



National Park Service
U.S. Department of the Interior
Yellowstone National Park
Wyoming, Montana, Idaho

Wireless Communications Services Plan Environmental Assessment

September 2008



Wireless Communications Services Plan

Environmental Assessment

Summary

The National Park Service (NPS) proposes to implement a Wireless Communications Services Plan in Yellowstone National Park.

This plan would protect park resources and values by limiting the types and locations of wireless services and infrastructure in Yellowstone National Park. Any new and appropriate wireless infrastructure would only be established at locations adhering to strict siting criteria. Wireless communication services covered in this plan include cellular phone services, NPS two-way radio system, resource monitoring stations, and wireless fidelity (WiFi) services.

This environmental assessment (EA) evaluates four alternatives for the proposed plan: A) No Action; B) reduction in wireless services; C) allow a limited increase in wireless services; and D) allow a substantial increase in wireless services. Alternative C is the park's preferred alternative; this alternative would add cellular coverage to the Lake area and improve cellular coverage at Canyon and Tower-Roosevelt. When feasible, the cell tower at Old Faithful would be relocated from its current location to a site near the water treatment plant to further reduce the impact on the viewshed. Antennas located at Mount Washburn would be relocated from the existing fire lookout and placed on a new platform tower adjacent to the lookout to reduce impacts to the viewshed from the historic lookout and improve visitor and park staff safety. On Bunsen Peak, obsolete equipment would be removed and the cellular phone facility would be relocated to Elk Plaza. The electric transmission line to the summit of Bunsen Peak would remain, but the equipment shed would be replaced with smaller equipment (e.g., cabinet sized weather-proof enclosures). Internet-WiFi access would be available at many of the park's hotels and stores and to residences in park development areas.

This EA has been prepared in compliance with the National Environmental Policy Act (NEPA) to provide the decision-making framework that 1) analyzes a reasonable range of alternatives to meet objectives of the proposal, 2) evaluates potential issues and impacts to Yellowstone's resources and values, and 3) identifies mitigation measures to lessen the degree or extent of these impacts. Impact topics examined in this EA are: Threatened and Endangered Species, Migratory Birds, and Birds of Special Management Concern, Wilderness, Soundscapes, Historic Properties and Cultural Landscapes, Health and Human Safety, Park Operations, Visitor Use and Experience, and Visual Quality. The only resource impact topic analyzed that could potentially result in moderate impacts under the preferred alternative is Visitor Use and Experience. All other impact topics examined resulted in impacts not greater than negligible or minor as a result of implementing the preferred alternative. The park conducted public scoping in 2006 from July 16–August 31 to assist with the development of this plan; comments were received, mostly in support of the proposed plan. No major impacts are anticipated as a result of this project. Implementation of the proposed actions would not result in unacceptable levels of impacts to park resources.

How this Plan/Environmental Assessment is Organized

The following summarizes the organization and highlights important sections of this document for the reader:

- [Chapter 1- Purpose and Need](#) explains the basis for this Wireless Communications Services Plan (page 1) along with background information on National Park Service policies and planning efforts that guide this analysis. You will find a discussion on current wireless communications services in the park (page 7) and a summary of resource impact topics (page 12) analyzed in later chapters.
- [Chapter 2 – Alternatives Considered](#) is where you will find details on the proposed alternatives. It provides two important tables that summarize environmental impacts by alternative (Table 1; page 19) and compare alternatives (Table 2; page 20) based on the four types of services (NPS radio, Cell

Phone Service, Resource Monitoring Stations, Wireless Internet) this plan covers. After the alternatives are described, you will find sections on Procedures and Constraints that must be followed in order to comply with laws, regulations and policies (page 39) as well as Mitigating Measures that must be followed in order to reduce adverse effects (page 40). There is also a section on Guidelines and Criteria (page 42) established for all the action alternatives that are important for consistent project design.

- Chapter 3 – Affected Environment describes the existing environmental conditions in areas potentially affected by this plan for those resources impact topics identified in Chapter 1. The information in this chapter provides the baseline for analysis.
- Chapter 4 – Environmental Consequences discloses the environmental effects of the proposed alternatives on the resource impact topics identified in Chapter 1 and described in Chapter 3. This chapter is organized by resource impact topic. For each resource topic, methodologies, assumptions, intensity levels and thresholds of change are identified followed by details on impacts for each alternative.
- Chapter 5 – Consultation and Coordination describes the scoping conducted for this plan/EA and lists those who prepared the document.
- A Glossary of Terms can be found after the Reference section following Chapter 5.
- The Appendices starting on page 140 provide information on the 2007 annual bird migration count (Appendix 1), a 15-year summary of annual bird migration counts (Appendix 2) and a summary of wireless telecommunication facilities (Appendix 3). Appendix 3 describes key components of wireless telecommunication networks and infrastructure requirements.

Public Comment

You may submit written comments through the NPS Planning, Environment and Public Comment (PEPC) Internet website (<http://parkplanning.nps.gov/yell>) or mail them to the superintendent at the address below. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment (including your personal identifying information) may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. Comments are due by midnight (MDST), October 31, 2008.

Superintendent
Yellowstone National Park
Wireless Communications Services Plan EA Comments
P.O. Box 168
Yellowstone National Park, Wyoming 82190

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CHAPTER 1: PURPOSE AND NEED

Introduction

This Wireless Communications Services Plan and Environmental Assessment (WCS Plan/EA) presents alternatives for evaluating wireless services and infrastructure proposed within Yellowstone National Park and assesses the impacts that could result from continuing the current approach or implementing one of the three action alternatives.

Wireless communications include cellular phone services, the National Park Service (NPS) two-way radio system, resource monitoring stations, and wireless fidelity (WiFi) services. These services rely on a combination of land lines, fiber, and an elevated antenna network to transmit voice and data information. Components of a WCS network in the park typically include: (1) antenna, (2) support structure, (3) equipment housing, (4) utility connections, and (5) access roads.

Background

Yellowstone National Park is located in the northwest corner of Wyoming and extends to the north and west into Montana and Idaho. Established by an Act of Congress on March 1, 1872, Yellowstone is managed by the National Park Service. Its 2.2 million acres were “set apart as a public park or pleasuring-ground for the benefit and enjoyment of the people” and to “provide for the preservation, from injury or spoliation, of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in their natural condition.”

Wireless services and infrastructure in Yellowstone are used daily in park operations, research activities, emergency functions, and by park visitors, contractors, and residents. Wireless facilities range from small-scale stations to monitor stream and thermal features to mountaintop communications sites. Functions include commercial telephone and data transmission, earthquake and other scientific monitoring, two-way radios for park operations and emergency communications, contractor and concessioner operations, FM radio stations, weather-band radio, cellular telephone service, Internet access, satellite TV, remote weather stations, and wireless webcams for resource monitoring.

In 2004, park managers placed a moratorium on the installation of new wireless equipment except for equipment that was: (1) in-kind replacement; (2) for emergency use; or (3) for temporary use (up to two years). The moratorium remains in effect until this plan is completed.

Rather than continuing to evaluate impacts from wireless projects on a case-by-case basis (the no-action alternative), the three action alternatives would use established criteria to guide decisions on the installation of wireless infrastructure. If existing wireless services in the park were deemed inappropriate according to these criteria, they would be discontinued. Similarly, existing wireless infrastructure may be modified or relocated.

Purpose and Need

The purpose for developing a Wireless Communications Services Plan is to protect park resources and values by limiting the types and locations of wireless services and infrastructure in Yellowstone National Park. The estimated number of wireless subscribers in the U.S. grew from 28.1 million in 1995 to 243.4 million by June 2007 (CTIA 2006), and as the use of wireless devices increases, so does the demand for infrastructure to support these services. Under the Telecommunications Act of 1996, national parks and other federal property are available for

Purpose –

To protect park resources and values by limiting the types and locations of wireless services and infrastructure

placement of telecommunications equipment by authorized providers unless there are unavoidable conflicts with the agency's mission. This wireless communications plan is therefore needed to address the following management, operational, and visitor concerns:

Operational Effectiveness and Safety

- The primary wireless communication method used by the NPS to support safety and essential law enforcement functions is a two-way narrow band system. However, park staff also uses cell phones, where service is available, and many employees report that cell phone service is essential to ensure reliable communications for emergency personnel in critical, life safety situations.
- Current 911 emergency coverage is insufficient in the park and improvement is needed for enhanced life, health, and safety response.

Conflicting Values

- Some people have expressed that cell phones and Internet access are inappropriate in national parks and conflict with the NPS mission to preserve resources. Some visitors have commented on the visual impact of some existing cell towers and the use of cell phones by other visitors, which they feel has a negative impact on their park experience. Conversely, other visitors have commented on the lack of cell phone coverage and the impact that has on their park experience.
- While some people have commented that allowing cell phone coverage in recommended wilderness areas impacts wilderness character, others have expressed the view that cell phone coverage throughout the park, including recommended wilderness, would enhance safety for visitors and employees.
- Park visitors, staff, and the Wyoming State Historic Preservation Office have commented that the Old Faithful cell tower impacts historical views from within the Old Faithful developed area and geyser basin.

Wireless Capacity and Performance

- The park has used all of the bandwidth available for its operations. Upgrades or improvements to the existing wireless network usually require additional bandwidth.
- The powerline to the summit of Mount Washburn, which is old and of inadequate capacity, is a limiting factor in improving the wireless equipment on the summit.
- Park managers need to consolidate equipment and improve the appearance, efficiency, and performance of wireless facilities at Bunsen Peak, Elk Plaza, and Mount Washburn (Figure 2). The Mount Washburn Fire Lookout, where there is a considerable collection of antennas close to areas of visitor access, poses a risk of radio frequency exposure.

Consistency of Practice

- The existing cell towers in the park were approved on a case-by-case basis after undergoing analysis under the National Environmental Policy Act, without a parkwide guiding vision. The park needs to develop a long-term plan to process requests for wireless services and infrastructure.
- Existing rights-of-way permits for all cell phone communication facilities in the park expire by the end of 2009. Park managers need to provide a consistent and timely process for responding to requests for the use of property, rights-of-way, and easements in the park by authorized cellular telephone companies and other wireless contractors.
- Scientists increasingly need to install instrumentation with wireless data transmission capabilities. Their requests are reviewed under research permit guidelines and, when appropriate, under wilderness minimum requirement guidelines, but they should also be considered under wireless communications criteria.

- Although some park concessioners have installed WiFi Internet access for business purposes and employee use, their request to allow visitor use of WiFi access in concessions facilities is on hold until this WCS plan/EA is complete.

Objectives

The objectives of this WCS Plan/EA are to:

- Protect park resources and values by strictly guiding the placement, appearance, and amount of wireless telecommunications infrastructure in the park.
- Improve operational effectiveness of wireless communications in the park and safety for park visitors, employees, residents, contractors, and concessioners.
- Consolidate existing wireless infrastructure and remediate existing impacts where possible.
- Evaluate requests to site non-NPS telecommunication antennas and related facilities in the park in accordance with the Telecommunications Act of 1996 (47 USC 332 note), which authorizes but does not mandate a presumption that such requests be granted unless doing so would create an unavoidable conflict with the agency mission, the current or planned use of the property, or access to that property.
- Develop a consistent and timely process to evaluate requests for wireless services and facilities in the park. Respond to requests for the use of property, rights-of-way, and easements by duly authorized cellular telephone companies, researchers, and project proponents.

Related Laws, Policies, Plans, and Actions

NPS management is guided by the U.S. Constitution, public laws, treaties, proclamations, Executive Orders, regulations, and Department of Interior directives. The following laws and policies are described in this section to illustrate the parameters under which this WCS Plan/EA must operate and the policies with which it must comply.

NPS Guiding Laws, Regulations, and Policies

- **NPS Organic Act of 1916**
Units of the national park system shall be managed “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).
- **National Parks Omnibus Management Act of 1998**
This act directs the NPS to use a broad program of the highest-quality science and information in managing and protecting units of the national park system.
- **Redwood National Park Act of 1978, as Amended**
This act states that the NPS must conduct its actions in a manner that will ensure no “derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress.”
- **Code of Federal Regulations, Revised July 2000**
Title 36, Chapter 1, provides regulations “for the proper use, management, government, and protection of persons, property, and natural and cultural resources within areas under the jurisdiction of the National Park Service.”

Authorities and Guidance for WCS Right-of-Way Permits

- **Telecommunications Act of 1996, PL 104-104, 110 STAT. 56 § 704(C)**
 The legislation 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) 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, the current or planned use of the property, or access to that property.
- **Presidential Memorandum: Facilitating Access to Federal Property for the Siting of Mobile Services Antennas (1995), 60 F.R. 42023, 40 U.S.C. § 581, NOTE, 1995**
 This Presidential Memorandum directs all department and agency heads to facilitate appropriate access to federal property for the purpose of siting mobile services antennas as long as such siting is in accordance with federal, state, and local laws and regulations, environmental and aesthetic concerns, preservation of historic buildings and monuments, protection of natural and cultural resources, and protection of national park and wilderness values.
- **Wireless Telecommunications and Public Safety Act of 1999, PL 106-81**
 This act designated “911” as the universal emergency number for all wire-line and wireless phones and expanded the areas covered by wireless telephone service.
- **Enhance 911 Services Act of 2004, PL 108-494**
 This act amended the National Telecommunications and Information Organization Act in order to: facilitate the reallocation of spectrum from governmental to commercial users; improve, enhance, and promote the nation’s homeland security, public safety, and citizen-activated emergency response capabilities through the use of enhanced “911” services; upgrade Public Safety Answering Point (PSAP) capabilities and related functions in receiving enhanced 911 calls; and support the construction and operation of a ubiquitous and reliable citizen-activated system.

Yellowstone National Park is a designated primary PSAP for Yellowstone National Park, Teton County (WY), Park County (WY), and Park County (MT).
- **GSA Bulletin FMR 2007-B2, Placement of Commercial Antennas on Federal Property, 72 F.R. 11881, March 14, 2007**
 This bulletin contains the General Services Administration guidelines and procedures for the placement of commercial antennas on federal property and directs federal agencies to consider the requirements of the federal agency managing the property when evaluating siting requests and determining the impacts of placing commercially-owned antennas on federal property.
- **36 CFR 14, Rights-of-Way and 16 USC 5, Rights-of-Way**
 These sections of the *Code of Federal Regulations* and the United States Code address the management of right-of-way permits on NPS lands.
- **NPS Management Policies 2006**
 Actions under this WCS Plan/EA are in part guided by section 8.6.4.3 of the *NPS Management Policies 2006*, which directs parks to consider requests to site non-NPS telecommunications facilities on NPS lands in accordance with the Telecommunications Act of 1996.

- **NPS Director’s Order 53, “Special Park Uses”**

This Director’s Order establishes that a special park use is a short-term activity in a park area that (1) provides a benefit to an individual, group or organization, rather than the public at large; (2) requires written authorization and some degree of management control from the NPS in order to protect park resources and the public interest; (3) is not prohibited by law or regulation; and (4) is neither initiated, sponsored, nor conducted by the NPS.

NPS Reference Manual 53, which accompanies Director’s Order 53, provides direction for processing and evaluating applications for right-of-way permits on NPS managed lands. Appendix 5, Exhibit 6, provides guidance specific for siting telecommunications facilities.

Other Applicable Federal Laws, Executive Orders, and Regulations

- **National Environmental Policy Act, 1969, as Amended**

This act is implemented through regulations of the Council on Environmental Quality (40 CFR 1500-1508). The NPS has adopted procedures to comply with this act and the CEQ regulations, as found in Director’s Order 12, Conservation Planning, Environmental Impact Analysis, and Decision-Making (2001), and its accompanying handbook.

- **Endangered Species Act of 1973, as Amended**

This act requires all federal agencies to consult with the Secretary of the Interior on all projects and proposals with the potential to impact federally endangered or threatened plants and animals.

- **The Wilderness Act of 1964**

This act states: “In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness.” Although there is great similarity between the NPS Organic Act and the Wilderness Act, Congress applied the Wilderness Act to NPS to strengthen its protective capabilities.

- **National Historic Preservation Act of 1966, as Amended**

Section 106 of this act requires federal agencies to consider the effects of their undertakings on properties listed or potentially eligible for listing on the National Register of Historic Places. All actions affecting the park’s cultural resources must comply with this legislation.

- **Historic Sites Act of 1935**

This act declares as national policy the preservation for public use of historic sites, buildings, objects, and properties of national significance. It authorizes the Secretary of the Interior and the NPS to restore, reconstruct, rehabilitate, preserve, and maintain historic or prehistoric sites, buildings, objects, and properties of national historical or archaeological significance.

- **Director’s Order 77, 1991**

This document provides guidance to park managers on the design, implementation, and evaluation of a comprehensive natural resource management program.

- **Federal Noxious Weed Act, 1975**

The Federal Noxious Weed Act (7 USC 2801-2814, January 3, 1975, as amended 1988 and 1994) provides for the control and management of non-indigenous weeds that injure or have the potential to injure the interests of agriculture and commerce, wildlife resources, or the public health.

- **Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds**

The United States has recognized the critical importance of this shared resource by ratifying international, bilateral conventions for the conservation of migratory birds, including the Convention for the Protection of Migratory Birds with Great Britain on behalf of Canada 1916,

the Convention for the Protection of Migratory Birds and Game Mammals–Mexico 1936, the Convention for the Protection of Birds and Their Environment–Japan 1972, and the Convention for the Conservation of Migratory Birds and Their Environment–Union of Soviet Socialist Republics 1978. The United States implemented these conventions, which impose substantive obligations for the conservation of migratory birds and their habitats, through the Migratory Bird Treaty Act. This executive order directs executive departments and agencies to take certain actions to carry out the act.

- **Executive Order 13112, Invasive Species**
This executive order requires the NPS to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause.
- **Executive Order 11990, Protection of Wetlands**
This executive order directs the NPS to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands and the direct or indirect support of new construction in wetlands wherever there is a practicable alternative.
- **Executive Order 11988, Floodplain Management**
This executive order directs the NPS to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and the direct or indirect support of floodplain development wherever there is a practicable alternative.
- **Executive Order 11593, Protection and Enhancement of the Cultural Environment**
This executive order directs the NPS to support the preservation of cultural properties and to identify and nominate to the National Register cultural properties within the park and to “exercise caution . . . to assure that any NPS-owned property that might qualify for nomination is not inadvertently transferred, sold, demolished, or substantially altered.”

The Purpose of Yellowstone National Park

National park system units are established by Congress to fulfill specified purposes. A park’s purpose is the fundamental building block for its decisions to conserve resources while providing for the “enjoyment of future generations.”

Purpose and Significance of Yellowstone National Park

- It is the world’s first national park.
- It preserves geologic wonders, including the world’s most extraordinary collection of geysers and hot springs and the underlying volcanic activity that sustains them.
- It preserves abundant and diverse wildlife in one of the largest remaining intact wild ecosystems on earth, supporting unparalleled biodiversity.
- It preserves an 11,000-year old continuum of human history, including the sites, structure, and events that reflect our shared heritage.
- It provides for the benefit, enjoyment, education and inspiration of this and future generations.

Yellowstone National Park Organic Act U.S.C., Title 16, sec. 22 (17 Stat.32)

Congress established Yellowstone National Park on March 1, 1872, “dedicated and set apart as a public park or pleasuring-ground for the benefit and enjoyment of the people; . . . for the preservation, from injury or spoliation, of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in their natural condition.”

Relationship to other Plans

This WCS Plan/EA is consistent with the following plans previously completed for Yellowstone:

- **Yellowstone National Park Master Plan (NPS 1974)**
The Record of Decision strives to balance human impacts and preservation of park resources by developing objectives for General Management, Resource Management, Visitor Use, and Interpretation.
- **Statement for Management (NPS 1991)**
It described the existing conditions and management objectives for natural resources, adjacent lands coordination, visitor use, cultural resources, and park operations and planning.
- **Yellowstone Wilderness Recommendation (NPS 1973)**
The Record of Decision recommends that 2,016,181 acres of the park be designated a wilderness area by an Act of Congress (Figure 11).
- **Parkwide Telephone Modernization Project EA (NPS 1992)**
There was a Finding of No Significant Impact on this proposal to upgrade the parkwide telephone system, which included replacement of aging switches and cables, standardizing equipment, and increasing capacity to meet park and concessioners needs.
- **Mammoth Area Cellular Communications Sites EA (NPS 1998)**
There was a Finding of No Significant Impact on this proposal to construct cellular sites near Mammoth Hot Springs, at Elk Plaza and Bunsen Peak.
- **Old Faithful/Grant Village Cellular Communications EA (NPS 1999)**
There was a Finding of No Significant Impact on this proposal to locate additional equipment at a cellular site at Old Faithful and Grant Village in order to improve cellular coverage, improve reliability, provide more options for cellular customers, and provide opportunities for the NPS to use cellular company-owned towers and associated infrastructure.

Current WCS in Yellowstone

- **Two-Way Radios**
The National Park Service uses a two-way narrowband radio system that operates in “mixed” (analog/digital) mode. Most government vehicles contain a mobile radio and most park employees use

The Cellular Concept –

Wireless communications are transmitted through the air via radio waves of various frequencies. An elevated antenna or antenna set transmits and/or receives these radio signals. The area covered by an antenna set is commonly referred to as a “cell”. Cellular systems are composed of interconnected neighboring “cell sites” forming a honeycomb effect. These cell sites operate on low amounts of electric energy.

a portable radio while working and traveling around the park. The radio system uses seven mountaintop repeaters in the park that are generally located near elevations of 10,000 feet in order to provide maximum coverage and minimize the number of repeaters that are required. Each of these sites is connected, using a variety of technologies, to the park’s 24/7 Communications Center, located in Mammoth, Wyoming. The radio system’s 20 base stations, located in developed areas, are also connected to the Communications Center and support approximately 300 “remote” desktop radios in offices, visitor

Wireless Services –

Includes mobile phones, pagers, and two-way enhanced radio systems, resource monitoring systems, and relies on the combination of land lines, fiber, and an extensive network of elevated antennas, typically found on communications towers, to transmit voice and data information.

KEY COMPONENTS

The key components of any wireless telecommunications networks include:

- Antenna
- Support Structure
- Equipment Housing
- Utility/Power Connection(s)
- Access

centers, and ranger stations around the park, providing direct access to the system.

- **Cell Phones**

Cell phone service is currently available in the Old Faithful, Mammoth, Grant Village, Canyon, and Tower-Roosevelt developments, as well as along the road corridor between Mammoth and Gardiner, Montana. The cell towers are located at Old Faithful, Grant Village, Mount Washburn, Bunsen Peak, and Elk Plaza (Fig. 1).

Cell phones are used by park staff, visitors, contractors, and residents. Some scientific monitoring equipment, such as some seismographs for detecting earthquakes and some Geographic Positioning System (GPS) stations for detecting ground movement, relies on cellular service to transmit data. Some park employees, ranger stations, and ambulances are issued cell phones in addition to two-way radios for improved communications. The number of NPS-owned cell phones in use was approximately 78 in 1996, peaked at 193 in 2007, and is 155 in 2008.

- **Commercial Data and Telephone Service**

Qwest Communications provides commercial data and telephone service throughout Yellowstone. A major upgrade to the system in 1992 replaced aging switches and cables and increased capacity to meet increased demands (NPS 1992). Microwave dishes and passive reflectors, located throughout the park, are integral to the phone system. Mount Washburn serves as a primary hub for data transmission throughout the park. The number of pay phones in the park has decreased dramatically in recent years. Phones were added to some guest hotel units after 1992.

- **Internet Access**

For security reasons, Internet access in NPS computers used by park employees is hard-wired. However, WiFi access can be purchased for personal use in the park where cell phone service is available. Residents of NPS housing are allowed to install satellite dishes for TV reception and Internet service. The Yellowstone Federal Credit Union and some Yellowstone Association locations also have satellite Internet connections. Some park concessioners have installed WiFi access for business purposes and for personal use by their employees. Park visitors have limited access to the Internet in areas with cellular service if they have the proper equipment installed in a laptop or a handheld device (e.g., a Blackberry). Even without Internet access, park visitors using laptops for other purposes in various places in Yellowstone has become a frequent occurrence.

- **Other Radio Transmission**

An FM translator and antenna, operated by the Gardiner/Mammoth FM Association, sits atop Bunsen Peak and transmits two FM radio stations for the Mammoth and Gardiner areas. An FM translator and antenna at Elk Plaza can transmit an additional three stations, but one frequency is currently unused. Weather band radio transmitters are installed at Elk Plaza and Grant Village.

- **Resource Monitoring**

The scientific monitoring equipment that uses wireless data transmission in the park includes:

- Twenty-five seismic stations and 14 GPS deformation monitoring stations “hubbed” through Mount Washburn that are maintained by the Yellowstone Volcano Observatory, which also obtains data from some of the 13 USGS-operated stream gauging stations;
- Nine automated snowpack and weather sensor (SNOTEL) sites (West Yellowstone, Canyon, Parker Peak, Two-Ocean Plateau, Thumb Divide, Snake River, Sylvan Road, Sylvan Lake, Northeast Entrance) operated by the Natural Resources Conservation Service;
- Three meteorological stations automated by the National Oceanic and Atmospheric Administration (Tower-Roosevelt, Mammoth, and Old Faithful) that transmit weather data to

WiFi (Wireless Fidelity) –

WiFi provides wireless local area connectivity to WiFi-enabled computers. WiFi was intended to be used for mobile devices and Local Area Networks (LANs) but is now often used for Internet access. It enables a person with a wireless-enabled computer or personal digital assistant (PDA) to connect to the Internet when in proximity of an access point. The geographical region covered by one or several access points is called a hotspot.

- the U.S. Weather Service via satellite, with an additional station at Lake that transmits via the phone system;
- o Three Remote Automated Weather Stations (Bechler, Quadrant Mountain, and Thorofare).

Sometimes equipment is temporarily deployed to monitor fire weather or changes in geothermal basins. For example, several seismometers and GPS deformation monitoring stations were installed at the Norris Geyser Basin after a significant ground-warming event in 2003.

Yellowstone National Park
 Public Scoping • August 2006

National Park Service
 U.S. Department of the Interior



Wireless Communication Services Existing Inventory

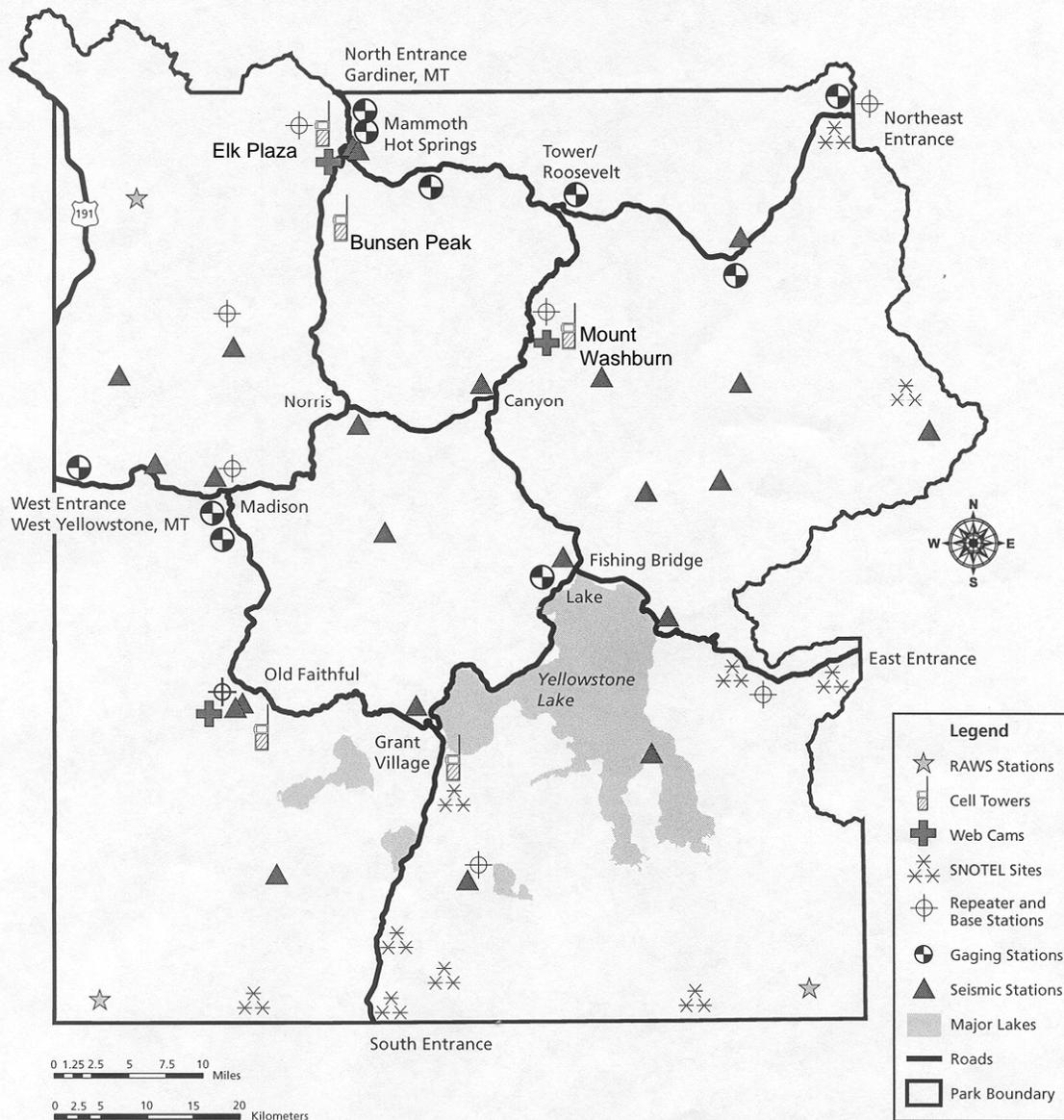


Figure 1 - Existing Wireless Communications Facilities in Yellowstone National Park

Impairment

NPS Management Policies require analysis of potential effects to determine whether or not actions would impair park resources (NPS 2006). The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must seek ways to avoid, or to minimize to the greatest degree practicable, adversely impacting park resources and values. However, laws do give the NPS management the discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values.

Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the NPS must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. Impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values. An impact to a park resource or value may constitute impairment to the extent that it has a major adverse effect upon a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or
- Identified as a goal in the park's general management plan or other relevant NPS planning documents.

An impact that may, but would not necessarily, lead to impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park. A determination on impairment is made in the Conclusion section for each of the resource topics in Chapter 4, *Environmental Consequences*.

Unacceptable Impacts

The impact threshold at which impairment occurs is not always readily apparent. Therefore, the Service will apply a standard that offers greater assurance that impairment will not occur. The Service will do this by avoiding impacts that it determines to be unacceptable. These are impacts that fall short of impairment, but are still unacceptable within the park's environment. Park managers must not allow uses that would cause unacceptable impacts; they must evaluate existing or proposed uses and determine whether the associated impacts on park resource and values are acceptable.

Virtually every form of human activity that takes place within a park has some degree of effect on park resources or values, but that does not mean the impact is unacceptable or that a particular use must be disallowed. Therefore, for purposes of these policies, unacceptable impacts are impacts that, individually or cumulatively, would meet the following criteria:

- inconsistent with a park's purposes or values,
- impede the attainment of a park's desired future conditions for natural and cultural resources as identified through the park's planning process,
- create an unsafe or unhealthful environment for visitors or employees,
- diminish opportunities for current or future generations to enjoy, learn about, or be inspired by park resources or values,

- unreasonably interfere with
 - park programs or activities;
 - an appropriate use;
 - the atmosphere of peace and tranquility or the natural soundscape maintained in wilderness and in natural, historic, or commemorative locations within the park;
 - NPS concessioner or contractor operations or services.

In accordance with NPS Management Policies, park managers must not allow uses that would cause unacceptable impacts to park resources. To determine if unacceptable impacts could occur to the resources and values of Yellowstone National Park, the impacts of proposed actions in this Environmental Assessment were evaluated based on the above criteria. A determination on unacceptable impacts is made in the Conclusion section for each of the resource topics in Chapter 4, *Environmental Consequences*.

Appropriate Use

Section 1.5 of NPS Management Policies (2006), *Appropriate Use of the Parks*, directs that the NPS must ensure that park uses that are allowed would not cause impairment of, or unacceptable impacts on, park resources and values. A new form of park use may be allowed within a park only after a determination has been made in the professional judgment of the park manager that it will not result in unacceptable impacts.

Section 8.1.2 of NPS Management Policies (2006), *Process for Determining Appropriate Uses*, provides evaluation factors for determining appropriate uses. All proposals for park uses are evaluated for:

- consistency with applicable laws, executive orders, regulations, and policies;
- consistency with existing plans for public use and resource management;
- actual and potential effects on park resources and values;
- total costs to the National Park Service; and
- whether the public interest will be served.

Park managers must continually monitor park uses to prevent unanticipated and unacceptable impacts. If unanticipated and unacceptable impacts emerge, the park manager must engage in a thoughtful, deliberate process to further manage or constrain the use or discontinue it.

Appropriate communications and resource or science monitoring facilities are common and vital structures in most park units. Proper location, sizing, and construction methods, would ensure that unacceptable impacts to park resources and values would not occur. Communication services of varying types are consistent with Yellowstone's Master Plan and other related documents. With this in mind, the NPS finds that wireless communications services and facilities are an appropriate use in Yellowstone National Park.

Public Scoping

Scoping is an early and open process to determine the breadth of environmental issues and alternatives to be addressed in an environmental assessment. Yellowstone staff has conducted both internal scoping on WCS with appropriate NPS resource specialists and external scoping with the public and interested parties. This interdisciplinary process helped to refine the EA's purpose and need, identify potential actions to address the need, and determine likely issues and resource impact topics (i.e., resources that could be impacted by the implementation of a given course of action or alternative).

Public scoping to identify issues and concerns began on July 13, 2006, with a press release, a mailing to interested parties, and posting of a scoping newsletter on the NPS Planning, Environment and Public Comment (PEPC) website. In August 2006, public open houses were held in Idaho Falls, Idaho (11 persons attended), Bozeman, Montana (12), and Cody, Wyoming (1), and in three locations in the park: the Lake Developed Area (15), the Old Faithful Developed Area (5), and the Mammoth Developed Area (4). The 50-day scoping period ended on August 31, 2006.

A total of 107 written comments were received through mailed letters (17), mailed park forms (22), and PEPC (68). All correspondence that was entered manually into PEPC was identified as a park form or letter. No form letters were identified. No comments were received from state or federal agencies.

Approximately 50% of the comments opposed increased cellular coverage for visitor convenience, but generally supported the use of wireless communication for NPS and visitor safety and emergency response needs. Approximately 30% of the comments favored increased wireless coverage in the park. Comments on the use of wireless technology for scientific research and monitoring were highly supportive. Recommendations for impact topics to be analyzed in the EA centered on visual impacts, noise/social impacts from cell phone use in geyser basins and wilderness, impacts to safety from radio frequency exposure and vehicle collisions, and impacts to migratory birds from cell towers. Preferences included restricting cellular telephone use to 911, restricting wireless coverage to building interiors, eliminating all wireless infrastructure, eliminating all wireless coverage from the backcountry, and increasing public radio use. Several comments focused on NPS wireless communication policies, and on health and human safety. Scoping comments were used during the formulation of alternatives and impact topics analyzed in this EA.

Impact Topics Retained for Further Analysis

Impact topics for this plan were identified on the basis of: (1) federal laws, regulations, and orders; (2) *NPS Management Policies 2006*; (3) NPS staff knowledge of resources at Yellowstone National Park; and (4) comments received during public scoping. The impact topics that received further analysis in this EA and the reasons why are listed below. For each of these topics the existing setting or baseline conditions within the affected project area is described in Chapter 3, Affected Environment. This information was used to analyze impacts on the current conditions of the project area in Chapter 4, Environmental Consequences.

Natural Resources

- **Threatened and Endangered Species**

This topic has been retained because the Canada lynx and the gray wolf are protected under the Endangered Species Act of 1973, as amended, and are present within potential project areas in the park.

- **Migratory Birds, including Bird Species of Management Concern**

This topic has been retained because bird species that have been recently removed from the threatened and endangered species list (i.e., bald eagles and peregrine falcons) and bird species of management concern that have been declining in Yellowstone in recent years (i.e., trumpeter swans and white pelicans) could be disturbed by antenna mounting structures and construction-related noise. Adverse impacts could be temporary or long-term.

- **Wilderness**

This topic has been retained because approximately 91% of the park's 2.2 million acres has been recommended to be designated a wilderness area and per NPS policy must be managed to preserve wilderness character. Some NPS radio repeaters and scientific monitoring equipment

currently installed within the recommended wilderness as well as installations approved in the future could degrade wilderness character.

- **Soundscapes**

This topic has been retained because human-caused sounds would likely increase temporarily during construction due to equipment, vehicular traffic, and other activities. Long-term impacts include the operation and maintenance of the wireless communication facility and the use of personal devices such as cell phones. Turbulence created by the interaction between towers, antenna, and wind would cause local increases in non-natural sounds.

Cultural Resources

- **Historic Properties including Cultural Landscapes**

Historic properties are the buildings, structures, objects, cultural landscapes, and districts listed on or eligible for listing on the National Register of Historic Places. Within Yellowstone are 7 nominated and 6 eligible historic districts, 7 individual historic properties that have been designated as National Historic Landmarks, 953 historic buildings, of which 371 are on the National Register and 320 have been determined eligible for listing, and 41 areas where preliminary surveys suggest cultural landscapes may exist. This topic has been retained because some communications structures such as antennas could be placed on buildings within historic districts and wireless towers or structures could impact historic properties and cultural landscapes

Social Resources

- **Health and Human Safety**

This topic has been retained because of questions about potential radio frequency exposure, increased traffic accidents due to people using cell phones while driving, and the ability of visitors to reach 911 or local rangers for access to emergency services.

- **Park Operations**

This topic has been retained because of park operations' essential need for wireless communication. The commercial telephone system and the NPS two-way radio system are the primary communications methods that support law enforcement, public safety, and management functions. However, park staff also uses cell phones where service is available, and many employees have stated that cell phone service is essential to ensure reliable communications for emergency service personnel in critical life and safety situations. Park staff and partners also use cell phones to conduct routine business. Staff scientists, science partners, and independent scientists rely on infrastructure with wireless data transmission to conduct research in Yellowstone.

- **Visitor Use and Experience**

This topic has been retained because visitors have expressed concern about how technology like cell phones, GPS units, and laptop computers will affect the visitor experience in the wilderness, backcountry, while viewing thermal features and vistas within the park, and in historical settings like hotel lobbies. The types of wireless service available and the location of wireless facilities such as cell towers may affect how visitors experience the park.

- **Visual Quality including Viewsheds**

This topic has been retained because Yellowstone abounds with impressive viewsheds of the highest quality. Most of Yellowstone's landscapes appear untouched by humans and retain their primeval characteristics. Less than two percent of the park is developed and facilities are predominantly grouped along the figure-eight road system and in a handful of small communities, leaving substantial acreage in its natural condition. Because the primary viewsheds are natural, facilities and structures often stand out in stark contrast to the scenery.

Impact Topics Dismissed From Further Analysis

The impact topics that have been dismissed from further consideration and the reasons why are listed below.

○ **Topography, Geology, and Soils**

The proposed construction of new wireless communications infrastructure in the park would be located in areas that do not contain sensitive topographic or geologic features and restricted to sites previously disturbed by construction. In some instances, minor modifications of the topography and excavation of soils would be required to facilitate a level surface on which to construct the facilities, but this would have a negligible to minor effect on the topography. This topic has been dismissed from further analysis because the proposed actions would result in no more than negligible to minor, temporary and permanent adverse effects to topography, geology, and soils.

○ **Vegetation including Rare Plants, Wetlands, and Exotic Plants**

The general locations for any proposed new wireless communications infrastructure have been previously disturbed by construction and the facilities would not be sited in areas that could impact rare plants or wetlands. In some instances, small areas of vegetation could be disturbed in construction areas. Site surveys would be done prior to installation of any wireless communication facility. Disturbed areas would be revegetated following construction. Introduction of exotic plants would be minimized through cleaning construction equipment prior to entry into the park. This topic has been dismissed from further analysis because the removal or disturbance of vegetation would result in no more than negligible to minor adverse impacts.

○ **Water Resources, Floodplains, and Hydrology**

Communications or monitoring sites will not be placed in surface waters or areas located within the 100-year floodplain. Dry sites will be used unless the facility is specifically designed to monitor water runoff. Periodic runoff could occur during storm events but water quality, water quantity, and drinking water are not expected to be affected by the wireless facilities. No hard surfacing would occur. Equipment sheds or cabinets would increase the amount of impervious surface in the area, which could possibly increase its erosion potential. However, this would have a negligible impact on the park's water resource. Therefore, these topics have been dismissed from further consideration.

○ **Wildlife**

All existing guidelines for limiting human entry into critical wildlife habitat, including Bear Management Areas and closures for nesting birds or denning wildlife, would be followed during installation of wireless facilities. Although noise would temporarily increase during construction, which may disturb wildlife in the general area, this would have a negligible to minor adverse effect on wildlife. Because the effects to wildlife and wildlife habitat from the proposed project are minor or less in degree, the general topic of wildlife has been dismissed from further analysis, but Threatened and Endangered Species, Bird Species of Special Management Concern, and Migratory Birds will be retained, as described above, as impact topics.

○ **Paleontological Resources**

This topic has been dismissed from further analysis because the general locations for any proposed wireless communications infrastructure have been previously disturbed by construction and little potential exists for excavation and construction activities to encounter paleontological resources.

○ **Archeological Resources**

This topic has been dismissed from further analysis because the proposed project areas are not expected to contain archeological resources and appropriate steps would be taken to protect any archeological resources that are inadvertently discovered during construction. Any proposed location for infrastructure related to wireless services would be surveyed prior to construction

and construction would not be allowed to proceed if archeological resources are identified in the immediate project area.

- **Ethnographic and Indian Trust Resources**

This topic has been dismissed from further analysis because American Indian tribes traditionally associated with the park were apprised of the proposed project during scoping and their responses indicated that no impacts to significant ethnographic resources were expected. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during project implementation, provisions outlined in the Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001) would be followed. There are no Indian trust resources (which are owned by American Indians and held in trust by the United States) at Yellowstone National Park.

- **Museum Collections**

Yellowstone's archives, library, and museum collections contain more than 5.3 million items, most of which are kept in the Heritage and Research Center (HRC) near the park entrance in Gardiner, Montana. This topic has been dismissed from further analysis because the wireless facilities are not anticipated to have measurable effects on these items.

- **Air Quality**

Construction of wireless communications facilities could result in direct, short-term, and negligible degradation of local air quality, but this topic has been dismissed from further analysis because such effects would be temporary, neither federal, state nor local ambient air quality standards would be exceeded, and Yellowstone's Class I air quality designation would not be affected.

- **Lightscape Management**

The proposed action may incorporate minimal exterior lighting on wireless facilities, but this topic has been dismissed from further analysis because the lighting would have negligible effects on the park's existing outside lighting or natural night sky. Lighting would be used only if maintenance activities must take place after dark (in case of emergencies or equipment failures) or if life-flight helicopter landings must be made in certain locations (e.g., the Old Faithful area). Light fixtures would be fitted with appropriate shielding mechanisms and placed only in areas where lighting is needed for safety reasons.

- **Socioeconomics**

This topic has been dismissed from further analysis because the proposed actions in this plan would not change local and regional land use or appreciably impact local businesses or other agencies. Implementation of the proposed action could provide a negligible benefit to local economies due to minimal and temporary increases in employment opportunities and associated revenues for local businesses and governments during facility construction.

- **Prime and Unique Farmlands**

This topic has been dismissed from further analysis because none of the soils in the park are classified as prime and unique farmlands.

- **Environmental Justice**

This topic has been dismissed from further analysis because none of the alternatives would have health or environmental impacts on minorities or low-income populations or communities as defined in the CEQ document Environmental Justice: Guidance Under the National Environmental Policy Act (CEQ 1998).

CHAPTER 2: ALTERNATIVES CONSIDERED

This chapter discusses four alternatives for providing various levels of wireless communications services and wireless communication facilities (WCFs) or infrastructure in Yellowstone National Park. The alternatives discuss present proposed actions, and address potential future actions that have not yet been proposed. A section that describes elements common to all action alternatives follows the descriptions of the alternatives. Guidelines and criteria used for the evaluation of potential future wireless communications projects are provided to reduce any resource impacts. Future actions may be implemented with the approval of the superintendent if they (1) meet the guidelines and criteria of this plan, (2) are recommended by the park's Telecommunications Committee, and (3) have negligible, minor, or moderate impacts as defined in this plan.

Alternative A, the *No Action Alternative* (required by NEPA), in this WCS Plan/EA would continue the current practice of reviewing and deciding individually on applications for WCFs, NPS radio upgrades, resource monitoring equipment, and wireless Internet services (WiFi) on a case-by-case basis, with no comprehensive guidance as to where such services should be provided and no criteria for siting associated equipment. This No Action alternative assumes that the NPS would not make major changes to current management. The 2004 park-imposed moratorium on new antennas would no longer be in effect, as this was a measure the park used until such time as this WCS Plan was complete.

The three action alternatives provide for various levels of service and infrastructure within the park based on input received during internal and public scoping sessions and from subsequent analysis and evaluation. Alternative B, *Reduction in Wireless Services*, would allow only the most basic of wireless communications services within the park. The NPS two-way radio system would remain essentially unchanged, but most cell phone service would be eliminated and wireless infrastructure would be removed, as would many weather monitoring sites. No new wireless Internet service would be allowed. Alternative C, *Limited Increase in Wireless Services* (preferred alternative), would allow cellular service at the Lake developed area, improve cellular service at the Tower-Roosevelt and Canyon development areas, relocate cellular infrastructure from Bunsen Peak to Elk Plaza for cell coverage at the Mammoth development area, and relocate the Old Faithful cell tower to reduce the existing visual impact of the tower. This alternative would address potential health hazard issues at Mount Washburn lookout, would implement additional volcanic observation equipment, and would allow for wireless Internet service in lodging guest rooms, lobbies, and park stores. Alternative D, *Substantial Increase in Wireless Services*, would allow cellular service at the Lake developed area; at the Madison, Norris, Bridge Bay, Tower-Roosevelt, and Fishing Bridge campgrounds; along the Grand Loop Road; and along the five park entrance roads. This alternative would maintain the existing Old Faithful cell tower and its appearance would be camouflaged. The construction of a facility on Bunsen Peak would allow for increased capacity for data transmission (bandwidth) into the park.

Each alternative is described in detail on the next few pages. Table 1 summarizes the impacts of Alternatives A, B, C, and D. Table 2 compares the components of each alternative, and includes a statement of the ability of these alternatives to meet the project objectives identified in Chapter One. Alternative C and D meet each of the objectives identified for this project, while Alternative A and B do not address all of the objectives. Tables 1 and 2 describe each alternative in detail and summarize environmental impacts for each alternative.

The following maps, shown for each alternative, illustrate general locations as well as existing and proposed coverage areas of each alternative. The actual coverage areas may vary from what is depicted on the maps since proposed systems have not yet been designed.

Impact Topic	Alternative A No Action	Alternative B Reduction in Services	Alternative C Preferred Alternative	Alternative D Increase in Services
Natural Resources				
Threatened and Endangered Species	May affect, not likely to adversely affect Canada lynx or gray wolves	May affect, not likely to adversely affect Canada lynx or gray wolves	May affect, not likely to adversely affect Canada lynx or gray wolves	May affect, not likely to adversely affect Canada lynx or gray wolves
Migratory Birds and Birds of Special Management Concern	Long-term, minor to moderate, adverse impacts	Long-term negligible to minor adverse impacts	Short- and Long-term, negligible to minor, adverse impacts	Long-term, minor to moderate, adverse impacts
Wilderness	Long-term minor adverse impacts	Negligible to minor, beneficial impacts	Negligible to minor, adverse impacts	Minor to moderate, adverse impacts
Soundscapes	Short- and long-term, minor to moderate, adverse impacts	Long-term, minor and beneficial impacts	Short- and long-term, minor, and adverse impacts	Short- and long-term minor to moderate, and adverse impacts
Cultural Resources				
Historic Properties and Cultural Landscapes	Long-term, minor, adverse impacts (no adverse effect § 106 of NHPA)	Long-term, moderate, beneficial impacts (no adverse effect § 106 of NHPA)	Long-term, minor, adverse impacts (no adverse effect § 106 of NHPA)	Long-term, moderate, adverse impacts (adverse effect § 106 of NHPA)
Social Resources				
Health and Human Safety	Long-term, minor, beneficial impacts	Long-term, minor, adverse impacts	Long-term, minor, beneficial impacts	Long-term, moderate, beneficial impacts
Park Operations	Long-term, minor, adverse impacts	Long-term, minor, adverse impacts	Long-term, minor adverse impacts	Long-term, negligible to minor, beneficial impacts
Visitor Use and Experience	Long-term, minor to moderate, adverse and beneficial impacts	Long-term, minor to moderate, adverse and beneficial impacts	Long-term, minor to moderate, adverse and beneficial impacts	Long-term, minor to moderate, adverse and beneficial impacts
Visual quality	Long-term, moderate, adverse impacts	Long-term minor beneficial impacts	Long-term minor and beneficial impacts	Long-term, moderate and adverse impacts

Table 1 – Environmental Impact Summary by Alternative

This table summarizes the anticipated environmental impacts for Alternatives A, B, C, and D. Only those impact topics that have been carried forward for further analysis are included in this table. Chapter 4, *Environmental Consequences*, provides a more detailed explanation of these impacts.

