



UNIVERSITY OF CALIFORNIA
COOPERATIVE EXTENSION

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PYROPHYTIC VS. FIRE RESISTANT PLANTS

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"White house" and its garden (trace with a dashed line) is a spectacular demonstration of defensible space. Wildfire with cataclysmic energy swiftly burned adjacent houses and vegetation, yet it died down after reaching the frontier of fire resistant garden.

PYROPHYTES

Plants that ignite readily and burn intensely (pyrophates) typically share certain characteristics:

- They are usually blade-leaf or needle-leaf evergreens.
- They have stiff, woody, small or fine, lacy leaves.
- Their leaves and wood usually contain volatile waxes, fats, terpenes or oils (crushed leaves have strong odors).
- Their sap is usually gummy, resinous and has a strong odor.
- They usually contain plentiful fine, twiggy, dry or dead materials.
- They may have pubescent (hair covered) leaves.

- They may have loose or papery bark.

- These plants flame (not smolder) when preheated and ignited with a match.

FLAMMABILITY & CONDITION

The condition of the plant is as important as its species. Even some "pyrophytic" species can be quite fire-resistant if properly maintained.

Depending on its growth form and access to water, the same species may be fire resistant in one environment and pyrophytic in another. Water-stressed plants that are in poor condition are more pyrophytic.

A pyrophytic species becomes explosively flammable when poorly maintained. South-facing slopes, windy areas, sites with poor soils and urban landscapes are more stressful for plants.

PYROPHYTIC VEGETATION TYPES :

Grasses: Any cured (dry) grass. Nonirrigated, annual grasses are typically more flammable than perennial grasses. Irrigated grasses are fire resistant.

Herbs: Any cured herb.

Ferns: Any dry or cured fern, particularly cured

bracken and sword ferns.

Brush: Any brush with excessive deadwood. Any over-mature, dying or dead brush.

Trees: Any forest, stand or urban forest that is over-dense, under stress or over mature.

PYROPHYTIC SPECIES: High Fire Hazard Native Shrubs			
Latin name	Common Name	Latin name	Common Name
<i>Adenostoma fasciculatum</i>	Chamise, Greasewood	<i>Erigonum fasciculatum</i>	California Buckwheat
<i>Arctostaphylos spp.</i>	Manzanitas (some twiggy) ^b	<i>Pickeringia montana</i>	Chaparral Pea
<i>Artemisia californica</i>	Sagebrush (California)	<i>Quercus spp.</i>	Scrub Oak (brushy oaks) ^b
<i>Baccharis spp.</i>	Coyote Brush ^{ab}	<i>Salvia mellifera</i>	Black Sage
<i>Castanopsis chrysophylla</i>	Chinquapin, Giant	<i>Vaccinium</i>	Huckleberry ^b
High Fire Hazard Native Trees:			
<i>Cupressus sargentii</i>	Sargent Cypress	<i>Pinus radiata</i>	Monterey Pine ^b
<i>Lithocarpus densiflora</i>	Tan Oak, Tanbark Oak	<i>Pinus muricata</i>	Bishop Pine ^b
<i>Pinus coulteri</i>	Coulter Pine	<i>Pseudotsuga menziesii</i>	Douglas Fir ^b
<i>Pinus attenuata</i>	Knobcone Pine	<i>Umbellularia californica</i>	California Bay ^b
High Fire Hazard (Introduced) Ecological Weeds:			
<i>Acacia spp.</i>	Acacia species ^b	<i>Eucalyptus spp.</i>	Eucalyptus ^b
<i>Cortaderia jubata</i>	Jubata Grass ^b	<i>Pennisetum</i>	Fountain Grass
<i>C. Selloana</i>	Pampas Grass ^b	<i>Spartium junceum</i>	Spanish Broom
<i>Cytisus scoparius</i>	Scotch Broom ^b	<i>Ulex europea</i>	Gorse ^b
<i>Cytisus monspessulanus</i>	French Broom ^b		
Fire Hazardous Introduced (Exotic) Plants:			
<i>Abies spp.</i>	Firs	<i>Picea spp.</i>	Spruces
<i>Bambusa spp.</i>	Bamboo ^b	<i>Pinus spp.</i>	Pines
<i>Cedrus spp.</i>	Cedars	<i>Rosmarinus officinalis</i>	Rosemary
<i>Chamaecyparis spp.</i>	False Cypress	<i>Spartium junceum</i>	Spanish Broom
<i>Juniperus spp.</i>	Junipers	<i>Taxus spp.</i>	Yew
<i>Larix spp.</i>	Larch	<i>Thuja spp.</i>	Arborvitae
<i>Lonicera japonica</i>	Japanese Honeysuckle	<i>Tsuga spp.</i>	Hemlock
<i>Palms</i>	Palm (if dry fronds)	<i>Ulex europea</i>	Gorse
<i>Pennisetum spp.</i>	Fountain Grass		

