Topic 10 – Fire Management

Introduction

Historically, and currently, fire has been and continues to be the main recurring disturbance factor in most of the Wasatch-Cache National Forest (WCNF) ecosystems. However, for the past 100 years, fire has been largely excluded from the forests, shrublands, and grasslands of the WCNF resulting in significant changes to many ecosystem components.

Laws, Policy, and Direction

The **Organic Administration Act** (1897) authorizes the Secretary of Agriculture to make provisions for the protection of national forests against destruction by fire.

The **Bankhead-Jones Farm Tenant Act** (1937) authorizes and directs the Secretary of Agriculture to develop a program of land conservation and land utilization to protect public lands.

The **Wilderness Act** (1964) 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** (1976) directs the Secretary of Agriculture to specify guidelines for land management plans to ensure protection of forest resources.

The **Clean Air Act** (1977) provides for the protection and enhancement of the nation's air resources.

The **Federal Fire Policy** (1995) outlines policies on fire suppression and integrating fire on the landscape.

The **Wildland and Prescribed Fire Management Policy: Implementation Procedures Reference Guide** (1998) covers the process for making fire suppression decisions, prescribed fire burn plans and implementation, and wildland fire use planning and implementation.

Protecting People and Sustaining Natural Resources in **Fire-Adapted Ecosystems: A Cohesive Strategy for** (USDA, 2000) describes fuel treatment priorities for federal lands.

A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment, 10-Year Comprehensive Strategy (USDA, USDI 2001) and **Implementation Plan** (2002). The Departments of Interior and Agriculture collaborated with the western Governors to develop a comprehensive approach to the management of wildland fire, hazardous fuels, and ecosystem restoration and rehabilitation on federal and adjacent State, tribal, and private forest and range lands in the United States. The primary goals of the 10-year Comprehensive Strategy are: 1) Improve prevention and suppression, 2) Reduce hazardous fuels, 3) Restore fire-adapted ecosystems, and 4) Promote community assistance.

The **Utah Fire Amendment** (USDA Forest Service, 2001) amended all of the Forest Plans for the Utah National Forests to allow for prescribed fire and wildland fire use. Prescribed fire was authorized in all places following site-specific environmental analysis. Wildland fire use was authorized Forest-wide following the Fire Management Plan with the following exceptions: 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; and sensitive watersheds.

The WCNF has elected, in this Forest Plan, to follow the decisions, and standards and guidelines, covered in the Utah Fire Amendment with one exception – the WCNF may allow wildland fire use in sensitive watersheds. The WCNF would prefer to do fire planning for specific sites to determine whether to include portions of "sensitive watersheds" (as defined in the Utah Fire Amendment) in areas approved for wildland fire use. For example, an acceptable wildland fire use perimeter may include portions of sensitive watersheds if a barrier to fire spread is included in the sensitive watershed. Until more site-specific analysis is completed (as areas are approved for Widland Fire Use in the Fire Management Plan), the WCNF will not implement landscape-level wildland fire use prohibitions in sensitive watersheds

Forest Service Manual and Handbook direction provide additional guidance for fire management activities.

Several layers of fire management related documents guide Forest Service actions. The WCNF Fire Management Plan (FMP) is a broad level *plan governing fire management actions* that is reviewed annually and revised as needed to reflect the Forest Plan and changes in the fire management program. The FMP*, based on guidance and direction in the Forest Plan, provides detailed information* for wildland fire use, fire suppression, prescribed fire, and hazardous fuels treatment. Content in the FMP is available to the line officer, *fire manager,* and fire incident commander, prior to future planned (prescribed *fire, mechanical treatment*) and unplanned (wildland fire) fire management activities so they can appropriately address resource and social concerns. Examples of measures that could be implemented to protect resources include: restrictions on *prescribed* burn *severity and size*, restrictions on the timing of fire use, restrictions on areas where burning activity would not be allowed, and guidance on where mechanical fire suppression activities would be limited.

Other specific documents *that are related to fire management activities* include the prescribed fire burn plan, wildland fire use plan, wildland fire implementation plan and the wildland fire situation analysis. These are fire management implementation documents for planned (prescribed) and unplanned (wildland fire) ignitions. They incorporate relevant measures and procedures from the fire management plan and apply them to site-specific, on-the-ground activities and actions. This tiering ensures that the prescribed fire and wildland fire actions will consider, incorporate, and be consistent with relevant Forest Plan management direction requirements.

