CHAPTER 3 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 What is in this Chapter?

An environmental assessment (EA) is a concise public document that serves to briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement (EIS) or a finding of no significant impact (FONSI) (40 CFR 1508.9). To determine whether there may be significant impacts, NEPA requires consideration of predicted impacts in terms of both context and intensity (40 CFR 1508.27).

"Context" simply means that the impacts must be considered in the appropriate setting or scale. For example, the impacts of the proposed vegetation management/fuel reduction are most appropriately evaluated in the context of the locale rather than the world as a whole. The Lonesome Wood Vegetation Management Proposal project area is limited in size and the activities are limited in duration. Effects are local in nature and are not likely to significantly affect regional or national resources.

"Intensity" refers to the severity of impact and requires consideration of 10 factors (40 CFR 1508.27).

(1) Impacts that may be both beneficial and adverse.

(2) The degree of effect to public health and safety.

(3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

(4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.

(5) The degree to which the effects on the quality of the human environment are highly uncertain or involve unique or unknown risks.

(6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.

(8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

(10) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

This chapter provides information relative to each of these factors as they pertain to each of the alternatives studied

in detail. It includes a discussion of the significant issues identified in chapter 2.

3.2 Beneficial and Adverse Effects Direct, Indirect and Cumulative Effects, (Factors 1 and 7)

This section discusses the environmental effects, both beneficial and adverse, that would result from implementation of the three alternatives presented in chapter 2. The expected impacts from the Lonesome Wood Vegetation management project are within the range of those identified in the Forest Plan. The actions being considered would not have significant impacts on resources as identified and described in the EA, Chapter 2, 3 and Appendix A.

3.2.1 Issue 1. Fire and Fuels

Fuels treatments are proposed to enhance the safety of wildland firefighters and public in and adjacent to the Wildland Urban Interface (WUI) by reducing fire behavior. How effectively do the treatments reduce fire behavior and meet the purpose and need.

Indicator

The change in vegetative fuel conditions will be assessed in terms of change to fire behavior. The parameters include flame lengths (feet), rates of spread (chains per hour), fire intensity (BTU's), expected fire type either crown or surface fire and expected spotting distances. The treatment effectiveness will also be analyzed by any change in the fuel models and loading. Fuel models help in prediction of fire behavior. (Hal E. Anderson 1982) Change in fire behavior will then be evaluated in terms of whether it meets the purpose and need.

Affected Environment

This analysis concentrates on the vegetative wildland fuels and how the vegetative treatments would influence potential fire behavior. The Background and Purpose and Need sections in Chapter 1 present the broader context related to the area as wildland urban interface and evacuation route. The continuity, density and tree species or canopy and ladder fuels, along with available surface (live and dead) fuels support wildland fire spread. Weather and live and dead fuel moistures influence whether wildland fire becomes a surface or crown driven fire.

The analysis area (compartments 709 and 710) is approximately 74 percent forested with lodgepole pine, Douglas-fir, subalpine fir, Englemann spruce and whitebark pine. Forested stands (overall the area is 74% forested) are predominantly single-storied, but two-storied and multi-storied stands also occur across the project area. Stand composition ranges from a mix of Douglas-fir and lodgepole pine (about 11%), pure Douglas-fir (21%), lodgepole pine (about 35%) to a mix of subalpine fir, Englemann spruce and lodgepole pine (19%) and small amounts of almost pure quaking aspen stands (<1%). Whitebark pine stands are found at the highest elevations (and comprise about 13% of the forested area). About 89 percent of the stands within the entire general area that are on forested lands are moderately to well stocked. In other words, the canopy density ranges from 40% to close to 90% as per aerial photo observations and ground verified stand exam data. (Novak 2007) These stocking levels indicate continuous crown fuels over much of the analysis area.

Basic stand information for the project area is based on intensive and quick plot stand examinations and mathematical regression estimates. Densities ranged from 120 to 4400 trees per acre and were highly variable across the Project Area. On steep, north- and northwest-facing slopes, stand densities were at the higher end of the range with 200 to 500 trees per acre greater than 5 inches diameter at breast height. On the more gentle slopes, overall densities were highly variable, but densities in trees greater than 5 inches diameter at breast height were between 200 and 300 trees per acre. Average stand diameters ranged from 1 to 15 inches with the majority between 6 and 9 inches at breast height. Tree heights typically average less than 70 feet. Stands in both compartments are predominantly in the mature and older age/size class (86%) with fewer stands classified as seedling or sapling (8%). (Novak 2007) These stocking densities indicate variability but a presence of extensive ladder and crown fuels.

Fuel models help to define fire behavior. Fire behavior depends on forest density, and composition, or canopy and ladder fuels, and amount of surface, fuels. The arrangement and moisture content of live and dead fuels, prevailing weather and physical setting are also factors. There are 13 fuel model types. These models along with dead and live fuel moisture content, slope and wind speed provide a basis for prediction of flame length (feet) fire spread rate (chains per hour) and intensity (btu's). For fuel model and loading analysis the units and adjacent areas were walked and these guides were referenced "Aids for Determining Fuel Models for Estimating Fire Behavior" (Anderson 1982) and Photo Guide for Appraising Downed wood Fuels in Montana Forests: Lodge pole Pine and Interior Douglas-fir cover types (Fischer 1981). -

Fire Behavior Fuel Model 10, 8, 5 and 2 are represented within and adjacent to the project area. The fuel models were used in several fire behavior modeling computer programs (Behave Plus and Nexus) to evaluate fire behavior and possibility of crown spread for this project. Fuel model 10 is the predominant fuel model however; the units are not uniform with regard to fuel characteristics. There are inclusions of FM 2, 8 and 5 within the broader area.

Fires burn with more intensity in FM10 than the other timber litter models. Dead and down fuels include greater quantities of 3 inch or larger wood resulting from over maturity or natural events that create a large load of dead material on the forest floor averaging 18 ton/acre. (Anderson, page 13. Fuel build up in the form of ladder fuels can cause this fuel model to go from surface to crown fire. Crowning, spotting and torching of individual trees are more frequent in fm 10 which can lead to a faster rate of spread, higher flame length and larger acreage burned. Forest types in this fuel model often have a tight closed canopy.

Fuel model 8 areas support a slow-burning, lower intensity ground fire with low flame lengths, which are less likely to move into the crowns of the trees. Trees are spaced apart with more open canopy. This fuel model has minimal dead and down material, averaging 7 tons/acre. (Anderson, page 11) Areas with fuel model 10 can be reclassified under fuel model 8 by reducing dead and down fuels, thinning to reduce crown canopy and removing ladder fuels. Fire behavior in fuel model 8 can be defined as slow-burning ground fire with low

flame lengths. Fire may encounter an occasional jackpot or heavy fuel concentration that can flare up. Fuels in fm 8 support torching and crown fire possibilities, only under severe weather conditions involving high temperatures, low humidity's, and high winds.

Fuel model 5 is defined with shrubs with litter cast and grasses or forbs in the understory. FM 5 represents Alder and snowberry that is mixed in with many lower elevation stands of Lodgepole. (Anderson, page 8) There are inclusions of FM 5 in proposed unit 26.

Fuel model 2 is primarily fine herbaceous fuels that may have cured or dead. The herbaceous fuels are usually mixed withy dead and down stem wood that can contribute to fire intensity depending on live and dead fuel moistures. This fm defines the units with open shrub lands and pine stands mixed. The predominant shrub in the proposed units is sage. There are inclusions of FM 2 in units 13, 16, 17, 30 and 31.

Fuel loading is dynamic, highly variable and difficult to predict over time. Fuel loading is measured in tons per acre. Fuel loading is the combined amount of dead and down fuel, measured in tons per acre (t/ac), in four fuel size classes that are (Fischer 1981):

- 1 hour size class (less that ¼ inch diameter)
- 10 hour size class (1/4 to 1 inch diameter)
- 100 hour size class (1 to 3 inches diameter)
- 1000 hour size class (> than 3 inches diameter)

Fuel loadings were estimated in the project area during site visits. The Photo Guides for Appraising Downed wood Fuels in Montana Forests: Lodge pole Pine and Interior Douglas-fir cover types (Fischer 1981) were used to estimate fuel loads.

Fuel loading helps to define the fuel models, contributes to fire intensity and acts as a ladder fuel preheating the understory vegetation.

Wildland Urban Interface (WUI)

Wildland Urban Interface areas occur where development (private or summer homes and wildland fuels (vegetation) meet at a well-defined boundary or are intermingled with no clearly defined boundary. There is more discussion related to the social and political environment that defines this WUI in Chapter 1.

The treatment units proposed within the WUI extend approximately ½ mile from the structure and private land boundaries. The distance is based on fire behavior modeling with the Behave Plus model. The Model estimated that firebrands from expected crown fire could be lofted and carried up to ½ mile or more away given the existing fuel conditions. (Anderson 2007) The existing fuel and fire behavior conditions are listed in Table 3.2.1 A.

Generally the WUI includes the Clark Springs, Rumbaugh, Romset and Lonesomehurst Summer Homes, the Fire Hole and Cozy Corners private in-holdings and the private lands on the south and east boundary of NFS land in the project area. The units identified primarily for WUI include 1-6, 14, 15, 22-25, and 29, parts of 10, 13, 17, 21, 26, and 30-32.

Evacuation Route

Evacuation Route is described as an egress and/or a route used to evacuate in a hazardous situation. These routes are also referred to as escape route in firefighter terminology. It is the route the emergency equipment will use to respond or leave from an incident. Flame length, rate of spread and intensity for an evacuation route should result in a surface fire. Visibility due to smoke would be lower with a lower flame length and intensities.

The evacuation route is a safety zone where people could safely egress or stage in with or without vehicles for an area threatened by wildland fire. A safety zone is "a preplanned area of sufficient size and suitable to provide protection from known hazards". The hazards to humans during wildland fire are heat, smoke, and lack of breathable air.

The calculation for determining a safety zone radius from radiant heat is four times the maximum flame length plus 50 square feet per person. If the potential for the fire to burn completely around the safety zone (both sides of the road) the diameter should be twice the values indicated above. Convective heat from wind and /or terrain influences increases this distance requirement.

The Fireline Hand book (March 2005 pg. 12-15), Behave plus computer model and a surface fuel model (Rothermel 1991) were used establish the equation for developing the 400 foot radius. In order to develop an evacuation route as a safety zone for an average of 8 people, or 3 vehicles the radius was doubled. (Anderson 2007)

A safety zone is ideally free of any burnable matter. The planned evacuation route along Denny creek road would have vegetation on both sides. The proposed treatments would lower the fire behavior but not as much, as if the area was free of vegetation for the safety zone radius.

Most units in the WUI are also identified for evacuation route needs. The units primarily defined for an evacuation route include 7-9, 11, 12, 19, 20, 26, 27 and portions of 10, 14 and 29 These areas are predominantly FM 10 with extensive ladder fuels and heavy surface fuel loading scattered throughout the area. Table 3.2.1.A shows the existing conditions and associated fire behavior.

Low Fire Risk Areas

These areas are portions of units that are generally in the WUI or evacuation route. They are more open, FM 2 or 8 with low surface fuels. Unit 18 is beyond a WUI or 400 evacuation route but has an Aspen component that is dying out. The units identified for maintenance of low risk were 13, 18 and 30. The fire behavior associated with the fuel conditions in these units is displayed in Table 3.2.1.A.

Fuel Break

The areas identified as fuel breaks, are immediately adjacent to WUI or evacuation routes by design so that the benefit of fuel reduction fortifies the effectiveness of treatment in those priority evacuation route and WUI areas. Portions of unit 7, 11, 12,17, 21, 26, contribute to the fuel breaks. The fire behavior associated with the fuel conditions in these units is displayed in Table 3.2.1 A.

Table 3.2.1.A: Fire Behavior Assessment for the Existing conditions

Fire Related Parameter	Unit Groupings – The group of units has similar fuel conditions and expected fire behavior.				
	22, 25, 27	17, 21, 20 26	2, 6, 10, 15,16, 19	1, 3, 4, 5, 7, 8, 9,11, 12	14, 23, 24, 26, 29, 30a, 31, 32
Acres	170	795	625	325	810
Fuel Model DFC FM 2,5 or 8 preferred.	8-10	8-10	10	10	10
Predicted rate of spread (ROS) Ch/Hr* DFC = < 20 ch/hr.	24	47	55	43	72
Flame Length (Fl) Ft DFC=< 4 feet	4-12	4-10	20	27	28
Fire Intensity BTU DFC = 100 btu's for under 4 foot flame length	210	1433	1583	1827	1191
Spotting distance miles DFC= 0 mile	.5	.7	.7	.8	1.2
Type of Fire DFC= surface fire	Surface-passive	Surface-passive	Passive-active	Passive-active	Active

Units 13, 18 and 30b (320 acres) are currently in Fuel Model 2 or 8, which is desirable because of their generally low fire risk.

*Fuel models explained in the *Affected Environment discussion*.

*Predicted spread rate is the speed the fire travels through surface fuels. It is measured in chains, 1 chain = 66 feet. Desired condition that allows direct attack wildland fire suppression is 20 chains per hour or less.

*Flame length in feet helps predict initial attack methodology in fire suppression. Also helps figure the safety of direct or indirect attack for fire fighters or equipment. Flame length also helps predict the potential of fire moving up into the canopy of the trees. Flame length can also be defined as the length of the flame of a spreading surface fire within the flaming front. Flame length is measured from midway in the action flaming combustions zone to the average tip of the flames. Wildland fire fighters can directly attack flame lengths of 0-4 feet. Flame lengths of 4 to 8 feet can be attacked with equipment (engines, dozers), above 8 feet aerial support is needed to suppress the fire. Flame lengths above 4 feet will reduce the safety of firefighters and make suppression more difficult. Desired condition is 4 feet and under.

*Fire Intensity (FI) is measured in Btu's and is defined as the head energy release per unit time from a one-foot wide section of the fuel bed extending from the front to the rear of the flaming front. Fireline intensity is a function of rate of spread and heat per unit area and is directly related to flame length. Fireline intensity and flame length are related to

the heat felt by a person standing next to the flames. Desired condition is under 100 btu's for under 4 foot flame length.

*Spotting distance is a distance that one can expect potential spot fire the resulting from firebrands from torching trees, burning fuels or wind driven surface fire. It is measured in miles or feet. The ideal spotting distance is 0. When the distance gets to be up to .5 miles direct suppression actions become unsafe and more difficult to control.

