Fire Regime Condition Classes and Forest Stewardship Planning On the Mt. Hood National Forest

Pacific Biodiversity Institute

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Introduction

Congressman Greg Walden and Congressman Earl Blumenauer of Oregon recently announced their efforts to address a multitude of issues related to the Mount Hood Area in Oregon. In a draft document of Mt. Hood Legislative Concepts from November 2005, they propose a Forest Stewardship Plan for the Mt. Hood region. As is stated in the draft document, this plan would be "a 10-year plan to address bug infested, disease ridden, and heavily overstocked trees in federally designated class II/III lands. The intent of the plan is to improve these areas to condition class I."

In this paper, we present a brief assessment and analysis of the concepts involved with fire regime condition classes, fire planning, and forest stewardship planning. We also address the general forest health situation in the Mt. Hood area and the opportunities and risks associated with a variety of forest stewardship activities.

Background on Fire Regime Condition Classes

The term "fire regime current condition classes" was initially proposed in 2001 by Colin Hardy and others (Hardy et al 2001) and subsequently adopted by many other public agency employees and used extensively in the public agency fire planning literature (e.g. Schmidt et al 2002, Hall and Bunnell 2001, Hann and Strohm 2003, Hann 2003, Hann et al 2003, Hann et al 2004).

As initially defined, fire regime current condition classes (FRCC) "are a qualitative measure describing the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings. One or more of the following activities may have caused this departure: fire suppression, timber harvesting, livestock grazing, introduction and establishment of exotic plant species, introduced insects or disease, or other management activities" (Schmidt et al, 2002).

Fire regime current condition classes are a simplistic classification of forests and other land cover types into 3 classes as follows (from Schmidt et al, 2002):

Condition Class 1
"Fire regimes are within an historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within an historical range. Where appropriate, these areas can be maintained within the historical fire regime by treatments such as fire use."

Condition Class 2
"Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range. Where appropriate, these areas may need moderate levels of restoration treatments, such as fire use and hand or mechanical treatments, to be restored to the historical fire regime."

Condition Class 3
"Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range. Where appropriate, these areas may need high levels of restoration treatments, such as hand or mechanical treatments, before fire can be used to restore the historical fire regime."

The FRCC model is illustrated in the figure below (Figure 2 from Hann and Bunnell, 2001). In the condition class model, forest stands are envisioned to move between condition class "states" as a result of either natural successional processes, natural disturbance events (wildfire and insects/disease) or restoration treatments.

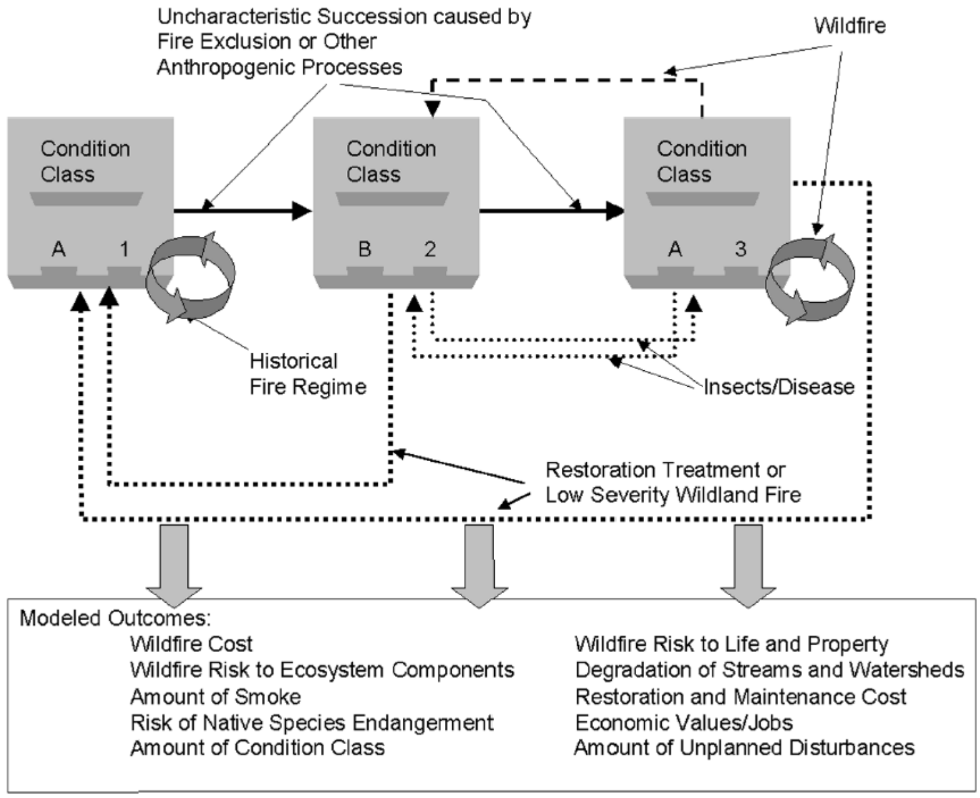


Fig. 2. A simplified diagram of the example landscape dynamics model for National Forests and Grasslands of the lower 48 States. The predicted 'states' of the model are condition classes following the definitions of Hardy et al. (2001). The dynamic processes that change the condition class include both unplanned and planned disturbances. From this basic model other outcomes, such as those shown, can be predicted.

The FRCC model was initially implemented at a coarse (1-km resolution), national scale (Schmidt et al, 2002). Numerous individuals noticed that the accuracy of the resulting spatial information was poor, in part, due to the low-resolution (1-km) AVHRR satellite imagery that was employed to map vegetation characteristics. Hann and Strohm (2003) developed finer scale methods and applications for the FRCC model for a pilot watershed in Colorado. They also incorporated additional variables into their fire and fuels planning project with the understanding the FRCC model was limited and, therefore, that more information was needed for good fire and fuels planning. They included mapping of the wildland urban interface, wildfire occurrence risk, fuel models, and a suite of additional resource and geographic variables in their integrated prioritization and planning process (Hann and Strohm 2003).

The FRCC model and definition were also modified by Hann and others since 2001. The following table describes a more current description of the three FRCC condition classes (From Hann and Strohm 2003):

Table 2—Condition classes from Hardy et al. (2001) and Schmidt et al. (2002) as interpreted by the authors for modeling landscape dynamics and departure from historical or natural range of variability in the Trout West watersheds. Historical range of variability (HRV) is the variability of regional or landscape composition, structure, and disturbances, during a period of time of several cycles of the common disturbance intervals, and similar environmental gradients, referring, for the United States, to a period prior to extensive agricultural or industrial development (synthesized from Morgan et al.1994; Landres et al. 1999; Hann et al. 1997). Natural range of variability (NRV) - the ecological conditions and processes within a specified area, period of time, and climate, and the variation in these conditions that would occur without substantial influence from mechanized equipment.

Class	NRV or HRV departure	Description
Condition class 1	Low	Vegetation composition, structure, and fuels are similar to those of the natural regime and do not predispose the system to risk of loss of key ecosystem components. Wildland fires are characteristic of the natural fire regime behavior, severity, and patterns. Disturbance agents, native species habitats, and hydrologic functions are within the natural range of variability.
Condition class 2	Moderate	Vegetation composition, structure, and fuels have moderate departure from the natural regime and predispose the system to risk of loss of key ecosystem components. Wildland fires are moderately uncharacteristic compared to the natural fire regime behaviors, severity, and patterns. Disturbance agents, native species habitats, and hydrologic functions are outside the natural range of variability.
Condition class 3	High	Vegetation composition, structure, and fuels have high departure from the natural regime and predispose the system to high risk of loss of key ecosystem components. Wildland fires are highly uncharacteristic compared to the natural fire regime behaviors, severity, and patterns. Disturbance agents, native species habitats, and hydrologic functions are substantially outside the natural range of variability.

The FRCC model is rooted in the concept that forests, shrublands and grasslands can be classified into fire regime classes (Hann and Bunnell 2001). The proponents of the FRCC model have formulated five fire regime classes that describe variations in fire frequency and severity (Table 2 from Hann and Bunnell 2001). Fire regime condition classes represent the degree of departure from one of the fire regime classes.

Table 2. Natural (historical) fire regime classes from Hardy *et al.* (2001) as interpreted by the authors for modeling landscape dynamics for National Forests and Grasslands in the lower 48 States

Fire regime class	Frequency (Fire return interval)	Severity	Modeling assumptions
I	Frequent (0–35 years)	Low	Open forest or savannah structures maintained by frequent fire; also includes frequent mixed severity fires that create a mosaic of different age post-fire open forest, early to mid-seral forest structural stages, and shrub or herb dominated patches (generally < 40 ha (100 acres)).
II	Frequent (0–35 years)	Stand replacement	Shrub or grasslands maintained or cycled by frequent fire; fires kill non-sprouting shrubs such as sagebrush which typically regenerate and become dominant within 10–15 years; fires remove tops of sprouting shrubs such as mesquite and chaparral, which typically resprout and dominate within 5 years; fires typically kill most tree regeneration such as juniper, pinyon pine, ponderosa pine, Douglas-fir, or lodgepole pine.
III	Less frequent (35–100 years)	Mixed	Mosaic of different age post-fire open forest, early to mid-seral forest structural stages, and shrub or herb dominated patches (generally < 40 ha (100 acres)) maintained or cycled by infrequent fire.
IV	Less frequent (35–100 years)	Stand replacement	Large patches (generally > 40 ha (100 acres)) of similar age post-fire shrub or herb dominated structures, or early to mid-seral forest cycled by infrequent fire.
V	Infrequent (> 100 years)	Stand replacement	Large patches (generally > 40 ha (100 acres)) of similar age post-fire shrub or herb dominated structures, or early to mid to late seral forest cycled by infrequent fire.

(From Hann and Bunnell, 2001)

Discussion of the Fire Regime Condition Class Model and Implementation

The fire regime condition class model provides a very simplistic way of looking at the ecological status of forests and other natural communities.   Since the ecological condition of natural communities is dependent on many factors, the history, frequency and magnitude of past disturbance events, such as wildfire, are only a few of the many factors that must be considered when determining the ecological condition, "status" or "health" of any forest or other natural community.