Affected Environment

Fire Occurrence

Fire occurrence records from 1970 to 2001 were analyzed for the following statistics. Of the almost 2000 fires recorded in the WCNF's fire occurrence database from 1970 to 2001, two-thirds of the fires (63%) are human-caused. The rest (37%) are started by lightning. The WCNF averages about 60 wildfires per year; the fewest recorded, was 13 fires in 1984; and the years with the most fires were 111, (1979), 110 (2000) and 96 (2001). The average fire size is 40 acres. Most fires are extinguished at 0.1 acres in size and 70% of the fires are < 1 acre. The largest fire recorded since 1970 burned 14,200 acres in June of 2002 named the East Fork Fire near Bear River, Utah. According to the fire statistics, the number of large fires appears to be increasing -- 90% of the fires >100 acres have occurred since 1980. Fire seasons of 2000, 2001 and 2002 were some of the busiest on the WCNF in terms of number of fires and total acres burned.

Prescribed Fire

The use of prescribed fire on the WCNF has been very limited in the past. For the past three years, the WCNF has prescribed burned approximately 1,250 acres per year, primarily in aspen stands.

Wildland Fire Use

Wildland fire use, only allowed after completion of a wildland fire use plan within in the FMP, is currently only allowed in one Wilderness Area in the WCNF: The High Uintas. Wildland fire use plans have been in effect in these two Wilderness Areas since 1998; and since then the WCNF has not managed any ignitions as wildland fire use. The Forest Service intends to prescribe appropriate wildland fire use during upcoming revisions of the Fire Management Plan. Wildland fire use plans may cover non-Wilderness lands as well as designated Wilderness areas. Upcoming revisions will include wildland fire use plans for the Deseret Peak, Mt. Naomi, and Wellsvilles Wildernesses and *surrounding areas* within the next 3 years. Wildland fire use plans for the other Wilderness areas will be developed within the next 5 years.

Fuels in the Wildland-Urban Interface

In the last ten years there has been a tremendous increase in the development and population adjacent to the Wasatch-Cache and Uinta National Forest boundary along the Wasatch Front. Soaring populations coupled with the increased use of national forest land has increased the risk and frequency of fire. Compounding the situation is the presence of vegetative communities with uncharacteristically high fuel loading. This situation can support severe fires which can result in significant impacts to properties and natural resources

Given this situation and the current national emphasis on reducing fuels in the wildland-urban interface, the WCNF, in conjunction with the Uinta NF, recently completed the Wasatch Front

Fuels Assessment Report (USDA Forest Service 2002). The Assessment analyzed the fuel situation and reduction opportunities on over 400,000 acres along the Wasatch Front. It is anticipated that the Fuels Assessment will guide site-specific planning to reduce fuels along the Wasatch Front.

The predominate cover class within the assessment area was oakbrush/shrub. Over 83 percent of the oakbrush/shrub cover class was classified as medium (62.6 percent) to high (20.8 percent) density. About half of the assessment area is classified as a medium/high, high, or very high fuel hazard. The oakbrush/shrub cover class dominates this area on the Wasatch-Cache.

Several areas along the Front were identified as having higher opportunities and needs for treatment. These areas include the cities and towns of North Ogden, Ogden, South Ogden, Bountiful, North Salt Lake, Sandy and Draper. Portions of the some of the canyons, specifically Parley's Ogden, Little Cottonwood were also labeled high treatment opportunity. Emigration Canyon in particular had the most classified as the highest treatment opportunity.

The WCNF has implemented few projects aimed at reducing hazardous fuels. No mechanical treatments have been initiated for the purpose of reducing high fuel loading. However, that is likely to change within the near future because of increased national emphasis on fuel reduction in the widland-urban interface.

Fire Regimes and Condition Classes

The ecosystems of the WCNF fall within a variety of fire regimes. Tables FM-1, FM-2, and FM-3 describe and categorize the fire regime and condition class as well as the condition classes of vegetation types that comprise 5% or more land cover on the WCNF.

Table FM-1. Fire Regime Definitions

Fire Regime Group	Frequency (Fire Return Interval)	Severity
I	0 – 35 Years	Low Severity
II	0 – 35 Years	Stand replacement severity
III	35 – 100+ Years	Mixed severity
IV	35 – 100+ Years	Stand replacement severity
V	>200 Years	Stand replacement severity

Fire regime and condition class definitions were adapted from the FS publication, "Protecting People and Sustaining Resources in Fire-Adapted Ecosystems: A Cohesive Strategy" (April, 2000). As stated in the Cohesive Strategy, treatment efforts should be concentrated in the shorter interval fire-adapted ecosystems (Fire Regimes I and II) that are in Condition Classes 2 and 3. This emphasis generally agrees with treatments aimed at achieving properly functioning conditions.

