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VEGETATION MANAGEMENT PLAN

for

Wild Horse Valley Homeowners Association

Novato CA, 94947

Prepared for:

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SUMMARY

Wild Horse Valley is located in a “canyon” drainage between two hip ridges with one way in and one way out. Due to high fire risk in the Wild Horse Valley, community fire preparedness and vegetation management are of utmost importance. The combination of fire weather, exposure, topography, vegetation fuel types and development come together to create a very high fire severity risk and potential for property loss (Figure 1).

Improvements should be made in the following key areas:

- Remove fire-prone vegetation
- Choose fire resistant landscape vegetation
- Maintain hydrant clearance for pumper engine clearance
- Maintaining vegetation adjacent to roads and driveways for fire safe access/egress
- Provide defensible Space around homes and other buildings

This report points out problem areas observed in Wild Horse Valley and provides strategies to improve fire safety through vegetation management.

The appendices provide general vegetation management strategies, and lists of fire prone vs. fire resistant trees and shrubs.



Figure 1 – The location of Wild Horse Valley in the hill area makes it more vulnerable to extreme fire behavior.

PURPOSE

Urban Forestry Associates (UFA) was hired to inspect the topography, vegetation and development within the Wild Horse Valley Homeowners Association in Novato at the request of Todd Lando on July 30, 2015. The purpose was to assess the condition of the vegetation for fire safety and to provide recommendations on fire risk mitigation through vegetation management.

OBSERVATIONS

This community is located inside the **Wildland Urban Interface (WUI)**. This is an area of transition between urban development and unmaintained open space where structures are at an elevated risk of damage from wildfires. Homes in the WUI are subject to strict construction and **Defensible Space** regulations to mitigate fire risk and protect the residences as well as first responders in the event of a fire.

Fire risk conditions in Wild Horse Valley are high in its current state due to topography and fuel loads. Slopes in the Wild Horse Valley HOA are steep, generally 30-50 percent slope, increasing the importance of adequate Defensible Space near structures. Slope contributes significantly to the rate and intensity at which fire spread. As fire spreads upslope it preheats fuels ahead of the flames, increasing rate of ignition and fire intensity.

There is a heavy presence of **fire-prone plants** within the ignition zones and residents front yards. Juniper (*Juniperus spp.*) shrubs were the most common problematic shrub. Fire prone pampas grass (*Cortaderia selloana*) was also prevalent. These are plants whose characteristics promote the intensity and spread of fire and are not recommended for use. These characteristics include volatile oils; an accumulation of fine, dead material; and **high surface area to volume ratios** in the foliage and stems (needles and fine twigs). See Appendix A for a list of fire-prone vs. fire-resistant plants.

Hydrant Clearance

Hydrant clearance is an issue where residents' landscape vegetation is conflicting with or growing much too close to hydrants. A stationary pumper engine must have safe access to each hydrant to hook up and provide "fire flow" (high water flow rates under elevated pressure). Heavy, fire prone fuels can interrupt fire flow and put homes and firefighters at risk (Figure 2).

