UNIVERSITY OF CALIFORNIA

SAN DIEGO

Functional Structure of Soft-Bottom Fish Communities of the Southern California Shelf

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy in Marine Biology

by

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1982

(Rosenblatt; R/F-63)

ABSTRACT OF THE DISSERTATION

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University of California, San Diego 1982
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This study describes the organization of the soft-bottom fish communities of the southern California mainland shelf from 10 to 200m depth in terms of the resource partitioning relationships of the fishes. Size and distributional data on the fishes were collected from 342 otter trawl samples taken from 99 stations during 1972 to 1973. Catches were dominated by pleuronectiform and scorpaeniform fishes and included 126 species from 43 families.

At the 0.50 level of affinity, recurrent group analysis identified 34 species (about 27% of the total) as important community members. This analysis defined nine recurrent groups with two to seven species per group and seven closely associated non-group species. Each recurrent group occurred primarily in one of three major depth zones across the shelf.

The species comprising a recurrent group were morphologically different with morphologically similar species occurring in other such groups at different depths. The species living together in these groups feed in different ways and generally on different types of prey. The diet and morphology of the 40 most common species were examined to obtain an estimate of the foraging behavior of each species. To determine the feeding habits of the fishes, 1013 stomachs were examined; these contained 461 prey species from 218 families and 31 classes.

From this information species were classified into 15 major foraging guilds. Guild members are generally found at different depths when they are the same size. Depth displacement graphs for species in each guild generally show regions of overlap where displacing species coexist and include from two to four displacing species across the shelf.

A set of the depth displacement graphs for each guild was arranged to describe the functional structure and species composition of the communities. Community structure is described in terms of the number and type of feeding guilds that are found at a given depth and the species composition in terms of which species of each guild dominates at that depth. This description of the communities provides a framework around which further studies can be directed to determine what natural or man-related factors contribute to or alter community organization.