

Coast Redwoods *in* Santa Clara County *Management and Irrigation*



The most common redwood species grown in the Santa Clara Valley is the *Sequoia sempervirens* or coast redwood. This document presents factors that affect the health and viability of this species and summarizes key actions you can take to keep your coast redwood healthy.

About the Coast Redwood

The coast redwood is the world's tallest tree – some reaching heights of 350 feet in the native stands. This iconic symbol of California is a much loved addition to many landscapes. The conical shape of fragrant green creates a woody environment that is cool and inviting. In its native range, the coast redwood grows rapidly in its early years and reaches 70 to 90 feet tall by 15 to 30 feet wide in 25 years. Away from this range, the coast redwood grows more slowly, usually reaching heights of no more than 50 feet.

A healthy coast redwood will have red-brown fibrous barked trunk that has straight, nearly parallel sides. The main branches of most coast redwoods will grow straight outward from the trunk with a slight curve upward at the tips. Feathery green foliage with gray-green undersides will be thick and lush, making it difficult to see the trunk of the tree when viewed at a distance. Bright green spring growth will mature throughout the summer and inconspicuous flowers will develop in late fall producing small cones that mature by the following year.

Coast redwoods gather water and nutrients through their extensive lateral root system. Large redwoods move hundreds of gallons of water daily from roots to canopy crown, so adequate moisture in surrounding soils is a critical component for their success. Inadequate moisture, or a hot dry site, will make the coast redwood grow slowly. If there is too much competition for water or light, the redwood will be lanky, thin and open.

The indigenous range of the coast redwood extends along a narrow strip of coastal California from parts of Monterey County to the southwestern border of Oregon. In these areas, the soils are consistently moist - winter rainfall is high and summer fog provides a near continuous drip - and temperatures are moderate year round. In Santa Clara County, coast redwoods typically attain only a fraction of the life span, height and lushness of the native stands.



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Coast Redwoods *in* Santa Clara County

The most successful way to grow a coast redwood is to duplicate its native environment. In Santa Clara County this can be a difficult endeavor with the area's unpredictable rainfall patterns, hot summers, low humidity, air pollution, and clay soils. The glaring buildings of the urban setting compound problems for the coast redwood by reducing the amount of rain water that can reach the roots and accelerating water loss. All of these factors must be countered to help these trees succeed. You will need to closely monitor - and possibly adjust - soils, irrigation methods, and horticultural practices to emulate the redwood's native conditions. The table below compares key conditions from the areas where coast redwoods thrive to those of Santa Clara County.

Comparison of Important Environmental Conditions for Coast Redwoods

Condition	Native Environment	Santa Clara County
Average rainfall	30 – 122 inches/year	13 – 25 inches/year
Average number of foggy/cloudy days	265 days/year	65 days/year
Average temperature range	40.6° F – 63.9° F	41.0° F – 84.3° F
Predominant soil type, drainage	Alluvial, well-drained	Clay, adequate to poor drainage
Average soil pH	5 – 7.5	6 – 8
Mulch	Plentiful - leaf litter left in place to decompose naturally	Variable - frequently little to none

Coast Redwoods and Irrigation

Coast redwoods have been shown to be salt sensitive, though some varieties (such as 'Los Altos') appear to be less vulnerable than others. For the coast redwood, it is essential to have good drainage and to use irrigation methods that move salts away from the root zone. In poorly drained soils, salts will build up over time whether irrigation water is potable or recycled. This process occurs more quickly when using recycled water because of the increased salt content of the water. Rainfall, which contains almost no salt and is slightly acidic, can leach the salts from the root zones, but additional leaching throughout the year may be necessary, especially in low rainfall years.

Your watering schedules should be adjusted with the weather and seasons. To avoid runoff in heavy clay soils or on slopes, low application rate emitters may be used. Low-volume systems with micro-sprinklers or flat nozzle spray heads are ideal for maintaining humidity under the tree canopy. Irrigate early in the morning, when winds are calm and evaporation is low. A root irrigator/feeder may also be used to shoot jets of water into the root zone for thorough deep watering without runoff. These jets of water not only break up compacted soil, they create air pockets and drainage pathways in the soil.