Table 2 - Alternatives Comparison Table

	NPS Radio	Cell phone Service	Resource Monitoring Stations	Wireless Internet
<p>Alternative A (No Action) Address wireless needs or proposals on a case-by-case basis. Remove Moratorium. Does not meet all project objectives, does not guide the placement of new facilities.</p>	<ul style="list-style-type: none"> Upgrade and install new equipment and functions as needed according to park needs, changing technology, and federal mandates on a case-by-case basis. 	<ul style="list-style-type: none"> Proposals for new cell phone coverage would be evaluated on a case-by-case basis. Replacement or upgrade of wireless equipment would occur as needed. No comprehensive plan would guide efforts. 	<ul style="list-style-type: none"> Proposals evaluated on a case-by-case basis. Wireless webcams for resource and public safety purposes would be approved on a case-by-case basis. 	<ul style="list-style-type: none"> Existing WiFi installations (some dormitories, Mammoth clinic, and YA offices) allowed; Additional WiFi evaluated on a case-by-case basis. Wireless webcams for visitor use would be installed within developed areas.
<p>Alternative B (Reduce wireless services and infrastructure within the park) Provide for basic life/health/safety wireless services (NPS radio, commercial phone and data services, cell service at Gardiner-Mammoth only). Does not meet all project objectives, does not improve operational efficiency and safety.</p>	<ul style="list-style-type: none"> Upgrade and install new equipment to existing sites as needed according to changing needs, technology, and federal mandates. There would be no increase in repeater sites. 	<ul style="list-style-type: none"> Cell phone facilities would be removed at Old Faithful, Grant Village, Canyon and Tower-Roosevelt areas, and service would no longer be available. Cell phone service remains in Gardiner-Mammoth area. Relocate cell phone antennas from Bunsen Peak to Elk Plaza. Remove all equipment and power transmission line to summit of Bunsen Peak (with the exception of the Qwest passive reflector). Remove Old Faithful, Grant, and Mt. Washburn cell towers and related equipment. Existing FM radio stations rebroadcast from Bunsen Peak would be removed. The translator equipment would be relocated to Elk Plaza and two new stations would be rebroadcast. The footprint of the existing facility at Elk Plaza would experience some possible increase in height of the tower, and expansion of existing fenced equipment area to accommodate new equipment shed or construction. Address safety at Mt. Washburn by relocating antennas and microwave dishes from exterior of the historic fire lookout onto a newly constructed support structure. No cell phone infrastructure would be allowed in recommended wilderness, minor developed areas, or along park roads 	<ul style="list-style-type: none"> No increase in volcano monitoring equipment; provide for upgrade of existing equipment. Remove stream gauging stations not needed for water quality or geothermal monitoring. No increase in RAWs; upgrade existing Bechler RAWs and replace permanent guy wires with platform and tripod. Establish criteria for providing new monitoring equipment based on life-health-safety needs (no webcams). 	<ul style="list-style-type: none"> Existing WiFi installations allowed; No additional WiFi would be approved. No new wireless webcams would be installed.
<p>Alternative C Preferred Alternative (Provide for limited increase in wireless services so that all major developed areas of the park have services) Provide cell service at Lake; improve cell service at Canyon and Tower-Roosevelt. Increase WiFi to include visitors. Meets all project objectives.</p>	<ul style="list-style-type: none"> Upgrade and install new equipment and functions as needed according to park needs, changing technology, and federal mandates and siting criteria. The proposed Telecommunications Committee and guidelines would be used for evaluating any new repeater sites. 	<ul style="list-style-type: none"> Limit new cell coverage to Lake developed area. Relocate Old Faithful cell tower to a site near the water treatment plant when feasible. Improve cell coverage at Canyon and Tower-Roosevelt with equipment upgrades at Mt. Washburn. Address safety at Mt. Washburn by relocating antennas and microwave dishes from exterior of the historic fire lookout onto a newly constructed support structure. Equipment would remain in the existing space under the observation deck. Remove obsolete equipment and relocate cellular antenna from Bunsen Peak to Elk Plaza. Allow new infrastructure on Bunsen Peak to provide for an increase in capacity of the data transmission (backbone) system within the park. Power line to top of Bunsen Peak would remain in service to provide power for this potential use. Maintain landline/data system passive reflector, FM radio translation equipment, and replace equipment shed with smaller equipment cabinet-sized enclosure. No cell phone infrastructure would be allowed in recommended wilderness, minor developed areas, or along park roads 	<ul style="list-style-type: none"> Implement proposed YVO monitoring plan (with the exception of the gauging station at Bechler and the upper Yellowstone River not being implemented), adding three stream gaging sites. Add new RAWs near NE entrance. Upgrade existing Bechler RAWs and replace permanent guy wires with platform and tripod. Replace existing manual weather stations with RAWs over time. Establish criteria/guidelines for installing new monitoring equipment (e.g., Webcams on fire structures only, NEON). Provide for temporary volcanic gas monitoring stations. 	<ul style="list-style-type: none"> WiFi available in lodging guest rooms, park stores, and hotel lobbies. WiFi available for administrative use by NPS, concessioners and partner organizations. Residential WiFi available by subscription in areas where cell coverage is available. No wireless webcams would be installed in backcountry areas for public use. Wireless webcams could be approved on a case-by-case basis within developed areas for public use, telecom needs.
<p>Alternative D (Provide substantial increase to wireless services to major and minor developed areas and park roads) Provide cell service on Grand Loop and entrance roads, major and minor developed areas. Increase WiFi coverage. Provide cell service in major campgrounds. Meets all project objectives.</p>	<ul style="list-style-type: none"> Upgrade and install new equipment and functions as needed according to park needs, changing technology, and federal mandates. New repeaters would be located to address current gaps in radio coverage. 	<ul style="list-style-type: none"> Limit new cell coverage to Lake developed area. Camouflage Old Faithful cell tower to reduce visibility from historic district. Improve cell coverage at Canyon and Tower-Roosevelt with equipment upgrades at Mt. Washburn. Allow seasonal cell coverage at Madison, Norris, Bridge Bay, and Fishing Bridge campgrounds through construction of new facilities. An additional tower may be needed to provide for cell coverage at the Bridge Bay Campground. Allow cell coverage along major roads using antennas on existing power line poles and/or additional cell towers. Address safety at Mt. Washburn by relocating antennas and microwave dishes from exterior of the historic fire lookout onto a newly constructed support structure with associated new equipment building and security fence. Remove obsolete equipment and relocate cellular antenna from Bunsen Peak to Elk Plaza. Allow new infrastructure on Bunsen Peak to provide for an increase in capacity of the data transmission (backbone) system within the park. Power line to top of Bunsen Peak would remain in service to provide power for this potential use. Maintain landline/data system passive reflector, FM radio translation equipment, and replace equipment shed with smaller equipment cabinet-sized enclosure. No cell phone infrastructure would be allowed in recommended wilderness. 	<ul style="list-style-type: none"> Install equipment proposed in YVO monitoring plan and additional monitoring sites. Upgrade monitoring equipment to meet National Volcano Early Warning System standards. Upgrade existing Bechler RAWs and replace permanent guy wires with platform and tripod. Replace existing manual weather stations with RAWs over time. Add new RAWs near NE entrance. Establish criteria/guidelines for installing new monitoring equipment (e.g., webcams on fire structures only, NEON). Provide for temporary volcanic gas monitoring stations. 	<ul style="list-style-type: none"> WiFi available in lodging guest rooms, park stores, and hotel lobbies. WiFi available for administrative use by NPS, concessioners and partner organizations. WiFi available for use by general public in most areas of development (either free or through resale by vendor or concessioner). WiFi available in campgrounds with more than 100 sites. Residential WiFi available by subscription in areas where cell coverage is available. Wireless webcams, as above, Alt. C.

Common to all action alternatives: Upgrade power to summit of Mt. Washburn. Reduce radio frequency exposure in visitor and employee areas at Mt. Washburn. Current passive reflectors and microwave dishes remain to support commercial phone and data system. Use best available technology, remove outdated and unused infrastructure. Use siting criteria for any new installations.

Alternative A: No Action

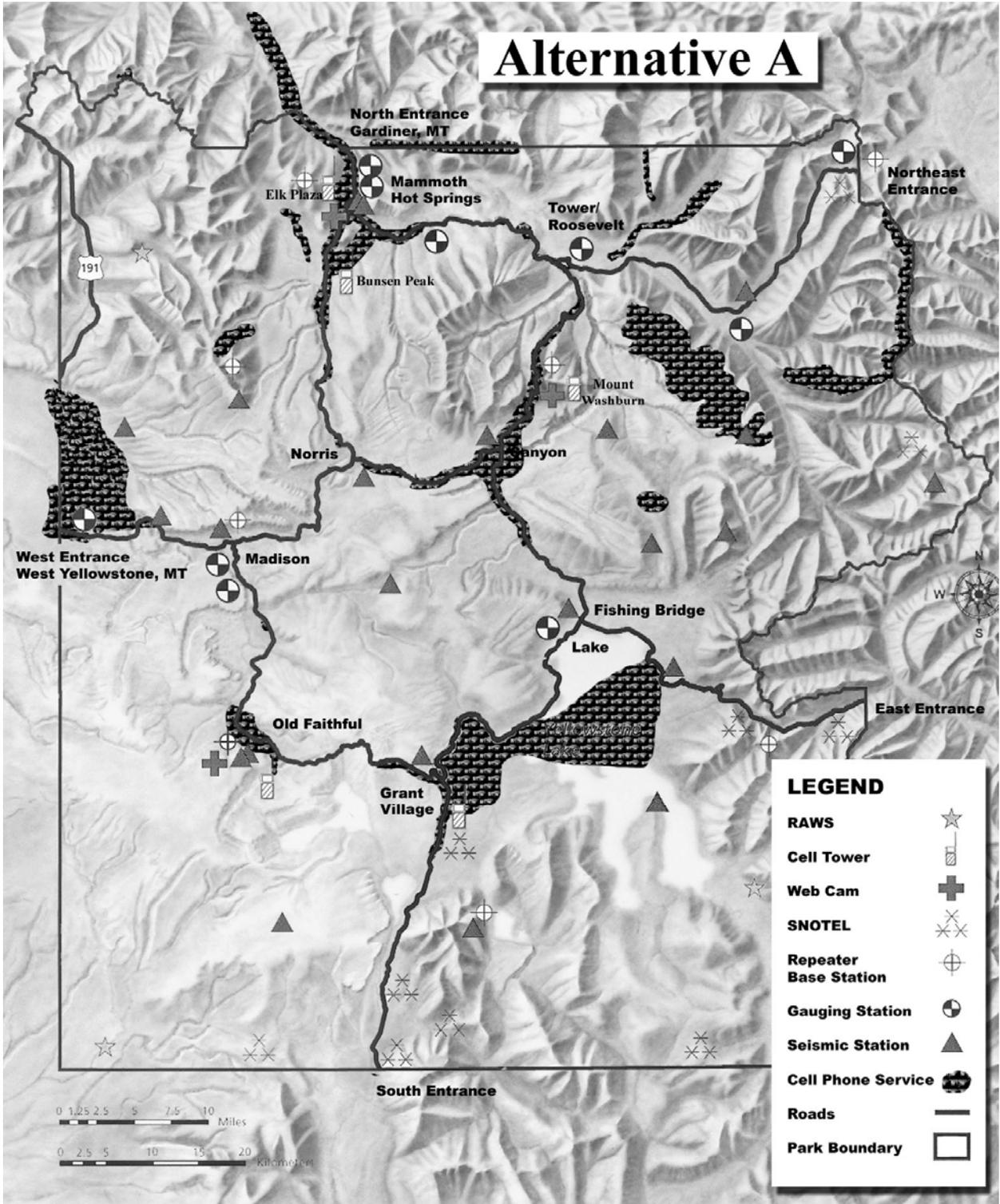


Figure 2 - Alternative A

Existing cell phone coverage is shown

Under Alternative A, *No Action*, the NPS would not develop comprehensive park guidelines and plan for installation of wireless cellular services, coverage and related WCF infrastructure. Yellowstone National Park staff would evaluate project proposals for wireless services on a case-by-case basis and would develop recommendations regarding each application for a decision by the superintendent. Applications related to the following three issues would receive the highest consideration: 1) emergency actions relating to telecommunications issues; 2) placement of temporary (two years or less) facilities not related to emergency actions that would improve the efficiency of NPS, concessioner, or contractor operations and have no greater than minor adverse impacts to park resources, or would have no increase in impacts to visitor and park staff safety; and 3) replacement or upgrading of existing telecommunications infrastructure that would not require new facilities to be constructed and would not have greater than negligible adverse impacts to any park resource. The current moratorium on wireless services and infrastructure would be removed.

NPS Radio

The health and safety of area visitors, employees, and residents depends on reliable two-way communications. However, with the existing system, two-way communications in areas within Yellowstone National Park are subject to "blind" spots, and are therefore unreliable. The use of current ground-based antennas with Yellowstone's varying topography will not eliminate these blind spots without the addition of an unacceptable number of towers or towers of excessive height. New WCF's might be added to enhance NPS radio coverage or meet changing technology or federal mandates, and park needs. Any new proposals to install additional wireless radio equipment would be reviewed on a case-by-case basis by park staff, and would adhere to NPS Director's Order 53 (DO-53) (*Special Park Uses*), frequency coordination, and permitting by the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA).

Cell phone

The five current cellular sites in the park (located on a ridge above the Old Faithful development, within a service area approximately one mile from Grant Village, on the fire lookout atop Mt. Washburn, atop Bunsen Peak approximately three miles south of Mammoth Hot Springs, and on Elk Plaza just northeast of Mammoth Hot Springs) would remain. These sites are all located in areas of previous disturbance, and none are located within recommended wilderness. This alternative would allow for some expansion of service areas evaluated on a case-by-case basis, though no plan would guide the actions.

Resource Monitoring

Any new research permit application that proposes to install wireless communications facility would be reviewed by the Research Permit Committee. This committee is led by the research permit coordinator with members that represent Resource and Visitor Protection, Interpretation, Maintenance, Compliance, Natural Resources, and Cultural Resources programs. The committee would review permits for purpose and need; scientific merit; impacts to public health and safety, scenic values, natural or cultural resources, visitor use activities, and resource compliance needs (e.g., National Environmental Policy Act [NEPA], National Historic Preservation Act [NHPA], Endangered Species Act [ESA], and Clean Water Act). Yellowstone currently issues more than 200 research permits annually; about 40 new permits are reviewed by the Research Permit Committee each year (less than five permits annually seek to install wireless equipment). The committee makes a recommendation to the chief of the Yellowstone Center for Resources on whether a permit should be approved.

If a proposed research project might have impacts greater than or minor, then the permit application would additionally be reviewed by the park's Resource Compliance Team. This committee is led by

the compliance coordinator and made up of staff representing all park divisions: Maintenance, Resource and Visitor Protection, Interpretation, Yellowstone Center for Resources, Concessions, and Administration. This committee would review the impacts of the proposal to determine whether or not this EA has assessed the impacts of the proposal, and whether additional NEPA or NHPA compliance should be completed prior to implementation of a project. They would make recommendations regarding the level of resource compliance necessary to the park's Management Team, which is comprised of the superintendent, deputy superintendents, division chiefs, safety officer, public affairs officer, budget analyst, and management assistant. The Management Team decides which projects would be approved and the level of necessary compliance.

If a research project is proposed within Yellowstone's recommended wilderness, a Minimum Requirement Analysis application would be completed and the permit application would be reviewed by the park's Wilderness Committee. This committee is led by the park's wilderness coordinator and made up of the trail crew supervisor and a representative from the Yellowstone Center for Resources. This committee reviews proposed projects for adherence to the Wilderness Act and NPS Policies on wilderness management. The committee reviews the Minimum Requirement Analyses completed for projects proposing the use of mechanized equipment or installation of equipment in recommended wilderness makes a recommendation to the chief ranger on which projects to approve, and documents the outcome of each project it reviews.

Wireless Internet (WiFi)

Wireless Internet service would be allowed in those areas and buildings that currently have it installed. These include 19 employee dormitories located at all major developed areas of the park except at Tower-Roosevelt; the Yellowstone Park School; and the Mammoth Clinic. Additional WiFi services requests within the park would be evaluated and approved on a case-by-case basis. Access to these systems would continue for dorm residents and park administrative and work functions related to the buildings served.

Electrical Power at Mt. Washburn

The power line to the summit of Mt. Washburn would not be upgraded, thus electric power would continue to be the primary limiting factor to equipment upgrades or additions on Mt. Washburn. The space requirements for electrical equipment would continue to be cramped and less than adequate.

FM Radio Stations

The Gardiner/Mammoth FM Association would continue to provide rebroadcast of currently available FM stations (KMTN (Jackson, WY), KEMC (Billings, MT), KXLB (Bozeman, MT), and KMMS (Bozeman, MT). Two stations are currently rebroadcast from Elk Plaza, and two from Bunsen Peak. A fifth frequency that is available to the association and not currently used would be retained for use as needed. Equipment would continue to be located in the equipment shed on Bunsen Peak, and in the equipment building at Elk Plaza. Antennas for both receive and transmit for each station would be retained. Additional request would be considered on a case-by case basis.

Alternative B: Reduction in Wireless Services

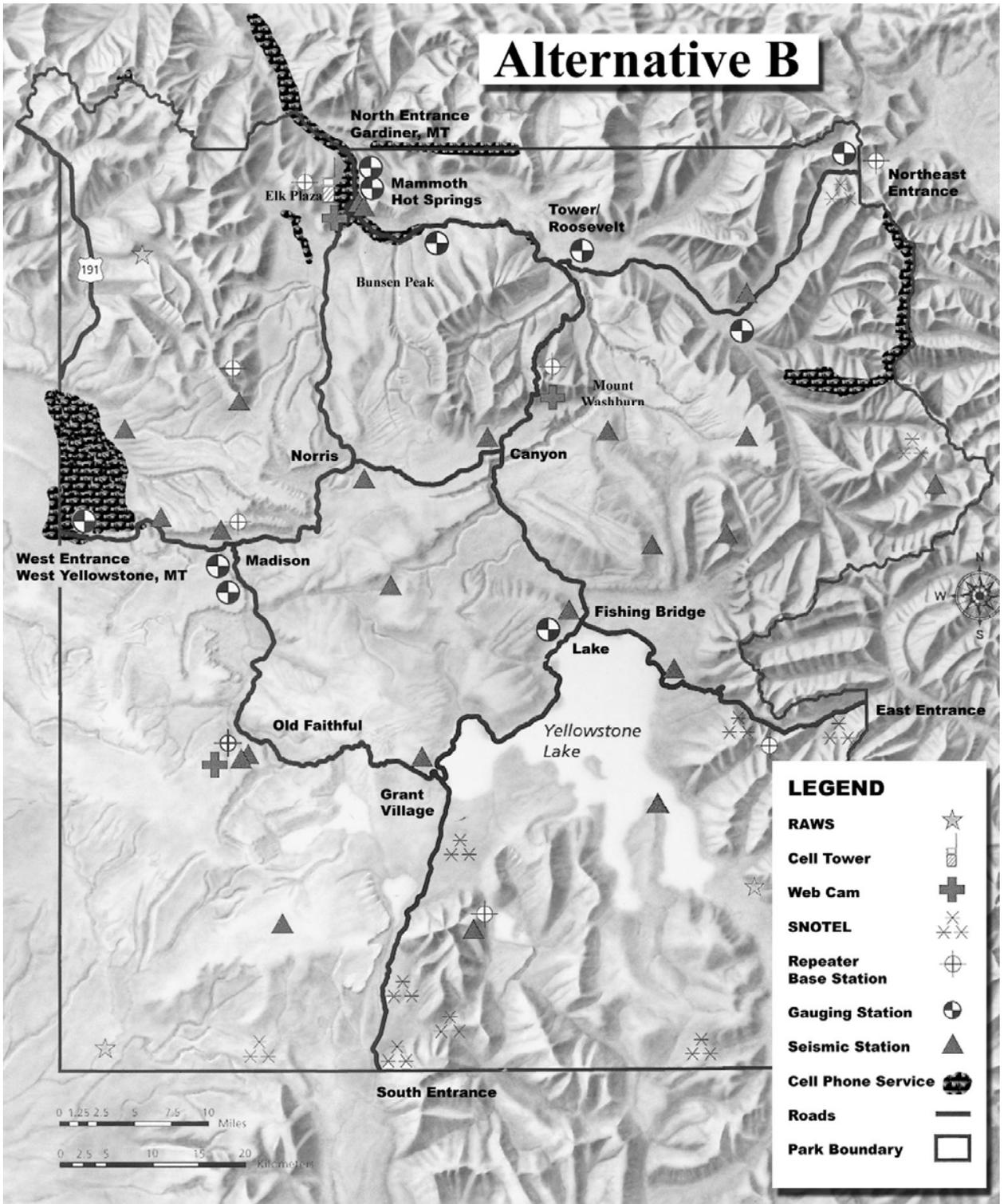


Figure 3 - Alternative B

Under Alternative B, *Reduction in Wireless Services*, only the most basic of wireless services needed for life, health, and safety would be allowed, and the overall number of WCFs would be reduced in the park. Cellular phone facilities would be eliminated at the Old Faithful, Grant Village, Canyon, and Tower-Roosevelt development areas, and service would no longer be available. Cellular phone service would remain in the Gardiner-Mammoth area. The cell phone antennas that are currently on Bunsen Peak would be relocated to Elk Plaza. All WCF equipment and the power transmission line to the summit of Bunsen Peak would be removed or relocated to Elk Plaza. The passive reflector used in the commercial phone and data system would remain at Bunsen Peak. The footprint of the existing facility at Elk Plaza would expand, including a possible increase in the height of the tower, and a slight expansion of the existing fenced area or construction. Installation of a new equipment shelter within the Elk Plaza site might be necessary to accommodate the relocated equipment. Some antennas on Mt. Washburn would be relocated onto a newly constructed support structure to remove wireless infrastructure from the historic lookout and to reduce existing safety hazards. Guidelines and criteria listed later in this chapter as “common to all action alternatives” would be implemented.

New proposals to install additional wireless communications services, equipment would be allowed under emergency situations, and reviewed by the park Telecommunications Committee which is led by the telecommunications specialist and comprised of members from compliance and resource programs.

NPS Radio

The park would upgrade and install new equipment and functions to the NPS radio system as needed to meet changing technology and federal mandates. No new NPS radio repeater sites would be installed, unless there have been documented high risks to health and human safety.

Cell phone

Cell phone facilities would be eliminated from the Old Faithful, Grant Village, Canyon, and Tower-Roosevelt developed areas and service would no longer be available. The existing cellular antennae monopole and equipment shelter would be removed at Old Faithful. The road to the site would remain to allow access to the domestic water supply for the area. The existing cellular antennae monopole and equipment shed located near the Grant Village water tank would be eliminated. This area would continue to function as a utility area serving the Grant developed area. The cellular antennas would be removed from the fire lookout structure located at the summit of Mt. Washburn. Removal of these antennas would eliminate cellular service from both Canyon and Tower-Roosevelt developments. Cell phone service would remain in the Mammoth Hot Springs area. This service originates from the lattice WCF tower currently located at Elk Plaza, and also serves the community of Gardiner, Montana, and the areas north and east Yellowstone National Park.

The six-foot cellular antenna and associated equipment on top of Bunsen Peak would be relocated to Elk Plaza. All other equipment, except the passive reflector for commercial phone service, atop the peak would be removed, including the two FM radio antennas. The passive reflector used by commercial phone and data provider would remain in service on Bunsen Peak. The overhead electric power line from Mammoth Hot Springs to the top of Bunsen Peak would also be removed. The footprint of the Elk Plaza facility would be expanded slightly; the current tower would be increased in height by up to 20 feet to accommodate the cell phone antennas that would be relocated from Bunsen Peak. Installation of a new equipment shelter within the Elk Plaza footprint may be necessary under this alternative to accommodate relocated equipment.

A new support structure would be erected atop Mt. Washburn that would allow antennas and microwave dishes to be relocated from the historic fire lookout structure and associated railings. This

would place a larger distance between park visitors and Radio Frequency emitting equipment. The existing electronic equipment would remain in the equipment room directly below the visitor viewing platform of the existing fire lookout. Views from the visitor viewing platform are currently to the east, south, and west. The relocation of existing facilities would be placed as much as possible to the north and northwest to maintain and improve the views from the viewing platform.

Resource Monitoring

There would be no increase in volcano monitoring equipment or new sites. However, existing equipment could be upgraded. The stream gauging station currently located on Soda Butte Creek would be removed and the area rehabilitated to natural conditions.

No new RAWS would be installed as part of this alternative. Existing RAWS at Old Faithful (located near the clinic and ranger station), Mt. Washburn, and others would be eliminated in this alternative. Over time, the existing 11 manual and automated weather stations could be reduced to five or six RAWS. The Bechler RAWS would be upgraded. The existing guyed tower would be replaced with a platform and tripod structure that does not require guy wires.

Any new research permit application that proposes to install wireless communications equipment would be reviewed by the park's Research Permit Committee as described in Alternative A. If a proposed research project might have impacts greater than negligible or minor, the permit application would additionally be reviewed by the park's Resource Compliance Team as described in Alternative A. Any new research permit application that proposes to install wireless communications equipment would be reviewed by the park Telecommunications Committee, described in Alternative A.

Wireless Internet (WiFi)

Wireless Internet service would be limited to those areas and buildings that currently have it installed. These include 19 employee dormitories located at all major developed areas of the park except Tower-Roosevelt; Yellowstone Park School; and the Mammoth Clinic. Access to these systems would continue to be for dorm residents, and for park administrative and work functions related to the buildings served. No additional WiFi services would be approved.

FM Radio Stations

The two existing FM radio station antennas and equipment, KMTN (Jackson, WY) and KEMC (Billings, MT), currently rebroadcast from Bunsen Peak would be removed. The translator equipment would be relocated to Elk Plaza and two new stations would be rebroadcast. The two existing FM stations, KXLB (Bozeman, MT), and KMMS (Bozeman, MT), would continue with rebroadcast from Elk Plaza. One frequency that is available to the Mammoth/Gardiner FM Association and not currently used would be retained for use as needed. Equipment at Elk Plaza would continue to be located in the existing equipment building.

Alternative C: Limited Increase in Wireless Services (Preferred Alternative)

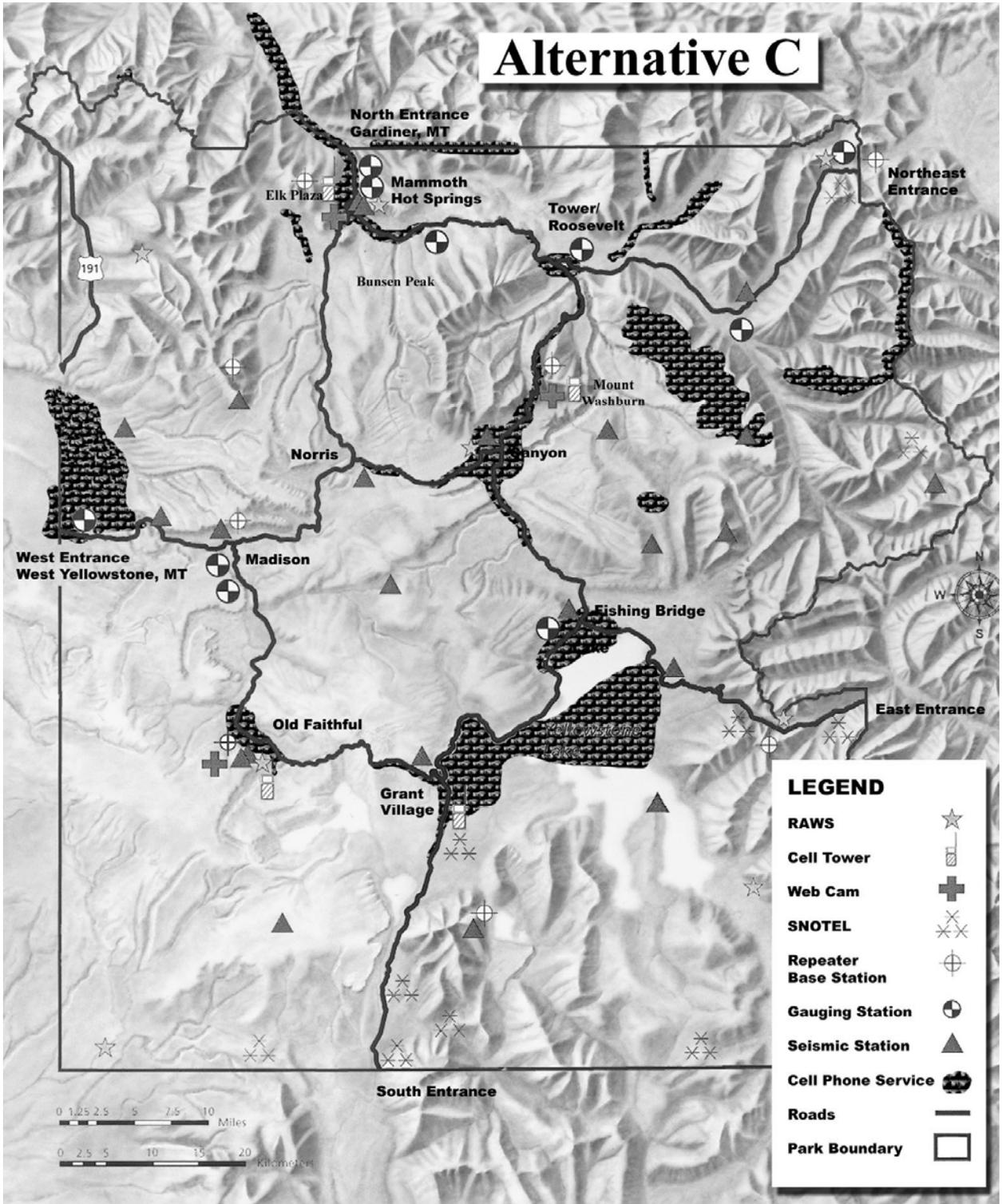


Figure 4 - Alternative C

Under Alternative C, *Limited Increase in Wireless Services*, cell phone coverage and WCFs would be allowed at the existing areas (Mammoth, Canyon, Tower-Roosevelt, Old Faithful and Grant developed areas). New cell phone coverage would be allowed at the Lake developed area using temporary or permanent infrastructure and equipment. The cell tower at Old Faithful would be relocated to a site near the water treatment plant when feasible. Viewsheds and safety at Mt. Washburn lookout would be improved by relocating antennas to a new platform tower adjacent to the existing location. Associated equipment would remain in the existing space under the visitor observation deck of the lookout. Obsolete equipment would be removed from Bunsen Peak. Cellular infrastructure originating from Bunsen Peak would be relocated to the Elk Plaza location. New infrastructure would be added on Bunsen Peak to increase the capacity of the data transmission system within the park. The electric transmission line to the summit of Bunsen Peak would remain, but the equipment shed would be replaced with a smaller cabinet-sized weather-proof enclosure to accommodate the FM translation equipment. Guidelines and criteria listed later in this chapter as “common to all action alternatives” would be implemented.

Any new proposals to install additional wireless communications services, repeater sites, or equipment would be reviewed by the park Telecommunications Committee, which is led by the telecommunications specialist and comprised of members from compliance and resource programs. This committee would review each proposal for purpose and need, resource impacts, and adherence to the guidance established by this plan, NPS DO-53, frequency coordination, and permitting by the FCC. The committee would make recommendations to the superintendent regarding the issuance of permits. The committee would also update the criteria established in this plan based on technology changes, make recommendations based on new technology, and document all decisions regarding wireless communications projects.

NPS Radio

The park will upgrade and install new equipment and functions to the NPS radio system as needed to meet changing technology, federal mandates, and park needs. Any new proposals to install additional wireless radio equipment will be reviewed by the park Telecommunications Committee, as described in Alternative B.

Cell phone

Cell phone coverage would remain at Mammoth, Canyon, Tower-Roosevelt, Old Faithful and Grant developed areas. New cell phone coverage would be allowed at the Lake developed area. Three potential locations have been considered for a new antenna mounting structure to serve the Lake developed area. These three sites include: the existing lattice tower (which houses a microwave dish used by Qwest) located just north and west of the Fishing Bridge Junction (Fig. 5), near the entrance to the wastewater treatment facility (Fig. 6), or near the existing water tank located to the west of the Lake administrative area (Fig. 7). Antennas for this new cell coverage at Lake would be configured to minimize spillover coverage into Yellowstone’s backcountry. All three potential sites have power and road access. None of the sites are located in recommended wilderness. All sites would be hidden from view of developed areas, the Grand Loop Road, and area hiking trails. The park would evaluate other sites to serve the Lake developed area so they meet the guidelines and criteria listed in the “Guidelines and Criteria for Siting, Design, Construction and Operations” section of this chapter.



Figure 5 Existing Lattice Tower, NW of Fishing Bridge

A new antenna mounting structure would be constructed at the summit of Mt. Washburn to relocate existing antennas and microwave dishes from the fire lookout structure (Fig. 8). This would address current safety concerns and viewshed impacts from the historic lookout. A new secure equipment building would be placed near this new mounting structure, and would not exceed one story in height (10'-15').



Figure 6 Wastewater Treatment Plant Entrance, Fishing Bridge



Figure 7 Water Tank Site, Lake

The Old Faithful cell tower would be relocated to an area near the Old Faithful water treatment plant when it becomes feasible to reduce the overall visibility of the tower. This would not occur before the current right-of-way (ROW) agreement with the cell phone provider expires in 2009. This relocation could result in a slight decrease in service near the Old Faithful developed area along a few miles of the Grand Loop Road.

The equipment and antennas associated with cell phone service atop Bunsen Peak would be relocated to the current Elk Plaza. New infrastructure would be added



Figure 8 Photo simulation concept for an antenna platform on Mt. Washburn. Existing conditions are shown in the left-side image

Courtesy Signing

Signing and protocols would be developed to help guide visitors in the courteous use of cell phones and other portable communications technologies.

to the top of Bunsen Peak to increase the capacity of voice and data transmission throughout the park.

While this system has not yet been designed, it would most likely use a powered microwave dish to relay additional bandwidth through an interim point to Mt. Washburn, and then be redistributed to the developed areas of the park.

Applications to the FCC for additional radio frequency spectrum would have to be completed and approved in order for this to occur. The existing electric power line to the summit would remain in service for this purpose, if and when it occurs. Any new proposals to install additional cell equipment will be reviewed by the park Telecommunications Committee, as described in Alternative B.

Courtesy signing and protocols would be developed and installed to help guide visitors in use of cell phones and other portable communications technologies. The wireless communications provider would be required to fund outreach projects to educate visitors in adhering to these protocols.

Resource Monitoring

This alternative would provide for the implementation of the Yellowstone Volcano Observatory (YVO) Monitoring Plan, with the exception that three gauging stations proposed in the Bechler area and the Upper Yellowstone River would not be installed to reduce wilderness impacts. Five proposed new seismic stations, would be allowed in this alternative; four are in park developed areas or road corridors (East Entrance, Northeast Entrance, U.S. 191 north of West Yellowstone, MT and Roaring Mountain–Obsidian Cliff road corridor), and one is within recommended wilderness in the Thorofare region in the southeast corner of Yellowstone. Because the proposed seismic station at Thorofare is within the park’s recommended wilderness, a Minimum Requirement Analysis would be completed and reviewed by the park Wilderness Committee prior to installation. Three new stream gauging stations are proposed for installation in the park (one on the Gibbon River near Norris, one on the Firehole River between Upper and Midway Geyser basins, and one on the Yellowstone River between Otter Creek and Chittenden Bridge). Gas monitoring stations would be deployed temporarily (up to one year) while gas monitoring strategies continue to be developed. All other proposals in the YVO Monitoring Plan are equipment upgrades to existing facilities.

Existing RAWS sites within the park would be maintained. A new RAWS would be installed in the northeast portion of the park near the Warm Springs trailhead. Manual weather stations located at Mammoth, Old Faithful, and Canyon would be replaced with RAWS over time, and as feasible. Existing tower structures and weather collecting sites would be used for upgrades. The Bechler RAWS would be upgraded and the existing guyed tower would be replaced with a platform and tripod structure that does not require guy wires. The National Weather Service proposal to upgrade existing automated weather stations at Mammoth, Tower-Roosevelt, Old Faithful and East Entrance would be proposed to monitor flash flood, storm development, and landslide conditions. A site at East Entrance would be determined using the siting criteria found later in this chapter. A temporary RAWS located on Hoyt Peak to monitor avalanche conditions on the East Entrance Road near Sylvan Pass would be made permanent.

Any new research permit application that proposes to install wireless telecommunications equipment would be reviewed by the park’s Research Permit Committee and Telecommunications Committee as described in Alternatives A and B, respectively. If a proposed research project might have impacts greater than negligible or minor, then the permit application would additionally be reviewed by the park’s Resource Compliance Team as described in Alternative A. If a research project is proposed

within Yellowstone's recommended wilderness, then a Minimum Requirement Analysis application would be completed and the permit application would be reviewed by the park's Wilderness Committee as described in Alternative A.

The National Ecological Observatory Network (NEON) is a continental-scale monitoring platform for discovering and understanding impacts of climate change, land use change, and invasive species on ecology. NEON would gather long-term data on ecological responses of the biosphere to changes in land use and climate, and on feedbacks with the geosphere, hydrosphere, and atmosphere. It would consist of distributed sensor networks and experiments linked by advanced cyber-infrastructure to record and archive ecological data for at least 30 years. The Yellowstone Northern Range site has been selected by NEON, Inc. as one of 20 Core Wildland Sites throughout the country. Core NEON sites would require permanent scientific monitoring equipment. A full proposal would detail what types and where such infrastructure is needed. Any infrastructure proposals would follow the guidelines determine through this plan and additional compliance might be required.

Wireless Internet (WiFi)

Wireless Internet service would remain in the areas where it is currently installed (described in Alternative A), and would additionally be allowed in park hotel lodging rooms and lobbies, stores, administrative facilities, and medical facilities. WiFi would be available for administrative use by concessioners and partner organizations. WiFi would be available in developed areas where cell towers are installed for residential subscription. The park would work with its concessioners to develop WiFi-free zones, courtesy protocols, and courtesy signing. Areas such as the Sun Room and porch at the Lake Hotel, the porch of the Roosevelt Lodge, the 1st floor of the Old Faithful Inn, and the Map Room of the Mammoth Hotel, would be kept WiFi-free as much as possible by limiting technologies under the park's control in these areas.

Webcams

Existing webcams within developed areas could be upgraded to wireless, or new wireless webcams could be installed in developed areas of the park if they are found to meet the siting criteria listed later in this chapter. No wireless webcams for visitor use would be installed within the backcountry areas of the park. It is possible that wireless webcams could be placed in backcountry areas for resource monitoring or to address safety concerns.

FM Radio Stations

The existing FM radio station and equipment would remain, but would be placed in smaller cabinet-sized equipment enclosures. The Gardiner/Mammoth FM Association would continue to provide rebroadcast of KMTN (Jackson, WY), KEMC (Billings, MT), KXLB (Bozeman, MT), and KMMS (Bozeman, MT). Two stations are rebroadcast from Elk Plaza, and two from Bunsen Peak. One frequency that is available to the association and not currently used would be retained for use as needed. The existing radio equipment at Elk Plaza would continue to be housed in the existing equipment building. Existing antennas for each station would be retained.

Electrical Power at Mt. Washburn

The existing power line to the top of Mt. Washburn is buried along the Chittenden Road, from the Grand Loop Road to a point about one quarter of a mile from the summit of Mt. Washburn. From this point the electric line is only semi-buried or lies on the surface of the ground and runs to the summit of Mt. Washburn. This aboveground portion of the service line has been considered to be near obsolete for a number of years, and should be replaced to supply a more reliable, increased amount of electric power to the summit. The current power supply limits any expansion or upgrade

of system components. The power supply has only one meter on the system, and the park is currently being billed for all power used by multiple entities on the mountain.

A new upgraded electric power line would be installed and buried within the existing roadbed or ditch of the last quarter-mile of the Chittenden Road on the north side of Mt. Washburn to the summit. The existing electric line that lies atop the ground would be removed. This upgraded power to Mt. Washburn would allow for individual metering of electric power consumption for all users.

Bandwidth Upgrade into the Park

A new facility would be constructed at the summit of Bunsen Peak to allow for additional wireless data transmission from Mammoth to Mt. Washburn. Data transmission from Mt. Washburn would then be distributed throughout the park. This facility would need at least two microwave dishes to beam signals from Mammoth to an interim point, and then to Mt. Washburn. Additional electronic equipment would be located in a new equipment building. Security fencing would be installed. Any new site would adhere to the guidelines and criteria listed later in this chapter.

Alternative D: Substantial Increase in Wireless Services

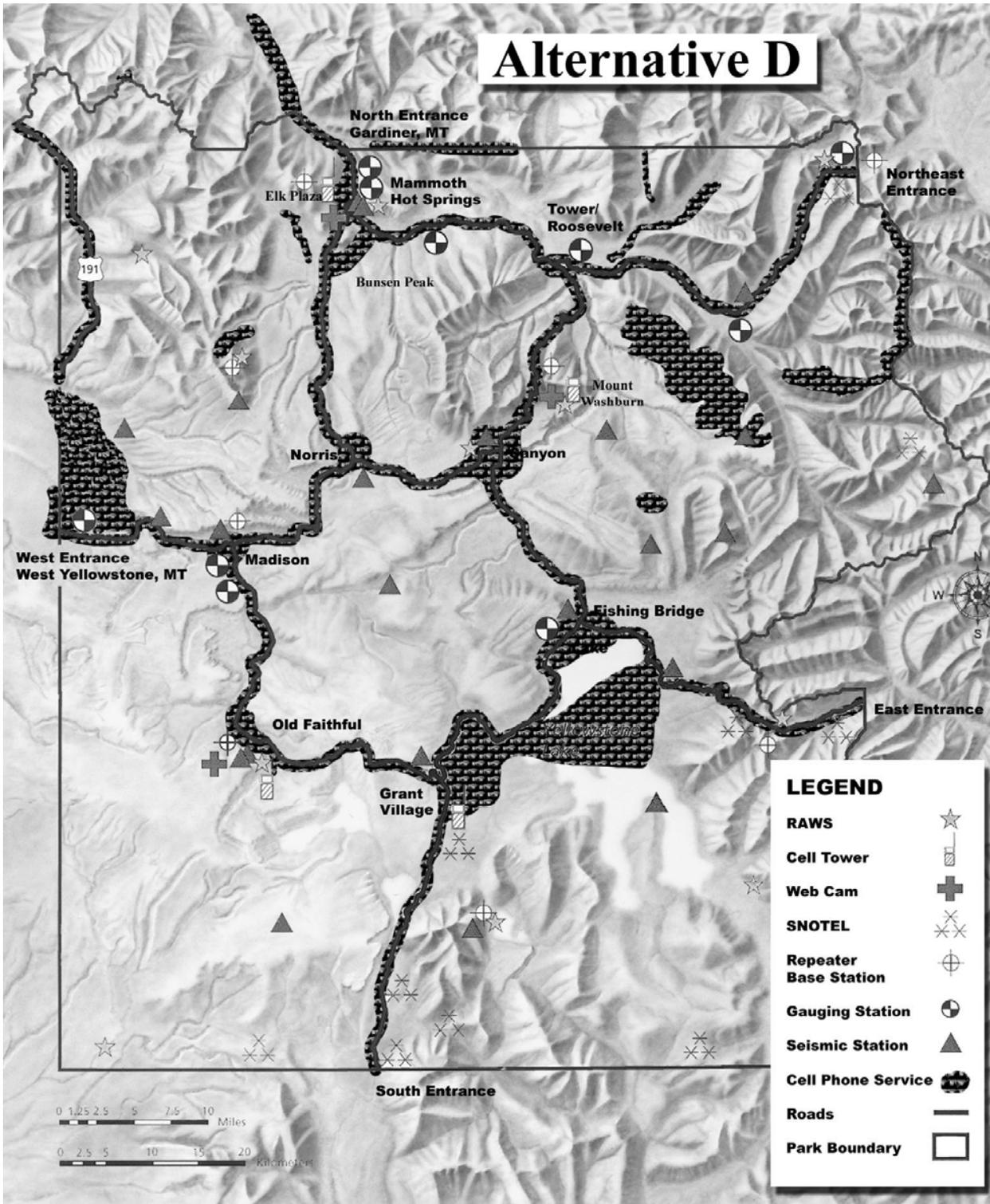


Figure 9 - Alternative D

Under Alternative D, *Substantial Increase in Wireless Services*, applications for new cell phone coverage and WCFs would be considered to allow: 1) cell coverage for the Lake developed area using temporary or permanent infrastructure and equipment, 2) seasonal (summer) cell coverage at the Norris, Madison, Bridge Bay, Tower-Roosevelt, and Fishing Bridge campgrounds through construction of new temporary or permanent facilities, and 3) cell coverage along primary roads (the Grand Loop Road, and the five entrance roads) using antennas on existing power line poles and/or additional cell towers.

The cell tower at Old Faithful would be camouflaged at its existing site to reduce the impact on the historic district when feasible. A new cell tower and associated equipment building would be installed on Mt. Washburn. Viewsheds and safety at Mt. Washburn lookout would be improved by relocating antennas to a new platform tower adjacent to the existing location. Associated equipment would remain in the existing space under the visitor observation deck of the lookout. Obsolete equipment would be removed from Bunsen Peak. Cellular infrastructure originating from Bunsen Peak would be relocated to the Elk Plaza location. New infrastructure would be added on Bunsen Peak to increase the capacity of the data transmission system within the park. The electric transmission line to the summit of Bunsen Peak would remain, but the equipment shed would be replaced with a smaller cabinet-sized weather-proof enclosure to accommodate the FM translation equipment. Guidelines and criteria listed later in this chapter as “common to all action alternatives” would be implemented.

Any new proposals to install additional wireless communication services and equipment would be reviewed by the park Telecommunications Committee as described in Alternative C.

NPS Radio

The park would upgrade and install new equipment and functions to the NPS radio system as needed to meet changing technology, federal mandates, and park needs. New repeater sites would be added to address gaps in the current NPS radio coverage.

Cell phone

Cell phone service and WCF would be added at Lake as described in alternative C. The Old Faithful cell tower would remain at its existing location and would be camouflaged to reduce its impact on the Old Faithful Historic District when it becomes feasible to do so. This would not occur before the current right-of-way agreement with the cell phone provider expires. Cell phone coverage would be added to the Grand Loop Road, and the five paved entrance roads of the park. This coverage would provide additional cellular service for accident reporting, improved communications for park staff, the ability for visitors to use cell phones from the many vehicle turnouts provided throughout the park, and for passengers to use cell phones while riding in vehicles.

New WCF infrastructure would be required to provide coverage along the park’s main road network. Power lines would have to be trenched along the roads where power is not currently available (see Fig. 10) to allow for multiple cell sites. Vehicle turnouts near the sites would have to be constructed to allow maintenance vehicles access from the main road. Antenna mounting structures would have to be added along the roads at a frequency and number that would allow for this “line of sight” technology to give continuous cell phone coverage. In areas where existing power or other utility poles exist, cellular antennas would have to be added, or placed in lieu of an existing power line pole, in order to mount antennas.

All campgrounds more than 100 campsites (Norris, Madison, Bridge Bay, Fishing Bridge and Tower Falls) and the five major park entrances would have cellular service via either permanent or seasonal facilities. Antennas and associated equipment would have to be installed near each of these sites and

located to give the best coverage and remain as hidden as possible. Power would have to be added in areas where it is currently lacking. The additional cell service described in this alternative would require construction of approximately 13–18 new cellular sites to cover the roads and campgrounds. Any new proposals to install additional cell equipment would be reviewed by the park Telecommunications Committee, as described in Alternative B.

Resource Monitoring

This alternative would allow for the installation of the proposed YVO monitoring plan as described in Alternative C. Additional monitoring stations would be installed including stream gauging stations in Yellowstone’s backcountry (Bechler and Yellowstone Rivers).

Existing RAWS sites within the park would be maintained. A new RAWS would be installed in the northeast portion of the park near the Warm Springs trailhead. Manual weather stations located Old Faithful and Canyon would be replaced with RAWS over time, and as feasible. Existing tower structures and weather collecting sites would be used for the upgrades. The Bechler and Mammoth RAWS would be upgraded and the existing guyed tower would be replaced with a platform and tripod structure that does not require guy wires. Additionally, three manual weather stations located at Mt. Washburn, Mt. Sheridan, and Mt. Holmes would be converted to RAWS as funding permits. The National Weather service proposal to upgrade existing automated weather stations at Mammoth, Tower-Roosevelt, Old Faithful and East Entrance is proposed to monitor flash flood, storm development, and landslide conditions. A site at East Entrance would be determined using the siting criteria found later in this chapter. A temporary RAWS located on Hoyt Peak to monitor avalanche conditions on the East Entrance Road near Sylvan Pass would be made permanent.

