

Methods

A field study near Sherwood Lake in the Santa Monica Mountains, California was undertaken during the same time frame as the SCI study (Fire occurred July 2006; measurements recorded August 2007 – October 2009) to monitor the water relations and post-fire recovery of native chaparral shrubs. This project was not initially intended to serve as a comparison to the Catalina Island study and did not include exclosures to manipulate the effects of deer browsing on post-fire resprouts. Nevertheless, the water relations, growth, and mortality of *H. arbutifolia* resprouts recorded in the Sherwood Lake study provide a valuable comparison that lends perspective to the level of deer browsing and mortality observed on Santa Catalina Island (SCI). Here we report comparisons of fire size, percentage of plants browsed, resprout height, resprout mortality, and minimum seasonal water potential (Ψ_{\min}) between unprotected *H. arbutifolia* shrubs from the SCI and Sherwood Lake field sites. Because the Sherwood site did not have deer exclosures, data are for unprotected shrubs at both sites. Mortality values are those recorded at the end of the two-year study, October 2008. The minimum seasonal water potential of post-fire resprouts was measured at midday during the 2007 drought year. Percentage of plants browsed and percent mortality were compared using chi-square tests. Resprout height and Ψ_{\min} were compared with two-sample t-tests.

Results

At the Sherwood Lake site 81% of unprotected *H. arbutifolia* resprouts showed signs of deer browsing, whereas 100% of *H. arbutifolia* from SCI were browsed ($X^2 = 9.39$, $df = 1$, $P < 0.01$). Also, browsed resprouts were taller at Sherwood than at SCI during both the 1st and 2nd summers after fire ($t = 3.31$, $df = 68$, $P < 0.01$ and $t = 4.08$, $df = 18.93$, $P < 0.001$, respectively), which suggests deer-browsing intensity was greater on SCI. Percentage mortality by Fall 2008 (2 years post-fire) was 26.7% for Sherwood Lake and 88% for SCI ($X^2 = 36.39$, $df = 1$, $P < 0.001$). The minimum seasonal water potential was lower (less hydrated) at Sherwood Lake than SCI ($t = 9.49$, $df = 16$, $P < 0.001$), suggesting that the increased mortality on SCI was not due to greater water stress. In addition, the island fire was much larger than the mainland fire (445 ha compared to 20.2 ha, respectively), indicating that increased browsing pressure on the island is not explained by fire size.

Table 3. Summary of the results from post-fire field studies on Santa Catalina Island and Sherwood Lake (California mainland). Both studies were performed during the extreme drought of 2007 and measured aspects of post-fire recovery of *H. arbutifolia* in the presence of deer browsing. Table includes percentage of plants browsed, resprout height (1st yr. & 2nd yr.), mortality, and minimum seasonal water potential (Ψ_{\min}) measured on unprotected resprouting shrubs. These results suggest that island shrubs experienced greater browsing intensity, higher rates of mortality, and experienced less severe water deficit compared to shrubs from the mainland over the same time interval. All comparisons between sites are different at a level of $P < 0.01$. Values for resprout height and Ψ_{\min} are means (+1SE).

Site	Fire Size ha	Plants Browsed %	Resprout Height (1st Yr.) m	Resprout Height (2nd Yr.) m	Mortality %	ψ_{\min} Mpa
Santa Catalina Island	445	100	0.11 (0.009)	0.24 (0.044)	88	-1.35 (0.079)
Santa Monica Mtns.	20.2	81	0.20 (0.033)	0.66 (0.065)	27	-2.84 (0.162)

* 81% browsed at Sherwood site reflects the level of browse at the end of the experiment (10/2009). Prior to that, very little if any browse was noticeable on *H. arbutifolia* resprouts at this mainland site.