

SEASONAL AND GEOGRAPHIC CHARACTERISTICS OF FISHERY RESOURCES

California Current Region - VI. Rockfish

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The purpose of this report on the rockfish resource, family Scorpaenidae, as for others in this series (Kramer and Smith, 1970a,b,c,d, 1971), is to describe the seasonal and geographic characteristics of their spawning populations on the basis of summarized data on the abundance of their larvae in the decade 1951-60. The organizations, area of investigation, and treatment of the data were presented in the first report of the series.

The rockfishes of the northeast Pacific are of major importance in the commercial and sport fisheries of the United States (Phillips, 1957, 1958). The family consists of so many species, most of them in the genus *Sebastes*, that they are usually grouped only under the common name "rockfish" in the commercial landing reports of the State of California. The family consists of three genera, of which *Sebastes* has at least 55 species; *Sebastes* has two species, and *Scorpaena* one. In California, three species of *Sebastes* comprise the major portion of the commercial catch of rockfish for human consumption, about six species form the greatest part of the animal food fishery, and two contribute chiefly to the sport fishery. The single species of *Scorpaena* contributes to both the commercial and

sport fisheries. The California fisheries and others in the northeast Pacific are described briefly at the conclusion of this report.

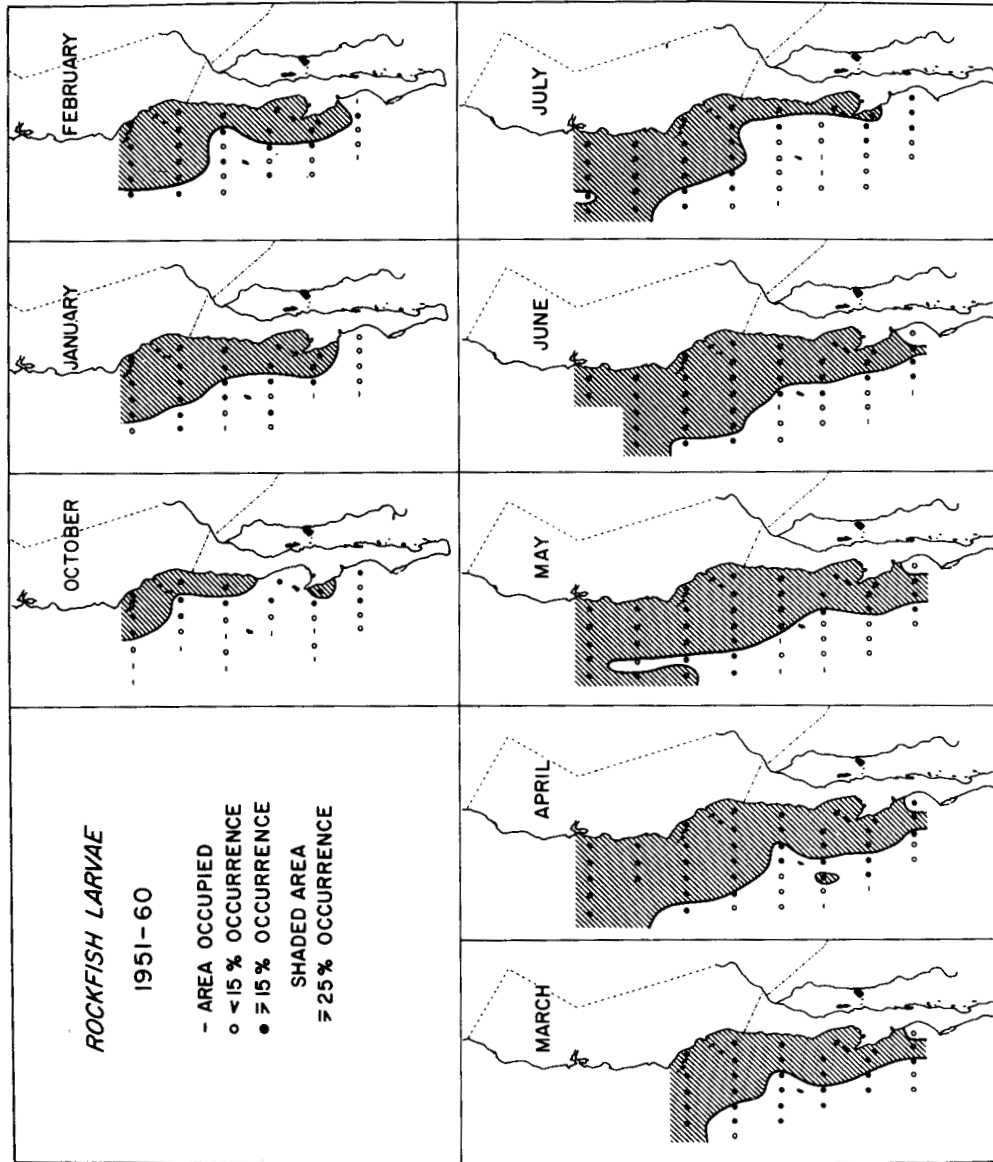
Sebastes Most Abundant Genus

The most abundant genus in the rockfish larva collections of the California Cooperative Oceanic Fisheries Investigations (CalCOFI) is *Sebastes* which, until recently, has been enumerated only as "rockfish", with no differentiation to species. Our knowledge of adult spawning, therefore, is based on total rather than individual species distributions. Some species, and the times and locations of their spawning, are discussed below.

