NATIONAL PARK SERVICE
U.S. DEPARTMENT OF THE INTERIOR

Ozark National Scenic Riverways
Missouri

REHABILITATE AND UPGRADE RADIO SYSTEM TO NARROWBAND DIGITAL

ENVIRONMENTAL ASSESSMENT

OZARK NATIONAL SCENIC RIVERWAYS

April 2011

PROJECT SUMMARY

INTRODUCTION

The National Park Service (NPS) is considering a project to rehabilitate and upgrade the two-way radio system for park communications within the Ozark National Scenic Riverways (the park). The proposed action would upgrade the existing five repeater sites to the narrowband digital system and would construct two new radio towers within the park to provide coverage in areas of the park with deficient radio coverage. A repeater acts as an intermediate station in transmitting radio communication signals to extend the reliable range of the originating station.

This document complies with both the *National Environmental Policy Act* of 1969, as amended, and Section 106 of the *National Historic Preservation Act* of 1966, as amended.

PURPOSE OF AND NEED FOR THE ACTION

The purpose of the project is to better protect public safety and improve NPS law enforcement and emergency service response by upgrading the park's radio communication system to provide radio coverage throughout the park.

The action is needed to comply with a government mandate requiring federal agencies to incorporate digital narrowband very high frequency communications systems into their operations.

OVERVIEW OF THE ALTERNATIVES

Two alternatives are addressed in this environmental assessment:

- Alternative A: No Action
- Alternative B: Upgrade and Rehabilitate Radio System.

SUMMARY OF IMPACTS

Impacts of the proposed alternatives were assessed in accordance with the *National Environmental Policy Act* and the NPS Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making. Several impacts topics were dismissed from further analysis because the proposed action would result in no impacts or negligible to minor or short-term impacts to those resources. No major impacts are anticipated as a result of this project.

HOW TO COMMENT

Agencies and the public are encouraged to review and comment on the contents of this environmental assessment during a 30-day public review and comment period. We invite you to comment on this plan and you may do so by any one of several methods. The preferred method of providing comments is on the NPS planning website: http://parkplanning.nps.gov/OZAR. You may also submit written comments to

Reed Detring, Superintendent
Ozark National Scenic Riverways
Attn: Radio Tower EA
404 Watercress Drive
Van Buren, MO 63965

Only written comments will be accepted. Please submit your comments within 30 days of the posting of the notice of availability on the Planning, Environment and Public Comment (PEPC) web site. Please be aware that your entire comment will become part of the public record. If you wish to remain anonymous, please clearly state that within your correspondence, although we cannot guarantee that personal information, such as email address, phone number, etc. will be withheld.

Contents

Appendices

List of Tables

List of Figures

CHAPTER 1: PURPOSE AND NEED

INTRODUCTION

The National Park Service (NPS) proposes to improve law enforcement response and better protect visitor safety by upgrading the two-way radio system for park communications within the Ozark National Scenic Riverways (the park). The proposed action would upgrade the existing five repeater sites to the narrowband digital system and would construct two new radio towers within the park to provide coverage in areas of the park with deficient radio coverage. The park consists of approximately 80,000 acres of land along the Jacks Fork and Current rivers in southern Missouri. The park and two proposed repeater sites are shown in figure 1.

The radio system currently operates on a wideband analog mode with five repeater sites and provides no communication security capability for Visitor Protection operations. The repeaters are not linked and radio traffic on one repeater is not generally audible to other subscribers. Additionally, the five repeaters do not provide operational coverage in several areas deemed necessary by the park.

This environmental assessment (EA) analyzes the proposed action and no action alternatives and their impacts on the environment, and has been prepared in accordance with the *National Environmental Policy Act* (NEPA) of 1969, as amended, and implementing regulations, Title 40 of the Code of Federal Regulations (CFR), Parts 1500–1508, NPS Director's Order 12 and the handbook, Conservation Planning, Environmental Impact Analysis, and Decision-making (NPS 2001). Compliance with Section 106 of the *National Historic Preservation Act* of 1966 has occurred in conjunction with the NEPA process.

PURPOSE OF AND NEED FOR ACTION

The purpose of the project is to better protect public safety and improve NPS law enforcement and emergency service response by upgrading the park's radio communication system to provide radio coverage throughout the park.

In addition, the action is needed to comply with a government mandate requiring federal agencies to incorporate digital narrowband very high frequency (VHF) communications systems into their operations.

The additional two repeater sites are needed to provide adequate coverage to the Rymer Ridge and Cedargrove areas of the park, where coverage is currently unavailable. The location of the park and proposed repeater sites are shown in figure 1.

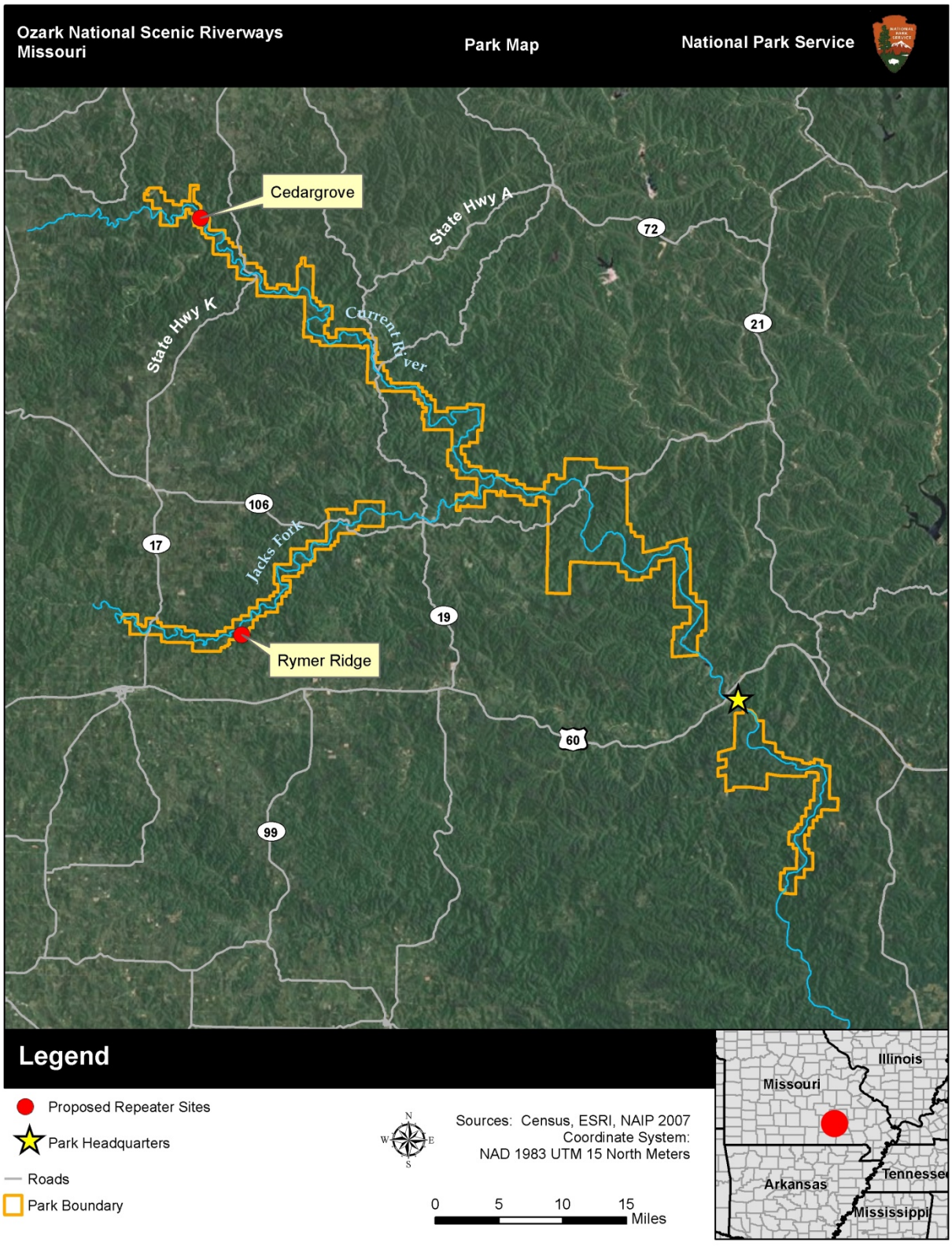

FIGURE 1: PARK AND PROJECT VICINITY

PROJECT BACKGROUND

Ozark National Scenic Riverways follows the courses of two of America's clearest and most beautiful spring-fed rivers through the hills of southern Missouri. The park is linear and sinuous, following the courses of the Current and Jacks Fork rivers for over 130 miles. The park is accessed by visitors and staff using a network of state and county paved and unpaved roadways. The long, narrow nature of the park complicates management because staff must travel long distances to manage park resources and visitors. Travel time from the park headquarters, in the town of Van Buren, to other park locations can reach or exceed 90 minutes.

The park's current radio communication system does not provide full coverage of park lands, including some heavily used visitor areas. The hilly topography of the Ozarks effectively diminishes radio and cell phone coverage in the area. At some locations along the river, neither NPS radios nor personal cell phones provide access to emergency response agencies. This can limit the park's ability to protect public safety and increase response time. Visitors have reported hiking to nearby hilltops to obtain a cellular signal during emergencies, to request assistance from NPS law enforcement, or to report resource violations (NPS 2010a).

Since November 1992, the Federal Communications Commission (FCC) has been working to replace all private land mobile radio (LMR) services to narrowband. Narrowbanding is one method adopted by the FCC to promote more efficient use of the radio spectrum used by public safety agencies (APCO 2007). Subsequent rule making by the FCC set January 2011 as the final date the FCC would accept applications for wideband, which is the type of private land radio system that is currently used by the park. By January 2013, all public safety radio systems must be narrowband compliant (APCO 2007).

The NPS has been working to upgrade all national park LMR systems to narrowband digital, including the system used at Ozark National Scenic Riverways. Additionally, the existing LMR system has limited to no coverage in two areas of the park, which hinders park operations and could affect public safety. As a result, in addition to upgrading the park's LMR system to narrowband digital, the NPS is proposing construction of two new repeater sites to address deficient coverage areas.

PURPOSE AND SIGNIFICANCE OF THE PARK

The Ozark National Scenic Riverways was established in 1964 "for the purpose of conserving and interpreting unique scenic and other natural values and objects of historic interest, including preservation of portions of the Current River and the Jacks Fork River in Missouri as free-flowing streams, preservation of springs and caves, management of wildlife, and provisions for use and enjoyment of the outdoor recreation resources…" (NPS 1964). Most visitor use of the park is river-oriented, with activities such as canoeing, john-boating, fishing, swimming, picnicking, tubing, and camping (NPS 1980).

RELATIONSHIP TO LAWS, EXECUTIVE ORDERS, POLICIES, AND OTHER PLANS

The NPS is governed by laws, regulations, and management plans before, during, and after any management action considered under any NEPA analysis. The following are those that are applicable to the proposed action.

APPLICABLE STATE AND FEDERAL LAWS

National Environmental Policy Act, 1969, as Amended

NEPA was passed by Congress in 1969 and took effect on January 1, 1970. This legislation established this country's environmental policies, including the goal of achieving productive harmony between human beings and the physical environment for present and future generations. It provided the tools to implement these goals by requiring that every federal agency prepare an in-depth study of the impacts of "major Federal actions significantly affecting the quality of the human environment" and alternatives to those actions and required that each agency make that information an integral part of its decisions. NEPA also requires that agencies make a diligent effort to involve the interested members of the public before they make decisions that affect the environment.

NEPA is implemented through Council on Environmental Quality (CEQ) regulations (40 CFR 1500–1508) (CEQ 1978). The NPS has in turn adopted procedures to comply with the act and the CEQ regulations, as found in Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making (NPS 2001), and its accompanying handbook.

National Park Service *Organic Act* of 1916

By enacting the NPS *Organic Act* of 1916, Congress directed the U.S. Department of Interior and the NPS to manage units "to conserve the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (16 USC 1). Despite this mandate, the *Organic Act* and its amendments afford the NPS latitude when making resource decisions that balance resource preservation and visitor recreation.

Because conservation remains predominant, the NPS seeks to avoid or to minimize adverse impacts on park resources and values. However, the NPS has discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of a park (NPS 2006a). While some actions and activities cause impacts, the NPS cannot allow an adverse impact that would constitute impairment of the affected resources and values (NPS 2006a). The *Organic Act* prohibits actions that permanently impair park resources unless a law directly and specifically allows for the acts (16 USC 1a-1). An action constitutes an impairment when its impacts "…harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values" (NPS 2006a). To determine impairment, the NPS must evaluate "…the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts" (NPS 2006a).

Endangered Species Act

The *Endangered Species Act* (ESA) was enacted in 1973 with the purpose to protect endangered and threatened species and to provide a means to conserve their ecosystems. The law is administered by the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration, National Marine Fisheries Service. Any federal agency action that may affect endangered, threatened, or proposed species must be evaluated in consultation with these two agencies. The federal agency involved must work to conserve listed species and make sure that their actions do not jeopardize the continued existence of a listed species. Development of a plan to modify a federal project is developed in conjunction with the USFWS and the National Marine Fisheries Service so minimal impact would occur to listed species and their habitat.

National Parks Omnibus Management Act of 1998

The *National Parks Omnibus Management Act* (16 USC 5901 et seq.) underscores NEPA and is fundamental to NPS park management decisions. Both acts provide direction for articulating and connecting the ultimate resource management decision to the analysis of impacts, using appropriate technical and scientific information. Both also recognize that such data may not be readily available and provide options for resource impact analysis should this be the case.

The *National Parks Omnibus Management Act* directs the NPS to obtain scientific and technical information for analysis. The NPS handbook for Director's Order 12 states, "if such information cannot be obtained due to excessive cost or technical impossibility, the proposed alternative for decision will be modified to eliminate the action causing the unknown or uncertain impact or other alternatives will be selected" (NPS 2001).

Redwood National Park Act of 1978, As Amended

All national park system units are to be managed and protected as parks, whether established as a recreation area, historic site, or any other designation. This act states that the NPS must conduct its actions in a manner that would ensure no "…derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directed and specifically provided by Congress."

Telecommunications Act of 1996

The *Telecommunications Act* of 1996 was enacted "to promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies" (Public Law No. 104-104, 110 Stat. 56 (1996)). Section 704(c) of the Telecommunications Act of 1996 and its regulations make federal property, including parkland, available for placement of telecommunications equipment by duly authorized providers absent unavoidable conflicts with the department or agency's mission, or the current or planned use of the property, or access to that property. At this time, no providers have approached the park regarding potential co-location.

Specific Authorities and Guidance for Special Parks Uses Including Telecommunication Facilities

U.S. Fish and Wildlife Service Interim Guidelines on Siting, Construction, Operation, and Decommissioning Telecommunication Facilities

These guidelines (USFWS 2010a) address the potential for substantial impacts on migratory birds from the construction of communication towers. The USFWS guidelines are applicable to the review of proposed tower siting and/or the evaluation of towers on migratory birds. Although actual levels of impacts on bird populations by smaller communication towers are still uncertain, in the interest of conservation of neotropical migrant bird species and other birds, the USFWS recommends the following measures to avoid and minimize these impacts:

1. Any company/applicant/licensee proposing to construct a new communications tower should be strongly encouraged to co-locate the communications equipment on an existing communication tower or other structure (e.g., billboard, water tower, or building mount). Depending on tower load factors, from six to ten providers may collocate on an existing tower.

2. If collocation is not feasible and a new tower or towers are to be constructed, communications service providers should be strongly encouraged to construct towers no more than 199 feet above ground level (AGL), using construction techniques that do not require guy wires (e.g., use of lattice structure, monopole, etc.). Such towers should be unlighted if Federal Aviation Administration (FAA) regulations permit.

3. If constructing multiple towers, providers should consider the cumulative impacts of all of those towers to migratory birds and threatened and endangered species as well as the impacts of each individual tower.

4. If possible, new towers should be sited within existing "antenna farms" (clusters of towers). Towers should not be sited in or near wetlands, other known bird concentration areas (e.g., state or federal refuges, staging areas, rookeries), in known migratory or daily movement flyways, or in habitat of threatened or endangered species. Towers should not be sited in areas with a high incidence of fog, mist, and low ceilings.

5. If taller (greater than 199 feet AGL) towers requiring lights for aviation safety must be constructed, the minimum amount of pilot warning and obstruction avoidance lighting required by the FAA should be used. Unless otherwise required by the FAA, only white (preferable) or red strobe lights should be used at night, and these should be the minimum number, minimum intensity, and minimum number of flashes per minute (longest duration between flashes) allowable by the FAA. The use of solid red or pulsating red warning lights at night should be avoided. Current research indicates that solid or pulsating (beacon) red lights attract night-migrating birds at a much higher rate than white strobe lights. Red strobe lights have yet to be studied.

6. Tower designs using guy wires for support which are proposed to be located in known raptor or waterbird concentration areas or daily movement routes, or in major diurnal migratory bird movement routes or stopover sites, should have daytime visual markers on the wires to prevent collisions by these diurnally moving species.

7. Towers appendant facilities should be sited, designed and constructed so as to avoid or minimize habitat loss within and adjacent to the tower "footprint." However, a larger tower footprint is preferable to the use of guy wires in construction. Road access and fencing should be minimized to reduce or prevent habitat fragmentation and disturbance, and to reduce above ground obstacles to birds in flight.

8. If significant numbers of breeding, feeding, or roosting birds are known to habitually use the proposed tower construction area, relocation to an alternate site should be recommended. If this is not an option, seasonal restrictions on construction may be advisable in order to avoid disturbance during periods of high bird activity.

9. In order to reduce the number of towers needed in the future, providers should be encouraged to design new towers structurally and electrically to accommodate the applicant/licensee's antennas and comparable antennas for at least two additional users (minimum of three users for each tower structure), unless this design would require the addition of lights or guy wires to an otherwise unlighted and/or unguyed tower.

10. Security lighting for on-ground facilities and equipment should be down-shielded to keep light within the boundaries of the site.

11. If a tower is constructed or proposed for construction, USFWS personnel or researchers from the Communication Tower Working Group should be allowed access to the site to evaluate bird use, conduct dead-bird searches, place net catchments below the towers but above the ground, and place radar, Global Positioning System, infrared, thermal imagery, and acoustical monitoring equipment as necessary to assess and verify bird movements and to gain information on the impacts of various tower sizes, configurations, and lighting systems.

12. Towers no longer in use or determined to be obsolete should be removed within 12 months of cessation of use.

EXECUTIVE ORDERS AND DIRECTOR'S ORDERS

Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision Making and Handbook

NPS Director's Order 12 and its accompanying handbook (NPS 2001) lay the groundwork for how the NPS complies with NEPA. Director's Order 12 and the handbook set forth a planning process for incorporating scientific and technical information and establishing a solid administrative record for NPS projects.

NPS Director's Order 12 requires that impacts to park resources be analyzed in terms of their context, duration, and intensity. It is crucial for the public and decision makers to understand the implications of those impacts in the short and long term, cumulatively, and within context, based on understanding and interpretation by resource professionals and specialists. Director's Order 12 also requires that an analysis of impairment to park resources and values be made as part of the NEPA document.

Natural Resources Management Reference Manual NPS-77

The purpose of this document is to provide guidance to park managers for all planned and ongoing natural resource management activities. Managers must follow all federal laws, regulations, and policies. This document provides the guidance for park management to design, implement, and evaluate a comprehensive natural resource management program (NPS 2004).

NATIONAL PARK SERVICE MANAGEMENT POLICIES 2006

The NPS *Management Policies 2006* (NPS 2006a) is the basic NPS-wide policy document, adherence to which is mandatory unless specifically waived or modified by the NPS Director or certain departmental officials, including the U.S. Secretary of the Interior. Actions under this EA are in part guided by these management policies. Sections which are particularly relevant to this project are as follows.

Section 8.2.5.1, Visitor Safety

The NPS strives to protect human life and provide for injury-free visits. As a result, the NPS will apply national safety codes and standards to prevent injuries or recognizable threats to visitor safety and will reduce or remove known hazards. Examples of visitor safeguards include the installation of artificial lighting or paved walking surfaces (NPS 2006a).

Impairment

According to NPS *Management Policies 2006*, an action constitutes an impairment when an impact "…would harm the integrity of park resources or values, including the opportunities that otherwise would

be present for the enjoyment of those resources or values" (NPS 2006a). Whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts. "An impact to any park resource or value may… constitute impairment. An impact would be more likely to constitute an impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- identified in the park's general management plan or other relevant NPS planning documents as being of significance (NPS 2006a)."

Impairment findings are not necessary for visitor use and experience, visitor and employee safety, park operations and management, or socioeconomics because impairment findings relate back to park resources and values. These impact areas are not generally considered to be park resources or values according to the *Organic Act*, and cannot be impaired the same way an action can impair park resources and values. An impairment determination for the NPS preferred alternative is provided in appendix A of this document.

PARK PLANS AND POLICIES

1984 General Management Plan and Development Concept Plan

A general management plan (GMP) provides park managers with the direction, goals, and objectives for making decisions on park operations. The current GMP provided the foundation for actions undertaken in previous developments in the park and will continue to be used to guide and/or develop management actions. A new GMP is in the beginning phases and is expected to be put into operation within the next 3–5 years. Until that time, any proposals in this EA must be consistent with the 1984 GMP. The development concept plans included within the GMP are site specific development recommendations for the redesign, replacement, relocation, or upgrading of facilities.

SCOPING PROCESS AND PUBLIC PARTICIPATION

NEPA regulations require an "early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action" (CEQ 1978). To determine the scope of issues to be analyzed in depth in this plan, meetings were conducted with park staff and the public.

In addition to internal and agency scoping, public scoping for the EA to upgrade and rehabilitate the radio system to narrowband digital began January 4, 2011, and concluded February 11, 2011. Notice of the public scoping period was posted on the Planning, Environment, and Public Comment (PEPC) website and sent to the park's mailing list. During the public scoping period, the NPS received zero comments from the public via the PEPC website.

ISSUES AND IMPACT TOPICS

Issues describe problems or concerns associated with current impacts from environmental conditions or current operations as well as problems that may arise from the implementation of any of the alternatives.

Park staff identified potential issues associated with the visitor access improvements during internal scoping. The issues and concerns identified during scoping were grouped into impact topics that are discussed in "Chapter 3: Affected Environment" and are analyzed in "Chapter 4: Environmental Consequences."

IMPACT TOPICS ANALYZED IN THIS ENVIRONMENTAL ASSESSMENT

VISUAL RESOURCES (AESTHETICS AND VIEWSHEDS)

The construction of two radio towers within the park could potentially impact the current viewshed along the park. As a result, this impact topic was carried forward for analysis.

SOILS

Construction of two new radio towers within the park would result in disturbance and compaction of soils in the area of construction. As a result, this impact topic was carried forward for analysis.

VEGETATION

Actions directly related to the tower construction would require the clearing or trimming of mixed deciduous forest and associated vegetation. As a result, this impact topic was carried forward for analysis.

WILDLIFE AND WILDLIFE HABITAT, INCLUDING SPECIAL-STATUS SPECIES

A variety of wildlife habitats are present in at and near both radio tower locations. The construction, operation, and maintenance of the towers could disrupt wildlife through disturbance and loss of habitat. These impacts could include creation of new edge habitats that allow establishment of nonnative and invasive plant species, which would also impact native communities. The operation of the towers could affect migratory, resident, and neotropical birds species (including raptors), as well as bats, by increasing the potential for collisions with the structures. In addition, the operation of radio towers may have long-term health and behavioral impacts on wildlife due to the radiofrequency emissions from the towers. As a result, this impact topic was carried forward for analysis.

PARK OPERATIONS AND MANAGEMENT, INCLUDING VISITOR PROTECTION

Implementation of the proposed action would require an upgrade of all current mobile and portable radios within the park to use the new radio system. Beneficial impacts could also be expected from increased radio coverage, encrypted Visitor Protection radios, and ease of communication park-wide. Encryption allows park rangers to communicate with each other without other NPS staff or the public being able to listen in, protecting confidential information, including private information from visitors, and the rangers' locations within the park. As a result, park operations and management, including visitor protection, was included for full analysis.

IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

The following impact topics were eliminated from further analysis in this EA. A brief rationale for dismissal is provided for each topic. Potential impacts to these resources would be none or negligible, localized, and most likely immeasurable.

GEOLOGY, GEOLOGIC HAZARDS, AND TOPOGRAPHY

There are no known geohazards located within the proposed project area. The proposed action would not require excavation or grading in a way that would disrupt geological or topographical resources, as both proposed locations are relatively flat. As a result, these topics were dismissed from further analysis.

CAVES

Due to the karst topography of the area, the park contains over 300 identified caves. All caves are currently closed to the public due to the discovery of White Nose Syndrome, a disease that kills bats. The proposed radio tower construction would not impact caves or cave habitat. At the Rymer Ridge location, there are 45 caves within a mile. The closest cave is approximately 1/4-mile from the site with no records of bat species or significant cave formations (Houf 2011). There are three caves located within a mile of the Cedargrove site. Of those three caves, one has documented bat species (Houf 2011). As there would be no impacts to caves and potential impacts to bat species have been analyzed under wildlife and wildlife habitat, caves were dismissed from further analysis.

WATER QUALITY

The 1972 *Federal Water Pollution Control Act*, as amended by the *Clean Water Act* of 1977, is a national policy to restore and maintain the chemical, physical, and biological integrity of the nation's waters, enhance the quality of water resources, and to prevent, control, and abate water pollution. The NPS *Management Policies 2006* provides direction for the preservation, use, and quality of water originating, flowing through, or adjacent to park boundaries. The proposed sites are located in excess of 1/4-mile from the rivers, and construction would disturb only a small area of soil and would not result in erosion that would impact water quality. As a result, water quality was dismissed from further analysis.

AIR QUALITY

The 1963 *Clean Air Act*, as amended (42 USC 7401 et seq.), requires federal land managers to protect air quality in national parks. During construction, local air quality would be temporarily affected by dust and vehicle emissions. Hydrocarbons, nitrogen oxide, and sulfur dioxide emissions would be rapidly dissipated by air drainage since air stagnation is uncommon at the project sites. Overall, there would be a slight and temporary degradation of local air quality due to dust generated from construction activities, but these effects would be localized and negligible. The park's current level of air quality would not be measurably affected by the proposed project; therefore, this impact topic was dismissed from further analysis.

FLOODPLAINS AND WETLANDS

Executive Order 11988, Floodplain Management, requires an examination of impacts to floodplains and the potential risk involved in placing facilities within floodplains. The NPS *Management Policies 2006*, Section 4.6.4, Floodplains and NPS Director's Order 77-2 Floodplain Management Guidelines (NPS 2003) provide guidelines on developments proposed in floodplains. The project area is not within a designated floodplain; therefore, floodplains were not addressed as an impact topic in this EA.

Executive Order 11990, Protection of Wetlands, requires federal agencies to avoid adversely impacting wetlands, where possible. NPS policies for wetlands as stated in NPS *Management Policies 2006* and Director's Order 77-1, Wetlands Protection, strive to prevent the loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. For regulatory purposes under the

Clean Water Act, the term wetlands means "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." Wetlands do not occur in or near the proposed project sites, and this topic is not addressed in this EA.

CULTURAL RESOURCES

Cultural Landscapes

According to Director's Order 28, Cultural Resources Management Guideline, a cultural landscape is

> …a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions.

The proposed radio tower repeater site at Rymer Ridge is undeveloped. The proposed site at Cedargrove was once a ranger station. The ranger station cabin is no longer at the site, but a clearing remains. An access road leading to the clearing is accessible by vehicle and there is an electric meter on a power pole near the edge of the clearing.

Although the Cedargrove site contains physical evidence of previous human use of park lands, the site is not a landscape eligible for listing in the National Register of Historic Places. The landscape is not significant for its associations with important events, activities, and persons, and there are no associated peoples for whom the landscape reflects endemic traditions, customs, beliefs, or values.

