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Appendix

1.0 INTRODUCTION

Landscape assessments for the six National Forests in Utah have identified many ecosystems in conditions that threaten their long-term resiliency, integrity, and sustainability. The assessments clearly show that fire is needed in these ecosystems at scales and frequencies much greater than originally analyzed in existing forest plans.

Over the last 20 to 30 years unwanted wildland fires have grown in size, intensity, and frequency. This has caused undesirable changes in the composition and structure (age and size) of forest and rangeland vegetation. One of the primary factors responsible for the increased size, intensity and severity of wildland fires is fire exclusion in forested ecosystems, which has led to uncharacteristically high fuel loadings.

The increasing size, intensity and severity of wildland fires pose greater threats to human life and property. More people are recreating in National Forests and building homes in wildland areas, increasing their exposure to naturally ignited wildland fires and increasing the risk of human-caused wildland fire ignitions. Also, the threat to cultural resources is increased by uncharacteristically high fire intensities and severities resulting from uncharacteristic changes in vegetation, fuel loadings, and fire behavior. Fire suppression costs have also increased.

New information concerning fire management has been developed in recent years, and fire management policies at the national level have changed. In 1998, the forest supervisors of the six National Forests in Utah (Ashley, Dixie, Fishlake, Manti-La Sal, Uinta, Wasatch-Cache) agreed that these changes needed to be incorporated in forest plan direction for fire management (both use and suppression of fire). They decided to work together to develop consistent direction for the six forest plans.

A forest plan is a dynamic management plan that provides integrated direction reflecting decisions, plans, and assessments made at various scales and times. It describes desired future conditions, goals, objectives, standards, and guidelines—collectively referred to as “management direction”—for a specific National Forest. The changes in fire management direction are incorporated in the proposed amendment to the six Forest Plans that add, delete, and modify items of programmatic direction. Appropriately reintroducing fire (as one of many land management tools) into ecosystems is expected to help land managers achieve the desired future conditions described in the existing forest plans.

The Forest Supervisors signed the project initiation letter for the Utah Fire Amendment analysis in June 1998. The interdisciplinary team developed a draft purpose and need and proposed action, and issued it for public comments and suggestions in October 1998. The team has considered the comments received and developed alternatives to the proposed action based on the issues raised. The interdisciplinary team wrote this environmental assessment to disclose the impacts of two action alternatives and the no-action alternative.

1.1 PURPOSE AND NEED FOR ACTION

Purpose: The forest plan amendments will provide direction (goals, standards, and guidelines) for fire management that is consistent with National Policy. The new fire management direction will provide additional tools to help land managers achieve the desired future conditions described in the existing forest plans.

Need: Existing forest plan direction for fire management was written in the early 1980's. Some of this direction is not consistent with current National Fire Management Policy and some information is redundant to the Forest Service manual and handbook. Inconsistent and redundant information needs to be removed.

Fire management direction in existing forest plans emphasize wildland fire suppression, touch upon using prescribed fire, and are generally silent concerning the use of wildland fire for resource benefit. Most existing forest plans lack the necessary management direction to implement a landscape-scale prescribed fire and wildland fire use program. Most existing forest plans discuss fuels management and fire suppression tactics but some lack the necessary management direction to address and prioritize hazardous fuels.

While suppression of unwanted wildland fires will continue, the forest plans need to provide land managers additional options in addressing ways to help achieve the desired conditions described in each forest plan. Responsible and appropriate use of fire, both prescribed fire and wildland fire use for resource benefit, across a landscape-scale is needed to help reduce hazardous fuels and sustain wildland ecosystems into the future. Existing fire management direction needs to be modified or deleted and new management direction needs to be added to the forest plans to address these concerns.

1.2 PROPOSAL

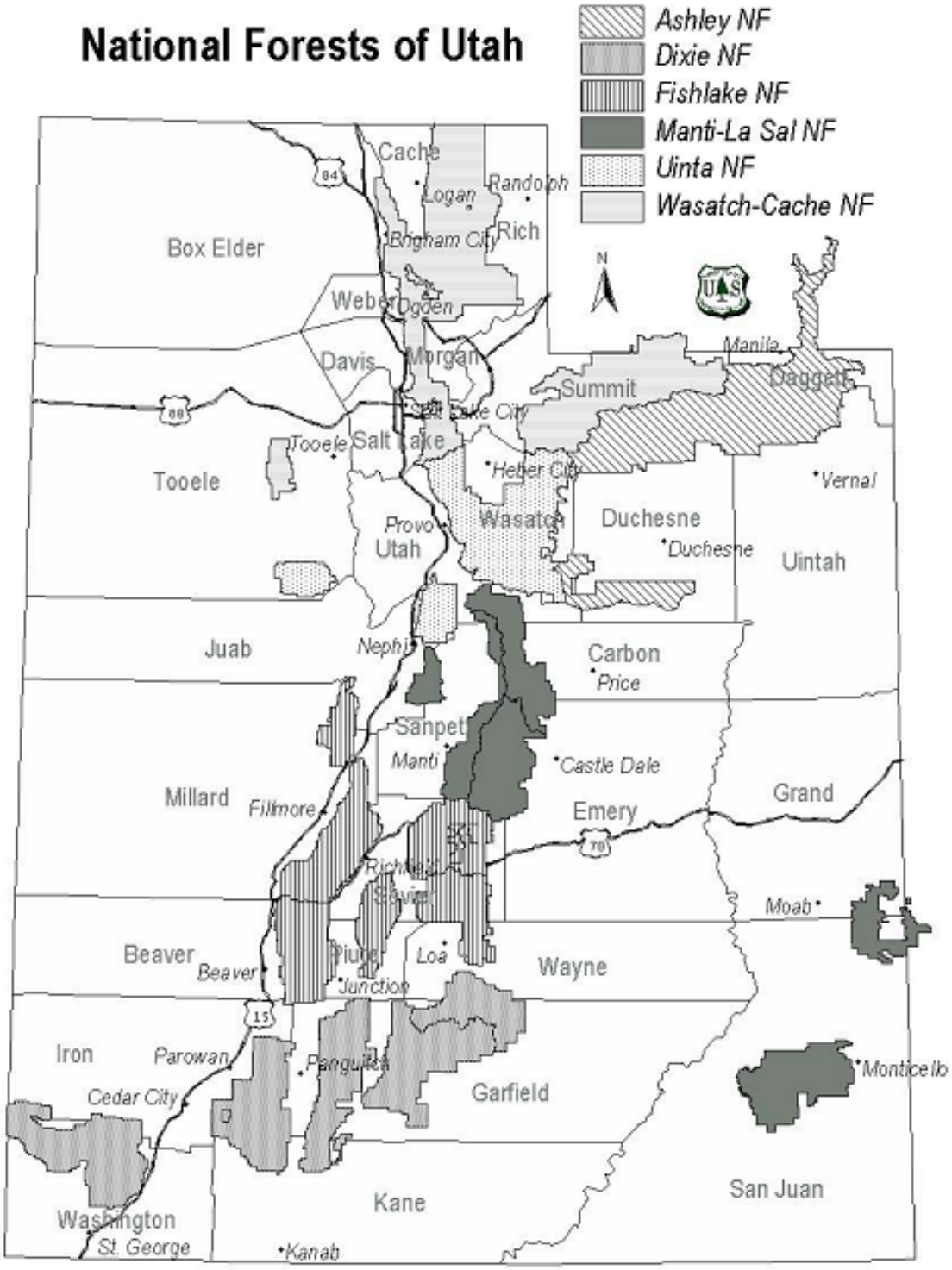
A new goal and new standards and guidelines would be added to the six forest plans using a forest plan amendment. The amendment language provides management direction that addresses suppression of unwanted wildland fire in areas with important social and economic values and reduction of hazardous fuels as well as identifies where prescribed fire and wildland fire use are authorized. Existing direction for fire management would be modified or deleted if inconsistent with the intent of the selected alternative. Section 2.5 of this EA provides additional details.

1.3 GEOGRAPHIC RANGE AND SCOPE

The six National Forests considered in this proposal are the Ashley, Dixie, Fishlake, Manti-La Sal, Uinta, and Wasatch-Cache (Figure 1-1). National Forest System lands within these forests total about 8.10 million acres (7.98 million acres in Utah, 90,000 acres in Wyoming, and 30,000 acres in Colorado). The decision will apply only to National Forest System lands (net acres); this analysis will refer to net acres unless specified otherwise.

As an amendment, changes to the forest plans will remain in effect until the plans are revised, which is projected to be about 2-4 years for all six plans in Utah. The programmatic management direction adopted through this amendment will not change the desired future conditions and land allocations of the six forest plans. This amendment will provide additional tools to help land managers achieve the forest-wide and management area desired future conditions already described in the existing forest plans. The temporary nature of this action (projected to be 4 years or less) together with the limited scope of this action would, therefore, limit its effects.

FIGURE 1.1


National Forests of Utah
Ashley NF
Dixie NF
Fishlake NF
Manti-La Sal NF
Uinta NF
Wasatch-Cache NF
N
Cache
Logan
Randolph
Box Elder
Brigham City
Rich
Weber
Ogden
Davis
Morgan
Manila
Daggett
Summit
Salt Lake City
Tooele
Salt Lake
Heber City
Vernal
Provo
Wasatch
Duchesne
Utah
Duchesne
Uintah
Juab
Nephi
Carbon
Price
Sanpete
Manti
Castle Dale
Millard
Fillmore
Emery
Grand
Richfield
Savier
Moab
Beaver
Beaver
Piute
Loa
Junction
Wayne
Iron
Parowan
Panguitch
Cedar City
Garfield
Monticello
Washington
St. George
Kane
Kanab
San Juan

The new fire management direction (goals, standards, and guidelines), *together with existing forest plan management direction not changed through this action*, will provide reasonable assurance that adequate environmental safeguards are incorporated in future projects and activities. All future projects will be carried out within the constraints of forest plan and Intermountain Regional Guide management direction (which both incorporate applicable law, regulation, and policy). Management direction in the selected alternative will apply to projects and activities prospectively (in the future) only.

The programmatic management direction adopted through this project would not change the physical environment; therefore, there would not be an irretrievable or irreversible commitment of resources. Any subsequent site-specific federal action that may change the environment, and that uses this direction to guide project design and implementation, would be subject to the National Environmental Policy Act and other relevant planning regulations. For more information on this process, including provisions for public notice, review and comment, and administrative appeal, refer to 40 CFR 1500-1508, 36 CFR 215, Forest Service Handbook 1909.15, and Forest Service Manual 1950.

1.4 DECISIONS TO BE MADE

Analyses and findings described in the environmental assessment will help the Forest Supervisors decide:

1. Whether to continue with current fire management direction (goals, guidelines, and standards) in the forest plans (no action), or change the management direction; and

2. What management direction is necessary and where should the direction be applied to address the purpose and need?

1.5 RELATIONSHIP OF THE FOREST PLAN TO OTHER FIRE PLANS

This section describes how forest plan direction is incorporated into fire management planning implementation documents and on-the-ground actions and activities. A summary description for each type of plan is presented. Figure 1-2 displays the relationship between National Fire Policy, the Forest Plan, and other fire management plans and implementation activities. This information is contained in the Wildland and Prescribed Fire Management Policy Implementation Procedures Reference Guide (FSH 5108); Forest Service Manual 5100, 5130, and 5140; Integration of Wildland Fire Management into Land Management Planning (1997); Wildland and Prescribed Fire Management Policy (1998); and Wildland Fire Use Policy memo (issued by Intermountain Regional Forester, 1998).

Forest Plan

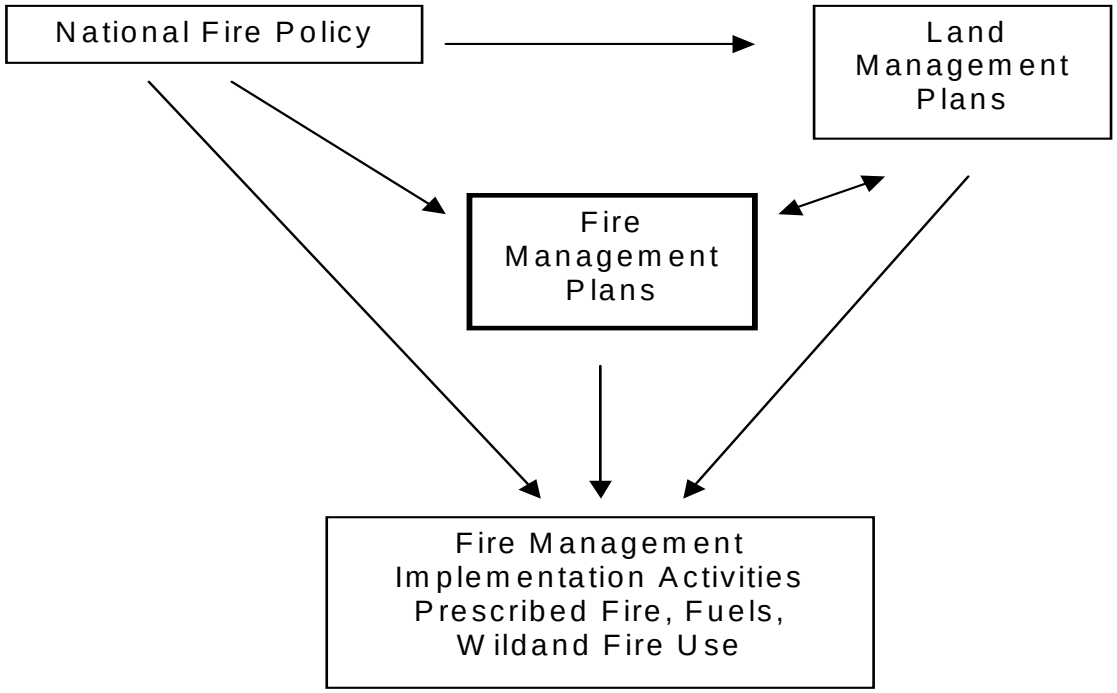
A forest plan is a dynamic management plan that provides integrated direction reflecting decisions, plans, and assessments made at various scales and times. It describes desired future conditions, goals, objectives, standards, and guidelines—collectively referred to as “management direction”—for a specific National Forest. Changes in management direction are incorporated in proposed amendments to the plan that add, delete, and modify items of programmatic direction.

Forest plan goals and desired future conditions provide a vision to move toward and consider in future landscape assessments and site-specific projects. Standards and guidelines provide reasonable

assurance that adequate environmental safeguards are considered and incorporated in future site-specific projects.

A programmatic environmental impact statement (EIS) and forest plan document incorporating applicable law, regulation, and policy; and direction from the Intermountain Regional Guide is prepared and a record of decision (ROD) signed. All future actions are to be carried out within the constraints of forest plan and Intermountain Regional Guide management direction.

FIGURE 1-2



Fire Management Plan (FMP)

The fire management plan, prepared at the forest level, provides implementation information for the fire management program. It incorporates all relevant forest plan management direction (goals, guidelines, and standards) necessary to implement on-the-ground fire management actions. It is updated annually to reflect changes in policy, forest plan direction, ground conditions, and other changes in the fire management program.

The FMP provides an overview of the fire management program; a description of the dispatching system; a description of the fire danger rating system and local indicators; and direction on incident business management practices. The plan includes information on prevention activities, preparedness actions, initial suppression actions to be taken on wildland fires, and large fire management. In addition the FMP may contain cooperative agreements between the Forest Service and adjacent land owners; (Federal, State, Private, or Tribal governments); local fire departments; and agencies with fire management responsibility.

The FMP also includes information on prescribed fire and wildland fire use, including a map of areas where they are authorized or prohibited by forest plan direction. The FMP may include resource inventory maps identifying sensitive ecological or cultural areas for example. Any mitigation or prescriptive measures required by law, policy, or forest plan standards and guidelines may also be identified to provide adequate environmental safeguards or to meet goals and desired conditions and associated resource objectives stated in the forest plan.

The intent is to provide the line officer and incident commander with information *before* planned and unplanned (emergency) fire management activities so that they can appropriately address resource and social concerns. The fire management plan must be approved by the Forest Supervisor before prescribed fire or wildland fire use projects are initiated.

A site-specific NEPA document is not prepared prior to the approval of the fire management plan because a fire management plan does not propose, authorize, or permit site-specific federal actions. As stated earlier, the FMP incorporates relevant management direction from the forest plan decision combined with existing resource information.

Prescribed Fire Burn Plan (RXBP)

The prescribed fire burn plan is a site-specific document prepared at the district level that describes implementation actions for a prescribed fire. It is prepared before ignition by individual(s) qualified as burn boss. During implementation, the next higher level official must approve any deviations from the parameters in the plan.

The prescribed fire burn plan outlines objectives and the immediate effects desired for the project, and describes how the project will be accomplished. It includes resource objectives from the vegetation prescription as well as guidance on pre-ignition activities needed, specific environmental and weather conditions under which the fire can be lit and burn, a job hazard analysis, and provisions for a test fire. It describes the ignition sequence, any holding actions that may be necessary, contingency plans in the event fire conditions change, and resources and equipment needed.

The plan includes site-specific maps that depict the general burn area, specific burn units, the contingency area, and ignition sequence and pattern. Also included are a complexity rating for the project, a burn organization chart, fire behavior predictions, and public and agency notification measures. It may also include a monitoring plan including pre-burn, during burn, and post-burn requirements, and a go/no-go checklist for validating the prescription on the day of the burn.

A site-specific NEPA document incorporating relevant information from the fire management plan (which includes relevant forest plan management direction) is prepared and signed before development of the vegetation prescription and prescribed fire burn plan. The burn plan applies information from the NEPA analysis and decision to the ground, within constraints, to provide reasonable assurance that objectives are met.

Wildland Fire Situation Analysis (WFSA)
The wildland fire situation analysis is a site-specific decision document that is prepared at the district level for all fires that exceed, or are expected to exceed, the initial planned response by local resources as outlined in the fire management plan. It must be completed to document the decision making process if a suppression-oriented response other than aggressive initial attack is determined to be appropriate for a fire. The WFSA will also be completed for prescribed fires or use of wildland fires if the Prescribed Fire Burn Boss or Fire Use Manager determines that the fire cannot be brought back into planned prescription limits with available resources in 48 hours.

A WFSA is prepared to document the current fire situation, and help the decision making official determine the most appropriate future actions for management of the fire. Preparation typically involves the local fire management officer, the line officer, and any needed resource specialists (determined by the location of the fire). The document guides them through a process of determining objectives and constraints for the management of the incident, developing and comparing strategic management alternatives, evaluating expected effects of alternatives, selecting a preferred alternative, and documenting the decision. The level of detail included in the objectives, constraints, alternatives, and effects will vary with the complexity of each incident.

The elements identified in the preferred alternative and the decision are revisited daily to determine if the WFSA is still valid for the current fire situation. If modification is needed, then a new WFSA is completed and new decision documented; this in turn is revalidated daily until another modification is needed, or until the objectives are achieved.

A site-specific NEPA document is not prepared and signed prior to the development of the WFSA because, following an unplanned ignition, wildland fires that exceed or are expected to exceed the initial planned response require immediate emergency decisions on appropriate suppression response. The WFSA incorporates relevant information from the fire management plan (which includes relevant forest plan management direction) and applies this knowledge to the ground, within constraints, to provide reasonable assurance that objectives are met.

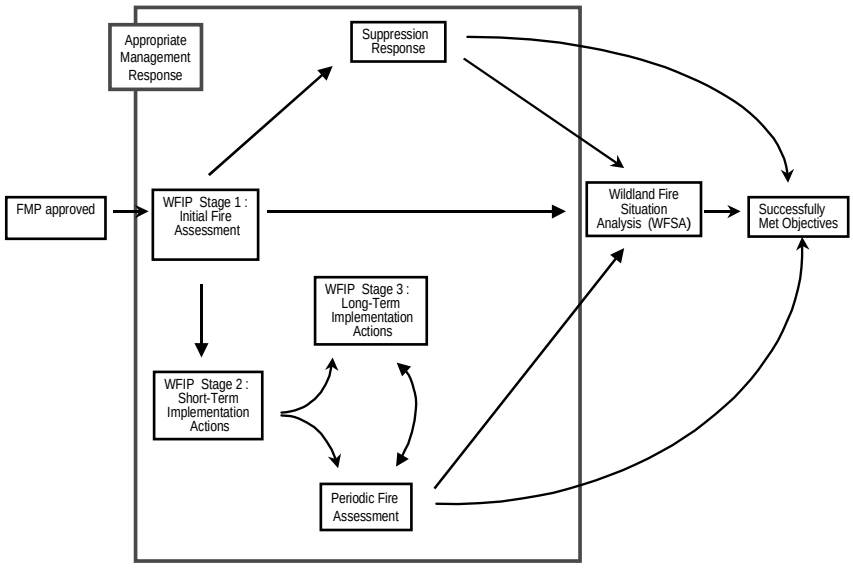
Wildland Fire Implementation Plan (WFIP)
The wildland fire implementation plan is a progressively developed, site-specific assessment and operational plan that is prepared once a natural ignition is determined to be in an area approved for wildland fire use. The document is prepared in three distinct stages according to the size and complexity of the fire as displayed graphically in Figure 1-3. The wildland fire implementation plan provides site-specific direction on resource objectives and effects to be accomplished, and describes the maximum manageable area for the fire, acceptable fire behavior parameters, any mitigation measures that may be needed, and the organization required to successfully manage the fire. The line officer or incident commander consults with resource specialists as required to make informed decisions.

Stage 1 of the process includes a short description of the fire situation and a go/no-go decision checklist to determine if the fire should be managed for use, or if a suppression-oriented response should be initiated (Figure 1-4). If the suppression response is initiated, the WFIP process stops at this point. If the decision is made to continue with the fire as a wildland fire use project, then Stage 2 is implemented.

The Stage 2 document outlines short-term implementation actions. It includes short-term fire behavior projections; a short-term risk assessment, a complexity analysis, and a Stage 3 need assessment. The Stage 3 need assessment uses four criteria to determine if a more detailed plan will be needed for successful management of the fire. These four criteria are complexity, time of season, relative risk, and documented or potential fire behavior. As these items move up their respective scales from low to high, the need to move to Stage 3 becomes greater. If the fire stays in Stage 2 status, this Stage 3 need assessment is completed daily until the fire is either moved into Stage 3 or declared out.

FIGURE 1-3

Wildland Fire Process



The Stage 3 document includes many of the elements of the Stage 2 document, but they are looked at over a longer time period and/or larger area. This plan includes more detailed analysis of potential fire behavior and fire movement. It assesses risk typically under both normal, expected weather scenarios and under extreme, rare event weather scenarios. It also includes a broader discussion of fire effects and monitoring requirements; more detailed public information plans; holding and suppression actions that may be required on parts of the perimeter; and contingency actions. It typically will include a discussion of the organization needed and timeframes required for successful management of the fire.

A site-specific NEPA document is not prepared and signed before development of the WFIP because, following an unplanned natural ignition, immediate emergency decisions regarding the appropriate management response are required. The WFIP incorporates any relevant information from the fire management plan (which includes relevant forest plan management direction). It applies this knowledge to the ground, within constraints, to provide reasonable assurance that objectives are met.

FIGURE 1-4

Example Go/No-Go Considerations Document

Fire Name District Date & Time of Ignition

	YES or NO
1) The fire is no immediate threat to life, property, or resources that cannot be mitigated;	_____
2) The necessary WFU management personnel will be available (including pertinent specialists*);	_____
3) Fire suppression resources are adequate based on the fire's potential;	_____
4) Approval obtained from Utah State Smoke Coordinator;	_____
5) ERC at acceptable level for FMZ;	_____
6) There is no other proximate fire activity that limits the successful management of this WFU;	_____
7) Potential effects on soils, heritage resources, TES species, and other resources are acceptable;	_____
8) Current fire size is less than 25% of proposed MMA;	_____
9) Fire weather forecasts indicate an acceptable level of fire activity predicted;	_____
10) Fire will accomplish resource management objectives for the area;	_____
11) There are no other external or Line Officer concerns that will restrict the designation of a WFU;	_____

If **"YES"** to all the above, the District Ranger approves management of the ignition as wildland fire use, informs the Forest Supervisor, and proceeds with development of the Wildland Fire Implementation Plan (WFIP). If any of the above are **"NO"**, and the District Ranger recommends management of the ignition as wildland fire use, contact the Fire Management Officer and Forest Supervisor for approval to develop the Wildland Fire Implementation Plan (WFIP).

If Go/No-Go considerations indicate the ignition cannot be managed as wildland fire use, document which considerations are unacceptable, and implement the appropriate suppression response strategy.

_____ _____ _____

Approving Line Officer Title Date & Time

* Pertinent specialists might include Silviculturist, Rangeland Management Specialist, Soil Scientist, Recreation Specialist, Archeologist, Ecologist, Wildlife and/or Fisheries Biologist, depending on the specific management objectives or special resources involved near the ignition area.

2.0 INTRODUCTION

Chapter 2 discusses public involvement, issues and other concerns with the proposed action, and how the issues and concerns were addressed. Three alternatives are analyzed in detail, including no action. Also described are five alternatives that were considered, but not given detailed study. The chapter ends with a comparative synopsis of alternatives based on the environmental consequences disclosed in Chapter 3. Additional and supporting information is maintained in the project record at the Fishlake National Forest Supervisor's Office.

2.1 PUBLIC PARTICIPATION

The scoping period began on October 13, 1998 and ended on November 16, 1998. Scoping packages were mailed to about 4,000 people, organizations, tribes, and agencies throughout Utah and in other states. (Each of the six National Forests in Utah sent the scoping letter to everyone on their planning mailing list.) A news release requesting public input was sent to the newspaper of record for each National Forest in Utah, as well as other newspapers, and TV and radio stations. The project was listed on each Forest's quarterly schedule of proposed actions and the scoping letter was also posted on the Utah Fire Amendment Project website, which was launched in April 1999.

Sixty responses to the scoping letter were received as of the end of July 1999. (Comments were accepted after the closing date). Comments were received from the following types of organizations: federal agencies, state government, local government, environmental groups, educational institutions, and industry.

Comments were also received from individuals. Most reside in Utah; others reside in Texas, New Mexico, Minnesota, and Oregon. Comments were received from most areas of Utah. Few comments related to a specific geographic area; rather, they tended to apply to National Forest System lands in general. Appendix A.3 lists all the persons, organizations, and agencies that responded with comments about the proposed action.

The comments were generally supportive of increasing the use of fire in forest management. The resource concerns raised by respondents tended to be items that need attention *within the context of increased fire program,* rather than objections to increasing fire use. Topics receiving the most comments were:

- impacts to air quality (including health effects and visibility)
- desire to commercially log and collect firewood in timbered areas before burning
- scientific soundness/sufficiency of properly functioning condition assessments and historic fire regime information
- risks for human safety and property
- short-term impacts on grazing

Other resource topics frequently raised included effects on wildlife habitat, revegetation/rehabilitation after burning, fuels management, and coordination of fire programs with other agencies. Many comments concerning the planning process were also received (development of goals and objectives, development of alternatives, preparation of implementation plans, etc). The largest number of comments related to providing for timber harvest before burning.

A newsletter was sent to respondents in July 1999 describing the modified proposed action, and an additional alternative; these were developed to address scoping comments. One comment was received in response to the newsletter, from an environmental organization. The co-team leaders met with the organization director in January 2000 to discuss his comments in detail.

2.2 RESOURCE TOPICS

Based on public input, the IDT recommended and the line officers approved twelve resource topics for analysis. Each topic includes a narrative statement with criteria or methods to measure change (effects). Resource topics to be carried into the analysis are described first, followed by topics not carried into the analysis, and issues recommended for alternative development.

Resource Topics Related to Biophysical Resources

1. Fire Ecology

In over 100 years of fire exclusion, many ecosystems have undergone changes in species composition and structure. Alteration of historic fire regimes and resultant changes in composition and structure have caused an overall loss of biodiversity, and an increase in fuel accumulations in many forested ecosystems.

Effects Criteria:
1. Describe changes in fire regimes and resulting changes in the composition, structure and function in each cover type.
2. Describe how predicted changes are consistent or inconsistent with the direction in the forest plans.

2. Exotic Plant Species

Following a fire, undesirable exotic plant species may displace and dominate native species. This contributes to loss of biodiversity.

Effects Criteria:
1. Describe changes to vegetation and competitiveness of exotic species.
2. Describe what types of sites are susceptible to exotic species.
3. Describe how changes are consistent or inconsistent with direction in the forest plans and existing agreements.

3. Wildlife Habitat

All types of fire (unwanted wildland fire, wildland fire use, and prescribed fire) and the absence of fire will change the composition and structure of vegetation. Populations of management indicator species (MIS) vary over time in response to changes in habitat characteristics.

Effects Criteria:
1. Describe historic and existing habitat characteristics for management indicator species.
2. Describe how predicted changes in management indicator species habitat are consistent or inconsistent with direction in forest plans.

4. Threatened, Endangered, Proposed, and Sensitive Species (TEPS)

All types of fire and the absence of fire change the composition and structure of vegetation. Threatened, endangered, proposed, and sensitive species habitats will vary in response to fire disturbance over time.

Effects Criteria:
1. Describe required habitat conditions for TEPS species (wildlife, fish, and plants) and how fire and the lack of fire alter those conditions.
2. Describe how predicted changes to habitat and species are consistent or inconsistent with direction in forest plans.

5. Soils, Water, and Aquatic Habitats

Heat radiated from fire may change soil productivity and hydrologic function. Soil erosion rates, and risk of flooding and landslides may increase until hydrologic function and vegetation cover is reestablished, especially in sensitive watersheds. Sedimentation and debris may affect water quality, aquatic habitats, and relative abundance of aquatic management indicator species.

Effects Criteria:
1. Describe how fire and changes to vegetation cover may change soil productivity, soil erosion, and risk of flooding and landslides and effect sensitive watersheds. Describe how those changes are consistent or inconsistent with direction in forest plans.
2. Describe changes in aquatic MIS habitats related to change in water quality; describe how changes are consistent or inconsistent with direction in the forest plans.

Topics Related to Social, Cultural, and Economic Concerns

6. Human Health and Safety

All types of fire emit particulates and gases into airsheds. This could impact the health of people in adjacent and downwind communities, and smoke may impair visibility along roadways. Fire changes vegetation, soil, and hydrologic function, which in turn impacts water quality. Changes in water quality could impact people's health.

Effects Criteria:
1. Describe expected changes to air quality, and how State and federal air quality (Clean Air Act) requirements and procedures will be met. Describe how predicted changes are consistent or inconsistent with direction in forest plans.
2. Describe how public safety will be protected when fire and smoke are expected near major road corridors or communities.
3. Describe changes to water quality and how State and federal quality (Clean Water Act) requirements, including those for municipal and urban watersheds, are met. Describe how changes are consistent or inconsistent with direction in forest plans.

7. Cultural Resources

All types of fire may change the defining qualities that make certain types of cultural resources eligible for listing in the National Register of Historic Places.

Effects Criteria:
1. Describe the defining qualities that make sites eligible. Identify site types whose defining qualities may be susceptible to effects from fire.
2. Describe and predict effects to the defining qualities of susceptible cultural resource site types, including traditional cultural properties (both known sites and those anticipated within the area of potential effect).
3. Describe how predicted effects to the defining qualities of susceptible site types (both known and anticipated within the area of potential effect) are consistent or inconsistent with direction in forest plans.

8. Scenery, Recreation, and Wilderness

All types of fire and the absence of fire change scenery over time from live vegetation to a mosaic of living and burned vegetation in transition. Smoke reduces the visibility of scenery. Some forest visitors may choose to recreate in a different area because fire changed scenery, and thus the recreation experience. Others may be attracted to a burned area by the chance to learn about fire's role in rejuvenating and sustaining ecosystems. Wilderness values may also be changed in response to fire.

Effects Criteria:
1. Describe changes in scenery and recreation experience.
2. Describe changes to wilderness values.
3. Describe how changes in scenery, recreation, and wilderness are consistent or inconsistent with visual, recreation, and wilderness direction in forest plans.

9. Access

All types of fire create openings in vegetation across the forest, providing new access opportunities for off-highway vehicle use. Mechanized fireline construction also creates access. Both can result in new unauthorized roads and trails.

Effects Criteria:
1. Describe access opportunities created by fire and mechanized fireline construction. Describe changes in authorized access to existing roads and trails identified on the Forest Travel Map.
2. Describe how predicted changes to forest access are consistent or inconsistent with direction in forest plans.

10. Property

Private and public facilities could be jeopardized or destroyed by all types of fire. Examples of susceptible property include Central Utah Project (CUP) facilities, summer homes, hydroclimatic data collection sites, electric transmission lines, communication sites, and forest guard stations.

Effects Criteria:
1. Describe the risk to property in ecosystems. Describe the management response for these situations and how property will be protected. Describe how these responses are consistent or inconsistent with direction in forest plans.
2. Describe the fuels treatment emphasis for susceptible properties and how predicted changes to fuels are consistent or inconsistent with direction in forest plans.

11. Timber

All types of fire may reduce the availability and commodity value of commercial and personal use timber. This may impact economic opportunities in local communities.

Effects Criteria:
1. Describe how fire changes the commercial value of timber and the availability of personal use and commercial timber.
2. Describe how predicted changes are consistent or inconsistent with direction in forest plans.

12. Livestock Use

All types of fire and the absence of fire would likely change composition and structure of rangeland vegetation, causing temporary changes in forage availability and changes in allotment use patterns, including periods of rest. This may impact economic opportunities in local communities.

Effects Criteria:
1. Describe how fire changes rangeland resources, including availability of forage. Describe anticipated changes to permits, allotment management plans, and annual plans of use, including periods of rest.
2. Describe how predicted changes are consistent or inconsistent with direction in forest plans.

2.3 TOPICS CONSIDERED BUT NOT ANALYZED IN DETAIL

Some topics were outside the scope of, irrelevant to, or not affected by the decision to be made.

1. Jurisdictional Issues/Management Coordination

Respondents were concerned about coordination with federal agencies and other jurisdictions. Coordination with these entities is standard operating procedure in fire management, and therefore inherent in all alternatives.

2. Monitoring and Evaluation

Some respondents perceived a need to develop new monitoring and evaluation activities related to the overall health, composition, structure, or function of an ecosystem or landscape. Each existing forest plan has monitoring and evaluation requirements that address fire management and all six forests currently monitor, each year, the number of acres burned by prescribed fire and wildland fire (either by arson, accidental, or natural ignition).

Monitoring activities designed to measure changes in health, composition, structure, or function of an ecosystem are not fire management monitoring activities, they are ecosystem-monitoring activities and, as such, would be outside the scope of this amendment. These types of monitoring activities would be best addressed in other areas of the forest plan because the number and location of acres burned that happens to move a landscape toward or away from a desired condition relates to the effect on, and desired conditions of other resources.

3. Research, Properly Functioning Condition Assessments

Some respondents perceived a need to develop new scientific knowledge about fire history and fire use before proceeding with the proposed action. This analysis will consider relevant science; new research is beyond its scope. Should monitoring and evaluation or new science present new information relevant to the decision, the interdisciplinary team will bring it to the Forest Supervisors for their consideration. The Forest Supervisors would determine what changes, if any, were needed in their decisions. Resource managers would modify or adapt actions accordingly.

Some were concerned about the scientific validity of properly functioning condition assessments. These rapid assessments, developed according to Region 4 protocols, are integrated interdisciplinary assessments of landscapes in each National Forest (USDA Forest Service, 1996). They are not research. The properly functioning condition assessment process provides the foundation for determining existing and desired conditions on our forest and rangelands.

The assessment team considers relevant research in characterizing a range of resource conditions (composition, structure, and function) across landscapes. The existing information gathered during an assessment will be used until better science is published and generally available. Landscapes are then classified as properly functioning, functioning at risk, or not functioning. Areas with conditions classified as functioning at risk or not functioning may be prioritized for restoration action.

4. Process

Some respondents felt an environmental impact statement (EIS) is needed to disclose the effects of the proposed action. This environmental assessment (EA) discloses the anticipated direct, indirect, and cumulative effects of the alternatives; it provides information to determine whether an environmental impact statement is necessary. Should new information develop, the interdisciplinary team will bring it to the Forest Supervisors for their consideration.

2.4 ISSUES RECOMMENDED FOR ALTERNATIVE DEVELOPMENT

A resource topic becomes an issue when there is a dispute or unresolved conflict associated with potential environmental effects of the proposed action (40 CFR 1500.4 (g), FSH 1909.15 12.3).

Some respondents were concerned about fire's potential to increase risk of flooding, landslides, and soil erosion, and about the effects these events might have on water quality, especially in watersheds that supply drinking water. Some respondents believed fire should be excluded from areas having commercial or personal-use timber; some said timber harvest should be considered before allowing the timber to be

burned. The resource topics **soil movement, quality of drinking water (Topic 5 and 6) and timber (Topic 11)** were identified by the interdisciplinary team and approved by the line officers as issues to focus the environmental analysis and develop alternatives to the proposed action.

2.5 ALTERNATIVES CONSIDERED IN DETAIL

Based on public input, the interdisciplinary team recommended, and the Forest Supervisors approved, two action alternatives in addition to the required no-action alternative. The alternatives sharply define the issues while responding to the purpose and need. Each alternative has specific programmatic impacts associated with how it achieves the purpose and need for the project.

Features Common to All Alternatives

All alternatives assume future fire management actions will be consistent with applicable law, regulation, Forest Service Policy such as manuals and handbooks, and the Regional Guide. For example, the Forest Service Handbook for wilderness provides direction concerning the use of prescribed fire within wilderness. All future projects must be consistent with this handbook direction. Because of this there is no need to restate all of the handbook information within the Forest Plan.

All alternatives assume the fire management plan for each forest, once updated, will identify and incorporate appropriate mitigation or prescriptive measures, some required by the forest plan. The intent is to provide reasonable assurance that adequate safeguards are available to the line officer so they may be appropriately applied during fire management implementation activities to address important ecological and social concerns.

None of the alternatives propose changes in forest plan desired future conditions, land allocations (land use emphasis), or management direction (goals, standards, guidelines) for resources other than fire management.

Alternative A - No Action

This alternative addresses the requirement of the National Environmental Policy Act and the National Forest Management Act to consider taking no action. Under this alternative, current forest plan direction (goals, guidelines, and standards) for fire suppression, prescribed fire, and prescribed natural fire (wildland fire use) would remain in effect. Individual projects would be evaluated consistent with NEPA and NFMA requirements.

Summary of Existing Direction: Suppression of naturally ignited fire is required by forest plans on most of the forests. Prescribed fire (management ignited prescribed fire) is approved in some areas in all six forest plans. The Ashley, Dixie, Manti-La Sal, Uinta, and Wasatch-Cache forest plans have limited areas approved for wildland fire use (prescribed natural fire); mostly in wilderness. The Fishlake National Forest has an approved prescribed natural fire plan for the entire forest. Wildland fire use is approved within a Fire Management Plan on portions of the Dixie National Forest. The analysis would disclose the effects of continued implementation of existing management direction that excludes natural ignitions and the resulting changes in fire regimes, composition, structure, and function of ecosystems.

Alternative B

Alternative B is designed to address the purpose and need for action. A new goal and new standards and guidelines (shown below) would be added to the six forest plans using a forest plan amendment. Existing direction for fire management (goals, objectives, standards, guidelines, etc.) would be modified or deleted if inconsistent with the intent of the decision. Appendix A.7 compares current fire management direction in each forest plan with Alternative B direction. Direction in other program areas would remain as currently displayed in each forest plan.

