This Toolbox Fire Recovery Project specialist report was prepared during March, April and May of 2003. It will be used, along with specialist reports from multiple resource areas, to prepare a Draft Environmental Impact Statement (DEIS) for the Toolbox Fire Recovery project. This specialist report will become a part of the planning record for the project, filed under:

"Toolbx/ Planning Record/ E_Specialists_reports_data_inventory_and_collection"

This report will be filed both in the 'hard-copy' planning record binders, on file at the Silver Lake Ranger District, and on the Fremont National Forest "K-Drive". In the interest of planning process efficiency, particularly in light of time and budget constraints, editing that occurs to the content of this report during the preparation of the DEIS will be reflected in the DEIS and will not necessarily be entered back into the content of this report. To insure the accuracy of such edits, I will review the content of both the DEIS and the (Final) FEIS and certify that their content is consistent with the analytical conclusions in this report. If during DEIS or FEIS editing, substantially different conclusions or interpretations are reached or substantial additional analysis is prepared from that displayed in this report, an addendum to this report will be prepared.

Specialist: /S/ Martina R. Keil Discipline: Range Management Date: 5/27/03

# RANGE – Non-Forested Plant Communities

# Introduction

This section details the expected effects the alternatives will have on six non-forested plant communities within the project area.

# Existing Conditions

## Plant Community Descriptions

*The descriptions are taken from the Plant Association of the Fremont National Forest (Hopkins, 1979), Riparian Zone Associations – Deschutes, Ochoco, Fremont and Winema National Forests (Kovalchik, 1987), and Pacific Northwest Ecoclass Codes for Seral and Potential Natural Plant Communities (Hall, 1998).*

The descriptions in this section are representative of typical non-forested plant communities that can be found in the project area. Normal variations within the systems can cause fluctuations in plant species diversity and composition. This is especially true for the riparian and meadow communities that have transitional zones, from the water to the uplands. Variations site-to-site and often year-to-year are normal and occur as a response to changing environmental conditions and site characteristics. Riparian Communities are considered part of the Sedge-Wet Meadow plant community. The current condition and effects sections will deal with them as such.

**101 – CJ S1 12 Juniper/Low Sage /Fescue**
The Juniper/Low Sage /Fescue plant community type will have very rocky soil surfaces with underlying cracked bedrock. *Artemisia arbuscula* (low sagebrush) and bunchgrasses, such as *Agrypyron spicatum* (bluebunch wheatgrass) and *Festuca idahoensis* are co dominant in a good condition site. Western juniper may be present at low densities, 2-4 trees per acre.

**104 – CJ S3 11 Juniper/Bitterbrush/ Bunchgrass**
The Juniper/Bitterbrush/Bunchgrass communities occur on dry sites with soil profiles to moderate depth. The potential for *Juniperus occidentalis* (western juniper), *Artemisia tridentata* (big sagebrush) and *Purshia tridentata* (bitterbrush) exits. *Festuca idahoensis, Agropyron spicatum* and *Poa sandbergii* (Sandberg's bluegrass) dominate the grass component.

**200-SD 19 13 Low Sage/Festuca idahoensis - Sitanion hystrix**
This plant community will have some winter and spring soil saturation. *Artemisia arbuscula* and bunchgrasses, such as *Agrypyron spicatum* and *Festuca idahoensis* are co dominant in a good condition site. *Sitanion hystrix* (Squirreltail) increases in poor conditions sites.

**202- SD 29 12 Big Sage/Festuca idahoensis – Sitanion hystrix**
The Big Sagebrush/Bunchgrass plant community is characterized by deep, well-drained soils. In the western portion of the project area, pumice and pumice ash are prevalent. Bunchgrasses such as *Festuca idahoensis* and *Agropyron spicatum* are dominant in the herbaceous cover. *Artemisia tridentata* var. *vaseyena* (mountain big sage) above 6000 feet and *Artemisia tridentata* var *tridentata* (basin big sage) below 6000' is considered a climax shrub.

