 100 animals. Management options that would impact vegetation and wetlands include opening fields near Boxley Valley that could be planted with more palatable forage species for purposes of dispersing elk use of the valley, which would have a small, long-term, and beneficial impact on vegetation.

Prescribed fire is used to manage some small areas within the study area, which includes building fire lines, conducting ignition operations, and protecting structures. In general, fires, whether prescribed or wild, return vegetation communities to an early successional stage comprised of grasses, forbs, and seedlings, which would have small, long-term, beneficial impacts to vegetation communities.

Constructing a fully accessible trail from the planned parking area, as well as proposed road improvements to the trailhead (i.e., paving access road and parking area) would minimally impact vegetation and be contained within the approved project area defined in the 2013 Lost Valley Trail and Campground Environmental Assessment.

Adverse impacts to vegetation could include the creation of non-designated trails and trampling because of additional use, for example. Trampling from livestock that inadvertently move from agriculturally leased lands to non-leased lands within some of the management areas would continue

as well. While periodic grazing impacts are not related to present or reasonably foreseeable actions, the cumulative trampling caused by trespass grazing can have localized effects on sensitive areas like riparian buffers and wetlands within the Boxley Valley study area.

Conclusion. Impacts of alternative A, when combined with other past, present, and reasonably foreseeable future actions such as recently completed and planned trail and park infrastructure improvements, and elk, prescribed fire, and streambank management, would result in direct and indirect, long-term, small, localized, and mainly beneficial effects to vegetation.

Environmental Consequences under Alternative B

Area-wide. Short-term, temporary construction impacts at expanded pull-outs and trailheads would occur, impacting a small amount of vegetation that would be permanently removed. Similarly, the addition of a few short-term parking spaces and introduction of new permeable surfaces, combined with stormwater flows, could add slightly higher volumes of runoff and sediments entering waterways. These actions would not have more than a negligible impact to sensitive vegetation or steep slopes near management areas as potential increases to these developed footprints would cover comparatively small areas within Boxley Valley.

Steel Creek. Formalizing traffic flows would have a small, beneficial impact on vegetation at Steel Creek as improved access road identification and routing would clearly direct visitors to designated sites and reduce the amount of trampling within the management area.

The preferred alternative would include short-term, temporary construction impacts at expanded pull-outs and trailheads. During construction, a negligible to small amount of vegetation would be permanently removed.

Ponca Access. Working with partners to address parking congestion by clearly delineating separate parking for private users and commercial users would reduce vegetative trampling in formerly undesignated areas; vegetation would naturally rehabilitate itself in certain areas. Proposed parking, for example, to the west of Beaver Jim's would remain largely hidden from the cultural landscape after post-construction native plantings begin to mature. Maintaining a stable and permeable road surface would limit stormwater impact runoff to sensitive riparian areas at the access.

Construction of a proposed road segment that would provide access through Ponca to State Highway 74 would permanently remove a swath of trees and other vegetation. Similarly, removal of a small amount of vegetation would occur at expanded pull-outs, trailheads, trail to a new elk viewing area, and the accessible boat launch. Construction of the additional road egress on the east side of the river would result in a minor level of vegetation removal and associated fragmentation of the forest canopy in that area as well. Approximately 0.5 acres of vegetation would be permanently removed within the Ponca Access management area in the first phase of project implementation, and an additional 1.4 acres would be removed in the second phase of construction. Through the removal of an existing access road, approximately 0.13 acres would be revegetated within the Ponca Access management area. These impacts would represent a small to negligible impact to vegetation within the larger Boxley Valley study area.

Lost Valley. Under alternative B, enhanced interpretation and education at the new proposed visitor center could provide a host of opportunities for visitors to learn about and experience the park's forests, riparian areas, and wetlands. Short-term impacts would include temporary construction impacts at expanded parking areas (e.g., 102 stalls under alternative B versus 75 stalls in alternative A). Similarly, a small amount of erosion could occur from removing vegetation (mostly native deciduous trees) within the footprint of the 390-foot-long and 24-foot-wide spur road that would access the proposed packaged wastewater treatment plant (see appendix A). Potential turbidity from the erosion generated by construction of the expanded parking areas, packaged

treatment plant and connected spur road, could have short-term, adverse impacts to vegetation within an adjacent Lost Valley tributary leading to Buffalo River. These impacts would be minimized by the implementation of best management practices during construction activities. Long-term impacts from the projected increase in visitation at Lost Valley would increase vegetation trampling and beech tree carving in the Lost Valley proper where locally rare vegetation is fairly common. Proposed construction of a visitor center would require permanently clearing approximately three acres of vegetation, representing a small impact to vegetation within the larger Boxley Valley study area. Non-designated trails that could be created by additional use in this area may continue to trample and damage vegetation as well but are expected to be largely contained by overall visitor use management improvements proposed in the alternative.

Boxley Mill. Grounds maintenance following improvements proposed in this plan would likely involve removal of invasive plant species, which would benefit the existence of native plant species. There would be no in-water work as project infrastructure (e.g., trails, bridges, revetments, and viewing platforms) would be sited upland from wetland areas, while providing interpretive and educational experiences about the cultural history and natural qualities of this management area.

Implementing the preferred alternative would lead to the permanent loss of a small to negligible amount of riparian vegetation, however, to construct proposed trails to wetland viewing platforms. Similarly, permanent impacts to vegetation would occur during the construction of expanded pull-outs and trailheads.

Cumulative Effects. Cumulative effects of alternative B would be slightly greater than the effects of alternative A due to an increase in proposed vegetation removal, particularly within the Ponca Access and Lost Valley management areas. The Ponca Access would experience approximately 1.3 acres of vegetation clearing and disturbance in the preferred alternative (compared to 0 acres of disturbance in the no-action alternative). Approximately 3.4 acres of vegetation removal and disturbance would occur at Lost Valley under the preferred alternative (versus 2 acres of disturbance in the no-action alternative).

Conclusion. Alternative B, when combined with the cumulative effect of recently completed trail and park infrastructure improvements (e.g., Lost Valley trail and campground upgrades circa 2014) and current or foreseeable elk, feral hog, prescribed fire, and streambank management, would have slightly greater impacts than the no-action alternative. The net direct and indirect effects would be site-specific, long-term, and have minimally negative effects on vegetation and wetland areas. For the Ponca Access management area, an additional 1.3 acres of vegetation would be removed to construct the proposed access road. Similarly, 3.4 acres of vegetation would be removed or disturbed in the Lost Valley management area. While impacts such as access road construction would fragment the forest canopy at management areas, when compared to the larger Boxley Valley area, relatively small areas of permanent vegetation would be removed in the preferred alternative.

WATER QUALITY IMPACT TOPIC

Affected Environment

As noted in this plan, the Arkansas Department of Environmental Quality has designated the Buffalo River an Extraordinary Resource Water and a Natural and Scenic Waterway, the highest water quality designation given by the state. Water quality in the Buffalo River at present is good. The primary nonpoint source pollutants are nitrogen, phosphorus, and fecal coliform bacteria (NPS 2018c), and pollutants are primarily a result of agricultural activities.

In addition to nearby land uses that impact water quality, the presence of dirt and gravel roads in Boxley Valley and other earth disturbing activities also impact the quality of water. Some management areas, like Steel Creek, are vulnerable to erosion from storms, floods, and other runoff events. Eroded soils in water become suspended soils in the water course and eventually settle to the bottom of the water course as sediment. Suspended soils and excessive sedimentation can have adverse impacts to water quality if not controlled.

As noted in the vegetation impact topic for this plan, Boxley Valley represents 2.2% (6.1 km²) of the Buffalo River watershed, and its agricultural legacy has impacted water quality in the area. The river flows are often characterized by high fecal coliform and other bacteria levels, particularly during and immediately after precipitation and runoff events (NPS 2004). Past efforts with landowners in Boxley Valley to exclude cattle from Buffalo River within the park's private use zone; building fences and providing access to alternative water sources (stock tanks) has shown progress in improving water quality within the Boxley Valley section of the watershed.

Loss of forest cover within the watershed has possibly increased both flood peaks and the amount of stream bed gravel in the river channel. These changes have been linked to increased stream bank erosion and water quality degradation, especially in tributaries (NPS 1999). However, Boxley Valley's wetland and riparian areas serve important roles in protecting water quality within the Buffalo River watershed. Riparian buffers help decrease erosion, for example, by reducing the speed of river flow, which allows sediments to settle more consistently along river banks.

Because of elevated fecal coliform concentrations recorded at certain water quality monitoring stations in Boxley Valley through the years, the park continues to work with Boxley Valley landowners to exclude cattle from the Buffalo River within this private use zone of the park. Ongoing monitoring would be implemented to determine the effectiveness of these actions on bacteria concentrations within Boxley Valley.

The proposed development modern wastewater treatment infrastructure at Steel Creek and Lost Valley would replace current facilities that do not meet visitor demand and capacity and are approaching the end of their useful operation and life cycle. Proposed wastewater treatment options for both sites would provide the highest level of treatment possible to limit the discharge of pathogens, nitrates, dissolved solids, and other pollutants into the watershed. Facilities would directly benefit river surface water quality via improved wastewater treatment and discharge as well. The final facility designs for both sites would meet current demand and projected wastewater treatment requirements for years to come. While the proposed facilities themselves are unique to visitor use and park management needs at Steel Creek and Lost Valley, respectively, they would accommodate peak loads of approximately 300-400 visitors per day at each site.

Steel Creek. Current restroom and wastewater management infrastructure at Steel Creek is inadequate to meet visitation demand, and the combination of high visitor use, and persistent flooding continues to threaten water quality from the overused, vulnerable, and sometimes poorly operational infrastructure. The existing Steel Creek launch restroom constructed in 1997, for example, was designed to serve only 35 visitors per day. It currently has a 1,000-gallon tank and 120 feet of sewer line. According to percolation tests conducted at Steel Creek in 1997, the occasionally flooded soil types at the site have moderate permeability and are "occasionally flooded" (averaging just less than one flood every other year). However, the flooding potential makes these soils poorly suited for infrastructure development such as buildings, roads, and septic tanks (NPS 1997).

The proposed septic system that would be connected by a new gravity sewer line directing waste from two new septic tanks that would serve the campground, to a new sewer effluent force main that would discharge into a mounded leach field having the adequate capacity to serve long-term campground needs. The new system would have a daily flow capacity of 9,000 to 12,000 gallons per

day (gpd), draining treated effluent to a leach field that would encompass approximately 15,000 to 20,000 square feet (0.3 to 0.5 acres). Septic tank capacity would range from 8,000 to 10,000 gallons for each of the two tanks, respectively.

Lost Valley. Similar to Steel Creek, current restroom and wastewater management infrastructure at Lost Valley is inadequate to meet visitation demand, and the combination of high visitor use, and flooding continues to threaten water quality from ongoing use of the site's vulnerable and sometimes poorly operational infrastructure. The park would continue to implement planned improvements at Lost Valley (see appendix A) in partnership with the Federal Highway Administration from the 2013 Lost Valley Trail and Campground Environmental Assessment and the 2017 Lost Valley Road and Parking Relocation Environmental Assessment.

Constructed on the north side of Lost Valley road (across from the proposed visitor center), the new on-site wastewater treatment plant would have a daily flow capacity of 9,000 to 12,000 gpd. This modern, prefabricated facility would measure approximately 20 to 30 feet long, 7 feet wide, and 10 feet deep, depending on final design specifications. The plant would incorporate the best available technology for treating and discharging effluent.

The accompanying administrative spur road to access the treatment plant would be approximately 390 feet long (0.07 miles) and 24 feet wide and would include a small parking area consisting of four spaces at the end of the spur to service the facility. Treated waste from the new plant and pump station would be directed to a single point source discharge south of the proposed visitor center.

The location for the treatment plant in the preferred alternative would require waste to be pumped uphill first, where discharge would then be transferred downhill to Clark Creek. Building the modern treatment facility would negate the need to construct a taller and more traditional enclosed structure to meet important park sewage treatment needs at Lost Valley and treat wastewater to levels that would meet or exceed state water quality parameters. Compared to other types of treatment facilities the park analyzed for this plan, the footprint of the proposed plant is also considerably smaller and would be easily hidden by its low profile and location in a forested area that is mainly out of site from visitors.

Environmental Consequences under Alternative A (Current Management)

Area-wide. Beneficial activities to water quality include coordinating with the Arkansas Department of Transportation to develop stream crossing designs and maintain culverts and proper stream function in the vicinity of Whiteley/Jimmy Creek, Boxley Bridge, and other areas in Boxley Valley. These evaluations would assist stabilizing vulnerable banks with native vegetation, support wetland functionality, and maintain Boxley Valley's good water quality.

Steel Creek. The existing vault toilet at the campground would continue to age beyond its operational lifespan and remain inadequate for servicing an increasing number of visitors. Without adequate facilities, an increase in fecal coliform would likely occur, having adverse impacts to the Buffalo River watershed.

Lost Valley. Impacts to water quality would be similar to those mentioned for Steel Creek.

Environmental Consequences under Alternative B

Area-wide. Similar to the analyses included in the vegetation and threatened and endangered species impact topics, short-term, temporary construction impacts would occur, likely generating a small amount of erosion that could lead to minor, localized turbidity within the management areas. Similarly, the addition of a few short-term parking spaces and introduction of new permeable surfaces, combined with stormwater flows, could add slightly higher volumes of runoff and

sediments entering waterways. These actions would not have more than a small impact to water quality in Boxley Valley.

