UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources

Fire-Smart Landscaping in the Sierra Foothills

California's Sierra Foothills are a diverse ecoregion composed of grassland, chapparal, hardwood, and conifer ecosystems. While plants native to the Sierra Foothills have coevolved with fire, recent wildfires increasingly demonstrate behavior which exceeds the natural tolerance of these species. Landscaping with plants adds further challenges, particularly considering how structures, defensible space, and surrounding wildland fuels interact during a wildfire. To reduce wildland and home landscape fuels, residents can leverage the natural characteristics of plants to apply the principle of "Right Plant, Right Place" and create robust, fire-smart landscapes.

Fire in Near-Home Landscaping

During wildfire, both live and dead vegetation become sources of fuel. By managing near-home fuels, residents can eliminate pathways for wildfire to spread, isolate fire when ignition occurs and reduce risk from ember-driven ignition (Figure 1). Understanding how fire behaves in each fuel type can help inform proper placement of native plants.

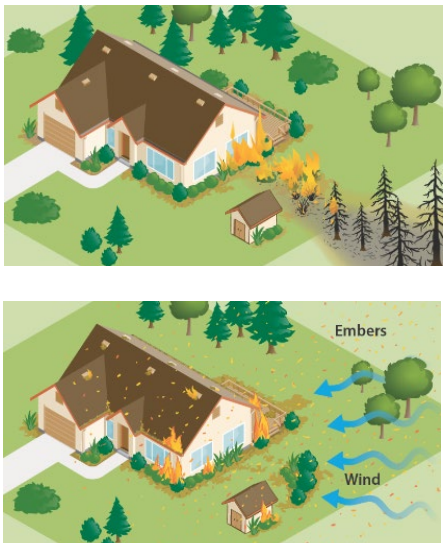

Figure 1 *(Top) Movement of fire through contiguous vegetation (Bottom) Ignition of near-home landscaping from embers (Valachovic et al, 2021).*

Surface Fuels include ground covers, low growing grasses, herbaceous, and woody perennials. Surface fuels produce light foliage which develops into fine fuels that are easily ignited and burn rapidly. Contiguous surface fuels can carry wildfire across a landscape and lead to ignition of heavier adjacent fuels (e.g., fences, patio furniture, structures, and woody vegetation). To minimize risk, reduce plant densities, particularly for taller-statured plants and create fuel breaks using non-combustible walkways. Short-statured surface fuels should be arranged into "islands" separated by non-combustible materials.

Ladder Fuels include woody shrubs, tall grasses, vines, and lower limbs of dominant trees. Ladder fuels carry fire vertically into the crowns of dominant vegetation, i.e., trees. Reduce the density of ladder fuels across the landscape to reduce opportunities for surface fire to carry into the canopy. Maintain spacing between individual plants to be at least twice the height of the mature plant, and increase spacing on steeper slopes (Figure 2).

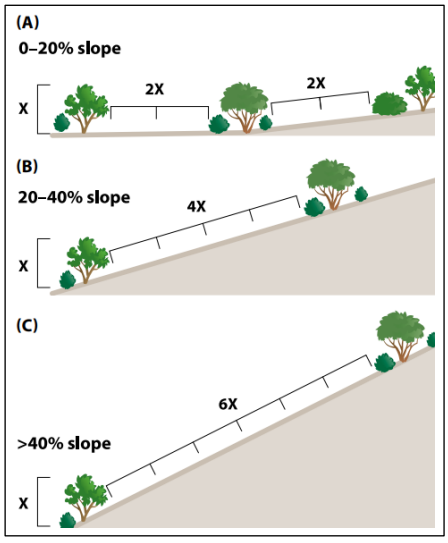

Figure 2 *Double or triple distances between vegetation as compared with flat ground depending on steepness (Valachovic et al, 2021).*

Ladder fuels can also be planted or managed into "islands" of vegetation separated by non-combustible space. Islands reduce the potential for fire spread; even if one island catches fire, other islands would need to be independently ignited. Additionally, proper landscaping within these islands can slow the development of weeds and other surface fuels.

Crown fuels include the upper canopy of dominant vegetation, i.e., the tree canopy for most landscapes. While many native tree species have adaptations to resist low intensity fires, crown fires can damage the foliage and lead to mortality. Pruning the limbs up along the stem of overstory trees reduces the vertical continuity of fuel in the landscape and the volume of material available to burn during a fire.

Defensible Space Zones

All plants, including those marketed as "firesafe" or "fire resistant" **burn under the right conditions**. Instead of considering how 'safe' a plant will be during fire, align plant characteristics with defensible space zones to create a fire-smart landscape.

