Chapter 3

Affected Environment and Environmental Consequences

This chapter describes the anticipated consequences of implementing each alternative. This section will compare the proposed action and the no action alternatives by issue and describe the environmental effects and consequences of these two alternatives. Acreage differences between sections are due to rounding differences or to how Geographic Information Systems (GIS) rules were applied during spatial analysis, and should not be considered as significant.

3.1 Affected Environment and Effects Relating to Key Issues

Key Issue #1: Fire Hazard Reduction

How effective will the chosen alternative be in reducing the chance of having a large, stand replacement or uncharacteristically severe fire in the project area that could destroy federal resources or damage private property and structures?

The first portion of this section (Fuels) will provide historic and current fuels information and address the following items related to Key Issue #1:

- The amount of the project area on which the fire hazard is effectively lowered.
- The degree that total fuel loadings are reduced on treated areas.
- The length of time that treatments are effective.

The second portion of this section (Silviculture) will provide the historic and current silvicultural conditions and address the final measure of Key Issue #1:

- The increase in individual tree vigor and overall stand health to reduce fire, insect, and disease related mortality.

Fuels

Historical Fire Regimes

The fire regimes described in Agee (1993) are used to describe those in Ninemile. Two historic fire regimes existed in the Ninemile Project Area: low severity Fire Regime 1, and non-forest stand replacement Fire Regime 2. The fire regime concept is a generalized way of characterizing the historic role fire played in an ecosystem, describing fire effects and vegetative conditions that likely contributed to historic fire behavior (i.e., flame length, fire size, and crowning/scorching potential).

The Ninemile ponderosa pine type was associated with frequent, light surface fire (5-15 year fire-free intervals). This is consistent with Fire Regime 1, the low severity fire regime. In a fire regime with frequent fire return intervals of low and moderate intensity, as in Ninemile, the vegetation historically consisted of well-spaced fire tolerant species such as ponderosa pine. The frequent, low intensity fires maintained the open stand

structures by killing brush, small trees, and seedlings, and consuming fuels before they accumulated to the level where the entire stand was threatened. Shade tolerant, thin barked species, such as white fir and lodgepole, were regularly thinned out or excluded from most of Ninemile by fire.

Fire Regime 2 in Ninemile is associated with the shrub and scabland communities that had minor stocking levels of ponderosa pine and juniper. Fire historically in these areas had fire-free intervals from 10-25 years. Fires played a variable role. In some cases it functioned as a stand replacement event on creating varying sized patches by killing most of the vegetation. In other areas fire served to keep some species, such as juniper and mountain mahogany, in refugia areas such as rock outcrops.

Current Fuel Condition

Stand structure changed with the advent of effective fire suppression in the 1920's, the opening of stands with varying levels of logging, and with grazing. Changes include a much higher stocking level of fire tolerant species, an increase of shade tolerant species in the intermediate layer, an increased shrub component and fewer openings associated with the natural stands. Ground fuels such as needle litter, dead branches and brush that once were consumed by the light surface fires have now accumulated to amounts that seldom occurred historically.

Past management activities, in particular timber harvest and fire suppression, and grazing have changed stand structure, composition, and landscape pattern. Currently, Ninemile is composed of well-stocked and overstocked multi-storied ponderosa pine stands, with minor amounts of lodgepole and pine associated stands. There are no examples of the historic open, fire-maintained stands remaining. Stands have less of a large tree component and many more small trees than existed in the past. This has created a continuous fuel ladder from the ground to the crowns of the larger trees and contributes to a continuous layer of fuels such as needles, limbs, and dead trees. Growth rates for trees are low, as competition is high for water, nutrients, and growing space. The slow growth rates and low level of tree and stand vigor makes trees more susceptible to insect attack and disease mortality, and makes trees less likely to survive a wildfire.

The total amount of fuel has also increased over time. Fuels have accumulated from needle fall and other conifer litter. Dry climatic conditions and very slow decomposition rates have lead to large accumulations of burnable materials. Brush species have become thick and decadent, with a large component of dead stems. The primary mule deer forage, bitterbrush, is predominately in a mature to overmature condition.

The brush and scablands have also increased their vegetation and fuel loads. Small ponderosa pine and juniper trees have spread through areas formerly dominated by sage, bitterbrush, and mountain mahogany. Ground fuels have accumulated to provide a more continuous fuel bed.

Given current stand structures and fuel loadings, fire can no longer function in the same way that it did historically. Uncharacteristically severe stand replacement fire events have become the norm, replacing the light ground fires that were characteristic of the fires in the Fire Regime 1 timbered areas, and the patchy fires in the Fire Regime 2

brush and scablands.

Current Fire Risk and Fire Hazard

The probability of fire activity in the future can be estimated by combining fire risk and fire hazard. Fire risk is the chance that a fire will occur. It is normally obtained through fire history analysis (average number of fires for a given area). Fire hazard is the fuel, topography, and weather conditions that affect fire spread, intensity, and the severity of the burn. Fuel is the only parameter that can be directly manipulated to reduce or increase the amount of fire spread and intensity. Fuel includes all the live and dead vegetation present, including needle litter, brush, and all sizes of trees.

Between 1970 and 2003 a total of 55 wildfires occurred on the National Forest lands within the Ninemile Project Area, or an average of almost two fires per year. Additional fires have started on the private land within the Ninemile boundary. Most fires within the Ninemile Area have been quickly suppressed at less than one acre. The Lone Pine Fire (1992) started within Ninemile and burned out of the area, consuming over 30,000 acres.

Figure 3-1 displays the fire occurrence for the Ninemile area from 1970 through 2003. Table 3-1 shows the fire occurrence by decade for the same time period. The numbers of fires increased each decade from 1970 to 1999, and appear to be on the same track for the first decade of the millennium. This increase is due to the increase in live and dead fuels and the increase in public use of Forest Service land.

Table 3-1: Fire Occurrence in the Ninemile Project Area, 1970-2003

Time Period for Fire Occurrence	Total Fires	Human Fires	Lightning Fires
1970-1979	8	3	5
1980-1989	15	4	11
1990-1999	23	8	15
2000-2003	9	5	4
1970-2003	55	20	35

Note: There is no fire history data available for non-Forest Service ownership within the Ninemile Area.

Current fuel profiles within the Ninemile Project Area reflect a high susceptibility to stand-replacement fire. A stand replacement fire is defined as one that would burn with severity that kills at least 80% of the existing vegetation. Stands within the area were rated, on a relative scale, on the potential to burn with stand replacing characteristics. For a complete explanation of the methods and models used to determine the existing fire hazard and a discussion of fire behavior by hazard class, please refer to the Fuels Specialist Report in the Project Record. The current fire hazard condition in the Ninemile Area is shown in Figure 1-4 in Chapter 1.

Currently 79% of Ninemile is classified as a high fire hazard. This level of hazard, in a wildfire, will produce uncharacteristically severe fire behavior, resulting in a stand-replacement event. Table 3-2 shows the percentage of the Ninemile Area classified as high, moderate, and low fire hazard.

Table 3-2. Ninemile Current Fire Hazard

Fire Hazard/Susceptibility to Stand Replacing Fire	% of Project Area
Low	8%
Moderate	13%
High	79%

Current Condition Class Rating

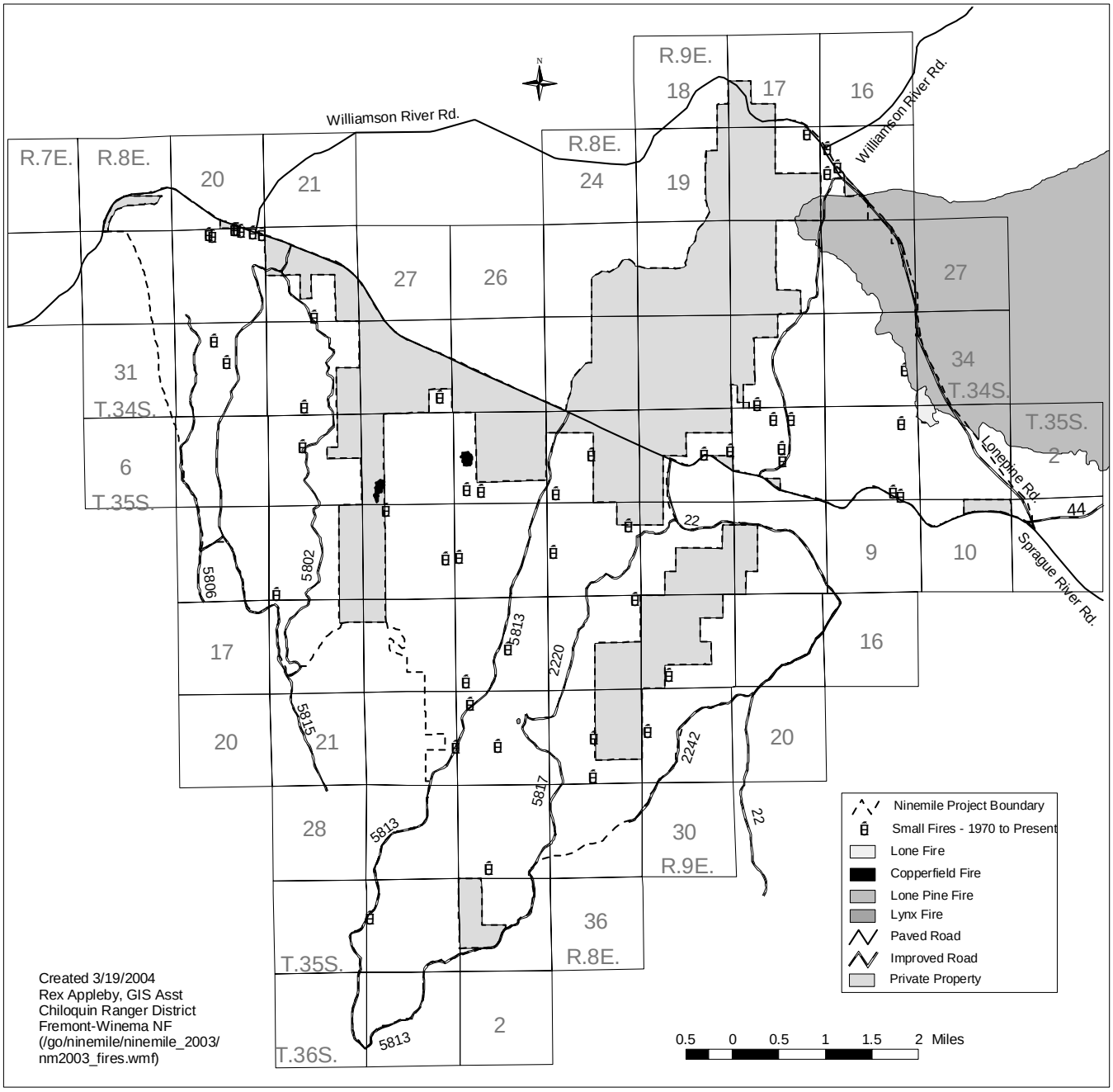
Condition class relates to the degree of departure from historical fire regimes and the resulting alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure, referred to in HFRA SEC. 101 (4) & (5). The following definitions are used (USDA Forest Service 2000).