Goal

Ecosystems are restored and maintained, consistent with land uses and historic fire regimes, through wildland fire use and prescribed fire.

Standards and Guidelines

Wildland Fire Suppression

1. *Standard* - Human life (firefighter and public safety) is the highest priority during a fire. Once firefighters have been assigned to a fire, their safety becomes the highest value to be protected. Property and natural and cultural resources are lower priorities.
2. *Guideline* - When assigning protection priorities to property and natural and cultural resources, decisions will be based on relative values to be protected, commensurate with fire management costs.
3. *Standard* - Human-caused fires (either accidental or arson) are unwanted wildland fires, and will be suppressed. Natural ignitions will be suppressed in areas not covered by an approved fire management plan.
4. *Guideline* - The full range of suppression tactics is authorized forestwide, consistent with forest and management area emphasis and direction.

Prescribed Fire

1. *Guideline* - Prescribed fire is authorized forestwide. (Use prescribed fire in wilderness only to meet wilderness fire management objectives.)

Wildland Fire Use

1. *Guideline* - Wildland fire use is authorized forestwide *except in*

    - administrative sites
    - developed recreation sites
    - summer home sites
    - designated communication sites
    - oil and gas facilities
    - mining facilities
    - above-ground utility corridors
    - high-use travel corridors.

The management response for these locations will be suppression if they are threatened.

In areas authorized for wildland fire use, the full range of management responses—from full suppression to monitoring—may be used.

Fuels

1. *Guideline* - Reduce hazardous fuels. The full range of fuel reduction methods is authorized, consistent with forest and management area emphasis and direction.

Alternative C

Alternative C responds to the issues of soil movement, quality of drinking water (Topic 5 and 6) and timber (Topic 11). Alternative C is identical to Alternative B, except wildland fire use would not be authorized in sensitive watersheds (about 315,000 acres) and timber emphasis areas (about 675,000 acres).

Some respondents felt, based on their experience, that the wild, uncontrolled nature of fire events presented unacceptable risks to them. These respondents felt society should be protected from flood, landslide, and soil erosion hazards that have occurred in the past and could occur again following a wildland fire. They were especially concerned about sediment polluting their drinking water. They also felt society should have an opportunity to use wood products before a wildland fire damaged or consumed them.

This alternative is intended to address their concerns by restricting wildland fire use as a tool in the two areas they described in their comments. Prescribed fire would be the only fire management tool authorized to address fire disturbance in these areas. Sensitive watersheds and timber emphasis areas would be included in the list of locations where wildland fire use is not authorized (see Alternative B, Wildland Fire Use, Guideline and Appendix A.7).

Sensitive watersheds are defined as watersheds having geologic formations highly prone to mass wasting and/or large flood events which pose an increased risk to people, water supplies and infrastructure, and other property located within them. Almost all the watersheds identified had a past history of flood events damaging nearby communities and some were sensitive because of the social sensitivity of the surrounding community. They are also all municipal watersheds, although this was not a requirement for selection. A team of specialists from each Utah Forest identified sensitive watersheds and Figure 3-1 in Section 3.5 of this document lists, by forest, the sensitive watersheds and their acreage. The Ashley, Dixie, and Fishlake National Forest's analyzed for, but did not identify watersheds that were sensitive based on the definition.

Timber emphasis areas for this analysis were defined based on the approach used in each of the six forest plans. The Ashley, Dixie, Fishlake, and Manti-La Sal forests allocated lands to timber emphasis using management areas. These were lands allocated to timber prescription upon which each forest based their anticipated harvest program. The Uinta and Wasatch-Cache forests did not allocate management areas specifically for timber, however they did identify the number of acres suited for timber

production upon which they based their anticipated harvest program. Figure 3-11 in Section 3.11 of this document lists, by forest, the acres allocated to timber emphasis management areas and the acres of lands suited for timber production.

2.6 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

October 1998 Proposed Action

The October 1998 proposed action had 5 goals, 15 objectives, no standards, and no guidelines (project file). Some respondents (internal and external) wanted to see standards and guidelines developed to provide clear direction for implementation projects. Some were also concerned about the magnitude and scientific validity of the acreage objectives in the initial proposed action, scoped in October-November 1998.

The appropriate time to set objectives is when each National Forest revises its forest plan. Developing objectives for the 3 or 4 years remaining in the 15-year planning period would not be useful because the few actions that could be planned and accomplished in that short time would not result in measurable change from current conditions. During plan revision, objectives in the current plan will be validated, those that are accomplished or no longer relevant will be deleted, and new objectives will be added to form a balanced management strategy for the next planning period.

After reviewing public comment and suggestions, the interdisciplinary team reconsidered the proposed action, modified it, and sent the revised proposal back out to those who expressed interest in this project, July 1999. Removing all the objectives resolved the concern about the magnitude of the acreage objective relative to this amendment. For these reasons this alternative was considered but not analyzed in detail.

Full Suppression - No Prescribed Fire, No Wildland Fire Use

The interdisciplinary team raised this alternative for consideration. No public respondents raised it. It considers the option of applying full suppression across each forest. Prescribed fire and wildland fire use would not be authorized anywhere.

This alternative was considered but not analyzed in detail because fire exclusion would result in continued loss of biodiversity. Ecosystems would not be sustained or maintained. Over the long term, the ability of the forest to provide goods and services required by society would be threatened. This alternative would not meet the purpose and need in terms of ecology, or social and economic needs.

Fire exclusion would also result in higher future risk to firefighter safety and potentially higher long-term suppression costs because the absence of fire would create uncharacteristically high fuel loadings, eventually leading to uncharacteristically large and intense fires. Moreover, allowing unmitigated threats to human life, property, and ecological resources would be irresponsible and socially unacceptable.

Wildland Fire Use (With Restrictions); No Prescribed Fire

This alternative addresses comments that fire is a natural process and active Forest Service management is not required for nature to sustain itself. The comments also stated that natural processes should prevail

to maintain these important ecosystems. The alternative would authorize wildland fire use except in the locations excluded in Alternative B. Prescribed fire would *not* be authorized.

This alternative was considered but not analyzed in detail because fire regimes and ecosystem composition and structure would be expected to continue to change and move toward a condition where they are functioning at risk or cannot be restored to a desired condition. The number of acres burned per year may not be sufficient to maintain fire regimes at the scale needed (forest assessments).

Some short-interval fire regimes have missed several fire cycles, and the build-up of live and dead fuels has created hazardous conditions in the wildland/urban interface. The Forest Service would likely extinguish many natural ignitions because existing fuel; if ignited by lightning, accident, or arson; may burn too hot (hotter than historically) causing uncharacteristic resource damage. Some of these lands may require the use of prescribed fire and/or mechanical fuel removal treatments before a wildland fire can be used.

Lastly, the Forest Service cannot choose when and where a wildland fire ignition will occur, although we can influence how the fire will burn by taking or not taking various actions. Prescribed fire is a flexible tool for management because we can choose when, where, and how fires will burn. As such, this alternative would likely present a higher risk to public and firefighter safety and potentially higher long-term suppression costs because wildland fire use is not as predictable as prescribed fire.

For these reasons this alternative was considered but not analyzed in detail.

Wildland Fire Use (With Restrictions); No Prescribed Fire in "Wild Areas"

This alternative also addresses the concern one respondent stated that fire is a natural process and active Forest Service management is not required for nature to sustain itself. This variation would prohibit the use of prescribed fire within what the respondent called "wild areas where anthropogenetic activities such as timber harvesting and road access are limited", called "wild areas". Prescribed fire would be authorized in all remaining lands as described in Alternative B. It would authorize wildland fire use except in the locations excluded in Alternative B.

This alternative was considered but not analyzed in detail because this alternative could require the forests to change land use allocations and associated desired future conditions. Making such changes are outside the scope of the stated purpose and need and outside the scope of this amendment decision.

The scope of this amendment is the fire management direction in the six forest plans. This amendment will not change forest plan management direction for other resources, will not change desired future conditions, and will not change land allocations (land use emphasis). The use of prescribed fire, wildland fire use, and wildland fire suppression tactics will be fully consistent with the existing land allocations and desired future condition decisions already made for the six forest plans. For example, the amended forest plan would not restrict the use of prescribed fire in a range, wildlife, or timber management prescription even if the land allocation were to contain some lands that exhibit limited anthropogenic activities or fell within a "wild area". The amended forest plan would authorize but limit the use of prescribed fire in a designated wilderness management prescription.

"Wild areas" were not allocated to a land use prescription (land use emphasis) in the existing Forest Plans nor did the plans provide desired future conditions, goals, standards, or guidelines for "wild areas". For example, lands that exhibited limited anthropogenic activities may have been allocated to a rangeland prescription, a wildlife prescription, or a semi-primitive recreation prescription when the forest plan decisions were signed in the mid-1980's. The land use emphasis and associated desired future conditions for these prescriptions typically provided for the manipulation of vegetation, such as prescribed burning, to help move toward or someday meet the desired future conditions, within the context of the allocation decision. Excluding the use of prescribed fire as a tool within a management area whose prescription and desired future condition provided for manipulation of vegetation (even though those lands may also be within a "wild area"), could have the result of interfering with, or superseding (changing) the existing management emphasis and associated desired future condition decisions in the forest plan.

The land use decisions for each National Forest have already been made. Desired future conditions for those land use allocations have already been made. The appropriate time to debate and balance these types of broader issues is during the revision of each forest plan. Land allocations (land use emphasis) and desired future conditions and their relationship to "wild areas where anthropogenic activities such as timber harvesting and road access are limited" are appropriately considered at the forest plan revision scale.

For these reasons this alternative was considered but not analyzed in detail.

Prescribed Fire and Wildland Fire Use with No Restrictions

This alternative addresses comments that fire is a natural process, and suppression of wildland fires caused the problems in the first place. It would allow wildland fire to burn wherever fire had historically occurred, without any suppression. It would also authorize prescribed fire.

This alternative was not analyzed in detail because it would not meet the need to stay within current land uses and social expectations, as stated in the purpose and need and proposed goal. (The alternative would allow wildland fires to burn without constraint, even in developed areas.) Moreover, it would not be consistent with National Interagency Policy regarding fire (1998). The Forest Service agrees that responsible and appropriate application of wildland fire use is important to sustaining healthy ecosystems; however, unmitigated threats to human life, property, and ecological resources would be irresponsible and socially unacceptable.

2.7 COMPARISON OF ALTERNATIVES

This section compares the alternatives considered in detail. It is based on the presentation of alternatives earlier in this chapter, and the resource effects detailed in Chapter 3 (affected environment and environmental consequences). The values presented represent all facets of the alternatives considered. For a comprehensive understanding of the direct, indirect, and cumulative effects for all resource topics and alternatives, refer to Chapter 3. The following information is intended to help the reader and Responsible Official to compare how different alternatives address the purpose and need, respond to issues, and affect resources.

The environmental effects for some resource topics did not vary by alternative or varied only in minor ways. Topics with environmental effects common or similar for all alternatives were Exotic Plant Species, Wildlife Habitat, Threatened, Endangered, Proposed, and Sensitive Species, Soil, Water, and Aquatic Habitat; Human Health and Safety; Scenery and Recreation; Access; Livestock Use, and Environmental Justice.

Comparison By Purpose And Need

The following narrative summarizes the relationship of each alternative to the identified purpose and need described in Chapter 1.

To what extent will the alternative provide forest plan direction for fire management that is consistent with national policy? To what extent will the alternative delete inconsistent and redundant information?

Alternative A, no action, does not affirmatively address this aspect of the purpose and need. Although the forest plans were fully consistent with national fire policy at the time they were approved (mid-1980's) they are now inconsistent with policy that was recently updated. They also contain information that is redundant to various fire manuals, such as the 5140 manual.

Alternative B and C do affirmatively address this aspect of the purpose and need. Wording in the existing forest plans not consistent with national policy and containing inconsistent and redundant information was removed and replaced with language consistent with national fire management policy.

To what extent will the alternative provide additional tools and address the need for anticipated increases in the scale of fire use to help land managers move toward desired conditions (DC) as described in the current forest plans? To what extent will the alternative provide for addressing hazardous fuel reduction?

Alternative A - Alternative A, no action, does not affirmatively address this aspect of the purpose and need. Movement toward the desired conditions in each plan is expected to take longer than the action alternatives because wildland fire use is not authorized across all six National Forests. Use of prescribed fire is expected to increase over time under Alternative A although the increase may not be as great compared to the action alternatives. As a result, fuel accumulations in some locations are expected to be maintained within desired conditions, however fuel accumulations in the majority of locations across each forest would likely continue to increase, and some above desired conditions.

Over the long term, across the six national forests, hazardous fuels are expected to continue to increase at a rate greater than the ability of the forest service to address using mechanical and prescribed fire methods alone. This in turn could result in greater number of large, uncontrollable wildland fires. Alternative A direction requires the suppression of all natural ignitions without regard as to cost effectiveness, social values, or resource benefit/detriment. Alternative A assumes sufficient resources are on-site from the time of ignition to appropriately manage a prescribed fire and sufficient resources arrive on-site to appropriately manage a wildland fire either as initial attack or as wildland fire use (some wilderness areas).

Effects Common to Alternative B and C - Alternative B and C do affirmatively address this aspect of the purpose and need. Both alternatives provide new management direction in the forest plans that will authorize prescribed fire and wildland fire use to help land managers move toward the desired conditions in their forest plan. Both alternatives allow for consideration of cost effectiveness, social values, and resource benefit/detriment when balancing wildland fire use against full suppression. Both alternatives assume sufficient resources are on-site from the time of ignition to appropriately manage a prescribed fire and sufficient resources arrive on-site to appropriately manage a wildland fire either as initial attack or as wildland fire use.

Alternative B and Alternative C both authorize wildland fire use forest-wide except in administrative sites, developed recreation sites, summer home sites, designated communication sites, oil and gas facilities, mining facilities, above-ground utility corridors, and high-use travel corridors. Alternative B and C both assume the fire management plan for each forest will identify appropriate mitigation or special prescriptive measures (some that are required by the forest plan) to provide adequate safeguards for potential affected resources such as threatened species and susceptible cultural resources.

Prescribed fires and wildland fire use in Alternative B and prescribed fires in Alternative C would occur under prescribed conditions and within approved fuels and weather conditions as outlined in the fire management plan. In practice, opportunities to use wildland fire use and prescribed fire in sensitive watersheds and timber emphasis areas would be limited (compared to other forest lands) because the management objectives for sensitive watersheds and timber emphasis areas (designed to sustain resource values) would likely result in a narrower set of conditions that prescribed fire and wildland fire use could be approved.

The anticipated effects to sensitive watersheds and timber emphasis areas could be similar in both alternatives assuming the Forest Service can "keep up" with fuel loading in these areas. The reduction in hazardous fuels and therefore the reduction in risk of having large, uncontrollable wildland fire in sensitive watersheds and timber emphasis areas could be similar between Alternative B and C even though each alternative has a different approach to this end.

- Alternative B - Reduction in fuels and subsequent reduction of risk to resource values (clean water and timber) is achieved in Alternative B by appropriately applying prescriptive measures in the fire management plan to future prescribed fire and wildland fire use activities. Using the go-no go protocol (Figure 1-4) for wildland fire use and the burn plan for prescribed fire; if the fire was out of prescription, the fire would be suppressed. If the fire were in prescription, then the fire would be managed to meet desired conditions and resource objectives for sensitive watersheds and timber emphasis areas.

- Alternative C - Reduction in fuels and subsequent reduction of risk to resource values in sensitive watersheds and timber emphasis areas is achieved because land managers choose the location and time of ignition for a prescribed fire. Prescribed fires would appropriately apply prescriptive measures taken from the fire management plan to help move the project area toward, or meet desired conditions. In the long-term, potential effects for both alternatives could be similar assuming under Alternative C direction, the Forest Service reduces hazardous fuels in these areas using prescribed fire as the only fire management tool (recognizing fuels could be reduced by mechanical or other methods currently approved in the forest plans also).

Effects Differing Between Alternative B and C - In the long-term, paths could diverge between Alternative B and C based on the assumption in Alternative C that the Forest Service has sufficient staff and resources to implement sufficient prescribed fires over time to reduce hazardous fuels using prescribed fire alone (recognizing fuels would be reduced by mechanical or other methods also). If the prescribed fire program falls short in addressing vegetation growth and fuel loading in those areas, then the expected effects of Alternative C could be more similar to Alternative A relative to resource impacts and meeting the purpose and need. Thus, ironically, it is possible that Alternative C may result in a higher, long-term, risk to sensitive watersheds and timber emphasis areas compared to Alternative B given the assumption described above.

Whether the prescribed fire program receives emphasis to "make up the difference", at least for the next planning period, is not reasonable to predict (not reasonably foreseeable) at this time and therefore becomes an issue best addressed during forest plan revision.

Comparison By Resource Topic

The narrative in Figure 2-1 summarizes the key differences between environmental effects that changed by alternative. The environmental effects for resource topics that varied by alternative in minor ways, or not at all, were not included thereby allowing the reader to focus on the key differences between alternatives. Resource topics that differed by alternative were Fire Ecology, Sensitive Watersheds, Cultural Resources, Wilderness, Property/Fuels, and Timber.

FIGURE 2-1

Comparison of Key Differences Among the Alternatives

RESOURCE TOPIC

1 - Fire Ecology

ALTERNATIVE A

In the next 3-4 years, no measurable changes to vegetation structure and composition are expected in any of the major cover types. Prescribed burning and wildland fire use are not expected to burn across large acreages in the short term to make a noticeable difference across the state or individual forest.

Over the next 50 to 100 years, monitoring is expected to show continued disruption of fire regimes. Down woody fuels in forested ecosystems continue to increase. When ignited, these fuels could contribute to large, more intense unwanted wildland fires compared to historic conditions. Forested areas continue to become overstocked with fire-sensitive tree species. Susceptibility to damage by unwanted wildland fire and to outbreaks of insects and pathogens is increased over time. Movement towards desired vegetative condition (properly functioning condition) is slow or is away from desired condition. These trends continue because fire disturbance continues to be excluded.

ALTERNATIVE B

Same as Alternative A.

Over the next 50 to 100 years, monitoring is expected to show desired changes in structure and composition of each cover type as the result of using wildland fire use and prescribed fire across the landscape. The increased use of fire is expected to break up large homogeneous patches of forest and rangelands. This is expected to slowly move these homogeneous patches towards a fine-grained (many small patches per unit area) landscape that is more resistant and resilient to fire and other disturbances, in both size and intensity. The expected increase in heterogeneity would result in an increase in biodiversity at the landscape scale. This trend is expected to move these ecosystems toward properly functioning condition (desired condition).

ALTERNATIVE C

Same as Alternative A.

Same outcomes as Alternative B except prescribed fire is the only fire management tool to achieve desired conditions. This outcome assumes the prescribed fire programs for the six forests have sufficient staff and resources to keep up with anticipated fuel loading in the sensitive watersheds (315,000 acres) and timber emphasis areas (675,000 acres).

If this assumption is incorrect then long-term outcomes could be similar to effects described for Alternative A in sensitive watersheds and timber emphasis areas.

RESOURCE TOPIC

5 - (Sensitive Watersheds), Soil, Water

ALTERNATIVE A

Soil productivity is maintained in low to moderate fire severity fires. Long-term soil productivity is maintained, however, as in the past, high severity fires would continue to have short-term negative effects to soils. Large, high severity fires that kill vegetation in sensitive watersheds carry the highest risk of exceeding State water quality standards and increased risk of mass failures, flooding and risk to human safety.

Suppression of wildland fires would continue. Accumulation of hazardous fuels would continue. Use of prescribed fire as a management tool to reduce hazardous fuels would increase. As hazardous fuels increase, the greater the risk of having large, high severity wildland fires.

ALTERNATIVE B

Same as Alternative A.

The increased use of prescribed and wildland fire use in sensitive watersheds is expected to reduce the long-term risk of uncharacteristic wildland fires and potentially reduce the risk of future damage to watershed values. Wildland fire use and prescribed fire in sensitive watersheds would only occur under specific approved fuels and weather conditions as discussed in the fire management plan for each forest. Conditions will be set to minimize the risk to water quality and maximize meeting long-term watershed

management objectives. Over the long-term, satisfactory watershed conditions are expected to be sustained with less water degradation.

ALTERNATIVE C

Same as Alternative A.

Same outcomes as Alternative B except prescribed fire is the only fire management tool to achieve watershed objectives. This outcome assumes the prescribed fire program for the six forests have sufficient staff and resources to keep up with anticipated fuel loading in the sensitive watersheds (315,000 acres). This outcome also assumes the six forests have the staff and resources to address other areas of the forest needing prescribed fire actions, including the timber emphasis areas (675,000 acres).

If this assumption is incorrect then long-term outcomes could be similar to effects described for Alternative A in sensitive watersheds and timber emphasis areas.

RESOURCE TOPIC

7 - Cultural Resources

ALTERNATIVE A

Forests consult with SHPO on a project by project basis.

ALTERNATIVE B

The Utah Forests have initiated consultation with the State Historic Preservation Office to develop a programmatic agreement for wildland fire management, which would establish guidance and direction for all six National Forests. Forests would identify known sites and areas deemed to have potential for containing susceptible cultural resources and establish strategies and tactics that can be applied in wildland fire planning and implementation.

These procedures would be incorporated into the fire management plans prior to approval and before a decision (the “go-no go” decision) has been made to manage wildland fire use for resource benefit. Advance planning would result in identification of susceptible sites prior to natural wildland fire ignition and provide fire managers with better tools to assure impacts are within negotiated limits.

ALTERNATIVE C

Same as Alternative B.

Same as Alternative B.

RESOURCE TOPIC

8 – Wilderness, (Scenery, Recreation)

ALTERNATIVE A

Of the 774,328 acres of Wilderness in five of the six national forests; about 129,686 acres (16.7 percent) are not authorized to use wildland fire use. All of these acres are on the Wasatch-Cache National Forest. Continued suppression of wildland fire may not be consistent with wilderness values and objectives. The remaining wilderness acres (83.3 percent) allow wildland fire use (formally called prescribed natural fire).

ALTERNATIVE B

774,328 acres (100 percent) of all Wilderness areas are authorized to use wildland fire use.

ALTERNATIVE C

Same as Alternative B.

RESOURCE TOPIC

10 – Property (Fuels)

ALTERNATIVE A

Wildland fire use can not be used in and around Government and private property and facilities. Use of prescribed fire (and other methods) as a management tool to reduce hazardous fuels surrounding property and facilities would increase. The risk of damaging or loosing property/facilities would be reduced.

Suppression of wildland fires would continue. Accumulation of hazardous fuels would continue. Fire suppression and prescribed fire costs would continue to increase. As hazardous fuels increase, the risk of loosing Government and private property and facilities from large uncontrollable wildland fires will continue to increase.

ALTERNATIVE B

Same as Alternative A.

The amount of acres burned within prescription over time would be expected to increase. Increased use of wildland fire for resource benefit combined with prescribed fire and other approved mechanical methods result in a reduction of hazardous fuels and the break up of large tracts of continuous heavy downed fuels. Forestlands are expected to gradually experience fewer large, destructive, uncontrollable wildland fires. This reduced hazard would be expected to lead to a reduced risk to property and facilities in the long-term.

ALTERNATIVE C

Same as Alternative A.

Risk to property and facilities within the timber emphasis and sensitive watershed areas would likely decrease compared to Alternative A if prescribed fire can "keep up" with fuel accumulation and address fuel continuity. Exactly how much is difficult to determine. If sufficient prescribed fire is not applied then the risks to property and facilities within these areas could increase over time. The effects would then become more similar to Alternative A within timber emphasis and sensitive watershed areas.

RESOURCE TOPIC

11 - Timber

ALTERNATIVE A

Wildland fires, and the use of fire, are expected to consume some commercial timber resources over time as has happened in the past. The value of timber impacted by wildland fire in the next three to four years will vary event-by-event, dependent on fire intensity and severity. Risk of fire escaping or moving out of prescription because of changes in weather will continue to be problematic. Availability of commercial and personal use timber is not expected to change in the short time remaining in this planning period.

In the long-term timber losses are expected to increase as fires become increasingly larger and uncontrollable. These losses will be unavoidable.

ALTERNATIVE B

Same as Alternative A.

The increased use of prescribed and wildland fire use in timber emphasis areas is expected to reduce the long-term risk of uncharacteristic wildland fires and potentially reduce the risk of future damage to commercial timber. Wildland fire use and prescribed fire in timber emphasis areas will only occur under specific approved fuels and weather conditions as discussed in the fire management plan for each forest. Conditions will be set to minimize the risk to timber values and maximize meeting timber management objectives. Long-term availability of commercial and personal use timber would likely be sustained, with less timber damaged by unwanted wildland fire.

ALTERNATIVE C

Same as Alternative A.

Same outcomes as Alternative B except prescribed fire is the only fire management tool authorized to achieve timber management objectives. This outcome assumes the prescribed fire program for the six forests have sufficient staff and resources to keep up with anticipated fuel loading in the timber emphasis areas (675,000 acres). This outcome also assumes the six forests have the staff and resources to address other areas of the forest needing prescribed fire actions, including sensitive watersheds (315,000 acres). If this assumption is incorrect then long-term outcomes could be similar to effects described for Alternative A.

3.0 INTRODUCTION

This chapter describes the affected environment and the environmental consequences. The affected environment describes the existing conditions of the project area that may or may not be affected by implementation of the alternatives considered in detail, described in Chapter 2. For each resource topic, the legal and administrative framework is presented followed by a brief description of the affected environment. The environmental consequences section discloses probable programmatic direct, indirect, and cumulative effects that could result from future use of the management direction in each alternative.

The analysis for most resources was limited to the geographic scope of the project area (EA, Section 1.3), however, in some cases; effects beyond the project area were considered and disclosed. The time frame for the effects disclosures is the life of the amendment, the time period between when the amendment is implemented and Forest Plans in Utah are revised (projected to be 4 years or less). Longer term effects of incorporating and applying management direction in future implementation projects is discussed, as appropriate.

The use of prescribed fire and wildland fire use in Utah will comply with the standards and guidelines identified in each Forest Plan. The standards and guidelines for all resources provide reasonable assurance that they are adequately addressed and protected at the programmatic level and eventually incorporated, in the future, at the site-specific, implementation, project level. This amendment will not change the standards and guidelines for other resource topic areas, therefore any current and future fire management actions and activities would have to be consistent with these standards and guidelines.

The fire management plan would incorporate relevant management direction for other resource topics and identify any mitigation or special prescriptive measures and procedures relative to them, in response to meeting forest plan goals, standards and guidelines. These measures would be intended to provide reasonable assurance that adequate environmental safeguards are incorporated to protect the specific resource. The measures in the Fire Management Plan would then be available to the line officer and incident commander, prior to future planned (prescribed) and unplanned (emergency, wildland fire) fire management activities so they can appropriately address resource and social concerns. Examples of measures which could be implemented to protect resources include required wind and temperature conditions, required soil and fuel moisture conditions, restrictions on burn severity/intensity, restrictions on the timing of the fire, restrictions on areas where burning activity would not occur, guidance on where mechanical fire suppression activities would be limited, and areas where revegetation would be required.

The prescribed fire burn plan, wildland fire implementation plan, and the wildland fire situation analysis are fire management implementation documents for planned (prescribed) and unplanned (wildland fire) ignitions. These documents incorporate relevant measures and procedures from the fire management plan and apply them to site-specific, on-the-ground, activities and actions. The prescribed fire and wildland fire actions would therefore have considered, incorporated, and be consistent with relevant Forest Plan management direction requirements.

This project incorporates by reference the direction in each of the six Forest Plans and the analysis disclosed in their environmental impact statements and Records of Decision. Supporting information developed for this analysis is maintained at the Fishlake National Forest Supervisor's Office in Richfield, Utah. The project record may contain more information than presented in this chapter.

3.0.1 INCOMPLETE AND UNAVAILABLE INFORMATION

There are less than complete inventories and knowledge about many relationships and conditions including the composition, structure, and function of vegetation cover types and the role of fire in sustaining ecosystems. The interaction among resource supply, the economy, and rural communities is also the subject of an inexact science. The ID team examined the available data and the best available information was used to evaluate the options and alternatives. There is a certain level of risk inherent in the management of forestlands even to standards based on conservative application of those relationships. Should there be new scientific information not projected in this analysis there are provisions for changing management direction. The adaptive management approach process, which is guided by monitoring, provides additional assurance of compensating for possible changes.

3.0.2 CUMULATIVE EFFECTS

Cumulative effects result from the impacts of past, present, and reasonably foreseeable future actions or policies combined with the direct and indirect impacts of using the management direction incorporated into each alternative. The geographic scope of this cumulative effects analysis represents lands administered by the six national forests unless specified otherwise. The paragraphs below summarize the key conclusions from the full effects disclosure that follows in the subsequent resource sections.

In this programmatic environmental assessment the Forest Service is considering the impacts of various short-term strategies to address the purpose and need for action. The standards and guidelines presented in the various alternatives are intended to provide additional tools to help achieve the desired future conditions in the existing forest plans and limit or mitigate potential negative effects to people, facilities, and the environment. The limitations vary depending on the alterative selected. The potential programmatic cumulative effects of this action would be limited by the short time period in which this amendment management direction would be in effect (projected to be 4 years or less, EA, section 1.3).

Future programmatic actions, such as the development of long-term management strategies to be considered by each forest during revision of their land and resources management plan are future actions, but not reasonably foreseeable at this time because the substance of the various alternatives to be considered by each of the six forests during revision is unknown at this time. These programmatic cumulative effects are appropriately considered and addressed within the Forest Plan revision environmental impact statement.

Existing forest plans contain management direction that restricts prescribed fire implementation activities. These restrictions include, but are not limited to, maintenance of hiding and thermal cover for wildlife and visual quality objectives (VQO's). For example, areas that have a VQO of retention would typically prohibit a prescribed burn because the blackened landscape could be noticeable and perhaps dominate the scenery. Tradeoffs between resource availability, use, and protection are expected to continue as a cumulative effect.

Rule making and future regulations for roads/transportation and roadless are not expected to cumulatively impact future fire suppression actions or the use of wildland fire use as a management tool because roads may be built in emergency situations. Road construction is not typical for prescribed fire projects therefore limited cumulative impacts are anticipated.

All six forests, have, or are in the process of, writing wildland fire use implementation plans, as a chapter in their fire management plans. The Fishlake NF is the only forest in Utah that has a plan that covers the entire forest. The High Uintas wilderness (Wasatch-Cache and Ashley NF's), Timpanogos and Lone Peak wilderness (Uinta NF), and the westside of the Pine Valley RD (Dixie NF) are currently authorized to use natural ignitions for resource benefit. Portions of the Manti-La Sal NF and the Dixie NF are currently in the planning process. Since these areas represent a small proportion of the total area, areas authorized for wildland fire use would be expected to contribute only a minor amount to the overall goal of restoring or maintaining historic fire regimes and maintaining vegetation in a properly functioning condition in the short-term.

Other federal land management agencies adjacent to the National forests of Utah have, or are also in the process of developing, management direction regarding wildland fire suppression, wildland fire use, and prescribed fire. These agencies would likely work cooperatively in the development of fire management plans and during implementation actions. The cumulative effect would likely be to lower risks to human life and property and provide for consistent management while addressing the land unit objectives across jurisdictional boundaries.

Many of the cumulative effects described in the following narratives, when realized, will occur in the future when and where prescribed fires, wildland fire use, and wildland fire suppression actions are implemented. This amendment does not authorize, fund, or implement site-specific, ground disturbing actions. This analysis incorporates by reference the analysis and discussion of potential cumulative effects in the existing EIS's for each National Forest. The adoption of management direction through this project will not change the physical environment; therefore there is no irretrievable or irreversible of commitment of resources.

Fire Ecology - Past silvicultural practices converted most early-seral communities to late-seral communities. For example, large, old ponderosa pine and Douglas-fir were harvested, leaving white fir and subalpine fir to become the dominant overstory. Some timber harvest areas, although small in proportion to the entire forested area, left some landscapes out of balance in regard to structure and composition (Admundson et al. 1997).

Past fire management practices reduced the spread of fires over each national forest. This allowed many forested areas to become overstocked with fire-sensitive tree species and increased their susceptibility to damage by unwanted wildland fire and to outbreaks of insects and pathogens (USDA Forest Service 1996). The effects of these past management practices are expected to continue in Alternative A.

Grazing by ungulates and domestic livestock has and will continue to impact all fire-adapted ecosystems (aspen, mixed conifer, ponderosa pine, pinyon/juniper, mountain shrub, sagebrush/grass/forb) by removing fine fuels and preventing the spread of surface fires (Bradley et al. 1992; Covington and Moore 1992; Johnson et al. 1994; Ogle and DuMond 1997; Tausch and West 1995). Alternative A management direction combined with continued grazing at current levels into the future is expected to lengthen fire intervals, which would result in the accumulation of down woody fuels in forested ecosystems (The effect of disrupting fire regimes is explained later in this chapter). If ignited, these fuels could contribute to large, more intense unwanted wildland fires compared to historic conditions. This trend is expected to move these ecosystems toward properly functioning condition at a slower rate compared to Alternatives B and C.

The increased use of fire in Alternatives B and C is expected to break up large homogeneous patches of forest and rangelands. This is expected to slowly move these homogeneous patches towards a fine-grained (many small patches per unit area) landscape that is more resistant and resilient to fire and other disturbances, in both size and intensity. The expected increase in heterogeneity would result in an increase in biodiversity at the landscape scale. This trend is expected to move these ecosystems toward properly functioning condition. Alternative A is expected to move slower toward properly functioning condition compared to Alternative B and C and is some cases move away.

The alpine, high-elevation spruce/fir, tall forb, desert-scrub, and riparian ecosystems in Utah are not dependent on the presence of fire to maintain sustainability over time. They are expected to remain in a properly functioning condition (relative to fire's role in sustaining these systems) for all alternatives.

Exotic Plants - Alternative A is expected to maintain a higher potential for the long-term spread and dominance of exotic plants because of the continued size and extent of unplanned wildland fires at a landscape level. Alternative B is expected to minimize the potential for invasion on planned burned areas and at the same time, by effecting a reduction in the size and extent of unplanned wildland fires, it may, at a landscape level, contribute to a reduction in the long-term spread and dominance by exotic species.

Wildlife Habitat - Timber harvest, livestock grazing, and recreational use, with their associated road building and site development, are the most prevalent activities affecting terrestrial habitats and biota. These activities can adversely affect habitats and wildlife populations by altering vegetative composition, quality, diversity, vigor, and fragmenting habitat to the point where it is unsuitable to one or more species. If habitats are not in properly functioning condition, the negative effects caused by fire will be more severe and of longer duration.

In general, if a vegetation type is in properly functioning condition, the structure, composition, and pattern of wildlife habitat across a landscape would be such that the majority of the species would be represented. Alternatives B and C add the ability to disturb vegetation using prescribed fire forest-wide and, in certain areas, authorizes wildland fire use. The cumulative effects disclosed for Alternative B and C in the Fire Ecology section above indicate ecosystems are expected to move toward the goal of being in a properly functioning condition if these tools are applied across the forest and rangeland landscapes. As long as enough suitable habitats are appropriately distributed across landscapes, that are properly functioning, then individuals lost during a localized disturbance event, such as a fire, *generally* would not be limiting relative to sustaining viable populations across the larger landscape.

Threatened, Endangered, Proposed, and Sensitive Species – Cumulative effects determinations are presented in Appendix A.5 and A.6. The goshawk and lynx management direction is expected to restrict the use of prescribed fire and wildland fire for resource benefit in areas where old forest characteristics are lacking. Fire is expected to continue to contribute toward adequate foraging habitat.

Soil/Water - For all alternatives, in both the short and long term, soil productivity would be maintained where low to moderate severity fires occur. In the short term, following a high severity fire, soil productivity is lowered initially but over time, across a landscape scale, soil productivity is expected to be sustained. Sedimentation or water yield following some fires will result in changes in stream channel stability, riparian ecosystems, and aquatic habitat (Rosgen, 1996; Leopold et al., 1964). The extent to which fire might have cumulative effects on a watershed is dependent on the characteristics of the specific fire.

Prescribed burns and wildland fire use which comply with forest plan standards and guidelines and the fire management plan have the potential of diminishing negative watershed effects compared to the anticipated severe impacts of uncharacteristic wildfire that is expected in the future with Alternative A and possibly in Alternative C if prescribed burning alone can not keep pace with fuel loading.
Large, high severity fires that kill vegetation in sensitive watersheds carry the highest risk of exceeding State water quality standards and increased risk of mass failures, flooding and risk to human safety. Over time, Alternative A has increased potential for having large, high severity fires compared to Alternatives B and C. The increased use of fire use in sensitive watersheds in Alternatives B and C is expected to reduce the long-term risk of uncharacteristic wildland fires and potentially reduce the risk of future damage to watershed values.

Aquatic Biota - For all alternatives, livestock grazing, timber harvest, and recreational use, with their associated road building and site development are the most prevalent past and future activities affecting riparian and aquatic habitats and associated aquatic biota. In areas where watershed or aquatic health is poor, the negative effects of fire will be greater and of longer duration. In contrast, healthy watersheds with healthy aquatic habitats will be more resilient to the effects of fire.

For all alternatives, in both the short and long term, aquatic habitats would be maintained where low to moderate severity fires occur. Large severe fires may result in increased sedimentation, which may in turn result in local extinctions of very small and isolated populations of fish. Many species and populations, however, may still have the ecological diversity necessary for coping with this type of historic disturbance; for example, bull trout and redband trout, seem to be adapted to such events. Resiliency of aquatic populations will likely continue to be dependent on large, well-connected and spatially complex habitats.

Human Health and Safety – Short-term impact to local air sheds from wildland fires and prescribed fire are expected to continue. For all alternatives, in the long-term, impacts to air quality are not expected to increase beyond what is currently allowed under law, consistent with all six forest plans in Utah.

Although fire does have the potential to change the chemical constituents of water, especially with respect to nutrients, in general, changes are not expected to be large enough to impair municipal water sources. Sedimentation or water yield following some fires will result in changes in stream channel stability, riparian ecosystems, and aquatic habitat. The extent to which fire might have cumulative effects on a watershed is dependent on the characteristics of the specific fire.

For all alternatives, State and Federal Water Quality Standards will be met. This would be accomplished in part, through the implementation of Best Management Practices designed for prescribed fire, fire suppression, and fuels reduction.

Cultural Resources Cumulative effects over time can include the loss of sites prior to the development of better research and protection techniques, the loss of interpretive values and incremental losses to the cultural resource information base. Under all alternatives this would include forest management projects that cause surface disturbance, natural deterioration and erosion to cultural resources, public visitation, illegal excavation and vandalism and unwanted wildland fire and prescribed fire.

In the long-term, effects of fire to susceptible cultural resources may not be vastly different among alternatives. Under Alternative A, fuels would continue to build, increasing the potential for larger, more severe fires to occur and result in increased frequencies of adverse impacts to cultural resources. Implementation of identification, evaluation, protection and consultation measures in accordance with historic preservation law and regulation is common to all alternatives and should assist in keeping effects within negotiated limits.

