Ozark National Scenic Riverways
Missouri

National Park Service
U.S. Department of the Interior

Ozark National Scenic Riverways Roads and Trails Management Plan/ Environmental Assessment

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CONTENTS

FIGURES

TABLES

A GUIDE TO THIS DOCUMENT

The roads and trails management plan and environmental assessment for Ozark National Scenic Riverways is composed of three chapters and 13 appendixes.

Chapter One: Introduction provides information regarding establishment of the park and the lands being protected encompassing 80,785 acres along the Current and Jacks Fork Rivers. The environmental assessment evaluates a range of possible alternatives and management actions and analyzes the impacts that could result from implementation of these alternatives. The purpose and need of the Roads and Trails Plan is examined and the supporting goals and objectives were identified that helped guide development of the three alternatives. Goals and objectives are listed, text describes and a map provides a visual depiction of the project area. A list of management issues is given and impact topics dismissed from full analysis is provided as are impact topics retained.

Chapter Two: Alternatives describes three alternatives including the NPS preferred alternative. These alternatives represent reasonable management directions consistent with NPS policies and applicable laws and planning requirements.

Chapter Three: Affected Environment and Environmental Consequences provides detailed information about the cumulative impacts for each of the alternatives covering visitor use and experience; vegetation and soils; fish and wildlife; federally listed threatened and endangered species; archeological resources; historic buildings, sites, and cultural landscapes; and socioeconomics.

Appendixes: The 13 appendixes provide more detailed information related to the Roads and Trails Management Plan and the Environmental Assessment. These include the full biological assessment, management zone maps, visitor capacity, proposed designated recreation areas, visitor use and management, mitigation measures and best management practices, consultation and coordination, references, a glossary of terms, trail classifications for existing trails, and road classification matrixes for alternative B and alternative C.

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Introduction

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CHAPTER ONE: INTRODUCTION

Ozark National Scenic Riverways (the park) was established as a unit of the national park system in 1964 to protect over 134 miles of the Current and Jacks Fork Rivers in the Ozark Highlands of southeastern Missouri. As a linear park encompassing approximately 80,785 acres along these rivers, a vast network of roads and trails serve as the primary conduit for visitors accessing the park.

This environmental assessment (EA) evaluates a range of possible alternatives and management actions and analyzes the impacts that could result from the implementation of these alternatives. At the conclusion of this environmental assessment and the decision-making process, one of the alternatives, or a combination of actions from multiple alternatives, will become the long-term management plan.

The park's existing general management planning documents continue to provide relevant guidance, which may be supplemented through development of additional planning documents such as this one. The Roads and Trails Management Plan (Roads and Trails Plan) is a component of the park's planning portfolio and fulfills park planning for resource and visitor use management and development guidance. This plan is consistent with the general guidance of the 2014 General Management Plan (GMP) and helps the park meet the statutory requirements of 54 *United States Code* (USC) 100502, specifically the requirement to address measures for preservation of resources, types and general intensities of development, and the identification of visitor carrying capacities. The plan is guided by relevant law, regulation, and policy (see appendix A).

1.1 PURPOSE AND NEED

The purpose of the Roads and Trails Plan is to improve the system of park roads and trails to ensure that it provides access to a variety of locations and experiences while also protecting the park's fundamental resources and values.

A plan is needed to ensure that designated [1] roads and trails and associated public recreation areas are clearly documented going forward, and that undesignated [2] roads and trails are properly restored [3] to protect the park's natural and cultural resources and improve visitor safety. Use of undesignated, visitor-created roads and trails have led to resource concerns and safety issues for visitors, including longer response times for law enforcement personnel and more complex search and rescue operations. Restoring redundant and undesignated roads would improve visitor experience, visitor safety, resource conditions, provide cost savings, and allow more investment in designated visitor facilities throughout the park.

1.2 SUPPORTING GOALS AND OBJECTIVES

A number of supporting goals and objectives have been identified that helped guide the development of alternatives for this plan. The goals and objectives for the Roads and Trails Plan were developed

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[1] Designated roads include roads within the National Riverways that have been authorized by the National Park Service through a formal planning process and which are designed, constructed, and maintained by the National Park Service in accordance with NPS road standards.

[2] Unauthorized, visitor-created trails that are not part of the official road and trail system.

[3] Additional information on restoration is provided in chapter two and in "Appendix G: Mitigation Measures and Best Management Practices."

with consideration of the park's purpose and significance; National Park Service (NPS) policies and mission; and input from park staff, partners, stakeholders, and the general public. Goals and objectives also assisted the planning team in the development and evaluation of alternatives and selection of a preferred alternative.

1.2.1 Goals

Overarching goals of the Roads and Trails Plan are to establish: (1) a system of designated roads, trails, public recreation areas, and staging areas; (2) appropriate types and levels of visitor use associated with roads and trails; (3) maintenance standards for designated roads and trails; and (4) guidance for restoring roads and trails identified for closure or rerouting.

The alternatives identified for analysis meet these goals and are also consistent with the following planning objectives that were outlined early in the planning process.

1.2.2 Cultural Resource Objectives

Roads, trails, river access points, and river crossings would be located to avoid and/or protect cultural resources that are important and integral to understanding the human history of the area, including sensitive archeological and ethnographic resources, cultural landscapes, precontact or historic structures, and ethnographic resources. In addition to these NPS-recognized resources, American Indian sites of cultural or religious significance would be avoided, both those known and others that may be identified as a result of ongoing consultation.

1.2.3 Natural Resource Objectives

Roads, trails, river access points, and river crossings would be designed and located to minimize adverse impacts on important vegetation and wildlife communities, water quality, would make use of existing disturbed areas, help restore heavily impacted and environmentally sensitive areas, and direct trail use to other designated trails or new trails having more suitable soils. Adjustments to the timing and distribution of trail use would help to further protect sensitive park resources.

1.2.4 Visitor Use and Experience Objectives

Roads, trails, river access points, and river crossings would provide clearly defined access to a variety of opportunities and locations in the park with minimal duplication. Appropriate access would facilitate education and interaction with natural resources as well as cultural landscapes and historic sites. Designating locations for parking and camping on gravel bars would enhance the scenic and natural qualities of the Riverways experience. Trails would be designed and managed to minimize conflicts among user groups and to enhance visitor safety. Where possible, the trail system might connect to trails on adjacent lands, creating an expanded network for the enjoyment of visitors. [4]

[4] Consistent with the US Department of the Interior Strategic Plan (2018–2022).

1.2.5 Park Operations Objectives

Roads, trails, river access points, and river crossings would be designed and located to maximize the efficiency of maintenance, interpretation, resource management, and law enforcement efforts while minimizing financial costs. The park management will strive to maintain flexibility to manage and protect natural and cultural resources as needed.

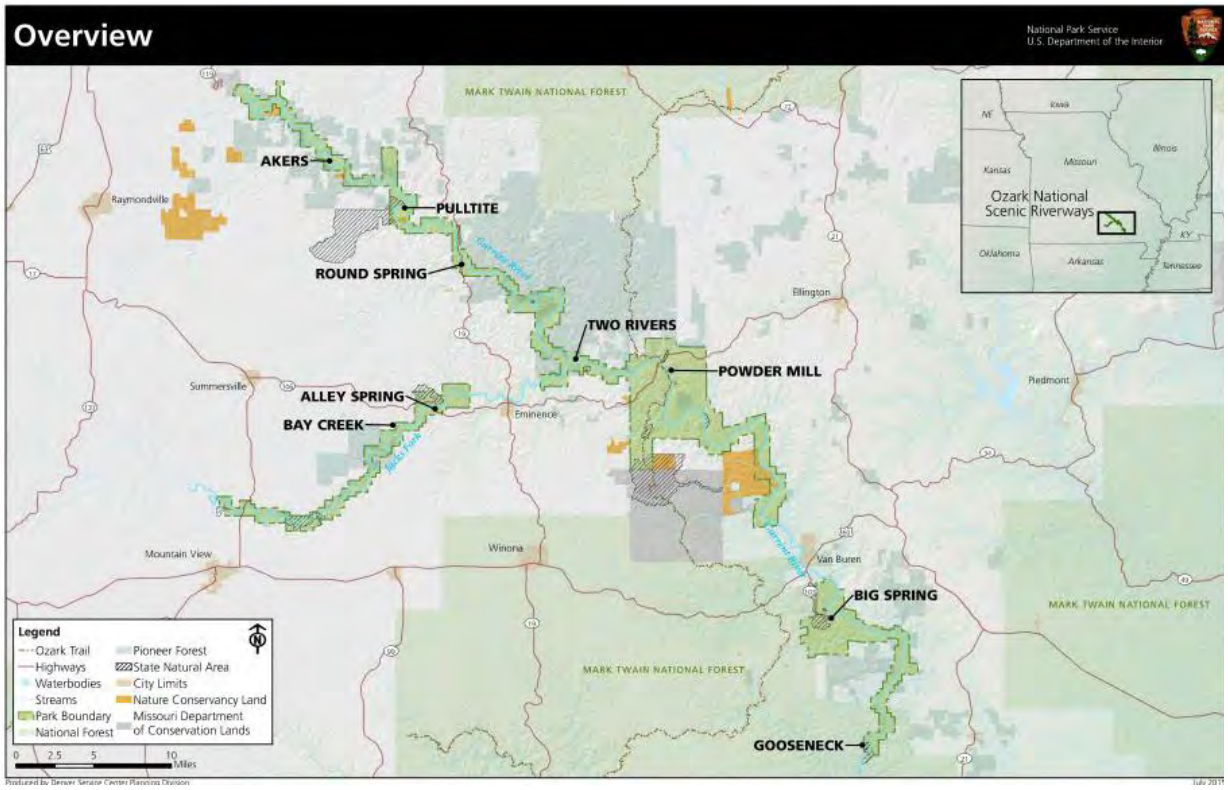
1.2.6 Community Objectives

The park's network of roads, trails, and recreation facilities would reflect the importance of the Current and Jacks Fork Rivers to communities and the surrounding region, both in terms of economy and lifeways.

1.3 PROJECT AREA

The park includes portions of the Current and Jacks Fork Rivers, providing 134 miles of clear, free-flowing, spring-fed waterways (figure 1). The impressive hydrogeologic character of the park's karst landscape supports an amazing variety of natural features, including a spring system unparalleled in North America and one of the highest densities of caves in any national park. [5]

Figure 1. Ozark National Scenic Riverways



[5] Karst is a type of landscape where the dissolving bedrock has created sinkholes, sinking streams, caves, springs, and other characteristic features.

The park lies in Missouri's Ozark Highlands, an important center of biodiversity in North America. The Ozark Highlands is home to a rich array of wildlife and plants, including endemic species that exist nowhere else in the world. These two rivers have been designated as Outstanding National Resource Waters (ONRW) in Missouri and are listed on the Nationwide Rivers Inventory. The outstandingly remarkable values include cultural, fish, geologic, historic, recreational, scenic, and wildlife resources. The park also features abundant archeological resources and historic structures, landscapes, and objects, reflecting the lifestyles of precontact peoples and historic settlers in the Ozark Highlands.

The free-flowing Current and Jacks Fork Rivers also provide excellent recreational opportunities. The recreational value of these rivers to the American people was explicitly stated in the park's 1964 enabling legislation. Activities for visitors include boating, canoeing, tubing, swimming, fishing, and sightseeing. Visitors can also enjoy hiking, backpacking, hunting, and horseback riding on park lands.

1.4 MANAGEMENT ISSUES CONSIDERED IN THIS DOCUMENT

Numerous planning issues were identified during internal and public scoping. The following topics represent the most pertinent comments and concerns that were identified during past planning team meetings and public engagement efforts held in October and November 2015 and November and December 2017. Key issues associated with road and trail management at the park are noted below.

1.4.1 Proliferation of Undesignated Roads and Trails

In addition to the 230.5 miles of road designated in the park as NPS public use, county, and state roads, park staff have documented over 39 miles of undesignated, visitor-created roads and traces. These informal, unauthorized roads and traces are largely attributed to off-road vehicle (ORV) use (including both licensed vehicles and all-terrain vehicles (ATVs) and utility task vehicles (UTVs) and have led to adverse impacts on natural and cultural resources, including disturbance to wildlife, damage and removal of vegetation, disturbance to soils and archeological resources, and other resource impacts.

The park currently provides 77 miles of designated hiking trails and 24 miles of equestrian trails. Over time, the park has experienced an increase in unauthorized, visitor-created trails as well—this is reflected by the 90-plus miles of undesignated trails that have been documented since 1991. This proliferation of undesignated trails largely reflects an increase in the popularity of horseback riding in and around the park during the last few decades (Chilman and Vogel 2001; NPS 2012).

1.4.2 Lack of Clearly Defined Designated Roads and Trails

The lack of clearly defined, designated trails has also made navigation in some areas difficult and confusing for park visitors. For example, in some areas, there are multiple visitor-created roads and trails leading to the same general destination. Additionally, use of visitor-created roads and trails has created safety issues for visitors, including longer response times for law enforcement personnel and more complex search and rescue operations.

1.4.3 Natural and Cultural Resource Considerations

Key resource and visitor management issues related to current road and trail conditions have widespread effects to the park's natural and cultural resources. The use of undesignated roads and trails fragment larger areas of quality habitat resulting in smaller, less effective "islands" of high-quality habitat throughout the park. In addition, the current volume and location of undesignated road and trail crossings in the Current and Jacks Fork Rivers can have an adverse impact on water quality and the Ozark hellbender (*Cryptobranchus alleganiensis bishopi*). This federally endangered species is highly sensitive to water quality impacts such as sedimentation and nutrient loads.

Visitor activities can also adversely impact archeological sites, both inadvertently as with the creation of undesignated trails that can disturb the stratigraphy and informational context of archeological resources, or by the illegal looting of sites and artifacts. Designated and undesignated trails have widened in places and become deeply incised and eroded. Artifacts and archeological features have been exposed on the surfaces of equestrian trails and in erosional gullies formed by heavy horse traffic (Chilman and Vogel 2001; NPS 2012).

1.5 DESIRED CONDITIONS

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 would look like, feel like, sound like, and function like in the future.

Desired conditions for the park are linked to management zones that were defined in the 2014 General Management Plan. There are seven designated management zones in the park, including four land-based zones and three river-based zones. Land-based zones are noted below and are described in more detail in table 1.

- Developed Zone
- Resource-Based Recreation Zone
- Natural Zone
- Primitive Zone

A map showing the spatial distribution of management zoning throughout the park is included in appendix B. [6]

[6] Note: Since the focus of the Roads and Trails Plan is associated with "land-based recreation" river-based zoning is not included in this document.

1.6 IMPACT TOPICS RETAINED OR CONSIDERED BUT DISMISSED FROM FULL ANALYSIS

1.6.1 Impact Topics Retained for Analysis

Based on an evaluation of the above-mentioned planning issues and consideration of the management strategies outlined in "Chapter Two: Alternatives," the National Park Service has retained the following impact topics for detailed analysis.

- Visitor Use and Experience
- Vegetation and Soils
- Water Quality
- Fish and Wildlife
- Threatened, Endangered, and Sensitive Species
- Archeological Resources
- Cultural Landscapes, Historic Sites, and Structures
- Socioeconomics

More information on impact topics retained for detailed analysis is provided in "Chapter Three: Affected Environment and Environmental Consequences." It should be noted that all park resources and values are considered important and are managed accordingly, regardless of whether or not they are retained in the impact analysis of this document. The dismissal of an impact topic from detailed analysis only means that the topic is not important to consider in this particular decision process.

1.6.2 Impact Topics Dismissed from Full Analysis

The impact topics listed in this section are not fully evaluated in this environmental assessment because they were not identified during scoping as being of concern, nor is it anticipated that implementation of the action alternative would substantially affect these resources. A brief description of the rationale for dismissing these resources is provided below.

Air Quality. None of the proposed alternatives have the potential to impact air quality, beneficially or adversely beyond current conditions; any additional recreation roads or trails would constitute a less than negligible amount of increased activity affecting air quality.

Ethnographic Resources. Ethnographic resources are likely to exist throughout the park and the surrounding region. Affiliated tribes have traditional cultural associations with the park and the area. The park also represents a significant ethnographic landscape for the descendants of the European American settlers who immigrated to the area during the early 19th century.

Ethnographic resources have been dismissed as an impact topic because none of the actions being proposed in the alternatives would substantially affect resources of cultural importance to the park's affiliated tribes or descendants of early European American settlers or impede their ability to access these resources in the park for cultural or traditional purposes.

Soundscapes. The alternatives would not result in a large variation in motorized vehicle use or ATV and UTV volume or frequency on park roads (appendix C). ATVs and UTVs are currently permitted on 156.5 miles of county and state roads that exist in the park and use of these roads is expected to

continue. The identification of visitor capacity for ATV and UTV use of park roads will maintain current use levels. The current understanding of use levels was informed by data collected in 2018 and 2019. Further, anticipated changes in the soundscape and acoustic environment would be relatively minimal and likely to include short-term impacts on the soundscape from construction activities related to the alternatives. Therefore, this impact topic was dismissed from further consideration in this environmental assessment.

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TABLE 1. MANAGEMENT ZONING AND SUMMARY DESIRED CONDITIONS

Land-Based Management Zones	Developed	Resource-Based Recreation	Natural	Primitive
Zone Concept	Areas support moderate to high levels of development and visitor services to accommodate concentrated visitor use and diverse recreational, educational, and interpretive opportunities. Most administrative facilities for operations and maintenance will be in this zone.	Areas support moderate levels of visitor use to accommodate a wide range of recreational, educational, and interpretive opportunities. Although some resource modifications could occur, natural and cultural resources will remain largely intact.	Areas support the broader ecological integrity of the park. Natural processes will dominate and only low-impact recreational activities will be allowed. Visitors will be immersed in nature with opportunities to enjoy solitude and natural sights and sounds.	Areas retain their wild, natural character. Natural resources and processes will be preserved to maintain pristine conditions and ecological integrity. Opportunities will be provided for visitors to experience backcountry challenges and solitude.
Levels of Development	Moderate to high levels of development to meet visitor use and park administrative needs.	Moderate levels of development for the purpose of directing visitor use, enhancing recreational opportunities, and protecting resources.	Developments will be limited to those essential for resource protection, research, monitoring, and basic visitor services.	Minimal development will be allowed for the protection of natural resources and to allow dispersed, low-impact visitor use.
Visitor Experience	Visitors will have opportunities to better understand the park's significant resources and values through a wide range of interpretive facilities and services, interact with other visitors and park staff, and recreate in an environment that is supported by a variety of visitor services. Visitors will experience a modified natural environment with developed visitor facilities for orientation; day and overnight use will concentrate most park visitors in these areas. They also will have a high expectation for quality services and facilities.	Visitors will have opportunities to participate in a range of recreational, interpretive, and educational opportunities. Visitors will experience a mostly natural setting where some visitor services are available.	Visitors will encounter intact natural resources, features, and systems for personal inspiration, education, and recreation. Experiences could include opportunities for solitude, contemplation, and self-reliance. Evidence of human use will be limited.	Visitors will be immersed in a primitive, wild setting with opportunities to experience backcountry challenges, solitude, and self-reliance. Visitors will have a sense of remoteness, isolated from the sights and sounds of other people.
Visitor Services	Moderate to high level visitor services could include one or more of the following: orientation and interpretive programs, signs, wayside exhibits, developed campgrounds, contact stations, commercial operations, convenience stores, dining, and shuttle services.	Moderate levels of visitor services will be provided such as orientation and interpretive programs, signs, and wayside exhibits, backcountry campgrounds, and commercial services if compatible with the desired resource conditions and visitor experience.	Low levels of visitor services will be provided such as informational signs, wayside exhibits, and primitive campsites.	Directional signs will be provided at trailheads. Limited interpretive materials might be available to promote safe and responsible recreation.
Natural Resource Condition	Natural resources will be managed to accommodate facilities for NPS operations and concentrated visitor use. The effects of developments and visitor use on the natural surroundings will be minimized through planning and design efforts.	Resources will be maintained in their natural condition yet modified where necessary to provide distinct visitor opportunities and experiences. Modifications will be aesthetically blended with the environment as much as possible.	Ecological integrity will be maintained by preserving and restoring natural resources and processes through an integrated natural resource management approach. Emphasis will be placed on protecting and restoring outstanding natural features and habitats for rare and endangered species.	Natural systems and processes will function independently of human intervention. Natural conditions will be restored when disturbed by human activity, but only if degraded sites are not expected to recover in a timely manner without human intervention. No development will occur.
Cultural Resource Condition	Cultural resources eligible for or listed in the National Register of Historic Places will be protected and managed consistent with NPS policies and the standards published by the Secretary of the Interior. All other cultural resources will be evaluated to determine if they should be preserved, stabilized, restored, or left unmaintained.	Same as developed.	Same as developed.	Same as developed.

Source: NPS 2015

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Alternatives

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CHAPTER TWO: ALTERNATIVES

Based on information and public input gathered during internal scoping, public scoping, data analysis, and release of draft preliminary alternatives, the National Park Service developed three alternatives, including a preferred alternative (alternative B), which are summarized below. Following a description of the alternatives is a list of actions common to all alternatives, as well as the Summary of Key Alternative Elements table presented later in this chapter (section 2.5). Detailed road and trail maps for each of the alternatives are provided in appendix D.

2.1 ALTERNATIVE A (NO ACTION, CURRENT MANAGEMENT)

Under alternative A, park officials would focus on continuation of the management direction established in the 2014 General Management Plan. The existing system of 230.5 miles of designated public use roads, trails, and river crossings would continue to be provided, along with opportunities for traditional recreation activities such as hiking, horseback riding, and hunting.

Undesignated or visitor-created roads and trails, as well as undesignated recreational areas, would be removed and restored to natural conditions. No new roads, trails, or associated facilities would be established. Horseback riding in the park would be limited to currently designated equestrian trails, as well as state and county unpaved roads. Biking would continue to be permitted on park roads, including electric bikes (E-bikes) per Secretary of the Interior's Executive Order 3376. Use of ATVs and UTVs would continue to be limited to county roads. This alternative would allow the least number of trails in the park.

The existing 96 designated recreation areas (appendix E) would continue to be provided. River access would be allowed only at designated access points. The park would continue to evaluate these areas on a case-by-case basis for closure or designation. Designated campsites or camping areas may be established on some gravel bars that are accessed by licensed vehicles. Visitors using motorized and nonmotorized watercraft could continue to camp on gravel bars as long as that campsite was 0.5-mile from any designated campsite and more than 50 feet from a designated river access point. (Additional information on gravel bar access can be found on page 75 of the 2014 General Management Plan).

Per the 2019 Ozark National Scenic Riverways Accessibility Self Evaluation and Transition Plan (SETP), the park would implement priority improvements that meet Architectural Barrier Act Accessibility Standards (ABAAS) including accessible routes near key park sites such as the Alley Spring Mill and Schoolhouse, Big Spring, Round Spring, and Two Rivers campground and amphitheater. The National Park Service would continue to consider future opportunities to expand the network of accessible trails in the park, where appropriate.

2.2 ALTERNATIVE B (NPS PREFERRED ALTERNATIVE)

2.2.1 Road and Trail Mileage

Under alternative B, a total of 216.5 miles of public use roads would be provided. All undesignated roads would be removed and restored to natural conditions, including roads identified for closure in the 1991 Roads and Trails Study that have not been closed to date. The National Park Service would close about 14.0 miles of currently designated NPS-administered roads—2.5 miles of which are in primitive zones. A large portion of these NPS administered roads are in the primitive zone near

Pulltite Campground. The Old Tram Road (NPS 123), located in the Lower Current River area would provide increased access for bicyclists and hikers. Approximately 14 miles of NPS public use roads would be closed due to the presence of other routes being available in and to the same locations, in unstable or unpassable conditions, or resource concerns.

In addition to the existing designated trail system, the park would add 49.5 miles of new trails, 7.5 miles of which would be outside the park's jurisdictional boundary, providing a total of 150.5 miles of trails. The park has partnered with landowners to identify additional conceptual trail alignments/corridors both in and outside the NPS boundary for future, authorized trails. Conceptual trail alignments are based on verbal agreements with those private landowners. Formal agreements would be secured in the future, prior to any trail development. [7] New trail alignments would be largely concentrated in the Upper Current River District—many of these trails would incorporate some portions of existing undesignated trail alignments, although new alignments would be constructed. Designated trails would be aligned to minimize potential impacts on sensitive cultural and natural resources. Most of the undesignated, visitor-created trails would be removed and restored to natural conditions.

2.2.2 Introduction of Biking

As in alternative A, biking would continue to be allowed on designated park roads. New bike trails would be formally designated along 5.8 miles of the Old Tram Road and 4 miles of existing trails in the vicinity of the Partney Ridge and Partney House Trails. [8] In the future, if a property owner is receptive, the park would consider additional loop and connector trails extending both inside and outside the park along the 5.8 miles of new trail that would be designated on Old Tram Road. E-bikes would be allowed in all locations traditional bikes are allowed. Alignments for these possible new trails along Old Tram Road would be identified as part of future planning.

2.2.3 Permit for Equestrian Riding

The National Park Service would seek to establish a permitting system for equestrian users that would require individual riders to secure a permit (possibly online via the Rec.Gov system, at park headquarters, or at other visitor contact points) prior to riding on park trails. When established, the permitting system would provide information and education to riders, help track the volume of use on equestrian trails, and enable the park to manage the levels of use on equestrian trails. Equestrian rider numbers and timing of use would be managed to spread use more evenly throughout the day on different trails to reduce congestion. Any fees (e.g., daily, multiday, seasonal, annual, etc.) tied to the future permit system would be based on factors such as trail maintenance and cost recovery needs associated with administering the permit system, as well as an analysis of comparable costs. [9] One new hiking trailhead (in the Middle Current River area) and one new horse staging area would be constructed with additional parking to accommodate equestrians in the Upper Current River area, in the vicinity of Cedar Grove / Dee Murray. The new horse staging area and the trailhead

[7] Proposed trail routes highlighted as part of alternatives B and C in appendix D reflect trail corridors that have been identified based on preliminary field verification. Exact placement on the landscape will be determined when trail planning and site design is initiated.

[8] Bicycle use on trails requires a separate rule-making process, which would follow this planning process.

[9] As of 2020, preliminary research did not point to any similar types of fees tied to equestrian use in the local surrounding region. Prior to implementation of an equestrian permit system, an analysis of comparable costs would be conducted and opportunities for additional public comment would be provided.

would be sited an appropriate distance from the river to the extent feasible to protect sensitive resources such as riparian zones. Site-specific National Environmental Policy Act (NEPA) and section 106 compliance would be completed for these sites at a later date.

2.2.4 All-Terrain Vehicle and Utility Task Vehicle Permits

The National Park Service would seek to authorize ATVs and UTVs on designated NPS roads through a permitting system (possibly administered online or by visiting park headquarters). Any fee (e.g., daily, multiday, seasonal, annual, etc.) tied to the future permit system would be based on factors such as road maintenance and cost recovery needs associated with administering the permit system, as well as an analysis of comparable costs. [10]

2.2.5 Horse Trail River Crossings

Undesignated river crossings would be closed and restored to reduce potential impacts on water quality and sensitive species. The seven existing designated horse trail river crossings would continue to be provided. Seven additional trail crossings would be designated on the Upper Current River to direct use away from dozens of informal, undesignated crossings. Horseback riders would continue to be required to cross the river only at the 14 total designated crossing points.

2.2.6 Designated Recreation Areas Along the River

The park would designate 94 recreation areas along the 134-mile river corridor (appendix E). Three recreation areas would be removed—the Summer's Bluff Primitive Area and Lower Flying W Primitive Area in the Upper Current; Panther Spring Primitive Area in the Lower Current. The primary reason for removal of these areas would be removal of the NPS-administered roads that provided access. River access would be allowed only at designated access points. Potential future updates to a river use management plan may necessitate that the number of recreation areas along the river be changed.

2.2.7 New Horse Staging Areas, Parking Areas, and Trailheads

Additional horse staging areas, parking areas, and trailheads proposed include a new hiking trailhead (in the Middle Current River area) as well as one new horse staging area and parking to accommodate equestrians in the Upper Current River area, in the vicinity of Cedar Grove/Dee Murray. New horse staging and parking areas and the trailhead would be placed at an appropriate distance from the river to the extent feasible to protect sensitive resources such as riparian zones. Site-specific NEPA and section 106 compliance would be completed for these sites at a later date.

[10] As of 2020, comparable costs for annual ATV/UTV permits in neighboring counties was $15. Comparable costs for daily and annual ATV/UTV permits ranged from $7/day; two-day permits were $14; three-day permits were $21; and annual permits were $45 (USFS 2018).

2.2.8 Vehicular Access to Gravel Bars

As in alternative A, visitors using motorized and nonmotorized watercraft could continue to camp on gravel bars a minimum of 0.5-mile from any designated campsite and more than 50 feet from a designated recreation area. [11] A designated camping area would be established on the Log Yard gravel bar. These sites would be managed for individuals accessing their campsites by licensed vehicle. The park would retain the flexibility to manage access to or close the Log Yard gravel bar to vehicle access to improve safety, reduce crowding, enhance visitor experience, and protect park resources. Gravel bar camping at Two Rivers would be allowed in designated campsites. Walk-in camping opportunities would be provided at some gravel bars formerly accessible by vehicles, and in these instances, designated parking will be provided in proximity to gravel bars where vehicular traffic is prohibited.

2.2.9 Accessible Routes and Trails

Same as alternative A. In addition, a quarter-mile accessible trail from the parking lot to Blue Spring would be constructed. Trails identified in appendix K having desired trail classes of "4" or "5," as well as any new trails that meet these classifications would be considered for universal access per the ABAAS.

2.3 ALTERNATIVE C

2.3.1 Road and Trail Mileage

Approximately 13.0 miles of NPS public use roads would be closed due to the presence of other routes being available to the same location, unstable or unpassable conditions, or resource concerns. Also, similar to alternative B, opportunities for traditional recreation activities such as hiking and horseback riding would be expanded. The key differences between the two action alternatives are mostly related to trail mileage, with alternative C having 9 more miles of trails and two additional river crossings. Alternative C also has one more recreation area for public use.

In addition to the existing designated trail system, the park would designate 58.5 miles of new trails, 7.5 miles of which would be outside the park jurisdictional boundary. As described in alternative B, the park has partnered with landowners to identify additional conceptual trail alignments/corridors for future, authorized trails. Formal agreements would be sought in the future before trails are developed. New trail alignments would be largely concentrated in the Upper Current River District; many of these trails would incorporate some portions of existing undesignated trail alignments, although new alignments would be constructed. Designated trails would be aligned to minimize potential impacts on sensitive cultural and natural resources. Most undesignated trails would be removed and restored to natural conditions. Additional trails included in alternative C comprise a quarter-mile accessible trail from the parking lot to Blue Spring, which would be constructed; new hiking opportunities near Montauk State Park in the Upper Current River area; and the addition of a loop trail that provides a longer and different experience than alternative B. Alternative C would also include 5.5 additional trail miles for equestrian riders.

[11] Larger gravel bars, such as those at Log Yard and Two Rivers, are generally more stable in contrast to smaller gravel bars, which are commonly affected by elevated river flows and flood events.

In the Middle Current River area, a new hiking opportunity would provide increased access with a new connection between Roberts Field and the Thorny Creek and Russell Mountain area and the Ozark Trail and provide additional connections to park resources for long-distance trail hikers as well as overall increased trail connectivity.

2.3.2 Introduction of Biking

Biking would continue to be allowed on designated park roads, and bike use would be allowed on approximately 12.0 miles of trails being formally designated for this use, including a portion of the Ozark Trail near Powder Mill. There would be new biking opportunities in alternative C along the Ozark Trail that are not included in alternatives A or B. The park would designate biking along a portion of the Nature Trail at Pulltite, which is in the Upper Current District, along with 1.5 miles of the Campground Bluff Trail in the Lower District. E-bikes would be allowed in all locations traditional bikes are allowed.

2.3.3 Permits for Equestrian Riding

As in alternative B, the National Park Service would seek to establish a permitting system for equestrian users. The permitting system would provide information and education to riders, help track the volume of use on equestrian trails, and enable the park to manage the levels of use on equestrian trails. Equestrian rider numbers and timing would be managed to spread use more evenly throughout the day on different trails to reduce congestion.

2.3.4 All-Terrain Vehicle and Utility Task Vehicle Permits

As in alternative B, the National Park Service would seek to authorize ATVs and UTVs on designated park roads through a permitting system.

2.3.5 Horse Trail River Crossings

Similar to alternative B, undesignated river crossings would be closed and restored to reduce potential impacts on water quality and sensitive species. The seven existing designated horse trail river crossings would continue to be provided. Nine additional trail crossings would be designated on the Upper Current River to direct use away from dozens of informal, unauthorized crossings. Horses would continue to be required to cross the river at 16 total designated crossing points.

2.3.6 Designated Recreation Areas Along the River

The park would designate 95 recreation areas along the 134-mile river corridor (appendix E). Summer's Bluff Primitive Area would be removed. River access would be allowed only at designated river access points. Potential future updates to a river use management plan may necessitate that the number of recreation areas along the river be changed.

2.3.7 Horse Staging Areas, Parking Areas, and Trailheads

Same as alternative B.

2.3.8 Vehicular Access to Gravel Bars

Same as alternative B.

2.3.9 Accessible Routes and Trails

Same as alternative B.

2.4 ACTIONS COMMON TO ALL ALTERNATIVES

While each alternative represents varying strategies related to roads and trails management, there are some strategies that would not vary by alternative. These strategies are considered "common to all" and ultimately serve to protect the park's resources and values. They are considered practical, common sense approaches to park management and are grounded in NPS policy and mandates and are likely to be employed under any future management scenario.

2.4.1 Designated Versus Undesignated Roads and Trails

Maps of roads and trails in each alternative (appendix D) depict the designated system of roads, trails, recreation areas, vehicle fords, and trail river crossings. Any locations not shown on the maps are undesignated and are unauthorized. All designated roads and trails would be marked with appropriate signage. All undesignated roads, trails, and river crossings would be removed and restored (see appendix G). Private, state, and federal non-NPS roads within park boundaries may not provide public access, which is at the discretion of the easement holder and private landowner.

2.4.2 Balancing New Trails with Rehabilitation of Existing Designated Trails and Restoration of Undesignated Trails

The park would develop a five- to seven-year funding strategy for rehabilitation, construction, and maintenance of roads and trails. The initiation and sequencing of trail and restoration projects would proceed according to available funding, resources (equipment, trail crews, etc.), and the availability of user groups and organizations to partner/assist with trail development and restoration efforts. Rehabilitation efforts for undesignated trails would likely first target those areas that receive the highest concentrations of public use. Conversely, trails determined to have been created primarily by free roaming horses, which are authorized per Omnibus Parks and Public Lands Management Act of 1996, would not be targeted. Section 106 compliance would be completed prior to any construction, rehabilitation, and maintenance.

The park has adopted the US Forest Service (USFS) National Trail Classification System, which prescribes development-scale and intended design and management standards (USFS – FSH 2309.18, 2008). Existing designated trails would be evaluated and improved, as necessary, to meet trail class designations and standards before building new trails. In addition, the restoration of unauthorized trails would be prioritized. Prior to constructing new trails, funding would be dedicated to the surveying and scoping of new trails.

2.4.3 Vehicle Fords

Currently, there are several vehicle fording sites on the Current River, Jacks Fork River, and major tributaries. The authorized vehicle fords are Akers Ford, Banks Ford, Ratliff Ford, and Blue Spring Ford. While the plan does not propose to close any crossings associated with any county's road network, the National Park Service will continue to evaluate roads that cross streams to determine their necessity.

2.4.4 Partnerships

A number of additional trails could eventually extend beyond the park's jurisdictional boundary, but would be dependent on partnerships and cooperative agreements with neighboring landowners. The park would continue to seek opportunities to partner with neighboring landowners inside and outside the park to identify potential options for keeping trail loops on one side of the river and expanding trail mileage. Additional rerouting of currently designated trails may be necessary to further protect sensitive park resources. Additional partnerships with neighboring private landowners and state agencies would be explored to connect trails outside the park to designated trails in the park for extended trail opportunities.

2.4.5 Volunteers

Where possible, park staff would work closely with volunteers to fund and/or assist with trail construction, development, maintenance, and restoration projects. The National Park Service would enter into formalized agreements with organized groups as necessary.

2.4.6 Access to Easements and Reconciling Road Right-of-Way Issues

The park would continue to work with counties, as necessary, to resolve any outstanding jurisdictional issues relating to easements and rights-of-way.

2.4.7 Archeological Surveys

Prior to construction of new trails (in alternatives B and C), or rehabilitation and restoration of undesignated roads and trails (all alternatives), the park will consult with the Missouri State Historic Preservation Office (SHPO) to address action-specific section 106 compliance requirements. With respect to new trails that would be phased in over time, the park will conduct appropriate inventories to identify archeological sites within the trail corridors. The park will also conduct archeological inventories of undesignated roads and trails in advance of restoration and rehabilitation activities, in consultation with the Missouri SHPO. Further consultation with the SHPO and associated tribes will occur in the event that archeological resources are identified that require mitigation (e.g., avoidance or possible data recovery if avoidance cannot be achieved through project redesign). Appendix G of this plan/EA includes best practices and mitigation measures for the treatment of archeological and other cultural resources.

2.5 SUMMARY OF KEY ALTERNATIVE ELEMENTS

Alternative A (No Action, Current Management)	Alternative B (NPS Preferred Alternative)	Alternative C
Total Road Mileage: 230.5 Total miles of designated NPS public use, county, and state roads: 230.5 miles • NPS public use: 74 miles • County and state: 156.5 miles In addition to the above, there are nonpublic use roads: • 13 miles of NPS administrative use only roads • 17.5 miles of private roads Total miles removed: • 2.5 miles park-administered roads and traces in primitive zones (NPS 2014)	**Total Road Mileage: 216.5** Total miles of designated NPS public use, county, and state roads: 216.5 miles • NPS public use: 60 miles • County and state: 156.5 miles In addition to the above, there are nonpublic use roads: • 12.5 miles of NPS administrative use only roads • 15.5 miles of private roads Total miles removed: • 14 miles public use roads • 2.5 miles park-administered roads and traces in primitive zones (replaced with hiking trails) • 2 miles of private roads	**Total Road Mileage: 217.5** Total miles of designated NPS public use, county, and state roads: 217.5 miles • NPS public use: 61 miles • County and state: 156.5 miles In addition to the above, there are nonpublic use roads: • 12.5 miles of NPS administrative use only roads • 15.5 miles of private roads Total miles removed: • 13 miles of public use roads • 2.5 miles park-administered roads and traces in primitive zones (replaced with hiking trails) • 2 miles of private roads
Total Trail Mileage: 101 miles • Designated hiking: 77 (13 miles outside boundary) • Designated horse plus hiking: 24 (5 outside boundary) • New trails: 0 miles	**Total Trail Mileage: 150.5 miles** Of this total, the following new trails would be designated: • New hiking trails: 16 miles • New horse and hiking trails: 23.5 miles (7.5 miles outside boundary) • New bike and hiking trails: 10 miles	**Total Trail Mileage: 159.5 miles** Of this total, the following new trails would be designated: • New hiking trails: 17.5 miles • New horse and hiking trails: 29 miles (7.5 miles outside boundary) • New bike and hiking trails: 12 miles
• Existing designated trails that do not meet trail classification standards may be rehabilitated or rerouted	• Same as alternative A	• Same as alternative A
• Biking would continue to be permitted on all designated park roads	• Same as alternative A	• Same as alternative A
• All undesignated, visitor-created trails (over 90 miles) would be restored to natural conditions	• Same as alternative A	• Same as alternative A
Introduction of biking (i.e., biking and E-bikes) • No change to allowed uses on designated trails • No introduction of biking on designated trails • Biking continues to be allowed on designated park roads	**Introduction of biking (i.e., biking and E-bikes)** • No change to allowed uses on designated trails • New bike trails: 10 miles	**Introduction of biking (i.e., biking and E-bikes)** • No change to allowed uses on designated trails • New bike trails: 12 miles
Permit for Equestrian Riding: Per the 2014 GMP, permits could be considered in the future, but they are not now	**Permit for Equestrian Riding:** The park would seek to implement an equestrian permitting system	**Permit for Equestrian Riding:** Same as alternative B

Alternative A (No Action, Current Management)	Alternative B (NPS Preferred Alternative)	Alternative C
Permits for ATVs and UTVs • ATVs and UTVs allowed on county-owned roads • ATVs and UTVs not allowed in campgrounds	**Permits for ATVs and UTVs** • Same as alternative A • In addition, a permitting system would be created for ATVs and UTVs on NPS-administered roads pursuant to 36 *Code of Federal Regulations* (CFR) § 4.10	**Permits for ATVs and UTVs** • Same as alternative B
Horse trail river crossings • Designated horse trail river crossings: 7 • Horses cross at designated crossing points only	**Horse trail river crossings** • Additional horse crossings: 7 • Total designated horse crossings (14 total) • Informal, unauthorized crossings would be removed and restored	**Horse trail river crossings** • Additional horse crossings: 9 • Total designated horse crossings (16 total) • Informal, unauthorized crossings would be removed and restored
Designated recreation areas along the river • Designated recreation areas: 96	**Designated recreation areas along the river** • Designated recreation areas: 94	**Designated recreation areas along the river** • Designated recreation areas: 95
New horse staging areas, parking areas, and trailheads • New horse staging areas: 0 • New parking areas: 0 • New trailheads: 0	**New horse staging areas, parking areas, and trailheads** • New horse staging areas: 1 • New parking areas: 1 • New trailheads: 1	**New horse staging areas, parking areas, and trailheads** • Same as alternative B.
Vehicular access to gravel bars • Designated campsites or camping areas: may be established on some additional gravel bars • Gravel bar camping at Two Rivers would continue to be allowed in designated campsites • Motorized and nonmotorized watercraft would be permitted to continue to camp on gravel bars (see distance stipulations in GMP)	**Vehicular access to gravel bars** • Same as alternative A. In addition, formalize designated campsites accessible by vehicles on the Log Yard gravel bar • Walk-in camping opportunities would be provided at some gravel bars formerly accessible by vehicles, and, in these instances, designated parking would be provided in proximity to gravel bars where vehicular traffic is prohibited	**Vehicular access to gravel bars** • Same as alternative B

2.6 ALTERNATIVES CONSIDERED BUT DISMISSED

As part of developing alternatives for this visitor use management plan, a number of alternatives and management actions were considered by the National Park Service but eliminated from further detailed evaluation because they either did not meet the purpose or need or stated objectives of the plan to a large degree, could not be implemented for technical or logistical reasons, or were not consistent with the purpose or significance of the park. The alternatives and actions and associated reasons for dismissal are described below.

2.6.1 Allow Free-Range Horseback Riding

Clearly marked and defined trails in appropriate management zones help manage trail use and direct it to the most appropriate areas of the park. Sensitive areas such as caves, archeological sites, wetlands, and stream crossings are distributed throughout the park, making their management and protection a challenge. Given the high numbers of equestrians that use the park, allowing "free range" riding would lead to adverse effects to natural and cultural resources and would not meet the purpose and need for the plan.

2.6.2 Designate All Currently Undesignated, Visitor-Created Trails for Trail Use

Over 90 miles of undesignated, visitor-created trails extend throughout the park. Many of these trails have not been properly sited and constructed and do not meet acceptable trail standards. Designating all of these trails would lead to too great of environmental impact on park natural and cultural resources and would not meet the purpose and need for the plan.

2.6.3 Close All Roads

Properly sited and constructed roads help direct and manage park visitors in appropriate areas and help minimize resource impacts. As a park that extends across 134 miles of river and two distinct watersheds, visitor access and enjoyment of the park relies heavily on some level of road access. Many park visitors access the park via designated park roads, with a large portion of these being county- or state-managed roads, making closure of all roads technically infeasible. One of the major issues that is being addressed in this plan is reducing the number of undesignated, visitor-created roads and traces that have gradually become more established over time.

2.6.4 Open All Trails to Bicycle Use

Not all of the park's trails are suitable for bicycle use, and not all trails are suitable for mixed use. The National Park Service is proposing to designate the most appropriate areas for bicycle use and will evaluate additional opportunities in the future.

2.7 MONITORING: INDICATORS, THRESHOLDS, AND MANAGEMENT STRATEGIES

Monitoring is the process of routinely and systematically gathering information or making observations to assess the status of specific resource conditions and visitor experiences; it is a critical step in successfully implementing any 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 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, and management strategies would be implemented as a result of this planning effort and are described below. Indicators would be applied to the action alternatives described in this plan. Indicators translate desired conditions in the plan into measurable attributes (e.g., number of undesignated (visitor-created) trails per mile of designated trail) 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 judgment of staff from management experience, and scoping on public preferences. A trigger is defined as a condition of concern for an indicator that is enough to prompt a management response to ensure that desired conditions continue to be maintained before the threshold is crossed.

The interdisciplinary planning team considered the central issues driving the need for the plan 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. The impact analysis is included in chapter three so the park can employ these actions, as necessary, to achieve desired conditions. The most critical indicators are

- number of undesignated (visitor-created) trails per mile of designated trail
- trail condition as reflected by trail width and trail incision
- number of undesignated roads
- number of incidents of reported theft and intentional vandalism to the NPS cultural sites and historic properties
- number of validated user-reported complaints to the National Park Service of conflicts on roads and trails
- visitor encounter rates on trails

2.8 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 experience, consistent with the purpose for which the area was established (as well as goals and objectives for this plan). [12] 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 six key analysis areas in the park including: Nichols Cabin (including the Flying W area); Alley Spring Trails; Rocky Falls; Big Spring Historic Zone; Round Spring Trail; Two Rivers area. Appendix C also includes visitor capacities for "other areas" such as Anglers' Trail near Montauk; Cave Spring Trail; Pulltite Trail; Jam Up Cave Trail; Welch Spring; Blue Spring Trailhead and Picnic Area; and Roberts Field.

The general management plan addressed water recreation visitor capacity as well as visitor capacities at gravel bars. In this Roads and Trails Plan there are a number of recreation sites. The majority of these sites are primarily accessed by water or their primary use is to provide access to water. Therefore, the visitor capacities are addressed in the GMP watercraft visitor capacity section. There

[12] To fulfill the requirements of the 1978 National Parks and Recreation Act (54 USC 100502), the identification of visitor capacities is legally required for all destinations and areas that this planning effort addresses (IVUMC 2016).

are three sites that are not primarily accessed by water or primarily providing access to water. Those sites are Klepzig Mill Day Use Area; Lost Man Ridge Primitive Area; and Cave Spring Day Use Area. Visitor capacities have been identified for these sites and they are also in the "other areas" section of appendix C. A visitor capacity was identified for ATV and UTV use on designated park roads as well.

2.8.1 Best Management Practices and 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 this environmental assessment. These actions would minimize potential adverse impacts associated with implementation of the preferred alternative and are provided in appendix G.

3

Affected Environment and Environmental Consequences

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CHAPTER THREE: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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

3.1 CUMULATIVE IMPACTS ANALYSIS METHODOLOGY

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 were analyzed by combining the impacts of the alternatives included in this document with the impacts of other past, present, and reasonably foreseeable future actions. These identified actions comprise the cumulative impact scenario. Unfunded and unapproved conceptual plans that broadly focus on long-term goals and objectives have not been included in the cumulative impacts scenarios. The geographic scope of the analysis includes actions in the project area as well as other actions in the park or surrounding lands, including adjoining counties where overlapping resource impacts are possible. The geographic extent generally includes the entire park and possibly some of the immediate surrounding area.

TABLE 2. NPS PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS

NPS Actions or Projects	Brief Description	Past	Present (or ongoing)	Reasonably Foreseeable Future Action
Flood Recovery	Ongoing and future repairs of existing, damaged river access sites and associated facilities in eight districts or areas impacted by the May 2017 flood: • Alley Spring • Buck Hollow • Powder Mill • Big Spring • Akers • Round Spring • Pulltite • Two Rivers Facility improvements will include redesign and rebuilding existing facilities—locations may vary, but physical extents are generally similar. Any road and campground infrastructure improvements would use sustainable design standards and would accommodate existing use levels.	X	X	X

NPS Actions or Projects	Brief Description	Past	Present (or ongoing)	Reasonably Foreseeable Future Action
Waymeyer / Pin Oak EA	As part of this project, the park will evaluate alternate location options to replace a flood-destroyed campground and floater access. The site would be redesigned to improve access and provide more sustainable floater access.			X
Big Spring Lodge and Cabin Rehabilitation	Repair and rehabilitation of the dining lodge, cabins, site features, and landscape of the Big Spring Historic District. The work includes complete rehabilitation of each interior and exterior of the 15 historic cabins and the dining lodge. Upon project completion, the park's concessions-operated lodging operation will be able to once again use these historic structures to provide a historically rich, quality visitor experience. The plan also includes site improvements to the campground and recreation area to improve public use activities.			X
Rocky Falls Redevelopment Plan	This plan will evaluate options for redesigning and improving the heavily used and impacted Rocky Falls area. The vault toilet facility was replaced in spring 2019. The park will explore a variety of future resource protection and visitor management strategies as part of this plan.			X
Planned Accessible Trails	A new 0.25-mile Architectural Barriers Act of 1968 (ABA)-accessible trail may be considered from the parking lot to Blue Spring. The National Park Service would work with the Missouri Department of Conservation and the Missouri Natural Areas Committee, as needed, to implement this trail.			X

TABLE 3. NON-NPS ACTIONS OR PROJECTS

Non-NPS Actions or Projects	Brief Description	Past	Present (or ongoing)	Reasonably Foreseeable Future Action
Commercial Trail Rides	Equestrian trail riding events that take place near the park are expected to continue. There are two equestrian commercial use authorizations (CUA) associated with the park: Cross Country Trail Rides in Eminence, Missouri, and Big Creek Trail Rides in Hartshorn, Missouri. Long weekend and week-long events can attract up to 2,500 riders and are scheduled approximately 18 times per year, from April through October.		X	
Federal Highway Emergency Relief for Federally Owned (ERFO) Infrastructure Improvements	Federal Highway ERFO projects are planned in Upper Current, Lower Current, Middle Current, and Jacks Fork Districts in response to the 2017 flooding. Projects include replacement of existing infrastructure such as parking areas, roads, pedestrian bridges, and trails being rehabilitated to meet appropriate standards and accommodate existing levels of use in these areas.		X	

Non-NPS Actions or Projects	Brief Description	Past	Present (or ongoing)	Reasonably Foreseeable Future Action
New Trail Along the Current River in Shannon County	The Ozark Trail Association recently completed a new spur of the Ozark Trail along the Current River in Shannon County. This new trail section will create the first hike/float loops in the park and connect the nearby NPS facilities with the L-A-D Foundation's Roger Pryor Pioneer Backcountry and Current River and Echo Bluff State Parks.		X	

3.2 VISITOR USE AND EXPERIENCE

3.2.1 Affected Environment (Existing Conditions)

Ozark National Scenic Riverways is a popular destination for local and regional visitors seeking outdoor opportunities. The park is open year-round to both daytime and overnight use. The linear park follows the channels of the Current and Jacks Fork Rivers and can be accessed in a number of locations throughout Dent, Shannon, Carter, and Texas Counties. A network of state, county, and park roads provide a variety of access points into the park, with State Highway 19 and US Highway 60 providing the primary access.

River-based recreation activities, including motorboating, canoeing, kayaking, fishing, camping, and swimming in the Current and Jacks Fork Rivers are the main draw for the majority of visitors. However, the park's hills, forests, rocky bluffs, and clear spring-fed rivers also provide opportunities for land-based recreation such as hiking, bird watching, hunting, and horseback riding. Visitors to the park can also experience a variety of cultural sites such as Alley and Klepzig Mills; explore the geologic features of the region's karst topography at locations like Big Spring, Devils Well, and Round Spring Cave; and attend ranger-led programs to learn about the area's natural and cultural resources. This land-based recreation is the focus of this plan.

To assess the overarching topic of visitor use and experience, the following subtopics are included: visitation trends; visitor opportunities; visitor orientation, education, and interpretation; and visitor activities.

3.2.2 Environmental Consequences of Alternative A (Current Management) on Visitor Use and Experience

The continuation of current management for roads and trails would not result in new impacts on visitor use and experience.

Road-Based Recreation. Visitors would continue to have access to road-based opportunities including scenic driving on over 230 miles of designated roads and scenic ATV and UTV use on designated county roads with a valid county permit. There would be a slight adverse effect to visitor use and experience stemming from the removal of 2.5 miles of roads in primitive zones, which would reduce access for visitors in the Round Spring area. Similar to the beneficial effect from the removal of unauthorized trails, the closure of undesignated roads and traces would be beneficial because it would make visitors less likely to get lost or venture into areas that are not designated.

Trail-Based Recreation. Under this alternative, existing designated trails that do not meet trail classification standards may be rehabilitated or rerouted. This would benefit all trail users who would be provided easy-to-follow trails that provide a consistent, high-quality, and safe trail tread for horses and people to travel on. There may be some temporary adverse impacts during trail construction and maintenance, as visitors may be redirected elsewhere.

Consistent with the 2014 General Management Plan, all undesignated, visitor-created trails would be restored. Undesignated, visitor-created trails that would be restored to natural conditions would have both beneficial and adverse effects. Since unauthorized visitor-created trails are negatively impacting visitor experience, their elimination would be beneficial because visitors would be less likely to get lost and confused about whether a given trail is designated or not.

The adverse effect would be the loss of access to areas currently served by over 90 miles of documented, undesignated trails. Without the undesignated trail mileage, visitor use would be concentrated on the 24 miles of designated horse trails, which could result in more crowded or congested trail conditions on trails that remain open and result in adverse impacts on visitor experience.

In addition to being able to hike along horse trails, hikers would continue to have access to nearly 77 miles of designated hiking-only trails and the diverse opportunities they provide throughout the park. The existing configuration of trailheads would continue to provide hikers access to the trail system. Future accessibility improvements associated with the park's Accessibility Self-Evaluation and Transition Plan would provide additional opportunities and beneficial impacts for visitors to access and enjoy the park near key park sites such as the Alley Spring Mill and Schoolhouse, Big Spring, Round Spring and Two Rivers campground and amphitheater.

Introduction of Biking. Visitors would continue to enjoy biking on designated park roads and in campgrounds only, so there would be no new impacts.

Horse Staging Areas, Parking Areas, and Trailheads, and River Crossings. Horseback riders would continue to have access to 24 miles of designated equestrian trails, many of which are concentrated in the area around Two Rivers. Horseback riders would continue to use seven river crossings and would have access to existing parking and staging areas. Concentrated visitor use on a few trails would continue to cause trail erosion and perceptions of crowding among some users, which would have adverse effects.

Designated Recreation Areas Along the River and Vehicular Access to Gravel Bars. Visitors would also continue to have access to the existing 96 designated recreation areas along the river and be able to camp on gravel bars, where permitted. Access to the designated recreation areas, as well as designated campsites and camping areas on gravel bars, would continue to provide opportunities for visitors to connect with the park's fundamental resources and values; however, no new impacts would occur because these opportunities already exist.

3.2.3 Environmental Consequences of Actions Common to Both Action Alternatives on Visitor Use and Experience

Many of the actions identified in chapter two are common to both alternatives B and C. The environmental consequences of those actions are described in the alternative B section. Therefore, the environmental consequences for alternative C are focused on the key differences between the two action alternatives.

Many of the actions identified that are common to all alternatives have beneficial impacts on visitor use and experience. For example, the addition of signage for roads, trails, river crossings, and recreation areas results in beneficial impacts on visitor use and experience because it would reduce confusion related to designated and undesignated trails. There may be some short-term adverse impacts on visitor use and experience related to trail maintenance and restoration; however, once complete, these would result in a higher quality visitor experience. Further, the 0.25-mile accessible trail from the parking lot to Blue Spring would be a beneficial impact on visitor use and experience, providing improved access and new opportunities. The impacts of these actions on visitor use and experience are not discussed further in the environmental consequences sections for alternatives B and C.

3.2.4 Environmental Consequences of Alternative B (NPS Preferred Alternative) on Visitor Use and Experience

The expansion of recreational opportunities such as hiking, horseback riding, and biking under alternative B would result in mostly beneficial impacts on visitor use and experience. The key differences between the two action alternatives are mostly related to trail mileage, with alternative B having fewer miles of trails for hikers, horseback riders, and bikers, and fewer river crossings. Alternative B also has four fewer recreation areas for public use when compared to alternative C.

Road-Based Recreation. Visitors would continue to have access to 216.5 miles of designated public roads. As undesignated roads and traces would be removed and restored, it would be less likely for visitors to get lost or enter areas without designated trails. While the removal of the undesignated roads may appear to have an adverse effect, many of the road miles that would be removed are routes that provide access to locations already served by other roads. Therefore, access to most destinations is not being reduced, but rather unnecessary and redundant road mileage would be removed. This would also alleviate confusion for visitors using roads in these areas.

A large portion of the roads being removed are in the primitive zone near the Pulltite Campground. The primitive zone provides visitors a sense of remoteness, isolated from the sights and sounds of other people; therefore, the removal of roads in these areas would be consistent with desired conditions and would have a beneficial impact on visitors seeking this type of experience (NPS 2014). The removal of the roads in the Rocky Creek Trail area would have beneficial and adverse impacts, as those who previously used this road by vehicle will no longer be able to do so. However, the conversion of the NPS road to hiking creates a new loop trail for visitors to the park. This area is also in the primitive zone and the removal of the road is consistent with the zone description and would have a beneficial impact on visitors seeking this type of experience.

The Old Tram Road, located in the Lower Current River area, would provide increased access for bikers and hikers. This has beneficial impacts as this trail is unique and provides new access and trail mileage for visitors.

Once implemented, ATV and UTV riders would be required to obtain an NPS-administered permit to ride on NPS roads. Because permits are already required by the counties for road travel and on nearby USFS lands for trail use, this would be a minor inconvenience; however, it would provide an opportunity for riders to connect with park staff to gain a better understanding of NPS rules and regulations.

Trail-Based Recreation. This alternative includes more trail mileage than alternative A. The impacts on hiking opportunities and equestrian uses in the Upper Current and Middle Current River areas would be mostly beneficial because visitors would have increased opportunities to experience

fundamental resources and values of the park such as the human occupation of and enduring connection to the Ozark Highlands; karst-based hydrogeological system; and outstanding river recreation experiences (NPS 2016a). Equestrian use in the Upper Current River would be expanded to include a loop trail near the Susie Nichols Cabin and access through the Cedar Grove area to the Howell-Maggard Cabin, providing access to the rich cultural history of the Current River. With fewer water crossings in alternative B than alternative C, there are fewer disruptions of river users, resulting in beneficial impacts on the outstanding river recreation experience when compared to alternative C. There would also be enhanced access through a new opportunity for hikers and anglers to explore and fish the area near Montauk State Park. This additional hiking-only opportunity would include access to the Tan Vat Recreation Area.

As described in alternative A, removal of undesignated roads and trails and clearly designating trails would have a beneficial impact on visitor use and experience. The implementation of visitor capacity would ensure that conditions on trails are consistent with desired conditions, including appropriate levels of encounters with other visitors.

In the Middle Current River area, as described in the road-based recreation impacts section, there would be a new loop trail increasing the hiking opportunities in the Rocky Creek area.

In the Lower Current River area, biking would be allowed on a newly designated trail along Old Tram Road and on trails in the vicinity of the Partney House.

In the Jacks Fork area, there would also be new hiking opportunities in the Jam Up Cave area that will provide visitors an opportunity to explore around the cave on foot, see rare plants remaining from the ice ages, and connect to the karst-based hydrogeological system. Visitors would still not be able to enter the cave itself, as it would remain closed to protect bats.

The separation of equestrian riders and bicyclists on trails would support safe visitor experiences. Alternative B would increase trail mileage and provide more opportunities for equestrian riders and bicyclists to pursue their respective recreational endeavors on designated and dedicated trails. However, as can occur on any trail system, despite the separation of user groups, there remains the potential for user conflicts among user groups throughout the expanded trail system.

Permit for Horseback Riding. The requirement to obtain a permit for horseback riding would mean horseback riders would continue to have opportunities to experience high-quality ecosystems. The implementation of a permit system would reduce the size of large groups and have beneficial and adverse effects on visitor experience. The management of group size would have beneficial impacts for users that prefer encountering smaller groups and adverse impacts for riders who prefer traveling in larger groups. Visitors would still be able to travel with friends and family through extended equestrian trail opportunities in the park. Further, any potential funding generated from a permit fee would be invested in future trail maintenance and monitoring that would serve to enhance visitor experience.

There would be some long-term adverse impacts associated with requiring visitors to obtain a permit for horseback riding. Visitors could be inconvenienced in the effort required to obtain the permit and they would also incur the associated cost of a permit fee.

There would also be short-term adverse impacts as visitors learn the process of obtaining a permit. The majority of equestrian riders come from Missouri or nearby states, so increased communication efforts about any sort of permit would reduce the impacts on these visitors; however, those who are not aware of the permit could be adversely affected if they arrived without knowledge of the changed management system. Depending on implementation of the permit system, if day-of or walk-up

permits are not available, it could reduce visitor spontaneity before and during their visit to the park. There would also be potential adverse impacts on those unable to obtain a permit.

Lastly, implementation of a permit system could lead to visitor perceptions that the park is less accessible. Depending on the maximum group size allowed under the permit system, visitors may have to travel through the park in smaller groups, and this could result in adverse impacts on those who enjoy the social camaraderie of a much larger group.

Horse Trail River Crossings. Equestrian riders would continue to have access to the seven existing river crossings, as well as seven additional designated river crossings. Park managers have documented many undesignated river crossings that are currently in use. Under the preferred alternative, some of the undesignated river crossings would be removed and restored. While the overall number of these river crossings would decrease under the preferred alternative and thereby have an adverse effect on equestrian riders' opportunities to cross rivers. Designated river crossings would continue to provide opportunities for equestrian riders to see, experience, and cross the Upper Current River, an Outstanding National Resource Water. Similar to the removal of undesignated trails, removal of the undesignated river crossings would have a beneficial impact because visitors would be less likely to get lost and experience confusion. River crossings are generally an enjoyable experience for equestrian riders. NPS research suggests many equestrian riders did not support closing river crossings (Algrim, Sharpe, Skibins 2018a).

This increased number of designated equestrian river crossings, when compared to alternative A, could adversely impact those boating and floating the river. Boaters, floaters, and hikers would now be more likely to encounter equestrian riders at these locations, with increased opportunity for conflict among users. However, due to the significant use of undesignated river crossings that currently takes place, this may not be the case. Also, with equestrian use on designated river crossings, visitors boating the river would know the locations of river crossings and could be more prepared for such interactions resulting in a beneficial impact on river users.

Introduction of Biking. Alternative B would have beneficial impacts on visitor opportunities for bicyclists. The addition of biking in the Lower Current River on the Old Tram Road and in the vicinity of the Partney Ridge and Partney House provides mostly beneficial impacts because this road is scenic and provides a new opportunity for visitors to experience challenging biking terrain. The Old Tram Road would be used by multiple user groups, which could result in the potential for adverse impacts as conflicts between user groups may occur.

Designated Recreation Areas Along the River. Visitors would continue to have access to 94 recreation areas along the 134-mile river corridor. Removal of three recreation areas does provide less access; however, many of these locations are duplicative and there are other recreation areas nearby that provide a similar experience; therefore, impacts on visitor use and experience would be negligible. One recreation area was added to provide river access in the Big Tree area.

Horse Staging Areas, Parking Areas, and Trailheads. Visitors would have increased opportunities due to the new hiking infrastructure and trailhead in the Middle Current River District. A new equestrian staging area would support horse use in the Upper Current River District and provide access to the increased trail network. Further, it would result in beneficial impacts as the ease of access for larger trailers would be improved.

Vehicular Access to Gravel Bars. Under alternative B, visitors would continue to have opportunities to camp on gravel bars in designated locations. A new designated camping area would be established on the gravel bar at Log Yard. Gravel bar camping would also be allowed at Two Rivers. New visitor opportunities at Log Yard and Two Rivers have beneficial impacts on visitor use

and experience. Designated parking will be provided in proximity to gravel bars where vehicular traffic is prohibited. Walk-in camping opportunities would be provided at some gravel bars formerly accessible by vehicles.

The walk-in gravel bar camping opportunities would also provide new opportunities for visitor access to the Current River. There would be reduced road noise at campsites, as they would be walk-in access only. There would be an adverse effect from removal of drive-in access to camping locations, which would reduce access for those who traditionally access these sites by vehicle.

3.2.5 Environmental Consequences of Alternative C on Visitor Use and Experience

The focus of this section is on the proposed management actions in alternative C that differ from alternative B. The environmental consequences for alternative C include the impacts described in alternative B unless otherwise noted.

Road-Based Recreation. Visitors would continue to have access to roughly 217.5 miles of designated public roads for scenic driving, bicycling, and in some cases horseback riding and ATV and UTV use.

Trail-Based Recreation. In terms of impacts on trail users, this alternative includes 9 more miles of trail for hikers, bicyclists, and equestrians than alternative B. This would mean increased opportunities to appreciate the scenery of the area and historic resources such as Nichols Cabin.

In the Upper Current area, there would be new hiking opportunities near Montauk State Park. In alternative C, a loop trail would be added that provides 1.88 additional miles and a different experience than alternative B. The loop trail in alternative C is 3.03 miles compared to 1.15 miles out and back in alternative B. Alternative C would also include 5.5 additional trail miles for equestrian riders. New, different, and longer trails in the Upper Current area have a beneficial impact on visitor experience. The horse trail river crossings are discussed in the "Number of Horse Trail River Crossings" section below.

In the Middle Current River area, a new hiking opportunity would provide increased access with a new connection between Roberts Field and the Thorny Creek and Russell Mountain area and the Ozark Trail and provide additional connections to park resources for long-distance trail hikers as well as overall increased trail connectivity. There would be new biking opportunities in alternative C along the Ozark Trail that are not included in alternatives A or B. New hiking and biking opportunities including increased connectivity result in beneficial impacts.

In the Lower Current River District, new hiking and biking opportunities, including a new trail on the north and south side of the Current River, would improve visitor access. The hiking and biking portion of the trail on the north side would connect to Chilton. In addition, the portion of the trail on the south side of the Current River would extend from a camping area and amphitheater that is currently accessed from Peavine Road. This would increase and diversify the opportunities in the popular and scenic Big Spring area. Also, in the Lower Current area there would be a new hiking loop trail in the vicinity of Cave Spring to enjoy more time in this geologically significant location, an example of the karst-based hydrogeological system, a fundamental resource and value. The new and diverse visitor opportunities in the Lower Current would have a beneficial impact on visitor use and experience. The impacts on hiking and equestrian users in the Jacks Fork River area would be the same as alternative B, including the additional hiking opportunities to Jam Up Cave.

Permit for Equestrian Riding. Same as described for alternative B.

Permits for ATVs and UTVs. Same as described for alternative B.

Introduction of Biking. The key difference for biking between the two action alternatives is two additional miles of biking trail proposed in alternative C (12 miles in alternative C compared to 10 miles in alternative B). Specifically, in the Upper Current District on the Pulltite Nature Trail; biking on the Ozark Trail section south of Powder Mill; the Campground Bluff Trail on the south side of the Current River from Big Spring Campground to the park boundary. As in alternative B, alternative C also includes biking on a newly designated trail along Old Tram Road.

In the Upper Current District, the Nature Trail in the Pulltite area would extend from the campground, providing hiking and biking opportunities, and additional activities for campers and day users to experience this historical area. User conflict on the Nature Trail at Pulltite may occur, as visitors who currently hike the trail travel at very slow speeds, slower than regular hikers and much slower than cyclists, and this may result in conflicts with bicyclists; however, this would only be on 200 feet of shared trail. The multiple activities on the Nature Trail could result in the potential for adverse impacts as conflicts between user groups may occur.

In the Middle Current area, a new biking opportunity would be provided on the Ozark Trail south of Powder Mill. New opportunities for bicyclists on the Ozark Trail are of great interest to some who desire biking long segments of the trail. Providing biking access on this stretch that runs through the park would increase trail connectivity in the region and provide new opportunities in the park and result in beneficial impacts.

In the Lower Current, the impacts of biking on the Old Tram Road would be the same as described in alternative B. However, the addition of the Campground Bluff Trail would provide new opportunities for campers at Big Spring Campground and also could connect to more trail mileage in the future.

Number of Horse Trail River Crossings. Equestrian riders would continue to have access to the seven existing river crossings as well as nine additional river crossings in the Upper Current River area. The impacts would be similar to alternative B with the difference that alternative C would provide two additional river crossings in the Upper Current, a desirable experience, and boaters and floaters might be more likely to encounter equestrian riders, which would be an adverse impact for the boaters and floaters.

Number of Designated Recreation Areas Along the River. Visitors would continue to have access to 95 recreation areas along the 134-mile river corridor. As in alternative B, Summer's Bluff Primitive Area would be removed as would the road to this recreation area. This would result in adverse impacts on visitor use and experience as visitors would no longer have vehicular access to this road or recreation area. However, under both action alternatives visitors would have hiking and equestrian use in this area because of proposed new trails and therefore still have access to the area.

Horse Staging Areas, Parking Areas, and Trailheads. Same as described in alternative B.

Cumulative Impacts

Past, present, and reasonably foreseeable future actions that have impacted visitor use and experience in the project area include ongoing and future repairs related to the May 2017 flood (see table 2 for a list of the park's past, present, or reasonably foreseeable actions). For example, the Waymeyer/Pin Oak EA will include finding alternate locations to replace a flood-destroyed campground and floater access. Another example includes the future redevelopment of the Rocky Falls area. Although there would be some short-term adverse impacts during construction for these

projects, the past, present, and reasonably foreseeable future actions have long-term beneficial impacts on visitor use and experience by recreating opportunities and access that were available before the May 2017 flood or expanding opportunities consistent with park zoning (GMP). Further, the rehabilitation of the Civilian Conservation Corps (CCC) cabins in the Big Spring area would have similar impacts, short-term adverse impacts during construction, and long-term beneficial impacts as visitors have a unique lodging opportunity in the future and another opportunity to connect to the rich history of the park.

As previously described, alternative A would have no new impacts on visitor use and experience. When the effects of alternative A are combined with other past, present, and reasonably foreseeable future impacts, the total cumulative impact on visitor use and experience would be beneficial. The incremental impacts of alternative A would not contribute to the beneficial impacts that are already occurring. Alternative B would have largely beneficial actions because of increased trail mileage and a diversity of available opportunities throughout the park. 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 be mostly beneficial. The incremental impacts of alternative B would contribute slightly to the beneficial impacts that are already occurring. Alternative C would have mostly beneficial impacts because of more opportunities for hikers, bicyclists, and equestrian riders through more trail miles and diversity of recreational opportunities when compared to alternatives A and B. When the effects of alternative Care combined with other past, present, and reasonably foreseeable future impacts, the total cumulative impact on visitor use and experience would be beneficial. The incremental impacts of alternative C would contribute slightly to the beneficial impacts that are already occurring.

Conclusion

Under the no-action alternative, the continuation of current management would result in no new impacts on visitor use and experience. Visitors would continue to have access to the designated equestrian trails, recreation areas, and biking would continue to be allowed on park roads.

Alternative B would result in mostly beneficial impacts because of the increased hiking, biking, and equestrian trail opportunities; however, there would be some adverse impacts as some recreation areas are removed. Removal of roads in the primitive areas would result in a beneficial impact on visitor use for those seeking a quiet, contemplative experience; and an adverse impact on those visitors who no longer will be able to access these areas in the same way. Permitting equestrian, UTV, and ATV use may have some short-term adverse impacts because of the added step associated with securing a permit during pre-trip planning.

Impacts of alternative C are very similar to those of alternative B. Alternative C provides the most trail mileage and therefore, more beneficial impacts for hikers, bicyclists, and equestrian riders. Further, increased trail connectivity throughout the park would have beneficial impacts on visitor use and experience. There could be additional adverse impacts on water-based recreation with the number of river crossings in alternative C as well as user conflicts on trails with multiple uses. There is also the potential for short-term adverse impacts relating to permitting equestrian, UTV, and ATV use.

3.3 VEGETATION AND SOILS

3.3.1 Affected Environment – Vegetation

The park lies in the oak/hickory-pine forest region of the eastern deciduous forest. Four major vegetation communities with 12 vegetation associations are found in the park. These vegetation communities and their associations are composed predominately of forest and are characterized as upland, streambank, gravel bar, and agricultural land vegetation communities.

In areas where unauthorized equestrian use, motorized vehicle, hiking, and camping, have occurred in undesignated areas, these activities have resulted in displacement, fragmentation, and degraded native upland and riparian vegetation communities. Most impacts occur along undesignated roads and trails, undesignated river access points, and around the perimeter of designated high-use areas where the frequency of trampling prevents establishment of vegetation. Several undesignated river accesses, launches, and crossings (for horses, motorized vehicles, and nonmotorized watercraft) disturb riparian vegetation along the rivers. In addition, visitor-caused disturbances increase the potential of invasive plant infestation. Motorized vehicles and horses can also spread invasive plants throughout the park by transporting weed seeds via manure or vehicle tires (NPS 2014).

Upland Plant Community. The upland plant community occurs on the park's upper slopes and ridges. This community type contains four different climax forests and two distinct types of open upland sites. Table 4 includes a brief description of each association.

TABLE 4. UPLAND PLANT COMMUNITY ASSOCIATIONS IN THE PARK

Association	Description
Oak / Hickory Forest	This is the most common upland association in the park and exists on drier upper slopes and ridges. This association includes black, white, and red oak; Ozark pignut; and shagbark and mockernut hickory. Understory plants include high- and low-bush huckleberry, smooth sumac, sassafras, cinquefoil, and dwarf iris.
Sugar Maple / White Oak	This association dominates west- and south-facing slopes due to intense solar radiation. On the wetter east and north-facing slopes, this association also includes northern red oak and red ash. Understory species include paw-paw, bladdernut, flowering dogwood, and wild geranium.
Oak / Pine	This association occurs on narrower ridges with acidic soils derived from sandstone, chert, and felsite. Understory vegetation is composed mainly of lowbush huckleberry and farkleberry.
White Oak / Red Maple	The white oak / red maple association occurs on the upper slopes of hills and ravines and includes winged elm and mockernut hickory.
Rock Ledge	This association is one of two open upland plant associations found scattered throughout the park. Common species include red cedar, blue ash, chinquapin oak, poison ivy, and golden current.
Open Glades ("barrens")	This association exists on felsite rock exposures and ridges. Characteristic species include hairy lip fern, spikemoss, early saxifrage, pine weed, and woodrush.

