

Durango West Metropolitan District # 2 Community Wildfire Protection Plan

March 2011



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Community Wildfire Protection Plan: Durango West Metro District #2

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.

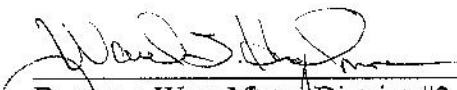


D. Kent Grant, District Forester

4/20/2011

Date

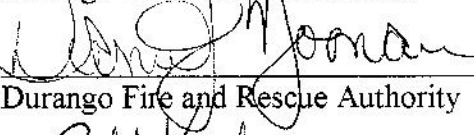
The following entities have received a copy of this Community Wildfire Protection Plan and agree with and support its content and recommendations.



Durango West Metro District #2

3/16/2011

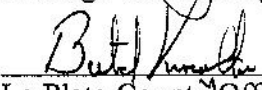
Date



Durango Fire and Rescue Authority

3/21/2011

Date



La Plata County Office of Emergency Management

April 5TH 2011

Date

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1. INTRODUCTION

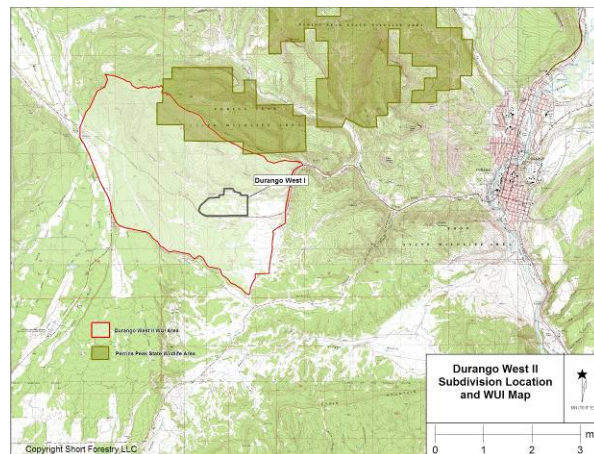
Community Wildfire Protection Plans are authorized by the Healthy Forests Restoration Act (HFRA) of 2003. HFRA places renewed emphasis on local community wildfire protection and response planning by extending a variety of benefits to communities with a wildfire protection plan in place. Among the benefits 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 Board of Durango West Metropolitan District #2, covering the Durango West Two subdivision, has recognized that the subdivision is at risk from wildfires moving into or originating within the subdivision. A local effort to educate homeowners has been underway for several years. Development of a Community Wildfire Protection Plan (CWPP) for the subdivision is the next step in that effort. This is the first CWPP prepared for Durango West Two.

2. BACKGROUND

A. Location

This CWPP covers the Durango West Two subdivision and its defined WUI. Durango West Two is approximately 8 miles west of the city limits of Durango, Colorado in La Plata County, on the north side of US Highway 160 (Location Map). The subdivision was initiated in 1977. Average elevation of the subdivision is approximately 7450 feet.



B. Community

Durango West Two is a 260-acre subdivision with 357 homes. Most are single-family residences but there are 25 condominium units in the southeast portion of the subdivision. The subdivision is essentially built-out, with only three lots not built on. Population of the subdivision is estimated at 1500.

The Metropolitan District water treatment facility and the Metropolitan District water supply tanks just west of the subdivision are outside the subdivision boundaries. The property these facilities are located on is not open to public use.

The road system serving the subdivision is paved with 30 foot-wide streets. Vehicles are often parked curb-side, so maneuvering room for large fire apparatus can be limited. Many streets end in cul-de-sacs. Public access to the subdivision is a single entrance from Highway 160. Acceleration/deceleration lanes are provided on the highway. An alternate access to Highway 160 exists from Aspen Drive in the southwest corner of the subdivision, but it is blocked by a locked steel gate.

Durango West Two is located in an 80 to 100-year old ponderosa pine/gambel oak forest vegetation type. A characteristic of the subdivision is the retention of the native trees and shrubs during construction of the residences. In the nearly 40 years since the establishment of the subdivision, other trees and shrubs have been planted in close proximity to the houses. The subdivision is bounded on the south by US Highway 160, Durango West One, a smaller but more dense subdivision, and by Lake Durango, a subdivision with 10 to 20 acre lots. The areas on the north and west consist of larger tracts of 40 acres or more with few structures. The overall context is semi-rural with generally unmanaged ponderosa pine/gambel oak vegetation.



Common Space Pond

There are two permanent water bodies within the subdivision, both occupying common space. Lake Durango is located approximately one-half mile southeast in an adjoining subdivision. Sheep Springs Gulch runs along the northern boundary of the subdivision but surface water is seasonal.

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 Abert's squirrel (*Sciurus aberti*) are some of the mammalian species. Merriam's turkey (*Meleagris gallopavo merriami*), common raven (*Corvus corax*), golden eagle (*Aquila chrysaetos*), red-tailed and sharp-shinned hawks (*Buteo jamaicensis* and *Accipiter striatus*), horned owl (*Bubo virginianus*), mountain and western bluebirds (*Sialia currucoides* and *S. Mexicana*), American robin (*Turdus migratorius*) and various other songbirds are some of the avian species. No US Fish and Wildlife Service listed "Threatened" or "Endangered" species are known

to inhabit the subdivision, however bald eagles (*Haliaeetus leucocephalus*) have been known to nest around Lake Durango.

Slopes ranges from essentially level (0-5%) in most of the subdivision to approximately 30% in the northern portion along Sheep Springs Gulch. Average grade from east to west is +8%. Slope position is on the back slope of the hillside rising from east to west. Slope shape is slightly convex. Aspect is east southeast.

Annual precipitation for the area is approximately 18 inches, with the majority falling as snow from October to April. June and September 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 mid July.

C. Local Fire History

The ponderosa pine/gambel oak vegetation type typical in the subdivision and surrounding area has had a high-frequency, low-intensity fire regime historically. Fire frequency was in the 2 to 20-year range and crown fires were rare. No wildfires larger than one acre have occurred in the immediate vicinity of the subdivision within the past 20 years. One to five small wildfires occur in the area annually. Most are single-tree lightning strikes or person-caused brushfires in relatively light fuels and are controlled in a matter of a few hours. Large wildfires have occurred in La Plata County in similar fuel types over the past twenty years, however. The most notable are the 2002 Missionary Ridge and Valley Fires which together burned 70,662 acres and 83 structures. Wildfires threatening the subdivision are expected to occur in the future as population and fuel loads in the subdivision vicinity continue to increase.

Fire suppression over the last 75 years or more has produced fuel conditions that are higher than considered “normal” for the ponderosa pine/gambel oak vegetation type. “Ladder” fuels and thick litter layers are continuous over much of the area within and surrounding the subdivision. Development of the subdivision itself has produced structural fuels in close proximity to the heavier than normal natural fuels. The risk of crown fire has increased and the risk of loss of structures in a fire event is higher. The subdivision is located within the “Red Zone” designated by the Colorado State Forest Service as having “High” risk of loss of structures in a wildfire. The La Plata County Fire Risk map completed as a part of the County CWPP process rates the area containing Durango West Two as “Higher” risk.

D. Recent Wildfire Preparedness Activities

Metro District

1. Participated in county-wide Red Zone study in 2007. The study has been made available to all residents.
2. Included Firewise educational information in monthly billing statements to residents and in DW2 newsletter.
3. Secured a \$24,910 grant from the Colorado State Forest Service for mitigation work on Metro District common property for 2010-11.

Property Owners

1. Several property owners are performing mitigation and maintenance work (e.g., hazard tree and shrub removal, branch pruning, needle removal from roofs and gutters, etc.) on their own properties.

3. PLAN AREA

A. Boundaries

The CWPP covers the WUI area developed collaboratively with the Durango West Two Metro District Board, subdivision residents, Firewise of Southwest Colorado, the Colorado State Forest Service, La Plata County Office of Emergency Management, Durango Fire and Rescue Authority and the San Juan Public Lands Center, responsible for managing the National Forest and Bureau of Land Management Public Lands in southwest Colorado. The WUI boundaries extend from the intersection of US Highway 160 and State Highway 140 north-northeast to the top of the divide between Cherry Gulch and Sheep Springs Gulch, east along a jeep trail to the top of the divide between Cherry Gulch and Coal Gulch, southeast along the divide to Highway 160, south along Highway 160 to the boundary of the Metro District, south along the Metro District boundary to its southeast corner, then west-southwest to South Lakeside Circle, south along South Lakeside Drive to County Road 125, then west to State Highway 140, north along Highway 140 to its intersection with US Highway 160. Total WUI area is 11.03 square miles and is shown on the WUI Map in Appendix A.

B. Private Land Characteristics

The private lands within the WUI boundary consist of five subdivisions, Durango West One, Durango West Two, Durango Ridge Ranches, Mira Monte and portions of Lake Durango, as well as over 100 parcels outside the subdivisions. Parcel sizes range from approximately 0.1 acre to over 500 acres. Many of the private parcels have residences or other structures on them. Some residents have

completed wildfire fuels mitigation around their homes, but many have not. All four subdivisions and the private tracts are forested with ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*) and montane shrubs dominated by gambel oak (*Quercus gambelii*). NFFL Fuel Models present are 1 – Short Grass, 2 – Timber/Grass, 6 – Dormant Brush and Piñon/Juniper and 8 – Closed Canopy Conifer. The map of fuel models for the WUI area is in Appendix A.

The Ute Mountain Ute Tribe owns two parcels of non-Reservation land totaling 1688 acres in the west-central part of the WUI area. Cover types include ponderosa pine, gambel oak and montane shrubs. NFFL Fuel Models present are 1 – Short Grass, 2 – Timber/Grass, 6 – Dormant Brush and Piñon/Juniper and 8 – Closed Canopy Conifer. The tribal lands are not open to the general public. The Colorado State Forest Service has assisted the tribe in forest management work on parts of the properties in the past several years.

C. Public Land Characteristics

Public lands in the WUI include approximately 82 acres of common space within the Durango West Two subdivision plus another 18 acres owned by Durango West Metro District #2. The common space includes tennis and basketball courts, a children’s playground, hiking and biking trails, two ponds and water wells used for domestic water for the subdivision. The additional Metro District-owned acreage contains the water tanks for municipal water and the sewage treatment plant. Vegetative cover includes grass and forbs, ponderosa pine, juniper, gambel oak and other montane shrubs. The major NFFL Fuel Models present are 1 – Short Grass, 2 – Timber/Grass, 6 – Dormant Brush and Piñon/Juniper and 8 – Closed Canopy Conifer.



Typical DW2 Common Space

Durango West Metro District #1 owns 11 acres of common space used primarily for utility easements and walkways. The Metro District has done fuels mitigation on approximately half of the common space since 2007. NFFL Fuel Models are 2 – Timber/Grass, 6 – Dormant Brush and 8 – Closed Canopy Conifer

A 212-acre portion of the Perrins Peak State Wildlife Area is located in the northeast part of the WUI. Cover types are ponderosa pine, Douglas-fir, juniper,

gambel oak and montane shrubs. NFFL Fuel Models present are 1 – Short Grass, 2 – Timber/Grass, 6 – Dormant Brush and Piñon/Juniper and 8 – Closed Canopy Conifer. The Colorado Division of Wildlife has been treating the Wildlife Area for fuels mitigation and those treatments are expected to continue. Treatments include thinning, mowing of shrubs and prescribed burning.

D. Fire Protection

Structural and wildland fire protection is provided by the Durango Fire and Rescue Authority. A volunteer-staffed fire station is located on the east side of the Durango West One subdivision, across US Highway 160 from Durango West Two. Both structural and wildland fire engines are resources available through the Authority. Other wildland fire resources are available through Durango Interagency Dispatch Center from the US Forest Service, Bureau of Land Management, 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. Additional aerial wildfire support can be provided by the Mesa Verde National Park initial attack helicopter at Hesperus and the Ute Mountain Ute initial attack helicopter at Towaoc.

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. Reverse 911 emergency notification is available for area residents

4. POLICIES

A. Federal

The Durango West Two 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 agency managing the land surrounding the at-risk communities.

B. 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.

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

The San Juan National Forest and San Juan Resource Area Land and Resource Management Plan and associated Fire Management Plan 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 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.

D. La Plata County CWPP

The Durango West Two CWPP tiers to the La Plata County CWPP approved in 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 Durango West Two community.

E. Subdivision Covenants

The Phase 1 subdivision covenants filed with La Plata County in December 1977 and the Phase 2 covenants filed in August 1980 limited tree removal to that needed to construct a dwelling and associated outbuildings on a lot. Roof construction was limited to wood shakes or shingles. Exterior surfaces including fences were to be wood, stone or brick.

Durango West Two no longer has a functional property owners association and the covenants are not enforced. Wildfire protective measures on individual

homesites are up to individual homeowners. Many homeowners in the subdivision are from other areas of the country where wildfire is not as great an issue as in southwest Colorado. Continuing education of homeowners is essential to gaining acceptance to and compliance with wildfire mitigation techniques and practices.