Scenery, Recreation, and Wilderness – For all alternatives, fires are expected to continue to be perceived as natural phenomena, and while, to some, they may diminish scenic quality in the short term, their presence is not expected to unduly affect visitor recreation experiences. People will continue to generally prefer recreating in vigorous, forested landscapes compared to landscapes recently burned. People will continue to fear the destructive force of fire yet they will continue to increasingly appreciate and accept the role fire has in maintaining and perpetuating ecosystems.

Under Alternative A, suppression of wildland fires in wilderness areas not approved for wildland fire use would continue to negatively impact wilderness values such as solitude, primitive recreation experience, untrammeled settings, and primeval character and influences; especially on the Wasatch-Cache National Forest. Alternative B and C would provide for fires role in sustaining ecosystems within wilderness areas.

Access - Short-term and long-term implementation of the three alternatives is not expected to change currently approved access to the National Forests. Some individuals may continue to choose to illegally drive off approved access routes into openings created by fire suppression activities. During a fire, and sometimes following a fire, some forest access routes may be temporarily closed to protect public safety.

Property – For all alternatives, private and government properties will continue to be damaged or destroyed by unwanted fires. However, the risks to property and facilities are expected to be reduced where natural wildland fuel reductions occur.

Alternative A is expected to continue the trend for increased fire suppression funding and resources. As hazardous natural fuels continue to increase, the risk of loosing Government and private property and facilities from large uncontrollable wildland fires will continue to increase. Under Alternatives B and C hazardous fuels surrounding property could be reduced and together with reasonably foreseeable future mechanical treatments, the risk from wildland fires would be reduced.

Timber – There will be little difference in the cumulative effects between the three alternatives in the short-term (less than 4 years). Wildland fires, and the use of fire, are expected to consume some commercial timber resources over time as has happened in the past. The value of timber impacted by wildland fire in the next three to four years will vary event-by-event, dependent on fire intensity and severity. Risk of fire escaping or moving out of prescription because of changes in weather will continue to be problematic. Availability of commercial and personal use timber is not expected to change in the short time remaining in this planning period.

In the long-term under Alternative A, timber losses are expected to increase as fires become increasingly larger and uncontrollable. These losses will be unavoidable.

The increased use of prescribed and wildland fire use in timber emphasis areas (Alternative B) is expected to reduce the long-term risk of uncharacteristic wildland fires and potentially reduce the risk of future damage to commercial timber. Wildland fire use in timber emphasis areas will only occur under specific approved fuels and weather conditions as discussed in the fire management plan for each forest. Conditions will be set to minimize the risk to timber values and maximize meeting timber management objectives. Long-term availability of commercial and personal use timber is expected to be sustained, with less timber damaged by unwanted wildland fire.

Alternative C would rely on prescribed fire as the only tool to achieve timber management objectives. The increased use of prescribed fire in timber emphasis areas (Alternative C) is expected to reduce the long-term risk of uncharacteristic wildland fires and potentially reduce the risk of future damage to commercial timber. This outcome assumes the prescribed fire program for each forest has sufficient staff and resources to keep up with anticipated fuel loading in the timber management areas. This outcome also assumes each forest has the staff and resources to address other areas of the forest needing prescribed fire actions. If this assumption is incorrect then the outcome could be similar to effects described for Alternative A.

Livestock Use – For all alternatives, in the short-term there is little difference between the three alternatives. Livestock grazing is a permitted use in all forest plans and this practice together with existing forest plan range management direction will continue under all alternatives. Alternatives B and C do not change management direction concerning livestock grazing use or practices. Authorization of prescribed fire and wildland fire use are expected to provide tools for range managers to make desired changes in vegetation.

As in the past there will continue to be the risk of fire escaping and consuming valuable livestock or forage, which could have immediate, unplanned adverse affects on grazing capacities and/or pasture rotation schedules. Structural developments such as fences and water developments may burn and be replaced. Fire could reduce effectiveness of natural barriers such as large forested areas or brush fields that are used as grazing unit boundaries. This could require either a change in grazing strategies or the construction of additional unit fences.

Fire in rangelands in good condition would see 1 to 3 years reductions in forage and subsequent changes in livestock management. Rangeland sites in poor condition may not improve in response to fire either rapidly, or possibly not at all. In many cases, it will be necessary to artificially seed burned areas so that the productive potential of the site is realized. This could require an additional 1 to 3 years of grazing rest. In the short-term annual operating plans would be expected to include periods of rest for some burned pastures with occasional adjustments in ten year grazing permits. Over time, monitoring is expected to indicate increased productivity and movement toward properly functioning conditions.

Environmental Justice - Affected groups would not be disproportionately impacted compared to other citizens within the affected locations and the magnitude of these impacts is expected to be low and not disproportionately adverse.

3.1 FIRE ECOLOGY

Legal and Administrative Framework

The following acts contain legal requirements and authorities to plan and carry out activities to protect National Forest System lands and resources from fire:

· The *Organic Administration Act of 1897* (16 U.S.C. 551) authorizes the Secretary of Agriculture to make provisions for the protection of National Forests against destruction by fire.

· The *Bankhead-Jones Farm Tenant Act of 1937* (7 U.S.C. 1010, 1011) authorizes and directs the Secretary of Agriculture to develop a program of land conservation and land utilization to protect the public lands.

· The *Wilderness Act of 1964* (16 U.S.C. 1131, 1132) authorizes the Secretary of Agriculture to take such measures as may be necessary in the control of fire within designated wilderness.

· The *National Forest Management Act of 1976* (16 U.S.C. 1600) directs the Secretary of Agriculture to specify guidelines for land management plans to ensure protection of forest resources.

· The *Reciprocal Fire Protection Act of 1955* (42 U.S.C. 1856) authorizes reciprocal agreements with federal, state, and other wildland fire protection organizations.

The National Forest Directives System (manuals and handbooks) outlines the administrative framework for fire management activities: the protection of resources and other values from unwanted wildland fire, and prescribed fire and wildland fire use to meet land and resource management goals and objectives. The framework in these manuals and handbooks provides for cost-efficient unwanted wildland fire protection and embraces the positive roles that fire plays on National Forest lands. The following portions of the directives apply directly to fire management as addressed in the forest plans: *FSM 2324.2 - Management of Fire (in wilderness), FSM 5100 - Fire Management.*

Additional direction for implementing the fire management program at the project level comes from the *Wildland and Prescribed Fire Management Policy - Implementation Procedures Reference Guide.* This guide was developed by an interagency team from the U.S. Forest Service, Bureau of Land Management, National Park Service, and Fish and Wildlife Service. The procedures outlined in the guide are consistent with FSM 5100.

3.1.1 AFFECTED ENVIRONMENT

Introduction

The role fire plays in ecosystems throughout the world is commonly accepted by ecologists and many natural resource managers (Agee 1993; Brown n.d.; DeBano et al. 1998; Johnson 1992; Johnson et al. 1994; Quigley et al. 1996; USDA Forest Service 1996; Whelan 1995). Fire's role is complicated because it influences and controls many ecosystem processes and characteristics such as nutrient cycling, plant composition and community structure, and fuel accumulations (Wright and Heinselman 1973). Ecologists classify the multi-faceted role of fire into fire regimes to aid in communicating its' function in

ecosystem management. Fire regimes discuss the nature of the disturbance by describing fire's intensity, frequency and effect on vegetation. Knowledge of fire regimes is increasingly recognized as a critical basis for managing landscapes (Brown n.d.) and comparing changes in fire frequencies and intensities between present and historical conditions highlights cultural influences.

Historical Setting

Presettlement Conditions (prior to 1850) Throughout the presettlement period, fire was an integral part of the maintenance and function for the majority of ecosystems in Utah. The seasonal cycling of fire through the landscape was as regular as the incidence of late summer lightning occurrence. The greatest number of fires, and the largest fires, occurred in the late summer and early fall. However, the climate was variable enough to allow fires to occur during periods in the early summer, spring, and even winter in some lower elevation sites.

The role of Native Americans in modifying fire regimes is often considered unnatural and not part of a "natural" fire regime (Martin and Sapsis 1991). We cannot, however, separate their role over the last 10,000 years from "natural" agents (MacCleery 1999). Native Americans probably reduced the periods between fires. Fires started by lightning would occur only under meteorological conditions conducive to the formation of thunderstorms and fire spread. Native Americans, however, could start fires at any time when fuel conditions were right for ignition and spread.

The combination of lightning and anthropogenic ignitions resulted in a variable distribution and size of vegetative patches prior to Euro-American settlement. For example, in ponderosa pine and mixed conifer the frequent low- to moderate-severity fire regimes produced a mosaic of patches, commonly dominated by large trees.

Post-settlement Conditions (1850 to present) The period since Euro-American settlement (approximately 1850 for most parts of Utah) and subsequent growth of industry by Euro-Americans has seen the curtailment of fire as a periodic modifying event in the vast majority of plant communities (Ogle and DuMond 1997). Many ecologists recognize that disruption of the historic pattern of frequent fires in short interval, low-intensity and mixed-severity fire regimes has resulted in major ecological changes, including increasingly severe unwanted wildland fires and insect and disease epidemics (Mutch et al. 1993; Arno et al. 1995; Covington and Moore 1992). Fire exclusion has produced a fuels complex that makes high-intensity fires more likely while the benefits of periodic burning have been essentially lost (Bradley et al. 1992).

Fire suppression, past timber harvesting and livestock grazing have altered fire regimes in Utah. The cumulative effect of these changes are found in the reduced frequency of burning in all plant communities and the increased potential for larger more intense fires when compared to historic patterns. Not all plant communities have experienced these changes equally, however. Fire exclusion and timber harvest since settlement has led to a more uniform arrangement of mid-successional patches and an increase in large, homogeneous patches, produced by high intensity fires. This coarse-grained (few large patches per unit area) landscape appears more susceptible to uncharacteristic fires and other disturbances, in both size and intensity. It is unknown how this homogeneity may affect vegetation. Because the types of fires producing this homogeneity are probably outside of the historic range of variation, a reduction of biotic diversity is likely (USDA Forest Service 1996a).

The landscapes that exist today have changed from those created by natural processes and Native American practices (Ogle and DuMond 1997). Contemporary forest and rangeland conditions are the result of settlement and concurrent natural resource development, creation of settlement infrastructures, and other activities. Historically, disturbance agents such as fire and floods were viewed as events that impeded progress toward settlement and development. Suppression policies were developed to limit the impacts of unwanted wildland fires. Fire exclusion and fire suppression policies have increased the chance of high-intensity fires. High-intensity fires are generally large and severe in their impacts.

Over the last 20 years, people have compounded the problem by moving into the wildland-urban interface to build homes and businesses. By doing so, they have increased their risk of exposure to high-intensity fires that could threaten their safety and property. The negative consequences of uncharacteristic high-intensity fires include (USDA Forest Service 1996a):

- Threatening lives and property
- Reducing hillside stability, leading to accelerated erosion and watershed degradation
- Losing the organic layer and critical nutrients in soils
- Destroying commercial timber
- Losing wildlife habitat associated with late seral successional stages

Major Cover Types

The following narrative briefly describes the current condition of vegetation types potentially affected by the decision to be made in this environmental document. This information was taken primarily from *Fire Ecology of Forests and Woodlands in Utah* (Bradley et al. 1992). Other sources of information used to prepare this assessment include the Properly Functioning Condition Assessments for the Uinta Mountains (USDA Forest Service 1998b), the Wasatch Mountains (USDA Forest Service 1998b), the Dixie National Forest (USDA Forest Service 1997), the Utah High Plateaus and Mountains Section (USDA Forest Service 1997), and the Manti-La Sal National Forest (in draft, USDA Forest Service 1998a). Detailed information regarding the fire ecology of each cover type can be found in Appendix A.8. The historical fire return intervals presented below for each cover type are estimates for the presettlement period (prior to 1850).

Aspen Quaking aspen is distributed throughout the State, with the largest concentrations in central and northern Utah. On sites where aspen is associated with conifers, fire has been the most important disturbance factor influencing changes in structural stages and composition, and minimizing dominance by conifer species. The fire return interval is less frequent today compared to historical averages (Bartos and Campbell 1998).

Historically, fire prevented conifers from dominating aspen stands. Fire maintained a mosaic of age classes in aspen across the landscape. Fire also maintained the clones in a healthy, vigorous condition. Non-lethal fires (7 to 10 years) at lower elevations, and stand-replacing fires (30 to 100 years) at higher elevations, historically regenerated this species forming even-aged stands and maintained a mosaic of structural stages across the landscape (Baker 1925; Chappell et al. 1997).

Existing conditions indicate that conifers will eventually replace many aspen stands. In some instances, sagebrush may replace aspen stands when ungulate grazing has removed both the overstory and understory causing the site to dry out and permit sagebrush to spread. The absence of fire, coupled with

excessive browsing of young aspen trees by livestock and wildlife, has led to rapid replacement of aspen communities by conifer forests (Bartos 1998). The decline of aspen results in loss of water, forage, and biodiversity (Bartos and Campbell 1998a).

Some of the aspen clones in Utah are in a mid to old structural stage (O'Brien 1999). Many areas are slowly being overtopped by conifers through plant succession, thereby reducing the aerial extent of aspen. Bartos and Campbell (1998) conclude that of the 2.1 million acres of National Forest System lands in Utah that were once dominated by aspen, only 800,000 acres are now dominated by aspen. This is a 60 percent reduction in aspen coverage.

Lodgepole Pine Lodgepole occupies extensive areas of northern Utah in a belt from 7,500 to 10,300 feet in elevation. Fire recycled decadent stands and led to the establishment of a new lodgepole pine forest. Fires burned every 100 to 300 years as stand-replacing fires removing all competing vegetation (especially fire sensitive, shade tolerant spruce and fir species) and prepared a mineral seedbed required for successful germination. Healthy lodgepole pine forests included a mosaic of dwarf mistletoe infection centers and uninfected stands interacting with periodic stand-replacing fires that varied in intensity (Kipfmueller and Baker 1998).

A fire history in the subalpine fir zone in northern Utah suggested less-frequent fires due to attempted fire exclusion favor more shade tolerant species such as Engelmann spruce and subalpine fir, allowing them to eventually overtop the shade intolerant lodgepole pine. Historically, more frequent fires in the early settlement period, 1860 to 1906, favored the establishment of lodgepole pine and aspen stands, but the recent reduction in fire, both spatially and temporally, favors more fire intolerant species (Wadleigh and Jenkins 1996). Low-intensity fires would have reduced both downed woody and ladder fuels in the lodgepole pine type. However, with the lack of disturbance from fire, the fire hazard is increasing, as the fuel structure develops to include ladder fuels. In the absence of large, stand-replacing fire, dwarf mistletoe infection will increase (Kipfmueller and Baker 1998).

Mixed Conifer This cover type typically includes a mix of coniferous species (Engelmann spruce, blue spruce, subalpine fir, white fir, Douglas-fir, ponderosa pine, lodgepole pine, limber pine, aspen, and occasionally bristlecone pine). The mix is variable depending on site, elevation, and geographic location. Stands are dominated by two or more of the coniferous species. Aspen is a component of many mixed conifer stands, however, it is not presently the principal species in this type. This type may contain as many as seven tree species or as few as two or three.

The historic role of fire in the mixed conifer zone is variable due to the wide range of vegetative and environmental conditions in which it occurs. In the ponderosa pine/Douglas-fir type, frequent (10 to 25 years) fires of low or moderate intensity favored the development of mostly pure pine stands. Longer fire free intervals (50+ years) favored Douglas-fir, which formed multistoried stands. Fires in ponderosa pine remained low in severity, thinning saplings and seedlings, reducing smaller woody fuels, and consuming shrubs and herbaceous vegetation. Where Douglas-fir regeneration became dense under a canopy of ponderosa pine, fire behavior was more variable. Low- to moderate-severity fires crept through the duff and acted as a thinning agent. Under more severe dry, windy conditions, fire may have reached the overstory crowns through the understory ladder fuels and killed all or part of the pine stand. On dry sites where Douglas-fir was both the dominant and associated species, scattered stands generally sustained low-severity thinning fires, and only in dry, windy weather could fire be driven through the crowns.

Stands dominated by Douglas-fir and white fir are included in the definition of mixed conifer. Fire histories for moist or cool Douglas-fir types in Utah are lacking. Douglas-fir in the Uinta Mountains have multiple fire scars and stands contain scattered charcoal, indicating fire has occurred at relatively frequent intervals in the past. In the Douglas-fir/aspen/lodgepole pine type, the fire regime was probably variable. Topography, weather, stand structure, and fuel loading all contributed to different patterns of fire intensity and frequency. A range of fire behavior, from light surface to stand replacement, occurred. As a result, a mosaic of fire intensities probably existed across the historical landscape. Stands were thinned or replaced, and species relationships were altered. Low intensity fires (15 to 50 years) favored Douglas-fir because mature trees are fairly fire resistant, and the relatively shade-tolerant seedlings were able to establish in moderate amounts of residual duff. Stand-replacement fires (50+ years) favored lodgepole pine or aspen on sites where seeds or suckering roots were available.

Little is known about the presettlement fire history in Utah white fir or spruce stands. Proximity, similar precipitation patterns, and lightning frequencies suggest that southern Utah white fir and blue spruce forests are comparable to the mixed conifer type in Colorado, Arizona, and New Mexico. The presettlement fire interval was probably relatively short (approximately 10 to 20 years). Tree species that require open stands and mineral soil for regeneration (ponderosa pine and Douglas-fir) are commonly found in white fir stands. White fir has low fire resistance as a young tree because of its relatively thin bark and low branching habit. Its resistance increases as its bark thickens with age. Fire carried by shrubby undergrowth, such as Gambel oak and common juniper, can torch out understory conifer trees. More fire-resistant species, such as ponderosa pine or Douglas-fir, were favored by frequent fires of low- to moderate-severity. White fir is favored and becomes dominant where fire is excluded.

Engelmann spruce/subalpine fir types have increased in mid elevational zones where fire exclusion allowed these species to dominate areas that were historically composed mainly of aspen or lodgepole pine. Fire return intervals of 40 to 60 years in these areas would tend to burn both the aspen and conifers that had become established since the last disturbance. Because of aspen's ability to regenerate quickly through vegetative suckering, it would be more likely than spruce or fir to be the dominant species following a fire. In areas where lodgepole pine is present and fire return intervals are somewhat longer, lodgepole pine is likely to dominate early stand development. Fire exclusion has allowed many of these stands to move toward spruce/fir forests. At somewhat higher elevations, insect outbreaks, mixed severity fires or fires that produced relatively small openings in the canopy would tend to create a mosaic of aspen patches and spruce/fir stands. Spruce and fir are very susceptible to fire and even smoldering ground fires could create openings in a spruce/fir dominated canopy. Depending on the time between large, stand replacing fires, this could create a mosaic that included 200+ year old spruce and much younger aspen stands. Spruce and fir are also encroaching on some meadows that were historically maintained by periodic fires.

The highest elevations of the spruce/fir type have very long fire return intervals and these ecosystems have not been adversely affected by fire exclusion. These ecosystems are discussed with the "Other" types that are considered properly functioning.

Blue spruce is a component of the mixed conifer type type, found primarily in riparian and lowland areas. Some of the most extensive areas of blue spruce are on the Dixie National Forest.

Fire exclusion, past timber management practices, and plant succession have impacted the mixed conifer zone. Logging operations over the last 100 years altered stand composition. Ponderosa pine

and Douglas-fir were selectively removed, leaving behind fire-sensitive species, such as white fir and subalpine fir. These stands are now dense and even-aged. Stands that were once adapted to low- to moderate-intensity fires are no longer adapted to a frequent fire regime. These stands are predisposed to burning as stand-replacing fires because of the presence of ladder fuels and the accumulation of down woody material below the overstory. Stand replacement fires, outside the historical range of intensity, and severity are likely. Where aspen is a component, the health and vigor of aspen clones are declining and may not, in some cases, respond to disturbance. Ponderosa pine requires bare mineral soil for seed germination and is unable to regenerate under a dense overstory of white fir.

Ponderosa Pine The ponderosa pine forest generally occupies warm, dry sites where ponderosa pine is the dominant or the co-dominant. In northern Utah, these habitats are mostly restricted to the southern and eastern Uinta Mountains. In southern Utah, this type is found between Gambel oak, sagebrush, or pinyon/juniper at lower elevations and mixed conifers (Douglas-fir and white fir) at higher elevations.

Historically, frequent low-severity fires probably restricted the accumulation of large down woody fuels. Fine fuels (grasses and needles) were the medium through which historical fires spread since most large fuels (limbs and trunks) would have been consumed by the frequent fires. Low intensity fires must have been common, and severe fires rare, because of the low fuel accumulations. Fires thinned stands and helped maintain an open park-like forest, with an understory of grasses, forbs and shrubs. Fire exposed mineral soil and reduced competing vegetation. Nutrients contained in woody debris, litter and duff were released by burning. This process helped to maintain forest health in these relatively dry stands, where decay takes place slowly. Periodic fires created uneven-aged stands comprised of various even-aged groups. Stands of old, large trees had low numbers of trees per acre.

In presettlement times, fire probably occurred with high frequency. Fire frequencies of 4 to 7 years have been estimated in Bryce Canyon National Park (Buchanan and Tolman 1983). Stein (1988) reported fire intervals of 15 and 18 years on the Paunsaugunt Plateau. Ogle (1997) found fires burned every 2 to 21 years on Elk Ridge in the Abajo Mountains. Researchers have studied similar ponderosa pine sites outside of Utah and found fires burned every 5 to 25 years (Arno et al. 1995; Fule et al. 1997; Harrington 1985).

The absence of fire has allowed much of this cover type to convert to a much higher proportion of shade-tolerant species (Douglas-fir and white fir). These stands are in the mid- to mature-age classes, are overly dense (compared to historical conditions), and are susceptible to insect and disease epidemics (Fule et al. 1997). Associated species, such as aspen, are often poorly represented. Historical grazing practices contributed, along with fire exclusion, to create stand conditions that were rare or nonexistent prior to settlement.

Pinyon/Juniper The pinyon/juniper type occupies the mountain foothills and plateaus of Utah. Pinyon, or two-needle pinyon, dominates in the central and eastern region. Singleleaf pinyon, a typical Great Basin species, is the dominant pinyon species in the Pine Valley and Bull Mountains. Occurring alone or as a codominant with both pinyons is Utah juniper. Pinyon/juniper woodlands commonly lie immediately below the montane forest zone. Douglas-fir, limber pine, or lodgepole stands may also be found adjacent to woodlands. Along the Wasatch Front, and in some southern mountains, pinyon/juniper woodlands are bordered at their upper limit by mountain shrub communities that replace the usual ponderosa pine belt. In mountains adjacent to desert, like the Abajo Mountains, grasslands may form a zone above the pygmy conifer woodlands where hot, desiccating winds prevent the establishment of

trees. At their lower boundaries, pinyon/juniper woodlands most often grade into shrublands or grasslands. Sagebrush communities are particularly common.

Fire opened stands, increased diversity and productivity in understory species, and created a mosaic of stands of different sizes and ages across the landscape. It also maintained the boundary between woodlands and adjacent shrub or grasslands. In the presettlement era, fire was a relatively common event. Specific fire history studies are few, but some estimates are available. Leopold (1924) suggested that fire occurred at intervals of 10 to 30 years in Arizona. Evidence of past fire was common in climax western juniper stands of southwestern Idaho. Burkhardt and Tisdale (1976) determined the fire interval in these stands ranged from 8 to 23 years. Relict woodlands, tree-age class distribution, and fire scars indicate presettlement stands were usually open, savannah-like or confined to rocky sites or ridges. As long as fire was a part of the ecosystem, fire sensitive pinyon/juniper was limited to habitats that offered partial protection from fire, such as rock outcrops.

Grazing has also interacted with fire and climate to shape the woodlands. Livestock have grazed pinyon/juniper stands for over 100 years. Grazing encourages the spread of exotic species, such as cheatgrass, and sites with a good growth of cheatgrass are at higher risk for large fires. Grazing has reduced herbaceous cover on many sites. Fire occurrence and extent has been severely limited by the removal of the fine fuels. This and past fire suppression policies have contributed to the current pattern of juniper and pinyon encroachment into formerly treeless areas. It has been estimated that up to 50 percent of the area now occupied by pinyon/juniper stands is of relatively recent origin, the oldest trees being 125 years old (Tausch et al. 1981). Moreover, these areas are dominated by a continuous closed canopy of pinyon/juniper that extends over thousands of acres. This large, homogeneous canopy becomes a fire hazard under extremely dry, windy conditions.

Mountain Shrub With slightly higher moisture regimes than sagebrush (USDA Forest Service 1997), this community is found intermingled with sagebrush at mid elevations and conifer/aspen at higher elevations. Mountain shrub communities are composed of several species including: mountain snowberry, currant, serviceberry, chokecherry, elderberry, Woods rose, bigtooth maple, Rocky Mountain maple, sagebrush, curlleaf and birch leaf mountain-mahogany, and occasionally Gambel oak. Many species in this fire-adapted ecosystem resprout following fire.

The effect of fire on these species is known (Bradley et al. 1992); however, fire history for this community is lacking. Although mountain shrub sites are productive and frequently have large amounts of live and woody fuels, moist conditions generally inhibit fire spread. Historically, fires probably spread from adjacent communities during dry years. USDA Forest Service (1997) estimates mixed-severity fires burned the community every 20 to 70 years prior to settlement. Arno and Wilson (1986) reported that fires burned every 13 to 22 years in curlleaf communities until the early 1900's along the Salmon River in Idaho. Schultz (1987) found large curlleaf mountain-mahogany up to 1,350 years old in western Nevada, indicating that severe fire has been infrequent in some communities. Schultz (1987) reported fire scars on large, old curlleaf mountain-mahogany in central Nevada that suggested understory fuels were insufficient to carry severe fire. Some old mountain-mahogany avoid fire by growing on extremely rocky sites.

Since the turn of the century, fire exclusion and overgrazing by ungulates has been shrinking the range of mountain shrub. Fires would have historically prevented or slowed the spread of pinyon/juniper and sagebrush into the mountain shrub community, but attempted fire exclusion have allowed for their

encroachment.

Gambel Oak Gambel oak is abundant in the mountains of central Utah, and with the exception of the Uinta Basin, is found east of these mountains throughout the State. It is found in the western part of Utah only in the extreme southwestern corner in Iron and Washington counties. It reaches into northern Utah in the northern-most extension of its range, being found at the southern boundaries of Cache and Rich counties. It ranges from 4,000 to 10,000 feet in elevation (Christensen 1949). Regional and ecological differences occur within this cover type. Oak grows in association with ponderosa pine in southern Utah (Kunzler et al. 1981) and maple in central Utah (Eastmond and Christensen 1968).

Fire history studies for Gambel oak are lacking. A fire frequency analysis in northern Utah in a largely urban interface zone had a combined (lightning plus person-caused ignitions) fire frequency of seven fires per year in a 25,600 acre area, with an average 56 acres burned per year. All recent large fires occurred in areas near population centers, and several burned in overlapping areas. The present regime of frequently repeated fires in these high hazard areas decreased diversity by favoring plants that thrive on frequent disturbance such as cheatgrass (Wadleigh et al. 1998). USDA Forest Service (1997) estimates oak burned historically every 20 to 50 years as mixed-severity fires.

The range of oak is estimated to be greater today than it was historically (Brown 1958; Christensen 1949; Christensen 1957). Christensen (1949, 1957) found Gambel oak has increased on benchlands and lower slopes of some mountains in central and northern Utah. Oak has not extended its range geographically but individual clumps have increased in size and the clumps are spreading downhill. Fire exclusion and livestock grazing may be responsible for the expansion of oak on benchlands and lower slopes. Despite the lack of fire, stand structures and conditions are sustainable and viable statewide (USDA Forest Service 1997).

Sagebrush/Grass/Forb This ecosystem is located along a wide variety of elevational gradients and is composed of several species of sagebrush.

Basin big sagebrush is found in deep, well-drained soils in valley bottoms or lower foothill areas. Because it tends to grow in deep, fertile soils, basin big sagebrush is an indicator of productive sites. Seedling establishment may begin immediately following a disturbance, but it usually takes a decade or more before basin big sagebrush dominates the site.

Wyoming big sagebrush grows in dry, gravelly soils; frequently a carbonate layer is present at 12 to 18 inches from the surface. Seedling establishment may begin immediately following a disturbance, but it usually takes a decade or more before it dominates a site. Among the subspecies of big sagebrush, Wyoming big sagebrush is the best adapted to poor site conditions. Its extensive root system spreads farther laterally than do those of the other subspecies, allowing it to establish and grow in shallow soils.

Mountain big sagebrush is found on foothills and mountain slopes at the upper elevational range (5,500 to 10,000 feet) of big sagebrush. Sites are characterized by deep, well-drained, slightly alkaline, rocky soils. Soil moisture is available most of the summer; snow cover is present in winter. Seed germination has a tendency to be stimulated by heat treatment.

Mountain silver sagebrush is typically associated with riparian zones within nonforested, mountainous communities at elevations above 6,900 feet. Sites include streamsides, meadow margins, seeps,

depressions, and wet mountain slopes. These areas are characterized by seasonally high soil moisture conditions and are often associated with areas of heavy, lingering snowpack. Although generally well-drained, soils become saturated in the spring and early summer (Hironaka et al. 1983), and standing water occasionally accumulates for short intervals (Dealy et al. 1981). This species usually occupies deep soils that are derived from limestone (Shultz 1986). Throughout much of its range, mountain silver sagebrush occurs as stringers along the edges of stream courses, moist meadows, and ponds.

The historic role of fire prevented sagebrush from completely dominating these sites. Grass and forb species associated with each of these communities are adapted to periodic burning and depended on fire to maintain a sparse sagebrush overstory. Sagebrush aggressively competes with the herbaceous understory for moisture and is capable of taking over a site in the absence of fire. Both basin and mountain big sagebrush ecosystems burned approximately every 20 years. Wyoming big and mountain silver sagebrush communities burned approximately every 40 years (Al Winward per. comm.).

On many rangelands, introduction of exotic plants, exclusion of fire, and traditional livestock management has resulted in more frequent disturbances, substantially changing the succession/disturbance regime associated with historical patterns. These changes can affect long-term productivity and increase the likelihood of disturbances perceived as catastrophic (USDA Forest Service 1996). Overgrazed sites with sparse herbaceous understories are prone to invasion by exotic annuals. If cheatgrass dominates the interspaces, the fire regime may be altered to one where fire burns more frequently (every 2 years). This new regime would favor cheatgrass at the expense of sagebrush. Sagebrush is not adapted to this fire interval. Generally, sagebrush isn't capable of achieving preburn levels before the next fire would occur. Over time this frequent fire regime, encouraged by the fine fuel of cheatgrass, would cause sagebrush and its associated herbaceous species to disappear from the site.

Other (alpine, high elevation spruce/fir, tall forb, desertscrub, and riparian) Properly functioning condition assessments indicated these cover types are not dependent on the presence of fire to maintain them in a properly functioning condition. The role of fire in the ecology of these ecosystems has been minimal, and it is assumed these ecosystems are within their historic range of variation, pertaining to fire as a disturbance process. Appendix A.8 contains more information on these cover types.

3.1.2 ENVIRONMENTAL CONSEQUENCES

Introduction

The following discussion will emphasize primarily the effects to fire-adapted vegetation instead of all the major cover types. Fire-adapted vegetation types include: aspen, lodgepole pine, mixed conifer, ponderosa pine, pinyon/juniper, mountain shrub, Gambel oak, and sagebrush/grass/forb.

Effects Common To All Alternatives (A, B, C,)

All six plans contain management direction that directs the forests to provide structurally diverse and productive forest and rangelands. The predicted changes to the ecosystem from implementing any of the alternatives would be consistent with this direction because all alternatives would move all vegetation types toward a properly functioning condition. By definition, properly functioning ecosystems are the result of maintaining sustainable, productive, and diverse forest and rangelands.

In the next 3-4 years, no measurable changes to vegetation structure and composition are expected in any of the major cover types. Prescribed burning and wildland fire use are not expected to burn across large acreages in the short term to make a noticeable difference across the state. The current condition of each cover type was created by past management practices over the last 100 to 150 years and these changes to structure and composition cannot be reversed in the next 3-4 years. However, over the next 50 to 100 years, monitoring is expected to show changes in structure and composition of each cover type as the result of using wildland and prescribed fire across the landscape.

Several ecosystems in Utah are not dependent on the presence of fire to maintain sustainability over time. The effects to these ecosystems are not expected to vary by alternative. They are expected to remain in a properly functioning condition (relative to fire's role in sustaining these systems) for all alternatives. They include: alpine, high elevation spruce/fir, tall forb, desertscrub, and riparian.

Effects Common To All Action Alternatives (B,C)

Major Cover Types The increased use of fire is expected to break up large homogeneous patches of forest and rangelands. This is expected to slowly move these homogeneous patches towards a fine-grained (many small patches per unit area) landscape that is more resistant and resilient to fire and other disturbances, in both size and intensity. The expected increase in heterogeneity would result in an increase in biodiversity at the landscape scale. This trend is expected to move these ecosystems toward the goal of being in a properly functioning condition. Specific changes to the major cover types are described below. These changes are expected to result from the long-term use of prescribed and wildland fire use.

Aspen The increased presence of fire would remove competing conifers and return decadent aspen stands to a healthier, more vigorous condition. Moreover, burning would increase the diversity and productivity of the understory and reduce the amount of water loss attributed to conifer encroachment (Bartos and Campbell 1998a). Removal of the fire-sensitive conifer species would make this ecosystem more resistant and resilient to disturbance. Aspen stands overtopped by conifer species burn with higher intensities than they did historically. This could result in fewer aspen sprouts and higher amounts of soil organic matter being consumed by fire. If aspen stands are treated with fire before conifers overtop the aspen, aspen clones would be less likely to be damaged by the intense heat. On a landscape scale, fire would create a mosaic pattern of aspen stands interspersed with conifer. This pattern would create natural fuel breaks that assist in the control of unwanted wildland fires, prescribed fires and wildland fire use because pure aspen stands tend to be wetter and burn with less intensity than neighboring conifer sites.

Lodgepole Pine Fire would convert these communities from shade-tolerant species (spruce and fir) back to lodgepole pine. The elimination of the fire-sensitive spruce and fir species would make the lodgepole ecosystem more resistant and resilient to disturbance. Removal of the dense understory would reduce the potential for uncharacteristic (in size, intensity, and severity) stand-replacing fires by removing potential ladder fuels that could carry fire into the crowns during extreme burning conditions. Fire would also reduce the accumulation of woody fuels that, when burned, can cause soil damage in dry conditions. Large, stand-replacing fires are expected to reduce the number of stand infected with dwarf mistletoe.

Mixed Conifer Fire would remove the shade-tolerant species (Douglas-fir, white fir, subalpine fir, Engel-

mann spruce, and blue spruce) and increase the amount of aspen, ponderosa pine, and lodgepole pine. The reduction of the fire-sensitive fir species would make this ecosystem more resistant and resilient to disturbance. Removal of the dense fir understory would reduce the potential for uncharacteristic stand-replacing fires by removing potential ladder fuels that could carry fire into the crowns during extreme burning conditions. Mixed severity fires would maintain the diversity, which would be less prone to epidemic insect outbreaks. Fire would prepare a bare mineral soil seedbed for ponderosa pine regeneration. Low-intensity surface fires would reduce the litter and shrub layer around the base of the large old pine trees that could be lethal to the overstory under extreme burning conditions. Reduction of the litter layer and the removal of seedlings and saplings would increase the productivity of the herbaceous understory species. Where aspen or lodgepole pine are a component of mixed conifer stands, fire would restore these species with a corresponding reduction in spruce/fir component.

Ponderosa Pine Fire would remove the shade-tolerant species (Douglas-fir and white fir) and thin out the ponderosa pine understory that are crowding out the pine overstory. The elimination of the fire-sensitive fir species would make this ecosystem more resistant and resilient to disturbance. Removal of the dense understory would reduce the fire hazard by removing potential ladder fuels that could carry fire into the crowns during extreme burning conditions. Low-intensity surface fires would reduce the litter and shrub layer around the base of the large old trees that could be lethal to the overstory under extreme burning conditions. Reduction of the litter layer and the removal of seedlings and saplings would increase the productivity of the herbaceous understory species.

Pinyon/Juniper Fire would open up the tree canopies and reduce the competition for water and sunlight with any remaining understory species. This would increase the productivity and diversity of the understory. This would also create a mosaic pattern of age classes of pinyon/juniper across the landscape by breaking up the vast expanses of homogeneous stands. Fire would remove pinyon/juniper from adjacent ecosystems (sagebrush/grass/forb, and mountain shrub) it has invaded and keep it contained on rocky, barren sites it occupied historically.

Mountain Shrub Fire would remove encroaching pinyon/juniper and convert decadent shrub stands to a healthier condition by replacing them with younger, more vigorous plants. In curlleaf communities, fire would remove the old, decadent plants and prepare a seedbed to assist in regeneration.

Sagebrush/Grass/Forb Fire would remove the encroaching pinyon/juniper stands and create a mosaic of age classes in the dense, decadent stands of sagebrush. Opening up the sagebrush canopy would reduce the competition for light and moisture with the herbaceous understory. This could increase the productivity and diversity of the herbaceous understory.

Alternative A Effects

Wildland fire use would be available for only a small portion of the national forest lands and the prescribed fire program would continue but would only allow small areas (100's of acres) to be treated at a time. Slower movement towards properly functioning condition is likely, with some areas moving away from properly functioning condition because wildland fire use is not authorized across the six national forests.

Aspen If current trends continue, it is likely that aspen will continue to convert to dominance by coniferous species (Bartos and Campbell 1998; Ogle and DuMond 1997). The ability of aspen to recolonize

these sites may be limited or lost by long-term site dominance by conifers. This could affect the resiliency of these areas to disturbance because aspen clones may continue to lose their ability to sprout or are unable to produce enough sprouts to sustain the clone following fire. Aspen could continue to be replaced on some stable sites by sagebrush (Bartos and Campbell 1998).

Lodgepole Pine Shade-tolerant species, such as spruce and subalpine fir, will continue to overtop lodgepole if current trends continue. Fire hazard will continue to increase as ladder fuels and down woody fuels accumulate. Stand replacement fires outside the historical range of intensity and severity are likely due to the build up of these fuels. Dwarf mistletoe infection centers will increase in size in the absence of stand-replacing fires**.**

Mixed Conifer Currently the typical stand structure and composition is multilayered; comprised largely of true firs and dominated by mature and overmature age/size classes. Given recent conditions and trends, shade-tolerant fir species may continue to replace ponderosa pine. Stand replacement fires in mixed conifer forests, outside the historical range of intensity, and severity are likely because of the continued growth of ladder fuels and accumulation of heavy fuels (Bradley et al. 1992). Where aspen is a component, the health and vigor of aspen clones are expected to decline and may not, in some cases, respond to disturbance. White fir is expected to continue to increase in density due to the lack of frequent, low-intensity fire and timber harvest, setting the stage for future insect outbreaks (USDA Forest Service 1997). Subalpine fir and spruce will increase as a component of stands containing aspen or lodgepole pine. In some areas, the aspen or lodgepole pine could be greatly reduced (or eliminated) and not able to re-establish following a major disturbance. Over time, insects and diseases in these conifers may increase fuel levels to a point where fires that do occur, would likely burn outside the historic range of variability regarding the aerial extent of burn.

