ELK MEADOWS SUBDIVISION FIRE WISE AND FORESTRY ASSESSMENT

2022

Committee Members Kurt Krueger, Tom Wilson, and Mark Petroni

Summary and Management Recommendations

The Forests in the Elk Meadow Subdivision are for the most part healthy and diverse. Tree species native to this area found within the subdivision include Douglas fir, lodgepole pine, subalpine fir, Engelmann spruce, limber pine, rocky mountain juniper, horizontal juniper, aspen and perhaps white bark pine. Other species native to Montana but not generally found at the elevation of Elk Meadows Subdivision have been introduced since the 2010 logging. They include ponderosa pine, western larch, spruce, and white bark pine. Many planted ponderosa pines have grown to sapling size and are dispersed in the common areas and some lots. Lodgepole pine and Douglas fir dominate vegetation throughout the subdivision.

Dense stands of lodgepole pine saplings can be found on the north slopes between the ridge top and Discovery Lane. These dense sapling stands are the result of logging that occurred prior to 1995, most likely in the early 1990s. Between 2009 and 2011 most of the rest of the subdivision was logged to remove beetle killed lodgepole. The heaviest logging was located along Mule Deer Lane and Moose Track Lane extending upslope to the ridgetop along Elk Meadows Lane.

Climate Change: *The direct effects of climate change on forests include increased temperatures and shifts in precipitation that together alter humidity, soil moisture, and water stress. Direct effects can be beneficial or detrimental to forest growth and survival. The results of this analysis on the direct effects of climate change on Montana's forests produced several key messages, some of which are shown below (for a complete list of key messages, see the Forests chapter):*

• *Increased temperatures will have positive or negative effects on individual trees and forest wide processes, depending on local site and stand conditions, but impacts from increased extreme heat will be negative. [high agreement, moderate evidence]*

• *Direct effects of climate change on individual trees will be driven by temperature in energy limited forests and moisture in water-limited forests. [high agreement, moderate evidence]*

• *The speed and magnitude of climate change may mean that increased forest mortality and contractions in forest distribution will outpace any gains in forest growth and productivity over the long run, leading to a net loss of forested area in Montana. [medium agreement, limited evidence] (2017 Montana Climate Change Assessment, https://davidjkatz.files.wordpress.com/2017/09/2017-montana-climate-assessment-executive-summary-lr.pdf)*

How climate change will affect the forested vegetation in the Elk Meadows Area is a matter of interpreting the data and predictions presented in the 2017 Climate Change Assessment. It is highly likely that longer summer droughts will change the vegetation composition of the area.

Species that are less drought tolerant such as lodgepole pine, spruce, subalpine fir and aspen will die out. Species such as Douglas fir, ponderosa pine, limber pine and juniper will survive.

Longer, drier summers will increase the risk of wildland fire. Coupling fire effects with drought further supports the hypothesis that lodgepole pine, spruce and subalpine fir will be reduced in the area. Species that tend to survive fire, Douglas fir and ponderosa pine will survive albeit in less density.

Recommendations:

Management of vegetation in the Elk Meadows Area must consider the effects of climate change. Dense stands of lodgepole reproduction should be thinned. Thinning will allow these stands to better survive drought and fire.

We recommend a 12'x12' spacing for the dense stands of lodgepole reproduction in Area 4 (1995 logged areas primarily on the north facing slope) and 8'x8' spacing for sapling stands (2010 logged areas primarily northwest facing along Mule Deer Lane and Moose Track Lane) in area 2. This spacing will allow the residual stand more access to moisture and sunlight. A masticator mounted on a skid steer could accomplish the thinning task and reduce the slash to mulch.

While ponderosa pine is drought tolerant it may change the fire frequency. Ponderosa pine needle cast generates increased ground fuel. Ponderosa pine stands have a fire return interval between 6-50 years while Douglas fir stands generally have a 19-43-year fire return interval. In addition, where Douglas fir and ponderosa pine share dominance the Douglas fir tend to be more shade tolerant out competing ponderosa pine in the stand.