**203 – SD 19 12 Low Sage/Festuca idahoensis**
Similar in structure to Low Sage/*Festuca idahoensis-Sitanion hystrix* community.

**225 – MX Meadows**

**Bluegrass Dry Meadow**
The Bluegrass Dry Meadow plant community is characterized by a water table at or near the surface in the early summer with a completely dry profile by early fall. The dominant species, in percent cover, is *Poa pratensis* (Kentucky Bluegrass) with various combinations of grasses and sedges making up the remainder of the vegetative composition. Willows may be present. Good condition Bluegrass Dry Meadow sites generally have less than 20% bareground. This community can often be found in conjunction with a wet or moist meadow. Normal variations in the moisture profile can result in an increase in *Poa pratensis* or an increase in *Deschampsia caespitosa* (Hairgrass).

**Hairgrass-Sedge Moist Meadow**
The Hairgrass–Sedge-Moist Meadow plant community will have a water table 20-30 inches of the soil surface most of the growing season. In a good condition site, *Deschampsia caespitosa* and various *Carex* species share dominance. Other grass species present are subordinate to *Deschampsia caespitosa* and include *Danthonia californica* (California oatgrass) and *Koleria pyramidata* (prairie junegrass). Wetter sites will be indicated by the presence of *Polygonum bistortoides* (American bistort), *Mimulus* species (monkeyflower) and *Veronica* species (speedwell), drier sites are indicated by a trace of *Poa pratensis*, *Hordeum brachyantherum* (meadow barley) and *Cinquefoil* species (potentilla). Unused sites tend to increase in litter and decrease in vegetative cover.

**Sedge-Wet Meadow**
The Sedge-Wet Meadow plant community will have water at or within 20 inches of the surface. Wetland sedges dominate a good condition site, with *Deschampsia caespitosa* present only in trace amounts. Increased site productivity can be seen with fall burning and the subsequent removal of a portion of the litter layer.

## Burned Acres Non-Forested Plant Communities

*Fire intensity acres are based on the BAER report and mapping efforts completed post fire for the Toolbox, Silver and Winter Fires (reference). The BAER analysis of fire intensity better represents conditions and expected response for the non-forested plant communities. These acres do not represent conifer mortality classes and should not be interpreted as such. In the report by Fred C. Hall, tree mortality percentages are often referred to as intensity.*
*ALL ACREAGES ARE APPROXIMATE.*

Three levels of fire intensity were mapped for the BAER effort: low, moderate and high. Areas mapped as low intensity contained a mosaic of understory burn conditions and unburned sites. In the non-forested plant community types presented, 8 acres were mapped at high intensity, 561 at moderate and 7,514 at low (Table NFPC-1).

Table NFPC -1. Burn intensities for non-forested plant communities within the project area based on the BAER efforts

| Ecoclass | Intensity | | | |
|---|---|---|---|---|
| | High | Moderate | Low (burned/unburned mosaic) | **Totals** |
| 101- CJ S1 12 Juniper/Low Sage/Festuca idahoensis | 7 | 338 | 1130 | **1475** |
| 104 - CJ S3 11 Juniper/Bitterbrush/Bunchgrass | 0 | 101 | 2146 | **2247** |
| 200 - SD 19 13 Low Sage/ Festuca idahoensis-Sitanion hystrix | 0 | 83 | 2631 | **2714** |
| 202 - SD 29 12 Big Sage/Festuca idahoensis - Sitanion hystrix | 1 | 0 | 93 | **94** |
| 203 - SD 19 12 Low Sage/Festuca idahoensis | 0 | 25 | 577 | **602** |
| 225 - MX Meadow | 0 | 14 | 368 | **382** |
| **Totals** | **8** | **561** | **6945** | **7514** |

**101 – CJ S1 12 Juniper/Low sage/Festuca idahoensis**
Approximately 1,475 acres of this plant community are within the project area. 7 acres were mapped at high intensity, 338 at moderate intensity and 1,130 at low intensity.