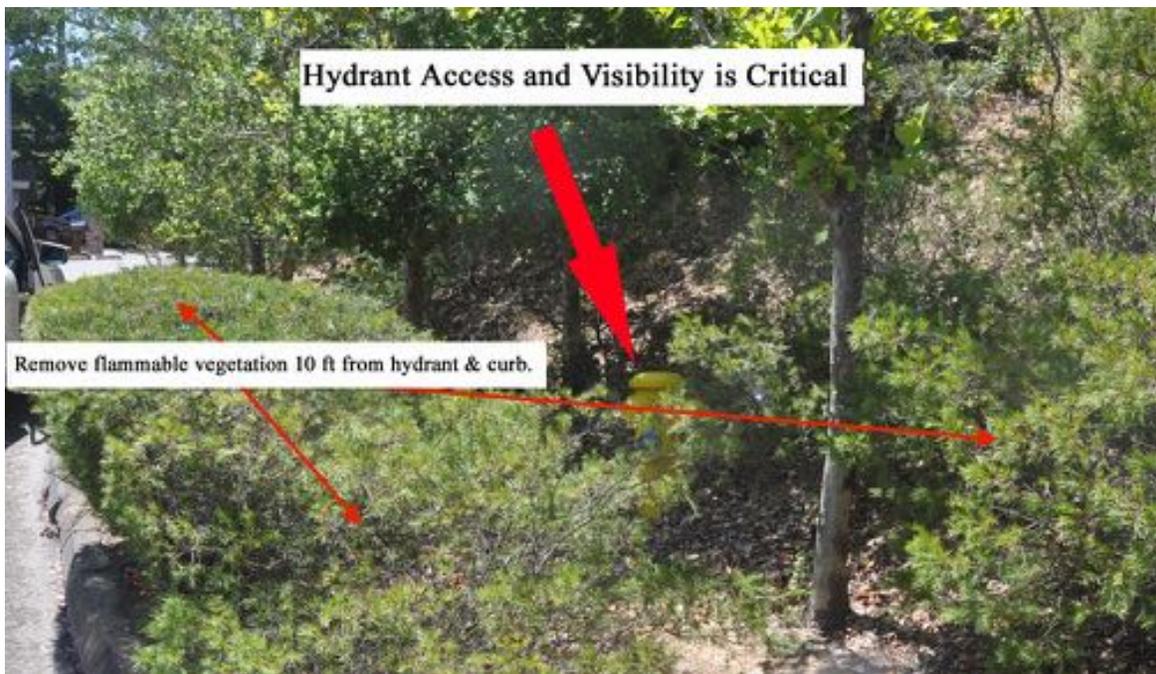


Figure 2 – Hydrants and the fire apparatus must be cleared for effective fire suppression.

DISCUSSION

Fire Apparatus Clear Zone (FACZ)

The area adjacent to roads and driveways is known as the Fire Apparatus Clear Zone (FACZ). Vegetation management in this area is critical to safe access/egress of residents and emergency vehicles during a wildfire event. Juniper is widely planted in Wild Horse Valley. Juniper is not recommended due to its production of fine dead material and flammability. Figure 1 below depicts the risk associated with having such fire prone shrubs planted within the FACZ. Ignition occurs at the roadside in the juniper hedge, which burns intensely, preheating and encouraging fire spread to adjacent tree canopies. This is known as a **fuel ladder**. Pine canopies have deadwood in lower canopies extending nearly all the way to the ground, known as **continuous ground to crown continuity**. Fire road access is substandard due to overgrown vegetation, narrow gate widths, and degraded entryways.

Specific Treatment Recommendations

- Roads and driveways must be cleared for evacuation preparation and emergency egress as well as emergency response.
- Limb up trees to 15 feet vertical distance above the roadway from pavement edge to pavement edge, and provide 10 feet of vegetation either side of the road as per defensible space requirements.
- Remove any juniper hedges within ten feet (10') of any road or driveway. These may be replaced with a fire resistant plant listed in Appendix A as long as there not a continuous fuel bed.
- Limb up trees to 10 feet above grade by removing all foliage and branches under 3" diameter below 10' on any tree, provided this does not remove more than 1/3 of the canopy.
- Remove light "ignition fuels" along roads and disrupt "ladder fuels" that might carry fire into the tree canopies by providing at least 10 feet of vertical clearance.
- Clean up down and dead debris along roads and driveways.
- Use only fire resistant landscaping along home entrance ways.



Figure 3 – Fire safe road and driveway sides facilitate loading of valuables and people for evacuation and fire suppression activities for home defense.