If soil tests indicate that there is excess salt in the root zone, additional water, known as a leaching fraction, may be required to rinse salts to below the root zone. The amount of additional water for leaching and the rate at which it is delivered will be dependant on the soil drainage. Ideally the leaching fraction should be calculated for you by a soil lab based upon soil testing on your site combined with your irrigation water quality reports.

Water quality reports, for both potable and recycled water, are typically posted on your Water Retailer's website. Because all water sources vary over time, water is analyzed frequently. If you are currently using South Bay Water Recycling (SBWR) water, test results may be found at www.sanjoseca.gov/sbwr



A healthy redwood tree irrigated with recycled water.

Common Problems for the Coast Redwood

In the last several years, University of California Cooperative Extension farm advisors from all over California have reported problems with redwoods, including browning, thinning and other symptoms of decline. A redwood trunk exhibiting a noticeable taper is another indicator of a stressed plant. Many factors may be contributing to these signs of decline. Common causes of problems for coast redwoods are presented below:

Aeration Deficit: A serious source of stress for the coast redwood is lack of oxygen in the soil which can lead to plant suffocation. Poor soil aeration may be caused by:

- *Too much irrigation*
- *Poor drainage due to compaction, underlying hardpan (a layer of dense soil below the top soil layer that is impervious to water movement) or sodic soil (soils containing excess sodium impeding water infiltration and water availability to plants)*
- *Physical barriers at soil surface such as asphalt, concrete, plastic, etc.*
- *Additional fill soil over existing root system*

Water Deficit: Perhaps the most prevalent problem for redwoods in Santa Clara County is drought stress. Dehydration may be caused by:

- *Inadequate or improper irrigation methods*
- *Runoff from slopes or compacted soils*
- *Hardscapes diverting up to 50% of rainwater away from root zones*
- *Surface evaporation due of lack of mulch layer*
- *Competition for water from other plants*
- *Lack of summer fog*
- *Low ambient humidity and drying winds*
- *Reflected heat and light from the built environment, including pavement and buildings*

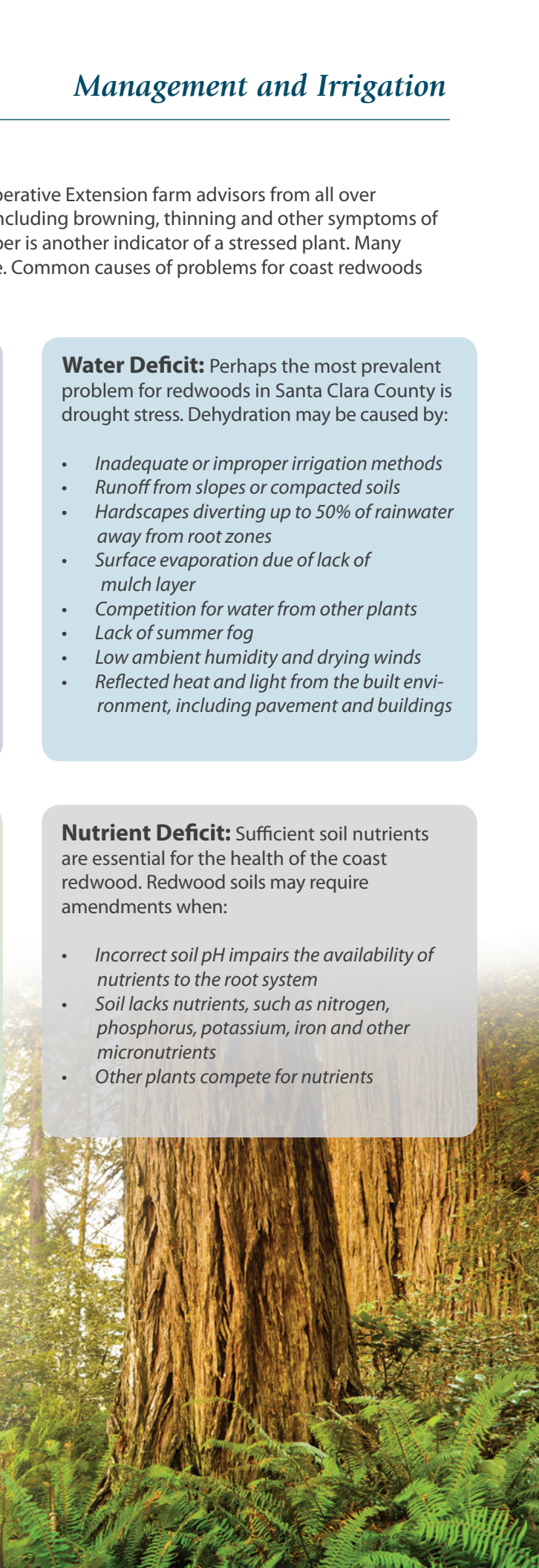
Salt Toxicity: Coast redwoods are a salt-sensitive species, so it is important to use irrigation techniques to leach salts from their root zones. Excess salt may result from:

- *Excessive fertilization*
- *High ground water table*
- *Salts in irrigation water*
- *Rapid evaporation rates*
- *Soil source material*
- *Inadequate leaching due to low rainfall or under watering*

Nutrient Deficit: Sufficient soil nutrients are essential for the health of the coast redwood. Redwood soils may require amendments when:

- *Incorrect soil pH impairs the availability of nutrients to the root system*
- *Soil lacks nutrients, such as nitrogen, phosphorus, potassium, iron and other micronutrients*
- *Other plants compete for nutrients*

If any of these conditions exist in your landscape, you should watch for changes in growth rate, canopy density and foliage color. These nonspecific symptoms are serious, but easily detected. Get to know the signs of moisture stress, nutrient deficiencies or toxicity, insects and diseases and take action accordingly.



Key Steps for Growing Coast Redwoods in Santa Clara County

1. Water widely and deeply; the top 18 to 24 inches of soil in the tree's root zone should be kept moist, but not soggy, all year round. Ensure irrigation water reaches from (but not on) the trunk/root collar to at least the dripline of the tree and preferably beyond.
2. Test for drainage: at least 1/4 inch per hour but not more than 2 inches per hour is optimal.
3. Periodically test soil to determine fertility, salinity and pH, and then adjust horticultural practices as needed.
 - Soil pH should be maintained between 5.0 and 7.5, with the optimum soil pH being 6.5.
 - Soil salinity should not exceed 2 to 3 dS/m. (dS/m = decisiemens per meter: a unit of electrical conductance used when measuring soil salinity).
4. Apply 2 to 4 inches of organic mulch, preferably wood chips and the redwood's own leaf litter within the dripline. In addition to mulch, retain as many lower branches on your tree as possible to shade and cool the soil.
5. Avoid compacting soils around your tree and take care to not damage major roots when working in soil amendments.
6. Monitor your tree regularly; address problems as they arise - there is no substitute for thorough field observation. Note: While thinning can be a symptom of decline, it is normal for the oldest leaves and twigs to turn from green to yellow to brown then drop in late summer and early fall.

If you are planning to plant new coast redwood trees, keep in mind the necessary long-term water commitment that will be required to maintain a healthy tree in this drought prone area. Other trees may give your landscape the same look and feel as the coast redwood without consuming excessive amounts of water. If you do choose to plant the coast redwood, confirm that you have good drainage, proper soil pH, and adequate long-term irrigation before planting to ensure the highest likelihood of success.

For those of you who wish to plant a more drought tolerant landscape or install permeable hardscapes, rebates may be available for both homeowners and commercial sites. Check with your water retailer or with the Santa Clara Valley Water District website (www.watersavinghero.com/partners/santa_clara_valley_water_district.html) before re-landscaping your property.

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