Based on this information and the overall fire hazard in the Subdivision it is recommend that no more planting of trees occur in the common areas. All the common areas are either on ridge tops or in more open areas that may serve as containment areas to check the spread of a wildfire. It is highly likely that the common areas between Elk Meadows Road and Moose Track Lane would be thinned by fire suppression crews should this area be need for fire line to stop fire from inundating the entire subdivision. Individual lot owners who may wish to plant trees should consider the long-term ramifications of adding fuel to the subdivision and should understand how longer drier summers will affect the vegetation.

The risk of wildland fire in the subdivision is significant at this time and will only get worse with longer, drier summers. Homeowners must understand that structures (homes, sheds, garages) are fuel just as much as the forest vegetation. A burning structure has the potential to spread and jeopardize adjacent property. The subdivision has taken steps to improve fire suppression capabilities such as the 1500-gallon cisterns buried at the junctions of Elk Meadows lane with Mule Deer Lane, Moose Track Lane and Bear Cub Lane. While this water is helpful, it is not enough to reach the entire subdivision or deal with a large wildland or structure fires.

Homeowners must take responsibility for their property and provide survivable space with the expectation that fire suppression forces cannot protect all the property in the subdivision at once and that a rapidly moving wildland fire could exceed suppression forces capabilities very quickly. The 2009 "Living with Fire" publication produced by FireSafe Montana is an excellent guide to developing survivable space. (www.firesafemt.org) Given fuel loading and predicted longer, hotter summers the question is not if the area burn it is when it will burn and how often.

A. Asessment Methodology and references

This report was assembled using data from the Deerlodge County Soil Survey produced by the USDA Natural Resource Conservation Service (1993). The soil survey provided topographic, vegetation type, precipitation amounts, and growing season information.

Observations from the established roads and walk through inventory of the Common Areas provided addition information concerning forest condition, tree species, and canopy coverage.

History of logging and plantings was provided by reviewing Google Earth historical records and from Kurt Krueger who lead these efforts in 2009 and 2010.

Assessment of fire hazard and potential fire spread was provided by Mark Petroni who was involved in wildland fire management for nearly 40 years. Firesafe information was provided from FireSafe Montana and their 2009 guide for homeowners.

Climate change information is from "The 2017-(2021) MONTANA CLIMATE ASSESSMENT
By: *Cathy Whitlock[1], Wyatt F. Cross[2], Bruce Maxwell[3], Nick Silverman[4], and Alisa A. Wade[5]*.

The subdivision was divided into areas of similar soil types, vegetation types, aspects and roads.

Information concerning fire regimes and fire effects is from the National Fire Effects Information System.

Forest Service publication "Fire Ecology of Montana Forest Habitat Types East of the Continental Divide" (1983) was the source for fire ecology information.

B. Weather for the Elk Meadows and Georgetown Area

Seasonal variations in weather: Moist springs give way to hot/dry summers. Snow can be expected in mid to late fall that will last all winter melting off in May and June. Wind can blow from any direction given frontal passage however, the prevailing wind is from the south to west. Thunderstorms can generate strong erratic wind from any direction. Most thunderstorm build over the Continental Divide to the south and move north easterly along the Dividenproviding a glancing effect on Elk Meadiows/ Georgetown Area.

C. Climate Change.

The following climate change information was reprinted directly from the 2017-2021 MCA report referenced above.

This assessment draws from, and is an extension to, the 2017 Montana Climate Assessment (MCA) (Whitlock et al. 2017), which provides the first detailed analysis of expected

impacts to Montana's water, forests, and agriculture from climate change. MCA presents 35 key messages, seven of which serve as important foundations to the work of this report:

