Heartwood Ranch
Community Wildfire Protection Plan
March 2012

Prepared for:
Heartwood Ranch
Homeowners Association
Bayfield, Colorado 81122
and
Upper Pine River Fire Protection District

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Community Wildfire Protection Plan: Heartwood Ranch

Approval

The Durango District of the **Colorado State Forest Service** has reviewed this Community Wildfire Protection Plan and approves its content and certifies that it meets or exceeds CSFS Community Wildfire Protection Plan minimum standards.

D. Kent Grant, District Forester — Date 4/16/12

The following entities have received a copy of this Community Wildfire Protection Plan and agree with and support its content and recommendations.

Heartwood Land Stewardship Team — Date 3/8/12

Upper Pine River Fire Protection District — Date 3/12/12

La Plata County Office of Emergency Management — Date April 9 2012

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1. INTRODUCTION

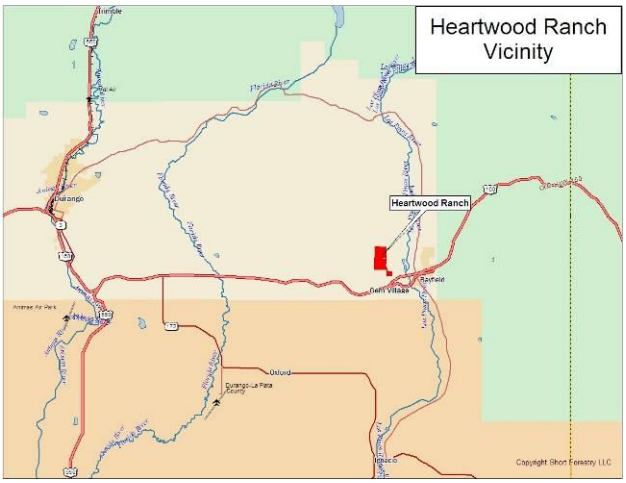
Community Wildfire Protection Plans are authorized by the Healthy Forests Restoration Act (HFRA) of 2003. HFRA places renewed emphasis on local community wildfire protection and response planning by extending a variety of benefits to communities with a wildfire protection plan in place. Among the benefits are the abilities to participate in establishment of fuels treatment priorities for both federal and non-federal lands surrounding communities, establishment of a local definition and boundary for the Wildland-Urban Interface (WUI), and enhanced opportunities for cost-sharing of community-based fuels treatments.

The Heartwood Ranch Homeowners Association has recognized that the subdivision is at risk from wildfires moving into or originating within the subdivision. A local effort to educate homeowners and develop defensible space has been underway for several years in conjunction with the Upper Pine River Fire Protection District (UPRFPD). Development of a Community Wildfire Protection Plan (CWPP) for Heartwood Ranch is the next step in that effort.

2. BACKGROUND

A. Location

This CWPP covers the Heartwood Ranch subdivision and its defined WUI. Heartwood Ranch is located in La Plata County in southwest Colorado, approximately 1.5 miles west of Bayfield on the north side of US Highway 160 (Vicinity Map). Elevation of the residential cluster in the subdivision is approximately 7100 feet.



B. Community

Heartwood Ranch is a 200 acre subdivision with 24 residences set up in a concentrated co-housing area. The co-housing area covers only 13 acres, leaving 187 open space acres in communal ownership under the Heartwood Ranch Homeowners Association. The residences are a combination of single-family and duplex structures with stucco exteriors and metal roofs. Most have wood decks and porches. The area also contains a community building, carports for the housing units, storage sheds and two workshops for the residents. The carports,

Heartwood Ranch Co-Housing Area

sheds and workshops are frame construction with wood siding. Access to the residences is by graveled pathways. Vehicles are restricted to roads and parking areas on the outside edges of the co-housing area.

Another 157 ace tract adjoining Heartwood Ranch is owned by Bruce and Sandra Thomson, residents of Heartwood. Their tract is managed as a part of the communal open space and is included in this CWPP. The Thomson tract includes two natural gas well pads, a buried gas pipeline servicing the well pads and a portable sawmill site used by the Heartwood residents.

The water supply for the subdivision is supplied by wells. The water is pumped into a 30,000 gallon tank northwest of the co-housing area along the north boundary of the subdivision. The tank is accessed by a single-lane graveled road. The subdivision also has 3.4 shares of water from the Thomson-Epperson Ditch. There are two fire hydrants located in the co-housing area.

Public access to the subdivision is via County Road 506, 0.25 miles west from its intersection with US Highway 160. Heartwood Lane leading from CR 506 to the co-housing area is a 0.85 mile 30 foot-wide graveled road. Heartwood Lane continues north and west into the Thomson tract where it accesses the two natural gas well pads and the sawmill site.

Heartwood Ranch is located in a piñon/juniper /montane shrub woodland vegetation type, transitioning to a ponderosa pine/Gambel oak type associated with moister drainages to the west side of the subdivision. A characteristic of the subdivision is the retention of the native trees and shrubs during construction of the residences. The overall context is rural. Most homes have small irrigated yard areas. Native grasses and forbs are the common ground cover up to homes.

There is a 1.1 acre permanent pond in the subdivision, located in the extreme southern part of the communal property. The Thomson-Epperson Ditch crosses the subdivision property in two areas for a total length of approximately 3800 feet.

The wildlife present in the area includes all the species expected in the lower montane areas of the central Rocky Mountains. Mule deer (*Odocoileus*

hemionus), elk (*Cervus elaphus*), black bear (*Ursus americanus*), cougar (*Felis concolor*), coyote (*Canis latrans*), porcupine (*Erethizon dorsatum*), skunk (*Spilogale spp*), and piñon mouse (*Peromyscus truei*) are some of the mammalian species. Merriam's turkey (*Meleagris gallopavo merriami*), common raven (*Corvus corax*), golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), horned owl (*Bubo virginianus*), mountain and western bluebirds (*Sialia currucoides* and *S. Mexicana*), piñon jay (*Gymnorhinus cyanocephalus*), downy woodpecker (*Picoides pubescens*), white-breasted nuthatch (*Sitta carolinensis*), juniper titmouse (*Baeolophus ridgwayi*), and mountain chickadee (*Parus Gambeli*) are some of the avian species. No US Fish and Wildlife Service listed "Threatened" or "Endangered" species are known to inhabit the subdivision area.

Slopes ranges from essentially level (0-5%) along ridge tops to approximately 40% on side slopes. Average gradient from south to north is +3%. Slope shapes are convex. Aspect is generally southeast.

Annual precipitation for the area is approximately 15 inches, with the majority falling as snow from October through March. May and June are relatively dry, with a summer "monsoon" in July and August. Early monsoonal storms are often characterized by dry thunderstorms with lightning and strong, variable outflow winds. The largest wildfires in the past 20 years in La Plata County have occurred from early June into early August.

C. Local Fire History

No wildfires have occurred in the subdivision since its inception. However, large wildfires have occurred in La Plata County in similar fuel types over the past twenty years. Examples include the Black Ridge Fire (1994) that burned over 10,000 acres approximately 15 miles southwest of the subdivision; the Missionary Ridge Fire (2002) that burned 73,000 acres of ponderosa pine, aspen, spruce and mixed conifer and 56 homes 8 miles north of the subdivision; the Valley Fire (2002) that burned 400 acres of ponderosa pine, Gambel oak and mixed conifer along with 27 homes 16 miles northwest of Heartwood; and the Sambrito 2 Fire (2011) that burned 500 acres of ponderosa pine and piñon/juniper 15 miles southeast of Heartwood.

D. Recent Wildfire Preparedness Activities

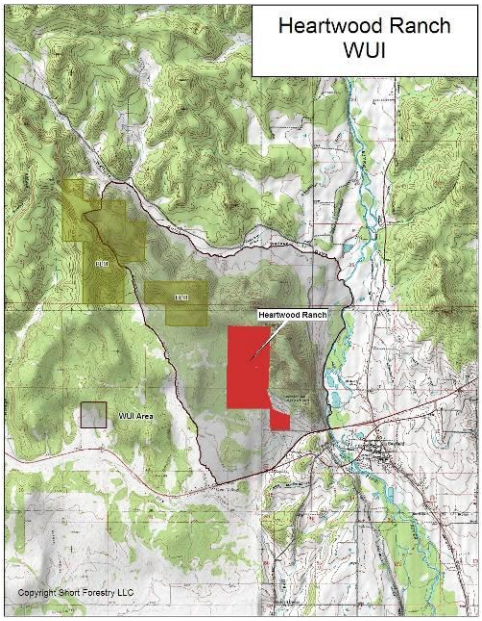
1. Included FireWise educational presentations and information at community meetings.

2. Reduced fuels by thinning and pruning south and west of the co-housing area in conjunction with the UPRFPD.

3. Two members of the community are FireWise Ambassadors for the subdivision.

3. PLAN AREA

A. Boundaries



The CWPP covering the WUI area was developed collaboratively with the Heartwood Ranch HOA, subdivision residents, the Colorado State Forest Service, La Plata County Office of Emergency Management, Upper Pine River Fire Protection District, FireWise of Southwest Colorado, the San Juan National Forest and the Bureau of Land Management. The WUI area is based on the area centered on the subdivision likely to burn in high fire danger conditions during a single burning period if pushed by 20 mph winds. The WUI boundaries are from the intersection of US Highway 160 and the Los Pinos River north to the confluence of Wallace Gulch, west up Wallace Gulch to just southwest of the intersection of County Roads 502 and 504, southwest to the top of Hartman Gulch, southeast along Hartman Gulch to its intersection with US Highway 160 in Gem Village and then east along Highway 160 to the Los Pinos River. Total WUI area is 3,730 acres and is shown on the **WUI Map** above and in Appendix A. Private land in the WUI covers 3,305 acres. The remaining 425 acres are public lands, all under Bureau of Land Management stewardship.

B. Private Land Characteristics

The 3,305 acres of private land within the WUI boundary includes the 357-acre Heartwood Ranch and over 100 parcels outside the subdivision. Parcel sizes range from approximately 0.1 acre to over 500 acres. Many of the private parcels outside Heartwood Ranch have residences or other structures on them and include commercial businesses in Gem Village. Land uses are generally residential, agricultural (pasture and hay production) and non-industrial business.

The vegetation is dominated by piñon pine (*Pinus edulis*) and one-seed juniper (*Juniperus monosperma*) woodland with ponderosa pine (*Pinus ponderosa*) in the moister drainages. Scattered narrowleaf and Fremont cottonwoods (*Populus augustifolia* and *P. deltoids ssp. deltoids* respectively) are found along intermittent drainages and the Los Pinos River bottom. The woodland understory is a combination of montane shrubs, grasses and forbs. Montane shrubs include Gambel oak (*Quercus Gambelii*), big and fringed sagebrush (*Artemsia tridentatum and A. frigida*), mountain mahogany (*Cercocarpus intricatus*) and serviceberry (*Amelanchier spp.*). Understory grasses include blue gramma, (*Bouteloua* gracilis) and indian ricegrass (*Orezopsis hymenoides*). The introduced annual cheatgrass (*Bromus tectorum*) is present in areas where the soil has been disturbed. Forbs include tansy aster (*Machaerathanthera grindilioides*), desert buckwheat (*Eriogonum* ovalifolium), lupine (*Lupinus spp.*) and yucca (*Yucca spp.*). The larger drainages often are dominated by grasses like western wheatgrass (*Agropyron smithii*) in addition to blue gramma and Indian ricegrass.

The vegetation cover types in the subdivision can be summarized in four community groups plus developed and water areas. Cover types are shown in the following table..

Cover Type	Area	Area Percent
Piñon/Juniper/Montane Shrub	218 acres	60%
Grass/Forbs	63 acres	18%
Ponderosa Pine	53 acres	15%
Sagebrush	6 acres	2%
Housing, Drill Pads, Ponds	17 acres	5%

Fuel Models associated with the cover types are discussed in Section 6: Resource Assessments and Trends. The cover types are shown on the **Heartwood Ranch Cover Type Map** in Appendix A

Private lands outside the subdivision within the WUI area have similar cover types and fuel models.

C. Public Land Characteristics

Public lands in the WUI consist of 425 acres managed by the USDI Bureau of Land Management located to the north and west of the subdivision. Vegetative cover and fuel models are similar to the private lands.

Cover includes grass and forbs, piñon pine, one-seed juniper, scattered ponderosa pine and Douglas-fir (*Psuedotsuga menziesii*), sagebrush, Gambel oak, mountain mahogany and other montane shrubs.

Approximately 87 acres of mechanical fuels mitigation treatments has occurred on BLM lands within the WUI area in Hartman Gulch to the north and west of the subdivision over the past ten years.

D. Fire Protection

Structural and wildland fire protection is provided by the Upper Pine River Fire Protection District. Both structural and wildland fire engines are resources available through the Fire Protection District. Other wildland fire resources are available through Durango Interagency Dispatch Center. Wildland fire resources include engines and crews from the US Forest Service, Bureau of Land Management, Mesa Verde National Park, Colorado State Forest Service, Bureau of Indian Affairs and the Southern Ute and Ute Mountain Ute Tribes. An air tanker base is located at Durango - La Plata Regional Airport and additional aerial wildfire support can be provided by the Mesa Verde National Park initial attack helicopter at Hesperus, the Ute Mountain Ute initial attack helicopter at Towaoc and the Colorado State Forest Service Single Engine Air Tanker at Cortez. The Counties, Federal land management agencies, Colorado State Forest Service and Fire Protection Districts in Southwest Colorado operate under a Consolidated County Annual Operating Plan (AOP) for wildfire protection.

4. PLANNING PARTNERS AND PROCESS

A. Partners

The HOA has received process and planning assistance and input from the following individuals and organizations:

Rich Graeber, Chief, Upper Pine River Fire Protection District
Kent Grant, Durango District Forester, Colorado State Forest Service
Craig Goodell, Acting Fire Management Officer, San Juan National Forest
Scott Wagner, Acting San Juan Public Lands Fuel Mitigation and Education Specialist
Pam Wilson, FireWise Council of Southwest Colorado
Butch Knowlton, La Plata County Emergency Manager
David Austin, Heartwood Ranch Land Stewardship Team member
Gail Grossman, Heartwood Ranch Land Stewardship Team member
Bruce Short, Short Forestry LLC, forest and fire management consultant

B. Process

The HOA maintains a Land Stewardship Team. Two of the Team members are FireWise Ambassadors for the subdivision as well. They attend the FireWise Council of Southwest Colorado meetings regularly and bring back FireWise information to the HOA members at the regularly scheduled meetings.

A Core Team was assembled including representatives from the Colorado State Forest Service, San Juan Public Lands Center, Upper Pine River Fire Protection District, La Plata County Office of Emergency Management, the Heartwood Land Stewardship Team, and the FireWise Council of Southwest Colorado. The Team met in September and October 2011 with Heartwood residents and developed a list of issues, concerns and potential mitigation treatments that the CWPP should address. A field trip to the subdivision by the Core Team occurred in January 2012. A final meeting to discuss the draft Plan and recommendations was held with the residents in February 2012

C. Desired Future Condition

The Desired Future Condition (DFC) for Heartwood Ranch has been developed through the collaborative CWPP process. The DFC is:

Heartwood Ranch is a desirable, rural forested community safer from catastrophic wildfire moving into or through the community. Homes are less vulnerable to wildfire by the use of fire-resistant construction methods and landscaping. Fuels within 100 feet of residences are maintained at levels which would support only low intensity surface fires, while fuels in the remainder of the landscape in the subdivision would support low to moderate intensity wildfire.