But even when one restricts the focus to a discussion of wildfire and its effect on forests, the situation is much more complex that the FRCC model. The forests of the Pacific Northwest have complex fire histories and the normal range of variation for fire frequency and magnitude can be large, even when one is considering just one forest stand or one watershed. Currently, the FRCC model is being applied based on subjective estimates and guesses about the general fire regime for a landscape. The estimates are made by people involved in the FRCC mapping process. The fire regime estimates are usually based on a best-guess at the central tendency for the entire range of variability within a given forest stand or landscape. This focus on the central tendency often ignores the wide range of variability that is usually present in a given area, and the influence of that variability on the ecosystems of the region.

For example, in a study area in the Oregon Cascades, wildfires were fairly common during the period from 1436 AD to 1575 AD, but then a gap of 189 years occurred before the next fire in 1764 AD (Morrison 1984, Morrison and Swanson 1990). Fires again became much more common after 1764 AD until the early 1900's when fire suppression was instituted. The mean fire-free interval for the Deer Creek study area was about 51 years for the entire period between 1436 AD and 1897 AD (based on further analysis of data presented by Morrison and Swanson 1990). The mean fire-free interval between 1436 AD to 1575 AD was about 46 years and the mean fire-free interval between 1764 AD and 1897 AD was about 27 years. However, there was a long gap of 189 years with no fires recorded in the study area between the period from 1575 AD to 1764 AD.

If one were attempting to determine the fire regime for this same area for the purpose of assigning a particular FRCC one would reach a very different results depending the approach taken in analyzing the fire history data. If the current FRCC approach is used, a fire regime would be assigned to the area based on the average fire frequency of the area. That approach would assign this area to a fairly frequent fire regime based on information from the fire history study discussed above. On the average, during the pre-settlement period, some part of the area burned every 50 years. Therefore, based on the current FRCC approach, the area might be assigned to a condition class of 3, since over two fire cycles of 50 years have been missed in the area in the post-fire-suppression era. The last fire occurred in 1897 AD. However, a more careful examination of the fire history data for this area reveals that it is still within the normal range of variation, since this range includes a period without fire of nearly 190 years. That is nearly twice the current fire-free interval that is commonly attributed to fire suppression activities. This more careful analysis would result in a condition class 1 assignment to the study area. The forest stewardship planning consequences of these two divergent FRCC assignments could be quite great.

In a 10-year forest management plan that focuses primarily on condition class when coupled with the current forest planning direction on the Mt. Hood National Forest, a FRCC 3 assignment could very likely target the area for logging and mechanical treatments to reduce stand density and coarse woody debris. On the other hand, an FRCC 1 assignment would mean that the stand is in optimal health and that no activities would be necessary.

This example illustrates one of the fallacies involved in relying on simplistic fire regime and FRCC assignments within a planning area or subset of a planning area. Unless a very careful examination of the fire history of an area is made that extends back in time for 600 to 1000 years, it will not be apparent whether an area is within its natural range of variation or not, with respect to the influence of wildfires on the ecosystem.

Ecological condition or "health" is controlled by many internal and external factors that operate on and within ecosystems. Plant growth, establishment, senescence, death, and the natural successional processes that result are the primary internal factors which influence ecological condition. Wildfire, along with many other natural disturbances (e.g. wind, flooding, landslides, avalanches, volcanic eruptions) can have a profound effect on an areas ecological state and condition. Human-induced disturbances (e.g. logging, grazing, road building) can also have a very profound effect on ecological condition. Abundance and distribution of native fauna and flora are important factors that should be considered when determining the ecological condition of a natural community. Abundance and distribution of alien (non-native) fauna and flora are important factors that should also be considered when determining the ecological condition of a natural community.

Unfortunately, the FRCC approach only incorporates a simplistic assessment of the wildfire history and successional state of the natural community using the current popular classification scheme. The result of this classification scheme is that every natural community in the United States has been reduced to a very simplistic classification – it is either condition class 1, 2 or 3. This may please our politicians and decision-makers, who strive for very simplistic understandings and solutions to complex problems, but the use of the FRCC model as the primary basis for forest and landscape planning is an oversimplification of complex systems and does not make use of the best available science.

Fire Planning and the Use of Fire Regime Condition Classes

Even if one is to restrict the scope of forest planning to the reduction of the risk of wildfire, the FRCC model is still an extremely limited tool and should not be the sole, or even the primary basis for planning. Sound fire planning incorporates information on: 1) topography and its influence on fire behavior and spread, 2) ground and canopy fuels and their effects on fire behavior and spread, 3) potential range of variability in weather conditions and their effect on fire behavior and spread, 4) fire-fighting resources and their ability to influence fire behavior and spread. Not a single one of these other factors are directly correlated with fire regime condition class.

Fire regime condition classes (as they are currently applied and mapped) do not necessarily have a correlation with ground or canopy fuel conditions. Areas categorized and mapped as FRCC 1 may have high levels of fine ground fuel or dense young coniferous canopy that can contribute to high rates of spread and high levels of fire severity. Likewise, areas categorized and mapped as FRCC 3 may have low levels of fine ground fuel and may have more complex, multi-layered canopies which may reduce fire severity and rates of fire spread.

The hard facts of wildfire behavior are that fires spread more readily in more open environments. When you reduce stand density and open up a stand through thinning or partial cutting, as is common in many forest restoration treatments, the resulting microclimate enhances fire spread. Fuels are drier and wind is able to move a fire more rapidly through an open stand. Fire severity can be enhanced as well, particularly if activity fuels are not completely treated. But even in the case of complete treatment of activity fuels, the rapid growth of understory shrubs, small trees, grasses, and herbs can quickly create a situation where fine fuel loadings are high and high fire intensity can readily occur during a wildfire.

In contrast with this, many mature and old-growth stands have dark, moist and still interior conditions created by the shade of multiple canopy layers. Fuel moisture remains high in these stands and wind often can not penetrate the forest interior. A broken, multi-storied canopy may also impede crown fire spread when compared to a young stand with a dense, single-layered canopy. Many of the old-growth stands on the Mt. Hood National Forest are now considered to be in fire regime condition class 3. A singular focus on the FRCC approach would consider these stands to be “out-of-whack” and in great need of being converted to “healthy” condition class 1 stands. But in reality, these old-growth stands are often the least likely to burn severely in a wildfire and mechanical treatments that are designed to convert them to condition class 1 are likely to result in increased fire risk.

The correlation between fire regime condition class and risk of extreme wildfire has not been proven by the proponents of the FRCC approach. There are many examples of areas that have been mapped (or would be classified as) condition class 1 that were severely burned in a stand-replacement wildfire (Graham et al 2002, Morrison 2005, Morrison and Smith 2005, Harma and Morrison 2003a, Morrison and Harma 2003, Morrison et al 2001, Morrison et al 2000, Skinner and Weatherspoon 1996, Stephens 1998, Weatherspoon and Skinner 1995). Likewise, there are many examples of condition class 3 lands that did not burn or burned at a low severity during wildfires. Wildfire behavior and risk is too complex to be predicted by a very simplistic 1-2-3 class system.

Mistaken Assumptions within the Fire Regime Condition Class Model about the Effects of “Restoration Treatments” on Fire Behavior

Imbedded in the FRCC model and definition is the idea that a forest manager can easily move a forest stand from one condition class to another by mechanical treatments (which usually includes some form of logging) and that this action will reduce wildfire risk (Hardy et al 2001, Schmidt el al 2002, Hann and Bunnell 2001, Hann et al 2004). However, this idea does not have adequate support in practice and is currently the subject of much scientific controversy. There is a large and growing body of scientific evidence that reduction of wildfire risk is much more complex than converting landscapes to condition class 1. Various forms of logging and other mechanical treatments may increase fire risk.

The knowledge that logging and thinning may increase wildfire risk is not new. Forest scientists have been concerned about this phenomenon for more than 60 years. A study by William G. Morris in 1941 of forests at Westfir, Oregon, revealed how clearcutting and partial cutting affect fire weather. Morris (1941) reported that fire weather in clearcuts can be seven times more severe than in adjacent uncut timber. Fire weather in partial cuts is also more severe and depends on the amount of canopy removed.

Nearly 50 years ago, further exploration of the effect of forest cutting was conducted. C.M. Countryman (1955), a USDA Forest Service research forester, reported that the cutting of mature and old growth forests drastically modifies the fire climate and that opening of a virgin, mixed conifer stand can increase the rate of fire spread up to 4.5 times. Countryman explains the physics involved. Forest cutting opens up the canopy so that sunlight can penetrate to the forest floor. As a result, temperatures increase at the forest floor and understory vegetation levels. Both the fine fuels and large fuels that exist below the canopy dry out more rapidly due to the temperature increases. Opening of the canopy also causes more air circulation, which greatly stimulates drying of fuels and desiccation of brush, grass and other vegetation below the canopy. As a result, all the fuels in a stand where the canopy has been reduced significantly become much drier than in the surrounding uncut forest. Then during a wildfire, winds are able to penetrate the cut stands much more readily than the uncut stands. These winds are able to push a fire through a cut stand much more rapidly than the winds push a fire through the uncut forest.

These basic facts about logging and fire were well understood decades ago but are not being incorporated into the planning efforts of many public agency personnel today. Over thirty years ago, the ***Journal of Forestry*** published an article by the Assistant Director of the US Forest Service's Pacific SW Forest and Range Experiment Station and a research forester in the PNW Exp. Station titled: "*The Fuel Buildup in American Forests: A plan of Action and Research*" (Wilson and Dell, 1971). The focus of this paper was primarily on the role that logging has played in increasing wildfire risk in our forests. They state that "*logging, thinning and road construction open up the forest and increase the amount of sunlight and wind at ground level*" which in turn increases fire severity and spread through logging slash.