*Expected fire type is discussed in Chapter 1. Surface fire is the desired condition.

Applicable Laws, Regulation, Policy and Forest Plan Direction

The applicable direction for this project is discussed in EA 1.6 for this issue.

Methodology

Fire behavior modeling inputs are calculated using various classifications including fire groups, fuel models, fuel loadings and fire regime and condition class. Classification like fuel model and measurements such as canopy base heights of trees were estimated by field observations walking through the units. (Anderson 2007)

The following programs were used to assess the change in vegetative fuel condition and resulting change in fire behavior. The treatment effectiveness was estimated by comparing the desired conditions to the estimated fire behavior.

FVS: Forest Vegetation Simulator-Fire and fuels extension was used to determine thinning effectiveness and crown bulk density.

Nexus" Fire behavior and hazard assessment system (2001) is a computer spread sheet program used to assess fire behavior for certain fuel models. Inputs include fuel models, fuel moisture live and dead, canopy fuels, slope and winds. The outputs determine if the wildfire would be active, surface, passive or conditional, with an outcome that presents whether a wildfire would spread up into the canopies and become a crown fire. The output also compares rate of spreads, flame lengths, scorch heights, fire size, and crown faction burned.

Behave plus is a computer based fire program used for predictions of fire behavior under given conditions. Behave was used to evaluate flame length, rate of spread, spotting potential and distance and fire behavior for ground fires. The inputs are fuel models, fuel moistures, topography, weather, tree species and height. Outputs are flame length, rate of spread, mortality, and spotting and scorch height.

It is important to note that the models used to represent the effects of the different treatment alternatives rely on several assumptions and limitations. Both Nexus and Behave assume a constant state of weather and topography. They also assume that fuels are both vertically and horizontally arranged continuously over the project area. In addition fire predictions were only predicted at the flaming front.

Inputs related to local and expected weather conditions came from the WIMS and Fire Family Plus programs. The Hebgen Lake Weather Station. 244603 are the local station. WIMS

(Weather Information Management System) database collects present and past weather data. The data was used for analysis and inputs to Behave Plus. Snotel (snow and precipitation measurement stations) sites around the Hebgen Basin were reviewed for present and past snow and water measurements. Western Regional Climate Center's web pages: http://www.wrcc.dri.edu/snotel/snoareas.html and http://www.wrcc.dri.edu/snotel/snomont.html

FIRE FAMILY PLUS 4.0 -is a Windows program that combines the fire climatology and occurrence analysis capabilities for programs into a single package with a graphical user interface. FireFamily Plus operates against a database of fire weather and fire occurrence. Local fire occurrence data can be integrated in most analysis functions. FireFamily Plus allows definition and computations based on Special Interest Groups (SIGS) and can generate NFDRS FireFighter Pocket Cards. This program was used to compare local wildland fire history and past weather from local weather station. http://www.firemodels.org/content/view/15/29/

The spatial boundary of the analysis area is within the timber compartments 709 and 710. The areas examined in more detail are the areas within and adjacent to WUI. Wildland fire history was analyzed in timber compartments 709 and 710 on the Hebgen Lake District of the Gallatin National Forest.

Modeling shows that is the expected timeframe for growth and change that creates regrows ladder and canopy fuels is 30-40 years in the planning area. This was derived from Forest Vegetation Simulator (FVS) and SimPPLLE model runs. (Novak 2007) As such, the temporal boundaries are a maximum of 30-40 years.

Direct and Indirect Effects of Alternative 1 No Action Alternative

Alternative 1 is the no action alternative with no fuel treatments in the project area and provides a baseline for comparison for the other alternatives.

If left untreated the fuel models would change with growth and death of vegetation. FM 2 and 5 would become encroached with conifers and change to fm 8 or 10. FM 8 environments would become fm 10 with denser canopy and more chance to have undesirable fire behavior. If no treatment is done to the fuels the risk and hazard would stay the same or increase with more build up of dead and down, the canopy closure would become denser and ladder fuels more abundant.

Table 3.2.1.A shows the modeled fire behavior of existing conditions if vegetation is left untreated. This fire behavior could make direct attack suppression very difficult and dangerous. Given the existing and expected condition of the vegetative fuels fires would very likely to spread up into the crown of the trees and produce a high intensity crown fire with spotting distances well over ½ mile. Expected fire behavior includes flame lengths from 4 to 28 feet, fire intensities well over 1000 BTU's and rates of spread of 24 to 72 ch/hr. This would create unsafe work conditions for wildland firefighters and treacherous evacuation routes. With this type of wildland fire there would likely be damage to private and Forest Service property, and extensive resource damage (water sheds, wildlife, and

soils). With this fire behavior there could also be a smoke impact to the Hebgen Basin area.

The purpose and need would not be meet with the No Action Alternative. There would be no vegetation treatments reducing wildland fuels in the WUI and evacuation routes.

The no action alternative does not support and is not consistent with the Gallatin National Forest Plan. The Forest Plan supports treatment for hazard reduction of natural fuel and dead and down woody debris that has accumulated. This Alternative would not implement any hazard reduction.

The Federal Wildland Fire management Policy (2005) states: Where wildland fire cannot be safely reintroduced because of hazardous fuel build-ups, some form of pretreatment must be considered, particularly in Wildland Urban Interface areas. With the no action alternative the hazardous fuel build up would not be treated, no pretreatment in WUI areas would be done

The National Fire Plan (2000) states: proposed investing in projects to reduce fire risk with the reference on hazardous fuels reduction. Assign highest priority for hazardous fuel reduction to communities at risk, where conditions favor uncharacteristically intense fires. The project area was listed as a "Community in the vicinity of Federal Lands at risk of wildfire in the Federal Register (Jan. 2001). In this alternative there would not be any fuel reduction to the communities at risk implemented in the proposed units.

Gallatin County Montana Wildfire Protection Plan (CWPP March 2007) states WUI protected by USFS and adjacent to private owned property will have a fuel reduction plan. The CWPP supports fuel reduction for safety, evacuation and defensible space. The hazards; for safety of fire fighters, evacuation route and defensible space would not reduced in the no action alternative.

Cumulative Effects of Alternative 1:

Since no activity would be implemented there would be no cumulative effect.

General effects discussion related to the Action Alternative

The proposed silvicultural treatments to meet fuels management objectives vary from unit to unit. Specific stand level treatments proposed for the various units were modeled with the Forest Vegetation Simulator (FVS) (Dixon 2002) to determine approximate post-treatment stand conditions. Not all of the stands within the treatment units contained stand examination data for use in the Forest Vegetation Simulator. However, field observations indicate that stand conditions where stands were not examined are similar enough to stands with data that results can be extrapolated. The modeled treatment included thinning with removal of various diameter classes and considered two levels of fire weather (fuel moisture conditions, air temperature, and wind speeds at 20 feet above the vegetation). (Novak 2007)

The treatment prescriptions for Alternative 2 and 3 were modeled using FVS with The Fire and Fuels Extension (FFE) (Reinhardt 2003). The type of fire modeled to occur under moderate and severe conditions was predicted to be a surface fire for approximately 30-40

years. Moderate weather is defined as 15 mph wind, 76 degrees and moderate fuel moistures and severe weather is defined as 20 mph wind, 86 degrees and dry fuel moistures. (Novak 2007)

Predicted mortality, if a fire were to occur under severe weather conditions, after treatment within the next 30 years is around 80-90% of the present forest material. Mortality from a surface fire under moderate weather conditions after treatment is predicted to be around 5%. The mortality predicted is likely the result of root and basal damage to the trees from fires that are intense enough at ground level to kill many trees regardless of size or crown base height. (Novak 2007)

After thinning treatments are completed, stands would have reduced densities, reduced ladder fuels, a more discontinuous crown cover, and a more patchy structure. Within all units, the species of dominance would continue. Where Douglas-fir dominated the overstory before thinning, Douglas-fir would continue to dominate in the overstory. Where lodgepole pine dominated the overstory before thinning, lodgepole pine would continue to dominate the overstory with a mix of subalpine fir, Englemann spruce and Douglas-fir in the understory. For the most part, the post-treatment stands would be single or two-storied. Surviving seedlings, saplings and poles would create the second story. (Novak 2007)

In general the treatments proposed in Alternative 2 and 3 create a safer environment for wildland fire fighters, public and forest users. The WUI and evacuation route would be more defensible in the event of wildfire. Crown canopy would be opened and ladder fuels reduced. Thinning would elevate the crown base height above 4 feet.

The proposed treatments would change the fuel model for a 10 to an 8 for almost the entire areas. Areas representing fuel model 8 would have lower fuel loading, higher crown base height and lower crown bulk density therefore lower flame lengths, lower fire intensity and less chance of crown fire.

Ground fuel clean up in Alternatives 2-3 would remove excessive natural fuels to less than 10-15 tons per acre. These are dead and down ground fuels 0 to 3 inches. The larger 3inch plus natural fuels would be reduced to not exceed 20 tons per acre. Natural fuels are the dead and down material that is currently in the unit.

There may be units along evacuation route that would receive only ground fuels clean up with no thinning. These fuels would be hand piled and burned or used as biomass. The lower fuel loading of dead and down would help lessen the chance of a fire start gaining high intensities, rates of spread or flame lengths and climbing to the canopies. Lower intensity fires and ground wildfire are less difficult and safer for firefighters to suppress than high intensity crown fires.

Slashing small diameter conifers, lopping and scattering and prescribed fire treatments would reduce conifer encroachment in aspen stands and meadow areas. These would function as fuels breaks. There would be an increased presence of aspen, which provides a more fire resistant forest type and protects a tree species at risk of

serious decline. This treatment would help maintain low risk fire areas.

Behave Plus and the Nexus spreadsheet were used to evaluate the vegetative change from thinning and surface fuel reduction to estimate the change in Fire Behavior. The estimates for each Alternative are in Tables 3.2.1 B & C.

Flame length (FL), fire intensity (FI) and rate of spread (ROS) have a strong correlation to firefighter safety, risk to the public, property and NFS resources and likelihood of surface or crown fire. Fire intensity less than 100 BTU/feet/second in association with flame lengths less than four feet enables direct attack as long as the rates of spread are less than 20 chains per hour. These parameters allow safe and effective suppression. Flame length and fire intensity are also strongly correlated to whether the evacuation route would be safe. The hazards to humans for wildland fire are heat, smoke and lack of breathable air.

Fire behavior reduction associated with the proposed thinning and surface fuel reduction would reduce spotting potential. The ideal spotting distance is 0. When the distance gets to be up to .5 miles direct suppression actions become unsafe and more difficult to control. The treatments in both alternatives would reduce the estimated spotting distance and therefore, the risk to firefighters, the public, property and NFS resources would be lessened.

The proposed treatments would reduce; stand density, crown closure (crown bulk density) and fire behavior (flame length, rate of spread and intensity). The predicted fire behavior would make direct attack suppression possible and safe. The treatments would also reducing the possible surface fire to crown fire spread and spotting distance These proposed treatments would improve the safety of wildland fire fighters and public in emergency events; wildland fire suppression and/or evacuation.

Direct and Indirect Effects of Alternative 2 Proposed Action

Fire behavior Table 3.2.1.B. displays the modeled fire behavior for the treated area for Alternative 2 and Table 3.2.1 D and E provide a comparison of the Alternatives.

Table 3.2.1.B: Fire Behavior Assessment for the Post Treatment Conditions Associated with Alternative 2

Fire Related Parameter	Unit Groupings – The group of units has similar fuel conditions and expected fire behavior if Alternative 2 is implemented.					
	22, 25, 27	17, 21, 20	2, 6, 10, 15,16	1, 3, 4, 5, 7, 8, 9,11 12,	14, 23, 24, 26, 29-50/50%, 31-30/70%, 32-50/50%	
Acres	170	370	625	325	870	245
Fuel Model DFC FM 2, 5 or 8 preferred.	8-10	8	8	8	8	8

	Unit Groupings – The group of units has similar fuel conditions and expected fire behavior if Alternative 2 is implemented.					
Predicted rate of spread (ROS) Ch/Hr* DFC = < 20 ch/hr.	24	3.2	1.9	3.2	1.9	1.0
Flame Length (Fl) Feet DFC=< 4 feet	4-12	1.4	1.1	1.4	1.1	.1
Fire Intensity BTU DFC = 100 btu's for under 4 foot flame length	182	160	182	182	210	514
Spotting distance miles DFC= 0 mile	.3	.1	.3	.3	.4	.4
Type of Fire DFC= surface fire	Surface-passive	Surface	Surface	Surface	Surface	Surface

Unit 13, 18 and 30 (440 acres) would be treated with prescribed burning. The objective of these treatments is maintenance not conversion. These treatments would maintain the area in lower fire risk conditions. Due to the dense forest cover in the "30a" (120 acres) portion of unit 30, prescribed burning would not maintain lower fire risk and fire behavior would not be effectively reduced.

Direct and Indirect Effects of Alternative 3 with Resource Mitigation

Fire behavior Table 3.2.1.C. displays the modeled fire behavior for the treated area for Alternative 3 and Table 3.2.1 D and E provide a comparison of the Alternatives.

Table 3.2.1.C. Fire Behavior Assessment for the Post Treatment Conditions Associated with Alternative 3.

Fire Related Parameter	Unit Groupings – The group of units has similar fuel conditions and expected fire behavior if Alternative 3 is implemented.					
	1, 22, 25, 27	17, 21, 20	2, 6, 10, 15,16, 19	5, 7, 9,11	14, 23, 24, 29-50/50%, 30a, 31-30/70%, 32-50/50%	
Acres	235	292	575	105	856	329
Fuel Model DFC FM 2,5 or 8 preferred.	8-10	8	8	8	8	

Fire Related Parameter	Unit Groupings – The group of units has similar fuel conditions and expected fire behavior if Alternative 3 is implemented.					
	1, 22, 25, 27	17, 21, 20	2, 6, 10, 15,16, 19	5, 7, 9,11	14, 23, 24, 29-50/50%, 30a, 31-30/70%, 32-50/50%	
Predicted rate of spread (ROS) Ch/Hr* DFC = < 20 ch/hr.	24	3.2	1.9	3.2	1.9	1.0
Flame Length (Fl) Ft DFC=< 4 feet	4-12	1.4	1.1	1.4	1.1	.1
Fire Intensity BTU DFC = 100 btu's for under 4 foot flame length	182	160	182	182	210	514
Spotting distance miles DFC= 0 mile	.3	.1	.3	.3	.4	.4
Type of Fire DFC= surface fire	Surface-passive	Surface	Surface	Surface	Surface	Surface

Unit 13, 18 and 30b (320 acres) would be treated with prescribed burning. The objective of these treatments is maintenance not conversion. These treatments are maintenance treatments and would keep these areas in lower fire risk conditions.