5. POLICIES

A. Federal

The Heartwood Ranch CWPP has been developed in response to the Healthy Forests Restoration Act of 2003 (HFRA). This legislation established unprecedented incentives for communities to develop comprehensive wildfire protection plans in a collaborative, inclusive process. Furthermore, this legislation directs the Departments of Interior and Agriculture to address local community priorities in fuel reduction treatments, on both federal and non-federal lands.

The HFRA emphasizes the need for federal agencies to collaborate with communities in developing hazardous fuel reduction projects and places priority on treatment areas identified by communities themselves through development of a Community Wildfire Protection Plan (CWPP). Priority areas include the wildland-urban interface (WUI), municipal watersheds, areas impacted by windthrow or insect or disease epidemics, and critical wildlife habitat that would be negatively impacted by a catastrophic wildfire. In compliance with Title 1 of the HFRA, the CWPP requires agreement among local government, local fire departments, and the state agency responsible for forest management i.e., the Colorado State Forest Service. The CWPP must also be developed in consultation with interested parties and the applicable federal agencies managing public lands surrounding the at-risk communities.

B. State

The State of Colorado is concerned about the size and intensity of wildfires occurring across the state in recent years. The State Legislature enacted House Bill 1110 in 2008, creating a five-year program running from 2009 to 2014 that allows landowners to deduct a portion of the actual costs of their wildfire mitigation from their state income tax. The program allows each landowner to get credit for fifty percent of the cost of wildfire mitigation up to a total of $2,500. To get the full credit the total mitigation costs must be $5,000 or greater. The work must be done in accord with an existing Community Wildfire Protection Plan to qualify.

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C. Consolidated County Annual Operating Plan

The Counties, Federal land management agencies, Colorado State Forest Service and Fire Protection Districts in Southwest Colorado operate under a Consolidated County Annual Operating Plan (AOP) for wildfire protection. This plan provides for mutual aid to assist with the management of wildfire incidents in southwest Colorado. The plan for mutual aid provides significantly enhanced initial and extended attack capabilities through the rapid convening of fire protection resources for managing a wildfire. The Consolidated County AOP outlines standard operating procedures and the level of participation and available resources of each party under the plan.

D. USFS and BLM Land and Resource Management Plan / Fire Management Plan

The San Juan National Forest and Tres Rios Resource Area Land and Resource Management Plans and associated Fire Management Plans describe the role of fire in the native ecosystems in southwest Colorado. These plans outline the strategies that the USFS and BLM will utilize to manage wildland fire and fuels on these federal lands in southwest Colorado. The San Juan National Forest and San Juan (now Tres Rios) Resource Area Fire Management Plan (2007) specifically describes objectives and strategies to manage fire and fuels on federal lands near communities within the wildland-urban interface.

E. La Plata County CWPP

The Heartwood Ranch CWPP tiers to the La Plata County CWPP approved in July 2006. This plan is consistent with the goals and strategies described within the La Plata County CWPP and provides further strategic and tactical direction specific to wildfire protection and mitigation for the Heartwood Ranch community.

F. Heartwood Ranch

Heartwood Ranch is a co-housing community and makes management decisions through a community decision process. The individual homeowners own and are responsible for maintaining their residences and the small yard areas immediately surrounding the residences in the co-housing area. The remainder of the subdivision is community property and is managed by community decisions under the general oversight of various Teams with specific management responsibilities. Undeveloped land management is the responsibility of the Land Stewardship Team.

Landscaping of community land is guided by a community decision from April 15, 2002. Homeowners are encouraged to plant and rejuvenate community property adjacent to their property by:

- Planting or constructing non-permanent landscaping features.
- Planting only areas that have been disturbed and not disturbing native vegetation.
- Eliminating noxious or invasive weeds.
- Maintaining drainage features.
- Ensuring access for fire vehicles on pathways.

6. RESOURCE ASSESSMENT AND TRENDS

A. Fuels and Fire Hazard

1. Cover Types

The Heartwood Ranch co-housing area is located in a mature piñon/juniper/montane shrub woodland vegetation type. Individual tree ages are up to 250 years old. Stand densities range from 0 to 140 square feet of basal area per acre due to the interspersion of tree groups, shrubby areas and small openings and average 60 square feet per acre. Montane shrubs are primarily Gambel oak, with densities up to 1300 stems per acre on the slopes. The Zone 2 area within 75 to 100 feet of the residential structures has been treated in the past 2 years by thinning the trees to 5 to 15 foot crown spacing and pruning up 4 to 6 feet. Gambel oak under the tree crowns as been cut to reduce ladder fuels. Slash has been piled and burned or removed as chips.

The ponderosa pine cover type to the west of the co-housing area is approximately 100 years old, reflecting the extensive timber harvests occurring in the lower elevations of La Plata County in the early 1900's. Stand densities range from 40 to 160 square feet of basal area per acre and average approximately 100 square feet per acre. That density is more than is desirable for good forest health. Infestation risk from mountain pine beetle (*Dendroctonus ponderosae*) increases above stand densities of 80 square feet per acre as does the risk of crown fire.

The grass/forb cover type consists largely of the agricultural pastureland in the southern portion of the subdivision tract. These lands are irrigated and are used to pasture livestock. If irrigated during the growing season the agricultural pastures act as a fuel break for wildfires.

Sagebrush occurs across the area as scattered individuals and clumps, but is only a cover type in a 6 acre area to the north of the co-housing area. It is interspersed with grasses and isolated piñon pine and juniper.

2. Fuel Models

The La Plata County CWPP (2006) shows the area of Heartwood Ranch as a "higher" level of concern on the La Plata County Fire Risk Zone Map due to the cover types and fuel loads typically present

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The major Fuel Models present across the subdivision by cover type are:

Cover Type	NFFL Model (Anderson, 1982)	Standard Fire Behavior Models (Scott and Burgan, 2005)
Piñon/Juniper/Montane Shrub	6	SH2
Grass/Forbs	1	GR1
Ponderosa Pine	9	TL8
Sagebrush	6	GS2

Brush and Piñon/Juniper (NFFL 6/Standard Fire Behavior SH2): This model includes the piñon/juniper and Gambel oak cover types. Fires carry through the shrub layer as well as the cured litter and dead woody material on the ground surface with moderate (greater than 8 miles/hour eye-level) winds. Lighter winds and openings in the canopy will drop the fire to the surface. Intensity and duration can be moderate to high. A complicating factor for this fuel model is the level of standing and down dead wood present due to past frost-kill in the oak and the piñon *Ips* outbreak in the early 2000's. Down woody fuels exceed 25 tons per acre in some locations and loads in excess of 10 tons per acre are common. Normal live and dead fuel loads in Fuel Model 6 are 6 tons per acre.

Model 6 / SH2

Short Grass (NFFL 1/ Standard Fire Behavior GR1): This model includes both native grass and agricultural pasture cover types. Fire spread is governed by the fine and continuous herbaceous

Model 1 / GR1

material that is cured or nearly so. Fire will not readily spread when relative humidity is over 25%. Fires are surface fires that move rapidly through the cured grass and associated litter. Fires can be intense if fuels are very dry but fire duration is usually short.

Closed Canopy Long-Needled Conifer (NFFL 9/Standard Fire Behavior TL8): This model is for the closed canopy ponderosa pine cover type. Fires generally carry through the surface litter and low brush with low flame lengths. Interlocking tree crowns and the presence of concentrations of fuels coupled with low fuel moisture, low humidities, high temperatures and moderate to high winds can increase spread rates and intensities and move fire into the tree crowns.

Model 9 / TL8

Sagebrush (NFFL 6/Standard Fire Behavior GS2): Fires are carried by both the grass and shrub components. Spread rate is high and flame length is moderate. Intensity can be high but duration is low.

Model 6 / GS2

3. Slash Treatment

Effective reduction of slash created by fuels mitigation is an important aspect of a fuels mitigation program. Piling and burning of slash is an effective treatment but usually requires snow cover or very moist conditions. Broadcast burning is also effective and more ecologically desirable since it can increase soil nutrients and provide good establishment conditions for desirable vegetation. However, broadcast burning requires a high level of technical expertise to accomplish.

Chipping slash is an alternative to piling and burning but it can generate large chip piles that stay for years or chip depths across the landscape which are a fire hazard in themselves in dry years.

4. Structural Vulnerability

Residential structure ignitability is generally low. Stucco is the predominant siding material for the residences. There are sheds and carports that are sided with stained wood and fences, porches and decks are of wood construction. Roofing is metal "propanel" type material. The major vulnerability issues are flammable vegetation and landscaping materials like wood chips in close proximity to the structures.

Co-housing Structures and Access

Another issue is the locations of the fire hydrants on the outside of the co-housing area, requiring extensive hose-lays to reach some of the structures. Access to the outside edges of the co-housing area is good but the interior has relatively narrow 12 foot-wide walkway access.

Access to the co-housing area via Heartwood Lane is good and will accommodate a Type 1 structural engine.

B. Values At Risk

1. Socio/Economic

The wooded ambiance of the subdivision is valued by its residents. House pets and livestock are common. Heartwood Ranch is a moderate cost subdivision close to Durango so the location is prized by its residents.

2. Ecological

The setting of Heartwood Ranch is wooded, so loss of the trees from wildfire would have a significant impact to the ambiance of the community, even if no structures were lost. No threatened or endangered species are known to inhabit the subdivision itself, but rare plants may occur within the WUI area.

Southwest Colorado is noted for its good air quality. Wildfire would negatively affect the air quality of the area during a fire.

Wildfire can adversely affect soil quality, reducing water permeability, increasing bulk density and removing organic matter. The soils in the subdivision are shale-derived with moderate erodibility and moderate fertility. Revegetation after intense surface fire can be slow in the piñon/juniper ecosystem, increasing susceptibility to erosion.

The subdivision is located in the Los Pinos River watershed. Water originating from the watershed flows into Navajo Lake and the San Juan River and then into the Colorado River. Introduction of soot and sediment due to a wildfire within the watershed could compromise water quality in Navajo Lake and the Colorado River.

Ecosystem health for the WUI is fair. Density of the ponderosa pine component, age of the piñon/juniper woodlands, the piñon ips bark beetle outbreak of the early 2000's, and suppression of small fires over the past 100 years has increased the downed woody fuels across the WUI area as well as needle and leaf litter depths. Fuels management has occurred on approximately 9 acres of the subdivision around the co-housing area in the past 2 years. The Bureau of Land Management has also conducted fuels management on 87 acres of the BLM ownership in the WUI. However, the forested stands across the WUI would generally carry a wind-driven crown fire.

C. Protection Capability

The subdivision is served by the Upper Pine River Fire Protection District. The District is staffed by both full-time staff and volunteer firefighters. There is a seasonal wildfire crew which has National Wildfire Coordinating Group (NWCG) wildland firefighting qualifications. The main fire station is located on the west side of the town of Bayfield along County Road 501 and there are several substations across the Fire Protection District. U.S. Forest Service and Bureau of Land Management fire crews and aerial wildfire support by the Mesa Verde National Park initial attack helicopter at Hesperus and the Ute Mountain Ute initial attack helicopter at Towaoc are available under the mutual aid agreement.

Wildland fires occurring on private lands are generally managed for full suppression. Wildfires on National Forest and BLM-managed public lands and Tribal lands in La Plata County are managed with policies that may involve full suppression, point suppression, confinement or containment strategies.

There are two fire hydrants in the subdivision, both located at the co-housing area. Water is provided by the 30,000 gallon domestic water storage tank owned by the subdivision and located northwest of the co-housing area. Although the fire hydrants can be used for firefighting, capacity is likely to be insufficient for extended attack on multiple structures.

Heartwood Domestic Water Tank

Evacuation of the subdivision in an emergency could be hampered by the single major access point for the subdivision. A secondary emergency access to County Road 506 is available in the south central part of the subdivision. The emergency access road has a formal easement but is not used for regular traffic flow. Evacuation actions are the responsibility of the La Plata County Sheriff's Office and the La Plata County Emergency Manager.

7. MITIGATION ACTION PLAN

A. Education and Community Outreach

The audience for the Mitigation Action Plan includes the residents of Heartwood Ranch, landowners immediately surrounding the subdivision that can benefit from mitigation activities on their properties and in the subdivision; government agencies planning complementary mitigation treatments and/or supplying grants or matching funds to perform mitigation; and emergency responders.

Outreach methods may include:

- Educational information at scheduled community meetings.
- Educational community workshops which could include subdivision residents and other community members sponsored by the FireWise Council of Southwest Colorado and/or the Upper Pine River Fire Protection District.
- FireWise Committee information mailed to all residents.
- Ensure landowners are aware of the state tax incentive for wildfire hazard mitigation (House Bill 1110).
- Periodic sponsored fuels treatment events with the residents sharing expertise and equipment.
- Awareness training on basic wildfire initial attack for interested subdivision residents

B. Policy

Authority and responsibility for managing vegetation on private property within Heartwood Ranch rests with the residents. The Land Stewardship Team has authority and responsibility for managing vegetation on the common space within the subdivision based on the community decision-making process.

C. Wildfire Mitigation Activities

1. Vegetation/Fuels Management

The tree cover surrounding the co-housing area is piñon and juniper woodland. Tree stocking is generally over-dense so recommended treatments are aimed at reducing density and removing ladder fuels to reduce the opportunity for crown fires in close proximity to the residences. The recommendations are consistent with *Creating Wildfire-Defensible Zones* (Dennis 1999a). The wildfire-defensible zones are shown on the **Heartwood Defensible Space Zones Map** in Appendix A.

Flammable trees or shrubs are discouraged within 15 feet of residences (Zone 1). If desirable trees or shrubs are in this area, dead branches, stems and leaf litter should be removed and the zone extended accordingly. Xeriscaping landscaping techniques using plants and materials with low flammability can reduce the risk of

flames adjacent to structures. Some residences are using wood chips from past vegetation management projects for landscaping material. It is recommended that chips within 5 feet of structures be replaced with gravel, rock or other non-flammable materials. Wood chips should not be used as mulch under flammable shrubs within Zone 1.

Zone 2 Treatment

The Zone 2 area within 75 to 100 feet of the co-housing area has been treated in the past 2 years by thinning the trees and pruning up 4 to 6 feet. Gambel oak under the tree crowns as been cut to reduce ladder fuels. Slash has been removed so surface fuels are low. The residents wish to maintain the existing amount of vegetative screening close to the residences for privacy and a natural-appearing ambiance. This desire can be accommodated by expanding Zone 2 to the west and north of the co-housing area and thinning to wider crown spacings in the expanded area. The expanded Zone 2 area from 100 to 150 feet to the north and west of the co-housing area shown on the **Heartwood Defensible Space Zones Map** (Appendix A) should have trees larger than 15 feet tall thinned to spacing of 15 to 25 feet between crowns. Trees selected for retention should generally have at least 50% live crowns. Branches lower than 5 feet from the ground surface should be pruned. Trees shorter than 15 feet tall should be spaced no closer than 5 feet from the edge of adjacent tree crown edges. Shrub clumps should be spaced no closer than 2 times shrub height to other clumps or trees.