- ***Condition class 1:*** Fire regimes are within or near historical range. The risk of losing key ecosystem components is minimal. Fire frequencies have departed from historic frequencies (either increased or decreased) by no more than one return interval. Vegetation attributes (species composition and structure) are intact and functioning within historical range.

- ***Condition class 2:*** Fire regimes have been moderately altered from the historic range. The risk of losing key ecosystem components has increased to moderate. Fire frequencies have departed from historical frequencies by more than one return interval. This results in moderate changes to one or more the following: fire size, fire frequency, intensity, severity, or landscape patterns. The vegetation attributes have been moderately altered from the historic range.

- ***Condition class 3:*** Fire regimes have been significantly altered from the historic range. The risk of losing key ecosystem components is very high. Fire frequencies have departed historic levels by multiple return intervals. This results in dramatic changes in fire size, frequency, intensity, severity, and landscape patterns. Vegetation composition and structure have been significantly altered from the historic ranges.

Figure 3-1. Fire Occurrence in Ninemile, 1970-2003.



Past activities and fire exclusion on federal lands have changed 95% of the Ninemile Project Area from a Condition Class 1 to Condition Class 3. These stands were once dominated by large old-growth ponderosa pine in an open park-like setting with little surface fuels or understory. Now, with 4 to 5 fire return intervals missing, these areas consist of multi-storied ponderosa pine stands with white fir, lodgepole, and juniper encroachment, heavy fuel loadings of dead and down material, and a large brush component. Wildfires burning in these areas during the summer months could have a devastating effect on the ecosystem. Only the portion of the 1992 Lone Pine Fire located within Ninemile is in Condition Class 1. Existing condition classes for Ninemile are shown in Figure 1-5 in Chapter 1.

Alternative 1 No Action

The no action alternative does not propose any treatments during this planning cycle. The need for lower level of fuel loading and reduction of ladder fuels will not be met. Tree and stand vigor increases will not happen. Mule deer forage habitat will not be improved. No commercial timber will be produced.

The threat to life and property by wildfire will escalate. Fire suppression will continue to occur, but with less success and higher risk to the public and firefighters. The condition class and the fire hazard will remain constant in the short term (one to five years), at a high risk of a stand replacement fire. In the longer term more of the area will be classified as high fire hazard and Condition Class 3 as hazardous fuels continue to accumulate. The Condition Class 1 area of the Lone Pine Fire will accumulate fuels and change into Condition Class 2 in about ten more years. The meadows, riparian and non-forest lands would continue to deteriorate with encroachment of juniper, conifers, and fuel accumulations. Wildlife forage will continue to decline as conifers increase their dominance of most stands. Stands that are at risk from insect or disease infestation will not be thinned and mortality will continue to occur, contributing to the fuel loading. Natural fuels, the pine needles and other dead vegetation, will continue to accumulate. Natural processes of decay will not remove the down and dead woody debris before the next fire cycle in the dry, cool climatic conditions of the Ninemile area. As available fuel increases, so will the potential for a large, stand replacement fire.

No action will increase the buildup of available fuels throughout the project area, moving the area further away from the desired conditions. The effects on fire management will be more rapid rates of fire spread, greater fire line intensities and a substantial increase in resistance to control. Fires will be more difficult for suppression resources to contain at a reasonable size, or prevent from spreading to adjacent private land.

With no action there will be no short-term effects to air quality due to prescribed burning activities. There will be uncontrolled degradation of air quality when a wildfire occurs, leading to firefighter and public health issues from extended exposure to particulate matter, carbon monoxide, other gasses associated with the smoke produced by large wildfires. Suppression costs will increase due to the probability of having larger fires that have an increased need for expensive suppression resources such as mechanized equipment and aircraft. A wildfire will burn very intensely and exhibit extreme fire behavior where large amounts of ladder fuels and dead debris have accumulated. The increased fire intensity will mean the short term loss of existing forage and the long term loss of thermal cover important for wildlife habitat. Such fire behavior will result in loss

of productivity and biodiversity in the stands. In the event of a wildfire, soil erosion could occur in some of the planning area following an intense post-fire precipitation episode. Surface soils could be damaged, resulting in runoff and sediment flow into the Sprague River.

Alternative 2 Proposed Action

Activities that effectively reduce fire hazard include treatments that reduce stand density, crown bulk density and crown base height, lower existing fuel concentrations, decrease the ladder fuels (brush and small trees) which provide vertical connectivity into the crowns of the overstory trees and reduce the need for extensive fuel treatments in the future. Stocking levels, crown bulk density, surface fuels, and crown base height are primary stand characteristics that determine crown fire potential. Crown fires are the most destructive and difficult to control part of any wildfire. Crown fires pose the greatest threat to forest stands, wildlife, wildlife habitat, and human life. Fuel treatments moderate extreme fire behavior within treated areas in short fire return interval ecosystems such as Ninemile. Omi and Martinson (2002), in a study that included timber and fuel types similar to Ninemile, examined the effects of various fuel reduction treatments on moderation of wildfire behavior. They concluded that treated stands burned less severely than untreated areas, and that it was important to treat the entire fuel profile, including thinning of the canopy. This and other articles on fuel reduction and its effects on wildfire are discussed in Section 2.2, Alternatives Dropped from Further Consideration.

The activities proposed in Ninemile are consistent with the recommendations on page 30 of the South of Sprague Watershed Assessment (USFS 1995) for reducing stocking in both trees and shrubs, reducing surface fuels, and the reintroduction of fire to the ecosystem.

The action alternative breaks up continuous blocks of high fire hazard areas. This break up of high hazard areas will affect a fire moving through the area should a wildfire occur. The intensity of the fire will be less, which in turn may alleviate some of the environmental damage. This alternative will return approximately 40% of the planning area to Condition Class 1. Upon completion of all treatments, the chance of a large stand replacement event in the project area will be greatly reduced. The forward movement of a wildfire will be slowed, improving firefighter safety, providing an advantage in suppression efforts, and reducing the final fire size.

Fire risk will stay approximately the same for the Ninemile Area. There will be a small possibility of an operations fire from the harvest, post treatment, or natural fuels activities. Fire occurrence in the treated areas may eventually be reduced due to the reduction in receptive fuels through application of the proposed treatments. Should a wildfire occur, the negative consequences of an ignition will be greatly reduced.

Effects of Individual Treatments on Fuels

Alternative 2 proposes to reduce fuels on 6961 acres within the Ninemile Project Area. Tables 2-1 and 2-2 (Chapter 2) show the types of treatments proposed for each unit.

Commercial thinning from below will break up the horizontal fuel continuity by opening

up the tree canopy and increasing the tree spacing in the stands. Crown bulk density will be reduced. The distance from the surface fuels to the crown will increase as the largest and best quality trees are retained. Commercial thinning will minimize the chance of a crown fire being started and sustained. Thinning increases stand vigor by providing more resources (rooting area, water, nutrients) to the selected residual stand. This results in healthier trees and a lower probability of future mortality from insects, disease, and wildfire that can contribute to future high fuel loadings.

Areas receiving commercial harvest will have the limbs and tops of the harvested trees removed to the landing sites using a Yard Tops Attached (YTA) contract provision. As a result, no slash from the thinning operation will remain in the unit. Neither the short or long-term fuel hazard will exist except at the landing. Landing piles will be chipped and removed or burned usually within one to two years. These piles will be concentrated, isolated and surrounded by bare dirt so that the risk of ignition is small, access for suppression is available and risk to the surrounding timber is slight.

Whipfalling and precommercial thinning reduces the horizontal and vertical fuel continuity of the understory fuel ladder. This reduces the possibility of a surface fire climbing into the crowns of larger overstory trees.

Machine piling and hand piling arranges scattered activity slash from whipfalling or precommercial thinning into concentrated piles away from residual trees so they can be burned with little or no damage to the overstory. This slash is typically piled the same year and burned after one summer of drying. Since this activity takes place after stands have been thinned, an individual pile, if ignited under adverse conditions, may cause adjacent trees to torch, but the likelihood of a moving crown fire is slight.

Pile burning will remove fuel concentration created by mechanical or hand piling methods. The piles can then be burned in the late fall or winter, when weather condition and soil moistures will help to minimize environmental effects of burning.