- *Annual temperatures have risen 2-3°F (1.1-1.7°C) since 1950, and our growing season is now 12 days longer. Montana has experienced an increase in warm days and nights, both in summer and winter. There is no trend in precipitation since 1950. [high agreement, robust evidence]*
- *Climate models project that temperatures will continue to increase and by the end of the century average annual temperature may be 9.8°F (5.4°C) higher than those recorded between 1971-2000, given our present rate of greenhouse gas emissions. [high agreement, robust evidence]*
- *Precipitation received at a state level may increase slightly in the future, but these gains will be offset by evaporation and transpiration due to higher temperatures. More precipitation will be received in winter, spring, and fall; summers will become drier than at present. [moderate agreement, moderate evidence]*
- *Rising temperatures will result in a shift from snow to rain earlier in the year than at present. In turn, this shift will result in earlier dates for the onset of snowmelt and associated peak stream runoff by the end of the century. [high agreement, robust evidence]*
- *The number of days >90°F (>32°C) will increase significantly by the end of the century, with the greatest warming in eastern Montana. The eastern part of the state will also experience more extreme heat (i.e., days when the heat index[1] exceeds 105°F [41°C]). [high agreement, moderate evidence]*
- *Increased wildfires are expected as wetter springs result in increased fuel accumulation, and drier summers lead to fuel desiccation. The size of fires and the length of the fire season will increase in both forest and grassland. [high agreement, robust evidence]*
- *Unforeseen climate-related weather events will occur with projected increases in temperature and drought in the coming decades, including greater likelihood of spring flooding, severe summer drought, and extreme storm events. [high agreement, moderate evidence]*

INDIRECT EFFECTS OF CLIMATE CHANGE ON FORESTS

Key Messages

• An increase in fire risk (i.e., probability of occurrence)—including an increase in size and possible frequency and/or severity (i.e., tree mortality)—is expected in the coming century as a result of a) prolonged fire seasons due to increased temperatures, and b) increased fuel loads from past fire suppression. Spatial patterns of fire activity will be complex and dependent on disturbance history and current stand condition. Fire risk may increase in all forests; fire severity may increase the most in lower elevation forests. [high agreement, robust evidence]

• *Rising temperatures are likely to increase bark beetle survival* [high agreement, strong evidence]*, but climate-induced changes to other insects and forest pathogens are more varied*

and less certain [medium agreement, moderate evidence]. *Climate change effects are difficult to forecast because of the interplay between climate-driven changes in insect or pathogen behavior and changes in host tree susceptibility.*

• There may be a reduction in the amount of carbon stored in forests. Rising temperatures and increased atmospheric CO_2 can increase forest productivity and thus the carbon stored in organic matter. However, warmer temperatures can also reduce soil carbon through increased decomposition rates. Overall, increased tree mortality from increased forest disturbance may cause a reduction in forest carbon storage. [low agreement, limited evidence] (A.A. Wade etal, Forests and Climate Change in Montana)

The direct effects of climate change on forests include increased temperatures and shifts in precipitation that together alter humidity, soil moisture, and water stress. Direct effects can be beneficial or detrimental to forest growth and survival. The results of this analysis on the direct effects of climate change on Montana's forests produced several key messages, some of which are shown below (for a complete list of key messages, see the Forests chapter):

• Increased temperatures will have positive or negative effects on individual trees and forest wide processes, depending on local site and stand conditions, but impacts from increased extreme heat will be negative. [high agreement, moderate evidence]

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• The speed and magnitude of climate change may mean that increased forest mortality and contractions in forest distribution will outpace any gains in forest growth and productivity over the long run, leading to a net loss of forested area in Montana. [medium agreement, limited evidence] (2017 Montana Climate Change Assessment, https://davidjkatz.files.wordpress.com/2017/09/2017-montana-climate-assessment-executive-summary-lr.pdf)