Cumulative Effects of Alternative 2 and 3

Past actions associated with vegetation management and fire suppression created the current fire and fuels condition. Past management activities that established human use patterns have also contributed to the existing condition. The reasonably foreseeable activities outlined in the EA 3.8 and Cumulative effects checklist (Anderson 2007a) would not alter the fire and fuels environment in any notable way. No major vegetative management is proposed that would alter the fuel condition. Private property owners plan some fuel reduction near structures on and adjacent to the NFS lands in this analysis area. These activities and Alternatives 2 and 3 would provide a combined benefit to the purpose and need for the project.

Table 3.2.1.D: Does the Expected Fire Behavior Change Meet the Purpose and Need for Action? (Fuels Report, Anderson 2007)

Desired Change or Fuel or Fire Behavior Parameter:	**Achievement of the Desired Change In Fire Behavior Would Address The Following Purpose Statements.**	**Alternative 1 – No Action**	**Alternative 2 – Proposed Action**	**Alternative 3 – Alternative with Resource Mitigation**
Fuel Model Conversion Fuel Model 8 is preferred over Fuel Model 10 Maintenance of FM 2, 5, 8 is desirable.	Improved firefighter, public safety and evacuation route effectiveness. Reduced risk to adjacent property due to more effective suppression. These conditions enable direct attack suppression tactics that are safer, more effective and less costly. Maintain existing fuel breaks or open areas in a low risk condition. ***The measure of success for these units in maintenance of the existing fuel model. Therefore, these units will not be compared with the other fire behavior parameters.***	965 acres of FM 8-10 (variation within units reflecting both fuel models and in some cases FM 2 and 5.) 1760 acres of predominantly FM 10 conditions. 320 acres not maintained in a low risk fuel model FM 2, 5 or 8	170 acres FM 8-10 2435 acres converted to FM 8 from FM 10. 320 acres maintained in a low risk fuel model FM 2, 5 or 8. 120 acres of reduced surface fuel reduction but not converted to a low risk condition.	235 acres FM 8-10 2157 acres converted to FM 8 from FM 10. 320 acres maintained in a low risk fuel model FM 2, 5 or 8. 333 acres untreated remain in FM 10 or 8-10.

Desired Change or Fuel or Fire Behavior Parameter:	Achievement of the Desired Change In Fire Behavior Would Address The Following Purpose Statements.	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3 – Alternative with Resource Mitigation
Flame Length (Feet) 4 feet or lower is safest with least risk. 4-8 feet may require machinery to suppress and pose more of a hazard. Greater than 8' may require aerial support and pose serious hazard	Improved firefighter, public safety and evacuation route effectiveness. Reduced risk to adjacent property due to more effective suppression. These conditions enable direct attack suppression tactics that are safer, more effective and less costly. Surface fire can be maintained in these conditions and these flame lengths would allow safe use of the evacuation route.	1320 acres with 4-12 feet FL 1725 acres with 20-28 FL	170 with 4-12 feet FL 2435 acres with 2 foot or less FL	333 acres not treated FL > 20 feet. 235 acres with 4-12 feet FL 2157 acres with 2 foot or less FL
Fire line intensity (BTU's) <100 BTU's enable direct attack, limits sustained crown fire and allows safe evacuation adjacent to the fire. 100-500 BTU's combined with desired Fl and ROS a surface fire can be maintained.	Improved firefighter, public safety and evacuation route effectiveness. Reduced risk to adjacent property due to more effective suppression. These fire intensities would allow safe use of the evacuation route with reduced FL.	525 acres with 210 BTU's expected. 2520 acres with 1191-1827 BTU's expected.	2605 acres with 160-220 BTU's expected	333 acres untreated with expected BTU's in excess of 1400. 2392 acres with 160-514 btu's expected

Desired Change or Fuel or Fire Behavior Parameter:	Achievement of the Desired Change In Fire Behavior Would Address The Following Purpose Statements.	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3 – Alternative with Resource Mitigation
Surface Fire Rate of Spread **(Chains/hour)** 20 ch/hr or less is desired. More than 20 ch/hr more, indicate a serious hazard and greater crown fire risk	Improved firefighter, public safety and evacuation route effectiveness. Reduced risk to adjacent property due to more effective suppression and reduced risk of sustained crown fire. Less risk of fire spread into the WUI or from the WUI.	525 acres with estimated ROS of 24 ch/hr 2520 acres with ROS in excess of 40 chains per hour	2435 acres with estimated ROS of < 4 ch/hr. 170 acres with estimated ROS of 24 ch/hr.	333 acres untreated with expected ROS in excess of 45 ch/hr. 2157 acres with estimated ROS of < 4 ch/hr. 235 acres with estimated ROS of 24 ch/hr.
Expected Fire Type Surface fire versus Crown fire is highly desired.	Improved firefighter and public safety. Reduced risk to property due to more effective suppression.	965 acres with surface and passive crown fire expected. 1760 acres with passive/ active crown fire expected. 810 acres active crown fire expect	2435 with expected surface fire. 170 acres with expected surface/passive crown fire.	333 acres untreated with expected passive/active crown fire. 2157 acres with expected surface fire. 235 acres with expected surface/ passive crown fire.

Desired Change or Fuel or Fire Behavior Parameter:	**Achievement of the Desired Change In Fire Behavior Would Address The Following Purpose Statements.**	**Alternative 1 – No Action**	**Alternative 2 – Proposed Action**	**Alternative 3 – Alternative with Resource Mitigation**
Expected spotting distance of lofting firebrands. (approximate) No spotting is preferred but distances less than ½ mile could allow for safe direct suppression tactics.	Reduced risk to property and fire spread from within the WUI to adjacent lands or fire spread from adjacent lands into the WUI. Spotting distance influences fire spread rates and the initiation of new fires ahead of the flaming front.	½ mile expected on 525 acres. .7-.8 miles expected on 1710 acres. Over 1 mile expected on 810 acres.	1/10 mile expected on 370 acres. .3-.4 mile expected on 2235 acres.	333 acres untreated spotting distances of .7 miles are expected on those acres. .1 mile expected on 292 acres. .3-.4 mile expected on 2100 acres.

Table 3.2.1.E. How Well Do Alternatives Meet the Purpose and Need For Action

Alternative 1 – No Action	Alternative 2- Proposed Action	Alternative 3 – Mitigated Alternative
0 acres of desired fire behavior reduction achieved in the WUI and/or evacuation route.	2755 acres of desired fire behavior achieved. In the WUI and evacuation route 290 acres of reduced fire behavior but not to fully desired conditions.	2477 acres of desired fire behavior achieved. 235 acres of reduced fire behavior but not to fully desired conditions. 1-1/2 to 2 miles of evacuation route partially maintained compared to 2 in units 7, 10 and 17. 20 acres of WUI not treated as effectively as possible compared to 2 in unit 1. 333 acres withdrawn from treatment in this Alternative.
Does not meet.	Meets most effectively.	Meets but not as well as 2.

Consistency with the Gallatin Forest Land Management Plan (1987) and Applicable Policy

The purpose and need is met with implementation of Alternatives 2 and 3. These Alternatives support and are consistent with the Gallatin National Forest Plan, Federal Wildland Fire Management Policy, the National Fire Plan and the Gallatin County Montana Wildfire Protection Plan.

Conclusion

The possibility of wildland fires due to human and natural starts will always be here. With the ongoing weather changes, drought and beetle activity the vegetation may become more vulnerable to wildfire starts. Alternative 2 and 3 would create a safer environment, a more defensible space and an evacuation route for fire fighters, emergency response and the general public on private and/or public land in a wildland fire or emergency evacuation.

The treatments would reduce wildland fire behavior allowing faster and more efficient fire suppression

In alternative 3 there are 403 fewer acres proposed for treatment in WUI, one to 1-1/2 miles of evacuation route not protected as well as in Alternative 2. The crown fuels in a portion of unit 1 would be untreated due to roadless lands protection, leaving a higher level of expected fire behavior in Alternative 3. This would make the WUI area and the evacuation route somewhat less safe than alternative 2.

3.2.2 Issue 2. Moose Winter Habitat

Moose on the east side of the Henry's Lake Mountains utilize a narrow band of habitat at the lower elevations along the shoreline of Hebgen Lake during the winter. Habitat important to moose within this area includes old lodgepole pine stands with subalpine fir understories. Fuels treatments in such stands may alter moose habitat to unsuitable condition by removing subalpine fir trees that are preferred browse, and/or by opening the canopy, which would allow greater accumulation of snow.

Indicator

Compliance with the applicable Gallatin Forest Plan standards (covered below) will be used as the indicator for this issue.

Affected Environment

Moose are an ecologically unique native species on the Gallatin National Forest. Many people consider them highly charismatic, and the opportunity to view this species is very important to recreationists (including summer home owners and permittees) within the project area. They are commonly observed around Hebgen Lake during the summer months when recreational use of the area is heaviest. Additionally, this moose herd provides some opportunity for hunters each year. There is no moose population estimate for this area as no surveys have been conducted in recent years, and no population objective has been developed. However, data from harvest surveys and general observations indicate a declining population trend over the past 15-20 years. As a result, moose viewing opportunities have declined and moose hunting permits for this area have been cut substantially over this period with

only 3 permits for bull moose allocated annually in recent years.

Winter is a critical time of year for moose because forage quality and availability is low, and energetic costs of moving through deep snow and maintaining body heat in cold temperatures are high (Canfield et al 1999, pages 6.3-6.6). Unlike ungulates in the northern Rocky Mountains that migrate to lower elevation valleys with little snow accumulation, moose often remain at higher elevations with greater snow accumulation. Winter habitat for moose is variable across their range, but always includes concentrations of accessible browse. Willow and aspen are among the most palatable browse species to moose. These habitats are often heavily used if snow conditions allow. At snow depths of around 30"-40", moose will shift from open browse fields to dense stands of conifers where canopy cover ameliorates snow depth and shading reduces crusting of snow. In the Greater Yellowstone Area, older lodgepole pine forests with subalpine fir understories were found to be heavily used by moose under such conditions. Subalpine fir is a preferred browse species for moose. Moose select patches with high concentrations of browse to minimize energetic costs of feeding (i.e., large quantities of forage can be consumed with little movement). Snow depths exceeding 45-50" will preclude moose use altogether.

Moose response to habitat disturbance varies substantially across their range. In many areas, early successional conditions created by fire or logging are beneficial because they result in vigorous regeneration of palatable browse species. However, the relationship of moose to ecological disturbances in the Greater Yellowstone Area appears to be different. In this area, older lodgepole pine stands are among the most important wintering areas, especially under severe conditions when moose are the most vulnerable. When subject to disturbance, these stands typically regenerate with high densities of lodgepole pine seedlings rather than palatable woody shrubs. These stands do not provide winter habitat for moose until shade tolerant subalpine fir saplings begin to achieve adequate densities under the aging lodgepole pine canopy. To illustrate this point, Tyers found little or no moose use of lodgepole pine stands <100 years old, and highest use of lodgepole pine stands >300 years old during mid-late winter (Tyers 2003, p.86-101). He also reported a precipitous decline in the Northern Yellowstone moose population following the 1988 fires (Tyers 2003, p.32), which burned approximately 35% of the study area and 29% of the mature forest in the study area (Tyers 2003, page 79). The loss of subalpine fir browse and canopy cover to ameliorate snow depth were the factors deemed responsible for causing this decline.

Applicable Laws, Regulations, Policy and Forest Plan Direction

The Gallatin Forest Plan contains management direction for big game winter range. There is a Forest-wide standard specifying, "big game winter range will be managed to meet the forage and cover needs of deer, elk, moose, and other big game species in coordination with other uses (USDA Forest Service 1987, page II-18)." Additionally, much of the project area is within Management Area 13which contains a standard that vegetative

management practices will be used to maintain and improve the quality and quantity of big game forage (USDA Forest Service 1987, page III-41).

Methodology for Analysis

To analyze the effects of proposed treatments on moose winter range, the spatial extent of moose winter range in timber compartments 709 and 710 was plotted using the ArcView 3.2 Geographic Information System program. Montana Fish, Wildlife, & Parks data was used to define moose winter range in this area. Next, queries of the Timber Stand Management Record System (TSMRS) database were conducted to identify stands that are currently in suitable condition for moose winter habitat.

The queries conducted were for late successional lodgepole pine and subalpine fir stands because these are the stands most important to moose when environmental conditions are difficult (i.e., when snow is deep and/or crusted). In addition, although moose may heavily use other vegetation types during winter (such as willows) the proposed treatments would not affect these stands. One category of stands identified were those in the subalpine fir series, currently in lodgepole pine or subalpine fir cover types, and which met old-growth criteria (defined as >150 years of age and at least 12 trees/acre >10" diameter). While the size of trees in the stand is unimportant from a moose habitat perspective, this criterion was included because the queries had already been run for other issues associated with this project, and it was judged that there would be few stands meeting the age criterion but not the diameter limit (Mark Novak, personal communication, 05/04/07). These stands had stand exam data sufficient to have high confidence that they are actually in the condition specified by the data, and therefore were considered to provide suitable moose winter habitat. Another category of stands identified were those that were likely to provide suitable moose winter habitat. These stands had characteristics similar to those meeting old growth criteria, but lacked stand exams to verify their current condition.

Once currently suitable habitat was identified, the proposed treatment units were overlayed onto the stands currently in suitable condition for moose winter range to identify which stands would be altered to an unsuitable condition for moose winter range. The estimated amount of winter moose habitat in suitable condition before and after the proposed treatments was then compared. Stands that had previously been harvested were also identified and overlayed for the cumulative effects analysis.

Direct and Indirect Effects of Alternative 1 (No Action Alternative)

Under this alternative, there would be approximately 1,760 acres of stands in compartments 709 and 710 providing suitable winter range for moose (Table 3.2.2.A). Moose winter habitat. With no treatment, these stands would continue to provide suitable habitat until a disturbance event eventually occurred. Given the current condition of these stands, stand replacement fire(s) would likely occur at some point in time. Such stand replacement fires would convert vegetation conditions to early successional stages that would not provide suitable winter habitat for moose. Although stand replacement

fires in this area are probably inevitable at some point in time, there is no way to know how much of the suitable moose habitat would be burned across time through such events until they actually occur.

