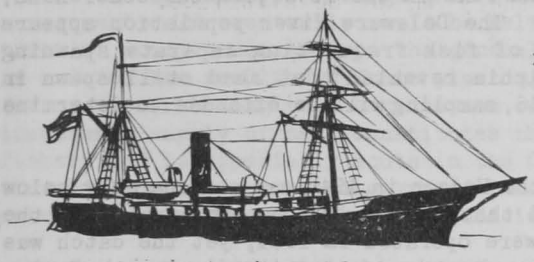
COMMERCIAL FISHERIES REVIEW

SERVICE ACTIVITIES IN THE ATLANTIC STATES 1/

: By Milton C. James *

Since the last annual meeting of the Commission, many changes have taken place. At last year's meeting, Mr. Chas. E. Jackson, my predecessor as Assistant Director of the Fish and Wildlife Service, explained to you the high percentage of our effort that was being directed toward maintaining and increasing the production of food as a war measure. A large portion of the Service personnel not in the armed forces was devoting full time to the wartime problems of the industry. On October 1, all of the Atlantic Coast field offices of the Office of the Coordinator of Fisheries were closed and the men returned to their regular duties. Hence, the biological work will soon be back on a pre-war basis, so that by next fall, I hope to have far more actual results to report to you than is the case at present.

Just prior to the outbreak of hostilities, the Service had commenced the conversion of a large steel otter-trawl into a modern marine research vessel. This vessel was to be used to continue and expand the oceanographical and biological investigations begun in the 1880's by the famous Albatross (see sketch) and continued by its successor, the Albatross II, which was decommissioned in 1923. Almost immediately after the United States entered the war, the Navy took over the vessel and outfitted it for war purposes. She has now been returned. The Service hopes to obtain sufficient funds to restore the vessel, now docked at Woods Hole, into a research vessel. She will be fitted with modern oceanographical equipment for making soundings, taking temperatures, salinities, bottom samples, and collecting both the microscopic and the larger forms of the floating plankton that constitute the chief food of the commercial fishes. She will be equipped with large otter-trawls capable of collecting fish in commercial quantities for studying the distribution and abundance of fish on the banks. She will be equipped to study methods for preserving fish at sea. The United States is one of the few large nations wholly without a seagoing fishery vessel; we can ill afford to tolerate this lack any longer.



The first marine biological station in the United States was established in the 1880's at Woods Hole, Massachusetts, by Spencer Fullerton Baird, first Commissioner of the old United States Fish Commission. This station pioneered in fishery research and was formerly a mecca for marine biologists. Time, however, has laid a heavy hand on the establishment. The Navy occupied the station during the war. The hurricane of 1938 badly damaged the old buildings, and last year's hurricane virtually completed the job, as well as ruining the protecting sea walls. Woods Hole provides a unique location for biological work. There is dockage for large vessels, marine aquaria for experimental work in the physiology and life history of fish and other marine organisms, and a rich and varied marine fauna for research purposes. Besides these physical advantages, there is the very considerable benefit to be derived from the proximity of other centers of marine research. The Woods Hole Oceanographic Institute and the Marine Biological Laboratory occupy sites adjacent to the Service Laboratory. The war has taught us that scientific progress is a cooperative achievement--that the scientific spirit does not thrive in isolation. To profit by the many advantages which Woods Hole offers, the Service is proposing to rebuild the station along modern lines to provide a long needed center for its marine research activities on the northern section of the Atlantic Coast.

1/ Report submitted to Atlantic States Marine Fisheries Commission on December 17, 1945. A discourse on Fish and Wildlife Service activities bearing on the interests of the Commission.

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As a culmination of several years' work on the blue crab of Chesapeake Bay, the Service presented a preliminary report on the investigations at a blue crab panel meeting of the Commission last spring. As a result of the statistical analysis of data collected over several years, it was shown that at the levels of abundance occurring during the eight years covered, there was no correlation between the number of spawning crabs and the number of young crabs surviving. This lack of correlation was clearly demonstrated by the pronounced increase in the commercial abundance of blue crabs during 1944 and 1945 reported at a panel meeting on October 6. The increases in abundance of crabs in 1944 and 1945 can only be attributed to natural factors that favored the survival of larger than average proportions of the crabs spawned in 1943 and 1944. Indeed the survival from the 1944 spawning, with about one-third as many spawners, was much greater than from the 1943 spawners.