In addition, the replacement of existing radio and repeater equipment on existing towers would have no impact on cultural landscapes, and impacts to the visual character of the project areas are analyzed under the Visual Resources (Aesthetics and Viewsheds) impact topic. Therefore, cultural landscapes was dismissed as an impact topic.

Archeology

On December 14, 2010, the archeologist/ Chief of the Resource Management Division at the park conducted a pedestrian cultural resources survey at each of the proposed tower locations. At Cedargrove, he found no trace of any prehistoric cultural materials or significant historic artifacts (Price 2011). At Rymer Ridge, he completed a Phase I cultural resources survey to determine the presence or absence of either prehistoric of significant historic cultural materials. He found no evidence of any prehistoric archeological material within the project area (Price 2011). Combined with research that indicates archeological sites are usually not found on ridge tops away from the stream setting, as is the case at Rymer Ridge, he determined there is no evidence of potential archeological resources at the Rymer Ridge location.

For both sites, it was concluded that there is no potential for an adverse effect on archeological resources. Therefore, archeology was dismissed as an impact topic.

Ethnographic Resources

Ethnographic resources are defined by the NPS as any "site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (NPS 1998a). Ethnographic resources typically hold significance for traditionally associated groups whose sense of purpose, existence as a community, and identity as an ethnically distinctive people are closely linked to particular resources and places.

Eight American Indian tribes are traditionally associated with park lands: Shawnee Tribe (Miami, OK); Cherokee Nation (Tahlequah, OK); United Keetoowah Band of Cherokee Indians (Tahlequah, OK); Delaware Nation (Anadarko, OK); Absentee Shawnee Tribe of Oklahoma (Shawnee, OK); Osage Nation (Pawhuska, OK); Delaware Tribe of Indians (Bartlesville, OK); and the Eastern Shawnee Tribe of Oklahoma (Seneca, MO). The proposed project was among several potential park projects discussed during face-to-face tribal consultations in November, 2010. No comments regarding the proposed project were received either during the consultations or in subsequent months. Copies of the EA will be forwarded to each associated tribe for review and comment. If subsequent issues or concerns are identified, appropriate consultations will be undertaken.

The park also represents an ethnographic landscape for the descendants of the Euro-American settlers who moved to the area during the early 19th century. Predominantly of Scotch-Irish ancestry, they established farmsteads and rural communities in the region that were commonly organized along kinship ties. Among the character-defining elements of the landscape that evolved as the settlers adapted to the Ozark highlands are the patterns of agricultural fields and dense natural vegetation; the circulation network of roads, trails, and river crossings; and the rivers themselves which figured prominently in nearly all aspects of daily live, sometimes facilitating and at other times hindering transportation, communications, and commerce. The small hamlets and villages that emerged along the riverways, some centered at the sites of saw and grist mills that often doubled as community gathering places, are enduring reminders of the patterns of settlement. Several cemeteries are within the park boundaries with continuing family associations to the earliest periods of settlement (NPS 1991c).

A special emphasis ethnographic study for the park also examined the traditional and changing roles of women in the Ozarks, their traditional knowledge and relationship to the environment, and their shared experiences and commonalities as well as their unique differences. The study found that Ozark women have held (and continue to hold) fundamental and diversified roles in fulfilling the tasks necessary to sustain their families. As necessary they have also applied themselves to tasks more traditionally associated with men's roles (e.g., tending farm animals and livestock, plowing fields, gathering plants and medicinal herbs, repairing structures) (Gaul and Lashlee 2001; Gaul and Lashlee 2005).

The proposed radio tower repeater site at Rymer Ridge is undeveloped and Cedargrove was once the site of a ranger station. There are neither ethnographic resources nor endemic traditions, customs, beliefs, or values associated with either site. In addition, the replacement of existing radio and repeater equipment on existing towers would have no impact on ethnographic resources. Therefore, ethnographic resources was dismissed as an impact topic.

Museum Objects

Implementation of the proposed action would have no effect on museum objects (historic artifacts, natural specimens, and archival and manuscript material); therefore, museum objects were dismissed as an impact topic.

ECOLOGICALLY CRITICAL AREAS

The park does not include any designated ecologically critical areas, wild and scenic rivers, or other unique natural resources, as referenced in the *Wild and Scenic Rivers Act* (16 USC 1271, et seq.), NPS *Management Policies 2006*, 40 CFR 1508.27, or the 62 criteria for designating national natural landmarks. Therefore, this impact topic was dismissed from further consideration.

PRIME AND UNIQUE FARMLANDS

Prime farmlands have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique agricultural land is land other than prime farmland that is used for production of specific, high-value food and fiber crops. Both categories require that the land be available for farming uses (CEQ 1980). Lands within the park are not available for farming and therefore do not meet these definitions. Therefore, this impact topic was dismissed from further consideration.

INDIAN TRUST RESOURCES AND SACRED SITES

The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights. No Indian trust resources or sacred sites have been identified at the park, so this impact topic was dismissed from further consideration.

LAND USE

The existing land use within the park would not change as a result of implementation of the proposed action; therefore the impact topic was dismissed from further analysis.

ENVIRONMENTAL JUSTICE

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. Guidelines for implementing this executive order under NEPA are provided by the CEQ (CEQ 1997). According to the U.S. Environmental Protection Agency (EPA), environmental justice is

> The fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies. The goal of this "fair treatment" is not to shift risks among populations, but to identify potentially disproportionately high and adverse effects and identify alternatives that may mitigate these impacts (EPA 1998).

There are both minority and low-income populations in the general vicinity of the park. However, environmental justice was dismissed as an impact topic for the following reasons:

- NPS staff actively solicited public participation as part of the planning process and gave equal consideration to input from all persons, regardless of age, race, income status, or other socioeconomic or demographic factors;
- Impacts associated with implementation of the preferred alternative would not disproportionately affect any minority or low-income populations or communities;
- Implementation of the preferred alternative would not result in any identified effects that would be specific to any minority or low-income populations or communities; and
- NPS staff does not anticipate that any adverse impacts on public health or the socioeconomic environment would fall appreciably more severely or result in disproportionately high and adverse impacts to minority or low-income populations or communities in the area.

QUALITY OF THE BUILT ENVIRONMENT / URBAN QUALITY / GATEWAY COMMUNITIES

Alterations to the park's radio communication system would have no effect on the built environment of the park or its gateway communities. Therefore, quality of the built environment was dismissed from further consideration.

ENERGY EFFICIENCY AND CONSERVATION POTENTIAL

Under each of the project alternatives, the NPS would continue to implement its policies of reducing costs, eliminating waste, and conserving resources by using energy-efficient and cost-effective practices (NPS 2006a), and it would continue to look for energy-saving opportunities in all aspects of park operations. Because the NPS would promote energy efficiency under any of the alternatives, this impact topic was dismissed from further consideration.

NATURAL OR DEPLETABLE RESOURCE CONSERVATION POTENTIAL

There would be no measurable difference in natural or depletable resource conservation among the alternatives being considered as part of this EA. It is not anticipated that a limited change in beach driving speeds would change depletable fossil fuel use because beach driving would continue on the length of the beach, without changes in access. Therefore, this impact topic was dismissed from further consideration.

CLIMATE CHANGE

Climate change refers to any significant changes in average climatic conditions (such as mean temperature, precipitation, or wind) or variability (such as seasonality and storm frequency) lasting for an extended period (decades or longer). Recent reports by the U.S. Climate Change Science Program, the National Academy of Sciences, and the United Nations Intergovernmental Panel on Climate Change provide evidence that climate change is occurring as a result of rising greenhouse gas (GHG) emissions and could accelerate in the coming decades. While climate change is a global phenomenon, it manifests differently depending on regional and local factors. General changes that are expected to occur in the future as a result of climate change include hotter, drier summers; warmer winters; warmer water; higher ocean levels; more severe wildfires; degraded air quality; more heavy downpours and flooding; and increased drought. Climate change is a far-reaching, long-term issue that could affect the park, its resources, visitors, and management. Although some effects of climate change are considered known or likely to occur, many potential impacts are unknown. Much depends on the rate at which the temperature

would continue to rise and whether global GHG emissions can be reduced or mitigated. Climate change science is a rapidly advancing field and new information is being collected and released continually.

Construction activities associated with implementation of the proposed action would contribute to increased GHG emissions but such emissions would be short term, ending with the cessation of construction. Any effects of construction–related GHG emissions on climate change would neither increase the park's carbon footprint nor be discernible at a regional scale, as it is not possible to meaningfully link the GHG emissions of such limited, individual project actions to quantitative effects on regional or global climatic patterns. Therefore, climate change was dismissed from further evaluation.

WILDERNESS

There are no areas currently designated or eligible for wilderness designation within the park. Therefore, this impact topic was dismissed from further consideration.

CHAPTER 2: ALTERNATIVES

INTRODUCTION

This chapter describes current management, or the no action alternative (alternative A), and the alternative developed to meet the purpose and need described in chapter 1 (alternative B). The no action alternative provides a baseline of existing conditions and actions and provides a basis for evaluating the changes and impacts of the action alternatives. The action alternative analyzed in this document, in accordance with NEPA, is based on preliminary design and the result of internal scoping and public scoping. This alternative, described in this section, meets the overall purpose of and need for proposed action. Alternatives that were considered but were not technically feasible, did not meet the purpose and need of the project, created unnecessary or excessive adverse impacts to cultural or natural resources, or conflicted with the overall management of the park or its resources were dismissed from further analysis and are also described in this chapter.

The NPS explored and objectively evaluated two alternatives in this EA:

- Alternative A: No Action
- Alternative B: Upgrade and Rehabilitate Radio System

The description of alternative B is based on preliminary designs and information available at the time of this writing. Approximate distances, areas, and layouts used to describe the alternative were estimated based on sound engineering practice and may change during the actual design. While the design and layout specifications are not known, the impact analysis took into account the likely impacts associated with typical installation and operation of digital radio communication equipment. If the specific design and layout chosen deviate from typical equipment, additional compliance may be required prior to project implementation to ensure that NEPA guidelines are met.

DESCRIPTIONS OF ALTERNATIVES

ELEMENTS COMMON TO ALL ALTERNATIVES

Under the action and no action alternatives, the park would upgrade the existing radio system to the APCO Project 25 digital modulation system. The proposed new radio system would include five or seven VHF repeaters linked together using microwave equipment. The VHF repeaters would operate in digital mode.

The communication system base station radio tower is currently located at the park headquarters. This base station tower would require an upgrade of radio equipment, with the installation of one microwave radio and two VHF antennae as well as a generator and propane tank to provide backup power.

All of the existing repeaters are located off of park property. The specific towers that would be used as repeater sites differs under alternatives A and B, however, four repeater sites would be used under both alternatives: Skyline, Stegall Fire Lookout Tower, Eminence, and Hartshorn, as well as the base operations tower at park headquarters (figure 2). With the exception of the Skyline tower, all towers that are common to both alternatives are owned by the Missouri Department of Conservation (MDC). The Skyline tower is owned by Partel Broadband Telecommunications, Inc.

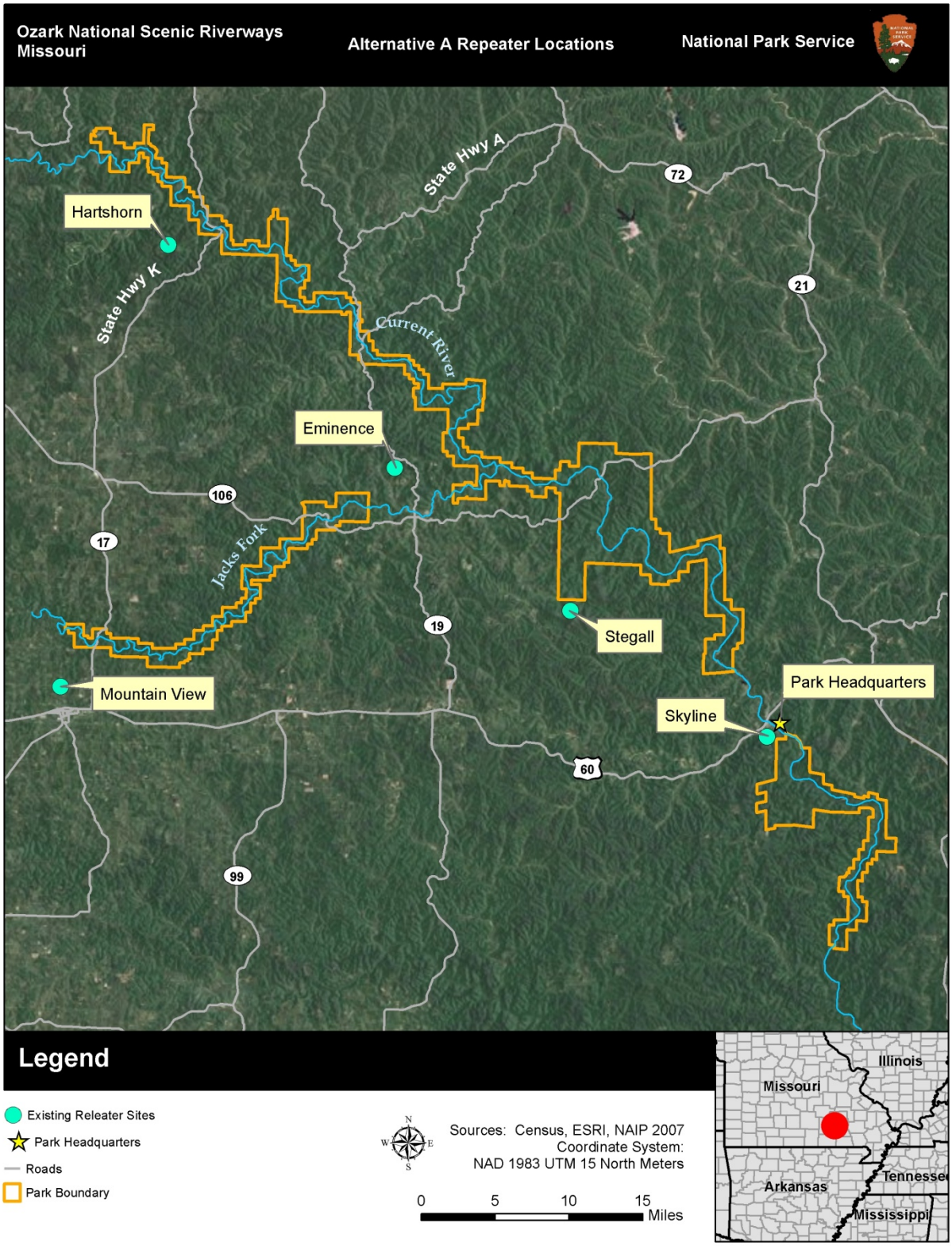

FIGURE 2: ALTERNATIVE A REPEATER LOCATIONS

At each location, the NPS would replace existing radio and repeater equipment on the existing towers with tower-mounted microwave radio dishes, integrated antennas and/or a VHF repeater antenna. VHF repeater antennas are rigid vertical structures that would be affixed to either the side or top of the towers. Microwave radio dishes would be anywhere from 2 feet to 4 feet in diameter and affixed to the side of the tower structures. Integrated antennas resemble a small cube, approximately 10 inches by 10 inches by 6 inches, with a flexible cable antenna that is mounted within the tower structure.

Additionally, a 5-foot by 5-foot concrete pad would be installed at each site to support a new climate controlled outdoor cabinet to house the associated radio equipment. Installation of the outdoor cabinet would require limited distances of trenching at each site to connect utilities to the cabinet area. Utilities and a meter are currently present at each existing repeater site and therefore an easement would not be necessary. At some locations, a small wooden building currently houses the NPS radio equipment. This structure may be retained or demolished, depending on site-specific needs. Additional site improvements may include the construction of a security fence and the removal of non-operational antennas on the towers. Table 1 provides a specific list of the existing NPS and private communication equipment, the new equipment that would be required, including the mounting heights and total antenna heights, any associated ground improvements, tower height, and property owner of each of the four repeater sites and headquarters tower that would be upgraded under both alternatives.

Currently there are no formal leases in place with Partel Broadband Telecommunications, Inc. or MDC. Prior to the installation of any new equipment, lease agreements would need to be put into place. Additional information regarding leasing is available in the “Permitting” section of this chapter.

At the base station at park headquarters and each of the four repeater locations that are common to all alternatives, the existing conditions and use of the property would not change. There would be minimal removal of mowed grass, negligible soil disturbance, no change in viewshed, and limited, short-term impacts to wildlife or wildlife habitat during any construction activities. As such, the four off-park repeater sites common to all alternatives are not carried through for full analysis within this EA. The cost of implementation, including the purchase of new radios, is analyzed under the topic “Park Operations and Management, including Visitor Protection.”

Voting

The VHF repeaters would be configured to operate in a voting scheme. Voting operates by having the receiver of each of the repeaters listen for the transmitted signal from the subscriber radio in the field. The receive signal strength of the transmitted signal would be shared between all repeaters via the microwave based network. The comparator functionality feature in each repeater compares and chooses to repeat the signal from the site that is receiving the strongest signal from the scriber radio. This process occurs approximately every 180 milliseconds, so the transmitted signal from the subscriber is constantly analyzed during the transmission and seamlessly switches between repeater receivers, which results in always repeating the best signal possible without the user needing to switch channels as they traverse the park.

TABLE 1: EXISTING AND PROPOSED TOWER DETAILS: COMMON TO ALL ALTERNATIVES

Tower Name	Property Owner	Tower Height (feet)	Existing NPS Equipment	Proposed NPS Antenna Equipment	Proposed NPS Microwave Equipment	Non-NPS equipment currently on the tower?	Existing NPS Structures	Site Improvements
Skyline	Partel	400	VHF: 40-ft vertical antenna (side mounted, total height 320-ft AGL) UHF: 15-ft yagi antenna (unknown mounting height, AGL)	VHF: 22-ft vertical (side mounted, total height 311 AGL)	Microwave 1: Dish (2-ft diameter) Microwave 2: integrated antenna (in tower mounted, total height 101 ft AGL)	Yes. This is a commercial communications site.	Wooden building – Partel would take ownership	Electrical trenching, outdoor cabinet, possibility for generator and security fencing
Stegall	MDC	80	VHF: four yagi stacked array (15 ft each, side mounted, total height 72.5 AGL) UHF: 15 ft yagi antenna (side mounted, total height 62.5 AGL)	VHF: 19-ft vertical (side mounted, total height 80 AGL)	Microwave 1: Dish (2-ft diameter) Microwave 2: Dish (3-ft diameter)	Yes. MDC repeaters. 3 VHF vertical antennas.	Wooden building – MDC would take ownership	Electrical trenching, outdoor cabinet, possibility for generator and security fencing
Eminence	MDC	200	VHF: 40-ft vertical antenna (side mounted, total height 195-ft AGL) UHF: five 15-ft yagi antennae (side mounted, total heights: 102.5 ft, 104.5 ft, 107.5 ft, 109.5 ft and 182.5 ft AGL) UHF 6: 10 ft vertical antenna (side mounted, total height 155 ft AGL)	VHF: 22 ft vertical (side mounted, total height 196 ft AGL)	Microwave 1: integrated antenna (in tower mounted, total height 126 ft AGL) Microwave 2: integrated antenna (in tower mounted, total height 146 ft AGL) Microwave 3: integrated antenna (in tower mounted, total height 166 ft AGL)	Yes. Unused antenna with unknown owner (top mounted with 205 ft AGL).	Wooden building would be demolished	Electrical trenching, outdoor cabinet, remove all unused antenna, possible guy wire replacement

Tower Name	Property Owner	Tower Height (feet)	Existing NPS Equipment	Proposed NPS Antenna Equipment	Proposed NPS Microwave Equipment	Non-NPS equipment currently on the tower?	Existing NPS Structures	Site Improvements
Hartshorn	MDC	200	VHF: 40-ft vertical antenna (side mounted, total height 160 ft AGL)	VHF: 22 –ft vertical (side mounted, total height 141 ft AGL)	Microwave 1: integrated antenna (in tower mounted, total height 116 ft AGL) Microwave 2: integrated antenna (in tower mounted, total height 166 ft AGL)	Yes. MDC has four VHF vertical antennas on tower, three active and one spare.	Wooden building would be demolished	Electrical trenching, outdoor cabinet, guy wire replacement
Park Headquarters	NPS	60	VHF 1: 22-ft vertical antenna (tower top mounted, total height 82 AGL) VHF 2: 4-ft vertical antenna (side mounted, total height 57 ft AGL)	VHF 1: 11-ft vertical (tower top mounted, total height 71 ft AGL) VHF 2: 4-ft vertical (side mounted, total height 54 ft AGL)	Microwave: integrated antenna (in tower mounted, total height 41 ft AGL)	N/A	N/A	Generator/propane tank

AGL: Above Ground Level

UHF: Ultra High Frequency

VHF: Very High Frequency

Subscriber Radios with Vote Scan

The proposed system would use subscriber radios with a feature known as "Vote Scan." Since the repeaters currently transmit on different operating frequencies, it can be difficult for the operator to know which channel to select on their subscriber radio for best radio service at a given location. Vote Scan would automate the channel selection process on the subscriber radio by analyzing the signal strength of the seven incoming signals and would select the channel receiving the signal the best. The feature would be most beneficial with mobile and portable subscriber radios since these radios are in motion (either by vehicle or being carried by park staff on foot) during much of the time they are in use.

Subscriber Radios

As a result of the implementation of the upgraded radio system to narrowband digital, all park radios would need to be replaced or upgraded to be equipped with the "Vote Scan" feature. All digital compatible radios currently in use would be reused in the new radio system.

In addition to new radio system operation channels and features, the new subscriber radios would be programmed with one zone containing the old radio system channels. This would allow the new portable radios to be distributed to park personnel and have the new mobile radios installed in the vehicles and boats prior to switching over to the new radio system. When the system cutover occurs, park personnel would only have to switch from the "old system" zone to the "new system" zone on their radios.

Visitor Protection

In addition to upgrading to digital compatible radios, the Visitor Protection branch would require both encrypted and non-encrypted radios. A portion of the new Visitor Protection radios would be equipped with Advanced Encryption Standard (AES) encryption. These radios would have the capability of using transmitting and receiving secured signals. All radios with the matching encryption key would be able to decode the encrypted transmission. This encryption would prevent other NPS staff or the general public from being able to listen to the transmissions, which can include confidential information.

Overall, the park would use 154 portable radios, 51 mobile radios, and 12 boat radios for approximately 220 total radios.

The park currently has 73 Motorola XTS5000 portable radios equipped with AES encryption which would be upgraded with the "Vote Scan" feature. All upgrades to existing radios would need to be completed by Motorola before the transfer to the narrowband digital signal.

ALTERNATIVE A: NO ACTION

Alternative A, the no action alternative, is the continuation of current management. It does not imply or direct discontinuing the present action or removing existing uses, developments, or facilities. If the no action alternative were to be selected, the NPS would respond to future needs and conditions without substantial action or policy change.

Under alternative A, the park would upgrade to narrowband digital in order to comply with FCC regulations, but no new radio towers would be constructed within the park. The new radio system would allow NPS staff to communicate using the Vote Scan feature and eliminate the need for users to switch channels as they traverse the park.

The no action alternative would use the five existing repeater locations shown in figure 2. In addition to the four repeater sites described in detail under "Elements Common to All Alternatives," the no action alternative would include the continued use of the Mountain View repeater site. Specific details regarding the existing equipment, proposed equipment upgrades, any associated site improvements, tower height and ownership are provided in table 2.

As no new radio towers would be constructed, the no action alternative would not provide operational coverage in several areas deemed necessary by the park, including the Cedargrove and Rymer Ridge locations. Radio coverage in these areas would continue to be spotty, and in certain areas, unavailable.

Rymer Ridge Site

The current radio system uses a repeater located at a site north of the town of Mountain View to cover the southwest end of Jacks Fork. This repeater fails to deliver the desired coverage along the Jacks Fork River especially in the Rymer Ridge area. Current radio coverage in the Rymer Ridge area includes approximately 35 percent of the total land area (Towery 2011). The Jacks Fork/Rymers area is remote with poor radio coverage which presents a safety issue for park rangers. Rangers within the park work alone and rely on radios to communicate with dispatch, other officers, and to call for law enforcement back-up or emergency assistance (Towery 2011).

Cedargrove Site

With the current radio system, the farthest northwest end of the park along the Current River lacks solid radio coverage. Currently, this area relies on coverage from a repeater located at the Hartshorn site which is approximately eight miles to the south. The combination of the terrain, distance from the repeater, and the age of the repeater equipment contribute to the poor radio coverage in this area. Current radio coverage in the Cedargrove area includes 45 percent of the total land area (Towery 2011). The Cedargrove area is highly visited during the summer months and includes a popular canoe and tubing access point that can accommodate hundreds of visitors within the course of a day as demonstrated in figure 3 (Towery 2011). Cell service is not available at the access point and the radio coverage under the current repeater system does not cover the access point.

In both areas, response can be hindered as there are certain locations without any radio service, and therefore rangers are not able to use the radio to communicate. Without radio service, rangers cannot call for law enforcement backup or for assistance from emergency medical service, search and rescue, or fire-fighting personnel (Towery 2011).

TABLE 2: EXISTING AND PROPOSED TOWER DETAILS: ALTERNATIVE A

Tower Name	Property Owner	Tower Height (feet)	Existing NPS Equipment	Proposed NPS Antenna Equipment	Proposed NPS Microwave Equipment	Non-NPS equipment currently on the tower?	Existing NPS Structures	Site Improvements
Mountain View	Partel	400	VHF: four 15-ft yagi stacked array (side mounted, total height 307.5 ft AGL) UHF: 15-ft yagi antenna (side mounted, total height 107.5 ft AGL)	VHF: 22-ft vertical (side mounted, total height 311 ft AGL)	Microwave: Dish (2-ft diameter)	Yes. This is a commercial communications site.	Wooden building – Partel would take ownership	Electrical trenching, outdoor cabinet, possibility for generator security fencing

AGL: Above Ground Level

UHF: Ultra High Frequency

VHF: Very High Frequency

FIGURE 3: CEDARGROVE RIVER ACCESS POINT

ALTERNATIVE B: UPGRADE AND REHABILITATE RADIO SYSTEM

New Repeater Locations

Alternative B would include the radio system upgrade and construction of two new radio tower repeater sites within the park, creating a radio system of seven repeater locations. Park personnel have identified two areas in the park with deficient radio coverage. The area along Jacks Fork from Blue Spring to Alley Spring and the area along the Current River near Cedargrove have poor radio coverage. Additionally, the NPS would no longer use the Mountain View tower and would instead use the existing Shannondale Fire Lookout Tower, which is owned by the MDC and located on MDC property. The existing NPS equipment at Mountain View (see table 2) would be removed and new narrowband digital equipment would be installed at Shannondale. Specific details regarding the existing equipment, proposed equipment, any associated site improvements, tower height, and ownership are provided in table 3. The location of all seven repeaters is shown in figure 4. The proposed project areas of the new repeater sites are shown in figures 5 and 6.