The recent USDA Forest Service Chief, Mike Dombeck stated in the Forest Service's fire management publication, Fire Management Today, *"Some argue that more commercial timber harvest is needed to remove small-diameter trees and brush that are fueling our worst wildlands fires in the interior West. However, small-diameter trees and brush typically have little or no commercial value. To offset losses from their removal, a commercial operator would have to remove large, merchantable trees in the overstory. Overstory removal lets more light reach the forest floor, promoting vigorous forest regeneration. Where the overstory has been entirely removed, regeneration produces thickets of 2,000 to 10,000 small trees per acre, precisely the small diameter materials that are causing our worst fire problems. In fact, many large fires in 2000 burned in previously logged areas laced with roads. It seems unlikely that commercial timber harvest can solve our forest health problems"* (Dombeck 2001).

The Sierra Nevada Ecosystem Project (a University of California study done in conjunction with the USDA Forest Service Pacific Southwest Research Station) states: "*Timber harvest, through its effects on forest structure, local microclimate, and fuel accumulation, has* *increased fire severity more than any other recent human activity*" (SNEP, 1996).   The Sierra Nevada Forest Plan goes on to explain that reduction of forest canopy cover causes more severe fires by increasing the velocity of mid-flame winds. The Sierra Nevada Plan acknowledges, "… *in areas where the larger trees* (greater than 12 inches in diameter breast height) *have been removed, stand replacing fires are more likely to occur*."

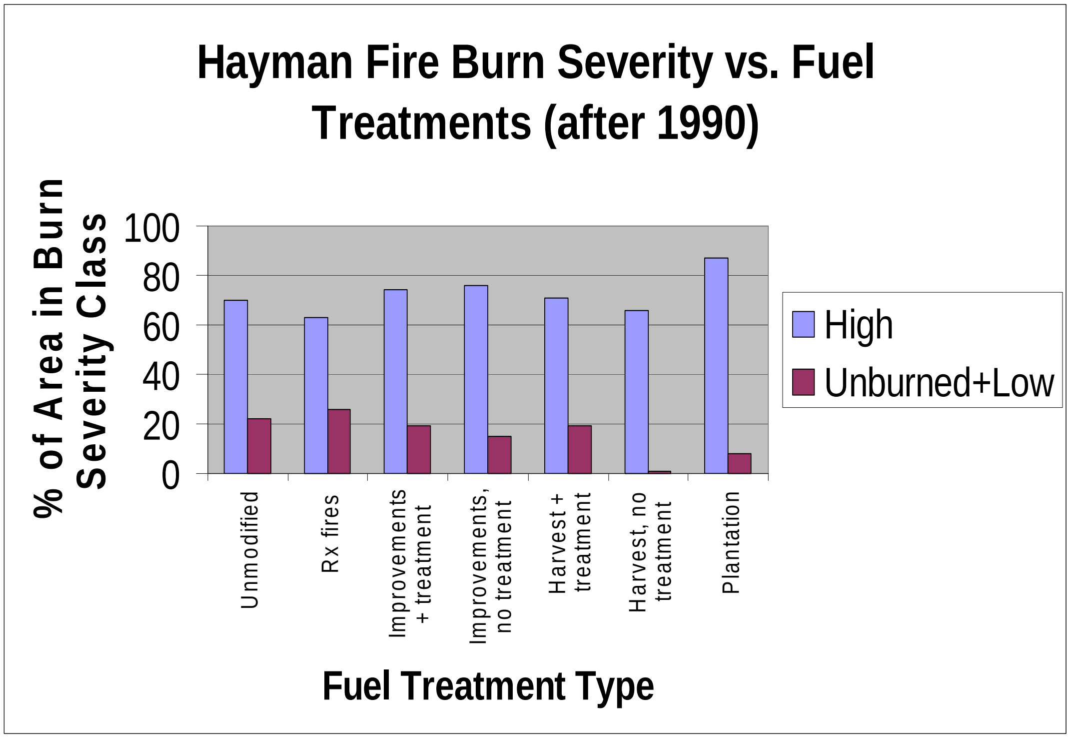
Many other scientific studies conducted over the years have indicated that commercial logging activities that remove significant amounts of the forest canopy may have an adverse effect on fire behavior and increase wildfire risk (Beschta, et al, 1995; Fahnestock, 1968; Huff et al, 1995; Skinner and Weatherspoon 1996; Stephens 1998, USDA Forest Service. 1995; Weatherspoon and Skinner, 1995).

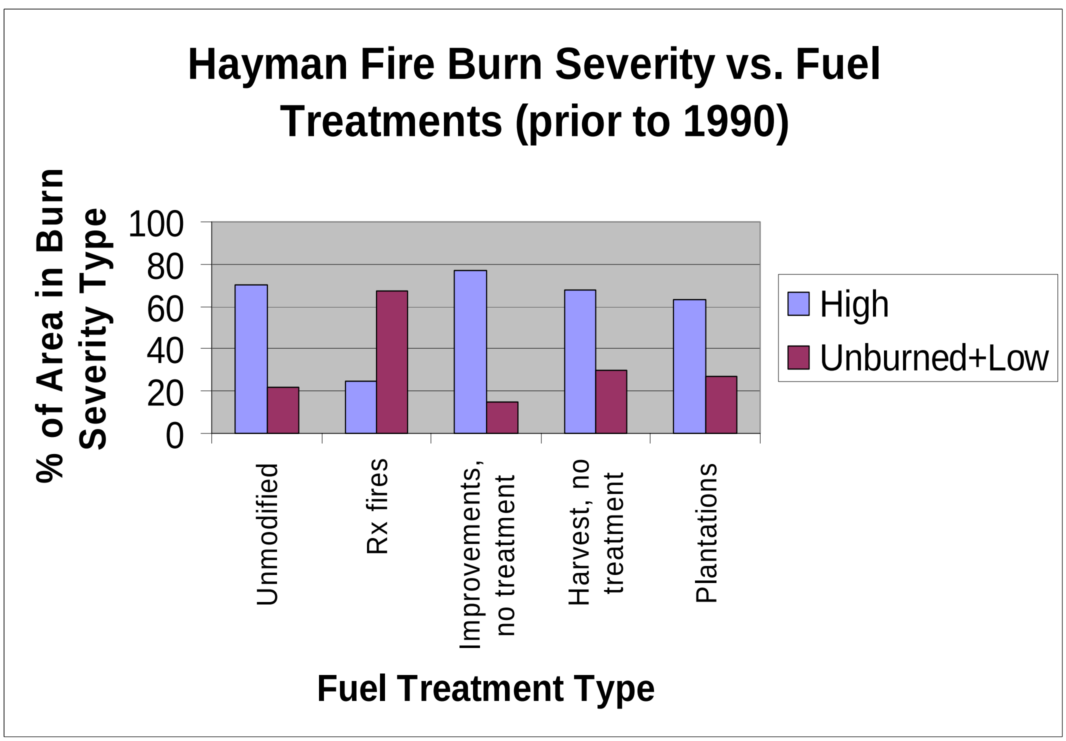
Studies conducted by Pacific Biodiversity Institute of the many major wildfires that have occurred during the last five years indicate that logging often plays a significant role in creating a landscape condition where very large and damaging fires thrive (Morrison et al 2000, Morrison et al 2001, Morrison and Harma, 2002, Harma and Morrison 2003a and 2003b). Examples of some of the most newsworthy and damaging wildfires that have burned in landscapes that have been heavily modified by logging activities (including commercial thinning) include the Rodeo-Chediski fires in Arizona, the Valley-Skalkaho Fire Complex in Montana, the Jasper Fire in South Dakota, and the Tyee Fire in Washington. In all these cases, intense fires occurred in heavily managed landscapes, burning between 80,000 and 500,000 acres.

The recent (2002) Hayman Fire in Colorado was a good case in point. This fire was the subject of an intensive study conducted by the USDA Forest Service and published in 2003 (Graham 2003). A major part of the Hayman Fire Case study was a detailed analysis of a wide variety of stand and fuel treatments that had been conducted in the fire area during the decades prior to the fire. Many fuel treatments had been conducted in the Hayman Fire area before the fire started, so the fire proved to be a good test for the efficacy of these treatments. The Hayman Fire blew up on June 9, 2002 and overwhelmed most fuel treatment effects in areas burned by fire that day.

The Hayman Fire Case Study examined how various types of fuel treatments affected fire behavior and fire effects of the Hayman Fire. In the Case Study the authors broke out the fuel treatments that were accomplished after 1990 and prior to 1990 into two separate groups for analysis purposes. The graphs presented below illustrate the differences between various fuel treatments for both time periods.

Prescribed fire was the most effective fuel treatment of any type in both time periods. The graphs below illustrate that thinning, logging and other stand "restoration" treatments did not significantly improve fire severity over untreated stands.





Note: only 3 acres existed in the categories of harvest or improvement with treatment, these were excluded from the graph because the area was to small to be statistically significant.

The Hayman Fire Case Study presents extensive photo documentation of the effect of various stand and fuel treatments on the behavior and severity of the wildfire. The photos below (Figures 85 and 86) from the Hayman Fire Case Study illustrate how the Hayman Fire burned through the Brush Creek and Goose Creek timber sale areas. Both of these areas experienced

Figure 85—Photo points 34 and 35 showing Goose Creek timber sale area in foreground (1986-1993). Activity fuels were pile-burned in 1993-1995. The Hayman Fire burned here the afternoon of June 9 as a high intensity surface fire.

Figure 86—Photo points 39 and 40 showing the Brush Creek timber sale that was followed by prescribed burning. The Hayman Fire burned here the afternoon of June 9 in crownfire and high-intensity surface fire.

high severity wildfire, despite the stand-level treatments. Nearly complete mortality of the unlogged trees occurred in both timber sale areas.

According to the FRCC model, both of these timber sale areas would have been considered to be condition class 1 after the mechanical treatments and prescribed fire that was used. The stands would have been considered condition class 3, prior to the "restoration" treatments. But, as the Hayman Fire proved, conversion from condition class 3 to condition class 1, did not reduce fire severity or fire spread through these areas.

