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**Elfin Forest Health**

Since Elfin Forest has dry brush and a good amount of standing wood, we hypothesize that the forest's health is predominantly affected by the drought. Our pictures show that the forest's overall health is fair and not severely damaged, but there are dried, small stumps, standing wood, and some insect damage on the larger trees. Trees at higher altitudes in the forest have a considerable amount of their branches covered with lichen, revealing a symbiotic relationship that has formed between these two organisms. Many trees at higher altitude seem to be dead probably due to the coming winter season, but there are some trees still alive. There doesn't seem to be much rainfall during this autumn because there are many paths in the dirt where water has traveled, but the plants around such areas have died and turned brown. There is a large amount of lichen on the rocks around these areas, which means there still has been some rainfall. The dead trees and sticks still have moisture, supporting the fact that there has been some rainfall. The stream running through the forest has developed into a small beach, indicating the stream was bigger at one point. The amount of algae in the water indicates nutrient rich water sustaining the algae, but lacks fish and other organisms besides insects. The trees near the lake seem to be healthy and green, indicating there is enough water from the stream to sustain the surrounding area. Upon looking at Global Forest Link's information about the forest, there has been an increase in tree coverage in this area rather than tree loss like the surrounding areas over the past decade. There is significant tree cover in this forest, which is identified as having tree cover that is greater than 30% of canopy density.

Although looking at recent drought maps shows that Elfin Forest is having abnormally dry temperatures during the 2017 autumn season and has traditionally done so (Source 2), the state of California has pulled out of the drought from 2012 and the area has been receiving more rainwater. (Source 4). Since Elfin Forest is located next to the Olivenhain Reservoir and Lake

Hodges, they serve as good indicators of the health of the land. These water sources are declared Level 1 Water Supply Condition and have been officially pulled out of the drought on April 7th 2017 (Source 4). According to the data, Lake Hodges is 56% full (Source 3). With the exception of some recent red flags due to Santa Ana winds increasing the local temperature (Source 5), the evidence shows water supply and streams running through Elfin Forest are healthy and can sufficiently supply the environment. While the forest within Elfin forest is well protected and well watered, with a canopy density of above 30% , tree coverage has been declining in the surrounding area of Lake Hodges since 2006 (Source 1). This is probably due to the forest fires in from 2006 through 2009 and the drought conditions since 2009.

In conclusion, our hypothesis that the forest's health is predominantly affected by the drought is partially correct. While Elfin Forest has been impacted by the drought, the impact has been very minor using indicators of drought conditions, red flags, general visual assessment and loss of forest coverage in surrounding areas. However, throughout all the recent area problems, Elfin Forest itself hasn't been impacted or had a loss in forest coverage and has been well maintained by the Olivenhain Municipal Water District. This same district has also been doing well in its conservation efforts, leading to many of the attributes of weak forest health being seasonal changes such as the hot Santa Ana winds and yearly drought conditions. Looking toward the future, with the increase in water supply and development projects in desalinating the brackish groundwater (Source 6), Elfin Forest and the area around Del Dios, Lake Hodges, and the Olivenhain Reservoir have the resources to continue to grow.

## **Sources**

- 1) <http://www.globalforestwatch.org/>
- 2) <http://droughtmonitor.unl.edu/>

- 3) <https://www.sandiego.gov/water/recreation/levels>
- 4) <https://www.olivenhain.com/your-water-supplies/drought/>
- 5) [http://www.fire.ca.gov/communications/communications\\_firesafety\\_redflagwarning](http://www.fire.ca.gov/communications/communications_firesafety_redflagwarning)
- 6) <https://www.olivenhain.com/your-water-supplies/san-elijosan-dieguito-valley-groundwater-project/>