The Zone 3 area farther from residences and structures should be managed to minimize tree mortality from insects and diseases and reduce the possibility of large-scale stand-replacement wildfires. Wind-driven crown fires are the primary type of stand-replacement wildfire in piñon/juniper woodlands, so thinning over-dense clumps to stand densities of 40 to 60 square feet of basal area or no more than 100 trees over 15 feet tall per acre and reducing downed woody fuels can reduce wildfire risk. Slash from thinning and fuels reduction activities should be chipped or piled for burning when snow is present or soils and vegetation are damp.

The 53 acre ponderosa pine stand should be selectively thinned in the dense clumps to 70 to 90 square feet of basal area per acre. Approximately 30% of the 6 inch diameter class and 50% of the 16 and 18 inch diameter classes should be removed on average over the stand area. 70 to 80% of the slash from thinning

should be piled and then burned when conditions permit or chipped. If chips are scattered, chip bed depths should not exceed 3 inches. All juniper trees within 10 feet of ponderosa pine tree crowns in the ponderosa pine stand should be removed in the initial thinning. Another thinning in approximately 10 years to a residual density of 60 to 70 square feet of basal area per acre is recommended and then maintaining that density over time. Prescribed burning of the stand on 10 year intervals should be considered after the second thinning to increase crown basal heights and maintain litter depths at more sustainable levels over time. The market for forest products is very depressed at the time of preparation of this plan, but historically stumpage value for sawtimber has been able to pay for the fuels treatment in stands of this kind. The recommendation is to schedule treatment of this stand for later in the plan period to allow for recovery of stumpage prices.

Typical Ponderosa Pine Treatment (Durango West 2)

Safe access to the water tank could be important during a wildfire, so development and maintenance of a shaded fuelbreak 50 feet on either side of the access road is recommended. The shaded fuelbreak prescription would be the same as and is included in the Expanded Zone 2 treatment area shown on the Recommended Treatment Areas Map in Appendix A.

An alternative escape route for the residents is in place but visibility and safety can be enhanced by development and maintenance of a shaded fuelbreak 50 feet on either side of the escape route. The treatment prescription would be the same as the expanded Zone 2, i.e., crown spacing of 15 to 25 feet between trees, tree clumps or shrub clumps and pruning of tree branches up 5 feet. Treatment area would be 5 acres and is shown on the Recommended Treatment Areas Map in Appendix A.

Probability of wildfire moving into or out of Heartwood Ranch can be reduced through implementation and maintenance of a 50 foot-wide shaded fuelbreak in the forests and woodlands along the subdivision boundary. The treatment prescription would be the same as the expanded Zone 2 and the escape route, i.e., crown spacing of 15 to 25 feet between trees, tree clumps or shrub clumps and pruning of tree branches up 5 feet. Treatment area would cover 9 acres and is shown on the Recommended Treatment Areas Map in Appendix A

Eradication of cheatgrass (*Bromus tectorum*) is recommended in Zone 1 and eradication or reduction within 30 feet of structures in Zone 2. Cheatgrass is extremely flammable when cured and spreads rapidly after disturbances like construction activity or wildfire. Control recommendations are found in the publication *Cheatgrass and Wildfire* (Davison, Smith and Beck 2007) in Appendix F.

2. Structural Vulnerability

Structure construction using unpainted rough wood products including wood shake roof shingles is discouraged since those materials are very receptive to sparks and flame. Roof materials such as metal, cement or cement-fiber shingles and tile are not receptive to sparks, flame and heat. Enclosing soffits with metal also discourages ignition of roofs and eaves. Detailed fire-resistant construction guidelines are found in *Firewise Construction, Design and Materials* (Slack 1999) in Appendix G.

Locate woodpiles and propane tanks at least 30 feet from structures. Clear flammable vegetation at least 10 feet away from woodpiles and tanks.

Enclose the underside of wood decks and porches so that embers and flames cannot get underneath them. Keep grass or weeds from growing under them.

3. Safety

The HOA should work with the La Plata County Emergency Manager to develop an Emergency Evacuation Plan for the subdivision. The plan should include wildland fire safety zone locations, standard evacuee assembly points, communication trees and management action points..

The subdivision should consider working with UPRFPD to locate one or more cisterns for fire suppression water supplies inside the residential compound to assist in structural fire protection.

Wildland fire behavior, suppression tactics and firefighter safety awareness training should be made available to interested subdivision residents who could be called on for initial attack.

Subdivision residents should be offered a general emergency situation safety awareness session annually to update emergency communication trees, evacuation routes and gathering points.

4. Specific Activity Recommendations and Priorities

The following mitigation activity and treatment recommendations are listed by priority for the Heartwood Ranch HOA, the residents and lot owners of Heartwood Ranch, Upper Pine River Fire Protection District and adjoining landowners and cooperators.

Group	Priority	Activity/Action	Estimated Cost	Activity Period
HOA	1	Continue fuels mitigation work in the 5 acre expanded Zone 2 around the co-housing cluster. The strategy is to remove ladder fuels, reduce built-up litter and thin dense clumps of trees to reduce the opportunity for crown fires.	$7500	2012
HOA	2	Provide basic initial attack wildland firefighting awareness training (similar to S110, S130, S190) to interested residents.	$500	2012
HOA	3	Develop a subdivision emergency notification and evacuation plan in consultation with Upper Pine River FPD, La Plata County Emergency Manager and the subdivision residents. The plan would include livestock care protocols, "Safety Zones" where residents could safely shelter-in-place and fire equipment staging areas.	$5000	2012/ 2013
HOA	4	Develop a shaded fuelbreak 50 feet on either side of the escape route leading from the co-housing area to the west end of CR 506.	$7500	2013
HOA	5	Develop a 50 foot-wide shaded fuelbreak along the wooded portions of the subdivision boundary	$13,500	2014
HOA	6	Work with CSFS to thin the ponderosa pine stand to maintain forest health and reduce crown fire potential	Paid by timber value	2015
HOA	7	Sponsor annual fuels "clean-up" days for the residents	$2000 annually	2012-2017
HOA	8	Assist homeowners with individual defensible space creation and fuel mitigation by providing annual information and education programs on effective mitigation techniques.	$500 annually	2012-2017
Homeowners	1	Pruning of trees and large shrubs around residences consistent with the recommendations of CSU Publication 6.302 *Creating Defensible Space* by F.C. Dennis	$500 per lot	2012-2017
Homeowners	2	Use of "FireWise" plant materials in landscaping per CSU Publication 6.305 *FireWise Plant Materials* by F. C. Dennis	Variable	2012-2017
Other Ownerships	1	Heartwood Land Stewardship Team and UPRFPD work with surrounding landowners to apply fuels mitigation treatments to their properties.	$1500 per acre	2012-2017

8. MONITORING AND EVALUATION

Monitoring and evaluation of outreach, education and mitigation efforts within the Heartwood Ranch and its WUI are an important part of the CWPP. The monitoring and evaluation actions for the CWPP are shown below along with the responsible group and when those actions should occur.

Monitoring		
Group	**Action**	**Period**
HOA	Annual Report to the Community, FireWise Council of SW Colorado , Colorado State Forest Service	Annually
CSFS	Monitoring of mitigation work status for work covered by grants	As required

Evaluation		
Group	**Action**	**Period**
HOA	Annual Report will list “Lessons Learned” from fuels mitigation projects and activities over the preceding year.	Annually
HOA	Review CWPP and measure progress by degree of accomplishment of mitigation benchmarks	Annually
HOA/CSFS	Update CWPP	No more than 5 years

9. GLOSSARY

acre: an area of land containing 43,560 square feet. A square acre would be about 209 feet by 209 feet. A circular acre would have a radius of 117.75 feet.

basal area: the cross-sectional area of a single stem, including the bark, measured at breast height (4.5 feet above the ground) For example, the basal area of a tree 13.5 inches in diameter at breast height is about 1 square foot. Basal area = 0.005454 times diameter squared. (b) of an acre of forest: the sum of basal areas of the individual trees on the area. For example, a well stocked pine stand might contain 70 to 90 square feet of basal area per acre.

canopy: the foliage formed by the crowns of trees in a stand.

defensible space: an area around a structure where fuels and vegetation are treated, cleared or reduced to slow the spread of wildfire towards the structure.

diameter at breast height (dbh): the diameter of a stem of a tree at 4 ½ feet above the ground.

downed fuels: the accumulated woody and vegetative material on the forest floor from leaf/needle fall, natural pruning and breakage that serves as fuel for wildfire.

ecosystem: A spatially explicit, relatively homogenous unit of the earth that includes all interacting organisms (plants, animals, microbes) and components of the abiotic environment within its boundaries. An ecosystem can be of any size: a log, pond, field, forest, or the earth's biosphere.

fuel loading: the oven-dry weight of fuel per unit area.

fuelbreak: A strategically located strip or block of land (of varying width) depending on fuel and terrain, in which fuel density is reduced, thus improving fire control opportunities. The stand is thinned and remaining trees are pruned to remove ladder fuels. Most brush, heavy ground fuels, snags and dead trees are removed and an open park-like appearance established.

ladder fuels: combustible material that provides vertical continuity between vegetation strata and allow fire to climb into the crowns of trees or shrubs with relative ease.

litter: the surface layer of a forest floor that is not in an advanced stage of decomposition, usually consisting of freshly fallen leaves, needles, twigs, stems, bark, and fruits.

lop and scatter: a hand method of removing the up-ward branches from tips of felled tress to keep slash low to the ground, to increase rate of decomposition, lower fire hazard, or as a pre-treatment prior to burning.

sapling: a usually young tree larger than a seedling but smaller than a pole.

silviculture: the art, science, and practice of establishing, tending, and reproducing forest stands of desired characteristics. It is based on knowledge of species characteristics and environmental requirements.

slash: the residue of treetops and branches left on the ground after logging or accumulating as a result of storms, fire, girdling or delimbing.

snag: a standing, generally unmerchantable dead tree from which the leaves and most of the branches have fallen.

stand: a contiguous group of trees sufficiently uniform in age-class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit.

thinning: a cultural treatment made to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality.

Wildland-Urban Interface: The geographical meeting point of two diverse systems - wildland and structures. In the WUI, structures and vegetation are sufficiently close so that a wildland fire could spread to structures or a structure fire could ignite vegetation.

Definitions except defensible space and Wildland-Urban Interface from *The Dictionary of Forestry*, John A. Helms, editor.

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Dennis, F.C. 1999b Fire-Resistant Landscaping. Colorado State University Cooperative Extension Resource Publication no. 6.303. 4 p.

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Slack, P. 1999. Firewise Construction, Design and Materials. Colorado State Forest Service, Ft. Collins, CO. 38 p.

APPENDICES

A. Maps

1. **Heartwood Vicinity**
2. **Heartwood WUI**
3. **Heartwood Vegetation Cover Types**
4. **Heartwood Defensible Space Zones**
5. **Heartwood Treatment Areas**

B. Creating Wildfire-Defensible Zones (CSU Extension Pub. 6.302, F. C. Dennis)

C. Fuelbreak Guidelines for Forested Subdivisions (F.C. Dennis)

D. Fire-Resistant Landscaping (CSU Extension Pub. 6.303, F. C. Dennis)

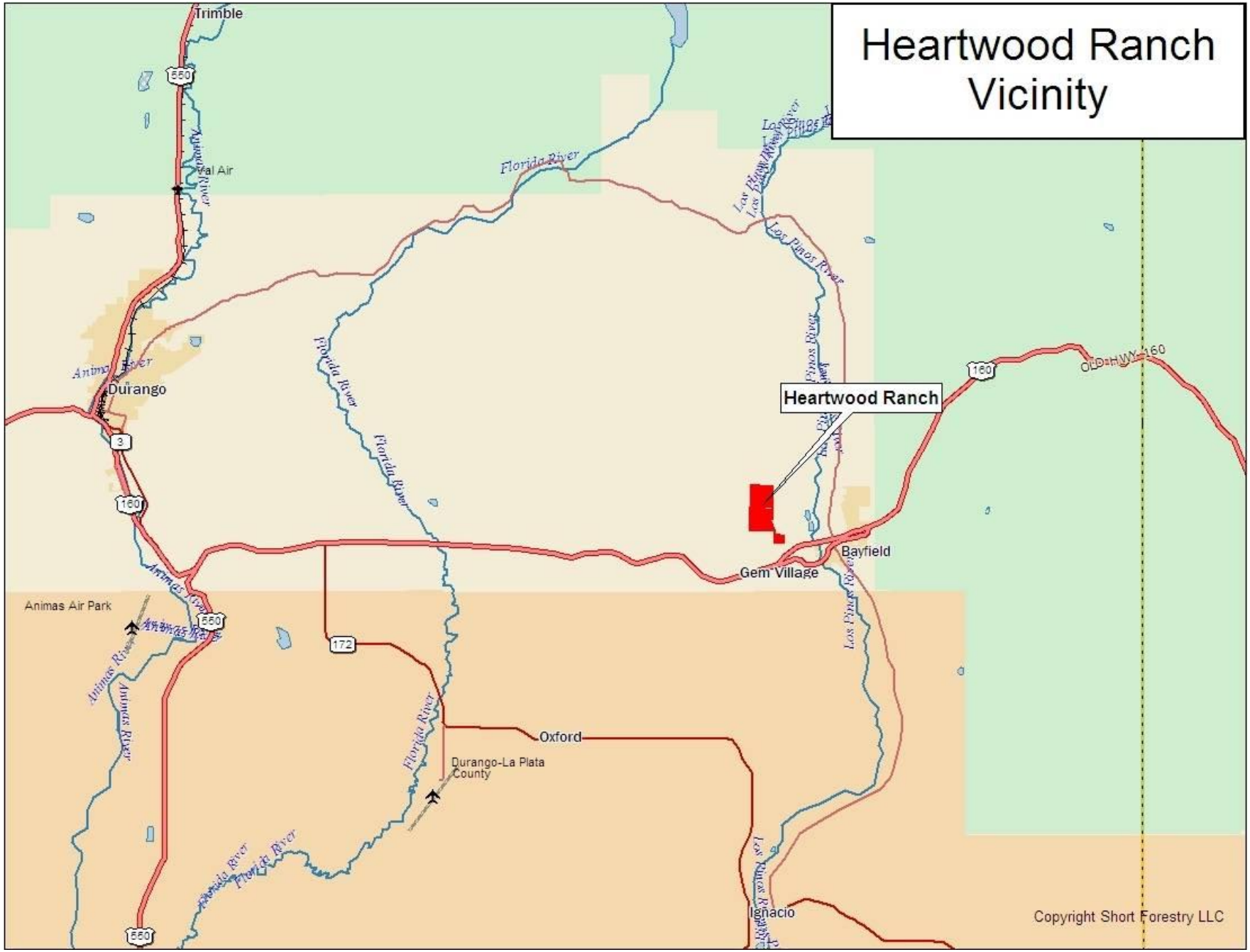
E. FireWise Plant Materials (CSU Extension Pub. 6.305, F. C. Dennis)