D. Elk Meadows Assessment

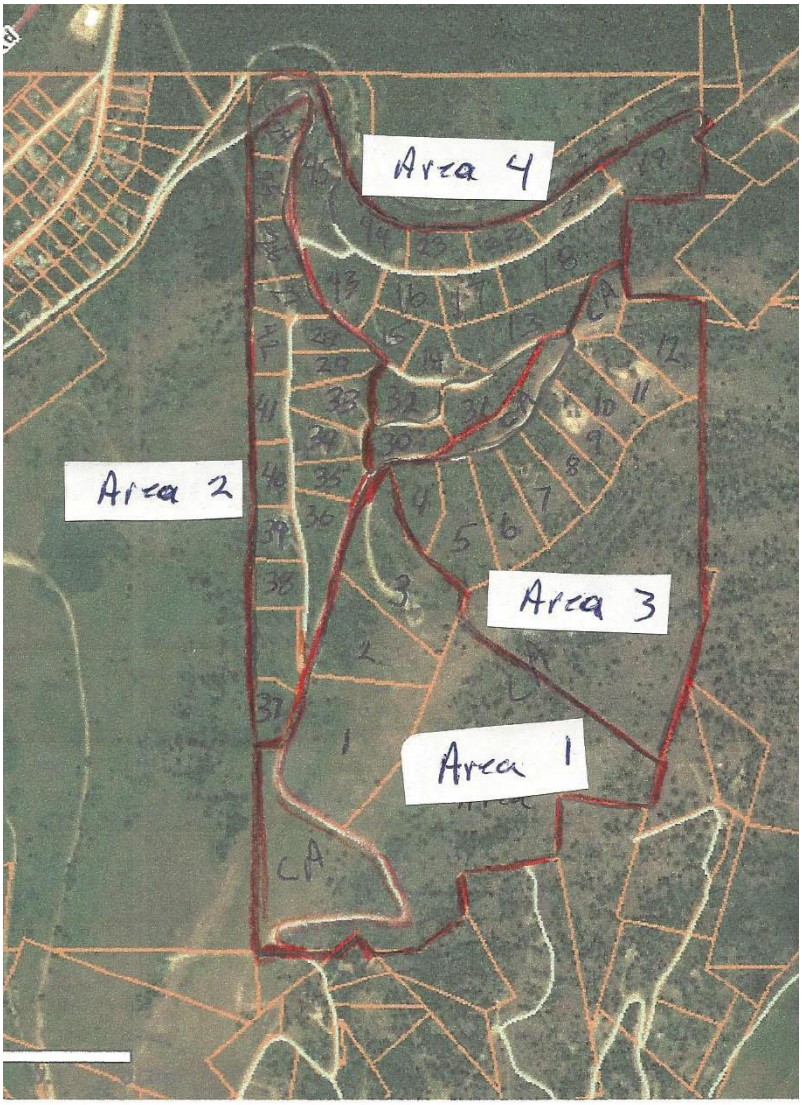
In an effort to address the site-specific vegetation types, topography, soil types, and fire risk the subdivision will be considered in 4 areas as follows:

Area 1 includes the southern aspect of the subdivision from the Southern Arch north to the high voltage overhead transmission line. The area includes the Common Area on both sides of Elk Meadows Lane and lots 1,2, and 3.

Area 2 includes the lots along Mule Deer and Moose Track Lane (lots 24.25,26,27,28,29,33,34,35,36,37,38,39,40,41,42,)

Area 3 includes the northern portion of the Common Area from the powerline and includes the Common Area along the west and east side of Elk Meadows Lane, and the Common Areas along the ridge top. lots 4,5,6,7,8,9,10,11,12 are included as well.

Area 4 includes the lots between Elk Meadows Lane and Moose Track Lane (lots 30,31,32) and all lots north of Elk Meadows Lane (lots 13,14,15,16,17,18,19,21,22,23,43,44,45).



Elk Meadows Subdivision
with Lot #s
CA - Common area

Area 1 Lots 1,2,3 and the Common Area

Soils: (75E)* Hanson gravelly loam, 15 to 35 percent slopes, (392E)*, Whitore cobbly loam, 15 to 35 percent slopes and Whitore gravelly loam, 15 to 35 percent slopes (92E)* are found in the area.

*Numbers represent soil inventory mapping designations.

Precipitation range and temperature taken from the soil survey: mean annual precipitation-15 to 22 inches and mean annual air temperature-36 to 45 degrees F (note climate change may have altered these figures since the soil survey was completed in the early 1990s and published in 2003.)

Topography of the area is south facing sloping uphill to the north. There is a shallow draw extending from south to north primarily through the common area. Slopes are as described above 35% over most of the area with small less steep benches.

Site Specific Weather for this area: Snow depth is generally less in the area than any of the other areas due to the southern aspect and lower elevation. The area is influenced by diurnal upslope winds during the day and downslope wind at night. The area is also in a thermal belt. During stable weather patterns cool air settles into the Georgetown Lake basin lifting warm air up slope that becomes trapped by cool ridgetop winds. Due to this "thermal belt" temperature can be 3-10 degrees warmer than the lake level. Wildland fires in thermal belts can actively burn at night due to the warmer/drier conditions.