Likewise, in the many other studies documented above, there are hundreds of thousands of acres of forest that were converted from condition class 2 or 3 to condition class 1 through "restorative" logging and subsequent prescribed burning of slash that subsequently burned ferociously in a major wildfire. There is ample evidence that converting a stand from condition class 2 or 3 to condition class 1 does very little to reduce the risk of wildfire in that area. Unfortunately, the belief that condition class 1 areas are more fire safe has been popularized, even though it is based on the wholesale acceptance of all the assumptions that are built into the FRCC model, not because of credible scientific support. Any attempt to reduce fire risk by converting a stand from one condition class to another might be expedient, but it would not be based on credible science.

Good Forest Stewardship Planning is Inherently Complex

Good forest stewardship planning is much more complex than moving a forest stand from one fire regime condition class to another. As stated earlier in this paper, many other factors need to be considered when determining the ecological condition or "health" of a forest. Forest planning must consider the wide range of attributes inherent in any landscape in order to best determine its current ecological condition, its values to both the human and natural world, and its potential future condition.

Forest stewardship planning that will stand the test of time and benefit future generations must be based on credible science, accurate information and careful testing of assumptions and models. Fire planning is an important part of forest stewardship planning, but as discussed above, it needs to incorporate many factors in addition to the fire regime condition class of the forest. Sound forest stewardship planning should not be reduced to a simplistic formula, untested assumptions or expediency.

Consideration of wildlife habitat, rare species occurrence, and ecological values associated with mature and old forests need to be a key component of good forest stewardship planning. Much progress has been made in the last 25 years towards our society's understanding and appreciation of these factors. Any plan should incorporate the lessons that have been learned from scientific study, public discussion and forest management of the Pacific Northwest's forests during the last quarter century. These need to be incorporated into any sensible plan to protect these forests from the possible threat of wildfire.

Many areas that contain the best wildlife habitat and the best old forests are now mapped as condition class 2 or 3 lands. On the Mt. Hood National Forest, these lands would be targeted for conversion to condition class 1 lands if the FRCC model becomes the primary focus of the forest health effort. In many cases, the conversion to condition class 1 would negate many of the wildlife habitat and ecological values present in these old forests. Careful consideration of the trade-offs involved with such a decision need to be made before activities are planned. In the following section of this paper, the overlap between some of the habitat values and the fire regime condition class 2 and 3 lands is examined.

Wildlife Habitat and Fire Regime Condition Classes – Examples from the Mt. Hood National Forest

Much of the areas mapped as FRCC 2 and 3 in the eastern Mt. Hood National Forest have been delineated by the Forest Service as prime wildlife habitat – often for the same reasons that it was mapped in FRCC classes 2 or 3. Seven examples of this situation are illustrated below:

- Figure 1 illustrates the overlap between FRCC 2 & 3 lands with areas mapped as containing old-growth forests meeting the Forest Service Region 6 definition. It is apparent that much of the class 2 and 3 lands are also old-growth forest.
- Many of the important late successional – old growth areas determined by "Gang of Four" scientific panel are now mapped by the Forest Service as condition class 2 and 3 lands (Figure 2).
- Many areas mapped by the Forest Service as 100-acre late successional reserves for spotted owl nest site protection are now mapped as condition class 2 and 3 lands (Figure 3).
- Many of habitat areas designated by the USFS for the pine marten are now mapped as condition class 2 and 3 lands (Figure 4).
- Many of habitat areas designated by the USFS for the pileated woodpecker are now mapped as condition class 2 and 3 lands (Figure 5).
- Quite a few of the areas mapped by the Forest Service as sensitive plant areas are also mapped as condition class 2 and 3 (Figure 6).
- Much of the area mapped by the Forest Service as an eastside wildlife emphasis area is also mapped as condition class 2 and 3 (Figure 7).

These examples demonstrated the inherent conflict between maintaining optimal wildlife habitat for many species that rely on late-successional/old-growth forest conditions and the desire to convert "unhealthy" condition class 2 and 3 forest stands (as currently mapped) to condition class 1 lands. Notwithstanding the question of whether this conversion to condition class 1 would reduce fire risk, it certainly would reduce habitat values for many late-successional forest species.

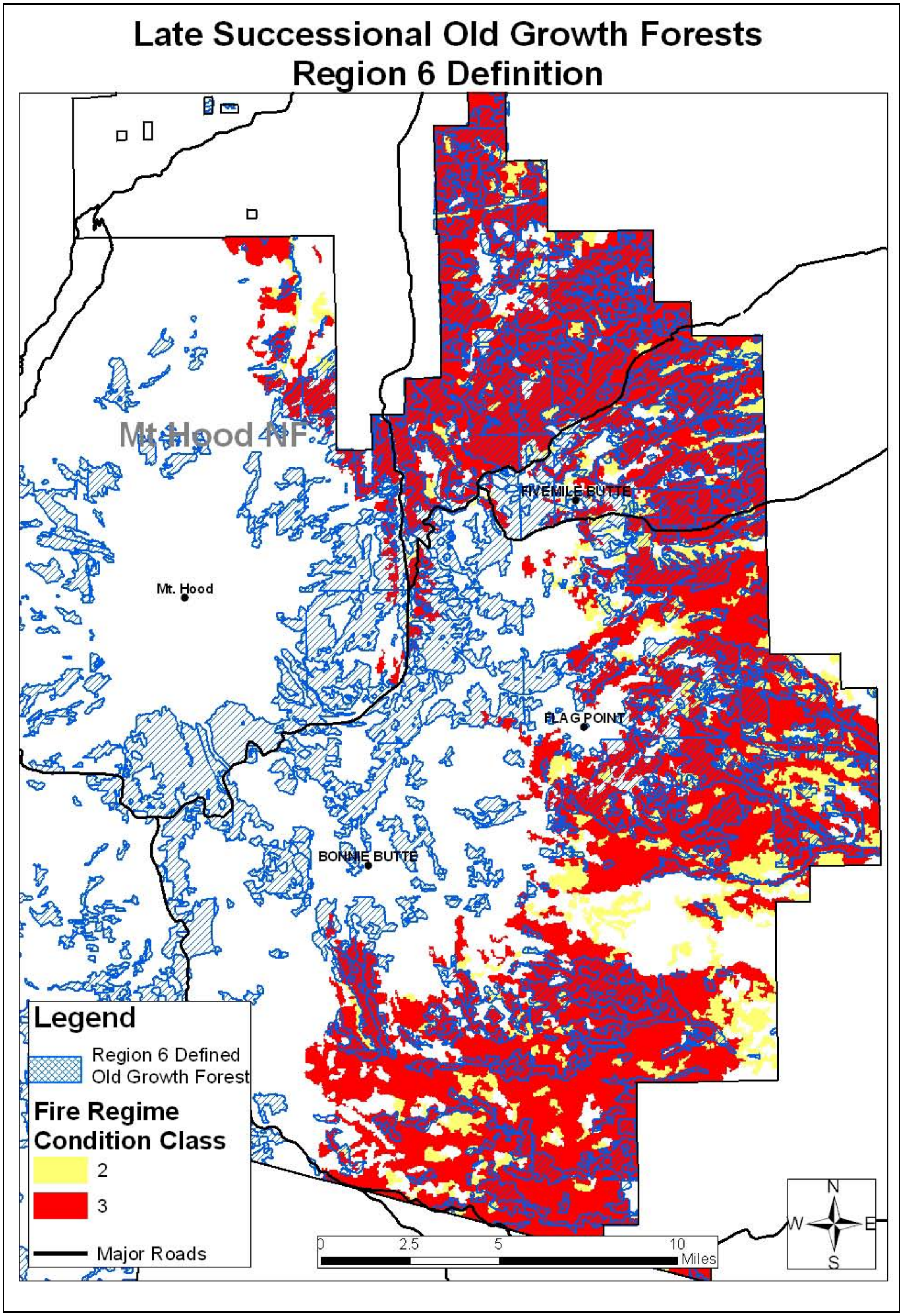


Figure 1. Fire Regime Condition Classes 2 & 3 (Forest Service 2004) on the eastern Mt. Hood National Forest overlaid by Forest Service map of forests meeting Region 6 old-growth definition.