Riparian Community. The riparian community is one of the most diverse, dynamic, and complex terrestrial habitats in the park. These areas are divided into three vegetation associations, including Silver Maple / Cottonwood, American Elm / Green Ash, and Sugar Maple / Bitternut Hickory. Table 5 includes a brief description of each association.

TABLE 5. RIPARIAN COMMUNITY ASSOCIATIONS IN THE PARK

Association	Description
Silver Maple / Cottonwood	This association occurs on stabilized gravel bars with deeper alluvial deposits. It supports a number of herbaceous species such as clearweed, greenheaded cone flower, and leatherwood.
American Elm / Green Ash	This association occurs on richer soils that receive less frequent flooding. Understory plants include trumpet creeper, spice bush, blackbrush, poison ivy, and blue phlox.
Sugar Maple / Bitternut Hickory	This association exists on richer soils that receive less frequent flooding. Understory plants include trumpet creeper, spice bush, blackbrush, poison ivy, and blue phlox.

Flooding is an important factor in the formation and maintenance of the park's riparian environments. Not only does it shape the physical landscape, but flooding can also aid in the dispersal and propagation of plant seeds and distribute nutrients. In turn, riparian areas perform a range of important ecological functions such as stabilizing streambanks, regulating stream temperatures, filtering pollutants, retaining nutrients, and providing habitat for numerous wildlife species.

Riparian areas of the park are also classified on variations in physical landform characteristics. These include active channels, active low floodplains, stable floodplains, and terraces.

- Active channels are characterized by proximity to the river where frequent flooding occurs. Vegetation development is limited and coarse materials such as gravel and sand are common.
- Active low floodplains are slightly elevated above active channels and typically receive several seasonal floods each year. Soils are relatively sandy and vegetation is characteristic of frequently flooded riverfront forests of sycamore, elm, ash, and hackberry.
- Stable floodplains are higher in elevation and are subject to only occasional flooding by the highest seasonal floods. Flood disturbance is minimal, resulting in more developed, silty soils that support less flood-tolerant plant species such as oaks, maple, and hickory.
- Terraces are remnants of former floodplains and rarely flood except during the most extreme storm events. Soils are well-developed, loamy, and silty and support flood-intolerant species such as mesic forest shrubs and herbs. Most terraces in the park have been cleared in the past for agricultural use.

Gravel Bar Community. The gravel bar community, which is subject to regular scouring during high flows or flood events, typically consists of the Ward's Willow / Witch-Hazel association—commonly found with alder and sycamore trees. These trees help to stabilize gravel bars and allow other plants to become established such as swamp dogwood, water willow, and chairmaker's rush.

Agricultural Land. Cultivated agricultural lands comprise approximately 1,280 acres of the park through a longstanding agricultural special use permit program administered by the National Park

Service to preserve certain pastoral scenes and improve wildlife habitat. These areas are maintained by local farmers through haying operations. When left uncultivated for extended periods of time, honey locust, bitterweed, dwarf fleabane, yarrow, crabgrass, and horseweed typically become established.

Rare Natural Communities. In addition to the broad vegetation communities described above, a number of rare natural communities occur within the park. These rare communities are interrelated assemblages of unique plants, animals, and other living organisms that are shaped by their physical surroundings, climate, and other natural processes. These natural communities provide essential habitat for a number of federally and state listed species found in the park.

The Missouri Natural Heritage Program, which is managed by the Missouri Department of Conservation, has ranked these community types based primarily on the number of occurrences found in the state. Other factors considered for state ranking include total acres, distribution, number of protected sites, and degree of threats. This same classification system is used to determine species of conservation concern listed in the federal and state listed species section below. The following paragraphs describe the state rankings established for the natural communities that occur in the park. Table 6 lists the rare natural communities of the park unit and their associated state rank (MDC 2016).

Global rarity rankings are not used by the Missouri Department of Conservation due to the difficulty in reconciling Missouri's state ranking system with this more widely used classification system. One rare community type not specifically mentioned on the state ranking is canebrakes. These dense thickets of giant cane (*Arundinaria gigantea*) form in the alluvial floodplains of the Current and Jacks Fork Rivers. Canebrakes provide important habitat for a number of rare species, including the Swainson's warbler, which is a Missouri state listed endangered species. Canebrakes are also important habitat for black bears, spotted skunks, golden mice, swamp rabbits, white-tailed deer, and gray squirrels.

TABLE 6. RARE NATURAL VEGETATION COMMUNITIES

Community Type—Forests	**State Rank**
Mesic bottomland forest	S2 Imperiled
Dry-mesic chert forest	S4 Apparently Secure
Mesic limestone / dolomite forest	S3 Vulnerable
Riverfront forest	S4 Apparently Secure
Community Type—Woodlands	**State Rank**
Dry igneous woodland	S4 Apparently Secure
Dry-mesic chert woodland	S4 Apparently Secure
Dry-mesic igneous woodland	S4 Apparently Secure
Dry chert woodland	S4 Apparently Secure
Community Type—Glades	**State Rank**
Dolomite glade	S3 Vulnerable
Igneous glade	S3 Vulnerable
Community Type—Wetlands	**State Rank**
Ozark fen	S2 Imperiled

Community Type—Stream Edge	**State Rank**
Gravel wash	S3 Vulnerable
Community Type—Caves	**State Rank**
Cave	S4 Apparently Secure
Cave spring	S4 Apparently Secure
Springs and spring branches	S4 Apparently Secure
Community Type—Cliffs	**State Rank**
Dry igneous cliff	S4 Apparently Secure
Moist limestone / dolomite cliff	S4 Apparently Secure
Dry limestone / dolomite cliff	S5 Secure

*S1: Critically Imperiled. Critically imperiled in the nation or state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state. Typically, five or fewer occurrences or very few remaining individuals (<1,000).

S2: Imperiled. Imperiled in the nation or state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the nation or state (1,000 to 3,000).

S3: Vulnerable. Vulnerable in the nation or state either because rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation. Typically, 21 to 100 occurrences or between 3,000 and 10,000 individuals.

S4: Apparently Secure. Uncommon but not rare, and usually widespread in the nation or state. Possible cause of long-term concern. Usually more than 100 occurrences and more than 10,000 individuals.

S5: Secure. Common, widespread, and abundant in the nation or state. Essentially ineradicable under present conditions. Typically with considerably more than 100 occurrences and more than 10,000 individuals.

Information about these rare natural communities can be found on the Missouri Department of Conservation's online library at: https://mdc.mo.gov/your-property/responsible-construction/missouri-natural-heritage-program.

Invasive Plant Species. As a result of a variety of human activities and human-based disturbances to the native plant communities in the area (including direct displacement of native plants), several nonnative and invasive plant species have moved in and proliferated in the park's river basins. Many of these nonnative plant species outcompete the native species, resulting in reduced or stressed populations of native plants and lower diversity of plants. Ground disturbances discussed in this section, such as land use development, recreational uses inside and outside park boundaries, agricultural uses, and local mining and mineral development, have contributed to the spread of invasive plants (NPS 2014).

Land alterations fragment the functionality of several plant communities and introduce disturbance zones that are prone to nonnative, invasive plant infestation. Some examples of invasive plants that threaten native plant communities include Eurasian water milfoil *(Myriophyllum spicatum),* purple loosestrife (*Lythrum salicaria)*, and Chinese bushclover (*Lespedeza cuneate*) *(Sericea lespedeza)*. Nonnative wildlife can also stress native plant populations. Similarly, the roads in the basins have fragmented plant communities and introduced disturbance corridors for weed infestation. Off-road motorized vehicles and equestrian use also disturb vegetation cover that can lead to nonnative, invasive plant proliferation and fragmentation of plant communities (Pickering et al. 2009). Spreading weed seeds via horse manure is known to occur in the park (NPS 2014).

3.3.2 Affected Environment – Soils

The park is located in the Current River Hills Subsection of the Ozark Highlands. As such, soils are rocky and formed mainly from carbonate and sandstone bedrock. Soils described in this section are part of an interconnected geo-landform-soils classification system that includes 36 ecological land types (ELTs) in the park (Meinert 2008). The ELT units range from hundreds of acres in size to those less than one acre. They are distinguished by parent soil material, landform, aspect, slope, and vegetation.

Trails in the Riverways experience varying degrees of erosion severity and muddiness, caused by compaction, level of use, type of use, location in the landscape, slope, design of the trail, and other localized trail conditions. Erosion and wetness is most prevalent in areas of the trail located in the floodplain, on fall line trails that follow direct drainage paths, and where heavier load trail users, such as horses, occur. Much of the degree of impacts depends on soil composition, slope, trail design, climate, and existing trail conditions.

In general, areas in the park that are unsuited for road and trail uses encompass cliffs, bluffs, and other steep extents, as well as intermittent stretches immediately adjacent to rivers and tributaries. Areas of poor suitability cover larger sections of the park's jurisdiction, including some moderately steep hillsides and most areas in floodplains. However, designated roads and trails largely avoid or skirt unsuited and poorly suited soil areas. For the most part, the park's informal network of roads and trails avoid unsuitable soil areas, but traverse through a much larger portion of poorly suited areas than the designated roads and trails.

3.3.3 Environmental Consequences of Alternative A (Current Management) on Vegetation and Soils

The continuation of current management for roads and trails would have ongoing and lasting adverse impacts—particularly on vegetation and soils in vulnerable areas such as steep banks, direct drainage paths, and where intensive equestrian use occurs. In the absence of strict law enforcement, visitors will likely continue to cut new, undesignated roads and trails to desired locations throughout the park. As most impacts occur along undesignated roads, trails, and river access points, and along the perimeter of designated high-use areas, such recreational uses would continue to displace, alter, fragment, and degrade native upland and riparian vegetation communities. In addition, visitor-caused disturbances increase the potential of invasive plant infestation. Motorized vehicles and horses can also spread invasive plants throughout the park unit by transporting weed seeds via manure or vehicle tires.

Under current management practices in alternative A, undesignated trails would be restored to natural conditions, which, over time, would have beneficial effects to vegetation and soils. Removal of approximately 2.5 miles of park-administered roads and traces in primitive zones would allow vegetation to return to these areas. Compared to alternatives B and C, the no-action alternative would have fewer adverse impacts on vegetation and soils at horse trail river crossings, as no additional crossings are proposed.

3.3.4 Environmental Consequences of Alternative B on Vegetation and Soils

Road Mileage. The moderate reduction in designated road mileage (from 230.5 miles in alternative A to 216.5 miles in alternative B) would have a small to medium beneficial impact on vegetation and soils. Some, if not most of the road sections proposed for removal, are on poorly suited soils for

road-based travel and recreation. Furthermore, all undesignated roads would be removed and restored to natural conditions, including roads identified for closure in the 1991 Roads and Trails Study that have not been closed to date. Over time, these restoration efforts would have long-term and wide-ranging benefits to vegetation and soils as former road segments would tend to stabilize slopes, wet areas, and other vulnerable sites prone to damage from road-based travel and recreation.

Trail Mileage. Under alternative B, 49.5 miles of new trails in the park would have small, long-term and permanent adverse impacts on vegetation and soils from the development of new trails.

Specific impacts on vegetation and soils in the preferred alternative B include the permanent removal of 9.5 acres (i.e., the total linear vegetation acreage removed within park boundaries) for hiking and hiking/biking trails and 7.7 acres within the park boundary for equestrian trails. Approximately 5.0 acres of additional vegetation is proposed to be cleared for equestrian trail development *outside* the park boundary. The 17.0 total acres of vegetation removed for trail development in alternative B within park boundaries is approximately 2% of the parkwide study area. This amount of vegetation loss would have a small impact on vegetation and soils in the Riverways as a whole.

Some undesignated trails and closed roads would be converted into designated trails and existing trail alignments that have potential to impact sensitive vegetation and soil types. New trail alignments may be required in future trail-building efforts to minimize impacts on vegetation resources and careful trail routing would likely result in a net beneficial impact on vegetation and soils for those trail sections. Increased access to the river would likely continue to increase the spread of invasive plant species.

On the other hand, the preferred alternative would have long-term, wide-ranging benefits to vegetation and soils along nondesignated trails that do not meet trail classification standards. These trails would be removed, rehabilitated, or rerouted on a case-by-case basis.

Permit for Horseback Riding. The proposed permitting system would help manage horse use levels, which would allow managers to protect several resource types. This would be a beneficial impact on vegetation and soils.

Introduction of Biking. There are no known areas of sensitive vegetation along the proposed new bicycle trails. Some adverse impacts would be expected, however, as additional biking would have likely small, adverse impacts on vegetation along the Partney Trail, south of Big Spring and the Old Tram Road in the Lower Current River District. Increased access to the river could increase the spread of invasive plant species.

Horse Trail River Crossings. Impacts from existing horse trail crossings combined with the seven proposed river crossings, would have an adverse effect on vegetation and soils in the immediate vicinity of each crossing. The average width of the proposed crossings is approximately 100 feet. Direct impacts from vegetation removal during establishment of the new crossings as well as likely proliferation of the footprint of each crossing over time, would have long-term and mainly small impacts on park vegetation and soils. When considering the overall size of the park, the horse trail crossings would have a negligible to small and localized impact. Increased access to the river would likely continue to increase the spread of invasive plant species.

The additional designated trail crossings would direct use away from dozens of informal, unauthorized crossings, benefiting vegetation at the informal crossings. Roads, trails, recreation areas, and river crossings that are not part of the designated system would be restored to natural conditions, which would have long-term beneficial impacts over time.

Designated Recreation Areas Along the River. The preferred alternative's proposed limit of 94 designated recreation areas is less than the 96 areas indicated in alternative A. Roads, trails, recreation areas, and river crossings that are not part of the designated system would be restored to natural conditions, which would have long-term and beneficial impacts on vegetation and soils.

Vehicular Access to Gravel Bars. There would be slightly beneficial impacts on vegetation and soils related to more structured and focused management of visitor access to gravel bars in the preferred alternative. As in alternative A, visitors using motorized and nonmotorized watercraft could continue to camp on gravel bars a minimum of 0.5-mile from any designated campsite and more than 50 feet from a designated recreation area. The preferred alternative proposes a designated camping area in the least impactful location to vegetation, soils, and other resources along the Log Yard gravel bar. These sites would be managed for individuals accessing their campsites by licensed vehicle and the park would retain the flexibility to manage access to or close the Log Yard gravel bar to vehicle access to protect park resources, improve safety, and enhance the visitor experience. Similarly, gravel bar camping at Two Rivers would be allowed in designated campsites to protect resources and enhance visitor experience.

Severe storm events and adverse impacts on vegetation on gravel bars from storm and flood-related impacts would continue to periodically inundate or destroy biological resources needed to sustain vegetation on gravel bars. In addition, gravel bars that are continually disturbed by vehicles and regular visitor use cannot sustain vegetation growth that would otherwise provide armor and protection for each bar. Overall, adverse impacts on vegetation and soils on those gravel bars slated for improvements to visitor access in the preferred alternative would be long term and negligible.

3.3.5 Environmental Consequences of Alternative C on Vegetation and Soils

Impacts on vegetation and soils in alternative C would be similar to those discussed in the preferred alternative, but with slightly greater parkwide impacts for each of the proposed management activities, discussed below.

Road Mileage. Same as alternative B.

Trail Mileage. Same as alternative B, but with greater adverse impacts on vegetation and soils because alternative C proposes 58.5 miles of new trails (versus 49.5 miles of new trails proposed in the preferred alternative).

Like alternative B, specific impacts on vegetation and soils in alternative C include removing a total of 10.8 acres of vegetation for hiking and hiking/biking trails and 10.6 acres within the park boundary for equestrian trails. Approximately 5.0 acres of additional vegetation is proposed to be cleared for equestrian trail development *outside* the park boundary. The 21.4 acres of vegetation removed for trails development in alternative C within park boundaries is approximately 2.6% of the parkwide study area. This amount of vegetation loss would have a negligible to small impact on vegetation and soils in the Riverways as a whole.

Some undesignated trails and closed roads would be converted into designated trails and existing trail alignments that have potential to impact sensitive vegetation and soil types. New trail alignments may be required in future trail-building efforts to minimize impacts on vegetation resources and careful trail routing would likely result in a net beneficial impact on vegetation and soils for those trail sections. Increased access to the river would likely continue to increase the spread of invasive plant species.

On the other hand, the preferred alternative would have long-term, wide-ranging benefits to vegetation and soils along nondesignated trails that do not meet trail classification standards. These trails would be removed, rehabilitated, or rerouted on a case-by-case basis.

Introduction of Biking. Same as alternative B, but with a small amount of additional, long-term adverse impacts on vegetation along trails where biking would be permitted including the Nature Trail at Pulltite; the Old Tram Road in the Lower Current River District, on the Partney Trail south of Big Spring, and a segment of the Ozark Trail.

Horse Trail River Crossings. Adverse impacts on vegetation and soils from alternative C would be greater than those in the preferred alternative. Because alternative C includes 9 new crossings (two more crossings than alternative B), this alternative would add a minor, long-term adverse impact on vegetation due to trampling at the additional crossings.

Designated Recreation Areas Along the River. Same as alternative B, but with a slightly less beneficial impact because alternative C proposes 95 total areas (versus 94 areas proposed for designation in alternative B and 96 areas retained in the no-action alternative). Thus, impacts on vegetation and soils in alternative C would be small, but greater overall than impacts noted in the preferred alternative.

Horse Staging Areas, Parking Areas, and Trailheads. Same as alternative B.

Vehicular Access to Gravel Bars. Same as alternative B.

Cumulative Impacts

There are several ongoing and planned actions within park boundaries that would affect vegetation and soils that are not part of this plan, including repairs of existing, damaged river access sites in eight districts damaged by the May 2017 flood. The park's Integrated Park Improvement process (IPI) involves relocation and removal of some flood damaged park facilities as part of the holistic effort to improve sustainability of flood-prone park assets. IPI projects include redesign of Big Spring, Alley Spring, Round Spring, and Pulltite Campgrounds. Roads would also be modified in these areas to improve access using more sustainable design standards. These efforts may have small or barely noticeable adverse impacts on vegetation and soils during construction and modification efforts.

Similar to the IPI efforts, other reasonably foreseeable actions include redesigning and improving the heavily used and impacted Rocky Falls area; repairing the dining lodge, cabins, site features, and landscape of the Big Springs Historic District; and evaluating the Waymeyer / Pin Oak area for maintenance and rehabilitation efforts to find alternate locations to replace a flood-destroyed campground and floater access. These efforts would have negligible localized adverse impacts on vegetation and soils overall.

Conclusion

Compared to the no-action alternative, alternative C (as well as the preferred alternative B) would have a similar range of beneficial and adverse effects on park vegetation and soils. Long-term, beneficial effects in alternatives C (and B) would outweigh the adverse impacts indicated in this section. Closing undesignated roads and trails would provide an overall benefit to vegetation and soils. New trail construction would permanently remove approximately 17.0 linear acres of

vegetation throughout the park in alternative B and 21.4 acres of vegetation in alternative C. As noted, short-term, minor adverse impacts from construction would be expected, although most trees would be small diameter and the National Park Service would avoid building trails in particularly vulnerable or unsuitable soil types to minimize overall impacts. New trail mileage would remove approximately 2% of the Riverways' existing vegetation cover in the preferred alternative, and approximately 3% in alternative C. Note that these figures do not include the number of trail acres that would be restored in the existing trail network, which would encourage the growth of native plants and have a host of other benefits to the natural environment.

In addition, the proposed permitting system would allow managers to further protect several resource types, including vegetation and soils, from significant impacts. While the establishment of new horse trail river crossings and the likely expansion of these crossings over time would trample and otherwise negatively impact park vegetation and soils in the immediate vicinity of those crossings, the overall impact of short-term construction activities and a small amount of vegetation and habitat loss would have a negligible to small and localized adverse impact on vegetation and soils. Other resource management actions in alternatives B and C would have long-term and substantive beneficial impacts on vegetation and soils—especially in areas of high existing visitation addressed in this plan.

3.4 WATER QUALITY

3.4.1 Affected Environment

The hydrogeologic foundation of the Ozark karst landscape supports a tremendous variety of natural features in the Riverways, including a spring system that is unparalleled in North America and the highest cave density in any national park system unit. Park waters also have national recreational significance and receive special protection against degradation. Among the park's accolades, the Current River is one of the few remaining free-flowing rivers in the United States (Bowles et al. 2018), and both the Current River and Jacks Fork River are designated as Outstanding National Resource Waters because of their exceptional water quality. Missouri's water quality standards classify Outstanding National Resource Waters as Tier Three Waters, which stipulates that no degradation of water quality is allowed. This stringent standard continues to protect the overall high water quality of these two rivers (NPS 2007). Water quality would likely remain high under current management practices and may improve slightly under the proposed action.

While water quality is generally very good in the park's rivers and springs, the current volume of use and the location of road and trail crossings in the Current and Jacks Fork Rivers can stress sensitive water resources, such as seeps, springs, and other wetland areas. Invertebrate communities and water quality in the Current and Jacks Fork Rivers are largely sound and have high biological condition, although ongoing and projected threats to these resources remain. Many aquatic plants are vulnerable to disturbance in the Ozark Plateau region, and assessing those communities is an important tool for managers to assess potential impacts on springs in the park. Monitoring data collected on aquatic vegetation from 2007 through 2015 found the park's springs have broad natural habitat diversity, reflected by the physical and chemical stability of these watershed features (Bowles and Dodd 2016). Similarly, fish communities of the Current River are also good indicators of water quality due to their ecological roles in streams and varying tolerances to anthropogenic disturbances, such as recreational uses on roads and trails. Monitoring data collected at six sites on the mainstem of the Current River and three sites on the Jacks Fork River from 2005 to 2010 indicated high community diversity and good to excellent Index of Biotic Integrity scores, representing a high quality and healthy fish community at the park (Dodd 2013).

When not managed properly, unauthorized equestrian and land-based motorized vehicle use on visitor-created roads, trails, and river crossings within park boundaries and other areas may cause localized erosion and higher levels of turbidity. Similarly, impacts from public recreation uses in and along the rivers and congested access points add to soil compaction, loss and trampling of vegetation, and erosion impacts.

Between 1998 and 2002, combined sources of streambed sediment and fecal coliform bacteria contributed to a section of the Jacks Fork River inclusion on Missouri's list of impaired waters under section 303(d) of the federal Clean Water Act. Potential sources of fecal contamination to the Jacks Fork River included a wastewater treatment plant, campground pit toilet or septic-system effluent, cross-country horseback trail riding, recreational boaters and swimmers, cattle, and wildlife (Davis and Barr 2006). The US Geological Survey, in cooperation with the National Park Service, conducted a study to better understand the extent and sources of microbiological contamination within the Jacks Fork River. Ten sites were sampled from 2003 to 2004, and several sites exceeded the statewide whole-body contact recreation standard for fecal coliform. Exceedances occurred in samples collected when trail rides occurred, and the Eminence Wastewater Treatment Plant may have contributed to one of the exceedances (Davis and Barr 2006).

During the 2003–2004 sampling period, to compare the effects of intense trail ride activity and large volumes of recreational boaters and swimmers, the USGS conducted hourly sampling for fecal coliform and *E. coli* bacteria. The study was conducted at a specific site on selected weekends when no trail rides were taking place and on weekdays during trail rides. Generally, the fecal bacteria densities decreased or stayed somewhat constant as the number of canoes, kayaks, and tubes passing the site increased. During trail rides, the fecal coliform bacteria densities generally increased as the number of horses crossing the river increased and decreased with a decrease in the number of horses crossing the river. Results indicated that recreational users (including boaters and swimmers) were not the primary source of fecal coliform bacteria in the Jacks Fork River; rather, the presence of fecal coliform bacteria was associated with other animals, with horses being the primary source (Davis and Barr 2006).

Water quality management and restoration planning are further complicated by river channel instability, some of which has been attributed to historic land-use patterns. Many threats largely originate outside park jurisdictional boundaries (Bowles et al. 2018). Gravel-bed rivers, such as the Jacks Fork and Current Rivers, are naturally dynamic where high flows mobilize bed material on an annual basis, creating gravel bars, promoting bank erosion, and driving processes, such as channel migration. Elevated riverbed mobility and channel migration across the Ozark Plateaus are thought to be driven by historical and present-day land-use patterns and reflect increased rates of coarse sediment delivery to regional rivers (USGS 2021). As noted in the Federally Listed Threatened and Endangered Species section of the RTMP/EA (section 3.5), species with limited locomotion or small home ranges (e.g., freshwater mussels) may be especially vulnerable to accelerated gravel movement at the site-specific scale. The Ozark hellbender (*Cryptobranchus alleganiensis bishopi*), a federally endangered species, is highly sensitive to water quality impacts, such as sedimentation, for example.

Depending on intensity, physical disturbance from some recreational activities, such as equestrian use on erodible stable soils and vehicle access and camping near gravel bars, can have varying impacts on water quality and vulnerable aquatic species (e.g., freshwater mussels) that serve as indicators of water quality (see section 3.5 of the RTMP/EA). A 2015 university study of potential impacts of stream crossing traffic on macroinvertebrate communities in the Current River during winter and summer months, for example, found that patterns in water quality and stream condition varied among the sites studied along the river; however, researchers found no consistent declines in macroinvertebrate diversity downstream of crossings (Heth et al. 2015). The high overall condition

scores indicated that current levels of stream crossings and traffic in the Current River did not pose a threat to macroinvertebrate communities at the spatial and temporal scale of the study.

Qualitatively, a visitor use study that surveyed 456 onsite visitors from April 2016 to October 2016 found that equestrian uses can have disproportionate adverse impacts to other visitors and visitor groups, as well as park resources (Algrim, Sharp, and Skibins 2018b). Researchers noted that the impacts are due to the nature of the activity (e.g., presence of horses, large groups) and the fluctuating seasonal use (e.g., extremely high equestrian use during summer and fall). Typical horse-riding impacts include soil erosion and compaction, damage to vegetation, wildlife disturbance, and water pollution, the research team indicated. In addition to biophysical impacts, potential social conflicts usually revolve around shared trail use with other horse riders, mountain bikers, and hikers. The study also included trail rider counts collected over a 10-day period in October 2015 and 4-day periods in April, May, June, July, and August, September, and October of 2016 at five locations throughout the park. Outside the periods of high use related to organized trail rides, equestrian use appeared to be relatively low, which may point to the need for management during peak use times, the study found. Regarding resource protection—including water quality management concerns—horse count data suggested that stricter management may be necessary at the locations with high levels of use during the late summer and fall months.

Regarding water quality impacts at a broader level, loss of forest cover within the watershed has likely increased 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 (USGS 2021). The park's wetland and riparian areas serve important roles in protecting water quality within park watersheds. Riparian buffers help decrease erosion, for example, by reducing the speed of river flow, which allows sediments to settle more consistently along riverbanks. As such, wetland areas along streambanks serve natural resource protection purposes. A 2017 recreation ecology literature review comparing different trampling impacts from trail user groups like those at Ozark National Scenic Riverways (e.g., hikers, horse riders, mountain bikers) supports the protective values of wetland buffers as well as their general vulnerability to both natural and human-caused degradation. The study indicated that horses create more erosion and rougher trails than other user groups (Hennings 2017). Findings indicated that horses and hikers made more sediment available than mountain bikers, particularly on wet trails. In addition, researchers noted that all user groups made sediment available for erosion, but horses caused greater soil compaction, yielded more sediment, and caused rougher trails.

Trail construction projects like those proposed in the RTMP/EA have occurred recently, such as the Current River Trail project in 2016. In cooperation with the Ozark Trail Association, the 21.6-mile Current River Trail was added to the Ozark Trail system as part of an implementation action from the park's 2014 General Management Plan. While the Current River Trail was designated for foot traffic only, a similar level of environmental analysis was prepared for the Current River Trail EA as the environmental analysis prepared for this RTMP/EA. The Current River Trail plan FONSI was signed, in part, due to construction methods that would minimize erosion and have negligible impacts to water quality (NPS 2016c). Similar trail construction methods and erosion control measures are included in the RTMP/EA.

3.4.2 Environmental Consequences of Alternative A on Water Quality

Under alternative A, water quality would be impacted in highly visited and congested areas by the continued use of the park's existing system of 230.5 miles of designated public use roads, trails, and river crossings. Long-term impacts to water quality would be improved, however, with the planned removal and restoration of undesignated or visitor-created roads and trails and undesignated

recreational areas. Similarly, no new roads, trails, or associated facilities would be established in the no-action alternative, and short-term construction impacts from these facilities and long-term use would not contribute to erosion, trampling, and potential sedimentation impacts to park water sources. Horseback riding in the park would be limited to currently designated equestrian trails as well as state and county unpaved roads, which would help contain water quality and other resource impacts on managed areas. However, impacts from visitor-created social trails would continue to proliferate—rutting, trenching, and trampling vegetation throughout park management zones, which causes erosion and contributes to water quality impacts.

Dirt and gravel roads in the project area and other earth disturbing activities impact the quality of water. Some management areas, like Log Yard and Two Rivers, 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 on water quality if not controlled.

Off-road vehicle use (including both licensed vehicles and all-terrain vehicles and utility task vehicles) would continue to have adverse impacts on water quality and other park resources. Soil disturbance, compaction, vegetation damage, and associated erosion to wet soils and some gravel bars would add to water quality impacts.

Biking would continue to be allowed on designated park roads, including electric bikes (E-bikes), per Secretary of the Interior's Executive Order 3376 and would have negligible impacts to water quality. Current and projected use on these designated roads is not expected to contribute additional erosion or other impacts to water quality.

3.4.3 Environmental Consequences of Alternative B on Water Quality

Potential direct and indirect effects from the preferred alternative include short- and long-term erosion and sedimentation impacts on streams. However, these effects would be tempered by a host of beneficial effects, including:

- A net reduction in roads and trails mileage, including the removal, and in many cases, the restoration of undesignated roads and trails
- Formalizing the park's system of roads, trails, and river access points
- Clearly identifying uses that are allowed on each road and trail
- Determining appropriate levels of effort needed to maintain the park's transportation network, which would also decrease the long-term, adverse effects to water quality and sensitive species, such as hellbenders, freshwater mussels, and their habitat

Road and Trail Mileage. A total of 216.5 miles of roads would be provided for public use under the preferred alternative. All undesignated roads would be removed and restored to natural conditions, including roads identified for closure in the 1991 Roads and Trails Study that have not been closed to date, which would have beneficial impacts to water quality due to reduced erosion and sedimentation over time. The National Park Service would close about 14.0 miles of currently designated NPS-administered roads, including 2.5 miles that are in primitive zones, which would also benefit water quality over time due to reduced erosion and sedimentation in these zones.

In addition to the existing designated trail system, the addition of 49.5 miles of new trails under the preferred alternative would have minor, short-term impacts to water quality due to small quantities

of sediment released into waterways during trail construction. Impacts to water quality from the preferred alternative's total of 150.5 miles of trails for public use would be minimized through best management practices during construction. Impacts to water quality would be negligible to minor due to environmentally sensitive trail design and implementation of mitigation techniques. For example, all new trails and reroutes of existing trails would be constructed according to the design parameters outlined in the "Design Parameters" section of the Trail Management Handbook (USFS 2008) and would use sustainable trail techniques outlined in the Trail Construction and Maintenance Notebook (USFS 2007).

Permit for Equestrian Riding. The permitting system established for individual horse riders under the preferred alternative would have beneficial impacts to water quality, as the park would be able to better manage the levels of use on equestrian trails. In addition, park staff would monitor water quality parameters and enforce best management practices and other management actions to minimize or avoid impacts from fecal contamination where concentrated equestrian use occurs. Equestrian rider numbers and timing of use would be managed to spread use more evenly throughout the day on different trails to reduce congestion, trampling, and erosion in heavily used areas, such as river crossings.

The new horse staging area that would be constructed with additional parking to accommodate equestrians in the Upper Current River area near Cedar Grove/Dee Murray would have short-term, temporary construction impacts on water quality during construction. The new staging area would likely generate a small amount of erosion that could lead to minor, localized turbidity in waterways. The addition of parking spaces and the introduction of new permeable surfaces, combined with stormwater flows, could add slightly higher volumes of runoff and sediments entering waterways. The new horse staging area and the trailhead would be sited at an appropriate distance from the river to the extent feasible to protect sensitive resources such, as riparian zones.

Introduction of Biking. As in alternative A, biking would continue to be allowed on designated park roads. New bike trails would be formally designated along 5.8 miles of the Old Tram Road and 4 miles of existing trails in the vicinity of the Partney Ridge and Partney House Trails. The additional designated biking mileage in the preferred alternative is not likely to impact water quality because current and projected use on these designated roads is not expected to contribute additional erosion or other impacts to water quality.

Horse Trail River Crossings. The seven existing designated horse trail river crossings would continue to be provided. Undesignated river crossings would be closed and restored to reduce potential impacts on water quality and sensitive species, which would benefit long-term water quality. Seven additional trail crossings would be designated on the Upper Current River to direct use away from dozens of informal, undesignated crossings. The designated crossings would have long-term beneficial impacts to water quality because they would help retain use within the park's established, formalized trail system. Use of proposed crossings would aid park managers in long-term monitoring efforts and increase the ability of managers to limit access when needed to protect park resources, reduce crowding, and improve safety.

During large trail rides, horse manure densities would likely increase as the number of horses crossing the river increases (Davis and Barr 2006). Large numbers of horses would contribute excess nitrogen to the water column at the proposed crossings, although the proposed horseback riding permit in the preferred alternative would mitigate impacts because park staff would be able to better manage equestrian volumes during peak riding periods. Equestrian riding permits and other mitigation measures included in the RTMP/EA (see appendix G) would help protect vegetation from potential "over-trampling" at designated trail crossings, which would directly benefit water quality

by reducing terrestrial impacts at crossings and allow park staff to better monitor resource impacts over time.

Designated Recreation Areas Along the River. The park would designate 94 recreation areas along the 134-mile river corridor, which would have slightly decreased impacts from visitor use activities and leading to negligible to minor vegetation trampling and sediment transport to park waters compared to the 96 areas designated in the no-action alternative. Like the no-action alternative, recreation areas that are not part of the designated system would be restored to natural conditions, which would have long-term and beneficial impacts on water quality.

Vehicular Access to Gravel Bars. As in alternative A, visitors using motorized and nonmotorized watercraft could continue to camp on gravel bars per established park rules and regulations, which would have similar impacts on water quality as the no-action alternative. Off-road vehicle, all-terrain vehicle, and utility task vehicle use would continue to have adverse impacts on water quality and other park resources. Soil disturbance, compaction, vegetation damage, and associated erosion to wet soils and some gravel bars would add to water quality impacts. Water quality would be slightly improved in the preferred alternative, however, due to a designated camping area that would be established on the Log Yard gravel bar. At Log Yard, the park would retain flexibility to manage access to or close the Log Yard gravel bar to vehicle access to improve safety, reduce crowding, enhance visitor experience, and protect park resources, which would have long-term benefits to water quality in the Log Yard vicinity. Similarly, gravel bar camping at Two Rivers would be allowed in designated campsites, leading to long-term water quality benefits in the Two Rivers vicinity because of park's ability to manage access.

3.4.4 Environmental Consequences of Alternative C on Water Quality

Environmental consequences to water quality under alternative C would be the same as those for the preferred alternative, except for the following impacts based on the plan's proposed management actions.

Road and Trail Mileage. Compared to the preferred alternative, alternative C has nine more miles of trails and two additional river crossings. Alternative C would have a slightly greater impact on water quality than alternative B due to the additional fecal matter, soil compaction, and erosion from trail development and trail use in alternative C. Alternative C also has two more recreation areas for public use, which would contribute a negligible to small amount of vegetation damage from recreational uses at these sites. The additional trail mileage, river crossings, and recreation areas are not expected to have greater than minor impacts to water quality due to environmentally sensitive trail design and implementation of mitigation techniques.

Introduction of Biking. New biking opportunities along the Ozark Trail and Pulltite Trail would be included in alternative C that are not included in alternatives A or B. However, the new biking designations and authorization of e-bikes in locations traditional bikes are allowed would have negligible impacts to water quality because current and projected use on these designated roads is not expected to contribute additional erosion or other impacts on water quality.

Horse Trail River Crossings. Compared to the preferred alternative, nine additional trail crossings would be designated on the Upper Current River to direct use away from dozens of informal, unauthorized crossings, which would have both beneficial and adverse impacts on water quality. The additional crossings would have beneficial impacts to water quality because they would formalize and clearly identify each river crossing and limit vegetation trampling and its associated erosion compared to the current mashup of visitor-created social trails that contribute sediment to park

waterways and damage sensitive aquatic areas. Additional crossings would introduce new points of fecal contamination along park waterways, and each crossing would include minor levels of trampling to soils and damage to vegetation, although these impacts would be confined to a much smaller footprint and thus have less overall impact than not formalizing such river crossings under the no-action alternative. Horses would continue to be required to cross the river at 16 total designated crossing points in alternative C, as formalizing these crossings would have a long-term and overall beneficial impact on water quality.

Designated Recreation Areas Along the River. The park would designate 95 recreation areas under alternative C compared to 94 areas proposed for designation in the preferred alternative. Alternative C would essentially have the same negligible to minor impacts to water quality as the preferred alternative.

Cumulative Impacts

External issues impact water quality, aquatic and riparian habitat, and related physical and biological processes at the park. Nearby timber operations, sand and gravel mining, and nonpoint sources of pollution impact water quality in park waters. Other nonpoint source pollutants are nitrogen, phosphorus, and fecal coliform bacteria. Due to the Ozark region's karst topography, interbasin groundwater connections make these streams vulnerable to contamination that may originate from adjacent watersheds (Bowles et al. 2018). Stressors, such as deforestation and other land management practices in the watershed, are particularly problematic because they can overwhelm localized protection of stream corridors at the watershed level. For example, increases in bank erosion rates and changes in channel morphology through time have been correlated with increased land clearing of steep uplands within a stream basin, as well as historical riparian land clearing (Bowles et al. 2018).

As noted in the RTMP/EA, sensitive species, such as Ozark hellbenders and freshwater mussels, need consistent levels of highly oxygenated water and are adversely affected by water quality impacts, such as sedimentation and nutrient loads. Habitat degradation caused by dams, ore and gravel mining, chemical runoff, inadequate sewage treatment, and various human activities can threaten these species.

Conclusion

Many of the actions proposed to manage visitor use in this plan would ultimately benefit water quality by reducing potential erosion and sedimentation impacts by visitors (through closure and rehabilitation of unauthorized river crossings). Additionally, some of the management strategies included in this plan are designed to rehabilitate and restore vegetation in the vicinity of undesignated roads, trails, and river crossings and to avoid water crossing locations that could add contaminants to habitat and affect wildlife species that are sensitive to water quality conditions, such as the Ozark hellbender.

3.5 FISH AND WILDLIFE

3.5.1 Affected Environment

The park's widely varied aquatic, terrestrial, and subterranean habitats support a diversity of animals, including some endemic species that exist nowhere else in the world. This is due in part to its location in the south-central part of the continent, which served as a refuge for species escaping major continental glacial and geologic events. At various times in the past, the mid-continental location of this uplifted region placed it at a crossroads of boreal, prairie, desert, deciduous forest, and alluvial floodplain ecosystems. Continental climate fluctuations then encouraged species movements to and from the surrounding regions. Simultaneously, the lack of glaciation or inundation of the plateau allowed the region to serve as lasting refuge for species colonization and adaptation. During this time, the soluble geologic material of the plateau was developing the complex karst terrain of springs, losing streams, caves, and seeps, which further diversified habitats available to animals. In particular, the park' numerous caves and springs likely provided stable environments for species to survive during these climatic events (TNC 2003).

The influx of plants and animals from different regions, combined with the sustained remnant populations of native plants and animals in this ancient landscape, allowed the evolution of new species, making the Ozark Plateau a unique and important region of North America. Combined with the high quality of the Current River watershed, the park continues to provide an important center for conservation of the ecological systems and processes that are unique to the Ozark Plateau and that contribute to the park's high biological diversity.

The following describes the broad range of fish and wildlife species associated with the major ecosystems in the park.

Aquatic Species. The Current and Jacks Fork Rivers support a diversity of aquatic fauna, including 125 of the approximately 260 fish species that are found in the entire Mississippi River valley. This diversity results from a unique combination of aquatic habitat conditions characteristic of upland, lowland, and large rivers.

Upland stream fish species are the most common and include minnows, shiners, suckers, sunfish, and darters. Of these, six species are endemic to the Ozark Uplands. They include the bleeding shiner, wedgespot shiner, Ozark shiner, checkered madtom, Ozark madtom, and Arkansas saddled darter.

The large, sustained flows of the Current River provide habitat suitable for fish species normally found in much larger rivers (NPS 2014). Such species include paddlefish, shovelnose sturgeon, American eel, gar, skipjack herring, and blue sucker. The Current River and adjacent drainages also support fish species that are widely separated from the remainder of their species' populations, providing evidence of changes in fish distribution caused by the last ice age. These species include the least brook lamprey, Ozark chub, whitetail shiner, southern cavefish, and barred fantail darter.

Sport fishing is popular in the park and smallmouth bass is the most commonly sought-after species by anglers. Rock bass, largemouth bass, green sunfish, longear sunfish, spotted bass, bluegill, catfish, and walleye are also part of the hook-and-line catch. Suckers are another important part of the fishery, and they are mostly caught by gigging, which is a traditional method of night fishing with spears, called "gigs," used during the fall season in the Ozarks.

Rainbow and brown trout, nonnative species to Missouri, are present in the Upper Current River and are periodically stocked by the Missouri Department of Conservation (MDC). The stretch of river from the Montauk State Park / Ozark National Scenic Riverways boundary to Cedar Grove is designated by the state as a blue ribbon trout area (MDC 2009).

Park aquatic habitats also support a variety of nonfish species such as amphibians, mussels, snails, crayfish, and insects. Many of these are species of conservation concern, including the Ozark hellbender, which is the largest salamander in North America (see "Threatened, Rare, and Special Status Wildlife Species" section). It lives exclusively in the waters of the Black and White River drainages in Arkansas and Missouri.

A total of 43 species and subspecies of mussels occur in the Current River watershed. An additional eight species are listed as species of conservation concern. Fourteen species of crayfish occur in the Current River watershed; five are in the Jacks Fork watershed. Of these, the Salem cave crayfish is listed as a species of conservation concern. The nonnative northern crayfish (*Orconectes virilis*) has also been found in the Upper Current River. The Black River drainage, which includes the Jacks Fork and Current Rivers, is listed as one of the top conservation priorities in the Ozark Plateau because of the taxonomic richness and diverse habitat requirements of its crayfish species.

The park's numerous springs provide important aquatic habitat for crenobionts (species confined to springs). The relatively constant environmental conditions of these waters have allowed many of these species to occur far outside their normal geographic ranges. At least 38 animal species are found only in Ozark springs and subterranean waters (NPS 2007).

Terrestrial and Avian Species. The terrestrial and avian species of the Riverways is characteristic of the Ozarks and contains animals common to both eastern deciduous forests and prairies to the west. Common wildlife observed in the park includes the white-tailed deer, gray and fox squirrel, eastern chipmunk, muskrat, beaver, cottontail rabbit, raccoon, coyote, striped skunk, and wild turkey. Less conspicuous mammals include black bears, river otters, mountain lions, shrews, weasels, bats, and mice. Also, an elk reintroduction program was initiated by Missouri Department of Conservation in the spring of 2011. The initial reintroduction effort took place in Peck Ranch Conservation Area, state land that abuts the park southeast of Eminence. In addition, amphibian and reptile species include 30 snakes, 8 lizards, 18 turtles, 16 salamanders and newts, and 15 frogs and toads. Among the park's known snake species, four common pit viper species (also known as copperheads) have been documented.

Numerous bird species are frequently seen along the riverways such as the belted kingfisher, great blue heron, Louisiana waterthrush, red-eyed vireo, red-tailed hawk, and red-bellied woodpecker. Resident birds of prey include six species of hawks and six species of owls. Many species of songbirds migrate through the area, including warblers, sparrows, grosbeaks, and finches. Other noteworthy bird species include the pileated woodpecker, osprey, and bald eagle.

Hunting and trapping are allowed in the park and are popular activities, especially among local residents in the area. Common game species include the white-tailed deer, squirrel, fox, raccoon, coyote, mink, skunk, bobcat, opossum, beaver, and muskrat. Gamebirds that include turkey, various species of waterfowl, doves, and quail are hunted in the park during various open seasons.

At least nine nonnative animal species have been introduced by humans into the park. These include the house sparrow, European starling, Norway rat, feral hog, and horse. These species compete with native wildlife for food resources and nesting sites, and they can damage vegetation and other natural resources.

Disturbances associated with land-based recreation and transportation uses can alter some terrestrial and avian species' behavior such as nesting and foraging and limit the available effective habitat for some species. When land-based recreational uses occur off-trail, they often trample and displace vegetation communities, which diminish habitat value for some wildlife species, particularly in sensitive riparian buffer areas along tributaries and river banks and near caves and other sensitive karst features that provide habitat highly vulnerable to human tampering. In addition, the use of undesignated roads and trails fragment larger areas of quality habitat. These effects result in smaller, less effective "islands" of high-quality habitat in the park.

Subterranean Species. Many of the caves and subterranean passages in the park provide important habitat for rare and endemic aquatic species, including troglobitic crayfish, cavefish, and various invertebrates. Two federally endangered bat species—the gray bat (*Myotis grisescens*) and Indiana bat (*Myotis sodalis*)—also reside in numerous caves in the park (see "Threatened, Rare, and Special Status Wildlife Species" section in this environmental analysis for more information). The rare grotto salamander, also known as the Ozark blind salamander, is found in several park caves that contain streams or pools. This salamander is listed as a species of conservation concern in Missouri.

Subterranean aquatic karst passages are more typical at the park than emergent cave passages. This is reflected in a greater diversity of aquatic cave fauna (46 total species) than terrestrial cave fauna (31 total species) in the region. The distribution patterns of these animal species are related more to subsurface bedrock and aquifer patterns than to surface topography.

3.5.2 Environmental Consequences of Alternative A on Fish and Wildlife

The continuation of current management of roads and trails could have both beneficial and adverse impacts on fish and wildlife depending on various factors. The continued use of undesignated river access and crossing points by horses and motorized vehicles, for example, would continue to have adverse, localized impacts on fish and wildlife habitats. These activities can stir up riverbeds, increase river turbidity, alter aquatic chemistry and increase nutrient and pollutant loading (such as from manure) in the rivers (MDNR 2003). In addition, visitor-caused disturbances increase the potential of invasive plant infestation in both upland and aquatic environments. Motorized vehicles and horses can spread invasive plants throughout the park by transporting weed seeds via manure, vehicle tires, and watercraft.

The fulfillment of the 2014 GMP mandates of restoring undesignated trails to natural conditions would, in the long-term, have benefits to fish and wildlife habitat and ecosystem functionality. The level of overall benefit would depend on the NPS ability to keep undesignated trails from being created and managing existing trails and recreation sites.

3.5.3 Environmental Consequences of Alternative B on Fish and Wildlife

The formalization of the road and trail network, plus development of new trails for hiking and horseback riding, would result in both beneficial and adverse impacts on fish, wildlife, and their habitats. The overall benefits of these actions would be greater than the adverse impacts.

Road Mileage. The overall reduction in total miles of NPS public use roads from 230.5 miles in alternative A to 216.5 miles, and the removal of 2.5 miles of park-administered roads and traces in primitive zones, would have a slightly beneficial effect on fish and wildlife habitat. These 14 miles of road restored to natural conditions, would provide more diverse habitat, and decrease the amount of erosion entering park waters from these roadways.

Trail Mileage. Under alternative B, 49.5 miles of new trails in the park would have small, long-term and permanent adverse impacts on vegetation and soils from the development of new trails.

Specific impacts on vegetation and soils in the preferred alternative B include the permanent removal of 9.5 acres (i.e., the total linear vegetation acreage removed within park boundaries) for hiking and hiking/biking trails and 7.7 acres within the park boundary for equestrian trails. Approximately five acres of additional vegetation is proposed to be cleared for equestrian trail development *outside* the park boundary. The 17.0 total acres of vegetation removed for trails development in alternative B within park boundaries is approximately 2% of the parkwide study area. This amount of vegetation loss would have a small impact on vegetation and soils in the Riverways as a whole.

Disturbances associated with land-based recreation uses along proposed trails could alter some terrestrial and avian species' behavior such as nesting and foraging. New trails would remove a small amount of vegetation habitat for some species. Impacts on wildlife from proposed trails would be considerably less, however, than those occurring from the 90-plus miles of existing visitor-created trails.

Similar to alternative A, benefits to fish and wildlife habitat would include restoring undesignated trails to natural conditions. In addition, new trails, such as those in the Upper Current River, would require new alignments to avoid impacts on sensitive resources.

In the future, designated trails would be evaluated and improved, as necessary, to meet new trail class designations and standards before building new trails. Some undesignated trails and roads proposed for closure would be converted into designated trails. Existing trails and areas for new trails could be temporarily closed to be surveyed, rehabilitated, and opened when determined suitable for use to ensure resource protection, including fish and wildlife habitat.

Permit for Equestrian Riding. Future implementation of a permit system for horseback riding would have a beneficial effect on fish, wildlife, and their habitats. The permitting system would help manage horse use levels, which would benefit fish and wildlife habitat by providing enhanced protection to these resources from the possible "over-trampling" of trails and crossings in vulnerable terrestrial and aquatic wildlife habitat. Furthermore, the permitting system would have indirect beneficial impacts on fish and wildlife because it would educate users and generate funding for horse trail management and maintenance activities and allow park staff to monitor resource impacts against established thresholds.

Introduction of Biking. Potential adverse impacts near sensitive wildlife habitat, such as caves, could occur with the introduction of bicycling, although these would be mitigated to a large extent by siting final trail alignments away from caves, wherever possible. Similar to impacts associated with new trails in general, cave and mine openings that are visible to bicyclists (and other user groups) would be vulnerable to potential resource disturbance and vandalism.

Horse Trail River Crossings. The seven additional horse trail river crossings proposed in alternative B would have small, but adverse impacts that would stir substrates at localized riverbed locations, and displace fish and wildlife that may be proximate to designated river crossing areas. It is likely that long-term trampling and expanded vegetation impacts at each crossing would occur and that crossing points would widen over time, but some of these effects would be mitigated by natural changes in river flows and flooding.

The additional trail crossings would direct use away from dozens of informal, unauthorized crossings, which would improve fish and wildlife habitat in these areas. Similarly, roads, trails,

recreation areas, and river crossings that are not part of the designated system would be restored over time to natural conditions, which would have long-term benefits to fish and wildlife habitat.

Designated Recreation Areas Along the River. Compared to the no-action alternative and alternative C, the preferred alternative would have the least impact on fish and wildlife because it proposes the fewest number of designated recreation areas. Alternative B would have the lowest impact levels to fish and wildlife habitat, as river access would be allowed only at these locations. Roads, trails, recreation areas, and river crossings that are not part of the designated system would be restored to natural conditions, which over time and similar to other restoration activities proposed in the plan, would have long-term benefits to fish and wildlife habitat.

The proposed horse staging area in the Upper Current River District and proposed hiking trailhead in the Middle Current River District would be placed at an appropriate distance from the river to protect sensitive fish and wildlife habitat (such as riparian zones) and minimize any potential adverse impacts.

Vehicular Access to Gravel Bars. There would be slight, short-term adverse impacts from erosion and sedimentation from the development of a designated camping area at Log Yard. There would be long-term beneficial impacts on fish and wildlife habitat related to managing visitor access to gravel bars. [13]

3.5.4 Environmental Consequences of Alternative C on Fish and Wildlife

Road Mileage. Effects are similar to alternative B with very little discernable variation between each alternative as resource values are consistent throughout the planning study area.

Trail Mileage. Effects are similar to alternative B with very little discernable variation between each alternative as resource values are consistent throughout the planning study area.

Like alternative B, specific impacts on vegetation and soils in alternative C include removing a total of 10.8 acres of vegetation for hiking and hiking/biking trails and 10.6 acres within the park boundary for equestrian trails. Approximately 5.0 acres of additional vegetation is proposed to be cleared for equestrian trail development *outside* the park boundary. The 21.4 acres of vegetation removed for trails development in alternative C within park boundaries is approximately 2.6% of the parkwide study area. This amount of vegetation loss would have a negligible to small impact on vegetation and soils within the Riverways as a whole.

Introduction of Biking. Same as alternative B, but with a small amount of additional adverse impacts on fish and wildlife habitat as biking would be authorized on the Nature Trail at Pulltite; the Old Tram Road in the Lower Current District, and a segment of the Ozark Trail.

Horse Trail River Crossings. Adverse impacts from alternative C would be slightly greater than the preferred alternative as alternative C includes 9 new crossings (two more crossings than alternative B).

[13] Because gravel bars shift in sizes and locations from year to year due to constantly changing river dynamics, park managers have a challenging time tracking visitor use and impacts on natural resources, such as fish and wildlife. Where gravel bars are disturbed by vehicles and regular visitor use, beneficial riparian vegetation cannot persist, which would have a slightly adverse impact on habitat values within the study area.

Designated Recreation Areas Along the River. Same as alternative B, but with a slightly less beneficial impact as alternative C proposes 95 total areas (versus 94 areas proposed for designation in alternative B and 96 areas retained in the no-action alternative). Thus, impacts on fish and wildlife habitat in alternative C would be small, but greater overall than impacts noted in alternative B.

Horse Staging Areas, Parking Areas, and Trailheads. Same as alternative B.

Vehicular Access to Gravel Bars. Same as alternative B.

Cumulative Impacts

There are several ongoing and planned NPS actions within park boundaries that would affect fish, wildlife, and their habitats that are not part of this plan (see table 3 for a list of the park's past, present, or reasonably foreseeable actions). Ongoing or reasonably foreseeable projects that could impact fish and wildlife include repairs of existing, damaged river access sites in eight districts damaged by the May 2017 flood.

Other reasonably foreseeable actions include redesigning and improving the heavily used and impacted Rocky Falls area and evaluating the Waymeyer / Pin Oak area for maintenance and rehabilitation efforts to find alternate locations to replace a flood-destroyed campground and floater access. These efforts would have small, localized impacts on vegetation and soils, but a negligible overall impact.

Cumulative impacts from the spread of invasive exotic species, denuded vegetation in designated recreation areas, and animal waste concentrations at proposed equestrian facilities, would contribute small, but noticeable resource impacts in localized areas in this plan that would be similar among all of the alternatives.

Conclusion

Compared to the alternative A, the action alternatives would have a similar range of beneficial and adverse effects on fish, wildlife, and their habitats, with long-term, beneficial effects outweighing the adverse impacts.

The net reduction in road and trail length, due primarily to closing undesignated roads and trails, would provide an overall benefit to fish and wildlife habitat. The proposed permitting system would help manage horse use levels, which would allow managers to protect several resource types, including fish and wildlife habitat from significant impacts. Overall, alternatives B and C would have localized, negligible and short-term adverse impacts on fish, wildlife, and their habitats during construction; however, in the long-term, there could be negligible beneficial impacts on these resources as a result of better management.

3.6 FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

3.6.1 Consultation History and Species Evaluation

The National Park Service initiated informal consultation in April 2015 with the US Fish and Wildlife Service (USFWS) Missouri Ecological Services Field Office to discuss the Roads and Trails Plan and potential impact on federally listed species and their critical habitats. The most recent list of federally listed species was obtained from the USFWS Information for Planning and Consultation (IPaC) website on February 26, 2019 (consultation code: 03E14000-2018-SLI-0269). Using this list, the park

determined which of those species and their critical habitats had a potential to occur in the plan study area. Federally listed species with the potential to occur in the study area and critical habitat are further analyzed in a biological assessment prepared for the plan (NPS 2019). Subsequent telephone conversations and field visits and meetings occurred between May 2015 and February 2019 (see appendix H, biological assessment for details).

Under each alternative considered in this plan, the park would protect these species and their habitat, as required under the Endangered Species Act. The actions proposed in this plan would, in the long-term, reduce potential disturbance, enhancing protection of these federally listed species. Further, no actions or new uses are being proposed that would result in the loss or disturbance of habitat for these species. The NPS would continue to discuss and consult with the USFWS after this plan is completed, including prior to the implementation of actions that could affect these species and their habitats.

Per compliance with section 7 of the Endangered Species Act, the National Park Service suggests the following level of effect based on the analysis presented in this plan/EA, with additional documentation included in appendix H, the biological assessment for this planning effort. The suggested effects determinations are based on alternative B—the plan's preferred alternative:

- The Ozark hellbender has a *may affect, not likely to adversely affect* determination. Potential direct and indirect effects from the proposed action include short- and long-term erosion and sedimentation impacts on streams; however, these effects would be tempered by a host of beneficial effects, including: (1) net reduction in roads and trails mileage, including the removal, and in many cases, restoration of undesignated roads and trails; (2) formalizing the park's system of roads, trails, and river access points; (3) clearly identifying uses that are allowed on each road and trail, which would further reduce cumulative effects to hellbender habitat; and (4) determining appropriate levels of effort needed to maintain the park's transportation network, which would also decrease the long-term, adverse effects to hellbenders and their habitat.
- The gray bat, Indiana bat, and northern long-eared bat have a *may affect, not likely to adversely affect* determination. Improvements and additions to the park's designated roads and trails system would not affect the integrity of sensitive portals near cave openings. New trails and recreation-related infrastructure included in the proposed action would not be developed in view of cave openings and other known Indiana bat habitat. Trees that would be removed in the vicinity of any known Indiana bat habitat as part of the proposed action would be limited to small diameter at breast height (dbh) cuts to help maintain forest coverage along trails and recreation facilities that could adversely affect any Indiana bat habitat. Tree removals near Indiana bat habitat would generally observe an eighth of a mile buffer around known hibernacula and cutting would be conducted during winter months, to the extent possible, to help ensure this species would not be affected by proposed management actions.

Table 7 and narrative discussions of protected wildlife species in this chapter focus on federally and state listed species that might be affected by the project's proposed activities (USFWS 2015 and MDC 2016).

TABLE 7. FEDERALLY AND STATE LISTED SPECIES KNOWN TO OCCUR IN OZARK NATIONAL SCENIC RIVERWAYS

Common Name	Scientific Name	Federal Status	State Status	State Rank
Gray bat (mammal)	*Myotis grisescens*	E	E	S3
Indiana bat (mammal)	*Myotis sodalis*	E	E	S1
Northern long-eared bat (northern myotis) (mammal)	*Myotis septentrionalis*	T	N/A	S3
Plains spotted skunk (mammal)	*Spilogale putorius interrupta*	N/A	E	S1
Red-cockaded woodpecker (bird)	*Picoides borealis*	E	N/A	N/A
Northern harrier (bird)	*Circus cyaneus*	N/A	E	S2
Swainson's warbler (bird)	*Limnothlypis swainsonii*	N/A	E	S2
Ozark hellbender (amphibian)	*Cryptobranchus alleganiensis bishopi*	E	E	S1

The US Fish and Wildlife Service uses the following categories to determine the federal status of species that are included in table 7.

E: Endangered. Any species that is in danger of extinction throughout all or a significant portion of its range (ESA §3(6)).

T: Threatened. Any species that is likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range (ESA §3(20)).

The Missouri Department of Conservation uses the following categories to determine the state status and rank of species that are included in table 7.

E: Endangered. A species that is in danger of extinction in the state of Missouri. Determined by MDC under constitutional authority.

S1: Critically Imperiled. Critically imperiled in the state because of extreme rarity or because of some factor(s) such as steep declines making it especially vulnerable to extirpation from the state.

S2: Imperiled. Imperiled in the state because of rarity due to very restricted range, few populations or occurrences, steep declines, or other factors making it vulnerable to extirpation from the state.

S3: Vulnerable. Vulnerable in the state due to a restricted range, relatively few populations or occurrences, recent and widespread declines, or other factors making it vulnerable to extirpation.

3.6.2 Affected Environment

The park's diverse aquatic, terrestrial, and subterranean habitats support a variety of rare and sensitive wildlife species. A complete list of all threatened, endangered, proposed, candidate, rare, and sensitive plants and animals known or suspected to occur in the park is available in the 2014 General Management Plan. Table 7 includes a full list of federally and state listed mammal, bird, and amphibian species that may occur in the park, based on information provided by the US Fish and Wildlife Service (USFWS), Missouri Department of Conservation, and cross-referenced with the NPS certified species list from the Integration of Resource Management Applications program (NPS 2016d). Other federally listed species indicated in the project's most recent species determination list (USFWS 2019) include the red-cockaded woodpecker, Hine's emerald dragonfly, and Virginia sneezeweed. Park resource managers, through informal consultation with external biological and ecological specialists, have indicated these species do not occur in the project area (or are unlikely to occur in the project area) and would not be affected by project actions (NPS 2019). Similarly, while the state-endangered plains spotted skunk was once known to inhabit the Riverways, and the state-endangered northern harrier and Swainson's warbler are known to occur in the park, they are not discussed in detail in this assessment. Project actions are not expected to affect these species.

There are also a number of undesignated trails that are situated near sensitive caves that provide habitat for federally listed bat species.

The following narratives provide brief descriptions of each state and federal listed endangered species that are known to occur in the park. A detailed description and regulatory profile of all federal listed species can be found at http://www.fws.gov/endangered/. Information about Missouri state listed species can be found at https://mdc.mo.gov/field-guide/statuses?status=994, which provides summaries for species of conservation concern.

Gray Bat. Gray bats are listed as endangered at the state and federal level because they tend to occur in large concentrations in a very limited number of caves, which makes them highly vulnerable to human disturbance. The gray bat's range is generally limited to the limestone karst areas of the southeastern United States. Gray bats usually live in caves year-round. In summer, they typically roost in caves near streams or rivers. During this time, they forage for flying insects above streams, riparian vegetation, and lakes. In winter, they hibernate in deep, vertical caves. In hibernacula, human disturbance causes the bats to use vital fat reserves, their only source of energy throughout winter. In maternity caves, pregnant females may abort unborn young or panicked mothers may drop babies to their deaths if they are forced to flee from intruders. Severe or repeated disturbance may cause reproductive failure of an entire colony.

Gray bats have been recorded in the park and are known to forage along streams, rivers, and reservoirs in this part of Missouri. While loss of habitat and suitable trees are threats to this species, current park practices of protecting riparian areas, not cutting hazard trees during certain times of year, and inspecting trees that might be used by these bats are important for the protection of gray bats. A fungus called white-nose syndrome is an ongoing threat to the population of gray bats in the park.

Indiana Bat. Indiana bats are listed as endangered at the state and federal levels. Indiana bats are small, migratory bats that roost together in large groups in caves and mines, typically in the vicinity of water sources. Each fall, these bats migrate to the caves and mines in their home territory to hibernate in large clusters. Very few hibernacula locations have been identified in the United States. Through spring and summer, most males use caves to roost, while females and young often roost under loose bark and in tree hollows of hickory and oak in riparian areas. The Indiana bat is nocturnal, primarily feeding on flies, moths, and other insects flying above streams and riparian trees.

Indiana bat populations were first surveyed in the Ozark region in the late 1950s. More recently, they have been found hibernating during the winter in the southern half of Missouri. They are commonly seen during the summer months, primarily north of the Missouri River, where they roost and raise their young.

Indiana bats are highly vulnerable to disturbance, habitat change, and environmental contamination, and are at particular risk because of their very concentrated and very limited hibernation sites. While loss of habitat and suitable trees are threats to the Indiana bat, current park practices of protecting riparian areas, not cutting hazard trees during certain times of year, and inspecting trees that might be used by these bats are helping to protect Indiana bats. As with the gray bat, white-nose syndrome is an ongoing threat to the population of Indiana bats in the park.

Northern Long-Eared Bat (or Northern Myotis). In May 2015, the USFWS listed the northern long-eared bat as threatened. Northern long-eared bats are medium-sized bats with noticeably long ears relative to other bats in the same genus. They 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, northern long-eared bats roost in colonies or individually in tree cavities and underneath bark, and occasionally in mines. It is a nocturnal feeder in forest understories of hilly terrain and on waterbodies. Their diet focuses on beetles, flies, and moths. Northern long-eared bats have been observed in several hibernaculum caves in the park and individuals have also been captured in the park's vicinity (USFWS 2015).

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. Other threats to the northern long eared bat include habitat disturbances (e.g., cave disturbances and vandalism, removal of roosting trees), wind energy development, climate change, and chemical pollutants.

Roads and Trails Considerations for Protected Bat Species— For protected bat species (i.e., gray bat, Indiana bat, and northern long-eared bat), the potential transmission of white-nose syndrome continues to threaten these populations. Although white-nose syndrome may be inadvertently transmitted into caves by humans carrying the fungus on their clothing and gear, the transmittal through a bat population is primarily from bat to bat (NPS 2014). Equestrian use, hiking, camping, motorized vehicles, motorboats, and other active park uses near bat foraging habitat and hibernacula may alter bat behavior or displace effective habitat areas. The effects of these uses may be impacted by human activity along both designated and undesignated roads and trails. Since the alignment and routing of undesignated trails typically does not take bat habitat quality into consideration, the development and continued use of undesignated roads and trails could continue to fragment larger areas of quality habitat.

Ozark Hellbender. The Ozark hellbender was listed as endangered by the USFWS in October 2011, and by the State of Missouri, respectively. The Ozark hellbender is a large and rare species of salamander found only in southern Missouri and northern Arkansas. The species is permanently aquatic and restricted to the Ozark Plateau in rivers that drain into the Missouri-Mississippi river systems. The Ozark hellbender's wellbeing largely depends on high-quality water systems with constant levels of dissolved oxygen, temperature, and flow. It has experienced severe population declines in the Ozark Highlands and collection of juveniles has become rare, indicating little recruitment in the populations (Briggler et al. 2010).

These salamanders are solitary in nature and make their homes under flat rocks in large, permanent streams and rivers. They have a broad, flat head with very small, lidless eyes. They range in color from reddish brown to dull gray brown. Hellbenders breed from late September to November, and their 200 to 700 eggs are fertilized externally and laid in depressions under flat rocks in rivers. Larvae hatch four to six weeks later. Hellbenders feed mainly on crayfish and other aquatic animals.

Because hellbenders remain active throughout the year and maintain their home territories year-round, it is important to minimize activities that change physical characteristics of rivers and streams and alter the flow and quality of water for long periods of time. Future changes to the river flow regime due to climate change may necessitate additional management actions to protect the hellbender and other endangered species.

The species occurs throughout the Current River and may still be present in small numbers in the Jacks Fork (USFWS 2015). An Ozark hellbender action plan has not yet been developed by the USFWS.

Roads and Trails Considerations for Ozark Hellbender— As noted, the hellbender is a habitat specialist that depends on clean clear water. Specifically, hellbender needs consistent levels of highly oxygenated water. They are primarily affected by water quality impacts such as sedimentation and nutrient loads, although no specific causal factor has been directly linked to the species' decline (Briggler et al. 2010). Habitat degradation caused by dams, ore and gravel mining, chemical runoff, inadequate sewage treatment, and various human activities can threaten the species. Other factors such as predation (fish), disease (specifically amphibian chytrid fungus), and severe physical abnormalities resulting from unknown causes, can contribute to declines (Briggler et al. 2010).

An ongoing captive propagation program in cooperation with the park, MDC, USFWS, the Saint Louis Zoo, and other partners is assisting initial hellbender recovery efforts. In 2011, the Saint Louis Zoo and the MDC announced that hellbenders had been successfully bred in captivity. In November 2012, the zoo's partner-supported Hellbender Conservation Center announced that eight female hellbenders had laid a total of 2,809 fertile eggs in the zoo's artificial nest boxes in simulated streams. By late November, the center had more than 1,000 larvae. For the first time, all three of the zoo's river populations reproduced (Saint Louis Zoo 2016). The program has set a goal to eventually release young hellbender to their native habitat.

Long-term recovery efforts will likely focus on improving water quality, reducing sediment and gravel input, and addressing any other threats found to contribute to declines. Especially critical is the protection of hellbender sites where reproduction is known to occur or which contain larger numbers of hellbenders (USFWS 2012).

3.6.3 Environmental Consequences of Alternative A (Current Management) on Threatened and Endangered Species

The continuation of current management for roads and trails would result in some beneficial and some adverse impacts on federally and state listed species. The overall effect of these impacts would be negligible over the long-term.

In general, activities along dirt and gravel roads within park boundaries are the largest source of sediments to streams and these impacts would persist on the park's designated dirt and gravel roads, which would contribute a small impact on sensitive hellbender habitat. Similarly, restoration of undesignated trails to natural conditions would have long-term, beneficial impacts on hellbender habitat, although short-term adverse impacts from restoration activities could include minor erosion and sedimentation to streams. These adverse impacts would be minimized to the greatest extent practicable by using construction best management practices.

ATVs and UTVs would continue to be allowed on county-owned roads with a valid county permit and biking would continue to be allowed on park roads, which would continue to have minimal noise impacts on listed bat species.

Seven designated horse trail river crossings would continue to be available to trail users, and horses would be permitted to cross the river only at these designated crossing points, which would continue to cause a small amount of sedimentation at these crossings.

Visitor and management activities at existing, designated recreation areas, as well as gravel bars, would continue to contribute to erosion, sedimentation, and turbidity, and have localized impacts on listed species' habitats. Such impacts would likely be minor and are not known or expected to impact sensitive habitat beyond current levels. While the proximity of recreational facilities (including trails) to sensitive aquatic habitat as well as vulnerable bat habitat (e.g., cave entrances) remains a key

management concern, ongoing activities to avoid these habitats are expected to provide sufficient protection for listed species.

3.6.4 Environmental Consequences of Alternative B on Threatened and Endangered Species

Road Mileage. The moderate reduction in designated road mileage (from 230.5 miles in the no-action alternative to 216.5 miles in alternative B) would have a small beneficial impact on listed species. Noise and other visitor-related impacts on formerly open roads would be reduced. Adverse impacts on listed species and their habitats as result of erosion and sedimentation would be minor and short-term, but overall impacts would be beneficial in the long term. These adverse impacts would be minimized to the greatest extent practicable by using construction best management practices.

Northern long-eared bats known to inhabit the project 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 USFWS 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 in the species' range (USFWS 2018). 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 on this species.

Trail Mileage. Under alternative B, 49.5 miles of new trails in the park would have relatively small overall impacts on listed species and their habitats. Short-term construction impacts would have small, mostly noise-related impacts on listed bat species. The endangered Ozark hellbender would likely experience short-term erosion and sedimentation impacts on its waterways habitat, although impacts from trail development are not expected to exceed a small level of overall effect to this species. Some undesignated trails and closed roads would be converted into designated trails and existing trail alignments that have potential to impact sensitive resources (i.e., habitat). New trail alignments may be required in future trail-building efforts to minimize impacts on listed species and careful trail routing would likely result in a net beneficial impact for those trail sections.

Northern long-eared bats known to inhabit the project area would be subject to a special rule under section 4(d) of the Endangered Species Act. Specifically, the final 4(d) rule allows the USFWS 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 in the species' range (USFWS 2016). Considerations include avoiding tree clearing and other proposed 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 on this species.

Under alternative B, trail development activities would include removal of small patches of small diameter trees (e.g., trees with a dbh of 3 inches or less), which would have a slight, indirect, and adverse effect to bat habitat (NPS 2018b). Proposed trail construction activities and maintenance, as well as potential visitor impacts that could occur near entrances to caves and mines would be further mitigated by constructing bat-friendly gates at particularly vulnerable locations (see appendix G,

which includes detailed mitigation and best management practices). Furthermore, trees would be cleared between November 1 and April 1 per best practices recommended by the USFWS (NPS 2016b).

Permit for Horseback Riding. Implementation of a permit system for horseback riding would have a beneficial effect on listed species and their habitats. The permitting system would help manage horse use levels, which would benefit listed species habitats by providing enhanced protection to these resources from the possible "over trampling" of trails and crossings in vulnerable terrestrial and aquatic wildlife habitat. The permitting system would have indirect beneficial impacts on listed species because it would educate users and generate funding for horse trail management and maintenance activities and allow park staff to monitor resource impacts against established thresholds.

Introduction of Biking. Potential adverse impacts near listed species habitat (and including designated critical habitat for Indiana bats) could occur with the introduction of biking, although these would be mitigated to a large extent by siting final trail alignments away from caves, wherever possible. Similar to impacts associated with new trails in general, cave and mine openings that are visible to bicyclists (and other user groups) would be particularly vulnerable to potential resource disturbance and vandalism. Introducing biking—particularly fast-paced riding—could frighten nesting or breeding wildlife near trails that would allow biking. In the future, connecting park roads and trails to conceptual trail alignments that would be built on neighboring lands would be dependent on the support of receptive property owners adjacent to park boundaries. These potential future bike trails and potential impacts on listed species from future development of bike trails are not analyzed further in this plan.

Horse Trail River Crossings. The preferred alternative would include seven new horse trail river crossings, in addition to seven existing designated crossings.

Adverse impacts on listed species and their habitats from development of the crossings would be limited to minor, short-term erosion and sedimentation impacts on streams and hellbender habitat. Creation of new crossings would also have beneficial effects to hellbenders by directing use away from dozens of informal, unauthorized crossings.

Designated Recreation Areas Along the River. The preferred alternative would have the least impact on listed species because it proposes the fewest number of designated recreation areas. Roads, trails, recreation areas, and river crossings that are not part of the designated system would be restored to natural conditions, which over time and similar to other restoration activities proposed in the plan, would have, long-term benefits to listed species habitat.

Vehicular Access to Gravel Bars. There would be beneficial impacts related to management of visitor access to gravel bars, which would have a positive and indirect effect to listed species habitat. However, gravel bars that are continually disturbed by vehicles and regular visitor use cannot sustain vegetation growth that would otherwise provide potential habitat for native species.