Steel Creek. Under the preferred alternative, constructing the mounded system and associated wastewater management infrastructure would have indirect benefits to water quality because the system's treatment capacity would meet increased demand from projected visitation to the site. The treated effluent would meet or exceed state water quality parameters and continue to ensure a good level of water quality in the Steel Creek area.

The mounded leach field would be located in the 100-year floodplain at Steel Creek, which presents a slight, but serious threat to water quality because severe flood events or potential system failures could release damaging contaminants directly adjacent to Buffalo River. The long-term environmental benefits of constructing the mounded system to support sustained water quality would outweigh potential risks of sewage overflows.

Lost Valley. The preferred alternative would have mainly beneficial impacts to water quality because the modern, packaged plant would provide a high level of treatment to limit the discharge of nitrates, dissolved solids, and other contaminants into the watershed. Similar to water quality considerations at Steel Creek, very minor, short-term impacts to local water quality would likely occur during construction of the treatment plant and spur access road. A small amount of erosion could occur from removing vegetation (mostly native deciduous trees) within the footprint of the 390-foot-long and 24-foot-wide spur road. Potential turbidity from the erosion generated by construction of the packaged plant could have short-term, adverse impacts to water quality within an adjacent Lost Valley tributary leading to Buffalo River. These impacts would be minimized by the implementation of best management practices during construction activities. After project completion, water quality would improve through reduced erosion and sedimentation.

Cumulative Effects. Cumulative effects of the preferred alternative would be less than the effects of alternative A because the modern mounded septic system at Steel Creek and the packaged wastewater treatment plant at Lost Valley would replace current facilities that do not meet visitor demand and capacity and are approaching the end of their useful operation. Compared to the current, aging restroom facilities at Steel Creek and Lost Valley, the proposed wastewater treatment options for both sites would provide the highest level of treatment possible to limit the discharge of pathogens, nitrates, dissolved solids, and other pollutants into the watershed. Facilities would directly benefit river surface water quality via improved wastewater treatment and discharge as well.

Continuation of hay and cattle leases could contribute to a small level of erosion and associated water quality degradation. As noted in previous impact topics, cattle that escape lessees fences or are otherwise allowed access to the river or its tributaries, can contribute direct and more intensive, adverse impacts to the aquatic system. In particular, cattle movement on river banks and within the river and its tributaries can erode soil from trampling and impact water quality from fecal input. These direct, mainly localized occurrences could have varying adverse impacts to water quality, depending on the number and frequency of cattle accessing park lands within Boxley Valley.

Conclusion. Alternative B, when combined with the cumulative effect of recently completed trail and park infrastructure improvements (e.g., Lost Valley trail and campground upgrades circa 2014), would have more long-term benefits and fewer adverse impacts (i.e., potential erosion and turbidity during construction) than the no-action alternative. The net direct and indirect effects would be site-specific, long-term, and have mainly beneficial effects on water quality.

This page intentionally blank.



Chapter Four

CONSULTATION AND COORDINATION



This page intentionally blank.

CHAPTER 4: CONSULTATION AND COORDINATION

The National Park Service consulted with a number of agencies, tribes, and interested persons in preparing this document. The public had numerous avenues for participation during the development of the plan—participation in public meetings and providing feedback by submitting comments via regular mail and electronically using the NPS Planning, Environment, and Public Comment (PEPC) system website.

PUBLIC INVOLVEMENT

Buffalo National River initiated development of the Boxley Valley Comprehensive Area Plan in the summer of 2016. In August 2016, the park held two public listening sessions to begin a conversation about goals and objectives associated with the Boxley Valley CAP, and to gather feedback to help inform the planning process and development of the “preliminary proposed action”, which was presented for subsequent public review between May 8 – June 10, 2017. On May 9-10, the NPS held two meetings at the Ponca Elk Education Center in Ponca, Arkansas to gather public feedback on the preliminary proposed action. The public was asked to identify management strategies and actions that were noted in the preliminary proposed action that would be most helpful in supporting the plan purpose and need, and whether there were additional management strategies and actions that should be considered as alternatives for the plan.

A total of 18 people attended the May 2017 public scoping meetings. In addition to comments provided during these meetings, members of the public were invited to enter comments into the NPS Planning, Environment, and Public Comment (PEPC) website, or submit them via email or mail. Thirteen (13) correspondences were provided via PEPC, email, and mailed letters, resulting in a total of 37 comments that were received during the scoping process.

The comments that the park received ranged from support or opposition for possible management actions to detailed recommendations for implementation of other possible actions. Comments related to potential management strategies and actions associated with the preliminary proposed action ranged from suggestions to expand interpretation and visitor contact, balance historical agricultural uses while maintaining natural river processes, and improve traffic management. Other commenters suggested that the park expand recreational opportunities in the Boxley Valley, improve visitor interpretation and orientation throughout the area, consider new and renovated infrastructure, promoting sustainable agriculture and holistic resource management practices for

CONSULTATION AND COORDINATION TO DATE WITH OTHER AGENCIES, OFFICES, AND INDIAN TRIBES

Section 7 Consultation

The National Park Service initiated informal consultation with the U.S. Fish and Wildlife Service (Arkansas Ecological Services Field Office) in a May 2017 letter. The letter notified the U.S. Fish and Wildlife Service that the National Park Service was developing a comprehensive area plan for the for Boxley Valley, requested a list of any list of federal species of concern, and included a brief newsletter that described a preliminary proposed action. The letter also specified that the National Park Service was initiating informal consultation on the project. The National Park Service referenced the electronic list of federally listed plant and animal species, as generated by the U.S. Fish and Wildlife Service Information for Planning and Conservation (IPaC) system (<https://ecos.fws.gov/ipac>).

The U.S. Fish and Wildlife Service was provided a supporting biological assessment on December 18, 2019. In a response letter dated January 23, 2020, the U.S. Fish and Wildlife Service concurred with the National Park Service determination that the project “may affect, but is not likely to adversely affect” the Indiana Bat (*Myotis sodalis*), Northern Long-eared Bat (*Myotis septentrionalis*), Gray Bat (*Myotis grisescens*), and Ozark Big-eared Bat (*Corynorhinus townsendii ingens*). Further, the U.S. Fish and Wildlife Service indicated that the National Park Service had met consultation requirements by informing the Service of their determination of “no effect” for the Eastern Black Rail (*Laterallus jamaicensis*), Red Knot (*Calidris canutus*), Whooping Crane (*Grus americana*), Missouri Bladderpod (*Physaria filiformis*), Rabbitsfoot (*Theliderma cylindrica*), as well as Rabbitsfoot critical habitat.

The U.S. Fish and Wildlife Service will be provided a draft of the plan/environmental assessment. The National Park Service will reinitiate consultation in the future, as appropriate, with the U.S. Fish and Wildlife Service for their concurrence on elements of the plan that may require further compliance.

Section 106 Consultation

In May 2017, the National Park Service sent a letter to the Arkansas Historic Preservation Program noting the intent to prepare a visitor use management plan for the study area. The National Park Service also included a newsletter that described the preliminary proposed action.

The Arkansas Historic Preservation Program was provided a draft plan/environmental assessment on January 27, 2020, and it was noted that, as a planning document, the National Park Service would not implement any on-the-ground work, and follow-up site-specific consultation would be conducted to assess the potential effects of the proposed alternatives on cultural resources. In accordance with Section 106 of the National Historic Preservation Act, the National Park Service will continue to consult with the Arkansas Historic Preservation Program and other stakeholders as actions identified in the plan advance to more detailed design development and implementation stages.

Consultation with Native American Indian Tribes

In May 2017, the National Park Service sent letters to 11 different tribes notifying them of the R&T Plan, plan objectives, the intent to keep the tribes informed as the planning process progressed, and to invite their participation in the planning process. The National Park Service received responses from the Osage Nation requesting a copy of the draft plan, once complete. Newsletters were also sent to each of the tribes during public scoping and release of preliminary alternatives for public review.

Each of the 11 tribes was provided a draft plan/environmental assessment on January 27, 2020, and it was noted that, as a planning document, the National Park Service would not implement any on-the-ground work, and follow-up site-specific consultation would be conducted to assess the potential effects of the proposed alternatives on cultural resources. In accordance with Section 106 of the National Historic Preservation Act, the National Park Service will continue to consult with affiliated tribes as actions identified in the plan advance to more detailed design development and implementation stages.

LIST OF AGENCIES AND PERSONS IDENTIFIED FOR ENGAGEMENT

Name of External NPS Consultation and Coordination	Title, Agency
Bill John Baker	Principal Chief, Cherokee Nation
Everett Bandy	THPO, Quapaw Tribe of Oklahoma
John Berry	Chief, Quapaw Tribe of Oklahoma
Sheila Bird	THPO, United Keetoowah Band of the Cherokee Nation
Matt Brownlee	Professor, Clemson University
Joe Bunch	Chief, United Keetoowah Band of the Cherokee Nation
Edwina Butler-Wolfe	Governor, Absentee Shawnee Tribe
Tyler Cribbs	Researcher, Kansas State University
Jeff Crow	Director, Arkansas Game and Fish Commission
Robin Dushane	THPO, Eastern Shawnee Tribe of Oklahoma
Tamara Francis	Chairman, Caddo Nation of Oklahoma
Devon Frazier	THPO, Absentee Shawnee Tribe
Dr. Andrea Hunter	THPO, Osage Nation
Stacy Hurst	State Historic Preservation Officer, Arkansas Historic Preservation Program
Sarah Lindsay	Database Manager, Utah Natural Heritage Program
Cindy Osborne	Environmental Review Coordinator, Arkansas Natural Heritage Commission
Brian Peterson	Researcher, Clemson University
John Red Eagle	Chief, Osage Nation
Ryan Sharp	Professor, Kansas State University
Ron Sparkman	Tribal Chairman, The Shawnee Tribe
Tonya Tipton	THPO, The Shawnee Tribe
Melvin L. Tobin	Field Supervisor, U.S. Fish and Wildlife Service, Arkansas Ecological Services Office
Elizabeth Toombs	THPO, Cherokee Nation
Glenna J. Wallace	Chief, Eastern Shawnee Tribe of Oklahoma
Boxley Valley Residents	Landowners and Lease Holders
Concessioners and Commercial Use Authorization Holders	Various
Local Government Leaders	Newton County

Name of Project Team and Other Internal NPS Consultation and Coordination	Title, Agency
Scott Babcock	Project Manager, DSC Planning
Chuck Bitting	Natural Resources, BUFF
Scott Blackburn	NEPA Specialist, NPS MWR Environmental Quality Team
Tokey Boswell	Chief of Planning, MWR
David Bowles	Aquatic Program Leader, Heartland Inventory and Monitoring Network
Mindy Burke	Contract Editor, DSC Planning
Kerri Cahill	Branch Chief, DSC Planning
Caven Clark	Former Interpretation and Resource Management, BUFF

Name of Project Team and Other Internal NPS Consultation and Coordination	Title, Agency
Steve DeGrush	Natural Resource Specialist, DSC Planning
Mark Foust	Superintendent, BUFF
Natalie Franz	Planner, MWR
Teri Gage	Former Chief of Business Services, BUFF
Colin Heffern	Landscape Architect, DSC Planning
Shawn Hodges	Natural Resources, Ecologist, RSM, BUFF
Dru James	Chief of Business Services, BUFF
Casey Johannsen	Interpretation, BUFF
Leigh Johnson	Community Planner, MWR
Rochelle MacMillan	Commercial Services, BUFF
Laura Miller	Superintendent (former), BUFF
Jesse Morris	Chief of Facility Management, BUFF
Lauren Ray	Interpretation, BUFF
Suika Rivett	Resources, Archeologist, BUFFF
Ashley Rodman	RSM, Hydrologic Technician, BUFF
Hector Santiago	Regional Rivers Coordinator, MWR
Randy Scoggins	Chief Ranger, BUFF
CD Scott	Biologist, BUFF
Robert Still	Division of Ranger Activities & Fire Management, Acting Chief Ranger, BUFF
Pamela Sullivan	Administration and Commercial Services, BUFF
Melissa Trenchik	Chief, Resource Stewardship and Science, BUFF
Rose Verbos	Visitor Use Specialist, DSC Planning
Steve Whissen	Cultural Resource Specialist, DSC Planning
Roberta Young	Cultural Resources, MWR



