Decline of Ornamental Redwood in Mendocino, Lake, and Sonoma Counties

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Over the last few years, I have received multiple calls from landowners and managers concerned about declining and dying ornamental redwood (*Sequoia sempervirens*). I have observed two general patterns of decline: trees dying from the top down (Fig 1.) and complete canopies that appear to be thinning, discolored, and drooping (Fig. 2). I suspect this decline and dieback cannot be contributed to one issue, but likely to a multitude health issues that can occur in off-site (or planted outside of their natural range) ornamental redwood.

Figure 1. Ornamental redwood dying from the top down and/or with dead branches in the canopy likely have redwood canker.

Figure 2. Ornamental redwood with the drooping and discolored needles are often water stressed.

Redwood are resilient trees, but urban environments can be challenging places for them to grow. They are susceptible to drought, limited tree spacing, soil compaction, overwatering and poor draining soils, underwatering, high salt concentrations or toxins in the soil, pollution mechanical injury, and animal damage. The continued stress of these abiotic factors can eventually weaken trees making them vulnerable to native insects and diseases.

I suspect this is what has been happening to the ornamental redwood I have observed in the region. After years of variable drought conditions (redwood have shallow roots, it does not take a huge change or inconsistency in water availability to cause stress), environmental stressors such as heat and exposure, perhaps changes to irrigation systems, the silly things we humans sometimes do to trees, and maybe even genetic characteristics that make them poorly adapted to these sites, have progressively weakened these trees to a point where they can no longer resist or tolerate attacks from insect and diseases.

Top and Branch Dieback

Trees with top and branch dieback appeared to have redwood canker, a disease that can be caused by several different fungi (Fig. 3). A canker (wound) can girdle the main stem or branch, and inhibit the movement of water, eventually killing the tissues above. As the tree becomes more stressed and new cankers form, the dieback will progress down the tree. Trees that are severely weakened by redwood canker become attractive to redwood bark beetle (Fig. 4) and their feeding further reduces the movement of water, hastening the decline of the tree.

In some instances, only the very tip of a tree will have brown needles. This is often caused by tree squirrels or other small animals that have gnawed through the bark and girdled the treetops. If the dieback continues to spread beyond the physical damage, there are likely other issues.

Figure 3. Brown lesion on a redwood likely caused by redwood canker.

Figure 4. Resin emerging from a redwood bark beetle entry hole.

Canopy Decline

Trees that have drooping and discolored needles appeared to be heavily water stressed. Typical signs of this stress were needles that died from the tips inward (Fig. 5) and a reduction of new needle flush. Needle discoloration also appears throughout the canopy, maybe even starting at the bottom or near to the stem. Some trees may even exhibit a heavy cone crop.

Other stressors such as soil compaction and soil borne pathogens infecting the roots may further inhibit the uptake of water and accelerate decline, especially during hot and dry summer months.

Figure 5. Needle dieback from the tip inward suggesting water stress.

Figure 6. A ~10 year old ornamental redwood with top dieback (left) and ~5 years old with stunted growth and branch dieback (right).

Young Trees

I found these patterns of top and branch dieback and canopy decline commonly occurred in ornamental redwood that were ~30 years old. But, in the last year I started observing similar symptoms in young redwood (Fig. 6). The causes of dieback and decline appeared to be the same; however, I also observed several other factors that were likely contributing to the decline of these younger trees.

In several instances, young trees were planted in the understory of larger trees (often different species) and in dense arrangements. I suspect competition for resources such as sunlight, water, and nutrients were reducing the vigor of these trees. Additionally, the build-up of organic matter beneath trees, and branches that extended to the ground created ideal conditions for Microtus. I found evidence of gnawing right above the soil surface that had girdled the stem on several trees that were rapidly declining.

Trees that were more open grown seemed to have some evidence of sunburn or sunscald. This damage was likely worsened by water stress. Severe sun damage by itself can partially girdle smaller trees, but also makes it easier for pathogens to establish.

Management Considerations

While the signs and symptoms of insect and disease infestation are obvious and can appear to be the main cause of decline, these are often secondary pests and are not the primary cause of decline or mortality. Therefore, it is important to manage the health of ornamental redwoods to keep them vigorous and more resistant to attacks from insects and diseases.

There are many management options that can help improve and maintain the health of ornamental redwood (e.g., loosening soil structure, proper irrigation, mulching, soil amendments, removing diseased wood, etc.). Check the resources below for more information. However, heavily declining trees (~>50% of the canopy is discolored or thinned) may not respond to management activities. Those trees should be assessed for risk and removed if they present a hazard.

I would consider consulting with an ISA (International Society of Arboriculture) or ASCA (American Society of Consulting Arborists) certified arborist to help assess the health of any redwood of concern and discuss potential management options.

Normal Needle Loss

In the late summer and early fall, redwood that appeared healthy throughout the summer may begin to show discolored needles and even needle loss. This a natural process in which the tree sheds needles that are several years old. Normal needle loss appears as even discoloration throughout the canopy and should occur after an abundant flush of new needles.

For additional information, below are several great resources on redwood and management considerations:

UC IPM – Redwoods (http://ipm.ucanr.edu/PMG/GARDEN/PLANTS/redwood.html)

UC IPM – Redwood Bark Beetle (http://ipm.ucanr.edu/PMG/PESTNOTES/pn7421.html)

UC article – Redwood Canker (https://ucanr.edu/sites/Mendocino/files/347575.pdf)

UC IPM – Voles (https://www.google.com/search?client=firefox-b-1-d&q=UC+IPM+voles)

UC IPM – Tree Squirrels (http://ipm.ucanr.edu/PMG/PESTNOTES/pn74122.html)

UC Master Gardener blog – Growing Coast Redwood (http://ccmg.ucdavis.edu/files/103008.pdf)

UC Master Gardener newsletter – How much water does a redwood take? (https://ucanr.edu/sites/mgslo/newsletters/Trees42617.pdf)

UC ANR Forestry – Redwoods (https://ucanr.edu/sites/forestry/California_forests/http___ucanrorg_sites_forestry_California_forests_Tree_Identification_/Coast_Redwood_Sequoia_sempervirens_198/)

Tree Associations Blog – Horticultural Considerations for Utilizing Coast Redwood in Northern California Landscapes (https://treeassociates.wordpress.com/2011/11/16/horticultural-considerations-for-utilizing-coast-redwood-in-northern-california-landscapes/)

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