A decade of invertebrate recruitment at Santa Catalina Island, California

Peter J. Edmunds and Jessica Clayton

Department of Biology, California State University, Northridge, Northridge, CA, United States

ABSTRACT

Marine fouling communities have long provided model systems for studying the ecology of community development, and settlement plates are the tool of choice for this purpose. Decades of plate deployments provide a baseline against which present-day trends can be interpreted, with one classic trend being the ultimate dominance of plates by colonial and encrusting taxa. Here we report the results of annual deployments of settlement plates from 2010 to 2021 in the shallow sub-tidal of southern California, where the recruitment of invertebrates and algae was recorded photographically, and resolved to functional group (solitary, encrusting, and arborescent) and the lowest taxon possible. The communities on these plates differed among years, with trends in abundances varying by functional group and taxon; solitary taxa consistently were abundant, but encrusting taxa declined in abundance. Seawater temperature and the subsurface concentration of chlorophyll a differed among years, and there was a weak inverse association between temperature and the abundances of encrusting taxa. Long-term increases in seawater temperature therefore could serve as a mechanism causing fouling communities to change. Because of the prominence of encrusting taxa in fouling communities, the shifts in abundance of this functional group reported here may portend ecologically significant changes in fouling communities exposed to warmer seawater because of an alleviation of competition for a classically limiting resource (*i.e.*, space).

Subjects Ecology, Marine Biology, Zoology

Keywords Monitoring, Recruitment, Long-term, Change, Subtidal, Marine

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Corresponding author
Peter J. Edmunds,
peter.edmunds@csun.edu

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INTRODUCTION

Benthic communities on hard surfaces in the marine environment (*i.e.*, fouling communities (*Richmond & Seed, 1991*)) have been quantitatively studied for more than a century (*McDougall, 1943*), and the results have played important roles in understanding the ecological processes determining community development (*Sutherland, 1974*; *Sutherland & Karlson, 1977*; *Buss & Jackson, 1979*). Settlement plates are the favored tool in such analyses, and they have been made of an assortment of materials in a variety of sizes, and typically are immersed for a range of times, at different orientations, and a variety of depths. While settlement plates are one of the oldest and most basic of tools in marine ecology (*e.g.*, *McDougall, 1943*), they are enjoying a resurgence of use to understand a rapidly changing marine environment (*Kordas et al., 2015*; *Obst et al., 2020*).

Settlement plates do not accurately mimic natural benthic surfaces because they usually are fabricated from ecologically irrelevant materials (*e.g.*, PVC (*Zimmerman & Martin,*