



Forest Service  
U.S. DEPARTMENT OF AGRICULTURE

Intermountain Region/Ashley National Forest

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# Final Environmental Impact Statement for Revision of the Ashley National Forest Land Management Plan

Pre-Objection Version Volume I - EIS



**Cover images clockwise from top:** Above the Lake Fork Drainage looking east toward Tungsten Pass, Mount Lovenia in foreground; participants at the Ute Indian Tribe Powwow in Fort Duchesne; Flaming Gorge National Recreation Area; Ute Mountain Fire Lookout. Photos credit: USDA Forest Service.

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<b>Acronym or Abbreviation</b>	<b>Full Term</b>
ATV.....	all-terrain vehicle
BLM.....	U.S. Department of the Interior, Bureau of Land Management
CCF.....	hundred cubic feet
CE.....	Categorical Exclusion
CEQ.....	Council on Environmental Quality
CFR.....	Code of Federal Regulations
DEIS.....	draft environmental impact statement
EIS.....	environmental impact statement
EO.....	executive order
EPA.....	Environmental Protection Agency
ESA.....	Endangered Species Act
FGNRA.....	Flaming Gorge National Recreation Area
FLPMA.....	Federal Land Policy and Management Act
Forest Service.....	United States Department of Agriculture Forest Service
GIS.....	geographic information systems
HVRA.....	high-value resource area
IAP.....	Intermountain Adaption Partnership
IPaC.....	USFWS Information for Planning and Conservation
IRA.....	inventoried roadless area
mcf.....	thousand cubic feet
MBF.....	thousand board feet
NAAQS.....	National Ambient Air Quality Standards
NEPA.....	National Environmental Policy Act
NHD.....	National hydrology dataset
NHPA.....	National Historic Preservation Act
NRA.....	National Recreation Area
NRCS.....	Natural Resources Conservation Service
NRGA.....	National Recreation and Geologic Area
NRHP.....	National Register of Historic Places
NWI.....	National Wetlands Inventory
NWSRS.....	National Wild and Scenic Rivers System
OHV.....	off-highway vehicle
ORV.....	outstandingly remarkable value
PM.....	particulate matter
PM <sub>10</sub> .....	particulate matter less than 10 micrometers in diameter
PM <sub>2.5</sub> .....	particulate matter less than 2.5 micrometers in diameter

RNA..... research natural area  
ROS..... recreation opportunity spectrum  
ROW ..... right-of-way  
SCC..... species of conservation concern  
SIO..... scenic integrity objectives  
SMS ..... Scenery Management System  
  
Tg..... teragram  
  
UDWR ..... Utah Division of Wildlife Resources  
USC..... United States Code  
USDA..... United States Department of Agriculture  
USFWS ..... United States Fish and Wildlife Service  
  
VCC ..... vegetation condition class  
VCMQ ..... vegetation classification, mapping, and quantitative inventory  
VMS..... Visual Management System  
VQO..... visual quality objective  
  
WCF..... watershed condition framework

# Summary

## Introduction

The National Forest Management Act of 1976 (Public Law 94-588) requires the preparation of an integrated land management plan by an interdisciplinary team for each unit of the National Forest System. The 2012 Planning Rule<sup>1</sup> (36 Code of Federal Regulations [CFR] 219.17(3)(b)(1)) guides the revision of land management plans to promote ecological, social, and economic sustainability of National Forest System lands and communities.

The Forest Service has prepared this final environmental impact statement (final EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This final EIS discloses the broad potential effects of a proposed revision of the Ashley National Forest Land and Resource Management Plan (Forest Service 1986). This document describes, in general terms, the expected effects of management during the plan period; it does not predict the site-specific effects of future speculative actions each time the standards and guidelines are implemented at the project level. Those site-specific effects would be disclosed in subsequent NEPA reviews during the implementation of individual projects.

Additional documentation, including more detailed analyses of planning area resources, may be found in the planning record.

## Proposed Action

The Forest Service proposes to revise the Ashley National Forest Land and Resource Management Plan (Forest Service 1986), referred to as the “forest plan,” to meet the legal requirements of the National Forest Management Act and the provisions of the 2012 Planning Rule. The proposed action is to create one unified forest plan for the Ashley National Forest; address gaps in current plan direction and changes in ecological, social, and economic conditions; and comply with the 2012 Planning Rule and other new laws, policy, regulation, and Forest Service direction adopted since 1986. The revised forest plan will describe the strategic intent of managing the Ashley National Forest for the next 10 to 15 years and will address the identified need to change the existing forest plan. The area affected by the proposal includes approximately 1.4 million acres of public land in northeastern Utah and southwestern Wyoming.

## Purpose and Need

The purpose and need for revising the forest plan are to (1) meet the legal requirements of the National Forest Management Act and the 2012 Planning Rule; (2) address the changed economic, social, and ecological conditions in the plan area that have occurred since the current forest plan was approved in 1986, as well as new focus topics described below; and (3) guide natural resource management activities on the Ashley National Forest for the next 10 to 15 years. The Forest Service developed the Ashley National Forest’s needs for change from findings of the assessment, public comments, and a series of collaborative public workshops. The following five focus topics have been identified in the preliminary need to change the existing plan: (1) sustainable recreation, (2) economic resiliency, (3) managing for

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<sup>1</sup> The National Forest Management Act of 1976 requires every national forest or grassland managed by the Forest Service to develop and maintain an effective land management plan (also known as a forest plan). The process for the development and revision of plans, along with the required content of plans, is outlined in planning regulations, often referred to as the planning rule.

traditional uses and multiple uses, (4) to improve tribal relationships and partnerships and manage cultural resources and areas of tribal importance, and (5) managing for resilient ecosystems and watersheds.

## Engagement of State and Local Governments, Other Federal Agencies, and Indian Tribes

NEPA requires the Forest Service to coordinate planning with other Federal agencies that have jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (see 40 CFR 1501.8). In addition, a State, tribal, or local agency with similar qualifications may become a cooperating agency by agreement with the lead agency. The Ashley National Forest is engaging with the following agencies for this EIS (those formally identified as cooperating agencies for plan revision with memorandums of understanding are indicated with an asterisk) :

- U.S. Fish and Wildlife Service
- U.S. Department of the Interior, Bureau of Reclamation
- U.S. Environmental Protection Agency
- Utah State Historic Preservation Office
- Wyoming State Historic Preservation Office
- Daggett County, Utah\*
- Duchesne County, Utah\*
- Summit County, Utah\*
- Utah County, Utah\*
- Uintah County, Utah\*
- State of Utah, Public Lands Policy Coordinating Office\*
- Daggett Conservation District, Utah\*
- Uintah Conservation District, Utah\*
- State of Wyoming, Governor's Policy Office\*
- Sweetwater County, Wyoming\*
- Sweetwater Conservation District, Wyoming\*
- Uinta Conservation District, Wyoming\*
- Uinta County, Wyoming\*
- Ute Indian Tribe\*

The Forest Service collaborated with cooperating agencies throughout the planning process to consider ways the forest plan could contribute to common objectives, address impacts, resolve or reduce conflicts, and contribute to compatibility between the Forest Service and other agencies' plans.

## Public Engagement

The Forest Service publicly launched the forest plan revision process in 2016. A *Federal Register* notice of initiation to start the assessment phase of the process was published on July 22, 2016 (*Federal Register*

Vol. 81 No. 141, p. 47749). The Forest Service hosted open houses and public meetings during July and August 2016 in Utah and Wyoming to invite comments on the proposed list of species of conservation concern, the process for identifying and evaluating lands that may be suitable for inclusion in the National Wilderness Preservation System, the process for identifying and evaluating potential additions to the National Wild and Scenic Rivers System and information and issues important to the assessment. The Forest Service held more open houses and public meetings in July 2017 to solicit comments on the draft assessment report. The Forest Service released wilderness inventory findings for review and comment at these meetings, and field trips related to the wilderness inventory were held in September and October 2017.

After releasing the final assessment report in October 2017, the Forest Service held four workshops in 2018 that further discussed topics the public had previously identified as priorities. The workshops initiated early discussion on the goals the attendees wanted to see in the draft forest plan. Throughout 2018 and part of 2019, the Forest Service worked on numerous drafts of a proposed forest plan that would be the basis of the environmental analysis.

The public scoping period for the EIS was initiated with the publication of the notice of intent in the *Federal Register* on September 10, 2019. A 60-day comment period was held from September 10 through November 8, 2019. The comment period provided the public with the opportunity to review the need for change document, the proposed forest plan, the draft wild and scenic rivers eligibility report, and the draft wilderness evaluation report. Additionally, the Forest Service held five open-house meetings in Utah and Wyoming in conjunction with the public comment period in the fall 2019 to begin scoping for the draft EIS on the forest plan revision. The Forest Service hosted three public webinars during this public scoping period as well.

The 90-day draft EIS comment period (November 19, 2021, through February 17, 2022) provided an opportunity for the public to review the draft EIS and provide comments and suggested content changes. Engagement for the draft EIS included three virtual public webinars, staffed information tables at community events such as the Duchesne County Farm Bureau/Duchesne County Beef Expo, and presentations at community meetings, such as the Vernal Chamber of Commerce.

## Significant Issues

The Forest Service compiled all public concerns related to the proposed revision of the forest plan into issue statements, which were then categorized as significant or nonsignificant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action, that involved potentially significant effects, and that could be meaningfully and reasonably evaluated and addressed within the programmatic scope of the forest plan. Nonsignificant issues were identified as those that were not related to the decision to be made, were related to concerns outside the scope of analysis, were related to concerns that have been or will be addressed by a separate planning process, or involved implementation-level decisions. The Council on Environmental Quality NEPA regulations provide the following explanation for this delineation in section 1501.7: “Identify and eliminate from detailed study the issues which are not significant, or which have been covered by prior environmental review (§ 1506.3).”

The planning team identified five main categories of significant issues, which drove the subsequent development of alternatives: (1) sustainable recreation; (2) designated areas; (3) fire and fuels management; (4) vegetation management, timber harvest, and sustainable ecosystems; and (5) social and economic contributions.

## Alternatives

The Forest Service developed the revised plan alternatives based on the Assessment Report of Ecological, Social, and Economic Conditions on the Ashley National Forest (Forest Service 2017a) and supplemental reports; the need for change; desired conditions; implementation and monitoring of the current forest plan; public, agency, and tribal input; and issues derived from comments received during the public scoping period. Four alternatives for the forest plan are analyzed in this final EIS: alternative A, the 1986 forest plan (as amended), referred to as the no-action alternative; alternative B modified, the proposed action, which was modified based on public and internal comments; alternative C, which emphasizes preservation of the natural setting and passive management to move toward desired conditions for vegetation and fire management; and alternative D, which focuses on accomplishing desired conditions by shared funding and cooperation with partners.

The alternatives represent a reasonable range of possible management options from which to choose, as required by NEPA (see 40 CFR 1505.14). All alternatives comply with law, regulation, and Forest Service policy. The Forest Service has identified alternative B modified as the preferred alternative.

## Conclusions about the Effects of the Alternatives

The Forest Service recognizes that there may be implications or long-term environmental effects of managing the Ashley National Forest under any of the four alternatives. Consequences are based on predicted implementing activities and are meant to compare alternatives on a programmatic level rather than provide exact measurements of effects. The Ashley National Forest's existing environment and the potential consequences to that environment from implementing the four alternatives are described in chapter 3.

The following assumptions are common to all resources in this final EIS:

- No direct environmental effects will result from the administrative action of developing or revising the forest plan. Proposed actions will not be approved or otherwise authorized based on the content of the forest plan; however, they must be consistent with plan components, which include desired conditions, objectives, standards, guidelines, designation of management areas, suitability determinations, and monitoring requirements.
- Components of the forest plan reflect compliance with current Federal, state, and local laws and regulations, and U.S. Department of Agriculture and Forest Service policy.
- Plan management direction (desired conditions, objectives, standards, and guidelines) and other plan direction (management areas and monitoring) will guide future planning decisions or implementation of site-specific projects and activities.
- Funding levels will be similar to those of the past 5 years.
- Effects analyses are applicable for the expected life of the forest plan, which is estimated to be from 10 to 15 years. Other time frames may be specifically analyzed, depending on the resource and potential consequences.
- Visitation and use of National Forest System lands and facilities will increase during the life of the plan.
- The spatial extent for most resources is the plan area, as defined in chapter 1. Some resources may have different spatial extents, which is defined in those resource sections.

- Monitoring identified in chapter 4 of the forest plan will inform the continued applicability of plan components and determine the need for future amendments.
- Individual proposed actions are not evaluated in this final EIS nor are they defined by specific location, design, and extent. Rather, the effects described are generic and used to compare the relative effects of alternatives on a forestwide basis.
- There may be minor, but acceptable, discrepancies between the surveyed acres from the Ashley National Forest administrative boundary and the geographic information system layers used to define administrative or other area boundaries.

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# Chapter 1

Purpose of and Need for Action

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# Chapter 1. Purpose of and Need for Action

## Introduction

The National Forest Management Act of 1976 (Public Law 94-588) requires the preparation of an integrated land management plan by an interdisciplinary team for each unit of the National Forest System. The Forest Service proposes to revise the Ashley National Forest Land and Resource Management Plan (Forest Service 1986), hereinafter referred to as the 1986 forest plan, in compliance with the National Forest System land management planning rule (36 Code of Federal Regulations [CFR] 219; hereinafter referred to as the 2012 Planning Rule). The 2012 Planning Rule guides the development of integrated resource management in the plan area—in this case, the National Forest System lands the Forest Service administers on the Ashley National Forest—within the context of the broader landscape. The revised Ashley National Forest Land Management Plan (referred to as the forest plan), developed under the 2012 Planning Rule, takes an integrated and holistic approach to land management that recognizes the interdependence of ecological processes with social, cultural, and economic systems.

The Forest Service has prepared this final environmental impact statement (final EIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and state laws and regulations. This final EIS discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. This document describes, in general terms, the expected effects of management during the plan period, but it does not predict the site-specific effects of future speculative actions each time the standards and guidelines are implemented at the project level. Those site-specific effects would be disclosed in subsequent NEPA reviews for proposed projects and activities.

The forest plan will provide broad, strategic guidance that is consistent with other laws and regulations. Though it will provide strategic guidance, no decisions will be made regarding the regulation of public activities and access to Federal lands; the management of individual roads, trails, or areas associated with the Travel Management Rule (36 CFR 212); or permitted activities, such as grazing and use by outfitters and guides. These activities, projects, and site-specific management actions are managed through separate administrative and regulatory processes. Similarly, no decision regarding oil and gas leasing availability will be made, although plan components may be brought forward or developed in the future that will help guide oil and gas leasing availability decisions that may be necessary. Some actions (such as hunting regulations), although important, are outside Forest Service authority and cannot be included in the proposed action.

Additional documentation, including more detailed analyses of plan area resources, may be found in the project planning record on the project website:

<https://www.fs.usda.gov/detail/ashley/landmanagement/planning/?cid=fseprd547713>.

## Plan Area

The Ashley National Forest encompasses about 1.4 million acres in northeastern Utah and southwestern Wyoming. The national forest is located in three major areas: the northern and southern slopes of the Uinta Mountains, the Wyoming Basin, and the Tavaputs Plateau. Elevations range from 5,500 feet on the Green River below Little Hole near Dutch John to 13,528 feet at the summit of Kings Peak (the highest point in Utah). About 70 percent of the Ashley National Forest falls within the Uinta Mountains. The Uintas are the largest east-west-trending mountain range in the lower 48 states. Together with the Tavaputs Plateau, the Uinta Mountains provide a unique ecological transition zone, connecting the

northern and southern Rocky Mountains. Nationally designated areas include the High Uintas Wilderness, Ashley Karst National Recreation and Geologic Area, and the Flaming Gorge National Recreation Area.

The Ashley National Forest falls predominantly within four counties on the northern border of Utah and southern border of Wyoming: Daggett, Duchesne, and Uintah Counties in Utah, and Sweetwater County in Wyoming (see figure 1-1). Small portions of the Ashley National Forest also lie within Utah, Wasatch, and Summit Counties in Utah. Portions of the national forest are within the external boundaries of the original Uintah and Ouray Reservation, and the national forest shares many miles of common boundary with Ute Indian Tribal trust lands. In addition, Uinta County, Wyoming, is in close proximity to the Ashley National Forest. These communities and counties are connected to the numerous ecosystem services and economic benefits the Ashley National Forest provides.

The Ashley National Forest is generally considered a rural national forest with many established uses and activities, such as land- and water-based recreation (including camping, hiking, boating, and all-terrain vehicle [ATV] or off-highway vehicle [OHV] riding), livestock grazing, commercial timber harvest, oil and gas production, hard-rock mining, firewood gathering, hunting, fishing, viewing scenery and wildlife, and visiting historic and prehistoric sites. The Ute Indian Tribe has a unique interest in the Ashley National Forest and values the lands on the Ashley National Forest for many reasons, including hunting and gathering, ceremonial and traditional uses, and ancestral connections.

## Proposed Action

The Forest Service proposes to revise its 1986 forest plan for the Ashley National Forest, in compliance with the 2012 Planning Rule, to provide strategic, program-level guidance for management of the Ashley National Forest's resources and uses over the next 10 to 15 years. The proposed action is to create one unified forest plan for the Ashley National Forest; address gaps in current plan direction and changes in ecological, social, and economic conditions; and comply with the 2012 Planning Rule and other new laws, policy, regulation, and Forest Service direction adopted since 1986.

Specific details about the proposed action are provided in chapter 2.

## Document Organization

The documents are organized as follows:

### **Final Environmental Impact Statement for the Forest Plan for the Ashley National Forest**

- *Chapter 1. Purpose of and Need for Action:* This chapter includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This chapter also details how the Forest Service informed the public of the proposal and how the public responded.
- *Chapter 2. Alternatives, Including the Proposed Action:* This chapter provides a more detailed description of the agency's preferred alternative (alternative B modified) as well as alternative methods for achieving the stated purpose. The Forest Service developed these alternatives based on issues raised by the public and other agencies. Chapter 2 presents a summary of the alternatives in comparative form. This information is supplemented by a matrix of the plan components, which vary by alternative, provided in appendix B. This discussion also includes mitigation measures. This chapter focuses primarily on the management that will vary by alternative. A full description of the proposed management (alternative B modified) is provided in the forest plan.

- *Chapter 3. Affected Environment and Environmental Consequences:* This chapter describes the environmental effects of implementing the proposed action and other alternatives. This chapter summarizes the information used to compare alternatives and contains the detailed basis used to measure the potential environmental consequences of each alternative. This chapter's discussion of the affected environment and impacts from the proposed management and alternatives is organized by resource topic. In addition, the affected environment and impacts for designated areas are discussed in a separate section. Areas designated by Congress (recommended wilderness and wild and scenic rivers) are discussed in the *Designated Areas* section. Recreation management areas are discussed in the *Recreation* section. Historic management areas are discussed in the *Cultural and Historic Resources* section.
- *Chapter 4. Preparers, Consultation and Coordination, and Distribution of the Environmental Impact Statement:* This chapter provides a list of preparers and agencies consulted during the development of the EIS.
- *References, Glossary, and Index:* The references section provides citations to literature sources used in the document. The glossary provides a list of terms used in the EIS and their definitions. The index provides page numbers for specific terms.
- *Appendixes:* The appendixes provide more detailed information to support the analyses presented in the EIS, as follows:
  - ◆ *Appendix A—Figures:* Provides figures.
  - ◆ *Appendix B—Comparison of Action Alternative Plan Components:* Provides a summary of change of management actions by alternative.
  - ◆ *Appendix C—At-Risk Species:* Provides species lists and occurrence data for federally threatened, endangered, and candidate species under the Endangered Species Act, as well as regional forester-identified species of conservation concern (SCC). Also provides information on habitat conditions, trends, and risk factors for these species.
  - ◆ *Appendix D—Species Persistence Analysis and Plan Component Crosswalks for At-Risk Species, Pollinators, Habitat Types, and Aquatics:* Provides persistence analysis information for federally listed species and SCC, as well as habitat crosswalks.
  - ◆ *Appendix E—Compatibility of Plan with Other Agency Plans:* Provides an overview of plans reviewed for consistency and identifies potential inconsistencies with these plans.
  - ◆ *Appendix F—Wild and Scenic Rivers Suitability Report:* Provides details of the wilderness suitability process.
  - ◆ *Appendix G—Recommended Wilderness Report:* Provides an overview of the recommended wilderness analysis process.
  - ◆ *Appendix H—Response to Comments:* Includes an overview of the public comment period and provides issues statements and responses for comments received during the public comment period.

## **Forest Plan for the Ashley National Forest**

The forest plan for the Ashley National Forest is a separate document and includes the following appendixes:

- Appendix 1—Maps

- Appendix 2—Watershed Condition Framework
- Appendix 3—Potential Management Approaches
- Appendix 4—Timber Suitability
- Appendix 5—Desired Scenic Character

Additional documentation may be found in the project planning record available online at the forest planning website: <https://www.fs.usda.gov/main/ashley/landmanagement/planning>.

## Changes between Draft and Final

The forest plan is no longer included as an appendix to the EIS and is now a stand-alone document. In addition, Attachment E. Crosswalks for Ashley Forest Plan Components from the draft forest plan were moved to Appendix D. Species Persistence Analysis and Plan Component Crosswalks for At-Risk Species, Pollinators, Habitat Types, and Aquatics, of the final EIS. New appendixes added to the final EIS are Appendix E. Compatibility of Plan with Other Agency Plans, and Appendix H. Response to Comments.

A section labeled “Notable Changes between Draft and Final” is located with sections of chapter 3, where appropriate. Additional grammar and sentence structure edits were made between the draft EIS and final EIS for all alternatives.

## Purpose of and Need for Action

The purpose for revising the current Ashley National Forest Plan is threefold: (1) the 1986 forest plan is over 30 years old and has been amended 24 times; (2) since the 1986 forest plan was approved, there have been changes in economic, social, and ecological conditions; changes in resource demands; new policies and priorities, including the 2012 Planning Rule; and new information based on monitoring and scientific research; and (3) the Forest Service needs to address the focus topics identified in the need to change the existing plan (sustainable recreation, economic resiliency, managing established resource uses, tribal and cultural resources, and managing for resilient ecosystems and watersheds).

The need to change the forest plan has been organized into five focus topics to help ensure the purpose of and need to revise the forest plan are met. The focus topics are as follows:

1. There is a need for sustainable recreation. This includes balancing recreation use with ecological integrity, addressing population increases and aging populations, and addressing shifts in the types of preferred recreation.
2. There is a need for economic resiliency. This includes balancing the needs of local communities and economies while providing ecosystem services such as the support of aquatic and terrestrial ecosystems, clean air and water, aesthetic values, cultural heritage values, and recreation opportunities that contribute to the quality of life and sense of place for both present and future generations.
3. There is a need to manage multiple uses and traditional uses. This includes management of uses such as mineral development, livestock grazing, timber and woodland products use, and fuelwood collection. There is a need to recognize and protect historic and contemporary cultural uses and to balance these uses while maintaining the long-term health and productivity of the land.

4. There is a need to manage cultural resources, improve tribal relationships and partnerships, and provide for subsistence and other cultural activities, including guidance for managing areas of tribal importance.
5. There is a need to manage for resilient ecosystems and watersheds. This includes protecting and restoring terrestrial and aquatic ecosystems and non-forest communities.

## Decision Framework

The 2012 Planning Rule specifies eight primary decisions to be made in forest plans:

- Forestwide components to provide for integrated social, economic, and ecological sustainability; a diversity of plant and animal communities; ecosystem services; and multiple uses, and to manage timber as required under the National Forest Management Act of 1976 (NFMA). Components must be within the Forest Service's authority and consistent with the inherent capability of the national forest (36 CFR 219.7 and 219.8–219.11).
- Identification of geographic area and management area-specific components (36 CFR 219.7(d)).
- Identification of suitability of areas for the appropriate integration of resource management and uses, including lands suited and not suited for timber production (36 CFR 219.7(c)(2)(vii) and 219.11).
- Identification of the maximum quantity of timber that may be removed from the national forest (36 CFR 219.7(c)(2)(ix) and 219.11(d)(6)).
- Identification of watersheds that are a priority for maintenance or restoration (36 CFR 219.7(f)(i)).
- Recommendations to Congress (if any) for lands suitable for inclusion in the National Wilderness Preservation System and rivers eligible for inclusion in the National Wild and Scenic Rivers System (NWSRS) (36 CFR 219.7(c)(2)(v) and (vi)).
- Identification or recommendation (if any) of other designated areas (36 CFR 219.7(c)(2)(vii)).
- Identification of plan monitoring questions and indicators for the plan monitoring program (36 CFR 219.7(c)(2)(x) and 219.12).

The forest supervisor for the Ashley National Forest will make the final decision on the selected alternative for the revised forest plan. The forest supervisor will review the proposed action, the other alternatives, and the environmental consequences and decide which plan alternative best meets the desired conditions, multiple-use concept, diverse needs of the people, and sustainable management of the Ashley National Forest, as well as the requirements of the National Forest Management Act of 1976 and the Multiple-Use Sustained-Yield Act of 1960. The forest supervisor, who is the responsible official for the forest plan, will issue a draft record of decision, in accordance with agency decision-making procedures (40 CFR 1505.2); the draft record of decision will disclose and discuss:

- The decision (identifying the selected alternative) and reasons for the decision
- How public comments and issues were considered in the decision
- How all alternatives were considered in reaching the decision, specifying which one is the environmentally preferable alternative (defined in 36 CFR 220.3)

As required by the planning rule (36 CFR 219.14(a)), the draft record of decision will also include:

- A statement of how the plan, plan amendment, or plan revision applies to approved projects and activities (36 CFR 219.14(a)(2) and 219.15)
- Documentation of how the best available scientific information was used to inform planning, the plan components, and other plan content, including the plan monitoring program (36 CFR 219.3 and 219.14(a)(3))

The revised forest plan will provide integrated plan direction for managing the national forest for the next 10 to 15 years. However, even after approval of the plan, project-level environmental analyses and decisions will still need to be completed for specific proposals to implement the direction in the forest plan. Forest plans do not make budget decisions.

## Direction Not Addressed in the Forest Plan

It is important to note that forest plans set broad direction; they do not include site-specific direction for where future projects will occur or how many permits will be issued. Forest plans provide a framework for integrated resource management and for guiding project and activity decision-making. Forest plans reflect the unit's expected distinctive roles and contributions to the local area, region, and Nation; they also reflect the roles for which the plan area is best suited, considering the agency's mission, the unit's unique capabilities, and the resources and management of other lands in the vicinity. Forest plans also do not affect treaty rights or other valid existing rights established by statute. Therefore, future forest plan direction will not include:

- Direction about specific roads and trails: Determinations about which roads and trails will be opened or closed to specific types of motorized and nonmotorized uses are not addressed at the forest plan level. Travel management planning is a project-level decision that requires a site-specific analysis; however, the forest plan may provide context and guidance for future travel management decisions.
- Authorizations or availability for oil and gas leasing: Determinations of lands suitable or available for future oil and gas leasing, as well as stipulations for such leasing, are made through the leasing analysis process. The forest plan will not make leasing availability decisions, provide site-specific authorizations for oil and gas leases, or change existing lease stipulations.
- Designation of wilderness or wild and scenic rivers: The formal designation of wilderness and wild and scenic rivers will not occur during the plan revision because only Congress can perform these acts. The plan revision process can recommend areas for wilderness designation or recommend rivers or river segments to be eligible or suitable for wild and scenic river status. Forest Service-identified eligible and suitable rivers or segments and recommended wilderness areas do not guarantee formal designation; however, they do influence forest plan guidance on how to manage these areas.
- Changes to designated roadless areas: The boundaries of inventoried roadless areas defined by the 2001 Roadless Area Conservation Rule cannot be changed at the national forest level. The Roadless Rule can only be modified through a national rulemaking process or congressional action.
- Numbers and types of permits: Determining the number of livestock permitted to graze or the types and numbers of other types of permits is managed at the site-specific project level. However, the forest plan will establish desired conditions and other guidance with which permitted activities will need to be consistent.



- Changes to existing water rights: The National Forest Management Act does not authorize bypass flow or water rights transfer requirements; rather, it directs the Forest Service to prepare management plans that provide for multiple uses and sustained yield of forest resources in accordance with the Multiple-Use Sustained-Yield Act of 1960. The act specifies that the national forests shall be managed for outdoor recreation, range, timber, watershed, and wildlife, fish, and aquatic species purposes; it contains no grant of authority for bypass flow requirements to the Forest Service. The National Forest Management Act does not contain any other specific directives governing Forest Service management of water resources. The forest plan will establish desired conditions and other guidance for watershed management; however, it will not address transfer of water rights.

## Relationship to Other Entities

NEPA requires the Forest Service to coordinate planning with other Federal, State, and local agencies that have jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (see 40 CFR 1501.8). In addition, a state, tribal, or local agency of similar qualifications may become a cooperating agency by agreement with the lead agency. Entities that have coordinated with the Forest Service for the development of the forest plan and the EIS are listed below, and those that have a formal agreement with the Forest Service in the form of a memorandum of understanding are indicated with an asterisk.

- U.S. Fish and Wildlife Service
- U.S. Department of the Interior, Bureau of Reclamation
- Utah State Historic Preservation Office
- Wyoming State Historic Preservation Office
- U.S. Environmental Protection Agency
- Daggett County, Utah\*
- Duchesne County, Utah\*
- Summit County, Utah\*
- Utah County, Utah\*
- Uintah County, Utah\*
- State of Utah, Public Lands Policy Coordinating Office\*
- Daggett Conservation District, Utah\*
- Uintah Conservation District, Utah\*
- State of Wyoming, Governor's Policy Office\*
- Sweetwater County, Wyoming\*
- Sweetwater Conservation District, Wyoming\*
- Uinta Conservation District, Utah\*
- Uinta County, Wyoming\*
- Ute Indian Tribe\*

The Forest Service collaborated with cooperating agencies throughout the planning process to consider ways the forest plan could contribute to common objectives, address impacts, resolve or reduce conflicts, and contribute to compatibility between the Forest Service and other agencies' plans. See *Consultation and Coordination* in chapter 4 and appendix E, Compatibility of Plan with Other Agency Plans, for additional details.

## Public Involvement

The Forest Service began the forest plan revision process in 2016. A notice of initiation to start the assessment phase of the process was published in the *Federal Register* on July 22, 2016 (*Federal Register* Vol. 81 No. 141, 47749). Prior to the July 2016 notice, the Forest Service met with cooperating agencies to present the proposed revision process, discuss the public involvement plan, and solicit pertinent data and information to use for the assessment.

The Forest Service also hosted open house public meetings during July and August 2016 in Utah and Wyoming to invite comments on the proposed list of SCC, the wilderness evaluation process, the wild and scenic rivers evaluation process, the areas of influence being considered for plan revision, and information and issues important to the assessment. The Forest Service held more open houses and public meetings in July 2017 to solicit comment on the draft assessment report. The Forest Service released wilderness inventory findings for review and comment at these meetings, and field trips related to the wilderness inventory were held in September and October 2017.

After releasing the final assessment report in October 2017, the Forest Service held four “hot topic” workshops in 2018, to delve deeper into the current science and social and economic demands facing national forest management. The topics were issues the public had previously indicated were priorities. The “hot topic” workshops enlisted input from participants on the goals and strategies the Forest Service might consider carrying into the early drafts of the proposed forest plan. Throughout 2018 and part of 2019, the Forest Service worked with the cooperating agencies to develop and refine numerous drafts of the proposed forest plan. The proposed action, which is the basis of the environmental analysis phase, evolved into the forest plan, with modifications based on public comment.

The public scoping period for the EIS was initiated with the publication of the notice of intent in the *Federal Register* on September 10, 2019. A 60-day comment period was held from September 10 through November 8, 2019. The comment period provided an opportunity for the public to review the preliminary need for change document, proposed direction in a proposal to revise the land management plan (proposed forest plan), the draft wild and scenic rivers eligibility report, and the draft wilderness evaluation report.

The Forest Service held five open house meetings in conjunction with the public comment period in October 2019 to begin scoping for the draft EIS on the forest plan revision. The meetings were held in the following communities: Green River, Wyoming, and Vernal, Duchesne, Manila, and Salt Lake City, Utah. Attendance was approximately 10–20 individuals per meeting.

Based on the issues identified from the scoping process on the proposed action, the Forest Service developed a range of alternatives to be analyzed in detail and prepared and published a draft EIS. A notice of availability (NOA) for the draft EIS and revised plan was published in the *Federal Register* on November 19, 2021. This publication of the NOA began the 90-day comment period, which ended on February 17, 2022. The public was notified of the opportunity to comment through various media outlets, including email, Facebook, a legal notice published in the *Vernal Express*, and the project website. Public webinars were held on December 8, 2021; January 19, 2022; and January 25, 2022. Cooperating agency

engagement during this time frame included virtual meetings in September and December 2021 and February 2022. In-person and virtual meetings with cooperating agencies on June 15 and 16, 2022, focused on the cooperating agencies' comments submitted on the draft EIS.

Individuals and organizations submitted comments via email, US Postal Service mail, facsimile, and the Forest Service's comment analysis and response application (CARA). The Forest Service received 90 comment letter submittals comprising 996 comments. Where applicable, comments were organized and aggregated into issue statements. The Ashley National Forest interdisciplinary team's responses to the comments and issue statements are available in appendix H.

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# Chapter 2

Alternatives, Including the Proposed Action

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# Chapter 2. Alternatives, Including the Proposed Action

## Introduction

This chapter describes and compares the alternatives the responsible official considered for the forest plan. It includes a discussion of how the alternatives were developed, the issues raised, descriptions and comparisons of the alternatives, and alternatives that were not considered in detail. Numbers, such as acres, miles, and volumes, are approximate due to the use of geographic information systems data and rounding. Except for designated areas, acres displayed are rounded to the nearest 100.

## Development of Alternatives

As discussed in chapter 1, this forest plan revision effort is based on the requirements of the 2012 Planning Rule, findings of the forest assessment, changes in conditions and demands since the 1986 forest plan, and public concerns. Issues were identified from the public involvement period, some of which drove the development of alternatives. Some components, such as the Wild and Scenic River eligibility study and the wilderness inventory and evaluation, are addressed in the revision because they are required by planning regulations (such as 36 CFR 219.17(3)(b)(1)).

The Council on Environmental Quality regulations, with respect to the National Environmental Policy Act (NEPA) procedures and specifically to the aspect related to alternatives development (36 CFR 40 1502.14), are fundamental to the process. This final EIS was developed and written consistent with Council on Environmental Quality NEPA direction that existed at the outset of the notice of intent in September 2019. The relevant section of the CFR reads as follows:

Based on the information and analysis presented in the sections on the affected environment (1502.15) and the environmental consequences (1502.16), it should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining the issues and providing a clear basis for choice among options by the decision maker and the public. In this section agencies shall:

- a) Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.
- b) Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits.
- c) Include reasonable alternatives not within the jurisdiction of the lead agency.
- d) Include the alternative of no action (which represents the current plan).
- e) Identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference.
- f) Include appropriate mitigation measures not already included in the proposed action or alternatives.

All reasonable alternatives to the proposed action must meet the purpose of and need for change and address one or more of the significant issues. Not all possible alternatives were carried into detailed study because the list of options would have been prohibitively large. Instead, the responsible official identified

those alternatives that met the criteria and created a reasonable range of outputs, direction, costs, management requirements, and effects from which to choose.

Revised plan alternatives represent a range of possible management options. Information presented here and in chapter 3 provides the basis from which to evaluate the comparative merits of the alternatives. Each alternative emphasizes specific land and resource uses and de-emphasizes other uses in response to the significant issues.

Alternative A (referred to as the 1986 forest plan in this document) is the no-action alternative, which reflects the 1986 forest plan, as amended to date; it accounts for current laws, regulations, and terms and conditions from biological opinions. Alternative B modified represents the Forest Service's preferred alternative and is based on the Forest Service's response to public comments and internal review on the Draft Revised Land Management Plan. Development of alternatives C and D was driven by issues identified during scoping.

## Issues Used for Alternatives Development

Issues serve to highlight the effects or unintended consequences that may occur from the proposed action or alternatives, giving opportunities during the analysis to reduce adverse effects and to compare trade-offs for the decision maker and public to understand. The Forest Service's planning team categorized the issues identified during scoping and identified those considered to be significant. Significant issues were defined as those directly or indirectly caused by implementing the proposed action, that involved potentially significant effects, and that could be meaningfully and reasonably evaluated and addressed within the programmatic scope of the forest plan.

The planning team identified five main categories of significant issues that drove the subsequent development of alternatives:

### **Sustainable Recreation**

Recreation-related comments represented the topic with the highest level of interest during the public scoping period. Commenters provided input on the allowable uses, size, and locations of backcountry recreation management areas. In addition, suggestions were provided on the use of recreation management areas as a way for the Forest Service to provide plan direction in specific areas where different recreation uses are concentrated. Some commenters stated that the Forest Service should provide opportunities for nonmotorized recreation and manage portions of the Ashley National Forest as closed to OHV use, while others requested additional opportunities for motorized recreation. Based on this input, a range of alternatives was developed for the size and use of backcountry, general, and destination recreation management areas.

Finally, scenic integrity objectives (SIOs) were developed and modified, as appropriate, to provide for the scenic character, which is a component of sustainable recreation in the 2012 Planning Rule. A range of alternatives was developed for SIOs based on resource integration for ecological, social, and economic sustainability and multiple uses.

### **Designated Areas**

Comments included suggestions for designated areas, including how to manage inventoried roadless areas and whether and where to recommend areas for wilderness. Some commenters stated that the Forest Service should analyze an alternative that manages all the wilderness inventory areas being proposed as recommended wilderness areas. Other commenters stated that an alternative should be included that



analyzes none of the areas being proposed as recommended wilderness. To address these concerns, the Forest Service has included a range of alternatives related to recommended wilderness. This includes no recommended wilderness under alternatives A, B modified, and D and the inclusion of the areas meeting the requirements for wilderness under the wilderness inventory and determined to be suitable for wilderness recommendation under alternative C.

## **Fire and Fuels Management**

Some commenters stated that management in the forest plan should focus on protecting communities, infrastructure, and natural resources from wildland fire and reducing hazardous fuels conditions.

Commenters brought up the need to identify high-risk areas for wildfire and employ a variety of methods to treat fuels; for instance, alternative D allows more motorized access for fuels treatment. In response, the Forest Service developed plan components at the forestwide level to support fuels management. Due to potential trade-offs in fuels management and desired conditions for other resources, a range of fuels management direction was provided across alternatives.

## **Vegetation Management, Timber Harvest, and Sustainable Ecosystems**

Concerns brought forward in public scoping were related to management of forage as well as forested vegetation and timber harvest. In addition, some commenters recommended an increase in timber production to achieve desired vegetation conditions and to contribute to local economies. The Forest Service also received comments on specific wildlife concerns, including habitat needs and threats to species of conservation concern, such as bighorn sheep. Additional concerns brought forward were related to sustainable ecosystems for wildlife, including management of soil and water resources.

## **Social and Economic Contributions**

Social and economic ties to the local and regional economy were a concern brought forward in public scoping across resources and resource uses. Recreation, and the importance of recreation opportunities on the Ashley National Forest, was a primary concern for local communities. Other resources of note with social and economic importance included livestock grazing and management of forested resources for community wildfire protection and for timber resources. While plan components specifically related to socioeconomics are intentionally broad in nature and do not vary by alternative, the Forest Service included variation in management related to recreation management areas and allowed uses to address these concerns.

## **Elements Common to All Alternatives**

All alternatives considered in the final EIS adhere to the principles of multiple use and the sustained yield of goods and services required by the Multiple-Use and Sustained-Yield Act as described at 36 CFR 219.1 (b)). All the alternatives are designed to:

- meet law, regulation, and policy;
- contribute to ecological, social, and economic sustainability;
- conserve soil and water resources and not allow significant or permanent impairment of the productivity of the land.
- maintain air quality that meets or exceeds applicable Federal, State, and local standards and regulations.
- protect cultural resources;

- provide sustainable levels of products and services;
- provide integrated direction as included in the plan components;
- include the following designated areas: the High Uintas Wilderness; Flaming Gorge National Recreation Area; Ashley Karst National Recreation and Geologic Area; Sheep Creek Canyon Geologic Area; research natural areas; national scenic trails; and national scenic byways; and
- manage all inventoried roadless areas consistent with the 2001 Roadless Area Conservation Rule (Roadless Rule).

## Description of the Alternatives

The range of alternatives developed and presented is based on an evaluation of the information gathered from public and internal comments and the purpose and need. While all alternatives provide a wide range of ecosystem services and multiple uses, some give greater emphasis to selected resources based on the theme of the alternative and the response to the focus topics identified in the need for change.

The Forest Service developed the plan alternatives based on the Ashley National Forest assessment (Forest Service 2017a); the need for change; desired conditions; implementation and monitoring of the 1986 forest plan; public, agency, and tribal input; and comments received during the public scoping period. The alternatives represent a range of possible management options from which to choose. Each alternative emphasizes specific land and resource uses and de-emphasizes other uses in response to the issues used for alternatives development. Some components may vary between alternatives to address the issues identified during scoping; the description of the alternatives provides specific details. Plan direction for desired conditions, goals, standards, and guidelines typically remains constant for all revised plan alternatives, with the exceptions noted.

In addition to the no-action alternative (alternative A), and the proposed action (alternative B modified), which was modified based on public and internal comments, two additional alternatives (alternatives C and D) were developed based on the identified issues. The alternatives span the range of forest management practices and uses of available resources. The general theme and intent of each alternative are summarized below in relationship to the issues used for alternatives development.

The Forest Service has provided a full suite of plan components for alternative B modified in the forest plan. A limited number of plan components and acres assigned to management areas vary by alternative. A summary of key differences between alternatives is included in the narrative below and in the tables provided in the “Comparison of Alternatives” section of this chapter.

### Elements Common to Alternatives B Modified, C, and D

The revised plan alternatives, B modified, C, and D, also referred to as action alternatives, are designed to be consistent with the 2012 Planning Rule and associated directives and to emphasize adaptive management and the use of best available scientific information. All action alternatives would:

- meet the purpose and need for change and address one or more significant issues;
- protect the outstandingly remarkable values of eligible and suitable wild and scenic rivers;
- provide the ecological conditions to support the persistence of species of conservation concern;
- maintain a sustainable level of goods and services to help support local and regional populations, tribes, and environmental justice communities, including wilderness, fish and wildlife, recreation

opportunities and access, timber, energy resources, livestock forage, and infrastructure, as determined by resource-specific desired condition; and

- provide for ecosystem services that add to the quality of life and sense of place of both present and future generations, including aquatic and terrestrial ecosystems, clean air and water, aesthetic values, cultural heritage values, and recreation opportunities.

In addition, each action alternative identifies designated areas, management areas, and associated plan direction that applies to these areas, in accordance with the 2012 Planning Rule (36 CFR 219.19 and 26 CFR 219.7(d)). These are described in further detail below.

Supplemental management approaches included in the forest plan would be applicable under all alternatives. These management approaches describe potential management approaches, strategies, and coordination activities that may take place at the project or activity level to help maintain existing conditions or to achieve the desired conditions described in the plan.

### Designated Areas

Designated areas are areas or features identified and managed to maintain the unique special character or purpose. Some categories of designated areas may be designated only by statute; some categories may be established administratively in the land management planning process or by other administrative processes of the Federal executive branch. Table 2-1 lists the designated areas common to all alternatives. These designated areas are identified in the 1986 forest plan (alternative A); however, not all designated areas include plan direction under alternative A. For additional information, see “Designated Areas” in chapter 3.

**Table 2-1. Designated Areas on the Ashley National Forest**

<b>Designated Area Name</b>	<b>Statute or Administratively Designated</b>	<b>Designation Authority</b>
Ashley Karst National Recreation and Geologic Area	Statutorily designated	Congressionally designated in 2019 under the John D. Dingell, Jr. Conservation, Management, and Recreation Act
Dinosaur Diamond Scenic Byway	Administratively designated	Designated by the Federal Highway Administration in 2002
Flaming Gorge National Recreation Area	Statutorily designated	Congressionally designated in 1968 by enactment of Public Law 90-540, Act to establish the Flaming Gorge National Recreation Area in the States of Utah and Wyoming,
Flaming Gorge-Green River Scenic Byway	Administratively designated	Designated as an All-American Road by the Federal Highway Administration in 2021
Flaming Gorge-Uintas Scenic Byway	Administratively designated	Designated by the Federal Highway Administration in 1998
High Uintas Wilderness	Statutorily designated	Congressionally designated in 1984 by enactment of Public Law 98-428, Utah Wilderness Act of 1984
Inventoried Roadless Areas	Administratively designated	Designated under the 2001 Roadless Area Conservation Rule (36 CFR 294)
Little Hole National Recreation Trail	Administratively designated	Designated in 1979 by Secretary of Agriculture

<b>Designated Area Name</b>	<b>Statute or Administratively Designated</b>	<b>Designation Authority</b>
Red Cloud-Dry Fork Loop Scenic Backway	Administratively designated	Designated by the Utah Scenic Byway Committee in 1990
Research natural areas	Administratively designated	Seven individual areas designated by the Forest Service Intermountain Region between 1987 and 1996
Reservation Ridge Scenic Backway	Administratively designated	Designated by the Utah Scenic Byway Committee in 1990
Sheep Creek Canyon Geologic Area	Administratively designated	Designated by the Forest Service Intermountain Region in 1962
Sheep Creek-Spirit Lake Scenic Backway	Administratively designated	Designated by the Utah Scenic Byway Committee in 1990

### Management Areas

Management areas describe how plan components apply to specific parcels of National Forest System lands, with locations shown on maps. Every plan must have management areas, geographic areas, or both (36 CFR 219.7(d)). Management areas depict lands with integrated packages of compatible resource direction, and they may overlap with other management areas. Alternatives B modified, C, and D identify three types of management areas: eligible and suitable wild and scenic rivers, historic management areas, and recreation management areas.

**Eligible and Suitable Wild and Scenic Rivers:** Two river segments (Green River [13 miles] and Upper Uinta River [40 miles]) are recommended for inclusion in the National Wild and Scenic Rivers System under the 2008 Wild and Scenic River Suitability Study for National Forest System Lands in Utah. The plan includes interim protection measures for these river segments to protect the characteristics and values for which the river segments were found to be eligible and suitable, until Congress can act on recommendations of suitable segments or finds the river segments not to be suitable. The corridor extends one-quarter mile on both sides of the river segment to protect the river-related values.

**Historic Management Areas:** These are specific areas or features on the Ashley National Forest that have been given a designation to maintain the unique character, purpose, or management emphasis. These are:

- Swett Ranch
- Ute Mountain Fire Lookout Tower
- Historic ranger stations
- Carter Military Road

**Recreation Management Areas:** These are areas on the Ashley National Forest where similar types and levels of recreation occur. Lands other than designated wilderness are divided into three distinct recreation management areas:

- Backcountry recreation management areas
- General recreation management areas
- Destination recreation management areas

While the suitability of certain uses and spatial distribution of these recreation management areas change between alternatives, the overall intent and themes remain consistent across the action alternatives (alternatives B modified, C, and D), as described below:

**Backcountry recreation management areas:** These areas provide large, undeveloped landscapes suited for dispersed recreation use. The public should expect to see natural landscapes with few amenities, limited management, lower visitor uses and density levels, and a limited Forest Service presence. Wheeled motorized travel is suitable, consistent within the desired recreation opportunity spectrum settings as assigned and on designated roads, trails, and areas, except under alternative C. Mountain bikes are permitted on existing roads and trails unless specifically excluded.

**General recreation management areas:** These areas are where the concept of multiple use is most evident. They are the working landscape where dispersed and developed recreation, fuelwood gathering, vegetation management, livestock grazing, electrical transmission infrastructure, communication sites, and oil and gas production may occur. The public should expect to see a variety of ecosystem-conservation management activities and some lands modified to meet multiple-use objectives. A broad spectrum of landscapes, activities, and uses are included, ranging from relatively unaltered lands to areas of active management for purposes of meeting a variety of social, economic, and ecological objectives. Small pockets of concentrated use may exist, but these do not dominate the landscape. In summer, dispersed recreation, camping outside a developed campground, off-highway vehicle riding, and motorized water recreation are the most popular uses.

**Destination recreation management areas:** These areas provide the most intensive recreation development on the Ashley National Forest. The public should expect areas of high-density recreation with high use levels. In winter, portions of these areas provide facilities for winter uses, such as ice fishing and cross-country skiing. Recreationists are attracted to these settings because of the variety of opportunities. Motorized access and support facilities (roads, parking lots, water access and boating support services, campgrounds, resorts, and marinas) are emphasized.

## **Alternative A—No Action (1986 Forest Plan)**

Alternative A, the no-action alternative, reflects current management practices under the 1986 forest plan, as amended and implemented, and provides the basis for comparing alternatives with current management and levels of output. The Council on Environmental Quality regulations (40 CFR 1502.14(d)) require that a “no action” alternative be analyzed in every EIS. This does not mean that nothing would occur under alternative A. The current forest plan would continue to guide management of the national forest, and ongoing work or work previously planned and approved would occur under that guidance. This alternative would not recommend any new management areas; no changes would occur to the plan in response to issues raised, and it would not adjust management in response to the requirements of the 2012 Planning Rule. A summary of current management is included below for the issues used for alternative development.

### **Alternative A in Relationship to Issues**

#### ***Sustainable Recreation***

Management is provided based on an assumption of moderate to heavy levels of dispersed recreation projected for the Ashley National Forest. A variety of recreation opportunity spectrum (ROS) classes provides activities from roaded natural to primitive setting (see appendix A, figure 2-4). Management Area G, Undeveloped Dispersed Recreation, includes approximately 80,000 acres in four areas: Fish Creek, Uinta River, Lakeshore Basin, and Weyman Park.

Under alternative A, scenic resources are managed in accordance with the Visual Management System (Forest Service 1974) where visual quality objectives are specified by management area. Visual quality objectives define degrees of change or contrast from the surrounding natural landscape. These existing inventoried visual quality objectives are preservation, retention, partial retention, modification, and maximum modification. In some management areas, the direction to meet visual quality objectives is included as standards. In other areas, it is stated as a value to be considered, but it should be reduced as needed to meet wildlife or other management area priorities and emphases. See appendix A, figure 2-8 for the spatial distribution of SIOs under alternative A.

### ***Designated Areas and Management Areas***

Under alternative A, designated areas (see table 2-1) are managed based on direction in the 1986 forest plan along with any stand-alone management plans for these areas. See appendix A, figure 2-20. Two river segments, the Green River (13 miles) and Upper Uinta River (40 miles), would be managed as suitable for inclusion in the National Wild and Scenic Rivers System (appendix A, figure 2-23).

### ***Fire and Fuels Management***

Under alternative A, fire and fuels management follows the direction in the 2001 Utah Fire Amendment to the 1986 forest plan. This plan provides forestwide direction for returning fire to the ecosystem, hazardous fuels reduction, and maintaining historical fire regimes.

The Forest Service uses wildfire decision support tools for strategic decisions on wildfires that assist land managers with fire prediction and estimating threats to values from that fire. This plan does not incorporate the latest policy and terminology changes since the amendment. Nor does it incorporate new fire-predicting and planning tools now available for determining high-risk areas, prioritizing those areas, and predicting benefits from treatments.

### ***Vegetation Management, Timber Harvest, and Sustainable Ecosystems***

A total of 11,000 acres of vegetation management was set as an objective in lodgepole pine habitat to encourage natural regeneration. The allowable sale quantity is set at 21 million board feet for the planning period based on 528,000 acres designated as suitable for timber production. This volume includes fuelwood and other products being harvested from the timber base. Due to policy changes, including the 2001 Roadless Rule, objectives set in the current plan are no longer achievable. Lands suitable for timber production are based on the 1986 forest plan, as amended, with current regulation and policy. For livestock grazing, forage utilization levels under alternative A would be determined by allotment in allotment management plans based on site-specific conditions and permit terms and conditions.

Alternative A includes goals, objectives, and standards for managing wildlife and habitat, including some directed at individual species, groups of species, and habitat conditions. Management emphasis is on actively managing habitat while minimizing harm from other resource activities, with special consideration to threatened, endangered, and high-interest species. However, alternative A does not specifically manage for species of conservation concern.

### ***Social and Economic Contributions***

Alternative A is focused on a commodity-based approach and emphasizes economic output associated with forest resources. The economic importance of recreation is not emphasized, and contributions from ecosystem services are not specifically addressed. Plan objectives reflect a mix of resource enhancement; timber and wood products volume; hazardous fuels treatment; road, trail, and facility maintenance; and new recreation facilities.

## **Alternative B Modified**

Alternative B modified is detailed in the revised forest plan. Alternative B, the draft revised forest plan, was included as appendix E to the draft EIS published on November 19, 2021. This alternative was modified following input received during the public comment period and through engagement with cooperating agencies. Modifications to alternative B are described in the “Modifications to Alternative B” section below.

### **Alternative B Modified in Relationship to Issues**

#### *Sustainable Recreation*

Under alternative B modified, the focus of recreation management would be on providing infrastructure to support recreation, while taking into account other resource values. In addition, management would provide for a variety of developed and dispersed recreation and tourism opportunities to support a diverse set of users and local communities. Three recreation management areas would be established to support different recreation opportunities: destination recreation management areas emphasizing developed recreation experiences in high-use areas, with motorized access and support facilities; backcountry recreation management areas focusing on dispersed recreation, with limited infrastructure; and general recreation management areas that allow for a range of recreational uses, including motorized and nonmotorized use, along with other forest uses (see appendix A, figure 2-1 for details).

Unlike alternative A, alternative B modified utilizes the Scenery Management System to determine the relative value, stability, resiliency, and importance of scenic values. The Scenery Management System also integrates an increased understanding of cultural landscapes and focuses on which desired scenic character attributes are to be maintained or enhanced. A range of SIOs are identified under alternative B modified—very high, high, moderate, and low—with an emphasis on a natural-appearing scenic character. The Scenery Management System recognizes natural disturbance processes, such as fire, insects, and disease, as part of the natural landscape, which is dynamic and important in maintaining healthy, sustainable, and scenic landscapes (see appendix A, figure 2-9 for details).

#### *Designated Areas and Management Areas*

Under alternative B modified, all existing designated areas and research natural areas would remain. In addition, two river segments, the Green River (13 miles) and Upper Uinta River (40 miles), would be managed as suitable for inclusion in the National Wild and Scenic Rivers System (see appendix A, figure 2-23). There would be no recommended wilderness areas.

#### *Fire and Fuels Management*

Under alternative B modified, fire management would strive to balance the natural role of fire while minimizing the negative impacts on watershed health, wildlife habitat, highly valued resources or assets (HVRAs), and air quality. Based on the historical disturbance regimes, the Forest Service would use wildland fire and other vegetation treatments to improve or maintain desired vegetation conditions during the life of the plan. Use the full range of fuel reduction methods, including wildland fire and other vegetation treatments, would occur on up to 32,000 acres per year. Use of natural ignitions for resource objectives would be encouraged, where conditions permit, on 10 percent of the ignitions over 10 years. Specific management is proposed for HVRAs to protect these values and to provide flexibility to manage changing resources over the life of the plan.

### *Vegetation Management, Timber Harvest, and Sustainable Ecosystems*

Alternative B modified would promote vegetation management for resource objectives. Treatments such as timber harvest, planned ignitions, thinning, and planting would be permitted on an estimated 2,400 acres of the Ashley National Forest annually (2,100 acres in the second decade). In this alternative, the Forest Service would identify acres as suitable or not suitable for timber production, based on compatibility with the desired conditions and objectives as well as legal and technical reasons. Additional areas would be identified as suitable for harvest outside timber production areas. In these areas, treatments to meet other resource objectives may contribute to the total harvest.

Under alternative B modified, site- and species-specific annual indicators, such as stubble height and utilization criteria, would be developed in grazing allotment planning. In the absence of updated planning or an approved allotment management plan, operators would follow utilization levels for forestwide management (50 percent) as well as 4-inch stubble height guidelines to provide criteria to help meet desired conditions for terrestrial vegetation. Annual monitoring indicators, as well as multiyear vegetation trend data, would be used to determine whether allotments are meeting desired conditions.

Management under alternative B modified would also support the maintenance and improvement of resilient ecosystems and watersheds to support wildlife diversity. It would provide ecological conditions to maintain persistence of each species of conservation concern and common and abundant species within the plan area. A complementary ecosystem and species-specific approach (known as a coarse-filter/fine-filter approach) would be used to contribute to the diversity of plant and animal communities and the long-term persistence of native species. The coarse-filter plan components are designed to maintain or restore ecological conditions for ecosystem integrity and biological diversity on the Ashley National Forest. Fine-filter plan components are designed to provide for additional, specific habitat needs for native animal species when those needs are not met through the coarse-filter plan components.

Specifically for bighorn sheep, management under alternative B modified would minimize contact between domestic sheep and bighorn sheep by focusing on collaboration with State agencies, utilizing memorandums of understanding, and applying site-specific management strategies described in domestic sheep permit annual operating instructions. Management would also limit authorization of new permitted domestic sheep or goat allotments unless the Ashley National Forest determines, based on local information and the best available science, that separation of the allotment and bighorn sheep can be obtained. In addition, alternative B modified would provide options if a domestic sheep grazing permit is waived without preference, including separation of domestic sheep and bighorn sheep, consistent with State bighorn sheep management plans, mitigating the threat of pathogen transfer from domestic sheep or domestic goats to bighorn sheep pursuant to a new site-specific memorandum of understanding, leaving allotments vacant, working with the State of Utah to remove or translocate bighorn sheep, and other options that would provide separation of the species or that would reduce the threat of pathogen transfer from domestic sheep and domestic goats to bighorn sheep.

### *Social and Economic Contributions*

Under alternative B modified, the forest plan emphasizes a sustainable level of goods and services, such as wilderness, fish and wildlife, recreation opportunities and access, timber, energy resources, livestock use, and infrastructure, as determined by resource-specific desired conditions. These goods and services would help support local and regional populations. The goal would be the support of ecosystem services associated with forest products, as well as those that contribute to the quality of life and sense of place for both present and future generations; this includes the support of aquatic and terrestrial ecosystems, clean air and water, aesthetic values, cultural heritage values, and recreation opportunities.



## Modifications to Alternative B

Alternative B was modified following input received during the public comment period and through engagement with cooperating agencies. Notable changes between alternative B and alternative B modified are listed below. Note that many of the changes described below and reflected in the forest plan are applicable across alternatives. Refer to appendix B for plan component wording by alternative.

- Air Quality—Updated language on emissions control strategies has been incorporated in guideline FW-GD-AIR-01 and air quality management approach 04.
- Watershed, Aquatic, and Riparian Ecosystems—Objective FW-OB-WATER-01 was updated from “improve the condition class” to “complete all essential projects.” The language in guideline FW-GD-RMZ-05 was clarified to better describe the riparian management zone dimensions.
- Fisheries and Aquatic Ecosystems—A guideline was added (FW-GD-FISH-05) that states “Sufficient habitat should be provided to maintain viable native and desirable nonnative fish and amphibian species.”
- Forest Vegetation—A factual correction was made to the acres of treatment from 1,500 to 2,400 acres in objective FW-OB-CONIF-01, which now reads, “Complete forested vegetation management treatments, such as timber harvest, planned ignitions, thinning, and planting, every year on an average of 2,400 acres annually . . .”
- Fire and Protection of Highly Valued Resources or Assets— Objective FW-OB-FIRE-03 is now guideline FW-GD-FIRE-04. Two indicators for MON-FIRE-02 were added to monitor FW-FIRE-OBJ-01 and 02. A goal (previously only in Alternative D) was added to promote collaboration to increase the percentage of fire-resilient landscapes around HVRAAs (see FW-GO-HWRA-02).
- Adapting to Climate Change: Goal FW-GO-CLIM-01 was clarified and now reads, in part: “Consider and incorporate climate adaptation strategies, approaches, and tactics in the development and design of projects and activities for resource management on the Ashley National Forest...”
- Carbon Storage and Sequestration—A desired condition was added (FW-DC-CARBON-02) related to rangeland carbon stocks.
- Wildlife and Special Status Species
  - ◆ Bighorn sheep: Management direction for bighorn sheep was updated; see plan wildlife guidelines (FW-GD-WILDL-09 and 10) and goals (FW-GO-WILDL-03). Modifications include updated direction for providing separation between domestic sheep and bighorn sheep, focusing on collaboration with State agencies, utilizing memorandums of understanding, and applying site-specific management strategies described in domestic sheep permit annual operating instructions.
  - ◆ Sage-grouse: A guideline (FW-GD-WILDL-11) was added stating, “Management actions should avoid degradation of occupied sage-grouse habitat,” with specific dates to avoid disturbances and compensatory mitigation.
  - ◆ Native bumble bees: A guideline was added to restrict the use of commercial apiaries if there is a threat of pathogen transfer from commercial apiaries to native bumble bees (see FW-GD-WILDL-12).
  - ◆ Migratory birds: A guideline was added to evaluate the effects of ground-disturbing and vegetation management activities on birds of conservation concern identified by the U.S. Fish and Wildlife Service and, as practical, mitigate activities to lessen impacts to birds of

conservation concern identified by the U.S. Fish and Wildlife Service (see FW-GD-WILDL-14).

- ◆ Wildlife corridors: A management approach that directs the evaluation of the effects of ground-disturbing and vegetation management activities on migrating ungulates and connective habitat was changed to a guideline and the following language was added to this guideline; “and, as practical, mitigate activities to lessen the impact to migrating ungulates” (see FW-GD-WILDL-15).
- Social and Economic Sustainability—A goal (FW-GO-SOCEC-01) was revised to include developing a common understanding with partners of the important socioeconomic contributions, “particularly in environmental justice communities where residents are more vulnerable to shifts in social and economic conditions.” A monitoring question (MON-SOCEC-02) and indicator were added to monitor the extent to which the Ashley National Forest is “contributing to social and economic sustainability for local populations of environmental justice concern, including Native American tribes.”
- Areas of Tribal Importance— Three goals were added to the plan (FW-GO-TRIBE-01 to 03). The first goal focuses on collaboration with the Ute Indian Tribe to facilitate solutions to issues that are important to the Tribe, including public access to NFS lands via roads on tribal lands. Goal 02 outlines regular meetings with the Ute Indian Tribe at the staff and leadership level so that the tribal perspectives, needs, concerns and traditional ecological knowledge are better understood and integrated into project design and decisions when appropriate. Goal 03 focuses on developing a better understanding by law enforcement officers, forest protection officers, and resource specialists of reserved Native American treaty rights related to hunting, fishing, and gathering on the Ashley National Forest. A management approach under Working and Coordinating with Tribes, Partners, and Cooperators (11) was added to “Develop a government-to-government tribal consultation agreement or protocol with the Ute Indian Tribe to enhance coordination and collaboration on projects within areas of tribal interest.”
- Timber—Clarifying language was added to the introduction on timber harvest and timber production; language was added to a desired condition related to “Harvest for timber production and for purposes other than timber production” (see FW-DC-TIMB-02). Annual timber sale harvest objectives (FW-OB-TIMB-01 and 02) were clarified, and a footnote was added that states, in part, “Estimates of timber outputs may be larger or smaller on an annual basis over the life of the plan, if legal authorities, management efficiencies, or unanticipated constraints change in the future.” Goal 01 in the draft forest plan was changed to a desired condition (FW-DC-TIMB-04).
- Livestock Grazing—Livestock grazing management direction was edited to provide for additional site-specific flexibility (see guidelines FW-GD-GRAZ-01 and 02).
- Energy and Minerals—Goals in the plan were changed to desired conditions (FW-DC-MINL-10 through 12).
- Geologic Resources and Hazards—Goals 03 and 04 in the plan were changed to desired conditions (FW-DC-GEOL-07 and 08).
- Recreation—The summer ROS acres were updated. Primitive acres are now 276,400 (from 286,700), and semiprimitive acres increased to 362,300 (from 351,900 acres). SIOs were updated as follows: acres of very high scenic integrity were reduced by approximately 10,000 acres, and acres of moderate and low scenic integrity increased. These changes are a result of not carrying forward recommended wilderness as a management area.

- Lands Special Uses—Information about the Central Utah Project was added to the section’s introduction. A guideline (FW-GD-LANDSU-03) and a goal (FW-GO-LANDSU-03) were added to address lands withdrawn for Bureau of Reclamation purposes. A management approach (#12 under *Working and Coordinating with Tribes, Partners, and Cooperators*) addresses coordination of management on withdrawn lands. A map of the Central Utah Project withdrawn areas was added to the forest plan.
- Area Direction—This section of the forest plan, previously labeled Management Areas, was subdivided into designated areas and management areas. Additional information was added to the introduction to the “Designated Areas” section, table 16 in the forest plan. Other changes are as follows:
  - ◆ High Uintas Wilderness—Suitability plan components were added related to timber production and harvest and new road construction.
  - ◆ Ashley Karst National Recreation and Geologic Area—A sentence was added to standard (DA-ST-ASKRGA-02): “Existing roads and trails may be rerouted to protect resources from degradation or to protect public safety.”
  - ◆ Sheep Creek Canyon Geologic Area—A suitability plan component related to livestock use was added (DA-SUIT-SCCGA-01).
  - ◆ A National Recreation Trail section was added to the plan with two desired conditions (DA-DC-NRTRAIL -01 and 02) for the Little Hole National Recreation Trail.
  - ◆ Research Natural Areas—Suitability plan components related to livestock use and timber production were added (DA-SUIT-RNA-01 and 02).
  - ◆ Recommended Wilderness—No recommended wilderness was carried forward under alternative B modified. These areas are now allocated as backcountry recreation management areas and remain designated as inventoried roadless areas.
  - ◆ Eligible and Suitable Wild and Scenic Rivers—This is management area direction since the U.S. Congress would need to act on recommendations before these would be considered designated areas. What had been a guideline in the draft forest plan is now a standard (MA-ST-WSR-01).
  - ◆ Historic Ranger Stations—Information was added about the ranger and guard stations in this management area (see table 19 in the forest plan).
- Monitoring Program—This chapter of the plan was revised to include more information on adaptive management. The monitoring table was divided into multiple tables by resource and monitoring questions, and indicators are now numbered. The plan components being monitored for each question were added. Monitoring questions and indicators were reworded, most notably in the watershed- and groundwater-dependent ecosystems section, the social and economic sustainability section, and fire section with two additional indicators (02 and 03) for question MON-FIRE-01.
- A reference list, glossary, and map appendix were added to the plan. Some plan component abbreviations were changed.

## Alternative C

Alternative C emphasizes preservation of the natural setting and the use of passive management (that is, reliance on natural processes for changes to vegetation structure) to move toward desired conditions for

vegetation and fire management. Specific plan components for alternative C are found in table 2-1 and table 2-2, and in appendix B. Maps showing the alternatives are found in appendix A.

## Alternative C in Relationship to Issues

### *Sustainable Recreation*

Under this alternative, the emphasis for recreation would be on backcountry recreation and recreation classes emphasizing a quiet experience. Compared with alternative A, motorized recreation would be reduced due to restrictions on use in backcountry recreation management areas and due to increased acres within the backcountry classification (appendix A, figure 2-2). Conflicts from other land uses with recreation would be reduced under this alternative because timber production and grazing would not be permitted in destination recreation management areas. Under this alternative, additional areas would be managed for high or very high SIOs, with a more natural and natural-appearing scenic character in keeping with the ROS and management area direction (see appendix A, figure 2-10 for locations of SIOs).

### *Designated Areas and Management Areas*

Alternative C includes all existing designated areas (see table 2-1). Alternative C includes four areas (50,200 acres) managed for wilderness characteristics as recommended wilderness areas (appendix A, figure 2-22). Alternative C also would bring forward four additional segments as suitable for inclusion in the National Wild and Scenic Rivers System (appendix A, figure 2-23). A research natural area, Gilbert Bench, would also be added, as compared with the other alternatives.

### *Fire and Fuels Management*

Alternative C would focus fuels management on the use of natural processes, including the use of wildland fire to move toward desired fire regimes with 20 percent of natural, unplanned ignitions managed to meet resource objectives. Under this alternative, the fewest acres are proposed for active vegetation management (that is, using the manipulation of vegetation through silvicultural and forest management practices to meet objectives). Outside of HVRAs, suppression would be emphasized to protect human health and safety or property.

### *Vegetation Management, Timber Harvest, and Sustainable Ecosystems*

Under alternative C, vegetation management is focused on the use of natural processes. Compared with alternative B modified, the areas suitable for timber harvest and the total volume harvested would be reduced. This is due to additional designated areas with limitations on timber harvest, limiting vegetation management in inventoried roadless areas, and fewer vegetation management projects that could contribute to timber yields, compared with other alternatives.

This alternative would emphasize preservation of the natural setting through additional protections in recommended designated areas as well as additional restrictions on resources uses. Alternative C would emphasize maintenance or improvement of wildlife habitat through the same coarse-filter/fine-filter approach as under alternative B modified but through greater use of natural unplanned ignitions. Forage for livestock would be limited to a level of 40 percent utilization and a stubble height of 4 inches.

To minimize the risk of contact between domestic sheep and bighorn sheep, this alternative would include the same collaboration with the State agencies and site-specific strategies in permit annual operating instructions as is included in alternative B modified. This alternative would also include more stringent plan direction for separation from domestic sheep. New domestic sheep or goat allotments would not be permitted within bighorn sheep core herd home ranges. In addition, when domestic sheep or goat grazing permits are voluntarily waived without preference, and if the allotment does not provide separation from

bighorn sheep, the allotments would be closed to provide separation between domestic sheep and goats and bighorn sheep.

### *Social and Economic Contributions*

Under alternative C, as under all alternatives, social and economic contributions from the Ashley National Forest would be retained. Under alternative C, management would support visitors who value a natural visual setting and nonmotorized recreation experiences. In addition, an increased emphasis on habitat connectivity would support ecosystem services associated with this value, including habitat for hunting, fishing, and wildlife viewing. Ecosystem services associated with clean water could benefit from the decreased emphasis on motorized use and a reduction in mechanical vegetation treatments.

### **Modifications to Alternative C**

Notable changes between alternative C in the draft EIS and alternative C in the final EIS are summarized below:

- Forest vegetation—The objective for average annual vegetation management treatments was updated from 1,000 acres (800 acres in the second decade) to an average of 1,800 acres annually (1,600 acres in the second decade). A factual correction was made to Alternative B Modified and the other alternatives were corrected accordingly.
- Wildlife—Direction for minimizing contact between domestic sheep and bighorn sheep was updated by focusing on applying site-specific management strategies described in domestic sheep permit annual operating instructions. Also, guidelines related to closing domestic sheep or goat grazing allotments were revised.

### **Alternative D**

This alternative includes the fewest restrictions on resource use. The focus under this alternative is on accomplishing desired conditions by shared funding and cooperation with partners. Specific plan components for alternative D are found in tables 2-1 and 2-2 and in appendix B. Maps showing the alternatives are found in appendix A.

### **Alternative D in Relationship to Issues**

Features of alternative D in relationship to the issues used for alternatives development identified above include:

#### *Sustainable Recreation*

Alternative D would emphasize increased motorized forest access and developed recreation opportunities. Motorized use would be permitted in backcountry recreation management areas, and objectives across management areas would emphasize increased roads, trails, and recreation infrastructure. Under alternative D, more areas would be included in moderate or low SIOs with a slightly altered scenic character, following the emphasis on a more developed recreation setting (see appendix A, figure 2-11).

#### *Designated Areas and Management Areas*

Alternative D includes all existing designated areas (see table 2-1). There would be no recommended wilderness areas. Two river segments, the Green River (13 miles) and Upper Uinta River (40 miles), would be managed as suitable for inclusion in the National Wild and Scenic Rivers System; however, no additional segments would be added.

### ***Fire and Fuels Management***

Alternative D encourages use of a full range of fire suppression strategies and tactics. In addition, all fuels treatments would be designed to support the protection of developed resources and to decrease fire behavior. Within HVRAs, use of wildland fire to support other management objectives would not be permitted, maximizing protection of resources in these areas.

Under alternative D, more acres would be treated through mechanical and prescribed fire fuels treatments, up to 40,000 acres per year, focusing on assets and not on natural resource protection. Through collaboration with partners, the Forest Service would seek to achieve the higher-end levels of anticipated vegetation treatment per year to minimize risks from uncharacteristic wildfire for local communities. If there is conflict between the need to mitigate hazardous fuels to protect critical values, particularly human improvements, and other natural resource concerns, alternative D would favor protecting those critical values.

### ***Vegetation Management, Timber Harvest, and Sustainable Ecosystems***

Alternative D would have the fewest restrictions on timber harvest, with the most acres suitable for timber production and the greatest harvest volume. In addition, this alternative would encourage harvesting in areas not suitable for production to accomplish other resource objectives, resulting in an increased harvest. Vegetation management under alternative D would support the highest level of treatment per acre over the life of the plan. For livestock grazing, forage utilization and stubble height under alternative D would be determined based on site-specific conditions to meet desired conditions, as under alternative A.

Under alternative D, management for wildlife would emphasize support for wildlife habitat while limiting the impacts on other land uses. Plan components for soil and water would provide fewer limitations on use compared with the other action alternatives. To minimize the risk of contact between domestic sheep and bighorn sheep, this alternative would include the same collaboration with the State agencies and site-specific strategies in permit annual operating instructions as are included in alternative B modified. This alternative would also utilize closed, vacant allotments or forage reserves outside of bighorn sheep core herd home ranges when permitting new allotments for domestic sheep or goats.

### ***Social and Economic Contributions***

Alternative D would emphasize active management of resources and promote partnerships to achieve higher-end targets of vegetation management and timber harvest. Active suppression of wildfire and fuels treatment in HVRAs would also emphasize the protection of developed resources for local communities and minimize distribution of historical uses in the forest, including timber and livestock grazing. This would support ecosystem services associated with these provisioning services. In addition, alternative D would emphasize accessibility to the Ashley National Forest, promoting increased motorized use. Support for ecosystem services associated with undeveloped recreation settings, naturalness, and passive management of resources would not be emphasized under this alternative. Since this alternative is dependent on partnering to develop new recreation and timber opportunities, if partnership funding is not available, recreation and timber objectives may not be achieved.

### **Modifications to Alternative D**

Notable changes between alternative D in the draft EIS and alternative D in the final EIS are summarized below:

- Forest Vegetation—In objective FW-OB-CONIF-01, a factual correction was made to the acres of treatment to an average of 2,500 acres annually from 1,600 acres.

- **Livestock Grazing**—Livestock grazing guidelines that focus on development of site- and species-specific annual indicators were added. Also, grazing management strategies at the allotment management plan level were described using annual monitoring indicators and multiyear vegetation trend data to determine whether allotments are meeting desired conditions.
- **Wildlife**—Direction for minimizing contact between domestic sheep and bighorn sheep was updated by focusing on collaboration with State agencies, utilizing memorandums of understanding, and applying site-specific management strategies described in domestic sheep permit annual operating instructions. The domestic sheep and goat grazing guidelines were revised to utilize closed, vacant allotments or forage reserves outside of bighorn sheep core herd home range when permitting new allotments for domestic sheep or goats.

## **Alternatives Considered but Not Given Detailed Study**

The Council on Environmental Quality requires Federal agencies to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14(a)). Public comments received during scoping provided suggestions for alternative methods for achieving the purpose of and need for action. Some of these alternatives were outside the scope of the purpose of and need for action, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary harm. These alternatives, and the subsequent agency rationale as to why they were not given further detailed study, are described below.

### **Travel Management Decisions Alternative**

Commenters requested an alternative that provides travel management decisions, including an assessment and inventory of roads, route designations, and over-snow vehicle use for winter recreation. Determinations related to the designation of roads, trails, and areas for motor vehicle use (36 CFR 212(b)) and over-snow vehicle use (36 CFR 212(c)) are site-specific decisions and are not addressed at the forest plan level. Travel management planning occurs outside of the forest plan revision process; however, the forest plan may provide context and guidance for future travel management decisions. For this reason, an alternative that evaluates travel management decisions was considered but not evaluated in detail.

### **Leasing Availability Decisions Alternative**

Commenters requested changes to fluid mineral leasing stipulations, including no surface occupancy stipulations for the Flaming Gorge National Recreation Area, inventoried roadless areas, and occupied sage-grouse habitat within priority habitat management areas. This alternative was considered but not evaluated in detail because leasing availability decisions are not within the scope of the need for change. Leasing availability decisions were evaluated in the 1997 Western Uintas Basin Oil and Gas Leasing EIS.

### **Tribal Geographic Area Alternative**

Commenters requested an alternative that identifies separate management for the portion of the Ashley National Forest that is within the original boundary of the Uintah and Ouray Reservation as a way to recognize the tribe's treaty rights to this area. This alternative was considered but not evaluated in detail because it is not appropriate for the Forest Service, in the context of forest plan revision, to draw conclusions about the legal status of the land within the original reservation boundary that is now a part of the Ashley National Forest.

### **Increasing Amount of Forested Areas**

Commenters requested that the Forest Service analyze an alternative that emphasizes the need to increase forestation of non-forested areas. This alternative was considered but not evaluated in detail because it is

not within the scope of the plan revision; it does not meet the need for change. The Forest Service is directed to maintain the diversity of ecosystems, including non-forest ecosystems. The 2012 Planning Rule requires that “[t]he plan must include plan components, including standards or guidelines, to maintain or restore the diversity of ecosystems and habitat types throughout the plan area.” The encroachment of conifers in sagebrush communities (a non-forested vegetation type) and the importance of management prescriptions to maintain these communities are discussed in chapter 3.

## Comparison of Alternatives

This section provides a summary comparison of alternatives. Plan components and management direction have been fully developed for alternative B modified (the forest plan). Table 2-2 and table 2-3 summarize the differences in management direction for resource areas that can be compared quantitatively or qualitatively by alternative. Information in table 2-2 and table 2-3 demonstrates the variation in alternatives, but it does not provide the full text for alternatives C or D. Rather, for convenience, the tables simply show differences in the alternatives, compared with alternative B modified. The forest plan includes the full text for the plan components of alternative B modified as well as other plan content. This document is the core document upon which other alternatives can be compared; it shows the proposed organization and layout of the final forest plan.

Appendix B, Comparison of Action Alternative Plan Components, includes the full text for plan components that vary by alternative. Plan components that are not shown as varying in appendix B would be carried forward in all action alternatives. The Forest Service determined it was easier to see differences in this format rather than providing four full alternatives with minor changes between the alternatives. Appendix A, Figures, provides figures demonstrating management that varies by geographic location, including ROS classes, SIO, and management areas. Table 2-2 provides a summary of variation by alternative for forestwide management; table 2-3 compares the differences in management area direction and size.



**Table 2-2. Summary of Plan Content Responding to Forestwide Issues by Alternative**

Resource	Alternative A	Alternative B Modified	Alternative C	Alternative D
<b>Sustainable Recreation</b>				
ROS Primitive (acres)	276,400	276,400	313,000	276,400
ROS Semiprimitive Nonmotorized (acres)	369,600	362,300	333,400	368,200
ROS Semiprimitive Motorized (acres)	282,700	289,000	282,400	280,700
ROS Roaded Natural (acres)	437,100	438,200	437,000	416,300
ROS Rural (acres)	10,600	10,600	10,600	34,900
SIO Very High	243,200 <sup>1</sup>	273,600	323,600	273,600
SIO High	457,700 <sup>1</sup>	436,100	686,300	240,000
SIO Moderate	304,400 <sup>1</sup>	425,800	320,400	596,100
SIO Low	351,000 <sup>1</sup>	240,700	45,900	266,500
SIO Very Low	15,000 <sup>1</sup>	0	0	0
<b>Fire and Fuels Management</b>				
Acres proposed for fuels treatment to move toward or maintain desired vegetation conditions (approximate acres per year)	No comparable plan components	6,600 to 32,000 acres per year	Same as alternative B modified	10,000 to 40,000 acres per year

<sup>1</sup> The 1986 Forest Plan was completed using the Visual Management System (Forest Service 1974) where the term “Visual Quality Objectives” (VQOs) was used to define visual resource management goals. In 1995, the Forest Service updated the Visual Management System to the Scenery Management System and the term “Scenic Integrity Objectives” (SIOs) was adopted in place of VQOs. A crosswalk was used to align SIO and VQO terminology. See Appendix A of Landscape Aesthetics: A Handbook for Scenery Management (Forest Service 1995) for a terminology crosswalk.

<b>Resource</b>	<b>Alternative A</b>	<b>Alternative B Modified</b>	<b>Alternative C</b>	<b>Alternative D</b>
Manage natural, unplanned ignitions to meet resource objectives across the entire Ashley National Forest (average percentage over 10-year period)	No comparable plan components	10 percent of the ignitions	20 percent of the ignitions	5 percent of the ignitions
Annual vegetation treatment around HVRAs during the first 5 years of the plan (acres)	No comparable plan components	1,000 to 3,000 acres	No comparable plan component	5,000 to 10,000 acres
<b>Livestock Grazing</b>				
Livestock forage utilization and stubble height guidelines	Use levels identified in the allotment management plan (1986 forest plan IV-32)	Site-specific allotment management plans would include utilization and stubble height guidelines; in the absence of these plans, 50 percent utilization for livestock and 4-inch stubble height guidelines	40 percent utilization for livestock and 4-inch stubble height guidelines	In the absence of updated planning or an approved allotment management plan, limit utilization of key forage species to no greater than 50 percent, unless monitoring demonstrates a different allowable use level is appropriate.
Permitted head months <sup>1</sup>	76,922	76,922	76,812	76,922
Permitted grazing (acres) <sup>1</sup>	919,700	919,700	906,700	919,700

Resource	Alternative A	Alternative B Modified	Alternative C	Alternative D
<b>Vegetation Management and Timber Harvest</b>				
Complete forested vegetation management treatments, such as timber harvest, planned ignitions, thinning, and planting, every year to maintain or move toward achieving desired conditions for forested ecosystems (acres)	Regeneration harvests in this decade and the last decade were projected to be an average of 4,000 acres a year; other vegetation treatments not identified	On an average of 2,400 acres (2,100 acres in the second decade) measured on a decadal basis	1,800 acres per year (1,600 acres in the second decade of the plan)	2,500 acres per year (2,200 acres in the second decade of the plan)
Acres suitable for timber production	528,000 <sup>2</sup>	109,800	80,500	114,300
Acres suitable for timber harvest	No areas identified for timber harvest under alternative A	189,400	93,700	189,400
Average annual timber sale quantity (100 cubic feet [CCF]/1,000 board feet [MBF]) in first decade	3,557 CCF (1,723 MBF) <sup>3</sup>	3,806 CCF (1,145 MBF)	2,822 CCF (795 MBF)	3,956 CCF (1,190 MBF)
Average annual wood sale quantity in first decade	N/A (allowable sale quantity for the planning period is 21 million board feet [MMBF])	3,806 CCF (1,145 MBF)	2,822 CCF (795 MBF)	3,956 CCF (1,190 MBF)

Resource	Alternative A	Alternative B Modified	Alternative C	Alternative D
<b>Wildlife</b>				
Bighorn sheep	<p>Sheep allotments that remain unutilized for a period of 5 years may be considered for conversion to another class of livestock or closed</p>	<p>When a domestic sheep or goat grazing permit for an allotment is voluntarily waived without preference, and if the allotment does not provide separation from bighorn sheep, then authorized use of the allotment should provide separation of domestic sheep and bighorn sheep by one or more of the following methods: (1) mitigate the threat of pathogen transfer from domestic sheep and domestic goats to bighorn sheep consistent with the most current State bighorn sheep management plans, (2) mitigate the threat of pathogen transfer from domestic sheep and domestic goats to bighorn sheep in accordance with reasonable management guidelines pursuant to a new site- specific memorandum of understanding, (3) leave the allotment vacant of domestic sheep and domestic goats, (4) work</p>	<p>Domestic sheep or goat grazing allotments that are voluntarily waived without preference and that do not provide separation from bighorn sheep would be closed to provide separation of domestic and bighorn sheep.</p>	<p>No comparable guideline.</p>

<b>Resource</b>	<b>Alternative A</b>	<b>Alternative B Modified</b>	<b>Alternative C</b>	<b>Alternative D</b>
Bighorn sheep <i>(cont.)</i>	<i>(continued)</i>	with the State of Utah to remove or translocate bighorn sheep, or (5) implement another method that would provide separation of the species or that would reduce the threat of pathogen transfer from domestic sheep and domestic goats to bighorn sheep.	<i>(continued)</i>	<i>(continued)</i>
Bighorn sheep	No comparable plan direction.	New permitted domestic sheep or goat allotments should not be authorized unless the Ashley National Forest determines, based on local information and the best available science, that separation of the allotment from bighorn sheep will be obtained. This guideline does not apply to the use of pack goats for recreational use, nor to existing domestic sheep or goat grazing permits waived with preference.	Do not issue new domestic sheep or goat grazing permits within current bighorn sheep core herd home range.	Utilize closed, vacant allotments, or forage reserves outside of bighorn sheep core herd home range when permitting new allotments for domestic sheep or goats.

<sup>1</sup> Excludes allotments administered by the Bureau of Land Management.

<sup>2</sup> Current plan direction for acres suitable for timber production does not account for roadless area restrictions.

<sup>3</sup> The MBF estimate for alternative A is based on the average amount of timber volume harvested annually in the past 10 years, including salvage timber volume; alternatives B modified, C, and D do not include salvage timber volume.

**Table 2-3. Summary of Plan Content by Alternative for Management Areas and Areas Administratively Recommended for Designation**

<b>Resource</b>	<b>Alternative A</b>	<b>Alternative B Modified</b>	<b>Alternative C</b>	<b>Alternative D</b>
<b>Backcountry Recreation Management Areas</b>				
Backcountry management areas size (acres)	No equivalent backcountry management area under alternative A	404,200	739,700	299,000
Timber harvest in backcountry management areas	No equivalent backcountry management area under alternative A	Suitable	Not suitable	Suitable
Motorized use	No equivalent backcountry management area under alternative A	Suitable	Not suitable	Suitable
<b>Destination Recreation Management Areas</b>				
Destination recreation management areas size (acres)	No equivalent destination recreation management area under alternative A	29,000	23,200	34,200
Acres suitable for timber production in destination recreation management areas	No equivalent destination recreation management area under alternative A	2,900	900	3,200
Grazing (permitted acres) in destination recreation management areas	No equivalent destination recreation management area under alternative A	13,000 acres currently have active allotments	None	13,000 acres currently have active allotments
<b>General Recreation Management Areas</b>				
General recreation management area size (acres)	No equivalent general recreation management area under alternative A	670,000	340,100	769,800
<b>Recommended Wilderness Areas</b>				
Recommended wilderness areas size (acres)	0	0	50,200	0
Recommended wilderness areas (number)	0	0	4	0

<b>Resource</b>	<b>Alternative A</b>	<b>Alternative B Modified</b>	<b>Alternative C</b>	<b>Alternative D</b>
<b>Research Natural Areas</b>				
Research natural areas size (acres)	7,700 acres	Same as alternative A	9,100	Same as alternative A
Research natural areas (number)	7	Same as alternative A	8	Same as alternative A
<b>Wild and Scenic Rivers</b>				
Wild and Scenic Rivers—suitable (miles)	Green River (13 miles); Upper Uinta River (40 miles)	Same as alternative A	Green River (13 miles); Upper Uinta River (40 miles); Dowd Creek (3.1 miles); Honslinger Creek (2.3 miles); Spring Creek 2 (6.8 miles); North Skull Creek (1.8 miles)	Same as alternative A

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# Chapter 3

Affected Environment and Environmental  
Consequences

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# Chapter 3. Affected Environment and Environmental Consequences

## Introduction

This chapter describes the existing environment of the Ashley National Forest and the potential consequences to that environment from implementing the range of alternatives described in chapter 2. Land management plans do not authorize or mandate any site-specific projects or activities, including ground-disturbing activities; however, there may be socioeconomic implications, or long-term environmental consequences, of managing the Ashley National Forest under this programmatic framework. Those environmental consequences are described in this chapter. Consequences are based on predicted implementing activities and are meant to compare alternatives on a programmatic level rather than provide exact measurements of effects; therefore, this document does not predict what would happen each time plan components are implemented.

## Analysis Methodology

### Best Available Scientific Information

The 2012 Planning Rule requires the responsible official to use the best available scientific information to inform the development of the forest plan, including plan components, the monitoring program, and plan decisions. The analysis in this chapter relies on peer-reviewed and technical literature, existing geospatial data, modeling tools and approaches, local information, workshop outputs, and information received during public participation periods. Data sources were screened for accuracy, reliability, and relevancy.

### Assumptions Common to All Resources

The following assumptions are common to all resources in this analysis:

- No direct environmental effects will result from the administrative action of developing or revising the forest plan. Projects, activities, and authorizations will not be approved or otherwise authorized based on the content of the forest plan; however, they must be consistent with plan components, which include desired conditions, objectives, standards, guidelines, and suitability determinations.
- Components of the forest plan and individual projects and activities reflect compliance with current Federal, State, and local laws and regulations and United States Department of Agriculture (USDA) and Forest Service policy.
- Plan decisions (desired conditions, objectives, standards, and guidelines) and other plan direction (management areas and monitoring) will guide future planning decisions and implementation of site-specific projects and activities.
- Funding levels will be similar to those of the past 5 years.
- Effects analyses are applicable for the expected life of the forest plan, which is estimated to be approximately 15 years. Other time frames may be specifically analyzed, depending on the resource and potential consequences.
- Visitation and use of Forest lands and facilities will increase during the life of the plan.

- The spatial extent for most resources is the plan area, as defined in chapter 1. Resources may have different spatial extents, which will be defined in those resource sections.
- Monitoring in the forest plan’s “Chapter 4. Plan Monitoring Program” for progress toward or maintenance of desired conditions and objectives will occur for the life of the plan. The plan will be amended, or management activities will be adjusted, as needed.
- Individual proposed actions are not evaluated in this environmental impact statement (nor are they defined by specific location, design, or extent. Rather, the effects described are generic and are used to compare the relative effects of alternatives on a forestwide basis.
- There may be minor discrepancies between the surveyed acres from the Ashley National Forest administrative boundary and the GIS layers used to define administrative or other area boundaries.

## Ecological Sustainability and Diversity of Plant and Animal Communities

### Air Quality

#### Introduction

Air quality is a critical resource protecting ecosystem health, human health, and the enjoyment of clear visibility in the national forest. Air pollutants, either by themselves or after chemical transformations in the lower atmosphere, can cause negative impacts on ecosystems, including changes in soil and water chemistry from nitrogen and acid deposition, damage to sensitive vegetation due to chronic and elevated ozone exposure, and increased visibility impairment in scenic areas. High concentrations of pollutants can also have adverse effects on people who visit, recreate, or work in the national forest.

The Forest Service is committed to monitoring and protecting air quality on National Forest System lands. Air quality is dependent on the type and amount of pollutants emitted into the atmosphere, ground topography, and prevailing weather conditions. Sources of air pollution in the Ashley National Forest include timber and mining operations, prescribed fire, road dust, transportation, and other combustion engine sources. When they occur, wildfires are also a large source of emissions. A small portion of the national forest also contains emission sources related to oil and gas development. Air pollution sources outside of the Ashley National Forest affecting the national forest include agricultural sources such as dairies and feedlots, fertilizer application, crop burning, and emissions from industrial sources and urban areas. Air quality also is affected by long-range transport of point and area source emissions via continental airflow patterns (Forest Service 2017b).

#### *Regulatory Framework*

**Clean Air Act of 1970 (42 USC 7401 et seq.), as amended**—This act provides the framework for protecting air quality at the national, state, and local levels. The act designates the US Environmental Protection Agency (EPA) as the chief regulatory body of air resources in the United States, but it allows some states to have management authority to implement their own air quality legislation, monitoring, and control measures. In Utah, air pollution is regulated by the Department of Environmental Quality’s Division of Air Quality. In Wyoming, air pollution is regulated by the Department of Environmental Quality’s Air Quality Division. Regulatory oversight of the Clean Air Act resides with the EPA and the States of Utah and Wyoming.

National Ambient Air Quality Standards (NAAQS). Under the authority of the Clean Air Act, the EPA has set time-averaged NAAQS for six criteria air pollutants considered harmful to human health and welfare: carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, lead, and two categories of particulate matter (particulate matter less than 10 micrometers in diameter [PM<sub>10</sub>] and particulate matter less than 2.5 micrometers in diameter [PM<sub>2.5</sub>]). The NAAQS consist of primary and secondary standards. The former provides requirements for public health, particularly sensitive populations such as asthmatics, children, and the elderly; the latter incorporates public welfare provisions, such as the protection of visibility, wildlife, crops, vegetation, and buildings. Any area that violates the NAAQS for any of the six criteria pollutants is designated as a non-attainment area. A maintenance area is a non-attainment area that has been re-designated to attainment status subject to submission and approval of a maintenance plan. The Utah Department of Environmental Quality, Division of Air Quality and the Wyoming Department of Environmental Quality, Air Quality Division are responsible for ensuring compliance with the NAAQS within their respective states.

Clean Air Act Conformity. The general conformity provisions of the Clean Air Act (section 176(c)) prohibit Federal agencies from taking action within a nonattainment or maintenance area that causes or contributes to a new or existing violation of the standards or delays the attainment of a standard. National Forest System lands that fall within nonattainment or maintenance areas are subject to these requirements. The Ashley National Forest has a 70-acre portion of land within the Unita Basin 8-hour ozone nonattainment area and a 3,900-acre portion within the Utah County PM<sub>10</sub> maintenance area. General conformity regulations must be met by the Ashley National Forest for any Forest Service actions, including those actions permitted or funded within these areas. This means every Forest Service action that produces air pollutants in the nonattainment or maintenance area must be evaluated for its effect on that area.

Prevention of Significant Deterioration (PSD). The Clean Air Act Amendments of 1977 created the PSD permitting program to preserve the clean air usually found in pristine areas. Its purpose is to prevent violations of the NAAQS and to protect air quality and visibility in pristine areas. The amendments designated national parks larger than 6,000 acres and national wilderness areas larger than 5,000 acres and established before 1977 as mandatory class I areas that would be afforded additional protections from air quality impairment. Areas not designated as class I are classified as class II. For class II areas, greater incremental increases in ambient pollutant concentrations are allowed as a result of controlled growth. There are no class I areas in or near the Ashley National Forest. The High Uintas Wilderness is a class II wilderness area managed by the Forest Service. It lies partly within the Ashley National Forest and partly within the Uinta-Wasatch-Cache National Forest.

**Wilderness Act and National Forest Management Act, including the 2012 Planning Rule**—The Wilderness Act requires management to ensure that wilderness character is preserved in all wilderness areas, regardless of whether they are class I or class II areas. Air quality has been chosen by the Forest Service as a mandatory measure of wilderness character for which certain aspects of air quality are indicators. The National Forest Management Act (NFMA) states that national forests are ecosystems whose management requires an awareness and consideration of the interrelationships of environmental factors, including air quality, within such ecosystems. The 2012 Planning Rule requires the Forest Service to assess sensitive air quality areas and emissions affecting these areas, and to use critical loads of air pollutant deposition as a way to track ecological conditions and trends of resources that are affected by air quality. Forest plans must include components to maintain or restore air quality.

**Smoke Management Programs**—In compliance with EPA direction, the States of Utah and Wyoming have implemented smoke management programs intended to prevent deterioration of air quality and exceedances of the NAAQS and to minimize smoke impacts on national forest visitors and nearby

communities from prescribed burning. Prescribed burning in the Ashley National Forest is subject to the regulations of the States of Utah and Wyoming, and the Forest Service coordinates with and complies with their regulations. These regulations determine the conditions under which burning can occur, to be protective of air quality and visibility in an airshed.<sup>1</sup> Smoke management agencies coordinate and, if necessary, limit prescribed burn activities within an airshed to minimize smoke-related impacts on human health and visibility in that airshed.

### *Analysis Area*

Air quality is affected by emission sources and pollutants, weather patterns, terrain, and prevailing winds. Primary and secondary pollutants are formed through chemical reactions in the atmosphere from precursor pollutants. The region of influence for a pollutant depends on the rate of emissions from a source, the elevation of the source, the type of pollutants, and the meteorological conditions that determine dispersion and dilution during transport from the emissions source. The region of influence for air pollutants ranges from very close to the source to hundreds of miles away.

The analysis area for the evaluation of effects on air quality from forest plan alternatives includes the airsheds in which the Ashley National Forest is located. The Utah portion of the Ashley National Forest is in Utah smoke management airsheds 7 and 9. Airshed 7 encompasses the north slope of the Uinta Mountains and Ashley National Forest, north to the Utah-Wyoming state line. Airshed 9 encompasses the south slope of the Uinta Mountains and Ashley National Forest, as well as the South Unit of the Ashley National Forest in the Tavaputs Plateau. This airshed is roughly equivalent to the Uinta Basin, a geologic depression bounded by the Wasatch Range on the west, the Uinta Mountains on the north, uplifted areas in northwestern Colorado on the east, and a broad east-west strip of higher plateau, which includes Tavaputs Plateau, rising sharply to the south. The State of Wyoming does not have predefined smoke management airsheds (Forest Service 2017b).

Because air flows freely across boundaries, and pollutant sources include local and long-range sources covering vast landscapes, the analysis discusses air quality across the entire Ashley National Forest. The temporal scope of the analysis is the anticipated life of the plan.

### *Notable Changes Between Draft and Final EIS*

Changes between the draft and final EIS were made to reflect changes in the impacts from the alternative B modified direction, including addition of updated language on emissions control strategies in guideline FW-GD-AIR-01. Analysis was also updated to correct factual errors, to provide more air quality trends data, and to expand the description of reasonably foreseeable actions in the cumulative effects analysis.

## **Description of Affected Environment**

### *Air Quality Conditions*

The Clean Air Act requires each state to identify areas that have ambient air quality in violation of the NAAQS using monitoring data collected through State monitoring networks. Areas that violate air quality standards are designated as nonattainment areas for the relevant criteria air pollutants, while areas that comply with air quality standards are designated as attainment areas for the relevant criteria air pollutants. Areas that have been redesignated from nonattainment to attainment are considered maintenance areas, and areas of uncertain status due to insufficient monitoring data are generally designated as unclassifiable but are treated as attainment areas for regulatory purposes.

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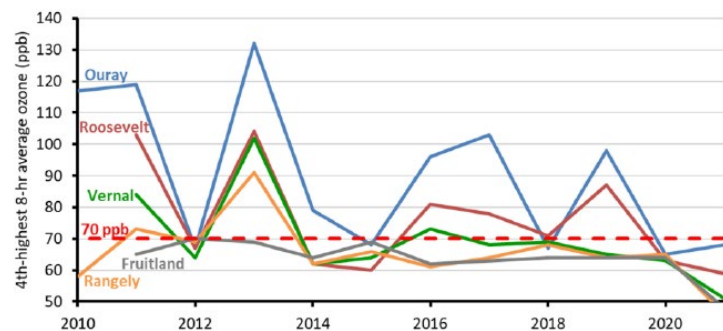
<sup>1</sup>The States of Utah and Wyoming have designated airsheds for smoke management purposes.

Most of the Ashley National Forest is designated as attainment or unclassifiable for the NAAQS (EPA 2020a). In 2018, the EPA designated portions of the Uinta Basin in marginal nonattainment status for elevated levels of wintertime ozone; a 70-acre portion of the Ashley National Forest north of Vernal is at the northeast extreme of this nonattainment area boundary. In addition, approximately 3,900 acres of the national forest, in Utah County, are in a PM<sub>10</sub> maintenance area.

Other non-attainment areas exist in the region with the potential to affect air quality on the Ashley National Forest. Portions of Utah's Wasatch Front metropolitan area, approximately 40 miles west of the Ashley National Forest, are in nonattainment for ozone, sulfur dioxide, PM<sub>10</sub>, and the 24-hour PM<sub>2.5</sub> NAAQS; portions of the Logan/Cache Valley area, approximately 70 miles northwest of the Ashley National Forest, are in nonattainment for the 24-hour PM<sub>2.5</sub> NAAQS. There is an ozone nonattainment area approximately 30 miles north of the FGNSA in Wyoming (EPA 2020b).

The Forest Service Rocky Mountain Research Station conducted ozone monitoring at one site in the Ashley National Forest. This site was part of an ozone study of remote, nonurban mountain areas in national forests in Colorado and northeastern Utah (Musselman and Korfmacher 2014). This site was located at Dutch John heliport near Flaming Gorge and was operated between 2010 and 2014. The results of the study indicated that ozone rarely exceeded 100 parts per billion or dropped below 30 parts per billion (the NAAQS is 70 parts per billion). Daily changes in concentration indicated that mixing of nitrogen oxides, volatile organic compounds, and ozone favored stable ozone concentrations. High ozone concentrations in the spring and at night suggested stratospheric intrusion might contribute to ambient ozone. The highest nighttime concentrations occurred at the highest elevations, while daytime concentrations were not correlated with elevation.

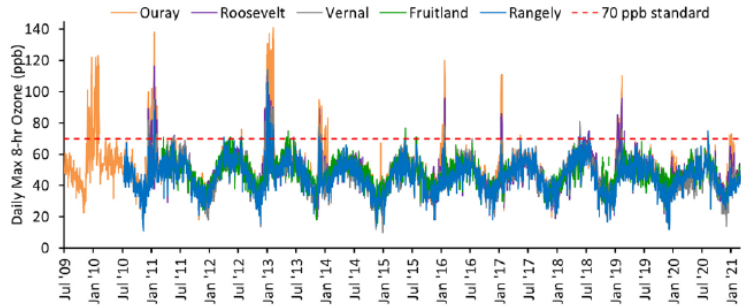
A more recent study of ozone and ozone precursor concentration data at 38 sites in the Uinta Basin showed a decline in ozone concentrations over the past decade, with ozone and nitrogen oxide concentrations trending downward at the rates of about 3 and 0.3 parts per billion per year, respectively. The study attributed the decline to weakening global demand for oil and natural gas and more stringent pollution regulations and controls, both of which have occurred over the previous decade (Mansfield and Lyman 2020). Air monitoring data showed 8-hour ozone concentrations in the Uinta Basin above the NAAQS of 70 parts per billion in many years over the prior decade (Lyman et al. 2021; figure 3-1). The Ouray, Roosevelt, Vernal, and Fruitland monitoring stations are located in towns that lie between the North and South Units of the Ashley National Forest; the Rangely monitoring station is east of the plan area in Colorado. As shown in figure 3-2, elevated ozone concentrations occur primarily in winter months.



**Figure 3-1. 8-Hour Ozone Concentrations in the Uinta Basin (2010–March 2021; Lyman et al. 2021)**

**Sources of Air Pollution Emissions**

Emission inventories provide an overview of the magnitude of air pollution and help inform areas that may be impacting air quality in the Ashley National Forest. These inventories include point, area, and mobile sources, as well as estimated emissions from natural events like wildfire. Emissions inventories are created by quantifying the amount of pollution that comes from point sources (power plants and factories) and area sources (automobiles in a city or oil and gas development). Emissions can also originate from natural events, like wildfire. Some sources originate within the plan area, though most sources of air pollutants originate outside the plan area (Forest Service 2017b).



**Figure 3-2. Time Series of Daily Maximum Ozone Concentrations in the Uinta Basin (2010–March 2021; Lyman et al. 2021)**

The major sources of carbon monoxide, nitrogen oxides, sulfur dioxide, PM<sub>10</sub>, PM<sub>2.5</sub>, and volatile organic compounds are the Wasatch Front metropolitan area, the Wyoming Interstate 80 (I-80) utility corridor, and the Uinta Basin (Forest Service 2017b). Ammonia emissions typically come from both tailpipes and agricultural sources. Emissions for counties in and around the plan area were examined for the last four EPA national emissions inventory cycles (2008, 2011, 2014, and 2017). As shown in table 3-1, below, there was a general decline in most criteria pollutant emissions over this time period, with some exceptions for individual counties. Counties in bold contain portions of the Ashley National Forest, while text in italics indicates a change only between the 2014 and 2017 inventory cycles.

**Table 3-1. Changes in Criteria Pollutant Emission Levels, 2008–2017**

County	Change in Emissions						
	Carbon Monoxide	Volatile Organic Compounds	Nitrogen Oxides	PM <sub>10</sub>	PM <sub>2.5</sub>	Sulfur Dioxide	Ammonia
Cache, Utah	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease
Carbon, Utah	Decrease	<i>Decrease</i>	Decrease	Decrease	Decrease	<i>Decrease</i>	Variable
<b>Daggett, Utah</b>	Decrease	Decrease	Stable	Decrease	Decrease	Decrease	Decrease
Davis, Utah	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease
<b>Duchesne, Utah</b>	<i>Decrease</i>	<i>Decrease</i>	Increase	Stable	Stable	<i>Decrease</i>	Increase
Uinta, Wyoming	Decrease	Decrease	Decrease	Decrease	Decrease	Variable	Variable
<b>Uintah, Utah</b>	<i>Decrease</i>	Increase	Increase	Decrease	Decrease	<i>Decrease</i>	Increase
<b>Utah, Utah</b>	Variable	Decrease	Decrease	Variable	Variable	Decrease	Variable
Salt Lake, Utah	Decrease	Decrease	Decrease	Decrease	Decrease	Stable	Decrease
<b>Summit, Utah</b>	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease	Decrease
<b>Sweetwater, Wyoming</b>	Decrease	<i>Decrease</i>	Decrease	Variable	Decrease	Decrease	Decrease



County	Change in Emissions						
	Carbon Monoxide	Volatile Organic Compounds	Nitrogen Oxides	PM <sub>10</sub>	PM <sub>2.5</sub>	Sulfur Dioxide	Ammonia
Wasatch, Utah	<i>Decrease</i>	Decrease	Stable	Decrease	Decrease	<i>Decrease</i>	Decrease

Source: EPA 2020d

Continued growth in the Wasatch Front metropolitan area and continued energy development in the Uinta Basin and southwest Wyoming will continue to affect air quality and air quality related values, such as visibility and deposition, in the Ashley National Forest.

### *Visibility*

There are no Interagency Monitoring of Protected Visual Environments visibility monitoring sites near the Ashley National Forest. The Forest Service operated a visibility camera on Lake Mountain from 1987 through 2000 and 2010 through 2015. Data from this camera indicated that visibility from Lake Mountain during the period it operated was good, with no impairment from haze (Bevenger 2017). Visibility can be affected by regional haze, plume blight, and episodic events such as wildfires.

### *Deposition and Critical Loads*

Emissions of sulfur dioxide, nitrogen oxides, and other pollutants, such as ammonia, can lead to atmospheric deposition of sulfuric acids, nitric acids, and other pollutants into national forest ecosystems. In sensitive ecosystems, acid compounds can acidify soil and surface waters, affecting nutrient cycling and ecosystem services. Deposition has been monitored at the East McKee National Trends Network site as part of the National Atmospheric Deposition Program since 2017. The Forest Service began operating the East McKee monitoring site on the eastern side of the Ashley National Forest in 2017, but the site has not operated long enough to provide deposition trends.

Critical loads describe the thresholds of air pollution deposition—harmful effects on sensitive ecosystem resources are not expected to occur below this. Critical loads are based on scientific information about expected ecosystem responses to a given level of atmospheric deposition. Nationally, critical loads for nitrogen and sulfur have been developed for many resources. Nitrogen critical loads for the Ashley National Forest have been evaluated for surface water acidification and eutrophication,<sup>2</sup> tree species growth and decadal survival, and lichen species richness and forage lichen abundance. Although the magnitude and extent of exceedances are still being investigated, initial results indicate that both surface water and lichen critical loads may be exceeded in much of the Ashley National Forest.

Recent analysis (McMurray et al. 2021) of deposition critical loads in the national forest have shown areas where nitrogen deposition is high enough to exceed one or more critical loads. Current nitrogen deposition rates indicate an increased risk for surface water acidification for 60 percent of the monitored lakes and an increased risk for early stages of eutrophication in surface waters across 60 percent of the forest. Deposition rates exceed critical loads across portions of the forest for tree species sensitive to increases in nitrogen. It is estimated that current deposition rates represent a greater than 1 percent decline in survival over 10 years for 93 percent of the timber stands where Douglas-fir is dominant or co-dominant, and 6 percent of the timber stands where quaking aspen is dominant or co-dominant.

<sup>2</sup>Eutrophication refers to excessive levels of nutrients in a lake or other body of water, frequently due to runoff from the land, which causes a dense growth of plant life and death of animal life from lack of oxygen.

Critical loads are developed based on modeling potential effects and monitoring responses. The surface water eutrophication critical loads were developed with local data, while tree critical loads were developed from nationwide datasets. Because of this, tree critical loads have more uncertainty. It should also be noted that exceedances of critical loads are a snapshot in time (2019) and do not indicate trends either upward or downward without more years of analysis (McMurray et al. 2021).

Long-term water quality monitoring of high-elevation lakes in the Uinta Mountains has not shown a significant trend toward acidification, but sediment surveys of some lakes reflect increases in lake productivity occurring since the mid-20th century (Hundey et al. 2014).

Another potential concern is deposition of dust from off-forest sources and its effects on high-elevation lakes, water yield, and timing of flows. Research in Utah's Wasatch Range and Colorado's San Juan Mountains indicates windblown dust can accelerate snowmelt and alter the timing of spring runoff (Skiles 2018). A 2018 study in the Wasatch Mountains concluded that a dust event "accelerated snowmelt by approximately 25 percent." In the San Juan Mountains, studies have shown that high dust concentrations "advance melt by 3–7 weeks" (Skiles 2018). Metals and other elements can be carried long distances in the dust, with a potential to influence aquatic organisms. Monitoring of snowpack chemistry at two sites in the Ashley National Forest shows no apparent trends in concentrations of ammonium, nitrate, sulfate, or mercury concentrations (Bevenger 2017).

Specific to the Uinta Mountains alpine zone, dust accumulation rates are similar to values reported for the Wind River Range of Wyoming but less than values for southwestern Colorado. This suggests a south-to-north decrease in regional dust flux (Munroe 2014). Grain analysis suggests the dust has an exotic origin and is not from local geology. There is a recording of an anthropogenic change in dust composition in the Uinta Mountains, linked to settlement of surrounding lowland basins (Reynolds et al. 2010; Munroe et al. 2015). Hundey et al. (2016) reported an increase in nitrate deposition in the Uinta Mountain lake sediments since the mid-20th century; the majority of nitrate is linked to distant agricultural activity and agricultural regions rather than industrial emissions.

#### *Wildfire and Prescribed Fire Smoke*

Wildfire smoke, particularly from large fires, affects air quality in the Ashley National Forest on a seasonal basis. Emissions from wildland fire (wildfire and prescribed fire) can contribute to elevated ambient concentrations of air pollutants, potentially affecting human health and safety. Careful use of prescribed fire during periods when smoke is less likely to affect communities can be a useful tool to prevent the greater impacts from large wildfires. Wildfire impacts are increasingly difficult to manage in national forests due to excessive fuel loads, a history of fire exclusion, an increased urban interface, and climate change (drought and increasing temperatures). Prescribed fire and fuels treatment projects include mastication (chipping), thinning, broadcast burns (area burns designed to reduce fuels in a contiguous area over a landscape), and pile burns (discrete piles of slash from timber harvest or thinning from fuels treatment projects, or both). These treatment techniques are designed to reduce the size, frequency, and intensity of wildfires and improve fire control, increase predictability of fire effects, and allow for smoke emissions management.

#### *Sensitive Air Quality Areas*

There are no class I areas in or near the plan area. The High Uintas Wilderness is a Forest Service-managed class II wilderness area and is in Utah smoke management airsheds 7 and 9. All non-wilderness areas of the Ashley National Forest and FGNRA are designated class II. Wilderness air quality related values and sensitive receptors have been identified for the High Uintas Wilderness area (table 3-2).

**Table 3-2. High Uintas Wilderness Air Quality Related Values and Sensitive Receptors**

<b>Wilderness Air Quality Related Values</b>	<b>Sensitive Receptor</b>
Water	Acid-neutralizing capacity values of high-altitude lakes; macroinvertebrate and other organisms
Fauna	None
Flora	Conifers, other ozone-sensitive species (for example, <i>Populus tremuloides</i> ), and lichen
Soils	None
Scenic Vistas	None

Source: Nick et al. 2012

### Summary

A small portion, approximately 70 acres, of the Ashley National Forest falls within the Uinta Basin 8-hour ozone nonattainment area, and is subject to the general conformity provisions of the Clean Air Act for ozone precursor emissions for general conformity. An additional portion, approximately 3,900 acres, of the southern unit falls within the Utah County PM<sub>10</sub> maintenance area and, therefore, requires general conformity evaluation for particulate matter emissions.

Visitors to the Ashley National Forest and FGNRA generally experience air quality below the NAAQS, except during smoke events. However, critical load modeling suggests current levels of nitrate deposition in western portions of the national forest could be at levels that represent an increased risk for eutrophication/acidification of high-elevation lakes inherently sensitive to changes in nutrient inputs. The area is minimally developed, has limited local emissions sources, and has predominantly very robust air dispersion. The Ashley National Forest is in compliance with each of the NAAQS, except for 70 acres that fall within the northeast boundary of the Uinta Basin marginal ozone nonattainment area.

Wildfire emissions, depending on the year, can be a large source of pollution within and around the Ashley National Forest. Management cannot control the emissions, except indirectly through fire suppression and fuels management. Prescribed fire emissions in the area occur during the spring and late fall. Smoke is managed during prescribed burns following Utah and Wyoming State regulations. Air quality impacts from other resource management activities, such as dust from logging roads and recreational use of National Forest System roads, are generally small and inconsequential. The impacts are not a concern at the forest planning level.

The greatest threat to the Ashley National Forest air quality is anthropogenic sources on lands of other ownership. Urban, industrial, and agricultural air pollution, from both upwind and surrounding source areas, have a potentially persistent impact because many of these emissions occur year-round. Permitted sources are managed by air quality regulatory agencies in Utah and Wyoming, and other upwind states. Although the Ashley National Forest does not have any class I areas to which PSD permitting would apply, the Forest Service does collaborate with the States of Wyoming and Utah on PSD permitting for areas that may affect other class I areas. With large sources, this analysis and consultation may indirectly benefit air quality in the Ashley National Forest.

Currently, areas directly contiguous to most of the Ashley National Forest are in attainment of all the NAAQS. A marginal designation is the least stringent classification for a nonattainment area, and does not require the state to submit a formal state implementation plan to the EPA. However, Utah has been implementing measures to reduce ozone concentrations, including enacting measures to reduce the

emissions of volatile organic compounds and nitrogen oxides in the Uinta Basin marginal ozone nonattainment area from oil and gas operations in the Uinta Basin (Utah DEQ 2020).

The small portion of the Ashley National Forest in Utah County is within the maintenance area for PM<sub>10</sub>. The Utah Department of Environmental Quality has a maintenance plan for Utah County, outlining strategies and controls that have been successful in maintaining air quality below the PM<sub>10</sub> NAAQS (Utah Department of Environmental Quality 2019). The county was redesignated by the EPA to maintenance status on March 27, 2020 (85 *Federal Register* 10989). As described previously, there also are a number of nonattainment and maintenance areas along the Wasatch Front, upwind of the Ashley National Forest. Measures are in place, including through state implementation plans, to reduce emissions in these areas.

## Environmental Consequences for Air Quality

### *Methodology and Analysis Process*

The potential impacts on air quality from management direction given in alternative A are compared with those under the action alternatives (alternatives B modified, C, and D). There are several activities in the Ashley National Forest that are sources of air pollutant emissions and have the potential to affect air quality and air quality related values, such as visibility. Of these activities, prescribed fire and naturally ignited fires managed to meet resource objectives are the forest management actions with the greatest potential to affect air quality. Data are not available to quantify smoke emissions, particularly those resulting from naturally ignited fires managed to meet resource objectives; therefore, the effects from management actions are discussed qualitatively based on the level of proposed fuels treatments and proposed prescribed fire treatments under each alternative and the anticipated outcome of these treatments. Effects are assessed for the short term (within 10 years) and the long term (greater than 10 years).

Sources of ambient pollution, other than prescribed fire and wildfire managed to meet resource objectives, produce emissions in the Ashley National Forest that will not vary greatly by alternative; they are not a significant source of air pollutants, as described under the affected environment. Therefore, these are described but not discussed in detail.

### *Analysis Assumptions*

- Air quality will continue to meet State and Federal ambient air quality standards in attainment areas.
- In the small portion of the national forest within the Uinta Basin ozone nonattainment area, ambient ozone concentrations will move toward attainment.
- It is unknown exactly when, where, or how much wildfire will occur, but the trend of increasing large wildfires and associated high smoke emissions will continue (Hurteau et al. 2014).
- The amount of emissions released from the combustion of vegetation depends on the type of vegetation, density of vegetation, and completeness of combustion.
- The Forest Service will practice smoke management actively with all prescribed fires and naturally ignited fires managed to meet resource objectives. This will include smoke prediction modeling, smoke monitoring, and close coordination with smoke management agencies.
- Climate trends will continue to be warmer and drier than historical conditions. It is expected that these warmer and drier conditions will result in an increase in insect and disease that will contribute to increased fire activity. Additionally, under warmer and dryer conditions, it is

anticipated that large fire activity will continue in the future and that fire seasons will be longer than historically observed. Drier conditions may also contribute to more dust and other pollutants from roads and agriculture.

- Increased human populations in the area surrounding the Forest may result in higher levels of criteria pollutants on the Forest due to airborne transport of emissions from surrounding areas.
- Increased use of the Forest may result in air pollution due to increases in motor vehicle use for Forest access and motorized recreation.
- The proposed forest plan revision does not make decisions related to minerals. The Forest is not identifying areas as suitable or not suitable for mineral development or identifying withdrawals. The impacts of the development of oil and gas will not vary by alternative and are not analyzed.

#### *Indicators*

- Changes in emissions of PM<sub>10</sub> and PM<sub>2.5</sub> from wildland fire based on acres treated using prescribed fire or the percentage of natural, unplanned ignitions to meet resource objectives (short term) and expected outcomes (long term)
- Changes in emissions of other criteria pollutants from national forest management actions and uses

#### *Environmental Consequences for Air Quality Common to All Alternatives*

##### **Effects from Air Resources Management**

Under all alternatives, the Forest Service would maintain air quality that meets applicable Federal, State, and local standards and regulations by meeting its legal obligations to comply with the Clean Air Act and the Utah and Wyoming State Smoke Management Programs. Alternative A provides guidance to “[Comply] with applicable air and water quality standards including but not limited to the Clean Air Act” (Forest Service 1986). Under alternatives B modified, C, and D, the Forest Service also would meet these legal obligations and would further consider emission reduction strategies to reduce impacts on air quality.

##### **Effects from Recreation and Social and Economic Contributions**

Under all alternatives, vehicles and equipment used in the Ashley National Forest for administrative uses, recreational uses, and forest uses, such as livestock grazing, timber production, mining, and oil and gas development, would produce fuel combustion-related emissions of criteria pollutants regulated by the EPA and the States of Utah and Wyoming. The Forest Service does not anticipate these emissions to increase substantially over current conditions or vary substantially across alternatives. Given that air quality in most of the Ashley National Forest is in compliance with the NAAQS and that these emissions are intermittent and dispersed, exhaust-related emissions would not have a substantial impact on air quality in the Ashley National Forest. Emissions in the 70-acre portion of the Ashley National Forest that lies in the northeast boundary of the Uinta Basin marginal ozone nonattainment area would be similar to those that currently occur.

Under all alternatives, mining and oil and gas development would occur to some degree over the life of the plan. Operation of these developments would be an ongoing source of criteria pollutants regulated by the NAAQS until they were decommissioned. Under all alternatives, such new uses would be subject to review and permitting, with recommendations for use of best management practices (all alternatives) and best available control technology to reduce emissions (action alternatives). Such review would include a consideration of effects, including changes in visibility, on the High Uintas Wilderness class II area under all alternatives.

Under all alternatives, motorized use of roads and trails and other surface-disturbing activities would produce fugitive dust, primarily in the form of PM<sub>10</sub>. The amount of dust generated depends on the property of the soils, including the silt content and moisture levels, weather conditions at the time of use, vehicle speeds, vehicle weights, and vehicle miles traveled. While finer particles (PM<sub>2.5</sub>) can remain airborne for long periods and travel hundreds of miles, larger particles (PM<sub>10</sub>) produce more localized and temporary impacts because they do not remain airborne as long as fine particles (EPA 2015a). Like combustion-related emissions, fugitive dust emissions are not anticipated to increase substantially over current conditions or vary substantially among alternatives. In addition, dust abatement is required for surface-disturbing projects to minimize fugitive dust; all alternatives contain objectives for reducing the potential for soil erosion that can lead to fugitive dust conditions. As such, the Forest Service does not anticipate uses that generate fugitive dust to have a substantial effect on air quality or affect visibility in the High Uintas Wilderness class II area, where such uses are limited.

### **Effects from Fire and Fuels Management and Vegetation Management**

Under all alternatives, vegetation and fuels treatments would be used, in varying degrees, to reduce tree density and the quantity of surface fuels and to remove insect-affected trees, which, in turn, would lower the risk of severe wildfire. Alternative C would rely more on natural processes than active vegetation management. Operation of chainsaws, chippers, and heavy equipment needed to perform the treatments releases exhaust-related criteria pollutants and particulates to the air. Burning larger branches, twigs, and other woody debris generates smoke-related PM<sub>2.5</sub> and PM<sub>10</sub>. While the amount of vegetation and fuels treatments varies across alternatives in terms of acres treated, the emissions from individual treatments would be temporary and intermittent.

Smoke produced from prescribed fire treatments and naturally ignited fires managed to meet resource objectives would be a large source of temporary emissions under all alternatives. Although several criteria air pollutants can be found in smoke, particulate matter is typically of most concern from a health and visibility standpoint. It is the primary pollutant resulting from the combustion of fuels during wildland fire (NWCG 2018). Studies indicate that about 90 percent of smoke particles emitted during wildland fires are PM<sub>10</sub> and about 90 percent of the PM<sub>10</sub> are PM<sub>2.5</sub> (NWCG 2018). PM<sub>2.5</sub> poses the greatest risk to human health because the small size of the particles can cause respiratory and heart problems, particularly in sensitive populations (EPA 2020b). The larger particles in PM<sub>10</sub> are of less concern to human health, but they can be a localized source of reduced visibility. Carbon monoxide released during fire is generally a localized health concern that is more likely to affect the health and safety of fire personnel. Combustion also releases nitrogen oxides, which are chemical precursors to the formation of ozone.

Under all alternatives, the Forest Service would use prescribed fire and naturally ignited fire to meet resource objectives; these would be managed according to standards and guidelines set forth under each alternative. Under all alternatives, the Forest Service would comply with the Utah and Wyoming Smoke Management Programs for prescribed fire and for naturally ignited fire managed to meet resource objectives, including the use of emission reduction and dispersion techniques to reduce adverse impacts on air quality. Emissions reduction techniques provide the Forest Service with tools to manage smoke levels and reduce the potential for exceeding the NAAQS and affecting visibility in the High Uintas Wilderness class II area during managed fire events. Emission reduction techniques are contained in both the Utah and Wyoming Smoke Management Plans (Utah Division of Air Quality 1999; Wyoming DEQ Air Quality Division 2004).

The potential for wildland fires may increase over the life of the plan due to a predicted increase in drought and higher temperatures, with adverse effects on air quality and visibility in the plan area, including in the High Uintas Wilderness class II area. Smoke from wildland fires may travel large

distances, impairing local and regional visibility and degrading air quality far from its point of origin, depending on topography and meteorological conditions such as wind speed and direction. In the case of uncharacteristically large wildfires, ambient concentrations of criteria pollutants may increase beyond the NAAQS, both locally and in distant locations. Vegetation and fuels management treatments under each alternative would offset this trend, to varying degrees, by moving forest cover types toward more desired conditions, resulting in more resistant and resilient forest vegetation communities. Increasing resistance to insects and pathogens and resilience to disturbance, such as fire and climate variability, would indirectly reduce impacts on air quality and visibility from wildfire.

#### *Environmental Consequences for Air Quality—Alternative A*

Under alternative A, there would be no change to current management. The 1986 forest plan does not contain explicit quantitative objectives for landscape-scale fuels treatments, prescribed fire, or managed natural ignitions, though these activities do occur. Impacts on air quality and visibility from these activities would be as described under “Environmental Consequences for Air Resources Common to All Alternatives.”

Over the long term, impacts on air quality and visibility from wildfires would continue. With no objectives to move forest vegetation communities toward desired conditions at a landscape level, an increase in the likelihood for more frequent, severe, and intense wildfires would continue. This would result in increased emissions of PM<sub>10</sub> and PM<sub>2.5</sub> over the long term, with the subsequent impacts on air quality described under “Environmental Consequences for Air Resources Common to All Alternatives” and potential increases in episodes of visibility impairment in the High Uintas Wilderness class II area.

#### *Environmental Consequences for Air Quality Common to Alternatives B Modified, C, and D*

Alternatives B modified, C, and D would provide forestwide management of vegetation communities toward desired conditions, including a more natural disturbance regime, and provide objectives for vegetation and fuels treatments, including prescribed burning and managing naturally ignited fires to meet resource objectives. This would focus treatments on reducing adverse effects from uncharacteristic wildfire, thereby reducing fire-related impacts on air quality and visibility over the long term compared with alternative A, which has no similar objectives. Management direction to consider emission reduction strategies to reduce impacts to resources if project emissions are identified as a potential concern would minimize emission contributions from activities on the Ashley National Forest across all action alternatives.

#### *Environmental Consequences for Air Quality—Alternative B Modified*

Under alternative B modified, prescribed burning in areas available for timber harvest would occur on up to 893 acres annually; additional acres may be burned for fuel mitigation purposes or for achievement of other resource objectives. In addition, the Forest Service would manage naturally ignited fires on 10 percent of the ignitions every 10 years. Because more fire-related treatments may occur, short-term increases in PM<sub>10</sub> and PM<sub>2.5</sub> from vegetation and fuels management may be greater than under alternative A, which does not specify an objective for these treatments. However, complying with the Utah and Wyoming Smoke Management Programs for prescribed fire and for naturally ignited fire managed to meet resource objectives would minimize these impacts and avoid visibility impairment in the High Uintas Wilderness class II area.

Alternative B modified would annually treat an average of 2,400 acres in areas available for timber harvest (2,100 acres in the second decade); alternative B modified would use wildland fire and other vegetation treatments to improve or maintain desired vegetation conditions on 6,600 to 32,000 acres per year. Over the long term, these treatments would move forest vegetation communities toward desired

conditions more than under alternative A, which has no such objectives for treatments at the landscape scale (see also “Terrestrial Vegetation”). This would have an indirect impact on air quality by lengthening the fire return interval, reducing available fuels during the fire season, restoring natural burn patterns, and reducing acres burned, reducing wildfire-related PM<sub>10</sub> and PM<sub>2.5</sub> emissions. Compared with alternative A, it also would reduce periodic episodes of visibility impairment from wildfire in the High Uintas Wilderness class II area over the long term.

#### *Environmental Consequences for Air Quality—Alternative C*

Under alternative C, prescribed burning would occur on up to 746 acres annually in areas suitable for timber harvest; additional prescribed burning may occur to meet other resource objectives. In addition, the Forest Service would manage naturally ignited fires on at least 20 percent of the ignitions every 10 years. Short-term impacts would be similar to those described for alternative B modified, with the potential for increased PM<sub>10</sub> and PM<sub>2.5</sub> emissions, compared with alternative B modified, if more acres were burned related to naturally ignited fires. As described for alternative B modified, complying with the Utah and Wyoming Smoke Management Programs would minimize air quality impacts and avoid visibility impairment in the High Uintas Wilderness class II area.

Alternative C would annually treat 1,800 acres in the first decade and 1,600 acres in the second decade of vegetation management in areas suitable for timber harvest. It would use wildland fire and other vegetation treatments to improve or maintain desired vegetation conditions on 6,600 to 32,000 acres per year. Alternative C may be less effective in moving vegetation toward desired conditions and improving ecosystem resilience at large scales compared with alternative B modified. This is because it emphasizes passive vegetation management rather than active, increased vegetation treatments. However, it would move forest vegetation communities toward desired conditions more than alternative A, with the same indirect impacts on air quality; these indirect impacts would be reducing wildfire-related PM<sub>10</sub> and PM<sub>2.5</sub> emissions and reducing periodic episodes of visibility impairment from wildfire in the High Uintas Wilderness class II area over the long term.

#### *Environmental Consequences for Air Quality—Alternative D*

Under alternative D, prescribed burning would occur on up to 884 acres annually in areas suitable for timber harvest; additional prescribed burning may occur to meet other resource objectives. In addition, the Forest Service would manage naturally ignited fires on at least 5 percent of the ignitions every 10 years. Short-term impacts would be similar to those described for alternative B modified, with similar numbers of acres treated with prescribed fire and naturally ignited fires managed for resource objectives. As described for alternative B modified, complying with the Utah and Wyoming Smoke Management Programs would minimize air quality impacts and avoid visibility impairment in the High Uintas Wilderness class II area.

Alternative D would annually treat 2,500 acres in the first decade and 2,200 acres in the second decade of vegetation management in areas suitable for timber harvest. Alternative D would use wildland fire and other vegetation treatments to improve or maintain desired vegetation conditions on 10,000 to 40,000 acres per year during the life of the plan. The increased acres of treatment proposed under alternative D would have long-term impacts similar to those described under alternative B modified—reductions in wildfire-related PM<sub>10</sub> and PM<sub>2.5</sub> emissions and fewer periodic episodes of visibility impairment from wildfire in the High Uintas Wilderness class II area compared with alternative A.

Long-term impacts would be a decreased risk of emissions from wildfires compared with alternative A, but an increased risk compared with alternative B modified, which has more flexibility to meet resource objectives using naturally ignited fire for resource benefits (see “Fire and Fuels”).



## Cumulative Environmental Consequences for Air Quality

The cumulative effects analysis area is the same as described under “Analysis Area.” The time frame for assessing cumulative effects on air quality is 10 years. Prescribed fires would continue to be applied under the direction of the Federal, State, and local land management agencies after consideration of such variables as weather, type and condition of fuels, duration, and acreage to be treated. Prescribed fires authorized by both the Utah Department of Environmental Quality and the Wyoming Department of Environmental Quality are based partly on the potential for cumulative effects from smoke with other activities planned during the same time; therefore, the potential for significant cumulative effects from planned ignitions is largely avoided or, in some cases, mitigated by adhering to the smoke management program in the State implementation plan. Likewise, air emissions from industrial sources are regulated under permits by the State and local environmental agencies. Therefore, if new significant sources of this kind are proposed, regulators would review the increment of pollutants, and mitigation and monitoring would be required to ensure continued attainment of the NAAQS in the Ashley National Forest.

While the vast majority of the Ashley National Forest is in attainment of the NAAQS, climatic conditions, such as drought and wind, can cause dust and particulate emissions associated with fire to vary significantly in extent over time. While wildfires are not considered in the assessment of attainment of the NAAQS because they are not planned actions, they could contribute to cumulative effects on air quality and visibility in the Forest Service-managed High Uintas Wilderness class II area.

In addition to emissions from wildfire and prescribed burning in the Ashley National Forest, other sources of emissions in and around the national forest have and would continue to affect air quality. Past and present actions have resulted in the effects on air quality, visibility, deposition, and critical loads described under “Affected Environment.” These include primarily surrounding and upwind regional area sources, including, but not limited to, wildfire and prescribed burning, agricultural sources, industrial emissions, mining (for example, the Simplot phosphate mine near Vernal and other large mines on the Wasatch Front), oil and gas development, residential and municipal sources, construction equipment, vehicles, road dust, gravel pit dust, campground wood fires, and smoke from wildland fires on lands of other ownership. Potential future sources of emissions that could affect the Ashley National Forest are continued growth in the Wasatch Front metropolitan area, continued mining and energy development in the Uinta Basin and southwest Wyoming, and reasonably foreseeable actions such as the Uinta Basin Railway, which includes potential routes through or adjacent to the South Unit of the national forest. Long-distance regional sources from the western United States and even Canada and Asia would also continue to affect air resources.

## Soils

### Introduction

Soils are a living, dynamic resource that supports physical, chemical, and biological activities of ecosystems. The diversity of soil types in the Ashley National Forest reflects the varied landscapes and soil-forming factors. Soils are formed from the interactions over time between parent materials, climate, organisms, topography, and vegetation communities. The physical, chemical, and biological properties of soils differ with soil characteristics and are always changing, but all soils provide many ecosystem services, including storing and cycling nutrients, providing long-term carbon storage, purifying air and water, storing and regulating water flow, and providing support for plants and human structures (Natural Resources Conservation Service [NRCS] 2001c).

Additional information about soils is available in the Ashley National Forest Assessment, Air, Soil, Water and Watershed Resources Report (Bevenger 2017, pp. 6–8 and 48–71) and the Ecosystem Diversity

Evaluation Report (Forest Service 2009a). Information from these sources is used within the discussion of the affected environment.

### *Regulatory Framework*

**National Forest Management Act of 1976**—Emphasizes the maintenance of productivity and the need to protect and improve soil and water resources and avoid permanent impairment of the productive capability of the land.

**Public Rangelands Improvement Act of 1978**—Directs that range condition and productivity be improved to protect watershed function, soil, water, and fish habitat.

**Forest Service Manual, Intermountain Region (Region 4) Ogden, Utah: FSM 2500 Watershed and Air Management Chapter 2550 Soil Management Supplement 2500-2011-1**—Provides direction on maintenance and measurement of soil quality, definitions for detrimental soil disturbances and soil quality, and references to be used for technical direction.

**USDA Forest Service FS-990a National Best Management Practices for Water Quality Management on National Forest System Lands: Volume 1—National Core BMP Technical Guide**—Provides best management practices for forest uses by the public and forest projects carried out by Forest Service personnel in order to protect the quality of soils and water.

**Forest Service Handbook 2509.22 Soil and Water Conservation Practices Handbook**—Provides site-specific soil and water conservation practices for use on National Forest System lands in Region 1 and Region 4 to comply with the Clean Water Act.

Additional contributors to the regulatory framework are described in Ashley National Forest Assessment, Air, Soil, and Watershed Resources Report (Bevenger 2017) and are incorporated by reference. The report contains descriptions of how acts, executive orders (EOs), memorandums of understanding, and agency manuals and handbooks influence the management of soil resources on National Forest System lands.

### *Analysis Area*

The area of analysis for soil resources is National Forest System lands in the Ashley National Forest.

### *Notable Changes Between Draft and Final EIS*

The “Description of Affected Environment” section has been updated and reorganized to provide clarity. A subsection, “Types of Soil Disturbance,” was added to describe soil disturbances in the Intermountain Region; this new subsection incorporates information from the draft EIS subsection, “Sensitive Areas and Compaction.” The analysis for soils has been updated to address changes from the draft EIS’s alternative B to the final EIS’s alternative B modified. This includes the analysis from no new recommended wilderness as well as updates to impacts from livestock grazing due to changes to livestock grazing plan components. Analysis for Alternative C and D was also modified for impacts from livestock grazing due to changes to management direction under these alternatives. “Environmental Consequences for Soils Common to All Alternatives” was revised for all effects to address comments and updated information.

### *Description of Affected Environment*

The Ashley National Forest lies within three distinct geographic areas: the Tavaputs Plateau, the FGNRA, and the Uinta Mountain range. The diversity of ecosystems in these areas reflects different climate conditions, topography, geology, and elevations ranging from 5,480 to 13,528 feet. Soil moisture and

temperature regimes range from aridic (dry) and mesic (warm) at lower elevations, to udic (humid) and cryic (very cold) at the highest elevations.

The forest is mapped in an integrated lands system inventory that focuses on large areas of similar geomorphology, geology, vegetation communities, and response to disturbances and management. Soils are described in relation to the ecosystem characteristics and processes of formation but are not described using soil taxonomy. The lands system inventory maps the forest within 166 landtypes that are aggregated into 24 landtype associations (Forest Service 2009a; Bevenger 2017). See figure 3-3.