TABLE 3: EXISTING AND PROPOSED TOWER DETAILS: ALTERNATIVE B

Tower Name	Property Owner	Tower Height (feet)	Existing NPS Equipment	Proposed NPS Antenna Equipment	Proposed NPS Microwave Equipment	Non-NPS equipment currently on the tower?	Existing NPS Structures	Site Improvements
Rymer Ridge	NPS	150	N/A	VHF: 22-ft vertical (side mounted, total height 141 ft AGL)	Microwave: Dish (4-ft diameter)	N/A	N/A	N/A
Cedargrove	NPS	199	N/A	VHF: 22-ft vertical (side mounted, total height 191 ft AGL)	Microwave: integrated antenna (in tower mounted, total height 196 ft AGL)	N/A	N/A	N/A
Shannondale	MDC	100	N/A	VHF: 19-ft vertical (side mounted, total height 100 ft AGL)	None	Yes. Local Sheriff department repeater. One antenna (height unknown).	N/A	Electrical trenching, outdoor cabinet

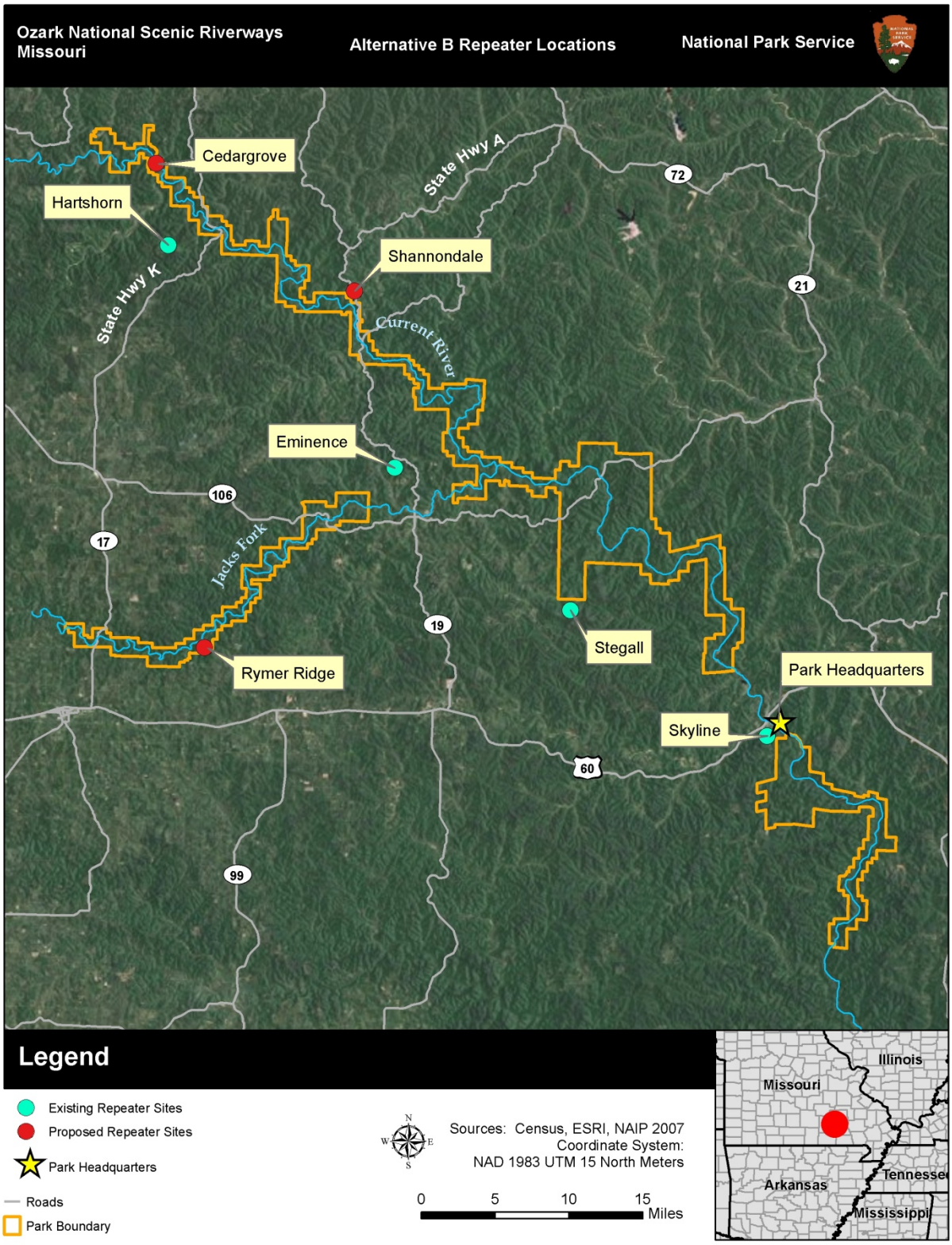

FIGURE 4: ALTERNATIVE B REPEATER LOCATIONS

FIGURE 5: RYMER RIDGE PROJECT AREA

FIGURE 6: CEDARGROVE PROJECT AREA

Rymer Ridge Site

The proposed new radio system would replace the Mountain View repeater site with a newly developed communications site near Rymers. The new site would be named the Rymer Ridge Repeater Site. Radio propagation software indicates a repeater located at the new Rymer Ridge site would greatly improve radio coverage along this portion of the Jacks Fork River. Incorporating a new repeater into this area would be expected to increase the existing coverage from 35 percent to 85 or 90 percent (Towery 2011).

This proposed location for the tower is currently undeveloped. The proposed site is on NPS property, southeast of Jacks Fork River near the Rymers facilities. This site is located on a ridge, near commercial power, and is accessible from "M" Highway via an old logging trace.

Given that the old logging trace is curved, a view of the proposed site would be obscured from the main road. An area approximately 75 feet by 75 feet would be cleared of trees, brush, and vegetation for the communications site compound. Based on the initial site visit, approximately 75 hickory, pine, oak, and ash trees would need to be removed. Approximately 12 of the 75 trees are mature trees. The new tower and equipment enclosure would be within the perimeter of the compound. The proposed 150-foot tower would be a self-supporting type that does not have guy wires. The distance between each of the three legs of the tower at the base would be approximately 15 feet. The new radio system would require the installation of a tower mounted microwave radio, 4-foot dish antenna, and a VHF repeater antenna on the new tower. The 4-foot dish antenna would be mounted at 145 feet AGL and the VHF vertical antenna would be side mounted on the tower at a center line level of 130 feet AGL. The proposed action includes a climate controlled outdoor equipment cabinet to house the new radio equipment. This outdoor cabinet would be installed on a 5 feet by 5 feet concrete pad near the base of the tower.

Commercial power and an electric meter would be installed from the existing overhead power line near the site to the load center panel mounted on the side of the outdoor cabinet. Powerlines are adjacent to the north of the site along the Howell-Oregon right-of-way. Approximately 200 feet of trenching would be required along the access road. The commercial power line would be below grade within the site compound. The new tower, outdoor cabinet, and site would be grounded. A 6-foot chain link security fence would be installed around the site perimeter. The fence would have a vehicle-width gate at the site entrance. The surface within the site compound and extending a few feet beyond the security fence would have aggregate rock installed over a weed barrier mat. The access road would be dirt, approximately 20 feet wide, and cleared of trees to accommodate construction equipment and maintenance vehicles.

Cedargrove Site

Radio propagation software predicts the radio coverage for this area from a well maintained repeater located at Hartshorn to have a mix of good and poor spots. To improve coverage in the Cedargrove area, a new repeater site is proposed for the new radio system at a site north of Cedargrove. The new site would be named the Cedargrove Repeater Site. Placing a repeater at this proposed site would greatly improve the currently less than acceptable radio coverage in the Cedargrove area along the Current River. Incorporating a new repeater at Cedargrove would be expected to increase the existing coverage from 45 percent to 85 or 90 percent (Towery 2011).

This proposed repeater site is on NPS property, approximately a half mile northwest of Cedargrove off of County Road 651. The proposed site was once a ranger station. The ranger station building (cabin) is no longer present, but a clearing remains. An access road leading to the clearing is accessible by vehicle. During preliminary scoping of the proposed communications site, it was discovered overhead commercial electrical power is present at the site with an electric meter on a power pole near the edge of the clearing.

Similar to the Rymer Ridge site, an area approximately 75 feet by 75 feet would need to be cleared of trees, brush, and vegetation for the communications site compound. A portion of the proposed compound area is currently free of trees, however approximately 7 to 10 large diameter oaks and hickory trees would need to be removed. The new tower and equipment enclosure would be within the perimeter of the site compound.

The proposed 199-foot tower would be a self-supporting type that does not have guy wires. The distance between each of the three legs of the tower at the base would be approximately 18 feet. The new radio system would require the installation of one microwave radio with an integrated antenna and a VHF repeater antenna on the new tower. The microwave radio/antenna would be mounted at 195 feet AGL and the VHF vertical antenna would be side mounted on the tower at a center line level of 180 feet AGL. A climate controlled outdoor equipment cabinet would be included to house the new radio equipment. This outdoor cabinet would be installed on a 5 feet by 5 feet concrete pad near the base of the tower. Commercial power from the existing overhead power pole/meter would be run to the load center panel mounted on the side of the outdoor cabinet. This would require approximately 20 feet of trenching within the project area. A meter is present at the site. The commercial power line would be below grade within the site compound. The new tower, outdoor cabinet, and site would be grounded. A 6-foot chain link security fence would be installed around the site compound perimeter. The fence would have a vehicle-width gate at the compound entrance. The surface within the site compound and extending a few feet beyond the security fence would have aggregate rock installed over a weed barrier mat. The existing access road is sufficient to accommodate pickup trucks, but would need to be widened to accommodate construction equipment. Trees would be cleared on either side to accommodate access. The dirt surface would be graded to provide an even road, as erosion has created ruts.

Prior to construction at either site, a professional topographic survey would be conducted and a computer-aided design drawing would be created. Additionally, soil core samples would be taken as part of a geotechnical study and report. A geotechnical report would be required before design of the tower and foundation to ensure substrates are suitable for tower construction.

MITIGATION MEASURES OF THE ACTION ALTERNATIVE

The NPS places a strong emphasis on avoiding, minimizing, and mitigating potentially adverse environmental impacts. To help ensure the protection of natural and cultural resources and the quality of the visitor experience, the following protective measures would be implemented as part of the selected action alternative. The NPS would implement an appropriate level of monitoring throughout the construction process to help ensure that protective measures are being properly implemented and are achieving their intended results.

VISUAL RESOURCES

- Retain as much tree cover as feasible.
- Use visually unintrusive materials, including unpaved access roads.

SOILS

- Use silt fencing and other erosion control methods during construction.
- Minimize the use of pervious paving materials, including gravel surrounding the radio tower complex and unpaved access roads.

VEGETATION

- Minimize cutting trees whenever possible.
- Clearly note vegetation clearing limits on construction documents and mark them in the field to minimize disturbance and alteration of vegetation and wildlife habitat.

WILDLIFE AND WILDLIFE HABITAT, INCLUDING SPECIAL STATUS SPECIES

- Conduct tree removal outside of roosting season, specifically between November 1 and April 1.
- Incorporate best available research related to the construction, operation, and maintenance of radio towers and the effect on wildlife and wildlife habitat, specifically migratory birds.
- Incorporate USFWS guidelines for communication towers, including limiting total heights to less than 200 feet, use of self supporting towers, and avoiding lighting whenever feasible.
- Specify wildlife and wildlife habitat resource conditions to be protected and maintained at Cedargrove and Rymer Ridge sites as related to the installation, operation, and maintenance of radio towers.

ALTERNATIVES CONSIDERED BUT DISMISSED

Several alternatives or alternative elements were identified during the design process and internal and public scoping. Some of these were determined to be unreasonable, or much less desirable than similar options included in the analysis, and were therefore not carried forward for analysis in this EA.

CEDARGROVE AREA

An additional site location was explored within the Cedargrove area. An area at a higher elevation farther north along County Road 651 would have provided similar coverage, however the area was not previously disturbed. The proposed Cedargrove location would require less tree removal and disturbance since it is a previously developed site.

RYMER RIDGE AREA

An additional site location was examined within the Rymer Ridge area. The original site proposed for the radio tower was to the north of the current site, along a sloped ridge. The topography of the area would have required more ground disturbance to prepare the site for development and would have required a large quantity of fill. The selected location is flatter and would require only a slight amount of grading to be buildable. Additionally, the selected location is accessible by an existing logging road that would require less tree removal for access. Due to the topographic and accessibility constraints, the second Rymer Ridge site was dismissed as a viable alternative.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

The NPS is required to identify the environmentally preferred alternative in its NEPA documents for public review and comment (Director's Order 12 Handbook, Sec. 4.5 E(9) (NPS 2001)). The environmentally preferred alternative is defined by the CEQ in their NEPA's Forty Most Asked Questions: "The environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101. Ordinarily, this means the alternative that

causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources" (Q6a).

After completing the environmental analysis, the NPS identified alternative B as the environmentally preferred alternative in this EA because it best meets the definition established by the CEQ. Alternative B best protects and enhances the scenic resources of park while minimizing disruption to the natural environment to meet project purpose and need. Alternative B also would improve visitor protection capabilities and includes only negligible to minor adverse impacts to the natural environment by minimizing areas of disturbance and applying appropriate mitigation where needed. Likewise, alternative B would provide park staff with better resources for visitor protection without detriment to the aesthetics of the park. Although alternative B results in some impacts to the biological and physical environment, those impacts are very localized and minor at most, mitigation is available and feasible, and the changes to the natural environment are more than balanced out by the ability to provide the benefits of park communication and visitor protection.

Table 4 is a summary of environmental consequences. The full analysis of alternatives is included in "Chapter 4: Environmental Consequences."

TABLE 4: SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Impacted Resource	Alternative A: No Action	Alternative B: Upgrade and Rehabilitate Radio System
Visual Resources (Aesthetics and Viewsheds)	• No impacts • No cumulative impacts	• Long-term negligible to minor adverse impacts • Long-term minor adverse cumulative impacts
Soils	• No impacts • No cumulative impacts	• Short-term minor adverse, long-term negligible to minor adverse impacts • Long-term minor adverse cumulative impacts
Vegetation	• No impacts • No cumulative impacts	• Short-term negligible to minor adverse, long-term negligible to minor adverse impacts • Short- and long-term negligible to minor cumulative impacts
Wildlife and Wildlife Habitat, including Special Status Species	• Long-term negligible to minor adverse impacts • Not likely to adversely affect the gray bat, Indiana bat, or cerulean warbler • Long-term, negligible to minor adverse cumulative impacts	• Short-term negligible to minor adverse, long-term negligible to minor adverse impacts • Not likely to adversely affect the gray bat, Indiana bat, or cerulean warbler • Short- and long-term negligible to minor adverse cumulative impacts
Park Operations and Management, including Visitor Protection	• Long-term moderate adverse impacts • Long-term minor adverse cumulative impacts	• Short-term minor adverse and long-term beneficial impacts • Long-term beneficial cumulative impacts

CHAPTER 3: AFFECTED ENVIRONMENT

This chapter describes existing environmental conditions in the areas potentially affected by the alternatives evaluated. This section will describe the following resource areas: visual resources; soils; vegetation; wildlife and wildlife habitat, including special status species; and park operations and management, including visitor protection. Potential impacts are discussed in "Chapter 4: Environmental Consequences" in the same order.

VISUAL RESOURCES (AESTHETICS AND VIEWSHEDS)

The park was founded on the principle of "conserving and interpreting unique scenic and other natural values…" (NPS 1964). The park is known for its scenic qualities and aesthetic attributes along the 134 miles of the Current and Jacks Fork rivers, as well as some 80,000 acres of river, forest, open field and glade environments. The Jacks Fork and Current rivers are tucked away in the rolling hills of the Missouri Ozarks. Visitors to the park typically enjoy leisurely canoeing and tubing trips down the river. While canoeing or tubing along the Jacks Fork or Current River, the main line of site includes the river waters and surrounding riverbank vegetation. Wide viewsheds of the surrounding landscape are not typical along the rivers.

Generally, the viewscape of a given area consists of the landforms, vegetation, water features, and cultural modifications (physical changes caused by human activities) that impart an overall visual impression of the area landscape. The landscape surrounding the proposed repeater locations consists of rolling hills with some steep changes in topography at the river basins. The nature of this project would place the radio towers on high points in the topography, while the main areas of recreation (places of high visual activity) are in the low-lying areas along the Current and Jacks Fork rivers. The Rymer Ridge site is currently an undisturbed site with mature forest cover while Cedargrove is the location of an old ranger station, in an area that has been previously disturbed.

RYMER RIDGE SITE

The Rymer Ridge site is located in the southwest extension of the park along the Jacks Fork River in a remote area of the park with low visitor use. The site is presently an undisturbed forest off County Road M-471 (figure 7). The tree height at the site is assumed to be that of a mature forest, with the average canopy height of approximately 65 feet. The closest public access point for the park is to Jacks Fork River and is approximately 0.8 miles northeast of the site. Rymer Ridge does not offer formal recreation opportunities such as trails, lookout points, or points of interest. It is located off an access road that leads to the Jacks Fork River and is not likely to attract many visitors specifically seeking scenic vistas. The Rymer Ridge site is situated at an elevation of 1,092 feet, while the public access point is located in a ravine along the river with an elevation of 782 feet. The elevation changes 310 feet in 0.8 miles (4,224 horizontal feet) with an average elevation change of approximately one vertical foot for every 13.5 horizontal feet between the sites. This elevation change and heavy vegetative cover makes the proposed tower location virtually invisible from the river under current conditions.

FIGURE 7: APPROXIMATE CENTER POINT OF RYMER RIDGE SITE

CEDARGROVE SITE

The Cedargrove site is located at the northern reach of the Current River. The proposed radio tower would be located in a previously disturbed clearing. The clearing was the location of a ranger station that has since been removed. The site is surrounded by mature forest on three sides. The south side of the site is open to the adjacent field and site access road (shown in figure 8). Two public recreational areas are in the vicinity of the proposed tower location; a public boat ramp (0.37 miles away) and a primitive campground (0.5 miles from the closest edge of the campground). Other than these two recreation areas, there are no additional recreation opportunities such as trails, lookout points, or points of interest near the site. The proposed tower site would be located off of County Road 651, which provides access to the public boat ramp. The elevation at the tower site is approximately 936 feet, while the public recreation sites are at a slightly lower elevation along the riverbanks. The boat launch is at an elevation of approximately 829 feet and the edge of the campground is at an elevation of approximately 860 feet. The elevation change between the tower and the boat ramp is 107 feet in 0.37 miles (1,953 horizontal feet) or a difference of one foot of elevation change for every 18 feet in between the sites. The elevation change between the tower and the campground is 76 feet in 0.5 miles (2,640 feet) or a difference of one foot of elevation change for every 35 horizontal feet between the sites.

FIGURE 8: NORTH SIDE OF CEDARGROVE SITE, FACING SOUTH

SOILS

Soils are classified by a complex taxonomy that includes soil associations, series, and phases. Soil associations represent the largest and most general classification. A soil association is a landscape that has a distinctive proportional pattern of soils and is named for the major soil types that it represents. It normally consists of one or more major soil series and at least one minor soil series. A soil series is a collection of soils that have major layers similar in thickness, arrangement, and other important characteristics, but may differ in surface layer texture. Each soil series is named for a town or other geographic feature near the location where the series was first observed and mapped. Soil phases are more detailed classifications that differentiate soils of the same series based on characteristics that affect the use of the soils, such as the texture of the surface soil, slope, or stoniness (USDA 1999).

The information presented below, which describes soils within both study areas, is taken from the Soil Survey of Dent and Shannon County, Missouri, part of the National Cooperative Soil Survey conducted by the Natural Resources Conservation Service. Soils occurring within the project area are illustrated in figures 9 and 10 and general soil characteristics are available in table 5.

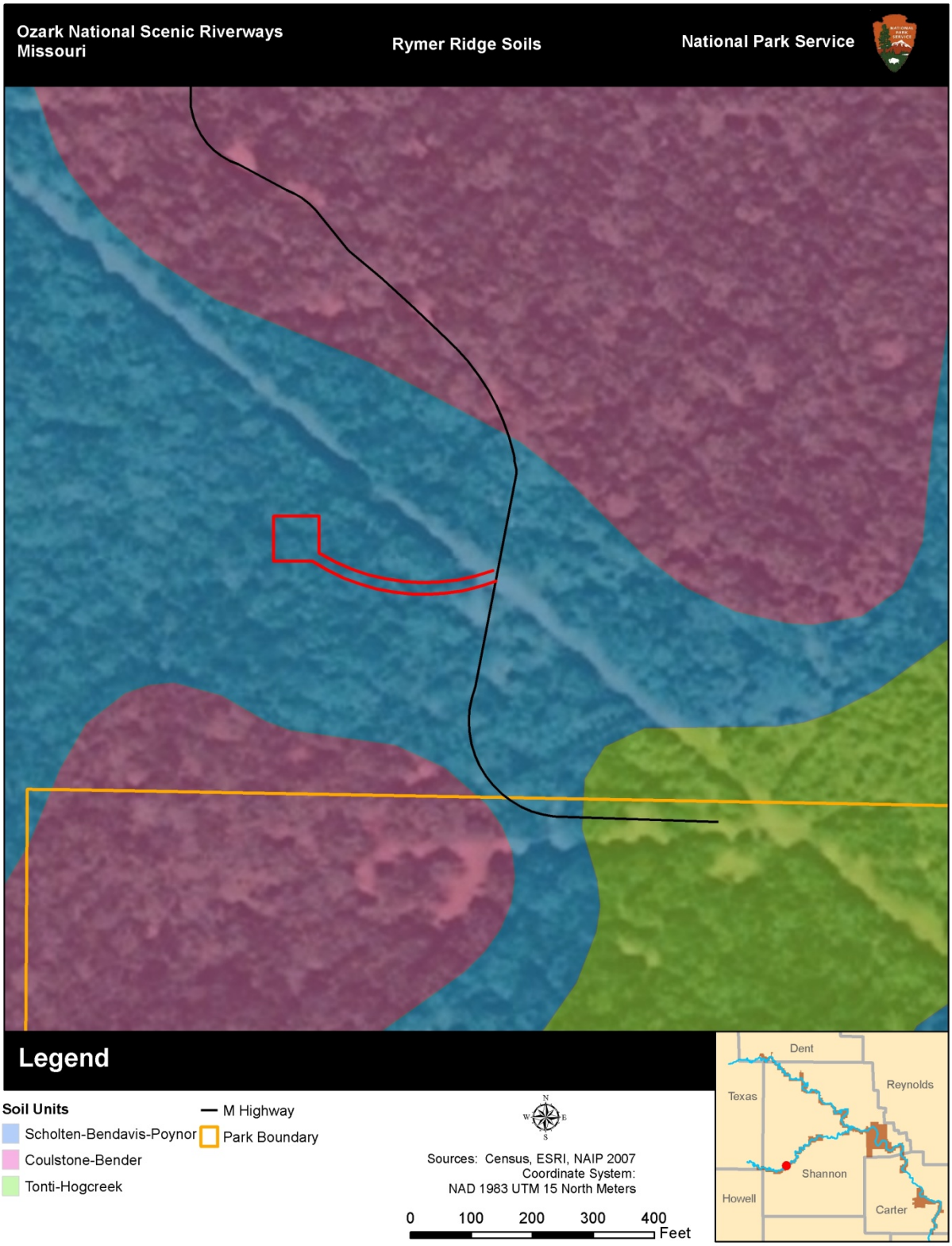

FIGURE 9: SOILS OCCURRING IN THE RYMER RIDGE PROJECT AREA

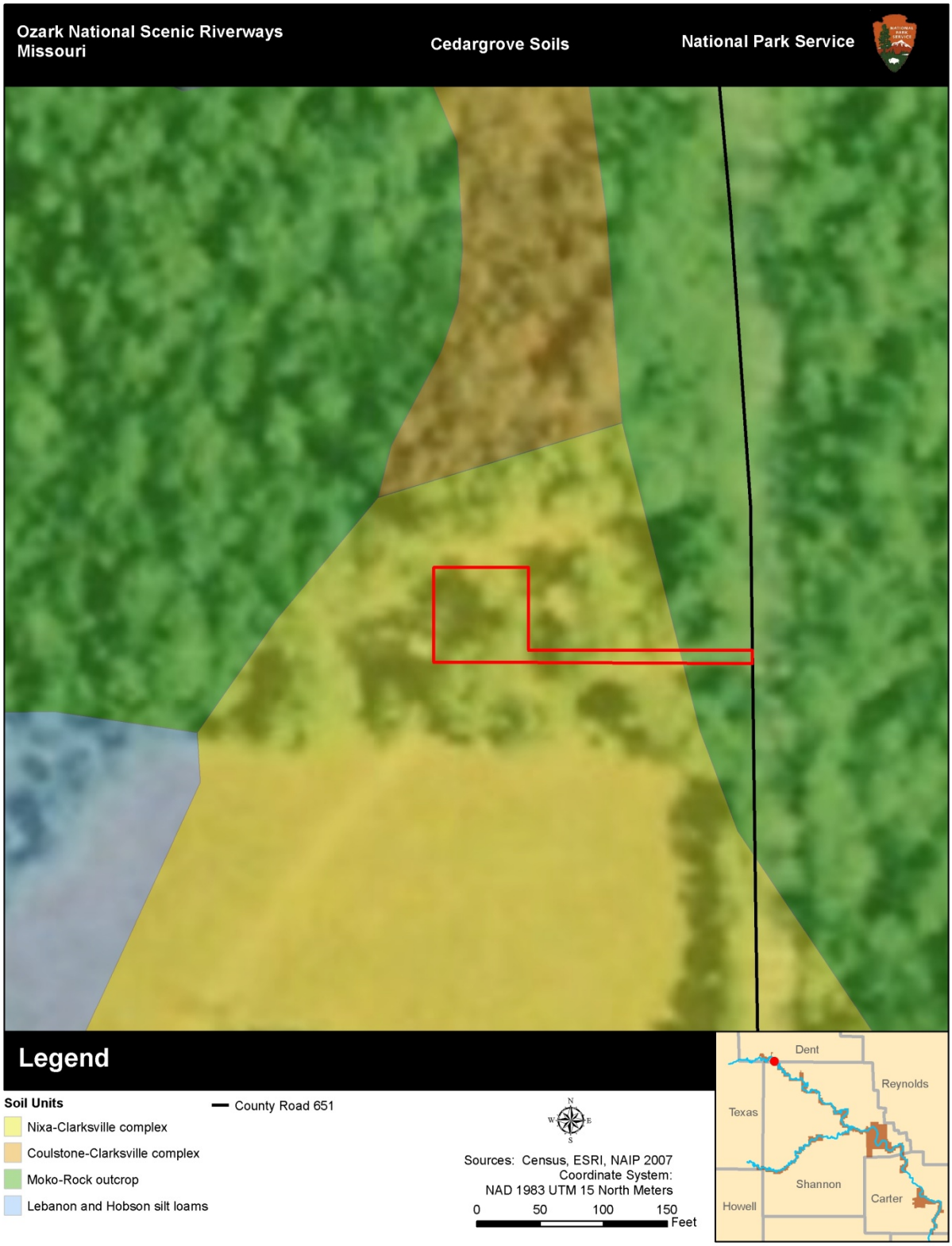

FIGURE 10: SOILS OCCURRING IN THE CEDARGROVE PROJECT AREA

TABLE 5: MAPPED SOILS IN THE PROJECT AREA

Soil Type	Slope (%)	Drainage	Permeability	Erosion Hazard (K Factor)	Depth	Hydric Soil (Y/N)
Coulstone-Bender	15–50	Somewhat excessively drained	Moderately to rapid	N/A	Moderately deep to very deep	N
Scholten-Bendavis-Poyner	8–15	Moderately well drained to well drained	Slow to moderately rapid	.15	Moderately deep to very deep	N
Tonti-Hogcreek	3–8	Moderately well drained	Very slow to moderate	.37	Moderately deep to very deep	N
Nixa-Clarksville	3–8	Moderately well drained to somewhat excessively drained	Very slow to moderate	.20	Very deep	N
Moko-Rock outcrop	15–50	Well drained to somewhat excessively drained	Moderate	.15	Shallow to very shallow	N

RYMER RIDGE SITE

The southern project area is located south of the Rymers Campground along the park boundary near County Road M, in Shannon County, Missouri. This area overlies the Coulstone-Bender, Tonti-Hogcreek and Scholten-Bendavis-Poynor general soil complex units.

The Coulstone-Bender soil complex is typically found on the back slopes and side slopes of hills with slopes ranging from 15 to 50 percent. Coulstone-Bender soils are very stony and somewhat excessively drained with Coulstone being formed from colluvium and residuum from interbedded sandstone and cherty dolostone. Bender soils were formed from residuum from sandstone. Coulstone Bender is moderately deep to very deep with moderately rapid permeability and no flooding characteristics with runoff potential being medium to very high. This is not a hydric soil (USDA 2005).