3.6.5 Environmental Consequences of Alternative C on Threatened and Endangered Species

Impacts on listed species and their habitats in alternative C would be similar to those discussed in the preferred alternative, but with slightly greater parkwide impacts for each of the proposed management activities discussed below.

Road Mileage. Same as alternative B.

Trail Mileage. Same as alternative B, but with greater adverse impacts on listed species habitat because alternative C proposes 58.5 miles of new trails (versus 49.5 new miles included in the preferred alternative).

Introduction of Biking. Same as alternative B, but with a small amount of additional impacts on listed species habitat because biking would be authorized on the Nature Trail at Pulltite; the Old Tram Road in the Lower Current, and a segment of the Ozark Trail.

Horse Trail River Crossings. Adverse impacts on listed species habitat from alternative C would be greater than the preferred alternative, as alternative C includes nine new crossings (two more crossings than alternative B). Additional crossings and trampling of vegetation and soils at each crossing would cause minor erosion and add sediments to park waters but would have no measurable reduction in hellbender population in the vicinity of the proposed horse trail crossings.

Designated Recreation Areas Along the River. Same as alternative B, but with a slightly less beneficial impact as alternative C proposes 95 total areas (versus 94 areas proposed for designation in alternative B and 96 areas retained in the no-action alternative). The overall impact would be negligible.

Horse Staging Areas, Parking Areas, and Trailheads. Same as alternative B.

Vehicular Access to Gravel Bars. Same as alternative B; differing only because there would also be short- and long-term impacts from likely erosion and sedimentation at Log Yard and Two Rivers.

Cumulative Impacts

Noise, erosion, and sedimentation from ongoing and future repairs of existing, damaged river access sites and associated facilities in eight districts impacted by the May 2017 flood could have some short-term, minor adverse impacts on terrestrial species. However, planned restoration activities and the park's implementation of best management practices for improving wildlife habitat (see appendix G) would encourage the recovery of native vegetation and minimize human impacts on sensitive habitats. Furthermore, NPS efforts to decrease the number of visitor-created trails would limit degradation to listed species' habitat and could improve habitat quality over time.

Conclusion

Most listed species would not be affected by the proposals in any alternatives. The implementation of the action alternatives on bats and hellbender may affect, but are not likely to adversely affect, either of these species.

Adverse effects on essential behaviors for listed bat species would be insignificant (i.e., immeasurable) and discountable (i.e., extremely unlikely to occur) for each alternative because the following stipulations would be adhered to: (1) the National Park Service would not cut trees or clear

vegetation used as roosting sites or those used for maternity purposes, (2) the National Park Service would not conduct vegetation clearing for trails or other proposed facilities between November 1 and April 1 of any given year, and (3) the National Park Service would conduct detailed surveys and consider rerouting conceptual road and trail alignments discussed in this environmental assessment, as well as other proposed facilities if listed species or habitat occurs in those areas.

The National Park Service would first seek to avoid impacts where possible. If total avoidance is not possible, the park would minimize adverse impacts through stipulations and best management practices during construction. Finally, where adverse impacts cannot be avoided or minimized, they would be mitigated. Mitigation actions would be based on the particular location and conditions unique to individual road and trail segments associated with alternatives B and C.

Effects to essential behaviors for hellbender in alternatives B and C would be insignificant and discountable. Directing visitor use to designated roads, trails, and other visitor facilities would provide park staff a means to reduce impacts on areas where monitoring indicates adverse effects from visitor use.

3.7 ARCHEOLOGICAL RESOURCES

3.7.1 Affected Environment

Over 480 prehistoric and historic archeological sites are recorded within the boundaries of the park, and several of the sites are listed or eligible for listing in the National Register of Historic Places. Site information is entered in the Archeological Site Management Information System maintained by the NPS Midwest Archeological Center in Lincoln, Nebraska. A synthesis of the archeological resource information was compiled in "An Archeological Overview and Assessment of the Ozark National Scenic Riverways, Missouri" (Finney 2006).

Most of the archeological investigations in the park have been conducted in the river valleys, where a high density of both prehistoric and historic sites has been documented. Many of the sites are large scale, complex, and/or multicomponent, and potentially overlap. The three terraces above the floodplain of the modern Jacks Fork and Current Rivers correspond to the principal site locations, with the greatest percentage of identified sites along the second terrace. Prehistoric site types are commonly associated with lithic tool production, food processing, and long- and short-term habitation areas. For thousands of years, American Indians used the Current and Jacks Fork Rivers as transportation corridors, settled along the river terraces, and used the region's abundant resources for subsistence. The river system facilitated cultural exchange and expanded the range of resources that could be procured by groups traveling or trading between different regions (Finney 2006).

The complete time line of regional cultural periods and stages are represented in the park's archeological record. The periods are distinguished by variations in projectile point types, tools, trade items and other defining or diagnostic artifacts and features. Although the archeological evidence is limited, Clovis points associated with early Paleo-Indian hunters and gatherers (12,000 to 8000 BC) have been identified from sites in the park. The ensuing Dalton cultural period (approximately 8500 to 7000 BC) marked a transition between the late Paleo-Indian and early Archaic periods in the Ozarks and throughout the Midwest and Southeast United States. The Archaic period followed next, divided into three stages: Early (ca. 7000 to 5000 BC), Middle (5000 to 3000 BC) and Late (3000 to 500 BC). The period was broadly characterized by more specialized foraging strategies, increasingly complex patterns of social organization, and growing populations during the Late Archaic (NPS 1991; Finney 2006).

The Woodland cultural tradition followed the Archaic, divided into Early (500 to 0 BC), Middle (AD 0 to 400), and Late (AD 400 to 700) substages. The Woodland period broadly extends from ca. 1000 BC to AD 1000 in eastern North America and is characterized by the development of ceramics, plant cultivation and domestication, burial mound and earthwork construction, increasing long-distance trade networks, and the establishment of sedentary villages. The late prehistoric or Mississippian cultural stage followed the Woodland period, broadly extending from ca. AD 1000 to 1600. The Emergent Mississippian substage (AD 700 to 1000) is characterized in the eastern Ozarks by shell-tempered ceramics and small, short-stemmed arrow points. Emergent Mississippian sites along the Current River typically represent ceremonial centers, small villages, and temporary campsites. While earthen mound complexes are rare at the park (one recorded mound assumed to be a burial site is at Gooseneck), sedentary or semi-sedentary populations occupied village sites along the river terraces. While the Mississippian culture grew and thrived in the central Mississippi alluvial valley between ca. AD 1275 and 1400, there is little archeological evidence for the presence of Mississippian people in the vicinity of the Current River after AD 1250; the culture largely disappeared from the region by AD 1350 (NPS 1991; Finney 2006).

Over one-fifth of the archeological sites recorded in the park are associated with historic tribal groups (the regionally dominant Osage and displaced tribes such as the Delaware and Shawnee) and to a large extent, the arrival of European American settlers during the early 19th century. Among the remaining historic archeological sites in the Riverways are an early trading post; the locations of farmsteads, dwellings, family cemeteries, and schools; a Civil War outpost; town and mill sites; and resources associated with extractive industries. Abandoned town sites include Chilton Community, Old Eminence, and Cedar Grove Community. Additionally, several farmsteads and dwelling ruins have been recorded as archeological sites, including Nichols Farmstead, McCormac Place, Alley Branch, Klepzig-Brandt Farm, and the Chilton-Williams Farm Complex. The Klepzig-Brandt Farm and Chilton-Williams Farm Complex are listed in the national register. Archeological resources associated with early mills are also in the park; the Alley Spring and Klepzig Mills, for instance, are atop archeological resources with prehistoric components, and the Phillips Bay Mill consists of the collapsed mill structure and associated archeological remains (NPS 1991; Finney 2006).

During 2010, NPS archeologists surveyed about 34 miles of authorized and unauthorized horse trails in the Two Rivers area of the park and near the Martin Bluff camping area and the Nichols Cabin. These investigations assessed the potential adverse impacts of horse use on known and previously unidentified archeological sites. Authorized trails in the Two Rivers area intersect 11 known archeological sites. The park maintains four authorized horse trails in the Two Rivers area (Jerktail Loop, Shawnee Loop, Broadfoot Loop, and Two Rivers Loop) and the area receives a high volume of horseback riding traffic. As a consequence, trails have widened in places and become deeply incised and eroded. Artifacts and archeological features have been exposed on the surfaces of horse trails and in erosional gullies formed by heavy horse traffic (NPS 2012).

Prehistoric artifacts were recovered from the ground surface during the 2010 pedestrian survey. Subsequent shovel testing conducted at two previously identified archeological sites in the Two Rivers area resulted in the identification of additional diagnostic artifacts and nondiagnostic lithic flakes (debitage). Nine new archeological sites (isolated finds) were also recorded. Recovered projectile points exhibited cultural associations with the Dalton, Middle and Late Archaic, Mississippian, and Early and Late Prehistoric periods. It was recommended that annual monitoring be implemented to assess the ongoing condition of the archeological sites observed to be impacted by the horse trails and to assist possible stabilization efforts. Additional testing was recommended to

document and evaluate the subsurface nature and areal extent of selected identified sites [14] (NPS 2012).

Results of the shovel test inventories suggest that archeological sites that intersect horse trails have the potential to contain a fairly high density of subsurface archeological deposits at shallow depths. The trails cross multiple landforms, including river terraces that contain some of the most extensive archeological sites in the park. Information from these sites, especially those yielding temporally or culturally diagnostic materials, are likely to contribute to further understanding of human occupation in the Current and Jacks Fork River valleys (NPS 2012). An additional archeological inventory was completed along the Shawnee and Two Rivers horse trails in 2016. Two new precontact sites were recorded (one on each trail) during that survey (NPS 2016e).

3.7.2 Environmental Consequences of Alternative A to Archeological Resources

Limited changes to visitor use management, recreational opportunities, or proposed construction of new park roads, trails and other facilities would occur. Consequently, known or potential archeological resources are unlikely to be affected by new or proposed ground-disturbing development activities. In some places, however, designated and undesignated trails have widened and become deeply incised and eroded. Artifacts and archeological features have been exposed where heavy horse trail traffic has created erosional gullies. 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 on sites resulting from natural erosion, visitor use, the illegal removal of artifacts, and other factors.

A slight or limited potential for increased visitation (particularly larger equestrian group rides) may continue to contribute to the erosional exposure of sensitive archeological resources to vandalism and inadvertent adverse impacts (e.g., the development of visitor-created trails) that can disturb or diminish the integrity and informational potential retained by subsurface archeological sites. Horseback riding would be limited to currently designated horse trails and state and county unpaved roads, but off-trail use would likely continue at some level. The use of ATVs and UTVs would continue to be allowed only on county roads. These measures would limit the potential for inadvertent erosional impacts on archeological resources. The restoration of undesignated roads and trails and the removal of roads and traces in primitive zones may entail the use of mechanized equipment and vegetation grubbing that could also potentially disturb archeological resources. However, all areas of proposed restoration disturbance would be archeologically surveyed to ensure avoidance of significant sites.

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. Appropriate protection and preservation measures would be carried out as necessary. Minor reroutes of existing trails may be required to protect archeological and other cultural resources, and these measures would be reviewed by cultural resource specialists and undertaken in a fashion that protects sensitive sites and resources.

[14] Trail incisions resulting from equestrian use ranged from 20 inches (50 cm) to 39 inches (100 cm) below surface and from 3 ft (1 m) to 10 ft (3 m) across (NPS 2012).

3.7.3 Environmental Consequences of Alternative B to Archeological Resources

Under alternative B, expansion of the park's designated trail system (an additional 49.5 miles of new trails) has a limited potential to adversely impact archeological resources and sites as a result of construction disturbance and increased visitor use. Minor rerouting of trails may occur to protect sensitive resource locations. New horse staging areas, parking areas, and trailheads would also be developed, along with new horse crossing locations along the Upper Current River. The restoration of undesignated roads and trails and the removal of roads and traces in primitive zones may entail the use of mechanized equipment and vegetation grubbing that could also potentially disturb buried archeological resources. However, all areas of proposed trail construction, restoration, and other development would be archeologically surveyed to ensure avoidance of significant sites. 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 implemented to reduce the loss of site information and integrity. Overall adverse impacts would be limited after these mitigation measures are implemented.

Beneficial impacts on archeological resources would result from park efforts (e.g., equestrian permitting system) to inform and educate visitors of the importance of protecting sensitive resources. Actions taken to impart appreciation and awareness among visitors of the need to protect and preserve cultural resources would contribute to the park's overall resource stewardship objectives. No new road construction would occur and the reduction of designated public roads and traces would further contribute to long-term beneficial impacts on archeological resources by limiting the potential for site disturbance by ongoing road maintenance. Restricting vehicles to designated roads would further protect resources from unauthorized / off-road ground disturbance and erosion. Reductions in undesignated river crossings and vehicle fords would also contribute to the protection of archeological resources along the river terraces.

3.7.4 Environmental Consequences of Alternative C to Archeological Resources

Under alternative C, the impacts on archeological resources would generally be the same as under alternative B, except for a comparatively increased potential for adverse impacts as a result of 58.5 miles of additional designated trails. Because alternative C entails the greatest expansion of the park's designated trail system, there is a correspondingly greater potential for inadvertent adverse impacts on archeological resources and sites as a result of construction disturbance and increased visitor use.

Cumulative Impacts

Some ongoing or foreseeable future actions have the potential to impact park archeological resources as a result of ground disturbance. These include flood recovery measures to repair existing river access sites and associated facilities in eight districts and areas damaged by the May 2017 flood. Some park facilities may be removed or relocated from the flood zone as part of the park's Integrated Park Improvement (IPI) process. Campgrounds and roads may be modified to improve access and address design sustainability standards (e.g., Waymeyer / Pin Oak EA).

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 resource 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 all alternatives (the no-action alternative A and alternatives B and C) would have both beneficial impacts and some limited adverse impacts on potential archeological resources as a result of ongoing visitor use and trail development/restoration activities. Other ongoing or reasonably foreseeable actions would result primarily in limited adverse impacts. The adverse impacts of the other actions described above, in combination with the impacts of the no-action alternative and alternatives B and C, would cumulatively result in long-term or permanent, limited or minimal adverse impacts on archeological resources. The impacts associated with the no–action alternative and alternatives B and C would represent a small component of the adverse cumulative impact.

Conclusion

Under all alternatives there is a limited possibility that known or unknown archeological resources could be disturbed by ongoing recreational visitor use and ground-disturbing construction activities. Alternative C presents the greatest potential for adverse impacts on archeological resources primarily by the increased extent of new trail development and restoration of undesignated roads and trails. However, NPS staff would continue to survey and assess proposed project disturbance areas and monitor and protect archeological resources under existing laws and policies. The National Park Service would also follow the best management practices and mitigation measures identified in appendix G of this planning document to avoid or minimize adverse impacts on archeological resources. Besides the possibility of project-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 any alternative in conjunction with other primarily ongoing or reasonably foreseeable actions.

3.8 HISTORIC BUILDINGS, SITES, AND CULTURAL LANDSCAPES

3.8.1 Affected Environment

The park's historic buildings, sites, and cultural landscapes are predominantly associated with 19th century settlement and various economic enterprises such as milling, logging, and mining. The cultural landscape was later altered by the emergence of recreational attractions and state and national park development during the first half of the 20th century. Most of these historic properties are listed in the National Register of Historic Places or have been determined eligible for listing.

Pioneer settlers of largely Scotch-Irish ancestry established regional farmsteads and rural communities in the early 19th century that were commonly organized along kinship ties. In many respects, they replicated settlement patterns that had prevailed along the Current River since prehistoric times, using the river terraces and broad, level areas at the river bends for habitation and crop cultivation. They used the rocky, higher elevations for livestock grazing and foraging. Although never completely isolated, the early self-sufficient settlers adapted to the rugged terrain of the Ozarks (NPS 1991).

Several grist mills developed along the Current River to grind corn primarily for home consumption. Some of the community mill sites developed into small hamlets. Sawmills also were established to provide mostly pine lumber for local use, although some commercial mills supplied lumber for

regional markets. The mill sites also served as social gathering centers for the settlers and places where other goods could be traded (NPS 1991).

Social interaction among the settlements was facilitated by the network of trails and roads that typically followed the creeks and rivers and connected the settlements and family farmsteads. Several of the backcountry trails and roads that currently exist along the park may have originated or evolved from the settlement period, and in some cases likely follow routes used by earlier American Indian inhabitants (NPS 1991).

Attesting to the hardships faced by early settlers, several cemeteries exist throughout the park. Some consist of small family plots and others are associated with larger villages and hamlets. Providing respectful protection of these cemeteries and ongoing access for family descendants and others are important objectives for NPS managers and park staff.

Situated along the Upper Current River District in Parker Hollow, the Nichols Farm is representative of the early self-sufficient farmsteads that emerged in the area. The national register-listed site is accessible along an existing, undesignated horse trail route that passes near the property, and is preserved and interpreted as a discovery site providing visitors a glimpse of frontier life. The property was acquired by John and Susie Nichols in 1897 and includes their house and barn (both constructed ca. 1910) and a corncrib (ca. 1932). The well-preserved farm complex represents a significant example of traditional Ozarks vernacular architecture. The single-lane Nichols Road, gravel-surfaced and about a 0.25-mile in length, contributes to the cultural landscape. The one-room Lower Parker School, attended by Nichols family children, still stands at the foot of Parker Hollow along the Upper Current River about a mile from the Nichols Farm (NPS 1991; LCS – *Nichols Cabin/House*; CLI – *Nichols Farm*).

During the 1920s, Missouri State Parks carried out various improvements (e.g., roads, trails, and buildings) along the Current and Jacks Fork Rivers. More extensive development activities were completed by the Civilian Conservation Corps during the Great Depression of the 1930s. In 1933, CCC camps were established at Alley Spring and Big Spring State Parks with oversight and technical assistance provided by the National Park Service. Among their many projects, CCC laborers constructed several miles of gravel roads and trails. They also built campgrounds, picnic shelters, cabins, and waterlines. The CCC-constructed buildings and structures were typically built in a distinctive rustic style that incorporated log timbers and locally quarried stone (NPS 1991).

3.8.2 Environmental Consequences of Alternative A – Historic Buildings, Sites, and Cultural Landscapes

Under alternative A, no substantial changes or development actions would occur to alter the character-defining qualities contributing to the significance of the park's cultural landscapes and distinctive vernacular historic structures and features. However, historic structures and cultural landscape resources, particularly those in the remote backcountry or accessible along the park's extensive trail network, may not always receive timely preservation maintenance and protection. They may therefore continue to be at risk of diminished integrity from weathering and increasing visitation, which would have a long-term limited adverse impact on these historic properties.

Some historic structures and sites along or near park trails, such as the Nichols Farm, may face ongoing impacts from inadvertent visitor activities or vandalism. However, horseback riding would be limited to currently designated horse trails and state and county unpaved roads. The use of ATVs and UTVs would continue to be allowed only on county roads. These measures would limit the potential for visitor-related disturbances to historic properties. The restoration of undesignated

roads and trails and the removal of roads and traces in primitive zones may entail the use of mechanized equipment and vegetation grubbing, which could also potentially disturb historic structures and cultural landscape features in project areas. However, all areas of proposed restoration disturbance would be surveyed and assessed by NPS cultural resource staff to ensure avoidance of significant sites.

Because many of the park's existing roads and trails evolved from the earlier historic settlement period, there is a possibility that removal or alteration of some roads and traces could disturb or curtail traditional access to places of cultural importance such as family cemeteries. The National Park Service would control or limit access in these instances to approved families/groups, a measure that would have long-term beneficial impacts on preserving traditional connections and associations to culturally important places. Character-defining features contributing to the integrity of historic roads and trails would also be preserved to the extent possible. Other beneficial impacts on historic buildings and cultural landscape features would result from enhancing visitor education and awareness regarding the importance of protecting and avoiding sensitive cultural resources. Continued monitoring of historic structures and cultural landscape features would also provide long-term benefits allowing the assessment of visitor use impacts and other factors on resource condition and integrity over time.

3.8.3 Environmental Consequences of Alternative B – Historic Buildings, Sites, and Cultural Landscapes

Under alternative B, expansion of the park's designated trail system (an additional 49.5 miles of new trails) has a limited or slightly increased potential to adversely impact historic structures and cultural landscape features as a result of construction disturbance and increased visitor use. Minor rerouting of trails may occur to protect sensitive resource locations. New horse staging areas, parking areas, and trailheads would also be developed, along with new horse crossing locations along the Upper Current River. The restoration of undesignated roads and trails and the removal of roads and traces in primitive zones may entail the use of mechanized equipment and vegetation grubbing that could also potentially disturb historic properties. However, all areas of proposed trail construction, restoration, and other development would be assessed by NPS cultural resources staff to ensure avoidance of significant sites. Should historic sites and contributing cultural landscape features be identified during design development and construction, these would be avoided to the extent possible by redesign, or other appropriate mitigation measures would be implemented to reduce the loss of site information and integrity.

Beneficial impacts on historic structures and cultural landscape features would result from park efforts (e.g., equestrian permitting system) to inform and educate visitors of the importance of protecting sensitive resources. Actions taken to impart appreciation and awareness among visitors of the need to protect and preserve cultural resources would contribute to the park's overall resource stewardship objectives. No new road construction would occur and the reduction of designated public roads and traces would further contribute to long-term beneficial impacts by limiting the potential for site disturbance by new construction and ongoing road maintenance. Restricting vehicles to designated roads would further protect resources from unauthorized/off-road ground disturbance and erosion.

3.8.4 Environmental Consequences of Alternative C – Historic Buildings, Sites, and Cultural Landscapes

Under alternative C, the impacts on historic buildings, sites and cultural landscapes would generally be the same as under alternative B, except for a comparatively increased potential for adverse impacts as a result of 58.5 miles of additional trails. Because alternative C entails the greatest expansion of the park's designated trail system, there is a correspondingly greater potential for inadvertent adverse impacts on historic buildings, sites and cultural landscapes as a result of construction disturbance and increased visitor use.

Cumulative Impacts

Some ongoing or foreseeable future actions have the potential for limited adverse impacts on historic buildings and cultural landscape features. These include flood recovery measures to repair existing river access sites and associated facilities in areas damaged by the May 2017 flood. Some park facilities may be removed or relocated from the flood zone as part of the park's IPI process. Campgrounds and roads may be modified to improve access and address design sustainability standards (e.g., Waymeyer / Pin Oak EA). Beneficial impacts on historic properties would result from planned repair and rehabilitation of the historic CCC-era Big Springs Lodge and Cabins along with campground and recreation area improvements. Other beneficial improvements are planned for the Rocky Falls area, and historic structures and cultural landscape features at Alley Spring.

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 historic properties. All new construction and rehabilitation would be designed and carried out in conformance with provisions of the *Secretary of the Interior's Standards for the Treatment of Historic Properties* with *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 historic structures and cultural landscapes at the park.

The impacts associated with implementation of all alternatives (the no-action alternative and alternatives B and C) would have both beneficial and adverse impacts on historic buildings and cultural landscape features. 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 and alternatives B and C, would cumulatively result in long-term or permanent, limited, or minimal adverse impacts on historic structures and cultural landscape features. The impacts associated with any alternative would represent a small component of the adverse cumulative impact.

Conclusion

Under all alternatives (the no-action alternative and alternatives B and C) there is a possibility that some ongoing or proposed road and trail projects could affect architectural elements of historic buildings and features contributing to the significance of the park's cultural landscapes. Alternative C presents the greatest potential for adverse impacts on historic structures and cultural landscapes primarily by new trail development and restoration of undesignated roads and trails. However, NPS staff would continue to survey and assess proposed project disturbance areas and monitor and protect resources under existing laws and policies. The National Park Service would also follow the best management practices and mitigation measures identified in appendix G of this planning

document to avoid or minimize adverse impacts on cultural resources. Besides the possibility of project-related impacts, long-term minimal or limited adverse impacts 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 and from day-to-day resource protection activities. Limited adverse cumulative impacts on historic structures and cultural landscapes also would occur from implementation of the no-action alternative and alternatives B and C in conjunction with other primarily ongoing or reasonably foreseeable actions.

3.9 SOCIOECONOMICS

3.9.1 Affected Environment

The park lies primarily in Carter and Shannon Counties in southeast Missouri, with small portions of the park in Dent and Texas Counties. The park's headquarters is in Van Buren, Missouri, which is about 190 driving miles south of St. Louis, Missouri, and 148 miles east of Springfield, Missouri. The study area includes Carter and Shannon Counties because the alternatives would most likely affect the communities in these counties. Socioeconomic data from these counties are compared to data from Missouri and the United States if it is available. Additionally, the communities of Eminence and Van Buren in Shannon and Carter Counties, respectively, are gateway communities to the park and are focus communities in the project area.

Major Communities. The City of Eminence is the county seat for Shannon County and is 5 miles west of Shawnee Creek, 7 miles west of Two Rivers, and 4 miles east of Alley Spring. Van Buren is the county seat for Carter County and serves as the location for park headquarters. US 60 travels through the town of Van Buren and across the Current River (see figure 1). Additionally, the towns of Birch Tree, Winona, and Summersville are near the park in Shannon County. The town of Ellington is east of the park, just outside the study area in Reynolds County. The town of Mountain View is also southwest of the park just outside the study area in Howell County. The town of Salem is north of the park in Dent County. Carter and Shannon Counties are relatively rural with approximately 12.3 and 8.4 people per square mile, respectively (US Census Bureau 2010)

Demographics.

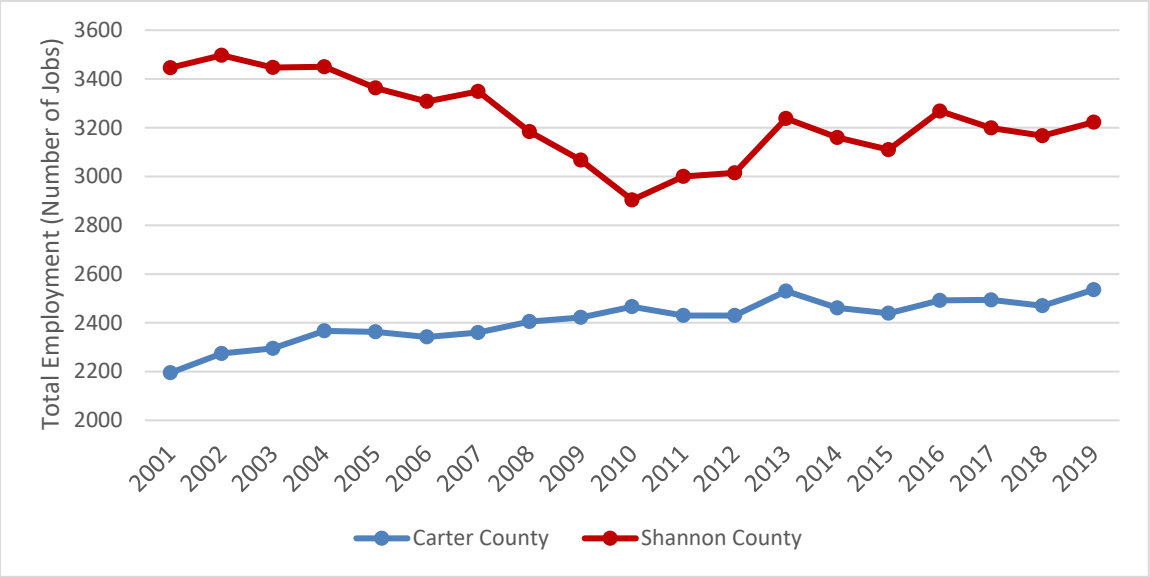
Population— In 2017, the population in Carter County was 6,279, with approximately 15.0% of the residents in the city of Van Buren (921 residents). Population in Shannon County was 8,571 in 2017, with approximately 7.0% of the population (617 residents) in the city of Eminence (US Census Bureau 2016; 2017). Area populations grew in the counties in the 1970s and early 1980s. Growth rates between 2000 and 2017 have been 2.7% and 1.4%, respectively, for Carter and Shannon Counties. In comparison, the population growth rate for the state of Missouri for this time period was 2.1%.

According to the State of Missouri, population is projected to increase in Shannon County by approximately 9.0% between 2015 and 2030, while population is projected to decrease in Carter County by approximately 2.0% during this period. In comparison, population in the state of Missouri is projected to increase by 9.0% between 2015 and 2030 (State of Missouri 2008).

Economic Characteristics. This section provides an overview of the economic conditions of the study area, including employment trends, employment by industry, unemployment rates, and economic contribution of park visitation.

Employment Trends— Total employment has steadily increased in Carter County since 2002 from 2,274 in 2002 to 2,536 in 2,019, an increase of 11.5%. Employment in Shannon County has been more volatile, decreasing between 2002 and 2010, and generally increasing since 2010 (see figure 2). In comparison, employment in the state of Missouri has grown by 11.2% during this same period.

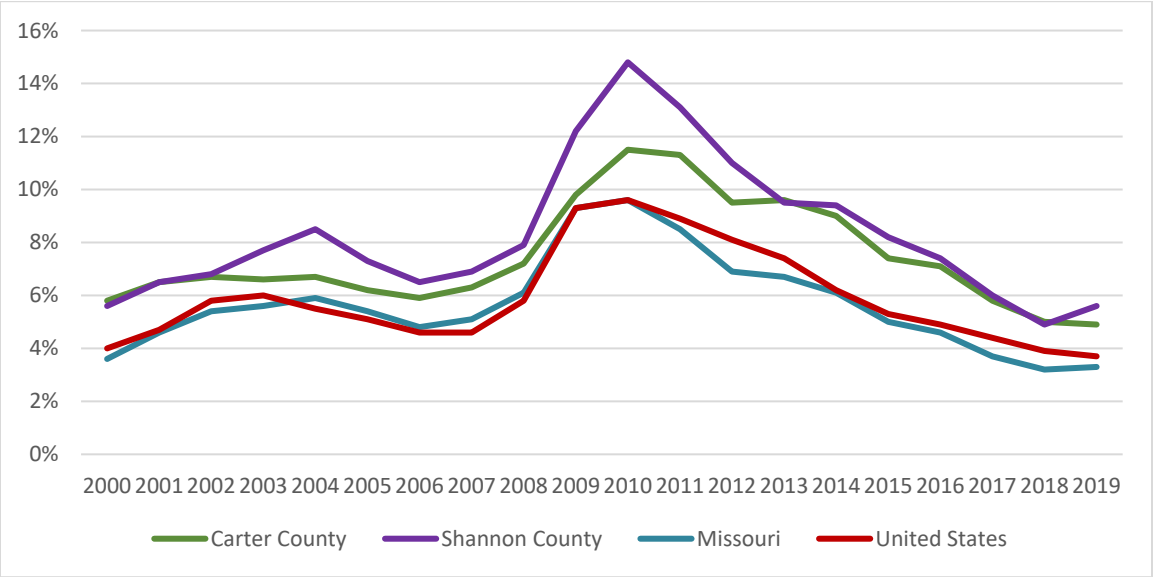
Figure 2. Employment Trends for Carter and Shannon Counties



Source: US Department of Commerce, Bureau of Economic Analysis, 2020

Unemployment— In general, trends in the unemployment rates in the study area have followed those at the state and national level, although the local unemployment rates have been higher. Unemployment rates in Shannon County were notably higher than those in Carter County, the state and the nation during the economic downturn in 2009 and 2010. Unemployment rates have been falling since the recession ended in late 2009, with 2019 unemployment rates of 4.9% in Carter County and 5.6% in Shannon County. For comparison, unemployment rates in Missouri and the nation were slightly over 3.0% in 2019.

Figure 3. Unemployment Rates in Carter County, Shannon County, State of Missouri, and United States from 2000–2019



Source: US Bureau of Labor Statistics 2020

Employment by Industry— Employment in the two-county study area has increased by 289 jobs between 2010 and 2016. Services comprised approximately 45.0% of the employment in the study area in 2016, with retail trade (10.0%) and health care and social assistance (8.0%) accounting for the greatest service-related employment. Nonservice employment, including farming (11.0%) and manufacturing (including forest products) (14.0%) are also relatively larger employing industries in the region. The government sector employs 15.0% of employment in the study area. Tourism-based service industries include retail trade, accommodations and food services, arts, entertainment, and recreation services, which together accounted for 13.8% of employment or 781 jobs in the study area in 2016.

Economic Contribution of Visitation to the Local Economy. The park attracts a large number of visitors, mostly from Missouri and Illinois (Morgan 2007). These visitors frequent local businesses (i.e., restaurants, hotels, and retail outlets) in communities surrounding the park, which contributes to the local economy. In 2018, there were 1,264,658 visitors, with estimated annual visitor spending in the local gateway region of $55.4 million (Cullinane et al. 2019). [15] The visitor spending and resulting sales to local businesses provide a measure of the direct effect of outdoor recreation on the regional economy. An economic impact analysis measures the changes in economic activity associated with a direct stimulus to an economy. In the case of recreation at the park, visitors who reside outside the local region (nonlocal visitors) inject spending into local economies while visiting the area, and this visitor spending creates multiplier effects in the local economies stimulating additional economic activity. The visitor spending of $55.4 million was estimated to support 840 jobs, $17.9 million in labor income, and $30.1 million in value added (equivalent to change in local gross domestic product), which includes the multiplier effect (Cullinane et al. 2018) in the local gateway region surrounding the park.

[15] Local gateway regions contain all counties in or intersecting a 60-mile radius around a park boundary.

Total tourism-based employment in the two-county study area was 781 in 2016 (see the "Employment by Industry" section). Tourism-based employment associated with the park's visitor spending would account for 94.0% of the tourism employment and 13.0% of total employment in the study area.

Commercial Uses. The park manages 18 concession contracts, as well as commercial use authorizations and special use permits, all of which provide services to park visitors. These include equestrian trail rides, canoe and tube rentals, and shuttle services for accessing the river. Some of these operators occupy government facilities and provide sales of camping supplies, firewood, and other merchandise. Commercial horseback rides occur at various places along the Current and Jacks Fork Rivers with major concentrations originating out of Eminence, Missouri, and in the vicinity of the Upper Current River. There are two commercial use authorizations for equestrian operations in the park: Cross Country Trail Rides (CCTR) and Big Creek Trail Rides. The guided trail rides provided by these companies bring in considerable numbers of horse riders that contribute to visitor spending in the local economy.

Cross Country Trail Rides operates out of Eminence, Missouri, and has a number of facilities, including an indoor riding arena, retail store, campground, stalls, restaurant, and shower house. They offer seven week-long events between May and October. Average attendance ranges from 300 to 2,200 guests per event, with the adult cost of admission ranging from $200 to $300 per ride (CCTR 2018). [16] In addition, CCTR offers two long-weekend holiday events over the Fourth of July and Labor Day. The attendance ranges from 500 to 900 guests during these events. Big Creek Trail Rides, located in Hartshorn, Missouri, northwest of Akers, provides guided trail rides as well as a campground, stalls, and room rentals. Big Creek Trail Rides is advertising nine one-week trail rides and two three-day trail rides in 2018, from April to October with the cost of adult admission being $270 per week-long ride and $160 per three-day ride. Both CCTR and Big Creek trail rides occur on trails that extend throughout the area; however, equestrian trails in the park (both designated and undesignated) serve as some of the most desirable riding locations, primarily due to the scenic opportunities in proximity to the Current River.

According to a recent survey of equestrian use and visitor perspectives, the month of October experiences the highest number of horse riders, coinciding with guided trail rides (Algrim et al. 2018a). In the beginning of October in 2016 (October 2–5), a total of 1,791 horse riders were counted during a trail ride; the locations most affected were Alley Spring (338 riders), Shawnee (708 riders), and County Road (737 riders). In early October 2015 (October 1–10), a total of 3,688 horse riders were counted during a trail ride; the locations most affected were Alley Spring (347 riders), Shawnee (987 riders), and County Road (2,170 riders). These areas also experienced considerable hiking use during these periods. September, June, and August also experience high equestrian use in these areas, typically coinciding with trail rides.

Fiscal Conditions. Missouri's sales tax is levied on the purchase price of tangible personal property or taxable services sold at retail prices. The state sales and use tax is 3.0%, and its revenues are distributed into the state general fund (State of Missouri 2017a). Retail trade purchases would be subject to these sales taxes, although retail sales of food are exempt from this 3.0% tax (State of Missouri 2017a). Cities and counties may impose local sales and use taxes that are paid to the state and then disbursed to the local governments.

[16] Costs do not include campsite, stall, and or applicable room fees. Children are charged at a reduced rate.

Missouri receives a fuel tax of 17 cents a gallon on motor fuels (gasoline, diesel fuel, kerosene, and blended fuel) from licensed suppliers, which is passed onto consumers. These tax receipts are distributed to the Missouri Department of Transportation and Missouri cities and counties for road construction and maintenance (State of Missouri 2018). The city share is based on population at the Decennial Census, and the county share is based on assessed rural land valuation and rural road mileage (State of Missouri 2017). For the county share, 50.0% of county funds are distributed based on the ratio of a county's rural road mileage to the total county rural road mileage of the state. The park's roads are not counted as rural roads for transportation funding because they are not owned by the county. The other half of county funds are distributed based on the ratio of the county's assessed total county rural land valuation to the total rural land valuation of the state, which is determined by a state tax commission annual report.

The state also collects taxes and fees on motor vehicle sales and purchases, a portion of which are distributed to local governments. As summarized in table 8, both sales tax and fuel tax revenues are important to the local governments in the study area. Sales tax disbursements from the state account for approximately 90.0% of the tax and fee disbursements to Eminence and Van Buren.

TABLE 8. TAXES DISPERSED FROM THE STATE TO LOCAL GOVERNMENTS (FY 2017)

Municipality	Total Taxes	Sales and Use Taxes	Fuel Tax and Fee	Other Taxes and Fees
Carter County	$1,232,246	$788,099	$350,656	$93,491
Shannon County	$1,203,625	$548,125	$655,382	$188
Eminence	$249,123	$225,141	$23,982	$0
Van Buren	$329,369	$296,634	$32,735	$0

Note: Other distributions to counties and cities include motor vehicle sales and taxes and motor vehicle licensing fees.

Source: State of Missouri 2017a

3.9.2 Environmental Consequences of Alternative A – Socioeconomics

Under alternative A, park management would continue the management direction established in the 2014 General Management Plan. The existing system of designated roads, trails, and river crossings would continue, along with opportunities for traditional recreational activities such as hiking, horseback riding, and hunting. Undesignated roads, trails, recreational areas and river crossings would be removed and restored to natural conditions.

Visitation to the park would continue to play an important role in the regional economic and fiscal conditions under the no-action alternative. Designated trails and roads would continue to provide access to the key attractions and features of the park. Constraining road travel to designated roads would primarily affect local users, who may be more familiar with the system of unauthorized roads. The number of individuals traveling to the area for equestrian events and activities is expected to remain the same. The closure of undesignated equestrian trails may result in more concentrated use on designated trails, especially during the trail riding events. Crowded conditions may deter some users from visiting the park, although they would likely visit adjacent private and state lands that provide some equestrian trails and facilities. It is likely that visitation would remain at current or slightly reduced levels because of crowded conditions under the no-action alternative.

According to a survey of horseback riding and hiking use in the park that occurred during eight separate three-day sampling periods between October 2015 and October 2016, an estimated 8,858 horseback riders visited the park (Algrim et al. 2018), with the vast majority in the Alley Spring,

Shawnee Creek, and Two Rivers areas (96.0%). The survey data indicate that horseback riding visitation is highest during organized trail rides.

As summarized previously, visitor spending supports jobs, income, and tax revenues in the study area, with the vast majority of the economic contribution attributed to nonlocal visitors. Over the course of construction, spending of $2.6 million under alternative A would support approximately 14 average annual construction jobs as well as indirect and induced jobs and income [17].

3.9.3 Environmental Consequences of Alternative B – Socioeconomics

Under alternative B, formal opportunities for traditional recreational activities such as hiking and horseback riding would be expanded. The park would designate 49.5 additional miles of new trails inside and outside the park's jurisdictional boundary, in addition to those existing trails noted in the no-action alternative. These trails would expand the total mileage available to hikers, bikers, and equestrians. Alternative B would also develop a new horse staging and parking area to accommodate equestrians in the Upper Current River and a new hiking trailhead and parking area in the Middle Current River area.

All undesignated roads would be removed and restored to natural conditions. In addition, there would be a reduction in designated road mileage (including a reduction of about 14 miles of NPS-administered roads). There would be no changes to the county- and state-owned roads in the region. The closure of undesignated roads would largely affect local visitors who are the main users of these roads. These closures are not anticipated to affect nonlocal visitation, and changes in visitor spending and associated regional economic impacts are expected to be negligible compared to the no-action alternative. Because the state and county road mileage would remain the same, no changes are anticipated to the allocation of fuel tax revenues to the counties compared to the no-action alternative.

The National Park Service would establish an equestrian permitting system that would track horseback rider numbers, educate users, generate revenues to offset trail improvement and maintenance costs, and manage horse use levels. If implemented, all horseback riding use in the park would require a permit. The permit cost may be passed onto the trail riders if the equestrian commercial use providers obtain the permits for the rides, although the cost of the permit would be nominal compared to trip and lodging expenses and would not likely affect the decision to visit the park.

The goal of the proposed equestrian permit system is to spread out the timing and distribution of use to reduce resource impacts from large horseback rider groups. These changes may affect how large groups could access the park and its trails. For example, a large horseback riding group may need to enter the Riverways at two different times during one day or on two different days instead of all at one time. This permitting system may deter some horseback riders from visiting the park because of the inconvenience in obtaining a permit or difficulties in accommodating large groups. In addition, the equestrian commercial use providers and horseback riding visitors may be inconvenienced and experience increased costs if they need to travel farther to access equestrian trails in the park or surrounding region.

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[17] The number of average annual jobs in this context is the annualized number of jobs in a given industry, where one job lasting 12 months is equivalent to two jobs lasting six months. Further, if construction took five years, spending would support 14 total jobs/five years, or 2.8 jobs per year.

The equestrian commercial use providers may have to adjust to any permit requirements, perhaps providing additional events to disperse the numbers of riders accessing the park at one time. Optionally, during the trail ride events (planned for long weekends or a week), there may be the need for up-front planning (e.g., sign-up sheets) to manage the numbers of horseback riders that can enter the park each day and/or within a day. In order for equestrian commercial use providers to help more effectively manage the timing and distribution of horseback riding they may need to adjust business operations to help spread park visitation across the day and/or in months (e.g., spread out the use), but the total number of horseback riding visitors would only reduce slightly or would not be affected. Additionally, horseback riders could access other private and state-owned land that provides equestrian trails and facilities, which would provide substitutes for riding opportunities.

Alternative B would add 10 miles of new trails where both hiking and biking are allowed. These expanded opportunities may result in small increases in visitation associated with these activities, resulting in slightly higher regional economic benefits and fiscal receipts compared to the no-action alternative. Additional commercial use opportunities may occur with the formalized access for these activities.

Allowing the use of ATV/UTVs on designated park roads would expand opportunities for this type of activity in the region, authorizing 60 miles of park roads to the regional roads and trails already open to ATV/UTV use. Data on ATV/UTV use in the region is limited, and it is difficult to assess whether any ATV/UTV use in the park would be new use, or existing ATV/UTV use diverted from other nearby sites. The economic impact of this permitted ATV/UTV use in the park would be beneficial but very small.

With the potential for slight decreases in horseback riding visitation, it is possible there could be slight reductions in visitor spending, regional economic benefits, and fiscal receipts compared to the no-action alternative. However, expanded formal access for horseback riding in the Upper Current River and new hiking and biking trails may increase visitation associated with these activities, resulting in increases in visitor spending, regional economic benefits, and fiscal receipts. Additional commercial use opportunities may occur. Overall, alternative B would result in minimal changes in socioeconomic and fiscal conditions compared to the no-action alternative.

Construction activities associated with new trail development, trail and road closures, restoration work, and new parking lots and facilities would provide opportunities for construction jobs and income, with beneficial impacts on regional economic conditions. Over the course of construction, spending of $5.4 million under alternative B would support approximately 30 average annual construction jobs as well as indirect and induced jobs and income (see footnote 18).

3.9.4 Environmental Consequences of Alternative C – Socioeconomics

Similar to alternative B, alternative C would also expand opportunities for traditional recreational activities such as hiking and horseback riding. The park would designate 58.5 additional miles of new trails inside and outside the park's jurisdictional boundary, more than in alternative B, as well as the development of a new horse staging and parking area to accommodate equestrians in the Upper Current River area and a new hiking trailhead and parking area in the Middle Current River area.

The effects of closure and restoration of undesignated roads in alternative C would be the same as in alternative B.

The impacts of the proposed equestrian permitting system would be similar to those described for alternative B. However, with 5.5 additional miles of equestrian trails available, travel costs may be

slightly lower because additional trails may be able to accommodate more horseback-riding visitors from one access point in the Upper Current River District.

Alternative C would expand formal access for horseback riding in the Upper Current River, with additional opportunities to explore the area southwest of the Nichols Cabin area. Alternative C would also add 12.0 miles of new trails where both hiking and biking use are allowed (compared to 10 miles under alternative B).

The economic impact of permitted ATV/UTV use in the park under alternative C would be the same as alternative B.

These expanded opportunities may result in small increases in visitation associated with these activities, which would be slightly greater than under alternative B, resulting in slightly higher regional economic benefits and fiscal receipts compared to the no-action alternative. Additional commercial use opportunities may occur with the formalized access for these activities. Overall, alternative C would result in slight increases in socioeconomic and fiscal benefits in the long term.

Construction activities associated with new trail development, trail and road closures, restoration work, and new parking lots and facilities would provide beneficial impacts on regional economic conditions. Estimated construction spending of $6.0 million under alternative C would support approximately 33 average annual construction jobs as well as indirect and induced jobs and income (see footnote 18).

Cumulative Impacts

Other past, present, and future trends and activities could affect the socioeconomic resources in the region (see table 3 for a list of the park's past, present, or reasonably foreseeable actions). Because the economic health of the area depends on tourism, the trends and actions, beneficial and adverse, discussed in "Visitor Use and Experience" would have an impact on the economy of the study area.

In the future, a number of initiatives would likely affect visitation and the local economy. Based on "Visitor Use and Experience," future actions that result in an increase in the number of visitors to the park should also have positive impacts on the local economy, while actions that decrease visitation could have negative impacts. These initiatives include the following:

Developing additional visitor attractions or activities beyond those offered at the park (e.g., biking trails and use) and those that currently exist near the park could increase the number of visitors to the area during off-peak seasons. This could encourage individuals to extend their stays, or attract a different type of visitor to the area. For instance, local businesses could increase their services to visitors who are interested in recreational opportunities associated with wildlife viewing and biking.

In addition, current and future national economic conditions would affect the local and regional economies as they affect the entire United States. Tourism is sensitive to the cost of fuel, with varying affects in communities near the park. Because the park is frequented by residents in the regional area (e.g., in a reasonable driving distance), there appears to be an increase in the number of day visitors coming to the park during the most recent economic downturn (2008 through 2010). This may be a sign that visitors are choosing to take vacations closer to their homes rather than longer, more costly trips farther from home. However, some concessioners have indicated that visitors who normally visit the park for a several-day visit are shortening their stays. The effects of national economic conditions vary over time, but economic conditions similar to those in 2008 and 2009 would have adverse impacts on regional economic conditions in the study area. Additionally, army force reductions at Fort Leonard Wood in counties adjacent to the project area have likely resulted and

would continue to result in some small decreases in visitation at the park, with adverse impacts on regional economic conditions.

Construction activities and operation and maintenance activities from cumulative actions would have beneficial impacts on socioeconomic conditions. Depending on the project, the impacts from construction and operation and maintenance could be short or long term. Cumulative impacts from all other actions affecting the regional economy would be beneficial, based on construction, economic development activities, and plans to improve visitor activities in the future. Park visitation anticipated under alternative A would continue to provide beneficial impacts on regional economic conditions; the closure of roads and trails may reduce visitation slightly. Cumulative impacts of current and proposed actions plus alternative A would result in long-term, beneficial impacts on visitor spending and associated regional economic conditions.

Alternative B may result in some small decreases in horseback riding visitation to the park from the permit requirements. However, impacts from any reduced visitor spending would be negligible to slight because other lands are available in the region for equestrian use and the trail riding trips to the park could be managed (and spread out) by the equestrian commercial use providers. In addition, new and different visitor opportunities may increase visitation and offset the potential for slight decreases in horseback riding use under alternative B. Overall, cumulative impacts on regional economic and fiscal conditions would be beneficial, and the incremental contribution of the actions under alternative B would be negligible.

Alternative C would provide additional new trails for equestrian, hiking, and biking use compared to alternative B, and a permit for equestrian use would be required. Overall, cumulative impacts on the regional economic and fiscal conditions would be beneficial, and the incremental contribution of the actions under alternative C would be negligible.

Conclusion

Under the no-action alternative, visitation and the economic contributions of visitor spending to the study area would continue, as would fiscal receipts collected by state and local governments. Construction projects expected under the no-action alternative would support 10 average annual jobs along with additional indirect and induced jobs and labor income.

Alternative B may result in a slight redistribution of visitation or a visitation reduction due to the implementation of the proposed equestrian permit system, though this change would be small in scale and likely offset by additional visitors drawn to the park by expanded hiking and biking opportunities. The economic contributions of visitor spending to the study area as well as fiscal receipts would be negligibly affected, and proposed construction spending would support 28 average annual jobs along with additional indirect and induced jobs and labor income.

Alternative C would have similar effects to alternative B, though the economic contributions of visitor spending would likely be higher as the trail networks available to equestrian and other users would be larger than those in alternative B. Alternative C would likely result in slightly higher economic contributions of visitor spending to the study area as well as fiscal receipts. Proposed construction spending in alternative C would support 49 average annual jobs along with additional indirect and induced jobs and labor income.

In all alternatives, state and county road mileage would be unchanged, so there would be no effect on the allocation of state fuel tax revenues to Carter and Shannon Counties.

Appendixes

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APPENDIX LIST

Appendix A: Relevant Law, Regulation, and Policy

Appendix B: Management Zones Map

Appendix C: Visitor Capacity for Ozark National Scenic Riverways Roads and Trails Management Plan

Appendix D: Alternative Roads and Trails Mapping

Appendix E: Proposed Designated Recreation Areas and Authorized Uses

Appendix F: Visitor Use Management and Indicators and Thresholds

Appendix G: Mitigation Measures and Best Management Practices

Appendix H: Biological Assessment

Appendix I: Consultation and Coordination

Appendix J: References and Glossary

Appendix K: Trail Classifications for Existing Trails

Appendix L: Road Classification Matrix – Alternative B

Appendix M: Road Classification Matrix – Alternative C

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APPENDIX A: RELEVANT LAW, REGULATION, AND POLICY

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APPENDIX A: RELEVANT LAW, REGULATION, AND POLICY

INTRODUCTION

The following federal and state laws, regulations, and policies guide park management and provide direction for the Roads and Trails Plan.

FEDERAL LAWS (UNITED STATES CODE)

54 U.S.C. Subtitle I – National Park System (NPS Organic Act and 1978 Redwood Amendments)
16 U.S.C CHAPTER 1, SUBCHAPTER LXX: OZARK NATIONAL SCENIC RIVERWAYS (just the establishment section 460m)

MISSOURI STATE LAW (MISSOURI REVISED STATUTES)

RSMo 304.013 All-terrain vehicles, prohibited on highways, rivers or streams of this state…
RSMo 304.032 Utility vehicles, operation on highway and in streams or rivers prohibited…
RSMo 304.033 Recreational off-highway vehicles, operation on highways prohibited…
RSMo 307.198 All-terrain vehicles, equipment required — penalty.
RSMo 301.010 Definitions.

FEDERAL REGULATIONS (CODE OF FEDERAL REGULATIONS)

36 CFR 2.1 (b): Preservation of Natural, Cultural and Archaeological Resources: Trails and Walkways
36 CFR 2.10 (a) and (b): Camping and Food Storage
36 CFR 2.16: Horses and Pack Animals (a), (b), (c), (d), (e), (f):
36 CFR 4.1: Applicability and Scope
36 CFR 4.2 (a) and (b): State Law Applicable
36 CFR 4.10 (a), (b) and (c): Travel on Park Roads and Designated Routes
36 CFR 4.30 (a), (d), (e), (f), (g) and (h) : Bicycles

MANAGEMENT POLICIES 2006 (NPS)

8.2 Visitor Use
8.2.2 Recreational Activities
8.2.2.1 Management of Recreational Use
8.2.2.3 River Use
8.2.2.8 Recreational Pack and Saddle Stock Use
8.2.3 Use of Motorized Equipment
8.2.3.1 Motorized Off-Road Vehicle Use
8.6.5 Access to Private Property
9.2 Transportation systems
9.2.1 Road Systems
9.2.1.1 Park Roads
9.2.1.2 Non-NPS Roads
9.2.1.2.1 Existing Commercial and Other Through-Traffic
9.2.1.2.2 Construction and Expansion Proposals
9.2.2 Trails and Walks
9.2.2.1 Cooperative Trail Planning

9.2.2.2 Hiking Trails
9.2.2.3 Equestrian Trails
9.2.2.4 Bicycle Trails
9.2.2.5 Water Trails
9.2.2.6 Interpretive Trails
9.2.2.7 National Trails
9.2.2.8 Trailheads
9.2.2.9 Trail Bridges
9.2.3 Traffic Signs and Markings
9.2.4 Parking Areas
9.3.1.1 Signs
9.3.1.5 Wayside Exhibits
9.3.2.1 Campgrounds
9.3.2.2 Backcountry Campsites
9.3.4.2 Facilities for Water Recreation

EXECUTIVE ORDERS

EO 11644 – Use of Off-Road Vehicles on the Public Lands
EO 11989 – Off-Road Vehicles on Public Lands

APPENDIX B: MANAGEMENT ZONES MAP

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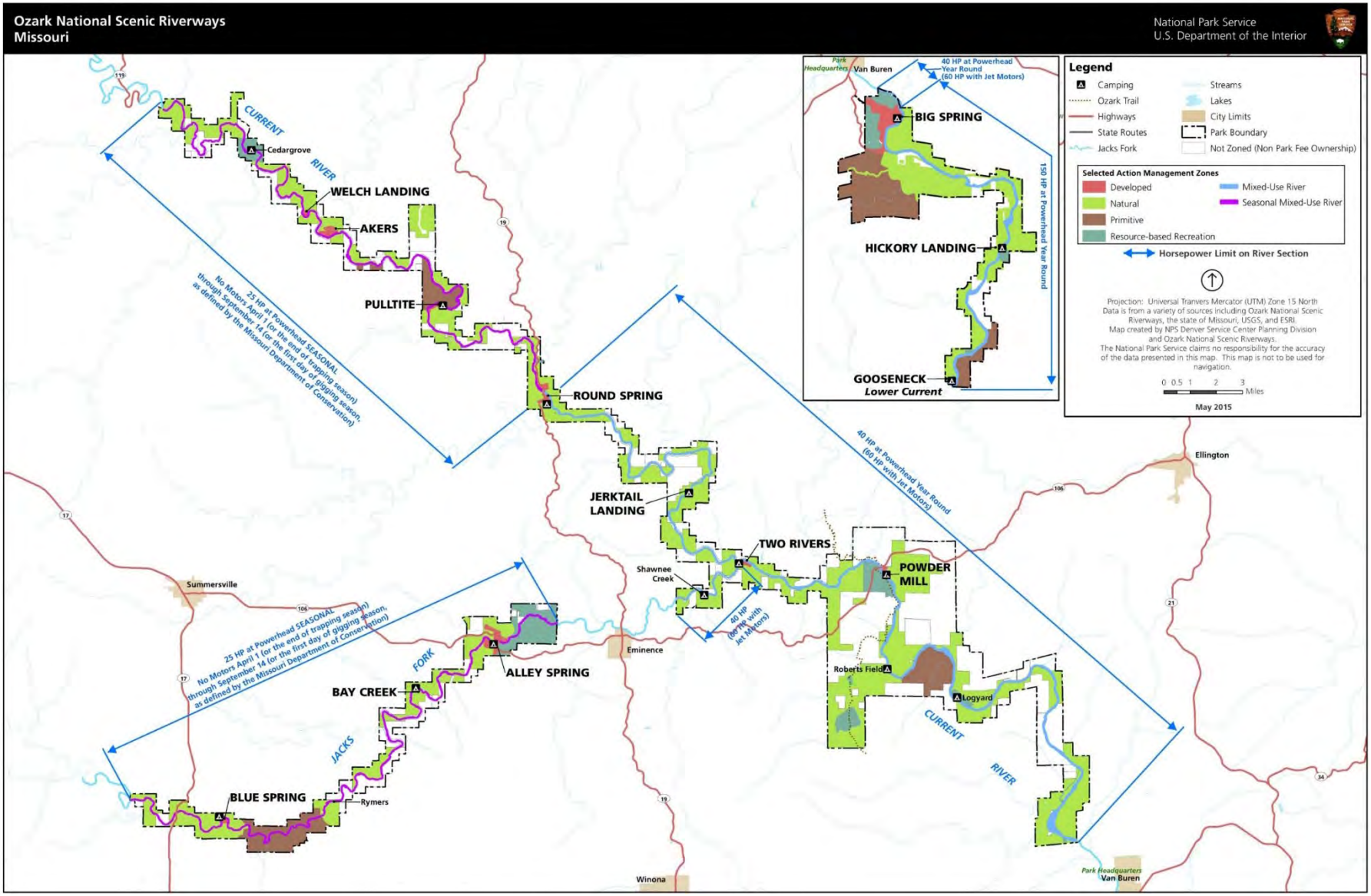
Figure B-1. Ozark National Scenic Riverways Management Zones Map



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APPENDIX C: VISITOR CAPACITY FOR OZARK NATIONAL SCENIC RIVERWAYS ROADS AND TRAILS MANAGEMENT PLAN

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APPENDIX C: VISITOR CAPACITY FOR OZARK NATIONAL SCENIC RIVERWAYS ROADS AND TRAILS MANAGEMENT PLAN

OVERVIEW

This appendix provides additional information about the identification of visitor capacity as it relates to the visitor use management framework for the Ozark National Scenic Riverways Roads and Trails Management Plan. Please refer to chapter one of this plan for a description of this framework that is common to all alternatives. For additional resources and information related to the visitor use management framework, as well as information on the Interagency Visitor Use Management Council guidance, please visit: https://visitorusemanagement.nps.gov/.

As noted previously, visitor use management is the proactive and adaptive process of planning for and managing characteristics of visitor use and its physical and social setting, using a variety of strategies and tools to sustain desired resource conditions and visitor experience. Visitor capacity is a component of visitor use management and is defined as the maximum amount and types of visitor use that an area can accommodate while sustaining desired resource conditions and visitor experiences (i.e., goals and objectives for this plan), consistent with the purpose for which the park unit was established. The identification and implementation of visitor capacities ensures that these desired conditions are met. Additionally, supporting management strategies can then be selected and implemented to maintain desired resource conditions and visitor experiences that are consistent with the purposes for which the park was established.

In some areas of the National Riverways, the current levels and patterns of visitor use are causing negative impacts on visitor experiences and resources and influencing the ability of the National Park Service to maintain desired conditions. By identifying and implementing visitor capacities, the National Park Service can also help ensure that resources are protected and that visitors have the opportunity for a range of high-quality road and trail experiences. The National Park Service is legally required to complete general management plans that include: identification of and implementation commitments for visitor carrying capacities for all areas of the system unit (54 USC 100502), as outlined by the 1978 National Parks and Recreation Act.

The general management plan included a list of indicators and standards (referred to as thresholds in this plan) including: percent of facilitated interpretive contacts per year regarding programs, demonstrations, and activities; number of campers on gravel bars designated for camping; density of parked cars at visitor-created river crossings and access points; the number of watercraft on the riverways; and the number of citations related to inappropriate behavior. The general management plan noted, “some of the indicators and standards are more directly tied to helping the National Park Service address visitor capacity. These indicators include numbers of campers on gravel bars designated for camping, density of parked cars at visitor-created river crossings and access points, and number of watercraft on the riverways. These indicators and standards directly inform management of the kinds and amounts of use that can be accommodated in different areas of the park while maintaining desired conditions. Further guidance for addressing visitor capacity will be found in subsequent implementation level plans that have a significant visitor use management component. These types of plans may include trails and camping management plans, site plans, and commercial services plan, amongst others. (GMP 200, pg. 99)”. The roads and trails plan contributes to meeting this legal requirement by providing additional detailed direction and analysis for visitor capacity that is consistent with the park’s general management plan.

PROCESS FOR IDENTIFYING VISITOR CAPACITIES

The approach for identifying visitor capacities is based on the Interagency Visitor Use Management Council's (IVUMC) Visitor Use Management Framework, Visitor Capacity Guidebook: Managing the Amounts and Types of Visitor Use to Achieve Desired Conditions and associated publications and is consistent with the literature and best practices on this topic. Further, the identification of the visitor capacities were informed by 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 four key guidelines: (1) determining the analysis area, (2) reviewing existing direction and knowledge, (3) identify the limiting attribute, and (4) identifying visitor capacity.

Guideline 1. Determine the Analysis Area.

Ozark National Scenic Riverways Context. The amount, timing, distribution, and types of visitor use at Ozark National Scenic Riverways influence both resource conditions and visitor experience. Currently, there is high demand for recreational opportunities in the park, particularly during summer and fall. Different user groups visit the park at different points throughout the season, with some overlap in the summer months. The primary activities for visitors using roads and trails at Ozark National Scenic Riverways are hiking, horseback riding, bicycling, ATV/UTV riding, and hunting. Also, many visitors use the park's roads and trails to access areas for water-based activities such as boating, rafting, canoeing, gigging, and fishing. Since the scope of the plan is to address the management of roads and trails, the primary user groups that are included in this capacity analysis are the horseback riders, bicyclists, hikers, and ATV/UTV riders. Further guidance for addressing visitor capacity can be found in subsequent implementation level plans such as site plans, commercial services plan, and revised river management plan, amongst others.

Currently, there are a complex mix of both designated and undesignated trail corridors and public use areas throughout the Riverways. Some of these designations (or the lack of) and subsequent uses are impacting park resources, the quality of visitor experience, and also visitor safety. This plan and identification of the visitor capacity is needed to better manage and protect the park through the identification of an authorized system of roads, trails, and river access points and meet the legal requirement. Using the US Forest Service Trail Assessment and Condition Survey (TRACS), the park has determined the designations and classifications of the designated trails. Although, the trail designations dictate trail management more than the use levels, the trail designations were considerations throughout this visitor capacity process.

Following guidance from the IVUMC, the level of analysis that occurs during visitor use management planning and visitor capacity identification process is determined on a sliding scale depending on the complexity and context of the plan. A higher level of analysis is necessary for some key locations due to the type and complexity of visitor use issues present as well as determinations that visitor use is near, at, or slightly above appropriate use levels. For these locations, a detailed analysis has been conducted to determine the appropriate level of use. For each key location, an overview of the setting, relevant indicators, visitor use issues, current use levels, and visitor capacities are described. For the other locations, desired conditions are largely being met and current use levels are sustainable and not resulting in impacts of concern. In these areas, a lower level of analysis for identifying visitor capacity has been applied.

Six analysis areas at the National Riverways have been identified in the plan that currently are experiencing levels of use that are near, at or slightly above use levels that require more detailed visitor capacity analysis and determinations. Future monitoring of use levels and indicators will inform the National Park Service if visitor capacities are encroached. If so, adaptive management strategies as outlined in this plan would be taken.

1. Nichols Cabin (including the Flying W Area)
2. Alley Spring Trails
3. Rocky Falls
4. Big Spring Historic Zone
5. Round Spring Trail
6. Two Rivers Area

In addition to these analysis areas, visitor capacities have also been identified for a number of "other areas" such as Anglers' Trail near Montauk, Cave Spring Trail, Pulltite Trail, Jam Up Cave Trail; Welch Spring, Blue Spring Trailhead and Picnic Area, and Roberts Field.

The general management plan addressed the water visitor capacity as well as visitor capacities at gravel bars. In this roads and trails plan there are a number of recreation sites, 96 in alternative A, 94 in alternative B, and 95 in alternative C. A majority of these sites are primarily accessed by water or their primary use is to provide access to water. Therefore, the visitor capacities are addressed in the GMP watercraft visitor capacity. There are three sites that are not primarily accessed by water or primarily providing access to water. Those sites are: Klepzig Mill Day Use Area; Lost Man Ridge Primitive Area; and Cave Spring Day Use Area. Visitor capacities have been identified for these sites in the "other areas" section of this appendix as well. The visitor capacities for the sites are pedestrian only therefore no equestrian or bicycling capacities were identified. Also, all of these sites are retained in both action alternatives so the visitor capacity is consistent across both action alternatives. Further, Broadfoot and Shawnee Staging Areas are also recreation sites identified in appendix E that do not provide access to water or are primarily used to access the water. However, Shawnee and Broadfoot Staging areas are included in the Two Rivers Analysis Area.

A visitor capacity for ATV/UTV use was also identified; however, as riders are using the roads for scenic riding and not always accessing key park destinations, the visitor capacities were identified for each district (i.e., Upper Current, Middle Current, Lower Current, and Jacks Fork).

Further, scenic driving with vehicles is also a common visitor activity at Ozark National Scenic Riverways. Most scenic drivers stop at one or more locations throughout the park have been included in the visitor capacities that have been identified by site. The site-based capacities will guide management of the amounts and types of use for the various roads that access these sites, so no further capacities have been identified.

Finally, as the park monitors the indicators and standards in the general management plan and the indicators and thresholds included in appendix F, the visitor capacities could be adjusted to protect resources and maintain desired conditions.

Guidelines 2 through 4 are discussed under each analysis area with location-specific information.

Guideline 2: Reviewing Existing Direction and Knowledge. The planning team reviewed desired conditions and indicators and thresholds, with particular attention to conditions and

fundamental resources and values that must be protected and are most related to visitor use levels. Desired conditions for Ozark National Scenic Riverways can be found in chapter one. Below, under each key area relevant indicators are listed with the associated thresholds. An overview of visitor use issues and current use levels is also provided for each key area. Current use levels have been informed by relevant data and studies. Actions contained in each alternative were also considered as part of the visitor capacity identification process. Some management actions seek to resolve current visitor-caused impacts and therefore allow for higher use levels as part of the capacity identification.

In addition to previous planning and guidance, relevant research also informed the visitor capacity analysis. Some of these studies or reports are described below.

Trail Rider Counts and Surveys: Lower Jacks Fork River Area (Chilman and Vogel 2001). In 2001, Dr. Kenneth Chilman from the Department of Forestry at Southern Illinois University and James Vogel from Colorado State University released a report regarding trail rider counts from the Lower Jacks Fork River area in the park. Chilman and Vogel (2001) noted that use had increased since the 1984 General Management Plan. This report also noted horse ridership along trails had increased from a few hundred in the early 1980s to approximately 3,000 during special event trail rides in August and October of 2000. Of those surveyed for the study, clear rivers and the beauty of the area were features riders liked about the area; 9% of riders surveyed in this study reported no problems, 9% had issues with other visitors/riders. Trail signage was the most commonly cited trail improvement that could be made to improve trail conditions. Chilman and Vogel (2001) found that not all riders who visit Cross Country Trail Rides (CCTR) go out for trail rides each day. For example, while 3,000 riders can be present at CCTR for a trail ride, the highest number of riders that Chilman and Vogel (2001) noted was 1,384 on October 2, and 1,346 on June 6. Chilman and Vogel (2001) noted that the average group size was eight; 25% of the groups contained 10 or more riders, and riders spent an average of approximately 5 hours on trails. In addition, 89.6% of those surveyed had been to a CCTR trail ride more than three times. The results from the 2001 Chilman and Vogel (2001) are consistent with recent research conducted by Kansas State University. Chilman and Vogel (2001) also counted riders on trails and it is notable that rider numbers on park trails were significantly lower than the number of riders that left CCTR. Chilman and Vogel (2001) did not count visitation on all park trails, but based on the question related to where riders went during their visit, horse riders are also visiting nearby private and state lands.

Assessment of Visitor-Related Impacts and Potential Management Strategies at Ozark National Scenic Riverways. In 2011, researchers from the College of Agricultural Sciences of Southern Illinois University conducted an assessment of visitor related impacts and potential management strategies at the park. Collecting data in June and August 2010, their research related to equestrian use in the park was included in this analysis (Park, Chilman, and Seekamp 2011). In the areas of the park that were surveyed, the report identified 88 miles of undesignated or visitor-created horse trails. This is four times the size of the formal trail network. The researchers noted that the informal trails typically followed ridgelines, roads and riverbanks and also double track road grades. This study evaluated the informal trails by condition class (see table C-1). Note: 29.8% of the total trail mileage was classified as condition class 4 and 5, which pose a danger to equestrian users via loose, wet soil and cobble-size loose rock in steep slope areas. Condition class 4 and 5 also cause serous resource impact. Their research identified lightly impacted trails as areas that could typically recover to natural conditions in less than a decade if effectively closed to use. This study also suggested 209 segments, approximately 32 miles of the informal trail network, that could be included in the formal trail system based on their usual slope, trail slope alignment, landform position, safety, substrate, and other factors.

This research also conducted river use count data that was not used for the capacity analysis for this plan.

TABLE C-1. INFORMAL HORSE TRAIL EXTENTS BY CONDITION CLASS

Condition Class	Miles
0- Barely visible	1.1
1- Continuous loss of vegetation	7.8
2- Loss of organic matter	28.1
3- Continuously bare soil	16.8
4- Isolated erosion sites	13.0
5- Gully erosion	9.4
Total informal trail	**88.1**
Total formal trail	**23.5**

Source: Table from park et al. 2011

Monitoring Horseback Riding Use and Understanding Visitor Perceptions of Current and Proposed Conditions at Ozark National Scenic Riverways. Kansas State University (KSU) worked with Ozark National Scenic Riverways to collect important visitor use data for many of the key locations from this capacity analysis. KSU collected data from October 1–10, 2015, and for select dates in April through October of 2016. The focus of the data collection efforts was to determine levels, types, patterns, and impacts of visitor activities along trails in Ozark National Scenic Riverways. Results from this research were used to inform the visitor capacities identified below. Some key findings included the majority of visitors surveyed were repeat visitors; horse riding, camping, and visiting historic sites were the three most reported activities, and visitors generally rank the quality of their visit to the park as high.

Additional Relevant Research and Data. In addition to the Chilman and Vogel (2001), Park, Chilman, and Seekamp (2001), and KSU (2017), the National Park Services visitation data is collected annually to track levels of visitor use parkwide. Park staff also collected a sampling of use level data related to ATV/UTV use in the fall of 2018 through early 2019. Research related to natural and cultural resources was integrated into the capacity determination as well as professional judgment. For example, the Horse Trail Archeology at Ozark National Scenic Riverways informed the capacity analysis. This archeological survey of horse trails in the Two Rivers area documented the extent of disturbance to archeological sites and trail conditions (NPS 2012). *Research for the Development of Best Management Practices to Minimize Horse Trail Impacts on the Hoosier National Forest* also informed this capacity analysis. The project team also consulted with the Missouri Department of Natural Resources, the US Forest Service, and managers of the Ozark Trail Association to understand use levels in the surrounding or nearby areas.

Guideline 3: Identify the Limiting Attribute. Guideline three requires the identification of the most 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 analysis area. This is an important step given that an analysis area could experience a variety of challenges regarding visitor use issues. In the cases where the limiting attribute is directly related to an indicator, then the threshold (as the minimally acceptable condition) is used as the primary (but not necessarily only) attribute used to identify the maximum kinds and amounts of use. This section also includes a list of other related indicators.

The indicators described above are not currently limiting attributes, however, the monitoring of these indicators could include management decisions in this area to protect resource conditions that are related to the identified limiting attribute. For example, trail width may not currently be the limiting attribute for an area, but trail width thresholds could be exceeded before use level thresholds such as encounter rates are exceeded. Therefore, understanding all the potential limiting attributes for an area is an important component of this analysis.

Guideline 4: Identify Visitor Capacity. Based on the analysis described (from guidelines 1–3), a visitor capacity has been identified for the maximum number of visitors that can be accommodated at each key location to ensure protection of desired conditions. Given the influence of the management actions in the alternatives on the assessment of visitor capacity, the visitor capacities may vary between the alternatives depending on the management strategies of that individual alternative. Common to all alternatives would be the discretion of managers to close trails during times of flooding and muddiness. At that time, trail closures would null the visitor capacity in all alternatives (Compendium Section 1.5 General Public Use(a)).

Overnight use, specifically, camping is mentioned throughout this capacity determination as a potential input of visitors on trails. These visitors were considered but were not assigned a specific allocation. The number of campsites and overnight facilities is not being managed or modified in this document and therefore are not included in this capacity analysis. The current number of overnight opportunities will be maintained in this plan.

Methodological Considerations

To identify the appropriate amount of use at one time or per day at key locations, a variety of data were reviewed to understand current conditions and then compared to desired conditions. Included in this mix of data are annual visitation numbers, permits, parking availability, trail counters, and other pieces of information such as average duration of visit. For example, the park assumes that the average horseback rider spends approximately 2 hours in the park whereas the average canoer spends 5 hours (IRMA 2017). The park also assumes that the average person per vehicle (PPV) ratio is 2.3 (IRMA 2017). Indicators and thresholds were developed to be responsive to current and future conditions and monitoring would track changes over time. For instance, if visitors began carpooling and traveling with on average more than 2.3 PPV the park would rely on the indicators and thresholds to ensure desired conditions are being maintained. If monitoring data suggests visitor use is exceeding the thresholds and visitor capacities identified in this plan, the park could implement adaptive management strategies to manage visitor use at key and other locations or the park could adjust the visitor capacity. Based on these data collection efforts, visitor capacities, in most cases, will be based on daily visitation numbers, and will be represented as people at one time (PAOT) which can be easily monitored in the future.

ANALYSIS AREAS

Nichols Cabin (including the Flying W Area)

Guideline 2. Review Existing Direction and Knowledge.

Location Overview— The Susie Nichols Cabin Trail sits on the western side of the northern portion of the Upper Current River. This popular 0.6-mile trail is situated on a historic dirt road that now serves as a popular hiking and equestrian route. The Nichols homestead is a cultural landscape typical of historic Ozark lifeways, listed in the national register, and was the home of Susie Nichols until her death in 1959.

