

## Aerial Detection Survey – Greater San Francisco Bay Area June 15<sup>th</sup>-19<sup>th</sup>, 2015

**Background:** Most of California is well into its fourth year of exceptional drought. As the drought has become increasingly severe and prolonged, tree mortality has generally increased in most areas, sometimes dramatically. This initial survey of the 2015 regular season was conducted as both a training/refresher mission and for normal data collection in an area that does not typically have high levels of mortality and where the drought conditions are mostly only severe to extreme. See Figure 1

**Objective:** Detect and map extent and severity of tree mortality along the coastal range from Monterey Bay north to Point Arena including the greater San Francisco Bay area.

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**Dates:** June 15<sup>th</sup>-19<sup>th</sup>, 2015

**Methodology:** Recently dead or injured trees were mapped visually by a surveyor using a digital aerial sketch-mapping system flying in a light fixed-wing aircraft approximately 1,000 feet above ground level. The surveyor recorded the number and species of affected trees and type of damage (mortality, defoliation, etc.) at each mapped location.

**Details:**

- Almost 4.6 million acres were surveyed; covering the Coast, Coast Range and points inland from Monterey Bay to areas around Clear Lake including the Greater San Francisco Bay area. Most of this area is privately owned, but public areas of note include Point Reyes National Seashore and Golden Gate National Recreation Area along with various smaller state parks and other public lands. See Figure 3.
- Almost 75,000 acres with tree mortality were recorded with an estimated 530,000 trees recently killed, mostly ponderosa and other pines.
- By far the most active area of mortality was around Monument Peak south of Clear Lake consisting primarily of ponderosa, knobcone and gray pine. See Figures 2, 4-6.
- Tanoak mortality was markedly decreased from previous years in intensity and was observed as large areas of scattered mortality. This may be due to sudden oak death spread being inhibited by dry conditions or simply due to a lack of viable host after so many years of ongoing mortality from SOD. One exception to this trend is areas north of Bodega Bay where significant amounts of more intense tanoak mortality were observed.
- In addition, on state and private lands surrounding Portola and Castle Rock State Parks southwest of San Jose, significant amounts of tanoak and other oak mortality were recorded. See Figure 7.
- Live oak mortality was also elevated in the hills south of Livermore, though fairly scattered in nature. See Figure 8.
- Highly visible, Chronic branch flagging was again observed on bishop pine within Point Reyes National Seashore, however, very little whole tree mortality was apparent. See Figure 9.

**Summary:**  
 Area surveyed: 4.6 million acres  
 Areas with mortality: 75,000 acres  
 Estimated number of trees killed: 530,000

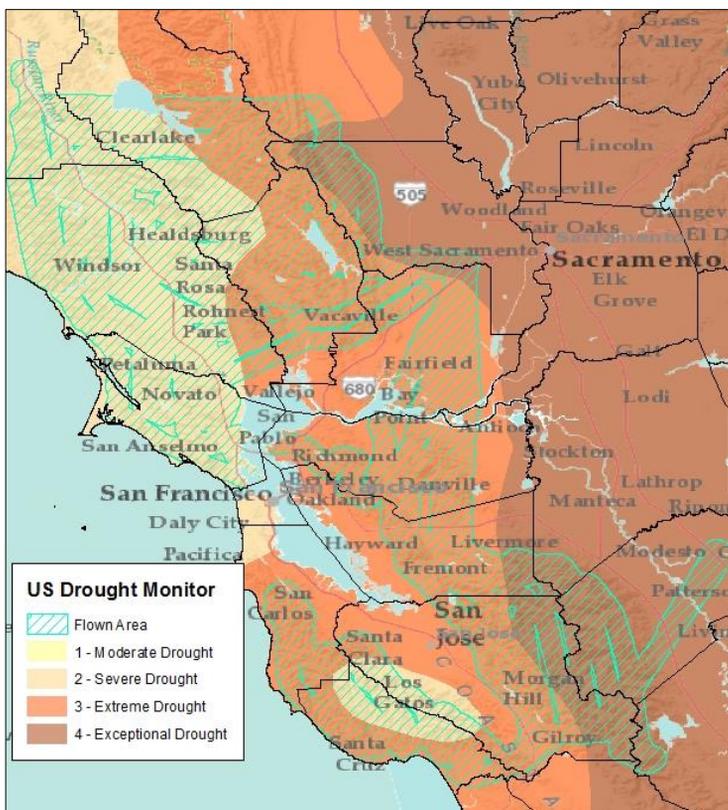


Figure 1. Flown area and drought conditions as of June 23, 2015 based on USGS Drought Monitor.