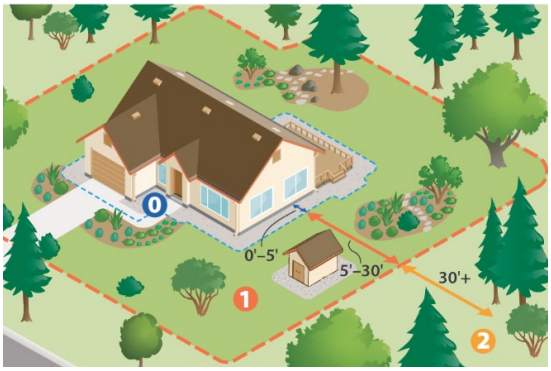

Figure 3 *Implementation of the three zones in a defensible space strategy.*

Defensible Space Zone guidelines help mitigate the intensity and spread of wildfires by increasing the horizontal and vertical space between fuels. Consider the purpose of each defensible space zone when designing a landscape (Figure 3):

Zone Zero (0-5 ft) reduces the potential for direct flame contact and ember ignition to the home by removing all vegetation and combustible material. Creating a clear perimeter around the house and any attached structures also reduces the potential for combustible windblown debris to accumulate. Use pathways composed of concrete, pavers, rock mulch, pea gravel, or bare soil.

Zone One (5-30 ft) slows the spread of wildfire to aid firefighters in structure defense. Zone One also reduces the potential for crown fire by creating discontinuity between the surface and ladder fuels. Consider landscaping with individual short-statured trees, irrigated lawns, and garden beds. Non-turf perennial and annual plants should be planted in "island" garden beds. Prune and thin plants to increase spacing between each other and the home.

Zone Two (30-100+ ft) moderates the behavior of approaching wildfire. Under moderate conditions, a crown fire in Zone Two may drop out of the canopy to the ground and burn with less extreme behavior. Reduce the continuity of fuel in the overstory by thinning trees and shrubs, pruning lower branches of trees to a height of 6-10 feet, and removing all dead and dying vegetation. Maintain grasses at a maximum height of 4 inches in this zone.

Planting Considerations

When deciding which plants to use in near-home landscaping, consider how their physiology and placement will interact during a fire.

Ground covers: Plant in island garden beds surrounded by non-combustible walkways and paths. Combustible mulches such as composted wood chips, shredded bark, or shredded rubber can still lead to smoldering combustion and flame, posing additional risk especially when located next to structures.

Herbaceous perennials and short-statured (<1 ft) grasses: Plant in widely-spaced island beds. Separate beds with non-combustible walkways, rock walls, or areas of irrigated, mowed lawn. Do not plant perennials next to structures.

Shrubs, woody vines, and taller grasses: Plant shrubs and taller grasses individually or in small clumps apart from each other. Do not plant under trees, decks, or adjacent to buildings. Generally, space the distance between shrubs and smaller trees to be at least twice their height when mature, increasing the spacing on steeper slopes (Figure 2). Near trees and buildings, plant only widely separated, low-growing, non-resinous varieties. Choose shrubs that are low growing, with minimal dead material and supple leaves. Choose hedge and screen plants with broad, waxy leaves and that don't build up dead material.

Trees: Position trees so that crowns are at least 10-15 feet away from structures. Leave plenty of room between trees to allow for growth; at least 10 feet between mature tree crowns.

Native or drought-tolerant plants: Plants native to your local area and Sunset Western Garden climate zone tend to establish better, can require less maintenance, and may do well with little to no additional water or other resources (Reid and Oki, 2008). Many drought-tolerant plants are not ignition-resistant especially after a long dry period. It is critical that you know your plants' biophysical characteristics and maintenance needs so you can manage them appropriately. All plants will burn if a fire produces enough heat, particularly plants in poor health and are insufficiently irrigated and maintained.

Mulch: Although inorganic mulches (i.e., rocks) are immune to combustion, organic mulches (i.e., wood chips, bark) provide many benefits to our landscapes (Downer, 2009) that are important to preserve while reducing fire risk. Coarse particle mulches and composted wood chips are less flammable than lighter mulches containing lots of air within the particles. Avoid using pine needles, leaves, or straw as these are highly flammable (Rogstad et al., 2007).

Horticulturists recommend mulching with arborist wood chips from tree pruning operations because it is readily available and provides benefits for trees and shrubs (Downer, 2009). Arborist wood chips are composed of leaves and wood from all aboveground parts of the tree (Figure 4) and is suitable for composting.

Figure 4 *Arborist woodchips before composting.*

Composting wood chips reduces its flammability, but also changes burn behavior. Composted mulches typically smolder instead of producing flames (Quarles and Smith, 2011), and can produce flame with wind (Lin et al. 2024). Smoldering material also produces heat over a long duration, which can kill tree and shrub roots, so it is best to rake mulch away from the base of trees and shrubs. Be aware that bark mulches do not compost as quickly as wood chips, possibly requiring many years and additional nitrogen to compost.

Maintenance Considerations

Maintenance is not only important for reducing ignition risk in individual plants but keeps your defensible space intact. Poorly maintained plants accumulate dead foliage and branches more rapidly, which increases the ease of ignition from embers and surface fire. When designing home landscaping, consider not only where to plant, but how you plan to maintain the species in a fire-smart condition.

Turf grasses: Keep well-watered but avoid waterlogging soil. Consider using species that require less water and are less prone to drying out in the summer. Avoid practices that will increase excessive growth, like applying nitrogen fertilizer, to reduce thatch build-up. Maintaining grass at low heights will also help reduce build-up of thatch and debris over time (Beard, 1973). Periodically remove and dispose of dead thatch layers.