Soil quality is used in this analysis to describe the capacity of soil to sustain plant and animal activity and productivity, to regulate water and solute flow, to store and cycle nutrients and carbon, to provide physical support, and to filter, buffer, and degrade organic and inorganic materials (NRCS 2015). Soil quality is influenced by both natural soil formation and human use and management. A dominant factor determining soil quality is the content of soil organic carbon within the top 1 meter of soil (Herrick and Wander 1997; Forest Service 2018b).

Soil productivity is one aspect of soil quality. Productivity is the ability to support vegetation, and it depends on many physical, chemical, and biological properties of the soil. Two main soil properties that determine vegetation productivity are the amount of nutrients and water the soils contain and can release to plants (NRCS 2001c). The nutrient exchange and the available water capacity of soils in turn depend on several factors, including soil depth, texture, pH, and soil organic matter and clay content (NRCS 2001a).

#### *Types of Soil Disturbance*

Soil disturbance is defined in the Intermountain Region as any activity or natural phenomenon that alters existing physical, chemical, and/or biological properties of the soil. Most soil disturbance is short lived and unavoidable as a result of forest management activities and public uses of the forest, but other disturbances can persist or even be irreversible. In soil management direction, soil disturbance is described in terms of thresholds when the disturbance becomes detrimental to the goal of maintaining soil quality (Forest Service 2011a). The main forms of detrimental soil disturbance are compaction, puddling, displacement, and severe burning. Detrimental soil erosion often accompanies soil disturbance because of changes to the soil surface.

Soil compaction is a loss of soil porosity and a corresponding increase in soil bulk density. Soil texture is a primary factor in determining soil compaction. Soils with mixed particle sizes, including the loam, sandy loam, and sandy clay loam texture classes, can easily compact; this is due to the ability of smaller particles to be forced between larger sand grains (NRCS 2001a). The second-most determining factor in soil compaction is the soil moisture content. Soils that are moist to wet are vulnerable to particle movement. Dry soils compact to a lesser extent, and saturated soils have pores filled with water; therefore, they deform instead of compact (Graecen 1980).

Compaction is often caused by the weight and vibration of vehicles, recreation equipment, and machinery used in timber management and construction. High levels of compaction can occur when equipment makes turns and from repeated passes over the soil. Soil that has been compacted has altered or absent structure and restricted water infiltration and root growth. The depth of compaction is often 12 inches but can extend to 24 inches in the soil profile. Various studies have shown that, once compacted, forest soils often take several decades to return to undisturbed levels of bulk density (Page-Dumroese 2006).

The threshold for detrimental soil compaction is usually evaluated at a depth of 5 to 30 centimeters below the mineral soil surface. Specific depths for measurement are dependent upon soil type and management

activities. Detrimental soil compaction is based on increased soil density (weight per unit volume), restricted root growth, and reduced aeration that inhibits water movement. Measurements of potential soil compaction may be qualitative or quantitative (Forest Service 2011a).

Soil displacement is the movement of soil material from its original position and can include mixing of soil horizons. Most displacement is due to equipment impacts from tires and tracks and can vary from small areas adjacent to tracks to large slope areas (Napper et al. 2009). Displacement creates areas that have lost their surface horizons, and leaves soil loosened and more susceptible to erosion. Detrimental soil displacement includes areas where 1 meter by 1 meter or larger exhibits the loss of either 5 cm or half of the humus-enriched topsoil (A horizon), whichever is less (Forest Service 2011a).

Soil puddling often occurs where soil has been compacted and the soil structure is destroyed by compression and is common in ruts and depressions made by mechanical impacts. Detrimental soil puddling is evaluated using compaction guidelines but is generally viewed at the soil surface. Visual indicators of soil puddling include clearly identifiable ruts with berms in mineral soil, or in an Oa horizon of an organic soil. Reduced infiltration and permeability are associated and visually present in areas with soil puddling. Soil puddling can alter local groundwater hydrology and wetland function and provide conduits for runoff (Forest Service 2011a).

Severely burned soil results in the loss of vegetation, fine plant roots, and the surface litter and duff layers (Parsons et al. 2020). The combustion of the organic matter in severely burned soil damages the soil structure and infiltration and often results in the formation of a hydrophobic (water repellent) layer that increases surface erosion rates. Severely burned soils exhibit black char, ash layers, and areas where soil color is changed to gray, orange, or reddish. Severely burned soil has altered pH and nutrients and is left sterile from the loss of soil microorganisms (Certini 2005). The detrimental threshold for severely burned soil applies to prescribed fire and is identified using the ratings for high fire severity as described in the Forest Service Burned Area Emergency Rehabilitation Program (FSH 2509.13) and Debano et al. 1998. Indicators used include soil humus losses, structural changes, hydrophobic characteristics and sterilization (Forest Service 2011a).

Soil erosion is a three-step process where soil particles are detached, moved, and deposited. Water, wind, and gravity can cause erosion and erosion is a natural and continual process. Accelerated soil loss often occurs after ground disturbance, when effective ground cover is reduced, when soil is displaced, or when soils have increased surface runoff due to compaction (NRCS 2001d). Soil is considered a nonrenewable resource due to its slow formation and because once it is moved off-site, it cannot be replaced (Lowery et al. 1999). Erosion is one of the greatest threats to soil quality. Detrimental erosion includes erosion rates that cause long-term productivity losses from an activity area or soil losses that are beyond those acceptable for the activity area (Forest Service 2011a).

Erosion affects the soil's physical, biological, and chemical properties. These changes stem from the degradation of soil structure and from the loss of the surface soil where soil microorganisms and biological activities are concentrated. As soil structure is damaged, it loses organic matter content and the ability to provide support, retain water, and cycle nutrients. The impacts of soil erosion can alter the types of plant communities that can be supported (Lowery et al. 1999).

Soil erosion hazard is the potential for accelerated erosion; it depends on both soil properties and site factors. Site factors influencing soil erosion include slope gradient, vegetation type, topography, and the amount of ground cover provided by vegetation in contact with the soil, rocks, coarse woody debris, litter, duff, and biological crusts. Climate, including the intensity and duration of storms, may become an increasingly important factor due to trends in climate change (Forest Service 2017n). Soil properties

related to erodibility include soil texture, rock content, organic matter, the strength and type of soil structure, soil infiltration rate, and the tendency to develop surface seal or physical crusts. Studies indicate that site factors, including the vegetation and degree of soil disturbance, have a greater impact on the amount of surface runoff and soil erosion than the soil properties (Elliot 2013).

**Soil Erosion and Slope**

Slope gradient is one of the most important site factors that determines soil erosion. The erosion potential increases along with increasing slope, up to a threshold of a slope gradient of approximately 86 percent or 41 degrees (Liu et al. 2001).

A general view of the soil erosion hazard is from the factor of slope and using slope intervals. The slope breaks used below are from regional soil interpretations where slope was a factor in determining potential impacts from fire, timber harvest, and off-highway vehicle use. Table 3-3 lists the approximate acres and percentages on the Ashley National Forest within the main slope intervals.

**Table 3-3. Acres of Percent Slope Ranges in the Plan Area**

Percent Slope	Acres	Percentage of National Forest in Plan Area
0–10	533,600	38.7
11–25	399,400	29.0
26–40	272,700	19.8
41–60	149,000	10.8
>60	22,900	1.7

Source: Forest Service GIS 2020

Mass wasting is also a source of soil loss, but it is difficult to quantify. Numerous mass wasting events that included slumps, debris flows, or landslides have been documented on the Ashley National Forest. These sites often occur on similar geologic formations and combinations or rock strata with contrasting permeabilities that promote slope saturation and failure, including shales, lacustrine deposits, and glacial till deposits. Other factors involved in slope failures include the slope gradient, the presence of springs and seeps, groundwater pressure, bedding angles, the type of surface vegetation, and disturbance from fire or storms (Forest Service 2017q).

**Sensitive Soil Areas**

The Ashley National Forest has areas where soils are prone to compaction due to moist to wet soil conditions. These include areas with springs and seeps, wetlands, and land areas with seasonally high water tables. Springs and seeps are areas of freshwater discharge at the ground surface. Both are widely distributed across the national forest, with an increased presence at higher elevations. Seeps are common in the Trout Slope and Alpine Moraine land type associations and are abundant in areas that border the Uinta Bollie land types (Forest Service 2009a). Figure 3-4 provides a general view of springs and Land Type Associations that contain areas sensitive to compaction.

Wetlands on the Ashley National Forest include areas with hydric soils, and fens with organic soils. In 2017, the Colorado Natural Heritage Program at Colorado State University mapped the fen wetlands on the Forest. This mapping indicates there are 8,614 potential fens on the Forest, with a concentration at higher elevations between 9,000 and 12,000 feet (Smith and Lemly 2017). Fens represent some of the most unique and fragile areas on the Forest and are important sites for maintaining water quality, water retention, carbon storage, and biodiversity. The organic materials that form fens accumulate over hundreds to thousands of years. Soils with seasonally high water tables are common in the Trout Slope

and Parks Plateau land types under varied plant communities. These soils have features in their soil horizons that reflect periods of saturation and anaerobic soil conditions.

## Environmental Consequences for Soils

### *Methodology and Analysis Process*

The analysis focuses on the general impacts from proposed alternatives over the plan area, instead of identifying site-specific impacts on soil. This section addresses the issue topics identified during scoping and subsequent alternatives development.

Potential effects of decisions and management actions were identified by reviewing the best available science and using qualitative and quantitative data related to impact indicators. Acres were used to best reflect the scale and magnitude of these effects. A GIS data set and overlays of resources and resource uses were used to quantify effects, when available. The analysis is mostly qualitative.

### *Analysis Assumptions*

- As slope increases, the potential for erosion increases and the risk of soil instability following disturbance increases, particularly if cover, structure, or permeability has been altered (NRCS 2001d).
- Mass wasting can result from heavy precipitation saturating unstable geologic formations, including shales.
- Surface-disturbing activities, including vegetation and fuels management projects, timber harvests, recreation, and mining, have greater impacts where soils have higher erodibility (Auerswald 2008).
- Biological soil crusts are present on a variety of soil types across the Ashley National Forest. They protect soils from wind and wind erosion by providing cover and reducing runoff. Once disturbed, recovery of biological crusts can take decades or longer to reestablish (Belnap et al. 2001).
- Soils on National Forest System lands will be managed to maintain productivity and soil physical, chemical, and biological properties by implementing best management practices and site-specific mitigation measures that prevent and reduce surface disturbance, including compaction and erosion (Forest Service 2012a).
- Restoration activities will be consistent with soil resource capabilities.

### *Indicators*

Impacts on soils are analyzed using the following indicators:

- Soil erosion hazard
- Soil disturbance including compaction

Indicators selected to compare alternatives focus on potential management differences resulting in accelerated soil erosion throughout the national forest and on places where detrimental disturbance could affect sensitive soils.

### *Environmental Consequences for Soils Common to All Alternatives*

Management activities with ground-based mechanical equipment would be avoided on slopes greater than 40 percent in all alternatives, with the flexibility of exceptions using new methods and mitigations that

protect soils in alternatives B modified and D. There are approximately 149,000 acres of these slopes in the Ashley National Forest.

### **Effects from Recreation**

The main impacts on soils from recreation uses on the national forest are soil compaction, soil displacement, and accelerated soil erosion.

Where motorized and nonmotorized recreation is on National Forest System roads and designated trails, the impacts from recreation use depend on the topography, slope gradient, soil properties, and the type of road or trail surface. For most roads and trails, the main impacts of compaction and displacement occur during construction, with reduced impacts from use, except where foot or wheeled traffic is on unstable areas. An accelerated erosion rate from roads and trails has been proven to be a continual source of soil erosion and sedimentation (Miller 2014), with erosion rates dependent on many factors. There are 1,450 miles of public roads and 1,263 miles of summer- and winter-use trails on the Ashley National Forest.

Developed campgrounds and areas of dispersed camping result in soil displacement, compaction, loss of vegetation, and increased bare soil. The impacts on the soil condition result from foot traffic, vehicles, trailers, recreational vehicles, and trails leading from campsites to outhouses and water. Developed campgrounds are generally more stable in the area of impacted soils. Dispersed campsites commonly expand in their impacts and often develop a web of all-terrain vehicle (ATV) trails radiating out from the camping areas.

The greatest impacts on soil resources due to recreation come from motorized use off designated roads and trails. Motorized equipment that runs cross country results in destruction of vegetation and soil surface horizons and often leaves ruts where the soil has been displaced and compacted. Once tracks are visible, other users follow, and tracks become areas of compacted bare soil. When routes are pioneered across meadows, the hydrology can be damaged by compaction, resulting in increased surface runoff, gully formation, and a drop in groundwater tables. Although snowmobiles cause less impacts than summer motorized uses, where snowmobile traffic travels cross-country, there is a potential for vegetation to be damaged and soils to become compacted.

### **Effects from Fire and Fuels Management**

Wildfires are considered a chief cause of accelerated erosion on forests of the Rocky Mountains (Elliot 2013), and prescribed fire can have similar impacts on soil resources. The fire burn severity depends on combined factors, including the fuels, topography, slope gradient, aspect, and climate. Depending on the soil burn severity level, the normal organic ground materials that protect and build soil surface horizons, including woody material, litter and duff, can be lost to combustion and result in increased surface runoff and erosion. Post-fire erosion also results from the loss of the vegetation canopy, plant root support, and the degradation or combustion of soil organic matter that holds soil structure and allows for water infiltration. Most fires can result in at least temporary development of hydrophobic soil surfaces, adding to the risk of post-fire soil erosion (Lal 2015).

Severely burned soil usually corresponds to areas of high fire severity and is more common to result from wildfires than prescribed fires. However, wildfires can move swiftly through an area with limited impacts on the forest floor or soils. Other fires, rated as low-severity fires, can result in severely burned soil due to the long burn duration, particularly if the overlying duff and soils are dry (Neary 2019).

Prescribed fire is generally considered less likely to result in severely burned soil because of the parameters that give some control to the fire. The Forest Service can time prescribed fire ignitions to

favorable factors, including wind speed, humidity, locations for burning, fuel loads, and the moisture content of the fuels and duff. Most fires result in a mosaic of fire severity and soil burn severity, but the risk and area extent of severely burned soils are lower for prescribed fires.

### **Effects from Designated Areas**

All the alternatives would manage the designated High Uintas Wilderness Area, Ashley Karst NRGAs, Sheep Creek Canyon Geologic Area, seven RNAs, 794,000 acres of IRAs, and two suitable wild and scenic river segments. Recreation and livestock grazing use is allowed in these areas; however, prescribed fire and vegetation management projects are banned in the wilderness area, and restrictions on new and temporary roads limit prescribed fire and vegetation management in the Ashley Karst NRGAs, the FGNRA, and IRAs. The Forest Service would expect the soil conditions in these areas to depend on the combined impacts of all the allowed uses.

### **Timber Harvest and Vegetation Management**

Soil disturbance from timber harvest operations and vegetation management projects includes soil compaction, displacement, and accelerated erosion. Forest soils are displaced and compacted by equipment tires and tracks on roads and skid trails, landings that are cleared for use, and impacts when large trees fall to the surface or are yarded. The degree of impacts partly depends on the amount of area impacted by landings, skid trails, and access roads. Impacts are also determined by the type of equipment used, the amount of vegetation removed, the slope gradient, and the timing of equipment use. Soil surface erosion can increase from the loss of canopy cover, understory vegetation, root support, and damage or loss of litter, duff, and surface horizons. Timber harvest, and the various vegetation treatments done to improve forest stand health, add different amounts of slash and woody material to the soil surface. These organic additions are critical for adding organic matter, nutrients, and carbon to the surface soil.

### **Effects from Livestock Grazing Management**

Disturbance to soil resources from livestock grazing is usually concentrated in relative microsites, including areas of trailing, water crossings, water sources, salt blocks, holding corrals, and bedding sites. These sites have impacts of soil displacement, loss of vegetation, and soil compaction. Impacts on soils can also add to surface erosion due to the increase in bare soil and the loss of water infiltration from compaction. Livestock grazing can cause compaction, displacement, and erosion in wetlands, in wet meadows, and along riparian corridors. Impacts in these areas of sensitive soils include trailing, sloughing of streambanks, and the development of mounds where holes are punched through the turf. Over the life of the plan, livestock grazing management that maintains or trends toward desired conditions would maintain the soil condition; however, if an area is overgrazed, the soil condition could decline.

### **Effects from Energy and Minerals**

#### *Effects from Oil and Gas Development*

Oil and gas development occurs and will continue on the South Unit of the Duchesne Ranger District. Soil disturbance results from the development of wells and pads, construction of access roads and condenser stations, and construction of miles of natural gas pipelines. Disturbance to soils includes soil compaction and displacement, and high subsequent erosion rates. Fifty well pads have been excavated, and the Berry Petroleum oil lease will allow 162 well pads to be constructed, with a given pad requiring up to 3 acres of land. An effort is made to stockpile the topsoil; however, given the thin surface "A" horizons in the area, soil materials become mixed, soil structure is destroyed, and erosion off the stockpiles reduces their quality.



Erosion rates are inherently high in the oil lease area due to the lacustrine and fluvial geology, which includes unconsolidated deposits and naturally erosive shale parent materials. Storms, particularly in summer months, often result in debris flows and add to the accelerated erosion levels. The oil and gas developments have increased the presence of invasive species in the South Unit, including halogeton.

#### *Effects from Mining*

Currently, there are approximately 103 active mine claims on the Ashley National Forest, with an individual claim usually occupying about 20 acres for equipment, test well drilling, or excavation needs. Disturbance to soils from mining activities includes soil compaction and displacement, with the potential for increased erosion from the claim area and access roads. Soil disturbance from mining claims in the future will depend on their site-specific location and the amount of ground disturbance at each claim site.

A summary of the main impacts on soil conditions on the Ashley National Forest is provided below in table 3-4. The numbers listed come from consultation with Ashley National Forest resource specialists and their assessment reports.

**Table 3-4. Summary of Current Main Impacts on Soil Conditions on the Ashley National Forest**

<b>Impact Source</b>	<b>Approximate Impacts Forestwide</b>
System roads	1,472 miles
Trails	1,263 miles: 185 motorized, 1,078 nonmotorized
Unauthorized off-road/off-trail motorized use	N/A
Developed campgrounds	55 campgrounds and 11 group campgrounds; total acre estimate 150 acres
Dispersed camping	N/A
Wildfire	124,473 acres (between 2012 and 2021)
Prescribed fire	33,802 acres (between 2012 and 2021)
Timber harvest	84,706 acres (between 1928 and 2021)
Fuels and vegetation management	Approximately 60,861 acres (between 2007 and 2021)
Livestock grazing	Approximately 997,600 acres
Oil and gas development	To date, 50 well pads developed covering 1–3 acres per pad. Total Berry Petroleum lease allows use of 25,900 acres in South Unit. Total lease allows 57 miles of new road. Total lease allows 87 miles of natural gas pipelines on the surface.
Mineral mining	Approximately 103 active mining claims covering 2,128 acres

#### *Environmental Consequences for Soils—Alternative A*

##### **Effects from Recreation**

Alternative A includes different recreation opportunity spectrum classes, from roaded natural to primitive settings, to encourage diversity of recreation uses. Alternative A also has 80,000 acres of dispersed recreation, which includes Fish Creek, Uinta River above U-Bar Ranch, Lakeshore Basin, and Weyman Park. This would continue to result in impacts, as described under “Environmental Consequences for Soils Common to All Alternatives.” Off-road motorized use and dispersed camping are common in the FGNRA and areas of the Vernal and Duchesne-Roosevelt Ranger Districts, resulting in impacts of soil compaction, displacement, and accelerated erosion.

### **Effects from Fire and Fuels Management**

Alternative A does not incorporate the newest fire management tools but emphasizes fire suppression and hazardous fuel reduction to maintain historical fire regimes. Fire suppression would limit the potential for severely burned soils, the development of soil hydrophobicity, and post-fire soil erosion in the short term. Continued use of fire suppression over the life of the plan could result in a buildup of hazardous fuels that increases the potential for high-severity fires (Barrett 2020). This would increase the potential for areas of severely burned soils and their susceptibility to erosion over the life of the plan.

Alternative A would emphasize timber harvest rather than prescribed fire for the reduction of hazardous fuels. For this reason, alternative A does not include a range of treatment acreages for prescribed fire. Impacts on soils from mechanical thinning and prescribed fire would be the same as those described under “Environmental Consequences for Soils Common to All Alternatives.”

### **Effects from Designated Areas**

Impacts would be the same as those described under “Environmental Consequences for Soils Common to All Alternatives.”

### **Effects from Timber Harvest and Vegetation Management**

Alternative A would limit timber harvest management on slopes greater than 40 percent. Impacts on soils from timber harvesting would be the same as those described under “Environmental Consequences for Soils Common to All Alternatives.”

### **Effects from Livestock Grazing Management**

There are no forestwide specific forage utilization or stubble height guidelines under alternative A; guidelines are determined at the allotment level. Current range conditions for sensitive soils and soils on moderate to steep slopes in allotment areas would continue under alternative A. The soil condition may be altered in areas where rangeland conditions are deteriorating, as described under “Environmental Consequences for Soils Common to All Alternatives.” The desired condition for livestock grazing management under alternative A is to optimize forage to the extent that it is cost effective and is balanced with other resources. This desired condition is being met in rangeland areas, except where soil conditions are deteriorating.

### **Effects from Energy and Minerals**

Impacts would be the same as described under “Environmental Consequences for Soils Common to All Alternatives.”

## *Environmental Consequences for Soils—Alternative B Modified*

### **Effects from Recreation**

Alternative B modified would provide three recreation management areas with different management emphases. One would include high-use destination recreation with motorized access and active allotments for grazing. Another area would be strictly backcountry recreation, with dispersed recreation outside wilderness areas and limited infrastructure; however, motorized use and timber harvesting would be allowed in backcountry areas under alternative B modified. The third would be a general recreation management area with a range of motorized to nonmotorized uses, similar to the recreation opportunity spectrum classes under alternative A. Management in backcountry recreation management areas (11,300 acres of potential wetlands) and general recreation management areas (22,900 acres of potential wetlands)

would have greater impacts on soils compared with 4,900 acres of potential wetlands in the destination recreation management area.

For all of these areas, motorized, destination, and dispersed recreation would compact and displace soils and increase erosion susceptibility, as described under “Environmental Consequences for Soils Common to All Alternatives.” Alternative B modified would provide more areas for recreation, and therefore more surface disturbance, than alternative A. This increases the potential for compaction and displacement of sensitive soils and erosion of soils on moderate to steep slopes, in comparison with alternative A.

### **Effects from Fire and Fuels Management**

Impacts on soils from mechanical thinning would be as described under alternative A, except alternative B modified would treat fewer acres and in doing so would limit the magnitude of soil disturbance.

Impacts on soils from prescribed fire would be similar to those described under “Environmental Consequences for Soils Common to All Alternatives”; however, alternative B modified would include a guideline for post-treatment to leave various sizes of coarse woody debris (minimum of 3 inches in diameter) distributed over 40 percent or more of the plan area, where available. This would increase soil stability and reduce the potential for erosion after treatments compared with alternative A.

Under alternative B modified, high-intensity fires may still occur because it would also use wildland fire to achieve desired vegetative objectives. This would increase the potential for areas of severely burned soil and soil loss. Alternative B modified would include a guideline for vegetation management that uses ground-based equipment to limit soil disturbance to no more than 15 percent of the area from completed cumulative management activities. This would also apply to timber management. If disturbance exceeds this threshold, the guideline encourages that mitigation measures be put in place to avoid further soil disturbance and to maintain soil quality.

### **Effects from Designated Areas**

No new designated areas are proposed under alternative B modified, so the impacts on soils in designated areas would be the same as those described under alternative A.

### **Effects from Timber Harvest and Vegetation Management**

Alternative B modified would allow timber harvest, thinning, and planned ignitions every year on an average of 2,400 acres (2,100 acres in the second decade, measured every 10 years) to maintain or move toward achieving desired conditions for forested ecosystems. Compared with alternative A, alternative B modified also would provide fewer acres suitable for timber production. Timber harvest would be allowed on additional acres (189,400 acres); however, alternative A would provide more acres overall for timber activities. This means the potential for soil compaction, displacement, and soil erosion would be reduced under alternative B modified compared with alternative A. Timber management would be limited on slopes greater than 40 percent; in areas suitable for timber production, this would include approximately 29,000 acres (Forest Service GIS 2020).

To prevent soil erosion and recreational use of temporary roads and skid trails, alternative B modified would include a guideline to establish post-project reclamation and require a minimum of 60 percent effective ground cover. This ground cover would include materials that provide soil stability, such as wood, slash, litter, surface rock, and understory vegetation.

In areas suitable for timber production, wetlands and fens would not be affected because there are no wetlands or fens in suitable areas (Forest Service GIS 2020); however, there are springs in these areas and high concentrations of seeps and high water table areas (Forest Service GIS 2020), as evidenced by

landtypes described under “Description of Affected Environment.” Soils in these areas would be vulnerable to soil compaction, displacement, and erosion if affected by timber harvest equipment. Alternative B modified would include guideline direction to use design features and mitigations to prevent impacts on soils.

### **Effects from Livestock Grazing Management**

Alternative B modified would ensure sustainability and resiliency of forage resources in upland and riparian areas by developing site- and species-specific annual indicators, such as stubble height and utilization criteria, during grazing allotment planning. These indicators would be documented in allotment management plans. In the absence of updated planning or an approved allotment management plan, alternative B modified would limit utilization of key forage species to no greater than 50 percent of the current year’s growth and leave a 4-inch or greater stubble height of palatable herbaceous species at the end of the grazing season between the greenline and bankfull of stream systems, unless monitoring demonstrates a different utilization use level of key forage species or stubble height is appropriate. Livestock grazing could be modified depending on the soil condition and other rangeland conditions to meet desired conditions by monitoring annual indicators and using multiyear vegetation trend data. Compared with alternative A, these guidelines would better maintain rangeland conditions, including soil condition, as described under “Environmental Consequences for Soils Common to All Alternatives.”

### **Effects from Energy and Minerals**

Impacts would be the same as described under “Environmental Consequences for Soils Common to All Alternatives.” Alternative B modified would include a guideline for new energy or mineral operations to not authorize ground-disturbing activities in riparian zones. This would protect sensitive riparian zone soils from compaction and displacement compared with alternative A.

### ***Environmental Consequences for Soils—Alternative C***

Plan components under alternative C would be the same as those described under alternative B modified.

### **Effects from Recreation**

Under alternative C, the Forest Service would manage three recreation management areas, similar to alternative B modified. Impacts from management would be greatest on soils in backcountry recreation management areas (with 15,800 acres of potential wetlands) and general recreation management areas (with 18,600 acres of potential wetlands) compared with 4,600 acres of potential wetlands in the destination recreation management area. Similar to alternative B modified, it would increase access to the Forest and the potential for soil compaction, displacement, and soil erosion compared with alternative A.

Alternative C would limit motorized vehicle use in backcountry areas, which would reduce soil compaction, displacement, and soil erosion impacts from motorized vehicles. Timber production and grazing would not be allowed in destination recreation management areas, so compaction and displacement ~~on~~ of sensitive soils and potential erosion on moderate to steep slopes would be reduced compared with alternative A.

### **Effects from Fire and Fuels Management**

Management of fire, both prescribed and natural fire, and fuels under alternative C and the resulting impacts on soils would be similar to alternative B modified except for an increased use of wildland fire to meet resource objectives. When using wildfires for resource objectives, there is always the potential for part of the burned area to have high-intensity fires, resulting in areas of severely burned soils. This would increase soil erosion susceptibility and soil loss over the life of the plan compared with alternative A.

### **Effects from Designated Areas**

Alternative C provides the most acres managed as recommended wilderness (50,200 acres) compared with alternative A. It would provide an additional RNA and four segments of wild and scenic rivers. Within the recommended wilderness areas and the proposed RNA, there would be 2,600 acres of potential wetlands (including fens), where sensitive hydric and organic soils occur. This management would increase opportunities to maintain soils sensitive to soil compaction or displacement compared with alternative A. This would indirectly reduce erosion rates, providing the most benefit for soils on moderate to steep slopes.

### **Effects from Timber Harvest and Vegetation Management**

Timber harvest under alternative C would be reduced compared with alternative A. Sensitive soils in wetlands and fens would not be affected because they do not occur in suitable areas. Springs within the suitable timber production area would need design features to avoid disturbance of sensitive areas (Forest Service GIS 2020). Overall, timber suitability and timber yields would be reduced compared with alternative A.

Similar to alternative B modified, timber management would be limited on slopes greater than 40 percent. Under alternative C, this includes approximately 22,400 acres in areas suitable for timber production (Forest Service GIS 2020). Limiting timber harvest and vegetation management in these areas could increase hazardous fuels and the potential for high-severity wildfires (Barrett 2020). The potential for fires that would result in severely burned soils and post-fire soil erosion would increase over time. This would likely outweigh the short-term beneficial impacts of reduced surface disturbance and soil erosion.

### **Effects from Livestock Grazing Management**

Compared with alternative A, alternative C would reduce utilization levels of key forage species. Alternative C would not allow for modifications, unlike alternative B modified, and it would help ensure rangeland desired conditions are maintained. Alternative C would implement a utilization limit of key forage species to no greater than 40 percent of the current year's growth. It also would leave a 4-inch or greater stubble height of palatable herbaceous species between the greenline and bankfull of stream systems. Soil condition would benefit from the plant cover, root support, and litter additions provided by these measures that would increase effective ground cover and soil organic matter.

### **Effects from Energy and Minerals**

The impacts would be the same as those described under alternative B modified.

### ***Environmental Consequences for Soils—Alternative D***

Plan components for soils under alternative D would be the same as those described under alternative B modified.

### **Effects from Recreation**

Alternative D would provide the most acres for infrastructure development and motorized use on roads and trails in backcountry areas. Similar to alternative B modified, grazing would be permitted in destination recreation management areas. These areas are currently permitted for grazing under alternative A but not as destination recreation management areas. Alternative D would also include three recreation management areas, as would alternatives B modified and C. Impacts on soils would be greatest in backcountry recreation management areas (with 9,000 acres of potential wetlands) and general recreation management areas (with 25,100 of potential wetlands) compared with the destination recreation management area, which would include 4,900 acres of potential wetlands.

Compared with alternative A, these additional areas designated for recreation would increase forest access for recreation vehicles, including off-road uses, and developed and dispersed recreation. This would result in impacts as described under “Environmental Consequences for Soils Common to All Alternatives.” The potential for compaction and displacement of sensitive soils and soil erosion susceptibility would increase, especially on moderate to steep slopes compared with alternative A.

### **Effects from Fire and Fuels Management**

Under alternative D, all fuel management tools would be emphasized and available for use. In the short term, mechanical thinning and prescribed fire would result in soil displacement, compaction, and severely burned soil and would add to soil erosion rates, especially on steeper slopes. Impacts from these treatments would be greater than they would be under alternative A because the Forest Service would treat more acres under alternative D. These fuel management tools would decrease hazardous fuel loads and result in lower-severity fires compared with alternative A. Further, these tools would have the potential to reduce impacts of severely burned soil and soil erosion over the life of the plan.

### **Effects from Designated Areas**

No new designated areas are proposed under alternative D, so impacts on soils in designated areas would be the same as described under alternative A.

### **Effects from Timber Harvest and Vegetation Management**

Alternative D would allow timber harvest, thinning, planned ignitions, and planting on 1,600 acres annually. Alternative D would provide 114,300 acres suitable for timber production, but this would be less than under alternative A. In total, timber harvest would be allowed on more acres (189,400 acres) than under alternative A. Timber harvest would also be allowed in unsuitable areas under alternative D, which would increase the potential for soil compaction and displacement and soil erosion susceptibility in those areas compared with alternative A. There would be approximately 1,200 acres of potential wetlands in areas suitable for timber production (Forest Service GIS 2020).

Similar to alternative B modified, areas where timber harvest is allowed would include areas of concentrated seeps, soils with high water tables, and potential wetlands where soils are more sensitive to compaction, displacement, and erosion. Timber management would be limited on slopes greater than 40 percent. Similar to alternative B modified, soils in these areas would be vulnerable to soil compaction and soil displacement from vehicles used to access timber, but these impacts would be avoided or mitigated under the proposed guideline, as described under alternative B modified.

### **Effects from Livestock Grazing Management**

Alternative D would not include specific utilization or stubble height guidelines; however, alternative D has general guidelines, so utilization of key forage species and stubble heights meet desired conditions for soils and terrestrial vegetation. If desired conditions are not met, then management would make site-specific adjustments, and soil conditions would benefit from maintenance of sufficient vegetation cover and litter additions to the surface soil.

### **Effects from Energy and Minerals**

The impacts would be the same as those described under alternative B modified.

## Cumulative Environmental Consequences for Soils

The cumulative environmental consequences analysis area for soils is National Forest System lands in the Ashley National Forest. Cumulative impacts would last for the life of the plan but could persist for decades or be permanent if soil is lost to erosion.

Fuels reduction and vegetation management projects would promote vegetative diversity and resiliency to wildfire disturbance. Examples of such projects are as follows:

- Little Pond Forest Restoration Project
- Greater Cart Creek Restoration Project
- Ashley National Forest Aspen Restoration Project
- South Slope Fuel Reduction Project
- Ashley National Forest Forest-Wide Prescribed Fire Restoration Project

In turn, wildfire intensity would decrease and so would the potential for severely burned soils. In combination with the vegetation management proposed in the revised plan, especially for alternatives B modified and D, this would have an cumulative effect of indirectly improving soil quality over the life of the plan; however, these projects would also increase treatment areas across the Forest and would cumulatively affect soils by increasing the potential for soil erosion. For tree removal especially, alternative A would result in the greatest potential for soil erosion, in conjunction with these reasonably foreseeable vegetative management projects. This is because it would provide the greatest acreage for areas suitable to timber production.

Recreation projects, such as the Badlands Trail Project—Part 2, Big Brush Creek—Outlaw All-terrain Vehicle (ATV) Trail Reroute Project, and the Highline ATV Trail Reroute Project, would reroute and reconstruct trails to improve resource conditions. These trails would result in short-term soil disturbance during construction, but they would help prevent future soil compaction, displacement, and erosion by providing designated routes and reducing off-trail motorized use. The Ashley Karst National Recreation and Geologic Area Management Plan will limit construction of new motorized access within the designated area. Soil resources may benefit from reduced impacts of road and trail construction, but recreation use may increase and result in areas of soil disturbance, including compaction, displacement, and accelerated erosion.

Water resource projects, such as the Sowers Creek Restoration, and the Dyer Creek Stream Restoration Project, would use heavy equipment to construct control structures, and improve stream conditions. These projects could result in initial soil disturbance within the project footprints, including soil displacement, compaction, and erosion, but provide long-term stability and reduced soil erosion.

Alternative D would result in the most disturbance to sensitive soils due to vegetation management and recreation. In conjunction with these reasonably foreseeable water resources projects, sensitive soils would be most vulnerable to compaction, displacement, and erosion under alternative D.

Future infrastructure projects would cause soil displacement and compaction and create the potential for accelerated soil erosion and establishment of invasive species. Examples of these projects are as follows:

- Uinta Basin Railway Project
- Green River to Buckboard Fiber Optic Cable Project
- Dry Creek Trona Mine and Water Pipeline

In addition to these projects, natural occurrences such as wildfires would result in additional soil loss in conjunction with vegetation treatments, recreation uses, timber harvesting, and livestock grazing. Wildfires typically result in larger areas of severely burned soil that result in higher levels of hydrophobicity and post-fire soil erosion. Wildfires will continue to be a threat to soils under all the action alternatives, but alternative D would provide the most fuel treatment tools and the greatest potential to reduce high-severity wildfires.

## **Watersheds and Aquatic and Riparian Ecosystems**

### **Introduction**

The Ashley National Forest is in the Green River drainage, a major tributary to the Colorado River. The drainage begins at the Continental Divide, in the Wind River Range in northwest Wyoming, and joins the Colorado River in Canyonlands National Park in south-central Utah. The drainage is comprised of the upper and lower Green River basin, being divided by the Uinta Mountains, where much of the Ashley National Forest is located. The FGNRA is on the north side of the Uinta Mountains and in the southern end of the upper Green River basin. The south unit of the national forest is in the Tavaputs Plateau. The Uinta Basin, generally, is between the Uinta Mountains and the Tavaputs Plateau (Forest Service 2017b).

The Ashley National Forest includes three distinct areas that differ in ecology, geology, and hydrology: the Uinta Mountains and FGNRA in the north unit and the Tavaputs Plateau in the south unit of the Ashley National Forest.

### *Regulatory Framework*

**Organic Administration Act of 1897**—States that one aspect of the mission of the national forests is to “provide favorable conditions of water flow.”

**Clean Water Act of 1948, as amended**—The principal law that addresses pollution in the nation’s streams, lakes, and estuaries. Originally enacted in 1948, it has been revised by amendments in 1972 (Public Law 92-500) that gave the act its current form and spelled out ambitious programs for water quality improvements that are now being put in place by industries and cities. Congress refined these amendments in 1977 (Public Law 95-217) and 1981 (Public Law 97-117). The 1987 amendments added the following language:

- Section 319, under which states are required to develop and implement programs to control nonpoint sources of pollution and rainfall runoff from farm and urban areas and construction, forestry, and mining sites.
- Section 303(d), which requires states to identify pollutant-impaired water segments and develop total maximum daily loads that set the maximum amount of pollution that a waterbody can receive without violating water quality standards. States must also develop a water-quality classification of streams and lakes, to show support of beneficial uses, and establish anti-degradation policies that protect water quality and stream conditions in systems where existing conditions exceed standards.

**Federal Water Pollution Control Act, as amended**—Provides direction to restore and maintain the chemical, physical, and biological integrity of the nation’s waters. Sections 303, 319, and 404 apply to



forest management. Section 208 of the 1972 amendment specifically mandates identification and control of nonpoint source pollution from silviculture. There are five required elements, as follows:

- Compliance with State and other Federal pollution control rules
- No degradation of instream water quality needed to support designated uses
- Control of nonpoint source water pollution using conservation or “best management practices”
- Federal agency leadership in controlling nonpoint source pollution from managed lands
- Rigorous criteria for controlling the discharge of pollutants into the nation’s waters

**Safe Drinking Water Act of 1977 and amendments**—In 1996, the Safe Drinking Water Act was amended with requirements to identify “source water protection areas” and to assess their susceptibility to contamination. This provides states with more resources and authority to enact the Safe Drinking Water Act. This amendment directs the states to identify source water protection areas for public water supplies that serve at least 25 people, or 15 connections, at least 60 days a year. In terms of relative size and scope, while an individual national forest unit may have four designated municipal watersheds, there may be over 100 source water protection areas that intersect with National Forest System lands managed by that unit.

Source water protection areas have been established to protect public water systems from contamination. These systems can be dependent on any type of water source, including streams, lakes, reservoirs, springs, wells, or infiltration galleries, and include systems used either year-round or only seasonally.

State governments were given the option to accept primacy or responsibility for delineating and developing assessments for these source water protection areas. Utah has accepted this responsibility and maintains the most up-to-date information regarding the source water protection delineations, assessments, and management requirements or goals; however, Wyoming has not accepted this responsibility and currently maintains a voluntary program for source water protection.

**Municipal Watersheds—36 CFR 251.9**—Authorizes the chief of the Forest Service to enter into agreements with municipalities to restrict the use of National Forest System lands from which water is derived to protect the municipal water supplies (Forest Service Manual 2542).

**Executive Order 11988 (May 24, 1977)**—Directs Federal agencies to take action on Federal lands to avoid, to the extent possible, the adverse short-term and long-term impacts associated with the occupancy and modification of floodplains. Agencies are required to avoid the direct or indirect support of development on floodplains whenever there are reasonable alternatives and to evaluate the potential effects of any proposed action on floodplains.

**Executive Order 11990 (May 24, 1977), as amended**—Requires Federal agencies exercising statutory authority and leadership over Federal lands to avoid, to the extent possible, the adverse short-term and long-term impacts associated with the destruction or modification of wetlands. Where practicable, direct or indirect support of new construction in wetlands must be avoided. Federal agencies are required to preserve and enhance the natural and beneficial values of wetlands.

**Executive Order 12962 (June 7, 1995)**—Acknowledges the recreational value of aquatic biota by stating the objectives “to improve the quantity, function, sustainable productivity, and distribution of United States aquatic resources for increased recreational fishing opportunities” by “(h) evaluating the effects of federally funded, permitted, or authorized actions on aquatic systems and recreational fisheries and document those effects relative to the purpose of this order.”

**Utah Water Quality Act (June 1, 2014)**—Develops surface water quality standards for the State of Utah and requires all discharges to adhere to those standards.

**Utah Groundwater Quality Protection (January 1, 2020)**—Develops groundwater quality standards for the State of Utah, defines groundwater class protection levels, and institutes a permit system for groundwater discharges.

### *Analysis Area*

The analysis area for watersheds, riparian management zones, and aquatic species includes all lands within the boundary of the Ashley National Forest. The temporal scope of the analysis is the anticipated life of the plan. The cumulative analysis area includes the 147 subwatersheds that overlap the Ashley National Forest but also extends beyond its boundaries.

### *Notable Changes Between Draft and Final EIS*

The affected environment was modified for factual corrections and based on input from public comments. Analysis was updated for alternative B modified based on changes to the alternative, including removal of recommended wilderness and to update effects from livestock grazing management on riparian vegetation structure and composition, as well as to address the addition of a guideline (FW-GD-FISH-05) that states “Sufficient habitat should be provided to maintain state population objectives and distributions of fish and amphibians.” Analysis was also modified to include the addition of text to show that recommended wilderness could affect the Forest Service’s ability to improve riparian, wetland, and possibly fen communities. Other edits included modification to the descriptions of riparian management zones, and updating the miles of perennial streams in the Ashley National Forest listed as impaired by the State of Utah based on the EPA’s final 2022 Integrated Report on Water Quality (EPA 2022c).

## Description of Affected Environment

### *Watershed Condition*

Watershed condition is the state of the physical and biological processes in a watershed; these processes affect soil condition and hydrologic function, which in turn support ecosystems. Watershed condition can be represented by a continuum from naturally pristine to degraded. The watershed condition framework (WCF), an analysis method developed by the Forest Service, classifies the state of all subwatersheds in the Ashley National Forest (Forest Service 2011b, 2011c). The WCF characterized the health and conditions of watersheds at the 6th-level hydrologic unit code scale, using a comprehensive set of 4 process categories, 12 indicators, and 24 attributes. The initial or baseline characterization was completed in 2011. Only watersheds that have 5 percent or more National Forest System lands were rated. For the Ashley National Forest, 107 of the 147 6th-level watersheds were characterized (figure 3-5, Watershed Condition Ratings).

Watersheds are classified as being in one of the following condition categories:

- Class 1 (properly functioning)—Watersheds exhibit high geomorphic, hydrologic, and biotic integrity<sup>3</sup>, relative to their natural potential condition, and they are functioning properly.

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<sup>3</sup>Geomorphic functionality or integrity can be defined in terms of attributes such as slope stability, soil erosion, channel morphology, and other upslope, riparian, and aquatic habitat characteristics. Hydrologic functionality or integrity relates primarily to flow, sediment, and water-quality attributes. Biological functionality or integrity is defined by the characteristics that influence the diversity and abundance of aquatic species, terrestrial vegetation, and soil productivity (Forest Service 2011b).

- Class 2 (functioning at risk)—Watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity, relative to their natural potential condition, and they are functioning but at risk.
- Class 3 (impaired function)—Watersheds exhibit low geomorphic, hydrologic, and biotic integrity, relative to their natural potential condition, and their function is impaired.

Overall, 57 of the 107 watersheds (53 percent) are functioning properly. Another 50 watersheds (47 percent) are functioning at risk. No watersheds have impaired function (table 3-5, figure 3-5). The distribution of overall scores indicate that 70 percent of the watersheds scored near the break between properly functioning and functioning at-risk watershed condition. Changing one or more attributes could shift the classification one way or another, indicating opportunities to improve watershed condition, but could also degrade watersheds through mismanagement (Forest Service 2017b).

The twelve indicators used to classify subwatersheds are in four process categories: aquatic physical, aquatic biological, terrestrial physical, and terrestrial biological. Most of the 107 watersheds are functioning properly relative to the indicators, except for the terrestrial physical indicator where most watersheds are functioning at risk. The terrestrial physical process category has 22 watersheds with impaired function due to high open road density, lack of road and trail maintenance, and proximity of roads and trails to water (table 3-5; Forest Service 2017b).

**Table 3-5. Watershed Condition Framework Ratings for the Ashley National Forest**

Watershed Condition Rating	Overall Watershed Condition		Watershed Condition Process Categories			
	Number of Watersheds	Percentage of Watersheds	Aquatic Physical (Number of Watersheds)	Aquatic Biological (Number of Watersheds)	Terrestrial Physical (Number of Watersheds)	Terrestrial Biological (Number of Watersheds)
Functioning properly	57	53	72	67	7	105
Functioning at risk	50	47	35	39	78	2
Impaired function	0	0	0	1	22	0

Source: Forest Service 2017b

Beyond simply assessing watershed condition, the WCF is used to identify priority watersheds, which are areas where land management decisions should emphasize maintaining or improving watershed conditions. The Forest Service designated the Swift Creek and Cart Creek watersheds as priority watersheds in 2012, with essential projects identified to improve watershed conditions. Work has been completed in the Swift Creek watershed. The forest plan identifies three priority watersheds— Cart Creek, Wolf Creek, and Whiterocks River—where restoration work is currently focused (figure 3-6).

### Watershed Vulnerability

For the Ashley National Forest, watershed vulnerability to climate change is considered moderate to high. Increases are anticipated for drought, heat, flooding, greater evaporation, snowpack loss, and earlier snowmelt that would shift runoff timing, reduce streamflow, and increase the severity and intensity of wildfires. Ashley National Forest watersheds are considered highly sensitive to these projected changes (Forest Service 2018a). Vulnerability would be moderate to very high to drought, heat, wildfire, and floods, with decreasing sensitivity as elevation increases (Forest Service 2017c).

The capacity for the Ashley National Forest watersheds to adapt to climate change is moderate, with most inherently resilient because they are in good functioning condition at present (table 3-5). Watersheds

functioning at risk are more vulnerable to climate change effects. This is due to the impaired function of terrestrial physical processes, including high road densities and poor road and trail conditions (Forest Service 2017c).

### **Surface Water Resources**

Surface water features in the Ashley National Forest are streams, reservoirs, lakes, wetlands, stock ponds, and springs (figure 3-7). These features provide habitat for diverse communities of vegetation, wildlife, and fish. They also provide water for such downstream uses as crop irrigation, domestic livestock, municipal and domestic water supplies, and commercial and industrial uses.

### **Surface Water Features**

Stream characteristics and flow patterns vary between the three geographic areas of the Ashley National Forest. Streams draining the Uinta Mountains typically occupy either U-shaped glaciated valleys or narrow, stream-carved canyons. Streams in the lower elevations of the FGNRA originate from Pleistocene glaciation, erosive sedimentary substrates, and a series of east-west trending faults. The Tavaputs Plateau is dissected by numerous stream channels, most of which are intermittent or ephemeral, on highly erosive substrates. The streams originate in steep, narrow canyons at the head of the plateau and transition to low gradient alluvial floodplains at lower elevations (Forest Service 2017c).

Overall, the Ashley National Forest contains 1,100 miles of perennial streams, 2,100 miles of intermittent streams, and an undetermined number of miles of ephemeral streams (table 3-6; figure 3-7).

**Table 3-6. Streams, Waterbodies, Seeps, and Springs in the Ashley National Forest**

<b>Waterbodies</b>	<b>Total</b>
Perennial streams (miles)	1,100
Intermittent streams (miles)	2,100
Lakes and reservoirs (acres)	55,400
Swamps and marshes (acres)	4,400
Seeps and springs (count)	474

Sources: Forest Service GIS 2020; National Hydrography Dataset (NHD) GIS 2020

There are thousands of waterbodies that total 55,400 acres in the Ashley National Forest (table 3-6; figure 3-7). At higher elevations in the Uinta Mountains, these include glacial lakes, potholes, kettle ponds, and beaver ponds. Wider valley bottoms include ponds created by depressions, reservoirs, and stock ponds.

High elevation waterbodies receive input from streams, seepage, and groundwater upwelling. Potholes and pools show high variation in surface water conditions based on annual climate fluctuations. Ephemeral pools, ponds, and potholes collect runoff in meadows and fluctuate year to year in depth (Forest Service 2018a).

Stream dynamics are driven predominantly by snowmelt for most of the Ashley National Forest, but they vary with the precipitation patterns. Runoff from persistent snow beds and groundwater discharge from springs and talus slopes maintain perennial stream baseflows. Peak flows of perennial and intermittent streams typically occur after heavy snowmelt runoff, but they can also result from rain and snow or summer thunderstorms. Annual snowmelt flows increase in late March to early April, peak in late May to early June, and return to baseflow levels in August. Due to the annual variation in precipitation and temperature, there is a high amount of variability in annual stream flows. Flow in the Tavaputs Plateau is

different from the Uinta Mountains or FGNRA due to the drier conditions. In some years, there can be no surface flow in the stream channels late in the year, and flow patterns are characterized more by peak flows after large thunderstorms than after snowmelt (Forest Service 2017b).

The streams across the Ashley National Forest transport water and sediment from the surrounding watershed. Increases or decreases in either the amount of water or sediment can affect stream dynamics, resulting in stream widening or downcutting and affecting stream and riparian area health. Stream channels in the Ashley National Forest are connected to adjacent floodplains, which vary by stream and valley type from tens of feet to hundreds of feet. The connectivity between the stream channel and floodplain is very important for regulating water quality and how water is distributed over time. Connected stream and riparian systems dissipate flood energy and recharge alluvial aquifers. Human occupancy and use along stream channels or in the floodplain have the potential to change water availability and sediment transport.

### **Disturbance Processes**

In some locations of the Ashley National Forest, channel, floodplain, and sediment dynamics have been altered since European settlement. Human-made stressors on stream dynamics and hydrology include dams and diversions, herbivory from livestock and wild ungulates, fire suppression, roads, and motorized recreation. Nonmotorized recreation can also have localized effects in areas of concentrated use.

Dams and diversions can alter the hydrology patterns for mountain streams in the Ashley National Forest. Changing flow patterns from dam releases can displace riparian areas, which can change the active stream channels and floodplains downstream. Canals and diversions dewater portions of the perennial channels they intercept and move water to other locations, altering the flow pattern of the natural channel. Roads and other disturbed sites could increase sedimentation to stream channels, lowering pool frequency and increasing fine sediment concentrations. Changes in vegetation groundcover in a floodplain from uncharacteristically intense wildfire, overgrazing, or poor management can affect peak flows or sediment loads to adjacent streams; this can result in channel widening or downcutting (Forest Service 2017d).

Climate change is considered an additional stressor. Potential changes in the pattern and timing of precipitation and temperature can augment existing stressors. Warming temperatures, prolonged drought, and extreme weather can affect channel, floodplain, and sediment dynamics. This would come about by increasing water stress on riparian and upland vegetation, increasing wildfire intensity and frequency, and increasing peak flow and sediment impacts on area streams (Forest Service 2017d).

### **Water Quality**

The primary source of pollution on National Forest System lands are nonpoint source pollutants. These are derived from diffuse overland sources, in contrast to point sources of pollutants, which discharge from identifiable outlets such as pipes, ditches, agricultural fields, or industrial or sewage treatment facilities.

Activities generating nonpoint source pollutants in the Ashley National Forest are oil and gas development, livestock grazing, road construction, timber and fuelwood harvesting, recreation, and ground disturbance from OHVs. Natural and unknown sources of pollutants may also contribute to nonpoint source pollution in the Ashley National Forest.

Utah and Wyoming assess water quality in their streams and waterbodies. Figure 3-8 includes perennial streams in the plan area that are listed as impaired under the Clean Water Act, section 303(d) list. Specific impairments are from aluminum, arsenic, boron, dissolved oxygen, pH, selenium, total dissolved solids, and zinc. There were 552 miles of perennial streams in the Ashley National Forest listed as impaired by

the State of Utah pending EPA designation (EPA GIS 2020). This represents 50 percent of all perennial streams in the Ashley National Forest. Harmful algal blooms have been observed periodically in the upper reaches of Flaming Gorge Reservoir in or near the plan area.

The EPA's partial approval of the 2016–2018 Integrated Report for the State of Utah extended to all waterbodies on the lists, with the exception of waters in Indian Country, as defined in 18 USC 1151 (EPA 2015b) (see also Figure 3-24: Map of Ute Indian Tribe Lands). In 2022, the final 2022 Integrated Report on Water Quality was issued, and total miles of perennial streams in the Ashley National Forest was reduced from 676 to 552. With the final approval of the integrated report, the EPA maintains that state water quality standards do not apply to waterbodies within Indian Country (EPA 2022c). The area includes a portion of the Ashley National Forest encompassing the Duchesne-Roosevelt Ranger District and portions of the Vernal Ranger District within the Whiterocks River drainage that is within the original treaty boundary of the Uintah and Ouray Reservation (Indian Country).

Under the Clean Water Act, Indian tribes may apply to the EPA to be treated as states for the purpose of setting water quality standards and administering other Clean Water Act programs on their reservations. The Uintah and Ouray Reservation is one of the reservations that to date has not applied for treatment as a state for setting water quality standards (EPA 2016).

Regardless of the water quality standards that apply to the plan area, the Forest Service is obligated to meet water pollution control requirements of the Clean Water Act to the same extent as any nongovernmental entity (33 USC 1323(a)).

### *Groundwater*

The Ashley National Forest contains unique groundwater resources that are very important to local ecosystems and downstream users, such as farmers and communities. At least 474 seeps and springs are in the Ashley National Forest (table 3-6; figure 3-7); some of them are very large along the northern and southern boundaries of the Uinta Mountains (NHD GIS 2020). These springs are associated with carbonate rocks, where streams at higher elevations lose water into the rock formations through karst features, such as sinking and losing streams, caves, sinkholes, and springs. Water then resurfaces at large springs at lower elevations (Forest Service 2017b).

Groundwater supports many wetlands, springs, and seeps across the Ashley National Forest. A portion of these are groundwater-dependent ecosystems, which include communities of plants, animals, and other organisms that are unique in the Ashley National Forest. The “Riparian and Wetland Areas” section below includes a discussion of these communities in greater detail.

Most spring developments in the Ashley National Forest are pipeline and trough systems to improve livestock distribution on grazing allotments. Other spring developments include domestic and drinking water systems for homes, campgrounds, recreation facilities, and larger systems for public drinking water use. Groundwater-dependent ecosystems were surveyed for impacts, and most did not show signs of dewatering or flow alternation beyond the natural range of variability. Those found to be outside the natural range of variation were typically observed at developed springs where other surface water sources were not common (Forest Service 2017b).

### *Water Uses*

The Ashley National Forest generates approximately 1.0 million acre-feet of water annually to streamflow and contributes a large, but unmeasured, quantity of water to multiple groundwater aquifers. A portion of this water is used by wildlife, livestock, recreationists, and administrators across the Ashley National

Forest; however, most of the water flows downstream and off the Ashley National Forest. A small portion of the water is used by private landowners inside the Ashley National Forest administrative boundary.

There are 3,313 inventoried water sources in the Ashley National Forest. During the 1970s and 1980s, the Ashley National Forest began a process to file claims on many of these uses with the State of Utah. The process, however, was never completed.

Presently, there are 32 dams in the Ashley National Forest, one of which was decommissioned in 2017. There are 14 pipelines that traverse parts of the Ashley National Forest, three of which are used for electricity generation. However, Moon Lake Electric is decommissioning the electricity generation facilities in the Yellowstone Canyon and Uinta Canyon areas, and associated pipelines will be removed. There are 30 irrigation pipelines and canals used for off-forest irrigation. Some of the water development infrastructure mentioned here is associated with the Central Utah Project and Flaming Gorge Dam (Forest Service 2018a).

### *Municipal Watersheds and Source Water Protection Areas*

Public water systems are defined under the Safe Drinking Water Act as entities that provide “water for human consumption through pipes or other constructed conveyances to at least 15 service connections or serves an average of at least 25 people for at least 60 days a year” (EPA 2017). (“Public” in public water systems refers to the people drinking the water, not to the ownership of the system.)

Source water protection areas are established to protect public water systems from contamination, in accordance with the 1996 amendments to the Safe Drinking Water Act. The Utah Department of Environmental Quality Division of Drinking Water’s source water protection program provides guidance and approval of source water protection areas in Utah. Wyoming is the only state in the country where public water system operators are not required to complete source water assessments; however, the State encourages water system operators to participate in voluntary assessments.

Source water protection areas in Utah are divided into source water protection zones according to the watersheds that provide water to the public water system intakes. Several municipalities extend their protection areas onto the Ashley National Forest, including the following municipalities in Utah: Duchesne, Whiterocks, Tridell, Vernal, Manila, Dutch John, and City of Green River, Utah. Management of these watersheds focuses on maintaining and improving the quality, in the long term, of surface water in the public water system. In addition, the Forest Service has designated the Ashley Karst National Recreation and Geographic Area with the purpose to conserve and protect the karst systems that provide drinking water and irrigation to Uintah County. The management plan includes forest plan components to protect the water quality of these headwater karsts.

### *Water Rights*

With regard to water uses and development, Forest Service Manual 2541.02 directs national forests and grasslands to obtain water needed for the National Forest System, in accordance with legal authority and with due consideration for the needs of other water users. This objective includes securing water rights for waters not reserved, in accordance with state laws, for water needed on acquired lands and securing rights on reserved lands, if the reservation doctrine or other Federal law does not apply to the uses involved (Forest Service Manual 2451.22).

The Ashley National Forest has water rights in both Utah and Wyoming. In Utah there are 1,590 perfected water rights: 1,401 for stock water, 129 for domestic use, 41 for irrigation use, and 19 for miscellaneous uses. The Ashley National Forest also possesses three subbasin claims, with plans to file for additional

claims. The Ashley National Forest plans to adjust stock water rights into a similar format to better meet current and future livestock watering needs. In Wyoming there are 12 domestic, miscellaneous, and stock watering rights associated with the FGNRA (Forest Service 2017b).

**Riparian and Wetland Areas**

In general, riparian areas are lands where land meets a river or stream; wetlands are lands that are saturated with water all year or for varying periods during the year. Hydrologic processes that affect riparian and wetland areas are volume and timing of stream flows, extent of area inundated by surface water, fluctuations in depth to groundwater, evapotranspiration, and fluvial influences, such as sediment deposit.

In the Ashley National Forest, intermittent and perennial streams have surface flows and groundwater connections adequate to support riparian vegetation. Ephemeral streams and human-made (anthropomorphic) channels with sporadic surface flows and little to no connection with the water table do not typically support riparian vegetation. Wetlands in the Ashley National Forest form in areas fed by surface water or groundwater: lakes, ponds, fens, and wet meadows (see the “Terrestrial Vegetation” section for more information on fens). Reservoirs and stock ponds also support wetlands at lower elevations in the Ashley National Forest.

Although riparian and wetland areas occupy only a small percentage of the Ashley National Forest, they provide important habitat for many terrestrial and aquatic species, including connectivity of habitat from headwaters to downstream areas. Riparian areas cover approximately 33,200 acres, or 2.4 percent of the Ashley National Forest (table 3-7; figure 3-7), while wetland areas next to lakes, ponds, and other waterbodies cover approximately 22,700 acres, or 1.6 percent of the Ashley National Forest (table 3-8; figure 3-9).

**Table 3-7. Riparian and Wetland Vegetation Types**

Vegetation Type	Acres
Riparian, unclassified	1,100
Herbaceous-dominated	14,300
Shrub-dominated	11,000
Tree-dominated	6,800
<b>Total</b>	<b>33,200</b>

Source: Forest Service GIS 2020

**Table 3-8. Emergent Wetlands from the National Wetlands Inventory**

Wetland Type	Acres
Freshwater emergent wetland	18,600
Freshwater forested/shrub wetland	4,100
<b>Total</b>	<b>22,700</b>

Source: Forest Service GIS 2020

The Uinta Mountains contain most of the perennial and intermittent streams in the Ashley National Forest, along with a wide variety of waterbodies, including glacial lakes, potholes, kettle ponds, and beaver ponds. The variety of surface water features, along with high precipitation, especially snow, support a wide range of riparian and wetland vegetation communities. Wet meadows, fens, and willow fields surround most waterbodies, forming expansive aquatic, riparian, and wetland ecosystems. These wet meadows can be herbaceous-dominated or willow-dominated, depending on soil conditions (Forest Service 2018a).



Herbaceous-dominated ecosystems are typically dominated by a mix of grasses and grass-like species such as water sedge (*Carex aquatilis*), Nebraska sedge (*C. nebrascensis*), beaked sedge (*C. utriculata*), tufted hairgrass (*Deschampsia cespitosa*), and wiregrass (*Juncus arcticus*) that occur across the elevations of the mountain range. The plane-leaf willow (*Salix planifolia*)/water sedge community is common along high-elevation streams and meadows. At lower elevations, deciduous trees are more common and include narrowleaf cottonwood (*Populus angustifolia*), boxelder (*Acer negundo*), and bigtooth maple (*Acer grandidentatum*). These riparian woodlands also contain coniferous trees, and willows are also distributed across all elevations (Forest Service 2018a).

The FGNRA includes surface water features that support a wide range of riparian and wetland vegetation communities. Most vegetation is dominated by herbaceous species, especially in the northern areas of the FGNRA, with high acreage of irrigation-influenced riparian and wetland areas. Woody species are narrowleaf and Fremont cottonwood (*Populus fremontii*), willows, boxelder, and chokecherry (*Prunus virginiana*), with a sparse cover of conifers such as ponderosa pine (*Pinus ponderosa*) and blue spruce (*Picea pungens*). Invasive species are common along the lower sections of streams entering the Flaming Gorge Reservoir (Forest Service 2018a).

The Tavaputs Plateau receives less precipitation than the other two geographic areas and is comprised primarily of ephemeral streams (those that flow only during part of the year). Accordingly, riparian and wetland vegetation communities are small and largely limited to streams with perennial reaches. Upper reaches of these streams include Booth’s willow (*Salix boothii*), aspen (*Populus tremuloides*), and some narrowleaf cottonwood, while lower reaches are characterized by wiregrass, sedges, and other grasses. Shrubs and trees are scattered through the lower reaches: cottonwood, boxelder, coyote willow (*S. exigua*), and graybark willow (*S. eriocephala*). Irrigation also influences the riparian and wetland areas at the lower elevations (Forest Service 2018a).

### General Fens

The Ashley National Forest contains a rich resource of fen wetlands, covering up to 13,869 acres across its jurisdiction. While that represents only 1 percent of the entire landscape, these fen wetlands are an irreplaceable resource. Fens are defined as groundwater-fed, peat-accumulating wetlands with organic soils that typically support sedges and low stature shrubs. They are important for maintaining groundwater and sequestering carbon (Smith and Lemly 2017).

In 2017 fen mapping for the Ashley National Forest was completed by the Colorado Natural Heritage Program (Smith and Lemly 2017). In total, 8,614 potential fens were mapped throughout the Ashley National Forest, 4,019 of which were most likely fens. Potential fens were identified by analyzing digital aerial photography and topographic maps, and fen confidence levels were assigned: 5 (likely fen), 3 (possible fen), and 1 (low confidence fen). Potential fen acreage by confidence level is summarized in table 3-9, and all potential fens in the Ashley National Forest are illustrated in figure 3-10. See Fen Mapping for the Ashley National Forest (Smith and Lemly 2017) for comprehensive fen analysis and descriptions.

**Table 3-9. Potential Fen Counts and Acreage, by Confidence Level**

Confidence	Count	Total Acres
5 (likely fen)	4,019	9,000
3 (possible fen)	2,765	3,000
1 (low confidence fen)	1,830	1,900
<b>Total</b>	<b>8,614</b>	<b>13,900</b>

Source: Smith and Lemly 2017

Climate-related risks that lead to drying conditions are a likely stressor for all fens. The Intermountain Region's climate vulnerability assessment indicates that mid- to high-elevation fens have both a moderate to high sensitivity and vulnerability ratings and a low to moderate adaptive capacity rating regarding climate-related risks (Forest Service 2018b). Those species that rely on cold and wet conditions and that are limited in size and distribution would be at risk with a warmer and drier climate. Species that inhabit mid-elevation fens may have the ability to move upslope to adaptable habitat as the climate becomes warmer. Plant community composition would be affected by increased water stress, opening niches for more drought-tolerant species.

### **Riparian Management Zones**

Riparian management zones are where riparian-dependent resources receive primary emphasis and management are subject to specific standards and guidelines. Riparian areas provide important habitat for amphibians, neotropical migrant birds, and small mammals, and they are migration corridors for terrestrial and aquatic species. Fish and other aquatic life benefit greatly from riparian area protection due to these functions. These areas consist of riparian and upland vegetation next to streams, wetlands, and other waterbodies and help maintain the integrity of aquatic ecosystems by the following actions (Naiman et al. 1992):

- Influencing the delivery of coarse sediment, organic matter, and woody debris to streams
- Providing root strength for channel stability
- Shading the stream
- Protecting water quality

Upland vegetation in riparian management zones, in combination with the riparian vegetation, create zones that provide important terrestrial and aquatic wildlife habitat and connectivity. Most wildlife use riparian management zones and aquatic habitats for at least some of their daily or seasonal needs. Due to their widespread distribution and linear or clustered pattern, riparian management zones provide extensive and important habitat connectivity areas for numerous species of wildlife. (Refer to "Wildlife and Plants" below for information on riparian-associated wildlife species and connectivity of habitat.)

During the past few decades, land managers have recognized the importance of riparian ecosystems in maintaining water quality and terrestrial and aquatic habitat. As a result, riparian conservation measures have been developed for Federal, State, and private lands, helping to preserve and protect the integrity of the riparian and wetland habitats and the water quality of associated waterbodies.

### **Disturbance Processes**

Riparian and wetland vegetation communities have been altered in the Ashley National Forest since the time of European settlement. Historical grazing decreased vegetation cover and altered soil composition in (Neff et al. 2005; Fernandez et al. 2008), which contributed to incised channels, headcutting,<sup>4</sup> and changes in the water table. Adaptive grazing management since the early 20th century has alleviated these conditions with increased vegetation cover and less damage to stream channels. Improper livestock grazing and wild ungulate grazing can impact riparian areas, with the greatest potential of impacts occurring during periods of drought (Forest Service 2017c).

Dams in the Ashley National Forest have changed hydrologic flow patterns by displacing riparian vegetation with their reservoir pools and have altered riparian vegetation communities downstream;

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<sup>4</sup>A break in slope along a stream profile which indicates an area of active erosion.

however, studies have found woody riparian vegetation in good condition downstream of dams and diversions, with good survival. These results indicate that flood disturbance is adequate for cottonwoods, willows, and other pioneer species and that adequate groundwater is available to maintain growth and survival.

Invasive and encroaching species are also an issue for riparian and wetland communities in the Ashley National Forest. Conifers are encroaching across elevations on the Uinta Mountains, with 500 acres observed during vegetation mapping (Forest Service GIS 2020). Conifer encroachment is common for the mid- to low elevations and is likely attributed to fire suppression. Conifers have also been observed encroaching into subalpine meadows. Conifer encroachment suppresses growth of wet meadows and decreases cover of wetland and riparian plant species. Russian olive (*Elaeagnus angustifolia*) and tamarisk (*Tamarix* spp.) are also encroaching into riparian areas. Tamarisk is one of the invasive species that is targeted by the Ashley National Forest weed program. It occurs in lower elevations of the Forest, predominantly along the highwater line of the Flaming Gorge Reservoir and at some locations along the Green River below the dam.

## Environmental Consequences for Watersheds and Aquatic and Riparian Ecosystems

### *Methodology and Analysis Process*

This section describes the methodology and analysis processes used to determine the environmental consequences of each alternative on watersheds and aquatic and riparian ecosystems. Environmental consequences are not site specific at this planning level and are described with qualitative descriptions, supported by past studies and observations.

The qualitative analysis is based primarily on the best available scientific information derived from the Ashley National Forest assessments (Forest Service 2017b, 2017d, 2018a), climate vulnerability assessments (Forest Service 2017c, 2018b), and recent reports and publications that assess current conditions and trends in conditions. In particular, soil and water best management practices monitoring data were reviewed to evaluate the effectiveness of current constraints on management actions. In addition, watershed condition assessments using the Forest Service WCF were examined for the Ashley National Forest to assess the existing watershed condition ratings and to identify restoration opportunities. Stream condition inventory monitoring and assessment data and Clean Water Act section 303(d) listings for Wyoming and Utah were also examined where available to evaluate impacts across the Ashley National Forest.

### **Groundwater**

In north-central Utah, most groundwater is withdrawn on lands outside the Ashley National Forest; therefore, the Forest Service has no influence on this practice. Forest Service groundwater policy (Forest Service Manuals 2560, 2880) and agency technical guides provide direction for well drilling and pumping in the Ashley National Forest. They specify that these activities must not adversely affect connected riparian habitat and water quantity and quality. Because direction in the Forest Service manual is considered adequate and groundwater withdrawal is governed by State regulations, additional management direction was not specified under any of the action alternatives, and they were not analyzed in this EIS.

### *Analysis Assumptions*

- The various watershed restoration activities described in the plan will occur to the extent necessary to achieve the objectives described for each alternative. The specific locations and designs of these

activities are not known at this time; therefore, this analysis refers to the potential of the effect to occur, taking into account that, in many cases, these are only estimates.

- The actual improvement rates of watershed condition depend on funding and support by Forest Service leadership and collaborators.
- Water conservation practices (best management practices) will be implemented during all management activities. Based on results of past monitoring, best management practices are expected to reduce both short- and long-term adverse impacts to less than significant levels.
- Some resources, such as groundwater, are not within the Forest Service's authority to control; these were noted.
- Conditions described in this analysis are generalized for the entire Ashley National Forest and may not represent water quality or flow conditions at any specific location.
- The Forest Service will continue to pursue opportunities to retrofit, relocate, or decommission roads and trails to reduce potential sediment transport to rivers and streams, especially in priority watersheds, as outlined in watershed restoration action plans. System trails are undergoing a similar assessment and retrofit program, but they are not considered to present the same degree of water quality threat as the road network; this is because of their relatively small footprint.
- Some management activities, such as mechanical vegetation treatments, minerals authorization, grazing management, and national forest infrastructure such as roads and campgrounds, can cause both short- and long-term adverse impacts on water quality; these are evaluated and mitigated at the site-specific project level when projects are proposed and designed.
- Vegetation management in riparian areas will occur to maintain or achieve desired conditions. Treatments will be designed to restore native species composition, reduce the presence of invasive species, and reduce the encroachment of conifer trees where appropriate. The end result of the treatments will generally be more diversity of riparian species as well as vigorously growing herbaceous vegetation.
- Aquatic habitat restoration in streams, meadows, springs, and other special aquatic habitats will be primarily to improve habitats for at-risk species, restore waterbody/floodplain connectivity, and improve downstream beneficial uses. Aquatic habitat restoration will be integrated into landscape treatment designs, where appropriate. Partnerships and additional funding opportunities from sources outside the Forest Service will be sought to increase the pace and scale of aquatic habitat restoration.

### *Indicators*

Effects indicators are measures of an action's impact on the environment (beneficial and adverse; direct, indirect, and cumulative). Appropriate effects indicators are those that would best reflect how the plan-guided management actions would likely affect watersheds and wetland and riparian ecosystems and those that would also translate into measurable indicators. Such indicators may be incorporated into specific projects proposed in the future to accomplish the forest plan's guidance and objectives. These indicators are as follow:

- Changes in water quality
- Changes in riparian, wetland, or fen vegetation structure and composition, including such indicators as species richness, vegetation cover, and plant structure
- Changes in overall watershed condition, as measured by the WCF

## *Environmental Consequences for Watersheds and Aquatic and Riparian Ecosystems Common to All Alternatives*

### **Water Quality**

#### *Effects from Recreation*

Recreation is especially harmful where there is repetitive and heavy use close to a waterbody. The construction of campgrounds, picnic areas, and trails disturbs the soil, making it more likely to erode and become deposited into a waterbody. Sediment and turbidity adversely affect aquatic habitat and can cause geomorphic processes to become imbalanced. Construction also typically involves heavy machinery, which can adversely affect water quality. Best management practices that would be followed under all alternatives, including grading and erosion control measures, would lessen the effects of construction and heavy machinery.

Dispersed recreation management areas are detrimental to surface water when compared with developed sites because they are often situated too close to streams and lakes. By their very nature, they offer no services, such as toilets or fencing, to mitigate potential water contamination or other water quality impacts. Dispersed sites are typically difficult to manage because they can be numerous and in remote locations. Especially where accessible by vehicle, but also possible at wilderness sites, soil compaction and bare soil from overuse can result in erosion and sedimentation (Leung and Marion 2000). Dispersed camping is common in the Ashley National Forest and is concentrated on the east side of Highway 191, adjacent to the shoreline of the Flaming Gorge Reservoir, as well as on Taylor Mountain, Iron Springs, Dry Gulch, and Hickerson Park Road.

Streambanks are often destabilized through walking along the banks, adversely affecting aquatic and riparian habitat, where banks become less resilient to flood flows, eliminating undercuts, and adding sediment to streams. Water quality is adversely affected when human waste, fuel from stoves and OHVs, and other contaminants are introduced to waterbodies. Several water resources in the Ashley National Forest are affected by dispersed camping and overcrowding.

While developed sites permanently alter the environment, they are generally designed with best management practices in mind, meaning properly sited developed recreation should affect surface water resources less than dispersed sites; this is because they concentrate and manage the use. Developed recreation sites guide people to have a contained, minimal impact on the local environment and are monitored for condition and use. That being said, impermeable surfaces, faulty sanitation services, and water supply diversions can be detrimental to water quality if not well sited and managed. This is because they can contribute pollutants and alter flow volumes.

Roads, trails, and stream crossings are known to cause sedimentation and erosion. High road densities degrade floodplain function, increase erosion, and decrease vegetation cover. Roads that cross riparian areas have direct impacts through vegetation removal and water flow alteration. Roads outside riparian areas may have indirect riparian effects, including concentrated overland flow, increased sedimentation, and accelerated runoff, with increased peak flows and related damage.

Trails can adversely affect surface water resources where they concentrate water over long distances, giving it erosive power. The effect is amplified on motorized trails, which are typically wider, more compact, more disturbed, and often rutted; this all further concentrates water. If the eroded soil is delivered to a stream channel, sedimentation can adversely affect water quality and aquatic habitat (Olive and Marion 2009). Where trails intercept overland flow, they can dewater soil and stream channels downslope while augmenting flow to other hillslopes and streams. Adding water to drier areas can result

in erosion, channel incision, and channel widening, which have implications for water quality and geomorphic processes.

#### *Effects from Designated Areas*

The designated High Uintas Wilderness Area is addressed under every alternative (274,014 acres in the Ashley National Forest). Management of wilderness prohibits motorized and mechanized ground disturbance and establishes wilderness guidance for recreation, such as camping a minimum distance from surface water. Wilderness management protects water quality through minimizing ground disturbance, erosion, and sedimentation.

#### *Effects from Restoration*

Stream channel restoration projects should have the long-term beneficial effects of rehabilitated geomorphic and biological processes, which would help to restore stream and riparian ecosystem services. Changed stream sinuosity, width-to-depth ratios, and frequency and depths of pools; removal of physical barriers, such as culverts, headcuts, and dams; and side channel restoration would restore natural stream processes. These activities also would improve aquatic habitat, stream temperature and sediment patterns, and streambank stability. The placement of wood, boulders, and gravel would improve channel morphology by creating pools, dissipating energy, and increasing sinuosity.

While improvement projects are typically successful on long-term resource conditions, they usually pose some localized risk of unintended, short-term adverse impacts on stream channels, water quality, and stream temperature. With the implementation of effective best management practices, the long-term benefits to water resources usually outweigh the short-term risks.

#### *Effects from Livestock Grazing Management*

Livestock grazing can adversely affect water quality (Armour et al. 1991). Where animals concentrate at stream channels and springs, they are more likely to contaminate surface waters. Most livestock-generated pollution is related to soil disturbance and erosion. Soil becomes compacted in areas where livestock habitually congregate. Compacted soil is less hospitable to plant roots than uncompacted soil. Where roots are unable to penetrate the soil, they are less able to take in nutrients and water, making plants more vulnerable to toppling, disease, and drought. Compacted soil also decreases bank strength (Abernethy and Rutherford 2001), causing streams to become more susceptible to erosion.

Livestock, with their hooves and body weight, can alter streambanks where they cross and trail along streams. Soil can be dislodged by hoof action where the ground is moist and sloped (Warren et al. 1986). The loosened soil becomes entrained during precipitation and high flows, contributing to turbidity and sedimentation. Significant contributions of sediment to a channel can disrupt the balance between incision and aggradation, adversely affecting aquatic and riparian habitats.

Through their feces and urine, livestock can contribute nutrients and organic matter (Sheffield et al. 1997), bacteria such as *E. coli* (Davies-Colley et al. 2004), and protozoan pathogens such as *Giardia* (Nader et al. 1998) to stream channels. Excessive nutrient inputs, particularly phosphorus and nitrogen, can cause algal growth to increase, water clarity to decrease, and ammonia concentrations to increase, which can be toxic to fish. The increased organic matter also serves as a food source for bacteria and other microorganisms, which lower oxygen levels in the water. Bacteria and protozoan pathogens can be harmful to humans and wildlife.

Livestock grazing can adversely affect stream temperature. Where stream channels lack sufficient vegetative shading due to overgrazing, the sun may warm surface water, harming cold water-dependent aquatic species.

Allotment level assessments conducted over the past decade have identified specific locations where past livestock grazing may have contributed to water quality impacts (see, for example, Goodrich and Huber 2017).

### **Riparian Vegetation Structure and Composition**

#### *Effects from Recreation*

Dispersed recreation management areas can be detrimental to riparian areas where human use concentrates in riparian areas next to streams and wetland features. Detrimental effects intensify if sites are accessed by motorized vehicles.

Dispersed sites that are merely closed and not rehabilitated would not experience the short-term impacts from heavy equipment use in riparian areas; however, they also would not likely improve or recover completely on their own. Sites would remain compacted from years of vehicle traffic; the compaction would inhibit revegetation, leaving exposed soils and vulnerabilities to invasive plant encroachment.

Roads and trails can also facilitate the introduction and spread of nonnative species. As noted above in the affected environment section, nonnative invasive plants and animals are already present in or next to many riparian and aquatic ecosystems. Nonnative invasive plants can displace native species, alter vegetation structure, and lead to declines in ecological status and functional diversity. They can also interfere with natural processes such as nutrient and fire cycles and alter water quality status, which reduces resilience and adaptive capacity.

#### *Effects from Designated Areas*

The High Uintas Wilderness Area is designated under every alternative (274,014 acres in the Ashley National Forest). Management of designated wilderness areas prohibits motorized and mechanized ground disturbance, establishes wilderness guidance for minimized disturbance for wildfire suppression activities, and limits access for recreationists. Wilderness management protects riparian and wetland ecosystems through minimizing ground disturbance, eliminating motorized access, and reducing recreation use, all of which reduce impacts on riparian and wetland vegetation and inhibit the spread of nonnative species.

#### *Effects from Livestock Grazing Management*

Livestock grazing would continue to affect many riparian and wetland ecosystems under all alternatives. Streamside vegetation is most affected by grazing because riparian-aquatic zones are usually grazed more heavily than are upland-terrestrial zones. Also, livestock congregate along streams for shade and water.

Livestock grazing can affect the riparian environment in a number of ways. Grazing can change and reduce riparian vegetation, alter vegetation community structure and function, and introduce nonnative plant species, thereby affecting the riparian habitat needed to support terrestrial and aquatic species (Forest Service 2017c). Improper grazing, such as intensive grazing in riparian, wetland, and fen communities, may change the vegetation composition by reducing highly palatable plant species while increasing less palatable plant species, including nonnative and invasive plant species; reduce vegetation cover; diminish plant species richness; and reduce the hydrological function related to the quality and quantity of riparian and greenline vegetation. Trampling by livestock can also erode streambanks and widen channels, causing sedimentation and aggradation of channels, and lowering the water table, with some impacts observed in the Ashley National Forest riparian communities (Forest Service 2009a). This can then reduce the amount of water available to support aquatic communities and terrestrial wildlife (Rasby and Walz 2011). Desired condition plan components common to all action alternatives for riparian areas, livestock grazing, and soil should minimize the potential for adverse impacts related to livestock grazing.

## **Overall Watershed Condition**

### *Effects from Recreation*

Motorized routes in watersheds can have many long-term adverse impacts on hydrologic processes (Gucinski et al. 2001), including altering hydrographs; causing channels to widen, incise, and aggrade; degrading water quality through sedimentation and turbidity; disrupting geomorphic and biologic connectivity; and increasing stream temperatures.

While various plan components in the transportation infrastructure—roads; watershed, aquatic and riparian ecosystems; and other sections of the forest plan seek to diminish the adverse effects by roads, as motorized route density increases in a watershed, water resources are more likely to be adversely affected. In general, watersheds with more than 1 mile of road per square mile can be considered to have moderate road density. More than 2.4 miles of road per square mile is considered high road density (Forest Service 2011c).

Eighty-five percent of the watersheds in the Ashley National Forest rate either fair or poor on the roads and trails condition indicator for the WCF score (table 3-5). These watersheds are spread across the Ashley National Forest; watersheds rated poor are on the Tavaputs Plateau, along the FGNRA, and scattered throughout the Uinta Mountains (Forest Service 2017b). The roads and trails condition indicator considers the road density in a watershed, whether best management practices are implemented, the percentage of roads and trails within 300 feet of streams or other waterbodies, and whether roads are on unstable landforms subject to mass wasting and sedimentation (Forest Service 2011c).

### *Effects from Vegetation and Fire Management*

Vegetation and fuels management strategies affect the fire regime in the Ashley National Forest. The WCF indicated that 90 percent of watersheds had fair scores for the fire regime or wildfire indicator over the Ashley National Forest (Forest Service 2017b). This indicated that most watersheds have a moderate departure from the reference fire regime. This increases the potential for high-intensity wildfires with the potential to affect the overall watershed condition.

### *Effects from Restoration*

Hydrologic processes can be adversely affected by management activities, such as fire suppression, prescribed fire, timber extraction, fuels reduction, noxious weed treatments, road construction, recreation, and livestock grazing. The watershed condition becomes adversely affected where most watershed acres have compromised hydrologic function. Where degraded, the beneficial effects of properly functioning watersheds are most likely realized if restoration is coordinated in time and location. While every alternative contains plan components that encourage and guide restoration, the scale and degree of coordination differ, as do their likely effectiveness.

## ***Environmental Consequences for Watersheds and Aquatic and Riparian Ecosystems— Alternative A***

### **Water Quality**

#### *Effects from Recreation*

Alternative A does not provide direction on mitigating resource damage from developed recreation sites. It also does not provide direction on dispersed camping, such as whether to close, rehabilitate, or mitigate dispersed sites where there is resource damage. Many of the popular dispersed sites are on routes parallel to streams and lakes in the Ashley National Forest. Without plan components to address these problems, adverse impacts on surface waters from sedimentation, soil compaction, and bare soils would continue, as



described in “Environmental Consequences for Watersheds and Aquatic and Riparian Ecosystems Common to All Alternatives.”

Since alternative A provides minimal guidance on trail construction and includes little trail maintenance, impacts on water quality from sedimentation, vegetation removal, and water flow alteration would continue.

#### *Effects from Designated Areas*

Alternative A would manage 13 miles of the Green River and 40 miles of the Upper Uinta River as suitable for wild and scenic river designation. Standards direct managers to protect and enhance the river values for which they were designated, as well as their water quality and free-flowing nature. Standards also limit facility, road, and trail construction, especially in wild segments. Ultimately, wild and scenic river management should benefit surface water quality because ground disturbance and recreation access are limited, minimizing the potential for adverse effects.

Alternative A also retains seven RNAs totaling 7,700 acres. Surface-disturbing activities and access are limited in the RNAs. These protective plan components would reduce potential impacts on water quality from recreation and motorized travel-related disturbance. They also reduce active treatment options in these areas.

Alternative A does not recommend the designation of any additional wilderness areas.

#### *Effects from Vegetation and Fire Management*

Alternative A does not include specific direction for managing most vegetation types, but vegetation treatments and prescribed burning would be used. The focus of the 1986 forest plan was for timber production and not to move vegetation types toward desired conditions or their natural range of variation. The threat of uncharacteristic wildfire would continue and would be the highest under all alternatives, posing increased risk for sedimentation, higher water temperatures, shifts in flood severity/frequency, and other destabilizing effects.

#### *Effects from Restoration*

Alternative A does not include quantifiable objectives for restoring water resources and considers these projects as opportunities arise. Watershed and waterbody restoration would proceed at current levels, albeit without a coordinated focus on priority watersheds. Water quality would continue to deteriorate in the Ashley National Forest under alternative A.

### **Riparian Vegetation Structure and Composition**

#### *Effects from Recreation*

Alternative A manages for a variety of developed and dispersed recreation experiences and provides a system of trails and roads for motorized recreation. It does not include management for dispersed camping or motorized and nonmotorized trails in riparian areas. Impacts on riparian areas from riparian vegetation removal, sedimentation, and soil compaction would continue as described under “Environmental Consequences for Watersheds and Aquatic and Riparian Ecosystems Common to All Alternatives.”

#### *Effects from Designated Areas*

Alternative A would manage 13 miles of the Green River and 40 miles of the Upper Uinta River as suitable for wild and scenic river designation. In turn, 1,670 acres of riparian vegetation communities, 1,000 acres of wetland vegetation, and 960 acres of possible or likely fens would receive increased protection through designation of these river corridors (table 3-10). Management activities, such as timber

harvest and erosion mitigation, would be prohibited within eligible river corridors unless treatment is needed to protect eligibility, classification, or values. Such designations can limit disturbance-related impacts such as road building, recreating, timber harvesting, and grazing.

Alternative A also retains seven RNAs that include 140 acres of riparian vegetation communities, 260 acres of wetland vegetation, and 280 acres of possible or likely fens (table 3-10). RNAs provide additional protection for riparian and wetland vegetation through plan components that protect and maintain the biodiversity that the RNAs represent, through minimizing disturbance.

**Table 3-10. Riparian, Wetland, and Fen Acreage in Designated Areas**

Designated Area	Riparian Vegetation (Acres)	Wetland Vegetation (Acres)	Possible or Likely Fens (Acres)
Wild and scenic river corridors	1,670	1,000	960
RNAs	140	260	280

Sources: Forest Service GIS 2020; Smith and Lemly 2017

#### *Effects from Restoration*

Alternative A provides some direction for rehabilitating and maintaining riparian conditions, including prioritizing rehabilitation projects in riparian areas; however, it lacks clarification on how to prioritize riparian restoration, contains no objectives for riparian restoration, and does not establish riparian management zones. Accordingly, riparian area restoration projects would continue in a slow and fragmentary fashion under this alternative, which would contribute to the continued departure of riparian and wetland vegetation from desired conditions.

#### *Effects from Livestock Grazing Management*

Approximately 919,700 acres of active allotments are addressed under alternative A; there are no specific grazing utilization or stubble height parameters at the forestwide level—these parameters are discussed during allotment-level NEPA analysis. As a result, there would be no consistent guidelines for these parameters, and the utilization rates of key forage species and stubble heights could vary by allotment. Accordingly, impacts in some riparian and wetland areas would continue as they have under the 1986 forest plan. Such impacts could potentially include loss of water available to support riparian and wetland ecosystems and the species that depend on them; increased runoff to streams and rivers; removal of desirable riparian and wetland species; streambank headcutting and incisement, sedimentation, and compaction; and spread of nonnative, invasive plants.

### **Overall Watershed Condition**

#### *Effects from Recreation*

Alternative A would maintain current road densities in watersheds across the Ashley National Forest. It would not designate recreation management areas nor include objectives to expand the motorized and nonmotorized trail systems in the Ashley National Forest. The current WCF scores for the roads and trails condition indicator would continue to show impacts from high road densities, with impacts from altering stream flow, increasing sedimentation, and increasing stream temperatures; however, such impacts would not be expected to decrease further.

#### *Effects from Vegetation and Fire Management*

The current 1986 forest plan (alternative A) does not contain specific direction for managing most terrestrial vegetation types. It also does not include objectives for using mechanical treatments and prescribed fire to treat vegetation communities and move them toward desired conditions. Alternative A is not likely to adequately address watershed condition indicators such as water quantity, fire regime, forest cover or forest health issues, such as tree mortality and insect infestation over the long term. This is

because these require an increase in pace and scale of terrestrial restoration to moderate the risk of large high-intensity fires at a landscape scale.

The threat of uncharacteristic wildfires would continue and would be higher than under all other alternatives; the overall watershed condition would be at risk from uncharacteristic wildfires with the potential to reduce overall WCF scores.

#### *Effects from Restoration*

Alternative A encourages restoration under the 1986 forest plan, but it does not include identification of priority watersheds or other landscape-scale restoration strategy to maintain or improve watershed condition. Under the 1986 forest plan, watersheds are restored when and where funding becomes available and does not prioritize areas of degradation or high visitor use. Overall, the watershed conditions would continue to degrade.

The WCF assessment identified 47 percent of watersheds to be functioning at risk (table 3-5). Restoration under the 1986 forest plan was not successful at moving watersheds toward proper functioning. This is due to a lack of guidance that provides focused coordinated treatments at the landscape scale.

#### *Environmental Consequences for Watersheds and Aquatic and Riparian Ecosystems— Alternative B modified*

The most significant change between alternative B modified and the existing 1986 forest plan (alternative A) is the incorporation of forestwide desired conditions, standards, and guidelines that together provide more detail and clarity regarding the conditions and management of watersheds that would contribute to the overall goal of maintaining the integrity and resilience of watersheds and riparian, wetland, and fen vegetation communities on the national forest.

#### **Water Quality**

As described above, several municipalities extend their source water protection areas into the Ashley National Forest. The greatest concern is with surface water intakes. Vegetation management activities as proposed for all alternatives can cause sedimentation and erosion that could enter streams. All alternatives would implement best management practices to reduce the potential of pollutants affecting water quality and aquatic habitat.

Overall, alternative B modified includes plan components to protect groundwater quality and source water protection areas. It would ensure that best management practices are implemented, activities are consistent with applicable source water protection requirements and goals, and beneficial uses are provided for.

#### *Effects from Recreation*

Alternative B modified would support recreation by providing infrastructure while taking into account other resource values. It would continue to provide for a variety of recreation possibilities, including developed and dispersed opportunities. It would establish three different recreation management areas that would support different recreation opportunities. Alternative B modified would include 670,000 acres under the general recreation management area where motorized and nonmotorized trail use is a priority.

Through these management areas, alternative B modified would include objectives that would expand both the motorized and nonmotorized trail system in the Ashley National Forest. These objectives include constructing 10 miles of mountain bike trails over the life of the plan, improving or maintaining 1 mile of road to dispersed camping sites every 3 years, constructing two OHV loop trails within 10 years of plan approval, improving 2 miles of motorized trails every 3 years, and expanding 10 miles of OHV trails to

60 inches wide to support larger OHV. Under alternative B modified, the motorized and nonmotorized trail networks would increase, including adding more trail miles, improving those trails that have higher usage, and transitioning trails to allow for larger OHVs. This would increase impacts on water quality from sedimentation, water flow alterations, and decreased vegetation cover. In addition, alternative B modified would improve access to popular dispersed camping sites, with water quality impacts from soil compaction, streambank destabilization, and pollutants introduced to streams from human waste and fuel for stoves and OHVs. Impacts on water quality would be greater than under alternative A due to increased trail construction, better access to dispersed recreation sites, and the potential for increased trail use.

#### *Effects from Designated Areas*

Alternative B modified would include the same suitable wild and scenic river segments and RNAs as alternative A, with impacts as described under “Environmental Consequences for Watersheds and Aquatic and Riparian Ecosystems—Alternative A.”

#### *Effects from Vegetation and Fire Management*

Alternative B modified would mechanically treat an average of 2,400 acres annually in the first decade and 2,100 acres annually in the second decade in areas where timber harvest is allowed. It would include 6,600 to 32,000 acres of fuels treatments annually to move vegetation communities toward desired conditions. Vegetation management objectives would be accomplished using wildfire and prescribed fire and mechanical treatments. By first reducing fuel levels through mechanical means, it minimizes the likelihood that prescribed fire would result in high soil burn severity and therefore adverse effects on hydrologic processes. Mechanized vegetation management has the potential for short-term negative impacts on water quality and increases in turbidity and sedimentation due to erosion of soil disturbed by heavy machinery.

The use of fire to restore the natural fire regime in watersheds and mechanized vegetation management could degrade water quality, reduce water quantity, and increase turbidity and sedimentation due to the loss of vegetation or ground cover. Those effects caused by mechanized vegetation management and fire restoration are usually short term, 1 to 5 years on average or until groundcover has been reestablished.

Mechanical forest thinning, including timber harvesting, and prescribed burning should reduce the likelihood of uncharacteristic wildfire (Agee and Skinner 2005), benefitting surface water resources through maintaining ground cover. Adequate groundcover reduces erosion potential by slowing the flow of water over the landscape and adding root strength to the soil. Indirectly, these activities maintain water storage capacity while reducing erosion and sedimentation (Johansen et al. 2001). The long-term potential for indirect impacts of sediment delivery on streams is lower than under alternative A.

Stream temperatures may be improved slightly due to lessening the risk of uncharacteristic wildfire killing vegetation, especially in riparian areas. This would maintain cooler temperatures along riparian corridors by retaining more shade.

#### *Effects from Restoration*

Alternative B modified includes an objective to improve or rehabilitate five road or trail crossings every 5 years for the life of the plan and an objective to complete at least one project per year to restore habitat or populations of aquatic species. Precedence would be given to priority watersheds and fish-bearing or Clean Water Act section 303(d)-listed streams. The rehabilitated stream crossings and aquatic habitat would improve the hydraulics of the streams, decrease water velocity, decrease scouring and sedimentation downstream, and improve aquatic organism passage.

## Riparian Vegetation Structure and Composition

### *Effects from Recreation*

As described above, alternative B modified would increase the motorized and nonmotorized trail systems in the Ashley National Forest and improve access to dispersed recreation sites. This would increase impacts on riparian and wetland species composition from soil compaction, removal of riparian and wetland vegetation, and possible introduction of nonnative species compared with alternative A.

### *Effects from Designated Areas*

Alternative B modified would include the same two suitable wild and scenic river segments and RNAs as alternative A.

### *Effects from Vegetation and Fire Management*

Alternative B modified would use a combination of mechanical treatments and prescribed fire to reduce the risk of uncharacteristic wildfire in the Ashley National Forest. The increased emphasis on vegetation and fire management to meet resource objectives would continue to improve riparian vegetation conditions. It also would reduce the risk of uncharacteristic wildfire across large landscape areas, especially those in higher elevations where there are fewer opportunities for more direct restoration. Alternative B modified would lead to more improvement of riparian ecosystem resilience to fire and climate change compared with alternative A. The emphasis on restoring low- and medium-intensity fires across the landscape (including in riparian areas) would limit the accumulation of fuels and encourage vigorous riparian habitats.

### *Effects from Restoration*

Alternative B modified would establish riparian management zones to protect the ecological integrity of these areas from potential harmful effects of catastrophic wildfire, unmanaged recreation, and potential overgrazing. Riparian management zone widths are generally defined in table 3-11 but may be wider or narrower, depending on the site.

**Table 3-11. Riparian Management Zone Widths**

<b>Riparian Management Zone Type</b>	<b>Default Riparian Management Zone Distance from Feature</b>
Perennial streams, natural ponds, lakes, open water wetlands, seeps, springs, and reservoirs	The slope distance extending 150 feet from the bankfull edge of the water body, or two site potential tree heights from the bankfull edge, or the distance from the waterbody to the outer margin of the riparian vegetation, whichever is greater
Intermittent seasonally flowing channels and waterbodies supporting riparian vegetation	The slope distance extending 100 feet from the bankfull edge of the waterbody or the distance from the waterbody to the outer margin of the riparian vegetation, whichever is greater
Ephemeral stream channels and waterbodies, unstable or potentially unstable areas	The slope distance extending 50 feet from the channel edge, or 50 feet from the outer edge of the unstable area

Alternative B modified would include plan components that restrict equipment refueling, maintenance, and storage of fuels and other materials in riparian management zones, locating timber roads and infrastructure outside of riparian management zones, and avoiding riparian management zones when

constructing roads and trails with some exceptions. These plan components would protect riparian, wetland, and possible fen areas for surface disturbance and would reduce access.

There would be more emphasis on ecosystem restoration, including riparian vegetation restoration, under alternative B modified than under alternative A. Alternative B modified includes an objective to improve or protect at least five groundwater-dependent ecosystem features (springs, seeps, or other wetlands) every 5 years for the life of the plan. It also would have an objective to improve the watershed condition of two watersheds every 10 years.

All restoration that reduces conifer encroachment and increases heterogeneity in riparian areas would move riparian vegetation composition and structure toward the natural range of variation. This would improve growing conditions for riparian hardwoods and shrubs that are often shaded out by upland trees and shrubs. Prescribed fire and wildfire managed to meet resource objectives would improve the condition, vigor, and health of most native riparian plants. Many native riparian plants sprout as an adaptation to flooding, and this often allows them to respond positively to fire as well (Fites-Kaufman et al. 2006). The trend in composition and structural heterogeneity of native species would increase.

#### *Effects from Livestock Grazing Management*

Alternative B modified would have the same number of acres for active grazing allotments as alternative A. In the absence of an allotment plan or other specific guidance, livestock grazing would follow forestwide utilization guidelines of key forage species for forage (50 percent) as well as 4-inch stubble height guidelines in riparian areas to help meet desired conditions for terrestrial vegetation. This would provide a forestwide guideline while allowing adjustments for site-specific conditions. This guidance would help reduce impacts on riparian and wetland vegetation in terms of maintaining species richness, vegetation cover, and plant structure compared with alternative A. It also would reduce the potential for plant species composition to shift toward unpalatable or grazing-tolerant plant species where livestock graze and away from native riparian and wetland species.

### **Overall Watershed Condition**

#### *Effects from Recreation*

Alternative B modified would designate recreation management areas with objectives that would expand both the motorized and nonmotorized trail system in the Ashley National Forest. Expanding the trail systems could increase road densities in watersheds that already rate fair or poor for the roads and trails indicator of the WCF scores (table 3-5); however, alternative B modified includes plan components that would avoid wetlands and unstable areas. The impacts on streams would be considered when reconstructing or constructing new roads. These plan components combined should reduce impacts on watershed condition from any new roads or trails constructed under alternative B modified, and they would not appreciably reduce WCF scores for the roads and trails condition indicator.

#### *Effects from Vegetation and Fire Management*

Alternative B modified would use mechanical treatments and prescribed fire to treat Ecological Response Units<sup>5</sup> and move them toward desired conditions. Vegetation management objectives would be accomplished using wildfire, prescribed fire, and mechanical treatments. This would improve the fire regime and move vegetation communities toward desired conditions in the Ashley National Forest watershed. They also could increase WCF scores for treated watersheds. In addition, alternative B

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<sup>5</sup>Ecological response units are map unit constructs with technical groupings of finer vegetation classes. The suite of vegetation classes that make up any given ecological response unit share similar disturbance dynamics, plant species dominants, and theoretical succession sequence (potential vegetation)

modified would manage 10 percent of natural unplanned ignitions to meet resource objectives associated with vegetation types.

The likelihood of large high-intensity fires would continue to increase but at a lower rate than under alternative A. This would be due to the combined mechanical treatments and prescribed burning, along with using unplanned natural ignitions to promote resource objectives. As a result, fuel reduction work under alternative B modified would provide benefits to maintaining water and soil quality and watershed condition over the long term. There would be expected improvements in WCF scores for the fire regime or wildfire indicator. As the pace and scale of mechanical tree thinning and prescribed fire increases, the Ashley National Forest should become more resilient to climate change than under alternative A.

#### *Effects from Restoration*

The Forest Service has identified priority watersheds in the Ashley National Forest to focus work in such a way that produces overall benefits to a watershed rather than restoring disparate locations throughout the national forest. For all priority watersheds, the Forest Service develops watershed restoration action plans. The Forest Service has identified essential projects to restore sites with legacy erosion and degraded aquatic and riparian habitats, such as streams and meadows. The watershed restoration action plans provide managers with a list and schedule of projects to be completed and are designed to improve the condition class rating of priority watersheds.

The proposed forest plan does not determine the development of new priority watersheds; instead, watershed managers use the WCF process to recommend new priority watersheds to responsible officials after assessing the need to restore degraded aquatic and riparian habitats. Recommendations are based on national forest inventory and monitoring data and such factors as interest and availability of partners, the presence of a listed species or SCC, and the risk of large, high-intensity wildfire. Managers will also consider watersheds already identified for fuel reduction and other ecological restoration. As new priority watersheds are selected, essential projects are identified in watershed restoration action plans.

Currently, alternative B modified has three identified priority watersheds: Cart Creek, Wolf Creek, and Whiterocks River. Once restoration work is completed on these watersheds, the Forest Service would select other watersheds where restoration is needed. Alternative B modified would increase the rate and scale of restoration above those under alternative A. Alternative B modified objectives include improving the WCF scores for two watersheds every 10 years, restoring at least five groundwater-dependent ecosystem features every 5 years, and improving aquatic habitat along 30 miles of stream during the first 10 years of plan implementation. These objectives, combined with focused restoration in priority watersheds, would improve WCF scores and overall watershed conditions compared with alternative A.

### *Environmental Consequences for Watersheds and Aquatic and Riparian Ecosystems— Alternative C*

#### **Water Quality**

##### *Effects from Recreation*

Alternative C would establish the same recreation management areas as alternative B modified but would reduce motorized recreation. It would do this by increasing the acreage of backcountry recreation management areas (335,500 acres more than under alternative B modified) and reducing the acreage of general recreation management areas (329,900 acres less than under alternative B modified). There are no equivalent management areas under alternative A. Backcountry recreation management areas emphasize lower visitor use and density levels and a low density of trails. Alternative C would reduce the miles of trail improvement and construction compared with alternative B modified and would prohibit wheeled motorized travel in the backcountry recreation management areas. This differs from alternatives B

modified and D, where wheeled motorized travel is allowed. Overall, alternative C would include less new trail construction and would restrict wheeled motorized travel in the backcountry recreation management areas compared with alternative A. This would reduce impacts on water quality from sedimentation and water flow characteristics.

#### *Effects from Designated Areas*

Alternative C would recommend 50,200 acres of wilderness and one additional RNA (1,400 acres). Impacts on water quality would be reduced compared with alternative A due to reductions in surface disturbance, restrictions on motorized travel, and a reduction in the concentration of recreation users. However, restrictions on restoration in recommended wilderness could affect the Forest Service's ability to improve these riparian, wetland, and, possibly, fen communities.

Alternative C would also recommend four additional river segments as suitable for inclusion in the Wild and Scenic River System. This would protect an additional 14 miles of rivers in the Ashley National Forest by decreasing the potential for surface disturbance and by limiting recreation access.

#### *Effects from Vegetation and Fire Management*

Unlike alternative B modified, alternative C would rely more on natural processes, such as wildfire, to treat vegetation communities. It would reduce objectives for vegetation treatments to 1,800 acres annually during the first decade and 1,600 acres annually in the second decade of the plan, but it would maintain the same acreage of fuels treatments as alternative B modified. Alternative C would treat a smaller proportion of the lands needing treatment to substantially reduce the risk of uncharacteristic wildfire. Alternative C would have fewer short-term impacts from vegetation treatments compared with alternative A, but it would not have long-term benefits for vegetation communities and fire regimes.

Alternative C would also increase the percentage of unplanned natural ignitions used to meet resource objectives from 10 percent under alternative B modified to 20 percent. Using wildland fire as a management tool without first reducing fuel loads with mechanical treatments could increase the potential for some areas to burn especially hot. This would result in some areas with a high soil burn severity that affects hydrologic processes and a temporary loss of riparian cover that moderates stream temperature. Overall, it would still decrease the potential for uncharacteristic wildfire and subsequent adverse impacts on water quality compared with alternative A.

#### *Effects from Livestock Grazing Management*

Livestock grazing would be restricted in destination recreation management areas under alternative C. This would remove 13,000 acres from grazing and would eliminate potential impacts on water quality for streams located in the destination recreation management areas, as described under "Environmental Consequences for Watersheds and Aquatic and Riparian Ecosystems Common to All Alternatives."

### **Riparian Vegetation Structure and Composition**

#### *Effects from Recreation*

Alternative C would decrease the motorized and nonmotorized trail systems compared with alternatives A and B modified and would restrict wheeled motorized travel in backcountry recreation management areas. This reduction of trail improvement and construction and motorized trail use would decrease impacts on riparian areas from sedimentation and riparian and wetland vegetation removal; it would reduce the potential for the spread of nonnative species.



*Effects from Designated Areas*

The largest number of acres of riparian, wetland, and possible or likely fens would be included in designated areas under alternative C (table 3-12). Alternative C would reduce disturbance from such activities as recreation and mechanical treatments compared with alternative A; however, restrictions on restoration in these areas could affect the Forest Service’s ability to improve these communities.

**Table 3-12. Riparian, Wetland, and Fen Acreage in Designated Areas Under Alternative C**

<b>Designated Area</b>	<b>Riparian Vegetation (Acres)</b>	<b>Wetland Vegetation (Acres)</b>	<b>Possible Or Likely Fens (Acres)</b>
Proposed wild and scenic river corridors (Dowd Creek, Honslinger Creek, Spring Creek, and North Skull Creek)	50	50	0
Proposed RNAs	140	260	20
Recommended wilderness	1,830	1,600	1,410

Sources: Forest Service GIS 2020; Smith and Lemly 2017

*Effects from Vegetation and Fire Management*

Alternative C would focus on natural processes to manage riparian communities, including the use of wildland fire to move toward desired fire regimes and limited mechanical thinning. There is high uncertainty as to how much fire and thinning would be used because of limitations on mechanical thinning and wildfire to meet riparian resource objectives. If there is an increase in low- to moderate-intensity wildfire, there could be a benefit to riparian species and composition under alternative C, similar to alternative B modified; however, if the rate of managed wildfire and prescribed fire remains low, then riparian vegetation restoration and improvement in ecological conditions would not be achieved as well as under alternative B modified.

*Effects from Restoration*

Alternative C would establish the same riparian management zones as alternative B modified and would include the riparian restoration objectives described under alternative B modified.

*Effects from Livestock Grazing Management*

Alternative C would reduce acres available for active grazing allotments by 13,000 acres compared with alternative A. Furthermore, alternative C forage for livestock grazing would have no greater than 40 percent utilization levels as well as a minimum 4-inch stubble height to help meet desired conditions for riparian and wetland vegetation. This would maintain native riparian and wetland vegetation in terms of species richness, vegetation cover, and plant structure to a greater extent compared with alternative A. It would also provide guidance for moderate forage utilization levels that could reduce the potential for plant species composition to shift toward unpalatable or grazing-tolerant species.

Livestock grazing would be restricted in destination recreation management areas under alternative C. This would remove 2,100 acres of riparian vegetation and 600 acres of wetlands from grazing and would eliminate potential impacts, such as altering the species composition and introducing nonnative species.

**Overall Watershed Condition**

*Effects from Recreation*

Alternative C would assign more acres to backcountry recreation management areas compared with alternative B modified. Backcountry recreation management areas emphasize nonmotorized recreation, and motorized trails are a minimal part of the trail network. WCF scores for roads and trail condition indicators are not expected to increase under alternative C and could decrease for watersheds where road

densities and trail use decrease. New road and trail construction would follow the same restrictions near streams and wetlands as described under alternative B modified and could improve WCF scores for the roads and trail condition indicator compared with alternative A.

#### *Effects from Vegetation and Fire Management*

Alternative C would reduce the overall acreage of mechanical treatments compared with alternative B modified, but it would maintain the same acreage of prescribed burning. This would reduce the benefits of combining mechanical treatments and prescribed burning. Alternative C would also increase to 20 percent unplanned natural ignitions managed for resource objectives. This, combined with decreased mechanical thinning, could increase the percentage of fires with high soil burn severity, which would increase impacts on watershed condition.

Overall, it is reasonable to assume that some watersheds would be adversely affected by high soil burn severity, while other watersheds would have improved conditions, with corresponding increases or decreases in WCF scores for the fire regime or wildfire indicator. Alternative C could reduce the long-term beneficial impacts on watershed condition by increasing the potential for high soil burn severity in some watersheds; however, it would still decrease the potential for uncharacteristic wildfires compared with alternative A.

#### *Effects from Restoration*

Same as those described under alternative B modified.

### ***Environmental Consequences for Watersheds and Aquatic and Riparian Ecosystems— Alternative D***

#### **Water Quality**

##### *Effects from Recreation*

Alternative D would designate the least acreage for backcountry recreation management areas with most acreage in general recreation management areas (99,800 acres more than alternative A). Alternative D would increase objectives for the construction and improvement of motorized and nonmotorized trails, including expanding access for wider OHVs. Compared with alternative A, the increased trail system and trail use would increase impacts on water quality from sedimentation and changes to stream morphology.

##### *Effects from Designated Areas*

Impacts are the same as those described under alternative A. Alternative D does not recommend any wilderness.

##### *Effects from Vegetation and Fire Management*

Alternative D promotes active management of wildland fire. It would include slightly higher vegetation treatment acreages and higher prescribed burn acreages (10,000 to 40,000 acres annually) compared with alternative B modified; however, the focus would be on suppression and protection of developed areas rather than moving vegetation communities toward desired conditions. This would maintain the risk of uncharacteristic wildfire outside of developed resources and highly valued resources and assets (HVRAs), with the potential for increased sedimentation and higher water temperatures.

#### **Riparian Vegetation Structure and Composition**

##### *Effects from Recreation*

Alternative D would expand and improve the motorized and nonmotorized trail systems and would designate the most acreage in the general recreation management area. This emphasizes multiple use, including motorized and nonmotorized access. The emphasis on trail improvement, construction, and

access would increase impacts on riparian areas compared with alternative A more than the other action alternatives.

*Effects from Designated Areas*

Alternative D would include the same suitable wild and scenic river segments and RNAs as alternative A. It would not include any recommended wilderness areas. Impacts on riparian vegetation structure and composition from designated area management would be the same as alternative A.

*Effects from Vegetation and Fire Management*

Alternative D emphasizes active management of wildland fire. All fuels treatments would be designed to support the protection of developed resources and to reduce fire intensity. Alternative D would also include the greatest acreage of vegetation management of all the action alternatives. There still would be the potential for uncharacteristic wildfire outside the HVRAs and not next to developed resources; however, alternative D would reduce the risk of uncharacteristic wildfire compared with alternative A. Compared with alternative B modified, however, this focus on suppression and protection of developed resources would decrease the effectiveness of vegetation treatments to improve riparian vegetation conditions.

*Effects from Restoration*

Alternative D would establish the same riparian management zones as alternative B and would include the same objective for improving groundwater-dependent features, with impacts as described under alternative B modified.

*Effects from Livestock Grazing Management*

Alternative D would have similar plan components for the management of allotments as alternative B modified, including utilization guidelines (50 percent) of key forage species. Impacts would be as described for alternative B modified.

**Overall Watershed Condition**

*Effects from Recreation*

Alternative D would assign the most acreage to general recreation management areas, where motorized and nonmotorized use is emphasized. It includes objectives for the most motorized and nonmotorized trail construction of all the alternatives, with the most potential to decrease the road and trail condition indicator for watersheds. It has increased potential to have impacts such as sedimentation, stream flow alteration, and stream temperature increases.

*Effects from Vegetation and Fire Management*

Alternative D promotes active management of wildland fire. It would increase the overall acreage of both vegetation treatments and prescribed burning over the life of the plan; however, alternative D would focus the vegetation treatments and prescribed burning on fire suppression and the protection of developed resources, with most of the treated acres in and around HVRAs. Alternative D would decrease to 5 percent the unplanned natural ignitions used to support resource objectives.

Despite an increased acreage of vegetation treatment compared with alternative A, alternative D's focus on suppression would increase the risk of high-intensity wildfires compared with alternative B modified. This is because the level of vegetation treatment would not reduce the risk of high-intensity wildfires enough to offset the impacts of increased fire suppression. This would increase the risk of adverse impacts on watershed condition and decreases in WCF scores for the fire regime or wildfire indicator. Alternative D would still reduce the risk of high-intensity wildfires compared with alternative A, with a subsequent

reduction of risk to watershed condition due to the objectives for vegetation treatment and prescribed burning.

#### *Effects from Restoration*

Effects from restoration activities would be the same as described under alternative B modified.

### Cumulative Environmental Consequences for Watersheds and Aquatic and Riparian Ecosystems

The timeline for assessing cumulative effects on water resources is 15 years, the life of the plan. That is because this is the time frame in which the proposed activities could occur. In addition, 15 years is enough time for the effects of the new plan components on water resources to become evident. The spatial boundaries of the analysis are the 147 subwatersheds that overlap the Ashley National Forest but also extend beyond its boundaries. For the most part, stream systems originate in headwaters in the Ashley National Forest and flow downstream onto lands owned or administered by entities other than the Forest Service.

Past, present, and future activities within the administrative boundary of the Ashley National Forest include livestock grazing, prescribed and natural fires, wildfire suppression, recreation, vegetation management, nonnative invasive plant treatments, road construction and maintenance, road decommissioning, wildlife habitat restoration and management, oil and gas development, and watershed restoration and management. Beyond the Ashley National Forest boundary, past, present, and future actions by other entities, as well as activities associated with rural residential communities, impact watersheds and aquatic and riparian ecosystems. In any watershed, regardless of landownership, these activities cumulatively affect, both beneficially and adversely, water quality, riparian and wetland vegetation communities, and watershed condition. All action alternatives would implement the proposed forest plan, while modifying a few of the plan components and would have similar cumulative impacts on water resources.

Lands under other entities' management policies are likely to continue affecting riparian and aquatic resources. The cumulative effects across the large, geographically complex, and diverse Ashley National Forest are difficult to analyze considering the uncertainties associated with government and private actions and ongoing changes to the region's economy. Whether those effects will increase or decrease across the Ashley National Forest in the future is a matter of speculation; however, based on the growth trends and current uses identified in this section, cumulative effects are likely to increase.

Many activities occur on private lands. These include water diversion, irrigation, livestock grazing, farming with varied cash crops, timber harvest, angling, construction of subdivisions and other housing, commercial development, building and stocking of private fish ponds, chemical treatment of noxious weeds, and flood control and stream channel manipulation.

Several municipalities have source water protection areas that include large portions of the Ashley National Forest. The Forest Service manages these headwaters to protect drinking water supply downstream, based on the Utah Department of Environmental Quality Division of Drinking Water's requirements. Alternatives B modified, C, and D include plan components to protect water quality in these areas, including objectives for restoration and vegetation treatments to improve the condition of these watersheds and reduce the risk of uncharacteristic wildfires.

One of the major issues affecting watershed condition and downstream water quality is the departure of vegetation communities from their historical fire regimes and the increased risk for uncharacteristic wildfire. Alternatives B modified, C, and D include plan components to move vegetation communities

toward desired conditions, including objectives for annual mechanical treatment, prescribed burning, and restoration objectives to improve priority watersheds in the Ashley National Forest. These actions would improve fire regimes and decrease the risk of uncharacteristic wildfires, reducing the cumulative impacts on water quality downstream, including changes to stream morphology and sedimentation.

The effectiveness of Forest Service management under all alternatives may be reduced or enhanced by the cumulative efforts of adjacent landowners. For all alternatives, without concerted efforts by many landowners, the potential for long-term, adverse, cumulative watershed impacts from high-intensity wildfire remains high.

## **Terrestrial Vegetation**

### **Introduction**

This section evaluates terrestrial ecosystems in the Ashley National Forest. The national forest is in three major areas: the northern and southern slopes of the Uinta Mountains, the Green River Basin, and the Tavaputs Plateau. Elevations range from 5,500 feet on the Green River, a unique ecological transition zone connecting the northern and southern Rocky Mountains.

The following section summarizes and updates the information found in the Ashley National Forest Assessment, Terrestrial Ecosystems, System Drivers, and Stressors Report (Forest Service 2017e).

Terrestrial ecosystems were evaluated by assessing key ecosystem characteristics that sustain the long-term integrity of these ecosystems. Key ecosystem characteristics were evaluated based on the influence of stressors and drivers and the estimated degree of departure from natural range of variation. Natural range of variation is defined as the variation of ecological characteristics and processes over scales of time and space that are appropriate for a given management application (Forest Service Handbook 1909.12). The time frame for natural range of variation is generally considered pre-European influence and should be “sufficiently long, often several centuries, to include the full range of variation produced by dominant natural disturbance regimes such as fire and flooding and should also include short-term variation and cycles in climate” (Forest Service Handbook 1909.12). The natural range of variation is a tool for assessing the ecological integrity and does not necessarily constitute a management target or desired condition.

The current status and trends of key ecosystem characteristics are also summarized considering current management and climate associated risks. The terrestrial ecosystems used in this assessment were selected vegetation types and landtype associations that were mapped based on the National Hierarchical Framework of Ecological Units (Cleland et al. 1997). This is a systematic land classification and mapping method developed to provide a scientific basis for implementing ecosystem management.

### ***Regulatory Framework***

The National Forest Management Act is a law that requires the Forest Service to develop forest plans, and in 2012 the U.S. Department of Agriculture (USDA) issued a new rule to guide the forest planning process. Known as the 2012 Planning Rule, it emphasizes that forest plans are to guide management of the national forests so they are ecologically sustainable. This includes managing terrestrial vegetation communities for long-term resilience to stressors and toward the natural range of variation. National forests are managed to provide ecosystems and watersheds with ecological integrity and diverse plant and animal communities. NEPA requires the Forest Service to disclose the potential effects of revising forest plans.

### Analysis Area

The analysis area for evaluating terrestrial vegetation communities includes all lands under the management of the Ashley National Forest. The spatial scale looked primarily at the vegetation type spatial scale for most key ecosystem characteristics. Landtype associations were also used as a spatial scale for evaluation for other ecosystem characteristics. Further, landtype associations were used to describe the geomorphic influences these landscapes exert on vegetation communities in the Ashley National Forest.

### Notable Changes Between Draft and Final EIS

Descriptions of terrestrial vegetation types and specific drivers and influences were clarified in the “Description of Affected Environment” section. Analysis of alternative B was updated to reflect changes in alternative B modified. These include analysis of impacts from the removal of recommended wilderness and the incorporation more flexibility in management direction for livestock grazing and related to the factual correction to the acres of annual treatment from 1,500 to 2,400 acres in objective (FW-OB-CONIF-01)

### Description of Affected Environment

The Ashley National Forest is made up of diverse ecosystems spanning three physiographic divisions, four sections, and fifteen subsections that are defined by the National Hierarchical Framework of Ecological Units. The four sections are the Uinta Mountains, Green River Basin, Tavaputs Plateau, and a very small portion of the Uinta Basin.

Within each subsection, the Ashley National Forest mapped landscapes at the landtype association scale. There are 24 distinct landtype associations in the Ashley National Forest (table 3-13, figure 3-3).

**Table 3-13. Descriptions of Landtype Associations in the Ashley National Forest**

<b>Name</b>	<b>Acres</b>	<b>Description</b>
Alpine Moraine	259,100	Glaciated lands including cirque basins and side slopes at the heads of the glacial canyons of the Uinta Mountains and pothole or knob and kettle landforms. This includes scoured basins and drift basins above the tree line, with alpine plant communities.
Antelope Flats	7,400	Includes sandy and gravelly quaternary pediments associated with the Green River and gypsiferous and alkaline or saline sediments of Mancos Shale.
Anthro Plateau	108,600	Consists of plateau lands dissected by long canyons with comparatively wide, flat bottoms. Canyons are cut through calcareous sandstones and marly, shale-like mudstones of the Green River and Uinta Formations.
Avintaquin Canyon	82,400	Composed of dendritically dissected plateau lands, underlain by marly, shale-like mudstones of the Green River and Uinta Formations, with narrow or moderately wide flat ridges and northerly gradients of about 5 percent. The dendritic canyons have steep walls and very narrow drainage bottoms.
Dry Moraine	9,600	Older glaciated landforms associated with the major glacial canyons of the central Uinta Mountains. Vegetation is variable and includes mountain big sagebrush/needle-and-thread grass, mountain brush, ponderosa pine, and aspen communities.

<b>Name</b>	<b>Acres</b>	<b>Description</b>
Glacial Bottom	14,000	Current floodplains and terraces along the bottoms of lower reaches of the major canyons of the south slope of the Uinta Mountains. Vegetation structure is the most complex in the Uinta Mountains. Coniferous trees including ponderosa pine and limber pine.
Glacial Canyons	71,800	Consists of the steep canyon walls of the glaciated canyons of the south slope of the Uinta Mountains. It includes small to large areas of boulder fields with little vegetation or sometimes with scattered coniferous trees and aspen.
Green River	62,400	Flats, hills, and canyons underlain by the Green River Formation. This association flanks the Flaming Gorge Reservoir in the Wyoming portion of the Ashley National Forest. Vegetation is generally dominated by cold desert shrub species of sagebrush.
Greendale Plateau	52,400	Consists of plateau lands of the eastern Uinta Mountains underlain by gently to moderately sloping quartzitic sandstone. Ponderosa pine and mountain big sagebrush are common at dry, lower elevations; lodgepole pine dominates the dry, upper elevations; and mesic to wet meadows are interspersed across the landtype.
Limestone Hills	18,500	Scarp and dip slopes of Mississippian Limestone of the south slope of the Uinta Mountains. This is part of the limestone donut that interruptedly surfaces around the Uinta Mountains. Douglas-fir generally dominates the scarp slopes.
Limestone Plateau	7,400	Plateau lands underlain by Mississippian Limestone of the south slope of the Uinta Mountains. Karst topography, including depressions of internal drainage is included in the association. In general, the association is of higher elevations than the Limestone Hills.
Moenkopi Hills	2,100	Foothills of the Uinta Mountains underlain by the Moenkopi Formation. This includes vegetated slopes and slopes eroding to badlands. Pinyon-juniper and mountain brush communities, dominated by alderleaf mountain mahogany, are common to this association.
North Flank	50,200	Comprised of some of the youngest deposits and oldest rocks in Utah. This association contains the classic faults and folds of Laramide orogeny that uplifted the Uinta Mountains about 70 to 40 million years ago.
Parks Plateau	95,800	Plateau lands of Bishop Conglomerate and possibly Browns Park Formation of the eastern Uinta Mountains. Vegetation includes large stands of lodgepole pine with an obvious history of stand replacement fire; stands of stable or persistent aspen.
Red Canyon	28,500	Precipitous walls of Red Canyon are the central theme of this association. It also includes some tributary canyons that feed into Red Canyon. Vegetation varies with aspect, depth to bedrock, and other features.
Round Park	10,500	Vegetation is dominated by large stands of lodgepole pine at lower elevations and by mixed coniferous stands at higher elevations. Meadows including Round Park are included.
South Face	46,300	Slopes of the south face of the Uinta Mountains. Gravel and cobble debris washed from Parks Plateau cover large areas of this association. It also includes dip slopes of the Park City Formation. Mountain big sagebrush/grass communities cover much of this association.

Name	Acres	Description
Strawberry Highlands	12,400	Characterized by high plateau lands dissected by long canyons with narrow to moderately wide bottoms underlain by calcareous sandstones and marly, shale-like mudstones of the Green River and Uinta Formations.
Stream Canyon	43,400	Stream-formed canyons of the south slope of the Uinta Mountains, including Dry Fork and Brownie Canyons, and Ashley Creek and Brush Creek Gorges. Geologic strata are variable and include Mississippian Limestone and Weber Sandstone.
Stream Pediment	8,100	Gravel, cobble, and boulder pediments associated with streams at lower elevations on the south slope of the Uinta Mountains. Coarse fragments are mostly quartzitic sandstone; characterized by mountain big sagebrush/grass and mountain brush communities with alderleaf.
Structural Grain	21,500	Composed of landtypes of the Uinta Mountain Group on the North Flank of the Uinta Arch; these are high angle north-dipping against Paleozoic through Mesozoic rocks to the north.
Trout Slope	142,000	Large, continuous subalpine forests of lodgepole pine, Engelmann spruce, and some subalpine fir dominate the association. Meadows or “parks,” including Trout Creek Park, Big Park (of North Fork Ashley Creek), and Summit Park are included.
Uinta Bollie	174,600	Alpine summits and slopes above glaciation including Matterhorn type peaks, rounded bollies, low gradient benches, talus of cirque headwalls and side slopes with underlying or exposed Precambrian quartzitic sandstones and shales of the Uinta Mountain Group.
Wolf Plateau	5,900	Limited to the far western corner of the Ashley National Forest. The largest portion is an upland plateau underlain by a variety of sandstones and some shales. The topography is nearly level to rolling.

Sources: Smith and Lemly 2017; Forest Service 2017e; Forest Service GIS 2020

In addition to landtype associations, vegetation types were also used to describe ecosystem characteristics in the Ashley National Forest (table 3-14, figure 3-11). Selected vegetation types were evaluated using landtype associations to distinguish certain characteristics and distinctions of the same vegetation type that span various landscapes in the Ashley National Forest. The vegetation types were selected based on their percentage of representation in the Ashley National Forest (5 percent or more), the ecosystem services they provide, and potential risk to sustainability. The vegetation types most prevalent on the national forest that are the primary focus of this section are alpine, coniferous forest, aspen, sagebrush, pinyon and juniper woodlands, and desert scrub. Rare and unique terrestrial habitats are also discussed.

**Table 3-14. Vegetation Types in the Ashley National Forest**

Vegetation Type	Acres	Percentage of Total Acres
Alpine	168,700	12
Coniferous Forest	621,600	45
Deciduous Forest	35,300	3
Seral Deciduous Forest	116,300	8
Mountain Brush	43,000	3
Shrubland	119,100	9
Riparian	33,300	2
Grassland	14,600	1
Forb	100	<1



Vegetation Type	Acres	Percentage of Total Acres
Woodland	120,300	9
Desert Shrub	59,900	4
Water	44,700	3
<b>Total</b>	<b>1,376,700</b>	<b>100</b>

Source: Forest Service GIS 2020

### *Alpine*

Alpine vegetation is a complex of communities at high elevation that consist of an array of plants adapted to harsh environmental conditions. Plants are typically low growing, mat forming, small or dwarfed in their structure, or some combination of these characteristics (Forest Service 2017e). Non-forest or alpine plant communities of high elevation are mostly found in the Alpine Moraine and Uinta Bollie landtype associations and to a small extent in the Trout Slope landtype association (see figure 3-3). Alpine ecosystems make up 12 percent of the total Ashley National Forest plan area, with alpine boulder, talus, and cliff communities comprising most of the alpine vegetation type.

### **Influences of Drivers and Stressors**

Ecological drivers that most influence alpine communities include topography, geology, aspect, snow accumulation and persistence, wind exposure, rodent activity, soil moisture, and temperature. Collectively, these processes shape the landscape and influence vegetation composition and structure and potential ground cover. Potential stressors include browsing by wild ungulates, pocket gopher activity, and sheep grazing in a few areas. The most common human disturbances are trails, dispersed camping, and recreation horse use. Impacts from humans in alpine environments have been relatively limited due to the remoteness and harsh conditions associated with high elevations; however, increased recreation is a foreseeable stressor during the next plan period.

### **Comparison of Natural Range of Variation and Current Conditions**

Current conditions of the alpine plant communities and structure in the plan area closely align with the natural range of variation. Studies indicate that native plants totally dominate all alpine communities in the plan area. These communities show satisfactory plant composition and ground cover conditions, with mostly stable trends within the natural range of variation (Forest Service 2017e).

Evidence indicates alpine areas in the Uinta Mountains exhibit changing community dynamics such as an increase in density and canopy cover of low willow (*Salix* sp.) in many alpine communities, both wet and dry, which has been documented for at least 50 years (Forest Service 2017e). This increase of willow has occurred concurrent with livestock grazing. Also, conifer tree lines have shown upslope movement since about 1870. These trends may be interrelated. Climate warming trends in the Uinta Mountains led to increased timberline tree densities and upslope expansion of Engelmann spruce and subalpine fir. Similarly, warming climates may influence the upward trend of low willows in alpine settings. Additionally, new tree establishment at or near timberline consistently occurs in low willow communities where low willows have increased. Pocket gopher activity in the Uinta Mountains is an inherent disturbance. This activity is indicated to be the major biotic factor controlling plant community dynamics and ground cover in select alpine communities (Forest Service 2017e).

### *Coniferous Forest*

Coniferous forest is broadly classified into five major types: ponderosa pine, lodgepole pine, Douglas-fir, mixed conifer, and Engelmann spruce. Some of these have aspen as an associated species. Together, these

coniferous vegetation types cover about 53 percent of the Ashley National Forest lands. A summary of acres distribution is listed in table 3-15. Minor types that occur in the Ashley National Forest are grouped as miscellaneous. Woodland forest and persistent aspen are not displayed.

**Table 3-15. Coniferous Forest Communities and Associated Seral Aspen**

Community	Acres	Acres Seral Aspen
Ponderosa pine	37,800	7,900
Lodgepole pine	150,700	18,800
Douglas-fir	46,700	38,000
Mixed conifer	236,400	44,200
Engelmann spruce	144,400	N/A
Seral aspen only	N/A	2,100
Miscellaneous (subalpine fir, blue spruce, five- needle pines, riparian forest*)	5,500	1,900
<b>Total**</b>	<b>621,500</b>	<b>112,900</b>

Source: Forest Service GIS 2020

\* May include a mix of conifers or deciduous trees such as aspen, cottonwood, willows, maples, and boxelder.

N/A = not applicable

\*\* Due to rounding, the total acres of coniferous forests in table 3-13 is slightly different than it is in table 3-12.

Coniferous forest distribution is displayed in figure 5 in the Ashley National Forest Assessment, Terrestrial Ecosystems, System Drivers, and Stressors Report (Forest Service 2017e).

Ponderosa pine (*Pinus ponderosa* var. *scopulorum*) occurs in three major landtype associations in the Ashley National Forest: Dry Moraine, Greendale Plateau, and Stream Pediment. Ponderosa pine occurs to a lesser extent on the Red Canyon and Structural Grain landtype associations.

Lodgepole pine (*Pinus contorta* var. *latifolia*) forms both persistent and seral communities. Persistent lodgepole pine occurs in two major landtype associations—Greendale Plateau and Parks Plateau—and to a lesser extent on the Round Park. Persistent lodgepole pine forests often occur at lower elevations (below 9,600 feet), are generally heavily stocked, and comprise large pure stands often exceeding 200 acres (Forest Service 2017e). Conversely, seral stands of lodgepole pine are distributed among the mixed conifer, consisting of relatively smaller stands (tens of acres or more) on the Trout Slope, Alpine Moraine, and Dry Moraine landtype associations. On the Trout Slope and Alpine Moraine landtype associations, lodgepole pine occurs more often at the lower to mid-elevations, where it can be seral to spruce and subalpine fir. Lodgepole pine is typically an early seral tree species with a range extending beyond the Intermountain Region.

Douglas-fir (*Pseudotsuga menziesii*) occurs on many landtype associations across the Ashley National Forest. On the Uinta Mountain Section, it is most prevalent on the North Flank and on the northerly aspects of the Stream Canyon and Red Canyon. Douglas-fir is most common, however, on the Tavaputs Plateau Section of the Ashley National Forest, on the Avintaquin Canyon and Anthro Plateau. The Douglas-fir forest type is well distributed across the national forest.

Mixed conifer (Engelmann spruce, lodgepole pine, and subalpine fir) and Engelmann spruce (*Picea engelmannii*) are extensively distributed, occurring on many landtype associations across the Ashley National Forest. These types are most prevalent on the Alpine Moraine, Trout Slope, Glacial Canyon, Stream Canyon, and Uinta Bollie landtype associations. Mixed conifer generally occurs in the lower dry to moist subalpine habitats, and the Engelmann spruce type generally occurs in the colder, upper

subalpine habitat, often at elevations over 10,000 feet. Most Engelmann spruce is in the High Uintas Wilderness, where there is little to no management.

### **Influences of Drivers and Stressors**

Conifer forest ecosystems are shaped by many drivers, including soils, precipitation, elevation, climate, and amount of sunlight. Stressors in coniferous forest communities are uncharacteristic wildfires, invasive species, warming temperatures due to climate change, or other human impacts, all of which may degrade or impair ecological integrity. These can affect such characteristics as the age, structure, and composition of forest stands. A lack of fire has caused departures in structure and function in forest vegetation types. Without fire, some forests become dense with closed canopies and can become more susceptible to large-scale insect and disease outbreaks. As trees die in large numbers, there are fewer large, old trees and an overall loss of structural and species diversity in the stand.

Disturbance regimes, especially fire, shape the composition, distribution, and stand structures of coniferous forests in the Ashley National Forest. Due to historical fire suppression, much of the coniferous forest communities has departed from the natural range of variation. For seral species that depend on frequent and mixed severity fires, stand structures have become more uniform. Without natural fire disturbances, stands have shifted toward denser younger trees and more shade-tolerant species.

To maintain dominance, ponderosa pine needs natural surface burning on a frequent fire return interval to eliminate other less fire-tolerant conifers. Vegetation treatments, including prescribed burning, pre-commercial thinning, and timber harvest, can also support ponderosa pine communities, especially in the absence of natural fire regimes. Recent harvests of ponderosa pine have been almost exclusively salvage harvest and have occurred in response to tree mortality from mountain pine beetle epidemics.

Lodgepole pine is the only conifer tree species present that is adapted to large stand-replacement fire. Stands of persistent lodgepole pine have a high percentage of closed cones, indicating a highly fire-adapted system. Harvested areas regenerated well to approximately the same species composition as the original stands.

In the Ashley National Forest, beetle outbreaks in the last two decades have affected the larger tree sizes in lodgepole pine, ponderosa pine, and Douglas-fir. Now, spruce beetle is affecting large Engelmann spruce trees as well. This means that the forest structure is likely to shift from mature and older trees to younger trees or even delayed regeneration. While large-diameter trees can still be found across the Ashley National Forest, the current distribution of sizes indicates a trend toward smaller trees that are not the preferred host size for bark beetles.

Douglas-fir stands were historically influenced by mixed-severity and low-severity fires. Low-severity fires that thinned the understory left older, fire-resistant survivors that provided seed and partial shade for the establishment of seedlings. The presence of low- to mixed-severity fire has been largely absent in Douglas-fir forests since settlement; it is likely outside the natural range of variation. Fire suppression led to Douglas-fir forests that had become increasingly dense, more mature, and susceptible to bark beetles.

A more frequent fire regime could change fuel dynamics, making the establishment of Douglas-fir a more likely outcome. Some studies suggest that Douglas-fir distribution will increase in a warmer climate (Forest Service 2017e). Yet others anticipate more frequent high-severity fires that will lead to loss of mature trees that serve as seed sources to the next generation of Douglas-fir. Where Douglas-fir is a seral species, it could increase in distribution since it is more fire tolerant than associated species.

In the mixed-conifer habitat type, the disturbance regime is significant in driving species composition. In both the mixed-conifer and Engelmann spruce vegetation types, insects are an important driver of change and composition in the subalpine system. See table 3-16 for details.