The shad population studied in 1945 included those of the Hudson and Delaware Rivers, also of rivers tributary to Chesapeake Bay. Scale samples, collected by the State Departments of Conservation cooperating with the Fish and Wildlife Service, have been studied to estimate the fishing rate in the various localities. Tagging experiments were continued in Sandy Hook Bay to learn more about the migration routes of shad. Plankton samples were made in the Potomac and Delaware Rivers to map out more fully the extent of the spawning areas in those rivers. As an aid to estimating abundance, catch statistics were gathered from a number of sources; State records, publications, dealers' account books, and daily records of individual fishermen.

Scale studies indicate that the number of repeater fish in different sections of Delaware Bay and River varies markedly. The run of shad at Bowers, Delaware, and at Dias Creek, New Jersey, contained a high percentage of repeaters; the runs in the river, on the other hand, were characterized by a high percentage of virgins. The Delaware River population appears not to be homogeneous, but to be made up of groups of fish frequenting separate spawning grounds. Plankton samples taken off North Philadelphia revealed that shad still spawn in that locality despite heavy pollution there. In 1946, sampling will be extended to determine the lower limit of spawning in the Delaware.

There are indications that the run of shad in the Hudson in 1945 was considerably below that of the previous year. Scale studies indicated that a somewhat larger portion of the run was caught by about the same number of nets as were operated in 1944, yet the catch was 1,150,000 pounds under that of last year. The scales also showed that the increment of virgins was below the estimated constant for first and second year repeaters. A small run of virgin shad was last experienced only two years ago, in 1943, when only about one-half of the estimated constant increment came in.

A limited number of experiments was carried on at the Service's Boothbay Harbor Fishery Station to develop a substitute food for young lobsters to replace beef liver, which had been used as a standard diet in the past. Preliminary results show that ground fresh mussels are the only diet which is equal to or better than beef liver. Using this diet and the best conditions in regard to temperature and light, it was possible to obtain a survival of better than 50 percent of the young lobsters from hatching to the fourth stage. In some cases, survivals as high as 62 percent were obtained with this diet. The experiments showed that ground fresh mussels were significantly better than beef liver and very much better than sheep liver or cooked and frozen mussels.

Experiments on chlorination of oysters conducted at the Service's Woods Hole, Massachusetts and College Park, Maryland laboratories added considerable information on the question of the reaction of living oysters to free chlorine which is used in their purification. The U. S. Public Health Manual states that water used in purification should be maintained in such condition by the continuous or intermittent application of chlorine to it that the chlorine residual does not fall below 0.05 p.p.m. It has been found that many oysters are very sensitive and cease pumping and close their shells when applied water contains only 0.01 p.p.m. of free Cl. It is true that repeated treatments result in a rapid development of tolerance which permit the oysters to open their shells and pump water at much higher concentrations than the initial, physiologically effective, dose. From that point of view, it would be ad-

vantageous to apply chlorinated water intermittently rather than continuously. The presence of free Cl in water undoubtedly reduces the rate of pumping of water and therefore interferes with the process of purification. It would be more expedient, therefore, to use chlorination only to disinfect the water and the shells of the oysters and let the oysters purify themselves in the water that contains no residual chlorine.

It was also demonstrated that oysters exposed to low or high temperature during storage or in transport may not resume pumping for two or even three days. These facts should be kept in mind to insure complete purification of oysters which are being conditioned for the market.

