Regulation of Red Sea Urchin Populations in Southern California*

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ABSTRACT

Analyses of red sea urchin, Strongylocentrotus franciscanus, size-frequency distributions show two distinctive population structures within the southern California bight. Three years of data suggest that these two population structures are constant and characteristic of the habitats where they are found. Size-frequency distributions near San Diego and the southern Channel Islands (Santa Barbara and San Clemente) show high annual recruitment, but poor survival during the second year. These populations exhibit a second mode of large individuals. Populations from the northern islands (Santa Rosa and San Miguel) are consistently not bimodal, exhibiting relatively low recruitment rates, but better survival of the second year class. The bimodal nature of southern populations is apparently caused by spiny lobster and California sheephead predation on mid-sized animals no longer protected by the spine canopy association. Laboratory experiments indicate that larger urchins attain some size refuge from lobster predation. These predators are rare on the northern islands. Thus southern red urchin populations appear to be regulated by predation on mid-sized animals, whereas northern populations are probably limited by recruitment success. The different net rates of red urchin production and the implications for fisheries management will be discussed.

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