

SEASONAL AND GEOGRAPHIC CHARACTERISTICS OF FISHERY RESOURCES

California Current Region--I. Jack Mackerel

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This is the first of a series of brief reports in which we intend to describe seasonal and geographic characteristics of the fishery resources in the California Current region. Emphasis will be placed on the use of summarized data to predict when and where adult spawning populations may be found--and whether or not such populations might be available to the fisheries during their spawning cycles. This first report deals with the jack mackerel.

These accounts will introduce a series of existing and future comprehensive reports and analyses in a program of intensive research carried on for more than 20 years by the California Cooperative Oceanic Fisheries Investigations (CalCOFI). The investigations were founded in 1949 to determine the reasons for the decline of the sardine fishery. The chief participants of the CalCOFI are the Scripps Institution of Oceanography (SIO), the California Department of Fish and Game (CF&G), and the Bureau of Commercial Fisheries (BCF). The investigations designated an area for their studies covering approximately 500,000 square miles from the California-Oregon border to the tip of Baja California (fig. 1). Their major task was to study the effects of the biological, physical and chemical environment upon the resources. The role of BCF was to determine the distribution and size of adult fish populations from egg and larva censuses.

In order to determine when and where spawning populations may be found, the data for 10 years, 1951-60, are summarized by grouping ("pooling") stations on the CalCOFI pattern into 40 X 120-mile areas (fig. 2) and observing percentages of occurrences of fish eggs and/or larvae. (Percentages of occurrence are the number of times larvae are

found in a sample, divided by the number of samples taken in a particular season and area during the decade.)

In the instance of jack mackerel (fig. 3), the data show that the major centers of spawning (49 percent or greater occurrence of larvae) occur first in March off southern California and northern Baja California; then, as the waters grow warmer, the major centers spread gradually northward as far as San Francisco in July. The absolute range of jack mackerel spawning areas has not been delimited by the CalCOFI. We know from additional surveys by CalCOFI, and other organizations in the United States and Canada, that the jack mackerel populations may extend as far offshore as 800-1,200 miles, as far north as the Gulf of Alaska (Blunt, 1969), and as far south as Cape San Lucas.

The jack mackerel fishery, once only incidental to those of the sardine and Pacific mackerel, suddenly became a major one in 1947--when its total landings were 65,000 tons from a few-thousand-ton fishery in previous years. In the next two decades, 1947-56 and 1957-66, it averaged 40,000 and 35,000 tons per year respectively.

Most landings of jack mackerel are juveniles or young adults taken within 50 miles offshore from San Diego to Point Conception. A small, variable fishery is carried on in Monterey Bay. The Mexican fishery, based in Ensenada, is a moderate one off northern Baja California. The fishery probably uses only a small part of the adult resource, which is estimated to be about 1.4-2.4 million tons within the CalCOFI pattern alone--and approximately twice that amount by adding what is estimated to be in the portion not delimited by the CalCOFI surveys (Ahlstrom, 1968). In