In cooperation with the Maryland Department of Tidewater Fisheries, the Service conducts a comprehensive study of the problem of rehabilitation and management of public oyster reefs in the Chesapeake Bay. The goal of this investigation is to put in operation a system of management which eventually would be self-supporting and would not require continuous expenditures of money received from the general taxpayer's fund. To attain this goal, careful study is made of the results of State planting operations and through observations and tests the factors contributing to the successes or failures of these operations are determined. Since inadequate supply of seed constitutes the greatest handicap in the development of the oyster fishery and is especially acute in the Chesapeake Bay region, studies are conducted with the view of locating new setting grounds and increasing the productivity of the areas, known as natural setting grounds, by more judicious planting.

It has been found that many fouling organisms impede the attachment of the oyster larvae and therefore indirectly are responsible for their annihilation. Careful check on fouling seasons for such forms as barnacles, mussels, Bryozoa, sponges, algae, and sedentary Protozoa, is being kept and data are summarized and made available to the State authorities with suggestions on how to adjust planting operations to avoid various difficulties.

Population studies on oyster reefs proved to be very useful for practical management. On the basis of these observations, certain bars in the upper part of the Bay were opened last year and materially contributed to the supply of marketable oysters without depleting the grounds. So far these studies by the Service have demonstrated great value and practicability of the control of harvesting on public reefs.

There was a fairly good set of oysters in Maryland waters during the past summer which fortunately occurred in some of the areas where planting of shells was recommended by the Service and was carried out by the State. With the additional supply of seed, the transplanting program next year will be materially increased.

During the year, general statistical surveys of the fisheries were conducted by the Fish and Wildlife Service, in cooperation with State Fishery Departments, in the States from Virginia to Maine, inclusive. Data were collected for the calendar year 1944 on the number of fishermen and fishing craft engaged in the capture of fishery products, the quantity of gear operated, and the volume and value of the catch.

Progress was made during the year in developing programs for the collection of current fishery statistics in the various States. Considerable assistance was furnished the States of New York, Maryland, and Virginia in this connection. In the future, data on the fisheries

of these States will be available in considerably greater detail than in the past and the accuracy of the figures will be improved.

Because of a shortage of personnel, it was not possible to collect data on the fisheries of the South Atlantic and Gulf States for 1944. Shortages of personnel and war activities have prevented a survey of this area since 1940. It is expected that it will be possible to collect data on the fisheries of all the Atlantic Coast and Gulf States for 1945, and to conduct annual surveys of these States in the future.

In addition, the collection and publication of current detailed data on the landings of fishery products at principal New England ports and New York City was continued and complete data were collected for all States on the production of canned fishery products, byproducts, and packaged fish in 1944.

Sanitation and bacteriological investigations conducted at the U. S. Fishery Laboratory, College Park, Maryland, included two projects conducted in cooperation with State fishery departments and several other projects with the fishery industry. The program was based upon a survey of the fishery problems of the Middle Atlantic and Chesapeake Bay regions.

As soon as it became apparent that the newly-developed ocean quahog fishery was of commercial importance, a study of the industry was undertaken. A field laboratory was set up at Warren, Rhode Island, in cooperation with the State of Rhode Island. The findings have been reported in a bulletin published by the Division of Fish and Game of the Department of Agriculture and Conservation of the State of Rhode Island, "The Ocean Quahog Fishery of Rhode Island", issued in 1945. Attention is directed to the fact that the sanitation requirements of the quahog industry are the same as those of the other shellfisheries and the recommendations which appear in the publication are equally applicable to them.

Because of the objections raised by various health authorities to the retention of oysters and clams in floats in Chincoteague Bay, an investigation was initiated in cooperation with the Commissioner of Tidewater Fisheries of Virginia to determine the effect of this type of wet storage on the sanitary quality of the shellfish, and a field laboratory was established at Chincoteague, Virginia. The data have not yet been analyzed since the work was just recently completed.

In connection with the Service's studies of the effects of chlorine solutions on oysters, preliminary investigations have been made on the purification of oysters taken from polluted waters. It appears from preliminary tests that it may be possible to free oysters of the organisms of pollution in a short period of time if certain fundamental conditions are met. Further investigations should be made on a commercial scale.

A study of the bacteriology of frozen oysters has been under way for the past seven months and includes qualitative tests to determine the changes which may occur during storage in the frozen state. The data obtained thus far indicates that there may be very little change in the bacterial flora under the conditions of the experiment.