Cumulative Effects of Alternative 1

The moose winter range in compartments 709 and 710 was used as the analysis area for cumulative effects. This area was used because it is the primary winter range available to moose occupying the east side of the Henry's Lake Mountains. The temporal bounds for the cumulative effects analysis was from approximately 1960 to 5 years in the future. The year 1960 was selected because this is approximately when the first timber harvest activity occurred at magnitudes that would affect moose winter habitat. Five years into the future was used because this is the approximate extent of any reasonably foreseeable future activities.

Approximately 2,300 acres of subalpine fir series stands with lodgepole pine cover type experienced some sort of harvest activity in the analysis area from approximately 1960 to the present, including most of the stands along the lakeshore in the southern part of the project area. These stands were probably some of the most important for moose winter range because they are located adjacent to other important moose winter range vegetation types such as willow and aspen stands, and because they are at the lowest elevations where snow depth would be lowest. Much of this harvest occurred during the 1980's, shortly before moose population declines in the area were first noticed. Harvest activity included both clear cuts and different types of intermediate cuts. Although many of these stands are now maturing, they have not yet reached advanced successional stages that would provide quality moose winter habitat. Past harvest activity has likely been a factor in the moose population declines observed within the analysis area.

Fuels reduction activities have occurred on Forest Service permitted recreation residences. These areas are of relatively low habitat value to moose during the summer season when residences are occupied, due to the high level of human activity that occurs. During the winter months when residences are typically unoccupied these areas may provide some useable habitat for moose, however recreation residence lots are generally maintained in a condition such that the late successional characteristics desirable to moose during deep snow conditions are lacking. Therefore, the effects of fuels reduction activities are probably very low.

Disturbance to wintering moose from recreational users may also be a factor in the declining population trend observed for moose in this area. The area receives regular snowmobile use on the Hebgen Lake Road, which bisects important moose winter habitat. Under the recently completed Gallatin National Forest Travel Plan decision, a portion of the Trapper Creek and Moonlight Creek drainages would be closed to snowmobile use in order to minimize disturbance to wintering moose in this area.

Direct and Indirect Effects of Alternative 2

As described above, Tyers (2003, page 32) noted a precipitous decline in moose populations in the Northern Yellowstone

winter range after large-scale fires burned approximately 29% of the mature forest in his study area. However, these fires were stand replacement events. The fuels treatments proposed under this alternative would involve thinning of the understory and/or overstory rather than complete stand replacement. No data is currently available on the effects of such treatments on moose. However, given what is known about moose winter habitat selection, some inferences can be made on how moose would respond to treatments.

Commercial harvest units would involve a mixture of larger overstory trees and smaller understory trees being removed. This would result in subalpine fir browse availability being reduced, and foraging opportunities for moose would be low. As described earlier, moose select patches with high densities of browse during winter to reduce energetic costs of feeding while maximizing forage intake. Additionally, partial overstory removal would alter snowpack characteristics as well. Less snow would be captured by the canopy, causing snow to accumulate more and increasing energetic costs of locomotion.

The effects of understory thinning and prescribed burning would be similar to those for commercial harvest in that availability of subalpine fir browse would decrease such that stands would provide low-quality foraging opportunity for moose during deep snow conditions. However, the overstory would not be altered and snowpack conditions would not change from the current situation.

Under the proposed action, approximately 16% of the estimated late winter moose habitat would be commercially harvested, 7% would be subject to understory thinning, and >1% would have pre-treatment and prescribed fire. A total of about 23% of the estimated suitable moose winter habitat would therefore be subject to treatment, and in these areas vegetation would be converted to low-quality habitat for moose during deep snow conditions (Table 3.2.2.A). These effects would be exacerbated by the fact that the treatments would be concentrated in the lowest-elevation portion of the winter range. Because snow depth increases with elevation, these areas are likely to be those most important to moose during winter and especially during deep snow conditions.

Logging activities would be restricted from December 1-May1, so disturbance to wintering moose from project activities would not be expected.

Table 3.2.2.A. Acres of suitable moose winter habitat to be treated by 3 methods under the project alternatives.

Suitable Habitat	Alt 1 (acres)	Alt 2 (acres)	Alt 3 (acres)
Proposed for harvest	0	280	125
Proposed for understory thin	0	120	100
Proposed for burning	0	5	5
Remaining suitable habitat post-treatment	1,760	1,355	1,530

Cumulative Effects of Alternative 2
The conversion of late winter moose habitat to low-quality habitat under this alternative would be additive to previous timber harvest activities already described for alternative 1. Cumulative effects on moose winter habitat and the resulting availability of forage during deep snow periods would be expected.

Direct and Indirect Effects of Alternative 3
The direct and indirect effects of alternative 3 would be similar to those described for alternative 2, except the magnitude would be lower. Approximately 13% of the total estimated late winter moose habitat would be treated (Table 3.2.2.A.) and therefore converted to low-quality habitat for moose during deep snow conditions.

Logging activities would be restricted from December 1-May1, so disturbance to wintering moose from project activities would not be expected.

Cumulative Effects of Alternative 3
The cumulative effects of this alternative would be lower than those expected under alternative 2 due to the lower number of acres treated.

Summary Conclusion
Both action alternatives would lead to a decline in the availability of late winter moose habitat. Because winter nutrition is a primary factor driving moose population dynamics, and because winter nutrition may already be a limiting factor for this population, both alternatives may contribute to continued moose population declines in the analysis area. The magnitude of these effects would be considerably larger under alternative 2 compared to alternative 3. Alternative 3 would better meet Forest Plan direction for providing forage and cover on moose winter ranges compared to alternative 2. Under either alternative, the population is not expected to be at risk of extirpation. Montana Fish, Wildlife, & Parks continues to administer a hunting season on moose in this area in which 3 permits for bullmoose are allocated annually. Moose permits would no longer be allocated for this area if the viability of the population were a concern. Similarly, moose are hunted throughout western Montana. Moose in the Greater Yellowstone Area and across North America are not considered at risk of extirpation.

3.2.3 Issue 3. Inventoried Roadless

Fuel treatments proposed in units 1, 2, 14 and 15 may affect roadless character. Proposed fuel treatments are being considered both within "Inventoried Roadless" areas (IRA) that currently retain their roadless character, and in portions of an IRA that have been roaded and harvested since the forest plan was published. These proposed fuel reduction activities are within the Lionhead 1-193 Inventoried Roadless Area (IRA).

Indicator

The project proposal and its alternatives are reviewed to determine if implementation significantly affects roadless characteristics and meets other criteria established in the 2001 Roadless Area Conservation - Final Rule, 36 CFR 294.

The portions of the Lionhead IRA that are within the Lonesome Wood Project area were evaluated for wilderness

character in the 1987 Gallatin Forest Plan and were not included in the Lionhead recommended wilderness. In addition, the portions of the IRA in the Lonesome Wood project area have not been included in subsequent wilderness legislation for the Lionhead recommended wilderness. Consequently, the concern related to this issue is adherence to the 2001 Roadless Final Rule.

Affected Environment

Portions of five proposed fuel treatment areas within the Lonesome wood project area fall within the Lionhead Inventoried Roadless Area (IRA) 1-963. All or portions of proposed units 1, 2, 13, 14, and 15 fall within the inventoried roadless area boundary that was published in the 2001 Roadless Final Rule.

Units 1 and 2 as described in the proposed action presented during scoping retain their inherent roadless characteristics. There is very subdued evidence within the portion of Unit 1 immediately adjacent to the Hebgen Lakeshore road of some single tree timber harvest – probably from the early construction of the Clark Springs Summer home structures in the 1930s. Widely spaced, well rotted stumps of mature trees are the only signs of manipulation in this area. Otherwise these units appear generally unmanaged and natural.

Units 13-15 however have been roaded and harvested since the forest plan was approved, and no longer retain their roadless character. Classified roads traverse these units, and roading and harvesting has occurred within, and adjacent to, the units on all sides.

Much of the Lionhead Roadless area (about 26,000 acres) was recommended for designation as wilderness in the Gallatin Forest Plan in 1987, but that recommended wilderness boundary does not extend east to include the entire IRA. The eastern edge of the IRA (where this project is located) was not recommended for wilderness designation. The recommended wilderness addition boundary follows a north south ridgeline that is approximately ½ mile west of the western most edge of proposed unit 2, and is roughly two miles west of the western edge of units 13-15. The Lionhead recommended wilderness has been included in several wilderness bills, which passed through Congress in the mid 1990's – dubbed as the Earthquake Lake addition to the Lee Metcalf Wilderness, and has a strong local constituency for designation as wilderness. This project would have no effect on any of the areas recommended for inclusion in the wilderness preservation system.

The roadless portion of the project area in the vicinity of units 1 and 2 is characterized on the north by steep, timber covered slopes that face toward Hebgen Lake. These areas are occasionally traveled by berry pickers, and hunters, but generally receive light recreation traffic. There are no system trails within this portion of the project area that facilitate more than occasional foot traffic. These units are within ½ mile of a group of summer homes.

In the vicinity of proposed units 13-15, there are a series of old logging roads, and harvested stands, which facilitate easier travel. This area is characterized by somewhat more gentle slopes, and a mix of conifers and aspen, in fairly open park like stands. There are also active

range allotments within this area, and evidence of cattle, fences and other range improvements is apparent. This area is immediately adjacent to a ranch and several other private homes.

Applicable Laws, Regulations, Policy and Forest Plan Direction

The National Forest Management Act, and associated agency policy directs the agency to evaluate all roadless lands for their suitability for designation as wilderness within the Wilderness Preservation system. The Final Environmental Impact Statement for the Gallatin National Forest Plan approved in 1987 evaluated roadless characteristics for all inventoried roadless lands on the forest (at that time), and made recommendations for future inclusion in the wilderness preservation system. The Forest Plan did not recommend including any of the project area in the wilderness system.

Roadless effects analysis for projects proposing roads, timber harvest, or surface disturbing activities within roadless lands must consider the potential effect of those projects to roadless land character, and the potential effects those activities may have on future wilderness designation. Additionally, roadless effects analysis must disclose and consider the effects to roadless character per the 2001 Roadless Rule, regardless of the potential for future designation.

In 2001 the Roadless Final Rule (USDA, 2001) was published after lengthy public debate and review. This rule recognized that roadless lands have inherent value for protecting watersheds, providing wildlife habitat, providing drinking water, primitive recreation opportunities, etc. regardless of their future designation potential as Wilderness. The 2001 rule, and a subsequent revision to that rule published in 2005 have been subject to various lawsuits. Currently, the 2001 Rule is in effect, and the 2005 rule has been enjoined from implementation. The Forest Service published interim agency direction interpreting the rule for land managing activities on National Forests that was in place for several years. That direction is now expired, and the reigning legal direction is the language in the 2001 Final Rule.

The portions of the project area within "Inventoried Roadless" per the 2001 Final Rule have not been proposed as wilderness in any wilderness bills introduced to Congress within the last several decades.

In addition to the six characteristics typically used for roadless area analysis (based on direction from the Region 1 Our Approach Desk guide to Effects Analysis), roadless characteristics were identified in the 2001 Roadless Area Conservation Final Rule.

The 2001 Final Rule (36 CFR 294) provides direction regarding timber harvest and road construction in inventoried roadless. The decision to construct roads within inventoried roadless associated with fuels projects is essentially prohibited by 36 CFR 294.12. This part of the 2001 Final Rule does allow some exceptions for road construction, none of which would apply to this project.

The decision to harvest timber is generally prohibited by the 2001 Final Rule, with the following exceptions (36 CFR 294 .13):

a. Timber may not be cut, sold or removed in inventoried roadless areas of

the National Forest System, except as provided in paragraph (b) of this section.

(b). Notwithstanding the prohibitions in paragraph (a) of this section, timber may be cut, sold, or removed in inventoried roadless areas if the Responsible Official determines that one of the following circumstances exists. The cutting, sale or removal of timber in these areas is expected to be infrequent.

(1) The cutting, sale, or removal of generally small diameter timber is needed for one of the following purposes and will maintain or improve one or more of the roadless area characteristics as defined in 36 CFR 294.11

(i) To improve threatened, endangered, proposed or sensitive species habitat; or

(ii) To maintain or restore the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period.

(2) The cutting, sale, or removal of timber is incidental to the implementation of a management activity and not otherwise prohibited by this subpart;

(3) The cutting, sale, or removal of timber is needed and appropriate for personal or administrative use as provided for in part 223 of Title 36 of the Code of Federal Regulations (36 CFR part 223).

(4) Roadless characteristics have been substantially altered in a portion of an inventoried roadless area due to the construction of a classified road and subsequent timber harvest. Both the road construction and subsequent timber harvest must have occurred after the area was designated an inventoried roadless area and prior to January 12, 2001. Timber may be cut, sold or removed only in the substantially altered portion of the inventoried roadless area.

Exception category 1 (ii) applies to proposed fuel treatment activities in units 1 and 2, and exception category (4) noted above applies to units 13-15, as these areas have been previously roaded and harvested, and no longer retain their inherent roadless characteristics

Methodology for Analysis

Unit prescriptions were reviewed relative to potential effects to roadless character and identified in the field and office during initial planning stages of this project. All units that fell within the Lionhead IRA were evaluated to determine the proposed action's potential effect on roadless character.

The following seven "wilderness" attributes are the basis for evaluation of the effects of the alternatives. These characteristics are those used to define wilderness attributes of an area and are the basis for evaluating actions or proposals, which could affect future wilderness designation.

Natural Integrity is the extent to which long-term ecological processes are intact and operating.

Apparent Naturalness means the environment looks natural to most people.

Remoteness is the perceived condition of being secluded, inaccessible, and out of the way

Solitude is a personal, subjective value defined as the isolation from the sights, sounds, and presence of others and development of man.

Special Features include unique geological, biological, ecological, and cultural or scenic features.

Manageability and Boundaries considers the ability to manage a roadless area to meet the minimum size criteria, which is 5,000 acres, for wilderness.

Special Places or Values refers to attributes of the area that are special or valuable to stakeholders, and are often less tangible than the previous 6 attributes.

In addition to these attributes other characteristics were identified in the 2001 Roadless Final Rule/ 36 CFR 294. They include:

High quality or undisturbed soil, water, and air;

Sources of public drinking water;

Diversity of plant and animal communities;

Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land; Primitive, semi-primitive non-motorized, and semi-primitive motorized classes of dispersed recreation;

Reference landscapes;

Natural appearing landscapes with high scenic quality;

Traditional cultural properties and sacred sites;

Other locally identified unique characteristics.

