2025

GRAND CANYON NATIONAL PARK
Annual Fire Management Plan Update and Review

☑ This Fire Management Plan has been updated for the 2025 fire season in accordance with NPS and DOI policy. Content updates for language, hyperlinks, and maps are included. A summary sheet is attached that describes this year's updates.

☑ The undersigned have reviewed the NEPA analysis documentation for this plan and find it sufficient to support the planned actions and fire management activities within this plan.

Appendices to this plan include:

☑ Appendix A - Annual Delegation of Authority to the Fire Management Officer from the Park Superintendent.

☑ Appendix B – Interpark Agreement(s) outlining program responsibilities between parks in the Group/Zone.

☑ Appendix C – Copies of Cooperative and Interagency Agreements that support the park's fire management program.

Appendix D – Preparedness Planning Documents Working off of old plans working w/ Forests on updating zone plan

- ☐ Fire Danger Operating Plan
- ☐ Preparedness Level Plan
- ☐ Initial Response Plan

By signing below, I hereby approve and adopt the Fire Management Plan and its appendices as updated for this year.

Shawn E Waldron 4/30/2025

Fire Management Officer, Northern Arizona Parks Group

04/30/25

Superintendent, Grand Canyon National Park

U. S. National Park Service

Grand Canyon National Park
Fire Management Plan

2024

This Fire Management Plan was prepared by

NPS Grand Canyon National Park, Fire and Aviation Management

and

NPS Intermountain Region, Fire and Aviation Management

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Edward Keable, Superintendent, Grand Canyon NP

Table of Contents

EXECUTIVE SUMMARY

This 2024 Fire Management Plan (FMP) represents a newly formatted version of Grand Canyon National Park's approved FMP that was completed in 2012. The 2012 plan was developed through a process involving public meetings, notices, and scoping that fully described the goals and objectives of the fire and fuels management program of the park. This updated FMP retains the elements of the fire and fuels programs described in the 2012 plan while following the current agency prescribed format for Fire Management Plans. This version also adopts current national terminology for wildland fire response and has reviewed and updated the program's goals and objectives with input from the park's interdisciplinary team. The Wildland Fire Management strategies, established Fire Management Units, and approved fuels management activities first described in the 2012 FMP remain unchanged.

Grand Canyon National Park is located on the Colorado Plateau's southwestern edge in northern Arizona (See Figure 1 - Grand Canyon National Park Overview Map). The park consists of over 1.2 million acres in Mohave and Coconino Counties. The region is characterized by raised plains and basins. The canyon itself is a major feature incising the landscape up to one mile deep. Park elevations range from just over 1,000 feet at the river's western exit to over 9,160 feet near the North Rim Entrance Station. The relatively flat terrain of both rims is broken by some of the world's most changeable and severe topography. The park shares boundaries with three Native American tribes (Navajo, Havasupai, and Hualapai), other NPS units (Lake Mead and Glen Canyon National Recreation Areas), the Arizona Strip (Bureau of Land Management), the Kaibab National Forest, and Baaj Nwaavjo I'tah Kukveni—Ancestral Footprints of the Grand Canyon National Monument. Twelve federally recognized tribes have cultural ties to the Grand Canyon including the Havasupai Tribe, Hopi Tribe, Hualapai Tribe, Kaibab Band of Paiute Indians, Las Vegas Band of Paiute Indians, Moapa Band of Paiute Indians, Navajo Nation, Paiute Indian Tribe of Utah, San Juan Southern Paiute Tribe, The Pueblo of Zuni, Yavapai-Apache Nation, and White Mountain Apache.

Grand Canyon National Park is designated as a World Heritage Site, recognized as a place of significance and universal value because of its cultural and natural resources, ecosystem processes, scenic qualities, and values, natural quiet and solitude, spiritual and inspirational qualities, and recreational opportunities that should be preserved as part of all people's heritage. It is the Fire Management Program's mission to manage wildland fires to preserve, enhance and (where necessary) restore these values.

1.0 INTRODUCTION, LAND MANAGEMENT PLANNING, and COMMUNICATION

As part of its mission, the National Park Service Wildland Fire Program manages wildland fire to protect the public, park communities, and infrastructure, conserve natural and cultural resources, and maintain and restore natural ecosystem processes (NPS Wildland Fire Strategic Plan, NPS 2020-24). Each park unit with burnable vegetation must have an approved Fire Management Plan that will address the need for adequate funding and staffing to support the fire management program. (Directors Order #18, Wildland Fire Management, NPS 2008). To align with the DOI FMP Framework, the NPS developed fire management planning guidance which considers fire program complexity and efficient and effective planning direction (see Reference Manual (RM) - 18, Fire Planning, Chapter 4).

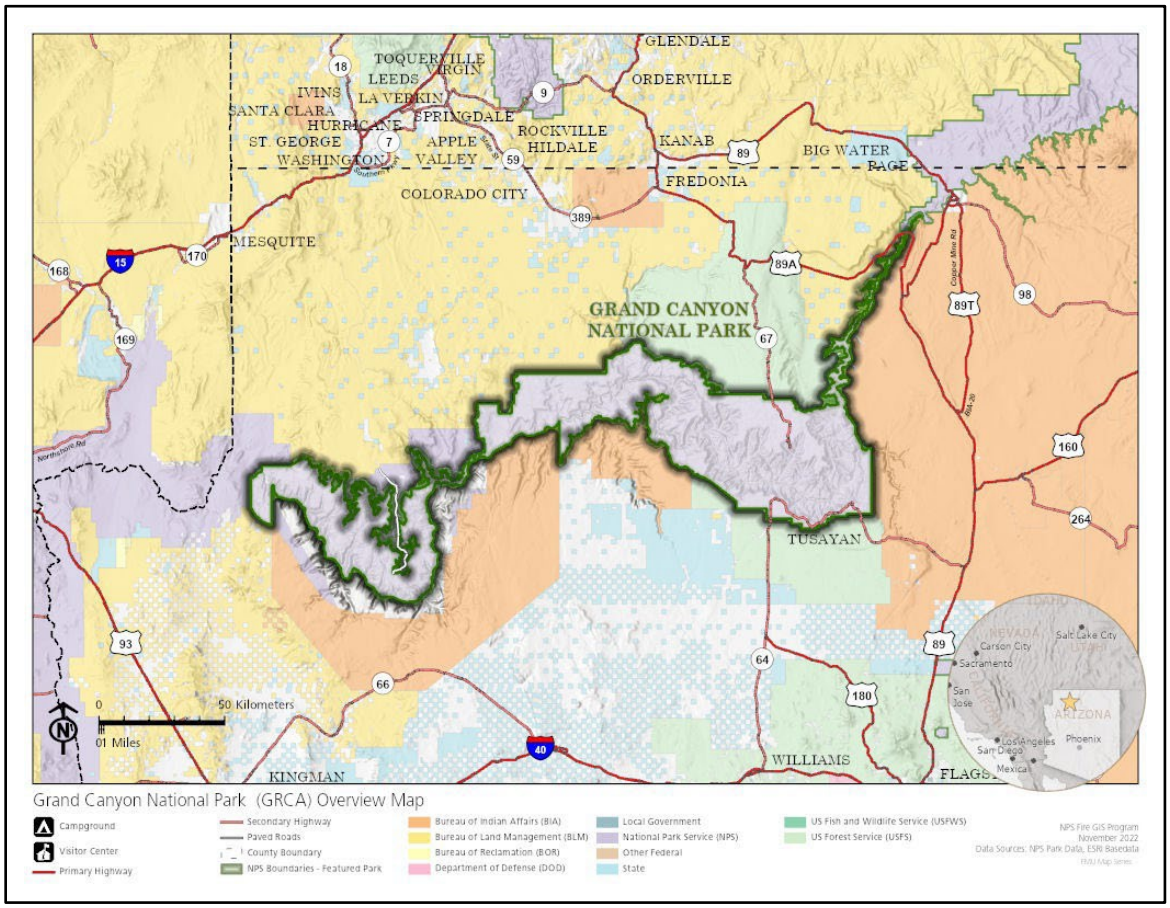

Figure 1. Grand Canyon National Park Overview Map

The Grand Canyon National Park Fire Management Plan is a strategic plan that defines a program of work to manage wildland fire, (includes prescribed fire and wildfire), and non-fire fuels treatments, and is based on directions contained in existing park unit planning documents. This plan provides for firefighter and public safety and includes strategies for managing wildland fires. It addresses values to be protected and is consistent with Grand Canyon National Park resource management objectives

and environmental laws and regulations such as the National Environmental Policy Act (NEPA), the National and State Historic Preservation Acts, the Endangered Species Act, the Clean Air Act, etc.

The Grand Canyon National Park Fire Management Officer (FMO) determines program requirements to implement land-use decisions through the FMP to meet land management objectives. The FMO is responsible for developing, maintaining, and annually evaluating the FMP to ensure accuracy and validity by completing an annual review. (Interagency Standards for Fire and Fire Aviation Operations (Red Book), Chapter 3, NPS Program Organization and Responsibilities).

1.1 Program Organization

The Grand Canyon National Park Fire Management Program receives support from the Intermountain Regional Office Division of Visitor and Resource Protection, Branch of Wildland Fire and Aviation Management. Within the park organization, the Branch of Wildland Fire and Aviation Management resides at the South Rim of Grand Canyon National Park with the Branch Chief (Fire Management Officer) reporting directly to the Chief Ranger, who reports to the park's Deputy Superintendent. The branch is responsible for the management of all wildland fire and aviation operations for the Northern Arizona NPS Fire Group that includes Sunset Crater National Monument, Walnut Canyon National Monument, Wupatki National Monument, Montezuma Castle National Monument, and Tuzigoot National Monument. See Figure 2 – Overview Map of the Northern Arizona NPS Group Units.

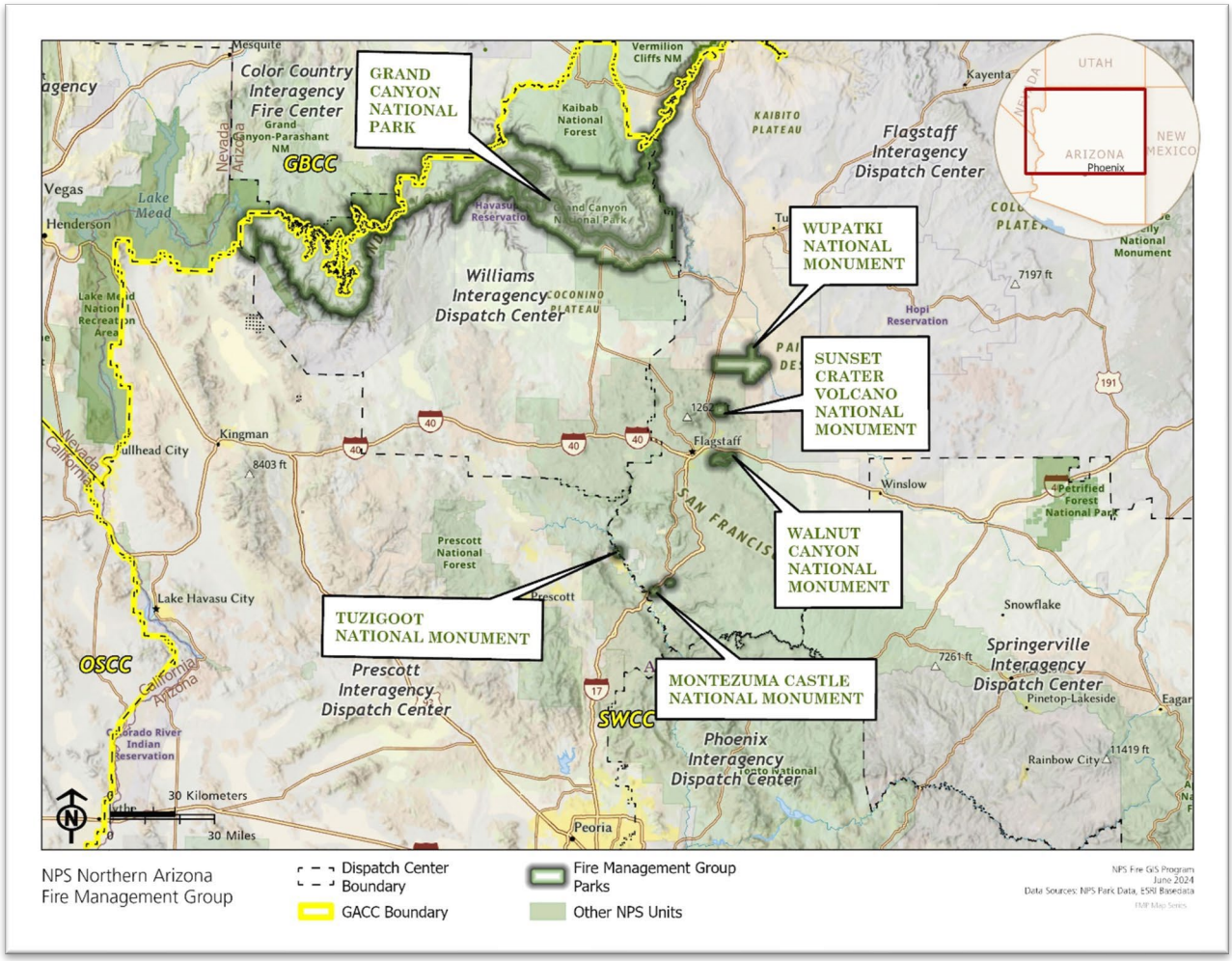

Figure 2. Overview Map of the Northern Arizona Parks Group Units

The organization of the park's fire management program helps to define areas of responsibility, provide clear direction and accountability, and further the development of a responsive fire management program. The Superintendent, Deputy Superintendent, Chief Ranger, and the Chief of Science and Resources Management also contribute to the management and implementation of the fire program.

Grand Canyon National Park has two districts, the North District associated with the North Rim of the park and the South District for the South Rim. Due to the geographical divide between the districts, the park's fire program is split into 2 operational units. See Figure 3 – Map of Grand Canyon National Park and the Kaibab National Forest. The two units also operate under an interagency agreement (refer to Appendix C) with the Kaibab National Forest (KNF), where the Grand Canyon National Park's South District and the KNF Tusayan Ranger District share tactical resources and logistical support. This also applies to the park's North District and the KNF North Kaibab Ranger District.