**104 – CJ S3 11 Juniper/Bitterbrush/ Bunchgrass**
Of the 2,247 acres within the project area, the majority, 2,146 were low in intensity and the remaining 101 were moderate in intensity. No acres were mapped as high intensity.

**200-SD 19 13 Low Sage/Festuca idahoensis - Sitanion hystrix**
Approximately 2,714 acres of this plant community type are within the project area. Burn intensity was primarily in the low category, 2631 acres, 83 acres moderate. No acres were mapped as high intensity.

**202- SD 29 12 Big Sage/Festuca idahoensis – Sitanion hystrix**
93 acres within the project area were mapped as low intensity and 1 acre was mapped as high intensity.

**203 – SD 19 12 Low Sage/Festuca idahoensis**
Approximately 602 acres are within the project area. No areas of high intensity were mapped, 577 acres of low intensity and 25 acres of moderate intensity were.

**225-MX Meadow/Riparian**
A specific count of the acreages for each of the meadow sub-types is not available at this time. Maps delineating the meadow sub-types are currently being created. What is known is that these plant communities can generally be found in the project area as part of transition from streams and other water sources to uplands. Within the project area the total acres, intensity of fire, expected fire response and alternative effects make the current delineation adequate. Within the project area there is a total of 382 acres of the meadow plant community type. The meadow areas mapped includes a mix of the three meadow subtypes, and may contain small areas of season long water dependent sedge sites. Of the acres within the project area 368 acres was mapped as low intensity and 14 acres were mapped at moderate intensity. No high intensity sites were

## Condition and Trend

*The condition and trend of the non-forested plant communities within the project area are based on data collected for the Grazing Permit Analysis process, tree mortality mapping done for this project, and professional judgment based on known past activities and field visits. References to tree mortality are made in an effort to describe the pre and post fire degrees of tree invasion into the non-forested plant communities. In a general, for non-forested plant communities, tree mortalities greater than 51% are an indication that tree invasion was high, 26-50% tree mortality indicated tree densities that show a moderate level of tree invasion and 0-26% tree mortality represent normal tree densities*.

The current conditions of the non-forested plant communities are influenced by current and past management practices. These include livestock use, a decreased fire frequency and other land management practices on both private and public land. The most notable management practice in recent years has been the suppression of fire (RMRS-GTR-42, 2000).

Recently, the use of proactive fuels management has begun to address the changes caused by lack of regular fire intervals in both forested and non-forested plant communities. However, the frequency of fire and level of reintroduction of the fire intervals necessary to keep non-forested plant communities functioning has not been adequate.

Fire suppression has lead to the invasion of trees into meadows and other non-forested vegetation types (Hopkins 1979, Kovalchick 1987, RMRS-GTR-42 2000). Photographs included in long-term trend data collection records for sites within the project area show significant conifer invasion. The conifer invasion and subsequent change in water dynamics as well as the nutrient sequestering resulting from lack of fire has affected both production and plant diversity (RMRS-GTR-42, 2000) and in turn the function of the non-forested plant communities as a whole. Overall, 2,234 acres of the non-forested plant communities had 0-25% tree mortality, 1,949 acres had 26-50% tree mortality and 3,329 acres had greater than 51% tree mortality (Table NFPC-2).

**101 – CJ S1 12 Juniper/Low sage/Festuca idahoensis**
**104 – CJ S3 11 Juniper/Bitterbrush/ Bunchgrass**
No long-term trend data was available for these plant community types. Tree mortality for 774 acres of the Juniper/Low Sage/Festuca idahoensis community was mapped greater that 51%. 808 acres of the Juniper/Bitterbrush/Bunchgrass plant community type was mapped at 51-100% tree mortality. This suggests substantial conifer invasion into both plant communities. As junipers are a component of this ecosystem, the 1,008 acres mapped at mortalities of 0 -25% for these plant communities could indicate expected degrees of juniper occurrence, as 2-4 acres of juniper trees are expected with periodic fire. Exclusion of periodic fire could increase juniper expansion (Hopkins 1979). Areas mapped at 25-50%, 1191 acres, are experiencing moderate tree invasion.