Ponderosa Pine Given current conditions and trends, this ecosystem would continue to convert, in some areas, to Douglas-fir or white fir. Stands would continue to increase in density, creating homogeneous, even-aged conditions that were rare or nonexistent prior to settlement. The continued growth of ladder fuels and accumulation of heavy fuels would lead to uncharacteristically large, intense unwanted wildland fires (Bradley et al. 1992; Covington and Moore 1992; USDA Forest Service 1997). Where aspen is a component, the health and vigor of aspen clones are expected to decline and may not, in some cases, respond to disturbance.

Pinyon/Juniper The vegetation in this community will continue to spread and create large, homogeneous stands of pinyon/juniper. This condition would lead to uncharacteristically large, intense unwanted wildland fires and invasion by exotic annuals following fire (USDA Forest Service 1997). The increase in tree density has and would continue to cause a decrease or complete loss of the understory and a reduction in biodiversity.

Mountain Shrub Many mountain shrub communities have and would continue to convert to pinyon/juniper. This is expected to increase the potential for uncharacteristically large, intense unwanted wildland fires in areas where pinyon/juniper has invaded and a gradual decline in health. Some populations would continue to become decadent without fire to rejuvenate this fire-dependent ecosystem (USDA Forest Service 1997). This trend could impact the resiliency of these communities to disturbance because uncharacteristically intense fires could kill many species that would typically sprout after fire.

Gambel Oak As the present trend continues, those areas with high fire frequencies, and those with

small burned acreages will probably become more uniform. With a decrease in diversity, recovery will be much slower when disturbances occur (Wadleigh et al. 1998). Prescribed fire would be used to open up stands and create mosaics of age classes. Stand structures and conditions are expected to remain sustainable and viable statewide (USDA Forest Service 1997).

Sagebrush/Grass/Forb Given current conditions and trends, the native herbaceous understory would continue to convert to exotic annuals and pinyon/juniper would continue to invade this ecosystem (USDA Forest Service 1997). In areas where pinyon/juniper has not invaded, sagebrush stands would continue to increase in age and density, creating homogeneous, even-aged stands. Biodiversity would continue to decrease as the herbaceous understory vanishes.

Alternative B Effects

This alternative is expected to increase the number of acres restored or maintained with fire beyond what could be treated using only prescribed fire. The availability of natural ignitions as a tool (outside of sensitive watersheds and timber emphasis areas) and an increase in the size (1000's of acres) of a typical prescribed fire is expected to change more vegetation across each forest to a sustainable, properly functioning condition in a shorter period of time compared to alternative A.

Alternative C Effects

The effects of fire on vegetation composition and structure would be similar to those described in Alternative B. The only difference is a small portion**,** located in timber emphasis areas (675,000 acres) and sensitive watersheds (315,000 acres), would be exempt from wildland fire use. Forests would have one less tool available to maintain or restore the sustainability of these ecosystems in these management areas. Prescribed fire would still be permitted, however. The risk of uncharacteristic fires would be greater in timber emphasis areas and sensitive watersheds that have not been treated with prescribed fire because prescribed fire would not keep pace with vegetative growth. If unwanted wildland fires occur in timber emphasis areas or sensitive watersheds, they would burn more intensely if wildland fire use and prescribed fire have not been used. Without fire, these areas would experience a build-up of down woody fuels and stand densities would increase. If enough of these areas were burned using prescribed fire, fire disturbance would keep up with growth and fuel loading and these conditions might not exist.

Timber emphasis areas are composed of: spruce/fir, aspen, lodgepole pine, mixed conifer, and ponderosa pine. Sensitive watersheds are composed of: aspen, mixed conifer, oak, mountain shrub, pinyon/juniper, sagebrush and several nonfire-adapted communities. No measurable impact is expected in the nonfire-adapted communities (alpine, high elevation spruce/fir, tall forb, desertscrub, riparian communities).

3.2 EXOTIC PLANT SPECIES

Legal and Administrative Framework

Section 302(b) of the *Federal Land Policy and Management Act of 1976* gives direction to take action to prevent unnecessary or undue degradation of public lands (43 U. S. C. 1732). Mandates and direction for control of plants listed as noxious weeds is included in the *Federal Noxious Weed Act of 1974* (7 U.

S. C. 2801) and *National Forest Management Act of 1976* (36 CFR Part 219.27 a. 3.), the *1999 Invasive Species Executive Order*, and Forest Service Manual (FSM 2080).

3.2.1 AFFECTED ENVIRONMENT

Exotic species are those plants not native to Utah and especially those that have been introduced from Europe, Asia, and other parts of the Old World. The effective exotic species, one that can compete successfully with desirable vegetation, is generally both aggressive and lacks specialization so that it can rapidly occupy varied climatic, environmental, and soil conditions. The greater the ability of the plant to survive drought, length of day and growing season, summer heat and winter cold, produce and disperse seed, have early season germination, and the ability to produce deep or abundant root systems, the more successfully it competes with other vegetation.

Currently, the majority of western rangeland is relatively intact native ecosystems and is uninfested by exotic species or noxious weeds. However, exotic rangeland weeds are spreading rapidly. Therefore, a critical objective of any fire management program must be to prevent exotic species invasion. Many exotic species are aggressively competitive and have shown ecological potential to invade into and increase in many native plant communities where they often replace and/or displace native plants in a wide range of habitat types and climate zones.

There are as many as 682 introduced plant species in Utah (Welch and others 1993). Many of these are not highly invasive. Some of the more notable highly invasive introduced species include cheatgrass (*Bromus tectorum*) and halogeton (*Halogeton glomeratus*) which have probably spread to all (or nearly all) suitable habitats in the State. Also all of the 21 species included on noxious weed lists of Utah counties and the State are introduced from Europe or Asia. These include leafy spurge (*Euphorbia esula*) , dyers woad (*Isatis tinctoria*), musk thistle (*Carduus nutans*) , and knapweeds (*Centaurea* spp.).

These invasive, introduced plants are spread by any agent which moves seeds including wind, water, animals, and vehicles. Initial establishment of these plants is greatly facilitated by ground disturbance which reduces native, residual plant competition and provides an optimal location for seed germination and exotic plant establishment. Vulnerable areas include roadsides, abandoned fields, urban development, and fire-burned lands. All ecosystems—urban, suburban, and rural, including wildlands, rangelands, forests, riparian areas, and wetlands—are vulnerable to invasion (USDA, 1998).

Recently burned areas are moderately to highly vulnerable to invasion of unwanted introduced species. Some of these highly invasive species are capable of forming dense patches or dominating large areas where they often reduce diversity of plants and production of desired vegetation. Exotic species have developed many characteristics, such as rapid growth rates, heavy seed production, and extended growing periods, which provide an advantage over native plants in occupying disturbed soil.

Risk of spread and dominance of invasive introduced species is related to elevation and plant communities. Although the number of introduced species capable of dominating low precipitation and low elevation sites is comparatively low, some of these, such as halogeton, have spread across these areas.

The highest risk for increase and dominance of cheatgrass has been in the Wyoming big sagebrush and pinyon/juniper communities. This plant has also moved into and dominated some of the desert shrub communities and is also abundant in oak and mountain shrub communities. The ability of this

plant to increase, dominate, and reduce diversity has been well demonstrated over many thousands of acres in Utah and elsewhere in the West. Without a healthy understory of perennial grasses and forbs, annuals such as cheatgrass tend to gain dominance *(Pechanec and Stewart, 1954)*. If cheatgrass is present in the understory, fire increases its spread, density, and cover *(Michael H. Ralphs, et al, 1976)*.

The highest risk for a variety of invasive exotic species appears to be in pinyon/juniper woodlands. With crown closure of pinyon/juniper in mature and old pinyon/juniper stands, understory species have been depleted. Where persistence of dense stands of mature and old pinyon/juniper has exceeded the life of seed banks of native understory species, these communities have been left with very low resistance to invasion of exotic species following fire or other disturbance.

In addition to the pinyon/juniper woodland, the oak, and warmer mountain shrub and montane sage-brush communities, have been highly influenced by invasive introduced species.

In higher elevation forests of ponderosa pine, aspen, Douglas-fir, and lodgepole pine, fewer exotic species have demonstrated the ability to replace or displace native vegetation. With increasing elevation into the spruce/fir forest, even fewer introduced species have demonstrated their ability to spread. As of yet, introduced species are unable to occupy alpine habitats.

Aggressive invasive introduced species have the potential to replace and displace native vegetation for a long term. For example, cheatgrass can perpetuate a fire regime of higher than normal fire frequency that tends to exclude native vegetation not adapted to the new fire regime. This results in a loss of plant species diversity, and reduced production of desired forage plants for wildlife and livestock. Structural diversity of plant communities, which is important to habitat for a number of wildlife species, is also greatly reduced where large stands of invasive introduced plants have displaced or replaced native vegetation.

3.2.2 ENVIRONMENTAL CONSEQUENCES

Effects Common to All Alternatives (Alternatives A, B, C)

As it has in the past, fire will continue to act as a disturbance factor in the vegetal development of most plant communities. All plants are affected to some extent by fire. Some are very tolerant and will resprout. Others are very sensitive and will be killed, or severely damaged. Some are stimulated by fire and may present additional management problems. The extent of damage or benefit of fire varies with the plant species and the intensity of the fire. Fire and its associated disturbance, creates the potential for invasion, spread, and subsequent dominance by exotic plants.

Changes to biological communities caused by exotic plant invasions resulting from unwanted, un-planned wildland fire are likely to be permanent. Infested plant communities are likely to never return naturally to their pre-invasion composition.

When fire is used as a vegetation manipulation technique in land management, the manager is using secondary succession to change vegetative communities to meet specific objectives. Since a competi-tive residual cover of native grasses is a primary deterrent to invasion by undesirable exotics (Roger Sheley et al, 1996), the effect of fire on influencing conditions favorable to invasive, exotic species (contrary to desired secondary succession) depends on pre-fire grass species productivity, density, and

cover; grass species resistance to fire and recovery after burning; the amount of bare ground created by fire disturbance; and the presence or proximity to populations of exotic species which would seriously reduce or prevent seedling establishment of perennial grasses.

Fire intensity, frequency, and season also affect the ability of grass species to resist serious harm from fire. In the Intermountain West, if a plant community is depleted of perennial grass cover, secondary succession is likely to go cheatgrass within 5 years (*Piemeisel, 1951; Pechanec and Stewart, 1954; Wright and Klemmedson 1965; Young et al, 1987; Mack, 1981*).

Exotic plant species and noxious weeds pose an increasing threat to native ecosystems, wildlife populations, endangered species, watershed function, and human activity on National Forest System lands throughout Utah. Fire, as a disturbance regime, increases the potential invasion by exotic plants. Most weeds initially invade into disturbed areas. A plant community that has been burned by fire will typically have less plant cover and more bare ground. This disturbance offers more sites for initial weed establishment and remaining vegetation that is less competitive, and therefore more likely to be out-competed by more aggressive exotics.

Fire may not only create the type of disturbance that promotes the colonization of many exotic species, but it also does not effectively control most existing exotic plants. Low intensity fires, particularly, are not hot enough to prevent resprouting from crowns or reestablishment from viable seeds in the soil. Some exotic species are stimulated by fire.

The time frame in which detectable invasion by exotic species can be observed after a fire disturbance is dependent on the precipitation zone, plant community, and vulnerability of the site. In higher precipitation areas (where more than 12 inches of precipitation per year is common), upland plant communities probably would not experience changes in ecological condition (remain in properly functioning condition). In drier, more arid areas (where less than 10 inches of precipitation per year is common), a reduction in ecological condition and complete conversion to exotic species, such as cheatgrass, would be likely within the first few years after a fire. Within these drier sites, there is a risk that the goal of moving toward Properly Functioning Condition (PFC) through the use of wildland fire cannot be achieved without additional, costly revegetation efforts. Unlike arid areas, invasions from exotic species in more moist upland areas are less likely because water usually is available for competitive native plant growth during the entire growing season.

The greatest risk for invasion, spread, and dominance by exotic invasive plants is expected to occur in the Wyoming big sagebrush, pinyon/juniper, oak, and mountain shrub communities. Within these communities, cheatgrass and other introduced plants have demonstrated their potential to dominate, drive plant community dynamics, and alter fire regimes (Evans and Young 1978; Billings 1994; Peters and Bunting 1994). Although they can be expected to spread following fire at higher elevations, their ability to dominate and change overall function of native vegetation is expected to be less. Higher elevation alpine sites are expected to resist the invasion and spread of exotic plants because 1) available niches are occupied by natives which capture a large proportion of the resources in the system, 2) the alpine community is a more healthy and stable weed-resistant community, 3) there is a lack of ground disturbance which would allow invasion—fire disturbance at these elevations and in these climatic conditions is limited in number and extent, and 4) moisture regimes and climatic conditions are less adaptable to exotic species.

On some soil types, there is a risk that burning by fire will effectively remove the optimal vegetation that the site is capable of producing. These sites may or may not be properly functioning. However, burning may degrade the site so that its climax state is altered to a less desirable condition, supporting less competitive vegetation that is vulnerable to dominance by exotic species.

Successful invasive species management requires a strategy that 1) controls invading weed species, and 2) minimizes potential for weed invasion *(Larson et. al., 1997)*. The following provisions will assure that well planned, implemented, and mitigated prescribed fires are expected to have lower vulnerability to invasion by exotic plants than unwanted wildland fires.

Examples of measures which could be implemented to prevent the invasion and spread of exotic plant species include 1) focusing on sites with an understory of residual grasses and the highest potential productivity—released, suppressed grasses have the greatest chance of competing with invasive species and re-establishing dominance on these sites, 2) not burning communities that have established exotic plants that could be spread by the fire disturbance, 3) not using fire on soil types that have low production capabilities or which currently have optimum ground cover, 4) monitoring and inspecting for early detection of invasion of burned areas that are in close proximity to established infestations, 5) revegetation with desirable, competitive grasses of sites without an understory of desirable species or which are vulnerable to invasion by exotic plants, 6) using fire prescriptions for burn severity/intensity, timing of the fire, and required soil moisture conditions that are not conducive to exotic species, 7) limit soil disturbance caused by fire management activity, and 8) include post-treatment for eradication of any infestations that are detected.

Effects Common to Both Action Alternatives (Alternatives B and C)

Greater emphasis on prescribed fire and wildland fire use could help reduce size and frequency of large unwanted wildland fires in the long-term. Alternative B is expected to minimize the potential for invasion on planned burned areas and at the same time, by effecting a reduction in the size and extent of unplanned wildland fires, it may, at a landscape level, contribute to a reduction in the long-term spread and dominance by exotic species.

Opportunity to plan for and incorporate exotic plant and noxious weed invasion prevention measures in project layout, design, and alternative evaluation can occur within the fire management plan for prescribed fire, wildland fire use, and wildland fire suppression actions. The fire management plan may identify and analyze locations of exotic and noxious weed risk relative to future fire management actions, presence or proximity of exotic species, expected mechanical disturbance response, mitigating measures, etc.

The NEPA analysis conducted for a prescribed fire action provides additional time to assess and disclose potential impacts. Wildland fire use and wildland fire suppression actions do not have additional time for assessment because wildland fire decisions are made rapidly within the context of an emergency situation. Properly planned and executed prescribed fire and appropriately managed wildland fire use and wildland fire suppression is expected to contribute to the return of plant and animal communities to their pre-fire state.

Alternatives B and C are similar because, although more arid sites are most vulnerable to invasion by exotic species, all vegetative communities, including sensitive watersheds and timber emphasis areas

are susceptible to infestation. Alternative C may result in less potential for invasion of exotic species caused by fire disturbance, but the soil disturbances inherent with timber harvesting and with water system maintenance in sensitive watersheds provide a similar potential for invasion of exotic weeds..

Alternative A Effects

The potential for invasion after unwanted wildland fires may increase the long-term spread and dominance by exotic species at a landscape level. As potential for large uncontrollable wildland fires increases the greater potential for invasion, spread, and dominance by exotic species. This is because there is no opportunity to 1) pre-select the treatment site, 2) determine vulnerability and provide mitigation, 3) determine presence of exotics and vulnerability to spread, 4) control the size or extent of the fire, 5) control the intensity of the burn.

3.3 WILDLIFE HABITAT

Legal and Administrative Framework

Several laws and orders are applicable to this action. They include, but may not be limited to:

· *Migratory Bird Treaty Act of July 3, 1918* (P.L. 65-186, Ch. 128, 40 Stat. 755; 16 U.S.C. 703-712) which gives protection to migratory birds with regards to taking, killing, and possessing.

· *Multiple-Use, Sustained-Yield Act of June 12, 1960* (74 Stat. 215, as amended; 16U.S.C. 528-531) recognizes and clarifies Forest Service authority and responsibility to manage wildlife and fish.

· *National Environmental Policy Act of January 1, 1970* (83 Stat. 852 as amended; 42 U.S.C. 4321, 4331-4335, 4341-4347) requires fish and wildlife concerns to be assessed in environmental analysis and environmental impact statements.

· *Forest and Rangeland Renewable Resources Planning Act of 1974*, (88 Stat. 476 as amended; U.S.C. 1601-1614) provides that wildlife and fish be included in the development of the National Resources Assessment and related Forest Service Program.

· *National Forest Management Act of 1976* (90 Stat. 2949; 16 U.S.C. 472a, 476 (note), 500, 513-516, 521b, 528 (note), 576b, 592-594 (note), 1600 (note), 1600-1602, 1604, 1606, 1608-1614) provides for the balanced consideration of all resources in National Forest land management.

· *Bald and Golden Eagle Protection Act of June 8, 1940* (16 U.S.C. 668-668d) provides for the protection of the Bald Eagle (a Federally listed species which has been proposed for delisting) and the Golden Eagle (which is not Federally listed or on the FS Sensitive Species list).

· Departmental Regulation 9500-4, which states U.S. Department of Agriculture policy on wildlife, fish and plant habitat management pertinent to public lands. This regulation states, in part, that, “Habitats for all existing native and desired non-native plants, fish and wildlife species will be managed to maintain at least viable populations of such species. In achieving this objective, habitat must be provided for the number and distribution of reproductive individuals to ensure the continued existence of a species throughout its geographic range.”

3.3.1 AFFECTED ENVIRONMENT

Introduction

In the State of Utah there are approximately 139 species of mammals, 423 species of birds, 54 species of reptiles, 18 species of amphibians and 73 fish species. This section covers the terrestrial species only.

Not all of these species use habitats provided on National Forest System lands. Habitat use by a species is dependent on many factors including elevation, latitude, topography, soils, precipitation, and vegetative structure, composition, patterns and disturbance regimes.

Important internal components of forests in Utah include snags, multiple canopies, and down woody debris (Reynolds and others 1992, Graham and others 1999). In Utah, these components tend to vary across forest types. For example, spruce/fir forests have complex forest structures with multiple canopies and large amounts of down woody debris. Lodgepole pine forests have simple forest structures, single canopies and have small amounts of down woody debris except in very old forests.

Non forested areas (such as alpine, grassland, meadow, sagebrush etc.), like the forested areas, consist of a variety of structures, compositions and age classes.

In providing habitat to maintain "the number and distribution of reproductive individuals to ensure the continued existence of a species throughout its geographic range" (Departmental Regulation 9500-4 — see Applicable Laws and Orders below), vegetative communities, including structure, composition, patterns, and disturbance regimes must be provided across the state where they historically existed. In general, this condition exists. Lacking elements may be in structure and composition within some vegetative types. There are several tools available to help identify the status of habitat conditions. They may include GAP analysis, the Interior West Resources, Inventory, Monitoring and Evaluation Program, and GIS mapping at the forest, regional or state levels. Properly Functioning Condition (PFC) work completed on the forests of Utah helped identify vegetative communities that may be at risk or need improvement.

Management Indicator Species (MIS) Since it is not practical or even possible to monitor all species of wildlife, planning regulations in the first round of forest planning directed forests to identify management indicator species. The Committee of Scientists report (Sustaining the People's Lands, Committee of Scientists, March 15, 1999) explains the concept of management indicator species and expands it for the next round of forest planning. The report states, "Because monitoring the status and assessing the viability of all species is impossible, studies must focus on a smaller subset of species." The Committee of Scientists propose in the report that Forests use the generic term "focal species" to describe this subset of species. The Committee states that, "The key characteristics of a focal species is that its status and time trend provide insights to the integrity of the larger ecological system." Focal species fall into 6 categories that already exist in the literature. These are indicator species (MIS), keystone species, ecological engineers, umbrella species, link species, and species of concern.

All existing forest plans have identified management indicator species (MIS). Under the planning regulations in effect when present plans were written, MIS included representatives from several if not all of the

categories discussed by the Committee of Scientists. The thought of some forests (Wasatch-Cache for one) now in the process of forest plan revision is that to monitor the effects of management through the monitoring of "focal species," the first five categories could provide species appropriate for the purpose. The sixth category, species of concern, may not always be appropriate. Species of concern, "...include some threatened and endangered species, game species, sensitive species, and those that are vulnerable because they are rare" (Committee of Scientists, 1999). In the case of threatened, endangered, sensitive and rare species, many are narrow endemics or are not spread evenly across the landscape and thus are not capable of determining the effects of management. They may be used on a particular project to monitor the effects of the individual project, if appropriate.

Generally, the Utah Division of Wildlife Resources manages wildlife populations on National Forest system lands. The Forest Service's responsibilities are focused on management of habitat and viability of species that are within its jurisdiction. However, close cooperation among the various agencies, governments, and other jurisdictions is necessary to provide proper management of wildlife resources.

The quality of wildlife habitat across the state varies widely. Assessing it on a large scale is complicated when consideration is given for the many different vegetation types, their structures, composition, patterns, and response to disturbance regimes. Human disturbance regimes affecting wildlife and habitat include hunting and fishing, urban/rural development, logging, grazing, mining, recreation, fire, and other surface disturbing activities. Natural disturbance regimes affecting wildlife and habitat include fire, insects, disease, wind, floods, landslides, avalanches, and other surface disturbing activities.

Pollinator Species Much attention has been focused recently on the role of biological pollinators in the environment. These include over 2000 vertebrate and a myriad of invertebrate species, many of which are migrants to Mexico and South America. Pollinators are widespread throughout Utah and include bees, beetles, butterflies, hummingbirds, moths, and bats. Threats include habitat loss and alteration, pesticide poisoning, grazing, and introduction of non-native pollinators. Due to the relatively new interest in pollinators, little is known about the management of the systems upon which they are dependent.

3.3.2 ENVIRONMENTAL CONSEQUENCES

Effects Common to All Alternatives

Natural disturbances, such as fire, have occurred in the past and are expected to occur in the future. Over time, wildlife has adapted to, and been sustained by, natural disturbances to their habitats. These events have and will alter habitat and have and will kill individuals and groups of individuals.

Although fires have the potential to directly and indirectly affect terrestrial biota, these effects are highly dependent on the extent, location, elevation, fuels, and intensity of the fire and soil types. In addition, the amount of vegetation remaining verses that which is consumed, the amount of ground cover remaining, and the timing and intensity of precipitation events following a fire can also influence terrestrial ecosystems. It must be remembered, however, that these systems are dynamic, resilient, and have evolved with fire.

The challenge with assessing the effects of a disturbance activity on wildlife or habitat is the fact that what is good for one species may be bad for another. For example, a fire can benefit some ground nesting species of birds but this same disturbance would be detrimental to canopy nesters. The key to

this dilemma is scale. As long as enough suitable habitats are appropriately distributed across landscapes, that are properly functioning, then individuals lost during a localized disturbance event *generally* would not be limiting relative to sustaining viable populations across the larger landscape. In general, if a vegetation type were in properly functioning condition, the structure, composition, and pattern of their habitat across a landscape would be such that the majority of the species would be represented.

The effects of fire on terrestrial indicator species are widely variable. These effects are dependent upon the fuels (vegetation type and composition); fire intensity, severity and size; soil types; and erosion after the fire until the soils are stabilized. If the fire were of low intensity, with a high degree of ground cover remaining, the effects would generally be less. Species populations would remain viable and individuals might be displaced for a very short period of time (less than five years).

Fires that are large, intense, and consume most of the fuels and ground litter may affect populations. This would affect not only species that live on the ground, but also those that live in shrub or tree canopies if the fire was a crown fire. With the large stand replacement fires, not only will some individuals lose their lives, but also displacement will be for longer periods of time, especially for species that depend on the canopy for all or a portion of their life cycle.

A wide variety of effects to terrestrial resources can be expected to occur between the two scenarios of small, low intensity fires in vegetation types which are properly functioning and large, stand replacing fires within vegetation types at moderate and high risk. Depending on fire intensity, location, vegetative conditions, and other factors, these effects can range from immeasurable to locally substantial, with varying lengths of duration.

The effects to pollinators are similar for all alternatives. Plants of fire-adapted systems have evolved with small and large fires. Recovery of both plants with showy flowers and pollinators associated with them are expected to be within the range of ecological history of plant communities. Alternatives that would increase fire frequency and improve distribution of fire events could result in beneficial effects for biological pollinators. Although fire might reduce pollinators and plants to which they are attracted for a year or perhaps two. However, in the long-run fire can be expected to have a positive effect on pollinators. In some cases such as deep woods of subalpine fir, plants with showy flowers could be dependent on fire or other disturbances that reduced tree dominance. Any fire might have potential to temporarily displace or perhaps reduce plants to which pollinators are attracted. Fire could also have direct effects to pollinators in the short-term by burning eggs, larva and other life stages of low mobility. Fire could also burn some adults of high mobility.

The common or abundant plants that take a comparatively long time to recover to preburn status following fire are not especially attractive to pollinators. These are commonly wind pollinated and without showy flowers and include pinyon, juniper, spruce, fir, big sagebrush, and curl-leaf mountain-mahogany. In many cases, plants with showy flowers recover rapidly after fire. Many produce flowers the year after fire, and in some cases the year of fire. These include sprouting woody species such as chokecherry, currents, rose, and serviceberry and herbaceous species such as fireweed, arnica, lupine, penstemon, balsamroot, mountain hollyhock, crepis, bluebells, geranium, and larkspur. Although some of these plants with brightly colored flowers might also be wind pollinated or self pollinated, visits to these plants by pollinators can be expected to be much greater that to wind pollinated species without showy flowers.

“Some biological pollinators are highly specialized, and their distribution corresponds closely with the

distribution of one or a very few plants. Thus, maintenance of diverse pollinator communities is dependent on maintenance of plant diversity. To the extent that fire increases the abundance and variety of herbaceous species present on a landscape, it will also help to maintain the full range of biological pollinators including these specialized species. The pollinators, in turn, will help ensure that seed is available to generate new populations of plants following fire."

"Biological pollinators are also susceptible to habitat fragmentation. A recent study in South Carolina showed that butterflies were able to move between forest openings that were close together, but rarely moved between more distant openings unless a habitat corridor was provided. Total numbers of butterflies per habitat patch also tend to increase when corridors are present. Thus the more frequent and widely distributed fire events are in a landscape, the higher the carrying capacity for populations of some biological pollinators." (The information on the two South Carolina studies was published in a recent Ecol. Soc. of Am. publication referred to in a press release on the web. The web site is http://esa.sdsc.edu/pr060499.htm.)

Alternative B Effects

The difference between Alternative B and the other alternatives is that more acres will likely be burned using prescribed fires and wildland fire for beneficial uses. The effects would remain the same, however, as prescribed fires will require NEPA analysis prior to implementation and would require that prescriptions be in compliance with forest plans and other Federal and State laws and regulations. The use of wildland fire to meet resource objectives will also require monitoring to ensure compliance with prescriptions contained within fire management plans. These too must be in compliance with forest plans and applicable Federal and State laws and regulations.

Alternative C Effects

Larger and more intense unwanted wildland fires could occur in the timber emphasis areas and sensitive watersheds due to uncharacteristically dense vegetative conditions and heavier fuel loadings. In these instances, there would likely be greater impacts to terrestrial resources. This assumes prescribed burning alone in these areas will not keep pace with vegetative growth and fuels buildups.

3.4 THREATENED, ENDANGERED, PROPOSED, AND SENSITIVE SPECIES

Legal and Administrative Framework

Conservation and recovery of federally listed species are the goals of the Endangered Species Act 1973 (ESA), as amended, 1988. Federal Agencies are directed to "implement a program to conserve fish, wildlife and plants" and to insure that their actions do not jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of critical habitat. The National Forest Management Act (NFMA) 1976, (36 CFR 219.19) goes further with the requirement that National Forests maintain viable populations of species " well distributed in the planning area."

The Secretary of Agriculture's Policy on Fish and Wildlife (Departmental Regulation 9500-4) directs the Forest Service to manage habitats for all native and desired nonnative plants, fish and wildlife species to maintain viable populations of each species; identify and recover threatened and endangered plant and animal species and to avoid actions which may cause species to become threatened or endangered.

In addition to Federally listed species, the Regional Forester maintains a list of sensitive species for which population viability is a concern due to a significant current or predicted downward trends in population numbers, density or habitat capability that would reduce the distribution of the species. Forest Service Sensitive Species Policy (FSM 2670.32) directs National Forests to assist states in achieving conservation goals for endemic species; to complete biological evaluations of programs and activities; avoid and minimize impacts to species with viability concerns; analyze significance of adverse effects on populations or habitat; and coordinate with states and the U.S. Fish and Wildlife Service (USFWS).

3.4.1 AFFECTED ENVIRONMENT

There are 22 threatened, endangered, or proposed plant and animal species and 80 sensitive plant and animal species which occur within the six National Forests of Utah (Appendix A.6). Habitats and distribution of these species are widely variable with some species being distributed throughout the six Forests and others species endemic to single specific locations. Projects that might affect species listed as endangered or threatened under the Endangered Species Act are subject to consultation with U.S. Fish and Wildlife Service (FSM 2671.45). In cooperation with the Forest Service and other local, state and federal agencies, recovery plans and objectives for threatened or endangered species are developed. Proposed projects must be consistent with recovery plan objectives (FSM 2672.2). In addition, biological assessments and biological evaluations are used to review all Forest Service projects for possible effects on TEPS (FSM 2672.4). Once completed, these assessments and evaluations are used in the decision-making process for a NEPA document and often provide recommendations for removing, avoiding, or mitigating potential impacts to TEPS species.

3.4.2 ENVIRONMENTAL CONSEQUENCES

Introduction

Although fires have the potential to directly and indirectly affect TEPS species, these effects are highly dependent on the extent, location, elevation, fuels, and intensity of the fire, and soil types. In addition, the amount of vegetation remaining verses that which is consumed, the amount of ground cover remaining, and the timing and intensity of precipitation events following a fire also impact habitat. It is interesting that many of the TEPS plant species occur in areas seldom frequented by fires: alpine, riparian, and areas with sparse fuels such as rocky, shaley barrens. It must be remembered, however, that these systems are dynamic, resilient, and most have evolved with fire. It is also necessary to recognize and consider the cumulative effects of other activities and conditions created by roads, recreation, special uses, and livestock grazing within the watersheds when determining effects on TEPS species.

Effects Common to All Alternatives

The direct and indirect effects of fire on terrestrial and aquatic TEPS species are widely variable and dependent on the factors listed above. If the fire is of low intensity, with a high degree of ground cover remaining, the effects would likely be minimal. Species populations would likely remain viable and individuals might be displaced for a very short period of time. Fires that are large, intense, and consume most of the fuels and ground litter may effect populations. This would affect not only species that live on the ground, but also those terrestrial species that live in shrub or tree canopies if the fire was a crown fire. With the large stand replacement fires, not only will some individuals lose their lives, but also displace-

ment will be for longer periods of time, especially for species that depend on the canopy for all or a portion of their life cycle.

The effects determinations to TEPS plant and animal species are summarized in Appendix A.5 and A.6. For TEP species, the only adverse effect would occur to Maguire's primrose (May Effect-Likely to Adversely Affect). The reason for this determination is due to the potential loss of overhead cover, which could affect the microclimate of the habitat upon which this species occurs. Populations of Maguires's primrose generally are found in hanging gardens that grow in the filtered shade of forest cover, primarily Douglas-fir. These areas are adjacent to a major travel corridor. Thus, wildland fire use would not be allowed in the vicinity. Additional NEPA analysis would be required prior to implementing prescribed fire.

For sensitive species a determination of WIFV (Will Impact Individuals or Habitats with a Consequence that the Action May Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species) was made for the boreal owl, great gray owl, petiolate wormwood, stone draba, Cronquist daisy, and Smith violet. The last three species of this list are found in situations similar to Maguire's primrose. Stone draba, Cronquist daisy and Smith violet would be affected by the loss of forested overstory cover that provides filtered shade for the microsites where these species grow. Also, all three occur near a major travel corridor where wildland fire use would not be allowed. Petiolate wormwood does occur in a fire-adapted ecosystem. However, the restricted area where this species is found has unusually high fuel loading because of the lack of fire in recent decades. If the area were to burn now, the unusually high fire intensity may adversely affect this wormwood. A determination of WIFV for the two owl species is due to the loss of foraging and nesting habitat from stand-replacing fires.

Large, severe fires could result in a determination of "May impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species" for the two sensitive fish species and the spotted frog. Low severity fires could result in a "no impact" determination. Due to their greater distance downstream of any potential projects, four of the endangered fish species (humpback chub, bonytail chub, Colorado squawfish, razorback sucker) are not likely to be affected by any of the alternatives. There would also be no effects to the endangered June sucker as they occur within an RNA where there are no planned activities and wildfires would be suppressed. These determinations are "worse case" assessments based on severe fire scenarios that could adversely affect habitats.

Prescribed fires will require NEPA analysis, BE/BA assessments, and consultation with U.S. Fish and Wildlife Service as appropriate, prior to implementation and would require that prescriptions be in compliance with Forest Plans and other Federal and State laws and regulations. The application of wildland fire use to meet resource objectives would also require go/no go assessments (Figure 1-4), consultation with U.S. Fish and Wildlife Service as appropriate, and monitoring to ensure compliance with prescriptions contained within fire management plans. These too must be in compliance with Forest Plans and applicable Federal and State laws and regulations. All alternatives are consistent with current direction provided in the six National Forest plans to provide for viable populations of plant, animal, and aquatic species.

Alternative C Effects

The effects would be similar to those described under "Effects Common to All Alternatives". Differences could result if larger and more intense wildfires occur in these two emphasis areas due to uncharacteristi-

cally dense vegetative conditions and heavier fuel loadings. In these instances, there could be greater impacts to threatened, endangered, proposed and sensitive species.

3.5 SOIL, WATER, AND AQUATIC BIOTA

Legal and Administrative Framework

There are many laws, Executive Orders and regulations for protecting, and where appropriate, enhancing soil, water, and aquatic biota. The specific authorities which direct the management of these resources on our National Forest System (NFS) lands are:

· Bankhead Jones Farm Tenant Act of 1937, as amended

· *Multiple-Use, Sustained-Yield Act of June 12, 1960* (74 Stat. 215, as amended; 16U.S.C. 528-531) recognizes and clarifies Forest Service authority and responsibility to manage wildlife and fish.

· *Forest and Rangeland Renewable Resources Planning Act of 1974*, (88 Stat. 476 as amended; U.S.C. 1601-1614) provides that wildlife and fish be included in the development of the National Resources Assessment and related Forest Service Program.

· *National Forest Management Act of 1976* (90 Stat. 2949; 16 U.S.C. 472a, 476 (note), 500, 513-516, 521b, 528 (note), 576b, 592-594 (note), 1600 (note), 1600-1602, 1604, 1606, 1608-1614) provides for the balanced consideration of all resources in National Forest land management.

· Public Rangeland Improvement Act of 1978

· Departmental Regulation 9500-4, which states U.S. Department of Agriculture policy on wildlife, fish and plant habitat management pertinent to public lands. This regulation states, in part, that, “Habitats for all existing native and desired non-native plants, fish and wildlife species will be managed to maintain at least viable populations of such species. In achieving this objective, habitat must be provided for the number and distribution of reproductive individuals to ensure the continued existence of a species throughout its geographic range.”

The Region 4 Soil Management Handbook, states, “land resource management will be consistent with the Forest Service goal of maintaining or improving long-term soil productivity and its related hydrologic function. Presently, at least 85 % of the total acreage occurring within an activity area must have soil properties that remain in satisfactory condition. Plans for projects where treatments are expected to cause resource damage, exceeding the maximum thresholds listed under the Region 4 Soil Quality Standards and Guidelines, must include provisions for mitigation of the ground disturbances.”

3.5.1 AFFECTED ENVIRONMENT

Introduction

The soil, water, and aquatic biota resources are grouped together in this section to highlight their interrelationships. The health of aquatic biota and their habitats are directly related to water quality that, in turn, is influenced by soil erosion and sedimentation. Presenting these resources in this order is intended to reduce redundancy.

Soil/Water Most of the soils occurring on NFS administered lands within Utah were formed in alluvium, colluvium, residuum, volcanic ash, lacustrine material, glacial till, glacial outwash sediments or eolian deposits derived from igneous, sedimentary and metamorphic geologic parent materials. The remaining organic soils were formed from partially decomposed plant residues that accumulated in shallow, stagnant waters. Some isolated areas consist of miscellaneous landtypes with rock outcrops, rubblelands, badlands, riverwash, etc. that usually support less than 10 percent vegetative cover.

The Fishlake, Dixie and Manti-La Sal National Forests have collected detailed soil resource information by participating on cooperative survey projects with the NRCS. The Ashley National Forest uses a combination of soil survey projects and land system inventories. Major portions of the Uinta and Wasatch-Cache National Forests have been sampled using the basic land systems approach developed by the Forest Service. Soil resources have been identified, mapped and documented within semi-desert, upland, mountain, high-mountain, subalpine and alpine type ecological areas.

The climate of Utah National Forests is quite variable, and is strongly influenced by elevation. It is classified as arid in the lower elevations and sub-humid in the higher elevations. Most precipitation occurs October through April, primarily as snow. Spring and summer precipitation is commonly produced by thunderstorms. Peak stream flows occur mainly in the spring as a result of melting snow packs, but some peak flows occur in the summer months in response to intense thunderstorms. Most perennial streams on the Forests occur at higher elevations and are generally of good quality, with low dissolved solids and few other contaminates. Streams in rangeland areas vary from ephemeral to perennial and dissolved solids are typically higher than from forested areas.

Sensitive watersheds are defined as watersheds having geologic formations highly prone to mass wasting and/or large flood events which pose an increased risk to people, water supplies and infrastructure, and other property located within them. Almost all the watersheds identified had a past history of flood events damaging nearby communities and some were sensitive because of the social sensitivity of the surrounding community (USDA, 1987). They are also all municipal watersheds, although this was not a requirement for selection. A team of specialists from each Utah Forest identified sensitive watersheds and Figure 3-1 lists, by forest, the sensitive watersheds and their acreage. The Ashley, Dixie, and Fishlake National Forest's analyzed for, but did not identify watersheds that were sensitive based on the definition.

Aquatic Biota Historically, fires were an important component of the disturbance regime for watersheds and aquatic ecosystems (Reeves et al. in press, in Rieman et al. in press). In southwestern montane watersheds, including Utah, fires occurred every 4-5 years (Swetman 1990) and were commonly ground level and understory in nature (Dieterich and Hibbert 1988, Wright 1990). Large fires supplied woody debris and triggered hydrologic events and debris flows that transported coarse substrates to stream channels (Rieman et al. in press). These processes may have provided the materials that maintained productive habitats for fish and other organisms (Swanson et al. 1990).