Cul-de-Sacs should be more heavily treated to allow fire engines and emergency crews safe turn around areas and hydrant access. The far end of Wild Horse Valley Road is of particular concern as there are declining Monterey cypresses (*Hesperocyparis macrocarpa*) trees lining a majority of the Cul-de-sac. If the Cypresses are not removed completely, they should be limbed up to at least 10 feet (Figure 4). Additionally a Hydrant is being obstructed by the lower branches of a coast redwood (*Sequoia sempervirens*). Although coast redwood is quite fire resistant, this tree should be limbed up to 10 feet to increase hydrant access.



Figure 4 – Limb up cypresses to 10 feet above grade or remove and remove dying cypress under power lines.



Figure 5 – Limb up redwoods for pumper engine clearance and branches to clear FACZ to 15 ft. above grade.

Fire Road Access

Fire roads are valuable access points for emergency crews in the event of a fire. Thus, they should be maintained clear of overhanging vegetation to allow access for emergency vehicles and fire crew access and to maintain the break in fuel continuity. Fire roads can provide firebreaks to contain wildfires or black lines from which fire crews can backfire to remove fuels from an approaching fire front. Therefore areas adjacent to fire roads should be thinned enough to provide light fuel growth (grasses and herbs) to aid back firing where appropriate or to provide a FCAZ for emergency access. The existing fire road entrances should be widened to a minimum of 14 feet, though 16 feet is optimal. Trees should be limbed up to 15 feet above the road bed. (Note: The particular road below (Figure 6) may not provide good fire access, but was used for an example.)



Figure 6 – fire roads provide access and potentially fire lines for fire containment.

Defensible Space

Aside from the fact that CA state law and local codes require up to 100 feet or more of defensible space, performing vegetation management around homes and other structures significantly increases the probability of surviving a fire event. Defensible space also aid firefighters' ability to respond to and suppress fire. In general defensible space work consists of maintaining the understory clear of flammable grasses and brush, removing fire prone plants within 30 feet of structures, and trimming trees to prevent fire spread from ground to crown or from tree canopy to tree canopy and to structures, (disrupt fuels vertically and horizontally). Selecting fire resistant shrubs near structures is another element of managing defensible space.

Some properties we observed in Wild Horse Valley have created good defensible space while others need a lot of work. For example, many homeowners have Monterey pine trees (*Pinus radiata*) growing directly adjacent to their homes with low hanging branches in direct contact with or very close to rooflines. Raising the canopy of such trees to increase clearance will reduce the probability of fire spreading from tree canopy to the home. An additional consequence of roof clearance is reduced debris in rain gutters, which is a common home ignition site.



Figure 7 – Pines surrounding home with low branches close to roof and roof overhangs (heat and ember traps) threaten home survivability. They also drop a lot of needles on the roof and in the gutters, particularly at the height of the fire season.

Vegetation Management Example

Figures 7 and 8 depict favorable and unfavorable fuel loading scenarios. Figure 7 is an example of heavy fine fuels (pines and junipers) and high fire risk. Figure 8 below is an example of a successful vegetation management program. Understory brush and fine fuels were cleared and tree canopies were raised. Such treatments reduce the rate of spread and probability of fire advancing in to tree canopies (crown fire). The result is an aesthetically pleasing park like feeling. Homeowner's association member involvement and buy in have been critical to the success of such ongoing programs.



Figure 8 – Undergrowth clearing is both aesthetically pleasing and fire resistant.

SCOPE OF WORK / LIMITATIONS

Information regarding property boundaries, land ownership, and tree ownership was evident from a land survey, property fencing and/or provided by the client. UFA has no personal or monetary interest in the outcome of this matter. All determinations reflected in this report are objective and to the best of our ability. All observations regarding the sites and trees were made by UFA personnel, independently, based on our education and experience. Determinations of the health and hazard potential of the subject trees are through visual inspection only and of our best professional judgment.