Chapter Five

REFERENCES

CHAPTER 5: REFERENCES

- Cribbs, T., Brownlee, M.T.J., Sharp, R., and Peterson, B.
2017 Visitor use and associated thresholds at Buffalo National River. Technical Research Report submitted to Buffalo National River.
- Interagency Visitor Use Management Council (IVUMC)
2016 Visitor Use Management Framework – A guide to providing Sustainable Outdoor Recreation. Edition One. July.
- Vaske, Jerry J. and Lori B. Shelby
2008 Crowding as a descriptive indicator and an evaluative standard: Results from 30 years of research. *Leisure Sciences*, 30: 111–126.
- U.S. Fish and Wildlife Service (USFWS)
2017a U.S. Fish and Wildlife Service. IPaC list for Boxley Valley Comprehensive Plan. Accessed 10-10-2017:
<https://ecos.fws.gov/ipac/location/JZCUJELMTBGXDI37GSKWAJQV3I/resources/#endangered-species>.
2017b U.S. Fish and Wildlife Service. Snuffbox (*Epioblasma triquetra*) information sheet. Accessed 10-10-2017:
<https://www.fws.gov/midwest/endangered/clams/snuffbox/index.html>.
2017c U.S. Fish and Wildlife Service. Rabbitsfoot (*Quadrula cylindrica cylindrica*) information sheet. Accessed 10-10-2017:
<https://www.fws.gov/midwest/endangered/clams/rabbitsfoot/index.html>.
2017 Arkansas Natural Heritage Commission (ANHC). Research & Data, Rare Species Search (Newton County) website: <http://www.naturalheritage.com/research-data/rarespecies-search.aspx>.
- National Park Service (NPS)
1985 “Landscape Thinking,” by Robert Melnick, CRM Bulletin (Volume 8, No. 1).
1986 “Cultural Landscaping, Buffalo National River,” by Richard Alesch, CRM Bulletin (Volume 9, No. 4).
1990 “Big Buffalo Valley Historic District, (Boxley Valley Historic District),” National Register of Historic Places Nomination Form.
1997 Mott, David N. “Ten Years of Water Quality Monitoring.” *Buffalo National River*. Accessed September 15, 2019. <https://www.nps.gov/buff/learn/nature/upload/Mott-1997-Ten-Years-of-Water-25-Quality-Monitoring.pdf>.
1999 Buffalo National River Resource Management Plan. On file at the Buffalo National River Headquarters Office.
2003 “Trip report for archeological inventory and testing at several campgrounds and various small projects within the Buffalo National River, Arkansas, November 3 - 14, 2003.” Midwest Archeological Center.
2004 Mott, David N. and Laurass, J. Water Resources Management Plan for Buffalo National River. On file at the Buffalo National River Headquarters Office.
2006 NPS *Management Policies 2006*.
2009 “Archeological Prospection Investigations of the Yarbrough Open Site #4 (3NW303) at the Steel Creek Horse Camp in Buffalo National River, Newton County, Arkansas.” Midwest Archeological Center Technical Report No. 115.
2010 Cultural Landscape Inventory, Boxley Valley, Buffalo National River.

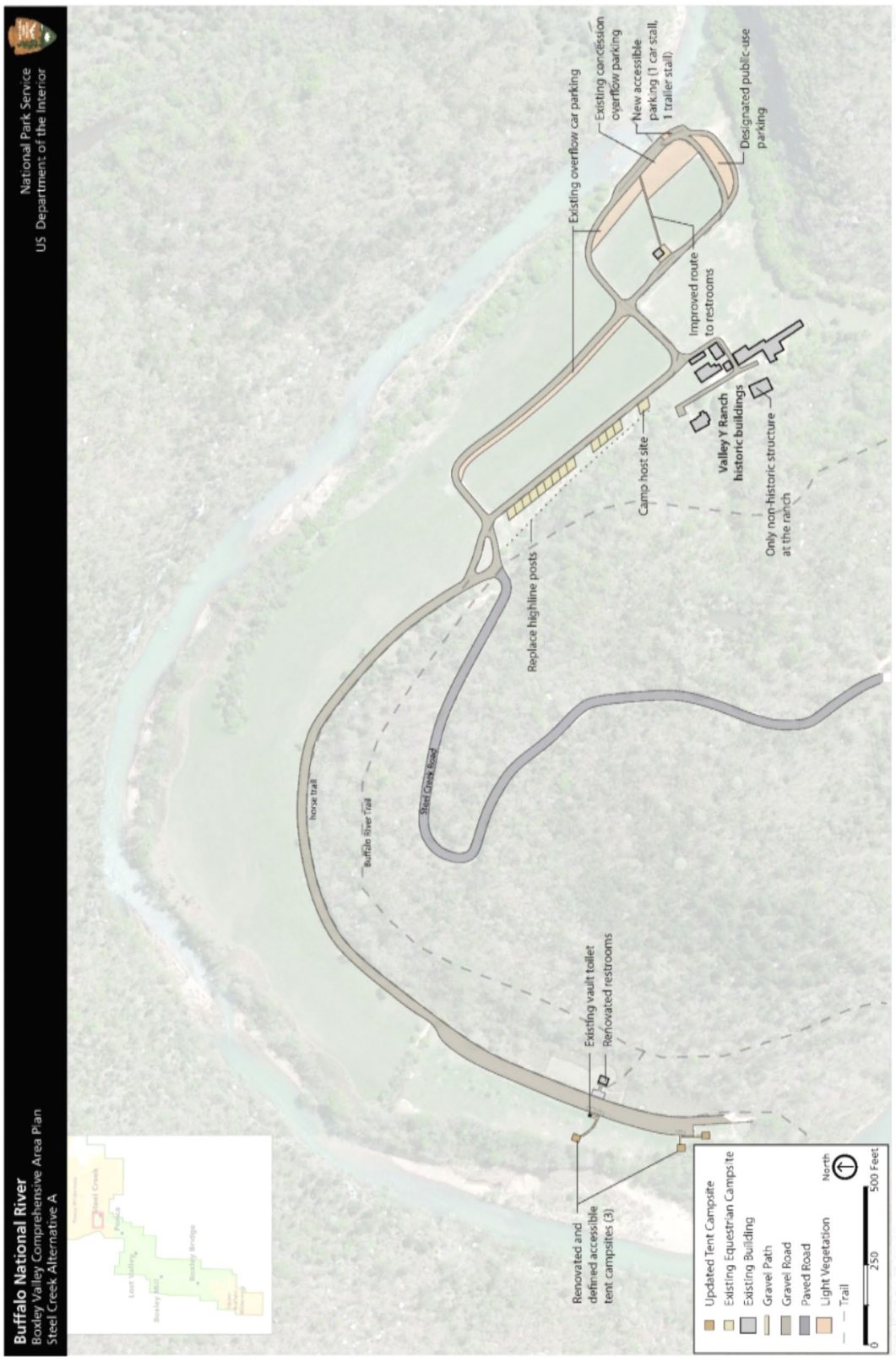
1 2013 Lost Valley Trail and Campground Environmental Assessment. On file at the Buffalo
2 National River Headquarters Office.
3 2015 Cultural Landscape Inventory, Valley Y Ranch at Steel Creek, Buffalo National River.
4 2018a Wetland Delineation Technical Report, Boxley Mill / Boxley Pond Area, Buffalo
5 National River. Prepared by NPS Water Resources Division. June 2018.
6 2018b Personal communication with Chuck Bitting, Buffalo National River Natural
7 Resource Program Manager. January 29, 2018.
8 2018c Erbie Road Improvements Environmental Assessment. On file at the Buffalo
9 National River Headquarters Office.
10 2019a Personal communication with Chuck Bitting, Buffalo National River Natural
11 Resource Program Manager. March 26, 2019.
12 2019b Biological Assessment for Boxley Valley Comprehensive Area Plan. On file at the
13 Buffalo National River Headquarters Office.
14 2019c Draft Elk Management Plan / Environmental Assessment. Buffalo National River,
15 Arkansas.

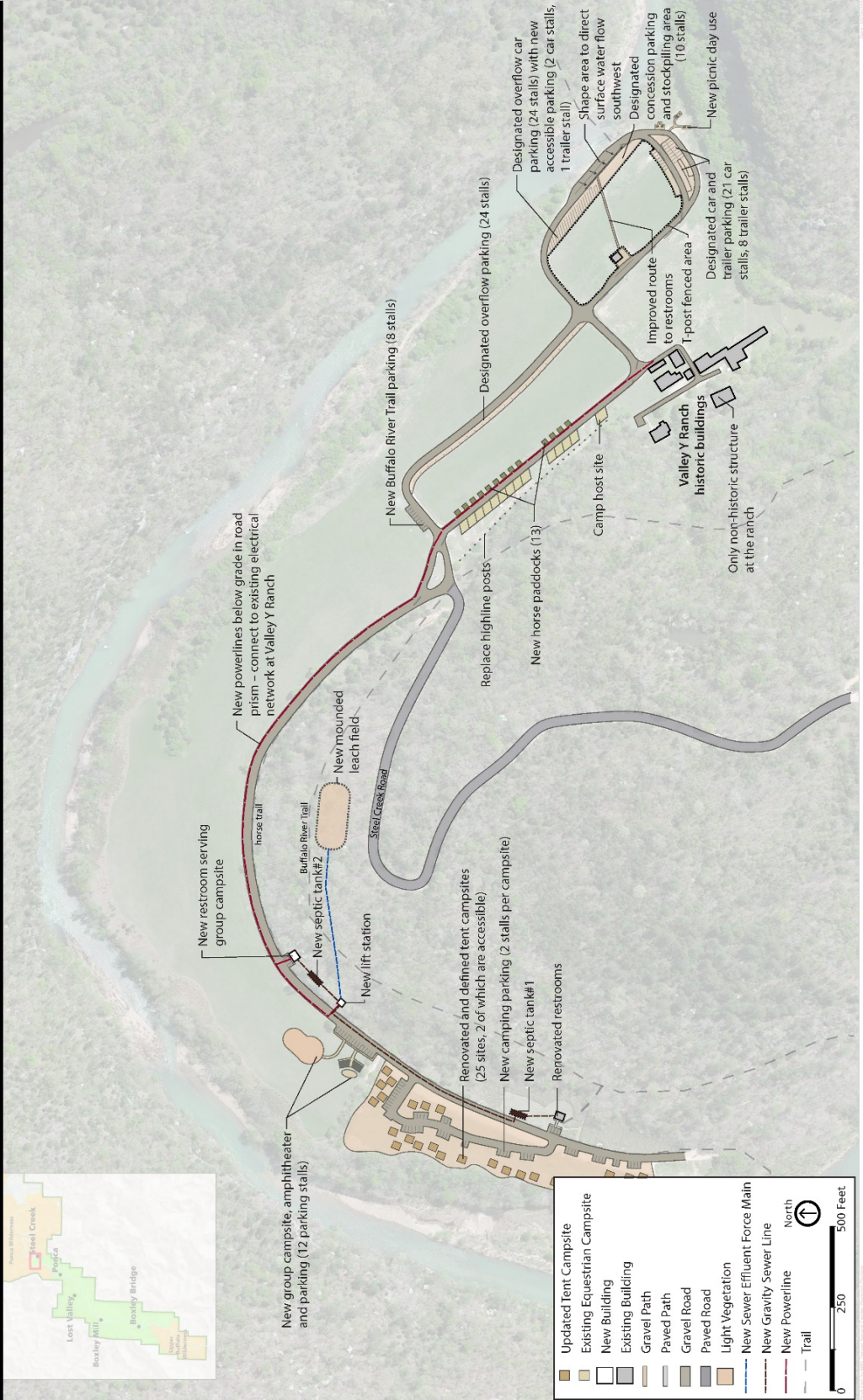
1

APPENDIX A: ALTERNATIVE SITE PLANS

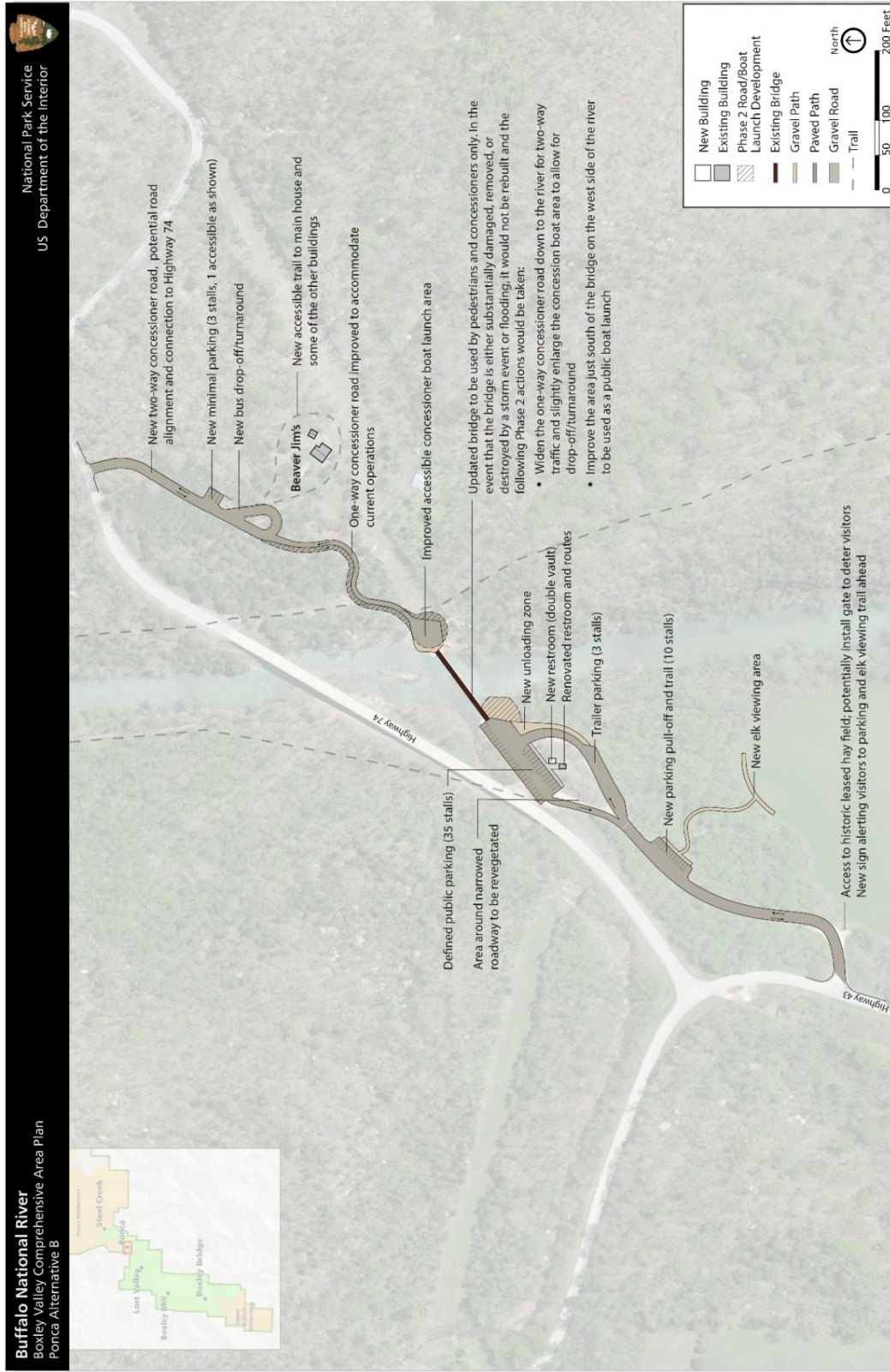
2

This page intentionally blank.