### Comparison of Natural Range of Variation and Current Conditions

**Table 3-16. Comparison of Natural Range of Variation in Coniferous Forest Types**

Forest Community	Comparison of Natural Range of Variation: Composition and Distribution	Comparison of Natural Range of Variation: Structural Stages
Ponderosa Pine	Tree composition characteristics appear to be in the natural range of variation, at least in areas that have had some form of disturbance such as harvest or underburning (including prescribed burning). Up to an estimated 20 percent of the ponderosa pine forest has not had recent disturbance; the estimated departure from the natural range of variation for undisturbed, untreated ponderosa pine is low to moderate.	Fire suppression has altered ponderosa pine structure. Although some areas have an uneven-aged structure that is closer to historical conditions, the larger tree component has become deficient in general. Other areas have an uneven-aged structure uncharacteristic of ponderosa pine, where saplings are greater in number. Fewer large trees are largely due to mountain pine beetle outbreaks that have targeted dense stands. These stands had likely missed fire cycles that would have kept tree density lower historically and less susceptible to bark beetle attack. Although the return of fire is trending the structure in this type back to historical conditions, there is still a moderate degree of departure from the natural range of variation.
Persistent Lodgepole Pine	This appears to be at low departure from the natural range of variation. This is indicated by the dominance of the lodgepole pine species in the overstory, the lack of other conifer tree species in the understory, and the response of the lodgepole pine type to regenerate lodgepole pine after a disturbance.	Based on the structure characteristic, the system appears to be operating at moderate departure from the natural range of variation, due to some fire suppression. Stand-replacing fires supportive of lodgepole pine communities would likely have been larger had they not been suppressed. Contributing to departure is patch size due to timber harvest, which occurred at much smaller sizes than would have occurred historically with wildland fire.
Douglas-fir	Based on the tree composition characteristic, the successional potential of species other than Douglas-fir varies across the Ashley National Forest. This characteristic appears to be at moderate departure from the natural range of variation.	The diverse structure characteristic, inherent to a mixed-severity fire regime in the Douglas-fir type, appears to be lacking on most landtype associations in the Ashley National Forest. This characteristic appears to be a moderate to high departure from the natural range of variation.

Forest Community	Comparison of Natural Range of Variation: Composition and Distribution	Comparison of Natural Range of Variation: Structural Stages
Mixed Conifer and Engelmann Spruce	<p>The current composition is consistent with that described in the natural range of variation. Native bark beetles, however, are altering this characteristic. With bark beetle-caused tree mortality, tree composition is expected to shift to subalpine fir where it is present. Composition in the Engelmann spruce type is estimated to be trending to a moderate departure from the natural range of variation. With increase in severe fire, lodgepole pine and aspen are expected to persist where they are present. Douglas-fir could increase in distribution where fire is mixed severity. Mixed conifer is therefore estimated at moderate departure due to some fire suppression and expected climatic trends that would shift tree composition away from historical conditions.</p>	<p>Mixed conifer: Some fire suppression has led to greater prevalence of older structure classes, especially in the Alpine Moraine and Trout Slope landtype associations. With bark beetle-caused tree deaths and subsequent wildland fire, tree structure is expected to shift from continuous mature and old structure to younger. It is likely that the size, shape, and patterns of stands in a particular structural stage created by timber harvest are much different from stands driven by fire of the past. Due to these reasons, the mixed conifer is estimated at moderate departure from the natural range of variation. Engelmann spruce: Tree structure is changing with the advance of spruce beetle-caused tree deaths. Combined with projected increases in fire, regeneration back to spruce would be delayed where seed tree sources are unavailable, possibly creating non-forest-like conditions. Structure in the Engelmann spruce type is estimated to be trending at moderate departure from the natural range of variation.</p>

**Aspen**

Aspen is a common montane plant community in the Uinta Mountains and is represented across the landscape within a broad range of environments, successional states, and community types. Aspen communities are found in a number of landtype associations and represent about 11 percent of the vegetation types in the plan area. Although aspen communities have a high number of different plant associations, two types—seral aspen and persistent aspen—are generally recognized and discussed, based on successional features. Seral aspen occurs over approximately 112,900 acres in the plan area and is distributed throughout conifer forest vegetation types (see table 3-15). Persistent aspen stands total approximately 35,100 acres. Together, seral and persistent aspen total about 148,000 acres on the national forest.

Seral aspen functions as a seral species in many conifer communities (Forest Service 2017e). Over three-quarters of aspen in the Ashley National Forest is classified as seral and is found primarily at higher elevations. Seral aspen depends on periodic stand-replacing fire or catastrophic regeneration in order to persist in most conifer communities (Forest Service 2017e).

Persistent aspen accounts for about 24 percent of all aspen in the plan area. Conifers are absent or nearly absent in these communities, which indicates that aspen is the long-term dominant type and is a stable plant community. Persistent aspen communities in the plan area are typically found on south-facing or warmer aspects and at lower to mid-elevations that are usually below the conifer zone (Forest Service 2017e).

### **Influences of Drivers and Stressors**

Complexities within aspen communities are influenced by genetic variability, environmental conditions, and disturbance mechanisms. The most recognized and understood driver of aspen communities is fire. Three modes of aspen regeneration are found in the plan area, as follows:

- Stand-replacing or catastrophic regeneration
- Continuous regeneration—A few aspen clones perpetually show continuous regeneration, producing new suckers regardless of disturbance or stress. This regeneration mechanism is relatively uncommon.
- Episodic regeneration—The most common non-stand-replacing regeneration mode in persistent aspen is episodic regeneration. Aging aspen stands lose vigor and are less resistant to disease, insects, and drought, and they ultimately succumb to these stressors. Aspen dieback triggers increased and abundant aspen suckers in affected aspen stands. Regeneration is expected to continue during the next plan period as aspen clones age and begin to dieback. Persistent aspen is expected to be sustained or show modest increases in clone size under processes of age deterioration and dieback, coupled with occasional stand-replacing fire.

Numerous stands of persistent and seral aspen, both small and large, have burned in wild and prescribed fires over the last 30 to 40 years. Successful suckering following fire has routinely occurred concurrent with other drivers and stressors of aspen.

Prescribed fire in persistent and seral aspen is expected to either occur at current rates or possibly increase during the next plan period. Wildfire occurrence is strongly related to environmental and climatic conditions. As the climate continues to warm, fire frequency is predicted to increase. Increased fire frequency in a warmer climate is predicted to benefit seral aspen communities. In persistent aspen stands, increased fire frequency would likely reduce the number of older, declining aspen stands and perhaps improve clone vigor and health with more frequent cohort turnover. Since stand expansion often occurs with new suckering, frequent fire would increase the total area of persistent aspen over time.

Some human disturbance, such as timber harvest, is beneficial to seral aspen. Where aspen is present, tree removal triggers new suckering and increased cover of aspen. Timber harvesting, however, trended downward between 1987 and 2008 and has remained level since that time. Timber harvesting is expected to remain level or possibly trend further downward during the next plan period, which will limit the benefits to seral aspen.

Persistent aspen communities are important for forage and cover by both domestic and wild ungulates. Livestock browsing of aspen suckers has been minimal and not sufficient to affect successful recruitment or diminish stand persistence. Livestock grazing in terms of numbers, class of livestock, and management is expected to remain relatively constant during the next plan period. Persistent aspen is expected to be sustained, and successful aspen recruitment is expected to occur concurrently with contemporary livestock stocking rates and management strategies. Livestock grazing is expected to minimally affect seral aspen communities.

Elk browsing has affected recruitment in some persistent aspen stands during the last 20 years. For the most part, elk browsing of aspen suckers is not sufficient to suppress successful recruitment or diminish stand persistence. One exception is in the Anthro Mountain landtype association where the elk population rose from a few dozen animals in the 1970s to about 1,450 animals by 2009. Due to the limited number of acres of aspen on the Anthro Plateau landtype association, aspen is more susceptible to elk browsing there than in other aspen-bearing landtype associations.

Elk populations are predicted to increase in the Ashley National Forest during the next plan period. If elk populations continue an upward trend, more aspen stands in the plan area would be susceptible to elk browsing following disturbances. This may threaten successful aspen recruitment and diminish aspen persistence or stand size over time.

Recreation is a minor stressor of aspen communities. Increased recreation use of the Ashley National Forest is predicted during the next plan period, but this trend is not expected to adversely affect aspen persistence in the plan area.

### **Comparison of Natural Range of Variation and Current Conditions**

Aspen communities in the Ashley National Forest have been subject to numerous stressors, disturbances, and management practices during the last 30 years; however, distribution, abundance, and function of aspen have been relatively constant and within expected parameters.

#### *Seral aspen*

Current monitoring in the Ashley National Forest indicates that seral aspen is diminishing in the plan area in terms of a decrease in aspen density, basal area (size of the stem), or cover. This is because the frequency and extent of fires have been reduced, which indicates moderate departure from the natural range of variation (Forest Service 2017e). Large and small fires and timber harvest have temporarily removed conifers at a number of seral aspen sites in the Ashley National Forest, but their occurrence is not sufficient to maintain seral aspen in the long term. As the climate continues to warm and become drier, fire frequency and size is predicted to increase, which would be beneficial to seral aspen. More conifer-aspen communities would transition to early and mid-seral stages due to an increase in stand-replacing fires.

#### *Persistent aspen*

Persistent aspen has persisted on the landscape at levels equal to or greater than at the beginning of the last plan period, which indicates sustainability over a 30-year period. Many persistent aspen stands show expansion due to new suckers outside the perimeter of the dying cohort (Forest Service 2017e). Existing conditions and current trends indicate that persistent aspen is near or within natural range of variation and is expected to remain so during the next plan period.

### **Climate-Related Risks and Trends**

Climate change is a potential driver of aspen. Seral aspen may benefit from a warmer and drier climate. More frequent and larger fires would move conifer-aspen communities toward early seral and mid-seral stages, which would favor greater aspen dominance of these communities. If the changing climate becomes drier and precipitation falls below required water needs, affected persistent aspen may be displaced by other communities, such as mountain big sagebrush (*Artemisia tridentata* var. *vaseyana*). In this case, upslope migration of persistent aspen must occur to maintain these communities, or seral aspen becomes persistent as conifers die-off and these communities migrate upslope.

#### *Sagebrush*

Communities of sagebrush are common to the Uinta Mountains, Tavaputs Plateau, and high deserts of Wyoming. These communities are represented across the landscapes of the Ashley National Forest within a broad range of environments, successional states, and community types. Sagebrush prefers drier and cooler environments generally, but species diversification exists because of variability in geography, climate, and topography.

Sagebrush communities are found in a number of landtype associations in the Ashley National Forest and occur on approximately 119,300 acres (9 percent of the total plan area). Mountain big sagebrush (*Artemisia tridentata* var. *vaseyana*, 70,900 acres), Wyoming big sagebrush (*Artemisia tridentata* var. *wyomingensis*, 38,100 acres), and black sagebrush (*Artemisia nova*, 9,300 acres) account for about 99 percent of sagebrush found in the plan area. Basin big sagebrush (*Artemisia tridentata* var. *tridentata*) is less than 1 percent of the sagebrush communities in the Ashley National Forest.

Since the early 1900s, almost all big sagebrush communities within the plan area have been affected by human uses and management. Livestock grazing has occurred in various forms and intensities for more than 100 years. Since the 1940s, thousands of acres of mountain big sagebrush have been plowed and seeded into introduced grasses, sprayed with herbicide, and treated with prescribed fire (Forest Service 2017e).

Mountain big sagebrush of the Parks Plateau, Anthro Plateau, Avintaquin Canyon, and Strawberry Highlands landtype associations are located mostly above 8,000 feet where annual precipitation is higher and summer temperatures are lower. Mountain big sagebrush communities of considerable size occur on these landtype associations. These communities are currently in satisfactory condition and have demonstrated resilience to disturbances both past and present. Herbaceous understories have responded rapidly and vigorously following disturbance. Mountain big sagebrush communities currently show high resilience to annual invasive plants following episodes of disturbance such as fire or drought. Little to no cheatgrass or other invasive annuals are documented in early, mid-, or late seral mountain big sagebrush communities of these landtype associations.

Many communities of mountain big sagebrush of the South Face, Dry Moraine, Glacial Canyon, Stream Pediment, and Structural Grain landtype associations are currently in satisfactory condition in regard to plant species composition, species richness, shrub cover, and total ground cover; however, these communities are potentially at risk due to their moderate to high susceptibility to annual invasive plants. Annual invasive plants degrade sagebrush communities by changing plant composition and structure, lowering species richness, and narrowing fire frequency. Long-term monitoring shows that cheatgrass is present and increasing in mountain big sagebrush communities with native herbaceous understories, especially following fire and severe drought. In contrast, communities where seeded nonnative grasses dominate herbaceous cover, cheatgrass is absent or has minor presence, with no indication of spread or increase. These communities typically have satisfactory plant composition, species richness, and total ground cover. Historical seeding treatments of these shrublands with nonnative grasses have demonstrated high resilience to invasive annuals.

Montane black sagebrush, mostly found in the Anthro Plateau and North Flank landtype associations, benefit from a cooler and wetter environment found at higher elevations. Black sagebrush has been less affected by human activities than mountain big sagebrush due to lower productivity.

Black sagebrush communities of the South Face and Green River landtype associations are in satisfactory condition in regard to plant composition, species richness, total ground cover, and shrub cover; however, they have a moderate to high susceptibility to invasive annuals. Black sagebrush communities have low to moderate resilience to annual invasive plants.

Wyoming big sagebrush communities have shown resilience to disturbance during the last 30 years. For the most part, these communities are in satisfactory condition in terms of plant composition, species richness, total ground cover, and shrub cover. After a drought, Wyoming big sagebrush has shown resilience, capability, and proper function. Wyoming big sagebrush communities have moderate to high susceptibility to cheatgrass invasion. Cheatgrass spread appears to increase during and shortly following



severe drought or fire. This susceptibility increases these communities' risk to loss of resilience, capability, and function.

### **Influences of Drivers and Stressors**

Natural disturbances play an important role in many sagebrush communities. Such disturbances as insects, disease, winter exposure, and snow layer are relatively minor in their effects on sagebrush spatially; however, fire and drought have affected sagebrush distribution, structure, and composition at larger scales (Forest Service 2017e).

Invasive grasses, such as cheatgrass, have become a significant stressor for many sagebrush communities. Cheatgrass is capable of altering fire patterns in low elevation sagebrush; as a result, sagebrush communities become more prone to fire. When infested sites eventually burn, cheatgrass outcompetes and displaces native vegetation, dominates cover, and is capable of creating annual monocultures. Under these conditions, fire frequency increases, often at intervals that preclude shrubs from reestablishing.

Although cheatgrass is present in some lower-elevation Wyoming big and black sagebrush communities, these communities are intact due to the absence of fire. Further spread of cheatgrass is predicted, which will make more communities prone to fire. In addition, as cheatgrass becomes more widespread, the incidence of fire and the size of burns are predicted to increase. The spread of annual invasive plants in sagebrush is predicted to continue, whether or not the climate becomes warmer and drier or droughts become more frequent; however, as the climate does become warmer and drier and droughts do become more frequent, the rate of spread is predicted to accelerate.

Fire appears most important in sagebrush communities of mid-elevations where conifer encroachment may displace shrubs. Historical fire patterns were sufficient to maintain sagebrush in these settings. Most black sagebrush communities in the pinyon-juniper belt require periodic fire to maintain shrubs (Goodrich 2005). If fire frequency remains constant during the next plan period, additional treatments would be necessary to curtail conifer displacement of sagebrush and help neutralize current trend. But fire frequency may increase in many sagebrush communities as the climate becomes warmer and drier, if severe and prolonged drought events become more common, and if the establishment and spread of annual invasive plants increases. During the next plan period, natural fire frequency of montane sagebrush communities is expected to remain outside the natural range of variation, but management prescriptions would be implemented to maintain these communities.

Many communities, especially those within and above the pinyon-juniper belt, are susceptible to conifer encroachment and displacement. With prolonged absence of fire, some sagebrush communities have transitioned into conifer forest or woodland types.

In relative terms, sagebrush has less recreation value than other areas of the Ashley National Forest. In the Uinta Mountains, national forest visitors typically drive through these communities to access forests, lakes, and streams of higher elevations. The highest recreation use is big game hunting. Many unauthorized roads and trails in sagebrush are either created, maintained, or expanded by hunters in ATVs and pickups. Overall, sagebrush communities nearest to main roads receive the highest use. Additional unauthorized roads and trails and noxious weed infestations are predicted to increase with increased recreation use.

Oil and gas exploration and development occurs in sagebrush communities on the Anthro Plateau landtype association. Many acres of mountain big, Wyoming big, and black sagebrush have been affected by this management activity. The greatest impact of oil and gas exploration is the introduction,

establishment, and spread of noxious weeds and invasive annuals into the area. Increased vehicle use, mostly from the oil and gas industry, has accelerated noxious weed infestations.

Drought is a natural disturbance that occurs regularly in arid regions of North America. Under the natural range of variation, response mechanisms to drought have successfully maintained sagebrush on western landscapes. Where herbaceous plants have died back, two responses have been documented. In most cases, herbaceous plants reestablish or recover from dieback within 2 to 5 years post drought. Where present, annual invasive plants are beginning to alter the sagebrush community's ability to respond to drought. Cheatgrass spread has accelerated, and native perennial understories have been displaced by the annual grass during severe droughts.

Livestock grazing is a stressor of sagebrush communities. It is considered the most extensive and enduring anthropogenic use of these communities. Historically, heavy livestock grazing depleted and/or reduced vigor of native herbaceous understories, decreased ground cover, and increased sagebrush canopy cover. To maintain or maximize forage production, mechanical, prescribed fire, and herbicide treatments were implemented from the 1940s through the 1980s to remove sagebrush. Over the years, adjustments have occurred in grazing management to lower grazing intensity and improve range conditions of sagebrush communities. On livestock allotments where these adjustments were made, plant compositions improved and total ground cover increased in sagebrush communities with native herbaceous understories. In some instances, higher species richness was documented in sagebrush communities with introduced perennial grass understories that were managed for light to moderate grazing intensities. Native plant compositions of sagebrush communities can remain in the natural range of variation with appropriate livestock management in the absence of annual invasive plants.

### **Comparison of Natural Range of Variation and Current Conditions**

Existing conditions and current trends indicate that sagebrush communities of higher elevations are near or in the natural range of variation and are expected to remain so during the next plan period. Sagebrush in higher elevation functions properly following disturbances, with sagebrush and herbaceous vegetation returning in the intervals described for the natural range of variation. Conifers encroach and displace some sagebrush communities, but not of the magnitude in and directly above the pinyon-juniper belt. These communities show low to moderate departure from the natural range of variation. Invasive annual plants are rare to nonexistent in these higher elevation communities and are not predicted to increase during the next plan period. Resilience is high and is expected to remain high during the next plan period. As the climate becomes warmer and drier, these communities may become more stressed and less resilient. Invasive annuals may become established and begin to spread in these communities.

Sagebrush communities below 8,000 feet are more susceptible to drought, fire, and invasive annuals than those of higher elevation. Invasive annuals are the primary cause of sagebrush communities not being in, or trending away from, the natural range of variation. At this time, many of these communities are currently in or of low departure from the natural range of variation, but many are predicted to depart from the natural range of variation during the next plan period.

Other stressors of sagebrush, such as livestock grazing, recreation OHV travel, wild ungulate use, and oil and gas exploration, may affect sagebrush communities and may even contribute to the spread of invasive annual plants, but these can be or have been appropriately managed or mitigated to maintain sagebrush communities in the natural range of variation.

### *Pinyon and Juniper Woodland*

Pinyon-juniper consists primarily of Utah juniper (*Juniperus osteosperma*) and two-needle pinyon pine (*Pinus edulis*) but may also include Rocky Mountain juniper (*J. scopulorum*). Pinyon and juniper are widespread generalists occupying broad climatic, soil, and thermal ecological zones. Persistent pinyon-juniper woodlands occur on many landtype associations across the Ashley National Forest. On the Uinta Mountain Section, it is most prevalent on Structural Grain, Red Canyon, and North Flank landtype associations, with some moderate presence on South Face. On the Tavaputs Plateau Section, this type occurs primarily on the Anthro Plateau and the Avintaquin Canyon landtype associations. In the plan area, pinyon-juniper woodlands occur on 120,400 acres, 9 percent of the total, in the Ashley National Forest.

### **Influences of Drivers and Stressors**

Disturbance in pinyon and juniper types may be necessary to maintain plant diversity. The primary disturbance of landscape change in the pinyon-juniper woodland and sagebrush ecosystem complex was fire, and fire patterns were generally tied to topography, soils, and existing vegetation composition. Fires ranged from low-intensity surface fires to stand-replacement fires, depending on the existing understory vegetation and density of pinyon and juniper. Historical fire rotations were generally very long, approximately 2 to 6 centuries. Fire return intervals typically driven by cheatgrass are too frequent for the development of pinyon-juniper communities.

### **Comparison of Natural Range of Variation and Current Conditions**

The fire return interval for pinyon-juniper communities is estimated to be a low departure from the natural range of variation, based on recent assessments of fire in pinyon-juniper communities in the Ashley National Forest and in other areas in the West.

The departure from the natural range of variation for pinyon-juniper communities in the Ashley National Forest varies according to landtype association. Most pinyon-juniper communities are considered to be at a low departure from the natural range of variation. The exception is pinyon-juniper communities found on the Structural Grain landtype association. These communities are considered to be at high departure from the natural range of variation due to the presence and high frequency of invasive species, including cheatgrass, and their strong biological capability to alter plant community dynamics.

### *Desert shrub*

Desert shrub communities are found mainly in the Green River landtype association, with some in the Antelope Flat, North Flank, and Moenkopi Hills landtype associations. These communities make up 4 percent, 59,900 acres out of 1,376,700 acres total of the Ashley National Forest.

Most desert shrub communities in the Ashley National Forest are in cold desert environments along the Flaming Gorge Reservoir in southwestern Wyoming. Desert shrub communities of the Green River landtype association grow only when temperatures are favorable and soil moisture is present, which indicates weather as a primary driver in community dynamics. Years of drought usually lead to meager vegetation and seed production, but shrubs and herbaceous plants may die back if the drought is severe or persisting. There is a resurgence of vegetation production, cover, and seed production with subsequent years of abundant moisture (Forest Service 2017e).

In general, desert shrub communities consist of a shrub or sub-shrub component, with few herbaceous plants. Herbaceous vegetation production is relatively low and perennial grasses make up most of that production. Mixed shrub communities, such as shadscale and Wyoming big sagebrush, are common.

### **Influences of Drivers and Stressors**

For 30 years, most desert shrub communities showed resilience to drought, ungulate grazing, and other disturbances up to about 2002. Since then, some desert shrub communities have become particularly susceptible to invasive annual plants. Gardner saltbush (*Atriplex gardneri*) communities are most vulnerable to invasive annuals and were the first communities to be negatively affected. Many Gardner saltbush communities are outside of or are trending away from the natural range of variation. Invasive annual plants are the greatest threat to desert shrub communities because of their ability to change vegetation compositions and eradicate native shrubs and perennial grasses.

Because of its harsh environment, low annual precipitation, and limited vegetation production, desert shrub communities have fewer human and ecological services than their montane or high elevation counterparts. Similar to many other vegetation types, livestock grazing is the most extensive and enduring human use of desert shrub communities. Livestock use shrubs and herbaceous forage during winter, spring, and early summer. Shrub cover, herbaceous cover, and total ground cover have been reduced, but grazing practices have not interrupted ecological processes of desert shrubs. Livestock have contributed to the spread of weeds and invasive annuals, which has diminished resilience of some grazed desert shrub communities, particularly Gardner saltbush.

Desert shrub communities usually have limited recreation value; however, the Flaming Gorge Reservoir continues to attract hundreds of thousands of visitors annually. Much of the recreation management area is in these desert shrub communities during the summer and autumn. Many unauthorized roads are created and maintained near the shores of the reservoir. Overall, desert shrub communities nearest to main roads receive the highest use and greatest impacts. Most new noxious weed and annual invasive plant infestations are along the drawdown basin of the reservoir and along authorized and unauthorized roads. The Flaming Gorge Reservoir is also a vector of spread for noxious weeds and invasive annual plants. Seeds and plant materials from the Green River watershed are deposited along the shoreline of the reservoir. Increased recreation use of the Flaming Gorge Recreation Area is expected during the next plan period. With increased visitation, additional noxious weed and invasive annual plant infestations are predicted.

Fire rarely occurs in desert shrub communities because vegetation production is low and bare soil to intermittent herbaceous cover between shrubs is typical; however, cheatgrass is capable of altering fire frequency and disturbance response sequences of desert shrubs, especially since most desert shrubs do not sprout following fire. Although cheatgrass is present in some desert shrub communities, these communities are relatively intact due to the absence of fire; however, further spread of cheatgrass is predicted during the next plan period, which makes desert shrubs more susceptible to fire.

### **Comparison of Natural Range of Variation and Current Conditions**

Invasive annual plants are the primary cause of desert shrub communities' departure or trend away from the natural range of variation. Where invasive plants are absent, there is a low departure from the natural range of variation. Where invasive annuals are present, desert shrub communities are of moderate to high departure and are trending away from the natural range of variation. As invasive annuals increase, the resilience of these desert shrub communities rapidly diminishes. Within the plan period, substantial change in vegetation composition of many desert shrub communities is predicted because of the presence and spread of invasive annual plants.

At this time, community structure of most desert shrub communities shows low departure from the natural range of variation. These include spiny hopsage, Wyoming big sagebrush, gray molly, black sagebrush, and most shadscale and winterfat communities. A few shadscale and winterfat communities

show low to moderate departure from the natural range of variation because of halogeton presence and spread. Most Gardner saltbush communities show moderate to high departure from the natural range of variation because of their displacement by halogeton. This trend is predicted to continue during the next plan period. Decreases in shrub structure of many desert shrub communities is likely because of predicted increases in fire frequency due to the presence and continued spread of cheatgrass.

### *Rare and Unique Habitat Types*

The Ashley National Forest consists of numerous plant communities, many of which are considered rare because of their limited distribution and infrequent occurrence on the landscape. Some rare plant communities also have extraordinary qualities that further distinguish them from others, such as supporting federally listed or SCC. Rare plant communities are likely more susceptible to stressors, whether natural or human caused, that may threaten their integrity or existence. The susceptibility is caused by the plant community's limited distribution and occurrence on the landscape.

Eighteen habitats were initially identified and evaluated using four rare and unique criteria (Huber 2016a). In order to qualify as a rare or unique habitat, at least three of the four criteria must apply. Of the 18 habitats evaluated, three qualified as rare and unique habitats. All three habitats are specific types of fens: calcareous/rich fens, peatlands/glacial canyon fens, and peatlands/limestone fens.

Although not all fens meet the criteria for rare or unique habitats, they are important ecologically and are an irreplaceable resource.

### **Calcareous or rich fens**

The South Fork Rock Creek Fen is in the South Fork Rock Creek drainage at approximately 9,300 feet elevation, is about 10 acres, and is on a gentle to moderate gradient (see figure 3-12, Rare and Unique Habitats). The fen is relatively open, with scattered and stunted Engelmann spruce trees, and mature spruce forests established along the perimeter. The fen consists of a patchwork of community types, and most of these are rare to the Uinta Mountains. The fen supports about 80 plant species, including several species unique to cold and wet conditions. There are no known threatened, endangered, or sensitive species, but two plant SCC are found in the fen. These plants are handsome pussytoes and wetland kobresia.

Potential stressors on this fen type include increased recreation use of the area, trampling due to livestock grazing, and avalanche disturbance. Long-term monitoring indicates that the fen has been in satisfactory condition, with stable trends, for at least the past 20 years (Forest Service 2017e). During this time, plant species composition has remained constant, and repeat photography indicates no change in community structure or size of the area. Based on these findings, the South Fork Rock Creek fen is considered to be trending toward its natural range of variation.

### **Peatlands or fens found in glacial canyons**

The peatlands or fens found in glacial canyons (Glacial Bottom landtype association) of the Uinta Mountains at elevations between 7,200 and 8,500 feet meet the criteria for a rare habitat. These fens are in or next to forested areas and are fed by small springs or aquifers found near the base of canyon slopes. Documented sites are Whiterocks Canyon (see figure 3-10), Uinta Canyon, and Rock Creek Canyon, but fens can be expected in other glacial canyons in the plan area. There are no known threatened, endangered, sensitive, or SCC species from this habitat type.

The primary driver of these fens are springs or seeps at the toe of canyon slopes. Disturbances are minimal due to these fens' location and current management direction. A road runs through the fen in

Whiterocks Canyon and likely has affected the hydrology and possibly plant species composition of the fen below the road. The other documented fens are remote and are not affected. No notable human impacts have been observed in the fens; however, increased recreation use of the area is a foreseeable stressor.

Long-term monitoring indicates that the habitat is in satisfactory condition, with stable trends (Forest Service 2017e). No change in plant species composition or structure has been detected over 20 years. These fens are considered to be within their natural range of variation, except the fen in Whiterocks Canyon. Due to a road that crosses the fen, it is considered to be slightly departed from its natural range of variation.

#### **Peatland or fen with limestone influence**

A few peatlands or fens with limestone influence are found in Sheep Creek and Hickerson Parks of the Greendale Plateau landtype association (see figure 3-10). The approximate area influenced by fens in Sheep Creek and Hickerson Parks is 85 and 30 acres, respectively. The fens are found within depressions, have relatively flat surfaces, and are fed by underground springs that create hydrostatic cones. There are no threatened, endangered, or sensitive species associated with the fens, but two plant SCC are found: wetland kobresia and silvery primrose.

The primary driver of these fens is springs that surface periodically throughout the fen. There are no known diversions, dams, or other human disturbances that would alter groundwater flow to the fens. Livestock grazing is a stressor and has occurred in the area for many decades, but livestock access to the interior of the fens is minimal due to saturated soils. The fens are near major Forest Service roads in the Ashley National Forest, and their perimeters are easily accessible by off-road recreation vehicles; however, there is little to no evidence of vehicle disturbance in the fens. Increased recreation near the fens is a foreseeable stressor.

Long-term monitoring indicates that the habitat is in satisfactory condition, with stable trends (Forest Service 2017e). No change in plant species composition or structure has been detected over several decades. These fens are considered to be within their natural range of variation.

#### ***Climate-related effects***

The Intermountain Adaptation Partnership (IAP) identified climate change issues relevant to resource management on Federal lands in Nevada, Utah, southern Idaho, eastern California, and western Wyoming. It developed solutions to minimize the negative effects of climate change and to facilitate the transition of diverse ecosystems to a warmer climate (Forest Service 2018b, Forest Service 2018d).

The following is a summary of the findings of the IAP's Climate Change Vulnerability and Adaptation in the Intermountain Region. This summary is for the relevant terrestrial communities found in the Ashley National Forest, described below.

#### **Subalpine spruce-fir forest**

This forest type is moderately vulnerable. Subalpine fir and Engelmann spruce may have increased growth in a longer growing season. Bark beetles will be a stressor for Engelmann spruce. If wildfire increases, crown fires may quickly eliminate mature trees across the landscape. Quaking aspen will be minimally affected by a warmer climate.

### **Mesic<sup>6</sup> mixed-conifer forest**

Late-seral forests will be susceptible to wildfire, especially where fuel loads are high. Douglas-fir and ponderosa pine, which have high fire tolerance, may become more common and late-seral species less common. Growth rates of most species will decrease. Lodgepole pine and quaking aspen will persist, perhaps with increased stress from insects and pathogens.

### **Dry mixed-conifer forest**

Most species in mixed-conifer forest (ponderosa pine, Gambel oak, quaking aspen) can cope with dry soils and wildfire. Growth of less drought-tolerant species (Douglas-fir, white fir) will decrease. With increased fire frequency, early-seral species will become more common and late-seral species less common.

### **Aspen mixed-conifer forest**

Increased wildfire frequency and extent will determine future composition and structure of this forest type. Conifers at higher elevations (mostly not fire resistant) will become less common, confined to northern slopes and valley bottoms. Quaking aspen and Gambel oak will attain increasing dominance because of their ability to sprout vigorously after fires, outcompeting species susceptible to drought and fire.

### **Persistent aspen forest**

Conifers at higher elevation (mostly not fire resistant) will become less common, confined to northern slopes and valley bottoms. Aspen will attain increasing dominance because of its ability to sucker vigorously after fire, outcompeting species susceptible to drought and fire. Douglas-fir will persist in locations with sufficient soil moisture. Overall productivity will probably decrease.

### **Montane pine forest**

Ponderosa pine will persist in this forest type because it is drought tolerant and fire tolerant, outcompeting other species following wildfire, but it will grow more slowly. Limber pine and bristlecone pine will probably persist at higher elevations where fuel loads are low. If insect outbreaks are more prevalent in a warmer climate, they could increase stress in pine species, especially during drought.

In non-forest ecosystems, increasing frequency and duration of drought are expected to drive direct changes in soil moisture, which will reduce the vigor of some species, causing death or making woody species especially more susceptible to insects and pathogens. Increasing frequency and extent of wildfires will be a major stressor for species that regenerate slowly following fire, especially non-sprouting vegetation such as most sagebrush species.

The dominance of nonnative plant species, especially annual grasses such as cheatgrass, will be enhanced by increasing disturbance and will themselves encourage more frequent fire—a significant change in the ecology of most vegetation assemblages. Although productivity may increase in some grasslands, most other non-forest ecosystems will experience lower productivity. Most native species are expected to persist if they can move to favorable portions of the landscape and are sufficiently competitive. Climate change effects on specific non-forest vegetation are discussed below.

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<sup>6</sup>Receiving a moderate or well-balanced supply of moisture.

### **Pinyon-juniper shrublands and woodlands**

These woodlands are sensitive to chronic low soil moisture during prolonged droughts (to which pinyon pines are more sensitive than junipers), increased insect outbreaks that follow drought stress, and increased frequency and extent of wildfire. These species will persist across the landscape, although the distribution and abundance of species may change.

### **Mountain big sagebrush shrublands**

Vulnerability varies from moderate to high because of the broad elevation range at which mountain big sagebrush occurs and because of the wide range in current conditions. Significant stressors are livestock grazing, expansion of pinyon pine and juniper species, altered wildfire patterns, and nonnative invasive species. These factors may be worsened by a warmer climate, especially in drier habitats.

### **Dry big sagebrush shrublands**

Vulnerability is high, as evidenced by significant deaths that occurred during recent drought. Conditions suitable for seedling establishment are infrequent under current climatic conditions and are likely to become less frequent in a warmer climate. Lower elevations of the Great Basin are especially vulnerable, whereas sagebrush in wetter locations may be able to persist. Stressors are overgrazing, expansion of pinyon pine and juniper species, nonnative invasive species, and altered wildfire patterns and intervals. A warmer climate may worsen these factors.

### **Sprouting sagebrush shrublands**

Warmer, drier climate will negatively affect the vigor and abundance of sprouting sagebrush species, which are adapted to more mesic conditions. These species can sprout following wildfire, but seed viability is short and unreliability of spring soil moisture will make them susceptible to prolonged droughts. Overall vulnerability is moderate, and regeneration will be critical to long-term persistence across the landscape.

### **Salt desert shrublands**

These shrublands have low to moderate vulnerability, depending on their location relative to soil moisture availability. Many of them have relatively high species diversity; some are well-adapted to periodic drought, and some may be able to migrate to higher elevations. Salt desert shrubland communities at lower elevations may be vulnerable to drought and are intolerant of wildfire. A warming climate may increase the susceptibility of salt desert shrubland communities to nonnative, invasive species.

### **Alpine communities**

The composition and distribution of alpine ecosystems will be affected by decreasing snowpack, altering plant vigor, and regeneration. Specific effects will depend on vulnerability thresholds of diverse species and the rate and magnitude of changes over time. Some species may be able to persist or migrate to suitable habitat, but the lower extent of some communities will be compromised by tree establishment (Forest Service 2018b, Forest Service 2018d).

## **Environmental Consequences for Terrestrial Vegetation**

The key differences in effects on vegetation by alternative can be summarized based on the degree to which vegetation is treated for resource objectives and multiple uses.



### *Methodology and Analysis Process*

For forest plan revision, management direction that may lessen or worsen threats to terrestrial vegetation are evaluated at a programmatic level. The forest plan does not authorize site-specific projects or activities; therefore, there are no direct effects from adopting the forest plan. Direct and indirect site-specific effects will be further analyzed when future projects are proposed. Although potential short-term consequences may be described where appropriate from implementing the programmatic approach, this evaluation focuses on longer term indirect and cumulative effects that may occur over the life of the forest plan.

### *Analysis Assumptions*

- Direction for vegetation management described in the plan will occur to the extent necessary to achieve the objectives described by each alternative. The specific locations and designs of these activities are not known at this time; therefore, this analysis refers to the potential of the effect to occur, realizing that in many cases these are only estimates.
- Nonnative, invasive plants will continue to be introduced and to spread from natural and human sources outside the authorization of the Forest Service. Establishment and spread of nonnative, invasive plants will move vegetation types away from the natural range of variation and will reduce ecological resilience and ecosystem function.
- For each vegetation type, the closer its ecological composition, structure, species richness, and disturbance response is to its natural range of variation (having low departure versus high departure), the more properly each vegetation type is functioning and the more resilient plants and animals are in the associated habitats.
- Disturbances such as fire, insects, disease, and decay are essential ecosystem processes in forested vegetation types. Disturbance regimes closer to the natural range of variation in frequency and intensity move vegetation types toward desired conditions that promote vegetation resilience. In contrast, the disruption of historical disturbance regimes would move vegetation types away from desired conditions and could, in turn, contribute to disturbances that are uncharacteristic, causing widespread tree mortality.
- Natural disturbance regimes remain a part of the landscape and will continue to affect ecosystems found in the Ashley National Forest. While these disturbance regimes would be somewhat influenced on a local scale due to vegetation treatments or fire management, predicting their effects on a large scale or over the long term is difficult. For this reason, they are not included as indicators of forest conditions; however, they are mentioned in the effects analysis.

### *Indicators*

- Plant community composition, cover, and structure
- Plant species richness
- Ground cover
- Vegetation type disturbance response

### *Environmental Consequences for Terrestrial Vegetation Common to All Alternatives*

#### **Effects from Vegetation Management**

Two broad categories of active vegetation treatments were evaluated: timber harvest and prescribed fire. These treatments change terrestrial vegetation indicators in both the short term—1 to 5 years—and the

long term. Timber management actions consists of five general types: uneven-aged regeneration harvest, even-aged regeneration harvest, thinning harvest, sanitation or salvage harvest, and pre-commercial thinning. These vegetation management practices vary in the number of potential acres treated under alternatives B modified, C, and D and are discussed below. Prescribed fires are planned ignitions where fire is deliberately applied to the landscape. The range of potential burned acres by vegetation types does not vary by alternative (see table B-5, Potential Number of Acres Burned per Decade and Desired Severity Based on Vegetation Type, in appendix B).

#### *Timber harvest*

An even-aged harvest (or two-aged with reserves) is a type of regeneration harvest. It includes clearcuts, seed tree, and shelterwood cuts. All of these harvest types remove most of the trees, opening up the forest canopy sufficiently to allow new tree seedlings to become established and grow. Vegetation cover is greatly decreased from removal of mid and top canopy species. Ground vegetation cover also decreases from heavy equipment impacts and could be short term until revegetation occurs or long-term from soil compaction and erosion effects preventing reestablishment.

After even-aged regeneration harvest, the forest size class changes to seedling or sapling, which is an early-seral forest condition. Forest dominance types and species richness may also change, depending on the composition of the regenerated forest. Forest cover and forest fuels, such as downed wood and snags, may decrease or increase, depending on the pre-harvest forest conditions, and may affect forest disturbance response. Nonnative species could spread or become established and out-compete native vegetation, changing species richness and composition.

Pre-commercial thinning occurs in stands of saplings that are generally 15 to 30 years in age and reduces tree densities and vegetation cover. Species composition may change if different species are targeted or left for improvement. Tree structure may be maintained or improved. Forest structure may be affected over the long term, affecting tree sizes, vegetation cover, and seral classes. Reducing tree densities could alter forest type disturbance responses to be more resilient to wildfire from less fuel loading and ladder fuel.

Selection harvest is a type of uneven-aged regeneration harvest that creates or maintains a multi-aged structure by removing some trees in all size classes either singly, in small groups, or in strips; this allows for a new age class to establish. Openings are created over a portion of the stand in each harvest entry. This process may change forest structure, and potentially species composition, sometimes gradually over many decades. Moving forest communities toward a diversity of age classes, where younger seral stages are in the mix, could improve forest resilience and response to insect outbreaks, which typically occur in mature dominant forest stands.

Commercial thinning is an intermediate harvest type that removes fewer trees than in a regeneration harvest, leaving a forest that is less densely stocked but still dominated by trees larger than seedling or sapling size class. The focus is not on regenerating a new forest stand; rather, it is on changing the condition of the current one to improve growth and enhance forest health and other resource objectives. Not only is forest cover reduced, but species compositions and forest structure may change due to the unequal removal of trees of different species or size. Tree growth is typically accelerated. Downed wood may be reduced and forest response to disturbance may be altered.

Surface-disturbing activities, including those associated with vegetation treatments, would disturb soils. This would indirectly promote nonnative, invasive plant introduction and spread (Mack et al. 2000), potentially leading to increases in cover of these species and changes to plant community composition. Nonnative, invasive plants and seeds may be transported on equipment and machinery used during

treatments. Treatments would alter light, moisture, and nutrient availability and would provide roughened surfaces where weed seeds may germinate.

*Prescribed fire and naturally ignited fire management*

Prescribed fire treatments are planned fire ignitions used to meet a variety of vegetation-related resource objectives, including the improvement of wildlife habitat, stimulation of aspen regeneration, reduction of stand densities, reduction of forest fuels, creation of openings of early-successional habitat, and restoration of natural disturbance processes. Prescribed fires may be designed to be of low severity (less than 40 percent tree death), mixed severity (between 40 to 70 percent tree death), or high severity (greater than 70 percent tree death), depending on the desired post-fire vegetation conditions. Prescribed fire would be most likely to be used outside most species' active growth periods when low biomass moisture levels would facilitate prescribed fire objectives.

Historically, naturally ignited fires were quickly controlled and put out by aggressive fire suppression activities. This altered the vegetation type composition, structure, and cover and moved them away from the natural range of variation.

Fires can shift plant community seral stages; this would depend on the severity of the fire. High-severity fires that remove most or all vegetation would shift the plant community to early seral stage classes, whereas low-severity fires would thin out young vegetation and retain mature trees trending toward mature seral stages. Fires affect species composition where some vegetation types require fire (or other large disturbances) for regeneration, such as aspen, or to stimulate reproduction and reduce competition from fire-intolerant fir species, such as ponderosa pine (Forest Service 2017e).

Heat generated during fire treatments can damage or kill existing desired vegetation; the amount of damage would depend on the species, its ability to withstand fire or regrow following fire, and fire timing. Nonnative, invasive plant cover is highest where fire intensity was greatest, indicating that relatively low-intensity fires would have less potential to result in nonnative, invasive plant spread (Forest Service 2017e). Vegetation composition, cover, and structure would change in both the short term and long term where fire treatments are used. Using fire to shift vegetation types toward historical fire patterns would improve vegetation type disturbance response and resilience in fire-dependent ecosystems. For example, ponderosa pine and aspen stands need frequent low- to mixed-severity fire to reduce competition of shade-tolerant conifer species.

**Effects from Recreation**

The effects on vegetation may result from various forms of recreation use. Development of new roads, trails and facilities, human ignition of unwanted fires, and unauthorized OHV use could change terrestrial vegetation indicators. The effects of these activities are the loss or modification of vegetation, spread of noxious weeds, and compaction of soil.

The level and intensity of change to vegetation indicators depends on the scale of recreation. For example, human-caused ignitions could result in small acres being burned or over thousands of forested acres being lost from a high-severity fire, depending on current conditions.

New development or expansion of trails, roads, campgrounds, or facilities would result in the permanent loss of vegetation types. All alternatives would be subject to these effects; however, adverse effects on vegetation indicators are most prominent in areas of higher recreation, such as in motorized and rural areas. The alternatives vary by the number of acres allotted to different recreation opportunity spectrum (ROS) classes (see chapter 2, table 2-1, Sustainable Recreation by Alternative).

### **Effects from Designated Areas**

Management of certain designated areas varies by alternative and is discussed below under the alternatives. In general, designated areas, such as recommended wilderness, suitable wild and scenic rivers, and RNAs, would reduce surface disturbance adverse impacts from management activities such as removal and modification of vegetation. This is because these areas rely more on natural processes to influence vegetation types toward or away from natural range of variation. Wilderness management would generally reduce the intensity and extent of direct impacts on vegetation types. This would come about because surface-disturbing activities would be reduced; however, ecosystem resilience may decline over time due to the lack of vegetation restoration and treatments to move vegetation types toward desired conditions.

### **Effects from Livestock Grazing Management**

The extent and intensity of effects from livestock grazing and rangeland management would depend on where grazing is allowed and the level of use. This is determined by such factors as stocking rate, class and kind of livestock, season and duration of use, fences, water developments, other rangeland infrastructure, soil moisture, plant palatability, the amount and timing of annual precipitation, and temperature.

Direct impacts on vegetation from livestock grazing are trampling, removed herbaceous biomass, reduced plant cover and height, reduced litter amount, increased soil compaction, increased amounts of bare ground, and the potential for nonnative, invasive plant seed dispersal. In the long term, livestock grazing may shift plant composition toward a community in which unpalatable or grazing-tolerant plant species are overrepresented.

### *Environmental Consequences for Terrestrial Vegetation—Alternative A*

#### **Effects from Vegetation Management**

The current 1986 forest plan (alternative A) does not contain specific direction for managing most terrestrial vegetation types. It emphasizes mountain pine beetle impacts in the lodgepole pine type and even-aged regeneration harvests that encourage natural revegetation. Regeneration harvests in this decade and the last decade were projected to be an average of 4,000 acres a year. However, these objectives are no longer achievable given that the suitable timber base has decreased from approximately 490,000 acres to approximately 130,000 acres, largely due to policy changes such as roadless area designations. Timber production and harvest would continue to be managed consistent with current guidelines and regulations; 213,419 acres are currently considered available for timber harvest prior to consideration of compatibility with desired conditions of other resources.

As determined in the Ashley National Forest assessment (Forest Service 2017e) all terrestrial vegetation types have some level of vegetation departure, indicating a need for vegetation management specific to vegetation types and informed by the best available science (see table 3-23). Alternative A does not provide such direction; therefore, terrestrial vegetation would likely continue to trend toward higher departure across all vegetation types. This results in more homogenous and increased densities in forest types that shift plant structure, cover, and composition away from desired conditions. Forest types would continue to have less resilience to disturbances and stressors such as climate, uncharacteristic wildfire (increased intensity and frequency), disease and insect outbreaks, and susceptibility to nonnative and invasive species. Non-forest types would not be managed for conifer encroachment or for desired species composition and cover.

Under alternative A, fire and fuels management follows the direction in the 2001 Utah Fire Amendment to the 1986 forest plan. This plan does not incorporate new fire-predicting and planning tools now available for determining high-risk areas, prioritizing those areas, and predicting benefits from treatments.

Alternative A does not include direction specific to treat different vegetation types, nor does it consider desired severity based on each vegetation type; therefore, fire management to move terrestrial vegetation toward the natural range of variation and natural fire patterns would have limited effectiveness. This would be especially true in fire-dependent vegetation types such as aspen and ponderosa pine.

### **Effects from Recreation**

A variety of ROS classes provides activities, from roaded natural to primitive setting, under alternative A. Alternative A has 276,400 acres in ROS primitive and 369,600 acres in ROS semiprimitive nonmotorized. These would have low recreation effects, as described under “Environmental Consequences for Terrestrial Vegetation Common to All Alternatives.” More direct recreation effects on terrestrial vegetation indicators, reduction in vegetation cover, spread of nonnative invasive species, and increased human-caused ignitions would occur on the 10,600 acres ROS rural, 437,100 acres ROS roaded natural, and ROS semiprimitive motorized (see figure 2-4). Alternative A does not designate recreation management areas, such as backcountry or destination recreation management areas. There are no additional recommended wilderness or proposed RNAs under alternative A.

### **Effects from Designated Areas**

Under alternative A, designated area discussion includes the Sheep Creek Canyon Geologic Area, seven RNAs (7,700 acres), and the High Uintas Wilderness. In these designated areas, terrestrial vegetation would have low direct effects from management activities, including effects described for vegetation management in “Environmental Consequences for Terrestrial Vegetation Common to All Alternatives” (see figure 2-20).

### **Effects from Livestock Grazing Management**

Approximately 919,700 acres of active allotments occur under alternative A. Alternative A uses project-level analysis and livestock grazing permit terms and conditions to meet desired conditions for key forage species. Under these conditions, the species composition in grazed upland plant communities could shift from dominance of less palatable or grazing-tolerant species, reduce the quantity and quality of vegetation cover, reduce total effective ground cover, and diminish plant species richness. Grazing in riparian areas may change the vegetation composition by reducing highly palatable plant species while increasing less palatable plant species, including nonnative and invasive plant species; reduce hydrological function related to the quality and quantity of riparian and greenline vegetation; and diminish plant species richness.

### ***Environmental Consequences for Terrestrial Vegetation Common to Alternatives B modified, C, and D***

#### **Effects from Vegetation Management**

Terrestrial vegetation desired conditions for all vegetation types common to alternatives B modified, C, and D are maintaining essential ecosystem components, processes, and functions. This would result in ecosystems that are resilient or adaptive to disturbances, such as fire, insects, pathogens, and climate variability. Movement toward these desired conditions under alternatives B modified, C, and D would be greater than under alternative A.

Under alternatives B modified, C, and D, vegetation treatments would occur over every decade following plan implementation to move vegetation toward desired conditions. Movement toward these desired conditions would be greater than under alternative A; this is because treatment techniques would be chosen based on best available science, depending on the specific vegetation type in which treatments are proposed. Table 3-17 and table 3-18 show the projected vegetation management practices in the first and second decades under each alternative. For example, the total for mechanical timber-oriented treatments is approximately (rounded to the nearest 100 acres) 1,500 acres annually for the first decade and 1,200 acres annually for the second decade under alternative B modified. Combining mechanical treatments with prescribed burning treatments brings the totals to approximately 2,400 acres annually for the first decade and 2,100 acres annually for the second decade.

**Table 3-17. Projected Forestwide Vegetation Management Practices (Annual Average Acres First Decade)**

Vegetation Type	Alternative B Modified	Alternative C	Alternative D
<b>Improvement/selection (uneven-aged harvest)</b>			
Mixed conifer	16	12	17
Engelmann spruce	0	0	0
Lodgepole pine	0	0	0
Douglas-fir	10	10	10
Ponderosa pine	203	104	210
Persistent aspen	0	0	0
<b>Total*</b>	<b>229</b>	<b>126</b>	<b>237</b>
<b>Regeneration* (even-age harvest)</b>			
Mixed conifer	57	44	60
Engelmann spruce	3	2	3
Lodgepole pine	107	88	111
Douglas-fir	5	5	5
Ponderosa pine	1	1	1
Persistent aspen	2	2	2
<b>Total</b>	<b>175</b>	<b>141</b>	<b>183</b>
<b>Thinning (intermediate harvest)</b>			
Mixed conifer	0	0	0
Engelmann spruce	0	0	0
Lodgepole pine	32	26	33
Douglas-fir	0	0	0
Ponderosa pine	0	0	0
Persistent aspen	0	0	0
<b>Total</b>	<b>32</b>	<b>26</b>	<b>34</b>
<b>Sanitation/salvage (intermediate harvest)</b>			
Mixed conifer	187	109	192
Engelmann spruce	29	17	30
Lodgepole pine	178	132	182
Douglas-fir	33	18	33
Ponderosa pine	79	53	80
Persistent aspen	0	0	0
<b>Total</b>	<b>506</b>	<b>331</b>	<b>517</b>

Vegetation Type	Alternative B Modified	Alternative C	Alternative D
<b>Pre-commercial thinning (intermediate treatment)</b>			
Mixed conifer	43	33	45
Engelmann spruce	0	0	0
Lodgepole pine	428	351	444
Douglas-fir	0	0	0
Ponderosa pine	127	65	131
Persistent aspen	0	0	0
<b>Total</b>	<b>598</b>	<b>449</b>	<b>620</b>
<b>Prescribed fire</b>			
Mixed conifer	18	0	17
Engelmann spruce	0	0	0
Lodgepole pine	7	0	6
Douglas-fir	12	0	12
Ponderosa pine	829	739	822
Persistent aspen	28	6	28
<b>Total</b>	<b>893</b>	<b>746</b>	<b>884</b>

Source: Forest Service GIS 2020

\*Totals may not add up due to rounding.

\*\*Even-aged regeneration harvest treatment includes clearcuts, shelterwoods, shelterwood removal, and seed tree methods.

**Table 3-18. Projected Forestwide Vegetation Management Practices (Annual Average Acres Second Decade)**

Vegetation Type	Alternative B Modified	Alternative C	Alternative D
<b>Improvement/selection (uneven-age harvest)</b>			
Mixed conifer	16	12	17
Engelmann spruce	9	7	10
Lodgepole pine	0	0	0
Douglas-fir	10	10	10
Ponderosa pine	203	104	210
Persistent aspen	0	0	0
<b>Total</b>	<b>239</b>	<b>133</b>	<b>247</b>
<b>Regeneration (even-age harvest)</b>			
Mixed conifer	57	44	60
Engelmann spruce	1	1	2
Lodgepole pine	107	88	111
Douglas-fir	5	5	5
Ponderosa pine	1	1	1
Persistent aspen	2	2	2
<b>Total</b>	<b>174</b>	<b>140</b>	<b>181</b>
<b>Thinning (intermediate harvest)</b>			
Mixed conifer	0	0	0
Engelmann spruce	0	0	0
Lodgepole pine	32	26	33
Douglas-fir	0	0	0
Ponderosa pine	0	0	0

Vegetation Type	Alternative B Modified	Alternative C	Alternative D
Persistent aspen	0	0	0
<b>Total</b>	<b>32</b>	<b>26</b>	<b>34</b>
<b>Sanitation/salvage (intermediate harvest)</b>			
Mixed conifer	187	109	192
Engelmann spruce	29	17	30
Lodgepole pine	178	132	182
Douglas-fir	33	18	33
Ponderosa pine	79	53	80
Persistent aspen	0	0	0
<b>Total</b>	<b>506</b>	<b>331</b>	<b>517</b>
<b>Pre-commercial thinning (intermediate treatment)</b>			
Mixed conifer	43	33	45
Engelmann spruce	0	0	0
Lodgepole pine	107	88	111
Douglas-fir	0	0	0
Ponderosa pine	127	65	131
Persistent aspen	0	0	0
<b>Total</b>	<b>277</b>	<b>185</b>	<b>288</b>
<b>Prescribed fire</b>			
Mixed conifer	18	0	17
Engelmann spruce	0	0	0
Lodgepole pine	7	0	6
Douglas-fir	12	0	12
Ponderosa pine	829	739	822
Persistent aspen	28	6	28
<b>Total</b>	<b>893</b>	<b>746</b>	<b>884</b>

Source: Forest Service GIS 2020

\*Totals may not add up due to rounding.

\*\*Even-aged regeneration harvest treatment includes clearcuts, shelterwoods, shelterwood removal, and seed tree methods.

#### *Timber Harvest*

Timber harvest projects under alternatives B modified, C, and D would affect the vegetation types in which they were carried out; these effects would be the same as those described in “Environmental Consequences for Terrestrial Vegetation Communities Common to All Alternatives.” Acres of vegetation types suitable for timber production differ by alternative and are summarized in table 3-19 below.



**Table 3-19. Acres of Vegetation Type that Overlap Suitable for Timber Production**

Vegetation Type	Alternative B Modified	Alternative C	Alternative D
Ponderosa pine	8,700	3,400	8,900
Mixed ponderosa pine	11,900	5,000	12,400
Lodgepole pine	23,600	23,100	24,500
Douglas-fir	3,100	3,100	3,200
Mixed conifer	34,100	25,100	35,900
Engelmann spruce/miscellaneous (subalpine fir, blue spruce, five-needle pines, riparian forest)	7,500	5,800	7,800
<b>Coniferous forest types total*</b>	<b>88,900</b>	<b>65,500</b>	<b>92,700</b>
Deciduous forest	3,800	3,200	3,900
Seral deciduous forest	17,100	11,800	17,700
<b>Total</b>	<b>109,800</b>	<b>80,500</b>	<b>114,300</b>

Source: Forest Service GIS 2020

\*Totals may not add up due to rounding.

*Prescribed fire and naturally ignited fire management*

Alternatives B modified, C, and D have incorporated the best available science and historical disturbance patterns to guide fire management and to achieve desired conditions for terrestrial vegetation. Fire effects are described under “Environmental Consequences for Terrestrial Vegetation Communities Common to All Alternatives” above. Prescribed fire and naturally ignited fire treatments would be used to move vegetation types toward more natural fire patterns, which would result in greater movement toward the natural range of variation compared with alternative A. Alternatives B modified, C, and D would manage natural ignitions to meet resource objectives for the associated vegetation type, though the percent objective would vary.

Using prescribed fire and wildfire management to move vegetation types toward desired conditions would move plant community composition, cover, and structure toward the natural range of variation over the long term where burned acres occur. Table B-5 in appendix B summarizes the potential acres managed per decade based on historical fire regime groups for each vegetation type. Of the total proposed fuel treatment acres, a quarter to a half are estimated to represent the use of prescribed fire or wildland fire for resource objectives. This is because fire management is a cost-effective form of treatment, allowing more forest restoration with limited funding. The exact amount of burned acres would vary by year and would depend on current conditions.

*Nonnative and noxious weed management*

Plan direction to manage nonnative and noxious weeds is the same under alternatives B modified, C, and D. This management would move terrestrial vegetation types toward desired conditions, improve or maintain pollinator habitat, and maintain or improve plant species richness, composition, and native plant diversity compared with alternative A.

**Effects from Recreation**

As described in “Environmental Consequences for Terrestrial Vegetation Common to All Alternatives,” the effects on recreation management areas depend on management direction. Recreation effects would be fewer in backcountry recreation management areas; higher-use recreation management areas would be subject to recreation development and increased recreation effects, as described in “Environmental Consequences for Terrestrial Vegetation Common to All Alternatives, Effects from Recreation.”

**Table 3-20. Acres of Vegetation Type that Overlap Recreation Management Areas**

Vegetation Type	Alternative B Modified	Alternative C	Alternative D
<b>Backcountry recreation</b>			
Alpine	48,900	51,100	44,000
Coniferous Forest	226,000	314,600	158,500
Deciduous Forest	7,900	28,400	5,400
Seral Deciduous Forest	39,200	83,100	33,100
Mountain brush	15,900	36,600	11,400
Shrubland	17,300	87,200	12,000
Riparian	8,900	14,700	7,300
Grassland	6,900	13,600	6,200
Forb	0	100	0
Woodland	32,300	84,400	20,400
Desert Shrub	100	24,800	100
<b>Total</b>	<b>404,100</b>	<b>739,500</b>	<b>299,000</b>
<b>Destination recreation</b>			
Alpine	0	0	0
Coniferous Forest	7,800	5,300	10,400
Deciduous Forest	800	500	800
Seral Deciduous Forest	2,700	2,100	3,700
Mountain Brush	600	600	900
Shrubland	4,000	3,500	4,400
Riparian	2,200	2,100	2,500
Grassland	0	0	0
Forb	0	0	0
Woodland	5,100	3,500	5,200
Desert Shrub	1,100	1,100	1,700
<b>Total</b>	<b>28,700</b>	<b>23,000</b>	<b>34,100</b>
<b>General recreation</b>			
Alpine	5,900	3,600	10,800
Coniferous Forest	238,500	152,200	303,200
Deciduous Forest	26,600	6,400	29,200
Seral deciduous Forest	71,700	28,400	76,800
Mountain Brush	26,400	5,800	30,600
Shrubland	97,700	28,500	102,600
Riparian	14,300	8,700	15,600
Grassland	7,600	1,000	8,400
Forb	100	0	100
Woodland	82,700	32,300	94,600
Desert Shrub	58,700	34,000	58,100
<b>Total</b>	<b>669,900</b>	<b>340,000</b>	<b>769,600</b>

Source: Forest Service GIS 2020. Total acres for recreation management areas differs from that in chapter 2, table 2-3 due to the exclusion of acres of water and rounding.

### Effects from Designated Areas

As described in “Environmental Consequences for Terrestrial Vegetation Common to All Alternatives,” the effects of designated areas depend on management direction. Management direction for recommended

wilderness and RNAs would have fewer direct effects from management; terrestrial vegetation types outside these areas could be subject to more management actions, such as timber harvest and grazing. Table 3-21, below, summarizes the acres of vegetation types in recommended wilderness and the proposed RNA for alternative C. Alternative C would generally reduce the intensity and extent of direct impacts on alpine and coniferous forest vegetation types. As described above, this would come about because surface-disturbing activities would be reduced; however, ecosystem resilience may decline over time due to the lack of vegetation restoration and treatments to move vegetation types toward desired conditions. Alternatives B modified and D do not have any recommended wilderness or proposed RNAs.

**Table 3-21. Acres of Vegetation Type that Overlap Designated Areas**

Vegetation Type	Alternative B Modified	Alternative C	Alternative D
<b>Proposed RNA (Gilbert Bench)</b>			
Alpine	N/A	1,400	N/A
<b>Recommended wilderness areas</b>			
Alpine	N/A	20,600	N/A
Coniferous Forest	N/A	27,400	N/A
Deciduous Forest	N/A	0	N/A
Seral Deciduous Forest	N/A	60	N/A
Mountain Brush	N/A	0	N/A
Shrubland	N/A	0	N/A
Riparian	N/A	1,800	N/A
Grassland	N/A	0	N/A
Forb	N/A	0	N/A
Woodland	N/A	0	N/A
Desert Shrub	N/A	0	N/A
<b>Total</b>	N/A	<b>49,860</b>	N/A

Source: Forest Service GIS 2020

N/A = not applicable

Effects on vegetation types

Vegetation condition class (VCC) is a measure of departure from reference (pre-settlement, natural, or historical) ecological conditions that typically results in alterations of native ecosystem components (see table 3-22 for VCC descriptions). VCC is used to assess the ecological departure from the natural fire regimes for each of the forest and non-forest vegetation types (table 3-23).

**Table 3-22. Vegetation Condition Class Descriptions from the LANDFIRE Classification System**

Vegetation Condition Class	Description
1. Vegetation Condition Class I.A	Very low vegetation departure 0–16%
2. Vegetation Condition Class I.B	Low to moderate vegetation departure 17–33%
3. Vegetation Condition Class II.A	Moderate to low vegetation departure 34–50%
4. Vegetation Condition Class II.B	Moderate to high vegetation departure 51–66%
5. Vegetation Condition Class III.A	High vegetation departure 67–83%
6. Vegetation Condition Class III.B	Very high vegetation departure 84–100%
Other	Water, snow and ice, non-burnable urban, burnable urban, barren, sparsely vegetated, burnable agriculture

Source: LANDFIRE classification system

**Table 3-23. Vegetation Condition Class (VCC) in Forested and Non-Forested Vegetation Types by Percentage of Area**

Vegetation Types	VCC IA	VCC IB	VCC IIA	VCC IIB	VCC IIIA	VCC IIIB	Other <sup>1</sup>	Total Area
Ponderosa pine	0.01%	6.76%	48.38%	25.98%	16.40%	0.12%	2.35%	100%
Lodgepole pine	0.19%	0.12%	43.50%	46.21%	5.29%	1.92%	2.77%	100%
Douglas-fir	0.03%	11.04%	41.81%	37.05%	7.34%	0.17%	2.56%	100%
Mixed conifer	0.32%	0.62%	65.36%	28.53%	1.63%	0.82%	2.72%	100%
Engelmann spruce	1.85%	0.18%	84.94%	3.73%	0.05%	2.43%	6.83%	100%
Miscellaneous <sup>2</sup>	1.27%	1.73%	55.05%	22.30%	6.05%	3.46%	10.15%	100%
Seral aspen	0.05%	0.68%	35.02%	50.04%	12.09%	0.75%	1.38%	100%
Persistent aspen	0.04%	0.69%	16.28%	55.47%	25.53%	0.42%	1.58%	100%
Sagebrush	0.63%	5.47%	57.14%	24.55%	7.79%	0.72%	3.70%	100%
Pinyon-juniper	0.79%	20.40%	42.16%	21.37%	1.94%	0.02%	13.32%	100%
Desert shrub	5.99%	5.19%	3.38%	78.51%	0.05%	0.01%	6.87%	100%

Source: Ashley National Forest Assessment Terrestrial Ecosystems, System Drivers, and Stressors Report (USDA Forest Service 2017e)

<sup>1</sup> Other includes water, barren ground, or sparse vegetation.

<sup>2</sup> Miscellaneous forest vegetation types include subalpine fir, blue spruce, five-needle pines, and riparian forest.

One or more of the following activities may have caused departures: fire suppression, timber harvesting, livestock grazing, introduction and establishment of nonnative species, or other management activities. For landscapes that were moderately or severely departed, those acres can provide the foundation for how many acres potentially need restoration. Alternatives B modified, C, and D share the same vegetation desired conditions and guidelines that address the threat of invasive species, conifer encroachment, and beetle epidemics. This would maintain or improve vegetation types and provide ecosystem resilience compared with alternative A.

In addition to VCC, vegetation classification, mapping, and quantitative inventory (VCMQ) has been completed for the Ashley National Forest (Forest Service 2009). The VCMQ program provides classification, distribution, and a quantitative inventory of existing vegetation. This provides a baseline for terrestrial vegetation structure in the form of percentage of canopy cover and tree sizes using diameter at breast height. The Forest Service can use this information to better achieve desired conditions for terrestrial vegetation and to determine effectiveness of vegetation treatments through monitoring changes in VCMQ.

**Ponderosa pine**—The Ashley National Forest Assessment documented that approximately 42 percent of ponderosa pine is in VCC II.B to III.B (moderate to very high departure), with 48 percent in VCC II.A (moderate to low departure). This indicates ponderosa pine needs active management to trend this vegetation type back toward the natural range of variation or desired conditions. Alternatives B modified, C, and D aim to manage approximately 6,300 to 63,100 potential burned acres per decade, depending on funding and staffing resources (see table B-5, Potential Number of Acres Burned per Decade and Desired Severity Based on Vegetation Type, in appendix B).

Prescribed fires would be mostly low to mixed severity to reduce conifer competition and maintain or improve ponderosa pine composition and structure where burning occurs. Fires of these severities would likely reduce fuel loading and ladder fuels, thereby reducing the potential for high-severity stand-replacing fires. This would increase ponderosa pine resilience to disturbance, such as wildfires and bark beetle outbreaks, when compared with alternative A. A guideline that calls for limitations on prescribed

burn operations in areas with surrounding mountain pine beetle pressures (scorch and lower crown damage to less than 50 percent on 90 percent of ponderosa pine in the larger diameter classes) would help reduce tree susceptibility to bark beetle attack.

Lodgepole pine—The Ashley National Forest Assessment documented approximately 43 percent in moderate to low and 46 percent in moderate to high vegetation departure. Alternatives B modified, C, and D would focus on regeneration timber harvest and would include clearcuts, shelterwoods, shelterwood removal, and seed tree methods. Distribution is based on a 120-year rotation in lodgepole pine stands that are persistent. Where these treatments occur, they would greatly reduce structure and vegetation cover and would reset the forest to early seral stages and regeneration (see also “Environmental Consequences for Terrestrial Vegetation Common to All Alternatives, Effects from Timber Harvest”). Desired conditions for persistent lodgepole pine are based on best available science. They would be used to manage for large fluctuations in distributions of structural classes with old forests; decadence would be rare. Lodgepole pine management would move this vegetation type toward desired conditions compared with alternative A.

Douglas-fir—This conifer forest type also demonstrates some vegetation departure that requires management to improve VCC. Under alternatives B modified, C, and D, the desired condition for interior Douglas-fir has greater than 75 percent composition, with less than 25 percent for true firs. Early seral stands of aspen may also be present after a stand-replacing event. Douglas-fir structure would be characterized by low-severity thinning fires and mixed-severity fires. Stand structure can range from uneven aged to even aged, but a dominating feature is that several structural classes tend to be evident in any landscape comprised of even-aged patches of mature and younger trees. Alternatives B modified, C, and D would treat approximately 2,400 to 13,600 potential acres per decade. Management would be determined based on historical fire regime groups, and a mix of fire severities (low to high) would be desired to maintain and improve vegetation types (see table B-5 in appendix B). Vegetation management for Douglas-fir with specific science-based guidance would be more effective to achieve desired conditions compared with alternative A.

Mixed conifer/Engelmann spruce—Desired conditions for the mixed conifer vegetation types is the same for alternatives B modified, C, and D, with Engelmann spruce and lodgepole pine being the dominant species. In Engelmann spruce vegetation type, greater than 40 percent to near 100 percent of Engelmann spruce would be desired, and subalpine fir would be the only seral species. The Ashley National Forest assessment documented approximately 94 percent of mixed conifer in VCC IIA and IIB and 85 percent of Engelmann spruce in VCC IIA (see USDA Forest Service 2017e, tables 28 and 29).

Table 5, Desired Mix of Structural Stages by Mixed Conifer Vegetation Type, in the forest plan details the desired mix of structural stages by mixed conifer vegetation types to guide management toward achieving desired conditions. Alternatives B modified, C, and D would improve mixed conifer and Engelmann spruce vegetation types where there would be vegetation treatments, including potential burned acres managed in both types (see table B-5 in appendix B). This would help improve these vegetation types’ species composition, structure, and cover and disturbance resilience.

Aspen—Desired conditions and guidelines for aspen are the same for alternatives B modified, C, and D. Plan direction for aspen in the form of desired conditions and guidelines would help move persistent and seral aspen stands toward the natural range of variation where treatments occur. The Ashley National Forest assessment determined that most of seral aspen (85 percent) has moderate to low (VCC II.A) and moderate to high (VCC II.B) vegetation departure; persistent aspen is mostly (81 percent) in moderate to high (II.B) and high (III.A) vegetation departure (see USDA Forest Service 2017e, table 29).

Guidelines for aspen include limiting livestock utilization of key forage species, restricting vehicle use (except in emergencies) in disturbed persistent aspen areas, designing aspen regeneration projects of appropriate size and methods, and using timber harvest prescriptions to facilitate new aspen suckering. Implementation of these guidelines would maintain or improve aspen species composition, structure, and cover.

Successful restoration treatments would maintain and increase the distribution of aspen communities where treatments occur and would extend to the perimeter of aspen clones. Depending on the methods of aspen regeneration, treatments could shift seral stages to younger successional classes. Aspen desired conditions state that new aspen suckering should occur equal to, but may extend beyond, the pre-disturbance perimeter of the regenerating clone. Crown cover of aspen suckers is 40 percent or greater at 5 years post-disturbance.

Treating areas of persistent aspen stands with prescribed fire would move aspen community composition toward a higher percentage of aspens, would decrease conifer composition, and would stimulate aspen generation; this would move this vegetation community toward early seral classes where treatments occur. Depending on the extent of conifer removal and treated areas beyond existing stands, there would be an increase in aspen distribution.

Pinyon-juniper woodlands—The Ashley National Forest assessment determined the majority (84 percent) of pinyon-juniper woodlands are in VCC I.B to II.B (low to moderate through moderate to high vegetation departure) (see USDA Forest Service 2017e, table 29). The desired condition for pinyon-juniper woodlands is the same for alternatives B modified, C, and D and would aim for desired successional and structural stage measurements. Furthermore, plan direction would maintain or improve 500 acres of burned pinyon-juniper woodland composition, structure, and disturbance response where vegetation treatments occur. Alternatives B modified, C, and D would maintain and improve pinyon-juniper woodlands compared with alternative A where vegetation treatments occur.

Non-forested types—Desired conditions for non-forest vegetation types are the same for alternatives B modified, C, and D. These communities would typically be controlled by natural conditions, such as topography, geology, elevation, and natural disturbance, and would vary across landscapes. Conifer encroachment would be limited to 10 percent tree crown cover or less. The Ashley National Forest assessment determined that 75 percent of desert scrub is in VCC II.B and 82 percent of sagebrush is in VCC IIA and IIB (see USDA Forest Service 2017e, table 29). Alpine communities were not assessed for vegetation departure in 2017.

Alternatives B modified, C, and D share an objective to restore or maintain 2,500 acres (on average) annually of non-forested vegetation types. This would apply to non-forest areas threatened by conifer encroachment or invasive plants or that are in degraded condition. Sagebrush habitat would be managed to provide appropriate habitat for greater sage-grouse. Alternatives B modified, C, and D would maintain or improve non-forest vegetation type structure, composition, and cover compared with alternative A. This is because specific and current science-informed management direction is lacking in the 1986 forest plan.

### *Environmental Consequences for Terrestrial Vegetation—Alternative B Modified*

#### **Effects from Vegetation Management**

Alternative B modified aims to treat an average of 2,400 acres annually in the first decade and 2,100 acres annually in the second decade of vegetation management, including prescribed fire. Table 3-17 and table 3-18 show the projected vegetation management practices by vegetation type in the first and second

decades under each alternative. Openings created by timber harvest treatments would not exceed 40 acres unless they are determined necessary to achieve desired ecological conditions. Additional exceptions apply for regeneration and even-aged timber stands in a single harvest operation (200 acres maximum opening size for persistent lodgepole pine and 100 acres for seral aspen). This would ensure that forest stands where treatments occur are structurally diverse and vary across landscapes in time and space.

Approximately 109,800 acres are suitable for timber production under alternative B modified (table 3-19). Timber harvest focus would be to maintain or restore forest and woodland types through science-informed management specific to vegetation types over commercial extraction. This would provide long-term vegetation resilience to support ecosystem health and sustainable forest economics compared with alternative A.

Under alternative B modified, naturally ignited fires would be managed on 10 percent of the ignitions every 10 years. The Forest Service would use wildland fire and other vegetation treatments to improve or maintain desired vegetation conditions on 6,600 to 32,000 acres per year during the life of the plan. The emphasis would be on using fire for ecosystem maintenance and restoration. Where these treatments occur, vegetation types would move toward desired conditions compared with alternative A.

### **Effects from Recreation**

Alternative B modified has the same acreage ROS rural as alternative A but slightly more acreage in motorized ROS acres (plus 6,300 acres in semiprimitive motorized and 1,100 acres in roaded natural) (see figures 2-4 and 2-5). In addition, there are objectives for increased motorized and nonmotorized routes. Compared with alternative A, this could slightly increase the effects on terrestrial vegetation indicators from motorized recreation, such as the loss or degradation of vegetation and spread of nonnative invasive species, as described under “Environmental Consequences for Terrestrial Vegetation Common to All Alternatives.”

Timber harvest and motorized use is permitted in backcountry and destination recreation management areas. Terrestrial vegetation would be subject to timber harvest and motorized recreation effects, as described previously, in these areas.

### **Effects from Designated Areas**

There are no additional RNAs or recommended wilderness under alternative B modified. Impacts on terrestrial vegetation indicators would be the same as alternative A.

### **Effects from Livestock Grazing Management**

Alternative B modified would have the same number of acres for active grazing allotments as alternative A; however, under alternative B modified, forage for livestock grazing would develop site- and species-specific annual indicators such as stubble height and utilization criteria during grazing allotment planning. It would also document these indicators in allotment management plans. In the absence of updated planning or an approved allotment management plan, livestock grazing would limit utilization of key forage species to no greater than 50 percent of the current year’s growth and leave a 4-inch or greater stubble height of palatable herbaceous species at the end of the grazing season between greenline and bankfull of stream systems, unless monitoring demonstrates a different utilization use level or stubble height is appropriate. There would be flexibility to adjust to site-specific conditions to help meet desired conditions for terrestrial vegetation. The Forest Service would use annual monitoring indicators as well as multi-year vegetation trend data to determine if allotments are meeting desired conditions and to inform and modify grazing management strategies such as time, timing, and intensity, when necessary, to meet or move toward desired conditions. Allotment management plans with forage utilization guidelines and

monitoring would help maintain native terrestrial vegetation indicators—species richness, vegetation cover, and plant structure—compared with alternative A. It also would reduce the potential for plant species composition to shift toward unpalatable or grazing-tolerant plant species where grazing occurs.

### *Environmental Consequences for Terrestrial Vegetation—Alternative C*

#### **Effects from Vegetation Management**

Alternative C emphasizes passive vegetation management rather than active increased vegetation treatments. Alternative C aims to treat 1,800 acres annually in the first decade and 1,600 acres annually in the second decade of vegetation management, including prescribed fire. Table 3-17 and table 3-18 show the projected vegetation management practices by vegetation type in the first and second decades under each alternative. Openings created by timber harvest treatments would not exceed 40 acres. Short-term effects from vegetation management, as previously described, would occur only where treatments are implemented. This would improve or maintain terrestrial vegetation indicators in these areas compared with alternative A. Such stressors as insect outbreaks, uncharacteristic wildfires, and climate effects would continue in untreated forest types.

Alternative C has the least acreage (approximately 80,500 acres) suitable for timber production and allowing timber harvest (93,700 acres) (see table 3-19 and table 3-70); therefore, more terrestrial vegetation in areas where timber harvest area is not allowed would not have potential short-term effects from timber harvest, as described above. These areas would maintain current trends (higher vegetation departure) of terrestrial vegetation indicators; however, alternative C may be less effective in moving vegetation types toward the natural range of variation and improving ecosystem resilience at large scales compared with the alternatives having more acres treated with multiple vegetation methods.

Under alternative C, naturally ignited fires would be managed on at least 20 percent (10 percent more than alternative B modified) of the ignitions every 10 years and would use wildland fire and other vegetation treatments to improve or maintain desired vegetation conditions on 6,600 to 32,000 acres (the same as alternative B modified) per year. The full range of fuel reduction methods is authorized, consistent with forestwide and management area emphasis and direction. Where fire is managed, terrestrial vegetation would trend back toward the natural range of variation and historical fire regimes and terrestrial indicators would likely improve, as described in “Environmental Consequences for Terrestrial Vegetation Common to All Alternatives.”

#### **Effects from Recreation**

Alternative C has approximately the same acreage of ROS semiprimitive motorized, ROS roaded natural, and ROS rural as alternative A; however, 83,000 acres of ROS semiprimitive nonmotorized would be moved into ROS primitive to connect to the existing primitive area in the High Uintas Wilderness under alternative C (see figures 2-4 and 2-6). There may be a decrease in recreation effects on terrestrial vegetation, as previously described; however, because primitive and semiprimitive nonmotorized ROS have similar effects on terrestrial vegetation, this change would be slight.

Timber harvest and motorized use would be excluded from backcountry recreation management areas. Terrestrial vegetation types in these areas would not be directly affected by timber harvest treatments or motorized recreation, as described in “Environmental Consequences for Terrestrial Vegetation Common to All Alternatives.” Livestock grazing would be excluded from destination recreation management areas (23,000 acres) and portions of grazing allotments would be closed. However, only 13,000 acres currently have active grazing; therefore, the reduction of potential effects to terrestrial vegetation would be limited to this area.



### **Effects from Designated Areas**

Alternative C is the only alternative that recommends wilderness acres: 50,200 in four areas (see figure 2-21). Terrestrial vegetation types, primarily alpine and conifer forest, would be subject to wilderness management direction, as described previously. In addition to existing RNAs, alternative C would propose RNA Gilbert Bench (1,400 acres in alpine vegetation), where vegetation management would follow RNA direction; it would also exclude timber harvest.

### **Effects from Livestock Grazing Management**

Alternative C would have reduced acres (13,400 acres closed) available for active grazing allotments and fewer head months compared with alternative A. Alternative C forage for livestock grazing would have no greater than 40 percent utilization levels, as well as a minimum 4-inch stubble height guideline for key forage species in riparian areas to help meet desired conditions for terrestrial vegetation. This would help maintain native terrestrial vegetation indicators of species richness, vegetation cover, and plant structure. It also would reduce the potential for plant species composition to shift toward unpalatable or grazing-tolerant plant species, which occurs with grazing overutilization.

### *Environmental Consequences for Terrestrial Vegetation—Alternative D*

#### **Effects from Vegetation Management**

Alternative D aims to treat 2,500 acres annually in the first decade and 2,200 acres annually in the second decade of vegetation management, including prescribed fire. Table 3-17 and table 3-18 show the projected vegetation management practices by vegetation type in the first and second decades under each alternative. Openings created by timber harvest treatments are the same as alternative B modified and would not exceed 40 acres, unless determined necessary to achieve desired ecological conditions. This would ensure forest stands where treatments occur are structurally diverse and vary across landscapes in time and space.

Approximately 114,300 acres are suitable for timber production and 189,400 acres allow for timber harvest under alternative D (table 3-19 and table 3-70). Alternative D has more emphasis on commodity timber harvest but would still use vegetation treatments to move terrestrial habitats toward desired conditions compared with alternative A.

Under alternative D, naturally ignited fires would be managed on at least 5 percent of the ignitions every 10 years and would use wildland fire and other vegetation treatments to improve or maintain desired vegetation conditions on 10,000 to 40,000 acres per year during the life of the plan. The full range of fuel reduction methods would be authorized, consistent with forestwide and management area emphasis and direction. Alternative D also would allow for minimum impact suppression tactics only in wilderness. Emphasis would be to manage fire for protecting developed resources; there would be limited focus on maintaining or improving terrestrial vegetation types.

Fire to achieve resource objectives would be prohibited in HVRAs. Terrestrial vegetation around HVRAs would be modified to protect developed areas and not movement toward the natural range of variation. Plant structure, densities, and vegetation cover would decrease to allow for better fire suppression. Still, plan direction under alternative D for vegetation management would maintain or improve terrestrial vegetation compared with alternative A. This would be due to management actions being based on current best available science and techniques, unlike under alternative A.

### **Effects from Recreation**

Alternative D emphasizes recreation and public access rather than restoring vegetation types. Alternative D has the same acreage of ROS primitive as alternative A but more acreage of ROS rural (plus 24,300 acres) (see figures 2-4 and 2-7 Alternative D: Recreation Opportunity Spectrum). This would increase the effects on terrestrial vegetation indicators from high-use recreation development and motorized use, as described under “Environmental Consequences for Terrestrial Vegetation Common to All Alternatives,” compared with alternative A. This could include higher incidents of human-caused ignitions, increased effects from motorized recreation, increases in unauthorized trail creation, and the spread of nonnative invasive species. Furthermore, alternative D has plan direction to expand or improve campgrounds, motorized routes, mountain bike trails, and dispersed camping docks in Flaming Gorge Reservoir. This would further increase potential recreation effects on vegetation types where recreation access is expanded or recreation use increases.

Timber harvest and motorized use would be permitted in backcountry recreation management areas and destination recreation management areas. Terrestrial vegetation would be subject to timber harvest and motorized recreation effects, as described previously, in these areas. As under alternative B modified, 13,400 acres of active grazing allotments would be allowed in destination recreation management areas, and terrestrial vegetation types could be affected where grazing occurs.

### **Effects from Designated Areas**

There are no additional RNAs, wild and scenic rivers, or recommended wilderness under alternative D. Impacts on terrestrial vegetation indicators would be the same as under alternative A.

### **Effects from Livestock Grazing Management**

Similar to alternative A, alternative D would have 919,700 acres of active grazing allotments, and guidelines state that utilization of key forage species and stubble height would meet desired conditions for soils and vegetation types. This would provide flexibility for grazing management and might result in utilization levels of key forage species higher or lower than 50 percent and reduced or increased stubble height of plants at the end of grazing seasons. Plant communities where grazing occurs could shift species composition toward unpalatable or grazing-tolerant species, could reduce or remove vegetation cover, and could change species richness. Without a defined stubble height guideline for key forage species, grazing below 4-inch stubble height might prevent key forage species from reestablishing, and nonnative and invasive species might compete with native vegetation, altering species richness and acres of plant communities. However, terrestrial and soil desired condition plan components common to alternatives B modified, C, and D should minimize the potential for severe adverse impacts.

### **Cumulative Environmental Consequences for Terrestrial Vegetation**

Several vegetation management projects in or near the Ashley National Forest would contribute to changes to terrestrial vegetation indicators, as follows:

- Ashley National Forest Aspen Restoration Project—A programmatic aspen stand restoration effort on the Forest. This project would complement alternatives B modified, C, and D to move aspen communities toward the natural range of variation in the plan area.
- Little Pond Forest Restoration Project in the Duchesne Ranger District—A timber and forest health project that includes aspects of public safety, watershed restoration, and fuels reduction.
- West Northwest Wildlife Habitat Improvement Project in the Flaming Gorge Ranger District—This project will remove conifer species from shrub community types through lop and scatter on 19,682

acres. The project intent is to maintain native vegetation diversity and watershed stability, to reduce wildfire potential, and to improve wildlife habitat.

- Iron Mountain Juniper Fuels Treatment in the BLM Rock Springs Field Office—Fuels treatments and forest health projects at multiple locations will treat up to 3,614 acres to keep public lands healthy and accessible by improving forest health and sagebrush habitat and minimizing the threat of catastrophic wildfire.
- Red Creek and Lizzie Spring Fuels Treatment in BLM Rock Springs Field Office—Fuels treatments and forest health projects at multiple locations will treat up to 2,113 acres to keep public lands healthy and accessible. It will do this by improving forest health and sagebrush habitat and minimizing the threat of catastrophic wildfire.
- Western Smiths Fork Restoration in the Uinta-Wasatch-Cache National Forest—This project will treat approximately 1,872 acres affected by the mountain pine beetle epidemic. The project will move this area toward the desired future condition of a more healthy and resilient forest.
- Whitney Reservoir Restoration in the Uinta-Wasatch-Cache National Forest—Recent death of spruce trees due to the spruce bark beetle has appeared along the eastern slope next to Whitney Reservoir. The proposed action is to harvest spruce trees (fewer than 250 acres) in order to control the spread of insects.
- Western Area Power Administration Right-of-Way Maintenance and Reauthorization Project—Update vegetation management activities along 278 miles of transmission lines on National Forest System lands to protect the transmission lines by managing for stable, low-growth vegetation.

The cumulative environmental consequences of proposed management in the context of the larger ecoregion would contribute to the movement of terrestrial vegetation toward desired conditions. The projects above, in combination with achieving the desired conditions shared by alternatives B modified, C, and D, would contribute to landscape restoration on a large scale, with a focus on reestablishing the composition, structure, species richness, and diversity of seral stages and structure to facilitate healthy, resilient, sustainable ecosystems. Cumulatively, these management efforts would also lessen the impact of invasive species, would provide resilience to disease and insect outbreaks, would improve wildlife habitat, and would reduce the risk of uncharacteristic wildfire. Increasing health and ecosystem function through management would also increase the ability of ecosystems in the region area to adapt to climate change. Ultimately, ecosystems exhibiting desired conditions better provide for multiple uses and better contribute to sustainable social and economic systems.

## Fire and Fuels

### Introduction

The effects of wildland fire have the potential to drive ecosystem change at a landscape scale (Hessburg et al. 2015). As such, wildland fire is considered a primary disturbance agent that both currently and prehistorically has created this type of change. Across the Ashley National Forest, fire has influenced vegetation patterns, composition, structure, and development of both individual stands and the larger landscape. Existing disturbance regimes are markedly altered from natural disturbance regimes. Today's landscape patterns are largely a byproduct of the cumulative effects of human activities and altered disturbance regimes.

The current national fire management policy is outlined in Guidance for Implementation of Federal Wildland Fire Management Policy (DOI 2009) and the Review and Update of the 1995 Federal Wildland Fire Management Policy (Interagency Federal Wildland Fire Policy Review Working Group 2001). This

policy allows fires to be managed for resource benefit, depending on direction in the Ashley forest plan. In addition, the forest plans for all the national forests in Utah, including the Ashley National Forest, were amended in 2000, which allows for the full range of fire management responses and management of hazardous fuels through prescribed burning and other vegetation management methods.

The Utah fire amendment is consistent with national policy, which requires that each fire have a set of objectives commensurate with the values at risk; therefore, a fire may have a mix of resource benefit and suppression objectives. The documentation for the decision of the strategic direction of the fire is made in the wildfire decision support system. Every fire with a resource objective or that escapes initial attack must have a decision in the wildfire decision support system.

### *Regulatory Framework*

**Wildfire Suppression Assistance Act of April 7, 1989 (HR 4936)**—Authorizes reciprocal fire protection agreements with any fire organization for mutual aid, with or without reimbursement. When reciprocal fire protection agreements do not exist, it allows for emergency assistance in the vicinity of agency facilities in extinguishing fires.

**Healthy Forests Restoration Act of 2003 (HR 1904)**—Aimed at expediting the preparation and implementation of hazardous fuels reduction projects on Federal land; encourages collaboration between Federal agencies and local communities; requires courts to balance the effects of action versus no-action before they halt a project's implementation; and requires Federal agencies to retain large trees under certain conditions.

**Urban Wildland Interface Communities within the Vicinity of Federal Lands That Are at High Risk from Wildfire (*Federal Register* Vol. 66, No. 3, 2001)**—List of communities in the vicinity of Federal lands that are at high risk from wildfire.

**FS Manual 5100**—Provides direction on wildland fire, including suppression and fuels management, such as prescribed fire in general and within wilderness.

**FS Handbook 5109**—Provides direction for wildland fire managers.

**National Fire Plan, August 2000**—Outlines a plan of action for Federal agencies to protect wildland urban interface and to be prepared for extreme fire conditions.

**Federal Wildland Fire Management Policy of 1995 (updated January 2001)**—Guides the philosophy, direction, and implementation of wildland fire management on Federal lands.

**2002 President's Healthy Forests Initiative**—Emphasizes administrative and legislative reforms to expedite fuels treatments and post-fire rehabilitation actions.

**Interagency Prescribed Fire Planning and Implementation Procedures Guide 2017**—Provides standardized procedures specifically associated with the planning and implementation of prescribed fire.

**Guidance for Implementation of Federal Wildland Fire Management Policy 2009**—Guidance for consistent implementation of the 1995/2001 Federal Fire Policy.

**National Cohesive Wildland Fire Management Strategy 2014**—A strategic document for all interested parties across all landscapes to collaborate, using best science, to address the nation's wildfire problems by focusing on three key areas: restoring and maintaining landscapes, fire-adapted communities, and response to fire.

**Interagency Standards for Fire and Fire Aviation Operations 2018 (NFES 2724)**—A reference guide that documents the standards for operational procedures and practices for the Forest Service fire and aviation management program.

### *Analysis Area*

Wildland fires do not follow administrative boundaries but instead burn based on fuels, weather, and topography; because of this, the analysis area for the fire and fuels management effects includes the fireheds overlapping the Ashley National Forest, encompassing both National Forest System lands and lands under other ownership, both in and next to the national forest. The analysis applies to the anticipated life of the plan, with some analysis occurring across the longer term (50 years); this is consistent with the analysis period for other key ecosystem characteristics associated with terrestrial vegetation.

### *Notable Changes Between Draft and Final EIS*

Edits have been made to the affected environment for clarity, and the alternative B analysis has been updated to reflect changes to management in alternative B modified, including rewording of objectives and guidelines for HVRAs (e.g., HW-OB-HVRA-01 and FW-GD-HVRA-03), as well as the addition of a goal for collaborate with partners, adjacent landowners, private industry, and outside interests to increase the percentage of fire-resilient landscapes around HVRAs.

## Description of the Affected Environment

### *Natural Fire Regimes and Natural Range of Variation*

A fire regime describes the general pattern in which fires naturally occur in a particular ecosystem over an extended period. Scientists classify fire regimes using a combination of factors: frequency, intensity, size, pattern, season, and severity (Weston 2010). Historical natural fire regimes are grouped into five categories based on the average number of years between fires (fire frequency) combined with characteristic fire severity reflecting percent replacement of dominant overstory vegetation (see table 3-24).

**Table 3-24. Fire Regime Group Descriptions**

<b>Group</b>	<b>Frequency</b>	<b>Severity</b>	<b>Severity Description</b>
I	0–35 years	Low/mixed	Generally low-severity fires replacing less than 25 percent of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75 percent of the overstory
II	0–35 years	Replacement	High-severity fires replacing greater than 75 percent of the dominant overstory vegetation
III	35–200 years	Mixed/low	Generally mixed-severity fires; can also include low-severity fires
IV	35–200 years	Replacement	High-severity fires
V	200+ years	Replacement/ any severity	Generally replacement severity; can include any severity type in this frequency range

Source: National Interagency Fuels Fire and Technology Transfer System 2010

To better understand the historical fire disturbances in each of the vegetation types, LANDFIRE fire regime groups are used to characterize the severity and frequency of fires in forested and non-forested vegetation types. The dominant fire regime group and range of fire frequency within forested and non-

forested vegetation types in the plan area is presented in table 3-25. Acres of each vegetation type in the plan area are shown in table 3-21 in the terrestrial vegetation section above.

Vegetation condition class is a measure of departure from reference (pre-settlement, natural, or historical) ecological conditions that typically alters native ecosystem components (see table 3-26 for VCC descriptions).

**Table 3-25. Dominant Fire Regime Groups and Fire Frequency within Forested and Non-forested Vegetation Types**

Vegetation Types	Dominant Fire Regime Groups	Fire Frequency (Years)
Ponderosa pine	I	6–60
Lodgepole pine	V	90–200
Douglas-fir	I, III	35–200
Mixed conifer	V	200–300
Engelmann spruce	V	200–400
Miscellaneous <sup>1</sup>	I	75–290
Seral aspen	I, III, IV	13–70
Persistent aspen	I	20–300
Sagebrush	III, IV	40–100
Pinyon-juniper	III, IV	150–200
Desert shrub	IV	100–240

Source: LANDFIRE 2020

<sup>1</sup> Miscellaneous forest vegetation types include subalpine fir, blue spruce, five-needle pines, and riparian forest.

**Table 3-26. Vegetation Condition Class Descriptions**

Vegetation Condition Class	Description
I.A	Very low vegetation departure, 0–16%
I.B	Low to moderate vegetation departure, 17–33%
II.A	Moderate to low vegetation departure, 34–50%
II.B	Moderate to high vegetation departure, 51–66%
III.A	High vegetation departure, 67–83%
III.B	Very high vegetation departure, 84–100%
Other	Water, snow and ice, non-burnable urban, burnable urban, barren, sparsely vegetated, burnable agriculture

Source: LANDFIRE 2020

VCC is used to assess the ecological departure from the natural fire regimes for each of the existing forest and non-forest vegetation types. As shown in table 3-27, most vegetation types on the forest are in VCC II.A and II.B, indicating moderate to low and moderate to high departure, respectively, from reference conditions. One or more of the following activities may have caused departures: fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, introduced insects or diseases, or other management activities (National Interagency Fuels Fire and Technology Transfer System 2010).

In the Ashley National Forest, the primary cause for departures is lack of disturbance, in particular, fire suppression. Areas affected by insects are shown in figure 3-13; the areas of highest damage are concentrated in the eastern portion of the High Uintas Wilderness.

**Table 3-27. Dominant Vegetation Condition Classes (VCCs) in Forested and Non-Forested Vegetation Types**

<b>Vegetation Types</b>	<b>Dominant VCCs</b>
Ponderosa pine	VCC II.A
Lodgepole pine	VCC II.A, II.B
Douglas-fir	VCC II.A, II.B
Mixed conifer	VCC II.A
Engelmann spruce	VCC II.A
Miscellaneous <sup>1</sup>	VCC II.A
Seral aspen	VCC II.B
Persistent aspen	VCC II.B
Sagebrush	VCC II.A
Pinyon-juniper	VCC II.A
Desert shrub	VCC II.B

Source: LANDFIRE 2020

<sup>1</sup> Miscellaneous forest vegetation types include subalpine fir, blue spruce, five-needle pines, and riparian forest.

In contrast to fire suppression, the Forest Service has infrequently used unplanned ignitions to manage wildfires and reduce fuels. Out of an average 20 to 30 wildfires each year, one to two have been managed wildfires.

#### *Recent Wildfire History and Trends*

The departure from reference conditions is reflected in the recent wildfire trends as the total number of acres burned has increased considerably over the last 3 decades. There was an abrupt transition in the mid-1980s from a regime of infrequent large wildfires that were generally short duration to one with much more frequent larger fires. Reduced winter precipitation, early spring snowmelt, and warmer dry seasons have played a role in this shift. An increase of large wildfires greater than 1,000 acres is particularly robust in lower- to mid-elevation forests that have missed one or more fire return intervals over the last 100 years. This area consists of dry forest types, such as ponderosa pine, Douglas-fir and pinyon pine, where fire exclusion has created a departure from the natural fire regimes (Westerling et al. 2006).

Over the last 3 decades, many areas have also experienced mountain pine beetle infestations. Those stands that have significant beetle infestations will continue to change the fuel profile and foliar moisture content over time, creating conditions that are potentially more susceptible to higher-intensity wildfires (Clecutus and Mulik 2014).

While large fires have burned a significant number of acres across the Ashley National Forest, they are generally rare, with less than 1 percent burning more than 1,000 acres. Due to the strong influence of the monsoon weather, the fire season is determined by its occurrence or lack of occurrence. Lightning from thunderstorms typically begins in late May and accounts for 68 percent of the fires. Due to vegetation green-up, 77 percent of the fires are usually less than a quarter of an acre and are easily suppressed. The potential for larger fires (greater than 100 acres) usually occurs between late June and mid-July. As the monsoons become more common by mid- to late July, all fires are less than 100 acres. As the monsoon influence subsides in the fall, fires usually remain relatively small and manageable (Nauslar et al. 2018).

Over the past decade, many larger fires have been caused by recreationists on the national forest. Figure 3-14 describes the percentage of fires by size class, and figure 3-15 shows the number of fires and total acres burned for the Ashley National Forest since 1970. The increase in acres burned in 2020 represents

Figure 3-14. Ashley National Forest Percentage of Fires by Size Class from 1970 to 214

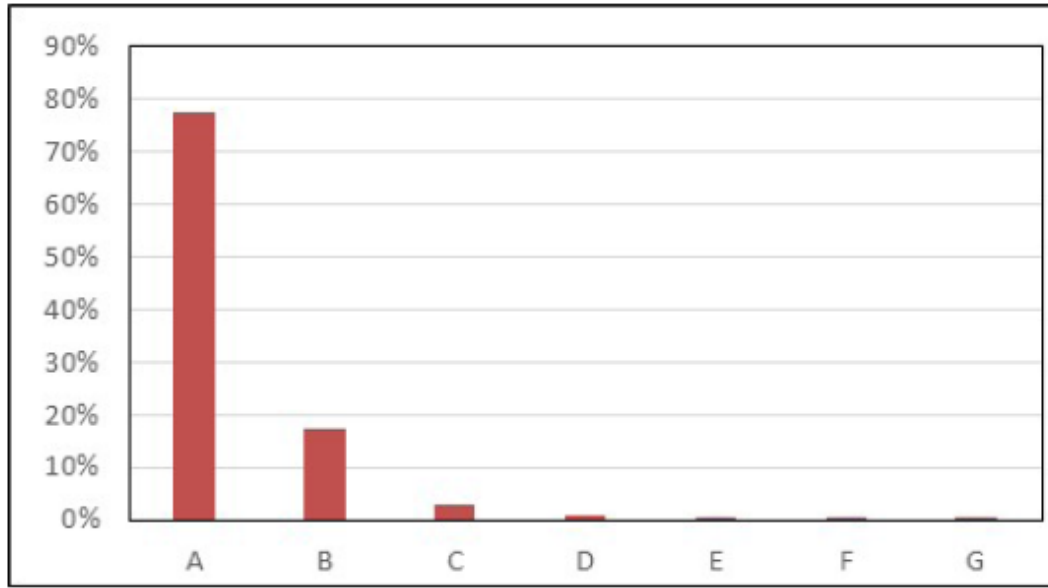
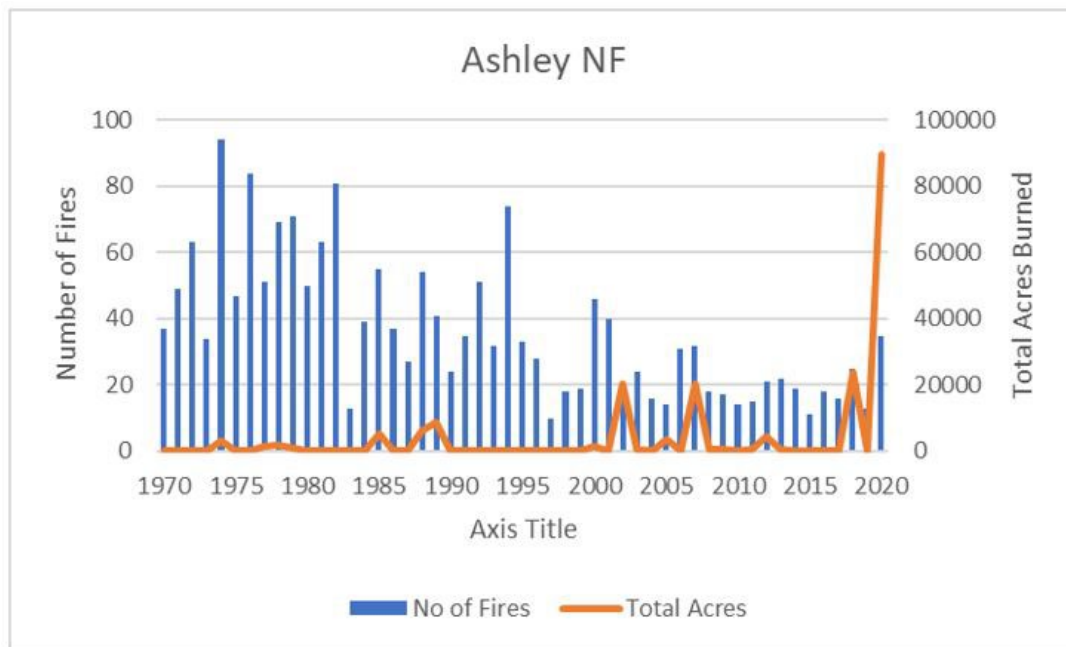


Figure 3-15. Ashley National Forest Number of Fires and Total Acres Burned from 1970 to 2020



the East Fork fire, which burned approximately 90,000 acres. The area that burned during the East Fork fire had high fuels loads from both standing beetle-killed trees and dead and downed trees. Portions of the area that burned with high severity had water-repellant soils after the fire, leaving those areas at higher risk of landslides and debris flows.



**Forest Fuels and Fire Behavior**

Given how conditions have changed, as described above, the Forest Service can characterize fuels to predict how fires may burn within the vegetation types. The Forest Service uses representative fuel models to quantify fire behavior characteristics and the potential effects on vegetation. Fuels are made up of the various components of vegetation, live and dead, that occur on a site. These components of surface fuels include litter and duff layers, the dead and downed woody material, grasses and forbs, shrubs, regeneration, and timber. Various combinations of these components define the major fuel groups of grass, shrub, timber, and slash. The differences in fire behavior among these groups are related to the fuel load and its distribution among the fuel particle size classes. In addition to surface fuels, crown fuels are described by canopy bulk density, canopy base height, and canopy fuel load (Scott and Burgan 2005).

The standard fire behavior fuel models are used to predict fire behavior resulting from various weather and topographic inputs. Crown fuels are important for determining crown fire characteristics, such as whether a fire can transition from the surface to the tree crowns. Fires in tree crowns are much harder to control because embers can result in spot fires<sup>7</sup> across control lines.

Several outputs calculated from fire behavior modeling are important to fire management decisions. The outputs of most concern are flame length and type of fire. Flame length is important in determining fire suppression techniques. In addition, these fire behavior characteristics are used to estimate resistance to control. This resistance is defined as the relative difficulty of constructing and holding a control line, as affected by resistance to line construction and by fire behavior (NWCG 2014). For instance, at flame lengths of 0 to 4 feet, a fire can be controlled by direct attack by hand and ground crews at the fire’s edge. As flame lengths increase to over 11 feet, indirect attack is the only option, using a combination of aerial resources, mechanical equipment, and hand and ground crews (NWCG 2006).

In order to quantify fire behavior characteristics and the potential mechanisms to control a wildfire, fire behavior modeling was used across the entire Ashley National Forest. The national fire behavior modeling and mapping system called FlamMap produced fire behavior outputs for flame length and fire type, shown in table 3-28 and table 3-29.

**Table 3-28. Flame Length and Percentage of Total Area Across the Ashley National Forest**

Flame Length Classes	Acres	Percent Total Area
Unburnable	250,685	18
0 to 4 feet	625,265	45
4 to 8 feet	380,747	27
8 to 11 feet	64,404	5
More than 11 feet	79,160	5

Source: Forest Service GIS 2020

**Table 3-29. Fire Type Acres and Percentage of Total Area Across the Ashley National Forest**

Fire Type	Acres	Percent Total Area
Unburnable	250,685	18
Surface fire	664,025	47
Passive crown fire (torching)	479,880	34
Active crown fire	5,670	Less than 1

Source: Forest Service GIS 2020

<sup>7</sup>A fire started by flying sparks or embers at a distance from the main fire.

### *Wildland-Urban Interface and Values at Risk*

Decades of fire exclusion in many areas have impeded the ecological benefits that result from fire. As a result, there has been a significant increase of fuel accumulations in systems that historically burned with high frequency at low severity. At the same time, there has been an increase in human improvements in or next to wildland fire fuels. These improvements continue to push outward from communities into areas that have a higher risk of fire (Malesky et al. 2018).

The wildland-urban interface is an area where both human improvements and structures meet and intermingle with wildland vegetation in the Ashley National Forest. These are areas that could be threatened by a fire burning wildland fuels and are considered HVRAs. The values associated with these areas are private land and structures, summer homesites, aboveground utility corridors, developed recreation sites, administrative sites, watershed improvements, reservoirs, canals, electronic and communication sites, and oil and gas facilities.

Fire and risk are inevitably linked and provide the foundation for fire managers to assess their potential effects. Current wildfire risk is represented by the possibility of loss or harm from a wildfire. The risk is displayed by the fire risk index rating, from very low to extreme. Wildfire risk is used to determine the potential of a wildfire affecting these values. The fire risk index rating combines the likelihood of a fire occurring and the potential hazard (fire behavior characteristics) in relation to those current values of concern (Utah Department of Natural Resources 2016). Most fire risk is rated relatively low; however, with the exclusion of fire and continuation of climate change, more acres will continue to move toward the moderate to high risk. See table 3-30 for current fire risk index acres and percent across the Ashley National Forest.

**Table 3-30. Acres and Percentage of Ashley National Forest Identified by the Fire Risk Index Rating**

<b>Fire Risk Index Rating</b>	<b>Acres</b>	<b>Percent</b>
Non-burnable	205,969	18
Very low	610,938	53
Low	120,303	10
Low to moderate	99,412	9
Moderate	70,677	6
Moderate to high	35,870	3
High	12,951	1
Very high	4,495	0
Extreme	1,478	0

Source: Forest Service GIS 2020

### *Climate Change*

With or without change in precipitation, temperature increases can decrease snow depth, alter timing and rate of snowmelt, lengthen or alter the timing of the growing season, and affect soil moisture levels. Climate change will affect disturbances in the ecosystem, with fire, insects, and disease being the most notable for the Ashley National Forest (Malesky et al. 2018). Increasing air temperatures are expected to change the frequency, severity, and extent of wildfires. Large wildfires that have occurred during a warmer climatic period during the past two decades signify a future in which wildfire is an increasingly dominant feature of western landscapes (Vose et al. 2016).

With an increase in temperature over the last several decades, there has been an increase in the number of years of drought. Drought has a clear correlation to the biotic and abiotic (living and dead) conditions within forested and rangeland vegetation types, and drought increases the potential for large fires (Vose et

al. 2016). Although some of these interactions are predictable, they can be difficult to quantify. The Forest Service has analyzed the fire danger index energy release component and Palmer drought severity index. It found a correlation of recent drought conditions to an increase in large fires in the Ashley National Forest (Forest Service 2017f).

## Environmental Consequences for Fire and Fuels

### *Methodology and Analysis Process*

The impacts analysis area for fire and fuels is the firesheds that overlap the Ashley National Forest. Indicators were selected based on those management actions in the plan that would affect the Forest Service's ability to improve or maintain desired vegetation conditions, protect high-value resources, and manage wildland fire.

A qualitative approach was used to analyze the types of impacts on fire and fuels, based on an understanding of current conditions in the analysis area. The analysis by alternative is largely quantitative, comparing acres treated and percentage of ignitions that would be managed. Given the programmatic nature of the forest plan, the exact locations and number of acres that would be affected by proposed management are unknown. Similarly, the cumulative effects analysis tends to be broad and generalized to address potential effects that could occur from a reasonably foreseeable management scenario, combined with other reasonably foreseeable activities or projects; consequently, this assessment is primarily qualitative. This is because of a lack of the detailed information that would result from project-level decisions and other activities or projects. The analysis assesses the magnitude of cumulative impacts by comparing the environment in its baseline condition with the expected impacts of the alternatives and other actions in the same analysis area.

### *Analysis Assumptions*

The analysis is based on the following assumptions:

- Acres with fuels treatments have reduced departure because treatments have altered the structure and composition of vegetation or fuel loads; this moves vegetation toward desired conditions.
- Actual acres treated under each alternative will depend on resource availability, NEPA analysis, weather conditions, socio-political factors, and other unpredictable factors.
- A direct relationship exists between fuel loading and potential fire intensity and severity.
- Demand for fuels treatments will likely increase over the life of this plan.
- Management under all alternatives will not directly change the frequency of naturally ignited fires because it will not change the sources of ignitions.

### *Indicators*

Analysis indicators for fire and fuels are as follows:

- Future fuels treatments—Acres of projected vegetation treatments
- Protection of high-value resources—Acres of projected vegetation treatments in HVRAs
- Flexibility of fire management—Percentage of natural, unplanned ignitions that would be managed for resource objectives

### *Environmental Consequences for Fire Common to All Alternatives*

Fuels treatments under all alternatives, such as manual, mechanical, and chemical treatments as well as prescribed fire, would reduce tree density and the quantity of surface fuels and would remove insect-affected trees. Such treatments would result in a more diverse forest structure by creating openings and clumps and generally reducing fuel density. Retained trees would generally be older and larger, with thicker bark and higher crown base heights; thus, they would be more fire resistant and less able to support crown fire (Agee and Skinner 2005). Overall, fuels treatments would move areas toward natural fire regimes and desired conditions.

The reductions in tree density, standing dead trees, ladder fuels, and surface fuels would decrease the probability of ground fire escalating to crown fire in any stand or forest type and would reduce unpredictable and hazardous high-intensity wildfire behavior such as spotting, crowning, and torching (Weise et al. 2018).

The wildland-urban interface zone will continue to grow under all alternatives. It introduces additional ignition sources, which increase the probability of wildland fire and the need for fire suppression. This expanding wildland-urban interface zone affects the Forest Service's ability to manage wildland fire as a natural process due to the necessity of protecting property, infrastructure, and public safety. Fire management within the wildland-urban interface zone is often more dangerous, time-consuming, and expensive than fire management in undeveloped areas. The need for fuel treatments in these areas is likewise increased in order to protect these values. Similarly, increased recreation use in the analysis area increases the probability of unintentional fire starts and the need for fire suppression.

Under all alternatives, there may be limitations on the timing or location of certain treatments to protect sensitive resources such as archaeological sites, nesting wildlife, and steep slopes. Protection of these areas can require modification to the design of fuels treatments and result in higher management costs or reduced treatment in specific areas. Should this occur, these areas would be at a continued risk for larger, more intense wildfires, with higher suppression costs and a higher risk of loss. The associated administrative workload would increase with an increase in acres treated and number of projects.

### *Environmental Consequences for Fire—Alternative A*

Existing trends described in the affected environment section would continue under alternative A, including departure from natural fire regimes, fuel accumulation, and increase in acres burned and risk of higher-intensity wildfires.

While the current direction in the 1986 forest plan does not specify the acres of projected vegetation treatments, acres of projected treatments to protect high-value resources, or the percentage of planned ignitions that would be managed for resource objectives, there is some direction to protect investments, use unplanned ignitions, and protect areas from insects and disease.

Further, Federal wildland fire management policy and the Utah National Forests Fire Amendment would support some movement toward desired conditions through vegetation and fire management for resource benefit over the short term; however, the pace of treatments would not be sufficient to reverse the trend of fire regime departure and fuel loading over the long term. Over the long term, the likelihood for more frequent, severe, and intense wildland fires would continue to increase. Forest conditions, wildlife habitats, recreation opportunities, and watershed conditions would be at increasing risk from large-scale, high intensity wildfires. In addition, the risk of property damage and public and firefighter exposure to erratic fire behavior would continue to increase.

### *Environmental Consequences for Fire—Alternative B Modified*

Fuels treatments, projected at 6,600 to 32,000 acres per year under this alternative, would move toward or maintain desired vegetation conditions more than under alternative A. Over the long term, fuels treatments would develop a fire-resilient landscape, bringing the frequency and severity of wildland fire closer to the natural range of variation. Impacts would likely be concentrated in those vegetation states with the highest departure from the natural range of variation; in vegetation types with VCC II.B: lodgepole pine, Douglas-fir, seral and persistent aspen, and desert shrub (see table B-15, appendix B2).

Impacts would also be concentrated in insect-affected areas, though there may be limitations on treatments in the High Uintas Wilderness, where some of the most severe insect damage is mapped (figure 3-13). The more acres treated, the more acres that would move toward desired conditions. This would reduce the extent and severity of wildfire in treated vegetation communities and would reduce suppression costs in the long term.

Alternative B modified includes a guideline to prioritize and protect high value resources, with projected treatments of hazardous fuels in HVRAs on averaging of 1,000 to 3,000 acres per year around highly valued resources or assets as shown in a hazard risk analysis and with partnership cooperation. Such treatments would assist in the control and management of fires in HVRAs over the short and long terms to a greater extent than under alternative A.

Goals to include collaborative planning to support management across jurisdictional boundaries and to increase the percentage of fire-resilient landscapes around highly valued resources or assets would support a long-term reduction in hazardous fuels. Education and working with outside interests could also reduce the likelihood of human-caused ignitions, thereby reducing the number of fires that would need to be controlled in HVRAs over the long term.

Management of unplanned ignitions on 10 percent of ignitions would afford fire management greater flexibility to meet resource objectives through managed wildland fire compared with alternative A. Given certain weather, fuels, and topography, fires can be managed with minimal risk to values. Where unplanned ignitions pose little risk to values, the Forest Service would be able to manage the Ashley National Forest for longer-term ecological benefits and could potentially reduce treatment costs and improve efficiency over the long term. The location of these effects cannot be predicted because the locations of future unplanned ignitions are unknown. There may be a desire to use such an approach, depending on the potentially affected resources.

### *Environmental Consequences for Fire—Alternative C*

Impacts under alternative C from fuels treatments would be the same as described for alternative B modified. Under alternative C, the lack of minimum treatment acres in HVRAs would have impacts similar to alternative A, with an emphasis on fuels treatments moving toward desired vegetation conditions and the use of fire to achieve resource objectives.

Management of unplanned ignitions would have impacts similar to those described for alternative B modified. By managing unplanned ignitions on at least 20 percent of ignitions, alternative C would allow the Forest Service to have increased flexibility to meet resource objectives through the use of managed wildland fire. Further, an increase in the use of managed wildland fire may reduce the need for prescribed fire and limit the resources available for, and costs associated with, prescribed fire treatments; as such, there could be a trend toward less use of prescribed fire under this alternative. However, with a greater proportion of managed wildland fire, there would be an increased risk of the unintended outcome/consequence that a fire could escape; this could lead to larger wildfires, habitat and watershed

damage, and recreation closures. Depending on the extent of such fires, impacts may persist over the long term.

### *Environmental Consequences for Fire—Alternative D*

Impacts from fuels treatments would be similar to those described for alternative B modified. The higher projected annual treatment acreage, from 10,000 to 40,000 acres, under alternative D would lead to a greater improvement of vegetation conditions. The likely location of impacts would be as described for alternative B modified. Alternative D would further reduce the extent and severity of wildland fires in treated vegetation communities and would reduce suppression costs in the long term.

Similarly, projected vegetation treatments in HVRAs would have the same types of impacts as described under alternative B modified. With the higher acreage of vegetation treatments under alternative D, a minimum of 5,000 to 10,000 acres per year, the Forest Service would have greater opportunity to control and manage fires near HVRAs over the short and long terms. This would result in a greater level of protection of these resources.

Management of unplanned ignitions for resource benefits would have impacts similar to those described for alternative B modified. With a reduced proportion of ignitions that would be managed under alternative D (at least 5 percent of ignitions) and increased focus on fire suppression, the Forest Service would have less flexibility to meet resource objectives through managed wildland fire. It would be less likely that the Forest Service would control the size and extent of wildfires through the use of managed wildland fire. Treatment costs might be higher than under alternative B modified since more resources would be devoted to active suppression.

### **Cumulative Environmental Consequences for Fire**

Past and present management actions and natural events in the analysis area have altered the condition of vegetation and natural fire regimes across the landscape. These actions and events include fire suppression, development, drought, and insect and disease outbreaks. In many cases, areas are now more prone to large, intense fires.

The cumulative effect of many past, present, and reasonably foreseeable future actions on fire and fuels in the analysis area would be a gradual improvement of forest conditions through updated land management planning and partnerships, fuels treatment, and forest restoration projects. Examples of these actions are the BLM Vernal Field Office resource management plan; the Daggett, Uintah, and Duchesne Counties general plans; the Utah and Forest Service Shared Stewardship Agreement; the West Northwest D1 Wildlife Habitat Improvement Project; and Iron Mountain Juniper Fuels Treatment.

All action alternatives would contribute to these improvements through a minimum acreage of vegetation treatments, both within and outside of HVRAs, and increased management of unplanned ignitions. Without specific direction regarding treatments and the increased use of unplanned ignitions for resource benefits, alternative A would lead to slower improvement of forest conditions, which would not be sufficient to reverse the trend of fire regime departure and fuel loading over the long term, as described above.

## **Carbon Storage and Sequestration**

### **Introduction**

Forests provide a key ecosystem service in the form of carbon sequestration—the uptake and storage of carbon—which helps regulate climate by modulating greenhouse gas concentrations in the atmosphere

(Deal et al. 2017; EPA 2018). Maintaining healthy, productive, native vegetation reduces carbon dioxide, a greenhouse gas that plays a major role in climate change (Forest Service 2016a).

Carbon in forests comes from carbon dioxide in the atmosphere. Through the process of photosynthesis, growing plants remove carbon dioxide from the atmosphere and store it in plant stems, branches, foliage, and roots, with much of this organic material eventually stored in forest soils (Dugan et al. 2020). Carbon is also stored in dead plant materials, including coarse woody debris and litter, and in harvested wood products (Forest Service 2015a). These different sources of carbon storage are known as carbon pools, while the amount of carbon stored in each pool is the carbon stock.

The amount of carbon that can be sequestered depends on many factors, including the type of vegetation community, parent materials, soils, and climate. Forested areas can store more carbon than non-forested areas, and meadows and healthy rangelands can store more carbon than arid shrubland and desert plant communities (Reeves et al. 2016). Soil carbon is a significant source of carbon storage, representing over 50 percent of the total carbon stored in forest systems in the U.S. (Forest Service 2020a).

Ecosystems are dynamic systems that store and release carbon, with carbon being released back to the atmosphere by respiration and decomposition processes or by disturbances such as land use changes, insect infestation, or fire. An area is called a carbon sink if it accumulates more carbon in plant biomass than the rate of releasing carbon dioxide; conversely, an area is a carbon source if it releases more carbon than the rate of carbon fixation into plant biomass (Forest Service 2015a). Forests store large amounts of carbon in their live and dead wood and soil, and are an important carbon sink, removing more carbon from the atmosphere than they are emitting. Thus, forests play an active role in controlling the concentration of carbon dioxide in the atmosphere (Pan et al. 2011).

This section describes the existing conditions of carbon stocks in the Ashley National Forest and analyzes the potential effects that the forest plan and alternatives would have on carbon sequestration and storage potential.

### *Regulatory Framework*

There are no regulatory requirements or established thresholds concerning management of forest carbon or greenhouse gas emissions; however, the 2012 Planning Rule and regulations require an assessment of baseline carbon stocks and a consideration of this information in management of the national forests (Forest Service Handbook 1909.12.4). The Forest Service recognizes the importance of managing forests and grasslands for their carbon storage potential to assist in regulating climate.

### *Analysis Area*

The importance of the carbon storage capacity of the world's forests is tied to their role in the removal and storage of carbon from the atmosphere at a global scale. The influence and contribution of the Ashley National Forest to global carbon sequestration and storage is extremely small relative to the role the world's forests play in lessening the effects of climate change; therefore, a meaningful analysis at the global scale is not practical.

Because the Forest Service has identified carbon sequestration as a key ecosystem service in regulating climate change, the affected environment provides information at a national, regional (Intermountain Region), and national forest scale. The national and regional information provides context for carbon sequestration in the Ashley National Forest. The temporal scale for analyzing carbon sequestration and storage is the life of the forest plan.

### *Notable Changes Between the Draft and Final EIS*

The Forest Service made changes between the draft and final EIS to reflect the impacts from the alternative B modified direction, and to provide more information on carbon stocks in non-forested vegetation, particularly soil carbon in rangelands.

## **Description of Affected Environment**

### *Forest Carbon Stocks and Trends*

The forest carbon cycle starts with the sequestration and accumulation of atmospheric carbon, which is stored in different pools in the forest ecosystem: aboveground biomass (leaves, trunks, and limbs), belowground biomass (roots), deadwood, litter (fallen leaves and stems), and soils. As trees or parts of trees die, the carbon cycles through these different pools, from the living biomass pools to the deadwood, litter, and soil pools. The cycle continues as carbon flows out of the forest ecosystem and returns to the atmosphere through several processes, including respiration, combustion, and decomposition. Carbon also leaves the forest ecosystem through timber harvests, by which it enters the product pool. This carbon is stored in harvested wood products while the products are in use but eventually returns to the atmosphere upon the wood products' disposal and eventual decomposition (Hoover and Riddle 2020).

The amount of carbon sequestered in a forest relative to the amount of carbon that forest releases into the atmosphere is constantly changing, driven in large part by human and ecological disturbances. Human disturbances are activities such as timber harvests or human-caused fires, while ecological disturbances include insect and disease infestations, wildfires, and weather, such as drought. Disturbances generally result in tree death, causing the transfer of carbon from the living pools to the deadwood, litter, soil, and product pools or directly to the atmosphere, as in the case of fire. If a disturbed site regenerates as forest, the carbon releases caused by the disturbance generally are offset over time. If the site changes to a different land use (such as to agriculture or urban development), the carbon releases may not be offset (Hoover and Riddle 2020).

### **National Carbon Storage and Trends**

The Ashley National Forest contains about 1.4 million acres or 0.7 percent of the 190 million acres of National Forest System lands in the U.S. The National Forest System constitutes approximately one-fifth of the total forest land area and contains one-fourth of the total carbon stored in all U.S. forests, excluding interior Alaska (Forest Service 2015a). U.S. forests have been a strong net carbon sink since at least 1990, absorbing more carbon than they emit annually. In 2018, U.S. forests sequestered 211 million metric tons of carbon, offsetting approximately 12 percent of the gross annual greenhouse gases emitted in the U.S. that year (EPA 2020c).

The U.S. EPA measures total forest carbon (carbon stored in forests under public and private ownership) using data collected by the Forest Service's forest inventory and analysis program and reports the data in its annual inventory of greenhouse gas emissions and sinks. According to the most recent inventory, U.S. forest carbon stocks, including forest ecosystems and harvested wood products, contained 58.7 billion metric tons of carbon in 2019. Most carbon was stored in soils (54 percent) and aboveground biomass (26 percent). U.S. forest carbon stocks increased nearly 10 percent between 1990 and 2019, with every year experiencing a net increase (EPA 2020c; Forest Service 2020b).

The amount of carbon sequestration and storage is not uniform across the U.S. The carbon stock inventory divides the country into four regions: North, South, Rocky Mountain, and Pacific Coast (which includes Alaska). The Rocky Mountain region, which includes the Forest Service's Intermountain Region, has lower carbon stocks than other regions of the U.S. (EPA 2020c).



Trends in sequestration and storage are described in the update to the Forest Service 2010 Resources Planning Act Assessment (Forest Service 2016b). At the national level, forest carbon stocks increased between 1990 and 2015, increasing at a rate of approximate 0.23 percent per year between 2010 and 2015. The rate of change reflects both the annual accumulation of new forested area and growth of existing forests, with the latter accounting for most of the increase.

The Rocky Mountain region was the only region where net sequestration of forestlands declined between 1990 and 2015, likely reflecting lower growth rates in aging forests (the dominant age class is over 100 years on both public and private lands) and disturbances, particularly wildfire, during that period. The Forest Service predicts increases in national carbon sequestration rates through 2025, followed by an overall decline in rates through 2060. The largest decline is predicted in the Rocky Mountain region, where timber harvesting and growth rates are the lowest and stand aging and disturbance govern forest change (Forest Service 2016b).

### **Regional Carbon Storage and Trends**

The Intermountain Region is spread across six states and includes approximately 22.6 million acres classified as forest land. The Forest Service estimated the baseline of carbon stocks in forests and harvested wood products for each region. The Intermountain Region (Forest Service 2015a) reported that total forest ecosystem carbon increased between 2005 and 2013, from 1,069 teragrams (Tg)<sup>8</sup> to 1,084 Tg (Forest Service 2015a). During this period, the Ashley National Forest generally increased in total forest ecosystem carbon, consistent with regional trends.

The amount of carbon stored in the understory, standing dead, down dead, forest floor, and soil organic carbon pools increased between 2005 and 2013, while carbon stored in aboveground and belowground pools decreased. Most of the carbon was concentrated in the aboveground, forest floor, and soil organic carbon pools (Forest Service 2015a). Although total forest ecosystem carbon in the region increased, carbon density (carbon stocks per acre) decreased slightly (Forest Service 2015a).

Carbon stored in harvested wood products contributes to the total forest carbon stocks. In the Intermountain Region, harvested wood product carbon stocks represented roughly 0.82 percent of total forest carbon in 2012 (Forest Service 2015a). The cumulative carbon stored in harvested wood products in the region accelerated around 1955 and increased until 2000, peaking at 9.5 Tg in storage. Since 2000, carbon stocks have been in a slow decline, and by 2013 the pool had fallen to approximately 9 Tg (Forest Service 2015a). The net sequestration rate of carbon in the Intermountain Region, including both the forest ecosystem and harvested wood products, was estimated at 1.91 Tg carbon/year for the baseline period, from 2005 to 2013 (Forest Service 2015a).

Birdsey et al. (2019) built off the baseline estimates of carbon stocks prepared for each Forest Service region, incorporating more detailed disturbance, climate, and atmospheric histories of each national forest and incorporating data from two additional forest carbon models. According to their report, national forests in the Intermountain Region had a very low rate of increase in carbon stocks between 1990 and 2011.

The main factors affecting carbon stocks have been fire and insects, with harvesting and climate and atmospheric changes having a lesser effect. From 1990 through 2011, fires significantly affected carbon storage in the region, reducing non-soil carbon stocks by about 1.9 percent. Severe bark beetle outbreaks

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<sup>8</sup>1 Tg is equal to a million metric tons. The units used in this section reflect the units in which carbon is reported in the source documents.

resulted in extensive tree death in parts of the region, contributing to a reduction in non-soil carbon stocks from insects of about 1.8 percent. Annual timber output declined in the early 1990s and has remained low.

A potential general trend for carbon stocks in the Intermountain Region is provided by the Rocky Mountain Research Station assessment. Climate, mainly increasing temperatures, has caused a decline of forest carbon since about 2000. In addition, about half of the forests are greater than 100 years old and undergoing declines in productivity and carbon accumulation. Increasing levels of carbon dioxide and nitrogen deposition have caused forests to accumulate more carbon and helped to counteract the declines from disturbances and stand aging. Accounting for all effects, however, the analysis indicates that the national forests in the region may already be switching from a carbon sink to a carbon source (Birdsey et al. 2019).

### **Ashley National Forest Carbon Storage and Trends**

The Ashley National Forest spans approximately 1.4 million acres of diverse geography in northeastern Utah and southwestern Wyoming. Approximately 1.02 million acres (over 70 percent) of the Ashley National Forest is forest land (Dugan et al. 2020). According to the baseline estimates of carbon stocks in the Intermountain Region (Forest Service 2015a), carbon stocks in the Ashley National Forest increased from 43.5 Tg in 1990 to 48.9 Tg in 2013, a 12 percent increase over this period. Despite some uncertainty in annual carbon stock estimates, there is a high degree of certainty that carbon stocks in the Ashley National Forest are relatively stable and not an obvious sink or source (Forest Service 2015a).

Based on a 2020 report, about 29 percent of forest carbon stocks are stored in the aboveground portion of live trees, which includes all live woody vegetation at least 1 inch in diameter. The forest floor and soil carbon stored in organic material to a depth of 3 feet (excluding roots) store a combined 51 percent of total carbon stocks (Dugan et al. 2020). While there is uncertainty in some of these values, notably a potential underestimation of carbon in soils, this breakdown provides an overall picture of how carbon is stored on the forested lands.

In the most recent carbon assessment for the Ashley National Forest, Dugan et al. (2020) synthesize carbon storage and disturbance trends. As described in the summary for their report, forest carbon stocks increased between 1990 and 2013, and negative impacts on carbon stocks caused by disturbances and environmental conditions have been exceeded by forest growth. According to satellite imagery, insects have been the most prevalent disturbance detected on the Forest since 1990. Insect epidemics from 1990 to 2011 have been severe, affecting 19.9 percent of the Forest and resulting in 5.0 megagrams<sup>9</sup> per hectare<sup>10</sup> of non-soil carbon loss (Dugan et al. 2020).

Past use of the Ashley National Forest for commercial timber, along with fire suppression policies and human-caused wildfires, have altered forest stands in the Forest. Stands are now mostly middle to older aged, with 73.5 percent of stands greater than 80 years old (based on 2011 data; Dugan et al. 2020). The rate of carbon uptake and sequestration generally declines as forests age. Accordingly, projections indicate a potential age-related decline in forest carbon stocks in the Ashley National Forest beginning in the 2020s; this potential decline mirrors expected trends in private and public forests in the Intermountain, Rocky Mountain, Northern, and Southwest Forest Service Regions (Dugan et al. 2020).

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<sup>9</sup>1 megagram is equal to one metric ton. The units used in this section reflect the units in which carbon is reported in the source documents.

<sup>10</sup>1 hectare equals about 2.5 acres.

Stand age distribution in the Ashley National Forest has been altered by insect infestations. Since 2011, spruce beetle infestations have resulted in a 3 to 8 percent shift from older to younger tree age classes, and more stands are expected to shift as the spruce beetle epidemic continues.<sup>11</sup>

Climate and environmental factors, including elevated atmospheric carbon dioxide and nitrogen deposition, have also influenced carbon accumulation in the Ashley National Forest. The effects of future climate conditions are complex and remain uncertain. Climate change has resulted in warmer temperatures and precipitation variability in the Intermountain Region, and these trends will continue to stress forests, with potentially negative effects on carbon stocks.

Although some forest stands may expand from a prolonged growing season, greater precipitation, and elevated atmospheric carbon dioxide concentrations, in general the stressors of drought, pathogens and insects, and increased wildfires would result in net detrimental effects across the forest and woodland communities. In addition, the increased atmospheric carbon dioxide and nitrogen deposition on forest stands does not appear to offset the loss of carbon due to climate and the disturbance and aging of forest stands. Because public lands do not have the same pressures of land use conversion that occur on private lands, forested areas in the Ashley National Forest will be maintained as forest in the foreseeable future. This will allow for a continuation of carbon uptake and storage over the long term (Dugan et al. 2020).

#### Carbon Stocks in Soils and Non-Forest Vegetation

Carbon stocks in soils are mainly organic carbon and are derived from living and dead carbon-based materials that form the soil organic matter, including vegetation, roots, bacteria, fungi, and arthropods. Glomalin, a glycoprotein produced by fungi adds to the soil organic matter and organic carbon pool (Forest Service 2018b; Nautiyal et al. 2019). About 58 percent of soil organic matter is soil organic carbon.

Soils vary in how much organic carbon they can store and at what depths their carbon is stored. Variables depend on the soil parent material, the soil texture and clay content, soil physical and chemical properties, the climate, microorganisms in the soil, and the type of vegetation. The organic carbon within soils is the largest pool of terrestrial carbon in the Intermountain Region. Globally, soil organic carbon contains more than three times as much carbon as the combined carbon from the atmosphere and terrestrial vegetation (Forest Service 2018b).

Soils can store and release carbon at the same time and act as a net sink or source of carbon. The carbon stocks in soils are influenced strongly by climate and vegetation. Soils have the potential to sequester additional carbon if temperatures decrease and moisture increases. Conversely, soils may lose carbon stocks and become a net source of carbon because of increased biological activity and respiration rates if temperatures warm without additional moisture, or under drought conditions. Most soils in the Intermountain Region currently hold their maximum soil organic carbon for the existing climate. Generally, soils in hotter, drier areas contain a near-surface soil organic carbon content (by mass) of 0.5 percent, and in cooler, moister areas they contain a near-surface soil organic carbon of 8 percent (Reeves et al. 2016). Shifts in non-forested vegetation communities may affect the amount and depth where most soil carbon is stored.

Soil organic carbon may be the best indicator of soil quality and resilience to disturbance. The soil organic carbon supports many soil processes and functions. These include providing nutrients to plants, binding

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<sup>11</sup>Colette Webb, Ashley National Forest, personal communication via email with Amy Cordle, EMPSi, on May 13, 2020, regarding stand age distribution changes due to spruce beetle infestation.

soil aggregates together and forming soil structure, providing energy for microbes, and increasing water infiltration and retention (Forest Service 2018b; Herrick and Wander 1997).

Rangelands are generally important carbon sink areas, with potential to mitigate greenhouse gases in some climatic conditions. The carbon stored in rangelands is stored mainly within the soil resources, estimated to represent 90 percent of the total carbon stocks in range ecosystems (McDermont and Elavarthi 2014). The status of carbon stocks, soil conditions, and rangeland vegetation are interrelated. Maintaining productive rangeland vegetation is critical to carbon stocks. The vegetation is a small carbon stock, and it provides organic matter and organic carbon to the soil surface within plant litter. Plant roots provide soil stability and input additional carbon into the soil. Soils can retain existing carbon stocks and slowly sequester carbon if they have continual additions of organic materials that counter the carbon lost from decomposition. The organic matter and organic carbon content in soils are important to many soil properties that support productive vegetation, including aggregating soil and holding soil structure, providing sites of nutrient exchange, and increasing the soil water-holding capacity.

Climatic factors may limit the potential of rangelands to store carbon in the future, particularly in drier rangeland areas (McDermot and Elavarthi 2014). Higher and fluctuating temperatures and an increase in drought cycles result in degraded range vegetation with a corresponding loss of carbon stored in vegetation and reduced additions of organic matter and carbon to soils. As soil organic additions lessen, the soil structure declines and decomposition rates increase, releasing carbon back to the atmosphere. Higher temperatures also increase soil microbial activity, which adds to the rate of decomposition and loss of carbon (McDermot and Elavarthi 2014).

Invasive species such as including cheatgrass, degrade the soil condition and alter soils' physical, chemical, and biological properties. Invasive species provide less organic matter and carbon to soils from leaf litter or root exudates, and they often have shallow roots that provide less soil stability. Soils can become carbon sources when invasive species are dominant. Range management can work to maintain carbon stocks by supporting productive vegetation that competes with invasive species and by protecting the soil structure and organic matter.

Aboveground carbon stored in shrubs has been measured for all of the non-forested lands in the Intermountain Region using vegetation structure, composition, height, and type data. Carbon density of shrubs is highly varied in the region, with the average across three heights ranging from 1.19 to 12.45 megagrams per hectare. The differences in shrub carbon stocks are expected to be related to the diversity of shrub heights and species in the region (Reeves et al. 2016). Standing carbon density of shrubs in the Ashley National Forest ranges from 3.60 to 4.80 megagrams per hectare. Based on a modeled area of 125,121 hectares (309,180 acres), the standing carbon in non-forested vegetation in the Ashley National Forest is between 0.45 and 0.6 Tg (Reeves et al. 2016).

## Environmental Consequences for Carbon Storage and Sequestration

### *Methodology and Analysis Process*

The spatial scale of analysis for assessing potential impacts on carbon storage and sequestration corresponds to the forested areas of the Ashley National Forest. A qualitative approach was used to analyze the short-term and long-term impacts of forest management actions on carbon storage and sequestration. This analysis draws on the quantitative analysis of the impacts of past management on forest carbon stocks, as described in the affected environment, and potential future changes in forest management. The analysis compares the estimated acres that would be treated annually for fuels and

vegetation management and the acres available for timber harvest and production to assess potential short-term changes in carbon stocks resulting from proposed management actions by alternative.

