The Highlands
at
Breckenridge Property Owners' Association
Filing 1-5
Tree Management Plan



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1.0 Introduction

1.1 Background

The MPB epidemic has transformed the green mountainsides into stands of “red pine”. Patches of young lodgepole pine trees are developing in many areas, a result of an MPB epidemic in the 1970’s into the 80’s.

An economic boom through the 1990’s and into the new century fueled an increase in development and construction in Breckenridge and throughout Summit County. The boost in building and loss of trees due to insects has elevated the need for planned reforestation, landscaping and tree preservation all with the underlying thought of future growth and wildfire mitigation.

The Highlands at Breckenridge POA contracted with A Cut Above Forestry (aka. Ceres Landcare) in 2012 to prepare a forest management plan addressing wildfire risk, mitigation and other vegetation concerns within the Highlands subdivision F1 - 5.

The scope of work included:

1) A quantitative/qualitative inventory of 145 properties to determine number of dead trees, insect/disease presence, and other data (see complete description of inventory process in section 6.1)..

2) Evaluation of the collected data

3) Recommendations on a subdivision wide scope and to individual lot details as appropriate

4) A written report of the results of the inventory, evaluation and recommendations.

1.2 Purpose

The purpose of this plan is to provide guidelines for the Highlands at Breckenridge property owners, POA and Town of Breckenridge planners regarding the ongoing management of the Highlands’ forest and tree resources.

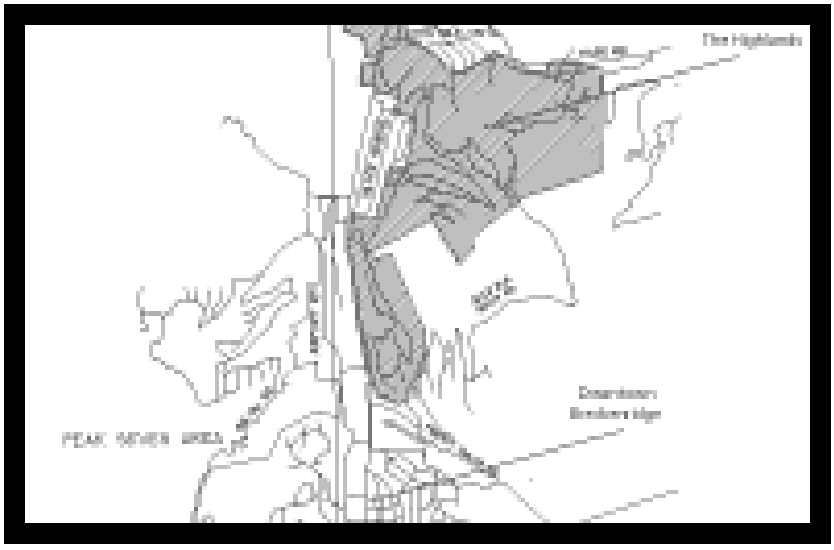
2.0 History and Description

2.1 History and Location

The Highlands at Breckenridge was established in the early to mid 1990's as a development on the northeast end of Breckenridge. Prior to development of the subdivision and opening it up for sales, there was some initial thinning performed. Since development, management of trees has been individualized to lots.

In order to preserve the aesthetics of the neighborhood, deter the spread of the mountain pine beetle, improve overall forest health, and provide wildfire mitigation, the Highlands Board of Directors formulated a policy regarding the annual removal of dead, dying and infested trees Trees have been removed for development of lots and construction of houses. Some fire mitigation has occurred. In many places there has been concentrated removal of Mountain Pine Beetle (MPB) infested trees and trees damaged by weather.

Located on the northeastern edge of the Town of Breckenridge, the Highlands at Breckenridge is positioned within easy access of four ski resorts in Summit County, Colorado. Town of Breckenridge trails intersect the development and are used for hiking and mountain biking. Other open spaces managed by the town are connected and used for mountain biking, hiking or just walking the dog.



The Highlands at Breckenridge is a covenant-controlled community with comprehensive Land Use Restrictions and Design Guidelines to ensure the esthetic integrity of the community. The community has earned a solid reputation for quality and competence, and has set new planning standards in the Town of Breckenridge. The 145 properties within the 5 filings surveyed are homes to a variety of full time and part time residents as well as vacation rentals through property management companies. The resident population swells during the ski season and the summer months with visitors and second home owners.

2.2 Access

The Highlands at Breckenridge are easily accessible through main entrances off Colorado State Highway 9.

3.0 Environmental Characteristics

3.1 Topography

Most of the subdivision is located on a dry hillside with a western exposure. Slopes vary from <5% to 25%.

Most of the subdivision's southern boundary is Tiger Road and the Town of Breckenridge Golf Course, used for golfing in the summer and a Nordic cross country ski center in the winter. The north and some of the eastern and western sides of the developed area are bounded by other developments.

3.2 Climate

The climate is typical of the Colorado mountains with cold, snowy winters and cool, relatively dry summers. The average annual air temperature is only about 34 degrees Fahrenheit. Annual precipitation in Summit County averages 20-24 inches with the bulk falling as snow in the winter months. The frost-free season ranges from 30 to 40 days in most of the area.

4.0 Wildfire Behavior

4.1 Fuels and Fire Behavior

The assessment of potential wildfire hazards begins with the evaluation of natural features that can fuel or carry a fire. Fuels, topography and weather are the three general factors that influence wildfire behavior. Weather cannot be altered, or predicted over the long term but general climate characteristics can be considered when developing strategies to reduce wildfire risk. Topography is sometimes altered during development but typically not enough to significantly impact fire behavior. Of the three factors, only fuel characteristics can be altered to reduce the severity of a potential wildfire.



The Interaction of these three fire behavior components affect the direction of travel, how fast a fire spreads, how intensely it burns and, consequently, how much effort it takes to control. Of these three elements fuel is the only factor that we can manage.

A successful fuel management program will reduce fire intensity by modifying the volume and consistency of woody fuels on the vertical and horizontal planes. Breaking up fuel continuity in the vertical plane (ladder fuels) can reduce the opportunity for a low

intensity surface fire to migrate into the canopy. Reducing horizontal fuel continuity both at the ground level and between crowns can help reduce both flame length, rate of spread and overall intensity.

Implementing a fuel management plan must be done strategically since poor decisions can have a negative impact in terms of forest health and fire behavior.
Too aggressive of a thinning program can leave a timber stand vulnerable to wind failure and actually increase the amount and continuity of surface fuels.

4.2 Fuel Characteristics and Fire Behavior

Fuels, topography and use vary throughout the properties. Using an ocular estimate of an aerial photo the proportional vegetation types on the Highlands are:

Table 1. Vegetation Types

Residential Mixed Conifer	Sage/Grassland	Residential Landscaped	Mixed Conifer Open Space
37%	10%	50%	3%

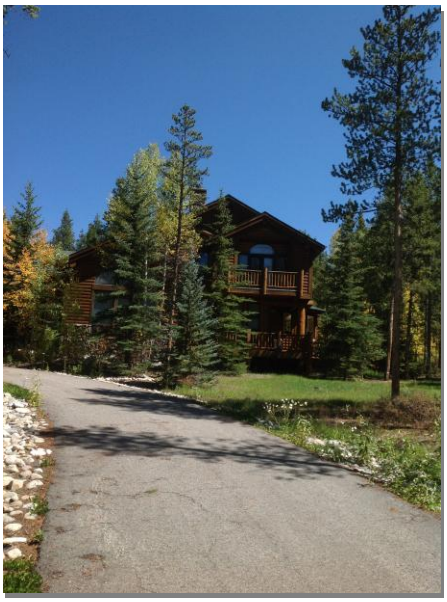


Residential mixed conifer stands are tracts occupied by single family homes. The vegetation varies from a maturing lodgepole pine over story with an understory of indigenous lodgepole pine saplings and transplanted spruce and aspen trees. Some native shrubs such as common juniper are scattered through the units as are plots of irrigated lawn. Some of the more open areas exhibit light to medium sagebrush densities. These areas are isolated from large runs of contiguous fuels and would likely have flame lengths from 0 to 8 feet in height unless structures are engulfed in fire.

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The **wetlands/meadow/mixed conifer** These are found in the Highlands are smaller pockets mostly on the western edge in and adjacent to the POA Open Space.

The **residential landscaped** area has a hardened, landscaped zone 1 area with transplants scattered in groups with some native lawns and some sodded areas. Drip lines for the most part are rocked and driveways are paved.



Residential Landscaped



Mixed Conifer

The **mixed conifer** is primarily composed of mature lodgepole pine with interspersed smaller Engelmann spruce. Aspen groves exhibit healthy regeneration.

The following table copied from the USFS fireline handbook illustrates how flame length affects heat output and suppression limitations.

Table 2. Effects of Flame Length

Flame Length	Fireline Intensity Btu//Ft/Sec	Interpretation
0-4	0-100	Person using hand tools at head or flank. Handline should hold fire.
4-8	100-500	Fires are too intense for direct attack on the head by persons using handtools. Handline cannot be relied on to hold fire. Equipment such as dozers, engines, and retardant aircraft should be effective
8-11	500-1000	Fires may present serious control problems such as torching, crowning, and spotting. Control efforts at the head of the fire Probably will be ineffective.
11+	1000+	Crowning, spotting, and major runs are common; control efforts at head of fire are ineffective.

4.3 Wildland Urban Interface

Fires are classified by the type of fuel they consume. A wildland fire is one that burns wildland fuels such as grass, shrubs and trees. The Wildland Urban Interface is where wildland fuels meet the community.

Wildland fires are further classified into ground, surface and crown fires. A **ground fire** is one smoldering in compacted fuels such as tree roots, peat, duff, punky wood or other materials that support a glowing fire without flame. **Surface fires** consume loose fuels on the ground such as grass, small shrubs, twigs, downed timber and slash. A **crown fire** is one that moves rapidly through tree crowns or tall shrubs such as gamble oak or service berry.

4.4 Wildfire Hazard and Risk

When assessing wildfire hazard and risk, wildfire **hazard** refers to vegetation or wildland fuel in terms of its contribution to problematic fire behavior and its resistance to control. **Risk** is the probability of an actual ignition of wildland fuels. Values-at risk include human life, infrastructure, structures, and natural resources that are likely to suffer long-term damage from the direct impacts of a wildfire.

Wildfire risk rating systems assess the several factors that can lead to or lessen the loss of values-at risk. The risk assessment includes determining fuel types, fuel consistency and topography which influence potential fire behavior. Suppression obstacles and opportunities including access, water availability and location within a fire district are considered. Construction materials, design, subdivision density, utility placement and exterior use such as fire wood storage and landscaping are evaluated to determine the vulnerability of structures.

Modification of any of these factors can help reduce wildfire hazard and risk therefore improving the possible strategies for fire suppression and limiting the loss of life, property and natural resources.

5.0 Noxious Weeds, Insects and Disease

Dwarf mistletoe definitely has a stronghold on most forested areas in the Highlands . Some evidence of cytospora canker are also seen. For these two diseases the best prescription is removal of the host (most of the time the entire tree).

Bark beetles are the most common insects (MPB, IPS and Spruce). The only means of control for these are preventive measures applied prior to their attacking the tree. This can be a spray applied to the trunk, a pheromone dispenser, or removal and chipping of infested trees prior to any emergence. As they are pests they are treated with “pesticides” (insecticides) that discourage the beetle’s entry into the tree. As they live under the bark there really is not a treatment to “poison” the beetle once it has entered.

Other insects that are seen as pests in the area are aphids, mites and pine & aspen scale. No evidence of these were recorded and would be most likely to affect the transplant aspen & spruce. To combat these insects, trees can be treated topically once present or systemically before they appear. Treatments can be a spray, a trunk treatment or an injection into the ground for uptake by the roots of the tree.

Most common noxious weeds were first introduced in European settlers’ gardens. Others were introduced later in time, they were in flower mixes or introduced to manage erosion of streambanks, etc. Today they can be introduced in seed packets of mixed wildflowers (this is less common now the weeds have been identified), transporting fill dirt from one locale to another, the tires of vehicles and also natural windborne seeding or spread of root systems. Some weeds such as toadflax take multiple types and times of treatment. Most of these plants are very tenacious and can become well established in very poor soil and site conditions.



5.1 Dwarf Mistletoe

Dwarf mistletoe (*Arceuthobium americanum Nutt. ex Engelm)* is the most prevalent tree disease throughout the lodgepole pine in the Highlands at Breckenridge. This plant parasite spreads by shooting a sticky seed that once connected to the host tree grows a root, called a sinker, into the trees vascular system. Once the dwarf mistletoe has invaded the tree, it begins to rob the host tree of vital water and nutrients. Over time the infected branches begin to look twisted and deformed, gradually the crowns of the infected trees show signs of thinning and decline. The crown eventually starts dying from the top down as lower branches take more food and water. The length of time required for dwarf mistletoe to kill a tree is dependent upon the degree of infection, tree vigor and tree size. Since dwarf mistletoe reduces tree vigor, infected trees become susceptible to secondary insect pests such as ips beetles and mountain pine beetle. Dwarf mistletoe is host specific; the specie of dwarf mistletoe found in the Highlands at Breckenridge is limited to lodgepole pine.

There are no easy solutions to remove dwarf mistletoe infections in Summit County. The best long term strategies against the disease include removing heavy infections of trees and then replacing dying trees with non-susceptible species such as spruce, fir or aspen. High value trees near homes can be pruned to reduce the percent of crown infected with dwarf mistletoe. Although this will not save the tree, you may gain extra years of live and esthetic quality for the tree.

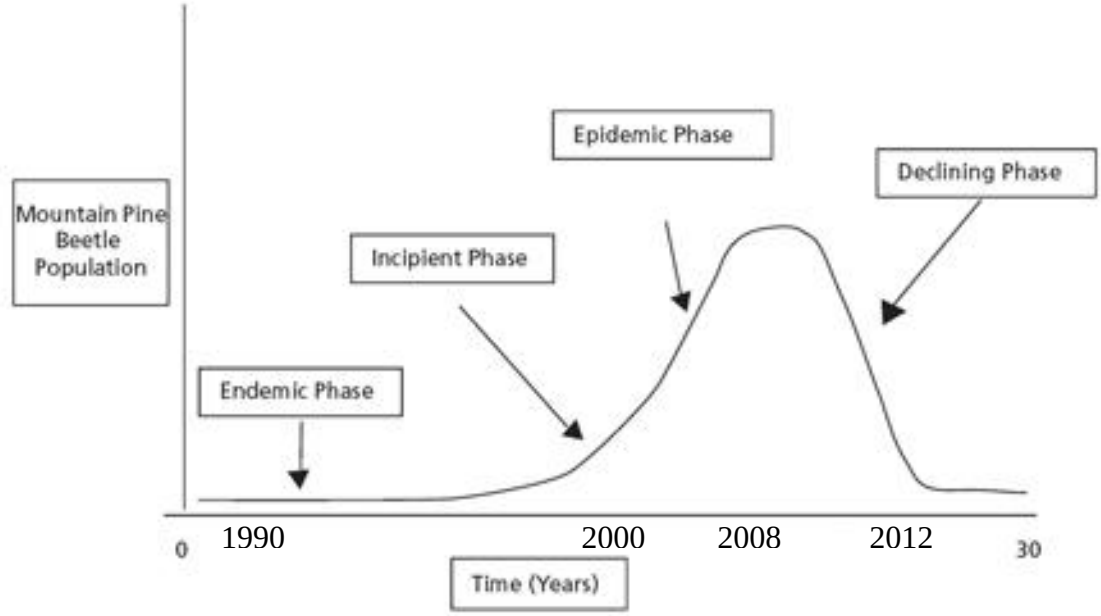
5.2 Cytospora canker



Cytospora Canker (*Cytospora chrysosperma*) is present on several of the aspen trees throughout the Highlands. The cytospora fungi attacks weak and wounded aspen of all sizes. Trees affected by drought, insects, defoliation by fungi, sunscald, herbicides, or mechanical injury are the most susceptible to cytospora infection. The symptoms of this disease are yellow or orange-brown to black discolored areas on the bark of the trunk and branches. The canker produces a liquid orange/brown ooze. The pimples are the reproductive structures of the fungus. Under moist conditions, masses of spores (seeds) may ooze out of the pimples in long, orange, coiled, thread-like spore.