Scholten-Bendavis-Poyner soil complex has a slope of 8 to15 percent and is found on shoulders and back slopes of hills. Scholten was formed by gravelly colluvium over clayey residuum from dolomite with Bendavis being formed from gravelly colluvium and Poynor from gravelly colluvium over clayey residuum from dolostone. This soil is moderately well drained to well drained and has a soil depth that is moderately deep to very deep. This particular soil complex involves a fragipan, which is an altered subsurface soil layer that works to restrict water flow and root penetration and affects water runoff and permeability. Permeability is very slow in the fragipan, moderate above and moderately rapid below. The soil is not considered hydric, has no flooding characteristics and the potential for water runoff is high (USDA 2005).

The Tonti-Hogcreek soil complex is found on the summit of hills and typically consists of slopes of 3 to 8 percent. This soil unit is moderately deep to very deep, moderately well drained that formed from loess over pedisediment over residuum weathered from dolomite. This soil also has a fragipan and permeability of this soil type ranges from very slow the fragipan and from moderate to slow above. Tonti-Hogcreek has no flooding characteristics, runoff potential is medium to very high and this soil is not considered hydric (USDA 2005).

CEDARGROVE SITE

The northern project area is located northwest of the Cedargrove Campground along County Road 651 in Dent County, Missouri. This area overlies the Nixa-Clarksville and Moko-Rock outcrop general soil complex units.

The Nixa-Clarksville soil unit is found on the summit of interfluves and has a slope ranging from 3 to 8 percent. The soil is very deep, moderately well drained to somewhat excessively drained with very slow to moderate permeability. Nixa was formed in colluvium and loamy residuum weathered from cherty limestone and Clarksville was formed from hill slope sediments and the underlying clayey residuum from cherty dolomite or cherty limestone. There are no flooding characteristics with runoff potential being medium to very high. This is not a hydric soil (USDA 2010).

The Moko-Rock outcrop is an extremely stony soil unit found on the back slope and side slope of hills, with a 15 to 30 percent slope. The soil is shallow to very shallow, well drained to somewhat excessively drained and moderate permeability. Moko was formed in loamy colluvium or residuum from limestone or dolostone. The soil has potential for very high runoff with no frequency of flooding. This is not a hydric soil (USDA 2010).

A ranger station was formerly located at this site, which caused disturbance and compaction of the soils. Disturbance usually changes soils properties, mixes the soil horizons, and has the potential to increase runoff and erosive properties of the soil. Previously disturbed sites may require future soil management and further construction can magnify the impacts from the previous disturbance.

To help estimate a soils potential for erosion a K factor is used. The K factor is a soil erodibility factor which represents both susceptibility of soil to erosion and the rate of runoff, as measured under the standard unit plot condition. Values of the K factor range from 0.02 to 0.69, with the higher value having more susceptibility to erosion. Soils high in clay have low K values, about 0.05 to 0.15, because they resistant to detachment. Coarse textured soils, such as sandy soils, have low K values, about 0.05 to 0.2, because of low runoff even though these soils are easily detached. Medium textured soils, such as the silt loam soils, have a moderate K values, about 0.25 to 0.4, because they are moderately susceptible to detachment and they produce moderate runoff. Soils having high silt content are most erodible of all soils. They are easily detached and tend to crust and produce high rates of runoff. Values of K for these soils tend to be greater than 0.4. For soil types within the project areas, the K factor is listed in table 5(IWR 2010).

VEGETATION

At the junction of the eastern hardwood forest, southern pine forest and Great Plains biomes, the Ozarks has a diverse plant population (NPS 2006b). The park lies within the oak-hickory forest region. Hills are steepsided and ridges are narrow with draws and ravines produced by tributaries to the Jacks Fork and Current rivers. The park encompasses the most diversified vegetation of any part of the state, including the greatest number of species (NPS 1991a). Vegetative communities within the park include several types of deciduous forest associations, bluff and rock ledge, gravel bar, and aquatic communities. Several unique glade communities containing species from earlier geological periods are also present. Riparian wetlands exist along the entire length of the rivers, except where steep bluffs reach the water’s edge, and along most small tributary streams of the major rivers (NPS 1980). These communities and vegetation associations are composed predominately of forest communities, except for some open vegetation areas and cultivated sites (NPS 1991a).

Today's Ozark forest is dominated by white oak (*Quercus*) and shortleaf pine (*Pinus echinata*), which is Missouri's only native pine species (NPS 2010b). Other common species found in the forest (or upland) community include maple (*Acer* spp.), hickory (*Carya* spp.), and ash (*Fraxinus* spp.). Sugar maple/white oak association likely dominates on west and south facing slopes due to intense solar radiation. On the wetter east and north facing slopes in the park, successional stages continue to develop into the climax forest of sugar maple (*Acer saccharum*), white oak (*Quercus alba*), northern red oak (*Quercus rubra*), and red ash (*Fraxinus pennsylvanica*). Understory species include paw-paw (*Asimina triloba*), bladdernut (*Staphylea trifolia*), flowering dogwood (*Cornus florida*), and wild geranium (*Geranium maculatum*). The most common upland association along the river system is the oak/hickory association found on dryer, more acid upper slopes and ridges. This association is comprised of black oak (*Quercus velutina*) and pignut hickory (*Carya glabra*) with predominant species of shagbark hickory (*Carya ovata*), mockernut hickory (*Carya alba*), and white and northern red oak. Understory species includes highbush (*Vaccinium corymbosum*) and lowbush huckleberry (*V. angustifolium*), smooth sumac (*Rhus glabra*), sassafras (*Sassafras albidum*), cinquefoil (*Potentilla simplex*), and dwarf iris (*Iris pumila*). On narrower ridges where acid soils are derived from sandstone, chert, and felsite rocks, the oak/pine association develops. This is a mixed oak and pine forest with a considerable variation of hardwoods. The understory is dominated by low-bush huckleberry and farkleberry (*Vaccinium arboreum*). White oak/red maple associations are found in upper slopes of hills and ravines and at the head of stream tributaries. Successional stages show a predominance of red maple and white oak with a codominance of species such as winged elm (*Ulmus alata*) and mockernut hickory. The rock ledge association is found scattered throughout the park. Common species found in this association are red cedar (*Juniperus virginiana*), blue ash (*Fraxinus quadrangulata*), chinquapin oak (*Quercus muehlenbergii*), poison ivy (*Toxicodendron radicans*), and golden current (*Ribes aureum*) (NPS 1991a).

Glade communities are found on felsite exposures and ridges. Characteristic species of glade communities include hairy lip fern (*Cheilanthes lanosa*), spikemoss (*Selaginella* spp.), early saxifrage (*Saxifraga virginiensis*), pineweed (or orange grass; *Hypericum gentianoides*), and woodrush (*Luzula* spp.) (NPS 1991a).

In the general vicinity of the Cedargrove site, the area surrounding the location on three sides is forested and dominated by small cedar, oak, and hickory. To the south there is a cultivated field. Given that the proposed Cedargrove location has been previously disturbed, the site is primarily cleared with young, smaller trees and virtually no understory vegetation. The proposed Rymer Ridge location is primarily forested consisting of cedars, oaks, pines, hickories, and ash.

FEDERALLY LISTED VEGETATION

The federally listed Virginia sneezeweed (*Helenium virginicum*) is known to occur in several locations in Shannon County and within two miles of the Rymer Ridge project area. In consultation with the USFWS, NPS biologists determined that there is no suitable habitat for Virginia sneezewood within either project area. As a result, the USWFS concurred that the project would have no effect on the plant species and it was not analyzed in chapter 4 of this EA.

WILDLIFE AND WILDLIFE HABITAT, INCLUDING SPECIAL STATUS SPECIES

The park provides riparian, upland forest, aquatic, open field, woodland, and subterranean habitats for a variety of species, including mammals, reptiles, amphibians, and birds (NPS 2006c, 2006d). The fauna is typical of the eastern Ozark region with species common to both the western prairie and eastern deciduous forests (NPS 1991a). This section focuses on native terrestrial wildlife species in the park that

could be affected by rehabilitating and upgrading the park radio system to digital-narrowband capable technologies at the Cedargrove and Rymer Ridge project locations.

MAMMALS

The general surroundings of the Rymer Ridge and Cedargrove sites provide habitat for several mammals that depend on the woodland, forest, and mixed grassland habitats that exist along the Current River (in the Cedargrove area) and Jacks Fork River (in the Rymer Ridge area). To date, 48 species of mammals have been documented as occurring in the park, including carnivores, ungulates, small mammals, and bats. Carnivorous mammals, such as coyote (*Canis latrans*), red (*Vulpes vulpes*) and gray fox (*Urocyon cinereoargenteus*), and bobcat (*Lynx rufus*) are present in the park with varying abundance for each species (NPS 2006e). Black bears (*Ursus americanus*) are considered rare in the park, but sightings increase each year (NPS 2006e). Reintroduction efforts in Arkansas in the 1960s have led to their reappearance in Missouri (Skalicky 2010).

There are consistent reports of mountain lions, or cougars (*Puma concolor*), in the area. The sightings are believed to be legitimate but it is not known if the animals are escaped pets or if they are a wild population, perhaps spreading from Texas (NPS 2006e). Although there is no evidence to indicate a breeding population, individual mountain lions have been found recently in Nebraska, Iowa, Oklahoma, Kansas, Arkansas, Illinois, and Missouri (MDC n.d.a) They prefer areas with dense undergrowth and cover, and maintain territories an average of 100 square miles in size (Mountain Lion Foundation n.d.).

Deer are abundant in the park and are the most popular game animal (NPS 2006e). The white-tailed deer (*Odocoileus virginianus*) is the only remaining native ungulate still thriving in Missouri. Deer in the Ozark region of Missouri live in primarily wooded areas and rely on natural forage, such as grape vines, green briar, Virginia creeper, oak leaves, pussy toes, clovers, and prickly lettuce (MDC n.d.b). In addition, oaks provide food and cover for white-tailed deer; young oaks with branches close to the ground provide brushy cover, and dried oak leaves are important in the winter diet (MDC n.d.c). During spring and summer, deer eat perennial plants more than annuals. In Missouri, the major natural predators include coyotes and bobcats. To reduce exposure to predators, fawns spend most of their time bedded and hidden in heavy cover, such as hay fields, grown pastures, and old fields (MDC n.d.b). Elk (*Cervus elaphus*) were once found throughout Missouri, but overharvest and habitat destruction in the 1800s eliminated this native species from the wild. Prompted by public interest, the MDC conducted the *Missouri Elk Reintroduction Feasibility Study* in 1999–2000. That effort was suspended at the time; however, prompted by renewed interest from the public and conservation groups, the Conservation Commission recently directed the MDC to reinitiate the development of an elk restoration plan. The plan was approved by the Conservation Commission in October 2010 (MDC 2010a). Portions of the park lie within the elk restoration zone established by the MDC, however the Rymers Ride and Cedargrove radio tower sites are outside of this zone.

Common small mammals known to occur in the park include raccoon (*Procyon lotor*), gray (*Sciurus carolinensis*) and fox squirrel (*S. niger*), eastern chipmunk (*Tamias striatus*), cottontail rabbit (*Sylvilagus* spp.), opossum (*Didelphia virginiana*), muskrat (*Ondatra zibethicus*), and several varieties of rats and mice (NPS 1991a). These small mammals occur in a variety of habitats within the park, including forest edges, open prairies, grasslands and meadows, deciduous forest, and shrub habitat (NPS 1991a). In the Ozark Highland, eastern spotted skunk (*Spilogale putorius*) is found in woodland habitats with extensive leaf litter and downed logs (MDC n.d.e). Other small mammals in the park include mink (*Mustela vison*), beaver (*Castor canadensis*), and river otter (*Lontra canadensis*) (NPS 1991a). These species occur in a variety of aquatic habitats within the park.

The park's many caves provide hibernation places for several bat species (NPS 2006e). There are 45 caves within one mile of the Rymer Ridge tower site. The closest cave to the tower site is approximately one fourth mile with no records of bat species. Of the 45 caves, two caves have documented bat species, including tri-colored bat (*Perimyotis subflavus*), little brown bat (*Myotis lucifugus*), and gray bat (*Myotis grisescens*). There are three caves within one mile of the Cedargrove tower site. Only one of these caves (within a half mile of the proposed site) has documented bat species, including tri-colored and gray bats. However, this cave is currently closed and under private ownership within an NPS Scenic Easement (Houf 2011a). Bats locate insects by a highly developed sense of echolocation. In this process, bats emit high frequency sounds, which bounce off the potential prey and return to the bat's ears. They use the information gained from the speed and direction of the returning sound signals to pinpoint prey (Ohio DNR n.d.). Because bats use echolocation to navigate and locate prey species, electromagnetic radiation associated with telecommunication towers can result in considerable threats to bats species (Nicholls and Racey 2007, 2009). In addition, the presence of manmade structures, including telecommunication towers, can result in direct mortality from collisions while in flight (Smith 2010).

BIRDS

The wide diversity of habitat types in the park and its location along the Mississippi Flyway results in a large variety of birds found within the park. Nearly 200 species of birds have been identified as nesting or migrating through the area. Over fifty species are known to nest in the park, with at least another dozen likely (NPS 2011).

The park's bird population varies by season and includes native and non-native species. Species found as year-round residents/breeding species include songbirds such as the mourning dove (*Zenaida macroura*), blue jay (*Cyanocitta cristata*), Carolina chickadee (*Poecile carolinensis*), and northern mockingbird (*Mimus polyglottos*), woodpeckers such as the red-bellied (*Melanerpes carolinus*) and pileated woodpecker (*Dryocopus pileatus*), raptors (*Cathartes aura*, *Buteo jamaicensis*), and owls (*Otus asio*, *Strix varia*) (NPS 1991b).

Many of the breeding birds in the park nest in the shrub layer; these include the northern cardinal (*Cardinalis cardinalis*), gray catbird (*Dumetella carolinensis*), northern mockingbird, wood thrush (*Hylocichla mustelina*), Carolina wren (*Thryothorus ludovicianus*), white-eyed vireo (*Vireo griseus*), and mourning dove. The brown thrasher (*Toxostoma rufum*) and rufous-sided towhee (*Pipilo erythrophthalmus*) nest on both the ground and in the shrub layer. These species depend on understory shrubs and ground vegetation for constructing nests and for concealment when feeding (Cornell Lab of Ornithology n.d.).

Birds that nest in the upper parts of the understory or canopy of woodlands include species such as the barred owl (*Strix varia*), common grackle (*Quiscalus quiscula*), blue jay, red-tailed hawk (*Buteo jamaicensis*), and blue gray-gnatcatcher (*Polioptila caerulea*). Woodlands also support cavity-nesting birds including the purple martin (*Progne subis*), red-bellied and pileated woodpecker, and house wren (*Troglodytes aedon*). Other nesting birds in the park nest almost exclusively on man-made structures, including the barn swallow (*Hirundo rustica*) and eastern phoebe (*Sayornis phoebe*) (Cornell Lab of Ornithology n.d.).

Non-breeding winter residents include cedar waxwing (*Bombycilla cedrorum*), brown creeper (*Certhia americana*), purple finch (*Carpodacus purpureus*), golden-crowned kinglet (*Regulus satrapa*), yellow-bellied sapsucker (*Sphyrapicus varius*), winter wren (*Troglodytes troglodytes*), and several species of warbler and sparrow (NPS 1991b). These species occur in a variety of forest and woodland habitats, including mixed coniferous-deciduous forests and woods (Cornell Lab of Ornithology n.d.). Other common species not known to nest in the park include whip-poor-will (*Caprimulgus vociferus*), belted

kingfisher (*Caprimulgus vociferus*), ruby-throated hummingbird (*Archilochus colubris*), common nighthawk (*Chordeiles minor*), and black vulture (*Caprimulgus vociferus*) (NPS 1991b).

Northern bobwhite (*Gallinago gallinago*) and wild turkey (*Meleagris gallopavo*) are game birds found year-round in the park (NPS 1991b). Northern bobwhite generally inhabits grasslands and wild turkey commonly inhabits hardwood forests with scattered openings, swamps, mesquite grassland, ponderosa pine, and chaparral respectively (Cornell Lab of Ornithology n.d.).

REPTILES AND AMPHIBIANS

Approximately 49 species of reptiles and 27 species of amphibians are known to occur the park, including turtles, lizards, frogs, salamanders, and snakes (NPS 1991a). Only a portion of these species have the potential to occur in or near the proposed upland project sites. There are only two land-dwelling turtles know to exist in Missouri, the three-toed (*Terrapene carolina triunguis*) and ornate box turtle (*Terrapene ornata ornata*), and both species occur in the park. The three-toed box turtle prefers habitat of oak-hickory forest with numerous openings and edge areas along brushy fields. The ornate box turtle is a common resident of grasslands, prairies, glades, pastures, and open woods.

Lizard species include the abundant five-lined skink (*Eumeces fasciatus*), the broadhead skink (*Eumeces laticeps*), the northern fence lizard (*Sceloporus undulatus hyacinthinus*), the racerunner (*Cnemidophorus sexlineatus*), the southern coal skink (*Eumeces anthracinus pluvialis*), the western slender glass lizard (*Ophisaurus attenuatus attenuatus*), and the uncommon eastern collared lizard (*Crotaphytus collaris collaris*) (MDC n.d.e; NPS 2006f). Lizards inhabit forests, glades, and prairies. Those living in forests (e.g., five-lined skink, broadhead skink, and northern fence lizard) use clearings to bask in the sun on logs, and spend a considerable amount of time in large trees. Glade species (e.g., eastern collared lizard, racerunner and southern coal skink) bask in the sun on rocks, taking shelter under them at night. Prairie lizards (e.g., western slender glass lizard) bask in the sun, but take shelter in animal burrows or under dead grass (MDC n.d.e, n.d.f).

There are 25 species of snakes known to occur within the park, including four venomous snakes. The most common of these is the copperhead (*Agkistrodon contortrix*), but timber rattlesnakes (*Crotalus horridus*) and western pygmy rattlesnakes (*Sistrurus miliarius streckeri*) may also be found (NPS 2006f). Other non-venomous snakes known to occur in open wooded areas within the park include rough green snake (*Opheodrys aestivus aestivus*), prairie kingsnake (*Lampropeltis calligaster calligaster*), red milk snake (*Lampropeltis triangulum syspila*), southern black racer (*Coluber constrictor priapus*), eastern garter snake (*Thamnophis sirtalis sirtalis*), northern scarlet snake (*Cemophora coccinea copei*), western ribbon snake (*Thamnophis proximus proximus*), and several species of water snake. In Missouri, snakes normally breed in the spring, soon after they emerge from winter dormancy (MDC 2004).

BEES AND OTHER POLLINATORS

The Ozarks support a variety of bee species and other species of pollinators, which are known to be affected by electromagnetic radiation associated with telecommunication towers (Bowling 2007; Harst et al. 2006; Kimmel et al. 2006). The park does not have a current list of insects known to occur within the Ozark National Scenic Riverways. However, the MDC has information on several species of insects, including bees and other pollinators, known to occur in Missouri. Bee species known to occur in Missouri and likely to occur within the park include honeybees (*Apis mellifera*), bumblebees (*Bombus* spp.), leafcutter bees (*Megachile* spp.), and large carpenter bees (*Xylocopa virginica*) (MDC n.d.e). Missouri's native bees are an abundant and diverse group of insects that live in virtually every kind of terrestrial habitat in the state, including prairies, forests, wetlands, backyards, and hedgerows. Other pollinators known to occur in Missouri and likely to occur within the park include yellowjackets (*Vespula* spp.,

Paravespula spp.), monarchs (*Danaus plexippus*), pearl crescents (*Phyciodes tharos*), silver-spotted skippers (*Epargyreus clarus*), and luna moths (*Actias luna*) (MDC n.d.e).

SPECIAL STATUS SPECIES

There are several state and federally listed wildlife species found within the park. Many of these species are primarily associated with or restricted to lowland riparian and wetland habitats, including the Ozark hellbender (*Cryptobranchus alleganiensis bishopi*), which is listed as endangered by the MDC and is a candidate species for the federal endangered species list (MDC n.d.e). The Ozark hellbender is found only in the clean, clear rivers of the Ozarks and does not use the upland habitats where both project areas are located. Therefore, this species, as well as other species not associated with the upland habitats at Cedargrove and Rymer Ridge, are not discussed further in this chapter or analyzed in chapter 4. See table 6 below for a list of state and federally listed species known to occur in the park, including descriptions of primary habitat.

TABLE 6: SPECIAL STATUS SPECIES KNOWN TO OCCUR IN OZARKS NATIONAL SCENIC RIVERWAYS

Common Name	Scientific Name	Status[1]			Habitat Type	Carried Forward[2]
		Federal	State	State Rank		
Mammals						
American badger	*Taxidea taxus*			SU	Grasslands/open areas	Yes
Golden mouse	*Ochrotomys nuttalli*			S3	Deciduous hardwood and coniferous pine forests	Yes
Gray bat	*Myotis grisescens*	E	E	S3	Caves found within two miles of rivers, streams, or lakes	Yes
Indiana bat	*Myotis sodalis*	E	E	S1	Cool caves (40°F) with relative humidity (66 to 95 percent)	Yes
Long-tailed weasel	*Mustela frenata*			S3	Variety of habitats; prefer woodlands and brushy fencerows	Yes
Marsh rice rat	*Oryzomys palustris*			SU	Semiaquatic – marshes and wet meadows; areas with grasses and sedges	No
Plains spotted skunk	*Spilogale putorius interrupta*		E	S1	Open tallgrass prairies, forests, and bushy areas; near streams or rivers	Yes
Swamp rabbit	*Sylvilagus aquaticus*			S2	Wet lowlands and along the banks of streams	No
Birds						
Bald eagle	*Haliaeeatus leucocephalus*			S3	Forested areas near lakes, rivers, or marshes	Yes

Common Name	Scientific Name	Status[1]			Habitat Type	Carried Forward[2]
		Federal	State	State Rank		
Cerulean warbler	*Dendroica cerulea*	SC		S2, S3	Forests with tall deciduous trees and open understory	Yes
Henslow's sparrow	*Ammodramus henslowii*	SC			Large, flat fields with no woody plants, and with tall, dense grass, a dense litter layer, and standing dead vegetation	Yes
Northern harrier	*Circus cyaneus*		E	S2	Open wetlands, meadows, pastures, prairies, grasslands, croplands, and riparian woodlands	Yes
Sharp-shinned hawk	*Accipiter striatus*			S3	Forests, usually with conifers	Yes
Swainson's warbler	*Limnothlypis swainsonii*		E	S2	Stands of giant cane in forested landscapes along stream and river floodplains	Yes
Amphibians						
Four-toed salamander	*Hemidactylium scutatum*			S4	Among mosses in swamps, boggy streams, and wet, wooded or open areas near ponds	No
Grotto salamander	*Eurycea spelaeus*			S2, S3	Caves with a stream or river running through	No
Ozark hellbender	*Cryptobranchus alleganiensis bishopi*	PE	E	S1	Large, permanent streams and rivers	No
Ringed salamander	*Ambystoma annulatum*			S3	Damp hardwood forests near shallow ponds	No
Reptiles						
Alligator snapping turtle	*Macrochelys temminckii*			S2	Deep sloughs, oxbow lakes and deep pools of large rivers	No
Eastern collared lizard	*Crotaphytus collaris*			S4	Rocks on dry, open, south-or southwest-facing limestone, sandstone and granite glades	No

Common Name	Scientific Name	Status[1]			Habitat Type	Carried Forward[2]
		Federal	State	State Rank		

Sources for status: (Houf 2011b)

Sources for habitat type: Chesapeake Bay Program n.d.; Cornell Lab of Ornithology n.d.; Georgia Museum of Natural History n.d.; Lower Mississippi River Conservation Committee n.d.; MDC n.d.e, 2010d; Museum of Texas Tech University n.d.; Seaholm 2002; University of Illinois 2008

[1] The U.S. Fish and Wildlife Service use the following categories to determine the federal status of species that are included in above table.

E—Endangered: A species which is in danger of extinction throughout all or a significant portion of its range.

T—Threatened: A species which is likely to become endangered within the foreseeable future.

PE—Proposed Endangered: Species officially proposed for listing as endangered; final ruling not yet made.

SC—Species of Concern: A species which the USFWS believes might be in need of concentrated conservation actions.

The MDC uses the following categories to determine the state status and rank of species that are included in above table. For those species with multiple state rankings, there is uncertainty about the exact status of their condition.

E—Endangered: A species which is in danger of extinction within the State of Missouri.

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 5 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. Typically 6 to 20 occurrences or few remaining individuals (1,000-3,000).

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. Possibly cause of long-term concern. Usually more than 100 occurrences and more than 10,000 individuals remaining.

SU—Unrankable: Currently Unrankable due to lack of information or due to substantially conflicting information about status or trends.

[2] *Yes* – Species likely to occur in or near the project areas and/or be affected by the construction, presence and operation of the towers at Rymer Ridge and Cedargrove. These species are discussed in chapter 3 and carried forward for analysis in chapter 4.

No – Species restricted to caves or riparian habitats and/or not likely to be affected by the construction, presence and operation of the towers at Rymer Ridge and Cedargrove.

FEDERALLY LISTED WILDLIFE SPECIES

Animals federally classified as endangered or threatened are protected under the ESA of 1973, as amended. The USFWS is responsible for the listing of species under the ESA. Federally listed species are afforded legal protection under the Act; therefore, sites supporting these species need to be identified.

Gray Bat (*Myotis grisescens*)

This endangered bat is the largest of all Missouri's Myotis bats, which include the little brown bat, the Indiana bat, and the Keen's bat. It averages 3 inches in length and has a wing-span of approximately 10 to 12 inches (MDC n.d.e). Gray bats are insectivorous and one of the few species of bats in North America that inhabit caves year-round (USFWS 2009). They occupy cold hibernating caves (approximately 41 to 48 degrees Fahrenheit) in the winter and warmer caves (57 to 77 degrees Fahrenheit) during the summer (USFWS 2009), often found within two miles of rivers, streams or lakes (MDC n.d.e). The gray bat occupies a limited geographic range in limestone karst areas of the southeastern United States (USFWS 1997). In Missouri, they primarily inhabit caves south of the Missouri River, particularly in the Ozarks,

although a few populations exist north of the river. Missouri contains about 20 percent of the total population of gray bats (MDC n.d.e). Of the 45 caves located in the vicinity of the Rymer Ridge site, one cave located approximately a mile from the area is a hibernacula for gray bats (Houf 2011). Of the three caves in the vicinity of the Cedargrove site, one cave located approximately 1/2-mile of the project has a historical gray bat population. A 2003 cave inventory conducted by the Cave Research Foundation estimated 5,500 gray bats use the cave (Houf 2011).

In summer, female gray bats form maternity colonies of a few hundred to many thousands of individuals (USFWS 2009) from late May to June (MDC n.d.e). Each female gives birth to a single young in June. Mothers and young rejoin the bachelor colonies in July and August. Gray bats exhibit great loyalty to their roosting and hibernating sites and will return to the same locations year after year (MDC n.d.e).

Foraging of gray bats in summers is strongly correlated with open water, such as rivers, streams, lakes, or reservoirs. Although the species may travel up to 22 miles between prime feeding areas over lakes or rivers and occupied caves, most maternity colonies are usually located between 0.6 to 2.5 miles from foraging sites. At foraging sites, gray bats typically forage within three meters of the water's surface. Gray bats are highly dependent on aquatic insects, especially mayflies, caddisflies, and stoneflies (USFWS 2009). They locate insects by a highly developed sense of echolocation. In this process, bats emit high frequency sounds, which bounce off the potential prey and return to the bat's ears. They use the information gained from the speed and direction of the returning sound signals to pinpoint prey (Ohio DNR n.d.).

The gray bat is both state- and federally listed as endangered (MDC n.d.e). Gray bats are endangered largely because of their habit of living in very large numbers in only a few caves. As a result, they are very vulnerable to disturbance (USFWS 1997). Despite its recovery in many areas, human disturbance is the main reason for the continued decline of gray bats in caves that are not protected.