The health and hazard assessments in this report are limited by the visual nature of the assessment. Defects may be obscured by soil, brush, vines, aerial foliage, branches, multiple trunks or other trees. None of the subject trees were examined using invasive techniques such as increment coring or Resistograph® tests. The probability of tree failure is dependent on a number of factors including: topography, geology, soil characteristics, wind patterns, species characteristics (both visually evident and concealed), structural defects, and the characteristics of a specific storm. Structurally sound, healthy trees are wind thrown during severe storms. Consequently, a conclusion that a tree does not require corrective surgery or removal is not a guarantee of no risk, hazard, or sound health.

TREE WORK STANDARDS AND QUALIFICATION

All tree work, removal, pruning, planting, shall be performed using industry standards as established by the International Society of Arboriculture. Contractor must have a State of California Contractors License for Tree Service (C61-D49) or Landscaping (C-27) with general liability, worker's compensation, and commercial auto/equipment insurance.

Contractor standards of workmanship shall adhere to current Best Management Practices of the International Society of Arboriculture (ISA) and the American National Standards Institute (ANSI) for tree pruning, fertilization and safety (ANSI A300 and Z133.1).

SOURCES

- Field Inspection performed by Urban Forestry Associates on July 30, 2015.



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APPENDIX A: GENERAL TREATMENT RECOMENDATIONS

TREATMENT RECOMMENDATIONS

VEGETATION FUELS MANAGEMENT STRATEGIES

Strategy: Select fire resistant plants

Actions:

- Remove any and all pyrophytic (fire-prone) shrubs within the indicated Defensible Space Zone.
- Select listed fire resistant species, or consult the VMP specialist for other fire resistant landscaping plant recommendations.
- When replanting, select species with low surface to volume ratios (i.e., southern magnolia, tulip tree, rhododendron, Myoporum or English laurel vs trees like acacia, eucalyptus, pine, fir and juniper).
- Select broadleaf vs. needle-leaf species.
- Select clean looking species with stout branches and twigs (non-twiggly).
- Select species listed as pest and disease resistant.
- Select deciduous trees and shrubs with supple, moist foliage.
- Select species without volatile oils in their leaves (use the smell test). Sap is water-like and does not have a strong oil odor.

Strategy: Reduce fuel volumes.

Actions:

- Remove all deadwood from trees and shrubs.
- Thin oaks and bays to reduce production of ground litter and debris.
- Create shrub/grass/hardscape mosaics from continuous shrub masses.
- Remove shrubs beneath and around existing and emerging trees.
- Use low-growing, non-pyrophytic (fire resistant) shrubs and ground cover as replacement plants.
- Remove/reduce all lofty or loosely compacted litter accumulations, especially large debris such as branches and replace with compact, small particle mulch to prevent invasion of noxious weeds and elevate the live fuel moisture of retained plants.
- Vines, which tend to accumulate dead material, should be removed from trees and the home.

Strategy: Reduce fuel flammability.

Actions:

- Irrigate plants, appropriate to species, to maintain high live fuel moisture content.
- Use fire resistant mulch to increase ground and live fuel moisture.
- Remove dead material and leaf litter from all shrubs.
- Cut all grasses when 50% cured (dried), or no later than June 1.
- Replace annual grasses with plants that do not cure (dry out).
- Remove deadwood in trees and shrubs.
- Remove all dead and downed material each year by June 1, leaving compact leaf litter or mulch to a depth of not more than 2".
- Remove shrubs that have a dead sub-canopy inside the surficial green canopy.
- Remove sick, dying, and dead shrubs and trees.

Strategy: Establish/maintain fuel discontinuity.

Actions:

- Remove/reduce "ladder" fuels (grass, to brush, to trees, low to high branches, lose flammable bark).
- Remove all Douglas fir and Monterey pine reproduction.
- Create shrub/grass mosaics from continuous masses by installing hardscape where possible.
- Remove shrubs from beneath and around existing and emerging trees.
- Thin thickets of small trees and tree reproduction from large tree understories.
- Create low fuel zones near structural vulnerabilities such as windows, decks, and large structural overhangs.