Ornamental grasses: Warm season grasses typically go dormant in the fall and are more prone to ignition during this time. Cut back dormant ornamental grasses if the weather is dry and there is still a chance of fire. If there is sufficient rain to extinguish wildland fires, ornamental grasses should be cut back in late winter to protect them from frost. If grass has been cut back in fall, you may need to cover with frost cloth to protect it through the winter. Evergreen grasses should have the dead leaves and thatch periodically removed.

Herbaceous perennials: Remove and dispose of dead and dying materials regularly. All plants have a waxy coating, called the cuticle, on leaves to reduce water loss. Drought resistant plants often have thicker cuticle layers to decrease water loss. However, this protective film is also flammable (Behm et al., 2004) and will likely release more energy when burned. Aromatics and other volatile organic compounds (VOC) are also common in herbaceous perennials and large numbers of these plants can intensify a fire (Courty et al., 2010; Courty et al., 2014). Resinous or oily leaves are an indicator of high-VOC content plants. It is recommended to maintain correct spacing of aromatic herbaceous perennials or avoid planting them in large densities. Examples of aromatic plants to minimally plant include rosemary, lavender, thyme, rockrose, and sages.

Shrubs or woody vines: Keep plants around shrubs low and free of dead material. Remove and dispose of dead and dying materials regularly. Hedges have an abundance of dead wood inside them and require extra maintenance to reduce ignition and combustion risk. Hedges should be properly spaced to reduce fuel continuity and regularly maintained to reduce the accumulation of dead wood and debris inside. A better alternative to hedges is to prune shrubs into a more natural shape when they are young by selecting a few main stems (Figure 5), thereby reducing the overall plant volume and opportunity for buildup of dead material. Prune to thin branch structure and minimize risk of leaves and needles being trapped and ignited by embers. Alternatively, shrubs can be maintained to be low growing (2’ or lower) to minimize flame heights. Be mindful of plants that regularly shed bark or branches.

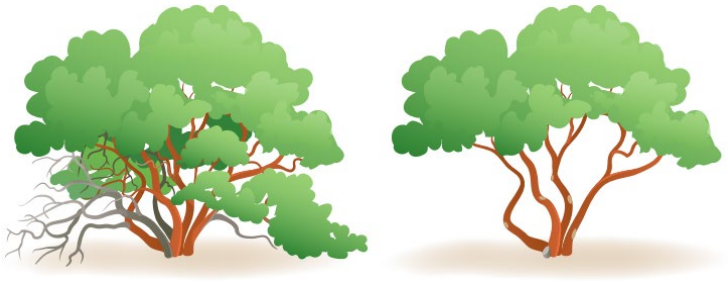

Figure 5 *Manzanita before (left) and after (right) regular pruning, resulting in a plant less susceptible to wildfire (Valachovic et al. 2021).*

Trees: Prune tree limbs to a height of six to ten feet to create an open crown structure and reduce ladder fuels. It is important to break up the horizontal and vertical fuel continuity around trees. Remove dead leaf and stem material within tree crowns and on the ground. Remove all shrubs and smaller trees growing under canopies of dominant trees. Trees which shed bark or branches are likely to need more regular maintenance to reduce fuel accumulations on the ground. Be mindful of species with significant leaf or needle drop and its impact on maintenance-related cleanup on the property, on the roof, and in rain gutters.

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Fire-Smart Considerations for Common Sierra Foothills Landscaping Plants

Physiological characteristics of plants can help guide fire-smart planting decisions. All plants burn under the right conditions, although some have characteristics which make them better adapted to fire in the appropriate defensible space zone. **The information provided below is specific to the Sierra Foothill region and assumes that plants are mature, properly irrigated, and growing in ideal conditions.** Water use classification is based on the WUCOLS (ccuh.ucdavis.edu/wucols) recommendations and growth rate indicates the rate of plant establishment and spread. It is encouraged to reference multiple sources, specific to the area that you are hoping to plant them in, when deciding which plants may be fire-smart for your home landscape.

Plant Name	Physiology	Fire-Smart Considerations
Agapanthus *Agapanthus spp.*  *Photo: Wiktionary 2012 Prenn*	**Form:** Herbaceous **Type:** Perennial **Native:** No **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are 12”-24” long, 1”-2“ wide, basal, linear, with entire margins **Size:** 1’-4’ tall and wide	• Does not have waxy, oily, or resinous foliage • Accumulates dead foliage and flowers around base of plant • Moderate growth rate • Water use classification: Low
Birch *Betula spp.*  *Photo: Wikipedia 2014 Jane Shelby Richardson*	**Form:** Shrub, tree **Type:** Perennial **Native:** No **Foliar Persistence:** Deciduous **Foliar Description:** Leaves are 1”-5” long, slightly less wide than long, alternate, simple, and oval-shaped with doubly serrate margins **Size:** 25’-33’ tall, 25’ wide	• Waxy foliage • Accumulates dead foliage and bark around base; bark peels and sheds • Moderate to fast growth rate • Water use classification: High