Vegetation is mixed in this area. In soil type 75E the primary vegetation is grass and shrub, specifically, bunch grasses and sagebrush. There are patches of lodgepole pine ranging in size from seedlings to mature open grown trees approximately 50' tall. In addition to lodgepole pine the area also has Douglas fir, limber pine, rocky mountain juniper, horizontal juniper, aspen, and recently planted ponderosa pine. The northwest facing portion of this area east of Elk Meadows Lane has denser stands of mixed conifers. This is especially true in lot 2 where no logging has taken place. The stand here has mature lodgepole and a significant component of dead and down material.

There are numerous old burned Douglas fir stumps on the south facing hillside. This area was either burned then logged or logged and burned more than 50 years ago. At the time of this past disturbance the area likely had an overstory of Douglas fir with a bunch grass understory. Now the overstory is gone and lodgepole have replaced the large Douglas fir. However, there is enough residual Douglas fir to indicate it is the climax species that will, in time, replace the lodgepole.

Given time and lack of disturbance (fire) this area would become more timbered. Shade tolerant species such as Douglas Fir will become dominant and outcompete limber pine, aspen, lodgepole pine and ponderosa pine. However, fire and climate change will likely accelerate this successional change from lodgepole to more scattered Douglas fir. Less moisture availability will favor shade tolerant species that can capitalize on early spring moisture and survive drought conditions. Lodgepole is a seral species that is relatively shallow rooted and less capable of withstanding drought conditions than Douglas fir.

Wildland fire hazard and risk is tied directly to topography, fuel type and weather. Grass is the primary fuel type in this area. A fire could move rapidly upslope (4-6MPH) with 8-10' flame lengths pushed by prevailing southwest wind. The shallow drainage along the east side of the area, through the common area could act as a chimney funneling a fire upslope as the drainage may modify wind direction and concentrates wind speed. This drainage has a more continuous timber component that will generate longer flame lengths (10' +), short and moderate range spotting, and greater resistance to control. Patches of timber throughout the area could burn intensely and generate spotting accelerating fire spread down wind and upslope. While this area is more susceptible to a rapidly spreading wildfire than any of the other areas it also offers the best opportunity to control a fire. Fires in grass are easier to control than timber fires. The combination of fine fuels coupled with the Elk Meadows Road offers an opportunity for fire suppression resources to check fire spread in this area.

There is high risk of human caused fires in the area give the number of homes below the subdivision along Elk Meadows Lane. Several of these homes are vacation rentals the attract visitors who may not be as fire aware as long term residents. Travelers on Elk Meadows Lane increase risk. Lightning is a risk as well.

Fires that can generate high intensity and long-range spotting (1-2 miles) pose a risk to this area. Such a fire south of Georgetown Lake along the Anaconda-Pintlar Wilderness could generate enough energy to cause burning embers to shower this area of the subdivision.

Fire regime is the "pattern, frequency, and intensity of the wildfires that prevail in an area over long periods of time". For this mixed stand of Douglas fir, lodgepole, shrubs and grass the fire regime frequency is 19-43 fire return intervals. If ponderosa pine becomes more established the fire return interval may become 6-50 years.

Climate change may influence this area with drier conditions resulting in less conifer coverage especially lodgepole pine. Douglas fir and ponderosa pine can

handle drought conditions and will likely survive in the wake of increased summer temperatures and decreased summer precipitation. Other species such as limber pine and juniper are also drought hardy and will likely survive. However, fire return intervals may become more frequent. There is ample evidence of past fires in this area.

Area 2 Lots 24.25,26,27,28,29,33,34,35,36,37,38,39,40,41,42,

Soil: Whitore gravelly loam,-15 to 35 percent slopes (92E)* is the primary soil type in this area.

*Numbers represent soil inventory mapping designations.

Precipitation range and temperature taken from the soil survey: mean annual precipitation is20 to 40 inches and mean annual air temperature is 36 to 39 degrees F (note climate change may have altered these figures since the soil survey was completed in the early 1990s and published in 2003.)