Table NFPC -2. Tree mortality in non-forested plant communities within the project area (Hall 2003)

| Ecoclass | Intensity | | |
|---|---|---|---|
| | 0-25% | 26-50% | 51-100% |
| 101- CJ S1 12 Juniper/Low Sage/Festuca idahoensis | 333 | 478 | 774 |
| 104 - CJ S3 11 Juniper/Bitterbrush/Bunchgrass | 675 | 713 | 808 |
| 200 - SD 19 13 Low Sage/ Festuca idahoensis-Sitanion hystrix | 1046 | 398 | 1273 |
| 202 - SD 29 12 Big Sage/Festuca idahoensis - Sitanion hystrix | 8 | 50 | 37 |
| 203 - SD 19 12 Low Sage/Festuca idahoensis | 0 | 96 | 264 |
| 225 - MX Meadow | 172 | 47 | 173 |
| **Totals** | **2234** | **1949** | **3329** |

**200-SD 19 13 Low Sage/Festuca idahoensis - Sitanion hystrix**
No condition and trend data is available for this pant community type. 1,273 acres were mapped at 51-100% tree mortality, indicating high invasion and to some degree loss of function. 1,046 acres showed 0-25% tree mortality and the remaining 398 had 26-50% tree mortality. Based on plant community descriptions (Hopkins 1979) the density of conifer species suggested by the 26-50% tree mortality is also probably beyond the historic condition.

**202- SD 29 12 Big Sage/Festuca idahoensis – Sitanion hystrix**
No condition and trend data is available for this pant community type. Poor condition sites show an increase in juniper cover (Hopkins 1979). 37acres were mapped at 51-100% tree mortality, indicating high tree invasion and to some degree loss of function. The 26%-50% tree mortality mapped on 50 acres also showed a decline in condition. 8 acres had 0-25% tree mortality.

**203 – SD 19 12 Low Sage/Festuca idahoensis**
No condition and trend data is available for this pant community type. 264 acres were mapped as having tree mortalities 51-100%, showing the most sever cases of tree invasion. 96 acres had moderate tree invasion, being mapped at 26-50% and 263 acres were shown to have 0-25% tree mortality.

**205-MX Meadow/Riparian**

Condition and trend data available for these plant community types show an overall increase in plants and decrease in bare ground. Tree mortality data show 173 acres of the meadow plant community type within the fire boundary had significant amounts of tree invasion with mortalities 51-100%. This invasion has had an effect on riparian species abundance. Based on plant community descriptions (Hopkins 1979 and Kovalchik 1987), the density of conifer species suggested by the 26-50% tree mortality, 47 acres, is also beyond the historic condition.

## Post Fire Response of Plant Communities

*Both BAER data and conifer mortality data will be referenced in this section; mortality data is interpreted as an indication of the level of conifer invasion into a system.*

Proper management of a non-forested plant community requires considerations of the community as a whole and not the management for any one particular plant species. However, some discussion on the effects fire on individual species is appropriate and included in this report.

The occurrence of high fire intensities was minimal, 8 acres out of the 7,514 acres of non-forested plant community types addressed. The remaining acreage was moderate, 561 acres and low, 6,945 acres (Table NFPC –1). The low intensity areas contain a mosaic of unburned sites and sites that experienced an under burn (Burned Area Emergency Recovery report), which is typical for wildfire in these communities (RMRS-GTR-42, 2000). In general, an increase in herbaceous species is expected post fire for the non-forested plant communities. Low intensity fire is similar to the fire intensity mimicked when prescribed fire treatments are implemented. Prescribed fire has been shown to result in an increase in productivity in sedge and meadow communities (FEIS), as well as in other non-forested sites (Hopkins 1979, West and Hassan 1985, Kovalchik 1987, and Tracy and McNaughton 1996). Hall (2003) predicts shrub sprouting in riparian communities and an increase in herbaceous cover on the shrub and juniper communities. Succession in sagebrush communities is generally grass/forb-dominated communities with sagebrush recovery in 30 or more years (RMRS-GTR-42, 2000).