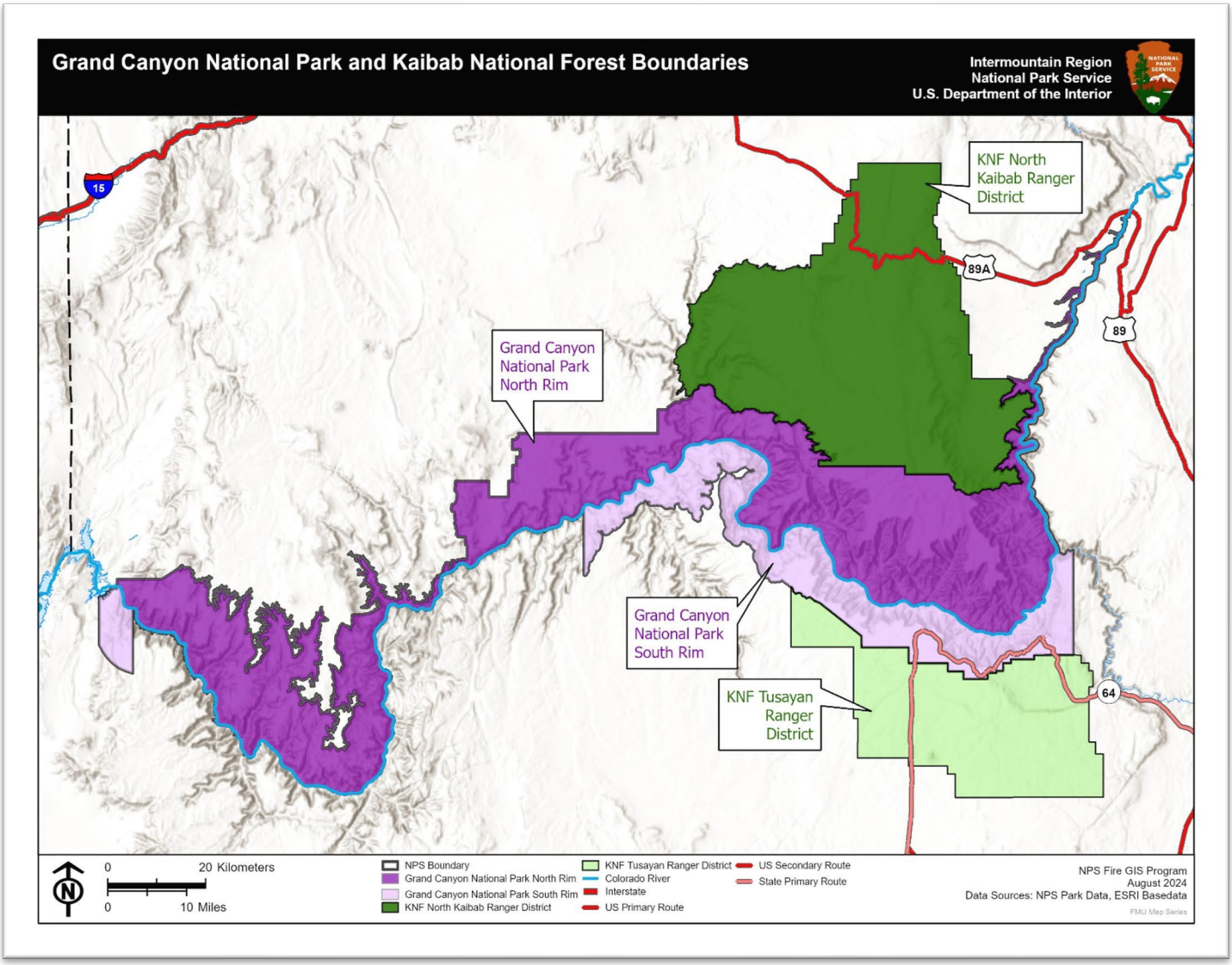

Figure 3. Map of Grand Canyon National Park and Kaibab National Forest

The Grand Canyon National Park Fire Management Officer (FMO) and Deputy FMO are based out of the South Rim. South District Fire resources include a NPS Interagency Fire Aviation Officer, the Grand Canyon Helitack Crew with two Exclusive-Use Type-3 Helicopters, and two Type-6 Wildland Fire Engines, housed at the South Rim Fire Compound. They operate under the NPS South District FMO. See Figure 4 – Grand Canyon National Park South District Organizational Chart. The park's wildland fire resources at the North District are integrated with the North Zone Interagency Fire program that operates under the North Zone (KNF) FMO. North Zone Interagency NPS Fire resources include a Wildland Fire Module, a Fuels Specialist, and a Fire Operations Technician. See Figure 5 – North Zone Interagency Fire Organizational Chart. Two NPS Fire Dispatchers work out of the Williams Interagency Dispatch Center in Williams, AZ.

The park's fire program is also supported by several zone-based employees. See Figure 6 – Other Grand Canyon National Park Fire Group Functional Organization. These include the Arizona Business Zone with a Zone Fire Budget Analyst, a Zone Fire Clerk (both located in Saguaro National Park), and a Zone Assistant Fire Business Clerk (in Grand Canyon National Park); the Northern Arizona Fire Ecology Group (a Fire Ecologist and Fire Effects Crew in Grand Canyon National Park); the Southwest Zone Fire Planner; and the Southwest Zone Fire GIS Specialist. The organizational charts below detail the park's Fire & Aviation Program and its integration with the Kaibab National Forest.

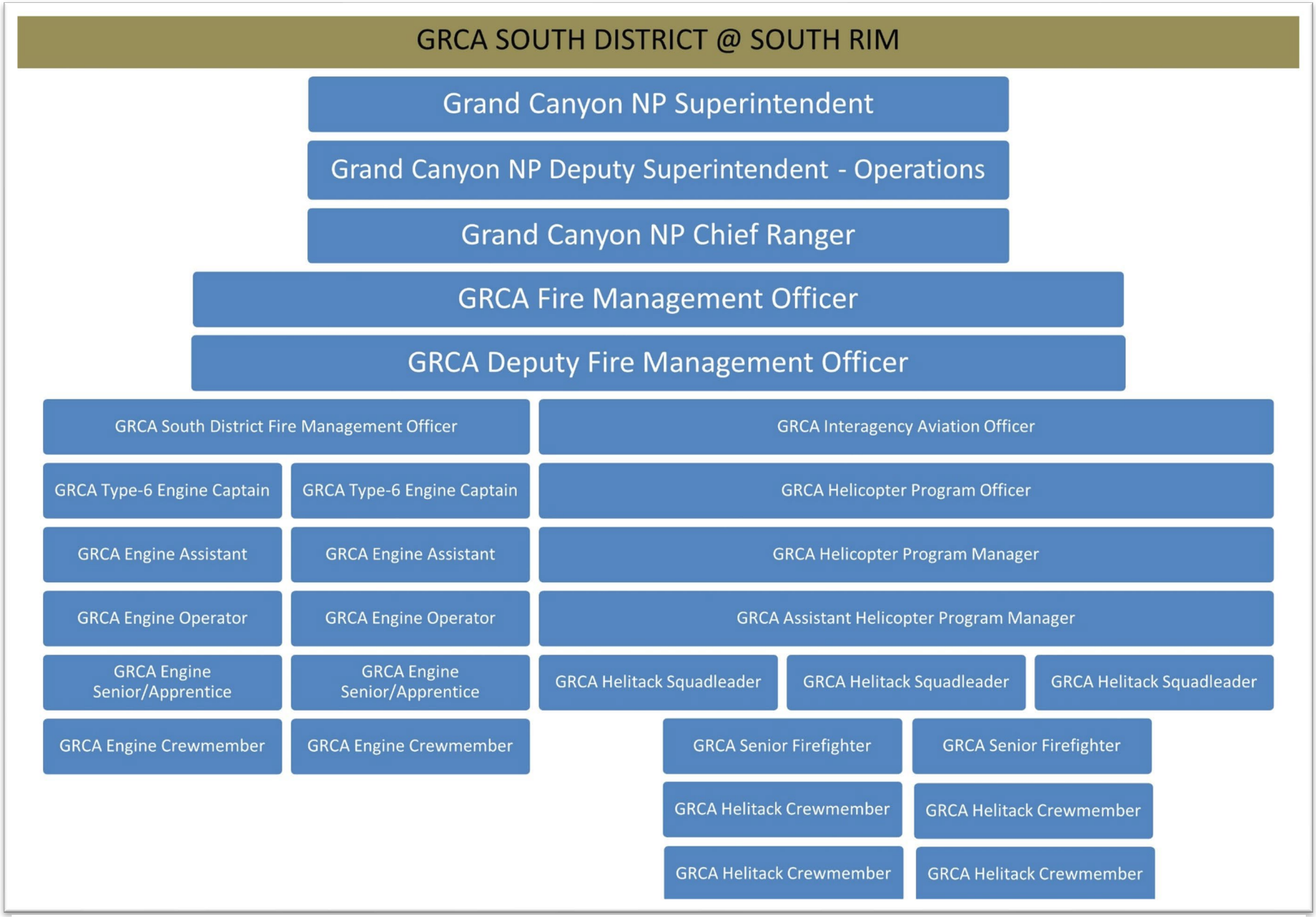

Figure 4. Grand Canyon National Park South District Organizational Chart

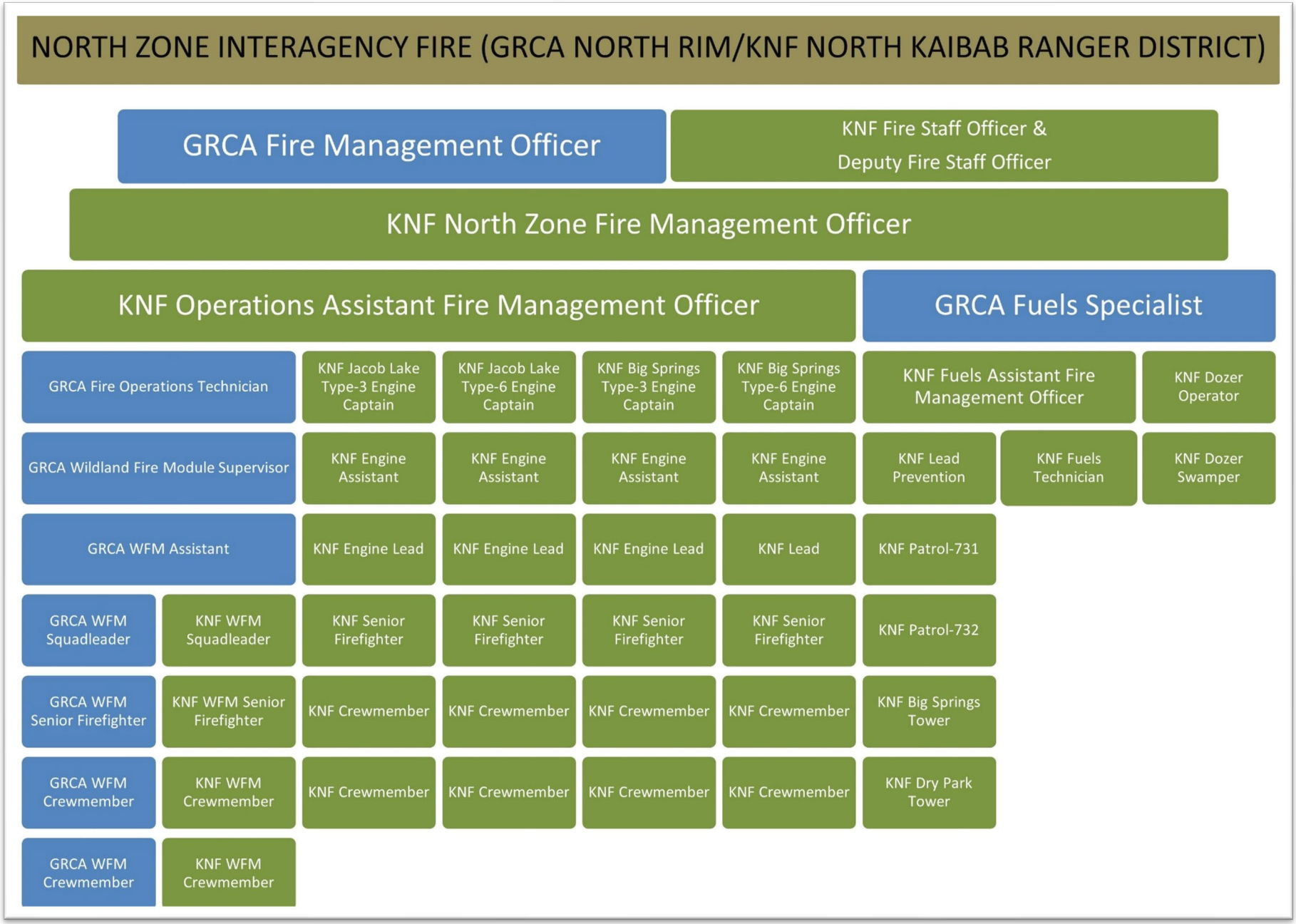

Figure 5. North Zone Interagency Fire Organizational Chart

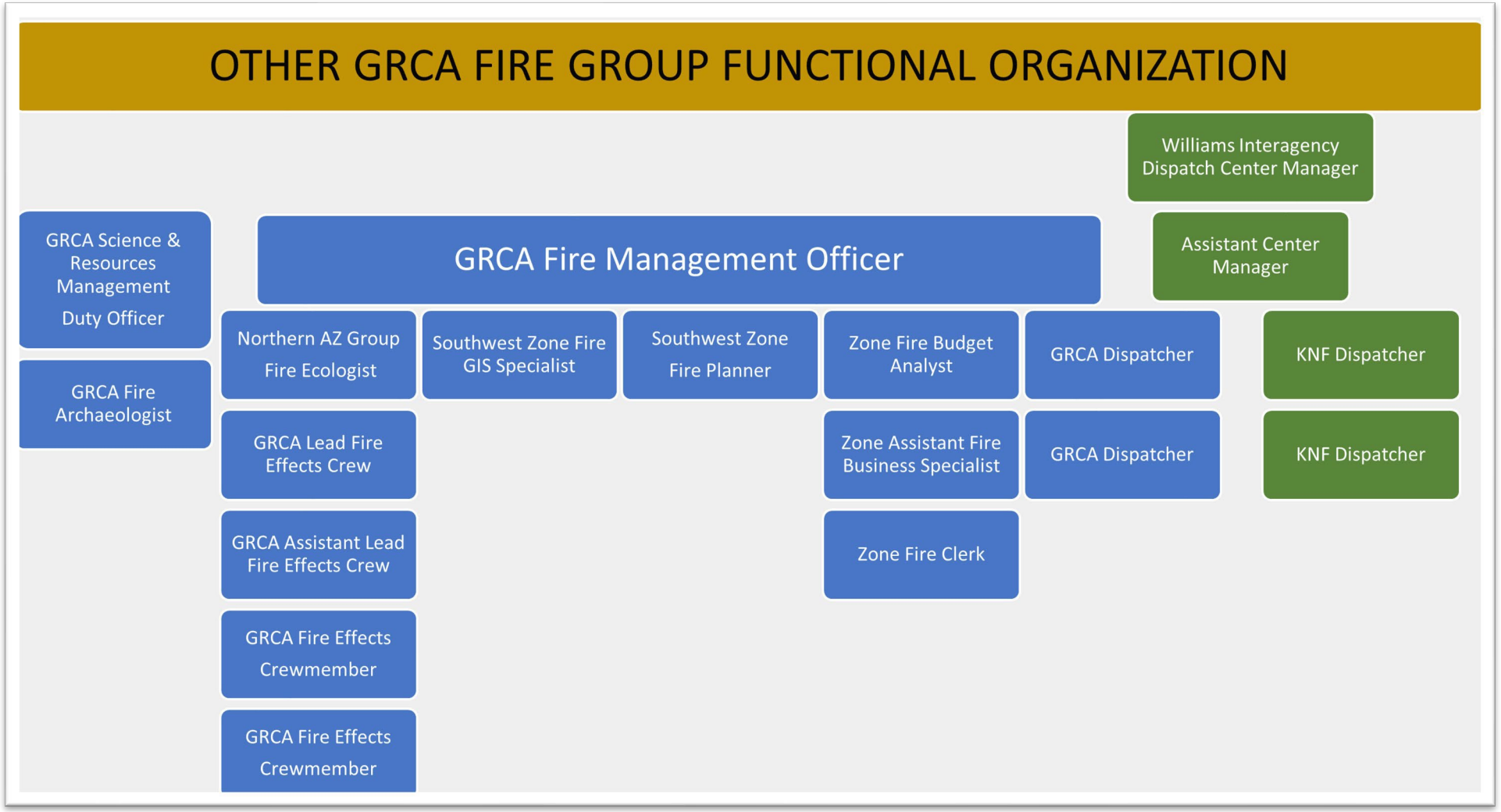

Figure 6. Other Grand Canyon National Park Fire Group Functional Organization

1.2 Fire Management Actions

Under the 2009 Guidance for Implementation of National Wildland Fire Management Policy, a wildland fire may be managed for one or more objectives and objectives can change as the fire spreads across the landscape. Objectives are influenced by changes in fuels, weather, topography; and involvement of neighboring land governmental jurisdictions having different missions and priorities. Grand Canyon National Park will manage fires, other than those determined to be human-caused, under both resource benefit and protection objectives. Initial action on human-caused wildfires will be to suppress the fire. All identified strategies will be considered available and will be informed by designated incident objectives. Wildfire objectives are expanded upon in Section 3.1 Management of Wildfires. The park's wildfire response will be coordinated with local partners, especially when there is potential for the fire to spread beyond NPS jurisdictions.