The rockfish family in the northeast Pacific extends from the Gulf of Alaska to Baja California (Phillips, 1957; Ahlstrom, 1961). The CalCOFI surveys have delimited the distributions of rockfish larvae to their southernmost extent and offshore off almost all of Baja California as indicated in the figure. They have not delimited the populations seaward off California nor in their northernmost extent where, in the limits of the surveys, they have been found as far offshore as 250 miles and as far north as the California-Oregon border.

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Percent occurrence of rockfish larvae, *Sebastes* spp., in 1951-60 on the survey pattern of the California Cooperative Oceanic Fisheries Investigations (CalCOFI). Each circle, line or dot represents a pooled statistical area (see Kramer and Smith 1970a).

Plankton data on rockfish are for larvae only. Their eggs are not planktonic because the genus *Sebastes* is ovoviviparous--the female is externally fertilized and incubates the eggs until the young are born upon extrusion into the water (Phillips, 1958). The genera *Sebastes* and *Scorpaena* lay their eggs in gelatinous floating masses (Pearcy, 1962; Phillips, 1958) which, to our knowledge, have never been collected in CalCOFI tows.

Summarized data for 1951-60, January through March, are for the area from Point Conception, California, to Point San Juanico, Baja California. The major centers of spawning (25 percent or more occurrences of larvae in plankton hauls) are delimited seaward in the survey pattern but not by the northernmost extent of the surveys. The areas of major spawning are about the same during those months with a slight spread seaward with time. Most of the surveys in April through July extended northward to the areas off San Francisco. In these months, the spawning centers extended farther seaward off southern and central California but were not delimited seaward or northward.

Definitive Spawning Periods

Recent identifications of some species of rockfish larvae collected on a number of CalCOFI surveys indicate that species or species groups have definitive spawning periods and geographic ranges. The chilipepper, *Sebastes paucispinis*, and shortbelly, *S. jordani*, are early-year spawners off southern and central California (unpublished data). The coral-red, *S. macdonaldi*, is a spring spawner with greatest numbers occurring off Baja California

from Cape Colnett to Punta San Juanico (Moser, in press). The rosy, *S. rosaceus* group, is a summer spawner with a southern distribution off Baja California. This latter group is related to the few species of *Sebastes* off the coast of Chile; from this it has been hypothesized that the group, at one time, may have formed a continuous population from North to South America (personal communication, E. H. Ahlstrom, Fishery-Oceanography Center, NMFS, La Jolla, California).

The narrowing of the offshore band of spawning centers off Baja California in July, and the separation of centers in October^{1/}, may be indications of spawning by species, species groups, and/or subpopulations. Data are not sufficient yet to form definite opinions on these points. Barrett, Joseph, and Moser (1966) in a study on the analysis of blood groups of the genus *Sebastes* (= *Sebastodes*) clarified a differentiation of species pairs which lends support to their distinction as species.

The Fisheries

The California Department of Fish and Game reports three kinds of fisheries in which different species of *Sebastes* are most dominant (Frey, 1971). The first, from Eureka to Santa Barbara, is for animal food in which unmarketable, trawl-caught rockfish are ground whole and quick-frozen for use on fur farms. Their important species are split-nose, *S. diploproa*, darkblotched, *S. crameri*, stripetail, *S. saxicola*, greenstriped, *S. elongatus*, sharpchin, *S. zacentrus*, and greentail, *S. chlorostictus*.

^{1/}Data for August, September, November, and December are insufficient for summarization to depict the trends shown in the figure.

The second is the commercial fishery for fresh food to which only three species, caught chiefly by trawl, contribute the greatest catches from Eureka to Santa Barbara. These are bocaccio, *S. paucispinis*, canary, *S. piniger*, and chilipepper, *S. goodei*.

The third is the sport fishery dominated by the blue, *S. mystinus*, and olive, *S. serranoides*. The sculpin, *Scorpaena guttata*, contributes abundantly to the fresh food fishery, chiefly by set lines, and the sport fishery.

Although little is known about the status of the rockfish populations, most of the catches remain good with no evidence of reduction by

any particular pressures. The California Department of Fish and Game estimates that a sustained yield of 15 to 20 million pounds could be maintained off California (Frey, 1970).

Some of the rockfish species important to the California fishery also figure significantly in the Washington and Oregon catches (Alverson, Pruter, and Ronholt, 1964). These are bocaccio, canary, and chilipepper. The major contributor in that commercial catch is the rockfish, *S. alutus*, marketed as Pacific ocean perch. Others include blackthroat, *S. aleutianus*, silvergray, *S. brevispinis*, yellowtail, *S. flavidus*, black, *S. melanops*, and flag, *S. rubrivinctus*.

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