

Project Area

The Piquett Creek Project is located about five miles southwest of Conner, MT, in T1N, R21W Sections 1-3, 9-12 & 15. The project area is approximately 5,800 acres, located within the Piquett Creek and West Fork Bitterroot River-Lloyd Creek watersheds. Refer to Map 1 - Project Area located on the project website <https://www.fs.usda.gov/project/?project=56774>.

Adjacent to the project area are approximately 96 private structures, Triple Creek Ranch and Trapper Creek Job Corps Center. Sixty-seven percent (3,888 acres) of the project area is considered WUI, as defined by the Bitterroot Community Wildfire Protection Plan. Ninety-seven percent (5,624 acres) of the project area has been identified as Community Protection based on results of the 2016 Bitterroot Wildfire Risk Assessment. Community Protection shows areas of the Bitterroot National Forest that if a fire were to start, have a probability of reaching private land and impacting those communities or inholdings.

The entire project area is within a priority landscape as designated by the Secretary of Agriculture under HFRA section 602(b). The following Forest Plan Management Areas are found within the project area.

Table 1. Management Areas within the Piquett Creek Project area.

Management Area	Management Goals	Acres	Percent
1	Emphasize timber management, livestock and big game forage production, and access for roaded dispersed recreation activities and mineral exploration. Assure minimum levels for visual quality, old growth, and habitat for other wildlife species.	398	7%
2	Optimize elk winter ranger habitat using timber management practices. Emphasize access for mineral exploration and roaded dispersed recreation activities. Provide moderate levels of visual quality, old growth, habitat for other wildlife species and livestock forage.	4,864	84%
3A	Maintain the partial retention visual quality objective and manage timber. Emphasize roaded dispersed recreation activities, old growth, and big game cover. Provide moderate levels of timber, livestock forage, big game forage and access for mineral exploration.	536	9%

Existing Conditions

Vegetation

The Piquett Creek project area is made up of a variety of vegetation cover types. Cover types are identified through the USFS Northern Region Existing Vegetation Mapping Program (VMap) and are categorized by the species with the greatest dominance¹. The existing mapped vegetation with 40% or greater dominance in the Piquett Creek project area is provided in Map 2 - Vegetation Cover Type. The mapped existing vegetation is further grouped into the following USFS Region 1 Cover Types (Table 2).

¹ Dominance refers to the species with the greatest abundance of canopy cover, basal area, or trees per acre within an area

Table 2. Vegetation cover type for the Piquett Creek project area.

Cover Type (40% Dominance)	Acres	Percent of Analysis Area
Ponderosa pine	3,371	58%
Dry Douglas-fir (<i>Douglas-fir & Shade Intolerant Mix</i>)	2,017	35%
Lodgepole pine	210	4%
Transitional Forest	66	1%
Grass	44	1%
Mixed Mesic Conifer (<i>Shade Tolerant Mix</i>)	25	0.4%
Spruce/fir (<i>Subalpine fir & Engelmann spruce</i>)	22	0.4%
Non-Vegetated (<i>Urban, Sparse, & Wetland</i>)	14	0.2%
Hardwood/Cottonwood	12	0.2%
Mesic Shrub (<i>Shrub</i>)	5	0.1%
Total Acres	5,786	

Departure from Historic Fire Regime

Natural disturbances, such as fire, insects, and disease, play a significant role in shaping the forest vegetation and each cover type responds differently to disturbance. Biological and physical conditions drive successional processes in forest vegetation communities that result in a mosaic pattern across the landscape made up of different age-classes, stand structure, and species composition. The primary historical fire regimes² within the assessment area had short to moderately short fire-free intervals, and were not typically stand replacing fires. Examining fire scars across multiple locations on the Bitterroot National Forest, Arno (1976) found an average fire-free interval of 11-16 years in ponderosa and Douglas-fir and 16-27 years in Douglas-fir, lodgepole pine dominated sites during the period of 1734-1889.

As time increases between the occurrence of fire and forests miss their natural fire return interval, forests continue to develop along the successional path until reaching a climax community. The concern with our forests developing into climax communities lies in the lack of ability for these stands to be resistant to fire, insect and disease. Species composition in climax communities are often dominated by species that are not fire resistant. Stands become dense with multiple layers of age classes creating ladder fuels and reducing overall stand resilience to insects and disease. Expand these characteristics across the landscape and the area is primed for a large wildfire and insect outbreak.

The departure from the historic conditions within the Piquett area is especially pronounced within the warm dry vegetation cover types represented by Fire Regimes I & II where, based on Arno's research, the mean fire free period was 19 years (Table 3). Over the past 129 years, only approximately 9% of the acres that should have experienced multiple fires have even burned once. This departure from natural disturbance patterns has led to major changes in fuels and vegetation composition causing 60% of the area classified as Fire Regime I to be at high risk of unnatural stand replacing fire.

² A fire regime describes how fire naturally functioned in terms of extent, severity, and frequency in a particular place.

Table 3. Fire regime data for the Piquett Creek project area.

Fire Regime Group	Total Acres by Fire Regime	Percent of Project Area	Acres Burned 1889-2018	Missed Fires (Mean Fire Free Period)	Percent of Acres Burned vs Historical Regime 1889-2018
I (0-35)	4,697	81	2,789	6.8 (19 years)	9%
II (0-35)	473	8	264	6.8 (19 Years)	8%
III (35-100)	433	7.5	184	4.6 (28 years)	9%
IV (35-200)	165	3	114	3.9 (33 years)	18%
V (200+)	13	<1	6	3.9 (33 years)	12%

Warm Dry Vegetation

The warm and dry environments include the Dry Douglas-fir (Douglas-fir and Shade Intolerant Mix) and ponderosa pine cover types making up the largest portion of the project area (totaling approximately 93%). The Warm and Dry vegetation types are often found at lower elevations and on warm and dry southern and western aspects. These forests types are currently dominated by ponderosa pine and Douglas-fir. Without fire as a natural disturbance, the species composition is shifting from historically dominated fire dependent and fire tolerant ponderosa pine to a higher percentage of Douglas-fir, a less fire tolerant species. Without frequent low intensity wildfire (0-35 years), young Douglas-fir have regenerated in the understory and are competing with ponderosa pine and often prevent the successful regeneration of ponderosa pine seedlings. Stand structure has changed from historically fire maintained open grown stands containing one to two age classes to commonly found Douglas-fir ingrowth creating a ladder fuel effect leading to higher fire intensities that are often fatal for all species including ponderosa pine. As more trees grow within the same space, the stand density increases creating competition stress for resources such as sunlight, water, and nutrients from the soil. Dense stand conditions put the trees at risk for insect and disease related mortality as stressed trees lose their natural ability to be resistant to these disturbances.

The most impactful changes to stand structure and composition affecting fire behavior within Piquett Creek have been increases in small to medium-sized, shade tolerant conifers that are sensitive to fire and increases in surface fuel loadings due to insect activity and the disruption to the natural fire cycle (Photo 1). High densities of shade tolerant tree species in the understory lower crown base heights and link surface fuels to crown fuels. These understory trees act as ladders that allow fire to burn into the overstory tree crowns. Higher surface fuel loads increase flame lengths that further aid in transitioning a surface fire into a crown fire. Crown fire behavior is also outside the range of variability for the majority of these vegetation types based on fire regime groups. With the current vegetation conditions in the project area, the risk of losing key ecosystem components is moderate to high. Crown fire activity reduces the effectiveness of fire suppression efforts and compromises the safety of firefighters and the public.



Photo 1

Cool Moist Vegetation

The cool and moist settings include the Lodgepole pine, Spruce/fir (Engelmann spruce and Subalpine fir), and Mixed Mesic Conifer (Shade Tolerant Mix) cover types making up approximately 4% of the project area. Cool and moist vegetation types are typically found at higher elevations and/or on northern and eastern aspects. The forest vegetation in these areas are often made up of a mix of some or all of the above species. Historic fire return intervals in these stands were less frequent (35-100 years) and vary in fire intensity from low to high



intensity. These tree species are less fire tolerant than the warm and dry species with some species displaying little to no fire tolerance and therefore naturally experience high levels of mortality or stand replacing fire. Over time, species composition in these stands often shift from Douglas-fir and lodgepole pine dominance to a higher component of subalpine fir. Stand densities increase as more shade tolerant trees continue to regenerate on site leading to dense multistoried stands (Photo 2). While these wetter sites are naturally capable of supporting more trees, stand densities have continued to increase leading to conditions favorable for insects and disease that thrive in multistoried conditions. Fewer fires have led to less diversity in stand ages and successional stages across the landscape. Without the varied patch size and patterns historically created by fire across the landscape, wildfires are burning with greater intensity over larger areas and insects and diseases are able to spread further with the increase in older and denser stands.

Wildlife Impacts

The departure from historic fire conditions also has implications for wildlife. Extended fire return intervals contribute to conifer encroachment in meadow habitats across the landscape. These habitats are important areas for wildlife species such as elk, mule deer, moose, and numerous songbirds. In addition, the shift in species composition and subsequent high densities of shade-tolerant understory species can limit the availability and distribution of forage for large ungulates. Natural fire regimes in the warm and dry environments that maintain or reduce tree densities allow for more sunlight to hit the forest floor and thus increase forage production and availability for big game in winter range.