Additionally, in April 2010, the MDC confirmed Missouri's first signs of "White-Nose Syndrome" (WNS) (MDC 2010b), which is a disease affecting hibernating bats that was discovered in Albany, New York in February 2006 (USFWS 2009). The name describes a white fungus typically found on the faces, wings, and ears of infected bats. WNS apparently spreads through bat-to-bat contact and via the environment, and is not known to infect other wildlife or humans. The disease causes infected bats to awaken more often during their winter hibernation and fly outside in search of insects to eat. This activity uses up stored fat reserves needed to get them through the winter, and they usually freeze or starve to death. More than a million hibernating bats have died in 11 states and Canada since the disease was documented in January 2007 (MDC 2010b). Laboratory tests recently confirmed the presence of the WNS fungus on a bat found in a cave in Pike County, Illinois (MDC 2010c), which is a concern for Missouri as the disease could spread quickly throughout the state if it spreads across state borders. Although WNS has not yet been documented in any population of *Myotis grisescens*, it is still considered a threat to the species (MDC 2010b; USFWS 2009).

Indiana Bat (*Myotis sodalis*)

This endangered, medium-sized bat averages 2 inches in length and has a wing-span of approximately 8 inches. Indiana bats are insectivorous, eating primarily moths, but also mosquitoes and aquatic insects. They need cool caves with stable temperatures of around 40 degrees Fahrenheit with relative humidity (MDC n.d.e).

Indiana bats hibernate through the winter in limestone caves and abandoned mines in the Ozarks (Burgess 2010; MDC n.d.e). However, some are known to hibernate under the bark of dead trees. Female bats enter hibernation in early autumn, shortly before the males. They emerge from hibernation in early spring and

begin migrating to their summer roosting and foraging areas. Home range size of Indian bats varies by individual as well as time of year; however, they are an average of 625 hectares during the fall and 255 ± 89 hectares in the spring. They have a wide nocturnal foraging area during the summer months as well (Burgess 2010).

Indiana bats summer along streams and rivers in north Missouri (MDC n.d.e). They roost at elevations from 0 to 5,728 feet above sea level (average 3,435 feet). Roosting takes place under the bark of large trees, under bridges, and sometimes in buildings. Trees in which Indiana bats are known to roost include bitternut hickory (*Carya cordiformis*), oaks (*Quercus* spp.), elms (*Ulmus* spp.), pines (*Pinus* spp.), American sycamore (*Platanus occidentalis*), and eastern cottonwood (*Populus deltoides*) (Burgess 2010). Roost trees are typically within canopy gaps in a forest, or along a fenceline or wooded edge. Habitats in which maternity roosts occur include riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities. Indiana bats typically forage in semi-open to closed (open understory) forested habitats, forest edges, and riparian areas (USFWS 2010b).

Like other insectivorous bat species, Indian bats use echolocation to maneuver through their various habitat types. They have well-developed eyesight which they use to aid with their travels from their winter hibernacula to their summer roosting sites (Burgess 2010).

Of Missouri's 6,500 known caves, only 27 have ever had sizeable Indian bat populations. More than 85 percent of Missouri's total population hibernates in only eight specific locations, three of which are located in Shannon, Washington, and Iron counties. No caves in the vicinity of either project area have a known Indiana bat population (Houf 2011). The Indiana bat is both state- and federally listed as endangered (MDC n.d.e). Threats to the Indiana bat vary during its annual cycle. During hibernation, threats include modifications to caves, mines, and surrounding areas that change airflow and alter microclimate in the hibernacula. Human disturbance and vandalism pose significant threats during hibernation through direct mortality and by inducing arousal and consequent depletion of fat reserves. During summer months, possible threats relate to the loss and degradation of forested habitat. Migration pathways and swarming sites may also be affected by habitat loss and degradation (USFWS 2010b). As described for the gray bat, WNS is a disease threatening bats throughout the eastern United States. Unlike the gray bat, Indiana bats are one species known to have been infected by the disease. Although there are no known occurrences of the disease in Missouri, the state's bat populations, including Indiana bat, are considered susceptible to infection (MDC 2010b).

Cerulean Warbler (*Dendroica cerulean*)

This small bird is a candidate species for listing under the ESA (USFWS 2011) and is listed on the Audubon Watchlist (Cornell Lab of Ornithology n.d.). Weighing less than 0.5 ounces, it averages 4.3 inches in length and has a wingspan of 8 inches. The cerulean warbler is primarily insectivorous, gleaning insects from leaves, and consumes some plant material in the winter (Cornell Lab of Ornithology n.d.). Cerulean warblers search for insects in the mountain forests of Columbia, Venezuela, Peru, and Bolivia during the winter. They arrive in mid-April and begin nesting. During the spring, cerulean warblers can be observed migrating through the Mississippi River Valley (MDC n.d.e). It breeds in forests with tall deciduous trees and open understory, such as wet bottomlands and dry slopes. Nests are typically placed 15 to 90 feet (5 to 27 meters) above the ground and 5 to 20 feet (1.5 to 6 meters) out on a lateral limb of a deciduous tree in mid- to upper-canopy (Cornell Lab of Ornithology n.d.). In the park, cerulean warblers can be observed from March through October and are considered widespread and easily found in proper habitat (NPS 1991b).

The cerulean warbler is considered one of the species of highest concern in the eastern United States because of a small total population size and significant declines throughout its range (Cornell Lab of

Ornithology n.d.). Ceruleans have shown one of the steepest declines of any warbler species, showing a decline of 4.5 percent per year from 1966 to 2001 according to the Breeding Bird Survey. Formerly one of the most abundant breeding warblers in Ohio and the Mississippi River Valleys, its population plummeted in the 1900s due to habitat destruction. They were especially abundant in the old-growth bottomland forests of the Mississippi Alluvial Valley, but these forests no longer exist. Mesic upland forests are scarce now as well. Primary threats include habitat degradation and forest fragmentation. Breeding habitat is degraded when mature deciduous forests, especially riparian forests, are lost; remaining forests are fragmented and isolated; less deciduous forests reach maturity because shorter rotation periods and even-aged management; and key tree species are lost because of disease (Audubon n.d.).

STATE-LISTED WILDLIFE SPECIES

Several state-listed mammal species are known to occur in habitats within the park that could be affected by the proposed construction and presence of radio towers at the Cedargrove and Rymer Ridge project locations. As listed in table 6, these mammals include American badger (*Taxidea taxus*), golden mouse (*Ochrotomys nuttalli*), long-tailed weasel (*Mustela frenata*), and plains spotted skunk (*Spilogale putorius interrupta*). These species occur in a variety of habitats within the park, including open areas such as grasslands and prairies, woodlands, and deciduous forests. For the majority of these mammals, habitat loss and fragmentation are considered primary threats (Lower Mississippi River Conservation Committee n.d.; MDC n.d.e).

State-listed birds known to occur in the park include bald eagle (*Haliaeeatus leucocephalus*), Henslow's sparrow (*Ammodramus henslowii*), northern harrier (*Circus cyaneus*), sharp-shinned hawk (*Accipiter striatus*), and Swainson's warbler (*Limnothlypis swainsonii*). These species occur in a variety of habitats including deciduous forest, open wetlands, woodlands, prairies and grasslands. Swainson's warbler inhabits stands of giant cane in forested landscapes along stream and river floodplains. In addition to habitat loss and fragmentation, the presence of telecommunication towers is a known threat to several bird species due to direct mortality from collisions (USFWS 2000).

PARK OPERATIONS AND MANAGEMENT, INCLUDING VISITOR PROTECTION

The superintendent is responsible for managing the park, its staff, all of its programs, and interactions with visitors, agencies, and organizations interested in the park. Park staff provides the full scope of functions and activities to accomplish management objectives and meet the requirements of park protection, emergency services, park health and safety, science, resource protection and management, interpretation and education, and management support. Currently, there are a total of 78 full-time and 138 part-time employees within the park (Towery 2010).

Visitor Protection staff responsibilities include search and rescue, emergency medical incidents, and assisting local fire and rescue departments at motor vehicle accidents that occur in or around the park boundary. The emergency operation statistics for the past three years are available in table 7.

TABLE 7: EMERGENCY OPERATION STATISTICS (2008–2010)

Year	Fatalities	Motor Vehicle Accidents	Search & Rescue	EMS Incidents	Fire Incidents
2008	0	11	9	24	4
2009	1	10	28	31	25
2010	4	9	8	18	16

Source: Towery 2010.

One of the park fatalities in 2010 involved the drowning of a teenager in the river just south of the proposed Cedargrove repeater site (Towery 2010). Currently, radios used by law enforcement staff are not encrypted and conversations between park rangers can be heard by all park staff and any members of the public scanning the same channel. Anyone listening to the channel being used by law enforcement staff is able to determine the location of park rangers as well as any information being distributed. In some instances, this information can include the full name, date of birth, and social security number of an individual.

RYMER RIDGE SITE

The Rymer Ridge site is located within a Natural Zone under the 1980 GMP for the park. According to the GMP, within a natural zone "natural resources and processes will be preserved and will remain largely unaltered by human activity" (NPS 1980). Currently, radio coverage in this area is provided by the Mountain View repeater site, located to the west of Rymers, which supports coverage for approximately 35 percent of the entire Rymers and Jacks Fork areas (Towery 2011).

CEDARGROVE SITE

Under the 1980 GMP, the Cedargrove site is within a Development Zone. According to the GMP, a development zone "contains developments for visitor use and safety and park operations. The management strategy for this zone will emphasize development of facilities in the most effective, efficient manner to minimize disruption of natural, cultural, scientific, and recreational values" (NPS 1980). Currently, radio coverage in this area is provided by the Hartshorn repeater site, located to the south of the Cedargrove area. This repeater site supports coverage for approximately 45 percent of the entire Cedargrove area (Towery 2011). Cedargrove also includes a popular river access point for canoeing and tubing which attracts hundreds of visitors daily during the summer months. At this location, park radios receive little to no coverage.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

This "Environmental Consequences" chapter analyzes both beneficial and adverse impacts that would result from implementing any of the alternatives considered in this EA. This chapter also includes impact definitions (e.g., negligible, minor, moderate, and major), methods used to analyze impacts, and the analysis methods used for determining cumulative impacts. As required by CEQ regulations implementing the NEPA, a summary of the environmental consequences for each alternative is provided in table 4 which can be found in "Chapter 2: Alternatives." The resource topics presented in this chapter, and the organization of the topics, correspond to the resource discussions contained in "Chapter 3: Affected Environment."

GENERAL METHODOLOGY FOR ESTABLISHING IMPACT DEFINITIONS AND MEASURING EFFECTS BY RESOURCE

The following elements were used in the general approach for establishing impact definitions and measuring the effects of the alternatives on each resource category:

- general analysis methods as described in guiding regulations, including the context and duration of environmental effects;
- basic assumptions used to formulate the specific methods used in this analysis;
- thresholds used to define the level of impact resulting from each alternative;
- methods used to evaluate the cumulative impacts of each alternative in combination with unrelated factors or actions affecting park resources; and
- methods and thresholds used to determine if impairment of specific resources would occur under any alternative.

These elements are described in the following sections.

GENERAL ANALYSIS METHODS

The analysis of impacts follows CEQ guidelines and Director's Order 12 procedures (NPS 2001) and is based on the underlying goal of providing unique scenic and other natural values and provisions for use and enjoyment of the outdoor recreation resources at the park. This analysis incorporates the best available literature applicable to the setting and the actions being considered in the alternatives.

As described in "Chapter 1: Purpose and Need," the NPS created an interdisciplinary science team to provide important input to the impact analysis. For each resource topic addressed in this chapter, the applicable analysis methods are discussed, including assumptions and impact intensity thresholds.

ASSUMPTIONS

Several guiding assumptions were made to provide context for this analysis. These assumptions are described below.

Analysis Period. The analysis period for this assessment is the expected period of construction to erect the proposed radio towers and to upgrade or purchase new radio equipment for park staff. Construction is expected to begin in November 2011 and be completed by March 2012. The analysis period for some

resource areas may extend beyond the period of construction. The specific analysis period for each impact topic is defined at the beginning of each topic discussion.

Geographic Area Evaluated for Impacts (Area of Analysis). The geographic study area (or area of analysis) for this assessment is the specific proposed radio tower locations at both the Rymer Ridge and Cedargrove sites. The area of analysis may extend beyond the project area boundaries for some cumulative impact assessments. The specific area of analysis for each impact topic is defined at the beginning of each topic discussion.

IMPACT DEFINITIONS

Determining the intensity of impacts is a key component in applying NPS *Management Policies 2006* and Director's Order 12. These impact definitions provide the reader with an idea of the intensity of a given impact on a specific topic. The impact intensity is determined primarily by comparing the effect to a relevant standard based on applicable or relevant/appropriate regulations or guidance, scientific literature and research, or best professional judgment. Because definitions of intensity vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this document. Intensity definitions are provided throughout the analysis for negligible, minor, moderate, and major impacts. In all cases, the impact intensities are defined for adverse impacts. Beneficial impacts are addressed qualitatively.

Potential impacts of all alternatives are described in terms of type (beneficial or adverse). Adverse impacts are also described in context; duration (short- or long-term); and intensity (negligible, minor, moderate, major). Definitions of these descriptors are included below.

> **Beneficial**. A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.
>
> **Adverse**. A change that declines, degrades, and/or moves the resource away from a desired condition or detracts from its appearance or condition.
>
> **Context**. Context is the affected environment within which an impact would occur, such as local, park-wide, regional, global, affected interests, society as whole, or any combination of these. Context is variable and depends on the circumstances involved with each impact topic. As such, the impact analysis determines the context, not vice versa.
>
> **Duration**. The duration of the impact is described as short-term or long-term. Duration is variable with each impact topic; therefore, definitions related to each impact topic are provided in the specific impact analysis narrative.
>
> **Intensity**. Because definitions of impact intensity (negligible, minor, moderate, and major) vary by impact topic, intensity definitions are provided separately for each impact topic analyzed.

CUMULATIVE IMPACTS ANALYSIS METHOD

The CEQ regulations to implement NEPA require the assessment of cumulative impacts in the decision making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). As stated in the CEQ handbook, "Considering Cumulative Effects" (CEQ 1997), cumulative impacts need to be analyzed in terms of the specific resource, ecosystem, and

human community being affected and should focus on effects that are truly meaningful. Cumulative impacts are considered for all alternatives, including the no action alternative.

Cumulative impacts were determined by combining the impacts of the alternative being considered with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other past, ongoing or reasonably foreseeable future projects and plans at the park and, if applicable, the surrounding area. Table 8 summarizes these actions that could affect the various resources at the park, along with the plans and policies of both the park and surrounding jurisdictions, which were discussed in "Chapter 1: Purpose and Need." Additional explanation for most of these actions is provided in the narrative following the table.

The analysis of cumulative impacts was accomplished using four steps:

> **Step 1** – Identify Resources Affected—Fully identify resources affected by any of the alternatives. These include the resources addressed as impact topics in chapters 3 and 4 of the document.
>
> **Step 2** – Set Boundaries—Identify an appropriate spatial and temporal boundary for each resource. The temporal boundaries are noted at the top of table 8 and the spatial boundary for each resource topic is listed under each topic.
>
> **Step 3** – Identify Cumulative Action Scenario—Determine which past, present, and reasonably foreseeable future actions to include with each resource. These are listed in table 8 and described below.
>
> **Step 4** – Cumulative Impact Analysis—Summarize impacts of these other actions (x) plus impacts of the proposed action (y), to arrive at the total cumulative impact (z). This analysis is included for each resource in this chapter.

The following past, present, and reasonably foreseeable future actions at The park or in the surrounding area have been identified as having the potential to impact the resources evaluated in this EA.

TABLE 8: ACTIONS THAT CONTRIBUTE TO CUMULATIVE IMPACTS

Impact Topic	Study Area	Past Actions	Present Actions	Future Actions
Visual Resources	Vicinity of proposed repeater locations	none	none	GMP
Soil	Proposed repeater locations	none	none	GMP
Vegetation	Proposed repeater locations	none	none	GMP
Wildlife and Wildlife Habitat, including Special Status Species	Vicinity of proposed repeater locations and airspace associated with the operation of the radio system	Other Tower Construction	Other Tower Construction	GMP, Other Tower Construction
Park Operations and Management, including Visitor Protection	Ozark National Scenic Riverways	none	none	GMP

VISUAL RESOURCES (AESTHETICS AND VIEWSHEDS)

METHODOLOGY AND ASSUMPTIONS

Impacts to viewscapes, including scenic views and visual resources associated with the park, were determined by considering the effect of the installation and operation of two new radio towers on the overall visual experience of park visitors who use the areas surrounding the proposed radio towers within the park.

STUDY AREA

The geographic study area for the scenic views and visual resources is a one-mile radius around both tower locations and within park boundaries, including public access points, recreational and high visitor use areas in the vicinity of the project. The study area for cumulative impacts includes the same one-mile radius.

Impact Definitions

Negligible: Visitors would likely be unaware of impacts associated with implementation of the alternative. There would be no noticeable change to the scenic views and visual resources or in any defined indicators of the scenic landscape.

Minor: Changes in scenic views and visual resources would be slight and detectable, but would not appreciably limit or enhance critical characteristics of the scenic river. Visitors would be unlikely to express an opinion regarding the changes.

Moderate: Few critical characteristics of the desired scenic views and visual resources would change. The changes would be notable and some visitors would be likely to express an opinion about them. The changes could lead to increases or decreases in visitation to areas of the park affect by the subject visual resources.

Major: Multiple critical characteristics of the desired scenic views and visual resources would change. The changes would be substantial and the majority of visitors would be likely to express an opinion about them. The changes would lead to increases or decreases in visitation in areas of the park affected by the subject visual resources.

Beneficial: The natural viewshed would be improved, reducing manmade structures and restoring the scenic landscape to its natural or historic condition.

Duration: Short-term impacts would be immediate, occurring during construction. Long-term impacts would persist after the construction.

ALTERNATIVE A: NO ACTION

Analysis

Under alternative A, the no action alternative, no construction activities would occur within the park. Existing radio tower repeater locations would be upgraded from an analog to a narrowband digital radio

system, however no additional repeater locations would be constructed and the existing viewshed within the park would not change.

Improvements to the existing tower sites under alternative A include the removal of existing antennas and the installation of new antennas on the existing towers. The Skyline and Eminence sites currently have one 40-foot vertical antenna and 15-foot yagi antennas installed on each tower. At both sites, the 40-foot antenna would be removed and replaced with a 22-foot vertical antenna. The Hartshorn site currently has a 40-foot vertical antenna, which would be replaced with a 22-foot vertical antenna. The Stegall site currently has four 15-foot yagi antennas mounted 72.5 feet above ground level (AGL). These antennas would be removed and replaced with a 19-foot VHF antenna (80 feet AGL). The park headquarters site currently has a 22-foot antenna (82 feet AGL) and two 4-foot antennas (57 feet AGL). These antennae would be replaced with an 11-foot vertical antenna (71 feet AGL) and two 4-foot antennas (54 feet AGL). Lastly, the Mountain View site currently has four 15-foot yagi antennas (307.5 feet AGL) and one 15-foot yagi antenna (107.5 feet AGL), which would be replaced with a 22-foot antenna (311 feet AGL).

The heights of antennas on the towers at Skyline, Hartshorn and park headquarters sites would all be lower under alternative A. The Skyline, Hartshorn, and park headquarters (which includes two antennas) sites would have a decrease in antenna heights by 9 feet, 19 feet, 11 feet and 3 feet respectively. At these sites, the upgrades to the towers would have no impact on viewshed and visual resources due to the lower heights. At the remaining sites, Stegall, Eminence, and Mountain View, there would be a slight increase in the total antenna height. Antenna heights at the Stegall, Eminence, and Mountain View sites would increase by 7.5 feet, 1 foot and 3.5 feet respectively. However, the total height of each existing tower would be equal to or greater than the heights of the individual antennas being replaced. Because the height of the replaced antennas would either decrease or would not exceed the total height of each existing tower, it is expected that the upgrades under alternative A would have no impact to viewshed and visual resources.

Implementation of the no action alternative would result in no impact to visual resources.

Cumulative Impacts

Because no impacts are projected under the no action alternative, no cumulative impacts would occur.

Conclusion

Implementation of the no action alternative would not result in impacts on visual resources near the project areas, as there would be no modifications to the sites. Total antenna heights at each of the existing tower locations would either decrease or be increased slightly, but not beyond the total existing tower height, resulting in no impacts. There would be no cumulative impacts.

ALTERNATIVE B: UPGRADE AND REHABILITATE RADIO SYSTEM

Analysis

A viewshed analysis was conducted for the radio tower construction at each of the two proposed sites. The results of the analysis are shown below in figure 11 (Rymer Ridge) and figure 12 (Cedargrove). The viewsheds were based on the proposed tower heights for each site while taking into account topography and existing tree cover in each location. The Geographic Information System (GIS) viewshed model used 10-meter Digital Elevation Model data resolution and assumed the tree height to be 20 meters, or 65.6 feet. Figures 8 and 9 depict visible areas as either yellow or green. The areas in yellow are areas from which the tower is predicted to be visible from ground level and would likely be visible to a park

visitor. The light green areas are those from which the tower would be visible from the tops of the projected tree canopy or if the intervening forest cover was removed. Since the observer would be at ground level or the base of the tree cover, it is assumed that in the areas shaded in light green, the tower would not be visible to a park visitor. With the existing forest cover, it would be unlikely that visitors would be able to see the proposed towers from areas in light green. Visibility calculations are based on a viewshed analysis overlayed with forest cover based on 2010 aerial imagery. This analysis was used to simulate potential views that would be blocked by forest cover or topography and showcase areas where the proposed towers may be visible.

Additionally, photosimulations were prepared to help visualize the impact of the proposed towers after construction. Photosimulations were prepared using digital photographs and a combination of GIS, 3-D visualization, and image software packages (ArcGISR 9.2, 3D Studio MaxR, and Adobe PhotoshopR, respectively). At the Rymer Ridge site, two photosimulations were prepared showing the proposed 150-foot radio tower; one from the proposed tower access road and one at a location along County Road M-471. At the Cedargrove site, four photosimulations were prepared showing the 199-foot radio tower; at the base of the tower, from an open field to the south of the site, at the public boat launch, and from State Highway B. Some of the photosimulations are included in the analysis below. For a before and after photo of each photosimulation, see appendix B.

Rymer Ridge

The Rymer Ridge site is located on a high hilltop, approximately 0.8 miles away from a public access point along Jacks Fork River at the base of the valley. In general, this area of the park is remote with very little public access or visitation. As demonstrated in figure 8 (Rymer Ridge), the proposed 150-foot radio tower would likely not be visible from the public access point along the Jacks Fork off County Road M-471. Additionally all other areas of visibility within the park are classified as “visible with tree cover,” meaning the tower would be visible in these locations if the tree cover was removed, however given the current dense tree cover it would likely not be visible. When coming downstream towards the Rymer Ridge project site, visitors on the river could potentially see the tower at certain points on the river, outside the area of visual analysis. Because much of the river corridor is bounded by steep topography and dense tree cover, it is unlikely the tower would be highly noticeable or visible for any long stretch of the river. The implementation of alternative B would result in long-term, negligible, adverse impacts to visual resources at the Rymer Ridge site. The tower would likely not be seen from the only public access point, or from any other locations in this section of the park with the exception County Road M-471, directly adjacent to the site, or potentially upstream from the site. A photosimulation of the proposed tower is shown in figure 13.

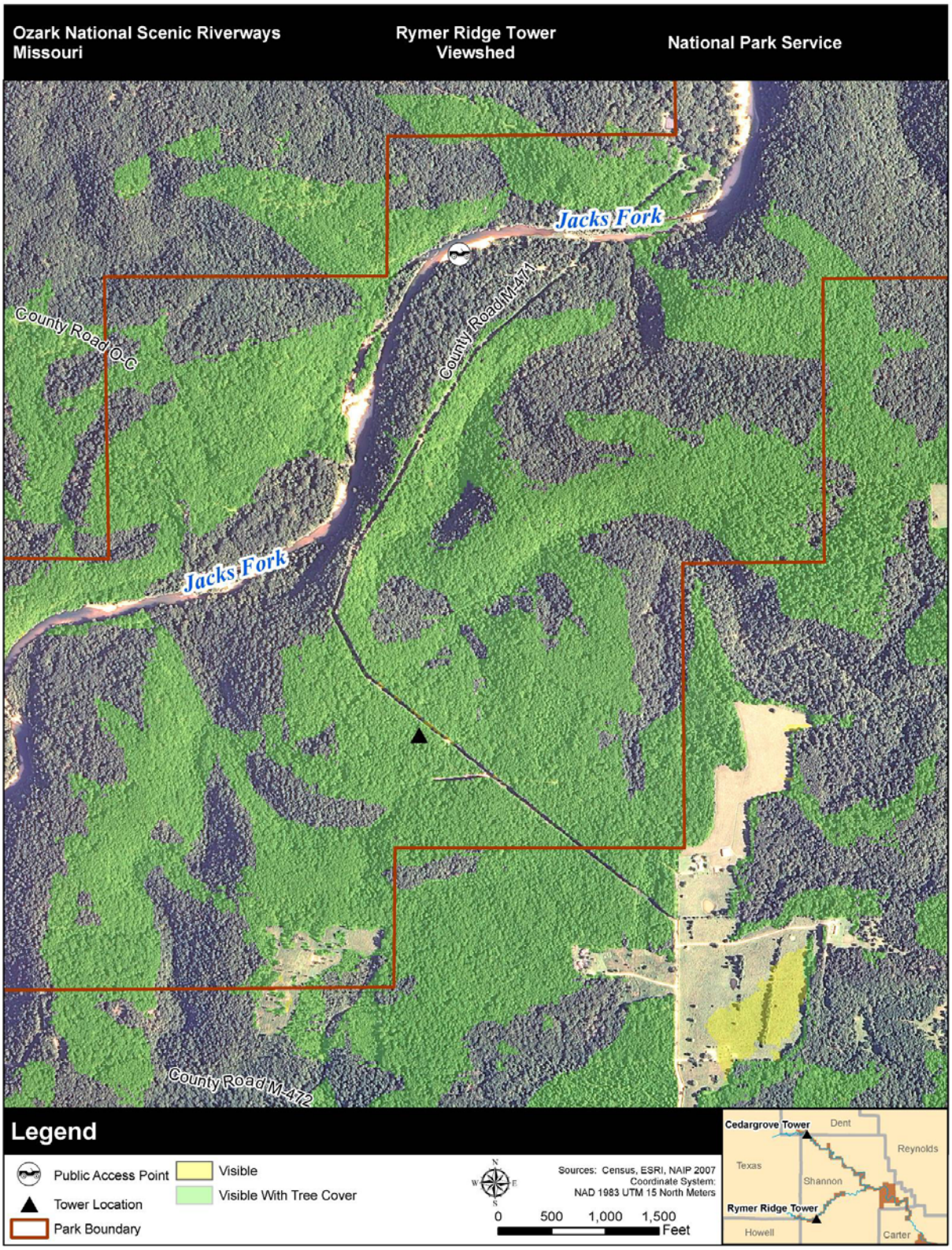

FIGURE 11: VIEWSHED ANALYSIS: RYMER RIDGE LOCATION

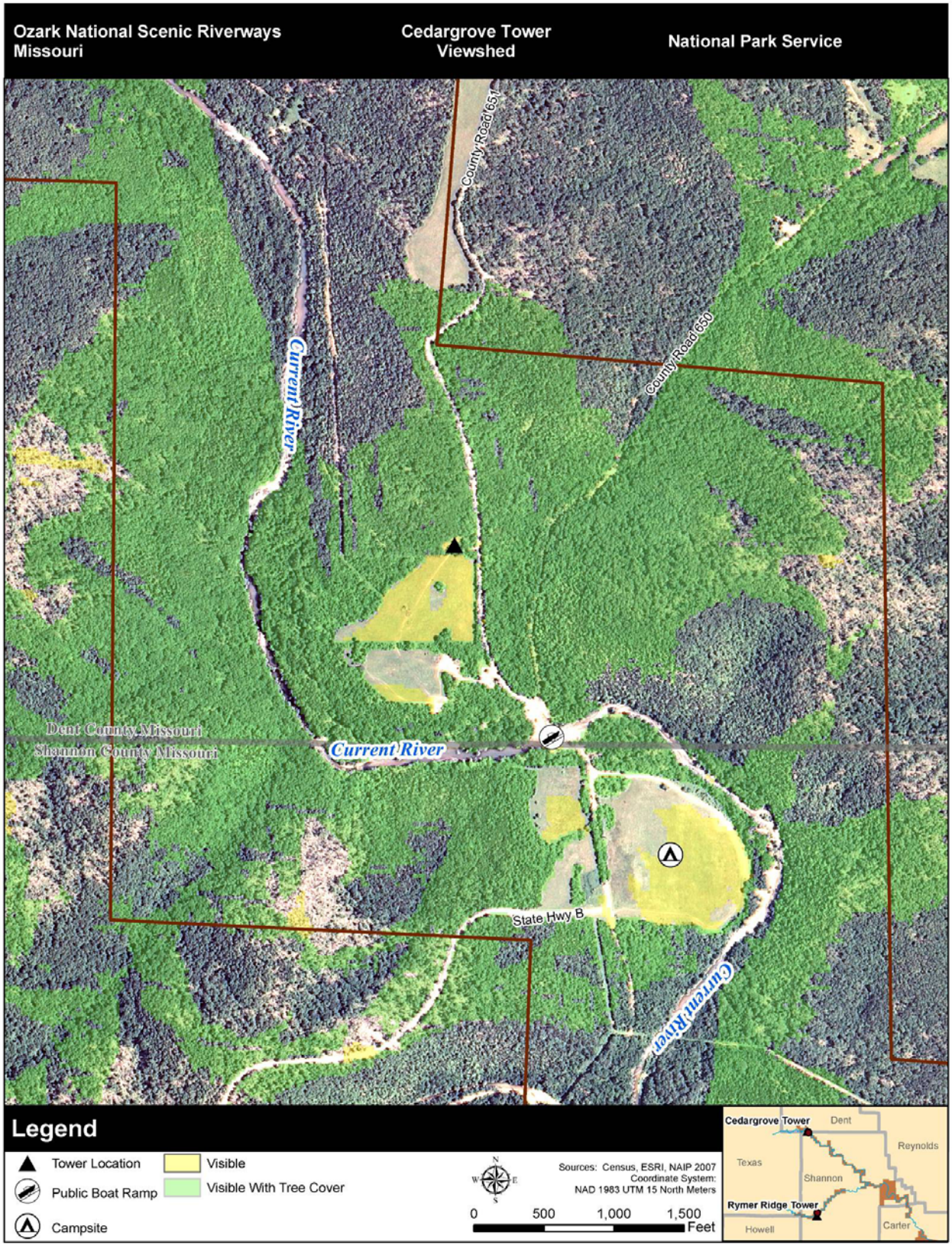

FIGURE 12: VIEWSHED ANALYSIS: CEDARGROVE LOCATION

FIGURE 13: PHOTOSIMULATION: RYMER RIDGE LOCATION

Cedargrove

The Cedargrove site is located off of County Road 651, approximately 0.5 miles northwest of the Cedargrove recreation area. As shown in figure 9, there are several spots of potential visibility for the proposed 199-foot tower. The tower would not likely to be visible from areas along public roads and the Current River due to vegetation and tree cover (shown in light green in figure 9). Areas with potential visibility include the open field directly south of the site, a public boat ramp southeast of the site, the Cedargrove primitive campsite, and views looking north off of State Highway B. Visibility from the open field and State Highway B are not likely to affect the visual resources within the park since these are not high recreation areas and it is not likely that visitors would be recreating in these locations. The park is known for the scenic vistas visitors can experience while kayaking, tubing or boating along the Current River. As shown in figure 9 and further demonstrated in the photosimulation in figure 14, the tower would not be visible when floating along the river due to topography and vegetation cover. While it would be visible at the boat launch site, it is not likely that visitors would be viewing the surrounding landscape; instead, their focus would be on safely launching their boat and accessing the river. The tower

