Vegetation Hazard

INTRODUCTION

Historical range of variability (HRV) concepts were developed in part to better understand how disturbances, vegetation, and other ecosystem components interact, and in turn how this affects plants, animals, fish, soil and water, and numerous other resources. Underlying this concept is the assumption that ecosystems operating within their historical range are resilient and resistant to disturbances such as insects, disease, and fire, because they have evolved within the influence of these disturbances. In turn, the various components and processes that interact with vegetation are sustained and function as they did historically. Insects, disease, and other disturbance agents generally operated at endemic or characteristic levels within historical landscapes (Harvey 1994). Shifts in species composition and density have created vegetative conditions where insects, disease, and wildfire may operate at epidemic or uncharacteristic levels.

Often various disturbance agents operate synergistically over space and time (Steele et al. 1996). The classic example is the mountain pine beetle, fire disturbance complex exhibited in lodgepole pine ecosystems (Crane and Fisher 1986). These ecosystems often lack enough fuels to carry fire, particularly in the early stages of succession. Over time, mortality from mountain pine beetle increases as the stands mature, contributing to the fuel loading. At some point, conditions are ripe for fire, the stands burn, and the cycle begins again.

There are many examples of complementary disturbance processes, particularly at the landscape scale (Rogers 1996). However, representing these often stochastic interactions requires complex modeling efforts. This analysis addresses only the two most widespread landscape disturbances, insects and uncharacteristic wildfire. Though we recognize that these disturbances interact, they were evaluated separately to simplify alternative comparison.

Issues and Indicators

Issue Statement –Forest Plan management strategies may affect the amount of vegetation at risk to uncharacteristic wildfire and epidemic insect disturbances.

Background to Issue – Concerns were expressed both internally and externally about the risk of undesirable disturbances, like the large uncharacteristic wildfires that occurred in the mid-1980s and into the 1990s. In 2000, as a result of the large wildfires that occurred that year, the Secretaries of Agriculture and the Interior were directed to develop a strategy to address severe wildland fires, reduce fire impacts on rural communities, and ensure effective firefighting capability in the future. This strategy—which includes National strategic and implementation goals and plans, budget requests and appropriations, and agency action plans—is known collectively as the National Fire Plan. One of the National Fire Plan goals is to reduce hazardous fuels to a level that decreases the risk of unplanned and unwanted wildland fire to communities and to the environment. The effort to reduce the risk of effects to the environment is focused on areas where the current conditions may lead to uncharacteristic wildfires. In many cases, these

events affect a host of resources—including fisheries, wildlife habitat, timber, visual quality, and soils—and have cost millions of dollars to suppress and mitigate. The long-term impacts of these disturbances prompted concerns about the likelihood of such events occurring in the future, and the potential to reduce the risks.

Indicators – The indicators used to measure vegetation at risk to uncharacteristic disturbance are: (1) Insect Hazard Index for forested vegetation, and (2) Uncharacteristic Wildfire Hazard Index for forested and non-forested vegetation. These indicators provide a relative measure of the potential for insect epidemics and uncharacteristic wildfires. The indices are directly related to changes in vegetative conditions, including size class and/or density, which will vary by the type and amount of vegetation treatment associated with each alternative.

CURRENT CONDITIONS

Current hazard conditions reflect current vegetation conditions. Current vegetation conditions have been influenced by rates of growth and development, and disturbances that have affected these rates. Vegetation is dynamic, continuing to change in response to the interaction of growth rates, successional development, and disturbance events. The growth stage matrix, developed for the vegetation modeling, was used to characterize hazard for both uncharacteristic wildfire and insect epidemics. The rate of change, reflected by growth and development of vegetation, varies in the model for each forested potential vegetation group (PVG) and non-forested vegetation cover type in accordance with the Growth Stages Matrix. Two growth stage matrices were developed for forested vegetation to account for different growth rates. One was associated with normal stand development, without vegetation treatments or natural disturbances that significantly alter existing stand structure or densities. The other growth stage matrix incorporates vegetation treatments that influence growth rates and stand development.

Conditions measured in the vegetation models are tree size class and/or canopy closure (density). Hazard was determined by assigning relative values to each cell in the growth stages matrix. The two forested vegetation growth matrices were evaluated separately and assigned hazard ratings based on assumptions about other components of the conditions, including species composition, vertical arrangement of vegetation, and for uncharacteristic wildfire, some indication of potential ground fuels. Insect hazard levels generally increase with increasing tree size and density. Uncharacteristic wildfire hazard levels also most often increase with density but have a more variable relationship to size class than the insect hazard ratings.

Insect Hazard

Insect Hazard Index

Each growth stage (combination of tree size and canopy closure) was rated for its susceptibility to epidemic insect activity. The effects of individual types of insects, or the combined effects of different classes of insects, especially bark beetles and defoliators, were considered. Output from the SPECTRUM model included the number of acres in each hazard class for each potential vegetation group. The hazard classes are none (0), low (1), moderate (2) and high (3).

Class 0 was labeled as none but actually represents a hazard classification of less than 1. Hazard was reported as the average number of acres in each hazard class for the middle of each decade, beginning with the current decade and continuing through the fifth decade.

Hazard is defined as a relative measure of predisposing conditions for damage caused by insects. This is similar to the definition of the term hazard used by Steele et al. (1996) in the publication, *Stand Hazard Rating System for Central Idaho Forests.* They further describe their hazard rating system as providing "…a relative measure of stand vulnerability to change agents within the next decade".

As previously stated, hazard ratings generally increase with increasing tree size and density. For example, areas in the grass/forb/shurb/seedling growth stage, or in the sapling tree size with low canopy closure growth stage are assigned a hazard rating of 1 (low) or 0 (less than 1), meaning that vegetation conditions, by themselves, do not predispose the stand or area to elevated levels of damage caused by insects. Areas in a large tree size and high canopy closure growth stage are usually assigned a hazard rating of 2 (moderate) or 3 (high), depending on the PVG.

An insect hazard index value of 2 indicates that a stand or area has an increased predisposition for insect damage. An insect hazard index value of 3 indicates that a stand or area is predisposed for epidemic insect activity. Damage from insects means that tree mortality can be expected to be higher than normal, and that the development from the current growth stage to a different growth stage will occur more rapidly. Growth stage will normally change to a less dense condition and/or to a smaller tree size class. The most extreme change would be equivalent to stand replacement, such as from a large tree size, high canopy closure growth stage to a grass/forb/shrub/seedling growth stage.

Species composition is an additional stand factor that was used in the stand hazard rating system developed by Steele et al. (1996). They adjusted hazard rating based on the percentage of host species within a given stand. Species composition was also considered in the development of the insect hazard rating used in the growth stages matrix for the SPECTRUM model. The two growth stage matrices, one each for normal and managed stand development, included a comprehensive characterization of each cell or growth stage. Species composition was part of this characterization and often revealed important differences between the normal and managed growth stages for the same growth stage within a potential vegetation group. Determining hazard through use of the SPECTRUM model considered all stands as having an initial hazard condition based on the normal growth stage matrix. After any treatment activity is applied by the model, hazard ratings are based on the managed growth stage matrix. This resulted in rating current insect hazard as being somewhat higher than actual conditions because the model fails to recognize present stand conditions in some of the small tree to large tree size classes that are currently better represented by the managed growth stage matrix.

Increases in fuel levels associated with increased mortality levels from insect activity may cause an increase in fire activity. In some cases these increased fuel levels can lead to uncharacteristic fires that may, in turn, have impacts to other resources, especially soils and wildlife habitat. Uncharacteristic fires are generally of a greater intensity and severity, leading to a greater

likelihood of stand-replacement fires, and fires that burn over larger areas. These fire events have both short and long-term effects on soil resources. Short-term impacts are associated with increased soil erosion rates, while long-term impacts result from reduced soil productivity.

Uncharacteristic Wildfire Hazard

Uncharacteristic Wildfire Hazard Index

Uncharacteristic wildfire hazard is defined as the effect of wildfire on the vegetative conditions when it burns (rather than if it will burn) described by PVG, size class, and canopy closure for forested vegetation, or cover type and canopy cover for non-forested vegetation, relative to the historical effect. Hazard is based on the vegetative conditions that influence fire behavior and potential effects (Bachmann and Allgöwer 1999, Deeming 1990). The hazard ratings are low (0), moderate (1), high (2), and extreme (3). These ratings are based on individual growth stage matrix ratings that range from 0.0 to 3.0 with 0.0 assigned to low (0); 0.5 or 1.0 assigned to moderate (1), 1.5 or 2.0 assigned to high (2); and 2.5 or 3.0 assigned to extreme (3). Though these ratings were developed before release of the National Fire Plan (USDA Forest Service 2000), the definitions, criteria, and process for assigning hazard ratings and condition classes were identical except for the number of ratings (Schmidt et al. 2002). Table VH-1 shows the relationship between the SWI Ecogroup hazard ratings and the National Fire Plan Condition Classes.

Table VH-1. Comparison of the Southwest Idaho Ecogroup Uncharacteristic Wildfire Hazard Ratings and the National Fire Plan Condition Classes

SWI Ecogroup Hazard Rating	National Fire Plan Condition Class
Low (0)	Condition Class 1
Moderate (1)	Condition Class 2
High (2)	Condition Class 3
Extreme (3)	Condition Class 3

Fire regimes were used to determine the difference between current and historical fire effects. The fire regimes are defined as nonlethal, mixed1, mixed2, and lethal (more detail regarding the fire regimes can be found in the *Introduction, Table 3-2,* and in the *Fire Management* section). To develop the ratings, historical fire regimes were identified for each PVG or cover type as a whole, based on available literature about the vegetative communities and fire regimes. The current fire regime was described for each combination of PVG size class and canopy closure, or cover type-canopy cover, based on the knowledge and experience of Fire Management personnel. Hazard was based on the departure between the historical and current fire regime for each combination of size class and canopy closure by forested PVG or canopy cover by non-forested cover type. Within the growth stage matrix this difference was assigned a numeric value (0.0 to 3.0). For example, low hazard (0.0) assumes there is little difference between the historical and current fire regimes, while extreme hazard (2.5 or 3.0) assumes a substantial difference.

In practical terms, the uncharacteristic wildfire hazard rating (or Condition Class) represents a departure in the conditions that occur on the landscape relative to the historical fire regime rather than a true description of the effects within that condition. For example, historically, dense canopy conditions in the Warm Dry Douglas-fir/Moist Ponderosa Pine potential vegetation group (PVG 2) likely burned with lethal effects. However, dense canopy conditions were considered rare under the historically frequent, nonlethal fire regime that has been documented for this PVG. Therefore, a preponderance of dense canopy conditions on the landscape for this PVG represents a departure in the way fire historically operated and therefore a change in the uncharacteristic wildfire hazard.

The hazard ratings do not account for areas that contain conditions that have become departed due to external forces, such as the invasion of non-native plants, as these conditions were not well described in the available data used for the analysis. In some areas, non-natives such as cheatgrass (*Bromus tectorum*) have dramatically altered historical fire regimes, particularly the frequency of fire (Miller and Tausch 2001). In certain vegetative types, the increase in hazard could indicate a potential increase in the risk of invasion by non-natives as many of these species often increase following the high severity conditions created by lethal fire. However, mixed2 and lethal historical fire regimes occur in some of the vegetative types where non-natives are found, particularly in the non-forested vegetation communities. In these regimes, any kind of fire that provides the conditions for the establishment and/or spread of non-native plants, whether it is within the HRV or not, increases the risk of non-native invasion.