5.3 Mountain Pine Beetle

Dead lodgepole pine trees can be seen throughout the forested areas surrounding Breckenridge. These trees are a result of a mountain pine beetle *(Dendroctonus ponderosae*) epidemic that started in the late 1990's. The pine beetle population that has multiplied exponentially over the past several years is likely going back toward endemic levels but the forest will require decades to recover. According to the survey data, levels in the Highlands are moving into the declining stage. No insects were found in the observational survey suggesting that the MPB could be returning to endemic populations. This gives forest managers the opportunity to look for potential insect/disease which would affect tree health into the future.



The most recent predictions from the U.S. Forest Service estimate a loss of 95% of lodgepole pine trees greater than 6-inches in diameter by the time the pine beetle returns to endemic levels. The included diagram provides a rough timeline of the current epidemic.



The mortality rate of mature lodgepole pine trees varies throughout the subdivision. Most lots have pockets of mature lodgepole where trees have been sprayed with a preventive Mountain pine beetle is an indigenous insect in the lodgepole pine ecosystem. The population tends to ebb and flow with forest condition. The insect prefers lodgepole pine trees that are greater than eight inches in diameter and are in excess of 80 years in age but the greatest limiting factor is tree stress. Even trees that are larger and older can stave off a pine beetle attack if they are healthy and vigorous. (A more detailed explanation of the mountain pine beetle and how they fit into the ecosystem is available in the Biological reviews section of this report).

5.4 Spruce Beetle



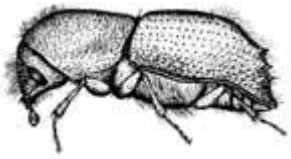
Figure 4 - An adult spruce beetle.

The spruce beetle, *Dendroctonus rufipennis* (Kirby), is the most significant natural mortality agent of mature spruce in the western Unite States. Similar to the mountain pine, the spruce beetle bores through the bark, lays eggs and for approximately 12 months the larvae mine through the phloem tissue disrupting the flow of water and nutrients through the vascular tissue.

There is no record of spruce beetle in the inventory but there are possible at risk trees. Spruce beetle is present in properties to the

north of Breckenridge as well as in some of the other filings to the north. Spruce beetle tend to attack stressed trees.

5.5 IPS Beetle





IPS beetle is similar to MPB exhibiting “pitch tubes” on the trunk and leaving boring dust (frass) on bark crevices or on the ground at the base of the tree. This beetle does not kill the tree completely until 8-10 months following initial infestation. It is not considered as destructive/aggressive as the epidemic levels of MPB have been. IPS rarely attacks healthy trees but prefers trees exhibiting stress or newly planted. Infestation by the IPS does not necessarily lead to complete death/loss of the tree as it typically just kills off the top of the tree. The life cycle is nearly identical to that of the MPB.

5.6 Scentless Chamomile

Scentless chamomile is an annual, biennual, short-lived perennial forb that is native to Europe. Seedlings emerge in spring producing a thick mat which prevents native plants from emergence. The seeds and flowers are continually being formed and each flower head can produce 300 seeds, with each plant producing up to 300,000 seeds. The flower is white in color, about ¾ inches and are daisy like. Leaves are alternate, fernlike, finely divided and odorless when crushed. Habitat includes; hayfields, pastures, roadsides, streambanks, fencelines and moist areas such as drainages. This plant can be found throughout the survey area. It is required to be eradicated in Summit County. Treat with a Sulfonylurea herbicide in spring to early summer.



5.7 Canada Thistle

Canada thistle is a member of the aster or sunflower family. It was introduced from Europe and is a creeping perennial. Reproduction occurs through seeding and spreading of the fleshy, horizontal roots The stem is hollow, smooth and hairy, 1-5 feet tall, simple and branched at the top. Leaves are set close on the stem and dark green with sharp spines on the outer edge. Flowers are small and compact, about 3/4" in diameter and are light pink to purple. This is the most common thistle found in the survey area and is one of the most widespread in Colorado. Control and eradication are difficult but required in Summit County. Treat with 2,4-D in spring and early fall to control rosettes.

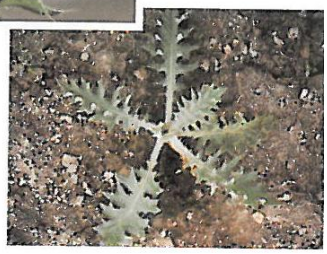


5.8 Bull Thistle

Bull Thistle is a biennial with a short, fleshy taproot. The stem is 2-5 ‘ tall bearing many spreading branches. The stem is green to brownish, sparsely hairy, irregularly and spiny winged. Flowers are 1 ½ - 2 “ wide, clustered at the ends of the branches. This thistle is not as common as the Canada thistle, but as it is a biennial may not have been observed in the survey as it could be in its’ dormant year.

Apply round-up or 2,4-D in the spring and fall.





5.9 Musk Thistle

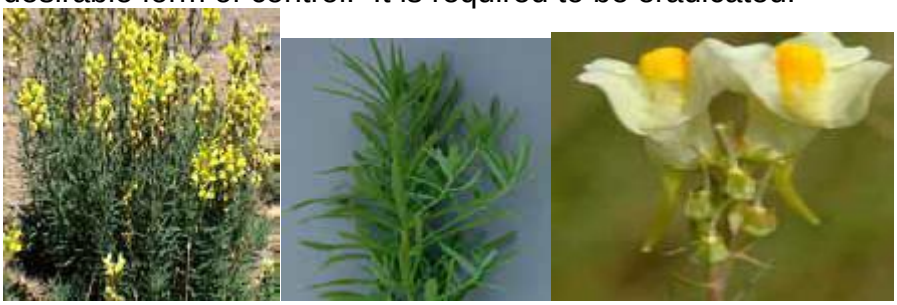
Musk thistle is a non-native biennial forb that reproduces solely by seed. This means that a plant completes its lifecycle in two years. In its’ first year, musk thistle appears as a rosette, during the second year the stem bolts, it flowers, sets seed and dies. This thistle produces many flower heads. It may produce as many as 100 flowering head in one plant, producing up to 20,000 seeds per plant. The key to management is seed prevention. Musk thistle can grow up to 6’ tall with leaves that are spiny, waxy and dark green. Flowers are purple and 11/2 to 3” in diameter. As seed set is normally in June or July, flowers of musk thistle were not observed during the survey but rosettes in their first year were. Disturbed land (such as by construction) is an area that this thistle grows as well as rangeland, roadsides, ditches, riparian areas and trails. This plant is required to be eradicated in Summit County.

Apply 2,4-d to rosettes in spring and fall.



5.10 Yellow Toadflax

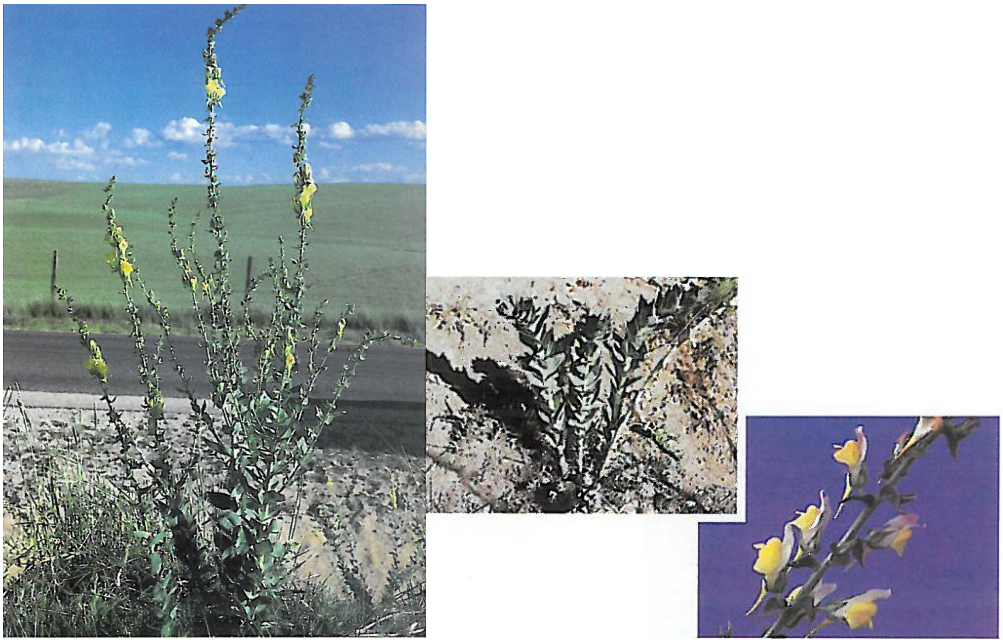
Yellow toadflax (common wildflower name: butter & eggs) is a perennial escaped ornamental plant originating in the Mediterranean. Leaves are long and linear, stems grow 1-3' tall. The flowers are snapdragon like and are bright yellow with the center being a deep orange. The root system is extreme and displaces desirable native plants. Disturbed areas (roads, new construction sites) are preferred habitat and this weed will adapt to many site conditions and soils. Prevention is the most desirable form of control. It is required to be eradicated.



Treat with Tordon when flowering or in the fall.

5.11 Dalmatian Toadflax

Dalmatian toadflax is a member of the figwort family. It is an introduced ornamental from Europe, It is a creeping perennial that resembles yellow toadflax. It is best adapted to arid soils, It also spreads easily and is difficult to manage because of its extreme root system and heavy seed production.



Treat with Tordon when flowering or in the fall.

6.0 Inventory and Analysis

To access the inventory map, go to http://www.arcgis.com/home/webmap/viewer.html?webmap=850ded273df547258373c35266b599e0&extent=-106.0722,39.4952,-105.988,39.5317 . The red dots are the lot inventory data tables and the white dots are the prescribed treatment date tables.

6.1 Inventory

See Appendix D: Forest Health Inventory.

Two types of inventory were implemented in preparing this plan. These areas were inventoried using a walk-thru and ocular evaluation to gather quantitative and qualitative data. The walk- through included 145 properties plus common land. Quantitative data includes a dead tree count and an inventory of newly infested mountain pine beetle trees. Qualitative data includes insect and disease presence, regeneration, common tree defects, hazard trees, specie concentrations and noxious weed presence. Each property has a 10 point check sheet with recommendations prepared during the walk-through (see sample check sheet in Appendix B).

6.2 Evaluation

The evaluation process included synthesizing the collected data to determine:

1. Insect and disease problems
2. Wildfire risk areas
3. Specie and age class diversity
4. Hazard tree severity
5. Noxious weed hotspots

7.0 Recommendations

7.1 Descriptions

The Highlands at Breckenridge was divided into 6 management units (in correspondence with the filings) for the purpose of evaluating, determining management goals and prescriptions. Although all are within the same neighborhood there were significant differences between some of the filings.

Management Unit #	Unit Description
Filing 1 Location	Filing 1 includes the lower south and north sides of Highlands Rd to the first switchback, Dyer Trail and Forest Circle. This is the southeast portion of the subdivision.
Description	Mixed conifer/aspen cover type. Most of the area has landscaping or at least a few trees planted on the developed lots. Aspen, Lodgepole Pine, Colorado and Engelmann spruce are the common trees found on the site. The most common transplants found in the landscaped areas are aspen and Colorado Blue Spruce.
2 Location	Filing 2 includes the southern loop of Rounds Rd and Spencer Court as well as the first 4 lots to the west of Highlands Rd after the left curve at the top of the hill.
Description	Mixed conifer/aspen cover type. Most of the area has landscaping or at least a few trees planted on the developed lots. Aspen, Lodgepole Pine, Colorado and Engelmann Spruce are the common trees found on the site. The most common transplants found in the landscaped areas are aspen and Colorado Blue Spruce. Filing 2 is similar to Filing 1 with some deeper lots on the upper eastern side of Rounds Rd. which show more native forest. A portion of Town of Breckenridge trails system passes through this area.
3 Location	Filing 3 is composed of the northwestern side of Highlands Drive as it comes up the hill from Hwy 9 and includes Barney Ford Circle as well as four lots on the east side of Highlands Dr. Some lots extend down to Hwy 9, the steepest slope in the management area.
Description	This stand is composed of a mixed conifer and aspen stand type. Engelmann Spruce and Aspen are common on the site. Most of the mature lodgepole pine trees that once shaded this area have been removed except the area on the northeast side of Highlands Dr. going down to the intersection light with Hwy 9.; here lodgepole pine is still fairly dense. With the exception of that section, landscaping is open and contains sage and shrubby cinquefoil where it is not mowed or string cut. This stand also includes sage grassland as it adjoins the POA Open Space.. Aspen and Willow are common on the western slope and aspen dieback is apparent. Transplants in this area include some aspen and Colorado Blue Spruce, but is also diversified with Bristlecone Pine, Schubert Cherry and ornamental shrubs.
4 Location	Filing 4 is composed of the area to the east and west of the upper loop section Rounds Road. It also includes 4 lots on the east side of Highlands Dr. after the northernmost intersection with Highlands Dr. and Rounds Rd. The lots on the eastern side are long and deep and extend to the Town of

	Breckenridge Open Space trails and United States Forest Service land where native forest has been left untreated. Currently, thinning treatments are taking place.
Description	Lodgepole Pine is the dominant specie in this filing but many of the mature trees have been lost to mountain pine beetle. Lodgepole pine seedling and sapling regeneration is abundant but a large percentage is already infected by dwarf mistletoe. Some individual Englemann spruce trees are scattered throughout and Colorado spruce transplants are present. Aspen regeneration is apparent.
5 **Location**	Filing 5 is composed of the area of Fletcher Court and that segment of Highlands Drive bordering Fletcher Court prior to the beginning of the Golf Course Highlands subdivision. It also includes one lot to the east of Highlands Dr. that is bordered by USFS land.
Description	This area has been mostly landscaped with good spacing between the remaining lodgepole pines. This is where some sage and shrubby cinquefoil starts to appear. There is not as much transplanting of aspen but more naturally occurring. Transplanted spruce are more mature than other filings, with natural regeneration apparent as well. Some bristlecone pine have been used as transplants as well.
6 **Location**	Highlands at Breckenridge Open Space
Description	This Filing is designated as urban reserve and is protected from development. Some Lodgepole Pine and Engelmann spruce are growing in this area with approximately 25% slope as it meets Colorado Hwy 9. There is heavy aspen growth with mature trees and apparent dieback. Along the interface with the residential lots there are patches with heavy willow growth. In the meadow areas sage and shrubby cinquefoil (potentilla) are the dominant species.

7.2 Prescriptions

See Appendix D: Prescriptions by Lot

Prescriptions were developed using the management objectives determined by the Highlands at Breckenridge POA board and evaluating the tree and forest data collected during the inventory process.

Prescriptions do not include suggested treatment as this needs to be accessed on an individual basis by a licensed applicator. If the property owner chooses to apply treatments it is highly suggested that they get professional assistance from a reputable nursery.

Time was not spent evaluating transplant trees on an individual arborist type of evaluation, but casual observations were made. Most of what was observed other than individual biotic disease issues were cases of environmental stress such as: (1) soil compaction, (2) nutrient deficiencies, and (3) structural disturbance from development and construction activities. This was found throughout the surveyed area.

See Appendix B for the observation form and Appendix C for the Prescription codes used for each individual lot. Following is a more general prescription given by common characteristics found in each of the 6 filings (units).