Any new research permit application that proposes to install wireless telecommunications equipment would be reviewed by the park’s Research Permit Committee and the Telecommunications Committee as described in Alternatives A and B respectively. If a proposed research project might have impacts greater than negligible or minor, then the permit application would additionally be reviewed by the park’s Resource Compliance Team as described in Alternative A. If a research project is proposed within Yellowstone’s recommended wilderness, a Minimum Requirement Analysis application would be completed and the permit application would be reviewed the park’s Wilderness Committee as described in Alternative A.

The National Ecological Observatory Network (NEON) would be established as in Alternative C.

Wireless Internet (WiFi)

WiFi would be provided in guest lodging rooms, park stores, and administrative facilities throughout the park. WiFi for use by the general public would be provided, when it becomes feasible, to most developed areas of the park. This service would be either a free system, or available through resale by a vendor or concessioner. This service would also be available in campgrounds with more than 100 sites. WiFi service would be provided in park residential areas either through a free system or through a vendor or concessioner. WiFi-free zones would be established in the areas listed in Alternative C. Courtesy signing and protocols would be developed and installed as in Alternative C.

FM Radio Stations

The existing FM radio station and equipment would remain, but would be placed in smaller cabinet-sized equipment enclosures. The Gardiner/Mammoth FM Association would continue to provide rebroadcast of KMTN (Jackson, WY), KEMC (Billings, MT), KXLB (Bozeman, MT), and KMMS (Bozeman, MT). Two stations are rebroadcast from Elk Plaza, and two from Bunsen Peak. One frequency that is available to the association and not currently used would be retained for use as

needed. The existing radio equipment at Elk Plaza would continue to be housed in the existing equipment building. Existing antennas for each station would be retained.

Webcams

As in Alternative C, existing webcams within developed areas could be upgraded to wireless, or new wireless webcams could be installed in developed areas of the park, if they are found to meet the siting criteria listed later in this chapter. No wireless webcams for visitor use would be installed within the backcountry areas of the park. It is possible that wireless webcams could be placed in backcountry areas for resource monitoring or to address safety concerns, if installed, these would only occur on fire lookouts.

Electrical Power at Mt. Washburn

As in Alternative C, a new electric power line would be installed and buried within the existing roadbed or ditch of the Chittenden Road, for about the last quarter-mile to the summit on the north side of the peak. This power line would replace the existing electric line that lies atop the ground. Upgraded power to Mt. Washburn would allow for individual metering of electric power consumption for all users.

Bandwidth into the Park

A new facility would be constructed at the summit of Bunsen Peak to allow for additional wireless data transmission from Mammoth to Mt. Washburn. Data transmission from Mt. Washburn would then be distributed throughout the park. This facility would need at least two microwave dishes to beam signals from Mammoth to Mt. Washburn. Additional electronic equipment would be located in a new equipment building. Security fencing would be installed.

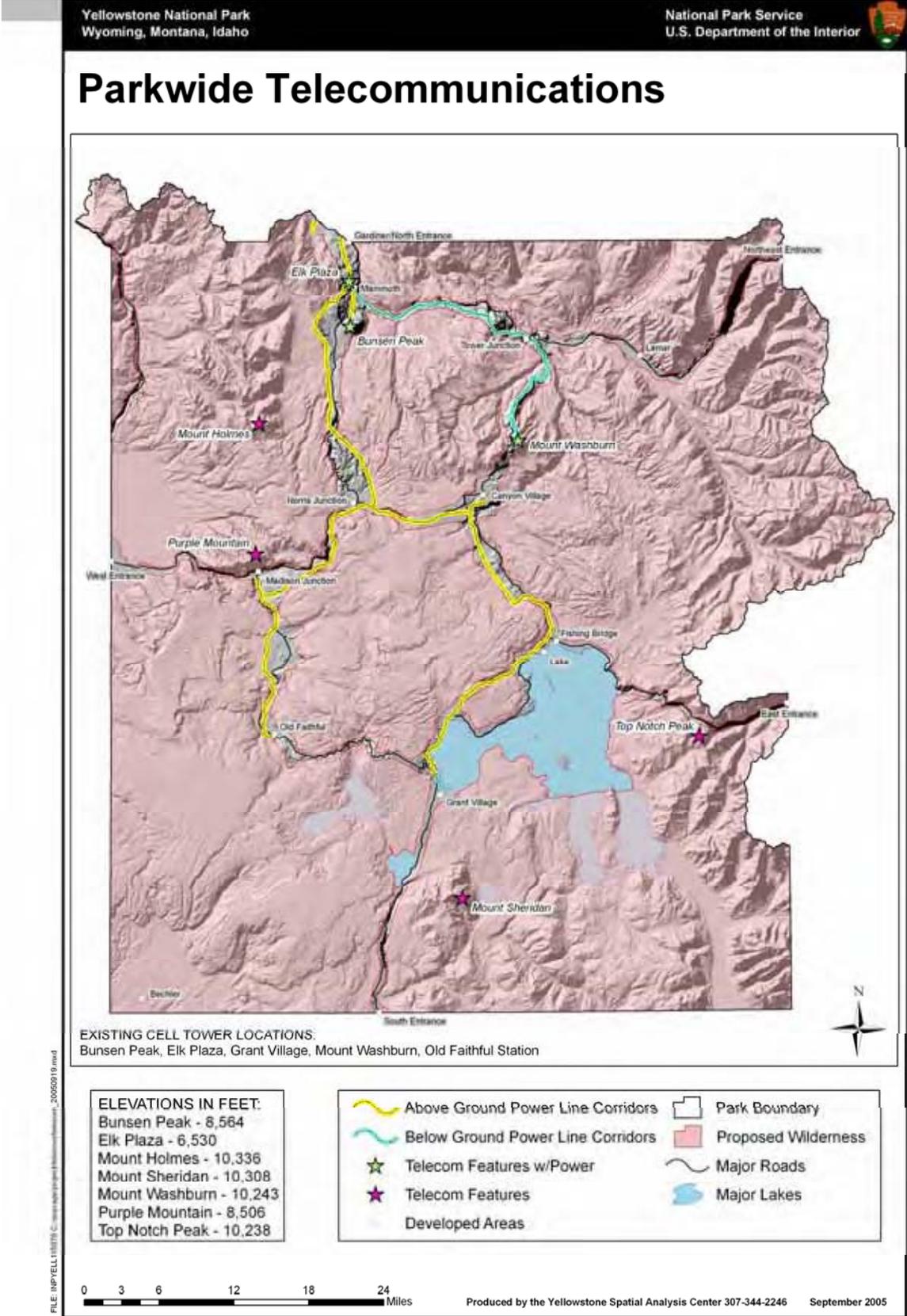


Figure 10 - Existing Power Lines

Procedures and Constraints Common to All Alternatives

Any proposed project will be subject to compliance with applicable laws, regulations, and NPS policies. For example:

- Proposed WCFs will be submitted to the park at the conceptual design stage for NEPA and NHPA scoping and review of consistency with park plans. The final construction plans, including all mitigations, will be presented in a formal application for final review of consistency with park plans and NEPA, NHPA (Section 106), and ESA requirements.
- Park staff will send a copy of the application for a proposed WCF to the managers of federal lands adjacent to the proposed site so that they can comment on potential impacts or other matters of concern.
- Park staff will comply with NPS DO-53 (Paragraph 10.3) and its implementing guidance in NPS Reference Manual 53 (RM-53), (Appendix 5, Exhibit 6). These policies direct how the NPS implements the Telecommunications Act of 1996 and subsequent directives, including requirements for notices in local newspapers and the Federal Register after NEPA and NHPA review has been completed.
- Some people are concerned about the EMF radiation generated by wireless equipment. The FCC has established EMF safety standards and extensive domestic and international research has not determined any hazard from WCFs operating at regulated power levels. No single WCF or combination of WCFs will be permitted to produce power densities anywhere in the park that exceed the FCC standards for human exposure at the point of closest public access.
- Any WCF must be constructed in a manner that meets the minimum requirements and standards of the Standard Building Code, the National Electrical Code, and the Standard Mechanical Code.
- The NPS strives to construct facilities with sustainable designs and systems that minimize environmental impacts and do not compete with or dominate the park's natural features or interfere with natural processes, such as the seasonal migration of wildlife or hydrothermal processes (*NPS Management Policies 2006*). To the extent possible, the WCF design and management should emphasize environmental sensitivity in construction, use of nontoxic materials, resource conservation, recycling, and integration of visitors with natural and cultural settings. The NPS also attempts to reduce energy costs and consumption by using energy-efficient and cost-effective technology.

This Yellowstone WCS Plan/EA will be used as the NEPA document to cover all subsequent wireless communications proposals that have direct, indirect, and cumulative impacts no greater than moderate, either adverse or beneficial, to any park resource. With respect to species protected under the ESA, projects that have moderate effects, (i.e., those that may have adverse effects on individuals or populations) would require additional consultation with the U.S. Fish and Wildlife Service under Section 7 of the ESA. However, even if the action could have a significant impact, emergencies requiring immediate action are exempt from the Council on Environmental Quality's regulatory provisions for implementing NEPA. In the event of an emergency, the park would take immediate action to prevent or reduce risks to public health and safety or serious resource losses. These actions could include the temporary placement of telecommunications or resource monitoring equipment to help manage the incident. Examples of emergency actions are cleanup of immediately threatening hazardous materials spills, fire suppression, and prevention or repair of damage by floods or other natural disasters.

For purposes of this section, the term “WCF” includes all associated infrastructure (equipment, antennas, poles, towers, supports, structures, power, conduit, access roads, and other components) used for construction, operation and maintenance of the WCF.

WCF Applications

Only FCC licensees can submit applications for sites for WCFs. All requests for wireless communications services, whether for a cell tower, a resource monitoring site, weather monitoring site, or a site to help improve public safety, will be directed to the park’s telecommunications specialist and referred to the Telecommunications Committee, comprised of park staff from compliance and resource programs. This committee will review each proposal for purpose and need, adherence to NPS DO-53, frequency coordination, and permitting by the FCC. The committee will determine if the proposal is consistent with the selected alternative of this plan, ensure that actions are incorporated into the project to minimize resource impacts, and recommend a course of action for the Superintendent, who will decide whether to approve, deny, or request further information on the proposal.

Park managers must ensure that any WCFs approved for installation in Yellowstone National Park are appropriately sited and do not degrade park resources or present hazards to park visitors or wildlife, that the requirements imposed upon WCFs by adjacent jurisdictions have been considered; and that compliance with NEPA and the NHPA is fully informed by knowledge of how to avoid adverse effects and use available techniques for mitigation. DO-53 Paragraph 10.3 and RM-53 Appendix 5 are not applicable to broadcast television or radio towers, microwave facilities, amateur radio, or other non-WCF. Other sections of RM-53 contain procedures to be used to consider applications for these types of non-WCF. If a WCF is approved, an internal memo to file would be written and added to the project administrative record.

Pursuant to the regulations in 36 CFR 14 and RM-53 guidance, the park will recover from WCF proponents the full cost of work related to processing their applications, NEPA and NHPA compliance (including subsequent environmental monitoring), and issuance and management of permits, including design review, plan checking, and construction inspection. The NPS is also required to collect a fair market value permit charge.

Right-of-Way Permits

Utility services have long been located in NPS units to provide service within a park or because geographic or other considerations necessitate the use of park lands to provide service outside the park. Title 16, United States Code, Section 5, and other authorities allow the NPS to issue right-of-way permits for such services under specified conditions. RM-53 provides detailed instructions on how to process and when to approve applications for rights-of-way permits. The permit documents proponent compliance with all conditions of approval. Right-of-way permits for Yellowstone lands must be signed by the NPS Intermountain Regional Director to become effective.

For WCFs that require a right-of-way permit (currently cellular communications towers and associated infrastructure), the park would issue a notice in the Federal Register per the requirements of NPS DO/RM-53. The public would have an opportunity to comment on the proposed tower and right-of-way permit. If the impacts of the proposed cellular tower would not exceed the criteria described in this EA and public comments do not indicate a potential for greater adverse impacts or reveal impacts that were not analyzed in this EA, the park would write a memo to file as part of the project administrative record and issue a permit for wireless use. If appropriate, the park would issue a press release notifying the public of this decision.

Mitigation Measures

Wireless telecommunications (e.g., cellular and other wireless telecommunications services) are a form of public utility, typically with multiple carriers authorized by the FCC to provide service in an area. They require a network of sites housing the equipment and antennas used to broadcast and receive signals from users. The nature of the technology creates the potential for significant visual and other resource impacts because multiple antennas may be spaced at regular intervals (especially if tall monopoles are installed to mount antennas), the antennas need to be placed in locations offering clear line-of-sight, and the network must be connected to existing electrical and telephone systems and accessible for maintenance; all of which make them highly visible.

To minimize the adverse effects to park resources from the construction and presence of wireless communication services and facilities, the following measures will be adhered to regardless of which alternative is selected. For Alternatives B, C, and D, the more specific criteria set forth under "Guidelines and Criteria for Action Alternatives" will also apply.

To preserve park resources

- Resource monitoring equipment will be placed in a recommended wilderness area only if it will provide information of scientific, educational, conservation, or historical use and if it can be installed in a way that preserves the wilderness character of the area.
- If it is necessary to use a historic structure as an antenna mount, park staff would monitor all placement activities to minimize the possibility of damage to the structure, and ensure that the mount is positioned to minimize its visibility to the public. Section 106 compliance would be initiated for any National Register listed or eligible property.
- Construction workers and supervisors will be informed about relevant park regulations and the importance of taking appropriate measures to minimize impacts to park resources.
- Construction workers and supervisors will be informed about special status species. If one of these species is discovered in a project area, contract provisions will require cessation of construction activities until park staff can assess the situation. The contract will be modified if necessary to protect the species.
- Construction activities will not be permitted in locations where archeological or paleontological resources are known to be present. If such resources are discovered during construction, the work will cease until park staff have consulted with the State Historic Preservation Officer and the Advisory Council on Historic Preservation (§36 CFR 800.13, *Post-review Discoveries*). In the unlikely event that human remains are discovered, provisions outlined in the Native American Graves Protection and Repatriation Act (1990) will be followed.
- Contractors and subcontractors will be informed of the penalties for illegally collecting artifacts or intentionally damaging paleontological materials, archeological sites, or historic properties.

To minimize ground disturbance

- Staging and stockpiling areas will be located in previously disturbed sites, away from visitor use areas to the extent possible, and returned to pre-construction conditions following construction.
- The minimum area needed for an approved construction activity will be delineated by construction tape, snow fencing, or similar material. All protection measures will be clearly stated in the construction specifications and workers will be instructed to avoid conducting activities beyond the identified construction zone.

- Because disturbed soils are susceptible to erosion until revegetation takes place, standard erosion control measures such as the use of silt fences will be used to minimize the possibility of soil erosion or impacts from soil erosion.

To minimize impacts during construction

- If necessary, dust generated by construction activity would be controlled by spraying water from an approved source on the site.
- The contractor will regularly monitor and check construction equipment to identify and repair any petrochemical leaks.
- To reduce noise and emissions, construction equipment will not be permitted to idle for extended periods and construction workers will not be permitted to broadcast portable audio devices through speakers.
- The timing of construction activities may be altered to minimize impacts on park visitors. One option would be to conduct most of the work in the off-season (winter) or shoulder (spring/fall) seasons. Another option would be to prohibit the use of construction equipment from 6 PM to 7 AM in summer (May–September), and 6 PM to 8 AM in winter (October–April). The National Park Service would determine this in consultation with the contractor.

To restore disturbed areas

- All disturbed areas would be restored shortly after construction activities are completed. Revegetation and recontouring would be designed to minimize the visual intrusion of the WCF while replicating as nearly as possible pre-construction conditions. Revegetation efforts would strive to replicate the natural spacing, abundance, and diversity of the native plant community. Weed control methods will be implemented to prevent the introduction of non-native species.

Guidelines and Criteria for the Action Alternatives

Under Alternative A, *No Action*, the NPS would not adopt comprehensive guidelines and park managers would continue to evaluate proposals for wireless services on a case-by-case basis. Under Alternatives B, C, and D, park managers would use the following guidelines to determine whether to approve a proposed project and how to mitigate its impacts on park resources and values. These guidelines would be updated over time to reflect changes in technology and experience in the park and other jurisdictions regarding wireless services.

The guidelines are intended to:

- Permit wireless telecommunications services in a manner that is sensitive to and protects the scenic, natural, cultural, and historic values of Yellowstone National Park and considers the health, safety and welfare of visitors, staff, residents, and cooperating agencies and neighbors of the park;
- Identify the issues that must be addressed in considering applications for wireless services and infrastructure in the park;
- Identify best practices, as they relate to protection of park resources, for the siting and design of WCFs (to be completed by the Telecommunications Committee);
- Provide guidance to potential WCF proponents, park staff, and interested members of the public that adheres to the procedural requirements of DO-53 and RM-53.

In order to eliminate, reduce, and mitigate the impacts associated with the siting of wireless telecommunications equipment within Yellowstone, the review of WCF applications would be conducted in a manner that ensures that proposed WCFs adhere to the guidelines listed below to the greatest extent possible. Additional site-specific requirements may be identified on a case-by-case basis by the Telecommunications Committee.

Application Process

(1) To avoid sensitive or inappropriate WCF sites and select sites that would most readily comply with these guidelines, the WCF proponent would identify proposed sites in conjunction with park staff before a formal application is submitted to the park.

(2) The identification of appropriate sites would seek to maintain the greatest possible distance between the proposed WCF and concentrations of park visitors, residents, and tenants, consistent with technological requirements and other park objectives. In addition to RM-53 notification requirements, the review of applications would include notification of park residents and tenants located within 300 feet of a proposed WCF as well as adjacent jurisdictions to inform them about the proposed site and allow them to comment.

(3) The construction and installation impacts of a proposed WCF would be assessed to ensure that the use of sites which might otherwise be acceptable would not result in the degradation or destruction of park values through site disturbance, construction disturbance, visual effects, thermal effects, noise, or other impacts. New access roads or trails would not be installed to facilitate either the installation or operation of a proposed WCF. To avoid ground disturbance in areas where it has not previously occurred and minimize ground disturbing activities elsewhere, sites would be located to minimize the need for additions to the park's utility infrastructure. All determinations of feasibility regarding mitigations or any other matters related to siting, design, or operation of WCFs would be made by park staff.

(4) To the maximum feasible extent, the consideration of applications for proposed WCFs would include an analysis of current and potential future applications from the proponent and other FCC licensees. Proponents would be required to document that no existing tower or structure could accommodate the proposed WCF, identify sites outside the park that were considered and the reason they were rejected, and submit their master plans indicating all anticipated future WCFs in or within two miles of the park for the next five years. Review of applications for proposed WCFs would include an evaluation of the cumulative impact of the proposed sites as well as existing sites. When proposed sites are approved in a particular area, the "carrying capacity" for additional sites would be assessed to avoid a proliferation of sites which could result in a derogation of park values.

(5) Multiple proponents for proposed WCFs in the same area would be encouraged to enter into joint ventures to reduce impacts to the park and simplify the park's review process. To reduce the number of individual WCF sites, proponents would locate their proposed WCFs with other existing or proposed facilities, including those operated by other carriers, whenever feasible. New sites would, where feasible and consistent with other park objectives, be constructed so that they can accommodate co-location or clustering with future WCFs. Right-of-way permits would contain provisions for proportionate reimbursement of construction costs by future WCF proponents if subsequent co-location occurs.

(6) Park staff would use outside technical experts when necessary to better understand the proponent's technical requirements as they relate to the feasibility of a proposed WCF in the park, but it is not expected that such expertise would be needed in every case. The advice of technical experts would be used to direct proponents to sites that best meet park objectives and do not

degrade park resources. Park staff would consider developing “constraint maps” or other graphical aids as necessary to identify unsuitable locations in the park.

Information Required for Application Submittals

- The final design and detailed mitigation plans for final review of consistency with park plans and approval pursuant to applicable laws.
- A site and coverage map and expected wireless services and realistic photo-simulation that depict the proposed WCF and access, if applicable, after installation.
- If a proposed WCF is within a viewshed, recreational use area, or occupied area, and would be visible if not screened, a vegetation screening plan or camouflaging method.
- Documentation of the extent to which opportunities for co-location or clustering WCFs have been considered, the number of additional WCFs that can be accommodated at the site, and explanation of factors that limit clustering.
- If the proposed site is within the viewshed of a listed landmark or historic property, photo-simulations depicting which elements of the WCF (including screening) could be seen from the historic resource.
- A description of any vegetation manipulation including tree-trimming or removal that would be required prior to the start of construction of the proposed WCF.
- A description of how vegetation would be protected during construction of the proposed WCF and related underground utility connections (e.g., temporary fencing, non-disturbance within tree drip lines, avoidance of tree roots, removal of trash and debris, and exotic vegetation control) and the site restoration plan.
- A description of the frequency and anticipated extent of tree trimming and vegetation management that will be required during operation of the proposed WCF and how these activities would be conducted to prevent adverse impacts and ensure compliance with the park’s Integrated Pest Management Program.
- A description of the frequency and anticipated extent of operations and management needs including access to the proposed site.

Design Standards and Construction Requirements

The proponent must site, design, install, and operate WCFs to minimize site development, ground-disturbing activities, construction-related disturbances, and disturbances to adjacent areas and park activities. Proponents must coordinate ground-based telecommunications requirements with the Telecommunications Office prior to permitting and compliance review. Any required work must be shown on the submitted design and construction documents.

Location of WCFs

- To minimize impacts to the park’s natural habitats of the park, new WCFs would be located with existing clusters of communications equipment or in developed areas if possible; otherwise, altered, fragmented, or degraded habitats would be selected over relatively intact native habitats.
- Radio repeater sites may be located in recommended wilderness areas only if they are determined to be the minimum requirement necessary to carry out wilderness management objectives.
- Access to WCFs must be by existing roads and trails. The WCF proponent may be permitted to repair an unpaved road, but not to pave currently unpaved roads or trails. Additional parking to accommodate the operation of proposed WCFs would be considered only in extraordinary circumstances.

- All WCFs would be designed to promote facility and site sharing by multiple users. The WCF proponent may be required to pay for a report by an independent expert regarding the feasibility of making provisions for co-location by future proponents at the proposed site and strategies that would minimize the number, size, and adverse environmental impacts of a proposed co-located site. The report would also explain the rationale for selection of the proposed site in view of the relative merits of any feasible alternative.
- To ensure that impacts are kept at or below “minor” as described in this EA, WCFs would not be located in a manner that adversely affects a building, district, or element eligible for listing on the National Register of Historic Places. WCFs would not be located where they would be detectable within the viewsheds between historic properties and the natural feature or vista it was designed for, such as the viewshed of the Old Faithful Geyser and surrounding Upper Geyser Basin from the Old Faithful Inn (or vice versa), or the viewshed of Yellowstone Lake and surrounding wilderness from the Lake Hotel or the Fishing Bridge Museum. Proposals must follow *The Secretary of the Interior Standards for the Treatment of Historic Properties* as well as *The Secretary of the Interior Standards for the Treatment of Historic Properties with Guidelines for the treatment of Cultural Landscapes*.
- The effects on threatened and endangered species would be no greater than “may affect, but not likely to adversely affect.” Construction activity would not occur within 1.0 miles of an active wolf den and individual impact areas (sites) would not exceed 0.05 acres in size. Aircraft support for installation of infrastructure in Lynx Analysis Units, as defined by the Canada Lynx Conservation and Assessment Strategy, would be infrequent (≤ 2 flights per project), and aircraft would remain $> 1,000$ feet above ground level. A vehicle-strike mortality of a lynx associated with any wireless project would preclude additional wireless projects until formal consultation with the U.S. Fish and Wildlife Service was completed.
- Towers would not be located in or near wetlands, known bird concentration areas, or known migratory or daily movement flyways, or habitat of threatened or endangered species. Tower locations would be configured to avoid areas or landscape features that attract raptors (i.e., hawks, falcons, eagles, owls). The siting of WCFs would avoid adverse impacts to wetlands, rare plant populations, species of special concern, and hydrothermal features. If possible, towers would not be located in areas with a high incidence of fog, mist, and low cloud ceilings.

Public Safety

WCFs must include: 1) fencing, barriers, or other structures or devices necessary to restrict access; 2) multi-lingual signage with warnings that the facility could cause exposure to EMF; and 3) other practices reasonably necessary to ensure that the facility is operated in compliance with FCC emission standards.

Fire Safety

Telecommunications towers, antennas, and other supporting equipment must be constructed of metal or other non-flammable material. At least one-hour fire resistant interior surfaces must be used in the construction of all equipment cabinets, enclosures, or other necessary structures. Proponents must install monitored automatic fire extinguishing systems, approved by the park, in all WCF buildings. Proponents are solely responsible for the costs associated with bringing WCFs into compliance with fire prevention requirements identified by the park’s Division of Resource and Visitor Protection. The park may identify additional fire safety requirements for WCFs located in isolated and potentially high fire risk areas.

Facility Height

- In order to minimize above-ground obstacles to birds in flight and visual obtrusion, WCFs can be no taller than necessary to accomplish their objectives.
- To avoid Federal Aviation Administration lighting requirements, no tower can exceed 199 feet in height, as measured from the natural undisturbed ground surface below the center of the base of structure to the maximum height to which the structure can be raised.

- Applications for WCFs taller than 20 feet above the surrounding tree height would require a detailed explanation of why a shorter installation is not feasible.
- The tops of antennas and equipment installed in building-mounted WCFs would not project above the top of the existing structure, excluding existing attachments such as other antennas.
- Ground-mounted WCFs would be mounted on footings or other devices that minimize the addition of impervious areas (e.g., concrete pads).

Minimizing Other Visual Impacts

- A WCF would include only the minimum amount of equipment needed for its operation, and the design plan would indicate how future proponents could be accommodated.
- New utility services for outdoor WCFs will be installed underground or placed in at-grade conduits unless this would disturb previously undisturbed areas or cause other unacceptable resource impacts.
- All ground-mounted towers must be self-supporting monopoles, lattice, or truss structures. The base diameter of any monopole will be the minimum required for the maximum height of the tower. Guyed towers or additional sections to increase the height of monopole towers would not be allowed.
- WCFs would be constructed in a manner that is compatible with the character of surrounding structures or otherwise made unobtrusive through use of the best available technologies (e.g., stealth technology, slimline poles, enclosed antenna, and micro-cells), screening with vegetation or existing topography, concealment, and/or camouflage. However, use of stealth facilities or other best available technologies must not diminish the physical or visual integrity of cultural resources. Locations where protective fencing would be required should be avoided, but if necessary, the proponent would work with park staff to determine the type and color. Rooftop installations would not be visible from the ground. Screening may include painting to match the existing structure or locating the WCFs within attics, towers, and behind and below parapets. Finishes or colors that would be shiny or reflective in sunlight would not be allowed. Proposed projects would include the removal of any existing visual obstructions and clutter on the rooftop or roofline that the park does not wish to retain.
- Trees and other vegetation adjacent to the footprint of the proposed WCF must be protected from damage. Topographic cuts and fills for WCFs must be minimized and justified. Park staff would identify appropriate mitigations for approved cuts or fills.
- Towers, buildings, and equipment would remain unlit unless light is needed for maintenance operations. Full cut-off fixtures would be used to minimize degradation of the night sky. Security or safety lighting for on-ground facilities and equipment would be down-shielded to keep light within the site boundaries.
- Support components (i.e., equipment rooms, utilities, and equipment enclosures) for WCFs must be placed in free-standing cabinets, inside buildings, or within existing rooftop, basement, or free-standing mechanical rooms. These facilities must be fireproof and impervious to theft, vandalism, and wildlife.
- No company logos or advertising would be displayed on WCFs.

Environmental Impacts

- The construction and operation of a WCF would not be permitted to increase sediment loading to any creek, stream, or river. Appropriate storm water management practices would be implemented to manage run-off and avoid creating attractions for birds.
- To minimize bird perching and nesting, external ladders and platforms on tubular towers would be avoided and tubular supports with pointed tops would be used when possible rather than lattice supports.

- Construction activities may be seasonally restricted to avoid disturbance of birds during periods of high activity, especially near breeding, feeding, or roosting areas. While birds are nest building or attending young in a nest on a tower, no nests will be removed or maintenance conducted. Tree-trimming or other vegetation removal would be completed before or after the bird-nesting season, which typically runs from mid-February through mid-August. Any work done during the nesting season would require additional coordination with park staff to ensure protection of nesting sites.
- The U.S. Fish and Wildlife Service personnel or other researchers would be allowed access to WCFs to monitor conditions before and after construction, assess impacts to migratory birds and other wildlife, conduct dead-bird searches, and place net catchments and radar, Global Positioning System, infrared, thermal imagery, and acoustical monitoring equipment to collect data on bird movements and the impacts of various tower designs and configurations.
- Proponents would develop a habitat restoration plan for the proposed site that avoids or minimizes negative impacts on vulnerable wildlife while maintaining or enhancing wildlife habitat. If mitigation of construction disturbance or installation of screening requires the planting of vegetation, native vegetation of local genetic stock from the area of the park in which the facility is located would be used. A monitoring and control plan would be in place to avoid the introduction or spread of any exotic vegetation.

Issuance of Permits and Activation of WCFs

When a WCF application has been approved, the NPS would issue a permit that is consistent with the NPS Intermountain Region's right-of-way permit for WCFs and contains standard terms and conditions for such permits in national parks along with an addendum for provisions specific to WCFs, including the required mitigation measures. Park staff would carefully supervise the construction of WCFs to ensure consistency with the terms of the permit. The carrier would not be allowed to activate the WCF until all required conditions had been met.

Ongoing Management

The Telecommunication Office would monitor the carrier's compliance with the terms of the WCF permit on at least an annual basis, including a review of insurance coverage, required reports submitted by the carrier, and inspection of the WCF by park staff from the Administration Division, Safety Office, and Fire Department. The Telecommunications Office would work with other park offices to determine whether any resource issues or other matters have arisen that need to be addressed and whether any changes in FCC or NPS requirements or policies require additional actions by the carrier.

Park staff would work with the carrier to avoid the need for additional equipment by switching to newer equipment and antennas of the same or smaller size that could provide any needed increase in capacity whenever feasible.

Terminating WCF Operations

A carrier that plans to abandon or discontinue operation of a WCF would notify the park by certified U.S. mail at least 30 days before the effective date. If a carrier fails to give such notice, the WCF would be considered abandoned upon discontinuation of operations.

Unless prior arrangements have been made or a tower is used for another wireless service, the carrier would be required to remove all WCF equipment within 90 days of the date of abandonment or discontinuation of use. This would include: (1) removal of antennas, mount, equipment shelters and security barriers; (2) proper disposal of waste materials from the site in accordance with local and state regulations; and (3) restoration of the site to its pre-WCF condition or the condition specified in the permit. All costs associated with WCF removal and site restoration would be borne by the carrier.

Appropriate Siting Examples

The following are generally acceptable types of sites for proposed WCFs within Yellowstone National Park. Proponents are encouraged to submit proposals consistent with these criteria. However, the appropriateness of any site must be confirmed with park staff; a site matching one or more of these criteria could be unacceptable if it would result in a derogation of park resources.

(1) Sites using existing infrastructure or non-occupied non-historic structures including streetlight standards, utility buildings, bridges, water tanks, existing towers, smokestacks and chimneys, provided that the proposed location and structure treatment is consistent with requirements found in Yellowstone National Park Management Plans and other applicable plans and guidance, including *The Secretary of the Interior's Standards for Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* as set forth in Title 36 of the *Code of Federal Regulations*, Part 68 (36 CFR 68) and *The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* (as set forth in 36 CFR 67). These standards are applicable because of potential impacts on other historic structures, cultural landscapes, or historic districts.

(2) Non-historic buildings with low use, including non-historic additions to historic buildings, including administrative buildings, utility structures, telephone switching facilities, and non-residential structures such as warehouses, equipment buildings or areas, garages, and service stations.

(3) Vacant or partially vacant non-historic buildings outside residential areas, especially non-occupied buildings that are not scheduled for near term occupancy, reuse, or demolition.

(4) Outdoor sites that A) would not disturb natural resources or require very minimal digging in previously undisturbed areas; B) are not readily visible or accessible to park visitors, tenants, or residents; C) are located away from viewsheds, residences, cultural resources; and recreational use areas; and D) have sufficient road, electrical, and telephone connections available nearby to service the site with minimal new construction.

(5) A historic structure will be considered for a WCF installation only when A) no other potentially acceptable sites are available; B) the lack of other potentially acceptable sites has been documented; C) installation of proposed WCF antennas, conduit, and related equipment is limited to non-historic (non-contributing) additions to the historic structure; and D) the proposed installation would fully comply with the regulatory requirements described in these guidelines. These requirements prohibit new penetrations in the walls, roof, or other features of a historic structure to accommodate WCF equipment or antennas.

(6) Sites for resource monitoring equipment would be provided only in locations that would not adversely affect natural or cultural resources. Monitoring stations for research and safety would only be allowed near a natural or cultural resource if essential to a project approved by the park's Research Review Committee.

(7) Monitoring equipment or radio repeater sites would be allowed in a recommended wilderness area only if the reasons for the placement are consistent with the Wilderness Act of 1964, NPS Director's Order 41 (*Wilderness Preservation and Management*), and the needed information could not be obtained in any area outside the recommended wilderness. Approval of such an installation would be consistent with the minimum requirement concept that determines whether the proposed action is appropriate or necessary for administration of the area as wilderness; does not pose a significant impact to wilderness resources and character; and the equipment used is the minimum needed.

Inappropriate Siting Examples

The following are examples of sites and WCFs that would be expected to result in a degradation of park values or potentially endanger park resources or visitor safety. Proponents are strongly encouraged not to submit applications for WCFs in these sites:

- (1) Any residential building or within 300 feet of residential areas in the park. This does not include fire lookouts or personal antennas (e.g., TV, WiFi)
- (2) Sites within plain view of sensitive natural or cultural areas, visitor centers, campgrounds, residential areas, trails, or park viewsheds.
- (3) Sites that would require special painting or lighting by statute or regulation for the facility to operate (e.g., Federal Aviation Administration requirements).
- (4) Sites where WCF construction or operation, including use of access roads, would have an adverse effect on a federally or state-listed endangered or threatened species.
- (5) Sites where WCF construction or operation occurs within the park's recommended wilderness, unless allowed through a minimum requirement analysis.
- (6) Outdoor sites on or near the top of an exposed ridge or hill, on a public trail, or within a creek/riparian corridor unless A) necessary to monitor wetlands, surface waters, or geothermal resources; or B) an existing structure or stealth technologies would be used to make the WCF unnoticed by the vast majority of visitors and the WCF would not otherwise degrade park resources or endanger visitors or wildlife.
- (7) Sites where WCF installation, construction, or operation, including regular access, would require construction of a new road, expansion of trails, or endanger or otherwise harm sensitive natural or cultural resources.
- (8) WCFs that are not designed for co-location or clustering with present or future WCFs if that would be feasible at the site. Clustering of antennas may minimize the overall height of tower, which in many cases is the preferred option.
- (9) WCFs whose design and installation are inconsistent with related planning documents, *The Secretary of the Interior's Standards for Rehabilitation*, or other plans, guidelines, or documents protecting park resources.
- (10) WCFs that are at a significant distance from electrical or telephone connections or existing roads for service access, such that construction to extend connections or access would result in a significant impact to park resources.
- (11) No WCF that would cause interference with park communications and emergency systems or other existing or proposed WCF in the park that could not be mitigated would be permitted.

Alternatives Considered and Dismissed

The following three alternatives were considered for project implementation, but were dismissed from further analysis for the reasons described.

- **Remove all existing cell phone service.** This alternative was considered to address comments received during the public scoping period of this plan. All cellular service throughout the park and its supporting infrastructure would be removed. During public scoping, a few members of

the public proposed this alternative as a potential solution. Alternative B removes all cellular service from the park with the exception of the Mammoth area. Because the community of Gardiner, Montana, receives cellular service from the same tower (Elk Plaza) that serves Mammoth Hot Springs, Wyoming, this alternative would remove a service in Gardiner that many residents there have come to rely upon. Therefore this alternative was removed from further consideration.

- **Reduce cell coverage to emergency calls only.** This alternative consisted of limiting cell phone service to 911 emergency calls only. Existing infrastructure would remain to allow the system to work. Cell phone service providers would likely not make a return on their investment, and would have to maintain the WCF for this purpose. Thus, maintaining a system for 911 only would not be economically feasible, and therefore this alternative was eliminated from further consideration.
- **Full build-out.** This alternative would have blanketed Yellowstone National Park with cell phone coverage. Coverage would have included all of the backcountry and recommended wilderness as well as all frontcountry, roads, and developed areas of the park. Power utility lines would be extended and constructed where none presently exist. This alternative would have required potentially hundreds of new sites and new roads and utilities for maintenance access and required power. Many of these sites would have been located in wilderness areas, which would not meet the objectives of this plan. Therefore, this alternative was eliminated from further consideration.
- **Redundant system from the west side of the park.** This would have been a component of an alternative that would have increased bandwidth (spectrum) coming into the park from the west side of the park. The system would likely have needed a mountain top site located within wilderness to construct a microwave site to relay the added bandwidth to Mount Washburn. As the site needed would have been in recommended wilderness, would need power, and likely road access, this component was dismissed and Bunsen Peak was recommended as a site to relay additional bandwidth from the north side of the park.

Actions/Equipment Outside the Scope of this Plan

The following actions or equipment are outside of the scope of this plan:

- **Devices that are connected through hard wiring.** Such as the NPS or Concessioner administrative computer networks or NPS Webcams connected to the Internet via hardwire. The park currently has three webcams operating within the park and located at Old Faithful, Mammoth, and Mt. Washburn. These webcams are used to allow the public to visit the park remotely via a computer with an Internet connection. Additionally, a webcam on Mt. Washburn is used by park fire management. These exist within the park, but will not be addressed in the plan as they are not considered a wireless technology, but rather an IT function. No webcams are proposed for installation in the backcountry areas for visitor use.
- **Mobile wireless devices.** Such as mobile GPS units, telemetry collars fitted on wildlife for research, or satellite phones. These are existing activities within the park, but are not addressed as part of this plan because they do not require WCF infrastructure.
- **Satellite Dishes.** Park employees are currently allowed to install personal satellite dishes on residences for access to satellite TV or the Internet. This is an existing allowed activity/function in the park, but is not part of this plan because they do not require WCF infrastructure.

Identification of the Environmentally Preferred Alternative

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which guides the Council on Environmental Quality (CEQ). The CEQ provides direction that “[t]he environmentally preferable alternative is the alternative that would promote the national environmental policy” as expressed in NEPA’s Section 101:

- fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
- preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
- achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life’s amenities; and
- enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Alternative A, *No Action*, would not meet the second evaluation factor above, as it would have no upper limit on the amount of new facilities that could be built. This alternative would not improve the aesthetics of some facilities already constructed, and does not address some potential existing human health hazards. This alternative does not proactively allow the NPS to protect its resources as it reacts to proposals rather than planning for a desired condition, and evaluating the impacts collectively.

Alternative B, *Reduction in Wireless Services*, would decrease the public’s ability to report on park resource violations, and reduce their ability to make emergency calls about life and health safety issues. This alternative does not strike the best balance between population and resource use.

Alternative C, *Limited Increase in Wireless Services*, is the environmentally preferred alternative because it best addresses these six evaluation factors. Alternative C would allow a limited increase in wireless services and WCF infrastructure and would provide an appropriate level of wireless communications services that meets health and safety recommendations, while minimizing environmental impacts to the extent possible. This alternative would have no net gain of cell phone sites within the park (due to the relocation of the Bunsen Peak cell site to Elk Plaza, and the addition of a cell site at Lake), and would allow cell phone access in all major developed areas while keeping to a minimum any spillover of service into the backcountry areas of the park.

Alternative D, *Substantial Increase in Wireless Services*, would substantially increase the amount of wireless service and infrastructure within the park. Allowing for cellular coverage on the park roads would likely increase motor vehicle accidents, and would require additional resource impacts associated with new WCF infrastructure, trenching new power lines, and construction of pullouts for maintenance purposes. Visual quality in the park would decrease due to the visibility of towers that cannot be hidden.

No new information came forward from public scoping or consultation with other agencies to necessitate the development of any new alternatives, other than those described and evaluated in this document. Because it meets the purpose and need for the project, the project objectives, and is the environmentally preferred alternative, Alternative C, *Limited Increase in Wireless Services*, is also recommended as the National Park Service preferred alternative. For the remainder of the document, Alternative C will be referred to as the preferred alternative.

CHAPTER 3: AFFECTED ENVIRONMENT

This chapter describes existing environmental conditions in areas potentially affected by the alternatives. This section describes the following resource areas: natural resources including threatened and endangered species, migratory birds including Species of Management Concern, wilderness and soundscapes; cultural resources including historic properties and cultural landscapes; and social resources including human health and safety, park operations, visitor use and experience, visual quality and viewsheds.

NATURAL RESOURCES

Telecommunications facilities may have an effect on natural resources including wildlife, especially migratory bird species and wilderness. Yellowstone is home to some of the largest concentrations of mammals in the lower 48 states. Sixty-one different mammals live here, including a wide variety of small mammals. Records of bird sightings kept in Yellowstone since its establishment in 1872 document 320 species, of which approximately 148 species are known to nest in the park. Wildlife species in Yellowstone that are protected by the Endangered Species Act include the Canada lynx (*Lynx Canadensis*). The gray wolf (*Canis lupus*) was recently removed from the List of Endangered Species on March 28, 2008. Endangered Species Act protections were reinstated on July 18, 2008 due to a court order. The grizzly bear (*Ursus arctos*) and bald eagle (*Haliaeetus leucocephalus*) were removed from the List of Endangered Species on April 30, 2007 and August 8, 2007, respectively. Yellowstone Species of Management Concern include the gray wolf, grizzly bear, pronghorn (*Antilocapra americana*), wolverine (*Gulo gulo*), bison (*Bison bison*), bald eagle, American peregrine falcon (*Falco peregrinus*), trumpeter swan (*Cygnus buccinators*), American white pelican (*Pelecanus erythrorhynchos*), Yellowstone cutthroat trout (*Oncorhynchus clarkii bouvieri*), westslope cutthroat trout (*Oncorhynchus clarkii lewisii*), arctic grayling (*Thymallus arcticus*), and western toad (*Bufo boreas*).

Wildlife species that may be affected by the park Wireless Communications Services Plan include threatened and endangered species and migratory birds including bird species of management concern. These topics are discussed below.

Wildlife

Threatened and Endangered Species

Canada lynx

The Distinct Population Segment of Canada lynx in the contiguous United States was listed as threatened under the Endangered Species Act (ESA) in 2000 because existing regulatory mechanisms in U.S. Forest Service (USFS) Land and Resource Management Plans were inadequate to protect lynx or lynx habitat (65 FR 16052). Lynx in the contiguous United States are considered part of a larger metapopulation whose core is located in the northern boreal forests of Canada. Lynx emanate from that area into the United States through coniferous forests with dense understories that receive deep, fluffy snows and support snowshoe hares, the lynx's principal prey (65 FR 16052). A resident population of lynx is distributed throughout its historic range in Montana, but available data are not sufficient to determine population size or trend (65 FR 16058).

Lynx occur in low numbers in the Yellowstone ecosystem, but have been detected using DNA-based methods in 18 locales since 2000 (Yellowstone National Park 2007). Numerous other sightings of Canada lynx or their tracks, without DNA support, have occurred (Yellowstone National Park files). Historical information suggests lynx were present, but uncommon, in Yellowstone during 1880 to 1980 (Murphy et al. 2004). From 2001 to 2004, the status and distribution of lynx were documented in spruce-fir and lodgepole pine forests in the park using snow tracking and hair-snare surveys

(McKelvey et al. 1999, Murphy et al. 2006). Cumulative detections represented at least three individuals, including two kittens born in two different years (Murphy et al. 2006). The presence of offspring indicated that resident, breeding individuals were present. Lynx were documented south of the East Entrance road and on the Central Plateau (i.e., Mary Mountain).

Lynx require cold boreal and montane conifer forests with dense understories that receive heavy snowfall and that support snowshoe hares, their winter principal prey. In accordance with the Canada Lynx Conservation and Assessment Strategy (CLCAS), park habitats dominated by mesic subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmanni*), and lodgepole pine (*Pinus ponderosa*) were mapped as lynx habitat (typically late successional or mature forests) or lynx habitat currently in an unsuitable condition (successional forests 1–20 years post disturbance). Twenty landscape units—Lynx Analysis Units (LAUs) — ranging from 33,000 to 155,000 acres in size were identified, each containing >15,000 acres of lynx habitat. LAUs were primarily associated with andesitic and sedimentary-based soils common in the northern and eastern portions of the park (Despain 1990). No LAUs were identified in the central and west-central portion of the park where dry lodgepole pine stands predominate at successional climax. Park LAUs typically occurred in the Yellowstone backcountry, although seven were transected by major park roads. Developed sites in the park typically did not occur in LAUs.

Managers use the standards and guidelines provided in the CLCAS to gauge the effects of park projects on lynx. Under the CLCAS, projects that occur outside LAUs have no effects on lynx. Projects inside LAUs may affect lynx, but not adversely, if the location occurs outside of lynx habitat, or occurs in lynx habitat that is currently unsuitable for lynx foraging, or occur in lynx foraging habitat, but ample suitable habitat is otherwise available. Thus, lynx foraging habitat can be modified if more than 70% remains suitable after the project.

Wireless projects, both in developed and backcountry areas, would occur in proposed lynx critical habitat Unit 5 (Greater Yellowstone) (FWS 2008). The proposal for the park includes the area north of the West Entrance road and west of the road extending from Gardiner to Norris Junction; the entire Northern Winter Range; the Absaroka Range along the park's northern and eastern boundary; and the area east of the South Entrance Road. A broad array of habitat types and successional stages are included; montane, subalpine, and deciduous (aspen) forests; sagebrush and grassland steppe; alpine areas; and riparian zones.

Gray Wolves

The gray wolf historically existed from Greenland, Alaska, and Canada through the lower 48 states to southern Mexico, with the exception of arid deserts and portions of California and the southeast. Predator control by local, state, and federal governments in the late 1800s and early 1990s resulted in its extirpation from the greater Yellowstone area and most of the lower 48 states by the 1930s (Phillips and Smith 1996). Wolves persisted in small numbers in northern Minnesota and Isle Royale, Michigan, and possibly in northern Michigan and the southwest. Wolves occasionally dispersed south from Canada into Montana and Idaho (Ream and Mattson 1982, Nowak 1983).

In 1978 the U.S. Fish and Wildlife Service (USFWS) listed the gray wolf as endangered throughout the contiguous 48 States and Mexico (except for Minnesota where the gray wolf was reclassified to threatened). In 1994, the USFWS designated unoccupied portions of Idaho, Montana, and Wyoming as two nonessential experimental population areas for the gray wolf. This designation enabled the reintroduction of 31 wolves from southwestern Canada into Yellowstone during 1995 and 1996 (Bangs and Fritts 1996). No critical habitat was designated.

The restored population rapidly increased in abundance and distribution and achieved its recovery goals for the Greater Yellowstone Area by the end of 2002 (USFWS et al. 2003). In 2007 there were approximately 171 wolves residing in 11 packs that were widely distributed across Yellowstone, but generally associated with ungulate winter ranges across the park. The U.S. Fish and Wildlife Service

delisted wolves in the northern Rocky Mountains in February, 2008, transferring management of the species to state wildlife agencies pursuant to approved wolf management plans (72 Federal Register 36939). However, Endangered Species Act protection was re-instated by court order in July, 2008. The gray wolf would thus remain a threatened species in the park.

Migratory Bird Species including Species of Management Concern

Migratory birds are those species that generally migrate south each fall from breeding grounds to their wintering grounds. They may winter in habitats throughout the Pacific region and central North America or even farther south into Mexico, Central and South America, and the Caribbean. In the spring, they return north to their breeding grounds, where they have young and the cycle repeats. Migratory birds generally follow four geographical flyways during their north-south spring and fall migrations across North America: Atlantic, Mississippi, Central, and Pacific. Yellowstone is in the Pacific flyway west of the continental divide and in the Central flyway for most of the park. Concentrations of migrating birds are more susceptible to collisions with structures.

In Yellowstone National Park, 320 bird species have been documented; 148 of these species nest in the park. Although a few species reside in Yellowstone year-round, including common raven, Canada goose, blue grouse, gray jay, red-breasted nuthatch, American dipper, and mountain chickadee, most are migratory species. Most migrate to Mexico and Central America for the winter and migrate to the U.S. in the spring. Migration brings many birds back to the park from their winter journeys south; other birds are passing through to more northern nesting areas. Most birds migrate to lower elevations and more southern latitudes beginning in September. Fall transients include tundra swans and ferruginous hawks. A few species including rough-legged hawks and bohemian waxwings migrate here from the north for the winter.