Uncharacteristic wildfire hazard indexes were developed by multiplying the total acres assigned to each growth stage matrix hazard rating by the rating (0.0 to 3.0) for different areas (PVG, Forest, wilderness, non-wilderness), and then summing the results for each area. Each result was then divided by the total number of either forested or non-forested acres for each area. The purpose of this approach was to account for different combinations of the ratings and amount of area with that rating. The indexes provided a relative comparison of vegetative hazard for a defined area or areas.

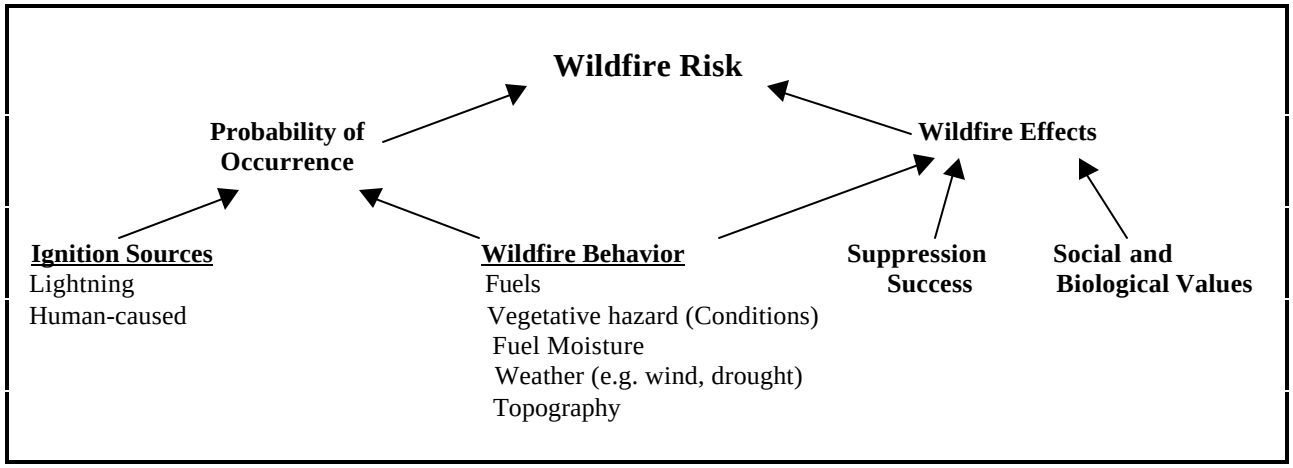
Wildfire Risk

Bachmann and Allgöwer (1999) describe wildfire risk as it relates to several factors, including the probability of occurrence and outcomes (wildfire effects) (Figure VH-1). The probability of occurrence is based on ignition sources (lightning or human-caused) and wildfire behavior, which is a function of vegetative hazard, weather, and topography. The effects of wildfire depend on wildfire behavior, the success of suppression actions, and social and biological values.

A wildfire, as currently defined by federal policy, is an “unwanted wildland fire”. Fires ignited by humans, other than prescribed fires, are considered by the 1995 fire management policy to be wildfires. Fires ignited by lightning may be evaluated for wildland fire use if they occur within a designated wildland fire use area and can meet resource objectives and other requirements. If the ignition does not meet certain requirements, it is declared a wildfire, and some type of suppression action is implemented. In some cases, a lightning ignition occurring within a wildland fire use area and within prescription could be declared a wildfire due to a lack of available personnel to manage the ignition, the potential air quality impacts, adjacency to boundaries, or a host of other concerns not related to effects on natural resources. Wildfire, in

and of itself, does not indicate a harmful impact. The wildfires of greatest concern are those with the potential to burn uncharacteristically, because these can have the most long-term effects to resources, or those that are threatening areas such as wildland-urban interface. The uncharacteristic wildfire hazard index is an attempt to evaluate how much area is in a condition that could lead to uncharacteristic wildfire rather than an evaluation of the overall wildfire risk.

Figure VH-1. Factors That Contribute To Wildfire Risk
(Adopted from Bachmann and Allgöwer 1999)



Current Conditions

Insect Hazard

Insect activity changes in response to changes in species composition and stand structure. The type and extent of changes vary somewhat by potential vegetation group. In most PVGs stand density has increased and in some cases species composition has changed from dominance by shade-intolerant species to shade-tolerant species. Additionally, in some areas, stand age has advanced to over-mature conditions. These conditions, individually and in combination, have resulted in increased susceptibility to large-scale insect infestation. Consequently, the size and intensity of areas attacked by insects has increased in many areas. In the drier PVGs, especially in stands where fire exclusion has resulted in the development of higher densities, bark beetles often replace fire as the cause of mortality. In PVGs where lodgepole pine is a significant cover type, fire exclusion has resulted in more continuous forest cover, leading to mountain pine beetle infestations that now affect larger areas, and for longer periods (ICBEMP 2000a).

According to aerial detection survey records dating back to 1968, bark beetles have killed over 4 million trees in the Ecogroup area. Depending on the particular year and location, this mortality ranged from endemic levels of widely scattered individual trees, to scattered groups of trees in one or more drainages, to large-scale epidemics where thousands of trees were killed over extensive landscapes.

The importance of such mortality is often a function of scale and management objectives. At endemic levels, bark beetles cause scattered mortality that provides important habitat for other plant and animal species, and woody debris that contributes to nutrient recycling. Bark beetles act as agents of change and play a critical role in the development, death, and rebirth of forests. Even at epidemic levels that result in very high rates of tree mortality, the effect of bark beetles can be considered beneficial or negative depending on the management objectives of the given area. In some forest ecosystems, such as lodgepole pine, mountain pine beetle outbreaks and subsequent fires are critical to ecosystem structure and function. However, bark beetle outbreaks can severely affect resource objectives, particularly in wildland/urban landscapes, watersheds, and high-value recreation areas. High levels of tree mortality result in loss of old growth, degraded watershed conditions, changes in species diversity and productivity, and loss in fish and wildlife habitat. Dead trees also add significant fuel loading to the forest. Extreme fuel loads can pose a threat to property and life.

Mountain pine beetle, which infests and kills various species of pine, was responsible for over 40 percent of all trees killed by bark beetles in the Ecogroup area since 1968. Most of this activity occurred on the Sawtooth National Forest in 1974-75. Another major outbreak of mountain pine beetle is currently underway in the Sawtooth Valley surrounding Stanley, Idaho, and will likely persist until most of the larger diameter (over 8 inches in diameter) lodgepole pine is dead. An estimated 1,000,000 lodgepole pine trees have been killed during this outbreak since 1998.

Douglas-fir beetle was responsible for killing approximately 25 percent of all the bark beetle-killed trees in the Ecogroup area and was most active from the mid-1980s to the mid-1990s. This beetle's activity, and that of western pine beetle, roughly coincide with a period of drought and wildfire; abiotic events that set the stage for higher levels of beetle-caused mortality.

The 10-year long spruce beetle outbreak from 1985 to 1994 on the Payette National Forest is also notable. This single infestation, where an estimated 393,000 trees were killed, was responsible for over 98 percent of the spruce beetle caused mortality in the Ecogroup.

Western spruce budworm and Douglas-fir tussock moth, which defoliate conifers, have also attained epidemic levels in the past. Western spruce budworm reached outbreak levels, defoliating Douglas-fir, subalpine fir, grand fir and western larch, on the Payette and Boise National Forests annually from 1968 through 1987, and on the Sawtooth National Forest from 1981 to 1987. In 1986, conifers on over 2.1 million acres were defoliated by western spruce budworm throughout the Ecogroup area. Repeated annual defoliation over this prolonged outbreak resulted in incremental growth loss, and varying degrees of top-kill and understory mortality. Spruce budworm-caused tree mortality, even after several consecutive years of defoliation, is usually light and limited to smaller, suppressed trees.

Currently, western spruce budworm populations are increasing in southern Idaho, with notable defoliation on 3,500 acres of the Boise Forest in 2002. Depending on several natural factors, including weather conditions, this population may collapse or it may expand over the next several years to encompass most of the susceptible Douglas-fir and true fir host type across the Ecogroup area. Several years of repeated defoliation can result in reduced aesthetic and visual values; reduced seed production; significant top-kill and mortality to understory host trees; and,

radial growth loss, top-kill, and some mortality to overstory host trees, particularly where host trees are also infected with dwarf mistletoe. Bark beetles may also attack and kill host trees that are predisposed by repeated defoliation.

Douglas-fir tussock moth is another important defoliator of grand fir, Douglas-fir, and subalpine fir across the Ecogroup area. Outbreaks of Douglas-fir tussock moth are cyclical, occurring at intervals of 7-10 years. Populations develop explosively, causing severe defoliation and tree mortality, and then abruptly subside after 1-4 years. The last major outbreak of Douglas-fir tussock moth in southern Idaho occurred in 1990-92, when approximately 400,000 acres were defoliated on the Boise, Payette and Sawtooth National Forests. This outbreak coincided with a significant period of drought that probably contributed to high levels of tree mortality.

Douglas-fir tussock moth populations rose slightly during 1998-2000 on small portions of the Boise, Payette and Sawtooth National Forests. This increase resulted in little defoliation, and populations collapsed to endemic levels by 2001. Future outbreaks of Douglas-fir tussock moth can be expected to occur at 7-10 year intervals across the susceptible host types of the Ecogroup area. These outbreaks may be short-lived, causing only unsightly defoliation in isolated locations or they may be widespread and longer in duration, resulting in severe defoliation, top-kill, growth loss and mortality to host trees (Bennett and Their 2003).

The average insect hazard index for current vegetation conditions of the Ecogroup is 1.38. This index value was developed by calculating the weighted average hazard rating for the acres in each hazard class. The average insect hazard was also calculated for forest vegetation that represents the mean values associated with historical range of variability (HRV). The desired vegetation conditions for Alternative 3 best represent the mean of conditions present under HRV, therefore, Alternative 3 was used to estimate insect hazard under HRV conditions. Doing this provides an estimate of the insect hazard indices for forested vegetation represented by conditions equivalent to the mean HRV values and are, for the Boise National Forest 1.12, Payette National Forest 1.29, and Sawtooth National Forest 1.18.

The weighted average insect hazard index for current conditions is greater than the weighted hazard index for forested vegetation within the historical range of variability, but the hazard index for current conditions does not account for desired species composition in stands that have been previously managed, and thus the calculated hazard index for current conditions is somewhat exaggerated. Current conditions do, however, reflect the relatively large percentage of forested area in grass/forb/shrub/seedling and sapling growth stages brought about in part by insect-caused mortality and wildfire events that have occurred since 1979. Tree mortality, whether caused by insects or fire, often reduces both canopy closure and tree size class, creating conditions that have a lower insect hazard rating. Many of the recent insect epidemics and fire events have been similar to stand-replacing activities; thereby contributing to the large area currently occupied by the grass/forb/shrub/seedling, and sapling tree size growth stages.

Currently, about 49 percent of the forested vegetation in the Ecogroup area is rated as being at moderate or high insect hazard. An estimated 32 percent of the Ecogroup area has a moderate hazard rating for insects, while 17 percent has a high hazard rating. The remaining 51 percent of the forested vegetation within the Ecogroup area has an insect hazard rating of low or none.