Topography of the area is a northwest facing sloping uphill to the east. Slopes are as described above 35% over most of the area with small, less steep benches.

Site specific weather for this area: This area is moister and cooler than Area 1 with 20-40" of annual precipitation 36-39-degree F average temperatures. The area is also influenced by diurnal wind during stable weather conditions. Expect upslope winds during the day and downslope at night. The area is also in a thermal belt. During stable weather patterns cool area settles into the Georgetown Lake Basin lifting warm air up slope that becomes trapped by cool ridgetop winds. Due to this thermal belt temperature can be 3-10 degrees warmer than the lake level. Wildland fires in thermal belts can actively burn at night due to the warmer/drier conditions.

Vegetation is dominated by lodgepole pine. In soil type 92E the primary vegetation is conifer forest. At this time the area has lodgepole pine ranging in size from seedlings to mature open grown trees approximately 60-70' tall. In addition to lodgepole pine the area also has Douglas fir, aspen, and recently planted ponderosa pine, whitebark pine, and western larch. Most of this area was logged between 2009 and 2011 to remove mountain pine beetle killed lodgepole pine. Reproduction following this logging is seedling and sapling lodgepole and Douglas fir. These sapling stands are scattered across the area and range in height from 2-6 feet tall. The logging appears to have removed most of the lodgepole overstory. Down dead material appears to be moderate approximately 5-10 tons per acre. The soil survey indicated the area would support Douglas fir-pinegrass and Douglas fir-twin flower habitat type.

Given time and lack of disturbance (fire) this area will become more timbered. Shade tolerant species such as Douglas Fir and ponderosa pine will become dominant and outcompete limber pine, aspen, lodgepole and other introduced species. This successional change may be accelerated due to climate change. Less moisture availability will favor shade tolerant species that can capitalize on early spring moisture and survive drought conditions. The effects of climate change on this vegetation type would be less shallow rooted conifers such as lodgepole giving way to more shade tolerant and drought resistant Douglas fir and ponderosa pine with deeper roots and ability to survive droughty conditions. Douglas fir and ponderosa pine are better adapted to surviving wildland fire. The predicted moist springs followed by dryer summers could reduce the overall density of the conifer forest.

Wildland fire hazard and risk: Fire on this northwest facing aspect dominated by lodgepole saplings would be characterized as having moderate rate of spread (1.5 MHP) under normal summer conditions. However, sever drought could cause the lodgepole reproduction to burn much more intensely. The entire area is a large basin that has the potential to direct and concentrate wind. Even though the fire may not have rapid rates of spread it would be difficult to control due to the continuous sapling stands and residual down fall. Short range spotting would contribute to fire spread and complicate control efforts

There is high risk of human caused fires in the area given the number of homes below the subdivision along Highway 1. Lightning is a risk as well.

Fires that can generate high intensity and long-range spotting (1-2 miles) pose a risk to this area. Such a fire south of Georgetown Lake along the Anaconda - Pintlar Wilderness could generate enough energy to cause burning embers to shower this area or downslope of the subdivision.

Fire regime for this northwest facing mixed stand of Douglas fir, and lodgepole, suggests 25-100-year fire return intervals. If ponderosa pine becomes more established the fire return interval may become 6-50 years.

Climate change may influence this area with drier conditions resulting in less conifer coverage especially lodgepole pine. Douglas fir and ponderosa pine can handle drought conditions and survive fire therefore, will likely survive in the wake of increased summer temperatures and decreased summer precipitation. Other species such as sub-alpine fire and Engelmann spruce are less capable of surviving summer time drought and will likely not survive. Lodgepole stands will become less dense with drier conditions but could still survive on this aspect given predicted climate change temperature increases. More frequent fires would favor Douglas fir and ponderosa pine further reducing lodgepole pine

Area 3 Lots 4,5,6,7,8,9,10,11,12

Soil: Whitore cobbly loam, 15 to 35 percent slopes (392E)* is the primary soil type in this area.

*Numbers represent soil inventory mapping designations.

Precipitation range and temperature taken from the soil survey the mean annual precipitation is 20 to 40 inches and mean annual air temperature: 36 to 39 degrees F (note climate change may have altered these figures since the soil survey was completed in the early 1990s and published in 2003.)