Table FM-2. Condition Class Definitions

Condition Class 1	The disturbance regime is largely intact and functioning. The effects of insects and disease as well as the potential intensity and severity of fire are properly functioning. Vegetation components are resilient to disturbances from wind, insects, disease, or fire and do not predispose the stand or its key components to a high risk of loss. *Note that currently none of the vegetation types on the WCNF are classified as this condition class.*
Condition Class 2	Moderate alterations to the historic disturbance are clearly evident, such as one or more missed fire return intervals. The effects of insects and disease as well as the potential intensity and severity of fire pose an increased threat to key components that define the system. Composition and structure of vegetation has shifted towards conditions that are less resilient and are therefore more at risk to loss from wind, insects, disease or fire.
Condition Class 3	The disturbance regime has been significantly altered. The effects of insects, disease, or fire may cause significant or complete loss of one or more defining ecosystem components. The highly altered composition and structure of the vegetation predisposes the stand or ecosystem to disturbance events well outside the range of historic variability, potentially producing changed environments never before measured.

Table FM-3. Vegetation on the WCNF by Fire Regime and Condition Class[1]

Vegetation Type	Acres	% of Forest	Fire Regime	Condition Class
Aspen, Aspen-Conifer, Conifer-Aspen[2]	205,600	17%	II, III, IV	3
Sagebrush	189,600	15%	II	2, 3
Engelmann Spruce and Subalpine Fir	153,400	12%	V	2
Mixed Conifer[3]	151,700	12%	III, V	2
Barren Land	101,500	8%	n/a	n/a
Oakbrush-Maple	90,800	7%	II	2, 3
Douglas-fir	87,500	7%	I, III	3
Pinyon and Juniper[4]	79,000	6%	II, V	3
Lodgepole Pine	61,300	5%	IV, V	2

[1]*Determinations of the fire regime and condition class were derived from professional expertise of the Plant Ecologist (Padgett) and Fire Ecologist (Pollet) and content found in the following two references: Fire Ecology of Forests and Woodlands in Utah (Bradley et al. 1991) and Fire Effects Information System (USDA Forest Service 2002).*

[2] Aspen , Aspen-Conifer, and Conifer-Aspen fall within fire regimes II, III, and IV, depending on the location of the aspen. Aspen occupies a wide ecological amplitude on the WCNF, and its historical fire regime is closely related to its neighboring vegetation. For example, where aspen is situated near sagebrush, it would have a more frequent fire return interval compared to the fire return interval of aspen located near spruce/fir forests.

[3]Mixed Conifer includes both the Bear River Range (lodgepole, Engelmann spruce, and subalpine fir) and Uinta Mountains (lodgepole, Engelmann spruce, subalpine fir and Douglas-fir). The historical fire regime in the WCNF's mixed conifer was likely more frequent mixed-severity fires coupled with infrequent stand-replacement fires.

[4]The historical fire regime for continuous cover of pinyon juniper with a grass/shrub understory was fairly frequent, preventing establishment of large trees. However, in rocky, generally unvegetated areas where trees were able to get established, some juniper trees were able to grow quite large with the lack of fire. In these vegetatively isolated pockets, fire was extremely infrequent.

Environmental Consequences

General Effects

Congress and federal land management agencies have recently spotlighted fire management policies and practices; this attention resulted from several severe fire seasons in the west starting in 1994 through 2002. Emerging national direction and policy emphasize increased fire suppression resources, fuel treatment, and fire restoration on the landscape. 2001 was the first year of substantially increased funding and personnel. It is unclear if this level of commitment and emphasis will be stable for the life of the Forest Plan, or if it will fluctuate. Discussion of effects for alternatives will assume a stable (based on 2001 and 2002 budgets) funding strategy for fire suppression, hazardous fuel treatment, wildland fire use, and prescribed fire.

Challenges to achieving landscape-level fuels reduction programs and prescribed fire programs may include: funding uncertainty, species at risk management, lack of experience and personnel for fire management project planning and implementation, potential for noxious weed invasion, sensitive watershed concerns, scenery resource concerns, smoke production, and dense human populations in and surrounding the forest. These challenges vary slightly among all alternatives and differences among alternatives are highlighted under specific effects and cumulative effects.

It is difficult predict with any degree of certainty the future frequency and size of unwanted wildland fires and wildland fire use. Generally, effects on fire management related to these unplanned ignitions do not vary widely among Alternatives 2 through 7. Exceptions are noted under specific effects and cumulative effects.

Effects are discussed in terms of the four aspects of the Fire Management Program: 1) fuel treatment to reduce hazardous fuel loadings; 2) prescribed fire for ecosystem benefit; 3) wildland fire use for resource benefit; and 4) fire suppression.