The basic goal of the fire management policies at Grand Canyon National Park is to meet resource management objectives while safeguarding public safety, cultural and natural resources, and private property. Fire management actions will reflect a commitment to safety, be cost-effective, and be designed to accomplish desired objectives. Prescribed fire (broadcast burning and pile burning) may be used to reduce fuel accumulation and meet other specific project objectives such as introducing fire where its disturbance has been absent. Non-fire fuel treatments are permitted within the park to minimize risk to life, property, and natural, historic, and cultural resources. This includes manual and mechanical treatments. These are further expanded upon in Section 3.2 Fuels Treatments.

1.3 Environmental Compliance

The Grand Canyon National Park Fire Management Plan's 2009 Final Environmental Impact Statement (EIS) describes and analyzes the potential environmental effects of the proposed action as presented in the FMP. The EIS Record of Decision (ROD) was signed by the Regional Director in 2010. The park's FMP Final EIS meets the requirements of the National Environmental Policy Act (NEPA), the National Historic Preservation Act (NHPA), and Section 7 of the Endangered Species Act (ESA). Consultation with the U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), Arizona State Historic Preservation Office (SHPO), Arizona Department of Environmental Quality, associated native communities/tribal governments, and the general public was conducted concurrently with public review of the EIS. The 2010 Final EIS ROD remains valid for the 2024 Grand Canyon National Park Fire Management Plan as the management strategies and actions have not changed and the affected environment remains the same. All planning documents associated with this FMP are available in the NPS Planning, Environment & Public Comment (PEPC) website in PEPC record 10959:

- Biological Assessment for the Grand Canyon National Park Fire Management Plan (05/27/2009).
- Biological Opinion for the Grand Canyon National Park Fire Management Plan (11/10/2009).
    - Threatened & endangered species evaluated: Mexican Spotted Owl and Mexican Spotted Owl Critical Habitat, Sentry Milk-Vetch, Kanab Ambersnail, Humpback Chub and Humpback Chub Critical Habitat, Razorback Sucker and its Critical Habitat, California Brown Pelican, Yuma Clapper Rail, Southwestern Willow Flycatcher, Desert Tortoise, California Condor, Yellow-Billed Cuckoo, and Relict Leopard Frog.
- Programmatic Agreement By And Among the National Park Service, Grand Canyon National Park and the Arizona State Historic Preservation Officer

Regarding the Fire Management Plan At Grand Canyon National Park (07/20/2009 - FMP PA duration is 15 years)

- Grand Canyon National Park Fire Management Plan Final Environmental Impact Statement and Record of Decision (01/10/2010).
- Grand Canyon National Park Office of Planning and Compliance – Letter of Authorization (06/10/2010)
- Memo to File – Federal Wildland Fire Management Policy Guidance Update and Terminology for Grand Canyon National Park's Fire Management Plan (04/23/2013)
- Amendment to Programmatic Agreement By And Among the National Park Service, Grand Canyon National Park and the Arizona State Historic Preservation Officer Regarding the Fire Management Plan At Grand Canyon National Park (01/24/2014)
- Grand Canyon National Park Office of Planning and Compliance – Revised Letter of Authorization (06/16/2016)
- Grand Canyon National Park Minimum Requirements Decision Guide Workbook – Management of Wildfires at Grand Canyon 2020-2025 (09/23/2020)
- Grand Canyon National Park Minimum Requirements Decision Guide Workbook – Implementation of prescribed fire preparation and operation at Grand Canyon 2020-2025 (08/27/2020)
- The 2009 Programmatic Agreement By And Among the National Park Service, Grand Canyon National Park and the Arizona State Historic Preservation Officer Regarding the Fire Management Plan At Grand Canyon National Park expired on 07/20/2024. The park will continue to send Cultural Resources Pre-season and Post-season Fire Reports to SHPO and tribes for Section 106 consultation. Any fire projects not covered by the Pre-season Report will be sent to SHPO and tribes and Section 106 consultation. A new Programmatic Agreement is currently being drafted.

Planned treatments implemented under this programmatic plan will be specifically evaluated to ensure all NEPA/NHPA/ESA requirements have been addressed. If projects outside of the scope of the EIS are necessary, additional NEPA/NHPA/ESA consultation and documentation will be completed.

1.4 Park Unit/Resource Management Planning

This FMP is intended to facilitate the accomplishment of park management goals and objectives identified in the following planning documents:

- Grand Canyon National Park General Management Plan (August 1995)

  The park's General Management Plan (GMP) outlines a vision for managing park resources and visitor experiences. It provides overall direction for park management, but most of the specific actions for implementation are provided through subsequent planning efforts and additional management plans, such as this FMP. The FMP objectives were developed by an interdisciplinary team to support the General Management Plan objectives. Consistent themes within the GMP reflect the value of protecting, preserving, and maintaining natural and cultural resources, processes, and landscapes through inventory, monitoring, research, and action to enable informed decision-making and interpretive opportunities for visitor enjoyment. The Fire Management Plan's strategic objectives and management goals support the underlying values of park management in protecting people, facilities, and resources and also

using wildland fire as a tool in specific circumstances that allow for improvement of wildlife habitat and other natural systems.

- Grand Canyon National Park Resource Management Plan (1997)

  In the park's Resource Management Plan, "restoration of a natural fire regime" was listed as one of 11 Overarching Issues facing Grand Canyon National Park. Overarching issues were defined as, "…broad-spectrum issues that affect more than one resource." The park's FMP goals directly align with the Resource Management Plan's objectives pertaining to fire as a natural process in the park. Both documents address the safety to people and property, using fire as a natural tool for forest and resource restoration, maintaining collaboration with partners such as tribal governments and other agencies with effective communication, and promoting science and monitoring fire effects.

- Grand Canyon National Park Foundation Document (September 2017)

  The foundation document is a presentation for all kinds and levels of future planning to coordinate from a single, shared understanding of what is most important about the park. Biodiversity and natural processes are considered fundamental values and it is noted how decades of fire suppression have likely altered forest communities in the park. Integrating valid and current science into fire management actions, the FMP supports the foundational goals of habitat restoration, protection, resource productivity, and a return to healthier forest ecosystems.

1.5 Collaborative Planning

This FMP and its EIS used a collaborative process utilizing an interdisciplinary team approach consisting of members of Grand Canyon National Park, the U.S. Forest Service, Arizona Department of Environmental Quality, U.S. Fish & Wildlife Service, associated tribes, interested public, and the NPS Intermountain Region. The park's staff rely heavily on collaboration with neighboring fire management resources as opportunities exist to work with local, tribal, county, state, and federal agencies in meeting the fire and resource objectives.

Grand Canyon National Park is a member of the Northern Arizona Area Board for fire and aviation coordination along with the Bureau of Indian Affairs; Hopi, Navajo, Hualapai, and Havasupai Tribes; Arizona Department of Forestry and Fire Management; Coconino and Kaibab National Forests. The park's fire program has developed cooperative and beneficial partnerships with wildland divisions within the Highlands, Pinewood, Flagstaff, and Tusayan Fire Departments in and around Flagstaff and Tusayan, Arizona. Firefighter support from these departments is depended on for wildfires and prescribed fire projects.

The fire management actions and collaborative partnerships described in this plan follow the goals of the National Cohesive Wildland Fire Management Strategy (Cohesive Strategy, updated 2023) which established a framework to restore and maintain ecosystem health in the fire-adapted ecosystems and to protect identified communities at risk. The Cohesive Strategy is an interagency effort to work together among stakeholders and across landscapes to progress towards three goals:

1. *Resilient Landscapes* – Landscapes, regardless of jurisdictional boundaries are resilient to fire, insect, disease, invasive species and climate change disturbances, in accordance with management objectives.
2. *Fire-Adapted Communities* – Human populations and infrastructure are as prepared as possible to receive, respond to, and recover from wildland fire.

3. *Safe, Effective, Risk-based Wildfire Response* – All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions.

Grand Canyon National Park fire staff will work alongside resource managers and neighboring agencies to achieve the goals stated in the Cohesive Strategy.

1.6 Communication and Education

Providing timely and accurate information related to fire management activities is a key strategy for gaining public support and educating park staff, visitors, and neighbors. Grand Canyon National Park is dedicated to effectively communicating fire prevention and emergency incident information to all affected communities and the general public, including non-English speaking, deaf or hard of hearing, and other populations.

The fire program participates in developing fire interpretation and educational programs designed to address aspects of the fire management program including smoke, aircraft noise, temporary closures, manual/mechanical treatments, prevention of invasive exotic plant species, and other resource topics. The fire program also assists in providing information to visitors about closures and restrictions. This is employed through collaboration with the Division of Interpretation and Education, the Division of Communications, Partnerships, and External Affairs, the Division of Science and Resource Management, and other park divisions.

Fire communication and education will be an ongoing strategic effort. In addition to providing timely and accurate information during incident response, the park will promote communications planning and foster understanding and support among staff, visitors, neighboring communities, and partners for the wildfire, prescribed fire, fuels management, fire prevention, and aviation programs. NPS Regional Fire Communication and Education Specialists are available to assist fire programs with fire prevention and education materials and support.

Additional information can be found in Reference Manual (RM) -18, Chapter 20, Communication and Education.

2.0 WILDLAND FIRE PROGRAM MANAGEMENT GOALS AND OBJECTIVES

The Grand Canyon National Park Fire Management Program will respond to all wildland fires based on an assessment of values at risk, potential resource management objectives, and possible consequences to firefighter and public safety and welfare. A community-based approach to wildland fire issues will involve close collaboration and cooperation with neighboring agencies that have a vested interest in wildland fire issues. These principles will also guide the planned application of prescribed fire and non-fire fuels reduction treatments throughout the park.

2.1 Goals and Objectives

The Grand Canyon National Park Fire Management Program has identified goals to achieve desired future conditions related to the ecological role of fire; the protection of resources, life, and property; enhancement of interagency cooperation and community involvement; the use of adaptive management for continuous improvement; and the effective management of personnel and resources. Each of the FMP's goals has specific objectives that guide activities in the park's Fire Management Units (refer to Section 3.1 – Management of Wildfires).

GOAL 1: Protect human health and safety and private and public property.

- Conduct wildland fire management activities with the most current risk assessment and mitigation techniques available to protect firefighter and public safety.
- Create and maintain defensible space using fuel treatments for real property and infrastructure within the park.
- Minimize smoke impacts on human health.
- Provide fire management workforce with the best available training, equipment, operating procedures, safety measures, and information needed to manage risks and perform activities safely.

GOAL 2: Restore and maintain park ecosystems in a natural, resilient condition.

- Incorporate the use of wildland fire through prescribed fire treatments and managing wildfire with resource benefit objectives when conditions and safety allow, to continue the ecological processes that are needed to maintain the integrity of vegetation communities.
- Restore ecosystems that are not within the range of natural variability to desired conditions and maintain them through natural processes within policy constraints.
- Set priorities for treatment activities based on site-specific information including departure from natural fire return intervals, desired conditions, and other relevant factors.

GOAL 3: Protect the park's natural, cultural, and social values.

- Utilize Resource Advisors and/or resource specialists to advise on all fire management activities that pose a threat of degradation to natural or cultural resources.
- Use fire management tools and techniques to maintain and restore certain cultural landscape areas and protect other cultural resources while minimizing adverse effects from fire and fire management activities. Use non-fire fuel treatments in areas where risks and constraints associated with wildfire response are high.
- Conduct fire management activities in the proposed wilderness in a manner that will not diminish suitability for designation or result in changes to the current wilderness proposal.
- Incorporate fire management objectives for reducing impacts to wilderness values, cultural and soil resources, and limiting the spread of invasive species to inform fire responses and tactics.
- Minimize smoke impacts on air quality values including visibility.

GOAL 4: Promote a science-based program that relies on current and best-available information.

- Promote research that will help understand the park's fire regimes, refine prescriptions, provide data for fire analyses, and effectively implement the park's fire management program.
- Monitor and evaluate fire management activities (wildfires, prescribed burns, fuel reduction treatments) to assess effects on natural and cultural resources and social values, and incorporate observations utilizing an adaptive management approach in refining a range of ecologically sound, climate-adapted, fire and resource management objectives.
- Update management strategies to address fire return interval departures, desired conditions, fire treatment priorities, and prescriptions as new relevant data become available.

GOAL 5: Educate, inform, consult, and collaborate with tribes, stakeholders, and the public.

- Maintain relationships and communication with Native American tribes to exchange learning about fire management and indigenous knowledge.
- Develop and implement a proactive process that disseminates current and accurate information to the public, park employees, media representatives, and cooperators that encourages support of the Fire Management Program. Planned fire activities will include communications planning commensurate with the complexity and risk associated with the activity/project.
- Conduct wildland fire prevention, education, and other activities in communities within and adjoining the park. Work in collaboration with local communities, county, state, and federal fire agencies with fire-management interests.
- Develop interpretive displays and educational programs, working with the other Grand Canyon National Park Divisions, to foster understanding and acceptance of the fire management program.

3.0 WILDLAND FIRE OPERATIONAL GUIDANCE

The Interagency Standards for Fire and Fire Aviation Operations (Red Book) describes national wildland fire policy. The Red Book is updated annually and references very detailed and specific language for wildfire response. The Reference Manual (RM) - 18, Wildland Fire Management (2019), provide policy for the National Park Service. Fire management activities that use aviation resources will be conducted in accordance with applicable guides, handbooks, and Reference Manual-60, Aviation Management. Wildland fire personnel conducting non-fire management missions will follow RM-60. Wildland fire mission support is the primary purpose for NPS wildland fire funded aircraft. Utilization and movement of these aircraft is governed by Regional and National Mobilization Standards and must be coordinated with relevant stakeholders at park, region and national office levels through fire duty officers. The Grand Canyon National Park FMP assumes conformity with agency and national policy in all actions and serves to provide locally specific guidance.

3.1 Management of Wildfires

Grand Canyon National Park's primary fire and resource management direction informs eight Fire Management Units (FMUs). An FMU is a non-overlapping geographical extent that defines an area within a land manager's jurisdiction with a specific set of objectives. Defining features include topography, access, values-to-be-protected, fuel types, or major fire regime groups, that set it apart from management characteristics of an adjacent unit. Vegetation communities were the primary basis for developing the eight FMUs. The Grand Canyon National Park FMUs are known as Kaibab Summit, Plateau, Peninsulas, Fire Islands, Backcountry Uplands, Primary WUI, Secondary WUI, and Inner Canyon. See Figure 6 – Grand Canyon National Park FMU Map. There is also parkwide direction for fire response common to all of the FMUs.