Mowing or slashbusting will further reduce ladder fuels and fuel profiles by chipping or shredding brush, small trees and other forest residue. Mowing will reduce the fuel bed height from up to 5 feet down to 6 inches or less, and increases the fuel packing ratios. This will reduce flame lengths and rates of spread, and increase burning windows for prescribed burning operations. Mowing and burning will also stimulate forage plants to produce more palatable forage.

Underburning and jackpot burning will reduce fuel loadings, fuel bed depth, and/or understory vegetation by consuming biomass. Burning helps increase the cycling of nutrients that are contained in dry forest litter.

Reduction of Fire Hazard and Change in Condition Class

The series of fuel reduction treatments described in Chapter 2 will lower the fire hazard and change the existing condition class on the acres treated. Table 3-3 shows the acres that are changed from high to low and moderate fire hazard and from Condition Class 3 to Condition Class 1. Figure 3-2 displays the change in fire hazard and Figure 3-3 shows the change in condition class resulting from implementation of the proposed action.

All units in the proposed action are in Condition Class 3 and will require the proposed combination of treatments in order to be returned to Condition Class 1. The majority of the acres proposed for treatment are rated as high fire hazard, with a few acres rated as a moderate fire hazard. All treated acres will be changed to a low fire hazard with the proposed action.

Up to 30% of the area within units with bitterbrush as the primary forage species will not be whip felled and underburned, in scattered blocks and strips, to retain mature bitterbrush seed sources in the units. There will be small areas left untreated to provide visual diversity and minor cover or screening for wildlife. After fuel reduction activities are completed, the areas left within the activity units will provide no appreciable fire hazard when considered on a landscape level.

Table 3-3. Fire Hazard and Condition Class Changes, Ninemile Proposed Action

Fire Hazard Changes		Condition Class Changes	
Current High Fire Hazard Acres	14597	Current Cond Class 3 Acres	17743
High Fire Hazard Acres Treated	6800	Cond Class 3 Acres Treated	6961
Percent of high hazard changed to low hazard	47%	Percent changed to Condition Class 1	39%

Effectiveness of Fuel Reduction over Time

The proposed action will assist in developing a more sustainable ecosystem. Sustainability refers to maintaining the composition, structure and process of an ecological system (USDA Forest Service, 1998). The sustainable condition of the Ninemile Project is the Desired Future Condition within the activity units where fire can perform as a stand maintenance process rather than a stand replacement event, while meeting wildlife habitat requirements.

In the short term, during project activities, full-tree yarding, slash busting, and piling are used to rearrange fuels so that fire hazard is low. This is discussed further in the section ‘Effects of Individual Treatments on Fuels’, above. In the longer term, chipping, pile burning and under-burning remove these fuels.

Units receiving commercial thinning as the starting point for the fuel reduction will be returned to Condition Class 1 following completion of all activities, including harvest, post sale fuels treatments, and underburning. Local experience shows that the units will remain in the low fire hazard and in Condition Class 1 for a minimum of 10 to 15 years. At this time a maintenance underburn would be needed to sustain a Condition Class 1 for another 10 to 15 years. Maintenance underburning would be done to reduce the accumulation of needles, small limbs and other ground fuels that had accumulated since the original prescribed burn, as well as to reduce the number of seedling conifers that had become established, and to reduce the grasses and brush component. Maintenance underburning might be delayed until year 20 to 25 depending on the

condition of the forage in and adjacent to a given unit. The commercial thinning in the Ninemile Proposed Action reduces conifer stocking to a level where intertree competition and growth rates should not be a concern for up to 30 years. This level of thinning will also allow site resources to be utilized by new forage plants and by the stimulated brush, lessening the current site dominance by conifers. Stand density and crown spacing should be evaluated for another thinning as tree growth rates slow in 25 to 30 years.

The fuel reduction units that did not require harvest were designed around stands of predominantly younger noncommercial trees or open stands of larger trees with a precommercial understory and heavy brush. Upon completion of fuel reduction and prescribed burning activities the fire hazard will be significantly reduced and these areas will be returned to a low fire hazard/Condition Class 1. The predominately noncommercial sized stands will grow rapidly, and will need to be evaluated for thinning to maintain stand health and crown spacing in less than 30 years. Maintenance underburning could take place in 10 to 15 years, as in the harvest units, or could be postponed to maintain forage production. The units starting with open stands of larger trees and a precommercial understory will essentially follow the same stand development and possible future treatments as the harvest units.

Figure 3-2. Ninemile Proposed Action Fire Hazard after Treatment

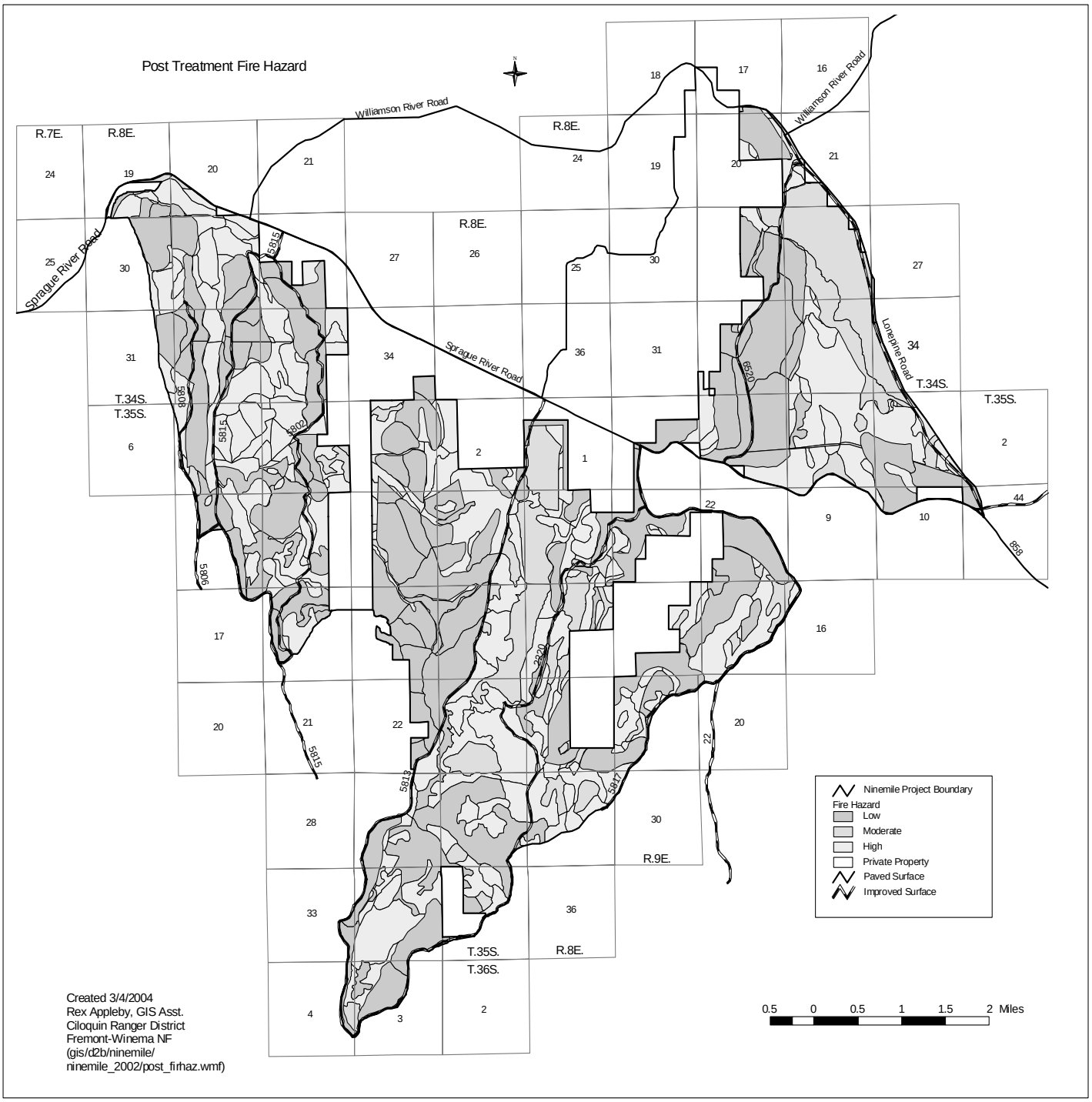
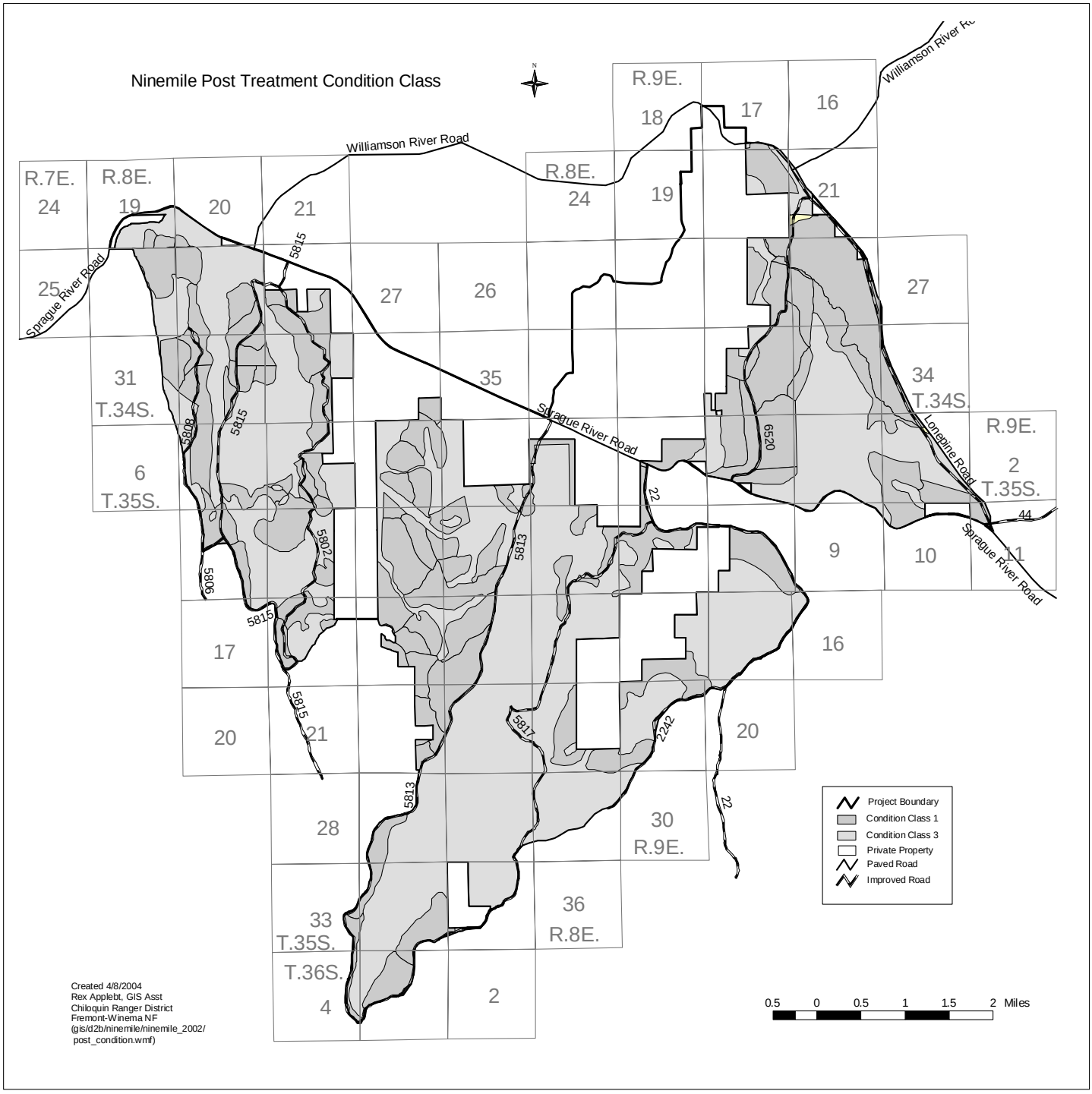