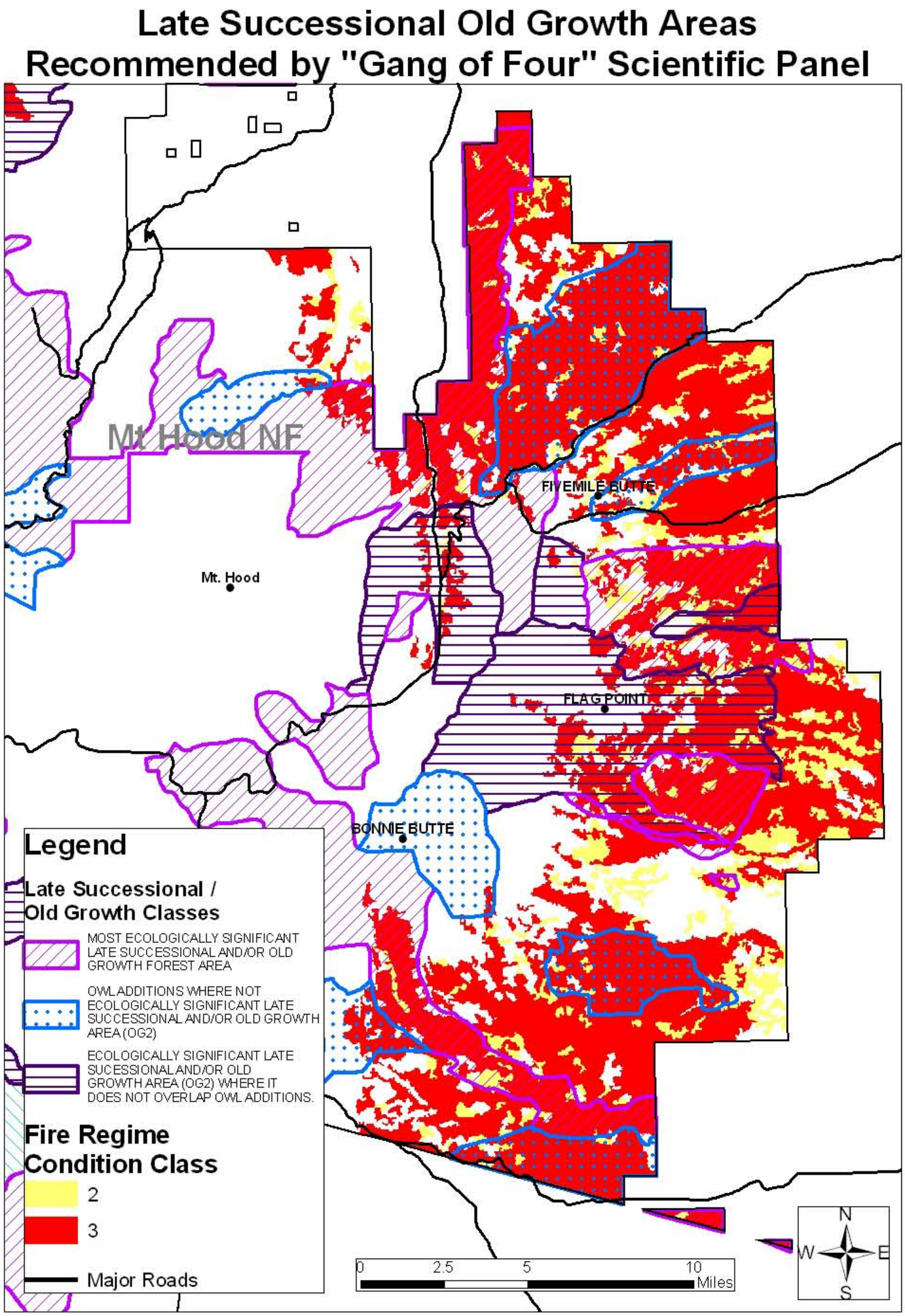


Figure 2. Fire Regime Condition Classes 2 & 3 (Forest Service 2004) on the eastern Mt. Hood National Forest overlaid by Forest Service map of late successional – old growth areas determined by "Gang of Four" scientific panel.

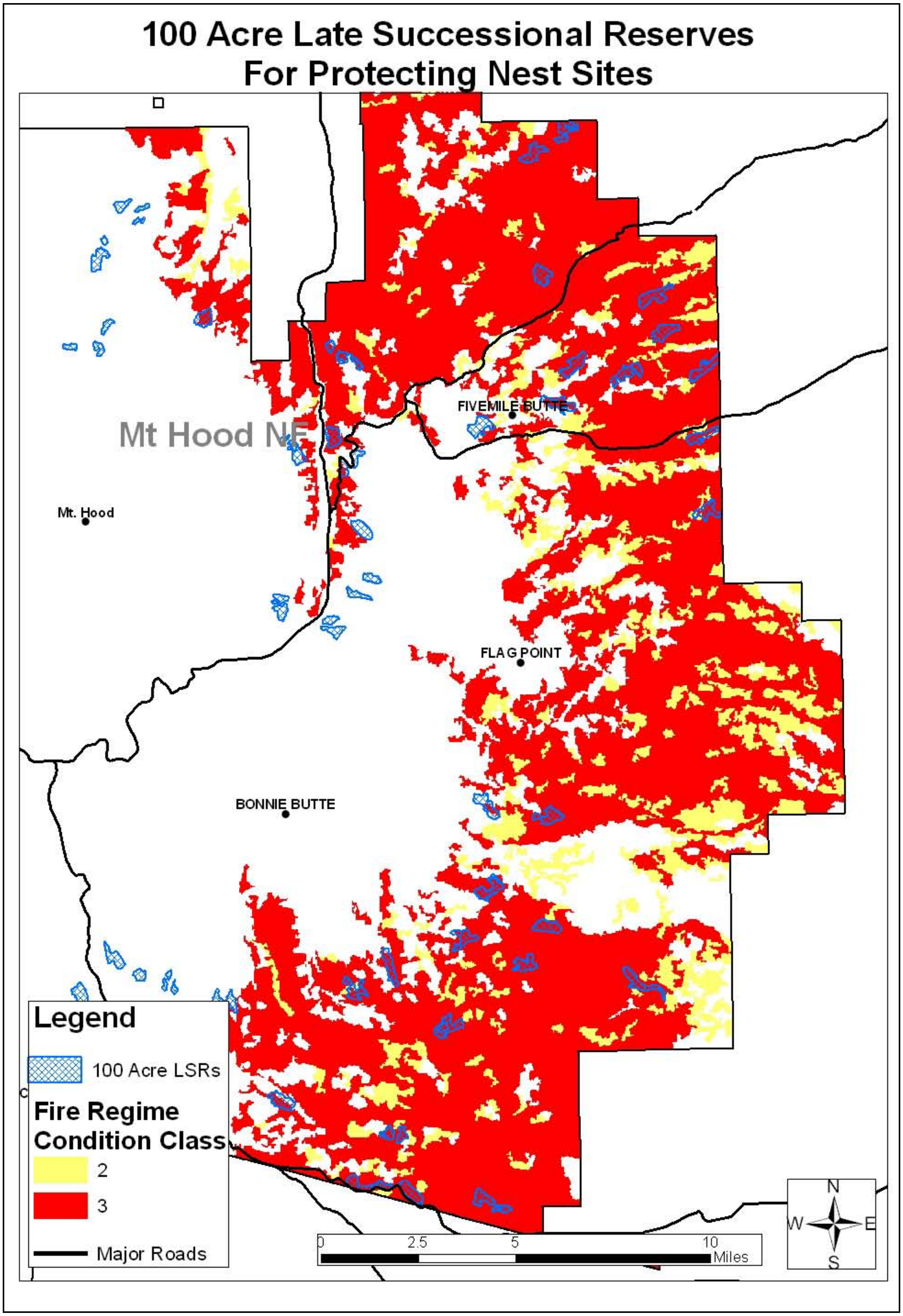


Figure 3. Fire Regime Condition Classes 2 & 3 (Forest Service 2004) on the eastern Mt. Hood National Forest overlaid by Forest Service map of 100-acre late successional reserves for spotted owl nest site protection.

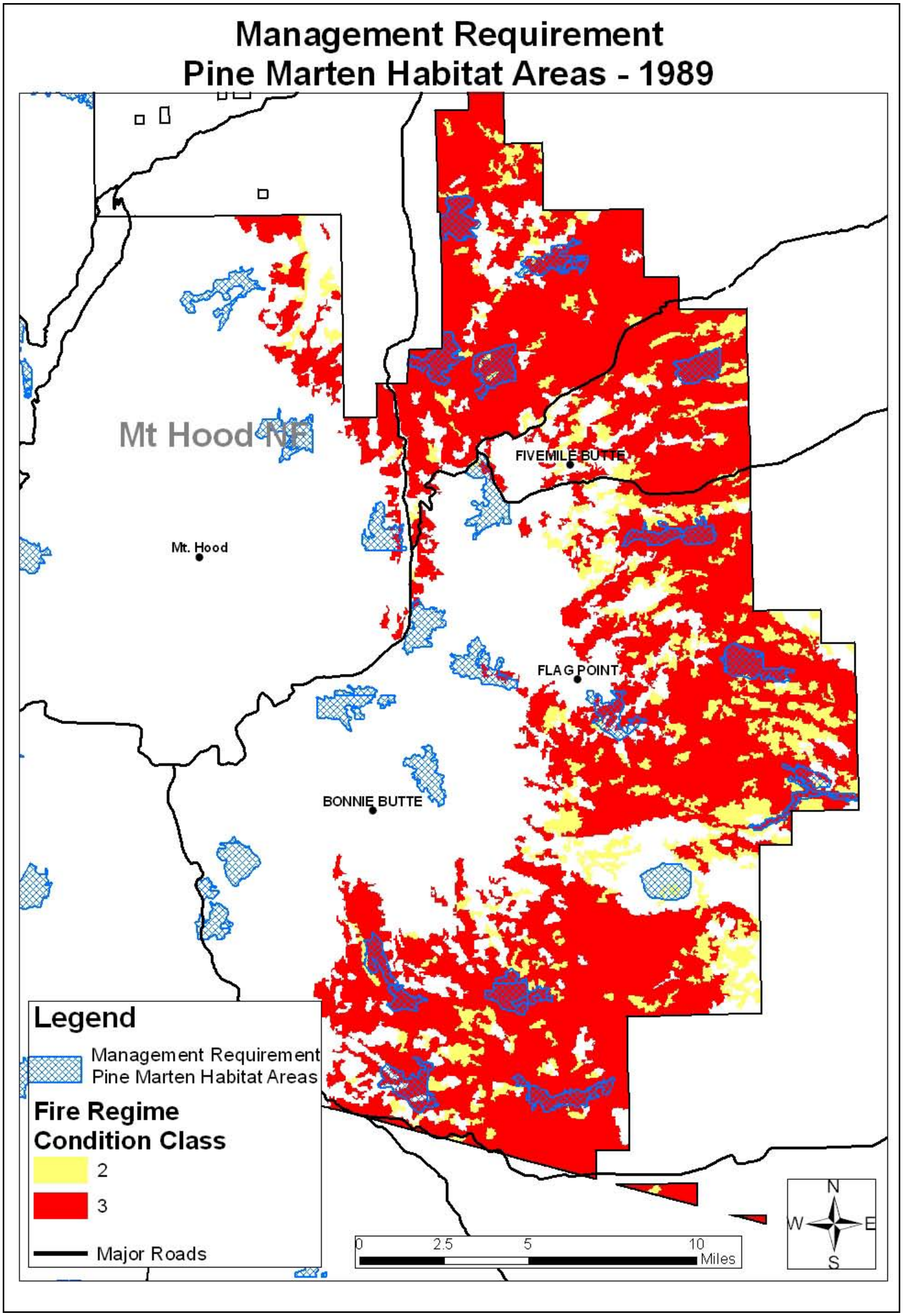


Figure 4. Fire Regime Condition Classes 2 & 3 (Forest Service 2004) on the eastern Mt. Hood National Forest overlaid by Forest Service map of pine marten habitat areas.

