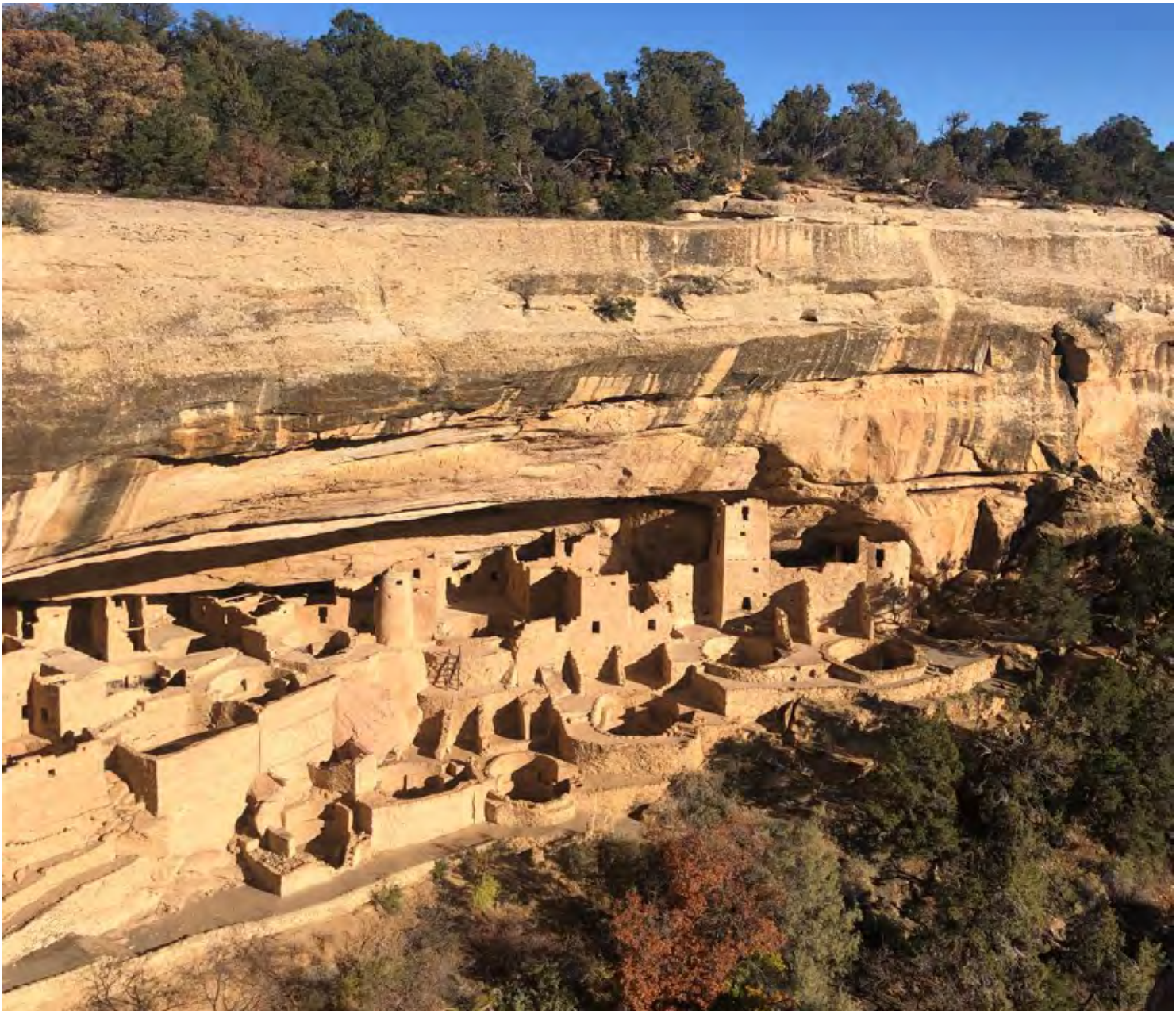
National Park Service
U.S. Department of the Interior
Mesa Verde National Park

Mesa Verde National Park
Yucca House National Monument
Fire Management Plan

Environmental Assessment

July 2023



Public Comment

We invite you to comment on this EA during the 30-day public review period. You may do so by providing comments through the National Park Service's (NPS) Planning, Environment, and Public Comment (PEPC) website for the park at: https://parkplanning.nps.gov/MEVE.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. Comments will not be accepted by fax, by e-mail, or in any other way than those specified above. Bulk comments in any format (hard copy or electronic) submitted on behalf of others will not be accepted.

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ACRONYMS AND ABBREVIATIONS

	Full Phrase
BMP	best management practice
CCC	Civilian Conservation Corps
CE	Common Era
CFR	Code of Federal Regulations
EA	environmental assessment
FMP	fire management plan
IPaC	Information for Planning and Conservation application
MRA	Minimum Requirements Analysis
MSO	Mexican spotted owl
MVNP	Mesa Verde National Park
NEPA	National Environmental Policy Act of 1969
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NPS	United States Department of the Interior, National Park Service
NRHP	National Register of Historic Places
RM	reference manual
RNA	research natural area
TCP	traditional cultural property
UNESCO	United Nations Educational, Scientific and Cultural Organization
U.S.	United States
USFWS	United States Fish and Wildlife Service
WERP	Wildfire Emergency Response Plan
YHNM	Yucca House National Monument

CHAPTER 1: PURPOSE AND NEED FOR THE ACTION

1.1 INTRODUCTION

The United States (U.S.) Department of the Interior, National Park Service (NPS) is proposing to develop and implement a fire management plan (FMP) for Mesa Verde National Park (MVNP) and Yucca House National Monument (YHNM) (collectively, "the parks"). Until recently, fire management activities had been conducted under a Wildfire Emergency Response Plan (WERP) that expired in 2022. The WERP allowed only full fire suppression and limited and localized fuels treatments to maintain defensible space in developed areas and around critical infrastructure. With its expiration and until a new FMP is developed and implemented, the only fire management option available is full suppression in response to wildfires and routine maintenance of existing defensible space.

1.2 PURPOSE AND NEED FOR THE PROPOSAL

The FMP's purpose is to incorporate federal wildfire policy and guidance grounded in the evolving science of wildfire management into an updated plan for the parks that meet NPS policies and requirements. The need for the FMP is to provide a flexible range of options and activities that the NPS could use to respond to changes in environmental conditions and the specific needs of fire management within the parks. The proposed FMP would also ensure the health and safety of the public, NPS staff, and firefighters; protect and maintain the parks' natural and cultural resources; and provide a quality visitor experience.

1.3 DESCRIPTION OF THE PROJECT AREA

For this environmental assessment (EA), the project area is defined as the administrative boundaries of the parks (Figure 1-1, Overview of the Parks). MVNP was established in 1906 to preserve and protect the material culture of the people who occupied the Mesa Verde cuesta.[1] The prehistoric architecture, artifacts, and landscapes that the parks are mandated to preserve are primarily associated with Ancestral Pueblo culture that occupied Mesa Verde and the Four Corners region from 550 to 1300 CE.

To protect certain areas of the park in a wilderness status, in 1976 Congress set aside 8,500 acres known as Mesa Verde Wilderness (Public Law 94-567, 90 Stat. 2692) under the provisions of the Wilderness Act (78 Stat. 890). On September 8, 1978, MVNP was among the first sites designated a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Cultural Site in recognition of the park resources' outstanding value and importance to all humankind. The park includes a Class I airshed, the highest standards set by Congress under the Clean Air Act. Park Mesa has been designated a research natural area (RNA). Within the park boundary are more than 5,000 known archeological sites, including 600 cliff dwellings and the mesa top sites of pit houses, pueblos, masonry towers, and farming structures (NPS 2015a).

[1]A cuesta is a ridge with a gentle slope (dip) on one side and a steep slope (scarp) on the other.

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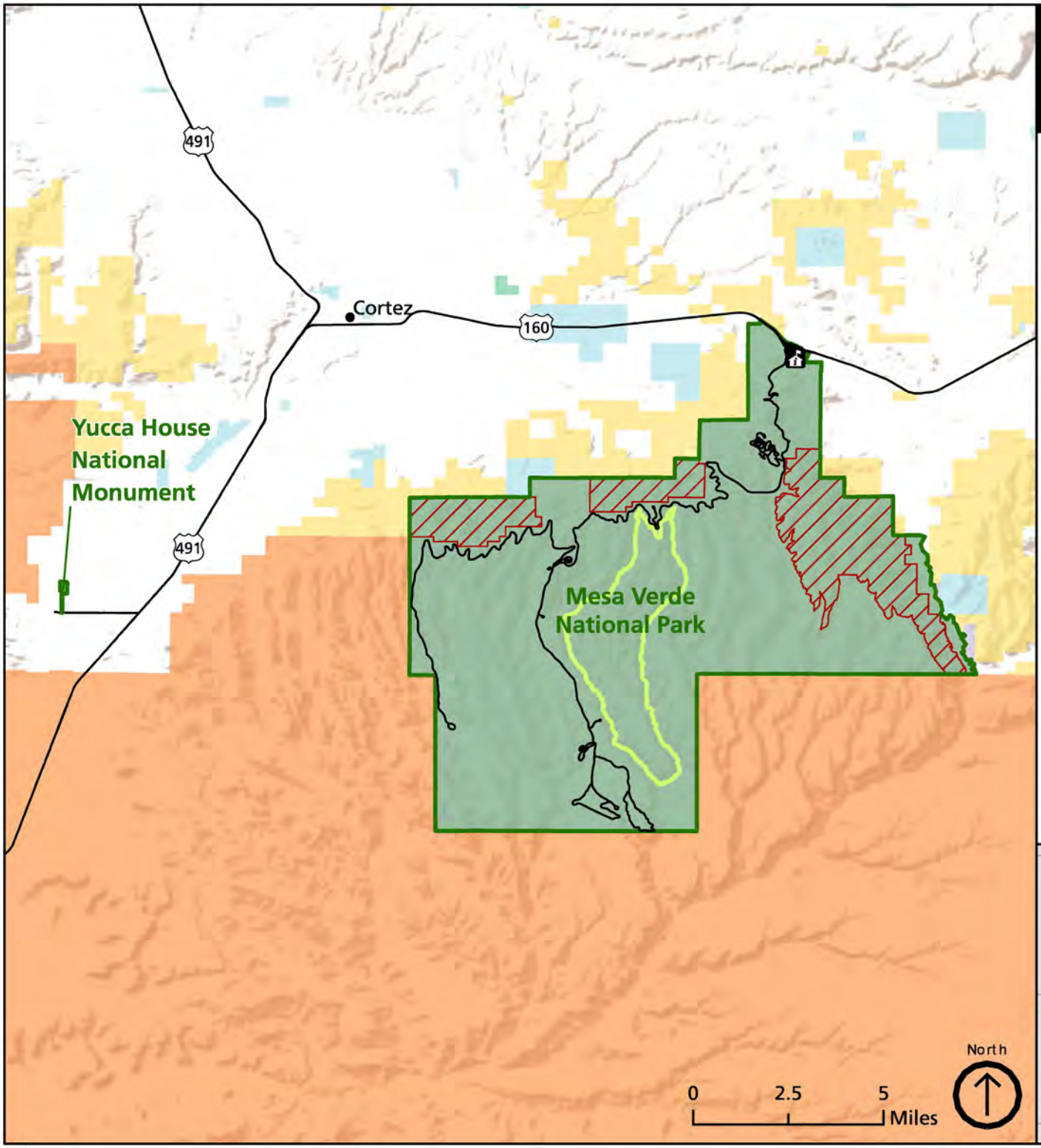

Figure 1-1
Overview of the Parks

- Visitor center
- Road
- Mesa Verde Wilderness
- Park unit administrative boundary
- Park Mesa Research Natural Area

- National Park Service
- Bureau of Land Management
- Indian Reservation
- US Fish and Wildlife Service
- State
- Private

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May 24, 2023
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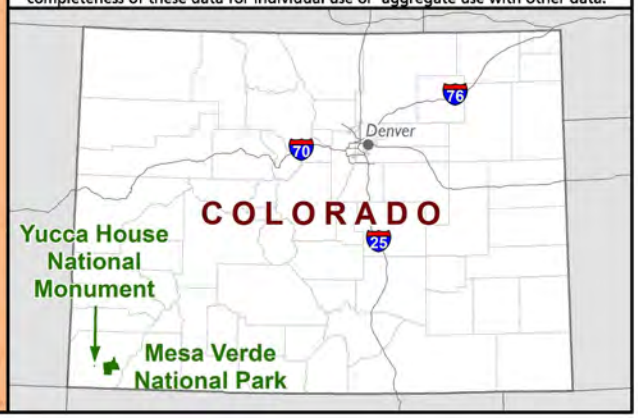

YHNM is a 33.6-acre prehistoric community generally referred to as "valley pueblo." It is located on the eastern approach of Sleeping Ute Mountain in Montezuma County in southwestern Colorado. It was established as a national monument in 1919 and is managed by MVNP staff. The monument preserves a large unexcavated pueblo in Montezuma Valley. Site chronology includes an initial occupation ranging from 1050 to 1150 CE followed by a later occupation from 1225 to 1300 CE. Overall, Yucca House is composed of a multistory masonry pueblo that includes a well-preserved great house, multiple towers in small plazas, a bi-wall structure, a significant number of kivas, and a well-delineated ceremonial plaza containing a great kiva, partially enclosed by an imposing wall just to the north.

With a few exceptions, the valley pueblos/community centers all relied on water sources within diverse landscapes. These resources provided a moderately resilient landscape capable of sustaining agriculture and the lifeways of the Ancestral Pueblo people (NPS 2015b). Since its establishment, YHNM has remained largely untouched, offering visitors a sense of discovery and preserving the pueblo's beauty and integrity for future generations.

CHAPTER 2: ALTERNATIVES

2.1 INTRODUCTION

This EA considers two alternatives: the no-action alternative (alternative A) and the proposed action alternative (alternative B and preferred action). The elements of these alternatives are described in the following sections. This EA analyzes the planned fuels treatments In addition, Appendix A describes an alternative that was considered but dismissed from detailed analysis.

2.2 ALTERNATIVES CARRIED FORWARD FOR ANALYSIS

2.2.1 Alternative A—No Action

The no-action alternative provides a benchmark for a decision maker to compare what would happen to the environment if current management were to continue, versus what would happen to the environment if one of the action alternatives were selected for implementation. Under the no-action alternative, the NPS would not implement the proposed FMP for the parks. Because the WERP expired in early 2022, treatment activities would be limited to full suppression of wildland fires as they occur and maintenance of existing defensible space through completion of a CE.

The NPS would manage unplanned fires under a fire management strategy like that found in the expired WERP. Under that strategy, the NPS would employ full suppression to control a fire and prevent it from exceeding a defined perimeter. Common tools and strategies associated with suppression efforts include the following:

- Helicopters and other aircraft to rapidly transport fire crews, equipment, and water and retardant to wildfires, especially in remote locations
- Wildland fire engines of various types, depending on the terrain and type of fire, to transport fire crews, equipment, and water to wildfires
- Use of retardant and water to reduce the wildfire's intensity and rate of spread and to enable firefighters on the ground to access the area and construct containment lines more safely near the fire. For response readiness, retardant is usually maintained in the fire equipment depending on the type of aircraft. This retardant is typically applied as a first response. Some fixed wing aircraft only carry water, gel, or foam delivery to the sites.
- Hand tools such as chainsaws, axes, and shovels for removing fuels and for digging fire lines.

The following objectives would be during suppression efforts:

- Manage risks to employees and the public
- Contain wildfires at the smallest size possible using tactics consistent with managing the risks to firefighters and the public
- Protect cultural and natural resources from fire and suppression operation impacts
- Protect the parks' infrastructure from fire and suppression operation impacts

To meet these objectives, the following operational constraints and requirements would be implemented during suppression efforts:

- Wheeled vehicles would remain on the hardened road surface unless approved by a resource advisor.
- Heavy equipment use would require superintendent approval.
- In situ pile burning would be used in a few locations where moving fuels is not practical or feasible; however, hauling would be conducted in a manner that avoids or reduces impacts on resources on the ground (that is, carrying rather than dragging fuels to avoid damage to cultural resources) (See Figure 2-1).
- Aerial application of water to suppress fire would be preferred, but the use of chemical foam and retardant would also be allowed by aerial application to minimize damage to sensitive resources. The use of retardant is a decision authorized by the Park superintendent and can be delegated to a resource advisor under the superintendent's authority and guidelines.
- Sensitive features, such as archeological sites and critical habitat for threatened and endangered species, would be avoided.
- Only approved water resources[2] would be used.

In the event of a wildfire at the parks under this alternative, suppression response could last from days to months, depending on the fire severity and the length of time needed to suppress the wildfire. In addition, effects related to post-wildfire response would also lengthen the time of effect. Post-wildfire management consists of four founding activities: repairing the suppression damage, emergency stabilization, burned area emergency rehabilitation, and restoration (NPS 2019a).

Repairing the suppression damage involves planned actions taken to repair the damages to resources, lands, and facilities resulting from wildfire suppression actions. Suppression damage repair activities are planned and performed by the suppression incident management team as soon as possible, prior to demobilization. Emergency stabilization is an extension of emergency actions and consists of planned actions taken to minimize threats to life or property resulting from the wildfire's effects. These actions may include stabilization, repair, replacement, or construction of physical improvements in order to prevent unacceptable degradation to natural and cultural resources. The objectives of emergency stabilization are to determine the need for emergency treatments, and then to prescribe and implement the treatments. Life and property are the first priority. Cultural and natural resources treated through emergency stabilization should be significant and immediately threatened.

Burned area rehabilitation consists of efforts undertaken to repair or improve wildfire-damaged lands unlikely to recover naturally, or to repair or replace minor facilities damaged by wildfire. The objectives of burned area rehabilitation are to (1) evaluate actual and potential long-term, post-wildfire impacts on critical cultural and natural resources and to identify those areas unlikely to recover naturally from severe wildfire damage; (2) develop and implement cost-effective plans to emulate historical or pre-wildfire ecosystem structure, function, diversity, and dynamics consistent with approved land management plans, or if that is not feasible, to restore or establish the integrity of a stable ecosystem in which native species are well represented; and (3) to repair or replace minor facilities damaged by wildfire. Typically, after a wildfire that has burned 10 or more acres, there is a suitability assessment for burned area emergency rehabilitation to rehabilitate built fire lines, assessment of resources affected by the fire, and implementation of emergency erosion or revegetation activities. Restoration activities are long-term ecosystem restoration projects that are

[2]All water sources inside the park boundary, including the Mancos River, are approved for fire suppression use.

beyond the funding limitations and timeframes of emergency stabilization and burned area rehabilitation and would be subject to additional planning and compliance.

2.2.2 Alternative B—Proposed Action and Preferred Alternative

The proposed action would develop and implement a new FMP for the parks. See Figure 2-1, Fuel Treatments Proposed in Mesa Verde National Park, for a map of proposed treatments currently planned for MVNP. Proposed activities for reducing hazardous fuels include:

- Mowing, limbing trees, trimming, chipping, hauling of materials to pile burn sites, and application of other manual and mechanical treatments, such as chainsaws, hand axes, and masticators to reduce vegetation along backcountry roads, infrastructure, and cultural resources to create buffers; maintain defensible space; limit fire spread; protect roads, parking lots, trailheads, and trails; and reinforce safety zones
- Prescribed fire in certain areas to reduce fuels load, reinforce safety zones, and maintain defensible space

Further, the NPS plans to maintain up to a 30-foot cleared buffer on either side of the backcountry roads and certain park resources (such as NPS buildings and sites of interest) for intensive fuels reduction.[3] Along the Mesa Top Loop Roads, rather than clearing 30 feet, the NPS would remove dead fuels up to 40 feet from the pavement edges, with no full clearing planned.

For structures in the parks, the NPS would likewise maintain a 30-foot buffer. The 30-foot buffer around buildings fuels would be removed but would not include live trees (see Figure 2-1). In addition, beyond that 30-foot buffer, the NPS plans to conduct less intensive treatments, such as limbing, to create space in vegetation and in the tree canopy to reduce the risk of fire spread. These treatments would occur up to 70 feet beyond the initial 30-foot buffer, accounting for a total of up to 100 feet of treatments around park structures.

The NPS would treat approximately 5 miles of the parks' backcountry roads per year. Over the life of the FMP, all 40 miles of backcountry roads in the parks would be treated, and treatments would be maintained as needed. Typically, these treatments along 5 miles of backcountry roads would occur on 15 to 35 acres per year, but treatment acreages would be left to the discretion of park management.

The FMP would also detail the location and extent of prescribed burns and other treatments such as mechanical thinning and manual vegetation removal to be implemented in the parks. At this time, specific treatment sites in YHNM have yet to be identified but would resemble those detailed above (along roads, infrastructure, cultural resources, parking lots, trailheads, and trails). This EA only analyzes the currently planned manual, mechanical, and prescribed fire treatments. Additional future prescribed burns could be planned and may be addressed through additional site-specific compliance and analysis, as appropriate.

Additional fuels treatments and prescribed fires would be planned on an annual basis for hazardous fuels reduction and vegetation management. Under the FMP, the use of the administrative burn pile zones approved previously under a CE would continue. In these burn pile zones, slash and cordwood resulting from manual or mechanical treatments are burned to dispose of these materials. There are currently two zones, the Morefield and Chapin Mesa burn zones (Figure 2-2, Administrative Burn Zones in Mesa Verde National Park).

[3]This buffer distance accounts for potential removal of heavy fuel loads along roadsides. It is possible that, in certain areas, this clearance buffer could be less than 30 feet.

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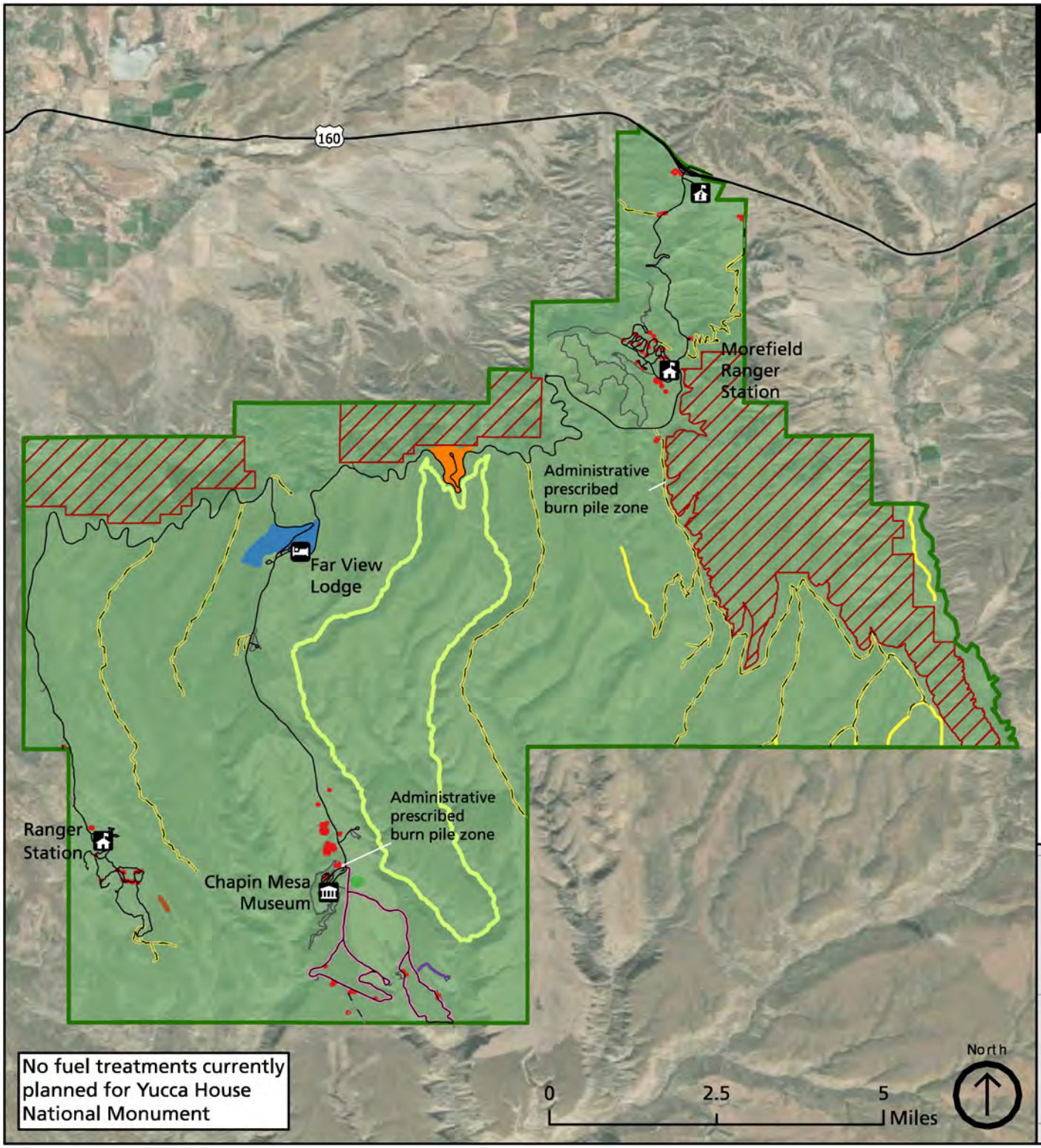

Figure 2-1
Fuel Treatments Proposed in Mesa Verde National Park

Proposed action

- Facility/ infrastructure protection
- Administrative prescribed burn pile zone
- Roadside fuel reduction
- Safety Zone maintenance
- Park Point prescribed burn
- Far View Lodge Units (Eastern and Western) prescribed burn
- Bobcat Canyon prescribed burn
- Loop Roads fuel reduction
- Soda Canyon Trail fuel reduction
- Ranger station
- Visitor center
- Museum
- Hotel
- Road
- Trail
- Administrative road
- Mesa Verde Wilderness
- Mesa Verde National Park administrative boundary
- Park Mesa Research Natural Area

Source: NPS GIS 2022
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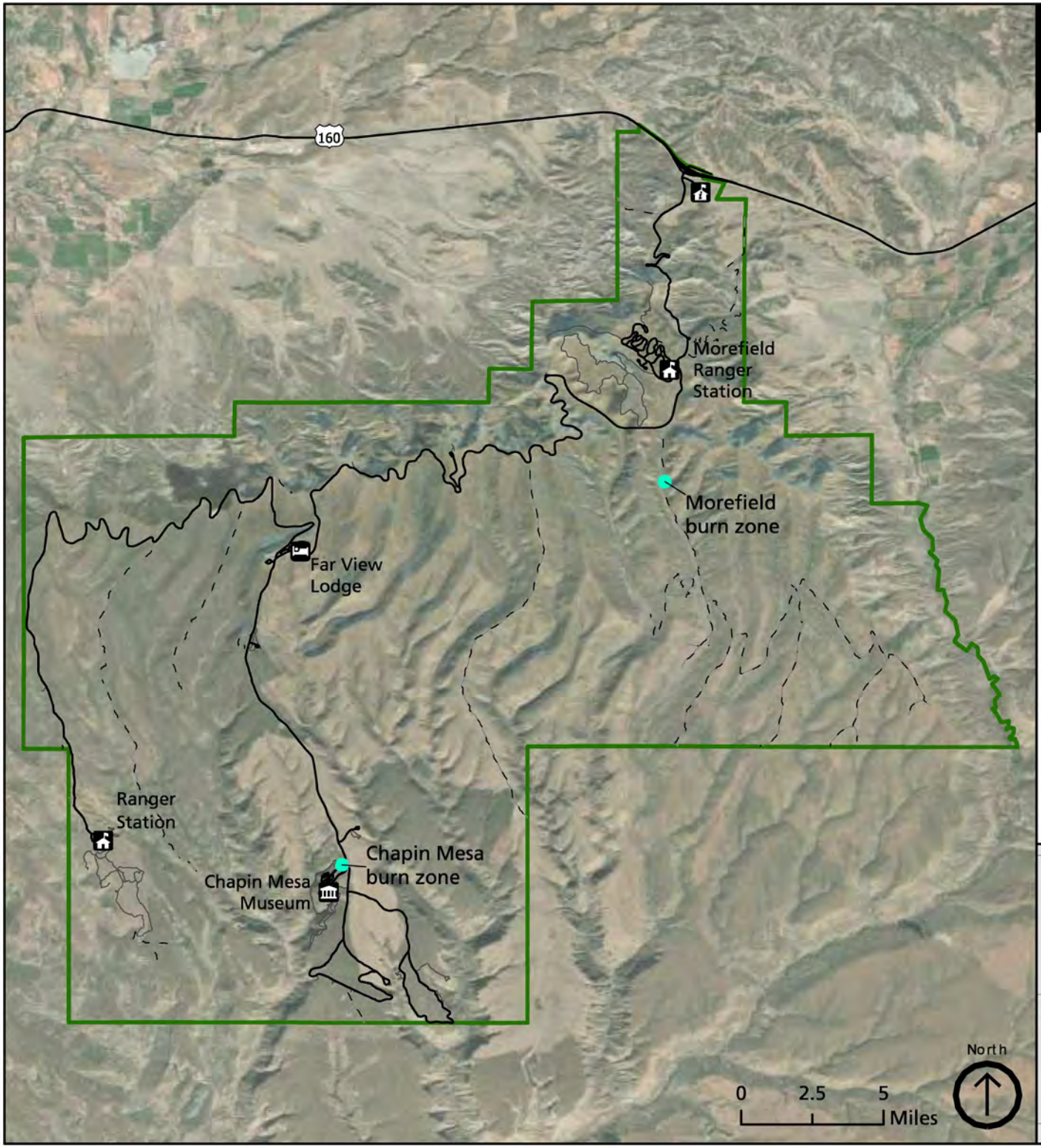

Figure 2-2
Administrative Burn Zones in Mesa Verde National Park

- Burn pile zone
- Ranger station
- Visitor center
- Museum
- Hotel
- Road
- Administrative road
- Trail
- Mesa Verde National Park administrative boundary

Source: NPS GIS 2022
April 13, 2023
MEVE_FMP_Rpts_Baseline.pdf
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Under the previous WERP, two areas at MVNP underwent prescribed burns: the Bobcat Canyon and eastern Far View Lodge Units. There is some potential for the eastern Far View Lodge Unit to be burned again under the proposed FMP. Both the Far View Lodge Unit and Bobcat Canyon Unit would be evaluated on a 5-year period to determine whether additional prescribed burns are needed (Figure 2-1, Fuel Treatments Proposed in Mesa Verde National Park). In addition to the previously burned units, the NPS has proposed two new prescribed burn areas in MVNP under the FMP: Park Point and the western Far View Lodge Unit (Table 2-1).

Table 2-1. Acres of Proposed Fire Treatment Types in MVNP

Treatment Action	**Acres Impacted**
Administrative pile zones prescribed burn	0.5
Bobcat Canyon prescribed burn	7
Park Point prescribed burn	102
Far View Lodge Units (eastern and western) prescribed burn	198*
Prescribed Burn Subtotal	307
Safety zone maintenance	15
Loop Roads fuels reduction	86
Soda Canyon fuels reduction	6
Facility/infrastructure protection	112
Roadside fuels reduction	338
Fuels Reduction Subtotal	557
Total	864

NPS GIS 2022

* The eastern unit is comprised of 67 acres; the western unit is comprised of 130 acres.

At Park Point, the NPS proposes to burn around 100 acres in a single day to reduce ground fuel loads and to protect park resources. A ground crew would apply fire by hand. The NPS would use previous burn scars and roads to buffer the burn unit. The burn would occur in the fall or early spring. At the western Far View Lodge Unit, the NPS proposes to burn around 100 acres to reduce Gambel oak fuel loads. Crews would number around 40 persons, with fire possibly applied via unmanned aircraft systems (drones)[4] during a week in the fall or early spring. The NPS plans to prescribe treatments in these units once every 10 years. Both areas would involve a return of vegetation, with employment of best management practices (BMPs) to reduce nonnative, invasive plants, and noxious weeds.

Under this alternative, the NPS would manage unplanned fires in the same manner as described under alternative A. The NPS would employ full suppression to control a fire and prevent it from exceeding a defined perimeter. Common tools and strategies associated with suppression efforts are described under alternative A.

As a form of NEPA compliance for analyzing the effects of the proposed action, this EA provides programmatic support and site-specific analysis of the proposed treatment projects discussed in the FMP. The goal is to support and streamline implementation and any future site-specific NEPA or NHPA compliance analyses. This EA does not preclude further NEPA or NHPA compliance analyses at the site-specific level, should impacts need to be addressed from subsequent treatments that are not considered by this EA.

The NPS would evaluate subsequent treatments at the parks to confirm they are within the scope of the EA; if so, the NPS would complete a memo to file before it could implement site-specific projects

[4]For guidance on the use of unmanned aircraft systems during prescribed fire treatments, see NPS Resource Manual (RM) 60, Aviation Management, and the Mesa Verde National Park Aviation Management Plan.

under this FMP. If the treatments change in scope and are not within the EA analysis, then the NPS would reevaluate them, or additional NEPA/NHPA analyses would be required.