The analysis also evaluates the effects of forest management on carbon storage and sequestration over the long term. Cumulative effects consider potential changes in future carbon stocks from past and proposed management actions, together with reasonably foreseeable actions that would affect forested areas in the Ashley National Forest. Because both forest management actions and natural and human disturbances affect net carbon stores, this analysis also considers natural and human-caused influences on carbon storage and sequestration based on past and projected trends. Analysis assumptions and uncertainties are described below.

### *Analysis Assumptions*

Analysis assumptions for carbon storage and sequestration are provided below.

- In a global atmospheric context, management levels described by the plan alternatives would have a negligible impact on national and global carbon emissions and carbon stocks.
- Carbon storage in soil and non-forest vegetation is an important component of carbon stores; nevertheless, the analysis focuses on forest vegetation due to the greater potential for change in carbon storage of forested areas from proposed management actions and because over 70 percent of the Ashley National Forest is forest land (Dugan et al. 2020).
- Carbon stocks on national forests are cyclical; carbon losses are from timber harvest and production, forest treatments, insect infestations and wildland fire; carbon gains are from regeneration and growth.
- It is difficult to quantify potential carbon consequences of management alternatives in the future due to potential variability in future conditions and the unknown nature and extent of future natural disturbances, such as insect infestations, wildfires, and drought, and human-caused disturbances such as fires. Small differences in carbon impacts among management alternatives, coupled with high uncertainty in carbon stock estimates, make the detection of statistically meaningful differences among alternatives unlikely.

### *Indicators*

Analysis indicators for carbon sequestration and storage are as follows:

- Acres of annual forested vegetation management treatments
- Acres available for fuels management treatments
- Forested acres available for timber harvest and production
- Outcome of treatments and timber harvest and production on carbon storage and sequestration over the long term
- Outcome of other natural and human-caused influences on carbon storage and sequestration over the long term

### *Environmental Consequences for Carbon Sequestration and Storage—Alternative A*

The 1986 forest plan contains limited direction for vegetation management to improve ecological sustainability and no plan component related to carbon storage or sequestration. There are no quantitative prescriptions for vegetation treatments, though these treatments would continue to occur. Timber production and harvest would be managed consistent with current guidelines and regulations; 528,000

acres are considered suitable for timber production under the 1986 plan, though due to policy changes and other considerations, the area managed for timber production is significantly less (see “Timber”).

Removal of forest vegetation for vegetation and fuels management and timber harvest and production would reduce carbon stocks in the short term; carbon would continue to be stored in timber that is harvested for use as wood products.

While the existing plan does not explicitly direct the movement of forest vegetation communities toward desired conditions, individual vegetation and fuels management actions and timber harvest would continue, improving stand health and resiliency in limited areas; however, without forestwide direction specific to vegetation type, forest vegetation would likely continue to trend toward higher departure across all forest cover types (see “Terrestrial Vegetation”). Trends in disturbance-related conditions, primarily related to insect infestation, would continue to affect forest ecosystems, making them more susceptible to fire and release of stored carbon through decay or combustion over the long term.

#### *Environmental Consequences for Carbon Sequestration and Storage Common to All Action Alternatives*

All of the alternatives would manage forest vegetation to improve ecological sustainability and move forest vegetation communities toward desired conditions. While the approaches may differ, as represented by the differing objectives for forest, fire and fuels, and timber management under each alternative, all alternatives would seek to move forest vegetation toward conditions that represent a more natural disturbance regime. This would result in more resilient forest ecosystems. Increasing forest resistance and resiliency to insect infestations, fire, drought, and disease slows the release of carbon and retains larger portions in forest carbon pools; carbon typically accumulates in forests and forest soils for decades to centuries until a disturbance releases this stored carbon into the atmosphere (Goward et al. 2008).

The revised plan alternatives all recognize the role of carbon storage and sequestration, establishing a desired condition to maintain carbon stocks by promoting forest stand health and the regeneration of forest stands and by retaining the net acreage of forested communities. As described in the revised forest plan, terrestrial ecosystems contain nearly three times the amount of carbon as the atmosphere and remove more carbon from the atmosphere than they emit; this helps regulate climate by modulating greenhouse gas concentrations in the atmosphere (Deal et al. 2017; EPA 2018). The revised plan alternatives provide more clarity and stronger integration of ecological concepts, such as managing forests to enhance ecosystem services, including climate regulation, than the 1986 plan. This stronger emphasis would promote management actions that indirectly maintain or improve carbon stocks over the long term to a greater extent than under the 1986 plan.

Under all of the revised plan alternatives, vegetation and fuels management treatments would reduce carbon stocks in the short term by removing forest vegetation. Examples of treatments for different forest cover types are as follows: uneven-aged harvest, even-aged regeneration, thinning, sanitation or salvage, and pre-commercial thinning. All of these treatments would remove biomass mechanically; prescribed fire and managing naturally ignited fires to meet Forest Service objectives would remove biomass through combustion. Products that are not burned immediately would continue to provide carbon storage off-forest for the life of their use, while biomass that is combusted would release its carbon directly to the atmosphere.

The short-term reduction in carbon from these forest management actions would be small relative to the overall carbon stocks on the Ashley National Forest and to carbon losses that could occur from natural disturbances, such as wildfires or insects and pathogens.

Vegetation and fuels management actions would increase carbon stocks over the long term by the following means:

- Increasing the uptake of carbon dioxide through regeneration and new growth and storage in forest vegetation
- Improving stand health, which decreases carbon loss from mortality and decomposition, as result of insects and pathogens and the stress of climate change
- Reducing wildfire risk, which reduces acres burned from wildfire

As shown in the literature, thinning reduces carbon in the short term, but there may be no discernible difference in thinned versus unthinned stands in total aboveground carbon stores several decades after thinning. This is due to the larger trees and to differences in understory and woody material (Schaedel et al. 2017). Managing for younger stands promotes relatively high rates of carbon uptake over time as forests regrow compared with older stands (Pregitzer and Euskirchen 2004).

Decreasing forest densities and fuel conditions to reduce the risk of large, stand-replacing disturbances from insects, disease, and fires can lower the risk for greater carbon stock losses and emissions in the future (Wiedinmyer and Hurteau 2010). A lower severity of wildfire may occur in the treated stands, resulting in less consumption of live and dead tree biomass, higher tree survival, and shortened recovery times (Hurteau et al. 2008; North and Hurteau 2011; Reinhardt and Holsinger 2010; Wiedinmyer and Hurteau 2010). Research demonstrates that treatments in vegetation types that historically supported frequent surface fires increase the likelihood of maintaining a net carbon sink into the future (Finkral and Evans 2008; Hurteau et al. 2016; Hurteau 2017).

#### *Environmental Consequences for Carbon Sequestration and Storage—Alternative B Modified*

Under alternative B modified, an average of 2,400 acres would receive forest vegetation management treatments annually in the first decade and 2,100 acres in the second decade. Treatments would occur in areas where timber harvest is allowed. Timber harvest and thinning would reduce carbon stocks in the short term, while plantings would contribute to increases in carbon stocks. As described under “Environmental Consequences for Carbon Sequestration and Storage Common to All Action Alternatives,” forest vegetation management treatments would increase carbon stocks through growth and regeneration, improved stand health, and reduced wildfire risk in treated areas.

The Forest Service would use wildland fire and other vegetation treatments to move toward or to maintain vegetation conditions on 6,600 to 32,000 acres per year. This includes managing naturally ignited fires on 10 percent of the ignitions every 10 years. Approximately one-quarter to one-half of the treated acres would likely be treated through the use of prescribed fire or wildland fire. Wildland fire and prescribed fire would reduce carbon stocks in the short term through combustion, but it would increase carbon stocks over the long term. This would come from stand regeneration, growth of new trees, and a reduction in fire severity and the number of acres burned in treated areas.

Timber harvest and production would be another source of forest carbon loss: 109,800 acres would be suitable for timber production; 3,806 hundred cubic feet (CCF) of timber would meet product utilization standards; and 3,806 CCF of wood product (fuelwood, biomass, and other volumes) would be offered for sale annually.

Harvested wood products that are not combusted would continue to provide carbon storage off-forest for the life of their use. While timber harvest and production would reduce carbon stocks in the short term,

these actions would contribute to a carbon gain over the long term from regeneration and improved stand health. Fewer areas would be suitable for timber production than under alternative A.

The combination of vegetation and fuels management would move forest vegetation cover types toward conditions that represent a more natural disturbance regime, increasing forest resistance and resilience to stressors over the long term. Compared with alternative A, forest management under alternative B modified would slow the release of carbon and maintain or increase carbon stocks over the long term.

#### *Environmental Consequences for Carbon Sequestration and Storage—Alternative C*

Under alternative C, short-term carbon losses would be slightly less than described under alternative B modified. Forest vegetation management treatments would treat 1,000 acres annually in the first decade and 800 acres annually in the second decade in areas where timber harvest is allowed. While less carbon would be removed in the short term, long-term improvements in carbon stocks would be less than described under alternative B modified; this is because fewer areas would be treated.

The Forest Service would use wildland fire and other vegetation treatments to improve or maintain desired vegetation conditions on the same number of acres per year as under alternative B modified; however, with a focus on passive vegetation management, it would manage naturally ignited fires more often (at least 20 percent of the ignitions every 10 years). Approximately one-quarter to one-half of the treated acres would likely be treated through the use of prescribed fire or wildland fire. Short- and long-term effects would be similar to those described under alternative B modified.

Carbon loss from timber harvest and production would be less than under alternative B modified, with half the acres (80,500 acres) suitable for timber production and a third less timber and wood products available for sale (2,822 CCF for each category). Short-term and long-term effects would be less than those described for alternative B modified. Fewer areas would be suitable for timber production than under alternative A.

The combination of vegetation and fuels management actions would move forest vegetation cover types toward desired conditions in treated areas more than under alternative A; however, with an emphasis on passive vegetation management, alternative C might be less effective in trending vegetation types toward the natural range of variation and improving ecosystem resilience at large scales compared with alternative B modified. This would make alternative C less likely than alternative B modified to achieve the long-term benefits of vegetation and fuels management on carbon storage and sequestration described under “Environmental Consequences for Carbon Sequestration and Storage Common to All Action Alternatives” section.

#### *Environmental Consequences for Carbon Sequestration and Storage—Alternative D*

Under alternative D, short-term carbon losses would be similar to those under alternative B modified. Forest vegetation management would treat 2,500 acres annually in the first decade and 2,200 acres annually in the second decade in areas where timber harvest is allowed; prescribed burning would be used on a similar 884 acres annually. Long-term improvements in carbon storage and sequestration would be similar to those under alternative B modified.

The Forest Service would use wildland fire and other vegetation treatments to improve or maintain desired vegetation conditions on 10,000 to 40,000 acres per year; it would manage naturally ignited fires on at least 5 percent of the ignitions every 10 years. Approximately one-quarter to one-half of the treated acres would likely be treated through the use of prescribed fire or wildland fire. Short-term loss of carbon would be greater than described for alternative B modified because potentially more areas would be



treated. Over the long term, alternative D would reduce the extent and severity of wildland fires in treated vegetation communities more than under alternative B modified because more areas would be treated. This would reduce carbon loss from fire over the long term more than under alternative B modified.

Carbon loss from timber production would be similar to that under alternative B modified, with slightly more acres suitable for timber production (114,300 acres) and just slightly more timber and wood product available for sale (3,956 CCF for each category). Short- and long-term effects would be similar to those described under alternative B modified.

Overall long-term impacts from the combination of vegetation and fuels management actions would be similar to alternative B modified.

### Cumulative Environmental Consequences for Carbon Sequestration and Storage

Past and present management actions and natural events have affected carbon storage and sequestration in the analysis area by altering the condition of vegetation and natural fire regimes. The main factors affecting carbon stocks have been insects and fire (Forest Service 2015a; Dugan et al. 2020) and aging conditions that have reduced productivity and carbon accumulation (Dugan et al. 2020). Increasing levels of carbon dioxide and nitrogen deposition have helped to counteract declines from disturbances and aging (Birdsey et al. 2019).

Carbon stocks in the Ashley National Forest increased by about 12 percent between 1990 and 2013, with forest growth exceeding the negative effects from disturbances and environmental conditions (Dugan et al. 2020). Projected trends indicate that national forests in the region have the potential to shift from being a carbon sink to a carbon source (Birdsey et al. 2019). While some forest stands may expand from a prolonged growing season, greater precipitation, and elevated atmospheric carbon dioxide concentrations, in general the stressors of drought, pathogens and insects, and increased wildfires would result in net detrimental effects across the forest and woodland communities (Dugan et al. 2020).

The cumulative effect of the forest plan alternatives and reasonably foreseeable future actions would be a gradual improvement of forest conditions over the life of the plan, helping to counteract the projected trends in stressors that affect carbon storage. Examples of these actions in the near term are the Ashley National Forest Aspen Restoration Project, Little Pond Forest Restoration Project, South Slope Fuel Reduction Project, and the Forest-Wide Prescribed Fire Restoration Project, all of which would improve stand conditions or reduce the potential for wildfire. Similar projects would occur over the life of the plan under all alternatives.

Sustainable management practices and the promotion of healthy, resilient forest ecosystems would increase the ability of the Ashley National Forest to provide long-term carbon storage and sequestration. In addition, forest lands would not be converted to other land uses, and long-term forest services and benefits would be maintained.

The increased risk of uncharacteristic fires, insects, and diseases from warming climatic conditions would continue to be an area of vulnerability to forest resilience and associated carbon sequestration and storage capacity. The net effects have a high degree of uncertainty because of the uncertain magnitude of future climate change and the complex interactions of forests with disturbances, climate, and ecological processes.

## Terrestrial and Aquatic Wildlife and Plants

### Introduction

Wildlife and plants are highly valued by the public for both consumptive and nonconsumptive use. Many species have healthy populations in the Ashley National Forest, because of good health and diversity of current habitat conditions. With an ever-increasing human population leading to more national forest users, the demand for wildlife opportunities continue to grow. This growth comes with the potential for habitat disturbance, as well as potential impacts on wildlife. As such, there is an opportunity for the Forest Service to be aware of these potential disturbances and to manage them to minimize negative impacts on this popular resource in the Ashley National Forest.

### *Regulatory Framework*

Species and habitats are managed in conjunction with other resources according to the Multiple-Use Sustained-Yield Act of 1960 (Public Law 86-517). For federally endangered and threatened species in the Ashley National Forest, habitat management and compatible multiple uses are determined in accordance with section 7 of the Endangered Species Act (ESA), as amended (Public Law 93-205). For SCC, habitat management and compatible multiple uses will be accomplished to ensure that those species persist in the Ashley National Forest, in accordance with the 2012 Planning Rule.

Under the 1986 forest plan, rare wildlife, aquatic, and plant species are managed as sensitive species. The regional forester identifies these as plant and animal species for which population persistence is a concern. The Forest Service sensitive species concept is not carried forward as part of the 2012 Planning Rule. In accordance with the 2012 Planning Rule, the regional forester has identified a list of SCC for the plan area. SCC are those native to, and known to occur in, the plan area and for which there is substantial concern about the species' ability to persist in the plan area. Maintaining these species that are vulnerable to decline in the Ashley National Forest will maintain forest diversity and thus will comply with the National Forest Management Act diversity requirement.

During the evaluation of species that the forest supervisor would recommend to the regional forester as SCC, the Forest Service, in part, considered species on the Intermountain Region regional forester's sensitive species lists for the Ashley National Forest. Some sensitive species were carried forward as SCC, but others did not meet the criteria during evaluation. Appendices C & D provide a list of those species that were recommended as SCC for the Ashley National Forest, as well as the current habitat conditions, trends, risk factors for those species, and a list of associated plan components that provide for the persistence of each at-risk species. Appendix C does not include wolverine or the Eureka mountainsnail because the wolverine was not a federally proposed species at the time appendix C was developed and the Eureka mountainsnail was added as an SCC after appendix C was completed. Appendix D contains all at-risk species.

Plant and animal species depend highly on the function of ecosystems with specific conditions, which create areas favorable for particular species. Important drivers of biodiversity loss and ecosystem service changes are habitat changes, long-term trends in climate, invasive species, and overexploitation. The revised forest plan addresses species' persistence by providing guidance to maintain or enhance habitat elements that are important for species found in the Ashley National Forest. The plan also addresses threats specific to habitat and provides guidance for species-specific threats. Guidance includes adopting a complementary ecosystem or coarse-filter and species-specific or fine-filter approach to maintaining species diversity. The coarse-filter approach aims to maintain or restore ecological conditions and functions similar to those under which native species evolved to prevent losses of biological diversity and maintain habitats for most species in an area. The fine-filter approach recognizes that, for some species,

ecological conditions or additional specific habitat features (key ecosystem characteristics) may be required, the reference condition is not achievable, or there are risks to the species' persistence not related to habitat; these factors may not be addressed by the coarse-filter approach.

In addition to the above, the following documents provide specific guidance for fish and wildlife:

- EO 13186, Responsibility of Federal Agencies to Protect Migratory Birds.
- Migratory Bird Treaty Act of 1918;
- Sikes Act of 1960;
- 3150.2 State and Private Forestry, Rural Community Fire Protection Program, Objectives;
- CFR 241.2 Parks, Forests, and Public Property, Fish and Wildlife, Cooperation in Wildlife Management.
- FSM 2670–2671 Wildlife, Fish, and Sensitive Plant Habitat Management, Chapter 70, Threatened, Endangered, and Sensitive Plants and Animals, Cooperation;
- FSM 2671.45 C & F 2671 Wildlife, Fish, and Sensitive Plant Habitat Management, Interim Directives;
- FSM 3110.2 State and Private Forestry, Cooperative Forest Fire Prevention, Objectives.
- 1982 Rule Provisions, Sections 219.13–219.26;
- Avian Power Line Interaction Committee (APLIC) Guidelines;
- U.S. Fish and Wildlife Service National Bald Eagle Management Guidelines (2007);
- Forest Service, U.S. Department of Agriculture, U.S. Department of the Interior, Bureau of Land Management, and Association of Fish and Wildlife Agencies Policies and Guidelines for Fish and Wildlife Management in National Forest and Bureau of Land Management Wilderness (2006).

The following documents provide guidance on management for invasive species: Executive Order 13112, Wetlands Management.

- Federal Noxious Weed Act of 1974, P.L. 93–629, as amended;
- FSM 2080.5, Noxious Weed Management;
- FSM 2150, Pesticide-Use Management and Coordination;
- FSM 2900, Invasive Species Management
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1947;
- National Strategy and Implementation Plan for invasive Species Management, FS-805 (2004);
- U.S. Forest Service Invasive Species Program website:  
<http://www.fs.fed.us/invasivespecies/index.shtml>.

### *Analysis Area*

The analysis area is the Ashley National Forest, which lies within the Duchesne and Upper Green River 4th-order hydrologic units. The Forest Service also considered species distributions in areas adjacent to the Ashley National Forest, as well as regional and global distributions of species. The Forest Service relates species distribution to Ashley National Forest vegetation types to better understand and define the relationship between species and their habitat needs.

### *Notable Changes Between Draft and Final EIS*

The affected environment was updated based on input from public comments, including information on big game and bighorn sheep. Analysis of alternative B was updated to reflect changes in alternative B modified in the “Environmental Consequences for Wildlife” section. These include analysis of impacts from the removal of recommended wilderness, additions to wildlife guidelines and goals, including the addition of a guideline for occupied sage-grouse habitat, for protection of native bumble bees, and to minimize impacts to migratory birds and wildlife corridors. Changes also include updates to the analysis to reflect updated management direction for Rocky Mountain bighorn sheep. For example, FW-GD-WILDL-09 and FW-GD-WILDL-10 were revised and FW-GO-WILDL-03 was added to further address the potential threat of pathogen transfer from domestic sheep to bighorn sheep.

### Description of Affected Environment

#### *Habitat Descriptions*

Habitats for wildlife and plants can first be described at the landscape or landtype association scale; there are 24 distinct landtype associations in the Ashley National Forest (table 3-31). On a broader level, habitat can be described by vegetation types. The Forest Service evaluated these using landtype associations to describe ecosystem characteristics that span various landscapes in the Ashley National Forest (table 3-31). The Ashley National Forest is composed of the vegetation types described under “Terrestrial Vegetation” (figure 3-11).

**Table 3-31. Landtype Associations in the Ashley National Forest**

<b>Landtype Association</b>	<b>Acres</b>
Alpine Moraine	259,100
Antelope Flats	7,400
Anthro Plateau	108,600
Avintaquin Canyon	82,400
Dry Moraine	9,600
Glacial Bottom	14,000
Glacial Canyons	71,800
Green River	62,400
Greendale Plateau	52,400
Limestone Hills	18,500
Limestone Plateau	7,400
Moenkopi Hills	2,100
North Flank	50,200
Parks Plateau	95,800
Red Canyon	28,500
Round Park	10,500
South Face	46,300
Strawberry Highlands	12,400
Stream Canyon	43,400
Stream Pediment	8,100
Structural Grain	21,500
Trout Slope	142,000
Uinta Bollie	174,600
Wolf Plateau	5,900
<b>Total</b>	<b>1,335,100</b>

Source: Forest Service GIS 2020

Note: The total differs from the sum of landtype associations due to rounding.

Vegetation is one of the primary factors that influences species diversity and abundance; it is one of the more obvious habitat components influenced by management, land use, and natural disturbance. A species' presence or absence in the Ashley National Forest is, in many cases, directly tied to availability, current ecological condition, and key ecosystem characteristics of vegetation types. Therefore, associating particular vegetation types with species or species groups is critical for assessing future management needs. The acres of major vegetation types and the associated general wildlife groups in the Ashley National Forest are shown in table 3-32, below.

**Table 3-32. Habitat Types in the Ashley National Forest**

<b>Vegetation Type</b>	<b>Acres</b>	<b>Percentage of Plan Area</b>	<b>Associated Wildlife Groups</b>
Alpine	168,700	12	Ptarmigans, pikas, elk, moose, deer, mountain goats, bighorn sheep, small mammals, predators, raptors, and migratory birds
Coniferous Forest	621,600	45	Large mammals (including game ungulates), small mammals, predators, old-growth dependent, large-tree dependent, cavity-nesting birds, raptors, and migratory birds
Deciduous Forest	35,300	3	Cavity-nesting birds, songbirds, raptors, game birds, big game, predators, beavers, and small mammals
Desert Shrub	59,900	4	Large mammals (including game ungulates), small mammals, predators, shrubland-associated birds, raptors, and migratory birds
Forb	100	0	Large mammals (including game ungulates), small mammals, predators, shrubland- and grassland-associated birds, raptors, and migratory birds
Grassland	14,600	1	Large mammals (including game ungulates), small mammals, predators, shrubland- and grassland-associated birds, and migratory birds
Mountain Brush	43,000	3	Large mammals (including game ungulates), small mammals, predators, shrubland-associated birds, raptors, and migratory birds
Riparian	33,300	2	Migratory birds, raptors, amphibians, small mammals, beaver, predators, and large mammals (including game ungulates)
Seral Deciduous Forest	116,300	8	Cavity-nesting birds, upland game birds, songbirds, raptors, game birds, big game, predators, beavers, and small mammals
Shrubland	119,100	9	Large mammals (including game ungulates), small mammals, predators, shrubland-associated birds, raptors, and migratory birds
Water/Aquatic	44,700	3	Waterfowl, fish (including native and desirable nonnative trout and non-game fish), aquatic invertebrates, aquatic reptiles, and amphibians
Woodland (Pinyon-Juniper)	120,300	9	Large mammals (including game ungulates), small mammals, predators, cavity-nesting birds, and migratory birds
<b>Total</b>	<b>1,376,700</b>	<b>100</b>	<b>N/A</b>

Source: Forest Service GIS 2020

### *Habitat Conditions by Ranger District*

**Flaming Gorge-Vernal Ranger District:** Habitat conditions in the Flaming Gorge-Vernal Ranger District can be characterized as generally in good to excellent condition (Forest Service 2017a). Unique to this geographical area, which is located on the north slope of the Uinta Mountains, is the largest ponderosa pine forested area in the Ashley National Forest. This area has been extensively managed over the years and supports a wide array of wildlife species. Similar to other areas in the Ashley National Forest, lodgepole pine, spruce, and sub-alpine fir, and aspen is a very common forest vegetation type on both the north and south slopes of the Uinta Mountains. Like the ponderosa pine forest area, lodgepole pine also supports a wide array of wildlife species. Mountain brush communities, such as mountain mahogany, are also found in this area. These communities provide an excellent habitat for many large and small terrestrial wildlife species (Forest Service 2017a).

**Duchesne-Roosevelt Ranger District:** Overall, habitat conditions in the Duchesne-Roosevelt Ranger District are good to excellent (Forest Service 2017a). Ponderosa and lodgepole pine are common, as well as mixed conifer (Douglas-fir, sub-alpine fir, and spruce) and aspen. These forested areas provide excellent habitat for various life stages of many wildlife species in the district. The south unit of the Ashley National Forest, an area south of U.S. 40, supports a large pinyon and juniper area, mixed with sagebrush; it supports the majority of sage-grouse in the district (Forest Service 2017a).

### *Terrestrial Species*

Terrestrial plant and animal species are those commonly found species that spend all or most of their time on dry land. These are typically mammals, such as deer and rabbits; birds, such as eagles and jays; reptiles, such as snakes and lizards; and macroinvertebrates, such as beetles and snails. Also included are land-based plants, such as trees and grasses. These animals and plants are native to the Ashley National Forest and are not considered invasive.

Terrestrial wildlife species rely on a variety of habitat features, such as vegetation for food, shelter, nesting, and bedding. General terrestrial species groups and vegetation types that they are associated with are summarized in table 3-32, above. Details on the characteristics and conditions of terrestrial habitat types are provided in the “Terrestrial Vegetation” section. Several species or species groups are given special consideration in this analysis due to public interest, additional stipulations for habitat management habitat, and/or sensitivity; they are described in greater detail below. Of those terrestrial species described below, Rocky Mountain bighorn sheep and greater sage-grouse were recommended as SCC, and the Canada lynx is listed as a federally threatened species. Since federally listed species and SCC together make up the at-risk species in the Ashley National Forest, Rocky Mountain bighorn sheep, greater sage-grouse, and Canada lynx are also at-risk species, but do not comprise all at-risk species in the plan area. Refer to the Persistence Analysis (Appendix D) for a complete list of at-risk species in the plan area and associated plan components that provide for the persistence of each at-risk species.

### **Big Game**

Big game species, such as mule deer (*Odocoileus hemionus*), pronghorn antelope (*Antilocapra americana*), moose (*Alces alces*), and elk (*Cervus canadensis*), are present throughout the Ashley National Forest; in particular, they rely on sagebrush and grassland communities for quality habitat and forage (Forest Service 2017a). Big game species are known to browse sagebrush and associated shrubs on the herbaceous understory. Some wild ungulates, such as mule deer, prefer mountain big sagebrush communities during the snow-free months of the year; Wyoming big and black sagebrush communities not covered by snow during winter months become important winter habitat for such species. Grasses and forbs are important summer forage, and they are browsed by elk year-round (Collins and Urness 1983). The browsing intensity of these shrubs is subject to shrub preference, winter conditions, availability of

other forage, and ungulate population densities. Mountain goats (*Oreamnos americanus*) are obligate occupants of subalpine and alpine environments in Utah. Elevations of up to 13,000 feet are frequented in summer, and winter habitat may be as high as 12,000 feet on windblown ridges. Mountain goats in Utah are often found above treeline as well as in forested subalpine zones, where they utilize a variety of grasses, forbs, shrubs, and lichens (UDWR 2018b).

Elk numbers have increased significantly over the last 30 years, and an upward trend in elk population is predicted for the next plan period (Forest Service 2017a). However, trends for all big game species will ultimately depend on big game management by the Utah Division of Wildlife Resources (UDWR) and the Wyoming Game and Fish Department (WGFD). Although populations fluctuate, mule deer and pronghorn antelope numbers have remained relatively constant over the last couple of decades; their populations are expected to follow a similar trend during the next plan period (Forest Service 2017a). Moose numbers, however, in the Ashley National Forest and on a regional scale are trending downward; studies are ongoing to determine the cause (Forest Service 2017a). Mountain goat numbers over a period of years steadily increased, but have now stabilized (UDWR 2018b)

### **Rocky Mountain Bighorn Sheep**

Rocky mountain bighorn sheep (*Ovis canadensis canadensis*) are native to the Ashley National Forest, but they were extirpated from the area in the early 1900s. Bighorn sheep were reintroduced in the Ashley National Forest in 1983. Several introductions and augmentations in the Ashley National Forest have occurred since then (Forest Service 2017a). Through the years since reintroduction, bighorn sheep have expanded their range in the Ashley National Forest. As such, all bighorn sheep in the Ashley National Forest are the result of these introductions and augmentations. Bighorn sheep prefer open habitat types (high alpine to lower grasslands) with adjacent steep, rocky areas for escape and safety (UDWR 2018). Bighorn sheep habitat is characterized by rugged terrain, including canyons, gulches, talus cliffs, steep slopes, mountaintops, and river benches (UDWR 2018).

A primary threat to bighorn sheep populations is disease. Pathogen transfer from domestic sheep to bighorn sheep is a concern when bighorn sheep overlap with domestic sheep allotments. Collaboration between the state of Utah and the Ashley National Forest in minimizing the risk of contact between the two species has been ongoing. There are two memorandums of understanding (MOU) between the agencies which help with this collaboration. One MOU is statewide memorandum of understanding between the State of Utah and the Forest Service and the other is a site-specific memorandum of understanding between the State of Utah and the Ashley and Uinta Wasatch Cache National Forests in regard to minimizing risk of contact between domestic sheep and bighorn sheep specifically in the Uinta mountains. Other species such as mountain goats may also carry pathogens that cause respiratory disease in bighorn sheep (Highland et al. 2018; Wolff 2016; Wolff 2018). Mountain goats often overlap bighorn sheep habitat and occur in high, rugged terrain such as the Uinta Mountains. The issue of possible transmission of pathogens between mountain goats and bighorn sheep is a State issue and is under Utah Division of Wildlife Resources authority. Domestic sheep and goats on private lands and Bureau of Land Management lands may also be potential vectors of pathogen transfer to bighorn sheep that use the Ashley National Forest, which could affect their viability.- Although the Ashley National Forest does not have any authority over actions on other lands or with potential pathogen transfer between wildlife species, such as between mountains-goats and bighorn sheep, several plan components contribute to the viability of bighorn sheep by minimizing the risk of contact between domestic sheep on the Ashley National Forest and bighorn sheep. See the Persistence Analysis (Appendix D) and the discussion of effects further below.

The current bighorn sheep population in the Ashley National Forest consists of five interconnected herds in the Uinta Mountains, which is primarily the northeast portion of the plan area, and the Avintaquin herd,

which is located on the South Unit portion of the plan area (see figure 3-18). All six herds are the result of reintroduction efforts; over time, they have expanded their range beyond the areas where they were introduced. The Avintaquin herd estimate is approximately 20 animals; the combined herd estimate for the five interconnected herds of the Uinta Mountains is 147 individuals (Forest Service 2020c). These herds have fluctuated over time and are on a stable to downward trend due primarily to predation and disease. More information on bighorn sheep habitat needs are described in appendix D, appendix C and table 3-38 and table 3-40 in this chapter. The acres of bighorn sheep habitat in the Ashley National Forest are summarized in table 3-33.

**Table 3-33. Rocky Mountain Bighorn Sheep Habitat in the Ashley National Forest**

Habitat Type	Area (Acres)
<b>Core Herd Home Range</b>	<b>307,000</b>
Avintaquin – Summer	67,000
Uintas – Summer	122,200
Uintas – Winter	117,700
<b>General</b>	<b>442,700</b>
General – Spring/Fall	18,400
General – Year-Long	424,300

Source: Utah Division of Wildlife Resources GIS 2020

### Greater Sage-Grouse

Greater sage-grouse (*Centrocercus urophasianus*) is a sagebrush-obligate species that requires sagebrush to breed, nest, raise broods, and winter. Greater sage-grouse uses the major sagebrush communities within the plan area at high and low elevations. Quality greater sage-grouse habitat is defined in terms of plant composition, species richness, shrub and herbaceous cover, and sagebrush seed production. Although there are many locations of greater sage-grouse in the Ashley National Forest, greater sage-grouse occurs at relatively low numbers in the Forest when compared with other areas of its range (Forest Service 2017a). Sage-grouse habitats in the Ashley National Forest only support about 10 percent of the sage-grouse population in the Uinta Basin. Sage-grouse are found on Anthro Mountain in the Duchesne-Roosevelt Ranger District, as well as in scattered areas of the Flaming Gorge-Vernal Ranger District (Forest Service 2017a).

Although populations are highly cyclical, the trend appears to be stable for greater sage-grouse populations on the plan area (Forest Service 2017a, 2020d). Management concerns related to this species include habitat impacts from invasive plant species, climate change, oil and gas development, predation, wildfires, and livestock grazing (Forest Service 2017a).

Sage-grouse management areas represent the highest-priority areas for sage-grouse conservation in Utah (State of Utah 2019). Greater sage-grouse core population areas are the highest-priority areas in Wyoming (Executive Order No. 2019-3, 2019). Sage-grouse habitat in the Ashley National Forest has been classified as either “priority” or “general” (Forest Service 2015b). All of the Wyoming portion of the FGNRA (excluding the reservoir itself) is either priority sage-grouse habitat or general sage-grouse habitat. Priority habitat represents areas that have been identified as having the highest conservation value to maintaining sustainable greater sage-grouse populations. General habitat is greater sage-grouse habitat outside of priority habitat. The acres of greater sage-grouse habitat types in the Ashley National Forest are summarized in table 3-34 and figure 3-16. However, both priority and general sage-grouse habitat types were mapped based on a broad large-scale approach and as such include areas that are not actually sage-grouse habitat as well as some sage brush areas that are not occupied by sage-grouse (Forest Service 2015b). These habitat layers were used for ease of analysis and to evaluate the broadest possible effects to



sage-grouse from the alternatives. More information on greater sage-grouse habitat needs is described in appendix C, appendix D, and in table 3-38 and table 3-40.

**Table 3-34. Greater Sage-Grouse Range and Habitat in the Ashley National Forest**

Habitat Type	Area (Acres)
Utah general	8,800
Utah priority	120,600
Wyoming general	31,000
Wyoming priority	23,600

Source: Forest Service GIS 2020

### Canada Lynx

Canada lynx (*Lynx canadensis*), a federally threatened species, inhabits forested areas, particularly areas of dense understory cover and/or thickets of young trees and mature forests with large amounts of coarse, woody debris. Although the Ashley National Forest contains lynx habitat, the 2007 Northern Rockies Lynx Management Direction Record of Decision classified the Ashley National Forest as unoccupied by lynx (Forest Service 2007). Between February 1999 and March 2007, 22 lynx from an experimental release in Colorado were located at least once in Utah, with the primary area of use in the Uinta Mountains. The majority of use was on the Uinta-Wasatch-Cache National Forest and to a somewhat lesser degree in the Ashley National Forest. These lynx were transient and did not take up residency in the Uinta Mountains (Forest Service 2017a).

In the 2013 Lynx Conservation Assessment Strategy, the Interagency Lynx Biology Team identified the Ashley National Forest as a peripheral area for Canada lynx that is incapable of supporting self-sustaining populations of lynx (Interagency Lynx Biology Team 2013). Peripheral habitat is intended to provide a mosaic of forest structure within the landscape to support snowshoe hare prey resources for individual lynx that could infrequently move through or reside temporarily in the area (Interagency Lynx Biology Team 2013).

Core or primary areas are those where there was strong evidence of long-term persistence of lynx populations, including both historical records of lynx occurrence over time and recent (within the past 20 years) evidence of presence and reproduction. Secondary areas are those where there were historical records of lynx presence—but fewer than in core areas—and no recent documentation of presence or reproduction, or where there were historical records of lynx, but the current status is unknown due to a lack of recent surveys (Interagency Lynx Biology Team 2013). However, the Ashley National Forest contains only peripheral habitat for lynx, as discussed above.

The acres of peripheral lynx habitat in the Ashley National Forest are summarized in table 3-35, below. More information on lynx habitat needs is described in tables C-1 and C-3 in appendix C and in appendix D.

**Table 3-35. Peripheral Lynx Habitat in the Ashley National Forest**

Habitat Type	Area (Acres)
Peripheral habitat	613,200

Source: Forest Service GIS 2020

### Aquatic Species

Aquatic plant and animal species are those commonly found species that spend all or most of their lives in water features in forest streams, springs, and pools. These species are usually represented by fish, such as

trout and chubs; amphibians, such as frogs and salamanders; and macroinvertebrates, such as aquatic insects and clams. Aquatic plants, such as hydrillas and lilies, are also included.

Habitat for aquatic species generally consists of streams, lakes, wetlands, springs, and riparian corridors, which are associated with the riparian and water vegetation types in the Ashley National Forest (table 3-36).

**Table 3-36. Aquatic Habitats in the Ashley National Forest**

<b>Aquatic Habitat Type</b>	<b>Total</b>
Perennial streams (miles)	1,100
Intermittent streams (miles)	2,100
Lakes and reservoirs (acres)	55,400
Swamps and marshes (acres)	4,400
Seeps and springs (count)	474
Riparian vegetation type (acres)	33,200

Sources: Forest Service GIS 2020; NHD GIS 2020

One measure of riparian habitat quality is the biotic condition index. The biotic condition index is an index of stream habitat quality that incorporates stream habitat (gradient and substrate composition), water quality (alkalinity and sulfate), and environmental tolerances of aquatic macroinvertebrate species (Platts et al. 1983). It reflects species’ diversity and abundance, which correlate to water quality. Values range from 2 to slightly greater than 100, with the larger values indicating greater tolerance (Platts et al. 1983). Most streams in the Ashley National Forest have average biotic condition index (from 2010 to 2020) values of 75 or greater (Abeyta 2020). Further details on the characteristics and condition of aquatic habitat types, including the watershed condition, are provided in the “Watersheds, Aquatic, and Riparian Ecosystems” section.

**Colorado River Cutthroat Trout**

The Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*) is an SCC found in many Ashley National Forest streams; there are 350 miles of Colorado River cutthroat trout streams (classified as the current population) in the Ashley National Forest (Forest Service GIS 2020; figure 3-17). One of its primary threats is the existence of nonnative trout, specifically, hybridization from rainbow trout and competition from brook trout. Colorado River cutthroat trout require cold, clear water, deep pools and boulders, and well-vegetated streambanks for cover. Although most of its habitat is in good condition, there are areas where erosion caused by overgrazing and unauthorized OHV use have affected its habitat by adding sediment to streams. The potential for climate change to cause warming temperatures and the resulting effects on seasonal stream flows could affect this trout’s habitat in the long term.

**Sport Fish**

The Flaming Gorge Reservoir is renowned for outstanding fishing opportunities. Species present in the reservoir include rainbow (*Oncorhynchus mykiss*), cutthroat (*Oncorhynchus clarkii*), brown (*Salmo trutta*), and lake trout (*Salvelinus namaycush*); kokanee salmon (*Oncorhynchus nerka*); smallmouth bass (*Micropterus dolomieu*); channel catfish (*Ictalurus punctatus*); mountain whitefish (*Prosopium williamsoni*); and most recently, burbot (*Lota lota*). Since completion of the Flaming Gorge Dam in 1962, the Green River below the dam has become a premier trout fishery. Species present in the river are rainbow, brown, brook (*Salvelinus fontinalis*), and cutthroat trout (Forest Service 2017d, 2020e).

In addition to the Flaming Gorge Reservoir and the Green River, the Uinta Mountains offer outstanding stream and lake fishing for many of the species listed above. Hundreds of lakes in the Uinta Mountains, including in the High Uintas Wilderness Area, offer fishing opportunities; fishing opportunities are also available in rivers such as the North Fork of Duchesne, Lake Fork, Uinta, and Whiterocks Rivers. Sport fish typically caught in these rivers are rainbow, brook, brown, and cutthroat trout (Forest Service 2017d).

### **Non-Game Native Fish**

In addition to sport fish, many non-game native fish occur in the plan area. The speckled dace (*Rhinichthys osculus*) is a small minnow that occurs in many of Utah's major streams and in numerous desert springs. This species has adapted to many different types of habitat, ranging from cold, swift-flowing mountain headwaters to warm, intermittent desert streams and springs (UDWR 2020e). The longnose dace (*Rhinichthys cataractae*) is native to northern Utah, where it is found in swift, cold creeks and occasionally lakes. Longnose dace is consumed by sport fish, especially trout, and is an important forage fish in some parts of its range (UDWR 2020d).

The mountain sucker (*Catostomus platyrhynchus*) is also common in Utah; it prefers the clear, cold water of streams with gravel substrate. This native Utah species can be found in Utah's Bonneville Basin and in the Colorado River system (UDWR 2020a). Mottled sculpin (*Cottus bairdii*) can be found in many of Utah's cold-water streams. It is a bottom-dwelling species that is important as a forage fish for stream-dwelling trout. Because trout predation can devastate mottled sculpin populations if sculpin do not have adequate hiding places, the species does best in areas where plenty of cover exists (UDWR 2020b).

### **Amphibians and Reptiles**

The western chorus frog (*Pseudacris maculata*) is a small frog commonly found throughout much of central and northeastern Utah. It can be found in a variety of habitats, including marshes, grasslands, agricultural lands, and forests, provided that water can be found nearby (UDWR 2020e). The northern leopard frog (*Rana pipiens* or *Lithobates pipiens*) is fairly common in Utah, but some reports indicate that its numbers may be declining. This frog occurs in a variety of aquatic habitats, particularly near cattails and other aquatic vegetation; however, it may be found foraging relatively far from water. During cold winter months, it is inactive, and it takes cover underwater or in damp burrows (UDWR 2020f).

The tiger salamander (*Ambystoma tigrinum*), a common species throughout Utah, is the only salamander species that occurs in the state. Within its range, the tiger salamander can thrive in almost any habitat type as long as water is found nearby. Water is necessary for two reasons: (1) the larval stage of the salamander life cycle is aquatic, and (2) the terrestrial adults return to water to breed. Due to predation, tiger salamanders often disappear from previously fishless areas once fish are introduced (UDWR 2020g).

The Great Basin spadefoot (*Spea intermontana*) is a small toad found throughout the Great Basin in a variety of habitats ranging from dry sagebrush areas to spruce-fir forests. Predicted habitat occurs throughout much of Utah and much of the plan area (UDWR 2020h).

Reptile species native to the Ashley National Forest include species such as the midget faded rattlesnake (*Crotalus oreganus concolor*), terrestrial garter snake (*Thamnophis elegans*), smooth green snake (*Opheodrys vernalis*), and rubber boa (*Charina bottae*). The terrestrial garter snake, smooth green snake, and rubber boa may be found in or near aquatic areas, such as moist meadows and along streams (UDWR 2020i, 2020j, 2020k).

### *At-Risk Species*

Together, federally threatened, endangered, proposed, and candidate species and SCC make up the at-risk species in the Ashley National Forest. The United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) page was queried for endangered, threatened, or proposed species whose range overlaps the plan area; these species are listed and discussed in detail in the biological assessment and the Persistence Analysis (appendix D) (USFWS 2020a and 2020b). Appendix D presents the list of SCC for the Ashley National Forest and provides species accounts.

Table C-3 in appendix C lists current habitat conditions, trends, and risk factors for threatened, endangered, proposed, and candidate animal and plant species. Table C-4 in appendix C lists current habitat conditions, trends, and risk factors for plant and wildlife SCC. (The information regarding current habitat conditions, ecological and human-related stressors, and habitat sustainability for plants was derived from plant assessments in Huber 2016b.) Appendix C does not include wolverine or the Eureka mountainsnail because the wolverine was not a federally proposed species at the time appendix C was developed and the Eureka mountainsnail was added as an SCC after appendix C was completed. Appendix D contains all at-risk species.

### *Summary of Trends and Conditions*

Generally, current habitat conditions for fish, wildlife, and plant species in the Ashley National Forest are suitable for all, or most, life history needs. Some wildlife species migrate or have seasonal movements off the Ashley National Forest to adapt to seasonal changes; others spend their entire life in the Ashley National Forest. Conifer tree encroachment continues to threaten sagebrush and grassland communities. However, habitat improvement projects in these areas are helping offset this invasion. Even with large-scale beetle epidemics, drought, fire, wind events, invasive plants, and other natural drivers, habitat is still supporting a wide array of species in the Ashley National Forest.

Species present in the Ashley National Forest today are essentially the same species prior to European settlement. Some species have declined in numbers while others have remained stable or increased. Overall, there has been an increase in the knowledge base of species distribution and numbers in the Ashley National Forest. This increased knowledge is due to an increased focus on species inventory, monitoring, and management by both the State wildlife management agencies and the Forest Service.

The current distribution of at-risk species in the Ashley National Forest ranges widely. Some species, such as the pygmy rabbit, are currently found in just one area or landtype association in the Ashley National Forest; others, such as the fringed myotis, are found in several landtype associations. Trends for some at-risk species are stable or increasing due to relatively low stressors and drivers (e.g., black rosy-finch). Other species of concern (sage-grouse) have higher levels of risk and uncertainty.

### *Conifer Encroachment and Nonnative, Invasive Species*

#### **Description**

Invasive plants can damage wildlife habitat, alter disturbance dynamics, and degrade soil and water quality (Vitousek et al. 1996; Smith and Finch 2014). Invasive, nonnative woody and herbaceous plants have been introduced to the Ashley National Forest and have spread through natural pathways. Encroaching species (typically coniferous trees) are native to the Ashley National Forest. However, in recent decades, these species have increased in cover and abundance along the mesic fringes of wetland meadows and in uplands (sagebrush/mountainbrush and grass/forb meadows). These increases have the potential to displace riparian plants and animals that specialize in grassland, shrubland, or deciduous tree-dominated vegetation types (Marlow et al. 2006).

Portions of the Ashley National Forest contain aquatic nuisance species, including whirling disease, New Zealand mud snail, chytrid fungus, didymo, and curly leaf and clasping leaf pondweed (Forest Service 2017d). Aquatic invasive species can alter the productivity, species diversity, water chemistry, and habitat value of waterbodies. They can alter habitat by outcompeting the native flora and fauna (examples are nonnative sport fish and crayfish), changing the nutrient content of the water (quagga and zebra mussels), and impairing habitat structure (quagga and zebra mussels and didymo, an invasive algae), which affect the survivability and life cycles of desired organisms (for example, the whirling disease effects on fish and the chytrid fungus effects on amphibians).

### **Influence of Drivers and Stressors**

Drivers and stressors of invasive species include

- temperature and precipitation patterns;
- atmospheric carbon dioxide concentration;
- evolutionary adjustments;
- human trade activities causing direct and indirect introductions; and
- indirect effects from altered wildfire regimes (Forest Service 2018b, Forest Service 2018d).

Terrestrial invasive species often establish after soil disturbance. Natural disturbances that expose bare soil due to wildfire, prolonged drought, and changes in the timing of precipitation can benefit the advancement of invasive species. Human-caused soil disturbance can be a pathway for the establishment of invasive species. Examples of human-caused disturbances include livestock grazing, burning slash piles, road construction, vehicle traffic, and reservoir operations that produce fluctuating water levels and a shoreline zone of exposed soil that lacks stable vegetation cover (Forest Service 2017d; Rice et al. 2017).

Predicted effects from climate change include increasing temperature, decreasing summer streamflow, increased vegetation stress, and increases in wildfire intensity and frequency. Added effects from these stresses would help establish and spread invasive species (Forest Service 2018b, Forest Service 2018d).

Drivers of aquatic invasive species include the presence of suitable aquatic conditions for the species (temperature, water chemistry, seasonality of flow, and channel properties). Modes of introduction and spread between waterbodies are often related to human transit and aquatic recreation, such as through bait, fishing gear, or watercraft.

### **Status and Trends**

Since the 2009 Ecosystem Diversity Evaluation Report and the 2011 WCF, there has been a marked expansion of terrestrial invasive species in lower elevations of the Ashley National Forest. This expansion has occurred subsequent to drought years in 2012 and 2013 (Forest Service 2017d).

Whirling disease has been documented in portions of the North Fork Duchesne River, South Fork Rock Creek, Beaver Creek, Carter Creek, Lake Fork River, South Brownie Creek, and Sheep Creek drainages, as well as the Flaming Gorge Reservoir (Forest Service 2017d). New Zealand mud snail is present in the Green River below the Flaming Gorge Reservoir. Curly leaf and clasping leaf pondweed are present in the Flaming Gorge Reservoir, Sheep Creek Lake, and Browne Lake. Chytrid fungus has been documented in the Goose Lakes in the Ashley Creek drainage.

Repeat photography in mid- and high-elevation meadows and shrub communities in the Ashley National Forest has documented an increase in young conifer species. The encroachment of conifer is primarily on the wet and dry periphery of these meadows. In some areas, the conversion is significant and may require management actions if these dry meadow areas are to be maintained (Forest Service 2017d).

There is localized incidence of aquatic and terrestrial invasive and encroaching species in many portions of the Ashley National Forest. Based on a 2016 report, a majority of landtype associations were determined to be trending toward the natural range of variation. This is because invasions were either being treated or did not have a dominant influence on the riparian areas (Dwire and Smith 2016). Of the 165 level 1 groundwater-dependent ecosystems surveys considered, 92 percent of sites were within the natural range of variation with no invasive species documented.

### Environmental Consequences for Wildlife

This section focuses on at-risk species identified by the Forest Service and the ecosystem-level and species-specific plan components that would contribute to their persistence in the Ashley National Forest. The Forest Service expects ecosystem-level plan components to provide for the broad ecological conditions that support native species' persistence, including other native wildlife that are not included as at-risk species. Predation of terrestrial wildlife species does influence species and can be a stressor. However, the control of predators is a state issue. As such, the plan and the EIS analysis focus on ecosystem-level plan components to provide for the broad ecological conditions as mentioned above.

### *Methodology and Analysis Process*

For the forest plan revision, management direction that may alleviate or exacerbate threats to ecological conditions is evaluated at a programmatic level. The forest plan does not authorize site-specific projects or activities; therefore, there are no direct effects from adopting the forest plan. Direct and indirect site-specific effects will be analyzed when future projects are proposed. Although potential short-term consequences from implementing the programmatic approach may be described, where appropriate, this evaluation focuses on longer-term indirect and cumulative effects that may occur over the 10- to 15-year life of the forest plan.

The Forest Service identified potential effects of decisions and management actions on species, populations, and habitats by reviewing the best available science and using qualitative and quantitative data related to impact indicators. To best reflect the scale and magnitude of these effects, the Forest Service used acres or miles whenever possible. It also used a GIS dataset and overlays of resources and resource uses to quantify effects when available.

### *Analysis Assumptions*

- Design features, such as seasonal and spatial restrictions, will limit direct impacts on some species.
- Impacts on at-risk species are directly related to impacts on specific habitat types or on general habitat types, as identified by vegetation types identified in table 3-32. If a specific habitat layer for an at-risk species was available, impacts were related to this habitat. Otherwise, general habitat types were used.
- Approaching desired conditions for vegetation types will provide optimal habitat for at-risk species. This means the habitat should contain the necessary ecological conditions for the contribution to the species' persistence.
- Ecosystem-level plan components will provide for the broad ecological conditions that support at-risk species' persistence.

- The natural range of variation reflects ecosystem conditions that have sustained the current complement of at-risk species' populations and habitats in the Ashley National Forest and provides the context for understanding natural diversity of ecosystems and processes.
- The effects of permanent changes to habitat are more impactful than those that temporarily alter habitat conditions but do not result in permanent habitat loss. Permanent habitat loss includes construction of buildings, paved roads, dams, and some aquatic alterations. Temporary impacts result from changes to habitat that will recover through time. Examples of these types of impacts include forestry, fuels treatments, and wildfire. These impacts do not result in a permanent loss of habitat.
- Temporary adverse impacts on at-risk species from short-lived ground-disturbing activities, such as thinning projects or prescribed fire, will be outweighed by long-term benefits from overall improved ecological conditions.
- The forest plan's desired conditions, objectives, standards, guidelines, management area allocations, and suitability will be followed when planning or implementing new site-specific projects and activities.

#### *Indicators*

- Changes in terrestrial and aquatic wildlife and at-risk species habitat quantity or quality as indicated by:
  - ◆ Acres of at-risk species-specific habitat types and general habitat types (as identified in table 3-14) that overlap with recreation management areas
  - ◆ Acres of at-risk species-specific habitat types and general habitat types (as identified in table 3-14) within wild and scenic rivers, RNAs, or wilderness areas
  - ◆ Acres/miles of restored or enhanced habitat (terrestrial, aquatic, riparian, or wetlands)
  - ◆ Acres of at-risk species-specific habitat types and general habitat types (as identified in table 3-14) suitable for timber production
  - ◆ Habitat (vegetation type) trends toward desired conditions
  - ◆ Potential for injury, mortality, or disturbance of at-risk species

#### *Environmental Consequences for Wildlife Common to All Alternatives*

Management actions under specific alternatives affect overall ecological conditions and move ecological conditions toward the desired state at different rates. Specific areas open to activities would vary between alternatives; even so, actions under all alternatives would have common impacts on wildlife and at-risk species. The actions are associated with the four major themes: recreation, vegetation and fire and fuels management, livestock grazing, and designated areas. Effects from actions related to these themes are described below.

#### **Effects from Vegetation Management and Fire and Fuels Management**

All alternatives would incorporate natural resource management to varying degrees in upland and riparian vegetation types. Categories of treatments broadly include timber harvest, prescribed fire, and riparian restoration. The goal of vegetation and fuels management is to achieve desired conditions, which are common across all alternatives and described in detail in the proposed forest plan. Moving vegetation toward desired conditions would improve the ecological condition, abundance, and distribution for species that depend on those vegetation communities. Differences in acres or miles treated under the

alternatives would affect movement of ecological conditions toward the desired state at different rates. This is described under the environmental consequences for each alternative.

Achieving desired conditions for vegetation types would generally improve habitat for wildlife and at-risk species over the long term. However, such treatments as timber harvest and prescribed fire would have short-term direct and indirect impacts on some wildlife and at-risk species. Treatments would affect wildlife and at-risk species through localized and temporary habitat alterations due to surface disturbance and vegetation removal. The latter could clear discrete areas of vegetation or remove specific wildlife habitat elements; these areas would no longer function as habitat for at-risk species until treated sites recover. Some species may benefit from habitat alterations that occur immediately after treatments, which may be the intent of the project. For example, greater sage-grouse would immediately benefit from treatments that remove encroaching conifers, which would reduce perch sites for predators and maintain sage-grouse habitat (sagebrush communities); big game species would immediately benefit from the creation of openings in large, dense timber stands. Large areas of vegetation removal could fragment surrounding habitats. Habitat fragmentation would interfere with wildlife species' movement and migration ability and could limit gene flow. Removing woody debris for such activities as fuelwood collection would reduce fine-scale habitats, such as nesting and refuge sites. The acres of vegetation treated would be spread out across the forest and over the life of the plan; impacts also would be dispersed, which would limit their intensity. For a detailed description of the effects of vegetation treatments on vegetation and riparian communities, see the "Terrestrial Vegetation" and "Riparian and Wetland Ecosystems" sections.

Vegetation and fuels treatments could have short-term impacts on nontarget vegetation, including at-risk plant species. Impacts could come about due to mechanical damage, such as from crushing and uprooting vegetation; unintentional herbicide drift; and burning nontarget vegetation. The use of tools to carry out vegetation treatments would also disturb local areas and might injure or kill at-risk plant species and less mobile wildlife species. These threats would be considered lower with the use of manual treatment options and greater with the use of mechanical treatments and prescribed fire. Some wildlife species could also be disturbed by noise associated with treatments, which could lead to such impacts as stress, displacement, or habitat avoidance. Impacts would last from the time of treatment until the vegetation community recovers. Vegetation likely would be treated intermittently and dispersed spatially over the life of the plan and based on necessity.

Vegetation and fire and fuels management under all alternatives is intended to move ecological conditions closer to desired conditions. This would result in a diversity of forest structure, from dense to more open areas, by creating openings in the forest structure while retaining some dense forests, removing insect-affected trees, and reducing fuel density. This would improve suitable ecological conditions for general wildlife and at-risk species by increasing the amount of habitat in the desired seral states or properly functioning condition. Retained trees would generally be older and larger (see "Fire and Fuels") and would provide breeding, roosting, and foraging habitat for many wildlife species. Moving vegetation toward desired conditions with natural fire regimes would also increase the resilience of vegetation communities to uncharacteristic disturbances and climate change. More resilient vegetation communities would reduce the potential for habitat loss, and therefore improve the likelihood of long-term species' persistence. Vegetation initially removed by the treatment methods would ideally come back as healthy, diverse, and resilient communities with no or few nonnative, invasive plants.

All alternatives would include some measure of treatments to restore or enhance wetland and riparian function. Similar to treatments in terrestrial habitats, in achieving long-term improvements to aquatic habitats, riparian restoration projects would have short-term negative impacts on aquatic species. These



would mainly be through short-term changes in habitat and disturbance, injury, or mortality of individuals. Habitat alterations would primarily include changes to the water quality and flow such as from the use of large equipment within or near stream channels, vegetation removal, and controlled burns. These types of activities may also cause soil disturbance and sedimentation, which may temporarily reduce the water quality, alter fish behavior patterns, and potentially interfere with spawning and egg development.

Over the long term, riparian restoration treatments would increase the extent and condition of riparian and wetland vegetation types, which are important habitats for many aquatic at-risk species, such as the Colorado River cutthroat trout. Instream restoration would enhance aquatic habitat by increasing stream cover, improving watershed conditions, reducing sedimentation, increasing habitat connectivity, and improving hydrological characteristics such as pools and riffles, which are important habitat features.

### **Effects from Recreation**

Each alternative would allow for some measure of recreation, with different management areas to support different recreation opportunities. Various forms of recreation may result in effects on wildlife and at-risk species; these types of effects are described below. The magnitude of effects would generally correspond to the area of wildlife and at-risk species habitat within different recreation management areas; these would vary by alternative and are described in the alternatives sections below.

Human presence would have local disturbances that would degrade the surrounding habitat for some species. Trampling of vegetation and soil from humans and vehicles would cause cover loss, soil compaction, decreased soil porosity, and increased erosion. It might also facilitate the spread of nonnative plants, which might alter vegetation communities by replacing native species, including at-risk plant species. These effects could lead to the loss or modification of species' habitat or key ecological elements (Leung and Marion 2000).

Development and use of roads, trails, and recreational facilities may also perpetuate habitat fragmentation for wildlife species, such as the Canada lynx. This would come about by creating bare ground that might otherwise provide forest cover or by causing individuals to avoid human presence and vehicles. Habitat fragmentation may reduce habitat functionality for species such as the Canada lynx by potentially impeding an individual's ability to make necessary daily, seasonal, or dispersal movements. Fragmentation of habitat for less mobile wildlife species, such as the pygmy rabbit, may have greater effects on their ability to perform daily movement and migration.

Trampling from such recreation as hiking, mountain biking, and OHV use could injure or kill at-risk plant species and less mobile wildlife species. Noise and human presence could also disturb wildlife species and cause such impacts as changes in behavior, masking of sounds important to survival and reproduction, stress and associated physiological responses, startling and flight responses, interference with mating or foraging, and displacement or habitat avoidance (Slabbekoorn and Ripmeester 2008; Barber et al. 2009; Blickley and Patricelli 2010). Chronic and frequent noise (e.g., from vehicle use) inhibits the ability of wildlife to detect important sounds, whereas intermittent and unpredictable noise (e.g., from hunting) is often perceived as a threat (Francis and Barber 2013). The former would result from such activities as motorized vehicle use and would continue as long as motorized routes are in use; the latter would be caused by recreation facility construction until construction is complete.

Depending on their tolerance of humans, some species would be affected by disturbances more than others and would experience decreased vigor, productivity, or survival. These effects would ultimately affect abundance, distribution, and population persistence (Barber et al. 2009). In some cases, recreation can lead to habitat loss or reduced habitat quality, with individuals or populations sometimes shifting

geographically into areas of lower quality habitat to avoid areas affected by human activity (Miller 2020). Effects from noise would vary by activity and species. Some wildlife species are particularly sensitive to noise disturbance, and unsuitable noise levels may cause habitat or nest abandonment or reproductive failure. The level of noise disturbance would be related to the type of activity and decibels produced, the distance to a species, and the level of noise attenuation from the landscape (Shannon et al. 2016). Other species, such as the Canada lynx and bighorn sheep, may be able to tolerate moderate levels of human presence. It appears that bighorn sheep may be somewhat tolerant of recreation activities (Papouchis et al. 2001; MacArthur et al. 1982; Longshore et al. 2013; Wiedmann and Bleich 2014; Toweill and Geist 1999). For example, bighorn sheep along Highway 191, Forest Service roads, and campgrounds near Flaming Gorge consistently use these areas and exhibit undisturbed behavior. Likewise, the Utah Division of Wildlife Resources unit management plan for bighorn sheep in this area indicates that bighorn sheep in the area are not disturbed by recreational activities (UDWR 2019b). Individual responses to disturbance, such as indifference, temporary avoidance, or long-term displacement, may depend on the season, intensity, frequency of human presence and activities, and the wildlife species being affected as well as the availability of nearby secure habitats.

In general, activities allowed in dispersed recreation management areas would cause less noise and disturbance to wildlife, whereas activities permitted in developed recreation management areas, such as increased motorized use and developed campgrounds, would cause relatively higher levels of disturbance to wildlife. Dispersed camping, which is allowed on most areas of the Ashley National Forest within 300 feet of roads, is a popular form of dispersed recreational use in the Ashley National Forest. Visitors engaged in dispersed camping often park trucks, OHVs, and campers within 300 feet of National Forest System roads to set up camp. This could cause disturbance, displacement, or injury of less mobile species and degrade wildlife habitat. There are no developed toilets or other facilities in these areas, and trash and human waste can attract predators, degrade the water quality, and remove special habitat elements such as downed logs and snags. Impacts from high-intensity use are especially evident in areas of higher recreation preference, such as wetlands, meadows, and streams. Species that inhabit aquatic habitat types may experience disproportionately higher effects due to concentrated use in their habitat.

Trampling of vegetation from vehicle and foot traffic associated with recreation may remove riparian vegetation, which shades streams and lowers water temperatures. Roads and trails near streams and stream crossings can also contribute to bank destabilization and alter hydrologic connectivity by causing road surface runoff and increased overland flow velocity (Kastridis 2020). This could lead to an increase in erosion, sedimentation, and turbidity, which might alter the water quality of a given watershed. Increased sediment from trails can fill pools that serve as overwintering habitat for resident fish species. In addition, erosion materials may form a new substratum that is inconsistent with that required for spawning by trout, and they may smother redds (Behnke 1992).

These recreation effects may reduce habitat conditions for aquatic species such as Colorado River cutthroat trout, which requires cool, clear water, deep pools and boulders, and well-vegetated streambanks for cover. These effects can also negatively impact aquatic amphibians' reproductive capabilities. Vehicles, humans, and recreational boat can also spread invasive weeds that can outcompete native species and degrade the quality of riparian habitat; aquatic nuisance species, such as the New Zealand mud snail, that can displace native prey; and whirling disease, which can affect young trout. Additionally, stream crossings that are not properly designed can reduce habitat connectivity for aquatic species by physically impeding passage, resulting in habitat fragmentation, population isolation, and reduced population resilience to environmental disturbance. Properly designed culverts can reduce these risks (Hoffman et al. 2012).

### Effects from Designated Areas

Under all alternatives, the existing designated areas described in chapter 2 would remain. These include the Sheep Creek Canyon Geologic Area; the Ashley Gorge, Gates of Birch Creek, Lance Canyon, Pollen Lake, Sims Peak Potholes, Timber-Cow Ridge, and Uinta Shale Creek RNAs; the designated High Uintas Wilderness Area (274,014 acres); IRAs (794,000 acres); and two suitable wild and scenic river segments.

The effects of management for designated areas on wildlife and at-risk species would generally correspond to the acres of general wildlife habitat (as indicated by vegetation types), aquatic habitat types, and at-risk species habitat types that are within designated areas. The overlap of existing RNAs, designated Wilderness and Sheep Creek Canyon Geologic area and with general, aquatic, and at-risk species habitat types are shown in table 3-37, table 3-38, and table 3-39, below.

**Table 3-37. Acres of General Wildlife Species' Habitat (as Indicated by Vegetation Types) in Existing Designated Areas**

Habitat	RNAs Alternatives A–D	Sheep Creek Canyon Geologic Area Alternatives A–D	Designated Wilderness Alternatives A–D
Alpine	2,600	0	113,900
Coniferous Forest	3,600	1,300	149,500
Deciduous Forest	0	0	0
Desert Shrub	0	0	0
Forb	0	0	0
Grassland	0	0	0
Mountain Brush	0	1,100	0
Riparian	100	100	7,600
Seral Deciduous Forest	600	500	2,600
Shrubland	0	200	0
Water	0	0	0
Woodland (Pinyon-Juniper)	700	500	0

Source: Forest Service GIS 2020

**Table 3-38. Aquatic Habitat Types in Existing Research Natural Areas (RNAs), Sheep Creek Canyon Geologic Area, and Designated Wilderness (Acres, Miles, or Count)**

Habitat	RNAs Alternatives A–D	Sheep Creek Canyon Geologic Area Alternatives A–D	Designated Wilderness Alternatives A–D
NWI wetlands (acres)	350	50	14,900
Springs (count)	1	2	3
Fens (acres)	240	0	7,100
Riparian vegetation (acres)	7,700	3,630	7,617
NHD waterbodies (acres)	210	0	6,961
NHD flow lines (miles)	17.4	14.5	586.9

**Table 3-39. At-Risk Species' Habitat in Existing Research Natural Areas (RNAs), Sheep Creek Canyon Geologic Area and Designated Wilderness (Acres or Miles)**

Habitat	RNAs Alternatives A–D	Sheep Creek Canyon Geologic Area Alternatives A–D	Designated Wilderness Alternatives A–D
Rocky Mountain bighorn sheep (general habitat [acres]) <sup>1</sup>	5,600	3,300	129,600
Rocky Mountain bighorn sheep (core herd home range [acres]) <sup>1</sup>	1,600	3,600	24,600
Greater sage-grouse (all habitat types [acres])	0	0	0
Lynx (peripheral [acres])	2,800	100	150,300
Colorado River cutthroat trout (current population [miles])	2.6	0.1	101
Peregrine falcon (acres)	1,900	200	73,200
Black rosy-finch (acres)	2,600	0	113,900
Pygmy rabbit (acres)	0	0	0
Fringed myotis (acres)	1,000	2,300	1,900

<sup>1</sup>There is overlap between the core herd home range and general habitat types.

Source: Forest Service GIS 2020

Management guidelines for designated areas would generally reduce impacts on wildlife and at-risk species and their habitats. This would be due to reduced surface-disturbing activities, access, and recreation in these areas. At-risk species associated with coniferous forest or alpine habitat (e.g., lynx, bighorn sheep, and black rosy-finch) may benefit from lower levels of disturbance and habitat alterations (e.g., fragmentation) due to reduced land-use activities in areas where their habitats fall within designated areas (see table 3-39). This is because a large portion of the High Uintas Wilderness Area occurs within coniferous forest and alpine habitat (see table 3-37) and thus overlaps habitat for these species. Additionally, 73,200 acres of designated wilderness overlaps habitat for the peregrine falcon, which includes cliffs associated with riparian and open lands. Falcons and other cliff-nesting raptors may benefit from reduced disturbance during nesting, which may decrease the chance of nest abandonment or interference with foraging. Bats may also benefit from reduced disturbance in areas where RNA's, designated wilderness and other special designations overlap fringed myotis habitat, particularly where these areas overlap roost sites (hibernacula).

Species associated with shrubland habitat would be impacted to a lesser extent from management for designated areas; this is because fewer acres of shrubland would be classified as a designated area (see table 3-37) and no greater sage-grouse or pygmy rabbit habitat would be impacted since no habitat for these two at-risk species is classified as a designated area (table 3-39). However, ecosystem resilience may decline in designated areas over time due to the lack of habitat restoration and enhancement management (for example, a lack of mechanical vegetation management to minimize the possibility of beetle epidemics and large-scale, uncharacteristic fire). Shrubland habitat would also experience this impact to a lesser extent.

All alternatives would manage 13 miles of the Green River and 40 miles of the Upper Uinta River as suitable wild and scenic river segments. Management guidelines for eligible river segments for inclusion in the National Wild and Scenic Rivers System (NWSRS) would help protection of river and stream habitats by preventing degradation of shorelines, the water quality, and the free-flowing nature of the eligible stream segments. Maintaining their eligibility for designation could have beneficial impacts by providing habitat connectivity for aquatic species. Although the suitable segments are not mapped as

Colorado River cutthroat trout streams, management could improve conditions for other fish and aquatic species such as sport fish, non-game native fish, aquatic reptiles, and amphibians. However, adverse impacts on habitat could also occur. This is because designated areas would not receive active natural resource management and the Forest Service would be unable to pursue activities such as habitat restoration and enhancement.

### **Effects from Livestock Grazing Management**

Under all alternatives, livestock grazing would have direct impacts on the quality of at-risk species' habitat by causing changes in the vegetation structure. The extent of changes would depend on the level of grazing; by ensuring grazing meets desired conditions, including for terrestrial and aquatic wildlife habitat, grazing would not alter vegetation structure in a way that would adversely affect wildlife habitat conditions. However, if not managed properly, overgrazing could occur and reduce herbaceous vegetation, which provides cover and forage for a variety of birds, mammals, and other at-risk wildlife. Therefore, species adapted to open habitats may experience increased habitat availability from grazing that reduces vegetation cover, whereas species that require denser cover may see a decrease in habitat (Schieltz and Rubenstein 2016; Dettenmaier et al. 2017).

Livestock can also spread nonnative, invasive plants, which may reduce habitat effectiveness and competition with at-risk plant species (Gross 2013). Additionally, cattle trampling at-risk plants and less mobile wildlife species would cause injury or mortality (Dettenmaier et al. 2017).

At-risk species that are associated with riparian habitat types could be affected the most by livestock overgrazing. This is because livestock disproportionately use these areas for forage, water, and shade. Excessive grazing can alter streambank stability, channel structure, and riparian composition, leading to degraded stream functionality. For example, trampling streambanks can widen streams, cause undercut banks to collapse, reduce riparian vegetation, increase surface runoff, and erode soil. These changes could ultimately degrade the water quality due to excess nutrients and sedimentation and could elevate instream temperatures due to reduced vegetation cover (Belsky et al. 1999).

In addition, overgrazing in riparian zones can negatively affect vegetation vigor, community structure, and species composition, which would reduce the quality of habitat for riparian-dependent at-risk plant species, such as Ute ladies'-tresses. Heavily grazed areas have fewer native and stabilizing plant species and instead support invasive vegetation (Gross 2013), which may compete with native plant species for resources.

Livestock overgrazing can directly affect fish, such as the Colorado River cutthroat trout, native non-game fish, and other aquatic species, such as amphibians, mollusks, and aquatic macroinvertebrates. Effects would be the result of trampling individuals and eggs; causing erosion and sedimentation; causing loss of wetland and riparian vegetation and backwater pools, which provide nursery habitat for fish; spreading disease; trampling springs; and reducing the water quality (Belsky et al. 1999; Forest Service 2015c).

Migratory birds would experience habitat loss or degradation from livestock overgrazing riparian areas, which many migrating birds use as stopovers on their migration routes. Reduced vegetation and its diversity, altered vegetation, and reduced habitat connectivity would limit the availability of nesting areas, forage, and cover for many bird species.

Livestock overgrazing can affect mammalian habitat if it reduces herbaceous plant cover and density, decreases plant litter, and alters the plant species composition and structure of riparian habitats. These changes would reduce forage or prey availability, cover, and breeding habitat for some species. Areas

surrounded by livestock watering facilities could become devoid of vegetation and as such would not provide habitat for wildlife, while forage around livestock watering facilities could also be reduced. Also of concern is direct competition between native ungulates and domestic livestock for browse and forbs, particularly during droughts (Ockenfels et al. 1991). Deer may avoid sites with high cattle forage utilization due to forage competition (UDWR 2019). Domestic sheep and goats can also transfer pathogens to bighorn sheep if contact between the two species occurs, which can cause bighorn sheep to contract respiratory disease (UDWR 2018).

The extent of grazing impacts would correspond to the acres with active grazing or closed to grazing under each alternative. Differences in livestock management may lead to differences in the magnitude of impacts; these are described in the alternatives sections below.

### *Environmental Consequences for Wildlife—Alternative A*

#### **Effects from Vegetation Management and Fire and Fuels Management**

Under alternative A, the Forest Service would continue to manage timber production and harvest consistent with current guidelines and regulations; 528,000 acres are currently considered suitable for timber production. Where these acres overlap wildlife and at-risk species habitats, species may experience short-term effects from the use of equipment to conduct treatments, as described under “Environmental Consequences for Wildlife Common to All Alternatives.”

Because the focus of the 1986 forest plan was for timber production and not to trend departed vegetation types toward the natural range of variation or desired conditions, wildlife and at-risk species’ habitats may not experience the full range of benefits from long-term habitat alterations that move ecological conditions closer to desired conditions. As described in “Terrestrial Vegetation,” ecological conditions would likely continue to trend toward higher departure across all vegetation types. This might result in more homogenous conditions, which might support a lower diversity of wildlife species relative to the natural range of variation. Habitats might be less resilient to disturbances and stressors such as climate effects, uncharacteristic wildfire (increased intensity and frequency), and disease and insect outbreaks; therefore, they might be less able to contribute to the persistence of at-risk species in the Ashley National Forest.

Fire and fuels management would continue to follow the direction in the 2001 Utah Fire Amendment to the 1986 forest plan. This plan might support some movement toward desired conditions through vegetation management and management of fires over the short term. However, the pace of treatments would not be sufficient to reach desired conditions over the long term. Over the long term, an increase in the likelihood for more frequent, severe, and intense wildland fires would continue, and wildlife habitats would be at an increased risk from large-scale, high-intensity wildfires. Wildlife habitats may support a lower diversity of wildlife species relative to the natural range of variation and have a reduced ability to contribute to the persistence of at-risk species in the Ashley National Forest.

Though restoration treatments could be implemented on a case-by-case basis, alternative A does not set a specific goal for the number of stream miles to be improved with riparian restoration treatments. Where these treatments occur, impacts from implementing the treatments and from restoring habitat would occur as described under “Environmental Consequences for Wildlife Common to All Alternatives.”

#### **Effects from Recreation**

Under alternative A, the Forest Service would continue to use the recreation opportunity spectrum and management practices outlined in the 1986 forest plan. Under this management, over 53 percent of the

Ashley National Forest would remain in the rural, semiprimitive motorized, and roaded natural classes, while 47 percent would remain in the semiprimitive nonmotorized and primitive classes. Impacts on wildlife and at-risk species from recreation, as described under “Environmental Consequences for Wildlife Common to All Alternatives,” would continue at their current level; impacts on wildlife and at-risk species from recreation in motorized and roaded natural classes would be greater than impacts from activities in nonmotorized and primitive classes.

### **Effects from Livestock Grazing Management**

Alternative A would continue to have approximately 919,700 acres of active allotments. Impacts on wildlife and at-risk species due to livestock grazing would continue at their current level; these types of impacts are described under “Environmental Consequences for Wildlife Common to All Alternatives.”

Under alternative A, there would be no guidance in the plan for forage utilization levels or stubble height; utilization of key forage species and stubble height would be determined in allotment management plans and other site-specific guidance. The absence of forest-wide forage utilization guidelines could result in relatively higher levels of impacts (for example, from reduced vegetation cover) on wildlife and at-risk species, as described under “Environmental Consequences for Wildlife Common to All Alternatives.”

Lower stubble height and higher forage utilization would cause plant communities to shift toward nonpalatable or grazing-tolerant species, which would reduce forage for native ungulates such as bighorn sheep. It would also reduce the vegetation cover and species richness, which would alter habitat conditions for wildlife and at-risk species, as described under “Environmental Consequences for Wildlife Common to All Alternatives.” Impacts would be less for big game species. This is because current management would limit utilization by livestock of key browse species on big game winter range to 20 percent.

Under current management, desired conditions for grazing/range are described as maintaining a quality range program, managed to optimize production. Current allotment management plans include “benchmark indicators” that address terrestrial and riparian utilization limitations. These may include utilization of key forage species no greater than 50 percent of the current year’s growth and leaving a 4-inch or greater stubble height of herbaceous species at the end of the grazing season between the greenline and bankfull of stream systems. These indicators help to reduce the potential for overgrazing.

### **Effects from Designated Areas**

Under alternative A, existing designated areas would remain but no new management areas would be recommended (no recommended wilderness and no additional wild and scenic river segments). Impacts on wildlife and at-risk species from management of existing designated areas would be the same as described under “Environmental Consequences for Wildlife Common to All Alternatives.”

### ***Environmental Consequences for Wildlife Common to Alternatives B Modified, C, and D***

All action alternatives provide habitat to contribute to recovery of federally listed endangered and threatened species and to maintain a viable population of each SCC within the plan area. The action alternatives would support the maintenance and improvement of resilient ecosystems and watersheds to support wildlife diversity, and they would provide for the maintenance of viable populations of each SCC within the plan area (appendix D). Habitat management would be based on a complementary ecosystem and species-specific approach (known as a coarse-filter/fine-filter approach), which is intended to contribute to the diversity of plant and animal communities and the long-term persistence of native species. The coarse-filter plan components are designed to maintain or restore ecological conditions for ecosystem integrity and biological diversity in the Ashley National Forest. Fine-filter plan components

are designed to provide for additional, specific habitat needs for native animal species when those needs are not met through the coarse-filter plan components.

Desired conditions for wildlife and at-risk species are common across all action alternatives. Along with plan components for terrestrial vegetation (see “Environmental Consequences for Terrestrial Vegetation Common to Alternatives B modified, C, and D”), they would help maintain at-risk species’ persistence in the Ashley National Forest by providing feeding, breeding, and sheltering habitat for native species (FW-DC-WILDL-01); providing habitat connectivity for native species, which in turn promotes daily and seasonal movement of species to facilitate maintenance of genetic diversity (FW-DC-WILDL-02, FW-GD-WILDL-15); contributing to the habitat needs (feeding, breeding, and sheltering) and the long-term persistence of at-risk species (FW-DC-WILDL-03); and ensuring ecological processes are present and functioning in a manner that sustains long-term persistence and supports recovery of at-risk plant species (FW-DC-ATRISK-01).

Terrestrial vegetation desired conditions would also help maintain habitat for wildlife and at-risk species. Desired conditions for all vegetation types common to alternatives B modified, C, and D are maintaining essential ecosystem components, processes, and functions. This would result in ecosystems that are resilient or adaptive to disturbances such as fire, insects, pathogens, and climate variability and that provide a diversity of habitat types across the Ashley National Forest (see “Environmental Consequences for Terrestrial Vegetation Common to Alternatives B Modified, C, and D”; appendix D; and the forest plan).

Guidelines for wildlife and at-risk species primarily focus on addressing threats to species and their habitat that are not addressed in the other resource areas (FW-GD-WILDL-01 through 15). These threats include habitat loss, fragmentation, and manipulation; human disturbance; spread of disease; and fire (appendix D). For example, maintaining a mosaic of forest structures with dense early successional coniferous and mixed-coniferous-deciduous stands and mature multistory conifer stands would help maintain peripheral habitat for possible dispersal of the Canada lynx onto the Ashley National Forest (FW-GD-WILDL-13). This would help alleviate threats to the lynx, such as habitat fragmentation or degradation if a lynx happens to wander on to the Ashley National Forest (appendix D). A guideline to reduce tree susceptibility to bark beetle attack (FW-GD-CONIF-01) would reduce threats to at-risk species, such as the lynx and fringed myotis, which could be threatened by habitat loss due to beetle kill. In addition, a guideline for greater sage-grouse (FW-GD-WILDL-11) would provide management direction to minimize degradation of occupied sage-grouse habitat and active leks, minimizing impact to this species.

Additionally, guidelines for wildlife corridors and Fish and Wildlife Service birds of conservation concern direct the evaluation of the effects of ground-disturbing and vegetation management activities on migrating ungulates and their connective habitat as well as Fish and Wildlife Service birds of conservation concern (FW-GD-WILDL-14 and FW-GD-WILDL-15). These two guidelines also direct, as practical, the mitigation of those activities to lessen the impact to those species (FW-GD-WILDL-14 and FW-GS-WILDL-15). For a detailed discussion on how plan components would alleviate threats to at-risk species and maintain their persistence in the Ashley National Forest, see appendix D.

The course-filter habitat forest plan component crosswalk (see appendix D) lists those plan components that would maintain habitat types for general wildlife species shown in table 3-30 and the crosswalk. These include plan components for other resources, such as terrestrial vegetation and soils, in addition to those for wildlife. Components for resource uses such as livestock grazing and energy and minerals ensure that these uses are compatible with ecological sustainability (for example, FW-DC-GRAZ-02) and protect ecosystem integrity (for example, FW-DC-MINL-02).



For species associated with alpine habitats (table 3-31), maintaining species richness and a mosaic of plant communities (FW-DC-ALPINE-01) would help maintain habitable niches that continue to provide breeding, foraging, and wintering habitat for alpine species. Plan components for forested vegetation (FW-DC-VEGTER-01 through 09; FW-DC-CONIF-01 and 02; FW-GO-VEGTER-01 and 02; FW-OB-CONIF-01; FW-GD-VEGTER-01 through 04; FW-GD-CONIF-01; FW-DC-ASPEN-01 and 02; FW-GD-ASPEN-01 through 04; FW-DC-PJ-01; FW-GD-PJ-01; FW-GD-TIMB-02 through 04; FW-GD-WILDL-13) would maintain habitat for species associated with deciduous and coniferous forests and woodlands (table 3-31) by emphasizing resilient, connected forests containing complex structural attributes. Vegetation treatments, chosen based on best available science, would help move vegetation toward desired conditions for specific vegetation types. Prescribed fire and naturally ignited fire treatments would be used to move vegetation types toward more natural fire patterns (FW-DC-FIRE-02 and 03; FW-OB-FIRE-01 and 02; FW-GD-FIRE-03). Such treatments would help to maintain habitat for wildlife species associated with the habitats treated.

Plan components for non-forested vegetation (FW-DC-VEGTER-01 through 09; FW-DC-VEGNF-01; FW-DC-ALPINE-01; FW-GO-VEGTER-01 through 03; FW-GD-VEGTER-01 through 04; FW-DC-SAGE-01 and 02; FW-DC-SHRUB-01; FW-GD-WILDL-01 and 15) would maintain habitat for species associated with grasslands and shrublands (table 3-31) by maintaining essential ecosystem components, processes, and functions. Additional components, such as for livestock grazing (FW-DC-GRAZ-02 and FW-GD-GRAZE-01 and 02), soils (FW-GD-SOIL-03 and 05), and rare and unique habitats (FW-ST-RAREHAB-01), would help maintain habitat sustainability by ensuring sustainability and resiliency of forage resources; protecting soils from compaction, displacement, and erosion; and avoiding or mitigating management activities that would disrupt ecological processes or compromise the overall ecological integrity of rare ecosystems. Objectives to restore ecological function, integrity, and resilience of non-forest vegetation (FW-OB-VEGNF-01) would improve habitat conditions in areas that have been previously impaired, thereby maintaining or increasing habitat for grassland and shrubland wildlife species. Plan components would help alleviate ecological stressors through restoration that reduces conifer encroachment, increases heterogeneity of terrestrial vegetation, and moves terrestrial vegetation composition and structure toward the natural range of variation (FW-GO-VEGTER-01 through 04; FW-GD-VEGTER-01 through 04; FW-DC-VEGNF-01; and FW-OB-VEGNF-01).

Plan components for watersheds, aquatic ecosystems, and riparian ecosystems would maintain or improve overall watershed conditions and habitat for riparian-associated and aquatic species (table 3-31) by ensuring watersheds and aquatic and riparian ecosystems are resilient to disturbance and support healthy, vigorous, and self-perpetuating plant communities (FW-DC-WATER-01 through 10; FW-DC-RMZ-01 and 02; and FW-DC-FISH-01 through 07) and associated wildlife species. Managing riparian management zones to maintain, protect, or enhance aquatic and riparian resource values (FW-GD-RMZ-01 through 06) would help riparian-associated species by protecting habitat from future degradation and improving previously impaired conditions. Management to limit the spread of pathogens to native bee species (FW-GD-WILDL-12) would also help support the continued presence of pollinators and thereby support habitat for plant communities.

See the course-filter habitat forest plan component crosswalk (appendix D) for a full list of plan components that would maintain each of the habitat types discussed above (table 3-31).

Actions under specific action alternatives affect overall ecological conditions and move ecological conditions toward the desired state at different rates. Specific forest plan components and areas open to activities would vary between alternatives, as described below.

### **Effects from Vegetation and Fire and Fuels Management**

All action alternatives would use vegetation and fuels management to provide necessary ecological conditions to support at-risk species in the plan area (appendix D). As described in “Terrestrial Vegetation,” vegetation treatments under all action alternatives would occur over every decade following plan implementation to move vegetation toward desired conditions. The acres proposed for treatment in each general wildlife habitat type, as indicated by vegetation type, would vary by action alternative (see “Terrestrial Vegetation”). Where management practices overlap species habitat types, the species would experience impacts resulting from temporary disturbance and short- and long-term habitat alterations, as described under “Environmental Consequences for Wildlife Common to All Alternatives.”

Differences in acres or miles treated under specific alternatives would affect the movement of ecological conditions toward the desired state at different rates; this is described under the analysis for each alternative. For all action alternatives, movement toward desired conditions would be greater than under alternative A. This is because treatment techniques would be chosen based on best available science depending on the specific vegetation type in which treatments were proposed.

Overall, vegetation and fire and fuels treatments would help achieve desired conditions for vegetation resources (appendix D). This would benefit wildlife and at-risk species by providing ecosystems consisting of healthy and diverse native plant communities that are resilient or adaptive to stressors such as fire, insects, pathogens, and climate variability (FW-DC-VEGTER-01 through 09). Vegetation desired conditions and guidelines also address the threat of invasive species, conifer encroachment, and beetle epidemics that threaten these species.

Plan components would also guide vegetation and fuels treatments to benefit specific at-risk species. For example, treatments in the sagebrush vegetation type would alter canopy cover to enhance habitat for greater sage-grouse (FW-DC-SAGE-01 and 02; FW-OB-SAGE-01; FW-DC-VEGNF-01; FW-OB-VEGNF-01). This would help alleviate threats to the greater sage-grouse, such as habitat degradation from conifer encroachment and noxious weeds. All action alternatives would include a standard that total tree and shrub canopy cover in semi-barren habitat should not exceed 10 percent within Evert’s wafer-parsnip’s habitat (FW-ST-ATRISK-01). Using vegetation treatments to achieve this standard would help maintain persistence of Evert’s wafer-parsnip by alleviating the threat of conifer encroachment (Huber 2016b).

Further, under all action alternatives, vegetation management activities should avoid removal of known raptor nests and should avoid, minimize, or mitigate disturbance around known active raptor nests (FW-GD-WILDL-03; FW-GD-WILDL-08); maintain snags and other habitat features for cavity nesters (FW-GD-WILDL-02); maintain bat habitat (FW-GD-WILDL-04 and 05); avoid or minimize negative impacts on known Eureka mountainsnail sites (FW-GD-WILDL-06); avoid degradation of occupied sage-grouse habitat and disturbance to breeding sage-grouse (FW-GD-WILDL-12); maintain pygmy rabbit habitat (FW-GD-WILDL-07); evaluate effects to birds of conservation concern and as practical mitigate activities to lessen impacts (FW-GD-WILDL-14); and evaluate effects of actions to migrating ungulates and connective habitat and as practical mitigate activities to lessen impacts (FW-GD-WILDL-15). Guidelines such as these would help reduce threats to at-risk species, improve ecological conditions, and ultimately contribute to maintaining at-risk species’ persistence in the Ashley National Forest. See appendix D for a detailed discussion on how plan components would alleviate threats to at-risk species and maintain their persistence in the Ashley National Forest.

#### *Timber Harvest*

Under all action alternatives, timber harvest projects would affect wildlife and at-risk species that inhabit the vegetation types in which the projects were carried out; these types of effects are described in

“Environmental Consequences for Wildlife Common to All Alternatives.” The magnitude of these effects would generally correlate to the number of acres of treatments carried out in wildlife habitat. The acres of general wildlife habitat (as indicated by vegetation types) suitable for timber production, and thus where timber harvest treatments would potentially occur, would vary by action alternative. This is shown in table 3-19 in “Terrestrial Vegetation.” The acres of at-risk species habitat suitable for timber production would also vary by action alternative, as shown in table 3-40, below.

**Table 3-40. Acres or Miles of At-Risk Species’ Habitat Suitable for Timber Production**

Habitat	Alternative B Modified	Alternative C	Alternative D
Rocky Mountain bighorn sheep (all habitat types [acres]) <sup>1</sup>	7,300	4,700	7,500
Rocky Mountain bighorn sheep (core herd home range [acres]) <sup>1</sup>	29,700	9,200	30,700
Greater sage-grouse (all habitat types [acres]) <sup>1</sup>	5,100	3,900	5,200
Lynx (peripheral [acres])	79,200	63,200	82,600
Colorado River cutthroat trout (current population [miles])	0	0	10
Peregrine falcon (acres)	0	0	0
Black rosy-finch (acres)	0	0	0
Pygmy rabbit (acres)	0	0	0
Fringed myotis (acres)	13,300	6,900	13,900

Source: Forest Service GIS 2020

<sup>1</sup>There is overlap between the core herd home range and general habitat types.

At-risk species, such as Rocky Mountain bighorn sheep, whose habitat is threatened by conifer encroachment may benefit from timber harvest. The area of bighorn sheep core herd home range that encompasses timbered stands is not typical bighorn sheep habitat (typically open, alpine areas); however, timber harvest within these atypical areas of core herd home range may benefit bighorn sheep by facilitating migration through the timber stands as bighorn sheep move between summer and winter ranges. Tree removal may also benefit bighorn sheep by increasing visibility and predator detection.

The lynx, which requires dense early successional coniferous stands to support snowshoe hare populations and cover for stalking prey as well as mature multistory conifer stands for denning areas, could lose some of these habitat features in areas where trees are harvested within peripheral habitat. However, forest plan components would require some of these features be retained and maintain habitat for lynx (appendix D). Species that primarily use alpine or cliff habitats (peregrine falcon, black rosy-finch) would not be affected by timber harvest, because none of their habitat would be suitable for timber production. Plan components would require vegetation treatments to avoid or minimize negative impacts on known Eureka mountainsnail sites (FW-GD-WILDL-06); thus, this species would be protected from adverse effects from timber harvest. See appendix D for a discussion of how plan components would alleviate this threat and maintain Eureka mountainsnail’s persistence in the Ashley National Forest.

Effects on specific vegetation types, and thus on general plant and wildlife habitats, are described in detail in “Terrestrial Vegetation.” As described above, achieving desired conditions for all vegetation types would ultimately improve habitat conditions for species associated with these habitat types, such as large mammals, small mammals, old-growth-dependent species, large-tree-dependent species, cavity nesting birds, and migratory birds (table 3-14). This would come about by reducing the risk of habitat loss from wildlife and other disturbances and by increasing vegetation structure and diversity, which would increase the availability of habitat features such as cover and nest sites. Plan components for timber under all

action alternatives would promote conditions that support wildlife habitat by managing timber production to promote ecosystem health and sustainability and to meet long-term vegetation conditions (FW-DC-TIMB-01 through 07).

#### *Fire and Fuels Management*

All action alternatives would manage natural ignitions to meet resource objectives for the associated vegetation type, though the percent objective would vary by alternative (see table 3-17 and table 3-18 in “Terrestrial Vegetation”). In general, managing naturally ignited fires would allow fire management greater flexibility to meet desired vegetation conditions relative to alternative A.

Fire and fuels treatments would have short-term impacts on wildlife and at-risk species that inhabit the vegetation types in which the treatments were carried out, as described in “Environmental Consequences for Wildlife Common to All Alternatives.” Over the long term, prescribed fire and wildfire management would move wildlife and at-risk species’ habitat toward desired conditions where burned acres occur. Habitat characteristics, such as plant community composition, cover, and structure, would trend toward the natural range of variation over the long term where burned acres occur. In general, alternatives that treat more acres would reach desired conditions more quickly. Plan components for fire across all action alternatives would help achieve natural fire regimes that sustain ecosystem sustainability and ecological resilience (FW-DC-FIRE-02 and 03; FW-OB-FIRE-01 and 02; FW-GD-FIRE-03 and 04; FW-GO-FIRE-02); this would benefit wildlife and at-risk species by reducing the loss of habitat or ecosystem function due to uncharacteristic wildfire.

#### *Riparian Restoration*

All action alternatives would include riparian restoration treatments, but the number of stream miles improved for riparian restoration treatments would vary by alternative. Under the action alternatives, effects on riparian and aquatic species habitats from restoration treatments would occur, as described under “Environmental Consequences for Wildlife Common to All Alternatives.” The rate of improvements to riparian habitats, as well as the extent of short-term disturbances due to construction activities, would generally correlate to the number of stream miles improved, which would vary by alternative.

Using riparian restoration to achieve desired conditions for watersheds, aquatic, and riparian ecosystems would promote conditions for riparian and aquatic species. This would be done by improving the health and resilience of aquatic and riparian ecosystems to provide migration, breeding, feeding, and sheltering opportunities for a wide range of terrestrial, amphibian, and avian wildlife (FW-DC-WATER-01 through 10). Further, riparian restoration treatments would help achieve desired conditions for fisheries and aquatics that provide habitat conditions to support the long-term persistence of aquatic species such as Colorado cutthroat trout. These include habitat connectivity; stream channels characterized by riffles, runs, pools, and woody material; low levels or an absence of aquatic invasive species; substrate with low levels of fine substrate (e.g., sand and silt); and high water quality (FW-DC-FISH-01 through 07). In addition, inclusion of a guideline for providing sufficient habitat to maintain viable native and desirable nonnative fish and amphibian species (FW-GD-FISH-05) would support habitat maintenance for all fish and amphibian species utilizing these habitats.

#### **Effects from Recreation**

The types of effects of various recreation on wildlife and at-risk species are described under “Environmental Consequences for Wildlife Common to All Alternatives.” The magnitude of these effects would generally correspond to the area of overlap between recreation management areas and general wildlife or at-risk species habitat (table 3-19 and table 3-41). Effects on wildlife, such as disturbance and

habitat degradation, would be more concentrated in high-use recreation management areas (destination and general recreation management areas) and lower in more dispersed, lower-use areas (backcountry recreation management areas and the High Uintas Wilderness). Specifically, destination recreation management areas, which emphasize developed recreation experiences in high-use areas with motorized access and support facilities, would have the greatest level of impacts on wildlife and at-risk species. Impacts from backcountry recreation management areas focused on dispersed recreation outside wilderness areas (with limited infrastructure) would be the least intense. It should be noted, however, that some of the potential impacts from recreational use may be partially offset by opportunities for long-term habitat improvements in destination and general recreation management areas, which would allow for initiation of habitat improvement projects.

Alternative A (1986 forest plan) does not include recreation management areas; therefore, it is not included in table 3-41, below.

**Table 3-41. Acres or Miles of At-Risk Species' Habitat in Recreation Management Areas (RMAs)**

Habitat	Alternative B Modified	Alternative C	Alternative D
<b>Rocky Mountain Bighorn Sheep (All Habitat Types [acres])<sup>1</sup></b>			
Backcountry RMA	185,700	265,500	137,500
Destination RMA	9,000	6,100	10,900
General RMA	118,300	41,300	164,600
High Uintas Wilderness	129,300	129,300	129,300
<b>Rocky Mountain Bighorn Sheep (core herd home range [acres])<sup>1</sup></b>			
Backcountry RMA	115,000	174,900	71,200
Destination RMA	17,500	13,700	17,500
General RMA	149,500	93,500	193,300
High Uintas Wilderness	24,400	24,400	24,400
<b>Greater Sage-Grouse (All Habitat Types [acres])</b>			
Backcountry RMA	21,700	124,300	13,200
Destination RMA	3,000	2,400	3,700
General RMA	159,100	57,200	166,900
High Uintas Wilderness	N/A	N/A	N/A
<b>Lynx (Peripheral Habitat [acres])</b>			
Backcountry RMA	237,100	374,200	171,600
Destination RMA	9,300	6,400	12,800
General RMA	291,000	156,600	352,900
High Uintas Wilderness	150,300	150,300	150,300
<b>Colorado River Cutthroat Trout (current population [miles])</b>			
Backcountry RMA	135.9	192.2	100.9
Destination RMA	7.5	6.4	11.1
General RMA	104.5	49.4	135.8
High Uintas Wilderness	101.0	101.0	101.0
<b>Peregrine falcon (acres)</b>			
Backcountry RMA	45,900	58,300	37,000
Destination RMA	3,400	3,100	3,900
General RMA	28,500	16,400	37,000
High Uintas Wilderness	73,200	73,200	73,200

Habitat	Alternative B Modified	Alternative C	Alternative D
<b>Black rosy-finch (acres)</b>			
Backcountry RMA	48,900	51,100	44,000
Destination RMA	0	0	0
General RMA	5,900	3,600	10,800
High Uintas Wilderness	113,900	113,900	113,900
<b>Pygmy rabbit (acres)</b>			
Backcountry RMA	0	2,500	0
Destination RMA	600	600	600
General RMA	7,100	4,600	7,100
High Uintas Wilderness	0	0	0
<b>Fringed myotis (acres)</b>			
Backcountry RMA	63,200	182,300	42,800
Destination RMA	10,200	8,300	11,700
General RMA	211,200	94,100	230,000
High Uintas Wilderness	1,900	1,900	1,900

<sup>1</sup>There is overlap between the core herd home range and general habitat types.

Source: Forest Service GIS 2020

Under all action alternatives, desired conditions for recreation would help ensure that recreation reflects healthy, resilient landscapes and provides opportunities for sustainable recreational use (FW-DC-ROS-05 through 08). Desired conditions for fisheries would alleviate threats from recreation in aquatic habitats (e.g., fishing) by removing aquatic invasive species and by providing aquatic habitats with features to support sustainable populations of native species, such as the Colorado River cutthroat trout (FW-DC-FISH-01 through 07). Additionally, multiple plan components would reduce potential for habitat degradation by emphasizing maintenance of key ecological and habitat conditions that provide essential habitat characteristics for native species, habitat connectivity, vegetation diversity, and ecological integrity and resilience (appendix D).

### Effects from Livestock Grazing Management

Under the action alternatives, impacts on wildlife and at-risk species from livestock grazing would be similar to those described for alternative A. However, because the action alternatives would emphasize maintenance or improvement of wildlife habitat and protections to riparian resources, the intensity of grazing impacts would be reduced. Achieving desired conditions for grazing (FW-DC-GRAZ-02; FW-GD-GRAZ-01 and 02) would ensure sustainable use of rangelands. Desired conditions for terrestrial vegetation and aquatic and riparian areas would ensure aquatic, riparian, upland, and wetland ecosystems support native plants and animals. This would result in improved habitat conditions that support the persistence of wildlife and at-risk species, including pollinators. Under alternative A, habitat support for these species would be determined at the site-specific level rather than be based on Forest-level direction.

### Effects from Designated Areas

Under the action alternatives, all existing designated areas would remain. Effects on wildlife and at-risk species from managing these areas would be the same as described under alternative A. Alternative C includes additional recommended wilderness or wild and scenic river segments. Alternative B modified and alternative D do not include additional recommended wilderness. The acres of general wildlife, aquatic habitat, and at-risk species' habitat that would overlap recommended wilderness are shown in table 3-42, table 3-43, and table 3-44, below. Impacts from managing additional designated areas are described under alternative C, below.

**Table 3-42. Acres of General Wildlife Species' Habitat (as Indicated by Vegetation Types) in Recommended Wilderness**

Habitat	Alternative B Modified	Alternative C	Alternative D
<b>Recommended Wilderness</b>			
Alpine	0	20,600	0
Coniferous Forest	0	27,400	0
Deciduous Forest	0	0	0
Desert Shrub	0	0	0
Forb	0	0	0
Grassland	0	0	0
Mountain Brush	0	0	0
Riparian	0	1,800	0
Seral Deciduous Forest	0	100	0
Shrubland	0	0	0
Water	0	200	0
Woodland (Pinyon-Juniper)	0	0	0
<b>Total</b>	<b>0</b>	<b>50,100</b>	<b>0</b>

Source: Forest Service GIS 2020

**Table 3-43. Acres, Miles, or Count of Aquatic Habitat Types in Recommended Wilderness**

Habitat	Alternative B Modified	Alternative C	Alternative D
NWI wetlands (acres)	0	2,550	0
Springs (count)	0	1	0
Fens (acres)	0	1,410	0
Riparian vegetation (acres)	0	50,150	0
NHD waterbodies (acres)	0	0	0
NHD flow lines (miles)	0	83	0

Source: Forest Service GIS 2020

**Table 3-44. Acres or Miles of At-Risk Species' Habitat in Recommended Wilderness**

Habitat	Alternative B Modified	Alternative C	Alternative D
Rocky Mountain bighorn sheep (all habitat types [acres]) <sup>1</sup>	0	25,700	0
Rocky Mountain bighorn sheep (core herd home range [acres]) <sup>1</sup>	0	0	0
Greater sage-grouse (all habitat types [acres])	0	0	0
Lynx (peripheral [acres])	0	28,200	0
Colorado River cutthroat trout (current population [miles])	0	11.1	0
Peregrine falcon (acres)	0	9,500	0
Black rosy-finch (acres)	0	20,600	0
Pygmy rabbit (acres)	0	0	0
Fringed myotis (acres)	0	0	0

<sup>1</sup>There is overlap between the core herd home range and general habitat types.

Source: Forest Service GIS 2020

Under all action alternatives, desired conditions for designated areas would benefit wildlife and at-risk species by preserving ecological and wilderness characteristics (DA-DC-HUW-01 through 07 and 09; DA-SUIT-HUW-01 and 02) and maintaining ecological conditions that support sustainability and resiliency (DA-DC-RNA-01 and 02). Standards to prohibit timber harvest in recommended wilderness would maintain habitat characteristics for species such as migratory birds that rely on trees for shelter and nesting sites (DA-SUIT-HUW-01). Prohibiting new roads, motorized trails, recreation developments, and energy utility corridors (DA-SUIT-HUW-01; DA-ST-HUW-01 and 03) would decrease the potential for disturbance, injury, or mortality; habitat loss; and habitat alterations.

### *Environmental Consequences for Wildlife—Alternative B Modified*

#### **Effects from Vegetation Management and Fire and Fuels Management**

Alternative B modified would promote vegetation management for resource objectives by aiming to treat an average of 2,400 acres annually in the first decade and 2,100 acres annually in the second decade of vegetation management, including prescribed fire, in areas where timber harvest is allowed. Where treatments overlap wildlife species' habitats (table 3-17, table 3-18, table 3-19, and table 3-40), species would experience short- and long-term impacts from implementing treatments and achieving desired conditions, as described under "Environmental Consequences for Wildlife Common to All Alternatives." Where these treatments occur, wildlife and at-risk species' habitat would move toward desired conditions over the long term.

Because more acres of lynx and fringed myotis habitat would be suitable for timber production relative to alternative A, these species would experience increased impacts from tree removal. As described under "Environmental Consequences for Wildlife Common to Alternatives B Modified, C, and D," at-risk species whose habitat is threatened by conifer encroachment (Rocky Mountain bighorn sheep) may benefit from increased timber harvest, whereas species requiring forest cover, such as lynx and fringed myotis, may experience habitat loss or degradation. All species may benefit from movement of habitat toward desired conditions, and forest plan guidelines would help reduce negative impacts from the implementation of vegetation treatments ("Environmental Consequences for Wildlife Common to Alternatives B Modified, C, and D"; appendix D).

Under this alternative, openings created by timber harvest treatments would not exceed 40 acres unless determined necessary to achieve desired ecological conditions. This would ensure forest stands where treatments occur are structurally diverse, vary across landscapes in time and space, and therefore provide a variety of wildlife habitat types across the national forest. Relative to alternative A, focusing timber harvest to maintain or restore forest and woodland types would improve habitat conditions for wildlife and at-risk species by providing increasing habitat resiliency and ecosystem health and by reducing habitat loss from overexploitation. Likewise, emphasizing the use of fire for ecosystem maintenance and restoration would improve habitat conditions and availability for wildlife and at-risk species. This would ultimately contribute to the recovery of federally listed endangered and threatened species and to maintaining a viable population of each SCC within the plan area.

Management of unplanned ignitions on 10 percent of ignitions would result in short-term impacts on wildlife and at-risk species, such as temporary habitat loss and the potential for injury or mortality. It also would result in long-term impacts such as improved habitat quantity and quality due to increased flexibility and the ability to reach desired conditions relative to alternative A. The location of these effects cannot be predicted because the locations of future unplanned ignitions are unknown.



Management under alternative B modified would also support the maintenance and improvement of resilient ecosystems and watersheds to support wildlife diversity. Under alternative B modified, 10 stream miles of aquatic species habitat would be improved every 5 years. These projects would have design features to restore habitat and populations of aquatic and riparian species. Stream restoration projects would result in improvements to aquatic and riparian species' habitats, as described under "Environmental Consequences for Wildlife Common to All Action Alternatives." Effects from plan components to meet desired conditions for watersheds, aquatic, and riparian ecosystems and fisheries/aquatics would be the same as those described under "Environmental Consequences for Wildlife Common to All Action Alternatives."

### **Effects from Recreation**

The effects from various types of recreation on wildlife and at-risk species are described under "Environmental Consequences for Wildlife Common to All Alternatives." The magnitude of these effects would generally correspond to the area of overlap between recreation management areas and general wildlife or at-risk species habitat (table 3-20 and table 3-41).

The acres of at-risk species habitat that would occur in recreation management areas under alternative B modified are shown in table 3-41. Included are 9,000 acres of general Rocky Mountain bighorn sheep habitat, 17,500 acres of Rocky mountain bighorn sheep core herd home range, 3,000 acres of greater sage-grouse habitat, 9,300 acres of lynx peripheral habitat, 7.5 miles of Colorado River cutthroat trout streams, 3,400 acres of peregrine falcon habitat, 600 acres of pygmy rabbit habitat, and 10,200 acres of fringed myotis habitat that would occur in destination recreation management areas (table 3-41). Since destination recreation management areas emphasize developed recreation experiences in high-use areas (with motorized access and support facilities), impacts such as disturbance and habitat alterations would be highest in these areas. Species that are sensitive to disturbance, such as fringed myotis, might be negatively affected from increased human presence in destination recreation management areas that overlap their habitat; however, plan components to reduce disturbance to caves would reduce the threat of disturbance to hibernacula (see appendix D). Additionally, destination areas are typically small, linear in scope, and already have a high level of human presence and disturbance, so wildlife may already avoid these areas or have become habituated to human presence. Plan components that support ecosystems and habitat conditions that provide essential habitat characteristics for native species would ensure that habitat for all at-risk species is maintained in the Ashley National Forest despite impacts from recreation (appendix D).

### **Effects from Livestock Grazing Management**

Alternative B modified would have the same number of acres for active grazing allotments as alternative A (approximately 919,700 acres); therefore, impacts on wildlife and at-risk species from livestock grazing would be similar to those described for alternative A. However, in the absence of site-specific direction in allotment management plans, inclusion of a forestwide guideline of management of forage utilization levels (50 percent) of key forage species and 4-inch stubble height guidelines in riparian areas under alternative B modified would help meet desired conditions for terrestrial vegetation and allow for flexibility for site-specific conditions. Compared with alternative A, this would improve habitat conditions for wildlife and at-risk species within active allotments. This would come about by maintaining or increasing vegetation cover, structure, and diversity, which provide habitat components, such as forage and cover, for a variety of wildlife species. It might also increase forage for big game species such as bighorn sheep by reducing the potential for plant species composition to shift toward nonpalatable or grazing-tolerant plant species where grazing occurs.

Forest plan components would help to address the threat of pathogen transfer from domestic sheep to bighorn sheep by providing separation when a permit is waived without preference. Where bighorn sheep do not come in contact with domestic sheep, pathogen transmission from domestic sheep to bighorn sheep is not a concern. These components would include a guideline that would provide separation of domestic and bighorn sheep when a permit is waived without preference by (1) providing separation that would mitigate the threat of pathogen transfer from domestic sheep and goats to bighorn sheep, consistent with the most current state bighorn sheep management plans; (2) mitigating the threat of pathogen transfer from domestic sheep or domestic goats to bighorn sheep in accordance with reasonable management guidelines pursuant to a new site-specific memorandum of understanding; (3) leaving the allotment vacant of domestic sheep and goats; (4) working with the State of Utah to remove or translocate bighorn sheep, or (5) using another method that would provide separation of the species or that would reduce the threat of pathogen transfer from domestic sheep to bighorn sheep (FW-GD-WILDL-09). Plan components would also limit authorization of new permitted domestic sheep or goat allotments unless the Ashley National Forest determines, based on local information and the best available science, that separation of the allotment from bighorn sheep will be obtained (FW-GD-WILDL-10). Alternative B modified also includes the following goal (FW-GO-WILDL-03): “Risk of contact between bighorn sheep and domestic sheep should be minimized through collaboration with the State of Utah, such as utilizing memorandums of understanding, and applying site-specific management strategies described in domestic sheep permit annual operating instructions that strive to minimize the risk of contact between the two species.” These plan components would reduce the risk of contact between domestic sheep and bighorn sheep and ensure consistency with statewide management approaches for bighorn sheep.

### **Effects from Designated Areas**

Under alternative B modified, all existing special areas and RNAs would remain. No additional designated areas, recommended wilderness areas, or wild and scenic river segments classified as suitable for inclusion in the NWSRS would be proposed under this alternative. Impacts from managing existing areas would be the same as those described for alternative A.

### *Environmental Consequences for Wildlife—Alternative C*

#### **Effects from Vegetation Management and Fire and Fuels Management**

Alternative C emphasizes passive rather than active vegetation treatments. Alternative C aims to treat 1,000 acres annually in the first decade and 800 acres annually in the second decade of vegetation management in areas where timber harvest is allowed (table 3-17, table 3-18, and table 3-19). Compared with alternative B modified, this represents a decrease in total acres treated. The acres of general wildlife and at-risk species’ habitat that are suitable for timber production would also decrease relative to alternative B modified (table 3-19 and table 3-40). Short-term impacts (e.g., disturbance) on wildlife and at-risk species resulting from implementing treatments, as described under “Environmental Consequences for Wildlife Common to All Alternatives,” would be less than under alternative B modified. Impacts from restricting openings created by timber harvest treatments to 40 acres or less would be similar to those described for alternative B modified, but habitat protections would be greater. This is because there would be no exceptions to the 40-acre maximum.

Because fewer acres of lynx and fringed myotis habitat would be suitable for timber production relative to alternative A, these species would experience reduced impacts from tree removal. The benefit to at-risk species whose habitat is threatened by conifer encroachment (Rocky Mountain bighorn sheep) is less under this alternative than alternative B modified since there are fewer acres of suitable timber production. Species requiring forest cover, such as lynx and fringed myotis, might experience less habitat loss or degradation relative to alternative B modified. Forest plan components would reduce negative

impacts from the implementation of vegetation treatments (see “Environmental Consequences for Wildlife Common to Alternatives B Modified, C, and D”; appendix D).

All species might benefit from movement of habitat toward desired conditions in areas where vegetation treatments occur, and to a greater extent than under alternative A. However, because fewer acres would be treated overall, alternative C might be less effective in trending vegetation types toward the natural range of variation and improving wildlife habitat. Stressors to at-risk species, such as insect outbreaks, uncharacteristic wildfires, and climate effects, would continue in untreated forest types.

Management of unplanned ignitions on at least 20 percent of ignitions would have impacts similar to those described for alternative B modified. However, the greater percentage of ignitions managed would increase short-term impacts on wildlife and at-risk species; it would also increase long-term impacts (e.g., improvements in habitat quantity or quality) by increasing the ability or rate at which desired conditions are achieved.

Effects from improving 10 stream miles of aquatic species habitat every 5 years would be the same as those described under alternative B modified.

### **Effects from Recreation**

Under alternative C, fewer acres of general wildlife and at-risk species habitat would occur in destination and general recreation management areas relative to alternative B modified; more acres would fall within backcountry management areas (table 3-20 in “Terrestrial Vegetation” and table 3-41). There are no comparable management areas under alternative A. As discussed under alternative B modified, since destination recreation management areas emphasize developed recreation experiences in high-use areas (with motorized access and support facilities), impacts such as disturbance and habitat alterations would be highest in these areas. The lowest level of impacts is anticipated in backcountry areas. Impacts on wildlife and at-risk species due to recreation would decrease relative to alternative B modified. This is because, with more acres designated as backcountry management areas, overall recreation would be lower intensity with fewer facilities, roads, or other disturbances. At-risk species that are sensitive to disturbance, such as fringed myotis, might benefit due to reduced human presence in their habitat; plan components to reduce disturbance to caves would still apply and would reduce the threat of disturbance to hibernacula (see appendix D). Additional plan components that support habitat characteristics for native species would ensure that habitat for all at-risk species is maintained in the Ashley National Forest despite impacts from recreation (appendix D).

### **Effects from Livestock Grazing Management**

Alternative C would have fewer acres with active grazing (13,400 acres closed) and fewer head months available relative to all other alternatives. Compared with alternative A, this would reduce the extent of impacts on wildlife and at-risk species from livestock grazing.

Management of forage utilization levels (40 percent) of key forage species as well as 4-inch stubble height guidelines in riparian areas under alternative C would help meet desired conditions for terrestrial vegetation. As described under alternative B modified, this would improve habitat conditions for wildlife and at-risk species within active allotments relative to alternative A. Compared with alternative B modified, improvements would be of a greater magnitude because forage utilization levels would be lower; thus, wildlife habitat features such as cover and forage would be increased. Reduced acres of livestock grazing in the more arid parts of the Ashley National Forest, however, could reduce the amount of water developments that some wildlife may depend on.

As under alternative B modified, this alternative would include a goal to minimize risk of contact between bighorn sheep and domestic sheep through collaboration with the State of Utah, such as utilizing memorandums of understanding, and applying site-specific management strategies described in domestic sheep permit annual operating instructions that strive to minimize the risk of contact between the two species. Relative to the other action alternatives, this alternative would include additional and more stringent plan direction for separation of bighorn sheep from domestic sheep. Components would include a guideline that would close allotments where permits are voluntarily waived without preference if the allotment does not provide separation between domestic sheep/goats and bighorn sheep (FW-GD-WILDL-09). New domestic sheep or goat allotments would not be permitted within bighorn sheep core herd home ranges (FW-GD-WILDL-10). Overall, this alternative would provide the highest level of separation of domestic sheep and bighorn sheep and would therefore result in the highest level of protection of bighorn sheep from pathogen transfer from domestic sheep.

### **Effects from Designated Areas**

Alternative C would include management for recommended wilderness areas (including 25,700 acres of Rocky Mountain bighorn sheep year-long habitat, 20,600 acres of black rosy-finch habitat, 28,200 acres of lynx peripheral habitat, 11.1 miles of Colorado River cutthroat trout streams, and 9,500 acres of peregrine falcon habitat). The acres of wildlife, aquatic, and at-risk species' habitat that would overlap recommended wilderness are shown in table 3-42, table 3-43, and table 3-44. This management would improve habitat conditions for these species by reducing disturbance, habitat fragmentation, habitat degradation, and potential for injury or mortality from vehicle collisions or trampling compared to alternative A.

Additionally, 1,400 acres of the proposed Gilbert Bench RNA would overlap the alpine vegetation type, corresponding to 1,400 acres of the following habitat types: Rocky Mountain bighorn sheep general year-long habitat, Rocky Mountain bighorn sheep core herd home range Uintas summer habitat, Rocky Mountain bighorn sheep core herd home range Uintas Winter habitat, and black rosy-finch habitat. RNA management in these habitat types would likely decrease impacts, such as disturbance and habitat fragmentation, on bighorn sheep, black rosy-finch, and other alpine species due to fewer surface-disturbing activities and other limited uses. Management to emphasize habitat connectivity and maintenance of a natural setting would generally increase habitat quality for all wildlife.

Under alternative C, there would be four additional segments brought forward as suitable for inclusion in the NWSRS, including 11.4 miles of fish-bearing streams. This is the only alternative in which streams used by Colorado River cutthroat trout would be included in the system. Management guidelines for the NWSRS would generally improve habitat for fish by preventing habitat degradation, as described under "Environmental Consequences for Wildlife Common to All Alternatives."

### ***Environmental Consequences for Wildlife—Alternative D***

#### **Effects from Vegetation Management and Fire and Fuels Management**

Alternative D aims to treat 1,600 acres annually in the first decade and 1,300 acres annually in the second decade of vegetation management in areas where timber harvest is allowed (table 3-17, table 3-18, and table 3-19). Compared with alternative B modified, this represents an increase in total acres treated. The acres of general and at-risk species habitat that are suitable for timber production would also increase relative to alternative B modified (table 3-19 and table 3-40) and to alternative A. Short-term and long-term impacts resulting from disturbance and habitat alterations would be as described under "Environmental Consequences for Wildlife Common to All Alternatives." Effects from plan components

to meet desired conditions for vegetation, timber, and fire would be similar to those described under “Environmental Consequences for Wildlife Common to All Action Alternatives.”

At-risk species whose habitat is threatened by conifer encroachment (Rocky Mountain bighorn sheep) would benefit from an increase of area that is suitable for timber production relative to alternatives A and B modified, whereas species requiring forest cover, such as lynx and fringed myotis, might experience a greater amount of habitat loss or degradation relative to alternatives A and B modified. Under this alternative, 10 miles of Colorado River cutthroat trout streams would be suitable for timber production. This could degrade habitat for the Colorado River cutthroat trout and other aquatic species because tree removal near streams could cause increased streambank erosion, runoff, sedimentation, and elevated water temperatures. However, forest plan components would reduce negative impacts from the implementation of vegetation treatments (see “Environmental Consequences for Wildlife Common to Alternatives B Modified, C, and D”; appendix D), and all species would benefit from movement of habitat toward desired conditions in areas where vegetation treatments occur.

Impacts from restricting openings created by timber harvest treatments to 40 acres or less would be similar to those described for alternative B modified; however, openings could exceed this threshold when determined necessary to achieve desired ecological conditions. This could fragment wildlife habitat by creating open areas that might provide appropriate habitat features, such as cover for elk and deer or foraging habitat for forest hawks and small mammals. Created openings could also benefit wildlife such as golden eagles, falcons, elk and deer by opening the canopy and providing foraging habitat for the species and/or increasing prey species habitat.

Management of unplanned ignitions would have similar impacts as described for alternative B modified. However, the reduced proportion of ignitions that would be managed under alternative D (at least 5 percent of ignitions) and the increased focus on fire suppression would decrease short-term impacts on wildlife and at-risk species, such as the likelihood for disturbance, injury, or mortality. It would also reduce improvements in habitat quantity or quality by reducing the ability to achieve desired conditions or the rate at which they are achieved.

Under alternative D, 15 stream miles of aquatic species habitat would be improved every 5 years. Stream restoration projects would result in improvements to aquatic and riparian species’ habitats, as described under “Environmental Consequences for Wildlife Common to All Action Alternatives.” Compared with alternative B modified, the amount of aquatic and riparian habitat improved would be greater because more stream miles would be improved. This would improve habitat conditions for aquatic species to a greater extent than under alternative B modified; however, short-term impacts, such as temporary sedimentation and the potential for injury or mortality from carrying out construction activities would also increase.

### **Effects from Recreation**

Under alternative D, more acres of general and at-risk species habitat would occur in destination and general recreation management areas relative to alternative B modified; fewer acres would fall within backcountry management areas (table 3-20 in “Terrestrial Vegetation” and table 3-41). Compared with alternative B modified, impacts on wildlife and at-risk species due to recreation would increase. This is because overall recreation would be higher intensity with more facilities, roads, and other disturbances. At-risk species that are sensitive to disturbance, such as fringed myotis, may experience increased disturbance due to increased human presence in their habitat. However, plan components to reduce disturbance to caves would reduce the threat of disturbance to hibernacula (see appendix D). Additional

plan components that support habitat characteristics for native species would ensure that habitat for all at-risk species is maintained in the Ashley National Forest despite impacts from recreation (appendix D).

### **Effects from Livestock Grazing Management**

Alternative D would have the same number of acres for active grazing allotments as alternative A; therefore, impacts on wildlife and at-risk species from livestock grazing would be similar to those described for alternative A. Unlike the other action alternatives, limits to utilization of key forage species and stubble height would not be predetermined but would be based on desired conditions. If greater forage utilization and lower stubble height were generally used under this alternative, this could translate to reduced habitat features such as forage and cover.

Relative to the other action alternatives, this alternative would include less stringent plan direction for separation of bighorn sheep from domestic sheep. As under alternative B modified, components would include a goal to minimize risk of contact between bighorn sheep and domestic sheep through collaboration with the State of Utah, such as utilizing memorandums of understanding, and applying site-specific management strategies described in domestic sheep permit annual operating instructions that strive to minimize the risk of contact between the two species. However, alternative D does not include a guideline with specific details for how to achieve separation of domestic sheep and bighorn sheep for allotments voluntarily waived without preference. Direction is provided in a guideline (FW-WILDL-GLD-10) to utilize closed, vacant allotments, or forage reserves outside of bighorn sheep core herd home range when permitting new allotments for domestic sheep or goats.

### **Effects from Designated Areas**

Alternative D does not include any additional designated areas, recommended wilderness areas, or wild and scenic river segments classified as suitable for inclusion in the NWSRS. Impacts from managing existing areas would be the same as those described for alternative A.

### **Cumulative Environmental Consequences for Wildlife, Fish, and Plants**

Past, present, and reasonably foreseeable actions that would contribute to cumulative impacts on wildlife and at-risk species in the Ashley National Forest are discussed below. Activities such as recreation and mineral development projects on or near the Ashley National Forest could cumulatively contribute to adverse impacts on wildlife and at-risk species, such as the potential for injury or mortality and habitat loss or alteration. Vegetation management, riparian restoration, and fish and wildlife enhancement projects, such as the High Uintas Wilderness Colorado River Cutthroat Trout Habitat Enhancement project, would contribute to beneficial impacts such as increased habitat quality and quantity. Fuels reduction and conifer reduction projects, such as the Lake Fork Hazardous Fuels Reduction and Wildlife Habitat Improvement Project and the Mill Park Forest Restoration Project, would also improve wildlife habitat by reducing potential threats from catastrophic wildfire and improving wildlife habitat and ecological conditions in the plan area.

Fishing and hunting, which the Utah Division of Wildlife Resources and the Wyoming Game and Fish Department manage, are other popular recreational activities in the Ashley National Forest. These activities would increase human presence in wildlife and at-risk species' habitat, which might cause disturbance or habitat alterations, as described above. In particular, gun shots would produce sudden, loud noises that could temporarily disturb wildlife and cause fleeing or habitat avoidance or abandonment. Fishing can lead to the spread of aquatic invasive species, such as whirling disease and New Zealand mud snails. Fishing can also contribute to degradation of riparian and aquatic habitat from human presence in these areas.

When combined with the impacts of other surface-disturbing (e.g., recreation and mineral development) projects, restoration and construction (e.g., for vegetation treatments or riparian restoration) projects under all alternatives would contribute to adverse impacts on wildlife and at-risk species, such as the potential for injury or mortality and habitat degradation. The cumulative contribution would likely be greatest under alternatives A and D, which provide fewer protections for wildlife and at-risk species. However, the contribution to such adverse effects would be outweighed by the countervailing positive effects from managing wildlife to alleviate threats to at-risk species and to support their persistence in the Ashley National Forest in the long term.

When combined with the impacts of other vegetation, riparian restoration, and fish and wildlife habitat enhancement projects, the proposed management efforts would contribute to the movement of habitats for fish and wildlife and at-risk species toward desired conditions. Achieving desired conditions (common to all alternatives), combined with habitat improvements from the vegetation, riparian restoration, and wildlife habitat enhancement projects, would contribute to habitat alterations on a large scale. Habitat improvements may include a decrease in nonnative species, increased availability of habitat features (for example, vegetation cover, structure, and diversity), and increased habitat resilience to disturbances.

The cumulative contribution to habitat improvements would likely be greatest under the action alternatives. This is because they would rely on an ecosystem-level and species-specific approach to habitat management that would contribute to the diversity and long-term persistence of native wildlife and at-risk species. Habitat improvements would ultimately contribute to the recovery of federally listed endangered and threatened species and to maintaining a viable population of each SCC within the plan area and the larger landscape.

## Social and Economic Sustainability and Multiple Uses

### Social and Economic Sustainability and Environmental Justice

#### Introduction

Local communities, particularly those adjacent to National Forest System lands, benefit from a multitude of goods and services provided by the Ashley National Forest; changes to the management of these resources have the potential to affect these communities. The 2012 Planning Rule states that plans are to guide management so that national forests and grasslands contribute to social and economic sustainability, providing communities with ecosystem services and multiple uses that deliver a range of social, economic, and ecological benefits in the present and into the future. This section, therefore, describes the social and economic conditions of the affected environment using key indicators of social and economic sustainability, describes how the Ashley National Forest currently contributes to social and economic sustainability of beneficiaries both locally and at a broader scale, and evaluates the impacts of the proposed forest plan and alternatives on the benefits the national forest provides to local beneficiaries and the general public. Baseline demographic and economic data collected for this report includes information from publicly available sources. These sources include, but are not limited to, the U.S. Department of Commerce, U.S. Census Bureau, U.S. Bureau of Economic Analysis, and U.S. Bureau of Labor Statistics. Current and historical Forest Service data are provided to summarize the Ashley National Forest contributions and levels of use. Other reports that were utilized to provide context for local social and economic concerns included Krannich (2008), a statewide study of public lands and Utah community concerns, and the 2008 Aspects of Beliefs and Values Regarding Resources and Management of the Ashley National Forest (Russell 2008), which included interviews with local interested parties of the Forest. For this analysis, social values are discussed within the context of the ecosystem services section.

Additional details for baseline social and economic conditions and contributions from the Ashley National Forest are provided in the socioeconomic assessment completed in advance of this planning effort (Forest Service 2017g).

### *Regulatory Framework*

**National Forest Revenue Act (amended 1908)**—This act requires 25 percent of revenues generated by National Forest System lands to be paid to the States for use by the counties in which the lands are situated for the benefit of public schools and roads.

**Multiple-Use Sustained-Yield Act of 1960**—This act identifies principles for managing the resources of the National Forest System. The direction to manage these resources for the greatest good over time includes the use of an economic and social analysis to determine management of the National Forest System.

**Forest and Rangeland Renewable Resources Planning Act of 1974 (as amended by the National Forest Management Act of 1976)**—This act requires consideration of potential economic consequences of land management planning.

**Secure Rural Schools and Community Self-Determination Act of 2000 and the subsequent reauthorizations of this act**—This act was designed to stabilize annual payments to States and counties containing National Forest System lands and public domain lands managed by the Bureau of Land Management. Funds distributed under the provisions of this act are for the benefit of public schools, roads, and related purposes. Payments are allocated to counties for use in different types of programs or projects, including schools and roads (Title I), projects to benefit forest lands (Title II), and search, rescue, and firewise community efforts (Title III).

**Executive Order No. 12898 on Environmental Justice (issued February 11, 1994)**—This executive order mandates Federal agencies to make achieving environmental justice part of their mission. It directs agencies to identify and address, as appropriate, any disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. Environmental justice communities are those identified as having meaningfully greater minority or low-income populations.

### *Analysis Area*

The socioeconomic area of analysis is defined by both geography and social ties. The analysis area is comprised of Daggett, Duchesne, and Uintah Counties in Utah, and Sweetwater County in Wyoming. These counties represent the functional economy for people living and working around the plan area. Although some effects may occur outside this area, the majority of the effects will likely occur within the four counties, which contain almost the entire plan area. Detailed information related to current social and economic conditions in these counties is included throughout this report.

Additional counties that have social and economic connections to the Ashley National Forest include Uinta County, Wyoming, which is in close proximity and has close economic ties to the Ashley National Forest; Utah and Wasatch Counties, Utah, which contain small portions of the Ashley National Forest; and Summit County, Utah, which shares a boundary with the Ashley National Forest's northern border. Where relevant, details for these counties are included. The temporal scope of the analysis is the anticipated life of the plan, which is 15 years.



**Notable Changes Between Draft and Final EIS**

The “Affected Environment” and “Environmental Consequences” sections have been updated based on public comments to address document inconsistencies and factual inaccuracies. Updated baseline data has been provided for some key data sets, and additional information has been included on recreation trends. Analysis has been updated for alternative B modified to incorporate updated management, including the removal of recommended wilderness and the updates to livestock grazing management direction. In addition, analysis has been updated to include modification to FW-GO-SOCEC-01 to emphasize coordination to reduce potential impacts to environmental justice communities. Goal (FW-GO-TRIBE) was updated to emphasize coordination with Indian tribes regarding their perspectives, needs, and concerns and to incorporate traditional ecological knowledge into project design where appropriate.

**Description of Affected Environment**

**Social and Economic Conditions**

**Age**

Population age is an important factor of analysis when considering management actions within the Ashley National Forest. Different age groups have different needs, values, and attitudes concerning National Forest management. A younger-than-average population age can indicate the need for family-friendly activities and uses, such as a trail system with a range of degrees of difficulty; an older-than-average population with extra mobility requirements might increase the demand for easily accessible trailheads and camping.

Table 3-45, below, shows the median age and age distribution for each county. For comparison, Utah, Wyoming, and the United States are also included. At 42.5, Daggett County has a median age well above average for both the United States and Utah. In addition, 12.6 percent of its population is over the age of 65. The median ages for the other three counties mirrors those of their respective states and are much lower than the United States average (38.1). With the exception of Daggett County, plan area counties also have a smaller over 65 population and a higher population of children and young adults compared with the national average.

**Table 3-45. Analysis Area Percentage of the Population by Age Group (2019)**

Location	Median Age	% Population Age 0–5	% Population Age 5–9	% Population Age 10–14	% Population Age 15–19	% Population Age 20–64	% Population Age 65+
<b>State of Utah</b>	30.8	8.1	8.5	8.4	7.9	56.3	10.8
Daggett County	42.5	3.9	6.5	8.2	9.1	59.8	12.6
Duchesne County	31.5	9.6	9.6	9.4	7.6	52.6	11.4
Uintah County	30.6	8.8	10.8	8.7	7.5	54.0	10.2
<b>State of Wyoming</b>	37.7	6.3	6.7	6.7	6.3	58.2	15.7
Sweetwater County	35.3	6.9	8.3	7.1	7.5	58.8	11.4
<b>United States</b>	38.1	6.1	6.2	6.4	6.5	59.2	15.6

Source: Census Bureau 2019a

### Population Size

Table 3-46, below, provides an overview of the population totals and change by specific towns, cities, and counties in the socioeconomic plan area. Populations for Utah and Wyoming are included for comparison. In the socioeconomic plan area, Daggett County has the smallest population, with only 613 residents. Compared with the other Utah counties, Daggett County has also experienced less growth since 1990. Sweetwater County has the highest population of the four counties, followed by Uintah and Duchesne Counties. Duchesne and Uintah Counties had the highest population growth in the socioeconomic plan area, both of which had growth rates above 50 percent. However, they remained below the Utah state growth rate of 79.8 percent.

**Table 3-46. Population in the Socioeconomic Analysis Area (1990–2019)**

Location	1990	2000	2010	2015	2019	% Change 1990–2019
<b>Utah</b>	<b>1,722,850</b>	<b>2,233,169</b>	<b>2,763,885</b>	<b>2,858,111</b>	<b>3,096,848</b>	<b>79.8</b>
<b>Daggett County</b>	<b>690</b>	<b>921</b>	<b>1,059</b>	<b>1,107</b>	<b>613</b>	<b>-11.2</b>
Dutch John	N/A	N/A	145	103	89	N/A
Manila	207	308	310	193	211	1.9
<b>Duchesne County</b>	<b>12,645</b>	<b>14,371</b>	<b>18,607</b>	<b>19,378</b>	<b>20,148</b>	<b>59.3</b>
Roosevelt	3,915	4,299	6,046	6,390	7,041	79.8
Duchesne	1,308	1,408	1,690	2,007	1,830	39.9
<b>Uintah County</b>	<b>22,211</b>	<b>25,224</b>	<b>32,588</b>	<b>34,576</b>	<b>36,084</b>	<b>62.5</b>
Vernal City	6,644	7,714	9,089	9,882	10,574	59.2
<b>Wyoming</b>	<b>453,588</b>	<b>493,782</b>	<b>563,626</b>	<b>575,251</b>	<b>581,024</b>	<b>28.1</b>
<b>Sweetwater County</b>	<b>38,823</b>	<b>37,613</b>	<b>43,806</b>	<b>44,595</b>	<b>43,521</b>	<b>12.1</b>
Green River	12,711	11,808	12,515	12,600	12,069	-5.1
Rock Springs	19,050	18,708	23,036	23,684	23,319	22.4

Sources: Census Bureau 1990, 2000, 2010, 2015, 2019a

### Employment

The employment distribution for the four-county socioeconomic analysis area is shown in table 3-47. The largest employment sector is government (17 percent of total jobs in the analysis area), followed by mining (15 percent), information (12 percent), and retail trade (10 percent). Forest Service management that affects government spending, mining, and recreation could affect the jobs these sectors contribute to the area. Retail spending includes spending associated with recreational visitors to the Ashley National Forest who spend money on supplies and equipment.

The next largest sector is construction (7 percent), followed by a variety of service industries that have an employment distribution ranging from 1 to 7 percent. Agriculture is a relatively small piece of the economy (5 percent).

Table 3-48 provides county-level employment by industry. In 2017, Daggett County’s largest employment industry was government (44 percent), followed by agriculture (11 percent) and accommodation and food services (10 percent). Duchesne County’s main employment industry was government (18 percent), followed by mining (17 percent) and retail trade (9 percent); agriculture was 9 percent. Uintah County’s main employment industry was government (18 percent), followed by mining (12 percent) and retail trade (11 percent); agriculture was 7 percent. Sweetwater County’s largest industry was mining (17 percent), followed by government (16 percent) and retail trade (9 percent); agriculture was only 1.4 percent (table 3-48).

**Table 3-47. Analysis Area Employment Distribution by Industry (2017)**

Industry	Employment	Percent Employment
<b>Total</b>	<b>57,330</b>	<b>-</b>
Agriculture, forestry, fishing & hunting	2,736	4.8
Mining	8,786	15.3
Utilities	848	1.5
Construction	4,178	7.3
Manufacturing	1,717	3.0
Wholesale trade	1,843	3.2
Retail trade	5,525	9.6
Transportation & warehousing	3,191	5.6
Information	388	12.1
Finance & insurance	1,343	2.3
Real estate & rental	2,772	4.8
Professional—scientific & technology services	1,788	3.1
Management of companies	311	0.5
Administrative & waste services	1,192	2.1
Educational services	383	0.7
Health & social services	3,401	5.9
Arts, entertainment, & recreation	592	1.0
Accommodation & food services	4,128	7.2
Other services	2,280	4.0
Government	9,928	17.3

Source: Forest Service data modeled with IMPLAN 2017 and Forest Economic Analysis Spreadsheet Tool

**Table 3-48. County-Level Employment by Industry (2017)**

Industry	County (%)			
	Daggett	Duchesne	Uintah	Sweetwater
Agriculture, forestry, fishing & hunting	11.2	8.7	7.2	1.4
Mining	0.9	16.7	11.7	17.4
Utilities	0.2	0.4	1.4	2.0
Construction	3.8	6.3	7.0	7.9
Manufacturing	2.5	1.7	1.6	4.4
Wholesale trade	1.4	1.9	2.8	4.1
Retail trade	4.4	8.7	11.2	9.2
Transportation & warehousing	6.0	6.9	5.1	5.3
Information	0.0	0.6	0.9	0.6
Finance & insurance	0.4	2.0	2.2	2.7
Real estate & rental	0.7	5.2	5.4	4.4
Professional—scientific & technology services	5.1	2.6	3.1	3.3
Management of companies	0.6	1.2	0.1	0.5
Administrative & waste services	1.0	1.4	2.0	2.5
Educational services	0.0	1.0	1.1	0.3
Health & social services	1.9	7.7	6.3	5.1

Industry	County (%)			
	Daggett	Duchesne	Uintah	Sweetwater
Arts, entertainment, & recreation	4.7	0.9	0.8	1.1
Accommodation & food services	9.6	4.1	6.8	8.7
Other services	1.7	3.8	5.8	3.0
Government	43.9	18.3	17.5	16.0

Source: Forest Service data modeled with IMPLAN 2017 and Forest Economic Analysis Spreadsheet Tool

### Personal Income

Among counties in the four-county analysis area, per capita income in 2018 was highest in Sweetwater County (\$53,145) and lowest in Uintah County (\$31,563). All area counties were below the state averages (see table 3-49). Average earnings were also highest in Sweetwater County (\$74,369) but lowest in Daggett County (\$32,980).