All fire management actions will be based on the location of the fire and the potential to impact or benefit the park and adjacent land values, considering firefighter and public safety as the highest priority. The response to wildland fire may range across a spectrum of tactical options (monitor, point/zone protection, confine, contain, etc.) and will consider the objectives and strategies allowed in the eight Fire Management Units. Actions will be decided on a case-by-case basis with participation from the park's Resource Advisors and/or resource specialists. All human-caused fires will receive an initial response to suppress the fire in the safest manner with the least impact to park values. Thinning and reduction of dead-and-down fuels and some live fuels along roads, trails, and firelines may occur during wildfire incident management.

Grand Canyon National Park Fire Management manages all wildfires while considering the objective to protect the following park-wide values. Values-driven wildfire response is the backbone for successful implementation of fire management decisions in all of the park's Fire Management Units.

- Protect each FMU's associated *Fire Exclusion Areas* (listed under each FMU descriptor) and any real property from direct wildfire impacts and from fire management activities outside of the scope of preventing wildfires from burning to Fire Exclusion Areas.
- Protect the boundaries with adjacent land jurisdictions including Kaibab National Forest, Bureau of Land Management, Lake Mead National Recreation Area, Grand Canyon-Parashant National Monument, Navajo Nation, Havasupai Reservation, Hualapai Reservation, etc. Wildfire strategies depend on collaborative communication with other agencies during wildfire planning and decision processes.
- Protect federally listed threatened and endangered species, species of special concern, and their habitat. Consulting with Resource Advisors and/or resource specialists is a critical component that influences fire management actions.
- Protect cultural resources. Consult with Resource Advisors, Archeologists, and/or cultural specialists to minimize impacts and/or avoid cultural sites during any wildfire activities.
- Protect air-quality-related values such as clean air for public health and safety and clarity as a visual consideration. This objective may inform actionable wildfire strategies and/or may be indirect with air quality monitoring and reporting.
- Protect, maintain, and/or enhance park wilderness. Minimum Impact Strategy and Tactics (MIST) is the foundation for all wildfire actions. Consult with Resource Advisors and /or resource specialists with the park's Resource Advisor Guide for park-specific MIST.

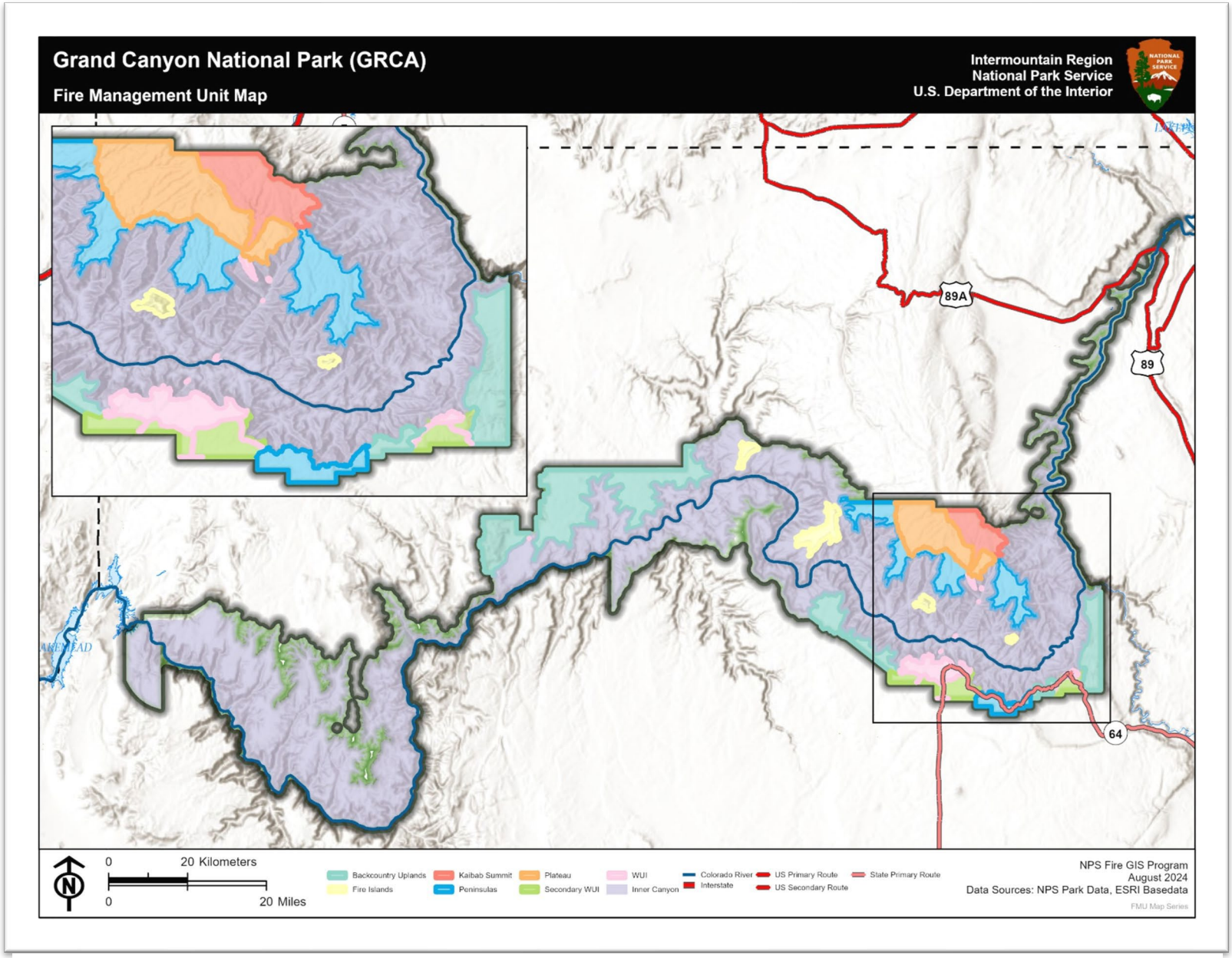

Figure 7. Grand Canyon National Park Fire Management Units Map

Kaibab Summit FMU (15,879 acres, 1.33% of the park)
The Kaibab Summit FMU includes the park's highest elevations in its North District. The vegetation mainly consists of mixed conifer forest with spruce, fir, and aspen, along with some ponderosa pine and interspersed meadows. This area contains one of the largest relict spruce-fir ecosystem in Arizona. Access is limited with primarily bordering roads such as Arizona Highway 67, the Scenic Road, and U.S. Forest Service dirt roads. The interior is only accessible on foot or from the air. There are heavy fuel loads, few water sources, limited helispots, few natural fuel breaks, and the area is remote.

Wildfires may be managed for multiple objectives including enhancement of wildlife habitat, reduction of tree densities, reduction of total fuel loads, increasing aspen abundance, etc. Managing wildfire that results in mosaic landscape fire effects is important to maintain and enhance spruce-fir, mixed conifer forests, and Mexican Spotted Owl potential habitat. Suppression strategies may be used to meet protection objectives, especially to minimize the amount of high and moderate-high severity fire effects and to protect the FMU's *Fire Exclusion Areas*:

- North Rim Entrance Station
- Lindbergh Hill Remote Automated Weather Station (RAWS) Site
- North Rim Fire Lookout

Plateau FMU (32,564 acres, 2.73% of the park)
The Plateau FMU consists of the southern slope of the Kaibab Plateau in the North District. Forests include spruce-fir, mixed conifer and ponderosa pine with meadows and aspen stands scattered throughout. The FMU contains some of the best examples of these vegetation types in the state, thus emphasizing the importance of restoration and maintenance of ponderosa pine ecosystems within mixed conifer forests. There are heavy fuel loads, few water sources, limited helispots, few natural fuel breaks, and the area is remote. Access to the Plateau FMU is from dirt roads along its boundaries and Arizona Highway 67 at its eastern border. Access to the Plateau FMU interior is either on foot or from the air.

Wildfires may be managed for multiple objectives including enhancement of wildlife habitat, reduction of tree densities, reduction of total fuel loads, increasing aspen abundance, etc. Managing wildfires in mixed-conifer forest structure depends on strategies that allow for mixed severity fire and mosaic landscape fire effects. Suppression strategies may be used to meet protection objectives, especially to minimize the amount of high and moderate-high severity fire effects and to protect the FMU's *Fire Exclusion Areas*:

- Adjacent North Rim Developed Area
- Kanabownits Fire Lookout
- North Rim dynamite cache (Marble Flats)
- North Rim Shooting Range

Peninsulas FMU (48,807 acres, 4.09% of the park)
The Peninsulas FMU is found in both the North and South Districts. The included areas are dominated by ponderosa pine stands with multi-aged oak and locust thicket understory. This FMU exhibits restored open ponderosa pine understory due to past management of wildfire. This FMU also exhibits areas of heavy fuels, limited water sources, and limited escape routes, but there are several known helispots. Access to the Peninsulas FMU is via paved roads, including Cape Royal Road and Desert View Drive. Point Sublime and Swamp Ridge peninsulas are accessed via dirt roads. Otherwise, access is by foot or air.

Wildfires may be managed for multiple objectives including enhancement of wildlife habitat, reduction of tree densities, reduction of total fuel loads, increasing aspen abundance, etc. Suppression strategies may be used to meet protection objectives, especially to protect canyon-viewing platforms and the FMU's *Fire Exclusion Areas*:

- Nearby North Rim Developed Area
- North Rim Forest Restoration Plots
- Kanabownits Cabin
- Hance Air Quality Station
- Greenland Lake Cabin
- Historic Grandview Entrance Station

Fire Islands FMU (13,454 acres, 1.13% of the park)
The Fire Islands FMU consists of four isolated mesas or plateaus, surrounded by the Grand Canyon. Vegetation ranges from ponderosa pine to pinion-juniper. This FMU contains topographically isolated relic ecosystems with unaltered fire regimes and is considered an important scientific resource and ecological benchmark. This area is remote with difficult access. Aside from a single foot-trail to Powell Plateau, access to the Fire Islands FMU is from the air.

Wildfires will be managed for resource benefit objectives using a monitoring strategy. There is very little potential for wildfire to spread beyond the mesa tops. There are no fire exclusion areas in the Fire Islands FMU.

Backcountry Uplands FMU (119,069 acres, 9.98% of the park)
Backcountry Uplands is the park's lowest elevation forested FMU, and the most fragmented. Vegetation communities include piñon-juniper woodlands, sagebrush meadows, juniper savannas, and limited stringers of ponderosa pine. The area is remote with long access routes and limited water resources. Access to some of these areas is by a network of remote dirt roads and trails, otherwise by air.

Wildfires may be managed for multiple resource objectives. Suppression strategies may be used to meet protection objectives, especially to protect canyon-viewing platforms and the FMU's *Fire Exclusion Areas*:

- Signal Hill Lookout
- Pasture Wash Ranger Station

Primary WUI FMU (14,611 acres, 1.22% of the park)
The Primary WUI FMU consists of eight sections of the park's most important infrastructure clusters and high-use public visitation locales on the North and South Districts. Management for resource benefit objectives in this FMU is not permitted. The overall intent within the Primary WUI FMU is to protect life and property in its natural setting.

All wildfires will be managed for protection objectives. Suppression strategies and tactics will be used, especially in the immediate proximity to developments, utilities, hazardous materials, and the FMU's *Fire Exclusion Areas*:

- North Rim Developed Area
- CC Hill
- Grand Canyon Village
- Supai Camp
- Hermits Rest
- Abyss Air Quality Monitoring Site

- Yaki Point – South Kaibab Trailhead
- Hopi Point telecommunications site
- South Rim Shooting Range
- Desert View
- Tusayan Museum and pueblo ruin
- Havasupai Garden
- Phantom Ranch
- Cottonwood Campground
- Tusayan Ruins and Museum
- Roaring Springs residence and pump house

Secondary WUI FMU (15,188 acres, 1.27% of GRCA)
The Secondary WUI FMU is on the South Rim's geographic Coconino Plateau, split between two sections, the area south of Grand Canyon Village and the area southwest of Desert View. Access to both sections is provided by a network of public, administrative, and U.S. Forest Service roads. The Secondary WUI FMU is managed to provide a protection buffer to the Primary WUI FMU.

All wildfires will be managed for protection objectives. The primary objective is to augment WUI protection within the surrounding natural ecosystem using fuels treatments. Suppression strategies and tactics will be used, especially in areas near developments, utilities, and hazardous materials. There are no fire exclusion areas in the Secondary WUI FMU.

Inner Canyon FMU (933,032 acres, 78.23% of Park)
The Inner Canyon FMU includes all areas below the rim that are not already associated with the other FMUs. The terrain is rugged and steep with generally discontinuous fuels. Vegetation ranges from forest types similar to above the rim environments to various desert woodland species and shrubs, and riparian communities near water. These areas are very remote with few water resources. Access to the Inner Canyon FMU is by foot or air.

Wildfires may be managed for multiple resource objectives. Maintaining native ecosystems and considering susceptibility to exotic plant conversions within the Inner Canyon is important. Wildfires may have protection objectives, especially to protect the FMU's *Fire Exclusion Areas*:

- Private inholdings (near Asbestos Canyon and Vulcan's Throne)
- Havasupai Garden
- Phantom Ranch
- Cottonwood Campground
- Lees Ferry
- Muav Saddle Cabin
- Tuweep Ranger Station and campground
- Roaring Springs residence and pump house

Generally, ground-based suppression actions cannot be safely accomplished below the rim due to extremely steep and rugged terrain with limited viable escape routes and safety zones. This limitation will drive many response decisions in the Inner Canyon.

3.1.1 Wildfire Response Planning

Expected Fire Behavior

Fire behavior at Grand Canyon National Park varies depending on fuel types, topography, and environmental conditions. It can range from short duration with high rates of spread in light flashy fuels located in the inner canyon, up to long duration with extreme fire behavior characteristics in the mixed-conifer fuel and spruce-fir types on the North Rim. The park's fire season generally begins in early April on the South Rim and over a month later on the North Rim's higher forested areas, and then ends in the fall of late September through early October.

The four main types of forests on the Grand Canyon National Park landscape are spruce-fir, ponderosa pine, mixed-conifer, and piñon-juniper woodlands. Spruce and fir forests can have low to moderate intensity surface fire when fuels moistures are high, but then are notorious for group torching, crown fires, and long-range spotting when wind, slope, and low fuels moistures align. Mixed-conifer forests have a similar spectrum of fire behavior. The spruce-fir component in mixed-conifer forests, when combined with monsoonal cold fronts' gusty winds, supports the potential for extreme fire behavior that leads to large fire growth. Fire containment can be difficult in this environment and often requires aerial resources and indirect confinement tactics with intensive removal of thick dead and down fuels accompanied with a burn out or backburn.

Fire behavior in ponderosa pine forests consists of surface fire with low to moderate flame lengths and rates of spread, and limited isolated torching. Direct strategies for confinement are usually successful. The park's piñon-juniper woodland fires are often from single-tree lightning strikes followed by moisture, limiting fire spread to a small area, usually with isolated torching and rapid, but limited surface fire spread depending on the continuity of grass and shrub ground fuels. Dry fuels, high-winds, and low precipitation can move wildfire rapidly through these woodlands resulting in active crown fire and high flame lengths that prevent direct ground attack. Often only aerial resources can be used on the active head and flanks. Once the wind dies down, fire behavior significantly decreases, then on-the-ground fire resources can go direct.