The table below attempts to cross walk the roadless characteristic defined in the 2001 Final Rule with the wilderness attributes described for forest planning. This illustrates the last paragraph in this section.

Table 3.2.3.A.: Wilderness Attributes Cross Walked with Roadless Characteristics

Wilderness Attributes	**Roadless Characteristics**
Natural Integrity	High quality or undisturbed soil, water, and air Sources of public drinking water Diversity of plant and animal communities Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land Reference landscapes
Apparent Naturalness	Natural appearing landscapes with high scenic quality
Remoteness and Solitude	Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed

	recreation
Special Features and Special Places or Values	Other locally identified unique characteristics Traditional cultural properties and sacred sites
Manageability and Boundaries	No criteria

Most of the roadless character features described in the 2001 Roadless Area Final Rule pertain to resource specific issues that are analyzed by other resource specialists for this project (like water, wildlife, vegetation, scenery, and soils sections). Please refer to those sections for more complete effects analysis for each resource.

Spatial Boundary: The spatial boundary for evaluating the effects of this project, as well as the cumulative effects of past or reasonably foreseeable actions on the roadless character is inventoried roadless lands west of Hebgen lake to the Earthquake Lake recommended wilderness boundary (Management Area 4).

Temporal Boundary: For the purposes of determining whether proposed fuel reduction work would have negative impact on roadless character, this analysis will use the time frame of 10 years. This is based on the anticipated maximum amount of time necessary for vegetative recovery to mitigate minor effects to roadless characteristics.

Direct and Indirect Effect of Alternative 1 (No Action Alternative)

The No Action Alternative would have no additional effects to existing roadless character within the project area. Chances for catastrophic wildfire would continue to pose threats to cabin owners and receptionists in the vicinity of the lakeshore road. The no action alternative would still allow the roadless lands to be designated as Wilderness in the future

General Effects Discussion common to all Action Alternatives

Three general fuel treatments are being proposed for areas within inventoried roadless lands. The treatment proposed which most closely replicates natural processes, and best retains the inherent roadless characteristics of the apparent naturalness, sense of remoteness, opportunities for solitude or a primitive recreation experience is prescribed burning. Typically the mechanical treatments associated with prescribed burning are minimal (some slashing of undergrowth timber), and not obvious to most observers. Prescribed burning is proposed in unit 13. The next least obtrusive treatment proposed is pre-commercial or small tree thinning and burning combined. These stands tend to have fewer and smaller trees removed, and are typically handpiled, creating less disturbance than machine piling. This treatment is proposed for units 2 and 15. The treatment most likely to have more visually apparent effects to roadless character is commercial thinning, which depending on current stand conditions and treatment needs to achieve fuels objectives, may have more obvious and longer lasting effects on the roadless characteristics of apparent naturalness, sense of remoteness, and natural integrity. This treatment is proposed in units 1 (Alternative 2) and unit 14. Commercially thinned units on tractor ground may have machine piled slash,

which further contributes to the visually apparent nature of treatments, and the amount of time it takes for those treatments to blend back into the naturally appearing landscape.

The following table summarizes proposed treatments for each unit in inventoried roadless for the two action alternatives. Note: about 2/3 of unit 1, most of unit 2, 2/3 of unit 13 and ½ of unit 14 are in the IRA while the rest of the acres are not in the IRA.

Table 3.2.3.B. Proposed Treatments for Units in the IRA.

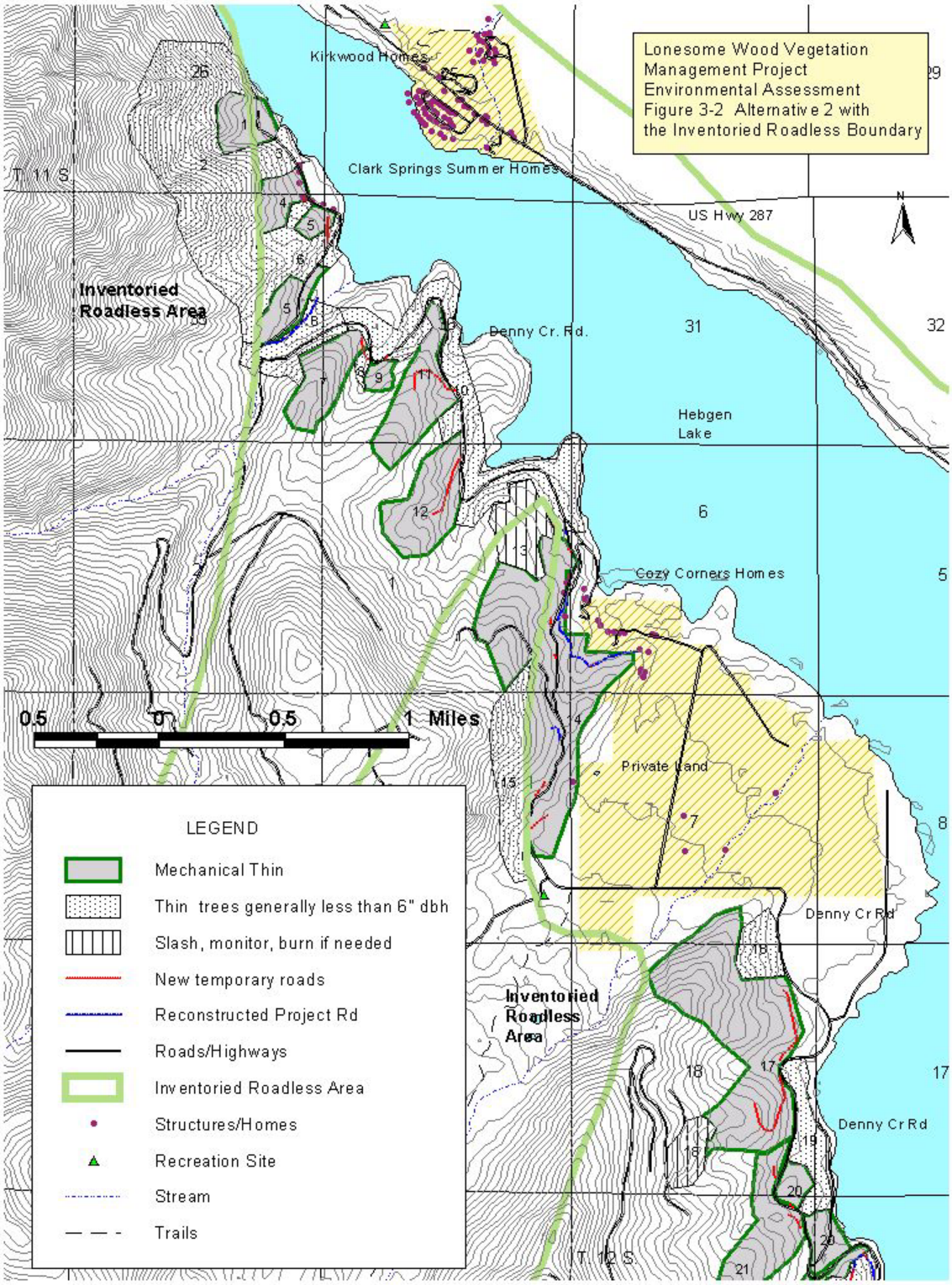
Unit	Alternative 2	Alternative 3
1	55 ac. acres commercial thin-about 35 in the IRA	0 ac.--(roadless portion moved to unit 2)
2	220 ac. precommercial thin	220 ac. precommercial thin
13	45 acres prescribed burn	45 acres prescribed burn
14	210 acres commercial thin	210 acres commercial thin
15	75 acres precommercial thin	75 acres precommercial thin

Again it is important to note that while units 13-15 technically are within the 1987 IRA boundary, they have since been harvested and roaded, and no longer retain roadless character.

Direct and Indirect Effects of Alternative 2

Figure 3.2: Alternative 2 with the Inventoried Roadless Boundary shows the units relative to the IRA boundary. Alternative 2 proposes fuel reductions in units 1 and 2, areas that retain their roadless character. This alternative proposes to treat approximately 35 acres in unit 1, in the IRA, by commercial thinning the unit, and treating the slash on site by handpiling and burning, or by whole tree yarding to a landing area outside of the IRA and disposing of the slash at the landing. This treatment would remove approximately 40-50 percent of the existing trees in unit 1. Harvest would concentrate on smaller trees, and the overall average diameter of trees in the harvested stand would increase. Alternative 2 proposes to remove small non-merchantable trees (generally less than 6" in diameter) across 220 acres of unit 2, by slashing the trees, handpiling and burning the slash on site. The overall objective for fuel treatment in this unit would be to reduce canopy coverage by about 40% to 50 % by a combination of thinning and creating small openings that break up the continuity of fuels. These openings would range in size from 1/3 of an acre to possibly as large as 5 acres by expanding on natural openings that currently exist. The proposed treatments within the roadless portions of units 1 and 2 would accomplish the objective of minimizing the uncharacteristic effects of wildfire proximate to the urban interface, by restoring stand conditions and ecosystem function in the urban interface that support surface fire similar to conditions that would be present if periodic fire had been allowed to burn through these stands.

In treatment areas that currently retain roadless integrity, proposed treatments would be light handed, and have no lasting effects to roadless character. Design features described in EA section 2.4.3 minimize potential effect to


Lonesome Wood Vegetation Management Project Environmental Assessment Figure 3-2 Alternative 2 with the Inventoried Roadless Boundary
Kirkwood Homes
Clark Springs Summer Homes
US Hwy 287
Inventoried Roadless Area
Denny Cr. Rd.
Hebgen Lake
Cozy Corners Homes
Private Land
Denny Cr Rd
Inventoried Roadless Area
Denny Cr Rd
T 11 S
T 12 S
0.5 0 0.5 1 Miles
LEGEND
Mechanical Thin
Thin trees generally less than 6" dbh
Slash, monitor, burn if needed
New temporary roads
Reconstructed Project Rd
Roads/Highways
Inventoried Roadless Area
Structures/Homes
Recreation Site
Stream
Trails

apparent naturalness, natural integrity, sense of remoteness and opportunities for solitude. These areas would retain their potential for designation as wilderness in the future, and their inherent roadless characteristics.

Units 13, 14 and 15 are proposed for fuel treatments in this alternative, but are in a portion of the project area that no longer retains roadless character. Three treatments are proposed in this area, prescribed burning, small tree thinning, and commercial thinning. These activities would be apparent to recreationists visiting the area, with additional effects to the already compromised roadless character of the area immediately surrounding these units.

Potential Effects to Roadless Characteristics:

Natural Integrity: The proposed treatments would to an extent replicate the effect of a low intensity understory fire in these areas. Stand treatments focus on removing small understory ladder fuels to minimize fire climbing into the crowns and establishing acceptable spacing between larger trees that have touching crowns. Surface fuel reduction is intended to reduce the risk of sustained crown fire and reduce the severity of wildfire effects. Treatments favor Douglas-fir survival and regeneration and lower intensity fire. Douglas-fir is a dominant species in these stands but is being out competed by more shade tolerant species due to a lack of periodic low intensity fires. The lack of fire over the last century has created un-natural fuel build ups in some locations. Fuel treatments should at least partially restore this balance. No significant negative effects to natural integrity are anticipated. See the effects discussions for wildlife, fisheries, and watershed for more specific discussions of effect to natural integrity.

Apparent Naturalness: During the mechanical treatment some portions of the project area would likely appear manipulated, particularly the commercially thinned units 1 and 14. The effect from small tree removal/precommecial thinning (units 2 and 15) is likely to be short term, 3-5 years, until understory vegetation has flushed and regrowth hides the small stumps and burn piles left from thinning. The effects to commercially thinned units would be more persistent – with evidence of stumps and slash more apparent and potentially persisting for several decades. Only occasional handpiles are expected in the Roadless portion of unit 1. Once the area is treated by burning slash piles, and several seasons of re-growth have softened the visual impacts, forest visitors would not likely notice where fuel treatments have occurred in precommercially thinned and burned units. Commercially thinned areas would be more apparent to visitors. Larger trees would be removed (targeting 15-35' spacing between residual trees), scattered throughout Units 1 and 14, potentially removing 40-50% of the existing overstory. Burned trees, logs, and stumps could be visible for several decades until they rot. The stumps would be an apparent human manipulation on an otherwise mostly natural appearing landscape. Mitigation activities in some of the treated areas would help minimize this effect, such as the angle cutting of stumps and covering them with dirt where feasible, and minimizing the number of larger diameter trees removed to what is necessary to achieve the stated objective

of reducing the potentially catastrophic effects from wildfire.

Remoteness: The presence of forest workers, chainsaws, helicopter, etc. would have time-specific effects on the feeling of remoteness lasting several months in length. This activity could create a temporal impact from the sounds of chainsaws, skidders and other equipment. The loss of sense of remoteness attributable to this proposal would cease as soon as personnel left the area. It is estimated to take about 8-12 days to complete work in all of unit 1.

Opportunities for Solitude: There would be short term (several months) impacts to visitors' opportunities for solitude within the immediate vicinity of the treatment units. Noise from chainsaws, presence of loggers and yarding machinery would affect people's opportunity for solitude for the duration of the project. There would be no long term or lasting impacts to opportunities for solitude. Once fuel treatment efforts have ceased, there would be no effect on opportunities for solitude.

Special Features and Boundary Manageability: These areas are nearby the Lionhead Recommended Wilderness, and are backdrop landscapes for summer home owners and clients visiting the Firehole Ranch. The forested landscape and natural setting is certainly one of the attractants to this ranch and summer cabins. This project, with mitigation, should be able to accomplish the goal of reducing the likelihood of crown fire proximate to the summer homes, and providing a safe escape route while retaining much of the integrity of the natural setting that many visitors have come to cherish. This project does not propose to change inventoried roadless boundaries. **Past harvest** activities (prior to this project proposal) would likely compel forest planners to adjust the inventoried roadless boundary during the forest plan revision process adjacent to proposed units 13-15. None of the project area is recommended wilderness in the current forest plan, nor has any of the project area been included in draft wilderness legislation for Montana in the last several decades.