Blackberry (California) *Rubus ursinus*  *Photo: CalPhotos 2008 Keir Morse*	**Form:** Shrub **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves can be simple or compound, having three leaflets with the terminal leaflet being three-lobed, each is 1”-2.5” long and 0.5” wide, alternate, triangular-ovate, with coarse-toothed margins, and prickly veins **Size:** 2’-6’ tall, 6’ wide	• Does not have waxy, oily, or resinous foliage • Accumulates dead woody material and foliage in and around base of plant • Fast growth rate, spreads rapidly and can become difficult to maintain • Water use classification: Low
Blackberry (Himalayan) *Rubus armeniacus*  *Photo: Calflora 2019 Connor O’Hara-Baker*	**Form:** Shrub **Type:** Perennial **Native:** No, INVASIVE **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are palmately compound, having three to five leaflets, with each being 1.5”-3” long, ovate in shape, with double-toothed margins, hooked prickles on stems and veins, and the stem is distinctly five-angled **Size:** 10’ tall, 13’-33’ wide	• Does not have waxy, oily, or resinous foliage • Accumulates dead woody material and foliage in and around base of plant • Fast growth rate, spreads rapidly and can become difficult to maintain • Water use classification: Low • Invasive and difficult to maintain
Blue-eyed grass *Sisyrinchium bellum*  *Photo: Calflora 2024 Steve Conger*	**Form:** Herbaceous **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Narrow, grassy, sword-shaped leaves coming from tufted stems **Size:** 3”-18” tall, 4”-24” wide	• Does not have waxy, oily, or resinous foliage • Accumulates dead material at the base • Moderate growth rate, spreads • Water use classification: Low • Do not cluster together as it can self-sow, creeping rhizomes will also enlarge the colony each year

Bottle brush *Callistemon spp.*  *Photo: Wikipedia 2017 Jim Evans*	**Form:** Shrub, tree **Type:** Perennial **Native:** No **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are 2”-4” in length and less than 2” in width, linear to lance-shaped, with entire margins, and are alternately arranged **Size:** 3’-15’ tall and wide	• Oily foliage • Accumulates dead foliage around the base of the plant and dead woody material in the interior sections of the plant • Moderate growth rate • Water use classification: Moderate to Low
Buck brush *Ceanothus cuneatus*  *Photo: Calflora 2021 Steve Matson*	**Form:** Shrub **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are up to one inch long and less than an inch wide, elliptic to round in shape, generally have entire margins but can be toothed near top, oppositely arranged **Size:** 5’-12’ tall and wide	• Waxy foliage • Accumulates dead woody material and flowers in crown and around base • Moderate to fast growth rate, spreads • Water use classification: Very Low • Highly flammable, reduce risk by pruning mature shrubs to reduce density of fuels
California buckeye *Aesculus californica*  *Photo: Calscape 2012 Gary A. Monroe*	**Form:** Tree **Type:** Perennial **Native:** Yes **Foliar Persistence:** Deciduous, beginning in summer **Foliar Description:** Leaves are palmately compound with 5-7 leaflets that are each 2”-7” in length, lanceolate to oblong shape, finely serrate margins **Size:** 13’-39’ tall, 40’ wide	• Does not have waxy, oily, or resinous foliage • Accumulates dead foliage in canopy and around base • Moderate growth rate • Water use classification: Very Low • Leaf drop occurs in summer

California Fuchsia *Epilobium canum*  *Photo: Calscape 2015 Steve Matson*	**Form:** Herbaceous **Type:** Perennial **Native:** Yes **Foliar Persistence:** Semi-deciduous **Foliar Description:** Leaves are 0.5”-2.5” in length, linear to widely ovate in shape, entire to strongly toothed in shape, and sessile; the plant is clumped with basal scaly shoots **Size:** 3”-18” tall, 2’-3’ wide	• Does not have waxy, oily, or resinous foliage • Accumulates dead foliage and flowers in and around base of plant; will die back and go dormant in winter, so it is best to cut it back to the ground once the flowers are spent • Fast growth rate, spreads through self-seeding and creeping rhizomes • Water use classification: Low
California Poppy *Eschscholzia californica*  *Photo: Calscape 2010 Neal Kramer*	**Form:** Herbaceous **Type:** Annual, perennial **Native:** Yes **Foliar Persistence:** Deciduous **Foliar Description:** Leaves are finely subdivided two to four times into obtuse or acutely lobed segments, are arranged alternately, can be basal or cauline, and are much branched **Size:** 0.5’-1’ tall, 0.5’-2’ wide	• Waxy foliage • Accumulates dead material; cut down to ground after plant dies back in summer and goes dormant • Moderate to fast growth rate • Water use classification: Very Low • Self-seeds freely but is not particularly invasive
Camellia *Camellia spp.*  *Photo: Wikipedia 2004 Kowloonese*	**Form:** Shrub **Type:** Perennial **Native:** No **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are 3”-4” long, simple, thick, have finely serrate margins, are leathery and glossy, and are alternately arranged **Size:** 6’-8’ tall, 6’ wide	• Waxy, oily foliage • Accumulates dead flowers in canopy and around base • Slow growth rate • Water use classification: Moderate

