Santa Rosa Island Restoration Study: Fog Fences vs. No Fences

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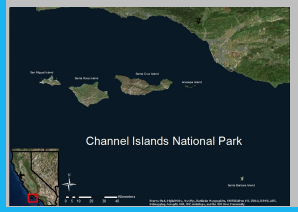
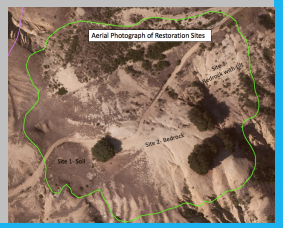
Introduction

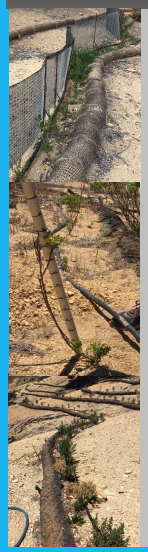
Santa Rosa Island is part of the Channel Islands National Park, 43 km off the coast of southern California. The island was ecologically degraded after nearly 150 years of continuous grazing from over one hundred thousand cattle, sheep, pigs, and other non-native ungulates. In 1986, the National Park Service bought the land and in 1998, the ranching era on the island came to a halt. In 2011, the remaining deer and elk were removed from the island. This study evaluated growth of native species planted 2016-2017, at the cloud forest restoration site on the Soledad Ridge near Radar Peak.

H: I predict that plants planted near a fog fence are larger in height and canopy area of those planted without a fog fence.





Methodology



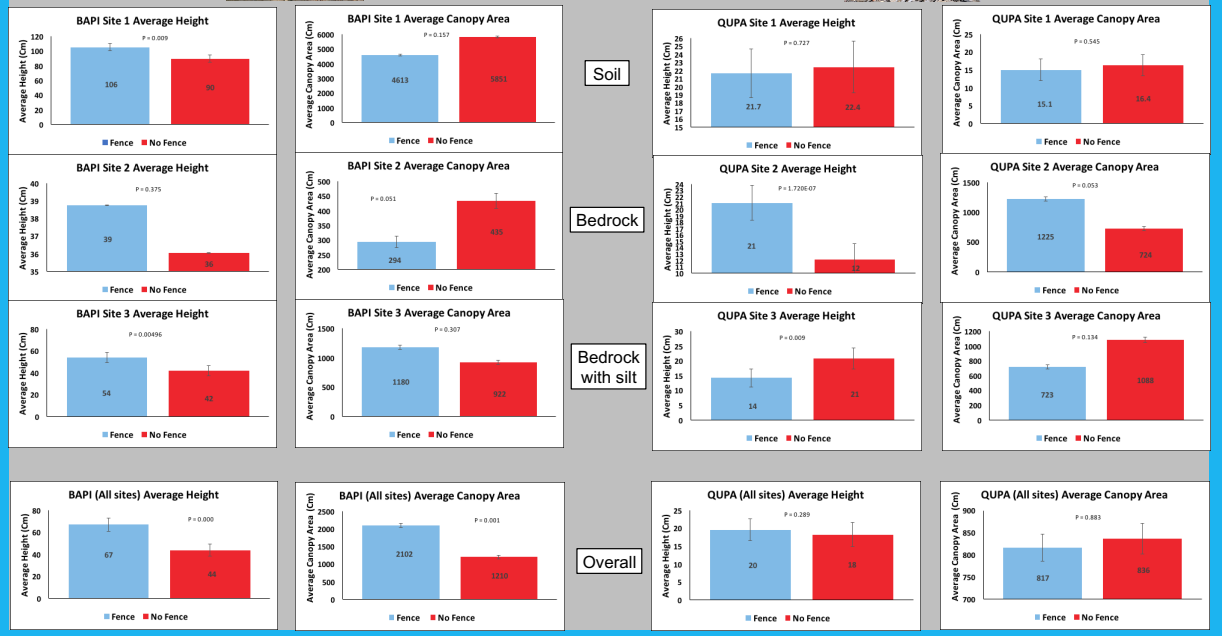
The cloud forest restoration plantings occurred from May 2016 through July 2019 with various areas planted each year. This project inventoried plants set out July through September 2016, as nursery stock from 2-inch pots, and island scrub oak planted as sprouted acorns in December 2016. Planted species included *Baccharis pilularis, Quercus pacifica, Achillea millefolium, Calystegia macrostegia, Ceanothus arboreus* and *Heteromeles arbutifolia, Rhus integrifolia* and *Stipa pulchra.* Plantings occurred along wattles made of cocoa-fiber and jute anchored along the slope contour to slow erosion and trap moisture. At planting gravity-fed drip irrigation was installed next to every plant, and some had additional "fog fences" (2x0.5-meter galvanized wire mesh covered with 40% shade cloth) installed to intercept blowing fog and deposit it as fog drip along the planting line. The plants were watered regularly from June until November of 2016-2018, averaging approximately 1 liter every two weeks.

There were three different substrate types within the restoration area: Site 1 which the substrate consisted of soil, Site 2 which consisted of bedrock, and Site 3 which consisted of bedrock with a thin layer (1-2 cm) of silt on top. In 2019, we recorded species present, the species height, and the canopy area along all the wattles, with and without fog fences. This study compared growth of the native shrubs *Baccharis pilularis* (cotoye brush) and *Quercus pacifica* (island scrub oak), with and without fog fences.

Results

Baccharis pilularis BAPI

Quercus pacifica QUPA



Discussion/ Conclusion

In all of the 1,268 plants set out in 2016, 586 coyote brush and 361 island scrub oaks were growing along the wattles in 2019. My hypothesis that plants growing with fog fences would be larger than those without was true when observing all the sites together for *Baccharis pilularis* (p=0.000, 445 df for average height; p=0.001, 445 df for average canopy area), and false when observing all the sites together for *Quercus pacifica* (p=0.289, 265 df for average height; p=0.083, 265 df for average canopy area). However, all three sites had different substrate types so the data was analyzed for the individual sites as well. Average height of *Baccharis pilularis* planted with fog fences was greater compared to those without at Sites 1 and 3 (p=0.009, 97 df; p=0.00496, 122 df), which had substrate types of soil and bedrock with silt on top. There were no significant differences for *Baccharis pilularis* canopy area. Sites 2, with substrate of bedrock, had significantly larger *Quercus pacifica* average height of those planted with fog fences compared to those without (p=1.720E-07, 91 df). There were no significant differences for *Quercus pacifica* canopy area. Both plants studied had no significant differences in canopy area, a future study could test out the reasoning behind this. Do fog fences limit the amount of space a plant can expand in canopy area? Another future study could look into the mortality rate of plants planted with fog fences versus plants planted without fog fences.

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