

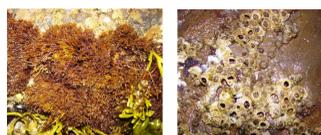
# Identifying key habitat associations for mussel recruits along central California rocky shores

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## Mussels are a key foundation species in rocky shore habitats

The mussel *Mytilus californianus* forms dense beds that provide a key source of food and habitat for a diverse biological community. Mussels are broadcast spawners and rely on oceanic larval input to replenish populations. Young mussels called “recruits” are considered poor settlers of bare rock and are thought to require biological substrate to thrive. For this reason, mussel beds can take > 30 yrs. to recover when damaged.



Outside of adult mussel beds, other biological substrates, like *Endocladia* and barnacle tests, are thought to be important for recruit success.

Substrates important for mussel recruit success have not been well studied. It is also unclear if the importance of associations varies along environmental stress gradients, as theory predicts.

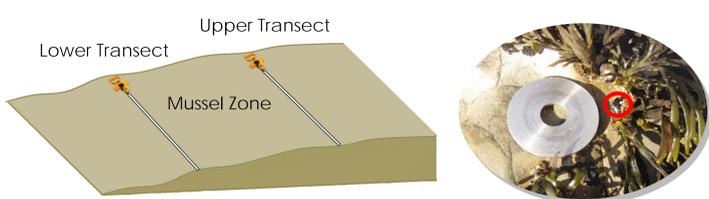
### Research Questions:

1. Do associations vary along tidal stress gradients?
2. What substrates or species do recruits associate with?



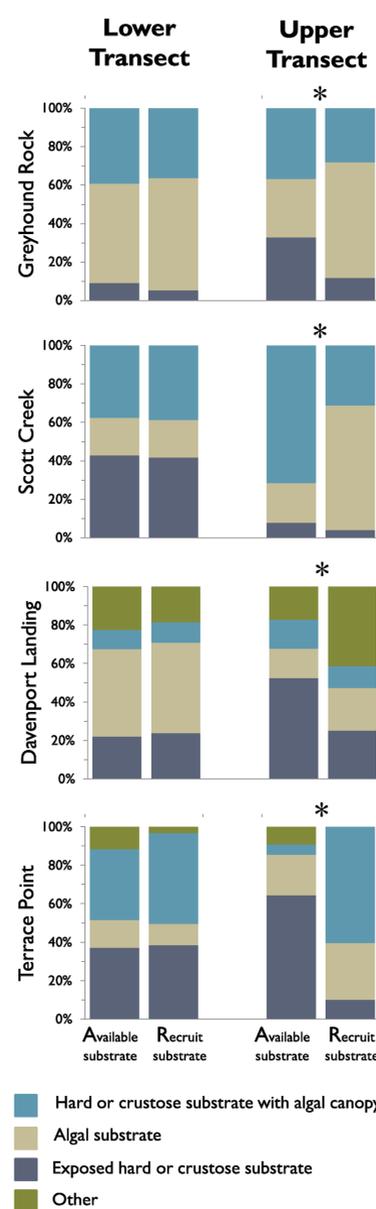
## Substrate survey methods

Transects (30 m) were placed in the upper and lower portion of the mussel zone at four Santa Cruz sites. I randomly sampled two mussel recruits settled outside mussel beds every meter on either side of the transect. For each observation, I noted primary and secondary substrate. I then surveyed the available substrate along each transect every 0.25 m. I used a chi-square test to determine if recruit substrate deviated from expected based on the frequency of available substrate.

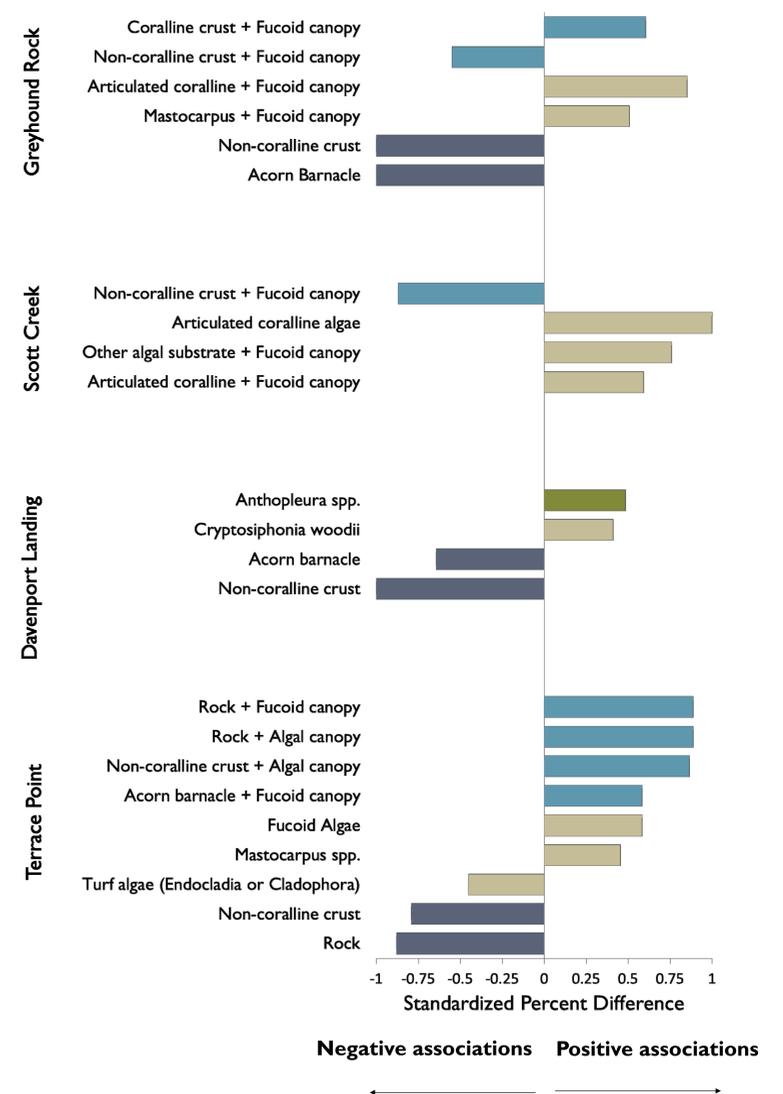


## Results

Mussel recruits had strong + and - associations with available substrates but only in the upper portion of the mussel zone (Fig. 1). Recruits had particularly strong positive associations with articulated coralline algae and algal canopies, especially furoid algal canopies. Strong negative associations were observed with non-coralline crust, acorn barnacles and rock (Fig. 2)



**Figure 1:** Available vs. recruit substrate composition. Asterisk denotes statistically significant differences.



**Figure 2:** The strongest positive and negative substrate and canopy associations for mussel recruits along the upper transect at each of the four survey sites.

## Conclusion

Positive associations appear to only be important for recruit success in the upper portion of the mussel zone. This suggests heat and desiccation stress are key drivers of these associations. The biological substrates that mussel recruits had strong positive associations with in this study were unexpected. The current scientific consensus is that mussel recruits require substrate that is byssal-like but these results suggest the presence of an algal canopy is more important. Identifying factors that promote recruitment success will be critical for the conservation and restoration of these valuable habitats and warrants further research.



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