Figure 3-3. Ninemile Proposed Action Condition Class after Treatment



Fire Hazard Cumulative Effects

The Ninemile Fuel Reduction Project is part of a landscape approach to treating areas that are currently at a high fire hazard rating and/or Condition Class 3. Since the Dorf EA decision in 1995 there have been seven project areas, including Ninemile, that have specifically addressed changing forest structure and fuel levels to more sustainable conditions. These projects, like Ninemile, address the entire stand condition in treated areas, including conifer stocking levels, ladder fuels, and accumulated natural fuels. Table 3-4 displays the project areas and the percentage of the project areas where fuel reduction is planned or has taken place. One future project, Ninemile North, is also shown, with estimated treatment acres.

The eight current and proposed project areas are connected and cover 117608 acres of the Chiloquin Ranger District. This includes a majority of the WUI area around the Chiloquin community. The projects, in aggregate, effectively reduce fuel hazard and lower the condition class on 32% of the total area. A majority of the remaining acres will remain in high fire hazard and Condition Class 3, and should be considered in future projects. The project areas are in varying stages of completion of the planned activities. When finished, the risk of uncharacteristically severe wildfires will be lower, and the ability to contain wildfires to relatively small sizes in the project areas will be enhanced as large blocks of high fire hazard conditions are broken up.

Table 3-4. Fuel Reduction Treatments in Past, Current and Future Project Areas

Project Area	Decision Date	Project Area Total Acres	Treated Acres	Percentage of Project Areas Treated
Dorf	12/13/95	7020	3080	44%
Ranch House	09/12/97	11422	4404	39%
Bayhouse	12/16/98	14389	4153	29%
Yosshouse	04/20/01	20600	5289	26%
Millhouse	08/01/01	17409	1918	11%
Chiloquin Community Fuels Reduction Project	05/03/02	4100	2321	57%
Ninemile	06/01/04*	18487	6961	37%
Ninemile North	07/01/05**	24181	9000**	37%**
Total, All Project Areas		117608	37126***	32%***

* Projected for Ninemile ** estimated for Ninemile North *** estimated grand total

Large wildfires, covering nearly 35000 acres in and near the Ninemile Project Area, were analyzed. The wildfire areas are in varying stages of recovery, and will take decades before the forest will return to prefire structures. Currently the Lone Pine, Quick, Skunk, and Whopper fires do not have the fuel strata necessary to facilitate another large wildfire. The wildfire returned the burned areas to Condition Class 1 and a low fire hazard rating. Though these areas are not considered adequate fuel breaks due to the influx of brush, the current fuel profiles would moderate wildfire behavior and allow for rapid containment of a wildfire until more fuels accumulate. The large fire

areas do contribute to the overall reduction of high hazard conditions across the landscape. Future activities are planned to treat the vegetation within these old fires that will keep them in or return them to Condition Class 1 and a low hazard state. The first of these projects may be done in a portion of the Lone Pine fire starting in 2005 if requested funding is provided. These future actions within the wildfire area include precommercial thinning and brush mowing. Figure 3-4 shows the past and future fuels reduction project areas and the wildfires in the vicinity of the Ninemile Project.

Landscape changes in fuel profiles through fuel treatments identified in the Ninemile project, combined with similar project activities on the Chiloquin District, will help to restore treated forest areas to a more resilient and resistant condition than currently exist. Fires will continue to occur in the project areas, but their size, severity, ecological and economical impact will be reduced through continued fuels management actions.

Silviculture

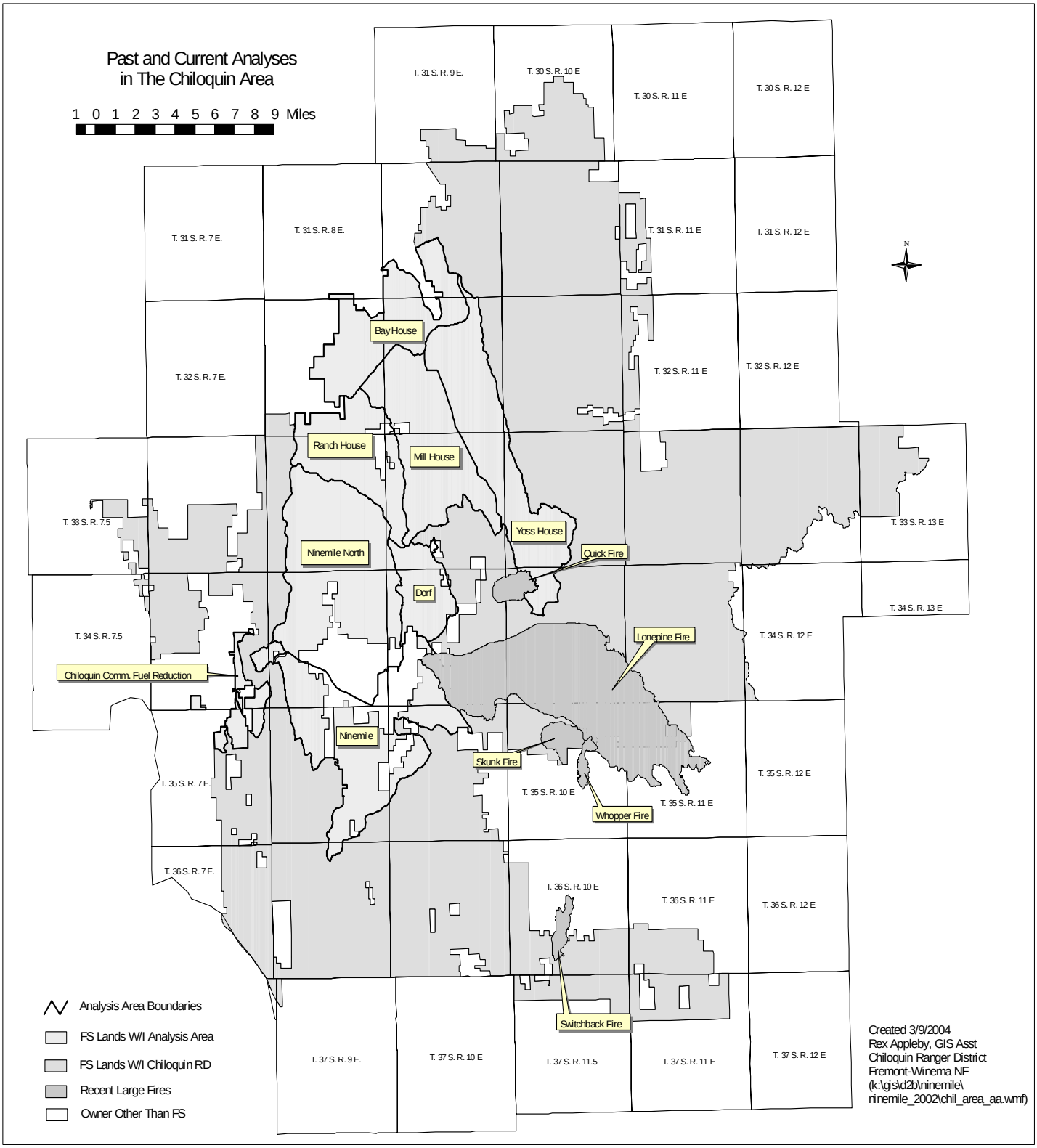
Historic Stand Structure

The Ninemile Project Area is contained within the South of Sprague (SOS) Watershed Analysis (USFS 1995). This study described the historic condition of the vegetation in several watersheds, including the Ninemile area. The reference era (pre-1875) description of forest types was taken from Bureau of Indian Affairs (BIA) records, reports by Lieberg (1899) and Munger (1917), and from *A First Approximation of Ecosystem Health*, (USDA Forest Service, 1993) in the SOS study. Historically ponderosa pine type covered 90% of this large watershed, and the pine associated type occupied less than 4%, primarily at elevations over 6000 feet. The remaining 6% of the area was meadows and other riparian areas. Based on historical records, there was no pine associated type and only incidental amounts of lodgepole pine in the Ninemile portion of the watershed analysis area.

