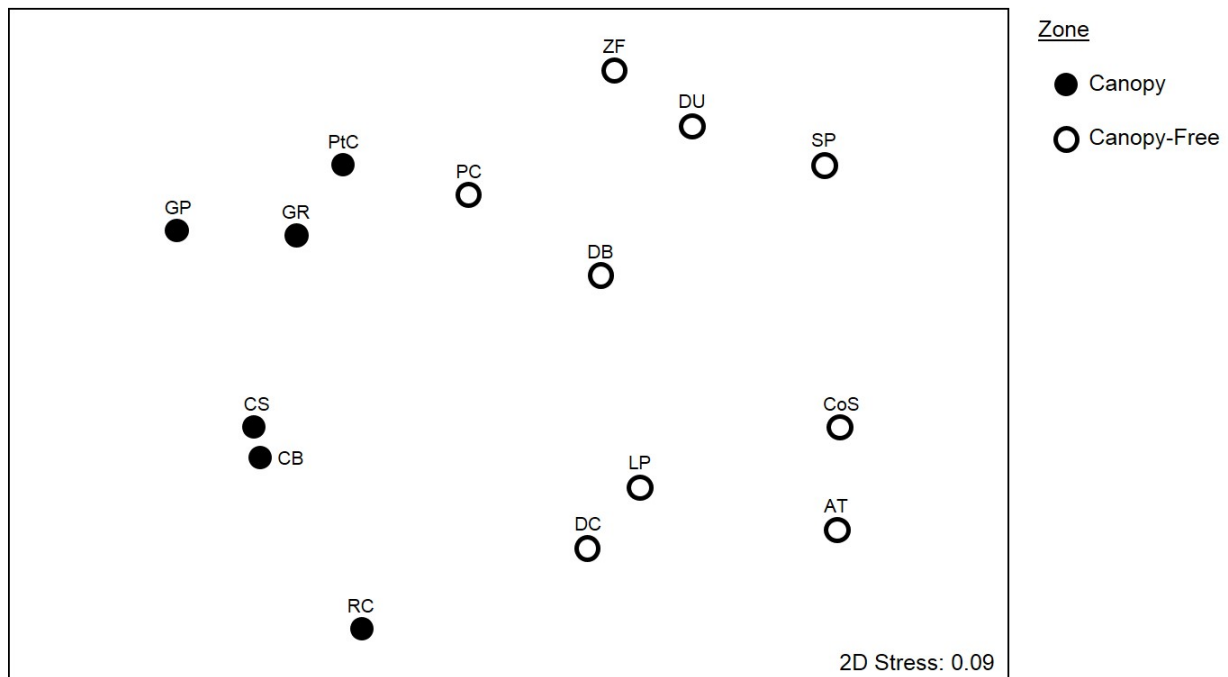


Appendix A. Identification of Macroalgal Groups

Survey data indicated the major difference between understory algal assemblages between habitats was the relative abundance of red and brown macroalgae (see *Results Macroalgal Community Structure*). We therefore used our survey data to assign individual species to canopy and canopy-free zones using a calculated index and standard ordination techniques.

Using all census data (across seasons and years), an index of canopy association (C_I) was calculated for each species, by taking the difference between the mean percent cover (\bar{X}) from each habitat (canopy-free zone minus canopy zone) and dividing by the sum of means from each habitat ($C_I = \bar{X}_{\text{canopy-free}} - \bar{X}_{\text{canopy}} / \bar{X}_{\text{canopy-free}} + \bar{X}_{\text{canopy}}$). Values ranged from -1.00 to 1.00 in which, a value of -1.00 indicates a strong association with the canopy habitat and a value of 1.00 indicates a strong association with the canopy-free zone. Of the red algal species observed at the study site, three of the nine species were associated with the canopy-free zone (Table 1). *Asparagopsis taxiformis* and *Laurencia pacifica* both showed a strong association toward the no canopy habitat (1.00 and 0.75, respectively) but were relatively low in abundance compared to all other foliose algae (red and brown taxa) (Table 1). *Plocamium cartilagineum* was weakly associated with the canopy-free environment (0.20) and had a higher relative abundance inside (12%) compared to outside (8%) the canopy (Table 1). All brown algal species were associated with the canopy-free zone ($C_I > 0.50$ [Table 1]). Indices between foliose red algae and foliose brown algae were statistically different (two-sample t-test, $t=4.57$, $df=13$, $P<0.001$). Multi-dimensional scaling (MDS) based on Bray-Curtis similarities, using the relative percent cover of each species, revealed similar species-level patterns with respect to the canopy (PRIMER v. 6; see *MDS plot* below).

Based on these observations, the low percent cover of individual species, and the distinct types of species under compared to outside the canopy, foliose macroalgae were categorized into red and brown algal groups for statistical analyses. Articulated and crustose coralline algae were also considered separately since these are recognized as functionally different groups (Steneck and Dethier 1994) and were not found to be strongly associated with either habitat (Table 1).



Multi-dimensional scaling using Bray-Curtis similarity of the relative abundances of macroalgae species. Species were clustered into two groups based on association with the canopy and canopy-free zones (SIMPROF test).

LITERATURE CITED

Steneck, R. S., and M. N. Dethier. 1994. A functional group approach to the structure of algal-dominated communities. *Oikos* 69:476-493.