Management Unit #	Management Objectives	Prescription Summary
Filing 1	1. Improve forest health. 2. Wildfire risk reduction 3. Increase long term insect and disease resistance.	1. Continue to remove dead and dying trees. 2. Where dwarf mistletoe infected overstory trees remain in the overstory, plant resistant trees such as aspen and spruce. 3. Only irrigated landscape should be installed within 15 feet of the homes 4. Thin dense lodgepole pine regeneration to obtain a spacing of 8-10 feet between trees. Removing trees with dwarf mistletoe first.
2	1. Improve plant health and specie mix. 2. Reduce potential for damage to persons or property from tree failure.	1. Remove all residual lodgepole pine trees with the exception of young, thrifty regeneration free of mistletoe. 2. Thin dense lodgepole pine regeneration to obtain a spacing of 8-10 feet between trees. 3. Restore with a mix of trees, shrubs, forbs and grasses of a native origin. If future plans include developing an irrigated more urban like park in this area more plants can be chosen from landscape plant list.
3	1. Reduce risk to persons and property from defective trees. 2. Increase long term insect and disease resistance. 3. Improve forest health. 4. Reduce wildfire risk to adjacent properties & subdivisions.	1. Remove dead trees or trees with obvious defects within striking distance of trails, 60-80 feet on each side. 2. Remove lodgepole pine trees with dwarf mistletoe rating greater than 4 and any sapling or pole with dwarf mistletoe on main stem. 3. Treat concentrations of slash created by hazard tree removal and dwarf mistletoe reduction by piling and burning in the winter months
4	1. Improve tree health. 2. Reduction of hazard trees. 3. Improve specie diversity. 4. Improve long term insect and disease resistance.	1. Remove dead trees and trees with defects. 2. Underplant with dwarf mistletoe resistant species such as spruce, 5 needle pine and aspen trees. 3. Thin dense lodgepole pine regeneration to obtain a spacing of 8-10 feet between trees. Removing trees with dwarf mistletoe first
5	1. Recommend planting species for specific areas.	1. Transplant suites of native plants into selective areas
6	1. Maintain diversity and condition of stand.	1. No action recommended for this Filing

7.3 Management Unit Prescription/Description Data

Management Unit 1

Location	Filing 1 includes the lower south side of Highlands Rd to the first switchback, Dyer Trail and Forest Circle. This is the southeast portion of the subdivision .
Topography Slope/Aspect	The aspect varies from west to north with a slope of <5% to over 25%.
Silvic History	The area has been thinned several times for mountain pine beetle removals. Some transplanted aspen and Colorado blue spruce can be found with a few other specie according to individual owner preference.
Use/Proposed Use	The area is comprised of single-family homes with a few still vacant lots .
Stand Type	Mixed conifer/aspen cover type. Most of the area has had some landscaping or at least a few trees planted on the developed lots.
Specie	Aspen, Lodgepole Pine, Colorado and Englemann spruce.
Age/Stories	One story stand with naturally regenerated lodgepole pine and aspen suckers in the understory. Transplanted spruce and aspen also contribute to the younger trees on the site. Mature lodgepole pines occupy the overstory. No core samples were collected but based on other data collected in the area the overstory originated around 1890's. Several areas that have not been disturbed have evidence of an old burn through the presence of old charred stumps.
Condition	Trees on the site are in good to fair condition. The mature, lodgepole pine overstory is infected with dwarf mistletoe. Some trees are in the tertiary stages of the disease others are showing signs of decline. The larger spruce trees appear in good health and form.. Much of the lodgepole pine regeneration is infected with dwarf mistletoe.
Insect/ Disease	Mountain pine beetle, dwarf mistletoe are common problems in the lodgepole pine trees. Marsonina leaf blight and cytospora canker, both fungal pathogens affecting aspen trees, could both be present in the area.
Non-Woody Vegetation	Most of the houses lots have been landscaped and have been built on. On the outer edges of these lots some downed fuels, woodpiles and slash can be found but are not considered a high risk.
Fuels	Very few coarse woody fuels are present as surface fuels. Ladder fuels are present but not in alarming densities.
Comments	The POA has sprayed these properties for five years and have minimized loss to mountain pine beetle. Individual owners have sprayed additional trees.

Prescription 1

Management Objectives	1. Improve forest health. 2.Wildfire risk reduction 3. Increase long term insect and disease resistance.
Silvicultural objectives	1.Reduce fuel concentrations 2.Maintain or improve age and specie diversity
Desired stand conditions after treatment	A multi-storied stand exhibiting specie and age diversity. The visual attributes of the developing stand should include specie, color and texture diversity. Spacing between transplanted trees should provide adequate space for growth to maturity.
Expected outcomes	Proactive control of future insect/disease. Reduction of down woody fuel concentrations and ladder fuels. Improved specie and age diversity
Follow-up	Annual inspection for noxious weeds and fuel build-ups under decks and around foundations.
Comments	For homes with a formal landscape the most important factor is to keep trees away from the eaves maintain the irrigated landscape within 15 fee of the house and minimize fuel concentrations, such as firewood and weeds, under raised decks. For structures with a more natural landscape consider revegetation in 3 zones. In Zone 1 (15-20 feet from your home) consider irrigated landscaping, rock, mulch, annual or perennial flowers and aspen trees. in zone two 15 feet to 45 feet or the property line, plant a mix of native trees, shrubs, forbs and grasses. Plant with growth in mind so as the plants grow they maintain a natural look but do not become ladder fuels. See Appendix A for a recommendation of trees, shrubs forbes and grasses.

Management Unit 2

Stand Size	51.24 total acres, with 39 lots between 1.01 and 2.23 acres each.
Location	Filing 2 includes the southern loop of Rounds Rd and Spencer Court
Slope/Aspect Topography	The aspect varies from west to north with slopes from 0-15%
Silvic History	The area has been thinned several times for mountain pine beetle removals. Some transplanted trees can be found.
Use/Proposed Use	Unit 2 is a developed residential community with a few open unbuilt lots.
Stand Type	Mixed conifer/aspen cover type.
Specie	Lodgepole Pine, Englemann spruce, Aspen
Age/Stories	MU 2 supports a one story stand with lodgepole pine poles being the predominant specie. Some lodgepole regeneration is present but hardly viable and not in quantities substantial enough to regenerate the stand to a healthy population. Aspen regeneration is apparent in a few specific areas. Some transplants, mostly Colorado blue spruce and aspen are present.. No core samples were collected but based on other data collected in the area the overstory originated around 1890's. Several areas that have not been disturbed have evidence of an old burn through the presence of old charred stumps
Condition	Trees on the site are in fair to poor condition. The lodgepole pine overstory is infected with dwarf mistletoe. Some trees are in the tertiary stages of the disease while others are showing signs of decline. The lodgepole pine seedlings and saplings are also infected with dwarf mistletoe. The stand has been heavily thinned through sanitation cutting to remove mountain pine beetle infested trees. The residual trees are typically small in diameter (>7 inches) with narrow and thin crowns. Most of the lodgepole pine exhibit thin crowns with malformed understory trees as a result of environmental stress.
Insect/ Disease	As in the rest of Summit County the mountain pine beetle has been active in this area. Most of the lodgepole pine regeneration and mature trees are infected with dwarf mistletoe.
Non-Woody Vegetation	Not much non-woody vegetation is apparent on the forest floor other than wildflowers, bushes such as wild rose and occasional juniper.
Fuels	Very few downed fuels are present in this area. Most fuel reduction would be accomplished through understory removal and pruning from the ground up to 6-8'.
Comments	The POA has sprayed these properties for five years and have minimized loss to mountain pine beetle. Individual owners have sprayed additional trees.

Prescription 2

Management Objectives	1. Improve plant health and specie mix. 2.Reduce wildfire risk by removal of ladder fuels.
Silvicultural objectives	1. Remove hazard trees 2. Maintain or improve specie diversity through managed planting of native species.
Desired stand conditions after treatment	A park-like appearance but dominated by native plants that will require less maintenance, have higher survival ratings and represent a mix of early sera in the developmental stage
Silvicultural System	1. Thin lodgepole pine regeneration to obtain a spacing of 8-10 feet between trees. 2. Restore with a mix of trees, shrubs, forbs and grasses that are spaced and of a specie to reduce wildfire threat. A multi-storied stand exhibiting specie and age diversity. The visual attributes of the developing stand should include specie, color and texture diversity. Spacing between transplanted trees should provide adequate space for growth to maturity.
Expected outcomes	Proactive control of future insect/disease. Reduction of down woody fuel concentrations and ladder fuels. Improved specie and age diversity
Follow-up	Annual inspection for noxious weeds. Irrigation for newly planted specimens.
Comments	The POA has sprayed these properties for five years and have minimized loss to mountain pine beetle. Individual owners have sprayed additional trees.

Management Unit 3

Stand Size	With 23 lots between 1.01 and 3.37 acres.
Location	Filing 3 comprises the northwestern side of Highlands Drive as it comes up the hill from Hwy 9 and includes Barney Ford Circle. Some lots extend down to Hwy 9, the steepest slope in the management area
Slope/Aspect/ Topography	West aspect <5% to >25%.
Silvic History	The area has been thinned several times for mountain pine beetle removals. Some transplanted trees can be found
Use/Proposed Use	Area is residential adjacent to POA Open Space.
Stand Type	Mixed conifer and aspen This stand also includes some open meadow and sage grassland periphery moving into aspen & willow.
Specie	Lodgepole pine, Englemann spruce and aspen
Age/Stories	One story stand with more aspen and spruce than other areas of the study area. More open meadow with no story. No core samples were collected but based on other data collected in the area the overstory originated around 1890's. Several areas that have not been disturbed have evidence of an old burn through the presence of old charred stumps.
Condition	Most of the lodgepole pine exhibit thin crowns with malformed understory trees as a result of environmental stress.
Insect/ Disease	Not as much of the lodgepole pine regeneration is infected with dwarf mistletoe as adjacent filings. Mature aspen stands, native grown rather than transplants are exhibiting dieback from cytospora canker and other aspen diseases.
Non-Woody Vegetation	Grasses, shrubby cinquefoil, sage and willow.
Fuels	On the residential lots there is minimal presence of downed fuels. In a few backlot areas that reach down to Hwy 9 there are dead trees and heavy understory. This is mostly comprised of specie that occur in a wetter ecozone so although a steep slope have less risk as fuels. Planted landscape carries the greatest risk for wildfire in some lots, some transplants have grown and have limbs, vegetation touching and under wooden decks. Tall native grasses outside the lawn areas carry potential for ground fires but are separated from houses by the landscaped areas.
Comments	Heavy willow and aspen growth, high dry native grasses along trail and interface with open space areas.

Prescription 3

Management Objectives	1. Increase long term insect and disease resistance. 2. Improve forest health. 3. Reduce wildfire risk
Silvicultural objectives	1. Remove hazard trees. 2. Encourage healthy regeneration. 3. Landscape to suggested wildfire mitigation standards.
Desired stand conditions after treatment	A park-like appearance but dominated by native plants that will require less maintenance, have higher survival ratings and represent a mix of early sera in the developmental stage
Silvicultural System	1.
Expected outcomes	
Follow-up	Annual inspection for noxious weeds, insect and disease..
Comments	The open meadow areas provide fuelbreak from the densely treed, steep slope coming from the western edge. Maintaining this break will be important for future management.

Management Unit 4

Stand Size	24 lots
Location	Filing 4 is composed of the area to the east and west of the upper loop section Rounds Road. .
Slope/Aspect/ Topography	The unit has steeper on the lots extending to the east and bordering the Town of Breckenridge trails and United States Forest Service land. The area has been thinned several times for mountain pine beetle removals
Silvi History	A few transplanted trees are present on the site. Currently thinning and removal of dead trees is being performed along the eastern boundary where the trail system adjoins the private property.
Use/Proposed Use	Residential
Stand Type	Mixed conifer/aspen
Specie	Lodgepole pine is the dominant specie in the unit. Individual Englemann spruce trees are scattered throughout. Aspen regeneration is apparent throughout the area.
Age/Stories	One story stand with naturally regenerated lodgepole pine and aspen suckers in the understory. Transplanted spruce and aspen also contribute to the younger trees on the site. Mature lodgepole pines occupy the overstory. No core samples were collected but based on other data collected in the area the overstory originated around 1890's. Several areas that have not been disturbed have evidence of an old burn through the presence of old charred stumps.
Condition	Stand is in fair condition. Many of the lodgepole pine exhibit thin crowns with malformed understory trees as a result of environmental stress.
Insect/ Disease	No insects found. Heavy older mistletoe damage has deformed trees. Trees exhibit environmental and construction stress..
Non-Woody Vegetation	Some juniper undergrowth and duff.
Fuels	Although fine fuels exist on the ground and in large woodpiles they are located farther back in lots. Downed fuels are up by trail area for the most part.
Comments	

Prescription 4

Management Objectives	1. Improve tree health. 2. Improve specie diversity. 3. Improve long term insect and disease resistance.
Silvicultural objectives	1. Remove defective trees. 2. Create healthy, native, sustainable understory. 3. Reduce the dwarf mistletoe in the over and understory.
Desired stand conditions after treatment	1. Understory of diverse species. 2. Reduced dwarf mistletoe in the overstory. 3. Reduced dwarf mistletoe in the understory.
Silvicultural System	1. Remove dead trees and trees with defects. 2. Underplant with dwarf mistletoe resistant species such as spruce, 5 needle pine and aspen trees. 3.Prune dead limbs and limbs from ground level up to 6-8'.
Expected outcomes	Reduce the number of trees with defects within the management unit. Improved specie diversity throughout the site.
Follow-up	Annual inspection for noxious weeds, insects and disease, and hazard trees.
Comments	

Management Unit 5

Stand Size	24 lots
Location	Filing 5 is composed of the area of Fletcher Court and that segment of Highlands Drive bordering Fletcher Court prior to the beginning of the Golf Course Highlands subdivision
Slope/Aspect Topography	West with a slope of 0-10%. Drier than other areas with ditches on the southern side.
History	The area has been thinned several times for mountain pine beetle removals
Use/Proposed Use	This area is a residential area is composed of single family home sites. .
Stand Type	Residential Transplanted and mixed conifer
Specie	Mixed conifer/Aspen
Age/Stories	One story lodgepole, not as much aspen regeneration. Start of some sage in open areas. Most of the lodgepole pine exhibit thin crowns with malformed understory trees as a result of environmental stress No core samples were collected but based on other data collected in the area the overstory originated around 1890's. Several areas that have not been disturbed have evidence of an old burn through the presence of old charred stumps.
Condition	Overall trees appear to be in good condition with no obvious insect or disease problems on the site.
Insect/ Disease	None seen other than some environmental stress.
Non-Woody Vegetation	Irrigated landscapes and lawns and planted shrubs/bushes.
Fuels	Ground fuel loading is very low and ladder fuel is sparse Planted landscapes that have overgrown carry the greatest wildfire risk. Some specie such as Bristlecone pine have been planted close to the house and are now touching siding and growing under eaves. Shrubs are doing the same. Rock drip lines need weeding as tall grasses and shrubs/bushes are growing in them and touching structures or growing under decks, porches and walkways. Transplant trees have grown dense and created some ladder fuels, although they also provide screening from Hwy 9 traffic noise.
Comments	----------



Prescription 5

Management Objectives	1. Recommend planting species for specific areas.
Silvicultural objectives	1. introduce native species into select areas.
Desired stand conditions after treatment	NA
Silvicultural System	1. Transplant suites of native plants into selective areas
Expected outcomes	Add some age and specie diversity to site.
Follow-up	Annual inspection for noxious weeds and fuel build-ups under decks. Keep lawns trimmed as they interface with open areas of tall native grasses.
Comments	

Management Unit 6

Stand Size	
Location	Highlands at Breckenridge Open Space
Slope/Aspect Topography	Steep slope to Hwy 9/west facing Open sage land moving into willows and aspen, moist soils.
History	No evidence of any past use is visible on the site.
Use/Proposed Use	This unit is designated as urban reserve and is protected from development.
Stand Type	Scattered Colorado spruce trees and lodgepole pine are growing on the slope.. The area surrounding dry sage/grassland but is moist due to irrigation as evidenced by presence of willows, shrubby cinquefoil and young aspen stands in parts. Mature aspen stands in less sloping areas.
Specie	Colorado spruce, Lodgepole pine, aspen
Age/Stories	Single story spruce trees and Lodgepole with some dense mature aspen stands. No core samples were collected but based on other data collected in the area the overstory originated around 1890's. Several areas that have not been disturbed have evidence of an old burn through the presence of old charred stumps.
Condition	The trees on this site are in good condition
Insect/ Disease	Non Observed
Non-Woody Vegetation	Sage, willow and potentilla are the most common low species growing on the site.
Fuels	Grasses and Low shrubs moving into aspen then spruce and pine. Dense growth with some open meadows.
Comments	

Prescription 6

Management Objectives	1. Maintain diversity and condition of stand.
Silvicultural objectives	1. Maintain or improve age and specie diversity
Desired stand conditions after treatment	1. Healthy diverse stand
Silvicultural System	1
Expected outcomes	1. Healthy and diverse stand
Follow-up	
Comments	