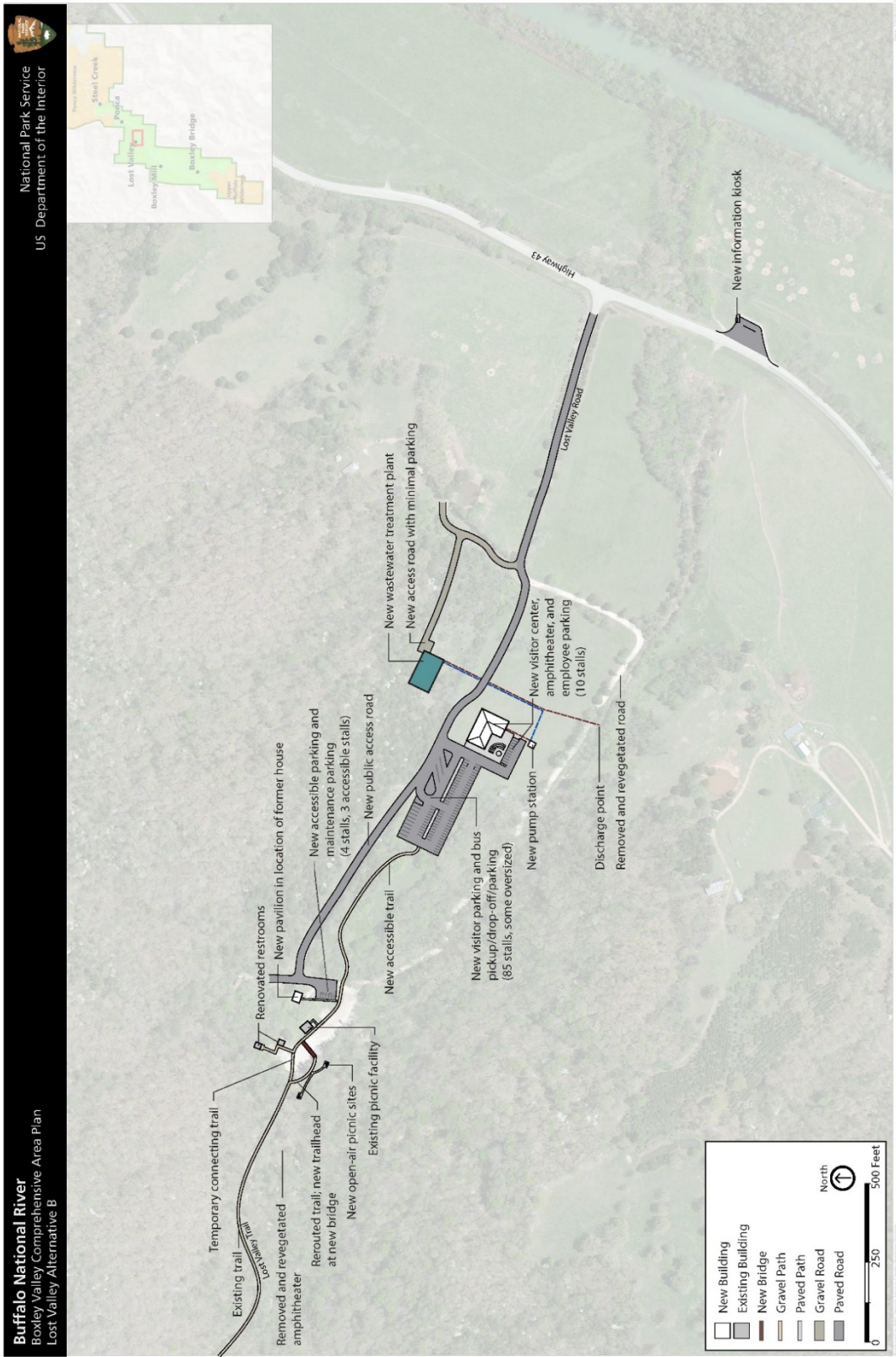












APPENDIX B: ALTERNATIVE B INDICATORS AND THRESHOLDS

This section provides additional information about the monitoring strategy as it relates to the visitor use management (VUM) framework for the Boxley Valley Comprehensive Area Plan (CAP). For additional resources in the VUM Framework please visit the following web address: <http://visitorusemanagement.nps.gov/> for a full description of the Interagency Visitor Use Management Council and Framework Guidance (IVUMC).

Monitoring is the process of routinely and systematically gathering information or making observations to assess the status of specific resource conditions and visitor experiences and is a critical step in successfully implementing any VUM plan. A monitoring strategy is designed and implemented to generate usable data for periodically comparing existing and desired conditions, assessing the need for management actions, and evaluating the efficacy of management actions. A well-planned monitoring strategy provides for transparency, communication, and potential cost savings through efficiencies and possibly cost sharing. A monitoring strategy includes the selection of indicators, along with establishment of thresholds or objectives, and any needed triggers. It also includes routine, systematic observations or data collection of the indicators over time as well as associated documentation and analysis.

Indicators, thresholds, monitoring protocols, management strategies, and mitigation measures would be implemented as a result of this planning effort and are described below. Indicators would be applied to the action alternatives described within this plan. Indicators translate desired conditions of the Boxley Valley CAP into measurable attributes (e.g., linear extent of visitor-created trails) that when tracked over time, evaluate change in resource or experiential conditions. These are critical components of monitoring the success of the plan and are considered common to all action alternatives. Thresholds represent the minimum acceptable condition for each indicator and were established by considering qualitative descriptions of the desired conditions, data on existing conditions, relevant research studies, professional judgement of staff from management experience, and scoping on public preferences.

The interdisciplinary planning team considered the central issues driving the need for the Boxley Valley CAP and developed related indicators that would help identify when the level of impact becomes cause for concern and management action may be needed. The indicators described below were considered the most critical, given the importance and vulnerability of the resource or visitor experience affected by types of visitor use. The planning team also reviewed the experiences of other park units with similar issues to help identify meaningful indicators. Not all of the strategies related to the indicators, thresholds and visitor capacity would be implemented immediately, rather as thresholds are approached or exceeded. Those strategies identified for use as needed are labeled as adaptive management strategies in each of the appendices. The impact analysis is included in chapter 3 so that the park can employ those as necessary to achieve desired conditions.

Crowding and Congestion at River Access Locations

Indicator: Number of boaters at one time (BAOT) at river access points during peak season at Ponca and Steel Creek Access locations.

Threshold

- (1) No more than 22 boaters at one time 80% of the time during peak season at Ponca Access.
- (2) No more than 40 boaters at one time 80% of the time during peak season at Steel Creek Access.

Rationale for Indicator and Threshold: This indicator applies to Ponca and Steel Creek Access, which are key locations in the project area. This is a well-known indicator in the field of social science and public lands research, and it would allow managers to understand the density of visitor use occurring at these two access locations. This indicator is useful as it allows NPS staff to accurately and efficiently evaluate the number of boaters at one time and compare those numbers to desired conditions for the area. "Boaters at one time" refers to the total number of boaters that are present at a site at any given point in time. Further, peak season is defined by the highest use time for the park, typically in the spring months when the river conditions provide excellent opportunities for river recreation. Peak season can shift slightly from year to year. This indicator also provides the opportunity to monitor for desired conditions related to providing visitors the opportunity to encounter natural resources, solitude, contemplation, and self-reliance.

The BUFF 2017 visitor surveys assessed visitor preferences for boaters at one time at Ponca Access (Cribbs, Brownlee, Sharp, & Peterson, 2017). The established threshold for boaters at one time aligns with visitor preferences and best professional judgement of park staff. Please see the Visitor Use and Associated Thresholds at Buffalo National River Research Report for more information about the methodology used to assess boaters at one time (Cribbs, Brownlee, Sharp, & Peterson, 2017).

Similarly, the threshold for Steel Creek was established based on results from research as well as the best professional judgement of park staff. Research identified visitor perception thresholds of no more than 50 BAOT at Dillards Landing and Gilbert. Like Steel Creek, Dillards Landing and Gilbert are considered to be larger river access sites. Park staff leveraged the visitor identified desired condition for PAOT and applied their understanding of Steel Creek. Given sensitive resources in the area and specifically proximate wilderness, the threshold at Steel Creek is slightly lower than that identified by visitors. Of primary importance in managing the Steel Creek access are the considerations of wilderness values across and downriver. The volume of visitors that launch from Steel Creek has the ability to impact downstream wilderness values. Therefore, even though we are managing access in the project area, the wilderness values were an important consideration for establishing an appropriate threshold.

Monitoring: Please see the Visitor Use and Associated Thresholds at Buffalo National River Research Report for more information about monitoring protocols for these thresholds (Cribbs, Brownlee, Sharp, & Peterson, 2017).

Management Strategies and Mitigation Measures:

- Develop and implement a public information effort about the desired conditions for the park and actions the National Park Service is taking to achieve those conditions and how visitors can best experience the park.
- Use innovative technology or methods to communicate with the public on other opportunities that are available to them within or outside of the park.
- Use press releases / media prior to historically crowded weekends to inform the public to be prepared for crowds.
- Where possible, encourage visitors to use sites that can handle high volumes of use during peak use times.
- Provide information on other visitor destinations within the park or nearby.
- Increase maps and signage about various destinations within and outside highly developed sites.
- Increase law enforcement.
- Manage to the visitor capacity for the area. To fulfill the requirements of the 1978 National Parks and Recreation Act (54 U.S.C. 100502), visitor capacity identifications and implementation strategies are legally required for all destinations and areas that this planning effort addresses (IVUMC 2016).
- Manage group size at appropriate locations.
- Designate some short-term parking spaces at key locations to ensure that parking lot use allows for a variety of people to visit that site over a day but keeps use levels within the thresholds.
- Commercial use would be regulated through updates to regulations and guidelines to operating contracts.

Crowding and Congestion at River Access Locations

Adaptive Management Strategy (implemented as thresholds are approached or exceeded): Develop a comprehensive river management plan.

1

Parking Lot Congestion

Indicator: Number of Vehicles at One Time (VAOT) at parking lots.

Threshold: VAOT does not exceed the design capacity of parking lots at the visitor destination more than 10% of the time per season.

Rationale for Indicator and Threshold: This indicator is a measure of visitors' ability to find parking at popular destinations. The park would monitor the number of vehicles being turned away upon arriving at their destination. This indicator would also help park staff understand the number of visitors displaced to other areas of the park. Monitoring this indicator and threshold will also allow for a greater understanding of visitor use patterns such as busy times of the year and the specific locations that crowding is occurring.

Monitoring: Periodically conduct an observational study of VAOT in parking lots and adjacent overflow areas to establish and update VAOT counts. Compare observed and/or estimated VAOT to the design capacity of parking lots.

Management Strategies and Mitigation Measures:

- Enforcement of parking and access restrictions, as well as site-management (signage, curbing, paving, re-veg, blockades) to resolve over-parking and visitor-created parking. Enforcement could occur through the use of a VUA or volunteer at crowded times of the day to assist with parking and temporary closures associated with full parking lots.
- Deploy Intelligent Transportation Systems (ITS) to provide visitors with information on the status of parking lots. This information would be conveyed to visitors prior to and/or upon entry to the corridor to facilitate seeking alternative experiences including those outside the corridor.
- Increase enforcement of endorsed parking only.
- Provide real-time information regarding parking and access opportunities (such as text alerts and radio station updates).
- Post signs indicating parking is at capacity (return at a later, designated time).
- Make greater public education efforts to encourage voluntary redistribution of use to off-peak times

Adaptive Management Strategy (implemented only as thresholds are approached or exceeded):

- Consider commercial service shuttles during designated times outside of peak use, before 10 a.m. or after Noon.
- Consider a temporary closure until more vehicles leave the area. Actions might include turning vehicles away.
- Update concession contracts to require shuttling between access locations, and stipulate that vehicles cannot be left at authorized launch sites.