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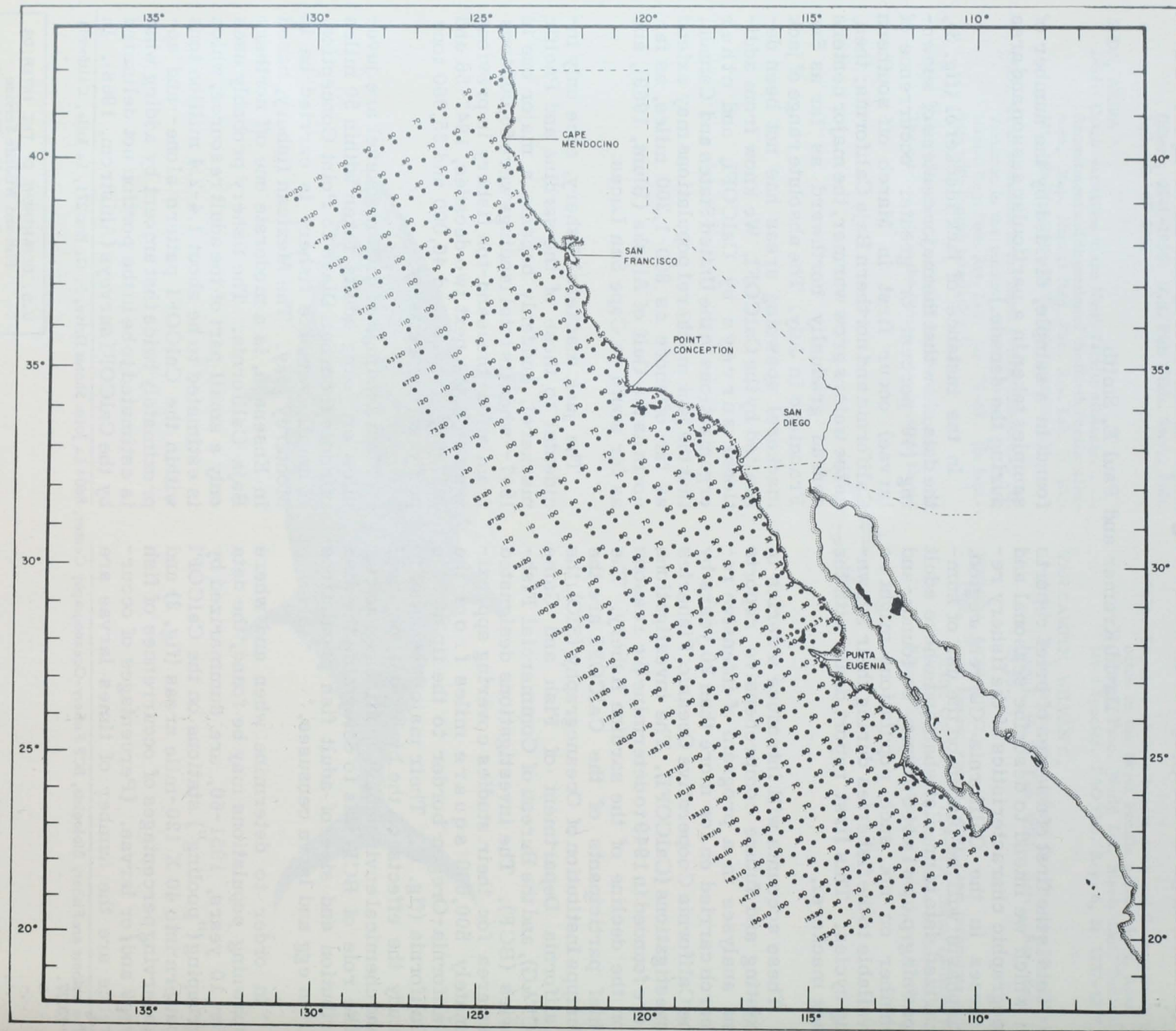


Fig. 1 - Station pattern of the California Cooperative Oceanic Fisheries Investigations (CalCOFI).