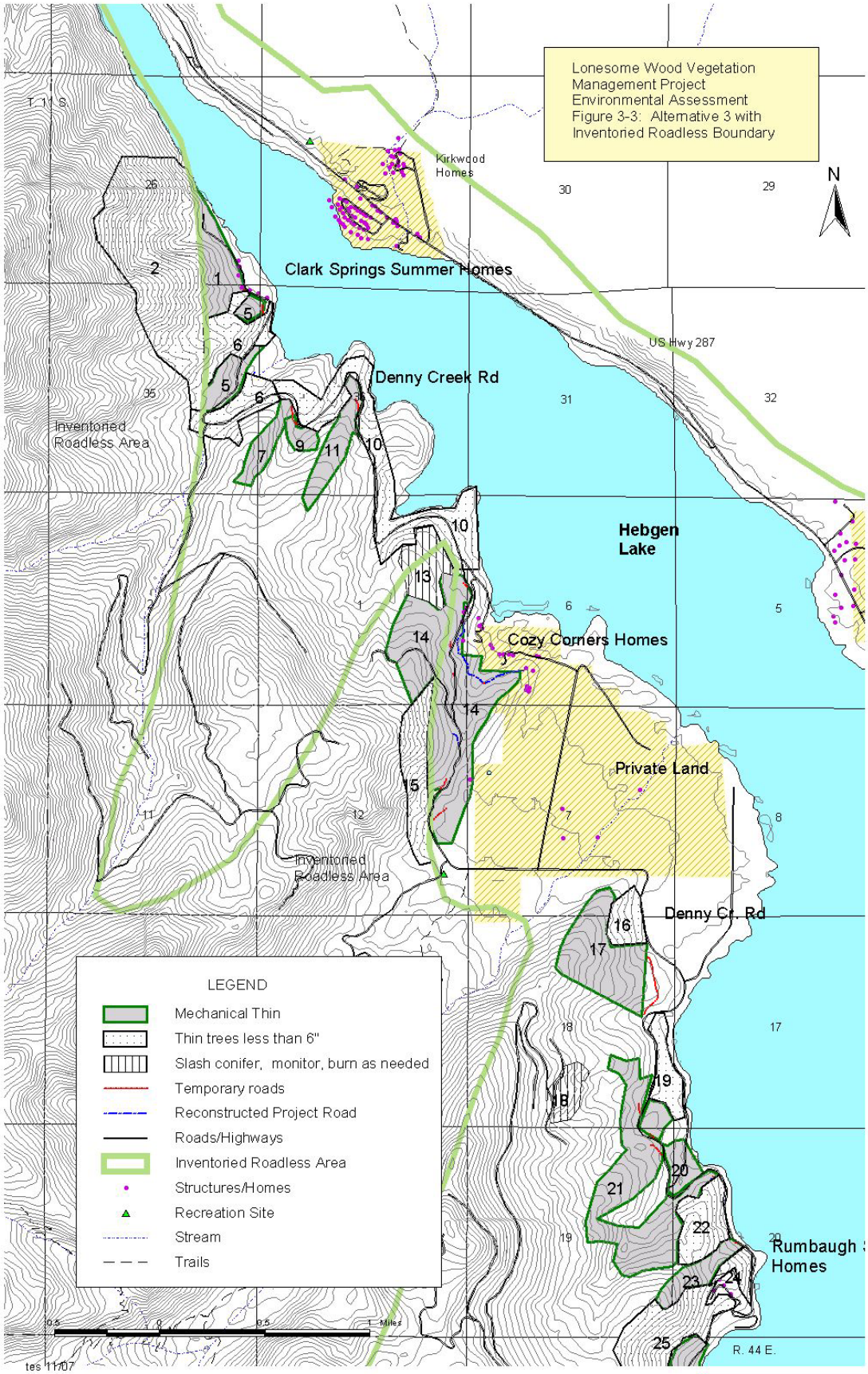
There would be no irretrievable or irreversible commitment of resources, which would eliminate possibility of the roadless area to be designated as wilderness at some future date. Temporal effects from this alternative may preclude including portions of this project area within inventoried roadless in the next several decades (the commercially thinned portions of Unit 1). This would be determined when the Forest revisits the roadless inventory during forest plan revision.

Cumulative Effects of Alternative 2

Barring an unforeseen major event such as fire, epidemic insect or wind events, there are no other known projects or activities proposed or ongoing in the analysis area, which would contribute to any significant cumulative effects on roadless area values, which have not already been described. Please see the cumulative effects checklist for roadless, in the project file.

Direct and Indirect Effects of Alternative 3

Figure 3-3: Alternative 3 with the Inventoried Roadless Boundary shows the units relative to the IRA boundary. The effects to roadless characteristics are similar to Alternative 2, except that the portion of Unit 1, which is in inventoried roadless in Alternative 2, would be


Lonesome Wood Vegetation Management Project
Environmental Assessment
Figure 3-3: Alternative 3 with Inventoried Roadless Boundary
N
T. 11 S.
Kirkwood Homes
Clark Springs Summer Homes
US Hwy 287
Denny Creek Rd
Inventoried Roadless Area
Hebgen Lake
Cozy Corners Homes
Private Land
Inventoried Roadless Area
Denny Cr. Rd
Rumbaugh Homes
R. 44 E.
LEGEND
Mechanical Thin
Thin trees less than 6"
Slash conifer, monitor, burn as needed
Temporary roads
Reconstructed Project Road
Roads/Highways
Inventoried Roadless Area
Structures/Homes
Recreation Site
Stream
Trails
0.5
0
0.5
1 Miles
tes 11/07

incorporated in unit 2 that proposes only small trees removal. Only those portions of proposed Unit 1 outside of inventoried roadless (essentially immediately west and east or below the Hebgen Lakeshore road) would be commercially thinned. By eliminating the commercial thinning in the IRA portion of unit 1, there would be no need to re-evaluate roadless boundaries during forest plan revision. This alternative would minimize negative impacts to apparent naturalness, and natural integrity within inventoried roadless, while still accomplishing some fuel reduction goals.

Cumulative Effect of Alternative 3

Barring an unforeseen major event such as fire, epidemic insect or wind events, there are no other known projects or activities proposed or ongoing in the analysis area, which would contribute to any significant cumulative effects on roadless area values, which have not already been described. Please see the cumulative effects checklist for roadless, in the project file.

Summary Conclusion

The 2001 Roadless Final Rule provides for opportunities to manage generally small diameter timber without building roads when: "(1) The cutting, sale, or removal of generally small diameter timber is needed for one of the following purposes and would maintain or improve one or more of the roadless area characteristics as defined in 36 CFR 294.11 … (ii) To maintain or restore the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period" and where … (4) "Roadless characteristics have been substantially altered in a portion of an inventoried roadless area due to the construction of a classified road and subsequent timber harvest. Both the road construction and subsequent timber harvest must have occurred after the area was designated an inventoried roadless area and prior to January 12, 2001. Timber may be cut, sold or removed only in the substantially altered portion of the inventoried roadless area." Clause (1) (ii) applies to fuel treatments proposed in Units 1 and 2, and Clause (4) applies to Units 13-15.

All alternatives with proposals for commercial thinning would increase the overall average diameter of target stands, generally concentrating thinning on smaller diameter trees. Short term negative effects (10+ years) to apparent naturalness and natural integrity would be most prevalent in Alt. 2 in the commercially thinned stand (Unit 1), and may not be perfectly in sync with some aspects of the Final Roadless Rule. Alternative 2 does propose to harvest enough mid size diameter mature timber that the end result (effects to apparent naturalness) would be quite obvious to recreationists who may travel through unit 1. However, without treating these stands within the IRA, potential effects from catastrophic wildfire could destroy private homes, and threaten human safety. Clause (1) (ii) of the Final Rule provides the option of treating fuels to lessen the uncharacteristic effects from wildfire. This project is designed to do that, while mitigating the effects to roadless character to the extent possible.

The potential impacts from Alternative 3 are similar to 2 except there is no commercial harvest in the IRA in unit 1

which eliminates those potential impacts.

Alternative 1, 2, and 3 comply with the Roadless Final Rule (2001) by focusing on removing generally small diameter timber within the truly roadless units, in an attempt to mitigate the potential effects to ecosystem function and structure and threats to human health and safety, from uncharacteristically intense wildfire events which may occur as a result of long term fire suppression.

3.2.4 Issue 4. Canada Lynx

Issue: Vegetation treatments in lynx habitat can alter the preferred habitat of their primary prey species, snowshoe hare (*Lepus americanus*). The availability of snowshoe hares is a primary limiting factor for lynx, and therefore proposed vegetation management activities may adversely affect lynx.

Discussion: On March 24, 2000 the U.S. Fish and Wildlife Service (USFWS) published its determination on the status for the contiguous U.S. distinct population segment of the Canada lynx (*Lynx canadensis*). The lynx has since been listed as a "threatened" species in the contiguous United States.

Affected Environment

Lynx habitat requirements

Prey availability, especially snowshoe hares, appears to be a primary limiting factor for lynx in the Northern Rockies. The main cause of lynx mortality is starvation (USDA Forest Service 2007*a*, page 141). Therefore, lynx habitat conservation measures are currently focused on maintaining adequate quantities of winter showshoe hare habitat.

Primary forest types that support snowshoe hare are subalpine fir, Engelmann spruce, and lodgepole pine (Ruediger et al. 2000, page 1-3). Secondary foraging habitat includes aspen, willow, and moist, cool, Douglas-fir stands (Ruediger et al. 2000, page 1-3). The key component of snowshoe hare habitat is dense understory vegetation. In winter, lynx forage for hares in vegetation that provides high densities of young conifer stems or branches that protrude above the snow (Ruediger et al. 2000, p. 1-4 and 1-7). Snowshoe hares avoid clear-cuts and very young stands (Ruediger et al. 2000, p. 1-7). Studies conducted in Yellowstone National Park and the Targhee National Forest showed that snowshoe hares generally occur at low densities in the Greater Yellowstone Ecosystem. However, higher densities of snowshoe hares have been found in dense stands of regenerating lodgepole pine saplings tall enough to protrude above the snow line in winter (McKelvey and McDaniel 2001, page 15; Hodges and Mills 2005), along with mature Douglas-fir and lodgepole pine/spruce-fir stands with well-developed understories and good canopy cover (Hodges and Mills 2005). Research in other portions of the Northern Rockies has shown similar results with winter snowshoe hare habitat often found in the stand initiation, understory re-initiation, and old forest multi-storied structural stages (USDA Forest Service 2007*a*, page 145).

Vegetation management can affect habitat suitability for lynx. Pre-commercial thinning reduces stem density in the dense, young stands that

often provide high-quality snowshoe hare habitat. Reductions in stem density alter food and cover availability so that these stands have little or no value for snowshoe hares. Understory thinning in older, multi-storied stands with understory vegetation dense enough to support snowshoe hares has a similar effect. Removal of only larger diameter overstory trees has little effect upon snowshoe hare habitat, and may even improve snowshoe hare habitat by creating small openings that stimulates understory growth (USDA Forest Service 2007*a*, page 153-154).

Lynx Habitat Management Guideance

In January 2000 the *Canada Lynx Conservation Assessment and Strategy* (LCAS) was published, which established early conservation measures for lynx habitat. It recommended that Lynx Analysis Units (LAU's) that contain all components of lynx habitat and approximate the size of an area used by an individual lynx be delineated (Ruediger et al. 2000, page 7-4). The Gallatin National Forest reviewed lynx habitat and re-delineated LAU's across the Forest in 2005. The project area is within the Henry's Lake Mountains LAU.

The recent Northern Rockies Lynx Forest Plan Amendment provides current guidance for management of lynx habitat. This document contains standards and guidelines specific to vegetation management and other Forest Service land management activities. The standards and guidelines in the Forest Plan amendment place more emphasis on conservation of old, multi-storied forests with adequate understory density to provide food and cover for snowshoe hares during winter as a result of recent research showing increased importance of these stands. There is much less emphasis on denning habitat compared to the old direction in the Lynx Conservation Assessment and Strategy, because denning habitat is no longer believed to be limiting. There are 4 standards for vegetation management applicable to this project (USDA Forest Service 2007*b*, Attachment 1). These standards are:

1. VEG S1: If more than 30% of the lynx habitat in an LAU is currently in a stand initiation structural stage that does not yet provide winter snowshoe hare habitat, no additional habitat may be regenerated by vegetation management projects.
2. VEG S2: Timber management project shall not regenerate more than 15% of lynx habitat on National Forest System lands within an LAU in a 10-year period.
3. VEG S5: Precommercial thinning projects that reduce snowshoe hare habitat may occur from the stand initiation structural stage until the stands no longer provide winter snowshoe hare habitat only: (1) within 200' of administrative sties, dwellings, or outbuildings; (2) for research studies or genetic tree tests evaluating genetically improved reforestation stock; (3) based on new information that is peer reviewed and accepted by the regional level of the Forest Service, and state level of FWS, where a written determination states that a project is not likely to adversely affect lynx, or that a project is likely to have short term adverse effects on lynx or its habitat but would result in long-term benefits to lynx and its habitat; (4) for conifer removal in aspen, or daylight thinning around individual aspen trees where aspen is in decline;

(5) for daylight thinning of planted rust-resistant white pine where 80% of the winter showshoe hare habitat is retained; or (5) to restore whitebark pine.

VEG S6: Vegetation management projects that reduce showshoe hare habitat in multi-story mature or late-successional forests may occur only: (1) within 200' of administrative sites, dwellings, outbuildings, recreation sites, and special use permit improvements, including infrastructure within permitted ski area boundaries; (2) for research studies or genetic tree tests evaluating genetically improved reforestation stock; or (3) for incidental removal during salvage harvest (e.g., removal due to location of skid trails).

The above standards are to be applied to all vegetation management projects except for fuel treatment projects within the wildland-urban interface as defined by the Healthy Forests Restoration Act. For fuels treatment projects that do not meet the above standards, no more than 6% (cumulatively) of the lynx habitat on a National Forest can be subject to fuels treatments (USDA Forest Service 2007, Attachment 1, page 4).

Additionally, the following guideline is applicable to fuels treatment projects:

1. VEG G10: Fuel treatment projects within the WUI as defined by the Healthy Forests Restoration Act should be designed considering Standards VEG S1, S2, S5, and S6 to promote lynx conservation.

Project Compliance with Habitat Management Guideance

Action alternatives 2 and 3 would be in compliance with standards VEG S1 and S2, as no regeneration activity is proposed under either alternative.

Alternatives 2 and 3 would both entail pre-commercial thinning in two units (#16 and 22). Unit #16 (25 acres) contains dense lodgepole pine seedlings that would support snowshoe hares during winter. Pre-commercial thinning would alter this stand to an unsuitable condition for winter snowshoe hare habitat, which would not meet standard VEG S5. Units #22 is a mixture of lodgepole and aspen saplings. This stand is not dense enough to qualify as winter snowshoe hare and treatments would designed to promote aspens by removing competing lodgepole pines. Treatment in this unit would therefore not affect winter showshoe hare habitat.