Unauthorized Parking
Indicator: Number of cars parking in undesignated areas by area location.
Threshold: No more than 20 cars parked in undesignated parking areas.
Rationale for Indicator and Threshold: The indicator of the number of unauthorized parking addresses issues of vegetation trampling and loss, noise, and visitor experience. If unauthorized parking sites are used routinely, impacts occur to vegetation, and trash is often left. This indicator would help NPS staff understand where demand for parking and/or pull-offs exists, as additional authorized sites are developed within the park. By monitoring this indicator the park will be able to track resource damage when parking is occurring outside of designated areas. It will also provide key information about visitor interests. Monitoring for this indicator helps to ensure that the desired conditions exist for visitor opportunities to encounter natural resources, and the park can monitor the ecological integrity as well as the cultural resource impacts.
Monitoring: Monitoring will have to be a collaborative among law enforcement, interpretation, natural resource staff, and fees personnel in the Boxley Valley area during high-traffic weekends during the spring and fall. The most important locations to monitor will be the Highway 43 corridor through Boxley Valley (for elk viewing), the Lost Valley entrance road (trailhead overflow), Ponca Access (river access overflow and elk viewing), and Steel Creek Access (river access and trailhead overflow).
Management Strategies and Mitigation Measures: ▪ Provide updated information on designated sites and regulations for parking. ▪ Assess use levels of the visitor-created sites to determine the appropriate action needed to discourage use of the site(s). ▪ Assess visitor-created sites that are being used continuously, and designate, if appropriate. ▪ Increase law enforcement presence.

Campsite Disturbance
Indicator: Percent increase in the area of disturbance at a designated campsite.
Threshold: No more than a 10% increase in area disturbance or vegetation loss at a campsite beyond infrastructure impacts.
Rationale for Indicator and Threshold: This indicator of the area of disturbance at campsites addresses issues of vegetation removal and site deflation. If the area of disturbance at a campsite continues to expand, the impact to vegetation increases as well as exposes artifacts and diminishes the visitor experience. This indirectly contributes to visitor-created trails and potential visitor conflict. The park is not currently meeting the desired conditions for campsites and therefore will seek to achieve the minimum established threshold. Monitoring for this indicator ensure that the desired condition to protect natural resources consistent with cultural resource values is maintained and achieved at Steel Creek.
Monitoring: The baseline campsite area is likely about 800 to 1,000 square feet. Currently, the area of disturbance likely exceeds 10%. Annual monitoring would occur to determine if the threshold is exceeded. USGS satellite imagery could be used in combination with on-site observations. Campground hosts may be able to inform park staff of sites in need of attention.
Management Strategies and Mitigation Measures: ▪ Sign restoration areas. ▪ Delineate sites and appropriately define them with vegetation, evaluate existing visitor-created trails, and evaluate the potential for establishing designated trails within the campground for visitor use. ▪ Allow for no more than two small tents or one large tent per site (currently allow no more than six people per site). Tents to be permitted only in designated tent sites. ▪ Anchor picnic tables. ▪ Revegetate key areas and plan appropriate cyclic maintenance. ▪ Provide updated information on campground rules and regulations. ▪ Assess visitor-created trails between campsites and designate if appropriate. ▪ Increase law enforcement, NPS staff, or volunteer presence at campground for education and enforcement.

Trail Conditions
Indicator: Percent change in trail condition classification.
Threshold: No more than 10% change in trail condition classification.
Rationale for Indicators and Thresholds: Monitoring for this indicator and threshold will ensure the trail conditions remain consistent over time. This indicator also accounts for monitoring related to soil compaction and expansion from trampling, soil moisture, and freeze and thaw cycles. It can also be indicative of unsustainable use on particular trails or that the trail design is not effective. This indicator was selected based on its ease of measurement, ability to provide useful data, cost-effectiveness, and ability to provide useful results any time of day or year. A 10% change in trail width and depth can inhibit vegetative growth and cause continual soil loss. Monitoring for this indicator will also allow the park to ensure desired conditions for minimizing the effects of development and visitor use through planning and design efforts are maintained and achieved.
Monitoring: The park will establish baseline trail condition classifications (which have a corresponding standard for trail width and depth). The park will establish monitoring protocols for trail width and per trail segment based on condition classes. Any new trail construction will follow trail standards.
Management Strategies and Mitigation Measures: Strategies to manage trail widening: ▪ Establishing trail borders with rocks, logs, or fencing. ▪ Advertising areas of muddiness, erosion, and excessive rockiness to contain the lateral spread of traffic along particular areas. ▪ Education encouraging visitors to stay to the center of the trail (more impact if a ranger provides direct contact). ▪ Strategically placing rocks, logs, or fences in select areas to constrain the trail width. Strategies to manage excessive soil loss: ▪ Hardening treads, where appropriate, through the application of gravel or rockwork. ▪ Installing rock steps when grades are steep. ▪ Incorporating periodic grade reversals within steeper treads that are carrying water. ▪ Water bars and outsloped treads. ▪ Drainage control structures. ▪ Temporary trail closures. ▪ Mulching. ▪ Sustainable (re)design. ▪ Install boardwalks and structures.

Inappropriate Visitor Behavior
Indicator: Number of reported cases of inappropriate behavior (i.e., off-leash dogs, dogs on trail, nuisance noise, drones, unauthorized use on trails or in other areas, etc.).
Threshold: No more than 10 cases of reported inappropriate behavior per week during at least 80% of peak visitation days.
Rationale for Indicator and Threshold: In addition to incidence of off-leash dogs, dogs on trail, nuisance noise, unauthorized use on trails or in other areas, etc., this indicator would monitor the incidence of unauthorized activities that occur on park land that may require a special use permit (e.g., unauthorized weddings, baptisms, or other large group events). Presence of staff and campground hosts during the peak season at key areas will influence how many incidents of inappropriate behavior are reported. Unendorsed behaviors become a primary safety concern and negatively impact visitor experience and park staff. This indicator and threshold supports protection of resources and visitor safety to ensure visitors can recreate in a safe environment that is supported by a variety of visitor services.
Monitoring: Monitoring protocols will need to be put in place to ensure that there is a weekly exchange of information among staff. River rangers, law enforcement staff, and interpretive staff may all need to assist in capturing this reporting during the busy season. There is an approximately 6-week peak activity period depending on water levels.
Management Strategies and Mitigation Measures: ▪ Consistent assessments of areas would need to be conducted. ▪ Placing campground reservation online may be helpful to tracking use and registering visitors' personal information, making it less likely they would participate in inappropriate behavior. ▪ Stepped up education oriented towards park regulations related to keeping dogs on leash and authorized trail uses. ▪ More direct contact and in-person education would be helpful. ▪ Establish trail watch volunteers to assist with recording incidents and disseminating information about appropriate trail use and visitor behavior. Adaptive Management Strategy (implemented only as thresholds are approached or exceeded): ▪ Area closures would only be considered after a range of management strategies have been implemented and are shown to be inadequate.

Damage to Property
Indicator: Number of reported incidents of damage to property (e.g., graffiti, vandalism, theft).
Threshold: No more than four incidents per year of damage to property.
Rationale for Indicator and Threshold: Most of these types of incidents are typically more serious and are often classified as felonies. Damage to property may include private property or cultural or natural park resources or government property. Damage to these resources or sites can occur through both intentional and unintentional means. Both can cause impacts that influence the integrity of resources. This indicator will help ensure desired conditions for important park resources are achieved.
Monitoring: This information is available to track via the Incident Management and Reporting (IMARs) system. Continue to record incidences of vandalism or theft. Review incident reports on a yearly basis. Strongly advertise that visitors report and help monitor any harmful activities, theft, or damage to property.
Management Strategies and Mitigation Measures: ▪ Prioritize documentation of resources in high visitor use areas. ▪ Continue monitoring and patrolling and have a higher frequency of condition assessments, including archeological site monitoring, in sensitive areas with high visitor use (as recorded by trail counters). ▪ Educate visitors on the sensitivity of resources and the need to protect historical and cultural sites. ▪ Target education to groups that are accessing areas with historical sites. ▪ Increase ranger presence or patrol. ▪ Increase and/or develop trail watch volunteers. ▪ Install viewscopes at wildlife viewing locations. ▪ Prioritize and increase enforcement and documentation. ▪ Reroute trails and examine potential temporary closures. ▪ Create physical barriers. Adaptive Management Strategy (implemented only as thresholds are approached or exceeded): ▪ Area closures would only be considered after a range of management strategies have been implemented and not demonstrated effectiveness.

Septic System Functionality
Indicator: Daily water flow rate (gallons/day) into septic systems at Steel Creek and Lost Valley.
Threshold: Daily flow rate does not exceed the design capacity of the septic system more than 10 days per season.
Rationale for Indicator and Threshold: This indicator is a measure of visitor density at Steel Creek and Lost Valley, where there are flush toilets. The park would measure usage compared to designed capacity to determine if the infrastructure can support the visitation that is occurring. Septic systems can fail when they are routinely overloaded, so monitoring this data will help protect park infrastructure. It will also help the park to track if these sites 'use seasons' change over time. Occasional overloading is not as detrimental, hence the 10 days per season threshold to account for peak floating weekends. This data could also be used to verify that all facilities are sized to the same thresholds. For instance, if the parking lot capacity is regularly reached, but the sewage capacity is not, then the toilet system is adequately designed. If the converse is true, where sewage capacity is being reached but no other indicators are revealing problems, then the toilet system may need to be revisited. This indicator will also ensure the desired condition are maintained for visitors to experience a modified natural environment that is designed to accommodate concentrated visitor use levels.
Monitoring: Collect meter readings on daily usage. Collections can be monthly or more regularly if threshold is being neared. Compare observed usage to the design capacity of the septic systems.
Management Strategies and Mitigation Measures: - Management strategies and mitigation measures would be similar for other indicators for parking and crowding. - Enforce parking design capacity to avoid regular overuse.

This page intentionally blank.

APPENDIX C: VISITOR CAPACITY IDENTIFICATION

OVERVIEW

This appendix provides additional information about the visitor capacity identification as it relates to the visitor use management (VUM) framework for the Boxley Valley Comprehensive Area Plan (CAP). Please refer to chapter 1 of this plan for a description of this framework that is common to all alternatives. For additional resources in the VUM Framework please visit the following web address: <http://visitorusemanagement.nps.gov/> for a full description of the Interagency Visitor Use Management Council and Framework Guidance (IVUMC). IVUMC defines visitor capacity as the maximum amounts and types of visitor use that an area can accommodate, while achieving and maintaining the desired resource conditions and visitor experiences that are consistent with the purposes for which the area was established. Visitor capacities were identified using best practices and examples from other plans and projects across the National Park Service. Based on these best practices, the planning team describes the process for identifying capacity following guidelines: 1) determining the analysis area, 2) reviewing existing direction and knowledge, 3) identifying the limiting attribute, and 4) identifying visitor capacity.

THE ANALYSIS AREA

Key areas were selected as destinations where high levels of use are currently or are projected to cause impacts to natural and cultural resources, and visitor experiences and related directly to desired conditions. For these key areas, a detailed analysis has been conducted to identify the visitor capacities. The visitor capacities will be used to implement management strategies for these sites as part of the plan. The following four key areas were identified:

- Ponca Access
- Steel Creek Access
- Boxley Mill
- Lost Valley

To fulfill the requirements of the 1978 National Parks and Recreation Act (54 U.S.C. 100502), visitor capacity identifications are legally required for all destinations and areas that this planning effort addresses (IVUMC 2016). Together, the above four key areas comprise the majority of the visitor use areas within the project area. Future monitoring of use levels and indicators will inform the National Park Service if use levels are at or near visitor capacities. If so, adaptive management strategies as outlined in this plan would be taken (see “Chapter 2: Visitor Use Management: Indicators, Thresholds, and Visitor Capacity”).

Review of Existing Direction and Knowledge

Context for Boxley Valley at Buffalo National River. During this step, the planning team developed desired conditions, indicators, and thresholds, with particular attention to conditions and values that must be protected and are most related to visitor use levels. Desired conditions for these areas can be found in “Chapter 2: Alternatives.” For each key area, relevant indicators are listed, the associated thresholds can also be found in chapter 2. An overview of visitor use issues and current use levels for each key area can be found in “Chapter 3: Affected Environment and Environmental Consequences.”

The amount, timing, and distribution of visitor use in the project area for the Boxley Valley CAP at Buffalo National River influence both resource conditions and visitor experiences. The levels and patterns of visitor use are causing moderate negative impacts to visitor experiences and more evident negative impacts to cultural and natural resources. These impacts influence the ability of the

National Park Service to maintain desired conditions. Appropriate management strategies can then be selected and implemented to maintain desired resource conditions and visitor experiences consistent with the purposes for which the park was established. Other data sources include visitor use research conducted between 2017 and 2018 by research teams. This information was used to understand conditions during those years and used as estimates to begin to understand the appropriate amounts and types of visitor use areas Boxley Valley can accommodate. Throughout the capacity analysis, the following technical report is cited *Visitor use and associated thresholds at Buffalo National River* (Cribbs, Brownlee, Sharp, & Peterson 2017).