Individual plant mortality can be expected in areas that received high and, depending on the species, moderate intensity burns. This mortality should be mitigated through the secondary succession resulting from adjacent sites with intact or enhanced species (RMRS-GTR-42, 2000) and or/ existing soil seed banks..

**101 – CJ S1 12 Juniper/Low sage/Festuca idahoensis**
**104 – CJ S3 11 Juniper/Bitterbrush/ Bunchgrass**
Fire intervals of 5-40 years maintained bunchgrass communities (RMRS-GTR-42, 2000), indicating fire has played a role in the maintenance and function of these communities. Festuca idahoensis has been shown to be more susceptible to fire both a reduction in basal diameter and mortality. Agropyron spicatum may be more tolerant of fire, with plants experiencing a reduction in basal diameter (Conrad and Poulton 1966). These responses were seen at ridge tops in what was probably a high intensity fire. Bitterbrush is highly susceptible to fire (Fire Effects Information System). However, fuel loading in the juniper/bitterbrush communities tends to be low in all but decadent stands. Old and young plants do not have a tendency to reprout (Blaisdell and Muegger 1956). Considering the amount of aces in these communities that burned at high intensity, 7 in the Juniper/Low sage/Festuca idahoensis and 0 in the Juniper/Bitterbrush/ Bunchgrass community, and the adjacent plants that remained unburned, recolinization of bunchgrasses is expected. The tree mortality in these plant communities indicated a 50 % or greater loss of tree species on 52% of the Juniper/Bitterbrush/Bunchgrass type. Where fire has killed junipers in this plant community, bitterbrush has appeared more vigorous (Fire Effects Information System EM).

**205-MX Meadow/Riparian**
Sedge-Wet Meadow sites and stream channel green-lines were looked at post fire August thru September 2002. Some species expected on these sites are Carex aquatilis, Carex nebraskensis and Carex utriculata. These carex species are rhizhomatus and the rhizomes are generally protected form all but the most severe fires (Fire Effects Information System). Post fire, carex spp within the project area along the stream channels showed recovery. Post fire recovery for these species can be rapid with low to moderate severity fires that top kill the vegetation. This rapid recovery within the project area indicated the rhizomes necessary for vegetative regrowth were not killed and the individual plants responded as expected for a low intensity fire (DeBenedetti and Parsons 1984, Racine et al. 1987). Periodic burning is suggested as a management tool to remove and breakup the litter layer (Hopkins 1979) and increase productivity. In areas devoid of vegetation post fire, vegetative recolonization of carx spp. is expected.

**200-SD 19 13 Low Sage/Festuca idahoensis - Sitanion hystrix**
**202- SD 29 12 Big Sage/Festuca idahoensis – Sitanion hystrix**
**203 – SD 19 12 Low Sage/Festuca idahoensis**
Variations in plant species response to fire in sagebrush communities are high. Elevation, pre-fire vegetation condition and variations within species and between species are some of the factors that effect response of the plant communities and individual plants. Limited research on low sage fire response has been completed. It appears to receive damage by fire. Basin big sage is considered intermediate in flammability. Reinvasion by big sage could be expected to occur through seed sources in adjacent, unburned areas (Fire Effects Information System). Brush control through use of fire can lead to dominance by *Chrystnothamnus* spp. (rabbitbrush) but can also increase productivity of the herbaceous layer. Invasion by cheatgrass is a concern post-fire (Fire Effects Information System, Hopkins 1979), especially below 5000' in elevation. Considering less than 1% of this type burned high and the remaining 93 acres either burned at low intensity or did not burn, it is expected that the burned acres will responds with an increase in the herbaceous layer. Any occurrence of cheatgrass should not affect the function of the community, as it is most likely in the high burn intensity acre. Any areas with low severity should not provide an increased opportunity for large amounts of cheatgrass. Although tree mortalities indicated a significant amount of tree invasion into these communities, post-fire mortality should result in an open canopy and increase in water availability. This combined will also improve the likelihood of increased productivity of the herbaceous layer.