FMPs do not expire and remain in effect until superseded by a new or revised plan. However, annual updates are required for the plan to be valid for the current year. The annual FMP update is intended to ensure wildland fire policy directives are included and current; ensure the FMP includes a process of adaptive management to incorporate new knowledge, modernization, and the best available science; ensure the document continues to conform to the FMP NEPA record, federal policy, FMP objectives and strategies, and terminology; and maintain a current multiyear fuel treatment plan (when fuels treatments are a part of a park unit's fire management options) (see NPS RM-18, Wildland Fire Management). The NPS's proposed FMP for the parks includes a fuels treatment plan with a term of 10 years; accordingly, for purposes of this analysis, the long-term strategy is understood to consist of a 10-year period. Should the FMP require revision or replacement to meet wildfire needs within the parks, the NPS would implement such revisions or replacements at that time.

2.3 MITIGATION MEASURES

Under the proposed action described in alternative B, the NPS would implement a suite of BMPs and mitigation measures to ensure that effects on resources in the parks that occur while implementing the FMP are reduced or eliminated. BMPs and mitigation measures depend on the affected resource. Those BMPs and mitigation measures that are applicable to all resources or are integral to the proposed action are listed here and those that are relevant or provide additional details or protections to certain resources are listed in Appendix B.

- The NPS would prioritize the use of water drops to suppress fires over the use of fire retardant after initial response. However, air tankers are usually preloaded with retardant, and aircraft using water may not be available.
- In the event of fire-retardant drops on a fire, such drops must avoid all water sources in MVNP, including springs sites and the Mancos River. Retardant drops occurring within ephemeral drainages upslope from water sources have the potential to carry retardant to water sources, particularly during monsoonal rain events that lead to flash flooding.
- Except for an imminent emergency situation, the air quality station would be identified for avoidance.
- Resource Advisors, or READs, would be available in preparation for fires. READs would be used as much as possible during fires and prior to fuels treatments at MVNP and YHNM.
- Alternatives to pile burning in intact natural communities would be explored and implemented to prevent resource degradation and damage.
- Boundaries of administrative burn zones[5] would be delineated via mapping and on-the-ground markers to avoid expansion out of already disturbed areas (Figure 2-2).
- Before any prescribed burn would take place in the project area, a burn plan would be prepared to address burning objectives and operational concerns. The plan would identify mitigation measures necessary to protect site-specific resource values, notification procedures for residents and visitors, and potential fire behavior and precautions.

[5] These administrative burn zones are identified as Chapin Mesa Administrative Burn Site and Morefield Administrative Burn Site.

- All burn plans would have an approved smoke permit issued by the Colorado Air Pollution Control Division. The burn boss would have a copy of issued permits on-site and would monitor and document smoke. Notification of ignition and daily actual activity reports would be submitted to the Colorado Air Pollution Control Division. As required by the smoke permit, smoke monitoring would be conducted as necessary and as determined at the time of the burn.
- A qualified burn boss would prepare and approve burn prescriptions before burning begins. The burn boss would be asked to participate in all potential treatment area design and layout activities where prescribed fire is planned to ensure the burn does not adversely affect resources in the area such as cultural resources, special status plant species, or water resources. The treatment objectives, along with the burn unit's design and layout, would be constrained by protection of these resources, and would determine the feasibility of using prescribed fire. Burn prescriptions would be consistent with weather conditions and fuel moistures and would be designed to best achieve desired fuels reduction. Fires would be variable in intensity and consistent with prescribed fire and other resource management objectives.
- To reduce impacts on water resources, the NPS would use tools to prevent or mitigate the discharge of fine particulates and chemicals into waterways, including but not limited to, sediment traps, silt fences, and regular inspection of treatment areas for erosion.
- Fuels treatments would not occur in wilderness or other specially designated areas, such as the Park Mesa RNA.
- To ensure safety, the NPS would close fuels treatment sites to visitor access prior to conducting treatments.
- Prior to any treatments, sensitive soil sites and areas with slopes over 35 percent would be identified and treatments would be avoided in these areas.
- The FMP would incorporate all the recommended avoidance and mitigations described in the NPS's Conservation Plan for Chapin Mesa Milkvetch, for example:
    - Conservation measures include leaving at least 50 percent of canopy cover, reducing the intensity of thinning treatments to maintain ecological characteristics of piñon-juniper woodlands, and coordinating with MVNP resource specialists.
    - Pre-treatment surveys to identify Chapin Mesa milkvetch populations to avoid these areas and reduce the impacts on the species.
- Treatments would not occur during the nesting season for migratory bird species in the project area (April 1 to August 15) to the maximum extent practicable.
- Prior to treatments, surveys for raptors would be conducted to identify locations of individuals or populations of these species and their nests and to allow for the implementation of protection measures.
- Prior to any treatments, the site would be surveyed for identification and flagging of threatened, endangered, and rare species. Limits of disturbance would be clearly flagged to reduce potential trampling of native vegetation and soils.
- The NPS would implement several measures to ensure impacts on cultural resources would be avoided or minimized, consistent with policy and direction on preserving these resources.
    - Cultural resource surveys of the appropriate intensity (as determined by a NPS archeologist) would be conducted before any ground-disturbing activities (that is, driving off road, slash removal by dragging , and pile burning) begin to avoid or minimize damage to cultural resources, including archeological sites and TCPs.

- The NPS will conduct a pedestrian Class III archeological survey and consult with the SHPO and Tribes on the identification of properties before implementing any prescribed burns.
- Consultation will include evaluation of whether there are areas with perishable archeological resources that should be treated with mechanical/manual fuel reduction instead of a prescribed burn.
- Adverse impacts on eligible or potentially eligible cultural resources would be avoided during project layout and implementation, as well as through monitoring, in coordination with a NPS archeologist, as necessary.

CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This chapter describes the affected environment (current and future expected conditions of the environment, including trends in conditions) and analyzes the potential environmental consequences (impacts or effects) that would occur as a result of implementing the alternatives. The analysis of impacts includes effects that are reasonably foreseeable and have a reasonably close causal relationship to this proposal. This chapter discusses the effects on vegetation, soils, special status species, and cultural resources. Other resources that were considered but dismissed from detailed analysis are discussed in Appendix C.

3.2 VEGETATION RESOURCES

3.2.1 Affected Environment

Piñon-juniper woodlands, montane chaparral communities, and desert shrub communities cover much of southern Colorado and the area where both parks are located (Figure 3-1, Mesa Verde National Park Vegetation Types). Historically, fires burned piñon-juniper woodlands an average of every 400 years. A sharp boundary exists between piñon-juniper woodlands at slightly lower elevations in MVNP's southern portion and the montane chaparral at slightly higher elevations in the north. This pattern is explained, in part, by more extensive fires in the northern area, which favor resprouting shrubs and eliminate the fire-sensitive piñon and juniper. The less frequent occurrence of large fire and resulting persistence of woodland in the park's southern portion may be due, in part, to natural barriers to fire spread (such as cliffs and sparsely vegetated slopes) to the south and west of the piñon-juniper woodlands.

Studies demonstrate that the recent large fires in MVNP and the vegetation responses to those fires appear to be within the historical range of variation for this ecosystem (Floyd et al. 2000). For approximately 100 years, fire suppression in the Southwest has increased the density of vegetation in many areas. Suppression in MVNP based on the referenced research has largely prevented stand replacing fires until the recent drought period. The main mechanism for the wildfires in the park has been drought, warmer temperatures, low fuel moisture, and decreased moisture during the monsoon season (Floyd et al. 2000). Recent fire history demonstrates the extent of fires in MVNP, especially since 2000 (Figure 3-2, Mesa Verde National Park Fire History).

The NPS uses the best available science to guide climate change adaptation for planned and unplanned fire treatment activities. This includes monitoring climate trends, maintaining preparedness for expected weather and fire behavior, and planning climate-appropriate fuels treatments. NPS fire managers work collaboratively to address the NPS mission through climate-adaptive approaches, including monitoring, research, and scenario planning. In December 2015, the Colorado Natural Heritage Program, in coordination with the Bureau of Land Management, conducted a climate change vulnerability assessment for the state (CNHP 2015). This document provides historical and projected climate information for various ecoregions in Colorado, including those found in the parks. It also outlines relevant strategies for key resource areas, including forested and rangeland landscapes.

The assessment notes that debate persists regarding the historical range of variation for stand density and high-severity fire incidence in mixed-conifer forests. Natural fire processes in this system are likely highly variable in both return interval and severity, depending on stand composition, site conditions, biogeographic history, and climate patterns. Critically, however, reasonably foreseeable trends indicate an increase in drought and high temperatures, which, prior to fire initiation are associated with larger burned area as fine fuels become dry (CNHP 2015).

In the ecoregion where the parks are located, it has been established that, due to changing climatic conditions, fires are recurring in shorter time spans (see Floyd et al. 2021). This is due to persistent drought conditions and warmer weather patterns that, in turn, alter the composition and density of vegetation and fuels found in MVNP. The likelihood of large wildfires in the parks is thus increasing due to increased fuels loading and prolonged drought conditions. Further, in the wake of large fires, these conditions increase opportunities for the spread of invasive weed species into burned areas. Additional disturbances in mixed-conifer forests may also occur due to windstorms or insect-pathogen outbreaks that can affect landscape-scale dynamics in mixed-conifer forest (CNHP 2015).

While no fires have been recorded in YHNM, in MVNP, five large fires in the last 30 years have threatened significant cultural and natural resources. The proposed FMP would contribute to the protection of these resources throughout both parks.

Mesa Verde National Park

MVNP is located within the larger south-sloping Mesa Verde cuesta physiographic feature, which covers 113,115 acres. Vegetation in this area is distinct within the arid Southwest because of its relative abundance of water (up to 20 inches of annual precipitation). This is the result of the orographic[6] uplift from the surrounding high peaks of the southern Rocky Mountains, a long growing season, a diverse geological substrate, and the subsequent soils and topographic variety. The vegetation at MVNP is not considered fire dependent. This means that, while fires occur in the vegetation found in MVNP, it is not considered fundamental to sustaining native plants and animals. As noted above, piñon-juniper woodlands (*Pinus edulis*, *Juniperus osteosperma*, and *J. scopulorum*), montane chaparral communities (*Quercus gambelii*, *Amelanchier utahensis*, *Cercocarpus montanus*, and other tall shrub species), and desert shrub communities (*Atriplex canescens*, *Sarcobatus vermiculatus*, and *Lycium pallidum*) cover much of southern Colorado and the area where the parks are located . Historically, fires burned piñon-juniper woodlands an average of every 400 years. This period is known as the fire return interval. For Gambel oak , this fire return interval is 100 years (Floyd et al. 2000). For the desert shrub communities, this fire return interval can vary from 150 to 250 years (USGS GIS 2011).

Recent fire events at MVNP have resulted in high mortality rates in piñon-juniper woodlands, soil erosion, and the spread of invasive weeds into fire-altered landscapes (Figure 3-2).

The most abundant vegetation communities in MVNP are described below. Acreages for each community are based on NPS Inventory and Monitoring Program data from vegetation classification and distribution mapping published in 2009 (Thomas et al. 2009).

Invasive plant species are present throughout the MVNP, particularly in areas that are highly disturbed, such as along roads and infrastructure. Thomas et al. (2009) noted invasive plant species in many vegetation communities that were surveyed and found that those species were often the dominant species in the herbaceous layer.

[6]The effect of mountains forcing moist air to rise.

Mesa Verde National Park

Fire Management Plan
Environmental Assessment

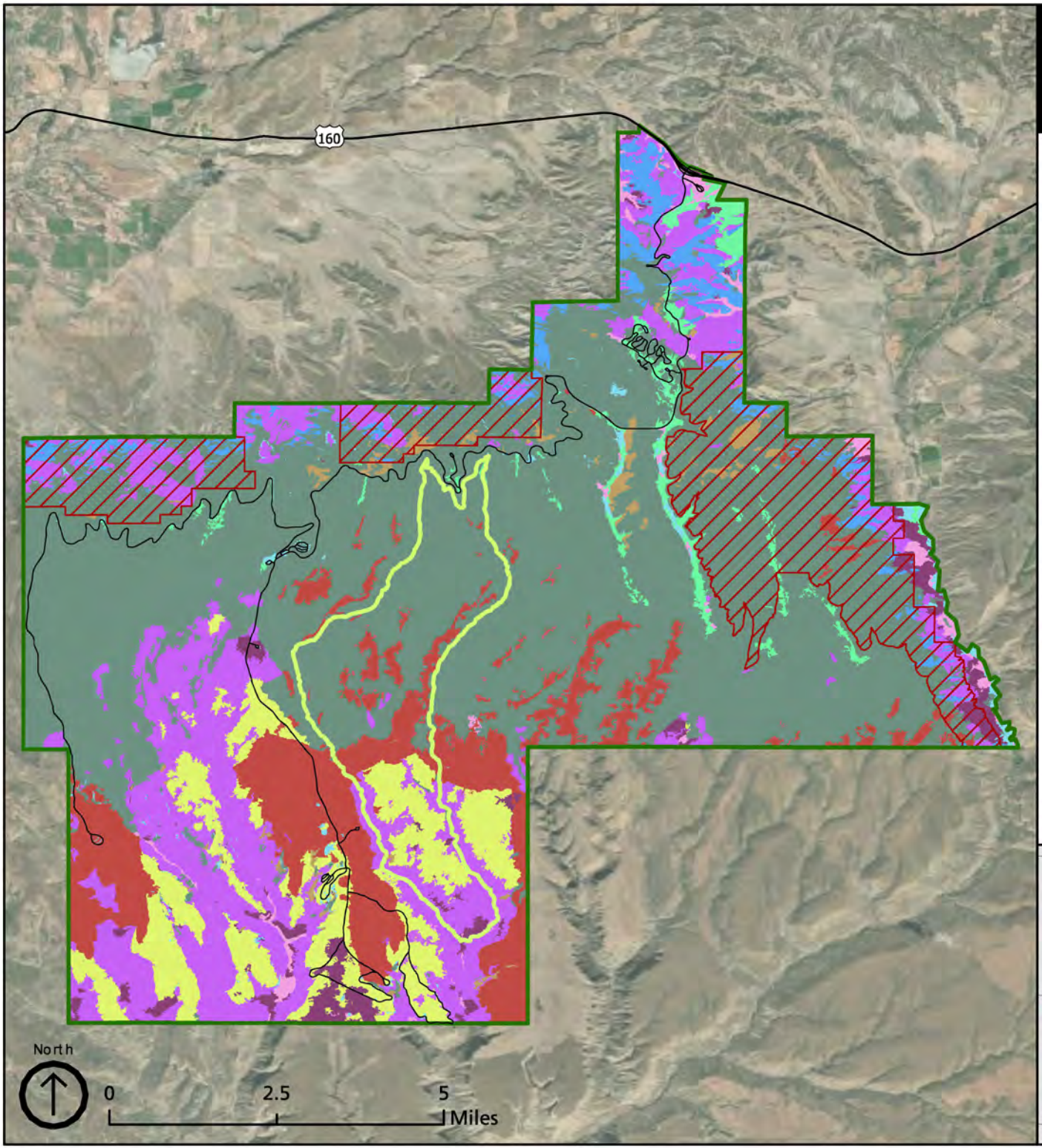


Figure 3-1
Mesa Verde National Park Vegetation Types

- Mixed Montane Shrubland
- Colorado Piñon - Utah Juniper / Mixed Montane Shrubland
- Disturbed Semi-natural Vegetation
- Colorado Piñon - Utah Juniper / Bitterbrush / Muttongrass Woodland
- Mancos Shale Vegetation
- Colorado Piñon-Utah Juniper
- Rabbitbrush Shrub Herbaceous Vegetation
- Douglas-fir / Gambel Oak Forest
- Big Sagebrush Shrubland
- Other

- Road
- Mesa Verde Wilderness
- Mesa Verde National Park administrative boundary
- Park Mesa Research Natural Area

Source: NPS GIS 2022
May 24, 2023
MEVE_FMP_Rpts_Baseline.pdf
No warranty is made by the National Park Service as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

Mesa Verde National Park

Fire Management Plan
Environmental Assessment

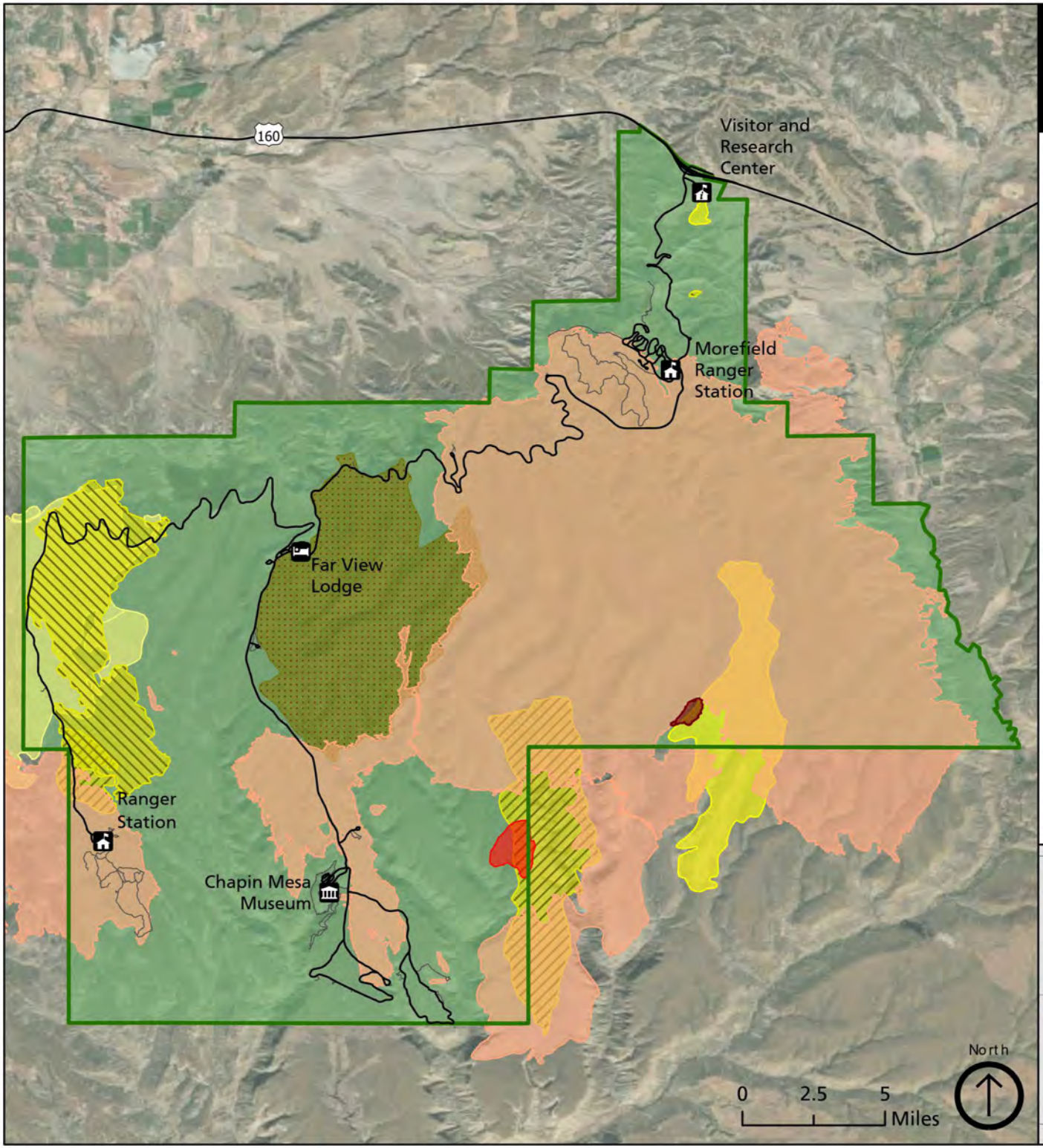


Figure 3-2
Mesa Verde National Park Fire History

Fire perimeter by decade

- 2020-present
- 2010-2019
- 2000-2009
- 1990-1999
- 1980-1989
- 1970-1979
- 1950-1969
- 1930-1949

*No fires greater than 1 acre occurred between 1940-1949 and 1960-1969.

- Ranger station
- Visitor center
- Museum
- Hotel
- Road
- Trail
- Mesa Verde National Park administrative boundary

Source: NPS GIS 2022
April 13, 2023
MEVE_FMP_Rpts_Baseline.pdf
No warranty is made by the National Park Service as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

The NPS has implemented current treatment efforts of invasive plant species in MVNP largely in disturbed areas along roads and around other park infrastructure. Since the NPS systematically began capturing data on invasive plants treatments, the NPS has identified chemical application as the greater degree of treatment, with mechanical treatments to a lesser degree. Approximately 1,903 acres were treated in 2021, with the largest effort in the Wetherill Mesa roadside area, which treated approximately 452 acres (NPS GIS 2022). Common invasive species that have been targeted during these treatments include cheatgrass (*Bromus tectorum*), smooth brome (*Bromus inermis*), musk thistle (*Carduus nutans*), and Canada thistle (*Cirsium arvense*) (NPS GIS 2022). Within MVNP, park staff have observed the distinct spread of invasive species post-disturbance.[7] Accordingly, disturbance actions like application of prescribed burns may increase the risk of spread of invasive species. However, within certain vegetation communities, specifically piñon-juniper woodlands, few to no invasives have been documented.

These observed trends are consistent with documented research throughout the region; soil disturbance is a major cause of the spread of invasive plant species, and intact vegetation communities are more resilient to the spread of invasive species (Miller et al. 2019; Floyd et al. 2021). However, in MVNP, the abundance and distribution of invasive species are not well understood due to the lack of available invasive species research and data.

Gambel Oak/Mixed Montane Shrubland

Gambel oak/mixed montane shrubland vegetation is represented by the Mixed Montane Shrubland vegetation type in Figure 3-1 and Table 3-1. This vegetation community represents the largest percentage of vegetation in MVNP (54 percent; Table 3-1). Gambel oak is the dominant shrub in this habitat type and may be co-dominant with other shrubs, such as serviceberry, antelope bitterbrush (*Purshia tridentata*), or rubber rabbitbrush (*Ericameria nauseosa*). Although not strongly associated with Gambel oak, the tree layer may include Rocky Mountain juniper. The herbaceous layer may be thick and can include white sagebrush (*Artemisia ludoviciana*), cheatgrass, and squirreltail (*Elymus elymoides*) (Thomas et al. 2009). Density and cover of Gambel oak and serviceberry may increase after fire.

Table 3-1. Vegetation Communities in the Parks

MVNP Native Vegetation Community	Acres	Percentage of Total Acres of Vegetation Community in the Parks
Mixed Montane Shrubland	28,986	54.0
Colorado Piñon-Utah Juniper	1,278	2.4
Colorado Piñon-Utah Juniper/Bitterbrush/Muttongrass Woodland	4,051	7.5
Colorado Piñon-Utah Juniper/Mixed Montane Shrubland	8,942	16.7
Disturbed Semi-natural Vegetation	6,050	11.3
Big Sagebrush Shrubland	582	1.1
Douglas fir/Gambel Oak Forest	618	1.2
Mancos Shale Vegetation	1,666	3.1
Rabbitbrush Shrub Herbaceous Vegetation	1,003	1.9
Other	529	1.0
Total	**53,705**	—

[7]Bethany Nickison, MVNP Compliance Coordinator, personal communication with EMPSi regarding invasive species trends in MVNP. May 2022.

YHNM Native Vegetation Community	Acres	Percentage of Total Acres of Vegetation Community in the Parks
Disturbed/Successional – Shrub Regeneration	5	13.9
Inter-Mountain Basins Semi-Desert Shrub Steppe	15	41.7
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	10	27.8
Other	6	16.7
Total	**36**	—

Sources: NPS GIS 2022; USGS GIS 2011
Note: Percentages are rounded and do not equal 100.

Piñon-Juniper Woodlands
Piñon-juniper woodland vegetation is another dominant vegetation community in MVNP. These woodlands occur on almost all of the mesas and slopes of the upper canyons. The eastern side of MVNP features a patchwork of piñon-juniper woodlands and shrublands (Thomas et al. 2009). Piñon pine and Utah juniper dominate the piñon-juniper type. Utah juniper dominates lower-elevation and xeric sites, and piñon pine dominates at higher-elevation and mesic sites.

Piñon-juniper stands in MVNP can be classified into two major types: 1) piñon-juniper old-growth woodlands, which are rare in the Southwest (shown as Colorado Piñon-Utah Juniper/Bitterbrush/Muttongrass Woodland in Figure 3-1) and 2) piñon-juniper shrublands that consist of sporadic piñon and juniper and a dense shrub layer dominated by serviceberry, Gambel oak, and other shrubs (shown as Colorado Piñon-Utah Juniper/Mixed Montane Shrubland in Figure 3-1). The herbaceous layer, when present, can include muttongrass (*Poa fendleriana*), dwarf lousewort (*Pedicularis centranthera*), western wheatgrass (*Pascopyrum smithii*), and sharpleaf twinpod (*Physaria acutifolia*).

Other smaller piñon-juniper communities also have been identified in MVNP, including Colorado piñon-Utah juniper/black sagebrush woodland, Colorado piñon-Utah juniper/sagebrush woodland, and Colorado piñon-Utah juniper sandstone barrens (shown as Colorado Piñon – Utah Juniper in Figure 3-1 and Table 3-1). Overall, these three groups of piñon-juniper woodlands make up a quarter of the vegetation in MVNP (Table 3-1).

Park records show that few fires occurred in MVNP during the early to mid-1900s, but the fire regime changed abruptly in the late 1900s with large, severe fires in 1989, 1996, 2000, and 2002, and smaller fires in 2003 and 2008 (Floyd et al. 2021). Protecting the remaining live old-growth piñon and juniper woodlands is important because such stands provide critical habitat for threatened and endangered species. Additionally, regeneration to this seral stage can take several centuries.

Disturbed Semi-natural Vegetation
This vegetation community is represented by the vegetation type of the same name in Figure 3-1 and Table 3-1. Disturbed semi-natural vegetation makes up approximately 11 percent of vegetation in MVNP (Table 3-1). The vegetation always occurs in burned areas and consists of a mix of herbaceous species, including native and nonnative forbs and grasses. The most frequent species include, but are not limited to, cheatgrass, musk thistle (*Carduus nutans*), showy goldeneye (*Heliomeris multiflora*), narrow-leaf penstemon (*Penstemon linarioides* ssp. *coloradoensis*), Fendler's bluegrass (*Poa fendleriana* ssp. *longiligula*), scarlet globemallow (*Sphaeralcea coccinea* ssp. *coccinea*), and other cool- and warm-season grasses that resprout following fire (Thomas et al. 2009).

Nonnative species, including musk thistle, Canada thistle, and cheatgrass, are of management concern in the recently burned piñon-juniper woodland and grassland cover types. These and other weed species tend to flourish immediately after fires, but some may decline in density years after recovery through succession.

Big Sagebrush Shrubland
Big sagebrush shrubland is represented by the vegetation type of the same name in Figure 3-1 and Table 3-1. Big sagebrush shrubland makes up approximately one percent of the vegetation in MVNP (Table 3-1). This habitat occurs in areas with intermittent flooding and is dominated by big sagebrush (*Artemisia tridentata* ssp. *Tridentata*) and rubber rabbitbrush. There is an herbaceous layer, which often contains nonnative species such as smooth brome, cheatgrass, and whitetop (*Cardaria draba*) (Thomas et al. 2009).

Douglas fir/Gambel Oak Forest
The Douglas fir/Gambel oak forest vegetation cover type is represented by the vegetation type of the same name in Figure 3-1 and Table 3-1. Douglas fir/Gambel oak forests make up approximately one percent of the vegetation in MVNP (Table 3-1). Douglas fir (*Pseudotsuga menziesii*) dominates the canopy, and Gambel oak dominates the shrub layer. Other shrubs may include mountain snowberry (*Symphoricarpos oreophilus*) and skunkbush sumac (*Rhus trilobata*). This habitat type tends to occur in canyons, at high elevations, or in areas with intermittent flooding (Thomas et al. 2009).

Rare, old-growth stands of Douglas fir exist in the deep canyons in the southern portion of MVNP, such as Wickiup, Spruce, Long, Bobcat, Cliff, Soda, and Navajo Canyons. Other old-growth Douglas fir stands are known to exist on the north escarpment and other north-facing pockets. These stands represent vital arboreal habitat for numerous mesic species, including the threatened Mexican spotted owl (*Strix occidentalis lucida*). The NPS has also identified these stands for protection from fire.

Mancos Shale Vegetation
Mancos shale is the oldest exposed rock formation in MVNP. Vegetation in this community largely consists of herbaceous species with limited (less than 10 percent) shrub and tree cover. Mancos shale vegetation makes up approximately three percent of the vegetation in MVNP (Table 3-1). Annual and perennial herbaceous species found on Mancos shale include desert princes' plume (*Stanleya pinnata*), rushy milkvetch (*Astragalus lonchocarpus*), Patterson's milkvetch (*Astragalus pattersonii*), sulphur-flower buckwheat (*Eriogonum umbellatum*), and San Juan gilia (*Gilia haydenii*). Very few trees and shrubs are found on Mancos shale; typical species include piñon pine, Utah juniper, or Rocky Mountain juniper (Thomas et al. 2009).

Rabbitbrush Shrub Herbaceous Vegetation
Rabbitbrush shrub vegetation makes up approximately two percent of the vegetation in MVNP (Table 3-1). Rubber rabbitbrush \is the dominant shrub in this community. Broom snakeweed (*Gutierrezia sarothrae*) is also common. The herbaceous species generally consist of smooth brome, a nonnative grass, and western wheatgrass (*Pascopyrum smithii*) (Thomas et al. 2009).

Other
Vegetation communities less than 100 acres and non-vegetation acres were combined and classified as "Other" in Figure 3-1 and Table 3-1. Combined, these communities make up approximately one percent of the vegetation in MVNP (Table 3-1). For MVNP these included agriculture, Douglas fir/boxelder woodland, erosion control, gravel, Mancos River woodland and shrubland, mixed wetland herbaceous vegetation, park facilities, paved roads, ponderosa pine woodland, rural residential, and exposed sandstone.

Yucca House National Monument

YHNM protects areas of native vegetation that have not experienced the grazing and cultivation that occurs on many neighboring lands. However, some invasive weeds have begun to move into the site. Vegetation communities in YHNM consist of disturbed/successional – shrub regeneration, semi-desert shrub steppe, and riparian woodland and shrubland (Table 3-1). Habitats within YHNM are dominated by desert shrubs, such as four-wing saltbush, greasewood, and wolfberry. Hilltops and

slopes within YHNM support Utah juniper, upland sagebrush (*Artemisia tridentata*), and a few piñon pine.

Vegetation communities less than 10 acres and non-vegetation acres were combined and classified as "Other" in Table 3-1. Combined, these communities make up approximately 17 percent of the vegetation in YHNM (Table 3-1). For YHNM, these communities included Colorado Plateau piñon-juniper woodland, cultivated cropland, developed open space, inter-mountain basins greasewood flat, inter-mountain basins semi-desert grassland, and pasture/hay.

Trends and Planned Actions – Vegetation Resources

In addition to wildfires, past, planned, and ongoing activities within the park that can affect vegetation include road and trail construction, building and facility construction, utility improvements, revegetation projects and climate change.

Planned road projects that are not yet in progress include Wetherill Mesa Road, Cedar Tree Tower, Far View Sites Road, and the Long House Loop Roads (also referred to as Tram Road) projects and culvert replacement along the Waterline Access Road. These projects are rehabilitating existing roads, and improving overall accessibility, overlooks, sidewalks, intersections, and parking areas. Work is mostly confined to road corridors.

The Mesa Top Loop Roads project is in progress and is expected to be completed this year.

Major construction projects planned outside of road corridors include development of the Paths to Mesa Verde bike path project, construction of the Mesa Top Comfort Station, construction of the wildland fire facility (likely near the park entrance), rehabilitation of the Headquarters Loop residences, and rehabilitation of the Chapin Museum. Project footprints and construction support areas would be defined on a site-specific basis and effects on vegetation would be addressed in project design and planning.

The planned replacement of the Wetherill Waterline and Morefield Waterline would have a limited footprint in mostly previously disturbed areas. The planned access route for the proposed stabilization of the Spruce Tree House alcove arch would also widen an existing trail.

The planned demolition and restoration of the old MVNP helibase site would include reseeding and revegetating with Chapin Mesa milkvetch seeds and/or plants.

Full fire suppression activities and use of equipment such as potable water tanks, aircraft landing areas, fire vehicles, fire lines would continue to affect vegetation.

Ongoing park management programs, such as fuels reduction to maintain defensible space, efforts to mitigate the effects of climate change related to persistent drought and the spread of noxious weeds and invasive plants, and the planned removal of trespass livestock from MVNP, would continue.