The cost to access recreation opportunities on Federal lands is one key factor influencing outdoor recreation use (Cho et al. 2014; Stevens et al. 2014). Personal income levels can, therefore, affect individuals' ability to adapt to an increase in recreation fees (Burns and Graefe 2006), as well as their likelihood of participation in outdoor recreation. Income levels may also affect the level of importance of forest resources (i.e., personal use fuelwood) for individuals and communities.

**Table 3-49. Average Earnings and Per Capita Income (2018)**

Location	Average Earnings Per Job (\$)	Per Capita Income (\$)
<b>Utah</b>	52,364	46,320
Daggett County	32,980	41,157
Duchesne County	44,498	36,709
Uintah County	45,392	31,563
<b>Wyoming</b>	55,122	60,361
Sweetwater County	74,369	53,145

Source: BEA 2019

### Unemployment

Table 3-50 shows the annual unemployment rate within the study area in 2021. Uintah and Sweetwater Counties had the highest rate of unemployment in 2021 (5.6 percent). Unemployment was lowest in Daggett County (3.6 percent). The unemployment rate is an indicator of the general economic condition of an area. All counties were above their respective state unemployment rates, but only Uintah and Sweetwater Counties were above the unemployment rate of the United States as a whole.

**Table 3-50. Unemployment (2021)**

Location	Unemployment Rate (%)
<b>Utah</b>	2.7
Daggett County	3.6
Duchesne County	4.9
Uintah County	5.6
<b>Wyoming</b>	4.5
Sweetwater County	5.6
<b>United States</b>	5.3

Source: BLS 2021

## Ashley National Forest Economic Contributions

### Overview of Market Contributions

The Ashley National Forest contributes economically to the surrounding region. The contributions are both directly through Forest Service employment, commodity revenues, and tax subsidies and indirectly through resource development, tourism, and recreational spending. The quantitative economic contributions are assumed to occur in the four-county socioeconomic analysis area. A summary of contributions is provided in table 3-51 and in the text below.

**Table 3-51. Estimated Annual Employment and Labor Income Contributions from the Ashley National Forest by Resource Program (2017)**

Ashley National Forest Contribution	Employment (Full- and Part-Time Jobs)	Labor Income (Thousands of 2020 Dollars)
Recreation (not wildlife and fish related)*	53	\$1,639
Recreation (wildlife and fish related)*	58	\$1,865
Grazing	124	\$2,100
Timber	28	\$1,406
Minerals	8	\$841
Payments to states/counties	69	\$3,793
Forest Service expenditures	225	\$12,763
<b>Total Forest Management</b>	<b>565</b>	<b>\$24,407</b>

Source: Forest Service data modeled with IMPLAN 2017 and Forest Economic Analysis Spreadsheet Tool

\* Recreation includes local and nonlocal visitor spending.

### Direct Expenditures by the Forest Service

The Ashley National Forest's annual budget (including expenditures and salaries and excluding fire expenditures) was approximately \$15.5 million in fiscal year 2017. Approximately 60 percent of the budget was spent on salaries in fiscal year 2017. The remainder was spent on equipment and other non-salary expenditures that contribute to land management. The Ashley National Forest's operational expenditures contribute to economic activity in the communities that surround the national forest. Forest Service employees live in these communities and spend their income on housing, food, and a variety of other local goods and services. The Ashley National Forest's non-salary expenditures generate economic activity in businesses that supply goods and services to support Forest Service programs.

Forest budgets may fluctuate over the life of the management plan but are not dictated by the management plan or alternatives; therefore, no variation across alternatives is modeled. Based on the current level of spending, Forest Service expenditures are estimated to contribute 225 jobs and approximately \$12.8 million dollars to the regional economy.

### Payments to Local Governments

This section discusses payments to local governments associated with payments in lieu of taxes (PILT) and the Secure Rural Schools and Community Self Determination Act of 2000 (SRSCS).

PILT are annual Federal payments made to local governments to offset property tax revenue losses from nontaxable Federal lands held within their boundaries. PILT are meant to subsidize taxes that would otherwise fund government services such as schools, road improvements, and fire suppression. PILT awarded to Uintah and Sweetwater Counties exceeded \$3.5 million each in 2015. Duchesne County

received nearly \$2.8 million in PILT, and Daggett County received less than \$400,000 in PILT in fiscal year 2019 (U.S. Department of the Interior 2020). The portion of PILT attributed to National Forest System lands represents a fraction of the total PILT payments to area counties. Total payments for Forest Service acres in study area counties were estimated at \$2,287,035 in 2019 (see table 3-52, below).

Counties containing Federal lands have historically received a percentage of the revenues generated by the sale or use of natural resources on these lands. Traditionally, this has been 25 percent of the value of public land receipts, such as revenue from Federal timber sales. A steep decline in Federal timber sales on national forests during the 1990s significantly decreased revenues to local counties. The SRSCS, reauthorized in March 2018, was enacted in part to address this decline by stabilizing payments to counties dependent on revenues from Federal timber sales. Counties are eligible to receive either the 25 percent of the value of public land receipts or the SRSCS funds.

**Table 3-52. Payments to States and Counties due to the Ashley National Forest**

Year	Payments in Lieu of Taxes*	Secure Rural Schools Payments	Mineral Payments
2014	\$2,079,154	\$948,344	\$747,460
2015	\$2,121,575	\$881,652	\$422,000
2016	\$2,162,777	SRS not reauthorized by Congress	\$173,710
2017	\$2,275,446	\$1,474,521	\$135,810
2018	\$2,288,291	\$1,376,761	\$203,010
2019	\$2,287,035	\$1,247,617	\$123,300

Source: Forest Service 2020g; U.S. Department of the Interior 2020

\*Portion of total PILT attributable to National Forest System acres. Additional payments to the analysis area are made as a result of other Federal lands (for example, the BLM).

All counties in the Ashley National Forest study area have chosen to receive the SRSCS funds. Total SRSCS payments to socioeconomic plan area counties are shown in table 3-52, above. The analysis uses an average of the payments in 2014, 2015, 2017, 2018, and 2019. Congress did not authorize the SRSCS Act in 2016, and no payments were made in that year. Because SRSCS payments are not responsive to changes in Forest Service receipts, no variation in these payments occurs across alternatives.

Revenue received under the terms of the mineral leasing laws (lease rentals, bid bonuses, and royalties) are paid into the U.S. Treasury. The Treasury returns 49 percent of that revenue to the state where mineral activities occurred. Some states distribute a percentage of this revenue directly to the counties of origin while others retain the entire amount at the state level (for example, state general fund). These distributions to counties are made, and differ, by state governments, and statistics are not reported back to the U.S. Department of the Interior, Office of Natural Resources Revenue. Because this analysis spans two states with different county distribution methods, the economic impact analysis assumes a 50 percent return from states to counties. This estimated annual county-level return is reported below, and a 5-year average is used in the impact model. Although oil and gas production and associated revenues will fluctuate based on global market conditions, this is outside the control of the Forest Service, so no variation across alternatives is included in economic modeling.

Revenue-sharing payments accounted for 69 jobs and \$3.7 million of labor income to the local area economies, based on IMPLAN modeling (table 3-51).

## **Tourism and Recreation**

A national forest visit is defined by the National Visitor Use Monitoring (NVUM) survey as the entry of one person to participate in recreational activities. The NVUM survey estimated 471,000 visits to the Ashley National Forest in 2017. The average group size was 2.8 persons (Forest Service 2017h).

Visits included both nonlocal visitors (those with residences more than 50 miles away) as well as local visitors. Based on 2017 data, nonlocal overnight visitors totaled approximately 27 percent, and nonlocal day visitors totaled 13 percent. Local day-use visitors from Duchesne, Sweetwater, and Uintah Counties made up the largest proportion of visitors at 34 percent. An additional 9 percent of local visitors stayed on the Ashley National Forest or surrounding area overnight (White 2017).

The level of recreation has increased over time; based on NVUM data, from 2012 to 2017 total visits increased by approximately 60 percent (see table 3-55) (Forest Service 2017h, 2012b). The NVUM national report indicates an increase in the visitation levels for the Rocky Mountain region, with an approximately 7.7 percent increase between 2019 and 2021. Although the long-term trend in visitation after the COVID-19 pandemic is not yet certain, early data indicates that use is down from the historic highs observed in 2020, but a moderately increased level of use may continue (Forest Service 2021, 2020h, 2019e).

Based on national averages, the expenditure per party per trip to the Ashley National Forest is estimated to range from \$38 by local day visitors to \$355 by nonlocal overnight visitors (in 2019 dollars). The single biggest expense for day visitors was gasoline, followed by food. For nonlocal overnight visitors, the largest expenditure was lodging, followed by food and then gas (White 2017).

Recreation on the Ashley National Forest by nonresidents provides an estimated 111 jobs. In 2017, it accounted for \$3.5 million in labor income to the region's economy (table 3-51).

Recreation of particular interest occurring on the Ashley National Forest takes place on the Green River and the Flaming Gorge Reservoir. Popular activities include floating, rafting, and fly fishing on the Green River and motorized water-based recreation on the Flaming Gorge Reservoir. These activities have created a thriving economic community of outfitters and guides in the northeastern portion of the Ashley National Forest along the Utah-Wyoming border. This area is in Daggett County, in and around Dutch John and Red Canyon, Utah. These activities have seen significant growth in recent years, based on the number of shuttles and number of launches by private companies supporting Ashley National Forest visitors. Between 2019 and 2020, increased visitation was particularly notable, presumably due to the COVID-19 pandemic and increased demand for local recreation opportunities. From 2019 to 2020, the number of launches by guides and outfitters on the Green River increased by 15 percent. Sales of boat ramp passes on the Green River also increased by more than 100 percent over the same period. As a whole, this activity is captured in the 2017 NVUM program visitor number data that are used to complete the IMPLAN economic and market analysis for recreational use. However, the analysis cannot provide specific market valuations related to these two specific recreational activities. While exact market valuations are not possible, it is clearly a growing and important industry for visitors and private outfitters alike.

The type of recreation on the Ashley National Forest may influence the level of economic contributions. For example, the national average spending per day by nonresident motorized users was estimated to be 41 percent higher than daily spending by hikers or bikers (White and Stynes 2008). Therefore, management decisions that affect the type of recreational use permitted, such as those that restrict motorized use, may affect the level of economic contributions.

NVUM data also include measures of satisfaction reported for recreational users. In general, satisfaction on the Ashley National Forest was reported to be highest for recreationists in designated wilderness. Respondents in undeveloped areas had the lowest level of reported satisfaction; however, all visitors reported satisfaction levels above 70 percent for the elements surveyed for all areas. See table 3-53, below, for details. It should be noted that the satisfaction rating site is based on the location where the participant was interviewed, but it may represent experiences outside of this immediate area.

**Table 3-53. Visitor Satisfaction**

<b>Satisfaction Element</b>	<b>Developed Site</b>	<b>Undeveloped Areas</b>	<b>Designated Wilderness</b>
Developed facilities	87.7	80.2	96.6
Access	92.6	85.0	88.2
Services	85.3	72.8	85.0

Source: Forest Service 2017h

A growing body of evidence suggests that “natural amenities” such as scenery, access to recreation, and the presence of protected areas such as wilderness areas, have additional indirect positive economic benefits for communities possessing such amenities. A study by Headwaters Economics (2012) summarizes much of the available research and reaches several conclusions:

- Entrepreneurs and employees who are not dependent on a particular workplace location are attracted to areas that possess high levels of natural amenities.
- Retirees are attracted to areas that possess high levels of natural amenities.
- A positive relationship exists between environmental protection and in-migration, retaining businesses, and attracting new businesses.

The above conclusions are reinforced by several other comprehensive studies, including one by the Wilderness Society (2007).

### **Mineral and Energy Development**

As discussed in “Energy and Minerals,” minerals extracted from National Forest System lands on the Ashley National Forest fall into three main categories: locatable, leasable, and salable. On the Ashley National Forest, minerals extraction is largely focused on leasable minerals (oil and gas), with lesser development and production of locatable and salable minerals.

In 2017, mineral extraction on the Ashley National Forest provided an estimated eight jobs and over \$841,000 in labor income to the region’s economy (table 3-51). This represents less than 1 percent of regional jobs in the energy and mineral sector. The level of future employment supported would be affected by the level of mineral extraction and market prices.

### **Forest Products**

Timber harvesting on the Ashley National Forest peaked in the late 1980s at approximately 27,000 thousand board feet (MBF) and has averaged between 4,000 and 6,000 MBF since 2001 (see “Timber” for additional details). Utah’s commercial timber harvest in 2016 was 24,900 MBF, 80 percent (19,800) of which was harvested from national forests (Hayes et al. 2018). The Ashley National Forest supplied 4,125 MBF in 2021, which is approximately 21 percent of the national forest timber harvested in Utah (Forest Service 2021). Duchesne County had approximately 5.2 percent of the total harvest in 2016, and Uintah County had 2.2 percent, although only a portion of this was from National Forest System land (Hayes et al. 2018). There are seven local mills or potential large-scale bidders in the Uinta Basin, including two in Duchesne, two in LaPoint, one in Tridell, one in Neola, and one in Vernal.



Based on economic modeling of 2017 data, the Ashley National Forest timber harvesting program contributed 24 jobs and \$1.4 million in labor income to the region's economy (table 3-51). Labor income estimates include saw timber and removal of poles, posts, and fuelwood harvested for nonpersonal use.

The trend in demand for Ashley National Forest wood products, particularly for non-saw timber material, is declining. Supply for non-saw timber material is currently exceeding demand. The offering of this material in recent years has exceeded the local purchasers' capacity due to a backlog of prior wood sales. Demand for sawtimber material, especially green sawtimber, has remained relatively constant in recent years. Fuelwood consistently represents the bulk of forest products<sup>12</sup> sold from the Ashley National Forest.

A history of fire suppression, other human uses, and vegetation management direction have resulted in a departure from historical vegetation conditions on much of the Ashley National Forest. An increased density of vegetation and encroachment of conifers into shrub communities further increase the chance of high-intensity wildfire, particularly in the wildland-urban interface where the chance of human-caused ignition is increased. Should fire occur, timber resources would be affected, and the social, economic, and ecological contributions would be affected. An additional discussion of fire management and current conditions is discussed in "Fire and Fuels."

### **Livestock Grazing**

Agriculture plays an important economic and social role in some parts of the socioeconomic plan area.

The Forest Service authorizes grazing permits through payment of a grazing fee that is based on head months, defined as 1 month's use and occupancy of the range by one weaned or adult cow with or without a calf, a bull, steer, heifer, horse, burro, or mule, or five sheep or goats. Current permitted use on the Ashley National Forest authorizes 76,922 head months. This includes approximately 3,000 animal unit months (AUMs) administered by the BLM. The BLM bills based on AUMs. One AUM is defined as the amount of forage necessary for the sustenance of one cow or its equivalent for a period of one month. The forest plan will not make management decisions for these AUMs. Authorized use varies by year based on forage or other resource conditions or permittee modifications, but it has historically been close to the permitted use level.

There are currently 99 permittees holding permits for grazing on the Ashley National Forest; most are in Duchesne (44.6 percent) and Uintah (32.6 percent) Counties. Sweetwater County has 5.6 percent of grazing permittees, while Daggett County has only 4 permittees. There are 39 permittees on the BLM-administered Ashley National Forest grazing allotments in Wyoming. Most typical ranches depend only partially on Federal land grazing for forage. However, economic studies have shown that this forage source can represent an important part of their livestock operation, particularly as a summer forage source. Federal livestock grazing affects livestock production and the viability of individual agricultural operations (Taylor et al. 2004). Grazing is likely to continue to represent an important economic sector for some communities and will help to maintain a traditional cultural setting.

Additional details of baseline conditions for livestock grazing are discussed in "Livestock Grazing." Up to 124 jobs and \$2.1 million in labor income would be directly or indirectly supported by grazing on the Ashley National Forest (table 3-51). Grazing and timber jobs combined represent approximately 4.3

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<sup>12</sup>Forest products include sawtimber products for commercial use (i.e., lumber), non-sawtimber products for commercial or personal use (e.g., posts and poles, fuelwood), and also non-timber products such as medicinal herbs, fungi, edible fruits and nuts, and other natural products.

percent of regional jobs in the agricultural sector. The relatively low level of contributions from grazing on Federal lands to the broader regional economy reflects a trend seen throughout the West (Power 2002).

### *Ecosystem Services*

Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fiber; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling (MEA 2005). The Ashley National Forest's ecosystem services contribute to social and economic sustainability. Local economies benefit from the availability of ecosystem goods and services, such as recreation and grazing lands, as well as other natural resources. Individuals in local communities have benefited from a host of services such as recreation, scenery, employment, and opportunities to connect with nature. Key ecosystem services for the socioeconomic plan area were identified based on the 2017 assessment (Forest Service 2017g), project scoping, and a project in partnership with Duke University's Nicholas Institute for Environmental Policy Solutions (Olander et al. 2021).

### **Provisioning Services**

Provisioning services are broadly described as products derived from ecosystems. These products can include a broad spectrum of products from raw materials, minerals and energy products, water, and medicinal resources. On the Ashley National Forest, the key provisioning services are those products discussed in detail under "Ashley National Forest Economic Contributions," above. These contributions include, but are not limited to, wood products, forage, and minerals and energy products (i.e., oil and gas, as described below). Harvest and extraction of these resources—and maintenance of the habitat to support long-term use of these resources—contribute to food sources, recreation, jobs, and spending of tourism dollars in the local area. These represent not only direct economic contributions but also support the maintenance of social and cultural values in the socioeconomic analysis area. Key services of minerals and energy, wood products, and livestock forage are discussed further below.

In addition, National Forest System land contributes to the livelihoods of area residents through subsistence uses. Public lands provide products of value to households at no or low cost (permit fees). Subsistence uses are fuelwood, boughs and Christmas trees, and additional products such as fish, game, plants, berries, and seeds. Use of these products is often part of tradition and sustains local culture; these uses have importance for certain groups, such as the Ute Indian Tribe. Krannich (2008) found that Daggett, Duchesne, and Uintah Counties have a high level of participation in non-commodity materials and resources collected from public lands. Nearly 26 percent of survey respondents in the study cut firewood for home use on public lands, 30 percent cut Christmas trees, and 32 percent gathered rocks for home landscaping. Additionally, pinyon nut gathering, fossil collecting, and wild berry and herb collecting for food were popular activities. The importance of wood products for general public use is discussed under "Forest Products," below. Resources of specific importance for local tribes are discussed under "Tribal Resources," below, and under "Areas of Tribal Importance."

### *Forest Products*

Timber is an example of a resource that represents a provisioning service with both market and nonmarket value. Timber harvesting represents a traditional source of employment in the socioeconomic analysis area, as discussed in the "Ashley National Forest Economic Contributions" section. Wood products from the Ashley National Forest are not currently a major economic driver in the regional economy due to the small area suitable for production and the generally lower commercial value of wood products harvested. Locally, however, wood product sales help support a number of sawmills and smaller business; they also provide an inexpensive source of fuelwood for area residents. In a 2008 survey, 80 percent of respondents

in Daggett, Duchesne, and Uintah Counties felt that having forested areas that are available for timber harvesting is moderately or very important to the overall quality of life in their community (Krannich 2008). Commenters in the public scoping period also requested increasing timber production to achieve desired vegetation conditions and to stimulate local economies.

Use of fuelwood also represents a traditional source of fuel and a subsistence use for some area residents. In addition, timber enhances the forest scenery, attracting visitors and providing cultural services for visitors and residents. Participants in the 2008 Beliefs and Values study (Russell 2008) describe timber as having aesthetic as well as economic value.

#### *Livestock Forage*

Vegetation within permitted allotments in the plan area provides a source of forage to support livestock. Availability of forage on the Ashley National Forest can support area ranching operations as an important seasonal source of forage. As such, forage use supports local ranching operations and provides for continuation of this traditional way of life in the region. Commenters in public scoping noted the importance of forage from National Forest System lands for livestock grazing and stated that flexibility in management of forage could benefit local livestock producers, enhance the sustainable multiple use of forest resources, and support economic activity.

#### *Energy and Minerals*

Oil and gas development is recognized as representing an important source of raw materials from the Ashley National Forest and other public lands in the region. In a 2008 survey of public land uses in Utah (Krannich 2008), 76 percent of respondents from Dagget, Duchesne, and Uinta Counties rated development of energy resources as “very important” for the quality of life of people living in their communities. In addition, 68.4 percent of respondents from the three-county area wanted mineral exploration or extraction to “stay about the same or moderately increase” on public lands in Utah. Public lands in this survey were defined as Federal lands managed by the Forest Service, the BLM, the National Park Service, and other agencies.

In the 2008 Beliefs and Values study (Russell 2008), participants also noted the contribution of economic benefits to local communities, as well as the benefit provided to national energy reserves. Others, however, noted the impacts of increased development as a result of energy activity and the changes to communities and social structure that result. Participants in the study noted population growth, increased diversity among residents, increased employment, higher wages, increased housing prices, decreases in the availability of affordable housing, increases in substance abuse, increases in traffic, strains on infrastructure, and an overall “busy” pace of life (Russell 2008).

#### *Tribal Resources*

The Ashley National Forest contains Ute Indian Tribe and Eastern Shoshone Tribe original homelands, which remain significant for tribal identity and cultural traditions. The Ashley National Forest supports a variety of tribal resources, as discussed in “Areas of Tribal Importance.” Key resources with tribal importance include gathering of plants for various purposes (religious, medicinal, consumption, and other applications), as well as hunting and fishing for subsistence use and ceremonial purposes. Key tribal resources and relevant habitat types are identified in table 3-64.

### **Cultural Services**

Cultural services are defined as benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, aesthetic experiences, and cultural heritage values. These can include cultural significance (e.g., use in books and paintings), spiritual and historical use (e.g., sites with religious or historical importance), recreational experiences, and educational or scientific importance

(e.g., sites used for education or scientific study). Affiliated tribes, locals, recreationists, and the general public are communities that depend on access to and conditions of resources on the Ashley National Forest.

Some cultural values can be described as nonuse values. Nonuse values are the values that people assign to economic goods if they never have and never will use them. Nonuse values, as a category relevant to the Ashley National Forest, include the following:

- Option value—The value placed on maintaining an asset or resource, even if there is little or no likelihood of the individual ever using it. The option value occurs because of uncertainty about future supply (the continued existence of the asset) and potential future demand (the possibility that it may someday be used). An example of an option value is desiring the maintenance of timber resources due to concern about a limited future supply.
- Bequest value—The value placed on maintaining or preserving an asset or resource so that it is available for future generations. An example of a bequest value is preserving species for future generations.
- Existence value—The benefit people receive from knowing that a particular environmental resource exists. An example is the preservation of wilderness areas and undeveloped spaces.

The key cultural services on the Ashley National Forest are cultural heritage values, aesthetic values, and recreation, as described further below.

#### *Cultural Heritage Values and Traditional Uses*

Agriculture, including livestock grazing, represents an activity with cultural ties to the plan area. Livestock grazing contributes to cultural services through the preservation of open space and the pastoral scenery, as well as by preserving traditional ways of life. Based on input in the 2008 Beliefs and Values study (Russell 2008), agricultural heritage is of particular importance in the region. Commenters noted that oil and gas have always been up and down, but agriculture has been steady. Sustaining grazing is also perceived to offer benefits to the custom and culture of rural communities. Additionally, hunting and fishing on the Ashley National Forest represent traditional uses that have ties to subsistence, and they may be experienced with multiple generations of a family; therefore, they have value as a cultural service.

#### *Recreation*

Values of recreation can be described as use values or nonuse values. Recreational fishing, hunting, boating, hiking, biking, off-roading, and skiing are all nonmarket use values associated with recreation on the Ashley National Forest. Nonuse values associated with recreation include existence values, such as the inherent worth in knowing that the pristine High Uintas Wilderness exists on the Ashley National Forest.

Participation in recreation can support wellness and personal enrichment. In addition, the undeveloped landscapes of the Ashley National Forest support those seeking solitude and places where people can reconnect with nature to escape the stresses of everyday life. Many people retreat to forests because they foster a sense of oneness with nature, which can stimulate contemplation, exploration of identity, and spirituality. Recreational hunting, fishing, and wildlife viewing also represent important forms of recreational use. Once user traditions are established, many users return to the Ashley National Forest regularly because of the unique opportunities associated with fish and wildlife resources and the local scenic environment associated with the pursuit of these activities.

Landscapes, wildlife, and other features provide scenic resources appreciated by recreationists and other visitors to the Ashley National Forest. While aesthetic value is not a socioeconomic outcome, it supports a variety of uses on the Forest. Recreationists, local outfitters, and guides directly benefit from these

landscapes and features, while local businesses benefit from spending by Ashley National Forest visitors. Commenters in public scoping noted the importance of continued recreation opportunities for local communities and residents and opportunities for motorized recreation in both summer and winter; infrastructure to support recreation was identified as a management priority for the Ashley National Forest. It should be noted that the type of recreational use can support values for different user groups. For example, motorized access for recreation can support use for participants who may have limitations on mobility. In contrast, limitations on motorized recreation support participants who value solitude and opportunities for quiet recreational experiences.

### **Regulating Services**

Regulating services are defined as benefits obtained from the regulation of ecosystem processes. Examples include carbon sequestration and climate regulation, waste decomposition and detoxification, and purification of water and air. Key services on the Ashley National Forest include climate and water regulation.

#### *Fuels Mitigation/Fire Management*

Active and passive forms of fuels management support the return of the Ashley National Forest to historical fire regimes and can minimize the risk of uncharacteristic fire for local communities; this is described in detail in “Fire and Fuels.” Uncharacteristic fire (i.e., high-intensity, large fires) can affect area residents and visitors through the potential for property damage, closures, evacuations, and health impacts from smoke.

#### *Climate Regulation and Adaptation*

Management of forest and timber resources to sustain long-term forest vegetation acts as a carbon sink to support carbon sequestration. Management of fuels and wildfire influence the regional response to fuels and the potential for large-scale wildfire. Additionally, future adaptive management of vegetation and ecosystems will affect the ability of the Forest Service to respond to change based on a changing climate.

#### *Water Regulation*

Water regulation represents a key service on the Ashley National Forest, which contains physical, chemical, and biological characteristics that enable vegetation and soil to filter and absorb surface water. This replenishes underground aquifers and moderates runoff during rainstorms. Water filtration services, provided by well-functioning ecosystems, help maintain the integrity of the watersheds. By managing for the health of forest ecosystems, the Ashley National Forest directly contributes to regional water quality and helps reduce financial costs associated with quality of water supplies. Communities that may benefit from regulating services include all local area residents and those recreating on the Ashley National Forest and aquatic habitats.

### **Supporting Services**

Supporting services are the underlying natural processes that sustain ecosystems and enable the production of all other ecosystem services. The Ashley National Forest sustains ecosystems on which plant and animal habitat depends. For example, soil formation, nutrient cycling, the production of oxygen, and evapotranspiration are factors that influence and shape characteristics of ecosystems on the Ashley National Forest. In addition, processes support the diversity and abundance of plants and animals provided by these habitats and ecosystems. For example, reforestation, natural succession, genetic variability, migration, and species interaction are shaped by these forest characteristics.

Support for pollinators and habitat connectivity represents a key service on the Ashley National Forest, which helps support intact ecosystems for the support of other services. Communities that benefit from

these services include recreationists, and researchers and students who benefit from opportunities for interpretation and learning. In addition, these services support communities interested in traditional and cultural uses by supporting specific habitats important for subsistence and other uses. Recreationists, local ranchers, the timber industry, and users of non-timber forest products also benefit from this suite of services.

#### *Habitat Connectivity*

The Ashley National Forest supports habitat connectivity across a wide range of ecosystems. This includes support for SCC. Management influencing the location, level, and type of development can influence the degree to which habitat connectivity is supported. The maintenance and enhancement of habitat supports the continued presence of terrestrial and aquatic wildlife for recreation opportunities. In addition, conservation of at-risk fish and wildlife species for the future represents an important nonuse value.

#### *Pollinator Support*

Vegetation and ecosystems on the Ashley National Forest provide support for pollinators. In turn, pollinators support both natural ecosystems and agriculture. Management influencing vegetation communities and invasive species control has the potential to influence pollinators.

#### *Environmental Justice*

Issued in 1994, EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, was established to ensure the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of Federal environmental laws, regulations, and policies. Fair treatment means that no specific group of people, including racial, ethnic, or socioeconomically defined communities, should bear a disproportionate share of the negative environmental consequences resulting from the execution of Federal, State, local, and tribal programs and policies.

To the extent practical and appropriate, Federal agencies shall use this information to determine whether their programs, policies, and activities have disproportionately high and adverse human health or environmental effects on minority or low-income populations. The president's Council on Environmental Quality (CEQ) developed guidance on environmental justice terminology and identifying minority populations; it provides the following definitions:

- The total minority population is defined as the total population minus that portion that is listed in U.S. Census Bureau data as White, of non-Hispanic origin. This method includes all individuals who identify as a racial or ethnic minority, or both, without double counting these populations.
- An environmental justice population is present when the minority population of the affected area exceeds 50 percent or is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis (CEQ 1997). "Meaningfully greater," for the purpose of this analysis, is defined as more than 5 percent higher than the comparison population at the state level.
- Low-income populations are defined relative to the annual statistical poverty thresholds from the U.S. Census Bureau (CEQ 1997). CEQ guidance does not provide criteria for determining low-income populations as specifically as it does for minority populations; therefore, for this analysis, low-income populations are defined as 50 percent or more of the population in the affected area being below the poverty level, or populations with at least 5 percent more people at or below the poverty level, relative to the state average level in poverty.

For the purpose of identifying a minority population concentration, the comparison population used in this report is the states of Utah and Wyoming. For the purpose of this analysis, “meaningfully greater” has been defined as 5 percentage points or more above the reference population (Grinspoon et al. 2014). For low-income populations, all populations with median household incomes below the poverty threshold, or populations with the total percentage of individuals above the state poverty level, are examined for further analysis. In addition to the above, Federally recognized tribes are considered environmental justice populations in and of themselves; when possible, they are included in the analysis as separate minority populations.

Table 3-54 presents percentages for minority populations and populations below the poverty line within the socioeconomic plan area. Populations were examined at the county and community level. The cities of Duchesne and Vernal, Utah, and the City of Green River, Wyoming, were identified as communities for further environmental justice analysis based on the total population below the poverty level and minority population, respectively. It should be noted that local minority populations include members of the Ute Indian Tribe, and that the Forest Service seeks free, prior, and informed consent from the tribe when making decisions that could affect the tribe or its interests.

**Table 3-54. Minority and Low-Income Populations within the Socioeconomic Plan Area (2019)**

<b>Geography</b>	<b>Racial and/or Ethnic Minority Population as Percentage of Total Population*</b>	<b>Population Below Poverty as Percentage of Total Population</b>	<b>Meets “Meaningfully Greater” Environmental Justice Threshold</b>
<b>State of Utah</b>	21.7	9.6	
Daggett County	2.6	2.9	
Town of Dutch John	0.0	0.0	
Town of Manila	0.0	2.4	
Duchesne County	14.8	13.4	
City of Duchesne	6.4	<b>15.0</b>	<b>Yes</b>
Uintah County	18.4	12.4	
City of Vernal	21.2	<b>19.7</b>	<b>Yes</b>
<b>State of Wyoming</b>	15.9	10.7	
Sweetwater County	20.4	11.3	
City of Green River	<b>21.7</b>	8.9	<b>Yes</b>
Uinta County	12.5	11.2	

Source: Census Bureau 2019a and 2019b

\* Minority population calculated based on total population minus those identifying as White of non-Hispanic origin. The remainder of the population identified as one or more racial or ethnic minority groups.

## Environmental Consequences for Social and Economic Sustainability

### *General Methodology and Analysis Process*

This section presents the social and economic consequences of implementing the alternatives. A quantitative analysis, in the form of jobs and labor income contributions, is provided for market transactions that result from activities on the Ashley National Forest. A qualitative analysis is provided for values associated with ecosystem services supporting the quality of life for visitors and communities near the Ashley National Forest. The social benefits can be used or valued differently by different groups and communities. The Ashley National Forest assessment, completed in 2017, provided an in-depth study of social and economic conditions and local community values and beliefs; the affected environment, above,

provides a summary of the key ecosystem services, including social benefits, that the Ashley National Forest offers.

It should be noted that conditions outside Forest Service management control, including market trends and demographic changes, will continue to affect socioeconomic conditions. Unless otherwise noted, all effects are for the life of the forest plan (15 years). The effects in this section are organized by the applicable indicators of effect identified below.

### *Analysis Assumptions*

- The economic impact analysis area is comprised of Daggett, Duchesne, and Uintah Counties in Utah and Sweetwater County in Wyoming; these represent the functional economy for people living and working around the plan area. Although some effects may occur outside this area, the majority of the effects will likely occur within these four counties, which contain almost the entire plan area. Quantitative contributions to the local economy, below, are estimated using this economic analysis area.
- Under all alternatives, recreational use, as measured in Ashley National Forest visits, will increase from current conditions over the 15-year planning period due to population growth.
- In most instances, the precise changes in indicators among alternatives are unknown. Therefore, the estimates are based on the professional expertise of the resource specialists and previous research.
- Oil and gas production and the associated revenues (and, therefore, the actual economic impact) will fluctuate based on global market conditions.
- Forest budgets may fluctuate over the life of the management plan; they are not dictated by the management plan or alternatives.
- Providing for improved economic and social benefits to communities in and around the Ashley National Forest will continue to be a focus of the Forest Service's management.
- All alternatives in the forest plan are expected to achieve desired conditions that contribute opportunity for local Indian Tribes.
- When needed, projects implemented on the Ashley National Forest will require a site-specific analysis of their potential impacts on local social and economic conditions and environmental justice.
- The community's ability to participate in the NEPA process will be retained across all alternatives.

### *Indicators*

Changes to the following economic and social indicators are used to discuss the impacts of proposed management:

#### **Economic Indicators**

- Regional employment and income

#### **Ecosystem Service Indicators**

- Recreational experience
- Cultural heritage values and traditional uses
- Fire and fuels management



- Climate regulation and adaptation
- Intact ecosystems
- Water regulation
- Energy and mineral products

### **Environmental Justice Indicators**

- Disproportionately high or adverse impacts on environmental justice communities
- Exposure pathways for environmental justice communities

Details for the indicators and methodology used to analyze each indicator are included below.

### ***Economic Impacts Analysis Methods***

The Forest Service estimated economic effects on the Ashley National Forest economic area of analysis through the use of a regional input-output model (IMPLAN); the Forest Service also evaluated an assessment of impacts on selected industrial sectors of the economy: recreation, livestock grazing, and timber. IMPLAN is a regional economic impact model that provides a mathematical account of the flow of dollars and commodities through a region's economy. This model provides estimates of how a given amount of an economic activity translates into jobs and income in the region. By using Forest Service expenditure data, resource output data, and other economic information, IMPLAN can describe the jobs and income that are supported by Forest Service management activities. The Forest Economic Analysis Spreadsheet Tool (Aphelia), a spreadsheet modeling tool developed by the Forest Service, uses a Microsoft Excel workbook as an interface between user inputs and data generated using the IMPLAN input-output modeling system.

Economic impacts are described in terms of direct, indirect, and induced impacts. Direct impacts, such as income and employment, are directly affected by activity on National Forest System land (for example, money spent on accommodations and food by recreational visitors). Indirect impacts occur when related industries gain from purchases by the directly affected businesses (for example, the purchase of supplies by food and accommodation businesses). Induced impacts are the results of spending by employees hired due to the business activity. Together, these are reported as the total impact of the different management alternatives. Together, the direct, indirect, and induced effects comprise the total economic impact on the local economy.

The analysis was conducted for the economic area of analysis, which, as described in the affected environment section, included the four counties. The model for this analysis used the 2017 IMPLAN data, which is the latest available dataset that the Aphelia application supported at the time of the analysis. Unless otherwise noted, results are provided in 2019 dollars.

Details for the methodology used to provide the quantitative analysis for the primary uses on the Ashley National Forest with economic contributions likely to vary based on proposed management (livestock grazing and timber) are provided below. Regional economic contributions are also estimated for contributions that are not likely to vary by alternative, including recreation, mineral development, Forest Service expenditures and salaries, and payments to counties and States. These contributions are detailed in "Environmental Consequences Common to All Alternatives."

### **Recreation**

The two determining factors of economic input for recreation are visitor numbers and how much each visitor spends while in the area.

Total annual recreation visits were obtained from the NVUM program’s most recent data to estimate average annual visitor numbers (Forest Service 2017h). For this analysis, an estimated 470,000 recreational visits annually was assumed. The actual visitation level is likely to vary based on regional and national economics and other factors. Recreation visits with a primary focus on wildlife-related recreation (including wildlife viewing, hunting, and fishing) are also captured separately. See table 3-55, below.

**Table 3-55. Estimated Annual Ashley National Forest Visitors**

<b>Visitation Type</b>	<b>2012</b>	<b>2017</b>
Wildlife-related visits	120,655	162,024
Total visits	295,000	471,000

Sources: Forest Service 2017h, 2012b

Note: A national forest visit is defined as the entry of one person upon a national forest to participate in recreation for an unspecified period of time. Wildlife-related visits include those where the primary activity was viewing wildlife, fishing, or hunting.

It is acknowledged that spending differences may occur due to the type of primary recreational use; however, the specific recreational activity has been found to have a secondary influence on visitor spending when compared with the type of visitation (i.e., day or overnight) (White 2017). The distribution of visitor type (i.e., local or nonlocal visitor) and use type are based on the most recent round of monitoring and are, therefore, used to estimate visitor spending for this analysis. Visits are broken out by recreation trip type. The NVUM trip type segments help explain differences in spending of distinct subgroups of visitors. Spending averages for different trip type segments are statistically and practically different for each trip segment (White 2017).

Traditionally, an economic impact analysis for recreation measures only the effects of “new” income in the economic area of analysis, based on spending of nonlocal residents on local recreation. The premise is that spending by local residents does not represent an additional source of economic activity in the area. In the absence of national forest recreation opportunities, spending by local residents would continue using local substitute recreation opportunities. Local residents, however, can make considerable recreation-related expenditures (based on spending on such items as gas and food). Therefore, to capture the importance to local communities, this analysis provides a contribution analysis, which captures spending by both local and nonlocal residents (defined here as those who traveled more than 50 miles to the Ashley National Forest).

While the recreation experience and type of activities engaged in may vary based on alternative selected, and overall recreation is anticipated to increase over time for all alternatives, no change to the overall level of visitation or the origin of visitors (i.e., local versus nonlocal) is anticipated by the alternatives. As a result, the estimated economic contributions are constant across all alternatives.

### **Livestock Grazing**

Livestock grazing represents a historical use with current contributions to local area economies. The level of use on the Ashley National Forest varies in response to changing forage conditions due to factors such as drought or fire. In some years, full permitted numbers are authorized; in other years, fewer numbers are authorized. The authorization level over the past 5 years has been close to 100 percent; therefore, the analysis assumes 100 percent of permitted head months are authorized. Current management economic contributions were, therefore, estimated using an average of permitted use over the 5-year period of 2015 through 2019. Changes across alternatives are estimated as changes from this baseline. Actual use is determined annually based on several factors, such as current forage and market conditions.

For consistency, the analysis assumes that current market demand for livestock products would continue over the planning period with a continuing demand for grazing on the National Forest System lands. Economic contributions to the regional economy from permitted use are determined based on National Agricultural Statistical Service employment and farm production expenses for beef cattle ranching and farming and sheep and goat farming. The input for the economic contribution model evaluating grazing use on Federal lands uses AUMs as a metric for comparison. To stay consistent with other sections, however, this discussion uses head months. It should be noted that economic contributions calculations are based on current stocking rate calculations. Should these calculations be adjusted due to drought and lowered forage production or to adjust for the average level of forage consumption per cattle, then the stated level of contributions would be modified.

For changes under alternative C due to exclusion of livestock from destination recreation management areas, the Forest Service used a GIS analysis to locate pastures that would be affected by plan components that close specific management acres to livestock grazing. It was assumed the impact on permitted head months per pasture would be proportional to the affected area. These affected pastures would see a 3.3 percent reduction in head months under alternative C. This is a much smaller 0.14 percent reduction in total head months forestwide.

### Timber and Forest Products

Estimated annual forest product volumes harvest data are used to estimate the economic impact of timber-related activities by alternative (see table 3-56). Alternative A represents a 10-year average of volume sold to lessen the effects of annual fluctuations. Alternatives B modified and C are estimates of available volumes based on the alternatives. Details of how these estimates were developed may be found in appendix 4 to the forest plan and the “Timber” section of this document. These timber volumes are used to estimate the economic impact of timber-related activities on the Ashley National Forest. The direct effects of timber and wood product sales were estimated using direct response coefficients developed from a national timber mill survey conducted by the University of Montana’s Bureau of Business and Economic Research (Sorenson et al. 2016). This survey provided more region-specific information than that in the default IMPLAN model. The indirect and induced effects were generated by the IMPLAN model.

**Table 3-56. Estimated Annual Forest Product Volume by Product Type**

	Alternative A	Alternative B Modified	Alternative C	Alternative D
Harvested for sawmills (e.g., sawtimber) (CCF)	2,054	5,118	3,440	5,278
Poles and posts (CCF)	1,482	1,440	1,170	1,497
Fuelwood (CCF)	5,816	5,204	5,204	5,204
<b>Total</b>	<b>9,353</b>	<b>11,762</b>	<b>9,814</b>	<b>11,979</b>

Source: Forest Service estimates. See forest plan, appendix 4

Fuelwood represents the dominant use of wood products on the Ashley National Forest. Historically, over 90 percent of the fuelwood volume removed from the Forest has been through individual permits. This provides important value to those who use this wood to heat their homes but will not contribute to jobs or income estimates presented in the impact analysis. Numerous commercial fuelwood operations and several sawmills process timber in the economic analysis area, as detailed in “Timber.”

**Ecosystem Services Analysis Methods**

As discussed in “Description of Affected Environment,” above, the Ashley National Forest provides socioeconomic benefits via ecosystem services in the form of market contributions (measured by jobs and income, as discussed above) and in the form of contributions for values that cannot be easily measured in the market, such as impacts on quality of life. As detailed in “Description of Affected Environment,” ecosystem services provided by the Ashley National Forest can be broken down into separate categories based on the type of services that they provide. An overview of the types of services analyzed for the categories is provided below.

As insufficient data and resources are available to assign quantitative values to most ecosystem service impacts that may result from changes among alternatives, the analysis considers potential impacts primarily in qualitative terms. This is consistent with direction provided in 40 CFR 1502.23 and the Forest Service’s 2012 Planning Rule regulations. Details for the metrics included are provided below in table 3-57 for each indicator.

**Table 3-57. Key Ecosystem Services and Indicators**

Indicators	Type of Ecosystem Service			
	Provisioning Service	Cultural Service	Regulating Service	Supporting Service
Recreation experience and access		X		
Wildfire protection and fuels mitigation			X	X
Water quality and quantity	X		X	
Cultural heritage value and traditional uses*	X	X		
Intact ecosystems				X
Climate regulation and adaptation			X	
Energy and mineral products	X			

\*Includes discussion of livestock forage, and timber and forest product availability as these represent traditional extractive uses on the Ashley National Forest

**Provisioning Services**

Indicators of key provisioning services identified on the Ashley National Forest include timber and forest products, water quantity and quality for municipal use, energy and mineral products, and livestock forage. The impacts of proposed management on the availability of these resources are discussed at length in other sections of this report. The discussions by alternative will refer to these sections, as appropriate.

In terms of ecosystem services provided by these resources, the level and quality of the available resource can affect the availability of the resource for use by local communities, as well as the jobs, income, and taxes associated with development and use of these resources. The potential for impacts is discussed in terms of the relative importance of these resources in the regional setting.

**Cultural Services**

Recreation access and experience—Recreation access and experiences, and the value that individuals and communities obtain from these services, vary depending on user groups. The table below (table 3-58) identifies key user groups on the Ashley National Forest and the recreation areas and amenities that have been determined to be most relevant to these user groups based on the type of use prioritized by these groups. Recreation management that results in changes to the size of these recreation areas or the access

**Table 3-58. Recreation Experiences Matrix**

User Group	Area Type				Specific Amenities						
	Wilderness Area/Recommended Wilderness	Destination Recreation Management Areas	Backcountry Recreation Management Areas	General Recreation Management Areas	Remote Areas with Low Use	Disability-Accessible Trails, Restrooms, and Parking Areas	Developed Recreation Sites, Such as Campgrounds, Picnic Areas, and Interpretive Sites	High-Quality Game Species habitat	High-Quality Fishable waterways	Trails with Mechanized Access	Trails with Motorized Access
Solitude seekers	X	-	X	-	X	-	-	-	-	-	-
Families	-	X	-	X	-	X	X	-	X	X	X
Large groups	-	X	-	X	-	-	X	-	X	X	X
Mobility-impaired visitors <sup>1</sup>	-	X	-	X	-	X	X	-	-	-	X
Hunters	X	-	X	X	X	-	-	X	-	-	X
Anglers	X	X	X	X	X	-	-	-	X	-	X
Commercial outfitters (boat trips)	-	X	-	X	-	-	-	-	X	-	-
Mountain bikers	-	-	X	X	-	-	X	-	-	X	-
OHV users	-	X	-	X	-	-	-	-	-	-	X
Cultural and historic site visitors	-	X	-	X	-	X	X	-	-	-	X
Tribal populations	X	X	X	X	X <sup>2</sup>	-	-	X <sup>2</sup>	X <sup>2</sup>	-	-
Environmental justice populations	-	X	-	X	-	-	X	-	-	X	X

Source: Olander et al. 2021, refined based on input from Ashley National Forest interdisciplinary team

<sup>1</sup> Includes those with mobility disabilities and elderly visitors

<sup>2</sup> Potential importance for spiritual and cultural significance

to, or quality of, the specific amenities would result in a change to the recreation experience. These changes may alter the users' level of satisfaction with their national forest recreation experiences. The analysis examines the potential changes to visitors' experience and satisfaction level based on changes to the size of recreation areas, the ability to access recreation areas, and the availability and quality of specific amenities based on proposed management changes. Available information on the current satisfaction level and visitation levels for different user groups is provided for context where available and appropriate. It is recognized that these user groups are not mutually exclusive and that the indicated uses are not a comprehensive list of all activities and areas utilized by each group. Rather, this table identifies key uses and areas of the Ashley National Forest for which management direction is most likely to impact a particular user group's recreation experience.

Cultural heritage values and traditional uses—Traditional uses of Ashley National Forest resources include primarily livestock grazing, timber and wood product harvest, and hunting. The analysis includes an assessment of the level to which the continued use of or access to these resources is permitted. It also includes a discussion of how vegetation management would affect these uses. In addition, this analysis examines impacts on Forest resources used in traditional cultural practices by Tribes. Key uses are detailed in the tribal resources crosswalk (table 3-64). The degree to which proposed management would affect relevant habitat types, and in turn the specific resources of importance, is discussed.

### **Supporting Services**

Intact ecosystems—Supporting services, such as pollinators and wildlife habitat, represent the ability of the Ashley National Forest to provide for diverse ecosystems with a variety of plant and animal species, including those with intrinsic or economic importance for people or both. The discussion of potential impacts on intact ecosystems refers to the analysis in the vegetation and fish and wildlife sections of this report. It also provides an overview of the trends that would be anticipated in the ability of the Ashley National Forest to support these services.

### **Regulating Services**

Wildfire protection and fuels mitigation—For communities near the Ashley National Forest, the ability of the Forest Service to support management of wildfire risk in the region is one of the key services provided. Based on the proposed management for vegetation and fire and the analysis in those respective sections, the degree of support for community fire protection and fuels mitigation is discussed by alternative.

Climate regulation and adaptation—The discussion of climate regulation and adaptation relies on the analysis in the climate section of this report. It provides a qualitative analysis of the relative level of proposed management to provide resilience to change in the face of future climate change.

Water regulation—The discussion of water regulation services includes reference to the analysis in the water resources section. The potential for impacts from development activities and vegetation treatments is discussed in the context of the ability of the Ashley National Forest to support water regulation services for the benefit of local municipal watersheds and for aquatic habitats.

### ***Environmental Justice Analysis Methods***

Disproportionately high or adverse impacts on environmental justice communities—Environmental justice involves examining disproportionately high or adverse health impacts resulting from management or other activities that impact the environment proximate to or within a community. The CEQ has interpreted environmental effects broadly: "Such effects may include ecological, cultural, human health,

economic, or social impacts on minority communities, low-income communities, or Indian Tribes when those impacts are interrelated to impacts on the natural or physical environment” (CEQ 1997, p. 26).

Exposure pathways for environmental justice communities—An exposure pathway is how an individual or community is exposed to a particular hazard. Exposures may be cumulative (e.g., low-level exposure over a long period of time leading to a buildup of toxins in the system), or there may be multiple hazards a community is exposed to (e.g., water contamination and smoke inhalation). Identifying major exposure pathways for an environmental justice community can help understand what health effects they may be facing.

Exposure pathways and disproportionately high or adverse impacts on environmental justice communities are discussed by alternative.

Because the forest plan and alternatives provide a programmatic level of management direction, the environmental consequences section presented here provides an overview of the communities that may be impacted and the types of impacts that could occur. A discussion of disproportionate adverse impacts on communities from site-specific actions would be included in subsequent analyses for implementation-level actions.

*Environmental Consequences for Social and Economic Sustainability Common to All Alternatives*

**Economic Analysis**

*Regional Employment and Income*

Table 3-59 and table 3-60, below, provide a summary of total jobs contributed and labor income supported, respectively. Under all alternatives, employment and labor income supported by activities on the Ashley National Forest would account for less than 1 percent of the four-county totals. This analysis considers only the market transactions that result from activities on the Ashley National Forest. The value of ecosystem services, such as clean air and water, are not captured in the economic impact analysis and are discussed separately under “Ecosystem Services Analysis.”

**Table 3-59. Total Jobs Contributed\***

<b>Resource Area</b>	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>
Recreation (not wildlife and fish related)	53	53	53	53
Recreation (wildlife and fish related)	58	58	58	58
Grazing	124	124	124	124
Timber	28	48	35	50
Minerals	8	8	8	8
Payments to States and counties	69	69	69	69
Forest Service expenditures	225	225	225	225
<b>Total Forest Management</b>	<b>565</b>	<b>585</b>	<b>572</b>	<b>587</b>

Resource Area	Alternative A	Alternative B	Alternative C	Alternative D
<b>Percent Change from Current</b>	N/A	3.54%	1.24%	3.89%

Sources: Forest Service data modeled with IMPLAN 2017 and Forest Economic Analysis Spreadsheet Tool

\* Jobs represent full- and part-time jobs and include wage and salary jobs, sole proprietorships, and individual general partners.

**Table 3-60. Labor Income Contributed (\$1,000s of 2020 Dollar)**

Resource Area	Alternative A	Alternative B	Alternative C	Alternative D
Recreation (not wildlife and fish related)	\$1,639	\$1,639	\$1,639	\$1,639
Recreation (wildlife and fish related)	\$1,865	\$1,865	\$1,865	\$1,865
Grazing	\$2,100	\$2,100	\$2,096	\$2,100
Timber	\$1,406	\$2,428	\$1,759	\$2,503
Minerals	\$841	\$841	\$841	\$841
Payments to States and counties	\$3,793	\$3,793	\$3,793	\$3,793
Forest Service expenditures	\$12,763	\$12,763	\$12,763	\$12,763
<b>Total Forest Management</b>	\$24,407	\$25,429	\$24,755	\$25,503
<b>Percent Change from Current</b>	—	4.19%	1.43%	4.49%

Sources: Forest Service data modeled with IMPLAN 2017 and Forest Economic Analysis Spreadsheet Tool

### *Recreation*

As discussed in the affected environment section, there are an estimated 470,000 recreation visits to the Ashley National Forest annually based on NVUM data; 41 percent of these visits originate outside the local area. The expenditures of nonlocal visitors to the Ashley National Forest support approximately 78 jobs and \$2.4 million in labor income annually. Local visitors contribute an additional 34 jobs and \$1.1 million in labor income. Recreation visitors to the national forest contribute to the local economy in terms of jobs and labor income. Recreation contributions reported above are annual averages, but actual contributions are likely to vary on a seasonal basis. Forest Service management is not anticipated to result in a change to the total recreation visits by alternative. As a result, no change to the level of recreation-associated contributions is anticipated. Under all alternatives, recreation visits are likely to increase over time, following regional population increases and recent trends toward increased visitation, as discussed in the Recreation section. Changes to the type of recreation use may occur by alternative and could result in some changes to spending patterns and economic contributions; however, these changes have been found to be secondary to the visit type (see the Economic Impacts Analysis Methods, recreation discussion for additional detail).

### *Minerals*

Natural gas and oil as well as stone, sand, and other materials are removed from the Ashley National Forest. The quantities removed are not expected to differ between alternatives. Using average sale values from the years 2015 through 2019, mineral activities on the Ashley National Forest would support approximately eight jobs and \$821,000 in labor income on average annually. The mineral program provides limited economic contributions relative to other Forest Service program areas, but on average these jobs pay relatively well. Locatable and leasable mineral resources, including oil and gas resources, will continue to be managed as required by applicable laws, regulations, and policy. Therefore, the



mineral program would contribute jobs, income, and raw materials to the local and national economy under all alternatives.

The mineral extraction industry can see large fluctuations over time as production and prices respond to global markets. This analysis uses a 5-year average to account for some fluctuation. The level of future employment supported would be affected by the level of mineral extraction and market prices.

#### *Payments to States and Counties*

As discussed in the affected environment section, the Ashley National Forest makes payments to local governments through the PILT, SRSCS, and mineral receipts. Proposed forest plan management is not anticipated to affect these payments. Across all alternatives, these payments would support approximately 69 jobs and \$3.8 million in labor income annually across all sectors. In addition, it should be noted that government jobs, which include some of the jobs supported by these payments, typically have a higher than average labor income contribution on a per job basis (approximately \$55,000 annually) and offer local economic stability in the form of jobs and labor income.

#### *Forest Service Expenditures*

Across all alternatives, Forest Service expenditures would include salary and non-salary expenditures (for example, field and office equipment and supplies, trail construction, and range improvements). While the specific categories of expenditures may vary based on the alternative selected, forest plan management decisions are not anticipated to affect the total level of funding. Forest Service expenditures are funded primarily through congressional appropriations.

It is estimated that these expenditures support approximately 225 jobs and \$12.8 million in labor income in the local economy annually. This accounts for the largest contribution to the local economy in terms of jobs and labor income relative to other program areas and offers local economic stability both in number of jobs and total labor income.

The specific categories of expenditures may vary based on the alternative selected. For example, it is anticipated that management focused on increased infrastructure to support developed recreation uses would increase cost of facility construction and management where this use is emphasized, such in as under alternative D. Due to uncertainty in the timing and level of expenditures, no attempt to model these differences has been included in this analysis. Site-specific projects would include additional NEPA analysis, as appropriate.

### **Ecosystem Services Analysis**

#### *Recreational Experience*

Under all alternatives, the Ashley National Forest would continue to provide a variety of recreation opportunities. The FGNRA and other developed recreation management areas, such as those occurring at trail systems, would support developed uses and would be provided under all alternatives. Dispersed recreation and opportunities for solitude and quiet recreation experiences could occur under all alternatives, but particularly in wilderness areas and recommended wilderness areas. The level of access to and quality of the specific amenities would result in a change to the recreation experience and would vary by alternative. Impacts would depend on the type and location of the recreation taking place, as well as the desired experience of a user group or individual. Changes to recreation management area access and amenities for identified user groups are explored for each alternative. Refer to “Recreation” for additional details of the analysis as well as a description of current activities with the highest level of use.

#### *Cultural Heritage Values and Traditional Uses*

Under all alternatives, the Ashley National Forest would continue to support livestock grazing, with only minor direct changes to the level of permitted grazing by alternative. From a cultural standpoint, rangelands are seen to provide the basis for sustaining the custom and culture of the rural lifestyle, provide a connection for future generations to natural resources (Russell 2008), and support social fulfillment experienced by families (Rimbey et al. 2007). In addition, traditional labor statistics may not fully capture the social and economic importance of these industries; this is because they do not include unpaid family labor, which may account for a substantial portion of total labor inputs in the agricultural sector (Kandel 2008).

The Ashley National Forest will continue to support ranching and livestock grazing as traditional cultural values in the rural communities adjacent to the Forest. Grazing on public lands has a lower grazing fee than its equivalent on private lands. The 2019 fee is \$1.35 per head month, while the fee on private lands for cow-calf pairs averaged \$20.00 in Utah and \$24.50 in Wyoming (NASS 2020). It should be noted, however, that grazing fees do not capture total operational costs to the permittee, including maintaining and repairing range developments.

Based on the 2017 cattle and sheep inventory for the four-county region (NASS 2017), it is estimated that grazing on the Ashley National Forest supports approximately 5 percent of the cattle and 25 percent of the sheep in the region. The actual percentage of livestock supported would vary based on the current use level and the number of months of the year that animals depended on forage on the Ashley National Forest. In addition, these calculations are based on total cow/calf inventory and may underestimate the importance of grazing in the Forest for beef cattle operations. As previously noted, grazing on National Forest System lands can represent important seasonal pastures that support larger grazing operations. Refer to “Livestock Grazing” for details of the analysis.

Hunting on the Ashley National Forest is a traditional cultural practice that provides food and is an activity that can be shared across generations. In addition, visitors who come to the Ashley National Forest to hunt wildlife contribute to the overall economy of the area by supporting recreation-related jobs and other jobs directly and indirectly associated with visitor spending.

Timber harvest would also continue under all alternatives at similar to current levels, supporting the availability of products for personal fuel use and traditional wood product use. Harvests would continue to be affected by market conditions, including the cost of extraction, on a site-specific basis. Refer to the “Timber” section for details of the analysis.

Under all alternatives, the ability to access materials, such as wood, herbs, medicinal plants, and native plant materials, to sustain traditional tribal ways of life and to provide products for traditional cultural practices would be maintained.

#### *Mineral Products*

Under all alternatives, leasable and locatable minerals would continue to be available for development, based on past forestwide and project-level decision documents. No additional discussion is included for this resource by alternative. Contributions from development of these resources would vary based on market conditions, as discussed in the jobs and income analysis. Refer to “Energy and Minerals” for details of the analysis.

#### *Wildfire Management and Fuels Mitigation*

Under all alternatives, protection of life and property has the highest priority for fire suppression activities. Overall, fuels treatments would move areas toward natural fire regimes and desired conditions

under all alternatives, thereby providing benefit to local communities in terms of fire risk reduction. Alternatives vary in the degree to which treatments would emphasize HVRAs and wildland-urban interface areas and the degree to which natural processer or active management would be emphasized. Refer to “Fire and Fuels Management” for additional details.

#### *Climate Regulation and Adaptation*

Under all alternatives, removal of forest vegetation for vegetation and fuels management and timber harvest and production would reduce carbon stocks in the short term; carbon would continue to be stored in timber that is harvested for use as wood products. Vegetation treatment under all alternatives would improve ecological sustainability and allow for adaptability in the face of climate change. The lack of quantitative objectives for vegetation treatments under alternative A, however, would limit the ability to achieve forestwide changes. See “Carbon Storage and Sequestration” for details of the analysis.

#### *Water Regulation*

Under all alternatives, the watershed condition to support municipal watersheds and aquatic habitats would continue to be affected by factors such as road-related erosion, departure from the historical fire regime, forest cover, and forest health issues over the long term. See the “Watershed and Aquatic and Riparian Ecosystems” section for details.

#### *Intact Ecosystems*

Under all alternatives, vegetation management actions would include management to limit nonnative and noxious weeds and improve vegetation conditions, supporting pollinators. In addition, all alternatives would incorporate natural resource management to varying degrees in upland and riparian vegetation types. However, such treatments as timber harvest and prescribed fire would have short-term direct and indirect impacts on habitat connectivity for some wildlife and at-risk species. In the long term, moving vegetation toward desired conditions would improve the ecological condition, abundance, and distribution for species that depend on those vegetation communities. These actions would support habitat for wildlife species that have importance for human use (i.e., hunting, fishing, and wildlife viewing), as well as those with intrinsic nonuse value (i.e., special-status species that people value for preservation for future generations). See “Terrestrial Vegetation” and “Wildlife and Plants” for additional details.

### **Environmental Justice Analysis**

#### *Disproportionately High or Adverse Impacts on Environmental Justice Communities*

As detailed in the affected environment section, communities have been identified in the plan area that meet the criteria for further consideration of environmental justice impacts. These include the cites of Duchesne and Vernal, Utah, and the city of Green River, Wyoming. Under all alternatives, the Forest Service will continue to provide opportunities for use of Forest resources by area communities, including resources with important cultural or subsistence value for these communities, ensuring they do not face adverse impacts due to a lack of resources.

Access for recreation would also be maintained for all communities. However, the level of access and the recreational experience may be affected by variation in management areas that restrict future motorized access (i.e., recommended wilderness). If the time to reach specific resources or sites is affected due to restrictions on use, the travel cost—that is, the total time and travel cost expenses that people incur to visit a site—could be affected. This may result in impacts on all users, but low-income populations may be disproportionately affected. Management that restricts the size of groups, such as in a wilderness setting, can also affect the social preference of certain groups to use the Ashley National Forest in a large group setting. This is notable for Hispanic populations, which more than other groups have statistically demonstrated a preference for recreation in larger groups and in more developed settings; this is not compatible with a wilderness setting (Kruger et al. 2005).

### *Exposure Pathways for Environmental Justice Communities*

Potential short-term impacts on human health for local communities could occur as a result of wildfire and the use of prescribed fire as a management tool. Limited studies have been conducted on the short-term impacts of wildfire smoke on vulnerable populations. Some information suggests that low-income and minority populations may be more susceptible to impacts from smoke due to a higher level of health conditions that smoke may impact, such as asthma (Rappold et al. 2012). Some populations may also experience a higher level of exposure due to disparities in time spent outdoors (i.e., farmworkers) or due to indoor home and work environments with higher infiltration of outdoor pollutants (Burke et al. 2021).

Across all alternatives, there would be no difference in how the use of prescribed fire affects air quality, in terms of protecting human health in the long term. This is because NAAQS are set at levels that are necessary to meet that objective. As a result, no long-term adverse impacts would occur on any populations, including those identified for environmental justice consideration, from this activity.

Vegetation treatments to reduce wildfire risk also would occur under all alternatives. However, variations in vegetation treatments could affect the potential for large-scale fire and the associated impacts on communities. In addition, there is the potential that rural communities with a higher level of minorities or low-income population may be particularly vulnerable due to a historically lower level of public participation in implementation-level management decisions affecting vegetation management (see, for example, Davies et al. 2018). Management approaches to incorporate coordination with local communities during implementation of management actions would reduce the risk of impacts on all communities, including minority and low-income populations.

### *Environmental Consequences for Social and Economic Sustainability—Alternative A*

Regional employment and income—Alternative A would continue Ashley National Forest management according to the 1986 forest plan. Management actions under alternative A are expected to support 544 jobs and approximately \$24.4 million in labor income in the local economy. The contribution of jobs and labor income under alternative A would be the lowest of all the alternatives. Over the last 10 years, the forest products that were sold averaged 9,353 CCFs annually. Assuming the same removal rate would continue under alternative A, alternative A would have the lowest removal rate of all alternatives. In addition, almost 60 percent of total volume is fuelwood removed through personal permits, which provides benefits to people but does not contribute to the estimates of jobs and income in the timber industry. Forest product removal under alternative A would support 28 jobs and approximately \$1.4 million in labor income in the local economy, annually. These estimated economic contributions, in terms of jobs and income, are fairly moderate compared with other Forest Service program areas. Livestock grazing would continue to represent an important economic sector for some communities and will help to maintain a traditional cultural setting, supporting approximately 124 jobs and \$2.1 million in labor income the regional economy.

Recreation experience—Under alternative A, no recreation management areas would be established, and management would be focused on site-specific direction. Without changes to management, recreation conflicts and displacement impacts may occur if demands are not met, impacting the value provided by the recreation experience for some user groups. Visitors using non-developed areas of the Ashley National Forest reported the lowest level of satisfaction with current management (see the affected environment section). In addition, vegetation management under alternative A may affect the recreation experience. Vegetation management would not support long-term improvement of habitat for hunting, fishing, or traditional tribal uses, and it might affect the experience for these users. Objectives to promote trail and route maintenance and construction would be limited. While opportunities for recreation would remain present for various user groups, current management would continue to fall short of demands.

Cultural heritage and traditional uses—Under alternative A, current levels of traditional uses would continue in the short term. However, a lack of specific objectives for improving vegetation or treating fuels could affect the long-term availability of resources. Should an uncharacteristic wildfire occur as a result of limited movement toward desired conditions for fuels, the ability to access these resources could also be affected. Timber and forest product use would be permitted. However, a lack of vegetation management objectives could result in decreased long-term harvest potential with related impacts on the ability to access resources for uses with traditional or cultural importance.

Access to Ashley National Forest resources with traditional importance for Indian Tribes, such as plant materials and medicines used by the Eastern Shoshone Tribe and Ute Indian Tribe, would also be affected by a lack of forestwide vegetation management. Examples of relevant materials are included in table 3-54. The level of impacts would vary based on the habitat in which these resources are located. See “Terrestrial Vegetation” for details of impacts on specific vegetation communities. Alternative A has no forestwide standards or guidelines addressing traditional or cultural uses.

Wildfire management and fuels mitigation—Under alternative A, existing trends, including departure from natural fire regimes, fuel accumulation, and the risk of high-intensity wildfires, would continue to provide a threat for local communities. Management based on the 1986 forest plan, Federal wildland fire management policy, and the Utah National Forests Fire Amendment would support some movement toward desired conditions; however, the current vegetation trends would result in an associated risk of property damage and public risk.

Climate regulation and adaptation—Under alternative A, there are no quantitative prescriptions for vegetation treatments. Although these treatments would continue to occur, forestwide contributions to climate regulation, and the related benefits to humans, might be limited.

Water regulation—Alternative A is not likely to result in a forestwide ability to address watershed condition indicators, such as water quantity, fire regime, forest cover, and forest health issues, over the long term. This is due to a lack of coordinated treatments at the landscape scale. As a result, municipal watersheds and aquatic habitats would continue to be affected.

Intact ecosystems—Under alternative A, a lack of forestwide objectives for vegetation treatment would limit the ability to support pollinators and habitat for wildlife species with importance for use and nonuse purposes. Although site-specific actions would improve conditions locally, the overall ability to move toward desired conditions could be limited.

Disproportionately high or adverse impacts—Under alternative A, dispersed and developed recreation opportunities and access for resource use would be available. The lack of forestwide standards or guidelines to direct recreation use would result in site-specific variation in management dictated by management areas. As a result, the potential for impacts on environmental justice communities’ access for forest resources and recreation would vary on a site-specific basis.

Similarly, a lack of objectives for vegetation could result in the potential for long-term impacts on the availability of forest resources with traditional cultural and medical uses for environmental justice communities, such as the Ute Indian Tribe and Eastern Shoshone Tribe. The level of impacts would vary on a site-specific basis, based on the location of vegetation treatments. Under alternative A, no areas would be managed as recommended wilderness. This would limit any impacts on environmental justice communities related to their ability to use preferred recreation sites; it also would minimize constraints on time and costs to travel to recreation.

Exposure pathways—Alternative A does not provide a forestwide directive for fuels treatments, such as mechanical thinning or prescribed burning. As a result, while vegetation management actions could move some vegetation communities closer to desired conditions and make them more resilient to wildfire, variations in vegetation treatments may affect the magnitude of fire resilience on the Ashley National Forest as a whole over the long term. This could differentially affect Ashley National Forest beneficiaries and identified environmental justice communities.

*Environmental Consequences for Social and Economic Sustainability—Alternative B Modified*

Regional employment and income—Management actions under alternative B are expected to support approximately 587 jobs and \$25.4 million in labor income in the local economy. The contribution of jobs and labor income to the local economy due to Forest Service management activities in alternative B is the second highest of all alternatives. This is primarily due to alternative B’s objectives for mechanical vegetation treatments, which increase the production of sawtimber. This increased production would increase local employment and labor income relative to alternative A; it would support 48 jobs and \$2.4 million in labor income annually.

Employment and income contributions from livestock grazing would be as discussed under alternative A. Although no direct changes to head months would occur as a result of proposed management, specific measures to protect bighorn sheep from disease (i.e., by leaving the allotment vacant of domestic sheep where permits are voluntarily waived without preference) could result in changes to the level of permitted sheep and goat use on a site-specific basis during plan implementation. Should head months be reduced, or allotments be closed, this could result in financial impacts to individual operators or to the regional industry, with impacts determined by the level of reduction.

Recreational experience—Under alternative B modified, forest plan management includes recreation management areas, which would allow for an increased variety of recreation opportunities compared with alternative A and would address specific areas where many different recreational activities are concentrated. Compared with alternative A, there is an increase in objectives that would expand both the motorized and nonmotorized trail system on the Ashley National Forest, providing opportunities for access to these experiences. Based on ROS class, there is a slight increase in acres with an emphasis on motorized recreation (i.e., semiprimitive motorized acres and roaded natural areas are slightly increased). Table 3-61, below, summarizes impacts on identified user groups. Details of the change from current conditions for each recreation management area and the attribute identified for specific user groups are included in this table.

Cultural heritage and traditional uses—Under alternative B modified, vegetation management objectives would support long-term retention or improvement of forage and provisioning of other forest products. As a result, long-term social benefits related to traditional or cultural practices associated with grazing resources and forest products would be supported under this alternative. Site-specific limits would occur for forest product removal, and they may affect livestock management in the additional recommended wilderness areas. Overall, access to forest resources would be maintained or improved in this alternative.

Tribes who use the Ashley National Forest resources for traditional food sources, medicines, and materials for ceremonial structures would have access maintained for these uses. Over the long term, the condition of resources should improve with forestwide vegetation management objectives.

**Table 3-61. Recreation Experiences Matrix—Alternative B**

User Group	Alternative B	
	Recreation Management Area	Recreation Amenities
Solitude seekers	There would be increased opportunities due to the establishment of backcountry recreation management areas.	Remote areas with dispersed use would not be prioritized.
Families	Opportunities in established destination recreation management areas and general recreation management areas would slightly increase.	Disability access would increase. Developed recreation sites would slightly increase, and facilities would improve. Objectives include direction to improve and construct motorized routes and could provide additional opportunities for recreation.
Large groups	Opportunities in established destination recreation management areas would slightly increase.	Developed recreation sites would slightly increase, and facilities would improve. Objectives include direction to improve and construct motorized routes and could provide additional opportunities for recreation.
Mobility-impaired visitors <sup>1</sup>	Establishment of destination recreation management areas would provide areas with management geared toward increased access in specific areas.	Disability access would increase. Developed recreation sites would increase, and facilities would improve.
Hunters	Establishment of recreation management areas might reduce conflicts of use.	There would be the potential for long-term improvement to high-quality game habitat. Plan components for route maintenance and construction could improve access.
Anglers	Establishment of recreation management areas might reduce conflicts of use.	There would be the potential for long-term improvement to high-quality fish species habitat. Plan components for route maintenance and construction could improve access.
Commercial outfitters (boat trips)	Establishment of destination recreation management areas and general recreation management areas would provide areas suited for use.	There would be the potential for long-term improvement to high-quality fish species habitat. Plan components for route maintenance and construction could improve access.
Mountain bikers	Establishment of destination, general, and backcountry recreation management areas might reduce conflicts with other recreational uses.	Objectives include improved routes and construction of additional routes for biking, which would enhance the experience.
OHV users	Backcountry areas would allow for motorized travel.	Objectives include direction to improve and construct motorized routes, which would enhance the experience.

User Group	Alternative B	
	Recreation Management Area	Recreation Amenities
Cultural and historic site visitors	Establishment of recreation management areas might reduce conflicts of use.	There would be enhanced opportunities for visitation with added plan components for heritage resources.
Tribal populations	Establishment of recreation management areas might reduce conflicts of use	There would be the potential for long-term improvement to high-quality game and fish species habitat.
Environmental justice populations	Establishment of destination and general recreation management areas would increase opportunities for access.	An increase in developed recreation sites would provide increased opportunities for access. Objectives include direction to improve and construct motorized routes and could provide additional opportunities for access.

<sup>1</sup> Includes those with mobility disabilities and elderly visitors

Wildfire management and fuels mitigation—Fuels treatments under this alternative would improve or maintain desired vegetation conditions, in comparison with alternative A. In the long term, this would move the frequency and severity of wildland fire closer to the natural range of variation, and reduce risks to adjacent communities from wildfire. Treatments in HVRAs in particular would assist in the control and management of fires in the wildland-urban interface over the short and long terms to a greater extent than under alternative A.

Climate regulation and adaptation—Under alternative B and all action alternatives, the Forest Service would establish a desired condition to maintain carbon stocks by promoting forest stand health and the regeneration of forest stands, as well as by retaining the net acreage of forested communities. This would support contributions to climate regulation. In addition, the combination of vegetation and fuels management would move forest vegetation cover types toward conditions that represent a more natural disturbance regime. This would increase forest resistance and resilience to stressors, such as those brought by climate changes, over the long term.

Intact ecosystems—Under alternative B and all action alternatives, plan direction to manage nonnative and noxious weeds would move terrestrial vegetation types toward desired conditions, improve or maintain pollinator habitat, and maintain or improve plant species richness, composition, and native plant diversity compared with alternative A.

Disproportionately high or adverse impacts—All action alternatives include plan components to promote collaboration and enhance communication with interested parties. These include a goal to work with partners to review socioeconomic contributions relevant to environmental justice communities, where residents are more vulnerable to shifts in social and economic conditions.

This would support collaboration with local communities to ensure that plan implementation takes into account relevant issues and considers the needs for these populations, including those identified as environmental justice communities. In addition, plan language provides for increased coordination with local tribes to support continued traditional and cultural uses for coordinating with tribes regarding their perspectives, needs, and concerns as well as traditional ecological knowledge. Management also includes a goal to collaborate with the Ute Indian Tribe to facilitate solutions to issues that are important to the Tribe and to the Ashley National Forest, including public access to National Forest System lands via roads on tribal lands and tribal identification of and access to culturally important plants on National Forest



System lands. This direction would limit the potential for adverse impacts on resources important to these populations.

Alternative B would also promote improved access to visitors compared with alternative A. This would decrease the potential for adverse impacts on environmental justice communities related to the ability to access resources.

Exposure pathways—Under alternative B and all action alternatives, forestwide vegetation treatment objectives related to prescribed fire would result in emissions and potentially have more short-term impacts for local communities. Smoke can cause health problems in humans and wildlife, and it can adversely affect visibility, all of which can adversely affect the quality of life. In the long term, however, vegetation treatments would move vegetation toward desired conditions and historical fire regimes. This would support a reduction in the risk of high-intensity fires with impacts on air quality and human health for all populations, including environmental justice communities. Treatments would also contribute to the safety of community homes and infrastructure. This would improve the quality of life in communities next to the Ashley National Forest, particularly those on the wildland-urban interface, where fire risk is high. The impacts on specific communities cannot be determined at this time due to a lack of site-specific treatment locations.

#### *Environmental Consequences for Social and Economic Sustainability—Alternative C*

Employment and income—Management actions under alternative C are expected to support approximately 573 jobs and \$24.8 million in labor income in the local economy. Relative to other action alternatives, this alternative supports the lowest estimated economic impact, in terms of jobs and labor income, in the local economy. Permitted head months are estimated to be lower under alternative C due to the exclusion of livestock from destination recreation management areas, which would affect some pastures. The portions of allotments that would be closed are small, and a reduction in permitted numbers is likely the best way to mitigate impacts. Assuming the reduction in permits is proportional to the pasture area affected, total permitted head months are estimated to decrease by 3 percent in the affected pastures. This is a much smaller reduction overall (0.14 percent across the Ashley National Forest). This minimal reduction would not result in a meaningful impact on the regional economy, but it might affect individual permittees.

An alternative assumption (that all affected pastures would be closed and not proportionally reduced) would result in a larger reduction of head months—a loss of 3,318 head months—and a small but measurable impact on the regional economy. Whether entire pastures would be closed would depend on whether the management areas could be managed to keep livestock out of the closed destination recreation areas (i.e., through the use of herding, natural boundaries, or fencing). If this is not feasible, then the entire pasture might need to be closed. This management would be determined on a site-specific basis. The closure of all affected allotments would result in a maximum estimated loss of seven jobs and \$120,000 in labor income on an average annual basis. Alternative C would result in the lowest estimated head months of all alternatives and the lowest level of economic effects in terms of jobs and income related to livestock grazing.

In addition, alternative C has the lowest level of forest product removal of the action alternatives. This is because of an emphasis on natural processes for vegetation management and an increase in the acres managed as recommended wilderness areas and backcountry recreation management areas where timber harvest would be restricted. This alternative would result in the lowest availability and removal of forest products and the associated economic effects related to the timber industry. Economic effects of forest

product removal under alternative C would support 35 jobs and \$1.8 million in labor income in the local economy annually.

Recreation experience—As under alternative B modified, alternative C would include the establishment of recreation management areas. Under alternative C, however, recreation emphasis would focus on expanded backcountry recreation management areas and would further restrict motorized use in these areas. This alternative also has the most acres set aside as proposed wilderness, and it includes additional stream segments managed as suitable for inclusion in the NWSRS. User groups that prioritize developed recreation sites and motorized use might have decreased satisfaction under this alternative, while those who prioritize solitude and a backcountry experience might have enhanced experiences. See table 3-62, below, for a summary of impacts by user group.

**Table 3-62. Recreation Experiences Matrix—Alternative C**

User Group	Alternative C	
	Recreation Management Area	Recreation Amenities
Solitude seekers	Opportunities would increase due to the most recommended wilderness areas and backcountry recreation management areas.	Management direction would emphasize remote areas with low use.
Families	Opportunities would decrease in destination recreation management areas.	Motorized routes and developed recreation sites would not be emphasized.
Large groups	Opportunities would decrease in destination recreation management areas.	Developed recreation sites would not be emphasized.
Mobility-impaired visitors <sup>1</sup>	Opportunities would decrease in destination recreation management areas. Increased wilderness areas may result in site-specific displacement	Motorized routes for disability access and developed recreation sites would not be emphasized.
Hunters	Establishment of recreation management areas might reduce conflicts of use. Limits on motorized use in backcountry recreation management areas and recommended wilderness areas might reduce access for these areas.	There would be the potential for long-term improvement to high-quality game habitat. Motorized routes would not be prioritized, which could limit access to some portions of the Forest.
Anglers	Establishment of recreation management areas might reduce conflicts of use. Limits on motorized use in backcountry recreation management areas and recommended wilderness areas might reduce access for these areas.	There would be the potential for long-term improvement to high-quality fish species habitat. Motorized routes would not be emphasized, which could limit access to some portions of the Forest.
Commercial outfitters (boat trips)	Establishment of destination recreation management areas and general recreation management areas would provide areas suited for use.	There would be the potential for long-term improvement to high-quality fish species habitat. Motorized routes would not be prioritized.

User Group	Alternative C	
	Recreation Management Area	Recreation Amenities
Mountain bikers	Increased recommended wilderness areas might result in site-specific displacement. Establishment of destination, general, and backcountry recreation management areas might reduce conflicts with other recreational uses.	Mechanized routes would not be prioritized, which could limit access for this use in some portions of the Forest.
OHV users	Limits on motorized use in backcountry recreation management areas and recommended wilderness areas might reduce access and result in displacement on a site-specific basis.	Motorized routes would not be prioritized which could limit access for this use in some portions of the Forest.
Cultural and historic site visitors	Establishment of recreation management areas might reduce conflicts of use.	There would be enhanced opportunities for visitation with added plan components for heritage resources.
Tribal populations	Establishment of recreation management areas might reduce conflicts of use.	There would be the potential for long-term improvement to high-quality game and fish species habitat.
Environmental justice populations	Increased wilderness areas might result in site-specific barriers to access.	Decreased emphasis on developed recreation sites might provide barriers to access for some areas.

<sup>1</sup> Includes those with mobility disabilities and elderly visitors

Cultural heritage and traditional uses—As described under alternative B modified, vegetation management objectives under alternative C could result in improved long-term vegetation conditions with related improvement in availability of resources for uses with traditional or cultural importance. Alternative C would, however, place the highest level of restrictions on livestock grazing and timber harvest, which would decrease the support for local community use of resources. Impacts for the regional economy overall would be limited due to the minor role that the Ashley National Forest plays in the agriculture sector in the region’s forestry and ranching sectors.

For tribal-related cultural resources, restrictions on motorized transport might result in site accessibility difficulties for those who require motorized transportation but could also provide an increased possibility of privacy for ceremonies or sacred sites.

Wildfire management and fuels mitigation—Under alternative C, impacts from fuels treatments would be similar to those described under alternative B modified. A lack of minimum treatment acres in HVRAs might limit treatment benefits for communities. With an increased use of managed wildland fire, there would be some risk that a fire could escape, potentially resulting in impacts on communities in the wildland-urban interface.

Climate regulation and adaptation—As described under alternative B modified, the combination of vegetation and fuels management actions would move forest vegetation cover types toward desired conditions in treated areas more than under alternative A. Under alternative C, however, an emphasis on passive vegetation management might be less effective in trending vegetation types toward the natural range of variation and improving carbon storage capabilities and ecosystem resilience to climate change at large scales compared with alternative B modified.

Water regulation—Alternative C could result in improvement to watershed conditions for municipal watersheds and aquatic habitat as a result of the potential to decrease road-related water quality impacts. This is due to a decreased emphasis on motorized use and a reduction in mechanical vegetation treatments. Prescribed burning would continue to affect watershed conditions. Using wildland fire as a management tool could increase the potential high-intensity fires in some areas, which could affect hydrological processes and water quality. Overall, alternative C would still decrease the potential for uncharacteristic wildfire and subsequent adverse impacts on water quality compared with alternative A but to a lesser degree than alternative B modified due to the restrictions on active vegetation management.

Intact ecosystems—Support for intact ecosystems would occur as described under alternative B modified. Under alternative C, reduced mechanical treatments and reliance on natural processes would reduce short-term impacts from treatment but would provide reduced long-term benefits for ecosystems when compared to alternative A. In addition, this alternative includes the greatest level of recommended wilderness, supporting habitat connectivity across a broader portion of the Ashley National Forest.

Disproportionately high or adverse impacts—The highest level of recommended wilderness would occur under this alternative. This would result in an additional potential for site-specific impacts on ability to access recreation areas (in terms of costs for access).

Exposure pathways—Impacts under alternative C would be similar to those described under alternative B modified. Due to a reliance on natural processes, short-term impacts from the use of prescribed fire would be reduced compared with other action alternatives; however, emissions would occur from use of managed wildland fires. This alternative would have the highest use of managed wildland fires of all alternatives. In the long term, under this alternative, the risk of uncharacteristic wildfire and associated health impacts from emissions would be greater than under alternative B modified due to the restrictions on active vegetation management.

#### *Environmental Consequences for Social and Economic Sustainability—Alternative D*

Employment and income—Management actions under alternative D are expected to support approximately 588 jobs and \$25.5 million in labor income in the regional economy. This alternative provides the largest economic contribution in terms of jobs and labor income impacts, although the estimated difference is not meaningfully greater than alternative B modified. Economic contributions from livestock grazing would be as described under alternatives A and B modified. Contributions from forest product removal would be highest under this alternative as a result of the emphasis on mechanical treatments to meet resource objectives and the largest number of acres suitable for timber production. The resulting economic impact is greater than all other alternatives, supporting jobs (50, average annual) and labor income (\$2.5 million annually) in the local economy.

Recreation experience—Under alternative D, recreation management areas would be established, as under alternatives B modified and C. Under this alternative, the emphasis would be on increased destination recreation management areas and more developed recreation opportunities and settings. Plan components would include objectives for a greater level of infrastructure development, particularly to support motorized and mechanized use. User groups who prioritize these uses are likely to have enhanced recreation experiences under this alternative, while those who value solitude, primitive recreation, and undeveloped areas may not have experiences enhanced compared with current conditions. Table 3-63, below, displays impacts by user group.

**Table 3-63. Recreation Experiences Matrix—Alternative D**

User Group	Alternative D	
	Recreation Management Area	Recreation Amenities
Solitude seekers	Opportunities would decrease due to a lack of additional recommended wilderness and decreased backcountry recreation management areas.	Management direction would not emphasize remote areas with low use.
Families	Opportunities would increase in destination recreation management areas.	Management direction would emphasize motorized routes and developed recreation sites with potential for increased recreation opportunities.
Large groups	Opportunities would increase in destination and general recreation management areas.	Developed recreation sites would be emphasized with potential for increased recreation opportunities.
Mobility-impaired visitors <sup>1</sup>	Opportunities would increase in destination recreation management areas.	Motorized routes and developed recreation sites would provide increased access with potential for increased recreation opportunities.
Hunters	Establishment of recreation management areas might reduce conflicts of use.	Motorized routes might provide increased access to portions of the Forest. There would be the potential for impacts on habitat due to other resource priorities.
Anglers	Establishment of recreation management areas might reduce conflicts of use.	Motorized routes might provide increased access to portions of the forest
Commercial outfitters (boat trips)	Establishment of destination and general recreation management areas would provide areas suited for use.	Motorized routes and developed sites might provide increased access.
Mountain bikers	Establishment of destination, general, and backcountry recreation management areas might reduce conflicts with other recreational uses.	Mechanized routes might provide increased access with potential for increased recreation opportunities.
OHV users	There would be increased destination and general recreation management areas and limited restrictions on motorized use in backcountry areas.	Motorized routes and developed sites might provide increased access.
Cultural and historic site visitors	Establishment of recreation management areas might reduce conflicts of use.	There would be enhanced opportunities for visitation with added plan components for heritage resources.
Tribal populations	Establishment of recreation management areas might reduce conflicts of use.	There would be the potential for impacts on tribal resources due to other resource priorities.
Environmental justice populations	Establishment of destination and general recreation management areas would increase accessible opportunities.	Increased emphasis on developed recreation sites might facilitate access.

Cultural heritage and traditional uses—Traditional communities that rely on forest resources, such as forage or forest products, would have their values and traditions supported the most under alternative D, in the short term. This is due to this alternative’s emphasis on access and resource output. In the long

term, the increased emphasis on treatments in HVRAs might not support the most movement toward desired conditions for forage and forested vegetation.

While access would be improved for tribal cultural resources, this alternative also has the highest potential for conflicts with other users for these resources and locations on the landscape with cultural or spiritual significance.

Wildfire management and fuels mitigation—Impacts from fuels treatments would be similar to those described for alternative B modified, but increased treatment overall and in the HVRAs would further reduce the extent and severity of wildland fires and the risk for communities. A reduced proportion of ignitions that would be managed and an increased focus on fire suppression would limit impacts on communities. This would result in a greater need for coordinated efforts with communities to cover the costs of treatment.

Climate regulation and adaptation—Over the long term, the combination of vegetation and fuels management actions would improve carbon storage capabilities and ecosystem resilience to climate change, as described under alternative B modified.

Water regulation—Alternative D would result in the highest potential for impacts from road- and trail-based erosion. Objectives focused on vegetation treatments and prescribed burning in and around HVRAs would support improvement for municipal watershed conditions. These actions would also reduce the long-term risk of high-intensity wildfires and the related impacts on watersheds compared with alternative A; however, this reduction would be less than under alternative B modified due to the emphasis on HVRAs rather than locations to benefit resource conditions.

Intact ecosystems—Support for intact ecosystems would occur as described under alternative B modified. Under alternative D, increased mechanical treatments and less reliance on natural processes would increase short-term impacts from treatment. Compared with other action alternatives, the lack of additional areas managed as recommended wilderness and the greater emphasis on developed use would result in decreased support for habitat connectivity.

Disproportionately high or adverse impacts—Impacts under alternative D would be similar to those described under alternative B modified. However, no additional wilderness areas would be included under this alternative and developed recreation sites would be emphasized. This would limit impacts on access for environmental justice communities.

Exposure pathways—Impacts under alternative D would be similar to those described under alternative B modified. Short-term impacts from the use of prescribed fire would be increased compared with other action alternatives. This is because of the emphasis on active management, particularly in HVRAs, which may often occur near communities and in the wildland-urban interface.

### Cumulative Environmental Consequences for Social and Economic Sustainability

The time frame for the economic cumulative effects analysis is the next 15 years. The geographic scope for the economic cumulative effects analysis is the four-county region identified for the direct and indirect impacts analysis. This analysis considers how past, present, and reasonably foreseeable future actions on lands throughout the region may interact with decisions made under the forest plan to affect the economic environment and ecosystem services.

The social and economic analysis of the forest plan is unique among the resources and uses. This is because the effects occur primarily off the Ashley National Forest. In this way, the indirect effects

described above are cumulative in nature—they evaluate the role of Forest Service decisions under the forest plan both on and off the Forest. However, the indirect effects analysis above does not address how actions taken on adjacent lands would affect the social and economic consequences of the forest plan. These impacts are discussed below.

Trends and activities that occur off the Forest might influence the recreation-related effects identified in the economic environmental consequences section. Under all alternatives, the forest plan would support diverse and sustainable recreation opportunities on the Ashley National Forest. Increased recreation use on the Forest would lead to a higher economic impact than predicted in the direct and indirect effects discussion. Population growth in the surrounding communities could contribute to increased recreation visitation and could lead to changes in preferences for the types and qualities of recreation supported on the Ashley National Forest. It is anticipated that the number of recreational visits is likely to continue to increase in line with population increases, with a corresponding increase in economic contributions over the planning period.

Recent events have resulted in even greater demand on forest resources. In 2020, visitation levels increased at unprecedented levels due to increased demand for regional recreation opportunities during the COVID-19 pandemic. For example, based on data from the Vernal and Duchesne-Roosevelt Ranger Districts, occupied nights for developed campgrounds increased by approximately 90 percent between 2019 and 2020. It remains to be seen whether this increase in use will continue. Changes to visitation rates on public lands adjacent to the Ashley National Forest may also affect visitation rates on the national forest and influence the economic impact on surrounding communities. Finally, Ashley National Forest visitation may also be affected by on-Forest projects, including implementation of the Ashley Karst NRGBA management plan and ongoing trail improvement projects. Changes to the recreation level and type would have the potential to affect the visitor experience, with impacts varying by user group, as discussed under impacts by alternative.

An increase in population locally in the region also has the potential to affect the demand on the Ashley National Forest for other resources, including fire protection resources for the wildland-urban interface. Market conditions and general economic trends can also affect Forest conditions and demand for forest products. Economic downturns affect the level and type of spending by recreationists in Forest communities. In addition, impacts on the market for livestock or timber could have locally important impacts on the economic feasibility of these resources on National Forest System lands.

For forest-dependent communities or those with significant cultural ties to the Ashley National Forest, multiagency and governmental efforts supporting landscape-scale restoration may improve the quality of life through maintaining and restoring ecosystem services on the landscape and increasing forest resiliency to disturbance. This could result in continued support for traditional resources and maintenance of cultural or spiritual traditions.

Climate change has the potential to affect a broad spectrum of resources and resource uses on the Ashley National Forest and the corresponding economic and social contributions from these resources. Long-term impacts, to which forest management contributes, may occur. These create a cumulative impact on the risk to populations from climate change effects, such as the ability to adapt to increased fire and drought. Similarly, Forest Service management actions affect water regulation, but this is also affected by the actions of other government, nongovernment, and private entities. This applies similarly to all ecosystem services that are provided by cross-boundary resources.

With regard to environmental justice, the potential for cumulative contributions to significant adverse impacts on specific communities would be dictated at the implementation level.

For details on the potential impacts from other management actions, also see the corresponding resource sections, including but not limited to “Livestock Grazing,” “Timber,” “Recreation,” and “Wildlife and Plants.”

## Areas of Tribal Importance

### Introduction

This section discusses the unique relationship the U.S. Government and the Forest Service have with federally recognized tribes. For a detailed discussion of the existing and current conditions, trends, and issues related to tribal resources and areas of tribal importance, the reader is directed to the Ashley National Forest Assessment, Tribal Report (Forest Service 2017i). The 1986 forest plan does not mention tribal uses, tribal treaty rights, or the Forest Service’s obligation to consult with Indian tribes in a variety of ways. Tribal knowledge and expertise can inform Forest Service planning through consultation to ensure that the Forest Service considers treaty rights, religious concerns, and use areas. Examples of information that might be helpful for Ashley National Forest management, while respecting confidentiality, include:

- Traditional plants, animals, minerals, and other resources of tribal interest
- Traditional hunting, fishing, and gathering areas used by tribal members
- Ensuring protection of sacred sites and traditional use areas
- Perspectives on treaty rights of and Federal obligations to the Ute Indian Tribe and Eastern Shoshone Tribe
- Effects of Forest Service projects, permits, and activities on traditional uses of forest plant resources

The Forest Service recognizes the need to improve tribal relationships and partnerships to provide for subsistence and other cultural activities (Forest Service 2017i).

### *Regulatory Framework*

The following are excerpts from some of the most relevant laws and authorities, in addition to NEPA, for addressing tribal rights and land uses in the Ashley National Forest:

**National Historic Preservation Act of 1966 (NHPA) (54 USC 300101 et seq.), as amended in 1992**—This act requires Federal agency officials to consult with Indian tribes concerning the effects of undertakings on historic properties of traditional and cultural importance to the tribes.

**American Indian Religious Freedom Act (42 USC 1996)**—This act states that “it shall be the policy of the United States to protect and preserve for American Indians their inherent right for freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including, but not limited to access to site, use and possession of sacred objects, and the freedom to worship through ceremonies and traditional rites.”

**Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001 et seq.), amended in 1992**—This act addresses the rights of lineal descendants and members of Indian tribes and Alaska Native and native Hawaiian organizations to certain human remains and precisely defined cultural items. The law requires Federal agencies and museums to provide an inventory and summary of human remains and associative funerary objects. The law also provides for criminal penalties for illegal trafficking in Native American human remains and cultural items.



**Executive Order 13175—Consultation and Coordination with Indian Tribes, November 6, 2000—**

This EO directs Federal agencies to establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes.

**Executive Order 13007, Indian Sacred Sites of 1996—**This EO directs Federal land management agencies, to the extent permitted by law and not clearly inconsistent with essential agency functions, to accommodate access to and use of Indian sacred sites, to avoid affecting the physical integrity of such sites wherever possible, and, where appropriate, to maintain the confidentiality of sacred sites. Federal agencies are required to establish a process to ensure that affected Indian tribes are provided reasonable notice of proposed Federal actions or policies that may affect Indian sacred sites.

**Cultural and Heritage Cooperation Authority (25 USC 3055)—**This states the Secretary of Agriculture may provide free of charge to Indian tribes any trees, portions of trees, or forest products from National Forest System land for traditional and cultural purposes, notwithstanding section 472a of title 16. Tree, portions of trees, or forest products provided under subsection (a) may not be used for commercial purposes. This authority also authorizes the Secretary of Agriculture to protect the confidentiality of certain information, including information that is culturally sensitive to Indian tribes, and requires the Forest Service to consult with affected Indian tribes before releasing culturally sensitive information.

In addition to ensuring that obligations to the tribes are met, the forest plan can help the Forest Service look for new ways to make the lands and programs internally managed relevant to the tribes now living adjacent to the Ashley National Forest. The Ute Indian Tribe and Eastern Shoshone Tribe have an inherent interest in maintaining their access to, and the preservation of, the Uinta Mountains and surrounding areas for cultural and traditional practices; they are also a part of the broader community that appreciates the forest for education, cultural interpretation, recreation, special events, and economic benefits.

### *Analysis Area*

The analysis area includes the entire Ashley National Forest. In the generalized discussion of context, the analysis extends to the broader cultural and temporal landscape, not wholly administrated by the Forest Service. The temporal scope of this analysis is the anticipated life of the plan.

### *Notable Changes Between Draft and Final EIS*

The affected environment section has minor modifications for factual corrections based on public comments. Analysis of alternative B was updated to reflect changes in alternative B modified. Changes include analysis of impacts from the removal of recommended wilderness as well as information related to new tribal plan components.

### **Description of Affected Environment**

The Forest Service manages the natural resources and landscapes that sustain members of the Ute Indian Tribe and Eastern Shoshone Tribe and their respective cultures and traditions. Local heritage, culture, traditions, and values have been handed down over generations and predate acquisition of the area by the United States. Long-standing use of the Ashley National Forest and its natural resources is fundamental to the economic, social, and cultural vitality of these two tribes. Some of these important uses (traditional uses) include:

- Gathering of plants for various purposes (religious, medicinal, consumption, and other applications)
- Gathering of minerals for ceremonial use
- Procurement of lodgepole pines
- Hunting and fishing for food and ceremonial purposes
- Religious and ceremonial uses (including pilgrimages, ceremonies, vision quest sites, and sacred burial visits)

Table 3-64, below, displays a summary of resources important to the Ute Indian Tribe and Eastern Shoshone Tribe by vegetation type.

**Table 3-64. Tribal Resources Crosswalk**

<b>Tribal Resource</b>	<b>Traditional Use</b>	<b>Vegetation/Geographic/ Geological Type</b>
Aspen ( <i>Populus tremuloides</i> )	medicinal	coniferous forest, deciduous forest
Bear root ( <i>Ligusticum porteri</i> )	medicinal, ceremonial	coniferous forest, deciduous forest
Bitterroot ( <i>Lewisia rediviva</i> )	medicinal, food	Pinyon-juniper woodland, coniferous forest
Camas ( <i>Camassia quamash</i> )	food	shrubland
Cedar ( <i>Juniperus osteosperma</i> )	medicinal, ceremonial	pinyon-juniper woodland
Chokecherries ( <i>Prunus virginiana</i> )	food, ceremonial	riparian
Dandelion ( <i>Taraxacum</i> )	medicinal	meadows, shrubland
Death camas ( <i>Zigadenus</i> spp.)	unknown	riparian
Elderberry ( <i>Sambucus</i> spp.)	food	riparian
Gooseberries ( <i>Ribes</i> spp.)	food	riparian
Gum weed ( <i>Grindellia squarrosa</i> )	medicinal	desert shrubland
Horse mint ( <i>Agastache urticifolia</i> )	utilitarian, seasoning	riparian
Indian potatoes/spring beauty ( <i>Claytonia lanceolata</i> )	food	pinyon-juniper woodland, shrubland
Mountain Mahogany ( <i>Cercocarpus</i> spp.)	ceremonial	shrubland
Pinyon pine ( <i>Pinus edulis</i> )	utilitarian	pinyon-juniper woodland
Ponderosa pine ( <i>Pinus ponderosa</i> )	food, seasoning	coniferous forest
Red willow ( <i>Salix</i> spp.)	ceremonial, utilitarian	riparian
Sagebrush ( <i>Artemisia tridentata</i> )	medicinal, ceremonial	shrubland, pinyon-juniper woodland, and deciduous forest
Sand bar willow ( <i>Salix exigua</i> )	utilitarian	riparian
Sap from ponderosa pine, pinyon pine, etc.	utilitarian	pinyon-juniper woodland, coniferous forest
Sweet grass ( <i>Hierochloa adorate</i> )	utilitarian	riparian, wet meadows
Sweetanise/western sweet cicely ( <i>Osmorhiza occidentalis</i> )	ceremonial, utilitarian	riparian
Tar weed ( <i>Madia glomerata</i> )	medicinal	shrubland
Tobacco ( <i>Nicotiana attenuate</i> )	ceremonial, utilitarian	shrubland
Wild garlic	food, seasoning	mountain meadows in deciduous and coniferous forest

<b>Tribal Resource</b>	<b>Traditional Use</b>	<b>Vegetation/Geographic/ Geological Type</b>
Wild onions: Tapertip onion ( <i>Allium acuminatum</i> ), shortstyle onion ( <i>Allium brevistylum</i> ), textile onion ( <i>Allium textile</i> )	food, seasoning	mountain meadows in deciduous and coniferous forest
Wild peppermint ( <i>Mentha</i> spp.)	ceremonial, utilitarian	riparian
Wild strawberries ( <i>Fragaria</i> spp.)	medicinal	deciduous forest, shrubland
Yampa ( <i>Perideridia gairdneri</i> )	food	mountain meadows in deciduous and coniferous forest
Yarrow ( <i>Achillea millefolium</i> )	medicinal	pinyon-juniper woodland, shrubland, and deciduous forest
Yucca ( <i>Yucca</i> spp.)	utilitarian	pinyon juniper woodland, shrubland
Large game habitat	food, ceremonial	all
Eagle hunting blinds	ceremonial	Uinta quartzite, sandstone, and coniferous forest
Vision quest sites	ceremonial	alpine, Uinta quartzite, and sandstone
Feathers	ceremonial	all
Rock shelters	ceremonial	Uinta quartzite and sandstone
Wild horse traps	utilitarian	Pinyon-juniper woodland

The Ute Indian Tribe and Eastern Shoshone Tribe original homelands remain significant for tribal identity and cultural traditions. The history of the U.S. Government’s displacement and relocation of native peoples has made cultural connections to original homelands difficult. Much of the land that was originally occupied and used by the Ute Indian Tribe and Eastern Shoshone Tribe was acquired by Euro-American settlers or is currently in private ownership. Tribal members have adapted to the loss of their traditional lands by finding alternate locations to practice cultural traditions or to gather traditional resources on public lands.

The FGNRA along the Green River in Wyoming includes lands that were historically used by the Eastern Shoshone tribal members, but these lands were outside of formal treaty or reservation boundaries. These areas still have cultural importance to the Eastern Shoshone Tribe.

The entire Duchesne-Roosevelt Ranger District, and the entire South Unit, are within the bounds of the original Uintah and Ouray Reservation. Numerous sections of the original reservation lands have been removed from tribal ownership through congressional acts, but the Ute Indian Tribe still maintains a cultural and legal connection to these lands. The original reservation lands are an area of tribal importance to the Ute Indian Tribe. The original reservation lands are also within “Indian Country” as defined in 18 USC 1151, and the Ute Indian Tribe maintains rights on those lands as specified by law and Federal court decisions. The original Uintah and Ouray Reservation is defined by the legal survey of the Uintah Special Meridian. Table 3-65, below, is a sampling of documented locations of historic and cultural importance for the Ute Indian Tribe. Because the entire Ashley National Forest is within Ute Tribal ancestral lands, areas of tribal importance are not limited to those lands within the reservation boundary.

In compliance with laws, regulations, EOs, Forest Service guidance, and plan amendments, the Forest Service has incorporated consultation and consideration of tribal resources and uses in planning and program management. The Forest Service primarily consults with tribes as part of the NHPA section 106 review process with regard to cultural resources and project implementation. In the forest planning

**Table 3-65. Places Important to the Ute People**

<b>Location</b>	<b>Reason for Importance</b>
Paint Mine-Moon Lake	Minerals for ceremonial use
Confluence of Rock Creek and Duchesne River	Former Ute Reservation Agency location; 1860s Ute horse racetrack
Rock Creek Area	Forested area used for hunting and gathering
McAfee Basin	Areas for plant collection (sweetgrass near Lower Stillwater River)
Mouth of Whiterocks Canyon	Former battle area
Uinta Canyon	Major trail to higher elevations
Willow Creek GS	Near a Ute horse racetrack
Pine Springs site in southwest Wyoming	Lithic material source
Red Cloud Loop above Brownie Canyon	Lodgepole pine procurement area
Near Elkhorn Ranger Station	Ceremonial area

Source: Forest Service 2017i

process, the Forest Service seeks to improve relationships and partnership with the tribes in ecosystem management; determine the traditional plants, animals, minerals, and other resources that are of interest; and develop a formal protocol to ensure that tribal members can exercise their treaty rights to gather traditional resources (Forest Service 2017i).

### Environmental Consequences for Areas of Tribal Importance

This section describes the potential effects of the proposed revised plan and alternatives on areas of tribal importance and tribal uses. The Ute Indian Tribe and Eastern Shoshone Tribe continue traditional use of the Ashley National Forest for a variety of purposes, including sustaining their cultural identity. Areas of tribal importance have the ability to provide indigenous communities with an important connection to their ancestors who may have sustained themselves in the same landscapes, places, and sacred sites for a variety of subsistence, cultural, or ceremonial uses.

#### *Methodology and Analysis Process*

Effects on tribal interests are known through direct tribal consultation between the Forest Service and affected tribes. The action alternatives represent programmatic decisions; therefore, they would have no direct effects on American Indian rights and interests. Potential effects would be considered indirect effects in that they would occur later in time and at the site-specific level. At the programmatic level of a forest plan, consequences are discussed qualitatively.

The Forest Service is not aware of all sites and interests of tribal importance. The Forest Service relies on its relationship and consultation with the Ute Indian Tribe and Eastern Shoshone Tribe to be informed as to where and what interests may be affected by Forest Service actions. The consultation process affords both tribes and the agency opportunities to identify sites, interests, and values of tribal importance as well as to identify mitigations and avoidance and protective measures to preserve tribal interests. Currently, significant gaps in data exist in the loss of cultural memory that is a direct result of forced removal of culturally affiliated tribes from ancestral homelands more than 100 years ago and a history of insufficient tribal consultation between the Forest Service and the tribes (Forest Service 2017i).

### *Analysis Assumptions*

The analysis includes the following assumptions:

- Decisions in the selected alternative (desired conditions, objectives, standards, guidelines, special areas, suitability, and monitoring) will form an outline for planning or implementing site-specific projects and activities. However, the NHPA section 106 process and additional regular consultation methods will be completed for any undertaking that may affect areas of tribal importance.
- At the time implementation-level decisions are being considered, the Forest Service will address analysis and impacts on areas of tribal importance from site-specific actions and will conduct government-to-government consultation.
- Members of federally recognized tribes will continue to access, use, and conduct religious pilgrimages and ceremonies at known and confidential traditional cultural properties and sacred sites, and will collect and use Ashley National Forest resources for traditional or tribal uses.
- The Forest Service will follow all applicable laws, policies, and regulations when planning or implementing site-specific projects and activities.
- Various treaties with the Ute Indian Tribe and the Eastern Shoshone Tribe that provide rights for gathering resources in traditional homelands and that provide rights to access and use of sacred or ceremonial areas on public lands will be upheld and respected.
- The tribes may be interested in recovering ownership of lands or specific resource locations that were part of their original land base and, therefore, may be concerned about committing lands to other uses.
- Changes to the transportation system that have the potential to affect the access and use of areas of importance will be analyzed during project-level planning.
- Unplanned ignitions will be analyzed at the time of the start and documented in the Wildland Fire Decision Support System. Management response to a wildfire will be based on objectives appropriate to conditions of the fire, fuels, weather, and topography to accomplish specific objectives for the area where the fire is burning. Effects on known tribal areas and cultural resources will be considered when determining the objectives and management response to a wildfire.
- Acres treated by fire and mechanical methods are cumulative over the life of the plan.
- Changes in land use, access, or methods of forest treatment could affect opportunities for solitude and privacy for tribal traditional and cultural activities. Increases in wilderness designation could increase the potential for solitude and privacy but could also impose limitations on the necessary access for tribes to reach areas of tribal importance and use.

### *Indicators*

Analysis indicators for areas of tribal importance are provided below.

- Extent and intensity of areas managed for recreational use
- Extent of actions or decisions affecting tribal resource access or exercise of treaty rights

### *Environmental Consequences for Areas of Tribal Importance Common to All Alternatives*

Under all alternatives, tribal use of the lands administered by the Forest Service will continue. This is because the tribal use of these lands and the surrounding area by the Ute Indian Tribe and Eastern

Shoshone Tribe has occurred long before the arrival of Euro-Americans and continues to the present day. Moreover, the use of these areas historically occupied and used by the tribes is protected by multiple treaties, EOs, and congressional acts (Forest Service 2017i). All action alternatives contain objectives that provide for regular meetings with the affected tribes in addition to the usual consultation for project-specific actions. This is a notable change in direction from the 1986 forest plan. All alternatives recognize the value of areas of tribal importance and their relationship to the Ashley National Forest.

Potential threats to areas of tribal importance affected by programmatic planning can be activities not initiated by agency actions: wildfire, looting, vandalism, and dispersed recreation outside established recreation management areas. Under all alternatives, the Forest Service would continue to consult with tribes to avoid, minimize, or resolve potential impacts.

### **Extent and Intensity of Areas Managed for Recreational Use**

Changes in public recreation access and intensity of use have the potential to compromise tribal solitude and privacy and affect areas of traditional resource gathering and tribal use. The Forest Service does not fully understand the exact locations and uses of many areas of tribal importance, which highlights the need for further consultation. Likewise, impacts on areas of tribal importance from varying levels of recreation extent and intensity have not been documented on the forestwide level. The development and maintenance of recreation infrastructure may have the potential to affect certain areas important for tribal use under all alternatives.

### **Extent of Actions or Decisions Affecting Tribal Resource Access or the Exercise of Treaty Rights**

Actions in the Ashley National Forest, including (but not limited to) grazing, fire and fuels management, vegetation treatments, and timber harvest, have the potential to affect treaty reserved rights for traditional tribal use. Applicable Federal and State regulations, Forest Service policies, and current programmatic agreements would apply to any ground-disturbing actions associated with a proposed development. These processes serve to avoid and minimize direct and indirect impacts on areas of tribal importance regardless of alternative. Historically, the Ute Indian Tribe has expressed a strong preference toward natural or passive management of vegetation over mechanical or prescribed treatments; this applies both to vegetation management and fire and fuels management (Forest Service 2017i). The practice of increased mechanical or prescribed treatments on the Forest may affect the character and setting of areas of tribal importance. Moreover, the Ute Indian Tribe considers the entire Forest sacred and important and has previously expressed concerns regarding active management across the Ashley National Forest.

Tribal consultation is necessary to identify areas used for traditional cultural activities and to maintain access through system roads, as well as through trail access and designated motorized access. Changes in access may also hinder the ability of tribes to visit and use areas of importance.

All alternatives will provide management direction for areas under protective designations. With proper and thorough tribal consultation, wilderness and other designated area designations have the potential to protect areas of tribal importance and use, including areas where traditional plants are gathered under an array of federally guaranteed treaty rights. However, without adequate consultation, wilderness and other designated area designations and changes in travel management associated with protective designations may inhibit continued access and tribal uses of National Forest System lands.

Areas of the Ashley National Forest are permitted for grazing under all alternatives. Tribal consultation is necessary to determine if and where grazing poses impacts on areas of tribal importance, specifically the traditional gathering of culturally significant plants.

Under all alternatives, the Forest Service will continue to consult with tribes as part of the NHPA section 106 review process with regard to areas of tribal importance, cultural resources, and project-specific implementation. All action alternatives include goals to meet with tribal representatives at regular intervals.

#### *Environmental Consequences for Areas of Tribal Importance—Alternative A*

The 1986 forest plan included little mention of tribal interests and lacked discussion, analysis, and programmatic direction for areas of tribal importance. The 1986 forest plan does mention that formal and informal contacts were made with the Ute Indian Tribe to determine if there were existing land use plans that would be in conflict with any of the revised plan alternatives. Through government-to-government consultation, it was determined that there would be no conflicts with existing plans and that implementation-level tribal consultation would continue to take place on project-specific implementation actions (Forest Service 1986). Nonetheless, under the 1986 forest plan and compliance with laws, regulations, EOs, Forest Service guidance, and plan amendments, the Forest Service incorporated consultation and consideration of tribal resources and uses in planning and program management.

#### **Extent and Intensity of Areas Managed for Recreational Use**

Recreation planning under alternative A is based on the assumption of moderate to heavy levels of dispersed recreation. Ground and vegetation disturbance as well as a loss of privacy, solitude, setting, or character may occur in conjunction with recreational use and associated facilities. Without diligent tribal consultation, these impacts may adversely affect the integrity of tribally important areas. However, under alternative A, consultation requirements would be implemented to protect and mitigate such impacts on areas of tribal importance.

#### **Extent of Actions or Decisions Affecting Tribal Resource Access or the Exercise of Treaty Rights**

Ground disturbance and impacts on culturally significant plants may occur in conjunction with management activities in the plan area. Disturbance to traditionally gathered plants can result from grazing, fire and fuels treatment, timber harvest, and vegetation management. Under the 1986 forest plan, grazing components are largely excluded, which allows for greater flexibility in management of grazing. Without proper consultation between affected tribes, ranchers, and the Forest Service, this has resulted in a lack of understanding of how to best protect tribally important locations and plant species, and this might continue to do so under alternative A.

A total of 11,000 acres of lodgepole pine habitat was set as an objective aimed to encourage natural regeneration, a method generally preferred by the Ute Indian Tribe. Section 106 and other consultation requirements would be required and implemented under alternative A to protect and mitigate impacts on areas of tribal importance within these areas and for any significant action in the Ashley National Forest. The lack of programmatic direction in substitution of site-specific planning for the above-mentioned actions might leave gaps in terms of how to best protect areas of tribal importance. Prescribed and mechanical treatments would occur under alternative A, along with the production of timber. Historically the Ute Indian Tribe has reiterated their preference for passive management of the Forest and less active management wherever possible. Under the 1986 forest plan, the Forest Service and ranchers do not have a complete understanding of what locations and what species of plants the affected tribes consider areas of tribal importance. Under alternative A, treaty reserved rights to gather plants of traditional importance and use might be affected due to a lack of understanding of how to best manage these species and areas of importance.

### *Environmental Consequences for Areas of Tribal Importance—Alternative B Modified*

#### **Extent and Intensity of Areas Managed for Recreational Use**

Forestwide plan components for access and recreation have similar effects on areas of tribal importance across all action alternatives. The allocation of recreation management areas varies by alternative and may affect the type of recreation intensity and access on specific areas of the Ashley National Forest. Furthermore, the recreation management areas are divided into three differing management areas that vary in intensity of proposed recreation development. Destination recreation management areas may have the greatest potential to affect solitude and privacy in tribally important areas, whereas backcountry recreation management areas will likely not foster threats to tribal privacy and solitude due to lower visitor density and use. General recreation management areas emphasize multiple use and may provide access to areas of tribal importance.

Alternative B modified aims to develop and maintain infrastructure to support recreation while also weighing resource values and local uses, including use by the local tribes. Under alternative B modified, the emphasis on providing a variety of developed and dispersed recreation to support a diverse set of users and local communities recognizes that local communities, including tribal communities, have traditionally used lands managed by the Forest Service; such direction might serve to promote, thorough consultation and effective management, the preservation of the setting, character, and function of areas of tribal importance. In addition, alternative B modified provides language to reduce impacts from some recreation activities on tribal lands by including a goal to work with the Ute Indian Tribe to restrict off-highway vehicles from crossing the national forest boundary onto tribal lands, where off-highway vehicle use is prohibited (see FW-GO-TRAIL-02).

#### **Extent of Actions or Decisions Affecting Tribal Resource Access or the Exercise of Treaty Rights**

Impacts on traditionally used resources and areas of tribal importance may be caused by other uses of the Ashley National Forest, including grazing, fire and fuels treatment, timber harvest, and vegetation management. Further programmatic consultation is needed to determine where tribally important resources exist and which Forest activities are potentially impactful to treaty-guaranteed tribal use of such resources. Additional consultation with affected tribes and ranchers is needed to identify these tribally important plant species and to determine whether grazing in certain areas poses a threat to traditional resource collection. Inclusion of Language in alternative B modified to consider tribal perspectives, needs, and concerns, as well as traditional ecological knowledge, in project design and decisions (FW-GO-TRIBE-2) would encourage coordination on site-specific projects to incorporate tribal information and minimize impacts. Additionally, a wildlife goal (FW-GO-WILDL-02) states that management actions are coordinated with management plans of other Federal, State, and local agencies, Tribes, and adjacent landowners, thus providing opportunities to manage wildlife habitat with importance for tribes through coordination and collaboration along and across administrative boundaries.

To a limited extent, alternative B modified embraces the natural role of fire in moving the Ashley National Forest to desired conditions in addition to prescribed fire and mechanical treatments. The Ute Indian Tribe has historically preferred natural or passive management of the Forest over mechanical or prescribed treatments. Alternative B modified may provide forestwide fire and fuels management direction that is more in line with the Ute Indian Tribe's preference, at least compared with alternative A. Alternative B modified permits timber harvest, planned ignitions, thinning, and planting on roughly 2,400 acres per year in the first decade and 2,100 acres per year in the second decade. The Ute Indian Tribe generally does not prefer these active treatments of the Forest; however, through sustained and regular tribal consultation, in addition to project-specific consultation, greater understanding of areas of tribal importance and the locations of these areas, and best management practices to protect tribal use of these



areas, management that is agreeable to the tribes and the Forest Service may be increasingly possible under alternative B modified.

### *Environmental Consequences for Areas of Tribal Importance—Alternative C*

#### **Extent and Intensity of Areas Managed for Recreational Use**

Under alternative C, the management emphasis for recreation would go in the direction toward a quieter experience and an increased emphasis on backcountry recreation. As compared with alternatives A and B modified, motorized recreation would be significantly reduced. This direction in managing recreation use might foster more opportunities for solitude and privacy for traditional tribal use. Differing from all other alternatives, under alternative C the Forest Service would manage backcountry recreation management areas as not suitable for wheeled motorized travel, which might restrict necessary access to areas of tribal importance. This is because tribal members may use existing Forest recreation infrastructure to reach tribally important areas by motorized vehicle. Further tribal consultation is needed to identify what recreation infrastructure, specifically motorized, tribal members depend on to access areas of tribal importance.

#### **Extent of Actions or Decisions Affecting Tribal Resource Access or the Exercise of Treaty Rights**

Alternative C is more protective than alternatives A and B modified in that it emphasizes preservation of the natural setting and implementation of passive management techniques. The Ute Indian Tribe has expressed that natural and passive management of the Ashley National Forest, the entirety of which is important and sacred to them, is their preferred method of Forest management (Forest Service 2017i). Alternative C provides slightly more restrictive grazing regulations, with 40 percent utilization of key forage species for livestock and 13,000 fewer acres permitted for grazing across the plan area (table 2-2). Consultation with affected tribes and ranchers, as needed and on a case-by-case basis, may help protect tribally important plant species from potential adverse grazing impacts.

Similar to alternative B modified, alternative C embraces the natural role of fire in moving the Ashley National Forest to desired conditions. Alternative C may provide forestwide fire and fuels management direction that is more in line with the Ute Indian Tribe's preference of passive management. Under alternative C, vegetation management has an emphasis on the use of natural processes to achieve desired conditions. Similarly, the use of prescribed fire and timber harvest would be significantly reduced. The Ute Indian Tribe generally prefers these passive treatments of the Forest.

Alternative C adds recommended wilderness areas in addition to all existing designated areas. Additional areas under protective designations may significantly reduce ground disturbance and impacts on tribally important plant species. However, the addition of protective designations also may have the potential to restrict motorized or mechanized transport access to the Forest, which, in turn, would limit access to areas of tribal importance (Forest Service 2019b).

### *Environmental Consequences for Areas of Tribal Importance—Alternative D*

#### **Extent and Intensity of Areas Managed for Recreational Use**

Under alternative D, the management emphasis for recreation would be in the direction toward increased Forest access and developed recreation opportunities. Management would emphasize motorized access, developed opportunities, and management controls to support these opportunities. The potential for impacts on areas of tribal importance from recreation would continue under this more intensive recreation approach. This emphasis may increase the potential for impacts on ground disturbance, the setting, and necessary solitude for tribally significant areas. Increased recreation development might also foster

increased access to certain areas of tribal importance by preserving and expanding upon motorized use in recreation management areas.

### **Extent of Actions or Decisions Affecting Tribal Resource Access or the Exercise of Treaty Rights**

Alternative D is less protective than all other alternatives and emphasizes active forest management techniques. It has the fewest restrictions on timber harvest and vegetation management. Additionally, alternative D embraces active management of wildland fire. Alternative D would not add new designated areas but would not remove existing areas under alternative A.

Historically, the Ute Indian Tribe has expressed a preference toward natural or passive management of vegetation over mechanical or prescribed treatments. Vegetation management approaches under this alternative might be problematic for the tribe. Livestock grazing allotments and stubble height regulations would be determined based on site-specific conditions. Consultation with affected tribes on site-specific management would continue to help protect tribally important plant species from adverse impacts.

### **Cumulative Environmental Consequences for Areas of Tribal Importance**

The use of resources and places important to the Ute Indian Tribe and Eastern Shoshone Tribe began long before the establishment of the Ashley National Forest. Thus, the distribution of resources and areas of tribal importance and tribal use in many cases crosses current jurisdictional boundaries. In addition, activities conducted on lands adjacent to the Ashley National Forest can also affect access to resources; the availability, abundance, and sustainability of resources; and the opportunities for tribal use in the Ashley National Forest.

Current and previous Forest Service management activities, public resource procurement, recreational use, and natural processes have affected the access and use of areas of tribal importance. Under all alternatives, effects on these places and features may directly or indirectly affect the tribes' access and ability to conduct ceremonial and traditional practices on other sacred sites or areas of tribal importance that are part of their continuing traditions.

Under all alternatives, negative effects, such as the loss or degradation of sacred sites, traditional cultural properties, and other resources that are important to tribes or that provide for tribal use, have happened in the past and probably will happen in the future. As time progresses, this loss results in fewer resources available to future tribal generations to learn about and connect with their cultural, religious, and spiritual practices, values, and identities. It is therefore imperative to work with the tribes that have traditionally used the Ashley National Forest to avoid and mitigate impacts on areas of tribal importance.

All forest plan alternatives would continue the necessary prerequisite of tribal consultation on a government-to-government basis. Implementation of a new forest plan would seek to avoid, or at least significantly reduce, impacts on areas of tribal importance. This could reduce cumulative impacts relative to alternative A. The Forest Service does not anticipate any additional cumulative impacts on areas of tribal importance and tribal uses as a direct result of any of the alternatives.

## **Cultural and Historic Resources**

### **Introduction**

Cultural resources can be defined as physical evidence or places of past human activity. Cultural resources are defined in Forest Service Manual 2360 as “an object or definite location of human activity, occupation, or use identifiable through field survey, historical documentation, or oral evidence.” This includes prehistoric and historic archaeological sites and districts, historic buildings and structures,

ethnographic landscapes, and traditional cultural properties. A traditional cultural property is defined as a cultural resource that is eligible for inclusion in the National Register of Historic Places (NRHP) because of its association with cultural practices or beliefs of a living community that are rooted in that community's history and important in maintaining the continuing cultural identity of the community. It must also be a tangible property; that is, it must be a district, site, building, structure, or object.

Cultural resources are important social and economic contributors to the Ashley National Forest, region, and nation. They provide opportunities for cultural tourism, education, and research. They are also necessary for maintaining the cultural identity of the Ute Indian Tribe and Eastern Shoshone Tribe who have traditionally called areas within and adjacent to the Ashley National Forest their home.

### *Regulatory Framework*

The NHPA directs agencies to manage effects on historic properties and protect significant historic resources from destruction, alteration, and neglect. Historic properties are defined under section 101 of the NHPA (54 USC 300–308) as any district, site, building, structure, or object included on, or eligible for inclusion on, the NRHP based on their importance to local, regional, or national history. The four NRHP criteria for eligibility are the following:

- Criterion A: “Event”—The property contributes to the major pattern of American history.
- Criterion B: “Person”—The property is associated with significant people of the American past.
- Criterion C: “Design and construction”—This concerns the distinctive characteristics of the building by its architecture and construction, including having great artistic value or being the work of a master.
- Criterion D: “Information potential”—The property has yielded or may be likely to yield information important to prehistory or history.

If a property is found to be eligible under one or more of the four criteria, it must also maintain most, if not all, aspects of integrity of location, design, setting, materials, workmanship, feeling, and association to be eligible.

Historic properties include archaeological sites, historic buildings, traditional cultural places of significance to communities, cultural landscapes, monuments, and cultural features that might be clustered in districts, individual sites, buildings, structures, and other objects deemed worthy of preservation for their historical significance. In addition to NEPA, the following are excerpts from some of the most relevant laws and authorities for addressing cultural and historic resources in the Ashley National Forest:

**National Historic Preservation Act of 1966 (NHPA) (16 USC 470), as amended**—NHPA section 106 directs all Federal agencies to take into account the effects of their undertakings (actions, financial support, and authorizations) on properties included in or eligible for the National Register. Advisory Council on Historic Preservation regulations at 36 CFR 800 implement NHPA section 106. NHPA section 110 establishes inventory, nomination, protection, and preservation responsibilities for federally owned historic properties.

**National Environmental Policy Act of 1969 (NEPA) (42 USC 4321–4346)**—NEPA establishes national policy for the protection and enhancement of the environment. Part of the Federal government's function in protecting the environment is to “preserve important historic, cultural, and natural aspects of our national heritage.” The act is implemented by the CEQ regulations at 40 CFR 15001508.

**The Archeological and Historic Preservation Act of 1974 (16 USC 469)**—The Archeological and Historic Preservation Act amended and expanded the Reservoir Salvage Act of 1960; it was enacted to complement the Historic Sites Act of 1935 by providing for the preservation of historical and archaeological data that might be lost or destroyed as the result of the construction of a federally authorized dam or other construction activity. This greatly expanded the number and range of Federal agencies that had to take archeological resources into account when executing, funding, or licensing projects. The Archeological and Historic Preservation Act also allows any Federal agency responsible for a construction project to appropriate a portion of project funds for archaeological survey, recovery, analysis, and publication of results.

**The American Indian Religious Freedom Act of 1978**—This act protects American Indian rights to exercise traditional religions, including access to sites and freedom to worship through ceremonial and traditional rites.

**Archaeological Resources Protection Act of 1979 (16 USC 470aa et seq.), as amended**—This act provides criminal penalties and civil penalties for the unauthorized excavation, removal, damage, alteration, or defacement of any archaeological resource found on public lands or Indian lands. The act includes National Forest System lands in its definition of public lands. The act also prohibits the sale, purchase, exchange, transportation, receipt, or offering of any archaeological resource obtained from public lands or Indian lands.

**Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001)**—This act provides a process for museums and Federal agencies to return certain Native American cultural items (human remains, funerary objects, sacred objects, or objects of cultural patrimony) to lineal descendants and culturally affiliated Indian tribes and Native Hawaiian organizations. The Native American Graves Protection and Repatriation Act includes provisions for unclaimed and culturally unidentifiable Native American cultural items, intentional excavation, and unanticipated discovery of Native American cultural items on Federal and tribal lands, and penalties for noncompliance and illegal trafficking. The act requires agencies and museums to identify holdings of such remains and objects and to work with appropriate Native American groups toward their repatriation. Permits for the excavation or removal of cultural items protected by the act require tribal consultation, as do discoveries of cultural items made during activities on Federal or tribal lands. The Secretary of the Interior's implementing regulations are at 43 CFR 10.

**Executive Order 11593—Protection and Enhancement of the Cultural Environment, issued May 13, 1971**—This EO directs Federal agencies to inventory cultural resources under their jurisdiction, nominate all federally owned properties that meet the criteria to the NRHP, use due caution until the inventory and nomination processes are completed, and ensure that Federal plans and programs contribute to the preservation and enhancement of non-federally owned properties.

**Executive Order 13175—Consultation and Coordination with Indian Tribal Governments, issued November 6, 2000**—This EO directs Federal agencies to establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes.

**Executive Order 13287—Preserve America, issued March 3, 2003**—This EO establishes Federal policy to provide leadership in preserving America's heritage by actively advancing the protection, enhancement, and contemporary use of the historic properties owned by the Federal government. The order encourages agencies to seek partnerships with State, tribal, and local governments, and the private

sector to make more efficient and informed use of historic properties for economic development and other recognized public benefits.

**Native American Graves Protection and Repatriation Regulations (43 CFR 10(b)— Human Remains, Funerary Objects, Sacred Objects, or Objects of Cultural Patrimony from Federal or Tribal Lands)**—The regulations establish a systematic process for determining the rights of lineal descendants and Indian tribes and Native Hawaiian organizations to certain Native American human remains, funerary objects, sacred objects, or objects of cultural patrimony with which they are affiliated. The regulations pertain to these objects whether they are inadvertently discovered or excavated intentionally under a permit issued under the authority of the American Antiquities Act of 1906 (16 USC 431-433) (Antiquities Act) or the Archaeological Resources Protection Act.

**Curation of Federally Owned and Administered Archaeological Collections (36 CFR 79)**—This establishes definitions, standards, procedures, and guidelines for Federal agencies to preserve collections of prehistoric and historic material remains and associated records recovered under the authority of the Antiquities Act, Reservoir Salvage Act, NHPA, and the Archaeological Resources Protection Act.

**36 CFR 261 Prohibitions in Areas Designated by Order; Closure of National Forest System Lands to Protect Privacy of Tribal Activities (2011)**—This “provides regulations regarding special closures to provide for closure of National Forest System lands to protect the privacy of tribal activities for traditional and cultural purposes to ensure access to National Forest System land, to the maximum extent practicable, by Indian and Indian Tribes for traditional and cultural purposes.”

### *Analysis Area*

The analysis area is primarily related to the resources in the Ashley National Forest, within the context of the thousands of years of pre-contact history and hundreds of years of post-contact history of the Uinta Mountains and surrounding areas. The temporal scope of the effects analysis is the anticipated life of the plan.

### *Notable Changes Between Draft and Final EIS*

The affected environment section was modified to include additional details on the historic ranger stations. Analysis of alternative B was updated to reflect changes in the new alternative B modified from the original draft EIS in the “Environmental Consequences for Cultural and Historic Resources” section. This includes analysis of impacts from the removal of recommended wilderness. Acres of vegetation management actions were updated in the “Environmental Consequences” section.

### **Description of Affected Environment**

Ashley National Forest is rich in historically and culturally significant properties. Cultural and historic resources, and uses in the plan area, are important to understanding the social, economic, and ecological sustainability of the plan area. For a detailed discussion of the cultural history, current conditions, trends, and issues related to the cultural resources of the Ashley National Forest, see the Ashley National Forest Assessment, Cultural and Historic Resources Report (Forest Service 2017j).

The plan area includes portions of northeastern Utah and southwestern Wyoming in the intermountain region of the United States. As of April 2020, approximately 104,445 acres are considered to have been inventoried to current standards, or 7.5 percent of the total plan area. Inventory has not been conducted evenly across the four districts or within each district. An additional 129,148 acres, or 9.3 percent of the total plan area, have been surveyed at a reconnaissance level (not current standards).

Currently, there are 2,585 known cultural resources documented in the plan area, including both prehistoric and historic remains. Cultural resource sites in the Ashley National Forest include 2,058 prehistoric sites, 431 historic sites, and 96 multicomponent sites. Of these, 1,140 sites meet eligibility requirements to be listed on the NRHP, and 6 sites have already been listed (see table 3-66 and table 3-67). Ongoing surveys, which are completed as part of section 106 cultural resource compliance requirements, have demonstrated that numerous cultural resources could be present in areas not yet surveyed. The Forest Service also maintains cultural resource sensitivity mapping data, which are incorporated in the impact discussions (figure 3-23). These sensitivity data should not be considered a predictive model. Currently, 385,000 acres of the Ashley National Forest are mapped as having high sensitivity for the presence of cultural resources, 378,600 acres as having moderate probability, and 614,000 acres as having low probability (Forest Service GIS 2020).

**Table 3-66. Summary of Cultural Resource Sites by Type in the Ashley National Forest as of June 2021**

NRHP Eligibility	Cultural Site Type			Total
	Prehistoric	Historic	Multicomponent	
Eligible	961	121	58	1,140 cultural sites
Listed	1	5	0	6 cultural sites
Not eligible	973	258	31	1,262 cultural sites
Unevaluated	124	47	7	178 cultural sites
<b>Total</b>	<b>2,059</b>	<b>431</b>	<b>96</b>	<b>2,585 cultural sites</b>

Source: Forest Service GIS 2021

**Table 3-67. National Register-Listed Properties in the Ashley National Forest as of June 2021**

Forest Site Number	State Number	Site Name	National Register Status
AS-0095	42DA157	Ute Mountain Fire Lookout Tower	Listed
AS-0147	42DA191	Swett Ranch Historic Homestead	Listed
AS-0151	42DA208/42UN823	Carter Military Road	Listed
AS-0192	42DC347	Stockmore Ranger Station*	Listed
AS-0193	42DC348	Indian Canyon Ranger Station*	Listed
AS-3000	48SW19962	Lucerne Valley Archaeological District	Listed

Source: Forest Service 2017j ,Forest Service GIS 2021

\*The Ashley National Forest has proposed to decommission the Indian Canyon Ranger Station and to transfer the Stockmore Ranger Station to the Bureau of Indian Affairs for management by the Ute Indian Tribe.

Traditional cultural properties are those areas of cultural significance identified by extant American Indian tribes and other groups, such as Mormon communities. These properties can include, but are not limited to, mountains, hills, springs, collecting areas, burial grounds, and unique landscape features.

National Register Bulletin 38 provides guidance for documenting and evaluating traditional cultural properties (Parker and King 1998). The Ute Indian Tribe has suggested that traditional plant collecting areas may be considered traditional cultural properties.

In addition to the sites listed above, the Ashley National Forest manages nine additional historical ranger/guard stations across the Forest, eight of which are eligible for National Register listing. See table 3-68 for details.

**Table 3-68. Historic Ranger Stations in the Ashley National Forest as of June 2021**

Site Name	Location	Current Use	National Register Status
Summit Springs Ranger Station	Flaming Gorge Ranger District	Recreational Cabin Rental	Eligible
Colton Ranger Station	Vernal Ranger District	Recreational Cabin Rental	Eligible
Trout Creek Guard Station	Vernal Ranger District	Recreational Cabin Rental	Eligible
Paradise Park Guard Station	Vernal Ranger District	Recreational Cabin Rental	Eligible
Elkhorn Ranger Station	Roosevelt Ranger District	None	Eligible
Uinta Park Guard Station	Roosevelt Ranger District	Recreational Cabin Rental (Planned)	Eligible
Yellowstone Ranger Station	Roosevelt Ranger District	Administrative Site	Eligible
Moon Lake/Lake Fork Guard Station	Roosevelt Ranger District	Recreational Cabin Rental	Ineligible
Altonah Ranger Station	Roosevelt Ranger District	Administrative Site	Eligible

Source: Forest Service 2021

\*Excludes two National Register-listed Ranger Stations (Stockmore and Indian Canyon) as details on these two stations are provided in table 3-67.

Cultural and historic resources within the plan area represent the processes and events important to the identity and history of local communities. Cultural resources contain a wealth of information regarding social and ecological conditions and changes through time. These conditions and changes include human successes and failures in coping with these transformations over the past 10 millennia. This information can be of value to managers making decisions regarding contemporary and future ecological management and in educating the public about the complex ecological sustainability of the plan area. Preservation of historic properties, traditional cultural properties, and traditional landscapes is important as a reminder of the collective past and a link to the future (Forest Service 2017j).