^a Good for erosion control; ^b Invasive Species

FIRESCAPE PLANT SELECTIONS

Fire-resistant Plants (These plants also tend to have certain typical characteristics — much of the information about fire resistant plants is anecdotal and has not been scientifically tested)

- Most are broad-leaf deciduous (lose their leaves) trees but some thick-leaf evergreens are also fire-resistant.
- Leaves tend to be supple, moist and easily crushed.
- Trees tend to be clean, not bushy, and have little deadwood.
- Shrubs are low-growing (2') with minimal dead material.
- Tall shrubs are clean, not bushy.
- Sap is water-like and typically does not have a strong odor.

DOMESTIC GARDEN

Succulents (These are among the most fire-resistant plants.)			
Latin name	Common name	Latin name	Common name
<i>Aeonium spp.</i>	Aeonium	<i>D. pulverulenta</i>	Dudleya
<i>Agave spp.</i>	Agave	<i>Lampranthus spp.</i>	Bush Ice Plant
<i>Aloe spp.</i>	Aloe	<i>Echeveria spp.</i>	Hen and Chicks
<i>Carpobrotus spp.</i>	Ice Plant ^b	<i>Malephora crocea</i>	Croceum Ice Plant ^b
<i>Cotyledon spp.</i>		<i>Malephora luteola</i>	Yellow Trailing Ice Plant ^b
<i>Crassula spp.</i>	Crassula ^b	<i>Portulacaria afra "Variegata"</i>	Elephant's Foot
<i>Delosperma "Alba"</i>	White Trailing Iceplant	<i>Sedum confusum</i>	Stonecrop
<i>Drosanthemum floribunda</i>	Rosea Ice Plant ^b	<i>Sedum rubrotinctum</i>	Brown Bean (Pork and Beans)
<i>D. hispidium</i>	Rosea Ice Plant ^b	<i>Senecio serpens</i>	
<i>Dudleya farinosa</i>	Dudleya or Cliff Lettuce		
Groundcovers:			
<i>Achillea tomentosa</i>	Woolly Yarrow	<i>Liriope gigantea</i>	Giant Turf Lily
<i>Ajuga reptans</i>	Carpet Bugle	<i>Myoporum parvifolium</i>	Myoporum
<i>Armeria maritima</i>	Common Thrift	<i>Osteospermum fruticosum</i>	Trailing African Daisy
<i>Arctotheca calendula</i>	Silver Spreader	<i>Pelargonium peltatum</i>	Ivy Geranium
<i>Cerastium tomentosum</i>	Snow-in-Summer	<i>Phyla nodiflora</i>	Lippia Repens
<i>Coprosma kirkii</i>	Creeping Coprosma	<i>Potentilla tabernaemontanii</i>	Spring Cinquefoil
<i>Duchesnea indica</i>	Mock Strawberry	<i>Pyracantha "Santa Cruz"</i>	Firethorn
<i>Eounymus Fortunei coloratus</i>	Winter Creeper	<i>Santolina chamaecyparissus</i>	Lavender Cotton
<i>Festuca rubra</i>	Creeping Red Fescue ^b	<i>Santolina virens</i>	Green Lavender Cotton
<i>Fragaria californica</i>	Wood Strawberry	<i>Thymus praecox arcticus</i>	Creeping Thyme
<i>Fragaria chiloensis</i>	Beach Strawberry	<i>Trifolium fragiferum</i>	O'Connor's Legume
<i>Gazania rigens leucolaena</i>	Trailing Gazania	<i>Verbena peruviana</i>	Perennial Verbena
<i>Iberis sempervirens</i>	Evergreen Candytuft	<i>Vinca spp.</i>	Periwinkle ^a

^a Good for erosion control; ^b Invasive Species

DOMESTIC GARDEN (Continued)