F. Cheatgrass and Wildfire (CSU Extension Pub 6.310, Davison, Smith and Beck)

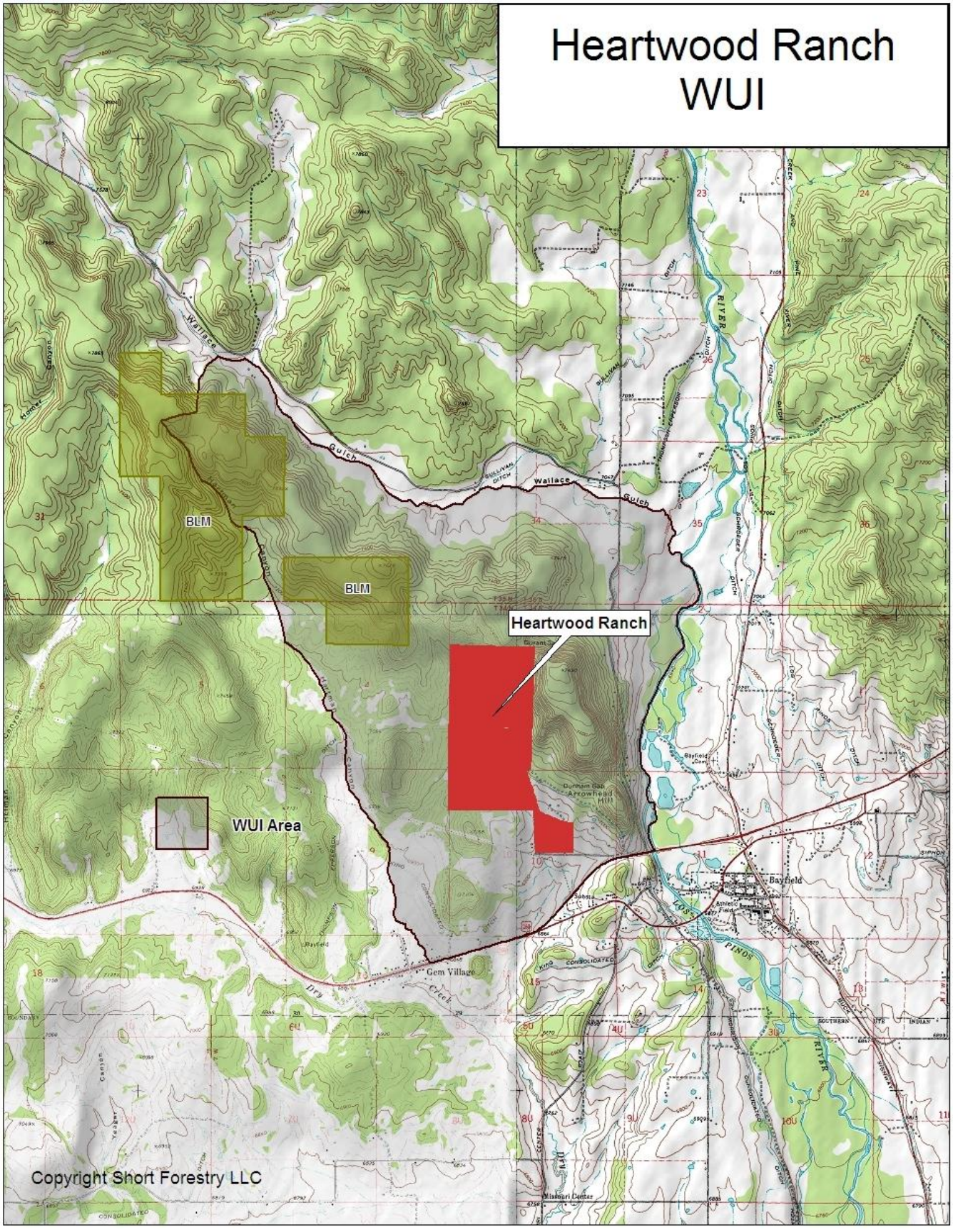
G. Firewise Construction, Design and Materials (P. Slack)

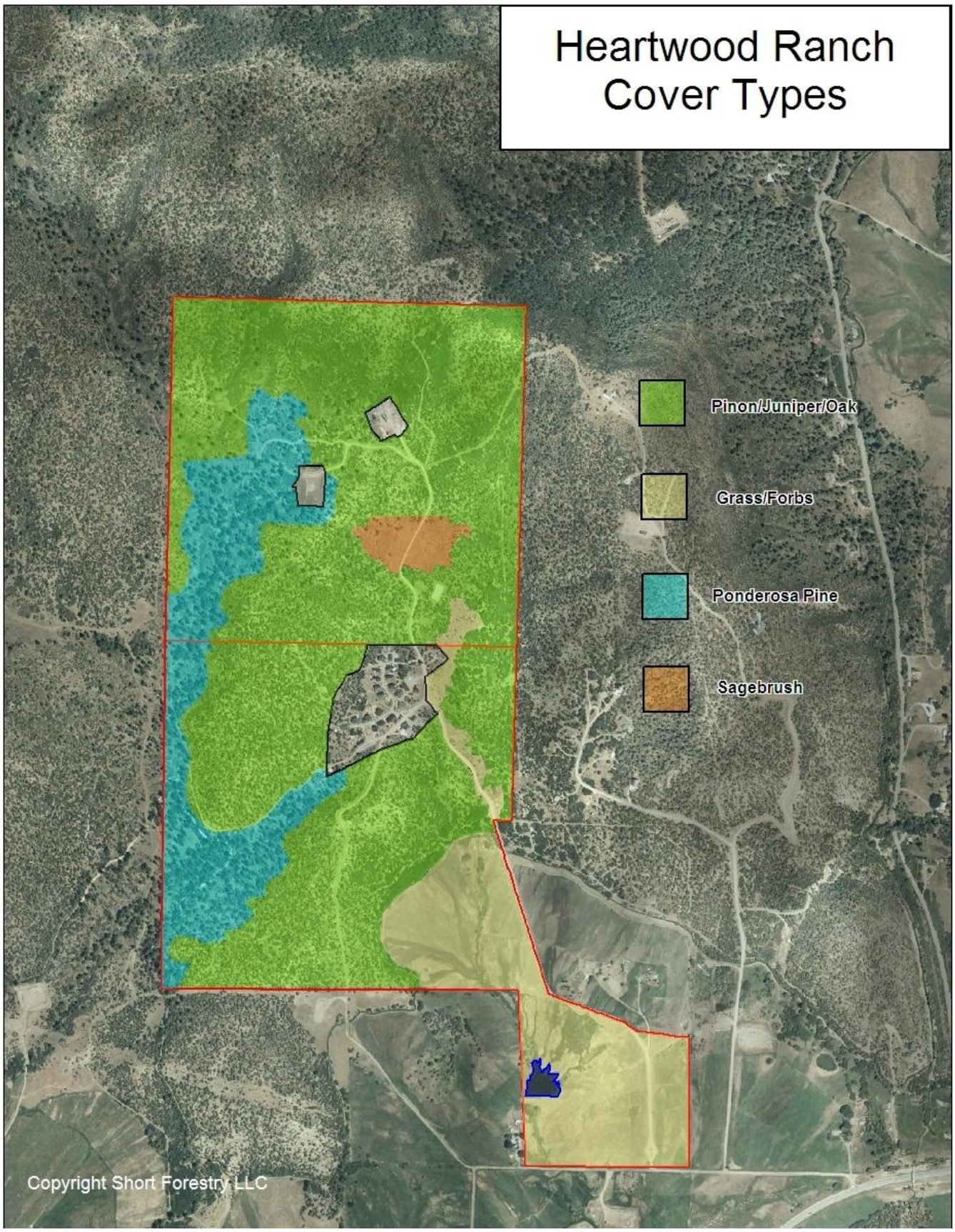
Appendix A

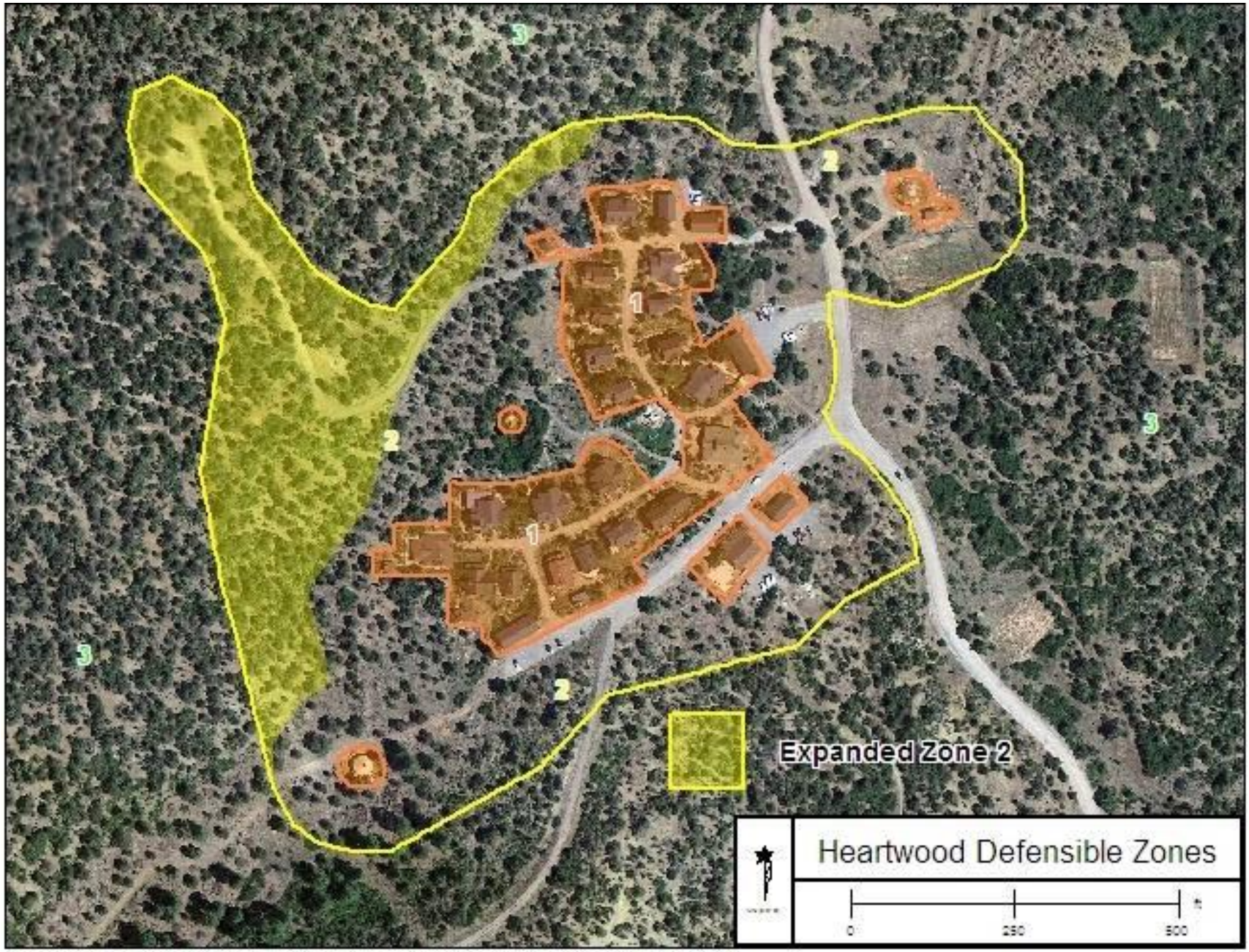
Maps


Heartwood Ranch Vicinity
Trimble
550
Val Air
Animas River
Florida River
Los Pinos River
Durango
3
160
Heartwood Ranch
OLD HWY 160
Bayfield
Gem Village
Animas Air Park
172
Oxford
Durango-La Plata County
Ignacio
Copyright Short Forestry LLC

Heartwood Ranch WUI




Heartwood Ranch
Cover Types
Pinon/Juniper/Oak
Grass/Forbs
Ponderosa Pine
Sagebrush
Copyright Short Forestry LLC


3
2
1
2
3
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2
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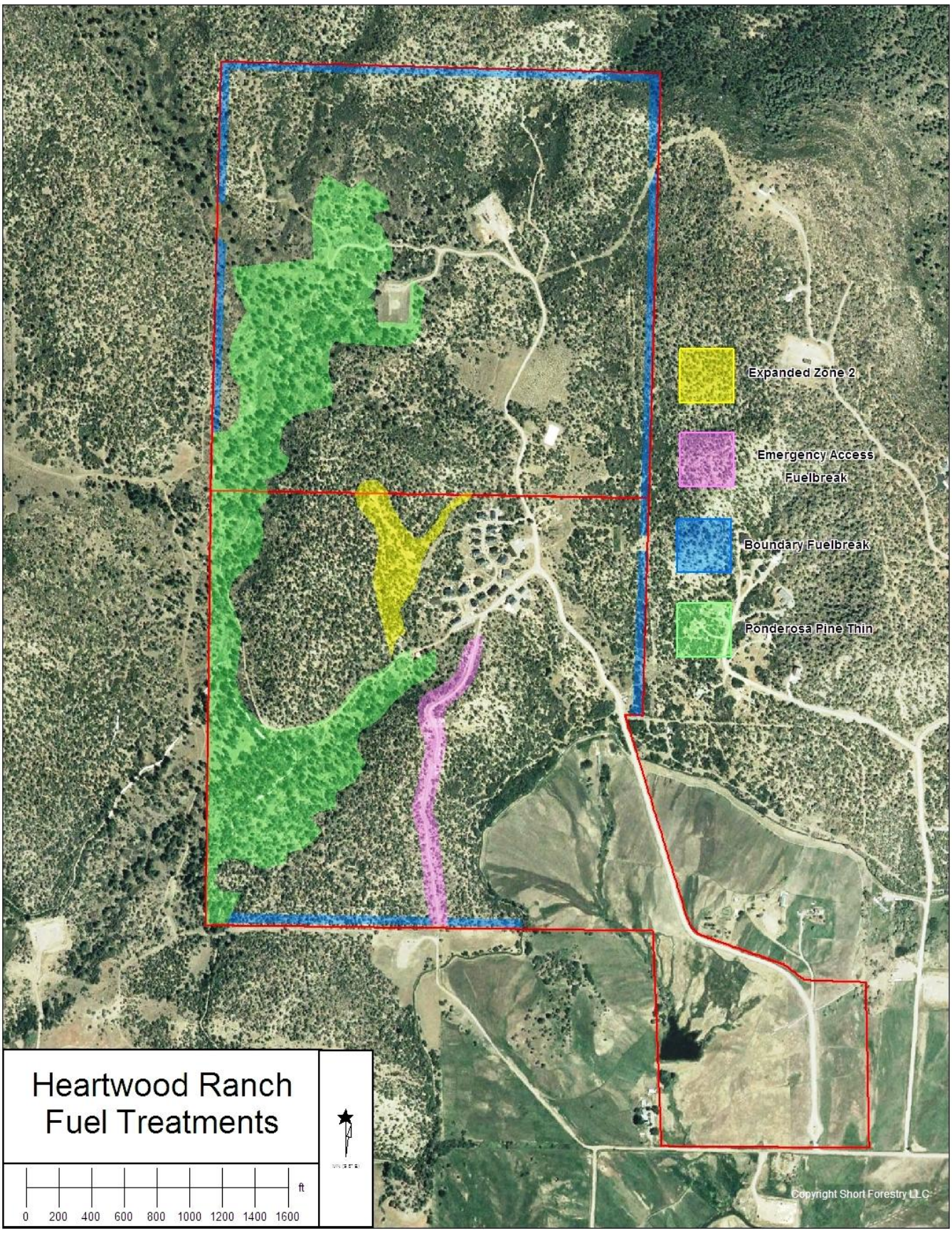
Expanded Zone 2
Heartwood Defensible Zones
0
250
500


Expanded Zone 2
Emergency Access Fuelbreak
Boundary Fuelbreak
Ponderosa Pine Thin
Heartwood Ranch
Fuel Treatments
0 200 400 600 800 1000 1200 1400 1600 ft
Copyright Short Forestry LLC

Appendix B

Creating Wildfire-Defensible Zones

FORESTRY

Creating Wildfire-Defensible Zones no. 6.302

by F.C. Dennis [1]

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 (and there are no guarantees), each will increase your home's, and possibly your family's, safety and survival during a wildfire.

