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A summary statement of the status of our knowledge of the marine fisheries of Virginia

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A SUMMARY STATEMENT OF THE STATUS OF OUR KNOWLEDGE OF THE MARINE FISHERIES OF VIRGINIA*

by Nelson Marshall

Fisheries research on Chesapeake Bay to date has concentrated on securing pertinent facts directly relating to the more important species. For this reason it is well to review the status of our knowledge on a species by species basis.

Oyster

We now know the general life history of the oyster and we understand the gross aspects of its habitat requirements. We know the vital role of oyster shell as a cultch for the early pelagic (drifting) stages to set on and, from accumulated data and observations, there is no doubt that existing oyster fishing practices often remove this shell in such quantities as to destroy natural rocks. It becomes necessary, therefore, to develop very active shell repletion programs if the natural productive conditions are to be restored.

Where, when, and under what conditions various aspects of natural reproduction take place must be well understood if expanded repletion efforts are to be effective. Several research laboratories along the coast are studying ecological and physiological aspects of this. Many features of this production question vary with the area involved; consequently the Virginia Fisheries Laboratory is concentrating on specific, representative local situations in the James, York and Rappahannock rivers. To tie such specific studies into a comprehensive repletion program, a complete examination of all the natural grounds is in order. Such an examination has never been undertaken.

Nothing appreciable is known about the heredity and the selective breeding potentialities of any marine fisheries forms. This gap in our knowledge seems especially important with respect to oysters for several reasons: (1) our cull laws result in removing the larger oysters, leaving the runts for reproduction -- an anti-selective practice common to many of our fisheries regulations, (2) there are foreign species and outside strains that might do very well if introduced into Virginia waters as pure stocks or as hybrids, and (3) the aquiculture practices of our private oyster planters would enable them to utilize findings along these lines.

Blue Crab

The life history of this species is rather well known and, from circumstantial evidence, we have a general idea of its migration. We must recognize, however, that certain gaps in this information are so significant that many basic concepts may need revision should fact prove different from assumption. We know

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* Report to the Fisheries Research Committee of the Advisory Council on the Virginia Economy.

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of the spawning that takes place at the mouth of the Bay but do not know whether this represents the center or just the edge of the breeding grounds and, whereas we know most of the developmental history, it is believed that there is a fifth larval stage yet to be determined. Finally, most of our thinking on Blue Crabs rests on the assumption that the Chesapeake Bay population is an entity in itself; yet it is possible that there are several populations involved and there may be marked continuity with populations from the north and south.

The most significant recent study relative to the Blue Crab is that by Pearson (1948)* This study indicates a lack of correlation between the parent stock and the success of the generation it produces. It elaborates on a negative correlation between the stream flow at Cartersville on the James River during the breeding season and the success of the generation of Blue Crabs being hatched at that time. This suggests important relationships between hydrographic conditions (perhaps the salinity in the larval range) and survival. Though Pearson's study is inconclusive, it has stimulated the present cooperative studies on sampling the abundance of Blue Crabs and it has been the key-note** in the creation of the Chesapeake Bay Institute for studying the hydrography of the Chesapeake Bay.

Shad

The spring spawning activity in freshwater is well known. The young-of-the-year leave for the sea the following fall, return to the Bay some years later, and migrate up river for spawning. That the individual fish migrates to the stream of its origin is assumed but not clearly established. In addition there is some evidence that shad migrating up the Bay to Maryland rivers don't even venture into the shallow Bay margins till they pass the Virginia area and near their parent-stream destinations. It is usually suggested that the adults return annually but that the young shad spend from 3 to 4 years at sea prior to this return to the Bay (an interval based on about three tag returns on North Carolina fish). Where the shad go when at sea is unknown. Large schools have been found recently in the Gulf of Maine and several shad tagged there have been recovered in Virginia.

The U. S. Fish and Wildlife Service has reported recently that over-fishing has been the cause of shad depletion in Virginia. The conclusion cannot be widely accepted in scientific circles until the data and reasoning on which it is based are released for review.***

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* Pearson, John C., 1948. Fluctuations in the Abundance of the Blue Crab in Chesapeake Bay. Research Report 14, U. S. Fish and Wildlife Service. 26 pp.

** This is a real tribute to Mr. Pearson who, rather than recognizing this "silver lining," has been disturbed by questions raised relative to his conclusions.