Yellowstone bird Species of Management Concern includes the bald eagle, American peregrine falcon, trumpeter swan, and white pelican. These species are monitored as are ospreys, common loons, harlequin ducks, great gray owls, and colonial nesting birds. In addition, annual North American Bird Migration counts, Christmas Bird Count, Glacier Boulder route songbird survey, and breeding bird surveys are conducted. The North American Bird Migration Count, also known as the International Migratory Bird Day Count, has been conducted since 1992 to determine general population and arrival trends of migratory birds in Yellowstone National Park. The 2007 migration count was conducted on May 12 (Appendix 1). Five observers recorded a total of 1,902 individual birds, including 94 total species of birds of which 69 species were within the confines of Yellowstone National Park (Appendix 1). A 15-year summary of the data during 1993–2007 indicates the numbers of species and birds observed during these surveys have been relatively consistent among years (Appendix 2).

Bird Species of Management Concern

Bald Eagle

Due to a population decrease caused by organochlorine pesticides (such as DDT) and other factors, bald eagles were listed as an endangered species under the Endangered Species Act in 1978 for 43 of the contiguous states, and threatened in the states of Michigan, Minnesota, Wisconsin, Oregon, and Washington (43 FR 6233). Habitat protection, management actions, and reduction in levels of persistent organochlorine pesticides resulted in significant increases in the breeding population of bald eagles throughout the lower 48 States. In response, the U.S. Fish and Wildlife Service reclassified the bald eagle from endangered to threatened in 1995 for the 43 contiguous states (60 FR 36000). Populations of bald eagles continued to increase and current data indicate the bald eagle has recovered in the lower 48 states, with an estimated minimum of 7,066 breeding pairs today compared to 487 active nests in 1963 (71 FR 8239). Numbers of nesting and fledgling bald eagles in Yellowstone also increased incrementally during 1987–2005 (McEneaney 2006). Resident and migrating bald eagles are now found throughout the park, with nesting sites located primarily along

the margins of lakes and shorelines of larger rivers. The bald eagle management plan for the Greater Yellowstone Ecosystem achieved the goals set for establishing a stable bald eagle population in the park, with a total of 26 eaglets fledged from 34 active nests during 2005 (McEneaney 2006). This is the highest number of fledged eaglets recorded to date in Yellowstone and the increasing population trend indicates habitat is not presently limiting the growth of the population. The U.S. Fish and Wildlife Service removed the bald eagle from the List of Endangered and Threatened Wildlife on August 8, 2007 (72 FR 37346).

Peregrine Falcon

The American peregrine falcon was removed from the List of Endangered and Threatened Wildlife and Plants on August 25, 1999 due to its recovery following restrictions on organochlorine pesticides in the United States and Canada, and implementation of various management actions, including the release of approximately 6,000 captive-reared falcons (64 FR 46541). The U.S. Fish and Wildlife Service has implemented a post-delisting monitoring plan pursuant to Section 4(g)(1) of the Endangered Species Act that requires monitoring peregrine falcons five times at three-year intervals beginning in 2003 and ending in 2015. Monitoring estimates from 2003 indicate territory occupancy, nest success, and productivity were above target values set in the monitoring plan and that the peregrine falcon population is secure and viable (71 FR 60563). Peregrine falcons reside in Yellowstone from April through October, nesting on large cliffs. The numbers of nesting pairs and fledglings in Yellowstone has steadily increased from zero in 1983 to 30 pairs and 44 fledglings in 2005 (McEneaney 2006).

Trumpeter Swan

Trumpeter swans were nearly extinct by 1900, but a small group of birds survived by remaining year-round in the vast wilderness of the greater Yellowstone area. This remnant population enabled the restoration of the species and today there are approximately 30,000 trumpeter swans in North America (U.S. Fish and Wildlife Service 1998). Yellowstone National Park supports resident, non-migratory trumpeter swans through the year, as well as regional migrants from the greater Yellowstone area and longer-distance migrants from Canada and elsewhere during winter. The National Park Service is committed to the conservation of resident trumpeter swans and preserving habitat for winter migrants in Yellowstone because swans are part of the natural biota and a symbolic species with considerable historical significance. However, since 1977 the park has supported relatively low and decreasing numbers of nesting pairs (median = 7, range = 2–17) and fledglings (median = 3, range = 0–12), while the abundance of the overall population has increased from less than 1,000 to greater than 5,000 swans (McEneaney 2006, U.S. Fish and Wildlife Service 1998). Also, Yellowstone provides limited and temporary winter habitat for migrant swans due to limited sections of ice-free water that diminish as winter progresses (McEneaney 2006). Thus, it does not appear that the dynamics of swans in Yellowstone will strongly influence the overall recovery of trumpeter swans in the Rocky Mountain region of the Pacific flyway.

Counts of resident, adult trumpeter swans in Yellowstone decreased from a high of 69 in 1961 to 10 in 2007. Causes of this relatively consistent decrease are unknown, but may include decreased immigration, competition with migrants, and effects of sustained drought and predation on productivity (McEneaney 2006). The Rocky Mountain trumpeter swan population operates at a scale larger than Yellowstone, and the dynamics of resident swans in Yellowstone appear to be influenced by larger sub-populations and management actions in the greater Yellowstone area and elsewhere. Numbers of adult swans counted during autumn aerial surveys at Yellowstone and Red Rock Lakes in the Centennial Valley of Montana indicated concurrent and substantial increases in abundance during 1931–1955, followed by concurrent and substantial decreases in abundance during 1961–2005. These results suggest swan dispersal from the larger subpopulation in the Centennial Valley may be an important factor for maintaining resident swans in Yellowstone by filling vacant territories or pairing with single adult birds (McEneaney 2006). Also, increases in the number of Canadian migrants to Yellowstone during winter over the last several decades may be reducing food resources

for resident swans during breeding (U.S. Fish and Wildlife Service 1998). Resident swans in Yellowstone are also susceptible to random, naturally occurring events operating at local and regional scales (e.g., severe winter weather, droughts, and predation). Drought conditions since 1995 have been the most severe recorded in northwestern Wyoming (Wyoming Division 01 Palmer Drought Severity Index) since monitoring began in 1895 (<http://www.cpc.ncep.noaa.gov>), resulting in an extensive reduction in the abundance and size of wetlands for nesting, molting, and feeding.

White Pelican

American white pelicans were identified as a Species of Management Concern and listed as a high-priority in the park's Strategic Plan because nesting attempts decreased from greater than 400 during the mid-1990s to 128 during 1999, and Yellowstone has the only current nesting colony of white pelicans in the National Park system (McEneaney 2002). Pelican control in the 1920s, followed by human disturbances in the 1940s and 1950s, kept the population at low levels. Since that time, pelican numbers have increased, but still fluctuate greatly from year to year, both in the number of nesting attempts and fledged juveniles. Flooding occasionally takes its toll on production, as does disturbance from either humans or predators (McEneaney 2002). The shallow-spawning Yellowstone cutthroat trout is the main food for white pelicans in Yellowstone. However, there are serious threats to this subspecies that could affect white pelicans, including interbreeding with introduced rainbow trout (*Oncorhynchus mykiss*), the illegal introduction of lake trout (*Salvelinus namaycush*) which prey upon cutthroat trout, and several outbreaks of whirling disease in major spawning tributaries. The recent drought in the Yellowstone area has made several spawning tributaries run dry in late summer, preventing cutthroat fry from migrating to Yellowstone Lake and making them easy prey for predators such as gulls, pelicans, and others. These threats have significantly reduced cutthroat populations in Yellowstone Lake and adjacent parts of the Yellowstone River. In 2007, a total of 427 pelicans nested and fledged 362 young, suggesting the subpopulation has recovered somewhat from the substantial decrease during the mid- to late-1990s.

Wilderness

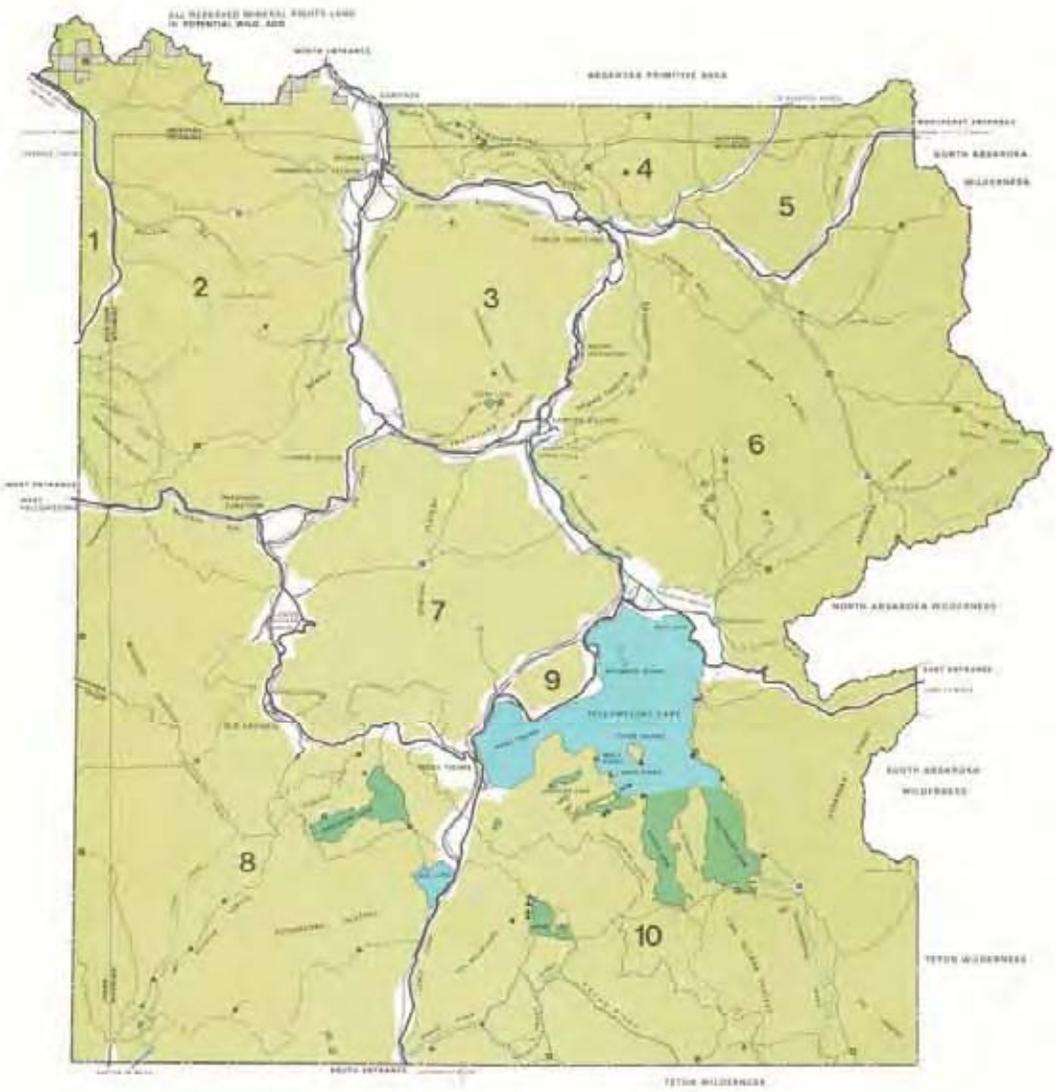
The Wilderness Act of 1964 defines wilderness as "... an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain..." and further as "... an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value" (The Wilderness Act 1964).

Approximately 91% (2,022,221 acres) of the park's 2.2 million acres are recommended wilderness (fig. 11) (NPS 1972). The remaining 9% of the park includes administrative facilities, developed areas, and roads. *NPS Management Policies 2006* state that all wilderness categories, including suitable, study, proposed, recommended, and designated shall be managed for the preservation of the wilderness characteristics, and that the NPS management decisions pertaining to lands qualifying as wilderness will be made in expectation of eventual wilderness designation. All management decisions affecting any wilderness category would further apply the concepts of "Minimum Requirement" where only actions necessary to manage the area as wilderness would be applied.

The public purpose of wilderness in NPS units includes the preservation of wilderness character and wilderness resources in an unimpaired condition, in accordance with the Wilderness Act, as well as for recreational, scenic, scientific, education, conservation, and historical use (NPS 2006). NPS does not seek to modify or eliminate risks associated with wilderness but strives to provide users with

general information concerning risks, recommended precautions, user responsibilities, and applicable restrictions and regulations.

A portion of Yellowstone's existing wireless communications services and wireless communications facilities are within Yellowstone National Park's recommended wilderness. These mostly include NPS radio repeaters, as well as scientific and weather monitoring devices. While there is patchy cell phone coverage located within isolated areas of Yellowstone's backcountry, there are no cellular towers or structures within Yellowstone wilderness lands.



ACREAGES

GRAND PARK ACRES: 7,227,772.91
 FEDERAL LAND: 1,976,706.98
 NON-FEDERAL LAND: 2,629.74

UNIT	WILDERNESS
1	11,249
2	191,814
3	122,216
4	41,221
5	50,165
6	49,761
7	92,100
8	112,840
9	7,679
10	406,274
TOTAL	1,374,000 ACRES

RESERVED WILD ADD 6,886 ACRES

LEGEND

PARK BOUNDARY	— — — — —
WALK	—————
TRAIL	—————
TELEPHONE	—————
ROAD	—————
RAIL	—————
PATROL CABIN	■
CAMPFIRE	●
LOOKOUT	●
ROCKY CLOSER OR HAZARD	●
GEOTHERMAL RESERVOIR	●
FISH TRAP	■
RESERVED MINERAL RIGHTS	■
WILDERNESS AREA	■

EXHIBIT A
WILDERNESS PLAN
YELLOWSTONE NATIONAL PARK
 GRAND TETON MOUNTAINS

Figure 11 - Recommended Wilderness Map

Soundscapes

In accordance with *NPS Management Policies* (2006) and Director's Order 47, *Sound Preservation and Noise Management*, an important part of the NPS mission is preservation of natural soundscapes associated with national park units. Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials. The frequencies, magnitudes, and durations of human-caused sound considered acceptable varies among NPS units, as well as potentially throughout each park unit, being generally greater in developed areas and less in undeveloped areas.

The natural soundscape of Yellowstone National Park is highly variable both spatially and temporally. Sound producing physical processes such as geothermal activity, wind and water and especially, biological processes such as animal vocalization depend heavily on season and time of day. Natural soundscapes vary from the mountain peaks to sage brush flats and along the banks of cascading rivers and streams to the middle of Yellowstone Lake. Weather conditions can be calm, but are often windy, especially in the afternoons. Rain and thunderstorms during the summer and fall and blizzards during the winter can dominate the natural soundscape. Rushing streams, waterfalls, and rivers create a constant localized high to moderate sound level that tends to mask nearby natural sounds. Geothermal areas have intermittent gurgling, hissing, rushing, and explosive sounds. Birds can be heard all year, but spring and early summer mornings enjoy dawn breeding bird choruses unlike other times of the year. Bison grunts and elk bugling form a dominant soundscape during their breeding seasons in the late summer and fall. Sounds associated with branches and trees rubbing against each other and popping sounds from wood freezing and thawing during very cold periods are commonly heard within the forested areas of the park. Sounds from the wind rustling the dried autumn leaves of cottonwoods and aspen and other deciduous trees are a certain indication of the departure of warm weather. Waves lapping on the shores of the larger lakes such as Yellowstone and Lewis Lakes mingle with the calls and wing-whistle of ducks and geese. These sounds fade as winter approaches and are replaced with the groaning, popping, ethereal sounds of freezing lake waters. The primitive calls of Sandhill Cranes ring through the park as they begin their southbound migration. Red squirrels' chatter and marmot and pika shrill whistles greet the visitor of the forest and high country. Voles and other small mammals can be heard scurrying among the forest duff and dried leaves. After the activity of the days, the depth of night and early morning are often blissfully silent. Some of the quietest sound levels ever measured in natural environments have been recently documented during the winter in Yellowstone.

Superimposed upon these natural soundscapes are those non-natural sounds generated by human activity. Hauling material, operating equipment, chipping organic debris, operating chainsaws, electric drills, construction equipment, helicopter access, and other construction activities could result in dissonant, human-caused sounds. Similarly, excessive human voice interactions may distract from otherwise tranquil and quiet park settings. From public scoping, excessive cell phone talking within park settings may affect visitor experience.

Federal and state land management agencies have received cell phone calls from hikers in need of assistance. To many people, a cell phone is as essential to one's backpack as a map, compass, and bottles of water (*American Hiker* 2005). Nearly as common, however, are the hikers who use their cell phones to offer commentary on their experience to friends and family back home. Ring tones, coupled with loud one-sided conversations, can be highly disruptive to the natural quiet and solitude that are treasured parts of the hiking experience (*American Hiker* 2005).

CULTURAL RESOURCES

Historic Properties including Cultural Landscapes

Historic properties are the buildings, structures, objects, cultural landscapes and districts listed on or eligible for listing on the National Register of Historic Places. There are seven nominated historic districts (HD) within Yellowstone National Park. These include Old Faithful HD, Lake Fish Hatchery HD, Roosevelt Lodge HD, Mammoth Hot Springs HD, Lamar Buffalo Ranch HD, and the Canyon Horseshoe Village HD. Six additional areas have been determined eligible as historic districts including Lake HD, Yellowstone Park Transportation Company HD, Tower Junction HD, Fishing Bridge HD, Bechler Ranger Station HD, and Canyon Service Area HD. Seven individual properties which include multiple buildings have been designated as National Historic Landmarks: Fort Yellowstone NHL Historic District, Northeast Entrance Station, Old Faithful Inn, Obsidian Cliff, and the Madison, Norris, and Fishing Bridge Museums. Yellowstone has 953 historic buildings; of these, 371 are listed on the National Register, while an additional 320 have been determined eligible for listing. The park's Grand loop Road and the park East, West, North, Northeast, and south Entrance Roads are also determined eligible as historic districts.

Cultural landscapes consist of "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." They provide a living record of an area's past, and a visual chronicle of its history. The character-defining features and patterns of a cultural landscape may include, as appropriate: natural systems and features; spatial organization; topography and landforms; vegetation; circulation systems and features; land use; buildings and structures; building cluster arrangement; water features; small scale features; and views and vistas.

In 1998, as part of its ongoing efforts to identify and manage its significant cultural resources, the NPS initiated the identification and documentation of cultural landscapes at Yellowstone National Park. As a result of these efforts, the NPS determined that cultural landscapes potentially exist at 41 areas within the park. These areas can be found at or within developed areas, historic districts, road historic districts, overlooks, scenic feature stops, campgrounds, trails, national historic landmarks, and some historic sites.

Cultural landscape inventories have been conducted for some of these park areas. A cultural landscape inventory (CLI) identifies and documents the characteristics of a cultural landscape that make it significant and worthy of preservation. Of the 41 identified cultural landscapes, CLIs have been completed for Artist Point, Apollinaris Springs, and Historic Game Ranch at Stephens Creek, which have all been determined eligible for listing in the National Register of Historic Places. The remainder of the cultural landscapes inventories are intended to be completed, and determinations of eligibility to the National Register be made over time for all 41 cultural landscapes.

There is a potential that some wireless communications facilities including antennas and structures would be placed on buildings within historic districts or on historic structures or may affect cultural landscapes within the park.

SOCIAL RESOURCES

Health and Human Safety

Visitation to Yellowstone has averaged 2.8–3.1 million visitors each year from 1993-2006; most visitations occur during the summer months. Visitor use in the park is concentrated in the major

developed areas, such as Old Faithful, Canyon, Lake, and Mammoth Hot Springs. Backcountry use accounts for 5–10% of park visitation (NPS 2000).

The NPS is committed to providing appropriate, high-quality opportunities for visitors and employees to enjoy the parks in a safe and healthful environment. Further, the NPS strives to protect human life and provide for injury-free visits. Human health and safety concerns associated with this wireless communications services plan include: exposure to electromagnetic frequency fields, the ability of cell phone users to reach 911 for emergency services, and the potential for increased traffic accidents related to cell phone use while driving.

Radio Frequency (RF) Exposure

Electromagnetic fields are produced by the local build-up of electric charges including those generated by human-made sources such as X-rays, television antennas, or telecommunications towers. These fields are present everywhere, but are invisible to the human eye. Included in this range of electric charges is radio frequency energy, a type of radio wave. These waves are measured by their frequency, or the number of waves passing a given point in one second. When discussing radio frequency signals, this frequency measurement is referred to as a hertz (Hz). One Hz equals one wave per second, one kilohertz (kHz) equals 1,000 waves per second, one megahertz (MHz) equals one million waves per second, and one gigahertz (GHz) equals one billion waves per second. Radio frequency (RF) energy includes waves with frequencies ranging from 3 kHz to 300 GHz. The FCC licenses most commercial and private radio frequency services, facilities, and devices used by the public, industry, and state and local government organizations (FCC 2007). The NTIA provides the same role for federal government organizations.

The spectrum of electromagnetic radiation includes radio waves and microwaves, collectively referred to as electromagnetic frequency, emitted by transmitting antennas. Radio frequency (RF) is one of several types of electromagnetic radiation. Radio frequency radiation can be generated from all wireless communications devices. Types of telecommunications that emit RF include cellular telephones, microwave dishes, radios, television and radar guns. High intensities can be harmful due to the ability of RF energy to heat biological tissues rapidly. Tissue damage can result because of the body's inability to cope with and dissipate the excessive heat. The FCC has created two limits to protect employees and the general public from RF emissions, expressed in the unit mW/m^3 , which is power density per unit area. The Occupational/Controlled exposure limits apply to situations in which persons are exposed as a consequence of employment and in which those persons who are exposed have been fully aware of the potential for exposure and can exercise control over their exposures. This limit is $5.0 \text{ mW}/\text{m}^3$. The General Population/Uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure. This limit is $1.0 \text{ mW}/\text{m}^3$. This level applies to NPS and non-NPS employees.

In May 2004, an OSHA survey was conducted to assess employee exposure to RF at Mt. Washburn using a *Nards 06 E-9* monitor. Five indoor samples were taken inside the lookout on the top level: one near each corner and one in the center. No overexposures were detected. Six samples were taken outside. Three of these (the northwest and southwest corners of the lookout upper level and the NPS North District repeater) were $2.0 \text{ mW}/\text{m}^3$, exceeding the 1.0 limit. It is not expected that employees would be exposed more than a few minutes in these areas. Additionally, the public is not allowed access to the third floor. With the exception of the North District repeater, all areas routinely accessed in the lookout by visitors were below $1.0 \text{ mW}/\text{m}^3$. Regardless, the park installed RF warning signs on the lookout gate and lookout door and RF caution signs on the northwest and southwest corners of the lookout railing, and on the North District repeater south of the lookout. Park personnel that access the site are trained in RF hazards.

Radio frequency exposure from physical proximity to antennas and radio equipment can have harmful effects on human health. The formulas for precise effects on human health and safety are

complicated and depend on amount of exposure, frequency band, signal strength, and type of radio waves to which one is exposed to. Potential adverse effects on human health from exposure to cellular antennas, two-way radio systems, satellite dishes and monitoring radios are generally negligible. Large microwave dishes, such as those used by the commercial phone service provider throughout the park to transport data, contain an increased risk to human health. All sites in Yellowstone National Park containing this riskier equipment are well signed, and most occur far away from areas frequented by visitors. The most significant exception to this is the Mt. Washburn Visitor Contact Station, where there is a significant collection of antennas representing many forms of communication. This location also serves as the commercial phone service provider's primary "hub" for data transmission throughout the park, and associated collection of microwave antennas.

Road Safety and Emergency Services Access

Accident Reporting: Cell phone use by the general public to 911 expedites accident response where cell coverage exists. During the summer months, visitors are more common within the park's developed areas and, to a lesser extent, the park's road system than they are in the park's backcountry. During the period of 2004 to 2007, the Yellowstone Park 911 dispatch center received 210 calls for assistance for motor vehicle accidents with injuries, 11 motor vehicle accidents that resulted in fatalities, and a total of 1,771 non-injury motor vehicle accidents.

Many employees and vehicles of Yellowstone National Park carry government issued cell phones. They are used to enhance an employee's ability to function more effectively while conducting National Park Service Business. Additionally, they are used during emergency response incidents, such as law enforcement, medical and fire situations. However, cell phones are not considered the primary method of communication for emergencies. The primary tool for emergencies is considered by the National Park Service to be the two-way radio system and cell phones are considered only an enhancement tool to be used when incidentally available.

Driving Safety: The use of cell phones while operating motor vehicles is widely known to increase motor vehicle accidents and associated injuries that occur as a result. National Park Service policy prohibits employees from using a cell phone while operating a government vehicle, except for law enforcement activity involved in an emergency incident.

Park Operations

Implementation of a parkwide program such as wireless communications can affect the operations of a park. These include an array of park operations including phone, computer, radio communications, visitor protection, dispatch operations, maintenance of park facilities and infrastructure, visitor education and resource monitoring and protection.

NPS Two-Way Radio system

Yellowstone National Park uses a two-way narrowband radio system, operating in "mixed" (analog/digital) mode to support essential law enforcement, public safety and emergency management functions. Most government vehicles contain a mobile radio and most park employees actively use a portable radio while working and traveling around the park. The radio system is complex, containing seven mountaintop repeaters (Fig. 1). These repeater locations generally occur at or near 10,000 feet elevation, providing maximum coverage in order to minimize the required number of repeaters. Each of these sites is connected, using a variety of technologies, to the park's 24/7 Communications or Emergency 911 Dispatch center, located in Mammoth. The radio system uses 20 base stations scattered around the park, each also connected back to the Communications Center. These base stations, located in developed areas, support approximately 300 "remote" desktop radios scattered in offices, visitor centers, and ranger stations around the park, providing direct access to the radio system.

The system is considered the park's primary form of emergency communications and is used for emergency medical services (EMS), structural fire, wildland fire, law enforcement, search and rescue, weather, avalanche, earthquake and other required types of necessary emergency services response. The National Park Service retains "exclusive jurisdiction" over Yellowstone National Park and is the primary provider of these services within the park. In areas along park boundaries, where partner agencies assist with these services, such as West Yellowstone Police Department, Grand Teton National Park, Cooke City Search and Rescue, five county Sheriff departments, three state police departments, Gardiner EMS, Gardiner Fire, and a number of other emergency functions. The park's radio system is shared with them. These agencies have direct access to Yellowstone dispatch and are able to communicate with park responders. In special cases, such as FBI, Department of Justice, air ambulances and other specialized responses that Yellowstone National Park does not provide itself, such assisting agencies will also have access to and utilize this same radio system.

The nature of two-way radio systems changes over time as technology and demands change. In some cases more repeater sites are added to provide more adequate radio system coverage throughout the park. At present, the system covers approximately 93% of backcountry areas and 99% of road and development areas in the park. As the park radio system is converted to full digital over the next 10 years, the percentage is likely to decrease and additional repeater sites may be necessary to provide communications coverage for emergency services. The advantage of digital communications includes vastly increased communications capabilities, such as digital encryption, private radio to radio communications and radio Caller ID. These features are required by current EMS, fire and law enforcement standards to protect the identities and conditions of EMS patients, as well as ongoing law enforcement investigations.

Cellular and Satellite Phones

Park staff use cell phones, where service is available, as an adjunct to the park radio system. Many of Yellowstone's employees state that cell phone service is essential to ensure that in critical life and safety situations, the NPS will have reliable communications for emergency service personnel. NPS staff and partners also use cell phones to conduct routine business.

Park staff, especially backcountry and fire management staff use satellite phones where park radios may be unreachable. However, this is an early use of this type of communication and has showed inconsistent results depending upon the availability of satellites at any given time. Satellites require no infrastructure in the park and are not covered in this document.

Research/Monitoring (Geothermal, Seismic, Water, Wildlife, Air Quality, Weather)

There are numerous types of resource monitoring communication functions and structures within Yellowstone National Park. These include communications to support the Yellowstone Volcano Observatory (YVO) seismic monitoring, SNOWpack TELEmetry (SNOTEL) stations to record snowfall and precipitation, and Remote Automated Weather Stations (RAWS).

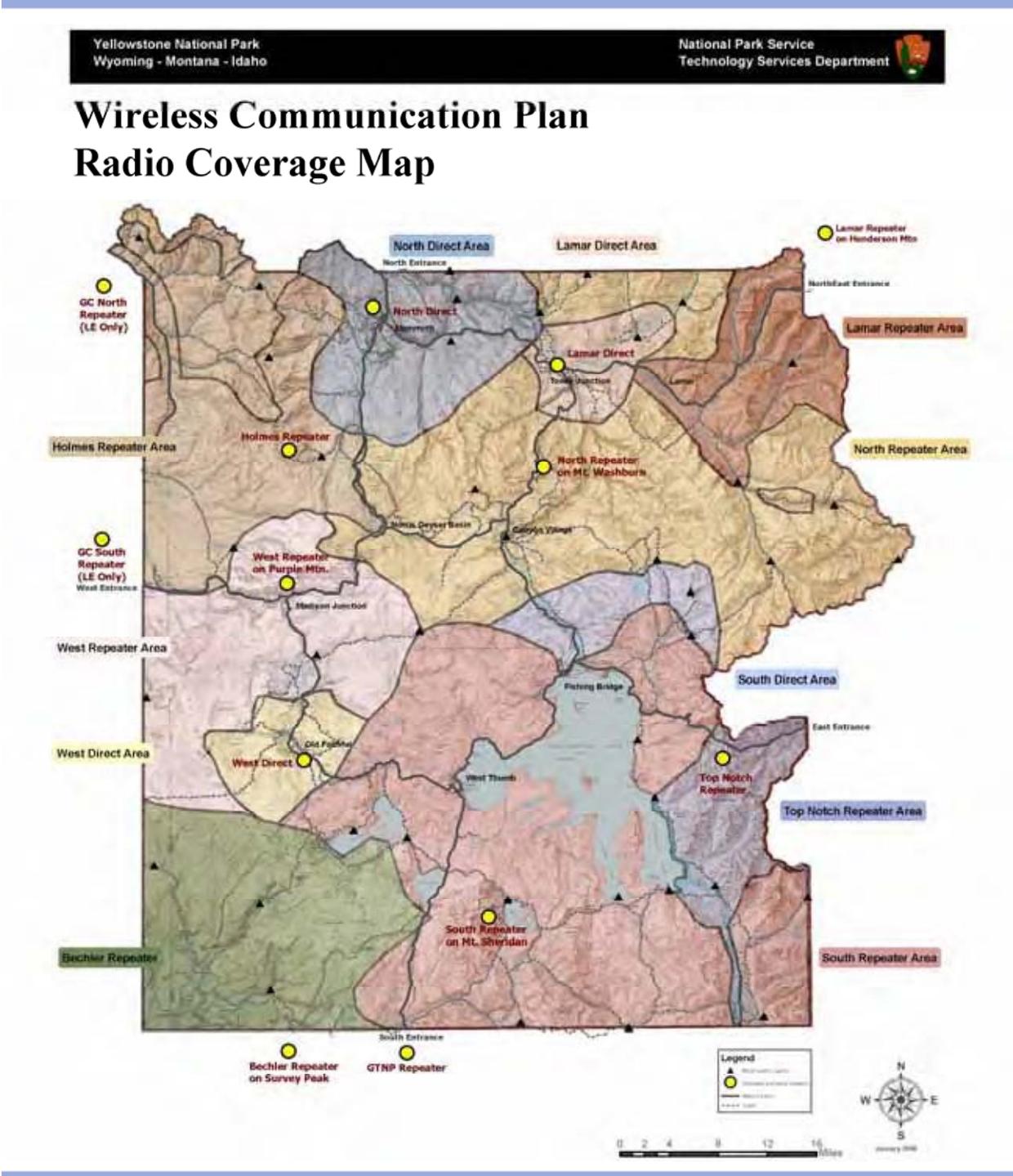


Figure 12 – Existing NPS Radio Coverage Map

Seismic Monitoring

An existing network of seismic monitoring stations in the park provides data to help understand overall seismicity in the region and gauge the magnitude of earth tremors. Thermal features and basins respond violently to volcanic/seismic activity, which creates both a hazard to humans and an opportunity to study and possibly predict major geologic hazards. The Yellowstone volcanic system has the additional characteristic that it is impacted by large earthquakes that occur as part of the mountain-building processes in the western U.S. Yellowstone operates this network under the Yellowstone Volcano Observatory (YVO), a partnership among the park, the U.S. Geological Survey (USGS), and University of Utah. The YVO is one of five USGS volcano observatories that monitor volcanoes in the United States.

There are many YVO monitoring sites throughout the front- and backcountry of Yellowstone National Park (Fig. 1). Volcanologists use the following two primary methods for assessing volcanic activity:

Seismographic Network to evaluate types, magnitudes, and locations of earthquakes. The Yellowstone seismographic network includes 20 above-ground seismograph stations of three types: 1) single-component stations measure short-period (1–10 Hz) vertical ground motion but do not measure lateral movement; 2) three-component stations yield data from both horizontal and vertical motions; and 3) broadband seismic stations are a type of three-component station that detects short-period energy as well as much longer waves that range over periods from one second to hundreds of seconds. The data are available in real time through the USGS and YVO websites (<http://www.seis.utah.edu/> and <http://volcanoes.usgs.gov/yvo/>). Additional sites are outside the park. Seismic networks with co-located accelerometers can determine the intensity of local shaking when ground motions are intense, such as during a large earthquake. There are no accelerometers currently deployed at Yellowstone.

Ground Deformation Network to observe and interpret uplift and subsidence of the ground surface. Within the Yellowstone area, this is currently monitored through four techniques: 1) Continuous Global Positioning System (GPS) is a satellite-based technique that provides daily or hourly high-precision locations. This technique is critical for volcano monitoring because it yields high temporal resolution (frequent updates) and can therefore alert scientists to rapid ground movements that may accompany subterranean magma movement. 2) Interferometric synthetic aperture radar (InSAR) is a satellite-based technique that provides one to two synoptic views per year of ground movement over the entire park. 3) Campaign GPS surveys, in which GPS data are collected at many stations on an annual or less frequent basis using temporary deployments of GPS receivers. 4) Precise leveling that measures the vertical component of ground motion through labor-intensive surveying. The technique yields an annual or less frequent, high-precision determination of ground movement

Remote Automated Weather Stations (RAWS)

The park's fire management program uses the RAWS system to determine seasonal fire conditions and potential strategies related to fuels and fire management. RAWS use satellites to transmit data. Each station has a GPS unit for receiving data but not used to transfer data. Data is transmitted ten minutes prior to each hour. There are three permanent RAWS in the Bechler, Quadrant and Thorofare areas of the park (Fig. 1). The RAWS antennas are 6 feet high, with a tubing mast up to 20 feet in height. The platform is 4 x 4 x 4 feet. They usually require at least one annual maintenance visit. There are also six manual weather stations located throughout the park. The park is seeking to replace the existing manual stations over time to allow for more accurate and timely weather information associated with fire management. There is also a need to propose two additional RAWS in the northeast area of the park, and at the Canyon developed area.

Temporary stations primarily service wildland fire needs, but also serve requests from park resource management for research and monitoring. The antennas for these are 3 feet off the ground and the

mast is 5 feet tall. They are typically set up on a temporary basis associated with a wildland fire or prescribed fire project.

SNOTEL Sites

Snowpack Telemetry (SNOTEL) is an automated system of snowpack and related climate sensors operated by the Natural Resources Conservation Service (NRCS) of the United States Department of Agriculture in the western United States. The sites are generally located in remote high-mountain watersheds where access is often difficult or restricted. Access for maintenance by the NRCS includes various modes from hiking and skiing to helicopters. All SNOTEL sites measure snow water content, accumulated precipitation, and air temperature. Some sites also measure snow depth, wind speed, solar radiation, humidity, and atmospheric pressure. These data are used to forecast yearly water supplies, predict floods, and for general climate research.

Microwave Dishes

There are telephone microwaves (passed through dish antennas or passive reflectors) throughout the park including Tower-Roosevelt, Mt. Washburn, Grant (two), Canyon, Old Faithful and Lake. These microwaves can be thought of as conduits or cables, for data transmission through the air. This data transmission is needed for both the commercial landline and data system, and for wireless technologies. Microwaves are all owned by a private telephone company. All have vehicle access. They are 9–10 feet in width and between 20 and 110 feet in height. Most are over 50 feet. The dish at Canyon is 80 feet tall, and dishes at Grant are 110 feet and Lake is 90 feet.

Wireless Internet

Wireless Internet is a limited function in Yellowstone National Park. Wireless fidelity (WiFi) Internet equipment has been installed in the Yellowstone Park School, all employee dormitories operated by park concessioners except at Tower-Roosevelt, and at the medical clinic in Mammoth. All current WiFi access is designed for park employees or residents; visitors do not have access to the Internet in Yellowstone unless they have a personal subscription plan via their cell phone provider.

Visitor Use and Experience

People from around the world come to Yellowstone National Park each year to experience its wonders. Visitation is highly seasonal. June, July, and August are the months of highest use, with 68% of the park's annual visitors arriving during this time. The shoulder-season months of September through November account for about 20% of park visitation; April and May account for 9%, with December through March (the winter season of oversnow visitation) accounting for only 3%. Park visitation between 1993 and 2006 ranged from 2.8 to 3.1 million visitors. In 2007, the park received 3,151,342 recreational visits, an all time high. Prior to 2007, 1992 had the highest level of park visitation with 3,144,405 visitors. While there are no day use quotas in Yellowstone during the peak summer season, overnight use is limited to the 14,341 visitors the park accommodates per night in hotels and lodges (7,498 "pillows") and campgrounds (2,281 total campsites with a capacity of 6,843 people).

A 2006 survey showed that 89% of park visitors came from outside the surrounding states of Idaho, Montana, and Wyoming; 94% came from outside the "local area" (defined as within 150 miles of Yellowstone). Ten percent of park visitors are international, with about 25% of them coming from Canada. About half of the people coming through Yellowstone's entrances are first-time visitors (Manni et al. 2006).

The most common site visited in the park is Old Faithful (90%), followed by Mammoth Hot Springs (69%), Canyon Village (64%), Fishing Bridge/Lake/Bridge Bay (45%), West Thumb/Grant Village (49%), Madison (47%), and Tower-Roosevelt (45%). Seventy percent of visitors were in groups of

two, three, or four; 25% were in groups of five or more. Of the visitor groups that spent less than 24 hours in the park, 82% spent five or more hours and 18% spent up to four hours. Of the visitor groups that that spent more than 24 hours in the park, 53% spent two to three days and 44% spent four or more days (Manni et al. 2006).

A high percentage of park visitors (93%) are satisfied with facilities, services, and recreational opportunities in Yellowstone. Visitors were especially satisfied with ranger programs (100%), visitor centers (96%), opportunities for learning about nature, history, or culture (94%), assistance from park employees (94%), exhibits (93%), and opportunities for outdoor recreation (93%) (NPS 2007).

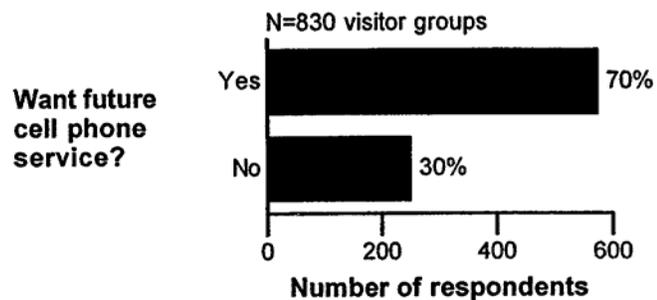
Greater than 95% of visitors to Yellowstone stay on park roads and within developed areas, the area the 1991 Yellowstone *Statement for Management* defines as the "Park Development Zone." Lands within this zone (10% of the park) are managed to provide and maintain developments that serve park management and visitor needs, although natural conditions are maintained to the greatest extent possible (NPS 1991).

Within the Park Development Zone, concessioners provide food and lodging services (2,225 guest rooms, 28 food and beverage operations, 21 gift shops, 11 grocery stores, five campgrounds) at Old Faithful, Mammoth Hot Springs, Madison, Tower-Roosevelt, Canyon, Fishing Bridge, Lake, Bridge Bay, and Grant Village; 3 medical clinics; 7 vehicle service stations; 1 marina; 3 livery operations (Canyon, Mammoth, and Tower-Roosevelt); and 4 public showers and laundry facilities. Yellowstone's interpretive rangers manage and staff the park's five primary visitor centers (Canyon, Fishing Bridge, Grant Village, Mammoth, and Old Faithful) and four information stations (the Madison Museum, Museum of the National Park Ranger, Norris Geyser Basin, and West Entrance contact stations). Approximately 2.1 million visitors, or 70% of all park visitors, used Yellowstone's visitor centers in 2002. The NPS operates seven campgrounds (Mammoth, Norris, Tower, Pebble Creek, Slough Creek, Indian Creek, and Lewis Lake), 52 picnic areas, and seven outdoor amphitheatres and maintains 466 miles of road (NPS 2003).

The 2006 Visitor Study, conducted during July 23–29, 2006, and distributed to 1,302 visitor groups within this Park Development Zone, described the primary reasons that visitors cited for visiting the park as (a) sightseeing/taking a scenic drive (59%); (b) viewing wildlife or birdwatching (16%); and (c) visiting a boardwalk/geyser basin (9%).

Question #23 of this study asked: On a future visit, would you and your group like to have the following

services available in developed areas in Yellowstone National Park, cell phone, internet access. Of the 830 responses regarding cell phone service, 70% said they would like to have cell phone service available on a future visit. Of the 726 responses regarding Internet access, 53% said they would not like to have this service available on a future visit. While some people feel passionately about this issue, wireless coverage and infrastructure do not seem to be primary concerns for most park visitors. For example, during the 2006 Visitor Study, visitors were encouraged to respond to the open-ended question "Is there anything else you and your group would like to tell us about your visit to Yellowstone National Park?" Of the 820 comments received in response to this question, only 14 (less than 2%) related to wireless communications services, including six that commented "please no cell phone/Internet in park;" six that commented "cell phone/Internet service would be good;" and two that commented "cell phone/Internet in some places."



Cell phone service available on a future visit

In a separate project, park interpretive rangers recorded 449 unsolicited comments made by visitors from October 2006 through September 2007. Of these comments, only one related to wireless services: a request for WiFi service in the park.

The Natural Zone, estimated at around 90% of the park, encompasses those lands recommended as wilderness in Yellowstone's 1973 Wilderness Recommendation and has been termed Yellowstone's "backcountry" (NPS 1991, Olliff and Consolo Murphy 2000). Lands in this backcountry zone are characterized by their primeval nature, relative lack of facilities, and a low level of visitor use. Within this zone, the park maintains approximately 1,000 miles of interconnected backcountry trails, 97 trailheads, and about 300 designated backcountry campsites.

Similar to trends at other western national parks, overnight backcountry use in Yellowstone peaked in 1977 at around 55,000 "people use nights" (the total number of nights spent in the backcountry) per year. Since 1990, people use nights have fluctuated between 34,000 and 46,000 with an overall downward trend (Olliff and Consolo Murphy 2000). Day use was monitored in 1992. Day use varied, depending on trail location and distance from the trailhead, and ranged from zero to 109 people per day per trail. Overall, the level of day use appears to be approximately four times the level of overnight use (Olliff, unpublished data).

A 1999 visitor survey found that "solitude and tranquility" was the most important desired benefit of overnight backcountry campers, followed by "to avoid crowded areas" and to "look at scenery." All three of these desired benefits rated very high on a 1–5 scale. "Social contact with other people," which rated at the opposite end of the 1–5 scale, was the least desired benefit (Oosterhous et. al. 2007).

Visitor satisfaction in national parks depends on people's individual motivations. Because park visitors' motivations differ, a particular park experience may satisfy some visitors and not others. As indicated above, visitors to Yellowstone's developed area and backcountry differ in the park experience they seek. Personality traits seem to be another important source of differing visitor motivation. While conducting a visitor use survey, Eisenberger and Loomis (2002) tested for personality traits. They found that at least three personality traits influenced the stated purpose for visiting Yellowstone and affected the enjoyment of the visitors' park experience, as follows:

- Visitors with the *Need for Sensory Experience* personality trait most strongly desired to experience enjoyable sights, smells, sounds, and visited to learn about nature, history, and culture;
- Visitors with the *Need for Affiliation* personality trait visited to engage in shared experiences;
- Visitors with the *Need for Exercise* trait visited to engage in strenuous physical activities, such as walking, hiking, or climbing.

While this is by no means an exhaustive list of personality traits or visitor motivations, it does point out that visitors come to Yellowstone for a variety of reasons, with a variety of backgrounds, and experience the park in individual ways. Enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks. The NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks, and to maintaining within the parks an atmosphere that is open, inviting and accessible to every segment of American society.

Yellowstone's stated visitor experience goals, as outlined in the Long-Range Interpretive Plan (NPS 2000), describe the cognitive, affective, sensory, and behavioral experiences that the park would like to be available to visitors. Visitors will have opportunities to:

- Experience the essence of the park's wild nature from wildlife, waterfalls, geysers, and scenery to wonder, quiet, solitude, and personal inspiration
- Develop a sense of appreciation and responsibility that will result in actions to protect, support, and promote the park and the National Park System (e.g., politically, financially, through volunteer activities)

- Successfully plan their visits and orient themselves to facilities, attractions, features, and experiences
- Behave in ways that do not hurt themselves or park resources
- Enjoy themselves, have memorable experiences, and go home feeling enriched
- Understand the park's significance and its primary interpretive themes
- Experience programs, media, and facilities that enhance their educational experiences
- Learn about the fragility of the park and threats to its resources

As communications technology becomes more widespread, some visitors have expressed concerns about how technology such as cell phones, GPS units, and laptop computers affect the visitor experience in the wilderness, backcountry, or while viewing thermal features and vistas within the park. The types of wireless service available (cell phone, Internet access), locations, and the siting of wireless facilities such as cell towers all affect how visitors experience the park.

Visual Quality including Viewsheds

Scenery has always been an integral part of the fundamental resources and values of national parks. Yellowstone's enabling legislation from 1872 reserves the park as a "pleasuring-ground for the benefit and enjoyment of the people." Historian Ethan Carr explains that "in the context of the 19th-century landscape park, the preservation of unimpaired scenery could be identified with civic virtue." The 1916 Organic Act that created the National Park Service sought to "conserve the scenery...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." And finally, Thomas Moran's paintings and William Henry Jackson's photographs of Yellowstone scenery were instrumental in convincing the Congress to set this area aside and "preserve it from injury or spoliation."

Outstanding scenic character has always distinguished national parks from other areas, including national forests. Yellowstone National Park abounds with impressive viewsheds of the highest quality. Despite being one of the oldest units in the park system, the majority of its landscapes appears untouched by humans and retains their primeval characteristics. Less than ten percent of the park is within the "Park developed Zone" (NPS 1991) and facilities are predominantly grouped along the figure-eight Grand loop Road system and within a handful of small park communities, leaving substantial acreage in its natural condition. Wide vistas of unique scenery such as Old Faithful geyser with a backdrop of forest and blue sky have attained iconic status representing not only Yellowstone, but the entire National Park Service. It is with these thoughts in mind that alternatives for wireless communications infrastructure must be evaluated.

Part of the allure and expectations associated with Yellowstone involve the impression that the park is predominantly in its natural condition. Visitors expect to see facilities grouped together and close to the roads instead of utility corridors and manmade structures out in the landscape. Because the primary viewsheds are natural, built structures often stand out in stark contrast to the scenery and thereby degrade part of the fundamental resource. The *NPS Management Policies 2006* require that telecommunications sites "are located where they would have the least impact on park resources" and "are not located in scenic, historic and/or sensitive areas."

A variety of installations relating to wireless communications currently exist in Yellowstone National Park (Fig. 1). They range from simple antennas to large towers with multiple attachments and associated buildings and roads. Their locations also vary from the middle of developed areas to remote research monitoring units in the backcountry. Given the multiple locations and types of equipment, there are varying degrees of visibility and visual intrusion (Fig. 13).



Figure 13 - Microwave dish (near) and cell tower (far) in the Old Faithful area

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

NEPA requires that environmental documents disclose the environmental effects or consequences of a proposed federal action and any adverse impacts that could not be avoided, if the proposed action were implemented. This section of the EA provides a basis for comparing the four alternatives and the impacts that would result from their implementation. Impact topics were selected based on internal and external scoping. This section is based on review of scientific information collected by the NPS, external sources, and scientific literature.