## Environmental Consequences of Alternatives

**Alternative A**

The post fire response expected in these communities, based on the BAER burn intensities, would still occur. However, lack salvage in the non-forested plant communities could increase the recovery time. This is mainly due to accumulation of dead down trees and the processes necessary to decompose the plant material. Tree invasion could be expected without the introduction of more frequent fire (through prescribed methods).

**All Salvage Alternatives**
***Salvage***
Post-fire response to non-forested plat communities could be increased by the removal of dead down trees through salvage operations. Levels of salvage vary alternative to alternative. In respect to overall salvage, these differences in salvage appear to be tied to resource needs outside the non-forested plant communities and would probably not vary significantly within these communities. Fuel accumulations and subsequent hazards would be reduced.
One exception is the amount of salvage in RHCAs.

***RHCA Salvage***
Although some degree of salvage in RHCAs is planned for all salvage alternatives, the acres vary. Accumulation of dead down trees in non-forested-RHCA plant communities may exceed levels present when more historic fire intervals. As the acres being salvaged decrease, this possibility increases. This could increase the fire intensity at ground level if not treated. Salvage necessary to increase plant community function and consequently herbaceous species would be impacted in all alternatives due to the restrictions placed on salvage in RHCAs. Levels of RHCA salvage are discussed in more detail below.

**Alternative C**
***RHCA Salvage***
**Direct –**Approximately 632 RHCA acres are proposed for salvage. This alternative would allow for the least amount of accumulation of dead down trees and lower the likelihood of exceeding levels present with more historic fire intervals.
**Indirect –** Decreased plant community function and herbaceous species in RHCA areas where salvage does not occur (buffers). Increased recovery time in non-forested plant communities in buffers. Increased fuels accumulation that could lead to increased fire intensity during a wildfire. Decreased opportunity for prescribed fire with increased fuel loads and possibility for higher intensity fires at ground level.

***Reforestation***

**Indirect –** Reforestation into Category 3 and 4 RHCAs could influence the recovery of non-forested sites. Outside RHCAs, mitigations are in place on other non-forested sites to keep restocking at appropriate levels.

***Prescribed Fire***
**Direct -**Use of prescribed fire as habitat improvement for shrub dependent wildlife species could be beneficial to the maintenance of function of shrub dominated non-forested plant communities - a return of historic fire intervals. Increases in herbaceous productivity.

***Soil and Riparian Projects***
**Direct-** Successful deciduous planting could decrease the time of recovery for specific species in the riparian zones.

**Alternative D**
***RHCA Salvage***
**Direct –**Approximately 216 RHCA acres are proposed for salvage. Accumulation of dead down trees may exceed levels present with more historic fire intervals where salvage does not occur. This alternative has the highest likelihood of exceeding down dead accumulation that would be seen with more historic fire intervals.
**Indirect –** The highest likelihood of decreased plant community function and herbaceous species. Increased recovery time in RHCA non-forested plant communities. Increased fuels accumulation that could lead to increased fire intensity during a wildfire. Decreased opportunity for prescribed fire with increased fuel loads and possibility for higher intensity fires at ground level.

***Reforestation***
**Indirect –** Reforestation into Category 3 and 4 RHCAs could influence the recovery of non-forested sites. Outside RHCAs, mitigations are in place on other non-forested sites to keep restocking at appropriate levels.

***Prescribed Fire***
Use of prescribed fire as habitat improvement for shrub dependent wildlife species could be beneficial to the maintenance of function of non-forested plant communities by the return of historic fire intervals. Increases in herbaceous productivity.

***Soil and Riparian Projects***
Successful deciduous planting could decrease the time of recovery for specific species in the riparian zones.