The structures are representative of the Ozarkian vernacular architectural style and the Scotch-Irish cultural presence. The Susie Nichols Farm District, including: house, barn, corn crib, associated landscape features, and refuse dump are intact. The characteristics of the vernacular architecture have been preserved, as have the original design and substantially the original materials, the district's feeling in its remoteness and sense of completeness, the historical association to the Scotch-Irish family that owned it throughout its entire use, the association to the great Ozark timber era, and the unencroached upon setting of the site.

This analysis area also includes the Flying W area. The Flying W site is a high use recreational area as people enjoy both river and land activities in this area, including camping, fishing, picnicking, hiking, and horseback riding. The park will implement the decision for the Flying W Vicinity Environmental Assessment that was completed in 2007. This will include providing vehicle access to the northern end of Flying W for day-use activities. The site will include an eight-car gravel parking lot and 500-foot walking trail to the bluff's gravel bar at the north end of the site. It will also include a new 0.9-mile horse trail on the bench, which will replace the existing unmaintained road along the river as a means of equestrian access. No restrooms will be constructed. Flying W is in the resource based recreation zone where visitors have opportunities to participate in a range of recreational, interpretive, and educational opportunities. Visitors will experience a mostly natural setting.

Current Equestrian Use Levels— According to KSU trail counts, there were a total of 257 equestrian trail users at Nichols Cabin during the seven separate sampling periods. This number includes equestrian use on both weekends and weekdays. October of 2015 was the busiest sampling period with 94 horse riders counted during the 10-day sampling period. This sampling period occurred during a trail ride, although this area is not nearby the trail ride departure area it may still see increased use during these events. See table C-2 below for additional total number of horse riders in the Nichols Cabin area from the KSU report (KSU 2017).

TABLE C-2. HORSE RIDER DATA BY LOCATION: NICHOLS CABIN

KSU Sampling Period	Total Number of Horse Riders
October 1–10, 2015*	94
April 21–24, 2016	41
May 23–26, 2016*	57
June 13–16, 2016*	17
July 13–16, 2016	8
August 3–6, 2016*	0
September 2–5, 2016*	31
October 1–4, 2016*	9

*Indicates sampling period that occurred during a trail ride.

According to KSU research, use at Flying W varied throughout the year, the highest amount of equestrian use occurred in April. Park staff have seen increased use in the summer and suspect there is also high visitation during the month of June. At high use times the facilities at this site are operating at full capacity; for instance, the unmaintained parking area is full and visitors resort to parking along the road. A small amount of additional use at the Flying W site can be

attributed to trail users accessing the site from other areas. Between April and July, a total of 45 equestrian trail users were counted, with an average of 5.6 riders per day (see table C-3). The average group size for equestrian riders was 2.88.

TABLE C-3. HORSE RIDER DATA BY LOCATION: FLYING W

Month (Data collection period)	Total Number of Horse Riders	Average Group Size
October 2015*	90	2.6
April 2016 (4 Days)	32	8
May 2016* (4 Days)	0	0
June 2016* (4 Days)	3	1.5
July 2016 (4 Days)	10	1.7
August 2016* (4 Days)	0	0
September 2016* (4 Days)	20	6.7
October 2016* (4 Days)	0	0
Total	65	2.56

*Trail rides are indicated by an asterisk

Other Use. According to KSU's report, 63% of people had rated the acceptability of encountering hikers on the trail as no impact and 27% had an extremely positive impact. Of those surveyed at Nichols Cabin (N=23), only one person identified hiking as their primary reason for being in the area.

Overview of Visitor Use Issues— The popularity of Nichols Cabin has increased in recent years but use levels are generally moderate at this site. There are multiple visitor-created trails in the area and these are mainly used by horseback riders. The main two-track trail to the cabin is not maintained by the National Park Service and shows evidence of heavy horse and motorbike traffic (NPS 2012). Some unauthorized trails use hiking trails, two-track roads, and other pathways while others are opportunistic visitor-created trails that connect established features (NPS 2012). There are no authorized horse trails in this area, however, the trail conditions in this area are in worse condition than the authorized and unauthorized trails in the Two Rivers area (NPS 2012). The most badly eroded sections of unauthorized trails are old two-track roads, where downslope water movement has removed sediments from the surface exposing rocks and cobbles and creating gully systems (NPS 2012). Horse use on the two-track trail approaching the cabin is adversely impacting archeological resources as erosion exposes the archeological resources that are near the surface. In addition, visitors seeking opportunities for close cabin viewing can result in erosion and incision around this historic structure. There has also been some vandalism on the historic cabin and the fence, as well as destruction to the barn and fence from horses chewing on the wood.

In the Flying W area, an increase in use and a lack of defined roads, trails, and parking areas is having a negative impact on the natural vegetation and cultural resources of the area. Currently, there are no designated equestrian trails in the area but there are an abundance of undesignated trails. Human and animal waste are also abundant, leading to foul odors in some areas. Other unregulated visitor uses in the area have led to a "party" atmosphere and have contributed to user conflicts. Other user conflicts occur due to people vying for limited space during peak times.

Guideline 3. Identify the Limiting Attribute. The limiting attributes related to visitor capacity of this area relate to cultural and experiential resource considerations. The desired

condition for this zone suggests solitude, contemplation, and self-reliance and evidence of human use would be limited. Managing visitor use levels in this area could prevent additional erosion and damage to the important cultural resources. Similarly in the Flying W area, an increase in use and a lack of defined roads, trails, and parking areas are having a tremendous impact on the natural vegetation and cultural resources of the area.

- Relevant indicators trail condition as reflected by trail width and trail incision
- Number of incidents of reported theft and intentional vandalism to cultural sites and historic properties
- Number of undesignated (visitor-created) trails per mile of designated trail
- Encounter rates on trails

Guideline 4. Identify Visitor Capacity. Discussions surrounding desired conditions and indicators and thresholds concluded that the amount of trail erosion and incision in the Nichols Cabin area is currently unacceptable and would be addressed by the actions in this plan; however, the current levels of use on trails are not particularly high. The management strategies being considered in the action alternatives (e.g., new designated equestrian opportunities), would support sustained or increased use (depending on alternative) and sufficiently improve resource conditions.

Alternative B— Management strategies under this alternative would improve resource conditions and enhance the riding experience at Nichols Cabin. To accomplish this, a total of 49.5 miles of new trail inside and outside the park jurisdictional boundary would be available, including 23.5 miles of new trail for equestrian and pedestrian use. NPS staff would assess and implement appropriate drainage techniques to reduce erosion. NPS staff would also consider hardening the area closest to the cabin to prevent continued damage to the historic structure. These strategies would allow current use levels to be increased because of more sustainable trails and improved resource conditions.

Pedestrian Use— Current use levels could be increased under this alternative because there would be newly designated trails in the area and resource conditions would be improved. The Nichols cabin and Flying W areas could accommodate more visitors and would encounter fewer visitors as more trails would disperse visitors south toward Cedar Grove. The parking area in the Nichols Cabin area would remain the same; however, visitors may access the trail network from the staging area in the Welch Landing area. Because of the new trail opportunities that are in both the natural and resource based zone, 28 visitors at one time could disperse north towards the Nichols Cabin area and an additional 28 visitors at one time on the trail that travels north from Cedar Grove. A total of 56 visitors at one time would be consistent with desired conditions of the zone and protective of resources. The encounter rate along the trails for this zone is no more than eight people encountered every hour. The visitor capacity would be protective of this desired condition as under this alternative there would be 49.5 new miles of trails within and outside the park jurisdictional boundary with the average hiking speed of two to three miles an hour it is unlikely that visitors would encounter more than eight other visitors and therefore exceed the threshold.

Equestrian Use— The total 23.5 miles of formalized equestrian/pedestrian trails to Nichols Cabin, Flying W and also to Cedar Grove picnic and camping area could accommodate increased equestrian use for a total of 16 riders on the designated trail system at one time. During especially wet times of the year this capacity could be decreased, adjusted, or trails could be closed to protect trail conditions and resources. Equestrian riders and pedestrians would share the trails in this area. While most horseback riders would begin their rides and access the

park from outside the park boundary using county or NPS roads, the majority of equestrian use would occur on designated park trails under alternatives B and C. For this reason, visitor capacities have been provided for equestrian use on park trails only. Equestrian riders travel slightly faster than pedestrians and are also considered within the encounter rate indicator and threshold.

Bicycle Use— Under this alternative there would be no change to allow bicycle use on any designated trails in the Nichols Cabin area. Therefore, no bicycle capacity is needed for this area.

Alternative C— Management strategies under this alternative would improve resource conditions and enhance the riding experience at Nichols Cabin. To accomplish this, a total of 58.5 miles of new trail would be maintained by park staff and volunteers, not all of these trail miles are in the Nichols Cabin area. The 29 miles of new equestrian and pedestrian trails are in the Upper Current, Nichols Cabin, and Flying W area. NPS staff would assess and implement appropriate drainage techniques to reduce erosion. NPS staff would also consider hardening the area closest to the cabin to prevent continued damage to the historic structure. If the trails were hardened, the park has determined that an increased level of use both equestrian and pedestrian could be accommodated. The new opportunities west of the river also provide increased trail mileage and connect to the Akers area.

Pedestrian Use— With more trail miles for equestrian/pedestrian trails the visitor capacity would be increased and still meet desired conditions. In addition, part of the new trail system in the Nichols Cabin area will be in the resource based recreation zone which has a higher encounter rate threshold. The visitor capacity for pedestrian use in the Nichols Cabin and Flying W areas would remain 28 visitors at one time. The visitor capacity for the new trails in the Cedar Grove area would be 56 visitors at one time. With the additional access point for pedestrian and equestrian users, and an increased number of equestrian visitors at Welch Landing, visitors would likely disperse and the visitor use in this area would be consistent with desired conditions.

Equestrian Use— Under this alternative, the additional miles of designated equestrian/pedestrian trails would be in the area and provide an increased number of water crossings. With new opportunities for visitor use to disperse and the density of horse riders to decrease in specific areas, it has been determined that the area could accommodate an increase in equestrian use of up to 25 riders on the trail at one time. Water-based recreation use was also a consideration as these user groups are more likely to encounter each other under this alternative. During especially wet times of the year this capacity could be decreased, adjusted, or trails could be closed to protect trail conditions and resources. While most horseback riders would begin their rides and access the park from outside the park boundary using county or NPS roads, the majority of equestrian use would occur on designated park trails under alternatives B and C. For this reason, visitor capacities have been provided for equestrian use on park trails only.

Bicycle Use— Under this alternative, there would be no change to allow bicycle use on any designated trails in the Nichols Cabin area. Therefore, no bicycle capacity is needed for this area.

Alley Spring Trails

Guideline 2. Review Existing Direction and Knowledge.

Location Overview— The Alley Spring and Mill is six miles west of Eminence, Missouri, on the Jacks Fork River and was a home, farm, and school for people who lived in the area over a century ago. The present building was constructed during 1893–1894 and sits on the original mill site. Two easy, designated hiking trail loops offer views of the mill along with interpretive waysides, access to Alley Spring, and a variety of natural scenic opportunities such as small caves and pine forest ridges. The 2014 General Management Plan designated this area as a developed zone, with surrounding lands designated as a natural zone. As such, visitors to this area should have opportunities to understand the park through a wide range of interpretive facilities and services, interact with other visitors and park staff, and recreate in an environment that is supported by a variety of visitor services. Visitors would experience a modified natural environment with developed visitor facilities for orientation; day and overnight use would concentrate most of the park's visitors in these areas. They would also have a high expectation for quality visitor services and facilities including orientation and interpretive programs, signs, wayside exhibits, developed campgrounds, contact stations, commercial operations, convenience stores, dining, and shuttle services. The large portion of visitors (45%) surveyed (N=968) at Alley Spring felt the area was not crowded (KSU 2017).

Trail Condition— In April 2017, a major flooding event occurred causing damage to many trails in the Alley Spring area. This area is prone to flooding and many of the trail segments experience damage from flooding, seepage, and have drainage issues. The Spring Branch Trail often experiences water saturation but was built on bedrock so it receives less water damage, except in uneven areas. The little loop that loops around pedestrian bridge washed away during floods. Previously, visitors could go around the spring to the parking lot. Currently, visitors have to go out to the spring and then double back. The overlook trail often has gravel and sediment buildup along the trail. The April 2017 flood caused a lot of damage to the Overlook Trail (such as rocks) and have become unstable in the Overlook section. Alley Spring park staff have also noticed an increase in visitor-created trails branching off the Overlook Trail and the Spring Branch Trail where visitors may attempt to explore caves.

Current Equestrian Use Levels— Opportunities for equestrian use at Alley Spring includes the park- and county-administered roads only. Equestrian riders come to Alley Spring via county roads and are not permitted to ride on the hiking trails near Alley Spring. They tether at hitching posts along the county road and are then able to hike the trails around Alley Spring. According to the KSU report in October 2015, the average group size at Alley Spring was 4.49 riders with a total of 347 riders over a 10-day period, for an average of 35 riders per day on county roads.

TABLE C-4. KSU HORSE RIDER USE AT ALLEY SPRING ALONG COUNTY ROADS

Month	Total Number of Horse Riders During Data Collection Efforts	Average Group Size
October 2015 (10 days)*	347	4.49
April 2016 (4 days)	10	1.5
May 2016 (4 days)*	0	0
June 2016 (4 days)*	132	4.86
July 2016 (4 days)	0	0
August 2016 (4 days)*	49	2.04
September 2016 (4 days)*	92	3.29
October 2016 (4 days)*	338	5.18

Source: Trail rides are indicated by an asterisk (KSU 2017, pg. 33).

Other Use— It is estimated that levels of hikers have remained fairly consistent over the years according to parking lot and traffic counter information. Alley Spring Campground has 146 family sites that can accommodate a maximum of six persons, for a total of 972 people that could be day users. There are 14 group sites that can accommodate 7 to 25 people. There are also three group sites that can accommodate from 7 to 45 people, resulting in up to 135 people that could be day users. Visitors staying at the campgrounds may access without using parking spaces; however, the visitors are not included in the visitor capacity identification below under trail access but were considered as an additional input of visitors. According to the KSU study, overall encounters with hikers had no impact at Alley Spring on visitors' experience (62%); in fact, 19% had an extremely positive impact on other visitors' experience.

Overview of Equestrian Use Issues— Alley Spring continues to be one of the most popular destinations for equestrian use in the park. The desire to see Alley Spring and Alley Mill and also to learn about the history of the place and the heritage of the area draws people to this part of the park. Trail use in the vicinity of Alley Spring is permitted on park- and county-administered roads only. However, there are visitor-created trails and spurs that connect to destinations on adjacent lands as riders try to loop back to where they originated, rather than riding back toward Eminence along park or county roads. Horseback riders often use undesignated trails in this area. According to KSU research, Alley Spring is the third-most used site for equestrian use in the park in terms of total number of horse riders per site (KSU 2017).

Other Use— Use of designated trails by hikers during wet periods leads to trail erosion and widening. There has been an increase in the creation of undesignated trails off designated pedestrian trails.

Guideline 3. Identify the Limiting Attribute. The limiting attributes of this area relate to a variety of natural and experiential resources, including visitor safety. This area is already highly developed and oftentimes crowded. Visitors currently see more visitors than the established encounter rate threshold in the direct vicinity of Alley Spring and Alley Mill; however, it is likely that visitors are also expecting to see more people in this area. Many visitors do not travel onto trails and so trail experiential conditions remain mostly in accordance with the encounter rate threshold. There are, however, continuing resource concerns on the trail around the spring branch and around the spring pool and a number of undesignated trails continue to be used. In addition, visitors continue to climb in and around the caves and bluff area on the lower section of the trail creating visitor safety concerns. Also, trail conditions during weather events when visitor use has continued has created many natural resource concerns.

Relevant indicators:

- Trail condition as reflected by trail width and trail incision
- Number of incidents of reported theft and intentional vandalism to cultural sites and historic properties
- Number of undesignated (visitor-created) trails per mile of designated trail
- Encounter rates on trails

Guideline 4. Identify Visitor Capacity. Alternatives B and C: Management strategies under these alternatives would improve resource conditions and enhance the hiking experience at Alley Spring. Because no actions differ between action alternatives in this area, the pedestrian, equestrian, and bicycle capacities are the same for both action alternatives.

Pedestrian Use— Currently, up to 366 people can be in the Alley Spring area at one time. Many visitors to this area remain near the parking area and are not exploring trails. The encounter rate indicator for this zone is still protective of desired conditions for the developed zone. Current use levels would be maintained and monitoring encounters on trails would ensure that desired conditions on trails are maintained. Visitor capacity in the Alley Spring trails would be 400 people at one time. This visitor capacity has carried forward the assumption that many of the visitors in the Alley Spring area remain near the parking area and are not on trails. The encounter rate indicator and threshold would inform future management of this area.

Equestrian Use— No equestrian capacity is necessary for this analysis area because equestrian use is permitted on county roads only in this area and the National Park Service does not manage county roads.

Bicycle Use— Under these alternatives, there would be no change to allow bicycle use on any designated trails in the Alley Spring area. Therefore, no bicycle capacity is needed for this area. Biking would continue to be allowed on park roads

Rocky Falls

Guideline 2. Review Existing Direction and Knowledge.

Location Overview— Rocky Falls can be visited year-round. It is on Route NN, off Route H, east of Eminence and Winona. It has a walking trail, restrooms, picnic tables, and fire grills. A short trail links to the Ozark Trail and brings visitors from a picnic area to the falls. During the spring and summer, this wide cascade of water puts on a beautiful display over a pink and purple porphyry igneous rock (containing large-grained crystals) formation. Rocky Falls is in the natural zone; however, a majority of the trail is in the resource-based recreation zone, where more services are provided. The natural zone includes opportunities for visitors to encounter intact natural resources, features, and systems for personal inspiration, education, and recreation. Visitors will also have opportunities for solitude, contemplation, and self-reliance, and evidence of human use will be limited. The resource-based recreation zone includes opportunities for visitors to participate in a range of recreational, interpretive, and educational activities. This zone indicates that visitors would experience a mostly natural setting where some visitor services are available.

The Klepzig Mill area is near Rocky Falls and has two parking spaces available that, on average, can accommodate five people. The Klepzig Mill Day Use Area has been separated out as an other area and visitor capacity was identified separately.

Current Use Levels— Rocky Falls is popular with people picnicking and hikers, particularly those interested in natural features and visiting the falls. The Rocky Falls area connects to the Ozark Trail, a 230-mile trail that runs throughout the Missouri Ozarks. Many visitors to this area are interested in visiting Rocky Falls and/or connecting with the Ozark Trail. There is also a Rocky Falls to Klepzig Mill Trail in this area that connects visitors to the Ozarks Trail. The traffic counter at Rocky Creek estimates the most use to the area occurs between June and October. Since 2007, the average number of visitors per month from July and October was approximately 1,600 (IRMA 2017).

Currently, summer months receive the highest visitation at Rocky Falls. The most use occurs in the first 0.25 mile of the trail to the falls because hiking use of the trail past the falls is low overall. A majority of visitors are hiking to Rocky Falls (150–200 people per day on the trail), then setting up tents and swimming in the falls. Visitors are likely attracted to this area because they are able to swim in the falls area. There is not a strong current here, the water is warmer than in other areas, and the scenery is compelling. In the summer of 2018, park rangers observed daily use levels on Mondays and Fridays (see table C-5). The number of visitors ranged from a low of 46 visitors on Monday, June 25 to a high of 190 visitors on Monday, May 28. A majority of these visitors were observed around the Rocky Falls area or hiking to the top of the falls.

TABLE C-5. NUMBER OF VISITORS OBSERVED AT ROCKY FALLS DURING SUMMER OF 2018

Date	Number of Visitors Counted
Monday, May 28	190
Friday, June 1	122
Monday, June 6	118
Friday, June 8	49
Monday, June 11	115
Friday, June 15	131
Monday, June 18	62
Friday, June 22	144
Monday, June 25	46
Monday, July 2	139
Friday, July 6	152
Monday, July 9	111
Friday, July 13	81
Monday, July 16	136
Friday, July 20	176
Friday, July 27	120
Monday, July 30	106
Friday, August 3	58
Monday, August 6	55
Friday, August 10	52

KSU reported a total of 16 hikers during the April collection effort (four days) and a total of 20 hikers in September during the four-day data collection effort, ranging from an average of one to five visitors per day. KSU reported a total of 41 hikers in the area in October (10-day sampling

period). There were no hikers counted during the KSU collection period in June; this is likely due to the location of the researchers. The parking area at Rocky Falls is currently undefined, so the number of vehicles able to park here varies. It is estimated that approximately eight vehicles can park in this location at one time; however, many more than eight vehicles actually park here and line up on the side of the road. When the persons-per-vehicle factor (2.3 ppv) is applied, this translates to approximately 18 people at one time that are able to enter the site through the undefined parking area.

A much smaller number of visitors tend to hike to the Ozark Trail from there. Because Rocky Falls is connected to the Ozark Trail, and some people may use this site for longer distance hiking or to connect to other locations such as Klepzig Mill, it is estimated that an additional two people at one time are likely to be at the site or in the area during peak use times and while connecting to other trails.

Equestrian use is not permitted in the Rocky Falls area.

Overview of Visitor Use Issues— Currently, the undesignated parking area at Rocky Falls is insufficient for busy summer weekends. On many weekends visitors are parking along the road in unauthorized areas. The high visitation during summer results in excessive trash. The restroom facility is insufficient to handle the high number of visitors. There is a need for better trail delineation to reduce the potential for undesignated trails, while being mindful of Stegall Mountain Natural Area stewardship.

There is a 0.5-mile spur trail that leads to the Current River section of the Ozark Trail. It is used by hikers connecting to Klepzig Mill in one direction. Trail users have difficulty navigating trails due to the lack of signage. Hikers can also access Stegall Mountain and Peck Ranch Conservation Area using this spur trail, both of which are not in the boundaries of the park. The spur trail receives heavy usage by hikers, but the trail remains in good condition. Visitor-created camps and firepits have been established along this trail and need to be monitored.

Guideline 3. Identify the Limiting Attribute. The limiting visitor capacity of this area relates to a variety of natural and cultural resources. Currently, the facilities provided at this site are consistent with the desired conditions of the zone; however, they are quickly being outpaced by visitation. Rocky Falls is in the natural zone and near the resource-based recreation zone where more services are provided. Current conditions are not consistent with the desired conditions for the natural zone. This zone indicates that visitors would experience a mostly natural setting where some visitor services are available. The trails from the top of the falls to the bottom are receiving a lot of traffic and there continue to be safety concerns as visitors seek additional opportunities.

Relevant Indicator— Encounter Rates on Trails (natural zone and resource-based recreation zone).

Guideline 4. Identify Visitor Capacity.

Both Action Alternatives—

Pedestrian Use— Rocky Falls is seeing increasing use in areas that are already experiencing high use. The visitor capacity for pedestrian use for all alternatives would be 56 visitors at one time at each site in this area. The park will continue to monitor indicators and thresholds and collect additional data, as needed. Further, the park will increase outreach and education to visitors about trail etiquette and visitor safety in and around the falls area.

Equestrian Use— No equestrian use is permitted in this area and thus no capacity determination was necessary.

Bicycle Use— No bicycle use is permitted in this area and thus no capacity determination was necessary.

As noted in the reasonable past, present, and foreseeable future actions, a planning effort for the Rocky Falls area will be undertaken. That plan will evaluate options for redesigning and improving the heavily used and impacted Rocky Falls area. The park will explore a variety of future resource protection and visitor management strategies as part of that plan and it could reevaluate the visitor capacity for the Rocky Falls area.

Big Spring Historic Zone

Guideline 2. Review Existing Direction and Knowledge.

Location Overview— Big Spring is one of the most popular areas in the park for hiking and easy to access day trips. The spring can be seen from the parking area and a wheelchair-accessible walkway is available. The accessible Slough Trail is nearby, along with several other trails that are not suitable for wheelchairs. There is a developed historic area built by the CCC and a natural area more akin to wilderness.

Big Spring Campground has sites for tents as well as RVs. Various special events (https://www.nps.gov/ozar/planyourvisit/calendar.htm) are held near the spring. Picnic areas are located throughout the area providing tables and grills. The Big Spring Lodge and Cabins are examples of Depression-era architecture. These were built by the Civilian Conservation Corps (https://www.nps.gov/ozar/planyourvisit/big-spring.htm) and they are still solid and could be in use today pending some much needed renovations.

This area affords visitors opportunities to connect to other public lands including Mark Twain National Forest. The general management plan designated the area to the west of the Current River as a developed zone and a natural zone to the east. The developed zone provides visitors a wide range of visitor services and includes on more of the following: orientation and interpretive programs, signs, wayside exhibits, developed campgrounds, contact stations, commercial operations, convenience stores, dining, and shuttle services.

Current Use Levels— The Peavine traffic counter is located between the road to the Ranger Cache and the road to the campground. In 2016, the highest levels of visitation were recorded between June through October, with an average of 2,556 vehicles per month for an estimated 5,900 visitors. The highest level of use was reported in August at 4,000 vehicles for an estimated 9,200 visitors in the area that month. There are roughly four parking areas in the Big Spring area. Big Spring has roughly 25 parking spaces, the boat ramp has roughly 15 spaces, the lodge has roughly 20 spaces, and the overflow parking has about 20 (undesignated) spaces for a total of 80 spaces.

Big Spring Campground has 123 family sites that can accommodate a maximum of six persons that could participate in day use activities. Two of the group sites can accommodate up to 45 people. In total, the Big Spring Campground could accommodate approximately 850 visitors at one time. Currently, the Big Spring area can accommodate approximately 1,578 visitors at one time, or a total of 1,600 visitors. There are no actions to change the capacity of the campground and issues related to the amount of use in the campground is not occurring at this time; therefore, these are a consideration because these visitors could also be on the trails and are not included in the visitor capacity.

Overview of Visitor Use Issues— There are high concentrations of visitors in the main parking area during peak periods of use. Currently, visitors must walk a long distance to get to some of the destination trails in the area, especially those in natural areas that are not accessible by vehicle.

Guideline 3. Identify the Limiting Attribute. The limiting attributes related to visitor capacity of this area relate to a variety of natural and experiential resources. Similar to Alley Spring, there are some resource concerns and issues with graffiti. The developed zone is to the west of the river and includes Big Spring; the natural zone is on the east side of the river. Visitors expect some level of crowding in the campground but a reduction in visitor use levels along the trails.

Relevant Indicators:

- Trail condition as reflected by trail width and trail incision
- Number of incidents of reported theft and intentional vandalism to cultural sites and historic properties
- Number of undesignated (visitor-created) trails per mile of designated trail
- Encounter rates

Guideline 4. Identify Visitor Capacity. Alternative B: Under alternative B, a new trail would be built along the Old Tram Road that would provide additional opportunities for hiking and bicycling.

Pedestrian Use— Under alternative B, current use levels in the developed area would be maintained at 250 visitors at one time. Monitoring of the encounter rate threshold will be important to ensure that desired conditions are maintained on trails in the Big Spring area. As many visitors to this area do not travel the trails, the area is currently within the threshold; however, the campground and visitor facilities could support more visitors than the desired conditions of the trail system prescribe. Reunions and other special events also occur in this area but a majority of the visitors for these occasions remain in the developed area and not on the trails. The additional hiking/biking multiuse provided under this alternative, on the east side of the river and within the natural zone, would provide a new opportunity and support an additional six visitors at one time. This user group would be sharing the Old Tram Road with bikes.

Equestrian Use— No equestrian use is permitted in this area and thus no capacity determination was necessary for equestrian use.

Bicycle Use— Under this alternative, biking would be allowed in this area on a multiuse trail along the eastern side of the Current River. If calculating bicycle use by magnitude, a small number of bicycles could be accommodated with a maximum of 10 bicycles at one time. This number would minimize any conflicts between user groups and could be adjusted based on monitoring indicators and thresholds.

Alternative C

Pedestrian Use. See alternative B. In addition, pedestrians would be able to travel on the east side of the Current River. Some pedestrian use of this undesignated trail already exists and would be maintained. It would be connected to the campground and in the resource-based recreation zone where the expectation of encountering other groups is higher and therefore could support 56 visitors at one time.

Equestrian Use— No equestrian use is permitted in this area and thus no capacity determination was necessary for equestrian use.

Bicycle Use— Under this alternative, the multiuse hiking/biking trail on the eastern and western side of the Current River. These additional areas for biking only allow for increased use compared to other alternatives with a moderate number of bicycles for a maximum of 20 bicycles at one time. The increased trail mileage on the eastern side is in the natural zone and would support the 10 bicycles at one time as described in alternative B. The trail mileage on the western side of the river is in the resource-based recreation zone and could support increased use levels with a visitor capacity; however, the trail at this time, without partnerships, is a 1.5 mile out and back trail. To stay consistent with encounter rates for this zone the visitor capacity is 20 bicycles at one time. While in this zone, visitors would experience more encounters and because this departs from the campground access, is easier. This number would minimize any conflicts among users groups and could be adjusted based on monitoring indicators and thresholds.

Round Spring Trail

Guideline 2. Review Existing Direction and Knowledge.

Location Overview— A short walk (0.1 mile) from the Round Spring Picnic Area takes visitors to an overlook where they can view the deep blue-green waters of Round Spring, which lies at the base of a moss/fern-covered limestone bluff. Interpretive exhibits provide information on geology and an overview of prehistoric peoples who once lived in the area. Nearby is the Round Spring Cave Trail that departs from the cave parking area through the woods along the spring branch and takes visitors to the Round Spring Caverns for a tour of the cave. Visitors are able to participate in tours led by a park ranger from Memorial Day to Labor Day.

Round Spring is in the developed zone. In this zone, visitors would have opportunities to better understand the Riverways' significant resources and values through a wide range of interpretive facilities and services, interact with other visitors and park staff, and recreate in an environment that is supported by a variety of visitor services. Visitors would experience a modified natural environment with developed visitor facilities for orientation; day and overnight use would concentrate most park visitors in these areas. They also would have a high expectation for quality visitor services and facilities.

Sixty family camping sites are located at the Round Spring campground and can accommodate a maximum of six persons. The nine group sites can accommodate up to 45 people each. Besides the Upper Current section of the Ozark Trail, which connects Round Spring to the Blair Creek section of the Ozark Trail, there are no new trails being proposed for the Round Spring area in this plan; therefore, it is a consideration for the capacity determination but not included.

Current Use Levels— The traffic counter at Round Spring indicates that peak visitation occurs between the months of June and September. Between June and September of 2016, an average of 2,226 vehicles passed through the area. There are two main parking areas with roughly 55 parking spaces combined. At times there can be up to 130 people at one time in the Round Spring area (55 parking spaces x 2.3 people per vehicle). Many of these users could be accessing the river at this location where visitor capacities have already been identified.

Overview of Visitor Use Issues— Visitor-created trails are a concern around the spring and spring branch. They are currently being addressed with signage and natural barriers in strategic locations. The trail leading from the campground to Carr's Store has been underutilized by visitors at Round Spring; however, the park is expecting increased traffic on this trail due to the completion of the Upper Current section of the Ozark Trail.

The pedestrian bridge over the Current River is used by visitors viewing the river or by campers crossing to the camp store and campsites on opposite sides of the river. The park is expecting an increase in traffic across this bridge due to the addition of the Upper Current section of the Ozark Trail. Volunteers will use this bridge to maintain the new Upper Current section of the Ozark Trail. The portion of the trail from the viewing platform down to the spring branch is eroding. In the Round Spring area, a group site is being used as a boat launch though it is not authorized.

Guideline 3. Identify the Limiting Attribute. The limiting attributes related to visitor capacity of this area relate to the natural, cultural, and experiential resources. The amount of artifacts and archeological resources in this area is a major concern and an ongoing issue with the continued use of undesignated trails. As visitor use is concentrated on the designated trails, monitoring trail conditions and resources will inform future management decisions for this area. In addition, the undesignated trails are detracting from the visitor experience and impacting natural resources.

Relevant Indicators:

- Trail condition as reflected by trail width and trail incision
- Number of incidents of reported theft and intentional vandalism to cultural sites and historic properties
- Number of undesignated (visitor-created) trails per mile of designated trail

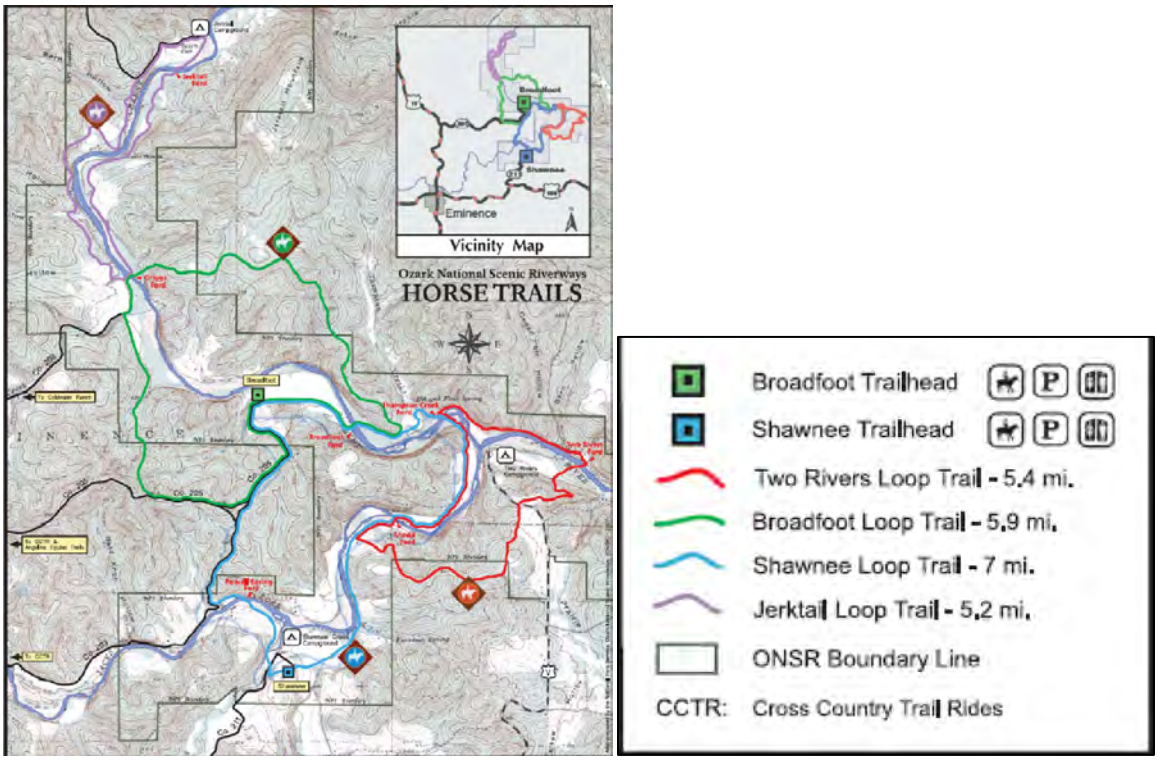
Guideline 4. Identify Visitor Capacity: Alternatives B and C.

Pedestrian Use— Current use levels would be maintained or able to accommodate increased use at 130 visitors at one time. Monitoring the encounter rate threshold will be important to ensure desired conditions are maintained on trails in the Round Spring area.

Equestrian Use— No equestrian use is permitted in this area and thus no capacity determination was necessary for equestrian use.

Bicycle Use— No bicycle use is permitted in this area and thus no capacity determination was necessary for bicycle use.

Two Rivers Area



Guideline 2. Review Existing Direction and Knowledge.

Location Overview— Currently, all of the designated horse trails in the National Riverways are in the Two Rivers area. The 2014 General Management Plan designated the Two Rivers area as a developed area that is surrounded by a natural zone—a majority of all four trails are in the natural zone. This zone represents areas that support the broader ecological integrity of the National Riverways. Natural processes dominate and only low-impact recreational activities are allowed. Visitors in the natural zone have opportunities to enjoy solitude and natural sights and sounds.

Visitors to the area have opportunities to explore a variety of trails—24 miles of designated trails including the Two Rivers Loop, Broadfoot Loop, Shawnee Loop, and Jerktail Loop. In addition, there are approximately 23 miles of undesignated trails in the Two Rivers area (estimation from figure 73 of Park, Chilman, and Seekamp report, 2011). Staging areas are located on the southern side of the Broadfoot and Shawnee Loops. The majority of the designated trails are flat, narrow, single-track paths (NPS 2012). Commercial use of the trails in the Two Rivers area is authorized and is primarily for equestrian use. The majority of use occurs during special events that are typically a weeklong and occur between May and October. One of the main operators is Trail Ride Guides, LLC, based out of Cross Country Trail Rides in Eminence, Missouri.

Surveys from 2001 suggest that riders enjoy visiting the CCTR area near Two Rivers because they can ride a different trail each day—so trail riding is well-distributed over the riding area (which includes a variety of neighboring state and privately owned lands) on any given day (Chilman 2001). CCTR is situated on the Jacks Fork River and provides riders access to county roads that provide access to conservation areas and the park. Groups of 10 or more riders to the

Angeline Conservation Area need a special use permit to ride the 9-mile-long trail. Respondents in the Chilman and Vogel Study (2001) reported Fox Pen, in Angeline Conservation Area, as their most commonly frequented horse trail outside the park (22% of those surveyed).

The 1991 Roads and Trails Study and Environmental Assessment identified that 5% of horse trail use was individual or casual group riders and noted in 1991 there was unmonitored access to the entire NPS horse trail system. In 1991, the park estimated that 95% of horse use was attributable to four, one-week organized trail ride events and the heavy concentration of activity tends to exaggerate the impacts that would be expected from a more even distribution of use. The 1991 Roads and Trails Survey recommended the number of organized trail ride events be maintained at or near current level of four per year for a period of four years from the time the plan was implemented, to allow for the systematic and controlled collection of information on use patterns and resource impacts. The study laid out a four-year plan of phased activities (data collection, monitoring, and supporting management decisions). The implementation and monitoring program was to set the limits of acceptable change and decreasing the levels of use of the horse trail system, if needed. In 2017, CCTR offered seven trail ride events, which is three more than the 1991 Roads and Trails Survey recommended to understand use levels and related impacts.

Current Use Levels— For the sampling 10-day period between October 1 and 10 of 2015, KSU counted a total of 3,688 riders, a one-day high of 640 riders, and low of 96 riders across all surveyed sites. The average group size ranged from 2.6 to 4.2 riders, with an overall average of 3.8 riders per group across all sample sites. The area that received the highest use was along County Road 19-203 southwest of the Two Rivers area. The majority of equestrian use occurred in fall and specifically the month of October. Ridership at the park peaked around 11:00 a.m. daily (KSU 2017).

Currently, the park issues group permits for groups of 25 horses or more to allow park staff to determine routes of travel on horse trails and unpaved roads and traces, and also monitor use and impacts and estimate maintenance costs. Across all of the sites, KSU data collection efforts noted some group sizes ranged from 1 to 32, with larger groups observed at the County Road 19-203 location.

Commercial horse facilities support special events that can range in size from 600–2,500 riders and horses per week. Many visitors to these facilities rent stalls and explore trails in their area (including trails in the National Riverways) on their own without guides. Guided rides in the National Riverways are managed through a commercial use authorization through the park and account for a very small percentage of usage. Currently, the CUA operator is able to function on the four designated horse trails. In 1991, there was only one commercial horse facility operator and in 2017 there were two. In 1991, CCTR provided four trail ride events, and in 2017 there were seven trail ride opportunities. October was the busiest month for the authorized commercial providers with a total of five ride days. The 1991 Roads and Trails Study set forth negotiable and non-negotiable agreement criteria for the permits. Currently, the CUA operator is able to travel with 25 horses per organized/guided ride, and if rides have more than 12 horses, two guides are needed. The CUA agreement also states that the total number of horses per day on organized/guided rides shall not exceed 150 per holder. According to park CUA data, the guided riding groups (fast, medium, slow, and mule riders for half day—returning for lunch—or all day with lunch brought to them on the trail) usually depart CCTR between 9:00 a.m. and 9:30 a.m., other riders may leave and return throughout the day. There are other recreational opportunities in the Two Rivers area including sightseeing, canoeing, or tubing.

The majority of equestrian riders visit the park in the fall—KSU counted 172 equestrian users in the spring, 2,015 in the summer, and 5,480 horse riders in the fall. Use of the trails throughout the Two Rivers area is primarily distributed between 9:00 a.m. and 3:00 p.m., with an initial "pulse" of riders entering the park in the mid-morning hours, with some choosing to enter the park in the late afternoon. The KSU report found that equestrian users did not report crowded conditions, but this may be related to their expectations for a more social experience and perhaps, more so, the number of undesignated trails that visitors are currently using.

Shawnee Creek Trail. This trail consists of a 7-mile loop that intersects the Broadfoot Loop Trail and Two Rivers Loop Trail. According to the KSU study (2017) there were 227 total riders on the sampling dates that occurred between April and July, and an average of 14.2 riders per day with a mean group size of 1.84. Chilman and Vogel (2001) estimated the number of trail riders at Shawnee Creek range from 9 per day to 263; however, not all of these riders in the Chilman and Vogel study (2001) may have been on the Shawnee Creek Trail, but perhaps were leaving the CCTR area. KSU collected data for the number of horses on the Shawnee Creek Loop and determined October was the most popular month (see table C-6). Shawnee also received very little use when trail rides were not occurring.

County Road 19-203 and Shawnee had the highest levels of use for the KSU data collection effort. County Road 19-203 had a total of 4,645 riders and Shawnee Creek had a total of 2,870 riders during the 28-day collection period of 38 days (29 week days and 9 weekend days). Those traveling along County Road 19-203 could be traveling to the Shawnee Creek Trail to eventually connect with other trails.

The highest levels of use at Shawnee Creek Trail occurred in October, coinciding with week-long riding events put on by the commercial horse riding facility. According to trail counts by KSU (2017), in October of 2016 (four days of observations) an average level of riders per day was 177 for Shawnee Creek Campground and County Road 19-203 was 184.

TABLE C-6. HORSE RIDER DATA BY LOCATION: SHAWNEE CREEK

Month (Data collection period)	Total Number of Horse Riders	Mean Group Size
October 2015* (10 days)	987	4.2
April 2016 (4 Days)	14	2.0
May 2016* (4 Days)	0	0
June 2016* (4 Days)	213	5.2
July 2016 (4 Days)	0	0
August 2016* (4 Days)	383	6
September 2016* (4 Days)	565	5.0
October 2016* (4 Days)	708	5.4
Total	2,870	3.5

*Trail rides are indicated by an asterisk (KSU 2017, pg. 34).

TABLE C-7. HORSE RIDER DATA BY LOCATION: COUNTY ROAD 19-203

Month (Data collection period)	Total Number of Horse Riders	Average Group Size
October 2015* (10 days)	2,170	4.3
April 2016 (4 Days)	13	2.2
May 2016* (4 Days)	5	1.3
June 2016* (4 Days)	672	5.0
July 2016 (4 Days)	0	0
August 2016* (4 Days)	528	5.9
September 2016* (4 Days)	520	4.3
October 2016* (4 Days)	737	5.2
Total	4,645	3.5

*Trail rides are indicated by an asterisk (KSU 2017, pg. 32).

Current Commercial Use of Shawnee Creek Trail. According to the park's CUA data, the one-day the CUA operator traveled in June was on the Shawnee Creek Trail. The group sizes ranged from 5 to 22 riders and the group had two guides. The CUA operator had three all-day groups that traveled at different speeds—slow, medium, and fast. Groups departed in 30-minute lags and were on the trail for approximately 2.5 hours. The Shawnee Creek Trail was also used in August for a half-day ride by a CUA operator. The group size ranged from 2 to 18 riders with two to three guides. The groups spent approximately 2.5 hours on the trail.

Jerktail Loop Trail. A 5.2-mile loop that is very popular and departs from County Road 19-203 and intersects both the Broadfoot Loop and the Two Rivers Loop, Jerktail Loop receives less use than the Shawnee Creek Loop. The two days in May that a CUA operated on the Jerktail Loop the group size ranged from 19 to 25 with two guides. The CUA operator had three all-day groups that traveled at different speeds—slow, medium, and fast. Groups departed in 30 minute lags and were on the trail for approximately 4.0 hours.

Current Commercial Use of Jerktail Loop. Jerktail Loop was frequently used by CUA operators in October with a total of eight group rides on three separate days. The group size ranged from 11 to 25 riders with two guides. The groups departed around 9:00 a.m. or 10:00 a.m., in 30-minute intervals and spent approximately 4.0 to 5.0 hours on the trail. In 2016, between the months of May and October, an average of 2,714 vehicles were counted in the Jerktail area (IRMA Statistics).

Broadfoot Loop Trail. A 5.9-mile loop that intersects both the Jerktail Loop and the Shawnee Creek Loop and County Roads 205 and 208. In October of 1999, 238 riders were counted going out and 50 coming back on Broadfoot Loop Trail.

Current Commercial Use of Broadfoot Loop Trail. The two days in May that a CUA operated on the Broadfoot Loop the CUA group size ranged from 15 to 25 riders with two guides. The CUA operator had three all-day groups that traveled at different speeds—slow, medium, and fast. Groups departed in 30-minute lags and were on the trail for approximately 4.0 to 5.0 hours on the trail. Authorized commercial groups also used the Broadfoot Loop in October with two days of all-day rides. Group sizes ranged from 11 to 25 riders with two guides and riders spent approximately 4.0 to 5.0 hours on the trail.

Two Rivers Loop Trail. The commercial use operator of the Two Rivers area reported no equestrian use on the Two Rivers Trail.

Overview of Visitor Use Issues— The most densely trailed and heavily impacted area with respect to informal horse trails is the Two Rivers area (Park et al. 2011). The designated equestrian trails in the area can be difficult to differentiate from visitor-created trails. People often report being lost and the lack of signage has been a visitor complaint or suggestion in many of the most recent studies (KSU 2017; Chilman & Vogel 2001). The formation of visitor-created trails can also indicate that riders are lost, the designated trails do not take riders where they wish to go, riders are trying to create a more direct route, and/or users are lacking facilities (Park et al. 2011). The majority of these visitor-created trails in the Two Rivers area stem from west of the Two Rivers area near networks of other horse trails and CCTR.

Dempsey (NPS 2012) suggested both authorized and unauthorized trails appeared to be stable and are in relatively good condition, though sections of the trails were eroded, incised, and/or widened. In addition, the rampant establishment of unauthorized horse trails by park visitors resulted in disturbance to archeological sites beyond the four authorized, maintained trails. Such trails have the potential to adversely impact archeological sites (NPS 2012).

Many of the trails are not meeting the desired conditions for the natural zone and adversely affecting natural and cultural resources. For example, trail incisions are 19.5 inches deep on Shawnee Loop and incision ranges from 20 inches to 40 inches below surface and widening from 3 feet to 9 feet across (NPS 2012). Adverse impacts on archeological sites occurred due to high frequency and levels of horseback use causing erosion and degradation along the trails. Dempsey (NPS 2012) suggests there is a potential for poor trail conditions, heavy traffic, and visitor removal of artifacts along these trails.

Many authorized trails and gravel or unimproved roads that are used as horse trails in the Two Rivers area intersect 11 archeological sites (NPS 2012). Park et al. (2011) found that a majority (57%) of undesignated trails that were inventoried were deemed to be "well drained," which is another good indicator of suitability for formal trail designation. In fact, 36% (31.6 miles) of visitor-created trails inventoried were deemed suitable for formal designation. Park et al. (2011) found that 50% of undesignated horse trails in the study area (Cedar Grove, Two Rivers) were a condition class ranging from 0 to 3.

There are concerns regarding the current levels of use associated with large group trail rides organized by local outfitters in the Eminence area. There is a lot of trail braiding likely because people ride off designated trails to go around natural obstacles created by floods. Additionally, designated trails need to be rehabilitated to meet trail class standards. Despite the presence of vault toilets at staging areas, many riders appear to not be using these leading to foul odors in some areas and human waste along trails. There is also some vandalism at the staging area.

The Assessment of Visitor-Related Impacts and Potential Management Strategies at Ozark National Scenic Riverways Report (Park et al. 2011) noted that the trails in the Two Rivers area were the most densely trailed and heavily impacted for three reasons: (1) presence of undesignated trails forming off of designated trails is common, (2) feral horses frequent the area, and (3) the proximity to Van Buren and Eminence make this area easier to access with a horse trailer than most areas. Park et al. (2011) also suggested the Two Rivers area needed systemic, intensive, and sustained rehabilitation efforts to improve trail conditions. Field staff from the Riverways assisted the Park et al. (2011) study and assessed each informal trail segment on slope, trail slope alignment, landform position, safety, substrate, and other factors.

TABLE C-8. INFORMAL EQUESTRIAN TRAIL EXTENTS BY CONDITION CLASS

Condition Class	Miles
0 - Barely visible	1.1
1 - Continuous loss of vegetation	7.8
2 - Loss of organic matter	28.1
3 - Continuously bare soil	16.8
4 - Isolated erosion sites	13.0
5 - Gully erosion	9.4
Total informal trail	88.1
Total formal trail	23.5

Source: Table from Park et al. 2011

Guideline 3. Identify the Limiting Attribute.

The limiting attributes related to visitor capacity of this area relates to the natural and experiential resources. Trails in the Two Rivers area are in the natural zone. A visitor to this area located in the natural zone should expect to encounter intact natural resources, features, and systems for personal inspiration, education, and recreation. Experiences could include opportunities for solitude, contemplation, and self-reliance. Evidence of human use would be limited (NPS 2014).

Currently, the average daily use levels are consistent with desired conditions in the natural zone; however, the special events occurring once a month are not consistent with natural zone desired conditions because the large groups can prevent visitors from enjoying solitude and experiencing the natural sights and sounds.

Relevant Indicators:

- Encounter rates on trails
- Trail condition as reflected by trail width and trail incision
- Number of undesignated (visitor-created) trails per mile of designated trail
- Number of validated user-reported complaints to NPS of conflicts on roads and trails

Guideline 4. Identify Visitor Capacity (Alternatives B and C).

Pedestrian Use Per Trail— Pedestrian use in the area remains fairly low and the visitor capacity will be increased at 28 visitors per trail at one time. This is consistent with the desired conditions for the developed zone that the campground is in and the natural zone that surrounds the Two Rivers area.

Equestrian Use for All Trails in the Two Rivers Area— Much of the current equestrian use in the Two Rivers area is on undesignated trails and current use levels are likely exceeding the thresholds for the natural zone. The continuation of current management includes the restoration of all undesignated trails to natural conditions. In other words, many of the undesignated trails currently in use in the Two Rivers area would be restored and this use would be redistributed to designated trails. This would likely result in more riders on the designated trails. Estimating from figure 73 of the Park et al. report (2011), it appears there are approximately 23 miles of informal trails in the Two Rivers area. The 24 miles of designated trail will remain; however, the 23 miles of informal trails will be restored and not part of the

designated trail system. The visitor capacity per trail would be 25 riders per trail at one time. It is likely that equestrian riders are traveling on more than one trail per visit. With half the trail mileage as undesignated trails are restored, riders using multiple trails, and the short window in which equestrian riders use these trails, riders may experience increased encounter rates between pedestrians and other trail riders. KSU research suggests that respondents in the 2015–2016 survey might not have felt crowded because much of the equestrian use was occurring on undesignated trails (2017). The concern over crowding may increase with more riders on the same trails. The monitoring of encounter rates will ensure thresholds are not exceeded and the visitor capacity may need to be adjusted once changes are made to the trails system to ensure desired conditions are maintained.

Under the two action alternatives, implementation of a proposed equestrian permit would be used to help manage visitor capacity. Information from permits would provide valuable data in addition to monitoring relevant indicators such as encounter rates, trail conditions, number of undesignated (visitor-created) trails per mile, and number of validated user-reported complaints. This information would provide important feedback for the future management of equestrian use in this area. Adaptive management actions could include increased communication, education efforts, trail etiquette, and other management actions to modify visitor use patterns, behavior, and potential levels. In addition to the ongoing monitoring, in three years the park would evaluate key factors in the Two Rivers area that inform management of equestrian use including trail conditions, visitor experience, user conflicts, resource sustainability, and visitor safety.

Bicycle Use— No bicycle use is permitted in this area and thus no capacity determination was necessary for bicycle use.

Special event capacity for equestrian use for both action alternatives:

Under the action alternatives, the special event equestrian capacity would be maintained at current use levels, 100 riders at one time, which would be in addition to the riders being guided through the commercial allocation. Again, the CUAs are authorized to have up to 150 riders per day. As noted above, these guided rides are dispersed throughout the day. Currently, the CUA holders rarely reach the 150 riders per day that they are authorized. In the future, the commercial allocation and the overall special event capacity could be adjusted. Increased efforts to communicate with private riders would be part of managing visitor use and expectations to address concerns regarding the experience for those visitors not participating in the special event. Management actions in the two action alternatives do not increase the trail mileage in this area, therefore, this area cannot accommodate increased use.

Designated Horse Trails in Two Rivers Area Visitor Capacity and Allocation Summary	Alt. B	Alt. C
Pedestrian use per trail at one time (not including campers)	25	25
Equestrian riders per trail at one time	25	25
Commercial Use Authorization (allocations), per day	150	150
Bicyclists	N/A	N/A
Special events (e.g., commercial use allocation plus the equestrian capacity)	250	250

OTHER AREAS

Anglers' Trail near Montauk: Alternatives B and C— The new trail mileage for the Montauk area would be in the natural zone. It would provide an additional opportunity in the Upper Current and near Montauk State Park. Visitors in this area can hike, picnic, and walk along the Current River. Many anglers use this area to access the river. As it is a designated hiking trail, no equestrian visitor capacity was identified. The encounter rate threshold for this zone is no more than four people encountered every hour along designated trails, with 20% of observations allowed to exceed the encounter threshold.

> Alternative B: The 1.15 miles of trail would provide two out and back opportunities. The visitor capacity for the area would be 16 people at one time; although there are two trails, they are short and out and back and this would increase the number of encounters along the trails.
>
> Alternative C: The 3.03 miles of trail, including a loop opportunity, would support increased use compared to alternative B. The visitor capacity would be 28 people at one time as one of the new trails in the area is still an out and back and the other is a loop and direction of travel could be controlled to increase use levels and reduce the number of encounters.

Cave Spring Trail— The loop trail, beginning at the Devils Well Day Use Area, traverses oak-pine forest ridges, a limestone glade, winds through hollows and crosses intermittent streams as it brings hikers down to the mouth of Cave Spring on the Current River. The Cliff segment of this loop trail traverses the side of a high limestone bluff overlooking the Current River with spectacular views, then returns to Devils Well via Parker Hollow alongside an intermittent streambed.

This is the premier trail in the park on the Upper Current River. The trail is currently lacking signage and, as a result, visitors are often confused and make wrong turns on this section. There are also other uses in the area including ATV/UTV trails and single track. The Parker Hollow area near the Cave Spring Trail is in the natural zone. Visitor capacity for this trail is 28 visitors at one time, which would remain consistent with the desired conditions for this zone. The encounter rate threshold for this zone is no more than four people encountered every hour along designated trails, with 20% of observations allowed to exceed the encounter threshold.

Pulltite Trail— This 1.5-mile loop trail includes several small wayside signs. Some of the signs have been vandalized and need to be replaced or repaired. The section along the river needs to be groomed during the spring and summer. According to the NPS public use statistics, Pulltite Trail sees its highest visitation between July and September, with a 2016 average of 2,744 vehicles for an estimated total of 6,311 visitors.

> Alternative B: Maintain current use in accordance with desired conditions at a visitor capacity of 28 people at one time on the Pulltite Nature Trail.
>
> Alternative C: Under this alternative the visitor capacity for the nature trail would remain the same for pedestrians as alternative B. In addition, biking would be allowed on this 2.7-mile loop, a low level of use would be permitted, the visitor capacity would be 6 bicyclists at one time as it is also in the natural zone and bikers may do multiple loops. The encounter rate threshold would be important to ensure desired conditions are maintained as this trail provides opportunities for multiple user groups.

Jam Up Cave Trail— Jam Up Cave Trail is in the primitive zone on the Jacks Fork and also part of the Jacks Fork Natural Area. Jam Up Cave can only be reached by water. Jam Up Cave is on the Jacks Fork River between Rymers and Blue Spring. Jam Up is a spectacular cave, but can only be reached by boat. The entrance is about 80 feet high and 100 feet wide.

> Alternatives B and C: There is 5.1 miles of new trail in the Jam Up Cave area, although this remains in the primitive area the increased trail mileage would disperse use and prevent the encounter rate threshold from being exceeded. The visitor capacity for alternatives B and C is 12 people at one time.

Welch Spring Trail— Currently, the parking areas at Welch Landing and Welch Primitive have space for a maximum of 14 vehicles. There is very little signage and most visitors are not aware of the trail. This trail also needs to be maintained during the spring and summer. The main Welch Spring area is on the east side of the river in the developed zone. The trail is approximately a third of a mile and travels along the river's edge to Welch Spring. The trail is wide in some areas. The encounter rate indicator is important for monitoring desired conditions in this area. As this is in the developed zone, this trail could support increased use of up to 35 visitors at one time, similar to the Blue Spring Trailhead and Picnic Area.

Blue Spring Trailhead and Picnic Area— This 1-mile hike may be accessed at Powder Mill or from the picnic area at the Blue Spring Trailhead and Picnic Area. The picnic area near Powder Mill is in the developed zone and includes the trailhead. The small restroom and picnic table at the Blue Spring parking lot is in the natural zone. The trail skirts the bottomland riparian forest along the Current River between Powder Mill and the Blue Spring State Natural Area where the trail parallels the spring branch out to Blue Spring. At times, the trail can become very muddy and flooding can overtake the trail. Visitor-created trails are a problem in this area because visitors try to bypass the flooding by going around muddy areas. This trail traverses NPS lands as well as Missouri Department of Conservation land (MDC).

The Blue Spring area has a picnic area and gravel parking lot. The visitor capacity for the Blue Spring area is 35 people at one time. Visitors to Blue Spring spend approximately 1–2 hours at the site. Monitoring encounter rates on trails would ensure desired conditions are maintained at this site. Changes to facilities in this area including redoing the campground and picnic area could reduce this sites' ability to accommodate use levels consistent with the developed zone. In the future, the visitor capacity for this site could be adjusted. As noted in the past, present, and reasonably foreseeable future, an ABA-accessible trail may be considered from the parking lot to the Blue Spring area. This trail would be an additional opportunity in the area but it is likely that because of the short length of the trail it would not affect the visitor capacity for this site.

Roberts Field— Under the two action alternatives B and C, a 3.4-mile hiking loop trail in the Roberts Field area built on an old road. This area is in the natural zone and travels partially through the primitive zone and provides an additional opportunity for visitors to experience nature. Currently, there are not many developments nearby and very few visitors travel this area. The encounter rate indicator would be most important for this area to ensure desired conditions are maintained. This trail could accommodate 28 visitors at one time. Although portions of this trail are in the primitive zone, the length of the trail would disperse use and continue to protect the desired conditions.

Klepzig Mill Day Use Area— A two-lane county road accesses the Klepzig Mill Day Use Area. Throughout the day visitors spread out across rocks and some visitors travel to view the Klepzig Mill building. It is separate from Rocky Falls analysis area. It is primarily in the resource-based recreation zone but surrounded by the natural zone. The visitor capacity for this area is 15

visitors at one time. Similar to the Cave Spring Day Use Area, there are many opportunities for visitors at this site so visitors are able to disperse and experience the uniqueness of the area and the natural zone characteristics.

Lost Man Ridge Primitive Area— Lost Man Ridge Primitive Area is a popular location for deer and turkey hunters. This is a primitive site with no amenities; however, current use occurs when visitors leave the road and access the primitive overnight site. In addition, some visitors day hike in this area and it remains in the natural zone; parking is limited here. The visitor capacity for this site is six people at one time.

Cave Spring Day Use Area— Cave Spring Day Use Area contains a cave with a flowing spring. A short trail leads to the mouth of the cave and there is a shelter cave where visitors are able to view the cave entrance. There is space for approximately five vehicles and a turnaround loop. Average visitor stay at this site is likely less than an hour. Visitors are also able to hike down a trail leading to the river. This day use only area is in the natural zone; however, there are multiple opportunities at this one site. The visitor capacity for the day use area is 15 visitors at one time.

ALL-TERRAIN VEHICLE AND UTILITY TASK VEHICLE USE

Guideline 1: Determine the Analysis Area(s).

ATVs and UTVs at the Riverways are not currently allowed on NPS public use roads; however, use on NPS roads has been observed. ATV/UTV use is occurring on county and state roads when being used for agricultural purposes or within 3.0 miles of the operators' primary residence.

There are opportunities to ride ATV/UTV trails in the nearby Mark Twain National Forest and ATV/UTVs can operate along county roads throughout the area as long as the vehicles are operated by licensed drivers with a valid county permit. Forest-specific off-highway vehicle permits are needed to ride in the USFS ATV/UTV area; only a county permit is needed to ride the USFS roads.

In the park, county and state roads comprise approximately 156.5 miles of designated roads. A visitor capacity for ATV/UTV riders has been identified because, under the two action alternatives, ATV/UTV use would be allowed on NPS public use roads for 60 miles in alternative B or 61 miles in alternative C; however, not on roads in the developed campgrounds; 36 CFR 4.10 permits ATV/UTV use on park roads and designated routes; however, routes and specific areas require promulgation. Actions in this plan only include NPS public use roads. Further, the visitor capacity is for the riders who are participating in scenic driving as visitor capacities have been identified for specific sites and trails above. Therefore, the analysis area for the visitor capacity for ATV/UTV use, specifically ATVs and UTVs, would be all NPS public use roads in the Riverways.

The park identified five areas where heavy ATV/UTV use is occurring. The Upper Current River receives a high number of the total ATV/UTV use, the three areas in the Upper Current River that likely receive the most use are: Parker area, Flying W, Akers area. In the Lower Current River, the Old Tram Road (NPS administered road) receives heavy ATV/UTV use and the North River Road in the Jacks Fork District (Shannon County Road 106-308). These roads are a mixture of county and park ownership and it is likely some private roads are also being used by ATV/UTV riders. These specific areas provide unique ATV/UTV opportunities. Some of these areas can continue to support higher use levels as riders are less likely to have higher

speed conflicts because the roads are rough and minimally maintained resulting in fewer conflicts with vehicle traffic. Further, some roads in these areas are more durable for this use as well as scenic as they are near the river.

Guideline 2: Review Existing Direction and Knowledge.

A majority of ATV/UTV use originates outside the park. Many nearby counties require permits to operate ATV/UTVs on county roads. The permit system varies between counties, for example the Dent County permit is $15 for the life of the equipment. The nearby Mark Twain National Forest issues single-, double-, and triple-day permits are strictly for the ATV/UTV areas as well as an annual option for trail use. If a visitor is only riding open US Forest Service roads or county roads they do not need a USFS trail permit.

Use levels throughout the area are tracked to some extent through the number of permits sold. Between October of 2017 and August of 2018, the Salem Ranger District estimated they issued 196 single-day permits, 145 two-day permits, 90 three-day permits, and 151 annual permits for the ATV/UTV areas. This number does not capture the ATV/UTV use on the USFS and county roads in the Mark Twain National Forest. The USFS numbers therefore only represent the trail usage occurring on USFS trails. If so, they typically need both a county and USFS permit when riding in the area.

Dent County estimated somewhere between 100 and 200 permits were sold in 2018. In September 2018, Carter County had issued approximately 154 permits.

As noted, ATV/UTV use is not currently allowed on park roads; however, it is occurring. From August to December 2018, the Riverways began documenting observed ATV/UTV use on NPS public use roads. The intent of this effort was to document the use levels observed on park roads throughout the park. The park recorded 43 observations between August 26, 2018, and March 10, 2019. From the 43 observations, park staff observed an estimated total of 407 visitors, 36 ATVs, and 196 UTVs. The 43 observations represent use from 26 days throughout the observation period. The number of people per observation ranged from 3 people to 30 and an event that occurred without a special use permit had over 200 visitors. Removing the one observation with 200 visitors, there were an average of eight ATV and UTV riders per day (207 riders divided by the 26 days of observation).

These data were noted during regular work hours and may not be reflective of all use levels and patterns. In the future, monitoring authorized use and indicators and thresholds could inform adjustments to the visitor capacity, if appropriate. The observations are not statistically representative of use levels for this use group; however, they inform the Riverways' understanding of this user group behaviors. Similar monitoring efforts for use levels could occur in the future.

Observations of ATVs and UTVs on NPS roads were somewhat evenly spread across the park, with 17 in Jacks Fork, 11 in Lower Current, and 14 in the Upper Current; however, only one observation occurred in the Middle Current. The location of the observations could be reflective of the time in which rangers were patrolling, opportunities in the area, among other factors.

Throughout the observation period, the number of ATVs ranged from one to six in a group with one being the most commonly observed. UTV group sizes were similar, with the range being one to eight UTVs and one being the most commonly observed. In the 12 of the observations that included only ATVs and no UTVs, the average group size was two visitors on an average of 1.7 ATVs. In the 23 observations where only UTVs were present, the average group size was 5.7 visitors on an average of 2.4 UTVs. This data is consistent with some research that suggests off-highway vehicle travel (e.g., ATVs and UTVs often have two visitors riding together). Seven of the 39 observations included groups that included both ATVs and UTVs. The average number of visitors per day, regardless of ATV/UTV vehicle, was seven riders.

Some observations did not determine the rider had a county permit. Of the 31 ATV and UTV riders where a county permit observation was noted, 48% of riders had a permit (15 of 31) from Shannon, Dent, and Carter Counties.

Relevant research suggests that ATV use of roads is more dangerous than trail use and there are many variables that can be linked to visitor safety concerns. Denning et al. found that more ATV fatalities resulted from roadways than off-road crashes (2012a). This research also noted that roadway crashes were more likely than off-road crashes to involve multiple fatalities, alcohol use, and collisions and head injuries (Denning et al. 2012a). Researchers have noted that more than one in three roadway crashes involved collision with another vehicle, and further stating that ATV use of roads results is a potential safety concern (Denning et al. 2012b). Accidents occur between multiple ATVs as well as ATVs and passenger vehicles (Williams et al. 2014). Speeding, alcohol, and lack of personal protective gear (e.g., helmets) can be linked to ATV-related deaths (Williams et al. 2014). Finally, ATVs are designed for off-road use; however, many of the deaths are occurring on public roads (Williams et al. 2014).

Other relevant research has been used to guide off-highway vehicle management through an understanding of rider's desired benefits, preferences, and perceived availability of specific amenities and conditions (Verbos, Brownlee & Merkel 2016). The research employed a supply and demand approach to link desired benefits (demand) with site characteristics (supply). Specifically, the top desired benefit was to enjoy nature, which was reported to be largely facilitated by social conditions such as few users, positive interactions with users, and users respecting the area. This finding suggests that social conditions are important and require management attention when considering riders' ability to enjoy nature. It also points to the need for management to consider that there is adequate supply or appropriate levels of social conditions to facilitate their connection with nature.

The research recommends that managers should continue to provide substantial attention to social conditions to ensure that adequate supply is maintained. Management recommendations regarding these findings include continuing specific management strategies and practices that:

1. Ensure a low density of riders and a high dispersion of riders across time and space. Investigating current use levels, rider densities, rider travel patterns, and their associated thresholds derived from users' perspectives should be evaluated, particularly for high-use sites.
2. Focus on ensuring positive interactions between users and environmental respect for riding areas. Education and public outreach programs may assist in this effort.

Guideline 3: Identify the Limiting Attribute(s).

Visitor safety and experience are the limiting attributes for ATV/UTV use under the action alternatives since use will only be allowed on roads and will therefore need to share the road

with passenger vehicles and other ATV/UTV users. A shared road between ATVs and UTVs and vehicles results in changes to driving patterns such as more situations involving vehicles passing ATV and UTVs. A shared road increases the potential for head-on collisions between vehicles and between vehicles and ATV and UTV riders. Visitor experience, specifically the rider experience in this analysis area, is also a limiting attribute. Low density and high dispersion of ATV/UTV use is supportive of a desired experience and constrains use on NPS public use roads. The Superintendent's Compendium would include additional information on ATV/UTV regulations to promote safe visitor use. The relevant indicator for the limiting attribute is the number of validated user-reported complaints to the National Park Service of conflicts on roads and trails.

Guideline 4: Identify Capacity.

Note in the no-action alternative, ATV/UTV USE would continue to only be able to operate on the 156.5 miles of county and state roads, within 3.0 miles of their primary residence, identified in chapter two. The no-action alternative is the continuation of current management, so no ATV/UTV use would be allowed on NPS roads and trails.

Under the action alternatives, ATV/UTV riders would have 60 (alternative B) or 61 miles (alternative C) of NPS road available for access. The one mile difference in alternatives is made up of multiple segments when combined, equal one mile. Therefore, the visitor capacity for ATV/UTV use would be the same for both action alternatives as the additional mile throughout the park does not support a noticeable difference in the mileage and therefore a difference in the number of ATV/UTV riders. ATV/UTV use would not be allowed on NPS trails. At this time, the visitor capacity for NPS road use would be a slight increase to existing use levels (approximately seven riders per day) identified during the NPS monitoring effort. The visitor capacity is 15 ATV/UTV riders in the Jacks Fork District; 15 in the Upper Current; 15 in the Middle Current; and 15 in the Lower Current at one time. Larger groups are acceptable on occasion; any groups with more than 15 visitors or riders would need to obtain a special use permit in advance of their ride. This visitor capacity assumes use patterns will remain fairly consistent with the observation period of 2018. This visitor capacity is also consistent with relevant research, ensuring a low density of riders and high dispersion on roads to reduce safety concerns and ensure social conditions for riders persist. As ATV/UTV use continues to be distributed throughout the park, this visitor capacity would be protective of desired conditions.

Education is the most important management tool to ensure visitor safety of all visitors on NPS roads is the top priority. Further, analysis of supply and demand (i.e., site characteristics that facilitate appropriate ATV and UTV use), monitoring use levels and indicators, and enforcement of the regulations would ensure accountability for all NPS road users. The visitor capacity could be adjusted in the future if monitoring indicates that is appropriate given conditions.

APPENDIX D: ALTERNATIVE ROADS AND TRAILS MAPPING

Note: "Private" roads are labeled on maps using road series numbers that were assigned as part of the 1991 Roads and Trails Study. National Park Service roads have been assigned new road series numbers as part of this plan to ensure consistency in terms of road nomenclature across the National Riverways.