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.

The measure of fuel hazard refers to its continuity, both horizontal (across the ground) and vertical (from the ground up into the vegetation crown). Fuels with a high degree of both vertical and horizontal continuity are the most hazardous, particularly when they occur on slopes. Heavier fuels (brush and trees) are more hazardous (i.e. produce a more intense fire) than light fuels such as grass.

Mitigation of wildfire hazards focuses on breaking up the continuity of horizontal and vertical fuels. Additional distance between fuels is required on slopes.

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,

Colorado State University Cooperative Extension

Putting Knowledge to Work

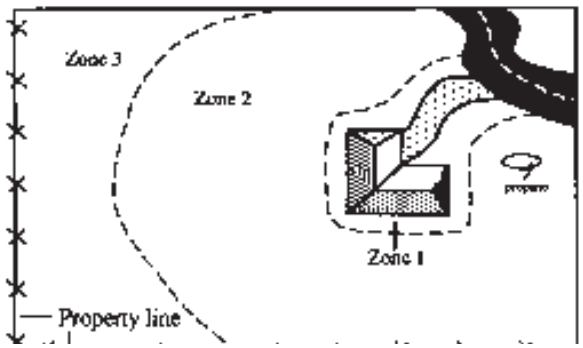


Figure 1: Forested property showing the three fire-defensible zones around a home or other structure.

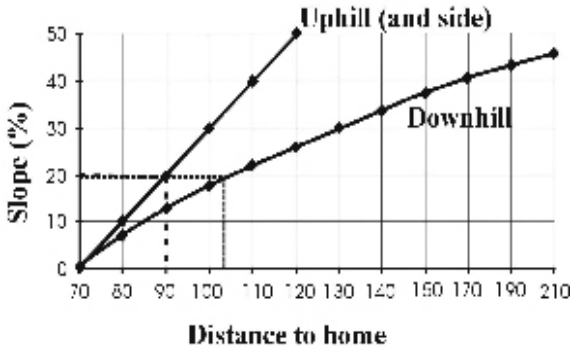


Figure 2: This chart indicates the *minimum recommended* dimensions for defensible space from the home to the outer edge of Zone 2. For example, if your home is situated on a 20 percent slope, the minimum defensible space dimensions would be 90 feet uphill and to the sides of the home and 104 feet downhill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

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. (See the Special Recommendations section of this fact sheet for shrubs, lodgepole pine, Engelmann spruce, and aspen.)

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.

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, for example, creates an attractive, easily maintained, nonflammable ground cover.

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.

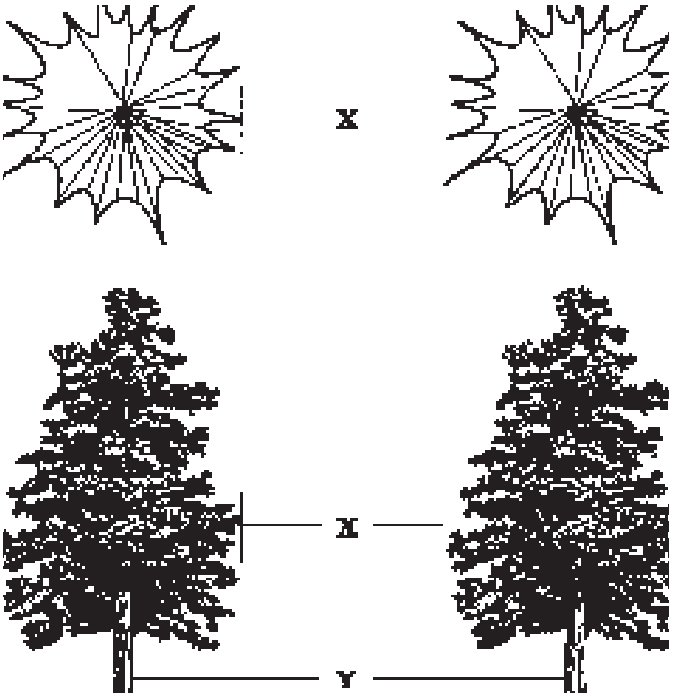
Ideally, remove all trees from Zone 1 to reduce fire hazards. If you do keep a tree, consider it part of the structure and extend the distance of the entire defensible space accordingly. Isolate the tree from any other surrounding trees. Prune it to at least 10 feet above the ground. Remove any branches that interfere with the roof or are within 10 feet of the chimney. Remove all "ladder fuels" from beneath the tree. Ladder fuels are vegetation with vertical continuity that allows fire to burn from ground level up into the branches and crowns of trees. Ladder fuels are potentially very hazardous but are easy to mitigate. No ladder fuels can be allowed under tree canopies. In all other areas, prune all branches of shrubs or trees up to a height of 10 feet above ground (or 1/2 the height, whichever is the least).

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. (See Figure 4 for *minimum recommended* spacing for trees on steep slopes.) Remove all ladder fuels from under these remaining trees. Carefully prune trees to a height of at least 10 feet.

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



Small clumps of 2 to 3 trees may be occasionally left in Zone 2. Leave more space between the crowns of these clumps and surrounding trees.

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 portions of Zone 3 adjacent to Zone 2 more heavily than the outer portions.

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. Where shrubs are the primary fuel in Zone 2, refer to the Special Recommendations section of this fact sheet.

Limit the number of dead trees (snags) retained in this area. Wildlife needs 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) 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. 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

Figure 4: Minimum tree crown and shrub clump spacing.

% slope	Tree Crown Spacing	Brush and Shrub Clump Spacing
0 -10 %	10´	2 1/2 x shrub height
11 - 20%	15´	3 x shrub height
21 - 40%	20´	4 x shrub height
> 40%	30´	6 x shrub height

Figure 5: Minimum tree spacing for Zone 3.

Tree Diameter (in inches)	Average Stem Spacing Between Trees (in feet)
3	10
4	11
5	12
6	13
7	14
8	15
9	16
10	17
11	19
12	21
13	23
14	24
15	26
16	28
17	29
18	31
19	33
20	35
21	36
22	38
23	40
24	42

of slash. Lay it 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. A gradual transition into this zone from defensible space standards to other management objectives you may have is suggested. 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 requirements will be dictated by your objectives for your land and the kinds of trees present. See Figure 5 for the *minimum* suggested spacing between "leave" trees. Forest management in Zone 3 is an opportunity for you to increase the health and growth rate of the forest in this zone. Keep in mind that root competition for available moisture limits tree growth and ultimately the health of the forest.

A high canopy forest reduces the chance of a surface fire climbing into the tops of the trees and might be a priority for you if this zone slopes steeply. The healthiest forest is one that has multiple ages, sizes, and species of trees where adequate growing room is maintained over time. Remember to consider the hazards of ladder fuels. Multiple sizes and ages of trees might increase the fire hazard from Zone 3 into Zone 2, particularly on steep slopes.

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.

Special Recommendations

Tree spacing guidelines do not apply to *mature* stands of aspen trees where the recommendations for ladder fuels have been complied with. In areas of aspen regeneration and young trees, the spacing guidelines should be followed.

Brush and shrubs

Brush and shrubs are woody plants, smaller than trees, often formed by a number of vertical or semi-upright branches arising close to the ground. Brush is smaller than shrubs and can be either woody or herbaceous vegetation.

On nearly level ground, minimum spacing recommendations between clumps of brush and/or shrubs is 2 1/2 times the height of the vegetation. Maximum diameter of clumps should be 2 times the height of the vegetation. As with tree crown spacing, all measurements are made from the edges of vegetation crowns (Figure 3).

For example: For shrubs 6 feet high, spacing between shrub clumps should be 15 feet or more apart (measured from the edges of the crowns of vegetation clumps). The diameter of shrub clumps should not exceed 12 feet (measured from the edges of the crowns). Branches should be pruned to a height of 3 feet.

Grasses

Keep dead, dry or curing grasses mowed to less than 6 inches. Defensible space size where grass is the predominant fuel can be reduced (Figure 5) when applying this practice.

Windthrow

In Colorado, certain locations and tree species, including lodgepole pine and Engelmann spruce, are especially susceptible to damage and uprooting by high winds (windthrow). If you see evidence of this problem in or near your forest, or have these tree species, consider the following adjustments to the defensible space guidelines. It is highly recommended that you contact a professional forester to help design your defensible space.

Adjustments: If your trees or homesite are susceptible to windthrow and the trees have never been thinned, use a stem spacing of diameter plus five instead of the guides listed in the Zone 3 section. Over time (every 3 to 5 years) *gradually* remove additional trees. The time between cutting cycles allows trees to "firm up" by expanding their root systems. Continue this periodic thinning until the desired spacing is reached.

Also consider leaving small clumps of trees and creating small openings on their lee side (opposite of the predominant wind direction). Again, a professional forester can help you design the best situation for your specific homesite and tree species. Remember, with species such as lodgepole pine and Engelmann spruce, the likelihood of a wildfire running through the tree tops or crowns (crowning) is closely related to the overabundance of fuels on the forest floor. Be sure to remove downed logs, branches and *excess* brush and needle buildup.

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.

Figure 6: Minimum defensible space size for grass fuels.

% slope	D-space size (uphill, downhill, sidehill)
0 - 20 %	30'
21 - 40%	50'
> 40%	70'

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. silt foundations and decks are enclosed, screened or walled up.

FIREWISE is a multi-agency program that encourages the development of defensible space and the prevention of catastrophic wildfire.

- □ 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.

References

Colorado State Forest Service, Colorado State University, Fort Collins, CO 80523-5060; (970) 491-6303:

- *FireWise Construction — Design and Materials*
- Home Fire Protection in the Wildland Urban Interface
- Wildfire Protection in the Wildland Urban Interface
- *Landowner Guide to Thinning*

Colorado State University Cooperative Extension, 115 General Services Bldg., Fort Collins, CO 80523-4061; (970) 491-6198; E-mail: resourcecenter@ucm.colostate.edu:

- 6.303, *Fire-Resistant Landscaping*
- 6.304, *Forest Home Fire Safety*
- 6.305, *FireWise Plant Materials*
- 6.306, *Grass Seed Mixes to Reduce Wildfire Hazard*
- 7.825, *Pruning Mature Shade Trees*
- 7.826, *Pruning Flowering Shrubs*
- 7.827, *Pruning Evergreens*

Colorado State Forest Service

This fact sheet was produced in cooperation with the Colorado State Forest Service.

[1]*Wildfire Hazard Mitigation Coordinator, Colorado State Forest Service.*

Appendix C

Fuelbreak Guidelines for Forested Subdivisions and Communities

Appendix D

Fire-Resistant Landscaping

FORESTRY

Fire-Resistant Landscaping no. 6.303

by F.C. Dennis[1]

Quick Facts...

More people are moving into Colorado's rural areas, increasing the chances of wildfire.

"Defensible space" is the primary determinant of a structure's ability to survive wildfire.

Native species are generally the best plant materials for landscaping in defensible space, but others can be grown successfully in Colorado.

To be a FireWise homeowner, plan well, plant well and maintain well.

Colorado Colorado State University Cooperative Extension

Putting Knowledge to Work

Colorado's population is growing, its urban areas are rapidly expanding, and people are building more homes in what was once natural forest and brushlands. Newcomers to rural areas need to know how to correctly landscape their property to reduce wildfire hazards.

Improper landscaping worries land managers and fire officials because it can greatly increase the risk of structure and property damage from wildfire. It is a question of *when*, not *if*, a wildfire will strike any particular area.

Vegetative clearance around the house (defensible space) is a primary determinant of a home's ability to survive wildfire. Defensible space is, simply, room for firefighters to do their job. If grasses, brush, trees and other common forest fuels are removed, reduced, or modified to lessen a fire's intensity and keep it away from the home, chances increase that the structure will survive. It is a little-known fact that in the absence of a defensible space, firefighters will often bypass a house, choosing to make their stand at a home where their safety is more assured and the chance to successfully protect the structure is greater.

Landscaping Defensible Space

People often resist creating defensible space because they believe that it will be unattractive, unnatural and sterile-looking. It doesn't have to be! Wise landowners carefully plan landscaping within the defensible space. This effort yields a many-fold return of beauty, enjoyment and added property value. Development of defensible space is outlined in fact sheet 6.302, *Creating Wildfire-Defensible Zones*.

Colorado has great diversity in climate, geology and vegetation. Home and cabin sites can be found from the foothills through 10,000-foot elevations. Such extremes present a challenge in recommending plants. While native plant materials generally are best, a wide range of species can be grown successfully in Colorado.

Many plant species are suitable for landscaping in defensible space. Use restraint and common sense, and pay attention to plant arrangement and maintenance. It has often been said that *how* and *where* you plant are more important than *what* you plant. While this is indeed true, given a choice among plants, choose those that are more resistant to wildfire.

Consider the following factors when planning, designing and planting the FireWise landscape within your home's defensible space:

- Landscape according to the recommended defensible-space zones. That is, the plants near your home should be more widely spaced and lower growing than those farther away.
- Do not plant in large masses. Instead, plant in small, irregular clusters or islands.