The ponderosa pine stands were dominated by single-storied, open park-like stands with an abundance of large diameter, fire resistant ponderosa pine trees. Smaller trees occurred as widely scattered poles, saplings and seedlings. Stocking levels averaged 30 to 90 square feet of basal area and 10 to 40 trees per acre in most stands. Approximately 70% to 90% of these stands would have been classified as single-story Late/Old Structural (LOS) stage. Frequent, low intensity fires maintained the open stand structure by killing brush, small trees, seedlings and consuming ground fuels. The estimated fire return interval was a light burn every 5 to 15 years. This frequent fire return interval had a dramatic affect on other vegetation types. Bitterbrush was more scattered, with grasses and forbs dominating the ground vegetation.

Most of the lodgepole type was young and scattered along meadow areas. Only 20% to 40% of the historical lodgepole pine was considered as Late/Old Structural stage, because of the frequent fires and the low tolerance of lodgepole to fire. Aspen and willows occupied 3 to 4 times the current area, and were regularly regenerated by fire. Juniper and mountain mahogany were kept to refugia areas such as scabs with thin soils and rocky outcrops where the fire return interval was less frequent and very low intensity. White fir was absent from most of the project area due to a low tolerance to fire. The historic structural stages present in the Ninemile Area are shown in Table 3-5.

Figure 3-4. Past, Current, and Future Fuels Reduction Projects on the Chiloquin Ranger District



Past Activities

Railroad and early tractor logging covered virtually all of the Ninemile Area. These early logging efforts by the BIA removed from 30 to 70% of the large overstory pine trees in any given area from the 1920's through the late 1950's. This removal, combined with effective fire suppression, set the stage for the current stand structure and condition in Ninemile.

Some of the pine and pine associated stands have been affected in their appearance by more recent activities. Since 1980, overstory removal treatments followed by precommercial thinning have left even-aged stands that are dense and uniformly the same height and diameter. Fuel treatments have included machine crushing/piling and minor amounts of underburning. The understory is primarily composed of bitterbrush with minor amounts of grasses and forbs. There have been three commercial timber sales that harvested 1526 acres, and precommercial thinning on 2641 acres.

The Lone Pine Fire is located on the northeast side of the Project Area. It burned approximately 30800 acres in August of 1992. Of this, a total of 25313 acres of timber and forestland burned on the Winema National Forest. Approximately 1000 acres of the fire is within Ninemile Project Area. Three salvage timber sales harvested approximately 493 acres of Lone Pine within Ninemile. The harvested areas were planted with trees and bitterbrush. Today most snags retained for wildlife have fallen to the ground. Planted trees, Ceanothus, and manzanita have responded well to the available growing space and extra nutrients.

Past activities since 1980 are shown in Figure 3-5 (Harvest) and Figure 3-6 (Precommercial Thinning).

Current Silvicultural Condition

Most of the ponderosa pine stands are now in a mid-seral structural stage with less old-growth structure than was present in the reference period (pre 1875). Table 3-5 shows the comparison between the historic and the current structural stages present in the Ninemile Area. There are no examples of the historic open, fire-maintained stands remaining. Stands have less of a large tree component and are heavily stocked with smaller trees, decadent brush and heavy accumulations of fuels. These small trees combined with the decadent brush and fuel accumulations provide a ladder for surface fires to transition to crown fires. Some stands now have more than 150 square feet of basal area and over 500 trees per acre. White fir has spread downward from higher elevations and lodgepole and juniper has spread from low areas, resulting in a change in species dominance across the landscape. Growth rates for trees are low, as competition is high for water, nutrients, and growing space. Tree mortality from insect and disease is evident in all of the conifer types. Fuels have accumulated from needle fall and other conifer litter. Brush species have become thick and decadent, with a large component of dead stems. The primary mule deer forage, bitterbrush, is poor quality and is predominately in a mature to over mature condition. Grasses and forbs appear to be absent on most of the uplands.