*** This suggests a weakness in fisheries research to date. To satisfy public demand conclusions have been released frequently without supporting data. The growth of the fisheries research field is automatically checking this for, as more scientists enter the field, the cross checking type of scientific activity inevitably increases.

Shad hatcheries have been operated with greater and lesser enthusiasm for a good many years. There is no evidence that their output has influenced abundance one way or another. This is as would be expected when one considers that the 80 million fry constituting a good hatchery output is equivalent to the reproductive capacity of relatively few shad.

Rock

The life history, habitat requirements, and migration of the rock are rather well known. As with the Blue Crab, studies to date suggest that environmental conditions influencing the early developmental stages have an important effect on abundance.

Croaker

Very little is known of this important species except its age and length at spawning. It is generally assumed that it is one of the many species that migrate to the North Carolina Cape regions in mid-winter, then back into the Bay and rivers in summer. We do not know where it spawns.

Other Fishes

Generally speaking, the published facts relating to other species are less complete than for the leading forms already mentioned. Hildebrand and Schroeder (1928)* assembled, in "The Fishes of Chesapeake Bay", an excellent summary of the life history facts that have been accumulated.

One characteristic of all the studies to date is that they have probed into the life histories of the individuals of species but have seldom studied the life history of a population, as is being done in the more advanced freshwater studies. The past work is the first step and has probably been the most efficient expenditure of effort, personnel, and finances in view of the lack of catch statistics and other pertinent population data. To illustrate the contrast between knowing the individual and knowing the population, let me point out that, whereas we now know that an average Rock spawns when it reaches a total length of 22 inches, we don't know what proportion of the Rock population reaches this size.

General

Little is known of the environment in general. This is an extremely important gap because it is clear that the basic conditions hold the key to production in any system. Actually the accumulated physical-chemical data, though scattered and taken for diverse uses, are likely to give a more useful picture than generally anticipated when brought together into a comprehensive whole.

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* Hildebrand, S. F. and W. C. Schroeder, 1928. Fishes of Chesapeake Bay. Bull. U. S. Bur. Fish., 1927, 43(1): 1-366.

Willard A. Van Engel of the Virginia Fisheries Laboratory has taken an initial step in this direction in his preliminary efforts to prepare a bibliography of Chesapeake Bay hydrography. It is expected that the Chesapeake Bay Institute will carry on from there, as well as initiate new work. Very little of the taxonomy and descriptive ecology needed for an environmental account of Virginia marine waters has been done. Finally, the task of putting environmental data together for a quantitative comprehension of the production system rests on the development of a very young and difficult phase of ecological science.

In the field of economics, the most comprehensive studies are: (1) the study titled "The Seafood Industries of the Chesapeake Bay", appearing in the August 31, 1945 issue of the Monthly Review of the Fifth Federal Reserve District, and (2) the study titled "The Socio-Economic Characteristics of the Counties Comprising the Chesapeake Bay Region of Maryland and Virginia" dealing with the years 1929-1940 and prepared by the Bureau of Population and Economic Research of the University of Virginia. These reports have analyzed and summarized the fishery industry with considerable finesse considering the paucity of basic facts.

Fisheries technology in the general realm of processing has advanced considerably, primarily under the leadership of the industry itself and the U. S. Fish and Wildlife Service. Quick freezing and other modern methods known to the food industry in general are not strange to the fishing industry but they have not been widely adopted in Virginia. Technological research to date has emphasized processing and has neglected fishing methods. Public support for the latter type of work has been less likely because of the assumption, usually without evidence, that intensive fishing is the all important cause of most fishery ills (many of our regulations have forced our fishermen to use more primitive methods, this being directly contrary to encouraging them to improve techniques).

A pertinent fact to mention in closing is that data available indicate catches today are generally as great in gross quantity as those of the reputedly "good old days" at the beginning of and before the turn of the century. Undoubtedly there has been some depletion for, in some situations, we are going to more distant grounds and using more gear to meet the market demand. Furthermore, we have shifted to other species as substitutes for some that filled the baskets in previous years. Even so, we cannot hastily assume that observed decreases in abundance are beyond the realm of the natural population changes. In our consideration of fisheries to date we have had a "one-track mind." Of the many environmental factors that might influence fish populations, we have repeatedly blamed man and his reputedly over-intensive fishing methods. The reason is obvious. We readily see man's activities and they often appear extreme whereas such influences as unfavorable water conditions are quite hidden. It is only in oystering on natural rocks that fishing intensity is known, beyond reasonable doubt, to be a serious detrimental factor.