Table VH-2 displays the percent of forest vegetation, for each Forest and Wilderness area, associated with each insect hazard index value. The Ecogroup average is also displayed.

Table VH-2. Percentage of Current Forested Vegetation In Each Insect Hazard Rating by Forest and Wilderness Area

Area	No Hazard (0)	Low Hazard (1)	Moderate Hazard (2)	High Hazard (3)
Boise NF	26	22	36	16
Payette NF (w/out Wilderness)	30	23	32	15
FC–RONRW	26	23	35	16
Sawtooth NF (w/out Wilderness)	28	25	26	21
Sawtooth Wilderness	27	44	20	9
Ecogroup Total	**28**	**23**	**32**	**17**

Uncharacteristic Wildfire Hazard

Since 1991, 21 percent of the acres in the Ecogroup have been burned by wildfire (Table VH-3). The amount burned from 1991 through 2000 was more than the previous two decades combined. These large wildfires are thought to be the combined result of drought that occurred through the late 1980s into the 1990s, and increases in hazardous vegetative conditions.

Table VH-3. Acres Burned in Three Decades by Forest and for the Ecogroup

Decade	Boise	Payette	Sawtooth	Ecogroup
1971-1980	11,474	3,407	6,534	21,415
1981-1990	218,335	201,999	39,201	459,535
1991-2000	454,250	673,643	81,889	1,209,782

Forested Vegetation - Currently, a total of 48 percent of the forested vegetation in the Ecogroup has a moderate, high, or extreme uncharacteristic wildfire hazard rating, increasing the risk that fires would burn uncharacteristically (Table VH-4). Such events affect soils, wildlife habitat and other resources by creating conditions that may be much different then they were historically.

Table VH-4. Percentage of Forested Vegetation Assigned to the Four Uncharacteristic Wildfire Hazard Ratings (Condition Classes) by Forest and Wilderness Area

Area	Low Hazard Rating (Condition Class 1)	Moderate Hazard Rating (Condition Class 2)	High Hazard Rating (Condition Class 3)	Extreme Hazard Rating (Condition Class 3)
Boise NF	44	38	15	3
Payette NF	56	29	8	7
FC–RONRW	54	31	12	3
Sawtooth NF	57	41	2	0
Sawtooth Wilderness	74	23	3	0
Ecogroup Total	**52**	**35**	**10**	**3**

The greatest hazard indexes (high and extreme) are in the warmer, drier PVGs including PVG 2 in all areas, and PVG 5 on the Boise Forest (Table VH-5). PVG 1—except on the Sawtooth Forest and Wilderness, and PVG 6 on the Boise Forest and in the Frank Church–River of No Return Wilderness (FC–RONRW)—have high hazard indexes. This means that current fire regimes are the least like historical in these groups. For example, PVG 2, which rated as extreme hazard where it occurs, contains vegetative conditions where fires today would more likely burn lethally compared to the historical nonlethal fire regimes. This change is related to shifts in distribution of vegetative conditions (size class, canopy closure, and species composition) across the landscape relative to the historical conditions. These shifts result in greater area in smaller trees that are less resistant to fire, and increases in stand density, ladder fuels, and more flammable species. Forested PVGs with moderate indexes are PVG 3 (except the Sawtooth Wilderness), PVG 4 in all areas, and PVG 6 on the Payette. In these PVGs, vegetative conditions are such that fires today may burn with greater intensity and severity than fires historically, but the conditions have not changed as much as in PVG 2.

Table VH-5. Uncharacteristic Wildfire Hazard Indexes for Forested Potential Vegetation Groups in the Ecogroup by Forest and Wilderness Area

Forest	Low Hazard Index	Moderate Hazard Index	High Hazard Index	Extreme Hazard Index
Boise	PVG 7 PVG 10 PVG 11	PVG 3 PVG 4	PVG 1 PVG 6	PVG 2 PVG 5
Payette	PVG 7 PVG 8/9 PVG 10 PVG 11	PVG 3 PVG 4 PVG 6	PVG 1 PVG 5	PVG 2
Frank Church–River of No Return Wilderness	PVG 7 PVG 8/9 PVG 10 PVG 11	PVG 3 PVG 4	PVG 1 PVG 5 PVG 6	PVG 2
Sawtooth	PVG 7 PVG 10 PVG 11	PVG 1 PVG 3 PVG 4		PVG 2
Sawtooth Wilderness	PVG 3 PVG 7 PVG 10 PVG 11	PVG 1 PVG 4		PVG 2

The lowest current hazard indexes are in PVGs 7, 8/9, 10, and 11. Fires in these PVGs are mostly mixed2 and lethal, which is similar to historical regimes. However, at a landscape level, fires today often produce larger lethal patches than occurred historically. This appears to be due to increases in homogeneity and a reduction of landscape mosaics caused in part by fire exclusion, past timber harvest, and blister rust in whitebark pine (Quigley and Arbelbide 1997).

A comparison of current size class and canopy closure to the historical conditions for the grass/forb/shrub/seedling and large tree size class found that, for most PVGs in all areas, there are currently more acres in the grass/forb/shrub/seedling and fewer acres in the large tree size class than historically (see *Vegetation Diversity*, Tables V-16, V-17, V-18, V19, and V-20). This indicates that the distribution of size classes relative to the historical is skewed toward smaller sized trees. The PVGs with the greatest departures relative to the large tree size class are those that currently have high or extreme uncharacteristic wildfire hazard indexes (PVGs 1, 2, 5, and 6). In all areas, PVG 1 shows the greatest change relative to historical conditions. Historically, the amount of area in this PVG in large trees was estimated to be 91.0 percent. Currently, 16.4 percent of the acres are in the large tree size class, which is a difference between the two of 74.6 percent (see *Vegetation Diversity* Table V-16). PVGs 2 and 5 followed PVG 1 in having the greatest departures between the historical and current large tree size classes.

Currently, the Boise Forest has the highest uncharacteristic wildfire hazard index for forested vegetation (Table VH-6). The FC–RONRW and Payette Forest have the second highest indexes. The Sawtooth Forest indexes are lower than the Boise and Payette. The Sawtooth Wilderness hazard index is the lowest of all areas primarily due to the preponderance of mixed2 and lethal fire regimes that occur there. Areas outside the Sawtooth Wilderness include some vegetative communities that transition from nonlethal on the west side of the Forest to mixed2 and lethal

toward the east, mainly in response to the two different climatic regimes occurring over this area. The Sawtooth Forest, including the Wilderness, is primarily in mixed2 to lethal fire regimes. Much smaller amounts of nonlethal and mixed1 occur there compared to the Boise and Payette. Therefore the uncharacteristic wildfire hazard indexes for the Sawtooth overall are lower than the Boise and Payette Forests.

Table VH-6. Current Uncharacteristic Wildfire Hazard Indexes for Forested and Non-forested Vegetation by Area

Area	Current Condition	
	Forested Vegetation	Non-forested Vegetation
Boise NF	0.65	0.11
Payette NF	0.50	NA
FC–RONRW	0.51	NA
Sawtooth NF	0.36	0.12
Sawtooth Wilderness	0.24	NA

Non-forested Vegetation – A little over 23 percent of the non-forested vegetation on the southern portion of the Boise and the Sawtooth Forest is assigned a moderate or greater uncharacteristic wildfire hazard rating (Table VH-7). Uncharacteristic wildfire hazard indexes for the southern Boise and Sawtooth Forest are about the same (Table VH-6). The majority of the hazard in the non-forested vegetative communities is a result of conditions in the cover types that contain mountain big sagebrush as a dominant or co-dominant species. Most of the hazard on both Forests occurs as a result of the large number of acres in the medium (21-30 percent) canopy cover class; very few acres are in the very high (greater than 31 percent) class. Fire regimes in communities that contain mountain big sagebrush were historically mixed2. An increase in hazard in this fire regime indicates that conditions on the landscape have become more homogeneous. Wildfires today may be uncharacteristic compared to the historical regimes in that they may produce more extensive areas of lethal conditions than occurred historically.

Table VH-7. Percentage of Non-forested Vegetation Assigned to the Four Uncharacteristic Wildfire Hazard Ratings (Condition Classes) on the Southern Boise and Sawtooth Forest

Area	Low Hazard Rating (Condition Class 1)	Moderate Hazard Rating (Condition Class 2)	High Hazard Rating (Condition Class 3)	Extreme Hazard Rating (Condition Class 3)
Boise NF	79	21	0	0
Sawtooth NF	76	24	Trace	0
Ecogroup Total	**77**	**23**	**Trace**	**0**

Background Wildfire (Wildfire Index) - All three Forests experience a certain level of wildfire each decade. Lightning ignites many of these wildfires, though some are the result of humans.

For the past three decades (since 1971), the number of ignitions on all three Forests has been relatively static (Table VH-8).

Table VH-8. Average Number of Lightning and Human-caused Wildfires per Year for Three Decadal Periods by Forest

Forest	Decade	Lightning (Avg. per year)	Human-caused (Avg. per year)	Total (Avg. per year)
Boise	1991-2000	118	36	154
	1981-1990	139	29	168
	1971-1980	138	36	174
Payette	1991-2000	116	12	128
	1981-1990	113	13	126
	1971-1980	101	27	128
Sawtooth	1991-2000	26	21	47
	1981-1990	24	21	45
	1971-1980	24	31	55

This analysis assumed that some level of "background wildfire" would occur on each Forest based on the fact that there will continue to be ignitions. This background level was developed from historical fire records and was intended to represent wildfire occurrence for "normal" weather conditions. Background levels were based on averages of the small and medium-sized fires that occurred between 1950-1994 for the Boise, 1970-1994 for the Payette, and 1980-1994 on the Sawtooth. Since the majority of starts, at least on the Boise and Payette Forests, are from lightning, there is little control over ignitions. Background wildfire represents those fires that are successfully suppressed during initial attack but burn some acres before they are put out. In general, during years of normal or unusually cool and/or wet weather, wildfires are suppressed while they are still small. The analysis of the data to generate the background wildfire for the modeling indicated that between 50,000-100,000 acres burned each decade throughout the Ecogroup area. These fires were assumed to be stand-replacing events. Therefore, acres affected by background wildfire were assigned to the earliest growth stage in the vegetative modeling.

The data used to generate acres burned by background wildfire did not include large wildfire events in the 1980s and 1990s, as these are thought to have been a result of unusually warm and dry weather combined with hazardous vegetative conditions. Information about the larger fires was used separately from the background wildfire to introduce wildfires that may occur as a result of abnormal (unusually warm and dry) weather conditions. During abnormally warm and dry years, fire behavior, particularly in areas with uncharacteristic vegetative conditions, is often more severe and can result in fires that are difficult to suppress during initial attack (Agee 1997). These fires often grow quickly and result in larger wildfires than those that are typically suppressed during initial attack. We defined these types of fires as "failed fire suppression" or "escaped initial attack".