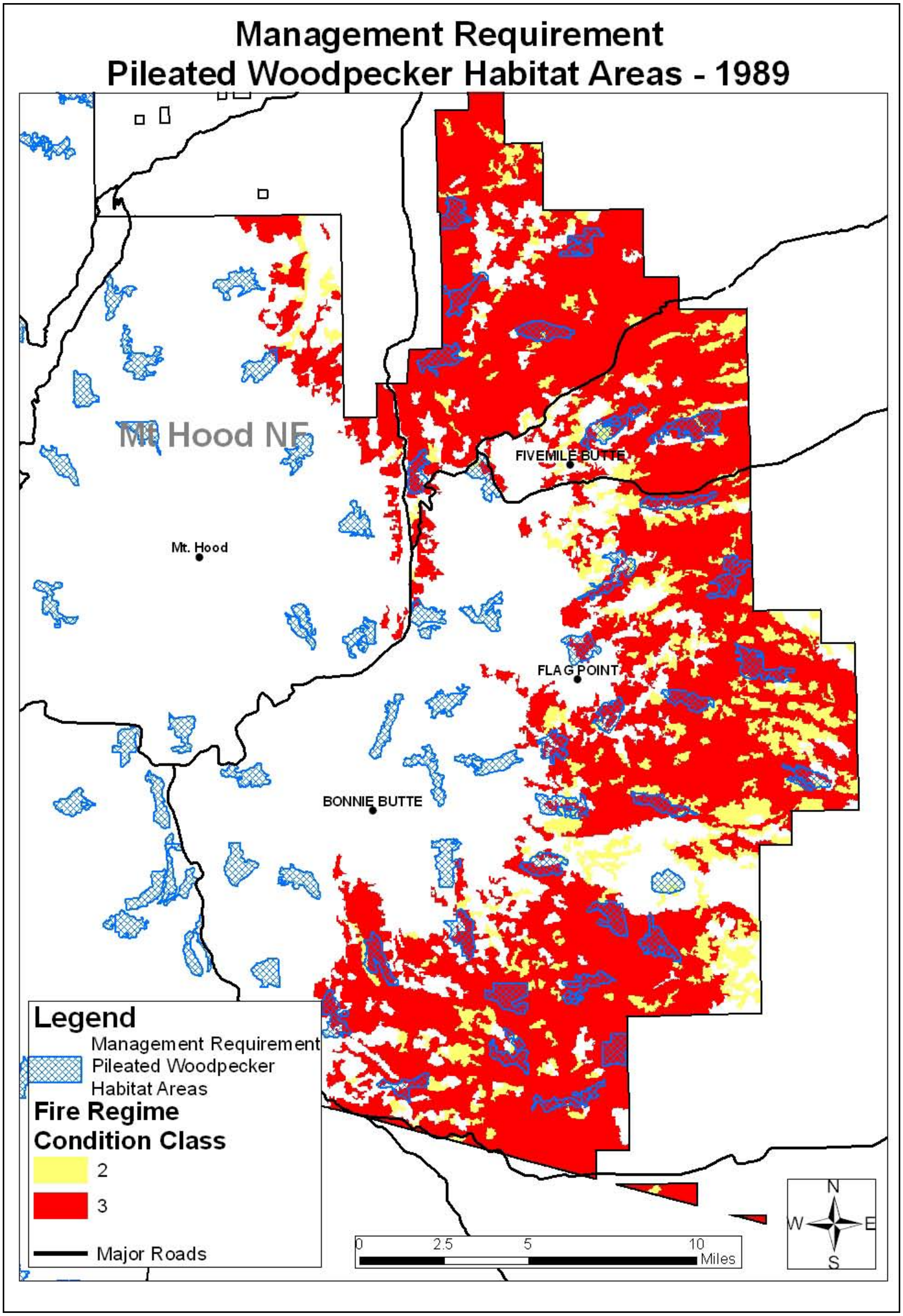


Figure 5. Fire Regime Condition Classes 2 & 3 (Forest Service 2004) on the eastern Mt. Hood National Forest overlaid by Forest Service map of pileated woodpecker habitat areas.

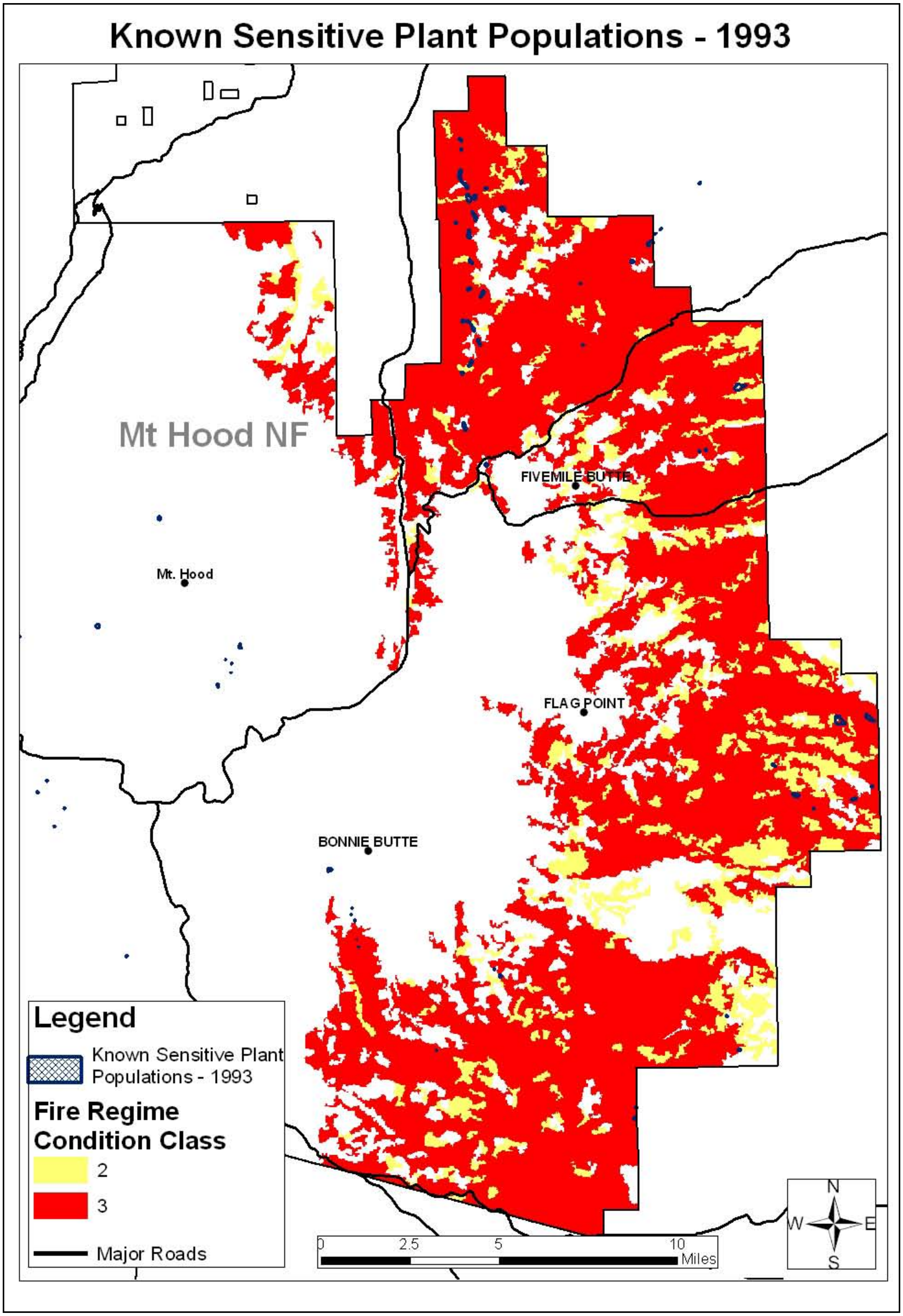


Figure 6. Fire Regime Condition Classes 2 & 3 (Forest Service 2004) on the eastern Mt. Hood National Forest overlaid by Forest Service map of sensitive plant areas.