Climate trends may impact vegetation resources throughout the park. Climate change patterns and drought are anticipated to lead to hotter temperatures, drier conditions, and more intense storm events which would alter the species abundance and distribution. Updated fire management planning would include measures to ensure that impacts on special status species would be avoided or minimized, consistent with park policy and direction on preserving these resources.

3.2.2 Impacts of Alternative A (No-Action Alternative)

As noted in Section 3.2.1, the NPS's inability to implement a fuels treatment program would allow fuel loads to accumulate in the parks. This is because of the trends described above: natural, low-intensity fire plays an important role in some vegetation communities, such as grasslands and

ponderosa pine forests. These communities can be negatively impacted by large, severe fires. However, other vegetation communities, such as piñon-juniper and Gamble oak, experience large, high-severity stand-replacing fires every 100 to 400 years as a part of their historical range of variability (Floyd et al. 2000). This trend is disrupted when persistent drought and the spread of noxious weeds and invasive plants increase fuel loads to the degree that fire behavior no longer corresponds to historic trends. Namely, fire spreads faster and burns more intensely in these high fuel loads.

Without the implementation of an FMP under alternative A, there is a higher risk of severe fires that can pose a risk to vegetation communities and other park resources. Additionally, equipment, personnel, and resources used to suppress large, severe fires would likely cause impacts on vegetation resources. These impacts include trampling and soil compaction, which reduce nutrient and oxygen intake from root systems. An abundance of certain species, such as invasive cheatgrass or native Gambel oak, can add to the fuels load and increase the severity of fires.

After fire events, invasive species also tend to establish before native species and can outcompete native species for resources. This establishment, in turn, alters the composition of vegetation communities to continuous fine fuel loads, which changes the predominant fire regime on the landscape. Impacts from previous fires in MVNP have shown that invasive species, such as musk and Canada thistle, cheatgrass, and stickseed (*Hackelia* sp.) outcompete native species in the first several years after a severe fire (Floyd-Hanna and Romme 1995). Invasive species like these, especially grass species like cheatgrass have been documented to increase fire frequency, severity, and occurrence exponentially in the ecosystem, which ultimately increases the fire risk (Fusco et al. 2019).

Under this alternative, other vegetation such as Gambel oak would continue to proliferate, which would lead to the continued accumulation of fuels on the ground. Abundant fuels allow wildfires to burn at high temperatures and spread easily.

Compared with the natural fire regime, impacts from severe fires can have drastically different effects on plant species. High-intensity fires can destroy dormant seeds in the soil seed bank that would otherwise persist with natural, low-intensity fires. Seeds that do survive severe fires may also have a decreased ability to germinate if the surrounding landscape has been altered due to the fire. Alterations that could affect seed germination include a lack of overstory to provide shade, post-fire erosion, the lack of organic surface matter, and the lack of unburned areas that provide sources of seeds for vegetation (Lentile et al. 2007).

Covington and Debano (1990) point out that wildfires occurring in piñon-juniper communities in windy, hot, and dry conditions can destroy nearly all the trees, remove all the understory vegetation and litter, and volatilize critical nutrients limiting ecosystem productivity. The potential for similar effects from severe fire on established piñon-juniper woodlands, as well as other vegetation communities, would persist without an established FMP that would help prevent severe fire occurrence. Accordingly, the risk of higher-intensity wildfires with destructive impacts on plant species would persist. This effect would be long term, with landscape changes lasting for years into the future in the absence of comprehensive fire management (DiTomaso and Johnson 2006).

Cumulative Impacts

The trends and conditions described in the affected environment resulting from past, planned, and ongoing actions would continue. Construction activities would continue to have the potential to impact vegetation in project footprints and construction support areas. The potential effects of vegetation removal, disturbance of native vegetation, and spread on non-native vegetation would be addressed in project design and planning and implementation of BMPs. The contribution of construction activities to cumulative impacts would be negligible. The cumulative impact of not

implementing more comprehensive fire management planning as the risk of severe fire increases could be substantial.

3.2.3 Impacts of Alternative B (Proposed Action)

Under alternative B, suppression impacts on vegetation communities would be like those described under alternative A. The addition of proposed fuels treatments under alternative B would increase impacts on certain vegetation communities. Mechanical treatments to reduce wildfire effects and to maintain defensible space would cause effects lasting from several weeks to several months, during which time treatments would be implemented. The timeframe for effects would be commensurate with the vegetation community in which the treatment would occur. For example, the effects from canopy removal and thinning in piñon-juniper woodlands would be longer compared to mowing grasses for which effects would only be anticipated for the growing season in which the treatments would occur. However, for treatments designed to maintain defensible space, impacts would persist for the life of the FMP, as such treatments would be conducted regularly. Effects on vegetation would be created from mowing, limbing trees, and trimming to maintain buffers along backcountry roads and around park infrastructure and critical resources. These kinds of effects would be contained to the area of treatment and not extend beyond prescribed treatment areas.

See Table 3-2, below, for a summary of the acreage of vegetation types in MVNP that would be affected by the proposed action. Impacts by acreage to mixed montane shrubland communities would be the greatest for all vegetation communities. Because mixed montane shrubland is the most common vegetation community, treatments would only impact 1.43 percent of this vegetation community. Impacts to a single vegetation community in relation to the occurrence of that community within MVNP would be greatest to rabbitbrush shrub herbaceous vegetation. However, the NPS would expect only 5.28 percent of this community to be affected, which represents just 0.10 percent of the overall vegetation in the parks. Impacts on all other vegetation communities combined are less than one percent of the total vegetation within the park. Overall, the proposed fuels reduction along roadsides would have the largest effect on vegetation, affecting approximately 336 acres (Table 3-2). The largest impact by community would be on "other vegetation," with treatments affecting approximately 8.70 percent of the communities that make up this category. However, many of these acres include park facilities, paved roads, rural residential, and sandstone.

Over the long term (one to six years following implementation of treatments), vegetation within and around treatment areas would likely benefit from treatments. Treatments could indirectly reduce invasive species that add to the fuel load and outcompete native species. Treatments are largely proposed around disturbed areas (roadsides and infrastructure; Figure 2-1), where many invasive species, such as cheatgrass, are known to persist. The NPS assumes this reduction would benefit native species by reducing competition and improving the spacing among vegetation and vegetation types, which would be overall closer to historical baseline conditions. To achieve these long-term benefits, multiple treatments could be necessary. However, this assumption would not be consistent throughout all vegetation communities. For example, treatments in old growth piñon-juniper woodlands would likely result in more invasive weeds, which would not be consistent with known baseline conditions.

Table 3-2. Acreage of Vegetation Types Affected by Proposed Fuel Treatments

Treatment Action	Colorado Piñon-Utah Juniper	Mixed Montane Shrubland	Rabbitbrush Shrub Herbaceous Vegetation	Big Sagebrush Shrubland	Disturbed Semi-natural Vegetation	Douglas Fir/ Gambel Oak Forest	Colorado Piñon-Utah Juniper/ Bitterbrush/ Muttongrass Woodland	Mancos Shale Vegetation	Colorado Piñon-Utah Juniper/ Mixed Montane Shrubland	Other
Administrative pile prescribed burn	0	0	0	0	0	0	0	0	0	0
Bobcat Canyon prescribed burn	5	1	0	0	0	0	0	0	0	1
Facility/infrastructure protection	6	14	12	4	21	0	26	1	7	22
Far View Lodge Units (eastern and western) prescribed burn	0	191	0	0	0	0	0	0	0	6
Safety zone maintenance	0	3	0	0	11	0	1	0	0	0
Soda Canyon fuels reduction	0	0	0	0	0	0	4	0	1	0
Loop Roads fuels reduction	10	0	0	0	14	0	44	0	7	11
Roadside fuels reduction	12	204	33	11	17	0	8	3	44	4
Upper Mesa prescribed burn	0	0	8	0	0	0	0	0	95	2
TOTALS	**33**	**414**	**53**	**15**	**63**	**0**	**83**	**4**	**154**	**46**
Percentage of acres impacted in MVNP	**0.06**	**0.77**	**0.10**	**0.03**	**0.12**	**0**	**0.15**	**0.01**	**0.30**	**0.10**
Percentage of acres impacted within each vegetation community	**2.58**	**1.43**	**5.28**	**2.58**	**1.04**	**0.00**	**2.05**	**0.24**	**1.72**	**8.70**

Source: NPS GIS 2022
Note: Impacted vegetation communities of less than one acre are not included.

Implementing the FMP could potentially result in an increased risk of uprooting, injury, or mortality to individual plants or plant communities. This would be due to the addition of mechanical vegetation treatments and implementation of prescribed burns. Modifying and removing vegetation would result in localized changes to vegetation composition and density; this would, in turn, alter fire behavior in that vegetation. These activities would also increase the potential for the spread of invasive grasses immediately following vegetation treatments.

The NPS would avoid this effect by implementing the BMPs listed in Appendix B. Monitoring and maintenance of treatment areas conducted for the life of the FMP would reduce the magnitude of the effects from the increase in invasive annual grass. Vegetation removal would be measured and spaced to avoid fragmentation or creation of notable losses of vegetation abundance or species diversity. Managed regrowth over the long term (for multiple years into the future) would serve to promote vegetation health. Long-term effects of prescribed fire on vegetation vary according to the vegetation community and fire frequency. A proper duration between treatments is important to provide adequate fuels reduction without affecting the long-term growth of vegetation and the establishment of invasive species. For example, in southwestern ponderosa pine forests, an interval of four to six years was shown to reduce fuel loads but not impact the growth of ponderosa pine (Peterson et al. 1994).

The NPS would use prescribed fire under specific weather and wind conditions to remove plant biomass from selected areas. Prescribed burning has impacts on plant communities; these impacts are complex and involve many factors, including fire intensity, frequency, time of year, targeted plants and communities, and past fires (DiTomaso and Johnson 2006). Impacts could also vary related to how the NPS would prepare sites for burns, which is typically done in the following ways:

- Removing brush and limbing trees using a chainsaw
- Scattering concentrations of large, heavy fuels to reduce fire and heat impacts
- Constructing hand lines to exclude fire from an area
- Using water and foam to pretreat a site, if practical, by wetting it down to minimize embers starting new fires

To clarify, the NPS would use broadcast-prescribed burns in shrubland communities. The NPS would employ pile burns at administrative pile locations or in-situ (on site) pile burn sites in conjunction with manual and mechanical treatments for most other vegetation types.

For in-situ pile burn sites, impacts on vegetation resources related to disturbing, removing, or trampling plants could occur. The creation of fire lines during suppression and in preparation for prescribed fire operations would directly remove existing vegetation where the lines were established. This is because constructing hand lines would involve physically scraping or digging with hand tools to bare mineral soil, which would remove vegetation in the process. Digging hand lines could also result in local increases in nonnative, invasive grass germination due to soil disturbance; however, implementation of BMPs (Appendix B) would reduce or prevent this impact.

When used in conjunction with other treatments, prescribed fire can help the vegetation community by improving seed bed conditions and facilitating proper vegetation re-establishment and site stability. For example, in areas with high invasive annual grass cover, prescribed fire would reduce the aboveground live plant and residual biomass cover and invasive annual grass seed bank; this would reduce competition for native plants to revegetate the area after the prescribed burn.

Broadcast-prescribed burns would benefit vegetation communities such as Gambel oak shrublands by reducing species competition and opening new habitat for native species to colonize. However, benefits may be small, since prescribed fire would mainly be concentrated around infrastructure and roads. Prescribed fire would also serve to minimize the potential for future high-severity fires at

MVNP. Previous fires have resulted in high mortality rates in piñon-juniper woodlands, soil erosion, and the spread of invasive weeds into fire-altered landscapes.

Although nonnative grasses such as cheatgrass, musk thistle, and Canada thistle also benefit after fires by quickly establishing in burn areas, the proposed burn schedules (in fall or early spring) for prescribed fire treatments at both the newly proposed and existing burn units would serve to promote the healthy reestablishment of native species and restore the natural landscape to historical baseline conditions. Revegetation of the existing and proposed prescribed fire units would employ BMPs to reduce weeds. BMPs for reducing the establishment of invasive plant species after treatments are discussed in Appendix B.

Cumulative Impacts

The trends and conditions described in the affected environment resulting from past and ongoing actions would continue. Projects with larger footprints, such as the loop roads and waterline projects, would involve more widespread impacts on vegetation communities through removal of plants and disturbance to soils that, in turn, increase the risk of invasive weed and nonnative plant proliferation. For projects with more discrete footprints, impacts on vegetation would be more likely to affect individual plants through removal and soil disturbance. The NPS would work to restore native vegetation through revegetation efforts where ground disturbance has occurred, but results of these efforts are mixed. A restoration goal of 100 percent native plant cover is often unrealistic because nonnative plants likely are already present in most previously disturbed work areas. The NPS also would mitigate the spread of nonnative plants through a variety of BMPs, including controlling construction materials entering the parks and equipment inspections at park entrances. In addition, the NPS would use herbicides to control the spread of nonnative plants in areas disturbed by ongoing construction and other ground-disturbing activities.

Construction activities would continue to have the potential to impact vegetation in project footprints and construction support areas. The potential effects of vegetation removal, disturbance of native vegetation, and spread of non-native vegetation would be addressed in project design and planning and implementation of BMPs. The contribution of construction activities to cumulative impacts would be negligible. Cumulative impacts from this alternative would be reduced due to the areas receiving treatment and the smaller chance for a large, high-severity wildfire. Impacts on some vegetation would also be temporary, as treatments would allow for revegetation. The impacts associated with the trends and conditions resulting from past, planned, and ongoing action in conjunction with the proposed action would be minimized.

3.3 SOIL RESOURCES

3.3.1 Affected Environment

Mesa Verde National Park

Two major soil groupings are recognized in MVNP. First are soils on the stable mesa tops that developed from aeolian (windblown) deposits. The second group includes steep canyons and hills that are composed of colluvial material fallen from steep slopes and alluvial material washed down from the slopes by intermittent streamflows. The windblown soils, also known as loess, generally have excellent qualities for native vegetation growth.

Soil depth and development vary by location relative to the mesa edges. Near the mesa edges or canyon rims, bare sandstone is commonly exposed. Closer to the rims, the soils often are a mixture of windblown soil and sandstone. These soils have a sandy loam texture with minimal development

of soil horizons or layers. Farther back from the mesa edges, the windblown soil has accumulated to greater depths (19 to 39 inches). These soils are relatively stable with little influence from the underlying bedrock. Subsoil textures are generally loam to clay loam with the development of subsoil argillic horizons (clay layer). Soil surveys for the Cortez area, including parts of Dolores and Montezuma Counties, and the Ute Mountain area reveal more than 40 specific soil types and complexes within the park. The most predominant soils are the following: Prater-Dolcan complex, Wauquie-Dolcan-Rock outcrop complex, Sheek-Archuleta-Rock outcrop complex, and Arabrab-Longburn complex. These soils, taken together, comprise nearly 48 percent of all soils found at MVNP (NRCS 2022a; NPS GIS 2022).

Winter moisture has leached calcium carbonate downward from the surface over thousands of years; calcium carbonate has accumulated in the lower parts of the soil profile, forming a white powdery deposit known as calcic horizons. Still farther away from the canyon edges, near the middle of the mesa, the windblown soils have developed to a greater depth. Soil accumulation over the sandstone or shale can be as deep as 3.3 to 6.6 feet. These deeper soils show excellent evidence of stability and soil development. Well-developed subsoil argillic horizons, along with calcium carbonate deposits in calcic horizons, are common. Deep deposits may extend over large areas on level topographies, but depths decline in the adjoining canyons or on steeper, less stable hillsides.

Soils in the steep canyons exhibit the greatest soil variability in MVNP. In most cases, steep canyons and mesa slopes are capped by a band of hard sandstone, with softer and more erosive shale or interbedded materials beneath. Colluvial soils develop below the near-vertical cliffs formed by the harder Cliff House Sandstone. These soils incorporate sandstone pieces from above mixed with the interbedded sandstone and shale layers of the underlying shale in the Menefee Formation. The soils tend to be shallower and have minimal development on the landscapes' convex positions and nearer the tops of the slopes. This is because the exposed steeper slopes have high erosion rates, approaching the point where erosion is equal to deposition and weathering of the bedrock. These steep, rocky slopes with little soil development tend to be poorly vegetated. The available water capacity is very low. This is due to the shallow depth, and little water infiltrates into the soil. Consequently, the runoff rates are high.

The soils at the slopes' lower portion accumulate to greater depths as the material erodes from above and is deposited in the fans and toe slopes near the bottom. These soils sometimes exceed 19 feet in depth. Deep colluvial soil is made up of soil and geologic material that has fallen from above. Lower slope soils have generally well-developed soil features and horizons. Weakly developed to well-developed argillic and calcium carbonate deposits are common. Soil textures tend to be loams to light clay loams; however, they have a great deal of variability, depending on the upslope geologic formations (Ramsey 2003).

Soil moisture varies with the location on the landscape. Many areas near the lower parts of the slope benefit from increased moisture due to runoff from areas above. The aspect (that is, the north, south, east, or west orientation direction) also plays a major role in determining the development and moisture status of the site. The soils on north-facing slopes are more fully developed and have better vegetation cover due to the better moisture status. The pH, organic material, and leaching of carbonates are all tangible evidence of this increase in available moisture on the north-facing slopes (Ramsey 2003).

Within piñon-juniper woodland habitat, Mikim loam and Arabrab-Longburn soils are the most likely to suffer from invasive vegetation after soil disturbances from things like wildfire, trespass livestock, or human activities. In addition, Arabrab-Longburn soils are more likely to support invasive plants, even without significant disturbance (Floyd-Hanna et al. 2006).

Good soil structure is important for the movement of water, gases and roots, which are all critical for a healthy soil. Compacted soils lack good soil structure as the air spaces that are essential in the

movement of water, gases and plant roots are compressed. Clayey and silty soils are most susceptible to compaction because their particles hold more water for longer than sands or loams. Soil compaction can lead to poor root growth, which reduces water and nutrient uptake.

Fragile soils are defined as those that are most vulnerable to degradation due to their high susceptibility to erosion and low capacity to recover after degradation has occurred (low resilience). These soils are characterized by a low content of organic matter, low aggregate stability, and weak soil structure. They are generally located on sloping ground, have sparse plant cover, and tend to be in arid or semiarid regions (NRCS 2022a).

Soils in which significant erosion is expected are defined as "severe" based on three criteria: soil erosion K factor,[8] the slope, and the content of rock fragments (NRCS 2022b). The total acres of fragile soils and soils with severe erosion hazards in MVNP are included in Tables 3-3 and 3-4.

Yucca House National Monument

Soil surveys reveal two main soil types at YHNM, Ramper loam and Zyme very channery clay loam (NRCS 2022a; NPS GIS 2022). Soils at YHNM have been identified as moderately saline, clay-rich soils developed from Mancos shale (NPS 2013). In near-surface environments, Mancos shale weathers to shale residuum, which resembles soil in its characteristics but retains the physical structure of the shale (Wright 2006). Residuum profiles in Mancos shale can range from several feet to dozens of feet thick.

Trends and Planned Actions -Soil Resources

In addition to wildfires, past, planned, and ongoing activities within the park that can affect soils include road and trail construction, building and facility construction, utility improvements, revegetation projects and climate change.

Planned road projects that are not yet in progress include Wetherill Mesa Road, Cedar Tree Tower, Far View Sites Road, and the Long House Loop Roads (also referred to as Tram Road) projects and culvert replacement along the Waterline Access Road. These projects are rehabilitating existing roads, and improving overall accessibility, overlooks, sidewalks, intersections, and parking areas. Work is mostly confined to road corridors.

The Mesa Top Loop Roads project is in progress and is expected to be completed this year.

Major construction projects planned outside of road corridors include development of the Paths to Mesa Verde bike path project, construction of the Mesa Top Comfort Station, construction of the wildland fire facility (likely near the park entrance), rehabilitation of the Headquarters Loop residences, and rehabilitation of the Chapin Museum. Project footprints and construction support areas would be defined on a site-specific basis and effects on soils would be addressed in project design and planning.

The planned replacement of the Wetherill Waterline and Morefield Waterline would have a limited footprint in mostly previously disturbed areas. The planned access route for the proposed stabilization of the Spruce Tree House alcove arch would widen an existing trail.

The planned demolition and restoration of the old MVNP helibase site would include reseeding and revegetating with Chapin Mesa milkvetch seeds and/or plants.

[8]Soils having a high silt content are the most erodible of all soils. They are easily detached, tend to crust, and produce high rates of runoff. Values of K for these soils tend to be greater than 0.4 (IWR 2002).

Ongoing park management programs, such as fuels reduction to maintain defensible space, efforts to mitigate the effects of climate change and the planned removal of trespass livestock from MVNP, would continue.

Climate trends may impact soil resources throughout the park. Climate change patterns and drought are anticipated to lead to hotter temperatures, drier conditions, and more intense storm events which could alter soil composition and stability. Warming temperatures and drought could result in more intense wildfires which can remove vegetation and cause soils to become more susceptible to erosion from wind and precipitation. Updated fire management planning would include measures to ensure that impacts on special status species would be avoided or minimized, consistent with park policy and direction on preserving these resources.

3.3.2 Impacts of Alternative A (No-Action Alternative)

Under the no-action alternative, activities identified in Section 2.2.1 and trends identified in Section 3.3.1 would continue. Wildfires would result in the loss of ground cover by consuming litter and duff. The loss of ground cover increases the risk of erosion and runoff. Also, wildfires can cause the loss of soil structure and integrity by consuming soil organic matter. Combusted organic compounds no longer act as an adhesive that binds soil particles into stable aggregates that resist detachment. Depending on the soil type and the degree of heating, burned and exposed soils are highly susceptible to erosion by wind, water, and gravity.

Wildfires can also cause the formation of water-repellent layers that reduce infiltration. However, the degree of soil modification and the resulting soil water repellency can be affected by the pre-fire soil texture and type, the amount and depth of litter cover, the soil moisture, the soil organic matter, and the fire's temperature and residence time (Parsons et al. 2010). Furthermore, the heat from a wildfire can sterilize soil and inhibit vegetation growth (Neary et al. 2005). When high soil burn severity occurs, all or nearly all the pre-fire ground cover and surface organic matter are generally consumed, and charring may be visible on larger roots. Bare soil or ash is exposed and susceptible to erosion, and the aggregate structure may be less stable (Parsons et al. 2010).

Wildfire suppression would have impacts caused by potential disturbance, erosion, or compaction of soils along fire lines or along paths used by firefighters, fire trucks, and other fire equipment. Such impacts would endure throughout the course of suppression activities, which could last a few hours to a week or months. Later effects related to compaction and erosion could endure for years after suppression activities, depending on the severity of the impact. In the event of a widespread and intense wildfire, large-scale erosion could potentially occur in the burn's footprint, especially on steeper slopes. Erosion resulting from decreased vegetation cover after an intense wildfire, particularly on those lands with steep slopes or following intense rainfalls, would cause impacts on soil stability that could persist for months or years. Fires of high intensity and severity may eliminate organic cover, decrease soil nutrients, kill soil microorganisms that are critical to soil fertility, increase pH, and alter the soil structure. Again, this loss of organic cover and nutrients would impact the area's ecosystem function overall into the future.

Intense fire can also create hydrophobic soils, which repel water and cause decreased infiltration that alters the soil hydrology and promotes erosion. These impacts are generally confined to the area where the soil burned; however, accelerated erosion and increased sedimentation could impact the area over the weeks, months, and years to come, depending on the soil type and fire severity. An approved rehabilitation plan would be required and implemented following wildfires to reduce impacts on soil.

As previously stated, an increase in fuel loads from a lack of fuels reduction treatments could lead to an increased risk in wildfire severity, which could lead to erosion and degraded soils. The severity of impacts would depend on the nature and intensity of any ensuing wildfires and other activities in each park, which would continue along current trends without any fuels treatment programs in place. In MVNP, impacts under the current trend related to wildfire would continue, creating more hydrophobic soils and soils at risk of erosion. In YHNM, where fires have been less common, the risk of effects related to fire is less likely but still possible.

Cumulative Impacts

The trends and conditions described in the affected environment resulting from past, and ongoing actions would continue. Construction activities would continue to have the potential to disturb soils in project footprints and construction support areas. The loss of ground cover, soil compaction, and potential erosion would be addressed in project design and planning and then implementation of BMPs. The contribution of construction activities to cumulative impacts on soils would be negligible. The cumulative impact of not implementing more comprehensive fire management planning as the risk of severe fire increases could be substantial and damage soil resources. The cumulative effects of high intensity fire would continue to degrade the sight by causing potential increases in soil erosion, soil compaction, fire suppression impacts and potentially the creation of hydrophobic soils.

3.3.3 Impacts of Alternative B (Proposed Action)

Under alternative B, the NPS would conduct wildfire suppression activities and fuels treatments as described in Section 2.2.2. The NPS would expect the impacts to be similar to those described under the no-action alternative, with the addition of effects from the fuels treatments proposed under the FMP. Proposed treatments would affect soil resources through surface disturbances that remove vegetation and decrease ground cover, compact soil, displace soil, and mix soil horizons (Elliot et al. 2020). When vegetation is removed and ground cover is decreased, the vegetation and ground cover no longer hold the soil in place. This makes the soil more susceptible to erosion by wind and water. Heavy machinery and vehicle use can compact soil. Further, dragging of materials for in situ pile burning could also potentially impact soil resources through displacement and erosion.

Fuels treatments under alternative B could impact soils and reduce the likelihood where hydrophobic conditions could occur during prescribed burns and manual and mechanical treatments. Trucks and other equipment used during fuels treatments could cause compaction or erosion. Prescribed fire could be beneficial to soil nutrient cycling. Prescribed burning can enhance the cycling of nutrients by converting surface mulch and plant litter to ash and by making many nutrients soluble and available for plant growth. Through this process, fire encourages new growth of many plant species. Overall, the NPS would plan and coordinate fuels treatments in such a way as to reduce the adverse impacts on soils.

Impacts on soils caused by fire suppression activities and fuels treatments would be limited to areas where prescribed burns or treatments were deemed necessary to achieve fire management objectives. These treatments would occur on a variety of soils on slopes of less than 35 percent. This is because, per the BMPs presented in Appendix B, prior to any treatments, the NPS would identify areas with slopes over 35 percent and avoid treatments in these areas. Some amount of both fragile and highly erodible soils could still be impacted under alternative B. Such impacts, including soil compaction and displacement, as well as mixing of soil horizons and compaction, would persist throughout the period of active prescribed burns and manual and mechanical treatments. This could persist as briefly as a few hours to as long as a few weeks or months.

Fragile soils comprise a small proportion (3 percent or less) of soils present in all the treatment areas, except for the Bobcat Canyon area, where roughly 100 percent of soils present are fragile soils (NPS GIS 2022; NRCS 2022a, b). Of all treatment areas, soils with severe erosion hazard comprise the largest proportion of soils present in the Roadside Fuel Reduction, Far View Lodge Units, and Park Point areas, where they represent roughly 41, 67, and 69 percent of soil types present in those areas, respectively (NPS GIS 2022; NRCS 2022a, b).

Table 3-3 and Table 3-4 contain detailed breakouts of acreages of fragile soils and soils with severe erosion hazard, respectively, occurring on slopes of less than 35 percent in MVNP that could be affected by various fire management-related treatments under the proposed action. Although over time impacts on soils could be beneficial by improving soil nutrient cycling, immediate adverse impacts on these sensitive soils could include soil compaction and erosion.

Overall, treatment impacts on sensitive soils would occur on approximately 29 acres of fragile soils and 363 acres of soils with severe erosion hazard under alternative B. This acreage represents less than one percent of the total amount of fragile soils and roughly one percent of the total amount of soils with severe erosion hazard, parkwide. Additionally, many of these treatments would be concentrated along roadsides and infrastructure, therefore minimizing impacts on the overall landscape. As a result, impacts would be limited, considering the relatively low proportion of total affected soils.

Table 3-3. Acreages of Fragile Soils Affected by Treatments Proposed under Alternative B

Soil Type	Acres		Treatment Area Name
	Parkwide	Treatment Area	
Longburn-Rock outcrop complex	4,834	6	Bobcat Canyon
		3	Facility/infrastructure protection
		17	Roadside fuel reduction
		1	Loop Roads fuel reduction
Wauquie, Stony-Dolcan complex	444	2	Roadside fuel reduction
—	5,278	29	—

Sources: NPS GIS 2022; NRCS 2022a

Table 3-4. Acreages of Soils with Severe Erosion Hazard Affected by Treatments Proposed under Alternative B

Soil Type	Acres		Treatment Area Name
	Parkwide	Treatment Area	
Longburn-Rock outcrop complex	4,834	6	Bobcat Canyon
		3	Facility/infrastructure protection
		17	Roadside fuel reduction
		1	Loop Roads fuel reduction
Northrim cobbly loam	2,492	26	Far View Lodge Units (eastern and western) prescribed burn
		3	Roadside fuel reduction
Prater-Dolcan complex	8,625	59	Roadside fuel reduction
Sheek-Archuleta-Rock outcrop complex	6,873	1	Facility/infrastructure protection
		106	Far View Lodge Units (eastern and western) prescribed burn
		18	Roadside fuel reduction
		70	Park Point prescribed burn
Sideshow silty clay loam	311	1	Facility/infrastructure protection
		7	Roadside fuel reduction

Soil Type	Acres		Treatment Area Name
	Parkwide	Treatment Area	
Sideshow-Zigzag complex	306	3	Facility/infrastructure protection
		3	Roadside fuel reduction
Tragmon-Sheek complex	2,927	4	Facility/infrastructure protection
		1	Far View Lodge Units (eastern and western) prescribed burn
		18	Roadside fuel reduction
Wauquie-Dolcan-Rock outcrop complex	5,398	8	Roadside fuel reduction
Zigzag very channery clay loam	118	1	Facility/infrastructure protection
		4	Roadside fuel reduction
Zigzag-Sideshow complex	1,155	3	Roadside fuel reduction
—	31,884	363	—

Sources: NPS GIS 2022; NRCS 2022b

Cumulative Impacts

The trends and conditions described in the affected environment resulting from past, planned, and ongoing actions would continue. Construction activities would have the potential to disturb soils in project footprints and construction support areas. The loss of ground cover, soil compaction, and potential erosion would be addressed in project design and planning and the implementation of BMPs. The contribution of construction activities to cumulative impacts on soils would be negligible.

Projects with larger footprints, such as the loop roads and waterline projects, would involve more widespread impacts on soil resources related to additional use and displacement, compaction, surfacing, and loss of vegetation cover. Localized adverse impacts would occur from construction of new facilities, such as waysides and vault toilets. Impacts include vegetation clearing, grading, excavation for foundations, replacement of native materials with fill, and covering soils with impermeable surfaces. Beneficial effects could be contributed by native plant landscaping, including planting salvaged and/or container-grown native plants and seeds. The NPS would work to protect soil resources through revegetation efforts where ground disturbance has occurred. The impacts associated with the trends and conditions resulting from past, planned, and ongoing action in conjunction with the proposed action would be minimized. The NPS also would mitigate the impacts on soil resources through a variety of BMPs, including those found in Appendix B and the following:

- Locate construction staging areas where they would minimize new disturbance of area soils and vegetation.
- Minimize ground disturbance, to the extent practicable, during construction of new or modification of existing facilities.
- Minimize driving over or compacting root zones.
- Use mats or plywood to minimize soil compaction impacts when working in wet areas.
- Revegetate project areas through native seeding and planting.
- Identify clearing limits to minimize the amount of vegetation loss.

The potential for cumulative effects on soils due to wildfire and wildfire suppression would remain, but be reduced when compared with alternative A. There may be temporary impacts on 392 acres of sensitive soils from planned treatments, but these actions would be planned and conducted by NPS to minimize adverse impacts on soils.

Overall, the reduction of fuels in the context of comprehensive fire management planning would reduce the potential for cumulative effects on soil resources from high intensity fire, including the direct disturbance of soils, erosion, compaction, fire suppression impacts and the creation of hydrophobic soils. Cumulative impacts would vary depending on the level of fire management, but potential cumulative impacts would be lessened by a reduction in high-severity fires.

3.4 SPECIAL STATUS SPECIES

3.4.1 Affected Environment

Federally Listed Species

The NPS used the U.S. Fish and Wildlife Service's (USFWS's) online Information for Planning and Conservation application (IPaC) to determine federally listed species, including threatened, endangered, and candidate species under the Endangered Species Act, which have the potential to occur in the parks. Seven species were identified (USFWS 2022):

- Mexican spotted owl (*Strix occidentalis lucida*) – Federally Threatened
- Southwestern willow flycatcher (*Empidonax traillii extimus*) – Federally Endangered
- Yellow-billed cuckoo (*Coccyzus americanus*) – Federally Threatened
- Colorado pikeminnow (*Ptychocheilus lucius*) – Federally Endangered
- Razorback sucker (*Xyrauchen texanus*) – Federally Endangered
- Monarch butterfly (*Danaus plexippus*) – Candidate Species
- Mesa Verde cactus (*Sclerocactus mesae-verdae*) – Federally Threatened

Apart from the Mexican spotted owl (MSO) and monarch butterfly, there is either little or no suitable habitat for the remaining federally listed species in the parks. The monarch butterfly is the only federally listed wildlife species carried forward for analysis.