Appendix A

Biological Reviews

Native Plant List

Firewise Plant List

Commercial Landscape Plant List

Lodgepole Pine Forest Type

Mixed Conifer Forest Type

Mountain Pine Beetle

Dwarf Mistletoe

Creating Defensible Space

Native Plant Selection List

Scientific Name	Common Name
Trees and shrubs	
Arctostaphylus uva-ursi	Kinnikinnick
Symphoricarpus oreophilus	Mountain Snowberry
Ribes montigenum	
Ribes cereum	Squaw Current
Pinus contorta	Limber Pine
Pinus aristata	Bristlecone Pine
Pseudotsuga menziesii	Douglas Fir
Populus tremuloides	Quaking Aspen
Abies lasiocarpa	Sub Alpine Fir
Abies concolor	White Fir
Picea engelmannii	Engelman Spruce
Shepherdia canadensis	Buffaloberry
Sambucus racemosa	Red Elder
Grasses	
Elymus trachycaulus	
Koeleria macrantha	
Trisetum spicatum	
Carex geyerii	
Bromus marginatus	
Muhlenbergia montanus	
Perennials / Forbs	
Lupinus argenteus	Lupine
Geranium viscosissimum	Sticky Geranium
Caltha leptosepala	
Castilleja sulfurea	Paintbrush
Penstemon strictus	Rocky Mountain Penstemon
Penstemon virens	
Penstemon rydbergii	
Penstemon secundiflorus	

Firewise Plant List

Key:	Water needs:	VL = very low	L = low	M = medium
	Sun/Shade:	S = sun	PS = part sun	Sh = shade
	Elevation:	Y = Yes	N = No	? = Questionable or unknown

Scientific Name	Common Name	Approx. Water Needs	Sun/ Shade Pref	Approx. Mature Height	Elevation 1000'		Approx. Bloom Month
					8	9	
Flowers and Ground Covers							
Achillea lanulosa[a]	Native yarrow	L-H	S/PS	1.5 - 2'	Y	Y	Jul
Aconitum spp.[c]	Monkshood	M-H	S	2'	Y	Y	Jun-Jul
Aconitum columbianum[a c]	Columbian monkshood	M-H	S	2'	Y	Y	Jun-Jul
Ajuga reptans[b]	Bugleweed	H	Sh	< .5'	Y	Y	Jun-Jul
Alchemilla sp.	Ladys mantle	M-H	PS/Sh	1'	Y	?	Jun-Jul
Allium cernuum[ac]	Nodding onion	L-H	S/PS	1'	Y	Y	Jun
Allium geyeri[ac]	Geyer onion	L-H	S/PS	1'	Y	?	Jun
Anaphalis margaritacea[a]	Pearly everlasting	L-H	S	1.5 - 2.5'	Y	?	Aug
Anemone blanda	Windflower	M-H	S/PS	1'	Y	?	Apr-May
Antennaria parvifolia[ab]	Small-leaf pussytoes	M	S/PS	<.5'	Y	Y	Jun

Antennaria rosea[ab]	Rosy pussytoes	M	S/PS	<.5'	Y	Y	Jun
Aquilegia spp.	Columbine	M-H	S/PS	1 - 2'	Y	Y	Jun-Jul
Aquilegia coerulea[a]	Colorado blue columbine	M-H	S/PS	1 - 2'	Y	Y	Jun-Jul
Aquilegia chrysantha[a]	Yellow columbine	M-H	S/PS	1 - 2'	Y	Y	Jun-Aug
Arabis sp.[b]	Rockcress	L-H	S	< 1'	Y	Y	May-Jun
Armeria maritima	Sea thrift	L-H	S/PS	.5'	Y	Y	Apr-Jun
Artemisia caucasica	Caucasian sage	L-M	S/PS	1- 2'	?	?	n/a
Artemisia frigida[ac]	Fringed sage	L-M	S	1 - 1.5'	Y	Y	n/a
Artemisia ludoviciana[a]	Prairie sage	L-M	S	1 - 1.5'	?	?	n/a
Aster laevis[a]	Smooth aster	L-H	S/PS	1 - 3'	Y	?	Aug-Sep
Aster porteri[a]	Porter aster	L-M	S	1'	?	?	Aug-Sep
Aubrieta sp.[b]	False rockcress	M	S	1'	Y	Y	Apr-May
Aurinia sp.[b]	Basket of gold	M	S/PS	1'	Y	Y	Apr-May
Calochortus gunnisonii[a]	Mariposa lily	M-H	S	.5 - 2'	Y	?	Jul-Aug
Campanula rotundifolia[a]	Common harebell	M-H	S	.5 - 1'	Y	Y	May-Oct
Centranthus ruber	Jupiters beard	L-H	S/Sh	2 - 2.5'	Y	?	May-Oct
Cerastium strictum[ab]	Mouse ear chickweed	M	S/PS	1'	Y	?	May-Jun
Cerastium tomentosum[b]	Snow-in-summer	L-M	S/PS	1'	Y	Y	May-Jun

Claytonia lanceolata[a]	Spring beauty	M	Sh	.5 - 1.5'	?	?	Mar-Apr
Convallaria majalis[bc]	Lily-of-the-valley	H	Sh	< 1'	Y	?	May-Jun
Delosperma nubigenum[b]	Hardy yellow iceplant	M-H	S	.5'	?	?	Jun
Delphinium spp.[c]	Delphinium	M-H	S/PS	.5 - 3'+	Y	Y	Jun-Jul
Dianthus spp.	Pinks	L-H	S	<.5' - 2'	Y	Y	May-Aug
Doronicum sp.	Leopards bane	H	S/PS	2 - 3'	Y	?	Jul-Aug
Echinacea purpurea	Purple coneflower	M	S	2 - 3'	Y	Y	Jul-Aug
Epilobium angustifolium	Fireweed	H	S/PS	3'	Y	Y	Jul-Aug
Erigeron flagellaris[a]	Whiplash daisy, trailing fleabane	L-M	S	< 1'	?	?	Jun-Jul
Eriogonum umbellatum[a]	Sulphur flower	M	S/PS	<.5'	Y	Y	Jun-Jul
Erysimum asperum[a]	Western wallflower	M	S/PS	1'+	Y	?	Jun-Jul
Gaillardia aristata[a]	Blanket flower	L-M	S	1 - 1.5'	Y	Y	Jul-Sep
Galium boreale[ab]	Northern bedstraw	M-H	Sh	<1'	Y	Y	May-Jun
Geranium spp.	Hardy geraniums	M	Sh/PS	2'	Y	Y	May-Oct
Geranium caespitosum[a]	Wild geranium	M	Sh/PS	2'	Y	Y	May-Oct
Geum triflorum	Prairie smoke	M-H	S/PS	1.5'	?	?	Jun
Helianthella quinquenervis[a]	Aspen sunflower	M	S	1'	Y	Y	?

Helianthemum nummularium	Rockrose	M-H	S	< 1'	?	?	May-Jun
Helianthus pumilus[a]	Small sunflower	M	S	1 - 2'	?	?	Jun-Jul
Heuchera spp.	Coral bells	M-H	PS/Sh	1 - 2'	Y	Y	Jun-Aug
Ipomopsis aggregata[a]	Scarlet gilia	M	S/PS	1 - 2'	Y	Y	Jun-Aug
Iris germanica	Bearded iris	L-M	S	1 - 3'	Y	Y	May-Jun
Iris missouriensis[a c]	Missouri or Native iris	M-H	S	1 - 2'	Y	Y	May
Lamium sp.[b]	Dead nettle	M-H	Sh	< 1'	Y	?	May-Jun
Lavandula spp.	Lavender	L-M	S	1 - 2'	?	?	Jun-Nov
Leucocrinum montanum[a]	Sand lily	L-M	S	< 1'	?	?	May
Liatris punctata[a]	Dotted gayfeather	VL-L	S	1 - 2'	Y	Y	Aug-Oct
Linum lewisii[ac]	Wild blue flax	L-H	S/PS	1 - 2'	Y	Y	May-Sep
Lupinus argenteus[ac]	Silver lupine	M	Sh/PS	1 - 3'	Y	Y	Jun-Jul
Mertensia lanceolata[a]	Narrow-leaved chiming bells	M-H	Sh/PS	1 - 2'	Y	Y	May-Jun
Mimulus guttatus[a]	Yellow monkey-flower	H	Sh	1'	Y	Y	?
Monarda fistulosa[a]	Native beebalm	M-H	S/PS	1 - 2'	Y	Y	Jul-Oct
Oenothera caespitosa[a]	White stemless evening primrose	L-M	S	1 - 2'	Y	Y	Jun-Aug
Papaver orientale	Oriental poppy	H	S/Sh	2 - 3'	Y	Y	May-Jun

Penstemon caespitosus[ab]	Mat penstemon	L-M	S	< .5'	Y	Y	Jun
Penstemon secundiflorus	Sidebells	L-M	S	1 - 2'	Y	?	May-Jun
Penstemon teucrioides[a]	Germander penstemon	L-M	S	.5'	?	?	Jun-Jul
Penstemon virens[ac]	Blue mist penstemon	M	S/PS	.5'	Y	Y	May-Jun
Phlox subulata	Moss phlox	M	S	< .5'	Y	Y	May
Polemonium sp.	Jacobs ladder	H	S/PS	1 - 2'	Y	Y	May-Aug
Potentilla fissa[a]	Leafy potentilla	M-H	PS	1'	Y	?	?
Potentilla verna[b]	Spring potentilla	M-H	PS	< .5'	Y	Y	Mar-May
Pulsatilla patens[a]	Pasque flower	M	S/PS	1'	Y	Y	Mar-May
Ratibida columnifera[a]	Prairie coneflower	L-M	S	2'	Y	Y	Jul-Sep
Rudbeckia hirta[a]	Black-eyed Susan	M-H	S	2 - 3'	Y	Y	Jul-Sep
Salvia officinalis	Cooking sage	L-M	S/PS	2'	Y	?	Jun
Saxifraga hirsuta	Saxifrage	H	S/PS	.5'+	Y	Y	May-Jun
Scutellaria brittonii[a]	Skullcap	M	S/PS	.5 - 1'	Y	?	Aug-Sep
Sedum spp.[b]	Stonecrop	M	S/PS	1 - 1.5'	Y	Y	Jul-Aug
Sedum lanceolatum[a]	Yellow stonecrop	M	S/PS	.5'	Y	Y	Jul-Aug
Sempervivum sp.	Hens and chicks	L-M	S/PS	.5'	Y	Y	n/a
Solidago missouriensis[a]	Smooth goldenrod	L-M	S	1 - 2'	Y	?	Jul-Aug
Thalictrum fendleri[a]	Fendler meadowrue	H	S/PS	2 - 3'	Y	Y	Jul-Aug

Thermopsis divaricarpa[a]	Spreading golden banner	M-H	S/PS	2'	Y	?	May
Tradescantia occidentalis[a]	Western spiderwort	M	S/PS	1.5'	Y	?	Jun-Aug
Thymus spp.[b]	Thyme	L-M	S	< .5'	Y	Y	Jun-Jul
Veronica pectinata	Speedwell	L-M	S	< .5'	Y	Y	Apr-Jul
Vinca minor[b]	Periwinkle, myrtle	H	Sh	< 1'	Y	?	Apr-Jun
Waldsteinia sp.[b]	Barren strawberry	M-H	Sh/PS	< 1'	Y	?	May-Jun
Shrubs							
Arctostaphylos uva-ursi[ab]	Kinnikinnick, bearberry	M	S/Sh	1'	Y	Y	n/a
Betula glanulosa[a]	Bog birch	H	S/PS	6 - 8'	Y	Y	n/a
Cercocarpus intricatus	Little-leaf mountain mahogany	VL-L	S	4 - 6'	Y	?	n/a
Cercocarpus montanus[ac]	True mountain mahogany	L-M	S	4 - 6'	Y	?	n/a
Chrysothamnus spp.[a]	Rabbitbrush	VL-L	S	2 - 6'	Y	Y	Jul-Aug
Cornus stolonifera[a]	Redtwig dogwood	H	S/Sh	4 - 6'	Y	Y	n/a
Cotoneaster horizontalis	Spreading cotoneaster	M	S/PS	2 - 3'	Y	?	May-Jun
Fallugia paradoxa[a]	Apache plume	VL-L	S	2 - 4'	Y	Y	Jun-Oct
Holodiscus dumosus[a]	Ocean spray, cliff/rock spirea	L-M	S/PS	4'	Y	Y	Jun

Jamesia americana[a]	Wax flower	M-H	S/Sh	2 - 6'	Y	Y	Jun
Lonicera tatarica	Tatarian honeysuckle	M	S/PS	4 - 6'	Y	Y	May-Jun
Mahonia repens[ab]	Creeping grape holly	L-H	S/Sh	1 - 2'	Y	Y	Mar-May
Philadelphus microphyllus[a]	Little-leaf mockorange	M	S	2 - 3'	Y	?	Jun
Physocarpus monogynus[a]	Mountain ninebark	M	S/Sh	2 - 4'	Y	Y	Jun
Potentilla fruticosa[a]	Shrubby cinquefoil	M	S/PS	2 - 3'	Y	Y	May-Sep
Prunus besseyi[a]	Western sand cherry	L-M	S	1 - 3'	Y	?	May
Ribes aureum[a]	Golden currant	M	S/PS	2 - 3'	Y	Y	Apr-May
Rosa woodsii[a]	Woods' or native wild rose	M	S/PS	2 - 3'	Y	Y	Jun-Jul
Shepherdia canadensis[a]	Russet buffaloberry	M-H	S	5 - 6'	Y	Y	n/a
Symphoricarpos spp.[d]	Snowberry, coralberry	M	S/PS	2 - 3'	Y	Y	n/a
Viburnum edule[a]	Highbush cranberry	H	S	6 - 8'	Y	Y	May-Jun
Yucca glauca[a]	Spanish bayonet, small soapweed, Great Plains yucca	VL-L	S/PS	2 - 3'	Y	?	Jun
Large Shrubs and Trees							
Acer ginnala	Ginnala maple	M-H	S	6 - 10'	Y	Y	n/a

Acer glabrum[a]	Rocky Mountain maple	M-H	S/Sh	6 - 10'	Y	Y	n/a
Acer grandidentatum[a]	Wasatch maple	M	S/PS	10 - 20'	Y	?	n/a
Alnus tenuifolia[a]	Thinleaf alder	H	S/PS	6 - 8'	Y	Y	Apr
Amelanchier alnifolia[ac]	Saskatoon alder-leaf serviceberry	M	S/PS	6 - 8'	Y	Y	Apr-May
Betula fontinalis[a]	River birch	H	S/PS	6 - 8'	Y	?	n/a
Corylus cornuta[a]	Filbert, beaked hazelnut	H	S/Sh	5 - 6'	?	?	n/a
Crataegus spp.[a]	Hawthorn (several native)	M	S	6 - 8'	Y	?	May
Fraxinus pennsylvancia	Green ash	M-H	S	20 - 25'	Y	?	n/a
Populus tremuloides[a]	Aspen	M	S	8 - 25'	Y	Y	n/a
Prunus virginiana melanocarpa[ac]	Western chokecherry	M-H	S/PS	6 - 8'	Y	Y	Apr-May
Rubus deliciosus[a]	Boulder raspberry, thimbleberry	M	S/Sh	4 - 6'	Y	Y	Apr-May
Salix amygdaloides[a]	Peachleaf willow	H	S/PS	20 - 30'	Y	?	n/a
Shepherdia argentea[a]	Silver buffaloberry	M	S/PS	4 - 6'	Y	?	Apr
Sorbus scopulina[a]	Western mountain ash	M-H	S/Sh	6 - 8'	Y	?	May
Syringa vulgaris	Common lilac	M	S	6 - 8'	Y	Y	May

[a] Native species.

[b] Ground cover plant.

[c] This species, or some species in this genus, may be poisonous to livestock, pets, wildlife and/or people under some conditions. Before planting, check with Colorado State University Extension, Colorado State Forest Service, or other knowledgeable personnel.

The following list was prepared by Phil Hoefer, Colorado State Forest Service. was reviewed by Jim Knopf, a landscape architect in Boulder, and two landscape architects on Colorado's Western Slope. Bloom time is approximate (observed in Boulder at 5,600 feet).