Perennials:			
Latin name	Common name	Latin name	Common name
<i>Achillea</i> spp.	Yarrow	<i>Iris</i> spp.	Iris
<i>Agapanthus</i> spp.	Lily-of-the-Nile	<i>Kniphofia uvaria</i>	Red Hot Poker (Torch Lily)
<i>Bergenia</i> spp.	Bergenia	<i>Lantana montevidensis</i>	Lantana
<i>Centaurea cineraria</i>	Dusty Miller	<i>Lavandula</i> spp.	Lavender
<i>Centranthus ruber</i>	Red Valerian (Jupiter's Beard)	<i>Limonium perzil</i>	Sea Lavender
<i>Coreopsis</i> spp.	Coreopsis	<i>Mimulus</i> spp.	Monkey Flower
<i>Dietes bicolor</i>	African Iris	<i>Oenothera berlandieri</i>	Mexican Evening Primrose
<i>Dietes vegeta</i>	Fortnight Lily	<i>Penstemon</i> spp.	Beard Tongue
<i>Erigeron karvinskianus</i>	Fleabane (Mexican Daisy)	<i>Sisyrinchium</i> spp.	Blue-Eyed Grasses ^a
<i>Erysimum linifolium</i>	Wallflower	<i>Stachys byzantina</i>	Lamb's Ears
<i>Geranium</i> spp.	Geranium	<i>Strelitzia reginae</i>	Bird of Paradise
<i>Hemerocallis hybrids</i>	Daylily	<i>Tulbaghia violacea</i>	Society Garlic
<i>Hesperaloe parviflora</i>	Red Yucca	<i>Zantedeschia aethiopica</i>	Common Calla ^b
<i>Heuchera maxima</i>	Island Alum Root	<i>Zauschneria californica</i>	California Fuchsia
Vines:			
<i>Rosa Banksiae</i>	Lady Banks' Rose	<i>Trachelospermum jasminoides</i>	Star Jasmine
<i>Solanum jasminoides</i>	Potato Vine	<i>Wisteria</i> spp.	Wisteria
<i>Tecomaria capensis</i>	Cape Honeysuckle		
Shrubs:			
<i>Brugmansia</i> spp.	Angel's Trumpet	<i>Mahonia repens</i>	Creeping Mahonia
<i>Buddlein</i> spp.	Butterfly Bush	<i>Nerium oleander</i>	Oleander
<i>Carpenteria californica</i>	Bush Anemone	<i>Nolina</i> spp.	Nolina (related to Yucca)
<i>Coleonema caka</i> "Diosma"	Brush of Heaven	<i>Pittosporum crassifolium</i>	Dwarf Karo
<i>Convolvus cneorum</i>	Bush Morning Glory	<i>Pittosporum tobira</i>	Mock Orange
<i>Cotoneaster congestus</i>	Likiano ^a	<i>Prunus lyonii</i>	Catalina Cherry
<i>Cotoneaster horizontalis</i>	Rock Cotoneaster ^{ab}	<i>Punica granatum</i>	Pomegranate
<i>Cotoneaster microphyllus</i>	Rockspray Cotoneaster ^a	<i>Rhapiolepis</i> spp.	India Hawthorn
<i>Cotoneaster dammeri</i>	Bearberry Cotoneaster ^{ab}	<i>Rhamnus alaternus</i>	Italian Buckthorn
<i>Echium</i> spp.	Echium or Priderot	<i>Rhododendron (Azalea)</i> spp.	Rhododendrons and Azaleas
<i>Escallonia</i> spp.	Escallonia	<i>Rhus integrifolia</i>	Lemonade Berry
<i>Lavatera assurgentiflora</i>	Malva Rose (Tree Mallow)	<i>Simmondsia chinensis</i>	Jojoba
<i>Ligustrum japonicum</i>	Japanease Privet	<i>Trachelospermum jasminoides</i>	Star Jasmine
<i>Ligustrum lucidum</i>	Glossy Privet	<i>Yucca</i> spp.	Yucca
<i>Ligustrum texanum</i>	Texas Privet		

^a Good for erosion control; ^b Invasive Species

DOMESTIC GARDEN (Continued)