Strategy: Reduce the possibility of fire traveling through tree crowns.

Actions:

- Separate overlapping tree and large shrub canopies.
- Thin fire-prone tree canopies (Coast live oak, California bay laurel, Douglas fir, Monterey pine,) to open canopy structure. To maintain tree health, remove no more than 30% of foliage per-tree, per-year).
- Ensure that no shrubs or immature trees are allowed to grow beneath mature trees where they would create a fuel ladder.
- Remove all conifer reproduction on property. Retain existing conifers as recommended, with treatment (limb to recommended height and remove all deadwood).
- Prune out low hanging fire-available branches and twigs up to 3 inches in diameter to a minimum of 10 feet above ground under any portion of the canopy or to an elevation 10 feet above the highest ground elevation.
- Where it is not possible to separate crowns by at least 10 feet, prune low hanging fire-available branches and twigs up to 3 inches in diameter to a minimum of 10 feet above ground under any portion of the canopy or to an elevation 10 feet above the highest ground elevation if the height of the tree allows.
- Perform fuel volume reduction actions mentioned above.

FIRE APPARATUS CLEAR ZONE (FACZ)

The FACZ is critical to safe access/egress during a wildfire event.

- All trees within 10' of roadways and driveways should be maintained so that no part of the tree's canopy extends laterally across the roadway or meets an opposing tree's canopy. This provides increased roadway clearance, and decreases the potential for flame impingement on the roadway.
- Tree canopy, where it extends over the roadway, should be raised to a minimum of 15 feet above the paved road surface to provide safe clearance for fire apparatus, and should not meet and opposing canopy.
- Vegetation within 10 feet of roadways should be restricted to fire resistant species (See attached list of fire resistant screen species). Plants should have low surface to volume ratio (Ex: pine is high, and magnolia is low) and should have low concentration of volatile oils, waxes, and fats (pine, fir & bay have high volatile oil content, redwood & oak have low volatile oil content, acacias have high volatility).
- All brush and brambles (blackberries) should be removed within 10 feet of roads to maintain the FACZ.
- Remaining roadside vegetation should be regularly deadwooded and irrigated where the plants are tolerant of summer water (even intolerant plants will tolerate infrequent deep irrigation).
- All dead and down material should be removed.
- Cured grasses and herbs should be cut to less than 4" from June 1 to November 1 or the onset of rain.

DRIVEWAY SIDE FUELS MANAGEMENT ZONE

- Trees adjacent to the driveway should be maintained to meet the same standards as the FACZ roadway, with 15' of vertical clearance from the driveway base (in accordance with Mill Valley Fire Department's Fire Protection Standard 210), and 5' laterally.
- All down and dead debris should be removed.
- Cured grasses and herbs should be cut to less than 4" from June 1 to November 1 or onset of rains.
- Brush, shrubs, and undergrowth should be removed at least 10' from the sides of the driveway.

APPENDIX B: Fire Resistant Plant List

Shade Tolerant	
<i>Species (scientific name)</i>	<i>Common Name</i>
<i>Agapanthus</i>	Dwarf lily-of-the-Nile
<i>Liriope</i>	Lily turf
<i>Vinca minor</i>	Dwarf periwinkle
Herbs	
<i>Galium odoratum</i>	Sweet woodruff
<i>Lavandula angustifolia</i>	English lavender
<i>Salvia chameadryoides</i>	Sage
<i>Teucrium chamaedrys</i>	Germander
<i>Thymus serpyllum</i>	Thyme
<i>Thymus vulgaris</i>	Thyme
<i>Thymus vulgaris 'Argentus'</i>	Silver thyme