Each impact topic is analyzed for direct, indirect, and cumulative impacts from each of the four alternatives. Impacts are described in terms of context (site specific, local, and/or regional effects), duration (short-term or long-term), timing (direct or indirect), and type (adverse or beneficial). Context, duration, and timing are factored into intensity thresholds (negligible, minor, moderate, major) defined for each impact topic. Definitions of intensity levels vary by impact topic, but the following definitions apply to all impact topics:

Term	Definition
Beneficial	a positive change in the condition of the resource or a change that moves a resource toward its desired condition
Adverse	a negative change in the condition of the resource or a change that moves a resource away from its desired condition
Direct	an effect that is caused by an action and occurs at the same time and place
Indirect	an effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable
Short-term	an effect which in a short amount of time would no longer be detectable, as a resource returns to its pre- disturbance condition; generally the duration of any portion of this project, which is expected to be one year or less
Long-term	a change in a resource or its condition that does not return to pre- disturbance levels and for all practical purposes is considered permanent

Cumulative Effects

NEPA regulations require 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 the 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). Cumulative impacts for each alternative were analyzed by adding the direct and/or indirect impacts of each impact topic to other past, present, and reasonably foreseeable future actions within Yellowstone National Park and surrounding areas. The scope for cumulative impacts varies to some degree for each impact topic.

Because cumulative impacts were determined by combining the impacts of each alternative with other past, present, and reasonably foreseeable future actions, it was necessary to identify other ongoing or reasonably foreseeable future projects at Yellowstone National Park and, if applicable, the surrounding region. The geographic scope for this analysis includes elements mostly within the park’s boundaries, while the temporal scope includes projects within a range of approximately ten years. Given this, the following projects were identified for the purpose of conducting the cumulative effects analysis:

- **Canyon Junction to Tower Junction (Dunraven Road) Road Improvement Project:**
 This road reconstruction project began in late summer 2003. The segment of the Grand Loop Road that comprises the Dunraven Road construction project stretches from Tower Junction to Canyon Junction, a total of 18.4 miles (29.3km). The entire road will be widened from its existing 19–22 feet to 24 feet and design will address needs for better drainage, more pullouts and parking areas, and slopes that can revegetate in the short, 2–3 month growing season. Design and construction are being accomplished in two phases. The first phase, from Chittenden Road to Canyon Junction, was completed in 2005. The second phase from Chittenden Road to Tower Junction is scheduled to begin in 2010, but is dependent upon highway funding. The second phase of the project would include the Tower Fall Campground road and the entrance road to Roosevelt Lodge, again dependent on funding. This project may also be split into three phases due to costs and the potential lack of funding for the entire project (Federal Highways proposed project schedule, 2007). The project would also include modification of the existing parking area at Calcite Springs (26 auto spaces, 3 RV/bus spaces). The road would shift away from the existing parking area to improve safety by separating the parking from the road. A traffic island would protect some very large Douglas-fir trees. The large parking area (approximately 80 auto spaces, approximately 9 RV/bus spaces) at the Tower Fall general store would be modified.
- **Beartooth Highway and Northeast Entrance Road Construction:**
 (aka Beartooth Highway Segment 1, Phase 2) – This work consists of reconstructing 4.3 miles of road adjacent to the park and widening it from a current 20 feet to 28 feet. Construction is expected to finish summer 2008. Additional Beartooth Highway work is proposed for the future.
- **West Yellowstone Contact Station, under construction:** Construction of a new visitor contact station located just outside the park in the town of West Yellowstone, Montana. This is a joint venture between the West Yellowstone Chamber of Commerce and the NPS.
- **New West Entrance Station, under construction:** A new entrance station has just been constructed to address delays that have occurred in the past with vehicles backing up at the gate due to poor queuing space, and narrow lanes. This project was completed in the summer of 2008.
- **Snowcoach Sheds at Canyon and Grant:** Preliminary planning, pre-design & cost analysis is underway. Construction is anticipated in 2008 or 2009.
- **South Entrance Seasonal Four-Plex:** This structure, to be used as employee housing was completed in the fall of 2007. Propane will need to be tied in to an individual system or to a propane “farm” by the park next year.
- **Old Faithful 8-Plex:** For use as employee housing in the Old Faithful administrative area. Design work on this structure is underway.
- **Albright Visitor Center Remodel:** The interior of this building would be remodeled to allow for improved exhibits, improve accessibility, and improve seismic stability. Work is currently planned for 2009.
- **Old Faithful Visitor Education Center:** Anticipate a construction start date of early summer 2008. Construction would last through summer of 2010.
- **OF Inn, Old West Wing Rooms, ongoing:** Renovation includes installing seismic, electrical, and plumbing upgrades. Historic building elements of the building will also be refinished. Work is expected to be completed in summer of 2008.

- **Old Faithful Lodge, ongoing:** This project includes the remodel of many public areas of the building including: the gift shop, the registration desk, and the public restrooms. Work is expected to be complete by the summer of 2008.
- **Lake Winter Springs Rehab:** This project would address seeking alternatives to augment the existing water supply for the Lake development. Work is currently scheduled for late summer/early fall 2008.
- **Grant Sludge Drying Beds:** Construct sludge drying beds for the sewage system at Grant. Work is scheduled to take place in 2008.
- **Canyon Lift Station:** Construct a sewage lift station for the Canyon administrative area. Work to be completed by NPS crews in 2008.
- **Grant Visitor Center:** This project involves the rehabilitation of the visitor center at Grant Village. This in-house project is ongoing, and addresses an interior remodel and a new roof structure.
- **Mammoth Jail:** Rehabilitation of this historic structure is scheduled to take place in 2008. The exterior of the building rehabilitation will address spalling concrete and structural cracking.
- **Mammoth Justice Center:** Construction of a justice center across from the U.S. Post Office building in Mammoth is ongoing. Construction began in 2007 and is expected to be completed in 2008.
- **Canyon Rim Drives road project, ongoing:** This project was started in 2007 with the rehabilitation of the Artist Point parking area and pedestrian walkways and observation areas. The project continued in 2008, where most work is concentrated on the North Rim Drive, camper services access road, and parking area just northeast of Canyon Village.
- **Lamar River Bridge Reconstruction/Replacement:** The Lamar River Bridge is scheduled to be reconstructed or replaced in 2009 dependant upon funding availability. Alternatives currently include reconstruction of the current bridge, replacement of the bridge in its current location, replacement of the bridge adjacent to its current location. Depending upon the alternative chosen, approximately one half mile of the Tower to Northeast Entrance road could be shifted to match the alignment of a new bridge. The old roadbed would then be rehabilitated, and the old bridge removed.
- **Norris-Madison Phase 3 road reconstruction project:** This project, scheduled to begin in fall 2008, is the third phase of the Madison to Norris road project. Work will include paving the new alignment above the Gibbon Canyon, and the removal of the road along approximately two miles of the Gibbon River. A new bridge will be constructed upstream of Gibbon Falls to connect the new alignment with the existing road alignment. A bridge at the north end of Gibbon Canyon will be removed.
- **Norris to Golden Gate – Road Reconstruction Project, future:** The road segment from Norris to Golden Gate is scheduled to be reconstructed in 2011. The project would take 2-3 years to complete.
- **Sylvan Pass Reclamation and Road Reconstruction:** This project would reconstruct a portion of the East Entrance Road through Sylvan Pass, and rehabilitate an area that has for many years

served as a source of gravel and rock for road reconstruction projects within the park. Design work for the Sylvan Pass project in progress and scheduled construction in 2008.

- **NEON:** The National Ecological Observatory Network (NEON) is a continental-scale monitoring platform for discovering and understanding impacts of climate change, land use change, and invasive species on ecology. NEON would gather long-term data on ecological responses of the biosphere to changes in land use and climate, and on feedbacks with the geosphere, hydrosphere, and atmosphere. It would consist of distributed sensor networks and experiments, linked by advanced cyber infrastructure to record and archive ecological data for at least 30 years. The Yellowstone Northern Range site has been selected by NEON, Inc. as one of 20 Core Wildland Sites throughout the country. Core NEON sites would require permanent scientific monitoring equipment. A full proposal would detail what types and where such infrastructure is needed. Any infrastructure proposals would follow the guidelines determined through this plan and additional compliance might be required.

NATURAL RESOURCES

Wildlife - Threatened and Endangered Species

Guiding Regulations and Policies

Protective measures for threatened and endangered species are provided pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*). Section 7(c) of the Endangered Species Act of 1973, as amended, requires the preparation of a biological assessment for any federal action that is a major construction activity to determine the effects of the proposed action on listed and proposed species. If a biological assessment is not required (i.e., all other actions), the lead federal agency is responsible for review of proposed activities to determine whether listed species will be affected. If it is determined that the proposed activities may affect a listed species, then federal agencies should contact the U.S. Fish and Wildlife Service to discuss consultation requirements. If it is determined that any federal agency program or project “is likely to adversely affect” any listed species, then formal consultation should be initiated with the U.S. Fish and Wildlife Service. Alternatively, informal consultation can be continued so the U.S. Fish and Wildlife Service can assist with determining how the project could be modified to reduce impacts to listed species to the “not likely to adversely affect” threshold. If it is concluded that the project “is not likely to adversely affect” listed species, then the federal agency should request that the U.S. Fish and Wildlife Service review the assessment and concur with the determination of not likely to adversely affect.

Methodology and Assumptions

The primary biological resource concern associated with wireless communications facilities (WCFs) includes potential adverse effects to Threatened and Endangered populations and their habitats. Potential effects to listed species including Canada lynx were evaluated using the best available information regarding the construction, operation, and maintenance of wireless telecommunications facilities. Wildlife biologists used scientific literature, data from long-term monitoring efforts in Yellowstone National Park and the Greater Yellowstone Ecosystem, and professional knowledge to define the intensity thresholds (i.e., degree of change) for impacts to listed species (Table 3). For these thresholds, the term *habitat* is defined as the suite of resources (e.g., denning sites, food, shelter, etc.) and environmental conditions (e.g., precipitation, prey base) that enable the presence, survival, and reproduction of a population, even if potentially suitable areas are currently unoccupied. Short-term effects are defined as those occurring during and immediately after construction (i.e., approximately one year), including conservation measures and monitoring of effects and effectiveness. Longer-term effects are considered permanent (i.e., anything beyond one year).

Intensity Level Definitions

Yellowstone National Park biologists familiar with each of the threatened and endangered species present in Yellowstone were consulted for their knowledge and opinion on potential project impacts. These biologists consulted records of threatened and endangered species sightings within Yellowstone National Park historic records of sightings, publications, and their detailed knowledge of the life habits of the species in question. The evaluation of effects included direct, indirect, interrelated, interdependent, and cumulative impacts as defined by the Endangered Species Act (ESA).

Consultation with the U.S. Fish and Wildlife Service (USFWS) will occur on the preferred alternative. During Section 7 consultation (called §7 Consultation), any mitigation proposed by the park for impacts to threatened or endangered species would include avoidance, minimization, and conservation measures as defined by the ESA.

The thresholds of change for the intensity of impacts to threatened and endangered species are defined as follows:

- Negligible:** No federally listed species or its proposed or designated critical habitat would be affected.
- Minor:** Effects are either insignificant, discountable, or wholly beneficial for individual members of the species. Negative effects are very localized, temporary, and not of measurable consequence to individuals, particularly effects related to human disturbance or habitat modification that might affect breeding, sheltering, or feeding of individuals.
- Moderate:** Effects are readily detectable, localized, and are often long-term in nature. Actions would result in some change to a population or individuals of a species or designated critical habitat. The change would be measurable and of consequence.
- Major:** Effects are readily detectable at the population level and are long-term in nature.
- Duration** Short-term effects would last only during the implementation of the project including its mitigation and monitoring measures. Long-term effects would typically constitute a permanent impact.

Canada lynx

IMPACTS OF ALL ALTERNATIVES

Analysis. Wireless services would likely occur in all alternatives with applications for new wireless communications facilities (WCFs) being considered for the Lake developed area using temporary or permanent infrastructure and equipment in all but Alternative B. A WCF at Lake development would be located at the existing lattice tower site just northwest of Fishing Bridge Junction, near the wastewater treatment facility, or near the water tank in the Lake administrative area. In Alternative C, the cell tower at Old Faithful would be moved to a site near the water treatment plant when feasible, and in Alternative B, it would remain at its existing location and camouflaged. Improvements to viewsheds and safety at Mt Washburn should be improved by removing antennas and placing them on a new platform tower adjacent to the existing lookout. Equipment would remain in the existing space under the observation deck. Improvements to viewsheds on Bunsen Peak by removing obsolete equipment, and the cell coverage link would also occur. In alternatives C and D, new infrastructure would be added to increase the capacity of the data transmission system

within the park. The transmission line to the top of Bunsen Peak would remain in service to provide power for this potential use (except Alt. B). FM equipment would remain on Bunsen Peak, but the equipment shed would be replaced with smaller equipment cabinet-sized enclosures.

At the extreme, wireless projects have the potential to reduce foraging habitat, and to disrupt lynx foraging, resting, or natal denning activities. However, the effects of new WCFs installation and maintenance of existing and new infrastructure would be negligible or minor under all alternatives because projects would involve little habitat loss, both individually and collectively, and because conservation measures applied by the park during installation of wireless facilities would minimize lynx disturbance.

The effects of individual wireless projects depend primarily on whether or not the project occurred in an LAU (Fig. 14), whether the LAU is currently occupied (Murphy et al. 2006) by lynx, the amount of site disturbance required to install the equipment, and the number and route of helicopter flights (e.g., whether or not over lynx habitat) required to support installation. The impact area of a typical WCF in the backcountry is expected to be $\leq 25\text{m}^2$. The type of wireless project (e.g., cell tower versus YVO or RAWs) is not important because the habitat loss, amount of construction-related disturbance, and the size of the equipment is expected to be collectively insignificant for each type.

For all alternatives, the effects of individual wireless projects that occur outside LAUs would be negligible (§7, ESA—no effect) on lynx. Areas outside LAUs typically support no lynx and provide little or no foraging opportunity for major lynx prey such as snowshoe hares and red squirrels. New or improved structures outside LAUs would not be large enough to impede movements of resident or transient lynx. Infrastructure associated with WiFi would be limited to existing developed areas and would have no new effects on lynx.

Projects that occur within LAUs (Fig. 14) (e.g., many in Alternatives C and D) would have minor effects (§7, ESA—may affect, not likely to adversely affect) on lynx. Such projects would cause either no loss of lynx habitat (i.e., sites in non-habitat or habitat currently in an unsuitable condition) or would cause an insignificant loss of lynx habitat (under each alternative, < 0.05 acre per structure and less than < 1 acre collectively across all LAUs).

Disturbance of resident lynx and their natal dens at any location would be highly unlikely because the duration of construction would be short (< 1 month), because lynx occur in very low numbers in the park, and because their distribution is largely restricted to the Absaroka Range and the Central Plateau (Murphy et al. 2006). Although lynx reproduction is documented in Yellowstone, no natal den sites are documented. Under all alternatives, however, helicopter flights for transporting equipment over occupied LAUs would occur more than 1000 feet above ground level (except landings) ≤ 2 flights per LAU would be allowed each year. These measures would likely reduce lynx disturbance associated with equipment transport to the level of insignificant.

Individual wireless sites would also be too small to significantly alter travel patterns of lynx, regardless of their location. Transport of wireless and construction-related equipment along park roads would pose very little (i.e., discountable) risk of vehicle-strike mortality because few lynx are present. If vehicle-strike mortality to a lynx should occur, all WCF installation activity along roads would cease pending re-initiation of consultation with the USFWS. No vehicle-strike mortalities of lynx are documented in the Yellowstone Ecosystem.

No adverse modification of proposed lynx critical habitat (FWS 2008) would result from implementation of any project alternative. The collective impact area of WCF projects in backcountry areas (< 1 acre) is very small (insignificant) in comparison to the 6.7 million acres of proposed lynx critical habitat in Unit 5. Implementation of any alternative, may affect, but is unlikely to adversely affect proposed lynx critical habitat.

Cumulative Impacts. The important past, present, and reasonably foreseeable actions occurring within the park and the surrounding area that might contribute to cumulative effects on lynx include road and facilities construction or reconstruction projects, subsequent visitor use of improved roads and facilities, and fire management. Similar to installation and management of wireless facilities, these activities potentially contribute to disturbance of lynx foraging, resting, or natal denning, or affect lynx habitat quality and quantity. Collectively, these activities at worst would be expected to have long-term minor adverse impacts to lynx because (1) few lynx naturally occur in the park, and (2) anthropogenic disturbance would be expected to occur primarily along roads or in developed areas of the park and largely outside of lynx habitat. In addition, fire management activities in the park are directed toward maintaining the natural fire regime (as consistent with human health and property concerns) and should be beneficial to lynx habitat in the long-term (Ruediger et al. 2000). The impacts to lynx populations resulting from these effects, in combination with the long-term minor impacts under all wireless alternatives, would result in long-term, minor, and adverse impacts to lynx populations found in the park.

Conclusion. Under all alternatives, there would be a limited change (decrease or increase) in wireless service and infrastructure (Table 3). However, WCFs would be located primarily in or near developed or existing disturbed areas of the park, thereby minimizing potential adverse effects on lynx. During construction of new WCFs, only short-term, minor adverse impacts (§7, ESA-insignificant), if any, would be expected to occur due to disturbance. Implementation of restrictions on the number and height of helicopter flights over occupied lynx habitat would greatly reduce the chances of disturbance-related effects on lynx. Habitat loss under all alternatives would be collectively insignificant. No vehicle-strike mortality is expected under any alternative. The cumulative effects of each alternative would be long-term, negligible to minor, and adverse. Because there would be no major, adverse impacts to lynx whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of this alternative would not result in any unacceptable impacts to lynx and is consistent with §1.4.7.1 of NPS *Management Policies* 2006. With respect to consultation with the U.S. Fish and Wildlife Service, our assessment of effects under all alternatives would be a "may affect, not likely to adversely affect." for lynx and "no adverse modification" for proposed lynx critical habitat.

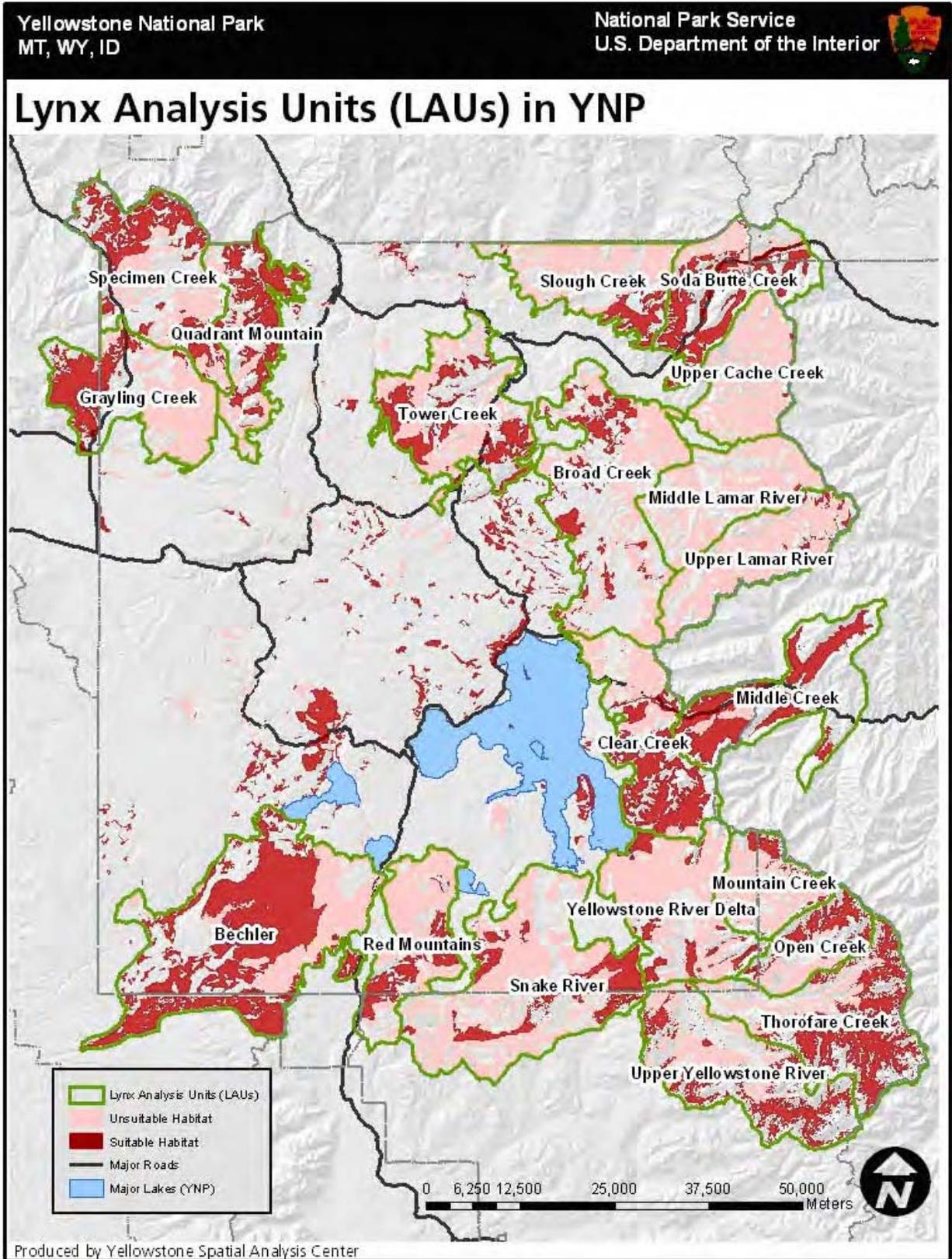


Figure 14 - Lynx Analysis Units

Gray Wolves

IMPACTS OF ALL ALTERNATIVES

Analysis. Wireless services would likely occur in all alternatives with applications for new WCFs considered for the Lake developed area using temporary or permanent infrastructure and equipment in all but Alternative B. A WCF would be located at the existing lattice tower site just northwest of Fishing Bridge junction, near the wastewater treatment facility, or near the water tank in the Lake administrative area. In Alternative C, the cell tower at Old Faithful would be moved to a site near the water treatment plant when feasible. Improved viewsheds and safety at Mt Washburn would occur by removing antennas and placing them on a new platform tower adjacent to the existing lookout. Equipment would remain in the existing space under the observation deck. Viewsheds on Bunsen Peak may also be improved by removing obsolete equipment, the cell coverage link, and Yellowstone Volcano Observatory equipment. In all alternatives, new infrastructure would be added to increase the capacity of the data transmission system within the park. The transmission line to the top of Bunsen Peak would remain in service to provide power for this potential use. FM equipment would remain on Bunsen Peak, but the equipment shed would be replaced with smaller equipment cabinet-sized enclosures.

All the wireless alternatives would have negligible or minor effects on wolves. Very little (< 1 acre) wolf or ungulate (prey) habitat would be modified or lost due to wireless projects proposed in each of the alternatives. Many wireless sites would occur in existing disturbed areas and have no effect on wolves. Adult wolves are tolerant of human disturbance and the presence of human infrastructure in developed areas and along roads in Yellowstone National Park, and wolves do not appear to avoid the portions of their pack territories that are in close proximity to roads or park developments (Kerry Murphy, personal communication 2008). Wolves commonly use areas near park developments and travel on or near interior Yellowstone roads during the day. They often bed near (<0.25 miles) roads and may prey on ungulates in the vicinity. Similarly, wolves do not avoid sites in the backcountry that contain antennas or small structures if they do perceive the site as a threat. Although wolves will encounter wireless sites in remote areas, construction activity should not significantly affect wolf behavior or travel patterns. Installation and maintenance, including helicopter landings and flights to or over wireless sites will not occur within one mile of active natal dens and rendezvous areas, and wireless sites will not be large enough to significantly alter wolf travel patterns. Transport of raw materials and construction equipment to wireless sites poses a small risk of vehicle-strike mortality to wolves. Eighteen wolves have been killed by vehicles on park roads. However, no losses associated with park staff or construction projects have been documented since wolves were reintroduced in 1995. Vehicle-strike mortality to wolves on park roads is currently being addressed in formal consultation with the USFWS.

Cumulative Impacts. Similarly to lynx, the important past, present, and reasonably foreseeable actions occurring within the park and the surrounding area that might contribute to cumulative effects on wolves include road and facilities reconstruction or improvement projects, subsequent visitor use of improved roads and facilities, and fire management. Human disturbance could cause temporary displacement of wolves from human presence, particularly in developed areas and along roads. Although visitors using park roads cause vehicle-strike mortality, this likely has no long-term negative effect on wolf population viability. Fire management activities in the park are directed toward maintaining the natural fire regime (as consistent with human health and property concerns) and should be beneficial to wolf prey (and thus wolves) in the long-term. Overall, the impacts to wolf populations resulting from these past, present, and future actions, in combination with the long-term minor impacts under all alternatives, would result in long-term, minor, and adverse (SESA-insignificant) impacts to wolf populations found in the park.

Conclusion. Under all alternatives, there would be a limited decrease or increase in wireless service and infrastructure. However, WCFs would be located primarily in or near developed or already-disturbed areas, thereby minimizing potential adverse impacts to wolves. During construction of new

WCFs, short-term minor adverse (§7 ESA-insignificant) impacts would be expected to occur from disturbance.

The collective effects of disturbance to resident wolves associated with construction and long-term presence of wireless sites would have little, if any, effect on wolf behavior. Disturbance to den and rendezvous sites will be nearly eliminated by controlling the timing of construction and location of wireless sites. No vehicle-strike losses of wolves are expected under any alternative. Because there would be no major, adverse impacts to gray wolves whose conservation is necessary to fulfill purposes identified in Yellowstone’s establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of this alternative would not result in any unacceptable impacts to gray wolves and is consistent with §1.4.7.1 of NPS *Management Policies* 2006. The cumulative effects each alternative are negligible or minor. No significant loss of wolf habitat would occur. With respect to consultation with the U.S. Fish and Wildlife Service, our assessment of effects under all alternatives would be “may affect, not likely to adversely affect.” The cumulative effects of each alternative would be long-term, negligible to minor, and adverse. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of NPS *Management Policies* 2006.

Table 3 - Impact thresholds under the National Environmental Policy Act (NEPA) and the 1973 Endangered Species Act (ESA) for threatened or endangered species in Yellowstone National Park. LAU: Lynx Analysis Unit (see text).

Species	Potential Human Effect	Criteria for “no effect” (ESA) or “negligible” effect” (NEPA) finding	Criteria for “not likely to adversely affect” (ESA) or “negligible–minor” (NEPA) finding	Criteria for “likely to adversely affect” (ESA) or ≥ minor (NEPA) finding
Canada lynx (threatened)	Disturbance of adults	Site is not in an occupied LAU	Site is in an occupied LAU, but flights supporting equipment installation and monitoring are > 1000 feet above lynx habitat. Chances of lynx disturbance are highly unlikely (i.e., discountable).	Repeated disturbance of an individual(s) may occur due to low-level (<1,000 AGL) flights over occupied LAUs
	Disturbance of active natal or maternal dens	Site is not in an occupied LAU	Site is in an occupied LAU, but flights supporting equipment installation and monitoring are > 1000 feet above lynx habitat and occur infrequently (≤ 2 per year). Chances of lynx disturbance are highly unlikely (i.e., discountable).	Significant audible or visual disturbance of lynx at a natal den may occur due to frequent (≥ 3 per year) low-level (< 1,000 ft AGL) flights over occupied LAUs.
	Habitat modification	Site is not in an LAU	(1) Site is within an LAU and in suitable habitat, but suitable habitat occupies >70% of the LAU, or site disturbance is insignificant (< 0.5 acre); or (2) the site is not in suitable lynx habitat (i.e., is in unsuitable or non-habitat)	Site is in an LAU and in suitable lynx habitat, suitable habitat occupies <70% of the LAU, and site disturbance is significant (> 0.5 acre).
	Vehicle-strike mortality due to material or	No past vehicle-strike losses have occurred	No past vehicle-strike losses have occurred in the park	At least one vehicle-strike mortality has

	equipment transport, parkwide	in the park due to transport	due to equipment transport	occurred due to equipment transport
Gray wolf (threatened)	Disturbance of adults	Site is within a developed area	Site is in an existing disturbed area at roadside or in backcountry	Repeated disturbance of individual(s) is likely
	Disturbance of active natal or maternal dens	Site is within a developed area	Site is ≥ 1.0 miles from an active den	Site is within 1.0 miles of an active den
	Habitat modification	Site is within a developed area	Impact area is <0.5 acre	Impact area is >0.5 acre
	Incidental wolf mortality due to material transport or construction	No past vehicle-strike losses have occurred in the park due to transport	No past vehicle-strike losses have occurred in the park due to equipment transport	At least one vehicle-strike mortality has occurred due to equipment transport

Migratory Birds and Birds of Special Management Concern

Guiding Regulations and Policies

Protective measures for migratory birds are provided pursuant to the Migratory Bird Treaty Act (16 U.S.C. 703) and Bald and Golden Eagle Protection Act (16 U.S.C. 668). The Migratory Bird Treaty Act establishes that all migratory birds and their parts (including eggs, nests, and feathers) are fully protected. The act establishes a prohibition, unless permitted by regulations, to “pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird...or any part, nest, or egg of any such bird.” The act also provides the Secretary of the Interior with authority to determine when “hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any...bird, or any part, nest or egg” could be undertaken and to adopt regulations for this purpose.

Under the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act, every federal agency has a mandatory obligation to protect the many species of migratory birds, including eagles and other raptors that may occur on lands under their jurisdiction. These regulations also include Yellowstone National Park’s bird Species of Management Concern including bald eagle, peregrine falcon, trumpeter swan and white pelican. The U.S. Fish and Wildlife Service recommends the following information be considered to assess project effects during planning analysis and promote the conservation of migratory bird populations: 1) the current status and habitat use of migratory birds in the project area, which may include the number of individuals, breeding pairs, population trends, and active nests within and adjacent to the project area; 2) a full, quantitative analysis of the effects of the proposed action on migratory bird species and their habitats; 3) measures that will reduce or eliminate (minimize) adverse effects to migratory birds, including protective buffers, seasonal restrictions, maintenance of habitat within the project area, raptor-proofing designs for power lines and other towers, and netting of waste pits; and 4) the projected short- and long-term trends to migratory birds and their trends during and after project completion using monitoring, modeling, and current literature.

Executive Order (EO) 13186, “Responsibility of Federal Agencies to Protect Migratory Birds” requires each federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement a Memorandum of Understanding with the

U.S. Fish and Wildlife Service to promote the conservation of migratory bird populations. Despite extended consultation and numerous drafts with proactive steps to benefit migratory birds in park units, the National Park Service and U.S. Fish and Wildlife Service were unable to resolve a method to allow for incidental take. Thus, a Memorandum of Understanding was never signed (Peter Dratch, National Park Service, personal communication 2007).

U.S. Fish and Wildlife Service Guidelines for Recommendation on Communications Tower Siting, Construction, Operation, and Decommissioning were developed recognizing that staff may need to be involved in the review of proposed facilities and the evaluation of their impacts on migratory birds. These guidelines would be to be used until the Communications Tower Working Group, a group of government agencies, industry, academic researchers and non-governmental organizations, develops significant new mitigation measures to prevent bird strikes related to wireless telecommunications facilities. They are provided in accordance with the Fish and Wildlife Coordination Act, as amended, the Migratory Bird Treaty Act, and Section 7 of the Endangered Species Act, as amended. Section 4.4 (Biological Resource Management) of the management policies for units of the National Park Service requires that managers "... maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems. The term 'plants and animals' refers to all five of the commonly recognized kingdoms of living things and includes such groups as flowering plants, ferns, mosses, lichens, algae, fungi, bacteria, mammals, birds ..." (NPS 2006).

Methodology and Assumptions

The primary biological resource concern associated with WCFs is potential adverse effects to bird populations and their habitats. The potential effects to resident and migratory birds, including bird species of management concern were evaluated using the best available information regarding the construction, operation, and maintenance of wireless telecommunications facilities. Wildlife biologists used scientific literature, data from long-term monitoring efforts in Yellowstone National Park and the vicinity, and professional knowledge to define the following intensity thresholds (i.e., degree of change) for impacts to bird species. For these thresholds, the term *habitat* is defined as the suite of resources (e.g., food, shelter) and environmental conditions (e.g., precipitation, predators) that enable the presence, survival, and reproduction of a population, even if potentially suitable areas are currently unoccupied. Short-term effects are defined as those occurring during and immediately after construction (i.e., approximately one year), including conservation measures and monitoring of effects and effectiveness. Longer-term effects are considered permanent (i.e., anything beyond one year).

Intensity Level Definitions

The following thresholds were used to determine the magnitude of effects on avian species and Bird Species of Management Concern:

- Negligible:** Adverse or beneficial impacts to individuals, their habitat, or the natural processes sustaining them would be extremely unlikely to occur or not be measurable.
- Minor:** Adverse or beneficial impacts to individuals, their habitat, or the natural processes sustaining them would affect a small, localized portion of the species' range in the park. Few occurrences of mortality for any avian species would be documented at WCFs. Short- or longer-term disturbances to individuals may occur and a small amount of habitat could be permanently modified or removed. However, these impacts would not measurably affect the movements, reproduction, or survival of many individuals, or the demography of population(s). Sufficient habitat would remain functional to maintain the viability of all resident and migratory species in the vicinity of any existing or possible future WCFs.
- Moderate:** Adverse or beneficial impacts to individuals, their habitat, or the natural processes sustaining them would affect a moderate portion of the species' range in the park.

Relatively frequent occurrences of mortality for any avian species would be documented at WCFs. Short- or longer-term disturbances could measurably affect the movements, reproduction, or survival of individuals, or the demography of population(s). However, impacts would not significantly increase the susceptibility of population(s) in or near the park to environmental or demographic uncertainty (e.g., severe winters, droughts, disease epidemics, skewed age or sex ratios). Sufficient habitat would remain functional to maintain the viability of all resident and migratory species in the vicinity of any existing or possible future WCFs.

Major: Adverse or beneficial impacts to populations, their habitat, or the natural processes sustaining them would be long-term and affect a large proportion of a species' range in the park. Avian mortality at WCFs would be consistently observable and documented in large numbers of individuals and/or species. The susceptibility of population(s) in or near the park to environmental or demographic uncertainty would significantly increase.

Duration Short-term effects would last only during the implementation of the project including mitigation and monitoring measures. Long-term effects would constitute a permanent impact.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis. Applications for WCFs would be considered within any portion of Yellowstone National Park on a case-by-case basis. Replacement or upgrade of WCFs would occur as needed, but no comprehensive plan would guide efforts. Power to the summit of Mt. Washburn would not be upgraded and current passive reflectors and microwave dishes would remain to support the commercial phone and data system. The best available technology would be required for new WCFs and outdated and unused infrastructure would be removed. New applications would be subject to all applicable guidance, including the U.S. Fish and Wildlife Service guidance for the siting, construction, operation and decommissioning of communications towers (see "Actions Common to All Alternatives"). Theoretically, there would be no imposed limit on the number of WCFs that could be constructed in the park. However, each facility would be required to complete the NEPA process before construction and implement the siting criteria. Thus, WCFs would not be permitted to the point where there would be numerous stand-alone facilities in one location that would increase the potential adverse impacts to avian species to a large degree. Based on this assumption, the construction of WCFs would result in long-term minor adverse impacts to birds if the number of new facilities is kept low, to long-term moderate adverse impacts if the number of new WCFs is high. There could be long-term minor to moderate adverse impacts to resident and migratory birds because construction of WCFs could be considered in any portion of the park, including *de facto* wilderness and areas with higher quality habitat. Construction of WCFs in high quality habitat for avian species could result in impacts such as collision with WCFs or avoidance of otherwise high-quality habitat by avian species.

Communications towers are known to be a risk factor to birds and, as a result, any new towers pose additive risks. Construction of new WCFs would result in short-term minor adverse impacts to birds and surrounding habitat due to ground disturbance at construction sites and the temporary removal or degradation of vegetation during construction of WCFs and associated structures. Construction would also create noise disturbance and expose potential avian habitat to an increase in human presence. However, once construction is over, and depending upon the degree to which impacted habitats return to their pre-construction state, birds may return and resume use of these sites. Implementation of the U.S. Fish and Wildlife Service guidance for communications towers should minimize habitat disturbance and inadvertent deaths of birds around WCFs or associated structures, thereby limiting habitat fragmentation and other adverse effects. The exclusion of new WCFs from wetlands and other habitats and locations where birds are known to concentrate should reduce adverse impacts to birds. Also, the co-location of any new WCFs could reduce the risks associated

with additional WCFs. The height restriction and exclusion of guy wires from new WCFs would also reduce potential adverse impacts to birds because taller towers pose a greater risk of collision than shorter towers and guy wires are a known avian collision risk factor at towers. Thus, the potential impact of bird collisions with WCFs should be long-term, minor, and adverse. If monitoring during and after construction of new WCFs determines that greater impacts are occurring to migratory birds and bird species of management concern than anticipated, then these findings will be taken into consideration for the site-specific NEPA document for each new facility application.

Cumulative Impacts. Past, present, and reasonably foreseeable actions occurring within the park and the surrounding area that would be expected to contribute to cumulative impacts include activities with construction of potential future WCFs. These projects would cause temporary displacement of migratory birds and bird species of management concern from human presence and construction noise in multiple areas of the park. The removal of vegetation to accommodate WCFs, trails, and road improvements would also result in an increase of permanent loss of avian habitats in multiple areas of the park, resulting in habitat fragmentation and the permanent displacement of some birds. Operation and maintenance of WCFs, trails, and roads not associated with WCFs would impact birds sensitive to noise and human presence, causing displacement of these species from habitat in the vicinity of these areas. Because of these impacts, the above projects would be expected to have long-term minor to moderate adverse impacts to avian species in areas surrounding the park. The impacts to avian species resulting from these past, present, and future actions, in combination with the long-term minor to moderate adverse impacts under the no action alternative, would result in long-term, minor to moderate, and adverse impacts to migratory birds and bird species of management concern found in the park.

Conclusion. Under the no-action alternative, there would be long-term minor to moderate adverse impacts to migratory birds and bird species of management concern from habitat loss and increased collision risk, depending on the number of WCFs sited in the park. Implementation of the U.S. Fish and Wildlife Service guidance for communications towers should minimize habitat disturbance and inadvertent deaths of birds around WCFs or associated structures, thereby limiting habitat fragmentation and other adverse effects. During the construction of new WCFs, short-term minor adverse impacts would be expected to occur from the temporary habitat loss and disturbance. Cumulative impacts would be long-term, minor to moderate, and adverse. Because there would be no major, adverse impacts to migratory birds or species of management concern whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of this alternative would not result in any unacceptable impacts to avian species and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE B: REDUCTION IN WIRELESS SERVICES

Analysis. Essential wireless services for life, health, and safety would be provided, while the number of WCFs would be reduced in the park. Cell phone infrastructure would be removed at Old Faithful, Grant Village, Canyon, and Tower-Roosevelt developed areas. As a result, cell phone service in these areas would be unavailable. Cell phone service would remain in the Gardiner-Mammoth area. Cell phone antennas would be relocated from Bunsen Peak to Elk Plaza. The power transmission line to the summit of Bunsen Peak and all equipment except the passive reflector would be removed. The footprint of the existing facility at Elk Plaza would experience some possible increase in height of the tower, and a slight expansion of the existing fenced equipment area or construction of a new building. Some antennas on Mt. Washburn would be relocated onto a newly constructed support structure adjacent to the current lookout.

The removal of infrastructure, relocation of equipment, and consolidation of antennas and other equipment on Elk Plaza would result in the temporary disturbance of migratory birds and Bird Species of Management Concern and degradation of habitat for some avian species. Once these

activities are completed, and depending upon the degree to which affected habitats return to their pre-construction state, birds may return and resume use of these sites. Implementation of the U.S. Fish and Wildlife Service guidance for the siting, construction, operation and decommissioning of communications towers (see "Actions Common to All Action Alternatives") during this consolidation will reduce potential adverse effects to birds. Thus, the long-term impact of this alternative on migratory birds would be negligible to minor and adverse.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that would be expected to contribute to impacts on avian species would be the same as those described for the no-action alternative, and result in long-term, minor to moderate, and adverse impacts. The impacts to migratory birds and Bird Species of Management Concern resulting from these past, present, and future actions, in combination with the negligible to minor adverse impacts under alternative B, would result in long-term negligible to minor adverse impacts to avian species found in the park.

Conclusion. Under alternative B, there would be an overall reduction in potential adverse impacts to migratory birds and bird species of management concern from WCFs, and WCFs would be excluded from the main areas of avian habitat. During the removal, relocation, and consolidation of WCFs, short-term minor adverse impacts would be expected due to temporary habitat loss and disturbance. However, implementation of the U.S. Fish and Wildlife Service guidance for communications towers should minimize habitat disturbance and inadvertent deaths of birds around WCFs or associated structures, thereby limiting habitat fragmentation and other adverse effects. Cumulative impacts would be long-term, negligible to minor, and adverse. Because there would be no major, adverse impacts to migratory birds or species of management concern whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of this alternative would not result in any unacceptable impacts to avian species and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE C: LIMITED INCREASE IN WIRELESS (PREFERRED ALTERNATIVE)

Analysis. A limited increase in wireless service would likely occur because applications for new WCFs would be considered for the Lake developed area using temporary or permanent infrastructure and equipment. A WCF may be located at the existing lattice tower site just northwest of Fishing Bridge junction, near the wastewater treatment facility, or near the water tank in the Lake administrative area. The cell tower at Old Faithful would be moved to a site near the water treatment plant when feasible. At Mt. Washburn improvements to viewsheds and safety may occur by relocating antennas and placing them to a new platform tower adjacent to the existing lookout. Equipment would remain in the existing space under the observation deck. Improvements may also occur to viewsheds on Bunsen Peak by relocating and replacing obsolete equipment to Elk Plaza. New infrastructure would be added to increase the capacity of the data transmission system within the park. The transmission line to the top of Bunsen Peak would remain in service to provide power for this potential use. FM equipment would remain on Bunsen Peak, but the equipment shed would be replaced with smaller equipment cabinet-sized enclosures.

This alternative would exclude the majority of suitable bird habitat in the park from consideration for WCFs, thereby minimizing potential adverse impacts to migratory birds and bird species of management concern. Short-term negligible adverse impacts would be expected from construction, operation, and maintenance of WCFs because new facilities would be located primarily in or near developed or already disturbed areas of the park. Birds in or adjacent to these areas would experience low-level disturbance from noise associated with construction, operation, and maintenance. However, once construction is over, and depending upon the degree to which impacted habitats return to their pre-construction state, birds may return and resume use of these sites. Implementation of the U.S. Fish and Wildlife Service guidance for communications towers should minimize habitat disturbance and inadvertent deaths of birds around WCFs or associated

structures, thereby limiting habitat fragmentation and other adverse effects. The exclusion of new WCFs from wetlands and other habitats and locations where birds are known to concentrate should reduce adverse impacts to avian species. Also, the co-location of any new WCFs could reduce the risks associated with additional WCFs. The height restriction and exclusion of guy wires from new WCFs would also reduce potential adverse impacts to birds because taller towers pose a greater risk of collision than shorter towers and guy wires are a known avian collision risk factor at towers. Thus, the potential long-term impact of bird collisions with WCFs should be negligible to minor, and adverse. If monitoring during and after construction of new WCFs determines that greater impacts are occurring to birds than anticipated, then these findings will be taken into consideration for subsequent WCFs.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that would be expected to contribute to impacts on avian species would be the same as those described under the no-action alternative, and result in long-term minor to moderate adverse impacts. The impacts to avian species resulting from these past, present and future actions, in combination with the negligible to minor adverse impacts under alternative C, would result in long-term, negligible to minor, and adverse impacts to avian species found in the park.

Conclusion. Under Alternative C, there would be a limited increase in wireless service and infrastructure. However, WCFs would be located primarily in or near developed or already disturbed areas of the park, thereby minimizing potential adverse impacts to birds. Long-term, negligible to minor and adverse impacts would occur in those areas of the park where WCFs would be considered due to the potential for habitat loss and bird collisions with WCFs in these areas that are not considered the main areas of habitat for avian species. During construction of new WCFs, short-term minor adverse impacts would be expected to occur from the temporary habitat loss and disturbance. However, implementation of the U.S. Fish and Wildlife Service guidance for communications towers should minimize habitat disturbance and inadvertent deaths of birds around WCFs or associated structures, thereby limiting habitat fragmentation and other adverse effects. Cumulative impacts to migratory birds and bird species of management concern would be short- and long-term, negligible to minor, and adverse. Because there would be no major, adverse impacts to migratory birds or species of management concern whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of this alternative would not result in any unacceptable impacts to avian species and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE D: SUBSTANTIAL INCREASE IN WIRELESS SERVICES

Analysis. A significant increase in wireless service would likely occur because applications for new WCFs would be considered for the Lake and other developed areas as well as along park roads and some backcountry areas using temporary or permanent infrastructure and equipment. Also, new applications would be considered for WCFs that provide seasonal cell coverage at the Norris, Madison, Bridge Bay, Tower-Roosevelt, and Fishing Bridge campgrounds through construction of new facilities. Cell coverage would be provided along major roads using antennas on existing power line poles and/or additional cell towers. The cell tower at Old Faithful would be camouflaged to reduce visual impacts when feasible. Improvements to viewsheds and safety at Mt. Washburn could occur by removing antennas and placing them on a new tower with an associated new equipment building and security fence. Improvements to viewsheds on Bunsen Peak may also occur by removing obsolete equipment and the cell coverage link (which would be moved to Elk Plaza). New infrastructure would be added to increase the capacity of the data transmission system within the park. The transmission line to the top of Bunsen Peak would remain in service to provide power for this potential use. FM equipment would remain on Bunsen Peak, but the equipment shed would be replaced with smaller equipment cabinet-sized enclosures.

Adverse effects under this alternative would be greater than for alternative C because new WCFs would be considered at campgrounds and along major roads. However, this alternative would still exclude the majority of suitable bird habitat in the park from consideration for WCFs, thereby reducing potential adverse impacts to birds. Short-term, negligible to minor and adverse impacts would be expected from construction, operation, and maintenance of WCFs because new facilities would be located primarily in or near developed areas of the park. Migratory birds and bird species of management concern in or adjacent to these areas would experience low-level disturbance from noise associated with construction, operation, and maintenance. However, once construction is over, and depending upon the degree to which impacted habitats return to their pre-construction state, birds may return and resume use of these sites. Implementation of the U.S. Fish and Wildlife Service guidance for communications towers should minimize habitat disturbance and inadvertent deaths of birds around WCFs or associated structures, thereby limiting habitat fragmentation and other adverse effects. The exclusion of new WCFs from wetlands and other habitats and locations where birds are known to concentrate should reduce adverse impacts to birds. Also, the co-location of any new WCFs could reduce the risks associated with additional WCFs. The height restriction and exclusion of guy wires from new WCFs would also reduce potential adverse impacts to birds because taller towers pose a greater risk of collision than shorter towers and guy wires are a known avian collision risk factor at towers. Thus, the potential impact of bird collisions with WCFs should be long-term, negligible to minor, and adverse. If monitoring during and after construction of new WCFs determines that greater impacts are occurring to avian species than anticipated, then these findings will be taken into consideration for subsequent WCFs.

Cumulative Impacts. Past, present, and reasonably foreseeable future actions that would be expected to contribute to impacts on avian species would be the same as those described for the no-action alternative, and result in long-term, minor to moderate, and adverse impacts to avian species in areas surrounding the park. The impacts to migratory birds and bird species of management concern resulting from these past, present and future actions, in combination with the minor to moderate adverse impacts under Alternative D, would result in long-term, minor to moderate, and adverse impacts to avian species found in the park.

Conclusion. There would be long-term, minor to moderate and adverse impacts from habitat loss and increased collision risk, depending on the number of WCFs sited in the park. During the construction of new WCFs, short-term minor adverse impacts would be expected to occur from the temporary habitat loss and disturbance. However, implementation of the U.S. Fish and Wildlife Service guidance for communications towers should minimize habitat disturbance and inadvertent deaths of birds around WCFs or associated structures, thereby limiting habitat fragmentation and other adverse effects. Cumulative impacts would be long-term, minor to moderate, and adverse. Because there would be no major adverse impacts to migratory birds or species of management concern whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of this alternative would not result in any unacceptable impacts to avian species and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

Wilderness

Methodology and Assumptions

In evaluating environmental impacts, the NPS would take into account (1) wilderness characteristics and values, including the primeval character and influence of the wilderness; (2) the preservation of natural conditions; and (3) assurances that there would be outstanding opportunities for solitude, that the public would be provided with a primitive and unconfined type of recreational experience; and (4) that wilderness would be preserved and used in an unimpaired condition.

Yellowstone would use a Minimum Requirement Analysis (MRA) to determine whether a proposed

management action is appropriate or necessary for the administration of the areas as wilderness, to the wilderness resources and character, and the selection of the management method (tool) that causes the least amount of impact to wilderness resources and character. The MRA would be appropriate for a use or activity, determined to be necessary to accomplish an essential task, which makes use of the least intrusive tool, equipment, device, force, regulation, or practice that will achieve the wilderness management objective.

In the determination of minimum requirement, the potential disruption of wilderness character and resources will be considered before, and given significantly more weight than, economic efficiency and convenience. If a compromise of wilderness resources or character is unavoidable, only those actions that preserve wilderness character and/or have localized, short-term adverse impacts would be acceptable.