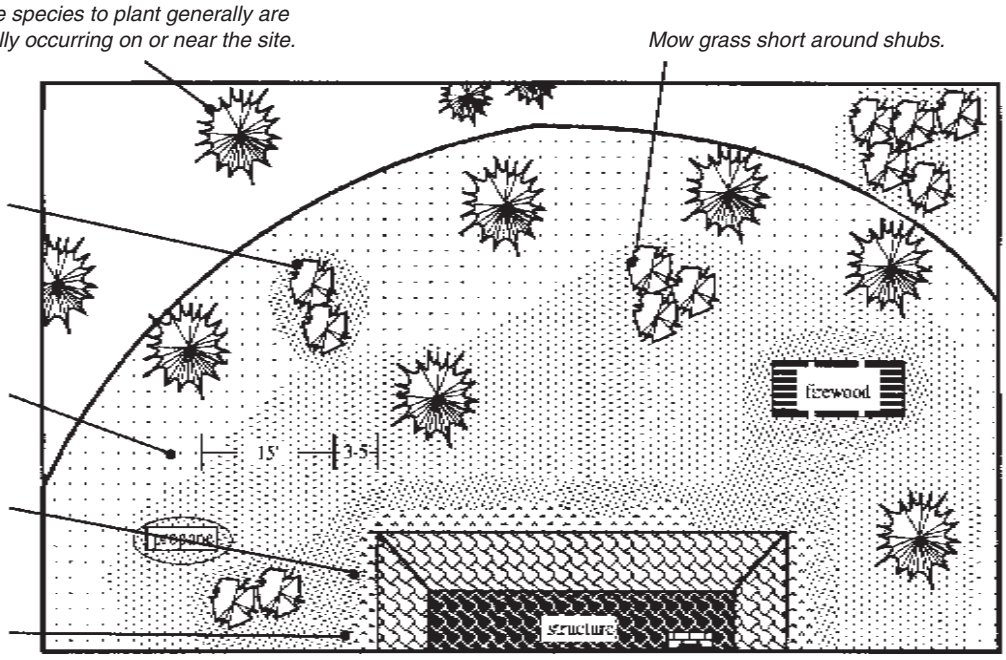


Figure 1: Forested property surrounding a homesite; shows optimum placement of vegetation near the structure.

- Use decorative rock, gravel and stepping stone pathways to break up the continuity of the vegetation and fuels. This can modify fire behavior and slow the spread of fire across your property.
- Incorporate a diversity of plant types and species in your landscape. Not only will this be visually satisfying, but it should help keep pests and diseases from causing problems within the whole landscape.
- In the event of drought and water rationing, prioritize plants to be saved. Provide available supplemental water to plants closest to your house.
- Use mulches to conserve moisture and reduce weed growth. Mulch can be organic or inorganic. Do not use pine bark, thick layers of pine needles or other mulches that readily carry fire.
- Be creative! Further vary your landscape by including bulbs, garden art and containers for added color.

Grasses

During much of the year, grasses ignite easily and burn rapidly. Tall grass will quickly carry fire to your house. Mow grasses low in the inner zones of the defensible space. Keep them short closest to the house and gradually increase height outward from the house, to a maximum of 8 inches. This is particularly important during fall, winter and before green-up in early spring, when grasses are dry, dormant and in a "cured" fuel condition. Given Colorado's extremely variable weather, wildfires can occur any time of the year. Maintenance of the grassy areas around your home is critical.

Mow grasses low around the garage, outbuildings, decks, firewood piles, propane tanks, shrubs, and specimen trees with low-growing branches.

Ground Cover Plants

Replace bare, weedy or unsightly patches near your home with ground covers, rock gardens, vegetable gardens and mulches. Ground cover plants are a good alternative to grass for parts of your defensible space. They break up the monotony of grass and enhance the beauty of your landscape. They provide a

References

- *6.302,* Creating Wild-Fire Defensible Zones
- *6.304,* Forest Home Fire Safety
- *6.305,* FireWise Plant Materials
- *6.306,* Grass Seed Mixes to Reduce Wildfire Hazard
- *7.205,* Pruning Evergreens
- *7.206,* Pruning Shrubs
- *7.207,* Pruning Deciduous Trees
- *7.233,* Wildflowers for Colorado
- *7.406,* Flowers for Mountain Communities
- *7.423,* Trees and Shrubs for Mountain Areas
- *7.413,* Ground Covers for Mountain Communities

Figure 2: Ladder fuels enable fire to travel from the ground surface into shrubs and then into the tree canopy.

variety of textures and color and help reduce soil erosion. Consider ground cover plants for areas where access for mowing or other maintenance is difficult, on steep slopes and on hot, dry exposures.

Ground cover plants are usually low growing. They are succulent or have other FireWise characteristics that make them useful, functional and attractive. When planted in beds surrounded by walkways and paths, in raised beds or as part of a rock garden, they become an effective barrier to fire spread. The ideal groundcover plant is one which will spread, forming a dense mat of roots and foliage that reduces soil erosion and excludes weeds.

Mulch helps control erosion, conserve moisture and reduce weed growth. It can be organic (compost, leaf mold, bark chips, shredded leaves) or it can be inorganic (gravel, rock, decomposing granite).

When using organic mulches, use just enough to reduce weed and grass growth. Avoid thick layers. When exposed to fire, they tend to smolder and are difficult to extinguish. Likewise, while your property might yield an abundance of needles from your native pines or other conifers, don't use them as mulch because they can readily catch and spread wildfire. Rake, gather and dispose of them often within your defensible space.

Wildflowers

Wildflowers bring variety to a landscape and provide color from May until frost. Wildflower beds give a softer, more natural appearance to the otherwise manicured look often resulting from defensible space development.

A concern with wildflowers is the tall, dense areas of available fuel they can form, especially in dormancy. To reduce fire hazard, plant wildflowers in widely separated beds within the defensible space. Do not plant them next to structures unless the beds are frequently watered and weeded and vegetation is promptly removed after the first hard frost. Use gravel walkways, rock retaining walls or irrigated grass areas mowed to a low height to isolate wildflower beds from each other and from other fuels.

Shrubs

Shrubs lend color and variety to the landscape and provide cover and food for wildlife. However, shrubs concern fire professionals because, as the next level in the "fuel continuum," they can add significantly to total fuel loading. Because of the woody material in their stems and branches, they are a potential source of fire brands. When carried in the smoke column ahead of the main fire, fire brands can rapidly spread the fire in a phenomenon known as "spotting."

But the primary concern with shrubs is that they are a "ladder fuel" – they can carry a relatively easy-to-control surface grass fire into tree crowns. Crown fires are difficult, sometimes impossible, to control (see Figure 2).

To reduce the fire-spreading potential of shrubs, plant only widely separated, low-growing, nonresinous varieties close to structures. Do not plant them directly beneath windows or vents or where they might spread under wooden decks. Do not plant shrubs under tree crowns or use them to screen propane tanks, firewood piles or other flammable materials. Plant shrubs individually, as specimens, or in small clumps apart from each other and away from any trees within the defensible space.

Mow grasses low around shrubs. Prune dead stems from shrubs annually. Remove the lower branches and suckers from species such as Gambel oak to raise the canopy away from possible surface fires.

Structural Elements of a FireWise Landscape

When building a deck or patio, use concrete, flagstone or rock instead of wood. These materials do not burn and do not collect flammable debris like the space between planks in wooden decking.

Where appropriate on steeper ground, use retaining walls to reduce the steepness of the slope. This, in turn, reduces the rate of fire spread. Retaining walls also act as physical barriers to fire spread and help deflect heat from the fire upwards and away from structures.

Rock or masonry walls are best, but even wooden tie walls constructed of heavy timbers will work. Put out any fires burning on tie walls after the main fire front passes.

On steep slopes, consider building steps and walkways around structures. This makes access easier for home maintenance and enjoyment. It also serves as a physical barrier to fire spread and increases firefighters' speed and safety as they work to defend your home.

FIREWISE is a multi-agency program that encourages the development of defensible space and the prevention of catastrophic wildfire.

Trees

Trees provide a large amount of available fuel for a fire and can be a significant source of fire brands if they do burn. Radiant heat from burning trees can ignite nearby shrubs, trees and structures.

Colorado's elevation and temperature extremes limit tree selection. The best species to plant generally are those already growing on or near the site. Others may be planted with careful selection and common sense.

If your site receives enough moisture to grow them, plant deciduous trees such as aspen or narrow-leaf cottonwood. These species, even when planted in dense clumps, generally do not burn well, if at all. The greatest problem with these trees is the accumulation of dead leaves in the fall. Remove accumulations close to structures as soon as possible after leaf drop.

When site or available moisture limits recommended species to evergreens, carefully plan their placement. Do not plant trees near structures. Leave plenty of room between trees to allow for their growth. Spacing within the defensible space should be at least 10 feet between the edges of tree crowns. On steep ground, allow even more space between crowns. Plant smaller trees initially on a 20- to 25-foot spacing to allow for tree growth. At some point, you will have to thin your trees to retain proper spacing.

As the trees grow, prune branches to a height of 10 feet above the ground. Do not overprune the crowns. A good rule of thumb is to remove no more than one-third of the live crown of the tree when pruning. Prune existing trees as well as ones you planted.

Some trees (for example, Colorado blue spruce) tend to keep a full crown. Other trees grown in the open may also exhibit a full growth habit. Limit the number of trees of this type within the defensible space. Prune others as described above and mow grasses around such specimen trees.

Maintenance

A landscape is a dynamic system that constantly grows and changes. Plants considered fire resistant and that have low fuel volumes can lose these characteristics over time. Your landscape, and the plants in it, must be maintained to retain their FireWise properties.

- ☐ Always keep a watchful eye towards reducing the fuel volumes available to fire. Be aware of the growth habits of the plants within your landscape and of the changes that occur throughout the seasons.
- ☐ Remove annuals and perennials after they have gone to seed or when the stems become overly dry.
- ☐ Rake up leaves and other litter as it builds up through the season.
- ☐ Mow or trim grasses to a low height within your defensible space. This is particularly important as grasses cure.
- ☐ Remove plant parts damaged by snow, wind, frost or other agents.
- ☐ Timely pruning is critical. Pruning not only reduces fuel volumes but also maintains healthier plants by producing more vigorous, succulent growth.
- ☐ Landscape maintenance is a critical part of your home's defense system. Even the best defensible space can be compromised through lack of maintenance. The old adage "An ounce of prevention is worth a pound of cure" applies here.

Colorado State FOREST SERVICE

This fact sheet was produced in cooperation with the Colorado State Forest Service.

[1] *Wildfire Hazard Mitigation Coordinator, Colorado State Forest Service.*

Appendix E

Firewise Plant Materials

FORESTRY

FireWise Plant Materials no. 6.305

by F.C. Dennis[1]

Quick Facts...

FireWise landscaping can be aesthetically pleasing while reducing potential wildfire fuel.

Plant choice, spacing and maintenance are critical.

Your landscape, and the plants in it, must be maintained to retain their FireWise properties.

Creating a "defensible space" around your home is one of the most important and effective steps you can take to protect you, your family and your home from catastrophic wildfire. Defensible space is the area between a structure and an oncoming wildfire where nearby vegetation has been modified to reduce a wildfire's intensity. (See fact sheet 6.302, *Creating Wildfire-Defensible Zones*.)

Many people resist creating defensible space around their homes because they believe these areas will be unattractive and unnatural. This is far from true. With careful planning, FireWise landscaping can be aesthetically pleasing while reducing potential wildfire fuel. It can actually enhance beauty and property values, as well as personal safety.

Many native plants are highly flammable during different seasons of the year. At such times, left unmanaged, they can accelerate the spread of a wildfire through your neighborhood, threatening homes, property and lives.

All vegetation, naturally occurring and otherwise, is potential fuel for fire. Its type, amount and arrangement has a dramatic effect on fire behavior. There are no truly "fireproof" plant species, so plant choice, spacing and maintenance are critical to defensible space landscaping. In fact, **where** and **how** you plant may be more important than **what** you plant. However, given alternatives, choose plant species that tend to be more resistant to wildfire.

General concepts to keep in mind when choosing and planting FireWise species are:

- A plant's moisture content is the single most important factor governing its volatility. (However, *resin* content and other factors in some species render them flammable even when the plant is well-watered.) Conifers tend to be flammable due to their oil and pitch content, regardless of their water content.
- Deciduous plants tend to be more fire resistant because their leaves have higher moisture content and their basic chemistry is less flammable. Also, when deciduous trees are dormant, there is less fuel to carry fire through their canopies.

In some cases, there is a strong correlation between drought tolerance and fire resistance. For example, a plant may shed its leaves or needles during extreme drought. Other drought-tolerant species may have smaller leaves or thick, succulent leaves. These plants offer less fuel or have a higher moisture content, both of which help reduce fire hazard.

There also appears to be a correlation between a plant's salt tolerance and natural fire resistance. Plants adapted to salty conditions, and actually growing in salty situations, may better resist burning.

Colorado State University Cooperative Extension

Putting Knowledge to Work

FireWise Plant List

The following list was prepared by Phil Hoefer, Colorado State Forest Service. It 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).