5. PLANNING PROCESS AND PARTNERS

A. Process

No Firewise committee exists for Durango West Two, so the CWPP contractor worked directly with the Firewise Council of Southwest Colorado and the Durango West Metro District board in getting public input into the Plan. A public CWPP input-gathering BBQ and workshop was held in May 2010 with over 35 attendees from the subdivision plus representatives from the Colorado State Forest Service, the San Juan Public Lands Center, Durango Fire and Rescue Authority and the Firewise Council of Southwest Colorado. Periodic updates on the process and Plan progress have been made at the regular monthly Metro Board meetings.

A meeting of the core group was held in July 2010 to review the May workshop input and provide additional input to the Plan. Discussion on emergency response access, staging areas, evacuation routes and the WUI area was held. Representatives from the Colorado State Forest Service, US Forest Service and Bureau of Land Management, Durango Fire and Rescue Authority, La Plata County Office of Emergency Management, Firewise Council of Southwest Colorado and the Plan contractor attended.

The Metro District Board has received process and planning input from Craig Goodell, Fuels Mitigation and Education Specialist for the San Juan Public Lands Center (USDA Forest Service and USDI Bureau of Land Management); Kent Grant, Colorado State Forest Service Durango District Forester; Butch Knowlton, La Plata County Emergency Management; Dan Noonan, Dave Abercrombie and Hal Doughty, Durango Fire and Rescue Authority; Pam Wilson and Tammy Tyner, Firewise Council of Southwest Colorado; Bruce Short, Short Forestry, LLC, forest and fire management consultant; and members of the Durango West Two community.

B. Desired Future Condition

The Desired Future Condition (DFC) for Durango West Two has been developed through the collaborative CWPP process. The DFC is:

Durango West Two is a desirable, semi-rural forested community safe from catastrophic wildfire moving into or through the community. Homes are not vulnerable to wildfire by the use of fire-resistant construction methods and

landscaping. Natural fuels are maintained at levels which would support only low intensity surface fires characteristic of the native forest ecosystem.

6. RESOURCE ASSESSMENT AND TRENDS

A. Forest Health

The forested stands in the common space are in good condition overall. There have been localized losses of ponderosa pine to ips and western pine beetles. Branch and tip kill was noted in the greenbelt surrounded by Oak Drive. This was likely caused by the southwestern pine tip moth (*Rhyacionia neomexicana*) and branch breakage by heavy snowfall in the winters of 2008-9 and 2009-10. Limited mechanical damage to aspen and other species planted around homes was noted across the subdivision. Some damage was from deer and elk rubbing or eating bark and foliage. Other damage was branch and top breakage caused by ice and snow buildup early or late in the snow season.

Portions of the ponderosa pine stands in the green space are overstocked with densities of 120 square feet of basal area per acre or more. The densest stands are at risk from mountain pine beetle infestation. Mountain pine beetle mortality can contribute to fuel buildups and wildfire control difficulties.

B. Fuels and Fire Hazard



Typical Ponderosa Pine Stand, Fuel Model 2

1. Fuels

The subdivision sits in an 80 to 120 year old “second growth” ponderosa pine/gambel oak vegetation type. Stand densities range from 25 to 75 square feet of basal area per acre due to the interspersion of tree groups and meadow areas. Clumps of ponderosa pine within the stands run up to 120 square feet of basal area per acre however. Gambel oak densities are 800 to 1300 stems per acre on the north-facing slopes of Sheep Springs Gulch.

The major NFFL Fuel Models present across the subdivision and wildfire characteristics for each model (Anderson 1982) are:

Model 1 – Short Grass: Fire spread is governed by the fine and continuous herbaceous material that is cured or nearly so. Fire will not readily spread when fuel moisture is over 25%. Fires are surface fires that move rapidly through the cured grass and associated litter.

Model 2 – Timber/Grass: Fire spread is through the cured fine herbaceous and dead woody material present. Fires are generally surface fires but concentrations of fuels may produce torching and firebrands and move fire into the crown layer.

Model 6 – Dormant Brush and Piñon/Juniper: 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.

Model 8 – Closed Canopy Conifer: Fires generally carry across the surface litter with low flame lengths. Interlocking tree crowns and the presence of concentrations of fuels coupled with low humidities, high temperatures and moderate to high winds can increase spread rates and intensities and move fire into the tree crowns.



Fuel Models 2 and 6 with Ladder Fuels

The subdivision itself can be characterized as “urban”, with structures like houses and sheds as well as trees and shrubs around homes being the primary fuel sources for a wildfire. The open space is approximately equal amounts of Fuel Models 2 and 6. Tree crowns often touch and crown bases are often less than 5 feet off the ground. “Ladder” fuels are common with gambel oak and planted shrubs occurring directly under the tree crowns. Crown fire

potential is moderate even for low to moderate intensity fires. Pre-settlement fire frequency for the ponderosa pine/gambel oak vegetation type in southwest Colorado was 2 to 20 years and the fires were generally low intensity. Lightning potential is low to moderate based on past lightning-caused wildfires in the subdivision WUI area. Human-caused wildfire potential is considered to be moderate, based on the fuel availability and density of the subdivision.

Fire suppression over the last 75 years or more has produced fuel conditions that are higher than considered “normal” for the ponderosa pine/gambel oak vegetation type. “Ladder” fuels and thick litter layers are continuous over much of the area within and surrounding the subdivision. Development of the subdivision itself has produced structural fuels in close proximity to the heavier than normal natural fuels. The risk of crown fire has increased and the risk of loss of structures in a fire event is higher. The subdivision is located within the “Red Zone” designated by the Colorado State Forest Service as having “High” risk of loss of structures in a wildfire. The La Plata County Fire Risk map completed as a part of the County CWPP process rates the area containing Durango West Two as

“Higher” risk. Natural fuel loads and fuel continuity would be expected to continue to increase if not treated.

Areas outside the subdivision which are considered to be of high risk for wildfire moving into the subdivision are the mouths of Sheep Springs and Cherry Gulches along Highway 160 to the east of the subdivision.

2. Structural Vulnerability

Structural ignitability is varied across the subdivision. Structures range from wood siding on wood framed houses to logs to combination wood or “masonite” siding with brick or stone fascias to stucco. Roofing is dominated by asphalt shingles, with metal a secondary material. As homeowners replace older roofing, metal is becoming more popular. A few structures still have wood shake shingles. Many houses have attached wood decks and porch



Structure with wood privacy fence and moderate ladder fuels

structures. Trees are often within 5 feet of the residence and pine needle buildup on roofs is common. Many houses have junipers planted next to them as landscaping or for ground cover. Native gambel oak is common on the lots and in the common space. Bark or wood chips are common as landscaping materials or as mulches in planting beds next to houses. Privacy fences are usually wood construction. Due to the close juxtaposition of heavy natural fuels and relatively flammable structural fuels, any structural fire occurring within the subdivision in the summer and fall has a high probability of turning into a wildfire. This situation also means that a wildfire moving into the subdivision currently has a high probability of causing structure loss.

Access to the fronts of the residences is generally good, but streets are relatively narrow for large urban fire apparatus. Access to the rear of residences is fair to poor, particularly in the winter.

Street width is moderately good (30 feet) and the streets are paved, but vehicles parked along the streets may limit accessibility for large urban fire apparatus. Cul-de-sac turnarounds may be insufficient for large fire trucks due to cul-de-sac sizes and vehicles parked along the curbsides.

C. Values At Risk

Socio/Economic

The forested ambiance of the subdivision is valued by its residents. House pets are common. Durango West Two is a moderate cost subdivision close to Durango, so the location is prized by its residents. Many residents have detached sheds in addition to their homes. Outdoor gazebos and hot tubs are also present.

Ecological

The setting of Durango West Two is forested, so loss of the trees from wildfire would have a significant impact to the ambiance of the community, even if any structures lost were rebuilt. 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 silt and clay loams with low to moderate erodibility and moderate to good fertility.

The water originating from the watershed containing the subdivision flows into Lightner Creek and then into the Animas River upstream from the Animas-La Plata pumping station. Introduction of soot and sediment due to a wildfire within the watershed would compromise water quality in the Animas and the new Lake Nighthorse Reservoir.

Ecosystem health for the WUI is fair to moderate. Lack of frequent fire has increased the size of the oak component, lowered crown base height in the ponderosa pine and increased needle and leaf litter depths. Some forest management has occurred on the Ute Mountain Ute tribal ownerships and in some of the tracts bordering Durango West Two, but the forested stands are overstocked across the WUI in general.

D. Protection Capability

The subdivision is served by Station #9 of the Durango Fire and Rescue Authority (DFRA), located on Woodcrest Drive in the Durango West One subdivision. The Station is staffed by nine volunteer firefighters, all of whom have National Wildfire Coordinating Group (NWCG) wildland firefighting qualifications. DFRA has three stations staffed 24/7, two of which are within 10 miles of the subdivision. An additional Type 6 brush engine is staffed from May through October by the Authority. Station #8 at Rafter J Estates subdivision has eight volunteer firefighters, a Type 1 engine, a Type 6 brush engine and water tender. The Fort Lewis Mesa FPD is also available under the mutual aid agreement with DFRA. Training of all DFRA firefighting staff, including volunteers, is conducted by the Authority.

There are 26 fire hydrants across the subdivision. Water is provided by four operational wells and Lake Durango. Average monthly water storage for 2009 and the first half of 2010 was 1,246,735 gallons. Situations requiring use of multiple hydrants may result in low water pressures or lack of water at some hydrants (personal communication with former DFRA Deputy Chief Allen Clay).

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

E. Emergency Evacuation

Evacuation actions are the responsibility of the La Plata County Sheriff's Office and the La Plata County Office of Emergency Management. Evacuation of the subdivision in an emergency could be hampered by the single major access point for the subdivision. A secondary emergency access is available on the northwest part of Aspen Drive, but it is normally gated and locked. A gated and locked access road to the water wells in Sheep Springs Gulch in the northeast part of the subdivision could be used to access Highway 160 via Terlun Drive through the Mira Monte Subdivision. However, many residents may not know how to access it since it originates at a driveway for a residence on Oak Drive. A dedicated access point for emergency vehicles and staging area could be developed in the southeast portion of the subdivision near the tennis courts. An old re-vegetated road prism exists just west of the tennis courts on common space that can provide a connection between Highway 160 and Pine Ridge Loop. Development of this access point would require installation of a gate at Highway 160 and coordination with Colorado Department of Transportation. The potential evacuation routes and staging area are shown on the Potential Emergency Evacuation Routes Map in Appendix A.

7. MITIGATION ACTION PLAN

A. Education and Community Outreach

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

Outreach methods include:

- Educational information included with Metro District billings.
- Educational community workshops sponsored by the Colorado State Forest Service, the Firewise Committee of Southwest Colorado or other organizations.
- A checklist of recommended wildfire mitigation techniques distributed to all homeowners by the Metro District.
- Periodic sponsored fuels treatment events with the residents sharing expertise and equipment such as chippers or tub grinders sponsored by the Metro District.

B. Policy

Authority for managing vegetation on Metro District property comes from Title 32 of the State of Colorado regulations governing Special Metropolitan Districts. Additional authorities for defensible space and driveway alignment and width for fire apparatus access have been proposed by La Plata County but have not been enacted at this time.

C. Fuel Mitigation Treatments

Durango West Two has 30% of the land base of the subdivision in common space owned by the Metro District. Most of the common space has native trees and shrubs in a similar condition to that on the privately owned lots. The Metro District has received a fuels mitigation grant from Colorado State Forest Service and is moving forward with fuels mitigation on the common property. The primary strategy is to remove ladder fuels, reduce built-up litter and thin overstocked clumps of trees to improve general forest health. The second strategy is to demonstrate the types of fuels mitigation needed to the residents and surrounding landowners.

The State of Colorado is concerned about the size and intensity of wildfires occurring across the state in recent years. The State Legislature enacted HB 1110 in 2008 which allows a deduction of 50% of the cost of wildfire mitigation in

Wildland–Urban Interface areas covered by a Community Wildfire Protection Plan from an individual’s income. For the tax years 2009-2013 up to \$2500 may be excluded from taxable income for mitigation work.

Metropolitan District #2

Recommended Metro District wildfire mitigation measures and treatments for 2010 and future years by priority are:

Priority	Project Description	Estimated Cost	Target Dates	Accomplished
1	Provide a “Checklist” of wildfire protection measures to current and new residents	\$500	2011 - 2016	In Progress
2	Remove ladder fuels under pines and reduce continuity of surface fuels by removing small trees, oak and shrubs under and within five feet of the edge of the crowns of the ponderosa pines on selected parts of the common space. Thin over-dense clumps of ponderosa pine to residual densities of 60 to 80 square feet of basal area to reduce the threat of crown fires. (Planned Treatment Map - Appendix A)	\$35,000	2011	In Progress
3	Prune oak and low-hanging tree branches close to road rights-of-way to assist fire equipment access	\$2,500	2011 - 2016	
4	Mow 20-foot strip around exterior of grassy common space areas when fire danger reaches “Very High” status	\$3,000 annually	2011 - 2016	
5	Assist homeowners in establishing a community forestry or Firewise Committee. Encourage at least 2 residents to become Firewise Ambassadors	No Cost	2011	
6	Develop a subdivision emergency notification and evacuation plan in consultation with DFRA, La Plata County Office of Emergency	\$5,000	2012	

	Management and the subdivision residents. The plan would include alternate ingress/egress points and fire equipment staging areas in the subdivision.			
7	Develop a slash disposal site for subdivision residents. Consider chipping and composting of woody slash in coordination with La Plata County and other subdivisions in the area	\$5,000 annually	2012	
8	Maintain the Metro District ownership within the subdivision as shaded fuelbreaks where feasible.	\$4,000 annually	2011-2016	

Subdivision Homeowners

The following projects are recommended for the homeowners in Durango West Two.