Alternatives 2 and 3 would entail understory thinning of approximately 120 and 100 acres respectively of old, multi-storied forest that currently provide winter snowshoe hare habitat. An additional 280 and 125 acres of older, multi-storied stands would be commercially thinned as well. Since commercial thinning units would have all size classes of trees removed to meet desired stand density, these stands would be converted to unsuitable condition for winter showshoe hare habitat. Treatment of these dense, mutli-storied stands would not meet standard VEG S6.

Although fuels treatments proposed in alternative 2 and 3 would not meet standards VEG S5 and VEG S6, fuels treatments in the wildland-urban interface are still in compliance with the Forest Plan Amendment if the cumulative amount of fuels treatments in lynx habitat across the Forest is limited to 6% or less of the total available lynx habitat. There are approximately 870,000 acres of lynx habitat on the Gallatin National Forest. Fuels treatment could therefore occur on up to

52,200 acres of lynx habitat under the Forest Plan guidance for fuels treatment projects. (USDA Forest Service 2007*a*, page 453). Under alternatives 2 and 3, approximately 2,455 and 2,195 acres of lynx habitat would be subject to fuels treatments. Most of these acres do not currently provide winter snowshoe hare habitat because they lack well-developed understories necessary for snowshoe hare food and cover. The cumulative amount of acres with fuels treatments implemented or planned on the Gallatin National Forest would still be well below the 6% allowable limit from the Forest Plan Amendment.

Fuels treatment projects were designed to balance the need to improve public safety with minimizing impacts to wildlife species such as lynx. Alternative 2 proposes fuels treatments to provide for protection of structures and a safe evacuation route based on modelling of expected fire behavior, while Alternative 3 proposes lesser amounts of fuels treatments to decrease effects on some species of wildlife (primarly moose) while still accomplishing much of the purpose and need for the project. Therefore, the intent of guideline VEG G10 would be met.

Summary

Approximately 425 (under alternative 2) or 250 acres (under alternative 3) of winter snowshoe hare habitat would be altered to unsuitable condition by pre-commercial, commercial, and understory thinning. However, the project would be in compliance with Forest Plan direction for management of lynx habitat. It is anticipated that projects in compliance with the Forest Plan Amendment standards would have few adverse effects upon lynx, and would promote the survival and recovery of lynx populations (USDA Forest Service 2007*b*, page 21). Therefore, this issue can be dismissed due to minor effect.

3.3 Public Safety (Factor 2)

Proposed activities would not have a significant negative affect on public health and safety. The purpose of the project is to reduce risks posed by forest fires to public and firefighter health and safety, especially as it relates to the wildland urban interface near the identified homes and evacuation route.

Mitigation is proposed that would ensure public safety in thinning activity areas and along the Denny Creek Road. Logging activities as proposed would be conducted in a safe manner to protect the public (EA, section 2.4.3.2). Similar actions have not significantly affected public health and safety. A minor impact for a short period may occur to local air quality from the burning of logging slash. However, burning is planned in accordance to State air quality standards and within burning periods approved by the State of Montana (EA, section 2.4.3.2).

Prescribed pile burning can present a risk of escaped fire. Extensive agency experience with similar local projects and conditions show these risks are low. This is due in part to the design of the project, including fire management expertise, the use of experienced crews, and presence of the necessary fire suppression resources. Warning signs and public announcements would be used to notify forest users of logging and burning activities.

The water resource analysis indicates no degradation of water quality that could

constitute a public health threat. The proposal would comply with the Clean Water Act. (EA, section 3.11.2)

3.4 Unique Characteristics of the Geographic Area (Factor 3)

There are no adverse effects to historic places or loss of scientific, cultural, historical, or other unique resources (EA 3.11.2, Allen 2007). This project is in compliance with the Region 1 programmatic agreement (1995) between the State Historic Preservation Office and the Advisory Council on Historic Preservation. (Allen 2006, EA, section 3.11.2)

There are no prime farmlands, wetlands, or wild and scenic rivers within the affected area. Wetlands would be protected by mitigation, EA 2.4.3. (Story 2.4.3)

A small portion of the project area is within an inventoried roadless area. However, no new road construction would occur as part of the alternatives. The alternatives would not result in significant impacts on inventoried roadless areas. The analysis concludes that the roadless characteristics would be maintained and the project complies with the Roadless Final Rule 2001. (EA, section 3.2.3)

3.5 Controversy over Effect (Factor 4)

This factor pertains to any disagreement between experts in a given field over the potential effects of this proposal. Although some may oppose the authorization of fuel treatments and associated activity, that does not constitute controversy over effect.

Chapter 2 of this document discusses public involvement and Chapter 4 lists the agencies, groups, and organizations contacted about this proposal. Written comments received can be found in the project file. At this time, no input was received that would indicate that there is controversy over the effects and conclusions discussed in this EA. However, consideration of this factor in determining significance should be delayed until after this EA is distributed to interested groups and individuals for comment.

After the public comment period, a summary of public comments and a Forest Service response would be prepared as an Appendix to the decision document. This information can be used to determine whether there is controversy over the effect and the significance of that controversy

3.6 Unique or Unknown Risks (Factor 5)

Scoping did not identify highly uncertain, unique or unknown risks. The possible effects on the human environment are not highly uncertain nor do they involve unique or uncertain risks. The technical analyses conducted for determinations of the impacts to the resources are supportable with use of accepted techniques, reliable data, and professional judgment. Impacts are within the limits that are considered thresholds of concern.

Thinning treatments and prescribed burning have occurred on the Gallatin National Forest for 50 years or more. This proposal involves routine operational practices for all phases of project implementation.

3.7 Precedence (Factor 6)

As stated in Chapter 1 of this EA, the objectives are to lower the risk of crown fire initiation, spread and fire severity by reducing the amount of dead and down

fuel loadings and by reducing tight canopy closure in tree crowns and ladder fuels.

This project would not set a precedent for future actions with significant effects. Proposed management practices are compatible with the Forest Plan guidance, and with the capabilities of the land. This action does not represent a decision in principle about a future consideration. While it is possible that future maintenance of fuel conditions may be needed, the future condition, need for and management priorities are uncertain now.

3.8 Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.

Consistent with the Council for Environmental Quality (CEQ) guidance, the past, present, and reasonably foreseeable activities are considered in the cumulative effects analysis for each resource area relative to the specific potential future effects of the proposal. Because the project's direct and indirect effects vary in time and space, each resource issue has a defined specific cumulative effects analysis area and timeframe that is pertinent to the specific resource and the issue being considered. The resource discussion evaluates the degree to which past, present, and future actions influenced or would influence the affected environment.

Cumulative effect analysis should "count what counts", not produce superficial analyses of a long laundry list of issues that have little relevance to the effect of the proposed action or the eventual decisions." (CEQ, January 1997, pp12) To state it differently, in relation to a project, a possible cumulative effect relates to whether the proposal would have a significant additive effect relative to a resource such as sensitive plants, soils, wildlife or fisheries. This strategy for cumulative effects analysis is further supported by recent guidance from the Council of Environmental Quality, Guidance on the Consideration of Past Actions in Cumulative Effects Analysis (6/24/2005) which states, "Generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into historical details of individual past actions."

The activities described below occur on lands in and around the project area and were considerd for possible cumulative effects. These are activities that have occurred in the past, present, or may occur in the foreseeable future. Future activities, including planned projects, may or may not occur. Not all activities pertain to each resource issue.

Timber harvesting on public land west of Hebgen Lake

Name	Dates Harvested	Total Acres
West Hebgen	95-86	1348
Moonlight	95-86	63
Quaking Dead	95-86	34
Various Past Harvest	76-46	1107

Other tree cutting activity on public land

Personal Fire wood gathering – some of these areas are included with the past timber harvest areas.

Aspen Regeneration - some of these areas are included with the past timber harvest activity.

Pre-commercial thinning.

Ongoing recreation use on public land

May include hunting, fishing, camping, motorized travel (vehicles, OHV, and snowmobile), use of Lakeshore recreation residences. These uses are expected to continue. Some proposed changes are discussed in the Gallatin National Forest Travel Management Plan, Record of Decision 10/2006.

Trail Maintenance and Use

The following trail heads are in the analysis area but not in units: Basin Trail, Coffin Lake Trail. Use of the trails and trail heads is expected to continue. For more detail on expected use see the Gallatin National Forest Travel Management Plan FEIS (10/2006), Detailed Description of Alternatives, pp. II-242-253 and the Record of Decision.

Implementation of the recent Gallatin Forest Travel Plan For more detail on expected use see the Gallatin National Forest Travel Management Plan FEIS (10/2006), Detailed Description of Alternatives, pp. II-242-253 and the Record of Decision. Some of the "go down" roads along the lakeshore will be closed. Some summer and winter trail use will change.

Past wildfires that escaped control

Two fires escaped control in compartment 709 in the 1970's. Both fires were upslope of the project area. One fire grew to 150 acres and the other to 300 acres. There have been approximately 75 spot fires recorded in compartments 709 and 710 since the 1940's.

Fisherman's Point Fishing Facility:

Pennsylvania Power & Light (PPL) plans to build a handicap accessible fishing facility at Fisherman's Point.

Lonesomehurst Boat Ramp

Improvements are planned for the Lonesomehurst Boat Ramp.

Watkins Creek Grazing Allotment:

Grazing is expected to continue on the Grazing allotment in the Watkins Creek drainage.

Fish habitat restoration

A fish barrier is proposed for installation in the "No Name Creek" /Wally McClure Creek west and south of Firehole Ranch.

Outfitter and Guide Use

Outfitter activity is limited in the area. One permittee provides trail rides on the Denny Creek road and up the Coffin Lake Trail.

Non-recreation special uses:

The Forest routinely responds to proposals for road and utility access and other varied uses on NFS lands. It is reasonable to anticipate the current uses will continue. In the project area this includes permits for access roads, water transmission lines, water developments for drinking water and others.

Noxious Weed Control

Approximately 89 acres are treated annually in the project area and a total of approximately 151 acres of noxious weeds have been treated in the 3021 acre cumulative effects analysis area. This work is expected to continue.

Forest and County Roads

No major improvements are planned for the roads in the project area. They are likely to be maintained at about the

current level. Culvert replacement is being considered for the Watkins Creek and Trapper Creek culverts on the Denny Creek Road. For more detail on expected use of Forest Roads see the Gallatin National Forest Travel Management Plan FEIS (10/2006), Detailed Description of Alternatives, pp. II-242-253 and Record of Decision.

3.9 Potential Effects to Private Land, Districts, Sites, Other Improvements or Structures (Factor 8)

The purpose of the proposal is to reduce the threat to life and property in the wildland urban interface by reducing the risk of crown fire initiation, spread and fire intensity. There is a potential benefit to private property from the proposal by meeting the purpose and need for action. See the comparison of alternatives in Chapter 2 and 3 for more information.

There are no historical districts or sites located on National Forest system lands being considered for treatment. A cultural resource inventory has been completed in the area, and all known cultural resources would be protected through mitigation (EA, section 2.4.3.2). The potential for impacting undiscovered sites is mitigated by compliance with Forest Plan standards and guidelines and through the use of standard timber sale contract clauses. No conflicts are anticipated.

3.10 Potential Effects on Threatened and Endangered Species (Factor 9)

The U.S. Fish and Wildlife Service has identified the Canada lynx and the gray wolf as threatened species that may be present in this portion of the Gallatin National Forest. (USFWS 2007)

Approximately 425 (under alternative 2) or 250 acres (under alternative 3) of winter snowshoe hare habitat would be altered to unsuitable condition by pre-commercial, commercial, and understory thinning. However, the project would be in compliance with Forest Plan direction for management of lynx habitat. It is anticipated that projects in compliance with the Forest Plan Amendment standards would have few adverse effects upon lynx, and would promote the survival and recovery of lynx populations (USDA Forest Service 2007*b*, page 21). Therefore, this issue can be dismissed due to minor effect. (Pils 2007a)

There are no wolf territories within the project area. The nearest known wolf pack is the Cougar Creek pack's territory on the west side of YNP northeast of West Yellowstone, MT (U.S. Fish & Wildlife Service et al. 2007, Figure 3), approximately 10 miles east of the project area. There are no known wolf dens or rendezvous sites in or near the proposed treatment units. Wolves probably pass through on occasion, but do not regularly inhabit the project area. Because there are no wolf packs established in the project area, any disturbance effects from project activities would be limited to temporary displacement of animals passing through the area. These effects would be discountable, and this issue can be dismissed due to minor effect. (Pils 2007j) The gray wolf is listed under the Endangered Species Act as a nonessential, experimental population in the Yellowstone area. Such populations are treated as species proposed for listing during the Section 7 process, and therefore consultation with the U.S. Fish and Wildlife Service are not required for this species.

Based on the analysis for these species the potential impact to threatened and endangered species are expected to be minor and in compliance with current direction.

3.11 Applicable Laws and Regulations

3.11.1 Federal Laws

Based on the issue identified in Chapter 2, the principle Federal laws applicable to this proposal include the: National Forest Management Act of 1976 (as amended), National Environmental Policy Act (NEPA) of 1969 (as amended), Endangered Species Act of 1973, National Historic Preservation Act (as amended 1992), American Indian Religious Freedom Act, and Native American Graves and Repatriation Act. Compliance with these laws is discussed below, or references within this document are noted. The Clean Air Act and Clean Water Act are discussed below under Findings.

3.11.2 Findings and Disclosures

Several of the laws and executive orders require project-specific findings or other disclosures. These are included here, and will be included in the Decision Notice. They apply to all alternatives considered in detail in this EA.

Clean Water Act

The Lonesome Wood Vegetation Management Project area for Alternative 2 and 3 would be in compliance with the Montana Water Quality Act and Administrative Rules of Montana, WQLS/TMDL constraints, and with Gallatin NF Forest Plan direction for water quality protection. Sediment modeling indicates that project sediment changes are low-moderate and well within the Gallatin NF sediment guidelines. (Story 2007a)

Clean Air Act

Residences particularly near units 1-4 Clark Springs Summer homes, unit 14 (Cozy Corners homes), 22, 24, and 29 (Rumbaugh Summer homes), and units 26 and 29 (Romset Summer homes and Lonesomehurst Summer homes) are within minimum ambient distance. These units are constrained to a minimum ambient distances of 0.1 to 0.2 miles to minimize $PM_{2.5}$ exceedences at the residences. These impacts are mitigated in the design features for action alternatives. Burning would be completed during the spring or fall when there is a low likelihood those homeowners would be in the area.