Two different models were used to evaluate vegetation. The forested vegetation was modeled using SPECTRUM and VDDT while the non-forested vegetation was modeled using only VDDT (see *Appendix B* for more details about the models). Wildfires that occur as a result of

"failed fire suppression" are not represented in the SPECTRUM modeling because this model does not provide a mechanism to account for these highly variable, stochastic events. The model can account for background wildfire as a constant (non-stochastic) variable. In contrast to SPECTRUM, the VDDT model can account for both non-stochastic and stochastic events but not for the types of goals and constraints evaluated using SPECTRUM. In order to address potential changes in wildfire occurrence for the forested vegetation, the VDDT model was used "post-SPECTRUM" to determine acres burned by failed fire suppression. To accomplish this, VDDT models were developed that provided the same vegetative conditions for each alternative over time based on the disturbances modeled in SPECTRUM. Once it was determined that the VDDT models were producing the same results as SPECTRUM, failed fire suppression was introduced as a disturbance.

Wildfire events were simulated in VDDT using the same disturbance sequencing so that they occurred in the same time periods from one alternative to another. Therefore the difference between the alternatives in acres burned by large events is due to differences in vegetative conditions rather than a different number of events. It is also important to note that wildfire acres generated by VDDT are not a "best guess" of the amount that might occur in the future. Rather, this analysis was developed to show relative differences between the alternatives based on probabilities assigned to vegetative conditions using acres burned by past wildfires as a guide.

ENVIRONMENTAL CONSEQUENCES

Effects Common to All Alternatives

Resource Protection Methods

Over the past several decades, landscapes have been altered due to a variety of factors including fire exclusion (Agee 1997). In many areas, particularly in the nonlethal and mixed1 fire regimes, ladder fuels have created fuel profiles that now support higher intensity crown fires in areas where such fires were historically rare (Graham et al. 1999). In other areas where fire intensity has not changed, such as in the mixed2 or lethal fire regimes, the homogeneity of fuel conditions has increased fire size. These conditions, particularly when coupled with extreme weather, can lead to wildfires that grow beyond the ability of suppression resources to stop them and, in some cases, jeopardize firefighter and public safety in areas like wildland-urban interface.

There are a variety of factors that contribute to the risk of wildfire (Figure VH-1), and there are several strategies that can be employed to reduce this risk. Fire prevention activities that reduce the number of human-caused ignitions decrease the probability of fire occurrence. Treatment of hazardous fuels and vegetative conditions alters fire behavior and effects (Pollet and Omi 2002). Conditions that burn with low-intensity provide the greatest opportunity to suppress fires while they are still small (Omi and Martinson 2002, Wagle and Eakle 1979). This approach is particularly effective in nonlethal and mixed1 fire regimes, as this is consistent with the way these communities function (Fulé et al. 2001, Omi and Martinson 2002). In the mixed2 and lethal fire regimes it is more difficult to maintain low-intensity conditions over the long term, even though under-burning may have occurred historically. Over time, species mixes and vegetative development at the stand level tend toward high-intensity fires (Brown 2000, Omi and

Martinson 2002). In these areas, changing the pattern of fuels across the landscape can provide opportunities to reduce the extent of wildfires through fuel breaks or strategic locations where suppression resources can safely attempt fire suppression (Deeming 1990, Finney 2001, Graham et al. 1999).

Other strategies to reduce the risk of wildfire include developing suppression resources in areas where there are currently none, increasing the size of existing suppression resources, upgrading or updating equipment, fostering cooperation among the various entities that own or manage the landscape, and educating property owners about methods for protecting their property or structures. While many of these activities have been taking place across the country, the National Fire Plan was developed in part to better define responsibilities, increase cooperation, and provide funding for many of these programs.

General Effects

Changes in hazard reflect changes in growth stages. Movement of vegetation from one growth stage to another is the direct effect of vegetation growth rates, management activities, and disturbances such as insect outbreaks or wildfires. The type and extent of management activity are predicted by the SPECTRUM model in response to constraints and goals for desired conditions. Achieving these goals within a certain budget is the primary factor that can influence change in hazard. For non-forested vegetation, the VDDT model predicts the type and extent of management activities and disturbances based on probabilities assigned to the various growth stages. It does not provide the same mechanisms for meeting goals and constraints that are provided by the SPECTRUM model.

Insect Hazard - Changes in growth stage and the rate of stand development can affect other Forest resources. Impacts to wildlife, soils, fuels, and other ecosystem components may result, because these ecosystems have evolved within a given disturbance regime. When a disturbance regime is significantly altered, development of forest vegetation may undergo substantial changes, and other resources may be affected. Areas that experience decreases in stand density may adversely affect wildlife species that benefit from denser stands, while other species may benefit from more open conditions. Areas that experience mortality levels that result in stand-replacement conditions may result in a mix of growth stages that rarely if ever occurred in the historical development of that ecosystem. Re-establishment of a more typical mix of growth stages may require many decades. During the interim periods, while a more desirable mix of growth stages is being re-established, individual ecosystem components may be adversely or beneficially affected, but ecosystem processes in general will function at an elevated level of risk. During this period the risk of wildfire may also increase in areas with elevated amounts or woody fuel less than 3 inches in diameter, before significant settling, compaction, and decomposition reduces fire hazard.

Changes in growth stage and the rate of stand development caused by insect activity and elevated levels of mortality may also affect the sustainability of forest products and the value of products removed. Increased mortality levels may result in short-term effects leading to increases in the availability of timber associated with salvage harvest and restoration activities. When mortality becomes too extensive, the ability to sustain predicted harvest levels, within the allowable sale quantity, may be impaired. The value of harvested timber products may also be reduced. Dead

trees removed during salvage harvest often have experienced some deterioration, or staining of the wood, resulting is reduced monetary value.

Uncharacteristic Wildfire Hazard - The effects of uncharacteristic wildfire would be the same for all alternatives; what varies is the risk of these kinds of fires based in part on hazard (Figure VH-1). As defined by the hazard indexes, the risk of uncharacteristic wildfire is greatest in the nonlethal and mixed1 fire regimes, as these have the greatest hazard ratings. In these fire regimes, current hazard is primarily a result of changes in species composition and vegetative density. Uncharacteristic wildfires can also occur in the mixed2 and lethal fire regimes, but the primary effect is change in patch sizes. This happens as the landscape becomes more homogeneous, resulting in larger patches of similar size or density classes. In the mixed2 and lethal fire regimes, individual vegetative communities may be within the historical frequencies, and therefore effects within the community are closer to characteristic. At the landscape level, however, lethal patch sizes, due to increased homogeneity of vegetative conditions from fire exclusion, may be larger following a wildfire than those that occurred historically (Arno 1976, Barrett et al. 1991).

Although stand-replacing fires did occur in nonlethal and mixed1 fire regimes in the past, these events were likely smaller in scale, and less extensive than they are today (Arno et al. 1995, Arno et al. 1997, Barrett et al. 1997). Currently, uncharacteristic wildfires kill those individuals, like large ponderosa pine, that had survived centuries of past fires. This adversely affects wildlife, soils, and other ecosystem elements as these ecosystems have evolved primarily under a different kind of fire regime. In forested ecosystems, wildlife species that use large snags or coarse wood will be affected in the long term as the available woody debris declines. Large trees (those greater than 20 inches) may take over 100 years to grow to that size. Also, uncharacteristic wildfires can create high-density shrub fields over large areas, particularly in PVGs 2 and 5, which were uncommon historically. Though ponderosa pine seedlings, if planted immediately following a fire, can outgrow many shrub species developing from seed, Douglas-fir can better tolerate these shrubby conditions (Steele and Geier-Hayes 1993). In some areas—for example PVGs 1, 2, and 5—the vegetative communities have been altered from ponderosa pine as the dominant community to a ponderosa pine-Douglas-fir mix or even a Douglas-fir dominated community. In these PVGs, communities dominated by ponderosa pine-Douglas-fir or Douglas-fir alone over large areas were not common on the historical landscape and likely have fire regimes or other disturbances processes that are not like historical conditions. In addition, noxious weeds or other exotics can invade susceptible areas. These species often delay or prevent re-establishment of native vegetation. This change in the vegetative component can have long-term impacts on ecosystem processes and functions.

Uncharacteristic wildfire events impact soils in the short and long term. The lethal, generally large-scale nature of these fires increases the risk of mass-movement and surface runoff (Wondzell 2001), and can reduce soil productivity. Generally the risk of soil erosion is a short-term impact that declines as the sites revegetate. Landslide risks can last longer, as these are often a function of the loss of overstory trees or other deep-rooted vegetation that provide a soil anchor. Once these species re-establish, the risk typically declines. Changes in soil productivity may be the most long-term effect as soils have evolved under the historical disturbance. Fires recycle nutrients retained in live and dead organic matter found on the site. Changes in fire

regimes, either in frequency or intensity and severity, can reduce soil productivity by changing soil properties, and reducing the soil's ability to absorb and recycle nutrients.

Direct and Indirect Effects by Alternative

Insect Hazard

Insect hazard for the Ecogroup area increases over time for each alternative, from the current average index rating of 1.38 to a range of 1.65 (Alternative 7) to 1.76 (Alternative 4) at the end of five decades. The increase in hazard is primarily due to an increase in the average tree size class, or in other words, because of the greater percentage of area occupied by large size trees. For example, on the Boise National Forest approximately 10 percent the forested area is currently occupied by trees in the large tree size class. After five decades this area is projected to increase to an estimated 23 percent of the forested landscape, and to between 36 and 52 percent of the area after 10 decades, depending on the alternative. The increasing trend in insect hazard is true for each Forest, however the decade-to-decade changes, ordering of alternatives by hazard index, and the magnitude of change varies by Forest. Table VH-9 shows the insect hazard index for the current conditions and the predicted conditions in the fifth decade. This is shown for each Forest and for each alternative with an Ecogroup Summary also displayed.

The area rated as having a moderate or high insect hazard index also increases over time for each alternative. SPECTRUM model outcomes show current conditions have an estimated 49 percent of the Ecogroup's forest vegetation in a moderate or high insect hazard condition. The area in a moderate or high insect hazard increases over time in each alternative. The percentage of area in this condition ranges from an estimated 53 percent (Alternatives 2 and 7, Boise National Forest) to an estimated 77 percent (Alternative 1B, Sawtooth National Forest) in the fifth decade. The ranking of alternatives by percent of area in the moderate and high insect hazard rating varies for each Forest. The following table (Table VH-10) shows the average hazard index rating, and the percent of area in moderate and high hazard for each Forest, and for each alternative, for the current conditions, and for the fifth decade.