Key: Water needs: VL = very low L = low M = medium H = high
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 Preference	Approx. Mature Height	Elevation (1,000 ft.) 5	6	7	8	9	Approx. Bloom Month
Flowers and Ground Covers										
Achillea lanulosa [a]	Native yarrow	L-H	S/PS	1.5 - 2'	Y	Y	Y	Y	Y	Jul
Achillea tomentosa [b]	Woolly yarrow	M-H	S/PS	.5'	Y	Y	N	N	N	Jul
Aconitum spp.[c]	Monkshood	M-H	S	2'	Y	Y	Y	Y	Y	Jun-Jul
Aconitum columbianum [ac]	Columbian monkshood	M-H	S	2'	Y	Y	Y	Y	Y	Jun-Jul
Ajuga reptans [b]	Bugleweed	H	Sh	< .5'	Y	Y	Y	Y	Y	Jun-Jul
Alchemilla sp.	Lady's mantle	M-H	PS/Sh	1'	Y	Y	Y	Y	?	Jun-Jul
Allium cernuum [ac]	Nodding onion	L-H	S/PS	1'	Y	Y	Y	Y	Y	Jun
Allium geyeri [ac]	Geyer onion	L-H	S/PS	1'	Y	Y	Y	Y	?	Jun
Anaphalis margaritacea [a]	Pearly everlasting	L-H	S	1.5 - 2.5'	Y	Y	Y	Y	?	Aug
Anemone blanda	Windflower	M-H	S/PS	1'	Y	Y	Y	Y	?	Apr-May
Antennaria parvifolia [ab]	Small-leaf pussytoes	M	S/PS	<.5'	Y	Y	Y	Y	Y	Jun
Antennaria rosea [ab]	Rosy pussytoes	M	S/PS	<.5'	Y	Y	Y	Y	Y	Jun
Aquilegia spp.	Columbine	M-H	S/PS	1 - 2'	Y	Y	Y	Y	Y	Jun-Jul
Aquilegia coerulea [a]	Colorado blue columbine	M-H	S/PS	1 - 2'	Y	Y	Y	Y	Y	Jun-Jul
Aquilegia chrysantha [a]	Yellow columbine	M-H	S/PS	1 - 2'	Y	Y	Y	Y	Y	Jun-Aug
Arabis sp.[b]	Rockcress	L-H	S	< 1'	Y	Y	Y	Y	Y	May-Jun
Armeria maritima	Sea thrift	L-H	S/PS	.5'	Y	Y	Y	Y	Y	Apr-Jun
Artemisia caucasica	Caucasian sage	L-M	S/PS	1- 2'	Y	Y	Y	?	?	n/a
Artemisia frigida [ac]	Fringed sage	L-M	S	1 - 1.5'	Y	Y	Y	Y	Y	n/a
Artemisia ludoviciana [a]	Prairie sage	L-M	S	1 - 1.5'	Y	Y	Y	?	?	n/a
Aster laevis [a]	Smooth aster	L-H	S/PS	1 - 3'	Y	Y	Y	Y	?	Aug-Sep
Aster porteri [a]	Porter aster	L-M	S	1'	Y	Y	Y	?	?	Aug-Sep
Aubrieta sp.[b]	False rockcress	M	S	1'	Y	Y	Y	Y	Y	Apr-May
Aurinia sp.[b]	Basket of gold	M	S/PS	1'	Y	Y	Y	Y	Y	Apr-May
Calochortus gunnisonii [a]	Mariposa lily	M-H	S	.5 - 2'	Y	Y	Y	Y	?	Jul-Aug
Campanula rotundifolia [a]	Common harebell	M-H	S	.5 - 1'	Y	Y	Y	Y	Y	May-Oct
Centranthus ruber	Jupiter's beard	L-H	S/Sh	2 - 2.5'	Y	Y	Y	Y	?	May-Oct
Cerastium strictum [ab]	Mouse ear chickweed	M	S/PS	1'	Y	Y	Y	Y	?	May-Jun
Cerastium tomentosum [b]	Snow-in-summer	L-M	S/PS	1'	Y	Y	Y	Y	Y	May-Jun
Claytonia lanceolata [a]	Spring beauty	M	Sh	.5 - 1.5'	Y	Y	Y	?	?	Mar-Apr
Convallaria majalis [bc]	Lily-of-the-valley	H	Sh	< 1'	Y	Y	Y	Y	?	May-Jun
Delosperma nubigenum [b]	Hardy yellow iceplant	M-H	S	.5'	Y	Y	Y	?	?	Jun
Delphinium spp.[c]	Delphinium	M-H	S/PS	.5 - 3'+	Y	Y	Y	Y	Y	Jun-Jul
Dianthus spp.	Pinks	L-H	S	<.5' - 2'	Y	Y	Y	Y	Y	May-Aug
Doronicum sp.	Leopard's bane	H	S/PS	2 - 3'	Y	Y	Y	Y	?	Jul-Aug
Echinacea purpurea[a]	Purple coneflower	M	S	2 - 3'	Y	Y	Y	Y	Y	Jul-Aug
Epilobium angustifolium	Fireweed	H	S/PS	3'	N	Y	Y	Y	Y	Jul-Aug
Erigeron flagellaris [a]	Whiplash daisy, trailing fleabane	L-M	S	< 1'	Y	Y	?	?	?	Jun-Jul
Eriogonum umbellatum [a]	Sulphur flower	M	S/PS	<.5'	Y	Y	Y	Y	Y	Jun-Jul
Erysimum asperum [a]	Western wallflower	M	S/PS	1'+	Y	Y	Y	Y	?	Jun-Jul
Gaillardia aristata [a]	Blanket flower	L-M	S	1 - 1.5'	Y	Y	Y	Y	Y	Jul-Sep
Galium boreale [ab]	Northern bedstraw	M-H	Sh	<1'	Y	Y	Y	Y	Y	May-Jun
Geranium spp.	Hardy geraniums	M	Sh/PS	2'	Y	Y	Y	Y	Y	May-Oct
Geranium caespitosum [a]	Wild geranium	M	Sh/PS	2'	Y	Y	Y	Y	Y	May-Oct
Geum triflorum	Prairie smoke	M-H	S/PS	1.5'	Y	Y	Y	?	?	Jun
Helianthella quinquenervis [a]	Aspen sunflower	M	S	1'	?	?	?	Y	Y	?
Helianthemum nummularium	Rockrose	M-H	S	< 1'	Y	Y	Y	?	?	May-Jun
Helianthus pumilus [a]	Small sunflower	M	S	1 - 2'	Y	Y	Y	?	?	Jun-Jul
Heuchera spp.	Coral bells	M-H	PS/Sh	1 - 2'	Y	Y	Y	Y	Y	Jun-Aug
Ipomopsis aggregata [a]	Scarlet gilia	M	S/PS	1 - 2'	Y	Y	Y	Y	Y	Jun-Aug
Iris germanica	Bearded iris	L-M	S	1 - 3'	Y	Y	Y	Y	Y	May-Jun

Scientific Name	Common Name	Approx. Water Needs	Sun/Shade Preference	Approx. Mature Height	Elevation (1,000 ft.) 5	6	7	8	9	Approx. Bloom Month
Iris missouriensis [ac]	Missouri iris	M-H	S	1 - 2’	Y	Y	Y	Y	Y	May
Lamium sp.[b]	Dead nettle	M-H	Sh	< 1’	Y	Y	Y	Y	?	May-Jun
Lavandula spp.	Lavender	L-M	S	1 - 2’	Y	Y	Y	?	?	Jun-Nov
Leucocrinum montanum [a]	Sand lily	L-M	S	< 1’	Y	Y	Y	?	?	May
Liatris punctata [a]	Dotted gayfeather	VL-L	S	1 - 2’	Y	Y	Y	Y	Y	Aug-Oct
Linum lewisii [ac]	Wild blue flax	L-H	S/PS	1 - 2’	Y	Y	Y	Y	Y	May-Sep
Lupinus argenteus [ac]	Silver lupine	M	Sh/PS	1 - 3’	Y	Y	Y	Y	Y	Jun-Jul
Mertensia lanceolata [a]	Narrow-leaved chiming bells	M-H	Sh/PS	1 - 2’	Y	Y	Y	Y	Y	May-Jun
Mimulus guttatus [a]	Yellow monkey-flower	H	Sh	1’	?	Y	Y	Y	Y	?
Monarda fistulosa [a]	Native beebalm	M-H	S/PS	1 - 2’	Y	Y	Y	Y	Y	Jul-Oct
Oenothera caespitosa [a]	White stemless evening primrose	L-M	S	1 - 2’	Y	Y	Y	Y	Y	Jun-Aug
Papaver orientale	Oriental poppy	H	S/Sh	2 - 3’	Y	Y	Y	Y	Y	May-Jun
Penstemon caespitosus [ab]	Mat penstemon	L-M	S	< .5’	Y	Y	Y	Y	Y	Jun
Penstemon secundiflorus	Sidebells	L-M	S	1 - 2’	Y	Y	Y	Y	?	May-Jun
Penstemon teucrioides [a]	Germander penstemon	L-M	S	.5’	Y	Y	Y	?	?	Jun-Jul
Penstemon virens [ac]	Blue mist penstemon	M	S/PS	.5’	Y	Y	Y	Y	Y	May-Jun
Phlox subulata	Moss phlox	M	S	< .5’	Y	Y	Y	Y	Y	May
Polemonium sp.	Jacob’s ladder	H	S/PS	1 - 2’	Y	Y	Y	Y	Y	May-Aug
Potentilla fissa [a]	Leafy potentilla	M-H	PS	1’	Y	Y	Y	Y	?	?
Potentilla verna [b]	Spring potentilla	M-H	PS	< .5’	Y	Y	Y	Y	Y	Mar-May
Pulsatilla patens [a]	Pasque flower	M	S/PS	1’	Y	Y	Y	Y	Y	Mar-May
Ratibida columnifera [a]	Prairie coneflower	L-M	S	2’	Y	Y	Y	Y	Y	Jul-Sep
Rudbeckia hirta [a]	Black-eyed Susan	M-H	S	2 - 3’	Y	Y	Y	Y	Y	Jul-Sep
Salvia officinalis	Cooking sage	L-M	S/PS	2’	Y	Y	Y	Y	?	Jun
Saxifraga hirsuta	Saxifrage	H	S/PS	.5’+	Y	Y	Y	Y	Y	May-Jun
Scutellaria brittonii [a]	Skullcap	M	S/PS	.5 - 1’	Y	Y	Y	Y	?	Aug-Sep
Sedum spp.[b]	Stonecrop	M	S/PS	1 - 1.5’	Y	Y	Y	Y	Y	Jul-Aug
Sedum lanceolatum [a]	Yellow stonecrop	M	S/PS	.5’	Y	Y	Y	Y	Y	Jul-Aug
Sempervivum sp.	Hens and chicks	L-M	S/PS	.5’	Y	Y	Y	Y	Y	n/a
Senecio spartioides [ac]	Broom groundsel	VL-L	S	2 - 3’	Y	Y	?	?	?	Sep-Oct
Solidago missouriensis [a]	Smooth goldenrod	L-M	S	1 - 2’	Y	Y	Y	Y	?	Jul-Aug
Thalictrum fendleri [a]	Fendler meadowrue	H	S/PS	2 - 3’	?	?	Y	Y	Y	Jul-Aug
Thermopsis divaricarpa [a]	Spreading golden banner	M-H	S/PS	2’	Y	Y	Y	Y	?	May
Tradescantia occidentalis [a]	Western spiderwort	M	S/PS	1.5’	Y	Y	Y	Y	?	Jun-Aug
Thymus spp.[b]	Thyme	L-M	S	< .5’	Y	Y	Y	Y	Y	Jun-Jul
Veronica pectinata	Speedwell	L-M	S	< .5’	Y	Y	Y	Y	Y	Apr-Jul
Vinca minor [b]	Periwinkle, myrtle	H	Sh	< 1’	Y	Y	Y	Y	?	Apr-Jun
Waldsteinia sp.[b]	Barren strawberry	M-H	Sh/PS	< 1’	Y	Y	Y	Y	?	May-Jun
			Shrubs							
Arctostaphylos nevadensis [ab]	Pinemat manzanita	M	S/PS	1 - 2’	Y	Y	Y	N	N	n/a
Arctostaphylos patula [a]	Greenleaf manzanita	M	S/PS	3 - 4’	Y	Y	Y	N	N	n/a
Arctostaphylos uva-ursi [ab]	Kinnikinnick, bearberry	M	S/Sh	1’	Y	Y	Y	Y	Y	n/a
Betula glanulosa [a]	Bog birch	H	S/PS	6 - 8’	Y	Y	Y	Y	Y	n/a
Calluna sp.	Heather	H	S/PS	2’	Y	Y	Y	?	?	Jul-Aug
Ceanothus fendleri [a]	Buckbrush, mountain lilac	M	S	2’	Y	Y	Y	?	?	Jul
Cercocarpus intricatus [a]	Little-leaf mountain mahogany	VL-L	S	4 - 6’	Y	Y	Y	Y	?	n/a
Cercocarpus montanus [ac]	True mountain mahogany	L-M	S	4 - 6’	Y	Y	Y	Y	?	n/a
Chrysothamnus spp.[a]	Rabbitbrush	VL-L	S	2 - 6’	Y	Y	Y	Y	Y	Jul-Aug
Cornus stolonifera [a]	Redtwig dogwood	H	S/Sh	4 - 6’	Y	Y	Y	Y	Y	n/a
Cotoneaster horizontalis	Spreading cotoneaster	M	S/PS	2 - 3’	Y	Y	Y	Y	?	May-Jun
Daphne burkwoodii	Burkwood daphne	M	S/PS	2 - 3’	Y	Y	Y	?	?	Apr-Jun
Erica sp.	Heath	H	S/PS	1’	Y	Y	Y	?	?	Jan-Mar
Euonymus alatus	Burning bush euonymus	M	S/Sh	1 - 6’	Y	Y	Y	?	?	n/a
Fallugia paradoxa [a]	Apache plume	VL-L	S	2 - 4’	Y	Y	Y	Y	Y	Jun-Oct
Holodiscus dumosus [a]	Ocean spray, cliff/rock spirea	L-M	S/PS	4’	Y	Y	Y	Y	Y	Jun
Jamesia americana [a]	Wax flower	M-H	S/Sh	2 - 6’	Y	Y	Y	Y	Y	Jun
Lonicera tatarica	Tatarian honeysuckle	M	S/PS	4 - 6’	Y	Y	Y	Y	Y	May-Jun
Mahonia aquifolium	Oregon grape holly	M-H	S/Sh	4 - 6’	Y	Y	Y	?	?	May-Jun