Trees			
Latin name	Common name	Latin name	Common name
<i>Acer spp.</i>	Maple	<i>Macadamia hybrids</i>	Macadamia Nut
<i>Arbutus unedo</i>	Strawberry Tree	<i>Metrosideros excelsus</i>	New Zealand Christmas Tree
<i>Ceratonia siliqua</i>	Carob	<i>Myoporum spp.</i>	Myoporum
<i>Cercis occidentalis</i>	Western Redbud	<i>Pistacia chinensis</i>	Chinese Pistache
<i>Cercocarpus betuloides</i>	Mountain Ironwood	<i>Pittosporum spp.</i>	Mock Orange
<i>Citrus spp.</i>	Citrus	<i>Quercus spp.</i>	Oak ^a
<i>Fagus spp.</i>	Beech	<i>Rhus lancea</i>	African Sumac
<i>Feijoa sellowiana</i>	Pineapple Guava	<i>Robinia pseudoacacia</i>	Locust, Black
<i>Fraxinus spp.</i>	Ash	<i>Schinus molle</i>	California Pepper Tree ^a
<i>Gleditsia triacanthos</i>	Honey Locust	<i>Schinus terebinthifolius</i>	Brazilian Pepper ^a
Moderate Fire Retarding Plants:			
<i>Ajuga crispa</i>	Giant Ajuga	<i>Hypericum calycinum</i>	St. Johnswort ^b
<i>Aloe aristata</i>	Dwarf Aloe	<i>Phyla nodiflora</i>	Lippia
<i>Aloe breviolia</i>	Shortleaf Aloe	<i>Myoporum parvifolium</i>	Myoporum
<i>Atriplex semibaccata</i>	Australian Saltbush	<i>Osteospermum fruticosum</i>	African Daisy
<i>Cerastium tomentosum</i>	Snow-in-Summer	<i>Teucrium chamaedrys</i>	Prostrate Germander
<i>Coprosma kirkii</i>	Creeping Coprosma	<i>Trifolium fragiferum var O'Connor's</i>	Legume (Strawberry Clover)
<i>Gazania rigens leucolaena</i>	Trailing Gazania		
Low Fuel Volume Native Plants:			
<i>Arctostaphylos hookeri</i>	Monterey Carpet (Manzanita)	<i>Ceanothus maritimus</i>	Maritime Ceanothus
<i>Arctostaphylos uva-ursi</i>	Bearberry ^a	<i>Cistus crispus</i>	Rockrose
<i>Ceanothus gloriosus</i>	Point Reyes Ceanothus ^a	<i>Cistus salvifolius</i>	Sageleaf Rockrose
<i>Ceanothus griseus 'Anchor Bay'</i>		<i>Digitalis spp.</i>	Foxglove
<i>Ceanothus griseus horizontalis</i>	Carmel Creeper ^a	<i>Grindelia stricta venulosa</i>	Coastal Wild Gum
<i>Ceanothus griseus 'Emily Brown'</i>		<i>Salvia sonomensis</i>	Creeping Sage ^a
<i>Ceanothus griseus 'Ray Hartman'</i>		<i>Symphoricarpos mollis</i>	Creeping Snowberry
Low Fuel Volume Native Perennials:			
<i>Achillea millefolium</i>	Yarrow	<i>Dicentra formosa</i>	Western Bleeding Heart
<i>Aquilegia formosa</i>	Western Columbine	<i>Epipactis gigantea</i>	Stream Orchid
<i>Asarum caudatum</i>	Wild Ginger	<i>Erigeron glaucus</i>	Beach Aster
<i>Aster chilensis</i>	Wild Aster	<i>Eriogonum spp.</i>	Wild Buckwheat
<i>Brodiaea laxa</i>	Grass Nut	<i>Eriophyllum confertiflorum</i>	Golden Yarrow

^a Good for erosion control; ^b Invasive Species

DOMESTIC GARDEN (Continued)