Fire suppression and control of wildfires have altered the natural, historic process of periodic burning and have resulted in fuel load buildups, increases in understory and brush, and increases in stand density (Wright 1990, Covington and Moore 1994). These factors, with the right burning conditions, often lead to large fires that consume much of the standing vegetation and ground litter. Such fires and related events have killed fish (Bozek and Young 1994) and even caused local extinctions or population reductions (Probst et al. 1992, Rinne 1996, Hepworth et al. 1997).

FIGURE 3-1
Forests With Sensitive Watersheds

National Forest	Watershed	Acres
Manti-La Sal	Monticello/Blanding (MWS)	10,962
	Mount Pleasant	5,282
	Fairview	4,492
	Spring City	6,342
Subtotal		**27,078**
Uinta	Bartholomew Canyon	3,780
	Battle Creek	3,070
	Dry Canyon	1,968
	Grove Creek	3,649
	Little Rock Canyon (Provo)	607
	Little Rock Canyon (Springville)	1,237
	Payson Canyon	16,374
	Provo Canyon	11,768
	Right Fork Maple Canyon	1,565
	Rock Canyon	6,295
	Slate Canyon	3,771
Subtotal		**54,086**
Wasatch-Cache	Big Cottonwood Canyon Area	33,828
	Bountiful Area	15,788
	Brigham City/W.Wellsville Area	52,907
	City Creek	10,725
	Draper Area	2,433
	Emigration Canyon Area	8,765
	Farmington Area	2,403
	Kaysville Area	3,054
	Little Cottonwood Canyon Area	16,049
	Mill Creek Area	13,713
	Parleys Canyon Area	26,221
	Willard/Ogden/Layton Front	42,666
Subtotal		**233,882**
TOTAL		**315,045**

Issues related to aquatic resources include the required habitat conditions for threatened, endangered, proposed, or sensitive fish species and how fire may alter those conditions; changes in aquatic MIS habitats that may result from changes in water quality; and whether changes to aquatic habitats are consistent or inconsistent with direction in the forest plans.

Within the area considered for this environmental assessment, approximately 8.10 million acres of land, including 27,100 miles of stream and 93,700 acres of lakes and reservoirs, provide aquatic habitats for a variety of fish species, including Bonneville, Colorado River, and Yellowstone cutthroat, rainbow, brown,

brook, and lake trout; suckers; shiners; dace; chubs; sculpins; and a variety of lesser known or less abundant species. Several fish species in the salmonid group, in addition to aquatic macroinvertebrates, are management indicator species.

Native fish show a wide variety of life history forms, including resident populations that inhabit small headwater streams with shorter migratory ranges; fluvial populations that use larger streams and main rivers and may show extensive migrations for spawning; and adfluvial populations which use lakes for rearing before returning to smaller streams for spawning.

The quality of fish habitat varies widely across the state and within Forests. In general, aquatic habitats have declined since the region was settled by Euro-Americans in the 1850's. Reasons include loss of habitat from logging, grazing, mining, recreation, diversion for irrigation and domestic supply purposes, other surface disturbing activities, and introduction of non-native species. In some instances these activities have resulted in changes to species composition of riparian vegetation or loss of riparian vegetation; destabilization of streambanks; filling in of pools and spawning gravels with sediment; loss of large woody debris recruitment; blocked migratory corridors; loss of riverine habitat to reservoir habitat; changes to gene pools; and disease. The fish habitat carrying capacity of these streams has been reduced, and a declining trend in the security of native fish populations observed.

3.5.2 ENVIRONMENTAL CONSEQUENCES

Effects Common to All Alternatives (Alternatives A, B, C)

Soil/Water

In a fire, soil is affected by the transfer of heat into both the duff layer and underlying mineral horizons. Impacts are quite variable, and highly dependent upon fire intensity, fire residence times, presence or absence of organic horizons, ambient moisture conditions occurring in the ground, and type of fuels being burned. Important factors affecting fire severity are microrelief, wind speed and direction, fuel moisture content, and kind and spatial distribution of fuels (especially duff, surface litter and accumulations of large woody debris).

The immediate impacts to soil include charring of the ground surface, possible development of water repellent conditions, and acceleration of erosion rates for a period of about 1 to 3 years. In addition, the burned areas could experience loss of plant nutrient reserves, and reduction or elimination of microbial populations. Soil productivity may be slightly diminished. This could occur in areas impacted by high-severity burns having long residence times during dry ground conditions. In some instances, the burned area would benefit from increased availability of nitrogen and phosphorus; cations of calcium, magnesium, and potassium; and minor amounts of sulfur. Over time, much of the vegetative cover can reestablish on disturbed sites through natural plant succession; eventually, severely burned soils will stabilize and the hydrologic function of the ground will return to normal, commensurate with site capabilities.

Important factors to consider when assessing the effects of fire on hydrologic function are 1) a fire's effect on vegetation, 2) how fire severity modifies the landscape, and 3) timing of subsequent precipitation. With a few exceptions (e.g. high elevation landscapes), watersheds of the Utah forests

have evolved along with the fire-dependent ecosystems within them. What is considered "normal" hydrologic behavior includes the effects of fire (Baker, 1990).

Role of Vegetation. One of the most important factors governing how a watershed will respond after fire is the extent to which fire kills vegetation and burns organic layers on the soil surface. Vegetation is key to watershed function because it 1) intercepts a portion of the precipitation which might otherwise reach the ground, 2) decreases the energy with which rainfall impacts the ground, and 3) influences the rate at which water infiltrates the soil.

When fire destroys the surface litter and vegetation canopy, soils are exposed to the erosive effects of precipitation and any subsequent runoff. Fire typically increases the rate of erosion on the landscape (DeBano et al., 1998; DeBano et al., 1996). Wildland fires tend to accelerate surface erosion more than prescribed burns because the potential is greater for higher severity burns that destroy more protective surface litter and vegetation canopy (DeBano et al., 1998).

Low to Moderate Fire Severity. Soil productivity would be maintained. Some areas may see a short-term increase in nutrient availability. Lethal temperatures for soil organisms typically occur 1 to 2 inches below the surface. Underlying mineral soil would not be visibly altered. Sufficient ground cover in the form of vegetation, litter, rock fragments larger than ¾ inches, and perennial canopy cover within 3 feet of the ground would remain in place to protect the soil surface from accelerated rates of erosion. There would be little if any change to water yield, runoff characteristics, mass failure potential, or water quality (Baker, 1990). There would also be little alteration of site hydrologic function or deterioration of water quality on nearly level to moderately steep terrain. Low-severity prescribed fire intermittently disturbs vegetation canopies and tends to leave a mosaic pattern of disturbed and undisturbed soil moisture regimes. Vegetation canopy is typically still present to dissipate rainfall energy (DeBano et al., 1996).

***High Fire Severity*.** A high-severity fire could adversely affect site productivity by impacting the physical, chemical and biological properties of the soil. The physical effects would include loss of structure, reduction in porosity, and alteration of color. Hydrophobic or water repellent conditions would be expected at the ground surface and may occur within the upper 6 inches of the topsoil horizon. Potential for flooding and higher erosion rates increases. Moderate- to high-severity fires tend to cover greater portions of a watershed and have the potential to cause greater impacts to watersheds compared to low-severity fires (Baker, 1990). In recent years, moderate- or high-severity burns are being used more commonly to convert mixed conifer stands to aspen, or pinyon/juniper to sagebrush/grass/forb vegetation types.

Timing of Precipitation Events and Erosion. The amount of time between a burn and a significant precipitation event is another important factor influencing watershed response to fire. If a watershed is subjected to intense thunderstorm activity while still bare of vegetation, large amounts of sediment will likely erode from the site. This has been documented many places on Utah National Forests (Kendall and Shanahan, 1998; Shanahan 1997, 1998; Smith, 1998). Adjacent sites that had vegetation canopy and surface organics did not experience any visible erosion).

Light burns followed by intense thunderstorms can have large impacts; while high severity burns followed by a wet warm summer dominated by gentle rains could promote rapid revegetation and lessen watershed impacts (DeBano et al., 1996). The steepness of a hillside influences the risk of any site to

overland flow and surface erosion, and is related to the rate at which the site is revegetated after a fire. Studies have shown that as slope increases, the rate of revegetation can slow, and the susceptibility of erosion increases (Wright et al., 1976).

While erosion after fire may be within the historic range of variation, impacts could be serious and undesirable if 1) erosion rates in a watershed are already elevated and accelerated by other management activities, 2) streams are already nonfunctioning or functioning at risk, or 3) important developments such as towns, reservoirs, and facilities exist in a floodplain, at a canyon mouth, or in other high risk locations.

As discussed earlier, there are several watersheds on the Utah Forests that have a history of flooding and mass failure as a result of impacts to vegetation, primarily from grazing during the late 1800's and early 1900's (Figure 3-1). There is the potential of increasing the occurrence of mass failures within specific areas (Megahan, 1983) because fire can affect the rate of runoff from a hillslope, increase the amount of water available in the soil due to evapotranspiration reductions, and kill deeper rooted species of vegetation which add to hillslope and soil strength.

Timing of Flow and Quantity of Flow. Many studies show a relationship between vegetation manipulation, water yield, and peakflow. One publication compared the results of 94 different paired watershed studies that looked at the effects of management induced vegetation reductions on water yield. In all those studies, none showed a loss of water or negative water yield. Although many studies showed an increase in water yield, the results were highly variable and numerical generalizations on amount of increase could not be made. It was determined that any procedure to predict potential water yield changes as a result of fire must be tailored to a specific watershed (Farnes and Hartman, 1989.

Fire can influence snow accumulation by creating openings in the forest canopy. The magnitude of this effect is dependant on the severity of the fire and the subsequent size of the openings. If a fire creates small openings in the forest canopy more snow can accumulate due to increased turbulence and fewer trees intercepting snow. There have also been studies which looked at the effects of charred black tree boles on the rate of spring snowmelt, which may cause snow to melt faster and earlier in the year and alter timing of stream runoff in a watershed (DeBano et al., 1998; DeBano et al., 1989).

Aquatic Biota

The direct and indirect effects of fire to MIS fish, aquatic macroinvertebrates, and amphibians are widely variable. Although fires can affect aquatic biota, effects are highly dependent on the extent, location, and severity of the fire; soil types; the amount of vegetation remaining; the amount of ground cover remaining; and the timing and intensity of precipitation events following a fire. A wide variety of effects to aquatic resources can be expected between the scenarios of small, low intensity fires in healthy, properly functioning watersheds and large, intense fires in unhealthy watersheds.

Direct effects include heating or abrupt changes in water chemistry (Minshall et al. 1989, McMahon and de Clesta 1990, Rinne 1996, Beeny and Parker 1998). Indirect effects include changes in hydrologic regime, erosion, debris flows, woody debris loading and riparian cover (Swanson and Lienkaemper 1978, Brown 1989, Megahan 1991, Bozek and Young 1994, and Robertson, pers. Obs.).

Fisheries. In their studies after the fires of 1992 and 1994 on the Boise National Forest, Rieman et al.

(in press) observed some fish habitats were lost or altered by the loss of old wood and the filling of pools by sediment; other habitats—such as new pools, channels and undercut banks—were created by the displacement and redistribution of fire-killed trees in the system. Debris flows scoured some small high-gradient channels, simplifying habitats in them or in the larger streams immediately below the confluence with those channels. Debris flows also delivered substantial volumes of coarse materials that were likely to contribute to the complexity of channels downstream. In many cases pools were virtually filled with new material, although pools in higher-gradient channels often remained relatively free of sediment. In reaches with high-intensity burn effects, shading from riparian cover was virtually eliminated. Woody debris in stream channels was often burned as well.

Riparian vegetation was not killed in the Boise fires although it was intensely burned in some reaches. Cover from emergent vegetation was lost immediately after the fires, but resprouting from roots was pronounced and the canopy immediately adjacent to the channel increased substantially in all intensely burned reaches. In the Stanislaus Complex of 1987 and other prescribed fires on the Stanislaus National Forest, Robertson (pers. obs.) noted that vigor of riparian species increased dramatically following the fires. This was partially attributed to lack of competition from adjacent vegetation (especially shading from dense, forested canopies).

In his study on several headwater streams within intensely burned watersheds in the Southwest, Rinne (1996) found that hydrologic events following a fire effectively extirpated two populations of brook trout (*Salvelinus fontinalis*) and one population of rainbow trout (*Oncorhynchus mykiss*). He attributed the loss to toxic slurry or ash flows. The extent of fish loss depended on (1) burn intensity, (2) size, frequency, and duration of flows during the summer monsoons, and (3) permanency of downstream reaches to which fish may have been displaced. Often springs or upwellings serve as refugia.

Rieman et al. (in press) found that recolonization of stream reaches was influenced by the proximity and direction of refuges. Fish were reestablished in depauperate reaches by dispersal from both upstream and downstream sources over relatively short distances. In general, where internal refuges exist, recolonization occurs rapidly —within a few years or even weeks (Meffe and Sheldon 1990, Niemi et al. 1900, Yount and Niemi 1990, Lamberti et al. 1991, Detenbeck et al. 1992, Bayley and Osborne 1993, Sheldon and Meffe 1995). The rate of recolonization and the way it occurs are strongly influenced by the local environment (Sheldon and Meffe 1995). Mechanisms that influence recovery or compensate for habitat loss might be triggered by or enhanced by a disturbance event (Minshall et al. 1989). In small cold streams, increased exposure to sunlight may warm water temperatures, increase primary productivity (Minshall et al. 1989), and ultimately result in faster growth or increased carrying capacities for juvenile fish (Murphy and Meehan 1991).

In the long term, effects can be positive (Swanson and Lienkaemper 1978, Brown 1989, Swanson et al. 1990). Increased inputs of large wood and coarse sediments from dispersed sources or storm-triggered debris flows are likely to follow large fires (Brown 1989, Megahan 1991). Larger materials often serve to store fine sediments and provide hydraulic complexity for sorting larger materials that are critical to fish habitat.

Recent theories strongly suggest that natural disturbance regimes may have been critical to maintenance of complex habitats and productivity of the associated populations (Reeves et al. 1995), as well as genetic and phenotypic diversity that supports resilience of populations in the short-term and adaptation in the long-term (Poff and Ward 1990). Minshall et al. (1989) noted that habitats and populations

appeared to be very dynamic following fires, and the effects are likely to persist for years or decades. Rieman et al. (in press) state that the suppression of fire in recent history could well have contributed to the overall decline in productivity of fish habitats throughout the region.

Rieman et al. (in press) conclude that "larger and more intensive fires may result in local extinctions of very small and isolated populations of fish. Many species and populations, however, may still have the ecological diversity necessary for dealing with this disturbance. Although fire may create important changes in watershed processes that are often considered as negative to fish, the spatial and temporal nature of the disturbances is important (Reeves et al. in press)." Fire and its associated effects are also episodic in nature and some species, such as bull trout and redband trout, seem to be adapted to such events. However, the resiliency of fish populations is likely dependent on large, well-connected and spatially complex habitats.

Aquatic Macroinvertebrates. Very little information could be found on the effects of fire to aquatic macroinvertebrates. The most recent studies were conducted by Rinne (1996) on several streams within some intensely burned watersheds in the Southwest. He found that populations of aquatic macroinvertebrates, the primary food sources of salmonids, were drastically reduced by post-fire water quality and quantity. Deposition of ash in substrates following low post-fire flow events may be more toxic to aquatic macroinvertebrates than to fish and that potential reduction in substrate oxygen levels may result in mass mortality of these substrate-dwelling organisms. He also found that altered stream hydrography resulting from watershed denudation and floods continues to influence macroinvertebrate densities and diversity.

Most studies of aquatic biota are related to the effects of wildland fire on these resources. Prescribed fires are used extensively in the Southwest (Wright 1990) and are becoming more common as a tool to manage vegetation and landscapes toward a more "natural" condition. Although not immediately fatal to salmonids in marginal headwater habitats, the amounts of sediment mobilized from watersheds following these normally small, low-intensity burns (Rinne and Neary, in press) could temporarily alter salmonid spawning substrates and the rearing areas for aquatic macroinvertebrates. Over time, this impact could be severe (Rinne 1996). Fine sediment fills in the interstices of substrate and ultimately reduces macroinvertebrate density (Bjornn et al. 1977, Rinne and Medina 1988, Everest et al. 1987). This negative impact on food supply, combined with the saturation of spawning substrates and the aggradation of pool habitats essential for fish survival during drought and winter periods, could be substantial. Rinne believes that the chronic impact of fine sediment accumulation in substrates may have as great an influence on salmonid populations as does the immediate, short-term response to ash flows and changes in hydrography following a wildland fire.

Beeny and Parker (1998) noted that in the first couple years following the Yellowstone fires, the canopies over streams opened up and there was a shift in the relative abundance of types of food available to the fish. Sunlight-dependent insects such as caddisflies and beetles did somewhat better, while the numbers of stoneflies went down. Adjoining waters served as sources of invertebrate immigration. This recolonization appears to be dependent on the health of the watershed before wildland fires: healthier watersheds recovered sooner than those heavily impacted by other management practices.

Amphibians. There is little published information on the effects of fire to amphibians. The fact that there are no reports of high mortality for any herptile species may indicate that amphibians are not highly vulnerable to fire. Kahn (1960) reported that western fence lizards survived a severe chaparral fire by

remaining in the soil beneath rocks. Amphibians similarly could survive a fire by remaining in the soil beneath rocks, entering animal burrows, or escaping into water; survival in retreats under flammable materials (logs, stumps, etc) would depend on fire severity and moisture conditions. Komarek (1969) states that animals appear to respond to fire with adaptive behaviors which minimize mortality; experiments with different types of prescribed fires resulted in no discernible amphibian mortality. Frogs escaped a fire by traveling ahead of the fire and burying themselves under wet leaves and soil in a small depression.

No specific information could be found on the response of amphibians to habitat alterations as a result of fire. Severe fires that burn surface objects such as logs and stumps would immediately decrease available hiding cover for some species, but post-fire resprouting of shrubby species would result in a longer-term, overall increase in low hiding cover. Fires in the spring could affect egg masses by reducing shade and increasing water temperatures. Any substantial change in runoff rates, erosion, or water tables caused by fire could degrade breeding sites.

Alternative A Effects

Soil/Water There would be no change from existing conditions over the next 10 years. In the long-term (the next several decades) the trend of ever increasing frequency of uncharacteristic large, high severity, high intensity unwanted wildland fire will continue assuming prescribed burning remains at current levels. These fires have the highest risk of adversely impacting watersheds.

Over the next 3 to 4 years, the expected indirect effects from Alternative A will be that approved prescribed fire burn plans become implemented on a limited scale and wildland fire use is authorized on the Fishlake National Forest and in small areas, such as wilderness, on the remaining forests. Suppression of all naturally ignited fire would be required across the majority of all Forest Service lands here in Utah. The use of low to moderate severity prescribed fire or authorization of wildland fire use, where authorized, would have few, if any, adverse impacts to the soil resource. Large incidents of unwanted wildland fire would be evaluated by a BAER Team and emergency rehabilitation treatments would be applied as deemed necessary to minimize threats to human life and property, maintain soil productivity and limit the deterioration of water quality.

Aquatic Biota See effects common to all alternatives page 3-37 through 3-39.

Alternative B Effects

Soil/Water Wildland fire use and prescribed fires may increase in size up to thousands of acres within prescription. At the watershed scale in the long-term (the next several decades) , this alternative has the potential to eventually decrease the frequency of uncharacteristic large, high severity, high intensity wildfires assuming wildland fire use and the application of prescribed fires can keep pace with vegetation growth and fuel loading.

Prescribed burns and wildland fire use which comply with forest plan standards and guidelines and the fire management plan have the potential of diminishing negative watershed effects compared to the anticipated severe impacts of uncharacteristic wildfire that is expected in the future with Alternative A and possibly in Alternative C if prescribed burning alone can not keep pace with fuel loading.

Aquatic Biota In the long-term (the next several decades), more acres will likely be burned using prescribed fires and wildland fire for beneficial uses. The effects would remain the same, however, as prescribed fires will require NEPA analysis prior to implementation and would require that prescriptions be in compliance with Forest Plans and other Federal and State laws and regulations. The authorization of wildland fire use to meet resource objectives will also require monitoring during the fire to ensure compliance with prescriptions contained within fire management plans. These too must be in compliance with Forest Plans and applicable Federal and State laws and regulations. This alternative is consistent with current direction provided in the six National Forest plans to provide for viable populations of aquatic species (including MIS and TES) and to maintain and improve aquatic habitats.

Alternative C Effects

Soil/Water Wildland fire use and prescribed fires may increase in size up to thousands of acres within prescription. Wildland fire use within prescription would not be an authorized tool in sensitive watersheds and timber emphasis areas.

At the landscape scale in the long-term (the next several decades), this alternative has the potential to decrease the frequency of uncharacteristically large, high severity, high intensity wildland fires assuming, in the absence of wildland fire use, prescribed fires alone can keep pace with vegetation growth and fuel loading. There could be less risk to the soil resource in the short-term by not authorizing wildland fire use in both timber emphasis areas and sensitive watersheds. In areas of spruce/fir, lodgepole pine, ponderosa pine, mixed conifer, and to a lesser extent aspen, a likelihood exists for the resource benefiting fire to become an escaped unwanted wildland fire. The risk of moderate or high severity fire in sensitive watersheds is expected to be less in the short-term because wildland fire would be suppressed; assuming again, prescribed fire can keep pace with vegetation growth and fuel loading.

If prescribed fire use does not keep pace with vegetation growth and fuel loading then long-term predictions for higher fuel loading could result in greater occurrences of fires with higher severity and it's resulting negative impacts to soils and watershed function. The negative impacts to streams, soils, and water quality predicted in Alternative A would then apply to sensitive watersheds and timber emphasis areas. So, ironically, Alternative C may reduce the short-term risk of negative uncharacteristic wildland fire effects in sensitive watersheds because we would attempt to suppress all wildland fires. However, in the long-term there may eventually come a day when our suppression efforts will not be able to suppress a fire fueled by decades of wood accumulation.

Aquatic Biota If larger and more intense wildfires occur in sensitive watershed and timber emphasis areas due to uncharacteristically dense vegetative conditions and heavier fuel loadings then there could be greater impacts to aquatic resources. Again, as discussed earlier these impacts are variable and dependent on other resource conditions within a watershed.

3.6 HUMAN HEALTH AND SAFETY

Legal and Administrative Framework

Overview of the Clean Air Act Congress passed the Clean Air Act (1967) and amendments to the Act (1972, 1977) to protect and enhance the quality of the Nation's air resources and to protect public health and welfare. Section 118 of the Clean Air Act requires that the federal government comply with all

federal, state, tribal, interstate, and local air quality standards and requirements (Integration of Air Quality Management into Land Management Planning, pg1-4). The Act established National Ambient Air Quality Standard (NAAQS) and gave the States primary responsibility for air quality management. States carry out this responsibility through development of a State Implementation Plan (SIP). Federal and State land managers must be certain that their actions comply with all procedural and substantive requirements contained in Federal, State, and local air pollution control regulations.

The Clean Air Act requires States to identify nonattainment areas (areas which do not meet national air quality standards) and to take action to bring those areas into compliance. Specific plans to reduce emissions and bring the area into compliance become part of the State Implementation Plan. Through this mechanism to achieve compliance, States and local air quality authorities can reduce or eliminate the use of prescribed burning in an area designated as nonattainment for particulates. This requirement could also restrict the use of prescribed fire outside a nonattainment area if such fires would contribute to the particulate load within a nonattainment area. (pg 2, Prescribed Fire Smoke Management Guide, by Prescribed Fire and Fire Effects Working Team, Feb. 1985, Pub. National Wildfire Coordinating Group)

Under the 1977 Clean Air Act Amendment (42 U.S.C.& 7401 et seq), areas of the country were designated as Class I, II, and III airsheds for the Prevention of Significant Deterioration purposes. Class I areas include national parks and wilderness areas designated before 1977 and over 5000 acres in size. Class I provides protection to pristine lands by severely limiting the amount of additional human-caused air pollution that can be added to these areas. There are five Class I areas in Utah; Bryce Canyon, Zion, Arches, Capitol Reef and Canyonlands National Parks. The rest of the state, including Forest Service wilderness areas, is classified as Class II. Presently, there are no haze (visibility) criteria that are enforced in Utah. The State of Utah has identified three areas of non-attainment for PM10; Utah County, Salt Lake County and a small area encompassing Ogden (State of Utah, Division of Air Quality).

Interim Air Quality Policy on Wildland Fire and Prescribed Fires This EPA interim policy addresses public health and welfare impacts caused by prescribed fires and wildland fires managed to meet resource objectives. This policy complements the Natural Events Policy that addresses public health impacts caused by wildland fires. The Interim Air Quality Policy urges States and Tribal managers to collaborate with wildland owners and managers to mitigate the air quality impacts that could be caused by the increase of prescribed fires and wildland fire use. (Integration of Air Quality Management into Land Management Planning, pg1-6)

Utah State Smoke Management Plan The State of Utah, Division of Air Quality and an interagency workgroup are presently drafting a Utah Smoke Management Plan. Its purpose is "to identify the responsibilities of the Utah Division of Air Quality (DAQ) and Federal, and State land managers (Land Managers) to coordinate procedures that mitigate the impacts of prescribed fire and wildland fire used for resource benefits on public health, public safety and visibility. This plan is designed to meet the requirements of Title R307, Utah's air quality rules and the policies of the Environmental Protection Agency's interim Air Quality Policy on Wildland and Prescribed Fires." (Draft Utah Smoke Management Plan, Utah Division of Air Quality, 1999).

A Smoke Program Coordinator acts as the decision-making authority among all participating agencies and landowners when the possibility of violations may occur. This individual will work with the monitoring section of Department of Air Quality to prevent and/or reduce violations. To assist land managers, a list of emission reduction and dispersion techniques commonly used is included in the current smoke

management plan. In the case of prescribed burns and new wildland fire use, this may include denying burn plan implementation due to poor smoke dispersal conditions until dispersal improves.

The current Federal and Utah standards are: (1) the concentration of PM-10 must not exceed 150 micrograms per cubic centimeter over a 24 hour period; or (2) the annual arithmetic mean must not exceed 50 micrograms per cubic meter at the monitoring equipment site. These values are monitored and summarized by the Utah State Division of Air Quality. There have been no known National Ambient Air Quality Standards exceeded due to prescribed fires in Utah (personal communication, Clif Benoit, 7/9/99 and Frances Bernards, 7/12/99).

As land managers increase prescribed burning on our nation's wildlands, areas affected by the smoke from these fires must still meet the federal air quality standards to protect public health. The U.S. Environmental Protection Agency (EPA); land management agencies in the U.S. Departments of Agriculture, Defense, and the Interior; and State and Tribal land and air quality managers are working in partnership to reconcile these seemingly contrasting goals: healthier wildland ecosystems through the increased use of prescribed fire and cleaner air. (Fighting Fire with Fire: Keeping Forests Healthy and Protecting Air Quality, U.S. EPA, February 1999, EPA-452/F-99-001). Best management practices are already limiting smoke's impact. These will continue to be refined and updated in the Utah Smoke Management Plan as appropriate.

EPA's Natural Events Policy treats unwanted wildland fires as a natural event. If the state has implemented a smoke management plan which addresses smoke impacts to health due to a natural event, the EPA will not redesignate an area nonattainment because of that natural event. This means when areas in Utah violate the PM 10 NAAQS because of a natural event, the agency will not be cited as contributing to nonattainment.

Overview of the Clean Water Act The Federal Water Pollution Control Act was enacted in 1972 (PL 92-500), and is now commonly referred to as the Clean Water Act. It was passed by Congress to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The Act has been amended many times over the years, and the latest amendments reinforce the focus of this legislation on water quality issues (PL 100-4). The following is a summary discussion of how this Act and associated legislation apply to waters located on National Forest System Lands in Utah.

The State has the primary responsibility to ensure the objectives of the Clean Water Act are met in Utah (33 U.S.C 1329; U.C.A 19-5; U.A.C R317-2). The Forest Service is directed under the Clean Water Act to meet State, interstate, and local requirements respecting control and abatement of pollution (33 U.S.C. 1329). USDA and Forest Service Nonpoint Source Water Quality Policy is directed to prevent or control pollution from nonpoint sources and to protect and maintain water quality and beneficial uses.

Section 303 (d) of the Clean Water Act requires that the State identify all water bodies that are not currently meeting established state water quality standards.

Memorandum of Understanding The Forest Service has entered into a Memorandum of Understanding, 1992 (MOU) with the State of Utah to "coordinate water pollution control activities on National Forest System Lands in Utah to protect, maintain and restore the beneficial uses of the waters of the State". The MOU identifies the Forest Service as the Water Quality Management Agency on National Forest System Lands. This MOU also identifies best management practices, implementation of Forest Plan

standards and guidelines, and soil and water conservation practices described in Forest Service Handbook 2509.22, as the mechanisms by which the Forest Service will meet the intent of the Clean Water Act in Utah.

Antidegradation Policy The U.S. Environmental Protection Agency (EPA) and Utah State antidegradation policies ensure that designated beneficial uses, once achieved, must be maintained. The antidegradation policy requires that 1) existing beneficial uses be maintained, 2) existing water quality be maintained where it exceeds minimum standards, 3) and requires special protection of designated High Quality Waters. With a few specified exceptions, all of the waters located on U.S. National Forests in Utah have been designated High Quality Waters (U.A.C R317-2-12). No water quality degradation is allowed which would interfere with or become injurious to existing instream water uses (U.A.C. R317-2-3). The recognized beneficial uses of water in Utah are public water supplies, wildlife, fish and aquatic life, domestic, agricultural, industrial, and recreation (U.A.C. R317-2-1A).

3.6.1 AFFECTED ENVIRONMENT

Air Quality In most fire-adapted ecosystems, there is ample evidence of historic fires that occurred in Utah forests. In the past 200 to 400 years fire had a much more active role in ecosystem function than today. It then follows that much more smoke would have been present and probably more days with smoke visible than in the current time. Smoke from wildfires (pre-European settlement) is described in Ogle and DuMond where Utah explorer John Wesley Powell's 1879 report is excerpted. He wrote "...wildfires in timber are on a scale so vast that the amount taken for industrial purposes sinks by comparison into insignificance." He further reports that "in seasons of great drought the mountaineer sees the heavens filled with clouds of smoke" (Ogle and DuMond, 1997).

Presently there are three airsheds recognized in Utah. These airsheds are defined by elevational and east and west basin differences. Air quality basin 1 encompasses the western valleys below 6500 feet and air quality basin 2 encompasses eastern valleys below 6500 feet. Air quality basin 3 includes all mountain valleys above 6500 feet elevation.

Air quality is affected by both natural and human-caused events. Natural events include smoke from wildland fires and wildland fire use; human-caused events include smoke from prescribed burning, recreational campfires and fugitive dust from unpaved roadways and timber sales. During the summer months there is a prevailing southwest wind pattern. This means that on average on a given summer day in Utah, the major air movement will be from the southwest to the northeast.

Water Quality Utah National Forests supply water to three major watersheds, the Upper Colorado River Basin (upstream of Lee's Ferry) and Lower Colorado River Basin (downstream of Lee's Ferry), and the Great Basin. Water is an important resource of all the Utah Forests. Large amounts are consumptively used for agricultural, municipal, domestic, and industrial purposes. Non-consumptive uses include fisheries, recreation, aesthetics, hydropower generation, and water quality maintenance. National Forests contribute water to many municipal watersheds across Utah.

Some water bodies located on National Forest System Lands contain pollutants or stressors that affect beneficial uses (for instance, water to drink or habitat for fish). These waters have been identified by the State of Utah, as required by Section 303(d) of the Clean Water Act, and are listed in the Project File. Most are reservoirs.

In general, water quality within Utah's National Forests is good. With only a few exceptions, all surface waters located within the boundaries of the National Forests have been designated as High Quality Waters by the State of Utah (U.A.C. R317-2-3 3.2, R317-2-12). High Quality Waters have been determined to have exceptional recreational or ecological significance and must be maintained at their existing high quality.

3.6.2 ENVIRONMENTAL CONSEQUENCES

Effects Common to All Alternatives (Alterntative A, B, C)

Air Quality In terms of air quality, there is not a significant difference among alternatives. The laws are clear and must be met with all prescribed fire and wildland fire projects. Any unwanted wildland fire will be suppressed to the best of the local unit's abilities, limiting smoke as much as possible in an emergency. All wildland fire use and prescribed fires will be cleared through the State of Utah Division of Air Quality's Smoke Manager before being utilized.

Impacts to air quality are not expected to increase beyond what is currently allowed under law, consistent with all six forest plans in Utah. Wildland fire as a source is occasionally unavoidable, relatively short duration and is expected to temporarily impact affected airsheds. Large, uncontrolled unwanted wildland fires would most likely produce the most air pollution over time as there is little or no control over what is emitted or the rate at which emissions occur. In contrast, prescribed burning allows control of what, when and how the burn is conducted and therefore much more control of the smoke amount, time of day and time of year it is emitted. When planning and conducting prescribed fires, the Prescribed Fire Manager and Prescribed Burn Boss would exercise their responsibilities in a way that meets Clean Air Act standard (Public Law 95-95) and best serves the public interest. (Pg 1, Prescribed Fire Smoke Management Guide, by Prescribed Fire and Fire Effects Working Team, Feb. 1985, Pub. National Wildfire Coordinating Group)

All types of fire emit smoke, particulates, and gases into airsheds. This could impact the health of people in adjacent and downwind communities, and impair visibility along roadways. The smoke from fire contains a number of pollutants, including fine particles called particulate matter (PM). Exposure to particulate matter can cause health problems, especially for people suffering from respiratory illnesses; including aggravated respiratory symptoms, poor lung function, and even premature death.

Smoke also affects the clarity of our air, also known as visibility. Smoke can impair our views and diminish the appreciation on scenic vistas in national parks, forest, and wilderness areas. As stated earlier, the National Ambient Air Quality Standards (NAAQS) would not be violated by prescribed natural fires or wildland fire use, as all ignitions must be cleared through the State's smoke manager. If conditions are deteriorating to a point where the NAAQS could be violated, the smoke manager has the ability to stop any new ignitions and/or require on-going fires to be put under full suppression (in the case of prescribed and wildland fire use).

Typical mitigations for burning near a busy road consist of three strategies: avoidance, dilution and emission reduction. Avoidance would include considering not burning the area and burning when the wind would keep the smoke away from the road. Dilution requires an unstable atmosphere and higher winds to keep visibility from being limited. Emission reduction utilizes techniques to limit the total amount of smoke produced; for example, burning smaller areas at a time, using a hotter prescription and reduc-

ing fuel loads before burning. Smoke levels along roadways would be monitored during any project that might possibly affect visibility, and therefore public and firefighter safety.

Based on recent health research, EPA revised the air quality standards for both particulate matter (PM 2.5) and ground-level ozone in July 1997. These standards will be implemented beginning in 2003, after enough baseline data has been collected. The new standards will provide better health protection for millions of Americans through limiting the amounts of particulates allowed in populated areas even more. With the new standards in place, land managers must consider using techniques that minimize prescribed fire emissions and the adverse impacts of smoke on public health and the environment. (Fighting Fire with Fire: Keeping Forests Healthy and Protecting Air Quality, U.S. EPA, February 1999, EPA-452/F-99-001). As with the current standards, these will also be met while utilizing prescribed fires and wildland fire use in Utah, in full compliance with the six Forest Plans.

Water Quality The effects that fire may have on water quality depend largely on the ability to transport different chemical and physical constituents to water sources. Nutrients that were not volatilized during the burning of organic material after a fire can be highly soluble and may be lost from soils either through the erosion process or through leaching. Nitrate (NO3) is the most mobile form of nitrogen, and has the greatest potential to be transported to water after fire (Brass et al., 1996). Phosphorous, and cations Ca, Mg, and K are not generally considered serious pollutants that affect water as a result of burning (DeBano et al. 1998; Baker, 1990).

Although fire does have the potential to change the chemical constituents of water, especially with respect to nutrients, in general it is not felt that the changes would be large enough to impair municipal water sources (Baker, 1990). Sedimentation is probably a greater threat to water quality. The studies cited previously have shown that sediment can increase as a result of burning. The effects on turbidity are less clear due to variable study results, and the paucity of turbidity studies related to fire (Baker, 1990; Tiedemann et al., 1979). Although there are no specific water quality standards for sediment, it is considered a pollutant in the State of Utah. High sediment loading is a parameter for which a stream or lake may be added to Utah's list of impaired waters pursuant to Section 303 (d) of the Clean Water Act. Sediment, hydrologic modification, and habitat modification are assessed through the nonpoint source lake and stream monitoring programs of the Utah Division of Water Quality (Utah DEQ, 1998). Accelerated sediment transport into streams can modify the longitudinal profile, shape, pattern, bedforms and subsequent aquatic habitat present in stream. Accelerated sediment transport can also affect the rates that reservoirs lose capacity (Leopold et al., 1964).

Sensitive watersheds are defined as watersheds having geologic formations highly prone to mass wasting and/or large flood events which pose an increased risk to people, water supplies and infrastructure, and other property located within them. Almost all the watersheds identified had a past history of flood events damaging nearby communities and some were sensitive because of the social sensitivity of the surrounding community (USDA, 1987). They are also all municipal watersheds, although this was not a requirement for selection. Most of them have been treated with large-scale watershed restoration measures designed to bring vegetation back on the landscape and slow down runoff.

As discussed above, fire is one management activity that has the ability to remove vegetation over large areas and increase runoff. Moderate or high severity burns which kill vegetation in sensitive watersheds carry the highest risk of exceeding State Water Quality Standards, non-compliance with Forest Plan Standards, increased risk of mass failures, flooding and risk to human safety.

All of the Forest Plans for Utah have language that states that State and Federal Water Quality Standards will be met, and that the Forests will comply with the requirements of the Clean Water Act. In relation to prescribed burns and wildland fire, this would be accomplished in part, through the implementation of Best Management Practices. Best management practices are outlined in the R1/R4 Soils and Water Conservation Practices Handbook commonly referred to as SWCP's (FSH 2509.22). In this handbook are several BMP's designed for prescribed fire, fire suppression, and fuels reduction.

3.7 CULTURAL RESOURCES

Legal and Administrative Framework

The Forest Service is required to consider the effects of agency undertakings on cultural resources deemed eligible for listing and those sites listed in the National Register of Historic Places (NRHP). The criteria for listing in the Register refer to the qualities of significance in American history, architecture, archaeology and culture. Once a site has been evaluated for its National Register significance, management activities are generally focused on those determined to be eligible for the NRHP.

Section 106 of the *National Historic Preservation Act of 1966*, as amended, requires the Forest Service to determine if federally funded, permitted, or licensed activities will affect significant cultural resources. An undertaking is any project that can result in changes to the character or qualities of a site that make it eligible for the National Register. For most projects, consideration of the effects of an undertaking on cultural resources proceeds in sequential steps of inventory, evaluation and determinations of effect. Consultation with the State Historic Preservation Office, the Advisory Council on Historic Preservation and interested parties occurs during these various phases to assist in identification and evaluation efforts and to finds ways to lessen impacts if adverse effects are anticipated.