Ceanothus *Ceanothus spp.*  *Photo: Calflora 2020 Julie A. Kierstead*	**Form:** Shrub **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves vary in size from 0.5”-3”, are ovate, most with slightly serrate margins, have three prominent parallel veins from base to tip of leaf, and have a glossy upper surface **Size:** 2’-10’ tall, 6’ wide	• Waxy foliage • Accumulates dead woody material and flowers in canopy and around base • Moderate to fast growth rate, spreads • Water use classification: Moderate to Low • Highly flammable, reduce risk by maintaining mature shrubs
Citrus *Citrus spp.*  *Photo: Wayde Carroll*	**Form:** Tree **Type:** Perennial **Native:** No **Foliar Persistence:** Evergreen **Foliar Description:** Leaves can be 2”-5” long, are elliptic in shape, most with pointed tips, some with finely toothed margins, and have a glossy upper surface **Size:** 10’-15’ tall, 6’-10’ wide	• Waxy, oily foliage • Accumulates dead leaves and fallen fruit around base • Growth rate varies • Water use classification: Moderate
Coffeeberry *Frangula californica*  *Photo: Calflora 2020 Julie A. Kierstead*	**Form:** Shrub **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are 1”-4” long, elliptic to ovate in shape, leathery, entire to toothed margins, with prominent veins, and are typically evergreen **Size:** 6’-15’ tall, 5’-15’ wide	• Does not have waxy, oily, or resinous foliage • Accumulates dead foliage around base • Moderate growth rate • Water use classification: Low • Takes pruning well, but avoid hedging

Crape Myrtle *Lagerstroemia indica*  *Photo: CalPhotos n.d. Dr. Nick V. Kurzenko*	**Form:** Tree **Type:** Perennial **Native:** No **Foliar Persistence:** Deciduous **Foliar Description:** Leaves are 1.5”-3” long, round to elliptic in shape, have entire margins, and can be opposite or alternate or whorled **Size:** 15’-25’ tall, 6’-15’ wide	• Does not have waxy, oily, or resinous foliage • Accumulates dead foliage in canopy and around base; bark peels in early summer • Fast growth rate • Water use classification: Low
Daffodil *Narcissus pseudonarcissus*  *Photo: Calflora 2019 Tomas Zavala*	**Form:** Herbaceous **Type:** Perennial (Bulb) **Native:** No **Foliar Persistence:** Deciduous **Foliar Description:** Four leaves, each 8”-18” in length, flat, and glaucous **Size:** 4”-20” tall, 4” wide	• Waxy foliage • Accumulates dead foliage and flowers; remove dead material once it has yellowed and weakened in early to late spring. • Moderate growth rate, can multiply quickly • Water use classification: Very Low
Deergrass *Muhlenbergia rigens*  *Photo: Calscape 2015 Zoya Akulova*	**Form:** Herbaceous **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaf blades are 4”-19.5” in length and 0.5”-2” wide, flat, truncate, and have ciliate margins **Size:** 4’-5’ tall, 4’ wide	• Does not have waxy, oily, or resinous foliage • Accumulates dead foliage in and around base; cut back in winter to remove dead plant material • Moderate to fast growth rate • Water use classification: Low • Can be cut annually to reduce fire risk

Douglas-fir *Pseudotsuga menziesii*  *Photo: Calflora 2020 David Krause*	**Form:** Tree **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are 1”-1.5” in length, flat, arranged spirally, and attached singly **Size:** 70’-250’ tall, 15’-25’ width	• Waxy foliage and resinous bark • Accumulates some dead foliage and woody material in canopy and around base; some bark shed • Moderate growth rate • Water use classification: Moderate
Fir *Abies spp.*  *Photo: Wikipedia 2010 Crusier*	**Form:** Tree **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are 1”-3.5” in length, sessile, 2-ranked, often upcurved on upper twigs, generally flat, have longitudinal white bands on the underside of leaves and sometimes on the topside **Size:** 30’-300’ tall, 15’-40’ wide	• Waxy foliage and resinous bark • Accumulates some dead foliage and woody material in canopy and around base; some bark shed • Moderate to fast growth rate • Water use classification: Moderate
Flannelbush *Fremontodendron californicum*  *Photo: Calflora 2020 Raelynn Noel*	**Form:** Shrub **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are 0.5”-3” in length, palmately lobed, with base truncate to shallowly cordate, soft to leathery, and have small stipules **Size:** 6’-20’ tall, 20’ wide	• Does not have waxy, oily, or resinous foliage • Accumulates dead material around base • Fast growth rate • Water use classification: Very Low • Trichomes covering the leaves can be irritating to eyes and skin