In addition, the action alternatives were assessed for the primary differences related to the amounts, timing, distribution, and types of use. The primary difference for visitor use issues between the two alternatives is in the type of access provided at Ponca Access. The differences in the alternatives suggest the need to look at different capacities for alternatives regarding Ponca access. For the remaining areas, the visitor capacity will remain consistent across the alternatives.

Identify the Limiting Attribute

This step requires the identification of the limiting attribute(s) that most constrain the analysis area's ability to accommodate visitor use. The limiting or constraining attribute(s) may vary across the analysis area and is described under each key area in the *Limiting Attribute and Relevant Indicators*. This is an important step given that a key area could experience a variety of challenges regarding visitor use issues.

Identify Visitor Capacity

To identify the appropriate amount of use at key areas, outputs from previous steps were reviewed to understand current conditions compared to desired conditions for the area. Visitation data that is collected annually by the National Park Staff to track levels of visitor use parkwide and by area was used as a data source. The National Park Service also collects annual data including counts of fees, parking availability, trail counts, and other data.

PONCA ACCESS

Ponca Access is a popular river access location with other opportunities such as horseback riding, hiking, elk viewing, and both commercial and public boating river access. Water levels on the river often determine the demand (types and amounts of use) at Ponca Access. Specifically, during paddling season, congestion is related to river access and is mostly commercial and private boaters launching during a condensed period of time. The lower the water levels, the more likely there are to be alternative use types such as equestrian use and elk viewing. Oftentimes the total amount of uses balances out over most times of the year. The exception to this is during paddling season when Ponca Access can become quite crowded. Higher water levels can indicate more boaters. Most boaters access Ponca in the morning to launch between a 2- to 3-hour window. The ratio of commercial to private use is about 60:40, which was adapted from the Buffalo River Floating use and Angler creel survey (Todd & Hodges 2014). Commercial use has a relatively fast turnover rate at Ponca Access. During the month of May, concessioners are not permitted to launch between the hours of 9:00 a.m. and noon on Saturdays as a part of their contracts at Ponca Access. An overview of commercial use is provided below and compared to Steel Creek (figure C-1).

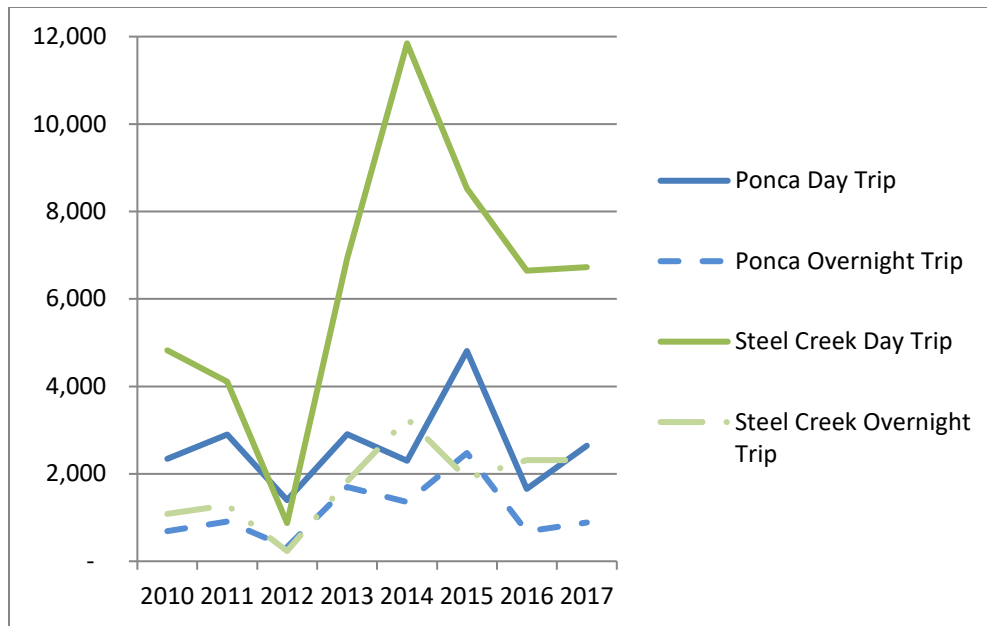


FIGURE C-1. COMMERCIAL USE AT PONCA AND STEEL CREEK

Further, at Ponca, the commercial user maximum weekend day (Friday, Saturday, and Sunday) reported use total was 455 since 2014, which averages to a max people per day of 132. Figures C-2 and C-3 visually describe the weekend day totals for commercial use and the average PAOT for commercial use at the Ponca Access.

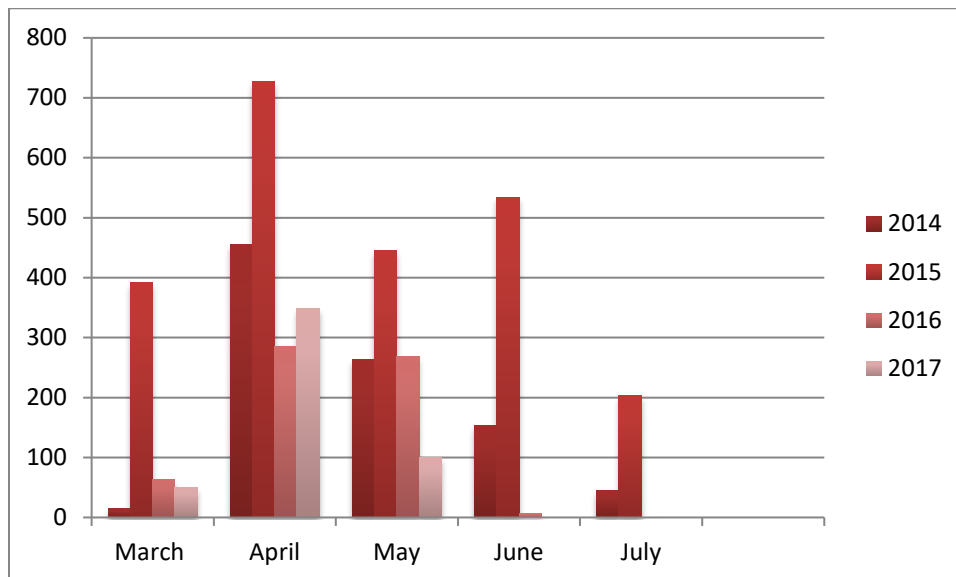


FIGURE C-2. WEEKEND DAY TOTALS FOR COMMERCIAL USE AT PONCA ACCESS

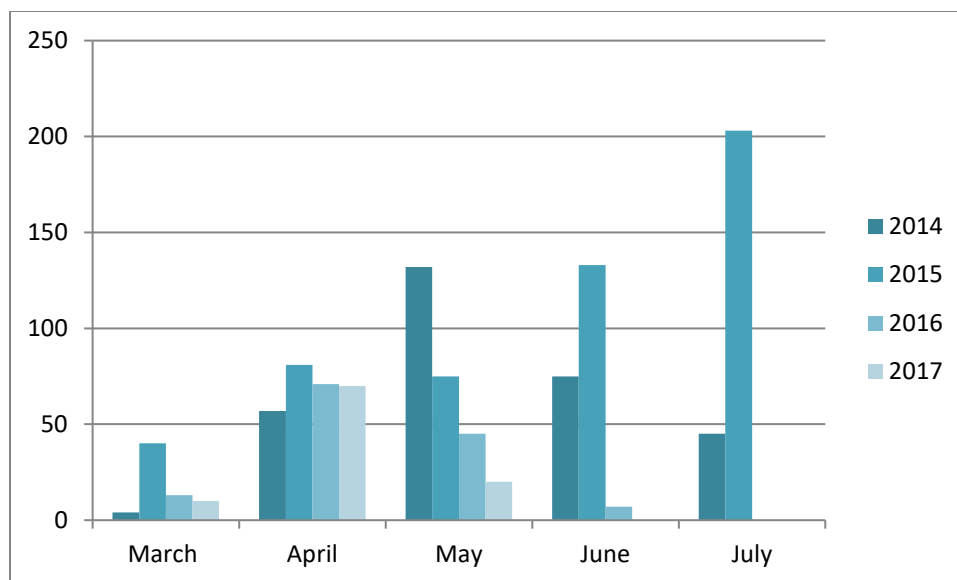


FIGURE C-3. AVERAGE PAOT FOR USE AT PONCA ACCESS

Visitor preferences from research at the park identified that no more than 22 people with watercraft at one time was acceptable. The number of people identified was not segmented by commercial or public visitor use, only overall use in the viewscape of Ponca Access. At Ponca (or similar areas), approximately 80% of visitors report that the National Park Service should take management action when 20 people are present at one time, and 75% report that they would not return to the site if 22 people were present at one time. Approximately 16% of visitors reported that use at river access areas should never be limited regardless of conditions, suggesting that a portion of the visiting population is opposed to the idea of limiting visitor use. At Ponca, Kyles, and Hasty, the average weekday (one to two people), weekend (two to three people), and holiday (one to four people) conditions are within the acceptable range (0–22 people). Alternatively stated, the average conditions at Ponca, Kyles, and Hasty do not exceed or violate visitors’ threshold for the amount of people at one time. However, there are several times in the year when the maximum count on a weekday, holiday, or weekend recorded by the camera exceeded visitors’ desired conditions. Specifically, on separate days there were 70 at Ponca. These conditions far exceed the threshold of 22 people at one time for these sites (Cribbs, Brownlee, Sharp, & Peterson 2017).

The most limiting attributes constraining visitor use at Ponca Access are the visitor experience and the physical space. The visitor experience is the most constraining as the number of boaters launching at Ponca has a direct impact on the ability for visitors to achieve their desired experience. The size and location of the loading area in addition to the area’s multiple uses can constrain the amounts and type of visitor use that are appropriate at the access at any one time. The most relevant indicator to monitor changes in these conditions is the *number of boaters at one time*. Ponca is in the Cultural/Historic Zone and as such the desired conditions for visitor experience is for a *wide range of interpretation and education opportunities and moderate level of commercial visitor services would be provided, such as canoe rentals, guided canoe trips, and limited land based activities such as guided hiking, camping, rappelling, firewood sales, photography, and horseback riding*. Given the focus on a wide range of interpretation and education opportunities couples with moderate levels of commercial services, the visitor experience is the primary limiting attribute at Ponca Access.

Visitor Capacity at Ponca and Implementation Strategies

Alternative B. Under alternative B, there would exist 35 parking stalls in the primary day use area, a horse trailer parking area with three parking stalls, a new designated elk viewing area with 10 parking stalls, a new boat drop off parking area and accompanied one-way concessioner road, and three parking stalls for access to Beaver Jim's. A total of 51 parking stalls would be available for day use parking. Commercial drop offs would occur on the east side of the river and the boat launch would be improved.

For alternative B, the park identified the need to maintain current levels related to hiking, horse use, and boat launching for commercial and public visitors, while wildlife viewing areas could increase from current use levels. These decisions were made based on knowledge that these types of uses peak during different seasons. For example, when it is peak floating season, it is not necessarily an ideal time for horse use. The same is true of peak season for elk viewing, which does not necessarily coincide with peak floating season.

Alternative B also includes phased site improvements in the event that the Ponca low-water bridge is either substantially damaged, removed, or destroyed by a storm event or flooding. If this were to occur, the bridge would not be rebuilt and the park would:

- Expand two-way road access on east side of the river from the parking area at Beaver Jim's south to the concession boat access on the east side of river.
- Provide for commercial use on the east side of the river by developing a turnaround at the east boat ramp for commercial use (providing room for concession-operated vans with trailers for kayak and client drop off).
- Provide river access to private boaters from the existing west lot at a new put-in located on the west side of the river just upstream from the current bridge.

Given these considerations for the Ponca low-water bridge associated with damage or destruction by flooding, the park identified the need to decrease visitor use levels related to hiking because access to the east side of the river would no longer be possible from the public use parking area. Therefore, that activity would no longer be available to visitors from the Ponca area. The park would maintain current levels related to horse use and boat launching for commercial and public visitors, while wildlife viewing areas could increase from current use levels. To complement the removal of the bridge, the park would pursue an improved public boat launch area with parking stalls (not designated for commercial drop offs).

Area /Type of Use	Change from Current Condition	Visitor Capacity
Launch Area/Boat Use	Maintain for commercial and private users	22 People/Boaters ¹ At One Time (PAOT)
Day Use (equestrian use, wildlife viewing, hiking and others)	Maintain	140 PAOT (51 parking stalls x 2.7 PPV)
Private Non-commercial Boating Area (might be needed during phased implementation)	Increase	88 PAOT

¹ People/Boaters At One Time represents those visitors in the launch area for boating purposes.

Strategies to implement visitor capacity:

- Continue to manage traffic at launch areas during highest volume days.
- Designate area for parking for types of uses.
- Recommend alternative use area during times of high congestion.
- Continue to use “temporary closures” (e.g., 10 to 15 minutes to relieve congestion at launch areas).
- Manage group size at appropriate locations.
- Designate some short-term parking spaces at key locations to ensure that parking lot turnovers encourage a large number of people to visit that site over a day but to keep the PAOT within thresholds.
- Concessions use would be regulated through updates to regulations and guidelines to concessions contracts.
- Update concession contracts for shuttling vehicles away from the authorized launch area.