Low Fuel Volume Native Perennials (cont.):			
Latin name	Common name	Latin name	Common name
<i>Eriophyllum stachaedifolium</i> var. <i>artemisaefolium</i>	Lizardtail	<i>Monardella villosa</i>	Coyote Mint
<i>Erysimum capitatum</i>	Foothill Wallflower	<i>Penstemon</i> spp.	Beard Tongue
<i>Erysimum concinnum</i>	Fragrant Wallflower	<i>Polystichum munitum</i>	Sword Fern
<i>Eschscholzia</i> spp.	California Poppy	<i>Pteridium aquilinum</i>	Bracken Fern ^b
<i>Grindelia stricta</i>	Coastal Wild Gum	<i>Ranunculus californica</i>	Buttercup
<i>Heuchera micrantha</i>	Coral Bells	<i>Romneya coulteri</i>	Matilija Poppy
<i>Iris douglasiana</i>	Douglas Iris	<i>Satureja douglasii</i>	Yerba Buena
<i>Iris longipetala</i>	Long-petaled Iris	<i>Sidalcea malvaeflora</i>	Checkerbloom
<i>Iris macrosiphon</i>	Ground Iris	<i>Sisyrinchium bellum</i>	Blue-eyed Grass ^a
<i>Lonicera hispidula</i>	Pink Honeysuckle	<i>Sisyrinchium californicum</i>	Yellow-eyed Grass
<i>Lupinus</i> spp.	Lupine ^a	<i>Solanum xanti</i>	Purple Nightshade
<i>Mimulus</i> spp.	Monkey Flower	<i>Zigadenus fremontii</i>	Star Lily
NATIVE WILDLAND PLANTS — Valued Native Watershed Species			
Trees			
<i>Acer macrophyllum</i>	Big Leaf Maple	<i>Fraxinus oregona</i>	Oregon Ash
<i>Aesculus californica</i>	Buckeye	<i>Juglans hindsii</i>	California Black Walnut
<i>Alnus rhombifolia</i>	White Alder ^a	<i>Platanus racemosa</i>	Western Sycamore
<i>A. rubra</i>	Red Alder	<i>Populus fremontii</i>	Fremont's Poplar
<i>Cercocarpus betuloides</i>	Mtn. Mahogany	<i>Quercus</i> spp.	Oaks ^a
<i>Cornus nuttalli</i>	Pacific Dogwood	<i>Salix</i> spp.	Willow
<i>Corylus cornuta</i>	Hazel	<i>Sequoia sempervirens</i>	Coast Redwood
Shrubs:			
<i>Ceanothus</i> (some) spp.	(Some) Wild Lilac ^a	<i>Penstemon corymbosus</i>	Thymeleaf Penstemon, Redwood Penstemon
<i>Dendromecon rigida</i>	Bush Poppy	<i>Penstemon breviflorus</i>	Bush Beardstongue, Gaping Penstemon
<i>Eriodictyon californicum</i>	Yerba Santa	<i>Solanum umbelliferum</i>	Nightshade, Blue Witch
<i>Galtheria</i> spp.	Salal	<i>Rhamnus</i> spp.	Buckthorn
<i>Garrya</i> spp.	Silk Tassel ^a	<i>Rhus</i> spp.	Sumac
<i>Heteromeles arbutifolia</i>	Toyon, Christmas Berry ^a	<i>Ribes sanguineum</i>	Red Flowered Currant
<i>Mimulus aurantiacus</i>	Sticky Monkey Flower		

^a Good for erosion control; ^b Invasive Species

FIRE-RESISTANT PRIVACY SCREEN PLANTS:

WARNING: Planted densely and with close spacing, hedges, screens and espaliers, by function and design, tend to be fire hazardous plantings. They produce excessive "twiggy" and fine deadwood in the planting interior. Additionally, when a wildfire nears tall hedges and screens, these create a wind-break turbulence on the lee side of the row. Fire-brands are sucked down onto the enclosed property or lee side structure. Regular shearing to create a tight outer crown makes hedges and screens more flammable because their internal branches and twigs die due to the lack of light. **REMEMBER:** All plants are flammable to some extent! More Plants With Poor Care = More Fuel!

Densely planted hedges and screens compete for the limited water and nutrients on the site and are usually in poor health. Resulting dieback makes these plantings more flammable.

Sheared hedges and screens have more fine, tinder dry deadwood under the dense green, outer crown.

More often than not espaliers are planted with pyrophytic species that can easily ignite structures.