Priority	Project Description	Estimated Cost	Target Dates	Accomplished
1	Formation of a community forestry or Firewise committee is recommended to serve as a coordinator for homeowner wildfire mitigation and forest enhancement activities. The committee would also be the community point of contact for organizations such as the Colorado State Forest Service and the Firewise Committee of Southwest Colorado	\$1,000	2011	
2	Store firewood at least 25 feet away from residences	No Cost	2010-2016	
3	Remove flammable plantings like low junipers and heavy pine needle and leaf litter within 10 feet of residences and decks. Remove pine needles and leaves from roofs and gutters annually	\$500 per lot	2011-2016	
4	Modify subdivision covenants	\$2,500	2011	

	to encourage thinning and pruning of trees consistent with CSU Extension publication 6.302 <i>Creating Defensible Space</i> on residential lots; use of fire-resistant plants and fire-resistant landscaping materials; and use of fire-resistant roofs and siding materials in new and remodel construction			
5	Creation of a 100 foot wide shaded fuelbreak on lots on the north and west sides of the subdivision is recommended (Recommended Treatment Map – Appendix A)	\$1,200 per lot	2013	
6	Thin trees on residential lots to achieve crown spacing of at least 5 feet for deciduous trees (e.g. aspen, green ash) and 10 feet for conifers (e.g. pine, spruce). Prune trees to eliminate branches overhanging structures	\$1,500 per lot	2011 – 2016	

Adjoining Ownerships

The following treatments are recommended for areas within the WUI outside the Durango West Two subdivision boundary. These treatments would require coordination with and permission of the landowners in the recommended treatment areas.

Priority	Project Description	Estimated Cost	Target Dates	Accomplished
1	Recommend removing ladder fuels beneath ponderosa pines and Douglas-firs along the north side of Sheep Springs Gulch between Highway 160 and the Durango West Two boundary (Recommended Treatment Map – Appendix A)	\$800 per acre	2014	

8. MONITORING AND EVALUATION

Multiple stakeholders are involved with monitoring and evaluation of outreach, education and mitigation efforts within the Durango West Two subdivision and it's WUI.

A. Monitoring

The monitoring actions and the responsible stakeholders are:

Monitoring Action	Frequency	Responsibility
Ensure semi-annual community work days are occurring	2 times per year	Metro District Board
Annual Report to the Community, Firewise Council of SW Colorado , Colorado State Forest Service	Annually	Metro District Board
Field review of mitigation treatments	Bi-annual	CSFS and DFRA
Annual Review of CWPP	Annual	Metro District Board
Periodic Review of CWPP	No longer than 5 years	CSFS and DFRA

B. Evaluation

Evaluation Actions and the responsible stakeholder are as follows:

Evaluation Action	Frequency	Responsibility
Annual Report will list "Lessons Learned" from fuels mitigation projects and activities over the preceding year	Annually	Metro District Board
Measure progress by degree of accomplishment of mitigation treatments	Annually	Metro District Board
Measure effectiveness of treatments	Bi-annual	CSFS

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 14 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 80 to 120 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 functional unit consisting of all the living organisms (plants, animals, microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size a log, pond, field, forest, or the earth's biosphere but it always functions as a whole unit. Ecosystems are commonly described according to the major type of vegetation; for example, forest ecosystem, old-growth ecosystem, or range ecosystem.

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

natural regeneration: trees or an age class of trees growing from natural seeding or natural vegetative reproduction (suckering, layering or sprouting).

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

second-growth forest: a relatively young forest that has been regenerated naturally or artificially after some drastic interference such as extensive cutting, wildfire, insect or disease attack, or blowdown

seedling: (a) a tree, usually less than 2 inches in DBH, which has grown from a seed (in contrast to a sprout). (b) a nursery grown tree which has not been lifted and replanted in the nursery (see transplant)

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

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.

10. LITERATURE CITED

Anderson, H.E. 1982. Aids to Determining Fuel Models for Estimating Fire Behavior. USDA Forest Service General Technical Report INT-GTR-122. Intermountain Forest and Range Experiment Station. Ogden, UT. 22 p.

Dennis, F.C. 1999. Creating Wildfire-Defensible Zones. Colorado State University Cooperative Extension Resource Publication no. 6.302. 6 p.

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

Dennis, F.C. 1999. Firewise Plant Materials. Colorado State University Cooperative Extension Resource Publication no. 6.305. 6 p.

Dennis, F.C.. Fuel Break Guidelines for Forested Subdivisions & Communities. Colorado State Forest Service. 8 p.

APPENDICES

A. Maps

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

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

D. Firewise Plant Materials (CSU Publication 6.305, F. C. Dennis)

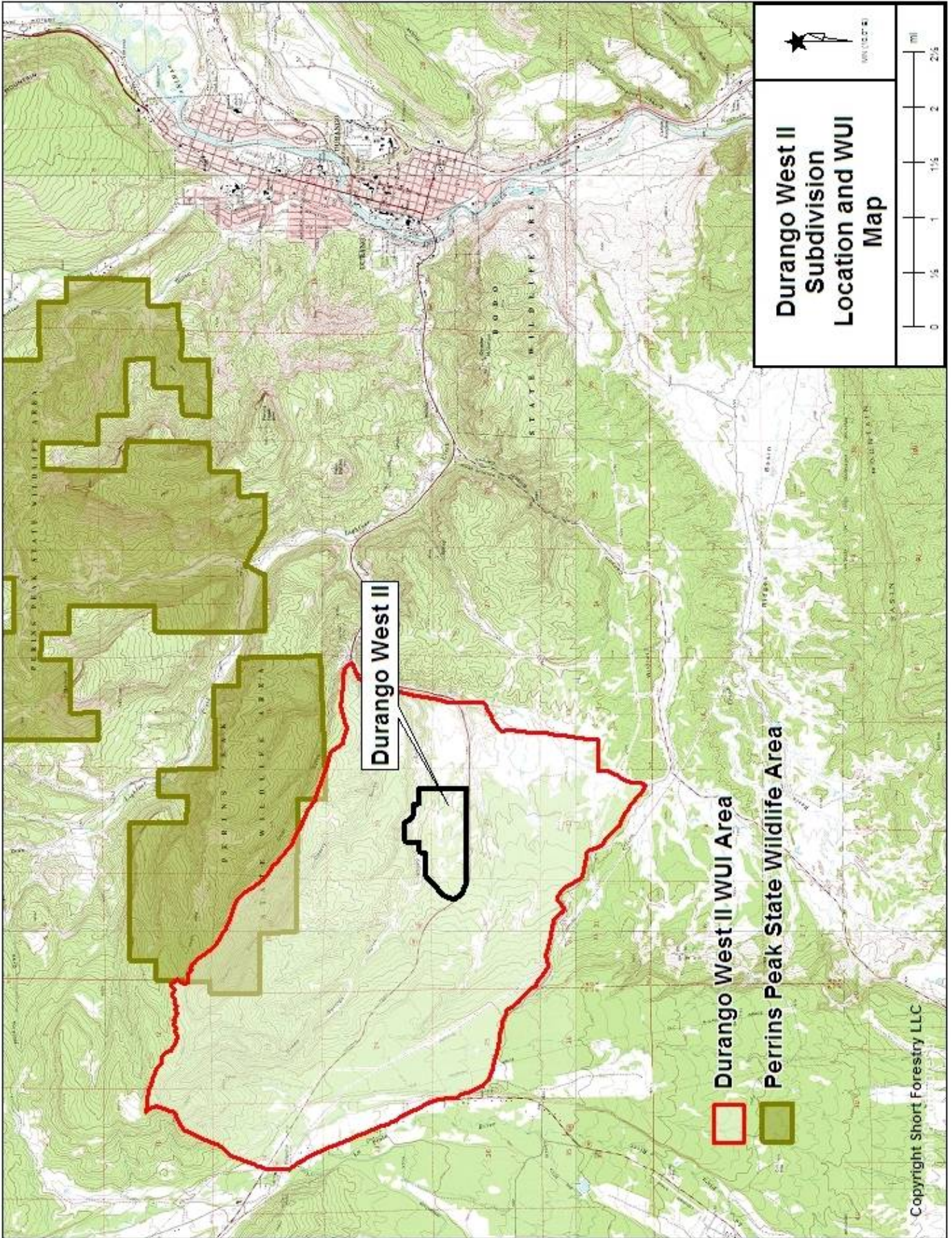
E. Fire-Resistant Landscaping (CSU Publication 6.303, F. C. Dennis)

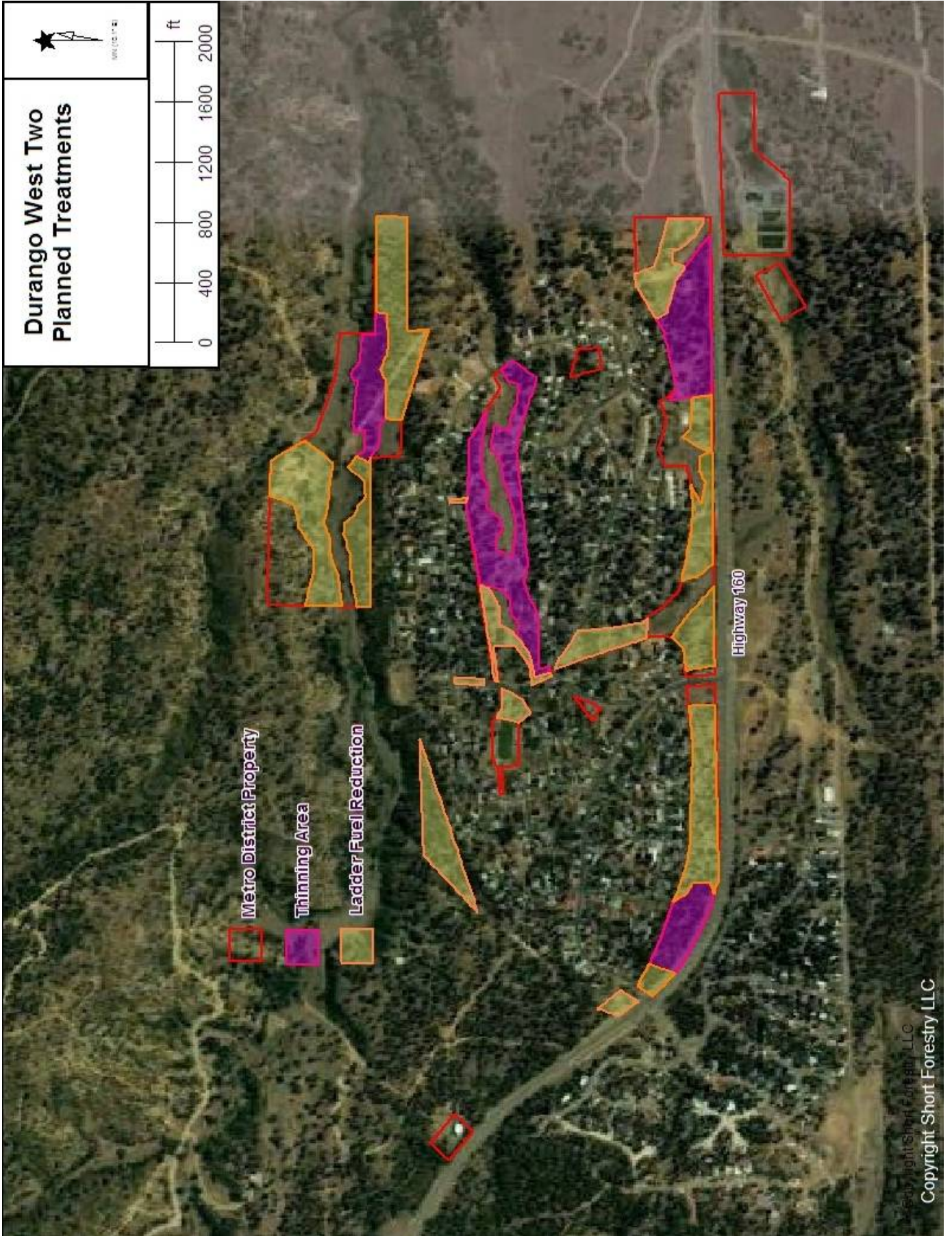
F. Homeowner Checklist for Wildfire Protection