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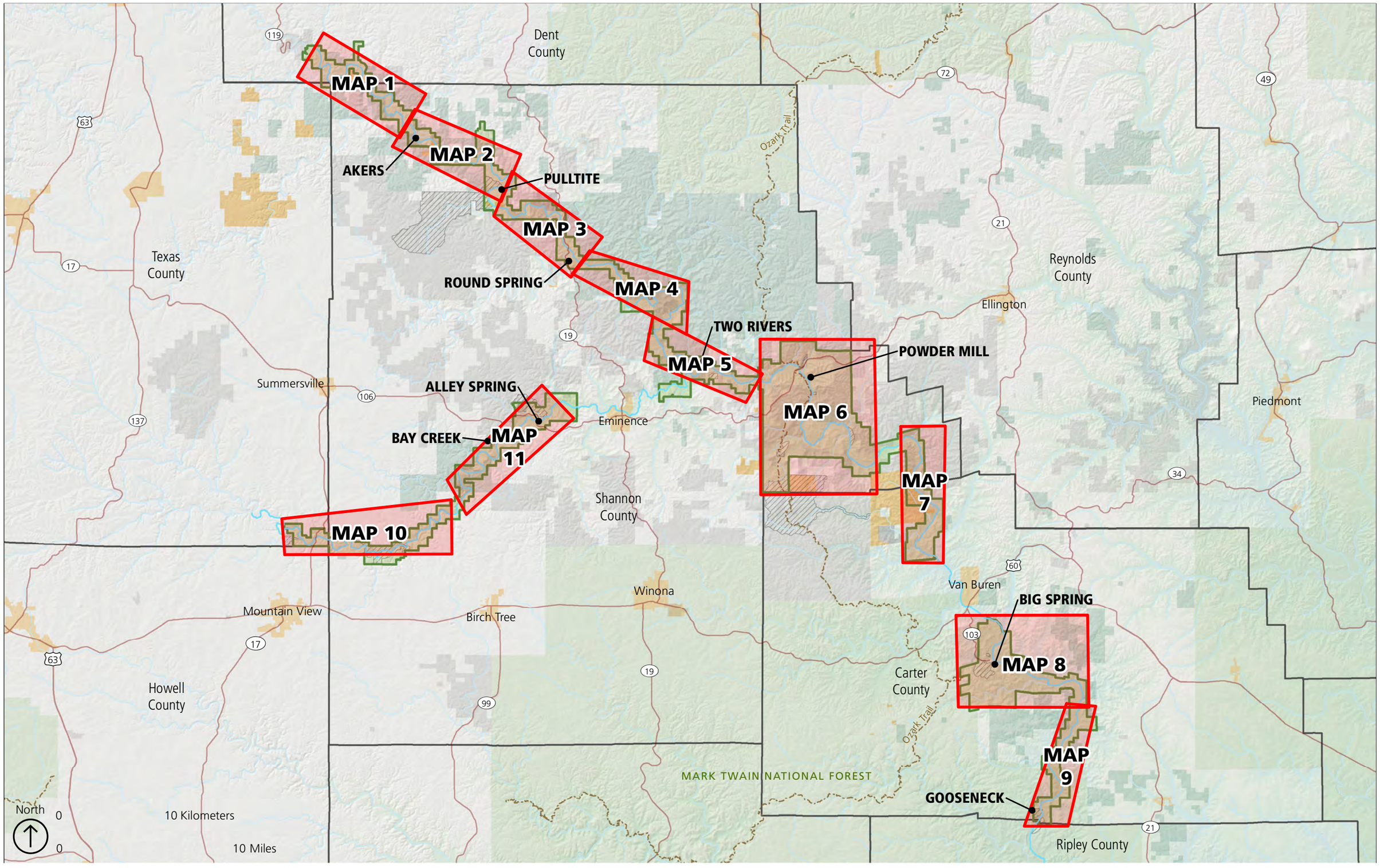
Roads and Trails Management Plan
Section Overview

Ozark National Scenic Riverways
Missouri

National Park Service
U.S Department of the Interior



Roads and Trails Management Plan

Ozark National Scenic Riverways
Missouri

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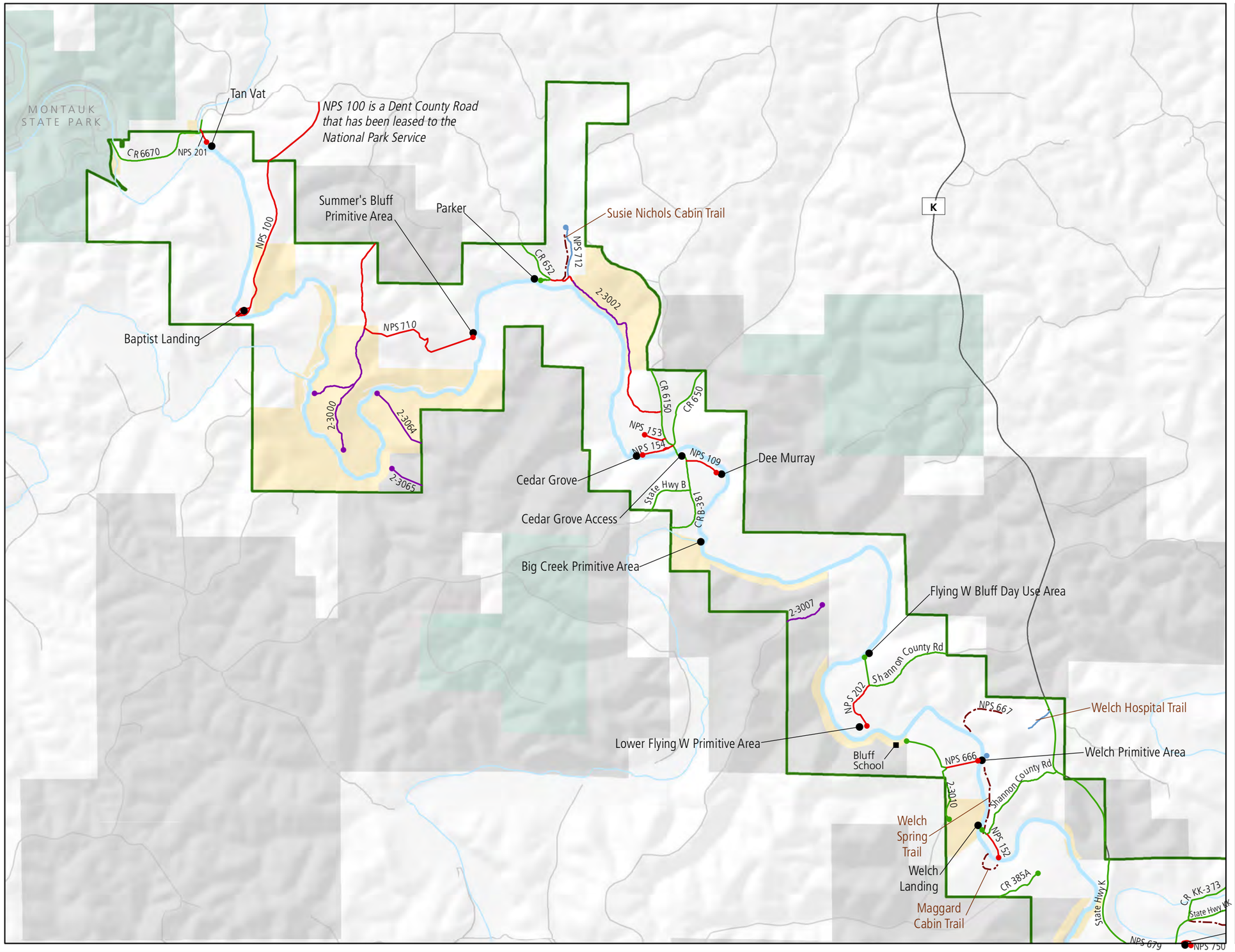
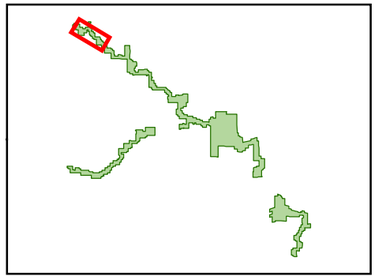


Alternative A

Upper Current - Section 1



Map A - 1

- Recreation Area

Roads - Alternative A

- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Trails - Alternative A

- Existing Hiking Trail

Other Map Features

- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- Park Boundary

0 0.5 1 Miles

North

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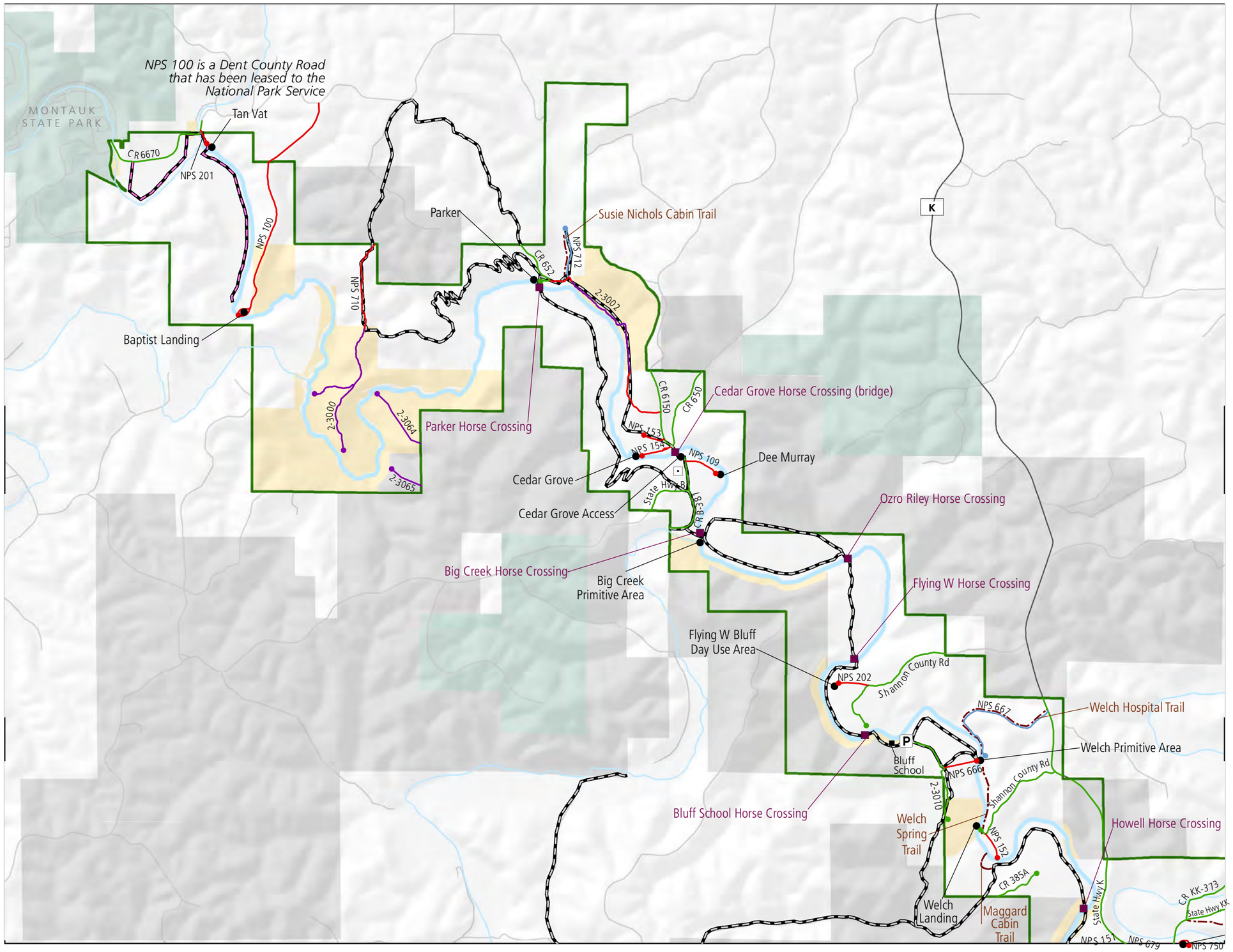
*Select overlapping features have been slightly moved
**Bulbs at end of roads indicate the termination of the road

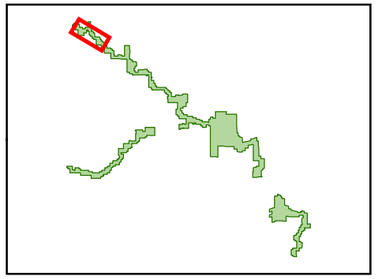
Roads and Trails Management Plan
Preferred Alternative

Ozark National Scenic Riverways
Missouri

National Park Service
U.S Department of the Interior



Alternative B
Upper Current - Section 1



Map B - 1

- Proposed Horse Crossing
- P Proposed Parking
- Proposed Horse Staging Area
- Recreation Area

Roads - Alternative B
- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Proposed Trail - Alternative B
- Hiking
- Hiking, Equestrian

Trails
- Existing Hiking Trail

Other Map Features
- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land

0 0.5 1 Miles

North

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Roads and Trails Management Plan

Ozark National Scenic Riverways
Missouri

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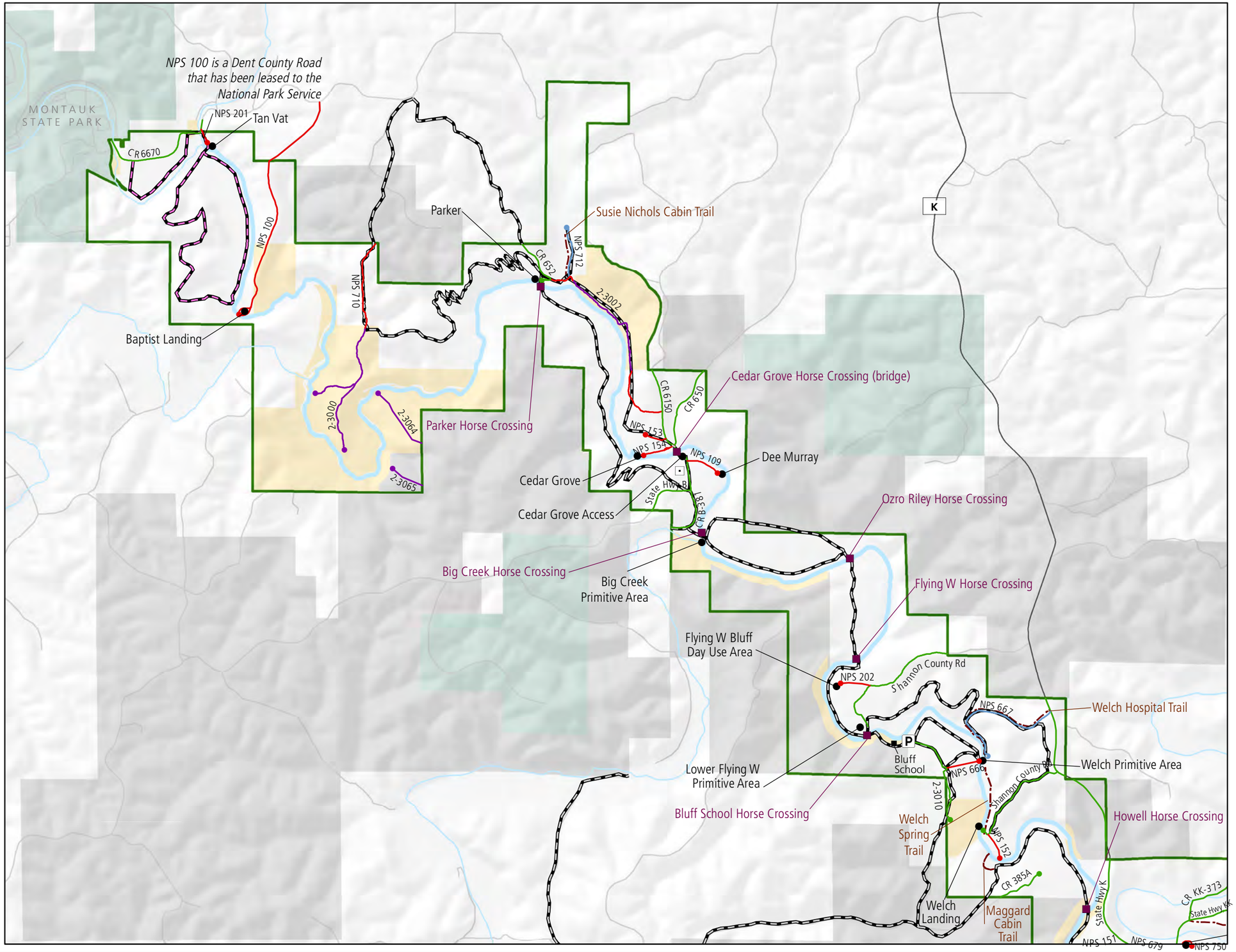
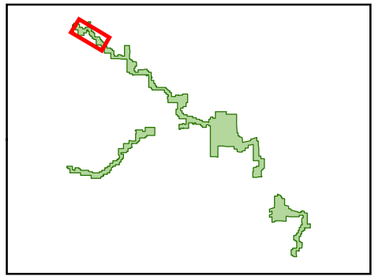


Alternative C

Upper Current - Section 1



Map C - 1

- Proposed Horse Crossing
- P Proposed Parking
- Proposed Horse Staging Area
- Recreation Area

Roads - Alternative C

- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Proposed Trail - Alternative C

- Hiking
- Hiking, Equestrian

Trails

- Existing Hiking Trail

Other Map Features

- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land

0 0.5 1 Miles

North

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Ozark National Scenic Riverways
Missouri

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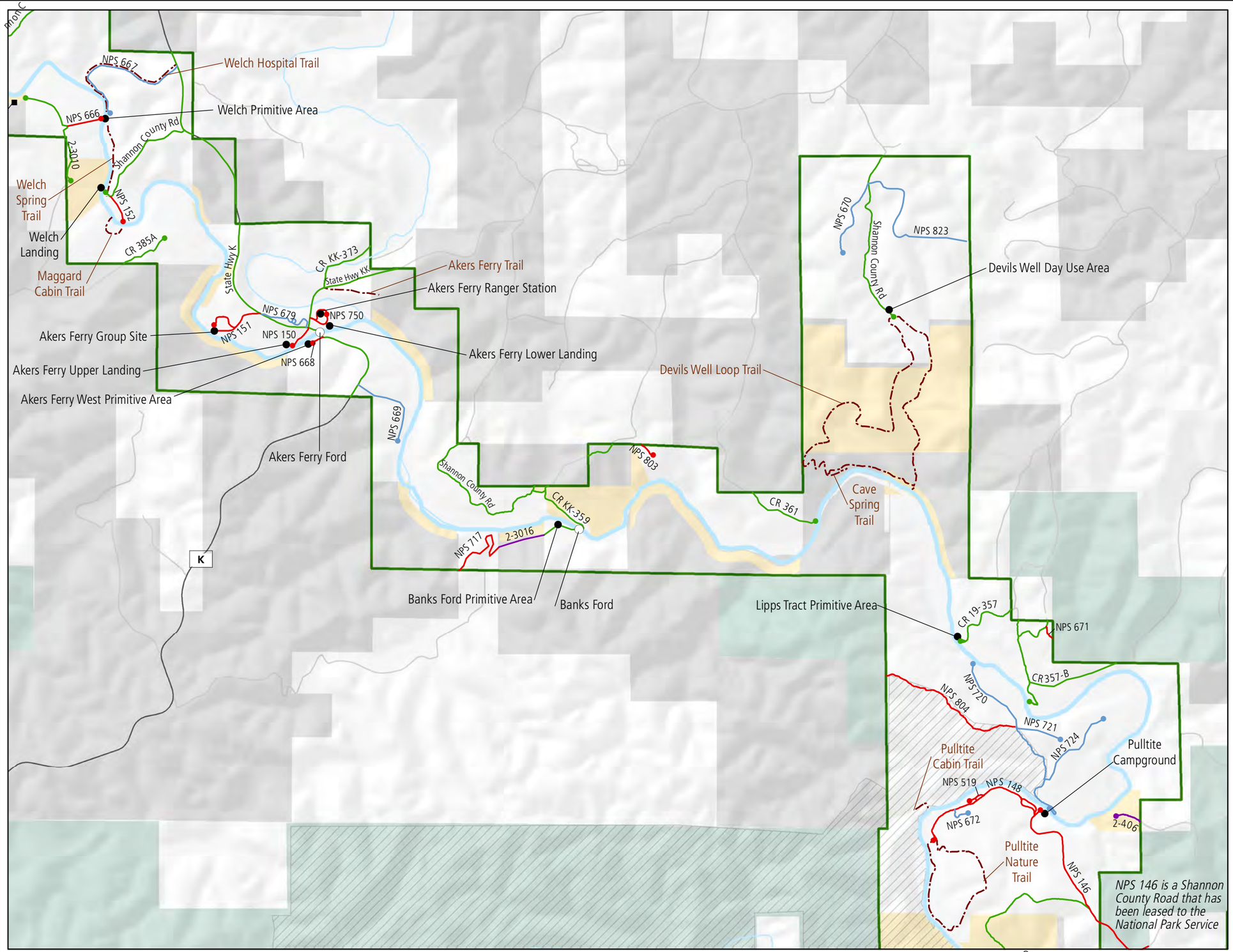
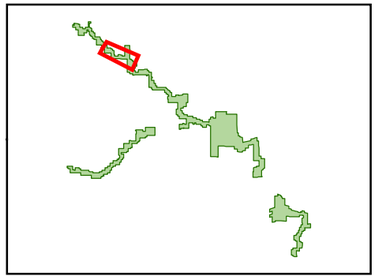


Alternative A

Upper Current - Section 2



Map A - 2

- Ford
- Recreation Area

Roads - Alternative A

- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Trails - Alternative A

- Existing Hiking Trail

Other Map Features

- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area
- Park Boundary

0 0.5 1 Miles

North

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*Select overlapping features have been slightly moved
**Bulbs at end of roads indicate the termination of the road

Roads and Trails Management Plan
Preferred Alternative

Ozark National Scenic Riverways
Missouri

National Park Service
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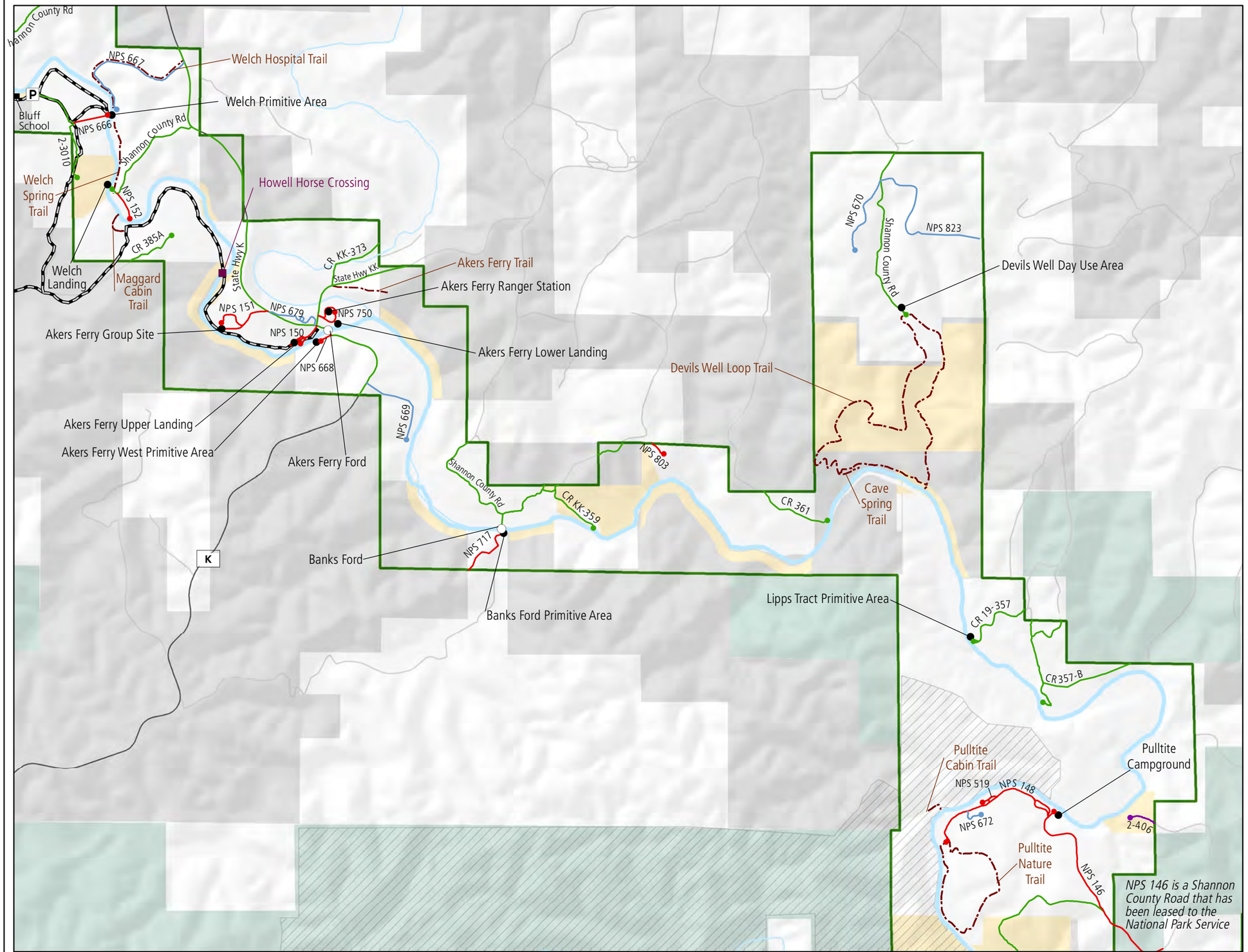
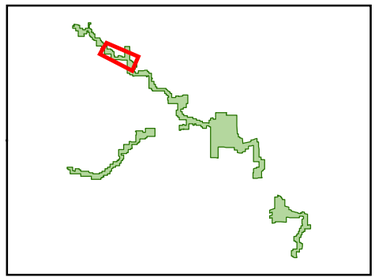


Alternative B
Upper Current - Section 2



Map B - 2

- Ford
- Proposed Horse Crossing
- Proposed Parking
- Recreation Area

Roads - Alternative B
- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Proposed Trail - Alternative B
- Hiking, Equestrian

Trails
- Existing Hiking Trail

Other Map Features
- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

0 0.5 1 Miles

North

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Roads and Trails Management Plan

Ozark National Scenic Riverways
Missouri

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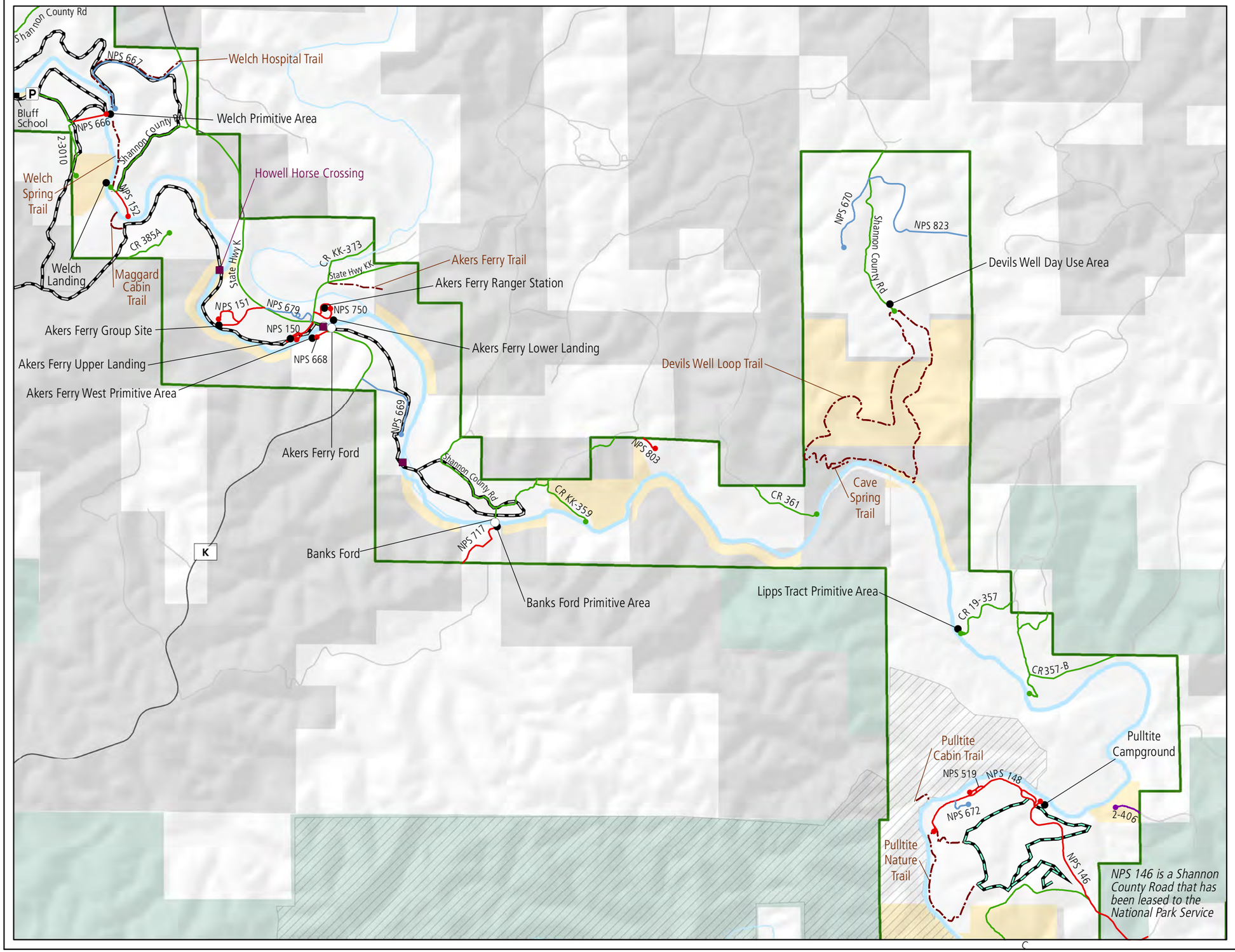
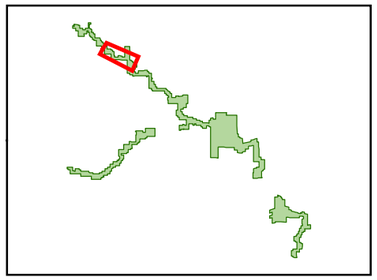


Alternative C

Upper Current - Section 2



Map C - 2

- Ford
- Proposed Horse Crossing
- P Proposed Parking
- Recreation Area

Roads - Alternative C

- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Proposed Trail - Alternative C

- Hiking, Biking
- Hiking, Equestrian

Trails

- Existing Hiking Trail

Other Map Features

- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

0 0.5 1 Miles

North

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Roads and Trails Management Plan

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Missouri

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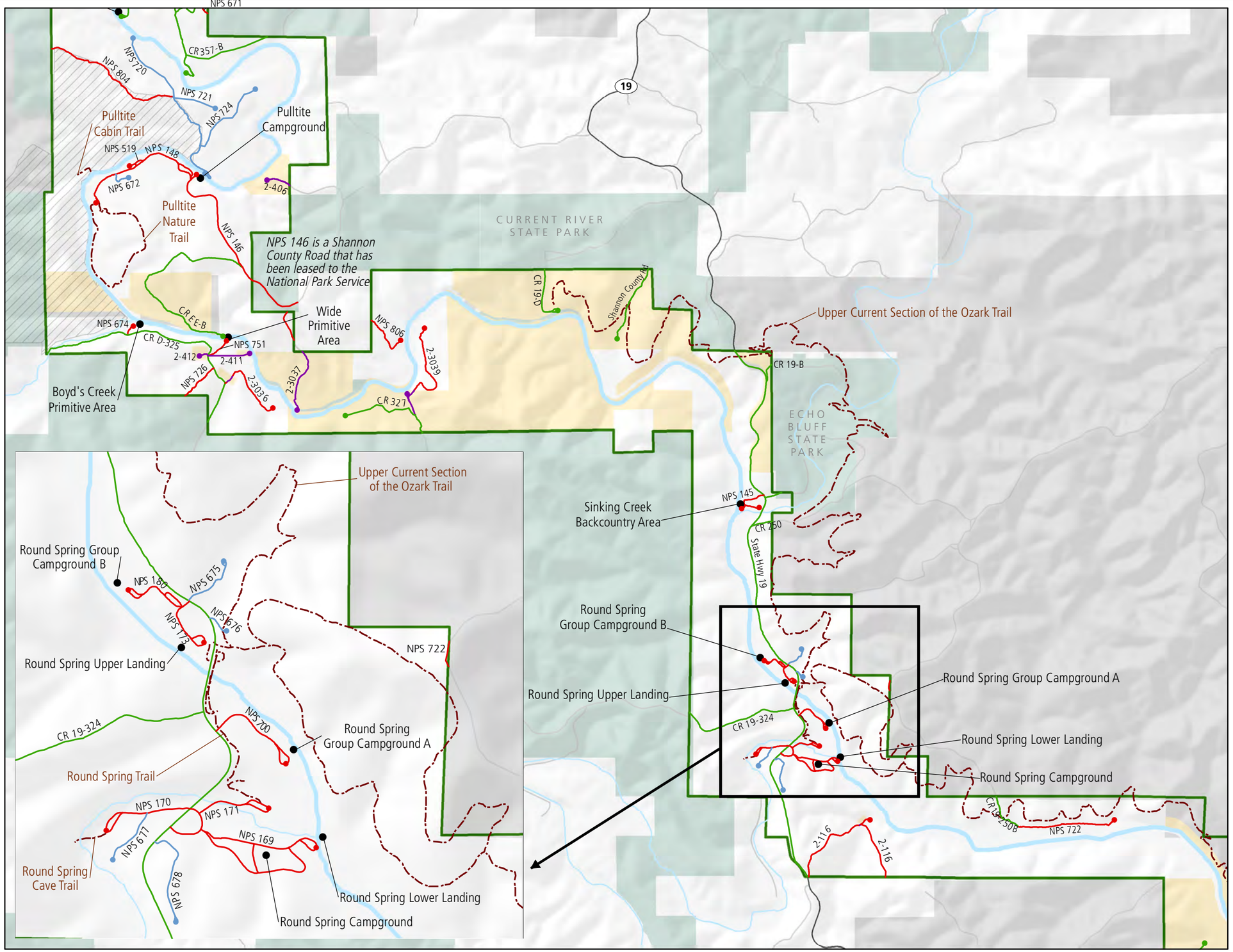
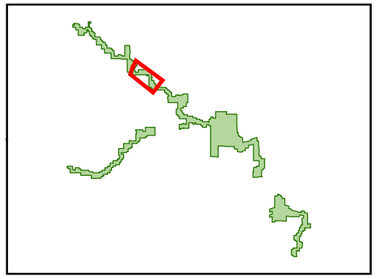


Alternative A

Upper Current - Section 3



Map A - 3

- Recreation Area

Roads - Alternative A

- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Trails - Alternative A

- Existing Hiking Trail

Other Map Features

- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area
- Park Boundary

0 0.5 1 Miles

North

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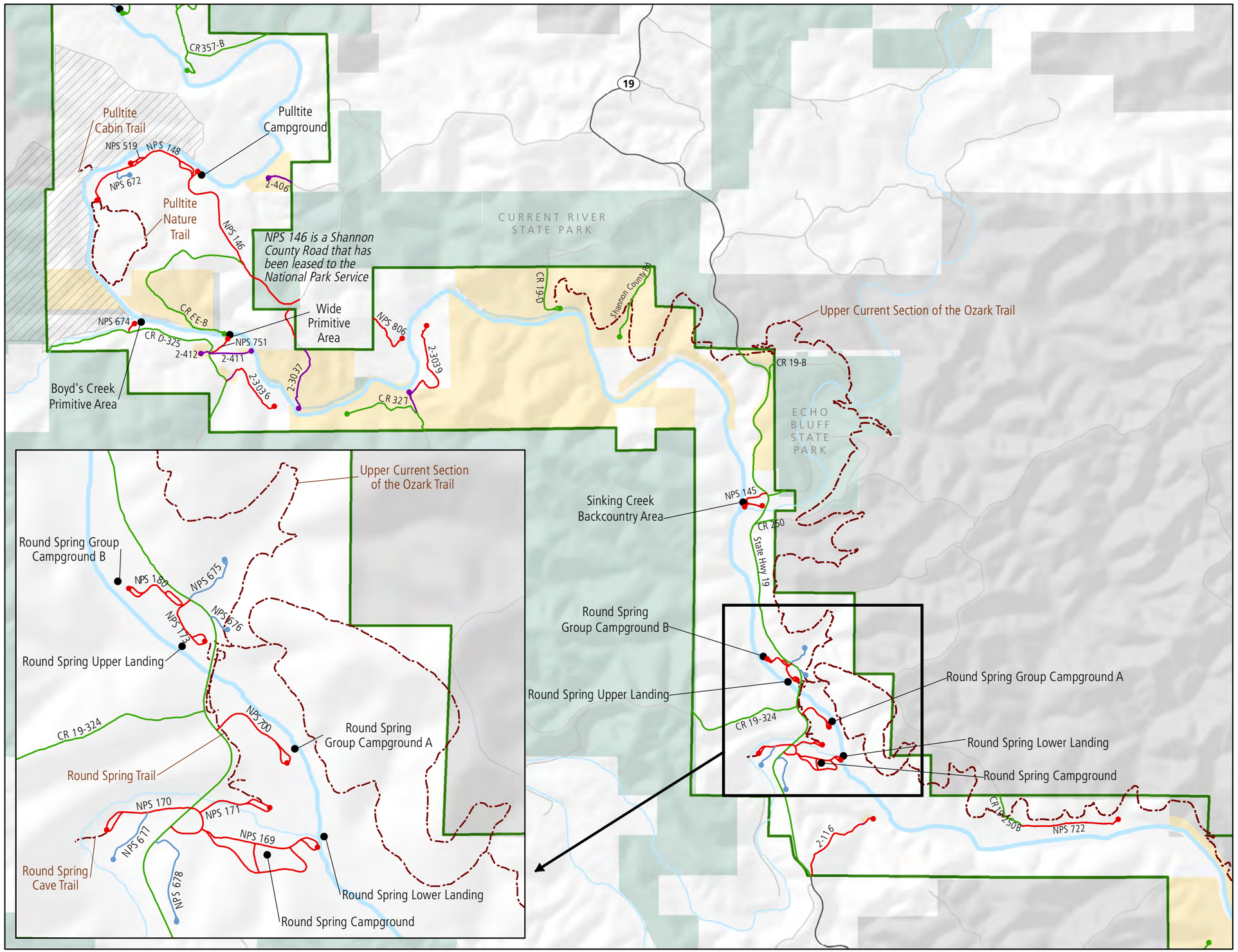
**Bulbs at end of roads indicate the termination of the road

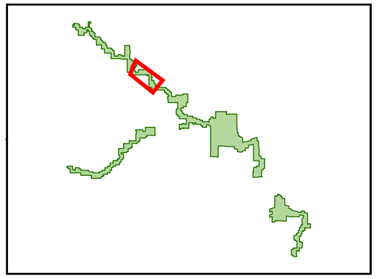
Roads and Trails Management Plan
Preferred Alternative

Ozark National Scenic Riverways
Missouri

National Park Service
U.S Department of the Interior



Alternative B
Upper Current - Section 3



Map B - 3

- Recreation Area

Roads - Alternative B
- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Trails
- Existing Hiking Trail

Other Map Features
- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

0 0.5 1 Miles

North

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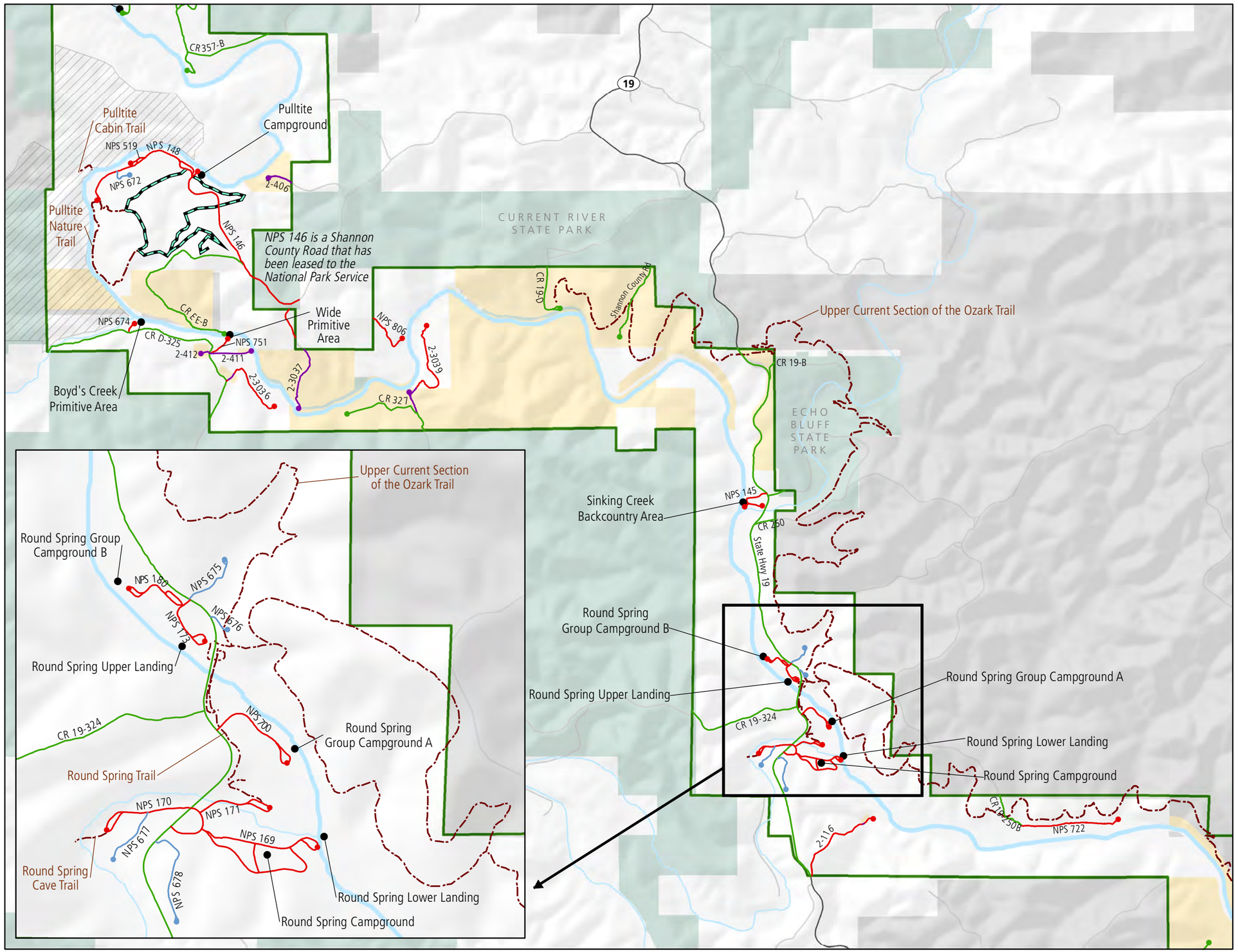
Roads and Trails Management Plan

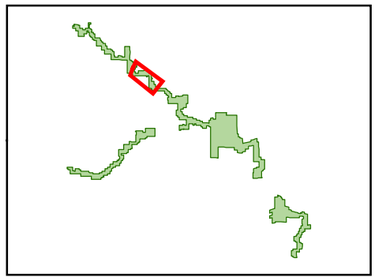
Ozark National Scenic Riverways
Missouri

National Park Service
U.S Department of the Interior



Alternative C

Upper Current - Section 3



Map C - 3

- Recreation Area

Roads - Alternative C
- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Proposed Trail - Alternative C
- Hiking, Biking

Trails
- Existing Hiking Trail

Other Map Features
- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

0 0.5 1 Miles

North

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Roads and Trails Management Plan

Ozark National Scenic Riverways
Missouri

National Park Service
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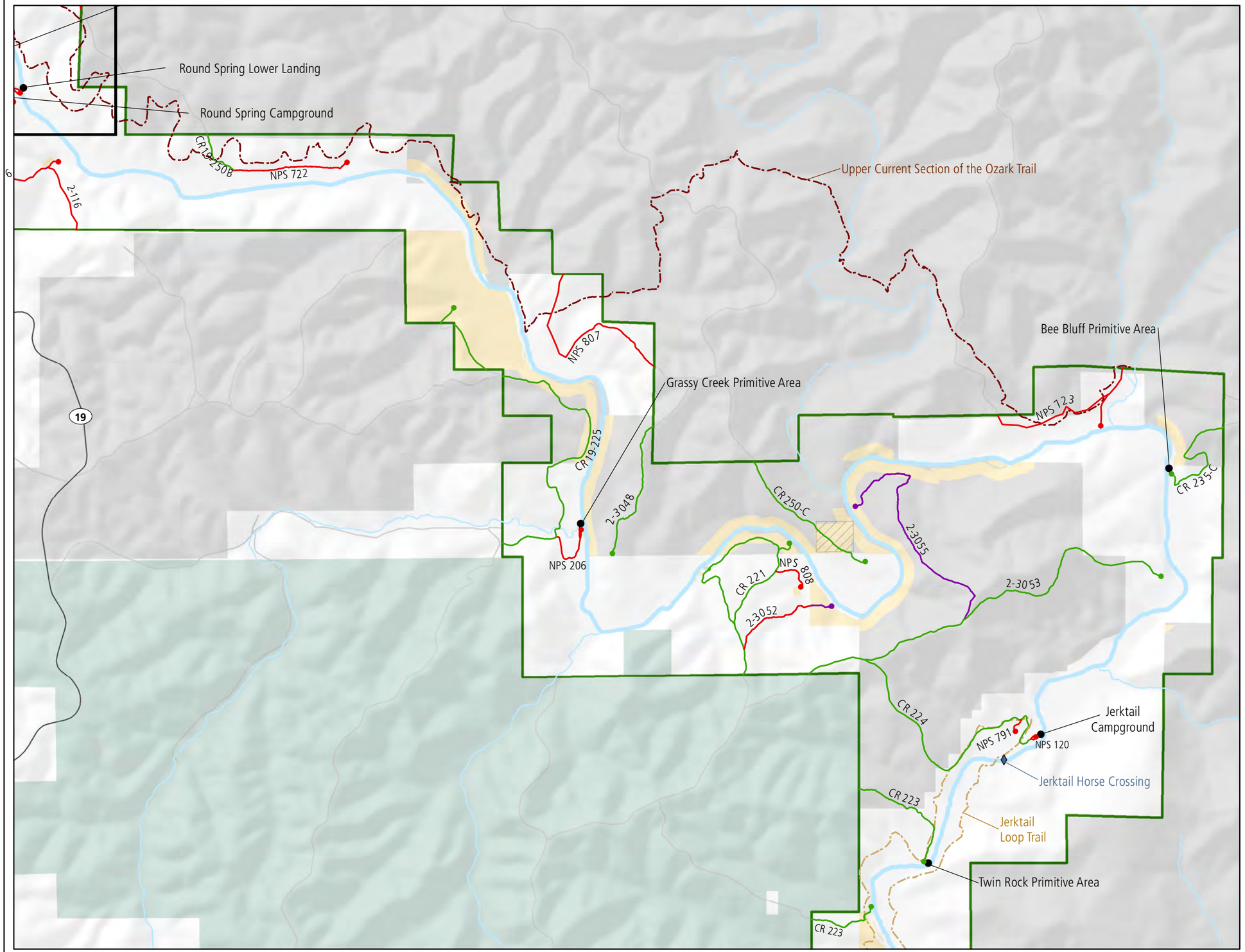
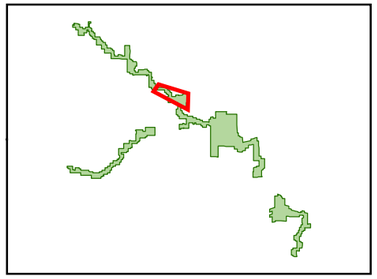


Alternative A

Upper Current - Section 4



Map A - 4

- Existing Horse Crossing
- Recreation Area

Roads - Alternative A

- County/State
- NPS (Open to Public)
- Private

Trails - Alternative A

- Existing Hiking Trail
- Existing Equestrian Trail

Other Map Features

- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area
- Park Boundary

0 0.5 1 Miles

North

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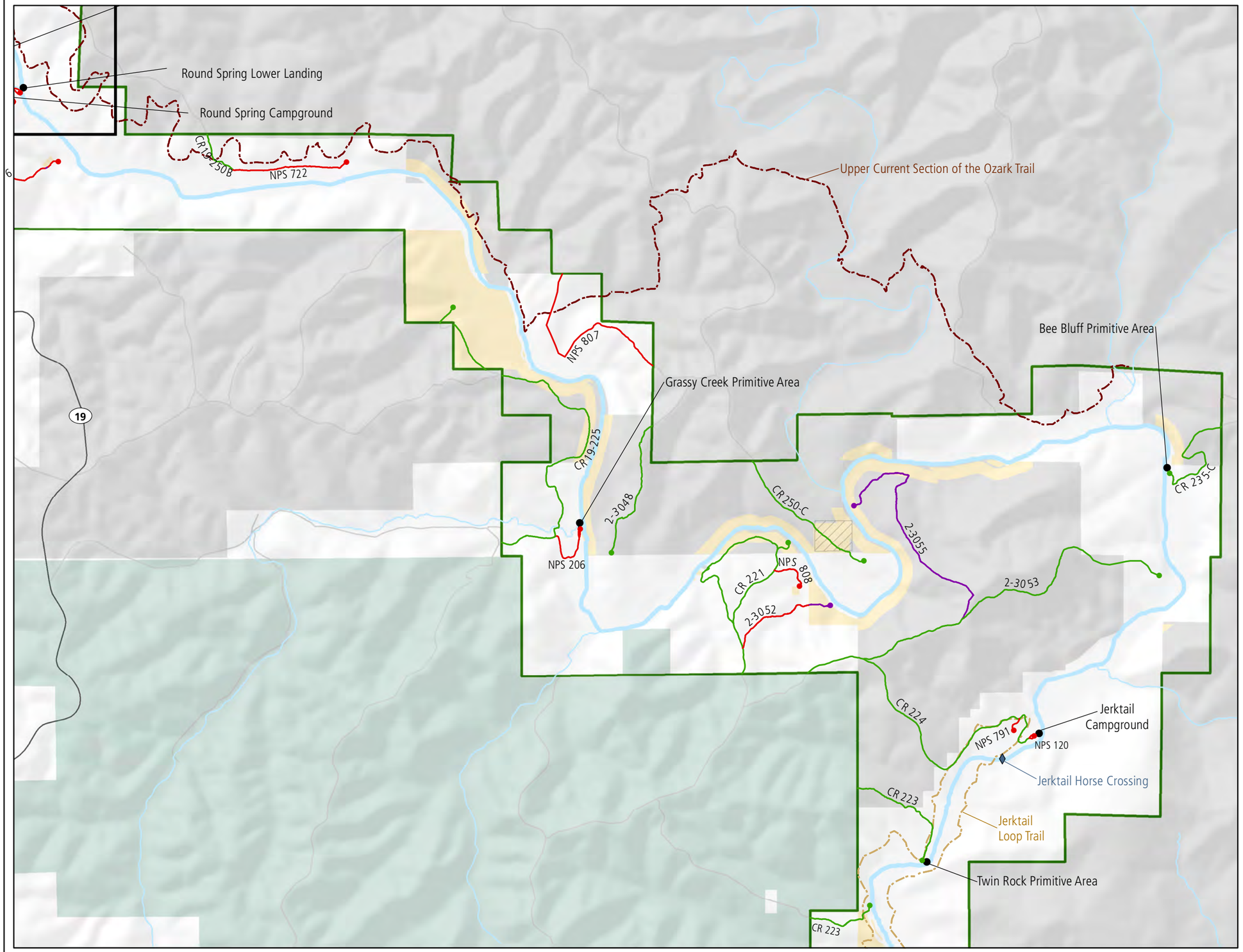
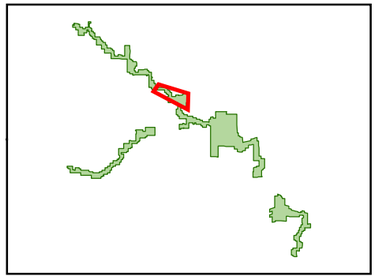
Roads and Trails Management Plan
Preferred Alternative

Ozark National Scenic Riverways
Missouri

National Park Service
U.S Department of the Interior



Alternative B
Upper Current - Section 4



Map B - 4

- Existing Horse Crossing
- Recreation Area

Roads - Alternative B
- County/State
- NPS (Open to Public)
- Private

Trails
- Existing Hiking Trail
- Existing Equestrian Trail

Other Map Features
- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

0 0.5 1 Miles

North

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Roads and Trails Management Plan

Ozark National Scenic Riverways
Missouri

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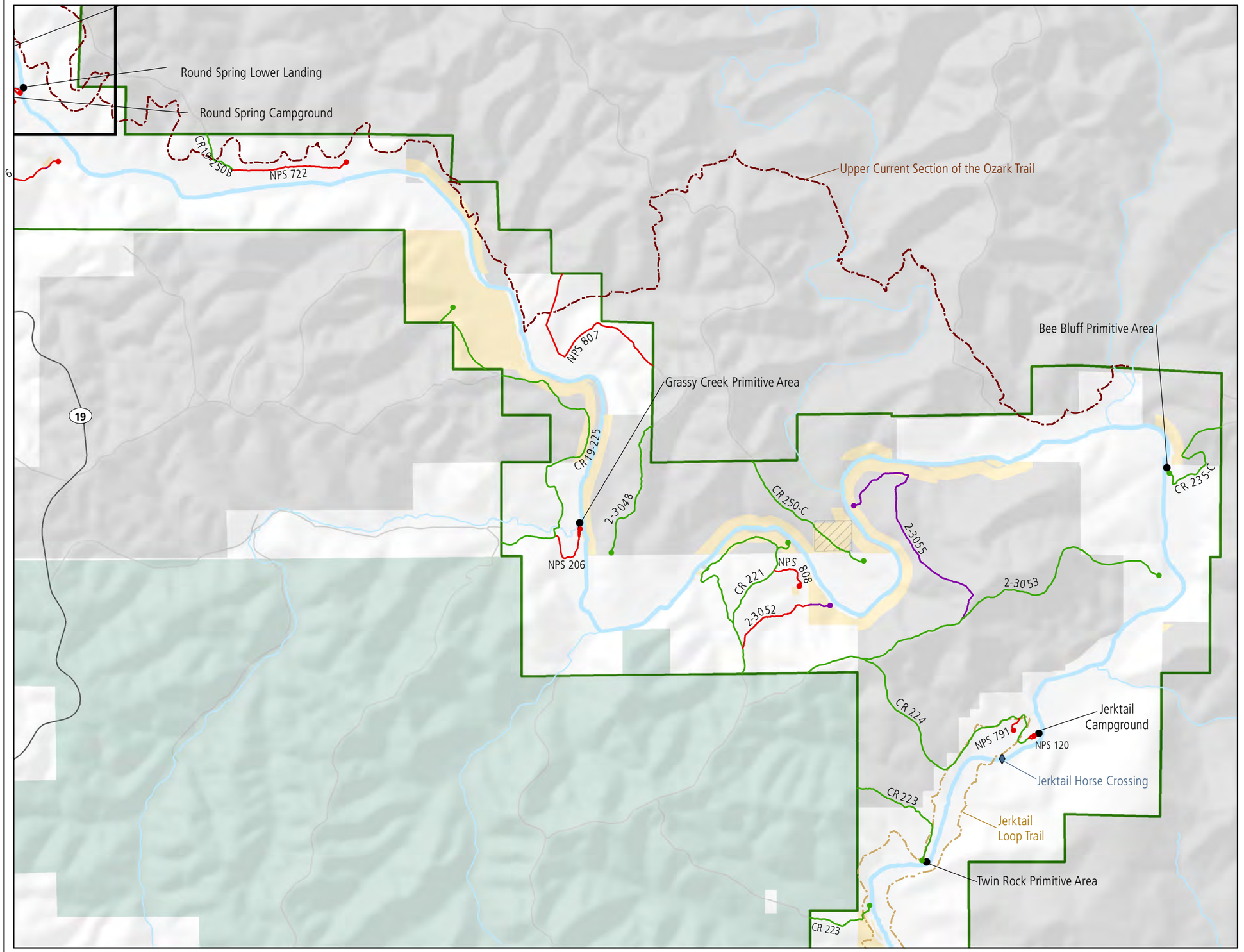
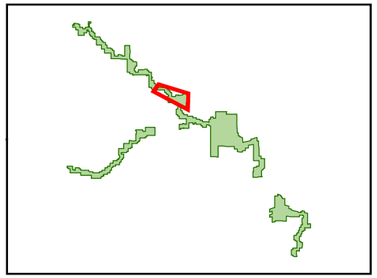


Alternative C

Upper Current - Section 4



Map C - 4

- Existing Horse Crossing
- Recreation Area

Roads - Alternative C

- County/State
- NPS (Open to Public)
- Private

Trails

- Existing Hiking Trail
- Existing Equestrian Trail

Other Map Features

- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

0 0.5 1 Miles

North

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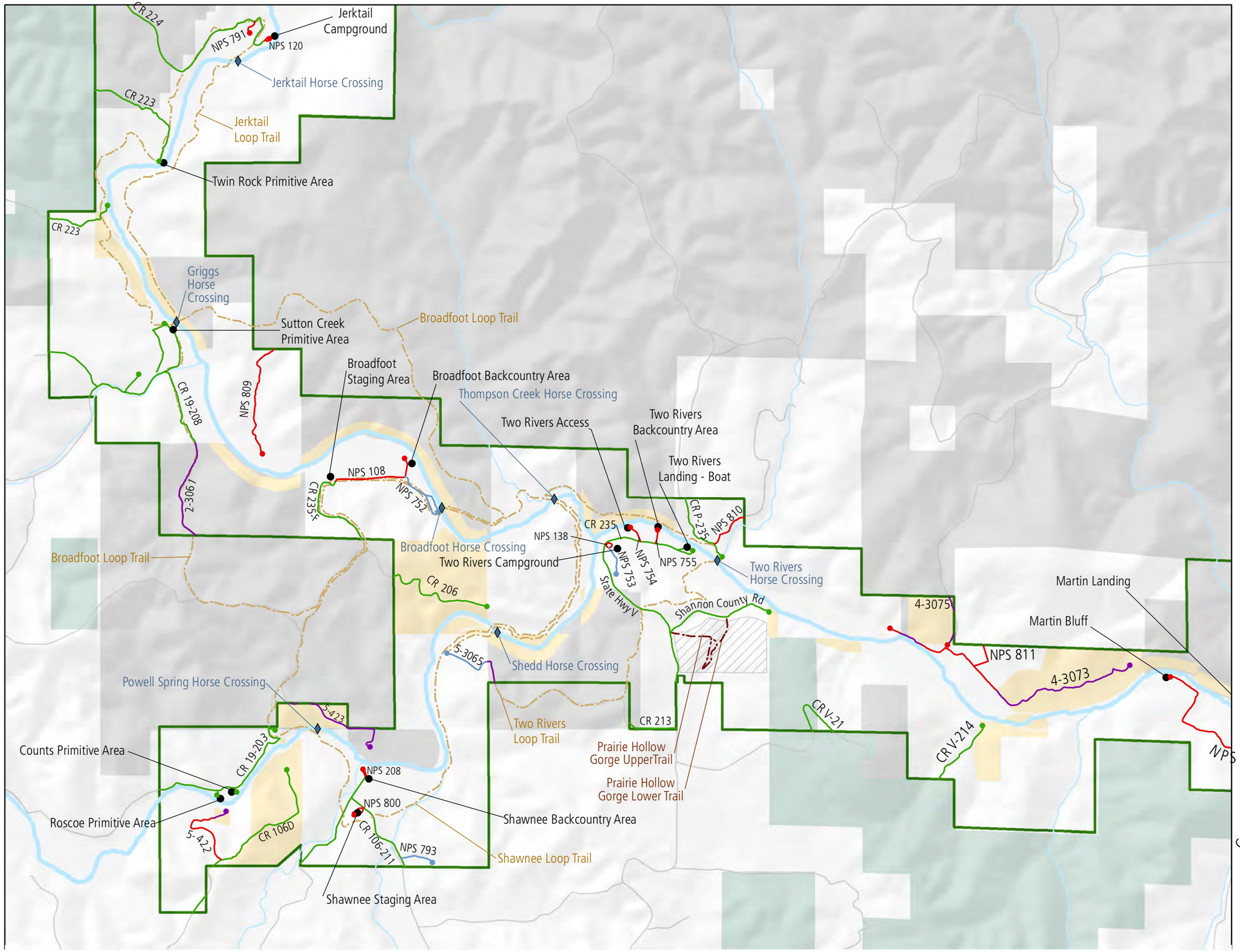
Roads and Trails Management Plan

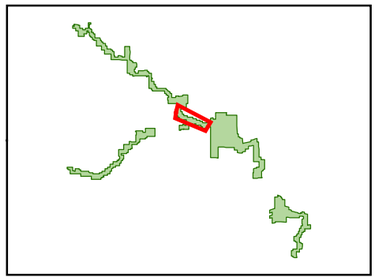
Ozark National Scenic Riverways
Missouri

National Park Service
U.S Department of the Interior



Alternative A

Middle Current - Section 1



Map A - 5

- Existing Horse Crossing
- Recreation Area

Roads - Alternative A

- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Trails - Alternative A

- Existing Hiking Trail
- Existing Equestrian Trail

Other Map Features

- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area
- Park Boundary

0 0.5 1 Miles

North

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Roads and Trails Management Plan
Preferred Alternative

Ozark National Scenic Riverways
Missouri

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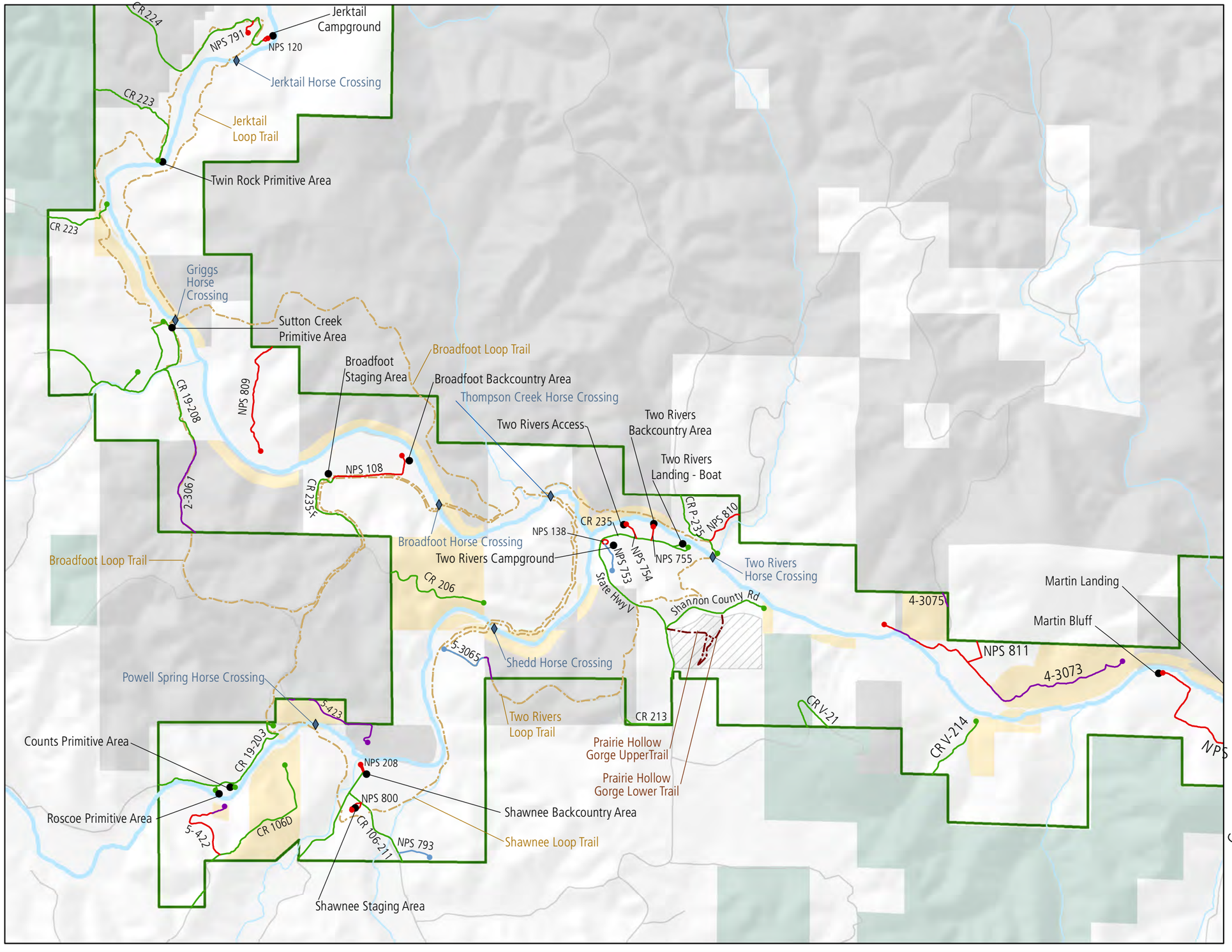
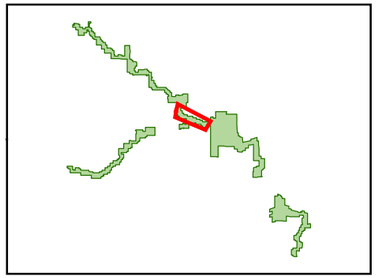


Alternative B
Middle Current - Section 1



Map B - 5

- Existing Horse Crossing
- Recreation Area

Roads - Alternative B
- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Trails
- Existing Hiking Trail
- Existing Equestrian Trail

Other Map Features
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

0 0.5 1 Miles

North

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Roads and Trails Management Plan

Ozark National Scenic Riverways
Missouri

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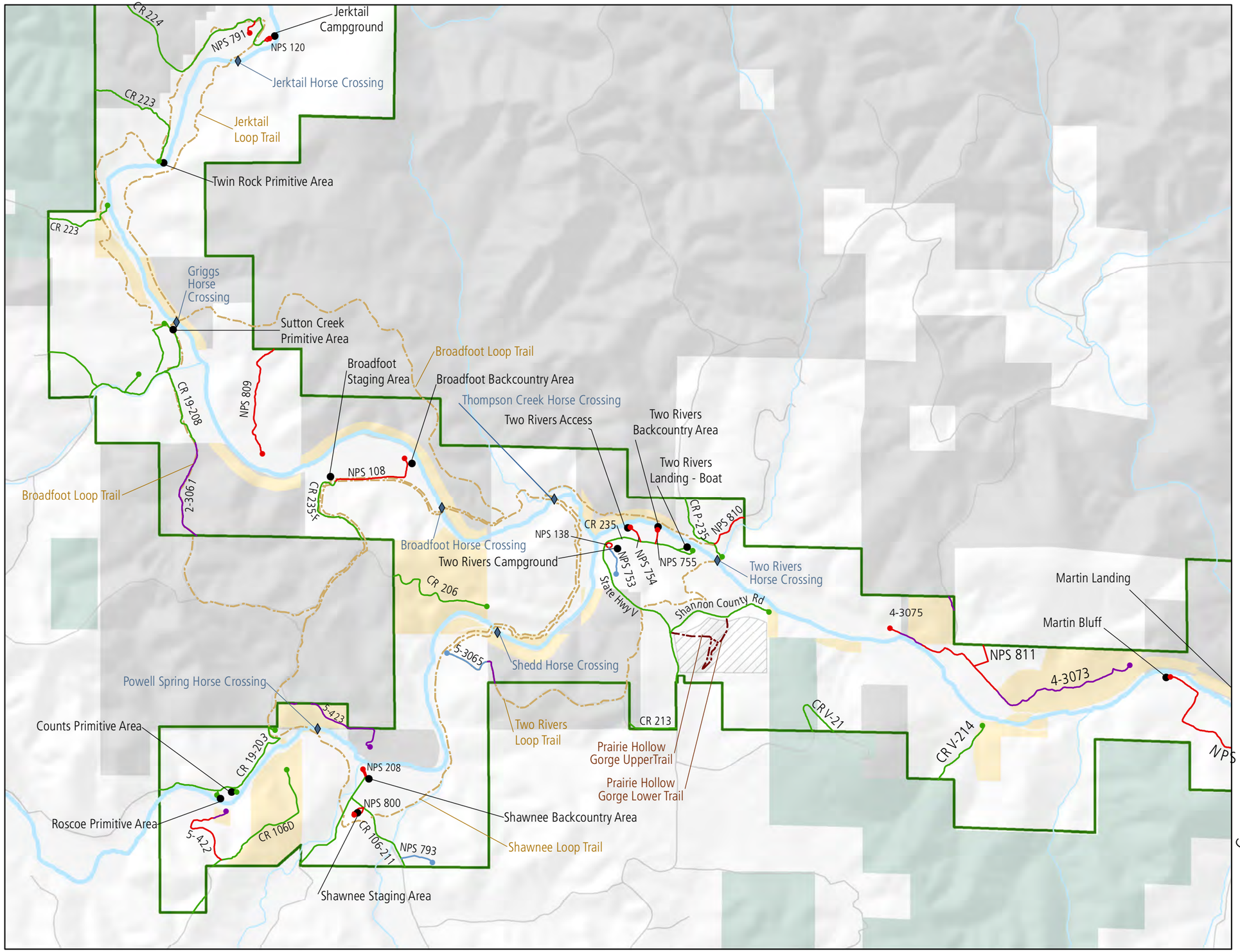
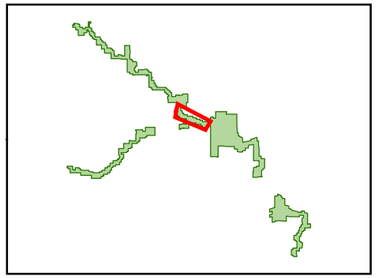


Alternative C

Middle Current - Section 1



Map C - 5

- Existing Horse Crossing
- Recreation Area

Roads - Alternative C

- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Trails

- Existing Hiking Trail
- Existing Equestrian Trail

Other Map Features

- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

0 0.5 1 Miles

North

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Roads and Trails Management Plan

Ozark National Scenic Riverways
Missouri

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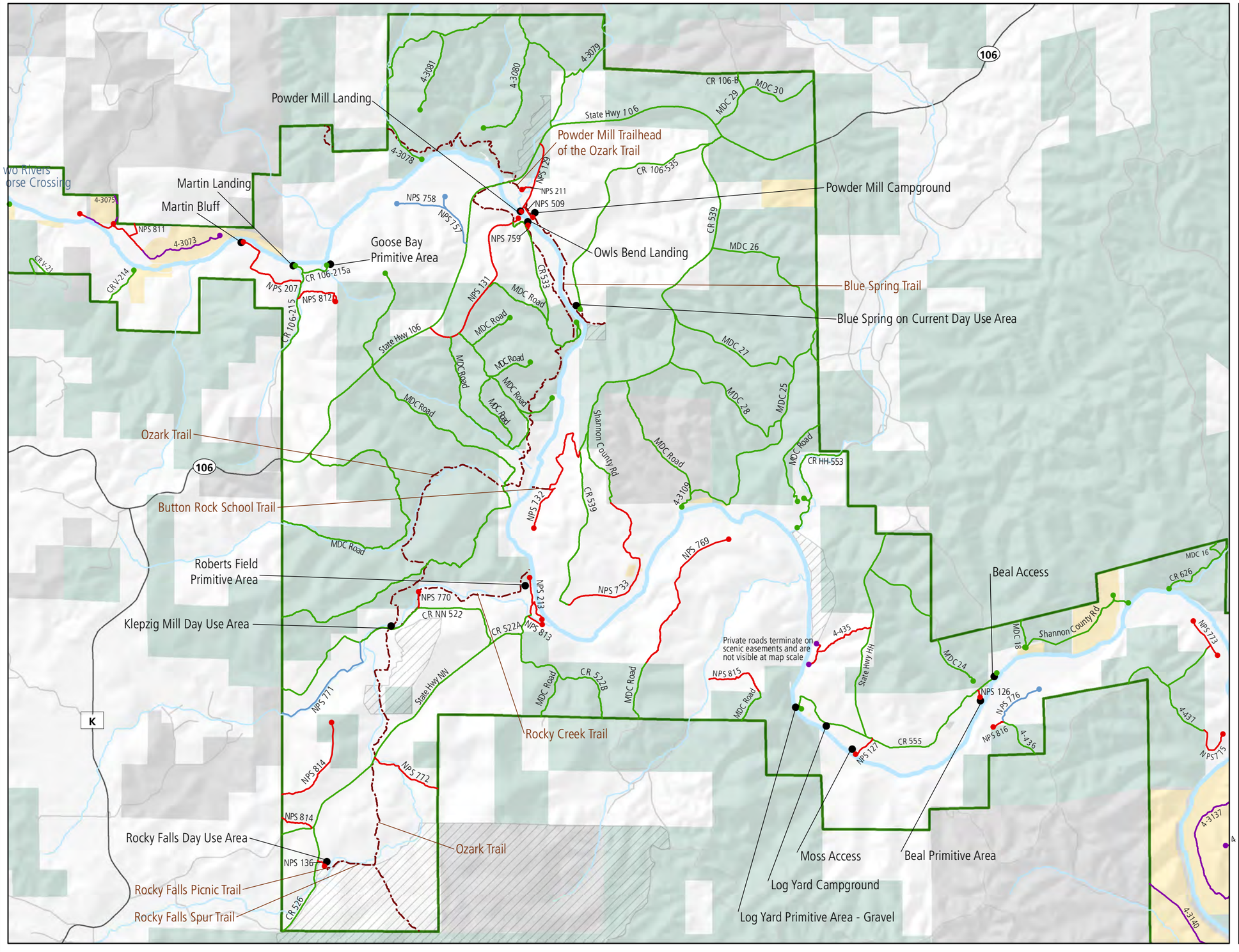
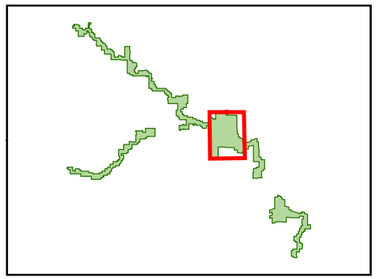
U.S Department of the Interior



Alternative A

Middle Current - Section 2



Map A - 6

- Recreation Area

Roads - Alternative A

- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Trails - Alternative A

- Existing Hiking Trail

Other Map Features

- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area
- Park Boundary

0 0.5 1 Miles

North

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Roads and Trails Management Plan
Preferred Alternative

Ozark National Scenic Riverways
Missouri

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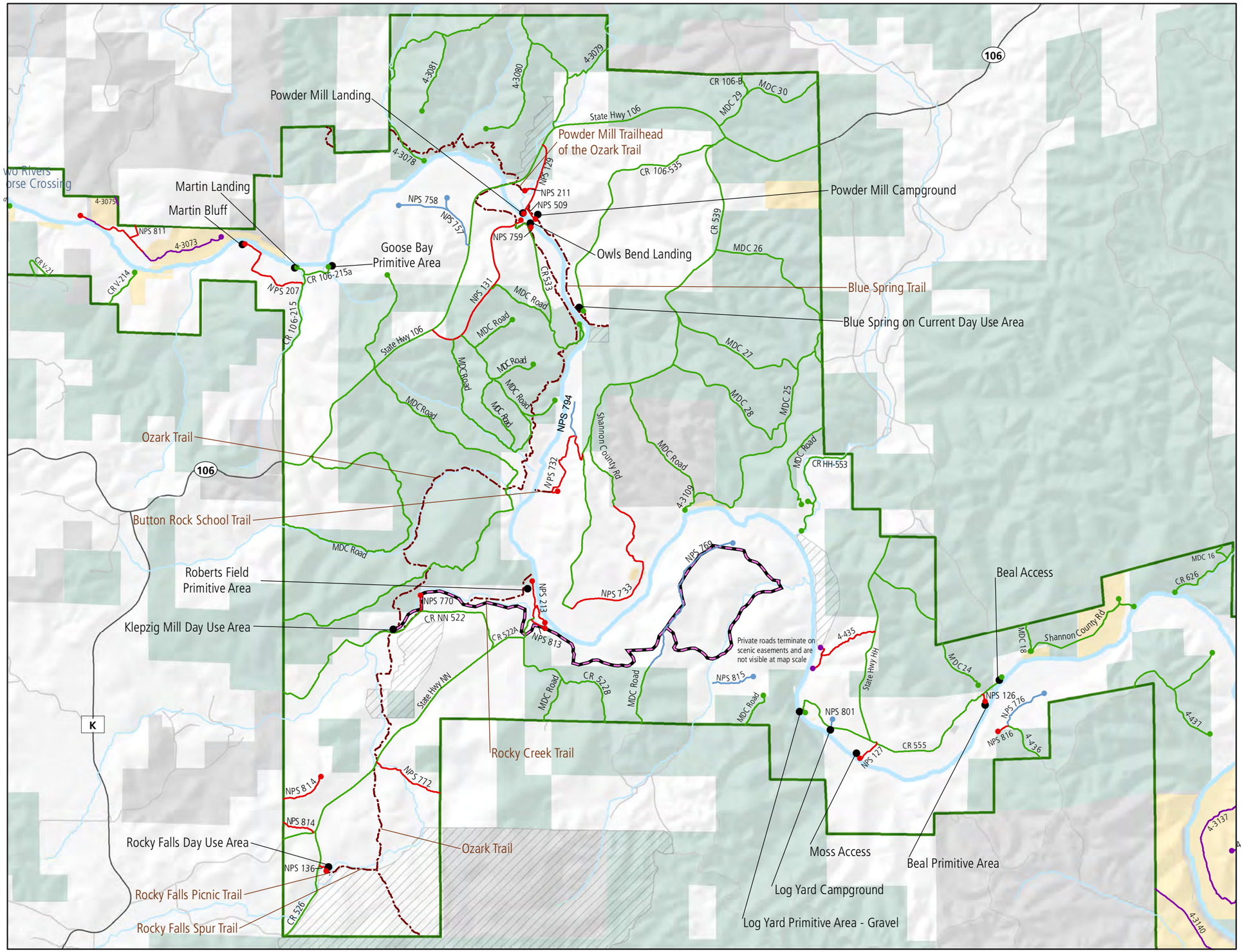
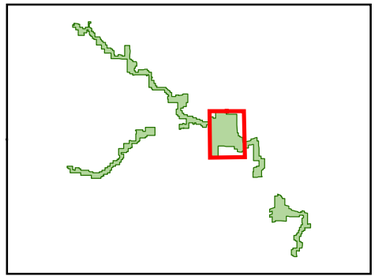
U.S Department of the Interior