Mexican Spotted Owl
The NPS conducts yearly surveys for MSO, but the species has not been identified in MVNP for over a decade. The NPS would continue to implement BMPs and other measures, such as surveying and monitoring for MSOs, to confirm the presence or absence of the species and ensure no effects (see Appendix B). With implementation of mitigation measures and due to the lack of species presence, adverse impacts on MSOs are unlikely and have been dismissed from further analysis (see Appendix C). Treatments in the parks would result in a potential benefit to MSOs through the protection of suitable habitat from increased wildfire risk.

Monarch Butterfly
The western population of monarch butterflies leave overwintering sites along the Pacific coast in late winter. Most individuals migrate south to breeding areas in Mexico. Once at their breeding areas, females lay eggs singly on milkweed species, which the caterpillars rely upon for energy and protective toxins called cardenolides. Complete metamorphosis from egg to adulthood may last 20 to 35 days, depending on temperature. During the spring and summer, an adult monarch spends its lifespan (2 to 5 weeks) feeding on a variety of flowering plants and mating. Multiple generations are produced throughout the summer with the final generation migrating to overwintering sites and living for 6 to 9 months (Western Monarch and Milkweed Mapper 2018).

The monarch butterfly uses a variety of habitats, including fields, vegetated roadsides, wetlands, and urban areas. Several species of milkweed (*Asclepias* spp.) are the host plants for the larvae stage of the

monarch butterfly, while flowering plants provide food sources for adults (Forest Service 2021). Although milkweed species have been identified in MVNP (Erdman and Welsh 1964), the distribution and abundance may be limited due to factors such as soil pH, moisture, and surrounding vegetation. NPS staff documented both monarch butterflies and milkweed species during the summer of 2022.

Adult monarch butterflies feed on a variety of flowering plant species, including aster (*Symphyotrichum* spp.), buckbrush (*Ceanothus* spp.), buckwheat (*Eriogonum* spp.), bur marigold (*Bidens* spp.), coyote bush (*Baccharis* spp.), goldenrod (*Solidago* spp.), manzanita (*Arctostaphylos* spp.), rabbitbrush (*Chrysothamnus* spp.), sage (*Salvia* spp.), sunflower (*Helianthus* spp.), thistle (*Cirsium* spp.), and willow (*Salix* spp.). These species occupy a wide variety of habitats, including woodlands, open areas and pastures, roadsides, and sage communities (Xerces Society 2015). Therefore, adult monarch butterflies may use portions of MVNP and YHNM during their migration.

For the remaining species, the NPS plans to avoid treatment in associated habitats such that no impacts would be anticipated on the corresponding species. Accordingly, they have been removed from detailed analysis (see Appendix C).

Other Special Status Species

Special Status Plant Species

Several special status plant species are found at the parks that are considered globally or locally rare. Many of these rare and endemic plants within the parks are associated with unique soils, creating soil-flora relationships that are still not fully understood.

Thirteen special status plant species have current or historical habitat that overlaps proposed treatment areas (NPS GIS 2022; CNHP 2022; Table 3-5). Of particular concern is the Chapin Mesa milkvetch, whose habitat is shown on Figure 3-3.

Table 3-5. Special Status Plant Species in the Parks

Common Name	Scientific Name	State Status	Occurrence in the Parks
Cliff Palace milkvetch	*Astragalus deterior*	S1 – Critically imperiled	MVNP
Mesa Verde stickseed	*Hackelia gracilenta*	S1 – Critically imperiled	MVNP
Large-flower globemallow	*Iliamna grandiflora*	S1 – Critically imperiled	MVNP
Smooth easter daisy	*Townsendia glabella*	S2 – Imperiled	MVNP
Alkaline pepperweed	*Lepidium crenatum*	S2 – Imperiled	MVNP
Chapin Mesa milkvetch	*Astragalus schmolliae*	S1 – Critically imperiled	MVNP
Spectacle-pod	*Dimorphocarpa wislizeni*	S2 – Imperiled	MVNP
Arizona gumweed	*Grindelia arizonica*	S2 – Imperiled	MVNP
Mesa Verde aletes	*Aletes macdougalii* ssp. *breviradiatus*	S1 – Critically imperiled	MVNP
San Juan gilia	*Gilia haydenii*	S2 – Imperiled	MVNP
Showy collomia	*Collomia grandiflora*	S1 – Critically imperiled	MVNP
Six-weeks muhly	*Muhlenbergia depauperate*	S1 – Critically imperiled	MVNP
Shortstem beardtongue	*Penstemon breviculus*	S2 – Imperiled	MVNP and YHNM

Sources: NPS GIS 2022; CNHP 2022

Five additional special status plant species that are known to occur in the parks—but do not have current or historical habitat that overlaps proposed treatment areas—were dismissed from further analysis, and rational for dismissal is discussed in Appendix C, Special Status Species.

Cliff Palace Milkvetch
Cliff Palace milkvetch (*Astragalus deterior*) is a critically imperiled/imperiled plant species that is endemic to the Mesa Verde landform. The estimated range of this species is 44 square miles (NatureServe 2019).

Cliff Palace milkvetch is a low-growing perennial herb, typically just 0.2 to 1.2 inches tall. The cream-colored flowers with purple markings bud in May and early June. This species grows in sand-filled depressions of flat rimrocks, on cliffs, and on adjacent sandy talus habitats. It can also be found on edges of mesas and in cracks and depressions in shallow soil in the piñon-juniper zone (NatureServe 2019). In MVNP, Cliff Palace milkvetch primarily occurs along rocky outcroppings and cliff edges on the south-facing canyon rims along the Mesa Top Loop and Cliff Palace Loop. Threats to Cliff Palace milkvetch include trampling, fire, degraded habitat quality, and erosion. Approximately 320 acres of Cliff Palace milkvetch have been identified in MVNP (NPS GIS 2022).

Mesa Verde Stickseed
Mesa Verde stickseed (*Hackelia gracilenta*) is a small perennial herb that is endemic to MVNP. The estimated range of this species is only 27 square miles. Habitat for this species includes shady canyons and mesa tops with loam or sandy loam soil. It is commonly found in piñon-juniper and Gambel oak communities. Development of park facilities, climate change, and invasive plant species are threats to the Mesa Verde stickseed (NatureServe 2022a). Approximately 390 acres of Mesa Verde stickseed have been identified in MVNP (NPS GIS 2022).

Large-flower Globemallow
Large-flower globemallow (*Iliamna grandiflora)* is known to occur in 10 populations across five counties in Colorado, including Montezuma County. It can be found in spruce, aspen, and piñon oak forests with moist soils from 6,900 to 8,400 feet. It is also known to occur in disturbed areas, such as along roadsides (NatureServe 2022b). Approximately 1,370 acres of large-flower globemallow have been identified in MVNP (NPS GIS 2022).

Smooth Easter Daisy
Smooth easter daisy (*Townsendia glabella*) is a perennial cushion-forming plant endemic to Colorado. It is known from Archuleta, La Plata, Montezuma, and Rio Grande Counties. Threats to this species include development, recreation, and road maintenance (NatureServe 2022c). Habitat for smooth easter daisy includes steep slopes associated with Mancos shale. It is commonly found with ponderosa pine, Gambel oak, piñon pine, and Utah juniper (CNHP 2012b). Approximately 1,140 acres of smooth easter daisy have been identified in MVNP (NPS GIS 2022).

Alkaline Pepperweed
Alkaline pepperweed (*Lepidium crenatum*) is found along openings in piñon-juniper woodlands from 6,000 to 8,000 feet. It is a small perennial that can reach up to one foot tall. It has small basal leaves and flowers that elongate in fruit. In Colorado, it is known from six counties: Delta, Mesa, Moffat, Montezuma, Montrose, and Rio Blanco. Threats to the alkaline pepperweed include recreation, maintenance, and nonnative species such as cheatgrass (*Bromus tectorum*) and smooth brome (CNHP 2012a). Approximately 360 acres of alkaline pepperweed have been identified in MVNP (NPS GIS 2022).

Chapin Mesa Milkvetch
Chapin Mesa milkvetch (*Astragalus schmolliae*) is a flowering herb. It is endemic to a small part of southwest Colorado's Mesa Verde cuesta. Specifically, it is found in MVNP and the Ute Mountain

Ute Tribal Park. It grows primarily in red loess[9] soil on Chapin Mesa, in old-growth piñon-juniper woodlands between 5,800 and 7,500 feet in elevation (Porter 2014; USFWS 2010). The Chapin Mesa milkvetch grows to 12 to 24 inches tall with ash-colored compound leaves and creamy white flowers. The plant develops a deep taproot that grows 16 inches or more (USFWS 2016).

Chapin Mesa milkvetch plants emerge in early spring. They flower between late April/early May and early to mid-June. Most plants release their seeds by late June. The seeds are hardy and long lived in the soil; only a small percentage of seeds germinate each year (Anderson 2004). The flowers' structure requires a strong insect for pollination, as the insect must force itself between the petals of the butterfly-shaped flowers. Ground-nesting bees, bumblebees, and bee flies are known pollinators (USFWS 2016).

In MVNP, Chapin Mesa milkvetch may be threatened by drought, fire, noxious weed invasion, development, and browsing by large herbivores (USFWS 2021). This perennial species reproduces by seed but can resprout after wildfire. The species' occupied habitat has been intensively surveyed and identified for several decades, using long-term demographic plots and belt transects, most recently by the Colorado Natural Heritage Program.

Suitable habitat for the Chapin Mesa milkvetch extends beyond the documented boundaries of occupied habitat; it includes most of Park Mesa and West Chapin Spur and more than half of Chapin Mesa. While Chapin Mesa milkvetch has been observed and documented on the Ute Mountain Ute Tribal Park, occupied habitat has not been mapped or quantified (USFWS 2021). In MVNP, recruitment is highly episodic and correlated to a wet spring, which is abundant in some years and absent in others (Anderson 2004). Both the emergence and population have been affected by wildfires and competition with nonnative, invasive plants. The population status across the boundary on tribal land is unknown to the federal government. Approximately 2,040 acres of Chapin Mesa milkvetch habitat have been identified in MVNP (NPS GIS 2022).

Populations are relatively small and restricted. Because of this, impacts on this species could be especially detrimental. In 2022, the USFWS withdrew the consideration of protecting Chapin Mesa milkvetch under the Endangered Species Act. This withdrawal was based on conservation plans and actions to identify and reduce threats to the species. The NPS's Conservation Plan for Chapin Mesa Milkvetch addresses specific management actions to reduce impacts on Chapin Mesa milkvetch (NPS 2018).

Spectacle-pod

Spectacle-pod (*Dimorphocarpa wislizeni*), also known as the touristplant, is an herb in the mustard family and has pink blossoms, pale-green leaves, and fruit that resemble eyeglasses. It is found in desert shrub or piñon-juniper communities with sandy soils. It can be found throughout the southwestern U.S. in Arizona, Colorado, Nevada, New Mexico, Texas, and Utah (NatureServe 2022d). Approximately 30 acres of spectacle-pod have been identified in MVNP (NPS GIS 2022).

Arizona Gumweed

Arizona gumweed (*Grindelia arizonica*) can be found in Arizona, Colorado, New Mexico, and Texas. In Colorado, it is known from Archuleta, Montezuma, and La Plata Counties. Habitat for this species includes openings in pine forests with clay soils at elevations between 3,500 and 7,500 feet. Approximately 60 acres of Arizona gumweed have been identified in MVNP (NPS GIS 2022).

[9]An unstratified, usually buff to yellowish-brown loamy deposit found in North America; believed to be chiefly deposited by the wind.

Mesa Verde National Park

Fire Management Plan
Environmental Assessment

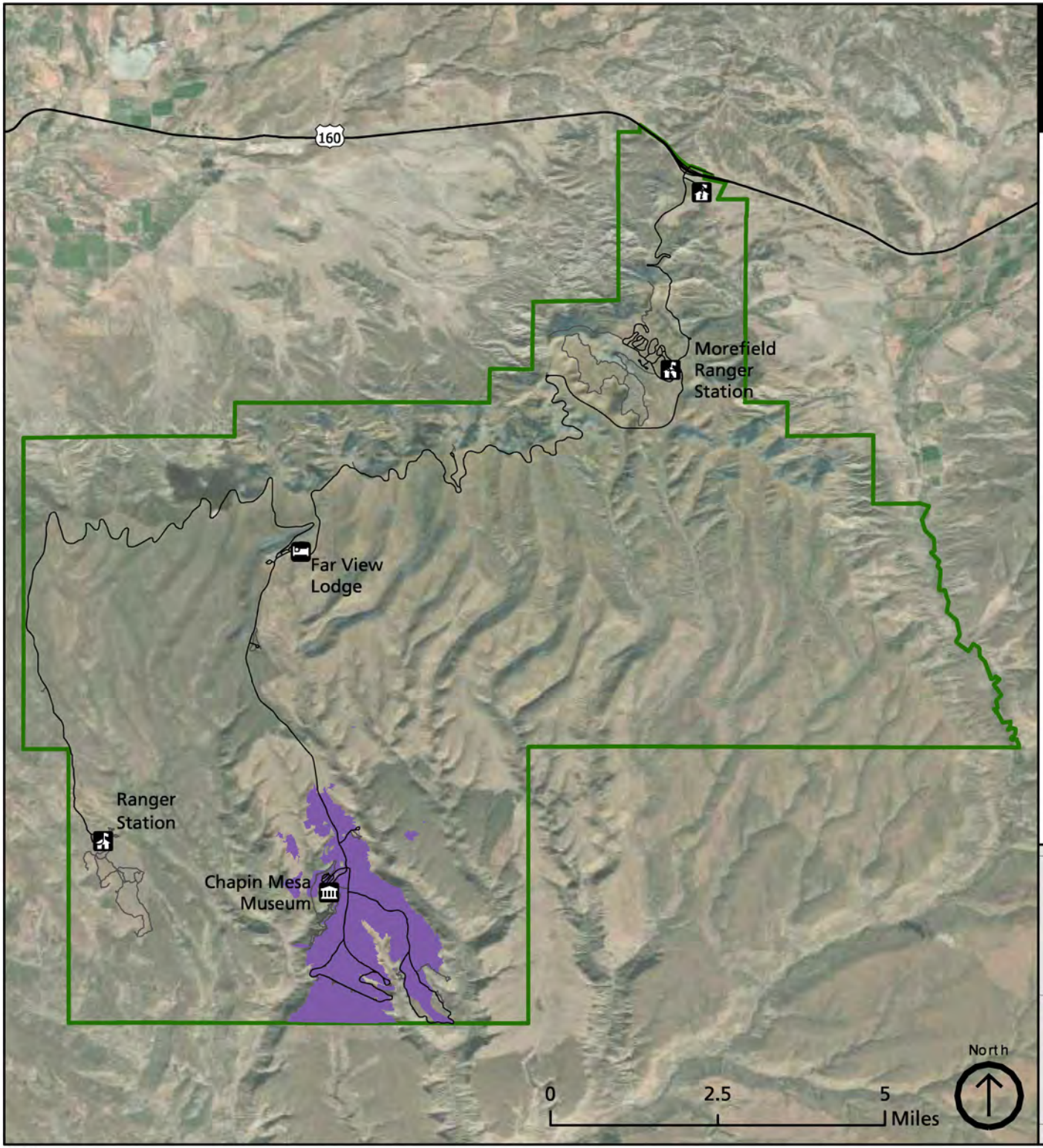


Figure 3-3
Mesa Verde National Park Chapin Mesa Milkvetch Habitat

- Chapin Mesa milkvetch
- Ranger station
- Visitor center
- Museum
- Hotel
- Road
- Trail
- Mesa Verde National Park administrative boundary

Source: NPS GIS 2022
April 13, 2023
MEVE_FMP_Rpts_Baseline.pdf
No warranty is made by the National Park Service as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

Mesa Verde Aletes
Mesa Verde aletes (*Aletes macdougalii* ssp. *breviradiatus*) can be found in Arizona, Colorado, and Utah. In Colorado, it is only known from Montezuma County. Habitat for this species varies and includes sandstone slabs and crevices in canyon walls. Occasionally, it can be found in deep sandy soils in pine-juniper woodlands (NPIN 2013a). Approximately 180 acres of Mesa Verde aletes have been identified in MVNP (NPS GIS 2022).

San Juan Gilia
San Juan gilia (*Gilia haydenii*) is a rare perennial known only from the Four Corners region of the United States. In Colorado, it has only been documented in Dolores, La Plata, Mesa, Montezuma, and Montrose Counties (NatureServe 2022f). The San Juan gilia grows in barren outcrops with rocky soils and occasionally in piñon-juniper forests and sagebrush communities. Threats to the species include recreation, grazing, and competition from nonnative plants (Colorado Natural Heritage Program 2017). Approximately 540 acres of San Juan gilia have been identified in MVNP (NPS GIS 2022).

Showy Collomia
Showy collomia (*Collomia grandiflora*) is an annual herb found throughout the western states of the U.S. and north through British Colombia. It is associated with dry soils and open wooded slopes below 8,000 feet (NPIN 2013b). Approximately 510 acres of showy collomia have been identified in MVNP (NPS GIS 2022).

Six-weeks Muhly
Six-weeks muhly (*Muhlenbergia depauperate*) is an annual grass found in Arizona, Colorado, New Mexico, Texas, and Utah. Habitat includes rocky outcrops and exposed bedrock with sandy banks. It is usually found in grama grassland communities (NatureServe 2022g). Approximately 30 acres of six-weeks muhly have been identified in MVNP (NPS GIS 2022).

Shortstem Beardtongue
Shortstem beardtongue (*Penstemon breviculus*) is a short perennial herb that can grow up to one foot. It is found in sagebrush, piñon-juniper, and grassland communities that have clay to loamy soils from 4,500 to 6,500 feet. Its range includes the Four Corners region; in Colorado, it is known from Montrose, San Miguel, and Montezuma Counties. Several populations are known to be on private property. Approximately 20 acres of shortstem beardtongue have been identified in YHNM (NPS GIS 2022). NPS staff counted 450 shortstem beardtongue plants in YHNM in 2012 and 1,012 plants in 2013. Approximately 460 acres have also been identified in MVNP (NPS GIS 2022). Threats to shortstem beardtongue include developments and their maintenance (Spackman et al. 1997; NatureServe 2022h).

Special Status Animal Species
Townsend's Big-eared Bat
Townsend's big-eared bats (*Corynorhinus townsendii*) can be found throughout the central and western parts of Colorado. Townsend's big-eared bats use alcoves, overhangs, mines, and crevices for roosting and use forests and wetland edges for foraging. They prey primarily on moths, beetles, and flies. Townsend's big-eared bats produce one offspring once per year. Birth occurs in May to July, depending on the local climate. Females gather to form maternity colonies in relatively warm parts of alcoves, overhangs, crevices, or mines, while males roost singly across the landscape. Winter hibernacula are generally in relatively cold parts of alcoves, overhangs, crevices, or mines, often near entrances and in well-ventilated areas (CPW 2018; Bradley et al. 2006). Townsend's big-eared bats have been found at multiple sites in MVNP (O'Shea et al. 2011).

Primary threats to Townsend's big-eared bats are disturbance and destruction of roosting sites. This species is highly susceptible to disturbance during roosting because it roosts on open surfaces on the

ceiling of alcoves, overhangs, and mines as opposed to positioning itself in cracks or crevices (Bradley et al. 2006). Alcoves, mines, overhangs, and crevices in MVNP provide suitable roosting habitat for Townsend's big-eared bats, while forest and wetland edges provide suitable foraging habitat. Suitable roosting and foraging habitats for Townsend's big-eared bats do not exist in YHNM.

Trends and Planned Actions – Special Status Species

In addition to wildfires, past, planned; and ongoing activities within the park that can affect special status species and habitat include road and trail construction, building and facility construction, utility improvements, revegetation projects and climate change.

Planned road projects that are not yet in progress include Wetherill Mesa Road, Cedar Tree Tower, Far View Sites Road, and the Long House Loop Roads (also referred to as Tram Road) projects and culvert replacement along the Waterline Access Road. These projects are rehabilitating existing roads, and improving overall accessibility, overlooks, sidewalks, intersections, and parking areas. Work is mostly confined to road corridors.

The Mesa Top Loop Roads project is in progress and is expected to be completed this year.

Major construction projects planned outside of road corridors include development of the Paths to Mesa Verde bike path project, construction of the Mesa Top Comfort Station, construction of the wildland fire facility (likely near the park entrance), rehabilitation of the Headquarters Loop residences, and rehabilitation of the Chapin Museum. Project footprints and construction support areas would be defined on a site-specific basis, and effects on special status species would be addressed in project design and planning.

The planned replacement of the Wetherill Waterline and Morefield Waterline would have a limited footprint in mostly previously disturbed areas. The planned access route for the proposed stabilization of the Spruce Tree House alcove arch would widen an existing trail where Chapin Mesa milkvetch may be present.

The planned demolition and restoration of the old MVNP helibase site would include reseeding and revegetating with Chapin Mesa milkvetch seeds and/or plants adding to the overall suitable habitat for Chapin Mesa milkvetch in MVNP.

Ongoing park management programs, such as fuels reduction to maintain defensible space, efforts to mitigate the effects of climate change and the planned removal of trespass livestock from MVNP, would continue.

Conservation plans for the Chapin Mesa milkvetch have been in effect on an ongoing basis and have been implemented by MVNP and the Ute Mountain Ute Tribe (NPS 2018b). Changes in fire management regarding consideration of rare plants are in place.

In 2022, the USFWS withdrew the consideration of protecting Chapin Mesa milkvetch under the Endangered Species Act. This withdrawal was based on conservation plans and actions to identify and reduce threats to the species. The NPS's Conservation Plan for Chapin Mesa Milkvetch addresses specific management actions to reduce impacts on Chapin Mesa milkvetch (NPS 2018).

Climate trends may impact special status species throughout the park. Climate change patterns and drought are anticipated to lead to hotter temperatures, drier conditions, and more intense storm events which would alter the habitat suitability for many species. Warming temperatures and drought could result in more intense wildfires. Updated fire management planning would include measures to ensure that impacts on special status species would be avoided or minimized, consistent with park policy and direction on preserving these resources.

3.4.2 Impacts of Alternative A (No-Action Alternative)

Other Special Status Species

Special Status Plant Species

General

Under the no-action alternative, activities and trends identified in Section 2.2.1 would continue. Because most special status plant species in MVNP have limited habitat ranges, under the no-action alternative there would be a greater chance of severe wildfire, which could eliminate or greatly reduce entire populations. As described in Section 3.3.2, severe fires can cause erosion and runoff, which affect the quantity and quality of soil. This could impact special status plant species by limiting colonization and affecting growth and germination. Other species may have a reduced ability for seeds to germinate if the soil quality is low.

In addition, in the event of a wildfire, suppression of wildfires could impact special status plant species from crews or machinery trampling individual plants. Additionally, suppression of wildfires could impact special status plant species by soil compaction from vehicles or equipment, which could inhibit seed germination. Finally, because wildfires can be severe and alter entire landscapes, the impacts of such a fire could last for years (Meyer et al. 2021).

Chapin Mesa Milkvetch

Impacts on Chapin Mesa milkvetch under the no-action alternative would be similar to those described for other special status plant species, with the following additions. The Chapin Mesa milkvetch relies on piñon-juniper communities that provide canopy cover. This cover establishes microclimates needed for Chapin Mesa milkvetch. High-intensity fires that eliminate canopy cover can alter these required conditions and reduce habitat suitability. Further, because the Chapin Mesa milkvetch requires deep soils for its roots, a reduction in soil quantity or quality could affect the Chapin Mesa milkvetch's ability to adequately establish root systems.

Because Chapin Mesa milkvetch is endemic to Chapin Mesa and Park Mesa and occupies a small range in the park, severe wildfires, and the associated impacts, such as reduced progeny, erosion, an increase in invasive species, and altered soil chemistry, could negatively impact entire populations of Chapin Mesa milkvetch. In the event of a wildfire, suppression activities could impact Chapin Mesa milkvetch from crews or machinery trampling individual plants. Additionally, suppression of wildfires could impact Chapin Mesa milkvetch by soil compaction from vehicles or equipment, which could inhibit seed germination. Finally, because wildfires can be severe and alter entire landscapes, the impacts of such a fire could last for years (Meyer et al. 2021).

Special Status Animal Species

Townsend's Big-eared Bat

Under the no-action alternative, activities identified in Section 2.2.1 would persist. Accordingly, the current trends identified in Section 3.4.1 would likewise continue. Fire suppression activities under alternative A could modify vegetation that provides food and shelter for insects, which in turn could affect Townsend's big-eared bats through displacement of individuals and through altering the prey availability or distribution. Suppression activities would likely take place in grasslands and forested areas where Townsend's big-eared bats forage. Therefore, the NPS would expect that Townsend's big-eared bats would avoid these areas during the presence of humans and equipment. No impacts would be anticipated on Townsend's big-eared bat roosting habitat since fire suppression would not impact mines, alcoves, and overhangs.

The NPS's response to wildfires could impact foraging areas, such as open sagebrush, forest edges, and grassland communities where suppression activities have resulted in the loss of vegetation. In the wake of wildfire, plant communities' species composition can be permanently altered by severe fires, and invasive species commonly expand into recently burned areas (Lesica et al. 2007). The NPS's response to these effects under current management policy, wherein there are no opportunities for active fuels management, is such that the risk of increased fire severity and frequency could increase due to accumulated fine fuels and the potential for the invasion of weeds and nonnative plants after unplanned ignitions.

Impacts to foraging areas could impact individuals, but these impacts would likely only affect small areas of the landscape allowing individuals to find alternate foraging areas. Additionally, no impacts to roosting habitat would be anticipated. Therefore, impacts would not lead to population level effects for the Townsend's big-eared bat.

Monarch Butterfly

Under the no-action alternative, activities and trends identified in the vegetation resources section would continue. In the event of wildfire, fire-suppression activities under Alternative A could pose an impact on monarch butterflies, if present, through displacement, injury, and mortality. Individuals could be trampled or crushed by equipment or crew members. Impacts on larval and pupal stage monarchs would likely be greater than they would be on adults due to their lack of mobility. Additionally, fire suppression could temporarily decrease foraging habitat and affect the availability or abundance of monarch butterflies' food sources. This, in turn, could impact larger habitat conditions for butterflies and delay the overall recovery of butterfly habitat.

As stated above, fire suppression could impact monarch butterflies. Also, because no treatments would be allowed and prescribed burns would not be authorized, there would be an increased risk of major wildfires. These fires could affect larger areas, as compared with treatment or prescribed burn areas. Additionally, wildfires would likely burn at a higher intensity, which would result in longer reestablishments for habitats to pre-fire conditions.

Although individuals could be impacted under the no-action alternative, due to the limited abundance and distribution of milkweed in the parks, it is not anticipated the monarch butterflies would be impacted at a population level.

Cumulative Impacts

The trends and conditions described in the affected environment resulting from past, planned, and ongoing actions would continue. Construction activities may have the potential to disturb special status species plants, animals, and their habitats. The potential for impacts would continue to be addressed in project design and planning and the implementation of BMPs. Requirements of the conservation plan for the Chapin Mesa milkvetch would reduce the potential for impacts for the proposed access for the Spruce Tree House Stabilization project . The contribution of construction activities to cumulative impacts on status species plants, animals, and their habitats would be negligible.

The cumulative impact of not implementing more comprehensive fire management could be substantial if large wildfires occur within the limited range of a special status species. However, cumulative impacts on special status species would be minimal if fires occur outside of their habitat range.

3.4.3 Impacts of Alternative B (Proposed Action)

Other Special Status Species

Special Status Plant Species

General

Under alternative B, the NPS would conduct wildfire suppression activities and fuels treatment activities as noted above in Section 2.2.2. Activities under alternative B could adversely impact special status plant species, particularly during prescribed burns and manual and mechanical treatments. Effects of prescribed fire and mechanical treatments include ground disturbance from fire and the associated activities and equipment, which could cause uprooting, injury, or mortality to plants. If vegetation is removed during activities and ground cover is decreased, soil is no longer held in place by the vegetation and ground cover, making it more susceptible to erosion by wind and water. Heavy machinery, equipment, and vehicle use could also compact the soil. This could make seed germination more difficult and allow noxious or invasive species to establish.

Impacts on special status plants would not be equal for all species. Prescribed burns would likely not impact plants that require rocky soils, cliffs, or outcrops, such as the Mesa Verde aletes, Cliff Palace milkvetch, and San Juan gilia. Species that require woodlands, grasslands, and open spaces, such as the Arizona gumweed, alkaline pepperwort, Chapin Mesa milkvetch, and shortstem beardtongue, could be impacted since these habitats are more likely to be managed by prescribed burns and fuels treatments. Species such as large-flower globemallow may be more vulnerable to impacts from treatments. This is because these species are known to occur in disturbed areas, such as along roadsides where treatments are proposed (approximately 338 acres of roadside fuel reduction). Other species such as Mesa Verde stickseed, alkaline pepperweed, and spectacle-pod may also be impacted disproportionally since these species occur in shrublands and piñon-juniper communities, where most treatments are proposed (Table 3-2).

Approximately 5.6 percent of suitable Chapin Mesa milkvetch habitat would be impacted from treatments. Because most impacts would be associated with the Loop Roads fuel reduction and infrastructure protection, pre-treatment surveys for these activities would be conducted to reduce the potential impacts on all special status plant species (Table 3-6).

Table 3-6. Acreage of Special Status Plants Affected by Proposed Fuel Treatments (Alternative B)

Treatment Action	Chapin Mesa Milkvetch	Other Special Status Plant Species
Administrative pile prescribed burn	0	0
Safety zone maintenance	12	0
Park Point prescribed burn	0	0
Far View Lodge Units (eastern and western) prescribed burn	0	31
Bobcat Canyon prescribed burn	0	6
Loop Roads fuels reduction	67	15
Soda Canyon fuels reduction	3	0
Facility/infrastructure protection	33	37
Roadside fuels reduction	0	46
TOTALS	**115**	**135**

Source: NPS GIS 2022

Impacts from alternative B could have beneficial impacts on some special status plant species. Prescribed fire has been shown to be a useful tool in combating invasive species and maintaining vegetation communities (DiTomaso and Johnson 2006). Also, effective treatments, such as

prescribed burns, could reduce the risk of high-intensity wildfires that could severely affect special status plant species. Prescribed fire could be beneficial to soil nutrient cycling by converting surface mulch and plant litter to ash and by making many nutrients soluble and available for plant growth. Through this process, fire encourages new growth of many plant species. However, continued treatment of these areas would be required to maintain suitable conditions for native species (Rondeau et al. 2022). Therefore, areas requiring multiple treatments would likely experience these benefits while areas requiring only one treatment would not be expected to benefit in the same manner.

A reduction in fuels would also likely benefit special status plant species by decreasing the risk of severe fire. Because special status species often occupy specific habitats and contain low numbers of individuals or reduced ranges, a severe fire could eliminate or greatly reduce entire populations.

Mechanical treatments and prescribed burns could have impacts on special status plant species. Impacts include trampling or disturbance that could cause injury or mortality to plants. However, over time, these activities could reduce the risk, severity, and intensity of wildfire in treatment areas. Additionally, these activities could reduce competition from other species, specifically invasive species that are known to outcompete native species. Under alternative B, the NPS would implement BMPs and mitigation measures to reduce impacts on special status plant species and their associated habitats. These measures are described in Appendix B.

Chapin Mesa Milkvetch

Under alternative B, the NPS would conduct wildfire suppression activities and fuels treatment activities as noted above in the vegetation and soil resources sections. Activities under alternative B could adversely affect Chapin Mesa milkvetch, particularly during prescribed burns and manual and mechanical treatments. Effects of prescribed fire and mechanical treatments include ground disturbance from fire and the associated activities and equipment, which could cause uprooting, injury, or mortality to plants. Treatment activities would impact approximately 115 acres of Chapin Mesa milkvetch habitat. Most of these impacts are associated with the Loop Roads fuels reduction (Table 3-6).

If vegetation is removed during activities and ground cover is decreased, soil is no longer held in place by the vegetation and ground cover, making it more susceptible to erosion by wind and water. Heavy machinery, equipment, and vehicle use could also compact the soil. This could make seed germination more difficult and allow noxious or invasive species to establish.

