Juniper Decline Project – Travis County Progress Report

Michael Koretsky

Texas A&M University

The juniper decline project has been progressing steadily since the deployment of all data loggers and the survey is on track to complete within the year timeframe (August 31, 2026). The 6 juniper trees (*Juniperus virginiana)* chosen on 08/27/2025 in Travis County Balcones Canyonlands Preserve (BCP) have increased the applicability of our data across Texas due to the increase in geographic range (Table 1). The selected trees were divided evenly between declining and healthy stands. Collected soil samples have been analyzed for nutrient composition, pH, and soil compaction through bulk density. Tree measurements, including height, diameter at breast height, were documented. Foliar, branch/stem, and root samples were collected and analyzed for pathogen presence. The deployed dataloggers recorded 4 months of microclimate temperature data. Due to the rocky nature of the BCP soil, soil water infiltration measurements need to be replicated as the variability is high. We will revisit the locations throughout Q1 to make field repairs necessitated by wildlife meddling as well as recollect water infiltration measurements.

Tree ID	Tree Coordinates	% Stand In Decline	DBH (cm)	Height (ft)	Regeneration
Healthy 1	N 30° 22.214' W 097° 50.223'	0 - 25	66.04	16.9	0
Declining 2	N 30° 19.993' W 097° 49.831'	75 - 100	46.99	47.4	52
Healthy 3	N 30° 24.464'W 097° 51.585'	0 - 25	24.13	20.9	73
Declining 4	N 30° 21.982'W 097° 49.973'	25 - 50	35.56	29.1	60
Healthy 5	N 30° 26.971'W 097° 51.871'	0 - 25	20.32	12.0	1
Declining 6	N 30° 27.285'W 097° 52.215'	25 - 50	15.24	16.4	3

Table 1. Travis County BCP *Juniperus virginiana* morphological data collected. Height was collected through an abney level standing from 20 feet away. Seedling regeneration is the number of saplings seen within a 20ft area around the selected tree. DBH (diameter at breast height (4.5 ft above ground level)).

Our preliminary findings support that no single incident, biotic agent (insect pest or pathogen), or abiotic factor appear to be the cause of the premature decline and death of the evaluated and nearby trees. This is similar to findings at our other sites across Texas. The data derived from the collected samples, including fungi, oomycetes, and minor beetle activity, supports that the primary driver of the decline is most likely abiotic factors, such as extreme temperatures, precipitation, and drought. These predisposing factors weakened the tree's primary and secondary defense mechanisms, making the trees more susceptible to infection and infestation.

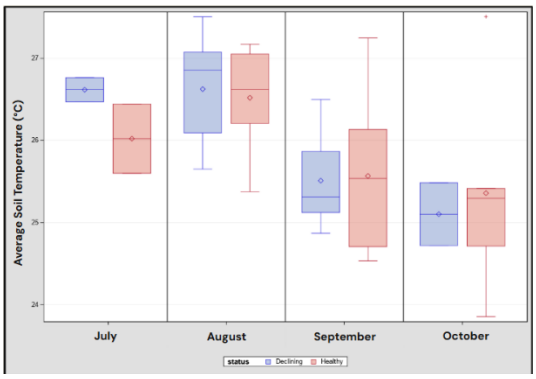


Figure 1. Average soil temperature for all healthy and declining trees

The microclimate plays the most significant role. Looking at figure 2, we see that in the hotter months, the declining trees have a higher average soil temperature. In the cooler months, we see the same trend. However, our canopy temperature data suggest that declining trees experience larger extremes in both directions. The following months' worth of data will help illuminate the true role of temperature decline.

A range of fungal and oomycete organisms were identified on all types of tissues collected from declining and healthy trees. The root survey testing results show that there is a higher rate of *Phytophthora* spp. and *Rhizoctonia* spp. among our declining trees. While these genera are often associated with pathogens, they are inclusive of many species, which can range from saprophytic soil inhabitants to virulent pathogens. While we cannot state if members of these genera caused the decline, it is positively correlated and something we are interested in investigating deeper. The other commonly found fungi are depicted in Figure 3. All but *Dothidea* are known to be predominately secondary pathogens that indicate the tree was stressed prior to infection. This continues to support that microclimate-related factors are likely the largest factor driving this decline event. We will continue to visit the BCP in order to up-keep the data loggers through summer 2026.

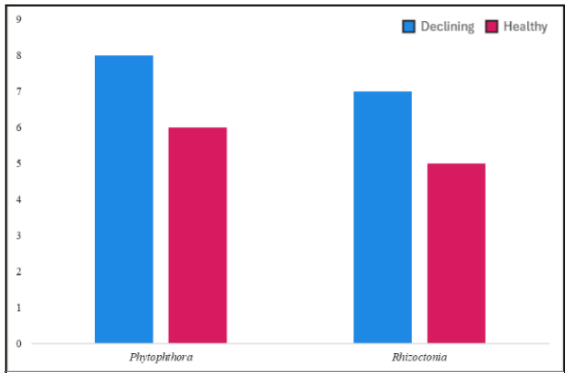


Figure 2. Number of trees with *Phytophthora* and *Rhizoctonia*

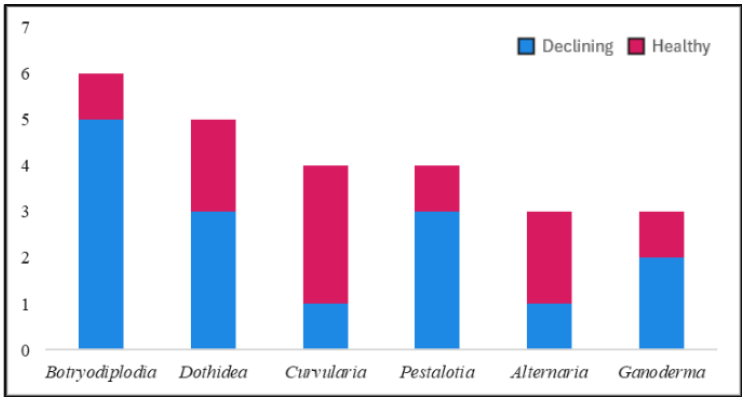


Figure 3. Presence of most found fungi across all surveyed trees

To identify whether pathogens are present, or what conditions are required for them to act as pathogens, species identification and Koch's postulates need to be completed, which is beyond the scope of this study.