Insect and Disease Disturbance

Forest insects and diseases are also disturbance factors that can dramatically alter the structure, composition and age class distribution. Douglas-fir beetle and western spruce budworm are actively present in the project area at minimal or moderate levels while the signs of past mountain pine beetle mortality is readily available. The Region 1 Forest Insect Hazard Rating

System³ has developed hazard ratings to aid in identifying stands that are risk for significant insect activity (Table 4). As seen in the table below, approximately one third of the project area is at a moderate to high hazard rating for all three commonly found insects.

Table 4. Insects and Disease Hazard within Piquett Creek project area.

Insects	Moderate Hazard Rating (% of Project Area)	High Hazard Rating (% of Project Area)
Douglas-fir Beetle	31%	2%
Western Spruce Budworm		32%
Mountain Pine Beetle	29%	35%

Dwarf mistletoe is also impacting Douglas-fir in the project area (Photo 3). Dwarf mistletoe is a parasitic plant that depends on a living host for water and nutrients. The witches brooms found in the tree canopies divert the nutrients to the mistletoe plant and reduce the amount of available nutrients to the rest of the tree. Eventually this drain in nutrients leads to a slow death starting from the top down. Severe infestations cause growth loss and cause the tree to be predisposed to attack by other insects or diseases. Additionally, witches brooms are highly flammable and increase fire risk and intensity within a stand.



Vegetation Departure & Condition Class

Vegetation Departure (VDEP) indicates how different current vegetation on a landscape is from estimated historical conditions. VDEP is based on changes to species composition, structural stage, and canopy closure. VDEP is a scale ranging from 0-100. (LANDFIRE) Vegetation Condition Class (VCC) represents a simple categorization of the associated Vegetation Departure (VDEP) layer and indicates the general level to which current vegetation is different from the simulated historical vegetation reference conditions.

Table 5 below displays the VCC classes found within the Piquett Creek Project Area. The fire regime column describes the changes to the fire regime the vegetation departure has caused and the impacts should a fire occur in those areas. Approximately 95% of the project area has a moderate to high vegetation departure from historic conditions.

³ Hazard ratings are determined based on the key stand characteristics desirable to each insect including species composition, tree size, stand age, and density.

Table 5. Vegetation Departure and Condition Class.

VCC CLASS	VCC DESCRIPTION	ACRES (% PROJECT AREA)	FIRE REGIME
VCC 1A	Very Low, Vegetation Departure 0-16%	75 (1%)	Fire regimes are within the natural (historical) range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition, structure, and pattern) are intact and functioning within the natural (historical) range. Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression).
VCC 1B	Low to Moderate, Vegetation Departure 17-33%	232 (4%)	
VCC 2A	Moderate to Low, Vegetation Departure 34-50%	2,715 (47%)	Fire regimes have been moderately altered from their natural (historical) range. Risk of losing key ecosystem components is moderate. Fire frequencies have departed from natural frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation and fuel attributes have been moderately altered from their natural (historical) range.
VCC 2B	Moderate to High, Vegetation Departure 51-66%	2,758 (48%)	
VCC 3A	High, Vegetation Departure 67-83%	1 (<1%)	Fire regimes have been substantially altered from their natural (historical) range. The risk of losing key ecosystem components is high. Fire frequencies have departed from natural frequencies by multiple return intervals. Dramatic changes occur to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been substantially altered from their natural (historical) range.
VCC 3B	High, Vegetation Departure 84-100%	8 (<1%)	
Water	Water	61 (<1%)	A waterbody that does not contain vegetation available to burn during a wildfire.

Wildfire Risk

A comprehensive Wildfire Risk Assessment was completed for the Bitterroot National Forest in 2016. During this process the Fire SIMulation System (FSIM) model used locally calibrated LANDFIRE Data to model 10,000 fire ignitions and the corresponding fire spread across the landscape under a multitude of weather and fuel conditions. The three fundamental components of the risk assessment are fire likelihood, fire intensity and susceptibility of fire effects within a spatial context. The risk assessment considers wildfire hazard by quantifying the probability of wildfire occurring (likelihood) and with what intensity. The results are a spatially explicit, quantitative framework that enables the comparison of likely fire-related losses and benefits to Highly Valued Resources and Assets (HVRA) across the landscape. The quantification of risk is then displayed in a common measure which is termed net value change. The overall conditional net value change (cNVC) as well as the cNVC for each HVRA was classified based on the likely fire-related losses (negative values) and benefits (positive values) across the landscape.

The existing conditions, wildfire burn probabilities, potential fire behavior and expected fire effects indicate HVRA on National Forest lands within this area and adjacent private property are at risk of negative effects should a wildfire occur. cNVC results within the project area

indicate that multiple HVRA's, communities, habitat for threatened and endangered species, trails, bridges and the suitable timber base are at risk to negative effects and loss from a wildfire under current conditions. Burn probabilities, fire intensities and cNVC are all above the mean values for the Bitterroot National Forest.

Fire Behavior

Fire type is used to describe current fire behavior conditions in the Piquett Creek Project Area. "Fire Type" describes whether the fire is a surface fire, an intermittent crown fire (also described as a torching fire), or a crown fire. A surface fire burns in the understory with relatively low flame lengths and intensities and consumes litter, duff, and low-growing vegetation. A passive crown fire is a fire where flames move from the surface to consume single or small groups of overstory trees. Tree torching is determined by weather, total fuel load, live fuel moistures (for those fuel models that incorporate live fuels in addition to dead fuel) and ladder fuels (Andrews and Chase 1989). Passive crown fire behavior is of a higher intensity than surface fire, but is not sustained. An active crown fire is one that becomes well-established in the overstory, moving from tree crown to tree crown at high intensities and high rates of spread while consuming surface fuel as well as overstory tree crowns. Crown fires are sometimes referred to as stand-replacing fires. Crown fire potential is increased by high wind speeds, low foliar moisture content, high surface fire intensity, presence of ladder fuels, sufficient canopy bulk density to sustain fire spread, and an unstable atmosphere (Van Wagner 1977, Rothermel 1991). Once a crown fire is established it tends to affect large areas because it moves fast and is usually impossible to control until fuel or weather conditions change the fire behavior.

Currently, under severe conditions the potential flame lengths coupled with the existing stand characteristics, topography and potential fire weather would result in 46% of the project area burning as surface fire, and 54% of the project area burning as passive or active crown fire.

Table 6: (Existing Conditions Potential Fire Type)

Fire Type (Project Area)	Acres (% of Project Area)
Surface Fire	2,647 (46%)
Crown Fire	3,108 (54%)
Fire Type (WUI)	Acres (% of WUI)
Surface Fire	1,667 (47%)
Crown Fire	1,850 (53%)
Fire Type (Community Protection)	Acres (% of Project Area)
Surface Fire	2,588 (46%)
Crown Fire	3,019 (54%)

Predicted flame lengths on 55% of the project area would exceed the conditions that allow firefighters to safely and effectively suppress a wildfire using direct attack with handtools. The predicted fire type and intensities would make it necessary to utilize indirect suppression tactics, requiring larger numbers of firefighters, mechanized equipment, and aircraft to be successful at containing a wildfire. An indirect strategy also generally results in an increase in fire size and the area affected in order to find suitable fire line locations and fuel conditions.

Table 7: (Existing Conditions Potential Flame Length)

Flame Length (Project Area)	Acres (% of Project Area)
0-4	2,613 (45%)
4-8	1,467 (25%)
8-12	650 (11%)
12+	1,055 (18%)
Flame Length (WUI)	Acres (% of WUI)
0-4	1,429 (41%)
4-8	972 (28%)
8-12	402 (11%)
12+	715 (20%)
Fire Type (Community Protection)	Acres (% of Project Area)
0-4	2,143 (38%)
4-8	1,612 (29%)
8-12	697 (12%)
12+	1,152 (21%)

Crown fire activity reduces the effectiveness of fire suppression efforts and compromises the safety of firefighters and the public. This type of fire behavior within the WUI would most likely lead to immediate evacuation notices for the West Fork communities which could impact approximately 96 structures, Triple Creek Ranch and Trapper Creek Job Corps for an extended period of time.

Crown fire behavior is also outside the range of variability for the majority of these vegetation types based on fire regime groups. Based on the vegetation condition classes found within the project area the risk of losing key ecosystem components are moderate to high. Conditions like these can lead to high acreage burned and significant adverse effects on resources (Scott and Reinhardt 2001).

Key variables that contribute to these levels of fire activity are; fuel arrangement, fuel loading, drought, dry windy weather and steep slopes. Of these variables, fuel is the only one that can be controlled or changed. The planned and progressive implementation of fuels treatments in and near areas with values at risk (ecosystem function, habitat, and infrastructure) would reduce the potential for negative impacts from wildfires in these areas by reducing ladder fuels, fuel loads, canopy bulk densities, canopy cover, increasing canopy base heights, creating fuel breaks and diversifying stand structure.

Fires that occur after treatments would encounter breaks in continuity of fuels, which could limit the spread and intensity of some of these fires. Treatments are designed to be effective at reducing, negative fire effects, fire behavior and improving success of fire suppression resources at or below 97 percentile conditions, not for rare weather events. At some point (extreme burning conditions during wind events and/or limited resources) suppression resources would have limited effect to successfully suppress a fire. In this case, the fire could simply spot over the treated area and continue burning however, it is still expected that the area treated would have reduced fire behavior and effects compared to untreated areas.

Desired Conditions

The desired future condition for the project area is to maintain a diversity of forested, non-forested, and other native vegetative types that are resilient to ecological processes that frequent the area. These community types are those listed in Table 1 above.