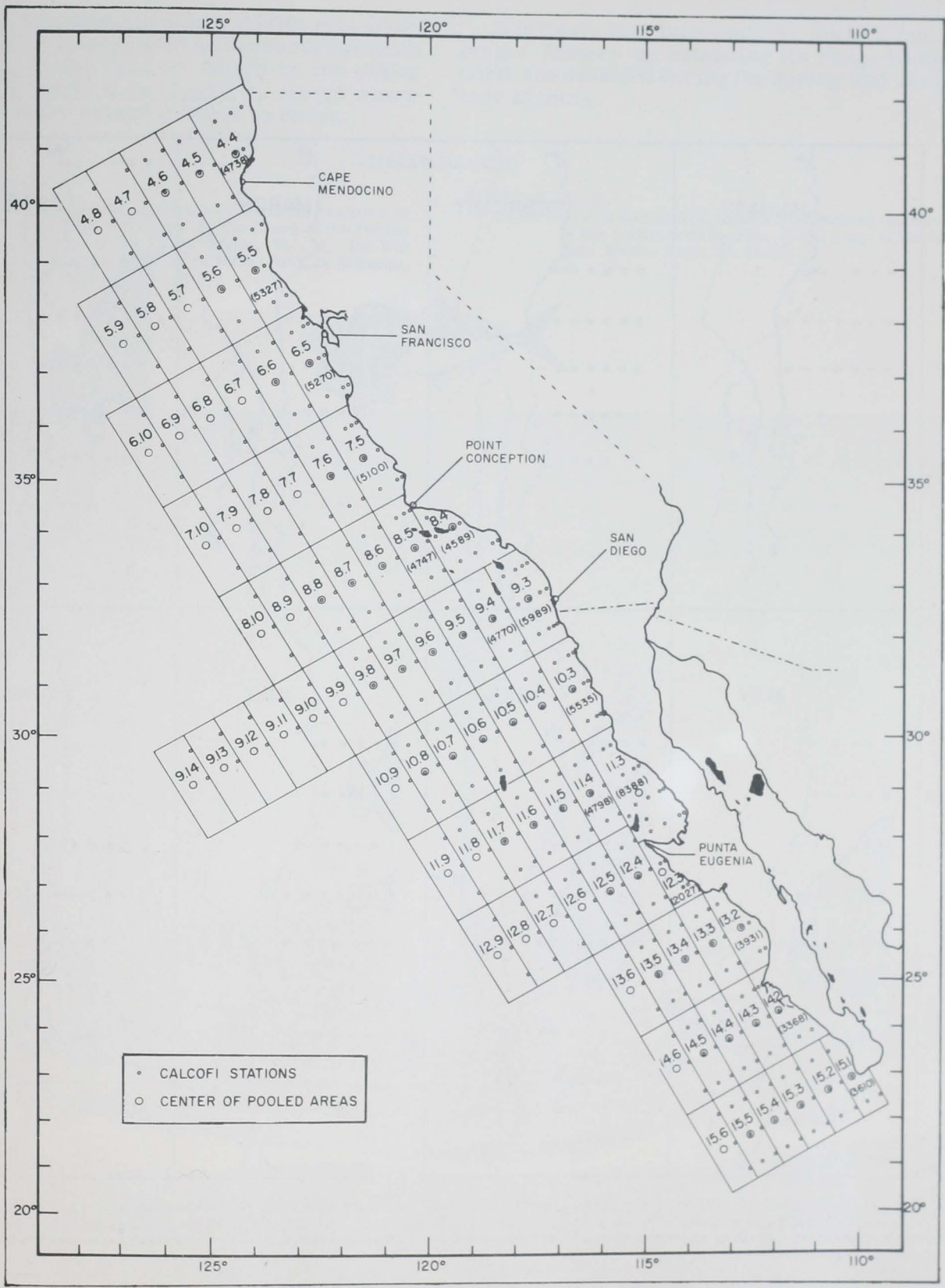


Fig. 2 - Pooled statistical areas of the CalCOFI pattern. Each rectangle represents 4,800 square miles (40 X 120 nautical miles) unless otherwise indicated as in the nearshore delineations.