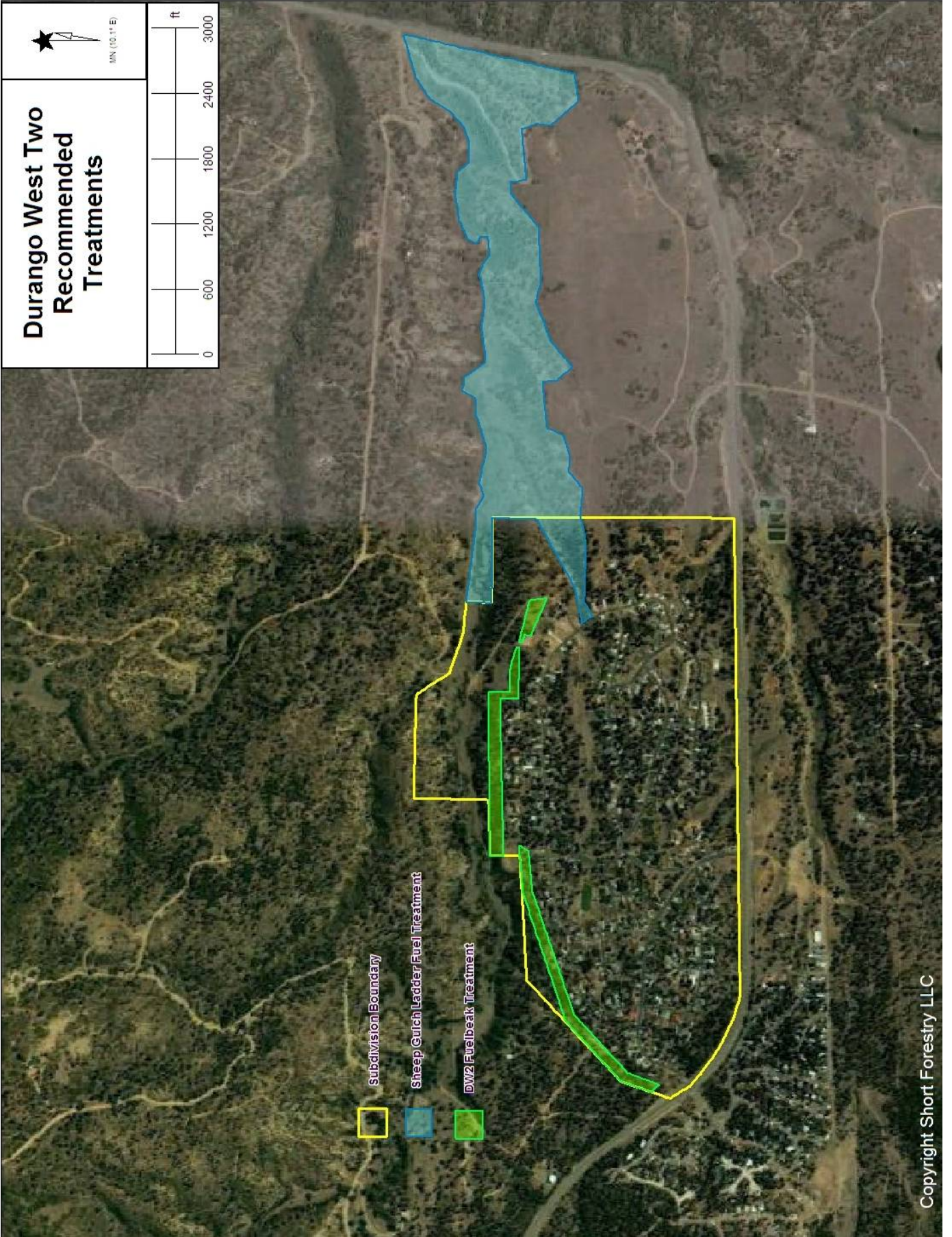
Appendix A

Maps

- 1. Location and WUI Area**
- 2. Planned Fuels Treatments**
- 3. Recommended Fuels Treatments**
- 4. Evacuation Routes**
- 5. Fuels Map**

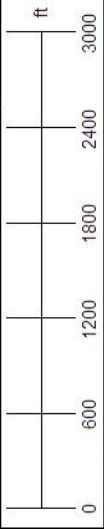




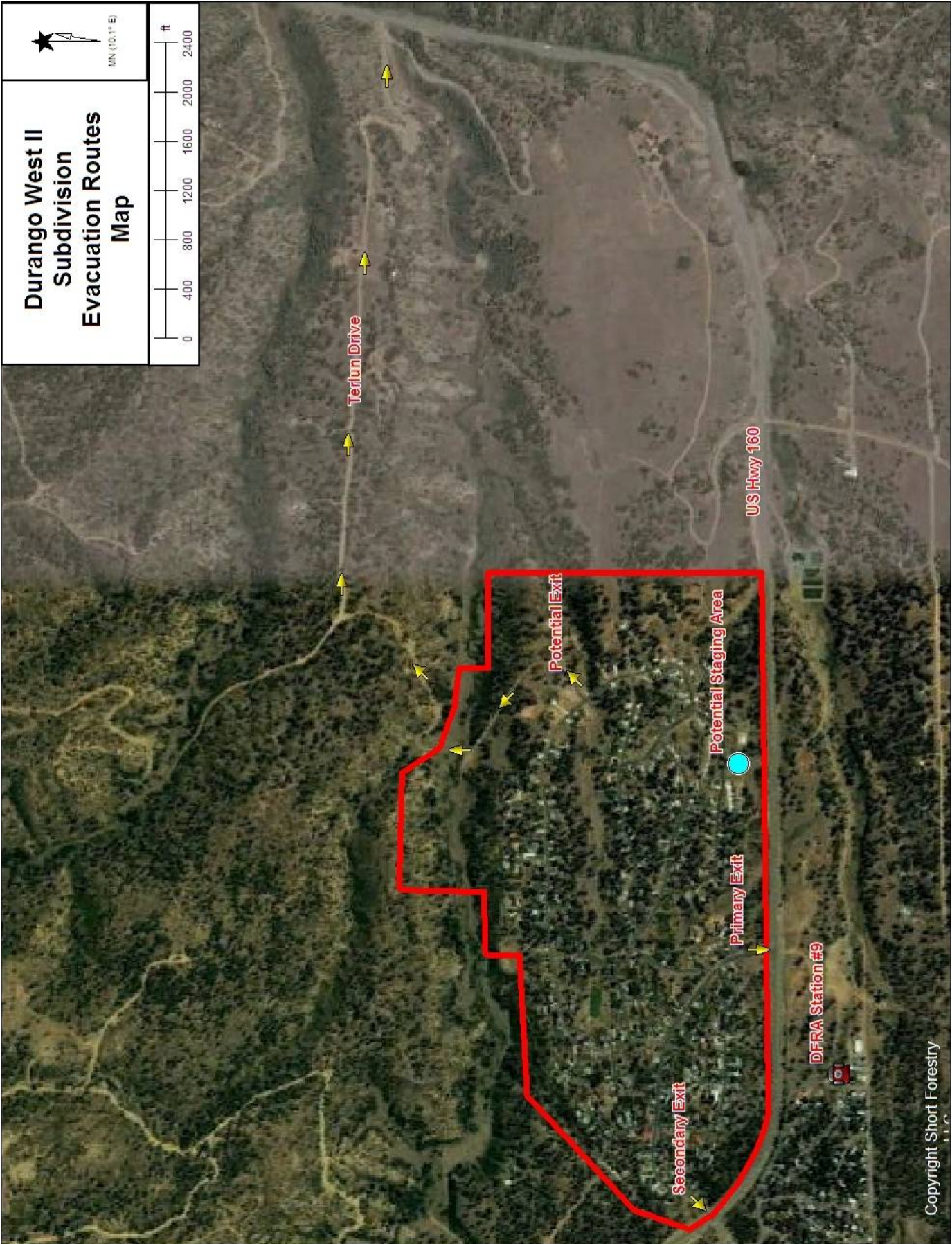


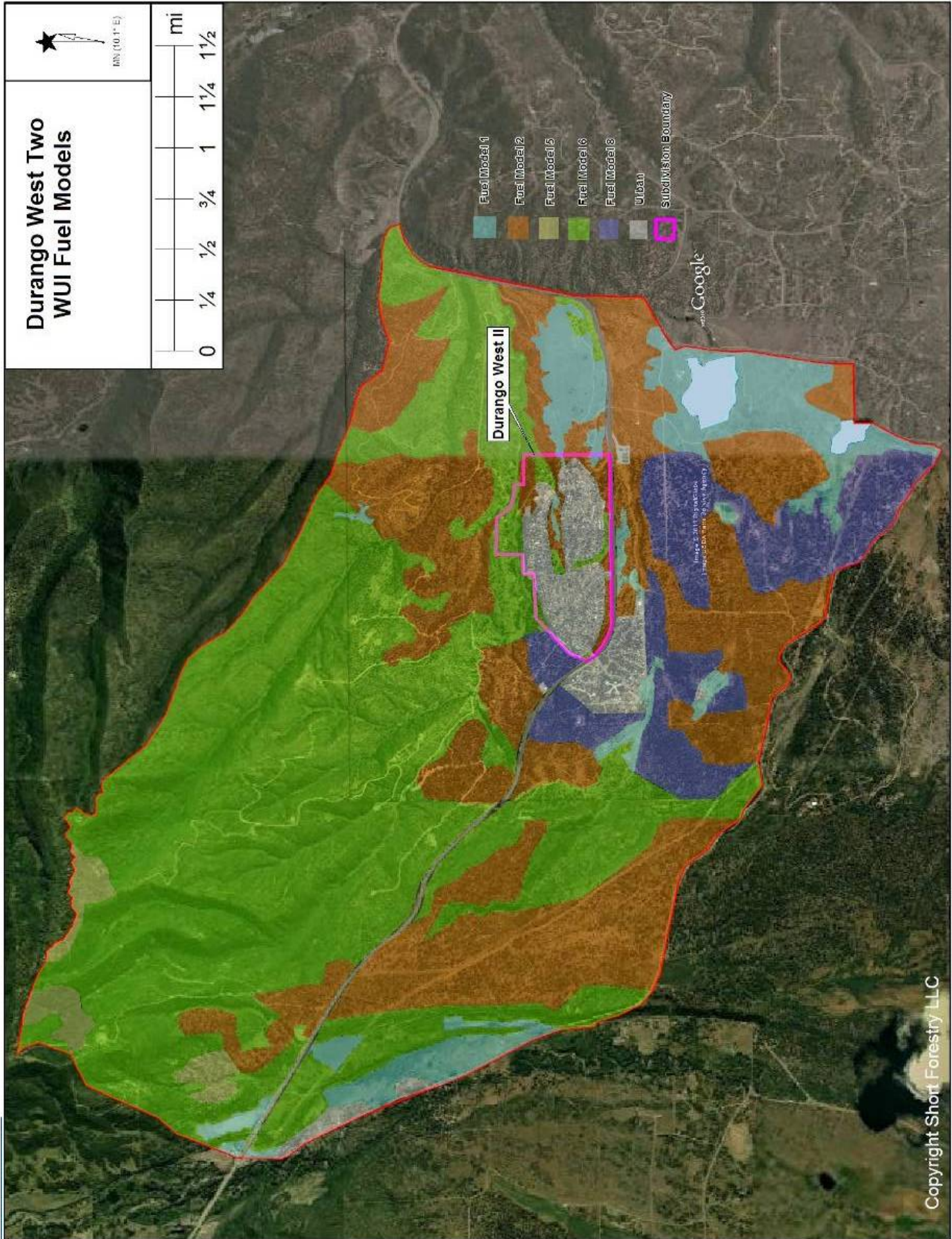
**Durango West Two
Recommended
Treatments**

MN 10 1° E



- Subdivision Boundary
- Sheep Catch Ladder Fuel Treatment
- DW2 Fuelbeak Treatment





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,

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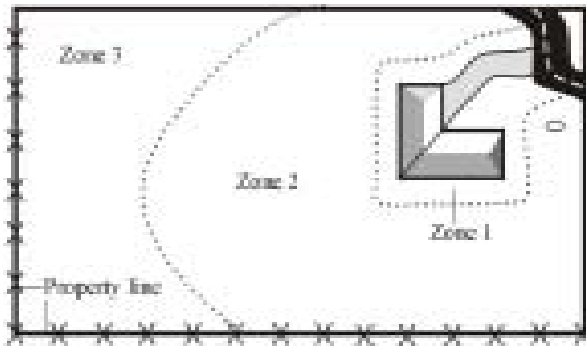


Figure 1: Forested property showing the three fire-defensible zones around a home or other structure.