Vegetation– At the landscape scale, the desired future condition is a mosaic and diverse landscape that is adaptable and resilient to natural disturbances such as insects, disease, fire and climate variability. The current forest conditions are not as resistance and resilient to disturbances as they historically were. While the project area is variable and treatments will be site specific, the desired results following treatment would be:

- Species compositions dominated by early seral species such as the more fire tolerant ponderosa pine.
- Lower stand densities to improve tree health and vigor and increase resilience to insects and disease.
- Stand structure that reduces the spread of insects, disease and fire.
- Appropriate species and age class diversity at the landscape scale.
- Varied patch size and patterns across the landscape to allow natural disturbance processes to take place at smaller scale as historically occurred.

Fire – A landscape that is resilient to fire, communities that can withstand a wildfire without loss and increased opportunities when managing fire as a natural process. Treatments that include surface fuel reduction, particularly by prescribed burning, are well supported for moderating potential wildfire behavior in both long- needle pine and mixed conifer forests. Research indicates the most appropriate fuel treatment strategy is often thinning (mechanical treatments that remove ladder fuels and decrease crown density) followed by piling and burning fuels, and prescribed fire. These treatments would provide maximum protection from severe fires in the future (Peterson 2005). Additionally, to achieve desired effects in tempering fire behavior at a landscape scale, land managers must apply optimally placed treatments at a rate of 1% to 2% on their land base per year (Finney 2008). Overtime, prescribed or wildfire would be used to maintain the desired conditions of this fire-dependent ecosystem.

Following implementation, the desired results would be:

- Less acres of crown fire behavior within the WUI, Community Protection and in low/mixed severity fire regimes.
- Vegetation and fuel conditions similar to those of historic fire regimes.
- A reduced risk from wildfire to firefighters, the public and adjacent private lands within the project area.
- Fire is restored as a natural process on the landscape necessary to maintain desired conditions.

Wildlife Habitat - Treatments across the project area have well-documented beneficial effects to wildlife when combined with appropriate design features to minimize impacts to T&E or sensitive species. Following implementation, the desired results would be:

- Increased forage and nutritional value for big game species in winter range through fuels treatments, prescribed burning, and invasive weed control.
- Reduced conifer encroachment in meadow habitats to restore increased forage and nutritional value for big game species and important song bird breeding and rearing habitat.
- Preserve and/or increase current old growth distribution across the landscape to provide habitat for important wildlife species such as Flammulated Owl, Lynx, Fisher, and Wolverine.

Purpose & Need

Considering the recommendations received during collaboration as well as the departure between the existing and desired conditions, the goal of the Piquett Creek project will be to:

Improve landscape resilience to disturbances (such as fire, insects and diseases) by diversifying forest structure and composition, and reducing fuels.

To reach that goal the following needs were identified:

- There is a need to reduce flame lengths and crown fire hazard potential within the Wildland-Urban Interface, adjacent community protection zone and low severity fire regimes.
- There is a need to restore fire back into the ecosystem to maintain landscape resiliency and restore natural range of variability.
- There is a need to reduce stand densities, increase age class diversity and favor shade intolerant species to promote resilience to stressors (e.g. drought, insects, and diseases).
- There is a need to improve habitat diversity, forage quality and quantity for big horn, mule deer, elk, and other regionally sensitive species.

Proposed Action

Within the Piquett Creek Project several different activities are proposed to be implemented to meet the desired conditions and purpose and need of the project. Treatments may occur on up to 3,000 acres within the project area as long as activities comply with the established design features. Resource specific criteria was developed for the project area to assist with designing treatments that would limit negative effects and allow for flexibility in prescribing treatments. The design features also ensure compliance with Forest Plan standards, applicable laws, regulations and policies.

The existing and desired future conditions of each individual stand will dictate the silvicultural treatments that would be applied. Priority for implementation would be for areas within the WUI that are at highest risk for crown fire and/or insects and disease. Across the project area, treatments will be designed to maximize the retention of healthy large diameter trees, provide diversity in structure and composition while affecting fire behavior and insects and disease hazard at the landscape scale, not just individual stands. Based on the existing conditions some

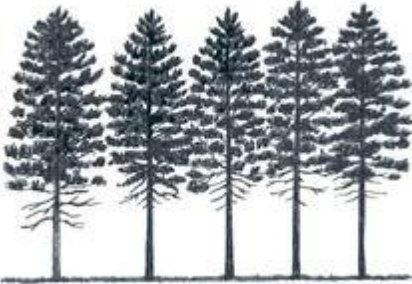

areas may need a combination of activities to move towards the desired conditions or a single treatment may be adequate in other areas. Desired conditions and fire return intervals will be maintained into the future through the use fire (prescribed or wildfire).

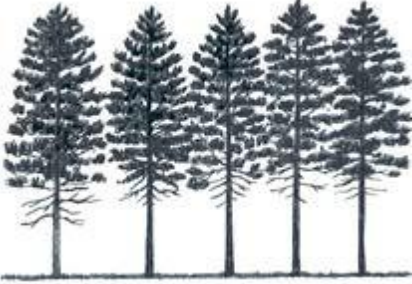

Activities could include:

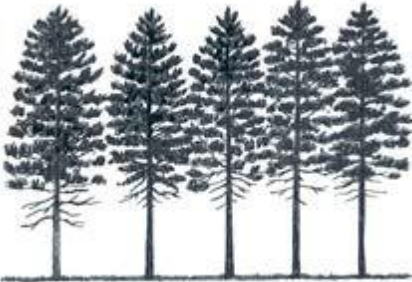

- Intermediate and regeneration harvests utilizing both ground based and skyline yarding, machine piling and burning, temporary road construction.
 - No harvest activities would occur within established RHCA buffers.
 - Hauling is restricted to FSR 49, 731, 5720, and 5724 and their spur roads.
 - A maximum of 500 trucks loads. Hauling will only occur on dry roads and prior to November 15th.
 - Within project watersheds, harvest would leave a residual stand and limit the increase in ECA (equivalent clearcut area) to 25%.
 - Ground-based yarding would generally be restricted to slopes 35 percent or less.
- Fuels Reduction activities such as understory thinning, hand piling, pile burning, fireline construction and understory burning.
- Road maintenance activities such as drainage maintenance, reconditioning, reconstruction.
 - No permanent road construction is proposed.
 - All temporary roads will be decommissioned no later than 3 years after the date the project is completed.
 - The resurfacing of FSR 49 with new gravel aggregate would be completed between mileposts 0.2 and 1.1. prior to hauling.
 - Drive thru dips would be installed to the approaches on two bridges that cross Piquett Creek located on FSR 49 and FSR 5720 prior to hauling.
 - All roads that cross streams will be graveled prior to any hauling.

Table 8 below provides a cross-walk between existing and desired conditions based on general habitat type (e.g. warm / dry or cool / moist). Treatment objectives within the cross-walk table are a combination of objectives for silvicultural, fuels, and wildlife programs to accomplish the identified purpose and need. During surveys for individual treatments, and implementation planning, additional opportunities may be determined to enhance resources with the identified silvicultural treatment. During implementation, the design features will be applied to minimize, avoid, or mitigate impacts to existing resources.

Table 8: (Existing Conditions to Desired Conditions Potential Treatment Crosswalk)

Warm and Dry: Ponderosa Pine	Existing Condition	Desired Future Condition	Silvicultural Treatment Options: Designed to move the stands toward the desired future condition. (All treatments will be based on the existing conditions of each treated stand.)
Stand Initiation Stage	Young Stands - planted or natural regeneration. Starting to see tree to tree competition. Ingrowth of additional shade tolerant species.	Open grown, vigorous stand. Feature the best tree, primarily ponderosa pine or other desirable individuals for species diversity. <ul style="list-style-type: none"> Estimated range between 50-150 trees per acre depending on site conditions. 	<ul style="list-style-type: none"> Small tree hand thinning.
Stem Exclusion Stage 	Even-aged stand. Crown to crown competition. Density related stressors. Moderate to high beetle hazard ratings. Past mountain pine beetle activity present with standing and down dead trees creating a fuels hazard. Ingrowth and competition from shade tolerant species. Ladder fuels may be present. Terraced Plantations: tightly spaced trees planted in terraced rows. Pockets of past mountain pine beetle mortality is present with standing dead and down material creating a fuels hazard. Stand conditions vary based on slope, aspect, soil type and water availability.	Open grown stand that is resistant and resilient to insects, disease and fire. The stand is dominated by ponderosa pine and may feature variable densities with opportunities for a second age-class of ponderosa pine. Retain the best genetics. <ul style="list-style-type: none"> ≤ 60 BA for pine beetle protection for 20-30 years. Open grown stands that are resistant and resilient to insects, disease and fire. Stands contain adequate understory vegetation to promote soil recovery. Depending on elevation and aspect, manage for a natural species composition for the site. <ul style="list-style-type: none"> ≤ 60 BA to reduce the risk of mountain pine beetle. 	Treatments shall vary across the landscape for diversity, habitat, and esthetics. <ul style="list-style-type: none"> Small tree hand thinning, mechanical thinning. Improvement Cut Irregular Selection Seed Tree Cut Shelterwood Cut Sanitation or Salvage Cut Prescribed Fire: site prep for planting and/or maintenance burning. Post-harvest planting where necessary. Treatment opportunities vary based on access, slope, soil type and condition, tree size, density and stand health. <ul style="list-style-type: none"> Hand Thinning Improvement Cut Sanitation or Salvage Cut Prescribed Fire
Mature with Understory Re-initiation 	Dominant and co-dominant ponderosa pine often growing with a mix of Douglas-fir. Stand densities are at moderate to high hazard for beetle activity. Stands have missed multiple low intensity fires compared to the historic fire return interval. Ingrowth and competition from shade tolerant species is dense and well-established. Stand conditions are often too dense for ponderosa pine to regenerate. A buildup of needle litter, duff, down trees and ladder fuels is putting these stands at risk for fire. Under the existing conditions, the stands that were once resistance to frequent low intensities fires will likely experience stand replacing fire.	A stand that is resistant and resilient to insects, disease and fire. Retain mature and large diameter healthy ponderosa pine. Feature two to three age classes of ponderosa pine to carry the stand and species into the future. Retain the best genetics. The stands shall be open grown with low or variable stand densities and maintained by prescribed fire. <ul style="list-style-type: none"> ≤60 BA to reduce the risk of beetle caused mortality. 	Treatments shall vary across the landscape for diversity, habitat, and esthetics. <ul style="list-style-type: none"> Improvement Cut Seed Tree Cut Shelterwood Cut Irregular Selection Group Selection/Single Tree Selection Sanitation or Salvage Cut Prescribed Fire: site prep for planting and/or maintenance burning. Post-harvest planting where necessary.

