

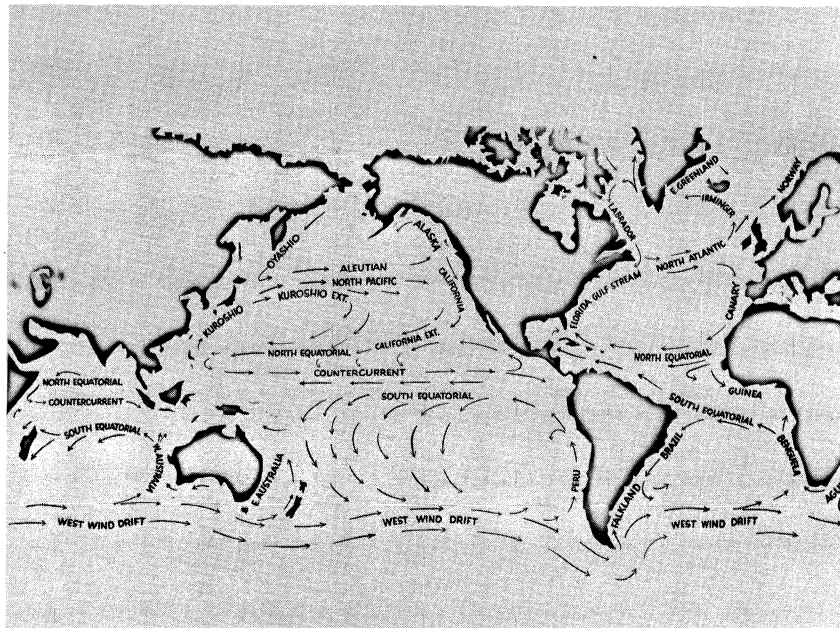


FIGURE 9

Changes in absolute abundance of tuna are obviously a problem to fishermen, but so are the movements of tuna as they range the oceans to feed and spawn. Over the years, fishermen have accumulated a vast amount of experience which usually tells them where to go to find fish. In many years and seasons, however, to the dismay of the fisherman, his "rule of thumb" breaks down and he is left literally with an empty bag. Fishery oceanographers in post-mortems of these fluctuations in availability have been able to explain in part, on the basis of a changing ocean environment, why the changes in distribution of tuna occurred. However interesting this may be to the oceanographer, it is not much help to the fisherman to know why he failed last year. The trend now is toward increased emphasis by fishery oceanographers in understanding the ocean, ultimately to predict these changes in tuna distribution in space and time. The benefit to fishermen will be enormous if precision can be reached in forecasting, so that San Pedro purse seiners can be told several months in advance that the probability for good catches is better, say, off northern California than off the U.S. east coast.

In any fishery, fluctuations in landings are caused by changes in absolute abundance of a species or its distribution in the ocean, and changes in intensity of fishing. Catch of albacore off the U.S. west coast varied widely from almost nothing in the late 1920's and 1930's to over 60 million pounds in 1950 (Fig. 10). Bureau of Commercial Fisheries scientists in cooperation with their colleagues of the State of California have been studying possible causes of these fluctuations. They have concluded that these fluctuations are caused mainly by changing ocean conditions. Thus, it is probable that if we had known as much in the late 20's and early 30's as we know now, the fishery would not have failed. Similarly, fluctuations in skipjack landings in Hawaii appear to be the result of changes in ocean conditions in that area. Enough has been learned of the relationship between these tuna resources and environmental conditions that forecasts