Effects on Fire Management from Roads and Access Management

Historical fire data show that the largest numbers of fires that occur on the Forest are along travelways, and primarily adjacent to roads. Alternatives 3, 4 and 5 would have the greatest potential for effects on fire management. Alternative 5 allows the greatest number of new roads (more than 60 miles) and Alternatives 3 and 4 allow nearly 50 miles of new roads. Alternatives 6 and 7 would have a significantly lower potential for effects on fire management. These alternatives allow between 12 and 15 miles of new roads. Alternative 2 would have a lower effect on fire management, allowing 9 miles of new and closing 7 miles of existing roads. Alternative 1 would have the least potential for effects on fire management. This alternative allows for 3 miles of new roads, but closes 76 miles of existing roads.

Effects on Fire Management from Timber Harvest

Table VEG-4 lists the number of acres treated through timber harvest and various other activities that will affect fire management activities. Timber harvest can create additional concentrations of activity fuels and increase the risk of ignition potential from the increased activity in the area,

such as chainsaws, and motorized equipment. Increased numbers of openings resulting from timber harvest can reduce fire's ability to transition from a surface fire to a crown fire and can reduce spread rates and spread distance. Timber harvest can reduce fuel loadings substantially in areas where natural fuel loadings are excessively high. However, timber harvest can also create additional activity fuels which if not treated properly under a slash disposal program can lead to higher fuel loadings over a given area and subsequently increase the threat of ignition and hazard.

In Alternative 1 where timber harvest is not allowed, there would be less activity fuel build-up. However, natural fuels would continue to accumulate and some fires may increase in size and intensity to an extent that initial attack success would be low. In addition, as timber stands age and become more decadent, the threat of large stand replacing fires becomes more likely. These types of fires create more risk to firefighters, the public, and adjoining high-value resources (developed areas, wildland-urban interface areas, plantations, etc.).

Alternative 5, allows for the harvest of the greatest amount of timber, with Alternative 4 harvesting nearly as much. Age class diversity, as a result of timber harvest, would be increased over the landscape, reducing the potential of large-scale, stand-replacement wildfires. However, Alternatives 4 and 5 would constrain fire use activities within suitable timber areas (prescription 5.2). Limiting prescribed fire (as described in Alternative 1, and to a lesser degree in Alternatives 4 and 5) would result in higher fire hazard and trends away from proper functioning condition for those areas except where they are treated by mechanical means. Alternatives 2, 3, 6 and 7 describe a combination of timber harvest, prescribed fire, and mechanical fuel reduction placing their effects between effects described for Alternatives 1 and 5. Alternative 2, as shown in Table VEG-4, treats the greatest number of acres using prescribed fire, more than twice the acres of Alternatives 3, 6, and 7, over four times that of Alternative 5 and more than 6.5 times that of Alternative 4.

Effects on Fire Management from Vegetation/Fuel Treatment

For the purposes of the following discussion, prescribed fire, vegetative treatments, and mechanical treatments (Table FM-4 from Table 2-2) are included as vegetation/fuel treatment. Table FM-4 summarizes the acres of vegetation/fuel treatment (as defined in this discussion) by alternative.

Alternative 1 has no vegetation/fuel treatment, but there would still be effects. Without any management-implemented vegetation/fuel treatment, the amount of biomass available to burn would increase potentially resulting in larger, more severe wildland fires. This situation would cause the most safety problems during active fires for firefighters and the public.

Alternative 2 has the greatest amount of acres treated. Based on the design of these vegetation/fuel treatments to move landscapes toward PFC, the risk of large, severe wildland fires would be reduced in areas where these treatments occur.

Table FM-4. Acres of Vegetation/Fuel Treatment by Alternative

Vegetation Treatment Types	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 7
	Vegetation Treatments (Total acres treated during 10-year planning period)						
Prescribed Fire- Aspen & Aspen/Conifer Mixed[2]	0	80,000	32,000	7,200	7,200	32,000	32,000
Aspen/Conifer Vegetative Treatment[2]	0	6,500	5,250	6,250	3,100	3,000	5,000
Aspen/Conifer Commercial Harvest (acres) from MPC 5.2[2]	0	0	2,250	6,250	12,400	2,000	3,500
Prescribed Fire- Douglas-fir (non-lethal) [2]	0	4,000	2,000	0	0	2,000	2,000
Prescribed Fire- Sagebrush[9]	0	40,000	20,000	10,000	10,000	20,000	30,000
Mechanical Treatment- Oak[2]	0	16,000	8,000	0	8,000	8,000	20,000
Prescribed Fire- Oak[2]	0	40,000	20,000	8,000	20,000	20,000	8,000
Total Vegetation/Fuel Treatment Acres	0	186,500	89,500	37,700	60,700	87,000	100,500