Warm and Dry: Dry Douglas-fir Shade Intolerant Mix	Existing Condition	Desired Future Condition	Silvicultural Treatment Options: Designed to move the stands toward the desired future condition. (All treatments will be based on the existing conditions of each treated stand.)
Stand Initiation Stage	Young Stands - planted or natural regeneration. Starting to see tree to tree competition and high stand densities. Western spruce budworm defoliation is present at low to high levels depending on site.	Open grown, vigorous stands. Feature the best tree and species composition for the site. <ul style="list-style-type: none"> • Estimated range between 50-150 trees per acre depending on site conditions. 	<ul style="list-style-type: none"> • Small tree hand thinning.
Stem Exclusion Stage 	Even-aged stand. Crown to crown competition. Density related stressors. Many stands are experiencing varying degrees of western spruce budworm defoliation. Douglas-fir dwarf mistletoe is common throughout the project area with a range of infection levels from mistletoe free trees/stands to heavy infections throughout the entire crown. Ingrowth and competition from shade tolerant species are starting to become established. Ladder fuels may be present.	Open grown stands that is resistant and resilient to insects, disease and fire. The species composition is dependent on location and conditions, often a mixed conifer stand is desired. Stand densities are variable and may allow for new age classes. Horizontally spaced age-classes are desired to minimize the spread of dwarf mistletoe and western spruce budworm. Retain the best genetics and phenotypic characters for a vigorous and resilient stand. Dry sites shall be maintained by prescribed fire. Reduce ladder fuels and multistory conditions that promote insects and disease. <ul style="list-style-type: none"> • < 100 sq ft of BA desired to reduce the risk of Douglas-fir beetle. 	Treatments shall vary across the landscape for diversity, forest health, wildlife habitat, and esthetics. <ul style="list-style-type: none"> • Small tree hand thinning, mechanical thinning. • Improvement Cut • Irregular Selection • Seed Tree Cut • Shelterwood Cut • Sanitation or Salvage Cut • Prescribed Fire: site prep for planting, low intensity maintenance burning, jackpot burning or mixed severity. • Post-harvest planting where necessary.
Mature with Understory Re-initiation Stage 	Dominant and codominant Douglas-fir often growing with a mix of ponderosa pine and other shade tolerant conifers. Douglas-fir beetle is currently active across the project area in these stands. Stand densities are at moderate to high hazard for beetle activity due to the high stand density of old trees, larger tree diameters and species composition. Stands have missed multiple low intensity fires compared to the historic fire return interval. Ingrowth and competition from shade tolerant species is dense and well established. Stands often contain moderate to high levels of western spruce budworm defoliation and dwarf mistletoe infections. It is common to find mature relic ponderosa pine towering above a multistoried dense Douglas-fir stand with little to no young ponderosa pine present to perpetuate a mixed conifer stand containing ponderosa pine in the future. A buildup of needle litter, duff, down trees and ladder fuels is putting these stands at risk for fire. Under the existing conditions, these stands that were once resistance to frequent low intensities fires will likely experience stand replacing fire and are currently experiencing insect and disease related mortality.	A stand that is resistant and resilient to insects, disease and fire. The stands shall be generally open grown with variable density. A mix of age-classes is preferred while retaining the healthies individuals, best genetics and phenotypic characteristics for a vigorous and resilient stand. Species composition will feature Douglas-fir and often ponderosa pine or other species where site conditions allow. Stand densities shall remain low enough to reduce the risk of beetle, disease and fire. Stands shall be maintained with prescribed fire. <ul style="list-style-type: none"> • < 100 sq ft of BA to reduce the risk of Douglas-fir beetle. • < 80 sq ft of BA to reduce the spread of western spruce budworm with horizontally well-spaced age-classes to reduce the spread of western spruce budworm and dwarf mistletoe. 	Treatments shall vary across the landscape for diversity, forest health, wildlife habitat, and esthetics. <ul style="list-style-type: none"> • Improvement Cut • Seed Tree Cut • Shelterwood Cut • Irregular Selection • Group Selection/Single Tree Selection • Sanitation or Salvage Cut • Prescribed Fire: site prep for planting, low intensity maintenance burning, jackpot burning or mixed severity. • Post-harvest planting where necessary.

Cool and Moist : Spruce/fir, Lodgepole pine, Mixed Mesic Conifer and Shade Tolerant Mix	Existing Condition	Desired Future Condition	Silvicultural Treatment Options: Designed to move the stands toward the desired future condition. (All treatments will be based on the existing conditions of each treated stand.)
Stand Initiation Stage	Young Stands, often lodgepole pine with a mix of other species - planted or natural regeneration. Starting to see tree to tree competition and high stand densities. Western spruce budworm defoliation is present at low to high levels depending on site where host species are present.	Open grown, vigorous stands. Feature the best tree and species composition for the site. <ul style="list-style-type: none"> • Estimated range between 100-200 trees per acre depending on site conditions. 	<ul style="list-style-type: none"> • Small tree hand thinning.
Stem Exclusion Stage 	Even-aged stand. Crown to crown competition. Density related stressors. Moderate to high beetle hazard ratings. Past mountain pine beetle activity present with standing and down dead trees creating a fuels hazard. Ingrowth and competition from shade tolerant species. Ladder fuels may be present. Many stands are experiencing varying degrees of western spruce budworm defoliation where host species are present.	Stands that is resistant and resilient to insects and disease. Fire is a natural disturbance process in these stands and often stand replacing in nature. The species composition is dependent on location and conditions, often a mixed conifer stand is desired. Stand densities are variable and may allow for new age classes. Horizontally spaced age-classes are desired to minimize the spread of dwarf mistletoe and western spruce budworm. Retain the best genetics and phenotypic characters for a vigorous and resilient stand. <ul style="list-style-type: none"> • < 100 sq ft of BA desired to reduce the risk of Douglas-fir beetle. 	Treatments shall vary across the landscape for diversity, forest health, wildlife habitat, and esthetics. <ul style="list-style-type: none"> • Small tree hand thinning, mechanical thinning. • Improvement Cut • Irregular Selection • Seed Tree Cut • Shelterwood Cut • Sanitation or Salvage Cut • Prescribed Fire: site prep for planting, low intensity maintenance burning, jackpot burning or mixed severity. • Post-harvest planting where necessary.
Mature with Understory Re-initiation Stage 	Dominant and codominant Douglas-fir often growing with a mix of ponderosa pine and other shade tolerant conifers. Douglas-fir beetle is currently active across the project area in these stands. Stand densities are at moderate to high hazard for beetle activity due to the high stand density of old trees, larger tree diameters and species composition. Stands have missed multiple low intensity fires compared to the historic fire return interval. Ingrowth and competition from shade tolerant species is dense and well established. Stands often contain moderate to high levels of western spruce budworm defoliation and dwarf mistletoe infections. It is common to find mature relic ponderosa pine towering above a multistoried dense Douglas-fir stand with little to no young ponderosa pine present to perpetuate a mixed conifer stand containing ponderosa pine in the future. A buildup of needle litter, duff, down trees and ladder fuels is putting these stands at risk for fire. Under the existing conditions, these stands that were once resistance to frequent low intensities fires will likely experience stand replacing fire and are currently experiencing insect and disease related mortality.	A stand that is resistant and resilient to insects, disease and fire. The stands shall be generally open grown with variable density. A mix of age-classes is preferred while retaining the healthies individuals, best genetics and phenotypic characteristics for a vigorous and resilient stand. Species composition will feature Douglas-fir and often ponderosa pine or other species where site conditions allow. Stand densities shall remain low enough to reduce the risk of beetle, disease and fire. <ul style="list-style-type: none"> • < 100 sq ft of BA to reduce the risk of Douglas-fir beetle. • < 80 sq ft of BA to reduce the spread of western spruce budworm with horizontally well-spaced age-classes to reduce the spread of western spruce budworm and dwarf mistletoe. • < 80 sq ft of BA to reduce the risk of mountain pine beetle in lodgepole pine. 	Treatments shall vary across the landscape for diversity, forest health, wildlife habitat, and esthetics. <ul style="list-style-type: none"> • Improvement Cut • Seed Tree Cut • Shelterwood Cut • Irregular Selection • Group Selection/Single Tree Selection • Sanitation or Salvage Cut • Prescribed Fire: site prep for planting, low intensity maintenance burning, jackpot burning or mixed severity. • Post-harvest planting where necessary.