Geranium *Geranium spp.*  *Photo: Calscape 2015 Jean Pawek*	**Form:** Herbaceous **Type:** Annual **Native:** Yes **Foliar Persistence:** Deciduous **Foliar Description:** Leaves are palmately lobed to divided, some are hairy, segments are palmately lobed or toothed, alternately to oppositely arranged, and generally have cordate bases **Size:** 2’-4’ tall and wide	• Oily, resinous foliage • Produces aromatic VOC compounds in foliage, plant sparingly • Accumulates dead foliage and flowers • Moderate growth rate • Water use classification: Moderate
Honeysuckle *Lonicera spp.*  *Photo: Calscape 1995 Saint Mary’s College of California*	**Form:** Vine, shrub **Type:** Perennial **Native:** Yes **Foliar Persistence:** Deciduous to semi-evergreen **Foliar Description:** Leaves are opposite, simple, and entire; 1-2 pairs beneath inflorescence which are often fused around the stem **Size:** 10’-25’ tall, 3’-15’ wide	• Waxy foliage • Accumulates dead foliage and flowers • Fast growth rate, spreads • Water use classification: Low
Heavenly Bamboo *Nandina domestica*  *Photo: Calflora 2019 Randy Huey*	**Form:** Shrub **Type:** Perennial **Native:** No **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are alternate, bi- or tri-pinnately compound, 12”-23.5” long, leaflets are 1”-3” long, have an acuminate tip and wedge-shaped base, entire margins, leathery, with varied colors throughout seasons **Size:** 4’-8’ tall, 2’-4’ wide	• Waxy foliage • Accumulates dead foliage and woody material around base and on plant • Fast growth rate • Water use classification: Moderate to Low • Pruning and thinning can be helpful to maintain an open structure

Incense Cedar *Calocedrus decurrens*  *Photo: Calflora 2018 David Popp*	**Form:** Tree **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are 0.25”-0.75” long, scalelike, blunt tipped, set in opposite, alternating pairs, and are yellowish green in color **Size:** 70’-100’ tall, 20’-35’ wide	• Waxy, oily foliage • Accumulates dead foliage and woody material around the base • Some bark shed on mature trees • Moderate to slow growth rate • Water use classification: Moderate
Iris *Iris spp.*  *Photo: Calflora 2019 Steve Matson*	**Form:** Herbaceous **Type:** Perennial **Native:** Yes **Foliar Persistence:** Deciduous **Foliar Description:** Leaves are in a 2-ranked basal fan, reduced, often bract-like, without development of distal portion **Size:** 0.5’-4’ tall, 0.5’-2’ wide	• Waxy foliage • Accumulates some dead foliage in and around base • Moderate growth rate • Water use classification: Moderate to Low
Juniper *Juniperus spp.*  *Photo: Calscape 2009 Joe Decruyenaere*	**Form:** Shrub, tree **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are scalelike, set in whorls of three, yellowish green in color, and have pronounced glands **Size:** 10’-26’ tall, 20’ wide	• Waxy, oily, resinous foliage • Accumulates dead woody material in canopy • Moderate to slow growth rate • Water use classification: Low

Lavender *Lavandula spp.*  *Photo: Calflora 2019 Julian Geoghegan*	**Form:** Shrub **Type:** Perennial **Native:** No **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are narrow, linear, and gray-green in color **Size:** 1.5’-2’ tall and wide	• Oily, resinous foliage • Accumulates dead woody material on the plant; prune in late summer after flowering. Remove any spent flower stalks or dead woody materials. If branch is alive, avoid cutting woody branches, • Moderate growth rate • Water use classification: Low
Lupine *Lupinus spp.*  *Photo: Calflora 2022 Steve Conger*	**Form:** Herbaceous, shrub **Type:** Annual, perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are palmately compound with 3-17 leaflets, entire, are often crowded near the base, and vary in color depending on the species **Size:** 1’-3’ tall, 1’-1.5’ wide	• Does not have waxy, oily, or resinous foliage • Accumulates dead foliage and flowers; remove spent flowers to encourage a second round of blooms in early fall. Cut back perennial plants to the ground as foliage browns in the fall. • Fast growth rate, spreads • Water use classification: Moderate to Low
Pacific Madrone *Arbutus menziesii*  *Photo: Calscape 2011 Neal Kramer*	**Form:** Tree **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are smaller than five inches in length, ovate to oblong, glabrous, have entire to minutely serrate margins, are white on the underside and bright green on the topside **Size:** 15’-100’ tall, 5’-25’ wide	• Waxy foliage • Accumulates bark on stems and around base, bark peels • Slow growth rate • Water use classification: Low • Can grow in shrub form on harsh sites

Maple *Acer spp.*  *Photo: Calflora 2020 Christopher Brown*	**Form:** Shrub, tree **Type:** Perennial **Native:** Yes **Foliar Persistence:** Deciduous **Foliar Description:** Leaves are oppositely arranged, and either simple or compound; simple leaves are palmately lobed and veined **Size:** 30'-115' tall, 65' wide	• Waxy foliage • Accumulates dead foliage and fruit around base • Fast growth rate • Water use classification: High to Moderate
Manzanita *Arctostaphylos spp.*  *Photo: Calflora 2022 R.A. Chasey*	**Form:** Shrub, tree **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are alternately arranged, simple, generally entire, and leathery **Size:** 10'-12' tall and wide	• Some have waxy or resinous foliage • Accumulates dead woody material and bark in canopy and around base, bark peels • Moderate to slow growth rate • Water use classification: Low to Very Low
Mahonia *Berberis aquifolium* *(formerly Mahonia aquifolium)*  *Photo: Calscape 2009 Barry Breckling*	**Form:** Shrub **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are 3"-9.5" long, pinnately compound with 5-9 leaflets, each 0.5"-2" wide, round to elliptic in shape, can be flat to strongly wavy have serrate margins, and have spines **Size:** 4'-7' tall, 6' wide	• Waxy foliage • Accumulates dead material around the base; prune in spring after flowering to maintain smaller size and plant spreading. • Moderate growth rate, spreads • Water use classification: Moderate • Synonymous with *Mahonia aquifolium*