Although fuels treatments have the potential to negatively impact Chapin Mesa milkvetch, these activities would reduce the extent of high-intensity stand-replacing fires in Chapin Mesa milkvetch habitat. Additionally, the NPS would plan and execute all treatments in accordance with the NPS's Conservation Plan for Chapin Mesa Milkvetch (NPS 2018). For example, conservation measures such as leaving at least 50 percent of canopy cover, reducing the intensity of thinning treatments to maintain ecological characteristics of piñon-juniper woodlands, and coordinating with MVNP resource specialists would reduce the impacts that treatments could have on Chapin Mesa milkvetch. Additionally, pre-treatment surveys to identify Chapin Mesa milkvetch populations would allow treatment activities to avoid these areas and reduce the impacts on the species. Because most impacts would be associated with the Loop Roads fuels reduction and infrastructure protection, pre-treatment surveys for these activities would be conducted to reduce the potential impacts on Chapin Mesa milkvetch.

Special Status Animal Species

Townsend's Big-eared Bat

Under alternative B, the NPS would conduct wildfire suppression activities and fuels treatments as described in Section 2.2.2. Impacts on Townsend's big-eared bats from alternative B include an increased risk of displacement and habitat alteration. This is from adding mechanical vegetation

treatments and implementing prescribed burns. Most of the parks contain shrub, sagebrush, and grassland vegetation, which provide suitable foraging habitat for Townsend's big-eared bats. Therefore, prescribed fire or treatment activities conducted in or near these habitats could impact bats by causing individuals to avoid these areas. Because the NPS would not conduct fire suppression and treatment activities in alcoves, overhangs, or mines, impacts on bat roosting habitat would not be anticipated.

With the addition of prescribed burns and expanded fuels treatments, impacts on Townsend's big-eared bats by altering prey availability and distribution would be anticipated. Increased treatments could reduce the amount of foraging and shelter habitat for insects. Continued treatments in the same area could permanently alter habitat and cause prey to abandon the area. Changes in the prey species distribution or availability could cause changes in bat foraging characteristics, such as the timing, duration, and location.

Fuels treatments and prescribed burns under alternative B could cause impacts on Townsend's big-eared bats, such as disturbance, avoidance, and habitat alteration. However, treatments have shown to be beneficial by reducing the severity of wildfires. Vegetation communities' response to wildfire and prescribed burns depend on a variety of variables, including pre-fire conditions, precipitation, species composition, and the local fire regime. Compared with prescribed burns, however, severe wildfires would impact larger areas and require longer to recover overall. Additionally, severe wildfires are more likely to permanently alter vegetation communities and allow invasive species to establish. Sagebrush communities, predominant throughout the parks, can require decades to recover after severe fires (Lesica et al. 2007). Reducing the risk of wildfires would limit the impacts severe fires would have on important foraging habitat for the species.

Impacts to foraging areas could impact individuals, but these impacts would likely only affect small areas of the landscape allowing individuals to find alternate foraging areas. Additionally, no impacts to roosting habitat would be anticipated. Therefore, impacts would not lead to population level effects for the Townsend's big-eared bat.

Monarch Butterfly

Under alternative B, the NPS would conduct wildfire suppression and fuels management activities as noted above in the vegetation and soil resources sections. Impacts on monarch butterflies from alternative B include an increased risk of displacement, injury, or mortality to individuals. This is due to adding mechanical vegetation treatments and implementing prescribed burns. Prescribed fire activities conducted within occupied monarch butterfly habitat could impact monarch butterflies by causing fire-related injuries or mortality. Specifically, individuals in the larvae stage of development, when mobility is limited, would be at a greater risk than adults. However, the NPS could alter these burns to exclude areas where milkweed or flowering plants that provide food sources have been identified. Additionally, as noted in the proposed action, the NPS could schedule burns to take place in the fall and winter, when monarch butterflies are known to be absent. Monarch butterflies could also avoid areas where the NPS is conducting fuels management or fire-suppression activities.

Effects of prescribed fire and mechanical treatments also include ground disturbance, which can cause uprooting, injury, or mortality to milkweed and flowering plants important to monarch butterflies. Although immediate impacts could include the loss of individual plants, some species of milkweed have been shown to quickly regrow after a prescribed burn. Restoring historical fire regimes, including the use of prescribed fire, has been shown to create milkweed patches and corridors (Baum and Sharber 2012).

Additional effects include the alteration of the vegetation structure and/or composition and changes to the soil structure and chemistry, which can render the site susceptible to invasion by nonnative or noxious weed species. It is also possible to introduce noxious or invasive species because of equipment used during activities. However, the NPS could minimize this effect by following

standard operating procedures for the control of noxious and invasive species. These procedures involve washing vehicles and equipment prior to entering treatment sites. Using existing roads and trails to access areas for activities would reduce soil compaction and erosion. Specific BMPs and mitigation measures (see Appendix B) to reduce impacts on soil and vegetation resources are outlined in the Potential Alternatives document.

Fuels management activities and prescribed burns under alternative B could cause immediate impacts, such as mortality and habitat alteration. However, fire management activities have shown to be beneficial to monarch butterflies by increasing opportunities for important plant species, such as milkweed and flowering plants, to establish in management areas. Additionally, compared with prescribed burns, severe wildfires would likely impact larger areas of suitable habitat. These areas would likely take longer to recover due to the higher intensity, as compared with prescribed burns. Under alternative B, the NPS would implement BMPs and mitigation measures to reduce impacts on monarch butterflies and the associated habitats. These measures are described in the Potential Alternatives document.

Although individuals could be impacted under the no-action alternative, due to the limited abundance and distribution of milkweed in the parks, it is not anticipated the monarch butterflies would be impacted at a population level.

Cumulative Impacts

The trends and conditions described in the affected environment resulting from past, planned, and ongoing actions would continue. Construction activities may have the potential to disturb special status species plants, animals, and their habitats. The potential for impacts would continue to be addressed in project design and planning and the implementation of BMPs. The requirements of the conservation plan for the Chapin Mesa milkvetch would reduce the potential for impacts for the construction access for the proposed Spruce Tree House Stabilization project. The contribution of construction activities to cumulative impacts on status species plants, animals, and their habitats would be negligible.

Projects with larger footprints, such as the loop roads and waterline projects, would involve more widespread impacts on special status species through removal of plants and disturbance to soils that increase the risk of invasive species and nonnative plant proliferation. For projects with more discrete footprints, such as those listed in the affected environment section, impacts on special status species would be more likely to affect individual plants through removal and soil disturbance. For all projects, the NPS would work to restore native vegetation through revegetation efforts where ground disturbance has occurred. The NPS also would mitigate the spread of nonnative plants through a variety of BMPs, including controlling construction materials entering the park and equipment inspections at park entrances. In addition, the NPS would use herbicides to control the spread of nonnative plants in areas disturbed by ongoing construction and other ground-disturbing activities. The impacts associated with the trends and conditions resulting from past, planned, and ongoing action in conjunction with the proposed action would be minimized.

The potential for cumulative effects on status species plants, animals, and their habitats due to wildfire and wildfire suppression would remain, but be reduced when compared with alternative A. There may be impacts resulting from fuel treatments, but these actions would be planned and conducted by NPS to minimize adverse impacts. The cumulative beneficial impacts under this alternative may vary depending on the species. Special status plant species might thrive under additional treatment while some special status wildlife species might be negatively impacted by the disturbance. However, cumulative impacts on these wildlife species may be temporary and minimal in the long term. Overall, the reduction of fuels in the context of comprehensive fire management planning would help reduce the potential for cumulative impacts on special status species by helping

to reduce the potential for high intensity fires, which over time if left unmanaged can impact species habitat for the long term.

3.5 CULTURAL RESOURCES

3.5.1 Affected Environment

Congress established MVNP in 1906 with the stated purpose to "provide specifically for the preservation from injury or spoliation of the prehistoric communities and other works and relics of prehistoric or primitive man within said park." These same resources were the basis for the listing of MVNP on the National Register of Historic Places (NRHP) in 1966. In 1978, the worldwide value of MVNP's archeological resources was further recognized when it was selected as one of the seven original UNESCO World Heritage Sites. Currently, there are 21 UNESCO World Heritage Sites in the United States. While MVNP is best known for cliff dwellings tucked into sandstone alcoves along canyon walls, there are thousands of cultural resources in the park representing thousands of years of Native American habitation of the Mesa Verde cuesta. Cultural resources in MVNP include prehistoric and historic archeological resources; prehistoric and historic districts, buildings, and structures; and cultural landscapes.

Yucca House is composed of an unexcavated masonry pueblo that was once multiple stories, and includes a well-preserved great house, multiple towers in small plazas, a bi-wall structure, a significant number of kivas, and a well-delineated ceremonial plaza containing a great kiva, partially enclosed by an imposing wall just to the north (NPS 2015b). On July 17, 1919, Henry Van Kleeck deeded 9.6 acres, including most of YHNM, to the federal government. Due to its significance as an excellent example of a valley pueblo, Woodrow Wilson made Yucca House a national monument by presidential proclamation on December 19, 1919 (NPS 2015). There are no historic buildings within YHNM due to its size and lack of development for visitors. While potentially present, cultural landscapes have not been documented within YHNM.

The cultural resources at the parks reflect early settlement, use, and management of the lands by Indigenous people; westward expansion of Euro-American people (as well as other non-European people) and their conflict with American Indian groups; resource extraction such as fuelwood gathering (MVNP only) and herding; early tourism; early environmental conservation efforts; development of water resources; and park planning, design, and land management.

The NPS manages cultural resources under a variety of federal regulations, including the NHPA, as amended. Section 106 of the NHPA requires agencies to consider the impacts of federal undertakings on historic properties that are eligible for or listed on the NRHP. Historic properties include landscapes, districts, sites, buildings, structures, and objects that are eligible for the NRHP. As there is an NRHP-listed archeological district that encompasses almost all of MVNP, most of the prehistoric archeology sites within the park boundary meet this definition.

Archeological Resources

Cultural resources in the parks include prehistoric and historic archeological sites that reflect the physical evidence of human presence spanning at least 5,000 years. Prehistoric sites consist of mounds of fallen rubble and earth from small and large villages, soil- and water-control devices, work areas, rock alignments of uncertain function, scatters of pottery shards and lithic fragments, campsites, mesa top sites, and cliff dwellings. The cliff dwellings vary from large communities (three contain over 120 rooms) to small, one-room storage areas.

Historic sites include Euro-American settlement and use of the area as well as early archeological research and tourism, particularly at MVNP. MVNP has over 5,000 known archeological sites (NPS

2015a). The condition of most of the prehistoric archeological sites is unknown. Approximately 1,000 sites are known to be in good condition, but approximately 500 sites, largely on steep talus slopes and in areas burned by recent fires, are vulnerable to severe erosion. The NPS manages 29 prehistoric cliff dwellings that are classified as buildings or structures. Many of these cliff dwellings are part of the Mesa Verde National Park Archeological District, which includes structures such as Square Tower House, Sun Temple, Spruce Tree House, Cliff Palace, and Balcony House (NPS 1976a).

In 2019, the NPS conducted a review of known archeological resources within MVNP to identify fire-sensitive archeological sites (those with wood elements that could be destroyed during a wildfire; NPS 2019b). The review focused on identifying historic Navajo sites with hogans and sweat lodges, historic cabins from homesteading or NPS management, and petroglyph sites. While the review noted that wood elements associated with many of these site types had burned in previous wildfires, there were 12 archeological sites that retained wood elements (NPS 2019b). These sites were identified as high- to medium-priority fire-sensitive sites and ranked for fuels treatments based on the wood elements present and the accessibility.

The YHNM site is a largely intact, unexcavated example of a "valley pueblo" archeological site, the large settlement type once found throughout the Montezuma Valley around a dependable spring. This valley probably was the major population and cultural center of the prehistoric Mesa Verde branch of the Ancestral Pueblo cultural tradition, although the Ancestral Pueblo culture of Chaco Canyon in New Mexico substantially influenced the buildings' architectural style.

There are also several archeological sites within or immediately adjacent to fuels treatment activities that would be implemented under the FMP. Previous archeological surveys identified 131 archeological sites within or adjacent (within 66 feet) to units designated for prescribed burning and fuels treatment project activities (Table 3-7). There are approximately 89 archeological sites located within 66 feet of backcountry roads proposed for thinning activities. Because the FMP does not include specific fuels treatment activities at YHNM, no site-specific identification of archeological sites was conducted for that park.

Table 3-7. Number of Archeological Sites at MVNP Potentially Affected by Prescribed Burns and Thinning Treatments

Prescribed Burns and Defensible Space Treatments	**Number of Archeological Sites Potentially Affected[1]**
Administrative pile prescribed burn	8
Safety zone maintenance: mechanical and manual fuel treatments	6
Park Point prescribed burn	0
Bobcat Canyon prescribed burn	10
Far View Lodge Units (eastern and western) prescribed burn	29
Loops Roads fuels reduction: mechanical and manual fuel treatments	30
Facility/infrastructure protection: mechanical and manual fuel treatments	48
Roadside fuels reduction: mechanical and manual fuel treatments	89
Total	**220**

NPS GIS 2022

[1] The total number of archeological sites accounts for sites that have been recorded and are those listed or eligible for listing on the NRHP.

The number of archeological sites from MVNP is approximate. This is because the count is based on geographic information systems data derived from hand-drawn maps of archeological site locations or locational information generated prior to the common use of global positioning system equipment. Therefore, there can be errors in location of up to 70 feet. Additionally, not all locations within the parks are surveyed for archeological resources, including some of the areas proposed for fuels treatments. Therefore, the numbers provided in Table 3-7 are estimates of the number of sites potentially impacted. Because archeological surveys are incomplete in areas where prescribed burns are proposed, before undertaking any prescribed burns the NPS will complete a site specific S106 compliance action, including identification of cultural resources and consultation with Tribes.

Historic Districts, Structures, and Buildings

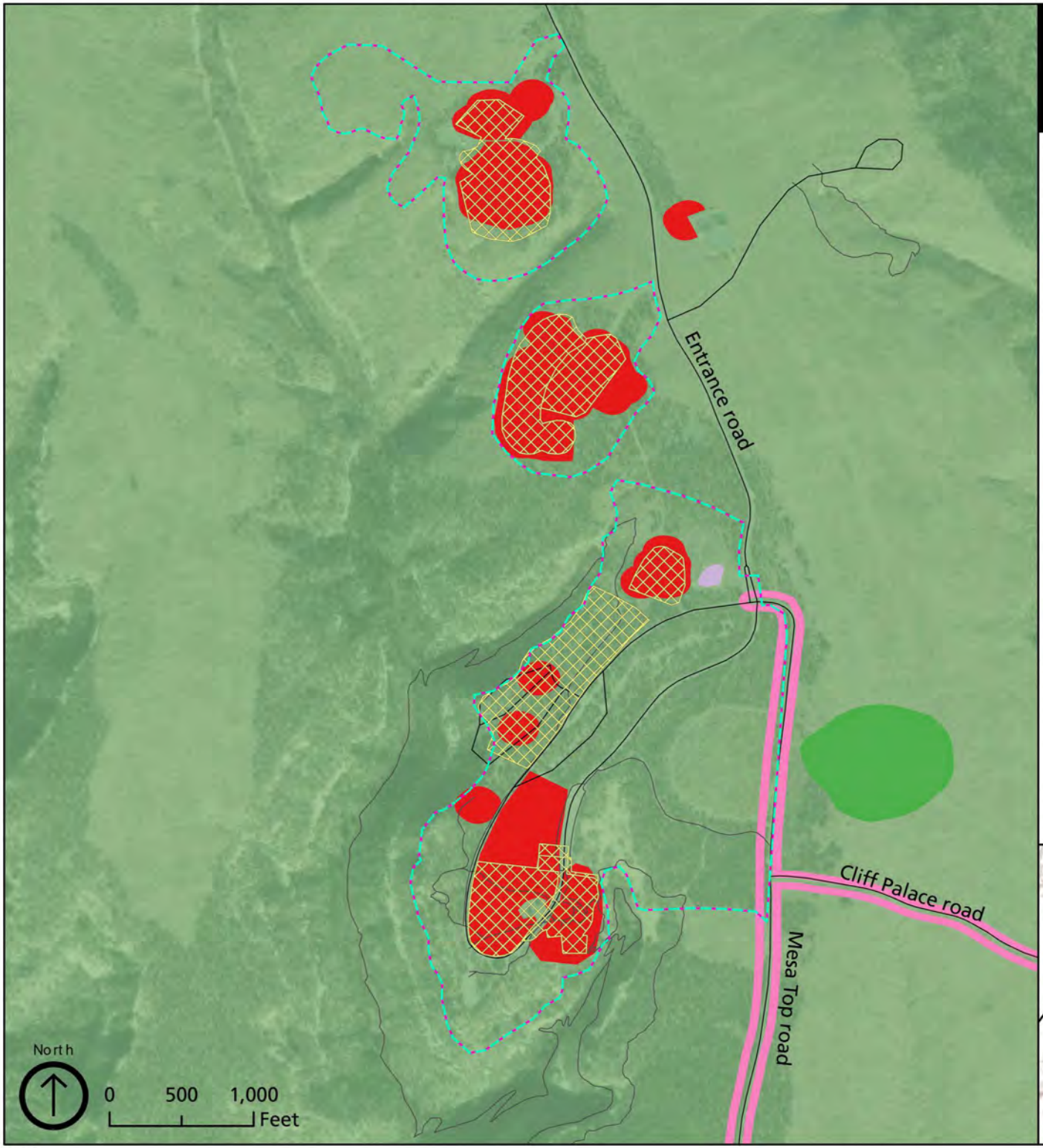
There are numerous historic structures and buildings in MVNP that reflect important eras or the influence of individuals important in the human history of the park, particularly related to early archeological excavations and tourism. The list of classified structures for MVNP identifies 635 historic structures. (see Figure 3-4, Cultural Landscapes and Historic Districts at Mesa Verde National Park). Many of these are associated with historic districts— geographically bounded areas that include a concentration of buildings, structures, and sites that are linked historically or aesthetically by plan or development. Figure 3-4 does not show all of the historic districts in MVNP. Districts not shown include Chapin Mesa Loop Roads Historic District, Far View Lodge and Motel Units Historic District, and Morefield Campground Historic District. There are no historic buildings or structures located at YHNM.

The NPS is charged with maintaining all historically significant structures to prevent degradation of significant characteristics. This includes protecting them from wildfire. Ten historic districts or buildings are located within or adjacent to proposed fuels treatments. These include eight historic districts comprised of multiple buildings, structures, and other features; and two individual buildings (Far View Center and Entrance Residence; see Table 3-8). These districts and buildings have been determined eligible for the NRHP. Mesa Verde Administrative District is listed as a national historic landmark (NHL). NHLs are nationally significant historic properties that represent an outstanding aspect of American history and culture.

One site at YHNM is classified as a prehistoric building or structure, like the 29 prehistoric sites at MVNP, even though archeological sites are usually not considered buildings or structures unless they have been excavated and stabilized to be aboveground, and most of YHNM prehistoric structures are unexcavated.

Cultural Landscapes

A cultural landscape is a geographic area, including cultural and natural resources and the wildlife or domestic animals within, associated with a historic event, activities, or person, or that exhibits other cultural or aesthetic values. Four cultural landscapes intersect with proposed fuels treatment activities. These include the Headquarters Loop, the Park Entrance Road corridor, the Utility Area, and the CCC Camps cultural landscapes, all of which are in MVNP (Table 3-9) (see Figure 3-4). Each of these landscapes are documented in a cultural landscape inventory and are determined eligible for listing on the NRHP (NPS 2012a, 2012b, 2012c, and 2012d). There are no documented cultural landscapes at YHNM.



Mesa Verde National Park

Fire Management Plan
Environmental Assessment

Figure 3-4
Cultural Landscapes and Historic Districts at Mesa Verde National Park

- Cultural landscape approximate perimeter
- Historic district and building

Proposed action

- Facility/ Infrastructure Protection
- Safety Zone Maintenance
- Administrative prescribed burn pile zone
- Loop Roads Fuels Removal
- Road
- Trail
- Mesa Verde National Park administrative boundary

Source: NPS GIS 2022
April 13, 2023
MEVE_FMP_Rpts_Baseline.pdf
No warranty is made by the National Park Service as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

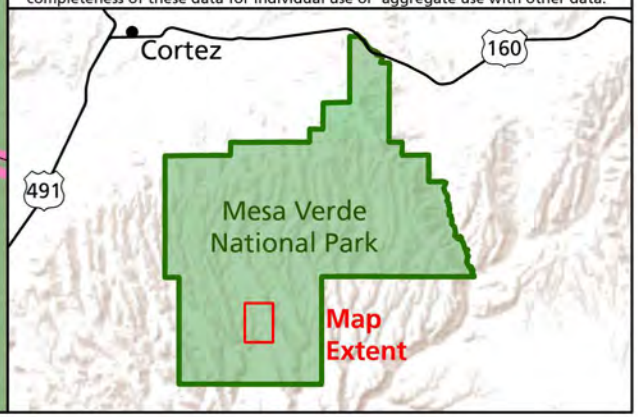


Table 3-8. Summary of Historic Districts and Buildings in or Adjacent to Proposed Project Fuels Treatments at MVNP

Resource Name	Period of Significance	Status	Description
Mesa Verde Administrative District NHL	1900–1924 1925–1949	NHL Criteria A, B, and C	This district includes six buildings: the superintendent's residence (1921), the park headquarters building (1923), the post office (1923), the old community building (1927; now the ranger station), the museum (1923–1924), and the ranger club (1925; now offices). All the buildings are constructed in the Pueblo Revival architectural style, with details derived from prehistoric sites. The district includes landscape features such as paths and walkways (NPS 1978 and 1987).
Chapin Mesa Picnic Area (formerly Spruce Tree Campground)	1917–1940	Eligible for the NRHP Criteria A and C	Chapin Mesa Picnic Area is located within the Administrative District but is not considered part of the NHL. The Civilian Conservation Corps (CCC) constructed the campground in 1935. It is one of the first developments constructed as part of the 1933 Master Plan for MVNP. It includes three one-way loop roads with campsites along each (one loop was closed and rehabilitated in the 1970s). The CCC also constructed comfort stations, retaining walls, curbs, drinking fountains, and fuel, water, and garbage stations (NPS 2007).
Chapin Mesa Loop Roads Historic District	1932-1970	Eligible for the NRHP Criteria A and C	Also known as the Ruins Loop Historic District (5MT23457), this district consists of three loop roads: Mesa Top Loop, Sun Temple Loop, and Cliff Palace Loop, all located on Chapin Mesa. Along each loop road are pullouts where visitors can stop and see mesa top archeological sites and viewing areas overlooking cliff dwellings. The CCC constructed the roads and the associated features; the roads have a Midcentury Modern design promoted by the Mission 66 program.
Mesa Verde CCC Camp and Maintenance Area Historic District	1933–1942	Eligible for the NRHP Criterion A and C	The district consists of two sections: an upper section associated with the Maintenance Area, which includes four utility buildings, and a lower section that served as the camp itself. The utility structures in the Maintenance Area served as the headquarters for CCC vehicles, shops, and general maintenance activities. Two buildings remain within the camp itself: the CCC Recreation Hall and Barracks Building #5 (also known as Jack Gray Warehouse). A labyrinth of trails that once connected the camp buildings also remains (NPS 2006).

Resource Name	Period of Significance	Status	Description
Far View Center	1968–1972	Eligible for the NRHP Criteria A and C Colorado State Register of Historic Properties Criteria A and C	The Far View Center, not currently in use, is a two-story, circular building with a cantilevered second story clad in sandstone veneer. The first story houses pie-shaped offices, staff and visitor restrooms, and mechanical systems. The second story includes an observation deck with expansive views to the south. The interior of the second story was largely dedicated to exhibit space, ticket sales, and the ranger desk (NPS 2016a).
Far View Lodge and Motel Units	1963–1972	Eligible for the NRHP Criterion A	This district includes 16 contributing buildings and structures that comprise the Far View Lodge and Motel, constructed between 1963 and 1982. The district includes a Neo Pueblo Revival-style building (Far View Lodge), with the rest of the buildings constructed in NPS Mission 66 style. The motel units are one- or two-story, wood-framed structures with characteristic butterfly roofs (NPS 2016b).
Navajo Hogans Historic District	1930–1945	Eligible for the NRHP Criteria A and C	Six stone "hogans" and a similarly built comfort station constructed by the NPS in the 1930s and early 1940s provide housing for seasonal Native American employees (NPS 1976b).
Residential Area Historic District	1934–1942	Eligible for the NRHP Criteria A and C	This district includes 18 buildings, 17 of which are cottages constructed by the CCC. The cottages all follow a similar design: a one-story frame cottage with one or two rooms. The 18th building is a dormitory moved from another location to the residence area in 1934. The building was originally constructed in 1925 as a mess hall near MVNP headquarters (NPS 2019).
Park Entrance Residence	1931–1942	Eligible for the NRHP Criteria A, and C	The Entrance Residence was constructed in 1931 to provide housing for NPS staff monitoring the main park entrance. The building is a one-story, Pueblo Revival style constructed of native sandstone blocks (NPS 1976c).
Morefield Campground Historic District	1964–1972	Eligible for the NRHP Criteria A and C	The Mission 66-era Morefield Campground is in Morefield Canyon and covers approximately 219 acres. It contains the Morefield Village constructed in the Contemporary style, about 267 individual tent campsites plus group camping areas, the Morefield Amphitheater, comfort station buildings, asphalt paved walkways, paved roads, parking lots, trailheads, and a water tank. The campsites and comfort stations are arranged along a series of one-way loop roads.

Table 3-9. Summary of Cultural Landscapes in or Adjacent to Proposed Fuels Treatments at MVNP

Cultural Landscape	Size (Acres)	Period of Significance	Landscape Characteristics	Description
Headquarters Loop Cultural Landscape	112	1906–1942	• Archeological sites • Buildings and structures • Constructed water features • Cultural traditions • Land use • Natural systems and features • Small-scale features • Spatial organization • Topography • Vegetation • Views and vistas	The Headquarters Loop cultural landscape encompasses the Headquarters Loop Road from where it intersects the Entrance Road and Ruins Road at a four-way stop and extends south to the tip of Chapin Mesa (NPS 2012a). Canyons surround three sides of the area, geographically bounding the landscape on top of Chapin Mesa. Headquarters Loop serves as MVNP's main hub, with intermingled administrative, residential, visitor, and utilitarian functions. The area included seven subunits: Spruce Tree Point Lodge, Spruce Tree Camp/Headquarters, Residential Area, Utility Area/Concessionaire's Tent and Cabin, Spruce Tree Public Campground, Hogan District, and North Entrance Information Plaza. The subareas are situated in an area of old-growth piñon-juniper that is thinned to reduce hazardous fuels and risk from wildfire. The subareas and associated features are connected by roads, pathways, and other small features and a natural setting that ties them together as a landscape.

Cultural Landscape	Size (Acres)	Period of Significance	Landscape Characteristics	Description
Park Entrance Road Corridor Cultural Landscape	1,278	1907–1957	• Buildings and structures • Circulation • Cultural traditions • Land use • Natural systems and features • Small-scale features • Spatial organization • Topography • Vegetation • View and vistas	The Park Entrance corridor includes a four-acre developed site at the intersection of U.S. Highway 160 and Park Entrance Road, a 25-mile by 500-foot corridor centered on Park Entrance Road and Ruins Road (includes Mesa Top Loop and Cliff Palace Loop; NPS 2012b). The Entrance Road is characterized by a curving route that winds up the mesa with expansive views. The curvilinear alignment, asymmetrical topographic manipulation, stone culverts and drop inlets, and naturalistic treatment and rounding of roadside slopes remain identifiable characteristics of Entrance Road and Ruins Road. Many of the stone features, such as culverts and pullouts, are attributable to the CCC and characteristic of CCC-era construction. The cultural landscape is considered in good condition. CCC Camp NP-6C is also an archeological site. There are no standing buildings.
Utility Area Cultural Landscape	9	1933–1937	• Buildings and structures • Circulation • Cultural traditions • Land use • Small-scale features • Spatial organization • Topography • Vegetation • Views and vistas	The Utility Area encompasses nine acres north of the headquarters area (NPS 2012c). It includes maintenance and residential areas designed and constructed by the CCC. The landscape is situated on a relatively flat landform, bounded on the north, west, and south by steep slopes. The vegetation is largely open piñon-juniper, with a portion of the landscape burned in the 2002 Long Mesa Fire. The landscape is a largely rustic design, characterized by the use of natural materials, non-intrusive features, and simple forms. Significant landscape features, such as curvilinear circular systems, stone curbs, asphalt paths, and signage, were designed to replace rugged, handcrafted structures built by pioneer craftsmen with hand tools.

Cultural Landscape	Size (Acres)	Period of Significance	Landscape Characteristics	Description
CCC Camps Cultural Landscape	Approximately 30	1933–1942	• Archeological sites • Buildings and structures • Circulation • Constructed water features • Land use • Small-scale features • Spatial organization • Topography • Vegetation • Views and vistas	The CCC Camps cultural landscape encompasses three separate CCC camps constructed in MVNP: one at the head of Prater Canyon, south of Entrance Road (NP-2-C); one on Chapin Mesa, north of headquarters (NP-5-C); and the third on Chapin Mesa to the north of NP-5-C (NP-6-C; NPS 2012d). The camps are characteristic of CCC-era construction, with buildings and structures connected by curvilinear paths, roads, and stonework. Camp NP-2-C and NP-6-C are now considered archeological sites, as no standing buildings or structures remain. Impacts on the landscape include alterations of extant buildings and structures, the loss of vegetation to beetle infestations and wildfire, the removal or alteration of small-scale features, and natural damage to archeological sites. The cultural landscape is considered in fair condition.

While buildings and structures are important components of these resources, landscapes include characteristics beyond the buildings themselves and consider the area's overall design and aesthetics. Landscape characteristics are the tangible and intangible aspects of a place that influence the history of the landscape's development or are products of its development. They can include methods for circulating people through an area (roads, paths, trails, etc.), small-scale features (such as rock walls or drinking fountains), the spatial organization of natural and human-made features, the vegetation, and the views. Specific features are identified within each landscape characteristic that contribute—or do not contribute—to the landscape (Table 3-9). A cultural landscape generally includes multiple landscape characteristics, but it does not need to include all characteristics to be considered eligible for the NRHP.

Trends and Planned Actions – Cultural Resources

The park's cultural resources are subject to a variety of disturbances, including erosion, natural deterioration of structures, landslides/rockfalls, wildfire, and other natural processes. Most archeological sites at MVNP are preserved in place, with minimal human intervention or protective measures. Construction, planning implementation, and maintenance of the park and facilities are undertakings subject to cultural resource protection laws. Adverse effects on historical properties are avoided or mitigated through completion of the Section 106 process.

In addition to wildfires, past, planned; and ongoing activities within the park that can affect cultural resources include road and trail construction, building and facility construction, utility improvements, revegetation projects and climate change.

Planned road projects that are not yet in progress include, Wetherill Mesa Road, Cedar Tree Tower, Far View Sites Road, and the Long House Loop Roads (also referred to as Tram Road) projects and culvert replacement along the Waterline Access Road. These projects are rehabilitating existing roads, and improving overall accessibility, overlooks, sidewalks, intersections, and parking areas. Work is mostly confined to road corridors.

The Mesa Top Loop Roads project is in progress and is expected to be completed this year.

Major construction projects planned outside of road corridors include development of the Paths to Mesa Verde bike path project, construction of the Mesa Top Comfort Station, construction of the wildland fire facility (likely near the park entrance), rehabilitation of the Headquarters Loop residences, and rehabilitation of the Chapin Museum. Project footprints and construction support areas would be defined on a site-specific basis, and effects on cultural resources would be addressed in project design and project planning.

The planned replacement of the Wetherill Waterline and Morefield Waterline would have a limited footprint in mostly previously disturbed areas. The planned access route for the proposed stabilization of the Spruce Tree House alcove arch would widen the existing trail.

The planned demolition and restoration of the old MVNP helibase site would include reseeding and revegetating with Chapin Mesa milkvetch seeds and/or plants. There is no surface evidence of archeological resources or historic buildings in this area.

Ongoing park management programs, such as fuels reduction to maintain defensible space, efforts to mitigate the effects of climate change and the planned removal of trespass livestock from MVNP, would continue.

Climate trends may impact cultural resources throughout the park. Climate change patterns and drought are anticipated to lead to hotter temperatures, drier conditions, and more intense storm events. Flash flooding could move surface artifacts and destroy the temporal and geographic context of archeological sites. Structures and protective rock features would be subject to erosion, weathering, and rockfalls. Warming temperatures and drought could result in more intense wildfires.

Updated fire management planning would include measures to ensure that impacts on cultural resources would be avoided or minimized, consistent with park policy and direction on preserving these resources.

3.5.2 Impacts of Alternative A (No-Action Alternative)

Under the no-action alternative, activities identified in Section 2.2.1 and trends identified in Section 3.5.1 would continue. Suppression activities implemented in response to unplanned ignitions have the potential to negatively impact cultural resources, with impacts varying based on the type of resource. The lack of fuels management in the no-action alternative would allow fuels to accumulate with the potential for increased wildfire severity or intensity if there is an unplanned ignition.