Topography of the area is ridge top and east facing. Slopes are as described above 35% over most of the area with small, less steep benches.

Site specific Weather for this area: This area is also moister and cooler than Area 1 with 20-40" of annual precipitation and 36-39-degree F average temperatures. The developed portion of this area is along the ridge top overlooking Daly Gulch. Due to the ridgetop exposure this area would be subject to free air prevailing wind with diurnal wind less of a factor. In stable conditions when a thermal belt could develop in areas 1,2 and 4 this area could be experience prevailing winds at night.

Vegetation is dominated by lodgepole pine. In soil type 392E the primary vegetation is conifer forest. At this time the area has lodgepole pine ranging in size from seedlings to mature open grown trees approximately 60-70' tall. In addition to lodgepole pine the area also has Douglas fir, spruce, subalpine fir and recently introduced ponderosa pine, spruce and western larch Most of this area was logged prior to 1995. Reproduction following this logging is sapling lodgepole. These lodgepole sapling stands are very dense and over stocked (750-1200 stems per acre). The logging appears to have removed most of the lodgepole overstory. Down dead material appears to be moderate approximately 5-10 tons per acre. The soil survey indicated the area would support a Douglas fir-pinegrass habitat type.

Given time and lack of disturbance (fire) the east facing slopes will become more timbered. Shade tolerant species such as Douglas Fir will become dominant and outcompete lodgepole and other introduced species. This successional change may be accelerated due to climate change. Less moisture availability will favor shade tolerant species that can capitalize on early spring moisture and survive drought conditions such as Douglas fir and ponderosa pine. Under normal conditions the more shade tolerant subalpine fir and spruce would dominate. With longer, drier summers predicted subalpine fir and spruce will like be lost to the stands due the longer drier summers. The predicted

moist springs followed by dryer summers could reduce the overall density of the conifer forest.

Wildland fire hazard and risk: Fire on this ridge top and southeast facing aspect dominated by lodgepole saplings would be characterized as having moderate rate of spread (1.5 MHP) under normal summer conditions. However, severe drought could cause the lodgepole reproduction to burn much more intensely. Most of the area faces east overlooking Daly Gulch which is a fairly narrow drainage that could easily act like a chimney modifying prevailing wind direction and speed up slope. This area is at risk from fire burning up slope from Daly Gulch and from the south up the draw described in Area 1. A fire moving up slope in these areas could have rapid rates of spread 4-6 MPH and once established in the lodgepole reproduction become very difficult to control.

The overstock stands of saplings resulting from the 1995 logging pose a unique fire hazard. Even though these stands are located in generally moist areas they can be dry enough to support a fire in normal fire seasons. Simply stated there are too many trees in the stands and there is not enough moisture to support them all. Therefore, these young dense stands could burn with higher intensity than expected during any fire season.

There is high risk of human caused fires in the area give the number of homes below the subdivision in Daly Gulch. Lightning is a risk as well.

The fire regime for this mixed stand of Douglas fir, lodgepole pine, shrubs and grass indicate a 19-43-year fire return intervals. If ponderosa pine becomes more established the fire return interval may become 6-50 years.

Climate change may influence this area with drier conditions resulting in less conifer coverage especially lodgepole pine. Douglas fir and ponderosa pine can handle drought conditions and will likely survive in the wake of increased summer temperatures and survive fire better than other species. Other species such as limber pine and juniper are also drought hardy and will likely survive. However, fire return intervals may become more frequent. There is ample evidence of past fires in this area. Other conifer species such as subalpine fire and Engelmann spruce are less capable of surviving summer time drought and will likely not survive. Lodgepole pine stands will become less dense with drier conditions but could still survive the predicted climate change temperature increases on this aspect and elevation. More frequent fires would favor Douglas fir and Ponderosa pine further reducing lodgepole pine

Area 4 13,14,15,16,17,18,19,21,22,23,4,30,31,32,43,44,45

Soil: Whitore gravelly loam, 15 to 35 percent slopes (92E)* is the primary soil type in this area.

*Numbers represent soil inventory mapping designations.