would also be visible from the Cedargrove campsite. Due to the relative distance away from the site, however, it is not likely that the tower would result in a large visual intrusion to the surrounding landscape. Overall, the construction of the radio tower would have long-term, minor, adverse impacts on visual resources within the park.

FIGURE 14: PHOTOSIMULATION: CEDARGROVE BOAT LAUNCH

Cumulative Impacts

NPS projects within the park include the implementation of a new GMP. The current GMP details Scenic Easement Subzones, which includes approximately 9,179 acres of privately owned lands that include federal scenic easements in their tract deeds. Under this stipulation, the park has the option to control any actions on the scenic easements that may adversely affect the visual qualities of the park. It is assumed that this stipulation would be carried forward in the GMP, reducing the potential for impacts to visual resources. Impacts to visual resources from the revised GMP would result in long-term, negligible, adverse impacts from any proposed construction. Alternative B would have long-term, negligible to minor, adverse impacts from the change in viewshed in the vicinity of the proposed towers. When combined with the impacts from the proposed GMP, alternative B would result in an overall long-term, minor, adverse cumulative impact to visual resources.

Conclusion

The implementation of alternative B would have long-term negligible adverse impacts to visual resources at the Rymer Ridge site as the proposed tower would not likely be seen from the only river access point. The implementation of alternative B would have long-term minor adverse impacts to visual resources at the Cedargrove site due to the visibility of the tower to designated recreation sites. Overall, alternative B

would have long-term, negligible to minor, adverse impacts on visual resources within the park. Cumulative impacts associated with visual resources would be long-term, minor, adverse.

SOILS

METHODOLOGY AND ASSUMPTIONS

Potential impacts were assessed based on the extent of disturbance to soils, including natural undisturbed soils, the potential for soil erosion resulting from disturbance, and limitations associated with soils. Analysis of possible impacts to soils were based on the review of existing literature and maps, information provided by the NPS and other agencies, and professional judgment. This section assesses the potential effects of the proposed upgrade and rehabilitation of the radio system in the project areas.

STUDY AREA

The geographic study area for impacts on soils includes both project areas for the proposed actions at the park as well as associated areas that would be used for construction staging for equipment and supplies. It is expected that construction activities would not occur outside these areas. The study area for cumulative analysis includes the entire the park and immediately adjacent areas.

IMPACT DEFINITIONS

The impact intensities for soils were defined as follows:

Negligible: The action would result in a change to soils, but the change would be so small that it would not be of any measurable or perceptible consequence.

Minor: The action would result in impacts on soils, but the change would be small and localized and of little consequence.

Moderate: The action could result in a change to soils; the change would be measurable and of consequence. Mitigation measures would be necessary to offset adverse impacts and would likely be successful.

Major: The action would result in a noticeable change to soils; the change would be measurable and would result in a severely adverse impact. Mitigation measures necessary to offset adverse impacts would be needed and would be extensive, and their success would not be guaranteed.

Beneficial: A beneficial impact would occur when actions were taken to actively preserve, stabilize or return soils to its pre-existing condition.

Duration: Short-term impacts occur during the implementation of the alternative; long-term impacts extend beyond implementation of the alternative.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

The no action alternative represents the current conditions in the project areas. There would be no grading or excavation of soils or removal of vegetation as a result of this alternative. Under the no action alternative, the park would upgrade to narrowband digital radio communications using the existing five repeater locations. No new radio towers would be constructed and no new impacts to soils would occur. As a result, implementation of the no action alternative would result in no impact to soils.

Cumulative Impacts

Since no impacts are projected under the no action alternative, no cumulative impacts would occur.

Conclusion

Under the no action alternative, there would be no new construction within the project areas and therefore no impact to soils. There would be no cumulative impacts.

IMPACTS OF ALTERNATIVE B: UPGRADE AND REHABILITATE RADIO SYSTEM

Analysis

Under alternative B, the park would construct two new radio tower repeaters at the Rymer Ridge and Cedargrove locations. Construction of the radio towers at both sites would require an area approximately 75 feet by 75 feet that would need to be cleared of trees, brush, and vegetation. In preparation for construction activities grading and leveling on construction areas would occur in areas currently maintained as natural vegetation.

The proposed radio tower location at Rymer Ridge is currently undeveloped and would require the removal of approximately 75 hickory, pine, oak, and ash trees as well as other vegetation. Soil productivity would decline in disturbed areas, such as the access road, and would be completely eliminated in areas within the footprint of the radio tower. When combined with the removal of all vegetation within the footprint, the proposed radio tower at the Rymer Ridge location would result in localized, long-term minor adverse impacts to soils.

Soil at the proposed Cedargrove site has been previously disturbed as the location was once a ranger station and, although the ranger station cabin in no longer present, a clearing remains. The construction of a radio tower and access road would require clearing of existing vegetation and would diminish and eliminate soil productivity. When combined with the impacts on soil properties and potential for increased runoff and erosion from previous disturbance at the site, alternative B would result in localized, long-term, negligible adverse impacts on soils.

At both locations, construction activities would result in the compaction of soils. Additionally, the soil layer structure would be disturbed and modified and soils would be exposed, increasing the overall potential for erosion. Resource protection measures would include the employment of best management practices, which would include the use of silt fencing to prevent and control soil erosion and sedimentation during construction of the radio towers and the clearing of access roads. In addition, at both locations infrastructure improvements require trenching for coaxial and power cables. As a result, construction activities and infrastructure improvements would have a localized short-term minor adverse impact on soils in the project area.

Overall impacts to soils as a result of alternative B would be short-term, minor adverse from the clearing of vegetation and exposure of soils. Long-term impacts to soils would be negligible to minor adverse resulting from reduced or eliminated soil productivity within the footprint of the radio tower complex and associated access roads.

Cumulative Impacts

Projects that could contribute to cumulative impacts to soils include the GMP. Impacts to soils from the GMP would depend on the level and location of potential development; however impacts to soils would be expected to be localized, minor, and adverse. Potential construction activities associated with the GMP could result in localized minor adverse impacts on soils while the potential reestablishment of natural vegetation would result in beneficial impacts. When combined with the localized long-term, negligible to minor, adverse impacts from in the implementation of alternative B, cumulative impacts on soils would be long term, minor adverse.

Conclusion

Construction of the proposed radio towers and access roads under alternative B would disturb, modify, and expose soils as the result of grading and other construction activities, resulting in localized short-term, minor adverse impacts on soils. The loss, modification, and disturbance of soils from the construction of radio towers and access roads as well as the increased potential for storm water runoff and erosion would results in localized, long-term, negligible to minor, adverse impacts on soils. Cumulative impacts on soils would be long-term, minor adverse.

VEGETATION

METHODOLOGY AND ASSUMPTIONS

Available information on vegetation and vegetative communities occurring at the park was compiled and reviewed. Predictions about short- and long-term project impacts on vegetation were based on general characteristics and proposed actions affecting vegetated areas associated with the proposed upgrade and rehabilitation of the radio system in the project areas.

STUDY AREA

The geographic study area for impacts on vegetation includes both project areas for the proposed actions at the park as well as associated areas that would be used for construction staging for equipment and supplies. It is expected that construction activities would not occur outside these areas. The study area for cumulative analysis includes the project area in the park and areas immediately adjacent to the project area.

IMPACT DEFINITIONS

The impact intensities for vegetation were defined as follows:

Negligible: Some individual plants could be affected as a result of the alternative, but measurable or perceptible changes in plant community size, integrity, or continuity would not occur. The impacts would be on a small scale.

Minor: The alternative would affect some individual native plants and would also affect a relatively minor portion of that species' population. The viability of the plant community would not be affected and the community, if left alone, would recover.

Moderate: The alternative would affect some individual native plants and a relatively large area in the native plant community that would be readily measurable in terms of abundance, distribution, quantity, or quality. Mitigation to offset adverse impacts could be extensive and would likely be successful.

Major: The alternative would have a considerable effect on native plant communities that would be readily apparent, and would substantially change vegetation community types over a large area in and out of the park.

Beneficial: A beneficial impact would occur when actions were taken to actively preserve, stabilize or return vegetative communities to its pre-disturbance condition.

Duration: Short-term impacts occur during the implementation of the alternative; long-term impacts extend beyond implementation of the alternative.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

Under the no action alternative, there would be no construction and no removal of vegetation. The upgrades required at the existing repeater locations would require light construction equipment in previously disturbed areas and would not impact vegetation at those locations. Implementation of the no action alternative would result in no impact to vegetation.

Cumulative Impacts

Since no impacts are projected under the no action alternative, no cumulative impacts would occur.

Conclusion

Implementation of the no action alternative would not result in impacts to vegetation and vegetative communities in the project areas, as there would be no modifications to these resources. There would be no cumulative impacts.

IMPACTS OF ALTERNATIVE B: UPGRADE AND REHABILITATE RADIO SYSTEM

Analysis

Under alternative B, the park would construct two new radio tower repeater sites, the Rymer Ridge and Cedargrove sites. Construction of the radio towers at both sites would require an area approximately 75 feet by 75 feet that would need to be cleared of trees, brush, and vegetation.

In preparation for construction activities, grading and leveling of construction areas would occur temporarily in areas currently maintained as turf or natural vegetation. As a result of construction activities, vegetation in the area of construction would be disrupted and removed. Resource protection

measures would include the employment of best management practices, which would include minimizing cutting trees whenever possible, and clearly noting vegetation clearing limits on construction documents and marking them in the field to minimize disturbance and alteration of vegetation and native habitat. Construction activities would have a localized short-term negligible to minor adverse impact on vegetation in the project areas and would be expected to stay within the 75-feet by 75-feet clearing.

The proposed radio tower location at Rymer Ridge is currently undeveloped, with construction requiring the removal of approximately 75 hickory, pine, oak, and ash trees as well as other vegetation. Approximately 12 of the 75 trees are mature trees. The removal of existing vegetation would result in localized, long-term minor adverse impacts to vegetation at the Rymer Ridge site.

Vegetation at the proposed Cedargrove site has been previously disturbed as the location was once a ranger station and, although the ranger station cabin in no longer present, a clearing remains. Although vegetation at this location has been previously disturbed, the construction of a radio tower and access road would require the removal of approximately 7 to 10 large diameter oak and hickory trees resulting in localized, long-term negligible to minor adverse impacts on vegetation at Cedargrove.

Cumulative Impacts

Projects that could affect vegetation include past, present, and reasonably foreseeable future projects at the park, as well as development that would involve construction in or around the project area. Future projects include the GMP, which could result in localized minor impacts on vegetation depending on potential development stemming from the plan. Potential construction activities associated with the GMP could result in localized short- and long-term minor adverse impacts on vegetation. However, the potential for reestablishment of natural vegetation exists, which could result in long-term beneficial impacts. When combined with the localized short- and long-term, negligible to minor, adverse impacts from construction activities and removal of trees in alternative B, cumulative impacts on vegetation would be short- and long term, negligible to minor adverse.

Conclusion

Construction of the proposed radio towers and access roads under alternative B would disturb and modify native plant species and vegetative communities as the result of grading and other construction activities, which would result in localized short-term, negligible to minor adverse impacts on vegetation. The loss, modification, and disturbance of native plant species from the construction of a radio tower and access road at Rymer Ridge would result in localized, long-term, minor, adverse impacts on vegetation. The loss, modification, and disturbance of native plant species from the construction of a radio tower at Cedargrove would result in localized, long-term, negligible to minor, adverse impacts on vegetation. Overall, cumulative impacts on vegetation would be short- and long-term, negligible to minor adverse.

WILDLIFE AND WILDLIFE HABITAT, INCLUDING SPECIAL STATUS SPECIES

METHODOLOGY AND ASSUMPTIONS

Information on wildlife species occurring in the project areas was based on review of existing literature on the areas and consideration of common wildlife species likely to occur in the park. Analysis of potential impacts on wildlife was based on the potential for species to use the proposed project sites or to be affected by project activities or loss of habitat associated with the proposed upgrade and rehabilitation of the radio system in the project areas.

STUDY AREA

The geographic study area for impacts on wildlife and wildlife habitat includes a one-mile radius of both project areas for the proposed tower construction at the park as well as associated areas that would be used as construction staging for equipment and supplies. It is expected that construction activities would not occur outside these areas. The study area also includes airspace associated with the presence and operation of the towers within the park and at five repeater sites located outside of the park boundary. The study area for cumulative analysis includes areas of physical disturbance and areas of radio operation as described above.

IMPACT DEFINITIONS

The impact intensities for wildlife and wildlife habitat were defined as follows:

Negligible: There would be no observable or measurable impacts on native species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations.

Minor: Impacts would be detectable, but they would not be expected to be outside the natural range of variability of native species' populations, their habitats, or the natural processes sustaining them.

Moderate: Readily detectable impacts outside the range of natural variability would occur on native animal populations, their habitats, or the natural processes sustaining them. The change would be measurable in terms of population abundance, distribution, quantity, or quality, and would occur over a relatively large area. Mitigation to offset adverse impacts could be extensive, but would likely be successful.

Major: Readily apparent impacts outside the range of natural variability would occur on native animal populations, their habitats, or the natural processes sustaining them. The change would be measurable in terms of population viability and could involve the displacement, loss, or restoration of a wildlife population or assemblage. Mitigation measures to offset the adverse impacts would be required and would be extensive, and success of the mitigation measures would not be guaranteed.

Beneficial: A beneficial impact would occur when actions were taken to actively preserve, stabilize or return native animal populations, their habitats, or the natural processes sustaining them to their pre-existing condition.

Duration: Short-term impacts occur during the implementation of the alternative; long-term impacts extend beyond implementation of the alternative.

The impact intensities for threatened and endangered species were classified using the following terminology, as defined under the ESA:

No effect – The proposed action would not affect a listed species or designated critical habitat OR listed species or designated habitat are not present.

May affect / not likely to adversely affect – Effects on listed species are discountable (i.e., extremely unlikely to occur and not able to be meaningfully measured, detected, or evaluated) or completely beneficial.

May affect / likely to adversely affect – When an adverse effect to a listed species may occur as a direct or indirect result of proposed actions and the effect is either not discountable or completely beneficial.

Likely to jeopardize proposed species / adversely modify proposed critical habitat – The appropriate conclusion when NPS identifies situations in which actions could jeopardize the continued existence of a proposed species or adversely modify critical habitat to a listed species within and/or outside park boundaries.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

Under the no action alternative, there would be no removal of vegetation or disruption of wildlife habitat. Implementation of the no action alternative would result in no impact to wildlife habitat, as upgrading radio equipment at the existing repeater sites would not alter the existing habitat in those locations. However, the continued use of radio towers for communication between park personnel within the park can adversely affect resident and migratory bird species, bats, bees, and other pollinators.

Although studies have not been conducted in the United States on radiation impacts to wild bird populations, studies in Europe have raised concerns about the impacts of low-level, non-thermal radiation on a variety of bird species (DiCarlo et. al. 2002). Preliminary research on wild birds at cellular phone tower sites in Spain showed strong negative correlations between levels of tower-emitted microwave radiation and bird breeding, nesting, and roosting in the vicinity of the electromagnetic fields (EMFs) (Balmori 2003). Everaert and Bauwens (2007) found strong negative correlations between the amount of radiation presence (both in the 900 and 1800 MHz frequency bands) and the presence of male house sparrows. Radiation has also been implicated in the effects on domestic honeybees and other pollinators. Honeybees have been declining due to colony collapse disorder by 60 percent at U.S. West Coast apiaries and 70 percent along the East Coast (Cane and Tepedino 2001). One theory regarding bee declines proposes that radiation from mobile phone antennas is interfering with bee navigational systems. Studies performed in Europe have documented navigational disorientation, lower honey production, and decreased bee survivorship (Bowling 2007; Harst et al. 2006; Kimmel et al. 2006).

Electromagnetic radiation can also result in physical and behavioral changes in foraging bats. The wing membranes of bats present a large surface area over which radiation might be absorbed, increasing heat load on the mammal. This, combined with the heat energy produced during flight makes bats particularly susceptible to overheating. Therefore, it is possible that thermal induction, resulting from EMF exposure in the vicinity of radar installations, could lead to discomfort or hyperthermia depending on EMF strength and the duration of exposure (Nicholls and Racey 2007). In addition, it is also possible that EMFs could result in echolocation interference, inhibiting prey detection or capture (Nicholls and Racey 2007, 2009).

Communication tower radiation may already be impacting breeding and migrating populations of birds, bees, and bats, resulting in long-term adverse impacts. However, it is likely that the impacts are negligible to minor based on the continuing abundance and diversity of species in the park. Therefore, the implementation of alternative A would result in long-term negligible to minor adverse impacts on wildlife species in the park, including state-listed species, from the potential physical and behavioral effects of electromagnetic radiation.

Federally Listed Species

Gray bats inhabit caves year round, and travel extensively to forage. It is possible that the presence of towers and ongoing radio operations affect this species, but they remain relatively abundant in the park, and it is not anticipated that effects could be quantified. It is also possible that the Indiana bat may be affected by ongoing radio operations, but there are no known populations in the vicinity of either project area. The majority of Missouri's Indiana bat population inhabits eight caves, none of which are near the project areas, therefore fatalities due to collisions with the two proposed towers could occur, but would not be expected to occur at a rate that would impact the Indiana bat population. Incidents of hyperthermia or behavioral changes would be possible for both species, but would not likely be measurable or appreciable Based on continued species abundance and diversity in the park, implementation of alternative A is *not likely to adversely affect* the gray bat and Indiana bat (see "Appendix C: Agency Consultation Letters").

As described above, studies indicate that exposure to electromagnetic radiation can affect bird abundance and behavior in the vicinity of EMFs. Towers also present strike hazards for flying birds. It is anticipated that effects of ongoing radio use and tower presence would have limited effects on the cerulean warbler. The current tower network meets the USFWS criteria for reducing impacts to migratory bird species. The species is present in the park for about half of the year and in limited numbers. It is not anticipated that adverse effects on would be meaningful or measurable. Therefore, implementation of alternative A, which does not include removal of vegetation or disruption of habitat, *may affect, but is not likely to adversely affect* the cerulean warbler.

Cumulative Impacts

Projects that could impact wildlife and wildlife habitat include past, present, and reasonably foreseeable future projects at the park involving development and construction that result in land-disturbing activities, as well as construction of communication towers. Future projects include the GMP, which could result in localized minor impacts on wildlife habitat depending on potential development stemming from the plan. Potential construction activities associated with the GMP could result in localized short- and long-term negligible to minor adverse impacts on wildlife habitat. However, the potential for reestablishment of natural vegetation exists, which could result in long-term beneficial impacts to wildlife as new habitat would be established.

Construction of communication towers (including radio, television, cellular, and microwave) in the United States has been increasing at an estimated six to eight percent annually since development of the cellular telephone, and construction continues at a rate of approximately 1,000 towers per month (USFWS 2010). Current and future communication towers in or near the park could result in long-term minor adverse impacts to certain wildlife species (i.e., birds, bats, and bees) from the physical and behavioral changes associated with electromagnetic radiation. In addition, communication towers pose a substantial threat to migratory birds, killing an estimated four to five million birds per year from collisions. Especially vulnerable are neotropical migratory songbirds (NMDGF 2001).

When combined with the localized long-term, negligible to minor, adverse impacts of alternative A, cumulative impacts on wildlife and wildlife habitat would be short- and long-term, negligible to minor adverse.

Conclusion

Implementation of the no action alternative would not result in impacts to wildlife habitat in the project areas, as there would be no modifications to native habitat. However, long-term negligible to minor

adverse impacts would result from the potential physical and behavioral effects of electromagnetic radiation on birds, bats, and bees within the park. Alternative A is not likely to adversely affect the federally endangered gray bat, the federally endangered Indiana bat, or the federally candidate cerulean warbler. Overall, cumulative impacts on wildlife and wildlife habitat would be long-term, negligible to minor and adverse.

IMPACTS OF ALTERNATIVE B: UPGRADE AND REHABILITATE RADIO SYSTEM

Analysis

Under alternative B, the park would construct two new radio tower repeater sites, the Rymer Ridge and Cedargrove sites. Construction of the radio towers at both sites would require an area approximately 75 feet by 75 feet that would need to be cleared of trees, brush, and vegetation.

In preparation for construction activities, grading and leveling of construction areas would occur temporarily in areas currently maintained as turf or natural vegetation. Implementation of alternative B would likely displace those species that currently use the areas where the proposed activities would be taking place. This displacement would result from the increased human activity and noise associated with construction vehicles on the site. In addition, mortality or injury of some smaller, less mobile, species could occur as a result of construction activities. Mitigation would include clearly noting vegetation clearing limits on construction documents and marking them in the field to minimize disturbance and alteration of vegetation and native habitat. Pre-construction and construction activities would have localized minor adverse impacts on wildlife and wildlife habitat, including state-listed species, in the project areas due to the relatively small areas being affected and the fact that there are other areas adjacent to the construction sites where displaced individuals could move that would provide adequate habitat. The loss or displacement of individuals of a non-federally threatened or endangered species would not affect the viability of the populations in and adjacent to the park. These minor adverse impacts on wildlife and wildlife habitat would be short-term because they would only occur during the construction period. Following construction activities, it is expected that any displaced species would likely return to the area.

The proposed radio tower location at Rymer Ridge is currently undeveloped, with construction requiring the removal of approximately 75 hickory, pine, oak, and ash trees as well as other vegetation. Approximately 12 of the 75 trees are mature trees. The removal of existing vegetation would result in localized, long-term minor adverse impacts on wildlife, including state-listed species, at Rymer Ridge from the loss of native habitat and habitat fragmentation due to increased edge habitat.

Vegetation and habitat at the proposed Cedargrove site has been previously disturbed as the location was once a ranger station. Although the ranger station cabin in no longer present, a clearing remains. While vegetation at this location has been previously disturbed, the construction of a radio tower and access radio would require the removal of approximately seven to ten large diameter oak and hickory trees resulting in localized, long-term negligible to minor adverse impacts on wildlife, including state-listed species, at Cedargrove from loss of native habitat for species that depend on those trees for food and/or shelter.

As described under alternative A, continued use of radio towers for communication between park personnel within the park and the associated effects of electromagnetic radiation could result in long-term adverse impacts on birds, bats, bees, and other wildlife species within the park. Under alternative B, these impacts are expected to be minor due to the presence of radio towers at Cedargrove and Rymer Ridge and the resulting increased radio coverage area at those sites.

The long-term presence of the radio towers at the Rymer Ridge and Cedargrove sites could potentially create a long-term impact on migratory birds (USFWS 2000). Birds most affected by collisions with communication towers (70 to 80 percent of fatalities in the eastern U.S.) are those that migrate at night, which are mostly songbirds (Smith 2010). Of these, thrushes (Muscicapidae), vireos (Vireonidae), and warblers (Parulidae) are most vulnerable (NMDGF 2001). Bats are also known to die from such collisions (Smith 2010). However, mitigation for the potential adverse impacts on migratory birds and bats at the project areas include following USFWS guidance on the construction and operation of communication towers (see "Chapter 1: Specific Authorities and Guidance for Special Parks Uses Including Telecommunication Facilities"). The towers at the Rymer Ridge and Cedargrove sites would not exceed 199 feet, would not require guy wires, and would not require tower or safety lighting, which would likely reduce the risk of collisions at both sites (Smith 2010). Therefore, the presence of the towers at Rymer Ridge and Cedargrove would likely result in long-term minor adverse impacts on migratory and resident birds (including state-listed birds), as well as bats within the park.

Threatened and Endangered Species

Federally Listed Species

No roosting habitat exists in the project areas, as gray bats inhabit caves year-round. Although they can travel long distances from caves to forage, foraging habitat is closely associated with rivers, streams, or lakes (MDC n.d.e; USFWS 2009). In addition, foraging is expected to be minimal to non-existent during the proposed time for tree removal (November 1 to March 1) at Rymer Ridge and Cedargrove as gray bats generally remain in hibernation caves throughout the winter months (USFWS 2009). However, as described under alternative A, the presence and operation of the radio towers after could result in long-term adverse impacts for bats due to physical and behavioral effects from tower collisions and electromagnetic radiation. Although these factors could threaten the gray bat, its use of cave habitat year-round would likely limit the threats considerably. In consultation with the USFWS, the USFWS stated that bat collisions with towers are rare and concurred that implementation of alternative B is *not likely to adversely affect* the gray bat.