Alternative 7 would treat more than half the acres of Alternative 2 and slightly more than Alternatives 3 and 6. Alternatives 3, 6, and 7 would have an intermediate effect on reducing fuels and, therefore on reducing the risk for uncharacteristically large and severe wildand fires. Alternative 5 is treats about 32 percent of the acres treated in Alternative 2 and about 60 percent of the acres treated in Alternative 7. Many vegetation/fuel treatments would be focused in populated areas and the risk to firefighters and the public would be mitigated in areas where treatments have occurred.

Alternatives 4 has fewer acres of vegetation/fuel treatments that all alternatives that treat vegetation. Where treatments do occur, the risks to firefighters and the public would be lessened and fires would be smaller and less intense than in those places where fuels were not treated. Fewer acres would be treated, however, so the benefits of fuel treatments would be less than Alternatives 2, 3, 5, 6, and 7, which all have significantly more acres treated.

Effects on Fire Management from Recreation

Undeveloped recreation can affect the fire management program both positively and negatively. As human use increases on the Forest, more people will be on hand to report fires that may normally go undetected for some time. With increased use, however, there will also be an increase in the incidence of human-caused wildfires.

Alternatives 3 and 5 increase recreation access opportunities compared to the other alternatives. Under these alternatives, human use will increase and therefore both fire detection and human-caused wildfires will likely increase. The other alternatives are all very similar in terms of effects from recreation and would likely have fewer human-caused ignitions than Alternatives 3 and 5.

Effects on Fire Management from Wildlife Management

Alternatives with more acres emphasized for wildlife habitat may affect fuel treatment and prescribed fire activities. The objectives for wildlife habitat may conflict with fuels reduction or fire management objectives. More acres of wildlife management habitat emphasis may result in more resource conflicts; modification of treatment types or intensity; or mitigation of treatment effects. Alternatives 3, 6, and 7 have the most acres designated as terrestrial habitat emphasis and would result in the most potential conflicts. Alternatives 4 and 5 have the fewest acres emphasizing terrestrial habitat and would have less potential conflicts. Alternatives 1 and 2 would have moderate potential conflicts.

Managing species at risk (SAR) poses significant constraints for fire management in terms of precluding treatments in an area that may negatively impact SAR habitat. However, most native wildlife species evolved with recurring fire and fire generally benefits wildlife habitat in the long-term. If certain vegetation treatments (prescribed fire, wildland fire use, and mechanical treatments) are prohibited over large areas due to TES concerns, greater risk of stand-replacement unwanted wildland fire will result due to more continuous fuels and higher fuel loading. This may result in a complete loss of habitat in an area for some SAR.

Prescribed fire, fuel treatment, suppression actions, and wildland fire use may need to be modified if they occur near habitat for species at risk or big game winter range. The effects of these modifications wouldn't change across the alternatives.

Effects on Fire Management from Aquatic and Semi-aquatic Species Management

Alternatives with more acres emphasized for aquatic habitat/watershed emphasis may affect fuel treatment and prescribed fire activities. The objectives for aquatics/watersheds may conflict with fuels reduction or fire management objectives. More acres of aquatic/watershed habitat emphasis may result in more resource conflicts, modifications of treatment types or intensity, or mitigation of treatment effects. Alternatives 3, 6 and 7 have the most acres emphasizing aquatic/watershed and would result in the most potential conflicts. Alternatives 4 and 5 have the fewest acres emphasizing aquatics/watershed and would have less potential conflicts. Alternatives 1 and 2 would have moderate potential conflicts.

Prescribed fire, fuel treatment, suppression actions, and wildland fire use may need to be modified if they occur near habitat for species at risk or in riparian areas. The effects of these modifications wouldn't change across the alternatives.

Effects on Fire Management from Soil and Water Resources Management

Under all alternatives, fire management may be affected by Forest Plan soil and water standards and guidelines, water bodies that are listed as impaired by Utah, and implementation of best

management practices (BMPs). Standards and guidelines under the section, Watershed, Riparian, and Aquatic Health contain several items that may preclude the use of fire or affect the amount of work needed to implement a prescribed burn or wildland fire use project. For impaired water bodies, projects that may increase the parameter that is causing the impairment will not be allowed unless it can be ascertained that no increase in that parameter will result from the project. Depending upon the issues of concern, BMPs may limit the extent or the timing of fire management projects or may require actions that will mitigate adverse effects of the fire management project.