For large or complex projects or classes of undertakings where effects cannot be fully determined in advance of an undertaking, the implementing regulations for Section 106 allow agencies to develop programmatic procedures and to implement phased compliance programs (36 CFR 80013(a)). Similar approaches to wildland fire have been applied in other states among federal agencies, state historic preservation offices and the Advisory Council on Historic Preservation (cf. Programmatic Agreement among the Bureau of Land Management, State of Colorado, the National Forests of Colorado, U.S.D.A. Forest Service, the State Historic Preservation Office of Colorado and the Advisory Council on Historic Preservation Regarding the Management of Wildland Fire for Resource Benefits.

3.7.1 AFFECTED ENVIRONMENT

Introduction

Cultural resources consist of sites, structures and objects used by prehistoric and historic peoples. These phenomena represent the physical remains of past human lifeways and activities in the forests. Prehistoric representations may include scatters of chipped stone tools, groundstone artifacts and ceramics (termed lithic and ceramic scatters), pithouse depressions, pueblo ruins, stone and mud food storage granaries, living tress which were peeled by native peoples to obtain inner bark for food, rockshelters, stone tool quarries, sweat lodges, projectile points and other manifestations of aboriginal lifestyles spanning the last 12,000 years. Historic site types may include trails from Spanish exploration,

pioneer settlement, and early military use, structures and modified landscape features from mining, ranching, homesteading, railroading, and recreation activities and developments during government administration of the forests.

The Forest Service seeks to provide the American people and future generations with opportunities to enjoy and appreciate the nation's rich and diverse cultural heritage. The Utah National Forests offer unique opportunities to protect and interpret the nation's heritage contained within archaeological and historical sites. The cultural resources of the Utah National Forests represent both ancient lifeways and the traditions of living peoples. The Forests manages for a wide diversity of uses and users including interpretation for the general public, conservation for scientific values and future generations and access for Native American traditional practices.

Cultural resources are formed by natural and cultural processes. For example, early native peoples may have chosen a place next to a creek for a summer camp. At this location, many activities may have taken place. Such activities could have included making and maintaining stone tools, making campfires, butchering and cooking wild animals, and sleeping inside of a small brush house, all cultural processes. When the camp was abandoned, the people would have left behind numerous discarded items and the remains of fires and food-processing areas. In the spring, flooding along the creek might deposit sediment over the camp area (a natural process) and bury the discarded artifacts and camp features (a natural process). Over hundreds of years, such natural depositional processes might continue burying the early campsite (and subsequent campsites) in natural sediments. If such sites are located in a stable landform (geomorphic) area, the buried contents of the site could remain protected for a considerable period of time.

However, in an unstable setting, natural erosion processes (like stream bank cutting) may cut into soil layers containing cultural materials and begin exposing and eroding artifacts from their original context. Historic structures in the Utah National Forests are largely built of wood and are subject to natural deterioration, even with maintenance. However, the Utah Forests also contains historic structures associated with mining, ranching and other uses that have remained relatively unaffected by destructive natural forces and remain as excellent examples of specific architectural styles and outstanding craftsmanship. Both archaeological and historical sites have been subjected to fires at varying intervals depending upon their location in different environmental settings containing variable fuel loads.

The Utah National Forests contain a wide variety of cultural resource site types. These site types exist both above and below the ground surface. Cultural resource sites may contain a variety of artifacts and materials made, used or introduced into sites by past peoples. These include materials made of stone, mineral, wood, bone, clay (fired and unfired ceramics), plants (seeds, charcoal, pollens, plant parts), and other materials.

Human occupation of the mountains, valleys, canyons and mesas of the Utah National Forests has been continuous for the last 10,000 years and probably longer. Remains of past human lifeways are found throughout the forests. Since the mid-1970s, the Forest Service has conducted cultural resource inventories to identify and evaluate cultural resources. These surveys have been conducted largely in advance of proposed undertakings on federal lands. Since that time, approximately 244,000 acres of National Forest System lands have been examined inventoried at various survey intensities resulting in the identification of over 8,300 sites. Figure 3- 2 provides data on the status of cultural resource inventories and inventoried sites by individual Forest.

FIGURE 3- 2
Cultural Resources by Forest, 1998*

Activity	Ashley	Wasatch-Cache	Uinta	Dixie	Fishlake	Manti/ LaSal	Total
Acres Surveyed	23,745	33,348	47,269	20,000	30,000	90,000	244,362
Percent Surveyed	1.7	1.7	4.8	1.0	1.9	6.3	
Total Sites	947	257	309	1,698	1,621	3,493	8,319
Total Sites Eligible	121	89	85	923	319	461c	1,537c
Sites on the NRHP	**0**	**1**	**0**	**3a**	**175b**	**2**	**142**

* Intermountain Region USDA-Forest Service Data Submitted for the Secretary of Interior's Report to Congress on Federal Archaeology Activities (1998).
a. Data from Dixie National Forest Environmental Impact Statement and Land and Resource Management Plan, pp. III-9.
b. Data from Gooseberry National Historic District and Aspen Cloud Rockshelters. Data from Fishlake National Forest Environmental Impact Statement and Land and Resource Management Plan, pp. III-24.
c. Many early surveys in the Manti-La Sal did not evaluate the National Register significance of sites. However, forest archaeologists estimate that of the 3,493 known sites, approximately 2,800 of these may qualify for listing in the National Register. Consequently, the total number of eligible and potentially eligible sites in the Utah National Forests may exceed 4,300.

From these data it is tempting to generalize about the number of sites that should be expected to be located within the Utah National Forests. However, because many of the surveys to locate cultural resources were conducted in support of other land developments, and not strictly to gain data that could be used to predict the numbers, types and location of sites in the forests, it is not possible to provide accurate estimate of the total number of expected sites in each of the Forests without much more detailed analysis/data.

The Utah Forests contain sites, which have been nominated and are listed in the National Register of Historic Places. On the Dixie National Forest these include the Mountain Meadows Massacre Site, the Pine Valley Chapel and Tithing Office and the Long Flat Prehistoric Stone Tool Quarry. In the Fishlake NF, the Gooseberry Historic District containing approximately 175 individual prehistoric properties and the Aspen Cloud Rockshelters have been nominated to the National Register. On the Manti-La Sal NF, the historic Great Basin Range and Watershed Research Station containing approximately 10 buildings and associated features and the Pinhook Battlefield Site are listed in the National Register. In addition, an area within the Monticello Ranger District of the Manti-La Sal containing prehistoric Anasazi puebloan sites may be eligible for listing as a Historic District.

Interpreted historic sites in the Utah National Forests include Swett Ranch and the Ute Fire Lookout (Ashley NF), Bullion Canyon Gold and Silver Mining Sites (Fishlake NF), the Great Basin Research Station, Stuart Ranger Station, Dry Wash and Devils Canyon Ruins (Manti-La Sal NF), and Wildcat Ranger Station (Dixie NF).

3.7.2 ENVIRONMENTAL CONSEQUENCES

Introduction

Direction for cultural resource management is provided in law, regulation, policy, and Forest plan direction for all six National Forests; thus, cultural resource management will not differ significantly by alternative. Effects vary and are dependent on a number of factors including fuel loads, burn temperatures and burn duration, and materials found in cultural resource sites.

There are several cultural resource site types believed to be at risk from unwanted wildland fire, wildland fires managed for resource benefits and prescribed fires. Those believed to be at high or moderate risk from the direct and indirect effects of all fires include historic sites with standing or down wooden structures and other flammable materials, historic cemeteries, aspen trees containing historic inscriptions, prehistoric rock art sites, prehistoric human burial locations, prehistoric sites with flammable architectural elements and flammable features, prehistoric artifact scatters in unstable geomorphic settings, prehistoric and historic artifact scatters whose significance is derived solely or largely from diagnostic data contained in surface artifacts, aboriginally peeled trees, prehistoric rockshelters and caves, cultural landscapes, and traditional cultural properties. For discussion purposes, sites at high or moderate risk are referred to as “fire-susceptible cultural resources”.

Those believed to be at lower risk include prehistoric and historic sites in deeply buried soil deposits, prehistoric artifact scatters in stable settings, prehistoric and historic scatters with non-flammable surface features, and sites officially determined ineligible for the listing in the NRHP. In this section, analysis is focused largely on the effects to fire-susceptible cultural resources.

Effects Common to All Alternatives (Alternatives A, B, C)

When considering effects to cultural resources from agency undertakings, potential impacts are evaluated with reference to how the significance-defining characteristics (i.e. the qualities of historic and archaeological sites that make them eligible for listing in the National Register of Historic Places) will be affected by the undertaking. As discussed above, these criteria refer to the qualities of significance in American history, architecture, archaeology and culture. For example, if a historic building has been deemed significant because it possesses a unique architectural style or is a good example of a period of construction, burning of the building by fire would have a direct, adverse and irreversible effect on the National Register defining quality of the building.

Some materials may be more resilient than others to fire effects. Materials lying on the ground surface are, in general, at more risk than those that are buried to direct effects from unwanted wildland fire, wildland fire use managed for resource benefits, and prescribed fire. However, buried sites located in unstable soils may be indirectly affected when a fire occurs and exposes the site to increased soil erosion potential.

A variety of management techniques are available to Forests under all alternatives to reduce or, in some cases, eliminate the effects of fire. These techniques include identifying known fire-susceptible sites and areas likely to contain fire-susceptible sites; using natural topographic features, vegetation clearings, existing roads and hand-built or dozer-constructed lines to limit the spread of fire; and establishing wet lines or applying retardant to halt fire spread. In addition, ensuring cultural resource specialists are

involved in prescribed fire, wildland fire use, and fire suppression planning and activities will assist fire managers in identifying and recommending appropriate actions to protect fire susceptible resources. While these tools are available to Forests under all alternatives, their use remains at the discretion of each Forest.

Prescribed Fire: Identification and protection efforts will continue to focus on prescribed fires on a case-by-case basis. Forests have employed sampling strategies focused on obtaining a representative sample to determine the types and numbers of cultural resources to be likely in prescribed burns' areas of potential effect and surveys designed by professional Forest archaeologists to identify sites believed to be vulnerable to direct effects from fire and fire management actions. In addition, surveys have focused on areas within proposed fire units that were most likely to be used for manual and mechanically constructed fire control lines and which also had potential to contain significant and cultural resources that could be affected by suppression actions. Many prescribed fires have used natural fire breaks (e.g. vegetation breaks, existing roads, and streams) to control the spread of prescribed fire. These practices would continue, but largely on a project-by-project basis subject to review and consultation with the SHPO. The degree of risk for direct and indirect effects to cultural resources from prescribed fire is expected to be less compared to wildland fire use and wildland fire suppression because office and field surveys identify fire-susceptible cultural resources prior to ignition of a prescribed fire.

Wildland Fire: Such advance planning is not feasible on unplanned wildland fires where suppression efforts are undertaken. In these cases, cultural resource specialists have been employed on fire management teams to identify cultural resources in the fire area and in some cases to conduct survey in advance of ground-disturbing activities deemed necessary to control the fire (e.g. mechanically-constructed fire lines). In these instances, cultural resource protection efforts have largely focused on avoiding and protecting sites from suppression activities; these efforts would continue. Guidance for wildland fire use and suppression has established that protection of cultural resources will be undertaken only if the safety of fire personnel can be assured. Given that fire behavior is not always predictable, known susceptible cultural resources could be directly/indirectly affected by wildland fire.

Unavoidable effects from fire on cultural resources have occurred in the past and are expected to occur in the future. While project-specific measures allow many known cultural resources to be protected, unidentified cultural resources (e.g. cultural resources located in areas which have not yet been surveyed) can be damaged or destroyed by wildland fire suppression and wildland fire use holding and monitoring activities associated with unplanned wildland fire management. Thus, there is an element of risk of damage/destruction to fire-vulnerable cultural resources under all alternatives.

For unplanned wildland fires, it is likely that monitoring efforts will identify damage to susceptible cultural resources after wildland fire has occurred. As future surveys are completed for Forest Service undertakings, additional resources will be located that will require documentation, evaluation and protection. Some may warrant stabilization and interpretation.

As public use of the Utah Forests continues to rise as expected, impacts to cultural resources are expected to increase. Unauthorized collecting, theft and illegal excavations are occurring and will continue. Natural erosion and depositional processes will also continue to affect cultural resources. Data collection through excavation to mitigate the unavoidable adverse effects caused by planned undertakings will occur and result in some loss of cultural resources.

Alternative A Effects

Under this alternative, it is likely that in long-term fuel loading would continue to increase; thus leading to larger, uncharacteristically severe fires. When unplanned ignitions occur, the agency may not be able to manage wildland fire within prescription limits. Some susceptible cultural resource sites will be directly and indirectly affected when this occurs.

Alternative B Effects

Standard case-by case field survey, identification and evaluation of historic properties and the completion of routine consultation with the State Historic Preservation Office are not feasible or reasonable with wildland fire use or for wildland fire suppression activities.

For such situations, the National Historic Preservation Act and its implementing regulations provides flexibility and allows agencies to develop programmatic procedures and to implement phased compliance programs (36 CFR 80013(a)) in consultation with the State Historic Preservation Office. The Utah Forests anticipate completing a programmatic agreement for wildland fire use and suppression, which would establish these procedures and protocols. Agreed upon protocols would establish guidance and direction for all Utah Forests to identify known sites and areas deemed to have potential for containing susceptible cultural resources prior to approving the wildland fire use sections of the fire management plans, and to establish strategies and tactics that can be applied in wildland fire planning, use and suppression actions. These procedures would be incorporated into the fire management plans prior to approval and before a decision (the "go-no go" decision; Figure 1-4) has been made to manage wildland fire use for resource benefits.

By establishing uniform protocols and procedures for identification, it is anticipated that advance planning will assist forests to identify susceptible sites prior to wildland fire use and provide fire managers with better tools to protect fire-susceptible cultural resources. Consequently, identification and protection efforts would be applied more uniformly and consistently statewide than they currently are under Alternative A.

Alternative C Effects

Effects to cultural resources under this alternative would be similar to those discussed in Alternative B with the following exception. Because timber emphasis and sensitive watershed areas would be added to the list of areas not authorized for wildland fire use, the number of susceptible cultural resources that could potentially be directly affected by wildland fire use would be less. However, given that fuels may continue to build in these areas, the potential for larger, uncontrollable fires could increase potentially posing a higher degree of long-term risk to fire-susceptible cultural resources in timber emphasis and sensitive watershed areas.

3.8 SCENERY, RECREATION AND WILDERNESS

Legal and Administrative Framework

Authorities to manage scenery and recreation come from general laws related to National Forest manage-

ment, e.g., the Multiple Use-Sustained Yield Act of 1960, the Wilderness Act (1964), the Wild and Scenic Rivers Act (1968), and the National Forest Management Act of 1976. However, many specific federal regulations (Codes of Federal Regulations), policies (Forest Service Manuals and Handbooks), and other guidance (technical manuals and papers) for scenery and recreation management exist for the Forest Service.

The Visual Quality Objective (VQO) system was used to develop current Forest Plans. The Forest Service has recently adopted a new scenery analysis and planning system, called the Scenery Management System (SMS). Currently, new scenery inventory data is being collected for the six National Forests in Utah using SMS methods. These data are not yet available or incorporated into the existing forest plans. They will be used in Forest Plan revision work within the next few years. Therefore, this environmental analysis will rely on the VQO information in the existing forest plans.

Wilderness is designated by an act of Congress. The Wilderness Act (P.L. 88-577) was passed in 1964. This legislation established the National Wilderness Preservation System, defined Wilderness, and set general guidelines for the designation and management of Wilderness. This enabling legislation, which created many Wildernesses in the United States, did not designate any Wildernesses in Utah. The Endangered American Wilderness Act of 1978 (P.L. 95-237), was the first to set aside National Forest lands in Utah as Wilderness, by designating Lone Peak Wilderness. The Utah Wilderness Act of 1984 (P.L. 98-428), named several new Wildernesses on National Forests in the state: High Uintas, Mt. Naomi, Deseret Peak, Mt.Olympus, Twin Peaks, Wellsville Mountain, Mt. Timpanogos, Mt. Nebo, Dark Canyon, Ashdown Gorge, Box-Death Hollow, and Pine Valley Mountain Wildernesses. A Forest Service Manual Chapter (2320), provides implementing policy and guidelines for Wilderness, and each National Forest Land Management Plan has management direction for Wilderness in Utah (except for the Fishlake National Forest where there is no designated Wilderness.) Many valuable how-to books on Wilderness, academic texts on Wilderness, visitor guides, and manuals from other federal agencies also provide useful insights to Wilderness managers and users.

3.8.1 AFFECTED ENVIRONMENT

Introduction

Utahns and visitors from other states and foreign countries spend millions of days each year enjoying various outdoor recreation activities on National Forest lands. A wide variety of outdoor recreation activities are possible on National Forest lands: developed recreation at picnic areas, campgrounds and ski areas; and numerous activities in backcountry areas; hiking, hunting, fishing dispersed camping and using off-road vehicles. Recreation activities take place year-round, with both developed and dispersed opportunities available in every season. The Recreation Opportunity Spectrum (ROS) is often used as a planning tool and descriptive device to identify the types of recreation opportunities that may be expected in different parts of a National Forest. Forests are mapped into ROS zones from very primitive non-motorized (essentially Wilderness) to very developed motorized (urban) opportunities, to give visitors an idea of what to expect in a particular setting.

A mosaic of vegetation and the scenery it adds to can be very important in the overall recreation experience. Scenic variability is very high in Utah, with landscapes ranging from low elevation desert, shrub and grassland settings, through a variety of deciduous and conifer forests, riparian areas, and upper elevation

montane and alpine areas. Each of these scenes is in part defined by the underlying geology, precipitation patterns, the aforementioned vegetation, and in response to the human uses present (or absence of uses).

Scenic values have been addressed in current forest plan goals, standards, and guidelines for the six National Forests headquartered in Utah. These forest plans were developed in the mid-1980's, a period when emphasis on recreation was growing significantly, and it was recognized that scenery was needed to support recreation experiences and as backdrops for communities. Visual Quality Objectives were usually mapped or defined in most Forest Plans identifying sensitivity levels of zones where the landscape was classified as preservation, retention, partial retention, or modification depending on the degree of allowable change.

The National Forests of Utah have fifteen designated Wilderness Areas as shown in Figure 3-3. The Fishlake National Forest has no designated Wilderness, and therefore is eliminated from consideration of effects of these alternatives regarding Wilderness.

FIGURE 3-3
Wilderness Areas in Utah National Forests

National Forest	Wilderness Name	Acreage
Ashley	High Uintas	276,175
Dixie	Ashdown Gorge	7,000
"	Box-Death Hollow	25,814
"	Pine Valley Mountain	50,000
Manti-La Sal	Dark Canyon	45,000
Uinta	Lone Peak	21,166
"	Mt. Nebo	28,000
"	Mt. Timpanogos	10,750
Wasatch-Cache	Deseret Peak	25,500
"	High Uintas	180,530
"	Lone Peak	8,922
"	Mt. Naomi	44,350
"	Mt.Olympus	16,000
"	Twin Peaks	11,334
"	Wellsville Mountain	23,580
	Total	774,328

In general the Wildernesses on National Forests in Utah are at higher elevation settings and have both forested, alpine and some scrubland vegetation in them. The Dark Canyon Wilderness is an exception to this generalization; lying at lower elevations, it is generally comprised of sandstone canyonlands with pinyon/juniper and scrub vegetation. At a minimum, Wildernesses have value as unmodified natural settings that can help sustain biological diversity and natural processes and value for primitive recreation. The definition of wilderness included in the original 1964 Act (below), succinctly states the fundamental values associated with designated Wilderness.

"(c) A wilderness, in contrast with those areas where man and his own works dominate the landscape, is

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

3.8.2 ENVIRONMENTAL CONSEQUENCES

Introduction

Two evaluation criteria have been identified for assessing effects of each alternative on scenery and recreation. First, changes to scenery, and recreation experience will be described for each alternative. Then, consideration will be given as to of whether changes in scenery and recreation use are consistent or inconsistent with visual or recreation direction in current forest plans. For Wilderness, the evaluation of effects is made through a consideration of effects to wilderness values as identified in the Definition of Wilderness (Wilderness Act, 1964).

Effects Common to All Alternatives (Alternatives A, B, C)

Scenery and Recreation The frequency and magnitude of wildland fire disturbance and resulting changes in scenery and recreation use is expected to be less in ecosystems not adapted to wildland fire when compared to vegetation ecosystems that are fire adapted. For example, in alpine areas fire is an infrequent event, at any time, and changes in scenery for these areas are affected to a greater degree by more dominant disturbance processes such as wind and landslides. The effects of wildland fire in non-fire adapted and fire adapted ecosystems is described in section 3.1 of this EA.

Fires are most often perceived as natural phenomena, and while, to some, they may diminish scenic quality in the short term, their presence does not unduly affect visitor recreation experiences (Love and Watson, 1992). People have begun to understand natural disturbance processes are integral to these systems, have maintained and perpetuated these landscapes, and that we should allow for this. Mass media coverage and government explanations of large, high-intensity unwanted wildland fires and ecosystem function have partially changed the general public's perception regarding the role of fire in forested ecosystems (Parfit, 1996). While studies show that people still generally prefer recreating in a vigorous forested landscape to one which has experienced a recent fire (Love and Watson, 1992), people also have gained an appreciation for natural processes.

Wilderness Four of the five National Forests in Utah with designated Wilderness provide direction in existing forest plans that allows the use of prescribed fire and prescribed natural fire (now called wildland fire use) in Wilderness. (As mentioned earlier, the Fishlake National Forest has no designated Wilderness.) These four are the Ashley, Dixie, Manti-La Sal and Uinta. For these four National Forests direction in the proposed action and in the current forest plans is essentially identical. The only changes from the

proposed action are terminology changes associated with the updated national fire policy. Therefore, the effects of choosing any of Alternatives A, B, and C are the same.

For the Wildernesses on these Forests, as well as for the High Uintas Wilderness on the Wasatch-Cache, the long term effects of operating under management that allows for prescribed fire and wildland fire use for vegetation, watershed, biodiversity, wildlife, recreation experience (etc.) and other values are discussed in those sections of this document.

The Forest Service Manual for Wilderness (Chapter 2324.21) defines two objectives for fire management in Wilderness. These are: "Permit lightning caused fires to play, as nearly as possible, their natural ecological role within wilderness." and "Reduce, to an acceptable level, the risks and consequences of wildfire within wilderness or escaping from wilderness."

Other more detailed direction on the use of prescribed fire and wildland fire use provide that area specific fire management planning be completed prior to its application. For values identified for Wilderness as described in the definition for Wilderness (above) a choice for any of the three alternatives will have positive effects, i.e. toward enhancement of conditions supportive to solitude or primitive recreation experience and to freely functioning ecological processes.

The Wasatch-Cache forest plan provides different direction than what exists for the other four National Forests with Wilderness in Utah. The current forest plan for the Wasatch-Cache does not allow the use of prescribed fire or wildland fire use in six of the seven Wilderness Areas that it manages. The exception is the High Uintas Wilderness, for which a forest plan amendment was done in 1997, with the FEIS for Management of the High Uintas Wilderness and its Record of Decision. This decision provided for prescribed fire and prescribed natural fire (now called wildland fire use) in the High Uintas. For the High Uintas effects similar to those described above for other Utah Forests can be anticipated for choosing any of the three alternatives presented in this document, i.e. generally positive effects on Wilderness values.

Alternative A Effects

There will be no discernible change in short-term effects (less than 4 years) to scenery from continuation with current forest plan direction. Recreation experiences for this term will not be affected by a continuation under current forest plan direction. For Wilderness, effects of continuation under current plan direction would not have any discernible change from current conditions over the short term.

Over the term specified by the scope of this amendment (circa four years), there will be little, if any, discernible affect to scenery or recreation from continuation with current plan direction. Continuation of current suppression responses, chances for larger, intense and severe fires increase, and it is expected that at some time in the future larger areas would burn, having larger areas of scenery affected by fire. Recreationists who prefer a forested setting are expected to displace to areas not burned. We expect sufficient acres to be available at any given point in time throughout the state of Utah.

As time continues, however, each year brings the increased possibility that fuel buildups from restricted use of prescribed fire or wildland fire use may bring on a heavy fire season with increased losses. Other potential for losses to insect infestations will increase in older stands over time. There will be continued loss of the aspen component, as more conversion to conifer occurs. Additionally, more grasslands would convert to pinyon/juniper. There is potential for this in the next four years, which would definitely affect

scenery and recreation experiences.

If current suppression of fire continues over the next 50 to 100 years, the pinyon/juniper community will continue to become a more dominant element in the landscape at lower elevations, reducing scenic variety. Historically, grass covered slopes were seen as a positive scenic attribute. This character has been greatly reduced as a result of the suppression of fire, and heavy grazing in the late 1800's and early 1900's. Fire is a necessary component for maintaining grass dominant communities. Continued active fire suppression will continue to increase the possibility of very severe, large-scale wildfires, that would likely dominate the landscape if they were to occur.

Throughout the short term, no action will result in little perceived change in aspen stands. If no disturbance events occur over the next 50 to 100 years, the aspen will become a less dominant element in the landscape. Many aspen clones will be encroached by spruce/fir, gradually over taking and sometimes destroying the clone. Other aspen clones have reached maturity and may begin to die without a disturbance event. Loss of aspen would change the landscape character of the region.

Excluding fire from conifer components of the forest mosaic will make them increasingly subject to larger fires as they age. Dense fuel buildups, and insect and disease infestations in older stands are more common than in younger forests, and chances for high intensity fires will increase over the next 50 to more than 100 years. Consequent larger scales effects on scenery and recreation in the conifer zones of forests can be expected under continuation with current management direction.

For Wilderness no difference among effects is anticipated for all Forests in Utah except for the Wasatch-Cache (See Section 3.8.2 Effects Common to All Alternatives (Alternatives A, B, C) above.) For all Wildernesses on the Wasatch-Cache: Mt. Naomi, Wellsville Mountain, Lone Peak, Twin Peaks, Mt. Olympus, Deseret Peak (except the High Uintas) the following direction is provided: " Suppress all wildfires. During periods of lowfire intensity or when natural barriers can be utilized, cost plus net change will be a prime considertion in determining appropriate actions." (W-CNF LMP, 1985: pages IV-209, 219, and 289). Other direction in the current plan requires minimum tool approaches to the suppression, response, demobilization, or any rehabilitation that might be needed. Thus, for the Wasatch-Cache, alone among National Forests in Utah, differing effects from direction in the No Action (Alternative A) and Alternatives B and C is possible, as current direction does not allow for prescribed fire or wildland fire use.

Longer term, cumulative effects of a continuance of consistent fire suppression activities in Wilderness on the Wasatch-Cache for vegetation, watershed, wildlife and other resources are addressed in other sections of this chapter as stated in those sections. For values that are peculiar to Wilderness [as defined in the Wilderness Act (above) e.g. solitude, primitive recreation experience, untrammeled settings, primeval character and influences, etc.] continuation under the No Action Alternative, (further fire suppression activities) is interruptive of those primitive recreation experiences, natural ecological processes and other associated values.

Alternative B Effects

Scenery Prescribed burns have been found to impact scenic beauty in the short-term, but with vegetation recovery, can enhance scenic beauty within five years (Rosenberger and Smith, 1998). Prescribed fire and wildland fire use cause short and long-term visual impacts, and may begin to dominate the view as the size of the area burned increases. This includes charred bark of standing trees and down logs, and a

blackened appearance to the ground and burned understory plants. Visual impacts will be reduced within two years, with the regeneration of ground cover plants and the deposition of forest litter over the burned sites. Regeneration of ground cover is expected to take place within one to two years. Grasses and brush sprouts will reduce the blackened appearance of the ground surface. Charred bark, limbs and other fire related features may be visible for many years, especially in spruce/fir, aspen and pinyon/juniper communities.

Aspen is a disturbance dependent species, and fire is a primary disturbance agent in aspen regeneration. Aspen is generally regarded as a very positive scenic element in the landscape. Regeneration is expected to take place in aspen stands within one year, shoots growing two to three feet within the first year. Treated aspen clones have a shrubby appearance for fifteen to twenty years following the fire. They would still provide fall color at this stage and increase the potential wildlife watching opportunities. Because aspen grows relatively quickly, within twenty to thirty years the stands begin to develop a high canopy. When a viable aspen clone exists in a spruce/fir community, aspen will be the first trees to return to the area.

Spruce/fir other conifer forests take longer than aspen to regenerate. An understory of grasses, forbs and shrubs will be visible within a year. In light shade or full sun, trees grow to four or five feet in about 20 years (Brunswick, 1998). For the next 80 to 100 years, the forested areas following the prescribed fire will have the appearance of a young forest; many trees will be in the seedling to sapling age classes.

Since most visitors perceive fire altered landscapes as a natural phenomenon (Taylor and Daniel 1984), prescribed fire is not likely to change undeveloped character of an area as long as mechanized constructed fire lines are not necessary to manage the fire. While fire has been considered to diminish scenic quality, the presence of fire did not adversely affect visitor satisfaction (Love and Watson 1992). Low to moderate severity fires are often perceived to enhance scenic quality for up to five years, because it reduced the understory vegetation and small woody debris. High severity fires were judged to cause deterioration in scenic quality and recreational acceptability for a prolonged time (Taylor and Daniel 1984).

Visitor perceptions of scenery are anticipated to be affected for one to fifty years, but to a lesser extent as time goes on. The level will be dependent on the recovery rate of ground cover and shrub regeneration. While the ground level and the branches of trees, shrubs and brush are blackened, and charred vegetation dominate the view, visitor expectations for how scenery ought to look are reduced. Within one to five years, as vegetation recovers, visitor expectations regarding scenery are usually met.

Recreation Fires may disrupt and reduce dispersed recreation activities for the short term and some displacement of activities from the immediate fire area to other areas will occur. Trail use, even in burned areas is not expected to decline markedly (Brunswick, 1998). It is possible that some recreationists may be endangered if they are not aware of agency notifications of proposed prescribed burn projects, although agency notifications of such activities will be prominent. If prescribed burns or other wildland fire use occurred within areas under permit to outfitter/guides, some displacement, interruption or modification of these permits/services might occur. It is anticipated that these disruptions would be relatively short term - for one to five years, until initial recovery of vegetation had taken place.

It is difficult to predict with precision how much reduction in recreation may occur, because many variables are unknown. Some research indicates that some negative effects are diminished scenic quality, displacement to other areas, on hunting, and water quality (Love and Watson, 1992). From a positive standpoint the same study found that recreationists felt that wildlife habitat, educational opportunities regarding fire, and stimulated vegetation growth were beneficially affected.

Local and regional use would be the most likely to be displaced during this period, because of more frequent visits and exposure to local publicity. Visitors from outside the region will be less likely to be displaced because of prescribed fire activities. Most visit the area infrequently, and probably would not change plans as a result of proposed treatments. Smoke from wildland fire use and prescribed fire may impact use and recreation experiences, dependent on wind and atmospheric conditions while the fire is burning. It is expected that with interpretation, explaining the actions taken, that impacts to recreation use can be reduced.

Over the longer term, it is expected that the overall effects for scenery and recreation will be positive. Vegetation mosaics will become more varied and colorful, and more vigorous vegetation will replace older decadent stands of shrubs and trees, which are susceptible to insects and disease. Grasslands and the amount of ground they cover will increase. Deadfall should decrease. Little of these effects will be evident within the course of the four year term that this decision covers. However, this alternative would start a process for the longer term for a return to vegetative complexes that are closer to the historic vegetative patterns prior to the arrival of Euro-American culture in the late 19th century.

Wilderness On the Wasatch-Cache, the overall long-term effect of choosing Alternative B would be that values associated with Wilderness would be allowed to more closely approximate the intent on the definition of wilderness provided in the Wilderness Act (1964).

Alternative C Effects

Scenery/Recreation Effects for this alternative would be similar to those for Alternative B, i.e., some short-term (1-5 year) displacement and reduction in recreation and degradation scenic values and scenic integrity, except that these reductions would not take place in sensitive watersheds or timber emphasis areas, since prescribed or wildland fire use would not be allowed in these areas. Consequently, any interruption of recreation or change of scenery in timber emphasis areas or sensitive watersheds would not be attributable to these agents.

For the longer term, that is beyond the scope of the four year term for this amendment, some scenic degradation can be expected in areas where prescribed and wildland fire use has been excluded. Similarly, potential for larger and higher intensity fires over the longer term increases with time. Elimination of prescribed and wildland fire from sensitive watersheds and timber emphasis areas, may lead to greater disruption of dispersed recreation activities in these areas, than if fire prescribed or wildland fire use had been allowed.

Wilderness On the Wasatch-Cache, the overall long-term effect of choosing Alternative C would be that values associated with Wilderness would be allowed to more closely approximate the intent on the Definition of Wilderness provided in the Wilderness Act (1964). Since this alternative does not allow prescribed fire or wildland fire use in critical sensitive watersheds, (portions of Lone Peak, Twin Peaks, Mt. Olympus, or Mt. Naomi Wildernesses are in municipal watershed), then some lessening of values defined in the Wilderness Act may occur, as protection of watershed and reduction of risks to identified values outside Wilderness are undertaken.

3.9 ACCESS

Legal and Administrative Framework

Access to National Forests lands was guaranteed in the time the National Forests were first created, in a paragraph in the *Organic Administration Act (1897)*. This basic value was recognized before the Forest Service was formally created as an agency in 1905 to administer National Forest lands (Steen, 1976:74). Since then a variety of direction regarding access and road and transportation systems has evolved. This includes many laws in which planning for and implementing transportation systems and access has been a topic. Included are the *Economy Act of 1932, Granger-Thye Act of 1950, National Forest Roads and Trails Act of 1964, Highway Safety Act of 1966, National Trails System Act of 1968, Federal Aid Highway Act of 1968, National Forest Management Act of 1976, and Surface Transportation Assistance Acts of 1978 and 1982*.

Additionally, direction is found in sections of the Forest Service Manual (7700) and Forest Service Handbooks on roads, trails, and other means of accessing National Forests. Finally, with the Natural Resource Agenda (1998) the Forest Service is developing new national level priorities and policies for appropriate planning for roads and travel networks within the context of ecosystem management. Implementation of this new roads policy will begin as we enter the 21st century.

3.9.1 AFFECTED ENVIRONMENT

Introduction

Access to the National Forests of Utah is provided by a network of transportation routes. Federal, state, county, and Forest Service roads, and Forest Service motorized and non-motorized trails make up this network. The type of vehicular or non-motorized access that is allowed is determined based on what is most appropriate for meeting forest plan goals and objectives for management areas. Forest and District travel plans outline which roads and trails are open to users, as well as seasonal regulations. Road and trail service and maintenance levels and road densities are defined in forest plans.

Public scoping identified an issue with respect to access. Some respondents wondered whether the proposed action might create resource problems (unauthorized road cutting, erosion, soil loss, and impacts to vegetation and wildlife) by providing new access opportunities through the creation of new openings in vegetation. The respondents' concern is that ATVs and 4 wheelers might move off-road more frequently if prescribed fire eliminates vegetative cover (barriers) to this mobility.

Additionally, concerns with possible effects of fireline construction in creating new access were raised. Bulldozing for fire breaks, road access, or other fireline construction can create new access into previously unroaded areas. This might also lead to the further development of unauthorized roads and trails, changing the desired character of the management area.

3.9.2 ENVIRONMENTAL CONSEQUENCES

Introduction

Two evaluation criteria have been identified for assessing effects of alternatives on conditions created by increased access. First, changes to access are considered, especially on increasing access from prescribed fire or wildland fire use and mechanized fireline construction associated with these. Then, consideration as to whether this is consistent or inconsistent with access opportunities in current forest plans.

Based on forest plan and travel plan decisions, some areas on National Forests may be closed to visitors. These closures or details on what access is allowable (e.g. vehicular or not, seasonality of access) can be amended at any time to meet current needs. In a travel plan only certain kinds of access are allowable, and these are defined.

Therefore, access by users, which is beyond what is currently permitted by forest or travel plans (and possibly causing resource damage), is a legal violation for which citations may be issued (36 CFR 261.12-14). Closures or other travel management decisions will be considered for areas where prescribed fire or wildland fire use projects are implemented as a part of any of the alternatives in this analysis. In any area where prescribed fire or wildland fire use would occur, law enforcement efforts might increase to keep users within the limits of legal travel (including signing or other public information to control visitors), but allowable access is not inherently changed. A legal violation of travel plan decisions is a violation, regardless of which programmatic fire amendment alternative is selected.

Effects Common to All Alternatives (Alternatives A, B, C)

Suppression responses using mechanized equipment and fire itself, create openings that off-road vehicles could negotiate. These openings are not intended to be used, or authorized for, public access. Some individual may choose to illegally drive off the approved access routes. During a fire, and sometimes following a fire, some forest access routes may be temporarily closed to protect public safety. In the short-term (under 4 years) no change from existing access conditions or travel management direction is expected with continuation under existing forest plan direction or either of the action alternatives. Short-term and long-term implementation of any of the three alternatives should not differentially affect access to the National Forests.

Travel management planning in coordination with fire planning will be responsible for determining appropriate access routes and types for forest plan management areas. All travel plan decisions regarding access on a National Forest, would be made to implement more general direction in a forest plan. As such they would have to be consistent, in any of the three alternatives being considered, with forest plan direction.

3.10 PROPERTY AND FACILITIES

Legal and Administrative Framework

FSM 7300 and *FSM 1241* require that Facility Master Plans be developed and revised to ensure proper planning and programming for buildings and related facilities to support the units' missions consistent with forest plans.

FSM 7500 - Water Storage and Transmission establishes policies, standards and criteria for the investigation, design, construction, emergency planning and response, maintenance and operation of water storage and transmission structures administered or permitted by the Forest Service. Water storage structures include all dams, settling ponds and tailing dams. Water transmission structures include ditches, flumes, tunnels, and penstocks.

Developed ski areas were originally authorized under the act of March 4, 1915, as amended July 28, 1956 (38 Stat. 1101; 16 U.S.C. 497) which authorized term permits for structures or facilities on National Forest System land and set up maximum limits of 80 acres and 30 years and the Act of June 4, 1897 (Ch 2, 30 Stat. 11, as amended 16 U.S.C. 473-475, 477-482, 551) which authorized annual permits for the land occupied by ski runs and undeveloped portions of the ski areas.

The *National Forest Ski Area Permit Act of 1986* (16 U.S.C. 497b) provides a unified and modern permitting process for Nordic and alpine ski areas on National Forest System lands.

The *Land and Water Conservation Fund Act of September 3, 1964* (16 U.S.C. 4601-4) provides for the acquisition and development of certain lands and other areas for outdoor recreation facilities.

The wildland-urban interface does not have any specific laws or policies governing its management but is affected by the pertinent laws and policies, which direct the management of all natural resources. There are cooperative agreements and memorandums of understanding that foster joint efforts across jurisdictions to address such issues as fire management.

3.10.1 AFFECTED ENVIRONMENT

Introduction

Currently within and adjacent to the six national forests in the State of Utah there are a vast number of Government and private properties and facilities. In many areas unwanted wildland fire has been a threat to these developments. As a consequence of total wildland fire suppression since the early 1900's, the incidence of property lost to unwanted wildland fire has increased. Figure 3-4 displays by decade how many acres have burned in the Intermountain Region (Southern Idaho, Western Wyoming, Nevada, and Utah) over the past 69 years (Intermountain Region Annual Fire Report, 1998).