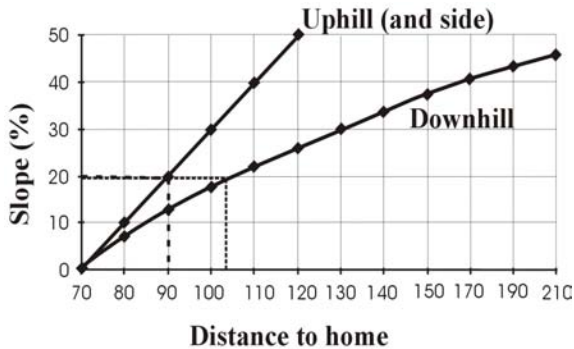


Figure 2: This chart indicates the minimum recommended dimensions for defensible space from the home to the outer edge of Zone 2. For example, if your home is situated on a 20 percent slope, the minimum defensible space dimensions would be 90 feet uphill and to the sides of the home and 104 feet downhill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

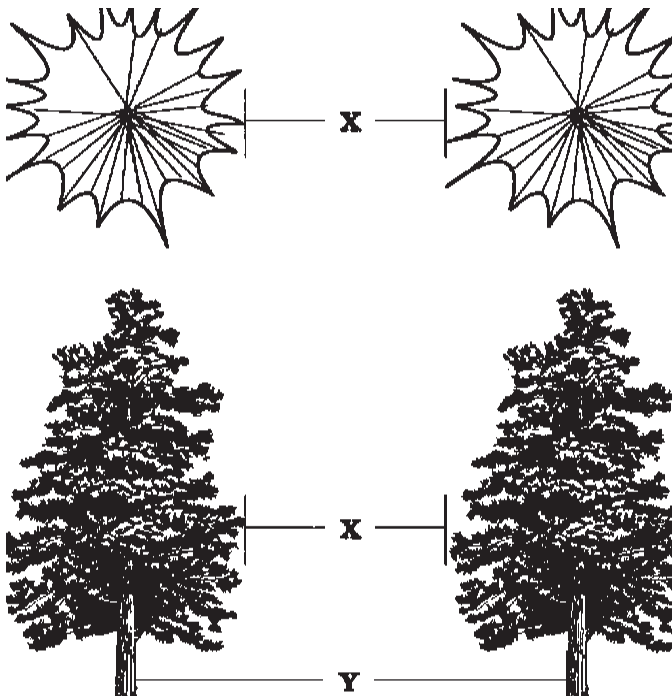


Figure 3: X = crown spacing; Y = stem spacing. Do not measure between stems for crown — measure between the edges of tree crowns.

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

% 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 4: Minimum tree crown and shrub clump spacing.

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

Figure 5: Minimum tree spacing for Zone 3.

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.

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

Figure 6: Minimum defensible space size for grass fuels.

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.



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

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

- Trash and debris accumulations are removed from the defensible space.
- A checklist for fire safety needs inside the home also has been completed.

This is available from your local fire department.

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*
- 7.205, *Pruning Evergreens*
- 7.206, *Pruning Shrubs*
- 7.207, *Pruning Deciduous Trees*

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

¹Wildfire Hazard Mitigation Coordinator,
Colorado State Forest Service.

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Appendix C

Fuelbreak Guidelines for Forested Subdivisions and Communities



Fuelbreak Guidelines for Forested Subdivisions & Communities

By

Frank C. Dennis



Knowledge to Go Places

This publication was developed for use by foresters, planners, developers, homeowners' associations and others. Implementation of these measures cannot *guarantee* safety from all wildfires, but will greatly increase the probability of containing them at more manageable levels.



Inadequate fire planning can result in loss of life or property and costly suppression activities.



Colorado's forested lands are experiencing severe impacts from continuing population increases and peoples' desire to escape urban pressures. Subdivisions and developments are opening new areas for homesite construction at an alarming rate, especially along the Front Range and around recreational areas such as Dillon, Vail, and Steamboat Springs.

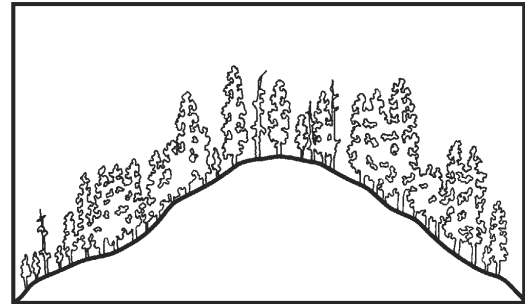
But with development inevitably comes a higher risk of wildfire as well as an ever-increasing potential for loss of life and property. Methods of fire suppression, pre-suppression needs, and homeowner and fire crew safety must all be considered in the planning and review of new developments as well as for the "retrofitting" of existing, older subdivisions.

Fuelbreaks should be considered in fire management planning for subdivisions and developments; however, the following are guidelines **only**. They should be customized to local areas by professional foresters experienced in Rocky Mountain wildfire behavior and suppression tactics.

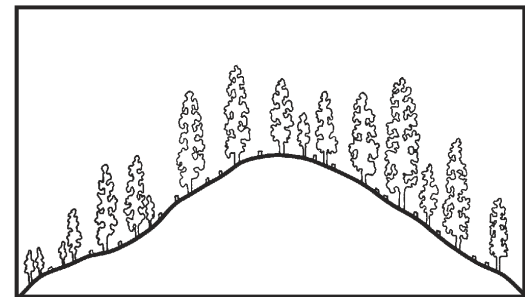
Fuelbreak vs Firebreak

Although the term fuelbreak is widely used in Colorado, it is often confused with firebreak. The two are entirely separate, and aesthetically different, forms of forest fuel modification and treatment.

- A firebreak is strip of land, 20 to 30 feet wide (or more), in which all vegetation is removed down to bare, mineral soil each year prior to fire season.



Above, cross section of mixed conifer stand before fuelbreak modification. Below, after modification.



- A fuelbreak (or shaded fuelbreak) is an easily accessible strip 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. Brush, heavy ground fuels, snags, and dead trees are disposed of and an open, park-like appearance is established.

The following is a discussion of the uses, limitations, and specifications of fuelbreaks in wildfire control and fuels management.

Fuelbreak Limitations

Fuelbreaks provide quick access for wildfire suppression. Control activities can be conducted more safely due to low fuel volumes. Strategically located, they break up large, continuous tracts of dense timber, thus limiting uncontrolled spread of wildfire.

Fuelbreaks can aid firefighters greatly by slowing fire spread under normal burning conditions. However, under extreme conditions, even the best fuelbreaks stand little chance of arresting a large



Before and after photos of a forest stand thinned to reduce fuel loads.

fire, regardless of firefighting efforts. Such fires, in a phenomenon called “spotting,” can drop firebrands 1/8-mile or more ahead of the main fire, causing very rapid fire spread. These types of large fires may continue until there is a major change in weather conditions, topography, or fuel type.

It is critical to understand: A fuelbreak is the line of defense. The area (including any homes and developments) between it and the fire may remain vulnerable.

In spite of these somewhat gloomy limitations, fuelbreaks have proven themselves effective in Colorado. During the 1980 Crystal Lakes Subdivision Fire near Fort Collins, crown fires were stopped in areas with fuelbreak thinnings, while other areas of dense lodgepole pine burned completely. A fire at O’Fallon Park in Jefferson County was successfully stopped and controlled at a fuelbreak. The Buffalo Creek Fire in Jefferson County (1996) and the High Meadow Fire in Park and Jefferson Counties (2000) slowed dramatically wherever intense forest thinnings had been completed. During the 2002 Hayman Fire, Denver Water’s entire complex of offices, shops and caretakers’ homes at Cheesman Reservoir were saved by a fuelbreak with no firefighting intervention by a fuelbreak.



Burned area near Cheesman Reservoir as a result of the Hayman Fire. Note the unburned green trees in the middle right of the photo, a treated fuelbreak.

The Need For A Fuelbreak

Several factors determine the need for fuelbreaks in forested subdivisions, including: (1) potential problem indicators; (2) wildfire hazard areas; (3) slope; (4) topography; (5) crowning potential; and (6) ignition sources.

Potential Problem Indicator

The table below explains potential problem indicators for various hazards and characteristics common to Colorado’s forest types. All major forest types, except aspen, indicate a high potential for wildfire hazard.

Fuel Type	Characteristics			Hazards			
	Aesthetics	Wildlife	Soil	Wildfire	Avalanche	Flood	Climate
Aspen	2	3	3	2	4	3	2
Douglas-fir	2	2	3	5	2	2	3
Greasewood-Saltbrush	4	2	2	2	1	3	3
Limber-Bristlecone Pine	3	2	4	3	4	2	5
Lodgepole Pine	2	2	3	5	4	2	4
Meadow	5	4	4	2	3	4	3
Mixed Conifer	2	1	1	5	3	1	3
Mountain Grassland	5	3	4	3	3	2	4
Mountain Shrub	3	5	4	4	2	2	3
Piñon-Juniper	2	3	4	4	2	3	2
Ponderosa Pine	2	3	1	5	2	2	3
Sagebrush	4	4	3	3	3	2	3
Spruce-Fir	2	3	3	4	5	3	4

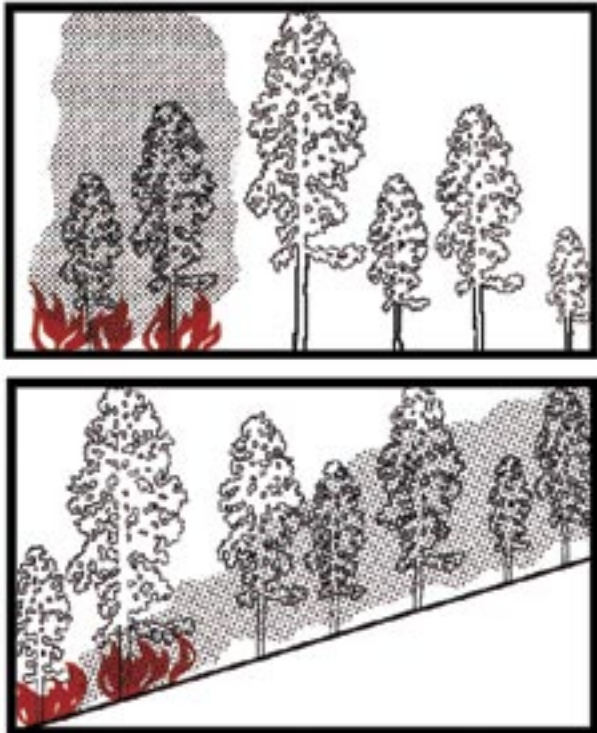
Legend: 5 – Problem may be crucial; 4 – Problem very likely; 3 – Exercise caution; 2 – Problem usually limited; 1 – No rating possible

Wildfire Hazard Maps

The Colorado State Forest Service (CSFS), numerous counties and some National Forests have completed wildfire hazard mapping for many areas within Colorado, particularly along the Front Range. These maps typically consider areas with 30 percent or greater slope; hazardous fuel types; and hazardous topographic features such as fire chimneys. Wildfire Hazard Ratings may be depicted in several ways. Whatever system is used, areas rated moderate or higher should be considered for fuel modification work.

Slope

Rate of fire spread increases as the slope of the land increases. Fuels are preheated by the rising smoke column or they may even come into contact with the flames themselves.



Fire effects, flat vs steep terrain. Note preheating of fuels on steep ground from passage of smoke column.

At 30 percent slope, rate of fire spread doubles compared to rates at level ground, drastically reducing firefighting effectiveness. **Areas near 30 percent or greater slopes are critical and must be reviewed carefully.**

Topography

Certain topographic features influence fire spread and should be evaluated. Included are fire chimneys, saddles, and V-shaped canyons. They are usually recognized by reviewing standard U.S.G.S. quad maps.

- Chimneys are densely vegetated drainages on slopes greater than 30 percent. Wind, as well as air pre-heated by a fire, tends to funnel up these drainages, rapidly spreading fire upslope.

- Saddles are low points along a main ridge or between two high points. Like chimneys, they also funnel winds to create a natural fire path during a fire's uphill run. Saddles act as corridors to spread fire into adjacent valleys or drainages.



Chimney.



Saddle.

- Narrow, V-shaped valleys or canyons can ignite easily due to heat radiating from one side to the other. For example, a fire burning on one side of a narrow valley dries and preheats fuels on the opposite side until the fire "flashes over." The natural effect of slope on fire then takes over and fire spreads rapidly up drainage and uphill along both sides of the valley.



Flashover in V-shaped valley.

Crowning Potential

An on-site visit is required to accurately assess crowning potential. A key, below, helps determine this rating. Fuel modification is usually unnecessary if an area has a rating of 3 or less.

Crowning Potential Key

	Rating
A. Foliage present, trees living or dead — B	
B. Foliage living — C	
C. Leaves deciduous or, if evergreen, usually soft, pliant, and moist; never oily, waxy, or resinous.	0
CC. Leaves evergreen, not as above — D	
D. Foliage resinous, waxy, or oily — E	
E. Foliage dense — F	
F. Ladder fuels plentiful — G	
G. Crown closure > 75 percent	9
GG. Crown closure < 75 percent	7
FF. Ladder fuels sparse or absent — H	
H. Crown closure > 75 percent	7
HH. Crown closure < 75 percent	5
EE. Foliage open — I	
I. Ladder fuel plentiful	4
II. Ladder fuel sparse or absent	2
DD. Foliage not resinous, waxy, or oily — J	
J. Foliage dense — K	
K. Ladder fuels plentiful — L	
L. Crown closure > 75 percent	7
LL. Crown closure < 75 percent	4
KK. Ladder fuels sparse or absent — M	
M. Crown closure > 75 percent	5
MM. Crown closure < 75 percent	3
JJ. Foliage open — N	
N. Ladder fuels plentiful	3
NN. Ladder fuels sparse or absent	1
BB. Foliage dead	0

The majority of dead trees within the fuelbreak should be removed. Occasionally, large, dead trees (14 inches or larger in diameter at 4 1/2 feet above ground level) may be retained as wildlife trees. If retained, all ladder fuels must be cleared from around the tree's trunk.