Effects on Fire Management from Air Quality

Air quality laws pertaining to smoke affect prescribed fire and wildland fire use activities. Prescribed fire and wildland fire use activities may need to be altered or mitigations employed to comply with air quality rules and regulations. Alternatives 2, 3, 5 and 6 have the most acres planned for prescribed fire and would be most affected by smoke management regulations. Alternative 1 would likely have the most acres burned in wildland fire use and may be also affected by smoke management regulations. Alternatives 4 and 5 would be least affected.

Effects on Fire Management from Special Designations

In RNAs, certain fire management activities are not allowed or may be constrained -- fuel treatments are not allowed, and wildland fire use and prescribed fire may be allowed only to meet specific resource considerations. Fire suppression tactics may need to be modified in RNAs. Acres of designated RNAs is highest in Alternatives 1, 2, 4, 6 and 7 and constraints on fire management activities would be applied to more acres compared to Alternatives 3 and 5 that have fewer acres designated as RNAs.

In Special Interest Areas or Special Areas, fire management actions should help perpetuate the unique ecosystem. Fuel treatment or prescribed fire may be accomplished for hazardous fuel reduction if it is compatible with the unique ecosystem. There may be constraints on fire management actions within these special areas. Alternatives 1, 2 6, and 7 have the most acres designated for Special Interest Areas or Special Areas and would have the most areas of constraints. Alternatives 3, 4 and 5 have the least acres designated and the fewest areas of constraints due to Special Interest Areas or Special Area designations.

Effects on Fire Management from Livestock Grazing

Livestock grazing concerns could significantly constrain fire management activities. Livestock grazing affects the amount of fuel available to burn in a wildland or prescribed fire. Intensive grazing in an area reduces the amount of fine fuels available to carry a surface fire possibly resulting in more successful fire suppression efforts. However, this becomes a disadvantage during prescribed burning when the fine fuels necessary to carry a lower-intensity fire are not available.

Grazing may affect prescribed fire in several ways: grazing may need to be deferred one or more years prior to prescribed fire to build up grass fuels necessary to carry a fire; and grazing will be

deferred for two growing seasons following prescribed fire to allow proper regeneration of native grasses and forbs.

Most of the grazing within allotments is in sagebrush and aspen fuel types. Therefore, the greatest impact to the fire management program from grazing will be in these fuel types. Effects from grazing will be the least in Alternative 1 since no fire management activities except wildland fire use are allowed. Effects from grazing would be related to the total amount of prescribed fire planned, with more effect when more acres are planned for burning. Coordination between planned prescribed burns and annual livestock grazing operations will need to be intensive. The most difficult to implement is Alternative 2 because it includes the highest acreage (12,000 acres annual average) of prescribed fire in these vegetation types. Alternative 7 includes this need for intensive coordination and management on 6,200 acres having a higher probability of success because of less total acres. The relative probability of success is directly related to total acres. Alternatives 3 and 6 have 5200 acres, and Alternatives 4 and 5 have 1720 acres.

Effects on Fire Management from Noxious Weed/Invasive Annual Plant Establishment

Noxious weed and invasive plant concerns can significantly affect fire management activities. In areas infested with noxious weeds or invasive annual grasses (cheatgrass or medusa head), wildland fire is often undesirable. The presence of noxious or invasive plants in an area may preclude prescribed fire or wildland fire use (or mechanical treatment in some cases) in that area if increased invasion of unwanted species is likely. Fires typically occur more frequently and burn larger in areas infested with invasive annual grass than in native vegetation. Currently, there are few feasible methods of controlling noxious weeds or invasive annual plants over large areas.

Noxious weed and invasive plant control do not vary by alternative; therefore the effects on fire management are similar for all alternatives.

Effects on Fire Management from Oil and Gas Management

Wildland fire use is not authorized in areas where oil and gas facilities are located. An appropriate management response will protect these areas is they are threatened. Prescribed is allowed only if compatible with oil and gas production. Alternative 5 has the greatest probability of these facilities being threatened because it has the greatest area available for leasing and consequently the greatest potential for facilities. Alternative 1 has the smallest probability.

Effects on Fire Management from Scenery Management

Fire management activities may be constrained by scenic resource concerns, especially in sensitive areas such as along primary and secondary travelways and use areas and along the Wasatch front. Scenic resource concerns may result in more costly management actions; for example, feathering edges or following natural features for fuel breaks is more expensive than a

linear fuel break, and smaller prescribed burn projects diminish the economies of scale inherent in larger projects. Scenic resource concerns affect all alternatives similarly.