Archeological Resources

Most archeological sites consist primarily of subsurface deposits, and fires can negatively impact these cultural deposits. The impacts of fire on archeological resources vary based on the type of fire, with fast-moving grass fires heating soils less than long-smoldering fires involving dense woody vegetation or piles of trees (Sturdevant et al. 2009). Burning stumps can negatively impact archeological resources because they burn at higher temperatures for longer periods, while also introducing fire into subsurface cultural contexts (Winthrop 2004).

In general, current trends would continue under the no-action alternative, including the continued, increased risk of severe wildfires in the parks. In ecosystems like those seen in the parks, such wildfires burn hotter and longer since fuel loading is generally heavier without fuels treatment activities. Accordingly, under the no-action alternative, there is a greater potential for higher-intensity, larger wildfires. This is from the inability to reduce fuel loading, particularly around important resources and where ignitions could occur due to the absence of an FMP.

Wildfires could impact archeological deposits through the burning of combustible or friable archeological materials, such as wood, textiles, bone, ceramic, masonry, and other building materials. Additionally, post-wildfire erosion at archeological sites (resulting from a loss of soil integrity, as described above) can displace artifacts and features from their context and remove their potential to contribute valuable information about an area's history and prehistory. All 12 of the high- to medium-priority fire-sensitive sites that the NPS identified during its 2012 review of archeological resources in MVNP would be at risk from loss of important cultural features and materials (see NPS 2019b).

Additionally, wildfire locations cannot be entirely predicted; therefore, there is the potential for impacts on archeological resources throughout both parks. During a wildfire, the NPS would strive to protect known archeological resources, especially those susceptible to fire, when wildfire conditions and safety allow for protective measures. Potential protective measures include fuels reduction around archeological sites, construction of fire lines to prevent the spread of wildfire into sites and using fire-resistant sheeting to protect combustible features and materials.

The most likely impact on archeological resources during suppression activities is the construction of fire lines, which often involves ground disturbance that can displace archeological materials. While steps are taken to avoid impacts on archeological sites during suppression activities, the topography, vegetation, safety, and wildfire behavior may dictate the location of fire lines. The NPS, in coordination with park archeologists, would locate staging areas, staff camps, and other suppression-related infrastructure to avoid or minimize impacts on archeological sites.

Historic Districts, Structures, and Buildings

There are no documented buildings and structures in YHNM; therefore, the discussion focuses on resources present at MVNP. Under the no-action alternative, there is the potential for impacts on historic districts, structures, and buildings within MVNP due to an increased potential for wildfires and associated suppression activities. Impacts could include the loss of the resource itself during a wildfire and/or visual impacts on adjacent areas that affect the character and setting of the district, structure, or building. Since the WERP expired in early 2022, the NPS is unable to conduct new fuels treatments, such as thinning trees around buildings. Given the distribution of districts, buildings, and structures in MVNP, wildfires could impact all the resources identified in this section.

The NPS generally conducts suppression activities in a method to protect important park infrastructure, which includes districts, buildings, and structures. Potential impacts from suppression activities include accidental damage from the use of mechanical equipment or the use of water and fire retardant. Additionally, the increase in use of certain areas that are also cultural resources, such as Morefield Campground or administrative buildings, during suppression activities could lead to an increase in wear and tear or accidental damage to these resources.

Cultural Landscapes

In general, impacts on cultural landscapes occur when the defining landscape characteristics are altered or lost. Under the no-action alternative, there is the potential for negative impacts on cultural landscapes due to the increased potential for wildfires and the associated suppression activities. Wildfires could impact multiple landscape characteristics associated with the cultural landscapes within the parks. For example, wildfires could remove vegetation, buildings, and features and modify views and vistas, altering cultural landscape characteristics that contribute to its integrity and eligibility for the NRHP. Due to the nature of wildfires, there is the potential for impacts across the four cultural landscapes detailed in this section.

Potential impacts on cultural landscapes from suppression activities are like those for districts, buildings, and structures. Additionally, there is the potential for removing vegetation within cultural landscapes during wildfires to prevent the loss of structures or infrastructure. This vegetation removal could have negative impacts on the overall landscape. Large-scale wildfires outside the cultural landscapes themselves could impact important views and vistas that define landscape characteristics.

Cumulative Impacts

The trends and conditions described in the affected environment resulting from past, planned, and ongoing actions would continue. Construction activities may have the potential to affect cultural resources, however all undertakings in the parks would be subject to completing the Section 106 process and adverse effects would be resolved. The contribution of construction activities to cumulative impacts on cultural resources would be negligible.

The cumulative impact of not implementing more comprehensive fire management could be substantial over time for cultural resources. Since cultural resources are generally considered non-renewable, impacts are permanent, and a no action decision could potentially increase cumulative impacts from high-severity fires.

3.5.3 Impacts of Alternative B (Proposed Action)

Under alternative B, the NPS would expect the impacts on cultural resources from wildfire and suppression activities to be less than under alternative A. However, alternative B emphasizes fuels

treatments around park infrastructure and resources. Many of these are cultural resources, so the permanent loss of resources would be unlikely, and adverse impacts would be minimized. There is the potential for fuels treatment activities associated with alternative B and the implementation of the FMP to impact cultural resources, particularly activities such as thinning trees, removing vegetation (mechanically and by hand), and conducting in situ pile burning and prescribed burning. There are known cultural resources present within or adjacent to areas proposed for fuels treatments under alternative B. The NPS would implement several measures to ensure impacts on cultural resources would be avoided or minimized, consistent with policy and direction on preserving these resources. Such measures as surveying and flagging for avoidance are outlined in Appendix B.

The proposed areas for fuel treatments have not been intensively surveyed for archeological resources. Many of the site locations were recorded prior to GPS technology and may not be accurate. Furthermore, due to topography and vegetation variability, surveys in shrub communities are sparse compared to surveys in pinyon-juniper communities. Because of these limitations and incomplete data, the NPS will complete a separate NHPA Section 106 compliance action before any prescribed burns are undertaken, including identification of historic resources and consultation with Tribes. The NPS would mitigate the impacts on cultural resources through a variety of BMPs, including those found in Appendix B; refraining from, where possible, additional ground-disturbing activities in known sensitive cultural resource sites; and continuing, where possible, to increase the inventory and monitoring program for cultural resources. This includes conducting surface and subsurface testing, as necessary, to document the potential for archeological resources or to understand the presence, extent, and significance of the cultural resources found.

Archeological Resources

There are known archeological resources within or immediately adjacent to proposed fuels treatment activities, including within road corridors, prescribed burn units, safety zones, and areas proposed for defensible space treatments. Following BMPs will ensure that impacts to archeological sites during mechanical and manual fuel removal will be avoided or minimized. Because there have not been intensive archeological surveys covering the proposed prescribed burn areas, the NPS will conduct a pedestrian Class III archeological survey and consult with the SHPO and Tribes on the identification of properties before implementing any prescribed burns. Consultation will include evaluation of whether there are areas with perishable archeological resources that should be treated with mechanical/manual fuel reduction instead of a prescribed burn.

Of the 12 high to medium priority fire sensitive sites that the NPS identified during its 2012 review of archeological resources in MVNP, seven are located within areas proposed for fuels treatment activities (that is, roadside or defensible space thinning) (NPS 2019). Given the BMPs and mitigation measures outlined in Appendix B, all archeological sites within proposed fuels treatment areas would be protected by avoidance during project activities. The removal of fuels from the vicinity of these sites (outside the site boundary) would provide some protection for these resources in the event of a wildfire. While there is the potential for accidental adverse impacts on these resources during project activities, overall, there would be limited adverse impacts on fire-sensitive archeological sites and potentially beneficial impacts if fuels treatments prevent the loss of wood elements during a wildfire.

The remaining five archeological sites have an increased potential for adverse impacts due to their more distant location from MVNP infrastructure and facilities (which are the focus for fuels treatments and protection). Wood elements associated with these sites could be lost during a wildfire, having permanent adverse impacts on the resource. The NPS would conduct protective measures at up to five sites each year, and if done at these sites, would provide some protection to fire-sensitive sites during a wildfire. Protective measures could include assessing and documenting known sites to determine their sensitivity to fire, reducing fuels within or adjacent to sensitive sites,

or creating fuel breaks around sensitive sites; sites within proposed FMP treatment areas would be prioritized for FMP activities (see Appendix B).

There is the potential for impacts on archeological resources because of wildfires and fuels treatment activities under alternative B. Impacts related to fire suppression operations and wildfire would be similar to those described under the no-action alternative and include potential damage or loss of archeological materials and features. There is also a risk of inadvertent destruction and the loss of resources due to trampling, scorching, or other damage caused while implementing fuels reduction treatments, particularly if resources are discovered during treatment.

Alternative B would also provide protections above those in the no-action alternative by following established BMPs and design features (Appendix B). The NPS would identify and avoid known archeological sites during project activities, including during prescribed burning. The NPS plans to conduct activities at proposed treatment areas involving no more than 5–10 archeological sites per year. Also, the NPS would not use mechanized equipment within archeological sites. If the NPS determines that activities should be conducted within an archeological site boundary, a qualified archeologist would be present to monitor the activities.

Archeological resources present in treatment areas would be at a reduced risk of impacts from wildfires over the long term (that is, the next decade) due to decreased fuel loading. Ultimately, removing vegetation adjacent to and within archeological sites would have long-term benefits to these resources by reducing fuel loading, leading to reduced fire severity if these resources were burned during a wildfire. Due to the established avoidance and minimization measures, the risk of potential impacts on archeological resources because of the activities included in the FMP would be reduced such that impacts would be negligible or minor, with overall outcomes creating more beneficial conditions for archeological resources. The impacts associated with the trends and conditions resulting from past, planned, and ongoing action in conjunction with the proposed action would be minimized.

Historic Districts, Structures, and Buildings

The potential for wildfire impacts on historic districts, structures, and buildings is anticipated to be reduced under alternative B due to fuels treatments that would create defensible space around these resources. This would reduce the potential for the complete loss of buildings and structures during a wildfire and would also minimize the potential for partial burning of structures. There is still the potential for accidental damage to buildings and structures during fire suppression activities, like under alternative A, but the creation of defensible space in advance of a wildfire would allow for deliberate removal that incorporates BMPs. Therefore, suppression activities near buildings and structures may not be necessary, and accidental impacts could be minimized.

Impacts on historic districts, structures, and buildings from implementing the FMP would be associated with the removal of vegetation from within and around these resources. There would be visual impacts associated with removing trees and vegetation, the density of the surrounding pinyon-juniper forest will be thinned. However, the setting and viewsheds of the Cultural landscapes would not be altered to the extent that their historic integrity would be diminished. Overall, the NPS would remove as little vegetation as necessary to protect the resource. The NPS would adhere to the Secretary of the Interior's Standards for the Treatment of Historic Properties to ensure the resource's integrity is maintained. Therefore, there would be limited negative impacts on districts, structures, and buildings from the removal of vegetation. See Table 3-10 for the acres of affected resources under alternative B.

There would be beneficial impacts on these resources from implementing the FMP, namely in the creation of defensible space within and around districts, buildings, and structures. These benefits

would persist for years into the future, as long as the FMP was implemented, with ongoing efforts to establish and maintain defensible space protecting critical resources in the event of wildfires.

Cultural Landscapes

The NPS would anticipate the impacts on cultural landscapes to be like those for historic districts, buildings, and structures. These impacts would be minimized due to the assumed reduction in wildfire potential as well as due to fuels treatments to reduce vegetation within or adjacent to the cultural landscape.

Under alternative B, the vegetation, views, and vistas are the main landscape characteristics that could be impacted by implementing the FMP and its associated activities. Impact to other landscape characteristics included in Table 3-9 would not be anticipated under alternative B. The removal of vegetation, particularly native vegetation, could cause visual changes, such as areas of disturbances or bare spots, piles of removed vegetation, or the presence of equipment. These changes would temporarily alter the landscape's overall aesthetic. The removal of vegetation within or adjacent to the landscape would alter the density of the surrounding pinyon-juniper forest; however, the setting and viewsheds of the cultural landscapes would not be altered to the extent that their historic integrity would be diminished. While fuels treatments could occur within a broad portion of each cultural landscape (see Table 3-10), such as in the Utility Area Cultural landscape, impacts are anticipated to be short term (less than one year) and largely limited to vegetation and views (see Table 3-10). BMPs, such as removing brush piles from within the cultural landscape, would further minimize these impacts.

Burn scars could intrude into important views, especially from roads associated with the cultural landscapes. However, prescribed burns tend to burn at a lower temperature than wildfires; therefore, prescribed burns should not leave burn scars that last as long as higher-severity wildfires. Areas burned during prescribed fires could be visible for several years, however, depending on the frequency and timing of burning. Avoidance and minimization measures would reduce the potential impact of these activities on cultural landscapes. The vegetation landscape characteristic emphasizes the need to retain native vegetation. Over time, the combination of avoidance and minimization measures, coupled with the removal of invasive plant species, could benefit the overall cultural landscape.

Table 3-10. Acreage of Cultural Landscapes Affected by the FMP Proposed Action[1]

Treatment Action	Headquarters Loop Cultural Landscape (110 acres)	CCC Camps Cultural Landscape (30 acres)	Utility Area Cultural Landscape (20 acres)
Prescribed burns	0	0	0
Facility/infrastructure protection	20	10	10
Safety zone maintenance	0	0	0
Soda Canyon fuels reduction	0	0	0
Loop Roads fuels reduction	0	0	0
Roadside fuels reduction	10	4	2
TOTALS	**30**	**10**	**10**
Percentage of total acres of the cultural landscape	**27%**	**33%**	**60%**

Source: NPS GIS 2022

Note: Unless less than 10 acres, all acres have been rounded up to the nearest 10.

[1] The Park Entrance Road Corridor Cultural Landscape is not included because geographic information systems information is not available.

Cumulative Impacts

The trends and conditions described in the affected environment resulting from past, planned, and ongoing actions would continue. Implementing prescribed burns may have the potential to affect cultural resources; however, all prescribed burns in the parks would be subject to completing the Section 106 process before implementation, including identification of archeological sites and consultation with Tribes. Impacts from implementing mechanical or manual fuel reduction would not adversely affect cultural resources because of the minimization and avoidance measures that would be followed (see Appendix B).

The parks' cultural resources are subject to a variety of disturbances, including erosion and other natural processes. Cultural resources in the parks and surrounding areas have also been adversely impacted to varying degrees from past construction-related disturbance (prior to the advent of archeological resources protection laws), visitor use, vandalism, erosion, and other natural processes. It is likely that ongoing and upcoming projects involving ground disturbance throughout the parks could affect cultural resources. These activities include past, present, and future road construction projects, such as the Mesa Top Loop Roads project, another project on Wetherill Mesa Road, and the Long House Loop Roads project. These activities also include major construction projects outside of road corridors, including development of the Paths to Mesa Verde bike path project, construction of the Mesa Top Comfort Station and a wildland fire facility, rehabilitation of the Headquarters Loop residences and the Chapin Museum, replacement of the Wetherill Waterline and Morefield Waterline, stabilization of the Spruce Tree House alcove arch, and demolition and restoration of the old MVNP helibase site to offset previous impacts on Chapin Mesa milkvetch. Finally, ongoing park management programs, such as ongoing fuels reduction to maintain defensible space and removal of trespass livestock from MVNP, would continue. These activities may continue to result in localized impacts on cultural resources through exposure to the elements and inadvertent damage or destruction. Projects with larger footprints, such as the loop roads and waterline projects, would involve more widespread impacts on resources due to the larger scale of plant removal and disturbance to soils that, in turn, increase the risk of damage to undiscovered or adjacent cultural resources in the area. For projects with more discrete footprints, such as the listed individual construction projects, disturbances that could cause such effects would be far more concentrated. This could potentially lessen the risk of impacts on cultural resources, depending on the location of the construction projects. Project activities may result in adverse effects on historical properties through ground disturbance, inadvertent damage, or alterations to setting. Construction, planning implementation, and maintenance of the park and facilities are undertakings subject to cultural resource protection laws. Potential adverse effects to historic properties will be avoided, minimized, or mitigated through completion of the Section 106 process.

The potential for cumulative effects on cultural resources over time would remain but be reduced when compared with alternative A. Proactive measures to reduce the overall risk of high-intensity wildfire and to protect cultural resources by identifying sensitive sites, reducing fuels within or adjacent to sensitive sites, or creating fuel breaks around sensitive sites would reduce the risk of adverse effects on cultural resources from wildfire. Fuel treatments would be conducted in compliance with the Section 106 process and adverse effects would be resolved. Overall, the reduction of fuels in the context of comprehensive fire management planning would reduce the potential for adverse cumulative effects on cultural resources.

CHAPTER 4: CONSULTATION AND COORDINATION

4.1 AGENCY CONSULTATION

As the FMP is implemented, the NPS intends to continue to coordinate with tribes in accordance with Section 106 of the NHPA, Executive Order 13175, and President Biden's memorandum dated January 26, 2021, regarding strengthening tribal consultation. This would include providing prior notice to tribes ahead of consultation and potentially coordinating visits to the parks. Accordingly, TCPs have been considered but dismissed from the detailed analysis in the EA.

The following agencies, organizations, and American Indian Tribes were contacted and invited to participate in the planning process:

- Bureau of Land Management – Tres Rios Field Office
- Bureau of Indian Affairs – Ute Mountain Ute Agency
- Natural Resources Conservation Service – Colorado Field Office
- U.S. Environmental Protection Agency – Region 8
- U.S. Fish and Wildlife Service
- U.S. Forest Service – San Juan National Forest
- Colorado State Historic Preservation Office
- Colorado Parks and Wildlife
- Montezuma County, Colorado
- Colorado State Land Board, Southwest District
- Colorado Department of Transportation – Region 5
- City of Cortez, Colorado
- City of Durango, Colorado
- Town of Dolores, Colorado
- Cortez Area Chamber of Commerce
- Durango Chamber of Commerce
- Mancos Valley Chamber of Commerce
- Mesa Verde Foundation
- Crow Canyon Archaeological Center
- Colorado Natural Heritage Program

During the civic engagement process, the NPS received comments from the Bureau of Land Management Tres Rios Field Office and Region 8 of the Environmental Protection Agency. The Bureau of Land Management was interested in future opportunities for cooperation given their adjacency to MVNP, and Region 8 provided comments requesting that NPS ensure that a number of resources were either considered or analyzed in the EA. The NPS will continue to perform outreach to these agencies throughout the remainder of the NEPA process.

MVNP and YHNM consult with the following 26 federally recognized tribes:

- Hopi Tribe of Arizona
- Jicarilla Apache Tribe
- Kewa Pueblo
- Mescalero Apache Tribe
- Navajo Nation
- Ohkay Owingeh
- Pueblo of Cochiti
- Pueblo of Nambe
- Pueblo of Picuris
- Pueblo of Sandia
- Pueblo of Taos
- Pueblo of Acoma
- Pueblo of Isleta
- Pueblo of Jemez
- Pueblo of Laguna
- Pueblo of Pojoaque
- Pueblo of San Felipe
- Pueblo of San Ildefonso
- Pueblo of Santa Ana
- Pueblo of Santa Clara
- Pueblo of Tesuque
- Pueblo of Zia
- Pueblo of Zuni
- Southern Ute Indian Tribe
- Ute Mountain Ute Tribe
- Ysleta del Sur Pueblo

During the civic engagement process, the NPS received comments from the Hopi Tribe Cultural Preservation Office, the Navajo Nation Heritage and Historic Preservation Department, and the Pueblo of Cochiti. Tribal comments related to ensuring that fire management practices not only reintroduce fires into the natural ecosystem but also protect archeological sites and traditional cultural properties. Tribes also requested ongoing consultation on the project. The NPS will continue to perform outreach to these tribes throughout the remainder of the NEPA process and solicit tribal perspectives on management actions on an ongoing basis.

CHAPTER 5: REFERENCES

Anderson, D. G. 2004. Population Status Survey of Schmoll's Milkvetch (Astragalus schmolliae). Prepared for the National Park Service, Mesa Verde National Park. Prepared by Colorado Natural Heritage Program, College of Natural Resources, Colorado State University, Fort Collins.

Bradley, P. V., M. J. O'Farrell, J. A. Williams, and J. E. Newmark, Editors. 2006. The Revised Nevada Bat Conservation Plan. Nevada Bat Working Group. Reno, Nevada.

CNHP (Colorado Natural Heritage Program). 2012a. Colorado Rare Plant Guide. Internet website: https://cnhp.colostate.edu/rareplants/guide.asp?id=25209.

_____. 2012b. Biodiversity Tracking and Conservation System. Colorado State University, Fort Collins, Colorado.

_____. 2015. Climate Change Vulnerability Assessment for Colorado Bureau of Land Management. K. Decker, L. Grunau, J. Handwerk, and J. Siemers, editors. Colorado Natural Heritage Program, Colorado State University, Fort Collins, Colorado. Internet website: http://www.cnhp.colostate.edu/download/documents/2015/CCVA_for_Colorado_BLM_final.pdf.

_____. 2017. Colorado Rare Plant Guide. Internet website: https://cnhp.colostate.edu/rareplants/guide.asp?id=17400.

Covington, W. W., and L. F. Debano. 1990. Effects of Fire on Piñon-Juniper Soils. General Technical Report. U.S. Department of Agriculture, Forest Service, RM-191. Pp. 78–86.

CPW (Colorado Parks and Wildlife). 2018. Townsend's big-eared bat. Internet website: https://cpw.state.co.us/learn/Lists/Wildlife%20Species/DispForm.aspx?ID=17.

DiTomaso, J. M., and D.W. Johnson (editors). 2006. The Use of Fire as a Tool for Controlling Invasive Plants. Cal-IPC Publication 2006-01. California Invasive Plant Council, Berkeley, California.

Erdman, J. A., and S. L. Welsh. 1964. "Annotated checklist of the plants of Mesa Verde, Colorado." *Brigham Young University Science Bulletin, Biological Series* 4(2).

Floyd, L., W. Romme, and D. Hanna. 2021. "Effects of recent wildfires in piñon-juniper woodlands of Mesa Verde National Park, Colorado, USA." *Natural Areas Journal* 41(1):28–38.

Floyd, M. L., et al. 2000. "Fire history and vegetation patterns in Mesa Verde National Park, Colorado, USA." *Ecological Applications* 10(6):1666–1680.

Floyd-Hanna, L., D. Hanna, and W. H. Romme. 2006. "Predicting and mitigating weed invasions to restore natural post-fire succession in Mesa Verde National Park, Colorado, USA." *International Journal of Wildland Fire* 15:247–259.

Forest Service. 2021. Monarch Habitat Needs. Internet website: https://www.fs.fed.us/wildflowers/pollinators/Monarch_Butterfly/habitat/.

Fusco, E. J., et al. 2019. "Invasive grasses increase fire occurrence and frequency across US ecoregions." *PNAS* 116(47):23594–23599. 10.1073/pnas.1908253116.

IWR (Institute of Water Resources). 2002. Revised Universal Soil Loss Equation (RUSLE). Online Soil Erosion Assessment Tool. K Factor (Soil Erodibility). Internet website: http://www.iwr.msu.edu/rusle/kfactor.htm.

Lentile, L. B., P. Morgan, A. T. Hudak, M. J. Bobbitt, S. A. Lewis, A. M. S. Smith, and P. R. Robichaud. 2007. "Post-fire burn severity and vegetation response following eight large wildfires across the western United States." *Fire Ecology* 3(1):91–101.

Lesica, P., S. V. Cooper, and G. Kudray. 2007. "Recovery of big sagebrush following fire in southwest Montana." *Rangeland Ecology & Management* 60(3):261–269.

Meyer, M. D., J. W. Long, and H. D. Safford (editors). 2021. Postfire Restoration Framework for National Forests in California. Prepared for the U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany California.

Miller, R. F., J. C. Chambers, L. Evers, C. J. Williams, and K. Snyder. (2019). The Ecology, History, Ecohydrology, and Management of Pinyon and Juniper Woodlands in the Great Basin and Northern Colorado Plateau of the Western United States. Gen. Tech. Rep. RMRS-GTR-403. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, Colorado.

NatureServe. 2019. *Astragalus deterior* - (Barneby) Barneby Cliff Palace Milkvetch. Internet website: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.129249/Astragalus_deterior.

_____. 2022a. *Hackelia gracilenta* – Colorado Stickseed. Internet website: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.150228/Hackelia_gracilenta.

_____. 2022b. *Iliamna grandiflora* – Large-flower Globemallow. Internet website: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.130892/Iliamna_grandiflora.

_____. 2022c. *Dimorphocarpa wislizeni* – Touristplant. Internet website: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.132601/Dimorphocarpa_wislizeni.

_____. 2022d. *Grindelia arizonica* – Arizona Gumweed. Internet website: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.152016/Grindelia_arizonica.

_____. 2022e. *Aliciella Formosa* – Aztec Gilia. Internet website: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.135541/Aliciella_formosa.

_____. 2022f. *Muhlenbergia depauperate* – Six-weeks Muhly. Internet website: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.145348/Muhlenbergia_depauperata.

_____. 2022g. *Penstemon breviculus* – Shortstem beardtongue. Internet website: https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.159141/Penstemon_breviculus.

NPIN (Native Plant Information Network). 2013a. "*Aletes macdougalii* ssp. *Breviradiatus.*" Lady Bird Johnson Wildflower Center at the University of Texas, Austin. Internet website: https://www.wildflower.org/plants/result.php?id_plant=ALMAB#:~:text=Native%20Habitat%3A%20Sandstone%20slabs%20and,%2C%20in%20pine%2Djuniper%20woodlands.

_____. 2013b. "*Collomia grandiflora.*" Lady Bird Johnson Wildflower Center at the University of Texas, Austin. Internet website: https://www.wildflower.org/plants/result.php?id_plant=cogr4#:~:text=USDA%20Native%20Status%3A%20L48%20(N,yellow%2Dsalmon%20to%20almost%20white.

NPS (National Park Service). 2008. Director's Order #18: Wildland Fire Management. January 16, 2009. Internet website: https://www.nps.gov/policy/DOrders/DO_18.pdf.

_____. 2015a. Foundation Document – Mesa Verde National Park, Colorado. October 2015. Internet website: http://npshistory.com/publications/foundation-documents/meve-fd-2015.pdf.

_____. 2015b. Foundation Document – Yucca House National Monument, Colorado. October 2015. Internet website: http://npshistory.com/publications/foundation-documents/yuho-fd-2015.pdf.

_____. 2016a. Determination of Eligibility for Far View Visitor Center, Mesa Verde National Park. Mesa Verde National Park, Colorado.

_____. 2016b. Determination of Eligibility for Far View Lodge and Motel Units, Mesa Verde National Park. Mesa Verde National Park, Colorado.

_____. 2018. Conservation Plan for Chapin Mesa Milkvetch (*Astragalus schmolliae*) at Mesa Verde National Park. Division of Research and Resource Management. Mesa Verde National Park, Colorado. National Park Service.

_____. 2019a. Reference Manual 18. Wildland Fire Management. April 2019. Internet website: https://www.nps.gov/subjects/fire/upload/nps-reference-manual-18.pdf.

_____. 2019b. Fire Sensitive Archeological Sites Treatment Priority. Unpublished report by Sheldon Baker, NPS.

_____. 2020. Wildfire Emergency Response Plan. Effective Date January 29, 2020.

NPS GIS (National Park Service Geographic Information Systems). 2022a. Mesa Verde National Park and Yucca House National Monument rare plants. Unpublished data. Mesa Verde National Park.

NRCS (Natural Resources Conservation Service). 2022a. Web Soils Survey. Fragile Soil Index. Cortez Area, Colorado; Parts of Dolores and Montezuma Counties; and Ute Mountain Area, Colorado and New Mexico.

_____. 2022b. Web Soils Survey. Erosion Hazard (Road, Trail). Cortez Area, Colorado; Parts of Dolores and Montezuma Counties; and Ute Mountain Area, Colorado and New Mexico.

O'Shea, T. J., P. M. Cryan, E. A. Snider, E. W. Valdez, L. E. Ellison, and D. J. Neubaum. 2011. "Bats of Mesa Verde National Park, Colorado: composition, reproduction, and roosting habits." *Monographs of the Western North American Naturalist* 5:1–19.

Porter, C. L. 2014. Colorado Rare Plant Field Guide: *Astragalus schmolliae*. Internet website: https://cnhp.colostate.edu/download/projects/rareplants/guide.asp?id=23141.

Ramsey, D. 2003. "Soils of Mesa Verde Country" In: Ancient Piñon-Juniper Woodlands: A Natural History of Mesa Verde Country. Edited by M. Lisa Floyd. University of Colorado Press, Boulder, Colorado.

Rondeau, R. J., D. G., Anderson, J. E. Handwerk, and S. Tova. 2022. "Post-fire effects on the globally imperiled Chapin Mesa milkvetch (*Astragalus schmolliae*) 2001–2019." *Natural Areas Journal* 42(1):4–17.

Spackman, S., B. Jennings, J. Coles, C. Dawson, M. Minton, A. Kratz, and C. Spurrier. 1997. Colorado Rare Plant Field Guide. Prepared for the Bureau of Land Management, U.S. Forest Service, and U.S. Fish and Wildlife Service by Colorado Natural Heritage Program, Fort Collins, Colorado.

Sturdevant, Jay T., Rod Skalsky, and Cody L. Wienk. 2009 Experimental Study of Local Fire Conditions and Effects on Surface or Near-Surface Archeological Resources at National Park Service Units – Midwest Region. JFSP Project Number 06-2-1-05. Internet website: https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1153&context=jfspresearch.

Thomas, K. A., M. L. McTeague, L. Ogden, M. L. Floyd, K. Schulz, B. A. Friesen, T. Fancheret, A. Cully. 2009. Vegetation Classification and Distribution Mapping Report: Mesa Verde National Park. Natural Resource Report NPS/SCPN/NRR—2009/112. National Park Service, Fort Collins, Colorado.

USDA (U.S. Department of Agriculture). 2018. Plant of the Week Streambank Wild Hollyhock (Iliamna rivularis). Internet website: https://www.fs.fed.us/wildflowers/plant-of-the-week/iliamna_rivularis.shtml.

USFWS (United States Fish and Wildlife Service). 2010. Endangered and Threatened Wildlife and Plants; Twelve Month Finding on a Petition to List *Astragalus microcymbus* and *Astragalus schmolliae* as Endangered or Threatened. 75 *Federal Register* 240, December 15, 2010.

_____. 2016. U.S. Fish and Wildlife Service Species Assessment and Listing Priority Assignment Form for Chapin Mesa milkvetch (*Astragalus schmolliae*). Mountain Prairie Region 6, Denver, Colorado.

_____. 2021. Species Status Assessment Report for the Chapin Mesa Milkvetch (*Astragalus schmolliae*). Lakewood, Colorado.

_____. 2022. Species list generated for the fire management plan for Mesa Verde National Park and Yucca House National Monument from the Information for Planning and Consultation website. Queried for the project area on February 9, 2022.

USGS GIS. 2011. GAP/LANDFIRE National Terrestrial Ecosystems. Internet website: https://www.usgs.gov/programs/gap-analysis-project/science/land-cover-data-download.

Western Monarch and Milkweed Mapper. 2018. A project by the Xerces Society, U.S. Fish and Wildlife Service, Idaho Department of Fish and Game, and Washington Department of Fish and Wildlife. Internet website: https://www.monarchmilkweedmapper.org/.

Winthrop, Kate. 2004. Bare Bones Guide to Fire Effects on Cultural Resources for Cultural Resource Specialists. National Center for Preservation Technology and Training. Internet website: https://www.ncptt.nps.gov/articles/disasters/wildland-structural-fire/fire-and-cultural-resource-management-fire-preparedness-3/bare-bones-guide-to-fire-effects-on-cultural-resources-for-cultural-resource-specialists/.

Xerces Society. 2015. Milkweeds and Monarchs in the Western U.S. Xerces Society for Invertebrate Conservation, Portland Oregon.

CHAPTER 6: GLOSSARY

Archeological resources: Any material remains or physical evidence of past human life or activities that are of archeological interest, including the record of the effects of human activities on the environment. They can reveal scientific or humanistic information through archeological research.

Candidate: Plants and animals for which there is sufficient information on their biological status and threats to propose them as endangered or threatened under the 1973 Endangered Species Act, but for which development of a proposed listing regulation is precluded by other higher priority listing activities.

Critical habitat: Defined in the Endangered Species Act as an area occupied by a species listed as threatened or endangered where there are physical or geographical features essential to the conservation of the species, or an area not currently occupied by the species, which is itself essential to its conservation.

Cuesta: A ridge with a gentle slope (dip) on one side and a steep slope (scarp) on the other.

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

Cultural resource: Aspects of a cultural system that are valued by or significantly representative of a culture or that contain significant information about a culture. A cultural resource may be a tangible entity or a cultural practice. Tangible cultural resources are categorized as districts, sites, buildings, structures, and objects eligible for listing on the National Register of Historic Places and as archeological resources, cultural landscapes, structures, museum objects, and ethnographic resources for NPS management.