Administrative use of motorized equipment or mechanical transport would be authorized only if determined by the MRA process to be the minimum requirement needed by management to achieve the purposes of the area as wilderness, including the preservation of wilderness character and values, or in emergency situations involving the health or safety of persons actually in the area. The use of motorized equipment and the establishment of management facilities are specifically prohibited when other reasonable alternatives are available.

Administrative facilities (e.g., ranger stations and/or patrol cabins, fire lookouts, radio and/or cellular telephone antennas, radio repeater sites, associated storage or support structures, and facilities supporting trail stock operations) would be allowed in wilderness if they are determined to be the minimum requirement necessary to carry out wilderness management objectives.

The MRA cannot be used to permit new road construction, permit new or widen or extend any existing rights-of-way, or allow inappropriate commercial uses or unlawful uses in wilderness. No new roads, permanent heliports, helipads, or airstrips would be allowed in wilderness unless specifically authorized by statute or legislation. Temporary vehicular access and aviation landing facilities may be permitted only to meet the minimum requirements of emergency situations, and will be restored, per an approved restoration plan, as rapidly as possible.

Scientific activities are encouraged and permitted in wilderness when these activities are consistent with the NPS responsibilities to preserve and manage wilderness. Scientific activities may be conducted in wilderness when the desired information is essential for the understanding of health, management, or administration of wilderness and the project cannot be reasonably modified to eliminate or reduce the nonconforming wilderness use(s) or if it increases scientific knowledge, even when this serves no immediate wilderness management purposes, provided it does not compromise wilderness resources or character. Scientific activities (including inventory, monitoring, and research) that involve a potential impact to wilderness resources or values can be allowed when the benefits outweigh the impacts on the wilderness resource or values, and as long as the project will not significantly interfere with other wilderness purposes (recreational, scenic, educational, conservation or historical) over a broad area, or for a long period of time.

Research and monitoring devices (e.g., data loggers, meteorological and seismic stations) may be installed and operated in wilderness if: (1) the desired information is essential for the administration and preservation of wilderness and cannot be obtained from a location outside of wilderness without significant loss of precision and applicability, and (2) the proposed device is the minimum requirement necessary to accomplish the research objective safely. All such activities must also be evaluated using the minimum requirement concept. Devices located in wilderness will be removed when determined to be no longer essential.

Impact analyses focused on wilderness character and/or wilderness experience, including the perpetuation of natural ecological relationships and processes, continued existence of native wildlife and vegetation populations, absence of permanent human structures, opportunities for solitude, and

opportunities for primitive and unconfined recreation. The thresholds of change for intensity of impacts and the duration of impacts are defined below.

Intensity Level Definitions

- Negligible:** Impacts to wilderness character or wilderness experience would not be detectable or barely detectable to visitors.
- Minor:** One or more attributes of wilderness character and wilderness experience change temporarily or in small ways in one or more locations. The change would impact a few visitors' experiences, but would result in little distraction from the quality of the experience.
- Moderate:** One or more attributes of wilderness character and wilderness experience change substantially in a single distinct region, or affect multiple regions; however, the change is not permanent and does not affect an entire visitor season. The change would noticeably decrease or improve the quality of the experience for a many visitors.
- Major:** One or more attributes of wilderness character and wilderness experience change substantially across more than one distinct region, on a permanent basis and over an entire visitor season. The change substantially improves many visitors' experiences or severely lowers the quality of most visitors' experiences; examples include addition or elimination of a recreation opportunity or a permanent change to an area.
- Duration:** Short-term effects would last only during the implementation of the project including mitigation and monitoring measures. Long-term effects would constitute a permanent impact.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis. Under Alternative A, no action would be taken to develop comprehensive park guidelines and plan for installation of wireless cellular services, coverage and related infrastructure. Yellowstone National Park staff would evaluate project proposals for wireless services on a case-by-case basis and would develop recommendations regarding various actions for a decision by the park superintendent. Actions related to wireless communications would be considered by emergency actions, placement of temporary (two years or less) facilities not related to emergency actions that would improve the efficiency of NPS, concessioners, and contractor operations, and replacement or upgrading of existing telecommunications and monitoring infrastructure that would not require new facilities to be constructed.

Existing resource monitoring and park radio telecommunications equipment and service would remain in Yellowstone's backcountry. The five cellular sites currently located in the park: Old Faithful, Grant Village, Mt. Washburn, and Bunsen Peak, and Elk Plaza are located within or near the bounds of existing developed areas and not within Yellowstone's recommended wilderness. Varying degrees of cell phone coverage occur within recommended wilderness, usually adjacent to developed areas. This spillover coverage would continue in all alternatives, but would not be targeted for these areas, and would be minimized to the extent possible. As in the past, no roads would be constructed within recommended wilderness, and no utilities would be extended into these areas.

Cumulative Impacts. Under existing and future minimum requirement analyses and approvals, ongoing administrative flights (primarily research, wildland fire management, and maintaining NPS radio systems) and occasional use of chainsaws to maintain backcountry trails would continue to occur in Yellowstone's recommended wilderness, resulting in short-term, negligible adverse impacts.

Ongoing recreational use of backcountry trails and campsites, including the use of stock, would contribute to long-term negligible adverse impacts to vegetation from trampling and erosion. Park staff strives to rehabilitate vegetation and soils when needed. Backcountry visitation could increase slightly over the next several decades as a result of population growth in surrounding counties and elsewhere; however, impacts to wilderness beyond a minor adverse intensity are not anticipated. None of the projects listed in the cumulative scenario earlier in this chapter occur within recommended wilderness. The impacts of these projects to wilderness resources would be mostly from noise occurring during construction activities, and this noise would diminish with distance into wilderness areas. When added to the other past, present, and reasonably foreseeable future actions within Yellowstone's recommended wilderness, Alternative A would have negligible to minor direct and indirect impacts.

Conclusion. Alternative A would result in minor direct or indirect impacts. There would be long-term, minor, adverse cumulative impacts to wilderness from administrative and recreational use due to the potential for additional research monitoring sites within wilderness, and some spillover cellular phone coverage from adjacent developed areas. Because there would be no major adverse impacts to wilderness whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of this alternative would not result in any unacceptable impacts to wilderness and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE B: REDUCTION IN WIRELESS SERVICES

Analysis. Under Alternative B, wireless services needed for life, health, and safety would be provided while the number of WCFs would be reduced in the park. Cell phone service would be removed at Old Faithful, Grant Village, Canyon, and Tower-Roosevelt. Cell phone service would remain in the Gardiner-Mammoth area with a tower at Elk Plaza. Existing resource monitoring and park radio telecommunications equipment and service would remain in Yellowstone's backcountry. No new facilities for resource monitoring are envisioned under this alternative. Cell phone service is not an expectation in Yellowstone's backcountry, and no commercial cell phone sites are envisioned to be constructed there as part of this alternative. The removal of cell phone sites from Grant, Old Faithful, Mount Washburn, and Bunsen Peak would remove infrastructure, and cell service coverage, enhancing wilderness qualities.

Cumulative Impacts. Under existing and future minimum requirement analyses and approvals, ongoing administrative flights (primarily research, wildland fire management, and maintaining NPS radio systems) and occasional use of chainsaws to maintain backcountry trails would continue to occur in Yellowstone's recommended wilderness, resulting in short-term, negligible adverse impacts. Ongoing recreational use of backcountry trails and campsites, including the use of stock, would contribute to long-term negligible adverse impacts to vegetation from trampling and erosion. Park staff strives to rehabilitate vegetation and soils when needed. Backcountry visitation could increase slightly over the next several decades as a result of population growth in surrounding counties and elsewhere; however, impacts to wilderness beyond a minor adverse intensity are not anticipated. When added to the other past, present, and reasonably foreseeable future actions within Yellowstone's recommended wilderness, Cumulative impacts from Alternative B would have negligible to minor direct and indirect impacts.

Conclusion. Alternative B would result in negligible to minor direct or indirect impacts. There would be negligible to minor beneficial impacts to wilderness from administrative and recreational use due to existing research monitoring sites, and some spillover cellular coverage in the Mammoth Hot Springs area due to the Elk Plaza cell site. Because there would be no major adverse impacts to wilderness whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park

or NPS planning documents; there would be no impairment to this resource. Implementation of this alternative would not result in any unacceptable impacts to wilderness and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE C: LIMITED INCREASE IN WIRELESS (PREFERRED ALTERNATIVE)

Analysis. Under Alternative C, a limited increase in wireless service would likely occur because applications for new WCFs would be considered for the Lake developed area using temporary or permanent infrastructure and equipment. Existing resource monitoring and park radio telecommunications equipment and service would remain in Yellowstone's backcountry. The cellular and wireless communications sites currently located in the park: Old Faithful, Grant Village, Mt. Washburn, Bunsen Peak, and Elk Plaza are within or near the bounds of existing developed areas and not within Yellowstone's recommended wilderness. The addition of cell phone coverage at Lake would increase the amount of spillover cell phone coverage into recommended wilderness, though the infrastructure would be located outside these boundaries. Additional impacts of this alternative are due to limited ground disturbance associated with the placement of a seismic monitoring station located near the Thorofare Ranger Station, and three stream gauging stations. Additional future resource monitoring stations may be added, but only if information can not be gathered from non-wilderness areas and a minimum tool analysis has been completed. Impacts would be mitigated by following the siting criteria listed in Chapter 2. Through the use of these criteria, impacts associated with viewing or hearing noise from infrastructure would be kept to minor or less.

Cumulative Impacts. Under existing and future minimum requirement analyses and approvals, ongoing administrative flights (primarily research, wildland fire management, and maintaining NPS radio systems) and occasional use of chainsaws to maintain backcountry trails would continue to occur in Yellowstone's recommended wilderness, resulting in short-term, negligible adverse impacts. Ongoing recreational use of backcountry trails and campsites, including the use of stock, contribute to long-term negligible adverse impacts to vegetation from trampling and erosion. Park staff strives to rehabilitate vegetation and soils when needed. Backcountry visitation could increase slightly over the next several decades as a result of population growth in surrounding counties and elsewhere; however, impacts to wilderness beyond a minor adverse intensity are not anticipated. None of the projects in the cumulative impacts scenario occur within recommended wilderness. Cumulative impacts of alternative C would be negligible to minor direct and indirect on wilderness resources.

Conclusion. Alternative C would result in negligible to minor direct or indirect impacts. There would be minor adverse cumulative impacts to wilderness from administrative and recreational use due to an additional cell site to provide coverage in the Lake developed area. Additional research monitoring sites could also occur. Because there would be no major, adverse impacts to wilderness whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of this alternative would not result in any unacceptable impacts to wilderness and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE D: SUBSTANTIAL INCREASE IN WIRELESS SERVICES

Analysis. Under Alternative D, a substantial increase in wireless service would likely occur because applications for new WCFs would be considered for the Lake developed area and new applications for WCFs that provide seasonal cell coverage at the Norris, Madison, Bridge Bay, Tower, and Fishing Bridge campgrounds through construction of new facilities. This alternative also provides for cell coverage along primary roads using antennas on existing power line poles and/or additional cell towers. Existing resource monitoring and park radio telecommunications equipment and service would remain in Yellowstone's backcountry and additional YVO structures would be added as

permanent facilities in the park's recommended wilderness. The addition of cell phone coverage along the park's major roadways would likely cause an increase in cell phone coverage spillover into recommended wilderness areas adjacent to these roads. Distances the coverage would travel would be dependant upon the infrastructure of the equipment used, and the terrain in each area. More visitors would notice the additional coverage while hiking backcountry trails leading to changes in their wilderness experience. Other impacts would be the same as stated above for Alternative C.

Cumulative Impacts. Under existing and future minimum requirement analyses and approvals, ongoing administrative flights (primarily research, wildland fire management, and maintaining NPS radio systems) and occasional use of chainsaws to maintain backcountry trails would continue to occur in Yellowstone's recommended wilderness, resulting in short-term, negligible adverse impacts. Ongoing recreational use of backcountry trails and campsites, including the use of stock, contribute to long-term negligible adverse impacts to vegetation from trampling and erosion. Park staff strives to rehabilitate vegetation and soils when needed. Backcountry visitation could increase slightly over the next several decades as a result of population growth in surrounding counties and elsewhere; however, impacts to wilderness beyond a minor adverse intensity are not anticipated. When added to the other past, present, and reasonably foreseeable future actions within Yellowstone's recommended wilderness, Alternative D would have minor to moderate direct and indirect impacts.

Conclusion. Alternative D would result in minor to moderate direct or indirect impacts. There would be minor to moderate adverse cumulative impacts to wilderness from administrative and recreational use due to the potential for additional cell coverage along the Grand Loop Road, the Lake Development, potential additional research monitoring sites, and the resultant spillover into wilderness areas. Because there would be no major, adverse impacts to wilderness whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of this alternative would not result in any unacceptable impacts to wilderness and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

Soundscapes

Guiding Regulations and Policies

36 CFR § 2.12 specifically prohibits operating motorized equipment or machinery (e.g., electric generating plants, motor vehicles, or motorized toys) or audio devices (e.g., radio, television set, tape deck or musical instrument) in a manner that exceeds a noise level of 60 dBA at 50 feet.

The National Park Service preserves, to the greatest extent possible, the natural soundscapes of the park (NPS 2006, Sec. 4.9). Intrusive sounds are a concern to park visitors: a system-wide survey revealed that nearly as many visitors come to national parks to enjoy the natural soundscape (91%) as come to view the scenery (93%) (NPS 2000).

Methodology and Assumptions

Human-generated noise sources throughout the developed zone of Yellowstone include vehicular traffic; recreational activities, such as hiking, sightseeing, groups of visitors talking, and picnicking; and noises associated with administrative uses (e.g., construction activities, road maintenance activities). Representative background average sound levels in Yellowstone's developed areas during daytime hours (7am to 7pm) in the Old Faithful area are: 52 decibels (dBA) (summer), 42 dBA (winter); in the West Yellowstone-to-Madison road corridor: 53 dBA (summer) and 40 dBA (winter) (Burson, unpublished data).

Human-generated noise sources in the backcountry zone are substantially less than in the developed zone, especially as one moves farther away from park developments and roads. Noise sources include recreational activities, such as hiking, horseback riding, and boating; general aviation and

commercial overflights, and administrative uses (e.g., occasional use of chainsaws to clear trails; overflights for wildlife monitoring; occasional installation of NPS radio or scientific monitoring equipment). Representative background average sound levels during daytime hours (7 AM to 7 PM) in Yellowstone's backcountry are at Fern Lake in upper Pelican Valley: 36 dBA (summer) and 26 dBA (winter) and on the Mary Mountain trail 1.5 miles from the Old Faithful-to-Madison road corridor: 27 dBA (winter) measured (Burson, unpublished data).

Potential impacts to the natural soundscape were evaluated based on the existing sound levels in comparison to potential noise levels associated with each of the alternatives. This evaluation is a qualitative assessment. Short- and long-term noise levels were considered. Short-term noise impacts would result from the construction of WCFs and installation of scientific monitoring equipment and long-term noise impacts would result from the operation and maintenance of additional WCFs as well as the use of devices such as cell phones.

Noises resulting from the operation and maintenance of WCFs include the air conditioning units in each equipment building. Another source of noise at WCFs would be an emergency generator located within the equipment buildings. It was assumed generator noise levels for additional facilities would be similar to the noise levels produced from the existing cooling units and would occur for a similar duration. These levels are included in the representative background noise levels reported in the section above.

Assumptions made for the analysis included:

1. Noise from construction activities would be short-term and would occur during the summer construction period for any additional facility built. It is assumed that the construction activities would be confined to normal, daytime working hours (7 AM to 7 PM).
2. Long-term noise levels associated with the operation and maintenance of any additional facilities would include noise from cooling fans and emergency generators located in the equipment building of each facility. It is assumed that the noise levels of new facilities would be comparable to the existing facilities, including generator testing and use. It could be expected that as technology advanced the noise levels created by the generators and cooling fans may decrease. This WCS plan/EA uses current technology as the baseline, but future noise levels may be quieter.
3. To analyze the impacts to natural soundscapes of visitors talking on cell phones, background conversation levels are assumed to be about 60 dBA at 3–5 feet. Cell phone ring sound levels were assumed to be up to 70 dBA at 3 feet (Burson, personal communication). From point sources, sound levels decrease approximately 6 dBA for every doubling of distance (e.g., 70 dBA at 3 feet is approximately 46 dBA at 50 feet) (Burson, personal communication).

Intensity Level Definitions

Given this methodology and the accompanying assumptions, the following criteria have been developed to assess the noise impacts for each of the alternatives:

- Negligible:** Natural sounds would prevail; noise generated by WCF construction, operation, or maintenance would be infrequent or absent, mostly immeasurable. Noise associated with the use of cell phones would be infrequent or absent.
- Minor:** Natural sounds would be predominant in backcountry areas, where management objectives call for natural processes to dominate. In developed areas, human-generated noise could be heard frequently throughout the day at moderate levels, or infrequently at higher levels; still, uninterrupted natural sounds could be heard regularly.

Moderate: Natural sounds would predominate in backcountry areas, but noise generated by WCF construction or installation of scientific equipment or NPS radio equipment could occasionally be present at low to moderate levels. In developed areas, human-generated noise would predominate during daylight hours. Uninterrupted natural sounds could still be heard occasionally.

Major: In backcountry areas, natural sounds would be impacted by human noise sources frequently or for extended periods of time at moderate intensity levels (but no more than occasionally at high levels), and in a minority of the area. In developed areas, noise generated by WCF construction, operation, or maintenance, installation of scientific equipment or NPS radio equipment, or the use of cell phones, would impact natural sounds most of the day at low to moderate intensity levels, or more than occasionally at high levels; noise would disrupt conversation for long periods of time and/or make enjoyment of other activities in the area difficult. In these areas, uninterrupted natural sounds would rarely be heard during the day.

Duration: Short-term effects would last during construction of a facility, typically up to three months. Long-term effects would be anything beyond the construction of a facility through the life of the facility, including maintenance activities.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis. An increase in wireless service would likely occur under the no-action alternative because applications for new WCFs, considered on a case-by-case basis, could be considered for the Lake developed area; the Norris, Madison, and Tower campgrounds; along major roads using antennas on existing power line poles and/or additional cell towers. There could be an increase in scientific monitoring equipment, including new gauging stations installed on the Upper Yellowstone River and the Bechler River. Cell phone coverage is not expected to be approved for Yellowstone's backcountry because it would interfere with wilderness mandates and NPS policy; however, small backcountry areas are expected to have cell phone coverage as a result of spillover from coverage in developed areas.

The operation of additional cooling units and generators that may be added would result in long-term, moderate, adverse impacts to natural soundspaces because of the higher ambient noise level in the localized area. Mitigation of these impacts include locating WCFs well away from any normal visitor use areas and the operation of additional cooling units and generators would not produce noise levels that exceed standards set in 36 CFR Section 2.12, based on the available data on cooling unit sound levels. Cooling systems similar to the ones currently in place at the park would produce a noise level of 60 dBA at 50 feet from the source.

Construction activities associated with the additional WCF at Lake and the changes at Mt. Washburn, Bunsen Peak, Elk Plaza, and Old Faithful developed area and installations at campgrounds and along power lines would result in short-term, moderate, adverse impacts to natural soundspaces in the developed zone because of the higher ambient noise level produced by construction activities. Installation of scientific equipment and NPS radio equipment in recommended wilderness would result in short-term, moderate, adverse impacts to natural soundspaces because of the higher ambient noise level produced by construction activities, including the potential use of helicopters for transport and the use of mechanized equipment for installation.

The additional use of cell phones in the Lake developed area, at campgrounds, and at pullouts and visitor attractions along the Grand Loop Road, and the continued use of cell phones at other developed areas in Yellowstone, would result in long-term, moderate adverse impacts to natural soundscapes. Impacts would be focused on areas, such as the boardwalk around Old Faithful, where visitors are often in close proximity to one another. Cell phones ringing, which could produce sounds up to 70 dBA at 3 feet (equivalent to 58 dBA at 24 feet), or cell phone conversations, which produce

about 60 dBA at 3-5 feet or 42 dBA at 24 feet), would be additive to the average ambient sound levels as represented by background levels at Old Faithful.

The use of cell phones in backcountry areas would not be expected to increase over current conditions; however, the impact to natural soundscapes would be long-term, minor, and adverse impacts. The impacts of cell phones ringing or cell phone conversations would be above the ambient sound levels measured in recommended wilderness; also, these types of human-generated sounds are contrary to wilderness mandates. The impacts would be mitigated by the small areas of cell phone coverage available in the backcountry under the no-action alternative.

The combined impacts to natural soundscapes under the no action alternative are expected to be short- and long-term, minor-to-moderate, and adverse.

Cumulative Impacts. Projects that would contribute to cumulative impacts to the park's natural soundscapes include construction of facilities such as the Old Faithful Visitor Education Center, which is likely to be completed during 2008 and 2009. The impacts resulting from these past, present, and future actions, in combination with the short- and long-term minor to moderate adverse impacts under the no-action Alternative would result in short-term and long-term minor to moderate, adverse impacts to natural soundscapes.

Conclusion. The combined impacts to natural soundscapes under the no-action alternative are expected to be short- and long-term, minor-to-moderate, and adverse. Cumulative impacts under this alternative would also be short- and long-term, minor to moderate, and adverse. Because there would be no major, adverse impacts to soundscapes whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of this alternative would not result in any unacceptable impacts to soundscapes and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE B: REDUCTION IN WIRELESS SERVICES

Analysis. Wireless services for life, health, and safety would be provided, while the number of WCFs would be reduced in the park. Cell phone service, and associated WCFs, would be removed at Old Faithful, Grant Village, Canyon, and Tower-Roosevelt developed areas. Cell phone service would remain in the Gardiner-Mammoth area. Cell phone antennas would be relocated from Bunsen Peak to Elk Plaza. All equipment and the power transmission line to the summit of Bunsen Peak would be removed, with the exception of the passive reflector. Some antennas on Mt. Washburn may be relocated onto a newly constructed support structure.

The operation of fewer WCFs would result in long-term, minor beneficial impacts to natural soundspaces because of the lower ambient noise level associated with fewer cooling systems, generators, and other mechanisms.

Construction activities to remove WCFs would result in short-term, minor adverse impacts to natural soundspaces in developed areas because of the higher ambient noise level produced by construction activities. Removal of scientific equipment in recommended wilderness would result in short-term, minor adverse impacts to natural soundspaces because of the higher ambient noise level produced by removal activities, including the potential use of helicopters for transport and the use of mechanized equipment for removal.

The use of cell phones in developed areas would be reduced in Alternative B, thus this alternative would result in long-term, minor beneficial impacts to natural soundscapes. The use of cell phones in backcountry areas would be reduced under Alternative B due to a reduction in areas covered by cell phone spillover. This would result in long-term, minor beneficial impacts to natural soundscapes.

The combined impacts to natural soundscapes under Alternative B are expected to be long-term, minor, and beneficial.

Cumulative Impacts. Projects that would contribute to cumulative impacts to the park's natural soundscapes are similar to those described in the no action alternative. The impacts resulting from these past, present, and future actions, in combination with the long-term minor beneficial impacts under Alternative B, would result in long-term minor beneficial impacts to natural soundscapes.

Conclusion. The combined impacts to natural soundscapes under Alternative B are expected to be long-term, minor, and beneficial. Cumulative impacts under Alternative B would also be long-term, minor, and beneficial. Because there would be no major, adverse impacts to soundscapes whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of this alternative would not result in any unacceptable impacts to soundscapes and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE C: LIMITED INCREASE IN WIRELESS SERVICES (PREFERRED ALTERNATIVE)

Analysis. A limited increase in wireless service would occur because applications for new Wireless service and WCF would be considered for the Lake developed area. The cell tower at Old Faithful would be relocated to a site near the water treatment plant when feasible. Antennas may also be relocated from the Mt. Washburn Lookout to a new platform tower adjacent to the existing lookout. Obsolete equipment, including cell antennas would also be removed or relocated from Bunsen Peak to Elk Plaza. In addition, wireless Internet access would be available to visitors in many hotels and stores throughout the park. There would be a slight increase in scientific monitoring equipment throughout the park.

The operation of an additional cooling unit and generator at Lake would result in long-term, minor, adverse impacts to natural soundspaces because of the higher ambient noise level in the local area. This WCF would be located well away from any normal visitor use area, mitigating much of the impact to visitors, since noise levels decrease 6 dBA with a doubling of distance from the source of the noise.

Construction activities associated with the additional WCF at Lake and the changes at Mt. Washburn, Bunsen Peak, Elk Plaza, and Old Faithful would result in short-term, minor adverse impacts to natural soundspaces in developed areas because of the higher ambient noise level produced by construction activities. Installation of scientific equipment and NPS radio equipment in recommended wilderness would result in short-term, minor adverse impacts to natural soundspaces because of the higher ambient noise level produced by construction activities, including the potential use of helicopters for transport and the use of mechanized equipment for installation.

The additional use of cell phones in the Lake developed area, and the continued use of cell phones at other developed areas would result in long-term, minor adverse impacts to natural soundscapes. The use of cell phones in backcountry areas would not be expected to increase over current conditions; however, the impact to natural soundscapes because of cell phone "spillover" coverage would be long-term, minor, and adverse impacts.

The combined impacts to natural soundscapes under the preferred alternative are expected to be short- and long-term, minor, and adverse.

Cumulative Impacts. Projects that would contribute to cumulative impacts to the park's natural soundscapes are similar to those described in the no action alternative. The impacts resulting from these past, present, and future actions, in combination with the short- and long-term minor adverse impacts under the preferred alternative, would result in short-term and long-term minor adverse impacts to natural soundscapes.

Conclusion. The combined impacts to natural soundscapes under the preferred alternative are expected to be short- and long-term, minor, and adverse. Cumulative impacts under the preferred alternative would also be short- and long-term, minor, and adverse. Because there would be no major, adverse impacts to soundscapes whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of this alternative would not result in any unacceptable impacts to soundscapes and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE D: SUBSTANTIAL INCREASE IN WIRELESS SERVICES

Analysis. An increase in wireless service would likely occur because applications for new WCFs would be considered for the Lake developed area. Also, new applications for WCFs would be considered that provide seasonal cell coverage at the Norris, Madison, and Tower campgrounds through construction of new facilities. Cell coverage would also be provided along major roads using antennas on existing power line poles and/or additional cell towers. Visitors would have access to wireless Internet throughout most developed areas if WiMax access is installed. There would be an increase in scientific monitoring equipment, including new gauging stations installed on the upper Yellowstone River and the Bechler River.

The operation of additional cooling units and generators at the Lake area and at Madison, Norris, and Tower campgrounds, and any needed for road coverage, would result in long-term, moderate, adverse impacts to natural soundscapes because of the higher ambient noise level in the localized area. These WCFs would be located well away from any normal visitor use areas and would not exceed noise standards set in 36 CFR, mitigating much of the impact to visitors, since noise levels decrease 6 dBA with a doubling of distance from the source of the noise.

Construction activities associated with the additional WCFs at Lake, Madison, Norris, and Tower-Roosevelt, and the changes at Mt. Washburn, Bunsen Peak, Elk Plaza, and Old Faithful, and installations along power lines, or other areas needed for road coverage, would result in short-term, moderate, adverse impacts to natural soundscapes in the developed zone because of the higher ambient noise level produced by construction activities. Installation of scientific equipment and NPS radio equipment in recommended wilderness would result in short-term, moderate, adverse impacts to natural soundscapes because of the higher ambient noise level produced by construction activities, including the potential use of helicopters for transport and the use of mechanized equipment for installation.

The additional use of cell phones in the Lake developed area, at campgrounds, and at pullouts and visitor attractions along the Grand Loop Road, and the continued use of cell phones at other developed areas in Yellowstone, would result in long-term, moderate adverse impacts to natural soundscapes. Cell phone coverage in backcountry areas would be expected to increase over current conditions due to spillover from providing coverage on the roads; the impact to natural soundscapes would be long-term, minor, and adverse.

The combined impacts to natural soundscapes under Alternative D are expected to be short- and long-term, moderate, and adverse.

Cumulative Impacts. Projects that would contribute to cumulative impacts to the park's natural soundscapes are similar to those described in the no-action alternative. The impacts resulting from these past, present, and future actions, in combination with the short- and long-term minor to moderate adverse impacts under Alternative D, would result in short-term and long-term minor to moderate, adverse impacts to natural soundscapes.

Conclusion. The combined impacts to natural soundscapes under Alternative D are expected to be short- and long-term, minor to moderate, and adverse. Cumulative impacts under Alternative D would also be short- and long-term, minor to moderate, and adverse. Because there would be no major, adverse impacts to soundscapes whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of this alternative would not result in any unacceptable impacts to soundscapes and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

CULTURAL RESOURCES (Historic Structures and Cultural Landscapes)

Guiding Regulations and Policies

In accordance with the Advisory Council on Historic Preservation's regulations implementing §106 of the NHPA (36 CFR Part 800, Protection of Historic Properties), impacts to historic properties including cultural landscapes for this project were identified and evaluated by (1) determining the area of potential effect (APE); (2) identifying cultural resources present in the area of potential effect that were either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the National Register; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Methodology and Assumptions

The purpose of this analysis is to determine if the placement of WCFs (including for cell phone coverage, scientific monitoring, NPS two-way radio system, and wireless Internet coverage) in the park is compatible or in conflict with historic properties and landscapes within the park and the direction provided by the *National Historic Preservation Act*. Thus, the guidance of this act was integrated into the impact thresholds. To determine impacts, the current and past uses of an area were considered and the potential effects of facility placement on visitor experience analyzed. This analysis is qualitative as the exact location of potential future WCFs is not known.

Impacts to historic properties and cultural landscapes are described in terms of type, context, duration, and intensity, as described above, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement the National Environmental Policy Act (NEPA). The topics of archeological resources, ethnographic resources, and museum collections were dismissed from further consideration (see *Impacts Dismissed from Further Consideration*) because none were identified in the project area and potential future sites would avoid any impacts to these resources. The §106 Summary in the preferred alternative is an assessment of the effect of the implementation of the alternative on cultural resources including historic properties and cultural landscapes based upon the criteria of effect and adverse effect found in the Advisory Council's regulations.

Under the Advisory Council's regulations, a determination of either *adverse effect* or *no adverse effect* must be made for affected historic properties and cultural landscape that are eligible for or listed on the National Register of Historic Places. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that would qualify it for inclusion in the National Register (e.g., diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association). *Adverse effects* also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR Part 800.5, Assessment of Adverse Effects). A determination of *no adverse*

effect means there would be an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register of Historic Places.

The CEQ regulations and the National Park Service's *Conservation Planning, Environmental Impact Analysis and Decision-Making* (Director's Order 12, NPS 1992) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact (e.g., reducing the intensity of an impact from major to moderate or minor). Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by §106 is similarly reduced. Although adverse effects under §106 may be mitigated, the effect remains adverse.

In order for a historic property to be listed in the National Register of Historic Places, it must meet one or more of the following criteria of significance: (A) be associated with events that have made a significant contribution to the broad patterns of our history; (B) be associated with the lives of persons significant in our past; (C) embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction; (D) have yielded, or may be likely to yield, information important in prehistory or history. In addition, the historic property must possess integrity of location, design, setting, materials, workmanship, feeling, and association (*National Register Bulletin, How to Apply the National Register Criteria for Evaluation*).

The Importance of the Property's Setting in Yellowstone: To retain historic integrity (and thereby avoid adverse effect) a property will always possess several, and usually most, of the seven aspects of integrity, which are location, design, setting, materials, workmanship, feeling, and association. While all aspects of integrity may be potentially affected by the proposals in this document, wireless telecommunications facilities have the potential to affect the setting and feeling by directly and indirectly affecting views from and within historic properties. In addition, the placement of antennas and other facilities on historic properties may affect the design, materials, and workmanship of that property. Proposed roads that are associated with WCFs also have the potential to affect the design of a historic district or cultural landscape.

"Setting" is the physical environment of a historic property. Whereas location refers to the specific place where a property was built or an event occurred, setting refers to the character of the place in which the property played its historical role. It involves how, not just where, the property is situated and its relationship to surrounding features and open space. Setting often reflects the basic physical conditions under which a property was built and the functions it was intended to serve. In addition, the way in which a property is positioned in its environment can reflect the designer's concept of nature and aesthetic preferences. The physical features that constitute the setting of a historic property and their relationships should be examined not only within the exact boundaries of the property, but also between the property and its surroundings. This is particularly important for districts (NR Bulletin #15).

Within the context of Yellowstone National Park, the setting of all historic properties has always, since its creation, been that of a scenic reserve as well as a place where natural and cultural resources were left unimpaired. Outstanding scenic character has always distinguished national parks from other areas, including national forests. In Yellowstone, it was the primeval character of the scenery that, combined with its outstanding natural features, led to its creation as a national park. The words, "retention of the park in its natural condition," contained in the 1872 enabling legislation, were later supplemented by the 1916 NPS Organic Act which charged the new bureau to, "conserve the scenery and the natural and historic objects and the wild life therein and...provide for the enjoyment of the same in such a manner and by such a means as will leave them unimpaired for the enjoyment of future generations." Thus, preservation of natural "scenery" has historically

been part of the park's purpose and mission. During the design and construction of most historic roads, trails, overlooks, buildings, etc., preservation of the natural scenery and primeval landscape was one of the fundamental objectives of park managers.

Of primary importance to the setting of a historic property in Yellowstone is its relationship to the very feature for which it was designed. The locations selected for most facilities were historically based either on the desire to select and develop viewpoints that revealed scenic vistas and features to their best advantage, thus maximizing the viewer's landscape experience, or on the desire to protect scenic vistas from any form of artificial obtrusion or interference. There are, therefore, some fundamental viewsheds between certain contributing features/patterns of a historic property and the setting. Examples of this relationship include the viewshed of the Old Faithful Geyser and surrounding Upper Geyser Basin from the Old Faithful Inn NHL (or vice versa), or the viewshed of Yellowstone Lake and surrounding wilderness from the historic Lake Hotel or Fishing Bridge Museum NHL. This visual relationship between the historic properties and its setting, feeling and association is integral to the property's integrity, and is of primary importance.

Area of Potential Effect (APE): In Section VI.C "Area of Potential Effects" in the *Nationwide Programmatic Agreement for Review of Effects on Historic Properties for Certain Undertakings Approved by the Federal Communications Commission, September 2004*, the presumed APE is ½ mile to 1-1/2 miles, depending on the height of the proposed WCF. However, due to the importance of outstanding natural scenic character to the setting and design of historic properties within Yellowstone, the APE is defined as the property itself and the entire viewshed or entire "seen area" in and around the property, even outside historic property boundaries. In the case of Yellowstone, historic properties that are near adjacent communities outside the park's boundaries, the APE and setting would be determined on a case-by-case basis.

Existing and Desired Condition of the APE: The contributing features and patterns of the historic property must retain integrity of location, design, setting, materials, workmanship, feeling, and association. Within the park, the setting outside the boundaries of the historic property, including long distance views, mostly appear to be free of artificial obtrusions or interference. Man-made structures stand out in stark contrast to the vast natural setting. Of particular importance are those views from certain contributing features of a historic property and the natural feature it was designed around, as in the case of the viewshed between Old Faithful Inn and the geyser basin of the Old Faithful Geyser. In addition, facilities that are constructed within an APE should harmonize with or blend into the landscape using the siting and design criteria established in this document.

For purposes of analyzing potential impacts to historic structures and cultural landscapes, the thresholds for the intensity of an impact are defined as follows. The methodology used for assessing impacts to an historic structure is based on how the project will affect the features for which the structure is significant. Since the undertakings described in each alternative would be programmatic in nature, rather than specific, these conditions are common to all thresholds:

- (a) The WCF would follow siting and design criteria to ensure facilities are appropriately camouflaged, and
- (b) "Fundamental viewsheds" are those that are between the historic property and the natural feature or vista it was designed for; such as the viewshed of the Old Faithful Geyser and surrounding Upper Geyser Basin from the Old Faithful Inn NHL (or vice versa), or the viewshed of Yellowstone Lake and surrounding wilderness from the historic Lake Hotel or Fishing Bridge Museum NHL, for example.

Intensity Level Definitions

- Negligible:** Impact(s) would not alter contributing features/patterns of the historic property. The impact of the WCF is not measurable. For purposes of §106, the determination would be no effect.
- Minor:** Impact would alter contributing features or patterns of the historic property or its setting, but the integrity of the property is not diminished. The WCF would be camouflaged so that it is not discernable as a WCF within the APE. The WCF is not detectable within fundamental viewsheds. For purposes of §106, the determination of effect would be no adverse effect. Stabilization/preservation of character defining features and patterns in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties*, and *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guideline for the Treatment of Historic Landscapes* would be beneficial. For purposes of §106, the determination of effect would be no adverse effect.
- Moderate:** Impact alters contributing features/patterns of a historic property, and the integrity is slightly diminished. The WCF is camouflaged so that it is not discernable as a WCF from/within a majority of the APE; however, it is detectable from a small portion of the APE. WCF is not detectable within fundamental viewsheds. National Historic Landmarks are affected. For purposes of §106, the determination of effect would be adverse effect. A memorandum of agreement (MOA) is executed among the National Park Service and applicable state historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts would reduce the intensity of impact under NEPA from major to moderate. Rehabilitation and restoration of a structure, building, or landscape in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties*, and *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guideline for the Treatment of Historic Landscapes* would be beneficial. For purposes of §106, the determination of effect would be no adverse effect.
- Major:** Alteration of a feature(s) would diminish the overall integrity of the resource. The determination of effect for §106 would be adverse effect. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the National Park Service and applicable state historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b). Adverse impact occurs when any of the following conditions, alone or in combination, are met: impact alters contributing features/patterns so that the integrity of the resource is diminished to the extent that it is no longer eligible for listing in the National Register; WCF can be seen from/within a majority of the APE; WCF is seen within fundamental viewsheds. For purposes of §106, the determination of effect would be adverse effect. Reconstruction of a structure, building, or landscape in accordance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* and *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guideline for the Treatment of Historic Landscapes* would be beneficial. For purposes of §106, the determination of effect would be no adverse effect.
- Duration:** Short-term effects would last during construction of a facility, typically from 1-2 months. Long-term effects would be anything beyond the construction of a facility through the life of the facility, including maintenance activities.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis. Under this alternative, a WCF may be proposed within the APE, for any of the park's historic properties and cultural landscapes. The APE for Yellowstone's historic properties is the property and its setting, which in Yellowstone is the entire viewshed or "seen area" from the property. Proponents would be required to comply with the siting and design guidelines established in this document, which are common to all alternatives. The intent of these guidelines is to ensure the WCF is not discernable as a WCF from or within most portions of any historic properties and their settings. The guidelines also ensure contributing features, patterns, and settings of historic properties are not adversely affected. Proponents would also be required to comply with NEPA, Section 106 consultation with SHPOs, and other referenced laws, policies, executive orders, and guidelines, including *The Secretary of the Interior Standards for the Treatment of Historic Properties*; both with and without the *Guidelines for the Treatment of Cultural Landscapes*. Therefore, this alternative has the potential to have long-term, minor adverse impacts to one or more of the park's historic properties and cultural landscapes. The application process outlined for the WCF siting and design criteria under alternative A would have no adverse effect on historic resources.

Cumulative Impacts. Past, present, and future actions that affect the same historic properties and their APE include the previous WCF antennae installations on Mt. Washburn Lookout, the cell tower at Elk Plaza, the lattice tower near the junction of Fishing Bridge Road with the Grand Loop Road, and the Old Faithful cell tower. Under the intensity level definitions of this document, these past actions would be considered overall as long-term, minor, and adverse. These past actions, in combination with the proposed actions under this alternative (which are guided by the siting and design criteria), would result in a long-term, minor adverse impact.

Conclusion. Due to the potential siting of new WCFs, which would follow the siting and design criteria established in this document, Alternative A would have long-term, minor adverse impacts (no adverse effect under Section 106) on historic resources. Because there would be no major, adverse impacts to historic resources whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource under Alternative A. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE B: REDUCTION IN WIRELESS SERVICES

Analysis. Under this alternative, essential life/health/safety wireless services would be provided, including NPS radio, land-line phone, and cell service at Gardiner-Mammoth. Because of this reduction of existing WCFs in the park, including the existing cell tower that is partially visible from Old Faithful Historic District and the alterations to the potentially eligible Mt. Washburn Lookout, these actions would be defined as "preservation" and "restoration" under *The Secretary of the Interior Standards for the Treatment of Historic Properties*. Therefore this alternative would have a long-term, moderate beneficial impact on the park's historic properties and cultural landscapes.

Cumulative Impacts. Past, present, and future actions that affect the same historic properties and their APE include reduction in height of WCFs near historic properties at Old Faithful removal of some equipment on Mt. Washburn Lookout. These actions to historic properties are considered "preservation and restoration" treatments. Therefore the cumulative impacts would be long-term, moderate beneficial. Under Section 106, this would be considered no adverse effect.

Conclusion. This alternative improves previous impacts to historic properties and cultural landscapes for some of the park's historic properties and WCF alterations on a potentially eligible structure (Mt. Washburn Lookout) would be removed. Impacts would be long-term, moderate beneficial; which is no adverse effect under Section 106. Because there would be no major, adverse impacts to historic resources whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing

legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource under Alternative B. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE C: LIMITED INCREASE IN WIRELESS SERVICES (PREFERRED ALTERNATIVE)

Analysis. Under this alternative, cell service and WCF infrastructure would be allowed at the Lake developed area by the siting of a cell tower at one of two sites: near the existing lattice tower just northwest of the Fishing Bridge road junction near the wastewater treatment facility, or at the existing water tank site near the administrative area. During summer 2007, both areas were field checked for visibility from the Lake Hotel Historic District, the Lake Fish Hatchery Historic District, Fishing Bridge Historic District, East Entrance Road Historic District, and the Grand Loop Road Historic District. The existing facilities at these locations are currently not noticeable or detectable from these historic properties due to the landforms and vegetation that screen them. It is assumed that cell towers placed in the same locations (following the siting and design criteria established in this document) would also not be visible from these historic properties. The existing lattice tower just northwest of the Fishing Bridge road junction is screened by vegetation and that screen is susceptible to fire. Therefore, this action would have a long-term, minor adverse impact on these historic properties and cultural landscapes. In terms of Section 106, this would be a no adverse effect.

Cell service would also be improved at Canyon and Tower-Roosevelt due to upgrading of the existing facilities on Mt. Washburn. The cellular WCF at Bunsen Peak would be relocated to Elk Plaza. Bunsen Peak and Mt. Washburn are to some extent, visible from the Grand Loop Road Historic District. Improvements to the appearance of these mountain peaks would be slightly beneficial to the setting of the Grand Loop Road. The Mt. Washburn Lookout would have previous WCF alterations relocated away from the lookout to an area adjacent to the structure. There would be an improvement of previous visual impacts due the removal of equipment from the lookout structure. This would be a long-term moderate beneficial impact. The new tower would follow the siting and design guidelines. Therefore, this action would have a long-term minor adverse impact to historic properties.

The existing cell tower at Old Faithful would be relocated to an area near the existing water treatment plant. During summer 2007, this area was field checked for visibility from the Old Faithful Historic District and the Grand Loop Road. From several vantage points, a tower at this location would not be visible from these historic properties due to distance and existing natural topographic and vegetative screening (Figs. 16 and 17). The construction of this cell tower would follow the siting and design criteria established in this document to ensure it is camouflaged, as well as *The Secretary of the Interior Standards for the Treatment of Historic Properties*; with and without the *Guidelines for the Treatment of Cultural Landscapes*. Therefore this action would have a minor adverse impact to these historic properties. In terms of Section 106, this would be considered no adverse effect.

Cumulative Impacts. Past, present, and future actions that affect the same historic properties and their APE include the improvement of previous impacts to historic properties at Old Faithful and Mt. Washburn Lookout, and improvement to the setting provided by relocating the Bunsen Peak tower to Elk Plaza and the equipment from the Mt. Washburn Lookout to an adjacent area. These proposed actions would be classified as "restoration" as defined by *The Secretary of the Interior Standards*. The new WCFs proposed for these areas would be camouflaged and not discernable; following the siting and design guidelines. The combination of past, previous and future actions would result in a long term, minor adverse and beneficial impacts. Under Section 106, this would be considered no adverse effect.

Conclusion. This alternative improves the setting affected by the previous WCF installations with only a long-term, minor adverse impact for proposed replacement WCFs. It provides for cell phone

service at the Lake developed area without affecting historic properties greater than a long-term, minor adverse impact. It would follow the siting and design guidelines established in this document. It would improve the integrity and condition of the Mt. Washburn Lookout, which would be a long-term, minor beneficial impact. Since the WCF relocation of equipment from Mt. Washburn Lookout to an adjacent area would be sited using the siting and design guidelines, there would be long-term, minor adverse impact. Therefore, the potential impact for this alternative would be long-term, minor adverse, which is no adverse effect under Section 106. Because there would be no major, adverse impacts to historic resources whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource under alternative C. Implementation of this alternative would not result in any unacceptable impacts and is consistent with § 1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE D: SUBSTANTIAL INCREASE IN WIRELESS SERVICES

Analysis. This alternative proposes the actions outlined in Alternative C, with the addition of cell service on park Entrance Roads and Grand Loop Road, and at smaller campground developed areas. The cell tower at the Old Faithful developed area would remain at its existing location but would be camouflaged when feasible. Therefore, for those aspects of Alternative D that are the same as Alternative C, the impacts to historic properties and cultural landscapes would all be the same.

For additional cell service and WCF infrastructure in Alternative D, impacts have been analyzed. Cell service would be allowed in park campgrounds with more than 100 sites: Madison, Norris, Bridge Bay, Tower, and Fishing Bridge campgrounds. This would be accomplished through construction of new WCFs that would serve those locations. An additional tower may be needed to provide for cell coverage at the Bridge Bay Campground. Although none of these campgrounds are historic properties, they are adjacent to historic properties and National Historic Landmarks (NHLs) and may be within their APE. The Grand Loop Road Historic District would be within the APE of these proposed actions. It is not fully known how or where WCFs would provide cell coverage for these roads and campgrounds. However, by following and complying with the siting and design guidelines of this document, this alternative would have a long-term, moderate adverse impact due to the potential affect to NHLs, Historic Properties and Cultural Landscapes..

Cell coverage would be provided along major roads using antennas on existing power line poles and/or additional cell towers. The Grand Loop Road Historic District encompasses most of the road system in the park and passes through or within the APE of many park historic properties, including some NHLs and historic districts. The APE for the road historic district is the viewshed seen from the road as well as the district itself. It is reasonable to assume that a large network of antenna sites with associated equipment would be needed to provide the cellular coverage proposed for this alternative. This large network would increase the likelihood of adverse affect on NHLs or other historic properties. Therefore, the impact of this action is long-term, moderate and adverse. Under Section 106, this would be considered an adverse effect.

Cumulative Impacts. Past, present, and future actions that affect the same historic properties and their APE include the improvement of previous impacts to historic properties at Old Faithful, and improvement to the setting provided by relocating the Bunsen Peak tower to Elk Plaza and the equipment from the Mt. Washburn Lookout to an adjacent area. These proposed actions would be classified as "restoration" as defined by the Secretary of the Interior Standards. Therefore the cumulative impacts would be long-term, moderate beneficial impacts. The new WCFs proposed for these areas would be camouflaged and not discernable; following the siting and design guidelines. Therefore, the combination of past and proposed future actions would result in a long-term, moderate adverse impact. Under Section 106, this would be considered an adverse effect.

Conclusion. The use of best technologies for the actions proposed in this alternative would be required, and the siting and design guidelines established in this document and *The Secretary of the*

Interior Standards for the Treatment of Historic Properties; with and without the *Guidelines for the Treatment of Cultural Landscapes* would be followed. However, because continuous coverage along the Grand Loop Road and Entrance Roads Historic Districts and adjacent historic properties, and the additional WCFs required throughout the park road system and near minor and major park developments and campgrounds would be near park NHLs, historic districts and properties, the overall impact for this alternative would be long-term, moderate adverse which is an adverse effect under Section 106. Because there would be no major, adverse impacts to historic resources whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource under Alternative D. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

SOCIAL RESOURCES

Health and Human Safety

Guiding Regulations and Policies

The National Park Service is concerned about the safety of visitors to its parks and will work with project proposals to enhance visitor safety as long as proposals do not result in a derogation of NPS resources or conflict with the current or planned use of NPS property (NPS 2006).

The *NPS Management Policies* state that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks. The policies also state, "While recognizing that there are limitations on its capability to totally eliminate all hazards, the National Park Service and its concessionaires, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees" (sec. 8.2.5.1). Further, the NPS will strive to protect human life and provide for injury-free visits (sec. 8.2.5).

Methodology and Assumptions

The analysis of human health and safety considered the effects of exposure to radio frequency (RF) radiation from WCFs, the ability of cell phone users to reach emergency services, and the potential for automobile accidents related to cell phone use while driving.