Design Features

Table 9. Preliminary Design Features for the Piquett Creek Project.

OBJECTIVE	DESIGN FEATURE
WATERSHED AND FISHERIES	
<p>Ensure that riparian-dependent resources receive primary emphasis in Riparian Habitat Conservation Areas (RHCAs)</p> <p>Ensure that the Montana Streamside Management Zone (SMZ) Law is met.</p>	<p>The INFISH RHCA buffers (USDA Forest Service, 1995) that are applicable to this project are:</p> <ul style="list-style-type: none"> • 300 feet on each side of the West Fork Bitterroot River, Piquett Creek, East Piquett Creek, and unnamed East Piquett tributary 2.0 • 150 feet on each side of the other unnamed perennial streams; • 100 feet on each side of intermittent streams; and • 50 feet on each side of wetlands < 1 acre in area. <p>A map of the RHCAs in the project area is available in the Project File.</p>
	<p>RHCA boundaries will be designated and marked on the ground in consultation with the fisheries biologist or hydrologist.</p>
	<p>The following activities will be prohibited in the RHCAs:</p> <ul style="list-style-type: none"> • Timber harvest • Log landings • Driving skidders • Yarding logs • Construction of temporary roads and tracked line machine trails
	<p>Ground-based equipment will be prohibited from entering the RHCAs without prior approval of the fisheries biologist or hydrologist. In situations where existing roads cross RHCAs, ground-based equipment can drive on the roads without approval of the fisheries biologist or hydrologist.</p>
	<p>Ground-based equipment will be prohibited from entering SMZs without the appropriate variance from Montana DNRC (SMZ Rule #4).</p>
	<p>In RHCAs, trees can be felled when they pose a safety risk. Felled hazard trees will be left on-site unless their removal is deemed necessary for safety reasons by the Timber Sale Administrator (TSA). If a felled safety tree in an RHCA falls across a road, the portion of the felled tree blocking the road will be cut up and rolled/thrown into the nearby RHCA. All portions of the felled tree not blocking the road will be left on site.</p>
	<p>If trees felled outside of the RHCAs land or roll into the RHCAs, their boles may be removed, but the tops and limbs will be left behind in the RHCAs.</p>
	<p>Generally, there will be no fuel storage, mixing of fuels, or refueling equipment in RHCAs. If there are no alternatives, refueling in RHCAs may occur, but must be pre-approved by the fisheries biologist or hydrologist, and have an approved spill containment plan. Small pumps (for example, Mark III) and chainsaws can be refueled within the RHCA as long as proper spill containment actions are implemented.</p>
	<p>Best Management Practices will be applied and monitored during the administration of the contract. Applicable BMP's are in the project file.</p>
<p>Ensure that haul roads are stable and deliver minimal amounts of sediment to streams</p>	<p>A maximum of 500 log truck loads will be hauled in this project. A truck load is defined as one log truck driving to the landing empty, and then driving back out loaded with logs and headed to the mill.</p>
	<p>Hauling would be restricted to FRs 49, 731, 5720, and 5724 and their spur roads.</p>
	<p>Hauling will only occur when roads are adequately dry. Hauling will cease during periods that are wet enough to produce movement of fines on the road surface. The TSA is responsible for determining when conditions are too wet to haul and has the authority to suspend hauling during those times.</p>
	<p>No hauling will occur after November 15, and there will be no snow plowing.</p>
	<p>All stream crossings that are mapped on the NHD GIS layer will be graveled before log trucks haul over them.</p>

OBJECTIVE	DESIGN FEATURE
	<p>All ditch relief culverts along FR 49 will have straw bale check dams installed below their outlets whenever hauling is occurring.</p> <p>Before log hauling commences, the following Best Management Practices will be applied to FRs 49 and 5720:</p> <p><u>FR 49</u></p> <ol style="list-style-type: none"> 1. Gravel aggregate will be applied between mileposts 0.2 and 1.1. 2. Drive thru dips will be installed on both approaches of the bridge crossing of Piquett Creek at milepost 1.0. 3. The road prism will be graded and shaped. 4. Straw bale check dams will be installed below the outlets of any ditch relief culverts located within 100 feet of Piquett Creek. <p><u>FR 5720</u></p> <p>Drive thru dips will be installed on both approaches of the bridge crossing of Piquett Creek at milepost 0.01.</p> <p>Road maintenance activities will follow the minimization measures for each road activity type specified in the April, 2015 Road-Related Activities Biological Opinion (USFWS, 2015b).</p> <p>Side-casting of road material into streams, wetlands, and RHCAs is prohibited (SMZ Rule #8).</p>
Ensure that prescribed burning operations minimize sediment delivery to streams.	<p>Helicopter ignition will not occur in RHCAs.</p> <p>Hand ignition will not occur within 50 feet of streams and wetlands (SMZ Rule #3). Fire will be allowed to back into and burn across the RHCAs if it so desires.</p> <p>All hand lines will be recontoured and covered with slash after use.</p> <p>Hand lines are not prohibited in RHCAs, but fire managers should minimize their use in RHCAs as much as possible. Hand lines will not be dug in wetlands.</p> <p>There will be no manual thinning or slash piling within 50 feet of streams and wetlands (SMZ Rule #5).</p> <p>If drafting from streams occurs, intake hoses will be fitted with a screen mesh equal to or smaller than 3/32 inch.</p>
Avoid direct effects to native fish and risks associated with aquatic invasive species.	Prior to entering the project area, equipment that has the potential to come into contact with water must be inspected, clean and dry. Do not transfer water, sediment, or vegetation when moving between drafting sites.
Reduce risk of changes in channel stability from increased water yield.	In project area watersheds, harvest would leave a residual stand and limit the increase in ECA (equivalent clearcut area) to 25%. The number of acres treated will be dependent both upon crown cover reduction within treatment units and the number of acres treated to limit changes in water yield and to maintain channel stability.
AIR QUALITY	
Ensure Compliance with the Clean Air Act and the Montana State Improvement Plan.	All prescribed burning will be implemented in full compliance with the MT DEQ air quality program through coordination with the Montana/IDAHO Airshed Group.
FIRE & FUELS	
Control of prescribed fire.	<p>All burning will take place under the guidelines set forth in a prescribed fire burn plan developed specifically for the project area that meets project objectives and the requirements of the NEPA decision.</p> <p>Firelines would be constructed as needed for fire control and protection of specific resources. Existing roads, trails, drainages, wet meadows, rocky outcrops, and other natural barriers would be used where possible.</p>
WILDLIFE	
Protect signed wildlife trees	Protect trees identified with “Wildlife Tree” signs from cutting or other damage. Exceptions include compliance with the silvicultural prescription and trees that pose a safety hazard. Wildlife trees that must be felled for safety reasons will not be yarded.

OBJECTIVE	DESIGN FEATURE								
Provide coarse woody debris for wildlife	<p>Do not remove pre-existing non-merchantable down logs from cutting units.</p> <p>Retain downed wood and woody debris.</p> <table border="0" data-bbox="483 302 997 422"> <tr> <td data-bbox="483 302 672 329"><u>Fire Group Type</u></td> <td data-bbox="760 302 997 329"><u>Coarse Woody Debris</u></td> </tr> <tr> <td data-bbox="483 329 526 357">2,4</td> <td data-bbox="760 329 915 357">5-10 tons/acre</td> </tr> <tr> <td data-bbox="483 357 505 384">6</td> <td data-bbox="760 357 927 384">10-20 tons/acre</td> </tr> <tr> <td data-bbox="483 384 558 411">7, 8, 9</td> <td data-bbox="760 384 915 411">8-24 tons/acre</td> </tr> </table> <p>Leave 1 to 2 hand piles per acre unburned in areas where hand piling is used for slash disposal to enhance habitat for small mammals and birds. Some retained piles may be consumed during prescribed fire operations.</p>	<u>Fire Group Type</u>	<u>Coarse Woody Debris</u>	2,4	5-10 tons/acre	6	10-20 tons/acre	7, 8, 9	8-24 tons/acre
<u>Fire Group Type</u>	<u>Coarse Woody Debris</u>								
2,4	5-10 tons/acre								
6	10-20 tons/acre								
7, 8, 9	8-24 tons/acre								
Maintain snag density	<p>Stand level prescriptions by a certified silviculturist and wildlife biologist will provide unit-specific snag retention requirements including spatial distribution, species, and snag sizes.</p> <p>Prescriptions will meet the proposed snag standards including the following number of snags over 9" DBH retained by Fire Groups if they exist in the unit prior to treatment.</p> <p>Fire Group Snags (average # of trees per acre)</p> <p>2,4 (2-5 tpa)</p> <p>6 (4-12 tpa)</p> <p>7, 8, 9 (10-15 tpa)</p> <p>Irregular distribution and small clumps are desirable. Location away from open roads is preferable. Species preference in order is ponderosa pine, Douglas-fir, lodgepole pine, spruce and true firs. Snags retained will include some from the largest diameter size class available within that unit. Larger snags are preferred over smaller snags for retention</p>								
Maintain suitable snowshoe hare habitat for compliance with the Northern Rockies Lynx Management Direction	<p>Adhere to the following applicable portions of the Northern Rockies Lynx Management Direction.</p> <p><u>Standard Veg S5:</u> Where and to what this applies: Standard VEG S5 applies to all precommercial thinning projects, except for fuel treatment projects that use precommercial thinning as a tool within the wildland urban interface (WUI) as defined by HFRA, subject to the following limitation:</p> <p>The Standard: 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:</p> <ol style="list-style-type: none"> 1. Within 200 feet of administrative sites, dwellings, or outbuildings; or 2. For research studies or genetic tree tests evaluating genetically improved reforestation stock; or 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: <ol style="list-style-type: none"> a. that a project is not likely to adversely affect lynx; or b. 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; or <p><u>Standard Veg S6:</u> Where and to what this applies: Standard VEG S6 applies to all vegetation management projects except for fuel treatment projects within the wildland urban interface (WUI) as defined by HFRA, subject to the following limitation:</p> <p>The Standard: Vegetation management projects that reduce snowshoe hare habitat in multi-story mature or late successional forests may occur only:</p>								