Marina Madrone *Arbutus 'Marina'*  *Photo: SelecTree n.d. SelecTree*	**Form:** Tree **Type:** Perennial **Native:** No **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are elliptic to oblong in shape, simple, and alternately arranged **Size:** 25'-40' tall, 30' wide	• Waxy foliage • Accumulates fruit and woody material in canopy and around base; accumulates bark on stems and around base, bark peels • Moderate growth rate • Water use classification: Low • Resembles *A. unedo* and is a good garden substitute for *A. menziesii*
Monkeyflower *Diplacus spp. and hybrids*  *Photo: Calflora 2024 Steve Conger*	**Form:** Herbaceous, shrub **Type:** Annual, perennial **Native:** Yes **Foliar Persistence:** Deciduous, evergreen **Foliar Description:** Leaves are generally sessile, glabrous to hairy, and have either toothed or entire margins **Size:** 4'-5' tall, 5' wide	• Resinous foliage • Accumulation of dead plant material depends on species • Moderate growth rate • Water use classification: Low • Once categorized as *Mimulus aurantiacus*, now multiple species in genus *Diplacus*
Oak *Quercus spp.*  *Photo: Calscape 2008 Neal Kramer*	**Form:** Shrub, tree **Type:** Perennial **Native:** Yes **Foliar Persistence:** Deciduous, evergreen **Foliar Description:** Leaf shape and size are variable; margins can be lobed, entire, serrated, or toothed; leaves are alternately arranged **Size:** 20'-80' tall and wide	• Waxy foliage • Accumulates dead foliage, woody material, and fruit in canopy and around base; some bark shed • Moderate to fast growth rate • Water use classification: Low to Very Low • Some oaks have leaves covered in trichomes that can be irritating to eyes and skin

Palm *Phoenix, Syagrus, and Washingtonia spp.*  *Photo: Calflora 2021 Ron Vanderhoff*	**Form:** Tree **Type:** Perennial **Native:** No, except for *Washingtonia filifera* **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are 5'-10' in length, sharply toothed at the base, palmately divided nearly to the middle into 40-60 segments, and have many thread-like fibers coming off the margins **Size:** 50'-100' tall, 10'-20' wide	• Waxy foliage • Accumulates dead foliage in canopy and around trunk; requires pruning to remove skirt of dead leaves surrounding trunk • Moderate growth rate • Water use classification: Moderate
Pampas grass *Cortaderia selloana*  *Photo: CAL IPC n.d. Joseph DiTomaso*	**Form:** Grass **Type:** Perennial **Native:** No, INVASIVE **Foliar Persistence:** Evergreen **Foliar Description:** Leaf blades are 1"-3" wide, up to 6' long, sharply toothed, blue-green on the top and dark green on the bottom, with a tuft of short hairs at the base **Size:** 20' tall, 13' wide	• Does not have waxy, oily, or resinous foliage • Accumulates dead foliage in and around base • Fast growth rate, spreads • Water use classification: Low • Produces many seeds that can travel far by wind and agriculture
Pine *Pinus spp.*  *Photo: Calscape 2009 Walter Siegmund*	**Form:** Tree **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are needles that are 1"-14" long, in sheathed or unsheathed bundles of 1-5 **Size:** 30'-200' tall, 20'-50' wide	• Waxy, resinous foliage • Accumulates some dead foliage and woody material in canopy and around base; some mature pines shed bark • Fast growth rate • Water use classification: Low to Very Low

Plumbago *Plumbago auriculata*  *Photo: Calflora 2020 Stephen Rosenthal*	**Form:** Shrub **Type:** Annual, perennial **Native:** No **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are 0.5”-1” wide, 1”-3.5” long, elliptic to oblanceolate, with entire margins **Size:** 6’ tall, 8’-10’ wide	• Does not have waxy, oily, or resinous foliage but its flowers are resinous and sticky • Accumulates dead flowers and foliage in canopy and around base • Fast growth rate • Water use classification: Moderate
Western redbud *Cercis occidentalis*  *Photo: Calscape 2020 Calscape*	**Form:** Shrub, tree **Type:** Perennial **Native:** Yes **Foliar Persistence:** Deciduous **Foliar Description:** Leaves are 2”-4” in length, cordate to ovate, with entire margins, leathery; leaf color changes with the seasons **Size:** 10’-18’ tall and wide	• Does not have waxy, oily, or resinous foliage • Accumulates dead foliage and woody material around base. Prune in late winter or early spring before new growth begins to remove dead material or crossed branches. • Moderate growth rate • Water use classification: Very Low
Redwood *Sequoia sempervirens*  *Photo: Calscape 2011 John W. Wall*	**Form:** Tree **Type:** Perennial **Native:** Exclusively to CA coast **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are less than an inch long, linear to lance-linear, awl-like, 2-ranked, and alternate **Size:** 50’-350’ tall, 15’-30’ wide	• Waxy foliage • Accumulates dead foliage and woody material in canopy and around base; some bark shed • Fast growth rate • Water use classification: High • Requires ample water and fog