Effects on Fire Management from Wilderness Management

Wilderness (prescription 1.1-1.4), recommended wilderness (prescription 1.5) is conducive to managing natural fuels using wildland fire use. Prescribed fire may be used in wilderness only to meet specified wilderness objectives; by contrast, prescribed fire may be used in recommended wilderness as long as it does not result in long-term changes to the wilderness character. To employ wildland fire use, the areas must be large enough for naturally occurring fires to fulfill their role in the ecosystem and reduce the risk of fire burning in areas where wildland fire may not be desirable (private property, developed recreation sites, sensitive watersheds). In wilderness and recommended wilderness, mechanical treatments and timber harvest are not allowed which may increase risk of high-intensity unwanted wildland fires – especially in the wildland-urban interface.

Alternatives 1 and 2 have the most acres for Wilderness and Recommended Wilderness, followed by Alternatives 6, 7, 3, 4 and 5. Alternatives 1 and 2 would employ more wildland fire use, but fires can be expected to be larger under these alternatives. Alternatives 4 and 5 would likely have more prescribed fire and mechanical treatments, which would reduce potential for large, severe wildland fires. Alternatives 6, 7 and 3 would have effects between Alternatives 1 and 5.

Effects on Fire Management from Roadless Area Management

In Alternatives 1, 2 and 6 that apply the Roadless Area Conservation Rule, prescribed fire and wildland fire use will be the favored treatment for ecosystem benefit and hazardous fuels treatment over mechanical treatment in inventoried roadless areas. Fire suppression will likely not be affected among the alternatives due to the relationship of human-caused ignitions and access. For example, as access to the Forest increases, the number of human-caused fire starts increases, but reporting increases and the ability for fire suppression resources to access an area increases. Conversely, as access to the Forest is limited, the number of human-caused starts decreases, but the ability for fire suppression resources to access an area also decreases.

Cumulative Effects

Table VEG-4 shows that Alternative 1 allows no treatment of vegetation (prescribed fire, timber or other mechanical methods), which will result in the greatest potential for fuels build up. Alternative 2 allows the greatest amount of all vegetation treatments. Alternative 4, while allowing the greatest amount of timber harvest, treats the least total acres because relatively few acres are treated through prescribed fire. As noted in Table VEG-6, the VDDT model identified Alternative 1 as having the potential to burn the most acres of aspen, and conifer through failed fire suppression. Alternatives 4 and 5 would have the potential to have the fewest acres burned through failed fire suppression. Alternatives 2, 3, 6, and 7 all had the potential to burn about one third the acres of Alternative 1 through failed fire suppression, and half again as many acres as

Alternatives 4 and 5. The cumulative effects discussion for fire management is divided into the four fire management activities (fuel treatments, prescribed fire, wildland fire use, and fire suppression) and a discussion on development in the wildland-urban interface.

Fuel Treatments

The potential for wildland fire is measured in terms of fire hazard and resistance to control. Wildland fire hazard can be defined by age, vegetation structure, vegetation density, vegetation amount and the proximity of this vegetation to high value areas. The relative degree of fire hazard is also related to the ability to use treatments that manipulate fuel-loading amounts resulting in desired fire behavior and effects. Prescribed fire, wildland fire use, timber harvest and mechanical treatments are all ways to manage fuel reductions. For alternative comparisons, fuel hazard may be increased in areas where fuel reduction actions (prescribed fire, mechanical treatment, timber harvest, wildland fire use) are constrained. Examples of management direction that constrains fire hazard reduction include: wilderness, recommended wilderness, and undeveloped area prescriptions precluding mechanical treatment; timber emphasis areas precluding prescribed fire; and areas precluding wildland fire use. These vary in both total acreages and location of those acres by alternative. It is assumed that reducing fire hazard will eventually lead to a reduced large wildfire occurrence and related expenditures.

Alternative 1 allows no hazardous fuels reduction treatments except wildland fire use. This alternative is questionable in its ability to achieve desired results from large wildland fires. In terms of safety and property protection, it is generally safer and less costly (for firefighters and the general public) to suppress fires in the initial stages rather than attempting suppression on large, high-intensity wildfires that are imminently threatening public safety and property. Alternative 1 would result in some natural fuels reduction if wildland fires were allowed to grow large. Without treatments placed strategically on the landscape, however, hazardous fuels reduction in critical areas (i.e., urban wildland interface) will be minimal resulting in increased risk of large, high severity wildland fires.

Among the other action alternatives (2 through 7), strategically situated mechanical and prescribed fire treatments will allow reductions in the most hazardous fuel accumulations. Wildland fire use is allowed under all alternatives (although limited in some alternatives), but it will not be the best tool for reducing hazardous fuel accumulations due to the unpredictable nature of lightning-caused ignitions.