Scientific Name	Common Name	Approx. Water Needs	Sun/Shade Preference	Approx. Mature Height	Elevation (1,000 ft.) 5	6	7	8	9	Approx. Bloom Month
Mahonia repens [ab]	Creeping grape holly	L-H	S/Sh	1 - 2'	Y	Y	Y	Y	Y	Mar-May
Philadelphus microphyllus [a]	Little-leaf mockorange	M	S	2 - 3'	Y	Y	Y	Y	?	Jun
Physocarpus monogynus [a]	Mountain ninebark	M	S/Sh	2 - 4'	Y	Y	Y	Y	Y	Jun
Potentilla fruticosa [a]	Shrubby cinquefoil	M	S/PS	2 - 3'	Y	Y	Y	Y	Y	May-Sep
Prunus besseyi [a]	Western sand cherry	L-M	S	1 - 3'	Y	Y	Y	Y	?	May
Purshia tridentata [a]	Antelope bitterbrush	L-M	S	1 - 2'	Y	Y	Y	?	?	Jun-Aug
Ribes aureum [a]	Golden currant	M	S/PS	2 - 3'	Y	Y	Y	Y	Y	Apr-May
Rosa woodsii [a]	Woods' or native wild rose	M	S/PS	2 - 3'	Y	Y	Y	Y	Y	Jun-Jul
Shepherdia canadensis [d]	Russet buffaloberry	M-H	S	5 - 6'	Y	Y	Y	Y	Y	n/a
Symphoricarpos spp. [d]	Snowberry, coralberry	M	S/PS	2 - 3'	Y	Y	Y	Y	Y	n/a
Viburnum edule [a]	Highbush cranberry	H	S	6 - 8'	Y	Y	Y	Y	Y	May-Jun
Yucca baccata [a]	Banana or broad-leaf yucca	VL-L	S/PS	2 - 3'	Y	Y	Y	N	N	Jun
Yucca filamentosa	Adam's needle	M	S/PS	2 - 3'	Y	Y	Y	N	N	Jun
Yucca glauca [a]	Spanish bayonet, small soapweed, Great Plains yucca	VL-L	S/PS	2 - 3'	Y	Y	Y	Y	?	Jun
Large Shrubs and Trees										
Acer ginnala	Ginnala maple	M-H	S	6 - 10'	Y	Y	Y	Y	Y	n/a
Acer glabrum [a]	Rocky Mountain maple	M-H	S/Sh	6 - 10'	Y	Y	Y	Y	Y	n/a
Acer grandidentatum [a]	Wasatch maple	M	S/PS	10 - 20'	Y	Y	Y	Y	?	n/a
Alnus tenuifolia [a]	Thinleaf alder	H	S/PS	6 - 8'	Y	Y	Y	Y	Y	Apr
Amelanchier alnifolia [ac]	Saskatoon alder-leaf serviceberry	M	S/PS	6 - 8'	Y	Y	Y	Y	Y	Apr-May
Amelanchier utahensis [a]	Utah serviceberry	VL-M	S	4 - 6'	Y	Y	N	N	N	May
Betula fontinalis [a]	River birch	H	S/PS	6 - 8'	Y	Y	Y	Y	?	n/a
Cercocarpus ledifolius [a]	Mountain mahogany	VL-L	S	6 - 15'	Y	Y	?	N	N	n/a
Corylus cornuta [a]	Filbert, beaked hazelnut	H	S/Sh	5 - 6'	Y	Y	Y	?	?	n/a
Crataegus spp.[a]	Hawthorn (several native)	M	S	6 - 8'	Y	Y	Y	Y	?	May
Fraxinus pennsylvancia	Green ash	M-H	S	20 - 25'	Y	Y	Y	Y	?	n/a
Gleditsia triacanthos	Honeylocust	M-H	S	60 - 70'	Y	Y	N	N	N	May
Malus sp.	Crabapple	M	S	10 - 15'	Y	Y	Y	Y	N	Apr-May
Physocarpus opulifolius [a]	Tall ninebark	M	S/PS	4 - 6'	Y	Y	Y	?	N	May
Populus tremuloides [a]	Aspen	M	S	8 - 25'	Y	Y	Y	Y	Y	n/a
Prunus americana [a]	American wild plum	M	S/PS	4 - 6'	Y	Y	Y	Y	N	Apr
Prunus cerasifera[c]	Flowering plum	M	S/PS	8 - 10'	Y	Y	Y	?	N	Apr
Prunus pensylvanica [ac]	Pin/fire/wild/red cherry	M	S/PS	6 - 8'	Y	Y	Y	?	N	May
Prunus virginiana melanocarpa [ac]	Western chokecherry	M-H	S/PS	6 - 8'	Y	Y	Y	Y	Y	Apr-May
Rubus deliciosus [a]	Boulder raspberry, thimbleberry	M	S/Sh	4 - 6'	Y	Y	Y	Y	Y	Apr-May
Salix amygdaloides [a]	Peachleaf willow	H	S/PS	20 - 30'	Y	Y	Y	Y	?	n/a
Shepherdia argentea [a]	Silver buffaloberry	M	S/PS	4 - 6'	Y	Y	Y	Y	?	Apr
Sorbus scopulina [a]	Western mountain ash	M-H	S/Sh	6 - 8'	Y	Y	Y	Y	?	May
Syringa vulgaris	Common lilac	M	S	6 - 8'	Y	Y	Y	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 Cooperative Extension, Colorado State Forest Service, or other knowledgeable personnel.

[d] Several species of symphoricarpos are native.

Plants for a FireWise Landscape

Plants that are more resistant to wildfire have one or more of the following characteristics:

- They grow without accumulating large amounts of combustible dead branches, needles or leaves (example: aspen).
- They have open, loose branches with a low volume of total vegetation (examples: currant and mountain mahogany).
- They have low sap or resin content (examples: many deciduous species).
- They have high moisture content (examples: succulents and some herbaceous species).
- They grow slowly and need little maintenance (do not need frequent pruning).
- They are short and grow close to the ground (examples: wildflowers and groundcovers).
- They can resprout following fire, thus reducing relandscaping costs (example: aspen).

Conifers

In Colorado, conifers make up much of our natural forest. Because of their high resin content, they are more susceptible to fire.

Even though conifers are flammable, you do not need to remove all of them from around your home. Wildfire hazards usually can be effectively reduced through proper thinning and pruning of existing trees and shrubs.

When choosing conifers for your defensible space, consider those with characteristics that make them better able to survive fire:

- *thick bark,*
- *long needles, or*
- *self-pruning. (Self-pruning trees lose lower branches naturally, leaving a greater distance between ground and canopy.)*

Additional FireWise Guidelines

Some additional tips to follow when planning a FireWise landscape include:

- Landscape according to the recommended defensible-space zones. The plants nearest your home should be more widely spaced and smaller than those farther away.
- Plant in small, irregular clusters and islands, not in large masses.
- Break up the continuity of the vegetation (fuel) with decorative rock, gravel and stepping stone pathways. This will help modify fire behavior and slow its spread across your property.
- Plant a variety of types and species. Besides being aesthetically pleasing, this will help ensure a healthier forest by reducing insects and diseases. Healthy, vigorous, thinned forests can better resist catastrophic fires than unhealthy ones with insect and disease problems.
- In the event of drought and water rationing, prioritize the plants you wish to save. Provide supplemental water to those nearest your home, perhaps using "gray water."
- Mulch to conserve moisture and reduce weed growth. Mulch can be organic (wood chips or small bark pieces) or inorganic (gravel or rock). Avoid pine bark, thick layers of pine needles or other materials that can easily carry fire.

Don't Forget Maintenance

A landscape is a dynamic, constantly changing system. Plants considered "fire resistant" and that have low fuel volumes can lose these characteristics over time. Your landscape, and the plants in it, must be maintained to retain their FireWise properties.

FIREWISE is a multi-agency program that encourages the development of defensible space and the prevention of catastrophic wildfire.

Be aware of the growth habits of the plants on your land and of the changes that occur seasonally. Keep a watchful eye for the need to reduce fuel volumes and fuel continuity.

- Remove annual, herbaceous plants after they have gone to seed or when the stems become overly dry.
- Rake up and dispose of litter as it builds up over the season.
- Mow or trim grasses to a low height within your defensible space. This is especially important as they begin to cure and dry.
- Remove plant parts damaged by snow, wind, frost or other agents.
- Timely pruning is critical. It not only reduces fuel volume but also maintains healthier plants with more succulent, vigorous growth.

Additional FireWise Publications

Cooperative Extension

The following publications are available from The Other Bookstore, Colorado State University Cooperative Extension, 115 General Services Bldg., Fort Collins, CO 80523-4061; (970) 491-6198; resourcecenter@ucm.colostate.edu. Printed copies cost $1; they are available free on our Web site at www.cerc.colostate.edu:

- 6.302, *Creating Wildfire-Defensible Zones*
- 6.303, *Fire-Resistant Landscaping*
- 6.304, *Fire Safety, Evacuation and Home Defense*
- 6.306, *Grass Seed Mixes for the Reduction of Wildfire Hazard*
- 7.205, *Pruning Evergreens*
- 7.206, *Pruning Shrubs*
- 7.207, *Pruning Deciduous Trees*
- 7.402, *Protecting Trees During Construction*

Colorado State Forest Service

The following publication is available from the Colorado State Forest Service, Colorado State University, Fort Collins, CO 80523-5060; (970) 491-6303:

- *Home Fire Protection in the Wildland Urban Interface*, CSFS #142-399

Colorado State Forest Service

This fact sheet was produced in cooperation with the Colorado State Forest Service.

[1] *Wildfire Hazard Mitigation Coordinator, Colorado State Forest Service.*

Appendix F

Cheatgrass and Wildfire

FORESTRY

Cheatgrass and Wildfire no. 6.310

Adapted with permission from University of Nevada Cooperative Extension publications FS-05-29 and SP-05-08[1]

Quick Facts...

Cheatgrass (downy brome) is a noxious weed that can invade grassland communities and displace native plants; it thrives in disturbed areas.

This weed can produce more than 10,000 plants per square yard and is highly flammable.

Cheatgrass can be controlled mechanically, biologically, chemically, or by applying fire under controlled conditions.

Cheatgrass and Wildfire - A Dangerous Combination

Cheatgrass (*Bromus tectorum*), also known as downy brome, is an annual plant native to Eurasia. This aggressive, invasive weed was originally introduced into North America through soils brought by ocean-going vessels and is now a dominant species in the Intermountain West.

Cheatgrass often occurs as a significant component of foothills rangeland vegetation along the eastern front of the Rocky Mountains. While cheatgrass is usually found along roadsides and disturbed sites in the east, it is highly abundant in the west and has invaded disturbed and undisturbed grassland communities to become the dominant species in many lower-elevation areas.

Figure 1. Illustration of cheatgrass. From USDA-NRCS PLANTS Database/Hitchcock, A.S. (rev. A. Chase). 1950. *Manual of the grasses of the United States*. USDA Misc. Publ. No. 200. Washington DC.

Its destructive habits have placed it on Colorado's noxious weed C list. As with most non-native species, cheatgrass lacks biological predators in North America, providing it a helpful advantage over native species in competition for nutrients, sunlight, and water.

Cheatgrass is notorious for its ability to thrive in disturbed areas—common disturbances include construction, fire, floods, poor grazing activities, and intense recreation. But, it also will invade undisturbed areas. Cheatgrass is hard to control once it becomes established. As this invasive weed begins to dominate an area, it alters native plant communities and displaces native plants thus impacting wildlife. Additional negative impacts include changes in soil properties, a decline in agricultural production, and altered fire frequencies. Cheatgrass is highly flammable and densely growing populations provide ample, fine-textured fuels that increase fire intensity and often decrease the intervals between fires. If fire should strike cheatgrass-infested land native plant communities can be inextricably altered. This may result in erosion and damage to water resources.

How to Identify Cheatgrass

Cheatgrass is an annual—it lives for only one year/growing season and then dies. It reproduces by seed and is termed a winter annual because its seed germinates from fall into winter. The plant reaches maturity in the spring and turns brown and dies with the onset of summer.

Colorado State University Cooperative Extension

The height of cheatgrass ranges from three to 30 inches. It has a crooked seed head and small soft hairs covering the entire body of the plant. Leaves emerge dark green with a hint of purple. As it matures and begins to cure, cheatgrass turns yellow to reddish-brown in color with seed heads ranging from two to six inches long at maturity. These seeds have wedged awns that may be dispersed by wind and water, but most often they are spread by adhering to clothes or to the coat of a wild or domestic animal.

Fire Hazards

The early-season growth habits of cheatgrass provide a competitive advantage by allowing it to grow tall and abundant before native species emerge. During years of high precipitation, this grass can produce more than 10,000 plants per square yard. Cheatgrass turns brown and dies by early summer leaving behind thick, continuous dry fuels and creating extreme wildfire hazards.

Though several components can affect flame length and fire spread, a typical cheatgrass fire on flat terrain with wind speeds of 20 miles per hour may generate flame lengths up to eight feet in height; the fire can travel more than four miles per hour. Grass fires are dangerous because they move quickly and grasses act as ladder fuels igniting larger and more volatile vegetation.

Due to these readily combustible characteristics, it is critical for those who live, play, or work in "cheatgrass country" to know not only how to identify and eradicate it, but also take precautions not to ignite it:

- Keep vehicles on well-maintained roads at all times. Fires can ignite as a result of hot car exhaust systems coming in contact with tall, dry fuels.
- Build campfires on bare ground in contained or designated areas. Make sure campfires are out completely before you leave.
- During hunting season or target practice, be aware of fires that may ignite due to stray bullets hitting solid objects and thus creating sparks.
- Supervise hay-baling and wheat harvesting operations closely to prevent ignition of dry fuels.
- Dispose of cigarette butts and matches properly.
- Use and maintain approved spark arresters on all power equipment.
- Keep an eye out for rocks and metal when brush hogging or mowing; sparks generated could start wildfires.
- Monitor sparks when using welding equipment. Have a fire extinguisher available.
- Instruct children to never play with fire or fireworks.

A Concern for Homeowners

Cheatgrass is highly flammable and therefore a concern for homeowners. Clear this grass from within the area 30 feet immediately surrounding your home. Cheatgrass can act as a ladder fuel to ignite larger fuels; these can, in turn, throw burning embers and pose an even larger threat. Grass should be mowed to a minimum of six inches or less. Keep yards clean and green. Perform routine vegetation maintenance around your home and high-value property areas to mitigate potential problems.

Control Methods

Cheatgrass can be controlled mechanically, biologically, chemically, or by applying fire under controlled conditions. The best results usually come from a combination of some or all of these techniques. The key to eradicating cheatgrass is diligence—once you begin the process you must be persistent and continue follow up treatments for up to four or five years (or however long it might take) because cheatgrass seed may survive in soils this long.

How can homeowners eradicate cheatgrass?

Cheatgrass can be removed by hand pulling or mechanical techniques (i.e., a lawn mower, weed whacker, disking); remove the grass before it has time to mature, produce seed, and cure (turn brown and die). Once cheatgrass has been removed, rototill the soil to a three inch depth. Plant the area with desirable species, water properly, and maintain.

Mechanical Treatments

Hand pulling – during spring and fall; repeat when new plants appear; effective in small areas only.

Disking/tilling (live plants) – spring and fall before the seed heads turn purple; repeat when new plants appear; use disk, rototiller, spike-tooth harrow, etc.

Disking/tilling (seeds) – once in late spring before seeding with desirable species in the fall; bury seeds at least three inches deep to prevent germination.

Mowing – not recommended as a long-term control technique as seed may be produced by mown plants.

Biological Treatments

Livestock grazing – graze, very heavily, twice in early in spring (approximately three weeks apart) when the grass is green but prior to seed formation; repeat for at least two years.

Chemical Treatments

A few chemical formulations exist, such as Plateau or Roundup, that may control or even eradicate cheatgrass. However, before using any chemical make sure that the herbicide label lists cheatgrass; if it is not listed, do not use. No one herbicide will control all weed species. Combinations of herbicides may be required for control. **As always, follow all instructions on the label.** For more assistance with chemical cheatgrass control, contact your county weed office or your local Colorado State University Extension office.

Controlled Burning Treatment – late spring and summer; controlled burning has associated risks which should be addressed in a prescribed burn plan. If not done correctly, prescribed burns may escape control and become wildfires, produce smoke that impairs visibility on highways or impacts individuals with respiratory problems, and may cause damage to desirable vegetation. Consultation with a prescribed fire/controlled burn specialist is recommended when developing a prescribed burn plan. Prescribed burn plans may require local and/or state burning permits. Contact your county sheriff or local fire official prior to burning.

For More Information

To learn more about cheatgrass and proper control methods contact your county weed district or Colorado State University Extension office.

Colorado State Forest Service, Colorado State University, Fort Collins, CO 80523-5060; (970) 491-6303; http://csfs.colostate.edu

Colorado State University Extension, 115 General Services Building, Fort Collins, CO 80523-4061; (970) 491-6198; E-mail: resourcecenter@ucm.colostate.edu:

- *6.303,* Fire-Resistant Landscaping
- *6.304,* Forest Home Fire Safety
- *6.305,* FireWise Plant Materials
- *6.306,* Grass Seed Mixes to Reduce Wildfire Hazard

[1]J. Davison, central/northeast area plant and soils specialist, University of Nevada; E. Smith, western area natural resource specialist, University of Nevada Cooperative Extension. Colorado adaptation by G. Beck, Colorado State University Extension weed specialist and professor, department of bioagricultural sciences and pest management.

Appendix G

Firewise Construction

Design and Materials