STEEL CREEK

Steel creek is another popular river access location that offers a swimming hole, open field camping, picnicking, and access for the public and commercial uses to enjoy the Buffalo River. Moderate to high use levels occur at Steel Creek, and special uses have increased including demand for wedding permits. The horse trail is typically used in fall when boating congestion decreases because of less flow in the river. Equestrian use is desirable when river levels are low, while boating is desirable during higher river levels.

The ratio of commercial to private use is about 60:40, which is the same as at Ponca Access. Commercial use has a relatively fast turnover rate at Steel Creek Access. An overview of commercial use is provided above and compared to Ponca, which is a sum of all the reporting weekend days in a month. Further, at Steel Creek, park staff and the interdisciplinary team assessed the commercial use data reported by commercial use authorizations to the park since 2014. July could have been a low water month during these years. Figures C-4 and C-5 provide an overview of commercial use at Steel Creek as reported by commercial use authorizations.

Steel Creek is considered by park staff to be one of the larger river access sites. While visitor data is not specific to Steel Creek, information from Dillard's Ferry and Gilbert can be applied given the similar nature of these launching locations. Visitor preferences from research at the park identified that no more than 50 people with watercraft at one time was acceptable at larger river access sites such as Dillard's Ferry and Gilbert (or similar areas). The number of people identified was not segmented by commercial or public visitor use, only overall use in the viewscape of the launching area at these locations. At Dillard's (or similar areas), 86% of visitors report that the National Park Service should take management action when 49 people are present at one time, and 78% report that they would not return to the site if 54 people were present at one time. Approximately 16% of visitors reported that use at river access areas should never be limited regardless of conditions, suggesting that a portion of the visiting population is opposed to the idea of limiting visitor use. At Dillard's, the average weekday (one person), weekend (five people), and holiday (five people) conditions are within the acceptable range (0 to 50 PAOT). Alternatively stated, the average conditions at Dillard's Ferry do not exceed or violate visitors' threshold for the amount of people at one time (Cribbs, Brownlee, Sharp, & Peterson 2017). See figure C-5.

The most limiting attributes constraining visitor use at Steel Creek are the cultural landscape, visitor experience and designated wilderness on the other side of the river. Each of these limiting attributes contributes to constraining visitor capacity at Steel Creek. Steel Creek is zoned as Developed and

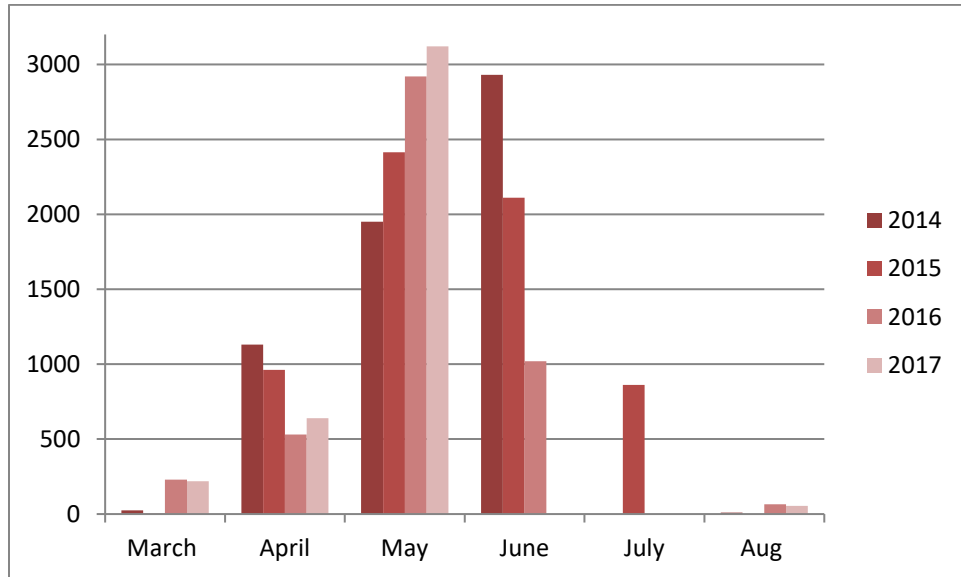


FIGURE C-4. WEEKEND DAY TOTALS FOR COMMERCIAL USE AT STEEL CREEK¹

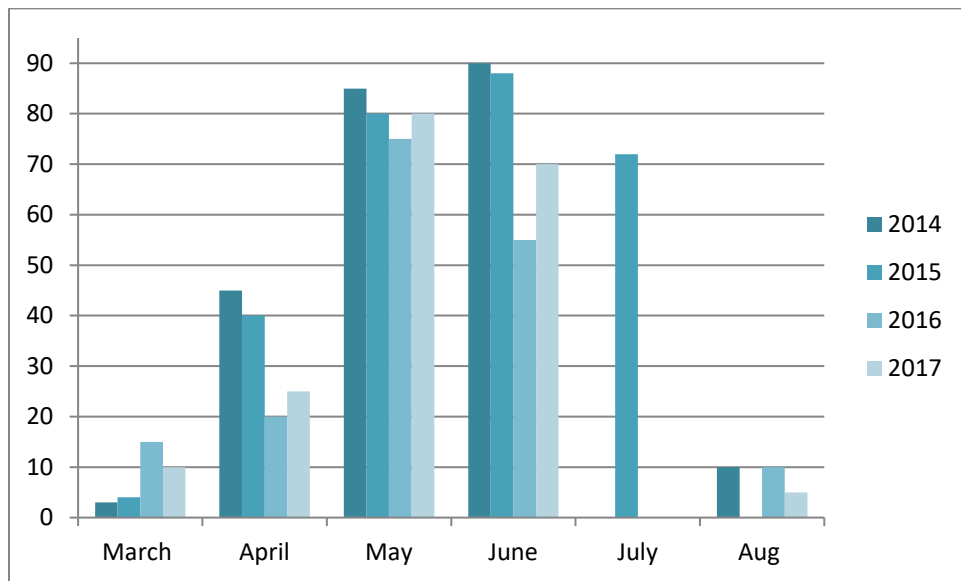


FIGURE C-5. AVERAGE PAOT FOR COMMERCIAL USE AT STEEL CREEK¹

¹Assumes majority of commercial users launch between 9 a.m. and Noon.

Cultural/Historic. As a part of the Cultural/Historic Zone, protection of the cultural landscape associated with Valley Y Ranch includes *opportunities for visitor use and interpretation that do not compromise important resource values and character-defining features*. The visitor experience will also constrain visitor use, as current overnight experiences are less than desirable and not meeting desired conditions for the area. Desired conditions for the visitor experience are blended between the Cultural/Historic zone and Developed zone. In this area visitors should have

- *a wide range of interpretation and education opportunities and moderate level of commercial visitor services would be provided such as canoe rentals, guided canoe trips, and limited land-based activities such as guided hiking, camping, firewood sales, photography, and horseback riding, and*
- *opportunities to better understand the national river's significant resources and values; interact with other visitors and NPS staff; and recreate in a safe environment that is supported by a variety of visitor services.*

Designated wilderness is on the other side of the river at Steel Creek access and was identified as a limiting attribute constraining visitor use in the area. The visitor capacity at Steel Creek was identified being mindful of how many visitors launching from Steel Creek enter wilderness directly downstream. This was an important consideration in identifying visitor capacity. The most relevant indicator to monitor changes in these conditions is the *number of boaters at one time, number of cars at parking lots, area of disturbance at designated campsites, and number of cases of inappropriate behavior*.

Visitor Capacity at Steel Creek and Implementation Strategies

Alternative B. Under alternative B, there would exist eight parking stalls at the new Buffalo River Trailhead parking lot, 24 stalls in designated overflow parking near the river launch. In addition, the secondary designated overflow lot would accommodate approximately 24 parking stalls; 10 stalls would be designated for concessions parking and stockpiling, with 21 car stalls with eight trailer stalls designated near the new picnic day use area. A total of 95 parking stalls would be available for day use parking.

Area /Type of Use	Change from current condition	Visitor Capacity
Launch Area/Boat Use	Maintain for commercial and private users	22 People/Boaters ¹ At One Time (PAOT)
Overnight Use	Increase	133 PAOT in the campground overnight 25 campsites which includes two accessible sites Up to four adults at each site One group campsite of up to 25 people
Equestrian Overnight Use	Increase	102 PAOT and 68 stock at one time 15 equestrian sites with two accessible sites Six people and four stock users per site

Area /Type of Use	Change from current condition	Visitor Capacity
Day Use (equestrian use, wildlife viewing, hiking, boating access outside of immediate launch area and others)	Maintain	250 PAOT
Weddings (Special Uses)	Increase	One wedding per weekend of no more than 100 PAOT and no more than two times a month. Weddings will be set up after 3 p.m. when congestion in the area. One wedding per weekend of no more than 25 PAOT on the gravel bar behind the campground.

¹ People/Boaters At One Time represents those visitors in the launch area for boating purposes.

Strategies to implement visitor capacity:

- Increase NPS staff presence in the area for the purposes of trip planning and visitor safety.
- Manage group sizes at appropriate locations.
- Require camping reservations via an online system.
- Designate some short-term parking spaces at key locations to ensure that parking lot turnovers encourage a large number of people to visit that site over a day but to keep the PAOT within thresholds.
- Designate commercial and private launching areas.
- Consider commercial service shuttles during designated times outside of peak use, before 10 a.m. or after Noon and require that vehicles be left off-site from the authorized launch area. Maintain through updates to the concessions contract.
- Continue to manage special events through special use permits or commercial use authorizations as appropriate.
- Concessions use would be regulated through updates to regulations and guidelines to concessions contracts.

Adaptive Management Strategy (implemented only as thresholds are approached or exceeded):

- Continue to use “temporary closures” (e.g., 10-15 min to relieve congestion at launch areas).

BOXLEY MILL

The Mill area has been open for guided tours since 2008, and then in October of 2017, the mill was opened on the weekend to visitors. The park provided tours for 775 visitors and 299 students on school field trips. The Boxley Mill was also an area of concentration for a ‘Bio Blitz’ event where about 30 visitors participated in citizen science. The mill is only accessible to visitors when park staff are onsite. Throughout the year, groups can and often call to reserve a ranger-led tour. The area is operated per a historic lease with the Gorgas Foundation that concludes in 2042.

The area is heavily managed and controlled by the National Park Service, and therefore major concerns related to the amounts and types of visitor use impacts to resources and desired conditions are limited. Unapproved access to the mill has occurred, very rarely. While there are some security issues, there’s no damage to date that the park has documented from visitors.

The most limiting attribute constraining visitor use in the Boxley Mill Pond area is the cultural landscape and the natural resources in the area. Boxley Mill is in the Cultural/Historic Zone, and as such the desired conditions emphasizes protection and interpretation of historic structures, archeological sites, and cultural landscapes. The Boxley Mill itself is also a historic resource, and its structural integrity was considered during the visitor capacity process. Moderate levels of visitor services such as orientation, interpretive, and educational programs related to cultural resources are provided. Further visitors would be provided with a wide range of interpretation and education opportunities and encounter cultural resources that provide opportunities for inspiration, contemplation, and education. Opportunities to continue cultural connections to place would be developed. The most relevant indicator to monitor changes in these conditions is the *number of reported incidents of damage to property (e.g., graffiti, vandalism, theft)* and *number of cars parking in undesignated areas*.

Visitor Capacity at Boxley Mill and Implementation Strategies

Park staff identified numerous strategies to implement the capacity for Boxley Mill Pond area. The Boxley Mill Historic Structure and building will be open to guided tours only. Guided tours of Boxley Mill would consist of no more than 10 people per group. The area around the mill and the mill pond would be self-guided along the improved paths. Given the sensitivity of the Mill and limited parking (15 improved parking stalls), park staff identified a visitor capacity of 38 PAOT. Under alternative B, this is an increase in current visitor use levels. This capacity would be higher during times when school groups are scheduled to be on site. A school bus turnaround will be provided to accommodate school group tours and events of the area would be scheduled during off-peak hours (outside of elk rut and fall colors) to reduce overlapping visitor use and potential crowding in the parking areas and around the mill and mill pond. School group tours will accommodate one school bus at a time no more than twice a day and will be scheduled through the Buffalo National River Education Program.

LOST VALLEY

Lost Valley is a high day-use area where visitors are largely accustomed to frequent encounters with other visitors. Types of use a Lost Valley predominantly include hiking and nature wildlife viewing. In research conducted by KSU and Clemson Universities, 81% of visitors reported that “hiking” was their main reason for visiting the area followed by experiencing “Nature/Wildlife,” which was reported by 33% of visitors (Cribbs, Brownlee, Sharp, & Peterson 2017). The visitor survey reflects data collected under current park conditions, without potential infrastructure such as a visitor center and supporting facilities.