Drought Tolerant	
<i>Species (scientific name)</i>	<i>Common Name</i>
<i>Achillea millefolium</i>	Common yarrow
<i>Ceanothus 'concha'</i>	Wild lilac
<i>Ceanothus maritimus</i>	Maritime ceanothus
<i>Cistus purpureus</i>	Orchid rockrose
<i>Diets fortnight</i>	Llily
<i>Lavandula dentata</i>	French lavender
<i>Limonium perezii statice</i>	Sea lavender
<i>Ribes viburnifolium</i>	Catalina perfume
<i>Solanum jasminoides</i>	Potato vine
<i>Tecomaria capensis</i>	Cape honeysuckle

California Natives	
<i>Species (scientific name)</i>	<i>Common Name</i>
<i>Carpenteria californica</i>	Bush anemone
<i>Eschscholzia californica</i>	California poppy
<i>Fremontodendron californica</i>	Common flannel bush
<i>Mahonia repens</i>	Creeping mahonia
<i>Mimulus longiflorus</i>	Monkey flower
<i>Polystichum munitum</i>	Sword fern
<i>Ribes sanguineum currant</i>	Pink winter currant, red flowering currant
<i>Salvia clevelandii</i>	Sage
<i>Salvia sonomensis</i>	Sage
<i>Zauschneria californica</i>	California fuschia

Perennials	
Species (scientific name)	Common Name
<i>Ajuga reptans</i>	Carpet bugle
<i>Chrysanthemum maximum</i>	Shasta daisy
<i>Echinacea purpurea</i>	Purple coneflower
<i>Prunus florabunda</i> 'Robinson'	Flowering cherry
<i>Rhododendron</i>	Azalea
<i>Rosa florabunda</i>	Rose
<i>Rudbeckia fulgida</i>	Black-eyed susan
<i>Teucrium cossoni</i>	Germander

Shrubs and Groundcovers	
<i>Erigeron karvinskianus fleabane</i>	Santa Barbara daisy
<i>Festuca glauca</i>	Fescue
<i>Iris douglasiana</i>	Douglas iris
<i>Kniphofia uvaria</i> 'DWF'	Red-hot poker, torch-lily
<i>Lantana camara</i>	Lantana
<i>Lavandula angustifolia</i>	English lavender
<i>Rhamnus californica</i>	Coffeeberry
<i>Santolina virens</i>	Santolina

Hedges and Screens	
Species (scientific name)	Common Name
<i>Acer ginnala</i>	Amur Maple
<i>Afrocarpus gracilior</i>	Fern Pine
<i>Arbutus unedo</i>	Strawberry Tree
<i>Camellia japonica</i>	Camellia
<i>Carissa grandiflora</i>	Natal Plum
<i>Ceritonia siliqua</i>	Carob
<i>Citrus species</i>	Lemons, Limes, Oranges, etc.
<i>Cocculus laurifolius</i>	Cocculus
<i>Cornus mas</i>	Cornelian Red, Sorbet
<i>Cornus stolonifera</i>	Red-Osier Dogwood
<i>Crataegus phaenopyrum</i>	Washington Thorn
<i>Elaeagnus angustifolia</i>	Russian Olive
<i>Elaeagnus pungens</i>	Silverberry
<i>Eriobotrya japonica</i>	Loquat
<i>Escallonia rubra</i>	Escallonia
<i>Eugenia species</i>	Eugenia
<i>Euonymus species</i>	Euonymous
<i>Feijoa sellowiana</i>	Pineapple Guava
<i>Hibiscus rosa-sinensis</i>	Tropical Hibiscus
<i>Hibiscus Syriacus</i>	Rose of Sharon
<i>Ligustrum lucidum</i>	Glossy Privet
<i>Ligustrum species</i>	Privet