The exposure to RF emissions from telecommunication facilities is an issue of concern for this WCS plan/EA. Under 47 CFR 1.1310, Part I, Radio frequency Radiation Exposure Limits are set which are based on the commonly accepted guidelines published by the Institute of Electrical and Electronics Engineers, Inc. and adopted by the American National Standards Institute (IEEE/ANSI) C95.1 – 1992 Standards. The FCC has adopted these standards as regulations and has established guidelines for evaluating compliance with them for human exposure to RF electromagnetic fields. Under all stated alternatives, it is the goals of this WCS plan to require and enforce all WCFs in Yellowstone National Park to meet or exceed RF related regulations and guidelines.

The IEEE/ANSI guidelines distinguish RF exposure into two distinct categories: Occupational/Controlled and General Population/Uncontrolled. Occupational/Controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure. General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure. The WCS Plan is committed to all future WCFs meeting both standards.

These guidelines are based on Maximum Permissible Exposure (MPE) limits, which factor in RF frequency, electric field strength, magnetic field strength, power density and average time of exposure using a complex formula to calculate an MPE limit. This limit varies between occupational and general populations, with occupational generally being more restrictive due to the higher probability of cumulative exposure effects on workers. The details of MPE limits are readily available from IEEE/ANSI and are best interpreted by an RF Engineer or Occupational Health Specialist before being applied to field applications. However, generally exposure to higher frequency equipment is worse than the same exposure to lower frequency equipment.

Approximate frequency ranges for common and existing WCF equipment in Yellowstone are listed in Table 4.

Table 4- Frequency Ranges for Common Equipment

Frequency Range	Type of Equipment
150-174 MHZ	2 Way Radio, UHF (Includes NPS Radio)
400-450 MHZ	2 Way Radio, (Includes NPS Radio)
800-900 MHZ	Cellular
1,200 MHZ, 2,400 MHZ & 5,400 MHZ	WiFi
1,430 MHZ & 12,180 MHZ	Satellite Internet
11,200 MHZ, 2,000 MHZ, 1,200 MHZ	Commercial phone / data backbone (Qwest)

Applications for WCFs in the park must be in compliance with RF regulations and would be evaluated through the required NEPA process. It would be required that all new proponents for WCFs in Yellowstone would meet the IEEE/ANSI-RF safety standards and any existing WCFs that currently do not meet these standards would be brought up to these standards by exiting operators under all alternatives of the WCS plan/EA. The impacts from RF emissions were determined using data collected on the existing facilities, and the assumption that all proponents would be compliant with these standards.

Impacts to cell phone users' abilities to connect with emergency services were determined by evaluating where coverage is currently provided and determining how each of the alternatives would change coverage. Greater coverage is assumed to provide better access to 911 emergency services.

Impacts from automobile accidents involving the use of cell phones were analyzed quantitatively based on existing traffic accident data. Accident data from 1975 through 2007 were analyzed to determine whether automobile accidents in the park increased, decreased, or remained stable following the installation of existing cell phone towers at Mt. Washburn (1997), Bunsen Peak/Elk Plaza (2000), Old Faithful (2001), and Grant Village (2001). This analysis shows that the number of auto accidents is highly correlated with the number of park visitors and has remained relatively stable at around 200 accidents per million visitors every year since 1975 (Obernesser and Gunther, unpublished data); thus, the impact of current cell phone coverage along roads on the number of auto accidents in the park is undetectable.

We also analyzed the number of wildlife strikes by vehicles, including large (>30 pounds) and mid-size (<30 pounds) mammals, based on existing data. Wildlife strike data for the park were analyzed to determine whether auto accidents within the areas of cell phone coverage increased, decreased, or remained stable following the installation of existing cell phone towers at Mt. Washburn (1997), Bunsen Peak/Elk Plaza (2000), Old Faithful (2001), and Grant Village (2001). The results of this analysis are as follows:

Mt. Washburn	Mean annual wildlife strikes pre-installation: 12.9 coverage area
	Mean annual wildlife strikes post-installation: 9.1

Bunsen/Elk Plaza	Mean annual wildlife strikes pre-installation: 8.6 coverage area Mean annual wildlife strikes post-installation: 7.4
Old Faithful	Mean annual wildlife strikes pre-installation: 2.0 coverage area Mean annual wildlife strikes post-installation: 1.3
Grant Village	Mean annual wildlife strikes pre-installation: 8.5 coverage area Mean annual wildlife strikes post-installation: 7.0

While other factors may be involved, there is no indication that under current cellular coverage, vehicular accidents or wildlife strikes has increased. The results of this analysis show that the number of wildlife strikes within the areas of cell phone coverage along roads in the park has remained stable before and after cell towers were installed (Gunther, unpublished data); thus the impact of current cell coverage on the number of wildlife strikes by vehicles is undetectable.

Intensity Level Definitions

The impact intensities for visitor safety are as follows.

- Negligible:** The impact to visitor or park staff safety would not be measurable or perceptible.
- Minor:** The impact to visitor or park staff safety would be measurable or perceptible, but it would be limited to a relatively small number of individuals at localized areas.
- Moderate:** The impact to visitor or park staff safety would be measurable and perceptible and would involve a large number of individuals in many areas of the park. Automobile Accidents rates would change slightly, many visitors would have the potential to be exposed to radio frequency levels above MPE, and a large number of visitors and staff would have either additional or reduced 911 cell phone coverage.
- Major:** The impact to visitor or park staff safety would be substantial. Accident rates in areas usually limited to low accident potential would be expected to substantially increase in the short- and long-term and impacts to the safety of individuals would be readily apparent throughout the park.
- Duration:** Short-term impacts would last during facility construction, typically less than 1-2 months. Long-term impacts would occur throughout the life of the facility, taking into consideration operation and maintenance of the facility.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis. Under the no-action alternative, and in accordance with the processes set out in Reference Manual 53 and this plan for the evaluation of WCF applications, all applications for new facilities would be evaluated for radio frequency emissions. All new facilities would need to meet all applicable standards related to radio frequency emissions in order to be considered within the park and there would be negligible impacts to visitor or employee safety from radio frequency emissions. The existing microwave dish on Mt. Washburn could, since it is not within a fenced compound, result in exposure above MPE limits, resulting in a long-term, minor adverse impact.

Consideration of future WCFs in the park could allow for more areas of the park to have cellular coverage than is currently the case if applications were approved on a case-by-case basis. All developed areas and campgrounds could eventually have cell phone coverage. Currently,

approximately 35% of the major park roads have cell phone coverage. Under Alternative A, cell phone coverage might, if applications were approved on a case-by-case basis after NEPA review, increase to 100% of park roads. Additional coverage would provide long-term moderate beneficial impacts as park visitors and park staff would have cellular coverage in more areas of the park, increasing the ability to make the necessary contacts during an emergency.

Although the increased ability to use cell phones in Yellowstone may provide benefits, it also has the potential to create an increase in accidents as the ability to use these phones would distract drivers. Even with a hands-free device, drivers could still be distracted while using a phone and driving. The analysis of accident data show empirically that neither the number of accidents nor the number of vehicle wildlife strikes has risen since existing cell phone towers were installed between 1997–2001. Although some studies have shown that use of a cell phone can increase the risk of collision up to four times, further research has shown that these numbers may be overstated and that banning cell phones would not result in a statistically significant reduction in auto accidents (Redelmeier and Tibsharani 1997, Hahn and Prieger 2006). Based on analysis of Yellowstone accident and wildlife strike data, and consistent with the results of these studies, it would be expected that a large increase in the ability of drivers to use cell phones while driving could have long-term minor adverse impacts on the number of accidents related to cell phone use while driving.

Cumulative Impacts. Past, current, and reasonably foreseeable future actions that could contribute to cumulative impacts under the no-action alternative include any roadway improvements in the park by the Western Lands Federal Highways Program (WLFHP) in conjunction with the park, which could be expected to provide beneficial impacts to those traveling the roadways; however, the rate of auto accidents has remained stable at around 200 accidents per million visitors since 1975. Since the road improvement program began in 1991, approximately 35% of park roads have been reconstructed. Based on this limited percent of improved roads, after analyzing existing accident data, it is likely that the road improvement program will have a negligible impact on the number of auto accidents in the park. The impacts on human health and safety in the park resulting from these past, present and future actions, in combination with the long-term minor adverse and long-term moderate beneficial impacts under the no-action alternative, would result in long-term minor beneficial impacts to human health and safety.

Conclusion. Under the no-action alternative, combined impacts to human health and safety would be long-term minor beneficial based on increased access to emergency services, but also considering the minor adverse effects from continued potential radio frequency exposure on Mt. Washburn and potential for increased accidents resulting from a large increase in cell phone coverage of roads. Cumulative impacts under the no-action alternative would be long-term, minor, and beneficial.

IMPACTS OF ALTERNATIVE B: REDUCTION IN WIRELESS SERVICES

Analysis. Under Alternative B, the removal of the WCF on Mt. Washburn, and Bunsen Peak would have a long-term minor beneficial effect in reducing radio frequency emissions. The ability of Yellowstone visitors and staff to use cell phones to reach emergency services under Alternative B would be reduced, resulting in a long-term moderate adverse impact to human health and safety.

The reduction of cell phone coverage along the roadways near Old Faithful, Grant Village, Canyon, Tower-Roosevelt, and near Mammoth developed areas would have little potential to reduce the number of auto accidents resulting from distracted drivers as there has been no increase in accidents since cell phone towers were installed in 1997–2001. It is expected that the decrease in the ability of drivers to use cell phones while driving proposed under Alternative B will have negligible impacts on the number of auto accidents related to cell phone use while driving.

Cumulative Impacts. Past, current, and reasonably foreseeable future actions that could contribute to cumulative impacts under Alternative B are similar to the no action alternative. The impacts on

human health and safety in the park resulting from these past, present and future actions, in combination with the long-term minor beneficial impacts from reducing radio frequency exposure and moderate adverse impact from reducing access to emergency services, would result in long-term minor adverse impacts to human health and safety.

Conclusion. Under Alternative B, combined impacts to human health and safety would be long-term, minor, and adverse based on reduced coverage and the ability to reach emergency services, but also considering the long-term minor beneficial impacts from any reduction in potential radio frequency exposure. Cumulative impacts under Alternative B would be long-term, minor, and adverse.

IMPACTS OF ALTERNATIVE C: LIMITED INCREASE IN WIRELESS (PREFERRED ALTERNATIVE)

Analysis. Under the preferred alternative, and in accordance with the processes set out in Reference Manual 53 and this plan for the evaluation of WCF applications, all applications for new facilities would be evaluated for radio frequency (RF) emissions. All new facilities would need to meet all applicable standards related to radio frequency emissions in order to be considered within the park and there would be negligible adverse impacts to visitor or employee safety from radio frequency emissions. In addition, improvements to the Mt. Washburn site would ensure that visitors are not exposed to radio frequency emissions above MPE limits, resulting in long-term, minor beneficial impacts.

The addition of a WCF at the Lake developed area would allow a small increase in the total park area that has cell phone coverage. In addition, improvement at Mt. Washburn would improve cell phone coverage at the Tower-Roosevelt and Canyon developments. Coverage in these areas would provide long-term, minor beneficial impacts as park visitors and park staff would have cellular coverage in more areas of the park, increasing the ability to make the necessary contacts during an emergency.

Due to the minimal increase of cellular coverage to roads under the Preferred Alternative, and since cellular coverage under existing conditions has had no apparent impact on the number of accidents or the number of wildlife strikes, it is expected that this small increase in the ability of drivers to use cell phones while driving would have negligible impacts on the number of accidents related to cell phone use while driving.

Cumulative Impacts. Past, current, and reasonably foreseeable future actions that could contribute to cumulative impacts under the preferred alternative are similar to the no action alternative. The impacts on human health and safety in the park resulting from these past, present and future actions, in combination with the long-term minor beneficial impacts under the preferred alternative, would result in long-term minor beneficial impacts to human health and safety.

Conclusion. Under the preferred alternative, combined impacts to human health and safety would be long-term, minor, and beneficial based on increased coverage and the ability to reach emergency services and a reduction in potential exposure to radio frequency emissions. Cumulative impacts under Alternative C would be long-term, minor, and beneficial.

IMPACTS OF ALTERNATIVE D: SUBSTANTIAL INCREASE IN WIRELESS SERVICES

Analysis. Under Alternative D, and in accordance with the processes set out in Reference Manual 53 and this plan for the evaluation of WCF applications, all applications for new facilities would be evaluated for radio frequency emissions. All new facilities would need to meet all applicable standards related to radio frequency emissions in order to be considered within the park and there would be negligible adverse impacts to visitor or employee safety from radio frequency emissions. In addition, improvements to the Mt. Washburn site would ensure that visitors are not exposed to radio frequency emissions above MPE limits, resulting in a minor beneficial impact.

The addition of a WCF at the Lake developed area, in most park campgrounds, and along road corridors would substantially increase cellular coverage throughout the park. Additional cell phone coverage in these areas would provide long-term moderate beneficial impacts as park visitors and park staff would have increased ability to make the necessary contacts during emergency situations. Although the increased ability to use cell phones in Yellowstone would provide benefits, it would also have the potential to create an increase in auto accidents as the ability to use cell phones would distract drivers similar to the no-action alternative. It is expected that the ability of drivers to use cell phones while driving would have long-term, minor adverse impacts on the number of accidents related to cell phone use while driving.

Cumulative Impacts. Past, current, and reasonably foreseeable future actions that could contribute to cumulative impacts under Alternative D are similar to the no-action alternative. The impacts on human health and safety in the park resulting from these past, present and future actions, in combination with the long-term moderate beneficial impacts under the preferred alternative, would result in long-term moderate beneficial impacts to human health and safety.

Conclusion. Under Alternative D, combined impacts to human health and safety would be long-term moderate and beneficial based on increased coverage and the ability to reach emergency services, and a reduction in potential exposure to radio frequency emissions, but also considering a long-term minor adverse impact from increased use of cell phones while driving. Cumulative impacts under Alternative D would be long-term, moderate, and beneficial.

Park Operations

Methodology and Assumptions

Yellowstone's law enforcement rangers are primarily responsible for providing safety and security for the park's visitors and infrastructure. Visitor safety programs include emergency medical services (1354 ambulance transports and 205 life flights from 2004 to 2007); search and rescue (66 incidents in 2002); structural fire (450 alarms and 10 fires in 2002); and law enforcement. Yellowstone is an area of exclusive federal jurisdiction, meaning that within the boundaries of the park, Yellowstone's law enforcement personnel have the sole authority and responsibility of enforcing both federal and state criminal and civil laws and regulations (NPS 2003).

Other essential park operations include interpretation, maintenance, administration, and resource management. Yellowstone staff manage nine visitor centers, museums, and contact stations; 1,700 administrative buildings, 12 campgrounds with more than 2,150 sites; 466 miles of roads; 15 miles of boardwalk; 1,100 miles of trails with 92 trailheads; and 301 backcountry campsites. Natural and cultural resources include one threatened and endangered species; 412 species of mammals and birds, birds, fish, reptiles and amphibians; over 10,000 hydrothermal features; 1,500 archeological sites; 379,000 cultural objects and natural science specimens; and 5,000,000 items in the park archives. The NPS employs more than 800 people during the peak summer season, and park concessioners employ an additional 3,400 (NPS 2007).

Each application for new, altered or renewal of WCFs in the park comes with an associated administrative workload. Applications must be evaluated and compared with park goals and plans to determine suitability. Once a WCF application is determined to be suitable, it must go through an environmental review analysis which would result in no additional NEPA compliance, if it falls within pre-existing compliance. It would result in requiring a NEPA Categorical Exclusion, Environmental Assessment or Environmental Impact Statement, if potential impacts warrant an assessment. Once that analysis is completed, and depending on the size, location and function of the proposed WCF, a Right-of-Way agreement, Memorandum of Understanding, formal contract or other form of agreement needs to be created in accordance with department policies and regulations, and permit issuance. Finally, the WCF alteration, upgrade or installation work and ongoing maintenance of the equipment, would be monitored by NPS staff.

The commercial telephone system and the NPS two-way radio system are the primary wireless communications methods to support essential law enforcement, public safety, resource management, maintenance, interpretive, and administrative functions. However, park staff uses cell phones, where service is available, as an adjunct to the park radio and commercial telephone systems. NPS staff and partners also use cell phones to conduct routine business. Staff scientists, science partners, and resource managers rely on infrastructure with wireless data transmission to conduct research and resource management in Yellowstone.

Park “management and operations”, for the purpose of this analysis, refers to the quality and effectiveness of park staff to maintain and administer park resources and provide for an effective visitor experience, while at the same time having the support available to conduct other essential park operations. This impact analysis is based on the current description of park operations presented in Chapter Three, *Affected Environment*.

Impacts to ability of staff to perform emergency services and essential operations were determined by evaluating where NPS radio coverage and cell phone coverage is currently provided and determining how each of the alternatives would change coverage. Greater coverage is assumed to provide greater benefits to park operations.

Scientific monitoring equipment using wireless technology to transmit data in real-time has become an essential component of understanding and protecting resources in Yellowstone. Increased ability to use wireless scientific monitoring equipment is assumed to provide greater benefits to park resource operations.

Intensity Level Definitions

The following thresholds for evaluating impacts on park operations and management were defined and applied to beneficial and adverse impacts:

- Negligible:** Park operations would not be impacted or the impact would not have a noticeable or measurable impact on park operations.
- Minor:** Impacts would be detectable and would result in a measurable, but small, change in park operations.
- Moderate:** Impacts would be readily apparent and would result in a substantial adverse or beneficial change in park operations that would be noticeable to staff and the public.
- Major:** Impacts would be readily apparent and would result in a substantial change in park operations that would be noticeable to staff and the public and would be markedly different from existing operations.
- Duration:** Short-term effects would be less than one year. Long-term effects would continue beyond one year.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis. Under the no-action alternative, applications for WCFs would be considered on a case-by-case basis. Replacement or upgrade of WCFs would occur as needed, but no comprehensive plan would guide efforts. In accordance with the processes set out in Reference Manual 53 and this plan for the evaluation of WCF applications, all completed applications for new facilities would be evaluated. Theoretically, there would be no imposed limit on the number of WCFs that could be constructed in the park. However, each facility would be required to complete the NEPA process before construction and implement the siting guidelines.

The NPS two-way radio system could be upgraded as needed, resulting in a long-term, minor, beneficial impact to park operations (approximately 93% of the park is currently covered with the existing two-way radio system).

Consideration of future WCFs in the park would potentially allow for more park developed areas and areas of the park road to have cellular coverage than is currently the case. The park would likely receive applications for additional facilities in areas that currently have coverage by only one or a few providers. Increased coverage in these areas would provide long-term moderate beneficial impacts as park staff would have cellular coverage in more areas of the park, increasing the ability to communicate and perform essential park operations.

The administrative workload associated with this alternative would be determined primarily by the volume and complexity of future WCF applications. Since they are each considered on a case-by-case basis, and there is no specific set of guiding thresholds, there could be a substantial increase in administrative workload as additional applications are considered, suitability determinations are made, environmental analysis is completed, and installations, upgrades and WCF alterations are made. Case by case consideration of applications would have long-term, moderate adverse impacts to NPS administrative workload.

Scientific monitoring devices would be evaluated case-by-case, which could lead to more and different types of scientific monitoring equipment being approved and installed. As this equipment typically is used to gather information to promote and benefit park resources, impacts to park resource operations would be long-term, minor, and beneficial. However, case by case consideration of applications and permitting would have long-term minor, adverse impacts to NPS administrative workload.

Impacts to backcountry operations would be negligible. Cell phone coverage is not expected to be approved for Yellowstone's backcountry because it would interfere with wilderness mandates and NPS policy; however, small backcountry areas are expected to have cell phone coverage as a result of spillover from increased coverage in developed areas.

The no-action alternative would have combined long-term, minor to moderate beneficial impacts on park operations.

Cumulative Impacts. Under the no-action alternative, projects listed in the cumulative scenario in the introduction of this chapter, combined with other past, present, and reasonably foreseeable future actions, would contribute to cumulative impacts to park operations and maintenance. The impacts on park operations resulting from these past, present and future actions, in combination with the long-term minor-to-moderate adverse impacts under the no action alternative, would result in long-term moderate adverse impacts to park operations.

Conclusion. The combined impacts to park operations under the no action alternative are expected to be long-term, minor to moderate, and beneficial. Cumulative impacts to park operations under the no-action alternative would be long-term, moderate, and adverse. Cumulative impacts combined with impacts from the no action alternative would result in long-term minor beneficial impacts to park operations.

IMPACTS OF ALTERNATIVE B: REDUCTION IN WIRELESS SERVICES

Analysis. Under Alternative B, with the removal of WCFs at the Old Faithful and Grant Village developed areas and Mt. Washburn and Bunsen Peak sites, the ability of Yellowstone staff to use cell phones for emergency services and other operations would be reduced, resulting in long-term moderate adverse impacts to park operations.

The NPS two-way radio system would continue to function at its current capabilities. Upgrades for radio improvements would occur as needed; there would be no new installations of WCF repeaters. Long-term, minor, adverse impacts to park operations would occur (approximately 93% of the park is currently covered with the existing two-way radio system).

Scientific monitoring devices would be reduced and focused primarily on life-health safety, resulting in a long-term, minor, adverse impact to park resource operations.

Administrative workload would be reduced in the long run as WCFs are removed from the park and associated maintenance would also be reduced. New applications, when received, would be easier to evaluate and a higher percentage would be rejected due to the more restrictive thresholds established under Alternative B. Rejected WCF applications would not result in workload associated with environmental analysis or formal agreements, resulting in long-term moderate beneficial impacts.

Cell phone coverage would be reduced under Alternative B as spillover into the backcountry would be reduced with the removal of WCFs at the Old Faithful and Grant Village developed areas and Mt. Washburn and Bunsen Peak sites, which would result in long-term, minor adverse impacts on park operations.

Alternative B would have combined long-term, minor to moderate adverse impacts on park operations.

Cumulative Impacts. Cumulative impacts under Alternative B are expected to be similar to the no action alternative, resulting in long-term, moderate adverse impacts to park operations. The impacts on park operations resulting from these past, present and future actions, in combination with the long-term moderate adverse impacts under Alternative B, would result in long-term, minor adverse impacts to park operations.

Conclusion. The combined impacts to park operations under Alternative B are expected to be long-term, moderate, and adverse. Cumulative impacts to park operations under Alternative B would be long-term, moderate, and adverse. Cumulative impacts combined with impacts from Alternative B would result in long-term minor adverse impacts to park operations.

IMPACTS OF ALTERNATIVE C: LIMITED INCREASE IN WIRELESS (PREFERRED ALTERNATIVE)

Analysis. Under the preferred alternative, increased cell phone coverage in the Lake developed area, and the increase in cell phone coverage at both Tower-Roosevelt and Canyon developed areas as a result of changes in the Mt. Washburn cell antennas, would provide long-term minor beneficial impacts as park staff would have cellular coverage in more areas of the park, increasing the ability to communicate and perform essential park operations.

The NPS two-way radio system could be upgraded as needed, resulting in a long-term, minor beneficial impact to park operations (approximately 93% of the park is currently covered with the existing two-way radio system).

Implementation of the proposed Yellowstone volcano monitoring plan, upgrade of the Bechler RAWS, and guidelines for installing new scientific monitoring devices, which could lead to more effective and less intrusive types of scientific monitoring equipment being installed, would result in long-term, minor, and beneficial impacts to park operations.

An increase in administrative workload would occur under Alternative C in both the long and short term. New applications will be considered for WCFs at the Lake developed area and, in the short-term, extensive work could take place at the Bunsen Peak, Elk Plaza and Mt Washburn sites. Each change comes with an associated administrative workload as NPS employees process applications,

alter agreements and oversee work, resulting in long and short term, minor to moderate adverse impacts.

Impacts to backcountry operations would be negligible. The small backcountry areas that currently have spillover cell phone coverage from developed areas would not be expected to change appreciably.

The preferred alternative would have combined long-term, minor beneficial impacts on park operations.

Cumulative Impacts. Cumulative impacts under the preferred alternative are expected to be similar to the no action alternative, resulting in long-term, moderate adverse impacts to park operations. The impacts on park operations resulting from these past, present and future actions, in combination with the long-term minor beneficial impacts under the preferred alternative would result in short- and long-term moderate adverse impacts to park operations.

Conclusion. The combined impacts to park operations under the preferred alternative are expected to be long-term, minor, and beneficial. Cumulative impacts to park operations under the preferred alternative would be long-term, moderate, and adverse. Cumulative impacts combined with impacts from the preferred alternative would result in long-term minor adverse impact to park operations.

IMPACTS OF ALTERNATIVE D: SUBSTANTIAL INCREASE IN WIRELESS SERVICES

Analysis. Under Alternative D, increased cell phone coverage in the Lake developed area, at the Madison, Norris, Bridge Bay, Tower, and Fishing Bridge campgrounds, and along park roads, would result in long-term moderate beneficial impacts as park staff would have cellular coverage in more areas of the park, increasing the ability to communicate and perform essential park operations.

The NPS two-way radio system could be upgraded as needed, resulting in long-term, minor beneficial impacts to park operations (approximately 93% of the park is currently covered with the existing two-way radio system).

Implementation of the proposed Yellowstone volcano monitoring plan, upgrade of several RAWs, and guidelines for installing new scientific monitoring devices, which could lead to more and different types of scientific monitoring equipment being installed, would result in long-term, minor, and beneficial impacts to park operations.

The administrative workload associated with this alternative would be determined primarily by the volume and complexity of future WCF applications. The alternative calls for a substantial increase in WCFs, following a specific set of guiding thresholds, and there could be a substantial increase in administrative workload as additional applications are considered, suitability determinations made, environmental analysis completed, and installations, upgrades and WCF alterations are made. Major increase in wireless services and applications would have long-term moderate adverse impacts to NPS administrative workload.

Addition of WiFi Internet services to most developed areas and campgrounds would result in long-term, minor, beneficial impacts to park operations as law enforcement rangers would have the ability to use computers in emergency services vehicles for background checks and to connect with medical information.

Impacts to the backcountry operations would be negligible. The small backcountry areas that currently have spillover cell phone coverage developed areas would not be expected to change significantly.

Alternative D would have combined long-term, minor to moderate beneficial impacts on park operations.

Cumulative Impacts. Cumulative impacts under Alternative D are expected to be similar to the no action alternative, resulting in long-term, moderate adverse impacts to park operations. The impacts on park operations resulting from these past, present and future actions, in combination with the long-term minor to moderate beneficial impacts under Alternative D, would result in long-term, negligible to minor beneficial impacts to park operations.

Conclusion. The combined impacts to park operations under Alternative D are expected to be long-term, minor to moderate, and beneficial. Cumulative impacts to park operations under Alternative D would be long-term, moderate, and adverse. Cumulative impacts combined with impacts from Alternative D would result in long-term, negligible to minor beneficial impact to park operations.

Visitor Use and Experience

Guiding Regulations and Policies

The *NPS Management Policies 2006* state that enjoyment of park resources and values by the people of the United States is part of the fundamental purpose of all parks and that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks (Section 1.4.3).

Methodology and Assumptions

The purpose of this impact analysis is to determine if the placement of WCFs (including for cell phone coverage, scientific monitoring, NPS two-way radio system, and wireless Internet coverage) in the park is compatible or in conflict with the purpose of the park, its visitor experience goals, and the direction provided by the *NPS Management Policies*. Thus, these policies and goals were integrated into the impact thresholds. To determine impacts, the current and past uses of an area were considered and the potential effects of facility placement on visitor experience analyzed. This analysis is qualitative, as the exact location of potential future WCFs is not known.

The primary impacts analyzed in this section include the impact on visitor experience, both positive and negative, of providing cell phone coverage to park visitors, providing WiFi Internet access to park visitors, installing scientific equipment with a wireless component, and maintaining the NPS two-way radio system. During scoping, both noise and social impacts from cell phone use in geyser basins and wilderness were singled out as important impacts. While impacts to viewsheds from the visual presence of the facility could detract from the visitor experience, these potential impacts are analyzed in the next section, *Visual Quality, including Viewsheds*.

Intensity Level Definitions

The following thresholds for evaluating impacts on visitor experience were defined:

- Negligible:** Visitors would likely be unaware of impacts associated with construction, operation, and maintenance of WCFs, and visitors would be unaffected by the ability to use cell phones or wireless Internet. Visitors would likely be unaware of scientific monitoring equipment. There would be no noticeable change in visitor use and experience or in any defined indicators of visitor satisfaction or behavior.
- Minor:** Changes in visitor use and/or experience would be slight and detectable, but would not appreciably limit or enhance critical characteristics of the visitor experience. Visitor satisfaction would remain stable.
- Moderate:** A few critical characteristics of the existing visitor experience would change, and the number of visitors engaging in a specified activity would be altered. Some visitors

participating in that activity or visitor experience might be required to pursue their choices in other available local or regional areas. Visitor satisfaction at the park would begin to either decline or increase.

Major: A number of critical characteristics of the existing visitor experience would change and/or the number of participants engaging in an activity would be greatly reduced or increased. Large numbers of visitors overall who desire to continue using and enjoying that activity or visitor experience would be required to pursue their choices in other available local or regional areas. Overall visitor satisfaction would markedly decline or increase.

Duration: Short-term impacts would last during facility construction, typically one to two months. Long-term impacts would occur throughout the life of the facility, taking into consideration operation and maintenance of the facility.

IMPACTS OF ALTERNATIVE A: NO ACTION

Analysis. Under the no-action alternative, applications for WCFs would be considered within any portion of Yellowstone National Park on a case-by-case basis. Replacement or upgrade of WCFs would occur as needed, but no comprehensive plan would guide efforts. Theoretically, there would be no imposed limit on the number of WCFs that could be constructed in the park. However, each facility would be required to complete the NEPA process and follow siting guidelines before construction.

For those visitors that feel cellular service and wireless Internet service enhances their experience, impacts would be long-term, minor to moderate beneficial as they enjoy existing and possibly increasing cell phone coverage and wireless Internet connections as an important enhancement of their visitor experience. For those visitors that feel cellular service and wireless Internet service detract from their experience, impacts would be long-term, minor to moderate, and adverse as the noise/social impact from wireless devices could create a noticeable impact to visitor experience that causes a change in visitor satisfaction. Some visitors might choose to pursue their activities in other available local or regional areas; these impacts will likely be most noticeable in geyser basins/boardwalks and in the lobbies of historic hotels. Impacts to visitor experience from scientific resource monitoring and implementation of the NPS two-way radio system would be negligible. Most visitors will be unaware that wireless monitoring devices are installed. There would be no noticeable change in visitor use and experience due to scientific monitoring devices. Impacts to the backcountry, or wilderness visitor experience, where solitude and natural sounds are more expected, would be negligible. Cell phone coverage is not expected to be approved for Yellowstone's backcountry because it would interfere with wilderness mandates and NPS policy; however, small backcountry areas are expected to have cell phone coverage as a result of spillover from coverage in developed areas. Alternative A would have a long-term, minor to moderate effect, both beneficial and adverse, on visitor use and experience.

Cumulative Impacts. Past, present, and reasonably foreseeable actions occurring within the park could include an increase in cell phone service in developed areas, campgrounds, and along roads; it is unlikely that WCFs to provide cell phone coverage or wireless Internet connections would be installed in recommended wilderness because these sites and services would conflict with wilderness mandates and NPS policy. The cumulative effects of this alternative coupled with other actions would result in long-term minor to moderate adverse and beneficial cumulative impacts to visitor use and experience.

Conclusion. Under the no action alternative, there would be long-term, minor to moderate adverse and beneficial impacts as various user groups are impacted differently from the presence and use of WCFs in various areas of Yellowstone National Park. Cumulative impacts under the no-action alternative would be long-term, minor to moderate, adverse and beneficial.

IMPACTS OF ALTERNATIVE B: REDUCTION IN WIRELESS SERVICES

Analysis. Essential wireless services for life, health, and safety would be provided, and the number of WCFs would be reduced in the park. Cell phone service would be removed at Old Faithful, Grant Village, Canyon, and Tower-Roosevelt developed areas. Cell phone service would remain in the Gardiner-Mammoth area. Cell phone antennas would be removed from Bunsen Peak and added to Elk Plaza. All equipment and the power transmission line to the summit of Bunsen Peak would be removed, with the exception of the passive reflector which will remain necessary for commercial phone and data service.

For those visitors that feel cellular service and wireless Internet service enhances their experience, impacts would be long-term, minor to moderate and adverse with a reduction of cell phone coverage and wireless Internet connections, which are an important part of their visitor experience. For those visitors that feel cellular service and wireless Internet service detract from their experience, impacts would be long-term, minor to moderate and beneficial as the noise/social impact from wireless devices would be reduced. Some visitors might choose to pursue their activities in other available local or regional areas. Impacts to visitor experience from scientific resource monitoring and implementation of the NPS two-way radio system would be negligible. Under this alternative, a reduction in scientific monitoring equipment is proposed. Most visitors would be unaware that wireless resource monitoring devices are installed. Impacts to the backcountry, or wilderness visitor experience, where solitude and natural sounds are more expected, would be minor beneficial. Cell phone coverage is not proposed for Yellowstone's backcountry and most of the existing "spillover" from coverage in developed areas would be eliminated as WCFs for cell coverage are removed from most areas. Alternative B would have a long-term, minor to moderate effect, both beneficial and adverse, on overall visitor use and experience.

Cumulative Impacts. Past, present, and reasonably foreseeable actions occurring within the park would include a decrease in cell phone service in developed areas, campgrounds, and along roads and a decrease in wireless spillover coverage into recommended wilderness. The cumulative effects of this alternative coupled with other actions would result in long-term, minor to moderate adverse and beneficial cumulative impacts to visitor use and experience.

Conclusion. Under Alternative B, there would be long-term, minor to moderate adverse and beneficial impacts as various user groups are impacted differently from the presence and use of WCFs in various areas of Yellowstone National Park. Cumulative impacts under the no-action alternative would be long-term, minor to moderate, adverse and beneficial.

IMPACTS OF ALTERNATIVE C: LIMITED INCREASE IN WIRELESS (PREFERRED ALTERNATIVE)

Analysis. A limited increase in wireless service would likely occur because applications for new WCFs would be considered for the Lake developed area using temporary or permanent infrastructure and equipment. In addition, wireless Internet access would be available to visitors in many hotels and stores throughout the park. There would be a slight increase in scientific monitoring equipment throughout the park.

For those visitors that feel cellular service and wireless Internet service enhance their experience, impacts would be long-term, minor to moderate and beneficial as they enjoy increased cell phone coverage and wireless Internet connections as an important part of their visitor experience. For those visitors that feel cellular service and wireless Internet service detract from their experience, impacts would be long-term, minor to moderate and adverse as the noise/social impact from wireless devices, including the new use of cell phones in the Lake area, could create a noticeable impact to visitor use that causes a change in visitor satisfaction. Some visitors might choose to pursue their activities in other available local or regional areas; these impacts will likely be most noticeable in geyser basins/boardwalks and in the lobbies of historic hotels. Impacts to visitor experience from scientific

resource monitoring and implementation of the NPS two-way radio system would be negligible. Impacts to the backcountry, or wilderness visitor experience, where solitude and natural sounds are more expected, would be negligible. Cell phone coverage is not proposed for Yellowstone's backcountry because it would interfere with wilderness mandates and NPS policy; the backcountry areas that have cell phone coverage as a result of "spillover" from coverage in developed areas will not increase appreciably over current conditions. Overall, Alternative C would have a long-term, minor-to-moderate effect, both beneficial and adverse, on overall visitor use and experience.

Cumulative Impacts. Past, present, and reasonably foreseeable actions occurring within the park would include an increase in cell phone service in the Lake area and the availability of wireless Internet to visitors in several major developed areas. Cell phone service and wireless Internet connections are not expected to be available in campgrounds, along roads, or in the park's recommended wilderness, except as minimal spillover from approved, developed area coverage. The cumulative effects of this alternative coupled with other actions would result in long-term, minor to moderate adverse and beneficial cumulative impacts to visitor use and experience.

Conclusion. Under the preferred alternative, there would be long-term, minor to moderate adverse and beneficial impacts as various user groups are impacted differently from the presence and use of WCFs in various areas of Yellowstone National Park. Cumulative impacts under the no action alternative would be long-term, minor to moderate, adverse and beneficial.

IMPACTS OF ALTERNATIVE D: SUBSTANTIAL INCREASE IN WIRELESS SERVICES

Analysis. A substantial increase in wireless service would likely occur because applications for new WCFs would be considered for the Lake developed area using temporary or permanent infrastructure and equipment. Also, new applications would be considered for WCFs that provide seasonal cell coverage at the Norris, Madison, Bridge Bay, Tower, and Fishing Bridge campgrounds through construction of new facilities. This alternative would provide for cell coverage along major roads using antennas on existing power line poles and/or additional cell towers. Visitors would have access to wireless Internet throughout most developed areas when proposed WiMax (area wide WiFi coverage) access is installed. There would be a slight increase in scientific monitoring equipment, including new gauging stations installed on the upper Yellowstone River and the Bechler River.

For those visitors who feel that cellular service and wireless Internet service enhances their experience, impacts would be long-term, moderate and beneficial as they enjoy increased cell phone coverage and wireless Internet connections as an important part of their visitor experience. For those visitors that feel cellular service and wireless Internet service detract from their experience, impacts would be long-term, moderate and adverse as the noise/social impact from wireless devices could create a noticeable impact to visitor use that causes a change in visitor satisfaction. With increasing coverage for cell phones along major park roads, campgrounds, and developments, and with area-wide coverage of wireless Internet available to visitors in developed areas, some visitors choose to pursue their activities in other available local or regional areas; these impacts will likely be most noticeable in geyser basins/boardwalks, along nature trails, and in the lobbies of historic hotels. Impacts to visitor experience from implementation of the NPS two-way radio system would be negligible. Impacts to visitor experience from scientific resource monitoring would be long-term, minor, and adverse as the new gauging stations installed along the upper Yellowstone and Bechler rivers could be noticed and impact visitors, especially since backcountry visitors expect to encounter primarily natural sights and sounds. Alternative D would have long-term, moderate effects, both beneficial and adverse, on overall visitor use and experience.

Cumulative Impacts. Past, present, and reasonably foreseeable actions occurring within the park would include an increase in cell phone service in developed areas, campgrounds, and along roads; WCFs to provide cell phone coverage or wireless Internet connections will not be installed in recommended wilderness because these sites and services would conflict with wilderness mandates and NPS policy; however, new scientific monitoring equipment will be installed in recommended

wilderness, and gauging stations on the upper Yellowstone and Bechler rivers will be visible from high-use trails. The cumulative effects of this alternative coupled with other actions would result in long-term, minor to moderate, adverse and beneficial cumulative impacts to visitor use and experience.

Conclusion. Under Alternative D, there would be long-term, minor to moderate adverse and beneficial impacts as various user groups are impacted differently from the presence and use of WCFs in various areas of Yellowstone National Park. Cumulative impacts under Alternative D would be long-term, minor to moderate, adverse and beneficial.

Visual Quality including Viewsheds

Guiding Regulations and Policies

Reference Manual 53 guides action on proposals for wireless telecommunication sites. NPS Management Policies (2006) consider scenic views and visual quality as highly valued characteristics.

Methodology and Assumptions

Scenic preservation and views has been very important to national parks for many reasons. During the early 20th century, after Yellowstone was already a park, there were many pressures to treat the parks like the national forests. Scenery became a more deliberate part of legislation and policy. It is in the 1916 mandate, and in later policies stated that constructing roads, trail, buildings and other improvements, particular attention must be devoted to the harmonizing of these improvements with the landscape.

Analyses of the potential intensity of impacts to the visual quality of the landscape were derived from the available information on viewsheds and from the park staff's observations of the effects on visual quality from previous infrastructure installations, rights of way and construction activities. Adverse effects are defined as any human-made feature that occurs within the park's natural vistas. It is possible that exemplary architecture acceptable in these vistas (e.g. the Madison Museum, the Old Faithful Inn, etc.) would enhance visual quality. Proponents would follow the guidelines for siting communication installations recommended in this document so that the installation harmonizes with or blends into the landscape to the greatest extent possible.

Intensity Level Definitions

The magnitude of effect is then based on the number of park visitors that will view the effect, the amount of time their view would be affected and the number of locations where the vista would be affected. The following thresholds were used to describe the magnitude of effects on visual resources:

Negligible	Impacts to the visual quality of the landscape are barely detectable, and/or will affect very few visitors.
Minor	Impacts to the visual quality of the landscape would be slight but detectable, visible to a relatively small number of visitors and confined to a small portion of the surrounding area.
Moderate	Impacts to the visual quality of the landscape would be readily apparent and/or will affect many visitors, but would not preclude enjoyment of adjacent views by a majority of the visitors. Visitors would likely be able to express an opinion about the impacts.
Major	Impacts to the visual quality of the landscape would be significantly adverse, affect a majority of visitors or affect a large portion or all of the surrounding area. Visitors would likely express a strong opinion about the impacts.

Duration: Short-term effects would be less than one year. Long-term effects would continue beyond one year.

IMPACTS OF ALTERNATIVE A: NO-ACTION ALTERNATIVE

Analysis. Under the no action alternative, no plan would be formally adopted to guide wireless communication in Yellowstone National Park and new proposals for WCFs would be evaluated on a case-by-case basis. There would be few limitations on what type of systems might be implemented in the park.

Because there would be no WCS plan and siting guidelines established for WCFs, impacts from proposed WCF service an infrastructure would have long-term, minor to moderate adverse impacts to visual quality; for example, the cell tower at Old Faithful would be visible from a wide range of vantage points and would continue to impact scenic resources. In addition, hikers to the summits of Mt. Washburn and Bunsen Peak would continue to see an assortment of WCF clutter relating adversely impacting their backcountry experience. Additional WCFs that might be approved on a case-by-case basis in the future would result in long-term, moderate, adverse impacts to visual quality.

Cumulative Impacts. Past, present, and reasonably foreseeable actions occurring within and near the park would include an increase in WCFs in gateway communities, highways, residential developments, and some mountaintops, resulting in a long-term, minor adverse impact to visual quality. The cumulative effects of this alternative with other actions would result in long-term moderate adverse cumulative impacts to the park's visual quality and viewsheds.

Conclusion. Under the no action alternative, there would be long-term, moderate adverse impacts to visual quality and viewsheds. Cumulative impacts under the no-action alternative would be long-term, moderate, and adverse. Because there would be no major, adverse impacts to visual quality and viewsheds whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of Alternative A would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE B: REDUCTION IN WIRELESS SERVICES

Analysis. Implementing Alternative B would reduce existing impacts to visual quality. Cellular communication infrastructure would be removed from the Old Faithful, Mt. Washburn, and Grant areas. Cell phone antennas would be relocated from Bunsen Peak to Elk Plaza. All equipment and the power transmission line to the summit of Bunsen Peak would be removed, with the exception of the passive reflector. This action would eliminate a portion of the existing man-made features from the landscapes in those locations. This alternative would result in long-term, moderate, beneficial impacts to visual quality and viewsheds.

Cumulative Effects. Past, present, and reasonably foreseeable actions occurring within and near the park would be similar to the no action alternative. The cumulative effects of this alternative with other actions would result in long-term minor beneficial cumulative impacts to the park's visual quality and viewsheds.

Conclusion. Under this alternative, there would be long-term, moderate beneficial impacts to visual quality and viewsheds. Cumulative impacts under Alternative B would be long-term, minor, and beneficial. Because there would be no major, adverse impacts to visual quality and viewsheds whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning

documents; there would be no impairment to this resource. Implementation of Alternative B would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

IMPACTS OF ALTERNATIVE C: LIMITED INCREASE IN WIRELESS (PREFERRED ALTERNATIVE)

Analysis. Implementing the Preferred Alternative would result in a limited increase of permanent WCF infrastructure in the park and an associated increase in cellular coverage in some areas. A new facility will be constructed somewhere in the Lake area following the guidelines set forth in Chapter Two; impacts from this additional WCF would be long-term, negligible to minor and adverse, affecting a small number of visitors in only a few locations.

The existing cell tower at Old Faithful would be relocated to a site near the water treatment plant when it is feasible. A viewshed analysis (figs. 16 and 17) has shown that the visibility of the tower could be reduced from 78 percent to 59 percent within the area that most visitors frequent. The removal of obsolete equipment from the top of Bunsen Peak and the relocation of cellular equipment to Elk Plaza will make a slight improvement to the area viewshed. Similarly, the relocation of antennas from the fire lookout on Mt. Washburn to a nearby stand alone tower will slightly improve the viewshed. Relocation and removal of wireless infrastructure would result in long-term, minor to moderate, beneficial impacts.

Under the Preferred Alternative, new research monitoring sites would be installed in the park. These structures will be located so that they are unlikely to be seen by hikers on maintained trails. The installation of this equipment would result in a long-term, negligible to minor adverse impact on visual quality.

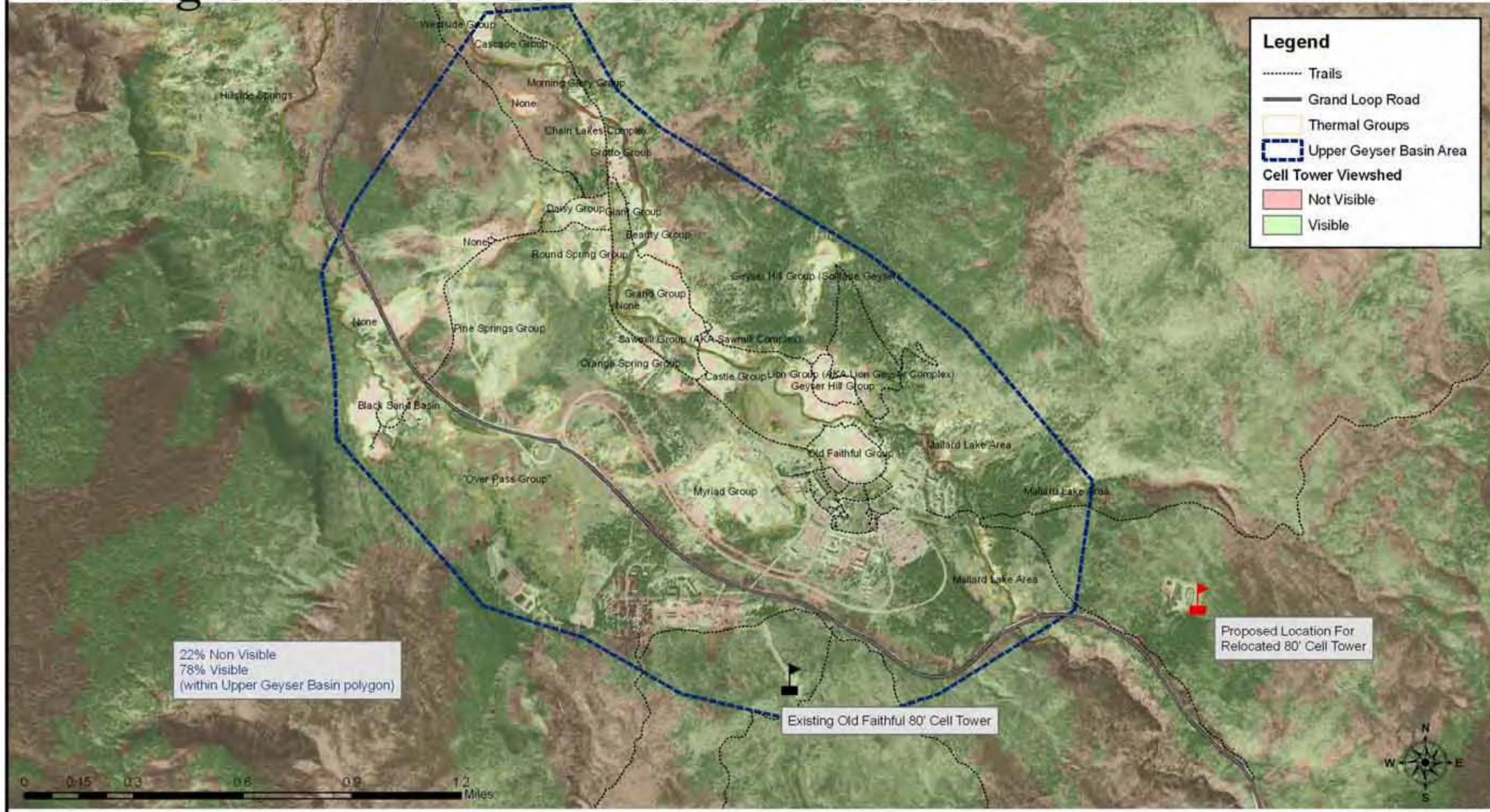
The combined impacts from the Preferred Alternative would be long-term, minor, and beneficial.

Cumulative Effects. Past, present, and reasonably foreseeable actions occurring within and near the park would be similar to the no action alternative. The cumulative effects of this alternative with other actions would result in long-term minor beneficial cumulative impacts to the park's visual quality and viewsheds.

Conclusion. Under this alternative, there would be long-term, minor beneficial impacts to visual quality and viewsheds. Cumulative impacts under the Preferred Alternative would be long-term, minor, and beneficial. Because there would be no major, adverse impacts to visual quality and viewsheds whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of Alternative C would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).