Ignition Sources

Possible ignition sources, which may threaten planned or existing developments, must be investigated thoroughly. Included are other developments and homes, major roads, recreation sites, railroads, and other possible sources. These might be distant from the proposed development,

yet still able to channel fire into the area due to slope, continuous fuels, or other topographic features.

Fuelbreak Locations

In fire suppression, an effective fire line is connected, or "anchored," to natural or artificial fire barriers. Such anchor points might be rivers, creeks, large rock outcrops, wet meadows, or a less flammable timber type such as aspen. Similarly, properly designed and constructed fuelbreaks take advantage of these same barriers to eliminate "fuel bridges." (Fire often escapes control because of fuel bridges that carry the fire across control lines.)

Since fuelbreaks should normally provide quick, safer access to defensive positions, they are necessarily linked with road systems. Connected with county-specified roads within subdivisions, they provide good access and defensive positions for firefighting equipment and support vehicles. Cut-and fill slopes of roads are an integral part of a fuelbreak as they add to the effective width of modified fuels.

Fuelbreaks without an associated road system, such as those located along strategic ridge lines, are still useful in fire suppression. Here, they are often strengthened and held using aerial retardant drops until fire crews can walk in or be ferried in by helicopter.

Preferably, fuelbreaks are located along ridge tops to help arrest fires at the end of their runs. However, due to homesite locations and resource values, they can also be effective when established at the base of slopes. Mid-slope fuelbreaks are least desirable, but under certain circumstances and with modifications, these too, may be valuable.

Fuelbreaks are located so that the area under management is broken into small, manageable units. Thus, when a wildfire reaches modified fuels, defensive action is more easily taken, helping to keep the fire small. For example, a plan for a subdivision might recommend that fuelbreaks break up continuous forest fuels into units of 10 acres or less. This is an excellent plan, especially if defensible space thinning is completed around homes and structures, and thinning for forest management and forest health are combined with the fuelbreak.

When located along ridge tops, continuous length as well as width are critical elements. Extensive long-range planning is essential in positioning these types of fuelbreaks.

Aesthetics

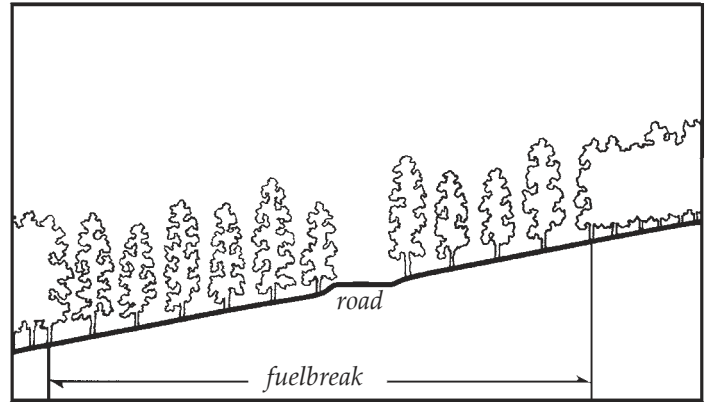
Improperly planned fuelbreaks can adversely impact an area's aesthetic qualities. Careful construction is necessary when combining mid-slope fuelbreaks with roads involving excessive cut-and-fill.



These photos, far- and near- views of the same site, illustrate that forest can be thinned without impacting aesthetics.

Care must also be taken in areas that are not thinned throughout for fuel hazard reduction. In such cases the fuelbreak visually sticks out like a "sore thumb" due to contrasting thinned and unthinned portions of the forest. (Especially noticeable are those portions of the fuelbreak above road cuts).

These guidelines are designed to minimize aesthetic impacts. However, some situations may require extensive thinning and, thus, result in a major visual change to an area. Additional thinning beyond the fuelbreak may be necessary to create an irregular edge and to "feather," or blend, the fuelbreak thinning into the unthinned portions of the forest. Any thinning beyond the fuelbreak improves its effectiveness and is highly recommended.



Cross-section of a typical fuelbreak built in conjunction with a road.

Constructing the Fuelbreak

Fuelbreak Width and Slope Adjustments

Note: Since road systems are so important to fuelbreak construction, the following measurements are from the toe of the fill for downslope distances, and above the edge of the cut for uphill distances.

The minimum recommended fuelbreak width is approximately 300 feet for level ground. Since fire activity intensifies as slope increases, the overall fuelbreak width must also increase. However, to minimize aesthetic impacts and to maximize fire crew safety, the majority of the increases should be made at the bottom of the fuelbreak, below the road cut.

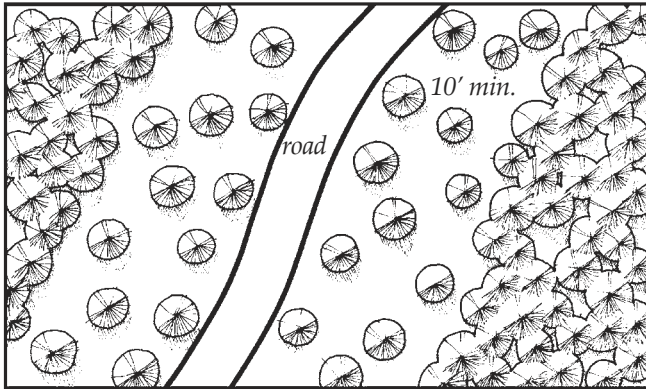
Widths are also increased when severe topographic conditions are encountered. Guidelines for fuelbreak widths on slopes are given below:

Fuelbreak Width/Slope			
Percent Slope (%)	Minimum Uphill Distance (ft)	Minimum Downhill Distance (ft)	Total Width of Modified fuels (ft)*
0	150	150	300
10	140	165	303
20	130	180	310
30	120	195	315
40	110	210	320
50	100	225	325
60	100	240	340

*As slope increases, total distance for cut-and-fill for road construction rapidly increases, improving fuelbreak effective width.

Stand Densities

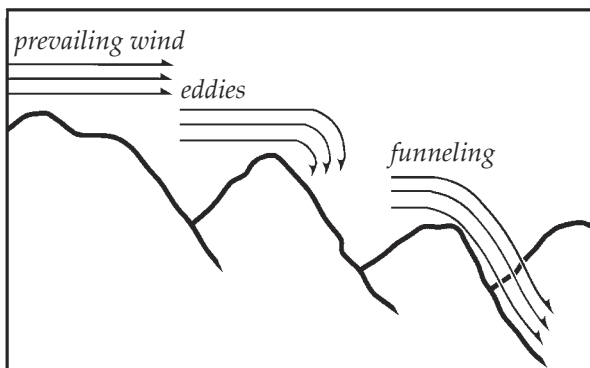
Crown separation is a more critical factor for fuelbreaks than a fixed tree density level. A *minimum* 10-foot spacing between the edges of tree crowns is recommended on level ground. As slope increases, crown spacing should also increase. However, small, isolated groups of trees may be retained for visual diversity. Increase crown spacing around any groups of trees left for aesthetic reasons and to reduce fire intensities and torching potential.



Plan view of fuelbreak showing minimum distance between tree crowns.

In technical terms, a fuelbreak thinning is classified as a heavy "sanitation and improvement cut, from below." Within fuelbreaks, trees that are suppressed, diseased, deformed, damaged, or of low vigor are removed along with all ladder fuels. Remaining trees are the largest, healthiest, most wind-firm trees from the dominant and co-dominant species of the stand.

Because such a thinning is quite heavy for an initial entry into a stand, prevailing winds, eddy effects, and wind funneling must be carefully evaluated to minimize the possibility of windthrow. It may be necessary to develop the fuelbreak over several years to allow the timber stand to "firm-up" — this especially applies to lodgepole pine and Engelmann spruce stands.



Topography affects wind behavior — an important consideration during fuelbreak construction.

Area-wide forest thinnings are recommended for any subdivisions. Such thinning is not as severe as a fuelbreak thinning, but generally should be completed to fuelbreak specifications along the roads (as outlined on page 6.) In addition, "defensible space thinnings" are highly recommended around all structures (see CSU Coop. Extension Fact sheet 6.302, *Creating Wildfire-Defensible Zones*).

Debris Removal

Limbs and branches left from thinning (slash) can add significant volumes of fuel to the forest floor, especially in lodgepole pine, mixed-conifer, or spruce/fir timber types. These materials can accumulate and serve as ladder fuels, or can become "jackpots," increasing the difficulty of defending the fuelbreak during a wildfire. **Slash decomposes very slowly in Colorado and proper disposal is essential.** Proper treatment reduces fire hazard, improves access for humans and livestock, encourages establishment of grasses and other vegetation, and improves aesthetics.

Three treatment methods are commonly used. These are lopping-and-scattering, piling and burning, and chipping. Mulching of small trees and slash using equipment similar to Hydro-axes or Timbcos equipped with mulching heads are becoming a popular method of treatment. Size, amount, and location of slash dictates the method used, in addition to cost and the final desired appearance. The method chosen will also depend on how soon an effective fuelbreak is needed prior to construction in new developments.



Lop and scatter: slash should be no deeper than 12" above ground surface.



Chipping is the most desirable, but also the most expensive method of slash disposal.



Piled slash can be burned but only during certain conditions, such as after a snowfall.

Fuelbreak Maintenance

Following initial thinning, trees continue to grow (usually at a faster rate). The increased light on the forest floor encourages heavy grass and brush growth where, in many cases, where little grew before. The site disturbance and exposed mineral soil created during fuelbreak development is a perfect seed bed for new trees that, in turn, create new ladder fuels. Thus, in the absence of maintenance, fuelbreak effectiveness will decrease over time.



Fuelbreak maintenance is essential. Ingrowth, shown above, will minimize the effectiveness of this fuelbreak within a few years.

Fuelbreak maintenance problems are most often the result of time and neglect. Misplaced records, lack of follow-up and funding, and apathy caused by a lack of fire events are some of the major obstacles. In addition, the responsibility for fuelbreak maintenance projects is often unclear. For example, control of a fuelbreak completed by a developer passes to a homeowner's association, usually with limited funds and authority to maintain fuelbreaks.

If fuelbreak maintenance is not planned and completed as scheduled, consider carefully whether the fuelbreak should be constructed. An un-maintained fuelbreak may lead to a false sense of security among residents and fire suppression personnel.

Conclusion

An image of well-designed communities for Colorado includes:

- Forested subdivisions where the total forest cover is well-managed through carefully planned, designed, and maintained thinnings. This contributes to reduced wildfire hazards and a much healthier forest — one that is more resistant to insects and disease.
- A system of roads and driveways with their associated fuelbreaks that break up the continuity of the forest cover and fuels. These help keep fires small, while also providing safer locations from which to mount fire suppression activities. In addition to allowing fire personnel in, they will allow residents to evacuate if necessary.
- Individual homes that all have defensible space around them, making them much easier to defend and protect from wildfire, while also protecting the surrounding forest from structure fires.

Creation of such communities is entirely feasible if recognition of the fire risks, a spirit of cooperation, an attitude of shared responsibility, and the political will exists.