OBJECTIVE	DESIGN FEATURE
	<p>1. Within 200 feet of administrative sites, dwellings, outbuildings, recreation sites, and special use permit improvements, including infrastructure within permitted ski area boundaries; or</p> <p>2. For research studies or genetic tree tests evaluating genetically improved reforestation stock; or</p> <p>3. For incidental removal during salvage harvest (e.g. removal due to location of skid trails).</p> <p>Guideline VEG G10 Fuel treatment projects within the WUI as defined by HFRA should be designed considering Standards VEG S1, S2, S5, and S6 to promote lynx conservation.</p>
Retain old growth habitat characteristics in units that contain old growth habitat	The Silviculturist and Wildlife Biologist will monitor stand markings and timber harvest to ensure the stands meet Green et al. (1995, addendum 2005) old growth criteria.
Minimize the chance of bear habituation	Food and garbage associated with project activities must be stored in a vehicle or other bear-proof container.
Maintain current status of Elk Habitat Effectiveness in project area	No new construction of permanent roads. Construction of temporary roads is permitted but must be decommissioned no later than 3 years after the date the project is completed.
Invasives	
To prevent the spread of the above species existing along the haul routes and the introduction of any new species in the area.	<p>The following prevention measures should be followed:</p> <ul style="list-style-type: none"> a) Remove all mud, dirt, and plant parts from all equipment before moving into project area. Cleaning must occur off National Forest lands (this does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area). b) Clean all equipment being used for implementation prior to entering the project area. c) Regularly inspect, remove, and properly dispose of weed seed and plant parts found on clothing and equipment. d) Minimize the creation of sites suitable for weed establishment. Soil disturbance should be minimized to meet project objectives. e) Rehabilitate and revegetate landing piles post burning to prevent suitable locations for weed establishment.
Rare Plants	
Protect Sensitive & Rare Plants	Based on the species, habitat and treatment, buffers may be placed around rare plants. Buffer size will be determined based on species and habitat.
Soils	
Minimize soil erosion and compaction. Commercial Harvest	<p>To a) ensure maintenance of long-term soil productivity through continued nutrient input and on-site moisture retention and b) meet understory wildlife habitat requirements, coarse woody material would be retained on-site upon completion of project activities per those guidelines outlined in <i>Soils, Wildlife, and Fire Requirements for Retention of Coarse Woody Debris: Assessment for Haacke Claremont Environmental Assessment</i> (Mayn 2007- further updates in progress). Larger diameter (15 inches or greater) un merchantable material, not contained within trees designated to be cut, would not be yarded in units where coarse woody debris tonnages are less than prescribed. At the timber sale pre-work conference, purchaser shall be encouraged to use largest diameter material available to meet this requirement.</p>

OBJECTIVE	DESIGN FEATURE	
Ground Based Yarding	<p>Selected project units that overlap with past harvest activities would be visited in the field prior to implementation of commercial harvest activities. General soil morphologic characterization will be conducted along with detrimental soil disturbance monitoring. These will be done in effort to a) establish a baseline against which to evaluate change in detrimental soil disturbance post implementation and b) determine whether any further design features or mitigations may be required to ensure project activities maintain long-term soil productivity. Selection of units to monitor prior to project implementation would be based upon multiple factors, including, but not limited to:</p> <ul style="list-style-type: none"> ○ Time since last harvest entry; ○ Past harvest type; ○ Susceptibility to detrimental soil disturbance based on mapped soil, geologic, and geomorphic attributes. <p>To minimize extent of project-related detrimental soil disturbance, harvest operations should utilize existing (i.e. previously used) skid trails and/or road beds whenever feasible.</p> <p>Ground-based yarding should be generally restricted to slopes 35 percent or less, as directed in the 1999 Bitterroot Forest Plan Monitoring Report and supported by subsequent monitoring. While the Bitterroot Forest Plan allows for ground-based yarding on up to 40 percent slopes, restricting operations to 35 percent slopes or less has been shown to minimize soil displacement and compaction due to rutting.</p> <p>To avoid excess soil compaction and/or displacement, ground-based yarding would only occur when soils are sufficiently dry or during appropriate winter conditions. These conditions can be further described as follows:</p> <ul style="list-style-type: none"> ● Dry conditions: Sufficiently dry operating conditions exist when the top six inches of mineral soil does not form a soft ball when squeezed in the palm of the hand and free water is not on the surface of the sample when squeezed or shaken. Contact the Forest Soil Scientist if questions arise. ● Winter conditions: Ground-based operations must maintain the following combination of snow depth and frozen soil conditions under the wheels or tracks/treads of equipment at all times. 	
	<p>Depth of compacted (by equipment) snow under wheels or track/tread*</p>	<p>Minimum thickness of solidly frozen soil needed below compacted snow layer</p>
	<p>10 or more inches</p>	<p>0 inches</p>
	<p>7 to 10 inches</p>	<p>1 inch</p>
	<p>4 to 7 inches</p>	<p>2 inches</p>
	<p>less than 4 inches</p>	<p>4 inches</p>
<p>* Pre-trailing. Pre-trailing selected skid trails a day or so prior to skidding or other heavy trail use is a way to achieve this objective. If average, pre-compacted snow depth along the proposed trail is more than 15 inches, pre-trailing can be done whether or not the soil is frozen. If pre-compacted snow depth is 8 to 15 inches; pre-trailing should be done only if the soil is solidly frozen in the top one inch or more.</p>		

OBJECTIVE	DESIGN FEATURE
	<p>Otherwise, pre-trailing should be delayed until more snow falls to accumulate to the 15 inch or more depth. To further aid soil protection, pre-trailing should be done using an “easy-does-it” approach, including slow ground speeds and steady movements. Avoid spinning tires and bouncing equipment around on trails as much as possible. Adequate pre-trailing air temperatures generally are in the low 20’s Fahrenheit or lower. For more information about pre-trailing conditions, consult with the Forest soil scientist.</p> <p>To expedite recovery in light of recent soil disturbance incurred during the previous entry, primary skid trails in ground-based harvest units would be slashed, seeded, and fertilized following completion of project activities.</p>
<p>Prescribed Fire (Broadcast burning)</p>	<p>To prevent detrimental accelerated erosion and associated loss of soil productivity, burn operations should ensure that at least 70 percent ground cover is maintained within each prescribed fire unit boundary. In cases where ground cover is less than 70 percent prior to burning, consumption and loss of ground cover should not exceed 15 percent. Ground cover includes duff, organic soil horizons, leaf litter and needlecast, ground cover associated with understory vegetation, fine and coarse woody debris, and surface coarse fragments. Prescribed fire prescriptions would be designed to meet these soil protection requirements.</p> <ul style="list-style-type: none"> - Coarse wood requirements would be considered when designing burn prescriptions. Coarse wood larger than 15 inches in diameter would not be <i>intentionally</i> ignited by crews during hand lighting operations. <p>Prior to burning, harvest-related slash would be left for one winter after cutting to allow for initial decomposition and nutrient leaching.</p> <p>Fireline construction using mechanized equipment would be required to adhere to the same soil moisture guidelines as those required during ground-based commercial harvest operations;</p> <ul style="list-style-type: none"> • Sufficiently dry operating conditions exist when the top six inches of mineral soil does not form a soft ball when squeezed in the palm of the hand and free water is not on the surface of the sample when squeezed or shaken. <p>To expedite site recovery, constructed fireline would be rehabilitated as soon as possible following completion of project activities, preferably within the same calendar year if not the following field season. Fireline rehabilitation would include, but not be limited to, replacement of displaced vegetation to minimize extent of exposed mineral soil and placement of slash across the line.</p> <p>To ensure maintenance of long-term soil productivity through continued nutrient input and on-site moisture retention, coarse woody material would be retained on-site upon completion of project activities based on assumed fire groups/vegetation response units within proposed project units (per Mayn 2007).</p>
<p>Prescribed Fire Hand piling and burning (not associated with landings)</p>	<p>In order to minimize extent of localized soil disturbance, hand piles would average six to eight feet in diameter; localized soil disturbance associated with each individual pile would be restricted to 50 square feet or less.</p> <p>To minimize extent of new detrimental soil disturbance, slash piles should take advantage of pre-disturbed locations wherever feasible, such as (but not limited to) old log landings, skid trails, and roads associated with past harvest units.</p> <p>Where feasible and practicable, crews may consider building crib structures to elevate</p>

OBJECTIVE	DESIGN FEATURE
	burn piles six to twelve inches off the ground to minimize degree of soil burn severity.
Temporary road and landings	Rehabilitation activities of temporary road construction and landings would include recontouring, slashing with readily available debris, and application of organic fertilizer and seed.
Visuals	
Maintain or improve scenic integrity.	Where feasible blend treatment units into the surrounding stands. Consider feathering edges to minimize artificial lines/edges and corners adjacent to untreated areas and along boundaries with private lands.
	In visually sensitive areas, minimize the number of skyline corridors and keep them as narrow as possible. Align corridors to avoid being perpendicular to the West Fork Road and to mimic topography to the extent feasible (technically and economically).
Heritage Resources	
Protect cultural sites within the project area.	No ground disturbance or burning would occur on known archaeological sites or historic structures. Report new discoveries of cultural material to the Forest Heritage Specialist. Consult with the Forest Heritage Specialist during implementation planning, and when treatments will occur in areas where heritage sites are present.
Recreation Management	
Prevent damage to existing trail features	All trails and their constructed features in the project area will be maintained, restored, or replaced in-kind to their original design according to the USDA Forest Service Trail Plans and Specifications.