Hedges and Screens	
Species (scientific name)	Common Name
<i>Magnolia species</i>	Little Gem Magnolia
<i>Malus species</i>	Apple
<i>Myoporum laetum</i>	Myoporum
<i>Myrica californica</i>	Pacific Wax Myrtle
<i>Nerium oleander</i>	Oleander
<i>Olea europaea</i>	Swan Hill Olive
<i>Osmanthus fragrans</i>	Sweet Olive
<i>Photinia fraseri</i>	Photinia
<i>Pittosporum crassifolium</i>	Karo
<i>Pittosporum tobira</i>	Mock Orange Pittosporum
<i>Pittosporum undulatum</i>	Victorian Box
<i>Plumbago auriculaata</i>	Cape Plumbago
<i>Podocarpus macrophyllus</i>	"Yew" Tree
<i>Prunus caroliniana</i>	Cherry Larel
<i>Prunus ilicifolia</i>	Hollyleaf Cherry
<i>Prunus laurocerasus</i>	English Laurel
<i>Pyrus kawakamii</i>	Evergreen Pear
<i>Rhamnus species</i>	Buckthorne
<i>Rhododendron species</i>	Azalea, Rhododendrons
<i>Vaccinium species</i>	Blueberry*
<i>Viburnum tinus</i>	Viburnum*
<i>Xylosma congestum</i>	Xylosma

APPENDIX C: Fire Prone Plant List

High Fire Hazard Native Shrubs	
<i>Species (scientific name)</i>	<i>Common Name</i>
<i>Adenostoma fasciculatum</i>	Chamise, Greasewood
<i>Arctostaphylos spp.</i>	Manzanita
<i>Artemisia californica</i>	Sagebrush
<i>Baccharis spp.</i>	Covote Brush
<i>Castanopsis chrysophylla</i>	Chinquapin, Giant
<i>Erigonum fasciculatum</i>	California Buckwheat
<i>Pickeringia montana</i>	Chaparral Pea
<i>Quercus spp.</i>	Scrub Oak (brushy oaks)
<i>Salvia mellifera</i>	Black Sage
<i>Vaccinium</i>	Huckleberry

High Fire Hazard Native Trees	
<i>Species (scientific name)</i>	<i>Common Name</i>
<i>Cupressus sargentii</i>	Sargent Cypress
<i>Lithocarpus densiflora</i>	Tanoak
<i>Pinus coulteri</i>	Coulter Pine
<i>Pinus attenuata</i>	Knobcone Pine
<i>Pinus radiata</i>	Monterey Pine
<i>Pinus muricata</i>	Bishop Pine
<i>Pseudotsuga menziesii</i>	Douglas Fir
<i>Umbellularia californica</i>	California Bay

Fire Hazardous Exotics	
<i>Species (scientific name)</i>	<i>Common Name</i>
<i>Apies spp.</i>	Firs
<i>Bambusa spp.</i>	Bamboo
<i>Cedrus spp.</i>	Cedars
<i>Chamaecyparis spp.</i>	False Cypress
<i>Juniperus spp.</i>	Junipers
<i>Larix spp.</i>	Larch
<i>Lonicera japonica</i>	Japanese Honeysuckle
	Plam (if dry fronds)
<i>Pennisetum spp.</i>	Fountain Grass
<i>Picea spp.</i>	Spruces
<i>Pinus spp.</i>	Pines
<i>Rosmarinus officinalis</i>	Rosemary
<i>Spartium junceum</i>	Spanish Broom
<i>Taxus spp.</i>	Yew
<i>Thuja spp.</i>	Arborvitae
<i>Tsuga spp.</i>	Hemlock
<i>Ulex europea</i>	Gorse

High Fire Hazard Exotics	
<i>Species (scientific name)</i>	<i>Common Name</i>
<i>Acacia spp.</i>	Acacia Species
<i>Cortaderia jubata</i>	Jubata Grass
<i>C. selloana</i>	Pampas Grass
<i>Cytisus scoparius</i>	Scotch Broom
<i>C. Monspessulanus</i>	French Broom
<i>Eucalyptus spp.</i>	Most Eucalyptus
<i>Pennisetum spp.</i>	Foutan Grass
<i>Spartium junceum</i>	Spanish Broom
<i>Ulex europea</i>	Gorse