Outside of the minimum ambient distances the smoke concentrations are expected to be within NAAQS and State of Montana air quality standards. The Lonesome Wood Vegetation Management Project burns would be coordinated with the Montana/Idaho State Airshed Group (http://www.smoke.org). The operations of the Montana/Idaho State Airshed Group are critical to minimize cumulative smoke/PM_{25} air quality impacts. The State Airshed Group, Monitoring Unit in Missoula, evaluates forecast meteorology and existing air quality statewide by individual airshed and specifies restrictions when smoke accumulation is probable due to inadequate dispersion. (Story 2007)

National Forest Management Act of 1976 (NFMA)/Gallatin Forest Plan

The National Forest Management Act (NFMA) and implementing regulations require the following findings to be made when making project-level decisions involving timber harvest.

Forest Plan consistency:

The Act required all projects and activites be consistent with the Forest Plan. The Gallatin Forest Plan was approved in 1987. Implementation of the action alternatives complies with the Gallatin Forest Plan and the Regional Guide. This project incorporates all applicable Forest Plan forest-wide standards and guidelines and management area prescriptions as they apply to the project area, and complies with Forest Plan goals and objectives. This includes additional direction contained in all amendments. All required interagency review and coordination has been accomplished; new or revised measures resulting from this review have been incorporated.

The Forest Plan complies with resource integration and management requirements of 36 CFR 219 (219.14 through 219.27). Application of Forest Plan direction for the Lonesome Wood Vegetation Management project ensures compliance at the project level. Project design is responsive to guiding direction for natural resource management activites as discussed in Chapters 1, 2 and 3.

Other NFMA consistency requirements:

1. Suitability for Timber Production: No timber harvest, other than salvage sales or sales to protect other multiple-use values, shall occur on lands not suited for timber production (16 USC 1604(k)).

Findings*:* Within the proposed treatment units MA 1 (Administrative site) and MA 15 (grizzly bear/dispersed recreation) are unsuitable and this amounts to approximately 5-10% of the treatment units. The project is designed for multiple use values (EA, section 1.3) including public safety and aspen enhancement. These activities are compliant with MA goals and standards. MA 1 goals are to maintain the administrative sites for the safety and enjoyment of users. MA 15 standards encourage big game habitat improvement that includes aspen enhancement. Chapter 1 section 1.6 and Chapter 3.2 discuss MA direction and compliance.

2. Timber Harvest on National Forest Lands (16 USC 1604(g)(3)(E)): A Responsible Official may authorize site-specific projects and activities to harvest timber on National Forest System lands only where:

a. Soil, slope, or other watershed conditions will not be irreversibly damaged (16 USC 1604(g)(3)(E)(i)).

Finding: Soil, slope and watershed conditions would be adequately protected. (Story 2007a, Shovic 2007)

b. There is assurance that the lands can be adequately restocked within five years after final regeneration harvest (16 USC 1604(g)(3)(E)(ii)).

Finding: The overall intent in the forested environments is to reduce stand densities by thinning. There is no intent to create conditions for tree regeneration in these areas. (Novak 2007, EA Chapter 2 and Appendix A)

c. Protection is provided for streams, stream banks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat (16 USC 1604(g)(3)(E)(iii)).

Finding: Protection is provided for streams, stream banks, wetlands and other bodies of water from detrimental changes…. Stream, riparian and fish habitat protection would be assured through best management practices, streamside protection rules and project specific mitigation. (EA, Section 2.4.3.2, Story 2007a, Roberts 2007))

d. The harvesting system to be used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber (16 USC 1604(g)(3)(E)(iv)).

Finding: The harvesting system proposed is the system determined to meet the fuel reduction purpose and need described in Chapter 1 most effectively. The economic feasibility of this project was not the reason for developing the alternatives. (Novak 2007, Lamont 2007)

3. Clear cutting and Even-aged Management (16 USC 1604(g)(3)(F)): Insure that clearcutting, seed tree cutting, shelterwood cutting, and other cuts designed to regenerate an even aged stand of timber will be used as a cutting method on National Forest System lands only where:

Finding: Not applicable, no clearcuts are proposed. The thinning proposed is an intermediate harvest. (EA, Chapter 1)

5. Construction of temporary roadways in connection with timber contracts, and other permits or leases: Unless the necessity for a permanent road is set forth in the forest development road system plan, any road constructed on land of the National Forest System in connection with a timber contract or other permit or lease shall be designed with the goal of reestablishing vegetative cover on the roadway and areas where the vegetative cover has been disturbed by the construction of the road, within ten years after the termination of the contract, permit, or lease either through artificial or natural means. Such action shall be taken unless it is later determined that the road is needed for use as a part of the National Forest Transportation System (16 USC 1608(b)).

6. Standards of roadway construction: Roads constructed on National Forest System lands shall be designed to standards appropriate for the intended uses, considering safety, cost of transportation, and impacts on land and resources (16 USC 1608(c)).

*Finding***:** The Gallatin National Forest Travel Plan analysis and decision has rigorously determined the management objectives of the entire road system throughout the Forest, including this area. This fulfills the Roads Analysis requirements for project level analysis. In the Travel Plan, disposition of "Project Roads" was left to the project level decision-making process. (Queen 2007) Project roads are those roads not open for motorized public use or those open for administrative use.

No additional system roads will be constructed as part of this project. Proposed temporary roads will be constructed and used for the life of the project and will be restored to surrounding area vegetation management objectives as part of the project closeout and not added to the Forest road system. (Queen 2007) The need for temporary roads is discussed in section 2.4.3.1.

D. Consideration of best available science:

In accordance 219.35a (2004

Interpretive Rule for Planning), the effects analysis is based on a thorough review of relevant scientific information, consideration of responsible opposing views and the acknowledgement of incomplete or unavailable information, scientific uncertainty, and "risk". Specialists have cited relevant references and considerations, when there was uncertainty that was disclosed and put in approriate context.

National Environmental Policy Act (NEPA) of 1969 (as amended)

The NEPA has been followed as required under 40 CFR 1500 in the development of this project. According to 40 CFR 1508.9 "Environmental assessment: (a) Means a concise public document for which a federal Agency is responsible that serves to: (1) Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact." (b) Shall include brief discussions of the need for the proposal, of alternatives as required by section 102 (2) (E), alternatives, and a listing of agencies and persons consulted.

"(a) As part of the scoping process the lead agency shall (3) Identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review, narrowing the discussion of these issues in the statement to a brief presentation of why they will not have a significant effect on the human environment or providing a reference to their coverage elsewhere." (40 CFR 1501.7) Further, 40 CFR 1502.2 (b) "Impacts shall be discussed in proportion to their significance. There shall be only brief discussion of other than significant issues. As in a finding of no significant impact, there should be only enough discussion to show why more study is not warranted."

The EA analyzed a reasonable and acceptable range of alternatives: the proposed action alternative, Alternative 3 with Resource Mitigation and the no action alternative. Five other alternatives were considered but not carried forward (EA, Section 2.4.4). The analysis (EA, Chapter 2, 3) and Appendix A discloses the expected impacts of each alternative and various issues and concerns raised by interdisciplinary team members, the public and other agencies.

The NEPA requires public involvement and consideration of potential environmental effects. The entirety of documentation for this analysis supports compliance with this Act.

Endangered Species Act of 1973

Under Section 7 of the Endangered Species Act, each Federal agency must ensure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any threatened or endangered species.

If a threatened or endangered species, or species proposed for listing occurs in an area where a project is proposed, a Biological Assessment (BA) must be prepared. If the action would result in a "may affect, likely to adversely affect" determination for the species, formal consultation with the U.S. Fish and Wildlife Service (USFWS) must occur and they would issue a Biological Opinion. If the action results in a "may affect, not likely to adversely affect" or "beneficial effect" conclusion, formal consultation is not necessary but informal consultation and a letter of concurrence must be obtained from the

U.S. Fish and Wildlife Service. If a "no effect" results, no consultation is necessary. To reduce effects of an action to an acceptable level, mitigation (coordination measures) may be necessary.

The USFWS identified the Canada Lynx and Gray Wolf as threatened or endangered species that may be present in this portion of the Gallatin National Forest (USFWS 2007). In addition to the individual species reports for Canada Lynx (Pils 2007a) and Wolf (Pils 2007j) a Biological Assessment will be prepared and consultation with the U.S. Fish & Wildlife Service would be completed prior to a decision being made.

The project was designed to implement the goals of the National Fire Plan. (EA, Section 1.6.

Finding: The project would be consistent with management direction for the Canada lynx and gray wolf, and would be in compliance with Endangered Species Act requirements.

Federal Cave Resources Protection Act

This Act is to secure, protect, preserve and maintain significant caves to the extent practical. Site features and field review substantiate that no caves are in the area. No known cave resources would be affected by this proposal. (Pils 2007i)

Heritage Program Laws (National Historic Preservation Act (amended 1992), American Indian Religious Freedom Act, and Native American Graves and Repatriation Act)

These laws essentially require that adequate and extensive review of these undertakings be conducted in order to assess the possible effects of these activities upon cultural resources. They also provide that Federal agencies conduct adequate consultation with pertinent tribes in order to be informed of any possible conflicts the actions to be taken would have on their ability to conduct traditional religious practices.

Evaluation of these alternatives was done in full compliance with direction from the Gallatin Forest Plan (parts II-3, II-17), the National Historic Preservation Act (Section 106 - 36CFR800.1) and the American Indian Religious Freedom Act. There would be no impacts to cultural resources as determined in the Heritage Resources Report (Allen, 2006). Native American communities have been contacted and public comment encouraged. No tribal concerns were identified for this project. (Allen 2006) The proposal would comply with the cited acts.

Sensitive Species (Forest Service Manual 2670) - This Manual direction requires analysis of potential impacts to sensitive species, those species for which the Regional Forester has identified population viability is a concern. Potential effects of this decision on sensitive species have been analyzed and documented in a Biological Evaluation for Terrestrial Wildlife Species (Pils 2007), Amphibian and Aquatics Report/Biological Evaluation (Roberts, 2007) and Sensitive Plant Report (Pils 2007h). This project as proposed would have "no impact" or minor impact to sensitive species.

The results of the Biological Evaluation for Terrestrial Wildlife Species (Pils 2007) indicate there would be 'no impact' to the Peregrine Falcon, Flammulated Owl, Harlequin Duck, Trumpeter Swan, and Western Big Eared

Bat. The action alternatives may impact individuals or habitat but will not likely contribute to a trend toward federal listing or loss of viability to the population or species for the Wolverine, Black Backed Woodpecker, Bald Eagle and Grizzly Bear.

Further there would be no impact to Fluvial Arctic Grayling, Westslope cutthroat trout, Yellowstone Cutthroat Trout, Northern or Leopard Frog. The action alternatives may impact individuals or habitat but will not likely contribute to a trend toward federal listing or loss of viability to the polpulation or species for western toad. (Roberts 2007)

The project as proposed, would have "no impact" on listed sensitive plant species except for eight species with habitat potential but no plants present and one species that is protected by mitigation. The determination for these nine species is may impact individuals or habitat but will not likely contribute to a trend toward federal listing or loss of viability to the population or species. (Pils 2007h).

Effects of Alternatives on Floodplains and Wetlands - Executive Order 11988

By incorporating project design features, following BMP and SMZ regulations, as well as effective mitigation measures, floodplains, and wetlands will not be adversely affected by any alternative. (EA, section 2.4.3).

Migratory Bird Treaty Act

On January 10, 2001, President Clinton signed an Executive Order outlining responsibilities of federal agencies to protect migratory birds.

Project actions that are implemented during the breeding season would have disturbance impacts, and potential for occupied nest destruction, which could affect any migratory bird species in the activity area. Most project implementation would occur during late summer and fall, which would minimize disturbance effects and potential for direct bird mortality. Resulting habitat alterations could be attractive for migratory bird species of concern such as the great gray owl, olive-sided flycatcher, and Swainson's hawk. Implementation of any of the alternatives evaluated would not likely have impacts notable at the population level for any of the migratory bird species considered in this report. (EA, Appendix A, Pils 2007d)

Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs federal agencies to integrate environmental justice considerations into federal programs and activities. Environmental justice means that, to the greatest extent practicable and permitted by law, all populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, are not excluded from, and are not affected in a disproportionately high and adverse manner by government programs and activities affecting human health or the environment (E.O. 12898 and Departmental Regulation 5600-2).

Public involvement has not identified any adversely impacted minority low income populations. None of the alternatives would have a discernible effect on minorities, American Indians, women, or the civil rights of any United

States citizen. No alternative would have a disproportionate adverse impact on minorities or low-income individuals. This proposal complies with the Order.

Short-term Use versus Maintenance and Enhancement of Long-term Productivity

Long-term productivity refers to the capability of forestland, in this case, to provide resources into the future. The alternatives are designed to protect the long-term productivity by reducing the risk of crown fire initiation, spread and severe fire. Soil, water and noxious weed best management practices further protect the long-term productivity of the treatment area. Impacts to resources are limited in time and intensity and would not deplete their long-term productivity.

Irreversible and Irretrievable Commitment of Resources

An *irreversible* commitment of resources refers to the use or commitment of a resource that cannot be reversed. For example, nonrenewable resources, such as minerals in the ore, would be removed forever during the milling of the ore and would be irreversibly committed. An *irretrievable* commitment is the short-term loss of resources, resource production, or the use of a renewable resource because of land use allocations, or a scheduling or management decision. The proposed action alternative does not involve an irreversible committment. Removal of wood products is an irretrievable commitment of trees for the project area for the short term.

Possible Conflicts with Other Land Use Plans, Policies and Controls

The alternatives are consistent with the objectives of Federal, regional, State and local land use plans, policies and controls for the area.

Available Information

There is less than complete knowledge about many of the relationships and conditions of wildlife, fish, forests, jobs and communities. The ecology, inventory and management of a large forest area is a complex and developing science. The biology of wildlife species prompts questions about population dynamics and habitat relationships. The interaction of resource supply, the economy, and communities is the subject matter of an inexact science. However, the basic data and central relationships are sufficiently well established in the respective sciences for the deciding official to make a reasoned choice between the alternatives, and to adequately assess and disclose the possible adverse environmental consequences. New or improved information would be very unlikely to reverse or nullify these understood relatitionships.