The following fuel and weather criteria have been identified as critical local thresholds. If combined, they can greatly increase fire behavior:

- 20' wind speeds over 10 mph (North Rim), over 15 mph (South Rim)
- Gust speeds over 15 mph (North Rim), over 30 mph (South Rim)
- Relative humidity values below 15% (North Rim), below 12% (South Rim)
- Temperature above 70°F (North Rim), above 75°F (South Rim)

Historical climate data shows that the Grand Canyon National Park area has warmed significantly over the period of 1895-2020, with the greatest increase in temperature during the 1970-2020 period (Lawrence et al. 2024). Annual average precipitation throughout the area did not change significantly over this time period. Increases in annual average temperatures have been attributed to human factors such as greenhouse gas emissions and deforestation that have accelerated environmental observed changes.

Drought in the Southwestern U.S. has reduced soil moistures to record low levels. The increasing temperatures and associated drought have reduced the Colorado River flow. The reduction is due to decreased winter snowpack, thus decreasing seasonal water run-off and the increase of evapotranspiration of the water that remains. Heat and aridity have played a factor in the decline of tree regeneration and tree mortality. Post-fire

regeneration of low-elevation ponderosa pine and Douglas-fir seedlings in the western U.S. were reduced by half from 1979-2015 and there has been a 50% decline in pinyon pine and juniper populations (Lawrence et al. 2024). Areas burned by wildfire across the U.S. from 1984 to 2015 have also doubled (Lawrence et al. 2024).

The National Park Service's Natural Resource Report - Historical and Projected Climate Change for the Grand Canyon National Park and Surrounding Areas, examines projection models of two possible climate futures for the park, of "Warm Wet" and "Hot Dry," both characterized at mid-century (2040-2069) and late-century (2070-2099) timeframes (Lawrence et al. 2024). Both climate futures projections generally show increasing temperatures with more extremely warm days and a decline in days below freezing per year. Days with snow per year will also decline. The implications of these projections point to a rise in landscape dryness that is also associated with vegetation stress. Combined, the modeled climate patterns result in tipping the scale further toward highly receptive wildland fire conditions. Across future climate scenarios, an increase in the frequency and intensity of extreme events is expected, including drought and heat, but also including precipitation events (Climate Change Response Program 2024). This means increases in the frequency and severity of fire weather conditions. However, it also means increases in rapid rainfall and snow melt, increased flooding, and, without pro-active measures, increased erosion after fire and fuels treatments, and reduced residence time of moisture in the ground where it is available for vegetation.

Projected future risks include exacerbation of already ongoing shifting environmental conditions mentioned such as drought, hydrology alterations, and tree mortality. Zones of forest and plant communities have the potential for shifts, which may require revisions to feasible desired conditions in certain areas. Data from fire effects plots reflects this reality, demonstrating changes in some vegetation types due to fire frequency and severity since 2000. Type conversion of forests to non-forest zones has been identified as a product of increases in high-severity wildfires and expected increases in plant pests, pathogens, and invasive species (Climate Change Response Program 2024). Plant composition will be modified by disturbances and transforming environments. Early seral species and exotics may take the places of native plants and create more continuous and more ignitable fine fuels, changing landscape flammability (McKenzie et al 2004). Soil and fuel moisture will also be altered. The moisture content of woody debris and live plants will respond to drought and burn more readily, contributing to landscape receptivity to wildfires. Prescribed burn windows are also expected to narrow and shift (Swain et al. 2023). Changes to expected conditions have implications for park goals, and how the Fire & Aviation Program will work to meet them.

Due to these conditions, risks to firefighters, the public, cultural and natural resources, and property can be expected to increase under hotter and drier conditions. Developed areas at the park are distributed in a blend with burnable vegetation with varying accessibility, compounding the challenges for wildland fire responders. Archeological and historic cultural resources are vulnerable to fire and postfire erosion. Mature and established forest and plant communities, which provide important wildlife and habitat resource values, could continue to decline.

In accordance with NPS Policy Memorandum 24-03, the park's Fire and Aviation and Science & Resource Management Programs are jointly undertaking a "Grand Canyon Climate Change Planning for Ecosystems" process, focusing on forests as the first ecosystem for evaluation. This process will interpret the climate projections for the

Grand Canyon region (Lawrence et al. 2024; Climate Response Program 2024) into specific expected effects on the ecosystem and resources, summarize the science on individual adaptation strategies (advantages, risks, when/where they are recommended), and engage park subject matter experts in decision making around how park goals and strategies can best be refined and revised. The park will utilize the National Park Service's Climate Change Response Strategy 2023 Update (National Park Service 2023) cornerstones (Understand, Adapt, Mitigate, Communicate), and Resist- Accept-Direct framework (Schuurman et al. 2020) to guide this planning process. The park will also utilize existing examples from other parks (such as Schuurman et al. 2024) and additional guidance being developed by the NPS Fire Climate Working Group (such as draft Wildland Fire Climate Best Management Practices) to inform this effort. Results will be incorporated into future versions of this and other park management plans, planning, and appropriate compliance processes. Data and research across many parts of the ecosystem (such as on microbiota, invasive species, plant drought resilience, and soil moisture) will be considered in concert with site histories, management actions, fire severity and history and Indigenous input whenever possible, to leverage actions and resources in an ecosystem approach (e.g. Naumann et al. 2011). Fortunately, Grand Canyon National Park has a long history of managing natural ignitions for resource objectives and has treated a majority of its landscape with multiple entries of wildfire and prescribed fire. Fuels treatments will use data on fire effects and ecosystem outcomes with adaptive management to track treatment effectiveness as the fire environment changes. Maintaining defensible space around structures and other highly valued resources and assets will be increasingly important for meeting the goals of this FMP and continuing to build upon the fire program's legacy.

Initial Response Procedures

The current Fire Danger Operating Plan (FDOP) used within the Northern Arizona Zone informs breakpoints for preparedness planning (see Appendix D). The Initial Response Plan (see Appendix D) outlines how resources will be dispatched to reported incidents based on location and current conditions. See Red Book, Chapter 10, Preparedness for the most current direction and reference current Initial Response direction in RM - 18, Chapter 2, Managing Wildland Fire, and Red Book, Chapter 11, Incident Management and Response.

The Incident Organizer (see Appendix J) includes an Initial Fire Size-up to be completed by the first resources on-scene of a fire and communicated to Williams Dispatch and the Zone Duty Officer. Each response to a reported fire will receive one or more management strategies approved by the Park Duty Officer and/or Park Superintendent. The type of wildfire resource response is outlined in the Initial Response Plan (Appendix D) based on the North Zone and South Zone daily preparedness levels. Refer to Section 3.1 – Management of Wildfires for more information on strategies.

Transition to Extended Response

A fire transitions to an extended response when:

- it exceeds the initial response and when the initial management objectives for the fire have not been successful, or
- if it has not been contained by initial resources dispatched to the fire and an alternative strategy is needed over initial control efforts, or
- the fire exceeds management capabilities assigned to the fire, or
- the fire has not been contained within the first 48 hours and there is no reasonable estimate of containment or control.

In those cases where initial actions taken on a wildland fire remain unsuccessful, a new course of action will be developed utilizing the Wildland Fire Decision Support System (WFDSS). The Zone Duty Officer in coordination with the Incident Commander and the Agency Administrator will utilize the Wildland Fire Risk and Complexity Assessment, PMS 236 to formally document their rationale regarding incident complexity and the adequacy of assigned incident command. Monitoring and regular fire assessments will inform the determination of a fire's evolving complexity. The Zone Duty Officer may elect to suppress any wildfire that they determine poses a threat to human life and/or property that cannot be mitigated. Refer to the Red Book, Chapter 11, Incident Management and Response, for current direction on wildfire command and organizational structure.

Fire Management Committee

For extended responses and fires with multiple objectives, key fire and resource staff who make up the Fire Management Committee (FMC) collaborate to support the decision-making process. The FMC reviews the situation of a current wildland fire incident and provides input and feedback regarding management alternatives. This group ultimately makes a management strategy recommendation to the park's Agency Administrator (AA), who makes the final decision on the course of action and approves it in WFDSS. Considerations include the location of a fire, determination of cause, time of the season, seasonal severity, impacts to visitor and park operations as well as values at risk and those that would benefit from fire.

Membership in the Fire Management Committee includes the Deputy Superintendent of Operations, Chief Ranger, Science and Resource Management Fire Liaison/ Resource Duty Officer, Fire Ecologist, Zone Fire Planner, and the Grand Canyon National Park Fire Management Officer or Park Duty Officer. These positions can be filled by designated Actings. The FMO typically chairs the FMC. To gain situational awareness regarding the determined decision, the following staff may also be included; the Chief of Facilities Management, the Public Affairs Officer, the Chief of Business & Administration, affected District Ranger(s), and the Tribal Liaison. Subject matter expertise may also be contributed by various resource and science specialists, and fire behavior specialists. In the case of a multi-jurisdictional incident, representatives from affected entities will be invited to participate in the FMC discussions and will be involved in the management decision process. The Fire Management Committee can be convened in-person, or virtually via conference call. The Park Duty Officer and Chief Ranger will coordinate the scheduling of the FMC meeting and communicate with all parties involved. Based upon the fire situation, this may happen in a very expedient manner.

Minimum Impact Strategies and Tactics (MIST)

MIST is the policy of the National Park Service. Agency-wide Minimum Impact Strategies and Tactics (MIST) are described in RM - 18, Chapter 2, Managing Wildland Fire, Exhibit 1. Resource Advisors may be assigned to wildfires to advise fire resources, fire managers, Incident Commanders, and Incident Management Teams on MIST and other resource protection measures. Grand Canyon National Park-specific MIST and related wilderness mitigation measures listed in Appendix G - Grand Canyon National Park Office of Planning and Compliance - 2016 Revised Letter of Authorization, Appendix H - Grand Canyon National Park 2018 Resource Advisors Pocket Guide, and the Grand Canyon National Park Minimum Requirements Decision Guide Workbook – Management of Wildfires at Grand Canyon 2020-2025. This Guidance was developed by park fire, resources, wilderness staff. Grand Canyon National Park fire managers,

resources specialists, resource advisors, and the incident management team may recommend and implement additional mitigation measures.

According to Directors Order #18, Wildland Fire Management, NPS 2008, all fire management activities in the wilderness, including categories of designated, recommended, potential, proposed, and study areas will be managed in a manner that does not jeopardize suitability for future designation. Therefore, fire is managed in Grand Canyon National Park's Proposed Wilderness and Proposed Potential Wilderness in keeping with Minimum Requirement Analysis protocols (see NPS Management Policy, Chapter 6: Wilderness Preservation and Management, 2006). See Figure 8 - Grand Canyon National Park Wilderness Map.

Grand Canyon National Park Fire & Aviation will submit for review and approval minimum requirement analysis documents regarding fire management activities including, but not limited to fuels sampling; fire effects monitoring; fire weather observation; air quality monitoring; cultural and natural resource surveys and monitoring; prescribed fire planning, preparation, and implementation; wildfire response; and resource rehabilitation. Use of vehicles, chainsaws, motorized pumps, aerial ignitions, and helicopter landings will be assessed on a programmatic basis under the minimum requirement decision process to reduce use to the extent possible. These programmatic documents will be reviewed annually and updated as needed. The Fire Management Plan EIS Record of Decision also stipulates mitigation measures for wilderness character that will be adhered to during the planning and implementation of wildland fire management operations within the managed wilderness areas of the park.

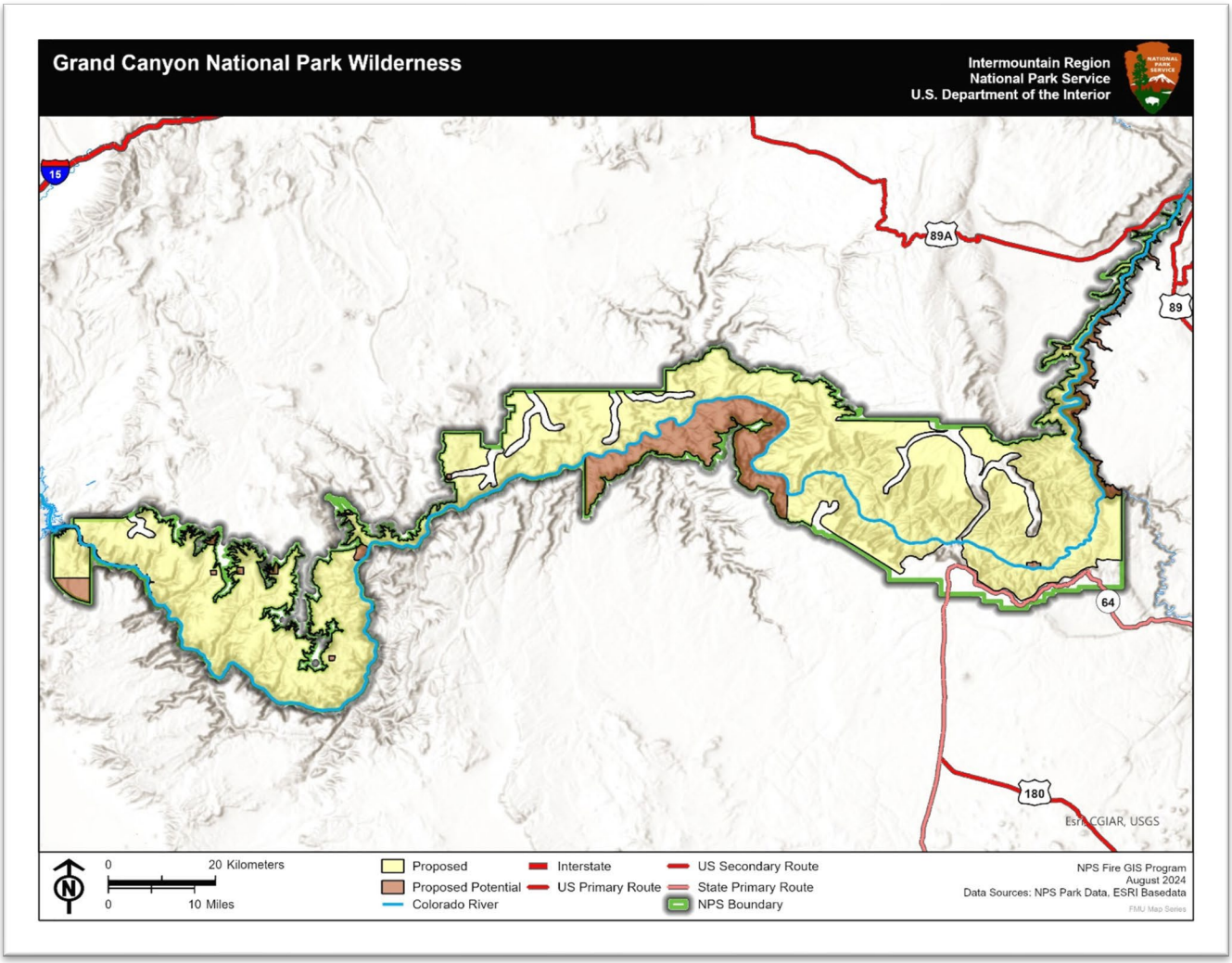

Figure 8. Grand Canyon National Park Wilderness Map

3.1.2 Wildland Fire Decision Support System (WFDSS)

The Wildland Fire Decision Support System (WFDSS) is an interagency, web-based application that helps agency administrators and fire managers make risk informed decisions for all types of wildfires, regardless of complexity. WFDSS integrates various applications used to manage incidents into a single risk-informed, collaborative system to streamline the analysis and reporting process. WFDSS is the primary decision support documentation platform for all NPS wildfires. Current direction on WFDSS pertaining to the NPS can be found in the Interagency Standards for Fire and Fire Aviation Operations (Red Book) in Chapters 3 and 11.