## Environmental Consequences for Cultural and Historic Resources

### *Methodology and Analysis Process*

Potential environmental consequences are evaluated on a programmatic, qualitative basis using past studies and observations and comparing the areal extent of potential implementation actions. The forest plan does not authorize site-specific projects or activities; therefore, there are no direct effects from adopting the forest plan. In this analysis, impacts are not evaluated on a site- or project-specific basis. Where applicable, cultural resource sensitivity evaluation data prepared by the Ashley National Forest are incorporated in the impact discussions; however, inventories for cultural resources are limited, and many cultural resources could be present in areas not yet surveyed (figure 3-23). Direct and indirect site-specific effects will be analyzed when future projects implementing the plan are proposed. This project-specific analysis and completion of the section 106 process will provide a more in-depth analysis of the impacts on cultural resources.

Indicators for identifying potential impacts on cultural resources are assessed by applying the criteria of adverse effect, as defined in the implementing regulations for section 106 (36 CFR 800). Actions that could alter, degrade, or otherwise affect the integrity and condition of a property have a high potential to adversely affect the values that contribute to the traditional, cultural, scientific, or historical value of the property. Actions that protect, limit, or otherwise avoid impacts on the integrity or condition of a property would protect and maintain the values that contribute to its traditional, cultural, scientific, or historical values.

The criteria of adverse effect also provide a general framework for identifying and determining the context and intensity of potential impacts on other cultural resources categories, such as any tribal or other traditional community, cultural, or religious practices or resources. For additional discussion on tribal resources and concerns, see “Areas of Tribal Importance.”

This section is organized by the issue topics identified during scoping and subsequent alternatives development that are most applicable to cultural resources. The analysis area is typically forestwide, with some targeted areas. The cumulative effects analysis includes the potential impacts that could occur from a reasonably foreseeable management scenario combined with other reasonably foreseeable activities or projects in the Ashley National Forest’s vicinity. This evaluation focuses on longer-term indirect and cumulative effects that might occur over the 10- to 15-year life of the forest plan.

#### *Analysis Assumptions*

- For implementation of site-specific actions proposed in this plan, the Forest Service will comply with section 106 of the NHPA.
- All laws, requirements, and Forest Service guidance pertinent to determining the impacts on cultural resources are included in determining the potential impacts.
- Cultural resources are generally considered to be nonrenewable; for example, adverse effects that impact the physical integrity of a historic property are irreversible, long-term impacts. Some impacts, such as changes to the setting, may be adverse effects in the short term.
- Avoidance of significant resources will be preferred rather than other methods of resolving any adverse effects that may be anticipated.
- The Forest Service is continually compiling cultural resource baseline information for areas that may be under consideration for future activities. This work will result in a greater understanding of the presence and condition of known resources and will identify potential conflicts.
- Ongoing consultation with contemporary tribal representatives would continue using a qualitative assessment of the potential for impacts on sites, landscapes, and other plant, animal, mineral, or other resources that may be important to those groups for traditional or religious uses.

#### *Indicators*

Analysis indicators for cultural and historic resources are provided below.

- The acres or areal extent of potential ground-disturbing activities and the potential for directly affecting cultural resources or exposing cultural resources to changes in setting, access, or erosion
- The timeline and acres of non-project-related survey, number of NRHP nomination studies proposed, and timeline for implementing qualitative assessment of cooperative planning and protective measures



- Change in acres of designations or restrictions, qualitative consideration of known areas of sensitive resources, and qualitative consideration of dispersed versus developed sites
- Acres of designated areas and qualitative assessment of management

***Environmental Consequences for Cultural and Historic Resources Common to All Alternatives***

The potential impacts on cultural resources associated with all alternatives are similar in nature and type. The alternatives are broad in scope and do not indicate specific project-level impacts that would be addressed through the subsequent section 106 processes. Management actions associated with the key issues all have the potential to affect cultural resources, primarily through ground disturbance, changes to the setting, and incidental and proactive protection measures.

Some of the greatest potential threats to cultural resources are those activities not initiated by agency actions: wildfire, erosion, looting, vandalism, trespass, and unmonitored dispersed recreation.

**Effects from Recreation, Recreational Access, and Recreational Designations**

Recreational use, including nonmotorized and motorized vehicle use, can affect cultural resources in the long term through direct disturbance, soil compaction, altered surface water drainage, erosion, intrusions to the setting, and access leading to unauthorized collection or vandalism. In addition, recreational facility development and maintenance can similarly affect cultural resources. The potential for impacts on cultural resources would increase as the population and recreational use increase or are concentrated in fewer areas or dispersed in areas where cultural resources are present. Ground disturbance as a result of dispersed recreational use and dispersed camping may have the potential to cause adverse effects on cultural resources. Thus, recreational designations and restrictions can affect the intensity and risk of impacts on cultural resources. The impact of repeated uses or visits over time could also increase the potential for impacts on cultural resources from erosion. Repeated visits to sites could also create social trails, directing more people to cultural sites. Increased access could damage resources through vandalism and unauthorized collection.

**Effects from Designated Areas**

Current management of designated lands, such as the FGNRA, scenic byways, national recreation trails, and existing wilderness, would continue. Under all alternatives, seven RNAs with a total area of 7,700 acres and the Sheep Creek Canyon Geologic Area would also be retained. Within the existing RNAs, Ashley National Forest cultural resource data indicate 1,600 acres have a high sensitivity for the presence of cultural resources and 2,200 acres have moderate sensitivity. Within the Sheep Creek Canyon Geologic Area, 200 acres have a high sensitivity for the presence of cultural resources and 1,400 acres have moderate sensitivity (see table 3-69). Designated areas may incidentally protect cultural resources from ground-disturbing and access-related impacts and alterations of the setting. However, in some cases, limiting activities such as mechanical vegetation treatments may affect opportunities to address fuels buildup and mitigate wildfire potential.

**Table 3-69. Summary of Cultural Resource Sensitivity by Selected Designated Areas and Vegetation Treatments**

Allocation	Alternative A	Alternative B Modified	Alternative C	Alternative D
Recommended Wilderness	0	0	50,200	0
High sensitivity for cultural resources	N/A	NA	15,900	N/A
Moderate sensitivity for cultural resources	N/A	NA	15,400	N/A
Research Natural Areas (RNAs)	7,700	7,700	9,100	7,700

Allocation	Alternative A	Alternative B Modified	Alternative C	Alternative D
High sensitivity for cultural resources	1,600	1,600	2,100	1,600
Moderate sensitivity for cultural resources	2,200	2,200	2,700	2,200
Sheep Creek Canyon Geologic Area	3,600	3,600	3,600	3,600
High sensitivity for cultural resources	200	200	200	200
Moderate sensitivity for cultural resources	1,400	1,400	1,400	1,400
Timber Harvest and Suitability	213,419	189,400	93,700	189,400
High sensitivity for cultural resources	N/A	70,600	39,400	70,600
Moderate sensitivity for cultural resources	N/A	60,000	31,400	60,000
Timber Production	N/A	109,800	80,500	114,300
High sensitivity for cultural resources	N/A	47,100	31,700	50,000
Moderate sensitivity for cultural resources	N/A	36,700	27,400	37,900
Annual Targets for Vegetation Management Treatments: year 1/subsequent years	No target	2,400/2,100	1,000/800	1,600/1,300

Source: Forest Service GIS 2020

### Effects from Fire and Fuels Management

Under all alternatives, fire and fuels management and treatments have the potential to cause impacts from ground and direct disturbance of cultural resources, changes in cultural settings, and exposure of cultural resources to vandalism, looting, and erosion. Management actions associated with wildfire use and suppression can lead to adverse effects on cultural resources, including the construction of firelines through cultural resource sites, the burning of perishable materials resulting from suppression ignition, and the effects of high temperatures on artifacts and features. Treatments to reduce fuels and proactive identification of cultural resources would reduce the risk of wildfire on cultural resources from emergency wildfire suppression activities such as fire breaks, where identification and avoidance may be impossible. Reducing wildfire risk would particularly benefit fire-sensitive resources like wooden structures and rock art as well as natural resource locations that may be important to tribes.

### Effects from Vegetation Management, Timber Harvest, and Sustainable Ecosystems

Potential impacts on cultural resources from vegetation management and timber harvest are similar for all alternatives. Potential impacts on cultural resources could result from ground and direct disturbance of cultural resources, changes in cultural settings, exposure of cultural resources to vandalism, looting, and erosion. Vegetation treatments include mechanical thinning, prescribed fire, invasive species control, hazardous fuels removal, and restoration projects. The locations of vegetation treatments are not precisely defined, and targeted acres and preferred treatment methods vary among the alternatives.

Treatment methods also vary in their potential for impacts. For example, ground-disturbing mechanical vegetation treatments could modify the spatial relationships of artifacts and site features and displace, break, or damage artifacts. The use of fire as a treatment could affect flammable cultural resource artifacts and features, cause spalling and staining of rocks, and distort the analysis of an artifact's date and function. Any form of vegetation management that might affect cultural resources would be reviewed in compliance with relevant cultural resources laws and regulations.

Unlike other potential vegetation treatments, the locations of potential timber harvest are defined and their relationship to known cultural resources or sensitive areas can be compared. The Forest Service would continue to use timber harvest under all alternatives to salvage dead trees, reduce hazardous fuels, enhance habitat, and provide for commercial and consumer uses. Potential impacts are similar to other

forms of vegetation treatment; however, timber harvest would typically involve more intensive ground disturbance at the harvest location and for access roads. Lands identified as suitable for commercial timber production are quantified under the action alternatives.

### **Effects from Social and Economic Contributions**

All the alternatives include ongoing activities that provide social and economic value to the local and regional economy and quality of life. These broadly include overlapping recreation opportunities, livestock grazing, resource enhancement, fire protection, forest products, cultural heritage, and aesthetic values. Cultural resources compliance under the NHPA section 106 process and other laws, requirements, and Forest Service guidance would continue to be implemented. The Forest Service would continue to assess the effects on cultural resources for all undertakings. The value of traditional and cultural uses in the Ashley National Forest would continue to be recognized in the Forest Service's programs and activities.

Surface-disturbing activities are associated with economic uses of the Ashley National Forest. Cultural resources can be directly affected by the modification, displacement, and loss of artifacts, features, and middens, resulting in the loss of valuable cultural resource information on the site function, date of use, subsistence, past environments, and other research questions. Construction or removal of ranch fencing, corrals, and tanks could affect the integrity of cultural resources. In areas where livestock congregate and trail, cultural resource sites could potentially be affected by the short-term removal of vegetation cover, increased soil compaction, and some mixing of artifacts and contextual relationships. Livestock grazing can be associated with ongoing, long-term, or incremental impacts on cultural resources on or near the ground, if present, which can accelerate erosion and weathering in areas where livestock congregate. However, when rangeland health standards are maintained through adequate management of livestock grazing, significant impacts on cultural resources would not be anticipated (Osborn et al. 1987; Roney 1977).

All the alternatives would continue oil and gas leasing and development in selected areas; no new allocations or availability decisions would be made. Oil and gas leasing is associated with potential impacts from ground and direct disturbance of cultural resources, changes in cultural settings, and exposure of cultural resources to vandalism, looting, and erosion.

### ***Environmental Consequences for Cultural and Historic Resources—Alternative A***

Alternative A is the current management based on the 1986 forest plan, as amended and implemented. Ongoing work and approved planned activities would continue, and the Forest Service would address effects on cultural resources. This alternative would not recommend any new management areas; no changes would occur to the plan in response to issues raised, and it would not adjust management in response to the requirements of the 2012 Planning Rule.

As described under “Environmental Consequences for Cultural and Historic Resources Common to All Alternatives,” the potential for impacts on cultural resources from ground and direct disturbance, intrusions to setting, erosion, and access would continue. Recreational use would continue to increase because recreational management allocations would not change. This would lead to potential overuse in some areas. The potential for impacts from designated management areas, fire and fuels management, vegetation management, and timber harvest are similar to those described under “Environmental Consequences for Cultural and Historic Resources Common to All Alternatives.”

Alternative A does not provide additional plan-level guidance specifying acres for targeting of vegetation treatments and fuel reduction. Currently, timber harvest and suitability acres total 213,419 acres. These

locations are not defined, so cultural resource sensitivity cannot be assessed. The current plan emphasizes commodities and economic output, including timber and wood products; hazardous fuels treatment; road, trail, and facility maintenance; and new recreational facilities. The Forest Service would continue to assess impacts on cultural resources associated with these undertakings on a project-specific basis.

*Environmental Consequences for Cultural and Historic Resources Common to Alternatives B Modified, C, and D*

Potential impacts on cultural resources are similar to those described under “Environmental Consequences for Cultural and Historic Resources Common to All Alternatives.” Alternatives B modified, C, and D incorporate the Forest Service’s 2012 Planning Rule, which provides more resources protection, adaptive planning, and integration among resources. Integrated plan components specifically address the protection of cultural resources, recognition of the value of traditional and cultural uses, and compliance with all laws, regulations, and policies. Desired conditions for cultural resources specified in the forest plan are common across all action alternatives. The action alternatives all include proactive objectives addressing a heritage program plan, cultural resource survey, site recordation, NRHP evaluations, and tribal meetings. These objectives vary among the alternatives in timelines and the number of actions anticipated.

Specifying proactive cultural resource objectives and desired conditions assists the Forest Service in meeting obligations under NHPA section 110 to maintain a preservation program for the identification, evaluation, nomination to the NRHP, and protection of historic and prehistoric properties. At a plan level, identifying the locations, significance, historic context, and relative importance of cultural resources can lead to increased knowledge of the resource base and the preservation needs and avoid the potential for future incompatible land allocation decisions.

Plan components for other resources, such as soils, scenic, water, areas of tribal importance, and others, include desired conditions that are largely consistent with cultural resource protection, enhancement, and impact avoidance. Fire and fuels management would include explicit objectives for defining and avoiding impacts on HVRAs, including cultural resources.

*Environmental Consequences for Cultural and Historic Resources—Alternative B Modified*

Under alternative B modified, the potential impacts on cultural resources are similar to those described under “Environmental Consequences for Cultural and Historic Resources Common to All Alternatives.” Specific proactive objectives for cultural resource management provide a 3-year timeline for developing a heritage program plan, annually completing at least 200 acres of cultural survey, documenting five historic properties, formally evaluating five historic properties for eligibility to the NRHP, and annual engagement with tribes.

When compared with alternative A, recreational management designations would be updated to support different types of recreational opportunities and levels of use. The potential for impacts on cultural resources from recreation would continue, and the areas defined for recreational uses would increase compared with alternative A. However, defining destination backcountry recreation management areas might direct those activities to areas where the levels of use might be more appropriate for cultural resource preservation.

Vegetation management treatments (such as timber harvest, planned ignitions, thinning, and planting) on an average of 2,400 acres would be targeted annually (2,100 acres annually in the second decade) for resource objectives. While vegetation treatments would continue under alternative A, alternative A does not currently have comparable plan targets for vegetation management.

Under alternative B modified, lands where timber harvest is total 189,400 acres. Of these, Ashley National Forest cultural resource data indicate 70,600 acres have a high sensitivity for the presence of cultural resources and 60,000 acres have moderate sensitivity. Areas with a higher sensitivity for the presence of cultural resources have a higher risk of impacts from ground and direct disturbance of cultural resources, changes in cultural settings, and exposure of cultural resources to vandalism, looting, and erosion.

Lands identified as suitable for timber production total 109,800 acres. Of these, Ashley National Forest cultural resource data indicate 47,100 acres have a high sensitivity for the presence of cultural resources and 36,700 acres have moderate sensitivity. Impacts are more likely to occur in those areas with a high sensitivity for the presence of cultural resources. Potential impacts on cultural resources could result from ground and direct disturbance of cultural resources, changes in cultural settings, and exposure of cultural resources to vandalism, looting, and erosion.

Alternative B modified emphasizes a sustainable level of goods commodities and economic output, including timber and wood products; hazardous fuels treatment; road, trail, and facility maintenance; and new recreational facilities. The Forest Service would continue to assess the impacts on cultural resources associated with these undertakings on a project-specific basis.

#### *Environmental Consequences for Cultural and Historic Resources—Alternative C*

Under alternative C, the potential impacts on cultural resources are similar to those described for alternative B modified. For cultural resources management, objectives under alternative C double the targets for proactive (non-project-related) cultural survey, site recordation, and NRHP evaluations. These actions would assist in cultural resource identification, preservation, and protection.

Recreational management designations would emphasize backcountry recreation and quiet recreational experiences on 739,700 acres, which is over half of the Ashley National Forest. The potential for impacts on cultural resources from recreation would continue, but this emphasis would reduce the potential for impacts from ground disturbance, changes to the setting, induced erosion, and access leading to vandalism and looting.

When compared with alternative A, alternative C would add an additional RNA totaling 1,400 acres and four recommended wilderness areas totaling 50,200 acres. Within the additional RNA, Ashley National Forest cultural resource data indicate 500 acres have a high sensitivity for the presence of cultural resources and 500 acres have moderate sensitivity. Within the recommended wilderness, 15,900 acres have a high sensitivity for the presence of cultural resources and 15,400 acres have moderate sensitivity in these recommended wilderness areas. The recommended wilderness areas would provide incidental protection from incompatible and ground-disturbing activities, including roads and vehicle use.

Vegetation management treatments (such as timber harvest, planned ignitions, thinning, and planting) on 1,000 acres annually in the first decade and 800 acres annually in the second decade would be targeted for resource objectives. Emphasis would be on the use of natural processes, including wildland fire use. While there are ground-disturbing impacts on cultural resources from mechanical and other treatments, wildland fire is unpredictable; its use can lead to adverse effects on cultural resources, including the construction of firelines through cultural resource sites, the burning of perishable materials, and the effects of high temperatures on artifacts and features. Treatments that minimize the potential for future uncharacteristic wildland fire could reduce the potential for impacts on cultural resources.

Under alternative C, lands where timber harvest is allowed total 93,700 acres. Of these, Ashley National Forest cultural resource data indicate 39,400 acres have a high sensitivity for the presence of cultural

resources and 31,400 acres have moderate sensitivity. Areas with a higher sensitivity for the presence of cultural resource have a higher risk of impacts from ground and direct disturbance of cultural resources, changes in cultural settings, and exposure of cultural resources to vandalism, looting, and erosion.

Lands identified as suitable for timber production total 80,500 acres. Of these, Ashley National Forest cultural resource data indicate 31,700 acres have a high sensitivity for the presence of cultural resources and 27,400 acres have moderate sensitivity. Potential impacts on cultural resources could result from ground and direct disturbance of cultural resources, changes in cultural settings, and exposure of cultural resources to vandalism, looting, and erosion.

Alternative C would continue Ashley National Forest's social and economic contributions emphasizing natural settings, nonmotorized recreation, and ecosystem services. The Forest Service would continue to assess the impacts on cultural resources associated with these undertakings on a project-specific basis. Alternative C would also support increased coordination with tribes related to the support of treaty rights. Similarly, the frequency of cultural surveys would be increased to support preservation of these resources.

#### *Environmental Consequences for Cultural and Historic Resources—Alternative D*

Under alternative D, the potential impacts on cultural resources would be similar to those described for alternative B modified. For cultural resources management, objectives under alternative D propose targets for proactive (non-project-related) cultural survey, site recordation, and NRHP evaluations, which is the same as under alternative B modified. These actions would still assist in cultural resource identification, preservation, and protection.

Recreational management designations would have a greater emphasis on general recreation destination areas. Management would emphasize motorized access, developed opportunities, and management controls to support these opportunities. The potential for impacts on cultural resources from recreation would continue; however, compared with alternative B modified, this emphasis would increase the potential for impacts from ground disturbance, changes to the setting, induced erosion, and access leading to vandalism and looting.

Alternative D would retain the current RNAs and would not add any new designations that could provide incidental protection from incompatible and ground-disturbing activities.

Fire and fuels management would emphasize active management of wildland fire using a full range of suppression techniques. Fuels treatments would be maximized to minimize risks from uncharacteristic wildfire. Suppression can lead to adverse effects on cultural resources. Treatments to reduce fuels and proactive identification of cultural resources would reduce the risk of wildfire on cultural resources from emergency wildfire suppression activities, such as fire breaks, where identification and avoidance might be impossible. While the Forest Service would employ other vegetation treatments, there would be an emphasis on timber harvest and production with 1,600 acres annually in the first decade and 1,300 acres annually in subsequent years. In comparison, there are currently no applicable plan targets for vegetation management under alternative A.

Under alternative D, lands where timber harvest is allowed total 189,400 acres. Of these, Ashley National Forest cultural resource data indicate 70,600 acres have a high sensitivity for the presence of cultural resources and 60,000 acres have moderate sensitivity. Lands identified as suitable for timber production total 114,300 acres. Of these, Ashley National Forest cultural resource data indicate 50,000 acres have a high sensitivity for the presence of cultural resources and 37,900 acres have moderate sensitivity. Potential impacts on cultural resources could result from ground and direct disturbance of cultural

resources, changes in cultural settings, and exposure of cultural resources to vandalism, looting, and erosion.

Alternative D would emphasize active management of resources, more motorized access, higher targets for vegetation treatment, fire suppression, and developing resources for local community uses. The emphasis on active management under this alternative would likely lead to a greater inventory of cultural resources, which would expand the body of scientific knowledge in the region. However, the potential for looting and vandalism of cultural resources might increase, correlated with increased public access to areas that might contain cultural resources, when compared with management proposed under alternative A. The Forest Service would continue to assess the impacts on cultural resources associated with these undertakings on a project-specific basis.

### Cumulative Environmental Consequences for Cultural and Historic Resources

The analysis area for cultural and historic resource cumulative effects is the National Forest System lands in the Ashley National Forest and the immediate vicinity. Past and present uses of the Forest, including logging, mining, recreation, grazing, rights-of-way, roads, visitor infrastructure, fire suppression, water development, transportation, and vandalism, have likely affected cultural resources through direct impacts or degradation of resource values. Natural processes, such as erosion, drought effects, and weathering, could lead to discovery of previously unknown cultural resources, but the potential damage to these sites would overcome the potential for discovery. Under all alternatives, cumulative impacts on cultural resources from climate change may occur from increased wildfire and more severe and frequent flooding and erosion. Population growth and increased recreation trends may increase the potential for impacts on cultural resources.

Present and reasonably foreseeable future actions that might potentially cause ground disturbance or changes to the setting, which potentially affect cultural resources, include various habitat improvement, restoration, and vegetation treatment projects; transmission, pipeline, and fiber-optic cable rights-of-way; water development and stream restoration projects; recreational trails and other facilities; and mining and other mineral development projects.

Federally funded or authorized actions that could affect cultural resources within the plan area would continue to be subject to project and compliance review under the NHPA. Other ground-disturbing activities, such as road construction, local or tribal actions, and utility infrastructure, might be reviewed by other Federal, State, or local agencies, as necessitated by applicable law. All the alternatives would be subject to further cultural resource review as projects and actions are implemented. Adverse effects on cultural resources would be resolved in the section 106 process.

No contributions to cumulative effects are anticipated under the forest plan alternatives. The alternatives address desired conditions, which would improve the stewardship of cultural resources in the long term and continue and enhance consideration of the effects on cultural resources that the Forest Service manages.

## Timber

### Introduction

The Forest Service manages the harvest of wood products<sup>13</sup> to move vegetation toward its desired conditions, improve watershed condition, improve wildlife habitat, and reduce wildfire risk through reduced fuels loads. Timber harvest is an important contributor to the local economy, providing jobs and income in the logging and manufacturing of wood products. Timber resources provide products that are in demand, including lumber, pulpwood, posts and poles, and firewood. The overarching goal of the Forest Service's land management program is to guarantee that forests will be managed in an ecologically sustainable manner. On lands that are suitable for timber production, it is important that forest conditions are favorable for the sustainable removal of timber. Key management objectives are to sustain healthy, diverse, and productive timber stands that will remain suitable for timber production. Maintenance and restoration of forests is the best way to sustain the health, productivity, and diversity of the land.

Historically, the Ashley National Forest produced a moderate amount of lumber, which led to the development of several local mills in surrounding communities. Compared with other western forests, the Ashley National Forest is known for smaller-diameter and shorter timber products, which makes it less competitive for commercial interests. Peak production of annual timber harvest in the Ashley National Forest occurred in the late 1980s at around 27,000 MBF (54,000 CCF).<sup>14</sup> Timber production in the Forest provides wood materials for a variety of uses, including softwood sawtimber, poles and posts, and fuelwood. Fuelwood represents an important source of energy for surrounding communities, with more than 6 percent of homes using wood as their primary fuel source.

Under the 1986 forest plan, 528,000 acres (38 percent) of the Ashley National Forest were designated as suitable for timber production, up to an annual allowable sale quantity of 21,000 MBF. The allowable sale quantity is the maximum level of harvest consistent with the 1986 forest plan's standards and guidelines. However, the area that is currently managed for timber production has been significantly reduced in size, and the volume harvested is significantly less than the annual allowable sale quantity, as identified in the 1986 forest plan. Since the 1986 plan was developed, the implementation of the 2001 Roadless Rule has reduced the number of acres suitable for timber production on the forest, specifically within IRAs, which account for approximately two-thirds of the acres available for production under the 1986 forest plan. In addition, the species, age class, and quantity of timber currently available for production have changed significantly due to stressors and drivers such as insects, disease, and lack of natural fire. Currently, suitability analysis indicates that approximately 130,080 acres (9 percent) of the Ashley National Forest are suitable for timber production.

Under the 2012 Planning Rule, identification of lands that are suited and not suited for timber production is required on national forests, based on legal withdrawal, site-specific conditions, and the compatibility of lands with the desired conditions and objectives found within the plan components. Lands that are found suitable for timber production are likely to receive regularly scheduled timber harvest, where resource conditions and site limitations impose less restrictions on the ability to harvest. Timber sales,

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<sup>13</sup>Wood products include timber products (green sawtimber and other products such as posts and poles), as well as green fuelwood. Timber products are represented by projected timber sale quantity, while green fuelwood is represented by projected wood sale quantity. In the Ashley National Forest there is no green fuelwood projected; therefore, projected timber sale quantity is equal to projected wood sale quantity. Salvage materials, which include dead, damaged, or dying volume (including dead sawtimber and personal use fuelwood), are not included in this definition or projected timber sale quantity volume estimates. See appendix 4 of the forest plan for additional details.

<sup>14</sup>Conversion to CCF may vary dependent on timber product type; however, a conversion factor of 0.5 MBF to 1 CCF was used for the purposes of this analysis.



along with other vegetation management tools, play an important role in this process. Responsible and well-managed timber harvest can lead to a reduction in hazardous fuel loading and promote desirable stand diversity, structure, and density.

### *Regulatory Framework*

**Multiple-Use Sustained-Yield Act of 1960**—This act establishes the policy and purpose of the national forests to provide for multiple use and sustained yield of products and services. This law authorizes the Secretary of Agriculture to administer and develop the use of renewable resources, including range, on National Forest System lands.

**Timber Sales on National Forest System Lands (6 USC 472a)**—This states that the Secretary of Agriculture may advertise timber products from National Forest System lands for sale via bid.

**Forest and Rangeland Renewable Resources Planning Act of 1974**—This law authorizes long-range planning by the Forest Service to protect, develop, and enhance the productivity and other values of forest resources. It requires that a renewable resource assessment and a Forest Service plan be prepared every 10 and 5 years, respectively, to plan and prepare for the future of natural resources. This act was reorganized, expanded, and otherwise amended by the National Forest Management Act of 1976.

**The National Forest Management Act of 1976**—This act requires every national forest or grassland managed by the Forest Service to develop and maintain an effective land management plan, also known as a forest plan. The process for the development and revision of plans, along with the required content of plans, is outlined in planning regulations, often referred to as the planning rule. Managers of individual forests and grasslands follow the direction of the planning rule to develop a land management plan specific to their unit.

**2001 Roadless Rule**—This rule was adopted to protect and conserve IRAs found on National Forest System lands. This rule prohibits road construction, road reconstruction, and timber harvesting on IRAs but allows for exceptions.

**2012 Planning Rule**—This requires that every national forest or national grassland managed by the Forest Service develop and maintain an effective land use plan (forest plan), which includes the management of available timber, including those stands both suitable and not suitable for production. Forest plans provide an outline for expected timber harvest and timber sales, and they describe the way in which timber will be produced.

### *Analysis Area*

The analysis area encompasses all National Forest System lands inside the Ashley National Forest plan area.

### *Notable Changes Between Draft and Final EIS*

Discussion has been updated to provide factual corrections and additional details for the affected environment based on public comments. Analysis for alternative B had been updated to reflect new direction in alternative B modified, including the removal of recommended wilderness and factual corrections to projected timber treatment acres to include prescribed fire. Table 3-71 had an original estimated value of 11,557 CCF (5,779 MBF) for alternative A, which also included personal use fuelwood volumes. The estimate was changed to 3,557 CCF (1,723 MBF) to exclude personal use fuelwood volume for a better comparison to the other alternatives. Corrections to MBF values for alternatives B modified,

C, and D reflect actual projected sawtimber volumes; cubic volumes that are not applicable to board feet were removed from these values.

### Description of Affected Environment

Approximately 53 percent (729,400 acres) of the analysis area is coniferous and seral aspen to coniferous forest. Coniferous forest is associated with several different assemblies of tree species, including ponderosa pine, ponderosa pine-mix, persistent lodgepole pine, Douglas-fir, mixed conifer, and spruce/fir. The species primarily managed in the Ashley National Forest for timber production are lodgepole pine, Engelmann spruce, Douglas-fir, and ponderosa pine.

The current suitability analysis indicates that nearly 18 percent (130,080 acres) of forested vegetation in the Ashley National Forest is suitable for timber production. Timber production is defined as the growing, tending, removing, and regenerating of trees to produce logs or other products for industrial or consumer use. Outside of lands suitable for timber production, the Forest Service uses irregular or unscheduled timber harvest as a vegetation management tool for other multiple-use purposes. For purposes of this analysis, a distinction will be made between lands *suitable for timber production* (or, simply, *production*) and areas where *other timber harvest is allowed*.

Timber production and harvest take place on the Duchesne, Flaming Gorge, Roosevelt, and Vernal Ranger Districts. Under the 1986 forest plan, the planned allowable sale quantity is 21,000 MBF per year. Timber harvest volume is currently well below what is allowable in the existing forest plan. The average amount of timber harvested annually over the past 10 years was approximately 5,700 MBF per year.

Fuelwood harvest accounts for approximately 49 percent of products removed from the Ashley National Forest annually; sawtimber accounts for 30 percent, and post and poles represent approximately 20 percent. Composition analyses in the plan area indicate that the single-tree selection harvest method represents approximately 38 percent (50,800 acres) of the total acres suitable for timber production on the Forest. The second-largest proportion of harvest method in the area suitable for timber production represents stands that are appropriate for clearcutting (22 percent [29,900 acres]).

Ecological factors also limit the volume of timber harvest in the Ashley National Forest. Additional information regarding forest conditions and threats to forested ecosystems is discussed in “Terrestrial Vegetation” and “Fire and Fuels.” The lack of natural fire over a century has led to timber stands that are increasingly dense with older trees and thus are more susceptible to insects and disease. Historical fire suppression has led to conditions that may have increased the frequency and scale of native bark beetle outbreaks, which can lead to cascading effects on soil, water, and wildlife. Diseases such as dwarf mistletoes and outbreaks of native insects have resulted in reduced growth and significant mortality of timber stands in the Ashley National Forest.

The primary causes of parasitic plant infection and insect infestation of trees in the Ashley National Forest are dwarf mistletoe (*Arceuthobium* spp.), Douglas-fir beetle (*Dendroctonus pseudotsugae*), spruce beetle (*Dendroctonus rufipennis*), and mountain pine beetle (*Dendroctonus ponderosae*). Of the nearly 48,000 acres of Douglas-fir on the forest, approximately 58 percent (28,000 acres) have been affected by Douglas-fir beetle since 1997. As of 2021, spruce-beetle-caused mortality has recently affected approximately 146,100 acres of the spruce-fir and mixed conifer vegetation types (approximately 29 percent), much of which occurs in the High Uintas Wilderness (figure 3-13). Recent surveys have shown that up to 36 percent of lodgepole pine stands are infected with dwarf mistletoe (Forest Service 2017k). Mountain pine beetle is the most destructive bark beetle affecting pines in western North America. In the Ashley National Forest, most of the damage due to mountain pine beetle has been documented in

lodgepole pine and ponderosa pine (Forest Service 2017k). Aerial insect and disease detection surveys in the Ashley National Forest show that mountain pine beetle affected approximately 60 percent of the lodgepole pine forests and 35 percent of ponderosa pine forests from 1997 to 2015. A review of the damage caused by mountain pine beetle (conducted in 2018 using aerial detection surveys from 1990 to 2015) estimates that approximately 65 percent of the area affected by mountain pine beetle is of low severity, 31 percent is of moderate severity, and less than 4 percent (10,360 acres) is of high severity damage (figure 3-13).

Mortality from beetles has modified the stand and age-class structure in the Ashley National Forest significantly since the 1986 forest plan was developed. The combination of fire suppression and insect infestation has also resulted in stand conditions that are potentially more susceptible to high-intensity and high-severity wildfires. Because of these changes to the overall structure and availability of timber on the Forest and inconsistencies between the 1986 forest plan and Forest Service Handbook direction, a new analysis is needed to account for changes in the types, size, and quantity currently available for harvest.

## Environmental Consequences for Timber

### *Methodology and Analysis Process*

Requirements in the 2012 Planning Rule at 36 CFR 219.11, the National Forest Management Act of 1976, and Forest Service Handbook 1909.12, chapter 60, provide guidance on conducting a timber suitability analysis as part of the forest planning process. Timber suitability was determined using resource data incorporated into GIS to apply criteria and identify lands suitable for timber production. Lands determined to be suitable for timber production are capable of producing a regular, sustainable, periodic output of timber, without impairment of the productivity of the land or inconsistency with other land management direction.

The sustained-yield limit is the amount of timber, meeting utilization standards that can be sustainably removed from the Ashley National Forest annually in perpetuity. It is the volume that could be produced in perpetuity on lands that *may* be suitable for timber production. This quantity of timber product volume establishes the sustainable level for the Ashley National Forest over the next 15 years. The sustained-yield limit is not a target but is a limitation on harvest. Quantities less than this threshold are anticipated to be sustainable in perpetuity unless forest growth rates decline significantly or wildfire removes areas from production because they fail to regenerate; quantities above this threshold would only be feasible for short periods of time.

The projected timber sale quantity and projected wood sale quantity are the annual amount of timber and other wood product volumes that can be expected to be sold over the next 15 years on those acres where harvest is allowed, following the implementation of the revised plan. The projected wood sale quantity includes all woody material likely to be sold from these harvests whether or not the material meets utilization standards. The projected timber sale quantity is a subset of the projected wood sale quantity; it is an estimate of the annual quantity of timber expected to be sold during the plan period. The volume in the projected timber sale quantity is the volume that meets utilization standards,<sup>15</sup> and it must be equal to or lower than the sustained-yield limit for the Forest. The estimation of these two quantities must be consistent with the plan components of the final plan or the unique mix of plan components in each alternative and consistent with the capability of the Ashley National Forest.

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<sup>15</sup>Specifications for merchantable forest products offered in a timber sale. Note that salvage volume (including merchantable dead sawtimber) does not apply to projected timber sale quantity. See the glossary for handbook definitions of projected timber sale quantity and projected wood sale quantity.

### *Analysis Assumptions*

- On lands suitable for timber production, regularly scheduled timber removal is expected to occur.
- The sustained-yield limit in the Ashley National Forest is estimated to be an average annual volume of 21,446 CCF (10,110 MBF).

### *Indicators*

- Forested acres that are available and accessible for timber production
- Forested acres that are available and accessible for timber harvest

### *Environmental Consequences for Timber Common to All Alternatives*

Under all alternatives, there is plan direction to continue to sustainably remove timber products from the Ashley National Forest under the sustained-yield limit, which is calculated as 21,446 CCF (approximately 10,110 MBF) average annual volume. Timber products will be harvested consistent with multiple-use objectives as well as with consideration of the desired conditions of forested acres on the Forest and desired conditions of other resources. A sustainable mix of timber products will continue to be offered, using a variety of harvest methods and contract types, in response to market demands.

Timber production and timber harvests will continue to contribute to the local economy. Sustainable removal of timber products will continue to promote the existing and emerging industry, though the Forest Service does not anticipate demand for Forest timber products to change significantly over the life of the plan. The projected wood sale quantity (which includes projected timber sale quantity as a subset) identified under each alternative is estimated based on reasonable expectations about fiscal capability and organizational capacity. If there is additional support to achieve desired conditions, the projected wood and timber sale quantities may be exceeded. Conversely, if available resources, markets, or other factors are less favorable than anticipated, the projected wood and timber sale quantities identified may not be met.

Timber harvest is a critical tool used to achieve desired vegetation conditions. All alternatives include mechanical treatments to vegetation, which may produce sawtimber, small-diameter timber, biomass, or fuelwood as a by-product. In addition, all alternatives provide opportunities for the public to collect fuelwood and other forest products under a permit system.

### *Environmental Consequences for Timber—Alternative A*

Under alternative A, 528,000 acres (38 percent) would be determined to be suitable for timber production (table 3-70) under the existing plan. However, this level of timber production does not account for policy changes, particularly under the 2001 Roadless Rule, which prohibits timber harvest in IRAs except under certain circumstances; thus, this level of timber production is currently not achievable. Alternative A would retain similar production levels as the previous decade and would continue to harvest old-growth, beetle-killed lodgepole and ponderosa pine. The emergence of new timber markets or any significant growth of existing markets would be least likely under this alternative, resulting in little change to the demand for wood products.

**Table 3-70. Acres of Timber Suitability Classification in the Ashley National Forest**

<b>Timber Classification Category</b>	<b>Alternative A</b>	<b>Alternative B modified</b>	<b>Alternative C</b>	<b>Alternative D</b>
Total National Forest System lands in the analysis area	1,378,500	1,378,500	1,378,500	1,378,500
Lands suitable for timber production	528,000 (130,100)*	109,800	80,500	114,300
Total lands not suitable for timber production	1,248,400	1,268,700	1,297,900	1,263,300
<i>Lands not suited for timber production due to legal or technical reasons</i>	1,248,400*	1,248,400	1,248,400	1,248,400
<i>Lands not suited for timber production due to incompatibility with desired conditions and objectives</i>	N/A	20,300	49,500	15,700
Other lands where timber harvest is allowed**	N/A	79,600	13,200	75,100
Sum of all lands available for timber harvest	N/A	189,400	93,700	189,400

Source: Forest Service GIS 2020

\*This value is reduced due to the removal of timber from production due to incompatibility with policy changes under the 2001 Roadless Rule.

\*\*These lands are not suitable for timber production but may be harvested for purposes other than timber production, such as for salvage, fuels management, insect and disease mitigation, and protection or enhancement of biodiversity or wildlife habitat.

### *Environmental Consequences for Timber—Alternative B modified*

#### **Effects from Timber Harvest and Production, Vegetation Management, and Fire and Fuels Management**

Under alternative B modified, 109,800 acres would be determined as suitable for timber production (table 3-70). Outside of acres suitable for timber production, timber harvest would be allowed on other lands up to 79,600 acres for purposes other than timber production, such as fuels management, which would remove wood products (see forest plan appendix 4) based on compatibility with desired conditions, objectives, standards, and guidelines.

Although alternative B modified proposes annual fuels treatments on 6,600 to 32,000 acres using wildland fire and other vegetation treatments, the use of harvest would likely take precedence over prescribed fire or the use of natural fire on lands suitable for timber production. Timber harvest would have a primary role in modifying the composition, density, structure, and spatial arrangement of vegetation to achieve desired conditions. The use of timber harvest to restore forest health is likely to maintain or improve vegetation, which, in turn, would maintain or increase the productivity of acres suitable for timber production over the long term. However, restricting timber harvest or production activities during periods of rehabilitation could result in site-specific limitations over the short term.

Under this alternative, approximately 1,500 acres of forested vegetation would receive mechanical treatments annually on all lands available for timber harvest, which would move forested ecosystems toward desired conditions. Alternative B would offer an annual projected wood sale quantity of 3,806 CCF (1,145 MBF; see table 3-71).

**Table 3-71. Annual Projected Wood Sale Quantity**

<b>Sustained-Yield Limit</b>	<b>Alternative A</b>	<b>Alternative B Modified</b>	<b>Alternative C</b>	<b>Alternative D</b>
21,446 CCF (10,110 MBF)	3,557 CCF (1,723 MBF)*	3,806 CCF (1,145 to MBF)	2,822 CCF (795 to MBF)	3,956 CCF (1,190 to MBF)

Source: Forest Service 2017a

\*The MBF estimate for alternative A is based on the average amount of timber volume harvested annually in the past 10 years, including salvage timber volume; alternatives B modified, C, and D do not include salvage timber volume. See forest plan appendix 4 for planned wood product output that includes estimated salvage volume for alternative B modified.

### **Effects from Recreation**

When compared with alternative A, alternative B modified would focus on providing additional infrastructure to support recreation. However, there would be no limitations on the volume of timber harvest in recreation management areas as long as that removal would coincide with the desired conditions of other resources.

### **Effects from Designated Areas**

Under alternative B modified, no additional designated areas would be established, and impacts would be as described under alternative A.

### *Environmental Consequences for Timber—Alternative C*

#### **Effects from Timber Harvest and Production, Vegetation Management, and Fire and Fuels Management**

Alternative C would determine the least number of acres suitable for timber production (80,500 acres) and other lands where timber harvest is allowed (13,200 acres), for a total of 93,700 acres. This reduction in acreage would result in a lower projected annual output of wood and timber sale quantities (table 3-71). Alternative C would also reduce the acres of annual forested vegetation available for treatments, further hindering the movement of forested vegetation toward desired conditions, when compared with alternative A. Alternative C would have the same number of acres available for fuels treatments as alternative B modified.

Fire and fuels management under alternative C would emphasize the use of natural processes to move conditions toward desired fire regimes. Outside of HVRAs, suppression would be used to protect human health and safety, as well as infrastructure. When compared with alternative A, alternative C would use modern fire-planning tools to determine high-risk areas, which might offer some protection to timber stands suitable for production. Over the short term, the lack of fire suppression might lead to a loss of wood products available for production or harvest. However, vegetation and fire and fuels management under this alternative would be likely to move forested vegetation toward desired conditions over the long term, unlike under alternative A.

### **Effects from Recreation**

Under alternative C, there would be an emphasis on management of recreation management areas to improve the backcountry experience for recreationists, unlike under alternative A. This management would increase the acreage of backcountry recreation management areas and would prohibit timber harvest within them. This would result in a decreased number of acres suitable for timber production.

### **Effects from Designated Areas**

Alternative C would include the most acres managed to maintain wilderness characteristics; no acres would be suitable for timber production within these areas to preserve the suitability of these areas for wilderness designation. Alternative C would also introduce additional miles of suitable rivers for inclusion in the NWSRS. This would reduce the available acres for timber harvest.

### *Environmental Consequences for Timber—Alternative D*

### **Effects from Timber Harvest and Production, Vegetation Management, and Fire and Fuels Management**

When compared with alternative A, alternative D has an increased emphasis on commodity timber harvest. This alternative would emphasize vegetation management to the highest level and would have the greatest volume and number of acres suitable for timber production (114,300 acres). The addition of other lands where timber harvest is allowed (75,100 acres) results in a total of 189,400 acres for this alternative (see table 3-70). This alternative would encourage using timber harvest over fire as the primary method of vegetation management to accomplish other resource objectives in all areas that allow harvest. Increases in vegetation management would result in a high degree of movement of forested ecosystems toward desired conditions over the long term. Due to the increase in acres suitable for timber production, this alternative would result in the highest volume of wood product output over the life of the plan (table 3-71).

Alternative D would propose fuels treatments on 10,000 to 40,000 acres per year, using wildland fire and other vegetation treatments. Since timber harvest has a primary role in fuels management on those lands that allow harvest, the volume of timber harvest would increase. In addition, management direction under this alternative would actively manage and suppress wildland fire, which might preserve forest stands for future harvest and production. When compared with alternative A, alternative D would be likely to maintain a greater amount of timber stands suitable for timber production by suppressing and managing wildfire.

### **Effects from Recreation**

Under alternative D, there would be an emphasis on high-intensity recreation opportunities, resulting in increased infrastructure and motorized access. However, there would be no limitations on the volume of timber harvest in recreation management areas as long as that removal would coincide with the desired conditions of other resources.

### **Effects from Designated Areas**

Under alternative D, there would be no recommended wilderness areas, and no additional wild and scenic river segments would be classified as suitable for inclusion in the NWSRS. Effects from designated areas on timber harvest and production would not change when compared with alternative A.

### **Cumulative Environmental Consequences for Timber**

Lands managed by the Forest Service within the Ashley National Forest analysis area, as well as lands adjacent to the Ashley National Forest, are considered under the cumulative effects analysis area. Ongoing and planned actions in the national forest and surrounding lands might influence and affect the cumulative environmental consequences for timber during the life of the plan (or approximately 15 years from the plan's implementation).

The timber industry might be affected by reductions in the supply of wood products within the region, both on Federal and non-Federal lands. Conversely, an increase in the availability of wood products on adjacent lands might lessen the impacts and demand for wood products in the Forest. As populations increase in lands near the Ashley National Forest, more stress could be placed on the Ashley National Forest and surrounding lands to meet the demands of industry.

Current and future foreseeable actions (table 3-2) might affect timber production and harvest both positively and negatively. For instance, future forest restoration projects might largely depend on market demand for wood products. If demand for wood products increases, a greater potential for successful restoration work could be expected, resulting in beneficial impacts through a restored landscape. If demand decreases, existing milling infrastructure may close, and less restoration work can be successfully completed, which would move the landscape away from desired conditions. However, market variability within the timber industry can be difficult to predict, making evaluation of cumulative impacts of past, present, and future actions challenging.

Management of timber using best practices, fuels reduction projects, and restoration of ecosystems would be beneficial when applied across the Ashley National Forest. If mechanical treatments are not selected as a restoration tool, prescribed fire would likely be the only other treatment alternative; often, restoration would not be possible.

Restoration projects, in particular, might also be limited by operational costs; this could influence the overall success of restoration work. However, those restoration projects that were successful would provide the greatest benefit to timber production and harvest; consequently, those projects would be critical to a continuous and sustainable supply of timber products.

## **Livestock Grazing**

### **Introduction**

Livestock have grazed the rangelands in the Ashley National Forest for longer than the Forest has existed administratively. Since initial settlement, domestic livestock have nearly continuously grazed what is now the Ashley National Forest and surrounding rangelands. Initially, the rangelands were grazed broadly by mostly cattle and sheep; however, since the enactment of the grazing permit system, the intensity and types of grazing permitted on these lands have decreased dramatically. Currently, most of the Ashley National Forest is grazed by cattle (13,370 head) and sheep (12,195 head).

Under the grazing permit system, the Forest Service administers domestic livestock grazing as compatible with other multiple-use objectives. Livestock grazing on rangelands offers several benefits to the local communities. Not only have rangelands provided an economic opportunity to sustain ranching operations for several generations, but they have also provided the basis for the local culture and lifestyle.

In addition to the economic benefit, rangelands offer large open spaces for recreation, such as hiking, hunting, and camping. Developments and structures built to provide water for livestock may also benefit wildlife species. Some grazing systems can be implemented to benefit targeted wildlife species, such as elk or greater sage-grouse (Vavra 2005). Permittees that hold grazing permits are generally individuals, families, or corporations, though permits may also be shared through partnerships. In the absence of livestock operations, some economic, recreational, and ecological benefits could be reduced.

Rangelands are divided into grazing units known as allotments, which are subdivided into pastures. Generally, allotments are managed on a rotational grazing schedule, which involves moving cattle from one pasture to another during different times of the year. Under most permits, grazing does not occur on



National Forest System lands year-round. Grazing operators may rotate cattle between pastures throughout the year, both on and off Federal lands. The borders of allotments and pastures typically follow geographic and topographic features, such as canyons and riverine habitat, and they may also be completely fenced.

Livestock grazing on National Forest System lands is permitted through term grazing permits. The term grazing permit authorizes the number and kind of livestock as well as the period of use and grazing allotment on which livestock are permitted to graze. As previously noted, the Forest Service authorizes grazing permits through payment of a grazing fee that is based on head months, defined as 1 month's use and occupancy of the range by one weaned or adult cow with or without a calf, a bull, steer, heifer, horse, burro, or mule, or five sheep or goats.

The Forest Service uses adaptive management to adjust the timing, intensity, and rotation patterns on the allotment based on resource conditions. It alters livestock numbers and class annually to respond to environmental, social, and economic needs. Permittees attend annual meetings with Forest Service range program staff to develop operating plans and instructions. Although typical operators depend only partially on public lands to sustain their livestock, forage sources on Federal lands still represent an important part of grazing operations.

#### *Regulatory Framework*

**The Forest Rangeland Renewable Resources and Planning Act of 1974 and the National Forest Management Act**—Authorize long-range planning to ensure the future supply of forest resources and the availability of lands and their suitability for resource management.

**The Public Rangelands Improvement Act of 1978**—Defines the current grazing fee formula and establishes rangeland monitoring and inventory procedures.

**Taylor Grazing Act of 1934**—Provides directives for grazing on public lands (excluding Alaska) to improve the conditions of rangelands and regulate their use. Under this law, permits cannot exceed 10 years and can be revoked due to drought or other natural disasters.

**Granger-Thye Act of 1950**—Establishes new guidelines for managing grazing on national forests. This act authorizes range improvements from appropriated funds and allows the Forest Service to authorize grazing advisory boards and to issue grazing permits for periods not exceeding 10 years.

**Multiple-Use Sustained-Yield Act of 1960**—Establishes the policy and purpose of the national forests to provide for multiple-use and sustained yield of products and services. This law authorizes the Secretary of Agriculture to administer and develop the use of renewable resources, including range, on the National Forest System lands.

**The Rescission Act of 1995 (Public Law 104-19)**—Requires each national forest to establish and adhere to a schedule for completing NEPA analysis and decisions on all grazing allotments within a 15-year period. The current National Allotment NEPA Schedule, based on the 2004 Interior Appropriations Act (P.L. 108-108), Section 325, covers the time frame of 2017–2028.

**Executive Order 12548, Grazing fees, 1986**—Establishes appropriate fees for grazing domestic livestock on public rangelands.

### Analysis Area

The analysis area is the Ashley National Forest. In the analysis area, approximately 997,600 acres (72 percent; table 3-72) are in grazing allotments. There are 66 grazing allotments that are authorized for the use of 89 permittees. Of the 66 grazing allotments, 5 (77,800 acres) are administered and facilitated by the BLM (impacts on BLM-administered grazing allotments are not analyzed in this document). The remaining 61 grazing allotments occupy 919,700 (67 percent) of the analysis area. In addition to the allotments themselves, operators may use roads outside of allotments to transport livestock and maintain their allotments; therefore, changes to travel and transportation management could affect grazing operations.

**Table 3-72. Allotment Statistics for the Ashley National Forest**

Ranger District	Number of Allotments	Acres	Head Months
Duchesne	26	325,800	29,278
Flaming Gorge <sup>1</sup>	15 (5 BLM)	144,600 (77,800 BLM)	5,427 (3,054 BLM animal unit months)
Roosevelt	11	245,200	22,920
Vernal	14	204,100	19,297
<b>Total<sup>2</sup></b>	<b>66</b>	<b>919,700</b>	<b>76,922</b>

Source: Forest Service GIS 2020

<sup>1</sup>Five allotments within the Flaming Gorge Ranger District are partially combined with adjacent BLM allotments.

No decision will be made for grazing on BLM-administered lands in this planning process.

<sup>2</sup>These figures do not include BLM-administered lands. The BLM bills based on animal unit months.

### Notable Changes Between Draft and Final EIS

The affected environment and analysis sections were updated based on public comments to correct inconsistencies in acres and terminology. Analysis for alternative B was modified to reflect changes to impacts based on updated management direction under alternative B modified, including changes to grazing management, direction for vacated allotments for bighorn sheep management, and removal of recommended wilderness. Analysis was also updated under alternatives C and D to reflect updated management direction for livestock grazing and bighorn sheep.

### Description of Affected Environment

The size of allotments in the Ashley National Forest varies greatly—from 100 acres to 58,300 acres—with the average allotment size being approximately 14,000 acres. Within allotments, the forage quality and availability, geology and topography, and compatibility with multiple-use objectives dictate the number of acres where grazing occurs. Currently permitted use accounts for 76,922 head months across all Forest Service grazing allotments in the Ashley National Forest. Permitted head months are closely connected to the forage production, topography, and water availability on each allotment, with larger allotments generally having more head months available for grazing.

In the Ashley National Forest, approximately 919,700 acres are currently available for grazing administered by the Forest Service. Grazing use has varied annually since the 1980s, with grazing levels increasing in some ranger districts and declining in others. Overall, the amount of permitted grazing has declined an average of 0.25 percent annually since 1980, or approximately 10 percent over the last 4 decades.

Factors affecting livestock operations and range management in the Ashley National Forest are largely based on market demand for livestock and rangeland conditions, both of which are based primarily on forage availability. Forage availability is principally connected to the condition of vegetation; thus, changes to vegetation and vegetation management can heavily influence grazing capacity and permitted use.

The proliferation of invasive species, woody vegetation encroachment, and drought all may affect the forage production on allotments for livestock grazing. The return of sagebrush, which is less productive and palatable to livestock, may also affect forage production in the Ashley National Forest. In addition, native ungulates also utilize forage.

Most rangeland in the Ashley National Forest is in good condition, and vegetation trends appear to be favorable and sustainable; however, some allotments have experienced an increase in invasive annuals, which may lead to a decline in forage for cattle and a decline in ecological condition. The most common invaders are cheatgrass (*Bromus tectorum*), stork's-bill (*Erodium cicutarium*), tumble mustard (*Sisymbrium altissimum*), saltlover (*Halogeton glomeratus*), and musk mustard (*Chorispora tenella*). The invasion of noxious and nonnative vegetation is influenced by increases in fire and drought, which can subsequently increase the cover of invasive annuals, creating a feedback loop that can reduce forage quality. Additional information on invasive species and their impacts on ecological condition is in "Terrestrial Vegetation."

In 2011, rangelands in the Ashley National Forest were evaluated using watershed condition data. These data quantify such factors as vegetation condition, invasive species threats, and the overall condition of rangelands. Of the 123 subwatersheds analyzed, 113 were reported to be in good condition, 9 in fair condition, and 1 in poor condition. Most of those in fair or poor condition are due to the impacts of invasive plants and are in the Flaming Gorge Ranger District in Wyoming (Forest Service 2017a). See "Terrestrial Vegetation" for additional details on rangeland conditions.

## Environmental Consequences for Livestock Grazing

### *Methodology and Analysis Process*

The analysis in the following section assesses the potential impacts on rangelands and grazing in all current allotments in the Ashley National Forest. Since grazing operations are generally confined to allotments, the discussion of impacts from the alternatives below would apply only to allotments available for grazing in the Ashley National Forest, which includes those that are active, vacant, or closed. The life of the forest plan is estimated to be 15 years, which is the period for which impacts are analyzed.

The potential effects on livestock grazing from decisions or management in the Ashley National Forest include changes to livestock numbers, season of use, and associated head months, as well as the availability and quality of forage in allotments. The potential impacts discussed below were identified by reviewing the best available science and data. The section specifically analyzes impacts on rangeland and grazing, whereas the impact of rangeland management on other resources is covered in their respective resource sections.

### *Analysis Assumptions*

- Livestock will be managed so that range conditions maintain or move toward desired conditions, as outlined in the forest plan.
- Livestock grazing will be managed to meet specific standards and guidelines for rangeland resiliency, including riparian standards and guidelines.

- Grazing allotments will remain active with permitted grazing as long as there continues to be demand. If permittees waive their permits with no preference and there is no demand, the allotments could be put into a vacant status, designated as forage reserves, or closed.
- Unauthorized use of rangeland will be minimal to nonexistent.

*Indicators*

- Forage quality and availability
- Total acres permitted and not permitted for grazing
- Level of permitted use for grazing operations (head months)

*Environmental Consequences for Livestock Grazing Common to All Alternatives*

**Effects from Livestock Grazing Management**

All alternatives would continue to provide forage for livestock and continue to support grazing operations in the Ashley National Forest. Livestock grazing management decisions that could affect grazing operations are generally based on allotment-specific adjustments in acres available and permitted for livestock grazing. Reducing the number of acres permitted for grazing within a given allotment might be accompanied by adjustments to grazing intensity (head months; table 3-73), limiting the number of livestock that might be permitted to graze.

**Table 3-73. Allotment Status by Alternative**

<b>Ranger District</b>	<b>Alternatives A, B Modified, and D</b>	<b>Alternative C</b>
<b>Total acres with permitted grazing<sup>1</sup></b>	<b>919,700</b>	<b>906,700</b>
Duchesne	325,800	319,200
Flaming Gorge	144,600	141,700
Roosevelt	245,200	241,700
Vernal	204,100	204,100
<b>Total acres with no permitted grazing</b>	<b>0</b>	<b>13,000</b>
Duchesne	0	6,600
Flaming Gorge	0	2,900
Roosevelt	0	3,500
Vernal	0	0
<b>Total head months available<sup>1</sup></b>	<b>76,922</b>	<b>76,812</b>

Source: Forest Service GIS 2020

<sup>1</sup> Excludes BLM-administered allotments

In addition, adjustments and limits on forage utilization levels and stubble height guidelines in riparian areas might lead to additional changes in grazing systems, such as the duration of use and pasture divisions or rotations. These adjustments and limits also might lead to an increase or reduction in the number of permitted livestock, season of use for permitted use, and changes to the associated head months.

**Effects from Recreation**

Motorized recreation in the Ashley National Forest might affect forage condition. Erosion and soil compaction from motorized vehicles might reduce forage quality and availability. Motorized recreation is

also known to increase the spread of invasive plants, thus further reducing forage quality (Wolf et al. 2017). Additionally, motorized recreation without the use of proper spark arrestors might lead to spark-ignited wildfires, resulting in the loss of available forage. Impacts from motorized recreation could lead to both short-term and long-term impacts on vegetation, which would be likely to result in a loss of head months. Motorized recreation vehicles might lead to direct impacts on livestock through collisions and stress from noise and human presence. Fugitive dust could increase the incidence of dust pneumonia and also reduce the palatability of forage.

While generally considered low impact, primitive and nonmotorized recreation might affect livestock by reducing forage quality in a similar manner to motorized recreation; however, these impacts would likely be of lower intensity when compared with motorized recreation and would be concentrated along trails and campsites, where livestock and visitors would most likely be in proximity. The potential impacts of mismanaged or heavy nonmotorized recreation on rangelands would be from erosion and trail damage, increased trail footprints, trampled vegetation, and increased spread of invasive plants, all of which might reduce forage quality and availability over the short and long term.

### **Effects from Designated Areas**

Under all alternatives, the management of designated wilderness might affect permittees' grazing operations; however, grazing would be available on existing active allotments, regardless of wilderness designation, under any alternative. The most likely impact from management of recommended or designated wilderness would be alterations to the timing and intensity of grazing operations to meet desired conditions to maintain wilderness character. Other potential impacts on grazing management due to recommended or designated wilderness would include impacts to access of allotments for maintenance of structural range developments, the ability to haul salt and minerals, and the retrieval of sick animals due to restrictions on motorized use.

The number of IRAs would not change under any alternative. Management actions in IRAs and RNAs that would not require the construction of new roads would still be allowed, including grazing. Because the acres of IRAs would not change under any alternative, there would be no impacts on grazing over the short or long term.

Interim management for segments of wild rivers deemed suitable includes quarter-mile buffers on either side of the suitable watercourse. Where wild and scenic rivers and grazing overlap, they would be managed under the guidelines in Forest Service Handbook 1909.12, chapter 82.5. The suitability of river segments does not preclude livestock grazing as long as management of livestock maintains the wild, scenic, and recreational values for a given river segment. The interim protections offered to suitable river segments that protect, restore, or enhance vegetation might have beneficial impacts on forage quality and availability.

### **Effects from Vegetation Management, Timber Harvest, and Sustainable Ecosystems**

Under all alternatives, rangelands and livestock might be affected by various types of natural resource management, especially those that disturb the soil surface or remove vegetation. The type and intensity of impacts would depend on management objectives and methods under a given alternative. Nevertheless, any surface-disturbing activities might alter forage availability and lead to changes in grazing systems and infrastructure.

All alternatives would include some sort of vegetation treatments. Over the short term, vegetation management projects, including mechanical thinning and prescribed fire, would affect rangelands by removing forage and by compacting or eroding soils. Treated pastures might need to be rested or deferred

during treatments and restoration, thus removing the availability of acres available for grazing in those areas; however, vegetation management is generally planned around grazing rotations when cattle are not present to minimize impacts on grazing operations. Over the long term, vegetation treatments would likely enhance forage quality and availability, potentially leading to an increase in forage and available head months.

Additional protections for sensitive natural resources, such as bighorn sheep, might affect grazing operations by altering the timing, intensity, and availability of permitted grazing, thereby limiting the number of livestock and season of use authorized to grazing operators. For example, expansion of bighorn sheep herds could result in the need to modify management of domestic sheep allotments to minimize contact between domestic sheep and bighorn sheep. Over the long term, additional protections of sensitive natural resources might lead to more sustainable vegetation conditions, which could increase forage availability for livestock.

### *Environmental Consequences for Livestock Grazing—Alternative A*

#### **Effects from Livestock Grazing Management**

Under alternative A, approximately 919,700 acres would be permitted for grazing operations across the Ashley National Forest. Livestock operations would continue to be supported by the Forest at sustainable levels, and the utilization of key forage species by livestock would continue at or near present available head months.

Management of grazing would continue as it has in the past with site-specific determination of forage utilization and stubble height based on “benchmark indicators” for utilization limits of key forage species in allotment management plans and terms and conditions of the permit.

Without forestwide guidelines, different forage use direction could be proposed. This could lead to inconsistent and subjective grazing management across the Ashley National Forest, potentially reducing plant resiliency and forage production.

#### **Effects from Recreation**

Under alternative A, there would be approximately 646,000 acres available to primitive and nonmotorized recreation and approximately 283,000 acres available to motorized recreation across the Ashley National Forest. Impacts from a given recreation type are discussed under “Environmental Consequences for Livestock Grazing Common to All Alternatives.”

#### **Effects from Designated Areas**

Impacts on livestock grazing under alternative A would be the same as those described under “Environmental Consequences for Livestock Grazing Common to All Alternatives.”

#### **Effects from Vegetation Management, Timber Harvest, and Sustainable Ecosystems**

Under alternative A, the goals, standards, and objectives for vegetation management in the 1986 forest plan would continue to be implemented. Fire and fuels management would continue to follow direction outlined in the 1986 forest plan, though it would not use modern prediction and planning tools to determine high-risk areas. Without prioritizing those areas, fires might increase in frequency, duration, and intensity, which could remove forage for livestock and increase competition for resources with wildlife.

Alternative A would continue direction under the 1986 forest plan to convert or close sheep allotments that remain unused for 5 years. There are currently approximately 111,500 acres (29,956 head months) permitted to graze sheep in the Ashley National Forest, 9,200 acres of which are in a vacant status and closed for sheep grazing.

### *Environmental Consequences for Livestock Grazing—Alternative B Modified*

#### **Effects from Livestock Grazing Management**

Under alternative B modified, no direct changes would occur to the level of permitted use or acres available for grazing compared to alternative A.

Sustainable grazing would be ensured through development of stubble height and forage utilization guidelines under allotment management plans as under alternative A, while providing additional details for implementation and direction for management in the absence of site-specific plans. Specifically, within allotments without allotment management plans or lacking forage use guidelines, forage for livestock would be limited to 50 percent utilization of key forage species and a stubble height of 4 inches, unless monitoring indicates a different level sufficient to meet and maintain desired conditions (table 3-70). Ongoing annual and multi-year monitoring plans would be developed, and in allotments where these grazing management strategies were not met and exceptions were not made, there could be modifications to the timing and intensity of grazing operations, particularly adjustments to livestock numbers or season of use or both and associated reductions in numbers and season of use permitted to grazing operators when compared with alternative A.

#### **Effects from Recreation**

Under alternative B modified, there would be approximately 639,000 acres available to primitive and nonmotorized recreation and approximately 289,000 acres available to motorized recreation across the Ashley National Forest. There would be a slight increase in nonmotorized recreation and a slight decrease in motorized recreation when compared with alternative A. No specific recreation classification (general, backcountry, or destination recreation management area) would prohibit livestock grazing. General impacts from recreation are discussed under “Environmental Consequences for Livestock Grazing Common to All Alternatives.”

#### **Effects from Designated Areas**

Impacts on livestock grazing from existing designated areas under alternative B modified would be the same as those described under “Environmental Consequences for Livestock Grazing Common to All Alternatives.”

#### **Effects from Vegetation Management, Timber Harvest, and Sustainable Ecosystems**

Under alternative B modified, wildland fire and other vegetation treatments would be used to improve or maintain desired vegetation conditions. Treatments on 2,400 acres annually of the Ashley National Forest (2,100 acres in the second decade) would affect grazing operations through changes in grazing systems; however, these types of management are generally planned around grazing rotations to minimize impacts on grazing operations. When compared with alternative A, vegetation treatments under this alternative would likely enhance forage quality and availability over the long term, potentially increasing forage production and increasing grazing capacity in the future.

Under alternative B modified, when a domestic sheep or goat grazing permit for an allotment is voluntarily waived without preference, management options to protect bighorn sheep from disease would include (1) mitigation of the threat of pathogen transfer consistent with the most current State bighorn

sheep management plans, (2) mitigation of the threat of pathogen transfer from domestic sheep or domestic goats to bighorn sheep in accordance with reasonable management guidelines pursuant to a new site-specific memorandum of understanding, (3) leaving the allotment vacant of domestic sheep and goats, (4) working with the State of Utah to remove or translocate bighorn sheep, or (5) implementation of another method that would provide separation of the species or that would reduce the threat of pathogen transfer from domestic sheep to bighorn sheep (FW-GD-WILDL-09). In addition, no new domestic sheep or goat allotments would be authorized under this alternative unless the Ashley National Forest determines, based on local information and the best available science, that separation of the allotment from bighorn sheep will be obtained (FW-GD-WILDL-10). These measures might affect grazing by reducing the number and season of use for permitted livestock through the potential closure of sheep and goat allotments as compared to alternative A. Management direction also calls for collaboration with the State of Utah, such as utilizing memorandums of understanding and applying site-specific management strategies described in domestic sheep permit annual operating instructions to separate domestic sheep and bighorn sheep (FW-GO-WILDL-03). Providing such options to allow for separation would limit the impacts on domestic sheep management. In addition, for subsequent management changes such as might be required when a term grazing permit is waived without preference, additional analysis of impacts to grazing operations and livestock operators would occur at the project scale. The level and type of analysis would be determined based on the option selected and might require additional NEPA analysis.

### *Environmental Consequences for Livestock Grazing—Alternative C*

#### **Effects from Livestock Grazing Management**

Under alternative C, forage for livestock would be limited to a level of 40 percent utilization of key forage species and a stubble height of 4 inches (table 3-73). Exceptions would not be made for utilization levels and stubble-height guidelines. In areas where these guidelines were not met, there would likely be modifications to the timing and intensity of grazing operations, particularly adjustments to the season of use and reductions in head months, when compared with alternative A. Alternative C is likely to have the greatest potential for site-specific adjustments to current head months during implementation due to the reduced site-specific exceptions to forage utilization levels and stubble height.

#### **Effects from Recreation**

Under alternative C, there would be approximately 646,000 acres available to primitive and nonmotorized recreation and approximately 282,000 acres available to motorized recreation across the Ashley National Forest. The nature and type of impacts from recreation would be as described in “Environmental Consequences for Livestock Grazing Common to All Alternatives”; however, the intensity of impacts under this alternative would be greater than under alternative A due to its emphasis on supporting additional recreation infrastructure.

Management under alternative C would exclude domestic livestock grazing in destination recreation management areas, and portions of grazing allotments could be closed. Removing permitted acres in these areas would reduce the number of acres available for grazing by 13,000 acres when compared with alternative A (table 3-74). The number of decreased acres represents a small proportion (1.4 percent) of total acres available for grazing on the Ashley National Forest. This reduction would result in a loss of head months available on pastures which fall within destination recreation management areas. Acres and head month estimates below include closures at a pasture level based on the destination recreation management area restrictions. There is a small potential for the need for closures of additional acres in pastures where cattle could not be effectively restricted, resulting in additional loss of head months. These impacts would be determined at the site-specific level during implementation. Specific operators might be impacted under this alternative, though those impacts would likely be minimal.



**Table 3-74. Acres of Permitted Grazing in Destination Recreation Management Areas under Alternative C**

Ranger District	Acres with No Permitted Grazing	Percentage of Allotment	Reduction in Head Months
Duchesne	6,600	2.1	-54.9
Flaming Gorge	2,900	2.0	-52.2
Roosevelt	3,500	1.4	-2.8
Vernal	0	0	0
<b>Total</b>	<b>13,000</b>	<b>1.4</b>	<b>-109.9</b>

### Effects from Designated Areas

Alternative C would have the highest percentage of the Ashley National Forest managed as designated areas; however, none of the acreage of the proposed designated areas overlapping current grazing allotments would preclude grazing. Some impacts might occur, however, related to the ability to access and maintain allotments in proposed wilderness areas, as described under “Environmental Consequences for Livestock Grazing Common to All Alternatives.”

### Effects from Vegetation Management, Timber Harvest, and Sustainable Ecosystems

Under alternative C, wildland fire and other vegetation treatments would improve or maintain desired vegetation conditions. Treatments on 1,000 acres of the Ashley National Forest on an average annual basis (800 acres on an average annual basis in the second decade) would affect grazing operations through changes in grazing systems; however, these types of management are generally planned around grazing rotations to minimize impacts on grazing operations. Where naturally ignited fire is to be managed to meet resource objectives, there could be short-term losses to forage availability; however, when compared with alternative A, vegetation treatments under this alternative would likely enhance forage quality and availability over the long term, potentially increasing forage production and increasing grazing capacity.

Alternative C includes specific measures to protect bighorn sheep from disease by closing domestic sheep or goat allotments, specifically those where permits are voluntarily waived without preference. Where domestic sheep and goats overlap bighorn sheep core range, no new permits would be issued. These measures represent the most restrictive measures for domestic sheep of all the alternatives and might affect grazing by reducing head months at a site-specific level through the closure of sheep and goat allotments. Inclusion of FW-GO-WILDL-03 would provide for site-specific management strategies in collaboration with the State of Utah and established MOUs as discussed under Alternative B.

### *Environmental Consequences for Livestock Grazing—Alternative D*

#### Effects from Livestock Grazing Management

Impacts on livestock grazing under alternative D would similar to those described under Alternative B, with the direction to include development of site- and species- specific annual indicators such as stubble height, stream bank alteration, woody vegetation utilization, and upland utilization during grazing allotment planning, and document them in allotment management plans and the inclusion of limits to 50 percent of forage utilization of key forage species in the absence of updated plans. However, Alternative D provides additional flexibility with the removal of defaults for stubble height. Impacts to livestock grazing would be similar to Alternative A but would provide a greater level of guidance for implementation.

### **Effects from Designated Areas**

Alternative D would manage the fewest acres as designated areas. Grazing would be compatible with all proposed and existing designated areas; thus, impacts on livestock grazing from existing and newly recommended designated areas under alternative D would be the same as those described under “Environmental Consequences for Livestock Grazing Common to All Alternatives.”

### **Effects from Recreation**

Under alternative D, there would be approximately 645,000 acres available to primitive and nonmotorized recreation and approximately 281,000 acres available to motorized recreation across the Ashley National Forest. There would be a slight increase in nonmotorized recreation and a slight decrease in motorized recreation when compared with alternative A. No specific recreation classification (general, backcountry, or destination) would prohibit livestock grazing. Impacts from a given recreation type are discussed under “Environmental Consequences for Livestock Grazing Common to All Alternatives.”

### **Effects from Vegetation Management, Timber Harvest, and Sustainable Ecosystems**

Under alternative D, wildland fire and other vegetation treatments would be used to improve or maintain desired vegetation conditions. Treatments on 1,600 acres of the Ashley National Forest annually (1,300 acres in the second decade) would affect grazing operations through changes in grazing systems; however, these types of management are generally planned around grazing rotations to minimize impacts on grazing operations. Over the long term, vegetation treatments under this alternative would likely enhance forage quality and availability, when compared with alternative A, potentially leading to an increase in forage production and an increase in grazing capacity in the future.

Alternative D would not have management direction to close or convert any existing sheep or goat allotments. Allotments voluntarily vacated that would be considered for conversion or closure under alternative A would not be affected under alternative D. Under alternative D, new permits for domestic sheep and goats would be allowed in closed, vacant allotments, or forage reserves outside of bighorn sheep core herd home range. This alternative therefore represents the greatest level of flexibility for domestic sheep management.

### **Cumulative Environmental Consequences for Livestock Grazing**

The analysis area for cumulative impacts on livestock and rangelands is the Ashley National Forest and the private, State, Tribal, and other federally administered lands surrounding the Forest. The time frame for assessing cumulative effects of rangelands and grazing is the maximum life of the plan, which is generally 15 years. Much of the Ashley National Forest is surrounded by rangeland, which is considered for cumulative analysis. Past, present, and future actions taken by surrounding private, State, Federal and Tribal lands could cumulatively affect rangelands and grazing in the Ashley National Forest. On lands surrounding the Ashley National Forest, past actions in the plan area have contributed to the existing conditions, while future actions will be addressed in specific project-level environmental analysis.

There are a wide range of planning and land use strategies that address land use next to the Ashley National Forest. Local soil and water conservation districts will continue to write land use plans to promote responsible and effective use and management of soil and water resources in their districts. This may contribute to the cumulative impacts on forage conditions on rangelands available for grazing.

In the counties that surround the Ashley National Forest, there is limited private land available for existing permit holders to graze livestock. Alternatives that remove available grazing acres on the national forest, such as alternative C, would cumulatively affect grazing to the greatest degree. Most permittees are unlikely to hold enough private land to graze their livestock year-round. Typically, livestock are

supplemented with hay during months when they do not have access to grazing allotments on Forest Service or BLM-administered lands. Ranching operations that are permitted to graze in the Ashley National Forest are an important factor in sustaining the local ranching economy and lifestyle.

Under all alternatives, water availability for livestock grazing is a constant issue for many counties surrounding the national forest. As counties and municipalities make decisions on how to allocate water for consumption and agriculture (including grazing operations), impacts on grazing may take place in the cumulative analysis area as water availability for both livestock and forage decreases. The costs associated with grazing in the months that livestock spend off the national forest could increase as the local production of forage decreases.

## Energy and Minerals

### Introduction

Demand for energy and minerals exploration and development in the plan area, and the subsequent need for managing those activities, is directly related to the exploration and development proposals generated by the public and industry. These proposals are related to fluctuations in demand and prices for various energy and minerals products. Management of mineral resources is responsive to global demands, prices, and uses rather than to long-range Forest Service or agency planning or decisions. Management of mineral resources therefore poses programming and scheduling challenges that are not common in other Forest Service resources or programs. It is the policy of the Forest Service to “foster and encourage” responsible minerals development; however, management of energy, locatable, and leasable mineral resources is governed by numerous laws and regulations and is not particularly discretionary at either the agency or the national forest level.

There are three categories of minerals: locatable, leasable, and salable. Each is subject to different Federal laws and implementing regulations. Most important, this affects whether Forest Service personnel have the discretion to deny some types of proposed mineral operations. This also affects how operations can be administered by the Forest Service.

Minerals are not a sustainable forest resource. Once a mineral resource is removed, it is no longer available; however, a major function of the minerals and geology program is to ensure that surface resources affected by mining are restored, to the extent possible. The restoration of these areas is an obvious contribution to the sustainability of other resources on the national forest. For more of a detailed discussion of the minerals, geology, and energy programs, including renewable energy, see the Ashley National Forest Assessment Energy Resource, Mineral Resources, and Geological Resources and Hazards Report (Forest Service 2017).

### *Regulatory Framework*

**Mining Law of 1872**—The Mining Law, as amended, opened the public lands of the United States to mineral acquisition by locating and maintaining mining claims. Mineral deposits subject to acquisition in this manner are generally referred to as locatable minerals. Locatable minerals include both metallic minerals, such as gold, silver, lead, copper, zinc, and nickel, and nonmetallic minerals, such as fluorspar, mica, certain limestones and gypsum, heavy minerals in placer form, and gemstones. It is difficult to prepare a complete list of locatable minerals because the history of the law has resulted in a definition of minerals that includes economics (BLM 2020).

**The Mineral Leasing Act of 1920**—This act provides that deposits of laterally extensive minerals, such as coal, oil, gas, and phosphate, can be acquired through competitive leasing systems (U.S. Department of the Interior 2018).

**The Materials Act of 1947**—The Materials Act (30 USC 601–604) authorizes the Forest Service to dispose of mineral materials on Federal lands, provided that the disposal is not otherwise expressly authorized or prohibited by law and is not detrimental to the public interest.

**The Mineral Leasing Act for Acquired Lands of 1947**—This act promotes the mining of coal, phosphate, sodium, oil, oil shale, gas, and sulfur on lands acquired by the United States (U.S. Department of the Interior 2018).

**The Energy Policy Act of 2005**—This act addresses energy production in the United States, including energy efficiency, renewable energy, oil and gas, coal, tribal energy, nuclear matters and security, vehicles and motor fuels (including ethanol), hydrogen, electricity, energy tax incentives, hydropower and geothermal energy, and climate change technology (United States Congress 2005).

**The Geothermal Steam Act and the Code of Federal Regulations (CFR)**—This act encourages the development of geothermal energy. The rule allows the leasing of land containing geothermal resources; however, Congress excluded any lands in the National Park System, U.S. Fish and Wildlife Service lands, and any other lands prohibited from leasing by the Mineral Leasing Act of 1920 (Geothermal Steam Act of 1970).

### *Analysis Area*

The geographic scope of the analysis includes all National Forest System lands within the Ashley National Forest boundary. Additionally, the cumulative effects consider the broader landscape and primarily focus on Duchesne, Uintah, and Daggett Counties in Utah for areas of the national forest in the Uinta Basin and High Uinta Mountains and on Sweetwater County in Wyoming. The geographic scope also includes areas of the Ashley National Forest in and around the FGNRA. When discussing the economic scale of analysis for energy and mineral uses in the Ashley National Forest, the analysis area expands to municipalities providing services to the local energy industry: Duchesne, Roosevelt, Vernal, and other surrounding municipalities. The temporal scope is the anticipated life of the plan, approximately 15 years.

### *Notable Changes Between the Draft and Final EIS*

In response to removing the proposed recommendation for 10,300 acres to be designated as wilderness under alternative B modified, the analysis of the impacts under alternative B was modified. In addition, the analysis was modified in response to public comments to clarify that interest in renewable development is growing and may cause an increase in future development interest on the Ashley National Forest. The analysis was also modified to clarify the management of leasable minerals and the associated impacts within recommended wilderness areas.

### **Description of Affected Environment**

The Ashley National Forest contains a wide variety of energy and mineral resources. People have been using and benefiting from those resources for many years, and demand is expected to continue. The Ashley National Forest provides the conditions necessary for renewable as well as nonrenewable energy production. Locatable, leasable, and salable minerals have been developed and extracted, and this is expected to continue, to varying extents, in the Ashley National Forest. A wide variety of leasable

minerals, including crude oil, natural gas, coal, tar sand, oil shale, gilsonite and elaterite (hard natural hydrocarbon tars), sodium minerals, and phosphate can be found in the plan area.

The Ashley National Forest contains relatively small amounts of widely scattered locatable minerals due to the local and regional rock layers and geologic history. Most of these rock units are sedimentary and are not promising for development of large locatable mineral deposits. The Ashley National Forest also has a significant amount of salable minerals, primarily consisting of crushed and screened road gravel, barrier rocks, riprap, and general construction and maintenance material.

## Energy and Minerals

### *Renewable Energy*

The primary type of renewable energy associated with the Ashley National Forest is hydropower, with a large dam at Flaming Gorge Reservoir and a few smaller reservoirs that also generate power. The Flaming Gorge Dam is operated by the Bureau of Reclamation and is in the Flaming Gorge Ranger District of the Ashley National Forest. There are three generating units in the Flaming Gorge Powerplant, with a total installed capacity of about 150 megawatts. The power plant produces approximately 500 million kilowatt hours of energy annually, which is enough to serve about 50,000 households. The power produced by Flaming Gorge Powerplant is distributed by the Western Area Power Administration to Wyoming, Utah, Colorado, New Mexico, Arizona, Nebraska, and Nevada.

Small hydropower operations also exist at Yellowstone Lake and in Uinta Canyon, both within the Roosevelt Ranger District of the Ashley National Forest. The Moon Lake Electric Cooperative has indicated they plan to retire the Yellowstone Lake and Uinta Canyon hydropower plants (Hyde 2021). There are several other reservoirs on the national forest, but they do not produce hydropower. Additional opportunities for hydropower generation exist due to large topographic variations across the national forest; however, the amount of hydropower potentially available is small relative to other potential energy sources.

Other forms of renewable energy, such as wind power, solar, geothermal, and biomass energy, have not seen similar interest or development in the Ashley National Forest. This is partially due to the low potential for these resources, relative to other areas in the country. It is also because of competition from abundant nonrenewable energy sources, such as crude oil, natural gas, and coal, in the immediate and surrounding areas (Forest Service 2017L). National interest in renewable energy is increasing and may lead to future development interest on the Ashley National Forest.

### Leasable Minerals

Leasable minerals are a category of mineral resources made available for exploration and development by mineral leasing. They are specific types of mineral resources described by the Mineral Leasing Act of 1920, including crude oil, natural gas, coal, oil shale, sodium, phosphate, potassium, and geothermal energy. Locatable minerals on public lands may be classified as hard rock leasable when they are on Federal acquired lands.

The Ashley National Forest contains a wide variety of leasable minerals, including crude oil, natural gas, coal, tar sand, oil shale, gilsonite and elaterite (hard natural hydrocarbon tars), sodium minerals, and phosphate. The different kinds of leasable minerals are briefly discussed below; however, only the crude oil, natural gas, sodium, and phosphate appear to have economic potential for current or near-future development in the Ashley National Forest.

### *Crude oil and natural gas*

There are considerable crude oil and natural gas resources in the South Unit of the Duchesne Ranger District of the Ashley National Forest. These resources are usually discussed together because they typically occur and are produced together, along with variable amounts of byproduct water. Most of the interest in and development of oil and gas resources in the Ashley National Forest has been in the eastern half of the South Unit. See figure 3-19 for the location of existing oil and gas leases.

There is also potential for crude oil and natural gas resources in the western half of the South Unit, along the northern and southern margins of the Uinta Mountains, and within the FGNRA. However, these areas of the national forest have seen little or no development to date. Other areas of the Ashley National Forest generally have low potential for crude oil and natural gas resources.

All active oil and gas leases and developments in the Ashley National Forest are in the eastern half of the South Unit of the Duchesne Ranger District. The Ashley National Forest currently has 163 active oil and gas wells, drilled and operated from 49 well pad locations, all of which are operated by Berry Petroleum. From its wells in the Ashley National Forest, Berry Petroleum produces about 260,000 barrels of crude oil and 980,000 MCF (thousand cubic feet) of natural gas per year.

Availability of lands for oil and gas leasing within the Ashley National Forest, along with appropriate stipulations to be used for leasing, were previously determined via the Western Uintah Basin Oil and Gas Leasing EIS and Decision. Those decisions remain in place, and are consistent with the new forest plan, but predate the 2001 Roadless Rule or the 2015 decision regarding greater sage-grouse and associated habitat. A new leasing analysis would likely be needed before additional oil and gas leases could be issued.

Since about 2015, lower crude oil prices have slowed development of new oil and gas wells in the Ashley National Forest. Numerous additional oil and gas wells have been proposed, and some of those have been approved for development. How many of those additional wells might eventually be drilled depends on interest by Berry Petroleum, as well as on future market prices and demand for crude oil and natural gas.

### *Coal*

Although several coal deposits are known or suspected to be in the Ashley National Forest, they are either prohibitively deep or are too small for significant economic development. Large coal deposits near Price, Utah, are suspected to extend northward at great depth, beneath the western portions of the South Unit of the Ashley National Forest. Such deposits are speculative, and the great depth likely prohibits exploration or development of these potential resources.

Small coal deposits of varying thickness and quality have been documented from several rock units along both the South and North slopes of the Uinta Mountains. Only a few of these overlap the Ashley National Forest, and most were not of sufficient thickness or quality to justify mining. None are considered to be economic.

### *Tar sand*

Tar sands are porous sandstones or other rocks where the pore spaces are filled with solid to semisolid crude oil or tar. There are tar sand deposits near the mouth of Whiterocks Canyon in the Vernal District. There are also smaller uneconomic and undocumented tar sand outcrops on or near Reservation Ridge in the South Unit of the Duchesne Ranger District.

The tar sand deposits near Whiterocks Canyon occur on both sides of the national forest boundary. An inactive commercial open-pit mine for tar sand is on private land bordering the Ashley National Forest. Materials removed from the mine were used as asphalt for paving local roads. The tar sand deposits also occur or continue onto the Ashley National Forest, but they have not been leased for exploration or development.

Tar sand deposits in the South Unit are related to the crude oil from the same area. Crude oil from the South Unit typically contains a large fraction of wax and is solid or semisolid at room temperature. Where porous rock layers are saturated with waxy crude oil and those rocks are exposed at the surface at room temperature, the oil-soaked rocks are considered tar sand deposits. In the South Unit, these deposits are small and intermittent and of little economic value compared with the large deposits elsewhere.

#### *Oil shale*

The Ashley National Forest has large areas with known or suspected deposits of oil shale. These deposits are in the Green River Formation, beneath large portions of the Flaming Gorge Ranger District and large portions of the South Unit of the Duchesne Ranger District. Although widespread, the known oil shale deposits in the Ashley National Forest are relatively thin and impure, and they are not economically promising for oil shale leasing.

#### *Gilsonite and elaterite*

Several small deposits of gilsonite or elaterite (natural hydrocarbon, tar-like, materials) are known to occur in the Ashley National Forest, but they are poorly documented. The known deposits are either prohibitively small for development compared with much larger deposits elsewhere in the Uinta Basin or appear to be largely exhausted.

#### *Sodium minerals*

An enormous deposit of trona (a leasable sodium mineral) occurs at depth within rocks of the Green River Formation, next to and partially underneath the FGNRA. At an estimated 127 billion tons, this constitutes the largest known trona deposit in the world. The trona is mined and processed to produce soda ash (sodium carbonate), an important industrial chemical used for a wide variety of products. In 2013, mining operations near Green River, Wyoming, produced more than 16 million tons of trona, employing 2,328 people and supplying approximately 90 percent of United States demand for soda ash.

All trona mining operations and associated surface facilities lie outside the Ashley National Forest; however, about 40 acres of the national forest is covered by an active sodium mineral lease in the SE quarter of Section 12, T16N R109W. The known and minable trona beds continue underneath portions of the Flaming Gorge Ranger District of the Ashley National Forest. When the FGNRA was created, it was recognized that large and potentially valuable trona deposits existed beneath portions of the FGNRA surface. The FGNRA was not closed to future minerals leasing, with the requirement that future lease developments not have significant adverse effects on the purposes for which the area was created.

#### *Phosphate*

A large phosphate deposit is being mined in the Brush Creek Area, north of Vernal, on lands bordering the Ashley National Forest. The phosphate ore occurs in portions of the Meade Peak Member of the Permian-age Park City Formation. Phosphate is not being mined in the Ashley National Forest; however, past mining has continued right up to the Ashley National Forest boundary, and similar phosphate deposits are known to occur nearby and elsewhere on the national forest. There are no phosphate leases in the Ashley National Forest.

## Locatable Minerals

Locatable minerals are sometimes called hard rock minerals and may include deposits of gold, silver, lead, zinc, copper, molybdenum, uranium, gypsum, chemical-grade limestone, and other rare or high-value minerals and metals. Rights to locatable minerals are obtained by staking mining claims, unlike leasable minerals where rights are obtained via mineral leases. Locatable minerals technically include any valuable mineral deposits that are subject to exploration and production under the Mining Law of 1872, as amended.

Compared with other national forests, the Ashley National Forest contains relatively small amounts of widely scattered locatable minerals, due to the local and regional rock layers and geologic history. Most of these rock units are sedimentary and are not promising for the development of large, locatable mineral deposits. As of January 2023, there were 84 active mining claims in the Ashley National Forest, most of which are clustered in the Blind Stream, Dry Ridge, Pole Creek, and Diamond Mountain areas. Mining claims are typically about 20.6 acres in size, for an approximate total of 1,730 acres of active mining claims.

The Ashley National Forest is open to the location of mining claims, except for the areas that have been formally withdrawn, discussed below, and areas of acquired land. Areas currently withdrawn from mineral entry and unavailable to exploration or extraction of locatable minerals are the High Uintas Wilderness, FGNRA, Ashley Karst NREGA, Sheep Creek Canyon Geologic Area, Stillwater Reservoir, Stillwater Diversion Tunnel, various power site withdrawals in large south-slope canyons, and a few smaller areas scattered across the Ashley National Forest (Forest Service 2019b). Various approved, active, or recent locatable minerals operations are scattered across the Ashley National Forest. The largest of these is the Limestone Mine in the Diamond Mountain area, which produces chemical-grade limestone. Other locatable minerals operations on the Forest are typically smaller and intermittent.

For the Ashley National Forest, potential future locatable mineral operations would likely include those minerals already being explored or minerals produced or mined in the past. These could include deposits of chemical-grade limestone, small high-grade copper-gold replacement deposits, small lead-silver deposits, low-grade disseminated copper-silver deposits, or additional deposits of honeycomb-style decorative calcite. Depending on industry action, market prices, and demand, there is some potential for exploration and development of new and different locatable minerals, including gypsum, uranium, rare earth elements, fluoride, gemstones, zeolites, and clay minerals.

## Salable (Mineral Materials)

Salable minerals and mineral materials are common minerals sold or given away at the discretion of the Forest Service. Salable minerals are defined as lower-value, common variety materials, such as rock, gravel, and soil. The term salable minerals is synonymous with mineral materials and can also be called common variety minerals. The Forest Service has the discretion to manage the sale or removal of these materials.

The Ashley National Forest contains large amounts of salable minerals. Some of these materials are used internally by the Forest Service for construction and maintenance of roads, campgrounds, and other infrastructure. The Ashley National Forest typically uses about 6,500 tons of salable minerals per year for construction and maintenance projects. This material consists primarily of crushed and screened road gravel, barrier rocks, riprap, and general construction and maintenance material.

Salable minerals are also sometimes provided free of charge to local governments for public projects and to the general public for small-scale noncommercial use. The Ashley National Forest typically issues



roughly 75 free-use rock permits each year to private citizens for their own personal noncommercial use. These permits typically allow removal of up to 1 to 3 tons of material each. The materials removed under free-use permits generally consist of sandstone flagstones, quartzite boulders, and river rocks used for decorating and landscaping private local residences. Salable minerals are also sometimes available, on a case-by-case discretionary basis, for sale to local commercial projects.

## Environmental Consequences for Energy and Minerals

### *Methodology and Analysis Process*

Indicators were selected based on the level of expected development of locatable and leasable minerals and energy, under applicable regulations for each type of resource. Development of these resources is expected to continue, but the levels of development, and the exact locations for future developments, are not known at this time.

### *Analysis Assumptions*

Mineral demand, exploration, and production vary depending on a number of external factors, and most are highly unpredictable. An evaluation of historical production can provide context or a qualitative estimation of mineral needs and production, which are directly related to mineral exploration; however, both depend on the mineral being mined and the type of mining necessary to extract the resource profitably.

### *Indicators*

- The number of acres open to mineral leasing in the Ashley National Forest
- The numbers of acres open to location of mining claims in the Ashley National Forest
- The numbers of acres open to renewable energy projects in the Ashley National Forest

### *Environmental Consequences for Energy and Minerals Common to All Alternatives*

Under all alternatives, decisions regarding mineral activities in the Ashley National Forest would align with law, regulation, and policy. They would be consistent with plan decisions for other resource areas, to the extent possible. This forest plan is not making any decisions regarding opening or closing of National Forest System lands to future mineral availability or development (such as via mineral withdrawals or no surface occupancy lease stipulations). Locatable and leasable mineral resources, including oil and gas resources, will continue to be managed by applicable laws, regulations, and policy.

Under all alternatives, no changes would be made to the current management of locatable or leasable minerals, such as the number of acres open, closed, or available for new mining claims or mineral leases. The designation of RNAs does not automatically make those areas unavailable for mining claims; therefore, there are no significant differences in impacts on acres open to location of mining claims between alternatives. However, designating areas as wilderness study areas or RNAs may affect development of common variety minerals and renewable energy development.

### *Environmental Consequences for Energy and Minerals—Alternative A*

Under this alternative, approximately 7,700 acres would continue to be managed as RNAs, where renewable energy developments would not be permitted; salable mineral development would also be discouraged but not necessarily disallowed.

### *Environmental Consequences for Energy and Minerals—Alternative B modified*

Alternative B modified would manage 7,700 acres as RNAs; this is the same as under alternative A. Renewable energy projects would not be permitted in these areas; however, they would still be permitted across the rest of the national forest. Salable mineral development would be discouraged but not disallowed in these RNAs.

### *Environmental Consequences for Energy and Minerals—Alternative C*

Under alternative C, four areas (50,200 acres total) would be recommended for wilderness designation, and 9,100 acres would be managed as RNAs. Renewable energy projects would not be permitted in recommended wilderness or RNAs but would still be permitted across the rest of the national forest. Salable mineral development would be discouraged but not disallowed in all cases in these areas. Per 30 CFR 226(3), lands recommended for wilderness allocation would not have mineral leases issued. Development on existing leases of leasable mineral resources could continue in these areas, and valid existing rights would be recognized.

Should Congress reject the recommendation for wilderness designation, the areas would revert to the locatable mineral allocations in the approved resource management plan for the areas. The management of locatable minerals would continue as stipulated in the General Mining Law of 1872 and other applicable laws and regulations. An act of Congress would be required to officially designate the four areas as wilderness and withdraw them from locatable mineral entry. Such an act of Congress would be a Federal action separate from the forest plan; therefore, the Forest Service expects the environmental consequences on locatable minerals under alternative C to be the same as those described under alternative A.

### *Environmental Consequences for Energy and Minerals—Alternative D*

Under alternative D, 7,700 acres would be managed as RNAs. Renewable energy projects would not be permitted in these areas but would still be permitted across the rest of the national forest. This alternative emphasizes increased access to the national forest and developed recreation opportunities. The construction of new roads, facilities, and parking areas to facilitate greater access could increase the demand for salable minerals, such as sand and gravel for use in construction and road maintenance. This could increase the volume of salable mineral production on the national forest. Increases in Forest access emphasized under this alternative could reduce costs associated with mineral exploration if additional National Forest System roads are constructed. Increases in road access could also improve access for renewable energy and petroleum development.

## **Cumulative Environmental Consequences for Energy and Minerals**

Mineral development depends on a variety of factors, including local and global demand, prices, and costs of exploration and development. Changes in any of these factors could result in increased or decreased levels of energy and mineral development in the Ashley National Forest. Impacts from mineral and energy exploration and development would be associated with ground disturbance and equipment use. This would lead to disturbed soils, vegetation, habitat, and wildlife, as well as noise and visual intrusions and air impacts. The cumulative impact from minerals and energy in the plan area is not known. Areas withdrawn or closed to minerals and energy would limit development and production and thereby reduce impacts associated with these activities.

## Geologic Resources and Hazards

### *Notable Changes Between the Draft and Final EIS*

In response to removing the proposed recommendation for 10,300 acres to be designated as wilderness under alternative B modified, the analysis of the impacts under alternative B was modified.

### Affected Environment for Geologic Resources and Hazards

The Ashley National Forest has a variety of geologic resources and geologic hazards. These hazards can pose a risk to people and infrastructure; they include landslides, debris flows, earthquakes, sinkholes, and other concerns. Geologic resources in the Ashley National Forest include many types and ages of fossils, natural caves and other karst resources, and areas with scenic or scientifically important rock layers or features. Significant fossils, natural caves, and related resources are protected by Federal laws and regulations. Fossil and cave resources are both fragile and nonrenewable, and special considerations are required to provide for both resource protection and recreational and scientific opportunities. Locations and details for significant fossil sites and natural caves are considered sensitive information and should be protected from inappropriate public disclosure.

The Ashley National Forest contains several geologic units that are prone to debris flows and landslides. These units tend to be weak, clay-rich, or poorly drained. The actual risk of landslides and debris flows, in areas with susceptible geologic units, depends on various other factors. One example is the presence of vegetation, which tends to stabilize shallow soils, delay water infiltration, and remove pressure from shallow groundwater. Areas where vegetation has been removed or killed by recent fires are typically more prone to landslides and debris flows.

Geologic hazards in the Ashley National Forest also include steep slopes, deep winter snowfall that can cause avalanches, and rock units susceptible to rockfalls. Affected areas are typically remote and the hazards are well known, so Forest Service infrastructure and visitors can generally avoid the most hazardous areas. Rockfall hazards and snow avalanches are best mitigated by keeping infrastructure and Forest visitors away from steep or vertical cliff areas.

The Ashley National Forest is in an area of the United States with no active volcanic activity; however, there is a moderate risk of infrastructure damage from local or regional earthquakes. Geologic maps show numerous bedrock faults scattered across the Ashley National Forest. Most of these faults are inactive, created or related to large-scale crustal movements that are no longer active; however, there are several faults or fault zones in the Ashley National Forest that are geologically active. Movement on these faults or others could result in significant earthquakes from time to time.

In addition to local geologic faults, the western portions of the Ashley National Forest are only about 30 miles from the well-known and geologically active Wasatch Fault Zone. Because of this proximity, visitors and infrastructure in the western portions of the Ashley National Forest would be at risk from large earthquakes on the Wasatch Fault Zone.

Certain kinds of bedrock are susceptible to the creation of natural caves and underground drainage systems. Areas with such rocks, where caves, sinkholes, and underground drainage systems have developed, are often called karst areas by geologists and other scientists. Most karst areas are associated with rock layers of limestone, dolomite, or gypsum because underground drainage systems can form more quickly in such rocks. The Ashley National Forest includes several karst areas, and large areas are underlain by karst-susceptible rock units. A few large karst sinkholes and karst collapse features are

known to exist in the Ashley National Forest; however, they are typically associated with known caves and karst systems and are in rugged and remote areas with little infrastructure (figure 3-20).

Karst areas are often hard to identify from the surface. Karst drainage systems and caves are often deep underground and difficult to access. Management of cave-related resources tends to focus on known caves, even though they represent only a small fraction of the actual caves and related resources that certainly exist.

## Environmental Consequences for Geologic Resources and Hazards

### *Methodology and Analysis Process*

Indicators are based on the potential for impacts on known geologic resources and hazards occurring on the national forest.

### *Analysis Assumptions*

No significant natural changes to geologic resources or hazards will occur over the life of the plan.

### *Indicators*

- The risk of damage to significant fossils, caves and karst features, and other geologic resources
- The danger to national forest users and infrastructure presented by geologic hazards

### *Environmental Consequences for Geologic Resources and Hazards Common to All Alternatives*

Under all alternatives, mineral development, facility construction, and road design and construction would include steps to avoid impacts on significant fossils, cave and karst resources, and other geologic resources. These guidelines could reduce the risk of damage to geologic resources in the future. Roads, trails, and other facilities would be designed and located to avoid geologic hazards, such as rockfalls, landslides, and avalanches, which will continue to present a risk to national forest users and infrastructure under all alternatives.

### *Environmental Consequences for Geologic Resources and Hazards—Alternative A*

Under this alternative, approximately 7,700 acres would be managed as RNAs. This management would provide protection to geologic resources from most forms of development.

### *Environmental Consequences for Geologic Resources and Hazards—Alternative B Modified*

Under this alternative, approximately 7,700 acres would be managed as RNAs. As under alternative A, this management would provide protection to geologic resources from most forms of development.

### *Environmental Consequences for Geologic Resources and Hazards—Alternative C*

Under this alternative, approximately 50,200 acres would be managed as recommended wilderness areas, and 9,100 acres would be managed as RNAs. Compared with management under alternative A, this management would provide more protection to geologic resources from most forms of development.

### *Environmental Consequences for Geologic Resources and Hazards—Alternative D*

Alternative D emphasizes increased national forest access and developed recreation opportunities. Care would need to be taken to keep developed recreation away from areas with geologic hazards to protect recreationists. The impacts from RNA management would be the same as those described under alternative A.

## Cumulative Environmental Consequences for Geologic Resources and Hazards

No cumulative impacts on geologic resources and hazards are expected to occur as a result of the management decisions made in this document.

## Transportation and Facilities Infrastructure

### Introduction

The infrastructure in the Ashley National Forest includes roads, bridges, trails, and other facilities, such as Forest Service buildings, drinking water and wastewater systems, and dams.

### *Regulatory Framework*

**National Forest Roads and Trails Act of October 13, 1964**—Authorizes acquisition, construction, and maintenance of forest roads and trails

**36 CFR 212, 2005 Travel Management Rule**—Requires designation of those roads, trails, and areas that are open to motor vehicle use, consistent with the provisions of EOs 11644 and 11989 regarding off-road use of motor vehicles on Federal lands

The following manuals and handbooks define maintenance levels and provide guidance on how the Forest Service's transportation system is managed, including additional direction on motorized and nonmotorized trail management:

- Forest Service Manual 2350 Trail, River, and Similar Recreation Opportunities
- Forest Service Handbook 2309.18 Trails Management Handbook
- Forest Service Handbook 7709.58 Transportation System Maintenance Handbook
- Forest Service Manual 7700 Transportation System, chapter 7730
- Forest Service Manual 7730 and 7709 and 23 CFR 650
- Forest Service Handbook 7309.11, section 22
- Forest Service Manual 7310

### *Analysis Area*

The analysis area for assessing effects on the infrastructure is the Ashley National Forest and other transportation corridors outside its boundary that provide important national forest access routes. The infrastructure falls under the jurisdiction of the Forest Service or adjacent counties and States. Specifically, the analysis area is the Ashley National Forest; surrounding Federal lands that border it (Bureau of Indian Affairs and BLM-administered lands and the Uinta-Wasatch-Cache National Forest), State lands, tribal lands, private inholdings, and private lands.

The analysis area includes all lands within the boundaries of the Ashley National Forest and is broken down into four spatial areas, based on the existing ranger district boundaries: Flaming Gorge, Vernal, Duchesne-Roosevelt North, and Duchesne-Roosevelt South. The temporal scope is the expected life of the plan.

### *Notable Changes Between Draft and Final EIS*

Changes between the draft and final EIS were made to reflect the impacts from the alternative B modified direction to remove recommended wilderness area. Revisions were also made to correct minor factual errors in the affected environment and environmental consequences sections.

### **Description of Affected Environment**

An inventory of transportation and facility infrastructure in the Ashley National Forest is provided in table 3-75. There are 1,472 miles of roads and 1,107 miles of trails and 90 road and trail bridges on the Forest. There are 409 forest service buildings, 31 dams, 30 drinking water systems, and 58 wastewater systems.

**Table 3-75. Facilities and Infrastructure in the Ashley National Forest, by Ranger District**

<b>Infrastructure</b>	<b>Flaming Gorge</b>	<b>Vernal</b>	<b>Duchesne-Roosevelt North</b>	<b>Duchesne-Roosevelt South</b>	<b>Total</b>
Forest Service buildings	233	75	94	7	<b>409</b>
Other buildings <sup>1</sup>	60	91	41	1	<b>193</b>
Dams <sup>2</sup>	8	14	9	0	<b>31</b>
Roads (miles)	462	445	307	258	<b>1,472</b>
Road bridges <sup>3</sup>	13	14	22	1	<b>50</b>
Trails (miles)	213	358	461	75	<b>1,107</b>
Trail bridges <sup>4</sup>	10	13	17	0	<b>40</b>
Trailheads	0	4	7	0	<b>11</b>
Wastewater systems	36	3	19	0	<b>58</b>
Water systems (in operation)	14	5	11	0	<b>30</b>
Recreation residence areas	1	2	1	0	<b>4</b>
Resorts	2	0	2	0	<b>4</b>
Marinas	3	0	0	0	<b>3</b>
Boat ramps	13	1	2	0	<b>16</b>
Canals	13	12	14	0	<b>39</b>

Source: Forest Service 2017m

<sup>1</sup>Other Buildings—Recreation residences and outbuildings (114), snow telemetry (SNOTEL) sites (13), resorts and outbuildings (32), marinas and outbuildings (15), communication sites (11), miscellaneous (8)

<sup>2</sup>Dams—Bureau of Reclamation (3), special-use permit (27), Forest Service (1)

<sup>3</sup>Road Bridges—Structures whose condition is reported to the Federal Highway Administration

<sup>4</sup>Trail Bridges—Longer than 20 feet in length and more than 5 feet above the ground

### **Roads and Road Bridges**

Access to National Forest System lands is generally provided by a seamless transportation system under the jurisdiction of multiple public road agencies, as follows: Federal highways, State highways, county highways and roads, municipal surface streets, and other roads managed by Federal agencies, such as the Forest Service or the BLM. Cooperative agreements between these agencies allow for shared maintenance and improvement schedules.

The Ashley National Forest uses county road agreements with Daggett, Duchesne, Sweetwater, and Uintah Counties to maintain many of the major roads on the Forest and to help bridge financial gaps in appropriated funds for road maintenance. Many roadways outside the Ashley National Forest boundaries pass through tribal or BLM lands and provide the only means of access to the national forest; roads

accessing the Duchesne Ranger District, for instance, are on tribal lands. Other districts are accessible by roads on BLM and State lands (Mortenson 2020).

The 2009 Motorized Travel Plan for Ashley National Forest (Forest Service 2009b) designated the location of routes open to public motorized use, the class of vehicle appropriate for each route, and the timing of use, for example seasonal restrictions. The plan designated 1,458 miles of open roads and 185 miles of open motorized trails. Each route was assigned a system number and shown on a motor vehicle use map. The 2015 Travel Analysis Report (Forest Service 2015d) identified the minimum road system for safe and efficient travel on the Forest. This report tiered to the 2009 motorized travel plan and identified 11 miles of National Forest System roads as likely not needed; these system roads may be analyzed for future decommissioning or trail conversion.

A seamless transportation network is critical for the efficient and safe movement of people, goods, and services, particularly emergency services. The Ashley National Forest maintains its road system with funding provided through annual congressional appropriations, through county road agreements, and through other agreements and funding sources. Most maintenance is funded through congressional appropriations and county road agreements. Currently 412 miles of road, approximately 28 percent of the Ashley National Forest road system, are maintained under county road agreements; 329 of these miles are passenger car roads, which is approximately 59 percent of the passenger car system on the national forest.

The primary components of road maintenance in the Ashley National Forest are blading and shaping; culvert cleaning and drainage improvements; sign maintenance and replacement; and gravel placement, chip seals, and asphalt resurfacing. The Ashley National Forest has 50 road bridges that require inspection on a minimum 2-year cycle, per Federal Highway Administration guidelines. Currently, 4 of the 50 bridges are classified as deficient, with others classified as in adequate condition (Mortenson 2020).

### *Trails and Trail Bridges*

The 2009 Motorized Travel Plan for Ashley National Forest designated 185 miles of open motorized trails (Forest Service 2009b). The national forest also contains 890 miles of nonmotorized trails. Motorized and nonmotorized trails are maintained on a fixed schedule.

There are 40 trail bridges in the Ashley National Forest. A trail bridge is generally defined as 20 feet long or longer and over 5 feet high. Trail bridges are inspected every 4 years by a qualified bridge engineer, and most trail bridges in the Ashley National Forest are in fair condition. More information regarding the nonmotorized trail system is provided in “Recreation.”

### *Other Facilities*

#### **Administrative facilities**

There are currently 409 Forest Service buildings in the Ashley National Forest. Most maintenance for these facilities is funded through congressional appropriations. In recent years, the number of buildings in the Ashley National Forest has been reduced through decommissioning and through the conveyance process, a method of transferring ownership of a building and site to another entity for an equitable value. From 2010 to 2017, the Ashley National Forest removed 49 buildings through either conveyance or decommissioning. In 2010, 10 buildings at five different administrative sites were conveyed. In 2012, an additional four buildings at two administrative sites were conveyed. In 2017, another 10 buildings at five administrative sites were conveyed.

The Ashley National Forest has also decommissioned 25 additional buildings that were deemed too costly to maintain and not critical to operations; further disposal of buildings is anticipated. Current efforts are

now underway to decommission the existing Indian Canyon Ranger Station. The Indian Canyon Ranger Station, which is currently condemned and beyond the state of restoration, is planned for eventual removal. Alternatives are currently being explored for the Old Stockmore Ranger Station, which is located on land not connected to the national forest.

Revenue obtained from these conveyances has been used to support the construction of a new, consolidated office in Manila for the northern end of the Flaming Gorge Ranger District and a new bunkhouse in Duchesne for the Duchesne Ranger District (Mortenson 2020). Older buildings that are potentially eligible for listing on or that are listed on the NRHP require additional considerations and funding to repair them and bring them up to standard. The Forest Service is also required to consider alternative uses before decommissioning these buildings. In general, the Ashley National Forest's buildings are being used efficiently and are in areas that support current land management needs.

### **Dams**

Of the 31 dams in the Ashley National Forest, the Forest Service has sole jurisdiction of the Daggett Lake dam; the other 30 dams are under special-use authorizations or easements. The number of dams is decreasing. New dams are not being built, and many remote high-mountain reservoir dams have been decommissioned. These include 14 wilderness dams that have been breached, thus stabilizing the reservoirs to natural lake levels (Mortenson 2020). The most recently decommissioned dam was at Milk Lake. Three of the six remaining wilderness dams have been reconstructed by special-use permittees. Recent plans for decommissioning include a request by Moon Lake Electric to remove a dam located on the Yellowstone River in Yellowstone Canyon. The reason for decommissioning the dam is because it is no longer economically viable for use as a hydroelectric facility. The Forest Service is complying with this request, and removal is anticipated to occur within the 2022–2023 time frame.

### **Drinking water and wastewater systems**

Thirty drinking water systems are in operation in the Ashley National Forest at a number of campground and administrative sites. These drinking water systems are maintained through annual congressional appropriations, grants and agreements from outside agencies, and recreation fees. These systems are tested monthly during their operational period to ensure they meet State drinking water standards.

The national forest has, in recent years, reduced the number of drinking water systems at some campgrounds. This is because aging water systems are costly to maintain and replace and they are at campgrounds where visitation levels do not justify the costs of maintenance. Additional reductions are being considered.

There are currently 58 wastewater systems across the Ashley National Forest, located at a number of campgrounds and administrative sites. Maintenance of these wastewater systems is funded primarily through congressional appropriations. In recent years, the number of associated wastewater systems has been reduced as a result of reductions in the number of drinking water systems across the national forest. At present, there are several campgrounds being considered for decommissioning or reduced services, such as removal of water and wastewater systems, due to low visitor use and high operational costs.

### ***General Infrastructure Condition***

Infrastructure in the Ashley National Forest is in generally good condition. The Forest Service uses available funding to ensure road maintenance and to mitigate safety and resource concerns, a trend that is expected to continue. Roads and trails that provide access to Federal lands are maintained on a schedule. The number of OHVs, particularly multi-passenger models, is increasing on the national forest, and the demand for looped routes to accommodate these vehicles is growing. As the available road budget



decreases, the staff of the Ashley National Forest may reduce the operational maintenance level of some roads to shift funding to the maintenance of more heavily traveled roads.

Many of the facilities in the Ashley National Forest are at the end of their lifecycles; that is, they are beyond the age that they were intended to last without maintenance and upgrades. As facilities continue to age, facility maintenance budgets have failed to keep up with maintenance needs. As a result, there is a large backlog of maintenance work required to bring buildings up to standard. The Forest Service has also been reducing the number of unneeded buildings through decommissioning and conveyance, a trend which is expected to continue. Some distribution and water collection systems have failed or water-collection systems have been determined to be under the influence of surface water, requiring additional water treatment and disinfection.

## Environmental Consequences for Transportation and Facilities Infrastructure

### *Methodology and Analysis Process*

The approach to impacts analysis involved a qualitative assessment of effects on the indicators described below. The impacts would come from various plan components proposed under each of the action alternatives, as compared with alternative A, no action. Impacts were assessed at the programmatic level since forest plan components are not quantified but, rather, are described in terms of qualitative planning-level goals and objectives. The area of analysis for direct and indirect impacts is the Ashley National Forest. It also includes other transportation corridors outside the national forest boundary that provide important national forest access routes and that fall under the jurisdiction of the Forest Service or adjacent counties and States. The analysis area for assessing cumulative effects on transportation infrastructure and facilities is the Ashley National Forest; surrounding Federal lands that border the Ashley National Forest under the jurisdiction of the Bureau of Indian Affairs, the BLM, and Uinta-Wasatch-Cache National Forest; State lands; tribal lands; private inholdings; and private lands that border the Ashley National Forest. The temporal scope is the expected life of the plan.

### *Analysis Assumptions*

The various activities described in the plan, such as providing infrastructure to support recreation, will occur to the extent necessary to achieve the objectives described by each alternative. The specific locations and designs of these activities are not known at this time; therefore, this analysis refers to the potential of the effect to occur, realizing that in many cases the degree of potential effects from these activities can only be estimated and not determined with a high level of precision.

### *Indicators*

Analysis indicators for transportation and facilities infrastructure are movement toward or away from adequate or fair condition of nonmotorized trails, motorized routes, and facilities and movement toward or away from providing adequate access via the existing transportation network

### *Environmental Consequences for Infrastructure Common to All Alternatives*

The Ashley National Forest manages a wide array of infrastructure and facilities that are accessed via a seamless transportation system. The system is under the jurisdiction of multiple public road agencies, as detailed in the preceding “Description of Affected Environment.” National direction for Forest Service management actions would continue to affect how infrastructure and facilities are managed across the national forest. Under all alternatives, variable infrastructure and facilities budgets would affect maintenance and further infrastructure development. Under all alternatives, the Forest would follow

guidance established by the Forest Service's National Strategy for a Sustainable Trail System to minimize impacts to resources (Forest Service 2017).

#### ***Environmental Consequences for Infrastructure—Alternative A***

Under alternative A, the no action alternative, current management practices would continue under the 1986 forest plan as amended and implemented. The 1986 forest plan would continue to guide management of the national forest, and ongoing work or work previously planned and approved would be done under that guidance. This alternative does not recommend any new management areas; there would be no changes to the plan in response to issues raised, and it would not adjust management in response to the requirements of the 2012 Planning Rule.

Roadway improvements would continue as needed under alternative A; however, there would be no further action taken to move roads and trails toward desired conditions. The Forest Service would not promote improvements to motorized trails and roads in general recreation management areas, nor would there be additional objectives to chip and seal or slurry roads in destination recreation management areas. The lack of such further action and objectives would keep maintenance activities on existing motorized trails and roads at the status quo.

The Ashley National Forest has facilities that are being used for purposes not originally intended. For example, some facilities and areas have been converted from one use to another, and even for multiple uses, to meet the current needs of the Forest Service. The maintenance requirements of the facilities and infrastructure are increasing, with much of the annual and cyclic preventive maintenance becoming deferred. The accumulation of deferred maintenance would lead to deterioration of performance, increased costs to repair, and a decrease in asset values.

As the workforce and mission services continue to evolve, the existing infrastructure might become obsolete because of its original purpose and design. This would require the Forest Service to look at adaptive reuses, multiple uses, and other ways to address accumulating deferred maintenance.

Under alternative A, short- and long-term effects on transportation and facilities infrastructure would continue as is. Using facilities for purposes not originally intended would continue, as would the conversion of use from one type to another. Maintenance requirements of the facilities and infrastructure would continue to increase, with much of the annual and cyclic preventative maintenance remaining deferred. The accumulation of deferred maintenance would result in further deterioration of performance, increasing costs to repair and decreasing asset values.

#### ***Environmental Consequences for Infrastructure—Alternative B Modified***

Under alternative B modified, the focus of recreation management would be on providing infrastructure to support recreation while taking into account other resource values. In addition, management would provide for a variety of developed and dispersed recreation tourism opportunities to support a diverse set of users and local communities. Three recreation management areas would be established to support different recreation opportunities: destination recreation management areas, emphasizing developed recreation experiences in high-use areas, with motorized access and support facilities; backcountry recreation management areas focused on dispersed recreation; and general recreation management areas that allow for a range of recreational uses, including motorized and nonmotorized use, along with other Forest uses.

Compared with alternative A, impacts from objectives related to backcountry recreation management areas, general recreation management areas, and destination recreation management areas would benefit transportation and facilities infrastructure due to the following:

- Improvements to trails and the provision of more dispersed camping docks and mountain bike-designated use
- Improvements to dispersed camping sites and access roads, OHV loop trails, and other recreational facilities

In particular, although many of the objectives are contingent on outside partnerships, adhering to objectives under alternative B modified would improve motorized trails and roads in general recreation management areas. Similarly, actionable objectives to chip and seal or resurface roads in destination recreation management areas and activities to improve nonmotorized trails in backcountry recreation management areas would move existing trails and roads toward adequate condition.

There would be short-term adverse impacts on transportation infrastructure during construction and maintenance. Overall, there would be long-term beneficial effects on facilities and transportation infrastructure from these improvements, which would move the condition of facilities and infrastructure toward desired conditions.

#### *Environmental Consequences for Infrastructure—Alternative C*

Impacts under alternative C would be similar to those described under alternative B modified. Motorized recreation would be reduced due to restrictions on use in backcountry recreation management areas and increased acres with this classification. Objectives for backcountry recreation management areas, general recreation management areas, and destination recreation management areas would generally be the same as under alternative B modified; however, under alternative C, the emphasis for recreation would be on backcountry recreation and recreation classes, emphasizing a quiet experience. This would likely result in lower periodic maintenance requirements for backcountry areas, with more gradual movement toward adequate or fair condition of routes and long-term beneficial effects on transportation and facilities infrastructure in backcountry areas.

The prohibition of new communication sites, roads, utility corridors, and other infrastructure in 50,200 acres of recommended wilderness areas would create barriers to the future development of infrastructure; however, this would not affect existing transportation and facilities infrastructure. Ongoing maintenance of Forest roads would continue, and there would be no effect on desired conditions. Any maintenance to dams, bridges, and administrative and drinking water facilities would require methods designed to ensure preservation of wilderness values. This would result in increased maintenance costs associated with compliance.

#### *Environmental Consequences for Infrastructure—Alternative D*

Alternative D would emphasize accessibility of the national forest, promoting increased motorized use and developed recreation opportunities. Compared with alternative B modified, there would be more acres in the plan area classified as destination recreation management areas supporting infrastructure development and motorized use. Motorized use would be permitted in backcountry recreation management areas, and objectives across management areas would emphasize increased roads, trails, and recreation infrastructure.

Impacts from objectives related to backcountry recreation management areas, general recreation management areas, and destination recreation management areas would be similar to those described for

alternative B modified; however, there would be additional transportation and facilities infrastructure. This would accrue from the provision of more dispersed camping docks, mountain bike-designated use, improvements to dispersed camping sites and access roads, OHV loop trails, and other recreational facilities. In addition, increased maintenance for roads would result in measurably greater benefits to the transportation infrastructure.

Under alternative D, additional loops and routes for motorized activities could be constructed. The Forest Service would consider expanding existing campgrounds to accommodate larger trailers and OHV users. This would result in the need for more periodic maintenance but would also lead to enhancements to existing facilities on the national forest.

### Cumulative Environmental Consequences for Transportation and Facilities Infrastructure

Past, present, and reasonably foreseeable plans and actions related to transportation and facilities infrastructure in the Ashley National Forest are as follows:

- The Great American Outdoors Act, activated into public law on August 9, 2020, will provide funding for facilities and roads in the Ashley National Forest, reducing forestwide deferred maintenance. The Forest Service has already submitted applications for funding of specific projects, all of which are intended to reduce the backlog of deferred maintenance. Funding in subsequent years may be used for facility renovation.
- Designation of the Ashley Karst National Recreation and Geologic Area in 2019 resulted in the prohibition of new roads in the area, with effects to both facilities and infrastructure.
- The Uinta Basin Railway Project, which is proposed by the Seven County Infrastructure Coalition, will construct a railroad along Highway 191, from Kayune to Myton and through Indian Canyon, passing just south of Duchesne. Roughly 11 miles of the route will be in the South Unit of the Duchesne-Roosevelt Range District.
- The Western Area Power Administration Right-of-Way Maintenance and Reauthorization Project will update vegetation management along 278 miles of transmission lines in the Vernal and Flaming Gorge Ranger Districts.
- The Badlands Trail Project will construct an approximately 3.3-mile-long OHV trail connection on the South Unit of the Duchesne-Roosevelt Ranger District.
- The Round Park Hardened Stream Crossing Project has provided hardened ford structures at two stream crossings in Round Park.

In general, these actions will result in beneficial effects on the transportation and facilities infrastructure in the Ashley National Forest. They will enhance existing infrastructure and move routes and facilities toward adequate conditions. In cases where these new plans would limit potential future development, such as in the case of the proposed Ashley Karst National Recreation and Geologic Management Plan, these plans would result in no effect on existing transportation and facilities infrastructure. Effects from these past, present, or reasonably foreseeable plans and actions would be the same across all alternatives.

It should be noted that additional reasonably foreseeable State and county-level plans and projects not specifically identified above may contribute to cumulative impacts to the extent that they have a connection to transportation and infrastructure.

Additionally, public use in the Ashley National Forest is increasing, as is the population of the Wasatch Front and other areas of Utah. There is a greater demand for services, as well as greater degradation of the road system, from the increased use; additional maintenance and improvements are required. This trend is expected to continue. There will continue to be a need to provide access for multiple uses, including timber harvesting, grazing, and recreation.

When combined with forest management actions under the alternatives analyzed above, none of the past, present, or reasonably foreseeable plans or actions would result in adverse cumulative effects on transportation and facilities infrastructure in the Ashley National Forest that would rise to a level of significance and warranting further discussion or analysis of effects.

## Recreation

### Introduction

The Ashley National Forest offers a variety of developed and dispersed recreational activities, such as camping and picnicking, hiking, mountain biking, horseback riding, wildlife and scenic viewing, hunting and fishing, OHV riding, and rock climbing. Wintertime activities are snowshoeing, cross-country skiing, ice fishing, and snowmobiling.

Popular Ashley National Forest destinations are the FGNRA and the High Uintas Wilderness. There are 55 developed campgrounds, 7 picnic areas, and 2 visitor centers. Of the approximately 1,200 miles of recreation trails on the Forest, 185 miles are motorized. The remaining trails are nonmotorized, with approximately 250 miles of those trails in wilderness areas (Forest Service 2009b).

The Ashley National Forest is a popular recreation destination for residents in eastern Utah, southwestern Wyoming, and northwestern Colorado. It is also common for travelers along the corridor between Yellowstone and Arches National Parks to spend time recreating in the Ashley National Forest.

Based on the percentage of Forest visitors who reported participating in an activity, the main activities are fishing (38 percent), viewing natural features (37 percent), hiking/walking (36 percent), viewing wildlife (28 percent), relaxing (28 percent), driving for pleasure (24 percent), developed camping (23 percent), motorized water activities (17 percent), and picnicking (12 percent) (Forest Service 2020L).

### *Regulatory Framework*

**Organic Administration Act of June 4, 1897 (30 Stat. 11, as amended)**—Authorizes the establishment of national forests.

**Term Permit Act of March 4, 1915 (Public Law 63-293, Ch. 144, 38 Stat. 1101, as amended; 16 USC 497)**—Provides direction to the National Forest System lands to authorize occupancy for a wide variety of uses through permits not exceeding 30 years.

**Multiple-Use Sustained-Yield Act of June 12, 1960 (Public Law 86-517, 74 Stat. 215)**—Provides direction for the National Forest System lands to provide access and recreation opportunities; it states “The policy of Congress is that national forests are established and administered for outdoor recreation.”

**National Forest Roads and Trails Act of October 13, 1964 (Public Law 88-657, 78 Stat. 1089, as amended)**—Declares that an adequate system of roads and trails should be constructed and maintained to meet the increasing demand for recreation and other uses. The act authorizes road and trail systems for the national forests. It authorizes granting easements across National Forest System lands, construction and

financing of maximum-economy roads (Forest Service Manual 7705), and imposition of requirements on road users for maintaining and reconstructing roads.

**Land and Water Conservation Fund Act of 1965 (Public Law 88-578, 78 Stat. 897, as amended; 16 USC 4601-4604 (note); 4601-4604 through 6a, 4601-4607 through 4601-4610, 4601-4610a–d, 4601-4611)**—“The purposes of this act are to assist in preserving, developing, and assuring accessibility to all citizens of the United States of America . . . [to] such quality and quantity of outdoor recreation resources . . . [and] providing funds” to the States for acquisition, planning, and development of recreation facilities and to Federal agencies for acquisition and development of certain lands and other areas.

**Architectural Barriers Act of August 12, 1968 (Public Law 90-480, 82 Stat. 718 51 USC 4151-4154, 4154a, 4155-4157)**—Establishes additional requirements to ensure that buildings, facilities, rail passenger cars, and vehicles are accessible to individuals with disabilities. It covers architecture and design, transportation, and communication elements of recreational site planning and development.

**National Trails System Act of October 2, 1968 (Public Law 90-543, 82 Stat. 919, as amended)**—Establishes the National Trails System and authorizes planning, right-of-way acquisition, and construction of trails established by Congress or the Secretary of Agriculture.

**Rehabilitation Act of September 26, 1973 (Public Law 93-112, Title V, 87 Stat. 390, as amended; 29 USC 791, 793-794, 794a, 794b)**—Requires that programs and activities conducted by Federal agencies and by entities that receive funding from, or operate under a permit from, Federal agencies provide an equal opportunity for individuals with disabilities to participate in an integrated setting, as independently as possible. The only exception to the requirement is when the program would be fundamentally altered if changes were made solely for the purpose of accessibility.

**Forest and Rangeland Renewable Resources Planning Act of August 17, 1974 (Public Law 93-378, 88 Stat. 476, as amended)**—Declares (per Sec. 10) that “the installation of a proper system of transportation to service the National Forest System . . . shall be carried forward in time to meet anticipated needs on an economical and environmentally sound basis.”

**Federal Land Policy and Management Act (FLPMA) of October 21, 1976 (Public Law 94-579, 90 Stat. 2742, as amended)**—Declares (per Sec. 102) that “the public lands be managed in a manner that . . . will provide for outdoor recreation and human occupancy and use.”

**Omnibus Parks and Public Lands Management Act of November 12, 1996 (Public Law 104-333, Div. I, Title VII, Sec. 701, 110 Stat. 4182; 16 USC 497c)**—Section 701 of this act authorizes the following:

- Establishes a system to calculate fees for ski area permits issued under the National Forest Ski Area Permit Act of 1986 (16 USC 497b)
- Provides for holders of ski area permits issued under other authorities to elect this permit fee system (Forest Service Handbook 2709.11, Sec. 38.03a)
- Includes provisions concerning compliance with the NEPA when issuing permits for existing ski areas (Forest Service Manual 2721.61f and Forest Service Handbook 2709.11, sec. 41.61b)

**Secure Rural Schools and Community Self-Determination Act of October 30, 2000 (Public Law 106-393, 114 Stat. 1607; 16 USC 500 [note])**—Provides provisions to make additional investments in, and create additional employment opportunities through, projects that improve the maintenance of existing

infrastructure, that implement stewardship objectives that enhance forest ecosystems, and that restore and improve land health and water quality.

**Federal Lands Recreation Enhancement Act of December 8, 2004 (Public Law 108-447, as amended)**—Gives the Secretaries of Agriculture and the Interior the authority to establish, modify, charge, and collect recreation fees on Federal recreational lands where a certain level of amenities has been developed.

**The Federal Cave Resources Protection Act of 1988 (Public Law 101-691)**—Aims to “secure, protect, and preserve significant caves on Federal lands for the perpetual use, enjoyment, and benefit of all people; and to foster increased cooperation and exchange of information between governmental authorities and those who utilize caves located on Federal lands for scientific, education, or recreational purposes.” Specific effects of the act include prohibiting disclosing the locations of significant caves, removing cave resources, and vandalizing or disturbing cave resources.

**Executive Order 12862, Setting Customer Service Standards**—Requires information about the quantity and quality of recreation visits be included in national forest plans.

**Executive Order 11644, as amended**—Establishes policy and procedure to ensure that the use of off-road vehicles “on public lands will be controlled and directed so as to protect the resources of those lands, to promote the safety of all users of those lands, and to minimize conflicts among the various uses of those lands.”

**Executive Order 13443, Facilitation of Hunting Heritage and Wildlife Conservation**—Directs Federal agencies to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

### **Analysis Area**

The analysis area is all lands in the Ashley National Forest, regardless of ownership or jurisdiction. When discussing larger population trends driving demand for recreation in the Ashley National Forest from surrounding areas, the scale of the analysis includes the greater Wasatch Front, southwestern Wyoming, and northwestern Colorado.

The Ashley National Forest and the nearby Dinosaur National Monument are on the primary corridor between Yellowstone and Grand Teton National Parks in northwestern Wyoming, Arches and Canyonlands National Parks in southeastern Utah, and Rocky Mountain National Park in north-central Colorado. Tourists who travel these corridors are considered in this analysis as well.

### **Recreation Opportunity Spectrum**

The Forest Service uses the ROS as a tool for managing diverse recreation opportunities and settings. Recreation opportunities include nonmotorized, motorized, developed, and dispersed recreation on land and water and in the air. The social, managerial, and physical attributes of a place collectively provide a distinct recreational setting.

Opportunities along the spectrum range from a primitive setting where there is a high probability of solitude, self-reliance, challenge, and risk to rural or urban settings where self-reliance, challenge, and risk are less relevant to the recreation experience. The physical setting is defined by the absence or presence of infrastructure, facilities, and other human-made modifications to the landscape. The social setting reflects the amount and type of contact between individuals or groups. The managerial setting is defined by the level of visitor and facility management. The Ashley National Forest has primitive,

semiprimitive nonmotorized, semiprimitive motorized, roaded natural, and rural ROS classes (table 3-76). There are no areas classified as urban.

**Table 3-76. Recreation Opportunity Spectrum Classes and Definitions**

<b>Recreation Opportunity Spectrum Class</b>	<b>Description</b>
Primitive	Large, remote, wild, and predominantly unmodified landscapes; areas with no motorized activity and little probability of seeing other people; few management controls
Semiprimitive nonmotorized	Areas of the forests managed for nonmotorized use; uses include hiking and using equestrian trails, mountain biking, and using other nonmotorized mechanized equipment; rustic facilities and opportunities for exploration, challenge, and self-reliance
Semiprimitive motorized	Backcountry areas used primarily by motorized users on designated routes; roads and trails designed for OHVs and high-clearance vehicles; offer motorized opportunities for exploration, challenge, and self-reliance; rustic facilities; often provide portals into adjacent primitive or semiprimitive nonmotorized areas
Roaded natural	Often referred to as front country recreation management areas, these areas are accessed by open system roads that can accommodate sedan travel. Facilities are less rustic and more developed, with campgrounds, trailheads, and airstrips often present. Provide access points for adjacent semiprimitive motorized, semiprimitive nonmotorized, and primitive settings.
Rural	Highly developed recreation sites and modified natural settings; easily accessed by major highways; in populated areas where private land and other land holdings are nearby and obvious; facilities are designed for user comfort and convenience
Urban	Characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Sights and sounds of people are predominant, with the likelihood for large numbers of users. Recreation is highly controlled and structured.

Source: Forest Service 2017o

The most developed recreation opportunities are in the Flaming Gorge Ranger District, 63 percent of which is roaded natural or rural. The most opportunities for recreation in a primitive setting are in the Duchesne-Roosevelt Ranger District, 60 percent of which is either primitive or semiprimitive nonmotorized (see table 3-77).

**Table 3-77. Summer Recreation Opportunity Spectrum by Class and Ranger District**

<b>Administrative Unit</b>	<b>Primitive</b>	<b>Semiprimitive Nonmotorized</b>	<b>Semiprimitive Motorized</b>	<b>Roaded Natural</b>	<b>Rural</b>	<b>Urban</b>
Flaming Gorge Ranger District	3%	27%	7%	59%	4%	0%
Vernal Ranger District	4%	32%	25%	39%	0%	0%
Duchesne-Roosevelt Ranger District	36%	24%	25%	15%	0%	0%
<b>Ashley National Forest</b>	<b>20%</b>	<b>27%</b>	<b>20%</b>	<b>32%</b>	<b>1%</b>	<b>0%</b>

Source: Forest Service 2017o



Managing recreation consistent with the physical, social, and managerial settings associated with those classifications can be challenging, especially in light of increasing visitor use and intensity. Some areas, such as the marinas in the FGNRA, likely approach an urban setting in the peak recreation season (May to September) even though they are mapped as roaded natural. Local governments have developed or are developing trail master plans, and many of them emphasize adding motorized trails. A new motorized trail has been constructed on the south side of the Duchesne-Roosevelt Ranger District since the 2017 assessment of the Ashley National Forest was written. Motorized trails in areas classified as primitive or semiprimitive nonmotorized would conflict with the recreation settings.

The Ashley National Forest ROS map is based on seasons when over-snow travel is not allowed, mostly summer and fall. Winter classifications have not been completed; however, winter travel is represented on Ashley National Forest winter travel maps. During the winter and early spring, snowmobiles are used in the semiprimitive summer ROS classifications. Other winter activities are ice fishing, cross-country skiing, and snowshoeing. There are no developed ski areas in the Ashley National Forest, but there are rental yurts available that are popular with cross-country skiers.

### Developed Recreation

Developed recreation takes place at facilities constructed for specific activities or groups of activities. Developed sites offer visitors a sense of security and structure, as well as facilities such as toilets, parking, picnic tables, and cooking areas.

The main developed recreation activities that occur in the Ashley National Forest are as follows:

- Staying overnight in developed campgrounds
- Viewing scenery from developed overlooks and interpretive sites
- Launching watercraft from developed boat ramps
- Entering the High Uintas Wilderness from developed trailheads
- Staying overnight at cabins and yurts
- Visiting interpretive and historic developed sites

The Ashley National Forest has 165 developed sites (see table 3-78). The developed sites, with the exception of boat-in campgrounds, are all accessed by motorized roads. Many developed recreation sites are access points for dispersed recreation, such as trailheads and boat ramps.

**Table 3-78. Developed Recreation Facilities in the Ashley National Forest**

Facility Type	Sites
Campgrounds	55
Group campgrounds	11
Rental yurts, cabins, and buildings	11
Marinas	3
Boat ramps	16
Day-use areas	8
Resorts and lodges	4
Trailheads	11
Visitor centers	2

Source: Forest Service 2017o

During the peak-use times—weekends and summer from May to September—most of the popular developed recreation sites are nearly all full. This indicates that use demand is successfully being met for most developed recreation facilities. During the summer, most activity is at campgrounds, marinas, visitor centers, and trailheads. During the winter, there is snowshoeing, cross-country skiing, and snowmobiling at trailheads and along trails.

### *Flaming Gorge National Recreation Area*

The FGNRA includes some of the most highly developed recreation sites in the Ashley National Forest (see *Designated Areas*). Boat ramps provide motorized and nonmotorized boat access to the Flaming Gorge Reservoir. Marinas offer restrooms, docks, picnic areas, fish cleaning stations, and concessions. Motorized and nonmotorized water-based recreation is popular, with key water access points at Cedar Springs, Lucerne Valley, and Buckboard Marinas (see figure 3-21). These areas often have full parking areas and congestion at the boat ramps during the peak summer recreation season. Recently, paddle trails were created on the reservoir for paddle boarding and kayaking. These water trails are various lengths and can be accessed from multiple points along the reservoir.

### *Recreation Facilities and Sites*

There are two visitor centers, one at the Flaming Gorge Dam, which is primarily run by the Bureau of Reclamation, and the other at Red Canyon. The Red Canyon visitor center is the primary interpretation point for the Ashley National Forest and provides scenic points of interest, educational programs, natural history, interpretive trails, and recreation information for the larger FGNRA and other recreational opportunities surrounding the FGNRA. The Flaming Gorge Dam provides guided tours, interpretive displays, and opportunities for picnicking and fishing.