*Colorado's mountains comprise diverse slopes, fuel types, aspects, and topographic features. This variety makes it impossible to develop general fuelbreak prescriptions for all locations. **The previous recommendations are guidelines only.** A professional forester with fire suppression expertise should be consulted to "customize" fuelbreaks for particular areas.*

Appendix D

Firewise Plant Materials



FORESTRY

FireWise Plant Materials

no. 6.305

by F.C. Dennis¹ (1/08)

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

Extension

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.	Sun/Shade Preference	Approx.	Elevation (1,000 ft.)					Approx.
		Water Needs		Mature Height	5	6	7	8	9	Bloom Month
Flowers and Ground Covers										
<i>Achillea lanulosa</i> ^a	Native yarrow	L-H	S/PS	1.5 - 2'	Y	Y	Y	Y	Y	Jul
<i>Achillea tomentosa</i> ^b	Woolly yarrow	M-H	S/PS	.5'	Y	Y	N	N	N	Jul
<i>Aconitum</i> spp. ^c	Monkshood	M-H	S	2'	Y	Y	Y	Y	Y	Jun-Jul
<i>Aconitum columbianum</i> ^{ac}	Columbian monkshood	M-H	S	2'	Y	Y	Y	Y	Y	Jun-Jul
<i>Ajuga reptans</i> ^b	Bugleweed	H	Sh	< .5'	Y	Y	Y	Y	Y	Jun-Jul
<i>Alchemilla</i> sp.	Lady's mantle	M-H	PS/Sh	1'	Y	Y	Y	Y	?	Jun-Jul
<i>Allium cernuum</i> ^{ac}	Nodding onion	L-H	S/PS	1'	Y	Y	Y	Y	Y	Jun
<i>Allium geyeri</i> ^{ac}	Geyer onion	L-H	S/PS	1'	Y	Y	Y	Y	?	Jun
<i>Anaphalis margaritacea</i> ^a	Pearly everlasting	L-H	S	1.5 - 2.5'	Y	Y	Y	Y	?	Aug
<i>Anemone blanda</i>	Windflower	M-H	S/PS	1'	Y	Y	Y	Y	?	Apr-May
<i>Antennaria parvifolia</i> ^{ab}	Small-leaf pussytoes	M	S/PS	<.5'	Y	Y	Y	Y	Y	Jun
<i>Antennaria rosea</i> ^{ab}	Rosy pussytoes	M	S/PS	<.5'	Y	Y	Y	Y	Y	Jun
<i>Aquilegia</i> spp.	Columbine	M-H	S/PS	1 - 2'	Y	Y	Y	Y	Y	Jun-Jul
<i>Aquilegia coerulea</i> ^a	Colorado blue columbine	M-H	S/PS	1 - 2'	Y	Y	Y	Y	Y	Jun-Jul
<i>Aquilegia chrysantha</i> ^a	Yellow columbine	M-H	S/PS	1 - 2'	Y	Y	Y	Y	Y	Jun-Aug
<i>Arabis</i> sp. ^b	Rockcress	L-H	S	< 1'	Y	Y	Y	Y	Y	May-Jun
<i>Armeria maritima</i>	Sea thrift	L-H	S/PS	.5'	Y	Y	Y	Y	Y	Apr-Jun
<i>Artemisia caucasica</i>	Caucasian sage	L-M	S/PS	1 - 2'	Y	Y	Y	?	?	n/a
<i>Artemisia frigida</i> ^{ac}	Fringed sage	L-M	S	1 - 1.5'	Y	Y	Y	Y	Y	n/a
<i>Artemisia ludoviciana</i> ^a	Prairie sage	L-M	S	1 - 1.5'	Y	Y	Y	?	?	n/a
<i>Aster laevis</i> ^a	Smooth aster	L-H	S/PS	1 - 3'	Y	Y	Y	Y	?	Aug-Sep
<i>Aster porteri</i> ^a	Porter aster	L-M	S	1'	Y	Y	Y	?	?	Aug-Sep
<i>Aubrieta</i> sp. ^b	False rockcress	M	S	1'	Y	Y	Y	Y	Y	Apr-May
<i>Aurinia</i> sp. ^b	Basket of gold	M	S/PS	1'	Y	Y	Y	Y	Y	Apr-May
<i>Calochortus gunnisonii</i> ^a	Mariposa lily	M-H	S	.5 - 2'	Y	Y	Y	Y	?	Jul-Aug
<i>Campanula rotundifolia</i> ^a	Common harebell	M-H	S	.5 - 1'	Y	Y	Y	Y	Y	May-Oct
<i>Centranthus ruber</i>	Jupiter's beard	L-H	S/Sh	2 - 2.5'	Y	Y	Y	Y	?	May-Oct
<i>Cerastium strictum</i> ^{ab}	Mouse ear chickweed	M	S/PS	1'	Y	Y	Y	Y	?	May-Jun
<i>Cerastium tomentosum</i> ^b	Snow-in-summer	L-M	S/PS	1'	Y	Y	Y	Y	Y	May-Jun
<i>Claytonia lanceolata</i> ^a	Spring beauty	M	Sh	.5 - 1.5'	Y	Y	Y	?	?	Mar-Apr
<i>Convallaria majalis</i> ^{bc}	Lily-of-the-valley	H	Sh	< 1'	Y	Y	Y	Y	?	May-Jun
<i>Delosperma nubigenum</i> ^b	Hardy yellow iceplant	M-H	S	.5'	Y	Y	Y	?	?	Jun
<i>Delphinium</i> spp. ^c	Delphinium	M-H	S/PS	.5 - 3'+	Y	Y	Y	Y	Y	Jun-Jul
<i>Dianthus</i> spp.	Pinks	L-H	S	<.5' - 2'	Y	Y	Y	Y	Y	May-Aug
<i>Doronicum</i> sp.	Leopard's bane	H	S/PS	2 - 3'	Y	Y	Y	Y	?	Jul-Aug
<i>Echinacea purpurea</i> ^a	Purple coneflower	M	S	2 - 3'	Y	Y	Y	Y	Y	Jul-Aug
<i>Epilobium angustifolium</i>	Fireweed	H	S/PS	3'	N	Y	Y	Y	Y	Jul-Aug
<i>Erigeron flagellaris</i> ^a	Whiplash daisy, trailing fleabane	L-M	S	< 1'	Y	Y	?	?	?	Jun-Jul
<i>Eriogonum umbellatum</i> ^a	Sulphur flower	M	S/PS	<.5'	Y	Y	Y	Y	Y	Jun-Jul
<i>Erysimum asperum</i> ^a	Western wallflower	M	S/PS	1'+	Y	Y	Y	Y	?	Jun-Jul
<i>Gaillardia aristata</i> ^a	Blanket flower	L-M	S	1 - 1.5'	Y	Y	Y	Y	Y	Jul-Sep
<i>Galium boreale</i> ^{ab}	Northern bedstraw	M-H	Sh	<1'	Y	Y	Y	Y	Y	May-Jun
<i>Geranium</i> spp.	Hardy geraniums	M	Sh/PS	2'	Y	Y	Y	Y	Y	May-Oct
<i>Geranium caespitosum</i> ^a	Wild geranium	M	Sh/PS	2'	Y	Y	Y	Y	Y	May-Oct
<i>Geum triflorum</i>	Prairie smoke	M-H	S/PS	1.5'	Y	Y	Y	?	?	Jun
<i>Helianthella quinquenervis</i> ^a	Aspen sunflower	M	S	1'	?	?	?	Y	Y	?
<i>Helianthemum nummularium</i>	Rockrose	M-H	S	< 1'	Y	Y	Y	?	?	May-Jun
<i>Helianthus pumilus</i> ^a	Small sunflower	M	S	1 - 2'	Y	Y	Y	?	?	Jun-Jul
<i>Heuchera</i> spp.	Coral bells	M-H	PS/Sh	1 - 2'	Y	Y	Y	Y	Y	Jun-Aug
<i>Ipomopsis aggregata</i> ^a	Scarlet gilia	M	S/PS	1 - 2'	Y	Y	Y	Y	Y	Jun-Aug
<i>Iris germanica</i>	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.)					Approx. Bloom Month
					5	6	7	8	9	
<i>Iris missouriensis</i> ^{ac}	Missouri iris	M-H	S	1 - 2'	Y	Y	Y	Y	Y	May
<i>Lamium</i> sp. ^b	Dead nettle	M-H	Sh	< 1'	Y	Y	Y	Y	?	May-Jun
<i>Lavandula</i> spp.	Lavender	L-M	S	1 - 2'	Y	Y	Y	?	?	Jun-Nov
<i>Leucocrinum montanum</i> ^a	Sand lily	L-M	S	< 1'	Y	Y	Y	?	?	May
<i>Liatris punctata</i> ^a	Dotted gayfeather	VL-L	S	1 - 2'	Y	Y	Y	Y	Y	Aug-Oct
<i>Linum lewisii</i> ^{ac}	Wild blue flax	L-H	S/PS	1 - 2'	Y	Y	Y	Y	Y	May-Sep
<i>Lupinus argenteus</i> ^{ac}	Silver lupine	M	Sh/PS	1 - 3'	Y	Y	Y	Y	Y	Jun-Jul
<i>Mertensia lanceolata</i> ^a	Narrow-leaved chiming bells	M-H	Sh/PS	1 - 2'	Y	Y	Y	Y	Y	May-Jun
<i>Mimulus guttatus</i> ^a	Yellow monkey-flower	H	Sh	1'	?	Y	Y	Y	Y	?
<i>Monarda fistulosa</i> ^a	Native beebalm	M-H	S/PS	1 - 2'	Y	Y	Y	Y	Y	Jul-Oct
<i>Oenothera caespitosa</i> ^a	White stemless evening primrose	L-M	S	1 - 2'	Y	Y	Y	Y	Y	Jun-Aug
<i>Papaver orientale</i>	Oriental poppy	H	S/Sh	2 - 3'	Y	Y	Y	Y	Y	May-Jun
<i>Penstemon caespitosus</i> ^{ab}	Mat penstemon	L-M	S	< .5'	Y	Y	Y	Y	Y	Jun
<i>Penstemon secundiflorus</i>	Sidebells	L-M	S	1 - 2'	Y	Y	Y	Y	?	May-Jun
<i>Penstemon teucrioides</i> ^a	Germander penstemon	L-M	S	.5'	Y	Y	Y	?	?	Jun-Jul
<i>Penstemon virens</i> ^{ac}	Blue mist penstemon	M	S/PS	.5'	Y	Y	Y	Y	Y	May-Jun
<i>Phlox subulata</i>	Moss phlox	M	S	< .5'	Y	Y	Y	Y	Y	May
<i>Polemonium</i> sp.	Jacob's ladder	H	S/PS	1 - 2'	Y	Y	Y	Y	Y	May-Aug
<i>Potentilla fissa</i> ^a	Leafy potentilla	M-H	PS	1'	Y	Y	Y	Y	?	?
<i>Potentilla verna</i> ^b	Spring potentilla	M-H	PS	< .5'	Y	Y	Y	Y	Y	Mar-May
<i>Pulsatilla patens</i> ^a	Pasque flower	M	S/PS	1'	Y	Y	Y	Y	Y	Mar-May
<i>Ratibida columnifera</i> ^a	Prairie coneflower	L-M	S	2'	Y	Y	Y	Y	Y	Jul-Sep
<i>Rudbeckia hirta</i> ^a	Black-eyed Susan	M-H	S	2 - 3'	Y	Y	Y	Y	Y	Jul-Sep
<i>Salvia officinalis</i>	Cooking sage	L-M	S/PS	2'	Y	Y	Y	Y	?	Jun
<i>Saxifraga hirsuta</i>	Saxifrage	H	S/PS	.5'+	Y	Y	Y	Y	Y	May-Jun
<i>Scutellaria brittonii</i> ^a	Skullcap	M	S/PS	.5 - 1'	Y	Y	Y	Y	?	Aug-Sep
<i>Sedum</i> spp. ^b	Stonecrop	M	S/PS	1 - 1.5'	Y	Y	Y	Y	Y	Jul-Aug
<i>Sedum lanceolatum</i> ^a	Yellow stonecrop	M	S/PS	.5'	Y	Y	Y	Y	Y	Jul-Aug
<i>Sempervivum</i> sp.	Hens and chicks	L-M	S/PS	.5'	Y	Y	Y	Y	Y	n/a
<i>Senecio spartioides</i> ^{ac}	Broom groundsel	VL-L	S	2 - 3'	Y	Y	?	?	?	Sep-Oct
<i>Solidago missouriensis</i> ^a	Smooth goldenrod	L-M	S	1 - 2'	Y	Y	Y	Y	?	Jul-Aug
<i>Thalictrum fendleri</i> ^a	Fendler meadowrue	H	S/PS	2 - 3'	?	?	Y	Y	Y	Jul-Aug
<i>Thermopsis divaricarpa</i> ^a	Spreading golden banner	M-H	S/PS	2'	Y	Y	Y	Y	?	May
<i>Tradescantia occidentalis</i> ^a	Western spiderwort	M	S/PS	1.5'	Y	Y	Y	Y	?	Jun-Aug
<i>Thymus</i> spp. ^b	Thyme	L-M	S	< .5'	Y	Y	Y	Y	Y	Jun-Jul
<i>Veronica pectinata</i>	Speedwell	L-M	S	< .5'	Y	Y	Y	Y	Y	Apr-Jul
<i>Vinca minor</i> ^b	Periwinkle, myrtle	H	Sh	< 1'	Y	Y	Y	Y	?	Apr-Jun
<i>Waldsteinia</i> sp. ^b	Barren strawberry	M-H	Sh/PS	< 1'	Y	Y	Y	Y	?	May-Jun