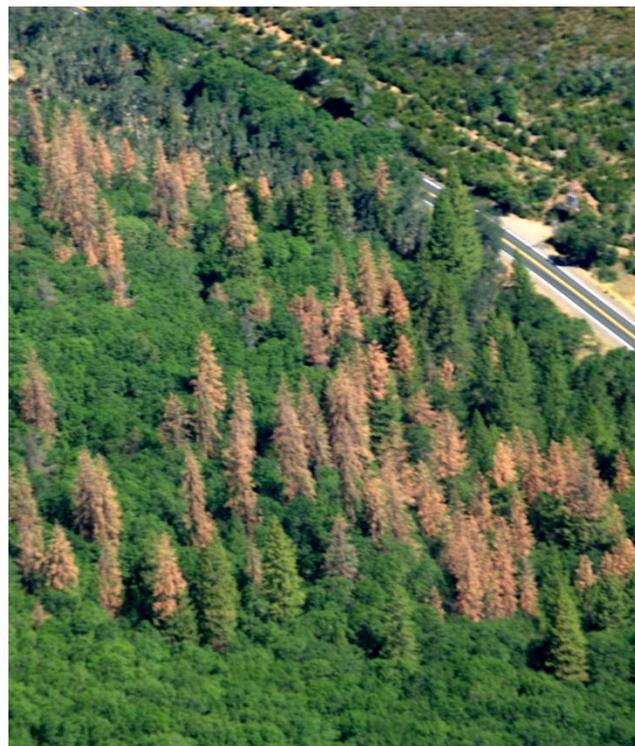


Figure 2. Ponderosa pine mortality south of Clear Lake near Hwy 29.

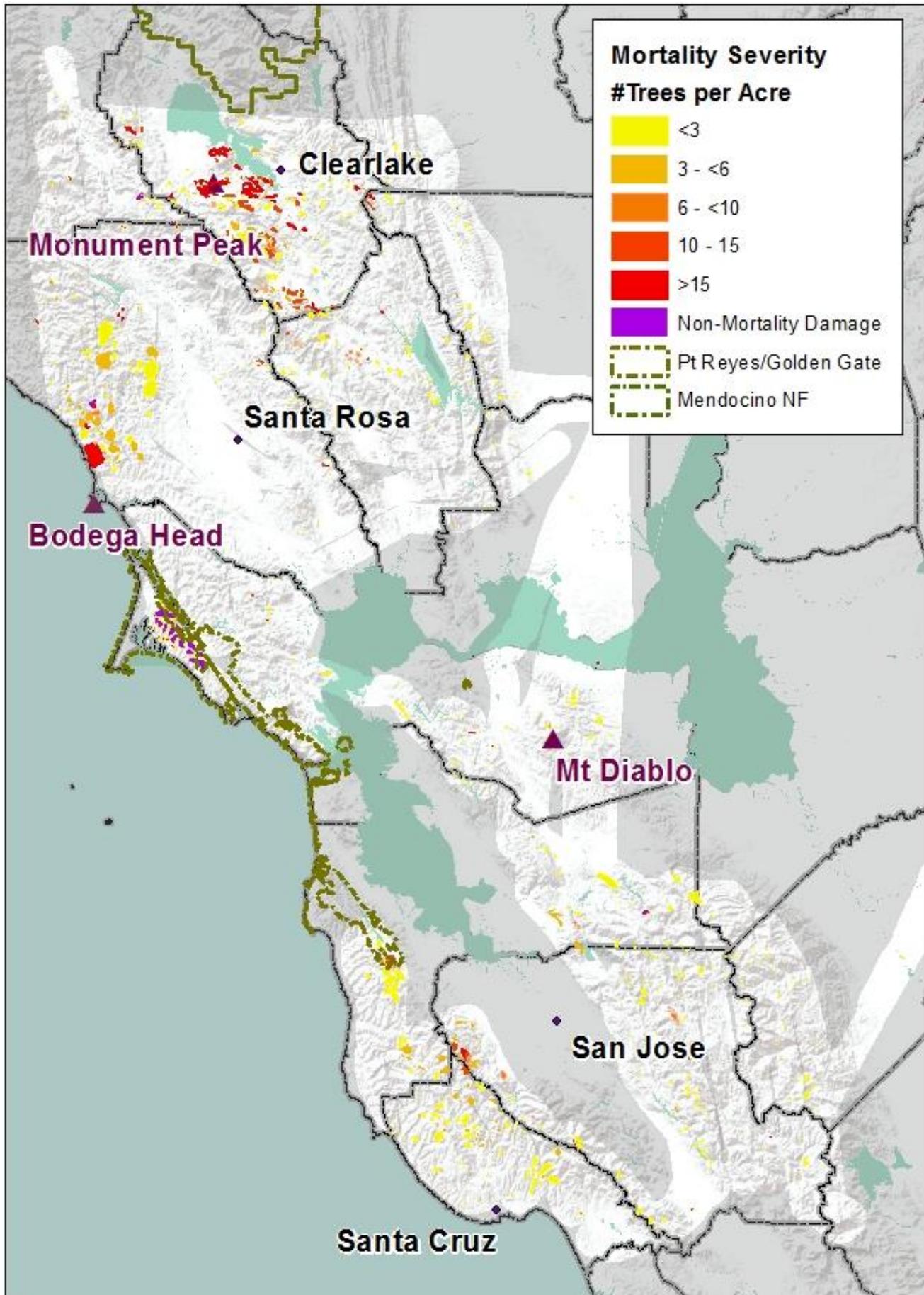


Figure 3. Map of area Surveyed and tree mortality and damage.



Figure 4. Ponderosa pine mortality north of the town of Twin Lakes southeast of Clear lake bordering a vineyard.



Figure 5. Fairly intense knobcone pine mortality south of Soda Bay and Clear Lake



Figure 6. Gray pine mortality in the foothills east of Napa Valley.



Figure 7. Tanoak mortality likely caused by sudden oak death north of Santa Cruz.



Figure 8. Scattered live and other oak species were seen in the rolling oak woodland areas south of Livermore and east of San Jose.



Figure 9. Flagging on bishop pine within Point Reyes National Seashore caused by chronic infections by Western gall rust.