The historic Swett Ranch Historic Site is an interpretive site on the FGNRA. The ranch was home to the Swett family, who ran the ranch in the early and mid-1900s.

Ute Tower Historic Site is a fire lookout tower constructed between 1933 and 1935. Though no longer serving as a lookout tower, the structure remains. The site gives people the opportunity to see what living and working in the tower was like for early lookouts.

### *Dispersed Recreation*

Dispersed recreation is any recreation outside of a developed recreation site: camping outside a developed campground, backpacking, operating OHVs, snowmobiling, driving for pleasure on roads and trails, fishing (including ice fishing) and boating, mountain biking, trail running, horseback riding, and cross-country skiing. Less common activities are target shooting and drone flying.

The level of dispersed use depends on each visitor's desired recreation experience, setting, ease of access, and nearby facilities. Dispersed camping is popular along the Flaming Gorge Reservoir shoreline. Visitors often use recreational vehicles and boats in such areas as Stateline Cove and South Buckboard. The eastern portion of the Vernal Ranger District, western and northern portions of the Flaming Gorge Ranger District, and areas in the Duchesne-Roosevelt Ranger District are popular for dispersed camping and OHV use.

Hunting and camping are popular in the Ashley National Forest. There is a 16-day overnight stay limit. No motorized retrieval of big game off designated roads and trails is allowed. Large game species are bear, mountain lion, moose, elk, mule deer, pronghorn antelope, and bighorn sheep. While hunting season can vary by species, most hunting occurs in the fall.

Dispersed winter use is concentrated around areas with sufficient snow for backcountry and cross-country skiing, skiing or snowshoeing into cabins and yurts, and ice fishing. There are several designated cross-country ski trails that are closed to snowmobiles and other over-snow motorized travel. Rental cabins and yurts, which are accessible by snowmobile, snowshoe, or cross-country ski, allow recreationists to stay overnight on the Forest in the winter.

The Ashley National Forest has a cooperative agreement with Uinta and Daggett Counties to groom snowmobile trails on the Vernal and Flaming Gorge Ranger Districts. The most popular snowmobile groomed trail is the Red Cloud Loop on the Vernal Ranger District. From this trail, snowmobilers can access many other areas on and off the Forest. On the Green River below the Flaming Gorge Dam, anglers fish from shore or by boat throughout the winter as the Green River does not freeze. Popular winter areas for nonmotorized recreation are Dry Fork Canyon, the Grizzly Ridge area, the Limber Flag yurt area, Buckboard Marina, Red Canyon, Green River below the Flaming Gorge Dam, and Little Hole Trail.

### *Trail-Based Recreation*

The Ashley National Forest offers a variety of motorized and nonmotorized trail-based recreation on approximately 1,200 miles of trails (Forest Service 2009b). Trail-based motorized travel is restricted to 185 miles of trails designated for motor vehicle travel. Some trails have seasonal limitations to protect natural resources, such as wildlife or riparian areas.

The Ashley National Forest also offers abundant nonmotorized opportunities on approximately 1,000 miles of nonmotorized trails, such as hiking, backpacking, climbing, horseback riding and packing, fishing, mountain and road biking, antler collecting (shed hunting), trail running, primitive camping, nonmotorized boating (kayaking, rafting, canoeing), backcountry downhill skiing, cross-country skiing, and snowshoeing. Dry Fork Canyon on the Vernal Ranger District is the most easily accessed portion of the Ashley National Forest from Vernal. Popular trail-based activities are horseback riding, hiking, and mountain biking. The more primitive settings in the Duchesne-Roosevelt Ranger District provide opportunities for hiking and backpacking in a primitive setting.

Many forest roads also serve as designated groomed snowmobile trails in the winter. Some of the most popular winter motorized recreation areas are Blind Stream, Grizzly Ridge, Oaks Parks, Deep Creek, Hickerson Park, Paradise, and Red Cloud Loop. Motorized equipment is often used for ice fishing on the Flaming Gorge Reservoir, when ice conditions allow it.

### *High Uintas Wilderness*

Dispersed recreation in the High Uintas Wilderness is popular. This use is primarily concentrated around the multiple lake basins scattered across the south slope of the Uinta Mountains. There are 290 miles of wilderness trails in the Ashley National Forest's portion of the High Uintas Wilderness and no established campsites.

Dispersed camping is allowed subject to the following regulations:

- No camping within 200 feet of a National Forest System trail
- No camping within 200 feet of live water
- No camping within 200 feet of an occupied campsite

At 13,528 feet, Kings Peak in the High Uintas Wilderness is the highest point in Utah. It is a popular backpacking and trail-running destination. The Upper Uinta River was found to be suitable as a wild river

and provides water-based recreation. The suitable segments of the Upper Uinta River include Gilbert Creek, Center Fork, and Painter Draw in the High Uintas Wilderness.

### Permitted Activities

The Green River corridor, below the Flaming Gorge Dam, is a Blue Ribbon trout fishery.<sup>16</sup> Visitors to the Green River participate in commercially guided trips. In 2015, there were 3,775 commercial fishing trips between Flaming Gorge Dam and the Little Hole day-use area (Forest Service 2020L). This area is also popular for commercial float trips; 3,345 vehicle shuttle trips between the Spillway boat launch and the Little Hole take-out in 2015 indicate the popularity of commercial and self-guided float boating (Forest Service 2020L).

Other permitted activities are those in the Duchesne-Roosevelt Ranger District, which include trips offered by outfitters and guides into the High Uintas Wilderness. The most popular wilderness trips are wilderness therapy programs.

### Recreation Issues and Trends

The recreation program of the Ashley National Forest plays a key role in the social stability, environmental integrity, and economic vitality of the surrounding communities. Sustainable recreation is defined as the set of recreation settings and opportunities on the National Forest System that is ecologically, economically, and socially sustainable for present and future generations. A sustainable recreation program is integral in protecting the natural, cultural, and scenic environment for present and future generations to enjoy. Several factors relating to societal, lifestyle, and demographic trends can affect recreation participation.

As discussed in the “Social and Economic Sustainability and Environmental Justice Section,” recreation in the Ashley National Forest has increased by 60 percent over the past 5 years, based on NVUM data. Further increases in recreation are likely, given the growing regional population. The population along the Wasatch Front and in the Uinta Basin is estimated to increase by 25 percent over the next 15 years. Smaller population increases are predicted for Uinta and Sweetwater Counties, Wyoming, and for the State of Wyoming for the same period. These are the areas where 75 percent of Ashley National Forest visitors live (Forest Service 2020L).

Nature-based recreation is expected to increase across the U.S., but the nature and type of recreation that will be preferred is difficult to predict. If national park visitation continues to increase, a greater number of people could alternatively choose to recreate on National Forest System lands. An estimated 15 to 30 percent growth in visitation is predicted over the next 15 years in the Ashley National Forest, based on the projected increases in regional population and demand for nature-based recreation (Forest Service 2020L).

Activities likely to show increases in overall rate of participation (as a percentage of visitation) are using motorized trails, mountain biking, cross-county skiing, and visiting developed areas for motorized and nonmotorized day-use activities (water-based, trail-based, interpretive, and viewing). Local county governments and tourism councils are encouraging visitors to stay an extra night on their way to other destinations.

There are also efforts to promote mountain biking in the northern portion of the Forest, near Vernal, and statewide. This will likely contribute to increased recreation in the Ashley National Forest, especially as

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<sup>16</sup>A Blue Ribbon fishery is a designation made in the United States by government and other authorities to identify recreational fisheries of extremely high quality.

the most popular places, like Moab, Utah, become overcrowded. Activities likely to have the same rate of participation are visiting primitive areas, developed and dispersed camping, snowmobiling, hunting, fishing, and patronizing private providers, including resorts and outfitter and guide services.

Increasingly popular activities in the Ashley National Forest are operating side-by-side OHVs,<sup>17</sup> geocaching, fat-tire mountain biking, drone flying, and stand-up paddle boarding. Other activities, such as operating timber sled snow machines, kite skiing, and riding electronic bicycles, could also emerge as important recreation uses in the future.

Changes in the level, location, and type of recreation may result in increased conflicts between recreation and other Forest uses and resources, conflicts between recreation users, and the need to reallocate Forest resources to provide for desired recreation experiences.

### *Notable Changes Between Draft and Final EIS*

The alternative B modified recreation analysis for effects from designated areas changed in response to the removal of all recommended wilderness. Additionally, the acreages for destination recreation management areas were updated in tables table 3-79, table 3-80, and table 3-81. Analysis was also updated to reflect the change in ROS.

## Environmental Consequences for Recreation

### *Methodology and Analysis Process*

For the forest plan revision, management direction that may lessen or worsen threats to recreation is evaluated at a programmatic level. The forest plan does not authorize site-specific projects or activities; therefore, there are no direct effects from adopting the forest plan. Direct and indirect site-specific effects will be further analyzed when future projects are proposed. Although potential short-term consequences from implementing the programmatic approach may be described where appropriate, this evaluation focuses on longer-term indirect and cumulative effects that may occur over the 10- to 15-year life of the forest plan.

### *Analysis Assumptions*

- Demand for motorized and nonmotorized land- and water-based recreation in the Ashley National Forest will continue to increase.
- Owing to local and State initiatives to promote regional recreation opportunities, nonmotorized water-based recreation, mountain biking, and other trail-based recreation will increase.
- The total acres managed as the FGNRA will not change.
- The Forest Service will continue to maintain recreation facilities and controls that contribute to the operational setting.
- There will be no changes in the type and number of recreation special use permits available in the Ashley National Forest.

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<sup>17</sup>A small four-wheel drive utility terrain vehicle or recreational off-highway vehicle that can seat two to six people.

*Indicator*

- Quality and availability of recreational opportunities; this indicator reflects changes to recreation from anticipated management activities associated with each alternative; it includes the degree to which conflicts occur between different types of recreation activities
- Changes in the ROS as measured by changes in ROS acres
- Potential for displaced recreation opportunities as measured by acres of treatments

*Environmental Consequences for Recreation Common to All Alternatives*

**Effects from Natural Resource Management**

Two broad categories of active vegetation treatments were evaluated: timber harvest and its associated vegetation manipulation and fire management, including prescribed fire and naturally ignited fire. See also “Environmental Consequences for Fire and Fuels.” These treatments would change scenery in forested vegetation communities, thereby indirectly affecting recreationists’ experiences in both the short term—1 to 5 year—and the long term (over 5 years). Recreationists would avoid areas of blackened and burned vegetation for overnight or long-term stays, and frequent and extensive vegetation treatments may require area closures or cause recreationists to avoid these sites. This would result in short-term adverse impacts on recreation by displacing visitors. In the longer term, these treatments would improve Forest health and enhance the scenic and recreational setting.

Long-term loss of screening vegetation or forest canopy that provides shading along trails or at dispersed camping sites could also adversely affect recreation; however, areas with open canopies could also facilitate access to dispersed camping sites. Areas opened by fuel treatments or harvest might cause an increase in the creation of unauthorized trails and increased off-road use.

These vegetation management practices vary in the number of potential acres treated under different action alternatives and are discussed below. The range of potential burned acres by vegetation types does not vary by action alternatives (see table B-5, Potential Number of Acres Burned per Decade and Desired Severity Based on Vegetation Type, in appendix B).

*Environmental Consequences for Recreation—Alternative A*

**Effects from Recreation Opportunities and Settings**

Under alternative A, the 1986 forest plan would remain in effect. Forest Service personnel would continue to use the existing ROS, and current management practices would continue as outlined in the 1986 forest plan.

Over 52 percent of the Ashley National Forest would remain in the semiprimitive motorized and roaded natural classes, and 47 percent would remain in the semiprimitive nonmotorized and primitive classes. Anticipated increased use would require an examination of the ROS, in order to ensure that the Ashley National Forest can adequately meet recreation demands and provide a variety of experiences. Without changes to management, recreation conflicts and displacement impacts might occur if demands are not met.

**Effects from Designated Areas**

Alternative A would include the continuation of no additional recommended wilderness. All current management areas and 31 designated areas would continue to exist as they are described in the 1986 forest plan, with the exception of the Ashley Karst NRGAs (established in 2019). There would be two wild

and scenic river segments that would be classified as suitable for inclusion in the NWSRS, totaling 53 miles. Under alternative A, designated areas include are the Sheep Creek Canyon Geologic Area and seven RNAs—Ashley Gorge, Gates of Birch Creek, Lance Canyon, Pollen Lake, Sims Peak Potholes, Timber-Cow Ridge, and Uinta Shale Creek—totaling 7,700 acres.

Recreation management would continue to provide dispersed and developed recreational opportunities and would enhance visitor experiences by providing access, services, and facilities with other resource considerations; however, this alternative would not provide recreational opportunities that are consistent with the social, environmental, and economic resource capacity of the Ashley National Forest, as required by the 2012 Planning Rule. This is because recreation trend data and visitor use have changed dramatically over time, and issues, opportunities, and expectations are now different. Due to these changes, it is difficult, now and into the future, to adequately manage the Forest’s recreation program by referencing a document created in the mid-1980s.

**Effects from Vegetation and Fuels Management and Timber Harvest**

Under alternative A, natural resource management objectives might not be adequately met and could affect the recreation experience. Lack of attainable vegetation management objectives would hinder the movement toward desired conditions, such as ecosystems that are resilient or adaptive to stressors such as fire, insects, pathogens, and climate variability. This could lead to vegetation degradation and would affect scenic resources. Changes in vegetation type or cover due to disease or wildfire could change the accessibility and quality of recreation opportunities in the Ashley National Forest.

*Environmental Consequences for Recreation—Alternative B Modified*

**Effects from Recreation Management Area Designations**

Alternative B modified includes the creation of destination (emphasizing developed recreation experiences), backcountry (emphasizing non-developed recreation experiences outside of designated wilderness), and general recreation management areas, which allow for a range of motorized and nonmotorized use. Creation of these management areas would allow for further refinement of management for different uses compared with alternative A and would address specific areas where many different recreation activities are concentrated. This would balance developed recreation opportunities and settings with opportunities for backcountry activities.

**Table 3-79. Alternative B Modified Recreation Management Areas**

<b>Recreation Management Area</b>	<b>Acres</b>
Destination recreation management areas	29,000
Backcountry recreation management areas	404,200
General recreation management areas	670,000

**Effects from Recreation Opportunities and Settings**

Compared with alternative A, alternative B modified acres vary only slightly, with a slight increase in motorized ROS classes (ROS roaded and ROS semiprimitive motorized) and a slight reduction in acres in semiprimitive nonmotorized. Compared with alternative A, this may provide enhanced opportunities for motorized users. Alternative B would also include objectives to increase and improve both motorized and nonmotorized routes, improving recreation opportunities for these users.

**Effects from Designated Areas**

Under alternative B modified, there would be no changes to designated areas compared with alternative A. Management under alternative B modified would consider current recreation trend and visitor use data,

which would facilitate more informed decision-making related to recreation management. Effects would be similar to those as described under alternative A.

### **Effects from Vegetation and Fuels Management and Timber Harvest**

Vegetation management under alternative B modified would include annual treatment targets that would result in short- and long-term changes to vegetation structure and related recreational settings. For example, alternative B modified aims to treat an average of 2,400 acres annually in the first decade and 2,100 acres annually in the second decade of vegetation management, and naturally ignited fires would be managed on 10 percent of the ignitions every 10 years. Overall, wildland fire and other vegetation treatments would be used to improve or maintain desired vegetation conditions on 6,600 to 32,000 acres per year during the life of the plan. Approximately 109,700 acres are suitable for timber production under alternative B modified. Timber harvest focus would be to maintain or restore forest and woodland types through science-informed management specific to vegetation types over commercial extraction. This would provide better long-term vegetation resilience to support ecosystem health and sustainable forest economics compared with alternative A.

Vegetation desired conditions for more open forests would be less appealing to campers, who might avoid dispersed sites with less vegetation screening. Conversely, more open park-like areas would be more visually appealing and would improve access to dispersed camping sites for such visitors as those pulling large trailers or driving recreational vehicles. User-created trails for bicycling, horseback riding, and hiking might be more likely in areas opened by fuel treatments or uncharacteristic large disturbances. Frequent and extensive vegetation treatments that elicit formal closures or cause recreationists to avoid these sites would negatively affect users' recreational experiences in the Ashley National Forest in the short term. Overall, short-term impacts on recreation would result from temporary and localized displacement of recreational opportunities during vegetation treatments. This would limit access to dispersed recreational opportunities and displace visitors. In the long term, vegetation and fuels treatments would improve Forest health and enhance the recreation setting compared with alternative A.

Mechanical thinning and prescribed burning could be consistent with managing for predominantly natural-appearing environments of primitive, semiprimitive nonmotorized, semiprimitive motorized, and roaded natural ROS classes, even though they would be visually evident; however, when compared with alternative A, these treatments could result in more open environments and changes in the quality of recreation opportunities by increasing the evidence of other users. This may not be consistent with semiprimitive nonmotorized and semiprimitive motorized ROS classes.

In contrast, primitive ROS classes would not have similar effects. This is because most of the primitive areas in the Ashley National Forest are in wilderness, where mechanical thinning could not occur, or they are in areas that receive fewer visitors; in such places, the chance of encountering other users is lower.

In addition, fires that are uncharacteristically large and burn with more intensity could have effects that occur over larger areas and last longer and are thereby inconsistent with managing for predominantly natural-appearing ROS classes. Any minor inconsistencies in managing for ROS settings would persist until the evidence of modification practices, such as stumps, were not evident and vegetation desired conditions were restored.



## *Environmental Consequences for Recreation—Alternative C*

### **Effects from Recreation Management Area Designations**

Alternative C places greater emphasis on backcountry recreation management areas, which are focused on dispersed recreation outside wilderness areas with limited infrastructure. These areas would manage for dispersed recreation opportunities and would establish management for roadless lands that have high conservation value. It would provide more dispersed recreation opportunities compared with all other alternatives; however, due to restrictions on wheeled motorized travel in backcountry recreation management areas under alternative C, motorized and mechanized (i.e., mountain bike) recreation opportunities might be displaced.

**Table 3-80. Alternative C Recreation Management Areas**

<b>Recreation Management Area</b>	<b>Acres</b>
Destination recreation management areas	23,200
Backcountry recreation management areas	739,700
General recreation management areas	340,100

### **Effects from Recreation Opportunities and Settings**

Changes in the ROS under alternative C result from more recommended wilderness acres than alternatives A and B modified. Due to recommended wilderness areas being managed as primitive, the desired ROS would have fewer acres classified as semiprimitive nonmotorized than the other action alternatives; it would include over 80,000 acres shifted from semiprimitive nonmotorized to the primitive ROS class. See figure 2-6 for the ROS map for alternative C.

This alternative offers the most opportunities for recreation users seeking remote locations with few management controls on the ground, no facilities, and large areas offering solitude. Recreation users seeking developed recreation would have fewer opportunities under this alternative compared with alternatives A and B modified. In addition, due to the emphasis on a primitive ROS setting, recreation users interested in both motorized and mechanized use may have fewer recreation opportunities under this alternative compared to all other alternatives.

### **Effects from Designated Areas**

Alternative C would manage more acres as recommended wilderness areas (50,000 more acres than alternative A). This alternative would establish four recommended wilderness areas totaling 50,200 acres. This would expand natural and unconfined recreational opportunities more than any other alternative. Additionally, increases in recommended wilderness would decrease developed, motorized, and mechanized recreation access in those areas compared with alternatives A and B modified. In addition, six river segments, totaling 59.7 miles, would be classified as suitable for inclusion in the NWSRS. Under this alternative, no miles of suitable rivers would be available for timber harvest, which would lessen impacts on recreation near these segments.

### **Effects from Vegetation and Fuels Management and Timber Harvest**

Alternative C emphasizes passive vegetation management rather than active increased vegetation treatments. It aims to treat 1,000 acres in the first decade and 800 acres in the second decade of vegetation management. Under alternative C, naturally ignited fires would be managed on at least 20 percent of the ignitions every 10 years. Wildland fire and other vegetation treatments would be used to improve or maintain desired vegetation conditions on 6,600 to 32,000 acres per year during the life of the plan, the

same as alternative B modified. Alternative C has the fewest acres suitable for timber production (approximately 80,500 acres) and timber harvest (93,700 acres).

Alternative C might have fewer short-term impacts on recreation than alternative B modified due to its emphasis on passive vegetation treatments; however, due to a greater proportion of managed wildland fire, there would be an increased risk that a fire could escape, resulting in reduced quality and availability of recreational opportunities. See the section on environment consequences for recreation for alternative B modified for short-term and long-term impacts from vegetation treatments.

### *Environmental Consequences for Recreation—Alternative D*

#### **Effects from Recreation Management Area Designations**

Compared with all other alternatives, management under alternative D would be more focused on developed recreation opportunities and settings. Impacts would be similar to those under alternative B modified; however, there would be an even greater emphasis on general and destination recreation management areas as opposed to backcountry recreation management areas. Management would emphasize motorized access, developed opportunities, and management controls to support these opportunities and experiences. For nonmotorized users, the setting would be less compatible and there would be the potential for conflicts with motorized uses. In addition to the increased acres of destination recreation management area management, alternative D would consider expanded campgrounds to accommodate trailers and OHV users. Expanded campgrounds would increase and improve recreation opportunities for developed camping and OHV users.

**Table 3-81. Alternative D Recreation Management Areas**

<b>Recreation Management Area</b>	<b>Acres</b>
Destination recreation management areas	34,200
Backcountry recreation management areas	299,000
General recreation management areas	769,800

#### **Effects from Recreation Opportunities and Settings**

Impacts would be similar to those described under alternative A since alternative D does not change management for any existing designated areas. It does not designate new areas, such as recommended wilderness areas or wild and scenic rivers. Alternative D has a slightly higher number of rural acres, classifying 34,000 acres as rural ROS. Recreation emphasis in these areas is on high-intensity activities, supported by facilities, motorized access, and management controls such as signs and guided tours. Increased motorized access would occur in semiprimitive motorized and roaded natural ROS areas. See figure 2-7. In general, this would intensify recreational use in these areas, and there would be a distinct shift in the ROS.

#### **Effects from Designated Areas**

Effects would be the same as those described under alternative A.

#### **Effects from Vegetation and Fuels Management and Timber Harvest**

Alternative D aims to treat 1,600 acres in the first decade and 1,300 acres in the second decade of vegetation management. Approximately 114,300 acres are suitable for timber production and 189,400 for timber harvest under alternative D. Under alternative D, naturally ignited fires would be managed on at least 5 percent of the ignitions every 10 years. Wildland fire and other vegetation treatments would be used to improve or maintain desired vegetation conditions on 10,000 to 40,000 acres per year during the life of the plan.

Alternative D allows for minimum impact suppression tactics only in wilderness. The intent is to manage fire to protect developed resources. There would be limited focus on moving vegetation toward desired conditions.

Likewise, alternative D would have a greater impact on recreation than alternative B modified due to its focus of treatment near heavily visited, developed areas; however, due to management actions being based on current best available science and techniques, alternative D would improve access to recreational opportunities compared with alternative A. Impacts would be greatest near developed recreation management areas compared with alternative B modified.

Alternative D has more emphasis on commodity timber harvest but would still use vegetation treatments that would improve recreational access compared with alternative A. See alternative B modified for short-term and long-term impacts from vegetation treatments.

### Cumulative Environmental Consequences for Recreation

Recreational uses on national forest lands are expected to continue to increase as more people nationwide continue to look for places to recreate. The Ashley National Forest is a regional destination for the greater Wasatch Front and a stopover for people traveling between nearby national parks. As more people venture onto public lands, differing societal desires and ideas of what recreation opportunities public lands should provide will continue to influence public land management policy.

Current management under alternative A is not able to adequately address increases in visitation and use. Management focused on primitive recreation, such as under alternative C, would not meet demand for motorized and mechanized recreation that is being promoted by local governments and regional tourism groups. Alternative B modified would balance developed recreation opportunities and settings with opportunities for backcountry activities to address increases in demands for both developed and dispersed recreation opportunities. Alternative D would address the demand for developed recreation but might not meet the needs of those looking for a more primitive recreation experience due to its emphasis on motorized access and developed facilities. Cooperation and funding for development and maintenance from other agencies, organizations, and local governments would continue to be necessary to meet public demands.

Reasonably foreseeable future actions in the Ashley National Forest relevant to this analysis are as follows:

- OHV and ATV trail construction and rerouting projects such as the Badlands Trail Project, Big Brush Creek-Outlaw ATV Trail Reroute Project, and Highline ATV Trail Reroute Projects
- Future vegetation management projects, including restoration projects and fuels treatments
- Implementation of the Ashley Karst NREGA Management Plan

OHV and ATV trail construction and rerouting projects would increase short-term impacts on recreation access from construction and closures under all alternatives; however, they would lead to improved recreational opportunities and availability in the long term. Future vegetation management projects could result in instances of displaced recreation opportunities in the short term but would improve the quality of recreation opportunities in the long term. For motorized and mechanized recreational users, these cumulative impacts would be greatest under alternative C.

Implementation of the Ashley Karst NREGA Management Plan could result in cumulative recreational impacts if certain activities such as motorized recreation are restricted. The extent and magnitude of these cumulative impacts is unknown.

## Scenic Resources

### Introduction

Scenery as well as other natural resources must be cared for and managed in order to maintain quality scenery for future generations. Scenery varies, depending on existing natural features, including vegetation, water features, landform, and geology, along with the cultural features and human alterations found in the landscape (such as buildings or manipulations of the land or vegetation). Cultural features and human alterations may contribute to scenic character when these elements have historic backgrounds, have nostalgic connotations, reflect the cultural legacy of an area, or create a visually pleasing complement to the natural character of the landscape (Hill 2019).

### *Regulatory Framework*

In 1995, the Forest Service updated the Visual Management System (VMS) to the Scenery Management System (SMS). The VMS (Forest Service 1974) had been used since the mid-1970s as the analysis tool for managing scenic resources and determining effects on scenery from proposed activities.

The VMS and SMS are both structured to primarily emphasize natural-appearing scenery, but the SMS recognizes the positive scenic values associated with some human modified (cultural) features and settings that are valued for their scenic influence. The SMS provides a systematic approach for determining the relative value and importance of scenery in National Forest System lands. Ecosystems provide the environmental context for the SMS, recognizing that a landscape is a dynamic and constantly changing community of plants and animals. The SMS also provides for improved resource integration of aesthetic, biological, physical, social, and cultural resources (Forest Service 2020k, 1995).

The VMS was used in the 1986 forest plan to identify visual quality objectives (VQOs) for the Ashley National Forest. The 1986 forest plan VQOs represent Ashley National Forest management direction to ensure that visitors are afforded views of natural-appearing landscapes when seen from popular travelways and developed recreation sites and where other visitor use is concentrated. The VQOs represent a combination of three visual components: landscape variety classes, distance zone, and viewer sensitivity. These ratings describe the level of visual variety or diversity of a landscape, areas of landscapes denoted by specified distances from an observer, and the observer's degree of interest in the visual qualities of the landscape (Buerkle 2017).

Agriculture Handbook 701, *Landscape Aesthetics: A Handbook for Scenery Management* (Forest Service 1995), defines the SMS for the inventory and analysis of the aesthetic values of National Forest System lands. The SMS represents the Forest Service's latest science in managing scenic resources and achieving high-quality scenery. It provides an overall framework for the orderly inventory, analysis, and management of scenery. It is a tool for integrating the benefits, values, desires, and preferences regarding aesthetics and scenery for all levels of land management planning. The SMS integrates increased understanding of ecological settings and resiliency concepts, disturbance patterns, and cultural landscapes in identifying the effects of various management practices on scenic resources (Hill 2019).

Forest Service Manual 2380 (Forest Service 2003) requires the agency to inventory, evaluate, manage, and, where necessary, restore scenery as a fully integrated part of the ecosystems of National Forest System lands and the land and resource management and planning process. Scenery must be treated

equally with other resources. Forest Service Manual 2380 specifies the use of the basic concepts, elements, principles, and variables defined in Agriculture Handbook 701 (Buerkle 2017).

Additional regulatory framework is described in the Scenery Management System Inventory Report, Ashley National Forest Land Management Plan Revision (Hill 2019) and is incorporated by reference. It contains descriptions of how NEPA and other laws, such as the Wilderness Act (1964), the 2012 Planning Rule, Forest Service Manual 1920, and other USDA handbooks influence the management of scenic resources on National Forest System lands.

### *Analysis Area*

The analysis area for scenic resources is the National Forest System lands in the Ashley National Forest (plan area of 1,377,600 acres). Also included, for cumulative considerations, are adjacent lands managed by entities other than the Forest Service.

### *Notable Changes Between Draft and Final EIS*

Based on public comments, additional scenic backways were described. In addition, scenic integrity objectives (SIO) acreages for alternative B modified were updated to reflect the removal of recommended wilderness under this alternative.

### **Description of Affected Environment**

The Ashley National Forest is comprised of diverse landscapes covering about 1.4 million acres in northeastern Utah and southwestern Wyoming. Although most of it is in the Uinta Mountain Range, the Ashley National Forest's diverse landscapes span three different landform types: the Uinta Mountains, the Green River Basin, and the Tavaputs Plateau (Hill 2019).

The scenery of the Ashley National Forest is among the amenities contributing to lifestyles and tourism in southwestern Wyoming and northeastern Utah. Ashley National Forest lands provide a scenic backdrop for the travel, work, and play of daily life for area residents. The Ashley National Forest's scenery contributes to casual and inexpensive recreation experiences near home and contributes to a general sense of well-being, security, and constancy (Buerkle 2017).

National visitor use monitoring data show that viewing natural features (37 percent) and driving for pleasure (24 percent) are main recreational activities (Forest Service 2020L) on the Ashley National Forest. Viewing scenery is a direct component of these activities. More detailed descriptions of the scenic character of the forest are provided in Scenery Management System Inventory Report, Ashley National Forest Land Management Plan Revision (Hill (2019, p. 3) and the Ashley National Forest Assessment, Scenery Report (Buerkle 2017, pp. 1 and 5–35); these reports are incorporated here by reference.

The U.S. Secretary of Transportation recognizes certain roads as national scenic byways based on their archaeological, cultural, historic, natural, recreational, and scenic qualities. In addition, there are other scenic byways formally recognized by States. The two scenic byways in the Ashley National Forest plan area are the Dinosaur Diamond Scenic Byway (11.8 miles in the plan area) and the Flaming Gorge-Uintas Scenic Byway (53.6 miles in the plan area) (Forest Service GIS 2020). Also, the Red Cloud Loop Scenic Backway is 36.2 miles in the plan area, and the Sheep Creek Scenic Backway is 11.4 miles in the plan area. Conserving scenic values is also a purpose of the FG NRA and Ashley Karst NRG. The State of Utah has designated the Reservation Ridge Scenic Backway, running from US-191 at the Avintaquin Campground turnoff on the Dinosaur Diamond Prehistoric Highway National Scenic Byway, west along the ridgeline to U.S. Highway 6, just east of Soldier Summit, within the South Unit of the Duchesne-Roosevelt Ranger District. A full list of other state-designated backways (some of which cross the Ashley

National Forest) can be found in the Utah State Bulletin, Rule R926015 (Utah Office of Administrative Rules 2011).

VMS VQOs are measurable standards or objectives for the management of scenery on National Forest System lands. The inventoried VQOs in the 1986 forest plan are preservation, retention, partial retention, modification, and maximum modification (Buerkle 2017). VMS VQO acres for the Ashley National Forest are presented in table 3-82 and are shown in figure 2-8.

**Table 3-82. Acres of Visual Quality Objective in the Analysis Area**

Visual Quality Objective	Acres	Percentage of Analysis Area
Preservation	243,200	18
Retention	457,700	33
Partial retention	304,400	22
Modification	351,000	26
Maximum modification	15,000	1

Source: Forest Service GIS 2020

In 2009 and 2018 Ashley National Forest personnel completed SMS inventories as part of the forest plan revision process to map scenic resource conditions. SMS inventories are described in detail in Hill (2019). Buerkle (2017) describes scenic character, scenic integrity, and trends affecting scenery in the Ashley National Forest. As part of the forest plan revision process, the SMS inventory and other resource considerations were used to develop scenic integrity objectives (SIOs) and other plan components and guidance in the revised forest plan and alternatives.

## Environmental Consequences for Scenic Resources

### *Methodology and Analysis Process*

This section discloses and evaluates the potential environmental consequences to scenic resources. The analysis considers how each alternative provides for scenery management. The analysis area for scenic resources is National Forest System lands in the Ashley National Forest (the plan area). Also included for cumulative considerations are adjacent lands managed by entities other than the Forest Service. Criteria for evaluating the potential level of alteration to the landscape are measured by acres of either a VQO or an SIO on National Forest System lands under each alternative; they are accompanied by a qualitative discussion of the potential effects on scenic resources from management activities. Because this analysis is for lands in the Ashley National Forest, it is a programmatic analysis instead of a site-specific analysis.

### *Analysis Assumptions*

The following assumptions are specific to scenic resources in this analysis:

- For the no action alternative, the VMS’s terminology of “VQOs” identified in the current plan and other current plan direction will be used to manage scenery. To describe and compare the environmental consequences, this analysis uses the SMS’s terminology of SIOs for all action alternatives. The terminology crosswalk from the VMS’s VQOs to the SMS’s SIOs is outlined in table 3-83. The VQO objectives are defined in Buerkle (2017).
- The principles of scenery management and environmental design will be applied in project-level planning in all Forest Service management activities.

**Table 3-83. Terminology Crosswalk from the Visual Management System to the Scenery Management System**

<b>Visual Management System's Visual Quality Objectives</b>	<b>Scenery Management System's Scenic Integrity Objectives</b>	<b>Perception of Scenery</b>
Preservation	Very high	The landscape is intact with only minor changes from the valued attributes described in the scenic character; naturally evolving.
Retention	High	Management activities are unnoticed, and the landscape appears unaltered.
Partial retention	Moderate	The landscape appears slightly altered; management activities are noticeable but are subordinate to the scenic character; relatively naturally appearing.
Modification	Low	The landscape appears altered. Management activities are evident and sometimes dominate, but they are designed to blend with surroundings by repeating form, line, color, and texture of attributes described in the scenic character.
Maximum modification	Very low	The landscape is heavily altered and the valued attributes described in the scenic character are not evident. Forest Service Manual 2310 states that very low is used only to describe existing scenic integrity; it is not used as an SIO or desired condition.

Source: Forest Service 1974, 1995, 2020f

- Scenery management techniques and principles will be used to mitigate any future site-specific land-altering activity or introduced elements on the land to achieve and maintain desired SIOs and desired scenic character. Scenery inventory GIS data layers will be reviewed during future project-level analysis and will be updated, based on ground-truthing, to keep the data layers accurate and relevant.
- Managing for natural-appearing scenery is important to the public.
- Natural changes to Ashley National Forest conditions will continue, and these changes will have a dynamic effect on the scenery of the Forest.
- The SIOs proposed for each alternative assume that vegetation will continue to evolve and be affected by various factors, such as fire, insects, drought, and disease. Also, the wildland-urban interface areas will continue to expand and become more developed. This may increase both the need to address fuel buildup around properties under other ownership as well as the pressure to protect aesthetics associated with landowners' sense of place.
- Changes in scenery and changes in public expectations related to landscape aesthetics and scenery will be monitored and documented (Forest Service Manual 2382—Scenery Management).
- Changes in public expectations related to landscape aesthetics and scenery will most likely be monitored at a regional or national level but may also be assessed during scoping for site-specific projects and review of current research when completing scenery analyses for site-specific projects.

*Indicators*

The analysis indicator for scenic resources is the acres of VQOs under alternative A and the acres of SIOs under the action alternatives. Table 3-84 lists scenery management acres by alternative.

**Table 3-84. Scenery Management by Alternative**

<b>Visual Quality Objective/Scenic Integrity Objective</b>	<b>Alternative A (acres)</b>	<b>Alternative B modified (acres)</b>	<b>Alternative C (acres)</b>	<b>Alternative D (acres)</b>
Preservation/Very high	243,200	273,600	323,600	273,600
Retention/High	457,700	436,100	686,300	240,000
Partial retention/Moderate	304,400	425,800	320,400	596,100
Modification/Low	351,000	240,700	45,900	266,500
Maximum modification/Very low	15,000	0	0	0

Source: Forest Service GIS 2020

*Environmental Consequences for Scenic Resources Common to All Alternatives*

Each alternative provides for scenery management to varying degrees with either current VQOs or proposed SIOs. They provide management direction for activities that modify or maintain the landscape, including sustainable recreation, designated areas, fire and fuels management, vegetation management, and timber harvest; however, negative impacts on the scenery may result where mitigation to meet the assigned objective is considered technically or economically infeasible. The objectives and associated plan components would not directly prohibit any on-the-ground work, but they may influence the design or the location of projects to meet or exceed the lowest allowable level of scenic integrity. The effects on scenery would be determined during a project-level analysis. Scenic management direction and scenic integrity objectives would influence the outcome of management activities throughout the life of the forest plan, providing for more natural or altered scenic character depending on the SIO assigned.

*Environmental Consequences for Scenic Resources—Alternative A*

Table 3-82, above, shows the acreage for the VQOs assigned to the Ashley National Forest by the 1986 forest plan (see figure 2-8). There would be no change in how scenery is currently managed on the Forest. VQOs would continue to be used and would be based on the degree of acceptable change to the visual character.

About 51 percent of the Forest would continue to be assigned preservation or retention VQOs, where the management emphasis would maintain or enhance the visual character. Overall, scenic resources would be maintained in preservation or retention VQOs; changes would not be noticeable to the casual observer. This would be less change than under alternative D because of the greater acreage in the preservation or retention VQOs (equivalent to high or very high SMS SIOs)

About 22 percent of the Forest would continue to be assigned a partial retention VQO, where the valued scenic character appears slightly altered and deviations must remain visually subordinate.

Using the VMS, 26 percent of the Forest would continue to be managed with a modification or maximum modification VQO. Under this classification, the valued scenic character appears moderately to strongly altered and deviations begin to dominate; management activities may dominate or disrupt the scenic character.

The 1986 forest plan direction for scenery management does not incorporate ecosystem management concepts into scenery management. This makes it difficult for managers to plan projects and work toward



an improved scenic resource condition. For example, healthy, fire-resistant vegetation is important for long-term scenic quality and scenic character resilience, such as under conditions that allow fires to move through the landscape without doing major damage and to recover relatively quickly from fire.

Maps with VQOs would continue to be used during project planning. These maps do not reflect changes in visitor use patterns, do not incorporate views from trails, do not reflect current public opinion, and do not reflect an ecosystem management landscape context. Additionally, VQOs do not recognize the cultural importance of traditional cultural properties and some human modifications, including prehistoric sites, historic sites, and human-made features such as campgrounds; therefore, VQOs do not provide adequate or integrated resource guidance for maintaining or protecting scenic quality when compared with the action alternatives.

The Forest Service would continue to return fire to the ecosystem, reduce hazardous fuels, and maintain historical fire regimes. There would continue to be no acre targets proposed for fuels treatment to improve or maintain desired vegetation conditions. As a result, there would continue to be greater opportunity for a catastrophic wildfire to dramatically change scenic resources, especially in areas with dense vegetation that is outside the natural range of variability.

In alternatives B modified, C, and D, the landscape characteristics for the different subareas in the Ashley National Forest are provided in the revised forest plan (see appendix 5). They tie to the ranger districts or geographic areas of the Ashley National Forest. This description of desired scenic character is not a component of alternative A; its lack would hinder informed decision-making when managing scenery.

The Forest Service would continue to use the existing ROS, and current management practices would continue as outlined in the 1986 forest plan. Without updating the ROS, the Ashley National Forest would struggle to adequately meet recreation demands in a way that also balances the desired scenic integrity. This would continue to degrade the scenic integrity where recreational activities are incompatible with scenery management.

Alternative A would designate 528,000 acres as suitable for timber production. This would alter the scenic character where timber production occurs because of the presence of timber management activities and areas with reduced vegetation. These impacts would be mitigated to meet the assigned VQOs; however, visitor expectations might not be met if areas with a modification or maximum modification VQO have increased visitor use and more concern for natural-appearing scenery. As reforestation progresses, these adverse impacts would diminish. However, this level of timber production does not account for policy changes, particularly under the 2001 Roadless Rule; thus, this level of timber production is currently not achievable.

Alternative A would continue to have 912,000 acres permitted for livestock grazing. The scenic character of areas permitted for livestock grazing would continue to be affected, such as through changes in vegetation condition and the presence of range improvements. Management activities such as livestock grazing also contribute to pastoral scenery and cultural heritage values.

Alternative A would continue to not have an objective related to prioritizing easements for providing access to the national forest. Nevertheless, the Forest Service would continue to manage the development of easements according to VQOs, which are based on the degree of acceptable change to the visual character.

***Environmental Consequences for Scenic Resources—Alternative B Modified***

Under alternative B modified, SIO acres would be assigned to the Ashley National Forest, as shown in table 3-85 (see figure 2-9). Alternative B modified would slightly increase the number of acres in areas where the management emphasis would maintain or enhance the valued scenic character. This is because 52 percent of the lands would have high or very high SIOs under alternative B modified compared with 51 percent under alternative A. Very high SIO is assigned to designated wilderness and recommended wilderness. High SIO is assigned to high-concern-level travelways, recreation sites, and cultural and historic sites in the foreground (0–0.5 mile) and middleground (0.5–4 miles) distance zone viewsheds.

**Table 3-85. Acres of Scenic Integrity Objectives in the Analysis Area—Alternative B Modified**

Visual Quality Objective	Alternative A		Scenic Integrity Objective	Alternative B Modified	
	Acres	Percentage of Analysis Area		Acres	Percentage of Analysis Area
Preservation	243,200	18	Very high	273,600	20
Retention	457,700	33	High	436,100	32
Partial retention	304,400	22	Moderate	425,800	31
Modification	351,000	26	Low	240,700	17
Maximum modification	15,000	1	Very low	0	0

Source: Forest Service GIS 2020

Alternative B modified would also increase the number of acres in areas where the valued scenic character appears slightly altered and deviations must remain visually subordinate. This is because 31 percent of the lands would have a moderate SIO under alternative B modified compared with 22 percent under alternative A.

Alternative B modified would reduce the number of acres in areas where the valued scenic character appears moderately to strongly altered and deviations begin to dominate. This is because 17 percent of the lands would have very low or low SIOs under alternative B modified compared with 26 percent under alternative A.

Between 6,600 and 32,000 acres per year would be managed for fuels treatment to improve or maintain desired vegetation conditions. This would establish vegetation conditions appropriate to the Forest. It would also establish conditions that would lessen opportunities for a catastrophic wildfire. These would maintain and enhance scenic character attributes (such as live tree cover, large trees, and scenic vistas) and improve the long-term scenic quality and scenic character resilience compared with alternative A.

Through integration with other resources, SIOs were mapped and desired scenic character is described for the forest plan analysis area. Plan components contain guidelines for vegetation management activities, new project activities, and new landscape modifications to meet SIOs. SIOs establish limits of acceptable human alterations as the landscape moves toward a landscape character goal. The landscape characteristics for the different subareas in the Ashley National Forest are provided in the forest plan (see appendix 5). They are a description of desired scenic character for the Forest. Alternative A has outdated objectives and desired scenic character.

Unlike alternative A, alternative B modified utilizes the SMS to determine the relative value, stability, resiliency, and importance of scenic values. The SMS recognizes natural disturbance processes, such as fire, insects, and disease, as part of the natural landscape that are dynamic and important in maintaining healthy, sustainable, and scenic landscapes. Under alternative B modified, the SIOs were reviewed and

modified, as appropriate, to follow scenic character guidelines based on the proposed ROS and recreation management areas, per the guidelines of the 2012 Planning Rule. Compared with alternative A, this would improve scenery management with respect to the ROS.

Alternative B modified would designate 109,800 acres as suitable for timber production. This would alter the scenic character where timber production occurs because of the presence of timber management activities and areas with reduced vegetation. However, the scenery plan components and SIOs would provide guidance for the desired outcomes for scenery management. As reforestation progresses, these adverse impacts would diminish. This would occur on 418,200 fewer acres than under alternative A.

The impacts on scenic resources in areas permitted for livestock grazing would be the same as those described under alternative A.

The impacts on scenic resources from the development of easements would be the same as those described under alternative A.

***Environmental Consequences for Scenic Resources—Alternative C***

Under alternative C, SIO acres would be assigned to the Ashley Nation Forest, as shown in table 3-86 (see figure 2-10). Alternative C would increase the number of acres in areas where the management emphasis would maintain or enhance the valued scenic character. This is because 74 percent of the lands would have high or very high SIOs compared with 51 percent under alternative A. Very high SIO is assigned to designated wilderness and recommended wilderness. High SIO is assigned to high- and moderate-concern-level travelways, recreation sites, and cultural and historic sites in the foreground (0–0.5 mile) and middleground (0.5–4 miles) distance zone viewsheds.

**Table 3-86. Acres of Scenic Integrity Objective in the Analysis Area—Alternative C**

Alternative A			Alternative C		
Visual Quality Objective	Acres	Percentage of Analysis Area	Scenic Integrity Objective	Acres	Percentage of Analysis Area
Preservation	243,200	18	Very high	323,600	24
Retention	457,700	33	High	686,300	50
Partial retention	304,400	22	Moderate	320,400	23
Modification	351,000	26	Low	45,900	3
Maximum modification	15,000	1	Very low	0	0

Source: Forest Service GIS 2020

Alternative C would reduce the number of acres in areas where the valued scenic character appears moderately to strongly altered and deviations begin to dominate. This is because 3 percent of the lands would have very low or low SIOs under alternative C compared with 27 percent under alternative A.

The impacts from the proposed fuels treatment to improve or maintain desired vegetation conditions would be the same as those under alternative B modified.

The impacts on scenic resources from establishing SIOs, scenery plan components included in the forest plan, and desired scenic character (forest plan, appendix 5) would be the same as those under alternative B modified.

In addition, the impacts on scenic resources from the SIOs and ROS would be the same as those under alternative B modified.

Alternative C would designate 80,500 acres as suitable for timber production. This would alter the scenic character where timber production occurs because of the presence of timber management activities and areas with reduced vegetation. However, scenery plan components and SIOs would provide guidance for the desired outcomes for scenery management. As reforestation progresses, these adverse impacts would diminish. This would occur on 447,500 fewer acres than under alternative A.

Alternative C would have 899,000 acres permitted for livestock grazing. The scenic character of areas permitted for livestock grazing would be affected, such as through changes in vegetation condition and the presence of range improvements. Management activities such as livestock grazing would also contribute to pastoral scenery and cultural heritage values. This would occur on 13,000 fewer acres than under alternative A.

Every 5 years, the Forest Service would consider and prioritize easements identified and agreed upon by State and county governments and private landowners for providing access to the national forest. This would provide the Forest Service with more opportunities to plan for changes that would affect the visual character compared with alternative A.

*Environmental Consequences for Scenic Resources—Alternative D*

Under alternative D, SIO acres would be assigned to the Ashley National Forest, as shown in table 3-87 (see figure 2-11). Only 17 percent of the Forest would be assigned a high SIO, where the management emphasis would maintain the valued scenic character compared with 33 percent under alternative A. Very high SIO is assigned to designated wilderness. High SIO is assigned to high-concern-level travelways, recreation sites, and cultural and historic sites in the foreground (0–0.5 mile) distance zone viewsheds.

**Table 3-87. Acres of Scenic Integrity Objective in the Analysis Area—Alternative D**

Alternative A			Alternative D		
Visual Quality Objective	Acres	Percentage of Analysis Area	Scenic Integrity Objective	Acres	Percentage of Analysis Area
Preservation	243,200	18	Very high	273,600	20
Retention	457,700	33	High	240,000	17
Partial retention	304,400	22	Moderate	596,100	43
Modification	351,000	26	Low	266,500	19
Maximum modification	15,000	1	Very low	0	0

Source: Forest Service GIS 2020

Alternative D would also increase the number of acres in areas where the valued scenic character appears slightly altered and deviations must remain visually subordinate. This is because 43 percent of the lands would have a moderate SIO under alternative D compared with 22 percent under alternative A.

Alternative D would reduce the number of acres in areas where the valued scenic character appears moderately to strongly altered and deviations begin to dominate. This is because 19 percent of the lands would have very low or low SIOs under alternative D compared with 27 percent under alternative A.

Between 10,000 and 40,000 acres per year would be managed for fuels treatment to improve or maintain desired vegetation conditions. This would establish vegetation conditions appropriate to the Forest. It would also establish conditions that would lessen opportunities for a catastrophic wildfire. These would maintain and enhance scenic character attributes (such as live tree cover, large trees, and scenic vistas) and improve the long-term scenic quality and scenic character resilience compared with alternative A.

The impacts on scenic resources from establishing SIOs, scenery plan components included in the forest plan, and desired scenic character (forest plan, appendix 5) would be the same as those under alternative B modified.

In addition, the impacts on scenic resources from the SIOs and ROS would be the same as those under alternative B modified.

Alternative D would designate 114,300 acres as suitable for timber production. This would alter the scenic character where timber production occurs because of the presence of timber management activities and areas with reduced vegetation. However, the scenery plan components and SIOs would provide guidance for the desired outcomes for scenery management. As reforestation progresses, these adverse impacts would diminish. This would occur on 413,700 fewer acres than under alternative A.

The impacts on scenic resources in areas permitted for livestock grazing would be the same as those under alternative A.

In order to provide access to the national forest, the Forest Service would annually consider and prioritize easements identified and agreed upon by State and county governments and private landowners. This would provide the Forest Service with more opportunities to plan for changes that affect the visual character compared with alternatives A, B modified, and C.

### Cumulative Environmental Consequences for Scenic Resources

Reasonably foreseeable future actions on and near the Ashley National Forest involve varying types of development and infrastructure, which can add artificial elements to undeveloped or natural areas. These actions include general land management planning (by counties or other Federal agencies), ROWs, and mineral development, such as the Uinta Basin Railway Project, the Wyoming Pipeline Corridor Initiative Project, and the Simplot Fringe Lease. Activities outside the Forest would have the greatest impact on scenery along the boundary of the Forest. The timing and nature of the impacts involving activities outside the Forest are largely unknown.

Some reasonably foreseeable future actions involve vegetation management, which could diminish landscape conditions in the short term from changing vegetation features in order to improve landscape conditions in the long term. These actions include forest restoration, habitat improvement, fuels treatment, and forest restoration in areas damaged by beetles.

Other reasonably foreseeable future actions involve recreation, such as the Ashley Karst NRG Management Plan. These actions could add artificial elements to undeveloped or natural areas from recreation trails and infrastructure. They could also restrict actions, thereby maintaining undeveloped or natural areas. Additionally, recreation management actions could encourage visitors concerned about landscape conditions to visit the Forest.

Each alternative provides for scenery management to varying degrees and with either current VQOs or proposed SIOs. They provide management direction for activities that modify or maintain the landscape, including sustainable recreation, designated areas, fire and fuels management, vegetation management, and timber harvest. The objectives and associated plan components would not directly prohibit any on-the-ground work, but they might influence the design or the location of projects to meet or exceed the lowest allowable level of scenic integrity. The effects on scenery would be determined during project-level analysis.

All action alternatives would provide for certain scenery management improvements. They would include ecosystem management concepts, incorporate desired scenic character (forest plan, appendix 5) in scenery management, address recreation management areas per the guidelines of the 2012 Planning Rule, and consider timber production with respect to the 2001 Roadless Rule. These would have beneficial cumulative impacts that would not occur under alternative A.

Alternative C would provide for the most natural and natural-appearing scenic character, with management activities blending with the characteristic landscape; this is because 74 percent of lands would have high or very high SIOs. It would also have the fewest acres permitted for livestock grazing and the fewest acres suitable for timber production. Therefore, when combined with the impacts described above from reasonably foreseeable future actions, alternative C would have the fewest cumulative impacts on the scenic character.

Alternative D would provide for a more slightly altered or altered scenic character, and management activities might be more noticeable and have the most cumulative changes. This is because only 37 percent of lands would have high or very high SIOs. Alternatives A and B modified are relatively similar with respect to high or very high SIOs (or retention or preservation SQOs); however, alternative B modified would have fewer cumulative changes to the landscape than alternative A. This is because 31 percent of the lands would have a moderate SIO under alternative B modified compared with 22 percent under alternative A.

## **Land Status and Ownership and Special Uses**

### **Introduction**

Within the Ashley National Forest's boundaries, landownership (containing surface and subsurface) includes public lands managed by the Forest Service, private inholdings, and Utah State lands. Land status is determined by legal regulations, restrictions, and permissions on how the land is used or managed for use, including planning, zoning, easements, and other legal designations. Landownership status on National Forest System lands can be changed through land adjustments. Under the land adjustment programs, the Forest Service acquires and consolidates key tracts of non-Federal land to conserve valuable natural habitat, reduce the risk of permanent development in sensitive areas, and enhance public recreation opportunities.

Land use in the Ashley National Forest varies based on landownership and status. With the exception of specific terms regarding water systems and permitting processes, the Forest Service cannot dictate use within private inholdings or on State land; however, the Forest Service must take these lands into consideration during planning and when making management decisions within the plan area. Current land use on lands managed by the Forest Service is based on current land allocations and permitted uses within existing land management plans.

Lands special uses require special-use authorizations and permits for recreation uses or for land and/or mineral development activities.

### ***Regulatory Framework***

The following is a select set of statutory authorities that govern landownership adjustments and the issuance and administration of special-use authorizations. They are briefly identified and described below to provide context to the management and evaluation of these resources. There are multiple other laws, regulations, and policies not described below that also guide the management of these programs; Forest Service Manuals 2700, 5400, and 5500 provide a comprehensive listing.

**Organic Administration Act of June 4, 1897 (16 USC 477-482, 551)**—This act authorizes the Secretary of Agriculture to issue rules and regulations for the occupancy and use of the national forests. This is the basic authority for authorizing use of National Forest System lands for other than ROWs.

**Occupancy Permits Act of March 4, 1915 (16 USC 497 et seq.), as amended**—This act authorizes use and occupancy on National Forest System land for recreational purposes, including resorts and recreation residences.

**General Exchange Act of March 20, 1922 (16 USC 485, 486)**—This act authorized the Forest Service to consolidate its holdings in national forests where a large percentage of private lands were intermingled with National Forest System lands. It made possible the exchange of inholdings within national forests for private lands of equal value and within the same state.

**Highway Act of August 27, 1958 (23 USC 317), supplemented by the Highway Safety Act of October 15, 1966 (49 USC 1651)**—This act authorizes the Federal Highway Administration to grant easements to States for highways that are part of the Federal-Aid System or that are constructed under the provision of chapter 2 of the Highway Act. The Forest Service consents to the grant of these easements in a form agreed upon by the two agencies and upon the State highway agency's execution of stipulations. This is the only authority for granting ROWs for projects on the Federal-Aid System or projects constructed under the provisions of chapter 2 of the Highway Act (Forest Service Manual 2731).

**National Forest Roads and Trails Act of October 13, 1964 (16 USC 532-38)**—This act authorizes the Secretary of Agriculture to grant temporary or permanent easements to landowners who join the Forest Service in providing a permanent road system that serves lands administered by the Forest Service and lands or resources of the landowner. It also authorizes the grant of easements to public road agencies for public roads that are not a part of the Federal-Aid System (Forest Service Manual 2732).

**The Act of November 16, 1973 (30 USC 185), amending Section 28 of the 1920 Mineral Leasing Act**—This act authorizes the Forest Service to issue authorizations for oil and gas pipelines and related facilities located wholly on National Forest System land. When the land is under the jurisdiction of two or more Federal agencies, authority for issuance is reserved to the United States Department of the Interior and BLM, subject to approval by the agencies involved.

**Federal Land Policy and Management Act of October 21, 1976 (43 USC 1761-1771)**—Title V of FLPMA authorizes the Secretary of Agriculture to issue permits, leases, or easements to occupy, use, or traverse National Forest System lands. FLPMA directs the United States to receive fair market value unless otherwise provided for by statute and provides for reimbursement of administrative costs in addition to the collection of land use fees (43 USC 1764(g)). This act also establishes policy for the exchange of lands under uniform procedures and requires that the lands exchanged be consistent with the prescribed mission of the agency.

**Alaska National Interest Lands Conservation Act of 1980 (16 USC 3210)**—This act provides numerous authorities related to access that are specific to national forests in Alaska. The provisions of section 1323(a) (16 USC 3210) apply to all National Forest System lands. This section provides that, subject to terms and conditions established by the Secretary of Agriculture, the owners of non-Federal land within a national forest shall be provided adequate access to their land. Regulations implementing section 1323(a) are set forth at 36 CFR 251, Subpart D—Access to Nonfederal Lands. See Forest Service Manual 2701.3, paragraph 3, for the summary of the provisions of 36 CFR 251, Subpart D.

**Small Tracts Act of January 12, 1983 (16 USC 521c–521i)**—This act authorizes the sale, exchange, or interchange of certain parcels of minimal size.

**Photographic Activities on Federal Lands Act of May 26, 2000, (16 USC 406l-6d)**—This act supplements the authority of the Secretary of Agriculture to regulate commercial filming and still photography on National Forest System lands. It also authorizes the secretary to retain and spend land use fees collected for commercial filming and still photography without further appropriation, and it provides for recovery of administrative and personnel costs in addition to the collection of the land use fee.

**Executive Order 13604—Improving Performance of Federal Permitting and Review of Infrastructure Projects, issued March 22, 2012**—This EO states that “it is critical that executive departments and agencies take all steps within their authority, consistent with available resources, to execute Federal permitting and review processes with maximum efficiency and effectiveness.”

**Energy Policy Act of 2005, Section 1211(c), Access Approvals by Federal Agencies (August 8, 2005, Public Law 109-58)**—This act states, “Federal agencies responsible for approving access to transmission and distribution facilities located in the United States shall expedite any Federal agency approvals that are necessary to allow the owners or operators of such facilities to comply with reliability standards regarding vegetation management, electric service restoration, or resolution of situations that imminently endanger the reliability or safety of the facilities.”

**Executive Order 13212—Actions to Expedite Energy-Related Projects, issued May 18, 2001**—This EO directs executive departments and agencies to take appropriate actions, to the extent consistent with applicable law, to expedite projects that will increase the production, transmission, or conservation of energy.

The following regulations provide direction for special uses management on National Forest System lands: 36 CFR 251—Land Uses and 36 CFR 254—Landownership Adjustments.

### *Analysis Area*

The analysis area includes all lands within the proclaimed boundaries of the Ashley National Forest. These lands are divided into four distinct areas based on the existing ranger district boundaries: Flaming Gorge Unit, Vernal Unit, Duchesne-Roosevelt North Unit, and Duchesne-Roosevelt South Unit (table 3-88 and figure 1-1). For the purpose of this analysis, Duchesne-Roosevelt has been separated into the North and South Units. The cumulative analysis will also include lands adjacent to the national forest boundaries.

### *Notable Changes Between Draft and Final EIS*

Analysis was updated to include an additional indicator for all alternatives related to Forest Service coordination with partners. Discussion was included related to new goals and guidelines for Forest Service coordination with the Department of the Interior—Central Utah Project Completion Act Office and the Bureau of Reclamation regarding lands withdrawn for Reclamation purposes within or adjacent to National Forest System lands, as well as a management approach detailing the process for coordination. In addition, analysis was updated to reflect the removal of recommended wilderness under alternative B modified.

### **Description of Affected Environment**

There are 1,400,282 acres of National Forest System lands, 21,074 acres of private land, and 1,720 acres of State land within the boundaries of the Ashley National Forest (see table 3-88).



**Table 3-88. Landownership Acreage within the Ashley National Forest Boundaries by Ranger District**

Ranger District	National Forest System Land	Private Land	State Land
Flaming Gorge	353,928	10,695	1,720
Vernal	341,218	7,428	0
Duchesne-Roosevelt North	500,779	2,295	0
Duchesne-Roosevelt South	204,357	656	0
<b>Total</b>	<b>1,400,282</b>	<b>21,074</b>	<b>1,720</b>

Source: Forest Service 2017a

Lands adjacent to the Ashley National Forest boundaries include parcels owned or managed by the BLM, Uinta-Wasatch-Cache National Forest, Uinta and Ouray Indian Reservation, the States of Utah and Wyoming, private entities, and counties.

### Land Special-Use Authorizations

The Ashley National Forest issues special-use authorizations for recreation (see table 3-88) and non-recreation (see table 3-89) uses. The 2017 Landownership and Status, Use, and Access Report (Forest Service 2017p) discusses the current conditions and trends of landownership and status. It includes information on conveyances, acquisitions (purchases and donations), land exchanges, ROW corridors, easement and ROW acquisitions, surveys of the Ashley National Forest, communication sites, and land status withdrawals that have occurred since implementation of the 1986 forest plan. Recreation special-use authorizations include recreation residences, resorts, marinas, outfitter and guide services, and temporary events. There are currently 125 recreation special-use authorizations issued in the Ashley National Forest. Requests for and interest in recreation special-use authorizations are increasing, and this is expected to continue. This increase is primarily for temporary events such as fishing derbies.

**Table 3-89. Recreation Special-Use Authorizations by Ashley National Forest Ranger District**

Recreation Special Uses	Flaming Gorge	Vernal	Duchesne-Roosevelt North	Duchesne-Roosevelt South
Privately owned improvements (recreation residences)	10	40	8	0
Privately owned resorts	2	0	2	0
Marinas	3	0	0	0
Government-owned improvements	2	0	0	0
Concessions (rental service)	1	0	0	0
Concessions (outfitters and guides)	20	1	10	0
Temporary events (number varies yearly)	21	5	0	0
<b>Total recreation special uses</b>	<b>59</b>	<b>46</b>	<b>20</b>	<b>0</b>

Source: Forest Service 2017p

The Forest Service processes and administers lands special-use authorizations for a variety of uses. These uses range from roads, powerlines, canals, and water pipelines to small dams and reservoirs. There are currently 146 lands special-use authorizations issued by the Ashley National Forest (see table 3-90). Requests for and interest in these types of authorizations are increasing, primarily for utilities such as power, oil and gas, fiber optic, and cellular. To date, the Ashley National Forest has not received any requests for authorizations in relation to renewable energy for wind or solar power, but some interest has been shown in the development of hydropower projects.

**Table 3-90. Lands Special-Use Authorizations by Ashley National Forest Ranger District**

Lands Special Uses	Flaming Gorge	Vernal	Duchesne-Roosevelt North	Duchesne-Roosevelt South
Agricultural and agricultural improvements	2	0	0	0
Research	3	0	0	0
Cultural resource and treasure trove uses	0	0	0	1
Storage	1	0	0	0
Oil and gas development	3	1	0	0
Energy generation and transmission	0	0	2	0
Electric transmission and distribution	8	2	5	1
Federal aid highway right-of-way	5	0	0	3
Road or trail authorization	12	0	5	1
Communications, communication use	5	5	1	0
Other communication uses (SNOTEL 18/seismic)	1	0	5	1
Telephone	4	1	5	0
Canals	5	6	6	0
Canals under ditch bill easements <sup>19</sup>	8	6	8	0
Dams, reservoirs	5	3	3	0
Dams, reservoirs under ditch bill easements	0	2	0	0
Water developments and measures (gauging stations)	3	3	5	0
<b>Total lands special uses</b>	<b>65</b>	<b>29</b>	<b>45</b>	<b>7</b>

Source: Forest Service 2017p

### Right-of-Way Corridors

The utility corridor management emphasis areas in the 1986 forest plan are generally consistent with the current needs identified by the Western Utility Group, an organization of major western gas, electric, and telecommunications companies. The 1986 forest plan direction identifies energy transportation and utility corridor/window designations. It also identifies areas of exclusion, such as the FGNRA, that have a statutory prohibition of ROWs for linear facilities or corridor/window designations (see figure 3-22).

Recent increased activity in large transmission projects, such as the Zephyr, Energy Gateway South, and Transwest Express projects, demonstrates that along with increased interest in communication uses and technologies, the demand for enhanced energy infrastructure and electrical connectivity is on the rise. This demand is expected to increase.

### Land Withdrawals and Conveyances

The term “withdrawal” as described in FLPMA means withholding an area of Federal land from settlement, sale, location, or entry, under some or all of the general land laws, for the purpose of limiting activities under those laws to maintain other public values in the area; reserving the area for a particular public purpose or program; or transferring jurisdiction over an area of Federal land, other than “property”

<sup>18</sup>SNOTEL is an automated system of snowpack and related climate sensors operated by the Natural Resources Conservation Service of the United States Department of Agriculture in the Western United States.

<sup>19</sup>Ditch bill easements are authorized under the Ditch Bill Act, which authorizes the Secretary of Agriculture to issue permanent easements for water conveyance systems in order to resolve title claims arising under acts repealed by the Federal Land Policy and Management Act of 1976 and for other purposes.

governed by the Federal Property and Administrative Services Act, as amended (40 USC 472), from one department, bureau, or agency to another department, bureau, or agency.

Prior to the passage of FLPMA, withdrawals generally took the form of an EO, public land order, or a secretarial decision. These executive actions, once published in the *Federal Register*, segregated the affected Federal land from mineral entry or location under the General Mining Act of 1872.

Since approval of the 1986 forest plan, six withdrawals have been revoked and one partially revoked within the Ashley National Forest. Roughly 12,000 acres remain withdrawn for various and sundry administrative purposes, including improved campgrounds, caves, reservoirs, and special geological areas. There are currently no withdrawal requests pending, and the Forest Service does not anticipate any requests in the near future.

Since implementation of the 1986 forest plan, the following conveyances have taken place on Ashley National Forest land under the authority of the Forest Service Facility Realignment and Enhancement Act:

- Manila Landfill (conveyed under Townsite Act authority) for 7.81 acres, completed 2015
- Roosevelt Office Administrative Site for 2.62 acres, completed 2013
- Green River Administrative Site for 4.23 acres, completed 2013
- Duchesne Ranger Station for 0.83 acres, completed 2010
- Roosevelt Dwelling #1 for 0.34 acres, completed 2010
- Roosevelt Dwelling #2 for 0.28 acres, completed 2010
- Duchesne Dwelling for 0.43 acres, completed 2010
- Vernal Administrative Site for 0.23 acres, completed 2010

In addition, withdrawals have been put in place for the Central Utah Water Project (CUP) of the Bureau of Reclamation. The CUP is a Federal water resources development project that diverts water via a system of reservoirs, tunnels, aqueducts, and other control features. The largest unit of the CUP, the Bonneville Unit, collects and distributes water in both the Uinta Basin of eastern Utah and the Bonneville Basin of central Utah. Other units of the CUP collect and distribute water solely within the Uinta Basin. CUP infrastructure on the Ashley National Forest is operated through special-use permitting. The CUP provides water for irrigation, municipal, and industrial uses, with secondary benefits for aquatic habitat, open-water recreation, and flood control.

### **Historic Treaty Rights**

The Ute Indian Tribe and Eastern Shoshone Tribe continue to assert certain access and resource-gathering rights within portions of the plan area through treaties. Multiple treaties, congressional acts, and case law have defined the relationships between the Federal government and Native American tribes. (Refer to the “Areas of Tribal Importance” section for more discussion regarding this topic.)

## **Environmental Consequences for Land Status and Ownership and Special Uses**

### ***Methodology and Analysis Process***

The Forest Service evaluated and compared current landownership patterns and the potential for land adjustments across all alternatives. This section focuses on land adjustment management that changes across alternatives and its effect on the lands program.

The Forest Service compared the number of special-use authorizations currently in effect with the potential changes that might result from implementation of any of the alternatives considered. The section is organized by the issue topics identified during scoping and subsequent alternatives development that are most applicable to lands special uses. A project-specific analysis would provide more in-depth analysis when implementing the plan.

### *Analysis Assumptions*

- There will be no changes made to landownership through the forest plan.
- The Forest Service will have the personnel and funding capacity to screen, process, and manage landownership adjustments.
- Community and public needs for services will continue.
- The emphasis of the lands program will remain on consolidating the Ashley National Forest's land base for easier management; it will not be shrinking or transferring the Federal estate to private parties or other jurisdictions.
- Acres subject to congressional delegation will not be open for land adjustments.
- Demand for special uses in the Ashley National Forest will increase, and infrastructure (power, communication, water, and transportation) needs will require additional facilities on National Forest System land.
- All alternatives will achieve desired conditions for special uses.
- All projects implemented in the Ashley National Forest will require a site-specific analysis of their potential impacts on and from special uses.
- Special-use permits across all alternatives will remain at constant levels or increase moderately based on demand.

### *Indicators*

- Acres identified for conveyance into or out of Federal ownership
- Changes to permitting or coordination procedures which would increase or decrease the internal workload for the Forest Service staff or increase or decrease the ability to effectively coordinate with partners
- Changes in access that would affect land use (for example, closure of roads or trails that would eliminate or increase the ability to access land for recreation, tribal uses, or timber harvesting)
- Acreages of land available for development for special use, roads, dams, water systems, utility corridors, communication sites, and other private or commercial uses that cannot be accommodated on private lands and that conform to management direction for the area
- Acreages per alternative of designated areas or management areas not available for development (such as recommended wilderness) or off-limits to development/special-use authorizations
- Acres of designated utility corridors

### *Environmental Consequences for Land Status and Ownership and Special Uses Common to All Alternatives*

Acres identified for conveyance into or out of Federal ownership would be the same across all alternatives.

The process for completing land-use authorizations and permits would not change under any of the alternatives; however, adjustments such as recommendations of areas for wilderness designation and closure of roads or trails would indirectly affect land use in those areas. This is because they would be subject to closures or would include restrictions on development.

Under all alternatives, 28.4 acres of designated utility corridors would remain open to special-use authorizations. This would allow for continued development and expansion in these areas under all alternatives.

*Environmental Consequences for Land Status and Ownership and Special Uses—Alternative A*

Under alternative A, changes to landownership and use would follow current management practices outlined in the 1986 forest plan. There would not be any new recommended management areas; therefore, land available for special-use authorizations and access routes would not change. Existing RNAs and designated wilderness areas would remain the same with current restrictions on 187,000 acres and 274,014 acres of land, respectively.

Under alternative A, there would be no changes to access roads or trails, and no IRAs would be proposed in recommended wilderness areas; therefore, the associated land use is not anticipated to increase or decrease, based on a gain or loss of access.

*Environmental Consequences for Land Status and Ownership and Special Uses—Alternative B Modified*

Under alternative B modified, the Forest Service would encourage the formation of user associations in lieu of individual special-use permits and ROWs in common-use facilities, uses, or areas. Under alternative B modified, multiple permits to the same organization should be incorporated into one permit if this facilitates permit administration. These efforts would assist in expediting the permitting process for organizations and decreasing internal workload for Forest Service staff.

Alternative B modified would also include a goal and guideline for Forest Service coordination with Department of the Interior—Central Utah Project Completion Act Office and the Bureau of Reclamation regarding lands withdrawn for Reclamation purposes within or adjacent to National Forest System lands, as well as a management approach detailing a process for coordination. This would improve the ability of the Forest Service to effectively coordinate with these partners.

Additionally, under alternative B modified, the following goals and objectives would improve access and recreation sites:

- Improve 5 miles of existing nonmotorized National Forest System trails for mountain bike use every 5 years over the life of the plan, if user groups or other partnerships are available to assist in improvement work.
- Make the backcountry recreation management area suitable for wheeled motorized travel consistent within desired recreation opportunity spectrum settings as assigned and on designated roads, trails, and areas.
- Provide five new dispersed camping docks on the shoreline of the Flaming Gorge Reservoir within 10 years of plan approval if funding is available
- Expand recreation opportunities by constructing 10 miles of trails designed for use by mountain bikes over the life of the plan, if local user groups or partnerships are identified to conduct annual trail maintenance

- Improve 1 mile of road to dispersed camping sites every 3 years
- Expand recreation opportunities by constructing two OHV loop trails (no more than 60 inches wide) within 10 years of plan approval if local user groups or partnerships are identified to conduct annual trail maintenance
- Expand recreation opportunities by converting 10 miles of National Forest System 50-inch-wide (or narrower) OHV trails to no more than 60 inches wide within 5 years of plan approval. This would be done through cooperation with local motorized use groups who identify trails that have the highest use by side-by-side OHVs and if identified trails can be converted without resulting in resource issues.
- Improve 2 miles of motorized trails every 3 years if local user groups are available to assist in improvement work
- Chip seal or slurry seal 2 miles of roads within destination recreation management areas every 5 years if road conditions warrant maintenance
- Improve facilities and infrastructure at five developed campgrounds every 10 years for the life of the plan, emphasizing areas with higher use and in a deteriorated condition

Access and recreation facilities improvement objectives and goals identified under alternative B modified would enable land users to access Forest System lands more safely and efficiently; this would provide more opportunities for special land use authorizations. There are more access and recreation improvement objectives proposed under alternative B modified when compared with alternative A.

#### *Environmental Consequences for Land Status and Ownership and Special Uses—Alternative C*

Under alternative C, management to encourage user associations would expedite the permitting process for organizations and decrease internal workload as described under alternative B modified. The goal for coordination with the Department of the Interior—Central Utah Project Completion Act Office and the Bureau of Reclamation regarding withdrawn lands would improve coordination, as discussed under alternative B modified.

Under alternative C, one new 1,400-acre RNA and 50,200 acres of new recommended wilderness areas would be established. Additionally, under this alternative, new ROWs would be considered unsuitable within the RNAs, and the recommended wilderness areas would include 48,600 acres of IRAs.

Under alternative C, restrictions on access would also include a restriction on motorized use within 739,700 acres in backcountry recreation management areas, which would decrease the ability and availability of special-use authorizations. Access improvement objectives identified under alternative C would allow Forest visitors to access National Forest System lands more safely and efficiently. While alternative C provides more restrictions on access and land use than alternative A, access improvement objectives may increase the land use in certain areas. Overall, there would be less National Forest System lands available for special-use authorizations under alternative C when compared with alternative A. However, with the use of designated energy corridors and other National Forest System lands available to accommodate special-use permits, there would be sufficient land for development.

Under alternative C, the following objectives and goals for access and recreation facilities improvements would provide more opportunities for land use than alternative A but less than alternative B modified:

- Improve 1 mile of road to dispersed camping sites every 3 years

- Chip seal or slurry seal 2 miles of roads within destination recreation management areas every 5 years, if road conditions warrant maintenance
- Improve facilities and infrastructure at five developed campgrounds every 10 years for the life of the plan, emphasizing areas with higher use and in a deteriorated condition

*Environmental Consequences for Land Status and Ownership and Special Uses—Alternative D*

Availability of land for special-use authorizations would not change under alternative D since there are no additional areas, such as wilderness, RNAs, or IRAs, identified for special designation.

Under alternative D, a goal for land status and ownership is to work with organizations to maintain and represent current individual inholdings. This would provide the Forest Service the opportunity to work collectively on maintaining the current land status. The goal for coordination with the Department of the Interior—Central Utah Project Completion Act Office and the Bureau of Reclamation regarding withdrawn lands would improve coordination, as discussed under alternative B modified.

Under alternative D, goals for lands special uses include prioritizing organizations that represent multiple permittees during the permitting process, along with annual considerations and prioritization of easements identified and agreed upon by State and county governments and private landowners for providing access to the national forest. Working closely with permittees and other landowners within the Ashley National Forest boundaries would increase the efficiency of approving or denying special land use authorizations. When compared with alternative A, this would be an improvement.

Additional goals and objectives under alternative D include the following:

- Consider expanding existing campgrounds to accommodate larger trailers and OHV users
- Improve 10 miles of existing nonmotorized National Forest System trails for mountain bike use every 5 years over the life of the plan if user groups are available to assist in improvement work
- Provide seven new dispersed camping docks on the shoreline of the Flaming Gorge Reservoir within 10 years of plan approval if funding is available
- Expand recreation opportunities by constructing 20 miles of trails designed for use by mountain bikes over the life of the plan if local user groups or partnerships are identified to conduct annual trail maintenance
- Improve 4 miles of road to dispersed camping sites every 3 years
- Expand recreation opportunities by constructing two OHV loop trails within 10 years of plan approval if local user groups or partnerships are identified to conduct annual trail maintenance
- Expand recreation opportunities by converting 10 miles of National Forest System 50-inch-wide (or narrower) OHV trails to no more than 60 inches wide within 5 years of plan approval. This would be done through cooperation with local motorized use groups who identify trails that have the highest use by side-by-side OHVs and if identified trails can be converted without resulting resource issues. (This is the same as under alternative B modified.)
- Improve 6 miles of motorized trails every 3 years if local user groups are available to assist in improvement work
- Chip seal or slurry seal 6 miles of roads within destination recreation management areas every 5 years if road conditions warrant maintenance

- Improve facilities and infrastructure at eight developed campgrounds every 10 years for the life of the plan, emphasizing areas with higher use and in a deteriorated condition

Access and recreation facilities improvement objectives identified under alternative D would provide the ability for Forest visitors to access Forest System lands more safely and efficiently; therefore, this would provide more opportunities for special land use authorizations. When compared with alternatives A and C, there are more access and recreation facilities improvement objectives proposed under alternative D but less than under alternative B modified.

Overall, alternative D would have the most acreage available for special-use authorizations. This is because of fewer designated areas and more improvements to access and recreation facilities when compared with the other alternatives.

## Cumulative Environmental Consequences for Land Status and Ownership and Special Uses

Landownership within the boundaries of the Ashley National Forest is not anticipated to change drastically within the life of the plan. The Forest Service will continue to address potential adjustments to landownership through existing laws, regulations, and policies.

When a special-use proposal is received, Forest Service manual direction requires Forest Service personnel to consider whether the proposed use is consistent with the mission of the Forest Service or can reasonably be accommodated on lands of other ownership. Private lands can provide opportunities for requests such as wind and solar power and small distribution lines but not for activities requiring large, continuous land bases, such as for hunting, tours, and access and utilities for inholdings.

Some restrictions to special-use authorizations would be required to meet the desired conditions, standards, and guidelines for other resource areas addressed in the action alternatives. The cumulative consequences of any of the proposed alternatives would not be significant. This is because they would have little to no effect on the activities and opportunities for these types of uses across the greater landscape. Cumulative impacts on special uses could occur through changes in the designation and development of land resources and the need for access. The presence of threatened, endangered, and sensitive species and historic and archaeological features and concerns may preclude the issuance of some land-use authorizations and place restrictions on others.

Reasonably foreseeable future actions in the Ashley National Forest that may increase visitor use and lead to increased special-use authorizations include a 3.3-mile OHV trail that will be constructed to connect Sowers Canyon Road to National Forest System Road 497 as part of the Badlands Trail Project. Additionally, the Big Brush Creek–Outlaw ATV Trail Reroute Project would reroute a popular section of a multi-use trail in the Vernal Ranger District to provide an improved recreational experience and to improve resource conditions. An additional trail would be constructed from the current trail to a turnaround near a cave. The Highline ATV Trail Reroute Project would reroute and reconstruct a motorized section of the Highline Trail between Highway 191 and East Park Reservoir in the Vernal Ranger District.

## Designated Areas

### Introduction

The following section is a description of the existing conditions and trends for designated areas in the Ashley National Forest; these are national recreation areas (NRAs), wilderness areas, geologic areas,



scenic byways, national recreation trails, inventoried roadless areas (IRAs), and research natural areas (RNAs). Wild and scenic rivers and recommended wilderness are also discussed in this section. It should be noted that these areas are only designated by Congress; however, until those designations occur, the Forest Service considers these to be management areas.

### Regulatory Framework

**The Wilderness Act of 1964**—Identifies wilderness uses and prohibited activities. To qualify for wilderness designation, an area must appear natural, must have outstanding opportunities for solitude or primitive and unconfined recreation, and must be at least 5,000 acres. The area may also contain ecological or geological features or other features of scientific, scenic, or historic value.

**Public Law 90-540**—Establishes the FGNRA to provide for public outdoor recreation benefits and conservation of scenic, scientific, historic, and other values contributing to public enjoyment.

**Federal Cave Resources Protection Act of 1988 (Public Law 101-691)**—Aims to “secure, protect, and preserve significant caves on Federal lands for the perpetual use, enjoyment, and benefit of all people; and to foster increased cooperation and exchange of information between governmental authorities and those who utilize caves located on Federal lands for scientific, education, or recreational purposes.” Specific effects of the act prohibit disclosing the location of significant caves, removing cave resources, and vandalizing or disturbing cave resources.

**John D. Dingell, Jr. Conservation, Management, and Recreation Act of 2019**—Protects public lands and modifies management provisions; it designates more than 1,300,000 acres of wilderness areas, expands several national parks and other areas of the National Park System, establishes four new national monuments while redesignating others, and establishes the Ashley Karst NRG.

**Wild and Scenic Rivers Act of 1968**—Directs Federal agencies to consider potential wild and scenic rivers in their land and water planning processes. To fulfill this requirement, the Forest Service’s 2012 Planning Rule requires the agency to identify rivers eligible for inclusion in the NWSRS. This is required whenever the Forest Service undertakes the development or revision of a land and resource management plan, commonly called a forest plan. Eligibility studies are required, but a suitability analysis is not. The Wild and Scenic Rivers Act seeks to protect and enhance a river’s natural and cultural values and to provide for public use, consistent with its free-flowing character, its water quality, and its outstandingly remarkable values (ORVs).

**Intermodal Surface Transportation Efficiency Act of 1991**—Establishes the National Scenic Byways Program, as amended by the Transportation Equity Act in 1998 and subsequently with the passage in 2005 of the Safe, Accountable, Flexible, and Efficient Transportation Equity Act—A Legacy for Users. The National Scenic Byways Program is a voluntary, community-based program administered through the Federal Highway Administration to recognize, protect, and promote America’s most outstanding roads.

**National Trails System Act of 1968 (Public Law 90-543)**—Authorizes the creation of a national system of trails composed of national recreation trails, national scenic trails, and national historic trails. National scenic trails and national historic trails may only be designated by an act of Congress; however, national recreation trails may be designated by the Secretary of the Interior or the Secretary of Agriculture to recognize exemplary trails of local and regional significance in response to an application from the trail’s managing agency or organization.

**2001 Roadless Area Conservation Rule (36 CFR Part 294)**—Establishes IRAs and prohibits road construction, reconstruction, and timber harvest, except under certain circumstances, in IRAs. This is

because they have the greatest likelihood of altering and fragmenting landscapes, resulting in loss of IRA values, which are as follows:

- High quality of undisturbed soil, water, and air
- Sources of public drinking water
- Diversity of plant and animal communities
- Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land
- Primitive, semiprimitive nonmotorized, and semiprimitive motorized classes of dispersed recreation
- Reference landscapes
- Natural-appearing landscapes with high scenic quality
- Traditional cultural properties and sacred sites
- Other locally identified unique characteristics

**The Organic Act of 1897**—Establishes RNAs, which include any tract of land or water that supports high-quality examples of terrestrial or aquatic ecosystems, habitats, and populations of rare or endangered plant or animal species or unique geological study of the features. RNAs are managed in a way that allows natural processes to predominate, with minimal human intervention.

### Analysis Area

The analysis area consists of designated areas in the plan area.

### Notable Changes Between Draft and Final EIS

The primary change that impacts the designated areas analysis is the removal of all recommended wilderness from alternative B modified, resulting in the same impacts as those described under alternative A. Additionally, several objectives, goals, and standards relating to designated areas were updated or adjusted slightly (see appendix B for a full list of relevant objectives, goals, and standards). Acres and the map of IRAs were updated to correct a mapping error in the draft EIS, which resulted in the omission of some IRAs.

### Description of Affected Environment

#### *Flaming Gorge National Recreation Area*

Congress designated the FGNRA in 1968 to provide for public outdoor recreation use and enjoyment of the Flaming Gorge Reservoir and surrounding lands and to conserve scenic, scientific, historic, and other values contributing to public enjoyment.

The 207,363 acres of the FGNRA include the Flaming Gorge Reservoir. The area is known for its scenery, geology, and recreation opportunities (Forest Service GIS 2020; Forest Service 2017o). Recreation opportunities include land- and water-based motorized and nonmotorized activities on and near the Flaming Gorge Reservoir and nonmotorized water-based activities on the Green River. Upland development is concentrated in a few areas, leaving the rest of the FGNRA in a predominantly natural state. The FGNRA has the highest level of developed recreation facilities in the Ashley National Forest (Forest Service 2017o). Management of the FGNRA is currently based on direction in appendix A of the

1986 forest plan. This direction will be superseded by the FGNRA management plan once it is finalized. This planning process will undergo separate NEPA analysis.

Increased access could damage archaeological sites in the FGNRA through vandalism and unauthorized collection. Although developed recreation sites are concentrated, dispersed recreation, camping, and OHV use occurs throughout the FGNRA, primarily adjacent to the reservoir in the central and northern areas (Forest Service 2017a). See “Recreation” for further information on recreational opportunities in the FGNRA.

### *High Uintas Wilderness Area*

Congress designated the High Uintas Wilderness under the Utah Wilderness Act of 1984, pursuant to the Wilderness Act of 1964. In 1997, the High Uintas Wilderness Management Plan was completed and amended the Ashley National Forest Plan (amendment 12). The Ashley National Forest staff manages 60 percent (274,014 acres) of the 456,705-acre wilderness and is the lead management unit (Forest Service GIS 2020; Forest Service 2017o). The Ashley National Forest coordinates management with the Uinta-Wasatch-Cache National Forest, which manages the remainder of the wilderness area.

The High Uintas Wilderness Area comprises the core of the Uinta Mountains and provides a nearly pristine natural setting. It is the largest wilderness area in Utah, more than three and a half times larger than the next largest wilderness area in the State (Forest Service 2017o).

### *Recommended Wilderness*

As part of its forest plan revision process, the Forest Service is required to identify and evaluate lands that may be suitable for inclusion in the National Wilderness Preservation System and to determine whether to recommend any such lands for wilderness designation. This process includes four steps: inventory, evaluate, analyze, and possibly recommend. While the supervisor of a national forest may preliminarily recommend suitable lands for National Wilderness Preservation System designation, only Congress has the authority to act on wilderness designations.

The Forest Service completed its Ashley National Forest Evaluation of Potential Wilderness Inventory Areas in May 2019. The final inventory comprises 28 polygons over 5,000 acres, and 4 polygons less than 5,000 acres that are next to the High Uintas Wilderness, for a total of 590,788 acres (about 43 percent of the Ashley National Forest; Forest Service 2019c). The wilderness evaluation, the second step, took a more detailed look at these inventoried areas to determine how well they meet wilderness characteristics using a set of five criteria set forth in the Wilderness Act of 1964 and Forest Service Handbook final directives (Forest Service Handbook 1909.12, chapter 70, section 72.1). Refer to the Ashley National Forest Evaluation of Potential Wilderness Inventory Areas for the full evaluation of the inventoried areas based on the criteria referenced above (Forest Service 2019c) and see appendix G for additional information.

### *Sheep Creek Canyon Geologic Area*

The Sheep Creek Canyon Geologic Area is located along the Flaming Gorge Scenic Byway. This area is next to the FGNRA and connects to the Uinta National Scenic Byway. It is known for its geologic value and is popular for wildlife viewing and pleasure driving. A portion of the Sheep Creek-Spirit Lake Scenic Backway also bisects the 3,600-acre area (Forest Service GIS 2020; Forest Service 2017o).

### *Ashley Karst National Recreation and Geologic Area*

The 173,699-acre Ashley Karst NRG is located along the southern slope of the Uinta Mountains and contains important geologic formations and karst features. The karst features capture surface water and

transport it through a series of underground cave systems to springs in the valley below, where it is used for drinking water and irrigation. The Ashley Karst NRGAs received special designation by Congress in March 2019 as part of the John D. Dingell, Jr., Conservation, Management, and Recreation Act. The purposes of the designation are to conserve and protect the watershed's geological, recreational, wildlife, scenic, natural, cultural, and historic resources in the area (Forest Service 2020i).

### *Wild and Scenic Rivers*

In 2008, the Forest Service completed its final EIS and signed the Record of Decision for its Wild and Scenic River Suitability Study for National Forest System Lands in Utah. The study evaluated the suitability of 86 eligible rivers (840 miles) on the national forests in Utah for recommendation for inclusion in the NWSRS. In the Ashley National Forest, two rivers were recommended as suitable (Forest Service GIS 2020): the Green River (13 miles, scenic classification) and the Upper Uinta River, including Gilbert Creek, Center Fork, and Painter Draw (40 miles, wild classification).

Since the 2008 suitability study, Congress has taken no action on the two rivers determined to be suitable for inclusion in the NWSRS. To date, it has not designated any rivers in the Ashley National Forest as components of the NWSRS.

As part of this plan revision, the Forest Service completed its draft wild and scenic rivers eligibility study and report in May 2019 (Forest Service 2019d). As allowed by the planning directives, the eligibility study was conducted for only those named rivers on a standard U.S. Geological Survey 7.5-minute quadrangle map that were not previously studied for eligibility. The summary responses to scoping comments and errata to the draft eligibility report, as well as the final eligibility report, were published in November 2022.<sup>20</sup>

The Forest Service made the following determinations for those rivers evaluated as part of the 2019 study:

- For Dowd Creek (3.1 miles), a cultural or historic ORV was identified, and the preliminary classification for this river is recreational.
- For Honslinger Creek (2.3 miles), a cultural or historic ORV was identified, and the preliminary classification for this river is recreational.
- For North Skull Creek (1.8 miles), a cultural or historic ORV was identified, and the preliminary classification for this river is wild.
- For Spring Creek (6.8 miles), a cultural or historic ORV was identified, and the preliminary classification for this river is recreational.

The Forest Service performed a wild and scenic river suitability study based on its 2019 wild and scenic rivers eligibility study and report in 2021. The wild and scenic river suitability followed the direction in Forest Service Handbook 1909.12, chapter 80, sections 83.2, Objective of the Suitability Study, and 83.21, Criteria for Determining Suitability. The purpose of the suitability phase is to determine whether eligible rivers are suitable for inclusion in the NWSRS, in accordance with the Wild and Scenic Rivers Act. Suitability considerations include the environmental and economic consequences of designation and the manageability of a river if Congress were to designate it. Forest Service Handbook 1909.12, chapter 80, section 83.2e identifies the various criteria that the Forest Service uses to determine suitability.

The suitability evaluation does not result in actual designation but only in a determination of a river's suitability for inclusion in the NWSRS. The Forest Service cannot administratively designate a river via a

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<sup>20</sup>These can be accessed at <https://www.fs.usda.gov/detail/ashley/landmanagement/planning/?cid=fseprd546973>.

planning decision or other agency decision as part of the NWSRS, and no segment studied is or will be automatically designated as part of the NWSRS. Only Congress can designate a wild and scenic river. Of the four eligible segments evaluated in the suitability study, none were determined to be suitable for inclusion in the NWSRS in the preliminary suitability determination. Suitability determinations made in a NEPA document are draft until the decision record for the NEPA document is signed. For additional information, see appendix F.

Note that management direction for the eligible and suitable wild and scenic river segments are in the management area section of the plan.

### *Scenic Byways*

Scenic byways are federally designated roads that feature one or more archaeological, cultural, historic, natural, recreational, or scenic qualities. Scenic byways in the Ashley National Forest are the Dinosaur Diamond Scenic Byway/Indian Canyon Scenic Byway, the Flaming Gorge-Uintas National Scenic Byway, and the Flaming Gorge-Green River Basin National Scenic Byway (Forest Service 2017o).

Scenic backways are State-designated routes in Utah that are less developed, rugged routes; they are often on National Forest System roads (Forest Service 2017a). Scenic backways in the Ashley National Forest are the Red Cloud Loop Scenic Backway and Sheep Creek Scenic Backway. The State of Utah also has designated the Reservation Ridge Scenic Backway running from U.S. Highway 191 at the Avintaquin Campground turnoff on the Dinosaur Diamond Prehistoric Highway National Scenic Byway, west along the ridge line to U.S. Highway 6, just east of Soldier Summit, within the South Unit of the Duchesne-Roosevelt Ranger District. Other state-designated backways (some of which cross the Ashley National Forest) can be found at <https://rules.utah.gov/publicat/bulletin/2011/20110715/34954.htm>.

- **Dinosaur Diamond/Indian Canyon Scenic Byway**—The byway includes the 12-mile segment of U.S. Highway 191 between Duchesne and Helper, Utah. The segment is the same as the Indian Canyon Scenic Byway and crosses the South Unit of the Duchesne-Roosevelt Ranger District. It follows Indian Creek through the Ashley National Forest to its highest elevation (9,100 feet) at Indian Creek Pass on the Ashley National Forest’s southern boundary. It is managed to promote tourism along its route through Colorado and Utah.
- **Flaming Gorge-Uintas National Scenic Byway**—Also known as “The Drive through the Ages,” the byway includes U.S. Highway 191 from Vernal to Dutch John, Utah, and Utah Highway 44 from U.S. Highway 191 to Manila. The 54 miles of the drive that are in the Ashley National Forest (along the eastern edge of the Uinta Mountains and the southern rim of Flaming Gorge Reservoir) affords outstanding views of the river gorge and the High Uintas. Interpretive pullouts provide roadside geology, ecology, and history information. The scenic byway is also along one of the primary routes from the national parks in Montana and Wyoming to the national parks in southern Utah.
- **Flaming Gorge-Green River Basin National Scenic Byway**—This byway is located in the southwest corner of Wyoming on two north-south roadways extending from I-80 south to the Utah state line for a total of 93 miles. Wyoming State Highway 530 parallels the west side of the FGNRA in Wyoming and is within the NRA for 4.7 miles, while U.S. Highway 191 is on the east side of the NRA. Both Wyoming State Highway 530 and U.S. Highway 191 are the highway access routes to the FGNRA and are designated state scenic byways (an application for the federal

designation is underway).<sup>21</sup> The scenic byway is also along one of the primary routes from the national parks in Montana and Wyoming to the national parks in southern Utah.

- **Red Cloud Loop Scenic Backway**—This backway can be accessed from U.S. Highway 191 in the Vernal area or at its junction with the Flaming Gorge-Untas National Scenic Byway, located 15 miles north of Vernal. The backway travels through sandstone canyons, mixed-conifer and aspen forests, and large meadow areas, and it provides views of the High Uintas Mountains. Most of this backway is unpaved roads (Forest Service 2020j).
- **Sheep Creek Scenic Backway**—This backway can be accessed from Highway 44, and it crosses the Sheep Creek Canyon Geological Area next to the FGNRA. It provides views of geological formations in the area (Forest Service 2020j).

*Little Hole National Recreation Trail*

The Little Hole National Recreation Trail (National Forest System Trail 006) follows the Green River through the Ashley National Forest, from the Flaming Gorge Dam to the Little Hole day-use area. The 7-mile trail is open year-round to hiking and is open seasonally to mountain biking. It also provides access to the Green River for fly fishing. See “Recreation” for further information on recreational opportunities.

*Inventoried Roadless Areas*

IRAs were established under the 2001 Roadless Area Conservation Rule (36 CFR 294). These areas are a group of National Forest System lands without roads and could be suitable for IRA conservation as wilderness or other non-standard protections. Approximately 795,000 acres in the Ashley National Forest are in 39 individual IRAs (Forest Service GIS 2020; Forest Service 2017o).

*Research Natural Areas*

The Ashley National Forest contains seven RNAs, with a total area of 7,700 acres (Forest Service GIS 2020). These RNAs have been designated for the purposes of maintaining biological diversity, conducting non-manipulative research and monitoring, and fostering education. The seven RNAs are Ashley Gorge, Gates of Birch Creek, Lance Canyon, Pollen Lake, Sims Peak Potholes, Timber-Cow Ridge, and Uinta Shale Creek. See table 3-91 for details.

**Table 3-91. Research Natural Areas**

Research Natural Area	Year Established	Acres	Features
Ashley Gorge	1996	1,200	Blue spruce, lodgepole pine, and aspen woodlands; shrublands with mountain mahogany and snowberry; moderate-gradient perennial stream; rare plant
Gates of Birch Creek	1988	200	Steep slope forests of Douglas-fir and lodgepole pine; hogback and water gap landforms
Lance Canyon	1996	300	Douglas-fir and pinyon pine woodlands; outstanding occurrence of Salina wildrye grassland community; big sagebrush shrubland with bluebunch wheatgrass
Pollen Lake	1987	1,100	Subalpine fir and Engelmann spruce forest and krummholz; alpine turf communities on shallow rocky soil; lake and wetlands in cirque basin; rare plants

<sup>21</sup>See [http://www.dot.state.wy.us/home/travel/scenic\\_byways.html](http://www.dot.state.wy.us/home/travel/scenic_byways.html)

Research Natural Area	Year Established	Acres	Features
Sims Peak Potholes	1991	700	Seral lodgepole pine with subalpine fir and Engelmann spruce understory; sedge-dominated pothole wetlands; rare plant
Timber-Cow Ridge	1996	1,200	Open Douglas-fir and ponderosa pine woodlands with abundant curl-leaf mountain mahogany; juniper-pinyon pine woodlands
Uinta Shale Creek	1996	3,000	Subalpine fir and Engelmann spruce forest and krummholz; alpine turf communities; cirque basins draining into moist forest-meadow complexes

Sources: Forest Service GIS 2020; Forest Service 2017o

## Environmental Consequences for Designated Areas

The analysis for designated areas is based on a review of the alternatives for the forest plan revision summarized in chapter 2, GIS data (Forest Service GIS 2020), and other relevant scientific literature.

### *Methodology and Analysis Process*

The analysis in this EIS is programmatic; therefore, no direct environmental effects would result from the administrative action of developing or revising the forest plan; consequently, plan decisions (desired conditions, objectives, standards, and guidelines) and other plan direction (management areas and monitoring) will guide future planning decisions or implementing site-specific projects and activities.

### *Analysis Assumptions*

Analysis assumptions for designated areas are as follows:

- All designated wilderness is managed according to the 1964 Wilderness Act and 1984 Utah Wilderness Act, 36 CFR 293, applicable Forest Service manuals and handbooks, any wilderness management plans, and the land management plan.
- Wilderness stewardship performance is used to measure how well the Forest Service is meeting its primary responsibility under the Wilderness Act, which is to preserve wilderness character. There are seven categories of wilderness stewardship performance elements for national forests to choose from for each wilderness: natural quality of wilderness character; undeveloped quality of wilderness character; untrammeled quality of wilderness character; outstanding opportunities for solitude or primitive and unconfirmed recreation quality of wilderness character; other features of value quality of wilderness character; special provisions; and administration. Recommended wilderness areas are not measured against the wilderness stewardship performance.
- Additional management tools and metrics used to manage wilderness values are the SMS, the recreation opportunity spectrum, and trail classifications. Typically, the scenic integrity objective for wilderness is very high: ROS class primitive or semiprimitive nonmotorized and trails classified as class 1 or 2 management objectives.
- Any area recommended for wilderness designation, scenic byways, or trail designation or found suitable as wild and scenic river segments through the planning process is a preliminary administrative recommendation. It will receive further review and possible modification by the Chief of the Forest Service, the Secretary of Agriculture, and the President of the United States. Congress has reserved the authority to make final decisions on wilderness designation.

### *Indicators*

The impact analysis area consists of designated areas in the plan area. Quantitative indicators for designated areas are as follows:

- Acres or miles of designated areas by alternative, including designated wilderness, recommended wilderness, special designation areas (including RNAs, NRAs, and geologic areas), IRAs in recommended wilderness, and suitable wild and scenic rivers
- The acres or miles of overlap of designated areas with other allocations outlined in chapter 2, as applicable

In addition to the quantitative indicators listed above, the analysis also includes qualitative indicators to measure the degree of change from the various determinations related to designated areas. Qualitative indicators include the degree to which recommended and designated wilderness promotes the protection of wilderness character and wilderness characteristics that existed at the time of the preliminary administrative recommendation and whether the overlapping allocations outlined in chapter 2 are compatible with the subject designation.

### *Environmental Consequences for Designated Areas Common to All Alternatives*

Under all alternatives, there would be no changes to the FG NRA, scenic byway miles, national recreation trails, geologic areas, or wilderness areas. These areas would continue to be managed according to the enabling legislation for which they were designated. Additionally, the acres of IRAs would be the same under all alternatives (795,000 acres). However, changes do occur by alternative for recommended wilderness areas as these areas have not been designated as wilderness areas by Congress.

In general, management actions that protect resources, such as limitations on ground-disturbing activities such as recreation, grazing, and facilities, would help maintain and improve the values associated with designated areas. In the same fashion, managing for resource uses could affect those values.

### *Environmental Consequences for Designated Areas—Alternative A*

Under alternative A, the 1986 forest plan would continue to guide management of the Ashley National Forest, and ongoing work or work previously planned and approved would occur under that guidance. This alternative would not recommend or establish any new designated areas; no changes would occur to the plan in response to issues raised, and it would not adjust management in response to the requirements of the 2012 Planning Rule. Under alternative A, special designation areas are the Sheep Creek Canyon Geologic Area and seven RNAs (Ashley Gorge, Gates of Birch Creek, Lance Canyon, Pollen Lake, Sims Peak Potholes, Timber-Cow Ridge, and Uinta Shale Creek), totaling 7,700 acres.

Alternative A would include the continuation of no new recommended wilderness, and no new wild and scenic river segments would be classified as suitable for inclusion in the NWSRS (Green River [13 miles] and Upper Uinta River [40 miles] would continue to be managed as recommended for suitability from the 2008 wild and scenic river suitability study). Under alternative A, the Forest would not be managed to meet current demands or conditions for recreation needs in designated areas or other non-designated areas on the Forest.

### *Environmental Consequences for Designated Areas—Alternative B Modified*

Under alternative B modified, all existing special areas and RNAs would remain. There would be no new designated areas and no recommended wilderness areas. River segments recommended as suitable for inclusion in the NWSRS would be the same as under alternative A, with impacts as described under alternative A.



### *Environmental Consequences for Designated Areas—Alternative C*

Compared with alternative A, alternative C would increase the percentage of the Ashley National Forest managed as designated areas. This alternative would include all areas meeting the requirements for wilderness under the wilderness inventory and determined to be suitable for wilderness recommendation under the wilderness review; therefore, alternative C would include the most acres managed for wilderness characteristics as recommended wilderness areas (four recommended wilderness areas totaling 50,200 acres). Timber harvest would not be allowed to maintain the option for future designation.

Continued management to the nonimpairment standard would maintain the area's suitability for preservation as wilderness. Under this alternative, recommended wilderness areas would include 50,100 acres of IRAs, whereas under alternative A there would be no IRAs in recommended wilderness areas. This action could help protect wilderness values by reducing surface disturbance from roads and vehicle use.

An additional RNA (Gilbert Bench, 1,400 acres) would be included under this alternative, resulting in a total of 9,100 total acres for eight RNAs. This management would emphasize habitat connectivity and maintenance of a natural setting.

This alternative would bring forward four additional segments as suitable for inclusion in the NWSRS: Dowd Creek (3.1 miles), Honslinger Creek (2.3 miles), Spring Creek 2 (6.8 miles), and North Skull Creek (1.8 miles). Under this alternative, no miles would be determined suitable for timber harvest, which would help protect and preserve relevant and important values.

Until Congress acts on suitability recommendations, stream segments would be managed under protective measures. These provisions protect streamside and riparian habitats, riparian and aquatic species, water quality, cultural and visual resources, and the recreational setting. Most notably, the protective measures would ensure that the values for which these river segments were found suitable are not compromised until Congress makes a decision regarding wild and scenic river designation. The major difference between designation and non-designation is the long-term protection afforded by legislation instead of an administrative land use plan; decisions in the forest plan, however, would affect suitability only.

Once a segment is determined suitable, it can be formally recommended to Congress or the Secretary of the Interior for inclusion in the NWSRS; therefore, the Forest Service would not permit any actions on eligible or suitable segments that would negatively affect the free-flowing nature, ORVs, or tentative classification or that would reduce water quality to the extent that it would no longer support the ORVs. As such, implementing the management actions in this plan would not affect eligible or suitable segments.

### *Environmental Consequences for Designated Areas—Alternative D*

This alternative would have the fewest restrictions on resource use and is the least protective of designated areas. There would be no new designated areas and no recommended wilderness areas. River segments recommended as suitable for inclusion in the NWSRS would be the same as under alternative A.

### **Cumulative Environmental Consequences for Designated Areas**

There are several actions that may have minor effects on wilderness values and NRGAs. For example, the West Fork Smiths Fork Colorado River Cutthroat Trout Enhancement CE aims to treat the streams in the West Fork Smiths Fork drainage, including some waters in the High Uintas Wilderness, with rotenone to remove nonnative fish species. This would enhance habitat for native Colorado River cutthroat trout and

could result in slight impacts on wilderness values. Additionally, the High Uintas Wilderness Domestic Sheep Analysis Project to evaluate the effects of continued domestic sheep grazing in the High Uintas Wilderness could result in impacts on wilderness values in the areas.

Finally, the Ashley Karst National Recreation and Geologic Management Plan for the congressionally designated Ashley Karst NRGAs could affect the values associated with the NRGAs.

## Other Required Disclosures

### Unavoidable Adverse Effects

The Ashley National Forest's revised land management plan provides a programmatic framework that guides site-specific actions but does not authorize, fund, or carry out any project or activity. Before any ground-disturbing actions take place, they must be authorized in a subsequent site-specific environmental analysis. Therefore, none of the alternatives would cause unavoidable adverse impacts.

### Relationship Between Short-Term Uses and Long-Term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16).

The revised forest plan will govern management of the Ashley National Forest's resources for the next 15 years. Although the forest plan would not directly implement these uses, the potential for these uses are described in the plan's goals and objectives at the forestwide and the management and designated area levels.

Long-term productivity refers to the capability of the land to provide resource outputs for a period of time beyond the planning period. Minimum management requirements, established by regulation (36 CFR 219.1(b)), provide for maintenance of long-term productivity of the land. Minimum management requirements are contained in forestwide and management and designated area standards and guidelines and would be met under any alternative. They ensure that the long-term productivity of the land is not impaired by short-term uses.

Monitoring and evaluation, as described in the forest plan, applies to all alternatives. The purpose of the plan monitoring program is to monitor desired conditions and objectives to provide for sustainability. Meeting sustainability objectives would provide for long-term productivity of the land, per 36 CFR 219.1(b). The analysis shows that management under the plan would provide for ecological sustainability (36 CFR 219.8(a)) and soil productivity (219.8(a)(2)(ii)). Although all alternatives are designed to maintain long-term productivity, there are differences among the alternatives in the long-term availability or condition of resources. There may also be differences among alternatives in long-term expenditures necessary to maintain or achieve desired conditions. The EIS discloses the analysis of effects for a range of alternatives, including no action. It considers effects on the issues used for alternative development and other resources for this time frame.

### Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable commitments of resources are defined in Forest Service Handbook 1909.15, Environmental Policy and Procedures. Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time, such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line right-of-way or road.

The decisions made in land management plans do not represent actual irreversible and irretrievable commitments of resources. This is because land management planning identifies what kinds and levels of activities are appropriate in different parts of the national forest; it does not make project-level decisions. Ground-disturbing activities cannot occur without further site-specific analyses and project decision documents.

### **Energy Requirements and Conservation Potential**

Energy is consumed in the administration of natural resources from the national forests. The main activities that consume energy are timber harvest, recreation use, road construction and reconstruction, minerals and energy exploration and development, transporting and managing livestock, and administrative activities of the Forest Service and other regulatory agencies. Energy consumption is expected to vary only slightly by alternative.

### **Prime Farmland, Rangeland, and Forestland**

No prime farmland, rangeland, or forestland has been identified in the plan area. Revision of the forest plan or the forest plan itself would not directly affect such lands. although implementation of the plan could have indirect effects. Regardless of the alternative selected for implementation, National Forest System lands would be managed with sensitivity to the values of any adjacent private or public lands.

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# Chapter 4

Preparers, Consultation and Coordination, and  
Distribution of the Environmental Impact Statement

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# Chapter 4. Preparers, Consultation and Coordination, and Distribution of the Environmental Impact Statement

## Preparers and Contributors

The following individuals and Forest Service staff contributed to the development of this final EIS.

**Table 4-1. List of Preparers**

Name	Title and EIS Contribution
Dan Abeyta	Fish and Wildlife Program Manager (Terrestrial and Aquatic Wildlife and Plants)
Anastasia Allen	Forest Plan Revision Team Lead
Dustin Bambrough	Natural Resources Planning Staff Officer (Livestock Grazing)
Allison Borchers	Economist (Social and Economic Sustainability, and Environmental Justice)
Ryan Buerkle	Forest Recreation Program Manager (Recreation Settings and Opportunities, Recreation Management Areas, and Designated Areas)
Rhett Burkman	Realty Specialist (Land Status and Ownership, and Special Uses)
Bob Christensen	Wildlife Biologist (Terrestrial and Aquatic Wildlife and Plants)
Lars Christensen	Collaboration Specialist
Joseph Flores	Forest Fire Management Officer (Fire and Fuels)
David Herron	Forest Geologist (Energy and Minerals, and Geologic Resources and Hazards)
Nicole Hill	Landscape Architect (Scenic Resources)
Allen Huber	Ecologist (Terrestrial Vegetation and Livestock Grazing)
Kathryn McKay	Writer-Editor
Sarah Leahy	Forest Soil Scientist (Soils and Carbon Storage and Sequestration)
Jim McRae	Timber Management Officer (Timber)
Valton Mortenson	Civil Engineer (Transportation and Facilities Infrastructure)
Chris Plunkett	Hydrology (Air Quality, and Watersheds and Aquatic Riparian Ecosystems)
Jeffrey Rust	Heritage Program Leader/Forest Archaeologist (Areas of Tribal Importance, and Cultural and Historic Resources)

<b>Name</b>	<b>Title and EIS Contribution</b>
Kristen Waltz	Economist (Social and Economic Sustainability, and Environmental Justice)
Colette Webb	Forester (Terrestrial Vegetation and Timber)
<b>Third-Party EIS Preparers (Environmental Management and Planning Solutions, Inc.)</b>	
Kevin Rice	Project Manager
Amanda Biedermann	Designated Areas Specialist
Lindsay Chipman	Wildlife Biologist
Amy Cordle	Air Quality and Climate Specialist
Francis Craig	Geologist/Minerals Specialist
Kevin Doyle	Heritage, Cultural, and Tribal Resources Specialist
Zoe Ghali	Deputy Project Manager, and Socioeconomic Specialist
Noelle Crowley	Recreation Planner
Derek Holmgren	Visual Resources Specialist
Theresa O'Halloran	GIS Technician
Holly Prohaska	Livestock Grazing Specialist
Julie Remp	Ecologist
Marcia Rickey	GIS Technician
Josh Schnabel	Lands and Realty Specialist
Kirsten Settas	Soil Scientist
Matthew Smith	Hydrologist
Andy Spellmeyer	Forest Ecologist

## Consultation and Coordination

During the development of the draft and final EISs, the Forest Service cooperated with federally recognized tribes; Federal, State, and local agencies; special interest groups; and individuals. Consultation and coordination can take multiple forms. USFWS, State Historic Preservation Offices (SHPOs), and the tribes are consulted as per the requirements of the Endangered Species Act and section 106 of the National Historic Preservation Act. In addition, Forest Service coordination with tribes occurs through formal government-to-government consultation. Finally, entities that “have jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal or reasonable alternative” (40 CFR 1501.6 and 40 CFR 1508.5) are invited to participate in the planning process, with details of the participation agreement laid out in a formal memorandum of understanding (MOU) between the entity and the Forest Service.

Entities that have coordinated with the Forest Service for the development of the forest plan and EIS are noted below, with those having a formal MOU agreement indicated. Details of the consultation fulfillment for the USFWS, Ute Indian and Eastern Shoshone Tribes, and Utah and Wyoming SHPOs are included below.

### Federally Recognized Tribes

Ute Indian Tribe (MOU)

Eastern Shoshone Tribe



## **Federal and State Agencies**

U.S. Fish and Wildlife Service

State of Utah, Public Lands Policy Coordinating Office (MOU)

State of Wyoming, Governor's Policy Office (MOU)

Utah SHPO

Wyoming SHPO

## **County and Local Governments and Agencies with MOUs**

Daggett County, Utah

Duchesne County, Utah

Summit County, Utah

Utah County, Utah

Uintah County, Utah

Daggett Conservation District, Utah

Uintah Conservation District, Utah

Sweetwater County, Wyoming

Sweetwater Conservation District, Wyoming

Uinta Conservation District, Wyoming

Uinta County, Wyoming

## **Consultation Summary**

The Ashley National Forest staff informally consulted with the USFWS in June 2022 to discuss those federally listed species that should be considered and evaluated in a biological assessment for its revised land management plan. As a result of this meeting, a list of species was developed and agreed upon. In accordance with section 7(c) of the Endangered Species Act, a biological assessment was prepared to assess the effects of implementing the plan on the seven federally listed species and one species proposed for listing identified by the USFWS as known or suspected to occur on the national forest.

The biological assessment considers the potential effects of the forest plan (alternative B modified) on these eight federally listed or proposed species for the Ashley National Forest. The Forest Service transmitted the biological assessment to the USFWS in 2022. Note that consultation with the USFWS for listed species plan components takes place at the programmatic level, whereas consultation on implementation will take place at the project level. The USFWS issued concurrence in January 2023 and a final biological assessment was transmitted to the USFWS in February, 2023.

As part of the NHPA section 106 consultation effort, the Forest Service sent copies of the draft EIS to the Eastern Shoshone Tribal Historic Preservation Officer (THPO), the Ute Indian Tribe THPO, the Utah

SHPO, and the Wyoming SHPO with letters addressing the area of potential effect and identification efforts for cultural resources. The Wyoming SHPO has participated as a cooperating agency throughout the forest planning process and has provided comments and recommendations for multiple plan components. The Forest Service has met with the Ute Indian Tribe Business Committee and the Ute Indian Tribe THPO (Cultural Rights and Protection Director) various time throughout the planning process to discuss plan components for areas of tribal importance and cultural and historic resources. Formal and informal consultation with the Ute Indian Tribe and the Wyoming SHPO have helped shape the language of the forest plan. The Eastern Shoshone Tribe and the Utah SHPO were given opportunities to consult on the forest plan and draft EIS, but they did not provide substantive feedback.

The Forest Service will consult with the Eastern Shoshone THPO, the Ute Indian THPO, the Wyoming SHPO, and the Utah SHPO regarding the NHPA section 106 finding of effect when the final EIS and forest plan are ready to be released. The Forest Service will continue to consult with the appropriate THPOs and SHPOs regarding NHPA section 106 compliance on Forest Service projects and programs implemented after the forest plan has been approved.

## Plan Consistency Review

The 2012 Planning Rule (36 CFR 219.4(b)) requires the review of the planning and land use policies of other Federal agencies, State and local governments, and Indian tribes. This review includes (1) consideration of the objectives of these entities as expressed in their plans and policies, (2) the compatibility and interrelated impacts of these plans and policies, (3) opportunities for the plan to address the impacts identified or contribute to joint objectives, and (4) opportunities to resolve or reduce conflicts, within the context of developing the plan's desired conditions or objectives.

Engagement with cooperating agencies has occurred throughout the planning process, beginning with the assessment phase. Cooperating agency meetings have occurred throughout the assessment and planning process starting in 2016. The planning team hosted 15 formal meetings with cooperating agencies to review comments on the preliminary need for change, wilderness report, wild and scenic rivers report, and the proposed forest plan. The planning team has also met with cooperating agencies, upon request, to review comments on a preliminary draft of the proposed plan and EIS.

In spring 2018, representatives from the Ashley National Forest requested that cooperating agencies provide current copies of county resource management plans or state resource management plans. In addition, the Ute Indian Tribe provided copies of several resource-specific plans for review. The forest plan revision interdisciplinary team reviewed the provided tribal, county, and state resource management plans for consistency with the proposed forest plan. Consistency review findings were tracked by resource topic, and review findings were discussed at interdisciplinary team meetings. Where appropriate, edits were made to the forest plan.

Following the release of the draft EIS and draft forest plan, the Forest Service updated the list of plans for review, to include the most recent plans and to incorporate plans noted in public comments for review. The detailed review of these plans is discussed in appendix E, Compatibility of Plan with Other Agency Plans.

It is recognized that new plans may be developed and additional revisions to existing state and local plans may occur during the plan's implementation period. The consistency of these plans with the forest plan will be reviewed as a component of the monitoring process.

## Distribution of the Environmental Impact Statement

The Forest Service provided notices of electronic availability ([www.fs.usda.gov/main/ashley/landmanagement/planning](http://www.fs.usda.gov/main/ashley/landmanagement/planning)) to Federal agencies, federally recognized tribes, State and local governments, and organizations that are cooperating agencies or that have requested updates. The Forest Service is required to send copies (or provide notices of electronic availability) to the following agencies: Animal and Plant Health Inspection Service Policy and Program Development Office, Rural Utilities Service, Natural Resources Conservation Service National Environmental Coordinator, USDA Office of Civil Rights, National Agricultural Library Acquisitions and Serials Branch, National Oceanic and Atmospheric Administration NEPA Coordinator, U.S. Army Corps of Engineers, US EPA Region 8, and Director of NEPA Policy and Compliance in the Department of Energy.

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## References

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## References

- Abernethy, B., and I. D. Rutherford. 2001. The distribution and strength of riparian tree roots in relation to riverbank reinforcement. *Hydrological Processes* 15(1): 63–79.
- Abeyta, D. 2020. Macroinvertebrate BCI Summary on the Ashley National Forest, unpublished.
- Agee, J. K., and C. N. Skinner. 2005. Basic principles of forest fuel reduction treatments. *Forest Ecology and Management* 211(1–2): 83–96.
- Armour, C. L., D. A. Duff, and W. Elmore. 1991. The effects of livestock grazing on riparian and stream ecosystems. *Fisheries* 16: 7–11.
- Auerswald, K. 2008. Water erosion. In W. Chesworth. *Encyclopedia of Soil Science*. Springer, 817–822. Heidelberg, Germany.
- Barber J. R., K. R. Crooks, and K. M. Fristrup. 2009. The costs of chronic noise exposure for terrestrial organisms. *Trends in Ecology and Evolution* 25: 180–89.
- Barrett, K. 2020. Federal Wildfire Policy and the Legacy of Suppression. *Headwaters Economics*. Internet website: <https://headwaterseconomics.org/natural-hazards/federal-wildfire-policy/>.
- BEA (U.S. Bureau of Economic Analysis, U.S. Department of Commerce). 2019. Regional Economic Accounts for Selected Counties. *Headwaters Economics*. Internet website: <https://headwaterseconomics.org/tools/economic-profile-system>.
- Behnke, R. J. 1992. Native trout of western North America. *American Fisheries Society Monograph* 6: 275. Bethesda, Maryland.
- Belnap, J., J. H. Kaltenecker, R. Rosentreter, J. Williams, S. Leonard, and D. Eldridge. 2001. Biological Soil Crusts: Ecology and Management. TR 1730-2. Denver, Colorado: United States Department of the Interior, U.S. Geological Survey, and Bureau of Land Management.
- Belsky, A. J., A. Matzke, and S. Uselman. 1999. Survey of livestock influences on stream and riparian ecosystems in the western United States. *Journal of Soil and Water Conservation* 54: 419–431.
- Beschta, R. L. 1997. Riparian shade and stream temperature: An alternative perspective. *Rangelands* 19: 25–28.
- Bevenger, G. 2017. Ashley National Forest Assessment. Air, Soil, and Watershed Resources Report. Unpublished. Ashley National Forest Supervisor’s Office, Vernal, Utah.
- Birdsey, Richard A., Alexa J. Dugan, Sean P. Healey, Karen Dante-Wood, Fangmin Zhang, Gang Mo, Jing M. Chen, et al. 2019. Assessment of the Influence of Disturbance, Management Activities, and Environmental Factors on Carbon Stocks of U.S. National Forests. Gen. Tech. Rep. RMRS-GTR-402. Fort Collins, Colorado: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

- Blickley, J. L., and G. L. Patricelli. 2010. Impacts of anthropogenic noise on wildlife: Research priorities for the development of standards and mitigation. *Journal of International Wildlife Law & Policy* 13(4): 274–292.
- BLS (Bureau of Labor Statistics). 2021. Local Area Unemployment Statistics for Selected Counties. Local Area Statistics. Internet website: <https://www.bls.gov/lau/>.
- BLM (United States Department of the Interior, Bureau of Land Management). 2020. Energy and Minerals—About Mining and Materials. Internet website: <https://www.blm.gov/programs/energy-and-minerals/mining-and-minerals/about>.
- Buerkle, R. 2017. Ashley National Forest Assessment, Scenery Report. May 2017. Ashley National Forest, Vernal, Utah.
- Burke, M., A. Driscoll, S. Heft-Neal, J. Xue, J. Burney, and M. Wara. 2021. The changing risk and burden of wildfire in the United States. *Proceedings of the National Academy of Sciences of the United States of America*. 2021 Vol. 118 No. 2. Internet website: <https://www.pnas.org/content/pnas/118/2/e2011048118.full.pdf>.
- Burns, R. C., and A. R. Graefe. 2006. Toward understanding recreation fees: Impacts on people with extremely low income levels. *Journal of Park and Recreation Administration* 24: 1–20.
- Census Bureau (U.S. Department of Commerce Census Bureau). 1990. CPH-2-1: Census of Population and Housing. Internet website: <http://www.census.gov/library/publications/1993/dec/cp-2.html>.
- \_\_\_\_\_. 2000. Census 2000 Summary File, DP-1: Profile of General Demographics. Internet website: <http://factfinder2.census.gov>.
- \_\_\_\_\_. 2010. Census 2010, DP-1: Demographic Profile Data. Internet website: <http://factfinder2.census.gov>.
- \_\_\_\_\_. 2015. American Fact Finder. American Community Survey 5-Year Estimates 2010-2015. Internet website: <http://factfinder.census.gov/>.
- \_\_\_\_\_. 2018. American Fact Finder. American Community Survey 5-Year Estimates 2013-2018. Internet website: <http://factfinder.census.gov/>.
- \_\_\_\_\_. 2019a. American Fact Finder. American Community Survey 5-Year Estimates 2015-2019. Table DP05. Internet website: <http://factfinder.census.gov/>.
- \_\_\_\_\_. 2019b. American Fact Finder. American Community Survey 5-Year Estimates 2015-2019. Table S1701. Internet website: <http://factfinder.census.gov/>.
- Certini, G. 2005. Effects of fire on properties of forest soils: A review. *Oecologia* 143: 1–10.
- Cho, S. H., J. M. Bowker, D. B. K. English, R. K. Roberts, and T. Kim. 2014. Effects of travel cost and participation in national forest visits. *Forest Policy and Economics* 40: 21–30
- Cleetus, R., and R. Mulik. 2014. Playing with fire: How Climate change and development patterns are contributing to the soaring costs of western wildfires. Internet website: [http://www.ucsusa.org/global\\_warming/science\\_and\\_impacts/impacts/climate-change-development-patterns-wildfire-costs.html#.VUkn0ZgcSfA](http://www.ucsusa.org/global_warming/science_and_impacts/impacts/climate-change-development-patterns-wildfire-costs.html#.VUkn0ZgcSfA).



- Cleland, D. T., P. E. Avers, W. H. McNab, M. E. Jensen, R. G. Bailey, T. King, and W. E. Russell. 1997. National hierarchical framework of ecological units. In: M. S. Boyce, and A. Haney(editors). *Ecosystem Management Applications for Sustainable Forest and Wildlife Resources*. Yale University Press, New Haven, Connecticut. Pp. 181–200.
- Collins, W. B., and P. J. Urness. 1983. Feeding behavior and habitat selection of mule deer and elk on northern Utah summer range. *The Journal of Wildlife Management* 47(3): 646–663
- Council on Environmental Quality (CEQ). 1997. Environmental Justice Guidance under the National Environmental Policy Act. Internet website: <https://www.epa.gov/environmentaljustice/ceq-environmental-justice-guidance-under-national-environmental-policy-act>.
- Davies I. P. , Haugo R. D. , Robertson J. C., Levin P. S. 2018. The unequal vulnerability of communities of color to wildfire. *PLOS ONE* 13(11): e0205825. <https://doi.org/10.1371/journal.pone.0205825>.
- Davies-Colley, R. J., J. W. Nagels, R. A. Smith, R. G. Young, and C. J. Phillips. 2004. Water quality impact of a dairy cow herd crossing a stream. *New Zealand Journal of Marine and Freshwater Research* 38(4): 569–576.
- Deal, Robert, Lisa Fong, and Erin Phelps (technical editors). 2017. Integrating Ecosystem Services into National Forest Service Policy and Operations. Gen. Tech. Rep. PNW-GTR-943. Portland, Oregon: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.
- Debano, L. F., D. G. Neary, and P. F. Ffolliott. 1998. *Fire’s effects on ecosystems*. New York: John Wiley and Sons Inc. 333 p.
- Dettenmaier S. J., T. A. Messmer, T. J. Hovick, and D. K. Dahlgren. 2017. Effects of livestock grazing on rangeland biodiversity: A meta-analysis of grouse populations. *Ecology and Evolution* 7(19): 7620–7627. doi:10.1002/ece3.3287.
- Dugan, A., D. McKinley, and D. Bambrough. 2020. Forest Carbon Assessment for the Ashley National Forest in the Forest Service’s Intermountain Region. Forest Service, Intermountain Region, Ogden, Utah. May 8, 2020.
- Dwire, K., and M. Smith. 2016. Natural Range of Variation Report for the Ashley National Forest. Chapter 1. Riparian and Wetland Ecosystems Associated with Streams Lake and Meadows in the Ashley National Forest. Chapter 2. Condition, Natural Range of Variability and Key Ecosystem Characteristics of Groundwater Dependent Ecosystems on the Ashley National Forest: Springs and Fens. Preliminary draft. Ashley National Forest, Vernal, Utah.
- Elliot, W. J. 2013. Erosion processes and prediction with WEPP technology in forests in the northwestern U.S. *Transactions of the ASABE* 56(2): 563–579.
- EPA (U.S. Environmental Protection Agency). 1998. *Interim Air Quality Policy on Wildland and Prescribed Fires*. Research Triangle Park, North Carolina.
- \_\_\_\_\_. 2015a. Report on the Environment: Particulate Matter Emissions. Internet website: <https://cfpub.epa.gov/roe/indicator.cfm?i=19>.
- \_\_\_\_\_. 2015b. Action letter of partial approval re: The State of Utah’s 2012 and 2014 Clean Water Act Section 303(d) Waterbody Lists, Reference 8EPR-EP, signed November 30, 2015.

- 
- \_\_\_\_\_. 2016. Federal Baseline Water Quality Standards for Indian Reservations. Proposed Rules. 40 CFR131. *Federal Register* 81(189): 66900.
- \_\_\_\_\_. 2017. Background on drinking water standards in the Safe Drinking Water Act (SDWA). U.S. Environmental Protection Agency. Internet website: <https://www.epa.gov/dwstandards/regulations/background-drinking-water-standards-safe-drinking-water-act-sdwa>.
- \_\_\_\_\_. 2018. Report on the Environment, Carbon Storage in Forests. Internet website: <https://cfpub.epa.gov/roe/indicator.cfm?i=86>.
- \_\_\_\_\_. 2020a. Green Book: Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. Internet website: [https://www3.epa.gov/airquality/greenbook/anayo\\_ut.html](https://www3.epa.gov/airquality/greenbook/anayo_ut.html) and [https://www3.epa.gov/airquality/greenbook/anayo\\_wy.html](https://www3.epa.gov/airquality/greenbook/anayo_wy.html).
- \_\_\_\_\_. 2020b. Health and Environmental Effects of Particulate Matter (PM). Internet website: <https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm>.
- \_\_\_\_\_. 2020c. Inventory of U.S. Greenhouse Gas Emissions and Sinks (1990–2018). EPA 430-R-20-002. April 13, 2020. Internet website: <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>.
- \_\_\_\_\_. 2020d. EPA National Emissions Inventories. Internet website: <https://www.epa.gov/air-emissions-inventories>.
- \_\_\_\_\_. 2022a. EPA. 2022a. About Air Data Reports, Air Quality Statistics Report. Internet website: <https://www.epa.gov/outdoor-air-quality-data/about-air-data-reports>.
- \_\_\_\_\_. 2022b. Air Quality Statistics Report, Duchesne and Uintah Counties (2011-2021). Internet website: <https://www.epa.gov/outdoor-air-quality-data/about-air-data-reports>.
- \_\_\_\_\_. 2022c. EPA 2022c Action letter of partial approval re: Clean Water Act Section 303(d) Total Maximum Daily Load (TMDL) Waterbody List, Reference 8WD-CWD, signed March 8, 2022.
- EPA GIS. 2020. GIS data representing the most up-to-date publicly available water program data by state (or custom area) from the EPA's Environmental Dataset Gateway (EDG) Clip N Ship Site. Internet website: <https://www.epa.gov/ceam/303d-listed-impaired-waters#currentstate>.
- Farmer, A. M. 1991. The effects of dust on vegetation—A review. *Environmental Pollution* 79: 63–75.
- Fernandez, D., J. Neff, and R. Reynolds. 2008. Biogeochemical and ecological impacts of livestock grazing in semi-arid southeastern Utah, USA. *Journal of Arid Environments* 72(5): 777–791.
- Finkral, A. J., and A. M. Evans. 2008. The effects of a thinning treatment on the carbon stocks in a northern Arizona ponderosa pine forest. *Forest Ecology and Management* 255: 2743–2750.
- Fites-Kaufman, J. A., A. F. Bradley, and A. G. Merrill. 2006. Fire and plant interactions. N. G. Sugihara, J. W. van Wagtendonk, K. E. Shaffer, J. Fites-Kaufman, and A. E. Thode (editors). In: *Fire in California's Ecosystems*. Berkeley: University of California Press.
- Forest Service (U.S. Department of Agriculture, Forest Service). 1974. Agriculture Handbook 462, National Forest Landscape Management Vol. 2. U.S. Department of Agriculture. Internet website: <https://www.nrc.gov/docs/ML1224/ML12241A372.pdf>.
-

- \_\_\_\_\_. 1986. Ashley National Forest Land and Resource Management Plan. Vernal, Utah.
- \_\_\_\_\_. 1995. Agriculture Handbook 701, Landscape Aesthetics: A Handbook for Scenery Management. U.S. Department of Agriculture. Internet website: [http://blmwyomingvisual.anl.gov/docs/Landscape%20Aesthetics%20\(AH-701\).pdf](http://blmwyomingvisual.anl.gov/docs/Landscape%20Aesthetics%20(AH-701).pdf).
- \_\_\_\_\_. 2003. FSM 2300 Recreation, Wilderness, and Relation Resource Management. Chapter 2380—Landscape Management. Internet website: <https://www.fs.fed.us/im/directives/dughtml/fsm2000.html>.
- \_\_\_\_\_. 2007. Northern Rockies Lynx Management Direction Record of Decision. National Forests in Montana, and Parts of Idaho, Wyoming, and Utah. Internet website: [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/fseprd524871.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd524871.pdf).
- \_\_\_\_\_. 2009a. Ashley National Forest Ecosystem Diversity Evaluation Report. Draft. Ashley National Forest, Vernal, Utah.
- \_\_\_\_\_. 2009b. Motorized Travel Plan. Final Environmental Impact Statement. September 2009. Internet website: <https://www.fs.usda.gov/detail/ashley/landmanagement/planning/?cid=STELPRD3839652>.
- \_\_\_\_\_. 2011a. Forest Service Manual Intermountain Region (Region 4) FSM 2500 Watershed and Air Management Chapter 2550 Soil Management. Supplement: 2500-2011-1. USDA Forest Service, Ogden, Utah.
- \_\_\_\_\_. 2011b. Watershed Condition Framework. FS-977. May 2011. Washington, DC.
- \_\_\_\_\_. 2011c. Watershed Condition Classification Technical Guide. FS-978. July 2011. Washington, DC.
- \_\_\_\_\_. 2012a. National Best Management Practices for Water Quality Management on National Forest System Lands. FS-31990a. April 2012. Washington, DC.
- \_\_\_\_\_. 2012b. National Visitor Use Monitoring Survey for the Ashley National Forest-Round 3. Internet website: [https://apps.fs.usda.gov/nvum/results/ReportCache/2012\\_A04001\\_Master\\_Report.pdf](https://apps.fs.usda.gov/nvum/results/ReportCache/2012_A04001_Master_Report.pdf).
- \_\_\_\_\_. 2015a. Baseline Estimates of Carbon Stocks in Forests and Harvested Wood Products for National Forest System Units: Intermountain Region. Forest Service whitepaper. Internet website: <https://www.fs.fed.us/climatechange/documents/IntermountainRegionCarbonAssessment.pdf>.
- \_\_\_\_\_. 2015b. Greater Sage-Grouse Record of Decision for Idaho and Southwest Montana, Nevada and Utah. Internet website: [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprd3855559.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3855559.pdf).
- \_\_\_\_\_. 2015c. Framework for streamlining consultation on livestock grazing activities. U.S. Department of Agriculture, Forest Service Southwestern Region. Albuquerque, New Mexico.
- \_\_\_\_\_. 2015d. Ashley National Forest. 2015 Travel Analysis Report. Vernal Utah. Internet website: [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/fseprd527289.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd527289.pdf).

- \_\_\_\_\_. 2016a. Assessment of the Influence of Disturbance, Management Activities, and Environmental Factors on Carbon Stocks: Intermountain Region. Forest Service whitepaper. Internet website: <https://www.fs.usda.gov/sites/default/files/Appendix-7-NFS-Disturbance-Carbon-Assessment-Intermountain-Region.pdf>.
- \_\_\_\_\_. 2016b. Future of America's Forests and Rangelands, Update to the Forest Service 2010 Resources Planning Act Assessment. General Technical Report WO-94. Forest Service Research and Development, Washington, DC.
- \_\_\_\_\_. 2017a. Assessment Report of Ecological, Social, and Economic Conditions on the Ashley National Forest. Vernal, Utah.
- \_\_\_\_\_. 2017b. Ashley National Forest Assessment—Air, Soil, and Watershed Resources Report. Ashley National Forest, Vernal, Utah.
- \_\_\_\_\_. 2017c. Assessment of watershed vulnerability to climate change for the Uinta-Wasatch-Cache and Ashley National Forests, Utah. Gen. Tech. Rep. RMRS-GTR-362. Fort Collins, Colorado: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- \_\_\_\_\_. 2017d. Ashley National Forest Assessment: Aquatic Ecosystems Report. Price, Utah.
- \_\_\_\_\_. 2017e. Ashley National Forest Assessment, Terrestrial Ecosystems, System Drivers, and Stressors Report. Prepared by Allen Huber, Colette Webb, Chris Plunkett, Brad Gillespie, Chris Gamble, Joe Flores, and Dustin Bambrough. Ashley National Forest, U.S. Department of Agriculture, Vernal, Utah.
- \_\_\_\_\_. 2017f. Ashley National Forest Assessment Wildland Fire Baseline Report. Vernal, Utah.
- \_\_\_\_\_. 2017g. Ashley National Forest Plan Revision Socioeconomic Specialist Report. Vernal, Utah: U.S. Department of Agriculture, Forest Service, Ashley National Forest.
- \_\_\_\_\_. 2017h. National Visitor Use Monitoring Survey for the Ashley National Forest. Internet website: [https://apps.fs.usda.gov/nvum/results/ReportCache/2017\\_A04001\\_Master\\_Report.pdf](https://apps.fs.usda.gov/nvum/results/ReportCache/2017_A04001_Master_Report.pdf).
- \_\_\_\_\_. 2017i. Ashley National Forest Assessment, Tribal Uses Report. Prepared by Jeff Rust, Forest Archaeologist. Ashley National Forest, Vernal, Utah.
- \_\_\_\_\_. 2017j. Ashley National Forest Assessment. Cultural and Historic Resources Report. Prepared by Jeffrey Rust, Heritage Program Lead. Ashley National Forest, Vernal, Utah.
- \_\_\_\_\_. 2017k. Ashley National Forest Assessment—Insects and Disease Report. Vernal, Utah.
- \_\_\_\_\_. 2017L. Ashley National Forest Assessment Energy Resources, Mineral Resources, and Geological Resources and Hazards Report. Prepared by David Herron for the Ashley National Forest. Vernal, Utah.
- \_\_\_\_\_. 2017m. Ashley National Forest Assessment. Infrastructure Report. April 2017. Vernal, Utah.
- \_\_\_\_\_. 2017o. Ashley National Forest Assessment—Recreation Opportunities, Designated Areas, Settings, and Access Report. Ashley National Forest, Vernal, Utah.