Interagency Spatial Fire Planning

Incident decisions must be consistent with applicable fire-related protection and resource management objectives and requirements from land and resource management plans and compliance documents. This guidance is incorporated into WFDSS as language to be included in relevant incident decisions and is depicted spatially where practical. The Interagency Spatial Fire Planning Service is the ArcGIS Online Web Application used to manage fire planning data (both spatial and language). Units are encouraged to upload and review data prior to fire season.

Strategic objectives and management requirements provide the foundation of the WFDSS decision. Strategic objectives are projected in WFDSS as Non-Overlapping Spatial Data with intended outcomes of management activities that contribute to the attainment of desired conditions over an extended period. Grand Canyon National Park employs strategic objectives either across the entire park unit (unit-wide) or may limit them to a specific Fire Management Unit (FMU). Strategic objectives inform fire managers and incident management teams of the types of fire management actions and tactics employed on the ground, for example, using suppression strategies to protect each FMU's Fire Exclusion Areas.

Management requirements are projected as Overlapping Spatial Data. They represent the technical and scientific specifications for fire management activities and potential actions to help achieve objectives across the spectrum of the park's natural and cultural resources protection and maintenance. Management requirements may also be employed unit-wide or be limited to spatially- specific locations. Consulting with Resource Advisors and/or resource specialists to protect cultural and natural resources is an example of a unit-wide management requirement. Retardant avoidance zones would be depicted in their specific spatial locations, usually associated with watersheds and bodies of water. The development of Grand Canyon National Park's management requirements was an interdisciplinary effort and largely originates from the park's FMP Final EIS and Biological Opinion.

Appendix I lists the park's objectives and requirements currently in WFDSS. These mirror the objectives and requirements described in Section 3.1 – Management of Wildfires. However, the information in Appendix I is specific to WFDSS to support wildfire response and therefore does not include fuels treatments and also contains additional direction for park-specific wildfire response actions coming from other agency policies and interagency guidance.

3.2 Fuels Treatments

Fuels Management Goals and Objectives

The park's fuels management program embodies the overarching goals and objectives as explained in Section 2.1 of this document. Fuels treatment strategies available to fire managers include the use of prescribed fire (broadcast burning and pile burning) and non-fire fuel treatments that consist of manual and/or mechanical treatments. The goals of the fuels treatment program are to decrease risks to life, safety, property, cultural resources, and natural resources within the context of the agency and park's policy framework through hazardous fuels reduction, and to reintroduce fire as an ecological process to restore fire-adapted ecosystems.

The fuels treatment planning process requires utilizing current knowledge on fire behavior,

vegetation, environmental conditions, and weather, combined to produce desired ecological outcomes. Fuels treatments also contribute to scientific data using observations before, during, and/or after treatments through the park's fire monitoring program and ongoing NPS Inventory & Monitoring efforts. Communication with park resource managers, stakeholders, and partners and keeping the public informed are critical in the planning and implementation phases to best protect the park's natural, cultural, and social values. All of this happens while keeping safety in mind. Hazardous fuels removal objectives focus on creating defensible space for property and the public. Safety considerations and risk mitigations are standard practice during implementation while fire personnel are on the ground or in the air performing fuels treatment work. Risk assessments and mitigations are established and communicated through briefings on the procedures and plan to all personnel.

Fuels Treatments

Fuels treatments are planned, organized, and implemented according to a rigorous protocol based on policy, the purpose of which is the safe and efficient accomplishment of approved protection and resource objectives. Specific fuels treatment projects require compliance with NEPA, NHPA, and ESA and a Superintendent-approved implementation plan outlining project-level goals and objectives for implementation.

Utilizing prescribed fire and non-fire treatments throughout planned strategic units and locations in the park provides fire management personnel buffer areas that will reduce risks when managing future wildland fires. Treated areas can provide fire resources more time and increased margins of safety when protecting life and property during wildfire events. It can also contribute to a favorable decision space that allows for evaluating the management of natural ignitions for resource benefit objectives. The Fire Islands FMU and Inner Canyon FMU do not allow for any prescribed fire or non-fire fuels treatments.

Prescribed Fire

Broadcast burning and pile-burning are the two-types of planned prescribed fire used at Grand Canyon National Park. Prescribed fire has been an integral part of NPS fire management programs and is a well-established practice used in an integrated program to improve forest health and maintain ecosystems. Prescribed fires are management-ignited fires intentionally lit to meet specific resource and protection objectives when predetermined conditions are met. Prescribed fire can be applied in strategic locations using special techniques. For example, igniting fires that burn hot enough to create canopy openings creates gaps that protect the remaining forest canopy from unwanted wildland fire or encourage aspen regeneration. Canopy openings, typical of a naturally fire-influenced forest, can break up crown fires near areas where protection of life, property, and resources is critical. Other prescribed fires are implemented to reduce dead-and-down fuels and understory vegetation without creating overstory canopy openings. Prescribed fire projects are permitted in six Fire Management Units: the Kaibab Summit, Plateau, Peninsulas, Backcountry Uplands, Primary WUI, and Secondary WUI.

Thinning and reduction of dead-and-down fuels and some live fuels using manual fuels removal techniques may occur on prescribed fire unit boundaries to reduce the risk of high-intensity fire along those boundaries or protect specific resources. Pretreatment of prescribed burn units can increase safety and effectiveness, especially in areas near WUI. In addition, pretreatment increases the protection of cultural resources and natural resource sites (such as nest trees) from fire impacts. Pretreatment fuels removal work increases firefighter-ability to contain the burn. Many designated prescribed burn units near communities, highways, and park boundaries need considerable pretreatment work.

Prescribed burn units usually require multiple burns to fully meet protection and resource objectives, dependent on fuel type. The first prescribed burn typically kills understory and midstory vegetation and consumes ground fuels. A second burn cleans up fuel from burned vegetation and thins new sprouts. Subsequent burns maintain a fire-influenced forest and reduce fuel accumulated since the last fire. Acres treated with future prescribed fires may decrease as acres managed under other wildland fire strategies increase and burn future prescribed fire units. Multi-year treatment schedules are subject to change as unplanned fires burn in proposed prescribed fire project areas, or weather, funding, personnel, and finding applicable prescription windows change the timeframes of project completion. These schedules will be reviewed and updated annually.

Prescribed fire may be used to accomplish objectives within Fire Exclusion Areas. Fire Exclusion Areas are defined as areas within a designated FMU in which all unplanned wildland fires are to be aggressively suppressed because of their proximity to values to be protected. These Fire Exclusion Areas are defined in Section 3.1 – Management of Wildfire under each FMU descriptor. An increase in treated Fire Exclusion Areas and WUI acres will decrease wildland fire risks and increase safety in those locations.

Non-fire Fuels Treatments

Manual and mechanical treatments complement prescribed fire by reducing hazardous fuels, creating defensible space and/or reducing crown fire risk in WUI, and pre-treating prescribed and wildfire perimeters. RM-18, Chapter 7, Fuels Management, defines manual treatment as "utilizing hand-operated tools or actions to thin or remove herbaceous and woody fuels and/or debris." Manual fuel removal involves chainsaws, other portable hand-held equipment like gas-powered trimmers, and hand tools. Non-fire fuel treatments may occur in the proposed wilderness to protect values at risk (Refer to Implementation of prescribed fire preparation and operation at Grand Canyon National Park - Minimum Requirements Decision Guide Workbook). Manual non-fire fuels treatments are permitted in six Fire Management Units: Kaibab Summit, Plateau, Peninsulas, Backcountry Uplands, Primary WUI, and Secondary WUI.

Mechanical fuel removal may involve wheeled or tracked vehicles. Use of wheeled or tracked vehicles in the wilderness is prohibited. No new roads will be constructed for any non-fire fuel treatment project. Mechanical non-fire fuels treatments are only allowed in the Primary WUI Fire Management Unit and areas directly adjacent to Arizona State Highways 64 (South Rim) and 67 (North Rim), given the constraints of wilderness. Those sections of Arizona State Highway 64 are found in the Peninsulas, Backcountry Uplands, and Secondary WUI FMUs. Sections of Arizona State Highway 67 are in the Kaibab Summit and Plateau FMUs. Techniques for manual/mechanical hazardous fuel reduction were vetted through an interdisciplinary group and approved through the Grand Canyon National Park FMP Final EIS, described below:

Hazardous Fuels Reduction Techniques for Mechanized/Manual Fuel Reduction Projects:

- **Mechanized Tree and Shrub Removal (feller-bunchers and forwarding):** Wheeled/tracked equipment with a cutting head severs stem and lays tree down. Stems stacked whole, or mechanically de-limbed and stacked, for transport by self-loading forwarder. Used for live tree removal.
- **Conventional Tree and Shrub Removal (saws, skidders, and grapplers):** Hand crews walk to each tree and fell/limb trees with chainsaw. Tracked or rubber-tired tractors with a grapple pick up trees or logs and drag them to areas where they are

loaded onto trucks or piled for burning. Used for removal of live and dead trees and shrubs.

- **Machine Crushing/Shredding:** Tracked equipment travels to each tree or stump to allow shredder head access to vegetation that needs shredding. Vegetation is crushed under tracks or shredded by flail cutters and left onsite. Various equipment types are used for the reduction of live trees, shrubs, and dead-and-down material.
- **Machine Piling:** Tracked or rubber-tired tractor grapples or pushes vegetation with front blades into piles; or tracked excavator with bucket and thumb grapples and piles vegetation. Used following tree removal or to prepare dead-and-down material for burning or chipping.
- **Yarding:** Cables are suspended from landing and trees or logs are attached to the cable and lifted or dragged to natural openings or landing areas. May use fetching arches which reduce surface disturbance. Used to remove freshly cut or dead-and-down material from burn units.
- **Low-impact Skidding:** Cut trees are skidded using horses or ATVs. May use fetching arches which reduce surface disturbance. This technique is size limiting: large trees, live or dead, exceed capability.
- **Hand Cutting/Piling**: Hand crews drive or walk to fuel-reduction areas and cut with chainsaws. Hand crews pile in place or carry and drag vegetation to burn sites.
- **Hand Cutting/Chipping**: Hand crews drive or walk to fuel reduction areas and cut with chainsaws. Vegetation transported to chipper; chipper towed through unit or staged at an approved location. Chips broadcast two inches deep, trucked to park areas for use, sold at cost, or given away.
- **Hand Cutting/Lop and Scatter**: Hand crews drive or walk to fuel reduction areas and cut with chainsaws. Vegetation is dispersed on the site and bucked to maximize soil contact. The height of scattered material shall not exceed 24 inches. Eventually consumed through broadcast burning or natural decomposition.
- **Limb Removal (Trees standing after thinning project complete):** Lower (up to six feet) limbs (living or dead) and branches are cut to remove ground and ladder fuels.
- **Pile Burning (Machine or hand piles):** Piles allowed to cure, then ignited when fuel and weather conditions appropriate. Used to remove surface- and ladder-fuel component reducing risk for broadcast-burning at later date. Pile elimination may occur combined with broadcast burning if appropriate to objectives.
- **Pile and Leave (Area would be broadcast-burned in five years):** Piles stay onsite longer but are removed during broadcast-burn.
- **Chip and Broadcast (Broadcast-burn after fuel reduction):** Vegetation chipped at landings or throughout treatment unit. Chip depth, fuel moisture, and ignition pattern considered in burn-prescription to mitigate smoke-production and fire-effects concerns.
- **Chip and Broadcast (Leave less than two-inch depth):** Chips dispersed directly from chipper chute and spread to avoid chip accumulations greater than two inches.

- **Chip and Haul:** Chips loaded in trucks or debris containers and hauled off-site for use as fiber or fuel. Chips donated for outside needs, hauled to park sites; may be sold at cost or given away.

Fire staff may incorporate new and/or experimental mechanical thinning techniques to accomplish fuel reduction projects and move forested areas toward desired conditions that will meet the requirements of the Grand Canyon National Park FMP FEIS. Mechanical fuel treatments as independent fuels projects or also part of pre-treating prescribed fire projects may occur in areas designated as either Primary WUI or directly adjacent to Arizona State Highways 64 and 67. Highway 64 and Highway 67 are not classified in either WUI FMU, but these roads and their corridors are primary public escape routes and will be included as areas where mechanical and manual thinning is proposed. For planning and funding purposes, work associated with these road corridors (300 feet from the road centerline) will be designated WUI projects. Manual and mechanical thinning standards in WUI are found in NWCG Standards for Mitigation in the WUI - PMS-052 - May 2023.

General Fuels Management Implementation Procedures

Activities proposed in the Fire Management Plan will be planned and implemented in accordance with RM 18, Chapter 7, Fuels Management, the NWCG Standards for Prescribed Fire Planning and Implementation, and the Red Book, Chapter 17, Fuels Management.

Fuels treatment plans are reviewed by an established interdisciplinary team (IDT). All plans will be submitted to the park's IDT for a review period. Comments for these plans will be addressed and/or incorporated and signatures will be gathered from each IDT member. The plans will then require signatures by the District/Zone FMO, Fire Ecologist, Chief of Fire and Aviation (FMO), Chief of Visitor and Resource Protection, Chief of Science and Resource Management, and Deputy Superintendent of Operations. Once these signatures have been gathered, a meeting will be scheduled with the Superintendent to deliver a briefing for approval.

All fuels treatment activities will require compliance-related work. The Grand Canyon National Park IDT may be included in discussions relating to the revision of the fuels treatment schedule. All parties should determine if a schedule adjustment will impact compliance requirements. Resource managers/ Subject-Matter-Experts (SME) assist the fire management program by supervising and coordinating survey and reporting requirements for Section 7 and 106 compliance. Site-specific mitigation measures to protect sensitive resources will be accomplished prior to implementing the project with coordination between the park's Fire and Aviation Branch and the Division of Science and Resource Management. Reports to the U.S. Fish and Wildlife Service (USFWS), including meeting with USFWS to discuss the previous and upcoming fire seasons, required by the Biological Opinion for the Grand Canyon National Park FMP Final EIS and the Arizona State Historic Preservation Office (SHPO) required to fulfill the Grand Canyon National Park FMP Section 106 compliance with SHPO and tribes are annual requirements. Pre-season reports describe future planned projects, current survey needs, and assessment of potential impacts. Post-season reports include accomplishments for wildfire and planned projects, lessons learned and the adaptive management process, fire severity data, detailed information of impacts to resources, and maps of all large fire events. The Arizona Department of Environmental Quality requires an initial registration of new plans or project areas with an annual scheduled meeting in which projects are highlighted.

Prior to the implementation of a prescribed fire project (other than pile burns), the Zone or District FMO will host a cooperators meeting. This meeting is intended to provide information to cooperators and stakeholders about potential impacts or concerns created by the forthcoming project. Information provided will cover goals and objectives, anticipated date and/or duration, project location, and mitigation measures, if any, identified to reduce impacts or concerns to cooperators. In addition to the cooperators meeting, the Prescribed Fire Burn Boss or Zone/District FMO will host a pre-burn meeting with members of the prescribed fire project's organization to discuss needs and site-specific tactics. A daily site-specific briefing will also be conducted for all project participants. This briefing will follow the briefing checklist found with the project plan or the checklist found in the Incident Response Pocket Guide.

Risk-Informed Decision-Making and Accountability Requirements

The NPS Fuels Management Program Planning and Reporting Requirements 2024-508 Memo establishes fuels management accountability requirements. Projects must document the use of a risk-informed decision-making process for project prioritization and selection. The NPS Wildland Fire Risk Assessment (WFRA) map was developed to evaluate and assess fuels risk rating by project area and can be used to document project prioritization and selection.