Table VH-9. Average Insect Hazard Indices by Alternative and Forest after 5 Decades

Area	Current Hazard Index	Average Hazard Index After 5 Decades						
		Alt. 1B	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt 7
Boise NF	1.41	1.71	1.66	1.70	1.72	1.68	1.72	1.65
Payette NF	1.36	1.78	1.76	1.77	1.79	1.73	1.77	1.78
Sawtooth NF	1.38	2.05	1.87	1.96	1.89	2.01	1.99	1.76
Ecogroup Total	**1.38**	**1.82**	**1.75**	**1.79**	**1.78**	**1.77**	**1.80**	**1.72**

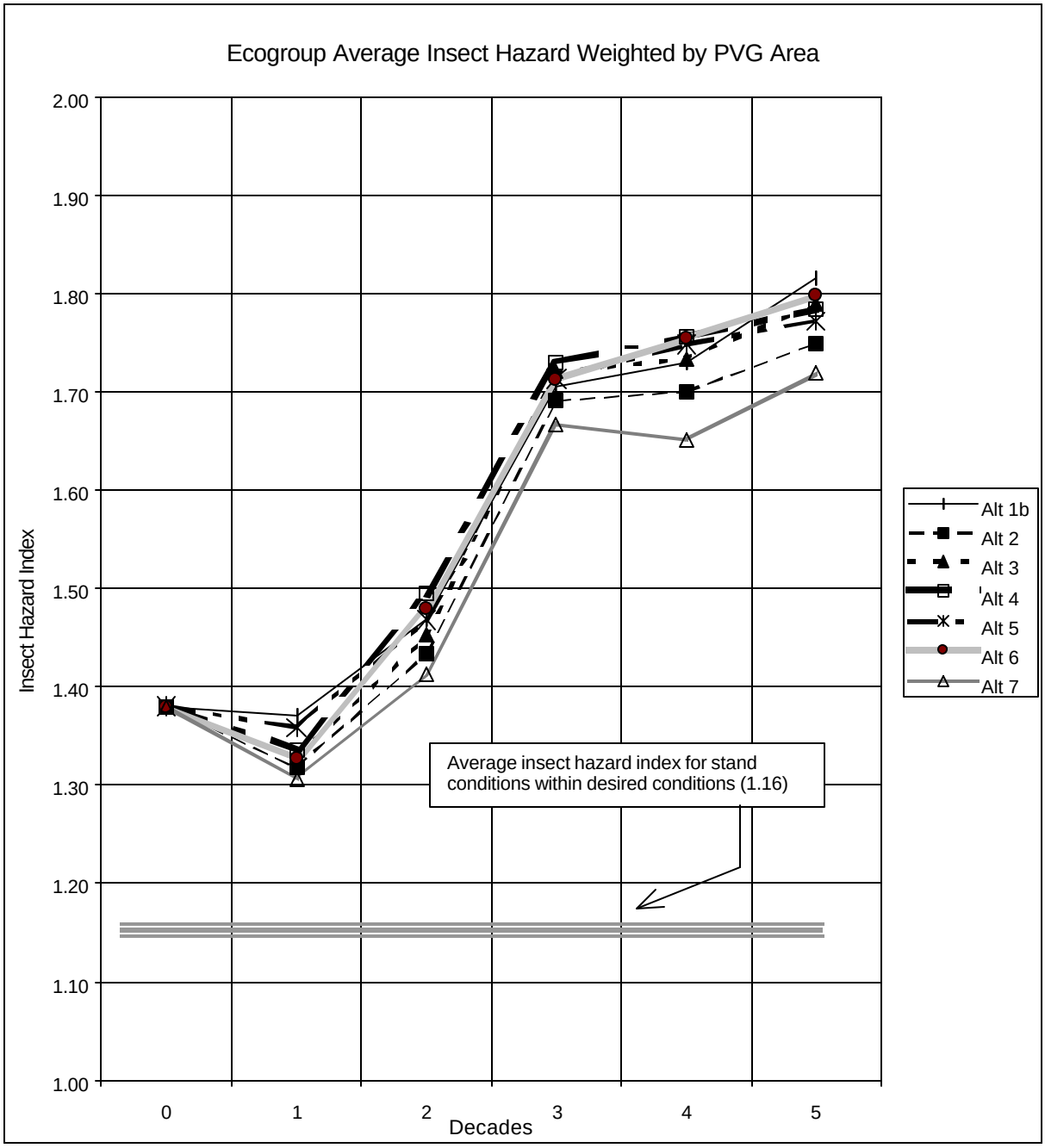
Table VH-10. Percent of Forest Vegetation in High and Moderate Insect Hazard by Alternative and Forest After 5 Decades

Area	Current Percentage	Percent Rated at High and Moderate Hazard After 5 Decades						
		Alt. 1B	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt 7
Boise NF	51	61	54	56	57	58	56	55
Payette NF	48	67	65	66	65	64	64	66
Sawtooth NF	46	79	72	76	73	77	77	67
Ecogroup Total	**49**	**67**	**63**	**64**	**64**	**64**	**64**	**62**

Figure VH-2 graphically displays the average insect hazard index rating for the entire Ecogroup area for each alternative, beginning with the current conditions, continuing through to the fifth decade.

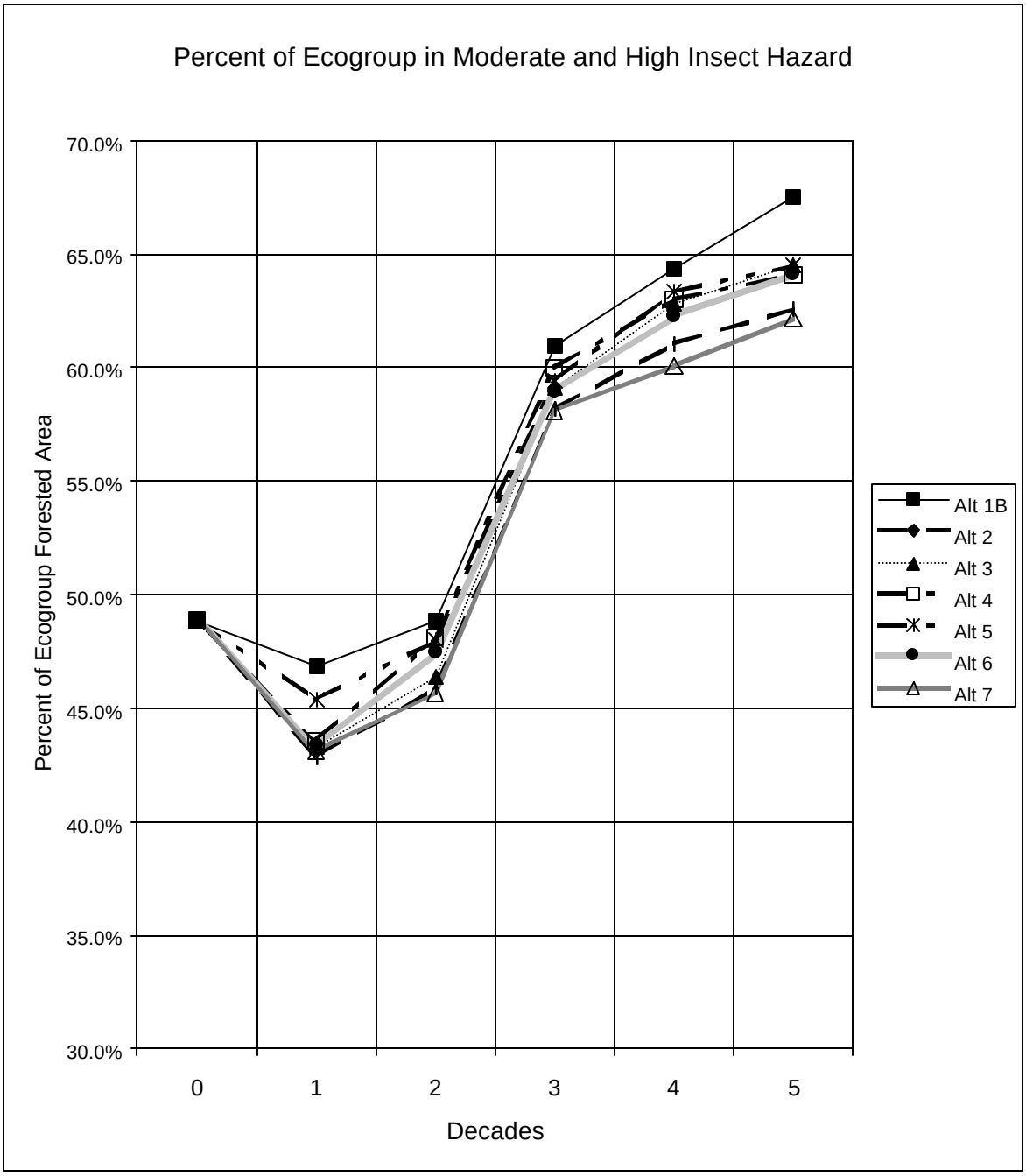
Figure VH-3 graphically displays the percent of the Ecogroup forested acres that have a moderate or high insect hazard rating. This is shown for the entire Ecogroup area for each alternative, beginning with the current conditions, continuing through the fifth decade.

Figure VH-2. Average Insect Hazard Rating by Alternative through the Fifth Decade



Note: Decade 0 represents current conditions. Decades 1 through 5 represent conditions expected to exist after treatments that occur in the previous decade and following 10 years of vegetative growth and development. Thus, decade 5 represents the conditions expected to exist in 50 years or about the year 2050.

Figure VH-3. Percent of Forested Acres at Moderate and High Insect Hazard by Alternative through the Fifth Decade



Note: Decade 0 represents current conditions. Decades 1 through 5 represent conditions expected to exist after treatments that occur in the previous decade and following 10 years of vegetative growth and development. Thus, decade 5 represents the conditions expected to exist in 50 years or about the year 2050.

Within each Forest the current insect hazard rating is the same for all alternatives. There is little difference between alternatives during the first few decades due to the combined effects of continued stand growth and development and the relatively small percentage of area that receives management actions during a decade. Differences between alternatives in their insect hazard index become more apparent during the fourth and fifth decades. The insect hazard index is described below for each Forest for conditions projected for the fifth decade.

Boise National Forest - Insect hazard index increases to values that range from 1.65 for Alternative 7 to a high of 1.72 for Alternatives 4 and 6. This compares to the current condition with an insect hazard index value of 1.41, and an average index value of 1.09 (range is 1.04 to 1.14) for forested vegetation that meets desired conditions. An estimated 51 percent of the forested vegetation is currently in a moderate or high insect hazard. This is projected to increase to between 54 percent for Alternative 2, and 61 percent for Alternative 1B. The percent of area in a moderate or high insect hazard would be 31 percent, ranging from 27 percent in Alternative 1B to 35 percent in Alternative 4 for forest vegetation that meets desired conditions. After 5 decades, the small difference in insect hazard index values (1.65 to 1.72) and the small difference in the percent of area with moderate and high hazard values (54 to 61 percent) does not indicate any important difference between the alternatives relative to the future risk of insect epidemic disturbance. Each alternative shows an increased predisposition to epidemic insect disturbance when compare to the current insect hazard index, indicating that insect population levels can be expected to expand to above endemic levels. Some noticeable mortality would be expected, but it would not normally be widespread. Further comparing alternatives, after 5 decades Alternative 7 has the lowest insect hazard index followed in order by Alternatives 2, 5, 3, 1B, 6, and 4. The differences between alternatives are only slight and are not expected to show any important difference in the level of insect-related damage.

Payette National Forest - Insect hazard index increases to values that range from 1.73 for Alternative 5 to a high of 1.79 for Alternative 4. This compares to the current condition with an insect hazard index value of 1.36, and an average index value of 1.22 (range is 1.13 to 1.33) for forested vegetation that meets desired conditions. An estimated 48 percent of the forested vegetation is currently in a moderate or high insect hazard. This is projected to increase to between 64 percent for Alternatives 5 and 6, and 67 percent for Alternative 1B. The percent of area in a moderate or high insect hazard would be 44 percent, ranging from 37 percent in Alternative 5, to 49 percent in Alternative 4 for forest vegetation that meets desired conditions. After 5 decades, the small difference in insect hazard index values (1.73 to 1.79) and the small difference in the percent of area with moderate and high hazard values (64 to 67 percent) does not indicate any important difference between the alternatives relative to the future risk of insect epidemic disturbance. Each alternative shows in increased predisposition to epidemic insect disturbance when compare to the current insect hazard index so that insect population levels can be expected to expand to above endemic levels. Some noticeable mortality would be expected, but it would not normally be widespread. Further comparing alternatives, after 5 decades Alternative 5 has the lowest insect hazard index followed in order by Alternatives 7, 2, 3, 6, 1B and 4. The differences between alternatives are only slight and are not expected to show any important difference in the level of insect related damage.