Bacteriological studies have been made of Pacific Coast crabmeat packed in vacuum, in sealed metal containers, frozen and maintained in the frozen state for one year. The data indicate that this method of processing is unsatisfactory unless the initial material is of high quality from a bacteriological viewpoint. The results obtained at the College Park Laboratory show that little, if any, change occurs in the flora of the crabmeat under these conditions of storage. Unless the crabmeat possesses a low bacterial content and is free of food-poisoning types of micro-organisms at the time of packaging, this vacuum pack may preserve the poor and dangerous qualities of the product indefinitely. This apparently is not true of crabmeat maintained in the frozen state without vacuum.

Fish spoilage investigations were undertaken during the year and a large number of cultures isolated for further study. Due to a shortage of personnel, it has not been possible to continue this work although it is of prime importance, since it may indicate methods of handling fish which will reduce losses from spoilage.

The fishery industry and associated enterprises have cooperated with the Fish and Wildlife Service in conducting sanitary surveys of certain fishing centers of the Chesapeake Bay. As a result, it has been possible to improve the sanitation in a number of fishery establishments as well as in the communities generally. By removing garbage and refuse dumps, installing modern plumbing, and cleaning the fishery plants, it has been possible to install a consciousness of cleanliness in the plant operators which will be reflected in the production of better quality fish and shellfish.

The use of DDT for the control of flies and other insect pests in fishery establishments has been investigated in cooperation with the Bureau of Entomology and Plant Quarantine of the U. S. Department of Agriculture. The first large scale application of DDT for civilian use was made at Crisfield, Maryland, during the first week of September. A reduction of 95 to 99 percent was made in the fly population in the fishery plants and this reduction has been maintained to the present.

The effect of DDT on the blue crab was also studied. In concentrations of the insecticide which greatly exceed those which usually obtain from airplane applications, the crab is rendered inactive but quickly revives if placed in fresh sea water. Even after an exposure to DDT for one hour in the inactive state, the crabs revived and showed no evidence of toxic effects.

A new, rapid method for the detection of coliform bacteria was worked out in cooperation with the University of Maryland and the Crisfield Seafoods Laboratory. The test depends upon the use of Duponol to restrict the growth of bacteria other than the coliforms and the ability of these bacteria to reduce nitrates rapidly. A preliminary report will appear in an early issue of the Journal of Bacteriology and the method of applying the test to seafoods will be published soon.

A graduate student, working at the College Park Laboratory, is studying the possibility of finding a better index to fecal pollution than the coliform bacteria. At present, the possibility of using the enterococci looks very favorable. These organisms have been found in all waters studied thus far which are known to be polluted. In waters surrounding a source of pollution, the enterococci out-number the coliform bacteria, while deep waters far from sources of contamination rarely, if ever, contain enterococci while they may contain coliform bacteria. The enterococci are resistant to high concentrations of salt, to wide variations in temperature and to antibiotic and other chemical substances. These properties indicate that this group of organisms may prove to be a superior index of pollution.

FISH PRODUCTION AT NEW BEDFORD

By William F. Royce*

The New England fishing industry, which produces the principal United States supply of fresh and frozen fillets and steaks, attained a record fish production in 1941. It was drastically reduced in 1942 and 1943 by the transfer of vessels to the armed forces. The construction of new vessels and the return of many others which had been in the armed forces, increased production slightly in 1944 and markedly in 1945. The production for the three principal ports of New England is shown in Table 1. It is to be noted that 1945 landings in these three ports were larger than the previous all-time peak year of 1941. This upward trend is expected to continue in 1946 if the abundance of the fish is maintained, since the producing capacity of the fleet has steadily increased during 1945.

New Bedford's contribution to this production picture has been a steadily increasing expansion from landings of 22 million pounds in 1938 to 101 million pounds in 1945. Several important changes in the industry have occurred to bring this about. New Bedford was primarily a landing and outfitting port for the boats and a shipping point for fish destined mostly for New York and Boston until 1939, when the first fillet plants started operation.

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