Rosemary *Rosmarinus officinalis*  *Photo: Calflora 2022 Andy Ford*	**Form:** Shrub **Type:** Perennial **Native:** No **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are needle-like, narrow, linear, oppositely arranged, simple, have entire margins, are green on the topside and white-tomentose on the underside **Size:** 1’-6’ tall, 2’-5’ wide	• Waxy, oily, resinous foliage • Accumulates some woody material in canopy and around base, some bark shed • Moderate growth rate, spreads • Water use classification: Low
Rose *Rosa spp.*  *Photo: Calflora 2018 Ron Vanderhoff*	**Form:** Shrub **Type:** Perennial **Native:** Yes **Foliar Persistence:** Deciduous, evergreen **Foliar Description:** Leaves are generally odd-pinnately compound, with 5-7 leaflets that are ovate to elliptic, can be hairy or glandular, and have single- or double-toothed margins **Size:** 1’-20’ tall, 1’-15’ wide	• Does not have waxy, oily, or resinous foliage • Some species accumulate dead plant material • Moderate to fast growth rate, spreads • Water use classification: Low • Can form thickets
Sage *Salvia spp.*  *Photo: Calscape 2010 Calscape*	**Form:** Herbaceous, shrub **Type:** Annual, perennial **Native:** Yes **Foliar Persistence:** Deciduous, evergreen **Foliar Description:** Leaves are generally lanceolate to ovate in shape, with entire or lobed or toothed margins, are simple, oppositely arranged, drought-deciduous, and some are tomentose **Size:** 1’-6’ tall, 1’-5’ wide	• Oily, resinous foliage • Some species accumulate dead plant material; tender species will die back and go dormant in winter. Cut back once the flowers are spent • Moderate growth rate, spreads • Water use classification: Moderate to Low

Snowberry *Symphoricarpos spp.*  *Photo: Calscape 2015 Margo Bors*	**Form:** Shrub **Type:** Perennial **Native:** Yes **Foliar Persistence:** Deciduous **Foliar Description:** Leaves are generally elliptic to round, simple, oppositely arranged, with entire or lobed margins **Size:** 2’-6’ tall and wide	• Does not have waxy, oily, or resinous foliage • Accumulates dead material around the plant; prune in late winter to early spring • Moderate to fast growth rate, spreads • Water use classification: Low
Star Jasmine *Trachelosperum jasminoides*  *Photo: Wikipedia 2005 A. Barra*	**Form:** Vine, shrub **Type:** Perennial **Native:** No **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are 3”-6” long, elliptic to ovate-lanceolate, simple, with entire margins, and are oppositely arranged **Size:** 2’ tall, 10’-30’ wide	• Waxy, oily, resinous foliage • Accumulates dead material at the base; prune after flowering to encourage new growth • Fast growth rate • Water use classification: Moderate
Strawberry Tree *Arbutus unedo*  *Photo: SelecTree n.d. SelecTree*	**Form:** Tree **Type:** Perennial **Native:** No **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are oblong in shape, simple, alternately arranged, and dark green. **Size:** 8’-35’ tall, 20’-35’ wide	• Waxy foliage • Accumulates fruit and woody material in canopy and around base; accumulates bark on stems and around base, bark peels • Moderate growth rate • Water use classification: Low • Can be thinned to keep open structure, or planted alongside several others and left unpruned to create a screen

Toyon *Heteromeles arbutifolia*  *Photo: Calflora 2018 Joaquin Hale*	**Form:** Shrub **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are 2”-4” long, elliptic, have finely toothed margins, are alternate, and leathery **Size:** 6’-25’ tall and wide	• Waxy foliage • Accumulates some dead foliage around base • Moderate growth rate • Water use classification: Very Low
Wormwood (Mugwort) *Artemisia spp.*  *Photo: Calscape 2016 Wynn Anderson*	**Form:** Herbaceous **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are generally linear, with entire to lobed margins, and tomentose, hairs glandular **Size:** 1.5’-15’ tall, 2’-10’ wide	• Oily, resinous foliage • Accumulates dead material; can cut back to a few inches off the ground in early spring while leaving live buds. Light pruning can help prevent fast rate of spread • Fast growth rate, spreads • Water use classification: Low
Yucca *Yucca spp.*  *Photo: Calscape 2010 Calscape*	**Form:** Shrub **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are 8”-59” long, linear, thick, rigid, spine-tipped, with entire to dentate margins, and form a rosette from the base **Size:** 15’-30’ tall, 30’ wide	• Waxy foliage • Accumulates dead foliage at the base; requires pruning to remove dead leaves surrounding base of trunk • Moderate growth rate • Water use classification: Low to Very Low

Yarrow *Achillea millefolium*  *Photo: Wikipedia 2019 SAplants*	**Form:** Herbaceous **Type:** Perennial **Native:** Yes **Foliar Persistence:** Evergreen **Foliar Description:** Leaves are less than an inch wide, 1”-3” in length, lanceolate to oblong, tripinnately divided, hairy, and clasping **Size:** 2’-3’ tall, 1.5’ wide	• Oily, resinous foliage • Accumulates dead material; prune in the spring to encourage bushier plants with more flowers or prune after the first bloom to encourage a second round of flowers • Fast growth rate • Water use classification: Low