Sawtooth National Forest - Insect hazard index increases to values that range from 1.76 for Alternative 7 to a high of 2.05 for Alternative 1B. This compares to the current condition with an insect hazard index value of 1.38, and an average index value of 1.14 (range is 1.01 to 1.22) for forested vegetation that meets desired conditions. An estimated 46 percent of the forested vegetation is currently in a moderate or high insect hazard. This is projected to increase to between 67 percent for Alternative 7 and 79 percent for Alternative 1B. The percent of area in a moderate or high insect hazard would be 42 percent, ranging from 31 percent in Alternative 1B to 48 percent in Alternatives 3 and 4, for forested vegetation that meets desired conditions. The difference in insect hazard index values (1.76 to 2.05) and the difference in the percent of area with moderate and high hazard values (67 to 79 percent) indicates some small differences between the alternatives relative to the future risk of insect epidemic disturbance. Each alternative shows in increased predisposition to epidemic insect disturbance when compare to the current insect hazard index so that insect population levels can be expected to expand to above endemic levels. Alternative 3 with an insect hazard index value of 1.96, Alternative 6 (1.99), Alternative 5 (2.01) and Alternative 1B (2.05) are especially notable because the projected hazard index is close to 2. While some mortality would be expected in all alternatives, it would likely be more widespread and could contribute to epidemic insect activity in Alternatives 3, 6, 5 and 1B. The area in a moderate or high insect hazard is also greatest in Alternatives 1B, 3, 5 and 6, ranging from 76 to 79 percent of the area occupied by forested vegetation. This would further support the possiblity of greater insect damage associated with Alternatives 1B, 3, 5, and 6, after 5 decades. A final ranking of alternatives, after 5 decades shows Alternative 7 has the lowest insect hazard index, followed in order by Alternatives 2, 4, 3, 6, 5 and 1B.

Uncharacteristic Wildfire Hazard

Forested Vegetation, Effects of the Desired Conditions - Desired conditions determine the vegetative stages that occur on the landscape. They vary for the alternatives depending on the alternative theme. Because vegetative conditions are the basis for determining uncharacteristic wildfire hazard, desired conditions, when achieved, define the level of hazard that occurs on the landscape. Some desired conditions are more hazardous than others. Desired conditions that move the landscape toward the historical range of variability, particularly toward larger trees and lower densities, are less hazardous from an uncharacteristic wildfire standpoint than alternatives that move conditions farther away from historical. Desired conditions that move the landscape toward a distribution of size classes and densities that are not within the historical range produce more uncharacteristic wildfire hazard because they represent a departure in the conditions that maintained the historical fire regime.

Desired conditions for forested vegetation were developed using historical range of variability as the anchor (Morgan et al. 1994). The large tree desired conditions for all areas except MPC 5.2 are within HRV. For MPC 5.2 areas, the desired conditions in PVGs 1, 2, 3, 5, and 6, not including Riparian Conservation Areas, are below the low end of HRV for the large tree size class to provide for a greater mix of other size classes on the landscape. These are the PVGs that make up the nonlethal and mixed1 fire regimes. Desired canopy closures are denser for PVGs 2, 5, 7, 8, and 9. The combinations of greater size class distribution and/or denser canopy closures are desirable under this MPC in order to increase yields needed to support wood fiber goals

under the various alternatives. Table VH-11 displays the percentage of total forested acres for each alternative in areas outside of designated wilderness that are managed for a greater mix of smaller size classes and/or denser canopy closures than historical. Because the management of designated wilderness does not vary by alternative it was not included in this comparison.

Table VH-11. Percentage of Forested Vegetation Outside of Designated Wilderness with Desired Conditions not in the Historical Range of Variability for Size Class and/or Canopy Closure for Alternatives by Forest

Forest	Alt. 1B	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
Boise	32	8	0	0	39	5	19
Payette	26	11	0	0	42	8	15
Sawtooth	2	0	0	0	14	0	0

There are no MPC 5.2 areas assigned in Alternatives 3 and 4 so the desired conditions Forest-wide are within the historical range of variability. This is also the case for Alternatives 2, 6, and 7 on the Sawtooth. Alternative 5, followed by 1B, on all three Forests has the most area managed outside of HRV. On the Boise and Payette, Alternative 7 ranks third. Alternatives 2 and 6 are between Alternatives 7, and 3 and 4.

SPECTRUM modeling DCs were used to estimate the hazard indexes for the desired conditions for areas outside of designated wilderness for each alternative (see *Appendix B* for information about the modeling DCs). Uncharacteristic wildfire hazard indexes for modeling desired conditions on the Sawtooth were similar (Table VH-12). This is due primarily to the small number of acres in PVGs that contribute to hazardous conditions. On the Boise and Payette, the modeling DC for Alternatives 3 and 4, which was the mean of HRV, has the lowest uncharacteristic wildfire hazard indexes for the desired conditions. The modeling DC for Alternative 2 was midway between the low end of HRV and the mean (see *Vegetation Diversity,* Figure V-1). The desired condition for this alternative produces a hazard index similar to Alternatives 3 and 4. Alternative 5 has the most hazardous modeling desired condition; the DC across the Forest for this alternative is the farthest from HRV. The hazard index for Alternative 1B desired conditions is lower than Alternative 5, but is the second highest. The modeling DC for this alternative was the low end of HRV. Alternatives 6 and 7 fall in between Alternatives 1B and 2.

Table VH-12. Uncharacteristic Wildfire Hazard Indexes for the Forested Vegetation Modeling Desired Conditions

Forest	Alt. 1B	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
Boise	0.23	0.11	0.10	0.11	0.27	0.17	0.20
Payette	0.20	0.12	0.12	0.12	0.21	0.17	0.17
Sawtooth	0.08	0.07	0.07	0.08	0.08	0.07	0.07

Even though the uncharacteristic wildfire hazard index for desired conditions for alternatives that contain more MPC 5.2 area is greater than those alternatives that contain less, wildfire risks

related to this hazard is determined by on several factors. Depending on the objectives for specific areas across the Forest, fuel breaks, strategic placement of less hazardous conditions relative to more hazardous, the location of conditions in relation to the topography, and typical fire movement patterns all factor into determining risk (see the Resource Protection Methods discussion in this section and in *Fire Management*). There are also opportunities within the MPC 5.2 range to reduce the hazardous conditions. This can be accomplished by providing more area at the higher end of both the large tree size class and low canopy closure range. This condition is closest to the historical range of variability for those PVGs that contribute the most to hazard. Therefore, these conditions reduce the risk of uncharacteristic wildfire the most within the MPC 5.2 desired condition range.

Frank Church–River of No Return and Sawtooth Wildernesses - Modeling scenarios were developed for the two Wilderness areas administered by the Ecogroup based on the current Wilderness management plans. The outcomes for the FC–RONRW show little change in the uncharacteristic wildfire hazard index over time from the current condition (Table VH-13). Vegetative conditions in the Wilderness are primarily a function of wildland fire disturbances that fluctuate in size and intensity depending on fuel and weather conditions. Some years produce many fires and others few. Some ignitions are managed for wildland fire use but others are suppressed depending on the burning conditions, resources available to manage the ignition, air quality considerations, location, expected size, and other factors. Hazard reduction is not an overall goal in the Wilderness except as it relates to specific areas, for example around inholdings. Therefore, hazard tends to fluctuate around some level depending on the amount of area that has or has not been affected by wildland fire.

The hazard index for the Sawtooth Wilderness showed an increase after five decades. The Sawtooth Wilderness is relatively small with many natural fuel breaks, and the current Wilderness Plan expects few acres to be treated, especially at higher elevations, from lightning ignitions that originate in the Wilderness. More than half of the uncharacteristic wildfire hazard that accumulates by the fifth decade occurs within PVGs 1 and 2, which are located at lower elevations adjacent to the Boise Forest. These areas are more likely to be treated from wildland fire use that moves from the Boise onto the Sawtooth rather than from ignitions that originate in the Wilderness. Coordination regarding wildland fire use between the two Forests would allow for more fire use. This would potentially create a different hazard index than was projected by the model.

Table VH-13. Area-wide Wildfire Hazard Index for the Current Condition and the Fifth Decade for the Frank Church–River of No Return and Sawtooth Wildernesses

Area	Current Index	Index for Fifth Decade
FC–RONRW	0.51	0.48
Sawtooth	0.21	0.49

Outside of Designated Wilderness - All alternatives except 1B included reduction of uncharacteristic wildfire hazard as one of the modeling variables to emulate the National Fire

Plan objectives (see *Appendix B*). An additional consideration was budget (see *Appendix B* for discussions on budgetary considerations). Addition of budget constraints affected alternatives in different ways. For all alternatives, the total number of acres treated over the entire modeled time period decreased. On all three Forests, addition of budget constraints decreased acres treated the most for Alternative 5. Alternatives 4 and 6 were least affected. However, though overall acres treated declined over the modeling period, in many cases, adding budget had only a minor influence on the achievement of the hazard reduction goals, with some exceptions. Alternative 1B accomplished greater hazard reduction when budget was not a factor. On the Boise, the hazard index for Alternative 1B with the budget was 29 percent greater than without budget (Table VH-14). However, as hazard reduction was not a modeling goal for this alternative, the outcome is the result of achieving other goals and constraints. Budget had a minor influence for the other alternatives on the Boise in that the indexes with and without budget were similar. This was also the case on the Payette, although adding the budget in Alternative 5 increased the hazard index the most for all the Payette alternatives.

Table VH-14. Percentage Change in Uncharacteristic Wildfire Hazard Index for the Fifth Decade with Budget Compared to Without Budget for Alternatives by Forest

Forest	Alt. 1B[1]	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
Boise	+29	+5	+8	-5	+10	+3	+2
Payette	+11	+2	+3	0	+22	0	-2
Sawtooth	+31	0	+30	0	+133	+35	+19

[1]Hazard reduction goal not represented for this alternative

Budget had minor influence on most alternatives on the Boise and Payette because, even though total acres treated decreased when budget constraints were included, the hazard reduction goals focused treatments on PVGs that contribute the most to hazard. For most alternatives, acres treated in the hazardous PVGs—primarily 1, 2, 5, and 6—remained the same or declined only slightly compared to PVGs that contribute less to hazard. Generally, treatment levels in PVGs 4 and 7, which are less hazardous PVGs, declined the most. For Alternative 5 on the Boise and Payette, treatment levels with budget constraints were the lowest of all the Alternatives in order to meet the Allowable Sale Quantity (ASQ) floor. This affected hazard primarily by reducing the treatments levels in PVG 1, which is not part of the suited timberlands. In this case, treatments were focused on PVGs that contributed to the ASQ.

Budget had the greatest influence on hazard on the Sawtooth. The decrease in total acres treated was much greater on the Sawtooth than on the Boise and Payette over the modeling period. Here, only Alternatives 2 and 4 provided similar hazard indexes when budget was added. Alternative 5 was most affected; adding budget increased the hazard index 133 percent. Alternatives 1B, 3, 6, and 7 were also affected. However, Alternatives 2 and 4 had enough budget funding to focus treatments on the PVGs that were contributing to hazard.