Site design for construction of the radio towers would require the removal of suitable roost trees for the Indiana bat at Rymer Ridge and Cedargrove. Indiana bats are known to use hickory, oak, elm, and pine trees for roosting habitat (Burgess 2010). Dominant vegetation at the Rymer Ridge site includes hickory, oak, and pine trees, and 75 trees, 12 of which are mature, would be removed under alternative B. At Cedargrove, seven to ten oak and hickory trees would be removed. Impacts to the two sites would be mitigated by only allowing tree removals to occur outside of the roosting season, specifically between November 1 and April 1. Because management actions would occur outside of the normal roosting season and additional habitat is available (if needed) adjacent to both project areas, the impact of construction activities and removal of native habitat under alternative B on the Indiana bat would not likely be measurable. As described under alternative A, the presence and operation of the radio towers has the potential to result in long-term adverse impacts on bats due to physical and behavioral effects from tower collisions and electromagnetic radiation. While it is possible that these effects could be measurable for the Indiana bat, there are no known Indiana bat populations in the vicinity of either project area. Impacts resulting from electromagnetic radiation would continue to occur as described under alternative A. The majority of Missouri's Indiana bat population inhabits eight caves, none of which are near the project areas, therefore fatalities from collisions with the two proposed towers could occur, but would not be expected to occur at a rate that would measurably impact the Indiana bat population. Consultation with the USFWS confirmed that there is limited potential roosting habitat at each of the project sites and concurred that implementation of alternative B is *not likely to adversely affect* the Indiana bat so long as tree removal occurs outside of the roosting season (see "Appendix C: Agency Consultation Letters").

Site design for construction of the radio towers would require the removal of suitable breeding habitat for the cerulean warbler at Rymer Ridge and Cedargrove. As described in chapter 3, the cerulean warbler breeds in forests with tall deciduous trees and open understory, such as wet bottomlands and dry slopes. Additionally, the primary threat to the warbler is habitat degradation and fragmentation, which would likely result from the removal of trees at the project areas, particularly at Rymer Ridge. However, it is expected that the impacts of construction activities at both locations would be negligible because they would occur outside of the normal breeding season (March-October) and additional habitat is available (if needed) adjacent to both project areas. As described under alternative A, the presence and operation of the radio towers could result in long-term adverse impacts for birds due to physical and behavioral effects from tower collisions and electromagnetic radiation, however the design of the towers would include mitigation measures to reduce impacts to bird species, including a height less than 200 feet, no safety lighting, no guy wires, and a small footprint. Therefore, implementation of alternative B, is *not likely to adversely affect* the cerulean warbler in the park.

Cumulative Impacts

Past, present, and reasonably foreseeable future projects at the park would be the same as those described under alternative A. When combined with the localized short- and long-term, minor, adverse impacts from the construction, presence, and operation of two radio towers under alternative B, cumulative impacts on wildlife and wildlife habitat would be short- and long-term, minor adverse.

Conclusion

Construction of new radio towers and access roads under alternative B would disturb wildlife and modify native habitat as the result of grading and other construction activities, which would result in localized short-term, negligible to minor adverse impacts on wildlife and wildlife habitat. The loss, modification, and disturbance of habitat from the construction of the radio towers and access roads at both the Rymer Ridge and Cedargrove sites would result in localized, long-term, negligible to minor, adverse impacts on wildlife and wildlife habitat. The presence and operation of the radio towers would result in long-term minor adverse impacts on birds, bats, and bees due to collisions and/or the effects of electromagnetic radiation. Alternative B is not likely to adversely affect the federally endangered gray bat, the federally endangered Indiana bat or candidate cerulean warbler. Overall, cumulative impacts on wildlife and wildlife habitat would be short- and long-term, minor and adverse.

PARK OPERATIONS AND MANAGEMENT, INCLUDING VISITOR PROTECTION

METHODOLOGY AND ASSUMPTIONS

Park management and operations, including visitor protection, for the purpose of this analysis, refer to the quality and effectiveness of park staff to maintain and administer park resources and provide for an appropriate visitor experience and protection. The impact analysis is based on the current description of park operations presented in “Chapter 3: Affected Environment” of this document.

STUDY AREA

The geographic study area for park operations and management is within the entire park.

IMPACT DEFINITIONS

The following definitions were used to assess the intensity of adverse impacts on park management and operations, including visitor protection and duration of impacts:

Negligible: Effects are at the lowest levels of detection with no adverse consequences.

Minor: Effects would be slight, with little change in the park's ability to provide emergency response, law enforcement, or discharge other duties and responsibilities in a cost effective manner.

Moderate: Effects would have measureable consequences for the park's ability to provide emergency response, law enforcement, or discharge other duties and responsibilities in a cost effective manner.

Major: Effects would have considerable consequences for the park's ability to provide emergency response, law enforcement, or discharge other duties and responsibilities in a cost effective manner.

Beneficial: Effects to park operations would result in reduced demands placed on park resources, including labor hours, equipment usage, and funding.

Duration: Short-term impacts would occur during the initial introduction of the narrowband digital radio system.

Long-term impacts would persist after implementation of the alternative.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis

Under alternative A, the park would upgrade the existing wideband analog communication system to narrowband digital by replacing the equipment at five existing tower locations off of NPS property. NPS staff park-wide would be able to communicate with each other on one channel, as the new radio system would include Vote Scan capabilities and automatically use the closest repeater site, eliminating the need for park personnel to manually switch channels as they traverse the park.

The implementation of narrowband digital radio communications would require an upgrade or purchase of approximately 220 radios. Of the existing radios with AES encryption, 72 would be upgraded with the Vote Scan capability. Additional mobile, portable, and boat radios would be purchased prior to the switch to narrowband digital, which would be a short-term, minor, adverse impact to park operations and management due to the cost of upgrades and purchasing new equipment. The new and upgraded radios would be programmed with the existing radio system channels so that the radios could be used prior to the system switch. Park personnel would only be required to switch the radios to the narrowband digital channel once the infrastructure was in place, minimizing any short-term adverse impact to staff. Overall, there would be long-term beneficial impacts to park operations and management as a result of the increased communication capabilities park-wide under the narrowband digital communication system.

In addition to increased communication capabilities, Visitor Protection staff would receive additional benefits from the AES encryption capabilities selected radios. The AES encryption would allow Visitor

Protection staff to transmit on a secure signal so that only other radios with the matching encryption key would be able to decode the encrypted transmission. The ability to transmit messages on a secure signal safeguards confidential information and increases ranger safety. Currently, anyone listening in on the same radio channel can determine the location of rangers, who work alone and rely on the system to communicate with other park staff. Encryption capabilities would allow rangers to communicate freely when responding to incidents or transmitting sensitive information, resulting in long-term, beneficial impacts to visitor protection.

Under alternative A, no additional radio towers would be constructed within the park, and spotty coverage would continue in several areas of the park, including the Cedargrove and Rymer Ridge locations. Radio coverage in these areas would remain at approximately 45 and 35 percent coverage, respectively, and continue to be unavailable in some areas. The ability for rangers to call for back-up or communicate with other NPS staff would be hindered, as well as limiting the response time for emergency incidences, resulting in long-term, moderate, adverse impacts to park operations and management and visitor protection.

Overall, the upgrade to the narrowband digital radio system would result in long-term beneficial impacts from increased communication capabilities and the ability for visitor protection staff to transmit on an encrypted channel. There would be short-term, minor, adverse impacts from the cost of upgrading existing radios or purchasing new radios for park staff prior to switching to the new system. There would be long-term moderate adverse impacts to park operations and visitor protection from deficient coverage in two areas where the current coverage is deemed unacceptable.

Cumulative Impacts

Projects that could contribute to cumulative impacts include the GMP. The GMP would be expected to contribute long-term beneficial impacts to park operations by implementation of management zoning and improved resource protection. When combined with the short-term minor and long-term, moderate adverse and long-term beneficial impacts to park operations and management, including visitor protection under alternative A, cumulative impacts would be long-term, minor, adverse.

Conclusion

Implementation of alternative A would result in long-term, moderate, adverse impacts to park operations and management, including visitor protection from the lack of full radio coverage within the park. There would be short-term, minor, adverse impacts from the costs of the initial radio upgrades and purchasing of new radios, but long-term, beneficial impacts from increased park-wide communications and visitor protection radio encryption capabilities. Cumulative impacts would be long-term, minor, and adverse.

IMPACTS OF ALTERNATIVE B: UPGRADE AND REHABILITATE RADIO SYSTEM

Analysis

Under alternative B, the park would upgrade the existing wideband analog communication system to narrowband digital. Impacts to park operations and management, including visitor protection from the switch from a wideband analog to narrowband digital park communications system would be the same as described under alternative A, including the beneficial impacts received from encryption capabilities.

Alternative B would also include the construction of two radio tower repeater locations within the park in areas where radio coverage has been deemed unacceptable by park staff. These proposed towers, located at Cedargrove and Rymer Ridge, would provide coverage in areas that currently experience deficient

radio coverage. Coverage would be expanded to 85 or 90 percent of the Rymers and Cedargrove area, greatly increasing the ability for communication between NPS staff in these locations. With improved coverage, it would be expected that emergency response times would decrease and rangers would be able to call for back-up without driving to an area with radio coverage. Benefits for visitor protection would be improved in the Cedargrove area, a popular visitor area that does not currently have radio coverage, providing a long-term beneficial impact to visitor protection.

Cumulative Impacts

Cumulative impacts to park operations and management, including visitor protection, would be the same as described under alternative A, with the GMP resulting in long-term beneficial impacts to park operations and management, including visitor protection. When combined with the short-term, minor adverse and long-term, beneficial impacts under alternative B, cumulative impacts would be long-term beneficial.

Conclusion

Implementation of alternative B would result in short-term, minor, adverse impacts and long-term, beneficial impacts to park operations and management, including visitor protection. Cumulative impacts to park operations and management would be long term and beneficial.

CHAPTER 5: CONSULTATION AND COORDINATION

Coordination with state and federal agencies was conducted during the NEPA process to identify issues and/or concerns related to natural and cultural resources within the park.

In accordance with Section 7 of the *Endangered Species Act* of 1973, in December 2010 the NPS sent a letter to solicit comments from the USFWS regarding the existence of threatened or endangered species within the project area. In a letter dated March 22, 2011, USFWS responded and concurred that alternative B would be not likely to adversely affect the gray bat, Indiana bat, or Virginia sneezewood. The USFWS also stated that since the NPS would adhere to mitigation measures regarding the height, structure, and lighting on the proposed towers, alternative B would not adversely impact migratory birds. The full USFWS response is provided in appendix C.

The proposed actions described in this EA are subject to Section 106 of the National Historic Preservation Act, as amended (16 USC 470 et seq.). In December 2010, NPS sent a letter to the State of Missouri Department of Natural Resources (DNR) to notify the Missouri SHPO of the proposed project. The Missouri SHPO responded on January 7, 2011, and stated that they would be interested in receiving and reviewing the EA.

This EA will also be submitted to the eight American Indian tribes traditionally associated with park lands: Shawnee Tribe (Miami, OK), Cherokee Nation (Tahlequah, OK), United Keetoowah Band of Cherokee Indians (Tahlequah, OK), Delaware Nation (Anadarko, OK), Absentee Shawnee Tribe of Oklahoma (Shawnee, OK), Osage Nation (Pawhuska, OK), Delaware Tribe of Indians (Bartlesville, OK), and the Eastern Shawnee Tribe of Oklahoma (Seneca, MO). The proposed project was among several potential park projects discussed during face-to-face tribal consultations in November, 2010. No comments regarding the proposed project were received either during the consultations or in subsequent months. If subsequent issues or concerns are identified, appropriate consultations would be undertaken.

During public scoping period, the NPS received no comments from the public regarding the proposed action.

This EA will be made available to the public and distributed to affected/interested agencies for a 30-day review and comment period. Notice of its availability will be posted on the NPS PEPC website at www.parkplanning.gov/OZAR.

CHAPTER 6: LIST OF PREPARERS

U.S. DEPARTMENT OF THE INTERIOR, NATIONAL PARK SERVICE

DENVER SERVICE CENTER

12795 West Alameda Parkway
Lakewood, CO 80228

Connie Chitwood, Natural Resource Specialist
Greg Cody, Technical Specialist for Cultural Resources
Rick Rampi, Project Manager
Scott Thomas, Project Specialist

OZARK NATIONAL SCENIC RIVERWAYS

404 Watercress Drive
P.O. Box 490
Van Buren, MO 63965

Kimberly Houf, Terrestrial Ecologist
Dr. James Price, Chief, Resource Management Division
Joe Strenfel, Environmental Protection Specialist
Jodi Towery, Law Enforcement Specialist

THE LOUIS BERGER GROUP, INC.

535 16th Street, Suite 600
Denver, CO 80202

Megan Blue-Sky, GIS/Environmental Scientist
Jacklyn Bryant, QA/QC
Rebecca Byron, Project Manager/Environmental Planner
George Dizelos, Geospatial Analyst
Emily Larson, Environmental Scientist
Lia Peckman, Environmental Scientist
David Plakorus, Environmental Planner

THE FINAL WORD

P.O. Box 291
Fairplay, CO 80440

Juanita Barboa, Editor
Sherrie Bell, Editor / Document Design

CHAPTER 7: GLOSSARY AND ACRONYMS

GLOSSARY OF TERMS

Affected environment—The existing environment to be affected by a proposed action and alternatives.

Consultation—The act of seeking and considering the opinions and recommendations of appropriate parties about undertakings that might affect properties on the National Register. Appropriate parties ordinarily include the State Historic Preservation Officer and Advisory Council on Historic Preservation. Consultation is very formal and procedurally oriented. Correct procedures are promulgated in 36 CFR 800.

Council on Environmental Quality (CEQ)—Established by Congress within the Executive Office of the President with passage of the *National Environmental Policy Act* of 1969. CEQ coordinates federal environmental efforts and works closely with agencies and other White House offices in the development of environmental policies and initiatives.

Cultural landscape—A geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values.

Cultural resources—Historic districts, sites, buildings, objects, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or any other reason.

Enabling legislation—National Park Service legislation setting forth the legal parameters by which each park may operate.

Environmental assessment (EA)—An environmental analysis prepared pursuant to the *National Environmental Policy Act* to determine whether a federal action would significantly affect the environment and thus require a more detailed environmental impact statement.

Ethnographic resource—A site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it.

Executive Order—Official proclamation issued by the President that may set forth policy or direction or establish specific duties in connection with the execution of federal laws and programs.

Finding of No Significant Impact (FONSI)—A document prepared by a federal agency showing why a proposed action would not have a significant impact on the environment and thus would not require preparation of an Environmental Impact Statement. A FONSI is based on the results of an environmental assessment.

***National Environmental Policy Act* of 1969 (USC 432 1-4347) (NEPA)**—The Act as amended articulates the federal law that mandates protecting the quality of the human environment. It requires federal agencies to systematically assess the environmental impacts of their proposed activities, programs, and projects including the "no action" alternative of not pursuing the proposed action. NEPA requires agencies to consider alternative ways of accomplishing their missions in ways which are less damaging to the environment.

***National Historic Preservation Act* of 1966 (16 USC 470 et seq.)**—An Act to establish a program for the preservation of historic properties throughout the nation, and for other purposes, approved October 15, 1966 [Public Law 89-665; 80 STAT.915; 16 USC 470 as amended by Public Law 91-243, Public Law 93-54, Public Law 94-422, Public Law 94-458, Public Law 96-199, Public Law 96-244, Public Law 96-515, Public Law 98-483, Public Law 99-514, Public Law 100-127, and Public Law 102-575].

Organic Act—Enacted in 1916, this Act commits the National Park Service to making informed decisions that perpetuate the conservation and protection of park resources unimpaired for the benefit and enjoyment of future generations.

Planning, Environment, and Public Comment—The National Park Service website for public involvement. This site provides access to current plans, environmental impact analyses, and related documents on public review. Users of the site can submit comments for documents available for public review.

Scoping—Scoping, as part of the *National Environmental Policy Act*, requires examining a proposed action and its possible impacts; establishing the depth of environmental analysis needed; determining analysis procedures, data needed, and task assignments. The public is encouraged to participate and submit comments on proposed projects during the scoping period.

Section l06—Refers to Section l06 of the *National Historic Preservation Act* of l966, which requires federal agencies to take into account the effects of their proposed undertakings on properties included or eligible for inclusion in the National Register of Historic Places and give the ACHP a reasonable opportunity to comment on the proposed undertakings.

State Historic Preservation Officer (SHPO)—Official appointed by the governor of each state and U.S. Territory, responsible for certain responsibilities relating to federal undertakings within the state.

ACRONYMS

AES	Advanced Encryption Standard
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DNR	Department of Natural Resources
EA	environmental assessment
EMF	electromagnetic field
EPA	U.S. Environmental Protection Agency
ESA	*Endangered Species Act*
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
GIS	Geographic Information System
GHG	greenhouse gas
GMP	general management plan
LMR	Land Mobile Radio
MDC	Missouri Department of Conservation
MHPO	Missouri Historic Preservation Officer
NEPA	*National Environmental Policy Act*
NPS	National Park Service
NPDES	National Pollutant Discharge and Elimination System
PEPC	Planning, Environment and Public Comment
SHPO	State Historic Preservation Office
TCP	Traditional Cultural Property
USC	United States Code
USFWS	U. S. Fish & Wildlife Service
VHF	Very High Frequency
WNS	White Nose Syndrome

CHAPTER 8: BIBLIOGRAPHY

Arduser, Mike

2001 "Pollinator Power." *Missouri Conservationist*, July 2001. Missouri Department of Conservation. Available online at: http://mdc.mo.gov/conmag/2001/07/pollinator-power. Accessed 24 February 2011.

Association of Public-Safety Communications Officials – International (APCO)

2007 *VHF/UHF Narrowband Mandate: It's Closer Than you Think.* Public Safety Communications Brochure. August, 2007.

Audubon

n.d. Cerulean Warbler (*Dendroica cerulea*). National Audubon Society, Inc. Available online at: http://audubon2.org/watchlist/viewSpecies.jsp?id=64. Accessed 23 February 2011.

Balmori, A.

2003 The effects of microwave radiation on the wildlife. Preliminary results, Valladolid, Spain, February. Manuscript submitted for publication to Electromagnetic Biology and Medicine.

Bowling, M.

2007 Where are the birds and bees? Health Action Magazine, Summer: 21-22.

Burgess, A.

2010 "Myotis sodalis." Animal Diversity Web (Online). Accessed 28 December 2010. Available online at: http://animaldiversity.ummz.umich.edu/site/accounts/information/Myotis_sodalis.html.

Cane, J.H. and V.J. Tepedino

2001 Causes and Extent of Declines Among Native North American Invertebrate Pollinators: Detection, Evidence, and Consequences. Conservation Ecology 5(1). 7 pp.

Chesapeake Bay Program

n.d. Marsh Rice Rat. Bay Field Guide. Available online at: http://www.chesapeakebay.net/bfg_marsh_rice_rat.aspx?menuitem=48235. Accessed 24 February 2011.

Cornell Lab of Ornithology

n.d. All About Birds. Bird Guide (Online). Cornell University. Available online at: http://www.allaboutbirds.org/guide/search.

Council on Environmental Quality (CEQ)

1978 Executive Office of the President. 1978. Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act. Code of Federal Regulations Title 40, Parts 1500-1508. Washington D.C.

1980 "Analysis of Impacts on Prime and Unique Agricultural Lands in Implementing NEPA." *Federal Register* 45: 59189.

1997 "Considering Cumulative Effects under the National Environmental Policy Act."

DiCarlo, A., N. White, F. Guo, P. Garrett, and T. Litovitz.

2002 Chronic Electromagnetic Field Exposure Decreases HSP70 Levels and Lower Cytoprotection. Journal Cellular Biochemistry 84: 447-454.

Everaert, J. and D. Bauwens

2007 A Possible Effect of Electromagnetic Radiation from Mobile Pone Base Stations on the Number of Breeding House Sparrows (Passer domesticus). Electromagnetic Biology and Medicine 26: 63-72.

Gaul, Karen (Hendrix College) and Corey Lashlee

2001 "Women of the Riverways – Special Emphasis Ethnographic Study for the Ozark National Scenic Riverways," prepared for the National Park Service, Midwest Regional Office, Omaha, Nebraska.

2005 "Rural Ozark Women and Traditional Associations to the Ozark National Scenic Riverway." Included in "Traditionally Associated Peoples and Ethnographic Resources," NPS Ethnography Program.

Georgia Museum of Natural History

n.d. Species Description – Golden Mouse. Georgia Museum Natural History, University of Georgia. Available online at: http://naturalhistory.uga.edu/~gmnh/gawildlife/index.php?page=speciespages/species_page&key=onuttalli. Accessed 23 February 2011.

Harst, W., J. Kuhn, and H. Stever

2006 Can electromagnetic exposure cause a change in behaviour? Studying possible non-thermal influences on honey bees – an approach within the framework of educational informatics. Acta Systemica-IIAS International Journal 6(1): 1-6.

Houf, K.

2011a Personal Communication between Kimberly Houf (NPS) and Rebecca Byron (LBG). January 27, 2011.

2011b Personal Communication between Kimberly Houf (NPS) and Rebecca Byron (LBG). February 22, 2011.

Institute of Water Research (IWR) Michigan State University

2010 *K Factor*. Available online at: http://www.iwr.msu.edu/rusle/kfactor.htm. Accessed December 12, 2010

Kimmel, S., J. Kuhn, W. Harst, and H. Stever

2006 Electromagnetic radiation: influences on honeybees (*Apis mellifera*). Institute Environmental Sciences, Institute Science and Science Education, and Institute Educational Informatics, Univ. Koblenz-Landau/Campus Landau, Germany. 6 pp.

Lower Mississippi River Conservation Committee

n.d. Plains Spotted Skunk. Available online at: http://www.lmrcc.org/Ecosystempage1_html/E-T%20Species/Plains%20Spotted%20Skunk.htm.

Missouri Department of Conservation (MDC)

n.d.a Mountain Lions – Life History, Habits and Range. Conservation Commission of Missouri. Available online at: http://mdc.mo.gov/discover-nature/wildlife-sightings/mountain-lions/life-history-habits-and-range. Accessed 22 December 2010.

n.d.b Deer – Life History. Conservation Commission of Missouri. Available online at: http://mdc.mo.gov/hunting-trapping/deer/life-history. Accessed 22 December 2010.

n.d.c Planning Ahead for Wildlife Survival: White-tailed Deer Management. Conservation Commission of Missouri. Available online at: http://mdc.mo.gov/landwater-care/animal-management/deer-management/planning-ahead-wildlife-survival-white-tailed-deer-. Accessed 27 December 2010.

n.d.d Elk Restoration. Conservation Commission of Missouri. Available online at: http://mdc.mo.gov/landwater-care/animal-management/elk-restoration. Accessed 27 December 2010.

n.d.e Field Guide. Conservation Commission of Missouri. Available online at: http://mdc.mo.gov/discover-nature/field-guide. Accessed 28 December 2010.

n.d.f Lizards. Conservation Commission of Missouri. Available online at: http://mdc.mo.gov/discover-nature/outdoor-recreation/nature-viewing/amphibians-and-reptiles/lizards.

2004 Snakes of Missouri. Written by Jeffrey T. Briggler and Tom R. Johnson, Herpetologists. August 2004. Available online at: http://mdc.mo.gov/sites/default/files/resources/2010/05/5187_3026.pdf.

2010a Elk Restoration in Missouri. October 2010. Available online at: http://mdc.mo.gov/sites/default/files/resources/2010/10/elk_restoration_flyer_approved.pdf

2010b White Nose Syndrome Action Plan. Prepared by the WNS Committee and Derek Shiels. April 2010. Available online at: http://mdc.mo.gov/sites/default/files/resources/2010/04/4195_1779.pdf.

2010c White-Nose Syndrome in Missouri. Published 27 April 2010. Available online at: http://mdc.mo.gov/discover-nature/habitats/caves-and-karst/white-nose-syndrome-missouri?page=0,0.

2010d Xplor [online]. Launched January 2010. Conservation Commission of Missouri. Available online at: http://xplor.mdc.mo.gov/xplor/wild-guide/wild-things.

Mountain Lion Foundation

n.d. Mountain Lion Biology and Behavior. Available online at: http://www.mountainlion.org/facts_biology.asp.

Museum of Texas Tech University

n.d. Marsh Rice Rat. The Mammals of Texas – Online Edition. Available online at: http://www.nsrl.ttu.edu/tmot1/oryzpalu.htm. Accessed 23 February 2011.

National Park Service (NPS)

1964 Enabling Legislation. Ozark National Scenic Riverways. Public Law 88-492, 88th Congress, Session 16. 78 Stat 608. August 27, 1964

1980 Environmental Assessment/General Management Plan. Ozark National Scenic Riverways. October 1980

1991a Roads and Trails Study and Environmental Assessment. Ozark National Scenic Riverways, Missouri. May 8, 1991.

1991b Ozark National Scenic Riverways – Birds of Ozark Riverways. Revised August 1991. Available online at: http://www.nps.gov/ozar/naturescience/loader.cfm?csModule=security/getfile&PageID=120559.

1991c "A Homeland and A Hinterland – The Current and Jacks Fork Riverways," by Donald L Stevens, Jr., NPS Midwest Regional Office, Omaha, Nebraska.

1998a Director's Order 28: Cultural Resources Management Guideline

1998b National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties. Accessible at: http://www.nps.gov/history/nR/publications/bulletins/nrb38/.

2001 Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision-making and Handbook.

2003 Director's Order 77-2 Floodplain Management Guidelines

2004 NPS-77: Natural Resources Management Reference Manual.

2006a NPS *Management Policies 2006*. Accessed online at: http://www.nps.gov/policy/MP2006.pdf.

2006b Ozark National Scenic Riverways – Plants. Available online at: http://www.nps.gov/ozar/naturescience/plants.htm. Last updated 25 July 2006. Accessed 20 December 2010.

2006c Ozark National Scenic Riverways – Animals. Available online at: http://www.nps.gov/ozar/naturescience/animals.htm. Last updated 25 July 2006.

2006d Ozark National Scenic Riverways – Natural Features & Ecosystems. Available online at: http://www.nps.gov/ozar/naturescience/naturalfeaturesandecosystems.htm. Last updated 25 July 2006.

2006e Ozark National Scenic Riverways – Mammals. Available online at: http://www.nps.gov/ozar/naturescience/mammals.htm. Last updated 25 July 2006.

2006f Ozark National Scenic Riverways – Reptiles. Available online at: http://www.nps.gov/ozar/naturescience/reptiles.htm. Last updated 25 July 2006.

2010a Ozark National Scenic Riverways. Kickoff Meeting Notes. December 15, 2010.

2010b Ozark National Scenic Riverways – Trees and Shrubs. Available online at: http://www.nps.gov/ozar/naturescience/treesandshrubs.htm. Last updated 8 September 2010. Accessed 20 December 2010.

2011 Ozark National Scenic Riverways – Birds. Available online at: http://www.nps.gov/ozar/naturescience/birds.htm. Last updated 19 January 2011.

New Mexico Department of Game and Fish (NMDGF)

2001 New Mexico Department of Game and Fish Guidelines for Mitigating Bird Mortality from Communications Towers. Conservation Services Division, July 2001. Available online at: http://www.wildlife.state.nm.us/conservation/habitat_handbook/documents/CommunicationTowerGuidelines.pdf. Accessed 24 February 2011.

Nicholls, Barry and Paul A. Racey

2007 Bats Avoid Radar Installations: Could Electromagnetic Fields Deter Bats from Colliding with Wind Turbines? PLoS ONE 2(3): e297. March 2007.

