

Spruce Browning and Defoliation on the North Coast

What's Happening to the Spruce Trees?

North Coast spruce trees are under attack this year. Most of these trees have dead or dropped needles, wilted branch tips, and/or twigs pointing in unexpected directions. However, the specifics of these symptoms are varied. While some branches are entirely browned out, others have a spray of new needles. With some spruce trees, the tops look normal, while the lower two-thirds of the canopy are brown. So what is going on?

As you might imagine from the varied symptoms, multiple factors are contributing to the dieback of coastal spruce trees. We speculate that this year's rain pattern triggered an increase in the presence of several pests and pathogens, including the invasive **spruce aphid**, a **giant conifer aphid**, a **tip-wilting pathogen**, and the **spruce spider mite**. All four of these organisms kill needles and/or small twigs, resulting in the notable defoliation of spruce trees.

While needle defoliation reduces growth and resources for defense against future stressors, it doesn't necessarily kill the tree outright. Based on previous defoliation events, the North Coast forest health team anticipates that **Sitka spruce trees will weather this current challenge**. However, it is hard to predict exactly how this will play out long term since recovery is partially dependent on what future stressors these spruce trees encounter. Read on for more information on the pests and pathogens that are causing spruce tree problems this year.



Figure 2. An invasive green spruce aphid on a spruce needle. Photo by USDA Forest Service, Southwest Region



Figure 1. Sitka spruce with significant mid and lower canopy dieback. Photo by W. Robinson, UC Extension.

Meet the Suspects

Spruce Aphids (*Elatobium abietinum*)

Invasive spruce aphids have been bothering North Coast spruce trees for many decades. Defoliation by these insects reduces growth, but only occasionally kills Sitka spruce trees in severe infestations. Spruce aphids primarily feed on older needles.

Symptoms: Mid and lower crown is brown, with only current year's needles remaining.

Ecology: Invasive, sucks sap from needles.

Hosts: Strong preference for spruce

Identifying Features: 1 – 2 mm long, about as wide as a spruce needle, light green with reddish eyes (Figure 2). Sometimes wings.

Active Period: Late winter – early spring

Dispersal Method: Wind and movement of host material for long-distance dispersal, flight for shorter distances.

Giant Conifer Aphids (*Cinara spp.*)

Giant conifer aphids are large, native aphids that suck sap from twigs. Although they often feed on the same trees as spruce aphids, they don't do as much damage and are usually not as numerous. Their eggs seem abundant on the trees this year, but the adult population remains elusive.

Symptoms: Twigs pointing in odd directions, stunted growth, unhealthy-looking crown.

Ecology: Many native aphid species suck sap from twigs.

Hosts: Conifers

Identifying Features: Up to 6 mm long, dark with long legs. Sometimes wings. Often mistaken for ticks. Black eggs the size of about two poppy seeds may be on the needles of infested trees (Figure 3).

Active Period: Late spring – early summer

Dispersal Method: Wind and movement of host material for long-distance dispersal, flight for shorter distances.



Figure 3. Giant conifer aphid eggs (black pellets) on spruce needles. Photo by W. Robinson, UC Extension.

Spruce Tip Blight (possibly *Sirococcus sp.*)

We suspect that this common foliar pathogen is responsible for the recent tip wilt on several conifer species, including spruce trees. *Sirococcus* ramps up under certain weather conditions, and its prevalence in coastal forests likely waxes and

wanes without major damage. However, the combination of defoliation of older needles by spruce aphids and damage of new foliage by *Sirococcus* may make it difficult for these trees to recover if no green needles remain.



Figure 4. Wilted tips characteristic of spruce tip blight. Photo by C. Lee, CalFire.

Symptoms: Wilted tips, especially in the mid and lower crown, with brown needles from the current growth year (Figure 4). Associated twigs may be dark and shriveled at the tip.

Ecology: Fungus that grows in sprouts and needles; native.

Hosts: Conifers

Identifying Features: Dark, round fruiting bodies on needles. Many fungi make similar structures, so presence of these only indicates a *Sirococcus* infection when combined with the wilted tip and shriveled twig symptoms.

Active Period: Spread during wet periods; likely grows year round.

Dispersal Method: Wind and water droplets from infected plants.

Spider Mites (*Oligonychus ununguis*)

Spider mites are tiny arthropods that suck juices out of spruce needles. They cause mild to severe damage to spruce trees but are less prevalent than the other pests and pathogens mentioned here this year.

Symptoms: Speckled bronze damage on needles, often in the lower crown. Needles may drop prematurely or be covered in webbing.

Ecology: Arthropod that feeds on plant juices; native.

Hosts: Primarily spruce, also other conifers

Identifying Features: About ½ mm long, light red when young, adults are dark green with light red legs and hairs.

Active Period: Active spring through fall with multiple generations per year; most active in late spring and early summer.

Dispersal Method: Wind and movement of host material; likely widely distributed at background levels.

Closing Thoughts

In addition to these insects and pathogens, Sitka spruce trees, like other coastal conifers, are contending with several chronic stressors. Drought, overabundance of moisture, or overcrowded stands can lead to the depletion of defensive resources and favorable conditions for pests and pathogens. We have also found root disease in many coastal forest stands, which is another significant stressor. In residential areas, spruce trees are often surrounded by understories of invasive plants that can harm the trees themselves. This is especially true of English ivy, which can injure trees (Figure 5).



Figure 5. English ivy growing up a heavily defoliated Sitka spruce. Photo by W. Robinson, UC Extension.

Although past experience suggests that these coastal spruce trees will survive the current influx of weather-dependant defoliators, each stand's recovery depends on the interaction of existing stressors, genetics, and topography with weather conditions over the next few years. Some harmful insect damage may also be mitigated in the future by increases in predator populations. For additional information on spruce issues, see the spruce section of our [web guide to local forest diseases](#), or email [Wallis Robinson](#) or [Chris Lee](#).

References

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Management Recommendations

- If a spruce tree still has some green needles, it's not dead. Unless it has signs of root disease or is otherwise structurally compromised, don't remove it yet.
- If possible, reduce competition and other stressful conditions. Specifically, remove introduced species such as English ivy from the area around your trees. For larger areas, consider thinning the stand to reduce competition.
- Avoid adding nitrogen to the soil – aphids prefer nitrogen-rich needles. Spruce trees near busy roads or over-fertilized areas may be more attractive hosts. For trees with tip-wilt blight, adding fertilizers high in magnesium may reduce symptoms, especially at nutrient-depleted sites.
- For extremely valuable individual trees, systemic or contact insecticides may help reduce aphid-related problems, although they will not affect fungal infection. Consult a certified arborist for more information.