Commercial Landscape Plant List

Landscaping Plants

Shade Perennials

Aconitum	fischeri or carmichaellii
Dicentra	'Spectabilis'
Hosta	Patriot
Lamium	maculatum 'White Nancy'
Ajuga	Burgundy Glow
Myosotis	alpestris 'Victoria Blue'
Polemonium	caeruleum 'Blue Pearl'
Pulmonaria	sacharata 'Smokey Blue'
Thalictrum	aquilegifolium

Sun Perennials

Achillea	'Moonshine'
Alchemilla	mollis
Antennaria	dioica
Aquilegia	caerulea
Calamagrostis	Karl Forester
Ceratostigma	plumbaginoides
Delphinium	Summer Skies
Echinacea	purpurea 'Magnus'
Geranium	'Johnson's Blue'
Hemerocallis	'Stella D' Oro'
Iris	Bearded- Misc
Iberis	sempervirens 'Snowflake'
Lupinus	'Gallery Blue'
Penstemon	strictus
Salvia	'May Night'
Thymus	praecox 'Pseudolanuginosus'

Shrubs

Acer Glabrum -	Rocky Mountain Maple -
Amelanchier Alnifolia -	Saskatoon Serviceberry -
Aronia Melanocarpa -	Black Chokeberry -
Artemesia '	Powis Castle' - Sagebrush -
Cercocarpus Montanius -	Mountain Mahogany -
Chrysothamnus Nauseosus -	Rabbitbrush Tall Green
Cornus Sericea 'Isanti' - Dogwood	
Crataegus crus-galli - Thornless Cockspur Hawthorn -	
Juniperus Horizontalis 'Blue Chip' -	Blue Chip Juniper -
Lonicera Involucrata -	Twinberry Honeysuckle
Physocarpus Monogynus -	Mountain Ninebark
Pinus Mugo -	Mugo Pine -
Potentilla Fruticosa	Golden Drop
Prunus Besseyi ' Paunee Buttes'	Sand Cherry
Prunus Virginiana	Chokecherry
Quercus Grambelii	Gambel Oak
Ribes Aureum	Golden Current
Ribes Cercum -	Wax Current
Ribes 'Pixwell' -	Gooseberry
Rosa Woodsii - -	Woods Rose
Rubus Deliciosus	Boulder Raspberry
Salix Purpurea 'Nana' -	Dwarf Arctic Willow
Sambucus Pubens	Native Red Berried Elder
Symphoricarpos Oreophillus	Mountain Snowberry
Syringa Vulgaris	Common Lilac

Trees

Populus tremuloides	Aspen
Populus lanceolata	Narrowleaf Cottonwood
Malus "dolgo"	Dolgo Crabapple
Picea englemannii	Englemann Spruce
Picea pungens	Colorado Spruce
Pseudotsuga menziesii.	Douglas-fir

Lodgepole Pine Forest Type

Lodgepole pine (*Pinus contorta*) generally occurs between 7,500 and 10,500 feet in elevation in Colorado. Maximum development occurs in the upper montane and lower subalpine zones on south and west slopes between 8500 and 10,000 feet. Lodgepole pine is often the first specie to appear in recently disturbed areas. This specie commonly seeds in first after a forest fire.

Lodgepole is frequently succeeded by other species of conifers, so is considered a seral specie on many sites. It is intolerant of shade and requires open conditions with an exposure with an exposed mineral soil to regenerate. Under optimum conditions, natural regeneration from seed can be very heavy. Seed regeneration typically creates dense stands of young trees competing for available sunlight, moisture and nutrients. Left alone, many of these stands become stagnant and diameter growth is minimal for the age of the trees. Other stands on better sites can naturally thin themselves over time. These stands can grow into sawtimber stands.

Vegetation on the forest floor beneath a dense lodgepole pine overstory can be almost totally absent. The understory vegetation typically increases with an open overstory. Initial competition between trees generally results in straight, slender stems with relatively sparse crowns from “self-pruning” from below. This characteristic made the specie especially suitable for use as tepee poles by Indians. Larger stems also make good house logs. Open grown trees can have full crowns and large trunk diameters. Lodgepole is considered mature at 120 to 140 years, although some stands on good sites remain healthy up to 200 years. Often times 200+ year old individuals can be found in a new stand. Usually these trees survived the fire that originated the stand. Typically these trees are not in good health or form.

Damaging agents of lodgepole pine include insects, disease, fire, porcupines, and high winds. The mountain beetle (*Dendroctinous ponderosae*) and the pine engrave (*Ips pini*) are the most aggressive insect pests. The mountain pine beetle is discussed in more detail in this Appendix.

Dwarf mistletoe (Arceuthobium spp.) is the most serious disease affecting lodgepole pine. The biology of dwarf mistletoe is discussed later in this Appendix.

Other pathogens of lodgepole pine include comandra blister rust, stalactiform and western gall rust. Lodgepole pine is also susceptible to various root rots, stem rots and needle cast diseases.

Lodgepole pine often occur in pure even-aged stands. Under the right conditions, lodgepole pine can be found in two three or multistoried stands. Often times the multi storied stands are mixed with other species such as Englemann spruce (*Picea englemanii*) or Subalpine fir (*Abies lasiocarpa*). Dense, young stands of sapling and pole sized trees in good condition can show improved growth through thinning. Thinning is also an important component is reducing wildfire risk in lodgepole pine stands. If dwarf mistletoe infection is heavy or the age is greater than 90 years old, the stand should be regenerated.
Because of it’s intolerance to shade lodgepole pine is usually accomplished by using an even-aged management method such as patch cutting, shelterwood cutting or simulated shelterwood cutting. Patch cutting is the most common form of regeneration.

Lodgepole pine is classified as a forest fire type. The cones are sealed by resin that keeps the seed inside. When a fire burns through the forest the heat melts the resin and the seeds are dispersed to

germinate in the ash and mineral soil. However, the specie does not rely solely on fire to regenerate. Typically, individuals exist with unsealed cones that disperse their seeds when they mature.

Mixed Conifer Cover Type

On the Colorado Plateau mixed-conifer forests generally occur at elevations from about 8000 feet to 10,000 feet, where annual precipitation is from 25 to 30 inches annually. In contrast to the ponderosa pine forest growing at slightly lower elevations, the mixed-conifer forest is comparatively lush and much more diverse. Depending on location, Douglas-fir, white fir, limber pine (in the north), blue spruce, and less commonly southwestern white pine form mixed stands in this community, with ponderosa pine joining the mix on warmer slopes. Blue spruce is common in moist areas on many of the high plateaus of central and southern Utah, while limber pine is a major component of mixed-conifer forests on the San Francisco Peaks near Flagstaff, Arizona. Quaking aspen, along with Gambel oak, is prominent in these forests following disturbances.

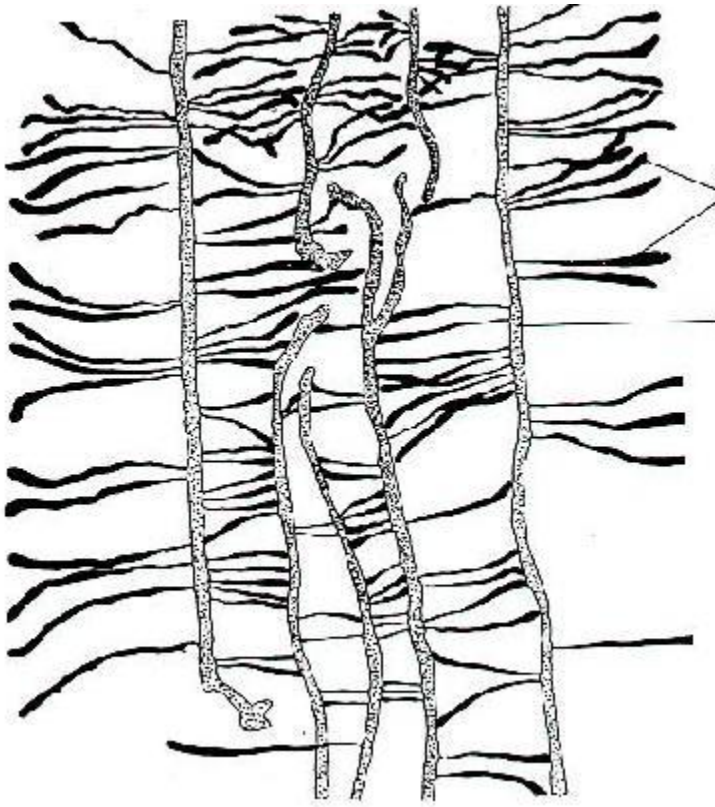
Under natural conditions the relatively open nature of the mixed-conifer forest coupled with the rich, moist soil found at these elevations allows for the development of a diverse understory of forbs, grasses, and shrubs. Understory conditions vary widely, from dry, open-canopy forests with grassy undergrowth on open slopes and ridges to moist, closed-canopied stands dominated by numerous herbaceous plants in the canyons and ravines. A popular zone for wildlife due to the abundant forage, black bears, mule deer, and elk can be quite common.

Fire histories in mixed-conifer forests vary with forest composition, landscape characteristics and human intervention. Until the late 1800s when grazing and fire suppression policies vastly reduced widespread fires, fire regimes included frequent surface fires to infrequent, patchy crown fires with return intervals of about 10 years. In the absense of fire these forests have undergone major changes in structure and species composition throughout the American west.

Ponderosa pine was once codominant in many mixed-conifer forests with relatively open stand structures, but fire suppression has allowed the development of dense sapling understories, with regeneration dominated by the more fire-sensitive Douglas-fir and white fir. Forest stand inventory data from Arizona and New Mexico show an 81% increase in the area of mixed-conifer forests between 1962 and 1986. Herbaceous understories have been reduced by denser canopies and needle litter, and nutrient cycles have been disrupted. Heavy surface fuels and a vertically continuous ladder of dead branches have developed, resulting in increased risks of crown fires. As these forests become reduced or fragmented, local endemic plants may become threatened or endangered.

Mountain Pine Beetle

Mountain pine beetle (MPB), **Dendroctonus ponderosae**, is native to the forests of western North America. Periodic outbreaks of the insect, previously called the Black Hills beetle or Rocky Mountain pine beetle, can result in losses of millions of trees. Outbreaks develop irrespective of property lines, being equally evident in wilderness areas, mountain subdivisions and back yards. Even windbreak or landscape pines many miles from the mountains can succumb to beetles imported in infested firewood.



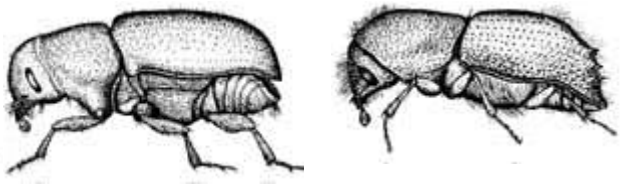


Figure 1: Adult **Dendroctonus** (left) versus **Ips** (right). Note gradually curved wing of **Dendroctonus**. Actual size of **Dendroctonus** from 1/8 to 1/3 inch, **Ips** 1/3 to 1/4 inch.
Gallery (left) are typically 1'-3' long often packed with frass and always vertical. The dark lateral areas are larval mines.

Mountain pine beetles develop in pines, particularly ponderosa, lodgepole, Scotch and limber pine. Bristlecone and pinyon pine are less commonly attacked. During early stages of an outbreak, attacks are limited largely to trees under stress from injury, poor site conditions, fire damage, overcrowding, root disease or old age. However, as beetle populations increase, MPB attacks may involve most large trees in the outbreak area.

A related insect, the Douglas-fir beetle (**D. pseudotsugae**), occasionally damages Douglas-fir. Most often, outbreaks are associated with previous injury by fire or western spruce budworm. (See fact sheet 5.543, **Western Spruce Budworms**). Spruce beetle (**D. rufipennis**)

is a pest of Engelmann and Colorado blue spruce in Colorado. Injured pines also can be attacked by the red turpentine beetle (**D. valens**).

Mountain pine beetles and related bark beetles in the genus **Dendroctonus** can be distinguished from other large bark beetles in pines by the shape of the hind wing cover (Figure 1, top). In side view, it is gradually curved. The wing cover of **Ips** or engraver beetles, another common group of bark beetles attacking conifers, is sharply spined (Figure 1, bottom).

Signs and Symptoms of MPB Attack

- Popcorn-shaped masses of resin, called "pitch tubes," on the trunk where beetle tunneling begins. Pitch tubes may be brown, pink or white (Figures 2 and 6).
- Boring dust in bark crevices and on the ground immediately adjacent to the tree base.
- Evidence of woodpecker feeding on trunk. Patches of bark are removed and bark flakes lie on the ground or snow below tree.
- Foliage turning yellowish to reddish throughout the entire tree crown. This usually occurs eight to 10 months after a successful MPB attack.
- Presence of live MPB (eggs, larvae, pupae and/or adults) as well as galleries under bark. This is the most certain indicator of infestation. A hatchet for removal of bark is needed to check trees correctly (Figures 3, 5 and 8).
- Blue stained sapwood (Figure 9). Check at more than one point around the tree's circumference.

Life History and Habits

Mountain pine beetle has a one-year life cycle in Colorado. In late summer, adults leave the dead, yellow- to red-needled trees in which they developed. Females seek out living, green trees that they attack by tunneling under the bark. Coordinated mass attacks by many beetles are common. If successful, each beetle pair mates, forms a vertical tunnel (egg gallery) under the bark and produces about 75 eggs. Following egg hatch, larvae (grubs) tunnel away from the egg gallery, producing a characteristic feeding pattern.

MPB larvae spend the winter under the bark. They continue to feed in the spring and transform into pupae in June and July. Emergence of new adults can begin in early July and continue through September. However, the great majority of beetles exit trees during late July (lodgepole pine) and mid-August (ponderosa pine).

A key part of this cycle is the ability of MPB (and other bark beetles) to transmit blue stain fungi. Spores of these fungi contaminate the bodies of adult beetles and are introduced into the tree during attack. Fungi grow within the tree and, together with bark beetle feeding, weaken it. This mutual network of beetle galleries and blue stain fungi disrupts the movement of water within the tree and rapidly kills it. The fungi give a blue-gray appearance to the sapwood.

Infested Trees

- Once MPB infest a tree, nothing practical can be done to save that tree.
- Under epidemic or outbreak conditions, enough beetles can emerge from an infested tree to kill about two same-sized trees the following year.
- **Ips** and related beetles that emerge early in summer often are mistaken for mountain pine beetle, leading to early reports that "MPB is flying." Be sure to properly identify the beetles you find associated with your trees.
- Trees from which MPB have already emerged (look for numerous round, pitch-free exit holes in bark) do not need to be treated.
- The direction and spread rate of a beetle infestation is impossible to predict. However, attacked trees usually are adjacent to or near previously killed trees.

Natural controls of mountain pine beetle include woodpeckers and Insects such as cleric beetles that feed on adults and larvae under the bark. Extreme cold temperatures also can reduce MPB populations. However, during outbreaks these natural controls often fail to prevent additional attacks.

Logs infested with MPB can be treated in various ways to kill developing beetles before they emerge as adults in summer. Logs may be burned, preferably in the fireplace, to kill the larvae under bark. They could also be debarked, killed, buried under 8 inches of soil, or chipped.

In some cases, hauling infested logs to "safe sites" a mile or more from susceptible tree hosts also is practiced. Following beetle emergence, wood can be used without threat to other trees.

Chemical control options for MPB have been greatly limited in recent years. Former treatments that involve ethylene dibromide fumigation have been banned. A few formulations of lindane remain available to treat infested logs. However, this option will end as soon as existing stocks are depleted.

Solar treatments that raise the underbark temperature to lethal levels (110 degrees F or more) are now being tried as a means of reducing beetle populations in infested logs. Such treatments can be performed with or without plastic. Key points to remember: place logs in a location that receives several hours of direct sunlight each day, do not stack logs on top of each other, and allow a minimum of two months of warm weather. If plastic is not used, the logs need to be rolled every three weeks or so. About one third of the log is treated with each orientation. If plastic is used, it should be clear. Water the logs prior to covering. Seal the edges with soil and repair rips with duct tape. Contact a forester for more details on solar treatments.

Prevention

Certain formulations of carbaryl (Sevin and others) and permethrin (Astro, Dragnet and others) are registered for use to prevent attacks on individual trees. These sprays are applied to living green trees in early summer to kill or deter attacking beetles. This preventive spray is quite effective through one MPB flight (one year).

Another method of prevention involves forest management. In general, the MPB likes forests that are old and dense. Thinning out excess trees reduces forest density, lessens fire hazard and improves individual tree vigor. Most mature Colorado forests have about twice as many trees as forests more resistant to MPB. Get help from a forester with this option.