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

Historic building: A constructed work usually immovable by nature or design, consciously created to serve some human activity.

Historic structure: Differs from buildings in that a historic structure is a construction meant to be used for purposes other than sheltering human activities (that is, grain elevators, bridges, etc.).

Prehistoric: Of, relating to, or denoting the period predating written records.

Special status species: Those species for which state or federal agencies assign an additional level of protection by law, regulation, or policy.

Threatened species: Any species likely to become endangered throughout all or a specific portion of its range within the foreseeable future, as designated by the Secretary of the Interior in accordance with the 1973 Endangered Species Act.

Wildfire: An unplanned fire caused by lightning or other natural causes, by accidental (or arson-caused) human ignitions, or by an escaped prescribed fire.

Appendix A

Alternatives Considered but Dismissed from Further Analysis

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APPENDIX A: ALTERNATIVES CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS

FMPs consider the use of wildfire for resource benefits; this is a management action where agencies manage naturally ignited wildland fires to accomplish specific pre-stated resource management objectives in predefined geographic areas. The proposed FMP for the parks does not include the management of wildfire for resource benefits for the reasons described below.

A sharp boundary exists between piñon-juniper woodlands at slightly lower elevations in the southern portion of the park and the montane chaparral at slightly higher elevations in the north. This pattern is explained, in part, by more extensive fires in the northern area, which favor resprouting shrubs and eliminate the fire-sensitive piñon and juniper. These high-intensity stand-replacing fires are thought to be part of the natural fire regime of some vegetation communities, such as piñon-juniper and Gamble oak, in portions of MVNP (Floyd et al. 2000). The less frequent occurrence of large fire and the resulting persistence of woodland in the park's southern portion may be due in part to natural barriers to fire spread (such as cliffs and sparsely vegetated slopes) to the south and west of the piñon-juniper woodlands.

Studies demonstrate that 70 percent of MVNP has burned in the last 100 years, and that the recent large fires in the park and the vegetation responses to those fires appear to be within the historical range of variation for this ecosystem (Floyd et al. 2000). In addition, wildfire in MVNP has been documented to cause high mortality rates in piñon-juniper woodland; soil erosion; the spread of invasive weeds, such as cheatgrass, into fire-altered landscapes; and damage or exposure to cultural resources. Low-intensity and frequent fires may not have been part of the historical fire regime of some vegetation communities within the park. However, given the current fire patterns seen in the vegetation in the parks, NPS biologists and ecologists determined that vegetation resources in the parks would likely not benefit from managed wildfire.

Further, due to the size of the parks, it would be difficult to manage fire for resource benefits before the fire may affect lands outside the parks' boundaries, such as lands under the Ute Mountain Ute Tribe. This tribe also uses a full suppression policy.

Accordingly, the NPS has evaluated the potential benefits of managing wildfire for resource benefit against the potential risks and determined that, for the parks, this alternative element would not be carried forward for further analysis.

Appendix B

Best Management Practices, Mitigation Measures, and Other Commitments

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APPENDIX B: BEST MANAGEMENT PRACTICES, MITIGATION MEASURES, AND OTHER COMMITMENTS

The following measures were developed to minimize or avoid impacts and would be implemented during execution of the action alternative, as needed. The BMPs and mitigation measures applicable to all resources and relevant to certain resources are listed here:

GENERAL

Under the proposed action described in alternative B, the NPS would implement a suite of BMPs and mitigation measures to ensure that effects on resources in the parks that occur while implementing the FMP are reduced or eliminated. General mitigation measures that are integral and applicable to the proposed action are listed in Chapter 2. Additional mitigation measures and BMPs that are relevant to certain resources are listed here.

VEGETATION RESOURCES

- For all fuels work, all equipment would be cleaned and free from invasive species and seeds prior to entering new work areas.
- Tree trimming or removal would occur in the fall and winter to prevent tree death or beetle infestations (September to March).
- Due to resultant resource degradation, limited pile burning would be recommended. Workers would avoid trampling vegetation and dragging fuels over the ground to minimize disturbance.
- Fuels reduction and prescribed fire in Douglas fir stands would occur only in coordination with and co-recommendation of the Natural Resource Program. Evaluation of the current scientific state of knowledge and evaluation would guide projects.
- Fuels reduction in ponderosa pine stands would occur only in coordination with and co-recommendation of the Natural Resource Program. Evaluation of the current scientific state of knowledge and evaluation would guide projects.
- Disturbed areas would be monitored and treated, as needed, for noxious weeds.
- The on-site dispersal of wood chips from chipping hazardous fuels would only occur after consulting with natural resources staff to ensure chip layers do not suppress plant growth.

SOIL RESOURCES

- Prior to any treatments, sensitive soil sites and areas with slopes over 35 percent would be identified. Treatments would be avoided in these areas.
- Trucks and other heavy equipment would remain on hard surfaces to avoid compaction and erosion of soils.
- Erosion control would be implemented around treatments, where needed, to prevent erosion.

- Treatments (manual, mechanical, and fire related) would be avoided in areas where there is the potential for impacts on water resources.
- Soil conditions would be evaluated to ensure that the soil moisture is low or that soils are frozen before management activities begin.
- An approved rehabilitation plan would be required and implemented following wildfires to reduce impacts on soil.

FEDERALLY LISTED AND SPECIAL STATUS SPECIES

- The FMP would incorporate all the recommended avoidance and mitigations described in the NPS's Conservation Plan for Chapin Mesa Milkvetch.
  - Conservation measures include leaving at least 50 percent of canopy cover, reducing the intensity of thinning treatments to maintain ecological characteristics of piñon-juniper woodlands, and coordinating with MVNP resource specialists.
  - Pre-treatment surveys to identify Chapin Mesa milkvetch populations to avoid these areas and reduce the impacts on the species.
- Project areas will be surveyed for *Asclepias* species (milkweed) before project implementation. If identified, the plants will be flagged for avoidance during project implementation (e.g., mowing, prescribed fire, etc.).
- Treatments would not occur during the nesting season for migratory bird species in the project area (April 1 to August 15) to the maximum extent practicable.
  - Activities that are planned to occur during the nesting season would only be done in treatment areas less than 20 acres to minimize the potential for disturbance and would be done in coordination with NPS wildlife biologist. Surveys would be conducted prior to the scheduled activity to determine whether active nests are present. If native bird nests are detected, they would be flagged, and nest tree/vegetation would not be removed.
  - During the nesting season, surveys would be repeated every 7 to 14 days to ensure any newly established nests are detected. An exception would be if nesting habitat is altered through tree mortality to a point where a biologist determines it be low quality or unsuitable habitat. After an initial nesting bird survey is done, work can be conducted through the migratory bird season.
  - Pile burning and slash piling (including hand or mechanical piling of existing material) would be implemented during the nesting season on a case-by-case basis, with concurrence of a NPS wildlife biologist.
- Prior to treatments, surveys for raptors would be conducted to identify locations of individuals or populations of these species and their nests and to allow for the implementation of protection measures. Because it could take several years to fully implement the project, re-survey for raptors may be required annually.
  - If nests of any diurnal raptors are observed in the project area, protective measures would be implemented coordinating with the park wildlife biologist. If a golden bald eagle nest is detected in the project area, additional protective measures may be implemented working directly with NPS wildlife biologists.

- Limits of disturbance would be clearly flagged to reduce potential trampling of native vegetation and soil.
- Prior to any treatments, the site would be surveyed for identification and flagging of threatened, endangered, and rare species.

CULTURAL RESOURCES

- Cultural resource surveys of the appropriate intensity (as determined by a NPS archeologist) would be conducted before any ground-disturbing activities (that is, driving off road, slash removal by dragging , and pile burning) begin to avoid or minimize damage to cultural resources, including archeological sites and TCPs.
- Adverse impacts on eligible or potentially eligible cultural resources would be avoided during project layout and implementation, as well as through monitoring, in coordination with a NPS archeologist, as necessary.
- If previously unidentified or unanticipated effects—that do not involve human remains—on historic properties are discovered during the undertaking, the workers would immediately halt all activity that may further disturb the discovery, as determined by a NPS archeologist. Work would cease at the site of discovery until MVNP staff has fulfilled the requirements of 36 CFR 800.13, including consultation with the Advisory Council of Historic Preservation, the State Historic Preservation Office, and Affiliated and Associated Pueblos and Tribes.
- If human remains are inadvertently discovered, MVNP staff would comply with all state and federal regulations, including consultation with the State Historic Preservation Office, according to 36 CFR 800.13. MVNP staff would comply with the stipulations of the General Agreement between Aztec Ruins National Monument, Chaco Culture National Historical Park, MVNP, and tribes when consulting with Affiliated and Associated Pueblos and Tribes.
- The NPS will conduct a pedestrian Class III archeological survey and consult with tribes on the identification of properties before implementing any prescribed burns. Consultation will include evaluation of whether there are areas with perishable archeological resources that should be treated with mechanical/manual fuel reduction instead of a prescribed burn.

PALEONTOLOGICAL RESOURCES

- Prior to treatments, the NPS would reference existing park information on potential fossil localities and formations to determine the sensitivity for the presence of paleontological resources. If there is the potential for the presence of rare, unusual, or scientifically important fossils to be impacted, BMPs would include surveying treatment areas for fossils and marking and avoiding treatment in those areas.

Appendix C

Resources Considered but Dismissed from Further Analysis

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APPENDIX C: RESOURCES CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS

The following impact topics were dismissed from further analysis because they are not of critical importance to this proposal, they do not exist in the project area, the proposal would not affect them, or through the application of BMPs and mitigation measures, there would be no measurable effects from the proposal.

AIR RESOURCES

The Clean Air Act of 1963, as amended (42 U.S. Code 7401 et seq.), requires federal land managers to protect air quality and to meet all federal, state, and local air pollution standards. The parks are subject to federal, state, and local air pollution standards. National ambient air quality standards have been established by the U.S. Environmental Protection Agency. Current standards are set for sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, particulate matter equal to or less than 10 microns in size, fine particulate matter equal to or less than 2.5 microns in size, and lead.

Montezuma County, Colorado, is currently in attainment for all criteria air pollutants (CDPHE 2019). MVNP is classified as part of a Clean Air Act Class l area and is afforded the highest level of protection from air quality impacts. In addition to the health-based national ambient air quality standards that protect ambient air quality, the Clean Air Act provides Class 1 areas with special protection for air quality and air quality related values, including visibility.

The proposed action could affect air quality due to vehicle and equipment operations during fuels reduction activities. Examples of potential air emissions associated with the proposed project activities include air pollutants from prescribed burning, diesel, and gasoline emissions from heavy- and light-duty equipment and tools, emissions from idling equipment, emissions from vehicles traveling on paved and unpaved roads, and re-entrained dust. The dispersal of smoke and dust from the activities described above could also potentially impact visibility in the parks, with such haze obstructing park views.

The potential impacts described above associated with the proposed action would be localized, and their duration would last as long as treatments are conducted—anywhere from a few hours to a week. During planned fire events, there would be impacts on the parks due to smoke and ash lasting as long as fire burns, which could be as short as an afternoon or as long as a week. However, because the NPS would comply with requirements and mitigation measures associated with a required smoke permit issued by the state of Colorado through the Colorado Department of Public Health and the Environment, such smoke-related impacts would be minor or eliminated. For any prescribed burn, the NPS would complete and provide a worksheet to apply for a smoke permit from the state of Colorado. This worksheet evaluates the planned activity in sufficient detail to understand emitting activities and estimated emissions to foster good air quality while meeting plan objectives. While completing this worksheet, the NPS must detail the following:

- The cubic feet of material for pile burns or the acres of area burned for broadcast burns
- The method for building burn piles or identifying areas for prescribed fire
- The distance of the area to be burned from occupied homes
- The predicted direction of smoke during various times of day
- The potential seasonal windows for the prescribed burn

The state constrains the planned activity to ensure the protection of air quality. Constraints can include restricting the time and season of the burn and dictating the required ventilation level that must occur for the burn to start. The NPS is then also required to provide notice to the Montezuma County Department of Health before initiating the burn.

During unplanned fire events, impacts related to suppression activities would be like those described above. The NPS would engage, after the fact, with relevant state and local agencies to address potential effects on air quality while instituting fire suppression activities. These impacts would last as long as the wildfire burns. Such durations could be as short as a few hours or as long as a few weeks or months, depending on the fire's severity.

Due to the state-issued burn permit, the associated constraints for prescribed fire, and the minimization of impacts during suppression, the proposed action would have temporary and localized effects on air quality and visibility; therefore, the air resources issue is dismissed from the detailed analysis.

GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE

The proposed action would result in emissions of greenhouse gases (GHGs) that are known to contribute to global climate change. The release of carbon dioxide (CO2) and GHG emissions would occur through actions such as prescribed burns and emissions from vehicles, aircraft, power tools, and other equipment. Full suppression efforts would reduce emissions that would occur if wildfires were allowed to burn naturally within the park. Compared to total GHG emissions in the state, the emissions from the proposed action would have a negligible impact on emissions in the state of Colorado. Thus, the emissions from the project would be inconsequential at a local, regional, and global scale and would not measurably detract from achieving relevant climate action goals and commitments, including Federal goals, international agreements, state, or regional goals. However, climate change is the result of the increased global accumulation of GHGs climate effects analysis is inherently cumulative in nature and as the project will result in GHG emissions there could a slight contribution to climate change if emissions from prescribed fires, tools, and equipment outweigh the emissions that would have occurred from natural burning wildfires being suppressed.

WATER RESOURCES

The Clean Water Act requires the NPS to "comply with all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution" (33 U.S. Code 1251 et seq., Section 313).

MVNP contains several water resources, including springs, seeps, ephemeral drainages, and, notably, the Mancos River. There are approximately 215 miles of intermittent streams, 10 acres of reservoir waters (wastewater lagoons), and 620 acres of wetlands at MVNP (NPS GIS 2022; USGS GIS 2022; USFWS GIS 2022). YHNM contains three springs that have created wetland conditions in the monument. These features are associated with watersheds and could be affected by runoff created where fuels treatments are conducted. In the case of suppressing unplanned ignitions when the NPS may need to use fire-retardant chemicals, runoff could also place such chemicals into water resources in the parks. After wildfire, there is also a risk of increased runoff due to the burning of ground cover. Runoff may carry suspended soil particles, dissolved inorganic nutrients, and other materials into adjacent water resources, impacting water quality.

Prescribed fire operations, especially those involving line construction on steep slopes, could have the same impact on water quality as those described under suppression operations. Further, the

Mancos River would be a proposed dipping location, or a location from which water is drawn for fire suppression efforts. In addition, all tributaries of the Mancos River are considered outstanding resource waters. The outstanding resource waters designation is automatic for national parks under the Clean Water Act; it prohibits impairment of these resources, which means such waters must continue to attain water quality standards. While water may not always flow in these tributaries, the protection remains, and the NPS continues to ensure that no impairment occurs to these tributaries. Usually during the fire season, the Mancos River is so low it is not viable to use as a dipping location. If water is taken out of the river it would stay within the watershed.

Additional minimization of potential risks to water quality and quantity would accrue from incorporating BMPs to prevent impacts on water resources in the parks (see the BMPs and mitigation measures listed in Appendix B). For suppression efforts, the NPS has developed a full suite of minimization measures to protect hydrological resources in the parks; these are compiled in the Resource Advisory guide. The NPS would rely on these measures when implementing suppression activities for unplanned ignitions.

Under the proposed FMP, using a combination of mechanical treatments and prescribed fire, the NPS would selectively treat areas prone to high-intensity fires under controlled conditions. The proactive nature of this alternative would reduce the likelihood of large, high-intensity fires that appear to have the greatest potential to cause damage to water resources. Further, the NPS would avoid treatments (manual, mechanical, and fire related) in areas where there is the potential for impacts on water resources.

In locations where the potential to impact water resources during proposed FMP treatment activities remains, the NPS would institute BMPs and other measures to prevent or mitigate the discharge of fine particulates and chemicals into waterways, including but not limited to, sediment traps, silt fences, and regular inspection of construction areas for erosion. Prescribed burn plans would ensure retention of protective ground cover and the soil's moisture-absorbing qualities. By protecting the ground cover, the potential for large amounts of sediments reaching watercourses would be greatly reduced, and the groundwater reserves would be recharged. With the implementation of mitigation measures such as these, the impacts on water resources would be reduced or eliminated. Therefore, water resources were dismissed from the detailed analysis.

WETLANDS

The NPS manages wetlands in accordance with Executive Order 11990, "Protection of Wetlands"; the Clean Water Act; the Rivers and Harbors Appropriation Act of 1899; and the procedures described in DO #77-1: Wetland Protection.

Approximately 3.5 acres of riverine wetlands would be affected by the proposed FMP treatment activities. This represents 6.6 percent of riverine wetlands in the park. The proposed FMP treatment activities would also affect approximately 0.04 acres of freshwater emergent wetlands and 0.02 acres of freshwater ponds (representing 0.1 and 0.2 percent of these wetland types parkwide, respectively).

As noted above, MVNP contains several drainages that could potentially be affected by FMP treatment activities, and YHNM contains three springs that could also be potentially affected by FMP activities. Such impacts would be like those described in the water resources section. Subsurface fed wetlands have been burned previously and have regenerated quickly, within a decade. As described above, the NPS would implement measures to prevent or mitigate the discharge of fine particulates and chemicals into waterways, including placement of sediment traps, silt fences, and regular inspection of construction areas for erosion. Therefore, the wetlands issue was dismissed from the detailed analysis.

PALEONTOLOGICAL RESOURCES

As noted in the soil resources section above, the parks are composed of four geologic formations: Mancos Shale, Point Lookout Sandstone, Menefee Formation, and Cliff House Sandstone. These formations are rich in fossils that were deposited approximately 90 to 75 million years ago (Harrison et al. 2017). Fossils typically found in the parks include mollusks, ammonites, bivalves, gastropods, chondrichthyans, skate teeth, fish bones and scales, and a toothed bird (NPS 2013). Fossiliferous building blocks have also been found at YHNM—the remains of past sea life became incorporated into the ancient pueblo structures of the monument (NPS 2013). In addition, two vertebrae from a plesiosaur (marine reptile) were discovered in a spoil pile associated with a Bureau of Reclamation ditch located next to YHNM. Because these fossils were found in a spoil pile, however, their original location is difficult to identify. Many fossils curated by the NPS were collected from YHNM.

Accordingly, the proposed project has the potential to affect paleontological resources where fuels reduction activities and fire suppression efforts risk disturbing fossil resources on or near the surface. During fuels treatment activities, fossils could be damaged or destroyed by trampling, burning, or vegetation removal. Effects from the proposed action also include the reduction in risk from a high-severity wildfire due to the lessened fuel load. Reduced fuels would make paleontological resources less vulnerable to damage or destruction by intense wildfires, associated fire suppression tactics, or the erosion that often follows high-intensity wildfires and can damage or displace fossil deposits.

To reduce or eliminate impacts on these resources, the NPS would implement BMPs to avoid or reduce impacts on paleontological resources. Such BMPs include surveying treatment areas for fossils prior to applying treatments and, where rare or unusual fossils are found, marking, and avoiding treatment in those areas. By implementing these BMPs, impacts on paleontological resources from the proposed project would be reduced or eliminated; therefore, paleontological resources were dismissed from the detailed analysis.

WILDLIFE (NOT INCLUDING SPECIAL STATUS SPECIES)

Management goals for wildlife include maintaining components and processes of naturally evolving park ecosystems, including the natural abundance, diversity, and ecological integrity of plants and animals (NPS 2006). The vegetation communities in the proposed project area consist largely of shrublands and to a lesser degree piñon-juniper woodlands, grasslands, and sagebrush communities. The proposed project could have an impact on the approximately 200 species of birds that have been documented at the parks, as well as several terrestrial wildlife, such as mule deer, coyote, bobcat, gray fox, mountain lion, black bear, elk, marmot, and porcupine. Fuels treatments could adversely impact birds and other wildlife by disturbing individuals and causing avoidance of areas during treatments. However, once the treatments are completed and thus the disturbance concluded, wildlife typically return and continue to use areas as they previously had.

More permanent impacts, such as limbing trees and removing downed limbs and trees to reduce fuel loads at certain sites in the parks, could result in a loss of breeding, nesting, and foraging habitat. However, as described in Section 2.2.2, these treatments would be isolated around roads and infrastructure, leaving most of the parks unaffected. Many of the species that use these areas are habitat generalists and would relocate if habitat suitability is impacted. Therefore, disturbance to wildlife would be immediate and temporary, and it would only impact individuals using areas where treatments were currently ongoing. Although some wildlife habitat could be permanently altered,

treatments would be concentrated in specific areas, leaving the majority of wildlife habitat unaffected. The specific treatment acreage and treatment type are discussed in Section 2.2.2.

Specific BMPs and mitigation measures for migratory birds and raptors are described in Appendix B. Additional mitigation measures for other resources would likely also reduce impacts on wildlife and habitat. For example, general BMPs to protect water resources from fire suppression and fuels reduction activities would benefit wildlife species that use wetland habitats. Specific BMPs for vegetation and soil resources would also protect wildlife habitat by reducing soil erosion and impacts on vegetation that could alter habitat suitability for some wildlife species. Because individuals would likely only be temporarily impacted and impacts on wildlife habitat would be minimal and reduced through BMPs for other resources, wildlife was dismissed from the detailed analysis.

FEDERALLY LISTED SPECIES

Mexican Spotted Owl (MSO)—Threatened

Listed in 1993 by the USFWS as a threatened species, the Mexican subspecies of the spotted owl is a resident of old-growth or mature forests that possess complex structural components, such as uneven-aged stands, high canopy closure, multistoried levels, and high tree density (NPS 2015). A protected activity center for MSOs, is located within MVNP, and the project area contains appropriate habitat for the species. Within MVNP, MSO habitat is in sandstone canyons and side canyons with Gambel oak thickets and stands of piñon-juniper woodland and Douglas fir.

A small breeding population was present in MVNP in the 1990s. In 2004 and 2005, surveys revealed that MSOs were present, but no breeding activity was observed. The NPS conducts yearly surveys, and the MSO has not been identified in MVNP for over a decade. Portions of MVNP are proposed as an MSO protected activity center (see Figure C-1, Mesa Verde National Park Mexican Spotted Owl Protected Activity Center).

Actions that open or remove mature or old-growth forests (such as logging, wildfire, and road or site construction that results in fragmentation of the forest) are detrimental to the local owl population. Human activities such as off-trail hiking and fuels treatments in or near nesting, roosting, or foraging sites may result in the owls abandoning the area; this may indirectly affect habitat parameters from trampling, vegetation removal, and increased fire risk.

The proposed project could result in impacts on nesting and breeding MSOs during fuels treatments (disturbance). Treatments could occur in foraging and/or nesting habitat, which could result in additional habitat loss. The USFWS has stated that MVNP could be part of an important recovery area for the species. The proposed alternatives would include suggested mitigation measures from the MSO Recovery Plan (USFWS 2012), including conducting surveys for MSOs prior to any treatment activities. See BMPs and mitigation measures listed in Appendix B for a list of measures aimed at protecting MSOs. If MSOs are present, the NPS would complete treatments outside of the breeding season (March 1 to August 30), and night work would not be authorized.

The NPS would implement BMPs and other measures, such as surveying and monitoring for MSOs, to ensure no effects on the species (see Appendix B). With implementation of mitigation measures and due to the lack of species presence, adverse impacts on MSOs would be avoided or minimized. Impacts could occur from a reduction in habitat, but these impacts would be minimal. Further, treatments in the parks would result in a long-term benefit to MSOs through the protection of habitat from increased wildfire risk. For these reasons, MSOs were dismissed from the detailed analysis. However, this dismissal does not extend to other special status species found in the project area.

Mesa Verde National Park

Fire Management Plan
Environmental Assessment

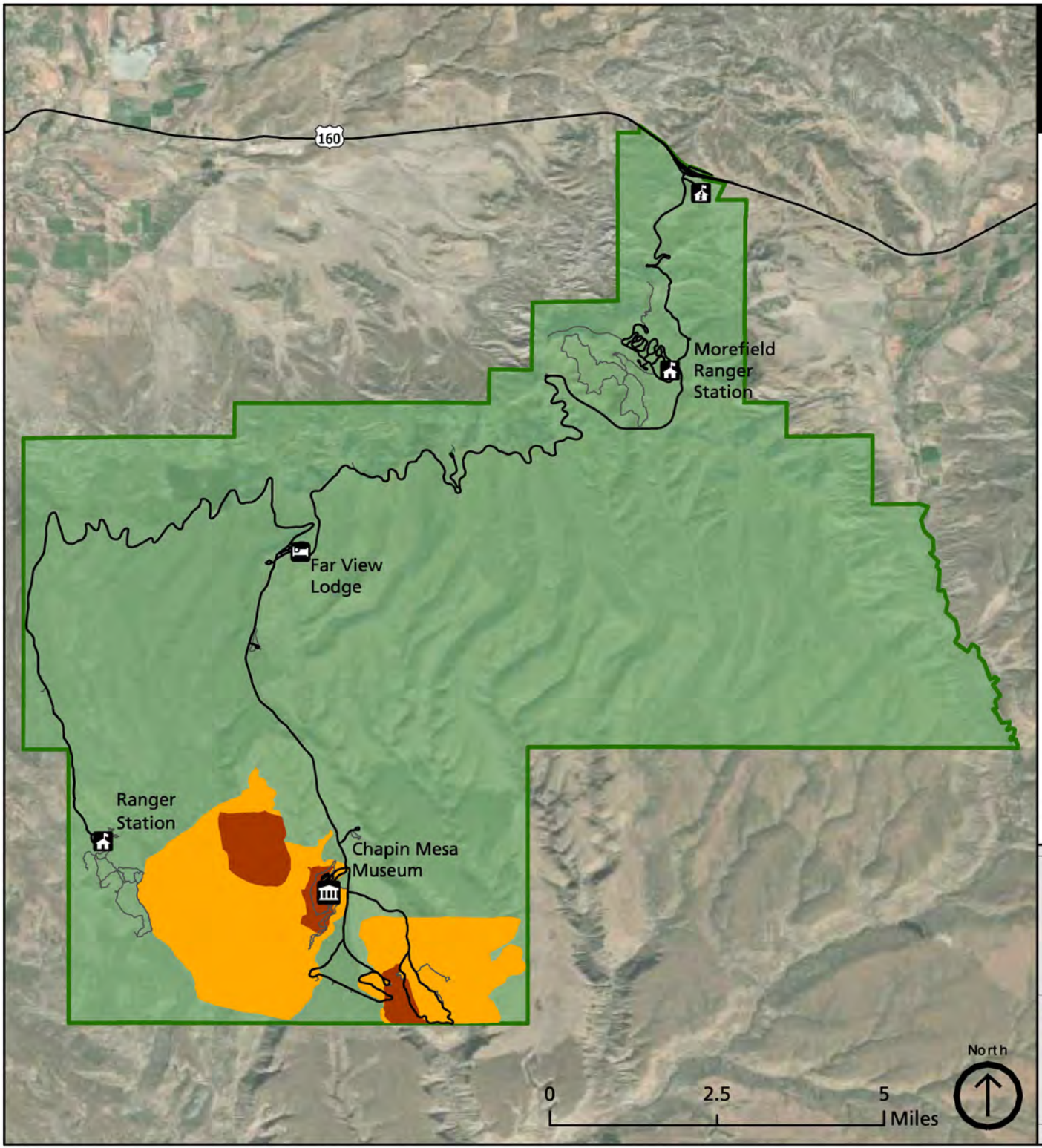

Figure C-1
Mesa Verde National Park Mexican Spotted Owl Protected Activity Center

Proposed Protected Activity Center

- Core Area
- Boundary
- Ranger station
- Visitor center
- Museum
- Hotel
- Road
- Trail
- Mesa Verde National Park administrative boundary

Source: NPS GIS 2022
April 13, 2023
MEVE_FMP_Rpts_Baseline.pdf
No warranty is made by the National Park Service as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

Other Federally Listed Species

In addition to the MSO, the IPaC list identified the following federally listed species:

- Southwestern willow flycatcher—Endangered
- Yellow-billed cuckoo—Threatened
- Colorado pikeminnow—Endangered
- Razorback sucker—Endangered
- Mesa Verde cactus—Threatened

While these species were identified on the IPaC list, neither park contains designated critical habitat nor suitable habitat for these species. Further, none of these species have been identified in the parks; also, the parks are not included in any of these species' current range. Accordingly, these species have been dismissed from further analysis.

SPECIAL STATUS SPECIES

The following special status species that have the potential to occur in the parks were dismissed from further analysis:

- Southern maidenhair fern (*Adiantum capillus-veneris*)—S2 (imperiled)
- Roundtail chub (*Gila robusta*)—SC (species of special concern)
- Giant helleborine (*Epipactis gigantea*)—S1 (critically imperiled)
- Dune spurge (*Chamaesyce platysperma*)—No rank
- Bigtooth maple (*Acer grandidentatum*)—S1 (critically imperiled)
- Cronquist's milkvetch (*Astragalus cronquistii*)—S2 (imperiled)

The roundtail chub is known to occur in the Mancos River on the eastern side of MVNP (Miller and Rees 2000). The BMPs designed to reduce impacts on water resources (described in Appendix B) would also protect aquatic species. Therefore, impacts on the roundtail chub would not be anticipated from FMP activities.

The remaining plant species listed above could be impacted from suppression activities permitted under either alternative if fires were to ignite in vegetation communities where these species occur. Impacts on these species would likely be unavoidable because fire suppression would be the highest priority. The NPS would address impacts on these species and their habitats after suppression activities were completed. Impacts from treatment and suppression activities would be minimized by implementing BMPs (see Appendix B). BMPs, such as pre-treatment surveys for rare plants and efforts to reduce the introduction of invasive plants species, would reduce impacts if these species are present in treatment areas. Impacts on the species from other FMP activities, such as fuels treatments and prescribed burns, would be unlikely. This is because, based on the best science available, these species have not been identified in areas currently proposed for fuels treatments in MVNP and are not documented as present in YHNM. Therefore, these species were dismissed from further analysis.

WILDERNESS

The Mesa Verde Wilderness designated by Congress in 1976 consists of 8,500 acres of wilderness in three units (two on the north escarpment or rim of the Mesa Verde cuesta and one on the east escarpment or rim). The Mesa Verde Wilderness is closed to public access. The absence of a human presence in this wilderness encourages natural rhythms and patterns to continue undisturbed and reduces the potential for human caused ignitions. Wilderness units A and B are located along the Park's north escarpment which drops to BLM lands on the Dolores Plateau. Both units are small in size (1,800 and 1,250 acres respectively) and are in close proximity to utility lines, paved access roads, and park boundaries with park roads along their southern edge. Wilderness unit C spans 5,450 acres in the far eastern portion of the Park. The eastern boundary roughly follows the base of the east escarpment west of the Mancos River and the Park boundary. BLM lands lie beyond the Mancos River including two Wilderness Study Areas – the Menefee Mountain WSA and the Weber Mountain WSA (NPS 2015.)

Chapter 6 of the 2006 NPS Management Policies addresses Wilderness Preservation and Management. All management decisions affecting wilderness must be consistent with the "minimum requirement" concept. This concept is a documented process used to determine if administrative actions, projects, or programs undertaken by the NPS or its agents and affecting wilderness character, resources, or the visitor experience are necessary, and if so how to minimize impacts. NPS Management Policy 6.3.9 Fire Management requires that all fire management activities conducted in wilderness areas conform to the basic purposes of wilderness and actions taken to suppress wildfires must use the minimum requirements concept.

A programmatic minimum requirements analysis (MRA) for wildfire management at MVNP was conducted in support of developing this fire management plan (NPS 2023 and See Appendix D). Wildfires have been suppressed since the park was established primarily to protect the archeological resources within the park and to protect essential park facilities and infrastructure, the life, health and safety of the public and park staff and prevent the spread of wildfire from the park onto adjacent lands. Natural unplanned ignitions have occurred and are likely to continue to occur in the wilderness based on historic wildfire ignition data and changing climate. Human-caused unplanned ignitions have rarely occurred in the park, and none have occurred in or near the Mesa Verde Wilderness. However, without continued active management of fires, the trend toward large fires could increase, endangering park resources.

The MRA outlines in detail the policies and authorities, alternative tools and methods, and the impacts on wilderness character for managing wildfire in the MVNP wilderness (NPS 2023). The minimum requirements determination includes managing wildfires in wilderness by using aerial and ground operations and also mechanical and non-mechanical tools. Suppression of fires would continue in the wilderness units and fuel reduction treatments would not occur. Air resources such as water drops by rotor-wing aircraft or water or retardant drops by fixed-wing aircraft could also be used allowing faster and more effective response (NPS 2023).