- 
- \_\_\_\_\_. 2017p. Ashley National Forest Assessment—Land Ownership and Status, Use and Access Report. Ashley National Forest, Vernal, Utah.
- \_\_\_\_\_. 2017q. Ashley National Forest Assessment: Energy Resources, Mineral Resources, and Geological Resources and Hazards Report. Draft. Prepared by David Herron, Ashley National Forest, Vernal, Utah.
- \_\_\_\_\_. 2017r. Forest Service Handbook Pacific Southwest Region (R5) FSH 2509.22— Soil and Water Conservation Handbook. Supplement 2509.22-2017-1. Chapter 50—Soil Erosion Hazard Rating. USDA Forest Service, Vallejo, California.
- \_\_\_\_\_. 2018a. Riparian and Wetland Ecosystems of the Ashley National Forest: An Assessment of Current Conditions in Relation to Natural Range of Variation. Gen. Tech. Rep. RMRS-GTR-378. Fort Collins, Colorado: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- \_\_\_\_\_. 2018b. Climate Change Vulnerability and Adaptation in the Intermountain Region. Gen. Tech. Rep. RMRS-GTR-375. Fort Collins, Colorado: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Part 1. Pp. 1–197.
- \_\_\_\_\_. 2018c. Cut and Sold reports. Fiscal year 2016. Internet website: [https://www.fs.fed.us/forestmanagement/documents/sold-harvest/reports/2016/2016\\_Q1-Q4\\_CandS\\_R04.pdf](https://www.fs.fed.us/forestmanagement/documents/sold-harvest/reports/2016/2016_Q1-Q4_CandS_R04.pdf).
- \_\_\_\_\_. 2018d. Climate Change Vulnerability and Adaptation in the Intermountain Region. Gen. Tech. Rep. RMRS-GTR-375. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Part 2. Pp. 199–513.
- \_\_\_\_\_. 2019a. Ashley National Forest Mid-Level Existing Vegetation Classification and Mapping. Intermountain Region, Ogden, Utah.
- \_\_\_\_\_. 2019b. Proposal to Revise the Land Management Plan for the Ashley National Forest. Daggett, Duchesne, and Uintah Counties, Utah, and Sweetwater County, Wyoming. Vernal, Utah.
- \_\_\_\_\_. 2019c. Ashley National Forest Evaluation of Potential Wilderness Inventory Areas. Ashley National Forest, Vernal, Utah.
- \_\_\_\_\_. 2019d. Wild and Scenic Rivers Eligibility Study and Report—Draft Eligibility Report. Ashley National Forest, Vernal, Utah.
- \_\_\_\_\_. 2019e. National Visitor Use Monitoring- 2019 National Summary Report. Internet website: <https://www.fs.usda.gov/sites/default/files/2019-National-Visitor-Use-Monitoring-Summary-Report.pdf>.
- \_\_\_\_\_. 2020a. Forest Carbon FAQs. Forest Service, Office of Sustainability & Climate, Washington, DC. Internet website: <https://www.fs.usda.gov/sites/default/files/Forest-Carbon-FAQs.pdf>.
- \_\_\_\_\_. 2020b. Greenhouse Gas Emissions and Removals from Forest Land, Woodlands, and Urban Trees in the United States, 1990–2018. Resource Update FS-227. April 2020. Internet website: [https://www.fs.fed.us/nrs/pubs/ru/ru\\_fs227.pdf](https://www.fs.fed.us/nrs/pubs/ru/ru_fs227.pdf).
-

- 
- \_\_\_\_\_. 2020c. Intermountain Region Species of Conservation Concern Assessment—Bighorn Sheep. Vernal, Utah.
- \_\_\_\_\_. 2020d. Intermountain Region Species of Conservation Concern Assessment—Greater Sage-Grouse. Vernal, Utah.
- \_\_\_\_\_. 2020e. Fish of Flaming Gorge. Internet website: <https://www.fs.fed.us/portaldata/r4/redcanyon/fish-and-wildlife.html>.
- \_\_\_\_\_. 2020f. FSM 2300 Recreation, Wilderness, and Relation Resource Management. Chapter 2310—Sustainable Recreation Planning. Internet website: <https://www.fs.fed.us/im/directives/dughtml/fsm2000.html>
- \_\_\_\_\_. 2020g. Secure Rural Schools and Community Self-Determination Act Payments. Final Payment Detail Report PNF (ASR-10-02). Internet website: <https://www.fs.usda.gov/main/pts/securepayments/projectedpayments>.
- \_\_\_\_\_. 2020h. Proposal to Revise the Land Management Plan for the Ashley National Forest. Ashley National Forest, Vernal, Utah.
- \_\_\_\_\_. 2020i. Ashley Karst National Recreation and Geologic Area. Internet website: [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/fseprd720402.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd720402.pdf).
- \_\_\_\_\_. 2020j. Special Places. Internet website: [https://www.fs.usda.gov/detailfull/ashley/specialplaces/?cid=fsm9\\_002444&width=full](https://www.fs.usda.gov/detailfull/ashley/specialplaces/?cid=fsm9_002444&width=full).
- \_\_\_\_\_. 2020k. Scenery Management System. Internet website: <https://www.fs.usda.gov/detail/tonto/landmanagement/planning/?cid=stelprdb5412120>.
- \_\_\_\_\_. 2020L. Ashley National Forest Visitor Use Report. Ashley National Forest, Vernal, Utah.
- \_\_\_\_\_. 2021. National Visitor Use Monitoring- 2021 National Summary Report. Internet website: <https://www.fs.usda.gov/sites/default/files/2021-National-Visitor-Use-Monitoring-Summary-Report.pdf>.
- DOI. 2009. Guidance for Implementation of Federal Wildland Fire Management Policy. Internet website: <https://www.doi.gov/sites/doi.gov/files/uploads/2009-wfm-guidance-for-implementation.pdf>
- Forest Service GIS. 2020. GIS data from Forest Service Region 4 geospatial data website and internal forest data. Internet website: <https://www.fs.usda.gov/detailfull/r3/landmanagement/gis/?cid=stelprdb5201889&width=full>.
- Francis, C. D., and J. R. Barber. 2013. A framework for understanding noise impacts on wildlife: An urgent conservation priority. *Frontiers in Ecology and the Environment* 11(6): 305–313.
- Genxu, W., H. Hongchang, L. Guangsheng, and L. Na. 2009. Impacts of changes in vegetation cover on soil water heat coupling an alpine meadow of the Qinghai-Tibet Plateau, China. *Hydrology and Earth System Sciences* 13: 327–341.
- Geothermal Steam Act of 1970. 2020. Internet website: [https://openei.org/wiki/Geothermal\\_Steam\\_Act\\_of\\_1970](https://openei.org/wiki/Geothermal_Steam_Act_of_1970).
-

- Goodrich, S.K. 2005. Classification and capabilities of woody sagebrush communities of western North America with emphasis on Greater Sage-grouse habitat. In: Shaw, Nancy L.; Pellant, Mike; Monsen, Stephen B., comps. 2005. Sage grouse habitat restoration symposium proceedings; 2001 June 4–7; Boise, ID. Proceedings RMRS-P-38. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. pp. 17-37.
- Goodrich, S. K. and Huber, A. A. 2017. Assessment of condition and trend of livestock allotments on the Ashley National Forest. Powerpoint. On file at: U.S. Department of Agriculture, Forest Service, Ashley National Forest, Supervisor's Office, Vernal, UT.
- Goward, S. N., J. G. Masek, W. Cohen, G. Moisen, G. J. Collatz, S. Healey, R. Houghton, et al. 2008. Forest disturbance and North American carbon flux. *EOS Transactions* 89: 105–116.
- Greacen, E. L., and R. Sands. 1980. Compaction of forest soils: A review. *Australia Journal of Soil Resources* 18: 163–189.
- Grigal, D. F. 2000. Effects of extensive forest management on soil productivity. *Forest Ecology and Management* 138: 167–185.
- Grinspoon, E., J. Schaefers, R. Periman, J. Smalls, C. Manning, and T. L. Porto. 2014. Striving for inclusion: Addressing Environmental Justice for Forest Service NEPA. Washington, DC: U.S. Department of Agriculture, Forest Service.
- Gross, L. M. 2013. Understanding the Relationship Between Livestock Disturbance, The Protocols Used to Measure that Disturbance and Stream Conditions. All Graduate Plan B and other Reports. Paper 258. Utah State University, Logan, Utah.
- Gucinski, H., M. J. Furniss, R. R. Ziemer, and M. H. Brookes. 2001. Forest Roads: A Synthesis of Scientific Information. Gen. Tech. Rep. PNW-GTR- 509. Portland, Oregon: U.S. Department of Agriculture Forest Service, Pacific Northwest Research Station. Internet website: [https://www.fs.fed.us/pnw/pubs/pnw\\_gtr509.pdf](https://www.fs.fed.us/pnw/pubs/pnw_gtr509.pdf).
- Hayes S. W., C.A. Bingaman, T.A. Morgan. 2018. Four Corners Forest Products Industry and Timber Harvest, 2016. Data Tables. University of Montana's Bureau of Business and Economic Research. Internet website: <http://www.bber.umt.edu/pubs/forest/fidacs/CO2016%20Tables.pdf>.
- Headwater Economics 2012. West is Best. Internet website: [https://headwaterseconomics.org/wp-content/uploads/West\\_Is\\_Best\\_Full\\_Report.pdf](https://headwaterseconomics.org/wp-content/uploads/West_Is_Best_Full_Report.pdf).
- Herrick, J. E. and M. M. Wander. 1997. Relationships between soil organic carbon and soil quality in cropped and rangeland soils: the importance of distribution, composition, and soil biological activity. In: Soil processes and the carbon cycle. Edited by R. Lal, J.M Kimble, R. F. Follett, and B. A. Stewart. Ch. 28. CRC Press.
- Hessburg, P. F., D. J. Churchill, A. J. Larson, R. D. Haugo, C. Miller, T. A. Spies, M. P. North, et al. 2015. Restoring fire-prone inland Pacific landscapes: Seven core principles. *Landscape Ecology* 30: 1805–1835.
- Highland, M.A., D. R. Herndon, B. C. Bender, L. Hansen, R. F. Gerlach, and K. B. Beckman. 2018. *Mycoplasma ovipneumoniae* in wildlife species beyond subfamily Caprinae. *Emerging Infectious diseases* 24 (12): 2384–2386. December 2018. Internet website: [www.cdc.gov/eid](http://www.cdc.gov/eid).

- Hill, N. 2019. Scenery Management System Inventory Report, Ashley National Forest Land Management Plan Revision. Ashley National Forest, Vernal, Utah. February 2019.
- Hoffman, R. L., J. B. Dunham, and B. P. Hansen (editors). 2012. Aquatic Organism Passage at Road-stream Crossings—Synthesis and Guidelines for Effectiveness Monitoring. U.S. Geological Survey Open-File Report 2012-1090.
- Hoover, K., and A. Riddle. 2020. Forest Carbon Primer. Congressional Research Service Report R46312. Washington, DC. April 15, 2020.
- Huber, A. 2016a. Rare and Unique Habitat: Filtering Criteria. Unpublished report on file at U.S. Department of Agriculture Forest Service, Ashley National Forest, Vernal, Utah.
- \_\_\_\_\_. 2016b. Plant assessments for Species of Conservation Concern (unpublished). U.S. Department of Agriculture, Forest Service, Ashley National Forest, Supervisor's Office, Vernal, Utah.
- Hundey, E., S. Russell, and F. Longstaffe. 2016. Agriculture causes nitrate fertilization of remote alpine lakes. *Nature Communications* 7: 10571.
- Hundey, E. J., K. A. Moser, F. J. Longstaffe, N. Michelutti, and R. Hladyniuk. 2014. Recent changes in production in oligotrophic Uinta Mountain lakes, Utah, identified using paleolimnology. *Limnology and Oceanography* 59(6): 1987–2001.
- Hurteau, M. D. 2017. Quantifying the carbon balance of forest restoration and wildfire under projected climate in the fire-prone southwestern United States. *Plos One* 12(1): e0169275. Internet website: <https://doi.org/10.1371/journal.pone.0169275>.
- Hurteau, M. D., A. L. Westerling, C. Wiedinmyer, and B. P. Bryant. 2014. Projected effects of climate and development on California wildfire emissions through 2100. *Environmental Science and Technology* 48(4): 2298–2304.
- Hurteau, M. D., G. W. Koch, and B. A. Hungate. 2008. Carbon protection and fire risk reduction: Toward a full accounting of forest carbon offsets. *Frontiers in Ecology and the Environment*, 6(9): 493–498. doi:10.1890/070187.
- Hurteau, M. D., S. Liang, K. L. Martin, M. P. North, G. W. Koch, and B. A. Hungate. 2016. Restoring forest structure and process stabilized forest carbon in wildfire-prone southwestern ponderosa pine forests. *Ecological Applications* 26(2): 382–391.
- Hyde, M. 2021. Personal communication with Michael Hyde, Community Development Administrator, Planning and Zoning Department, Duchesne County. Cooperating agency comment on draft EIS, April 29, 2021.
- IAP (Intermountain Adaptation Partnership). 2016. Draft. Intermountain Adaptation Partnership: Vulnerability assessment summaries. Internet website: <http://www.adaptationpartners.org/iap/docs/IAPVulnerabilityAssessmentSummariesDraft.pdf>.
- IMPLAN (IMPLAN Group LLC). 2017. IMPLAN System Data and Software. 2017 Data Year. IMPLAN Professional Version 3.1. Internet website: [www.IMPLAN.com](http://www.IMPLAN.com).
- Interagency Federal Wildland Fire Policy Review Working Group. 2001. Review and update of the 1995 Federal Wildland Fire Management Policy. National Interagency Fire Center, Boise, Idaho.



- Interagency Lynx Biology Team. 2013. Canada Lynx Conservation Assessment and Strategy. Third edition. U.S. Department of Agriculture Forest Service, U.S. Department of the Interior Fish and Wildlife Service, U.S. Department of the Interior Bureau of Land Management, and U.S. Department of the Interior National Park Service. Forest Service Publication R1-13-19, Missoula, Montana.
- Johansen, M. P., T. E. Hakonson, and D. D. Breshears. 2001. Post-fire runoff and erosion from rainfall simulation: Contrasting forests with shrublands and grasslands. *Hydrological Processes* 15: 2953–2965.
- Kandel, W. 2008. Profile of Hired Farmworkers: A 2008 Update. Economic Research Report, No. 60. Economic Research Service, United States Department of Agriculture, July 2008. Internet website: <https://www.ers.usda.gov/webdocs/publications/46038/err-60.pdf?v=0>.
- Kastridis, A. 2020. Impact of Forest Roads on Hydrological Processes. *Forests* 11(2): 1201; doi:10.3390/f11111201.
- Krannich, R. S. 2008. Public Lands and Utah Communities Survey. Summary Report of Research Findings. Submitted to Public Lands Policy Coordination Office, Office of the Governor, State of Utah. Salt Lake City. September 2008. Utah State University, Institute for Social Science Research, Logan, Utah.
- Kruger, L., R. Mazza, and K. Lawrence. 2005. Proceedings: National Workshop on Recreation Research and Management. February 8-10, 2005. Portland, Oregon. U.S. Department of Agriculture, Forest Service. Pacific Northwest Research Station. General Technical Report PNW-GTR-698.
- Kurzel, B.P., Veblen, T.T., Kulakowski, D. 2007. A typology of stand structure and dynamics of quaking aspen in northwestern Colorado. *Forest Ecology and Management* 252 (2007), pp. 176-190.
- LANDFIRE. 2020. Vegetation Condition Class and fire regime data. Internet website: <https://www.landfire.gov/vcc.php>.
- Lal, R. 2015. Restoring soil quality to mitigate soil degradation. *Sustainability* 7: 5875-5895.
- Leung, Y.-F., and J. L. Marion. 2000. Recreation impacts and management in wilderness: A state-of-knowledge review. In: D. N. Cole et al. (compilers), *Wilderness Science in a Time of Change Conference: Missoula, Montana, May 23–27, 1999: Vol. 5, Wilderness Ecosystems, Threats, and Management (Proceedings RMRS ; P-15)*. Pp. 23-48. Ogden, Utah: United States Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Liu, Q. Q., L. Chen, and J. Li. 2001. Influences of slope gradient on soil erosion. *Applied Mathematics and Mechanics* 22(5): 510–519.
- Longshore, K., C. Lowrey, and D. B. Thompson. 2013. Detecting short-term responses to weekend recreation activity: Desert bighorn sheep avoidance of hiking trails.
- Lowery, B., G. L. Hart, J. M. Bradford, K-J.S. Kung, and C. Huang. 1999. Erosion impact on soil quality and properties and model estimates of leaching potential. In: *Soil Quality and Soil Erosion*. Edited by Rattan Lal. Soil and Water Conservation Society, Ankeny, Iowa. Pp. 75–91.

- Lyman S. N., M. L. Mansfield, H. Tran, L. David T. O’Neil, and D. Smuin. 2021. 2021 Annual Report: Uintah Basin Air Quality Research. Bingham Research Center, Utah State University. Vernal, Utah.
- MacArthur, R. A., V. Geist, and R. H. Johnston. 1982. Cardiac and behavioral responses of mountain sheep to human disturbance. *Journal of Wildlife Management* 46(2): 351–358.
- Mack, R. N., D. Simberloff, W. M. Lonsdale, H. Evans, M. Clout, and F. Bazzaz. 2000. Biotic invasions: Causes, epidemiology, global consequences and control. *Issues in Ecology* 5: 1–20.
- Malesky, D., B. Bentz, G. R. Brown, A. R. Brunelle, J. M. Buffington, L. M. Chappell, et al. 2018. Effects of climate change on ecological disturbances (Chapter 8). In: J. E. Halofsky, D. L. Peterson, J. J. Ho, N. J. Little, L. A. Joyce (editors). *Climate Change Vulnerability and Adaptation in the Intermountain Region (Part 2)*. Gen. Tech. Rep. RMRS-GTR-375. Fort Collins, Colorado: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Pp. 199–263.
- Mansfield, M. L., and S. N. Lyman. 2020. Winter Ozone Pollution in Utah’s Uinta Basin is Attenuating. *Atmosphere*, 12(1), 4; <https://doi.org/10.3390/atmos12010004>.
- Marion, J., J. Arredondo, J. Wimpey, and F. Meadema. 2018. Applying recreation ecology science to sustainably manage camping impacts: A classification of camping management strategies. *International Journal of Wilderness, Communication & Education* (2). Internet website: <https://ijw.org/2018-applying-recreation-ecology-science-to-sustainably-manage-camping-impacts/>.
- Marlow, C. B., R. Tucker, B. Sauer, B., and V. Shea. 2006. Broadening the scope of prescribed fires: Opportunities to rehabilitate degraded riparian zones. *Forest Ecology and Management* 234: S169.
- McDermot, C., and S. Elavarthi. 2014. Rangelands as Carbon Sinks to Mitigate Climate Change: A Review. *Journal of Earth Science and Climatic Change* 5:8.
- McMurray, Jill A., C. Todd McDonnell, Ann E. Mebane, and Linda H. Pardo. 2021. Assessment of Atmospheric Nitrogen and Sulfur Deposition Critical Loads for Aquatic and Terrestrial Resources on National Forest System Lands in the Intermountain Region. Gen. Tech. Rep. NRS-204. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station. 308 p. Internet website: <https://doi.org/10.2737/NRS-GTR-204>
- MEA (Millennium Ecosystem Assessment). 2005. *Ecosystems and Human Well-being: Synthesis*. Internet website: <https://www.millenniumassessment.org/documents/document.356.aspx.pdf>.
- Miller, Sue. 2014. From watersheds to the web: Online tools for modeling forest soil erosion. USDA Forest Service, Rocky Mountain Research Station. Issue 14. *Science You Can Use Bulletin*.
- Mortenson, V. 2020. Valton Mortenson, Civil Engineer, Ashley National Forest, personal communication with Josh Schnabel, EMPSi, on April 3, 2020.
- Mueggler, W. F. 1988. Aspen community types of the Intermountain Region. Gen. Tech. Report INT-250. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 135 p.

- Munroe, Jeffrey S. 2014. Properties of modern dust accumulating in the Uinta Mountains, Utah, USA, and implications for the regional dust system of the Rocky Mountains. *Earth Surface Processes and Landforms* 39(14): 1979–1988.
- Munroe, Jeffrey S., Emily C. Attwood, Samuel S. O’Keefe, and Paul J. M. Quackenbush. 2015. Eolian deposition in the alpine zone of the Uinta Mountains, Utah, USA. *Catena* 124: 119–129.
- Musselman, Robert C., and John L. Korfmacher. 2014. Ozone in remote areas of the Southern Rocky Mountains. *Atmospheric Environment* 82: 383–390.
- Nader, G., K. W. Tate, R. Atwill, and J. Bushnell. 1998. Water quality effect of rangeland beef cattle excrement. *Rangelands* 20(5): 19–25.
- Naiman, R. J., T. J. Beechie, L. E. Benda, D. R. Berg, P. A. Bison, L. H. MacDonald, and E. A. Steel. 1992. Fundamental elements of ecologically healthy watersheds in the Pacific Northwest coastal ecoregion. In: R. J. Naiman (editor), *Watershed Management: Balancing Sustainability with Environmental Change*. Pp. 127–188. New York, New York: Springer-Verlag. Internet website: [https://www.fs.fed.us/pnw/lwm/aem/docs/bisson/1992\\_bisson\\_fundamental\\_elements\\_of\\_ecologically.pdf](https://www.fs.fed.us/pnw/lwm/aem/docs/bisson/1992_bisson_fundamental_elements_of_ecologically.pdf).
- Napper, C., S. Howes, and D. Page-Dumroese. 2009. *Soil-Disturbance Field Guide*. United States Department of Agriculture Forest Service, National Technology and Development Program. Internet website: <https://www.fs.fed.us/t-d/pubs/pdf/08191815.pdf>.
- NASS (National Agricultural Statistics Service). 2017. *Census of Agriculture, Volume 1, Chapter 2: County Level Data*. Issued April 2019. Internet website: [https://www.nass.usda.gov/Publications/AgCensus/2017/Full\\_Report/Volume\\_1\\_Chapter\\_2\\_County\\_Level/](https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1_Chapter_2_County_Level/).
- \_\_\_\_\_. 2020. *Calf-cow state grazing fees*. Internet website: [https://www.nass.usda.gov/Charts\\_and Maps/Grazing\\_Fees/gf\\_cc.php](https://www.nass.usda.gov/Charts_and Maps/Grazing_Fees/gf_cc.php).
- National Interagency Fuels Fire and Technology Transfer System. 2010. *Interagency Fire Regime Condition Class Guidebook, Version 3.0*. Internet website: <https://www.frames.gov/partner-sites/frcc/frcc-guidebook-and-forms/>.
- Nauslar, N. J., B. J. Hatchett, T. J. Brown, M. L. Kaplan, and J. F. Mejia. 2018. Impact of the North American monsoon on wildfire activity in the southwest United States. *International Journal of Climatology* 39: 1539–1554.
- Nautiyal, P., R. Rajput, D. Pandey, K. Arunachalam, and A. Arunachalam. 2019. Role of glomalin in soil carbon storage and its variation across land uses in temperate Himalayan regime. *Biocatalysis and Agricultural Biotechnology* 21(2019) 101311
- Neary, D. G. 2019. Forest soil disturbance: Implications of factors contributing to the wildland fire nexus. In: *North America forest soils conference-international symposium on forest soils*. Soil Science Society of America Journal 83: 5228–5243.
- Neff, J., R. Reynolds, J. Belnap, and P. Lamothe. 2005. Multi-decadal impacts of grazing on soil physical and biogeochemical properties in southeast Utah. *Ecological Applications* 15(1): 87–95.

- NHD (National Hydrography Dataset) GIS. 2020. National Hydrography Dataset GIS data for flowlines, waterbodies, and seeps. Internet website: <http://prd-tnm.s3-website-us-west-2.amazonaws.com/?prefix=StagedProducts/Hydrography/NHD/State/HighResolution/GDB/>.
- Nick, Andrea, Mike McCorison, and Beth Plymale. 2012. Wilderness Air Quality (WAQV) Monitoring Guidance: Ashley and Uinta-Wasatch-Cache National Forests. Ogden, Utah.
- North, M. P., and M. D. Hurteau. 2011. High-severity wildfire effects on carbon stocks and emissions in fuels treated and untreated forest. *Forest Ecology and Management* 261: 1115–1120. Internet website: <https://www.treearch.fs.fed.us/pubs/41628>.
- NRCS (United States Department of Agriculture Natural Resources Conservation Service). 2001a. Soil Quality Information Sheet: Rangeland Soil Quality—Compaction. Internet website: <https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/resource/>.
- \_\_\_\_\_. 2001b. Soil Quality Information Sheet: Rangeland Soil Quality—Physical and Biological Soil Crusts. Internet website: <https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/resource/>.
- \_\_\_\_\_. 2001c. Soil Quality Information Sheet: Soil Quality—Introduction. Internet website: <https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/resource/>.
- \_\_\_\_\_. 2001d. Soil Quality Information Sheet: Rangeland Soil Quality—Water Erosion. Internet website: <https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/resource/>.
- \_\_\_\_\_. 2015. Soil Quality Indicators: Physical, Chemical, and Biological Indicators for Soil Quality Assessment and Management. Internet website: <https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/soils/health/assessment/?cid=stelprdb1237387>.
- NWCG (National Wildfire Coordinating Group). 2006. NWCG Fireline Handbook. Appendix B, Fire Behavior. Boise, Idaho.
- \_\_\_\_\_. 2014. Wildland Fire Incident Management Field Guide. Operations Group, Boise, Idaho.
- \_\_\_\_\_. 2018. Smoke Management Guide for Prescribed Fire. <https://www.nwcg.gov/sites/default/files/publications/pms420-2.pdf>.
- Ockenfels, R. A., D. E. Brooks, and C. H. Lewis. 1991. General Ecology of Coues White-Tailed Deer in the Santa Rita Mountains. Technical Report No. 6. Arizona Game and Fish Department, Phoenix.
- Olander, L., K. Warnell, T. Warziniack, Z. Ghali, C. Miller, and C. Neelan. 2021. Exploring the Use of Ecosystem Services Conceptual Models to Account for the Benefits of Public Lands: An Example from National Forest Planning in the United States. *Forests* 12(3): 267.
- Olive, N. D., and J. L. Marion. 2009. The influence of use-related, environmental, and managerial factors on soil loss from recreational trails. *Journal of Environmental Management* 90(3): 1483–1493.
- Osborn, Alan J., Susan Vetter, Ralph J. Hartley, Laurie Walsh, and Jesslyn Brown. 1987. Impacts of domestic livestock grazing on archaeological resources of Capitol Reef National Park, Utah. *Occasional Studies in Anthropology* 20. U.S. Department of the Interior, National Park Service, Midwest Archaeological Center, Lincoln, Nebraska.

- Page-Dumroese, D. S., M. F. Jurgensen, A. E. Tiarks, F. Ponder, Jr., F. G. Sanchez, R. L. Fleming, J. M. Kranabetter, et al. 2006. Soil physical property changes at the North American long-term productivity study sites: 1 and 5 years after compaction. *Canada Journal of Forest Research* 36: 551–564.
- Pan, Y., R. A. Birdsey, J. Fang, R. Houghton, P. E. Kauppi, W. A. Kurz, O. L. Phillips, et al. 2011. A large and persistent carbon sink in the world's forests. *Science* 333: 988–993.
- Papouchis, C. M., F. J. Singer, and W. B. Sloan. 2001. Responses of desert bighorn sheep to increased human recreation. *Journal of Wildlife Management* 65(3): 573–582.
- Parker, P. L., and T. F. King. 1998. Guidelines for Evaluating and Documenting Traditional Cultural Properties. National Register Bulletin 38. Revised. U.S. Department of the Interior, National Park Service, Washington DC.
- Parsons, A., P. R. Robichaud, S. A. Lewis, C. Napper, and J. T. Clark. 2010. Field guide for mapping post-fire soil burn severity. General Technical Report, RMRS-GTR-243. United States Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins Colorado.
- Platts, W. S., W. F. Megahan, and G. Wayne Minshall. 1983. Methods for Evaluating Stream, Riparian, and Biotic Conditions. General Technical Report INT-138. Ogden, Utah: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station.
- Power, T. 2002. Taking Stock of Public Lands Grazing, an Economic Analysis. In: *Welfare Ranching, The Subsidized Destruction of the American West*, Wuerthner, G. and Mattson, M. [eds]. p. 263-269
- Pregitzer, K. S., and E. S. Euskirchen. 2004. Carbon cycling and storage in world forests: Biome patterns related to forest age. *Global Change Biology* 10: 2052–2077.
- Rasby, R. J., and T. M. Walz. 2011. Water Requirements for Beef Cattle, G 2060, NebGuide. University of Nebraska, Lincoln.
- Rappold A. G., W. E. Cascio, V. J. Kilaru, S. L. Stone, L. M. Neas, R. B. Devlin, and D. Diaz-Sanchez. 2012. Cardio-respiratory outcomes associated with exposure to wildfire smoke are modified by measures of community health. *Environ Health* 11: 71.
- Reeves, M., J. Bruggink, M. Krebs, and S. Campbell. 2016. Baseline Estimates of Carbon Stocks in Non-Forest Soils and Vegetation for National Forest System Units in the Intermountain Region in Support of Forest Plan Revision. Forest Service. Salt Lake City, Utah.
- Reinhardt, E., and L. Holsinger. 2010. Effects of fuel treatments on carbon-disturbance relationships in forests of the northern Rocky Mountains. *Forest Ecology and Management* 259(8): 1427–1435. doi:10.1016/j.foreco.2010.01.015.
- Reynolds, R. L., J. S. Mordecai, and J. G. Rosenbaum. 2010. Compositional changes in sediments of subalpine lakes, Uinta Mountains (Utah): Evidence for the effects of human activity on atmospheric dust inputs. *Journal of Paleolimnology* 44: 161–175.

- Rice, J., T. Bardsley, P. Gomben, D. Bambrough, S. Weems, S. Leahy, C. Plunkett, et al. 2017. Assessment of Watershed Vulnerability to Climate Change for the Uinta-Wasatch-Cache and Ashley National Forests, Utah. General Technical Report RMRS-GTR-362. Fort Collins, Colorado: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Rimbey, N. R., L. A. Torell, and J.A. Tanaka. 2007. Why grazing permits have economic value. *Journal of Agricultural and Resource Economics* 32 (1): 20–40. Internet website: <https://jareonline.org/articles/why-grazing-permits-have-economic-value/>.
- Roney, John. 1977. Livestock and Lithics: The Effects of Trampling. Unpublished manuscript. U.S. Department of the Interior, Bureau of Land Management, Winnemucca District Office, Winnemucca, Nevada.
- Russell, J. C. 2008. Adams-Russell Consulting. Aspects of Beliefs and Values Regarding Resources and Management of the Ashley National Forest. Ashley National Forest. Vernal, Utah.
- Schaedel, M. S., A. J. Larson, D. L. R. Affleck, T. Belote, J. M. Goodburn, and D. S. Page-Dumroese. 2017. Early forest thinning changes aboveground carbon distribution among pools, but not total amount. *Forest Ecology and Management* 389: 187–198. doi:10.1016/j.foreco.2016.12.018.
- Schieltz, J. M., and D. I. Rubenstein. 2016. Evidence based review: Positive versus negative effects of livestock grazing on wildlife. What do we really know? *Environmental Research Letters* 11(11).
- Scott, J. H., and R. E. Burgan. 2005. Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model. General Technical Report RMRS-GTR-153. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, Colorado.
- Shannon, G., M. F. McKenna, L. M. Angeloni, K. R. Crooks, K. M. Fristrup, E. Brown, K. A. Warner, et al. 2016. A synthesis of two decades of research documenting the effects of noise on wildlife. *Biological Reviews* 91: 982–1005. doi:10.1111/brv.12207.
- Sheffield, R. E., S. Mostaghimi, D. H. Vaughan, E. R. Collins, Jr., and V. G. Allen. 1997. Off-stream water sources for grazing cattle as a stream bank stabilization and water quality BMP. *Transactions of the ASAE* 40(3): 595–604.
- Skiles, S. M., D. V. Mallia, A. G. Hallar, J. C. Lin, A. Lambert, R. Petersen, and S. Clark. 2018. Implications of a shrinking Great Salt Lake for dust on snow deposition in the Wasatch Mountains, UT, as informed by a source to sink case study from the 13–14 April 2017 dust event. *Environmental Research Letters* 13(12): 124031
- Slabbekoorn, H., and E. A. P. Ripmeester. 2007. Birdsong and anthropogenic noise: Implications and applications for conservation. *Molecular Ecology* 17: 72–83.
- Smith, D. M., and D. M. Finch. 2014. Use of native and nonnative nest plants by riparian-nesting birds along two streams in New Mexico. *River Research and Applications* 30: 1134–1145.
- Smith, G., and J. Lemly. 2017. Fen Mapping for the Ashley National Forest. Colorado Natural Heritage Program, Colorado State University, Fort Collins, Colorado.

- Smith, M. D., K. P. Driscoll, and D. M. Finch. 2018. Riparian and Wetland Ecosystems of the Ashley National Forest: An Assessment of Current Conditions in Relation to Natural Range in Variation. USDA Forest Service, Rocky Mountain Research Station, General Technical Report, RMRS-GTR-378. Fort Collins, Colorado.
- Smith, N. S. 1984. Reproduction in Coues whited-tailed deer relative to drought and cattle stocking rates. In: Deer in the Southwest: A workshop (P. R. Krausman and N. S. Smith, editors). Pp. 1–6.
- Sorenson, C. B., C. E. Keegan III, T. A. Morgan, C. P. McIver, and M. J. Niccolucci. 2016. Employment and wage impacts of timber harvesting and processing in the United States. *Journal of Forestry* 114(4):474 – 482.
- State of Utah. 2019. Utah Conservation Plan for Greater Sage-Grouse. Internet website: [https://wildlife.utah.gov/sage-grouse/Utah\\_Greater\\_Sage-grouse\\_Plan.pdf](https://wildlife.utah.gov/sage-grouse/Utah_Greater_Sage-grouse_Plan.pdf).
- Stevens, T. H., T. A. More, and M. Markowski-Lindsay. 2014. Declining national park visitation: An economic analysis. *Journal of Leisure Research* 46: 153–164.
- Taylor, D. T., R. H. Coupal, T. Foulke, and J. G. Thompson. 2004. The economic importance of livestock grazing on BLM land in Fremont County, Wyoming. Laramie, WY, USA: University of Wyoming, Department of Agricultural and Applied Economics. Internet website: [www.uwagec.org/WyoCRE/Publications/Fremont%20County%20final26Oct04.pdf](http://www.uwagec.org/WyoCRE/Publications/Fremont%20County%20final26Oct04.pdf).
- Thornton, P. K. 2010. Livestock production: Recent trends, future prospects. *Philosophical Transactions of the Royal Society B: Biological Sciences* 365(1554): 2853–2867.
- Toweill, Dale E., and V. Geist. 1999. Return of royalty – wild sheep of North America. Boone and Crockett Club and Foundation for North American Wild Sheep, Missoula, Montana. January 1999.
- UDWR (Utah Division of Wildlife Resources). 2018. Utah Greater Bighorn Sheep Statewide Management Plan. Internet website: <https://wildlife.utah.gov/pdf/bg/bighorn-plan.pdf>.
- \_\_\_\_\_. 2018b. Utah Mountain Goat State-wide Management Plan 2018
- \_\_\_\_\_. 2019. Utah Mule Deer Statewide Management Plan. Internet website: [https://wildlife.utah.gov/pdf/bg/mule\\_deer\\_plan.pdf](https://wildlife.utah.gov/pdf/bg/mule_deer_plan.pdf).
- \_\_\_\_\_. 2019b. Bighorn sheep unit management plan, Uinta Mountains, North Slope/South Slope, WMUs #8 & 9, August 2019. Internet website: [https://wildlife.utah.gov/pdf/bg/plans/bighorn\\_uinta\\_mountains.pdf](https://wildlife.utah.gov/pdf/bg/plans/bighorn_uinta_mountains.pdf).
- \_\_\_\_\_. 2020a. Mountain sucker, *Catostomus platyrhynchus*. Internet website: <https://dwrcdc.nr.utah.gov/rsgis2/Search/Display.asp?FINm=catoplat>.
- \_\_\_\_\_. 2020b. Mottled sculpin, *Cottus bairdii*. Internet website: <https://dwrcdc.nr.utah.gov/rsgis2/Search/Display.asp?FINm=cottbair>.
- \_\_\_\_\_. 2020c. Speckled dace, *Rhinichthys osculus*. Internet website: <https://dwrcdc.nr.utah.gov/rsgis2/Search/Display.asp?FINm=rhinoscu>.
- \_\_\_\_\_. 2020d. Longnose dace, *Rhinichthys cataractae*. Internet website: <https://dwrcdc.nr.utah.gov/rsgis2/Search/Display.asp?FINm=rhincata>.

- \_\_\_\_\_. 2020e. Western chorus frog, *Pseudacris triseriata*. Internet website: <https://dwrcdc.nr.utah.gov/rsgis2/search/Display.asp?FINm=pseumacu>.
- \_\_\_\_\_. 2020f. Northern leopard frog, *Rana pipiens*. Internet website: <https://dwrcdc.nr.utah.gov/rsgis2/Search/Display.asp?FINm=ranapipi>.
- \_\_\_\_\_. 2020g. Tiger salamander, *Ambystoma tigrinum*. Internet website: <https://dwrcdc.nr.utah.gov/rsgis2/Search/Display.asp?FINm=ambytigr#:~:text=The%20tiger%20salamander%2C%20Ambystoma%20tigrinum,as%20water%20is%20found%20nearby.&text=This%20salamander%20breeds%20in%20the%20spring%2C%20often%20after%20rains>.
- \_\_\_\_\_. 2020h. Great Basin spadefoot, *Spea intermontana*. Internet website: <https://dwrcdc.nr.utah.gov/rsgis2/Search/Display.asp?FINm=speainte>.
- \_\_\_\_\_. 2020i. Terrestrial garter snake, *Thamnophis elegans*. Internet website: <https://dwrcdc.nr.utah.gov/rsgis2/Search/Display.asp?FINm=thameleg>.
- \_\_\_\_\_. 2020j. Smooth green snake, *Opheodrys vernalis*. Internet website: <https://dwrcdc.nr.utah.gov/rsgis2/Search/Display.asp?FINm=liocvern#:~:text=The%20smooth%20greensnake%2C%20Opheodrys%20vernalis,Abajo%2C%20and%20La%20Sal%20Mountains>.
- \_\_\_\_\_. 2020k. Rubber boa *Charina bottae*. Internet website: <https://dwrcdc.nr.utah.gov/rsgis2/Search/Display.asp?FINm=charbott#:~:text=The%20rubber%20boa%2C%20Charina%20bottae,primarily%20in%20the%20Wasatch%20Mountains>.
- United States Congress. 2005. Energy Policy Act of 2005. Public Law 109–58—August 8, 2005. Internet website: <https://www.congress.gov/109/plaws/pub158/PLAW-109pub158.pdf>.
- U.S. Department of the Interior. 2018. Mineral Leasing Act of 1920 as Amended. Internet website: <https://uscode.house.gov/view.xhtml?path=/prelim@title30&edition=prelim>.
- \_\_\_\_\_. 2020. Payments in Lieu of Taxes. Internet website: <http://www.doi.gov/pilt>.
- USFWS (U.S. Fish and Wildlife Service). 2020a. IPAC Species List. Consultation Code: 06E23000-2020-SLI-0560. April 23, 2020. Utah Ecological Services Field Office. West Valley City, Utah.
- \_\_\_\_\_. 2020b. IPAC Species List. Consultation Code: 06E13000-2020-SLI-0219. April 23, 2020. Wyoming Ecological Services Field Office. Cheyenne, Wyoming.
- Utah Department of Natural Resources. 2016. Utah Wildfire Risk Assessment. Internet website: <https://wildfirerisk.utah.gov/Map/Public/>.
- Utah DEQ (Utah Department of Environmental Quality). 2020. Ozone: EPA Designates Marginal Nonattainment Areas in Utah. Internet website: <https://deq.utah.gov/communication/news/ozone-marginal-nonattainment-areas-utah>.
- Utah Division of Air Quality. 1999. Utah Smoke Management Plan. Revised January 16, 2006. Internet website: [https://smokemgt.utah.gov/static/pdf/SMP011606\\_Final.pdf](https://smokemgt.utah.gov/static/pdf/SMP011606_Final.pdf).
- Utah Division of Wildlife Resources GIS. 2020. Mammal habitat coverages GIS data. Internet website: <https://dwrcdc.nr.utah.gov/ucdc/DownloadGIS/disclaim.htm>.



- Utah Office of Administrative Rules. 2011. Utah State Bulletin. Rule R926-15. designated Scenic Byways. July 15, 2011, issue (Vol. 2011, No. 14) Internet website: <https://rules.utah.gov/publicat/bulletin/2011/20110715/34954.htm>.
- Vavra, M. 2005. Livestock grazing and wildlife: Developing compatibilities. *Rangeland Ecology & Management* 58(2): 128–134.
- Vitousek, P. M., C. M. D'Antonio, L. L. Loope, and R. Westbrooks. 1996. Biological invasions as global environmental change. *American Scientist* 84: 468–478.
- Vose, J. M., J. S. Clark, C. Luce, and T. Patel-Weynand. 2016. Effects of Drought on Forests and Rangelands in the United States: A Comprehensive Science Synthesis. General Tech Report WO-93b. US Department of Agriculture Forest Service, Washington, DC.
- Warren, S. D., T. L. Thurow, W. H. Blackburn, and N. E. Garza. 1986. The influence of livestock trampling under intensive rotation grazing on soil hydrologic characteristics. *Journal of Range Management* 39(6): 491–495.
- Weise, D. R., J. Cobian-Iniguez, and M. Princevac. 2018. Surface to crown transition. In: S. L. Manzello, editor. *Encyclopedia of Wildfires and Wildland-Urban Interface (WUI) Fires*. Internet website: [https://link.springer.com/referenceworkentry/10.1007%2F978-3-319-51727-8\\_24-1](https://link.springer.com/referenceworkentry/10.1007%2F978-3-319-51727-8_24-1).
- Westerling, A. L., H. G. Hidalgo, D. R. Cayan, and T. W. Swetnam. 2006. Warming and earlier spring increases western US Forest wildfire activity. *Science* 313: 940–943.
- Weston, D. 2010. What is a fire regime? Internet website: <https://oregonexplorer.info/content/what-fire-regime?topic=95&ptopic=62>.
- White, E. M. 2017. Spending Patterns of Outdoor Recreation Visitors to National Forests. General Technical Report PNW-GTR-961. Portland, Oregon: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.
- White, E. M., and D. J. Stynes 2008. National Forest Visitor Spending Averages and the Influence of Trip-Type and Recreation Activity. *Journal of Forestry*. January/February 2008. Internet website: [http://www.wildfire-economics.org/Library/White\\_&\\_Stynes\\_2008.pdf](http://www.wildfire-economics.org/Library/White_&_Stynes_2008.pdf).
- Wiedinmyer, C., and M. D. Hurteau. 2010. Prescribed fire as a means of reducing forest carbon emissions in the western United States. *Environmental Science & Technology* 44(6): 1926–1932. doi:10.1021/es902455e.
- Wiedmann B. P., and V. C. Bleich. 2014. Demographic responses of bighorn sheep to recreational activities: A trial of trail. *Wildlife Society Bulletin* 38(4):773–782; DOI: 10.1002/wsb.463
- Wilderness Society, The. 2007. National Dividends: Wildland Protection and the Changing Economy of the American West. Internet website: [https://www.researchgate.net/publication/242161137\\_Natural\\_Dividends\\_Wildland\\_Protection\\_and\\_the\\_Changing\\_Economy\\_of\\_the\\_Rocky\\_Mountain\\_West](https://www.researchgate.net/publication/242161137_Natural_Dividends_Wildland_Protection_and_the_Changing_Economy_of_the_Rocky_Mountain_West).
- Wolf, K. M., R. A. Baldwin, and S. Barry. 2017. Compatibility of livestock grazing and recreational use on coastal California public lands: Importance, interactions, and management solutions. *Rangeland Ecology & Management* 70(2): 192–201.

- Wolff, P., M. Cox, C. McAdoo. 2016. Disease transmission between sympatric mountain goats and bighorn sheep. Biennial Symposium of the Northern Wild Sheep and Goat Council 20:79.
- Wolff, Peregrine M. 2018. Wild sheep pneumonia: the Nevada Experience. Wyoming Domestic and Wild Sheep Interaction Working Group Meeting. December 13, 2018.
- Wuerthner, G. (ed.). 2007. Thrillcraft: The environmental consequences of motorized recreation. White River, VT: Chelsea Green.
- Wyoming DEQ (Department of Environmental Quality) Air Quality Division. 2004. Wyoming Smoke Management Program Guidance Document. Internet website: [http://deq.wyoming.gov/media/attachments/Air%20Quality/Smoke%20Management/Guidance/AQD\\_Smoke-Management-And-Open-Burning\\_Smoke-Management\\_Open-Burning-and-Ag-Burning-Guidance-Documents\\_2004-1101.pdf](http://deq.wyoming.gov/media/attachments/Air%20Quality/Smoke%20Management/Guidance/AQD_Smoke-Management-And-Open-Burning_Smoke-Management_Open-Burning-and-Ag-Burning-Guidance-Documents_2004-1101.pdf)
- Zhou, P., O. Luukkanen, T. Tokola, and J. Nieminen. 2008. Effect of vegetation cover on soil erosion in a mountainous watershed. CATENA 73(3): 319-325.

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# Glossary

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## Glossary

**2012 Planning Rule**—Direction that sets forth process and content requirements to guide the development, amendment, and revision of land management plans to maintain and restore National Forest System land and water ecosystems while providing for ecosystem services and multiple uses, effective May 9, 2012 (36 CFR§ 219).

**Active floodplain**—Flood prone area; the zone bordering a stream subject to more frequent flooding (less than 50-year recurrence interval). General field interpretation of the active floodplain is the valley bottom up to an elevation twice the stream's maximum bank-full depth, measured at the thalweg.

**Active vegetation management**—Active management involves using the manipulation of vegetation to meet objectives. Methods utilized may include a variety of silvicultural and forest management practices including timber harvesting, tree planting, thinning, prescribed burning, grazing, weed control, and other activities for improving wildlife habitat and watersheds, such as erosion control, fire suppression, and restoration-based fuel treatment.

**Adaptive management**—The general framework encompassing the three phases of planning: assessment, plan development, and monitoring (36 Code of Federal Regulations [CFR] 219.5). This framework supports decision-making that meets management objectives while simultaneously accruing information to improve future management by adjusting the plan or plan implementation. Adaptive management is a structured, cyclical process for planning and decision-making in the face of uncertainty and changing conditions with feedback from monitoring, which includes using the planning process to actively test assumptions, track relevant conditions over time, and measure management effectiveness.

**Administrative site**—A location or facility constructed for use primarily by government employees to facilitate the administration and management of public lands. Examples on National Forest System lands include, but are not limited to, ranger stations, warehouses, and guard stations.

**Airshed**—Airsheds are geographic areas that, because of topography, meteorology, and climate, are frequently affected by the same air mass. Additionally, airsheds are areas subject to similar air pollution conditions.

**All-terrain vehicle**—A type of off-highway vehicle that travels on three or more low pressure tires, has handle-bar steering, is less than or equal to 50 inches in width, and has a seat designed to be straddled by the operator.

**Allotment**—A designated area of land available for permitted livestock grazing (36 CFR 222). A grazing allotment can include National Forest System lands and lands of other ownership. Permits are issued for the use of allotments or portions of allotments. Allotments are in active status when grazing permits have been issued; allotments are in vacant status when they do not have a grazing permit issued. Allotments are in closed status when they have been closed to livestock grazing by administrative decision or action (Forest Service Manual 2205).

**Alpine area**—High-altitude areas (above approximately 11,200 feet) found above timberline, including their associated plant communities.

**Animal unit month**—The amount of feed or forage required by one mature cow of approximately 1,000 pounds or its equivalent for 1 month. The forage requirement of both adults and offspring should be considered (Forest Service Handbook 2209.15).

**Aquatic organism passage**—Provides the ability for fish and other aquatic creatures to move up and downstream under a road.

**Aquifer**—An underground layer of water-bearing permeable rock, rock fractures, or unconsolidated material (gravel, sand, or silt) from which groundwater can be extracted using a water well.

**Aspen stand**—Term used where numerous individual aspen clones have coalesced to form a continuous aspen community.

**At-risk species**—A federally recognized threatened, endangered, proposed, or candidate species, or a species of conservation concern that is relevant to the plan area and planning process (36 CFR 219.6(b)). See also **candidate species, endangered species, proposed species, species of conservation concern, threatened species.**

**Bankfull**—The stream flow level or discharge at which channel maintenance is the most effective at moving sediment and forming or changing bars, bends, meanders, and the average morphologic characteristics of channels. Bankfull discharge is associated with a momentary maximum flow that, on average, has a recurrence interval of 1.5 years as determined using a flood frequency analysis. In stable rivers, bankfull is reached when the water cannot be contained within its banks and flooding begins. In entrenched streams, bankfull width is restricted and more difficult to determine, but the top of depositional features is typically bankfull. On aggrading streams, the bankfull discharge is no longer contained within the banks during a bankfull event, often causing excessive flooding. A stream's bankfull discharge may increase or decrease with hydrologic modifications, changes in impervious land surfaces, or vegetative cover types that alter the rates of water movement through the watershed.

**Bark beetle**—Any beetle that feeds exclusively in the cambial region of stems, boles, or branches, and spends most of its life cycle there. The cambial region is that layer of tissue between the inner bark and the wood of the tree. While bark beetles are native to the Ashley National Forest and play important ecological roles, they can cause extensive tree mortality and negative economic and social impacts.

**Basal area**—The cross-sectional area of all stems of a species or all stems in a stand measured at breast height (4.5 feet above the ground) and expressed per unit of land area.

**Basal cover**—The basal area of a plant that extends into the soil at ground level.

**Best available scientific information**—Scientific information used to inform the planning process; information determined by the responsible official to be the most accurate, reliable, and relevant to the issues being considered (36 CFR 219.3).

**Best management practice**—The method(s), measure(s), or practice(s) selected by an agency to meet its nonpoint resource control needs. Best management practices include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. Best management practices can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (35 CFR 219.19) or into the air. This term—best management practices—is also used in other resource areas to describe methods or techniques found to be the most effective and

practical in achieving an objective (such as preventing or minimizing impacts from grazing, and invasive weed establishment and spread) while making use of the resources.

**Biodiversity**—The variety and abundance of plants, animals, and other living organisms and the ecosystem processes, functions, and structures that sustain them. Biodiversity includes the relative complexity of species and communities across the landscape at a variety of scales, connected in a way that provides for the genetic diversity to sustain species over the long term.

**Biological integrity**—Biological integrity (or functionality) is defined by the characteristics that influence the diversity and abundance of aquatic species, terrestrial vegetation, and soil productivity.

**Biological functionality**—Biological functionality or integrity is defined by the characteristics that influence the diversity and abundance of aquatic species, terrestrial vegetation, and soil productivity.

**Blue Ribbon fishery**—A designation made in the United States by government and other authorities to identify recreational fisheries of extremely high quality.

**Broadcast burn**—A management treatment where a prescribed fire is allowed to burn over a designated area within well-defined boundaries. A broadcast burn is used for a reduction of fuel hazard, as a resource management treatment, or both.

**Burn severity**—A qualitative assessment of the heat pulse directed toward the ground during a fire. Burn severity relates to soil heating, large fuel and duff consumption, consumption of the litter and organic layer beneath trees and isolated shrubs, and mortality of buried plant parts.

**Calcareous fen**—A type of fen with high (alkaline) pH due to calcium concentration in the parent materials and water. These are rare wetlands on the Ashley National Forest.

**Candidate species**—A status for (1) U.S. Fish and Wildlife Service candidate species, a species for which the U.S. Fish and Wildlife Service possesses sufficient information on vulnerability and threats to support a proposal to list as endangered or threatened, but for which no proposed rule has yet been published by the U.S. Fish and Wildlife Service; for (2) National Marine Fisheries Service candidate species, a species that is: (i) the subject of a petition to list and for which the National Marine Fisheries Service has determined that listing may be warranted, pursuant to section 4(b)(3)(A) of the Endangered Species Act (16 United States Code [USC] 1533(b)(3)(A)), or (ii) not the subject of a petition but for which the National Marine Fisheries Service has announced in the *Federal Register* the initiation of a status review. See also **at-risk species**, **endangered species**, **proposed species**, **threatened species**.

**Canopy base height**—The average height from the ground to the lowest living foliage.

**Canopy bulk density**—The foliage contained per unit crown volume.

**Canopy cover**—The percentage of a fixed area covered by the crown of an individual tree, shrub or plant species or delimited by the vertical projection of its outermost perimeter; each vegetation canopy layer is considered independently from the others. The sum of canopy cover percentage for all species/layers/life-forms may exceed 100 percent. This term is most often used to describe non-forest vegetation in this document.

**Capability**—The potential of an area of land or water, or both, to produce resources, supply goods and services, and allow resource uses under a specified set of management practices and at a given level of management intensity.

**Carbon density**—An estimate of forest carbon stocks per unit area.

**Carbon flux**—The amount of carbon exchanged between earth's carbon pools: the oceans, atmosphere, crust, and terrestrial ecosystems.

**Carbon pools**—Reservoirs of carbon that have the capacity to both take in and release carbon. Earth's carbon pools are the oceans, atmosphere, crust, and terrestrial ecosystems. In the forest ecosystem, accumulated carbon is stored in five different pools: aboveground biomass (leaves, trunks, and limbs), below ground biomass (roots), dead wood, litter (fallen leaves and stems), and soils.

**Carbon sequestration**—The process in which atmospheric carbon dioxide is removed from the atmosphere by photosynthesis and stored as carbon in plant biomass and soils. **Carbon stocks**—The quantity of carbon stored within soils, vegetation (live and dead), and wood products.

**Cave, significant**—See **significant Federal cave**.

**Central Utah Project**—The Central Utah Project (CUP) was authorized in 1956 under the Colorado River Storage Project Act (P.L. 84-485) as a participating project of the Colorado River Storage Project. The Central Utah Project Completion Act (P.L. 102-575), enacted on October 30, 1992, transferred all responsibility and authority to complete the construction of the CUP to the Central Utah Water Conservation District. In addition, it established the Utah Reclamation Mitigation Conservation Commission to coordinate mitigation and conservation activities for the project. The Department of the Interior retains oversight responsibility and ultimate authority to ensure completion and future operation of the project in accordance with Federal laws, regulations, and policies. See **withdrawn lands**.

**Classification (of a river or river segment)**—Identification of the class (wild, scenic, or recreational) that appropriately describes an eligible river or river segment, based on the criteria established in section 2(b) of the Wild and Scenic Rivers Act.

**Clearcut regeneration method**—An even-aged (or two-aged with reserves) regeneration harvest method that removes essentially all trees in a stand, producing a fully exposed microclimate for the development of a new single-age class of trees in one entry. A clearcut may or may not have reserve trees left to attain goals other than regeneration. See also **even-aged method**, **regeneration harvest method**, **silvicultural system**, **two-aged method**.

**Climax (forest)**—An ecological community that represents the culminating stage of a natural forest succession for its locality (in other words, for its environment).

**Coarse woody debris**—Dead organic materials, including plant stems, branches, roots, and logs in all stages of decay generally using a greater than 3-inch diameter criterion.

**Codominant tree species**—Tree species in a forest that are about equally numerous and exert the greatest influence.



**Commercial thinning**—An intermediate harvest with the objective of reducing stand density primarily to improve growth and enhance forest health and other resource objectives. Treatment can recover potential mortality while producing merchantable material.

**Commercial use/activity**—A use or activity on National Forest System lands (a) where an entry or participation fee is charged, or (b) where the primary purpose is the sale of a good or service, and in either case, regardless of whether the use or activity is intended to produce a profit (36 CFR 251.51).

**Community wildfire protection plan**—A plan developed in the collaborative framework that prioritizes areas for hazardous fuel (vegetation) reduction treatments. The plan also recommends the types and methods of treatment on Federal and non-Federal land that will protect one or more at-risk communities and essential infrastructure. The plan also recommends measures to reduce structural ignitability throughout the at-risk community. A CWPP may address issues such as wildfire response, hazard mitigation, community preparedness, or structure protection—or all of the above.

**Compaction (soil)**—A compression of soil resulting in an increase in soil bulk density and a decrease in soil porosity and infiltration. Compaction is commonly due to the weight and vibration of equipment or other traffic on the soil and can commonly affects soil 2 to 12 inches below the surface. Compaction changes or destroys soil structure, reduces infiltration, inhibits water movement, and may reduce the soil's air and water holding capacity.

**Composition (biological)**—The biological elements within the different levels of biological organization, from genes and species to communities and ecosystems.

**Composition (stand)**—The proportion of each tree species in a stand expressed as a percentage of the total number, basal area, or volume of all tree species in the stand.

**Composition (vegetation)**—The proportions of various plant species in relation to the total on a given area; it may be expressed in terms of cover, density, weight, etc.

**Conifer**—A cone-bearing tree with needle-like or scale-like leaves that are typically evergreen.

**Connectivity**—The ecological conditions that exist at several spatial and temporal scales that provide landscape linkages that permit the exchange of flow, sediments, and nutrients; the daily and seasonal movements of animals within home ranges; the dispersal and genetic interchange between populations; and the long-distance range shifts of species, such as in response to climate change (366 CFR 219.19). Connectivity needs vary by species.

**Conservation**—The protection, preservation, management, or restoration of natural environments, ecological communities, and species.

**Control (of invasive species)**—With respect to invasive species (plant, pathogen, vertebrate, or invertebrate species), control is defined as any activity or action taken to reduce the population, contain, limit the spread, or reduce the effects of an invasive species. Control activities are generally directed at established free-living infestations, and may not necessarily be intended to eradicate the targeted infestation in all cases.

**Corridor**—A linear strip of land identified for the present or future location of transportation or utility rights-of-way within its boundaries. It can also be identified for wildlife habitat connectivity or for protecting forest resources.

**Cover**—The elements of the environment used by an animal for hiding.

**Cover type**—The existing vegetation of an area described by the dominant plant species. Also see “forest type.”

**Critical habitat**—For a threatened or endangered species: (1) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the Endangered Species Act (16 USC 1533), on which are found those physical or biological features (a) essential to the conservation of the species, and (b) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with provisions of section 4 of the Endangered Species Act (16 USC 1533), upon a determination by the Secretary [of the Interior] that such areas are essential for the conservation of the species (Endangered Species Act, section 3 (5)(A) [16 USC 1532 (3)(5)(A)]. Critical habitat is designated through rulemaking by the Secretary of the Interior or Commerce (Endangered Species Act, section 4 (a)(3) and (b)(2) [16 USC 1533 (a)(3) and (b)(2)]).

**Critical load**—The level of atmospheric deposition below which significant harmful effects on specified sensitive elements of the environment are not expected to occur. Atmospheric deposition is the process by which particles, aerosols, dust, and gases move from the atmosphere to the earth’s surface via rain, snow, fog, or dry deposition.

**Crown cover**—Crown cover is the percentage of a fixed area covered by a vertical projection of the outermost perimeter of the natural spread of the foliage of plants above 4.5 feet. Crown closure can be measured from above looking down on the canopy (“bird’s-eye view”). The total crown cover percentage of an area cannot exceed 100 percent. This term is most often used to describe forested vegetation in this document.

**Crown fire**—A crown fire burns in the elevated canopy fuels. Canopy fuels normally consumed in crown fires consist of the live and dead foliage, lichen, and very fine live and dead branch wood found in the forest canopy. There are three types of crown fire: passive, active, and independent.

**Passive**—Also called torching or candling, this is one in which individual or small groups of trees torch out, but a solid flame is not consistently maintained in the canopy. These can encompass a wide range of fire behavior, from the occasional tree torching to a nearly active crown fire. Passive crowning is common in many forest types, especially those with an understory of shade-tolerant conifers.

**Active**—A crown fire in which the entire fuel complex becomes involved, but the crowning phase remains dependent on heat released from the surface fuels for continued spread. Medium- and long-range spotting associated with active crowning leads to an even greater rate of fire growth. Containment of active crown fires is very difficult.

**Independent**—A crown fire that burns in canopy fields without the aid of a supporting surface fire. Independent crown fires are not addressed because they occur so rarely and because no model of their behavior is available.

**Culmination of mean annual increment of growth**—The age in the growth cycle of an even-aged stand at which the average annual rate of increase of volume is at a maximum.

**Cultural resources**—The present expressions of human culture and the physical remains of past activities, such as buildings, structures, districts, landscapes, archaeological sites, and objects. They can

also include locations that can be significant in national, regional, or local history, architecture, archaeology, engineering, or culture. They include sacred sites and natural features significant to contemporary communities or peoples.

**Culvert**—Drain or waterway crossing under a road or railroad.

**Decision document**—A record of decision, decision notice, or decision memo (36 CFR 220.3).

**Decommission**—Demolition, dismantling, removal, obliteration, or disposal of a deteriorated or otherwise unneeded asset or component, including necessary restoration and cleanup work. Also see road decommissioning.

**Designated area**—An area or feature identified and managed to maintain its unique special character or purpose. Designated areas include congressionally designated areas, such as designated wilderness and national recreation areas. In addition, these areas include recommended wilderness, suitable and eligible wild and scenic river segments, inventoried roadless areas, and research natural areas.

**Desired condition**—Descriptions of specific social, economic, or ecological characteristics of the plan area, or a portion of the plan area, toward which management of the land and resources should be directed.

**Desired scenic character**—Appearance of the landscape to be retained or created over time, recognizing that a landscape is a dynamic and constantly changing community of plants and animals. It is a combination of landscape design attributes and opportunities as well as biological opportunities and constraints.

**Detrimental soil disturbance**—A degradation of the soil condition that alters the productivity and hydrologic function of a soil. Detrimental soil disturbance is defined by soil displacement, soil compaction, soil puddling, severely burned soil, and soil erosion.

*detrimental soil compaction*—Soil compaction is generally evaluated from 5 to 30 centimeters below the mineral soil surface. Specific depths for measurement are dependent upon soil type and management activities. Detrimental soil compaction is increased soil density (weight per unit volume) and strength that restricts root growth, reduces soil aeration, and inhibits water movement. Measurements of potential soil compaction may be qualitative or quantitative. Indicators that can be used include soil structural change, shovel penetration resistance, and calibrated penetrometer readings.

*detrimental soil puddling*—Soil puddling is generally evaluated at the mineral soil surface. Visual indicators of soil puddling include clearly identifiable ruts with berms in mineral soil, or in an Oa horizon of an organic soil. Reduced infiltration and permeability are associated and visually present in areas with soil puddling. Soil puddling may occur in conjunction with detrimental soil compaction. The guidelines for soil compaction (defined above) are to be used when this occurs. Soil puddling can also alter local groundwater hydrology and wetland function and provide conduits for runoff.

*detrimental soil displacement*—Detrimental soil displacement includes areas where 1 meter by 1 meter or larger exhibits the loss of either 5 cm or ½ of the humus-enriched top soil (A horizon), whichever is less.

*detrimental soil erosion*—Detrimental erosion includes erosion rates that cause long-term productivity losses from an activity area or soil losses that are beyond those acceptable for the activity area.

*severely burned soil*—The severely burned soil guideline applies to prescribed fire. Severely burned soils are identified by ratings of fire severity and the effects to the soil. A severely burned soil is generally soil that is within a High Fire Severity burn as defined by the Forest Service Burned Area Emergency Rehabilitation Program (Forest Service Handbook 2509.13) and Debano et al. (1998). Soil humus losses, structural changes, hydrophobic characteristics, and sterilization are potential effects of severely burned soil.

**Developed recreation**—Recreation use or opportunities occurring at developed sites.

**Developed recreation site**—An area that has been improved or developed for recreation (36 CFR 261.2). A recreation site on National Forest System lands that has a development scale of 3, 4, or 5:

- Development scale 3 (moderate site modification)—Where facilities are about equal in terms of protection of the natural site and user comfort. The contemporary/rustic design of improvements is usually based on use of native materials. Inconspicuous vehicular traffic controls are usually provided. Roads may be hard surfaced and trails formalized, with the primary access over high-standard roads. Development density is about three family units per acre. Interpretive services are informal, if offered, but generally direct.
- Development scale 4 (heavy site modification)—Where some facilities are designed strictly for users' comfort and convenience, and facility design may incorporate synthetic materials. There may be extensive use of artificial surfacing of roads and trails. Vehicular traffic control usually is obvious, with the primary access usually over paved roads. Development density is three to five family units per acre. Plant materials are usually native. Interpretive services, if offered, are often formal or structured.
- Development scale 5 (extensive site modification)—Where facilities are mostly designed for users' comfort and convenience and usually include flush toilets; they may include showers, bathhouses, laundry facilities, and electrical hookups. Synthetic materials are commonly used. Walks may be formal, and trails may be surfaced. Access is usually by high-speed highways. The development density is five or more family units per acre. Formal interpretive services are usually available. Plant materials may be nonnative, and mowed lawns and clipped shrubs are not unusual.

**Diameter at breast height**—The diameter of the stem of a tree measured at breast height (4.5 feet) from the ground. Diameter at breast height in this document implies diameter outside the bark.

**Dispersed camping**—The practice of camping outside a developed campground, including designated dispersed camping, dispersed vehicular camping, or backcountry camping.

**Dispersed recreation**—General term referring to recreation use outside developed recreation sites; this includes activities such as scenic driving, hiking, backpacking, climbing, hunting, fishing, snowmobiling, horseback riding, cross-country skiing, and recreation in primitive environments.

**Displacement (of soil)**—The movement of soil from one place to another by physical forces, including mechanical (equipment) and human or animal traffic.

**Disturbance**—An event that alters the structure, composition, or function of terrestrial or aquatic habitats; any relatively discrete event in time that disrupts ecosystem, watershed, community, or species

population structure and/or function and changes resources, substrate availability, or the physical environment. Natural disturbances include, among others, drought, floods, wind, fires, wildlife grazing, and insects and pathogens; human-caused disturbances include actions such as timber harvest, livestock grazing, roads, and the introduction of exotic species (36 CFR 219.19).

**Disturbance activities**—Activities that result in notable vegetation removal, soil disturbance, and/or altered behavior of wildlife. Examples include, but are not limited to, road construction and timber harvest.

**Disturbance regime**—A description of the characteristic types of disturbance on a given landscape; the frequency, severity, size, and distribution of these characteristic disturbance types, and their interactions. The natural pattern of periodic disturbances, such as fire or flooding (36 CFR 219.19).

**Ditch bill easements**—Ditch bill easements are authorized under the Ditch Bill Act. This act authorizes the Secretary of Agriculture to issue permanent easements for water conveyance systems in order to resolve title claims arising under acts repealed by the Federal Land Policy and Management Act of 1976, and for other purposes.

**Diversity of plant and animal communities**—The distribution and relative abundance or extent of plant and animal communities and their component species, including trees in an area.

**Dominant**—In ecology, that component of a community (for example, tree species) that is exerting the greatest influence because of its life form or great abundance.

**Driver (ecology)**—A natural or human-induced factor that directly or indirectly causes a change in an ecosystem. Examples include climate change, fire events, invasive species, and flooding.

**E-bikes (electronic bicycles)**—A bicycle equipped with an electric motor and a battery that may be activated in order to assist with or replace pedaling.

**Easement**—Permissions the Forest Service gives another party to use National Forest System land for a specific purpose (such as private landowners needing to build a road across National Forest System land to their property).

**Ecological condition**—The biological and physical environment that can affect the diversity of plant and animal communities, the persistence of native species, and the productive capacity of ecological systems. Ecological conditions include habitat and other influences on species and the environment; examples of ecological conditions include the abundance and distribution of aquatic and terrestrial habitats, connectivity, roads and other structural developments, human uses, and invasive species (35 CFR 219.19).

**Ecological integrity**—The quality or condition of an ecosystem when its dominant ecological characteristics (for example, composition, structure, function, connectivity, and species composition and diversity) occur within the natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human influence (36 CFR 219.19).

**Ecological processes**—The physical, chemical, and biological actions or events that link organisms and their environment. Processes include water cycle, nutrient cycling, disturbance response, species composition and structural succession.

**Ecosystem** (36 CFR 219.19)—A spatially explicit, relatively homogenous unit of the earth that includes all interacting organisms and elements of the abiotic environment within its boundaries. The term

ecosystem can be used at a variety of scales; for the forest plan, the ecosystem is referred to spatially at the forestwide and geographic area scales as well as within potential vegetation types. An ecosystem is commonly described in terms of its:

- *Composition*: The biological elements within the different levels of biological organization, from genes and individual plant and animal species to communities (such as cover types).
- *Structure*: The organization and physical arrangement of biological elements, such as snags and down woody debris; vertical (size class and structure class) and horizontal (density) distribution of vegetation; stream habitat complexity; landscape pattern; and connectivity.
- *Function*: Ecological processes that sustain composition and structure, such as energy flow, nutrient cycling and retention, soil development and retention, predation and herbivory, and natural disturbances such as wind, fire, and floods.
- *Connectivity*: See “connectivity.”

**Ecosystem resilience**—See “resilience.”

**Ecosystem services**—The benefit(s) people obtain from an ecosystem, including: (1) provisioning services, such as clean air and fresh water, energy, fuel, forage, fiber, and minerals; (2) regulating services, such as long-term storage of carbon; climate regulation; water filtration, purification, and storage; soil stabilization; flood control; and disease regulation; (3) supporting services, such as pollination, seed dispersal, soil formation, and nutrient cycling; and (4) cultural services, such as educational, aesthetic, spiritual, and cultural heritage values; recreational experiences; and tourism opportunities (36 CFR 219.19).

**Ecotone**—Ecotones exist where there is a gradual blending of two ecosystems across a broad area, or they may be manifested as a sharp boundary line. Without periodic disturbance processes such as fire, plants in competition extend themselves on one side of the ecotone as far as their ability to maintain themselves allows. Beyond this, competitors of the adjacent community can take over. As a result, the ecotone can represent a shift in dominance. This zone shifts in location and condition based on climate influences, successional processes, and disturbance processes. Examples include transition zones in riparian areas between terrestrial and aquatic ecosystems or between non-forested grass/shrub communities and forested communities.

**Effective ground cover (soils)**—For soil inventory purposes, effective ground cover is expressed as a percentage of material, other than bare soil on the land surface. It includes coarse woody debris, litter, duff, surface rocks (large gravels, cobbles, stones, boulders, and rock outcrop), biological crusts, and vegetation in contact with the soil. This estimate of ground cover differs from other resource protocols.

**Eligible river**—Within the Wild and Scenic River Act, eligibility is an evaluation of whether a candidate river is free flowing and possesses one or more outstandingly remarkable value(s). If found eligible, a candidate river is analyzed as to its current level of development (water resources projects, shoreline development, and accessibility), and a tentative classification is made that it be placed into one or more of three classes: wild, scenic, or recreational. Eligibility and classification represent an inventory of existing conditions.

**Endangered species**—A species that the Secretary of the Interior or the Secretary of Commerce has determined is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act. Endangered species are listed at 50 CFR 17.11, 17.12, and 224.101.

**Encroachment (conifer)**—A successional process of increasing conifer cover and density in non-forest ecosystems; historically regulated by periodic natural disturbances such as fire.

**Energy resources**—Renewable (solar, hydropower, wind, biomass, and geothermal) or nonrenewable (oil, natural gas, coal, and tar sand) resources.

**Environment**—All the conditions, circumstances, and influences surrounding and affecting the development of an organism or group of organisms.

**Environmental impact**—Any change to the environment, whether adverse or beneficial, resulting from human activities; the effect that people's actions have on the environment. Used interchangeably with environmental consequence or effect.

**Environmental justice community**—A community with a meaningfully greater minority or low-income population, compared with the population as a whole.

**Ephemeral streams**—A channel or draw reach that only carries surface flow in direct response to precipitation. An ephemeral channel may have a defined bed and banks, depending on the physiographic setting, climate, and dominant weather patterns.

**Erosion (soil)**—The detachment and transport of individual soil particles or soil aggregates of soil by wind, water, or gravity. Different forms and levels of soil erosion include sheet wash (fairly even soil loss), rills (small channels), and gullies (channeled erosion deeper than 19 inches or the depth that can be obliterated by a plow).

**Even-aged method**—Regeneration and maintenance, including harvest, of stands with one age class. Also see clearcut regeneration method, seed tree regeneration method, shelterwood regeneration method.

**Even-aged stand**—A stand of trees composed of a single-age class in which the range of tree ages is usually  $\pm 20$  percent of rotation. One age class comprises greater than 90 percent of total stand basal area most of the rotation. Also see *Silvicultural System*.

**Facilities**—Real property assets managed for the administration of the national forest. Examples are buildings, administrative pastures and fencing, water systems, wastewater systems, campgrounds, picnic areas, and interpretive sites. For the purpose of this document, facilities do not include roads, trails, dams, or airfields.

**Felling**—Cutting or uprooting standing trees; causing them to fall as a result of the cutting or uprooting.

**Fens**—Peat-accumulating wetland that supports marsh-like vegetation, usually fed by mineral-rich surface water or groundwater.

**Final regeneration harvest**—The final timber harvest in a sequence of harvests designed to regenerate a timber stand or release a regenerated stand. A final regeneration harvest could be a clearcut, removal cut of a shelterwood or seed tree system, or a selection cut.

**Fire behavior**—The manner in which a fire reacts to the influences of fuel, weather, and topography.

**Fire control**—See “fire suppression.”

**Fire disturbance regime**—See fire regime.

**Fire exclusion**—The disruption of a characteristic pattern of fire intensity and occurrence (primarily through fire suppression).

**Fire frequency**—The number of times that fires occur within a defined area and time period.

**Fire intensity**—The amount of energy released by a fire; however, no single metric (including reaction intensity, fire line intensity, temperature, residence time, radiant energy, and others) captures all of the relevant aspects of fire energy. Fire line intensity is most frequently used in forested ecosystems.

**Fire, managed**—See “managed fire.”

**Fire regime**—Description of the patterns of fire occurrences, frequency, size, severity, and sometimes vegetation and fire effects as well, in a given area or ecosystem. A fire regime is a generalization based on fire histories at individual sites. Fire regimes can often be described as cycles because some parts of the histories get repeated, and the repetitions can be counted and measured, such as the fire return interval. The five natural fire regimes are classified based on the average number of years between fires combined with the severity of the fire (the amount of vegetation replacement) and its effect on the dominant overstory vegetation.

**Fire shed**—Areas of similar wildfire threat where a similar response strategy could influence the wildfire outcome; fire sheds are conceptually analogous to watersheds.

**Fire risk**—The probability or chance of fire starting determined by the presence and activities of causative agents.

**Fire severity**—Describes the immediate effects of fire on vegetation, litter, or soils. Fire severity depends not only on the amount of heat generated by a fire (intensity) but also on the duration and residence time of the fire. While a fast-moving, wind-driven fire may be intense, a long-lasting fire that creeps along in the forest underbrush could transfer more total heat to plant tissue or soil. In this way, a slow-moving, low-intensity fire could have much more severe and complex effects on something like forest soil than a faster-moving, higher-intensity fire in the same vegetation. For this reason, the terms fire intensity and fire severity are not synonymous or interchangeable.

**Fire suppression**—The work and activities connected with fire extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished.

**Flame length**—The distance between the flame tip and the midpoint of the flame depth at the base of the flame (generally the ground surface). This is an indicator of fire intensity.

**Floodplain**—Lowlands bordering streams that are subject to recurrent flooding. Floodplains are composed of sediments carried by streams and deposited on land during flooding. An active floodplain is a flood-prone area; the zone bordering a stream subject to more frequent flooding (less than 50-year recurrence interval). The general field interpretation of the active floodplain is the valley bottom up to an elevation twice the stream’s maximum bankfull depth, measured at the thalweg (the line connecting the lowest points along a streambed).

**Focal species**—A small subset of species whose status permits inference to the integrity of the larger ecological system to which it belongs and provides meaningful information



regarding the effectiveness of the plan in maintaining or restoring the ecological conditions to maintain the diversity of plant and animal communities in the plan area. Focal species are commonly selected on the basis of their functional role in ecosystems.

**Forage**—Non-woody plants available to livestock or wildlife for feed.

**Forage reserve**—Allotments on which there is no current term permit obligation for some or all of the estimated livestock grazing capacity.

**Forage species**—Plants and animals that are food sources for fish, mammals, and birds.

**Forb**—A herbaceous (herb-like) plant, other than grass or grass-like plants.

**Forest**—An ecosystem characterized by a more or less dense and extensive tree cover, often consisting of stands varying in characteristics such as species composition, structure, age class, and associated processes.

**Forest product**—Forest products include sawtimber products for commercial use (i.e. lumber), non-sawtimber products for commercial or personal use (e.g., posts and poles, fuelwood), and non-timber products such as medicinal herbs, fungi, edible fruits and nuts, and other natural products.

**Foreground (immediate foreground, middleground, and background)**—Distance from a viewer to the National Forest landscape being viewed. Immediate foreground usually refers to up to 300 feet; foreground is up to 1/2 mile from the viewer; middleground is from 1/2 to 4 miles from a viewer; background is from 4 miles to the horizon.

**Forest health**—The perceived condition of a forest derived from concerns about such factors as its age, structure, composition, function, vigor, presence of unusual levels of insects or disease, and resilience to disturbance. *Note*, perception and interpretation of forest health are influenced by, for example, individual and cultural viewpoints, land management objectives, and the appearance of the forest at a point in time.

**Forest land**—An area at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest uses. Lands developed for non-forest use include areas for crops, improved pasture, residential or administrative sites, improved roads of any width and adjoining road clearing, and powerline clearings of any width (36 CFR 219.19).

**Forest plan**—A document that guides sustainable, integrated resource management of the resources within a plan area and within the context of the broader landscape, giving due consideration to the relative values of the various resources in particular areas (36 CFR 219.1(b)). Consistent with the Multiple-Use Sustained-Yield Act of 1960 (16 USC 528–531), the Forest Service manages National Forest System lands to sustain the multiple use of its renewable resources in perpetuity while maintaining the long-term health and productivity of the land.

**Forest type**—A category of forest usually defined by its vegetation, particularly its dominant vegetation, based on percentage cover of trees. Synonymous with forest cover type.

**Fuels management**—An act or practice of controlling flammability and reducing resistance to control of wildland fuels through mechanical, chemical, biological, or manual means, or by fire, in support of land management objectives.

**Fuels treatment**—The manipulation or removal of dead or live plant materials to reduce the likelihood of ignition and/or lessen potential damage and resistance to fire control. Example treatments include lopping, chipping, crushing, piling, and burning.

**Fuelwood**—Wood used for conversion to some form of energy.

**Function**—Ecological processes that sustain composition and structure, such as energy flow, nutrient cycling and retention, soil development and retention, predation and herbivory, and natural disturbances such as wind, fire, and floods.

**Functioning at risk**—Wetland or riparian conditions that are in limited functioning condition; however, existing hydrologic, vegetative, or geomorphic attributes make them susceptible to degradation.

**Gap (forest canopy)**—The space occurring in forest stands due to individual or group tree mortality, blowdown, or removal.

**Geographic area**—A spatially contiguous land area identified within the plan area. A geographic area may overlap with a management area (36 CFR 219.19).

**Geographic information system (GIS)**—A computer process that links database software to graphics (spatially explicit) software and provides database and analytic capabilities.

**Geomorphic functionality or integrity**—Geomorphic functionality or integrity can be defined in terms of attributes such as slope stability, soil erosion, channel morphology, and other upslope, riparian, and aquatic habitat characteristics.

**Global carbon cycle**—Process by which carbon moves between the oceans, atmosphere, earth's crust, and terrestrial ecosystems. It includes the places in which carbon is stored (pools), how long it resides there, and the process that transfer it from one pool to another (fluxes).

**Grazing**—Consumption of range or pasture forage by animals.

**Grazing permit**—Authorizes livestock to use National Forest System or other lands under Forest Service control for the purpose of livestock production. Term permits are issued for up to 10 years with priority for renewal at the end of the term. On-and-off grazing permits are permits with specific provisions on rangelands, only part of which is National Forest System lands or other lands under Forest Service control. Private land grazing permits are permits issued to persons who control grazing lands adjacent to or within a national forest proclaimed boundary and who waive exclusive grazing use of these lands to the United States for the full period the permit is to be issued (36 CFR 222). Temporary permits are issued for up to 1 year. Examples of temporary permits include livestock use permits for transportation livestock issued to persons engaged in commercial packing or dude ranching.

**Greenline**—The first perennial vegetation that forms a lineal grouping of community types on or near the water's edge. Most often it occurs at or slightly below the bankful stage.

**Ground cover (soils)**—Any combination of coarse woody debris, litter, duff, surface rock, vegetation basal area, and biological crusts. Also see total ground cover.

**Ground fire**—A ground fire burns in ground fuels, such as duff, organic soils, roots, and rotten, buried logs. Ground fires are generally ignited by surface fires and have very low spread rates. For these reasons, ground fires are not predicted or further discussed in this analysis because they would be secondary to and in association with a surface fire.

**Ground-disturbing activity**—An activity that results in a change in the vegetation cover or topography and that may cause or contribute to sedimentation. Ground-disturbing activities include, but are not limited to, removing vegetation cover, excavating, filling, and grading.

**Groundwater**—Water in a saturated zone in a geologic stratum. Water stored below the water table where the soil (or other geologic material) is saturated.

**Groundwater-dependent ecosystem**—A community of plants, animals, and other organisms whose extent and life processes depend on groundwater. Examples include riparian areas, wetlands, groundwater-fed lakes and streams, cave and karst systems, aquifer systems, fens, springs, and seeps.

**Group**—In silviculture, a unit of harvest or regeneration in group selection. The size of a group depends primarily on the creation of a microclimate conducive to establishment of desired regeneration of particular tolerance. The group size is often expressed as a function of the surrounding tree height. For example, a group size is commonly approximately twice the height of the mature trees. See *patch*.

**Habitat**—The native environment of an animal or plant.

**Habitat type**—A habitat type classification provides an ecologically based system of land stratification in terms of vegetation potential. As the habitat type is the basic unit in classifying land units or sites based on their biotic potential, it emphasizes similarities and differences in ecosystems that carry implications for a variety of land management objectives. Habitat types or habitat type groups can have similar biophysical characteristics, and similar function and response to disturbances. A habitat type will produce similar plant communities at natural or near-natural conditions.

**Hardened stream crossing**—A trail or travel way constructed across a stream that allows livestock to cross or to drink with minimal disturbance to the streambank and channel.

**Hazard tree**—A tree that has the potential to cause property damage, personal injury, or fatality in the event of a failure, where failure is the mechanical breakage of a tree or tree part. Failures often result from the interaction of defects, weather factors, ice or snow loading, or exposure to wind. Tree hazards may include dead or dying trees, dead parts of live trees, or unstable live trees (due to structural defects or other factors) that are within striking distance of people or property (a target). Defects are flaws in a tree that reduce its structural strength. Trees may have single or multiple defects, which may or may not be detectable. Failures result in accidents only if they strike a target.

**Headcutting**—A break in slope along a stream profile, which indicates an area of active erosion.

**Head Month** – **A month's use and occupancy of range by one animal, except for sheep or goats. For fee purposes 5 sheep or goats, weaned or adult, are equivalent to one cow, bull, steer, heifer, horse, or mule.**

**Highly valued resources and assets**—The things we care about. Features on the landscape that are influenced positively or negatively, or both, by fire. Some resources have only modest value and may not be analyzed in an assessment of risk to HVRAs. Likewise, low-value assets like outbuildings are often left unanalyzed so that efforts can be focused on the more highly valued resources or assets. Examples include life, property, structures, natural and cultural resources, community infrastructure, public support, economic opportunities such as tourism, and air quality.

**Historic property**—Any prehistoric or historic district, site, building, structure, or object included on, or eligible for inclusion on, the National Register of Historic Places.

**Homestead**—Public land acquired through the Homestead Act of 1862, which accelerated the settlement of the Western Territory by granting 160 acres of surveyed public land for a minimal filing fee and required 5 years of continuous residence and improvements on that land.

**Hydric soils**—A soil that formed under conditions of saturation, flooding, or ponding long enough to develop anaerobic conditions in the upper part.

**Hydrologic functionality**—Hydrologic functionality or integrity relates primarily to flow, sediment, and water quality attributes.

**Hydrologic unit code (HUC)**—Watersheds are delineated by the U.S. Geological Survey (USGS) using a nationwide system based on surface hydrologic features. This system divides the country into 21 regions (2-digit), 222 subregions (4-digit), 370 basins (6-digit), 2,270 subbasins (8-digit), approximately 20,000 watersheds (10-digit), and approximately 100,000 subwatersheds (12-digit). A hierarchical hydrologic unit code consisting of 2 additional digits for each level in the hydrologic unit system is used to identify any hydrologic area (see [Federal Standards and Procedures for the National Watershed Boundary Dataset, 4th ed., 2013](#)). A complete list of hydrologic unit codes, descriptions, names, and drainage areas can be found in [United States Geological Survey Water-Supply Paper 2294](#), titled “Hydrologic Unit Maps.”

**Improvement cutting**—An intermediate harvest that removes the less desirable trees of any species in a stand of poles or larger trees, primarily to improve the composition and quality.

**Indian tribe**—Any Indian or Alaska Native tribe, band, nation, pueblo, village, or other community that is included on a list published by the Secretary of the Interior under section 104 of the Federally Recognized Indian Tribe List Act of 1994 (25 USC 479a-1).

**Indicator**—A specific resource measure used in answering monitoring questions related to a forest plan monitoring program.

**Infrastructure**—The collection of human-built improvements such as roads, trails, airfields, facilities, and dams that serve the mission of the national forest.

**Intermediate treatment**—Any harvest or tending treatment designed to enhance growth, quality, vigor, and composition of the stand after establishment or regeneration and prior to final harvest. Regeneration establishment is not an objective of an intermediate treatment.

**Intermittent stream**—A stream that has perennial water in a discontinuous manner during all or part of the year, often in pools, longitudinally. Intermittent streamflow can be the result of a discontinuous supply from springs or groundwater seepage, or a discontinuous supply from surface sources, including runoff of rainfall and seasonal snowmelt, or both. Fish-bearing intermittent streams are distinguished from non-fish-bearing intermittent streams by the presence of any species of fish for any duration. Many intermittent streams may be used as spawning and rearing streams, refuge areas during flood events in larger rivers and streams, or travel routes for fish emigrating from lakes; they also may be used as semipermanent habitat in perennial pools of intermittent streams in the pine savanna region.

**Intermountain region**—Also known as Region 4, the Intermountain Region of the Forest Service encompasses twelve national forests and one grassland covering approximately 34 million acres within Utah, Idaho, Nevada, Wyoming, and eastern California as well as a research station in Colorado.

**Invasive plant**—Native and nonnative plants that are capable of spreading into native plant communities and disrupting vital ecological processes.

**Invasive species**—An alien species whose introduction does, or is likely to cause, economic or environmental harm or harm to human health. A species that causes, or is likely to cause, harm and that is exotic to the ecosystem it has infested. Invasive species infest both aquatic and terrestrial areas and can be identified within any of the following four taxonomic categories: plants, vertebrates, invertebrates, and pathogens (Executive Order 13112).

**Key ecosystem characteristic**—The dominant ecological characteristic(s) that describes the composition, structure, function, and connectivity of terrestrial, aquatic, and riparian ecosystems that are relevant to addressing important concerns about a land management plan. Key ecosystem characteristics are important to establishing or evaluating plan components that would support ecological conditions to maintain or restore the ecological integrity of ecosystems in the plan area.

**Key forage species** – Forage species whose use serves as an indicator to the degree of use of associated species. Key forage species are generally the most palatable and highly selected forage species but can vary based on dominant vegetation types, elevation, and ecological conditions.

**Land management plan**—See “forest plan.”

**Land that may be suitable for timber production**—A preliminary classification in the process of determining lands that are suited for timber production. This preliminary classification excludes National Forest System lands that are not suitable for timber production based on the factors identified in 36 CFR 219.11(a)(1)(i), (ii), (iv), (v), and (vi); it is made prior to the consideration of the factor at 36 CFR 219.11(a)(iii), which identifies suitability based on objectives and desired conditions established by the plan for those lands.

**Landing**—A cleared area in the forest to which logs are yarded or skidded for loading onto trucks for transport.

**Landscape**—A defined area irrespective of ownership or other artificial boundaries, such as a spatial mosaic of terrestrial and aquatic ecosystems, landforms, and plant communities, repeated in similar form throughout such a defined area (36 CFR 219.19).

**Landtype**—A unit shown on an inventory map with relatively uniform potential for a defined set of land uses. Properties of soils landform, natural vegetation, and bedrock are commonly components of landtype delineation used to evaluate potentials and limitations for land use. Landtypes often have common drainage characteristics and patterns.

**Landtype association**—Map (ecological) units that are aggregates of several specific landtypes. They are defined mainly by their geomorphic processes and development and further described for their geology, landforms, soils, slope, vegetation and climate.

**Lease**—A contract between the landowner and another granting the latter the right to search for and produce oil, gas, or other mineral substances (as specified in the document) or the right to conduct an activity for a payment of an agreed rental, bonus, or royalty. This right is subject to the terms, conditions, and limitations specified in the document.

**Life of the plan**—The anticipated life of this forest plan, which is defined as 15 years.

**Livestock**—A type of domestic animal raised for commercial production purposes (for example, cattle).

**Long-term persistence**—Means a species “continues to exist in the plan area over a sufficiently long period that encompasses multiple generations of the species, the time interval between major disturbance events, the time interval to develop all successional stages of habitat types, or the time interval needed for the overall ecosystem to respond to management” (Forest Service Handbook 1909.12, chapter 20, section 23.13c.1c).

**Maintain (an ecological condition)**—In reference to an ecological condition: To keep in existence or continuance of the desired ecological condition in terms of its desired composition, structure, and processes. Depending on the circumstance, ecological conditions may be maintained by active or passive management, or both (36 CFR 219.19). Also see Vegetation management.

**Managed fire**—Selected fire strategy that is less than full suppression; this means full perimeter control regardless of the tactics meant to bring about that control. Managed fire may also be referred to as managed fire for resource benefits, managed natural ignitions, or other similar terms.

**Management, adaptive**—See adaptive management.

**Management area**—A land area identified within the plan area that has the same set of applicable plan components. A management area does not have to be spatially contiguous (36 CFR 219.19).

**Mean annual increment of growth**—The total increment of increase of volume of a stand (standing crop plus thinnings) up to a given age divided by that age. In land management plans, the mean annual increment of growth is expressed in cubic measure and is based on the expected growth of stands according to intensities and utilization guidelines in the plan.

**Mean annual increment of growth, culmination of**—The age in the growth cycle of an even-aged stand at which the average annual rate of increase of volume is at a maximum.

**Mesic**—Receiving a moderate or well-balanced supply of moisture.

**Minerals**—The Forest Service defines three types of mineral (and energy) resources:

- *Locatable minerals*: Commodities such as gold, silver, copper, zinc, nickel, lead, and platinum, and some nonmetallic minerals such as asbestos, gypsum, and gemstones
- *Salable mineral materials*: Common varieties of sand, stone, gravel, cinders, clay, pumice, and pumicite
- *Leasable minerals*: Commodities such as oil, gas, coal, geothermal, potassium, sodium phosphates, oil shale, and sulfur. On acquired lands, solid minerals are leasable.

**Minimum impact suppression tactics (also Minimum impact suppression techniques)**—Guidelines for fire suppression and post-fire activities that use procedures, tools, and equipment that are commensurate with the fire’s potential or existing behavior and produce the least impact on the environment without compromising safety or the effectiveness of suppression efforts.

**Mitigate**—To avoid, minimize, rectify, reduce, or compensate the adverse environmental impacts associated with an action.

**Monitoring**—A systematic process of collecting information to evaluate effects of actions or changes in conditions or relationships (36 CFR 219.19).

**Motorized route**—A National Forest System road or trail that is designated for motorized use on a motor vehicle use map pursuant to 36 CFR 212.51.

**Multiple use**—Per 16 USC 531, “the management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output, consistent with the Multiple-Use Sustained-Yield Act of 1960” (16 USC 528–531; 36 CFR 219.19).

**Municipal watershed**—36 CFR 251.9 authorizes the Chief of the Forest Service to enter into agreements with municipalities to restrict the use of National Forest System lands from which water is derived to protect the municipal water supplies (Forest Service Manual 2542) within a given watershed area.

**National ambient air quality standards**—National air quality standards established by the U.S. Environmental Protection Agency under authority of the Clean Air Act (40 CFR 50) to protect public health and public and ecosystem welfare.

**National Forest System**—Includes national forests, national grasslands, and the National Tallgrass Prairie (36 CFR 219.19 and 219.62).

**National Forest System lands**—A nationally significant system of Federally owned units of forest, range, and related land consisting of national forests, purchase units, national grasslands, land utilization project areas, experimental forest areas, experimental range areas, designated experimental areas, other land areas, water areas, and interests in lands that are administered by the Forest Service or designated for administration through the Forest Service.

**National Forest System road**—Part of a system of permanent roads determined to be needed for the use, protection, and enjoyment of the national forest.

**National Forest System trail**—Part of a system of permanent trails determined to be needed for the use, protection, and enjoyment of the national forest.

**National Wild and Scenic Rivers System**—Established in the Wild and Scenic Rivers Act of 1968 (16 USC 1271 (note), 1271–1287; 36 CFR 219.19) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations.

**National Wilderness Preservation System**—The Wilderness Act, signed into law in 1964, created the National Wilderness Preservation System and recognized wilderness as “an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain.”

**Native species**—An organism that was historically or is presently in a particular ecosystem as a result of natural migratory or evolutionary processes, and not as a result of an accidental or deliberate introduction into that ecosystem. An organism’s presence and evolution (adaptation) in an area are determined by climate, soil, and other biotic and abiotic factors (36 CFR 219.19).

**Natural range of variation**—The variation of ecological characteristics and processes over scales of time and space that is appropriate for a given management application. The natural range of variation is a tool for assessing the ecological integrity and does not necessarily constitute a management target or desired condition. The natural range of variation can help identify key structural, functional, compositional, and connectivity characteristics, for which plan components may be important for either maintenance or restoration of such ecological conditions.

**Natural recovery**—The use of natural processes to reforest an area after a disturbance (such as fire) and the acceptance of resulting conditions, even though it may take many years to attain stocked forested conditions.

**Non-forest land**—Lands that do not meet the definition of forest land.

**Non-forest vegetation**—Persisting vegetation communities whose compositions are predominantly grasses, grass-like plants, forbs, or shrubs. Non-forest vegetation includes grasslands, savannas, shrublands, deserts, tundra, alpine, marshes, and meadows. Trees typically occupy less than 10% of the landscape, and in fire-driven communities, return intervals are sufficient to maintain assemblages of these plants in space and time. See also forest land.

**Nonnative species**—Organisms that do not occur naturally in an area but are introduced as the result of deliberate or accidental human activities. Unlike invasive species, nonnative species may not hinder or prevent the survival of others within the ecosystem.

**Noxious weed**—A regulatory term defined through Federal and individual state statutes. Noxious weeds are invasive plants capable of successfully expanding their populations into new ecosystems beyond their natural range and can create lasting impacts on native plant communities. Fire, native pests, weather events, human actions, and environmental change can exacerbate impacts.

**Nurse tree**—A tree, group, or crop of trees, shrubs, or other plants, either naturally occurring or introduced, used to nurture, improve survival, or improve the form of another tree species or crop when young by protecting it from frost, insolation, wind, or insect attack.

**Objective**—A concise, measurable, and time-specific statement of a desired rate of progress toward a desired condition or conditions.

**Off-highway vehicle**—Any motorized vehicle designed for or capable of cross-country travel.

**Outfitting/outfitter guide**—An outfitter rents on or delivers to National Forest System lands for pecuniary remuneration or other gain any saddle or pack animal, vehicle, boat, camping gear, or similar supplies or equipment. Guiding is provided services or assistance (such as supervision, protection, education, training, packing, touring, subsistence, transporting people, or interpretation) for pecuniary remuneration or other gain to individuals or groups on National Forest System lands (36 CFR 251.51).

**Outstandingly remarkable values**—Within the Wild and Scenic Rivers Act, categories of scenery, recreation, geology, fisheries, wildlife, historic/cultural, or other similar values.

**Partnership**—Voluntary, mutually beneficial, and desired arrangement between the Forest Service and another or others to accomplish mutually agreed-on objectives consistent with the agency's mission and serving the public's interest.



**Passive vegetation management**—Passive vegetation management allows for natural forest succession and relies primarily on natural processes, such as wildfire, for changes to vegetation structure.

**Patch**—A small part of a stand or forest that can be tens, hundreds, or even thousands of acres and a relatively homogenous part of a stand or forest that differs from the surrounding forest. See *group*.

**Peatland**—A generic term for any wetland that accumulates partially decayed plant matter (peat).

**Perennial (streams)**—A stream that flows continuously throughout most years and whose channel bed is generally located below the surrounding groundwater elevation.

**Permanent road**—A National Forest System road intended to remain in service to highway vehicles over the long term. The prerequisite for design, construction, operation, and maintenance is for a sustained service life. For example, features such as bridges and culverts are designed with a service life of 50 years or more.

**Permit (special use)**—A use authorization that provides permission, without conveying an interest in land, to occupy and use National Forest System land or facilities for specified purposes, and that is both revocable and terminable (36 CFR 251.51).

**Permitted grazing**—Authorizes livestock use on National Forest System lands. Authorizing permits include grazing permits for commercial livestock production purposes.

**Persistence**—Continued existence or permanence despite opposition, change, or disturbance. See also long-term persistence.

**Personal use permit**—Normally used to describe the type of permit issued for removal of wood products (firewood, post, poles, and Christmas trees) from National Forest System land when the product is for home use and not to be resold for profit.

**Pinyon-juniper woodland**—A common coniferous woodland type in the western United States, where pinyon pines and junipers are codominant trees.

**Plan area**—The National Forest System lands covered by a forest plan (36 CFR 219.19).

**Plant and animal community**—A naturally occurring assemblage of plant and animal species living within a defined area or habitat (36 CFR 219.19).

**Plan component**—Plan components (desired conditions, objectives, standards, guidelines, suitability, and monitoring questions and monitoring indicators) provide a strategic and practical framework for managing the plan area. They can apply forestwide or can be specific to a management area or designated area.

**Pole**—**1. Tree size class**—A tree of a size between a sapling and a mature tree. On the Ashley National Forest, a pole may range from 3 to 8 inches at diameter at breast height depending on the species. **2. Product class**—A non-sawtimber forest product. On the Ashley National Forest, a pole is generally 2.5 to 5.5 inches in diameter and of unspecified length; lodgepole pine is a preferred species for poles.

**Post**—A non-sawtimber forest product. On the Ashley National Forest, a post is generally 5.6 to 6.9 inches in diameter and up to 10 feet in length; a variety of species are utilized, with lodgepole pine and juniper being a preferred species for post.

**Pre-commercial thinning**—An intermediate treatment in which the selective felling, deadening, or removal of trees from a young stand maintain a specific stocking or stand density range. The removal of trees is not for immediate financial return (there is no merchantable product available); rather, it is to reduce stocking to concentrate growth on the more desirable trees.

**Prescribed burn or prescribed fire**—A fire ignited via management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and National Environmental Policy Act requirements (where applicable) must be met, prior to ignition.

**Prevention of significant deterioration**—An Environmental Protection Agency program that applies to new major sources or major modifications of existing sources of air pollutants in areas that meet the national ambient air quality standards. Prevention of significant deterioration does not prevent sources from increasing emissions; instead, it is designed to protect public health, and ecosystem health and welfare, to preserve, protect, and enhance the air quality in class I areas, such as national parks, and class I wilderness areas to protect economic growth, and to ensure that any decision to permit an increase in air pollution undergoes careful evaluation and consideration, which includes State and Federal air regulatory agencies, land management agencies, and the general public.

**Productivity**—The capacity of National Forest System lands and their ecological systems to provide the various renewable resources (such as timber) in certain amounts in perpetuity. In land management, productivity is an ecological term, not an economic term (36 CFR 219.19).

**Projected timber sale quantity (PTSQ)**—The estimated quantity of timber meeting applicable utilization standards that is expected to be sold during the plan period. As a subset of the projected wood sale quantity (PWSQ), the projected timber sale quantity includes volume from timber harvest for any purpose from all lands in the plan area based on expected harvests that would be consistent with the plan components. The PTSQ is also based on the planning unit's fiscal capability and organizational capacity. The PTSQ is not a target or a limitation on harvest, and is not an objective unless the responsible official chooses to make it an objective in the plan.

**Projected wood sale quantity (PWSQ)**—The estimated quantity of timber and all other wood products that is expected to be sold from the plan area for the plan period. The PWSQ consists of the projected timber sale quantity as well as other woody material such as fuelwood, firewood, or biomass that is also expected to be available for sale. The PWSQ includes volume from timber harvest for any purpose based on expected harvests that would be consistent with the plan components. The PWSQ is also based on the planning unit's fiscal capability and organizational capacity. The PWSQ is not a target or a limitation on harvest, and is not an objective unless the responsible official chooses to make it an objective in the plan.

**Properly functioning condition**—When riparian areas have adequate vegetation, landform, or woody material present to dissipate stream energy associated with high waterflow, thereby reducing erosion and improving water quality; capture sediment and aid floodplain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks against erosion; and maintain channel characteristics. Proper functioning condition for groundwater-dependent ecosystems (for example, seeps, springs, wetlands, and shorelines) have adequate vegetation, landform, or debris present to dissipate energies associated with wind action, wave action, and overland flow from adjacent sites, thereby reducing erosion and improving water quality; filter sediment and aid floodplain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize islands and shoreline features against cutting action; restrict water percolation; and develop diverse ponding characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterbird breeding, and other uses. A wetland or riparian area in proper functioning condition

will, in turn, provide associated values, such as fish and wildlife habitat and recreation opportunities, and support greater ecological diversity.

**Proposed action**—A project, activity, or action that a federal agency aims to implement or undertake, and which is the subject of an environmental analysis. Proposed action is a specific term defined under the National Environmental Policy Act.

**Proposed species**—A species that is not listed as “endangered” or “threatened” under the Endangered Species Act but that has been proposed for such listing in accordance with Section 4 of the act.

**Protection fire management area**—This management area has hazardous fuel (vegetation) conditions that currently put highly valued resources and assets at risk of damage from wildfire. Wildfire is suppressed under most conditions due to the potential economic loss and public safety concerns posed by a wildfire.

**Range improvements**—Any activity or program on or relating to rangelands that is designed to improve production of forage, change vegetation composition, control patterns of use, provide water, stabilize soil and water conditions, or provide habitat for livestock and wildlife.

**Rangeland health**—The degree to which the integrity of the soil, vegetation, and ecological processes are sustained.

**Rangelands**—Land on which the indigenous vegetation (climax or natural potential) is predominantly grasses, grass-like plants, forbs, or shrubs and is managed as a natural ecosystem. If plants are introduced, they are managed similarly. Rangelands include natural grasslands, savannas, shrublands, many deserts, tundra, alpine communities, marshes, and meadows.

**Reasonable assurance**—A judgment the responsible official makes based on best available scientific information and local professional experience that practices based on existing technology and knowledge are likely to deliver the intended results. Reasonable assurance applies to average and foreseeable conditions for the area and does not constitute a guarantee to achieve the intended results.

**Reclamation**—The restoration of a site or resource to a desired condition to achieve management objectives or stated goals.

**Recommended wilderness**—An area that has been determined to meet the criteria to be designated as wilderness and that the Forest Supervisor proposes in a land management plan to be recommended to Congress for inclusion into the National Wilderness Preservation System.

**Recovery**—Denotes improvement in a threatened or endangered species population or viability.

**Recreation**—The set of recreation settings and opportunities on the National Forest System that is ecologically, economically, and socially sustainable for present and future generations (36 CFR 219.19).

**Recreation opportunity**—An opportunity to participate in a specific recreational activity in a particular recreation setting to enjoy desired recreational experiences and other benefits that accrue.

**Recreation opportunity spectrum**—The system that the Forest Service uses to describe an opportunity to participate in a specific recreation activity in a particular recreation setting to enjoy desired recreation experiences and other benefits that accrue. Recreation opportunities include nonmotorized, motorized, developed, and dispersed recreation on land and water, and in the air (36 CFR 219.19).

**Recreation setting**—The social, managerial, and physical attributes of a place that, when combined, provide a distinct set of recreation opportunities. The Forest Service uses the recreation opportunity spectrum to define recreation settings and categorize them into six distinct classes: primitive, semiprimitive nonmotorized, semiprimitive motorized, roaded natural, rural, and urban. Also see “recreation opportunity spectrum” (36 CFR 219.19).

**Recruitment (of aspen)**—A process that refers to the addition of new individuals to a population of canopy trees. In reference to aspen, shoots have reached sufficient height where terminal buds extend beyond browsing reach of ungulates ( $\geq 6$  feet), with greater probability of reaching maturity.

**Regeneration**—*Silviculture* **1.** Seedlings or saplings **2.** The act of renewing tree cover by establishing young trees naturally (for example, natural seeding through available seed tree sources or root suckering) or artificially (direct seeding or planting).

**Regeneration harvest method**—Any removal of trees intended to assist in the regeneration of a new age class or to make regeneration of a new age class possible. Regeneration harvest may be through even-aged or uneven-aged methods. See also clearcut regeneration method, even-aged method, seed tree regeneration method, selection regeneration method, shelterwood regeneration method, uneven-aged method.

**Regeneration (of aspen)**—The production of new aspen suckers or seedlings. The term is used in reference to those individual shoots that are generally less than 6 feet, with terminal buds vulnerable to browsing.

**Relative cover**—The proportion that a species composes of the total plant cover. Total cover always adds up to 100 percent.

**Research natural area**—A physical or biological unit in which current natural conditions are maintained to the extent possible. These conditions are ordinarily achieved by allowing natural physical and biological processes to prevail without human intervention. However, under unusual circumstances, deliberate manipulation may be utilized to maintain the unique feature that the research natural area was established to protect (Forest Service Manual 4063.05).

**Reserves/reserve trees**—Live trees, pole-sized or larger, retained in either a dispersed or aggregated manner after the regeneration period under the clearcutting with reserves, seed tree with reserves, shelterwood with reserves, or group selection with reserves methods. Trees are retained for resource purposes other than regeneration. See also clearcut regeneration method, seed tree regeneration method, shelterwood regeneration method.

**Resilience (ecological)**—The ability of a species or its habitat, or both, to recover from stresses and disturbances. Resilient ecosystems regain their fundamental structure, processes, and functioning when altered by stresses, such as increased CO<sub>2</sub>, nitrogen deposition, and drought, and disturbances like land development and fire.

**Resistance**—Capacity of an ecosystem to retain its fundamental structure, processes, and functioning (or remain largely unchanged) despite stresses, disturbances, or invasive species.

**Resource value rating**—The value of vegetation present on an ecological site for a particular use or benefit, particularly for watershed protection and erosion control. Plants of moderate to high resource value exhibit moderate to high growth habit, plant structure, biomass and/or soil-binding root systems that are conducive to reduce soil erosion.

**Response to wildland fire**—The mobilization of the necessary services and responders to a fire. The mobilization is based on ecological, social, and legal consequences; the circumstances under which a fire occurs; and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected.

**Responsible official**—The official with the authority and responsibility to oversee the planning process and to approve a plan, plan amendment, and plan revision (36 CFR 219.19 and 219.62).

**Restocked**—The condition of the growing space occupancy of trees to be achieved after a disturbance that has substantially altered the existing stocking (see definition of *Stocking*).

**Restoration**—The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed; ecological restoration focuses on reestablishing the composition, structure, pattern, and ecological processes necessary to facilitate terrestrial and aquatic ecosystems sustainability, resilience, and health under current and future conditions (36 CFR 219.19).

**Restore**—To renew or return to a former state by the process of restoration (see restoration) (36 CFR 219.19).

**Revegetation**—Establishing or reestablishing desirable plants on areas where desirable plants are absent or of inadequate density, by management alone (natural revegetation) or by seeding or transplanting (artificial revegetation) (Society for Range Management 1999).

**Rights-of-way**—Legal rights provided by the Forest Service to another party to pass along a specific route through National Forest System land (such as a transmission line passing through a national forest).

**Riparian**—Of or pertaining to the bank of a body of flowing water; the land adjacent to a river or stream that is at least periodically influenced by flooding. Riparian is sometimes also used to indicate the banks of lakes and ponds subject to periodic inundation by wave action or flooding.

**Riparian area**—A three-dimensional ecotone of interaction that includes terrestrial and aquatic ecosystems that extend into the groundwater, above the canopy, outward across the floodplain, up the near slopes that drain to the water, laterally into the terrestrial ecosystem, and along the watercourse at variable widths (36 CFR 219.19).

**Riparian ecosystem**—A transition between the aquatic ecosystem and the adjacent upland terrestrial ecosystem. A riparian ecosystem is identified by soil characteristics and by distinctive vegetation communities that require free or unbounded water.

**Riparian management zone**—A portion, or portions, of the watershed where riparian-dependent resources receive primary emphasis and management activities are subject to specific standards and guidelines (36 CFR 219.19).

**Riparian (vegetation type)**—The plant community adjacent to a river, stream, or spring. Riparian vegetation is typified by the presence of hydrophilic (water-loving) plants.

**Risk**—A combination of the likelihood that a negative outcome will occur and the severity of the subsequent negative consequences (36 CFR 219.19).

**Road**—A motor vehicle route more than 50 inches wide, unless identified and managed as a trail (36 CFR 212.1; Forest Service Manual 7705).

**Road decommissioning**—Removal from the road system and taken out of service. The unneeded road corridor would be returned to the natural landscape.

**Roadless area conservation rule**—The 2001 Roadless Rule establishes prohibitions on road construction, road reconstruction, and timber harvesting on 58.5 million acres of inventoried roadless areas on National Forest System lands. The intent of the 2001 Roadless Rule is to provide lasting protection for inventoried roadless areas within the National Forest System in the context of multiple-use management.

**Rotation**—The number of years (including the regeneration period) required to establish and grow timber under an even-aged management system to a specified condition or maturity for regeneration harvest.

**Sacred site**—Executive Order 13007, Indian Sacred Sites defines an Indian sacred site as “any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian Tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significant to, or ceremonial use by, an Indian religion; provided that the Indian Tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site.”

**Sagebrush**—Any of several North American shrubs or sub-shrubs that are capable of forming vast communities in the semidesert, steppe, and montane regions of the western United States.

**Salvage harvest**—The removal of dead trees or trees damaged or dying because of injurious agents, other than competition, that recovers economic value that would otherwise be lost, or because the removal of the dead or damaged trees contributes to achieving plan desired conditions or objectives.

**Sanitation harvest (cutting)**—An intermediate harvest that removes trees to improve stand health by stopping or reducing the actual or anticipated spread of insects and disease.

**Sapling**—A usually young tree larger than a seedling but smaller than a pole. On the Ashley National Forest, a sapling may range from 1 to 4 inches diameter at breast height depending on the species.

**Sawtimber**—Trees or logs cut from trees with minimum diameter and length and with stem quality suitable for conversion to lumber. The minimum diameter and length are dependent on species and if the trees are alive or dead.

**Scenery Management System**—A systematic approach to inventory, analyze, manage, and monitor the scenic resources. This system provides a process to determine the relative value and importance of the national forest scenery and assist in establishing overall resource objectives. This classification system recognizes scenery as the visible expression of dynamic ecosystems functioning within "places", which have unique aesthetic and social values. It describes the existing and desired conditions of scenic character within the plan area and is structured to emphasize "natural appearing" scenery.

**Scenic character**—A combination of the physical, biological, and cultural images that gives an area its scenic identity and contributes to its sense of place. Scenic character provides a frame of reference from which to determine scenic attractiveness and to measure scenic integrity (2012 Planning Rule and 36 CFR 219.19). The scenic character description incorporates the visible natural physical and biological features, as well as the context and ways the scenery is viewed and experienced. A scenic character description also includes the viewing context and associations that viewers have with that scenery based on visible historic and cultural elements and significant and broadly relevant special places.

**Scenic integrity objectives**—Serve as thresholds of allowable visual dominance by landscape modifications and deviations from the valued scenic character; they describe the lowest allowable scenic integrity level for an area. They describe the degree to which a landscape is visually perceived to be complete when compared with the scenic character of that area.

Very high scenic integrity refers to landscapes where the valued scenic character is intact with only minute, if any, deviations. Generally provides for ecological changes only.

High scenic integrity refers to landscapes where the valued scenic character appears intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the scenic character so completely and at such scale that they are not evident.

Moderate scenic integrity refers to landscapes where the valued scenic character appears slightly altered. Noticeable deviations must remain visually subordinate to the scenic character being viewed.

Low scenic integrity refers to landscapes where the valued scenic character appears moderately altered. Deviations begin to dominate the valued scenic character being viewed, but they borrow valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetation type changes, or architectural styles outside the landscape being viewed. The deviations should not only appear as valued scenic character outside the landscape being viewed but compatible or complementary to the character within.

Very low scenic integrity refers to landscapes where the valued scenic character appears heavily altered. Deviations may strongly dominate the valued scenic character. They may not borrow from valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetation type changes, or architectural styles within or outside the landscape being viewed. However, deviations must be shaped and blended with the natural terrain (landforms) so that elements such as unnatural edges, roads, landings, and structures do not dominate the composition.

**Scenic river**—Within the Wild and Scenic River Act, a tentative classification of a river or sections of a river that are free of impoundments; shorelines or watersheds are still largely primitive, and shorelines are largely undeveloped but accessible in places by roads.

**Section 106 process**—Regulations implementing the National Historic Preservation Act of 1966, which describe the procedures for identifying and evaluating historic properties, assessing the impacts of Federal actions on historic properties, and project proponents consulting with appropriate agencies to avoid, reduce, or minimize adverse effects.

**Secure habitat**—An area with low levels of human disturbance or habitat that allows a wildlife species to remain in a defined area despite an increase in stress or disturbance. The components of secure habitat can include vegetation, topography, the size of the patches of vegetation, road density, distance from roads, intensity of the disturbance, and seasonal timing of the disturbance. This general definition covers most uses of the term secure habitat, except for elk and grizzly bear, which have specific definitions.

**Sediment**—Solid mineral and organic material that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice.

**Sediment delivery**—The delivery of sediment to a waterbody via overland flow, mass wasting, human activity, or some other means.

**Seed tree regeneration (methods)**—An even-aged (or two-aged with reserves) regeneration harvest method or cutting procedure that regenerates and maintains a stand with a single age class by cutting all trees except for a small number of widely dispersed trees retained for seed production and to produce a new age class in an exposed microenvironment. Seed trees are usually removed after regeneration is established. The seed tree method may or may not have reserve trees left to attain goals other than regeneration. Also see even-aged method, regeneration harvest method, silvicultural system, two-aged method.

**Seep**—A wet area where a seasonal high water table intersects with the ground surface. Seeps that meet the definition of a wetland are included in the riparian corridor.

**Selection regeneration (uneven-aged methods)**—An uneven-aged regeneration harvest method or cutting procedure that regenerates and maintains a multi-aged structure by removing some trees in all size classes either singly, in small groups, or in strips, allowing for a new age class to establish. Also see regeneration harvest method, silvicultural system, uneven-aged method..

**Seral**—A biotic community that is developmental; a transitory stage in an ecological succession.

**Seral/structural stage**—A phase of development of an ecosystem in ecological succession from a disturbed, relatively unvegetated state to a complex, mature plant community.

**Shade intolerant plant species**—Having the capacity to compete for survival under direct sunlight conditions.

**Shade tolerant plant species**—Having the capacity to compete for survival under shaded conditions.

**Shall**—Indicates mandatory direction, equal to “must.” Shall is typically used in forest plan standards.

**Shelterwood (methods)**—An even-aged (or two-aged with reserves) regeneration harvest method or cutting procedure in which, in order to provide a source of seed and/or protection for regeneration, the old crop (the shelterwood) is removed in two or more successive cuttings, the first of which is ordinarily the seed cutting (though it may be preceded by a preparatory cutting), and the last is the final cutting. Part of the shelterwood could be retained as reserves to attain goals other than regeneration and to create a two-aged stand. Also see even-aged method, regeneration harvest method, silvicultural system, two-aged method.

**Should**—Indicates preferred direction that should be fully considered. However, departure is allowed for specific circumstances when deviation achieves the desired results, and the purpose and intent of the direction are met. Should is typically used in forest plan guidelines.

**Shrub**—Perennial, multi-stemmed woody plant that is usually less than 13 to 16 feet in height. Shrubs typically have several stems arising from or near the ground, but they may be taller than 16 feet or single stemmed under certain environmental conditions.

**Side-by-side off-highway vehicle**—A small four-wheel drive utility terrain or recreational off-highway vehicle that can seat two to six people.

**Significant cave**—A cave located on National Forest System lands, managed under authority of the Cave Resource Protection Act, which has been determined to contain significant, biota, cultural, geologic, mineralogic or palaeontologic, hydrologic, recreational, educational, or scientific resources or opportunities.



**Significant federal cave**—A natural cave located on federal lands, which has been evaluated and found to meet the criteria for designation as a significant federal cave. The criteria for designation as a significant federal cave include biota, cultural, geologic, mineralogic, paleontologic, hydrologic, recreational, educational, or other scientific resources or opportunities.

**Silviculture**—The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands. Silviculture entails the manipulation of forest and woodland vegetation in stands and on landscapes to meet the diverse needs and values of landowners and society on a sustainable basis.

**Silvicultural System**—A management process whereby forests are tended, harvested, and replaced resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the fellings that remove the mature crop and provide for regeneration, and according to the type of forest thereby produced. The system name is based on the number of age classes (for example, even-aged, two-aged, and uneven-aged) or the regeneration method (for example, clearcutting, seed tree, shelterwood, and selection) used.

**Site potential tree height**—The average maximum height of the tallest dominant trees for a given site class.

**Skid trails**—A cleared corridor used in timber harvest to transport trees by dragging them along the ground to the landing/processing area.

**Skidding**—Transporting trees or parts of trees by trailing or dragging them.

**Slash**—The residue left on the ground after felling and other silvicultural operations, or that has accumulated there as a result of storms, fire, or natural pruning.

**Slash piles**—Woody residue that has been moved, either mechanically or by hand, into piles for burning.

**Slope distance**—In terms of riparian management zones, slope distance is considered the linear distance along the ground surface, traveling directly upslope (along the steepest gradient), away from the seasonal high-water level of a waterbody (stream, pond, lake, spring, or wetland).

**Snag**—A standing dead tree usually greater than 5 feet in height and 6 inches in diameter at breast height.

**SNOTEL**—An automated system of snowpack and related climate sensors operated by the Natural Resources Conservation Service of the United States Department of Agriculture in the western United States.

**Soil burn severity**—Parsons et al. (2010) defines three categories of soil burn severity after a fire:

*Low soil burn severity:* Surface organic layers are not completely consumed and are still recognizable. Structural aggregate stability is not changed from its unburned condition, and roots are generally unchanged because the heat pulse below the soil surface was not great enough to consume or char any underlying organics. The ground surface, including any exposed mineral soil, may appear brown or black (lightly charred), and the canopy and understory vegetation will likely appear “green.”

*Moderate soil burn severity:* Up to 80 percent of the pre-fire ground cover (litter and ground fuels) may be consumed but generally not all of it. Fine roots (0.1 inch or 0.25 cm diameter) may be scorched but are rarely completely consumed over much of the area. The color of the ash on

the surface is generally blackened with possible gray patches. There may be potential for recruitment of effective ground cover from scorched needles or leaves remaining in the canopy that will soon fall to the ground. The prevailing color of the site is often “brown” due to canopy needle and other vegetation scorch. Soil structure is generally unchanged.

*High soil burn severity:* All or nearly all the pre-fire ground cover and surface organic matter (litter, duff, and fine roots) is generally consumed, and charring may be visible on larger roots. The prevailing color of the site is often “black” due to extensive charring. Bare soil or ash is exposed and susceptible to erosion, and aggregate structure may be less stable. White or gray ash (up to several centimeters in depth) indicates that considerable ground cover or fuels were consumed. Sometimes very large tree roots (> 3 inches or 8 cm diameter) are entirely burned extending from a charred stump hole. Soil is often gray, orange, or reddish at the ground surface where large fuels were concentrated and consumed.

**Soil erosion**—See erosion (soil).

**Soil productivity**—The ability of soil to sustain vegetation, which depends on the amount of nutrients and water the soils contain and can release to plants.

**Soil quality**—The capacity of soil to perform these functions: to sustain plant and animal activity and productivity; to regulate water and solute flow; to store and cycle nutrients and carbon; to provide physical support; and to filter, buffer, and degrade organic and inorganic materials.

**Source water protection areas**—The area delineated by a state or tribe for a public water system or including numerous public water systems—whether the source is groundwater or surface water, or both—as part of a state or tribal source water assessment and protection program approved by the Environmental Protection Agency under section 1453 of the Safe Drinking Water Act (42 USC 300h-3(e); 36 CFR 219.19) or any subsequent laws applicable to public water systems that provide water for human consumption.

**Special-use permit (special-use authorization)**—A written permit, term permit, lease, or easement that authorizes use or occupancy of National Forest System lands and specifies the terms and conditions under which the use or occupancy may occur (30 CFR 251.51). The use authorization does not convey an interest in land, and it is both revocable and terminable.

**Species of conservation concern**—A species, other than federally recognized threatened, endangered, proposed, or candidate species, that is known to occur in the plan area and for which the Regional Forester has determined that the best available scientific information indicates substantial concern about the species’ capability to persist over the long term in the plan area (36 CFR 219.9(c)).

**Species richness**—The number or list of different species within a community or habitat.

**Species richness within the natural range of variability**—The range of different species (from the least to most) that are known to occur within a community or habitat type while existing within its natural state.

**Spring**—A water source located where water begins to flow from the ground due to the intersection of the water table with the ground surface. The source generally flows throughout the year. Springs that are the source of perennial or intermittent streams are included in the riparian corridor.

**Spotting**—Behavior of a fire producing sparks or embers that the wind carries and that start new fires beyond the zone of the main fire’s direct ignition.

**Stand**—A community of trees occupying a specific area and sufficiently uniform in canopy composition, age, and size class to be a distinguishable unit, forming a single management entity. Also see two-aged stand.

**Standard**—A mandatory constraint on project and activity decision-making; a standard is established to help achieve or maintain the desired condition or conditions, avoid or mitigate undesirable effects, or meet applicable legal requirements.

**Stand-replacing fire**—A fire that is lethal to most of the dominant aboveground vegetation and substantially changes the vegetation structure. Stand-replacement fires may occur in forests, woodlands and savannas, annual grasslands, and shrublands. They may be crown fires (fires burning in elevated canopy fuels), high-severity surface fires (fires burning in the surface fuel layer), or ground fires (fires burning in ground fuels such as duff, organic soils, roots, and rotten, buried logs; secondary to surface fires).

**Stocking**—An indication of growing space occupancy of trees relative to plan-defined desired conditions for the stand or area. Common indices of stocking include the number of trees by size and spacing, percent occupancy, basal area, relative density, or crown completion factor.

**Stressors**—Factors that may directly or indirectly degrade or impair ecosystem composition, structure, or ecological process in a manner that may impair its ecological integrity; examples include an invasive species, the loss of connectivity, or the disruption of a natural disturbance regime (36 CFR 219.19).

**Stubble height**—The height of forage plants remaining after grazing has occurred; average stubble height includes both grazed and un-grazed plants (Forest Service Handbook 2209.13, chapter 90).

**Succession/successional stage**—A predictable process of changes in structure and composition of plant and animal communities over time. Conditions of the prior plant community or successional stage create conditions that are favorable for the establishment of the next stage. The different stages in succession are often referred to as “seral” or “successional” stages.

**Suitability of lands**—A determination made regarding the appropriateness of various lands in a plan area for various uses or activities, based on the desired conditions applicable to those lands. The terms suitable and suited, and not suitable and not suited can be considered the same. Also see land that may be suitable for timber production.

**Suppression**—All the work of extinguishing a fire or confining fire spread.

**Surface disturbing activities**—Actions that alter the vegetation, surface/near surface soil resources, and/or surface geologic features beyond natural site conditions and on a scale that affects other public land values. Examples of surface disturbing activities may include operation of heavy equipment to construct well pads, roads, pits, and reservoirs; installation of pipelines and power lines; maintenance activities; and several types of vegetation treatments (e.g., prescribed fire, etc.).

**Surface fire**—A fire that burns in the surface fuel layer, which lies immediately above the ground fuel but below the canopy or aerial fuels. Surface fuels consist of needles, leaves, grass, and dead and down branch wood and logs, shrubs, low brush, and short trees. Surface fire behavior varies widely,

depending on the nature of the surface fuel complex. Surface fires are generally easier to contain than any type of crown fire (a fire burning in elevated canopy fuels).

**Sustainability**—The capacity to meet the needs of the present generation without compromising the ability of future generations to meet their needs. For the purposes of this part, “ecological sustainability” refers to the capability of ecosystems to maintain ecological integrity; “economic sustainability” refers to the capability of society to produce and consume or otherwise benefit from goods and services, including contributions to jobs and market and nonmarket benefits; and “social sustainability” refers to the capability of society to support the network of relationships, traditions, culture, and activities that connect people to the land and to one another, and support vibrant communities (36 CFR 219.19).

**Sustainable recreation**—The set of recreation settings and opportunities on the National Forest System that is ecologically, economically, and socially sustainable for present and future generations (36 CFR 219.19). Also see recreation setting, recreation opportunity.

**Sustained yield limit**—The amount of timber, meeting applicable utilization standards, “which can be removed from [a] forest annually in perpetuity on a sustained-yield basis” (NFMA at section 11, 16 U.S.C. 1611; 36 CFR 219.11(d)(6)). It is the volume that could be produced in perpetuity on lands that may be suitable for timber production. Calculation of the limit includes volume from lands that may be deemed not suitable for timber production after further analysis during the planning process. The calculation of the sustained yield limit is not limited by land management plan desired condition, other plan components, or the planning unit’s fiscal capability and organizational capacity. The sustained yield limit is not a target but is a limitation on harvest, except when the plan allows for a departure.

**Terrestrial**—Term in biology generally used to describe living organisms that live and grow on land, as opposed to air or water.

**Thalweg**—The longitudinal profile line, or line connecting the lowest points along a streambed.

**Thinning**—A cutting made to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality (harvest trees that are likely to die).

**Threatened species**—A species that the Secretary of the Interior or the Secretary of Commerce has determined is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Threatened species are identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act. Threatened species are listed at 50 CFR 17.11, 17.12, and 223.102. Also see candidate species and endangered species.

**Thresholds (ecological)**—Points in space and time at which one or more of the primary ecological processes responsible for maintaining the sustained equilibrium of the ecological state degrades beyond the point of self-repair. Examples of thresholds include soil erosion and nutrient loss so severe that some plants cannot grow; invasion of a site by a plant that is so dominant that other plants cannot compete; and a change in the plant community structure—the arrangement of plants on the site—so that fire, a naturally occurring event that directs ecosystem change, cannot occur or occurs in a more destructive way.

**Timber harvest**—The removal of trees of sufficient size and quality to furnish raw material for wood fiber use and other multiple-use purposes (36 CFR 219.19).

**Timber production**—The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use (36 CFR 219.19).

**Topography**—The configuration of a land surface, including its relief, elevation, and the position of its natural and human-made features (mapping).

**Total ground cover**—The proportion of the soil surface covered by vascular plant parts, litter, rocks, mosses, and lichens. Vascular plant parts include both aerial (canopy and foliar cover, standing live and dead vegetation, and biomass) and basal cover. Also see ground cover.

**Total maximum daily load**—A pollution budget that includes a calculation of the maximum amount of a pollutant that can occur in a waterbody and allocated the necessary reductions to one or more pollutant sources (such as metals, sediment, and turbidity). A total maximum daily load serves as a planning tool and potential starting point for restoration or protection activities with the ultimate goal of attending or maintaining water quality standards.

**Traditional cultural property**—A subset of historic properties. Traditional cultural properties are historic properties that are in the main or in part eligible for listing on the National Register of Historic Places because of their “association with cultural practices or beliefs of a living community that (a) are rooted in that community’s history, and (b) are important in maintaining the continuing cultural identity of the community” (Parker and King 1998).

**Trail**—A route 50 inches or less in width or a route over 50 inches wide that is identified and managed as a trail (36 CFR 212.1).

**Trail class**—A range of categories (1–5) that reflects the level of trail development, with 1 being the least developed and 5 the most developed.

**Trailhead**—The transfer point between a trail and a road, lake, or airfield. The area may have developments that require or facilitate the transfer from one transportation mode to another.

**Transmission line**—The facility in an electric power system used to move large amounts of power from one location to a distant location; a transmission line is distinguished from a distribution line by higher voltage, greater power capability, and greater length. Transmission system voltages are typically from 69 kilovolts up to 765 kilovolts.

**Treaty rights**—Those rights or interests reserved in treaties for the use and benefit of tribes. The nature and extent of treaty rights are defined in each treaty. Only Congress may abolish or modify treaties or treaty rights.

**Two-aged method**—Regeneration and maintenance, including harvest, of stands with two age classes. The resulting stand may be two-aged or trend toward an uneven-aged condition because of both an extended period of regeneration establishment and the retention of reserve trees (green trees). See also clearcut regeneration method, reserves/reserve trees, seed tree regeneration method, shelterwood regeneration method, silvicultural system.

**Two-aged stand**—A growing area with trees of two distinct age classes separated in age by more than ± 20 percent of rotation. Each age class comprises greater than 10 percent of the basal area most of the rotation. Also see rotation, silvicultural system.

**Two-aged system**—A planned sequence of treatments designed to regenerate or maintain a timber stand with two age classes. A two-aged system is a form of even-aged management.

**Unauthorized road or trail**—A road or trail that is not a National Forest System road or trail, or a temporary road or trail and that is not included in a forest transportation atlas.

**Understory**—Plant communities that live under the canopy of trees, shrubs, or the dominant plant of the community.

**Uneven-aged method**—Regeneration and maintenance, including harvest, of stands with a multi-aged structure by removing some trees in all size classes either singly, in groups, or in strips. See also selection regeneration method, silvicultural system.

**Uneven-aged stand**—A stand of trees of three or more distinct age classes, either intimately mixed or in groups. Also see *Silvicultural System*.

**Unplanned ignition**—The start of a wildland fire by lightning, volcanoes, and unauthorized and accidental human-caused fires.

**Untrammeled**—A term defined in the context of the Wilderness Act as an area where human influence does not impede the free play of natural forces or interfere with natural processes in the ecosystem.

**Utilization standards (timber)**—Specifications for merchantable forest products offered in a timber sale.

**Values at risk**—Ecological, social, and economic assets and resources that fire or fire management actions could affect. Examples include life, property, structures, natural and cultural resources, community infrastructure, public support, economic opportunities such as tourism, and air quality.

**Vegetation condition class**—Depiction of the degree of departure from historical fire regimes, possibly resulting in alternations of key ecosystem components. These classes categorize and describe vegetation composition and structure conditions that currently exist inside the fire regime groups. Based on the coarse-scale national data, they serve as generalized wildfire rankings.

**Vegetation management**—A process that changes the composition and structure of vegetation to meet specific objectives, using such means as prescribed fire, timber harvest, or thinning. For the purposes of this document, the term does not include removing vegetation for permanent developments such as mineral operations, ski runs, trails, or roads, and it does not apply to human-caused wildfire and permitted livestock grazing. Vegetation management can be active or passive:

*Active vegetation management* involves manipulating vegetation to meet objectives. Methods used may include a variety of silvicultural and forest management practices including timber harvesting, tree planting, thinning, prescribed burning, grazing, weed control, as well as other activities to improve wildlife habitat and watersheds such as erosion control, fire suppression, and restoration-based fuel treatment.

*Passive vegetation management* allows for natural forest succession and relies primarily on natural processes such as wildfire for changes to vegetation structure and species composition.

**Vegetation management practices**—Silvicultural practices such as reforestation, prescribed fire, thinning to reduce stand density, and other practices designed to facilitate growth and development of trees.

**Vegetation type conversion**—A change from one vegetation type to another (for example, tree to shrub) or from one tree species to another.

**Vegetative structural stage**—Vegetative structural stage is a generalized description of the structural stages a stand passes through as it ages. Classification into one VSS or another is based on the diameter class containing the greatest basal area (Reynolds et al. 1992). Stands can be placed into one of many stages (usually six) ranging from grass/forb to old forest. Note that the term *old* and others like it are using tree size as a proxy to age [class], as tree ages are not used to assign a stand to a stage. VSS classification is generally not appropriate to apply to uneven-aged stands.

**Watershed**—A region or land area drained by a single stream, river, or drainage network; a drainage basin (36 CFR 219.19).

**Watershed condition**—The state of a watershed based on physical and biogeochemical characteristics and processes (36 CFR 219.19).

**Watershed Condition Framework**—A comprehensive approach for classifying watershed condition, proactively implementing integrated restoration in priority watersheds on national forests and grasslands, and tracking and monitoring outcome-based program accomplishments for performance accountability. The framework assesses watersheds using indicators of the biological and physical factors that affect watershed condition, focusing on aquatic and terrestrial conditions that Forest Service management actions can influence.

**Wetland**—Those areas that are inundated by surface water or groundwater. The water has a frequency sufficient to support and that, under normal circumstances, do or would support a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, fens, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.

**Wild and scenic river**—A river designated by Congress as part of the National Wild and Scenic Rivers System, which was established in the Wild and Scenic Rivers Act of 1968 (16 USC 1271 (note), 1271–1287; 36 USC 1131–1136).

**Wild river**—Within the Wild and Scenic River Act, a tentative classification of a river or sections of a river that is free of impoundments and generally inaccessible except by trail; the watersheds or shoreline are essentially primitive, and waters are unpolluted. These represent vestiges of primitive America.

**Wilderness**—Any area of land designated by Congress as part of the National Wilderness Preservation System that was established in the Wilderness Act of 1964.

**Wildfire**—A naturally caused wildland fire (for example, from lightning) or human-caused fire, and considered an emergency management situation.

**Wildland**—Forests, shrub lands, grasslands, and other vegetation communities that have not been significantly modified by agriculture or human development.

**Wildland fire**—Any non-structure fire that occurs in the wildland. There are two types of wildland fire: unplanned (natural or human-caused wildfire) and planned (prescribed fire).

**Wildland-urban interface**—A term as defined by the Healthy Forest Restoration Act section 101. It is the area adjacent to an at-risk community that is identified in the community wildfire protection plan. If there is no community wildfire protection plan in place, the wildland-urban interface is the area 0.5 miles from the boundary of an at-risk community, or within 1.5 miles of the boundary of an at-risk community

if the terrain is steep, there is a nearby road or ridgetop that could be incorporated into a fuel break, the land is in condition class 3, or the area contains an emergency exit route needed for safe evacuations.

**Withdrawn lands**—Lands are withdrawn from the National Forest System when a parcel of land is transferred from one administrative jurisdiction (the Forest Service) to another Federal agency. Lands are withdrawn for purposes of specific federally authorized projects, such as the development, construction, maintenance, operation, and protection of Federal projects. See Central Utah Project.

**Without preference**—A grazing permit that is waived back to the Forest Service without preference of a new permit designee.

**Woodland**—A forested plant community in which, in contrast to a typical forest, the trees are often small, characteristically short-boled relative to their crown depth.

**Yarding**—Initial hauling of a log from the stump to a collection point.



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