

## **Bathymetric responses in functional structure of southern California demersal fish communities to Pacific Decadal Oscillation regimes and an El Niño**

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### **ABSTRACT**

During the past 35 years, changing ocean conditions in the Southern California Bight (SCB), due largely to the Pacific Decadal Oscillation (PDO) and two major El Niños, have variably affected the abundance of different fishes. Less well-known are bathymetric changes in species distribution and community organization occurring during these periods. Regional surveys of demersal fishes in the SCB during this period have provided data for assessing changes in fish abundance and bathymetric distribution, as well as for describing the functional organization of communities. This study describes bathymetric shifts in the functional organization of demersal fish communities on the continental shelf during a PDO cycle and an El Niño. The study is based on results of four large-scale surveys of the demersal fish fauna of the southern California shelf (10 - 200 m depth) conducted in 1972-1973 (cold regime), 1994 (warm regime), 1998 (El Niño), and 2003 (cold regime). The latter three studies are compared to a baseline model of the functional organization the communities developed using 1972-1973 data. The functional organization is described in terms of the occurrence of 18 foraging guilds and the depth replacement pattern of their dominant species across the shelf. Although the order of depth replacing species within a given guild relative to depth generally did not change between the surveys, the relative portion of the shelf occupied by a numerically dominant guild members often did change, as well as a variety of pattern shifts. Changes in depth replacement patterns in these oceanic periods varied by guild. El Niño effects on these patterns included expansions or contractions of depth ranges of some guild members, retreats of some guilds or guild members to deeper water, and intrusions of new dominant guild members from the south. Changes between cold and warm regime periods were generally less pronounced but some gradual declines in the occurrence of deep-living guild members during the warm regime were apparent, suggesting decreased recruitment from the north. Patterns of several guilds were identical or nearly so in the two cold regimes, suggesting a resilient return to baseline cold regime patterns. Examination of depth replacement patterns within foraging guilds provides a unique perspective for understanding disruptive effects and resilient responses of demersal fish communities to changing ocean conditions. Understanding how fish populations and communities change in bathymetric distribution in response to natural changes in ocean conditions will contribute to evaluation of anthropogenic (fishing, pollution, habitat alteration) effects on southern California fish populations and communities.

### **Full Text**

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