Description of Project Activities

Proposed Vegetation and Fuels Treatments

We anticipate needing and using several treatments types to manage the existing vegetation and fuels within the Piquett Creek project area to create conditions that are more resistant and resilient to disturbances. Considering site specific stand conditions and the degree of departure from desired conditions, a suite of treatments would be applied across the project area. Treatments will utilize project design features to ensure compliance with laws, policy, regulations and Bitterroot National Forest Plan standards and guidelines. Site specific mitigations or resource specific thresholds may be developed during implementation and incorporated.

Prescribed Burning without Prior Harvest: Prescribed burning without harvest would occur primarily in the Warm and Dry vegetation types. The locations are often steep, dry, and rocky and may have limited access. This treatment would burn needle litter accumulations, grasses, brush, forest litter and concentrations of down wood. It would maintain and reduce surface fuel and the ingrowth of shade tolerant Douglas-fir on dry sites historically dominated by ponderosa pine due to frequent low intensity fire. Prescribed burning would lower fuel loading, improve species composition and structure and stimulate browse species for wildlife forage.



Small Tree Thinning (Plantations): A non-commercial treatment in young stands typically less than 35 years old. Small tree thinning may occur in naturally regenerated young stands or in planted stands. The objective of thinning young stands is to improve stand health, growth, and species composition for the future.

Intermediate Treatments: Intermediate treatments including thinning and improvement cuts are purposed to maintain or enhance desirable stand characteristics. These treatments are designed to mimic nature's low intensity disturbances such as low intensity fire or low levels of insect related mortality and are most commonly used in the warm and dry, ponderosa pine and Douglas-fir forest types. The trees selected for removal within these areas would generally be smaller or showing signs of insect stress such as defoliation. Following treatment these areas would generally not be open enough to allow for the successful establishment of seedlings of desired species. Depending upon site conditions and tree species left after treatment, fuel hazard would be reduced by use of by prescribed fire and/or hand crew small tree thinning or slashing as appropriate.

- **Improvement Cut:** Improvement cutting treatments would occur in stands in drier habitats with a significant ponderosa pine component and low to moderate levels of insect and disease activity. This treatment is designed to promote and maintain mature ponderosa pine and Douglas-fir communities in these areas by removing competing less desirable species (Douglas-fir) with the goal of increasing the growth, vigor and resilience to disturbance. *An example is thinning a warm and dry mixed conifer stand containing ponderosa pine and Douglas-fir by removing intermediate or suppressed Douglas-fir and favoring ponderosa pine in a more open grown stand providing space between the crowns.*
- **Commercial Thin:** A commercial thin would retain the healthiest trees with large, well-formed crowns. The objective is to improve tree growth and would favor the desired species determined by the site conditions, fire tolerance, and desired future conditions. *An example would be thinning a more mature plantation to reduce stand densities, favor the desired species and increase growth and vigor.*

Irregular Selection: This treatment would result in a mosaic of small openings and thinned areas with variable residual densities. Trees would be thinned in areas where there is the opportunity to maintain or enhance the conditions for desirable species. Trees removed would generally be smaller, less dominant, diseased, or of a species not desired for the future stand composition. This uneven-aged treatment would promote multiple age classes and variable forest structure. *An example is removing stressed Douglas-fir with signs of western spruce budworm defoliation while retaining the individuals that show signs of genetic resistance to the budworm; leaving a variable density residual stand with possible openings.*

Regeneration Harvest: Regeneration harvests are proposed to address forest health issues including insect, disease and fire hazard. Regeneration harvests include shelterwood cuts, seed tree cuts and clearcuts. Regeneration harvests are a treatment tool that mimics natural disturbances that result in moderate to high levels of tree mortality. The following types of

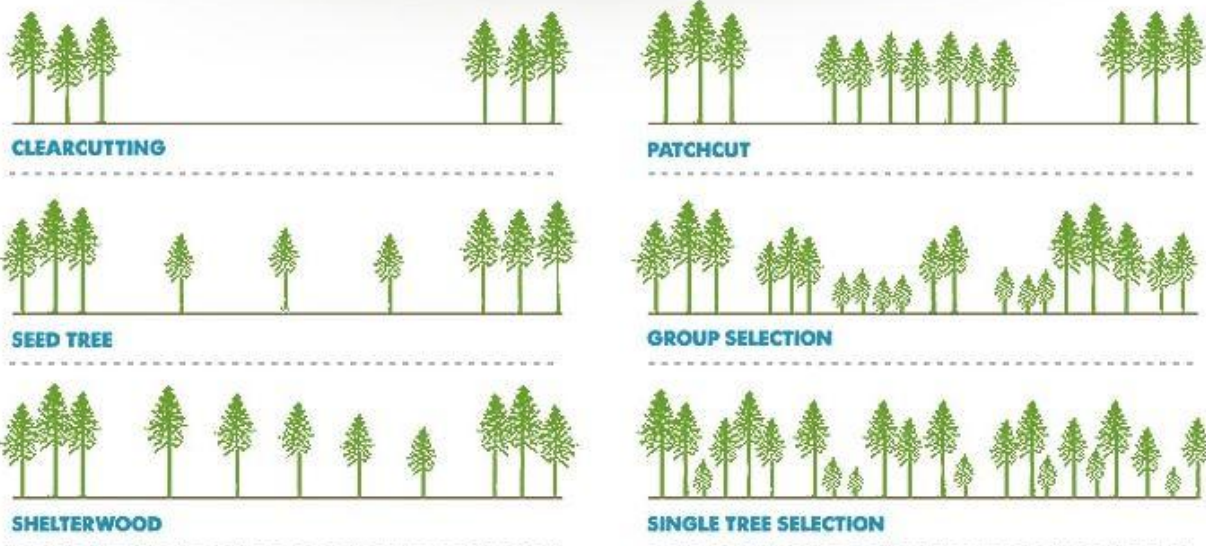
regeneration harvests are tools used in forest types that would naturally experience stand replacing fire or high mortality related to insects and disease. These treatments are most commonly found in cool and moist forest types. *An example is a mixed conifer stand on a cool and moist site where lodgepole pine has experienced mountain pine beetle mortality, Douglas-fir and subalpine fir are experiencing heavy western spruce budworm defoliation, Douglas-fir contains moderate to high levels of dwarf mistletoe, or root disease is present. In many cases, one or more of these insects or diseases is a factor and post-treatment tree retention varies depending on stand health, species and regeneration needs.*

Shelterwood with reserves trees would be left scattered throughout a stand or in clusters designed to provide shade and seed for successful regeneration.

Seed tree with reserves individual trees would be left to produce desirable seed for regeneration.

Clearcut with reserves reserve trees would not be relied upon to produce seed or shade, but would function to meet other objectives. Regeneration treatments would remove most of the trees in an area to provide growing space for planted or natural seedlings.

TYPES OF HARVEST



Thinning and slashing includes reducing the density of seedling, sapling and pole sized trees with purposeful selection of leave trees using a combination of a spacing requirement, diameter limit or species preference. These activities would be used on most acres to control species



composition, increase tree vigor, remove ladder fuels, increase canopy base heights, and prepare stands for the use of prescribed fire.

Piling includes the gathering and concentrating of residual slash (tops, limbs, branches, trunks, etc.) and existing dead and down woody material (generally larger than 1 inch in diameter) in excess of Course Woody Debris requirements by hand or machine. Piles are carefully located outside of residual/leave tree driplines, in openings or areas of low tree densities to minimize scorch to trees when burned. Piling is primarily used in conjunction with thinning to dispose of residual slash thereby reducing fuel loadings, fire intensities and protecting residual trees prior to the use of prescribed fire.



Pile burning is used to dispose of excess vegetation remaining after thinning and mechanical treatments. Pile burning is guided by burn plans that specify the parameters of favorable conditions during which the risk of fire spread and air quality impacts are low but insure complete fuel consumption.

units or along roads and serve to decrease the resistance to control of fire. The activity includes clearing an area ranging between 20 and 100' wide of all vegetation less than 8" and pruning limbs of residual trees to limit the probability of torching and spotting. All existing down woody fuels and thinning slash within this area is removed and scattered to limit fire intensities.