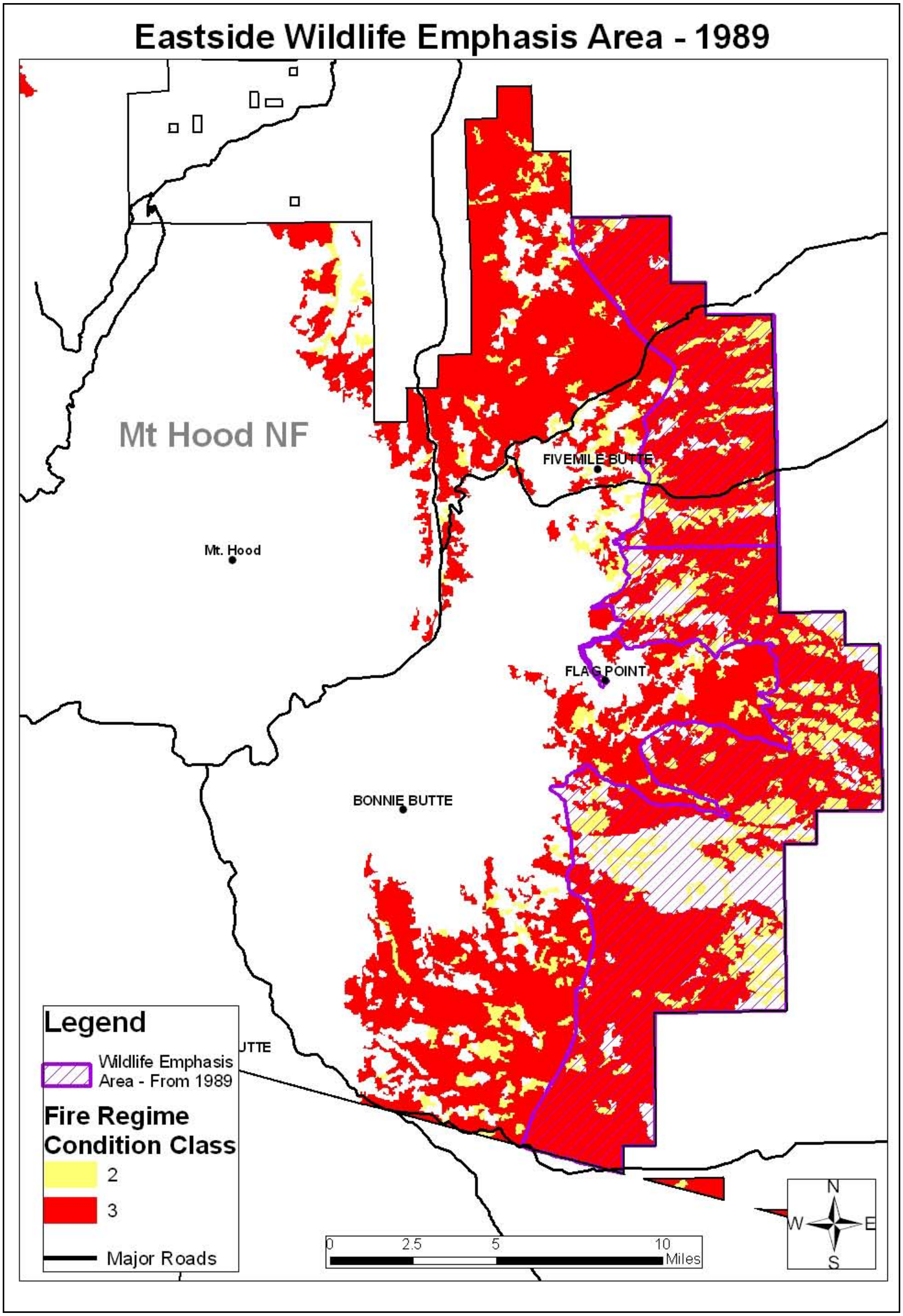


Figure 7. Fire Regime Condition Classes 2 & 3 (Forest Service 2004) on the eastern Mt. Hood National Forest overlaid by a Forest Service map of eastside wildlife emphasis areas (1989).

Proposed Wilderness and Fire Regime Condition Classes – Examples from the Mt. Hood National Forest

Many of the lower elevation portions of areas proposed for Wilderness designation are mapped by the Forest Service as FRCC 2 and 3 lands (Figure 8).

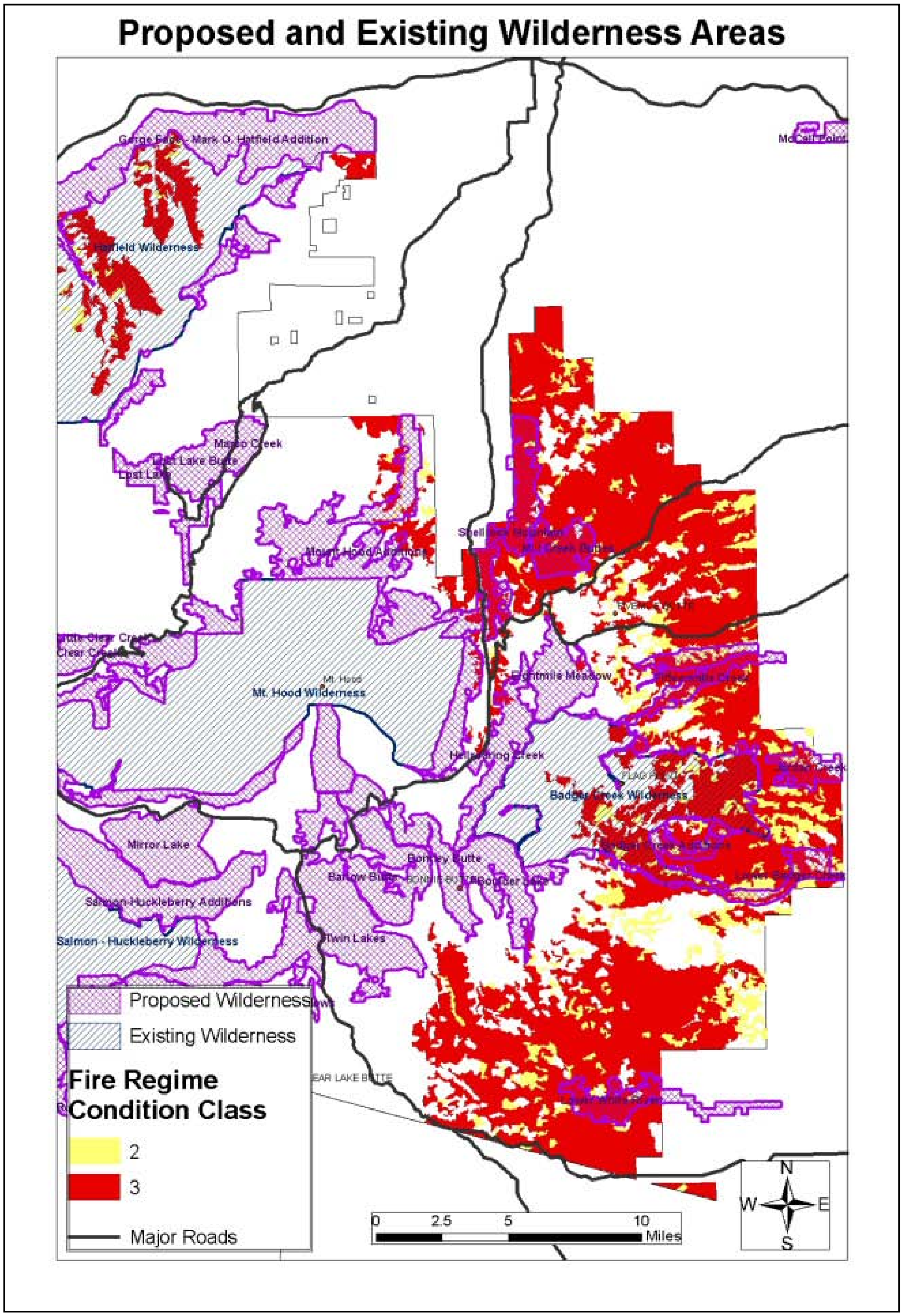


Figure 8. Fire Regime Condition Classes 2 & 3 (Forest Service 2004) on the eastern Mt. Hood National Forest overlaid by a map of proposed Wilderness areas.

Current Status of Data Related to Fire Regime Condition Classes

There have been several attempts to map fire regime condition classes on the Mt. Hood National Forest. The first attempt was part of a national effort conducted by the USDA Forest Service Fire Science Lab (Schmidt et al 2002). This effort resulted in a publication and a set of GIS data layers which included FRCC mapping for the entire conterminous US. This data was produced at a coarse, 1-km resolution scale and the underlying vegetation data was derived from analysis of 1-km scale AVHRR satellite imagery. In the last few years, it has become widely recognized that this first FRCC mapping attempt was highly inaccurate and had many flaws.

The Mt. Hood National Forest obtained a higher resolution (30-meter) FRCC data set in 2004 from the Forest Service Region 6 Office. This is the current FRCC data set that is used by the Mt. Hood National Forest today. It is also the data set that we have used in this report to evaluate the overlap between condition classes and various other forest attributes. The Mt. Hood 2004 FRCC data set was created specifically for the Mt Hood NF, incorporating satellite imagery based data products such as WODIP (Western Oregon Digital Imaging Project) and IVMP (Interagency Vegetation Mapping Project) (personal communication Nancy Lankford, Mt. Hood Silviculturist). This condition class map was created directly from query results using WODIP, IVMP, and some other input data.

According to Nancy Lankford, the current FRCC map relies on coarse scale mapping to indicate Fire Regime Condition Classes on the National Forest. Ms. Lankford notes, however, that the methodology used to complete the 2004 map is currently being refined, and that peer reviewed mapping of “Potential Natural Vegetation” groups as well as environmental variable modeling will be incorporated into a revised FRCC map. Nancy Lankford feels that the 2004 FRCC map is currently the best available information regarding FRCCs on the Mt Hood National Forest.

There is concern within the Forest Service that the Mt. Hood 2004 map is not accurate and should not be used at this time. Jane Kertis, Area Ecologist for the Mt. Hood, Willamette and Siuslaw National Forests is currently working with others in the national LANDFIRE program to produce a new FRCC map for the Mt. Hood National Forest. Ms. Kertis advised against using the 2004 FRCC data layer and to wait for the revision that the Forest Service was working on (personal communication Jane Kertis, Area Ecologist). Apparently, this data will be available early next year.

In summary, our discussions with Mt. Hood National Forest personnel indicate that there is, at least, an acknowledgement that the 2004 Fire Regime Condition Class data covering Mt Hood National Forest is coarse scale and may not be accurate at the forest stand level. Fuel planners in the National Forest have been instructed not to use the map for planning activities, besides referencing large landscape segments that may be in need of further finer scale analyses to assess actual fire regime condition class status. Using the 2004 map to justify fuels reduction activities at the stand level would be a serious misuse of the data. No field based accuracy assessment of the fire regime condition class data has been conducted. A new FRCC map is in preparation by the Area Ecologist and the national LANDFIRE program and will be available in the near future.

Due to the acknowledged problems that have emerged with the first two attempts to map FRCCs, a scientifically sound approach requires that there be a careful internal and external review of the latest attempt to map FRCCs before it is used in fire and forest planning. An independent and rigorous accuracy assessment is the best way to validate the new FRCC map and to determine the appropriate scale of use and the types of uses that are appropriate.

In the process of our evaluation of the FRCC mapping of the Mt. Hood National Forest, we have taken a quick look at how the 2004 FRCC mapping corresponds with on-the-ground forest conditions. An overlay of the FRCC mapping with a fairly recent digital orthophoto immediately reveals that there is very little correlation between FRCC classes and readily recognizable forest condition in the area covered by the aerial photography (Figure 9.) There are many clearcuts or portions of clearcuts shown in the aerial photography that are mapped as FRCC 1. There are many that are mapped as FRCC 3 and some that are mapped as FRCC 2. Portions of the same clearcut may be mapped in all three condition classes. But there is no apparent on-the-ground difference between the sites. Likewise, areas of older forest are mapped in all three condition classes, with no discernable on-the-ground difference. Likewise, areas of young to mature, single-layered canopy forest are mapped in all three condition classes – with no discernable on-the-ground difference between the stands or portions of a single stand.