Facts

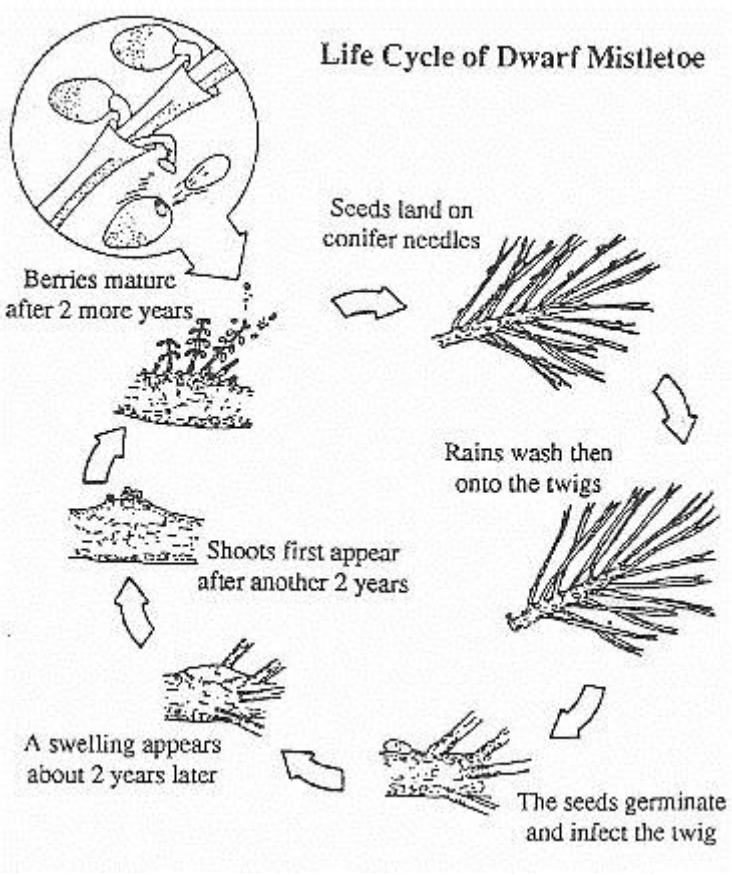
- Mountain pine beetles (MPB) are the most important insect pest of Colorado's pine forests. MPB often kill large numbers of trees annually during outbreaks.
- Trees that are not growing vigorously due to old age, crowding, poor growing conditions, drought, fire or mechanical damage, root disease and other causes are most likely to be attacked.
- For a long-term remedy, thin susceptible stands. Leave well-spaced, healthy trees.
- For short-term controls, spray, cover, burn or peel attacked trees to kill the beetles. Preventive sprays can protect green, unattacked trees.

Dwarf Mistletoe



Dwarf mistletoes are parasitic plants which infect all pine tree species in Colorado. There are 14 species of dwarf mistletoe which may infect the state's native conifers. The parasitic plants are typically associated with one or two principal host tree species. Nursery and ornamental plantings are usually not infected, although dwarf mistletoe is known to be a problem on Scotch pine. The parasite can be introduced into an area by planting trees which are infected.

Life Cycle: The plant spreads primarily by seed. The berry-like fruits ripen in the late summer or fall and burst, shooting their sticky seeds distances up to 50 feet. The seeds adhere to needles, twigs, branches and trunks and germinate the following spring. Infection of the host occurs when the root-like structure from germinated seed successfully penetrates the bark. The root-like system becomes imbedded in the wood and provides the plant with water and nutrition supplied by the host tree. The mistletoe plant continues to grow and spread in the host. Shoots of mistletoe form within two to four years, and fruits are produced in another one to two years.



Signs and Symptoms of Infection: The first visible symptom is a slight *swelling* (fig. 1) of the bark at the site of infection, creating a spindle shaped branch. Two to three years following infection, the plant produces yellow to light-green colored, leafless *shoots* (fig. 1) up to eight inches long. *Witches brooms* (fig. 1) are common symptoms of older infections. Broomed branches are loosely arranged masses of twigs and foliage and are very conspicuous in the lower crowns of older trees. Over time, the foliage of infected trees becomes thin, short, and yellowish, and the tree begins to die from the top down.

Damage Caused: Dwarf mistletoes weaken trees by robbing the tree of food and water, and disrupting the movement of these important materials within the tree. Infected trees have slower growth rates and reduced seed production. The parasite also can kill the tree the directly. The length of time it takes for mistletoe to kill a tree depends on the age of the tree, how vigorous the tree is, and how heavily infested the tree is with mistletoe. Seedlings and saplings are usually killed in a short time after becoming infected, while larger trees often live for many years with mistletoe infections. However, they become progressively weaker and eventually die as a direct result of the parasite, or succumb to other problems like bark beetles. Trees are usually killed within about 10 to 15 years once they become heavily infected.

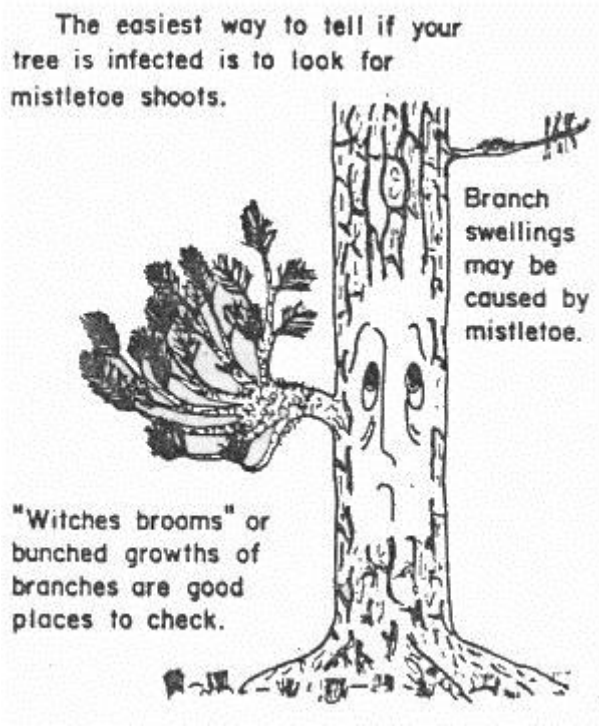


Figure 1. Signs of infection

Control: The best treatment option for mistletoe depends on the degree of infestation, the age and location of the tree, and concerns of property owner. A common system for assessing the severity of a dwarf mistletoe infection is the 6-Class Dwarf Mistletoe Rating System (DMR). The system is explained in the figure 2 below.

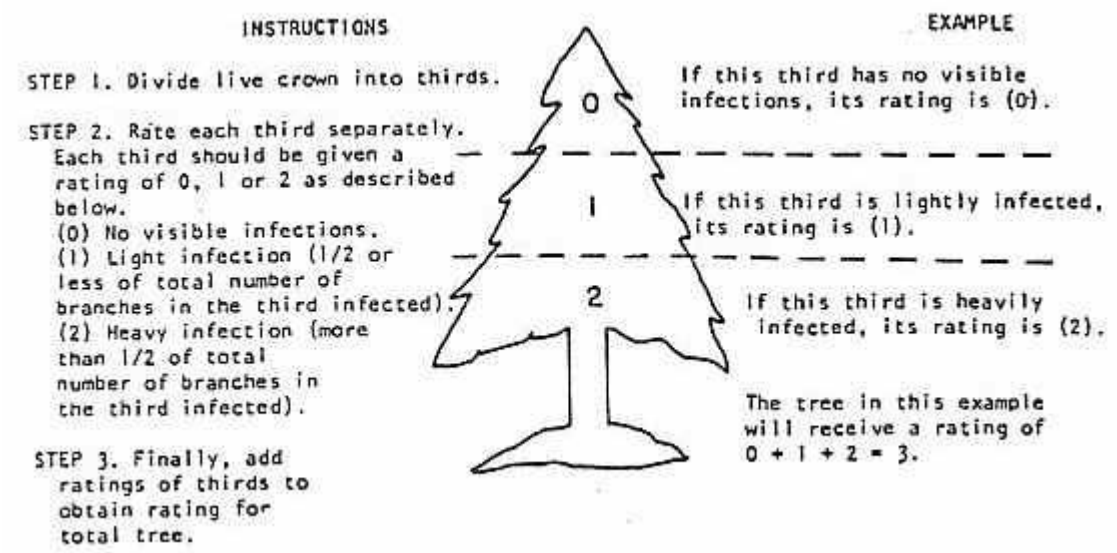


Figure 2. The 6-Class Dwarf-Mistletoe Rating System

Cutting. Trees with severe infections, DMR of 5 or 6, and those with only a few live branches should be removed. Trees with high, unreachable infections should also be removed to keep them from raining seeds on uninfected trees below. Removal of heavily infected trees also eliminates the hazard diseased and decayed trees become around the home. All trees, particularly older ones, should be

examined to determine if decay, disease, or other defect has created hazardous conditions. If the trees are isolated from healthy susceptible tree species (minimum separation of 50 feet) they may be retained for their aesthetic benefits.

Pruning. Trees with less severe infections, DMR <= 4, can benefit from pruning off infected branches. Pruning out witches brooms can improve the tree's health and lengthen its life. If more than 50% of the tree's crown needs to be removed to eliminate the infections, then it may be best to remove the entire tree. Remove infected branches at the trunk, just outside the swelling at the base of the branch. Remove the entire branch rather than just the infected section, as not all infections will be visible. Cut to highest infected branch, or even to branches two feet above the highest visible infection if doing so will leave enough live tree crown. Mistletoe infections on branches within six inches of the tree trunk have likely spread into the main tree stem; if the main stem is less than five inches in diameter where the infected branch attaches, the entire tree should be removed. Otherwise, remove the infected branch and periodically scrape shoots off the trunk should they appear. Examine pruned trees every 2 or 3 years, and prune out any additional infections and knock off new shoots.

Resistance. Since most species of dwarf mistletoe in Colorado are considered host specific, the disease can be controlled by favoring tree species which are known to be immune to the dwarf mistletoe species present. Selection of immune tree species should be considered during thinning and planting projects.

Creating Wildfire-Defensible Zones

by F.C. Dennis

Quick Facts...

- Wildfire will find the weakest links in the defense measures you have taken on your property.
- The primary determinants of a home's ability to survive wildfire are its roofing material and the quality of the "defensible space" surrounding it.
- Even small steps to protect your home and property will make them more able to withstand fire.
- Consider these measures for all areas of your property, not just the immediate vicinity of the house.

Fire is capricious. It can find the weak link in your home's fire protection scheme and gain the upper hand because of a small, overlooked or seemingly inconsequential factor. While you may not be able to accomplish all measures below, each will increase your home's, and possibly your family's, safety. Start with the easiest and least expensive actions. Begin your work closest to your house and move outward. Keep working on the more difficult items until you have completed your entire project.

Defensible Space

Two factors have emerged as the primary determinants of a home's ability to survive wildfire. These are the home's roofing material and the quality of the "defensible space" surrounding it.

Use fire-resistive materials (Class C or better rating), not wood or shake shingles, to roof homes in or near forests and grasslands. When your roof needs significant repairs or replacement, do so with a fire-resistant roofing material. Check with your county building department. Some counties now restrict wood roofs or require specific classifications of roofing material.

Defensible space is an area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire towards the structure. It also reduces the chance of a structure fire moving from the building to the surrounding forest. Defensible space provides room for firefighters to do their jobs. Your house is more likely to withstand a wildfire if grasses, brush, trees and other common forest fuels are managed to reduce a fire's intensity.

Creating an effective defensible space involves developing a series of management zones in which different treatment techniques are used. See Figure 1 for a general view of the relationships among these management zones. Develop defensible space around each building on your property. Include detached garages, storage buildings, barns and other structures in your plan.

The actual design and development of your defensible space depends on several factors: size and shape of buildings, materials used in their construction, the slope of the ground on which the structures are built, surrounding topography, and sizes and types of vegetation on your property. These factors all affect your design. You may want to request additional guidance from your local Colorado State Forest Service (CSFS) forester

or fire department.

Defensible Space Management Zones

Zone 1 is the area of maximum modification and treatment. It consists of an area of 15 feet around the structure in which all flammable vegetation is removed. This 15 feet is measured from the outside edge of the home's eaves and any attached structures, such as decks.

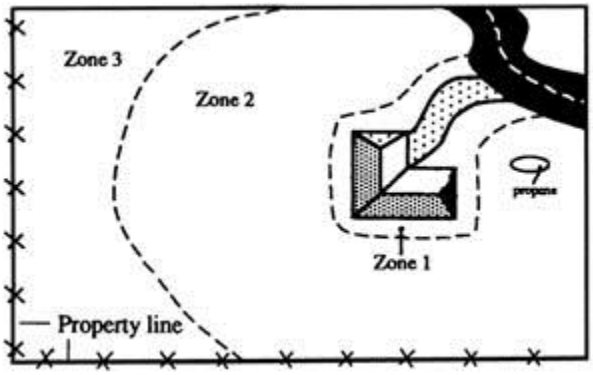


Figure 1: Forested property showing the three fire-defensible zones around a home or other structure.

Zone 2 is an area of fuel reduction. It is a transitional area between Zones 1 and 3. The size of Zone 2 depends on the slope of the ground where the structure is built. Typically, the defensible space should extend at least 75 to 125 feet from the structure. See Figure 2 for the appropriate distance for your home's defensible space. Within this zone, the continuity and arrangement of vegetation is modified. Remove stressed, diseased, dead or dying trees and shrubs. Thin and prune the remaining larger trees and shrubs. Be sure to extend thinning along either side of your driveway all the way to your main access road. These actions help eliminate the continuous fuel surrounding a structure while enhancing homesite safety and the aesthetics of the property.

Zone 3 is an area of traditional forest management and is of no particular size. It extends from the edge of your defensible space to your property boundaries.

Prescriptions

Zone 1

The size of Zone 1 is 15 feet, measured from the edges of the structure. Within this zone, several specific treatments are recommended.

Plant nothing within 3 to 5 feet of the structure, particularly if the building is sided with wood, logs or other flammable materials. Decorative rock creates an attractive, easily maintained, nonflammable ground cover.



Figure 2: This chart indicates the minimum dimensions for defensible space from the home to the outer edge of Zone 2. For example, if your home is situated on a 20 percent slope, the minimum defensible space dimensions would be 90 feet uphill and to the sides of the home and 104 feet downhill from the home.

If the house has noncombustible siding, widely spaced foundation plantings of low growing shrubs or other "fire wise" plants are acceptable. Do not plant directly beneath

windows or next to foundation vents. Be sure there are no areas of continuous grass adjacent to plantings in this area.

Frequently prune and maintain plants in this zone to ensure vigorous growth and a low growth habit. Remove dead branches, stems and leaves.

Do not store firewood or other combustible materials in this area. Enclose or screen decks with metal screening. Extend the gravel coverage under the decks. Do not use areas under decks for storage.

Ideally, remove all trees from Zone 1 to reduce fire hazards. If you do keep a tree, considered it part of the structure and extend the distance of the entire defensible space accordingly. Isolate the tree from any other surrounding trees. Prune it to at least 10 feet above the ground. Remove any branches that interfere with the roof or are within 10 feet of the chimney. Remove all "ladder fuels" from beneath the tree. (Ladder fuels are small shrubs, trees, tree limbs and other materials that allow fire to climb into the tree crown -- the branches and foliage.)

Zone 2

Zone 2 is an area of fuel reduction designed to reduce the intensity of any fire approaching your home. Follow these recommended management steps.

Thin trees and large shrubs so there is at least 10 feet between crowns. Crown separation is measured from the furthest branch of one tree to the nearest branch on the next tree (Figure 3). On steep slopes, allow more space between tree crowns. Remove all ladder fuels from under these remaining trees. Carefully prune trees to a height of 10 feet.