Figure 3-5. Past Harvest Activities in Ninemile, 1980 to Present

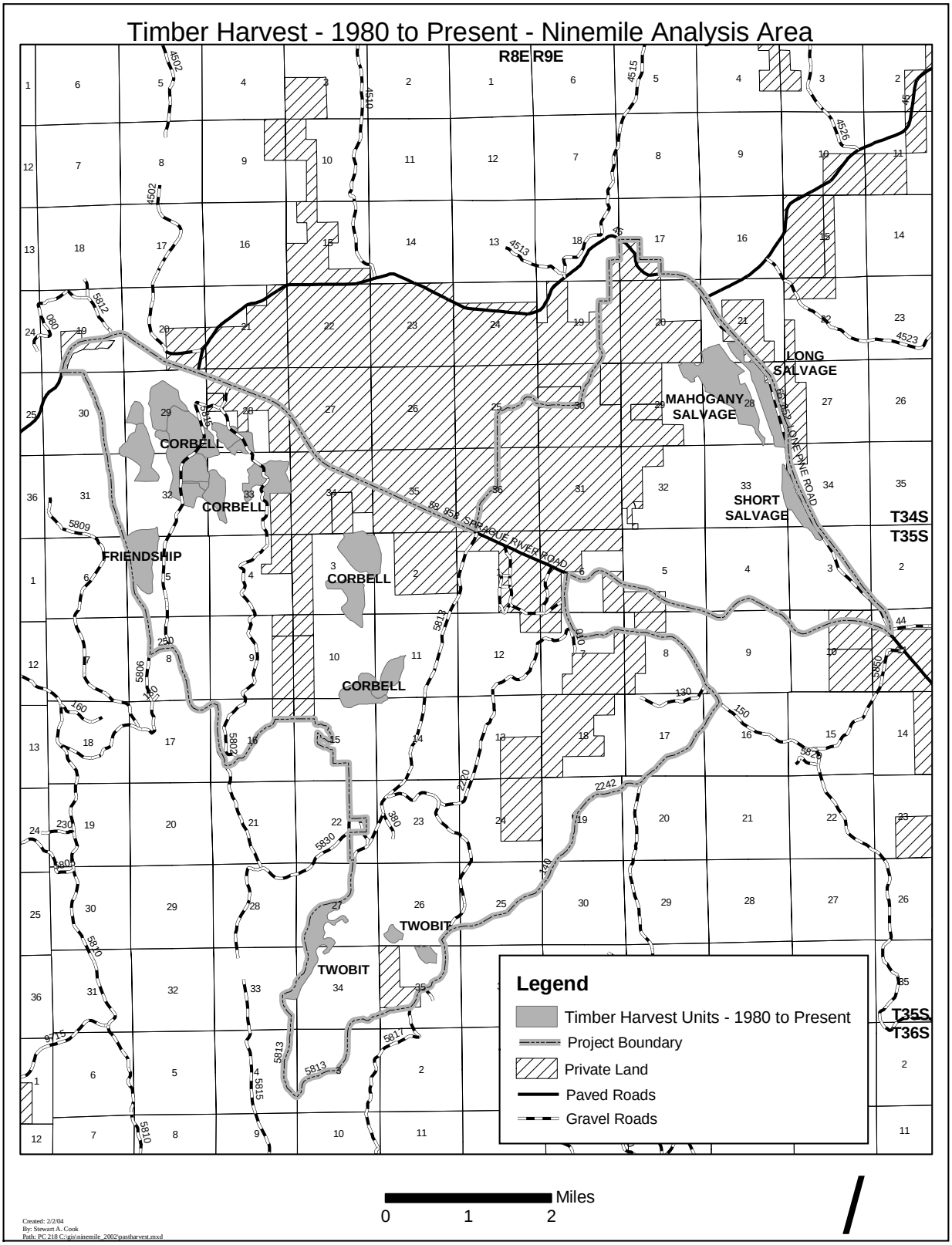


Figure 3-6. Past Precommercial Thinning in Ninemile, 1980 to Present

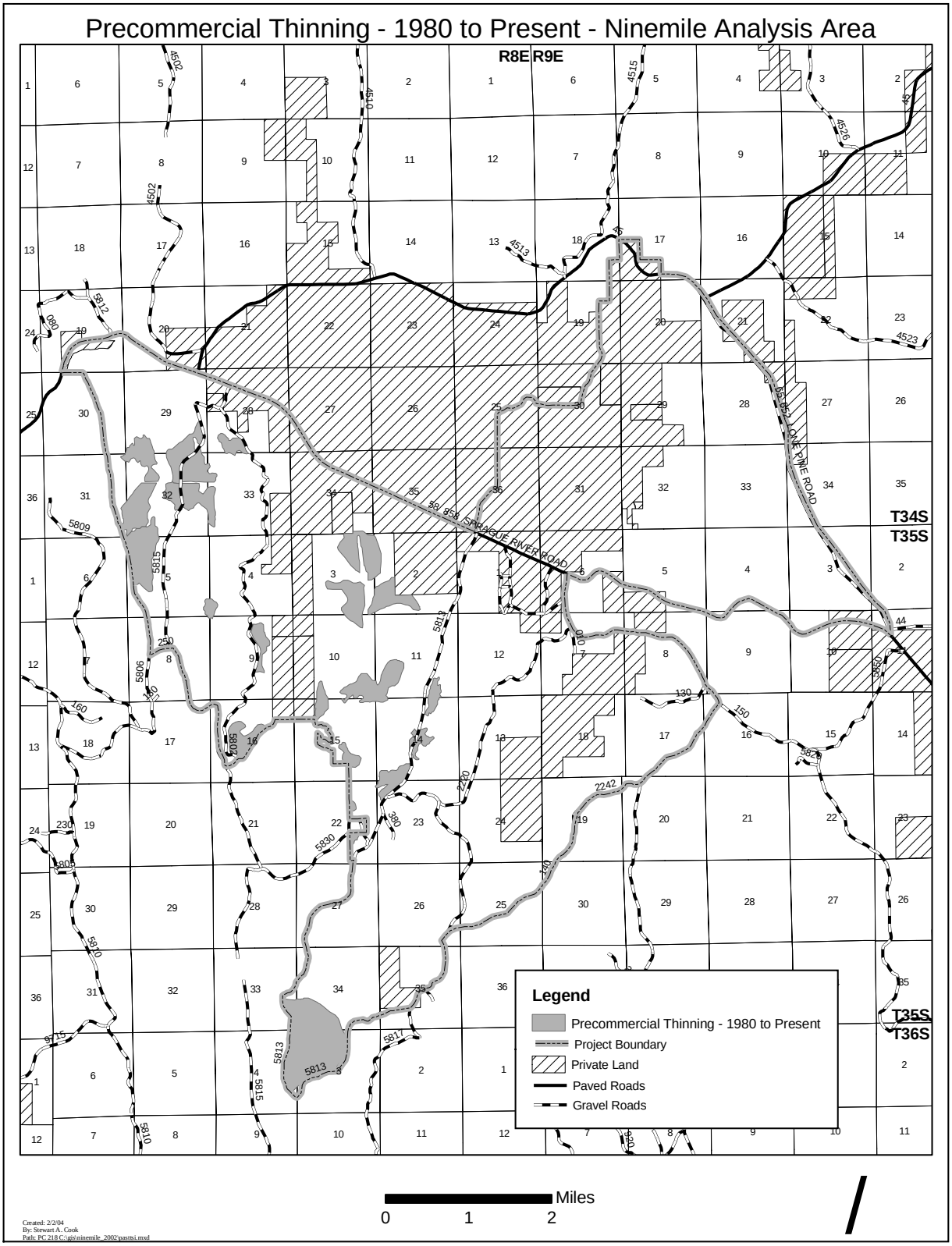


Table 3-5. Historic, Current, and Post-Implementation Structural Stages

Vegetation Type	Early Structural Stages		Mid Structural Stages			Late/Old Structure Stages	
	Stand Initiation (percent)	Stem Exclusion (percent)	Understory Reinitiation (percent)	Multi-strata without Large Trees (percent)	Moved *toward* single-strata w/large trees*** (percent)	Single-strata with Large Trees (percent)	Multi-strata with Large Trees**** (percent)
Historic Range Estimates*							
PIPO**	8-18	4-6	0-14	0-14	n/a	70-90	4-6
PICO**	33-56	23-47	0-37	0-37	n/a	5-16	2-5
Alternative 1 (No Action) Current Range Estimates							
PIPO	5	0	63	22	n/a	0	10
PICO	26	0	0	0	n/a	0	74
Alternative 2 (Proposed Action) Post Implementation							
PIPO	5	0	45	0	40	4	6
PICO	29	2	0	0	0	0	71

*Historical conditions from "A First Approximation of Ecosystem Health", USFS, Pacific Northwest Region, June, 1993 and other sources.

** PIPO = Ponderosa Pine and Pine Associated; PICO = Lodgepole Pine

*** This column displays the percentage of the vegetation type that would be moved from a mid-seral condition toward an open, park-like condition typical of historical single-storied LOS stands. All areas proposed for treatment may not have enough large (>21" DBH) trees to be classified as ``single-strata with large trees'', but would develop into such stands over time with thinning and underburning.

**** This column displays the stands identified as old-growth in the Winema 1990 Old Growth Inventory. These areas have at least 8.5 trees per acre larger than 21" DBH. The column "multi-strata without large trees" includes other stands where there are fewer trees over 21" DBH.

Stand Initiation - When land is reoccupied by trees following a stand-replacing disturbance;

Stem Exclusion - Forested areas where the occurrence of new trees is limited by moisture or light;

Understory Reinitiation - When a second generation of trees is established under an older, typically seral, overstory;

Multi-Strata without Large Trees - Stand development resulting from frequent harvest or lethal disturbance to the overstory;

Single-Strata with Large Trees - Forested areas resulting from frequent, non-lethal prescribed or natural underburning, or other management;

Multi-Strata with Large Trees - Forested areas lacking frequent disturbance to understory vegetation.

Expected Changes in Stand Condition

Alternative 1 No Action

Stand structure and composition will continue to move toward multi-strata stands that are increasingly dominated by small understory trees. No stands will shift to the open, park-like stands that were the norm in the historical reference period. Individual large and medium diameter conifers will continue to die from resource competition and continued insect and disease mortality. Competitive stress will be temporarily reduced as individual overstory trees die, but this would be offset by recruitment of understory vegetation. High stocking levels will continue to predispose the stands to outbreaks of insects or disease. Plant diversity will remain the same or decline given no active management. Plant species requiring openings, or that require frequent fire or other disturbance will still be present, but in lower numbers and in fewer areas. Conifers will increase in dominance throughout the project area. Ponderosa stands will continue to increase in white fir, lodgepole pine and juniper stocking.

Old growth pine and pine associated stands would likely lose a majority of the large tree component. As the younger trees grow, competition for moisture and other resources will increase resulting in the suppression mortality in the smaller stems and gradual loss of the larger trees. White fir and sugar pine are less tolerant of moisture-related competition stress, and will be affected sooner than the more drought tolerant

ponderosa pine. Bark beetles will be the main contributor to the large tree mortality as stress makes larger trees more susceptible to successful insect attack. Epidemic levels of bark beetles will eventually develop in second growth trees as well, and potentially kill 50 to 90 percent of entire stands or groups of stands. Fuels will increase, and the risk of loss to large-scale fires will increase as well.

Old growth status for lodgepole is short-lived, and lodgepole old growth will decline at a faster rate than ponderosa pine old growth. Typically, lodgepole grows as even-aged stands, with most trees reaching maturity at about the same time. At maturity lodgepole has a diameter and phloem thickness that is suitable for the mountain pine beetle to successfully attack and reproduce. Bark beetles are currently operating at an endemic level in the lodgepole, killing individual trees and small groups of trees in mature stands each year, allowing small pockets of lodgepole reproduction to become established.

Understory shrubs, forbs and grasses will decline as litter layers deepen and conifers continue to utilize limited site resources and shade out understory vegetation. Aspen, willows and other riparian vegetation would continue to decline and possibly disappear from some sites. Meadow diversity would decline, as juniper and lodgepole will continue to encroach. Wildlife forage amount and diversity would decrease. Big game cover, provided by understory conifers, will increase.

Fire hazard will continue to increases as insect and disease levels increase, deeper litter layers, the shrub component becomes decadent, and the number of competition increases. An increase in the understory competition will contribute to mortality in the overstory. Risk of a stand replacement fire will increase every year the fuel is not treated. In the event of a stand replacement fire, wildlife habitat will be greatly changed from loss of vegetation and sensitive plant habitat could be temporarily lost. Sheet and gully erosion could be accelerated reducing soil productivity and increasing impacts to aquatic species. Cultural resources could be permanently lost or damaged, and recreational and visual resources degraded for extended periods of time. The desired future condition for all of the management areas as defined in the Winema LRMP (1990) would be set back or lost for many years.

Alternative 2 Proposed Action

All Fuel Reduction Units

All treatments in ponderosa pine and pine associated stands will meet the intent of the Winema LRMP (1990) as amended to move existing stand structures toward missing or under-represented structural stages. The proposed activities will move ponderosa pine and pine associated stands from a multi-strata condition toward the single-strata structural stage that occurred historically. The proposed action (Alternative 2) moves 4% of the existing multi-strata stand to single-strata with large trees late/old structure stage (LOS). The biggest change occurs when all of the multi-strata *without* large trees and a portion of the understory reinitiation stage stands are moved toward the single strata LOS condition. Approximately 44% of the pine stands will move in structural condition towards the missing and under-represented structural stages that occurred historically. These stands will be moved toward the open, park-like condition with the proposed action, but will not meet the structure conditions for LOS immediately following treatment, as most do not have sufficient large diameter trees. These stands

will need further conifer thinning, and time, to meet the single storied LOS condition. Single-strata LOS stands are more sustainable, i.e. have less mortality from insects and disease, and do not support stand replacing fires. Table 3-5 displays the historical, current, and post treatment structural stages in Ninemile.

The proposed fuel reduction treatments will reduce tree stocking, increase spacing between tree crowns, and reduce ladder fuels. A reduction in the ladder fuels and interlocking tree crowns will substantially reduce the risk of crown fire, the primary cause of stand replacing wildfire. The vegetation left after treatment will have more growing space and access to needed resources such as water, nutrients, rooting space, and sunlight. This will result in increased growth and vigor for individual trees and treated stands as a whole. Trees will be more resistant to drought, wildfires, insects and disease.

Brush mowing or slashbusting will reduce the fuel bed depth. Fast burning ladder fuels will be temporarily removed which would reduce short-term hazard. Some bitterbrush will be killed by the mowing treatment; however, a majority of the bitterbrush plants should live. Bitterbrush plants treated by mowing will re-sprout and produce more palatable forage plants than the untreated decadent bitterbrush.

Short-term effects on vegetation from underburning will include the loss of a portion of the current year plant growth, depending on season of burning. Species composition changes will favor those plants adapted to fire (Ceanothus, currant, manzanita, and most grasses and forbs). Plants poorly adapted to fire (bitterbrush) would decrease until new plants become established. Some nutrients will be lost to the atmosphere while others would become more available for residual plant growth. Underburning could reduce snag and down log habitat unless measures are taken to protect these features during underburning operations.