Precipitation range and temperature taken from the soil survey: The mean annual precipitation is 20 to 40 inches and mean annual air temperature is 36 to 39F degrees (note climate change may have altered these figures since the soil survey was completed in the early 1990s and published in 2003.)

Topography of the area is north facing. Slopes are as described above 35% over most of the area with small, less steep benches.

Site specific Weather for this area: This area is the moistest and coolest area in the subdivision. The north facing slope holds snow longer in the spring and stays moist longer into the summer. During extreme droughts the dense reproductions stands and ladder fuels in the area could become dry enough to support high intensity wildland fires. This area tends to sheltered somewhat from prevailing wind but is susceptible to diurnal upslope winds during the day and downslope at night. The area may also fall in the thermal belt as described in areas 1 and 2.

Vegetation is dominated by lodgepole pine. In soil type 92E the primary vegetation is conifer forest. At this time the area has lodgepole pine, Douglas fir, Engelmann Spruce, Sub-alpine fir, possibly white bark pine and introduced spruce, western larch, and white bark pine, ranging in size from seedlings to mature dense mixed conifer forest with trees approximately 60-70' tall Most of this area was logged prior to 1995. However, several lots appear to have not been logged or very lightly logged. Reproduction following logging is sapling lodgepole. These lodgepole sapling stands are very dense and over stocked (750-1200 stems per acre). In the logged areas most of the lodgepole overstory has been removed. Down dead material appears to be moderate approximately 5-10 tons per acre. There are lots in this area that have not been logged and have a mixed component of Douglas fir, mature lodgepole pine, Engelmann spruce, and subalpine fir. The soil survey indicated the area would support Douglas fir-twin flower habitat type. However, due to the presence of subalpine fir which is more shade tolerant than Douglas fir this area may become a subalpine fir grouse whortleberry habitat type.

Given time and lack of disturbance (fire) this area could become more heavily timbered with a mix of species. Shade tolerant species such as Douglas Fir and/or sub-alpine fir will become dominant and outcompete lodgepole and other introduced species.

However, climate change predictions could alter this succession. Drier, hotter summers will favor Douglas fir which is more drought resistant. Subalpine fir

and spruce will likely die out. More frequent and intense fire will also favor Douglas fir over lodgepole, subalpine fir and spruce

Wildland fire hazard and risk: During normal fire seasons this area would generally remain moist. Fires could still start but would likely be small and easily controlled. However, during extreme drought similar to 2021 the heavy continuous fuel in this area can quickly ignite and generate a high intensity fire that is very difficult to control Fire on this north facing aspect dominated by dense stands of lodgepole saplings and unlogged stands with ladder fuels in close proximity to homes creates a very dangerous situation. While fires on this north aspect may not have rapid rates of spread, resistance to control is very high given the ladder fuels, dense sapling stands, and down fall. A fire that becomes established in this area (escapes initial attack) would pose a high risk to homes in the area.

The overstock stands of saplings resulting from the 1995 logging pose a unique fire hazard. Even though these stands are located on a generally moist slope they can be dry enough to support a fire in normal fire seasons. Simply stated there are too many trees in the stands and there is not enough moisture to support them all. Therefore, these young dense stands could burn with higher intensity than expected during any fire season.

There is high risk of human caused fires in the area give the number of homes below the subdivision along Fire Lane and in Old Georgetown. In addition, the area immediately north of the Elk Meadows Subdivision boundary is being developed introducing additional human caused fire risk. Lightning is a risk as well.

Fires with rapid rates of spread approaching from the west or south could easily spot into this area increase the risk.

Fire regime for this mixed stand of Douglas fir, lodgepole, subalpine fir, and Engelmann Spruce indicates a 35-100 years fire return intervals. Stand replacement fires have been recorded at 200+ year intervals

Climate change may influence this area with drier conditions resulting in less conifer coverage especially lodgepole pine. The area may be too cool for ponderosa pine but Douglas fir will likely thrive. Subalpine fir and Engelmann Spruce are less drought hard and may be lost to this area. Introduced species such as western larch may survive drought conditions but would likely not thrive in the wake of hotter, drier conditions.

For more information contact members of the Forestry Committee

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