Alternative B
Middle Current - Section 2



Map B - 6

- Recreation Area

Roads - Alternative B
- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Proposed Trail - Alternative B
- Hiking

Trails
- Existing Hiking Trail

Other Map Features
- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

0 0.5 1 Miles

North

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Roads and Trails Management Plan

Ozark National Scenic Riverways
Missouri

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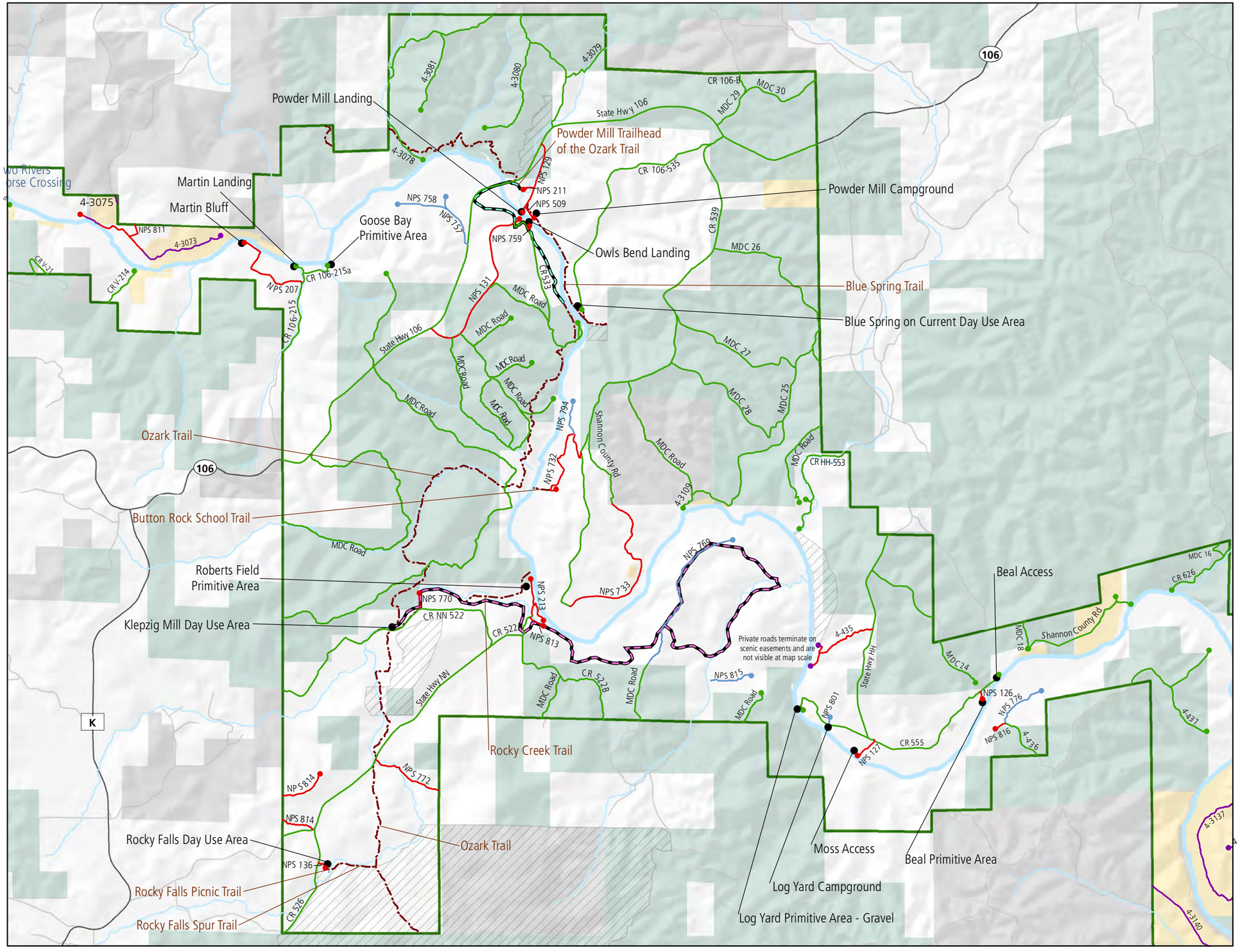
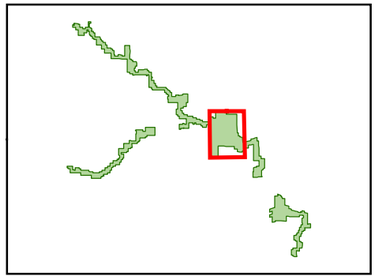


Alternative C

Middle Current - Section 2



Map C - 6

- Recreation Area

Roads - Alternative C
- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Proposed Trail - Alternative C
- Hiking
- Hiking, Biking

Trails
- Existing Hiking Trail

Other Map Features
- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

North

0 0.5 1 Miles

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Roads and Trails Management Plan

Ozark National Scenic Riverways
Missouri

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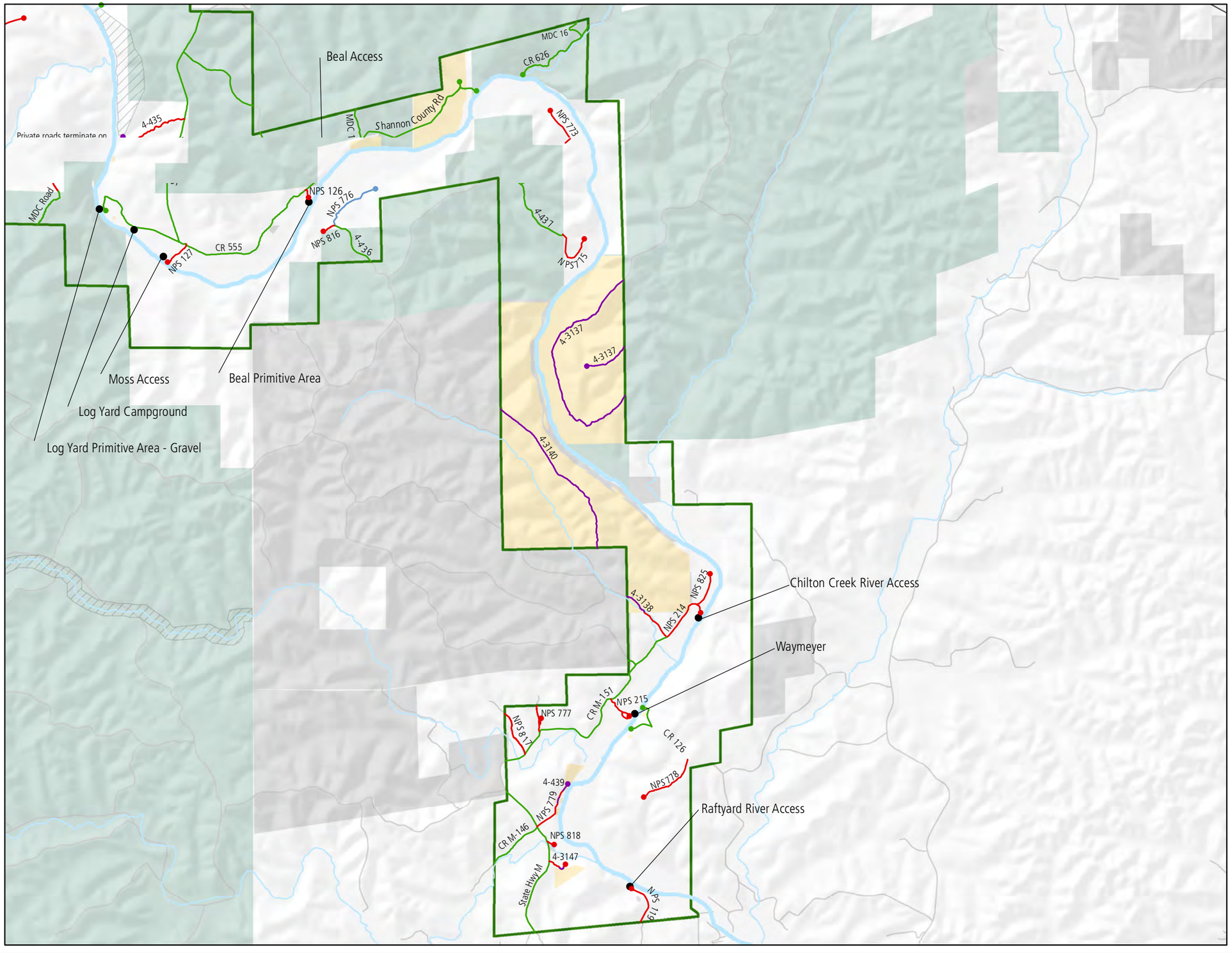
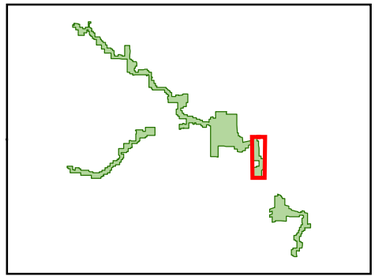


Alternative A

Lower Current - Section 1



Map A - 7

- Recreation Area

Roads - Alternative A

- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Other Map Features

- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area
- Park Boundary

0 0.5 1 Miles

North

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Roads and Trails Management Plan
Preferred Alternative

Ozark National Scenic Riverways
Missouri

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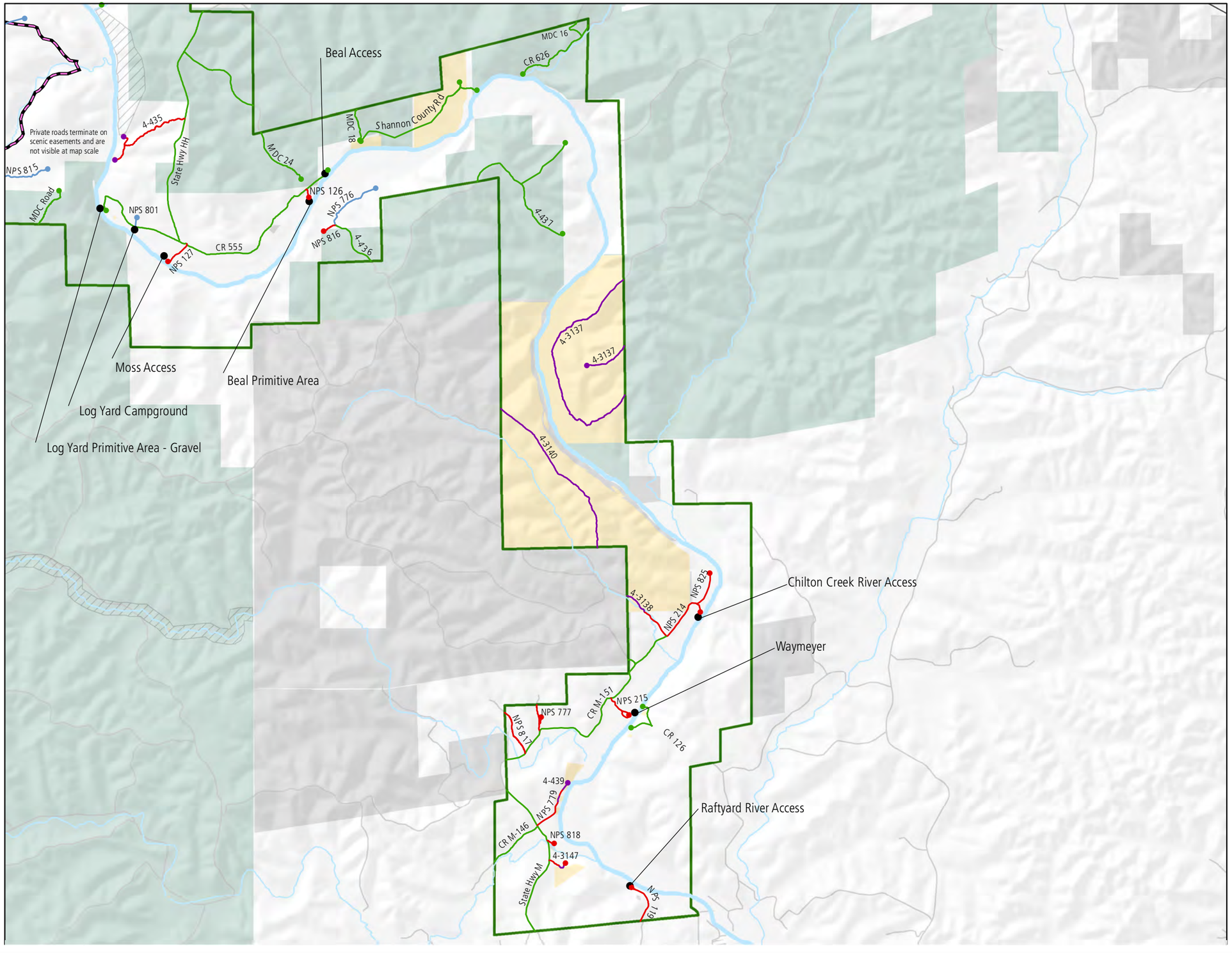
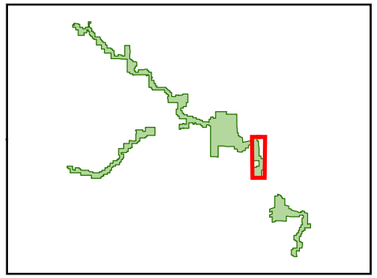
U.S Department of the Interior



Alternative B
Lower Current - Section 1



Map B - 7

- Recreation Area

Roads - Alternative B
- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Proposed Trail - Alternative B
- Hiking

Other Map Features
- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

North

0 0.5 1 Miles

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Roads and Trails Management Plan

Ozark National Scenic Riverways
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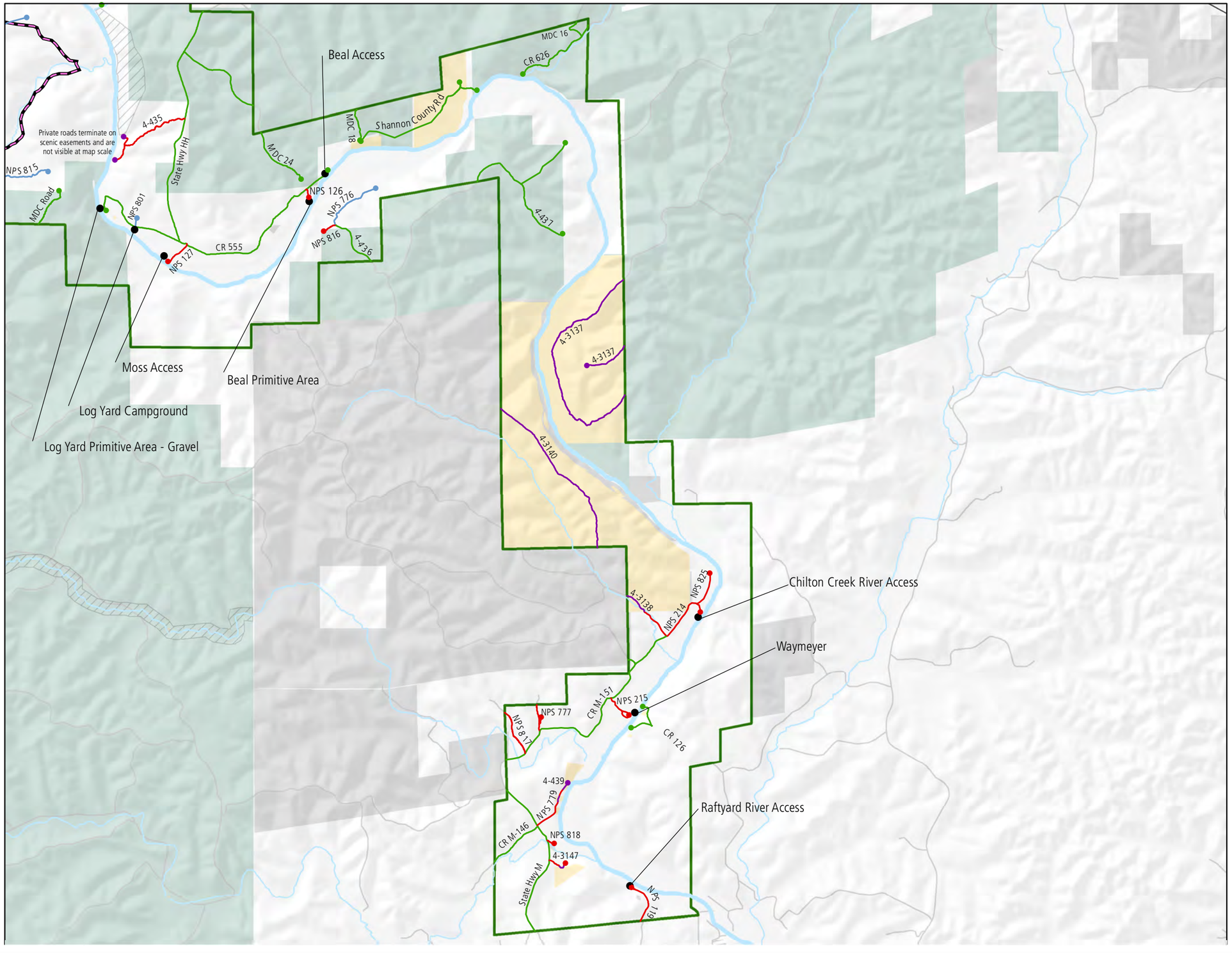
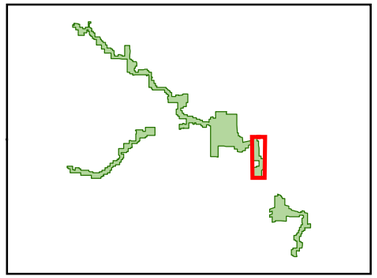


Alternative C

Lower Current - Section 1



Map C - 7

- Recreation Area

Roads - Alternative C

- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Proposed Trail - Alternative C

- Hiking

Other Map Features

- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

North

0 0.5 1 Miles

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Roads and Trails Management Plan

Ozark National Scenic Riverways
Missouri

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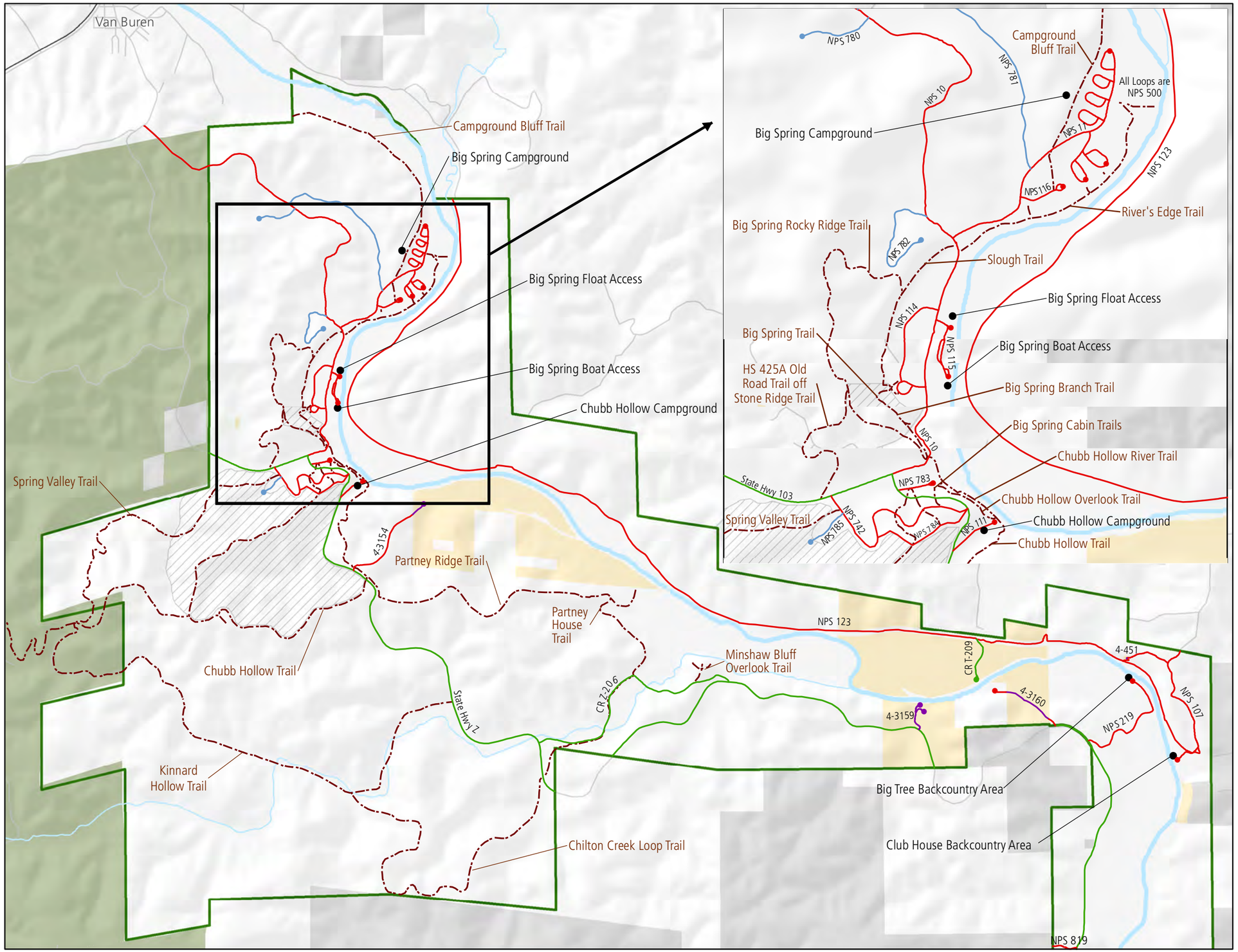
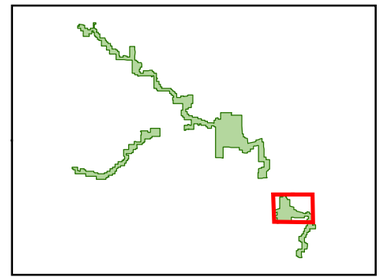


Alternative A

Lower Current - Section 2



Map A - 8

- Recreation Area

Roads - Alternative A

- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Trails - Alternative A

- Existing Hiking Trail

Other Map Features

- Major Road
- Road
- River
- Scenic Easement
- Private Land
- State Natural Area
- Mark Twain National Forest
- Park Boundary

0 0.5 1 Miles

North

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Roads and Trails Management Plan
Preferred Alternative

Ozark National Scenic Riverways
Missouri

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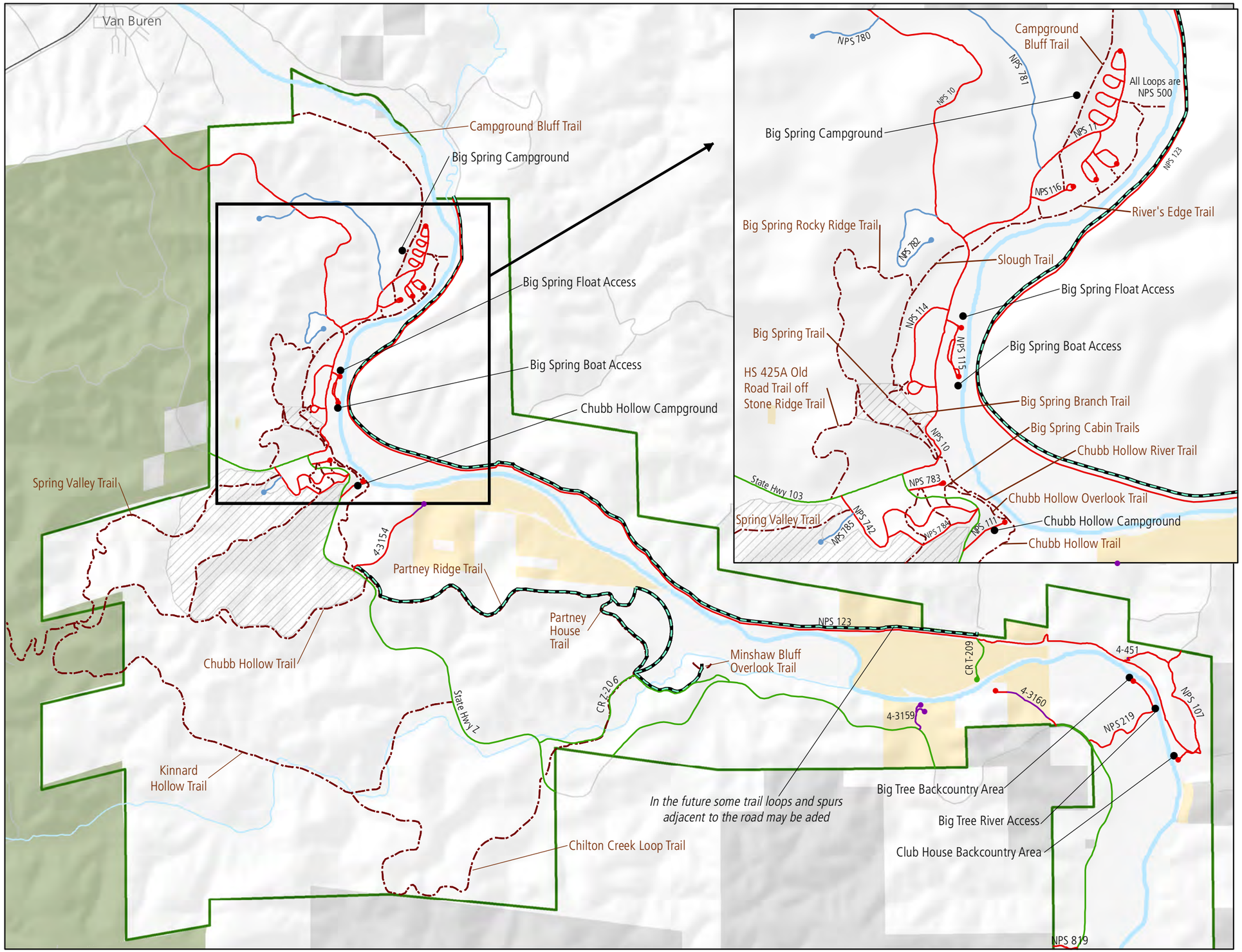
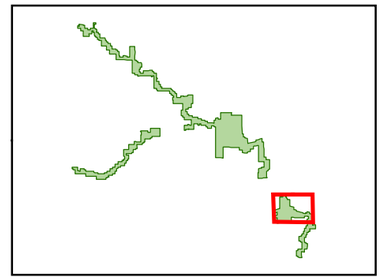


Alternative B
Lower Current - Section 2



Map B - 8

- Recreation Area

Roads - Alternative B
- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Proposed Trail - Alternative B
- Hiking, Biking

Trails
- Existing Hiking Trail

Other Map Features
- Major Road
- Road
- River
- Scenic Easement
- Private Land
- State Natural Area
- Mark Twain National Forest

0 0.5 1 Miles

North

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Ozark National Scenic Riverways
Missouri

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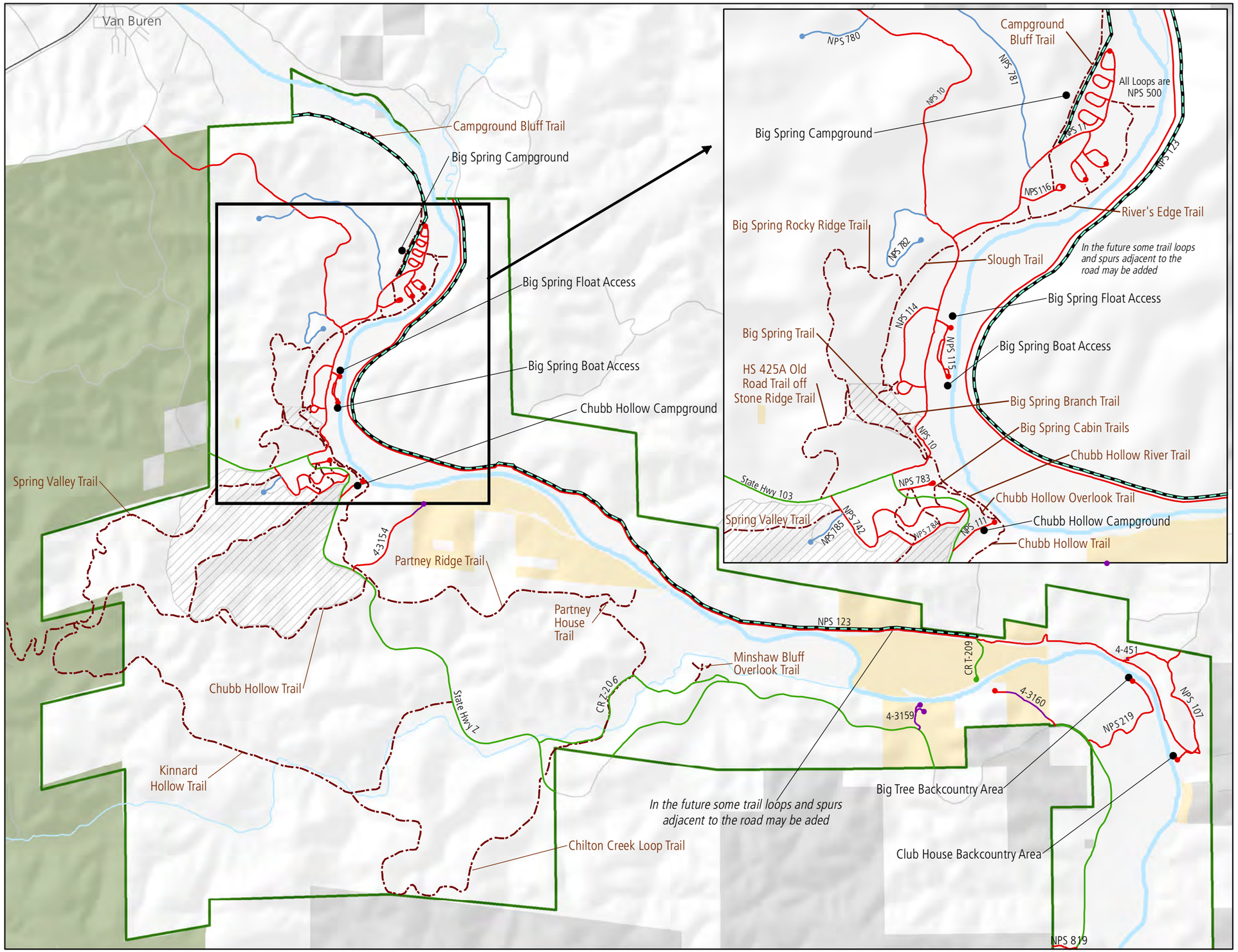
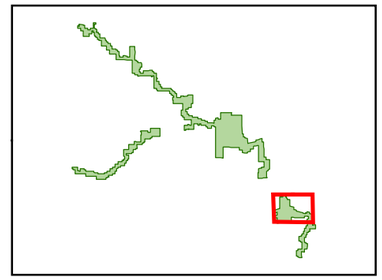


Alternative C

Lower Current - Section 2



Map C - 8

- Recreation Area

Roads - Alternative C
- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Proposed Trail - Alternative C
- Hiking, Biking

Trails
- Existing Hiking Trail

Other Map Features
- Major Road
- Road
- River
- Scenic Easement
- Private Land
- State Natural Area
- Mark Twain National Forest

0 0.5 1 Miles

North

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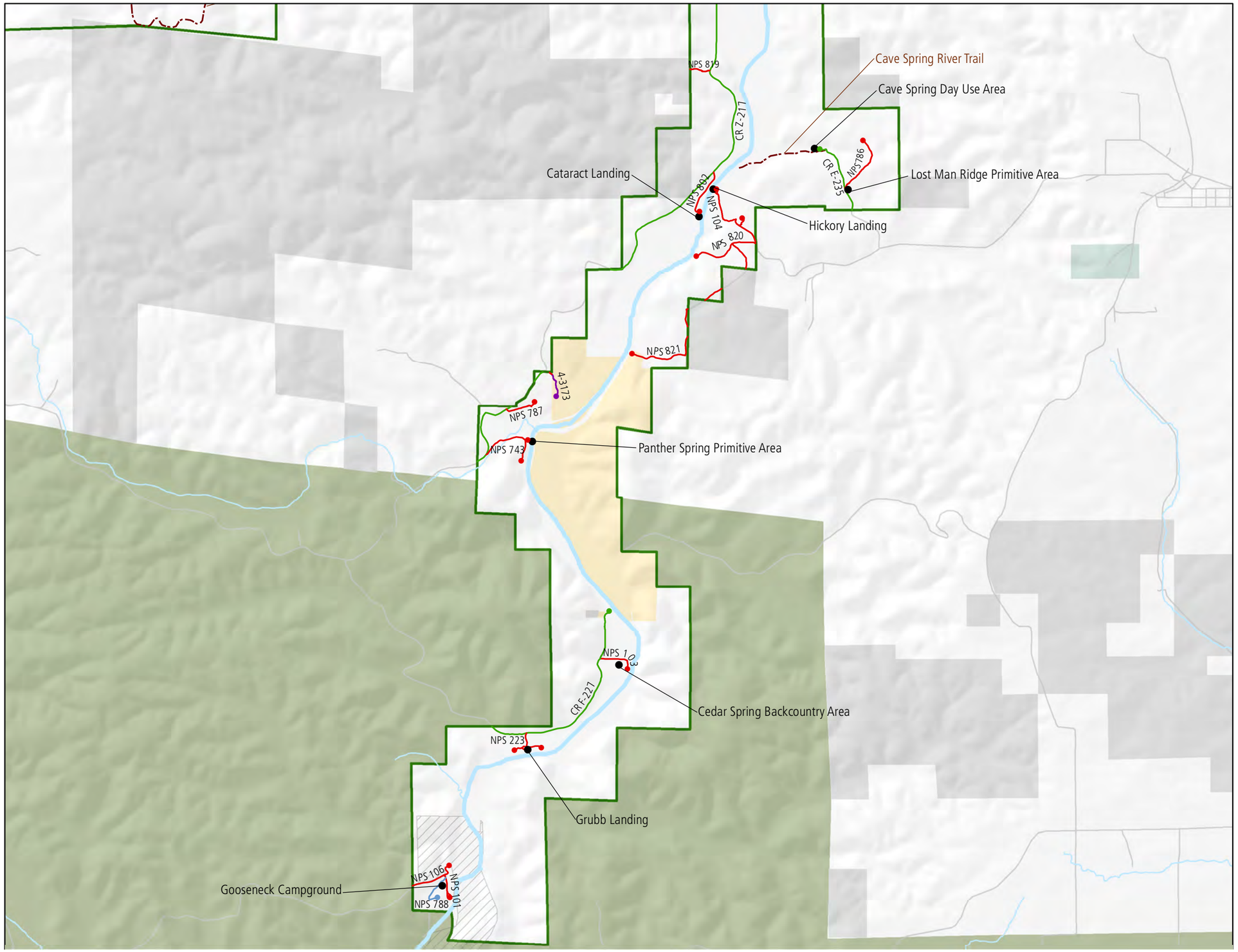
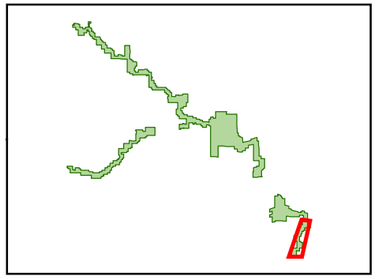
Ozark National Scenic Riverways
Missouri

National Park Service
U.S Department of the Interior



Alternative A

Lower Current - Section 3



Map A - 9

- Recreation Area

Roads - Alternative A

- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Trails - Alternative A

- Existing Hiking Trail

Other Map Features

- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area
- Mark Twain National Forest
- Park Boundary

0 0.5 1 Miles

North

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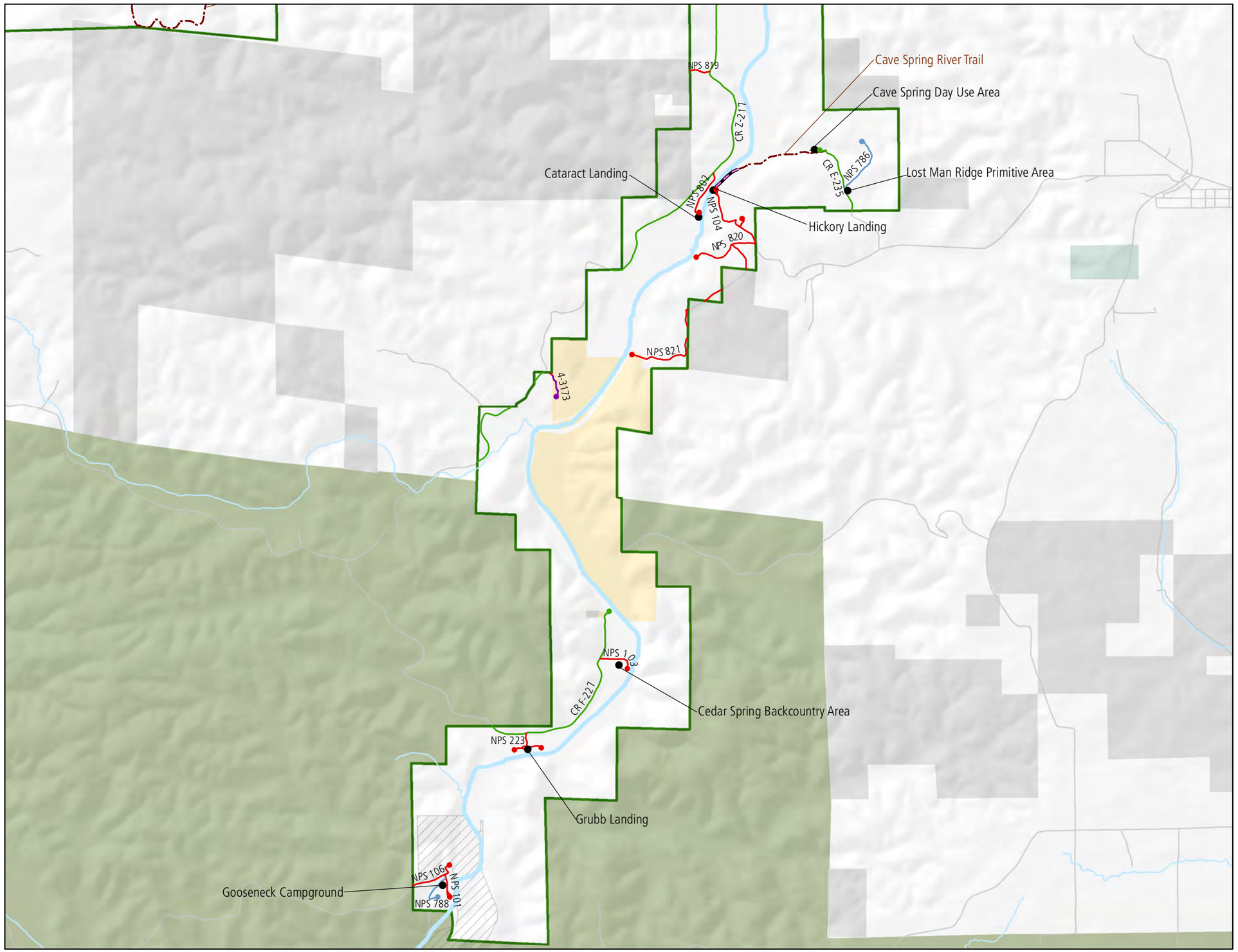
*Select overlapping features have been slightly moved
**Bulbs at end of roads indicate the termination of the road

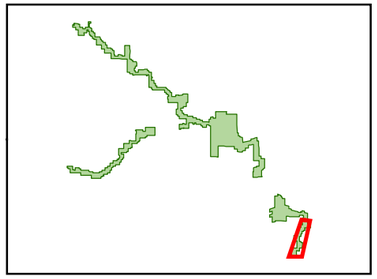
Roads and Trails Management Plan
Preferred Alternative

Ozark National Scenic Riverways
Missouri

National Park Service
U.S Department of the Interior



Alternative B
Lower Current - Section 3



Map B - 9

- Recreation Area

Roads - Alternative B
- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Proposed Trail - Alternative B
- Hiking

Trails
- Existing Hiking Trail

Other Map Features
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area
- Mark Twain National Forest

North

0 0.5 1 Miles

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Roads and Trails Management Plan

Ozark National Scenic Riverways
Missouri

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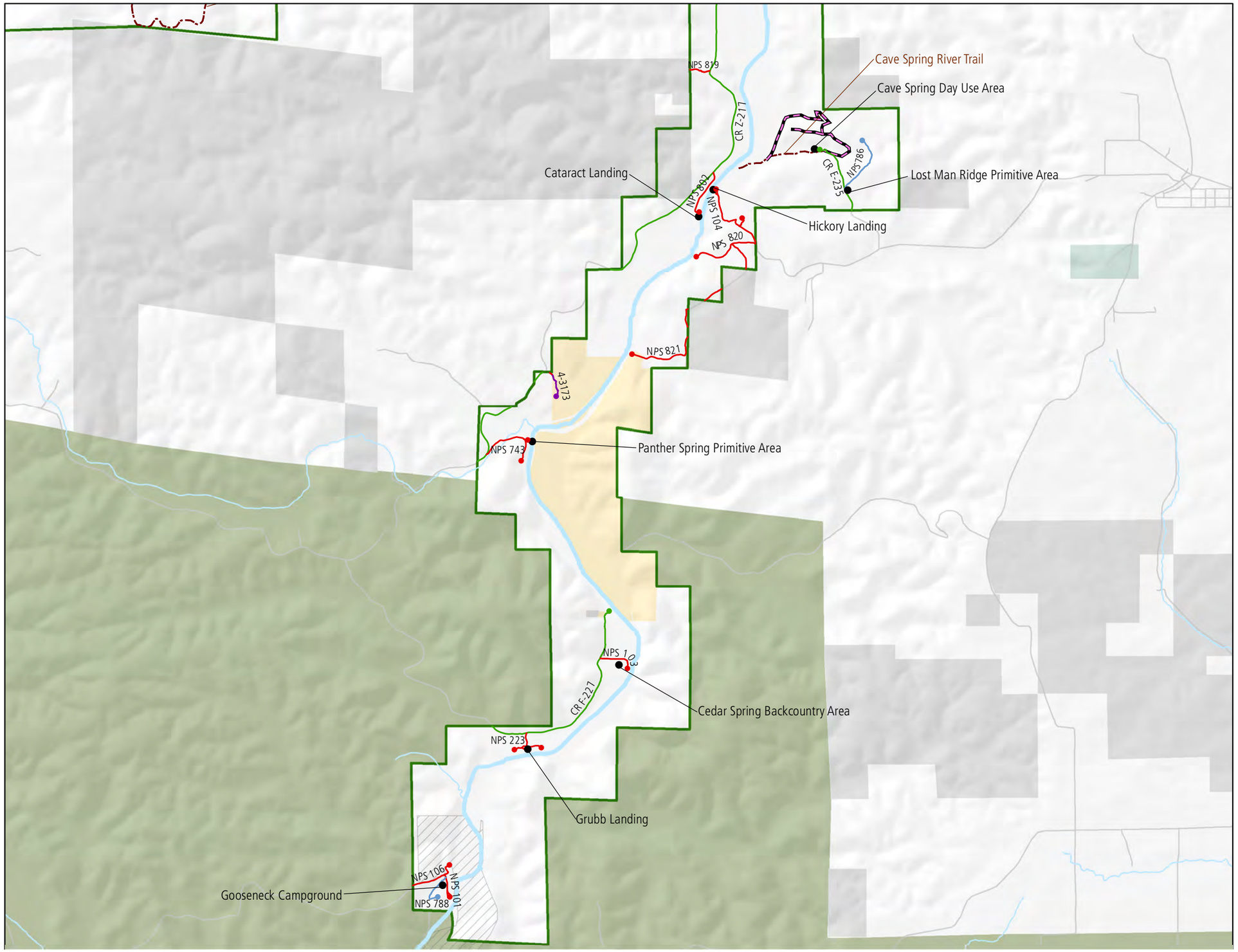
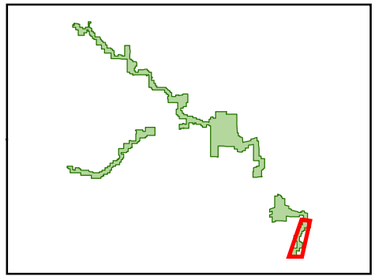


Alternative C

Lower Current - Section 3



Map C - 9

- Recreation Area

Roads - Alternative C

- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Proposed Trail - Alternative C

- Hiking

Trails

- Existing Hiking Trail

Other Map Features

- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area
- Mark Twain National Forest

0 0.5 1 Miles

North

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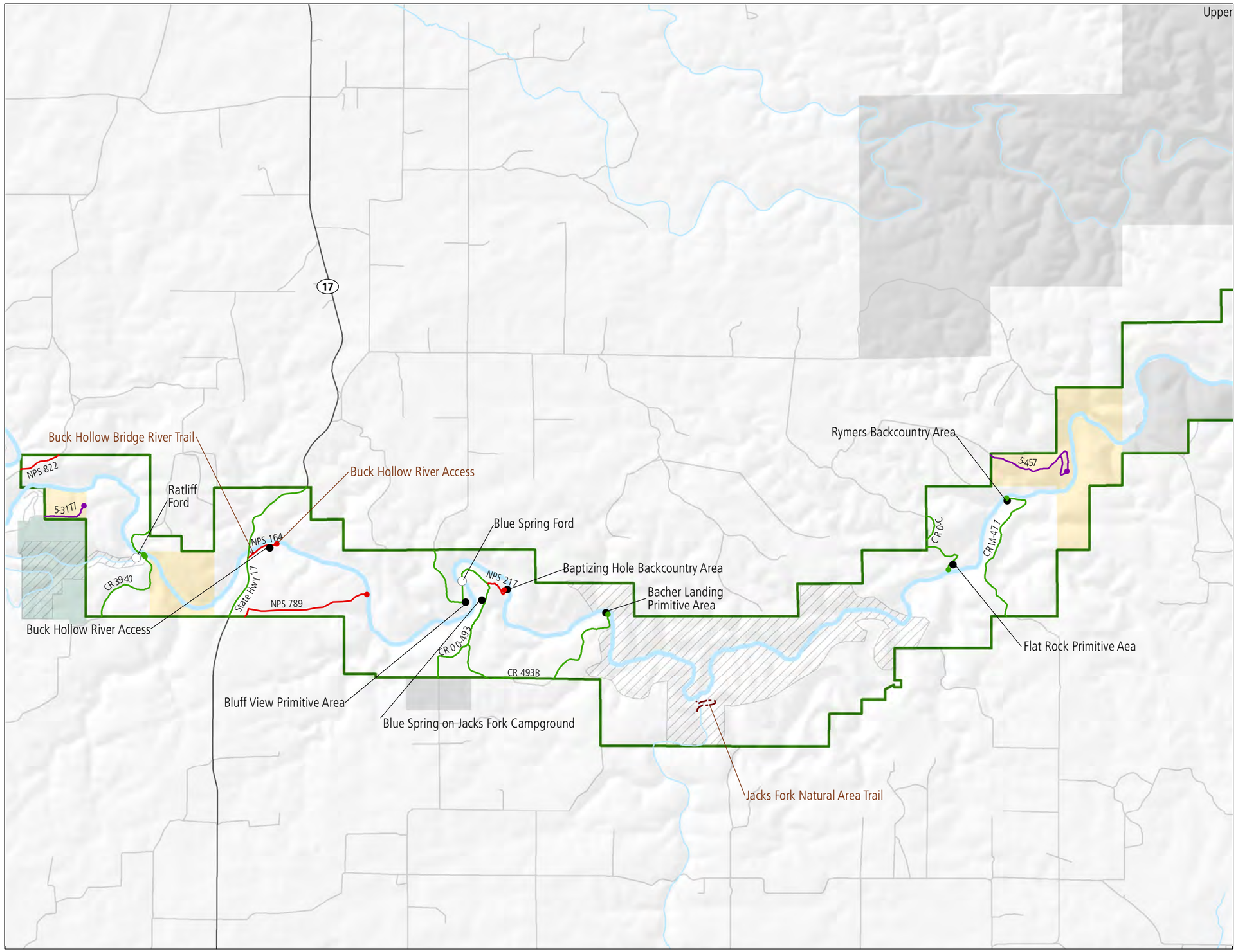
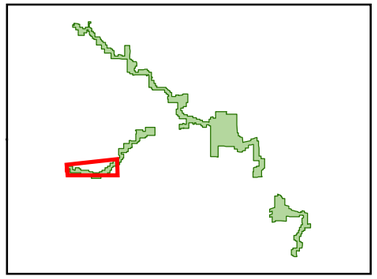


Alternative A

Jacks Fork - Section 1



Map A - 10

- Ford
- Recreation Area

Roads - Alternative A

- County/State
- NPS (Open to Public)
- Private

Trails - Alternative A

- Existing Hiking Trail

Other Map Features

- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area
- Park Boundary

North

0 0.5 1 Miles

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Preferred Alternative

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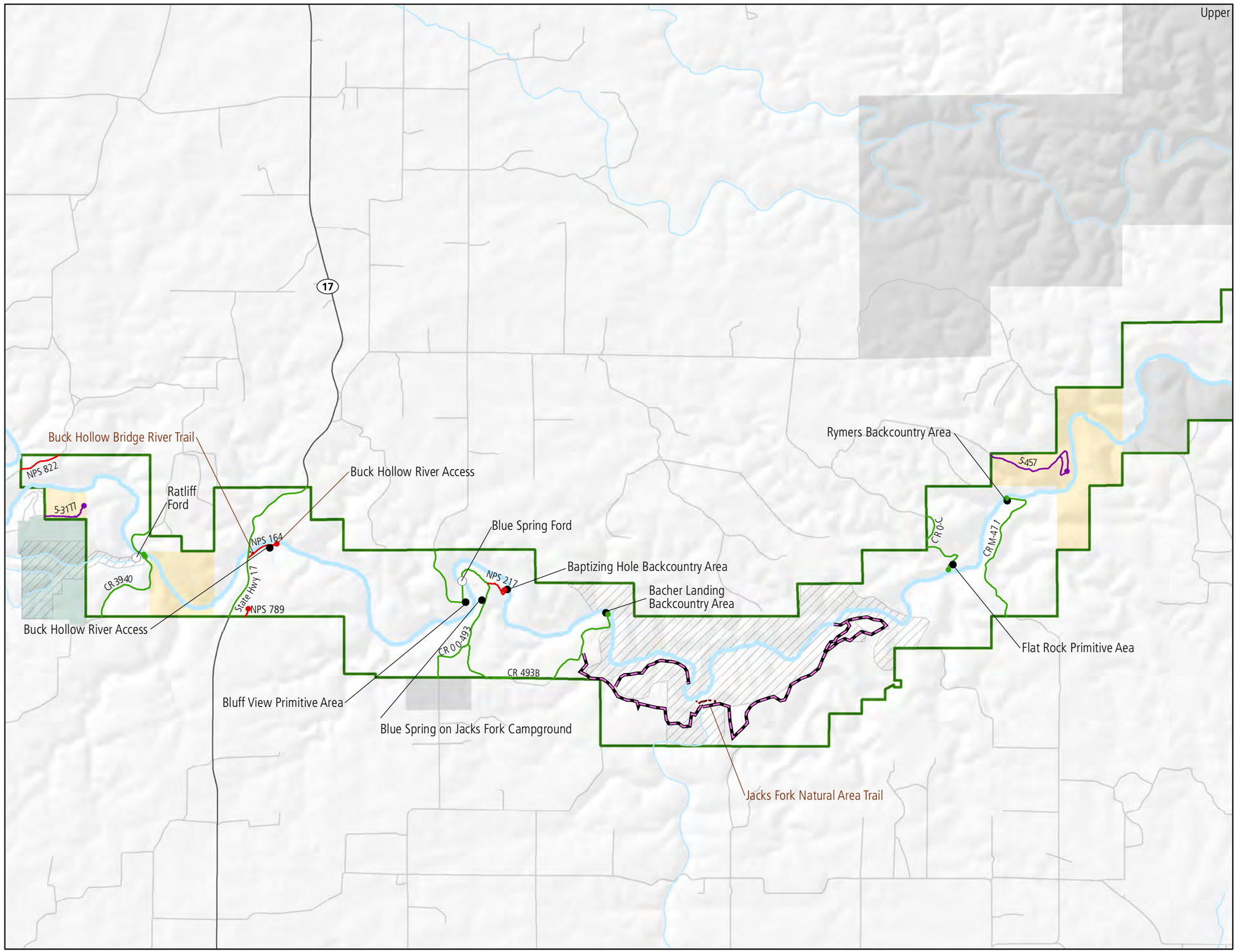
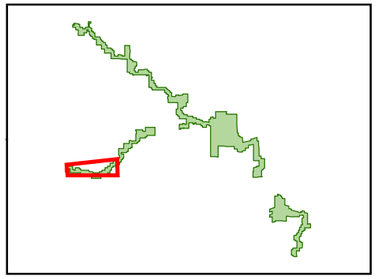


Alternative B
Jacks Fork - Section 1



Map B - 10

- Ford
- Recreation Area

Roads - Alternative B
- County/State
- NPS (Open to Public)
- Private

Proposed Trail - Alternative B
- Hiking

Trails
- Existing Hiking Trail

Other Map Features
- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

0 0.5 1 Miles

North

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Roads and Trails Management Plan

Ozark National Scenic Riverways
Missouri

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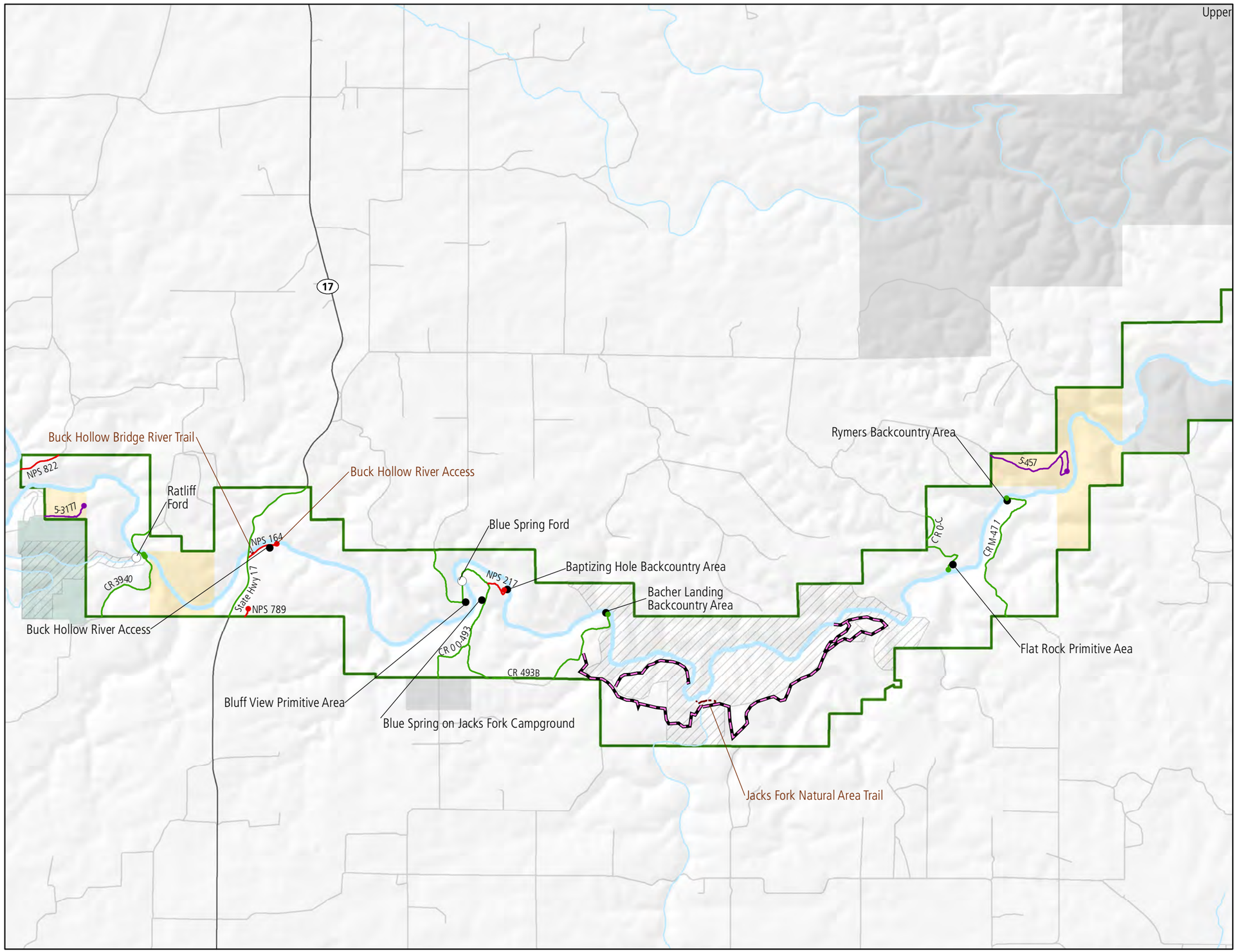
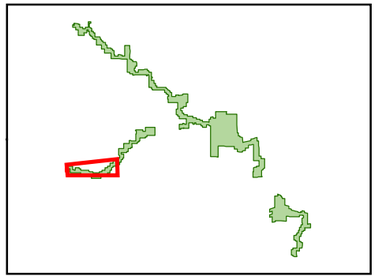


Alternative C

Jacks Fork - Section 1



Map C - 10

- Ford
- Recreation Area

Roads - Alternative C

- County/State
- NPS (Open to Public)
- Private

Proposed Trail - Alternative C

- Hiking

Trails

- Existing Hiking Trail

Other Map Features

- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

North

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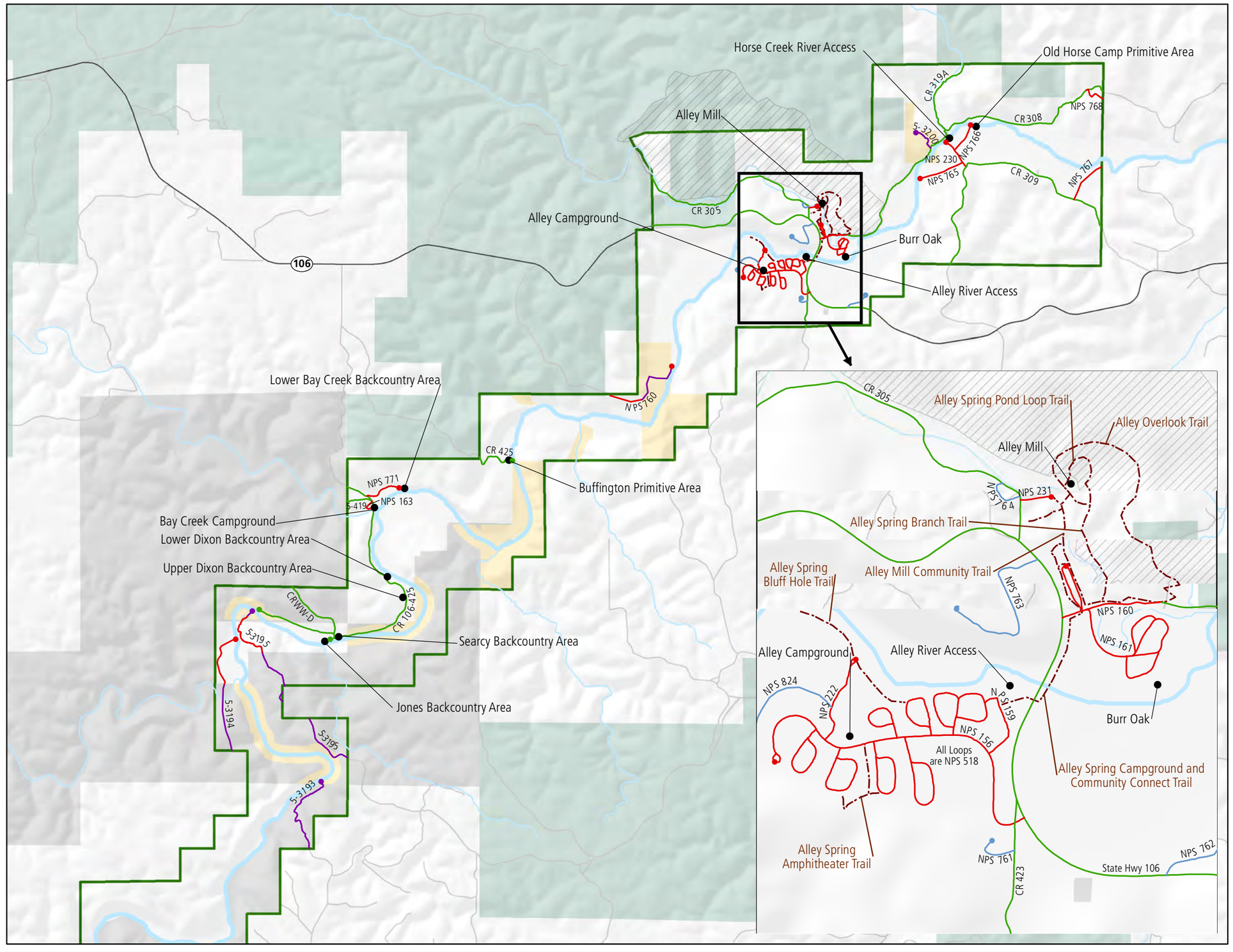
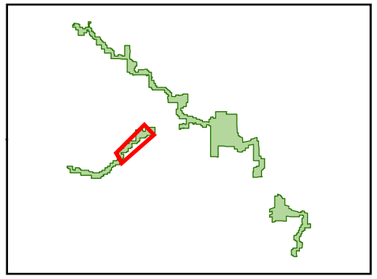


Alternative A

Jacks Fork - Section 2



Map A - 11

- Recreation Area

Roads - Alternative A

- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Trails - Alternative A

- Existing Hiking Trail

Other Map Features

- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area
- Park Boundary

0 0.5 1 Miles

North

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Preferred Alternative

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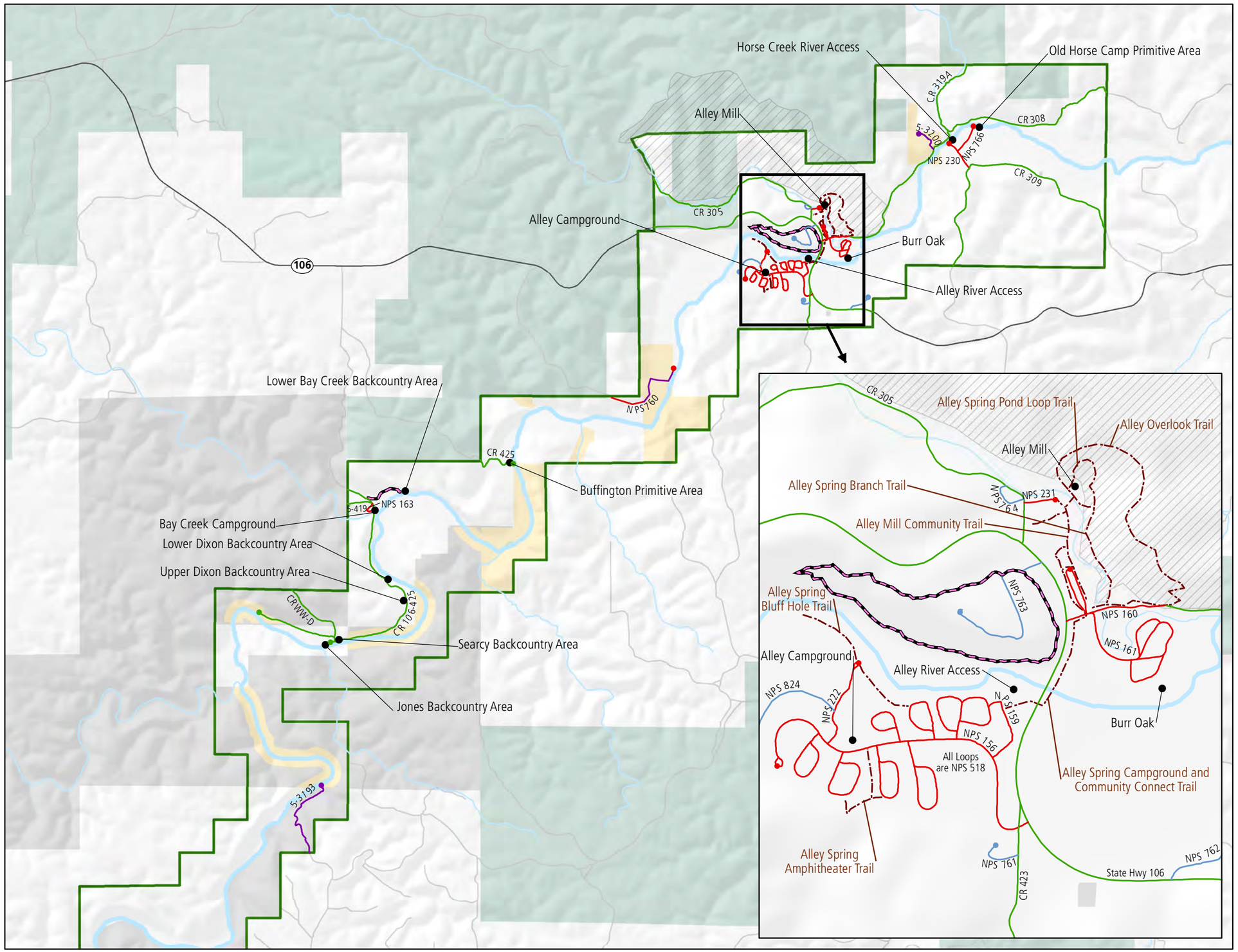
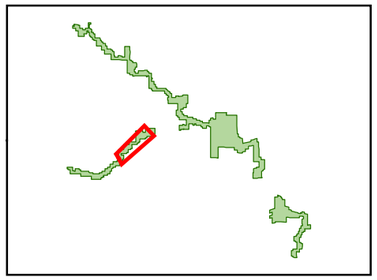


Alternative B
Jacks Fork - Section 2



Map B - 11

- Recreation Area

Roads - Alternative B
- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Proposed Trail - Alternative B
- Hiking

Trails
- Existing Hiking Trail

Other Map Features
- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

0 0.5 1 Miles

North

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Ozark National Scenic Riverways
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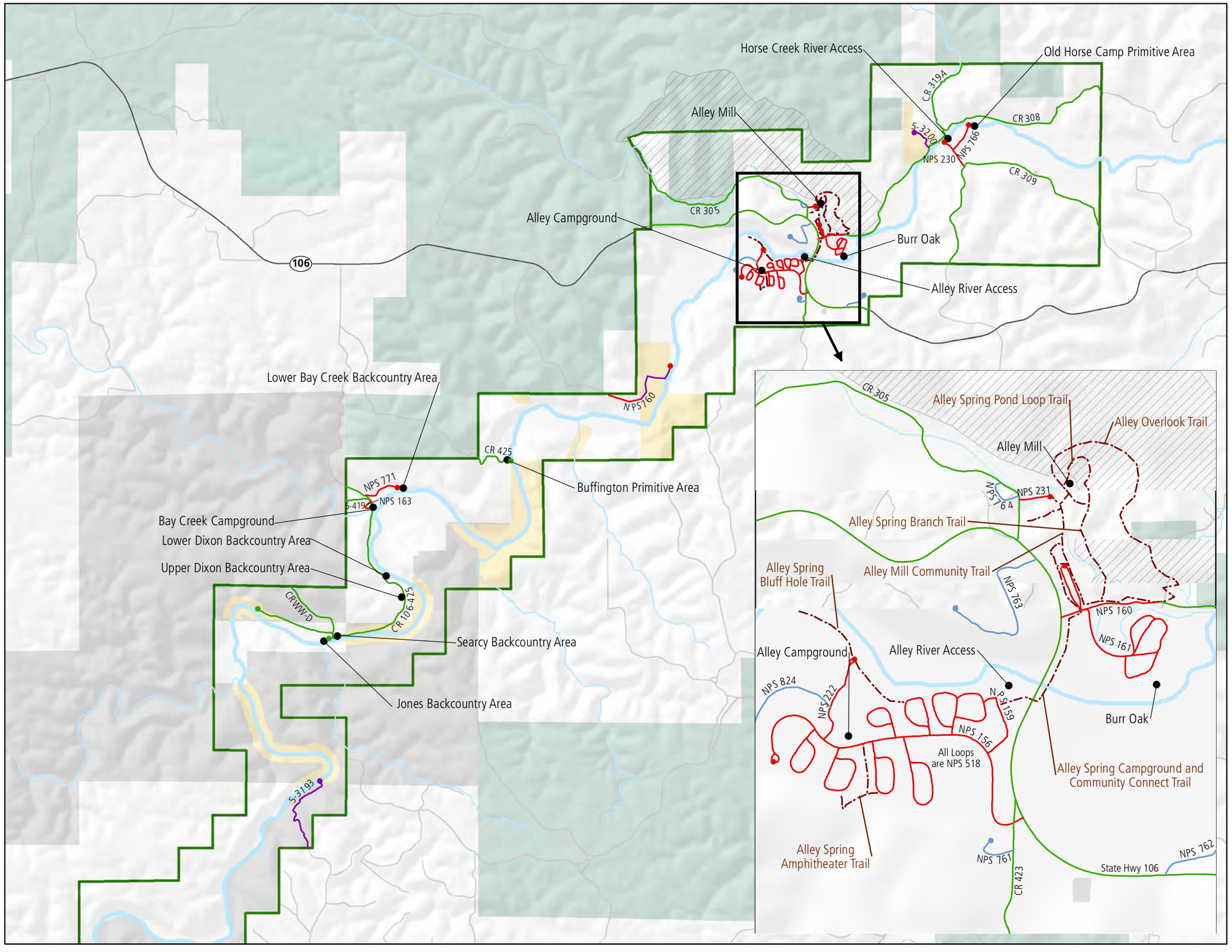
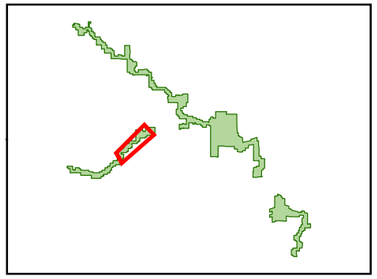


Alternative C

Jacks Fork - Section 2



Map C - 11

- Recreation Area

Roads - Alternative C

- County/State
- NPS (Open to Public)
- NPS Administrative (Closed to Public)
- Private

Trails

- Existing Hiking Trail

Other Map Features

- Major Road
- Road
- River
- Scenic Easement
- Private Land
- MO Department of Conservation Land
- State Natural Area

0 0.5 1 Miles

North

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APPENDIX E: PROPOSED DESIGNATED RECREATION AREAS AND AUTHORIZED USES

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Site Name	Map Section *	Map Number	Alt A	Alt B	Alt C	Primitive Camping	Back Country Camping	Developed Camping	Day Use ONLY	Boat Ramp	Boat Access	Concession Floater Access	Floater Access
Tan Vat	UC	Map 1	X	X	X	—	—	—	—	—	X	X	X
Baptist Landing	UC	Map 1	X	X	X	—	—	—	—	—	—	X	X
Summer's Bluff Primitive Area	UC	Map 1	X	—	—	X	—	—	—	—	—	—	—
Parker	UC	Map 1	X	X	X	X	—	—	—	—	—	—	—
Cedar Grove	UC	Map 1	X	X	X	—	X	—	—	—	X	—	—
Cedar Grove Access	UC	Map 1	X	X	X	—	—	—	—	—	X	X	X
Dee Murray	UC	Map 1	X	X	X	—	X	—	—	—	—	—	—
Big Creek Primitive Area	UC	Map 1	X	X	X	X	—	—	—	—	—	—	—
Flying W Bluff Day Use Area	UC	Map 1	X	X	X	—	—	—	X	—	—	—	—
Lower Flying W Primitive Area	UC	Map 1	X	—	X	X	—	—	X (alt B)	—	—	—	—
Welch Primitive Area	UC	Map 1	X	X	X	X	—	—	—	—	—	—	—
Welch Landing	UC	Map 1	X	X	X	—	—	—	—	—	—	X	X
Akers Ferry Group Site	UC	Map 2	X	X	X	—	X	—	—	—	—	—	—
Akers Ferry Upper Landing	UC	Map 2	X	X	X	—	—	—	—	—	X	X	X
Akers Ferry Ranger Station	UC	Map 2	X	X	X	—	—	—	X	—	—	—	—
Akers Ferry Lower Landing	UC	Map 2	X	X	X	—	—	—	—	—	—	X	X
Akers Ferry West Primitive Area	UC	Map 2	X	X	X	X	—	—	—	—	X	—	X
Banks Ford Primitive Area	UC	Map 2	X	X	X	X	—	—	—	—	—	—	—
Devils Well Day Use Area	UC	Map 2	X	X	X	—	—	—	X	—	—	—	—
Lipps Tract Primitive Area	UC	Map 2	X	X	X	X	—	—	—	—	—	—	—
Pulltite Campground	UC	Map 2	X	X	X	—	—	X	—	—	X	X	X
Boyd's Creek Primitive Area	UC	Map 3	X	X	X	X	—	—	—	—	—	—	—
Wide Primitive Area	UC	Map 3	X	X	X	X	—	—	—	—	X	—	X

Site Name	Map Section *	Map Number	Alt A	Alt B	Alt C	Primitive Camping	Back Country Camping	Developed Camping	Day Use ONLY	Boat Ramp	Boat Access	Concession Floater Access	Floater Access
Sinking Creek Backcountry Area	UC	Map 3	X	X	X	—	X	—	—	—	X	—	—
Round Spring Group Campground B	UC	Map 3	X	X	X	—	—	X	—	—	—	—	—
Round Spring Upper Landing	UC	Map 3	X	X	X	—	—	—	—	X	—	X	X
Round Spring Group Campground A	UC	Map 3	X	X	X	—	—	X	—	—	—	—	—
Round Spring Campground	UC	Map 3	X	X	X	—	—	X	—	—	—	—	—
Round Spring Lower Landing	UC	Map 3	X	X	X	—	—	—	—	X	—	X	X
Grassy Creek Primitive Area	UC	Map 4	X	X	X	X	—	—	—	—	—	—	—
Bee Bluff Primitive Area	UC	Map 4	X	X	X	X	—	—	—	—	—	—	—
Jerktail Campground	UC	Map 4	X	X	X	—	X	—	—	—	X	X	X
Twin Rock Primitive Area	UC	Map 4	X	X	X	X	—	—	—	—	—	—	—
Sutton Creek Primitive Area	MC	Map 5	X	X	X	X	—	—	—	—	—	—	—
Broadfoot Staging Area	MC	Map 5	X	X	X	—	—	—	X	—	—	—	—
Broadfoot Backcountry Area	MC	Map 5	X	X	X	—	X	—	—	—	—	—	—
Two Rivers Campground	MC	Map 5	X	X	X	—	—	X	—	—	—	—	—
Two Rivers Access	MC	Map 5	X	X	X	—	—	—	—	—	—	X	X
Two Rivers Backcountry Area	MC	Map 5	X	X	X	—	X	—	—	—	—	—	—
Two Rivers Landing - Boat	MC	Map 5	X	X	X	—	—	—	—	X	—	—	—
Roscoe Primitive Area	MC	Map 5	X	X	X	X	—	—	—	—	—	—	—
Counts Primitive Area	MC	Map 5	X	X	X	X	—	—	—	—	—	—	—
Shawnee Backcountry Area	MC	Map 5	X	X	X	—	X	—	—	—	X	X	X
Shawnee Staging Area	MC	Map 5	X	X	X	—	—	—	X	—	—	—	—
Martin Bluff	MC	Map 6	X	X	X	X	—	—	—	—	—	—	—
Martin Landing	MC	Map 6	X	X	X	X	—	—	—	—	X	—	X

Site Name	Map Section *	Map Number	Alt A	Alt B	Alt C	Primitive Camping	Back Country Camping	Developed Camping	Day Use ONLY	Boat Ramp	Boat Access	Concession Floater Access	Floater Access
Goose Bay Primitive Area	MC	Map 6	X	X	X	X	—	—	—	—	X	—	X
Powder Mill Landing	MC	Map 6	X	X	X	—	—	—	—	—	X	X	X
Powder Mill Campground	MC	Map 6	X	X	X	—	X	—	—	—	—	—	—
Owls Bend Landing	MC	Map 6	X	X	X	—	—	—	—	—	X	X	X
Blue Spring on Current Day Use Area	MC	Map 6	X	X	X	—	—	—	X	—	—	—	—
Klepzig Mill Day Use Area	MC	Map 6	X	X	X	—	—	—	X	—	—	—	—
Rocky Falls Day Use Area	MC	Map 6	X	X	X	—	—	—	X	—	—	—	—
Roberts Field Primitive Area	MC	Map 6	X	X	X	X	—	—	—	—	X	X	X
Log Yard Primitive Area-GRAVEL	LC	Map 6	X	X	X	X	—	—	—	—	X	X	X
Log Yard Campground	LC	Map 6	X	X	X	—	X	—	—	—	—	—	—
Moss Access	LC	Map 6	X	X	X	—	—	—	—	—	X	X	X
Beal Primitive Area	LC	Map 6	X	X	X	X	—	—	—	—	—	—	—
Beal Access	LC	Map 6	X	X	X	—	—	—	—	—	X	X	X
Chilton Creek River Access	LC	Map 7	X	X	X	—	—	—	—	X	X	—	X
Waymeyer	LC	Map 7	X	X	X	—	—	—	—	—	—	X	X
Raftyard River Access	LC	Map 7	X	X	X	—	—	—	—	—	—	X	X
Big Spring Campground	LC	Map 8	X	X	X	—	—	X	—	—	—	—	—
Big Spring Float Access	LC	Map 8	X	X	X	—	—	—	—	—	—	X	X
Big Spring Boat Access	LC	Map 8	X	X	X	—	—	—	—	X	—	—	—
Chubb Hollow Campground	LC	Map 8	X	X	X	—	X	—	—	—	—	—	—
Big Tree Backcountry Area	LC	Map 8	X	X	X	—	X	—	—	—	—	—	—
Big Tree River Access	LC	Map 8	—	X	—	—	—	—	—	—	X	—	X
Club House Backcountry Area	LC	Map 8	X	X	X	—	X	—	—	—	X	—	X
Cave Spring Day Use Area	LC	Map 9	X	X	X	—	—	—	X	—	—	—	—

Site Name	Map Section *	Map Number	Alt A	Alt B	Alt C	Primitive Camping	Back Country Camping	Developed Camping	Day Use ONLY	Boat Ramp	Boat Access	Concession Floater Access	Floater Access
Lost Man Ridge Primitive Area	LC	Map 9	X	X	X	X	—	—	—	—	—	—	—
Hickory Landing	LC	Map 9	X	X	X	—	—	—	—	—	X	X	X
Cataract Landing	LC	Map 9	X	X	X	—	—	—	—	—	—	X	X
Panther Spring Primitive Area	LC	Map 9	X	—	X	X	—	—	—	—	X	—	—
Cedar Spring Backcountry Area	LC	Map 9	X	X	X	—	X	—	—	—	X	—	X
Grubb Landing	LC	Map 9	X	X	X	—	X	—	—	—	X	—	—
Gooseneck Campground	LC	Map 9	X	X	X	—	X	—	—	—	X	—	X
Buck Hollow River Access	JF	Map 10	X	X	X	—	—	—	—	—	—	X	X
Bluff View Primitive Area	JF	Map 10	X	X	X	X	—	—	—	—	—	X	—
Blue Spring on Jacks Fork Campground	JF	Map 10	X	X	X	—	X	—	—	—	X	X	X
Baptizing Hole Backcountry Area	JF	Map 10	X	X	X	—	X	—	—	—	—	—	—
Bacher Landing Backcountry Area	JF	Map 10	X	X	X	—	X	—	—	—	—	—	X
Flat Rock Primitive Area	JF	Map 10	X	X	X	X	—	—	—	—	—	—	X
Rymers Backcountry Area	JF	Map 10	X	X	X	—	X	—	—	—	X	X	X
Jones Backcountry Area	JF	Map 11	X	X	X	—	X	—	—	—	—	—	—
Searcy Backcountry Area	JF	Map 11	X	X	X	—	X	—	—	—	—	—	—
Upper Dixon Backcountry Area	JF	Map 11	X	X	X	—	X	—	—	—	—	—	—
Lower Dixon Backcountry Area	JF	Map 11	X	X	X	—	X	—	—	—	—	—	—
Bay Creek Campground	JF	Map 11	X	X	X	—	X	—	—	—	X	X	X
Lower Bay Creek Backcountry	JF	Map 11	X	X	X	—	X	—	—	—	—	—	—
Buffington Primitive Area	JF	Map 11	X	X	X	X	—	—	—	—	—	—	—
Alley Campground	JF	Map 11	X	X	X	—	—	X	—	—	—	—	—

Site Name	Map Section *	Map Number	Alt A	Alt B	Alt C	Primitive Camping	Back Country Camping	Developed Camping	Day Use ONLY	Boat Ramp	Boat Access	Concession Floater Access	Floater Access
Alley Mill	JF	Map 11	X	X	X	—	—	—	X	—	—	—	—
Burr Oak	JF	Map 11	X	X	X	—	—	—	—	—	X	X	X
Alley River Access	JF	Map 11	X	X	X	—	—	—	—	—	X	X	X
Horse Creek River Access	JF	Map 11	X	X	X	—	—	—	—	—	—	X	X
Old Horse Camp Primitive Area	JF	Map 11	X	X	X	X	—	—	—	—	—	X	—

*UC = Upper Current; MC = Middle Current; LC = Lower Current; JF = Jacks Fork

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APPENDIX F: VISITOR USE MANAGEMENT AND INDICATORS AND THRESHOLDS

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APPENDIX F: VISITOR USE MANAGEMENT AND INDICATORS AND THRESHOLDS

VISITOR USE MANAGEMENT

Visitor use management is the proactive and adaptive process of planning for and managing characteristics of visitor use and its physical and social setting, using a variety of strategies and tools, to sustain desired resource conditions and visitor experiences. Visitor use management is important because NPS managers strive to maximize opportunities and benefits for visitors while achieving and maintaining desired conditions for resources and visitor experiences in a particular area. Managing visitor access and use for visitor enjoyment and resource protection is inherently complex. It requires that managers analyze not only the number of visitors but also where they go, what they do, their impacts on resources and visitor experiences, and the underlying causes of those impacts. Managers must acknowledge the dynamic nature of visitor use, the vulnerabilities of natural and cultural resources, and the need to be responsive to changing conditions.