Litter layers will be reduced and mineral soils exposed with underburning. While increased light and precipitation will become more available to understory species following burning, some areas of exposed soils would lose moisture more rapidly until litter layers re-establish. Site resources will be more readily available to non-conifer species. Grasses and forbs will become more abundant. New, more nutritious brush will come from resprouts or from newly started plants. Hardwood species such as aspen would be regenerated and would have more growing space. Other big game forage species, such as bitterbrush, may decrease in quantity initially, but would increase in palatability and nutrient content over the current condition.

Fuel Reduction Units including Harvest

Stand structure would change in the proposed harvest units by: (1) reducing conifer stocking levels below 21 inches DBH; (2) retaining all large trees (>21 inches DBH); (3) favoring aspen and willow patches by removing nearby conifers less than 21 inches DBH; (4) favoring ponderosa pine over lodgepole and white fir; (5) shifting growth from conifers to shrubs, grasses, and forbs; and (6) reducing the majority of the decadent brush with a combination of slashbusting and underburning. Average conifer diameters will increase as the largest, healthiest, and best quality trees are retained.

Fuel Reduction Units without Harvest

Stand structure would change in the proposed natural fuels units by: (1) reducing conifer stocking (<8 inches DBH); (2) reducing the majority of the decadent brush with a combination of slashbusting and underburning; (3) shifting growth from decadent brush to the selected trees, younger shrubs, grasses and forbs.

Stand Health Risk

High risk stands from a forest health or silvicultural viewpoint are defined as stands with a stand density where tree growth and vigor has declined significantly. Competition for resources such as available moisture and nutrients is intense. Increased mortality can be expected in these slow growing stands from insects and diseases. Trees are more susceptible to fire mortality. These types of stands support uncharacteristically intense stand replacement wildfire and have a high fire hazard.

Moderate risk stands are defined as stands that are currently growing with enough vigor that the stand will not incur a significant amount of mortality due to insect and/or disease for 10 to 20 years. These stands normally have some larger trees with a well developed understory of brush and small conifers. Most of these stands have a high fire hazard.

Low risk stands are defined as stands that have had recent disturbance (wildfire or harvest in the last 15 years), which has dropped the stocking level greatly. These stands would be considered to have a low to medium fire hazard.

Field observations have shown that stands with high density are currently receiving mortality from both insects and disease. Two analytic methods (Growth Basal Area and Stand Density Index) were used in conjunction with field observations to determine risk to the stands in the Ninemile Area.

Currently high risk stands make up 32% (5276 acres) of the Ninemile Project Area. Alternative 1 (No Action) will, in ten years, increase the acreage of high risk stands to 39% (6288 acres) of the Ninemile Area. The ten years later figure represents the number of acres that grow into high silvicultural risk over time as stocking continues to increase. Table 3-6 shows the current levels of stand risk and the increase over time under the No Action Alternative (Alternative 1). Figure 3-7 shows the existing stand health risk.

Alternative 2, the proposed action, will reduce the number of high risk stands from 32% (5276 acres) to 11% (1775 acres) in the Ninemile Area. Over time some untreated stands will grow into high risk as stocking increases. None of the treated areas proposed in Ninemile will return to the high or moderate risk category within ten years. In approximately 25-30 years the treated stands will grow back to stocking levels that will again predispose the stands to insect and disease mortality. In ten years 17% (2796 acres) would be at high risk compared to 39% (6288 acres) of the Alternative 1 (No Action). Table 3-7 displays the stand health risk for the proposed action immediately after treatments and after ten years. Figure 3-8 shows the stand health risk after treatment by the proposed action.

Table 3-6. Current and Future Stand Health Risk, Alternative 1.

Current Stand Health Risk			
Type	**Low Risk Acres / %**	**Mod Risk Acres / %**	**High Risk Acres / %**
Ponderosa/Pine Associated	800 ac / 5%	10119 ac / 63%	5081 ac/ 32%
Lodgepole	68 ac / 26%	0 ac / 0%	195 ac / 74%
Totals	868 ac / 5%	10119 ac / 63%	5276 ac / 32%
Stand Health Risk after Ten Years, No Action Alternative			
Ponderosa/Pine Associated	800 ac / 5%	9107 ac / 57%	6093 ac / 38%
Lodgepole	68 ac / 26%	0 ac / 0%	195 ac / 74%
Totals	868 ac / 5%	9107 ac / 57%	6288 ac / 39%

Table 3-7. Stand Health Risk Post Treatment and after Ten Years, Alternative 2.

Post Treatment Stand Health Risk, Proposed Action			
Type	**Low Risk Acres / %**	**Mod Risk Acres / %**	**High Risk Acres / %**
Ponderosa/Pine Associated	4261 ac / 27%	10119 ac / 63%	1589 ac / 10%
Lodgepole	77 ac / 29%	0 ac / 0%	186 ac / 71%
Totals	4338 ac / 27%	10119 ac / 63%	1775 ac / 11%
Stand Health Risk after Ten Years, Proposed Action			
Ponderosa/Pine Associated	4261 ac / 27%	9107 ac / 57%	2601 ac / 16%
Lodgepole	77 ac / 29%	0 ac / 0%	195 ac / 74%
Totals	4338 ac / 27%	9107 ac /57%	2796 ac / 17%

Stand Health Cumulative Effects

The Ninemile Fuel Reduction Project is part of a landscape approach to reduce the number of stands that are at high risk to loss from insects and disease and are susceptible to stand replacing fires. The Chiloquin Ranger District has done comprehensive stand thinning and fuels reduction in vegetation management since 1995. Six project areas have been considered to date, including Ninemile. One future project, Ninemile North, is shown with treatment acres approximated. These areas are connected and cover 108746 acres of the Chiloquin Ranger District. Approximately 65% (70216 acres) of the ponderosa and lodgepole pine stands are considered to be at high silvicultural risk from elevated stocking levels and slow growth rates. Decisions signed in the past and foreseeable future projects propose to treat 34% (23811 acres) of the stands that are considered at high risk. This leaves approximately 66% (46369 acres) within these project areas that will remain at high risk. Table 3-8 shows the treatment data for high risk stands in the projects. Figure 3-9 shows the location of the project areas.