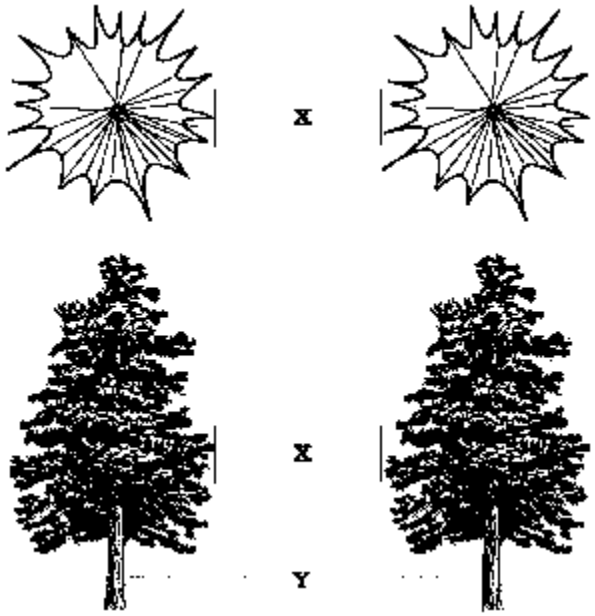


Figure 3: X = crown spacing; Y = stem spacing. Do not measure between stems for crown -- measure between the edges of tree crowns.

Because Zone 2 forms an aesthetic buffer and provides a transition between zones, it is necessary to blend the requirements for Zones 1 and 3. Thin the inner portions of Zone 2 more heavily than the outer portions. Gradually increase tree density as you approach Zone 3.

Isolated shrubs may remain, provided they are not under tree crowns. Prune and maintain these plants periodically to maintain vigorous growth. Remove dead stems from trees and shrubs annually.

Limit the number of dead trees (snags) retained in this area. Wildlife need only one or two

snags per acre. Be sure any snags left for wildlife cannot fall onto the house or block access roads or driveways.

Mow grasses (or remove them with a weed trimmer) as needed through the growing season to keep them low, a maximum of 6 to 8 inches. This is extremely critical in the fall when grasses dry out and cure or in the spring after the snow is gone but before the plants green up.

Stack firewood and woodpiles uphill or on the same elevation as the structure but at least 30 feet away. Clear and keep away flammable vegetation within 10 feet of these woodpiles. Do not stack wood against your house or on or under your deck, even in winter. Many homes have burned from a woodpile that ignited as the fire passed. Wildfires can burn at almost any time in Colorado.

Locate propane tanks at least 30 feet from any structures, preferably on the same elevation as the house. You don't want the LP container below your house -- if it ignites, the fire would tend to burn uphill. On the other hand, if the tank is above your house and it develops a leak, LP gas will flow downhill into your home. Clear and keep away flammable vegetation within 10 feet of these tanks. Do not screen propane tanks with shrubs or vegetation.

Dispose of slash (limbs, branches and other woody debris) removed from your trees and shrubs through chipping or by piling and burning. Contact your local CSFS office or county sheriff's office for information about burning slash piles. Only if neither of these alternatives is possible, lop and scatter slash by cutting it into very small pieces and distributing it over the ground. Avoid heavy accumulations of slash. Make it lay close to the ground to speed decomposition. If desired, no more than two or three small, widely spaced brush piles may be left for wildlife purposes. Locate these towards the outer portions of your defensible space.

Zone 3

This zone is of no specified size. It extends from the edge of your defensible space to your property lines. In this area, you are encouraged to manage your forests in a more traditional manner. Typical management objectives for areas surrounding homesites or subdivisions are: provide optimum recreational opportunities; enhance aesthetics; maintain tree health and vigor; provide barriers for wind, noise, dust and visual intrusions; support limited production of firewood, fence posts and other forest commodities; or grow Christmas trees or trees for transplanting.

Specific thinning requirements will be dictated by your objectives for your land. However, most thinning will be done from below (leaving the biggest and best trees) and on an individual tree basis.

Thinnings sanitize and improve the forest stand by removing trees that are damaged, attacked by Insects, infected by disease, or are of poor form or low vigor.

Tree spacing usually depends on the species being managed and factors such as susceptibility to windthrow or damage from heavy snow loading. For ponderosa pine and Douglas-fir, a good rule of thumb for stem spacing is diameter + 7. For lodgepole pine

and Engelmann spruce, the stem spacing guide is diameter + 5. Measure diameter in inches at about 4 1/2 feet above the ground. Substitute feet for inches and add it to the spacing guide number for the proper species. For example, if the average tree to be left following your thinning was an 8-inch ponderosa pine, then use the formula 8 + 7 = 15, for a spacing of 15 feet between trees as measured between tree stems. See Figure 3.

A greater number of wildlife trees can remain in Zone 3. Make sure that dead trees pose no threat to power lines or fire access roads.

While pruning generally is not necessary in Zone 3, it may be a good idea from the standpoint of personal safety to prune trees along trails and fire access roads. Or, if you prefer the aesthetics of a well-manicured forest, you might prune the entire area. In any case, pruning helps reduce ladder fuels within the tree stand, thus enhancing wildfire safety. Mowing is not necessary in Zone 3.

Any approved method of slash treatment is acceptable for this zone, including piling and burning, chipping or lop-and-scatter.

Maintaining Your Defensible Space

Your home is located in a forest that is dynamic, always changing. Trees and shrubs continue to grow, plants die or are damaged, new plants begin to grow, and plants drop their leaves and needles. Like other parts of your home, defensible space requires maintenance. Use the following checklist each year to determine if additional work or maintenance is necessary.

Defensible Space and FireWise Annual Checklist

- Trees and shrubs are properly thinned and pruned within the defensible space. Slash from the thinning is disposed of.
- Roof and gutters are clear of debris.
- Branches overhanging the roof and chimney are removed.
- Chimney screens are in place and in good condition.
- Grass and weeds are mowed to a low height.
- An outdoor water supply is available, complete with a hose and nozzle that can reach all parts of the house.
- Fire extinguishers are checked and in working condition.
- The driveway is wide enough. The clearance of trees and branches is adequate for fire and emergency equipment. (Check with your local fire department.)
- Road signs and your name and house number are posted and easily visible.
- There is an easily accessible tool storage area with rakes, hoes, axes and shovels for use in case of fire.
- You have practiced family fire drills and your fire evacuation plan.
- Your escape routes, meeting points and other details are known and understood by all family members.
- Attic, roof, eaves and foundation vents are screened and in good condition. Stilt foundations and decks are enclosed, screened or walled up.
- Trash and debris accumulations are removed from the defensible space.
- A checklist for fire safety needs inside the home also has been completed. This is available from your local fire department.

APPENDIX B

Forestry Inspection Checklist



Highlands at Breckenridge Forestry Inspection Checklist

Lot #_____

	Y	N			
1. House	☐	☐			
2. Dead Trees	☐	☐			
3. Insects	☐	☐			_____
4. Disease	☐	☐			_____
5. Weeds	☐	☐			_____
6. Hzd Tree	☐	☐			_____
	1	2	3		
7. *Wildfire Risk	☐	☐	☐		_____
8. **Structure	☐	☐	☐		_____
9. ***Density	☐	☐	☐		_____
10. Down Fuels	☐	☐	☐		_____

11. Recommendations:_____
_____
_____

Check List Users Guide

The check list was a tool to insure that the most important characteristics of the lot were inspected and evaluated consistently. The tool was used in the field to collect notes and note presence or provide a format to give a rating. The following is a guide to reading the checklist. Specific prescriptions are provided in the next section.

Item	Yes or No questions
1	Is a house present on the lot
2	Are dead trees present on the lot
3	Are insects present if so what insect
4	Are signs of living or non living (environmental) disease present on the lot.
5	Are noxious or invasive weeds as identified in the Summit County Weed List present. If so which weeds
6	Are Hazard trees present . Hazard trees are defined as trees with obvious defects (those that can be identified at the walk through level of our inspection) and are within striking distance of the house or other gathering area. Trees with internal defects, small cracks or other less obvious defects were not noted.

Item	Ratings
7	The wildfire risk is rated in Zones. Each property has 2 or 3 ratings. The first number is for zone 1, second zone 2 and the third is for zone 3. A score of 1 indicates a low risk and well managed defensible space A core of 2 indicates some minor work should be performed such as brush removal, thinning or pruning A score of 3 indicates the area is non-compliant and steps should be taken to improve the defensible space both for the protection of the house in case of a wildfire and the neighborhood in the case of a house fire.
8	Stand structure indicates the number of crown “layers in a group of trees. A rating of 1 indicates one primary crown layer. This is typical structure of our aging lodgepole pine stands where all of the trees are the same height. A rating of 2 is an indicator of two levels of tree heights. Most common in the Highlands is an established overstory with clumps of seedlings growing in areas cleared due to trees killed by the mountain pine beetle. A rating of 3 is a stand with an established overstory, groups of seedlings and y”mid-story” trees that are usually 15 to 30 feet tall and younger than the overstory

9	Density is a visual rating of trees per acre. 1 is a thin, open park-like stand of trees some of these are natural but most 1 ratings are where heavy tree removal for mountain pine beetle took place.
	2 is areas that are moderately dense. 3 is areas that where the tree population is very dense. Often thimes the trees are small diameter and a person would have a difficult time walking through without having to turn their shoulders to navigate.
10	Down fuels rating is a visual rating of coarse down woody fuels. 0 is no concentrations of fuel on the property 1 is 1 0r 2 small piles 2 is 3-5 smaller piles of 1 medium pile 3 is large piles or several medium or small piles

APPENDIX C

2012 Highlands @ Breckenridge Forest Health Survey
Lot Inspections
Prescription Codes

If your lot number is not present that means your lot had no problems significant enough to warrant a prescription

Highlands @ Breckenridge lot surveys prescription codes		
Wildfire Management	WF1	**Treatments for zone 1** **May include:** prune 6-8' up from ground level to remove dead & ladder fuels, remove woodpiles, trim vegetation against house/under decks, thin understory from below, thin for defensible space
	WF2	**Treatments for zone 2** **May include:** removal/pruning of ladder fuels, thin for defensible space, thin from below, remove duff/slash, remove downed fuels
	WF3	**Treatments for zone 3** **May include:** same list as zone 2
Forest Health Management	FH1	Thin to reduce competition
	FH2	Dwarf mistletoe – remove DMT trees
	FH3	Remove hazard (living trees)
Dead Removal	DD	Removal of dead & down trees
	DS	Removal of dead, standing trees

Appendix D

Highlands @ Breckenridge Forest Health Survey

Recommended Treatment Prescriptions by Lot

- Please note that these are only recommended treatments, consult with a land care professional prior to treatments to discuss a treatment plan.

lot #	Prescription	Comments
1	DD	Remove down slash and logs
3	FH1	thin as necessary to control understory & DMT
4	WF1	prune, remove from below to elevate crowns
5	FH2	Remove DMT trees
5	WF2	remove 6-8 trees in back to thin for DF
6	FH2	remove trees in back with heavy dwarf mistletoe
6	FH2	remove apps 10 trees with late stage DMT around house
6	WF2	remove for defensible space
8	FH1	remove older trees with less than 10" diameter to reduce competition
8	FH2	Remove trees with late stage DMT infestation Apps 40 trees.
9	DS	remove 2 dead trees
9	FH1	thin to reduce competition
10	FH 1	thin to reduce competition
11	DS	remove 2 dead trees and 1 broken tree
11	DS	remove 1 dead tree
11	FH2	remove apps 20 trees with heavy DMT infection
11	FH3	remove 1 tree with heaving soil
12	DS	remove 5 dead trees above flume
12	FH2	remove apprx 25 trees with heavy DMT
13	DS	remove 1 dead tree
14	DS	Remove 6 dead trees
14	FH1	remove approximately 20 trees that are overtopped, and crown ratios less than 20%
14	FH1	remove approximately 20 trees that are overtopped, and crown ratios less than 20%
14	FH2	remove approximately 15 trees heavily infected with DMT throughout lot
14	FH2	remove 6 trees weakened and bent by weather.
15	FH1	Remove approximately 15 small overtopped trees to reduce competition
15	FH3	remove 1 tree with soil cracking
16	DD	remove 1 dead
16	DS	remove 1 dead
16	WF1	light thin to remove poor competitors
18	WF1	remove a few trees from zone 1
19	WF2	create crown spacing in zone 2

20	DS	Remove 1 dead tree, soil heaving
22	WF1	raise crown on lodge pole pine to 8 feet
23	WF1	Raise crown to 8 feet on lodge pole pine trees taller than 20 feet
24	WF1	Thin trees by removing the small, overtopped lodge pole pine trees to increase the availability of water and nutrients for the better competitors. Remove approximately 35 trees
25	DD	remove 1 downed dead tree
25	DS	remove 1 dead standing tree
25	FH1	Thin "understory" by removing poor formed, overtopped lodge pole pine trees apps 40 trees
26	FH1	Thin stand removing approximately 30 small diameter Lpp to reduce competition
27	DD	Remove 4 dead or down trees
28	FH2	thin to reduce competition and provide crown separation approximately 20-30 trees.
29	FH1	thin to reduce competition and separate crowns apps 20-30 trees
30	WF3	remove dead fuels and downed
31	WF1	keep transplant spruce pruned from logs on se corner garage
31	WF1	install rock drip - keep weeded
31	WF1	prune dead limbs and up 6-8'
31	WF1	remove deep duff layers and woodpiles under decks
31	WF2	thin understory
33	WF1	prune shrubs away from house
34	FH1	thin understory
35	FH1	thin understory
35	WF!	remove/prune shrubs on N/S for ground fuel reduction
35	WF1	prune dead limbs and 6-8' up
35	WF1	prune shrub from under deck
36	WF1	prune dead limbs and 6-8' up
37	DD	Remove 1 dead tree
37	WF1	Remove approximately 35 small diameter and overtopped trees to reduce competition.
37	WF1	Prune dead branches to a height of 6-10 feet
40	WF1	prune dead branches to a height of 6-8 feet.
41	DD	remove 2 recent blow overs. 2 small bent trees
42	FH1	thin some smaller trees out to reduce competition
43	FH1	Remove overtop trees with narrow crowns
43	FH1	thin smaller overtop lodgepole pine
45	FH1	Thin & prune dead aspen and those infested with Cytospora
45	WF1	prune dead branches 6-8 feet
45	WF2	Remove juniper clumps under lodgepole pine
46	FH1	remove small suppressed trees in back
46	WF1	Remove dead branches to a 6-8 foot height
46	WF1	install rock drip edge to keep long grasses, weeds away from house
46	WF2	thin and remove juniper from base of Lodgepole pine to reduce ladder fuels
47	FH1	Remove 20 small, overtopped lodgole
48	FH1	thin appx 45 trees on east side to reduce competition
50	DD	remove downed fuels
50	WF1	remove weeds from under decks
51	WF1	remove small fuels/understory
51	WF1	remove smaller trees (fuels)

51	WF2	Remove smaller trees (fuel)
52	WF2	thin from below to reduce fuels
53	DD	remove slash pile
53	DS	remove 3 dead trees
53	WF1	prune 6-8' up from ground level
53	WF2	thin to reduce competition andwildfire in zone 2 crown spacing, keep buffer
54	DD	remove downed fuels 3
54	FH 1	thin small overtopped trees to reduce competition appx 25
54	WF1	clean out flammables under deck
55	FH1	thin overtopped trees to reduce competition, appx 30 trees
58	WF1	raise crowns to 6-8 feet
61	DD	renove downed fuels
62	DD	clean up down trees in back of lot
63	DD	clean up slash pile
64	WF1	prune to elevate crowns
64	WF2	thin to remove understory on southside
66	DD	clean up broken trees
68	WF2	thin appx 10 trees to improve crown spacing
69	WF1	Prune trees removing dead wood to a height of 6 to 10 feet
70	FH1	remove appx 35 small lodgepole pine and a few spruce to reduce competition
70	WF1	prune trees removing green and dead branches to a height of 6-8 feet to reduce ladder fuels.
70	WF1	remove small trees in southeast house corner. Cut back vegetation around house. Install rock drip edge around house especially in back and under bump out windows.
71	FH1	Remove approximately 15 poor formed and stressed lodgepole
71	FH2	Remove 1 broken lpp
72	FH2	Remove approx 10 trees heavily infected with dmt
73	DS	remove dead
75	DS	remove broken tree/s
75	WF1	remove scattered woodpiles leaning against trees
75	WF1	thin from below
76	WF1	remove dead limbs and branches overhanging roofline, ladder fuels 6-8' on trees in front
76	WF1	thin from below
76	WF2	thick litter, pine needles under trees
77	WF1	prune dead limbs and 6-8' up
77	WF1	prune branches from under eaves of house
77	WF1	remove tall grasses/plants against house & weed drip line
78	WF1	remove tall grass under deck stairs
78	WF1	thin from below
79	WF1	remove Bristlecone that has grown and is too close to foundation and branches against siding
79	WF1	remove LPP seedling from under satellite dish
79	WF1	complete rock drip line
80	WF1	prune aspen limbs from touching deck
81	WF1	clean bushes and grasses and woodplie from under porch
81	WF1	trim grasses from dripline and hot tub deck
82	WF1	trim weeds and grasses away from under deck stairs
82	WF1	prune landscape trees/shrubs so they are not touching building