2009 The Aversive Effect of Electromagnetic Radiation on Foraging Bats – A Possible Means of Discouraging Bats from Approaching Wind Turbines. PLoS ONE 4(7): e6246.

Ohio Department of Natural Resources (Ohio DNR)

n.d. Life History Notes – Indiana Bat. Ohio Division of Wildlife. Available online at: http://www.dnr.state.oh.us/Portals/9/pdf/pub370.pdf.

Price. J

2011 Archeological Investigations at Two Proposed Radio Tower Sites in Ozark National Scenic Riverways. February 22, 2011.

Seaholm, L.

2002 *Ambystoma annulatum*. Animal Diversity Web (Online), University of Michigan Museum of Zoology. Available online at: http://animaldiversity.ummz.umich.edu/site/accounts/classification/Ambystoma_annulatum.html. Accessed 23 February 2011.

Skalicky, F.

2010 Black bear study underway in Missouri. Available online at: http://mdc.mo.gov/newsroom/black-bear-study-underway-missouri. Published on 12 October 2010.

Smith, Tim

2010 "Birds That Go 'Bump' in the Night." Published 29 December 2010. Available online at: http://mdc.mo.gov/blogs/fresh-afield/birds-go-bump-night. Accessed 17 December 2011.

Towery, J.

2010 Park Employee Numbers and Emergency Operation Stats.

2011 Personal Communication between Jodi Towery (OZAR) and Rudi Byron (LBG). February 16, 2010.

United States Department of Agriculture (USDA)

1999 Natural Resources Conservation Services: *Soil Taxonomy: A Basic System of Soil Classification for Making and Interpreting Soil Surveys*

2005 National Resources Conservation Services. *Soil Survey Shannon County, Missouri*

2010 National Resources Conservation Services. *Web Soil Survey of Dent County, Missouri*

United States Environmental Protection Agency (EPA)

1998 Final Guidance for Incorporating Environmental Justice Concerns into EPA's NEPA Compliance Analyses. April 1998.

United States Fish and Wildlife Service (USFWS)

1997 Threatened and Endangered Species – Gray Bat, *Myotis grisescens*. U.S. Fish and Wildlife Service, Fort Snelling, Minnesota. 18 September 1997. Available online at: http://www.fws.gov/midwest/endangered/mammals/pdf/gray-bat.pdf.

2000 Service Guidance on the Siting, Construction, Operation and Decommissioning of Communications Towers. United States Department of Interior, Fish and Wildlife Service,

Washington, DC. 14 September 2000. Available online at: http://www.fws.gov/migratorybirds/currentbirdissues/hazards/towers/comtow.html.

2009 Gray Bat (*Myotis grisescens*), 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Midwest Region, Columbia, Missouri Ecological Services Field Office, Columbia, Missouri. September 2009. Available online at: http://ecos.fws.gov/docs/five_year_review/doc2625.pdf.

2010a Communications Tower Siting, Construction, Operation, and Decommissioning Recommendations, Service Interim Guidelines. USFWS, Midwest Region. Available online at: http://www.fws.gov/Midwest/endangered/section7/telecomguidance.html.

2010b Endangered Species: Indiana Bat Draft Recovery Plan. Accessed online 14 January 2011 at http://www.fws.gov/midwest/endangered/mammals/inba/inba_drftrecpln16ap07.html. Last updated 14 September 2010

2011 Species Profile – Cerulean warbler (*Dendroica cerulea*). Last updated 22 February 2011. Available online at: http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B09I#candidate. Accessed 22 February 2011.

University of Illinois

2008 *Hemidactylium scutatum*. Illinois Natural History Survey. Available online at: http://www.inhs.illinois.edu/animals_plants/herps/species/he_scutatu.html. Last updated 11 November 2008. Accessed 23 February 2011.

Zedeno, Maria Nieves, and Robert Christopher Basaldu

2003 "Ozark National Scenic Riverways, Missouri – Cultural Affiliation Study (final report)," Bureau of Applied Research in Anthropology, University of Arizona, Tucson, AZ. Prepared for the National Park Service, Midwest Regional Office, Omaha, Nebraska.

APPENDIX A: IMPAIRMENT DETERMINATION

THE PROHIBITION ON IMPAIRMENT OF PARK RESOURCES AND VALUES

NPS *Management Policies 2006*, Section 1.4.4, explains the prohibition on impairment of park resources and values:

> While Congress has given the Service the management discretion to allow impacts within parks, that discretion is limited by the statutory requirement (generally enforceable by the federal courts) that the Park Service must leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise. This, the cornerstone of the Organic Act, establishes the primary responsibility of the National Park Service. It ensures that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them.

WHAT IS IMPAIRMENT?

NPS *Management Policies 2006*, Section 1.4.5, "What Constitutes Impairment of Park Resources and Values," and Section 1.4.6, "What Constitutes Park Resources and Values," provide an explanation of impairment.

> …impairment…is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values.

Section 1.4.5 of NPS *Management Policies 2006* states:

> An impact to any park resource or value may, but does not necessarily, constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is
>
> - necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
> - key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
> - identified in the park's general management plan or other relevant NPS planning documents as being of significance.
>
> An impact would be less likely to constitute an impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and it cannot be further mitigated.

Per Section 1.4.6 of NPS *Management Policies 2006*, park resources and values that may be impaired include

- the park's scenery, natural and historic objects, and wildlife, and the processes and condition that sustain them, including, to the extent present in the park: the ecological, biological, and physical processes that created the park and continue to act upon it; scenic features; natural visibility, both in daytime and at night; natural landscapes; natural soundscapes and smells; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; ethnographic resources; historic and prehistoric sites, structures, and objects; museum collections; and native plants and animals;
- appropriate opportunities to experience enjoyment of the above resources, to the extent that can be done without impairing them;
- the park's role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system, and the benefit and inspiration provided to the American people by the national park system; and
- any additional attributes encompassed by the specific values and purposes for which the park was established.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park, but this would not be a violation of the *Organic Act* unless the NPS was in some way responsible for the action.

HOW IS AN IMPAIRMENT DETERMINATION MADE?

Section 1.4.7 of NPS *Management Policies 2006* states:

> In making a determination of whether there would be an impairment, an NPS decision-maker must use his or her professional judgment. This means that the decision-maker must consider any environmental assessments or environmental impact statements required by the National Environmental Policy Act of 1969 (NEPA); consultations required under section 106 of the National Historic Preservation Act (NHPA), relevant scientific and scholarly studies; advice or insights offered by subject matter experts and others who have relevant knowledge or experience; and the results of civic engagement and public involvement activities relating to the decision.

NPS *Management Policies 2006* further define "professional judgment" as "a decision or opinion that is shaped by study and analysis and full consideration of all the relevant facts, and that takes into account the decision-maker's education, training, and experience; advice or insights offered by subject matter experts and others who have relevant knowledge and experience; good science and scholarship; and, whenever appropriate, the results of civic engagement and public involvement activities relating to the decision."

IMPAIRMENT DETERMINATION FOR THE PREFERRED ALTERNATIVE

This determination on impairment has been prepared for alternative B described in chapter 2 of this environmental assessment (EA). An impairment determination is made for all resource impact topics analyzed for alternative B. An impairment determination is not made for park operations, including visitor

protection because impairment findings relate back to park resources and values, and this impact area is not generally considered to be a park resource or value according to the *Organic Act*, and cannot be impaired in the same way that an action can impair park resources and values.

The NPS has determined that the implementation of the NPS alternative B would not constitute an impairment to the resources or values of the Ozark National Scenic Riverways. This conclusion is based on consideration of the thorough analysis of the environmental impacts described in the EA, relevant scientific studies, the comments provided by the public and others, and the professional judgment of the decision-maker guided by the direction in NPS *Management Policies 2006*. Implementation of the NPS selected alternative would not result in impairment of park resources or values whose conservation is (1) necessary to fulfill specific purposes identified in the park's establishing legislation, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or (3) identified in the park's management plan or other relevant NPS planning documents as being of significance.

FINDINGS ON IMPAIRMENT FOR THE REHABILITATION AND UPGRADE OF THE RADIO SYSTEM TO NARROWBAND DIGITAL AT OZARK NATIONAL SCENIC RIVERWAYS

Alternative B would result in short-term to long-term negligible to minor adverse impacts on some of the park's resources, which include visual resources, soils, vegetation, and wildlife and wildlife habitat, including special status species.

VISUAL RESOURCES (VIEWSHEDS AND AESTHETICS)

The Rymer Ridge site is located on a high hilltop, approximately 0.8 miles away from a public access point along Jacks Fork River at the base of the valley. In general, this area of the park is remote with very little public access or visitation. The proposed 150-foot radio tower would likely not be visible from the public access point along the Jacks Fork off County Road M-471. Additionally all other areas of visibility within the park are classified as "visible with tree cover," meaning the tower would be visible in these locations if the tree cover was removed, however given the current dense tree cover it would likely not be visible. The implementation of alternative B would result in long-term, negligible, adverse impacts to visual resources at the Rymer Ridge site.

The Cedargrove site is located off of County Road 651, approximately 0.5 miles northwest of the Cedargrove recreation area. The tower would not likely to be visible from areas along public roads and the Current River due to vegetation and tree cover. The tower would adversely impact several areas within the park including two public recreation areas. Areas with potential visibility include the open field directly south of the site, a public boat ramp southeast of the site, the Cedargrove primitive campsite, and views looking north off of State Highway B. Visibility from the open field and State Highway B are not likely to affect the visual resources within the park since these are not high recreation areas and it is not likely that visitors would be recreating in these locations. Although the proposed tower would be visible from two designated recreation areas within the park, the tower is not likely to have adverse impacts on the visual quality of the park. The tower would not be visible when visitors float along the river due to topography and vegetation cover. While it would be visible at the boat launch site, it is not likely that visitors would be viewing the surrounding landscape; instead, their focus would be on safely launching their boat and accessing the river. The tower would also be visible from the Cedargrove campsite. Due to the relative distance away from the site, however, it is not likely that the tower would result in a large visual intrusion to the surrounding landscape. Overall, the construction of the radio tower would have long-term, minor, adverse impacts on visual resources within the park.

Implementation of the preferred alternative would not appreciably change views of the river, hills, trees, and other prominent components of the Ozark landscape. Although the two new towers would be visible, it is not anticipated that the majority of visitors would be aware of changes in the viewshed associated with the towers or new radio equipment. Because there would only be negligible to minor adverse impacts from the proposed tower construction at each location, alternative B would not result in impairment.

SOILS

The proposed radio tower location at Rymer Ridge is currently undeveloped and would require the removal of approximately 75 hickory, pine, oak, and ash trees as well as other vegetation. Soil productivity would decline in disturbed areas, such as the access road, and would be completely eliminated in areas within the footprint of the radio tower. When combined with the removal of all vegetation within the footprint, the proposed radio tower at the Rymer Ridge location would result in localized, long-term minor adverse impacts to soils.

Soil at the proposed Cedargrove site has been previously disturbed as the location was once a ranger station and, although the ranger station cabin in no longer present, a clearing remains. The construction of a radio tower and access road would require clearing of existing vegetation and would diminish and eliminate soil productivity resulting in localized, long-term, negligible adverse impacts on soils as the site has been previously disturbed.

At both locations, construction activities would result in the compaction of soils. The soil layer structure would be disturbed and modified and soils would be exposed, increasing the overall potential for erosion Additionally, at both locations infrastructure improvements would require trenching for coaxial and power cables. As a result, construction activities and infrastructure improvements would have a localized short-term minor adverse impact on soils in both project areas.

Overall impacts to soils as a result of alternative B would be short-term, minor adverse from the clearing of vegetation and exposure of soils. Long-term impacts to soils would be negligible to minor adverse resulting from reduced or eliminated soil productivity within the footprint of the radio tower complex and associated access roads.

Implementation of the preferred alternative would result in limited, site-specific mixing and disturbance of soils and associated long-term loss of productivity resulting from construction of two new tower structures, installation of access roads, and associated utility trenching. Soil productivity and characteristics would not change outside the immediate project area. Because there would be only negligible to minor adverse impacts on soils, alternative B would not result in impairment.

VEGETATION

In preparation for construction activities grading and leveling on construction areas would occur temporarily in areas currently maintained as turf or natural vegetation. As a result of construction activities, vegetation in the area of construction would be disrupted and removed. Construction activities would have a localized short-term negligible to minor adverse impact on vegetation in the project areas and would be expected to stay within the 75-feet by 75-feet clearing.

Construction at the undeveloped site at Rymer Ridge would require the removal of approximately 75 hickory, pine, oak, and ash trees as well as other vegetation. Approximately 12 of the 75 trees are mature trees. The removal of existing vegetation would result in localized, long-term minor adverse impacts to vegetation at the Rymer Ridge site.

Although vegetation at the Cedargrove site has been previously disturbed, the construction of a radio tower and access road would require the removal of approximately 7 to 10 large diameter oak and hickory trees resulting in localized, long-term negligible to minor adverse impacts on vegetation at Cedargrove.

The loss, modification, and disturbance of native plant species from the construction of a radio tower and access road at Rymer Ridge would result in localized, long-term, minor, adverse impacts on vegetation. The loss, modification, and disturbance of native plant species from the construction of a radio tower at Cedargrove would result in localized, long-term, negligible to minor, adverse impacts on vegetation.

Implementation of the preferred alternative would result in limited site clearing, and disturbance or removal of vegetation, resulting from construction of two new tower structures, installation of access roads, and associated utility trenching. Vegetation would not be affected outside the immediate project area. Because overall adverse impacts to vegetation would be negligible to minor, the implementation of alternative B would not result in impairment.

WILDLIFE AND WILDLIFE HABITAT, INCLUDING SPECIAL STATUS SPECIES

In preparation for construction activities grading and leveling on construction areas would occur temporarily in areas currently maintained as turf or natural vegetation. Implementation of alternative B would likely displace those species that currently use the areas where the proposed activities would be taking place. This displacement would result from the increased human activity and noise associated with construction vehicles on the site. In addition, mortality or injury of some smaller, less mobile, species could occur as a result of construction activities. Pre-construction and construction activities would have localized minor adverse impacts on wildlife and wildlife habitat in the project areas due to the relatively small areas being affected and the fact that there are other areas adjacent to the construction sites where displaced individuals could move that would provide adequate habitat. The loss or displacement of individuals of a non-threatened or endangered species would not jeopardize the viability of the populations in and adjacent to the park. These minor adverse impacts on wildlife and wildlife habitat would be short-term because they would only occur during the construction period. Following construction activities, it is expected that any displaced species would likely return to the area.

The removal of existing vegetation at Rymer Ridge would result in localized, long-term minor adverse impacts on wildlife at Rymer Ridge from the loss of native habitat. While vegetation at Cedargrove has been previously disturbed, the construction of a radio tower and access radio would require the removal of approximately seven to ten large diameter oak and hickory trees resulting in localized, long-term negligible to minor adverse impacts on wildlife at Cedargrove from loss of native habitat for species that depend on those trees for food and/or shelter.

Implementation of the preferred alternative would result in limited site clearing, and disturbance or removal of habitat, resulting from construction of two new tower structures, installation of access roads, and associated utility trenching. Habitat removal would not be affected outside the immediate project area. Because overall adverse impacts to wildlife and wildlife habitat would be negligible to minor, alternative B would not result in impairment.

Special Status Species

No roosting habitat exists in the project areas, as gray bats inhabit caves year-round. Although they can travel long distances from caves to forage, foraging habitat is closely associated with rivers, streams, or lakes (MDC n.d.e; USFWS 2009). In addition, foraging is expected to be minimal to non-existent during the proposed time for tree removal (November 1 to March 1) at Rymer Ridge and Cedargrove as gray bats generally remain in hibernation caves throughout the winter months (USFWS 2009). However, the

presence and operation of the radio towers after could result in long-term adverse impacts for bats due to physical and behavioral effects from tower collisions and electromagnetic radiation. Although these factors could threaten the gray bat, its use of cave habitat year-round would likely limit the threats considerably. Therefore, implementation of alternative B is *not likely to adversely affect* the gray bat.

Site design for construction of the radio towers would require the removal of suitable roost trees for the Indiana bat at Rymer Ridge and Cedargrove. Because management actions would occur outside of the normal roosting season and additional habitat is available (if needed) adjacent to both project areas, the impact of construction activities and removal of native habitat under alternative B on the Indiana bat would not likely be measurable. As described above, the presence and operation of the radio towers has the potential to result in long-term adverse impacts on bats due to physical and behavioral effects from tower collisions and electromagnetic radiation. While it is possible that these effects could be measurable for the Indiana bat, there are no known Indiana bat populations in the vicinity of either project area. Impacts resulting from electromagnetic radiation already exist and would continue to occur. The majority of Missouri's Indiana bat population inhabits eight caves, none of which are near the project areas, therefore fatalities from collisions with the two proposed towers could occur, but would not be expected to occur at a rate that would measurably impact the Indiana bat population. Therefore, implementation of alternative B is *not likely to adversely affect* the Indiana bat.

Site design for construction of the radio towers would require the removal of suitable breeding habitat for the cerulean warbler at Rymer Ridge and Cedargrove. The primary threat to the warbler is habitat degradation and fragmentation, which would likely result from the removal of trees at the project areas, particularly at Rymer Ridge. However, it is expected that the impacts of construction activities at both locations would be negligible because they would occur outside of the normal breeding season (March-October) and additional habitat is available (if needed) adjacent to both project areas. The presence and operation of the radio towers could result in long-term adverse impacts for birds due to physical and behavioral effects from tower collisions and electromagnetic radiation, however the design of the towers would include mitigation measures to reduce impacts to bird species, including a height less than 200 feet, no safety lighting, no guy wires, and a small footprint. Therefore, implementation of alternative B, is *not likely to adversely affect* the cerulean warbler in the park.

Implementation of the preferred alternative would result in limited habitat removal for the federally listed species and would not be affected outside the immediate project area. Electromagnetic frequencies would continue to be emitted and may cover a wider area. Tower collisions are possible but the NPS would adhere to USFWS guidelines for communication tower construction to mitigation adverse impacts. Because the preferred alternative is not likely to adversely affect the gray bat, Indiana bat, and cerulean warbler, alternative B would not result in impairment.

APPENDIX B: PHOTOSIMULATIONS

Proposed Radio Towers at Rymer Ridge and Cedargrove in Ozark National Scenic Riverways Park

Van Buren, MO

Before

After

Description of Photo Location:
Taken from field to the south of the radio tower location.

Cedargrove Radio Tower
View 1
Direction Taken: NE

Structure placements as shown are for photo simulation purposes only. Actual structure placement will be determined during detailed design and engineering of the route selected and approved.

Before

After

Description of Photo Location:
From existing access road at the site.

Ceadergrove Radio Tower
View 2:
Direction Taken: N

Structure placements as shown are for photo simulation purposes only. Actual structure placement will be determined during detailed design and engineering of the route selected and approved.

Before

After

Description of Photo Location:
From Cedargrove public boat launch on Current River.

Ceadergrove Radio Tower
View 3
Direction Taken: NW

Structure placements as shown are for photo simulation purposes only. Actual structure placement will be determined during detailed design and engineering of the route selected and approved.

Before

After

Description of Photo Location:
Off of Highway B

Ceadergrove Tower
View 4
Direction Taken: N

Structure placements as shown are for photo simulation purposes only. Actual structure placement will be determined during detailed design and engineering of the route selected and approved.

Before

After

Description of Photo Location:
Off of County Road M -471

Rymer Ridge Radio Tower
View 1
Direction Taken: NW

Structure placements as shown are for photo simulation purposes only. Actual structure placement will be determined during detailed design and engineering of the route selected and approved.

Before

After

Description of Photo Location:
Taken in location of proposed access road off of County Road M -471

Rymer Ridge Radio Tower
View 2
Direction Taken: N

Structure placements as shown are for photo simulation purposes only. Actual structure placement will be determined during detailed design and engineering of the route selected and approved.

APPENDIX C: AGENCY CONSULTATION LETTERS

APPENDIX D: PERMITTING

Under alternative B, the proposed action would be constructed entirely on NPS lands; therefore it is not likely that the project would require state or local regulatory or construction permits. Additionally, no rights-of-way or lands would need to be acquired, as the proposed tower sites are completely contained within NPS-owned land. A summary of federal and state permits that may typically be required for construction in Missouri and on NPS lands are shown in table D-1.

At this time, the NPS believes that no federal or state permits would be required as part of the project. The rationale is documented in table D-1. However, if the need for specific permits is identified at a later date, the NPS will complete the necessary permitting prior to implementing construction.

As described under "Elements Common to All Alternatives" in chapter 1, several upgrades would be completed under both the action and no action alternatives. These upgrades would require communication with landowners and could include negotiation. At the Skyline and Mountain View repeater sites, climate controlled outdoor cabinets to house the new radio equipment would be installed. Partel Broadband Communications has been informed of these potential changes, has given verbal approval for installation, and is open to creating a lease agreement for the NPS as a tenant at the site. At each of the sites on MDC property (Stegall, Eminence, Hartshorn, and Shannondale), a written agreement between the MDC and NPS would be required, outlining each agency's use of the property, tower, building(s), and site compound. A representative from MDC has given initial verbal approval for the installation of an outdoor cabinet on a concrete pad at the base of each repeater tower as well as approval for the installation of NPS radio equipment at the Shannondale location, which is not currently used for the park communications system.

TABLE D-1: SUMMARY OF FEDERAL AND STATE PERMITS

Agency	Potential Permits Required	Agency Contact Information	Implications for this Project
Federal Agency			
United State Corp of Engineers Section 404/401 permit	Issues a Section 404/401 permit under the *Federal Water Pollution Control Act* of 1972, as amended (*Clean Water Act*; 33 USC 1344) for discharge of dredged and fill material into U.S. waters, including wetlands. Issues a Section 10 permit under the *Rivers and Harbors Appropriations Act* of 1899 (33 USC 403) for structures or work in, of affecting, navigable waters of the United States.	Brian Johnson Regulatory Division 700 W. Capital Little Rock, AR 72203 (314) 331-8575	It is not likely that a Section 404, 401 or 10 permit would be required for this project due to the absence of wetlands or waterways at both tower locations. The proposed sites are located near the Current and Jacks Fork rivers, however the construction would disturb only a small area of soil and would have a negligible impact on erosion and would not be expected to impact water quality.
U.S. Environmental Protection Agency (EPA)	Issues a National Pollutant Discharge and Elimination System (NPDES) permit under Section 402, *Federal Water Pollution Control Act* of 1972, as amended (*Clean Water Act*; 33 USC 1251) for discharges into waters of the United States.	The State of Missouri DNR is the NPDES Permitting Authority for all regulated discharges. Water Protection Program P.O. Box 176 Jefferson City, MO 65102 800-361-4827 573-751-1300 cleanwater@dnr.mo.gov	This project would be exempt from a NPDES permit under the State of Missouri DNR. Exemptions from the permit requirements state “Sites that disturb less than one acre of total land area that are not part of a common plan or sale and that do not cause any violations of water quality standards and are not otherwise designated by the department is requiring a permit, where water quality standards are not exceeded.” Each site would require the installation of a 75-ft by 75-ft pad, equal to 0.26 acres each. The Rymer Ridge site would require the construction of a new access road proposed to be 200 feet by 20 feet, equal to 0.10 acres. The total estimated area of impact is 0.36 acres, which is below the 1-acre impact requirement for a NPDES permit.
United States Fish and Wildlife Service (USFWS)	Provides consultation under the ESA, Section 7(a)(2) regarding effects to threatened or endangered species. Provides consultation under the *Fish and Wildlife Coordination Act* regarding effects to fish and wildlife resources.	Charles Scott, Field Supervisor Columbia Ecological Services Field Office U.S. Fish and Wildlife Service 101 Park Deville Dr., Suite A Columbia, MO 65203-0057	Consultation with the USFWS began on December 28, 2010, with a Section 7 consultation letter informing USFWS of the project. Upon receipt of response, it will be determined if surveys or permits would be required for any sensitive species as a result of the project.

Agency	Potential Permits Required	Agency Contact Information	Implications for this Project
Federal Aviation Administration (FAA)	In administering 14 CFR 77, the prime objectives of the FAA are to promote air safety and the efficient use of the navigable airspace. To accomplish this mission, aeronautical studies are conducted based on information provided by proponents on an FAA Form 7460-1, Notice of Proposed Construction or Alteration.	Air Traffic Contact for the state of Missouri Vivian Vilaro 847-294-7575 Vivian.vilaro@faa.gov	CFR Title 14 Part 77.9 states that any person/organization who intends to sponsor any of the following construction or alterations must notify the Administrator of the FAA: • any construction or alteration exceeding 200 feet above ground level • any construction or alteration: • within 20,000 feet of a public use or military airport which exceeds a 100:1 surface from any point on the runway of each airport with its longest runway more than 3,200 feet • within 10,000 feet of a public use or military airport which exceeds a 50:1 surface from any point on the runway of each airport with its longest runway no more than 3,200 feet • within 5,000 feet of a public use heliport which exceeds a 25:1 surface • any highway, railroad or other traverse way whose prescribed adjusted height would exceed the above noted standards • when requested by the FAA • any construction or alteration located on a public use airport or heliport regardless of height or location. The proposed radio towers are 150 feet and 190 feet; thus, they are under the 200 feet threshold and the FAA form 7460-1 would not be required.

Agency	Potential Permits Required	Agency Contact Information	Implications for this Project
Federal Communications Commission (FCC)	Code for Federal Regulation 17.4- Antenna structure registration. (a) Effective July 1, 1996, the owner of any proposed or existing antenna structure that requires notice of proposed construction to the Federal Aviation Administration must register the structure with the Commission. This includes those structures used as part of stations licensed by the Commission for the transmission of radio energy, or to be used as part of a cable television head end system. If a Federal Government antenna structure is to be used by a Commission licensee, the structure must be registered with the Commission. As such, each owner must file FCC Form 854 (Application for Antenna Structure Registration) with the Commission. Code for Federal Regulation 17.7- Construction, Marking, And Lighting Of Antenna Structures. A notification to the Federal Aviation Administration is required, except as set forth in 17.14, for any of the following construction or alteration: (a) Any construction or alteration of more than 60.96 meters (200 feet) in height above ground level at its site.		Code for Federal Regulation 17.4- Antenna structure registration and Code for Federal Regulation 17.7- Construction, Marking, And Lighting Of Antenna Structures. Form 854 states that “Registration with the Commission is required *before* any construction or alteration of an antenna structure, which requires notification to the Federal Aviation Administration (FAA).” Notification of the FAA is required when “any construction or alternation of more than 60.96 meters (200 feet) in height above ground level at its site.” Therefore Form 854 will only be required if any towers or alternations require the height above ground level to exceed 200 feet.

Agency	Potential Permits Required	Agency Contact Information	Implications for this Project
United States Code	Under 47 of the US Code 303 (q) 1965 - Subsec. (q). Pub. L. 89-268 required abandoned or unused radio towers to continue to meet the same painting and lighting requirements that would be applicable if such towers were being used in connection with transmission of radio energy pursuant to a license issued by the Commission and authorized the Commission to direct dismantlement of such towers when the Administrator of the Federal Aviation Agency determines that there is a reasonable possibility that they may constitute a menace to air navigation."	U.S. Government Printing Office Mail Stop: IDCC 732 N. Capitol Street, NW Washington, DC 20401 Toll-Free: 866-512-1800 DC Area: 202-512-1800	If the towers do not require notification from the FAA (under 200 feet), they would not be considered a "menace to air navigation" and the project would be exempt. Additionally, no NPS owned towers would be abandoned as a result of either alternative. NPS equipment would be removed from one privately-owned tower under alternative B.
State Agency			
Missouri Department of Natural Resources (DNR)	NPDES Permit (described under EPA) Construction Permit, or New Source Review.	Missouri DNR Michael Abbott P.O. Box 176 Jefferson City, MO 65102 573-526-1139	Confirmed with DNR that this project would be exempt from a NPDES permit as described above under EPA.

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 wise use of our land and water resources, protecting our fish and wildlife, 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. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

614/106487.