Suppression of fires in the wilderness degrades the wilderness character of "untrammeled." Trammeling is the intentional control of natural processes. Controlling the process and progress of fires, whether through the creation of handlines, or the maintenance of containment lines degrades the untrammeled quality of wilderness. Trammeling impacts would be caused by suppression techniques occurring during initial attack response such as fireline construction, relocation of fuels outside of the fireline, suppressing fire with the use of portable pumps and hose lays as well as aerial water drops, limbing trees, and cutting of vegetation. These would continue through the duration of the fire response. Rehabilitation actions would be taken after a fire has been suppressed to repair resource damage caused by the fire suppression activities. Affected control lines, staging areas, and

helispots would be rehabilitated as soon as possible following disturbance. Though resulting in positive effects on the natural quality, these actions involve manipulation of the natural environment and thus impact the untrammeled quality of wilderness character

The "undeveloped" character of the wilderness could also temporarily be degraded through some actions such as the landing of aircraft, the use of motorized equipment and post-fire rehabilitation. By using fast aerial response tools, the temporary impacts on undeveloped character of wilderness could be limited (NPS 2023). The delivery of equipment, supplies, firefighters, and ignition materials from air resources represents a "landing" in NPS policy that degrades the undeveloped quality of wilderness. Existing helispots and naturally clear areas conducive to safely landing rotor-wing aircraft would be used.

The use of motorized equipment such as chainsaws and rotary trimmers would also degrade this quality. The construction of fire control lines, trails created by firefighting personnel, staging areas, blivit or portable water tanks installations, installation of mulch and erosion control to support post-fire rehabilitation and creation of monitoring plots to assess post-fire rehabilitation would temporarily degrade the undeveloped quality. The removal of all temporary installations such as blivits and portable water tanks and rehabilitation of firelines, staging areas and trails to pre-fire conditions would largely restore the undeveloped quality.

The approved minimum requirements analysis for wildfire management in MVNP includes effective suppression methods that would minimize the degradation of wilderness character and also protect wilderness character. Fuels reduction treatments such as manual or mechanical removal, or prescribed fire would not occur in wilderness under either alternative. Therefore, the potential for impacts to wilderness character by suppression activities would be the same and is dismissed from further analysis and consideration.

PARK MESA RESEARCH NATURAL AREA

The Park Mesa Research Natural Area (RNA) was designated in MVNP in 1966, but the boundaries of this 1,500-acre area were never formally defined (USDA Forest Service, 1968). The entirety of Park Mesa has been managed as an RNA since its designation. The Park Mesa RNA was primarily established as a piñon-juniper ecosystem refence area for the purposes of scientific study and education, and for maintenance of biological diversity. The Park Mesa RNA includes one of the few minimally disturbed stands of old-growth piñon-juniper forest remaining in MVNP.

NPS Management Policy 4.3.1 provides a framework for management of RNA. Activities in research natural areas generally will be restricted to nonmanipulative research, education, and other activities that will not detract from an area's research values.

Wildfires in the old-growth piñon-juniper forest in MVNP are typically stand replacing. Much of this old-growth piñon-juniper forest has been replaced by previous wildfires with a weedy, early seral stage herbaceous vegetation community that likely would take centuries to return to an old-growth piñon-juniper forest. The unplanned ignitions (natural and human-caused) that occur on Park Mesa would be suppressed to protect the research value of the old-growth piñon-juniper forest and associated biological diversity of this vegetation community. The stands of old-growth piñon-juniper forest on Park Mesa that would be protected are also necessary as a reference area for this ecosystem type that has been converted by wildfire.

Park Mesa is a roadless mesa and suppression activities are expected to occur by air resources such as water drops by rotor-wing aircraft or water or retardant drops by fixed-wing aircraft. Fuels reduction activities are not planned or expected to occur in the Park Mesa RNA. Therefore, Park Mesa RNA is dismissed from further consideration.

VISITOR USE AND EXPERIENCE

There would be impacts on visitors in the parks during fuels reduction and fire suppression activities that would last for as long as fuels reduction treatments or suppression efforts were taking place, which is estimated from a few hours to weeks or even months at time, if a fire event and cleanup efforts are large enough in scale. This is due to closures of certain areas while treatments take place and due to the alteration of aesthetic resources because of fuels reduction activities. In other words, the loss of access to certain park resources, the presence of fire and vegetation reduction crews and the noise they create during treatments, and the swathes of removed or burned vegetation in the parks could affect visitors' use and experiences. In the event of a large wildfire, the parks would be closed to focus on response efforts and to reduce safety risks to visitors. Accordingly, impacts could range from reduced access to small areas for a few hours, to complete closures for hours, day, or even weeks at a time.

However, such impacts from fuels treatments are expected to last only about a week at a time. Also, they would be constrained to a few certain areas at a time such that visitors would still have access to other portions of the parks during treatments; thus, they would have access to other opportunities for recreation. In other words, effects on experience would be minor because enjoyment of the parks during treatments would not be precluded. Also, such treatments would occur at times of low visitation to the parks. Further, treatments would have an overall long-term benefit to visitor use and experience through the reduction of wildfire risk in the parks, which would contribute to protection of and access to park resources. Therefore, this topic has been dismissed from the detailed analysis.

HUMAN HEALTH AND SAFETY

During fuels reduction and wildfire suppression activities, the NPS would implement measures to protect visitors, park employees, and firefighting crews. For example, the NPS would restrict visitors and NPS employees from active work areas and burn unit areas to ensure their safety during fuels reduction activities. In the event of a large wildfire, the parks would be closed to visitors to reduce risks to health and safety. The NPS would follow requirements under smoke permits issued by the state of Colorado. Further, crews working on the prescribed burn units would comply with required safety procedures when conducting prescribed fire and fire suppression activities. Over the long term, the proposed fuels reduction activities and fire suppression strategies implemented under the FMP would reduce human health and safety risks associated with the ignition and spread of wildfires. For these reasons, human health and safety has been dismissed from the detailed analysis.

CULTURAL RESOURCES – TRADITIONAL CULTURAL PROPERTIES

There are traditional cultural resources and ethnographic resources present within both parks. These resources, as well as potential impacts, were identified during consultation with Native American Tribes. The NPS acknowledges that these TCPs have a role in tribes' oral and ceremonial tradition as well as tribes' existence and worldview

Furthermore, the NPS confirms that while implementing the FMP, it would use BMPs and avoidance and minimization measures to protect archeological sites and TCPs (see Appendix B). These measures would include conducting cultural resource surveys prior to applying prescribed burns, consulting tribes prior to treatments, and modifying treatments in areas where TCPs are present.

As the FMP is implemented, the NPS intends to continue to coordinate with tribes in accordance with Section 106 of the NHPA, Executive Order 13175, and President Biden's memorandum dated January 26, 2021, regarding strengthening tribal consultation. This would include providing prior notice to tribes ahead of consultation and potentially coordinating visits to the parks. Accordingly, TCPs have been considered but dismissed from the detailed analysis in the EA.

REFERENCES-APPENDIX C

Brandenburg, W. H., M. A. Farrington, and S. J. Gottlieb. 2004. Colorado Pikeminnow and Razorback Sucker Larval Fish Survey in the San Juan River during 2004. Division of Fishes, Museum of Southwestern Biology Department of Biology University of New Mexico Albuquerque, New Mexico.

CDPHE (Colorado Department of Public Health and Environment). 2019. State Implementation Plans (SIPs). Internet website: https://cdphe.colorado.gov/public-information/planning-and-outreach/state-implementation-plans-sips.

CNHP (Colorado Natural Heritage Program). 2022. CNHP Tracked Vascular Plants. Internet website: https://cnhp.colostate.edu/ourdata//trackinglist/custom-tracking/?group=11.

Cornell Lab of Ornithology. 2021. Yellow-billed Cuckoo. *All About Birds* online database. Internet website: https://www.allaboutbirds.org/guide/Yellow-billed_Cuckoo/.

Floyd, L. M., D. D. Hanna, and W. H. Romme. 2000. "Historical and recent fire regimes in Pinon-Juniper Woodlands on Mesa Verde, Colorado, USA." *Forest Ecology and Management* 198:269–289.

Floyd, L., W. Romme, and D. Hanna. 2021. "Effects of Recent Wildfires in Piñon-Juniper Woodlands of Mesa Verde National Park, Colorado, USA." *Natural Areas Journal* 41(1):28–38.

Floyd-Hanna, L., and W H. Romme. 1995. Fire History and Fire Effects in Mesa Verde National Park. Final Report MEVE-R91-0160. Rocky Mountain Region, National Park Service.

Halterman, M. D. 1991. Distribution and habitat use of the Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) on the Sacramento River, California, 1987–1990. M.S. Thesis, California State University, Chico, California.

Harrison et al. 2017. Mesa Verde National Park: Paleontological resource inventory (non-sensitive version). Natural Resource Report. NPS/MEVE/NRR—2017/1550. National Park Service. Fort Collins, Colorado.

Miller, W. J., and D. E. Rees. 2000. Ichthyofaunal surveys of tributaries of the San Juan River, New Mexico. Miller Ecological Consultants, Inc., Fort Collins, CO.

NPS (National Park Service).2015. Wilderness Building Blocks 1 &2, Wilderness Basics & Character Assessment . Mesa Verde Wilderness, Mesa Verde National Park, Prepared by Joelle Marier, for the National Park Service.

_____. 2018. Conservation Plan for Chapin Mesa Milkvetch (*Astragalus schmolliae)* at Mesa Verde National Park. Division of Research and Resource Management. Mesa Verde National Park, Colorado. National Park Service.

_____. 2023. Programmatic Minimum Requirements Analysis for Management of Wildfires at Mesa Verde National Park. Division of Research and Resource Management. Mesa Verde National Park, Colorado. National Park Service.

Peterson, D. L., S. S. Sackett, L. J. Robinson, and S. M. Haase. 1994. "The Effects of Repeated Prescribed Burning on *Pinus ponderosa* Growth." *International Journal of Wildland Fire* 4(4):239–247.

Thomas, K. A., M. L. McTeague, L. Ogden, M. L. Floyd, K. Schulz, B. A. Friesen, T. Fancheret, and A. Cully. 2009. Vegetation Classification and Distribution Mapping Report: Mesa Verde National Park. Natural Resource Report NPS/SCPN/NRR—2009/112. National Park Service, Fort Collins, Colorado.

USFWS (U.S. Fish and Wildlife Service). 2011. Mancos Milkvetch (*Astragalus humillimus*) 5-year Review Summary and Evaluation. New Mexico Ecological Services Office, Albuquerque, New Mexico.

_____. 2012. Mexican spotted owl recovery plan, first revision (*Strix occidentalis lucida*). Albuquerque, New Mexico.

_____. 2018 Species Status Assessment Report for the Razorback Sucker (*Xyrauchen texanus*). U.S. Fish and Wildlife Service, Mountain Prairie Region 6, Denver, Colorado.

_____. 2020. Species Status Assessment Report for the Colorado Pikeminnow (*Ptychocheilus lucius*). U.S. Fish and Wildlife Service Department of the Interior Upper Colorado Basin Region 7, Denver, Colorado.

_____. 2021. Species Status Assessment Report for the Chapin Mesa Milkvetch (*Astragalus schmolliae*). Lakewood, Colorado.

USFWS GIS (U.S. Fish and Wildlife Service Geographic Information Systems). 2022. National Wetlands Inventory (NWI). URL: https://www.fws.gov/wetlands/data/Mapper.html.

USGS GIS (U.S. Geological Survey Geographic Information Systems). 2022. National Hydrography Dataset (NHD). Internet website: https://apps.nationalmap.gov/downloader/#/.

USNPS (U.S. Department of the Interior, National Park Service) GIS. 2022. Mesa Verde National Park hydrologic features. Unpublished data provided by Mesa Verde National Park.

Appendix D

Programmatic Minimum Requirements Analysis for Management of Wildfires at Mesa Verde National Park

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APPENDIX D: PROGRAMMATIC MINIMUM REQUIREMENTS ANALYSIS

DETERMINATION IF ADMINISTRATIVE ACTION IS NECESSARY

Description of Situation – What is the situation that may prompt administrative action?

The United States (U.S.) Department of the Interior, National Park Service (NPS) is proposing to develop and implement a fire management plan (FMP) for Mesa Verde National Park (MVNP) and Yucca House National Monument (YHNM) per agency policy that requires each unit of the National Park System with burnable vegetation to have such a plan. Congress designated 8,500 acres within Mesa Verde National Park as the Mesa Verde Wilderness in 1976. No wilderness is designated at YHNM and the management of wildfires that may occur at the monument will not be analyzed.

Mesa Verde National Park was established in 1906 to preserve and protect the material culture and associated archeological landscapes of the Ancestral Pueblo people that occupied the Mesa Verde cuesta from approximately 550 CE to 1300 CE. Subsequent legislation extended protection to the natural resources present in the park.

Wildfires have been suppressed since the park was established primarily to protect the archeological resources within the park and to protect essential park facilities and infrastructure and the life, health and safety of the public and park staff, and prevent the spread of wildfire from the park onto adjacent lands.

To date, over 4,700 archeological sites have been identified in MVNP. The identified archeological sites within the Mesa Verde Wilderness (and others not yet identified and described since cultural resource surveys are incomplete for the wilderness) are at risk of direct damage from fire during wildfires and indirect damage such as post-fire erosion. The vegetation communities in the wilderness are adapted to long fire return intervals but persistent drought and a changing climate are increasing wildfire frequency and severity elevating the risk of more direct and indirect damage and potential destruction of cultural resources within the wilderness.

In addition to the increased risks of wildfire damage to cultural resources the risk of a wildfire igniting in and spreading from the wilderness to essential park facilities and infrastructure and threatening the life, health and safety of the public and park staff, and adjacent non-NPS properties is increasing with persistent drought and a changing climate.

Options Outside of Wilderness – Can action be taken outside of wilderness that adequately addresses the situation?

Where natural unplanned ignitions occur cannot be accurately predicted and these ignitions have occurred and are likely to continue to occur in the Mesa Verde Wilderness based on historic wildfire ignition data and changing climate. Human-caused unplanned ignitions have rarely occurred in the park, and none have occurred in or near the Mesa Verde Wilderness likely because the wilderness has not been open for public access since it was designated. Suppression of wildfires outside the park or outside the designated wilderness would prevent a wildfire from spreading into wilderness but would not adequately address the situation if an ignition occurs in wilderness.

Criteria for Determining Necessity – Is action necessary to meet any of the criteria below?

1. Valid Existing Rights or Special Provisions of Wilderness Legislation

   No existing rights or special provision are applicable.

2. Requirements of Other Legislation

   No requirements of other legislation.

3. **Wilderness Character** – untrammeled, undeveloped, natural, opportunities for solitude or primitive and unconfined recreation, or other features of value.

No action is necessary to satisfy valid existing rights or special provisions of wilderness legislation or requirements of other legislation. Action is not necessary to protect the untrammeled, undeveloped, and natural quality of wilderness, or opportunities for solitude or primitive and unconfined recreation.

Action is necessary to protect other features of value within the Mesa Verde Wilderness, specifically the cultural resources for which the park was created. The park was established in 1906 to preserve and protect the material culture of the early people who occupied the Mesa Verde cuesta. The ancient architecture, artifacts, and landscapes that the NPS is mandated to preserve are primarily associated with Ancestral Pueblo people who occupied Mesa Verde and the wider region from 550 CE to 1300 CE.

Congress established MVNP to "provide specifically for the preservation from injury or spoliation of the ruins and other works and relics of prehistoric or primitive man within said park." These same resources were the basis for listing the park on the National Register of Historic Places (NRHP) in 1966. In 1978, the value of the park's archeological resources was further recognized internationally when the park was selected as one of the seven original World Heritage Sites recognized by the United Nations Educational, Scientific and Cultural Organization (UNESCO).

The record of these pre-European settlement activities is preserved in structures, features, landscapes, and sites which are vulnerable to impacts from moderate to high intensity fire, and many have experienced deterioration from previous wildfires. In the absence of fire management activities, including suppression of wildfires, wildfire would have a much greater chance to reach, and damage known cultural resource sites and those yet to be identified due to incomplete archeological surveys. Some of this damage would be permanent and a direct effect of fire and an indirect effect such as post-fire erosion. Active suppression of wildfires within wilderness would reduce the likelihood of future large, moderate to high intensity wildfires that could threaten these cultural resources.

Determination of the Minimum Activity – Determine the Minimum Activity.

Other Direction – *Is there "special provisions" language in legislation (or other Congressional direction) that explicitly **allows** consideration of a use otherwise prohibited by Section 4(c)? **AND/OR** has the issue been addressed in agency policy, management plans, species recovery plans, or agreements with other agencies or partners?*

Yes. other direction includes:

- The Wilderness Act of 1964, **Section 4D (1) – Special Provisions –** "…In addition, such measures may be taken as may be necessary in the control of fire, insects, and diseases, subject to such conditions as the Secretary deems desirable."
- NPS Management Policies (2006), **4.5 - Fire Management –** "All wildland fires will be effectively managed through application of the appropriate strategic and tactical management options as guided by the park's fire management plan. These options will be selected after comprehensive consideration of the resource values to be protected, firefighter and public safety, costs, availability of firefighting resources, weather, and fuel conditions. Naturally ignited and human-ignited fires managed to achieve resource management and fuel treatment objectives, and the smoke they produce, will both be managed to comply with applicable local, state, and federal air quality regulations. Such fires will also include monitoring programs that record fire behavior, smoke behavior, fire decisions, and fire effects to provide information on whether specific objectives are met and to improve future fire management strategies. All parks will use a systematic decision-making process identified in their fire management plans or other documents to determine the most appropriate management strategies for all unplanned ignitions and for any naturally or management-ignited fires that are no longer meeting resource management objectives."
- Guidance for Implementation of Federal Wildland Fire Management Policy (February 3, 2009), **Federal Wildland Fire Management Policy**
    - **Policy Statement 1:** Firefighter and public safety is the first priority. All Fire Management Plans and activities must reflect this commitment.
    - **Policy Statement 2:** The full range of fire management activities will be used to help achieve ecosystem sustainability, including its interrelated ecological, economic, and social components.
    - **Policy Statement 5:** Rehabilitation and restoration efforts will be undertaken to protect and sustain ecosystems, public health and safety, and to help communities protect infrastructure.
    - **Policy Statement 11:** Wildland fires are suppressed at minimum cost, considering firefighter and public safety, benefits, and values to be protected, consistent with resource objectives.

Time Constraints – What, if any, are the time constraints that may affect the action?

The proposed full suppression objectives for management of wildfires in the park allows for rapid assessment and initial attack of unplanned fire events and to reduce the chance that these fires cause unwanted high severity impacts, potential park closures, potential loss or damage to cultural resources and park facilities and infrastructure, and fire spread outside the park boundary.

Components of the Action – What are the discrete components or phases of the action?

The components of the action include:

- Travel to and from the fire
- Tools used to suppress fire
- Condition of area after fire

ALTERNATIVES

Alternative 1. Managing wildfires utilizing only ground operations with non-mechanical tools in wilderness.

Response to all wildfires (natural or human caused) would be by vehicle on accessible roads. Travel from the road corridor to the fire's edge would be by hiking. Firefighters would hike into the fire area with line gear and hand tools. Fire size-up would occur after the firefighters arrive on-scene and be transmitted to dispatch via handheld radios.

Containment lines would be constructed with hand tools and hand saws (including limbing, bucking of large logs, and mitigation of hazard tree conditions near holding lines). Water support on handlines will be with bladder bags carried by firefighters. Engines will travel on accessible roads outside the wilderness to support temporary water tanks that are located adjacent to accessible roads. Suppression of spot fires outside of established fire lines, will be done with fire crews and hand tools. Firing adjacent to containment lines and accessible roads if necessary to contain a fire would be done by firefighters with drip torches and fusees. Mop up of hot areas near containment lines will be done with hand tools and bladder bags. Patrolling of fire lines away from accessible roads will be done on foot. Mapping of the fire perimeter will be done on foot using electronic Global Navigation Satellite Systems (GNSS) mapping devices.

Protection of sensitive resources, including cultural sites, would include reducing fuels using hand tools to construct holding lines and hand saws to remove adjacent large fuels.

Initial attack could be expected to succeed on the majority of fires. Most extended attack fires would be suppressed at less than 200 acres. During extreme fire danger conditions larger acreages could be affected and high intensity fire runs would be likely. Expected fireline production would be 1-2 chains/hour for a crew of five (5) in shrubland and woodland fuels, 3 chains/hour in forest fuels and 6 chains/hour in grassy fuels.

Discussions about fireline tactics that include line construction, mop-up, and patrolling on fires not extinguished upon initial attack will occur during evening planning meetings. Those tactics will include only the tools described in this programmatic MRA.

Rehabilitation of fire-affected area would begin as soon as possible following the incident. Condition of the area after the fire as to fuel loads and around sensitive cultural sites may be in a more fire-resilient condition in low, moderate, and small high severity areas and cultural resources may be less likely to be damaged by large, high-severity wildfires. Vegetation, soils, and cultural resources would likely be negatively impacted in high severity areas.

Mitigations:

- Fire Archaeologists and Resource Advisors (READS) would be on site or involved in the planning process to monitor operations and minimize, to the extent possible, direct damage to cultural and natural resources.
- Locate control lines and other soil-disturbing fire management activities to minimize damage to resources
- Protect aquatic habitat, riparian and wetland areas, meadows, and other sensitive resource areas by defining and avoiding these areas.
- Rehabilitate affected sites (e.g., control lines and staging areas) as soon as possible following disturbance. Develop suppression repair plan and Burned Area Emergency Response (BAER) and Burned Area Rehabilitation (BAR) plans as appropriate.
- Inspect staging areas, incident command posts/base camps, etc., periodically to minimize exotic species introduction. Clean fire vehicles, equipment, and clothing, prior to returning from an out-of-park incidents in compliance with park policy.
- Park all vehicles and place staging areas outside of the wilderness boundary.
- Use Minimum Impact Suppression Tactics (MIST) to minimize disturbances to soil, vegetation, and wilderness character
- Procure certified weed-seed-free mulching materials and native plant seed for use in fire rehabilitation
- Upload strategic objectives and fire management options related to wildland fire management in wilderness into Wildland Fire Decision Support System (WFDSS).

Wilderness Impacts of Components of the Action in Alternative 1

Untrammeled: Trammeling is the intentional control of natural processes. Controlling the process and progress of fires, whether through creation of handlines or application of water degrades the untrammeled quality of wilderness.

Undeveloped: The construction of fire control lines, trails created by firefighting personnel, staging areas, installation of mulch and erosion control to support post-fire rehabilitation and creation of monitoring plots to assess post-fire rehabilitation would temporarily degrade the undeveloped quality. The rehabilitation of firelines, staging areas, and trails to pre-fire conditions would restore this quality.

Natural: The natural quality of wilderness would be negatively affected if initial attack and extended attack suppression tactics and techniques fail, and high intensity fire runs occur. Much of the woodland and forest vegetation communities in the wilderness are adapted to long fire return intervals based on research conducted in the park and high intensity fire would result in stand replacement of these communities. Re-establishment of these vegetation communities may take centuries or may not occur due to increased potential for invasion by weedy plant species and changing climate. High severity wildfire would also negatively affect soils, water flow, and erosional processes. Post-fire revegetation and erosion controls would improve this quality.

Solitude or Primitive and Unconfined Recreation: Park visitors would not experience an effect to solitude or primitive and unconfined recreation since the Mesa Verde Wilderness is not open to public access.

Other Features of Value: Cultural resources would be protected from wildfire though manual fuel reduction. Fuel reduction by fire consumption would also occur although limited in area and could

ultimately enhance the protection of fire sensitive cultural sites from future fires. Participation by Fire Archeologists and READs would increase protection of sensitive cultural resources.

Alternative 2. Managing wildfires utilizing aerial and ground operations with the use of mechanical and non-mechanical tools in wilderness.

Response to all wildfires (natural or human caused) will be by vehicle on administratively open roads or by aircraft. Travel from the road corridor to the fire, helispot, or short-haul site will be by hiking.

Firefighters would hike into the fire area with line gear, hand tools and chainsaws. Fire size-up would occur with aerial reconnaissance enroute to the fire, or on the ground after the firefighters arrive on-scene. Fire size-up would be transmitted to dispatch via handheld radios.

Firing adjacent to containment lines and accessible roads if necessary to contain a fire would be done by firefighters with drip torches and fusees.

Containment lines would be constructed with hand tools and chainsaws (including limbing, bucking of large logs, and mitigation of hazard tree conditions near holding lines). Water support on handlines would be with bladder bags carried by firefighters, and hose lays and portable pumps. Engines would travel and remain on existing, accessible roads to support temporary water tanks that are also located adjacent to accessible roads. Aerial suppression support would occur using fixed-wing and rotor-wing aircraft utilizing water and retardant drops. Suppression of spot fires outside of established fire lines would be done with aerial water or retardant support, hoselays, and fire crews using hand tools and chainsaws. Mop up of hot areas near containment lines would be done with hand tools, hoselays, and bladder bags. Patrolling of firelines beyond existing, accessible roads would be done by foot or by air. Mapping of the fire perimeter would be done on foot, by Unmanned Aerial System (UAS), or by rotor-wing aircraft using electronic GNSS mapping devices. Delivery of supplies, like blivits and drinking water, to areas away from accessible roads would be done with long-line operations from rotor-wing aircraft.

Protection of sensitive cultural sites would include reducing fuels using hand tools to construct holding lines and chainsaws to remove adjacent large fuels. Temporary wrapping of cultural sites with fire resistant materials would occur as needed.

Initial attack could be expected to succeed on most fires because of a high response speed by flying firefighters close to the fire area. Most extended attack fires would be suppressed at less than 0.25 acres since aviation assets could be used to support ground firefighters with water and retardant drops. During extreme fire danger conditions hundreds of acres could be affected and opportunities for reducing high-intensity fire runs would be moderate, as aviation assets could be used for water and retardant drops in places where fire behavior makes it unsafe for fire crews to engage in ground suppression efforts. Expected fireline production would be 3-4 chains/hour for a crew of five (5) in shrubland and woodland fuels, 5 chains/hour in forest fuels and 12 chains/hour in grassy fuels., as chainsaws and rotary trimmers would allow for faster bucking of logs, faster felling of hazard trees and faster cutting of brushy and grassy fuels.

Discussions about fireline tactics that include line construction, firing, mop-up, and patrolling on long-term fires will occur during daily planning meetings. Those tactics will include only the tools described in this programmatic MRA.

Rehabilitation of fire-affected area would begin as soon as possible following the incident. Condition of the area after the fire as to fuel loads and around sensitive cultural sites may be in a more fire-resilient condition in low, moderate, and small high severity areas and cultural resources may be less

likely to be damaged by large, high-severity wildfires. Vegetation, soils, and cultural resources would likely be negatively impacted in high severity areas.

Mitigations:

- Fire Archaeologists and READs would be on-site or involved in the planning process to oversee operations and, to the extent possible, minimize direct damage to cultural and natural resources.
- Locate control lines, helispots, fire camps, and other soil-disturbing fire management activities to minimize damage to resources
- Protect aquatic habitat, riparian and wetland areas, meadows, and other sensitive resource areas by defining and avoiding these areas, especially with fire retardant application. Water drops are preferred over fire retardant under all circumstances except for protection of life and safety. Avoidance zones will be identified in fire planning documents and maps and may be flagged on the ground if deemed necessary by resource advisors or management staff.
- Rehabilitate affected sites (e.g., control lines, staging areas, and helispots) as soon as possible following disturbance. Develop suppression repair plan, and BAER and BAR plans as appropriate.
- Inspect helispots, staging areas, incident command posts/base camps, etc., periodically to minimize exotic species introduction. Clean fire vehicles, equipment, and clothing, prior to returning from an out-of-park incidents in compliance with park policy
- Use MIST tactics to minimize disturbances to soil, vegetation, and wilderness character
- Park all vehicles and place staging areas outside of the wilderness boundary.
- Procure certified weed-seed-free mulching materials and native plant seed for use in fire rehabilitation
- Upload strategic objectives and fire management options related to wildland fire management in wilderness into WFDSS.

Wilderness Impacts of Components of the Action in Alternative 2

Untrammeled: Trammeling is the intentional control of natural processes. Controlling the process and progress of fires, whether through the creation of handlines, or the maintenance of containment lines degrades the untrammeled quality of wilderness.

Undeveloped: The delivery of equipment, supplies, firefighters, and ignition materials from air resources represents a "landing" in NPS policy that degrades the undeveloped quality of wilderness. Existing helispots and naturally clear areas conducive to safely landing rotor-wing aircraft would be used. The use of motorized equipment such as chainsaws and rotary trimmers would also degrade this quality. The construction of fire control lines, trails created by firefighting personnel, staging areas, blivit or portable water tanks installations, installation of mulch and erosion control to support post-fire rehabilitation and creation of monitoring plots to assess post-fire rehabilitation would temporarily degrade the undeveloped quality. The removal of all temporary installations such as blivits and portable water tanks and rehabilitation of firelines, staging areas and trails to pre-fire conditions would restore this quality.

Natural: The rapid initial attack response with the use of fixed-wing and rotor-wing aircraft is expected to increase suppression success and limit high intensity fire runs preserving the existing ecological processes in the wilderness. Conversion of existing woodland and forest vegetation communities adapted to long fire return intervals to early seral stages and susceptible to invasion by weedy plant species is not expected to occur. The use of aircraft and motorized tools would

introduce sounds that would temporarily degrade the natural quality during the suppression activities. In the event suppression tactics fail and a high intensity wildfire does occur it would negatively affect vegetation, soils, water flow, and erosional processes degrading the natural quality of the wilderness. Post-fire revegetation and erosion controls would improve this quality.

Solitude or Primitive and Unconfined Recreation: Park visitors would not experience an effect to solitude or primitive and unconfined recreation since the Mesa Verde Wilderness is not open to public access.

Other Features of Value: Cultural resources, including sites that may not have yet been identified through survey, would be more protected during wildfire through rapid initial attack using air resources, manual fuel reduction and the temporary wrapping sites as needed. The limited, reduced fuel loading around these sites could ultimately enhance the protection of fire sensitive sites from future fires. Participation by Fire Archeologists and READs would increase protection of sensitive cultural resources.

Alternatives Not Considered

A no-action alternative was not analyzed. Without active management of fires, the trend toward large fires and park closures could increase, endangering park resources.

Alternative Comparison

- Alternative 1 and 2 similarly degrade the untrammeled character of wilderness.
- Alternative 2 use of additional temporary installations such as portable water tanks, rotor-wing aircraft landing areas, and the use of mechanical tools such as motorized equipment and aircraft degrades the undeveloped character of wilderness more than Alternative 1.
- Alternative 2 expected rapid initial attack response time using aircraft and use of aircraft to control fire spread and to limit high intensity fire runs protects the existing natural character of wilderness more than Alternative 1.
- Alternative 1 and 2 do not affect visitor opportunities for solitude or primitive and unconfined recreation since the Mesa Verde Wilderness is not open to the public.
- Alternative 2 expected rapid initial attack response time using aircraft and use of aircraft to control fire spread and to limit high intensity fire runs protects cultural resources which have been formally identified as other features of value of the Mesa Verde Wilderness more than Alternative 1.

Selected Alternative

Alternative 2. Managing wildfires utilizing aerial and ground operations with the use of mechanical and non-mechanical tools in wilderness.

This alternative would allow fire managers to be faster and more effective as they manage wildfires in the Mesa Verde Wilderness to protect the life, health and safety of the public and employees and park resources. Initial attack success of unplanned fires would be highest because of a high response speed with flying firefighters close to the fire area. Most extended attack fires would be suppressed at less than 0.25 acres since aviation assets could be used to support ground firefighters with water and

retardant drops. Success of suppressing fires that exhibit moderate to high intensity fire behavior would be highest, as aviation assets could be used for supporting ground firefighters with water and retardant drops. Using aerial resources reduces firefighter exposure to all wildland fire hazards like snags and the fire itself. This alternative also allows managers to safely contain unplanned fires at a faster pace, and often at a lower cost.

MONITORING AND REPORTING REQUIREMENTS

At the end of each year, the Fire Management Program will provide a report to the Wilderness Coordinator which includes a list of aircraft and UAS flights, including the type and model of aircraft, and the dates, number and total flight hours logged for wildland fire management operations

APPROVED PROHIBITED USES

Motorized Equipment: Use of chainsaws, rotary trimmers and portable pumps necessary to suppress an unplanned ignition for the duration of the incident.

Landing of Aircraft: Use of rotor-wing aircraft for transport of firefighters, delivery of supplies, and water drops. Use of UAS for reconnaissance and mapping. Use of fixed-wing aircraft for reconnaissance, and water and retardant drops. Use of aircraft would be what is determined necessary to suppress an unplanned ignition for the duration of the incident.

Installations: Use of existing helispots and natural clearings for rotor-wing aircraft landing as determined by aviation operations and firefighting personnel for the duration of the incident, temporary installations of blivits and portable water tanks for use during incidents, installation of biodegradable mulch and erosion control devices, and monitoring plots for post-fire rehabilitation and restoration activities.

Prepared

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