Settlement in fouling communities of San Francisco Bay at varying time intervals

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Abstract

Settlement among native and invasive marine organisms in fouling communities was observed at various time intervals in the San Francisco Bay. Many of these well-known, globally invasive organisms grow rapidly and often outcompete or overgrow natives. Settlement plates were placed at three different protected areas within the Bay (Richmond Marina Bay Yacht Club (1), Berkeley Marina (2), and Fort Baker (3)) and scored once a week for 5 weeks. The two larger East Bay sites (1 and 2) showed considerably greater species diversity and abundance in comparison to the smaller site near the mouth of the Bay (site 3). Furthermore, at the Eay Bay sites, algal cover gradually decreased as animal diversity and abundance progressively increased. Species including Didemnum sp., Balanus glandula, Waterplora subtorquata, white encrusting bryozoan, and white branching bryozoan showed significant settlement differences in initial recruitment density on empty plates deployed in the 1st versus the 3rd week. Recruitment on the plates appeared to show a priority effect where the earliest settlers (colonial tunicates and Bugula neritina) were consistently the most abundant species present each subsequent week. Measuring the growth and abundance of the invasive organisms is important to study because they are altering the habitats and opportunities for native organisms to persist.

Materials and Methods

Colonial tunicates growing on mussels. Fouling community at Richmond on mussels.

Results

Species that settled 1st at Richmond and Berkeley were the most abundant in the 5th week. Animal diversity increased in the 3rd week, many of the animals that settled at Richmond did not settle at Berkeley (Fig. 1). Richmond and Berkeley display the greatest diversity, while Fort Baker showed the most species diversity. Richmond was dominated by B. neritina, Didemnum sp. and tube-dwellers appeared in greater abundance at Fort Baker; both species of B. neritina were not found at Fort Baker (Fig. 2. Colonial tunicates include Botrylloides sp. (BC), B. vidiceus, and brown scuzzy algae (Cohen, 1995).

Conclusion/Future Directions

The fouling communities observed in the San Francisco Bay display a large assortment of native and invasive species. In this study, variation in community composition of fouling organisms was observed at multiple locations within San Francisco Bay over the course of 5 weeks. Commonalities among the sites were also found. In 2 of the 3 sites algae settled in the first 2 weeks, but was increasingly displaced by animals starting in the 3rd week. The dominance of early settlers on our settling plates is attributed to the priority effect. Colonial organisms dominated at all 3 sites, although each site differed in species composition and dominance. Environmental variation may play a large role in the recruitment, see accompanying poster “Analysis of San Francisco Bay Environmental Conditions as They Relate to Organismal Abundance” by Mary Dournaee. Further study should be carried out to observe long-term behavior of fouling communities and possible causes of the changes in community composition.

Acknowledgements:

Acknowledgements:


1 Botryllus sp. (BC): The species name is unknown. BC refers to the bi-colored colors of the zooids.
2 Colonial tunicates include all colonial tunicates, regardless of presence of planktonic larvae: Balanidae sp. (BC), B. vidiceus, or B. similicentra.
3 Colonial tunicates include Ciona sp., Molgula sp., and ascidianidae aspera. A white branching bryozoan, white encrusting bryozoan, tube-dwelling animals, Balanus glandula, Ulva sp., Enteromorph sp., and brown scuzzy algae (Cohen, 1995).