FIGURE 3-4.
Number of acres burned in the Intermountain Region by decade between 1930 and 1998.

Decade	Average # Fires/Year		Average # Lightning Fires/Year			Average # Person Fires/Year		Average Lightning Caused Acres/Year
		Percent Lightning Caused		Percent Person Caused				
		Average		Average		Person Caused Acres/Year	Average	Acres/Year
1930-1939	940	602	338	63	37	27,443	26,316	53,759
1940-1949	713	480	233	67	33	16,747	27,301	44,048
1950-1959	733	486	247	67	33	3,084	7,574	10,658
1960-1969	940	685	255	73	27	9,736	8,756	18,492
1970-1979	1,116	735	381	65	35	8,708	14,065	22,773
1980-1989	987	713	274	72	28	87,509	36,288	123,797
1990-1998	1,192	899	293	75	25	125,813	20,159	145,972

In the late 1800's and early 1900's the transportation system that was used to access fires was primarily on foot, by horseback, railroad, and by vehicle on a few roads. During the mid to late 1940's access began to improve with the advent of smokejumping. Jeeps, trucks, aircraft (fixed and rotor wing), half-tracks, and bulldozers were used on the fire line. By the mid 1960's the use of helicopters became common as a form of transportation, equipment, and water delivery (Pyne et al. 1982). During the late

1980's and early 1990's there has been widespread development and use of helirappelling. By 1995 there were as many helirappellers in the nation as there were smokejumpers. Access and the speed in which fires could be attacked improved dramatically.

In spite of the fact that as the fire fighting resources became highly sophisticated and mobile in the 1980's and 1990's the number of acres that were burned per year dramatically increased. Also, even though the population and recreational use has increased dramatically from the early 1930's to the present time, the percentage of person caused fires by decade has decreased from 37 to 25 percent.

The increase in the number of acres burned per year is primarily a result of the increase in fuel loading due to decades of effective fire suppression. As fuel loadings increase, firefighting resources have become less and less effective in controlling wildland fires. Even though firefighters get to the wildland fires much quicker and in greater numbers than they did in the early years of fire suppression, many fires that do escape initial attack become much larger and more destructive than they use to. The end results are larger uncontrollable wildland fires that destroy increasing numbers of Government and private properties and facilities every year.

A few of the Forest Service properties and facilities that can be threatened by unwanted wildland fire each year include, but are not limited to, camp and picnic grounds, visitor information buildings, administrative sites, guard stations, look out towers, water developments (range and culinary) sanitation facilities, fences, communications sites, Remote Automatic Weather Stations (RAWS), and bridges for roads and trails, to mention a few. Figure 3-5 summarizes some of the facilities and developments that are owned by the Forest Service on the six National Forests in Utah. They are as follows: administrative sites (guard stations), developed recreation sites (campgrounds, picnic sites, etc.), communication sites, Remote Automatic Weather Stations (RAWS). Many of these facilities and developments are located on the Forests where they can be threatened by wildland fire (Forest Plans for Ashley, Dixie, Fishlake, Manti-La Sal, Uinta, and Wasatch-Cache National Forests).

FIGURE 3-5.
Number of facilities and developments operated by the Forest Service in Utah.

Forest	Admin. Sites	Dev. Rec. Sites	Comm. Sites	RAWS
Ashley	147	95	5	4
Dixie	66	41	11	4
Fishlake	?	28	?	3
Manti-La Sal	74	24	7	3
Uinta	8	51	6	2
Wasatch-Cache	156	151	10	4

In the private sector some of the properties, developments and facilities that can be threatened by unwanted wildland fire each year because they are either within a forest boundary or immediately adjacent to it, include but are not limited to, resorts and lodges, ski facilities, concessions, summer homes, utilities (power lines, oil/gas transport lines, oil/gas wells and pump stations, telephone lines, etc.), permanent residences and land, communication sites (radio, microwave, cellular phones, etc.), railroads, highways support facilities, rest stops, and recreation facilities. Figure 3-6 summarizes the properties, facilities and developments that are privately owned that have special use permits issued by

the Forest Service (Forest Plans for Ashley, Dixie, Fishlake, Manti-La Sal, Uinta, and Wasatch-Cache National Forests). They are as follows: ski areas, lodges and resorts, recreational residences, camps and concessionaries, communication and electronic sites, oil and gas sites, mining sites, above-ground utility lines, and State regulated highways. Figure 3-7 summarizes the number of acres of private and State lands within forest boundaries for the six national forests.

FIGURE 3-6.
Number of properties, facilities and developments that are privately owned and are under special use permits in Utah.

Forest	Ski Areas		Lodges, Resorts	Rec Res	Camps, Conces	Comm. Sites	Oil & Gas Sites	Mining Sites	Above-Ground Utilities	State Reg Roads
Ashley	0	5	58	4						
Dixie	1	2	43	1						
Fishlake	0	3	8	3						
Manti-La Sal	0	2	43	3						
Uinta	0	1	102	4						
Wasatch-Cache		6	5	10	4					
Totals	7	17	264	19						

FIGURE 3-7.
Number of acres of private and State lands within forest boundaries

Forest	Acres of Private and State Lands Within Forest Boundary
Ashley	10,022
Dixie	83,298
Fishlake	109,835
Manti-La Sal	82,646
Uinta	86,711
Wasatch-Cache	726,298
Totals	1,098,810

3.10.2 ENVIRONMENTAL CONSEQUENCES

Introduction

This discussion of the environmental consequences on government and private property and facilities will cover all the Forests in the State of Utah and areas immediately adjacent to those forests where wildland fire can threaten them.

How wildland and prescribed fires are managed has and will have a direct effect on the protection of Government and private property and facilities. The original wildland fire management policy consisted of total fire exclusion with little if any prescribed fire. This policy was a result of large deadly fires in the Lake States and Idaho that occurred in the late 1800's and early 1900's (Pyne et al. 1982). Many of these fires occurred due to poor brush disposal practices that left high levels of logging slash. The practice of total fire exclusion produced acceptable results with extensive organization and effort following the 1910 fires in Idaho and Montana. However, the effects of almost total elimination of natural fire in the wildland environment for the past 80 to 90 years has had a profound effect on the amount of natural

fuels which have increased to high and extreme levels in many of the low and mid level elevations. With this increase in wildland fuels has come an increase in the number of large destructive wildland fires. The increasing loss of Government and private property and facilities is a direct result of those fires (Pyne et al. 1982).

Alternative A Effects

An indirect effect that would likely occur if the current forest plan directions regarding fire suppression, prescribed fire, and wildland fire use continue is the need for increased fire suppression funding and resources on the Forests. The Aviation and Fire Management budget is determined by the National Fire Management Analysis System (NFMAS), which was developed back in the early 1980's. If the current trend of larger, more destructive unwanted wildland fires increases, NFMAS will indicate that there is a need for additional funding and fire suppression resources. However, it has become apparent to many fire managers during the past decade that more fire suppression resources will not effectively control the large unwanted wildland fires that are occurring with increasing numbers nation wide.

An indirect long-term effect under Alternative A is the continued accumulation of hazardous natural fuels. The use of prescribed fire as a management tool to reduce hazardous fuels is on the increase statewide. However, at the present time there are relatively very few designated Fire Management Areas on the six National Forests that utilize wildland fire for resource benefit. The Fishlake and the Dixie National Forests are the only Forests out of the six that actively utilize wildland fire use for resource benefit outside of a wilderness area. If this trend continues and hazardous natural fuels are permitted to increase, the risk of loosing Government and private property and facilities from large uncontrollable wildland fires will continue to increase.

The present level of fuels treatment utilizing prescribed fire and mechanical treatment on the National Forest in the State of Utah may not be adequate to reduce the risk from unwanted wildland fire. To illustrate this point Figure 3-8 shows the projected approximate prescribed burn acreage for FY 2000 for the six National Forests. Figure 3-8 indicates that only 1.6 percent of the forested land (70,800 acres) would be treated in FY 2000 with prescribed fire. If only 70,800 acres were treated each year it would take 30 years just to treat half (2,147,550 acres) of the forested land on the National Forests in the State of Utah (Forest Plans for Ashley, Dixie, Fishlake, Manti-La Sal, Uinta, and Wasatch-Cache National Forests).

FIGURE 3-8.
The projected prescribed burn acreage for FY 2000 in Utah.

Forest	Approximate Rx Burn Target for FY 2000			Total Forest Acreage	%
	Rx Burn Acres of Forest Total	Total Forested Acreage		% Rx Burn Acres of Forested Acreage	
Ashley	11,000	1,373,219	0.8%	836,900	1.3%
Dixie	24,300	1,967,187	1.2%	1,069,900	2.3%
Fishlake	15,900	1,424,479	1.1%	770,000	2.1%
Manti-La Sal	11,500	1,334,491	0.9%	689,800	1.7%
Uinta	4,700	913,333	0.5%	400,000	1.2%
Wasatch-Cache	3,400	1,219,748	0.3%	528,500	0.6%
Totals	70,800	8,232,457	0.9%	4,295,100	1.6%

Figure 3-9 shows how many acres were treated with prescribed fire and wildland fire use in the Intermountain Region from 1991 to 1998. Although there has been a dramatic increase in the number of acres that have been treated over the past 9 years, the amount of acres treated is beginning to level off over the past 4 years (Intermountain Region Annual Fire Report, 1998).

FIGURE 3-9.
Number of acres treated using prescribed fire and wildland fire use in the Intermountain Region between 1991 and 1998.

Year	Prescribed Fire	Wildland Fire Use for Resource Benefit	Totals
1991	4,758	0	4,758
1992	9,627	0	9,627
1993	7,916	0	7,916
1994	9,331	0	9,331
1995	15,392	0	15,392
1996	41,438	8,900	50,338
1997	60,525	273	60,798
1998	68,961	16,432	85,393
Totals	217,948	25,605	243,553

Figure 3-10 shows how many acres were treated with prescribed fire on the National Forests in Utah from 1994 to 1998. All of the Forests in Utah have increased the acres that they have prescribed burn during this period of time. However, like the prescribed burn program in the Region, prescribed burning on the six national forests in Utah is also beginning to level off.

FIGURE 3-10.
Number of acres treated using prescribed fire on the National Forests in Utah between 1994 and 1998.

Year	Ashley	Dixie	Fishlake	Manti-La Sal		Uinta	Wasatch-Cache
1994	166	800	3,132	95	364		0
1995	1,449	1,100	2,526	1,505	0		50
1996	3,440	3,700	6,772	2,000	0		895
1997	5,000	11,000	5,593	0	0		950
1998	3,310	17,216	6,600	6,750	1,200		800
Total	10,550	33,816	24,623	10,350	1,564		2,695
Average		2,110	6,763	4,924	2,070	313	539

Alternative B and C Effects

Alternatives B and C identifies areas in, or around, all the National Forests that have Government and private property and facilities where wildland fire use would not be used. The risk of damaging or loosing property or facilities from wildland fire use would be reduced significantly. Prescribed fire and other methods could be used in those areas to reduce the fire hazard and help in the protection from un-wanted wildland fire.

Over time, as more areas are treated with wildland fire use (where it will not threaten property and facilities) and prescribed fire the forests will gradually experience fewer large, destructive, uncontrollable wildland fires. The occurrence of wildland fire and it's use for resource benefit would be random and the area burned in each event would be monitored and allowed to take its natural course while meeting forest plan direction and prescription in the Fire Management Plan. The amount of acres burned over time across landscapes would be expected to result in a reduction of hazardous fuels and the breaking up of large tracts of continuous heavy downed fuels. This reduced hazard would be expected to lead to a reduced risk to property and facilities in the long-term.

Alternative C could decrease the risk, compared to alternative B, to property and facilities within the timber emphasis and sensitive watershed areas IF prescribed fire can "keep up" with fuel accumulation and address fuel continuity. Exactly how much is difficult to determine. IF sufficient prescribed fire is not applied then the risks to property and facilities within these areas could increase over time. The effects could then become more similar to Alternative A.

Both action Alternatives B and C have the guideline that wildland fire use will be authorized forest wide except in Government or private properties or facilities. They both give the guideline that authorizes the use of prescribed fire forest wide. The common effect both of these alternative have on Government and private property and facilities is that they will be better protected with less threat to their loss as more and more natural wildland fuels are treated. In and around many of the Government and private properties and facilities prescribed fire along with mechanical treatments can be used to greatly reduce the risk from wildland fires. As more areas in and around these resources are treated, the opportunity to safely apply wildland fire use (natural ignitions) for resource benefits will also increase.

3.11 TIMBER

Legal and Administrative Framework

From a legal standpoint, the principal statues governing timber management on National Forests are:

· The *Organic Act of 1897* (16 U.S.C. 473-475) authorizes the Secretary of Agriculture to establish regulations governing the occupancy and use of National Forests and to protect the forests from destruction.

· The *Knutson-Vandenburg Act of 1930* (16 U.S.C. 576-576b), as amended by the *National Forest Management Act of 1976* (16 U.S.C. 472a), directs the Secretary to provide for improvement of the productivity of the renewable resources within the National Forest timber sale areas. It authorizes the collection and use of timber receipts for these purposes.

· The *Multiple-Use, Sustained Yield Act of 1960* (U.S.C. 528-531) recognizes timber as one of five major resources for which the National Forests are to be managed. It further directs the Secretary to develop and administer the renewable surface resources of the National Forests for multiple-use and sustained yield of the many products and services obtained from these resources.

· The *Roads and Trails Act of 1964* (16 U.S.C. 532-538) directs the Secretary to provide for the existence of an adequate system of roads and trails within or near National Forest.

· The *Small Business Act* (15 U.S.C. 644, as amended 1958) provides for the agencies to participate in programs with the Small Business Administration. This is the authority for the Small Business Timber Sale Set-aside Program.

· The *National Environmental Policy Act (NEPA) of 1969* (16 U.S.C. 4321) requires agencies to analyze the physical, social, and economic effects associated with proposed plans and decisions, to consider alternatives to the proposed action, and to document the results of the analysis.

· The *Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA)* (16 U.S.C. 1600-1614), as amended by the *National Forest Management Act of 1976*) directs the Secretary to periodically assess the forest and rangeland resources of the nation, and to submit to Congress at regular intervals, recommendations for long-range Forest Service programs essential to meet future resource needs.

· The *National Forest Management Act (NFMA) of 1976* (16 U.S.C. 472a) sets forth the requirements for Land and Resource Management Plans for the National Forest System. It also amends several Acts applicable to timber management. It specifically addresses most aspects of timber management and how it is related to other resources. NFMA is the primary authority governing the management and use of timber resources on the National Forests.

· The *Forest Resources Conservation and Shortage Relief Act of 1990* (16 U.S.C. 620) sets forth restrictions on export of unprocessed timber originating from federal lands. It addresses certain exceptions to export restrictions and establishes reporting requirements.

? The following regulations also apply: The rules governing the sale and disposal of timber are set forth at 36 CFR 223, Subparts A and B. Subpart governs suspension and department of timber purchasers, and Subpart D covers timber export and substitution restrictions. The Chief's authority to manage and dispose of timber is delegated from the Secretary at 7 CFR 2.42 and described at 36 CFR 223.1. The text of these rules is set forth in *FSM 1010*.

3.11.1 AFFECTED ENVIRONMENT

Timber emphasis areas for this analysis were defined based on the approach used in each of the six forest plans. The Ashley, Dixie, Fishlake, and Manti-La Sal forests allocated lands to timber emphasis using management areas. These were lands allocated to a timber prescription upon which each forest based their anticipated harvest program. The Uinta and Wasatch-Cache forests did not allocate management areas specifically for timber, however they did identify the number of acres suited for timber production upon which they based their anticipated harvest program. The six forest plans currently do not allow wildland fire use in timber emphasis areas. Figure 3-11 displays, by forest, the acres allocated to timber emphasis management areas and the acres of lands suited for timber production.

FIGURE 3-11
Acres allocated to timber emphasis management areas and the acres of lands suited for timber production

Acres of Timber Emphasis using Lands Allocated to Management Areas

Ashley	13,171	(LRMP IV-6, 10, 66, 70, 77, 84, and 90)
Dixie	270,400	(LRMP IV-116)
Fishlake	58,729	(LRMP IV-51)
Manti-La Sal	145,800	(LRMP III-46)
Sub Total	**488,100 acres**	

Acres of Timber Emphasis using Lands Suitable for Timber Production

Uinta	20,900	(LRMP B-4)
Wasatch-Cache	166,200	(LRMP IV-376)
SubTotal	**187,100 acres**	
GRAND TOTAL	**675,200 acres**	

3.11.2 ENVIRONMENTAL CONSEQUENCES

Effects Common to All Alternatives (Alternatives A,B,C)

When fire burns through harvestable timber with high intensity and severity the commercial value of the timber is often reduced or lost completely if the tree is partially or wholly consumed. Trees killed by fire tend to dry quickly and develop radial cracks (checks) that can sometimes go to the center of the tree. These cracks may preclude the opportunity to produce dimensional lumber at a sawmill. Dimensional lumber (currently) can be sold for more money than a similar board foot of a tree sold as a house log. So, the decrease in value is often the difference between the value of a green log that could be sold for a

dimensional lumber end product verses a salvaged dead log sold as a house log end product.

When fire burns through harvestable timber with low intensity and severity then the tree is often not wholly consumed and can be partially consumed. The effect of the fire disturbance is dependent on many factors. An important factor is the ability of the affected tree species to withstand and cope with fire disturbance. For example, spruce has thin bark and is easily stressed or killed under these fire conditions. Ponderosa pine has thicker bark and is typically unaffected by a low intensity fire. Another factor is the age/size of the tree: larger trees are sometimes better able to withstand fire disturbance than smaller ones.

A common impact to trees under low intensity fire conditions includes some type of damage at the base of the tree such as an opening through the bark. Openings through the bark leave the tree vulnerable to insect and disease, which may, or may not, lead to tree mortality but commonly leads to rot which can reduce the trees value as a wood product. This again, depends on site-specific conditions following the burn event.

The effects described above are the same regardless if the fire is prescribed or a wildland fire.

There will be little, if any, difference in the environmental consequences between the three alternatives in the next 3-4 years. The commercial value of timber impacted by fire in the next three to four years will vary event-by-event, dependent on fire intensity and severity. As has happened in the past, there will always be a risk of fire escaping or moving out of prescription because of changes in weather. Nevertheless, the availability of commercial and personal use timber is not expected to change in the short time remaining in this planning period.

Typically sensitive watersheds were excluded from the suited timber base because they had harvest limiting factors so they did not contribute in a planned sense to the availability of timber.

Effects Common to Alternatives A and C

If prescribed fire and mechanical treatments do not keep pace with vegetative growth and fuel loading in timber emphasis areas, then this situation is expected to result in uncharacteristically intense and severe unwanted wildland fires that could reduce the value of the timber in the affected areas. Salvage harvest opportunities may increase with time coincident with the increased risk of larger, uncharacteristic wildland fires. Such harvests often would occur within 2 to 3 years following the fire before wood quality deteriorates. Spruce is an exception and often retains its value for salvage harvest for 20 to 30 years or longer because spruce is mainly used for house logs.

If the prescribed fire program keeps pace with vegetative growth and fuel loading in timber emphasis areas, then the risk of uncharacteristically intense and severe unwanted wildland fires would be reduced. The threat of loss of commercial timber would also be reduced.

The exclusion of sensitive watersheds from wildland fire use is not expected to impact the availability of personal use and commercial timber because timber in those areas did not typically contribute to planned volumes and are not expected to contribute in the future.

Alternative B Effects

This amendment changes the fire management standards and guidelines for timber management to allow for appropriate use of prescribed and wildland fire under specific prescriptions.

Some situations exist where fire use, under proper conditions, in timber emphasis areas may be desirable. Four examples illustrate this point. 1) In portions of some timber emphasis management areas, fire may be desirable to enhance ecosystem sustainability. 2) For some of the forests, portions of the wood production and utilization management areas are unsuitable for timber harvests. 3) At times industry may prefer to harvest dried aspen wood. Fire that precedes the harvest begins the drying process before the harvest. 4) Prescribed fire (for example, cool under-burns) could be used to reduce the potential for stand-replacing fires in ponderosa pine or mixed conifer forests. Fire is a tool for timber stand improvement. Commercial value is preserved in timber emphasis areas.

The use of fire in timber emphasis areas and other areas across each forest would likely reduce the long-term risk of uncharacteristic fires and reduce the damage to commercial timber. Prescribed fires and wildland fire use would occur under prescribed conditions and within approved fuels and weather conditions. These fires would occur during cooler periods and can produce favorable results for timber management. Therefore, long-term availability of commercial and personal use timber would likely be sustained where fire was used, with less timber damaged by unwanted wildland fire.

In practice, wildland fire use and prescribed fire activities would likely have less application in cover types such as Engelmann spruce and lodgepole pine and greater utility in meeting timber management objectives in cover types such as ponderosa pine. This is the case because the timber management objectives and resulting silvicultural prescriptions for spruce/fir and lodgepole pine would likely result in a narrow set of conditions to approve ignitions which would likely result in fewer real-life opportunities to approve wildland fire use and prescribed fire. Conversely, timber management objectives and the resulting silvicultural prescriptions for ponderosa pine would likely result in greater real-life opportunities to approve wildland fire use and prescribed fire. Lodgepole Pine is found mainly in Northern Utah and ponderosa Pine is mainly found in southern Utah, with spruce represented across all six National Forests.

When a lightning fire is allowed to burn (wildland fire use), an interdisciplinary team of resource professionals including silviculturists and other specialists must recommend that the fire will be beneficial and that recommendation must be approved by a line officer. Otherwise, that specific lighting-caused fire will be deemed an unwanted wildland fire and appropriate suppression actions will be used to fight the fire. This decision is recorded in the Go/No-Go Considerations Document (Figure 1-4) found in the Fire Management Plan that must be completed on each forest before any wildland fire use is approved. Also, before any prescribed fire is used in timber emphasis areas additional NEPA documents and public review will be required.

There is, however, always a risk of fire escaping or moving out of prescription because of changes in site conditions; such as weather. Therefore, it is expected wildland fire use and prescribed fire will consume some valuable timber resources over time as has happened in the past. The requirement to document the Go/No-Go Consideration following prescriptions from the fire management plan is intended to lessen the risk of such losses.

The application of wildland fire use in sensitive watersheds is not expected to impact the availability of personal use and commercial timber permits to any important degree because they typically did not contribute to planned volumes and are not expected to contribute in the future. It is possible that killed trees could be salvage harvested, but this would only occur if the activities do not degrade the water quality or conflict with other requirements for those areas.

3.12 LIVESTOCK USE

Legal and Administrative Framework

The Secretary of Agriculture sets forth responsibilities mandated by statutory authority through Departmental regulations and memorandums. Policy relating to range resources and coordination of range activities of the USDA Forest Service is included in the following:

· The *Forest and Rangeland Renewable Resources Planning Act of 1974* (Section 6, (g)(2)(a)) specified that the Secretary of Agriculture was to promulgate regulations that set out the process for the development and revision of land management plans, which would require the identification of the suitability of lands for resource management.

· The *Federal Land Policy and Management Act of 1976* states that public lands will be managed in a manner that will provide food and habitat for fish, wildlife and domestic animals.

· The *National Forest Management Act of 1976* allows the Forest Service to assess present and anticipated uses of the nation's public and private forests and rangelands.

· The *Public Rangelands Improvement Act of 1978* recognized the need to correct unsatisfactory conditions on public rangelands by increasing funding for maintenance and management of these lands.

3.12.1 AFFECTED ENVIRONMENT

Introduction

Rangelands comprise 84 percent of the 54,346,000 acres in the state of Utah. Occurring at higher elevations with greater amounts of precipitation, the National Forest System lands are generally the most productive of all federal lands in Utah. About 68 percent of the 8,000,000 acres of Forest Service lands in Utah provide forage for livestock. No other land use on NFS lands is as extensive as livestock grazing. Approximately 650,000 animal unit months of grazing, of which 95 percent occurs during the summer, are authorized on these NFS rangelands *(Johnson, 1989)*.

On these rangelands, grasses and grass-like plants are important components of the plant communities. The plant cover on such lands is actually a complex of true grasses, grasslike plants, forbs and shrubs, and even trees. Major range ecological types (and their approximate percentages of total NFS lands) in Utah include: alpine (1%), aspen (10%), sagebrush (27%), gamble oak (6%), mountain brush complex (5%), pinyon/juniper (26%), ponderosa pine (2%), riparian (1%), and tall forb (5%). The remaining 17% is comprised of mixed conifer and spruce/fir forest types which are generally unsuited for livestock grazing *(Admundson et. al., 1996)*. The sagebrush-grass, pinyon/juniper, and aspen types are the major range types, adding up to 63 percent of the grazing area.

Sagebrush-Grasslands Native sagebrush-grass vegetation is dominated by woody species of Artemisia with an understory of perennial grasses and forbs. However, vegetal cover is usually not continuous and considerable bare ground is often exposed. Principal grasses are wheatgrasses, fescues, bluegrasses, bromegrasses, junegrass, needlegrasses, squirreltail, ricegrass, and wildrye *(Blaisdell et. al.1982)*.

A primary problem in the condition of the sagebrush-grass ecosystem is the increase in numbers and size of sagebrush and other low value shrubs that have accompanied the reduction in perennial grasses and forbs. Not only is this a direct loss of forage, but resulting stands of sagebrush are frequently so dense that they form a barrier to livestock movement. Even when livestock force their way into thick sagebrush stands, they are often unable to reach more than half of the palatable grasses and forbs. Because of its long life and ability to compete with perennial herbs for moisture and nutrients, sagebrush in dense stands is a serious obstacle to range improvement through grazing management or seeding of desirable species.

The role of fire in sagebrush-grass vegetation depends largely upon whether sagebrush is climax on a specific site or has invaded overgrazed rangelands. Where it is an invader, its reestablishment following burning depends upon the amount of degradation of the grassland and whether the herbaceous species are abundant enough to rapidly and fully occupy the site. Since big sagebrush does not sprout, even occasional fires will tend to eliminate this shrub from a healthy, natural grassland. Sagebrush seedlings seldom become established nor do they grow well in good stands of grass *(Blaisdell, 1949, 1953)*. Wherever sagebrush is part of the climax community, fire alters species composition appreciably for the first few years, but the vegetation eventually reverts to its previous balance *(Mueglar, 1976)*.

Pinyon/Juniper During this century, heavy livestock grazing has reduced grass competition as well as fuel for fires which has permitted pinyon and juniper to invade adjacent grassland forage communities rapidly and unchecked. O'brien and Woudenberg (1999) found that about 57 percent of trees sampled in Utah are estimated to be less than 120 years old, while about 14 percent of all Utah stands had an age of 200 years or more. They found that the overwhelming majority of pinyon/juniper stands have no visible evidence of disturbance. Historically, when fires occurred about every 10 years, or possibly about every 30 years, juniper ranges were restricted to shallow, rocky soils and rough topography where fuels were sparse or absent (Gruell, 1999). Fire, therefore, has the potential as a tool to reclaim grasslands that have been invaded by juniper, but not on true climax juniper sites (Burkhardt and Tisdale, 1976).

Grasses common to the pinyon/juniper type include: bluebunch wheatgrass, Sandberg bluegrass, cheatgrass, bottlebrush squirreltail, and Indian ricegrass *(Barney and Frischnecht, 1974).* Naillon et. al. (1999) found that Sandberg bluegrass is the most consistent perennial grass component in the understory and cheatgrass was a common annual grass component. Herbage yields of pinyon/juniper stands can vary considerably, depending on surface texture of soil and stage of succession *(Thatcher and Hart, 1974).*

When applied at the proper seral stage, fire has been used successfully to increase understory production from pre-burn productions of 60-223 lb/ac to 500-1660 lb/ac *(Schroeder, 1964; Clary, 1971)*. Old, closed stands of pinyon/juniper become very decadent with only a sparse herbaceous understory and are difficult to kill because fires do not carry easily. At least 600 to 700 lb/acre of understory fine fuels is needed to carry a fire in open stands of pinyon/juniper *(Wright et. al., 1979)*. Closed stands with no

grass or shrub understory are almost impossible to burn and would probably require winds in excess of 35 miles per hour to carry a fire *(Blackburn and Bruner, 1975)*.

Aspen Woodlands Aspen woodlands are a highly valued range resource in Utah. They provide abundant summer grazing for livestock. Usable forage beneath aspen stands ranges from 40 and 70 percent of the undergrowth biomass (Bartos and Campbell, 1998). Seral aspen stands in advanced stages of succession to conifers usually contain much less desirable growth production than do stable aspen stands.

Under certain site conditions, aspen is a self-perpetuating dominant species, but more frequently it is seral to conifers. A change from an aspen-dominated community is accompanied by changes in understory and a marked decrease in values for livestock grazing. Bartos and Campbell (1998) indicate that there has been an approximate 60 percent decline in aspen dominated landscapes on National Forest System lands in Utah.

Mueglar (1988) determined that total annual dry weight of undergrowth herbage of aspen stands in the Intermountain Region varied from as low as 10 lb/ac to 3,800 lb/ac, with an average production of 976 lb/ac. As a general rule, production of herbaceous and shrubby understory growth gradually decreased as conifer cover increased in the overstory layer. This decrease became pronounced when conifers were as little as 15 percent of the overstory.

Existing conditions indicate that most aspen stands in Utah will eventually be replaced by conifers, sagebrush, or possibly other shrub communities. The decline of aspen results in loss of water, forage, and biodiversity. Bartos and Campbell (1998) concluded that for every 1000 acres of aspen that converts to conifer, an estimated 500 to 1,000 tons of undergrowth biomass is not produced. This is relative to the consumption of water by conifers, which is no longer available for streamflow or undergrowth production.

3.12.2 ENVIRONMENTAL CONSEQUENCES

Effects Common to All Alternatives (Alternative A, B, C)

The primary use of wildland fire on forage producing rangelands is to reduce cover of the woody dominants—sagebrush, pinyon and juniper, and conifers. The objective is to reduce competition with existing herbaceous plants or species that will be seeded into the fire. Multiple benefits are obtained by this treatment. Increased production, nutrient quality, and palatability of herbaceous plants are observed after a burn.

By killing certain plants, fire reduces competition and releases resources (water, nutrients, light) to those plants that survive the burn and to new plants established from seed within the burn area. All plants are affected to some extent by fire. Some are very tolerant and will resprout, others are very sensitive and will be killed, or severely damaged. Some composition changes that occur after burning may not be desirable. Therefore, before utilizing wildland fire, a determination should be made as to the composition of the plant community that is to be burned and the expected results that should be attained.

Fire breaks up large tracts of sagebrush and pinyon/juniper dominated landscapes and establishes a mosaic of vegetation types. The creation of openings and more nutritious, palatable forage will attract

livestock concentrations and result in minor to moderate shifts in livestock utilization and distribution patterns.

In the short-term there appears to be little difference between alternatives. During the early part of the first growing season following wildland fire use, it is evident that actual damage to vegetation far out-weighs the benefits. Perennial grasses and forbs are clearly lowered in vigor, as old plants are badly broken up and remaining plants are small and scattered. Although rhizomatous species are apparently less damaged than others, even these have poor vigor. Shrubs are represented by only a few sprouts. Much bare ground is exposed, but an abundant growth of annuals may fill these openings. This lack of production and vigor requires that most burns be completely protected from livestock grazing for at least one and possibly two growing seasons.

Grazing during the first year could cause serious damage to soil and desirable perennials. During the second year, continued rest will allow restoration of vigor and the typical heavy seed production of perennial grasses and forbs. Light grazing in the third year, after seed dissemination, may serve as a useful purpose in helping to plant the seed *(Blaisdell et. al., 1982)*.

Generally these adjustments would be addressed in annual operating plans without adjustments in 10-year grazing permits. Occasionally adjustments in 10-year grazing permits might be prescribed. Since, on good range sites, fire would change the composition and structure of rangeland forage for only 1-3 years following fire, reductions in forage and subsequent changes in livestock management would be temporary. Livestock are likely to concentrate on burned areas, resulting in overuse of this portion of a pasture. This can be prevented by burning entire pastures or by fencing the burn area for use as a separate management unit. We recognize the need to coordinate fire use activities with annual operat-ing plans for livestock grazing to permit the reestablishment of vegetation.

The effect of fire on forage grasses depends largely on their growth form. Bunchgrasses with a dense arrangement of vegetative culms, such as Idaho fescue and needle-and-thread are severely damaged by fire, since their dense culms burn for 2 to 3 hours after a fire passes. Bluebunch wheatgrass and bottlebrush squirreltail are less susceptible to fire because they are composed primarily of coarse stems with some leafy material. They burn quickly with very little heat going below the soil surface, and will usually return to pre-burn production in 1 to 3 years *(Blaisdell, 1953)*.

Fire also increases production and availability of desirable sprouting browse species such as service-berry, snowbrush ceonothus, and true mountain mahogany. However, plant communities with lots of antelope bitterbrush, curlleaf mountain mahogany, or cliffrose should not be burned because it takes an extended period for these species to recover. By contrast, communities with an abundance of horsebrush or rabbitbrush should not be burned because fire keeps these species healthy. Blaisdell (1953) found that production of these species doubled by three years after burning and were 3 to 5 times more prolific at the end of 12 years.

A key concern is that if a woodland with an understory dominated by cheatgrass burns, the site is then dominated by cheatgrass and other annuals. Cheatgrass can rapidly occupy a burned area even if only a few seeds are available *(Countryman and Cornelius, 1957)*. Cheatgrass is usually the most abundant annual following wildland fire in the pinyon/juniper vegetative type and has a cover value as high as 12.6 percent on 3-year-old burns *(Wright et. al, 1979)*.

Because such sites may reburn every 3 to 5 years, they often are permanently converted from a woodland to an alien grassland *(Laycock, 1999)*. Wildland fire use in cheatgrass ranges should always be followed by artificial seeding, as native species will rarely increase rapidly enough (if at all) to accomplish management objectives (Young, 1982). If cheatgrass or other highly invasive species increase sufficiently to dominate sites after wildland fire, quality and quantity of livestock forage would be reduced, resulting in adjustments in stocking rates, changes in grazing management plans, and 10-year grazing permits.

Wildland fire use in poor condition or low seral communities, where the perennial grass and forb understory is depleted, is risky since there may not be enough fine fuel for successful burning. Limited success of burning these areas may occur only if adequate rest from livestock grazing is provided to generate sufficient fine fuels to carry a fire. This may require 1 to 2 years or more of pre-burn rest. If burned, these poor condition rangelands may not improve in response to fire either rapidly, or possibly not at all. In many cases, it will be necessary to artificially seed burned areas so that the productive potential of the site is realized. This would then require an additional 1 to 3 years of grazing rest.

Other short-term effects include burning of structural developments including fences and water developments. Fire could also reduce effectiveness of natural barriers such as large forested areas or brush fields that are used as grazing unit boundaries. This would then require either a change in grazing strategies or the construction of additional unit fences. There is also the risk of fire escaping and consuming valuable livestock or wildlife forage, which could have immediate, unplanned adverse affects on grazing capacities and/or pasture rotation schedules.

Effects Common to Alternatives B and C

In the long-term, alternatives B and C are expected to reduce the size and number of large unwanted wildland fires through prescribed fire and managed wildland fire use. Monitored and mitigated wildland fire use would provide for protection, reconstruction, or reduced impacts to fences and other range developments. Advance planning will allow pre-burn and post-burn adjustments in livestock management to be negotiated with the least amount of disruption to total ranch operations. Prescribed fire and wildland fire use provide the best opportunity to manage the invasion of cheatgrass caused by fire disturbance through timing, intensity, site selection, and seeding so that it does not become the post-burn dominating species.

Alternative A Effects

Under the No Action Alternative, greater frequencies and sizes of unwanted wildland fires are expected to occur. This would result in unplanned, and possibly unmanageable, requirements for changes in livestock grazing strategies. Required rest on a large scale could be economically adverse to some ranchers. On the other hand, failure to provide adequate rest could cause irreparable damage to depleted rangelands.

3.13 ENVIRONMENTAL JUSTICE

Legal and Administrative Framework

· Executive Order 12898 “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” provides that “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” The executive order makes clear that its provisions apply fully to programs involving native Americans.

3.13.1 AFFECTED ENVIRONMENT

The majority of minority groups (African American, Asian, and Hispanic) live in Salt Lake, Davis, Weber, and Utah Counties. The majority of Native Americans live in Salt Lake, San Juan, Uintah, Duchesne, and Utah Counties. San Juan and Duchesne counties have the highest percentage of low-income residents. Most of the minority and low-income groups live in the urban environment of northern Utah. There are some members of these groups that rely on forest products or related forest and range activities for their livelihood (1999 Economic Report to the Governor).

3.13.2 ENVIRONMENTAL CONSEQUENCES

Some of these groups may be impacted by small changes expected in the availability of timber for personal and commercial use or changes in yearly range operating plans following fire if they are economically tied to one of those industries. Some groups may be impacted by smoke generated by prescribed fire, wildland fire, and wildland fire use. These types of effects are expected to be localized and would be difficult to measure. In the short-term Alterative A would be expected to generate less smoke compared to Alterative B and C because wildland fire use and prescribed fire are authorized.

The effects of each alternative are expected to be similar to these groups in that wildland fires are random events and these events will occur under all alternatives. Effects of prescribed fires on these groups will be analyzed site-specifically as they are proposed. We expect these groups may be impacted by smoke from fires, for example, but would not be disproportionately impacted because smoke from fires will be monitored, and if not consistent with Utah State requirements, the fires (and smoke effects) would be suppressed. The health of these groups, therefore, would not be disproportionately impacted compared to other citizens within the affected locations. Thus, the magnitude of these impacts is expected to be low and not disproportionately adverse.

A.9 Response to Comments

Introduction

The following table lists the persons, organizations, or agencies that responded to the Forest Supervisors with comments about the environmental assessment. The comment period ended December 22, 2000; however the list reflects all comments received to date.

List of Respondents

ID No.	Group Name	Signatory	Address	Zip Code	Date Rec'd.
1.		Any Borgeson	P. O. Box 881 Santaquin, UT	84655	12/6/00
2		Joleen H. Bell	2379 East 900 East Salt Lake City, UT	84108	12/12/00
3	Utah Environmental Congress	Craig Axford	1817 S. Main St. #9 Salt Lake City, UT	84115	12/15/00
4		Ron Hamblin	2770 N. Washburnville Rd. Monroe, UT	84654	12/21/00
5		James O. Kennon	P. O. Box 440067 Koosharem, UT	84744	12/22/00
6	Yale School of Environmental Studies	Kimberly Danley	2159 Waterbury Rd. (rear house) Chesire, CT	06410	12/26/00
7	Southern Utah Wilderness Alliance	Liz Thomas	P. O. Box 1726 Cedar City, UT	84721	12/26/00
8	Western Fire Ecology Center - American Lands Alliance	Timothy Ingalsbee	P. O. Box 51026 Eugene, OR	97405	12/27/00
9	High Unitas Preservation Council	Dick Carter	P. O. Box 72 Hyrum, UT	84319	12/27/00
10		John Swanson	3400 Edmund Blvd. Minneapolis, MN	55406	12/29/00
11	Willow Creek Ecology	John Carter	P. O. Box 280 Mendon, UT	84325	1/4/01
12		Rick Hoffmann	963 S. Diestel Rd, Salt Lake City, UT	84105	12/22/00
13	State of Idaho: Division of Environmental Quality	Diane Riley	1410 North Hilton Boise, ID	83706	1/29/01

ID No.	Group Name	Signatory	Address	Zip Code	Date Rec'd.
14	Utah State Division of Air Quality	Frances Bernards	Salt Lake City, UT		2/1/01
15		Mark Belles	9318 Willard Street Rowlett, TX	75088	11/18/00

Comments and Response to Comments

As comment letters were received they were given a number and the content of the letters analyzed. For each letter, relevant comments are quoted followed by the Forest Service response. All comments will be considered in making a decision.