Multi-Year Fuels Treatment Plan

The Grand Canyon National Park Fuels Management Program will use the Interior Fuels and Post-fire Reporting System (IFPRS) for submitting proposed projects for approval, tracking accomplishments of the program, reporting performance, and measuring success. A three year Planned Program of Work (PPOW) can be found in that system. The Active Management (Fuels) v 2.0 | Wildland Fire Risk Assessments (arcgis.com) displays fuels treatments accomplished by the National Park Service's Wildland Fire Management program.

In addition, the park uses a long-term planning process to track all stages of fuels project implementation over the entire planning horizon. Fire managers work with park staff (interdisciplinary teams, resource managers, and other specialists) on an annual basis to review and update the fuels program's strategic direction. This annual review includes analyses of completed structure and/or risk assessments for park values. The Deputy FMO, North Zone FMO, South District FMO, and Fire Ecologist will update and extend the Multi-Year Fuels Treatment schedule annually or as needed when treatments are adjusted. Revisions and updates are submitted for approval to the Park FMO. Fire regimes, fuel loading, and defined desired conditions will be considered for planning future prescribed fire projects. Identification of future non-fire treatments will be based on the protection of critical infrastructure within the Primary WUI FMU (such as public safety zones, communications sites, and water/utility sites). The park's Multi-Year Treatment Plan is in Appendix E.

Defensible Space

The NPS has adopted the International Code Council's (ICC's) International Urban-Wildland Interface Code through the parameters described in Executive Order Wildland-Urban Interface Federal Risk Mitigation. Contained in the ICC's code (sections 603 and 604) are descriptions of defensible space and maintenance requirements for wildland urban interface (WUI) areas. Reference RM - 18, Chapter 7, Fuels Management for additional information. The basic application of these standards includes removing dead and dying plant material, mowing, and irrigating grasses, thinning live woody vegetation, and pruning low branches. These treatments reduce the likelihood of a structure igniting during a wildfire incident and

provide firefighters with safe opportunities for effective suppression. The ICC code stipulates that:

- The minimum requirement for defensible space around structures is 30 feet.
- Tree crowns should be pruned and maintained to a minimum of 10 feet horizontal clearance from structures and overhead electrical facilities.
- Tree limbs should be pruned to maintain a 6-foot clearance above the ground.
- High fire-hazard areas, flammable construction materials, topography, and fuels may require up to, and possibly more than, 100 feet of additional clearance space.

Grand Canyon National Park fire managers recognize the need to treat hazardous fuels immediately adjacent to homes and other structures, and forests and woodlands within and next to WUI areas. Most of the park's FMUs contain Fire Exclusion Areas that contain some form of structures or values at risk as listed in Section 3.1 – Management of Wildfires. The immediate focus on defensible space fuels treatments points toward the Primary WUI and Secondary WUI FMUs. Treatments in the Primary WUI FMU reduce fuels around values at-risk including roads and utilities to allow firefighters defensible space to safely take action on wildfires in the WUI. The Primary WUI includes centralized tourism and infrastructure hubs in and surrounding Grand Canyon Village and Desert View on the South Rim, and Bright Angel Developed Area on the North Rim. Secondary WUI FMU treatments reduce fuels in areas surrounding Primary WUI to slow or stop approaching wildland fires. Because prevailing winds are from the southwest, maintaining lower fuel loads in these forests decreases the risk of fires moving quickly through the Secondary WUI FMU and further threatening the Primary WUI FMU.

Additional treatment units not identified in the treatment schedule may also be treated, including residential areas that have or have not been treated in the past. For example, some thinning has occurred in the historic district, but only in areas within 30 feet of structures. Modifications to degree of thinning may occur in the historic landmark district or adjacent to individually listed National Register of Historic Places Buildings Additional thinning may occur inside or outside that 30-foot space to expand defensible space and meet desired conditions throughout the WUI. Current information on NPS Structure Protection needs and guidance can be found at NPS Wildfire Risk Assessment.

3.3 Preparedness

The Northern Arizona Fire Danger Operating Plan and the Grand Canyon National Park's Preparedness Level, Staffing, and Initial Response Plans are found in Appendix D of this FMP. Reference the Red Book, Chapter 10, Preparedness for preparedness planning requirements.

Preparedness Activities

Preparedness activities provide detailed procedures and standards for wildland fire operations, including both pre-season and ongoing fire season activities. Preparedness activities also include pre-planned procedures for initial response and incident management. Grand Canyon National Park participates in an interagency fire organization with the Kaibab National Forest to operate a safe, efficient, and cost-effective fire management program in support of resource objectives through appropriate planning and coordination.

The Northern AZ Fire Danger Operating Plan (FDOP) establishes Fire Danger Rating Areas (FDRAs) that include Grand Canyon National Park North and South Rims. The

FDOP analyzes historic fire occurrence, and includes statistical analysis of multiple fire danger indices that inform breakpoints for the following sub-ordinate plans (see Appendix D):

- *Preparedness Level Plan* - describes overall program responsibilities as fire conditions escalate/decrease through the year
- *Staffing Plan* – describes daily staffing requirements for Fire Management resources
- *Initial Response Plan* – identifies initial resources to dispatch to reported fires based upon location and the day's forecast fire conditions

The National Weather Service (NWS), Flagstaff, AZ Forecast Office generates fire weather forecasts for the Northern Arizona Zone twice daily during fire season. The Williams Interagency Dispatch Center communicates the day's fire planning forecast and additional watches/warnings and issues daily fire danger ratings for the Northern Arizona Zone based for each FDRA.

To ensure readiness, the park will conduct an annual pre-season fire readiness inspection, which will address detection, communication, dispatch, and response and management capabilities. This inspection will be conducted to determine whether the park's current training levels, equipment inventories, knowledge of policy and regulations, and organizational qualifications and structure meet established standards. The Grand Canyon National Park Fire and Aviation Program will utilize the latest Interagency Preparedness Review Checklists to conduct and document readiness reviews. Refer to RM - 18, Preparedness, Chapter 5, and Red Book - Preparedness, Chapter 10 for current preparedness direction.

The training and development of park staff in the skills necessary for safe and effective implementation of the Fire Management Program remains key to its success. All personnel taking part in the fire program will meet current agency and NWCG standards (Wildland and Prescribed Fire Qualification System Guide, PMS 310-1) for training and job qualification. Typical annual activities include a training needs assessment considering all levels of NWCG courses, continuing education topics, NPS essential competencies, etc. A local training schedule will be developed to meet the identified needs. At a minimum, training presented locally will meet the needs required to maintain NWCG incident qualifications.

Coordination and Dispatching

The Williams Dispatch Center (WDC) manages fire and aviation initial and extended dispatch functions for the Kaibab National Forest, Grand Canyon National Park, Hualapai Tribal Forestry-Fire (HTF-WFM), and Truxton Canon Agency BIA (TCA-BIA). WDC operates under the direction of the Center Manager, who provides general direction and policy to center personnel and is the primary contact for center operational issues. The Center Manager is co-supervised by the KNF Deputy Fire Staff and Grand Canyon National Park Deputy FMO. All the Interagency FMOs and the local Aviation Officer serve as advisors to the Center Manager.

The Dispatch Center Manager is responsible for supervision of the Dispatch Center operations and is charged with independently acting in wildland fire management and emergencies. The Dispatch Center will commit resources (people, equipment, and aircraft) to meet initial response needs based on established plans and will coordinate between other local area dispatch centers, the Southwest Coordination Center (SWCC),

and the local Multi-Agency Coordinating Group. The Initial Response Plan identifies initial fire responses under the Williams Dispatch Center's coordination areas, see Appendix D. The Dispatch Center primarily operates the Interagency Resource Ordering Capability (IROC) website, which enables fire managers to request fire personnel and equipment and track where they're located.

Duty Officer

The Park Duty Officer (DO) is typically filled by the Grand Canyon National Park FMO, the park's Deputy FMO, the South District FMO, or the North Zone Fuels Specialist. The Park DO coordinates with Zone/District DOs, and the Grand Canyon National Park Resource Duty Officer/ resource specialists during decision-making for wildland fires in the park. The Park Duty Officer may be filled by outside overhead qualified personnel in cases of limited park capacity. They are the daily liaison between Zone/District DOs, Incident Commanders, and Grand Canyon National Park leadership, resources management, law enforcement, and maintenance. The Park DO is the primary wildland fire authority responsible for the park's interdisciplinary planning coordination and leadership representative during wildfires on park land as described in Section 3.1.1 Wildfire Response – Fire Management Committee. The Park DO is above the Zone/District DO in the chain of command and provides briefings and situational awareness to Grand Canyon National Park leadership.

Zone Duty Officers will be assigned by Zone and/or District FMOs. Qualifications for Zone Duty Officers are based on preparedness levels and are identified in the Interagency Preparedness Plan. Delegation of Authority is from the Superintendent to Duty Officers. Any individual providing Duty Officer coverage will receive, per Interagency Standards for Fire and Aviation Operations, a Delegation of Authority from the Superintendent is required prior to performing as a DO. Grand Canyon National Park and KNF have an Interagency Delegation of Authority in place annually to cover duty officers working on either jurisdiction (Appendix A). The Zone/District DO oversees and implements the daily wildfire operations and resource staffing within the zone where both KNF and Grand Canyon National Park wildland fire resources may be utilized.

The following guidelines outline the responsibilities and duties of Zone/District Fire Duty Officer:

- The Fire Duty Officer is responsible for the management of any wildland fire-related incident or emergency on the zone. The DO will be notified after the WDC has initiated the initial dispatch action.
- Serves as the initial contact person on most incidents for WDC and cooperating agencies.
- Supervises ongoing fire management activities including fire suppression actions.
- The DO will go "In-Service/Out of Service" as Duty Officer and stay in radio contact with the WDC. If unavailable by radio, the DO will advise the WDC of availability by phone.
- Ensures appropriate staffing occurs. The DO will make sure that the daily line-up is reported to the WDC.
- Ensures appropriate investigation occurs for all wildland fires.
- Ensures that all local and out-of-area wildland firefighters have received an appropriate briefing.
- The DO will be available to receive after-hour calls from WDC.

- Each district will have a DO available throughout the entire year, not only during fire season.
- Resource Ordering: Ensures that only trained and qualified personnel are made available for wildland fire assignments. WDC will contact the appropriate DO to confirm resource availability for an "out of area" assignment. If approved, the DO will provide a Point of Contact to communicate fill information to WDC: Roster names, travel times, equipment numbers, etc.
    - Exception – Grand Canyon National Park Fire Resources: For Any Resource Orders filled by NPS resources, unless preapproved, a Park DO will need to have concurrence for all Out of Park assignments. This assures accountability for NPS resources & employees. This includes aviation requests which must approved by the Park DO before filling an order.
- The WDC will be notified if there is a change in the DO. Affected in-service resources will be notified of the change by WDC via radio announcement if necessary.

Agency Administrator

The Superintendent has the responsibility per the Red Book, Chapter 3, NPS Program Organization and Responsibilities "for the safe and efficient implementation of fire management activities within their unit, including cooperative activities with other agencies or landowners under delegations of authorities." The Red Book further defines performance requirements for the Superintendent or their principal actings to the fire management program. For the purposes of the park's fire management program, "principal actings" signify as Agency Administrators and will meet NWCG requirements to be qualified as such (AADM) in the Incident Qualification and Certification System. For Grand Canyon National Park, those positions will typically be the Superintendent, Deputy Superintendent – Operations, Chief Ranger, and Chief of Science and Resource Management. Throughout the fire season, a qualified AADM will be identified and available for fire management decisions.

The required training for the Superintendent and Deputy will include the M-582 class, "Fire Program Management, Leading Complex Fire Programs."

Prevention

The limited amount of backcountry users in the forested areas of the park and recreational camping, combined with the park's stringent permitting system, help to prevent human- caused ignitions. Park law enforcement rangers also provide consistent patrols that aid in wildfire prevention education.

Fire managers should review reports through the InFORM web-based application annually to determine if increased prevention work would help in reducing human-caused ignitions. Park responsibilities for wildland fire prevention include the following:

- Wildland fire prevention and education will be integrated into all management functions, including interpretation, visitor protection, maintenance, and administration.
- The need for wildland fire prevention and education training will be assessed, coordinated, and facilitated.
- Wildfire prevention and education programs and/or messaging will be provided

to the public.
- Coordinated messaging will be provided regarding fire conditions, restrictions, or fire related closures in place across the interagency area.

Safety Program / Plan

The Grand Canyon National Park Superintendent is responsible for providing a documented occupational safety and health program (Director's Order #50B). The park's safety plan is reviewed annually with field fire and fire aviation personnel to discuss issues that could compromise safety and effectiveness during the upcoming season.

The safety of firefighters and the public is the park's first priority. This FMP and the activities defined within reflect the park's commitment to safety. Additionally, safety is the responsibility of all firefighters, managers, and administrators. Individuals are responsible for their own performance and accountability. Every supervisor, employee, and volunteer are responsible for following safe work practices and procedures, as well as identifying and reporting unsafe conditions. All firefighters, fireline supervisors, fire managers, and agency administrators have the responsibility to ensure compliance with established safe firefighting practices.

The Grand Canyon National Park Fire and Aviation Program falls under the umbrella of the park's Risk Management Office and its Safety Manager. The Risk Management Office promotes the use of the Department of Interior's Safety Management Information System (SMIS) for on-the-job injury and near-misses reporting by the employee and the supervisor. SMIS is the primary safety reporting system for all National Park Service employees.

The Grand Canyon National Park Fire and Aviation Program also adopts the SAFENET system and the SAFECOM websites. SAFENET is a web-based reporting tool for operational wildland firefighters and support staff to communicate unsafe, unhealthy, near-miss, and high-risk operations within wildland fire, all-hazard operations, training, and other related work environments to leadership. SAFENET also collects data to assist in identifying trends, document working conditions, and track accidents. SAFECOM is the Department of Interior (DOI) and the U.S. Forest Service (USFS) aviation safety web-based reporting system that fulfills the Aviation Mishap Information System (AMIS) requirements for aviation mishap reporting for those agencies. Categories of reports include incidents, hazards, maintenance, and airspace. The system enables users to report any condition, observation, act, maintenance problem, or circumstance with personnel or the aircraft that has the potential to cause an aviation-related mishap. The Wildland Fire Lessons Learned Center is also another avenue for safety education and awareness. Their Rapid Lesson Sharing reporting portal encourages recent work-related experiences where those involved or affected share their perspective in a more in-depth story-telling lesson format on what happened and how others can learn from that experience. The Wildland Fire Lessons Learned staff works with reporting individuals to produce their lesson which may include photos and maps, then are kept in their web-based database.

The park has an established evacuation plan that is managed by the Visitor & Resource Protection (VRP) Division. The plan can be found in hard copy at the South Rim Fire and Aviation building and the digital documents are located in the Grand Canyon National Park VRP Division SharePoint website. Under circumstances in which a

wildfire forces an evacuation, Fire and Aviation personnel's primary response will be to manage the wildfires, while others execute the evacuation procedures. During other all-risk incidents that trigger an evacuation, Grand Canyon National Park Fire and Aviation employees may be called on to support or assist with an evacuation.

Job Hazard Analysis

The Fire Management Officer is required to ensure the completion of job hazard analysis (JHA) for fire and fire aviation activities so mitigation measures are taken to reduce risk, as directed by Red Book, Chapter 3, NPS Program Organization and Responsibilities. Job Hazard Analyses are reviewed and updated on an annual basis and new ones are created as needed. JHAs reside currently on file with individual modules and remain available to all fire management employees. Copies of relevant JHAs stay filed on the fire program's network drive and hard copies exist on hand.