Below are some "relatively more fire-resistant" species, if properly maintained:

Screen Plants			
Latin name	Common name	Latin name	Common name
<i>Acer ginnala</i>	Amur Maple	<i>Ligustrum spp.</i>	Privet
<i>Arbutus unedo</i>	Strawberry Tree	<i>Lonicera spp.</i>	Honeysuckle Bush
<i>Berberis spp.</i>	Barberry	<i>Malus spp.</i>	Apple
<i>Buxus spp.</i>	Boxwood	<i>Myrica californica</i>	Pacific Wax Myrtle
<i>Camellia spp.</i>	Camellia	<i>Photinia x fraseri</i>	Photinia
<i>Carissa grandiflora</i>	Natal plum	<i>Pittosporum crassifolium</i>	Karo
<i>Ceratonia siliqua</i>	Carob	<i>P. eugenoides</i>	Lemonwood
<i>Citrus spp.</i>	Citrus	<i>P. tobira</i>	Mock Orange Pittosporum
<i>Cocculus laurifolius</i>		<i>P. undulatum</i>	Victorian Box
<i>Cornus stolonifera</i>	Red-osier Dogwood	<i>Plumbago auriculata</i>	Cape Plumbago
<i>C. mas</i>	Cornelian Cherry, Sorbet	<i>Podocarpus gracilior</i>	Fern Pine
<i>Crateagus phaenopyrum</i>	Washington Thorn	<i>P. macrophyllus</i>	Yew Tree
<i>Dodonaea viscosa</i>	Hopbush	<i>Prunus caroliniana</i>	Cherry Laurel
<i>Elaeagnus angustifolia</i>	Russian Olive	<i>P. ilicifolia</i>	Hollyleaf Cherry
<i>E. pungens</i>	Silverberry	<i>P. laurocerasus</i>	English Laurel
<i>Eriobotrya japonica</i>	Loquat	<i>Pyrus kawakamii</i>	Evergreen Pear
<i>Escallonia rubra</i>	Escallonia	<i>Rhamnus spp.</i>	Buckthorn
<i>Eugenia spp.</i>	Eugenia	<i>Rhododendron spp.</i>	Rhododendron / Azalea
<i>Euonymus spp.</i>	Euonymus	<i>Vaccinium spp.</i>	Blueberry
<i>Hibiscus rosa-sinensis</i>	Tropical Hibiscus	<i>Viburnum tinus</i>	Viburnum
<i>H. syriacus</i>	Rose of Sharon	<i>Xylosma congestum</i>	Xylosma

FIREWISE TREE AND SHRUB MAINTENANCE

TREES:

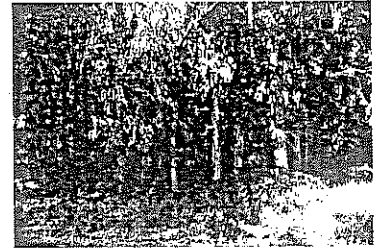
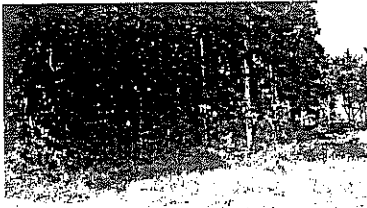
When thinning woodlands, first remove sick, dying and dead trees. Second, remove or clean up trees with excessive deadwood. Third, remove highly flammable species (needle leaf and blade leaf trees with volatile oils). Tree crowns should be separated by at least ten feet. Add five additional feet for every ten percent increase in slope (10 ft. separation on slopes 0 to 10%, 15 ft. separation on slopes from 11 to 20%, and 20 ft. separation on slopes from 21 to 30%, and so forth).

- Raise all tree crowns at least ten feet above the ground. Thin out tree crowns (up to 25%) to reduce total fuels.
- Remove dead branches and large areas of dead foliage, all vines, and loose papery bark.
- Remove all flammable undergrowth and woody debris.

SHRUBS:

Separate individual shrub crowns by two times the height, or clump shrubs into islands of no greater than 18 ft. diameter and separate the islands by a distance of no less than two times the canopy height.

When thinning brush areas, first remove dead, sick or stressed shrubs, then highly flammable shrubs [i.e. highly twiggy shrubs, shrubs with small woody leaves, shrubs with volatile oils (smell them!)]. The shrub cover should not exceed 30% of your defensible space landscape. Remove dead and diseased branches. The maximum dead-to-live ratio is 20%. You may limb up shrubs, but no greater than one third the height. Remove all vines, papery bark or other suspended debris. Remove or mow undergrowth to 3 inches, and remove all woody debris.



FireSafe Marin in Cooperation with University of California Cooperative Extension

FireSafe Marin—a multi-agency organization to improve fire safety and risk-reduction programs—is a non-profit association of government agencies, the fire service, private companies and citizens devoted to fire prevention throughout Marin County. This project was partially supported by Fireman's Fund Insurance, Pacific Gas and Electric, Marin Community Foundation, and County of Marin.