Under current conditions, from the Lost Valley parking lot visitors can access a trail to Eden Falls and Cob Cave. Visitor preferences for encounter rates was assessed by recent social science research (Cribbs et. al. 2017). Visitors report preferences of no more than 35 people encountered during a one-hour time while hiking; when 35 or more hikers are encountered, use levels become unacceptable. Visitors report that the National Park Service should take management action when 40 people or more are encountered per hour while hiking. Visitors report that they would not return to Buffalo National River if they encountered 44 people per hour while hiking. While visitors report potential displacement around 40 or more encounters, they also report much lower encounters for current conditions. Visitors report encountering 11 people during one hour of hiking on weekdays, 14 people during one hour of hiking on weekends, and 25 people during one hour of hiking on holidays. All visitor use levels are reported as ‘acceptable’ to visitors recreating in the Eden Falls area and are well below the point at which visitors report the National Park Service should take management action. There are periods during the year when the number of other visitors encountered during one-hour of hiking did not align with visitors’ desired conditions. Specifically,

1.5% of visitors sampled on weekdays reported encountering 50 or more people during one hour of hiking, and 5% of visitors sampled on weekends reported encountering 50 or more people during one hour of hiking; 25% visitors intercepted on holidays reported encountering 50 or more people during one hour of hiking.

Visitor preferences for amounts of use were also assessed by social science research (Cribbs et. al. 2017). Visitors report preferences of no more than 38 PAOT at Eden Falls. Beyond 38 PAOT, visitors report social conditions to be unacceptable when that number reaches 52. However, current use levels at Eden Falls are on average one person per hour during a typical weekday. During weekends and holidays, there are two people present at Eden Falls per hour, on average. This average level of visitor use for weekdays, weekends, and holidays is acceptable and well below the point at which visitors believe the National Park Service should take management action. There were a couple times in the year when the number of people present at one time at Eden Falls was only marginally acceptable to visitors (Cribbs et. al. 2017).

Under alternative B, there would exist four parking stalls, three accessible parking stalls near the trail head, and 95 parking stalls surrounding the new visitor center, which totals 102 parking stalls. The parking stalls are used to assess the number of people that could be present given potential facility site designs. If 90% of the parking stalls were full, 91 of the spaces would be occupied (person per vehicle multiplier of 2.7), and 250 people would be in the visitor center and surrounding area. Then, if 80% of visitors elect to hike the Lost Valley trail (73 parking spaces dedicated to visitors using the trails with a person per vehicle multiplier of 2.7), that could contribute 200 people hiking the trail at any one time.

The most limiting attribute constraining visitor use at Lost Valley is the visitor experience on the Lost Valley trail. The visitor experience is the most constraining given the terrain, trail type (out and back), and partial accessibility. These factors have direct impacts on the ability for visitors to achieve their desired experience as well as the ability for desired conditions to be achieved and maintained related to the amounts and type of visitor use that are appropriate. The most relevant indicator to monitor changes in these conditions is the *trail condition class*, *number of cases of inappropriate behavior*, and *number of reported incidents of damage to property*. Lost Valley is in the Developed Zone, and as such the desired conditions for visitor experiences are about convenient, highly accessible developed areas. Developed zones accommodate concentrated visitor use, structured interpretive and recreational opportunities, and administrative needs. The natural environment may be modified to support such uses. Facilities may include visitor centers and contact stations, paved roads, parking areas, developed campgrounds, viewing areas, picnic areas, pavilions, trailheads, surfaced walkways, boat launches, and operational facilities. Encounter rates are moderate to high. This zone does not occur within designated wilderness.

Visitor Capacity at Lost Valley and Implementation Strategies

Alternative B. Park staff identified that the visitor capacity at Lost Valley can increase from current use levels. The new facilities and infrastructure would offer additional visitor opportunities and experiences in the Lost Valley outside of the current opportunities for picnicking and day hiking. The increase in visitor use at Lost Valley could also have potential benefits to other areas within the planning area, including Ponca Access and Steel Creek. The visitor capacity for the Lost Valley area is the combined total of the visitor center area and trails (450 PAOT) and special use permits (50 PAOT) for a total of 500 PAOT for day use only.

The visitor capacity for visitor center area and trails will be 450 PAOT or a 90% full parking lot surrounding the visitor center. The visitor capacity accounts for the number of available parking stalls at 90% efficiency multiplied by the PPV for the busy season which is 2.7. Within the 450 PAOT visitor capacity at Eden Falls Cave will be 38 PAOT. This was identified by research as the point at

which the visitor experience becomes degraded and less quality. The special use permit was a factor the park considered when identifying visitor capacity. Special use permits would be issued for weddings and other special events as appropriate. Therefore, special use permits would add 50 visitors to the visitor capacity at Lost Valley.

The identified visitor capacity for Lost Valley would contribute visitor use levels in exceedance of visitor preferences for encounter rates on the Lost Valley Trail. This decision was intentionally made based on park staff best professional judgement and the acknowledgement that with a new visitor center, visitor use levels are likely to increase, and as result, visitor preferences for encounter rates could adjust. Visitors typically expect higher densities in developed areas, especially those nearby visitor centers. Further analysis of the visitor capacity would be completed as a part of the design and planning for the visitor center at Lost Valley. During that analysis, the visitor capacity might be adjusted.

To implement the visitor capacity at Lost Valley, the park would continue to pursue partnerships with the Ponca Elk Education Center for the future visitor center. The park would develop monitoring protocols for real time visitor counts of the number of people on the trail at one time. Education about the opportunities at the visitor center and adding a trail map to Eden falls with elevation and mileage would contribute to disperse use between experiences in the Lost Valley area. Park staff would also develop messaging to harden the experience by informing visitors about the amounts and types of use they are likely to encounter. This messaging could include photographic displays. With the construction of a new visitor center, park staff would also be able to manage and intercept school groups who arrive without prior notice. This would provide the opportunity to distribute the timing of visitor use in the area and specifically on the Lost Valley Trail to prevent congestion.

Strategies to implement visitor capacity:

- Direct visitors to other visitor experiences and opportunities.
- Employ a one in, one out management strategy.
- Parking lot/trail closures will only be considered after a range of management strategies have been implemented and are shown to be inadequate.
- Employ intelligent transportation system.

Adaptive Management Strategy (implemented only as thresholds are approached or exceeded):

- Temporary trail closures to alleviate congestion and disperse visitor use (e.g., 10 to 15 minutes).

APPENDIX D: MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES

NATURAL RESOURCES

- Continue to monitor water quality parameters to ensure water quality standards are maintained.
- Consult with an NPS biologist before beginning construction to ensure impacts to vegetation and wildlife are kept to a minimum.
- During all construction activities, best practices for weed and erosion management would be used, including:
 - Minimize new ground/soil disturbance to the greatest extent possible and select previously disturbed areas for construction staging and stockpiling.
 - Fence or clearly mark construction limits to protect sensitive areas.
 - Enforce prevention of disturbances to vegetation and soil outside construction limits.
 - Ensure project personnel make daily checks of clothing, boots, laces, and gear to ensure no exotic plant propagates and no off-site soil is transported to the work site.
 - Thoroughly pressure-wash equipment to ensure all equipment and machinery are clean and weed free before being brought into the project area.
 - Cover all haul trucks bringing materials from outside the park to prevent seed transport and dust deposition.
 - Obtain all fill, rock, topsoil, or other earth materials from approved and/or inspected sites.
 - Implement erosion control measures, such as planting or seeding at vulnerable sites within management areas.
 - Use siltation control devices such as silt fencing and mulch stabilization to reduce erosion, capture eroding soils, and prevent sediments from entering wetland areas.
 - Revegetate so as to reconstruct the natural spacing, abundance, and diversity of native plant species as much as possible. All disturbed areas would be restored as much as possible to pre-construction conditions shortly after work is completed.
 - Monitor vegetation for impacts caused by maintenance of all facilities and infrastructure associated with the implementation of this plan and general park operations.

CULTURAL RESOURCES

- The National Park Service would practice good resource stewardship with regard to the protection of archeological resources, historic structures and cultural landscape resources. Desired conditions and indicators and thresholds developed as part of this plan would signal when cultural resources were sustaining a maximum acceptable level of impact.
- The National Park Service would continue, and possibly enhance, ongoing cultural resource monitoring programs by staff.
- In consultation with the State Historic Preservation Officer, Advisory Council on Historic Preservation, and other interested parties the National Park Service would apply the following measures to avoid or minimize impacts on cultural resources:

- All activities would comply with the National Historic Preservation Act, *The Secretary of Interior's Standards and Guidelines for Archeology* and Historic Preservation, and Director's Order 28: Cultural Resource Management.
 - Archeological inventory and/or evaluation would precede any and all ground-disturbing activities (such as enlarging the visitor center, construction of staff housing units, or trail development) where inventories have not been previously conducted.
 - Archeological monitoring would continue during construction in areas where there is potential for buried resources.
 - Archeological resources would be identified and delineated prior to project work. All construction projects would be sited to avoid impacts as much as possible.
 - The National Park Service would ensure that all contractors, subcontractors, and lessees are informed of the penalties for illegally collecting artifacts or intentionally damaging archeological sites. Contractors and subcontractors would be instructed on procedures to follow if previously unknown archeological resources are uncovered during implementation.
 - Equipment and material staging areas used during construction projects would avoid known archeological resources.
 - Fencing off highly sensitive archeological and ethnographic sites within the project area would be implemented as needed.
 - If previously undiscovered archeological resources are uncovered during construction, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed in consultation with the Arkansas State Preservation Office and associated tribes. Newly discovered archeological sites would be assessed for significance and national register eligibility by an NPS-approved archeologist. The archeologist would then determine if the area should be excluded from construction activities and how the exclusion would be made. All project personnel would be briefed to stay out of areas of sensitive archeological resources.
 - A NAGPRA Plan of Action will be drafted and implemented.
- In the unlikely event that human remains, funerary objects, or objects of cultural patrimony are discovered during construction activities, applicable provisions of the Native American Graves Protection and Repatriation Act (Public Law 101-601) and its implementing regulations would be followed.

VISITOR EXPERIENCE AND SAFETY

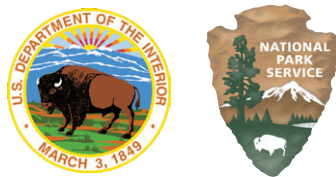
- Past and ongoing monitoring would inform future mitigation measures to avoid impacts on the cultural and natural resources of the Boxley Valley as well as on the visitor experience. These include:
 - Monitoring of visitation through various methods such as visitor surveys and transportation data.
 - Periodic visitor surveys and data collection to determine visitor use patterns, visitor characteristics, visitor use conflicts, and visitor preferences and satisfaction with visitor opportunities and other programs, services and facilities.
 - Documenting and monitoring of law enforcement incidents.
 - Resource condition surveys, as needed.
 - Proactive addressing of safety measures using signs, bulletin boards, and sharing of safety information during staff interactions with visitors.

- Future monitoring would also inform mitigation measures to minimize impacts on the cultural and natural resources of the Boxley Valley as well as the visitor experience. These could include:
 - Enhancing ongoing monitoring programs by park staff and partners.
 - Implementing measures to reduce adverse effects of construction on visitor experience and safety. Measures may include, but are not limited to, phasing construction, temporary closures, noise abatement, visual screening, providing information to visitors on the purpose and need for construction, and directional signage to help visitors avoid construction activities.
 - Using feedback from routine patrols and ranger interactions with visitors and results from other resource monitoring programs to analyze and manage current or future recreational activities and opportunities.
 - Developing a visitor education program with consistent messaging on behaviors appropriate to the Boxley Valley. Information could be shared through additional appropriate signage, park staff and volunteer messaging, the park website, and printed / visual materials available to visitors throughout the unit. Additional efforts could reach visitors prior to their arrival, for example, through the cooperation of commercial operators.
 - Ensuring that facilities, programs, and services of the National Park Service and its partners are accessible to and usable by all people, including those who are disabled. This policy is based on the commitment to provide access to the widest cross-section of the public and to ensure compliance with the Architectural Barriers Act and the Rehabilitation Act.
 - Responding to visitor conflicts and incidents using law enforcement protocols. Incidents would be reviewed by safety committees and incident reports generated and dispersed to park staff.
- Manage to establish visitor capacities based on an analysis of desired conditions, current visitor use information, monitoring of relevant indicators and thresholds, and implementation potential management strategies such as visitor education, site management, visitor use regulations, rationing or reallocation of visitor use, and enforcement.
- Continue to hire seasonal staff to assist/manage access during peak use times.
- Consider visitor safety in all planning and projects and general operation.
- Consider using the principles of operational leadership in planning safe visitor access to park features.

EDUCATION AND INTERPRETATION

- Continue to provide interpretive programs to educate visitors on the park's unique aquatic resources; Boxley Mill, and the Lost Valley area during periods of peak visitation, as funding permits.
- Continue to support a full-time interpretive ranger stationed at Steel Creek.
- Continue existing agreement with North Arkansas College and University of Central Arkansas to manage the Steel Creek Research Learning Center.
- Continue recruiting campground hosts to provide support for park operations at Steel Creek.
- Continue to maintain the developed campground and launch area, including the horse campground at Steel Creek.
- Continue to provide environmental science programs at Ponca and Steel Creek access areas.

- Continue to maintain interpretive waysides and informational signage at Steel Creek, Ponca, and Lost Valley.
- Continue seasonal roving interpretation by river rangers.
- Continue to update online information for interpretation and education.
- Continue to use all available information tools such as social media, etc. to provide up-to-date messaging on visitor opportunities, use patterns, congestion, and appropriate times to access popular areas.



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historic places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

BUFF 173/167030
February 2020

National Park Service
U.S. Department of the Interior

Buffalo National River
Arkansas