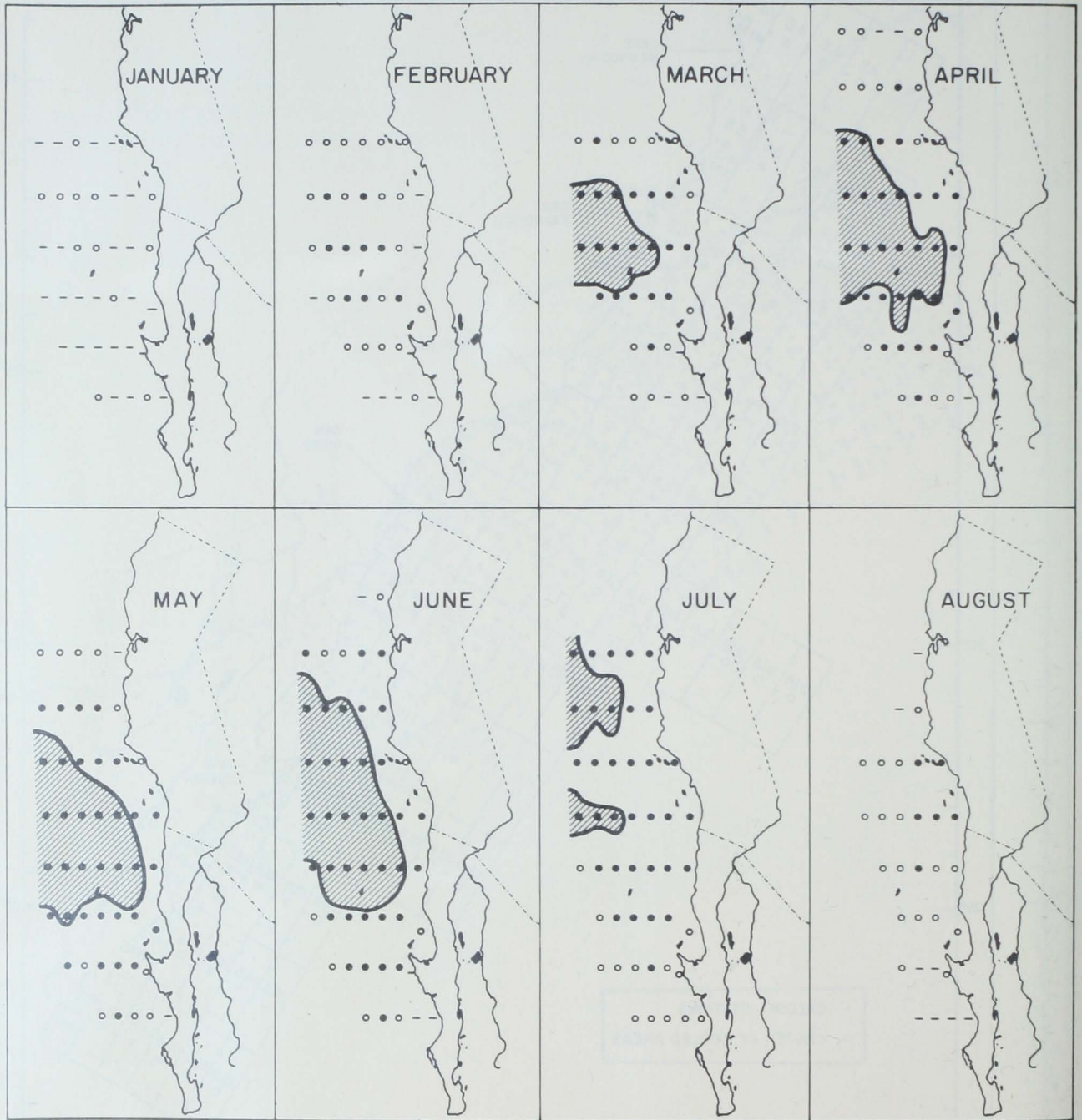


Fig. 3 - Percent occurrences of jack mackerel larvae in 1951-60 on the survey pattern of the California Cooperative Oceanic Fisheries Investigations (CalCOFI). Each line, circle or dot represents a pooled statistical area (see fig. 2). (o) - less than 10% occurrence; (●) - equal to or greater than 10% occurrence; shaded area - greater than 49% occurrence; (-) - area occupied with no occurrences.

addition, the taking of young adults may indicate that the fishery seldom harvests the adult spawning population shown by the major spawning centers in figure 3, except where those centers extend closest to shore.

It is likely that this could be made a much larger fishery by extending its range to the north and seaward during the spring and summer months.

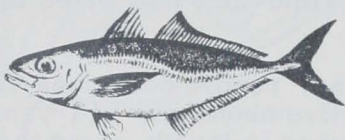
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'North Pacific': 64-ft., San Pedro-stationed jack mackerel purse seiner; 82-ton capacity.

(Photo: W. R. Perrin, BCF La Jolla)