Our fieldwork in the area supports our assessment of the 2004 FRCC map using aerial photography. There is a very wide range of on-the-ground conditions that are contained in each mapped condition class and there is tremendous overlap in on-the-ground conditions between the three condition classes. This does not constitute a formal accuracy assessment, rather a caution that the 2004 FRCC mapping may be highly inaccurate and not useable.

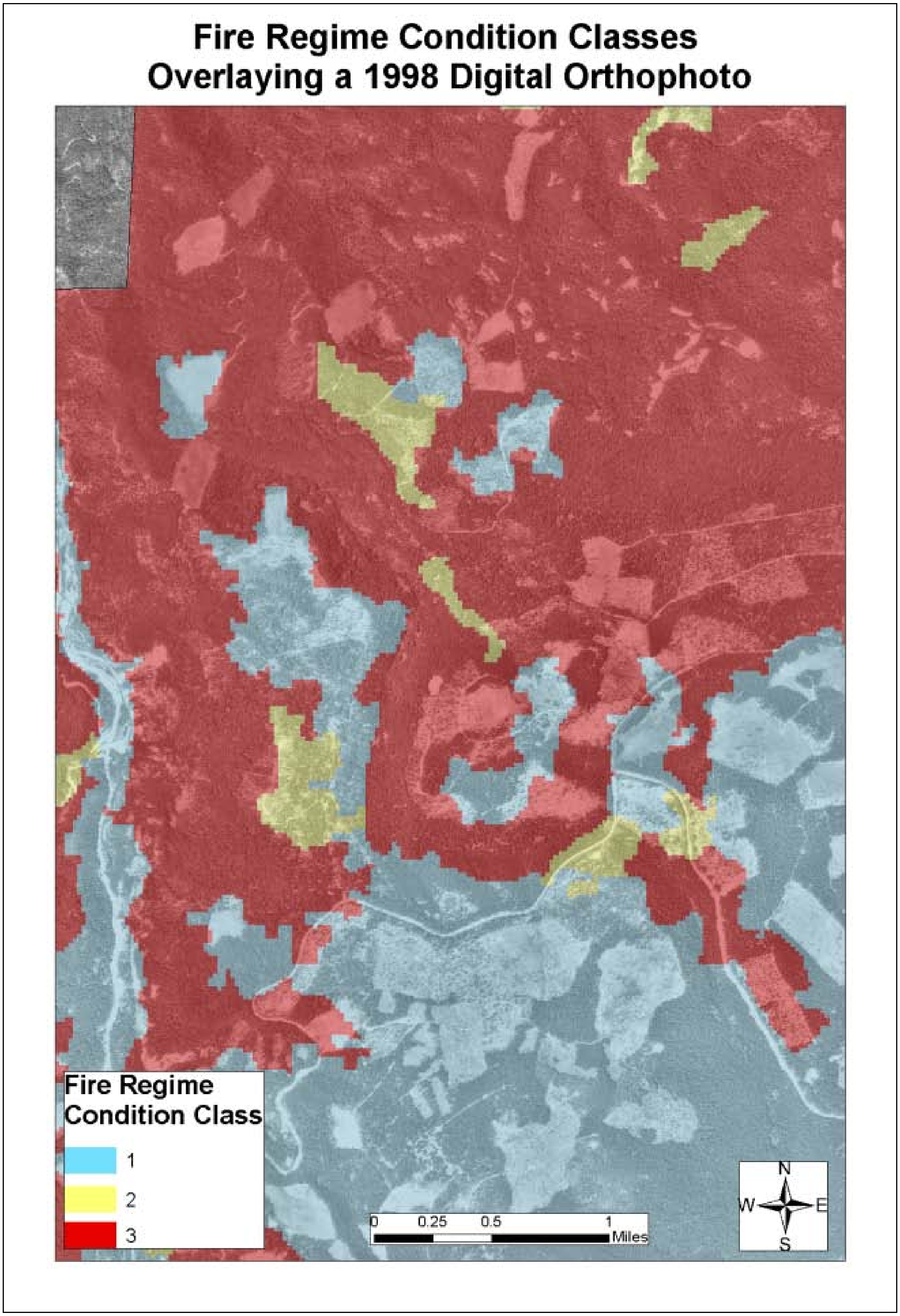


Figure 9. Fire regime condition classes on the Mt. Hood (2004 version) as a color overlay on a panchromatic digital orthophoto from 1996.

Recommendations

The fire regime condition class model and maps are not ready for use in forest planning

To achieve scientifically defensible results, any plan needs to incorporate the results from a discussion of the divergent viewpoints on the fire regime condition class model, as well as its application and implementation in the field. Currently, it is not accepted among all forest scientists as a useful component of forest and fire planning. There are many scientists who have serious concerns about the model, its application and its implementation. These viewpoints need to be reconciled for there to be sound forest health planning.

Fire regime condition classes need to be based on the long-term variability of fire frequency and magnitude experienced by a landscape, not just the average conditions in one or two centuries. FRCCs need to incorporate highly accurate mapping of current and potential vegetation. The vegetation mapping products should be subjected to a rigorous, independent accuracy assessment before use in FRCC mapping. Vegetation succession and disturbance models used in the FRCC process need to be carefully peer-reviewed by independent experts with a wide range of perspectives. The resulting FRCC map products need to be carefully reviewed on the ground to see how well they match reality.

Forest stewardship and fire planning and legislation must incorporate a wide variety of information and FRCCs should not be the primary basis for decision-making

Once new FRCC mapping is completed and tested for accuracy and reliability through careful internal and external review, this new condition class mapping could be combined with many other factors to assist in determining what lands should be treated to deal with the risk of catastrophic wildfire and insect and disease epidemics/outbreaks.

Forest restoration efforts should emphasize use of prescribed fire and fire-use policies over mechanical treatments

Many studies of wildfires and the potential benefit of forest restoration efforts have shown that prescribed fire and fire-use (using wildfires to accomplish forest restoration objectives) are by far the most effective means to reduce the risk of wildfire to both forests and communities. Thinning and logging often increase the intensity of wildfire behavior, therefore these tools should be used with great caution if the objective is to reduce fire risk.

Focus on reduction of wildfire risk to homes and communities

Reduction of wildfire risk to homes and communities should be a primary goal of any legislation that is proposed for the Mt. Hood area. It is a readily achievable goal if well established guidelines are followed.

Jack Cohen, a US Forest Service research scientist who specializes in wildfire risks to communities and structures, emphasizes that the most important element of risk reduction is in building construction and maintenance followed by the maintenance of a relatively fuel-free perimeter around structures (Finney and Cohen 2002, Cohen 2000a, Cohen 2000b, Cohen 2000c, Cohen 2000d, Cohen 1999, Cohen and Butler 1998, Cohen and Saveland 1997). Community and structure protection should be a primary goal of any forest stewardship planning effort and any legislation that is proposed to deal with land management issues surrounding Mt. Hood. To accomplish this goal it is unnecessary to engage in fuel reduction activities that are a substantial distance from the areas targeted for protection (Finney and Cohen 2002).

The homes and communities surrounding Mt. Hood all need to be carefully reviewed for fire safety. In many cases vegetation needs to be removed or modified within the 30-meter home ignition zone. Many houses have cedar shake roofs. These roofs are not suitable for a forest environment where wildfire is a frequent event and need to be replaced with fire-proof roofing. Likewise, exterior wood siding on some homes may be inappropriate for a forest environment and should be replaced with fire-resistant siding. Open wood decks need to be modified so that they do not pose a significant fire risk. Debris and firewood storage next to some homes needs to be eliminated or mitigated as it poses a significant fire risk.

It is important to emphasize that clearing trees and other vegetation away from structures is not in itself sufficient in preventing them from burning in a wildfire. There are innumerable cases where homes burned in a wildfire with a very sparse tree cover surrounding them. This happens when burning embers ignite flammable materials around the home or flammable parts of the building (roofs, walls, decks). In the Virginia Lakes Fire (Morrison et al 2001), several homes burned where there was little surrounding forest because of home construction and maintenance issues (Figure 11). Therefore, incentives for improvements in home construction and home maintenance will be one of the most cost effective ways to spend taxpayer dollars to protect homes and communities from wildfire.

Wildlife habitat protection and ecological values associated with old forests need to be carefully balanced with the desire to reduce fire risk

As discussed in previous sections of this paper, there is considerable overlap between areas of importance to wildlife and areas that might be candidates for forest stewardship projects focused on reduction of wildfire risk. Likewise, many old forests contain significant ecological value and may also be seen as candidates for wildfire risk reduction activities. There needs to be a careful balancing of the desire to reduce the risk of wildfire with the values present in old forests and areas of importance to wildlife. Often logging and thinning activities may degrade wildlife habitat and ecological values present in old forests. Whether these activities result in a reduction in wildfire risk is the subject of scientific controversy.

Properly designed legislation can set an appropriate framework to guide the creation of a 10-year plan to enhance and protect communities and ecological values in the Mt Hood Area

Many aspects of the legislation proposed by Congressmen Walden and Blumenauer will help the Mt. Hood area develop new recreational opportunities and enhance communities. It should also include strong provisions to help property owners create fire-safe homes and help communities to develop fire fighting resources and response plans to potential wildfire threats. The forest stewardship portion of the legislation needs to be include a more complex, scientifically credible approach to forest stewardship planning – as addressed in this paper. Carefully crafted forest stewardship projects can benefit the local communities and the larger Mt. Hood ecosystem. But a simplistic approach based on the belief that conversion from on FRCC to another will accomplish meaningful goals will not be successful. Good forest stewardship is inherently complex and legislative efforts to promote this stewardship should acknowledge this complexity.

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