86	FH	spruce showing a lot of needle drop, keep an eye on condition to decide on remova;
86	WF1	prune 6-8' up and dead limbs
87	WF1	remove 2 spruce against back deck
87	WF1	remove smaller understory to prevent ladder fuels
88	DD	remove windblown downed fuel at corner
88	DD	remove 1 windblown on NW
88	WF2	remove small understory trees,thin from below
88	WF2	remove smaller understory trees that are leaning against larger trees
89	WF1	remove bristlecone that has grown next to and against garage, not enough space for growth & and is fire risk against house
89	WF1	remove weeds in rock dripline, install rock drip around entire house especially along wooden sides
89	WF1	prune all dead limbs and 6-8' up
90	WF1	remove trees already marked
90	WF1	prune all dead limbs and up 6-8'
90	WF2	clear piles of stumps, wood
91	WF2	remove downed fuel
92	WF1	remove overhanging branches from roofline (SE)
92	WF1	prune trees 6-8' up and all dead
93	FH1	remove skinny scraggly trees
94	DD	remove downed fuels throughout lot
94	DS	remove dead trees approx 5 throughout lot
94	FH1	remove very small trees
94	WF1	remove woodpile close to deck
95	FH1	thin a few very little understory trees
96	WF1	elevate crowns
97	WF1	prune trees touching deck
98	DD	Remove 1 windblown tree
98	FH2	remove 1 transplant aspen w/ heavy canker
98	WF1	prune cbs touching decks
99	DD	remove windblown
100	WF1	prune dead limbs
103	DD	remove windblown tree
105	WF1	remove weed in drip line, under eaves in garage and deck in back
106	WF1	thin from below
109	DD	clean up down dead material
109	DS	remove 4 standing dead trees
109	WF1-2	remove 20 overtopped lodge pole pine behind house
109	WF2	prune 6-8' up to elevate crowns
110	WF1	thin from below
111	FH2	remove 1 co-dominant leaner
111	WF1	all trees 6-8' from grd lvl
113	DD	remove windfallen tree
114	DD	remove windblown & downed fuels, chip slash pile
114	WF1	prune ornamentals (shrubs) touching the structure
117	DD	rem windblown tree in back by trail, scattered log piles agst trees, const lumber agst house

117	WF1	thin from below
118	WF1	thin from below
118	WF1	prune overhanging branches touching and over roofline
119	FH1	remove bent scraggly trees in n corner
119	WF1	thin from below
119	WF1	remove vegetation under decks and against house
120	DS	remove dead (1)
120	WF1	remove very thin understory trees
121	WF1	prune dead and 6-8' up from ground -all trees
121	WF1	remove weeds from under deck
121	WF1	prune dead and branches from roofline all trees 6-8' above ground
121	WF1	remove weeds from under deck
123	WF1	remove weeds under back porch
124	WF1	remove weeds/grass away from side of house in dripline
124	WF1	prune dead branches
126	WF1	prune tree w/ DMT branches away from deck (2 lg) & tree next to it so branches don't overhang roofline
126	WF1	prune dead branches from all trees
129	WF1-3	prune dead branches
130	WF1	prune branches of LPP so they are away from house
133	WF1	remove weeds in stone cobble against walls
133	WF1	prune dead & 6-8"all trees
133	WF2	remove som brush and tiny understory
134	WF1	remove 1 small dead on SW corner, east of deck
136	WF1	remove weeds from dripline next to garage and under eaves
136	WF1	prune dead
136	WF2	remove downed fuel
137	WF1	remove weeds and small aspen against back of house
137	WF2	prune dead branches
138	WF2	remove downed tree
140	FH2	remove 1 small LPP on SW corner
140	WF1	remove or at least prune 1 LPP to prevent branches overhanging deck
141	DD	continue removal of downed fuels
142	DD	remove downed fuels
142	DS	remove 2 dead transplants
142	WF1	thin understory and small trees next to house
143	FH1	remove leaners, not dead but very small
144	DD	remove slash
144	FH2	remove small leaners that are towards house or impinging on other trees
145	FH1	thin understory
145	WF1	prune 6-8'
145	WF2	remove juniper for fuel reduction

Appendix E

Highlands Filing 1-5 Owners

first names	last name	highlands street address	lot #	filing #
Ken and Lauren	Adams	215 Highlands Drive	Lot 79	Filing 3
James	Aiken	165 Highlands Drive	Lot 29	Filing 1
Mike and Sandy	Albright	153 Dyer Trail	Lot 43	Filing 2
Allen	Allweiss	567 Highlands Drive	Lot 139	Filing 5
Dave and Donna	Anglin	113 Dyer Trail	Lot 7	Filing 1
Russell	Asleson	24 Fletcher Court	Lot 121	Filing 5
Bobby	Baer	69 Rounds Road	Lot 114	Filing 4
Christopher	Banas	75 Rounds Road	Lot 117	Filing 4
Richard	Bauder	165 Dyer Trail	Lot 45	Filing 2
Mark and Nancy	Bauman	30 Rounds Road	Lot 59	Filing 2
Larry and Marilyn	Beebe	214 Highlands Drive	Lot 75	Filing 3
Jeffrey and Laurel	Bellay	222 Highlands Drive	Lot 73	Filing 3
Belinda and LaFawn Biddle	Biddle	79 Dyer Trail	Lot 5	Filing 1
Stephen and Linda	Bloom	10 Spencer Court	Lot 54	Filing 2
Jim and Laura-Leigh	Brook	5 Barney Ford Drive	Lot 90	Filing 3
Stan and Nancy	Brown	49 Rounds Road	Lot 111	Filing 4
Randy and Michelle	Brunschwig	10 Fletcher Court	Lot 136	Filing 5
Eric and Lisa	Buck	34 Fletcher Court	Lot 123	Filing 5
John and Pat	Callies	43 Rounds Road	Lot 64	Filing 2
Barbara	Campbell	83 Forest Circle	Lot 13	Filing 1
Charles	Casazar	66 Forest Circle	Lot 17	Filing 1
Robert	Chalfant	85 Rounds Road	Lot 119	Filing 4
Jeff	Chase	13 Rounds Road	Lot 39	Filing 2
Louis	Cirillo	464 Highlands Drive	Lot 143	Filing 5
Barry and Cheryl	Clairmont	35 Fletcher Court	Lot 126	Filing 5
Mike	Collins	164 Dyer Trail	Lot 47	Filing 2
Jim and Lisa Stone	Cunning	29 Fletcher Court	Lot 128	Filing 5
Stephen	David	186 Highlands Drive	Lot 30	Filing 1
Stephen	David	156 Highlands Drive	Lot 31	Filing 1
Stephen	Davis	33 Rounds Road	Lot 66	Filing 2
Marc and Julie	Demers	18 Fletcher Court	Lot 133	Filing 5
Jerome	Dolinsky	6 Rounds Road	Lot 71	Filing 2
Rainer and Nancy	Dronzek	53 Rounds Road	Lot 112	Filing 4
Robert and Gretchen	Dudney	229 Highlands Drive	Lot 83	Filing 3
Richard and Marilyn	Engle	28 Rounds Road	Lot 58	Filing 2
Miguel and Mary	Espinosa	9 Spencer Court	Lot 52	Filing 2

Mike and Margie	Flores	74 Rounds Road	Lot 101	Filing 4
Keith and Laura	Fowler	10 Rounds Road	Lot 70	Filing 2
Clifford and Fabienne	Fox	13 Barney Ford Drive	Lot 87	Filing 3
William	Fraser	244 Highlands Drive	Lot 93	Filing 3
John and Melissa	Friedery	31 Fletcher Court	Lot 127	Filing 5
Tom and Linda	Fritz	221 Highlands Drive	Lot 81	Filing 3
Gordon	Giffin	116 Dyer Trail	Lot 21	Filing 1
Sean and Kelly	Goff	70 Rounds Road	Lot 102	Filing 4
Arch and Shelley	Gothard	52 Rounds Road	Lot 107	Filing 4
Robert	Greene	17 Rounds Road	Lot 40	Filing 2
Kathleen	Griesemer	63 Dyer Trail	Lot 4	Filing 1
Douglas	Gurlea	398 Highlands Drive	Lot 144	Filing 5
Ken and Annette	Hallock	25 Dyer Trail	Lot 2	Filing 1
Kenneth	Hallock	9 Rounds Road	Lot 38	Filing 2
Wentzell	Hamner	12 Barney Ford Drive	Lot 86	Filing 3
John	Hardy	3 Barney Ford Circle	Lot 91	Filing 1
John	Hardy	1 Barney Ford Circle	Lot 92	Filing 3
John and Susie	Hayes	3 Rounds Road	Lot 37	Filing 2
John and Lisa	Hickok	225 Highlands Drive	Lot 82	Filing 4
Brian	Higgins	174 Highlands Drive	Lot 32	Filing 1
John and Lynda	Hodgson	58 Rounds Road	Lot 105	Filing 4
Thomas	Hokel	88 Forest Circle	Lot 15	Filing 1
Larry	Hollatz	72 Dyer Trail	Lot 23	Filing 1
Larry	Hollatz	185 Highlands Drive	Lot 27	Filing 1
Greg and Lyn	Hullinger	65 Forest Circle	Lot 12	Filing 1
Scott and Pam	Inglis	71 Rounds Road	Lot 116	Filing 4
Dale and Charlotte	Irwin	14 Fletcher Court	Lot 135	Filing 5
Brad and Claire	Katzung	158 Dyer Trail	Lot 48	Filing 2
Bob and Margot	Keith	209 Highlands Drive	Lot 77	Filing 3
Ron	King	8 Fletcher Court	Lot 137	Filing 5
Andrea	Kreeger	146 Dyer Trail	Lot 20	Filing 1
John and Betsy Ross	Krieg	91 Forest Circle	Lot 14	Filing 1
Dan and Kristi	Labs	29 Rounds Road	Lot 57	Filing 2
James and Lois	Lacy	62 Rounds Road	Lot 104	Filing 4
Chris and Debra	Laidlaw	78 Rounds Road	Lot 100	Filing 4
Steve and Pat	Larson	199 Highlands Drive	Lot 35	Filing 2
Carol and Wayne	Lockwood	175 Highlands Drive	Lot 28	Filing 1
Allan	Lyall	154 Dyer Trail	Lot 49	Filing 2
James and Elsielea	McAnally	14 Spencer Court	Lot 53	Filing 2
Connie	McArthur	240 Highlands Drive	Lot 94	Filing 3
John	McCarroll	97 Dyer Trail	Lot 6	Filing 1
Terence	McCarthy	282 Highlands Drive	Lot 145	Filing 5
Robert and Jennifer	McIntosh	161 Dyer Trail	Lot 41	Filing 2
Jim	McShane	82 Forest Circle	Lot 16	Filing 1
Bill and Lisa	Middlebrook	44 Rounds Road	Lot 63	Filing 2

Barbara	Miller	11 Dyer Trail	Lot 1	Filing 1
Bob and Bonnie	Miller	56 Rounds Road	Lot 106	Filing 4
Morris and Doris	Molinero	16 Rounds Road	Lot 68	Filing 2
Forrest and Judy	Murphey	8 Spencer Court	Lot 55	Filing 2
Tom and Elizabeth	Nethery	207 Highlands Drive	Lot 33	Filing 2
William	Oliver	21 Fletcher Court	Lot 131	Filing 5
William	Oliver	19 Fletcher Court	Lot 132	Filing 5
Bill and Donna	Oliver	211 Highlands Drive	Lot 78	Filing 3
Jon	Olson	43 Dyer Trail	Lot 3	Filing 1
Jorge	Oria	12 Rounds Road	Lot 69	Filing 2
Rick and Pam	Oshlo	48 Rounds Road	Lot 108	Filing 4
Jim	Osick	4 Spencer Court	Lot 56	Filing 2
Richard and Teresa	Pannomarew	20 Rounds Road	Lot 67	Filing 2
John	Pattenden	48 Forest Circle	Lot 18	Filing 1
Ty and Kim	Pennington	129 Dyer Trail	Lot 8	Filing 1
John and Claire	Peppercorn	86 Rounds Road	Lot 98	Filing 4
Dee	Perry	38 Dyer Trail	Lot 25	Filing 1
Terry	Perucca	605 Highlands Drive	Lot 140	Filing 5
Gene	Pflum	26 Forest Circle	Lot 19	Filing 1
Dennis	Phelps	16 Dyer Trail	Lot 26	Filing 1
Mark and Carole	Piotrowski	40 Rounds Road	Lot 62	Filing 2
Jeff and Ann	Pontius	38 Fletcher Court	Lot 124	Filing 5
Larry	Pozner	492 Highlands Drive	Lot 142	Filing 5
Dirk and Leslie	Raemdonck	90 Rounds Road	Lot 97	Filing 4
David	Reid	92 Dyer Trail	Lot 22	Filing 1
Bill and Zelma	Reid	54 Dyer Trail	Lot 24	Filing 1
Gary and Gail	Renick	33 Forest Circle	Lot 10	Filing 1
Eric and Megan	Riordan	16 Fletcher Court	Lot 134	Filing 5
Amber	Robinson	15 Forest Circle	Lot 9	Filing 1
Dale and Cindy	Rufenacht	540 Highlands Drive	Lot 141	Filing 5
Jeff and Pam	Rush	93 Rounds Road	Lot 120	Filing 4
Hal	Schroeder	46 Rounds Road	Lot 109	Filing 4
Bill and Donna	Shaner	217 Highlands Drive	Lot 80	Filing 3
Taha	Shawar	25 Fletcher Court	Lot 129	Filing 5
Mark	Speese	57 Rounds Road	Lot 113	Filing 4
Bruce and Judy	Spinney	2 Rounds Road	Lot 72	Filing 3
James	Stivers	37 Rounds Road	Lot 65	Filing 2
David	Suchomski	23 Fletcher Court	Lot 130	Filing 5
Breckinridge	Thomas	7 Spencer Court	Lot 51	Filing 2
Randall and Kathy	Thompson	157 Dyer Trail	Lot 44	Filing 2
Doug and Denise	Thornton	159 Dyer Trail	Lot 42	Filing 2
David and Loren	Treadwell	150 Dyer Trail	Lot 50	Filing 2
Jim and Marty	Trisler	218 Highlands Drive	Lot 74	Filing 3
Russ and Janey	Trowbridge	94 Rounds Road	Lot 96	Filing 4
Karin	Tucker	82 Rounds Road	Lot 99	Filing 4
Harold	Turtletaub	531 Highlands Drive	Lot 138	Filing 5
Craig and Andrea	Ulrich	238 Highlands Drive	Lot 95	Filing 4

	Vanm LLLP	37 Fletcher Court	Lot 125	Filing 5
Bill and Donna	Wehner	210 Highlands Drive	Lot 76	Filing 3
Michael and Ruby	Wendling	203 Highlands Drive	Lot 34	Filing 2
Kerry and Alice	Williams	36 Rounds Road	Lot 61	Filing 2
Frank	Willis	7 Barney Ford	Lot 89	Filing 2
Darin and Michele	Winn	67 Rounds Road	Lot 115	Filing 4
Butch	Winslow	79 Rounds Road	Lot 118	Filing 4
Mark and Jill	Wood	191 Highlands Drive	Lot 36	Filing 2
Sierra Building & Design		66 Rounds Road	Lot 103	Filing 4
Sonrise Cabin LLC		47 Forest Circle	Lot 11	Filing 1
DC Alpine LLC		45 Rounds Road	Lot 110	Filing
Crystal Creek		26 Fletcher Court	Lot 122	Filing 5
Bravosure LLC		15 Rounds Road	Lot 46	Filing 2
Rising Sons Land and Cattle		32 Rounds Road	Lot 60	Filing 2
Sierra Building & Design		4 Barney Ford	Lot 84	Filing 3
Cheyenne Creek Land Co		10 Barney Ford	Lot 85	Filing 3
V & H Development		11 Barney Ford	Lot 88	Filing 3