Figure 3-7. Ninemile Current Stand Health Risk

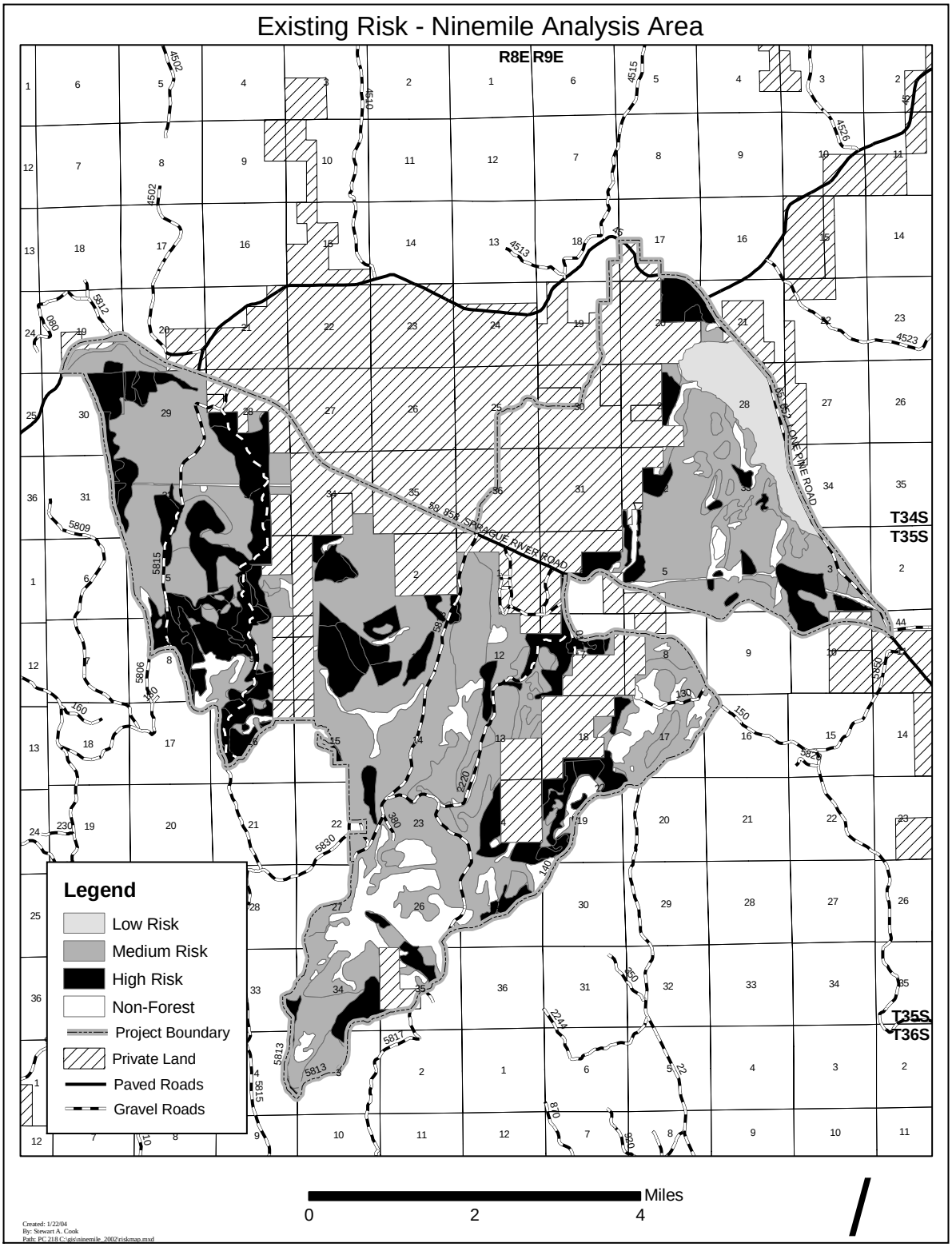


Figure 3-8. Ninemile Stand Health Risk Following Treatment Alternative 2

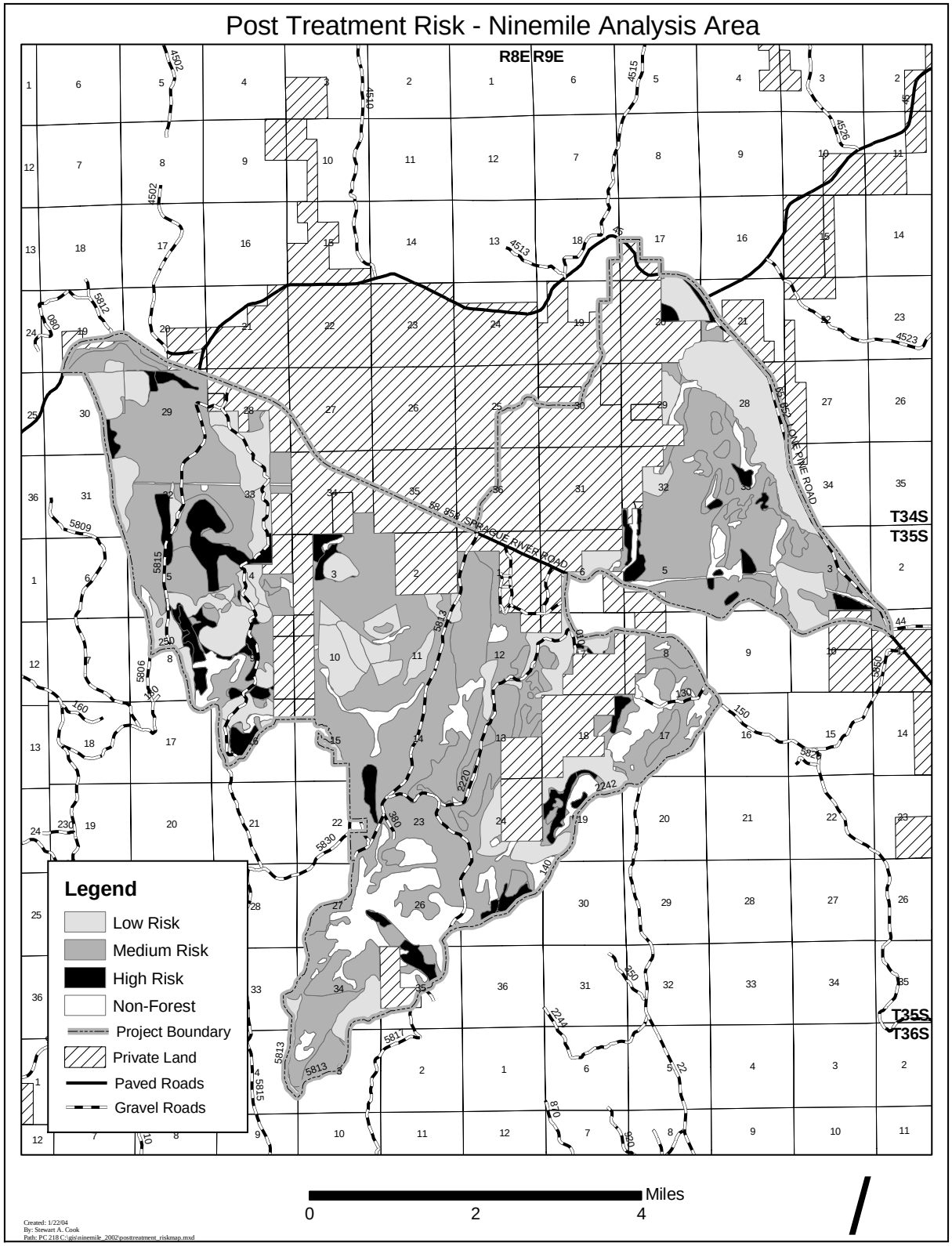
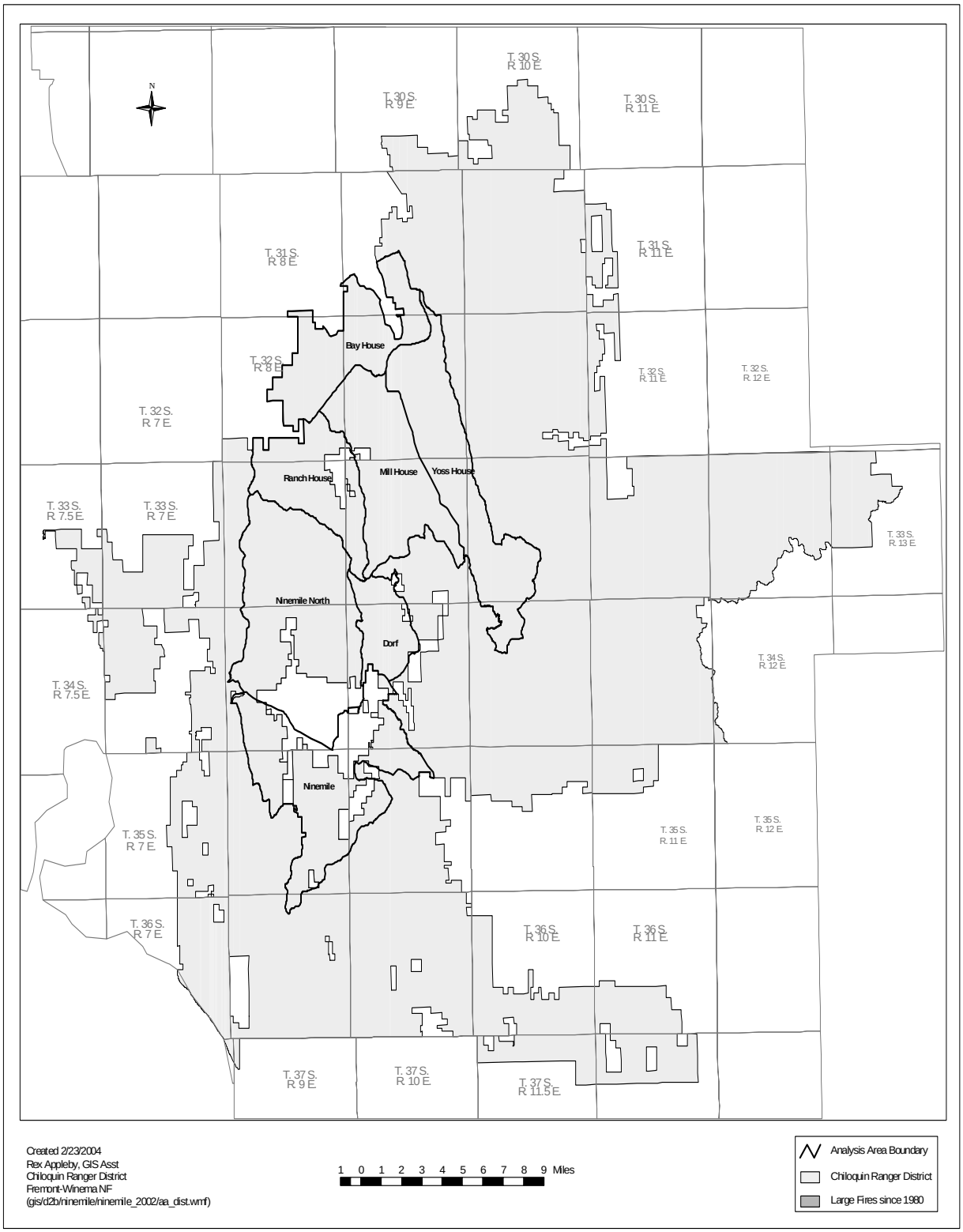


Table 3-8. Stand Health Risk for Ninemile and Adjacent Project Areas

Project Area	NEPA Date	Project Area Total Acres	High Risk Stands by Timber Type					
			Existing Acres		Acres Treated		Acres Untreated	
			PP	LP	PP	LP	PP	LP
Dorf	12/13/95	7020	3200	200	985	0	2215	200
Ranch House	09/12/97	11422	7500	2394	3407	878	4093	1516
Bayhouse	12/16/98	14389	9198	3867	1877	1005	7321	2862
Yosshouse	04/20/01	20600	11890	4778	4170	1307	7720	3471
Millhouse	08/01/01	17409	5927	4786	1433	479	4494	4307
Ninemile	06/01/04*	18487	5081	195	3461	9	1620	186
Ninemile North	07/01/05*	19419	7000	4200	3600*	1200*	3400*	3000*
Total	*= estimated	108746	49796	20420	18933	4878	30863	15542

The Chiloquin Community Fuels Reduction Project (CCFRP) was not included in the above table showing silvicultural risk reduction. The selected alternative for CCFRP (May 3, 2002) elected to only treat ground fuels, brush, and smaller (less than 8 inches DBH) portion of the conifer stocking. The selected alternative, while moderately successful in reducing fire hazard, did not fully treat the silvicultural risk. A second action alternative in CCFRP proposed to commercially thin 1346 acres and increase underburning by almost double the amount in the selected alternative. The second action alternative did a better job of reducing both fire hazard and treating silvicultural risk, but was not selected by the decision maker for reasons explained in the decision (CCFRP Decision Notice, 2002).

Figure 3-9. Past, Current and Future Project Areas Treating Silvicultural Risk



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