Prescribed Fire Post Treatment-

Usually the final step of the phased approach for effectively reducing surface fuels depending on existing conditions, proximity to values and desired outcomes. Windows of opportunity (burn windows) for implementing prescribed fire typically occur in the spring and fall months, prior to and after the normal fire season.

Prescribed fire within the project area will improve big game habitat, reduce surface fuels, reintroduce fire to a fire dependent ecosystem and move areas of the project closer to the desired conditions.



Effects of the prescribed burning are reduced fuel loadings that are variable across the units but within historic ranges for each fire group. Prescribed fire will also create a discontinuous fuelbed that will reduce potential fire intensities and spread. Canopy base heights will be raised and ladder fuels removed by thinning and removing understory and intermediate sized trees. Desired scorching on residual tree's lowest limbs during prescribed fire implementation will also raise canopy base heights and reduce the probability of torching during a wildfire. The changes to surface and canopy fuels from the proposed treatments will result in reduced fire type and intensity. Maintenance burning would continue to occur at appropriate fire return intervals determined by site conditions.

Road Management Activities

Road management activities are needed to implement the project and maintain the current road infrastructure. In addition to road maintenance and temporary road activities described below, the resurfacing of FSR 49 with new gravel aggregate would be completed between mileposts 0.2 and 1.1. Drive thru dips would be installed to the approaches on two bridges that cross Piquett Creek located on FSR 49 and FSR 5720. Additionally all roads that cross streams will be graveled prior to any hauling. Implementing these upgrades to the existing road infrastructure will address current sources that are contributing sediment into Piquett Creek.

Maintenance activities would include surface blading, minor earth work (e.g. cut and fill shaping), road surface shaping, ditch cleaning and reshaping, roadside clearing and/or brushing, seeding disturbed areas, drain dip and cross drain cleaning and construction, culvert cleaning, armoring, and/or replacement, slash filter windrow and sediment trap construction near live water crossings. Because these roads are intended for long-term access, and in many cases would remain open to public travel, work would be performed to minimize environmental impacts and to provide a safe and stable road.

Temporary roads would be constructed to a minimal standard to provide access for timber harvesting equipment and log trucks. These roads would be decommissioned within 3 years of the completion of the project. Decommissioning of the road would include replacing overburden (excavated soils) back onto the road prism to return the ground to its natural contour, placing woody debris on the disturbed area, and seeded and fertilizing the disturbed soil.

Collaboration

We utilized a collaborative process to help develop a purpose & need and proposed action that would meet the identified goals of reducing flame lengths and crown fire potential and reduce susceptibility to current and future insect and disease activity within the Piquett Creek Project area. Over the past several months, district staff have engaged with local residents of the West Fork as well as other interested groups, organizations and local government within the Bitterroot Valley to hear ideas and develop a proposed action that would meet those goals. A summary of the collaboration efforts are listed below:

- May 13th - Existing Condition presentation to the Ravalli County Collaborative

- July 16th - Request for collaboration letter mailed to 100 adjacent landowners & local residents, Ravalli County Collaborative (RCC), Bitterroot Restoration Committee (BRC), and Trout Unlimited (TU)
- August 7th- Public field trip to the project area that included a variety of stops that highlighted different existing conditions, desired conditions and treatment options. Attended by members of the RCC, BRC, TU, West Fork Rural Fire District, local residents and business.
- August 15th- Public field trip for additional local residents.

The district received feedback and recommendations from several local residents as well as the Ravalli County Collaborative. Overall there was support and agreement that actions are needed to address the current conditions and reduce fire risk in the area. The common themes are listed below:

- Place the highest priority for treatments to reduce fuels and improve forest health within the Wildland Urban Interface.
- Design treatments that promote structural and species diversity while favoring the retention of large trees.
- Promote natural processes outside of WUI to improve stand resiliency and diversify the landscape.
- Enhance wildlife habitat and diversity across the landscape.
- Reduce the potential of losing relatively rare habitats (old-aged forests, riparian habitats and brush fields) to wildfire.
- Ensure no net gain or loss of open roads or trails within the area.
- Mitigate potential sedimentation sources into all streams from roads and trails.
- Manage the area with a high regard for aesthetics with focus on what is being left behind.
- Protect riparian habitats to promote shade, woody debris and cold water for fish and amphibians.
- Pursue stewardship projects and cost share partners to help fund treatments.
- Evaluate current and future recreational opportunities.

This information was used to develop the purpose and need and proposed actions. Although developing recreational opportunities is outside of the scope of this project, I am interested in feedback that could be used to develop future projects in the area that would promote recreation.

Categorical Exclusion Category

Wildfire Resilience. The Consolidated Appropriations Act of 2018 (Public Law 115-171) amended Title VI of the Healthy Forests Restoration Act of 2003 (HFRA) (16 U.S.C. 6591 et seq.) to add Section 605. Section 605 establishes a categorical exclusion for hazardous fuels reduction projects in designated areas on National Forest System lands. A hazardous fuels reduction project that may be categorically excluded under this authority is a project that is designed to maximize the retention of old-growth and large trees, to the extent that the trees

promote stands that are resilient to insects and disease, and reduce the risk or extent of, or increase the resilience to, wildfires (HFRA, Sections 605(b)(1)(A)).

This categorical exclusion may be used to carry out a hazardous fuels project in an insect and disease treatment area that was designated by the Secretary under HFRA section 602(b) by March 23, 2018. (HFRA, Section 605(c)(2)(C))

Within designated landscape scale areas, projects carried out under this authority are:

Prioritized in the wildland-urban interface; or

If located outside the wildland-urban interface, limited to Condition Classes 2 or 3 in Fire Regime Groups I, II, or III that contain very high wildfire hazard potential.

(HFRA, Sections 605(c)(2)(A) & (B))

Projects carried out under this authority may not be implemented in any of the following areas:

a component of the National Wilderness Preservation System;

any Federal land on which, by Act of Congress or Presidential proclamation, the removal of vegetation is restricted or prohibited;

a congressionally designated wilderness study area; or

an area in which activities... would be inconsistent with the applicable land and resource management plan.

(HFRA, Sections 605(d)(1) - (4))

A project under this authority must either carry out a forest restoration treatment that:

complies with the eligibility requirements of the Collaborative Forest Landscape Restoration Program under section 4003(b) of the Omnibus Public Land Management Act of 2009 (16 U.S.C. 7303(b)).

(HFRA, Sections 605(b)(2))

Or, a project under this authority must carry out a forest restoration treatment that:

maximizes the retention of old-growth and large trees, as appropriate for the forest type, to the extent that the trees promote stands that are resilient to insects and disease, and reduce the risk or extent of, or increase the resilience to, wildfires;

considers the best available scientific information to maintain or restore the ecological integrity, including maintaining or restoring structure, function, composition, and connectivity; and

is developed and implemented through a collaborative process that includes multiple interested persons representing diverse interests; and

is transparent and nonexclusive; or meets the requirements for a resource advisory committee under subsections (c) through (f) of section 205 of the Secure Rural

Schools and Community Self-Determination Act of 2000 (16 U.S.C. 7125). (HFRA, Sections 605(b)(1)(A) - (C)).

Projects carried out under this authority are subject to the following size limitation on the number of acres treated:

may not exceed 3000 acres.

(HFRA, Section 605(c)(1))

Projects carried out under this authority are subject to the following limitations relating to roads:

A project . . . shall not include the establishment of permanent roads.

The Secretary may carry out necessary maintenance and repairs on existing permanent roads for purposes of this section.

The Secretary shall decommission any temporary road constructed under a project under this section not later than 3 years after the date on which the project is completed.

(HFRA, Section 605(c)(3))

Piquett Creek Project Summary of Requirements

1. The project area is WUI or designated in accordance with section 602(b) of HFRA
 - 100% of the project area is within a designated 602(b) area
 - 67% of the project area is considered WUI, as defined by the Bitterroot Community Wildfire Protection Plan.

- 97% of the project area has been identified as Community Protection based on results of the 2016 Bitterroot Wildfire Risk Assessment.
2. Maximum 3,000 acres *treated* (not project area). Project may include any combination of conditions described above (activities inside and outside WUI, for instance).
 - Up to 3,000 acres are proposed for treatment under this decision.
 - Treatments will be focused on high risk areas within the WUI or in areas classified as Condition Class 2 & 3 within Fire Regime Groups I-III.
 3. Exempt from objection process (218 review)
 4. No permanent roads. Temporary roads must be decommissioned no later than 3 years after the date the project is completed.
 - No permanent roads are proposed and temporary roads will be decommissioned within 3 years of project completion.
 5. Must be developed through collaborative process.
 - The purpose and need and proposed action was developed with input from a collaborative process. Refer to the detailed summary of the collaborative process above.
 6. Public scoping must be conducted.
 - A public scoping period will occur between September 12th and October 11th, 2019.
 7. Maximize retention of old-growth and large trees as appropriate.
 - Prescriptions and treatments will be designed to retain and protect healthy large trees.
 8. The project is not located in Wilderness or WSA; in areas where removal of vegetation is restricted or prohibited by statute or presidential proclamation; or in areas where the activities would be inconsistent with the Forest Plan.
 - Project area is not located within Wilderness, Wilderness Study Area, Recommended Wilderness or an Inventoried Roadless Area.
 - Proposed activities are consistent with Forest Plan direction for Management Areas 1, 2 & 3A.