Letter 1 Andy Borgeson

Comment: *"Can anybody other that the writers comprehend the E.A.?"*

Response: The interdisciplinary team tried to strike a balance between plain language and the technical language needed to adequately explain some points.

Letter 2 Joleen H. Bell

Comment: ***"****I think Alternative B is the preferred direction. I strongly support any plan which tries to support more natural processes even at the expense of human comfort."*

Response: Your comment is noted.

Letter 3 Utah Environmental Congress; Craig Axford

Comment: *"The UEC wishes to make clear that it supports the return of fire to Utah's forest ecosystems, and recognizes that fire plays a crucial role in maintaining a viable, healthy forest."*

Response: Your comment is noted.

Comment: *"The role logging plays in increasing the risk of wildfire within forest ecosystems is ignored."*

Response: The EA, sections 3.0 and 3.1 disclose the effects of timber harvest in shaping conditions in terms of fuel loading, fire regimes, and vegetation composition and structure. The EA, section 3.11 discloses the impacts fire may have on timber management activities.

Comment: *"While opening the way for greater use of prescribed fire and/or prescribed natural fire is an important step, the Forest Service cannot possibly hope to use these methods to begin restoring the forests without removing, or at least significantly reducing, livestock."*

Response: The purpose and need for action, proposal, geographic range and scope, and decisions to be made are discussed in the EA, Chapter 1. The focus of this amendment is fire management direction. Changing management direction (goals, desired conditions, standards, and guidelines) for livestock grazing is outside the scope of this amendment.

Comment: *"Nor can it hope to begin to restore an ecosystem while continuing to log, thus increasing the risk of fire, while simultaneously claiming that logging is being done to reduce fuel loads and "restore" the forest."*

Response: The purpose and need for action, proposal, geographic range and scope, and decisions to be made are discussed in the EA, Chapter 1. The focus of this amendment is fire management direction. Changing management direction (goals, desired conditions, standards, and guidelines) for timber management is outside the scope of this amendment. As cited above, the EA does disclose the effects of timber harvest activities on fire risk factors including fuel loading, fire regimes, and vegetation composition.

Comment: *"The UEC urges the Forest Service to begin efforts that will lead to a serious reduction or elimination of livestock and an end to logging on Utah's national forests."*

Response: Serious reductions or elimination of livestock and an end to logging on Utah's national forests are actions outside the scope of this amendment.

Letter 4 Ron Hamblin

Comment: *"When a fire is caused by God (nature if that word is too strong) then nature or God puts it out. Who are you to say that He is handling the environment wrong by letting lightning strike where it does."*

Response: An alternative was considered, but not analyzed in detail that would allow wildland fire to take its natural course without human interference. The rationale for not analyzing the alternative in detail is found in the EA, section 2.6. Existing Forest Plans, for the most part, do not allow responsible officials to use natural ignitions for resource benefit; they must be suppressed. The proposed action is intended to address the need for wildland fire use (the use of a natural ignition for resource benefit) and is a feature of Alternatives B and C. Its use, however, would not be authorized in certain areas listed in the EA, section 2.5.

Comment: *"In just the Oldroyd Complex 8 miles of 50' wide fire line was bulldozed. This is in an area where ATV's are outlawed because they cause too much damage?? Come on now, how can you justify that??!!" "You require all the companies that do business in the forest to do the same. Are you above your own laws?? So far you seem to be."*

Response: Alternatives B and C would authorize the full range of fire suppression tactics, subject to forestwide and management area direction (EA, section 2.5). This means the incident commander must consider other parts of the Forest Plan, such as land allocations and their associated standards and guidelines. Additionally, some standards and guidelines might limit or prohibit the use of some

suppression tactics, for example a bulldozer would be prohibited within wilderness.

The potential damage and cost of various fire management actions may pose must be considered and balanced in context with the risk to human life and property and natural and cultural resources. There may be situations in which the responsible official would authorize a prohibited use, for example if human life were threatened. This decision would be carefully considered and then documented as part of the wildland fire situation analysis (WFSA). Also please see response to Letter 8 concerning effects of fire suppression.

Comment: *"If a fire threatens my home, which is out side city limits, I don't expect the "Santa Fe Hotshots" to show up here at my neighbor's expense to fight it. It's between me, the fire, and my insurance company."*

Response: Your comment is noted.

Comment: *"None of the cabins you claim to protect by letting the undergrowth build up are on public land. Why does my money go to protect them?"*

Response: This amendment does not authorize, fund, or implement site-specific, ground disturbing actions such as local fuel reduction treatments designed to reduce fire hazard and risk around facilities. This amendment would authorize fire management tools that could be used in future site-specific actions to help reduce hazardous fuels and move toward desired conditions outline in the existing Forest Plans. The purpose and need for such actions would be open for public comment and discussion at that time.

Letter 5 James O. Kennon

Comment: "*Some of my concerns are in the text when it refers to other studies and publications not available to the public."*

Response: The project file for this analysis contains some information not presented in detail within the EA. For example, many scientific papers are referenced yet the entire paper is not reproduced within the EA. The project file is open to the public and is available for viewing upon request.

Comment: *"Another concern is the number of places it excludes some National Forests. The Fishlake Forest is excluded in a number of places. It appears in these cases that Forest can then do its own thing."*

Response: The affected environment and environmental consequences disclose conditions and impacts for the six national forests of Utah. Sometimes a forest lacks a resource that is present on another forest. For example, the desert tortoise is found only on the Dixie National Forest so the discussion is limited to this forest. Each forest has some resource and social conditions that are unique, and forests have some conditions in common. The Forest Supervisor responsible for each National Forest will make a decision for his/her forest after careful consideration of the information in the project file, EA, and public comments.

Comment: *"While it states that fires have occurred in the past 200-400 years, it neglects to mention that more people live in Utah today than 400 years ago. Many people suffer more health problems now than*

400 years ago. People live longer and are affected more by poor air quality. I disagree that "Best management Practices are already limiting smoke impact." (Page 3-43). I spent 20 years as a paid firefighter and have some knowledge of the subject. In the amendment it states that no smoke problems had been reported. That does not mean it hasn't occurred. I can report of at least two myself."

Response: Your comments are noted. Each National Forest currently applies applicable operating procedures and emission reduction and dispersion techniques from the Utah State Smoke Management Plan to appropriately address air quality requirements. These practices are designed to reduce adverse impacts to people and communities.

The EA recognizes there will be impacts to air quality and poor air quality conditions may cause health problems in people that live nearby or downwind of a fire (EA, section 3.6.2). People with known respiratory problems may contact the Forest Service to seek appropriate solutions prior to prescribed fire activities and during wildland fire actions. Also see response to letter 13 regarding air quality.

Comment: *"On page 1-6 it states that the prescribed fire burn plan is to be prepared by an individual qualified as a burn boss. It does not state the qualifications. Are they required to be trained in certain areas?"*

Response: To be qualified as a prescribed fire burn boss, an individual must have completed the required training listed below, and also must perform satisfactorily as a trainee prescribed fire burn boss. A qualified prescribed fire burn boss must evaluate and certify the trainee is capable. It typically takes an individual 7 to 12 years to become qualified as a prescribed fire burn boss. The individual must also meet strict physical fitness requirements and perform the job regularly to remain qualified. Often, the individual has either a college degree or a technical fire management certification in addition to fire specific training.

Required training includes:

- Advanced Fire Behavior
- Applied Fire Effects (this teaches you area specific fire impacts on plants, animals, soils, water, and air)
- Smoke Management Techniques
- Fire Program Management (techniques for integrating fire into resource management)
- Prescribed Fire Burn Boss
- Fire in Ecosystem Management (information on fire's role in ecosystem function and management)
- Weather and Meteorology
- Leadership and Organizational Development
- Introductory Fire Effects (this teaches you general fire impacts on plants, animals, soils, water, and air)
- Intermediate Fire Behavior
- Ignition Operations (techniques and tools for starting fires safely to accomplish specific objectives)
- Air Operations (safe and appropriate use of various types of aircraft)
- Interagency Incident Business Management (proper use of federal money on wildland firefighting)
- Fire Operations in the Urban Interface (safe tactics for fighting fires in the wildland/urban interface)
- Pumps and Water Use
- Chainsaw Operations

- Basic Fire Behavior
- Firefighter Training (introductory fire strategy, tactics, weather, safety practices)

Comment: *"Another problem I have seen is that soil conditions vary within a burn area and little consideration was given for different treatment of these areas. Sagebrush has been burned without reseeding which leaves the soil exposed for several years."*

Response: Impacts to soil resources and productivity are disclosed in the EA, section 3.5. Variations of soil conditions within a specific area are not disclosed because this is a programmatic document. Site-specific soil conditions will be referenced within each forest's fire management plan. This information is available to the incident commander and responsible official **before** unplanned (emergency) and planned (prescribed) fire activities occur.

Adjustments in wildland fire suppression tactics in response to soil conditions are site-specific decisions considered and documented during a wildland fire event within the WFSA. For a prescribed fire, changes in soil conditions, potential impacts to soil resources, and possible mitigation measures are addressed in a site-specific NEPA document and burn plan. Some areas are reclaimed and seeded following a wildland fire. This work is documented in a burned area emergency rehabilitation report.

Comment: *"While the blame is being pointed at the build up of from lack of fire, man has contributed to the problem. The slash from logging operations is left to add fuel to any fire occurring in the area. Logging sites need to be cleaned up at least within a year after being logged. The trees that are killed by your burning is left standing till the blow over leaving more fuel for the next time."*

Response: Your comment is noted. See the two responses for Letter 3 regarding effects of timber harvest and changing management direction for timber management.

Letter 6 Yale School of Environmental Studies; Kimberly Danley

Comment: *"This ecological risk assessment will aid the Forest Service in deciding the future fire management policy of national forests is Utah, in regards to the recently released Utah Fire Amendment Environmental Assessment. Specifically, it will evaluate the risk of fire suppression on ponderosa pine forests of the Paunsagaut Plateau region for the Dixie National Forest in Southern Utah."*

Response: Your comments are noted. This information will be considered in making a decision.

Letter 7 Southern Utah Wilderness Alliance; Liz Thomas

Comment: *"SUWA supports the concept of allowing wildland fires to burn, foregoing suppression actions except in cases where loss of human life is imminent. We commend the USFS for addressing this issue for the national forest lands in Utah and look forward to having Forest Plans amended in order to incorporate natural fire in the forest ecosystems."*

Response: Your support is noted, however none of the alternatives considered in detail "allows wildland fires to burn foregoing suppression actions except in cases where loss of human life is imminent". An

alternative was considered, but not analyzed in detail, that would allow wildland fire to take its natural course without human intervention. The rationale for not analyzing this alternative in detail is found in the EA, section 2.6

Comment: *"Of the three alternatives that are analyzed in the EA, alternative B comes the closest to actually making a difference on the ground."*

Response: Your comment is noted.

Comment: ***"****None of the alternatives adequately address the impacts of grazing on the wildland fire proposal, nor does the EA adequately address grazing impacts for areas on which wildland fires would be allowed to burn."*

Response: See response to livestock grazing for Comment Letter 3. The EA, section 3.1 discloses the impacts of grazing on fire regimes and vegetation. The EA, section 3.12 discloses the impacts fire may have on permitted grazing activities.

Comment: *"Although the EA states several times that livestock grazing is one of the major causes of the abysmal conditions that exist on the Utah forests today, the proposed Plan Amendment does not propose to deal with the cause of the problem."*

Response: See response to livestock grazing for Comment Letter 3.

Comment: *"The EA falls short by not addressing the importance of using native seed, exclusively, if reseeding is determined to be necessary for any area in which wildland fire is allowed." "The plan amendment is the appropriate vehicle in which to address this issue and by failing to do so, the amendment keeps the open the door for the continued intentional and planned invasion of non-native plants."*

Response: The focus of this amendment is fire management direction. Changing management direction (goals, desired conditions, standards, and guidelines) for vegetation (such as using native seed exclusively) is outside the scope of this amendment. The potential need to seed to establish vegetation following a fire is disclosed in the EA, sections 3.1, 3.2, 3.5, and 3.12. The effects and relationships of fire and exotic plants are disclosed in the EA, section 3.2. In addition, the six Forest Plans already contain management direction to utilize native species from locally adapted seed sources in management activities when and where practical.

Comment: *"When would wilderness management objectives ever require a prescribed fire? Since a wilderness is one in which "man is a visitor" it is hard to imagine a scenario that would allow the "visitor" to intentionally set a fire in a wilderness and yet have the area be "untrammeled by man"."*

Response: The enacting legislation for Utah wilderness areas authorizes specific short- and long-term activities within a specific wilderness area. The Forest Service handbook for wilderness discusses potential use of prescribed fire within wilderness areas; prescribed fire may be a management practice consistent with an authorized or permitted activity within wilderness. In addition, should a wildland fire in wilderness threaten human life or property outside the wilderness boundary, a prescribed fire may be

considered as a tool to address the threat. The EA discloses impacts to wilderness values in section 3.8.

Letter 8 Western Fire Ecology Center – American Lands Alliance; Timothy Ingalsbee

Comment: "*While we understand your position that members of the public are not going to be involved in the development of Fire Management Plans (FMPs) according to NEPA, this position is contrary to the interagency teleconference broadcast by the BLM on April 8th, 1998." "This teleconference, "Managing Wildland Fire: From Policy to Implementation," made repeated verbal commitments that the public would be fully involved in the development of FMPs at each step in the process, and this process would comply with NEPA."*

"We want to argue for the strategic value of including informed public involvement in FMPs in order to both help educate the public and gain their long-term support for these plans. If FMPs are not going to follow NEPA, then other means of public input and collaboration should be explored and utilized."

Response: The Forest Supervisors strongly agree with your comment regarding "*the strategic value of including informed public involvement in FMPs in order to both help educate the public and gain their long-term support for these plans".* The Forest Supervisors intend to provide opportunities for interested publics to be involved in the development of fire management plans, specifically in the soon-to-be-added wildland fire use sections. We agree that such involvement will improve the fire management plans.

The 1998 BLM policy you reference relates to the BLM, not the Forest Service. A site-specific NEPA document is not prepared prior to approval of a fire management plan because an FMP does not propose, authorize, or permit site-specific federal actions (EA, section 1.5). The FMP combines relevant management direction from the Forest Plan with existing resource information such as Forest Service Manuals and Handbooks, relevant research, resource maps, and local knowledge. This information is available to the responsible official and incident commander before planned and unplanned (emergency) fire management activities are initiated so that they may appropriately address resource and social concerns. All planned burns (prescribed fire) will also undergo additional site-specific NEPA analysis and decisions including public involvement.

Comment: *"We dispute the notion that "All types of fire may reduce the availability and commodity value of commercial and personal use timber." [2-5] "We highly doubt that fire managers would develop prescriptions that would allow fire severity sufficient to consume commercial timber."*

Response: The statement you refer to on page 2-5 is a general issue statement, which was followed by criteria to measure change (effects). The effects of fire on the value of timber resources is disclosed in the EA, section 3.11. We agree with your assertion that forest managers would develop prescriptions or parameters to limit the risk of resource damage during a prescribed fire and during wildland fire use. If the fire were to deviate from the prescription suppression actions would be taken.

Comment: *"In general, we believe there is no ecological validity from excluding fire from fire-adapted ecosystems. Therefore, we strongly support Alternative B for selection as the final plan amendment."*

Response: Your comment is noted.

Comment: *"However, the EA failed to fully analyze and disclose what are the direct, indirect, and cumulative effects of fire suppression, especially aggressive tactics." "Honest and complete public disclosure of the environmental, ecological, and socioeconomic effects of aggressive suppression is long over due. The agency has never done a programmatic NEPA analysis on these effects. Nor, despite years of requesting this analysis in suppression-related timber sales, has the agency provided this in project level documents. This amendment is the precise time and venue for this critical analysis."*

Response: Analyzing programmatic effects across the agency (all National Forests) are outside the scope of this analysis and decision. Regarding wildland fire suppression there is not an important difference between alternatives; the existing Forest Plans authorize suppression, as do the action alternatives. The programmatic cumulative effects of changing Forest Plan management direction for prescribed fire, wildland fire use, and wildland fire suppression are disclosed in the EA, section 3.0.2. The programmatic direct and indirect effects of changing Forest Plan management direction for prescribed fire, wildland fire use, and wildland fire suppression management direction are disclosed in the EA, sections 3.1 through section 3.13. The programmatic direct, indirect, and cumulative effects of fire suppression were also disclosed in the environmental impact statements of the existing Forest Plans (approved in the 1980's). Indeed, fire suppression was typically the primary focus of fire management in these plans. This EA tiers to Forest Plans and their environmental impact statements, and incorporates their analyses by reference (EA, page 3-1 and 3-3).

While site-specific direct, indirect, and cumulative impacts of fire suppression activities are not disclosed in this environmental assessment, site-specific effects are addressed in the planning documents prepared at the time of a fire: the Wildland Fire Situation Analysis (WFSA) for wildland fire suppression activities and the Wildland Fire Implementation Plan (WFIP) for wildland fire use activities (EA, section 1.5). These documents are prepared by interdisciplinary teams composed of appropriate resource specialists (soil scientist, archeologist, range management specialist, wildlife biologist, silviculturist, etc.) as determined by the responsible official.

Interdisciplinary teams assist the fire managers in developing appropriate suppression or fire use alternatives given site-specific resource values and potential impacts. They also develop mitigation measures that are included in specific implementation direction to firefighting personnel. For example, a single-blade-wide dozer line is used with engine support to establish a section of fireline, instead of using the dozer alone to establish a two- or three-blade-wide line. Or no dozer lines are built in a riparian area (only hand crews are used), even if it means it will take longer to suppress that section of the fire.

A resource advisor monitors and documents the implementation and effectiveness of the mitigation measures. The resource advisor has the authority to change suppression strategies or impose additional mitigation measures if, once out on the ground, he/she determines additional measures are necessary.

Gallons of fire retardant and water dropped from aircraft, miles of fireline dug by hand, and miles of fireline constructed by bulldozer are recorded in site-specific fire reports for all large fires (those exceeding 100 acres in timber fuel types and 300 acres in grass fuel types). In addition, acres of fireline reclaimed and seeded and acres seeded on severely burned lands following a fire are also recorded in a burned area emergency rehabilitation report. See also the response to the second comment of Letter 4.

The site-specific direct, indirect, and cumulative effects of prescribed fire activities are addressed in the categorical exclusion, environmental assessment, or environmental impact statement prepared by an interdisciplinary team for each prescribed fire project. Necessary mitigation measures are carried forward into the site-specific prescribed fire burn plan (EA, section 1.5).

Letter 9 High Uintas Preservation Council; Dick Carter

Comment: *"First, there seems little connection of this document with the broader and highly funded National Fire Plan. This seems a problem of merit."*

Response: The National Fire Plan was issued in the fall of 2000 in response to the 2000 fire season. The National Plan sets forth strategic interagency goals and objectives to address:

- Agency firefighting capacity.
- Restoration of damaged watersheds.
- Hazardous fuels reduction.
- Economic assistance to communities.
- Reduction of fire hazards and restoration of landscapes in communities.

The Utah Fire Amendment is not directly related to the National Fire Plan because the amendment project began in late 1998. However, fire management direction in the amendment is consistent with the National Fire Plan and will help the Utah Forest Supervisors meet goals and objectives in the National Fire Plan.

Comment: "Second, *the EA dismisses the "no prescribed fire in wild areas" (emphasis added). This was the alternative we suggested and had every reason to believe it would be analyzed based on the meetings above. It is dismissed for spurious reasons—bureaucratic mumbo-jumbo, to say the least."*

Response: The alternative suggested by the High Uintas Preservation Council was considered by the Forest Supervisors and, as you state, a meeting was held specifically to discuss your suggestion. The alternative was not analyzed in detail because it would require the forests to change land use allocations and associated desired future conditions. Such changes are outside the scope of this amendment (EA, section 2.6). Such an alternative could be considered during revision of the Forest Plans.

Comment: *"Third, wilderness is again listed as a resource associated with recreation and scenery. When will the Forest Service ever understand the value of wilderness as a resource (using the word resource forces the archaic language, but still…) in and of itself that deeply transcends recreation and scenery? We wonder whether Utah forests will ever make the transition. Until that happens the weak analysis of fire will continue in a wild context."*

Response: Wilderness was approved as a topic to consider in detail and was grouped with topics related to social, cultural, and economic concerns (EA, section 2.2). The affected environment and environmental consequences to wilderness are disclosed in the EA, sections 3.8.1 and 3.8.2.

Comment: "*In this context there should be no prescribed fires allowed in wilderness. By definition prescribed fires can't meet wilderness objectives, particularly if wilderness is ever understood to be above and beyond recreation and scenery, because they are <u>prescribed</u>." "Prescribed fire meets no wilderness objective(s) simply because a prescribed fire is outside of the context of wild/ecological processes (the very opposite of prescribed) defined by wilderness."*

Response: See response to wilderness for Comment Letter 7.

Comment*: "Fourth, the only alternative that has meaning in the EA, is of course, Alternative B. Alternative C violates the very premise for the alternative—to "put" fire back into forest ecosystems. By excluding timber emphasis areas the whole context is again abandoned in the name of "timber absolutism". Those particular areas, interestingly, but not ironically, that are furthest outside of any historical variability context largely because of "fire proof management and timber harvesting. If Alternative C is selected the six Utah national forests, who often say 'we are inconsequentially important for timber', will send the strongest signal possible that timber still dominates and ecological literacy and process(es) will again be shoved into a corner."*

Response: Your comment is noted.

Comment: "*Fifth, the Goal should really be altered to say "Ecosystems are restored and maintained within historic fire regimes, through wildland fire use and prescribed fire consistent with land uses where necessary." This makes the goal of fire as a ecological process more important only to be constrained where necessary to protect the developed sites listed as exceptions in Alternative B."*

Response: The wording changes you suggest could have been fully considered had they been received during the public involvement period before release of the EA. The Forest Service recognizes the important role fire plays in maintaining healthy ecosystems (EA, section 3.1 through 3.5) and also recognizes the importance of social and economic health and safety of nearby communities (EA, section 3.6 through 3.13). The goal: "Ecosystems are restored and maintained, consistent with land uses and historic fire regimes, through wildland fire use and prescribed fire." reflects the importance of maintaining healthy ecosystems balanced with the need for consistency with land use decisions already made in existing Forest Plans and the role fire plays as a disturbance process in many ecosystems.

Comment: *"Finally, the whole business of standards and guidelines is confusing. To be effective, everything, it appears, should be a standard since that seems to be the implementation gauge. And, if this is not implemented by each forest the whole thing reeks of a 'deep' shallowness."*

Response: The definitions we used to develop the standards and guidelines for this amendment are found in the EA, appendix A.2.

Letter 10 John Swanson

Comment: "*I suggest that all Wildland Fire areas be managed as Wildlife Fish Plant Habitat Sanctuary Preserve Wilderness Areas. With all Roadless Areas to be fully preserved and designated as Wilderness. And oppose all forms of salvage logging."*

Response: The purpose and need for action, proposal, geographic range and scope, and decisions to be made are discussed in the EA, Chapter 1. The focus of this amendment is fire management direction. Changing management direction (goals, desired conditions, standards, and guidelines) and land use emphasis (management prescriptions) for wildlife, fish, wilderness, and timber harvest are outside the scope of this amendment.

Letter 11 Willow Creek Ecology; John Carter

Comment: "*Willow Creek Ecology, Inc. cannot support the proposed Fire Amendment because it does not address the long-term effects of livestock grazing on forest health. These effects are well documented in the literature and for and meaningful restoration of forest health must be taken into account. Where livestock grazing has been a factor in these problems, livestock management must be addressed in a substantive way. The proposed amendment has not done this."*

Response: See response to livestock grazing for comment letter 3.

Letter 12 Rick Hoffmann

Comment: "*After reading through the plan on the internet Alternative B is the best proposal, but even it is far short of what really needs to be done!"*

Response: Your comment is noted.

Comment: *"Allowing logging to reduce these fuel loads is not an option. If they are cut without the following clean up of slash, trash tree removal, and reforestation into the natural fauna (not single species agraforest) then the fuel load only gets worse. Firewood gathering is such a small consumer of fuels it doesn't even register, but should continue. Any reduction is better than doing nothing. This only leaves one economical means to realistically reduce fuels, and that is carefully planned prescribed burns!."*

Response: Please see responses to Comment Letter 3 regarding logging and associated activities. In addition to prescribed fire, Alternatives B and C provide for use of natural ignitions for resource benefit (wildland fire use). Wildland fire use is another tool for fuel reduction.

Comment: *"No exclusion as listed in alternative B. Persons with property on or near Forest Lands need to be educated on fire safety, both with proper management, and constructing buildings better able to withstand fire. Education is far cheaper than trying to protect private property when fires are raging!"*

Response: An alternative with no restrictions (exclusions) for Alternative B was considered but not analyzed in detail for reasons stated in the EA, section 2.6. We agree that education is an important component of fire prevention activities.

Comment: *"Non native plants like cheat grass, and the excessive fuels build up as a result of poor forest management including logging and fire suppressing are going to be difficult, and expensive problems to bring into a natural balance. Fire has always been nature's way of maintaining forest health. When the first settlers arrived in the west the forested land must have been quite a sight. We as a society need forest products, but we also need healthy forest!"*

Response: Your comment is noted. We believe both action alternatives would provide additional tools to help move toward desired conditions in our Forest Plans and contribute to sustaining wildland ecosystems (EA, section 1.1.).

Letter 13 State of Idaho Division of Environmental Quality; Diane Riley

Comment: "*Page 1-6 describes the prescribed fire burn plan. There is no question that burn plans should include smoke management. The "Interim Air Quality Policy on Wildland and Prescribed Fires" requires burn plans to include: emission reduction actions; smoke dispersion evaluation; public notification; public exposure reduction; and air quality monitoring. Including these elements in the burn plan discussion would be appropriate guidance to provide the UT national forests."*

Response: Your suggestions are noted. The contents of a burn plan described in the EA, page 1-6 is a general summary. Burn plans and the NEPA analysis and decision they are based on draw on many sources of information (scientific research, landscape assessments, local knowledge, and manuals and handbooks) and bring in many more operational requirements than displayed in the summary. In addition, the information and requirements in each plan may be different in response to site-specific conditions within the project boundary.

Comment: *"The interim policy also directs land managers to consider alternatives to fire, such as mechanical treatment. Mechanical treatment alone or in combination with fire treatment can reduce emissions and impact. The EA should include a discussion of alternatives that should be considered in the planning process."*

Response: The purpose of the proposal is to provide additional tools to help land managers achieve desired future conditions described in the existing Forest Plans (EA, section 1.1). The existing Forest Plans authorize or prohibit various fuel reduction methods or land management tools. Consideration of which fuel treatment method(s) (authorized by a Forest Plan) to apply at a specific site to address the purpose and need for action at that location is appropriately addressed during site-specific project development and analysis.

Comment: *"Page 3-45 indicates that the alternatives would not increase air quality impacts. The EA should project the acres of prescribed, wildland fire use, and unwanted wildfire over the project life (4 or more years) and compare the emissions for each alternative. This would provide a clearer picture on how the alternatives may affect air quality."*

Response: The EA, section 3.6.2 states "Impacts to air quality are not expected to increase beyond what is currently allowed under law, consistent with all six Forest Plans in Utah." We did not intend this statement to mean smoke impacts to air quality would not increase. Rather, any future use of prescribed fire or wildland fire use will not exceed National Air Quality Standards. Increases in smoke and impacts to air quality are potential short-term (duration of fire) effects as disclosed in section 3.6.2, but these increases will not violate state air quality standards. The State smoke manager must approve wildland fire use and prescribed fire actions. Once approved, if conditions deteriorate to the point where the standards could be violated (usually determined by modeling during the site-specific fire), the State smoke manager has the authority to stop any new ignitions and/or require on-going fires to be put under full suppression to address potential cumulative effects. Any unwanted wildland fire will be suppressed to the best of the local units abilities, limiting smoke and air quality impacts as much as possible in an emergency.

The EA, section 3.6.2 states, "In terms of air quality, there is not a significant difference among

alternatives." Air quality standards must be met in all alternatives and are expected to be met in all alternatives; thus there is not a significant difference among alternatives relative to meeting State air quality standards. The type of modeling analysis you reference is appropriate to consider during a site-specific wildland fire action or in the analysis of a proposed prescribed fire. Model parameters such as vegetation cover type ignited, estimated duration of burn and acres burned, humidity, precipitation, and wind direction and velocity to name a few) can be measured or professional judgment applied to the site-specific situation. The results can be helpful in predicting smoke emissions and impacts to air quality for areas surrounding the fire.

Comment: *"We support a coordinated effort between state, interstate, federal, tribal, and local agencies. All prescribed fire activities must include careful consideration of air quality impacts and requirements."*

Response: The Forest Service also fully supports coordinated effort between state, interstate, federal, tribal, and local agencies. All analyses of proposed prescribed fire activities will include careful consideration of air quality impacts and requirements.

Letter 14 Utah State Division of Air Quality; Frances Bernards

Comment: *"I was a bit confused about the time interval (projected to be 4 years or less?) that the fire amendment would be in effect. I guess that means that the fire amendment was developed to give land managers a tool for including prescribed fire and wildland fire use for resource benefits in the development of Forest Plans in the future? Section 3.0.2 touches on this issue."*

Response: This amendment will provide direction (goals, standards, and guidelines) for fire management that is consistent with national policy; it provides additional tools to help land managers achieve desired future conditions described in the Forest Plans (EA, section 1.1). As an amendment, these changes to the Forest Plans will remain in effect until each of the six plans are revised; estimated to be in about 2 to 4 years. The temporary nature of this action and its limited scope limit its effects (EA, section 1.3 and 3.0.2).

Comment: *"Paragraph #3 of the Overview of the Clean Air Act (CAA) mentions the state's authority to regulate particulate matter in smoke from fire. The key pollutants from smoke are elemental and organic carbon, volatile organic compounds, sulfur oxides, nitrogen oxides, nitrates, carbon monoxide, in addition to particulate matter. The CAA established National Ambient Air Quality Standard (NAAQS) for particulate matter, sulfur dioxide, ozone, carbon monoxide, nitrogen oxides, and lead. So, the UDAQ also regulates VOC and NOx pollutants from fires since they combine, in the presence of sunlight, to ozone. Technically, we have the authority to regulate CO emissions from fire, but they're so minuscule I hope they don't become an issue. We aren't tracking NOx or VOC emissions yet, but in the future we probably will."*

"The bottom line is, the paragraph only mentions particulate matter non-attainment areas and should include our ozone maintenance area. Davis and Salt Lake counties are designated as an ozone maintenance area. The NAAQS for ozone is set as 0.08 parts per million or ppm (fourth high, maximum eight-hour average, averaged over three years) and 0.120 ppm (maximum one-hour average, with no more than three exceedances allowed in any three-year period) for ozone."

"The NAAQS is set for particulate matter as 150 micrograms per cubic meter (24-hour average, with no

more than three exceedances allowed in any three-year period) for PM10, and 65 micrograms per cubic meter (24-hour average, ninety-eighth percentile, averaged over three years) for PM2.5. The eight-hour standard for ozone, the PM2.5 standard and the PM10 standard are under judicial review."

Response: As we have in the past, the Forest Service will continue to work closely with the State during Forest Service fire management activities (wildland fire suppression, wildland fire use, and prescribed fire) to assure all air quality requirements are appropriately addressed (EA, section 3.6.2), including ozone maintenance area requirements.

Comment: *"The section on the Utah Smoke Management Plan (SMP) needs to be updated. The SMP was finalized on July 20, 1999, and, subsequently, revised on March 23, 2000."*

"In addition, the Utah Division of Air Quality is going through rulemaking to codify the requirements of the SMP. The rule (R307-204, Emission Standards: Smoke Management) was finalized by the Air Quality Board during the January 3, 2001, board meeting and will become effective in April of this year. The rule provides operating procedures for land managers using prescribed fire or wildland fire on land they own or manage. The SMP remains an operating plan that specifies the emission reduction and dispersion techniques that may be considered best smoke management practices and other details essential to the smoke management program."

Response: The Forest Service will use the Smoke Management Plan including applicable operating procedures and emission reduction and dispersion techniques to appropriately address air quality requirements. The recent updates to the Smoke Management Plan will help limit smoke impacts during fires, which will improve air quality. The EA, section 3.6.2 states National Air Quality Standards will not be violated by prescribed fire or wildland fire use as these actions must be approved by the State smoke manager. Once approved, if conditions deteriorate to the point where the standards could be violated (usually determined by modeling during the site-specific fire), the State smoke manager has the authority to stop any new ignitions and/or require on-going fires to be put under full suppression to address potential cumulative effects. Any unwanted wildland fire will be suppressed to the best of the local units abilities, limiting smoke and air quality impacts as much as possible in an emergency. Thus the recent update to the smoke management plan does not change the effects disclosed in the EA.

Comment: *"In Section 3.6.2, Environmental Consequences, the first paragraph states that all wildland fire use and prescribed fires will be cleared through the Smoke Manager. According to R307-204, land managers are required to submit a burn plan, pre-burn information, and burn request to the executive secretary at the Division of Air Quality before ignition."*

"I'm not sure if we have enough monitoring data to determine whether "impacts to air quality are not expected to increase beyond what is currently allowed under law". At this time, federal land managers in Utah have not monitored impacts of smoke from prescribed fires or wildland fires on public health. Visibility monitoring for Class I areas has been conducted by federal land managers through the IMPROVE program, though. The UDAQ monitoring network is not extensive enough to determine the effect that prescribed fires or wildland fires have had on air quality. Even the data from our monitoring sites in the Wasatch Front may not be an accurate measure of the effects of the smoke on public health. Several factors influence the monitoring data that is collected in the Wasatch Front, such as, complex terrain, wind flow, distance of wildfires to monitoring stations, etc."

Response: A burn plan, pre-burn information, and burn request will be sent to the executive secretary at the Division of Air Quality before ignition of a prescribed fire.

Smoke and air quality modeling analysis is an appropriate technique to consider during a site-specific wildland fire action or in the analysis of a proposed prescribed fire. Applicability of air quality modeling is best determined by the responsible official, incident commander, and State smoke coordinator at the time of each site-specific event. Model parameters such as vegetation cover type ignited, estimated duration of burn and acres burned, humidity, precipitation, and wind direction and velocity to name a few) can be measured or professional judgment applied to the site-specific situation. The results can be helpful in predicting (modeling) smoke emissions and impacts to air quality for areas surrounding the fire.

The Forest Service understands the State monitoring network is not extensive nevertheless any future use of prescribed fire or wildland fire use will not exceed National Air Quality Standards. Short-term (duration of fire) increases in smoke and impacts to air quality are potential effects as disclosed in section 3.6.2, but these increases will not violate state air quality standards. The State smoke manager must approve (or disapprove) wildland fire use and prescribed fire actions. If disapproved the wildland fire will be suppressed to the best of the local units ability or ignition will not occur for the prescribed fire. Once approved, if conditions deteriorate to the point where the standards could be violated (usually determined by modeling during the site-specific fire), the State smoke manager has the authority to stop any new ignitions and/or require on-going fires to be put under full suppression. Any unwanted wildland fire will be suppressed to the best of the local units abilities, limiting smoke and air quality impacts as much as possible in an emergency.

Letter 15 Mark Belles

Comment: *"The EA was very easy to read and the comparison between alternatives clear and straightforward. First and foremost I completely support the stated goal of the proposed action. I am also gratified that the comments received thus for were "within the context of increase fire program"(p.2-1). It is heartening to know that you are receiving support for the Amendment in one form or another."*

Response: Your comment is noted.

Comment: *"This option (Alternative A) is completely unacceptable because it fails to meet the purpose and need of the project."*

"This (Alternative B) is my preferred alternative. While Alternative C has some desirable features, I am concerned that reliance on prescribed fire in Alternative C will vitiate the project in the sensitive watershed and timber emphasis areas. Wildfire is a vital component to the eventual return of properly functioning conditions in the Forests. It may be instructive to review the Forest Plans of the six Forests and evaluate the percentage of planned activities that were actually carried out over the life of the plans and the percentage of activities that were not carried out due to budget constraints. This project must not hinge on staffing and resource levels."

"I find the concerns about water quality compelling, yet the restriction of wildfire within these areas is problematic since, as the EA repeatedly notes, staff and resource constraints may result in the outcome of Alternative C to be similar to Alternative A. It seems that there is a strong possibility that Alternative C,

whose sole Raison d'Etre is to reduce the risk of poor water quality, could result in higher risk of poor water quality that Alternative B."

"At this time I do not find a case for restriction of wildfire in timber emphasis areas has been established. There only justification I can find stated is the "society should have an opportunity to use wood products before a wildland fire damaged or consumed them" (p.2-9). I suggest that a study to determine the overall contribution to society from these timber resources in the context of the entire timber industry must be conducted and the benefit, if any, established before."

Response: As stated in the EA, section 2.7, Alternative A, no action, does not affirmatively address the purpose and need for action. Movement toward the desired condition in each plan is expected to take longer than the action alternatives because wildland fire use is not authorized across all six National Forests. Wildland fire use and prescribed fire are essential tools to help move forests toward the desired conditions in each Forest Plan. The EA, figures 3-8, 3-9, and 3-10 provide information about the fire use activities carried out for the years stated. It is logical to assume if budget for fuels were increased additional acres could have been treated.

The National Fire Plan was issued in the fall of 2000 and additional budget has become available to address its goals and objectives. The fire management direction in this amendment is consistent with the National Fire Plan and will help the Utah Forest Supervisors meet goals and objectives in the National Fire Plan. Also see response to the National Fire Plan for Comment Letter 9. The additional funding anticipated from the National Fire Plan will increase the fire program staffing and will increase the number of acres treated by fire use. Use of fire is one tool in addition to other tools available to reduce hazardous fuels and move toward desired conditions. The impacts to watershed condition and water quality are disclosed in the EA, section 3.5. Hazard fuel treatments in sensitive watersheds, especially those within or adjacent to interface communities would likely receive emphasis for treatment.

The impacts to timber resources are disclosed in the EA, section 3.11. The commercial value of timber impacted by fire in the next three to four years will vary event-by-event, dependent on fire intensity and severity. Availability of commercial and personal use timber is not expected to change in the short time remaining in this planning period. Areas that emphasize wood fiber production in each Forest Plan will receive prescriptions designed to meet timber management objectives and limit potential damage by fire use. Also see response regarding timber resources for Comment Letter 8.

Comment: *"Based on the case made for water quality, I recommend that Alternative B be modified to restrict use of wildfire in the designated watersheds and adopted without other modification. The Example Go/No Go Considerations Document could be modified to recognize the special rules of these areas."*

"In closing, I hope that your project succeeds and that Utah's national Forest are allowed to return to the natural, frequent, low-intensity fire regime of the past."

Response: Your comment is noted.