Proactively planning for visitor use maximizes the ability of agencies to encourage access and protect resources and values. In this plan, visitor use refers to human presence in an area for recreational purposes including education, interpretation, inspiration, and physical and mental health. Visitor use goes beyond the types of activities that people engage in at parks. Visitor use also includes the amount, timing, and distribution of visitor activities and behaviors.

THE PLANNING PROCESS

This plan uses the visitor use management framework to develop a long-term strategy for managing visitor use within the National Riverways. The general planning process used for this plan is outlined below and is consistent with the guidance outlined by the Interagency Visitor Use Management Council (IVUMC, www.visitorusemanagement.nps.gov). The visitor use management framework provides a process in which visitor capacity should be addressed when necessary. Visitor capacity, a component of visitor use management, is the maximum amounts and types of visitor use that an area can accommodate while achieving and maintaining desired resource conditions and visitor experiences consistent with the purposes for which the area was established. Visitor capacities would vary for different trails and or trail segments depending on the desired conditions and issues of the specific area. The monitoring component of this visitor use management framework would test the effectiveness of management actions and provide a basis for informed adaptive management of visitor use. Please refer to the figures below for an overview of the visitor use management planning process steps.

Figure F-1: Overview of the Visitor Use Management Planning Process

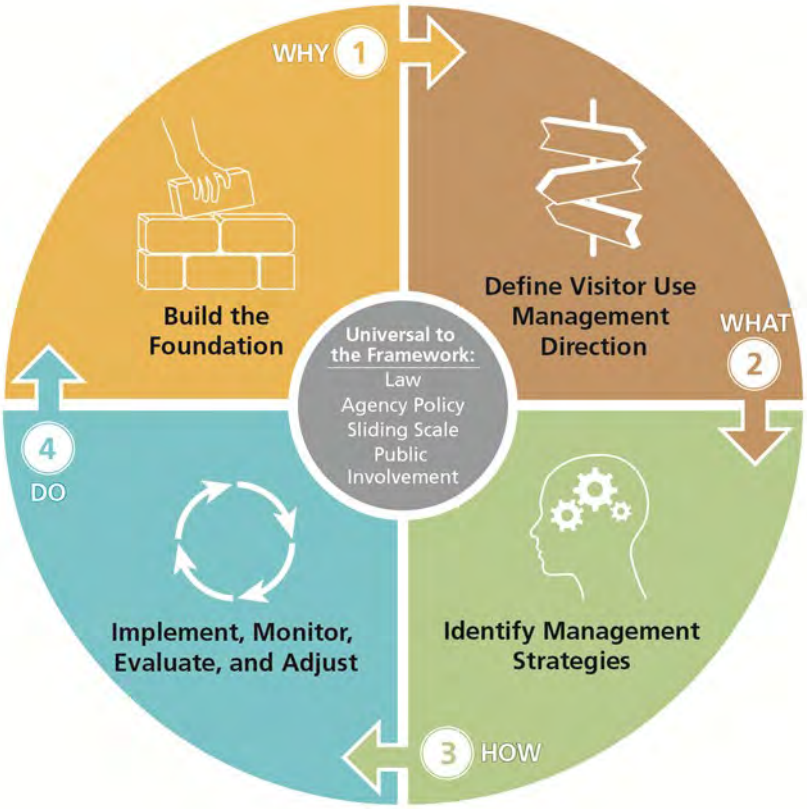

Figure 2. Elements and steps of the Visitor Use Management Framework

Steps:

1. Clarify project purpose and need.
2. Review the area's purpose and applicable legislation, agency policies, and other management direction.
3. Assess and summarize existing information and current conditions.
4. Develop a project action plan.

Outcome: Understand why the project is needed, and develop the project approach.

Steps:

5. Define desired conditions for the project area.
6. Define appropriate visitor activities, facilities, and services.
7. Select indicators and establish thresholds.

Outcome: Describe the conditions to be achieved or maintained and how conditions will be tracked over time.

Steps:

8. Compare and document the differences between existing and desired conditions, and, for visitor use-related impacts, clarify the specific links to visitor use characteristics.
9. Identify visitor use management strategies and actions to achieve desired conditions.
10. Where necessary, identify visitor capacities and additional strategies to manage use levels within capacities.
11. Develop a monitoring strategy.

Outcome: Identify strategies to manage visitor use to achieve or maintain desired conditions.

Steps:

12. Implement management actions.
13. Conduct and document ongoing monitoring, and evaluate the effectiveness of management actions in achieving desired conditions.
14. Adjust management actions if needed to achieve desired conditions, and document rationale.

Outcome: Implement management strategies and actions, and adjust based on monitoring and evaluation.

INDICATORS AND THRESHOLDS

Indicators translate the broad description of desired conditions into measurable attributes (i.e., number of informal trails) that could be tracked over time to evaluate change in resource or experiential conditions. The planning team considered many potential issues and related indicators that would identify impacts of concern, but those described below were considered the most significant, given the importance and vulnerability of the resource or visitor experience affected by visitor use. The planning team also reviewed the experiences of other park units with similar issues to identify meaningful indicators. Thresholds that represent the minimum acceptable condition for each indicator were then assigned, taking into consideration the qualitative descriptions of the desired conditions, data on existing conditions, relevant research studies, staff management experience, and scoping on public preferences. Although defined as "minimally acceptable," thresholds still represent acceptable conditions. Also, establishing thresholds does not imply that no action would be taken prior to reaching the threshold. One goal of visitor use management is to strive to make progress toward desired conditions. Thresholds identify when conditions are about to become unacceptable and accordingly serve as a "line in the sand" letting managers and the public know that corrective action must be taken to keep conditions acceptable so that progress toward desired conditions can be achieved over time.

For some indicators, triggers have been developed. A trigger reflects a condition of concern for an indicator that is enough to prompt a management response to ensure that desired conditions continue to be maintained before the threshold is crossed. Indicators, thresholds, triggers (when identified) and associated potential management actions that would be implemented as a result of this planning effort are described below. Indicators are applied across all action alternatives in the plan. In this plan, thresholds at times vary either by alternative, zone, or at specific sites. These variations reflect the content of the management strategies ascribed for each alternative. For example, if access to a site is restricted in one alternative the threshold will be different than in an alternative where visitor opportunities remain the same or are expanded at that same site. Where actions across the alternative do not result in differences of visitation to sites the thresholds do not vary.

Visitor use management is an iterative process in which management decisions are continuously informed and improved. Indicators are monitored, and adjustments are made as appropriate to ensure monitoring is responsive to change. As monitoring conditions continues, managers may decide to modify or add indicators if better ways are found to measure important changes in resource and experiential conditions. Monitoring indicators helps NPS staff determine the most effective way to manage visitor use to attain desired visitor experiences and resource conditions.

Information on the NPS monitoring efforts, related management actions, and any changes to the indicators and thresholds would be available to the public.

Number of Undesignated (visitor-created) Trails Per Mile of Designated Trail

The indicator of the number of visitor-created trails is related to the issues of vegetation trampling and soil erosion. Visitor-created trails are not managed directly by park staff, are not featured on park maps, or reported to the public for recreational use. Consequently, these trails can often run in contradiction to accepted, evidence-based best practices for trail design (Park, Chilman, and Seekamp 2011). Designated trails, on the other hand are periodically assessed, featured on park maps, and generally maintained by park staff. Visitor-created trails are noticeable to people using the trails and to park staff. As visitor-created trails are made, vegetation is trampled, causing soil erosion, potentially soil loss around cultural sites, and

habitat fragmentation. This indicator measures the number of visitor-created trails that branch off designated park trails, this does not include trail braiding, trail widening. By tracking new visitor-created trails over time, NPS staff can understand how often additional visitor-created trails are developed and identify some of the reasons for the creation of these trails. This indicator helps protect natural and cultural resources by identifying visitor-created areas of disturbance through the creation of undesignated trails.

This threshold addresses the expansion of visitor-created trails from the existing trail network. While Ozark National Scenic Riverways retains the authority to close undesignated visitor-created trails, park staff, recognize multiple factors influence creation of visitor-created trails, and many are unintentional acts such as users getting lost, moving around muddy spaces or flooded areas. Thresholds are set at a minimum level of acceptance depending on the zone. The threshold was set at zero visitor-created trails in the developed zone even though this zone receives the highest amount of trail users because the National Riverways manages lands in the developed zones to a higher use standard (e.g., hardened trails or roads).

Thresholds
Primitive Zone: No more than one visitor-created trail leaving designated trail per one mile measurement.
Natural Zone: No more than two visitor-created trails leaving designated trail per one mile measurement.
Resource-Based Recreation Zone: No more than three visitor-created trails leaving designated trails per one mile of measurements.
Developed-Zone: Zero visitor-created trails leaving designated trail.

Management actions:

- Develop and implement a public information effort about the desired conditions at the National Riverways and actions the National Park Service is taking to achieve those conditions and how visitors can help. This information could be distributed through direct visitor contact, park publications (online and printed), and wayside exhibits.
- Where it is difficult to differentiate between designated trails and undesignated trails, ensure the designated trail is well-defined, signed, and provides access to locations that trail users want to reach (as long as those destinations are appropriate).
- Disguise and rehabilitate visitor-created trails as soon as possible.
- Use barriers in conjunction with informative signs at the entrance to visitor-created trails directing trail users to stay on the designated trail.
- Undesignated trails would be closed. Those with access to unsafe locations or places where sensitive resources exist will be a priority for closure.
- Increase enforcement of off-trail use.

Monitoring strategies and time line:

- Monitoring would occur annually during designated trail condition assessments (or possibly as user-created trails are identified). Monitoring could be led by the National Park Service and/or partners and volunteers. Priority monitoring would be in areas

receiving the highest use. The public would continue to play a role in informing the National Park Service of undesignated trails.

- Additional monitoring could occur with assistance from volunteers. NPS staff would provide basic training covering the characteristics of user created trails (e.g., photos of visitor-created trails versus designated trails) and how to use a monitoring form. Volunteers would also be provided with trail maps and a way to measure distance such as phone apps or GPS.

Trail Condition as Reflected By Trail Width and Trail Incision

This indicator will provide staff with information on the extent of user-caused incision and widening of trails. Trails that receive higher overall use are likely to have higher rates of soil loss, erosion, and widening. By tracking changes over time, NPS staff can understand if use on the trails are generally increasing or decreasing and if maintenance solutions are effective. As staff evaluate trails and trail segments, to determine if they are within threshold, places with known archeological sites would be highest priority for evaluation. Maximum incision (center trail depth) is faster for park staff to monitor than total soil loss, which is measured as maximum incision and cross sectional area. Both soil loss and trail width have long been documented in literature as measures of trail condition.

Thresholds are set at a minimum level of acceptance depending on the zone. Desired trail width is based off Trail Class, which reflects the management intent for the trail or trail segment. Staff at the National Riverways use USFS Trail Class design parameters for trail maintenance and design. Trail Class design parameters address trail tread width, clearing (height and width) for hiker/pedestrian, for pack and saddle, for bicycle, for various motorized uses, and winter nonmotorized uses. In this case thresholds for trail width for Trail Classes 2-4 represent pack and saddle as the designed use, recognizing that equestrians may not be allowed on all trails. Thresholds for trail width for Trail Class 1 and 5 represent hiker/pedestrian as the designed use, acknowledging that other uses may be allowed on trails in these areas. Trail Class descriptions are not perfectly aligned with zones, as trails cross zones and diverse areas within zones. Therefore park staff manage and design trails using Trail Class as general guidelines per zone.

Triggers and Corrective Actions
Trigger 1 (All Zones): Artifacts, known archeological sites, and new archeological sites are often exposed and/or discovered in a trail prior to threshold depth or width. This trigger will be: Any visible artifact exposed by trail activity or user-caused erosion. **Corrective Management Actions:** The affected site would undergo an archeological survey and assessment. A survey and assessment would document the sites' characteristics, location, condition, integrity, and evaluate eligibility of the resource for listing in the National Register of Historic Places along with next steps for cultural resource management. Depending on this determination other management actions, such as trail hardening, could be chosen and tailored to specifically address how the resource is affected by trail use and condition.

Thresholds
Primitive Zone: Trail Class 1: Maximum tread incision would not exceed 8 inches, and trail tread width would not exceed 12 inches more than 70% of the time per one mile of the trail.
Natural Zone: Trail Class 2: Maximum tread incision would not exceed 6 inches, and trail tread width would not exceed 24 inches more than 70% of the time per one mile of the trail. Trail Class 3: Maximum tread incision would not exceed 6 inches, and trail tread width would not exceed 48 inches more than 70% of the time per one mile of the trail.
Recreation-Resource Based Zone: Trail Class 3: Maximum tread incision would not exceed 6 inches, and trail tread width would not exceed 48 inches more than 70% of the time per one mile of the trail. Trail Class 4: Maximum tread incision would not exceed 6 inches, and trail tread width would not exceed 96 inches more than 70% of the time per one mile of the trail.
Developed Zone: Trail Class 4: Maximum tread incision would not exceed 6 inches, and trail tread width would not exceed 96 inches more than 70% of the time per one mile of the trail. Trail Class 5: Maximum tread incision would not exceed 2 inches, and trail tread width would not exceed 72 inches more than 70% of the time per one mile of the trail.

Management actions:

- Shift or segregate trail use.
- Employ switchbacks in areas of steep terrain.
- Install water bars, subbase structures, and culverts to allow appropriate drainage.
- Change the design of a trail to accommodate multiple user groups.
- Reroute, close trails or harden trails to protect sensitive resources, or when excess water is present in order to prevent long-term damage to trails, habitats, and improve visitor safety and experience.
- Limit a particular type of use in order to alleviate trail degradation.

Monitoring strategies and time line:

- National Park Service will continue annual trail condition assessments and make improvements as funding and staffing allows.
- Necessary improvements will be prioritized.
- Partners and volunteers currently play a role supporting trail condition monitoring and light trail maintenance by reporting areas of concern, and assisting in limbing and cutting back vegetation.
- Additional supporting partners and/or grants would be pursued to help support maintenance of any new trails.

Number of Undesignated Roads

The indicator of the number of undesignated roads addresses impacts caused by unauthorized off-road use in Ozark National Scenic Riverways. Off-road recreational driving is an illegal activity that causes significant damage to park resources and can lead to erosion, sedimentation, habitat fragmentation, and the introduction of invasive species. Undesignated roads are

sometimes created to access the river, and other times as an activity. This indicator helps NPS staff to document new areas of damage and to communicate to the public why this activity is illegal and damaging. Information on areas of disturbance also may be used in court proceedings as individuals cited for this activity are charged or ticketed. This indicator helps protect natural and cultural resources by identifying areas of disturbance through the creation of unauthorized roads.

Due to the zero tolerance nature of this threshold, management actions may need to be implemented immediately. Closing undesignated roads ensures that user impacts on cultural and natural resources do not expand to areas that are not designated for road access and that use is contained within existing roads.

Thresholds
Primitive Zone: No visitor-created roads leaving designated park, county, private, and/or state roads.
Natural Zone: No visitor-created roads leaving designated park, county, private, and/or state roads.
Resource-Based Recreation Zone: No visitor-created roads leaving designated park, county, private, and/or state roads.
Developed Zone: No visitor-created roads leaving designated park, county, private, and/or state roads.

Management actions:

- Develop and implement a public information effort about the desired conditions at the National Riverways and actions the National Park Service is taking to achieve those conditions. This could include information about how undesignated roads damage National Riverways resources, including water quality, threatened and endangered species, and cultural sites. This information could be distributed through direct visitor contact, park publications (online and printed), and wayside exhibits.
- Expand signage to more clearly delineate designated roads.
- Increase enforcement of off-road use.
- Close and rehabilitate undesignated roads as soon as these roads are identified, in order to reduce erosion and expedite natural restoration.

Monitoring strategies and time line:

- Monitoring as part of ongoing, routine patrols.

Number of Incidents of Reported Theft and Intentional Vandalism to Cultural Sites and Historic Properties

The Riverways staff is already using internal guidelines to monitor these resources. This indicator for human impacts on cultural resources is based on existing monitoring protocols and helps NPS staff measure damage to cultural sites and historic properties along roads and trails. The condition of these resources is indicative of the level of use in an area and the ease of access of sites to park users. Cultural sites and historic properties are nonrenewable. This means sites cannot recover from natural and human-caused disturbance. Management efforts would

be focused on maintaining the integrity and condition of sites, with the proposed threshold being no more than one incident of intentional vandalism per year or one incident of theft per year. To ensure that thresholds are achieved visitor education and enforcement of park regulations would be continued, and closures of particularly vulnerable areas would be considered if needed.

Thresholds
Primitive Zone: No more than one incident of theft or intentional vandalism per year to cultural sites and historic properties along roads and trails.
Natural Zone: No more than one incident of theft or intentional vandalism per year to cultural sites and historic properties along roads and trails.
Resource-Based Recreation Zone: No more than one incident of theft or intentional vandalism per year to cultural sites and historic properties along roads and trails.
Developed Zone: No more than one incident of theft or intentional vandalism per year to cultural sites and historic properties along roads and trails.

Management actions:

- Develop and implement a public information effort about the desired conditions the National Riverways and actions being taken to achieve those conditions. This information could include information about how cultural sites and archeological sites are nonrenewable resources and that damage such as vandalism and theft are crimes under the Archaeological Resources Protection Act and 36 CFR 2.1. This information could be distributed through direct visitor contact, park publications (online and printed), and wayside exhibits.
- Place signs directing visitors to stay on trails or paths.
- Increase law enforcement patrols.
- Temporary and/or permanent closures of affected areas.

Monitoring strategies and time line:

- Continue to record incidences
- Continue to conduct annual assessment of cultural and archeological sites
- Status reports every two to six months on conditions of structures, and adjust depending on frequency or necessity to be at sites

Number of Validated User-Reported Complaints to the National Park Service of Conflicts on Roads and Trails

The indicator of user-reported complaints is related to conflicts between users and visitor behavior on roads and trails. The indicator seeks to understand and address the types of behaviors and conflicts that users believe are a problem.

This threshold addresses perceived conflict, behavioral issues, and/ or problem areas on roads and trails. There should be less potential for road and trail user conflicts in the primitive zone due to lower types and amounts of use on roads and trails. There may be higher potential and

tolerance among visitors for particular behaviors and for user conflicts among road and trail users in the natural and resource based recreation zones, since visitors expect to see more types and greater amounts of users in these areas. By tracking this information over time the effectiveness of management actions described in the plan can be evaluated and other management actions can be taken as necessary to better address the issue of inappropriate visitor behavior. National Riverways staff treats every compliant equally regardless of where it occurs in the park.

Threshold
All Zones: No more than one validated user-reported complaint on roads and trails per month in the same area.

Management actions:

- Develop and implement a public information effort about the desired conditions for the National Riverways and actions the National Park Service is taking to achieve those conditions. Information could include appropriate visitor behaviors, including proper road and trail etiquette and the rationale behind not allowing particular activities or discouraging specific behaviors. This information could be distributed through direct visitor contact, park publications (online and printed), and wayside exhibits.
- Investigate and validate the complaint and determine if the complaint requires further action. If safety related, take action immediately.
- Work with the affected users to understand the root of the conflict, create understanding between users, if possible change future behavior, and resolve the conflict.
- Create and post trail signs explaining trail etiquette (e.g., who yields to who).
- Consider limiting a particular type of use on certain trails, segregating uses or changing the design of existing trails to prevent repeat conflicts.
- Modify permit system and permit requirements for trails to help minimize user conflicts related to the amount of use.
- Modify permit restrictions for ATV/UTV use (e.g., group size, travel times, locations, etc.).

Monitoring strategies and time line:

- Law enforcement staff would continue to monitor user-reported complaints related to conflicts on roads and trails through incident reports.

Encounter Rates on Trails

This indicator measures the number of people trail users encounter per day as they are traveling along a trail. This indicator is related to horseback riders and hikers perceptions of crowding along park trails. The indicator would allow NPS staff to monitor the general type of experiences that users have along trails. Researchers and managers have historically considered encounters to be a primary measure of solitude. This is important in the natural zone, where the majority of the park's designated trails are located. This park staff recognizes the need to have a variety of experience types at Ozark National Scenic Riverways and therefore thresholds vary depending which management zone a trail is located on. Thresholds have been developed based

off comparable encounter rate thresholds established at other similar settings and trail use data collected by Kansas State University.

This threshold addresses visitor experience on trails. Each zone in the park would support a different type of experience. In the primitive zone, visitors would have a sense of remoteness, isolated from the sights and sounds of other people. The primitive zone offers very low encounter rates with other visitors year-round. In the natural zone, trail users would experience opportunities for solitude, contemplation, and self-reliance, as well as low to moderate encounter rates with other visitors, mostly engaging in nonmotorized recreational activities. Visitors could expect to have more encounters in the natural zone than in the primitive zone. The resource based recreation zone supports moderate encounter rates and diverse recreational activities. The developed zone supports moderate to high levels of visitor use, and encounter rates, and a diversity of activities.

Thresholds
Primitive Zone: No more than three people encountered every three hours along designated trails, with 20% of observations allowed to exceed the encounter threshold.
Natural Zone: No more than four people encountered every hour along designated trails, with 20% of observations allowed to exceed the encounter threshold.
Resource-based Recreation Zone: No more than eight people encountered every hour along designated trails, with 20% of observations allowed to exceed the encounter threshold.
Developed Zone: No more than 20 people encountered every hour along designated trails, with 20% of observations allowed to exceed the encounter threshold.

Trigger and Corrective Management Actions
Trigger 1 (All zones): Zones have encounter rates exceeding the zone threshold shown for three consecutive years. **Corrective management actions:** Conduct monitoring the following year by direct observation on each section exceeding its threshold. Increase the development and distribution of information pertaining to the unique attributes of other trails in the area. **Rationale:** To ensure that desired conditions are protected, the National Park Service would immediately address early indications of unanticipated increases in encounter rates. More frequent monitoring will allow managers to identify permanent changes in use patterns and take appropriate actions.

Management actions:

- Develop and implement a public information effort about the desired conditions for the National Riverways and actions the National Park Service is taking to achieve those conditions. This information could be distributed through direct visitor contact, park publications (online and printed), and wayside exhibits. The goal would be to have

visitors self-disperse or come during lower use times of the day or season to accommodate similar levels of trail use without concentrating use during peak periods.

- Provide visitor trend data on the website to allow park users to understand when they might be able to obtain a more desirable experience.
- Expand awareness and education of the variety of trail options and opportunities through multiple public information channels and by coordinating with local partners to help disperse NPS trail information.
- Consider separating different uses on different days on multiple use trails.
- Increased communication to private riders during special events, messaging would include informing visitors they may experience increased encounters
- Modify the equestrian permit system. If necessary, the permit system could be modified in the future to include a timed-entry or additional specifications to influence timing, location distribution, and amount of visitor use.

Monitoring strategies:

- Encounter rates on select trail segments would be collected every one to three years by park staff, volunteers, or interns (e.g., Student Conservation Association crews). The frequency of monitoring could be adjusted, if needed. Trail monitoring would vary from season to season to ensure that a variety of trails (high use and low use) are monitored. Monitoring would be initiated at least 0.25 mile from the trailheads to allow for higher encounter rates at the immediate entrance and exit to the trails. Specific trails could be targeted if NPS staff believes that thresholds are being neared. Encounter rate monitoring would be done in conjunction with the collection of trail counter data. In the future, if encounter rates remain consistent then subsequent monitoring could be done with trail counters. At that time, encounter rate monitoring could be done every five years to ensure desired conditions are maintained.
- Monitoring of encounter rates can be accomplished in a variety of ways. One technique that the National Park Service could employ involves tracking the number of people encountered when traveling one-way along a trail and beginning collection 0.25 mile away from the trailhead. As stated above, this monitoring could also be completed by volunteers, partners, or other groups interested in collaborating with the park.
- If the encounter rate thresholds are exceeded but thresholds from other indicators are not, such as number of undesignated trails or number of validated user-reported complaints to the National Park Service of conflicts on roads and trails, then the thresholds could be revisited. If desired conditions are still being met then the encounter rate threshold could be adjusted while still maintaining desired conditions.

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APPENDIX G: MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES

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APPENDIX G: MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES

Avoidance, minimization, and mitigation measures and best management practices (BMPs) would prevent or minimize potential adverse effects associated with the implementation of the alternatives.

NATURAL RESOURCES

Restoration

Roads, trails, recreation areas, and river crossings that are not part of the designated system would be removed and restored to natural conditions. During implementation, park staff would determine the exact restoration strategy needed based on factors such as the likelihood that vegetation would naturally recover and the extent of the existing human impacts. Roads and trails situated close to developed areas or are highly visible from nearby access routes would undergo a higher level of restoration (i.e., grubbing, mechanized equipment work, gates, or fencing), while areas that are less noticeable and deeper in the forest would undergo more modest restoration treatments (such as using natural barriers on trails) and be allowed to revegetate on their own. Restoration would be contingent on funds and staff availability and may be phased over time.

Caves

The National Park Service would gate off access to any caves proximate to trails to prevent human disturbance, as needed.

Additional mitigation measures and best management practices related to natural resources are noted below:

- Consult with a NPS biologist before beginning construction to ensure impacts on 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.
  - Disturbed soil would be revegetated using specific native species seed mixes that do not include invasive or nonnative species.
  - Ensure project personnel make daily checks of clothing, boots, laces, and gear to ensure no nonnative 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.
  - Enact erosion control measures such as siltation control devices to reduce erosion and capture eroding soils.
  - 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 preconstruction 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.
- Any tree removal during trail construction would be done between September 30 and April 1, during the period when the federally listed Indiana bat and the northern long-eared bat would not be using trees for roosting and foraging.
- Periodically evaluate river crossings to document resource impacts and any necessary restoration efforts.
- Continue to monitor for vital signs indicators to monitor aquatic conditions.
- The National Park Service will explore best management practices to mitigate resource impacts tied to vehicle fords associated with county roads and will cooperate with county commissioners on their implementation. Such mitigation measures may include bridges, hardened low-water crossings, culverts, or closures, as appropriate.

CULTURAL RESOURCES

In consultation with the State Historic Preservation Office(r), associated tribes, and other interested parties, the National Park Service would apply the following measures to avoid or minimize cultural resource impacts:

- All activities would comply with the *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation*, the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (including the *Guidelines for the Treatment of Cultural Landscapes*), and NPS Director's Order 28: *Cultural Resource Management*.
- NPS staff would continue to inventory and research archeological, historic, ethnographic, and cultural landscape resources to further document and support cultural resources management at Ozark National Scenic Riverways. NPS staff would conduct any needed archeological or other resource-specific surveys, National Register of Historic Places evaluations and identify recommended treatments. Because of the extensive mileage of proposed new trails, a phased approach to archeological surveys would be undertaken over multiple field seasons and coordinated with construction schedules. The results of these efforts would be incorporated into comprehensive planning and resource assessments, as well as site-specific planning, mitigation, and environmental analysis.
- The National Park Service would practice good resource stewardship with regard to archeological resources, historic structures, and cultural landscapes. Desired conditions and indicators and thresholds developed as part of this plan would signal when these cultural resources were sustaining a maximum acceptable level of impact.
- Known archeological sites, historic structures and contributing cultural landscape features would be routinely monitored to assess and document the effects on resources by natural processes and human activities. As feasible, archeological resources would be left undisturbed and preserved in situ in a stable condition to prevent degradation and

loss of research values unless intervention could be justified based on compelling research, interpretation, site protection, or park development needs. Recovered archeological materials and associated records would be treated in accordance with NPS *Management Policies 2006*, NPS Museum Handbook, Director's Order 24: *NPS Museum Collections Management*, and 36 CFR Part 79.

- As appropriate, archeological surveys or monitoring would precede any ground disturbance, including trail construction or removal and rehabilitation of unauthorized trails. Significant archeological resources would be avoided to the greatest extent possible during construction. If such resources could not be avoided, an appropriate mitigation strategy (e.g., controlled excavation, recordation, and mapping of cultural remains prior to disturbance to ensure that important archeological data is recovered and documented) would be developed in consultation with the Missouri SHPO and, as necessary, associated American Indian tribes.
- If previously unknown archeological resources were discovered during construction or restoration activity, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented in consultation with the Missouri SHPO and associated tribes. If the resources could not be preserved in situ, an appropriate mitigation strategy would be developed. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001) would be followed. If non-Indian human remains were discovered, standard reporting procedures to notify appropriate authorities would be followed, as would all applicable federal, state, and local laws.
- The National Park Service would ensure that all contractors and subcontractors are informed of the penalties for illegally collecting artifacts or intentionally damaging archeological sites and historic properties. Contractors and subcontractors would be instructed on procedures to follow if previously unknown archeological resources are uncovered during construction.
- Equipment and material staging areas used during construction projects would avoid known archeological resources and historic sites, and highly sensitive site locations would be fenced within project areas.
- The National Park Service would consult with associated American Indian tribes to develop and accomplish park projects and programs in a way that respects the beliefs, traditions, and other cultural values of tribes who have ancestral ties to park lands. The National Park Service recognizes the past and present connections of associated tribes with park lands and that potential resources, places, and traces of tribal use are important parts of the cultural environment to be preserved, protected, and interpreted as appropriate.
- The National Park Service would encourage visitors through the park's outreach and interpretive programs to respect and leave undisturbed any inadvertently encountered archeological and historical resources.
- The National Park Service would cooperate with partners, park neighbors, and other stakeholders to establish and enforce measures to prevent and reduce human impacts, such as vandalism and looting, on cultural resources.

NPS staff would continue to provide respectful protection of family cemeteries in the National Riverways, and would maintain appropriate access for family descendants and others on a case-by-case basis.

TRAIL MANAGEMENT

Maintenance of Trails

Trails would be maintained according to the specified trail class (for example, Class 5 trails would require more extensive maintenance than Class 2 trails). Factors such as flooding, storm damage, and use levels may require modifications to the trail maintenance schedule. An implementation strategy would include prioritization of trail and road restoration, maintenance and rehabilitation, and development. This strategy could include redirecting use to other areas where the use is appropriate or previously designated and temporary closures until archeological surveys, trail maintenance, and restoration is completed.

Signage for Roads, Trails, River Crossings, and Recreation Areas

Designated roads, trails, river crossings, and recreation areas would be clearly and consistently signed for visitors on maps, on the ground, and in park informational materials, in order to assist visitors with trip planning and reassure visitors that they are on a designated facility. These signs would display commonly used symbols and icons based on widely accepted sign standards. Vehicular travel will be limited to designated and signed roads only.

Sustainable Trail Principles

All new trails and reroutes of existing trails would be constructed according to the design parameters outlined in the "Design Parameters" section of the Trail Management Handbook (USFS – FSH 2309.18, 2008) and would use sustainable trail techniques outlined in the Trail Construction and Maintenance Notebook (USFS 2007). Trail class designations have been identified as part of this planning process and would inform the above prioritization and all other trail work.

Proposed new trail alignments included in the alternatives would be based on GIS mapping analysis, study of aerial imagery, and field observations. Final trail alignments may vary slightly from the trail alternative corridors shown on the Road and Trails Plan maps appendix D), based on results of additional field verification of final alignments prior to construction, archeological field surveys, and section 106 consultation. The final alignments for trails would be reviewed by the park's natural and cultural resources experts to ensure impacts on sensitive resources are minimized. If any sensitive resources are discovered during trail construction, that work would cease and the area would be surveyed in more detail so that impacts can be avoided or minimized and/or an alternate route can be established. The park would prioritize trails that connect visitors to the history and important stories of the National Riverways. Considerations would also include staging areas, practicality of access, safety, and resource protection.

Temporary Trail Closures

Periods of heavy or sustained precipitation often lead to flooding, saturated soils, and muddy conditions along park trails. Use of park trails during these time periods can lead to rutting, trenching, braiding, social trail creation, and widening of tread. The inundation of some areas with water during flooding also presents serious threats to visitor safety. During or after periods of heavy precipitation, the park would implement temporary closures on a case-by-case basis to protect trails, improve visitor safety, and reduce negative resource impacts.

Trail Management Corrective Measures

In the instance that resource thresholds are exceeded in a given area, the park would implement corrective measures to minimize resource impacts, which may include trail closures for periods of time, requiring trail permits, or other management actions.

Rerouting of Certain Portions of Designated Trails

The National Park Service would continue to perform minor reroutes of existing trails, where necessary, to protect natural and cultural resources and improve visitor experience. Such actions would be conducted in a manner consistent with NPS Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making*; section 3.3(c).

VISITOR EXPERIENCE AND SAFETY

- Past and ongoing monitoring would inform future mitigation measures to avoid impacts on the cultural and natural resources of the Riverways as well as on the visitor experience. These include:
  - Monitoring 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 law enforcement incidents.
  - Resource condition surveys, as needed.
  - Proactively addressing safety measures using signs, bulletin boards, and sharing 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 Riverways 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 appropriate behavior and responsible visitor use. 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 established visitor capacities based on an analysis of desired conditions, current visitor use information, monitoring 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 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.

APPENDIX H: BIOLOGICAL ASSESSMENT

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United States Department of the Interior

NATIONAL PARK SERVICE
Interior Region 4
Ozark National Scenic Riverways
404 Watercress Drive
P.O. Box490
Van Buren, Missouri 63965

1.A.2

October 17, 2019

Karen Herrington, Field Supervisor
U.S. Fish and Wildlife Service
Missouri Field Office – Ecological Services
101 Park DeVille Drive, Suite A
Columbia, MO 65203

Subject: Ozark National Scenic Riverways Roads and Trails Management Plan / Environmental Assessment; ESA Section 7 Informal Consultation

Dear Ms. Herrington:

We are pleased to provide you with a copy of the draft biological assessment and a CD of the Draft Roads and Trails Management Plan / Environmental Assessment for Ozark National Scenic Riverways, Missouri for your review and consideration. The purpose of the plan is to improve the system of park roads and trails to ensure that it provides visitors with access to a wide variety of locations and experiences while also protecting the Riverways' fundamental resources and values. The plan is needed to ensure that designated roads and trails and associated public recreation areas are clearly documented, and that undesignated roads and trails are properly restored to protect park natural and cultural resources and improve visitor safety. Use of undesignated, visitor-created roads and trails have created resource concerns and safety issues for visitors, including longer response times for law enforcement personnel and more complex search and rescue operations. Restoring redundant and undesignated roads would improve visitor experience, visitor safety, and resource conditions.

Among the actions identified under the NPS preferred alternative (alternative B) are an expansion of trails for traditional recreation activities such as hiking and horseback riding. In addition to the park's existing designated trail system, an additional 55.6 miles of new trails would be designated including 11 miles outside the park's jurisdictional boundary under partnership agreements. Some currently undesignated trails and closed roads would be converted to designated trails. As necessary, the alignments of existing undesignated trails would be modified to minimize potential impacts to federally listed species. Bicycling would continue to be permitted on all designated park roads, and 10.4 miles of new bike trails would be designated. Use of ATVs and UTVs would be permitted on county roads and NPS roads with a valid permit.

Most of the undesignated, visitor-created trails would be closed and restored to natural conditions. The National Park Service would seek to establish a permitting system for equestrian users that would provide information and education to riders, track the volume of use on equestrian trails, and help the park manage the levels of use on equestrian trails. All undesignated roads would be closed and restored to natural conditions. Undesignated river crossings and vehicle fords would be reduced from current levels to minimize potential impacts to water quality and other sensitive species and resources.

We are requesting your written concurrence of our determination of effects for the proposed action on federally listed species in accordance with section 7(a)(2) of the Endangered Species Act of 1973 (as

amended) (Act), codified in 50 CFR §402.02 and §402.14. Informal consultation was initiated 4/22/2015 between Trisha Crabill of your office and Lawrence Johnson, Superintendent of Ozark National Scenic Riverways (ONSR) for the National Park Service (NPS). Subsequent telephone conversations and field visits and meetings occurred on the following dates:

- May 11, 2015: telephone call between ONSR, NPS Denver Service Center (DSC), and USFWS to discuss protocol for the BA.
- October 6, 2015: telephone call between ONSR, DSC, and USFWS staff to provide project updates and discuss next steps for BA process.
- March 1, 2016: public meeting with park partners and stakeholders (including USFWS) to discuss a range of trail and road issues for the planning team to explore during alternatives development.
- June 27, 2016: telephone call between ONSR, DSC, Missouri Department of Conservation (MDC) and USFWS staff to review current and proposed roads and trails alignments and river crossings to determine if any would impact federally listed species.
- November 20, 2017: telephone call between to discuss potential impacts from revised project actions, including new alignments for proposed roads and trails.
- November 8, 2018: telephone call with DSC and USFWS to discuss suitability of current and proposed river crossings for federally listed species.
- November 14, 2018: field visit with ONSR and USFWS staff to determine if any of the current or proposed river crossings contain suitable larval habitat for federally listed Ozark Hellbender.
- February 26, 2019: telephone call with ONSR, DSC, and USFWS staff to discuss best management practices and other considerations the plan should incorporate to protect listed bat species and their habitat.

The proposed roads and trails management plan is a comprehensive, parkwide planning effort located in Ozark National and Scenic Riverways in southeastern Missouri. With this letter, we submit our biological assessment (BA) containing a description of the proposed management action, species addressed, discussion of effects, and our and our effect determinations for the following federally listed species:

- Gray bat *(Myotis grisescens)*, endangered
- Indiana bat *(Myotis sodalist)*, endangered
- Northern long-eared bat *(Myotis septentrionalis)*, threatened
- Ozark hellbender *(Cryptobranchus alleganiensis bishopi)*, endangered

We have determined that our proposed action is "may affect, not likely to adversely affect" for the gray bat, Indiana bat, and northern long-eared bat, and "may affect, not likely to adversely affect" for the Ozark hellbender, as the effects of this action are insignificant and discountable for the reasons stated in our assessment. There is designated critical habitat for Indiana bat within the project area. If you agree with these determinations, please send your written concurrence to me.

Sincerely,

Lawrence E. Johnson
Superintendent

Enclosures

cc:
Scott Babcock, National Park Service/Denver Service Center Project Manager

TABLE OF CONTENTS

1.0 INTRODUCTION

The Endangered Species Act of 1973 (16 U.S.C. 153 *et seq*.), as amended (ESA or Act) in section 7(a)(1) directs federal agencies to conserve and recover listed species and use their authorities in the furtherance of the purposes of the Act by carrying out programs for the conservation of endangered and threatened species so that listing is no longer necessary (50 CFR §402). Furthermore, the Act in section 7(a)(2) directs federal agencies to consult (referred to as section 7 consultation) with the U.S. Fish and Wildlife Service (USFWS) when their activities "may affect" a listed species or designated critical habitat. Additionally, NPS Management Policy (2006) directs the NPS to "inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species to the greatest extent possible".

1.1 Purpose of this Biological Assessment

This biological assessment (BA) analyzes the potential effects of the proposed roads and trails plan on the Ozark National Scenic Riverways (park) on federally listed threatened, endangered, proposed animal (wildlife, invertebrates, and fish) species, pursuant to section 7(a)(2) of the ESA. Federally listed threatened and endangered animal species meeting the following criteria are addressed in this assessment:

1. known to occur in the park based on confirmed sightings;
2. may occur in the park based on unconfirmed sightings;
3. potential habitat exists for the species in the park; or
4. potential effects may occur to these species.

1.2 Current Management Direction

Current management direction for federally listed and proposed threatened and endangered species can be found in the following documents, filed at our office:

- Endangered Species Act of 1973, as amended (ESA or Act)
- 1916 NPS Organic Act
- NPS General Authorities Act of 1978
- NPS Management Policies 2006
- Migratory Bird Treaty Act (MBTA)
- National Environmental Policy Act (NEPA)
- Northern Long-Eared Bat Final 4(d) Rule

2.0 CONSULTATION HISTORY

The NPS initiated Informal consultation in April 2015 with the USFWS Missouri Ecological Services Field Office to discuss the plan/EA and potential impact to federally listed species and their critical habitats. The most recent list of federally listed species was obtained from the USFWS IPaC website on February 26, 2019 (consultation code: 03E14000-2018-SLI-0269). Using this list, the park determined which of those species and their critical habitats had a potential to occur within the plan study area. Federally listed species with the potential to occur within the study area and critical habitat are further analyzed in this biological assessment prepared for the roads and trails plan. Species not known or with no potential of occurring in the study area were excluded from further review in the biological assessment with a "no effect" determination, corresponding rationale, and were not further analyzed. Subsequent telephone conversations and field visits and meetings occurred between May 2015 and March 2019.

3.0 Proposed Management Action (NPS Preferred Alternative)

Under alternative B, opportunities for traditional recreation activities such as hiking and horseback riding would be expanded. The existing designated trail system would continue to be provided. The park would designate 55.6 miles of new trails located on NPS fee lands within the park's jurisdictional boundary. Some undesignated trails and closed roads would be converted into designated trails. In other areas, such as the upper Current River, some of the proposed trails would require modified alignments to existing undesignated trails to minimize potential impacts to sensitive cultural and natural resources. On certain privately owned lands that occur within and outside of the park jurisdictional boundary, the National Riverways has worked with private landowners to identify additional conceptual trail alignments/corridors for future, authorized trails. These conceptual trail alignments are based on verbal agreements with those private landowners. Formal agreements would be sought in the future before trails are developed.

Most of the undesignated, visitor-created trails would be closed and restored to natural conditions. The National Park Service would seek to establish a permitting system for equestrian users that would provide information and education to riders, track the volume of use on equestrian trails, and help the park manage the levels of use on equestrian trails. Mountain biking would be permitted on all designated park roads. Approximately 5.8 miles of new mountain biking trails would be designated in the Lower District along the Old Tram Road and in the vicinity of the Partney Ridge and Partney House trails.

All undesignated roads would be closed and restored to natural conditions, including roads identified for closure in the 1991 Roads and Trails Study that have not been closed to date. In addition, there would be a moderate reduction in designated road mileage (including a reduction of about 12 miles of NPS-administered roads—2.5 miles of which are NPS-administered roads and traces in primitive zones).

3.1 ACTIONS COMMON TO ALL ALTERNATIVES

While each alternative represents varying strategies related to roads and trails management, there are some strategies that would not vary by alternative. These strategies are considered "common to all" and ultimately serve to protect the park's resources and values. They are considered practical, common sense approaches to park management and are grounded in NPS policy and mandates and are likely to be employed under any future management scenario.

Restoration – Roads, trails, recreation areas, and river crossings that are not part of the designated system would be closed and restored to natural conditions. During implementation, park staff would determine the exact restoration strategy needed based on factors such as the likelihood that vegetation would naturally recover and the extent of the existing human impacts. Roads and trails situated close to developed areas or are highly visible from nearby access routes would undergo a higher level of restoration (i.e., grubbing, mechanized equipment work, gates, or fencing), while areas that are less noticeable and deeper within the forest would undergo more modest restoration treatments (such as using natural barriers on trails) and be allowed to revegetate on their own. Restoration would be contingent on funds and staff availability and may be phased over time.

Temporary trail closures – Periods of heavy or sustained precipitation often lead to flooding, saturated soils, and muddy conditions along park trails. Use of park trails during these time periods can lead to rutting, trenching, braiding, social trail creation, and widening of tread. The inundation of some areas with water during flooding also presents serious threats to visitor safety. During or after periods of heavy precipitation, the park would implement temporary closures on a case-by-case basis to protect trails, improve visitor safety, and reduce negative resource impacts.

Trail management corrective measures – In the instance that resource thresholds are exceeded in a given area, the park would implement corrective measures to minimize resource impacts, which may include trail closures for extended periods of time, requiring trail permits, or other management actions.

Rerouting of certain portions of designated trails – The NPS would continue to perform minor reroutes of existing trails, where necessary, to protect natural and cultural resources and improve the visitor experience. Such actions would be conducted in a manner consistent with NPS Directors Order 12; Section 3.3 (c).

Caves – The NPS would gate off access to any caves proximate to trails to prevent human disturbance, as needed.

Vehicle Fords – Currently there are several vehicle fording sites on the Current River, Jacks Fork River, and major tributaries. While the plan does not propose to close any crossings associated with any county's road network, the NPS will continue to evaluate roads that cross streams to determine their necessity.

Signage for roads, trails, river crossings, and recreation areas – Designated roads, trails, river crossings, and recreation areas would be clearly and consistently signed for visitors on maps, on the ground, and in park informational materials, in order to assist visitors with trip planning and reassure visitors that they are on a designated facility. These signs would display commonly used symbols and icons based on widely accepted sign standards. Vehicular travel will be limited to designated and signed roads only.

Sustainable trail principles – All new trails and reroutes of existing trails would be constructed according to the design parameters outlined in the Design Parameters Section of the Trail Management Handbook (USFS – FSH 2309.18, 2008) and would use sustainable trail techniques outlined in the Trail Construction and Maintenance Notebook (USFS, 2007). Trail class designations would be identified as part of this planning process and inform the above prioritization and all other trail work.

Proposed new trail alignments included in the alternatives would be based on GIS mapping analysis, study of overhead imagery, and field observations. Final trail alignments may vary slightly from the trail alternative corridors shown on the R&T Plan maps Appendix B), based on results of additional field

verification of final alignments prior to construction, archeological field surveys, and Section 106 consultation. The final alignments for trails would be reviewed by the park's natural and cultural resources experts to ensure impacts to sensitive resources are minimized. If any sensitive resources are discovered during trail construction, that work would cease and the area would be surveyed in more detail so that impacts can be avoided or minimized and/or an alternate route can be established. The park would prioritize trails that connect visitors to the history and important stories of the National Riverways. Considerations would also include staging areas, practicality of access, safety, and resource protection.

Maintenance of trails – Trails would be maintained according to the specified trail class (for example, Class 5 trails would require more extensive maintenance than Class 2 trails). Factors such as flooding, storm damage, and use levels may require modifications to the trail maintenance schedule.
An implementation strategy would include prioritization of trail and road restoration, maintenance and rehabilitation, and development. This strategy could include redirecting use to other areas where the use is appropriate or previously designated and temporary closures until archeological surveys, trail maintenance, and restoration is completed.

Accessible trails – The park has three trails that are accessible to persons with disabilities: Alley parking lot to Alley Mill; Big Spring parking lot to Big Spring; and the Slough Trail at Big Spring. These trails provide opportunities for persons with disabilities to see some of the park's most outstanding resources. A new 1/4-mile accessible trail may be considered from the parking lot to Blue Spring on the Current River. The National Park Service would work with the Missouri Department of Conservation and the Missouri Natural Areas Committee as needed to implement this trail. The park staff will continue to look for other opportunities to develop accessible trails in the park, where appropriate, particularly with respect to any trails in the upper Current River under alternatives B and C. Hardened surfacing of accessible trails may be necessary in some areas.

Designated versus undesignated roads and trails – Maps of roads and trails within each alternative (see Appendix B in the plan/EA) depict the designated system of roads, trails, recreation areas, vehicle fords, and trail river crossings. Any locations not shown on the maps are undesignated. All designated roads and trails would be marked with appropriate signage. Private, state, and federal non-NPS roads within the park's boundary may not provide public access. Public access would be at the discretion of the easement holder and private landowner. All undesignated roads, trails, and river crossings would be removed and restored.

Volunteers – Where possible, the park staff would work closely with volunteers to fund and/or assist with trail construction, development, and maintenance and restoration projects. The National Park Service would enter into formalized agreements with organized groups as necessary.

Exotic plant monitoring team: The park would establish an exotic plant monitoring team comprised of park staff, volunteers, and partners that would assist with invasive plant species monitoring. The park would also seek assistance from the National Park Service's Biological Resources Division to support an Exotic Plant Management Team at the park.

Partnerships: A number of additional trails could eventually extend beyond the park's jurisdictional boundary, but would be dependent on partnerships and cooperative agreements with neighboring landowners. The National Riverways would seek opportunities to partner with neighboring landowners within the park and outside the park to identify potential options for keeping trail loops on one side of the river and expanding trail mileage. Additional rerouting of currently designated trails may be

necessary to further protect sensitive park resources. Additional partnerships would be explored to connect trails outside the park to designated trails within the park for extended trail opportunities.

Access to easements and reconciling road ROW issues: The NPS would continue to work with counties, as necessary, to resolve any outstanding jurisdictional issues.

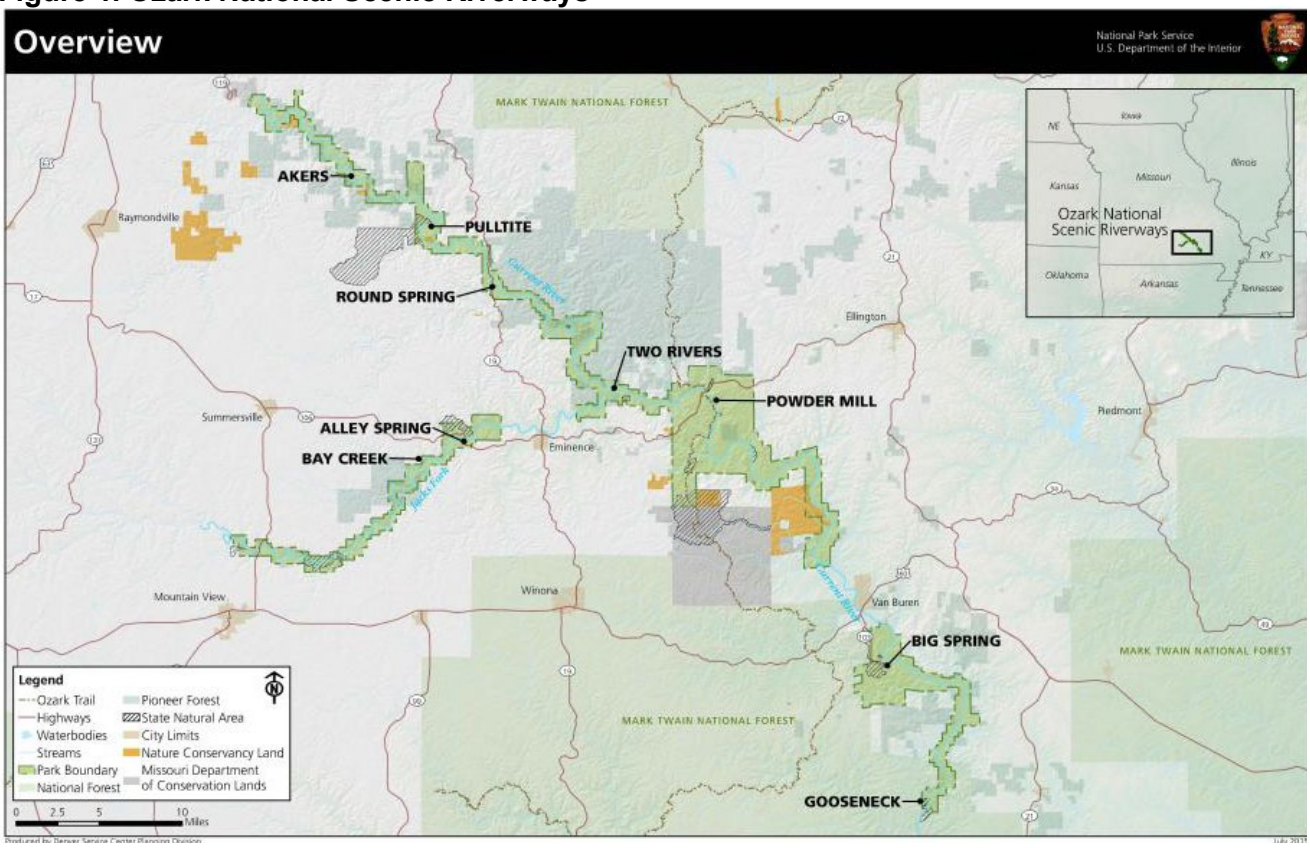
4.0 Action Area Description

The National Riverways include portions of the Current and Jacks Fork Rivers, providing 134 miles of clear, free-flowing, spring-fed waterways (Figure 1). Approximately 80,000 acres of jurisdictional park boundary encompass these river miles and form the plan's action area. The National Riverways' karst landscape supports a unique variety of natural features, including a spring system unparalleled in North America and one of the highest densities of caves in any national park.

The National Riverways lie within Missouri's Ozark Highlands, an important center of biodiversity in North America. The Ozark Highlands is home to a rich array of wildlife and plants, including endemic species that exist nowhere else in the world. These two rivers have been designated as Outstanding National Resource Waters in Missouri. The National Riverways also feature abundant archeological and historic structures, landscapes, and objects, reflecting ancient life in the Ozark Highlands.

The free-flowing Current and Jacks Fork Rivers also provide excellent recreational opportunities. The recreational value of these rivers to the American people was explicitly stated in the 1964 enabling legislation. Activities for visitors include boating, canoeing, tubing, swimming, fishing, and sightseeing. Visitors can also enjoy hiking, backpacking, hunting, and horseback riding on park lands.

Figure 1. Ozark National Scenic Riverways



5.0 PRE-FIELD REVIEW

Documentation of federally listed species and designated critical habitat in the action area was obtained from the USFWS IPaC website on February 26, 2019. Using this list, the NPS determined which of these species and critical habitat had a potential to occur within the action area (shown in Table 1 below). Species not known or with no potential of occurring in the action area are documented with rationale in Table 1 below and will not be discussed further in this document. Excluded species have been dropped from further analysis by meeting one or more of the following conditions:

1. Species does not occur, nor is expected in the action area during the time activities would occur
2. Occurs in habitats that are not present
3. Is outside of the geographical or elevational range of the species.

In addition, Table 1 provides a brief summary of federally listed/proposed species; designated/proposed critical habitat; species' habitat requirements; and occurrence information of species that are known or may occur in the action area.

As indicated, the action area includes designated critical habitat for the Indiana bat (*Myotis sodalis*). Direct, indirect, or cumulative effects could occur within designated critical habitat and is addressed further in this assessment.

5.1 Species Considered and Evaluated

The following table indicates whether the species from the USFWS official species list (2/26/2019) are known or expected to occur within the action area; if suitable habitat is present; or why they are excluded from further analysis.

Table 1. Threatened, endangered, candidate/proposed species with the potential to occur within the action area and critical habitat. The USFWS species list (USFWS 2019) was obtained from IPaC website on 2/26/2019. Species and critical habitat not having the potential to occur were excluded from further review with a no effect determination and associated rationale, below.
[1] **Status Codes**: **E**=federally listed endangered; **T**=federally listed threatened; and **CH**=designated critical habitat
[2] **Exclusion Rationale Codes**: **HAB**= no habitat present in action area; **ODR**=outside known distributional range of the species;

Species Common and Scientific Name	Status[1]	Potential to Occur	Critical Habitat	Rationale for Exclusion[2]	Habitat Description and Range in Action Area
MAMMALS					
Gray bat *Myotis grisescens*	E	Yes	No	N/A	Known to forage along streams and rivers and can occur in large concentrations in a very limited number of park caves.
Indiana bat *Myotis sodalis*	E, CH	Yes	Yes	N/A	Occurs within the park. They are known to hibernate during the winter in the southern half of Missouri and are found north of the Missouri River in the summer, roosting and raising their young.
Northern long-eared bat *Myotis septentrionalis*	T	Yes	No	N/A	Typically spends winters hibernating in large caves with large entrances, constant temperatures, and high humidity. Has been observed in several hibernaculum caves within the park and individuals have been captured in the park's vicinity.
AMPHIBIANS AND REPTILES					
Ozark hellbender *Cryptobranchus alleganiensis bishopi*	E	Yes	No	N/A	Occurs throughout the Current River and may still be present in small numbers in the Jacks Fork. Prefer habitat beneath flat rocks in large, highly-oxygenated streams and rivers.
BIRDS					
Red-cockaded woodpecker *Picoides borealis*	E	No	No	HAB	Historically known to occur within action area vicinity, but currently does not exist.
INSECTS					
Hines emerald dragonfly *Somatochlora hineana*	E	No	No	HAB, ODR	Associated with areas of groundwater-fed wetlands that are perched over limestone bedrock, but not known to occur within action area vicinity.
FLOWERING PLANTS					
Virginia sneezeweed *Helenium virginicum*	T	No	No	ODR	Species historical range includes areas of southern Missouri, but is not currently known to occur within action area.

As indicated in the above table, there are four federally listed threatened or endangered species (gray bat, Indiana bat, northern long-eared bat, and Ozark hellbender) with the potential to occur and one designated critical habitat within the action area. Therefore, only those species and critical habitat will be addressed hereafter in this assessment. The remaining species/critical habitat shown above without a potential to occur in the action area will not be analyzed further based on the rationale provided. The proposed action will have no effect on these other species or critical habitat.

6.0 EVALUATED SPECIES INFORMATION

6.1 Gray Bat

Field reconnaissance

Gray bats typically occur in large concentrations in a very limited number of caves, which makes them highly vulnerable to human disturbance. The gray bat's range is generally limited to the limestone karst areas of the southeastern United States. Gray bats have been recorded in the National Riverways and are known to forage along streams, rivers, and reservoirs in this part of Missouri.

Special status and biology

Gray bats are listed as endangered. This species tends to live in caves year-round. In summer, they typically roost in caves near streams or rivers. During this time, they forage for flying insects above streams, riparian vegetation, and lakes. In winter, they hibernate in deep, vertical caves. In hibernacula, human disturbance causes the bats to use vital fat reserves, their only source of energy throughout winter. In maternity caves, pregnant females may abort unborn young or panicked mothers may drop babies to their deaths if they are forced to flee from intruders. Severe or repeated disturbance may cause reproductive failure of an entire colony.

While loss of cave habitat and suitable trees are threats to this species, current National Riverways practices of directing park facilities like roads and trails away from caves and cave entrances; protecting riparian areas, not cutting hazard trees during certain times of year, and inspecting trees that might be used by these bats are important management activities that mitigate impacts to gray bats. A fungus called white-nose syndrome is an ongoing threat to the population of gray bats in the park unit. The potential transmission of white-nose syndrome continues to threaten gray bat populations – in addition to several other bat species, including the federally listed Indiana and northern long-eared bats. Although white-nose syndrome may be inadvertently transmitted into caves by humans carrying the fungus on their clothing and gear, the transmittal through a bat population is primarily from bat to bat (NPS 2014). Equestrian use, hiking, camping, motorized vehicles, motorboats, and other active National Riverways uses near bat foraging habitat and hibernacula may alter bat behavior or displace effective habitat areas. The effects of these uses may be impacted by human activity along both designated and undesignated roads and trails. The continued use of undesignated roads and trails could continue to fragment larger areas of quality habitat.

6.2 Indiana Bat

Field reconnaissance

Indiana bat populations were first surveyed in the late 1950s. More recent surveys concluded that while many Missouri hibernacula populations have decreased, Indiana bats occur in or within a half-mile of the Riverways. They have been found hibernating during the winter in the southern half of Missouri, and are found during the summer months primarily north of the Missouri River, roosting and raising their young.

Special status and biology

Indiana bats are federally listed endangered species and have designated critical habitat within the National Riverways study area. They are small, migratory bats that roost together in large groups in caves and mines, typically in the vicinity of water sources. Each fall, these bats migrate to the caves and mines in their home territory to hibernate in large clusters. Very few hibernacula locations have been identified in the United States. Through spring and summer, most males use caves to roost, while females and young often roost under loose bark and in tree hollows of hickory and oak in riparian areas. The Indiana bat is nocturnal, primarily feeding on flies, moths, and other insects flying above streams and riparian trees.

Indiana bats are highly vulnerable to disturbance, habitat change, and environmental contamination, and are at particular risk because of their very concentrated and very limited hibernation sites. Park managers would continue to protecting known, occupied maternity roost trees, and all efforts to avoid disturbing roost and other sensitive habitat would be taken to minimize impacts to this endangered species. While loss of suitable trees and other types of habitat degradation are threats to the Indiana bat, Endangered Species Act (ESA) regulations and park practices that protect riparian areas, refrain from cutting hazard trees during certain times of year, and inspecting trees that might be used by bats are important actions to help preserve Indiana bats and bat habitat in general. In addition to its vulnerability to disturbances, white-nose syndrome is an ongoing threat to the population of Indiana bats in the National Riverways.

6.3 Northern Long-Eared Bat

Field reconnaissance

Northern long-eared bats are most common in the eastern U.S. and the Atlantic coast states, but also occur as far west as Oklahoma, Wyoming, and Montana. The species has been observed in several hibernaculum caves within the National Riverways and individuals have also been captured in the park's vicinity.

Special status and biology

In May 2015, the U.S. Fish and Wildlife Service listed the Northern Long-eared Bat as threatened. Northern long-eared bats are medium-sized bats with noticeably long ears relative to other bats in the same genus. They typically spend winters hibernating in large caves with large entrances, constant temperatures, and high humidity. In summer months, northern long-eared bats roost in colonies or individually in tree cavities and underneath bark. It is a nocturnal feeder in forest understories of hilly terrain and on waterbodies. Their diet focuses on beetles, flies, and moths.

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 (as indicated in this assessment) in many areas of the eastern U.S. This threat contributed directly to the reasoning for the proposed listing, as the disease is spreading from the eastern U.S. to several areas of the Midwest, where similar bat population reductions are expected. Other threats to the northern long eared bat include habitat disturbances (e.g., cave disturbances and vandalism, removal of roosting trees), wind energy development, climate change, and chemical pollutants.

Northern long-eared bats 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 USFWS to protects habitat areas 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 cave openings) 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.

6.4 Ozark hellbender

Field reconnaissance

The species occurs throughout the Current River and may still be present in the Jacks Fork (USFWS 2015). The Current River was not surveyed extensively until the 1990s and in 1992, researchers found hellbenders. More hellbenders were documented in 1999, and in 2005 and 2006 as well (76 Fed. Reg. 61,960).

Jacks Fork was initially surveyed for Ozark Hellbenders in 1992, and hellbenders were documented that year. No hellbenders were found during investigations of Jacks Fork in 2003 and none were found in 2006 (76 Fed. Reg. 61,958).

Special status and biology

The Ozark hellbender was listed as endangered by the U.S. Fish and Wildlife Service in October, 2011 and by the State of Missouri, respectively. The Ozark hellbender is a large and rare species of salamander found only in southern Missouri and northern Arkansas. The species is permanently aquatic and restricted to the Ozark Plateau in rivers that drain into the Missouri-Mississippi river systems. The Ozark hellbenders' wellbeing largely depends on high-quality water systems with constant levels of dissolved oxygen, temperature, and flow. It has experienced severe population declines in the Ozark Highlands and collection of juveniles has become rare, indicating little recruitment in the populations (Briggler et al. 2010).

These salamanders are solitary in nature and make their homes under flat rocks in large, permanent streams and rivers. They have a broad, flat head with very small, lidless eyes. They range in color from reddish-brown to dull gray-brown. Hellbenders breed from late September to November, and their 200 to 700 eggs are fertilized externally and laid in depressions under flat rocks in rivers. Larvae hatch four to six weeks later. Hellbenders feed mainly on crayfish and other aquatic animals.

Because hellbenders remain active throughout the year and maintain their home territories year-round, it is important to minimize activities that change physical characteristics of rivers and streams and alter the flow and quality of water for long periods of time. Future changes to the river flow-regime due to climate change may necessitate additional management actions to protect the hellbenders and other endangered species.

An Ozark hellbender action plan has not yet been developed by the U.S. Fish and Wildlife Service.

7.0 Environmental Baseline

As defined under the ESA, the environmental baseline includes past and present impacts of all federal, state, and private actions in the action area; the anticipated impacts of all proposed federal actions in

the action area that have already undergone formal or early section 7 consultation; and the impact of state and private actions which are contemporaneous with the section 7 consultation process. Future actions and their potential effects are not included in the environmental baseline. This section in combination with the previous section defines the current status of the species and its habitat in the action area and provides a platform to assess the effects of the proposed action under consultation with the USFWS.

7.1 Previous consultation with the USFWS within the study area

Table 2 describes all past completed section 7 consultation that have previously occurred within the study area.

Table 2. Past consultation with the USFWS and determinations for actions within the action area for all federally listed/proposed species and designated/proposed critical habitat (CH).

Project	Type of Project	Species Addressed	Determination[1]	Date
General Management Plan	*Resource management*	*Gray bat*	*NLAA*	*2015*
		Indiana bat	*NLAA*	
		Northern long-eared bat	*NLAA*	
		Ozark hellbender	*NLAA*	

[1] **ESA determinations**: **NE** = No effect, **NLAA** = May affect, not likely to adversely affect, **BE** = Beneficial effect, and **LAA** = Likely to adversely affect.