3.4 Post-Fire Programs and Response

Grand Canyon National Park is responsible for taking prompt action after a wildfire to minimize threats to life or property, and to prevent unacceptable degradation of natural and cultural resources. Damages resulting from wildfires are addressed through four activities:

Suppression Repair: This effort intends to repair suppression damages and is the responsibility of the Incident Commander. This activity is paid for with wildfire suppression funding.

Emergency Stabilization: the intent is to protect life and property and critical resource values and is the responsibility of the Superintendent. This activity is paid for with Emergency Stabilization (ES) funding.

Rehabilitation: the intent is to repair wildfire-damaged lands that are unlikely to recover naturally to management-approved conditions, or to repair or replace minor facilities damaged by wildfire. This activity is paid for from Burned Area Rehabilitation (BAR) funds.

Restoration: the intent is to continue the rehabilitation efforts started in the BAR process beyond the time limitation set by the Department of Interior. This activity is paid for by regular program funds.

RM – 18, Chapter 18, Post Wildfire Programs and the Red Book, Chapter 11, Incident Management and Response provide direction on current processes and timeframes.

3.5 Air Quality/ Smoke Management

The State of Arizona has implemented Smoke Management Regulations under the authority of the Clean Air Act. Grand Canyon National Park works closely with the Arizona Department of Environmental Quality (AZDEQ) to ensure compliance with the regulations and the development of actionable mitigations. A comprehensive Smoke Management Plan, which meets the requirements of the AZDEQ's Final Forest and Range Management Burn Rule.

The park is classified under the Clean Air Act as a Class 1 Airshed, a status requiring the most stringent protection against air pollution increases and further degradation of air quality related values, as well as restoration of natural visibility conditions. Grand Canyon National Park is within the boundaries of Arizona's Mohave and Coconino counties, neither of which have non-attainment air quality areas.

A variety of measures can be taken to reduce or manage smoke produced by wildland fires.

For prescribed fire, some measures apply during the planning phase, for example, when defining the prescription window for a prescribed fire. Other measures apply during the fire itself. No single measure is applicable to all fires, but all fires can be managed using some of these measures. In preparing prescribed fire burn plans, appropriate computer smoke-dispersion models will be run to predict smoke impacts at critical receptor locations. These critical receptors include population centers and developments nearby and, in the park, including Grand Canyon Village, Cameron, Tuba City, Bodaway Gap, Tusayan, Desert View, the Cross-Canyon Corridor (Kaibab and Bright Angel Trails), North Rim developed area, Kaibab Lodge, Supai, and Tuweep. Plans for prescribed fires that result in predicted exceedances of National Ambient Air Quality Standards or unhealthy conditions under the Air Quality Index will be refined until such impacts are not expected at critical receptor locations. Since current models do not model smoke impact scenarios, computer model outputs will be treated with caution, and results interpreted in light of previous experience.

In case of unhealthy conditions, prompt notification is essential to protect public health.

- To aid public understanding of fire management plans and actions, park staff will ensure fire management information is available for the public (visitors, residents, contractors, etc.)
- Provide neighboring jurisdictions (land managers, communities, and tribal governments) with information on planned fire activities on an annual basis and with updates as needed before particular projects or incidents relevant to them.
- Make information available to interpretive staff, guides, and others whose jobs include frequent public contact to explain the need for fire in park ecosystems and the nature of fire and smoke management.
- During fire operations, disseminate public information on fire and its impacts (beneficial and adverse)
- If unhealthy conditions are present, promptly notify all people in the affected area (visitors, employees, contractors, etc.). The NPS will follow the most current Environmental Protection Agency guidelines for public notification. Area closures may be made by the Superintendent, and smoke production from contributing park fires should be reduced as quickly as possible.

Arizona Administrative Code R-18-2, Article 15 (ADEQ 1996), and the Clean Air Act, includes burn activity reporting, smoke reduction techniques, and alternatives to burning. Additional Smoke Management information can be found in RM 18, Air Quality and Smoke Management, Chapter 9.

3.5.1 Smoke Management Activities

Smoke permitting is handled by the Arizona Department of Environmental Quality (AZDEQ) using an online registration and reporting system (Arizona Smoke

Management Online Approval System, AZ-SMOAS; smoke.azdeq.gov). Requests for smoke permits can be put in five days in advance by submitting a burn plan. After approval, the annual registration must be completed. A daily burn request must also be submitted, as well as an accomplishment form. If the online system is down, send an email to smoke@azdeq.gov.

Smoke modeling runs using the Simple Approach Smoke Estimation Model that calculates fuel consumption, particulate emissions, and dispersion of particulate matter produced by prescribed burning are required to support AZ-DEQ Burn Plans.
The schedule for AZDEQ's Air Quality Division (AQD) notification and report is as follows:

- For every day ignition is planned: Daily Burn Request (cannot submit one request for entire burn duration) will be submitted online, by 2 pm the day prior. AQD will either post the approval on their website or call with approval to the park on the same business day as the Burn Request submittal. All smoke permit approvals are also posted on the USFS Southwest Area Fire website. A "no reply" from AQD is an approval to burn. Only a statement of disapproval can prevent or stop an ignition.
- By 2 pm the day prior to ignition: Smoke dispersion map, with the location of burn relative to locations of smoke-sensitive areas, Class I areas, or non-attainment areas within 15 miles in any direction of the project.
- By 2 pm on the day following an approved ignition: Daily Burn Accomplishment form. Include successive acreage covered and Best Management Practices (BMP) used.

To support fire management's adherence to regulations applicable to the Clean Air Act and the AZDEQ guidelines, smoke monitoring and education aimed at providing for public, firefighter, and aviator safety will be conducted during wildland fire incidents. This occurs by several methods such as the release of weather balloons to confirm predicted wind directions and ventilation forecasts, smoke monitoring with particulate monitors, and/or through visual observations, public notification and media releases, and the use of pilot car operations or road closures during times of heavy smoke impact to roadways.

The Grand Canyon National Park Fire & Aviation Program will implement as many emission reduction techniques as feasible, subject to the economic, technical, legal, and safety implications of the techniques, and burn management objectives to reduce smoke produced by wildland fires. Appendix G - 2016 Revised Letter of Authorization further details the actionable mitigation measures that should be taken when appropriate, with regards to reducing smoke impacts.

3.6 Data and Records Management

Fire program information, data, and records are used by Grand Canyon National Park, regional and national offices for a variety of purposes. This information must be well managed to be readily available for use when needed and safeguarded from damage or destruction. Records are covered by N1-95-05-02, an interagency disposition schedule, and Directors Order-11D, Records and Electronic Information Management. The park will ensure data are created and records managed by the requirements listed in RM - 18, Chapter 19, Information and Technology Management, and Chapter 11, Wildland Fire Reporting.

All NPS units are required to complete reporting requirements for all fires that occur within their boundaries. The IC is responsible for completing the appropriate sections of the Incident Organizer, based on the incident's complexity, and completing an incident narrative of significant events. Additionally, the IC will collect spatial data (origin point and perimeter depending on fire size) and submit that to the District/Zone and/or Park FMO. The Park FMO, Deputy FMO, South District FMO, or Fuels Specialist will utilize this information to finalize the official fire report in the InFORM web application.

Agency policy further defines how fire reports are managed, spatial data associated with wildland fires and fuels treatments will be collected, stored, and shared following guidance in RM – 18, Information and Technology Management, Chapter 19. A GIS database is maintained locally for all wildland fires and mechanical and prescribed fire projects

implemented in the Park. Additionally, park-specific wildland fire spatial data is supported by the NPS Southwest Zone and Intermountain Region Fire GIS Specialists. They assist with the creation, editing, management, and display of authoritative NPS Wildland Fire datasets through the development of web mapping applications, map creation, technical support, and training.

The Incident Qualifications and Certification System (IQCS) is the database used for tracking NPS wildland firefighter's qualifications, certifications, and training. The Zone Assistant Fire Business Specialist manages the personnel IQCS accounts. New employees are required to submit IQCS New Responder Forms to have an account established. All active individuals participating in any wildland fire training or incidents will submit an IQCS Responder Update Form at the end of each calendar year. This form documents training attended, training instructed, medical clearance, physical fitness completion, and qualified and trainee position performed. This information is required to generate Qualification Cards and for availability through IROC. The Park FMO is the Certifying Official within the IQCS.

4.0 PROGRAM MONITORING AND EVALUATION

The Northern AZ NPS Fire Management Program uses lessons learned from incident and program reviews as well as monitoring in its adaptive management process for both planned and unplanned actions at the project/incident level for overall program effectiveness**.**

4.1 Monitoring

Monitoring of wildfires, prescribed fires, and non-fire treatments will be conducted to meet the requirements of RM-18, Chapter 8, Fire Ecology and Monitoring. Grand Canyon National Park employs the NPS Fire Monitoring Handbook (NIFC 2003) standard four-level approach to monitoring unplanned and prescribed fires. Seven Monitoring Type Descriptions have been developed for programmatic monitoring of park vegetation. Additional monitoring types will be developed as needed if the prescribed fire is used in areas not already covered by existing monitoring type descriptions. Development of monitoring type descriptions, protocols, objectives, and desired conditions is the responsibility of the Fire Ecologist, with input from other disciplines.

The Northern Arizona Fire Ecology Group has maintained an active Fire Effects Monitoring Program housed at Grand Canyon National Park since 1990. In 2010, the Grand Canyon National Park Wildland and Prescribed Fire Monitoring and Research Plan (Monitoring Plan) was developed and is included in Appendix F. The Monitoring Plan describes event monitoring conducted during active fires, programmatic objective- based monitoring protocols, project-specific monitoring protocols, and burn severity mapping protocols. The group produces a Fire Ecology Annual Report that summarizes and incorporates applicable research results from within and outside the park and monitoring results from park prescribed fires and wildfires.

4.2 Research

The mission and goals for the NPS Wildland Fire Management Program outlined in Director's Order 18 include science-based management and integration of Wildland Fire with other NPS programs. Both of these goals are achieved, in part, through fire research. Conducting research that will help define natural fire regimes, refine prescriptions, provide data for fire behavior

models, and effectively implement the park's fire management program is an objective of this FMP. In addition to understanding the historic and current role of fire in park ecosystems, fire-related research at Grand Canyon National Park aims to acquire the knowledge necessary to inform actions relating to firefighter safety, fire response strategies, and/or fuel treatment design, adapt management under climate change, and to improve fire management practices that affect the park's natural, cultural, and social values. Refer to RM – 18, Chapter 17, Fire Research.

Past fire-related research within the park includes studies on forest reference conditions, fire regimes, restoration, fire effects to vegetation, wildlife, and soils, fuels and fire behavior, air quality and smoke, and information and education. Extensive fire-related research relevant to the park is referenced throughout the FMP Final EIS (NPS 2010). References for completed fire research, details of current fire research, and lists of fire research needs can be found in the Grand Canyon National Park Wildland and Prescribed Fire Monitoring and Research Plan (Appendix F), the Grand Canyon National Park Fire Ecology Annual Report, and the National Park Service Research Permit and Reporting System.

When opportunities arise for collaboration with academic researchers, the park will support investigations to better understand the role of and interactions between fire and fuels treatments and drought, wildlife, vegetation, soils, climate change, invasive species, air quality, and other land management techniques and challenges.

The Northern Arizona/ Grand Canyon Fire Ecology Group has played an integral role in representing the Grand Canyon National Park Fire and Aviation program when providing park fire information and data to research projects, participating in associated data collection, and partnering with other working groups as subject matter experts.

4.3 Evaluations, Reviews, and Updates

Fire Program Review

The National Park Service has developed a Wildland Fire Program Review Guide that describes the program review framework. For more information reference RM - 18, Chapter 16, Evaluations, Reviews, and Investigations. Reviews may be scheduled on a regular cycle, or requested by park, regional, or national leadership.

The Intermountain Region conducts Annual Program Assessments that evaluate the health of a program across nine program areas. Findings and trends identified in these assessments assist regional managers in focusing their formal review schedule.

Wildland Fire Incident Review

All wildland fires and fire-related incidents will be reviewed in accordance with RM - 18, Chapter 16, Evaluations, Reviews, and Investigations and the Red Book, Chapter 18, Reviews, and Investigations.

Required Annual Regional FMP Review Process

An annual review is required for this Fire Management Plan. The review process is described in Reference Manual - 18, Chapter 4 and 2024 Interim Policy for RM 18 Chapter 4, Fire Management Plans. Any needed updates to this FMP such as new terminology, policy references, or changes to park specific information will be identified and made as part of this process. After review by Regional Fire Planners, a new cover sheet for the FMP will then be signed by the Fire Management Officer and the Park Superintendent.

This FMP's appendices will also be reviewed annually and replaced with current (signed, if applicable) documents as needed. Electronic copies of the FMP and required appendices with current ink or certified electronic signatures will be uploaded to the NPS-IMRO-Annual Park Preparedness Docs Folder. Fire Management Plans that have not undergone annual updates within the specified timeframe are not considered current.

NWCG GLOSSARY

The National Wildfire Coordinating Group (NWCG) Glossary of Wildland Fire provides an extensive listing of approved terms and definitions used by the NWCG community. It contains terms commonly used by NWCG in the areas of wildland fire and incident management and is not intended to list all terms used by NWCG groups and member agencies. The NWCG has directed that all committee and subgroup product glossaries be contained within the NWCG Glossary of Wildland Fire to maintain definition consistency and clarity among documents.

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USEFUL WEB LINKS

Directors Order #18: Wildland Fire Management; National Park Service

(Red Book) Interagency Standards for Fire and Fire Aviation Operations, NFES 2724

NWCG Standards for Prescribed Fire Planning and Implementation, PMS 484

Reference Manual #18: Wildland Fire Management; National Park Service

APPENDICES

A. Annual Delegation of Authority from Superintendent to Fire Management Officer

B. Annual Kaibab NF/ Grand Canyon NP Duty Officer Delegation of Authority
- Grand Canyon National Park Inter-Divisional Agreement
- Arizona Wildland Fire Business Zone Inter-Park Agreement
- Grand Canyon & Flagstaff Monuments Inter-Park Agreement
- Grand Canyon & Verde Valley Monuments Inter-Park Agreement

C. MASTER COOPERATIVE WILDLAND FIRE MANAGEMENT AND STAFFORD ACT RESPONSE AGREEMENT
- Interagency Annual Operating Plan Between Forest Service, U.S. Department of Agriculture, Kaibab National Forest, North Kaibab R.D. and the National Park Service, U. S. Department of Interior, Grand Canyon National Park
- Interagency Annual Operating Plan Between Forest Service, U.S. Department of Agriculture, Kaibab National Forest, South Zone and the National Park Service, U. S. Department of Interior, Grand Canyon National Park

D. Preparedness Planning Documents
  - 2021 Northern Arizona Interagency Fire Danger Operating Plan (FDOP) DRAFT
  - Preparedness Level Plan
  - Staffing Plan
  - Initial Response Plan

E. Northern Arizona Parks Group Multi-Year Treatment Plan

F. 2010 Grand Canyon National Park Wildland Fire and Prescribed Fire Monitoring & Research Plan

G. Grand Canyon National Park Office of Planning and Compliance - 2016 Revised Letter of Authorization

H. Grand Canyon National Park 2018 Resource Advisor Guide

I. Grand Canyon National Park WFDSS Direction

J. Grand Canyon National Park Incident Organizer