**Alternative E**
***RHCA Salvage***
**Direct –**Approximately 532 RHCA acres are proposed for salvage. Accumulation of dead down trees may exceed levels present with more historic fire intervals where salvage does not occur.
**Indirect –** Decreased plant community function and herbaceous species in RHCA areas where salvage does not occur, buffers. Increased recovery time in non-forested plant communities in buffers. Increased fuels accumulation that could lead to increased fire intensity during a wildfire. Decreased opportunity for prescribed fire with increased fuel loads and possibility for higher intensity fires at ground level.

***Reforestation***
**Indirect –** Reforestation into Category 3 and 4 RHCAs could influence the recovery of non-forested sites. Outside RHCAs, mitigations are in place on other non-forested sites to keep restocking at appropriate levels.

***Prescribed Fire***
The opportunity to introduce historic fire intervals into non-forested plant communities would be eliminated. These communities benefit, in function and structure, from the occurrence of low intensity prescribed fire. Decreases in herbaceous productivity.

***Soil and Riparian Projects***
Successful deciduous planting could decrease the time of recovery for specific species in the riparian zones.

**Alternative G**
***RHCA Salvage***

**Direct –**Approximately 610 RHCA acres are proposed for salvage. Accumulation of dead down trees may exceed levels present with more historic fire intervals where salvage does not occur.
**Indirect –** Decreased plant community function and herbaceous species. Increased recovery time in non-forested plant communities. Increased fuels accumulation that could lead to increased fire intensity during a wildfire. Decreased opportunity for prescribed fire with increased fuel loads and possibility for higher intensity fires at ground level.

***Reforestation***
**Indirect –** Reforestation into Category 3 and 4 RHCAs could influence the recovery and function of non-forested sites. Outside RHCAs, mitigations are in place on other non-forested sites to keep restocking at appropriate levels.

***Prescribed Fire***
Use of prescribed fire as habitat improvement for shrub dependent wildlife species could be beneficial to the maintenance of function of non-forested plant communities by the return of historic fire intervals. Increases in herbaceous productivity.

***Soil and Riparian Projects***
Successful deciduous planting could decrease the time of recovery for specific species in the riparian zones.

**Alternative H**
***RHCA Salvage***
**Direct –**Approximately 216 RHCA acres are proposed for salvage. Accumulation of dead down trees may exceed levels present with more historic fire intervals where salvage does not occur. This alternative has the highest likelihood of exceeding down dead accumulation that would be seen with more historic fire intervals.
**Indirect –** The highest likelihood of decreased plant community function and herbaceous species. Increased recovery time in RHCA non-forested plant communities. Increased fuels accumulation that could lead to increased fire intensity during a wildfire. Decreased opportunity for prescribed fire with increased fuel loads and possibility for higher intensity fires at ground level.

***Reforestation***
**Indirect –** Reforestation into Category 3 and 4 RHCAs could influence the recovery and function of non-forested sites. Outside RHCAs, mitigations are in place on other non-forested sites to keep restocking appropriate levels.

***Prescribed Fire***
Use of prescribed fire as habitat improvement for shrub dependent wildlife species could be beneficial to the maintenance of function of non-forested plant communities by the return of historic fire intervals. Increases in herbaceous productivity.

***Soil and Riparian Projects***
Successful deciduous planting could decrease the time of recovery for specific species in the riparian zones.

## Cumulative Effects

**All Salvage Alternatives**
Salvage operations have the potential to spread noxious weeds into non-forested plant communities. Combined with suppression activities in non-forested plant communities the chance for establishment of noxious weeds increases. The acres of non-forested plant communities that experience high fire intensities as well as areas in these communities where suppression activities occurred are more susceptible to weed invasions. Introduction of previously undocumented noxious weeds through suppression activities may have occurred. Any introduction or increase of noxious weeds into these systems could decease the function of these communities, but the acres where this is likely are few. Mitigations and BAER treatments will minimize the chances of this occurring.

## Discrepancies

Some discrepancies exist between the acres calculated within the project area and the acres for the plant community tree mortality reported by Hall (< 10 acres). These are probably due to the addition and deletion of areas that occurred between the Hall report and the final analysis area.

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