7.2 Past and current activities within the study area

Past and current activities within the action area include:

Flood recovery

Ongoing and future repairs of existing, damaged river access sites and associated facilities within eight areas of the National Riverways impacted by the May 2017 flood:

- Alley Springs
- Buck Hollow
- Powder Mill
- Big Springs
- Akers
- Round Springs
- Pulltite
- Two Rivers

Facility improvements will include redesign and rebuilding of existing facilities - locations may vary, but physical extents are generally similar. Any road and campground infrastructure improvements would utilize sustainable design standards and would accommodate existing use levels.

Waymeyer/Pin Oak EA

As part of this project, the park will evaluate alternate location options to replace a flood-destroyed campground and floater access. The site would be redesigned to improve access, and provide more sustainable floater access.

Big Springs Lodge and Cabin Rehabilitation

This planned rehabilitation effort consists of the repair and rehabilitation of the dining lodge, cabins, site features, and landscape of the Big Springs Historic District. This project will rehabilitate fifteen historic CCC cabins for a total of 10,068 square feet and a historic CCC Dining Lodge consisting of 3,315 square feet. The work includes complete rehabilitation of each historic cabin's and the dining lodge's interior and exterior. Upon project completion, the Park's one and only concessions-operated lodging operation will be able to once again utilize these historic structures to provide a historically rich, quality visitor experience.

8.0 Effects to Evaluated Species and Determinations

8.1 Federally Listed Species

Gray bat

Direct and indirect effects

Under the proposed action, the moderate reduction in designated road mileage would have a small beneficial impact to gray bats. New trails would be routed away from cave entrances. Noise and other visitor related impacts on formerly open roads would be minimized. Similarly, 55.6 miles of new trails located on NPS fee lands would have relatively small overall impacts to gray bats. Short-term construction impacts would have small, mostly noise-related impacts to gray bats.

Under the proposed action, road and trail development activities would be directed away from caves and cave entrances. Tree removals needed near gray bat habitat would generally observe an eighth of a mile buffer around known hibernacula and cutting would be conducted during winter months. Road development activities would include removing small patches of small diameter trees (e.g., trees with a diameter at breast height [dbh] of three inches or less) which would have a slight, indirect, and adverse effect to bat habitat (NPS 2018b).

Proposed trail construction activities and maintenance, as well as potential visitor impacts that could occur near entrances to caves would be avoided. Trail alignments would be routed away from caves and cave entrances to respect sensitive habitat.

Permits for horseback riding would have a beneficial effect on gray bat and its habitat. A permitting system would help manage horse use levels, which would benefit gray bats by enhancing protection from the possible "over-trampling" of trails in vulnerable terrestrial wildlife habitat. Furthermore, a permitting system would have indirect beneficial impacts to gray bats because it would educate users and generate funding for horse trail management and maintenance activities, and allow park staff to monitor resource impacts against established thresholds in the roads and trails plan.

Potential adverse impacts near gray bat habitat (and including designated critical habitat for Indiana bats) could occur with the introduction of mountain biking, although these would be mitigated to a large extent by siting final trail alignments 1/8- to ¼- mile from caves, wherever possible. Similar to impacts associated with new trails in general, cave openings that are visible to mountain bikers (and other user groups) would be particularly vulnerable to potential resource disturbance and vandalism.

Cumulative effects
Ongoing and future repairs of existing, damaged river access sites and associated facilities within eight areas of the National Riverways impacted by a catastrophic flood in May 2017 could contribute noise that may have short-term effects on gray bats.

In the future, connecting park roads and trails to conceptual trail alignments that would be built on neighboring lands would be dependent on the support of receptive property owners adjacent to park boundaries. Additional mountain bike trails and potential impacts to listed species from future development of mountain bike trails are not analyzed further in the roads and trails plan.

Interrelated and independent actions and their effects
Interrelated activities are part of the proposed action that depends on the action for their justification, and interdependent activities have no independent utility apart from the action. There are no interrelated or interdependent actions associated with this action; therefore, there are no anticipated adverse effects to gray bats.

Effect determination
For gray bat, we have determined the proposed action will have a ***may affect, not likely to adversely affect*** determination for this federally listed species. Improvements and additions to the National Riverways' designated roads and trails system would not affect the integrity of sensitive portals near cave openings. New trails and recreation related infrastructure included in the proposed action would not be developed within view of cave openings and other known gray bat habitat. Trees that would be removed within gray bat habitat as part of the proposed action would be limited to small diameter at breast height (dbh) cuts to help maintain forest coverage along trails and recreation facilities near gray bat habitat. Tree removals needed near gray bat habitat would generally observe an eighth of a mile buffer around known hibernacula and cutting would be conducted during winter months, to the extent possible, to help ensure this species would not be affected by proposed management actions.

Indiana bat

Direct and indirect effects
Direct and indirect effects to Indiana bats (both beneficial and adverse) would be similar to those indicated for gray bats under the proposed action. In addition to its federally endangered status, Indiana bats have designated critical habitat within the National Riverways study area.

Cumulative effects
Cumulative effects to Indiana bats would be similar to those indicated for gray bats.

Interrelated and independent actions and their effects
Interrelated activities are part of the proposed action that depends on the action for their justification, and interdependent activities have no independent utility apart from the action. There are no interrelated or interdependent actions associated with this action; therefore, there are no anticipated adverse effects to Indiana bats.

Effect determination
For Indiana bat, we have determined the proposed action will have a ***may affect, not likely to adversely affect*** determination for this federally listed species. Improvements and additions to the National Riverways' designated roads and trails system would not affect the integrity of sensitive portals near cave openings. New trails and recreation related infrastructure included in the proposed action would not be developed within view of cave openings and other known Indiana bat habitat. Trees that

would be removed in the vicinity of any known Indiana bat habitat as part of the proposed action would be limited to small diameter at breast height (dbh) cuts to help maintain forest coverage along trails and recreation facilities that could adversely affect any Indiana bat habitat. Tree removals needed near Indiana bat habitat would generally observe an eighth of a mile buffer around known hibernacula and cutting would be conducted during winter months, to the extent possible, to help ensure this species would not be affected by proposed management actions. Furthermore, trees would be cleared between November 1 and April 1 per best practices recommended by the USFWS on a 2016 bridge repair or removal project in the Big Spring area because this species may be active in Missouri throughout October (NPS 2016).

National Riverways managers, through informal consultation with USFWS staff, were asked to consider implementing conservation measures for Indiana bat and northern long-eared bat from a 2018 programmatic agreement the USFWS developed in partnership with the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and Federal Transit Administration (FTA). Similar to those conservation measures noted above, which focus on protecting vegetative cover near cave openings, additional practices from the programmatic agreement that could be implemented in the roads and trails plan could follow specific guidance provided in the agreement for new roads and trails development, maintenance practices, tree removal and lighting measures, noise and vibration abatement, and other habitat preservation protocols (USFWS 2018). For the biological opinion (BO) – and used simply as a best management practices proxy for the proposed action in the roads and trails plan – projects can rely on the consultation with no additional site-specific, formal discussions between the agencies and USFWS. Rather, an expedient “check-in” with the local USFWS Field Office would suffice for documentation and approval purposes with regard to the programmatic agreement. Agencies would either complete the Assisted Determination Key in the USFWS Information for Planning and Consultation (IPaC) System or send a Project Submittal Form to the appropriate USFWS Field Office prior to project commencement (USFWS 2018).

Northern long-eared bat

Direct and indirect effects

Direct and indirect effects to northern long-eared bats (both beneficial and adverse) would be similar to those indicated for gray bats and Indiana bats under the proposed action[1]. There is no designated critical habitat for northern long-eared bats in the study area.

Cumulative effects

Cumulative effects to northern long-eared bats would be similar to those indicated for gray bats and Indiana bats.

Interrelated and independent actions and their effects

Interrelated activities are part of the proposed action that depends on the action for their justification, and interdependent activities have no independent utility apart from the action. There are no interrelated or interdependent actions associated with this action; therefore, there are no anticipated adverse effects to northern long-eared bats.

Effect determination

1 In addition to its federally threatened status, northern long-eared bats known to inhabit the study area would be subject to a special rule under Section 4(d) of the Endangered Species Act (ESA). The final 4(d) rule allows the USFWS 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 2018). Considerations under the rule are mentioned in section 10.0 “additional conservation recommendations” in this BA.

For northern long-eared bat, we have determined the proposed action will have a ***may affect, not likely to adversely affect*** determination for this federally listed species. Similar to the effect determination for gray bat and Indiana bat, improvements and additions to the National Riverways' designated roads and trails system would not affect the integrity of sensitive portals near cave openings. Northern long-eared bat is also afforded protection through a special rule under Section 4(d) of the Endangered Species Act (ESA). Specifically, the final 4(d) rule allows the USFWS 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 2018). This rule provides expanded buffers around northern long-eared bat hibernacula, for example, which USFWS staff indicated would be approximately one-quarter mile around known northern long-eared bat hibernacula in this plan.

Similarly, the effect determination for northern long-eared bat would include the stipulation that trees slated to be removed as part of the proposed action would be limited to small diameter at breast height (dbh) cuts to help maintain forest coverage along trails and recreation facilities near sensitive habitat. Following guidance outlined in the Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat (USFWS 2018) as indicated for Indiana bat, above, could be followed as a best management practices proxy for northern long-eared bat under the proposed action in the roads and trails plan as well.

Trees would be cleared between late fall and early spring per best practices recommended by the USFWS on a 2016 bridge repair or removal project in the Big Spring area (NPS 2016).

Ozark hellbender

Direct and indirect effects

Under the proposed action, adverse impacts to hellbenders and their habitat would be limited to minor, short-term erosion and sedimentation impacts to streams depending on road restoration methods used. For trail development in the proposed alternative, Ozark hellbenders would likely experience short and long-term erosion and sedimentation impacts to its waterways habitat, although impacts from trail development are not expected to exceed a small level of overall effect to this species. Some undesignated trails and closed roads would be converted into designated trails and existing trail alignments that have potential to impact sensitive resources (i.e. habitat). New trail alignments may be required in future trail-building efforts to minimize impacts to listed species and careful trail routing would likely result in a net beneficial impact for those trail sections.

A permit for horseback riding would have a beneficial effect on hellbenders and their habitat. A permitting system would help manage horse use levels, which would benefit hellbenders by enhancing protection from the possible "over-trampling" of designated trail crossings at their junctions with vulnerable terrestrial and aquatic wildlife habitat. A permitting system would have indirect beneficial impacts to hellbenders because it would educate users and generate funding for horse trail management and maintenance activities, and allow park staff to monitor resource impacts against established thresholds in the roads and trails plan.

Gravel bars that are continually disturbed by vehicles and regular visitor use cannot sustain vegetation growth that would otherwise provide armor and protection for each bar. Although there are no popular gravel bar areas near known hellbenders' habitat, indirect effects from visitor activities and resource disturbance on gravel bars could cause sedimentation and result in minor impacts to downstream hellbenders' habitat.

Cumulative effects

Erosion and sedimentation effects from ongoing and future repairs of existing, damaged river access sites and associated facilities within eight areas of the National Riverways impacted by a catastrophic flood in May 2017, could may have short-term, minor adverse effects on hellbenders.

Interrelated and independent actions and their effects
Interrelated activities are part of the proposed action that depends on the action for their justification, and interdependent activities have no independent utility apart from the action. There are no interrelated or interdependent actions associated with this action; therefore, there are no anticipated adverse effects to hellbenders.

Effect determination
For Ozark hellbender, we have determined the proposed action will have a ***may affect, not likely to adversely affect*** determination for this species. Potential direct and indirect effects from the proposed action include short and long-term erosion and sedimentation impacts to streams, however these effects would be tempered by a host of beneficial effects, including (1) net reduction in roads and trails mileage, including the removal – and in many cases – restoration of non-designated roads and trails; (2) formalizing the National Riverways' system of roads, trails, and river access points; (3) clearly identifying which uses are allowed on each road and trail, which would further alleviate cumulative effects to hellbenders' habitat; and (4) determining appropriate levels of effort needed to maintain the park's transportation network, which would also decrease the long-term, adverse effects to hellbenders and their habitat.

8.2 Critical Habitat

Indiana Bat

Direct and indirect effects
Critical habitat for Indiana bat is located within Shannon and Dent counties within the National Riverways study area. The bat's broader range is referenced in figure 2, below.

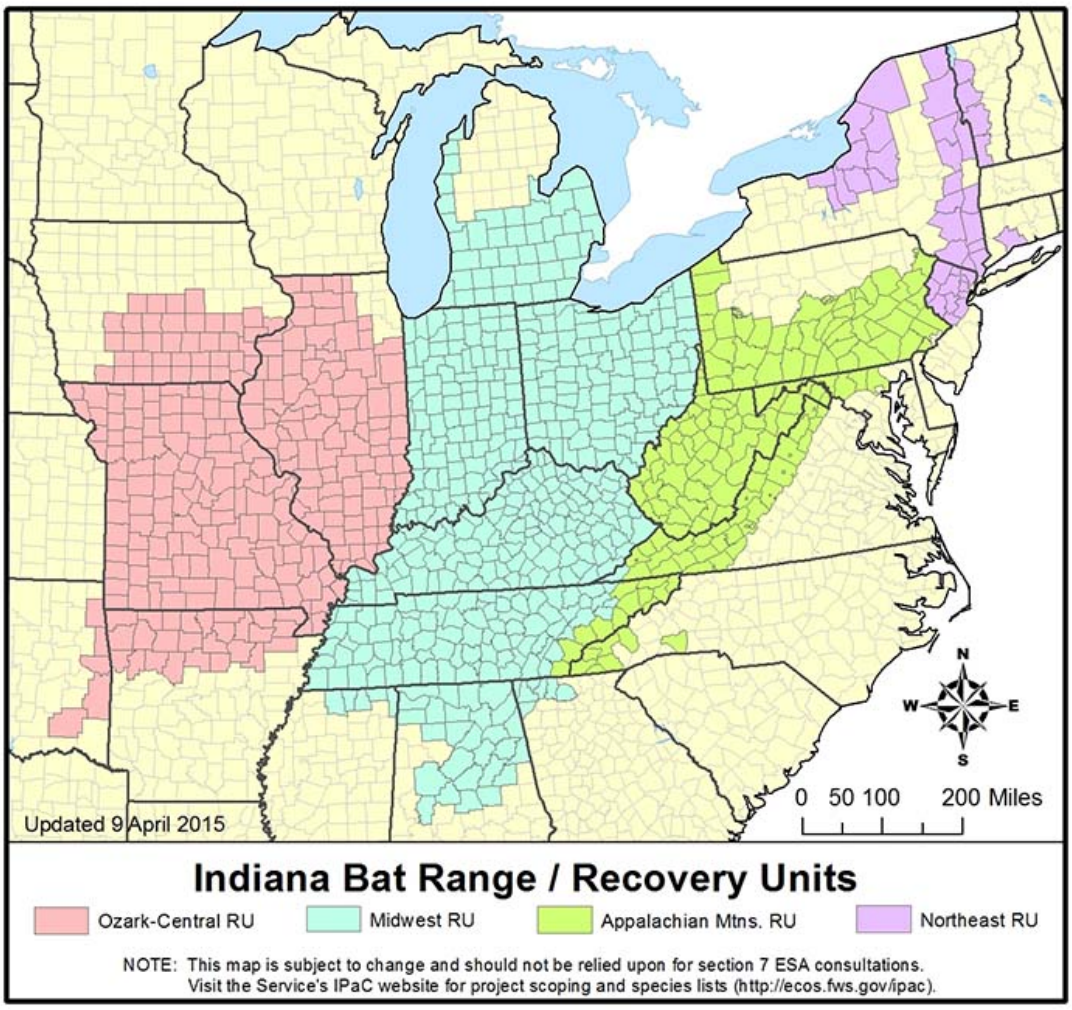


Figure 2: Indiana Bat Range

Direct and indirect effects to Indiana bat habitat (both beneficial and adverse) include the moderate reduction in designated road mileage (from 211 miles in the no action alternative to 199 miles in alternative B), which would have a small beneficial impact to Indiana bat habitat. Noise and other visitor related impacts on formerly open roads would be minimized. Similarly, 55.6 miles of new trails located within and outside the park jurisdictional boundary would have relatively small overall impacts to Indiana bat habitat. Short-term construction impacts would have small, mostly noise-related effects on Indiana bat habitat.

Under the proposed action, road development activities would include removing small patches of small diameter trees (e.g., trees with a diameter at breast height [dbh] of three inches or less) which would have a slight, indirect, and adverse effect to bat habitat (NPS 2018b).

Proposed trail construction activities and maintenance, as well as potential visitor impacts that could occur near entrances to caves would be avoided. Trail alignments would be routed away from caves and cave entrances to respect sensitive habitat.

A permit for horseback riding would have a beneficial effect on Indiana bat habitat. A permitting system would help manage horse use levels, which would benefit gray bats by enhancing protection from the

possible “over-trampling” of trails in vulnerable terrestrial wildlife habitat. A permitting system would have indirect beneficial impacts to Indiana bats because it would educate users and generate funding for horse trail management and maintenance activities, and allow park staff to monitor resource impacts against established thresholds in the roads and trails plan.

Potential adverse impacts near Indiana bat habitat could occur with the introduction of mountain biking, although these would be mitigated to a large extent by siting final trail alignments 1/8- to ¼- mile from caves, wherever possible. Similar to impacts associated with new trails in general, cave openings that are visible to mountain bikers (and other user groups) would be particularly vulnerable to potential resource disturbance and vandalism.

Cumulative effects

Cumulative effects to Indiana bat habitat would include ongoing and future repairs of existing, damaged river access sites and associated facilities within eight areas of the National Riverways impacted by a catastrophic flood in May 2017 and could contribute noise that may have short-term effects on Indiana bat habitat.

Adding to cumulative effects on Indiana bat, connecting park roads and trails to conceptual trail alignments that would be built on neighboring lands would likely occur, but these developments would be dependent on the support of receptive property owners adjacent to park boundaries. Additional mountain bike trails and potential impacts to listed species habitat (including critical habitat for Indiana bat) from future development of mountain bike trails are not analyzed further in the roads and trails plan.

Interrelated and independent actions and their effects

Interrelated activities are part of the proposed action that depends on the action for their justification, and interdependent activities have no independent utility apart from the action. There are no interrelated or interdependent actions associated with this action; therefore, there are no anticipated adverse effects to Indiana bat habitat.

Effect determination

For Indiana bat, we have determined the proposed action will have a ***may affect, not likely to adversely affect*** to critical habitat for this federally listed species. Improvements and additions to the National Riverways’ designated roads and trails system would not affect the integrity of sensitive portals near cave openings. New trails and recreation related infrastructure included in the proposed action would not be developed within view of cave openings and other known Indiana bat habitat. Trees that would be removed in the vicinity of any known Indiana bat habitat as part of the proposed action would be limited to small diameter at breast height (dbh) cuts to help maintain forest coverage along trails and recreation facilities that could adversely affect any Indiana bat habitat. Tree removals needed near Indiana bat habitat would generally observe an eighth of a mile buffer around known hibernacula and cutting would be conducted during winter months, to the extent possible, to help ensure this species would not be affected by proposed management actions.

National Riverways managers, through informal consultation with USFWS staff, were asked to consider implementing conservation measures for Indiana bat and northern long-eared bat from a 2018 programmatic agreement the USFWS developed in partnership with the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and Federal Transit Administration (FTA). Similar to those conservation measures noted above, which focus on protecting vegetative cover near cave openings, additional practices from the programmatic agreement that could be implemented in the roads and trails plan could follow specific guidance provided in the agreement for new roads and

trails development, maintenance practices, tree removal and lighting measures, noise and vibration abatement, and other habitat preservation protocols (USFWS 2018). For the biological opinion (BO) – and used simply as a best management practices proxy for the proposed action in the roads and trails plan – projects can rely on the consultation with no additional site-specific, formal discussions between the agencies and USFWS. Rather, an expedient "check-in" with the local USFWS Field Office would suffice for documentation and approval purposes with regard to the programmatic agreement. Agencies would either complete the Assisted Determination Key in the USFWS Information for Planning and Consultation (IPaC) System or send a Project Submittal Form to the appropriate USFWS Field Office prior to project commencement (USFWS 2018).

9.0 Need for Re-Assessment Based on Changed Conditions

This BA and findings above are based on the best current data and scientific information available. A new analysis and revised BA must be prepared if one or more of the following occurs: (1) new species information (including but not limited to a newly discovered activity area or other species information) reveals effects to threatened, endangered, proposed species, or designated/proposed critical habitat in a manner or to an extent not considered in this assessment; (2) the action is subsequently modified or it is not fully implemented as described herein which causes an effect that was not considered in this assessment; or (3) a new species is listed or critical habitat is designated which may be affected by the action that was not previously analyzed herein.

10.0 Additional Conservation Recommendations

Northern long-eared bats known to inhabiting the project 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 United States 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 2018). Considerations include avoiding management activities near bat hibernacula (such as caves and cave openings) 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 species.

11.0 Literature Cited

2019 National Park Service. Roads and Trails Plan for the Ozark National Scenic Riverways. In prep. Available at the National Park Service Denver Service Center.

2019 Information for Planning and Consultation (IPaC) Resource List: Updated list of threatened and endangered species that may occur in your proposed project location. Ozark National Scenic Riverways. Accessed February 26, 2019.

2018 U.S. Fish and Wildlife Service. U.S. Northern Long-eared Bat Final 4(d) Rule. Accessed 3-1-2019: https://www.fws.gov/midwest/endangered/mammals/nleb/4drule.html.

2016 National Park Service. Environmental Assessment for the Big Spring Bridge. U.S. Departement of the Interior.

2015 U.S. Fish and Wildlife Service. Memorandum from Field Supervisor, U.S. Fish and Wildlife Service to Superintendent, Ozark National Scenic Riverways. May 26, 2015.

2014 General Management Plan for the Ozark National Scenic Riverways. Available at the National Park Service Denver Service Center.

2010 Briggler, J.T., T. Crabill, K. J. Irwin, C. Davidson, J. Utrup, and A. Salveter (editors). Hellbender Conservation Strategy: An action plan for the recovery of the Ozark and Eastern Hellbender in the Ozark Highlands of Missouri and Arkansas. Ozark Hellbender Working Group, Jefferson City, Missouri. 59 pp.

2011 Federal Register. Vol. 76, No. 194. October 6, 2011 (76 Fed. Reg. 61,958). Endangered and Threatened Wildlife and Plants; Endangered Status for the Ozark Hellbender Salamander. Final Rule.

2007 United States Forest Service. Trail Construction and Maintenance Notebook. U.S. Department of Agriculture. Accessed February 2019: https://www.fs.fed.us/t-d/pubs/pdfpubs/pdf07232806/pdf07232806dpi72.pdf

United States Department of the Interior

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January 6, 2019

MEMORANDUM

To: Superintendent, Ozark National Scenic Riverways

From: Missouri Ecological Services Field Supervisor, U.S. Fish and Wildlife Service

Subject: Informal Consultation on the Ozark National Scenic Riverways Roads and Trails Management Plan

This memorandum is in response to your October 17, 2019 letter requesting concurrence with your determination of effects for the proposed Roads and Trails Management Plan for the Ozark National Scenic Riverways (ONSR). We have reviewed the biological assessment (BA) you provided and offer the following comments under the authority of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531-1543).

According to your letter, the purpose of the plan is to improve the system of park roads and trails to ensure that it provides visitors with access to a wide variety of locations and experiences while also protecting the Riverways' fundamental resources and values. An Environmental Assessment (EA) was developed to evaluate a range of possible alternatives and management actions and to analyze impacts that could result from implementation of the alternatives. You indicated in your letter that you are requesting consultation on the Preferred Alternative.

Under the Preferred Alternative, the following actions are proposed:

- Opportunities for traditional recreational activities, such as hiking and horseback riding, would be expanded. The existing designated trail system would continue to be provided, and the park would designate 55.6 miles of new trails, 11.0 miles of which are outside the park's jurisdictional boundary. Some undesignated trails and closed roads would be converted into designated trails. In other areas, such as the Upper Current River, some of the proposed trails would require modified alignments to existing undesignated trails to minimize potential impacts to sensitive cultural and natural resources and to follow more sustainable trail alignments (e.g., meet acceptable trail slope and design standards).

- Biking would be permitted on all designated park roads. Biking would continue to be allowed on designated park roads and roughly 10 miles of new bike trails would be

formally designated.

- Most of the undesignated, visitor-created trails would be closed and restored to natural conditions. The National Park Service would seek to establish a permitting system for equestrian users that would provide information and education to riders, track the volume of use on equestrian trails, and help the park manage the levels of use on equestrian trails.

- All undesignated roads would be closed and restored to natural conditions, including roads identified for closure in the 1991 Roads and Trails Study that have not been closed to date. In addition, there would be a moderate reduction in designated road mileage.

- Undesignated river crossings and vehicle fords would be reduced from current levels to minimize potential impacts to water quality and sensitive species. Use of all terrain vehicles (ATVs) and utility task vehicles (UTVs) would be permitted on county roads and NPS roads with a valid permit.

As stated in the BA, the list of federally listed species that occur within the project area and could be affected by project activities includes the gray bat (*Myotis grisescens*), Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), and Ozark hellbender (*Cryptobranchus alleganiensis bishopi*).

According to information provided in the BA, improvements and additions to the ONSR's designated roads and trails system would not affect the integrity of sensitive portals near cave openings known to contain listed bat species. New trails and recreation-related infrastructure included in the proposed action would not be developed within view of the cave openings and other known habitat of listed bat species. Trees that would be removed within the habitat of listed bat species would be limited to those with a small diameter at breast height to help maintain forest coverage along trails and recreation facilities. Tree removal would generally observe an eight of a mile buffer around known hibernacula of listed bats. In addition, Kimberly Houf, of your staff, stated in an email on December 20, 2019 that no known Indiana bat trees would be removed or disturbed. Based on these measures, we do not expect disturbance to listed bat species and concur with your determination that project activities may affect, but are not likely to adversely affect the gray bat, Indiana bat, and northern long-eared bat.

The Ozark Hellbender is a large, aquatic salamander inhabiting cool, fast-flowing streams and rivers in the Ozark Highlands. The species occurs throughout the Current River and may still be present in small numbers in the Jacks Fork River. Under the Preferred Alternative, there will be a net reduction in the miles of roads and trails within the ONSR given the closure of some undesignated trails. In addition, it is stated in the BA that some trails may be rerouted to minimize potential impacts to sensitive cultural and natural resources. Therefore, we expect there will be a net reduction in sediment entering the streams. We anticipate little, if any, increase in sedimentation from allowing biking on roads and on the roughly 10 miles of new bike trails proposed for formal designation. No equestrian trails cross the Current River or Jacks Fork River within the immediate vicinity of known Ozark hellbender locations, thus we do not expect any direct physical impacts or disturbance from these crossings. Additionally, available water quality data indicates that there is no water quality degradation from the equestrian river crossings. Thus,

we concur with your determination that project activities may affect, but are not likely to adversely affect the Ozark hellbender.

We appreciate your efforts to protect threatened and endangered species and your extensive coordination during the planning process. If you have any questions or require additional information, please feel free to contact Trisha Crabill of my staff at 573-234-5016.

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APPENDIX I: CONSULTATION AND COORDINATION

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APPENDIX I: 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

Between October 26 and November 25, 2015, the Ozark National Scenic Riverways invited the public to share initial thoughts, concerns, and ideas to improve and manage the roads and trails network to ensure quality recreational experiences for park visitors while also protecting cultural and natural resources. During the public scoping period, approximately 295 individual correspondences were received, not including form letters. Of these, 231 were submitted directly to the NPS PEPC website. Approximately 76 people attended a public open house event held at Eminence High School in Eminence, Missouri, on October 26, 2015; 23 people attended the public open house event at the Van Buren Youth and Community Center in Van Buren, Missouri, on October 27, 2015; 48 people attended the public open house event at the Salem City Hall Auditorium in Salem, Missouri, on October 28, 2015; and 57 attended the public open house event at the Holiday Inn in Sunset Hills, Missouri, on October 29, 2015. During the public open house events, approximately 180 comments on flip charts and 25 comment cards were received. All hand-written comments received during the public open house events or via standard mail were transcribed and entered into the PEPC system. In addition, approximately 1,800 form letters were received.

Four public open house events in Salem, Van Buren, Eminence, and St. Louis provided the public an opportunity to share input on roads and trails management with NPS staff and provide ideas about possible management actions for the Roads and Trails Plan. In March 2016, the park invited a diverse array of local and regional stakeholders to meet and discuss some road and trail management issues in the National Riverways and to help further inform development of preliminary alternatives. This meeting allowed participants to gain a better understanding of the differing viewpoints of other stakeholders and helped to improve dialogue and relationships between participants and park staff.

The park released a newsletter in November 2017 outlining preliminary draft management alternatives for review and comment. The newsletter was sent to 770 individual e-mail addresses on November 9, 2017. Additionally, approximately 1,722 hard copies were sent on November 16, 2017. Hard copies were also sent to various local, state, and federal governmental officials, tribal representatives, local business leaders, commercial users, and other individuals who had previously expressed interest in the planning process. On November 14, 2017, the National Park Service issued a news release announcing the comment period in an effort to reach members of the public not already on the distribution list for e-mail or hard copies. The public was encouraged to comment online and to identify any comments or concerns on the preliminary alternatives between November 17, 2017, and December 15, 2017. The comment period was extended to January 15, 2018, in response to commenters' requests. During public review of the preliminary alternatives, approximately 894 correspondences were received through the NPS PEPC website and via mail and e-mail directly to the park. Comments were received from 20 states, Guam, and the District of Columbia. Two comments were received from other countries. Seven different form letters were received containing 595 total signatures; however, the majority of comments came from private individuals.

Comments ranged from simply stating which alternative was supported or opposed, to detailed recommendations for implementation of an alternative concept. Many visitors expressed support for alternative A, the no-action alternative, noting that focusing on improving and maintaining current trails instead of creating new ones would save taxpayers money; however, many commenters suggested additions to this alternative such as increasing enforcement of park regulations. For alternative B, commenters stated support for closing undesignated river crossings, roads, and trails, while others expressed opposition because of the need for increased park management, particularly in equestrian use and primitive camping areas. Commenters expressed support for alternative C because it proposed the largest number of equestrian trails; others were opposed to the alternative because they are concerned that the trails would become overcrowded and unsafe. Some commenters noted that managing current trail use levels is already challenging.

The comments that the park received ranged from support or opposition for possible management actions to detailed recommendations for implementation of other possible actions. Respondents reported the primary visitor use-related issues to be a lack of parking, restrooms, and a primary point of contact for visitors in the park (i.e., a comprehensive visitor center), as well as high and/or concentrated use resulting in impacts on resources. Specific comments on the issues and actions evaluated based on the following topic areas:

- Congestion and Crowding (including parking, public transit/shuttles, managed entry, managed access (in the park)
- Management of Commercial Use Authorizations
- Facilities/Infrastructure (including restrooms/changing stations and drinking water, road improvements,
- Need for a Park Visitor Center
- Enforcement
- Other Feedback

Consultation and Coordination to Date with Other Agencies, Offices, and American Indian Tribes

Section 7 Consultation. The National Park Service initiated informal consultation with the US Fish and Wildlife Service (Missouri Ecological Services Field Office) in an April 2015 letter. The letter notified the US Fish and Wildlife Service that the National Park Service was developing a roads and trails management plan for the area for the park. 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 US Fish and Wildlife Service. Information for Planning and Conservation (IPaC) system (https://ecos.fws.gov/ipac).

The US Fish and Wildlife office was provided a draft biological assessment that aligned with the draft EA on October 17, 2019. The National Park Service received concurrence on the biological assessment on January 6, 2020. On April 21, 2021, the National Park Service notified the US Fish and Wildlife Service of additional minor map updates for roads associated with alternatives B and C, including relocation of the Lewis Hollow Ford from its current location to the original or "traditional" crossing location. On May 14, 2021, the National Park Service confirmed with the US Fish and Wildlife Service that there were no known hellbender locations and suitable hellbender habitat near the proposed ford location. The National Park Service will continue ongoing informal consultation and reinitiate consultation in the future, as appropriate, with the

US Fish and Wildlife Service for their concurrence on elements of the plan that may require further compliance.

Section 106 Consultation

In April 2015, the National Park Service distributed a newsletter to the Missouri SHPO noting the intent to prepare a roads and trails management plan for park. Later that month, the Director and Deputy State Historic Preservation Officer sent a letter indicating that they reviewed information pertaining to the planning process, and that they looked forward to continuing to work with NPS staff.

The Missouri SHPO was provided a review copy of the plan/environmental assessment on October 17, 2019 to assess the potential effects of the proposed alternatives on cultural resources. The National Park Service received a response on November, 22, 2019, which stated that the completion of the planning document will not affect cultural resources and that the proposed methods for identifying historic properties outlined in the plan would be adequate for identification under Section 106 of the National Historic Preservation Act. The Missouri SHPO also expressed support for continued consultation on a project-by-project basis for future development, rehabilitation, and restoration activities proposed in the document. In accordance with Section 106, the National Park Service will continue to consult with the Missouri SHPO, associated NHOs, and other stakeholders as actions identified in the plan advance to more detailed design development and implementation stages.

Native American Consultation with American Indian Tribes

In April 2015, the National Park Service sent letters to eight tribal partners notifying them of the Road and Trails 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.

Edwin Butler-Wolfe, Governor, Absentee Shawnee Tribe of Indians of Oklahoma
Bill John Baker, Principal Chief, Cherokee Nation
C. J. Watkins, Acting President, Delaware Nation
Paula Pechonick, Chief, Delaware Tribe of Indians
Glenna J. Wallace, Chief, Eastern Shawnee Tribe
Scott Bighorse, Principal Chief, Osage Nation
Ron Sparkman, Chief, Shawnee Tribe
George Wickliffe, Chief, United Keetoowah Band of Cherokee

In October 2019, the National Park Service provided copies of an initial draft of the Roads and Trails plan to the eight affiliated tribes, requesting input on the document. The National Park Service did not receive any comments on the draft plan, despite hopes for active participation. In an ongoing effort to improve relationships with tribal partners, the National Park Service planned a consultation meeting in April of 2020 in Tulsa, OK, and sent invitations to tribal leadership and historic preservation officers in March 2020 to discuss the Roads and Trails Plan in addition to other forthcoming projects. The meeting could not go forward as scheduled due to the COVID-19 pandemic.

Between October and December 2020, the National Park Service held individual meetings with five of the eight affiliated tribes' historic preservation staff to address the topics that had been on

the agenda for the April 2020 meeting, including the Roads and Trails Plan. Meetings were held with Elizabeth Toombs, Cherokee Nation Tribal Historic Preservation Officer; Erin Paden, Delaware Nation Historic Preservation Director; Brice Obermeyer, Delaware Tribe Director of Historic Preservation; Andrea Hunter, Osage Nation Tribal Historic Preservation Officer; and Tonya Tipton, Shawnee Tribe Historic Preservation Officer. Representatives from the Absentee Shawnee Tribe, Eastern Shawnee Tribe, and United Keetoowah Band of Cherokee Indians did not respond to meeting requests. In the meetings, NPS staff explained the need for the plan and answered questions about the various alternatives and the proposed archeological testing strategy. The National Park Service made the draft plan and supporting mapping available for the tribes to review and comment in May 2021, just prior to release of the document for public review, and encouraged responses and feedback both to the park directly and as part of the 30-day public response period.

John Raymond Johnson, Governor, Absentee Shawnee Tribe of Indians of Oklahoma
Chuck Hoskin, Jr., Principal Chief, Cherokee Nation
Deborah Dotson, President, Delaware Nation
Chester Brooks, Chief, Delaware Tribe of Indians
Glenna J. Wallace, Chief, Eastern Shawnee Tribe
Geoffrey M. Standing Bear, Principal Chief, Osage Nation
Benjamin Barnes, Chief, Shawnee Tribe
Joe Bunch, Chief, United Keetoowah Band of Cherokee Indians

Negotiation with Shannon County

In 1991, the National Park Service released a roads and trails study and environmental assessment. Shannon County Commissioners objected to this document claiming an additional 32 roads for county maintenance and control. This study had been through extensive public input and consultation, including with the county commissioners, prior to completion. The roads and trails study was implemented even though the 32 roads remained disputed.

As part of the current planning effort, the National Park Service and Shannon County Commissioners acted in good faith to negotiate and resolve the jurisdictional dispute over these 32 roads plus several other recently claimed roads and fords, some of which required agreement with private landowners. In an effort to diligently address issues presented by the Shannon County Commissioners regarding the recently claimed roads, as well as the originally disputed roads, the National Park Service extensively investigated and considered each and every road the commissioners disputed and attempted to resolve the dispute. Shannon County was also pursuing resolution on these private lands through legal action.

In summary, the National Park Service and Shannon County reached a tentative agreement on the original 32 disputed roads during this negotiation. However, negotiations failed to reach agreement on several roads that were not part of the original list. Even though the National Park Service and Shannon County were unable to reach agreement prior to release of this plan, many elements of the tentative agreement have been incorporated in the plan in an effort to accommodate the county's requests. There are currently no disputes over any roads in Carter, Dent, or Texas counties.

External Consultation and Coordination – State of Missouri

Kathy Harris, Advisory Council on Historic Preservation
Sarah Parker Pauley, Director, Missouri Department of Conservation
Mark A. Miles, Missouri State Historical Preservation Office

Toni M. Prawl, Director, Missouri State Historical Preservation Office

Internal Consultation and Coordination – Ozark National Scenic Riverways

Eric Daniels, Chief of Resource Management
Chris Figge, Jacks Fork District Ranger
Mike Gosset, Resource Management Biotech
Victoria Grant, Natural Resources Specialist
Rick Halbert, Chief of Operations
Eric Herndon, Upper Current District Ranger
Kim Houf, Terrestrial Ecologist
Patrick Jackson, Lower Current District Ranger
Larry Johnson, Superintendent (retired)
Jason Lott, Superintendent
Dena Matteson, Chief of Interpretation, Planning, and Partnerships
Austin Konkel, Upper Current Ranger
Bill McKinney, Upper Current Law Enforcement
Russell Runge, Deputy Superintendent
Joe Strenfel, Environmental Protection Specialist
Peggy Terrance, Concession Specialist
Debbie Wisdom, Chief of Administration
Allison Young, Park Archeologist
Kevin Young, Facility Maintenance Specialist

Department of the Interior

Tokey Boswell, Chief of Planning and Compliance
Christine Gabriel, Regional Environmental Coordinator
James Lange, Planning Portfolio Manager

Internal Consultation and Coordination – Denver Service Center Planning

Laura Babcock, GIS Specialist, DSC Planning
Scott Babcock, Project Manager, Senior Planner
Kerri Cahill, Branch Chief
Steve DeGrush, Natural Resource Specialist
Wanda Gray Lafferty, Contract Editor
Ray McPadden, Assistant Project Manager (former)
Aleksandra Pitt, Visitor Use Project Specialist
Jennifer Stein, Visitor Use Project Specialist
Steve Whissen, Cultural Resources Specialist
Andrew White, Visitor Use Project Specialist

Contractor Support

Steve Butler, ERO Resources
Bill Mangle, ERO Resources
Jeff Gutiérrez, Environmental Planner, Louis Berger Group
Lisa McDonald, Natural Resource Economist, Pinyon Environmental

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APPENDIX J: REFERENCES AND GLOSSARY

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APPENDIX J: REFERENCES AND GLOSSARY

Algrim, Susi J., Ryan L. Sharp, and Jeffery C. Skibins

2018a "Monitoring Horse Riding Use and Understanding Visitor Perceptions of Current and Proposed Conditions at Ozark National Scenic Riverways: Research to Inform the Roads and Trails Plan." Kansas State University, Manhattan, KS.

Bowles, D. E., L. W. Morrison, and J. T. Cribbs

2018 Aquatic invertebrate community structure, biological condition, habitat, and water-quality at Ozark National Scenic Riverways, Missouri, 2005–2014. *Proceedings of the Arkansas Academy of Science* 72:67–80. https://scholarworks.uark.edu/cgi/viewcontent.cgi?article=3292&context=jaas.

Briggler, J. T., T. Crabill, K. J. Irwin, C. Davidson, J. Utrup, and A. Salveter (eds.)

2010 "Hellbender Conservation Strategy: An action plan for the recovery of the Ozark and Eastern Hellbender in the Ozark Highlands of Missouri and Arkansas." Ozark Hellbender Working Group, Jefferson City, MO. 59.

Chilman, K., and J. Vogel

2001 "Research Report on Trail Rider Counts and Surveys – Lower Jacks Fork River Area, Ozark National Scenic Riverway." Washington, DC.

Davis, J. V., and Barr, M. N.

2006 "Assessment of possible sources of microbiological contamination in the water column and streambed sediment of the Jacks Fork, Ozark National Scenic Riverways, Missouri – Phase III." US Scientific Investigations Report 06-5161. 32. https://water.usgs.gov/nps_partnership/ozar.php.

Federal Register

2011 "Endangered and Threatened Wildlife and Plants; Endangered Status for the Ozark Hellbender Salamander. Final Rule." Vol. 76, No. 194. October 6, 2011 (76 Fed. Reg. 61,958).

Finney, Fred A.

2006 "An Archeological Overview and Assessment of the Ozark National Scenic Riverways, Missouri." Upper Midwest Archaeology, St. Paul, Minnesota and St. Joseph, Illinois. Prepared for the National Park Service, Midwest Archeological Center, Lincoln, NE.

2018a "Monitoring Horse Riding Use and Understanding Visitor Perceptions of Current and Proposed Conditions at Ozark National Scenic Riverways: Research to Inform the Roads and Trails Plan." Kansas State University, Manhattan, KS.

2018b Dent County. Plan Your Vacation: Vacation in the Salem Area. Auto Tours. Dent County, MO. Accessed September 11, 2018. https://www.salemmo.com/chamber/visitor_information/vacation_in_the_salem_area/auto_tours.php.

Hennings, Lori

2017 *Hiking, mountain biking and equestrian use in natural areas: A recreation ecology literature review*. Portland, OR: Metro Parks and Nature.

Heth, R. L., D. E. Bowles, and J. E. Havel

2016 "Potential impacts of stream crossing traffic on macroinvertebrate communities in a Missouri Ozark River." *River Research and Applications*. 2898:1–10. doi: 10.002/rra.

Meinert, Dennis M.

2008 "Ozark National Scenic Riverways Soils-Geo-Landform Relationships." Missouri Department of Natural Resources – Division of State Parks. Missouri Department of Conservation.

2009 Information extracted from the Missouri Department of Conservation website. Accessed April 15, 2016. http://mdc.mo.gov/fish/sport/trout/areas.htm.

2016 "Missouri Natural Heritage Program – Species and Communities of Conservation Concern Checklist." Missouri Department of Conservation. Jefferson City, MO. 57.

Missouri Department of Natural Resources, Geological Survey and Resource Assessment Division

2003 "Topics in Water Use: Southern Missouri." Water Resources Report Number 63.

National Park Service (NPS)

1991 "A Homeland and A Hinterland – The Current and Jacks Fork Riverways." Historic Resource Study, Ozark National Scenic Riverways, by Donald L. Stevens Jr., NPS Midwest Region, Omaha, NE.

2007 Vana-Miller, D. L. Water Resources Foundation Report, Ozark National Scenic Riverways. Natural Resource Report NPS/NRWRD/NRR—2007/363. National Park Service, Water Resources Division, Fort Collins, CO.

2012 "Horse Trail Archeology at Ozark National Scenic Riverways" (Technical Report: No. 131, Midwest Archeological Center, Lincoln, NE) by Erin C. Dempsey.

2013 Fish community monitoring at Ozark National Scenic Riverways: 2005–2010 summary report. Prepared by H. R. Dodd. Natural Resource Data Series. NPS/HTLN/NRDS—2013/599. National Park Service, Fort Collins, CO. https://www.nps.gov/im/htln/monitoring-reports.htm.

2014 *General Management Plan for the Ozark National Scenic Riverways*. https://parkplanning.nps.gov/document.cfm?parkID=158&projectID=15793&documentID=62761

2015 *Ozark National Scenic Riverways General Management Plan – Presentation Plan*.

2016a "Aquatic vegetation monitoring in springs at Ozark National Scenic Riverways, 2007–2015." Prepared by D. E. Bowles and H. R. Dodd. Natural Resource Data Series NPS/OZAR/NRDS—2016/1044. National Park Service, Fort Collins, CO.

2016b Environmental Assessment for the Big Spring Bridge. US Department of the Interior.

2016c Environmental Assessment for Ozark Trail Association – Current River Trail. 37. https://parkplanning.nps.gov/document.cfm?parkID=158&projectID=44227&documentID=72205.

2016d Ozark National Scenic Riverways NPS Species Certified List. Integration of Resource Management Applications program. Accessed April 29, 2016.

2016e "Trip Report, Archeological Investigations in Advance of Big Spring Utility Upgrade and Jacks Fork Area Trails Rehabilitation, March 27–April 9, 2016." By Erin C. Dempsey. Report on file, National Park Service, Midwest Archeological Center, Lincoln, NE.

2018 National Park Service Visitor Use Statistics. Ozark National Scenic Riverways. Public Use Statistics Office. Accessed August 28, 2018. https://irma.nps.gov/Stats/.

2019 Biological Assessment for the Roads and Trails Management Plan. (In prep). Ozark National Scenic Riverways, Van Buren, MO.

2021 "Stream classification and gravel-bar inventory for Buffalo National River and Ozark National Scenic Riverways." Prepared by S. O. Erwin, R. B. Jacobson, and J. C. Jones. U.S. Geological Survey Scientific Investigations Report 2020 5122:42. https://doi.org/10.3133/sir20205122.

n.d. List of Classified Structures – Nichols Cabin/House. Ozark National Scenic Riverways, Van Buren, MO.

n.d. Cultural Landscape Inventory – Nichols Farm. Ozark National Scenic Riverways, Van Buren, MO.

The Nature Conservancy (TNC)

2003 Ozarks Ecoregional Conservation Assessment. Minneapolis, MN.

Oregon Metro Trail Association

2017 *Hiking, mountain biking and equestrian use in natural areas: A recreation ecology literature review*. "Chapter 6: Overview of Effects on Wildlife." 14. https://www.oregonmetro.gov/sites/default/files/2017/09/28/Metro-Recreation-Ecology-Literature-Review.pdf.

Park, L., K. Chilman, and E. Seekamp

2011 "Assessment of Visitor-Related Impacts and Potential Management Strategies at Ozark National Scenic Riverways." University of Illinois Department of Forestry and College of Agricultural Sciences. Urbana-Champaign, IL. Prepared for the National Park Service.

Pickering, C. M., W. Hill, D. Newsome, and Y-F. Leung

2009 "Comparing hiking, mountain biking and horse riding impacts on vegetation and soils in Australia and the United States of America." *Journal of Environmental Management* 91 (2010):551–562.

Saint Louis Zoo

2016 "Hellbenders in Missouri – Ron Goellner Center for Hellbender Conservation" (fact sheet). Accessed March 29, 2016. http://www.stlzoo.org/conservation/wildcare-institute/hellbendersinmissouri/.

US Fish and Wildlife Service (USFWS)

2012 Recovery Outline for the Ozark Hellbender. Columbia, MO. 13.

2015 Memorandum from Field Supervisor, US Fish and Wildlife Service to Superintendent, Ozark National Scenic Riverways. May 26, 2015.

2017 "Monitoring Horse Riding Use and Understanding Visitor Perceptions of Current and Proposed Conditions at Ozark National Scenic Riverways." Kansas State University, Park Management and Conservation Program, Manhattan, KS. Prepared for Ozark National Scenic Riverways.

2018 US Northern Long-eared Bat Final 4(d) Rule. Accessed March 1, 2019. https://www.fws.gov/midwest/endangered/mammals/nleb/4drule.html.

US Geological Survey (USGS)

2021 "Stream Classification and Gravel-Bar Inventory for Buffalo National River and Ozark National Scenic Riverways." Scientific Investigations Report 2020-5122. US Department of the Interior, US Geological Survey, Columbia, MO. 42. https://pubs.usgs.gov/sir/2020/5122/sir20205122.pdf.

Vana-Miller, D. L.

2007 Water Resources Foundation Report, Ozark National Scenic Riverways. Natural Resource Report NPS/NRWRD/NRR-2007/363. National Park Service, Water Resources Division, Fort Collins, CO.

GLOSSARY

angler. Angler refers to a person who catches fish for pleasure.

backcountry areas. Areas that include backcountry campsites and may also include additional recreational uses (like boat access or floater access).

backcountry campsites. Backcountry campsites would require a fee and provide some basic amenities, such as restrooms, tables, fire rings, and/or lantern posts.

designated road. Designated roads include roads within the National Riverways that have been authorized by the National Park Service through a formal planning process and which are designed, constructed, and maintained by the National Park Service in accordance with NPS road standards.

designated trail. Designated trails are those non-motorized trails in the National Riverways that have been authorized by the National Park Service through a formal planning process and which are designed, constructed, and maintained by the National Park Service in accordance with sustainable trail standards.

developed campgrounds. Developed campgrounds provide campsites that require a fee and provide basic amenities for tent and recreational vehicle campers (i.e., restrooms, tables, fire grills, and lantern posts). These campgrounds might also include showers, RV dump stations, electric hook-ups, reservations systems, and campground hosts.

equestrian. An equestrian refers to a horseback rider. "Equestrian use" also refers commonly to horseback riding.

indicators. Indicators translate the goals and objectives of the park into measurable attributes (i.e., number of visitor-created trails) that can be tracked over time to evaluate change in resource or experiential conditions.

primitive area. Area that includes primitive campsites and may also include additional recreational uses (such as boat access or floater access).

primitive campsite. Primitive campsites would not require a fee and would have no amenities. Some primitive sites are accessible by vehicles.

recreation area. Designated site associated with roads or trails where recreational activity is occurring, such as camping, day use, or river access. Recreation areas are identified on the maps with black dots. A detailed chart of recreational use at each site is found in appendix E.

state natural area. Biological communities or geological sites that preserve and are managed to perpetuate the natural character, diversity, and ecological processes of Missouri's native landscapes.

thresholds. Thresholds represent the minimum acceptable condition for each indicator and are established by considering qualitative descriptions of the park goals and objectives, data on existing conditions, relevant research studies, staff management experiences, and scoping of public preferences.

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 (i.e., goals and objectives for this plan) and visitor experiences consistent with the purpose for which the area was established.

visitor-created trail. An unauthorized nonmotorized or motorized trail, in the park, created by visitors for which no formal NPS planning, design, construction, or maintenance has occurred. These trails are also often commonly referred to as informal or social trails.

visitor use. Refers to human presence in an area for purposes that include education, interpretation, inspiration, and physical and mental health. Visitor use goes beyond the types of activities that people engage in at parks. Visitor use also includes the amount, timing, and distribution of visitor activities and behaviors.

APPENDIX K: TRAIL CLASSIFICATIONS FOR EXISTING TRAILS

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APPENDIX K: TRAIL CLASSIFICATIONS FOR EXISTING TRAILS

Trail Name (from GIS Data)	District	Permitted use/s	Current Class based on the TRAC rating system*	Desired Class based on the TRAC rating system
Alley Spring Amphitheater Trail	Jacks Fork	Existing Hiking Trail	3	3
Alley Spring Bluff Hole Trail	Jacks Fork	Existing Hiking Trail	3	3
Alley Overlook Trail	Jacks Fork	Existing Hiking Trail	3	3
Alley Spring Pond Loop Trail	Jacks Fork	Existing Hiking Trail	3	4
Alley Spring Branch Trail	Jacks Fork	Existing Hiking Trail	3	3
Alley Spring Campground and Community Connect Trail	Jacks Fork	Existing Hiking Trail	3	3
Alley Mill Community Trail	Jacks Fork	Existing Hiking Trail	4	4
Big Spring Rocky Ridge Trail	Lower Current	Existing Hiking Trail	3	3
Blue Spring Trail	Middle Current	Existing Hiking Trail	3	3
Blue Spring Trail (owned by MDC)	Middle Current	Existing Hiking Trail	n/a	n/a
Buttin Rock School Trail	Middle Current	Existing Hiking Trail	2	3
Devil's Well Loop Trail	Upper Current	Existing Hiking Trail	3	3
Cave Spring Trail	Upper Current	Existing Hiking Trail	3	3
Cave Spring River Trail	Lower Current	Existing Hiking Trail	3	3
Chilton Creek Loop Trail	Lower Current	Existing Hiking Trail	3	3
Chubb Hollow Trail	Lower Current	Existing Hiking Trail	3	3

Trail Name (from GIS Data)	District	Permitted use/s	Current Class based on the TRAC rating system*	Desired Class based on the TRAC rating system
Chubb Hollow River Trail	Lower Current	Existing Hiking Trail	3	3
Chubb Hollow Overlook Trail	Lower Current	Existing Hiking Trail	3	3
Jacks Fork Natural Area Trail	Jacks Fork	Existing Hiking Trail	3	3
Kinnard Hollow Trail	Lower Current	Existing Hiking Trail	3	3
Ozark Trail	Middle Current	Existing Hiking Trail	2	3
Partney Ridge Trail	Lower Current	Existing Hiking Trail	3	3
Powder Mill of the OT Trail	Middle Current	Existing Hiking Trail	3	3
Prairie Hollow Gorge Lower Trail	Middle Current	Existing Hiking Trail	2	2
Prairie Hollow Gorge Upper Trail	Middle Current	Existing Hiking Trail	3	3
Pulltite Cabin Trail	Upper Current	Existing Hiking Trail	2	3
Pulltite Nature Trail	Upper Current	Existing Hiking Trail	3	3
River's Edge Trail	Lower Current	Existing Hiking Trail	3	3
Rocky Falls Spur Trail	Middle Current	Existing Hiking Trail	3	3
Rocky Falls Picnic Trail	Middle Current	Existing Hiking Trail	3	4
Round Spring Trail	Upper Current	Existing Hiking Trail	3	3
Round Spring Cave Trail	Upper Current	Existing Hiking Trail	3	3
Slough Trail	Lower Current	Existing Hiking Trail	3	4

Trail Name (from GIS Data)	District	Permitted use/s	Current Class based on the TRAC rating system*	Desired Class based on the TRAC rating system
Big Spring Trail	Lower Current	Existing Hiking Trail	5	5
Big Spring Branch Trail	Lower Current	Existing Hiking Trail	3	3
Spring Valley Trail	Lower Current	Existing Hiking Trail	3	3
Susie Nichols Cabin Trail	Upper Current	Existing Hiking Trail	3	3
Welch Spring Trail	Upper Current	Existing Hiking Trail	3	4
Welch Hospital Trail	Upper Current	Existing Hiking Trail	3	3
Maggard Cabin Trail	Upper Current	Existing Hiking Trail	3	3
Akers Ferry Trail	Upper Current	Existing Hiking Trail	3	3
Upper Current section of the Ozark Trail	Upper Current	Planned Trail	3	3
Ebb and Flow Trail	Middle Current	Existing Hiking, Equestrian Trail	3	3
Rocky Creek Trail	Middle Current	Existing Hiking Trail	3	3
Minshaw Bluff Overlook Trail	Lower Current	Existing Hiking Trail	3	3
HS 425A Old Road Trail off Rocky Ridge Trail	Lower Current	Existing Hiking Trail	3	3
Big Spring Cabin Trails	Lower Current	Existing Hiking Trail	3	3
Partney House Trail	Lower Current	Existing Hiking Trail	3	3
Campground Bluff Trail	Lower Current	Existing Hiking Trail	2	4
Buck Hollow River Access	Jacks Fork	Existing Hiking Trail	3	3

Trail Name (from GIS Data)	District	Permitted use/s	Current Class based on the TRAC rating system*	Desired Class based on the TRAC rating system
Buck Hollow Bridge River Trail	Jacks Fork	Existing Hiking Trail	3	3
Broadfoot Loop	Middle Current	Existing Hiking, Equestrian Trail	3	3
Jerktail Loop	Middle Current	Existing Hiking, Equestrian Trail	3	3
Shawnee Loop	Middle Current	Existing Hiking, Equestrian Trail	3	3
Two Rivers Loop	Middle Current	Existing Hiking, Equestrian Trail	3	3

*Based on the U.S. Forest Services, *TRACs-Trail Assessment and Condition Survey*. 2011 User Guide. Note: any new trails would be constructed to meet class III design standards

APPENDIX L: ROAD CLASSIFICATION MATRIX – ALTERNATIVE B

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Road Name (Alt B)	Road Number (Alt B)	District (Alt B)	Managed (Alt B)	Length (miles) (Alt B)	Class (Alt B)	Surface Type (Alt B)	Map Number (Alt B)
Akers Campground Roads	NPS 750	Upper Current	NPS	0.30	3	Gravel	2
Akers Group Campsite Road	NPS 151	Upper Current	NPS	0.54	3	Gravel	2
Akers Maintenance Road	NPS 679	Upper Current	NPS Administrative	0.41	6	Gravel	2
Akers Road West Camp Road	NPS 668	Upper Current	NPS	0.09	4	Gravel	2
Alley Spring Boat Launch Road	NPS 159	Jacks Fork	NPS	0.16	2	Gravel	11
Alley Spring Campground Loops	NPS 518	Jacks Fork	NPS	1.69	3	Paved	11
Alley Spring Campground Road	NPS 156	Jacks Fork	NPS	0.79	2	Paved	11
Alley Spring Picnic Area	NPS 161	Jacks Fork	NPS	0.62	2	Paved-Gravel	11
Alley Spring Residence Road	NPS 761	Jacks Fork	NPS Administrative	0.09	6	Paved	11
Alley Sp Bld 508 Loop	NPS 764	Jacks Fork	NPS Administrative	0.08	5	Gravel	11
Alley Sp Handicap Parking	NPS 231	Jacks Fork	NPS	0.06	3	Gravel	11
Alley Sp Maintenance Road	NPS 763	Jacks Fork	NPS Administrative	0.39	6	Gravel	11
Alley Sp Picnic Road / Parking	NPS 160	Jacks Fork	NPS	0.43	3	Gravel	11
Alley Sp Primitive Use Area	NPS 222	Jacks Fork	NPS	0.21	2	Gravel	11
Arley Lewis Tract Road	NPS 722	Upper Current	NPS	0.62	3	Gravel	4
Baptist Access Road /Co Road 653	NPS 100	Upper Current	Leased to the NPS from Dent County	1.73	2	Paved	1
Baptizing Hole Road	NPS 217	Jacks Fork	NPS	0.21	4	Gravel	10
Bay Creek Campground Road	NPS 163	Jacks Fork	NPS	0.13	2	Gravel	11
Beal Cabin Road	NPS 816	Upper Current	NPS	0.11	4	Gravel	2
Beal Landing Road	NPS 126	Middle Current	NPS	0.08	4	Gravel	6
Big Spring Cabin Road	NPS 784	Lower Current	NPS	0.36	4	Gravel	8
Big Spring Fire Cache Road	NPS 780	Lower Current	NPS Administrative	0.24	6	Paved-Gravel	8
Big Spring Group Camp Road	NPS 116	Lower Current	NPS	0.20	3	Paved	8
Big Tree Campground Road	NPS 219	Lower Current	NPS	0.76	2	Gravel	8
Big Sp Boat Launch Road	NPS 115	Lower Current	NPS	0.37	3	Paved	8
Big Sp Cabin Road	NPS 742	Lower Current	NPS	0.71	2	Paved	8
Big Sp Camp Loop Road	NPS 11	Lower Current	NPS	0.61	3	Paved	8
Big Sp Campground Loops	NPS 500	Lower Current	NPS	1.44	3	Paved	8
Big Sp Lodge Road	NPS 783	Lower Current	NPS	0.14	2	Paved	8
Big Sp Maintenance Access Road	NPS 785	Lower Current	NPS Administrative	0.14	6	Paved-Gravel	8
Big Sp Picnic Area Loop	NPS 114	Lower Current	NPS	0.50	2	Paved	8

Road Name (Alt B)	Road Number (Alt B)	District (Alt B)	Managed (Alt B)	Length (miles) (Alt B)	Class (Alt B)	Surface Type (Alt B)	Map Number (Alt B)
Boyd's Creek Prim Area Road	NPS 674	Upper Current	NPS	0.07	4	Gravel	2
Brandt Field Road	NPS 770	Middle Current	NPS	0.15	N/A	N/A	6
Broadfoot Tract Road	NPS 108	Middle Current	NPS	0.48	2	Gravel	5
BS Water Tank Road	NPS 782	Lower Current	NPS Administrative	0.45	6	Gravel	8
Buck Hollow Landing Road	NPS 164	Jacks Fork	NPS	0.30	2	Gravel	10
Buttin Rock Road	NPS 732	Middle Current	NPS	1.02	4	Gravel	6
Buzzard Mtn Road	NPS 814	Upper Current	NPS	0.76	4	Gravel	2
Cataract Hill Trace	NPS 819	Upper Current	NPS	0.15	4	Gravel	3
Cataract Landing Road	NPS 802	Lower Current	NPS	0.36	N/A	N/A	9
Cedar Cabin Road	2-3052	Upper Current	NPS	0.47	4	Gravel	3
Cedar Grove Campground Road	NPS 154	Upper Current	NPS	0.24	3	Gravel	1
Cedargrove Cemetery Road	NPS 153	Upper Current	NPS	0.14	2	Gravel	1
Cedar Spring Campground Road	NPS 103	Lower Current	NPS	.25	4	Gravel	9
Chilton Creek Boat Ramp	NPS 214	Middle Current	NPS	0.14	2	Gravel	7
Chilton Farm Road	NPS 757	Middle Current	NPS Administrative	0.86	6	Gravel	6
Chubb Hollow Group Camp Road	NPS 111	Lower Current	NPS	0.17	3	Paved-Gravel	8
Colley Lake Road	NPS 810	Upper Current	NPS	0.23	4	Gravel	3
Conner Lake Trace	NPS 104	Lower Current	NPS	0.08	2	Gravel	9
Court House Cave Road	2-116	Upper Current	NPS	0.59	6	Gravel	3
Crafton Easement Road	NPS 818	Middle Current	NPS	0.07	4	Gravel	4
Crancer Tract Road	5-422	Middle Current	NPS	0.44	4	Gravel	4
Dee Murray Campground Road	NPS 109	Upper Current	NPS	0.21	3	Gravel	1
Devil's Well Upper Road	NPS 670	Upper Current	NPS Administrative	0.47	4	Gravel	2
Doctor Jolly Road	NPS 669	Upper Current	NPS Administrative	0.5	N/A	N/A	2
E Old State Road 106/Co Road 531	NPS 129	Middle Current	NPS	0.68	N/A	Paved	6
East Bland Road	NPS 733	Middle Current	NPS	1.66	N/A	N/A	6
East Chilton Creek Road	4-3138	Middle Current	NPS	0.28	4	Gravel	4
Firing Range Road	NPS 667	Upper Current	NPS Administrative	0.90	6	Gravel	1
Goehler/Stringer Road	2-3039	Middle Current	NPS	0.6	4	Gravel	5
Gooseneck Area Roads	NPS 101	Lower Current	NPS	0.25	3	Gravel	9
Gooseneck/Hawes Access	NPS 106	Lower Current	NPS	0.35	3	Gravel	9

Road Name (Alt B)	Road Number (Alt B)	District (Alt B)	Managed (Alt B)	Length (miles) (Alt B)	Class (Alt B)	Surface Type (Alt B)	Map Number (Alt B)
Grubb Hollow Prim Camp Road	NPS 223	Lower Current	NPS	0.35	2	Gravel	9
Halferty Tract Road	4-3160	Middle Current	NPS	0.12	4	Gravel	5
Hart Road	4-435	Middle Current	NPS	0.84	4	Gravel	5
Hickory Road	NPS 104	Lower Current	NPS	0.6	2	Gravel	9
Hooper Field Road	4-3173	Middle Current	NPS	0.02	4	Gravel	5
Horse Camp Primitive Camp Road	NPS 230	Jacks Fork	NPS	0.24	4	Gravel	11
Howell Road	NPS 150	Upper Current	NPS	0.38	3	Gravel	2
J. R. Bland Road	NPS 769	Middle Current	NPS Administrative	1.5	4	Gravel	6
Jerktail Road/Co Road 224	NPS 120	Middle Current	NPS	0.07	2	Gravel	4
K. C. Clubhouse Road	NPS 107	Lower Current	NPS	0.87	2	Gravel	8
Kelley Cabin Road	4-451	Middle Current	NPS	0.32	4	Gravel	5
Lesh Farm Road	NPS 758	Middle Current	NPS Administrative	0.12	6	Gravel	6
Lofton Lake Road Spur	NPS 777	Middle Current	NPS	0.08	4	Gravel	7
Lofton Lake Road	NPS 777	Middle Current	NPS	0.22	4	Gravel	7
Log Yard River Access Road	NPS 127	Middle Current	NPS	0.23	2	Gravel	6
Loop off 4-3157	NPS 107	Lower Current	NPS	0.07	N/A	N/A	8
Lost Man Cave Road	NPS 786	Lower Current	NPS Administrative	0.44	N/A	N/A	9
Lower Grassy Road	NPS 206	Middle Current	NPS	0.39	4	Gravel	4
Martin Hole Road	NPS 207	Middle Current	NPS	0.89	N/A	N/A	6
McCormac Access Road	NPS 762	Jacks Fork	NPS Administrative	0.18	4	Gravel	11
Mildred Bland Road	NPS 803	Middle Current	NPS	0.1	4	Gravel	6
Moloney Road	4-3073	Middle Current	NPS	0.59	4	Gravel	6
Montgomery Easement Road	4-3154	Middle Current	NPS	0.54	4	Gravel	6
NPS 152	NPS 152	Upper Current	NPS	0.17	N/A	N/A	2
NPS 202	NPS 202	Upper Current	NPS	0.18	N/A	N/A	2
NPS 717	NPS 717	Upper Current	NPS	0.33	N/A	N/A	2
NPS 754	NPS 754	Middle Current	NPS	0.09	N/A	N/A	5
NPS 755	NPS 755	Middle Current	NPS	0.07	N/A	N/A	5
NPS 760	NPS 760	Jacks Fork	NPS	0.26	4	Gravel	11
NPS 766	NPS 766	Jacks Fork	NPS	0.23	N/A	N/A	11
NPS 791	NPS 791	Middle Current	NPS	0.09	N/A	N/A	4

Road Name (Alt B)	Road Number (Alt B)	District (Alt B)	Managed (Alt B)	Length (miles) (Alt B)	Class (Alt B)	Surface Type (Alt B)	Map Number (Alt B)
NPS 793	NPS 793	Middle Current	NPS Administrative	0.18	N/A	N/A	5
NPS 794	NPS 794	Middle Current	NPS Administrative	0.33	N/A	N/A	6
NPS 800	NPS 800	Middle Current	NPS	0.15	N/A	N/A	5
NPS 801	NPS 801	Middle Current	NPS Administrative	0.05	N/A	N/A	6
NPS 824	NPS 824	Jacks Fork	NPS Administrative	.23	4	Gravel	11
NPS 825	NPS 825	Lower Current	NPS	.28	2	Gravel	7
Old Tram Road	NPS 123	Lower Current	NPS	7.51	2	Gravel	8
Owl's Bend Access Road	NPS 759	Middle Current	NPS	0.04	N/A	N/A	6
Paul Woods Road	NPS 807	Middle Current	NPS	1.13	4	Gravel	7
Pea Vine Road	NPS 10	Lower Current	NPS	3.19	1	Paved	8
Pin Oak Primitive Camp Road	NPS 214	Middle Current	NPS	0.32	N/A	Gravel	7
Porter Tract Road	NPS 820	Middle Current	NPS	0.5	4	Gravel	7
Powder Mill Campground Road	NPS 509	Middle Current	NPS	0.17	2	Gravel	6
Powder Mill Visitor Center Road	NPS 211	Middle Current	NPS	0.16	3	Gravel Paved	6
Powell Tract Road	NPS 809	Middle Current	NPS	0.65	4	Gravel	7
Pulltite Campground Road	NPS 148	Upper Current	NPS	1.05	3	Paved	2
Pulltite Floater Camp Area Road	NPS 519	Upper Current	NPS	0.11	3	Paved	2
Pulltite Maintenance Road	NPS 672	Upper Current	NPS Administrative	0.13	6	Gravel	2
Pulltite Road	NPS 146	Upper Current	Leased to the NPS from Shannon County	1.26	1	Paved	3
Raft Yard Road	NPS 119	Middle Current	NPS	0.39	2	Gravel	7
Roberts Field Prim Camp/Co RD	NPS 213	Middle Current	NPS	0.34	2	Gravel	6
Rocky Creek Easement Road	NPS 813	Middle Current	NPS	0.15	4	Gravel	7
Rocky Creek Road	NPS 772	Middle Current	NPS	0.69	2	Gravel	6
Rocky Falls Access Road	NPS 136	Middle Current	NPS	0.14	2	Gravel	6
Rogers Creek Road	NPS 817	Middle Current	NPS	0.39	4	Gravel	7
Rogors Creek Road	NPS 779	Middle Current	NPS	0.34	N/A	N/A	7
Royal Hole Road	NPS 789	Jacks Fork	NPS	0.06	N/A	N/A	10
RS Campground/River Access Road	NPS 169	Upper Current	NPS	0.80	3	Paved	3
RS Cave Access Road	NPS 170	Upper Current	NPS	0.45	3	Paved	3
RS Cave/Maintenance Road	NPS 677	Upper Current	NPS Administrative	0.15	N/A	Paved	3
RS Cluster Campground Road	NPS 700	Upper Current	NPS	0.32	3	Paved-Gravel	3

Road Name (Alt B)	Road Number (Alt B)	District (Alt B)	Managed (Alt B)	Length (miles) (Alt B)	Class (Alt B)	Surface Type (Alt B)	Map Number (Alt B)
RS Floater Parking Lot	NPS 180	Upper Current	NPS	0.11	3	Paved	3
RS Group Campsite Road	NPS 180	Upper Current	NPS	0.16	3	Paved	3
RS N Water Tank Road	NPS 676	Upper Current	NPS Administrative	0.06	6	Gravel	3
RS Picnic Area Road	NPS 171	Upper Current	NPS	0.26	3	Paved	3
RS Upper River Access/Parking	NPS 173	Upper Current	NPS	0.21	3	Paved	3
RS Water Tank Road	NPS 678	Upper Current	NPS Administrative	0.27	6	Gravel	3
RS Sewage Treatment Road	NPS 675	Upper Current	NPS Administrative	0.17	6	Paved-Gravel	3
Section Field Road	NPS 823	Upper Current	NPS Administrative	0.93	N/A	N/A	2
Shawnee Campground Road	NPS 208	Middle Current	NPS	0.11	3	Gravel	5
Shedd Tract Trace	5-3065	Middle Current	NPS Administrative	0.26	N/A	N/A	5
Sinking Creek Campground Road	NPS 145	Upper Current	NPS	0.31	3	Gravel	3
Stoops Road	NPS 822	Lower Current	NPS	0.32	4	Gravel	8
Summer Tracts Road	NPS 710	Upper Current	NPS	0.56	3	Gravel	1
Susie Nichols Cabin Road	NPS 712	Upper Current	NPS Administrative	0.33	2	Gravel	1
Susie Nichols Road	2-3002	Lower Current	NPS	0.6	4	Gravel	8
Sweezie Hollow Road	NPS 781	Lower Current	NPS Administrative	0.98	6	Gravel	8
Tan Vat Canoe Access Road	NPS 201	Upper Current	NPS	0.12	3	Gravel	1
Ted O'Gwynn Road	2-3037	Lower Current	NPS	0.21	4	Gravel	9
Titus Cabin Road	NPS 808	Lower Current	NPS	0.22	4	Gravel	9
Trace off 4-213	NPS 213	Middle Current	NPS	0.22	4	Gravel	6
Tuttle Easement Road	4-3147	Lower Current	NPS	0.13	4	Gravel	9
Two River Campground Road	NPS 138	Middle Current	NPS	0.09	3	Gravel	5
Two Rivers Well Access Road	NPS 753	Middle Current	NPS Administrative	0.17	6	Gravel	5
Tyler Tract Road	2-3036	Lower Current	NPS	0.43	4	Gravel	9
Upper Sugarcamp Road	NPS 806	Jacks Fork	NPS	0.31	4	Gravel	11
W Old State Hwy106/Co Road 531	NPS 131	Middle Current	NPS	1.67	2	Paved	6
Warren Bland Road	NPS 776	Middle Current	NPS Administrative	0.51	4	Gravel	7
Waymeyer	NPS 215	Middle Current	NPS	0.34	2	Gravel	7
Welch Spring Prim Area Road	NPS 666	Upper Current	NPS	0.2	4	Gravel	1
Well Access Road	NPS 788	Lower Current	NPS Administrative	0.29	6	Paved	9
Whisker Jones Tract Road	NPS 815	Jacks Fork	NPS Administrative	0.84	4	Gravel	11

Road Name (Alt B)	Road Number (Alt B)	District (Alt B)	Managed (Alt B)	Length (miles) (Alt B)	Class (Alt B)	Surface Type (Alt B)	Map Number (Alt B)
Wide Road	NPS 751	Upper Current	NPS	0.15	3	Gravel	3
Wildcat Mountain Road	NPS 811	Jacks Fork	NPS	0.17	4	Gravel	10
Yantis Tract Road	NPS 821	Jacks Fork	NPS	1.06	4	Gravel	10

APPENDIX M: ROAD CLASSIFICATION MATRIX – ALTERNATIVE C

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Road Name (Alt C)	Road Number (Alt C)	District (Alt C)	Managed (Alt C)	Length (miles) (Alt C)	Class (Alt C)	Surface Type (Alt C)	Map Number (Alt C)
Bay Creek Campsite	NPS 771	Jacks Fork	NPS	.29	2	Gravel	11
NPS 743	NPS 743	Lower Current	NPS	.52	N/A	N/A	9

Note: Roads noted above are in addition to those presented in appendix L for alternative B.

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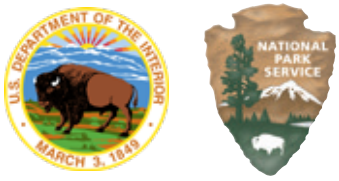

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving 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.

OZAR 614/175477
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National Park Service
U.S. Department of the Interior