Existing Old Faithful Cell Tower Viewshed



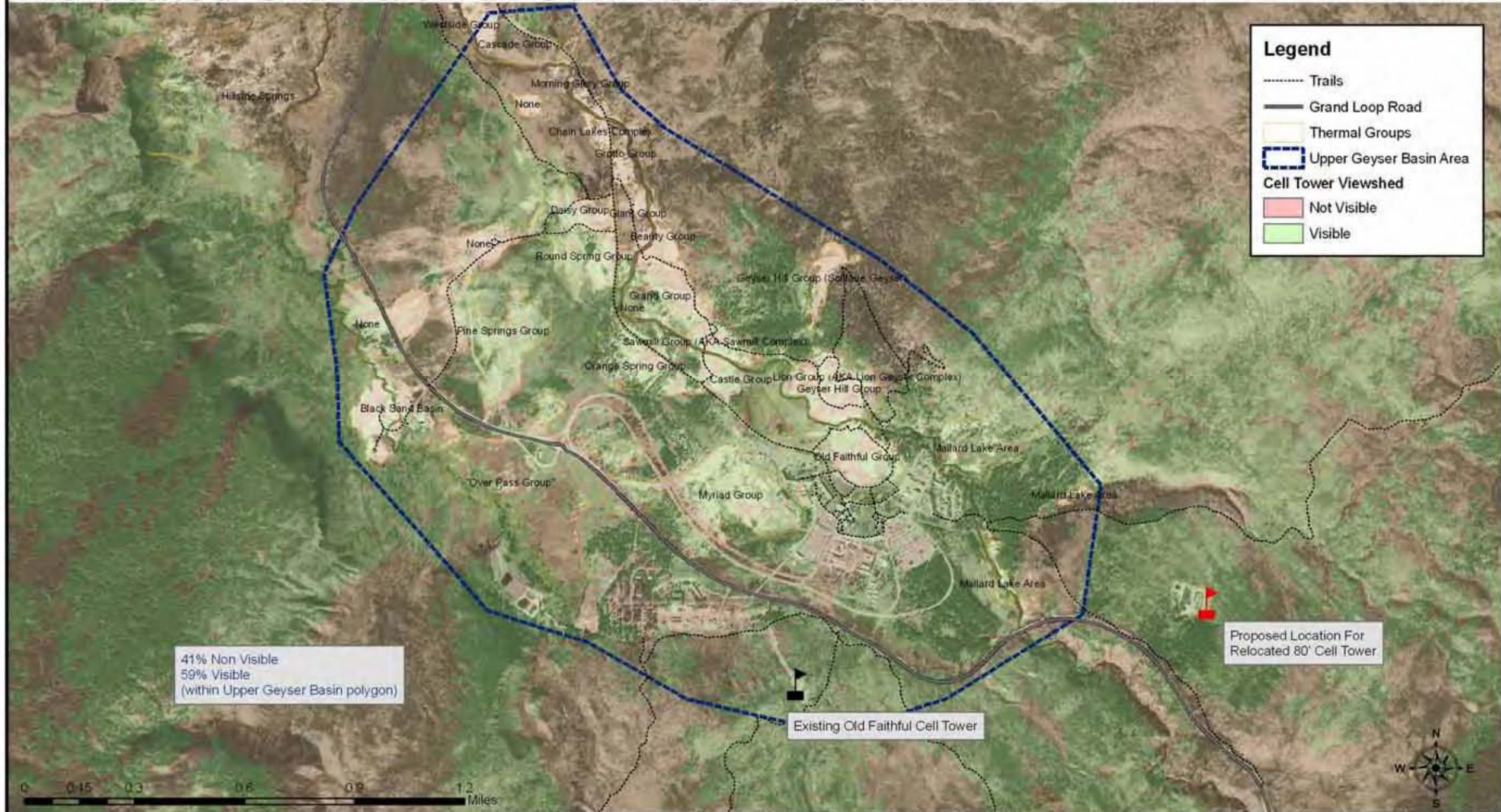
22% Non Visible
78% Visible
(within Upper Geyser Basin polygon)

Proposed Location For
Relocated 80' Cell Tower

Existing Old Faithful 80' Cell Tower



Relocated Old Faithful Cell Tower Viewshed



41% Non Visible
59% Visible
(within Upper Geyser Basin polygon)

Proposed Location For
Relocated 80' Cell Tower

Existing Old Faithful Cell Tower

IMPACTS OF ALTERNATIVE D: SUBSTANTIAL INCREASE IN WIRELESS SERVICES

Analysis. Implementing Alternative D would involve an increase in wireless communications infrastructure across a wide range of areas in the park. This alternative allows the opportunity to provide cellular service for all developed areas, along the entire Grand Loop Road, along all five entrance roads and at all campgrounds over 100 spaces. Given the existing topography park-wide and the requirement for proponents to follow the guidelines proposed in this document, the system could not provide coverage using only a few installations on the highest points. It is reasonable to assume that a large network of antenna sites with associated equipment would be proposed around the park over time. The existing cell tower at Old Faithful would be camouflaged to reduce its visibility when feasible. The removal of obsolete equipment from the top of Bunsen Peak and the relocation of cellular equipment to Elk Plaza will make a slight improvement to the area viewshed. Similarly, the relocation of antennas from the fire lookout on Mt. Washburn to a nearby stand alone tower will slightly improve the viewshed. These actions would result in long-term, moderate, adverse impacts to visual quality.

Under the Alternative D, new research monitoring sites would be installed in the park. These structures will be located so that they are unlikely to be seen by hikers on maintained trails. The installation of this equipment would result in a long-term, minor adverse impact on visual quality.

The combined impacts from Alternative D would be long-term, moderate, and adverse.

Cumulative Effects. Past, present, and reasonably foreseeable actions occurring within and near the park would be similar to the no action alternative. The cumulative effects of this alternative with other actions would result in long-term, moderate adverse cumulative impacts to the park's visual quality and viewsheds.

Conclusion. Under this alternative, there would be long-term moderate adverse impacts to visual quality and viewsheds. Cumulative impacts under the Alternative D would be long-term, moderate, and adverse. Because there would be no major, adverse impacts to visual quality and viewsheds whose conservation is necessary to fulfill purposes identified in Yellowstone's establishing legislation; key to the natural and cultural integrity of the park; and identified as a goal in other park or NPS planning documents; there would be no impairment to this resource. Implementation of this alternative would not result in any unacceptable impacts and is consistent with §1.4.7.1 of *NPS Management Policies* (2006).

CHAPTER 5: CONSULTATION AND COORDINATION

Scoping

External (public) scoping was conducted to inform various agencies and the public about the proposal to prepare a plan to guide future wireless communications services in Yellowstone National Park and to generate input on the preparation of this Environmental Assessment. The scoping effort began on July 13, 2006, with a press release, mailing to interested parties, and posting of a scoping newsletter on the NPS Planning, Environment and Public Comment (PEPC) website. Three public open houses were held in August 2006, one each in Idaho Falls, Idaho; Bozeman, Montana; and Cody, Wyoming. Three open houses were held in the park in late August at the Lake, Old Faithful, and the Mammoth developed areas. The 50-day scoping period ended on August 31, 2006.

A total of 107 written comments were received through mailed letters (17), mailed park forms (22), and through PEPC (68). No comments were received from state or federal agencies. Scoping comments are discussed further in Chapter 1, *Purpose and Need*.

Federal Agencies

A copy of this EA will be forwarded to the U.S. Department of the Interior, Fish and Wildlife Service, to allow for consultation as required by Section 7 of the Endangered Species Act. This will occur during the public review period of this EA.

State Agencies

The park will submit this EA to the Wyoming State Historic Preservation Office for their review and comment for compliance with Section 106 Consultation under the National Historic Preservation Act.

Native American Groups

A letter and project newsletter were mailed to Yellowstone's 26 affiliated tribes and 47 other potentially interested tribes on July 24, 2006, to solicit concerns and comments for the proposed project. The park received a letter from the Rosebud Sioux Tribe, South Dakota, on August 16, 2006, requesting that the park keep them informed of the project progress, immediately cease work and notify them in the event that human remains or archeological items are discovered, and to forward them a copy of the EA. The park will notify the 73 tribes of the availability of the draft EA and will forward a copy to any tribe requesting it.

Internal Scoping

Internal scoping was conducted by an interdisciplinary team in Yellowstone National Park. Interdisciplinary team members met regularly throughout the course of this planning process to discuss the purpose and need for the project; various alternatives; potential environmental impacts; past, present, and reasonably foreseeable projects that may have cumulative effects; and possible mitigation measures. The team also gathered background information and discussed public outreach for the project. Over the course of the project, team members have conducted individual site visits to view and evaluate the potential facility sites.

Environmental Assessment Review and List of Recipients

The Environmental Assessment was released for public review on September 16, 2008. To inform the public of the availability of the Environmental Assessment/Assessment of Effect, the National Park Service published and distributed a letter and press release to various agencies, tribes, and members

of the public on the park's mailing list, and developed a press release for publication in local newspapers. Copies of the Environmental Assessment/Assessment of Effect will be provided to interested individuals, upon request. Copies of the document will also be available for review on the Internet at <http://parkplanning.nps.gov/yell>.

The Environmental Assessment will be on public review for a 45-day public comment period ending October 31, 2008. During this time, the public is encouraged to submit their written comments to the National Park Service at the address provided at the beginning of this document. Following the close of the comment period, all public comments will be reviewed and analyzed, prior to the release of a decision document. The National Park Service will issue responses to substantive comments received during the public comment period, and will make appropriate changes to the Environmental Assessment, as needed.

List of Preparers and Reviewers

- Eleanor Clark, Chief, Comprehensive Planning and Design, NPS, Yellowstone National Park
- Kaelyn Johnson, Communications Manager, NPS, Yellowstone National Park
- Tim Klukas, Prescribed Fire Manager, NPS, Yellowstone National Park
- Chris Lehnertz, Deputy Superintendent, NPS, Yellowstone National Park
- Suzanne Lewis, Superintendent, NPS, Yellowstone National Park
- Doug Madsen, Outdoor Recreation Planner, NPS, Yellowstone National Park
- Tom Olliff, Chief, Yellowstone Center for Resources, NPS, Yellowstone National Park
- Dan Reinhart, Supervisory Resource Management Specialist, NPS, Yellowstone National Park
- Mike Reynolds, Telecommunications Supervisor, NPS, Yellowstone National Park
- PJ White, Supervisory Wildlife Biologist, NPS, Yellowstone National Park
- Julie York, (former) Outdoor Recreation Planner, National Park Service, Yellowstone National Park

Consultants (provided information):

- Mike Angermeier, Landscape Architect, NPS, Yellowstone National Park
- Shan Burson, Acoustic Ecologist, NPS, Yellowstone National Park
- Herb Dawson, Historic Architect, NPS, Yellowstone National Park
- Erik Hendrickson, (former) Project Manager, NPS, Yellowstone National Park
- Ann Johnson, Archeologist, NPS, Yellowstone National Park
- Kerry Murphy, Wildlife Biologist, NPS, Yellowstone National Park
- Al Nash, Public Affairs Officer, NPS, Yellowstone National Park
- Vern Nye, Telecommunications Specialist, NPS, Yellowstone National Park
- Zehra Osman, Landscape Architect, NPS, Yellowstone National Park
- Jo Suderman, Exhibit Technician, National Park Service, Yellowstone National Park

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Glossary of Terms

Taken in part from the Cellular Telecommunications Industry Association (CTIA)

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

AMPS: Advanced Mobile Phone Service (AMPS) is the original analog “cellular” service transmission standard first deployed in the United States, still used as a default standard for cellular systems in the U.S., and in some regions around the world.

APE: “Area of Potential Effect” The geographic area or areas within which an undertaking may cause changes in the character or use of cultural resources, if any resources exist there. This area always includes the actual site of an undertaking, but may also include other areas where the undertaking will cause changes in land use, traffic patterns, or other aspects that could affect cultural resources, including visual, atmospheric, or audible changes.

Analog: The traditional method of adapting radio signals so they can carry information. AM (Amplitude Modulation) and FM (Frequency Modulation) are the two most common analog systems. Analog has largely been replaced by digital technologies, which are more secure, more efficient and provide better quality.

Antenna: A device for transmitting and receiving radio frequency (RF) signals. Often camouflaged on existing buildings, trees, water towers or other tall structures, the size and shape of antennas are generally determined by the frequency of the signal they manage.

Bandwidth: The transmission capacity of a communications pathway. It is expressed in bits per second, bytes per second or in hertz (cycles per second).

Base Station: The central radio transmitter/receiver that communicates with mobile telephones within a given range (typically a cell site).

Bluetooth: The name for a technological standard (a communications protocol) that enables mobile devices equipped with a special chip to send and receive information wirelessly. Using Bluetooth, electronic devices such as desktop computers, wireless phones, electronic organizers and printers can communicate over short-ranges using the 2.4 GHz spectrum band.

Broadband: A transmission facility having a bandwidth (capacity) sufficient to carry multiple voice, video or data channels simultaneously. Broadband is generally equated with the delivery of increased speeds and advanced capabilities, including access to the Internet and related services and facilities “that provide 200 kbps upstream and downstream transmission speeds” (per the FCC’s Fourth Annual Report to Congress on the “Availability of Advanced Telecommunications Capability in the United States,” September 2004).

Broadcast: To transmit information over the airwaves to two or more receiving devices simultaneously. Information can be transmitted over local television or radio station, satellite systems or wireless data communications networks.

BTA (Basic Trading Area): A geographic area designed by Rand McNally to reflect business centers, and adopted by the FCC for the licensing of Personal Communications Services and some other wireless services. BTAs are composed of several neighboring counties associated by business and commuting patterns. The U.S. is divided into 493 BTAs

Carrier: Also known as service provider or operator, a carrier is the communications company that provides customers service (including air time) for their wireless phones.

CDMA (Code Division Multiple Access): A technology used to transmit wireless calls by assigning them codes. Calls are spread out over the widest range of available channels. Then codes allow many calls to travel on the same frequency and also guide those calls to the correct receiving phone.

Cell: The basic geographic unit of wireless coverage. Also, shorthand for generic industry term "cellular." A region is divided into smaller "cells," each equipped with a low-powered radio transmitter/receiver. The radio frequencies assigned to one cell can be limited to the boundaries of that cell. As a wireless call moves from one cell to another, a computer at the Mobile Telephone Switching Office (MTSO) monitors the call and at the proper time, transfers the phone call to the new cell and new radio frequency. The handoff is performed so quickly that it's not noticeable to the callers.

Cell Site: The location where a wireless antenna and network communications equipment is placed in order to provide wireless service in a geographic area.

Cell Splitting: A means of increasing the capacity of a wireless system by subdividing one cell into two or more smaller cells.

Cellular: A mobile communications system that achieves enhanced system capacity by dividing up a coverage area into regions called cells, then reusing the available spectrum from cell to cell (Frequency Reuse). When a mobile user moves from a cell to an adjacent cell, a hand-off must be performed to ensure uninterrupted service.

Channel/Circuit: A communications pathway that may take the form of a connection established over wireless, wired, or fiber optic facilities.

Co-Location: Placement of multiple antennas at a common site. Some companies act as brokers or cell site managers, arranging cell sites and coordinating many carriers' antennas at a single cell site.

Council on Environmental Quality (CEQ): Established by Congress with 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.

CSD (Circuit Switched Data): One technological approach used for the exchange of data. A circuit connection is made that is exclusively reserved for the individual's use. This can be inefficient, as many communications do not require a dedicated communications channel, but only brief connectivity, for the transmission of short messages.

CMRS (Commercial Mobile Radio Service) Provider: An FCC designation for any wireless carrier or license owner whose wireless service is connected to the public switched telephone network and/or is operated for profit. Wireless services that are offered to the public are classified as CMRS, unlike private systems which are classified as "Private Mobile Services."

Decibel (dBa): In electronics and communication, the decibel is a logarithmic expression of the ratio between two signal power, voltage, or current levels. In acoustics, the decibel is used as an absolute indicator of sound power per unit area. A decibel is one-tenth of a Bel, a seldom-used unit named for Alexander Graham Bell, inventor of the telephone.

Developed Area: As used in this plan, include the areas that buildings are congregated for visitor use activities (visitor centers, gas stations, postal services, stores, restaurants, and lodging facilities. In some cases these areas may also include boardwalks, and paved walkways to thermal or scenic

features close the development. Major developed areas of the park include Mammoth Hot Springs, Tower-Roosevelt, Canyon Village, Lake, Grant Village, and Old Faithful.

Digital: Technological approach that converts signals (including voice) into the binary digits '0' and '1'. This data is compressed, and then transformed into electronic pulses for a wired network, optical light waves for fiber optic networks or radio waves for wireless networks. Digital wireless technology has largely superseded analog technology, because digital delivers more capacity and supports more applications, as well as offers better sound quality, and more secure signals.

DSL (Digital Subscriber Line): A digital line connecting the subscriber's terminal to the serving company's central office, providing multiple communications channels able to carry both voice and data communications simultaneously.

Dual Band: A wireless handset that works on more than one spectrum frequency, e.g., in the 800 MHz frequency and 1900 MHz frequency bands.

Dual Mode: A wireless handset that works on both analog and digital networks.

EDGE: Enhanced Data Rate for Global Evolution is an evolutionary step in the GSM-development path for faster delivery of data, delivered at rates up to 384 Kbps. The standard is based on the GSM technology platform and uses the TDMA approach (see TDMA, below).

Electromagnetic Frequencies: The transmission of electrical energy through wires, the broadcasting of radio signals and the phenomenon of visible light.

Emergency Services: Public services that respond to emergency situation including police, fire, rescue, and EMS.

Endangered Species Act (ESA) (16 USC § 1531 et seq.): An act to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved and to provide a program for the conservation of such endangered species and threatened species.

Enhanced 911 (E-911): 911 service becomes enhanced 911 emergency reporting service when there is a minimum of two species features added to it. E-911 provides ANI (Automatic Number Identification) and ALI (Automatic Location Information) to the 911 operator.

ESMR (Enhanced Specialized Mobile Radio): A single wireless device that combines a two-way radio, phone, mobile dispatch, radio paging and Mobile data capabilities, and operates on digital networks. Examples of ESMR service providers include Nextel Communications, Nextel Partners, and Southern LINC Wireless, among others.

ESN (Electronic Serial Number): The unique serial identification number programmed into a wireless phone by the manufacturer. Each time a call is placed, the ESN is transmitted to a nearby base station so the wireless carrier can validate the call. The ESN differs from the Mobile Identification Number, which identifies a customer's wireless phone number. MINs and ESNs are electronically monitored to help prevent fraud.

Evolution-Data Optimized (EV-DO): A wireless radio broadband data standard adopted by CDMA mobile service providers in United States, and other countries. EV-DO is aimed at delivering maximum downlink speeds of 3.1 Mb/s.

Federal Regulatory Fee: Annual communications regulatory fees as mandated by Congress. The fees require the FCC to recover the regulatory costs associated with its enforcement, policy and

rulemaking, user information, and international initiatives.

FDD (Frequency Division Multiplexing): Frequency-division multiplexing is a method in which numerous signals are combined for transmission on a single communications channel. Each signal is assigned a different frequency (subchannel) within the main channel.

GPRS (General Packet Radio Service): A packet technology approach that enables high-speed wireless Internet and other GSM-based data communications. It makes very efficient use of available radio spectrum for transmission of data.

GPS (Global Positioning System): A worldwide satellite navigational system, made up of 24 satellites orbiting the earth and their receivers on the earth's surface. The GPS satellites continuously transmit digital radio signals, with information used in location tracking, navigation and other location or mapping technologies.

GSM (Global System for Mobile Communications): A technological approach also based on dividing wireless calls into time slots. GSM is most common in Europe, Australia and much of Asia and Africa. Generally, GSM phones from the United States are not compatible with international GSM networks because the U.S. and many other nations use different frequencies for mobile communications. However, some phones are equipped with a multi-band capability to operate on such other frequencies.

Handoff: The process when a wireless network automatically switches a mobile call to an adjacent cell site.

Historic District: An area that generally includes within its boundaries a significant concentration of properties linked by architectural style, historical development, or a past event.

iDEN (Integrated Digital Enhanced Network): A specialized mobile technology that combines two-way radio, telephone, text messaging and data transmission into one digital network. iDEN is designed to give users quick access to information on a single device. Introduced by Motorola and used by AirTel Montana, Nextel Communications, Nextel Partners, and Southern LINC Wireless, among others.

Infrastructure: The basic facilities, equipment, and installations needed for the functioning of a system.

Interconnection: Connecting one wireless network to another, such as linking a wireless carrier's network with a local telephone company's network.

Interoperability: The ability of a network to coordinate and communicate with other networks, such as two systems based on different protocols or technologies.

LAN (Local Area Network): Is a small data network covering a limited area, such as a building or group of buildings. Most LANs connect workstations or personal computers. This allows many users to share devices, such as laser printers, as well as data. The LAN also allows easy communication, by facilitating e-mail or supporting chat sessions.

Megahertz (MHz): Is a unit of frequency equal to one million hertz or cycles per second. Wireless mobile communications within the United States generally occur in the 800 MHz, 900MHz and 1900MHz spectrum frequency bands.

MIN (Mobile Identification Number): The MIN, more commonly known as a wireless phone number, uniquely identifies a wireless device within a wireless carrier's network. The MIN is dialed

from other wireless or wireline networks to direct a signal to a specific wireless device. The number differs from the electronic serial number, which is the unit number assigned by a phone manufacturer. MINs and ESNs can be electronically checked to help prevent fraud.

MSA (Metropolitan Statistical Area): One of the 306 urban-centered cellular service areas based on the largest urban markets as designated by the U.S. government in 1980. Two “cellular” service operators are licensed in each MSA.

MTA (Major Trading Area): A geographic area designed by Rand McNally to reflect business centers, and adopted by the FCC for the licensing of Personal Communication Services and some other wireless services. MTAs are composed of neighboring basic trading areas (BTAs) associated with major business centers. The U.S. is divided into 51 MTAs, which do not reflect state boundaries.

MTSO (Mobile Telephone Switching Office): The central computer that connects wireless phone calls to the public telephone network. The MTSO controls the series of operations required to complete wireless calls, including verifying calls, billing and antenna handoffs.

OFDM (Orthogonal Frequency Division Multiplexing): A system for the transmission of digital message elements spread over multiple channels within a frequency band, in order to achieve greater throughput while minimizing interference and signal degradation through the use of multiple antennas.

Packet: A piece of data sent over a packet-switching network, such as the Internet. A packet includes not just the data comprising the message but also address information about its origination and destination.

Packet Data: Information that is reduced into digital pieces or ‘packets’, so it can travel more efficiently across networks, including radio airwaves and wireless networks.

PCS (Personal Communications Services): Defined by the FCC as a broad family of wireless services, commonly viewed as including two-way digital voice, messaging and data services. One set of “PCS” licenses established by the FCC operates in the 1900 MHz band.

PDA (Personal Digital Assistant): A portable computing device capable of transmitting data. These devices offer services such as paging, data messaging, e-mail, computing, faxes, date books and other information management capabilities.

PIN (Personal Identification Number): An additional security feature for wireless phones, much like a password. Programming a PIN into the Subscriber Information Module (SIM) on a wireless phone requires the user to enter that access code each time the phone is turned on.

Protocol: A standard set of definitions governing how communications are formatted in order to permit their transmission across networks and between devices.

PSD (Packet Switched Data): A technological approach in which the communication “pipe” is shared by several users, thus making it very efficient. The data is sent to a specific address with a short delay. This delay depends on how many users are using the pipe at any one time as well as the level of priority requested for your information. PSD is the technology used for data communication across the Internet and makes more efficient use of the network.

RAWS: “Remote Automated Weather Station” A self powered and automated weather data collection and retrieval platform that stores weather information digitally. Data retrieved is in digital format through satellite transmission, phone transmission, radio transmission or by direct connection with a personal computer. These stations are usually powered by solar panels and batteries and require annual maintenance to calibrate instruments. Frontcountry

automated weather station usually are powered by direct connection to a power source and phone line.

Repeater: Devices that receive a radio signal, amplify it and re-transmit it in a new direction. Used in wireless networks to extend the range of base station signals and to expand coverage. Repeaters are typically used in buildings, tunnels or difficult terrain.

Roaming: When traveling outside their carrier's local service area, roaming allows users to continue to make and receive calls when operating in another carrier's service coverage area.

RSA (Rural Service Area): One of the 428 rural markets across the United States, as designated by the FCC for the delivery of cellular service outside of the initial 306 MSAs.

Smart Antenna: A wireless antenna with technology that focuses its signal in a specific direction. Wireless networks use smart antennas to reduce the number of dropped calls, and to improve call quality and channel capacity.

Smart Phone: Wireless phones with advanced data features and often keyboards. What makes the phone "smart" is its ability to manage and transmit data in addition to voice calls.

SMS: Short Messaging Service enables users to send and receive short text messages (usually about 160 characters) on wireless handsets. Sometimes referred to as "text messaging."

Spectrum Allocation: Process whereby the federal government designates frequencies for specific uses, such as personal communications services and public safety. Allocation is typically accomplished through lengthy FCC proceedings, which attempt to adapt allocations to accommodate changes in spectrum demand and usage.

Spectrum Assignment: Federal government authorization for the use of specific frequencies within a given spectrum allocation, usually in a specific geographic location. Mobile communications assignments are granted to both private users such as businesses, and commercial providers such as wireless and paging operators. Spectrum auctions and/or frequency coordination processes, which consider potential interference to existing users, may apply.

Spread Spectrum: A method of transmitting a radio signal by spreading it over a wide range of frequencies. This reduces interference and can increase the number of simultaneous users on one radio frequency band.

TCP/IP (Transmission Control Protocol/Internet Protocol): A protocol permitting communications over and between networks, the TCP/IP protocol is the basis for the Internet communications.

TDMA (Time Division Multiple Access): A technological standard that permits the transmission of information by dividing calls into time slots, each one lasting only a fraction of a second. Each call is assigned a specific portion of time on a designated channel. By dividing each call into timed 'packets,' a single channel can carry many calls at once.

Telecommunications Relay Service (TRS): A telephone service that allows persons with hearing or speech disabilities to place and receive telephone calls.

Third-Generation (3G): A general term that refers to technologies which offer increased capacity and capabilities delivered over digital wireless networks.

Tri-Band Handset: Phones that work on multiple frequencies, typically in the 1900 MHz, 800 MHz, and 900 MHz frequencies used in the U.S. and elsewhere.

Tri-Mode Handset: Phones that operate in different modes, such as the CDMA, TDMA, and analog standards.

UMTS (Universal Mobile Telecommunications Systems): This is third generation technology generally based on W-CDMA (Wideband Code Division Multiple Access). UMTS promises a communications speed between 384 kbps and up to about 2 Mbps.

Viewshed: A physiographic area composed of land, water, biotic, and cultural elements which may be view and mapped from one or more viewpoints and which has inherent scenic qualities and/or aesthetic values as determined by those who view it.

VoIP (Voice over Internet Protocol): VoIP is not simply capable of delivering voice over IP, but is also designed to accommodate two-way video conferencing and application sharing as well. Based on IP technology, VoIP is used to transfer a wide range of different type traffic.

Voice Recognition: The capability for wireless phones, computers and other devices to be activated and controlled by voice commands.

WAN (Wide Area Network): A general term referring to a large network spanning a country or around the world. The Internet is a WAN. A public mobile communications system such as a cellular or PCS network is a WAN.

WAP (Wireless Application Protocol): Wireless Application Protocol is a set of standards that enables wireless devices, such as phones, pagers and palm devices, to browse content from specially-coded Web pages.

WCF (wireless communications facility): Same as WTF, see below.

W-CDMA: Wideband Code Division Multiple Access, one of two 3G standards that makes use of a wider spectrum than CDMA and therefore can transmit and receive information faster and more efficiently.

WiFi (Wireless Fidelity): WiFi provides wireless connectivity over unlicensed spectrum (using the IEEE 802.11a or 802.11b,g,n, standards), generally in the 2.4 and 5 GHz radio bands. Wi-Fi offers local area connectivity to WiFi-enabled computers. WiFi was intended to be used for mobile devices and LANs, but is now often used for Internet access. It enables a person with a wireless-enabled computer or personal digital assistant (PDA) to connect to the Internet when in proximity of an access point. The geographical region covered by one or several access points is called a hotspot.

Wi-Max: An acronym that stands for Worldwide Interoperability for Microwave Access, a certification mark for projects that pass conformity and interoperability tests for the IEE 802.16 standards providing metropolitan area network connectivity for fixed wireless access at broadband speeds. Products that pass the conformity tests for WiMAX are capable for forming wireless connections between them to permit the carrying of Internet packet data. It is similar to WiFi in concept, but has certain improvements that are aimed at improving performance and should permit usage over much greater distances.

Wireless: Describing radio-based systems that allow transmission of telephone and/or data signals through the air without a physical connection, such as a metal wire or fiber-optic cable.

Wireless Internet: A general term for using wireless services to access the Internet, e-mail and/or the World Wide Web.

Wireless Local Area Network (WLAN): Using radio frequency (RF) technology, WLANs transmit

and receive data wirelessly in a certain area. This allows users in a small zone to transmit data and share resources, such as printers, without physically connecting each computer with cords or wires.

Wireless Private Branch Exchange (PBX): Equipment that allows employees or customers within a building or limited area to use wireless devices in place of traditional landline phones.

Wireless Services: Any of a number of technologies or services “typically electronic” that allow the transfer of information over a distance without the use of electrical conductors “wires” using various radio frequencies without being physically wired together.

WLL (Wireless Local Loop): WLL is a system that connects wireless users to the public switched telephone network (PSTN) using wireless technology and other circuitry to complete the “last mile” between the wireless user and the exchange equipment. Wireless systems can often be installed faster and cheaper than traditional wired systems.

WTF (wireless telecommunications facility): The term includes all associated infrastructure (equipment, antennas, poles, towers, supports, structures, power, conduit, access roads, and other components) used for construction, operation and maintenance.

Appendices

Appendix 1. Observations, North American Bird Count

Observations during the North American Bird Migration Count, also known as the International Migratory Bird Day Count, on May 12, 2007, in Yellowstone National Park and from Gardiner to Livingston in Montana. Abbreviations are: SB-FB = Sedge Bay-Fishing Bridge; FB-C = Fishing Bridge-Canyon; C-N-M = Canyon-Norris-Mammoth; M-G = Mammoth-Gardiner (Wyoming); M-G = Mammoth-Gardiner (Montana); GV-PV = Gardiner Valley-Paradise Valley; and SV = Shield's Valley.

Species	Wyoming					Montana		Totals
	SB-FB	FB-C	C-N-M	M-G	M-G	GV-PV	SV	
Canada Goose	30	24	6			10	40	110
Trumpeter Swan						1	3	4
Green-winged Teal	20	6	8				25	59
Mallard	22	4	4			11	28	69
Northern Pintail	4						16	20
Blue-winged Teal		1					2	3
Cinnamon Teal	8						12	20
Northern Shoveler	6						14	20
Gadwall	44						12	56
American Wigeon	84						34	118
Lesser Scaup	76	10	44				46	176
Ring-necked Duck	4						20	24
Common Goldeneye	12	3						15
Barrow's Goldeneye	46	12	2					60
Bufflehead	20	4						24
Harlequin Duck		9						9
Common Merganser	8	2				4		14
Ruddy Duck	1							1
Common Loon							1	1
Eared Grebe							45	45
Western Grebe							26	26
American White Pelican	5					20		25
Great Blue Heron	2	2				3	2	9
Osprey		1			1	1		3
Bald Eagle	1					2	1	4
Northern Harrier			2			1	1	4
Swainson's Hawk	2							2
Red-tailed Hawk		1	1			5	4	11
Golden Eagle							1	1
American Kestrel			2			5	3	10
Merlin						1		1
Peregrine Falcon	1							1
American Coot	1		4				20	25
Sandhill Crane	6		4				25	35
White-faced Ibis							17	17
Killdeer	8	4	2			1	3	18
Spotted Sandpiper		3				2		5

Least Sandpiper	1						1	
Willet						22	22	
American Avocet	7					9	16	
Lesser Yellowlegs						4	4	
Greater Yellowlegs						1	1	
Wilson's Snipe						1	1	
Wilson's Phalarope	1		13			8	22	
California Gull	1						1	
Franklin's Gull						21	21	
Rock Pigeon				1		2	3	6
Mourning Dove						5	4	9
Calliope Hummingbird						1		1
Downy Woodpecker						1		1
Hairy Woodpecker			1			1		2
Red-naped Sapsucker						1		1
Northern Flicker (red-shafted)	3		1			3	3	10
Eastern Kingbird					1			1
Horned Lark					2			2
Tree Swallow	100	6				30		136
Violet-green Swallow	6					25		31
Northern Rough-winged Swallow						20		20
Bank Swallow		22						22
Clark's Nutcracker			2			2		4
Black-billed Magpie			1		6	11	2	20
American Crow		4				3		7
Common Raven	12	8	8			4	2	34
Black-capped Chickadee								
Mountain Chickadee	2		2					4
House Wren			1					1
Rock Wren	1							1
American Dipper		1						1
Ruby-crowned Kinglet	8	4	20					32
Mountain Bluebird	4	4	1			2	4	15
Townsend's Solitaire	1							1
American Robin	61	20						81
European Starling		6				7	8	21
Yellow-rumped Warbler	6	5	2					13
Orange-crowned Warbler			1					1
Yellow Warbler						3	4	7
Vesper Sparrow	15	8	9		2	2	5	41
Song Sparrow						1		1
Savannah Sparrow	10	26	4					40
Chipping Sparrow		2						2
Brewer's Sparrow							2	2
White-crowned Sparrow	20							20
Dark-eyed Junco	4		5					9
Red-winged Blackbird	1					11	12	24
Western Meadowlark		4				11	9	24
Yellow-headed Blackbird	4		2					6
Brewer's Blackbird	1	18				8	13	40

Brown-headed Cowbird	4	4					2	5	15
Common Grackle							2		2
Cassin's Finch		14	8						22
House Finch							14		14
Pine Siskin	2		7				8		17
American Goldfinch							2		2
House Sparrow							2		2
	686	242	167	1	12	251	543		1902

Appendix 2. 14 year summary of data collected during the North American Bird Migration Count

A 14-year summary of data collected during the North American Bird Migration Count, also known as the International Migratory Bird Day Count, during 1992–2006 in Yellowstone National Park and from Gardiner to Livingston in Montana.

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number Species Recorded	72	74	61	82	93	91	85	85	91	90	78	90	96	89	94
Revised Number Species (1996 Standards and Route)	86	74	75	82	93	91	85	85	91	90	78	90	96	89	94
Total Individual Birds															
Yellowstone NP, WY	1,545	1,793	2,408	1,797	1,038	1,073	826	750	967	895	716	839	1,085	927	1096
Yellowstone NP, MT	289	145	242	113	94	64	163	912	74	128	205	34	172	96	12
Park County, MT	139	89	248	313	949	413	1,974	936	656	609	2,709	547	1,852	1,423	794
Grand Totals	1,973	2,027	2,898	2,223	2,081	1,550	2,963	2,598	1,697	1,632	3,630	1,420	3,109	2,446	1,902
Number Observers	2	5	7	4	4	4	3	5	5	5	4	4	3	4	5
Total Hours in the Field	16	47.5	76.5	28	42	48	36	69	44	55	44	44	35	40	50
Total Species: Yellowstone	69	73	52	73	70	69	70	61	65	71	56	66	80	68	69

Appendix 3. General Summary of Wireless Telecommunications Facilities

Wireless telephony, also known as wireless telecommunications, includes mobile phones, pagers, and two-way enhanced radio systems, and relies on the combination of land lines, fiber, and an extensive network of elevated antennas, typically found on communications towers, to transmit voice and data information. This technology is known as the first and second generation (1G and 2G) of wireless deployment.

KEY COMPONENTS

The key components of any wireless telecommunications networks include:

1. Antenna
2. Support Structure
3. Equipment Housing
4. Utility Connection(s)
5. Access Road(s)

Telecommunications is the transmission, emission or reception of radio signals, digital images, sound bytes or other information via wires, cables, and space, through radio frequencies, satellites, microwaves, or other electromagnetic systems. Telecommunications includes the transmission of voice, video, data, and broadband using wireless or satellite technologies.

One-way communication for radio and television uses a combination of antennas and receivers to transmit signals from the station to an antenna or group of antennas located on a broadcast tower, which then transmits to the receiving devices found in a radio or television.

Two-way communication through traditional land line telephone service utilizes an extensive network of land lines to transmit a phone call between two people. Fiber optic cable can deliver high-speed Internet connection, cable television reception, and an alternative to traditional land line telephones. It uses an extensive network of copper wire lines above and below ground.

The first generation of wireless telecommunications, known as 1G, operated on an analog system in the 800 megahertz (MHz) range. This technology only carries one conversation per channel, limiting the number of users. Wireless telecommunications continued operating with 1G technology through the 1980s, when digital technology appeared and led to second generation, or 2G, wireless technology. The 2G technology used digital circuit switching that allowed multiple conversations on the same channel and greatly increased capacity (Silicon Press 2007).

Currently in the United States, wireless telecommunications are using 3G technology. This technology allows both universal access and portability across different device types with a faster communications speed than the 2G systems (Silicon Press 2007). Third, fourth, and fifth generations (3G, 4G, and 5G) of wireless telecommunications include the ability to provide instant access to e-mail, the Internet, radio, videos, TV pod-casting, mobile commerce, and Global Positioning System (GPS), in one hand-held wireless telephone unit. Successful use of this technology requires the deployment of a significant amount of additional infrastructure, i.e., elevated antennas on above ground structures such as towers, bridges, water tanks, roof-tops, signage, electrical transmission towers, and light poles.

WIRELESS TELECOMMUNICATIONS FACILITY (WCF) APPEARANCE AND DESIGN

The design of WCFs can vary greatly, depending on the type of technology used, and this technology continues to evolve rapidly. Fixed facilities used for wireless telecommunications are referred to as cellular base stations, cell stations, PCS ("Personal Communications Service") stations or telephone transmission towers. These base stations consist of antennas and electronic equipment. Because the antennas need to be high in the air, they are often located on towers, poles, water tanks, rooftops, or other support structures.

A WCF needs the following components: the support structure, the equipment building, the antennas, the utilities, and the access. Most support structures are made of aluminum, steel, stainless steel, wood, plastic or composite materials. There are four main types of facilities, which include mainly tower structures:

1. **Lattice Tower:** A lattice tower is typically three-sided with a triangular base and is often used in heavy loading conditions.
2. **Monopole Tower:** This is a tower that is a single pole. The heights of these structures generally do not exceed 200 feet. Antennas are mounted on the exterior of the tower.
3. **Guyed Tower:** These facilities are supported by guy wires anchored into the ground. Most radio and television towers are guyed towers. These structures can reach more and 300 feet in height.
4. **Stealth Tower or Other Type of Facility:** These facilities are poles, towers, or other structures that are designed to look like something else such as a tree or a sign. Many municipalities require these types of towers in their zoning regulations. They are generally more expensive than the other types of towers to install because of added materials needed to disguise the appearance of the facility, also known as a “stealth” facility.



Various Examples of Wireless Communications Facilities

In addition to free standing support structures, antennas can also be placed on existing structures such as rooftops and signs.

The above support structures (or base stations) are used to house an antenna. An antenna is a structure or device that is used to radiate or receive electromagnetic waves. Generally a support structure will house multiple antennas from each carrier. In urban and suburban areas, wireless providers commonly use panel or sector antennas for their base stations. These antennas consist of rectangular panels, about 1 by 4 feet in dimension. The antennas are usually arranged in three groups of three antennas each. One antenna in each group is used to transmit signals to wireless phones, and the other two antennas in each group are used to receive signals from wireless phones.

WCFs include operating equipment, which is often called the Base Transmitter Station or BTS, or an equipment shelter. The electronic equipment associated with these facilities can be housed in either an equipment room within a pre-existing building, in a specially constructed outdoor equipment shelter, and/or in specialty cabinets designed by cellular providers or equipment vendors. Equipment cabinets range in size and capacity from one small cabinet that can be the size of a 2-foot by 2-foot square to the size of a refrigerator. Multiple cabinets may be required if a company decides to expand the capacity of a site, or there may be multiple cabinets associated with one structure that houses multiple providers' antennas. Equipment cabinets may be concealed to reduce visual impacts.

Equipment housing/shelters for a WCF typically include:

- environmental control (air conditioning and heating units)
- electrical power supply (DC battery packs and /or AC power and/or a power generator)
- a connection to local telephone lines (either a T-1 or E-1 line, similar to a regular phone line, or a microwave antenna placed near the main antennas)
- back-up power supply
- radio transceivers
- data interface which mediates between the telephone company and radios
- noise filters
- coaxial cables connecting the antennas to the equipment room/cabinet.

Technological Limits, Possibilities and Design Options

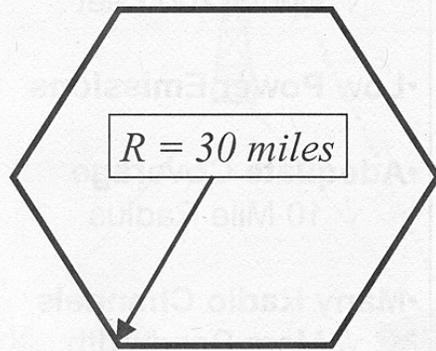
The Cellular Concept –

How Wireless Telecommunications Technology Works

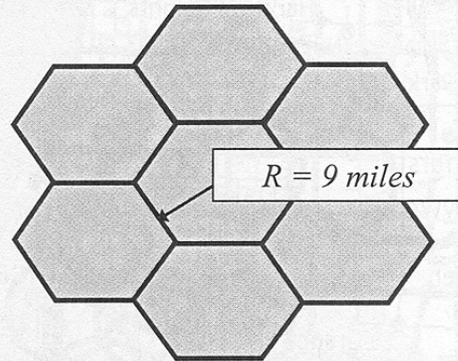
Wireless communications are transmitted through the air via radio waves of various frequencies. An elevated antenna or antenna set transmits and/or receives these radio signals. The area covered by an antenna set is commonly referred to as a "cell". Cellular systems are composed of interconnected neighboring "cell sites" forming a honeycomb effect. These cell sites operate on low amounts of electric energy.

Frequency Re-Use Technology

Then...& Now



Early systems used high power on high antennas to maximize range, but channels could not be re-used for great distances.



Modern systems use low power and low antennas, radio channels can be re-used more closely, increasing capacity.

In essence, cellular service is a low power two-way radio. In a cellular system each station is independent of, and interdependent with, the network. Each site is independent in that it provides service to a portion of the local area. However, each site is interdependent due to the way that the frequency channels are grouped for re-use.

Location, Siting and Design Options for Minimizing Negative Impacts

Preferred location and conditions for wireless telecommunications facilities depend on the interplay of various location, siting, and design variables. The development of a multi-site wireless telecommunications network is an interactive process in which proposed site designs are tested and modified. A proposed site is not fixed to a particular point, rather a location is sought within an initial search area or "search ring" that may extend a half mile to a mile from its center. Because there are many variables involved, there are often potential alternatives that must be investigated. Just as the provider must try to optimize the network design for technical efficiency, the park would always work towards optimizing any potential design for minimum visual impacts.

Antenna Height

Antenna height is an area of potential conflict between service providers - who seek to gain the widest possible signal coverage - and the park concerned with visual impacts. Generally speaking, the higher the antenna, the greater the coverage area, therefore, the greater the cost efficiency for the provider during initial roll out of a system. On the other hand, the height of an antenna mount is an important factor affecting how obtrusive a structure is visually. In some areas, it may be in the park's interest to require a potential provider to increase the frequency of antenna locations while lowering the height of each installation thereby achieving the same coverage with less visual impact. It is clear that there are some areas that require more protection or mitigation than others to address

visual impacts. The challenge in planning for wireless telecommunications facilities is to protect resources while providing services to the visitor and for operations.

Wireless telecommunications systems are normally developed in phases. In the initial “coverage” phase, some providers who need multiple antenna sites, seek to locate a few taller mounts in strategic points along major highways and other areas of anticipated higher usage, to gain the widest signal pattern at the lowest cost. Later, as use of the system increases, the antenna mounts may become shorter, and more would be installed to increase the capacity of the system. The developed areas of Yellowstone National Park are not likely to expand, and visitation has been relatively constant for the last decade, though cell phone users have been increasing nationally, regionally, and locally. Lowering the antenna heights in the initial coverage phase is technologically possible, however, it may require the service providers to over-build their system, without any assurance that the over-built system will ever be used to full capacity or be of the design to best serve the area.

Horizontal Spacing

The spacing between cell towers in a network depends strongly on the antenna height. Typically, the lower the antenna mount, the smaller the cell, and more sites are needed to get the desired coverage. In Yellowstone National Park, the developed areas of the park are relatively compact in nature. Providing for cell coverage in the developed areas of the park may, in many cases, require a single mounting structure, that would allow for the required co-location opportunities for competing companies. As the cell sites may not “see” each other due to distance or topography, additional infrastructure needs to be in place for the network to function. Links between the sites need to be established back to a switching station either via a cable either buried, or strung on poles, or via a microwave link. Yellowstone currently has a system of microwave dishes within the park provided by the Qwest telephone company that link remote sites within the park.

Another aspect of horizontal separation is the separation of ground mounts from certain areas of sensitivity. The potential visual impact of tall structures underlies the link between structure height and a zone of sensitivity around certain uses. An improperly located and sited 150-foot or 200-foot mount may have a visual impact on scenic vistas miles away, even though the facility itself is located in a developed area of the park. Thus, consideration must be given to locating taller structures that are visually obtrusive at some distance away from visually sensitive areas, such as geyser basins, campgrounds, trails, or roads.

Use of Existing Structures

Wireless telecommunications antennas can be mounted on existing tall structures such as power transmission line towers or poles, buildings, water tanks, fire lookouts, and utility poles. When this can be done, it eliminates many of the concerns that arise when new, freestanding antenna mounts are proposed. Thus, an adequate inventory of suitable tall structures (including communication towers that can accommodate additional antennas) is another important tool to provide for suitable sites that minimize impacts.

Siting to Limit Visual Impact

It is possible to greatly reduce visual impacts through careful placement of the facility on certain sites. This would entail placement with respect to trees and/or buildings that can help screen the mount from line-of-site vantage points at ground level. Other strategies include placement outside the normal line of vision, such as inside a curve if near a roadway, and screening of the base and lower level of the mount through vegetation and/or intervening buildings or uses.

Mount Design

As defined in this plan, a mount is any supporting structure used to hold wireless telecommunications antennas at a desired height. The mount can consist of an existing building, water tank or similar structure or it can be a tower or pole fabricated specifically for that purpose and ground-mounted or mounted on the top or side of a building.

There are three basic types of fabricated mounts currently used by the industry. These include the steel lattice mounts, monopoles, and guyed mounts.

WIRELESS TELECOMMUNICATIONS FACILITY INFRASTRUCTURE AND ZONING

The location of antennas used for transmitting radio signals and wireless data is critical to attaining a functioning wireless telecommunications network. With the deployment of 1G wireless, only two competing wireless cellular providers existed, both in the 800 MHz band. With the deployment of 2G, and the entrance of four competing PCS providers operating in the 1,900 MHz band, along with the Enhanced Specialized Mobile Radio (ESMR) system operating in the 850 MHz band, the wireless marketplace became fiercely competitive. “Speed to market” and “location, location, location” became the slogans for the competing 1G and 2G providers. The concept of sharing facility base stations was not part of the strategy; each provider sought to have the fastest deployment, and develop the largest customer base, resulting in a quick return on the cost of deployment.

Coincidentally, as local governments began to adopt development standards for the wireless communications industry, the industry strategy changed. The cost associated with each provider developing an autonomous inventory of facility base stations put a financial strain on the ability to deploy the networks. Therefore, most of the wireless providers divested their internal real estate departments and tower inventories. This change gave birth to a new industry—vertical real estate. The new industry included a consortium of tower builders, tower owners, site acquisition, and site management firms. No longer was a tower being built for an individual cellular, ESMR, or PCS provider, but towers were built for a multitude of potential new tenants who would share the facility without the individual cost of building, owning, and maintaining the facility. Sharing antenna space on the tower between multiple providers is called co-location.

The vertical real estate business model for new towers was founded on tall tower structures intended to support as many wireless providers as possible. As a result, local landscapes became dotted with all types of towers, and communities began to adopt regulations that tried to inhibit wireless telecommunications towers within their jurisdictional boundaries. Wireless deployment came to a halt in many geographical areas. Second generation wireless providers paid large sums of money for the rights to provide wireless services. But the license agreements between the wireless providers and the Federal Communications Commission (FCC) mandated the networks be deployed within a specific time period, and local government agencies were prohibiting the deployments through new zoning standards. This prompted the adoption of Section 704 of the Telecommunications Act of 1996, facilitating the placement of these facilities on federal lands.

The present model for new facilities provides for shorter structures that provide a smaller service area, better reflecting the need for more successful connectivity and resulting in fewer dropped calls and better overall service.