Uncharacteristic wildfire hazard for forested vegetation declined after five decades from the current index for all alternatives except 1B on all three Forests, and Alternative 5 on the Sawtooth (Table VH-15). Alternative 5 on the Payette had the same rating after 5 decades as the

current index. On the Sawtooth, Alternative 2 was the same as the current, and Alternatives 2, 3, and 6 declined only slightly.

Table VH-15. Forest-wide Uncharacteristic Wildfire Hazard Indexes for the Current Condition and the Fifth Decade for Alternatives by Forest

Forest	Current Index	Index for Fifth Decade						
		Alt. 1B	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
Boise	0.65	0.81	0.45	0.41	0.38	0.57	0.41	0.57
Payette	0.50	0.62	0.43	0.38	0.38	0.50	0.38	0.49
Sawtooth	0.36	0.46	0.36	0.35	0.30	0.42	0.35	0.31

Changes in hazard indexes for the fifth decade for the alternatives resulted from changes in the number of acres assigned to the various hazard ratings (Table VH-16). Acres moving from more hazardous conditions to less hazardous lower the index and vice versa. For example, fifth decade hazard indexes for Alternative 1B on all three Forests increased from the current condition. In all cases, the number of acres assigned to the low hazard rating decreased and the number of acres assigned to extreme increased (Table VH-16). This was also the case for the FC – RONR and Sawooth Wildernesses at the fifth decade (Table VH-17).

Table VH-16. Percentage of Forested Vegetation Assigned to the Four Uncharacteristic Wildfire Hazard Ratings (Condition Classes) for the Current Condition and Alternatives by Forest

Hazard Rating[1] (Condition Class[2])	Current Condition	Alt. 1B	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
Boise NF								
Low (Condition Class 1)	44	42	52	52	53	41	51	45
Moderate (Condition Class 2)	38	36	40	41	42	47	43	44
High (Condition Class 3)	15	8	5	4	3	9	4	5
Extreme (Condition Class 3)	3	14	3	3	2	3	2	6
Payette NF								
Low (Condition Class 1)	56	50	52	53	52	49	51	50
Moderate (Condition Class 2)	29	31	37	38	39	35	40	38
High (Condition Class 3)	8	9	9	7	8	14	8	7
Extreme (Condition Class 3)	7	10	2	2	1	2	1	5
Sawtooth NF								
Low (Condition Class 1)	57	43	51	52	56	45	51	56
Moderate (Condition Class 2)	41	50	45	44	43	49	46	42
High (Condition Class 3)	2	7	3	4	1	6	3	2
Extreme (Condition Class 3)	0	<1	<1	0	<1	0	<1	<1

[1]Southwest Idaho Ecogroup
[2]National Fire Plan

In general, alternatives with lower fifth decade hazard indexes than currently increased the number of acres assigned to the low hazard rating and decreased the number of acres in the higher hazard classes (high and/or extreme). On the Boise, Alternatives 2 through 7 produced fewer acres in the high class and though hazard in the extreme class sometimes remained the same or even increased (e.g., Alt. 7) the movement of acres among the ratings was enough to

produce a lower hazard index than the current. On the Payette Forest, Alternatives 2 through 7 also moved acres out of the higher hazard classes, but more acres moved out of the extreme class and fewer from the high.

Table VH-17. Percentage of Forested Vegetation Assigned to the Four Uncharacteristic Wildfire Hazard Ratings for the Current Condition and Fifth Decade for the Frank Church River of No Return and Sawtooth Wildernesses

Hazard Rating[1] (Condition Class[2])	Current Condition	Fifth Decade
FC-RONR Wilderness		
Low (Condition Class 1)	54	52
Moderate (Condition Class 2)	31	38
High (Condition Class 3)	12	4
Extreme (Condition Class 3)	3	6
Sawtooth Wilderness		
Low (Condition Class 1)	74	49
Moderate (Condition Class 2)	23	40
High (Condition Class 3)	3	8
Extreme (Condition Class 3)	0	3

[1]Southwest Idaho Ecogroup
[2]National Fire Plan

Changes in hazard rating classes for the Sawtooth and the relationship to hazard indexes at the fifth decade were much more difficult to discern. Because there are fewer acres contributing to hazardous conditions, only subtle changes are reflected. For example, the hazard index for Alternative 7 at the fifth decade was 0.31 compared to the current condition of 0.36 though there were very small changes in the amount of area in the various hazard ratings. In this case, changes are more often within a hazard rating class, for example from 3.0 to a 2.5 than between rating classes (extreme to high).

Boise National Forest - Alternatives 3, 4, and 6 produced the lowest uncharacteristic wildfire hazard indexes after five decades (Table VH-15). These three alternatives, as well as Alternative 2, have the lowest hazard index for the desired condition (Table VH-12), and movement toward the DC over the first five decades appears to lower the overall hazard index. However, no alternatives achieved the hazard index for the desired condition because only a few PVGs in each alternative were at desired condition for forested vegetation in the fifth decade (see *Vegetation Diversity* Table V-95). In general, those that were at desired condition are not the PVGs that contribute the most to hazard. However, those PVGs not at the DC for an alternative were showing progress toward the desired condition. For example, currently for PVG 2, the large tree size class makes up 14.5 percent of the forest-wide area. The desired condition is for 80.0 percent of the PVG 2 area to be in the large tree size class (see *Vegetation Diversity*, Table V-15). Thus the difference between the desired condition and the current condition for large trees is -65.5 percent. At the fifth decade, the difference relative to the desired condition is -59.8 percent. The alternative is moving toward desired conditions but, due to the limitations imposed by growth rates, does not achieve desired condition for the PVG forest-wide at the fifth decade. This in turn is reflected by the uncharacteristic wildfire hazard index. Although the index for the

alternative is lower than the current index, it is still higher than the hazard rating for the desired condition. The hazard index for Alternative 5 at the fifth decade was closest to the hazard rating for the desired condition, followed by Alternatives 6 and 7 (Table VH-18). The smaller gap between the fifth decade and desired condition hazard index for Alternatives 5 and 7 occurred not because these alternatives reduced hazard more than others, but rather because the hazard indexes for the desired condition for these two alternatives are among the highest. Alternatives 2 and 3, which have lower hazard indexes for the desired condition, were farthest away.

Table VH-18. Percentage Difference Between the Forest-wide Fifth Decade and Uncharacteristic Wildfire Hazard Index for the Desired Condition for Alternatives by Forest

Forest	Alt. 1B[1]	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
Boise	72	76	76	71	53	59	65
Payette	68	72	68	68	58	55	65
Sawtooth	83	81	80	73	81	80	77

Uncharacteristic wildfire hazard indexes for PVGs that have extreme or high current hazard (Table VH-5) declined by the fifth decade for all alternatives except 1B, where hazard reduction was not a goal (Table VH-19). For PVG 2, which has the highest current hazard index, Alternative 4, followed by 6 and 3, reduced the index the most. Like with PVG 2, the fifth decade hazard index for PVG 5 was lower than the current condition for all alternatives except 1B. Alternative 4, followed closely by 3 and 5, resulted in the lowest indexes.

Table VH-19. Uncharacteristic Wildfire Hazard Indexes at the Fifth Decade for PVGs that had Extreme and High Current Condition Indexes on the Boise Forest by Alternative

PVG	Current Index	Index for Fifth Decade						
		Alt. 1B	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
1	0.80	0.98	0.09	0.07	0.18	0.73	0.08	0.28
2	1.44	1.90	0.58	0.50	0.43	0.85	0.48	1.15
5	1.16	1.28	0.85	0.76	0.74	0.76	0.87	0.86
6	0.76	0.48	0.75	0.63	0.62	0.66	0.68	0.66

As with PVGs 2 and 5, uncharacteristic wildfire hazard indexes for PVG 1 declined for all alternatives except 1B. The greatest change occurred in Alternatives 3, 6, and 2. Current hazard in this PVG is high because of lack of past disturbance to remove ladder and ground fuels.

Alternatives that treat these conditions lower the hazard. Alternative 5 treats the fewest acres in this PVG and Alternative 6 treats almost all the PVG 1 acres in the first five decades. Alternatives 2, 3, and 4 also treat most of the acres in this time period.

For PVG 6, all Alternatives, including 1B, reduce uncharacteristic wildfire hazard though not as much as other PVGs. Alternative 2 reduces hazard the least and Alternative 1B the most. All the other alternatives are similar.

Payette National Forest - Like the Boise, uncharacteristic wildfire hazard was higher in the fifth decade than currently for Alternative 1B (Table VH-15). The hazard index for Alternatives 5 and 7 remain similar to the current condition even though hazard declines for some PVGs. This occurs because overall the Forest is below the moderate density desired conditions for these two alternatives. Consequently the increase in hazard results from acres moving into the moderate and high-density canopy closures. Alternatives 3, 4, and 6 have the lowest fifth decade hazard index. The alternatives that had fifth decade hazard indexes closest to the desired condition were similar to the Boise with a slightly different arrangement (Table VH-18). Here, Alternatives 5 and 7 followed Alternative 6. Like the Boise, Alternative 2 was farthest away and Alternatives 1B, 3, and 4 fell in the middle.

Hazard in PVG 2, which currently has an extreme uncharacteristic wildfire hazard index (Table VH-5), declined by the fifth decade for all but Alternative 1B (Table VH-20). Alternative 3, followed by 4, produced the lowest hazard rating, while Alternatives 7 and 5 were at the higher end. For PVG 5, which currently has a high hazard rating, the fifth decade hazard in Alternatives 1B and 7 was above the current. This appears to be from a combination of acres meeting the moderate density desired condition plus acres that are not treated and remain in high density. Alternatives that had lower hazard index for PVG 5 emphasize low density desired conditions and move more acres out of high density. Alternatives 4 and 6 produced the lowest hazard rating. PVG 1 is also currently at high. In the case of this PVG, all alternatives produced lower hazard than currently. Alternatives 6, 3, and 4 produced the lowest fifth decade hazard, while Alternatives 5 and 1B were the highest.

Table VH-20. Uncharacteristic Wildfire Hazard Indexes at the Fifth Decade for PVGs that had Extreme and High Current Condition Indexes on the Payette Forest by Alternative

PVG	Current Index	Index for Fifth Decade						
		Alt. 1B	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
1	0.84	0.79	0.10	0.01	0.04	0.67	0.00	0.29
2	1.19	1.90	0.49	0.37	0.47	0.82	0.51	0.94
5	1.01	1.29	0.88	0.82	0.67	0.97	0.70	1.10

Sawtooth National Forest – Overall, the uncharacteristic wildfire hazard on the Sawtooth is lower than the Boise and Payette due to differences in the PVGs. The Sawtooth contains much greater area in the mixed2 and lethal fire regimes, which have lower hazard ratings. Hazard on the Sawtooth does not change as much as on the Boise and Payette for most alternatives. As with the other two Forests, hazard goes up for Alternative 1B (Table VH-15). Likewise, hazard increases for Alternative 5 which was most influenced by addition of budget. Alternative 2

remains at the current level, and Alternatives 3 and 6 decline slightly. Alternative 4, followed by 7, reduced hazard the most. Alternative 4, followed by 7, was closest to the desired condition hazard at the fifth decade (Table VH-17). However, the difference between the alternatives was not as great as on the Boise or Payette. The difference between Alternative 4 fifth decade hazard and desired condition is 73 percent, while for Alternative 1B the difference is 83 percent.