Prescribed Fire

The potential for prescribed fire for ecosystem restoration and maintenance is dependent upon management area prescriptions and desired future conditions, the type of vegetation, and priorities for funding. The amount to be treated annually is difficult to predict due to a myriad of factors that must be considered. The WCNF's inexperience in undertaking large-scale, stand replacement prescribed fires in the forested cover types, unreliable prescriptive windows during the late summer/early fall, and the availability of adequate resources to complete these projects may influence the activities completed on an annual basis over the several years. In all alternatives (except Alternative 1, but emphasized in Alternative 2), the intent is to build

experience in prescribed burning over the planning period so that as skills are gained, learning can be used to increase the acreage treated in later years.

Alternatives that include substantial amounts of prescribed fire will result in trends leading toward properly functioning conditions and reduced hazardous fuel conditions. No prescribed fire is allowed in Alternative 1. Although Alternative 1 does not include prescribed fire, the use of fire on the landscape may result in trends toward properly functioning conditions in that alternative. The most active and liberal prescribed fire program is in Alternative 2, followed by Alternatives 3, 6 and 7. Alternative 2, and Alternatives 3, 6 and 7 to a lesser degree, would most quickly achieve trends toward proper functioning condition and reduced risks of unwanted wildland fires. Alternatives 4 and 5 limit prescribed fire in timber emphasis areas (prescription 5.2).

Wildland Fire Use

Prediction of acres of wildland fire use by alternative is not possible. Seasonal weather and climatic factors, combined with budgetary and organizational constraints, would make any comparison generic and invalid. Across all alternatives, wildland fire use is also not allowed in the following management prescriptions: 4.5 (developed recreation areas); and 8.1 (oil and gas or other mineral production sites).

Other than the above-mentioned areas, wildland fire use will be considered across the rest of WCNF. Site specific plans for wildland fire use events are developed as events take place. Once wildland fire use is approved in the Fire Management Plan for an area, that does not mean that every natural ignition will managed in that way. For each ignition, a decision will be made whether to suppress or manage as wildland fire use. It is unlikely that ignitions that have potential to become large, high severity fires that threaten public safety or private property will be managed as wildland fire use.

A general assumption is that wildland fire use will be greatest in Alternative 1 (since it is a natural process in vegetation). Alternatives 2, 3, 4, 6 and 7 will equally allow wildland fire use on most areas of the WCNF. Alternative 5 also limits wildland fire use in management prescription 5.2 (timber emphasis). As stated previously, it is impossible to assign acres of wildland fire use across alternatives.

Wildland fire use implementation will result in conditions moving toward PFC and reduced hazardous fuels accumulations. The negative effects may include: increased erosion potential following fire, displaced recreation, displaced grazing, noxious weed invasion, and smoke.

Fire Suppression

The effects of fire suppression are generally long-term. The problems associated with years of fire suppression policies went unperceived for many years. Forest managers and researchers now have realized that suppressing fires has resulted in many undesirable vegetation changes that eventually lead to even more uncontrollable wildfires or undesirable changes in vegetation patterns in the future. Aggressive fire suppression is essential where life, safety and valuable

resources are at risk, however, there are trade-offs in terms of future fire suppression efforts and ecosystem health.

Under all alternatives, fire starts that are not managed as wildland fire use will be managed using the appropriate management response based on safety and values at risk. All non-lightning caused fires will be managed as unwanted wildland fires, even in areas identified for wildland fire use. Alternative 1 may result in less aggressive fire suppression actions in situations where a wildland fire poses little risk to life or property. Alternatives 2 through 7 are similar in terms of fire suppression.

Special Problems Associated with Development in the Wildland-Urban Interface

Increased development near the Forest boundary, often referred to as the wildland interface, affects the fire management program in several ways. The need for fire suppression resources increases due to the high values at risk (i.e., densely populated subdivisions) from a fire burning out of the Forest onto private lands. The need for fuels management (primarily mechanical treatment) along the Forest boundary increases both to reduce the risk of a fire leaving the Forest, and to reduce the risk of a fire on private property entering the Forest. Using prescribed fire or wildland fire use to reduce fuels may be severely constrained near the interface due to the relatively high risk of an escape onto private property and high values at risk. Wildland fire use opportunities will be limited near the populated areas along the Forest boundary.

Increased urbanization along the Forest boundary presents many challenges for fire management. However, increased urbanization does not vary among the presented alternatives and the effects on fire management will likely be similar for all alternatives.