Shrubs

<i>Arctostaphylos nevadensis</i> ^{ab}	Pinemat manzanita	M	S/PS	1 - 2'	Y	Y	Y	N	N	n/a
<i>Arctostaphylos patula</i> ^a	Greenleaf manzanita	M	S/PS	3 - 4'	Y	Y	Y	N	N	n/a
<i>Arctostaphylos uva-ursi</i> ^{ab}	Kinnikinnick, bearberry	M	S/Sh	1'	Y	Y	Y	Y	Y	n/a
<i>Betula glandulosa</i> ^a	Bog birch	H	S/PS	6 - 8'	Y	Y	Y	Y	Y	n/a
<i>Calluna</i> sp.	Heather	H	S/PS	2'	Y	Y	Y	?	?	Jul-Aug
<i>Ceanothus fendleri</i> ^a	Buckbrush, mountain lilac	M	S	2'	Y	Y	Y	?	?	Jul
<i>Cercocarpus intricatus</i> ^a	Little-leaf mountain mahogany	VL-L	S	4 - 6'	Y	Y	Y	Y	?	n/a
<i>Cercocarpus montanus</i> ^{ac}	True mountain mahogany	L-M	S	4 - 6'	Y	Y	Y	Y	?	n/a
<i>Chrysothamnus</i> spp. ^a	Rabbitbrush	VL-L	S	2 - 6'	Y	Y	Y	Y	Y	Jul-Aug
<i>Cornus stolonifera</i> ^a	Redtwig dogwood	H	S/Sh	4 - 6'	Y	Y	Y	Y	Y	n/a
<i>Cotoneaster horizontalis</i>	Spreading cotoneaster	M	S/PS	2 - 3'	Y	Y	Y	Y	?	May-Jun
<i>Daphne burkwoodii</i>	Burkwood daphne	M	S/PS	2 - 3'	Y	Y	Y	?	?	Apr-Jun
<i>Erica</i> sp.	Heath	H	S/PS	1'	Y	Y	Y	?	?	Jan-Mar
<i>Euonymus alatus</i>	Burning bush euonymus	M	S/Sh	1 - 6'	Y	Y	Y	?	?	n/a
<i>Fallugia paradoxa</i> ^a	Apache plume	VL-L	S	2 - 4'	Y	Y	Y	Y	Y	Jun-Oct
<i>Holodiscus dumosus</i> ^a	Ocean spray, cliff/rock spirea	L-M	S/PS	4'	Y	Y	Y	Y	Y	Jun
<i>Jamesia americana</i> ^a	Wax flower	M-H	S/Sh	2 - 6'	Y	Y	Y	Y	Y	Jun
<i>Lonicera tatarica</i>	Tatarian honeysuckle	M	S/PS	4 - 6'	Y	Y	Y	Y	Y	May-Jun
<i>Mahonia aquifolium</i>	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.)					Approx. Bloom Month
					5	6	7	8	9	
<i>Mahonia repens</i> ^{ab}	Creeping grape holly	L-H	S/Sh	1 - 2'	Y	Y	Y	Y	Y	Mar-May
<i>Philadelphus microphyllus</i> ^a	Little-leaf mockorange	M	S	2 - 3'	Y	Y	Y	Y	?	Jun
<i>Physocarpus monogynus</i> ^a	Mountain ninebark	M	S/Sh	2 - 4'	Y	Y	Y	Y	Y	Jun
<i>Potentilla fruticosa</i> ^a	Shrubby cinquefoil	M	S/PS	2 - 3'	Y	Y	Y	Y	Y	May-Sep
<i>Prunus besseyi</i> ^a	Western sand cherry	L-M	S	1 - 3'	Y	Y	Y	Y	?	May
<i>Purshia tridentata</i> ^a	Antelope bitterbrush	L-M	S	1 - 2'	Y	Y	Y	?	?	Jun-Aug
<i>Ribes aureum</i> ^a	Golden currant	M	S/PS	2 - 3'	Y	Y	Y	Y	Y	Apr-May
<i>Rosa woodsii</i> ^a	Woods' or native wild rose	M	S/PS	2 - 3'	Y	Y	Y	Y	Y	Jun-Jul
<i>Shepherdia canadensis</i> ^d	Russet buffaloberry	M-H	S	5 - 6'	Y	Y	Y	Y	Y	n/a
<i>Symphoricarpos</i> spp. ^d	Snowberry, coralberry	M	S/PS	2 - 3'	Y	Y	Y	Y	Y	n/a
<i>Viburnum edule</i> ^a	Highbush cranberry	H	S	6 - 8'	Y	Y	Y	Y	Y	May-Jun
<i>Yucca baccata</i> ^a	Banana or broad-leaf yucca	VL-L	S/PS	2 - 3'	Y	Y	Y	N	N	Jun
<i>Yucca filamentosa</i>	Adam's needle	M	S/PS	2 - 3'	Y	Y	Y	N	N	Jun
<i>Yucca glauca</i> ^a	Spanish bayonet, small soapweed, Great Plains yucca	VL-L	S/PS	2 - 3'	Y	Y	Y	Y	?	Jun

Large Shrubs and Trees

<i>Acer ginnala</i>	Ginnala maple	M-H	S	6 - 10'	Y	Y	Y	Y	Y	n/a
<i>Acer glabrum</i> ^a	Rocky Mountain maple	M-H	S/Sh	6 - 10'	Y	Y	Y	Y	Y	n/a
<i>Acer grandidentatum</i> ^a	Wasatch maple	M	S/PS	10 - 20'	Y	Y	Y	Y	?	n/a
<i>Alnus tenuifolia</i> ^a	Thinleaf alder	H	S/PS	6 - 8'	Y	Y	Y	Y	Y	Apr
<i>Amelanchier alnifolia</i> ^{ac}	Saskatoon alder-leaf serviceberry	M	S/PS	6 - 8'	Y	Y	Y	Y	Y	Apr-May
<i>Amelanchier utahensis</i> ^a	Utah serviceberry	VL-M	S	4 - 6'	Y	Y	N	N	N	May
<i>Betula fontinalis</i> ^a	River birch	H	S/PS	6 - 8'	Y	Y	Y	Y	?	n/a
<i>Cercocarpus ledifolius</i> ^a	Mountain mahogany	VL-L	S	6 - 15'	Y	Y	?	N	N	n/a
<i>Corylus cornuta</i> ^a	Filbert, beaked hazelnut	H	S/Sh	5 - 6'	Y	Y	Y	?	?	n/a
<i>Crataegus</i> spp. ^a	Hawthorn (several native)	M	S	6 - 8'	Y	Y	Y	Y	?	May
<i>Fraxinus pennsylvanica</i>	Green ash	M-H	S	20 - 25'	Y	Y	Y	Y	?	n/a
<i>Gleditsia triacanthos</i>	Honeylocust	M-H	S	60 - 70'	Y	Y	N	N	N	May
<i>Malus</i> sp.	Crabapple	M	S	10 - 15'	Y	Y	Y	Y	N	Apr-May
<i>Physocarpus opulifolius</i> ^a	Tall ninebark	M	S/PS	4 - 6'	Y	Y	Y	?	N	May
<i>Populus tremuloides</i> ^a	Aspen	M	S	8 - 25'	Y	Y	Y	Y	Y	n/a
<i>Prunus americana</i> ^a	American wild plum	M	S/PS	4 - 6'	Y	Y	Y	Y	N	Apr
<i>Prunus cerasifera</i> ^c	Flowering plum	M	S/PS	8 - 10'	Y	Y	Y	?	N	Apr
<i>Prunus pensylvanica</i> ^{ac}	Pin/fire/wild/red cherry	M	S/PS	6 - 8'	Y	Y	Y	?	N	May
<i>Prunus virginiana melanocarpa</i> ^{ac}	Western chokecherry	M-H	S/PS	6 - 8'	Y	Y	Y	Y	Y	Apr-May
<i>Rubus deliciosus</i> ^a	Boulder raspberry, thimbleberry	M	S/Sh	4 - 6'	Y	Y	Y	Y	Y	Apr-May
<i>Salix amygdaloides</i> ^a	Peachleaf willow	H	S/PS	20 - 30'	Y	Y	Y	Y	?	n/a
<i>Shepherdia argentea</i> ^a	Silver buffaloberry	M	S/PS	4 - 6'	Y	Y	Y	Y	?	Apr
<i>Sorbus scopulina</i> ^a	Western mountain ash	M-H	S/Sh	6 - 8'	Y	Y	Y	Y	?	May
<i>Syringa vulgaris</i>	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.

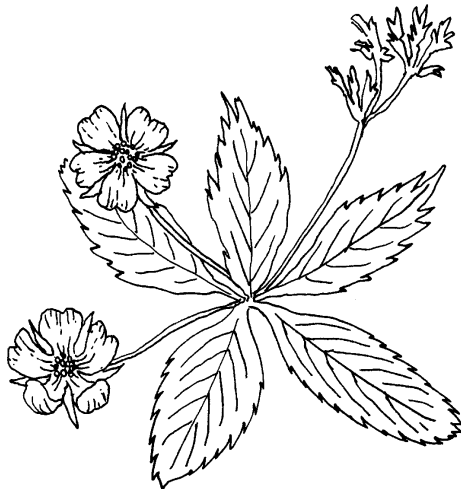
When choosing conifers for your defensible space, consider those with characteristics that make them better able to survive fire:

- 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

Colorado State University Extension

The following publications are available from The University Resource Center, 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 website at www.urc.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*
- 7.402, *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

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

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

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Appendix E

Fire-Resistant Landscaping



FORESTRY

Fire-Resistant Landscaping

no. 6.303

by F.C. Dennis¹

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'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.

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The best tree species to plant generally are those naturally occurring on or near the site.

Mow grass short around shrubs.

Plant low-growing, nonresinous shrubs near structures.

Keep grass mown around structures to a maximum of 8 inches.

Plant wildflowers near structures only if they are well-irrigated and cut back during the dormant season.

Gravel area or mow grass short next to the structure.

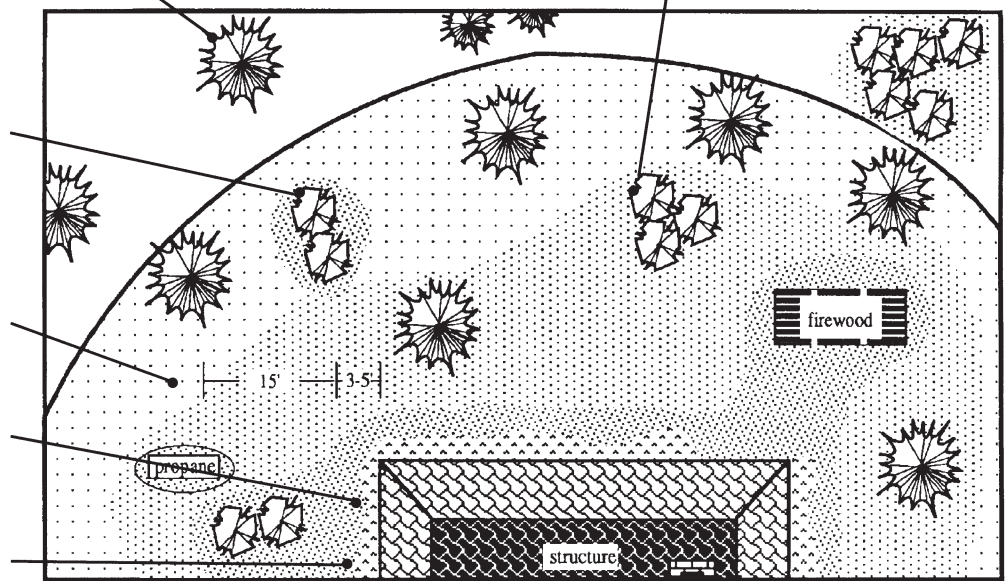


Figure 1: Forested property surrounding a homesite; shows optimum placement of vegetation near the structure.

- 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.

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*
- 7.233, *Wildflowers for Colorado*
- 7.406, *Flowers for Mountain Communities*
- 7.413, *Ground Covers for Mountain Communities*
- 7.423, *Trees and Shrubs for Mountain Areas*

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



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.

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

¹Wildfire Hazard Mitigation Coordinator,
Colorado State Forest Service.

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 University, U.S. Department of Agriculture, and Colorado counties cooperating. Extension programs are available to all without discrimination. No endorsement of products mentioned is intended nor is criticism implied of products not mentioned.

Appendix F

Homeowner Checklist for Wildfire Protection

HOMEOWNER CHECKLIST FOR WILDFIRE PROTECTION

Durango West Two is located in a ponderosa pine and gambel oak forest that is naturally subject to wildfire every two to ten years. Since wildfire is not a desirable occurrence in a subdivision with over 350 homes, residents should ensure their property is resistant to wildfire damage. Residents should also be prepared for a wildfire if it should occur in or around the subdivision. This checklist is designed to assist homeowners to landscape their property in ways which will reduce wildfire hazards around their home and provide space for firefighters to do their job if a fire happens. It also lists actions homeowners should take to prepare for the possibility of wildfire.

Wildfire Hazard Mitigation

- Clear roofs and gutters of pine needles, leaves and other debris
- Pile firewood at least 25 feet away from house and decks. DO NOT pile firewood under a deck by the house.
- Do not use wood chips, pine straw or bark as landscaping material within 25 feet of the house.
- Remove “ladder fuels” like shrubs that extend into the crowns of trees and tree branches within 10 feet of the ground surface.
- Install metal attic, eave and foundation vent screens.
- Areas under decks are screened or blocked so flames or embers cannot get underneath
- Branches overhanging the roof and chimney are removed.
- Chimney screens are in place and in good condition.
- Keep grass irrigated and mowed during the growing season.
- Use roofing materials like metal or asphalt shingles for the house and outbuildings.
- Avoid using junipers, yews, decorative tall grasses or similar plants within 10 feet of the house or outbuildings since these plants are easily combustible.

Wildfire Preparations

- Develop a family evacuation plan with escape routes, meeting points, pet care and other details understood by everyone.
- Ensure fire extinguishers are checked and in good working condition.
- Ensure an outdoor water supply or faucet is available, complete with a hose and nozzle that can reach all parts of the house and any outbuildings.
- Ensure your house number is easily visible from the street.
- Ensure fire trucks can easily access your driveway, with no low-hanging branches or overgrown shrubs blocking access.
- Prepare an evacuation kit containing clothing, important papers, and necessary medications during fire season.