Only PVG 2 currently falls into the extreme hazard category (Table VH-4); there are no PVGs in high. However, though PVG 2 is in extreme, it accounts for only one percent of the total forested vegetation outside of the Sawtooth Wilderness. Forest-wide increases in hazard are primarily a result of changes in hazard for PVGs 4, 7, and 10. Even though hazard declined for most alternatives for the PVGs that generally produce the most hazard, hazard indexes increased in PVGs that are currently low. While the increase was not enough to push any one PVG out of the low category, because the hazard is currently relatively low, the cumulative changes were enough to increase the overall Forest-wide hazard index.

Forested Vegetation Hazard and Acres Burned by Wildfire - The number of acres burned by lethal wildfire over the first five decades was closely linked to changes in uncharacteristic wildfire hazard indexes. On all three Forests, Alternative 1B, which had the highest hazard index at the fifth decade, burned the greatest number of acres over the first fifty years (Table VH-21). Alternative 4 burned the fewest acres on all three forests. This alternative had the lowest hazard index at the fifth decade on the Boise and Sawtooth. On the Payette, the hazard index for Alternatives 3, 4, and 6 was the same at the fifth decade, and was the lowest compared to the other alternatives. The arrangement of alternatives from most to least acres burned was similar to the arrangement of hazard from highest to lowest on each Forest.

Table VH-21. Forested Vegetation Uncharacteristic Wildfire Hazard Index at the Fifth Decade and Total Acres Burned by Wildfire over the First Five Decades for Alternatives by Forest

Boise	Fifth Decade						
	Alt. 1B	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
Hazard index	0.81	0.45	0.41	0.38	0.57	0.41	0.57
Total Acres Burned	292,625	258,175	245,380	240,865	262,355	242,675	260,735
Payette	**Fifth Decade**						
	Alt. 1B	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**	**Alt. 6**	**Alt. 7**
Hazard index	0.62	0.43	0.38	0.38	0.50	0.38	0.49
Total Acres Burned	374,560	354,135	330,395	324,595	369,015	337,420	349,415
Sawtooth	**Fifth Decade**						
	Alt. 1B	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**	**Alt. 6**	**Alt. 7**
Hazard index	0.46	0.36	0.35	0.30	0.42	0.35	0.31
Total Acres Burned	126,480	120,225	117,250	112,995	124,995	119,420	113,625

Non-forested Vegetation - Non-forested vegetation was not analyzed on the Payette Forest, as there were not enough acres to represent in the modeling. For the Boise and Sawtooth,

uncharacteristic wildfire hazard for non-forested vegetation was greater after five decades than current hazard for all alternatives. This occurred even with the introduction of wildfires that failed fire suppression. For all alternatives, the number of acres in the high canopy cover class, which was the primary contributor to hazard under the current condition, was less in the fifth decade than currently. However, in all cases the number of acres in the very high class increased dramatically (see *Vegetation Diversity*). The number of acres moving into the very high canopy cover class may be exaggerated by the modeling because currently there are much fewer acres in this class (Table VH-22). Acres move into the very high class from high; the rate of movement represented in the modeling may be faster than the rate that occurs in reality. The increase in hazard for all alternatives relative to the current condition resulted from an increase in acres in the very high canopy cover class. On both Forests, the alternative with the fewest acres in the very high class in the fifth decade (Alt. 5) had the lowest hazard index, while the alternative with the most acres in the very high class (Alt. 6) had the highest (Table VH-23).

Table VH-22. Non-forested Vegetation Uncharacteristic Wildfire Hazard Index for the Current Condition and the Fifth Decade for Alternatives by Forest

Forest	Current Index	Index for Fifth Decade						
		Alt. 1B	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
Boise	0.11	0.19	0.20	0.18	0.23	0.17	0.24	0.19
Sawtooth	0.12	0.18	0.18	0.18	0.21	0.16	0.24	0.18

Table VH-23. Non-forested Vegetation Uncharacteristic Wildfire Hazard Index and Percent of Total Non-forested Acres in Very High Canopy Cover in the Fifth Decade for Alternatives by Forest

Boise	Current Condition	Fifth Decade						
		Alt. 1B	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
Hazard index	0.11	0.19	0.20	0.18	0.23	0.17	0.24	0.19
Percent of total acres	<1	11	12	10	15	9	17	11
Sawtooth	**Current Condition**	**Fifth Decade**						
		Alt. 1B	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**	**Alt. 6**	**Alt. 7**
Hazard index	0.12	0.18	0.18	0.18	0.21	0.16	0.24	0.18
Percent of total acres	<1	9	10	9	12	8	16	9

This increase in hazard relative to the current condition resulted from movement of area from less to more hazardous uncharacteristic wildfire hazard ratings (Table VH-24). Acres move into the very high class based on the modeled pathways due to lack of disturbance (see *Vegetation Diversity* for examples of how acres move into the high or very high canopy cover class from

other mechanisms not represented in the model). On the Boise the alternatives between 5 and 6 were, from lower to higher hazard, Alternative 3, Alternatives 7 and 1B, Alternative 2, and Alternative 4. On the Sawtooth, Alternatives 1B, 2, 3, and 7 rated the same, followed by Alternative 4.

Table VH-24. Percentage of Non-forested Vegetation Assigned to the Four Uncharacteristic Wildfire Hazard Ratings (Condition Classes) for the Current Condition and Alternatives by Forest

Hazard Rating[1] (Condition Class[2])	Current Condition	Alt. 1B	Alt. 2	Alt.3	Alt. 4	Alt.5	Alt.6	Alt. 7
Boise National Forest								
Low (Condition Class 1)	79	72	72	74	70	74	68	73
Moderate (Condition Class 2)	21	16	16	16	15	17	15	16
High (Condition Class 3)	0	12	12	10	15	9	17	11
Extreme (Condition Class 3)	0	0	0	0	0	0	0	0
Sawtooth National Forest								
Low (Condition Class 1)	76	74	74	75	72	76	69	75
Moderate (Condition Class 2)	24	16	15	15	15	16	15	15
High (Condition Class 3)	Trace	9	10	9	13	8	16	10
Extreme (Condition Class 3)	0	Trace	Trace	Trace	Trace	Trace	Trace	Trace

[1]Southwest Idaho Ecogroup
[2]National Fire Plan

The total number of acres burned by wildfire, both failed fire suppression and background, was greatest in the alternative with the most acres in the very high canopy cover and lowest in the alternative with the fewest acres in the very high canopy cover class (Table VH-25). The arrangement of alternatives based on acres in very high canopy coverage and acres burned by wildfire were in the same order. On the Boise this was, from least acres to most acres, Alternative 5, followed in order by 3, 7, 1B, 2, 4, and 6. On the Sawtooth, the order was Alternative 5, 1B, 3, 7, 2, 4, and 6.

Table VH-25. Total Acres Burned by Wildfire over the First Five Decades and Percent of Total Non-forested Acres in Very High Canopy Cover in the Fifth Decade for Alternatives by Forest

Boise	Alt. 1B	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Alt. 7
Wildfire acres	20,819	21,178	17,796	28,893	16,567	31,362	20,717
Percent of total acres	11	12	10	15	9	17	11
Sawtooth	**Alt. 1B**	**Alt. 2**	**Alt. 3**	**Alt. 4**	**Alt. 5**	**Alt. 6**	**Alt. 7**
Wildfire acres	135,781	142,870	137,609	175,312	122,373	208,438	140,559
Percent of total acres	9	10	9	12	8	16	9

Even though the acres in the very high canopy cover class may be exaggerated by the modeling, this would likely not change the relationship of the alternatives to each other based on hazardous

conditions and wildfire. Given that the treatment rates in the high class would not change, the array of alternatives based on high rather than very high would be the same. Though the hazard rating for the high class is not as great as the very high, high canopy closure contributes to hazard. Currently the acres in the high canopy closures are the primary contributor to the current condition hazard index.

Summary of Risk of Uncharacteristic Wildfire - High levels of uncharacteristic wildfire hazard increase the risk of large, uncharacteristic wildfires. Alternatives that produce lower hazard reduce this risk. Some alternatives reduce the hazard in PVGs that have been most affected by recent wildfires. These are primarily the nonlethal PVGs that support ponderosa pine as a major seral species. However, none of the alternatives achieve the Forest-wide hazard rating for the desired conditions at the fifth decade primarily because of the large difference between the current and desired condition for most alternatives. In general, though, alternatives show progress toward the desired conditions and subsequently the uncharacteristic wildfire hazard ratings associated with the DCs. Exceptions are on the Sawtooth and for Alternative 5 where budget had some influence on treating the conditions that contribute to hazard. Reductions in hazard increase opportunities to move toward or maintain the desired vegetative conditions over time. They also reduce the risk of undesirable impacts to listed species, aquatic ecosystems, soils, commodities, air quality, and other areas of concern. Those alternatives where hazard increases over time are at higher risk of not achieving desired conditions and of producing undesirable impacts to resources and other concerns.

Cumulative Effects

Insect Hazard

Insect hazard increases for all alternatives over time. Increased hazard means that forest vegetation is more predisposed to the damaging effects of harmful insects than are the current conditions, and also that forest vegetation will be more vulnerable to insect-caused damage than what was most likely experienced under historical conditions. Hazard is not expected to continue an upward trend indefinitely, however. Forested vegetation conditions that contribute to hazard, species composition, tree size, and density should eventually achieve a degree of stability and then continue to develop toward desired conditions. Thus, hazard should eventually decline and approach a hazard level associated with desired vegetation conditions.

Increased insect hazard will not affect hazard levels of forested vegetation on other ownerships in the vicinity National Forest System lands. However, insect populations are not contained to any single ownership. When insect populations reach epidemic levels, healthy, vigorous trees are unable to withstand the pressure and may be damaged or killed. Insect populations at epidemic levels may expand rapidly, infecting large-scale areas that may extend to other ownerships. Stands on other ownerships likely exhibit a wide-range of conditions relative to insect hazard but this has less importance when insect populations are at epidemic levels. Forest vegetation conditions that are at moderate to high insect hazard levels on National Forest System lands may contribute to the development of an insect epidemic outbreak. If this should occur, forest vegetation on other ownerships may be at greater risk for elevated mortality levels. Several factors will determine the extent of risk on other ownerships, including type and condition of forest vegetation, proximity to insect epidemic outbreak, current climate conditions,

the presence or absence of natural barriers to the expansion of the insect outbreak, effectiveness of suppression efforts, and the influence of naturally occurring insect pathogens and predators.

Uncharacteristic Wildfire Hazard

Increased hazard increases the risk from fires that move from other ownerships to National Forest System lands. Sometimes, vegetative conditions on adjacent ownerships, in particular private lands, are relatively hazardous. This hazard results from a lack of understanding about fire risk, the desire either aesthetically or economically to produce denser vegetative conditions, or other factors. Therefore, while the hazard on other ownerships may be high, the effects of fires moving onto National Forest System lands from other ownerships can change with changes in hazard. Lower hazard allows opportunities to suppress oncoming fires, keeping them small, or to reduce the effects of these fires. Conversely, higher hazard on National Forest System lands increases the risk of large, difficult to suppress wildfires that can cross over onto other ownerships.