of docks had been made possible by a separate appropriation of $160,000; the Dane Construction Company of Sommerville, Mass. was awarded the contract for this work. In 1957 the Director's residence (former Coast Guard bungalow) was moved to a new site and the barrack-type frame building (former WAVES quarters) was given to the MBL and moved away. On December 27, 1957, the Government entered into a contract with Mishara Construction Company, Inc., of Brighton, Mass. for the razing of the old laboratory, residence building, and maintenance shop and for the construction of a three-story 44 feet x 190 feet masonry building. The old buildings were vacated, and the Laboratory personnel occupied temporary quarters in a private estate midway between Falmouth and Woods Hole. The shellfish investigations were conducted in a laboratory at the MBL.

Early in 1958 the old buildings were demolished. The staff of the Laboratory consisted at this time of Director, Herbert W. Graham, Assistant Director, the late Clyde C. Taylor, 21 fishery research biologists, 21 fishery aids, 6 technical assistants, and 16 persons employed in administration and maintenance. The Albatross III, with a crew of 24 officers and men, was attached to the Laboratory.

New and important changes in the research program and administrative functions of the Laboratory, which became effective since 1950, resulted from the reorganization of the Fish and Wildlife Service. As previously mentioned, under the authority of the President's Reorganization Plan III, the Bureau of Fisheries was merged with the Bureau of Biological Survey to form the Fish and Wildlife Service under the U.S. Department of the Interior. A new Fish and Wildlife Act was passed during the second session of the 84th Congress and on August 8, 1956, was approved by President Eisenhower. The "Declaration of Policy" of the Act states that "Congress hereby declares that the fish, shellfish, and wildlife resources of the Nation make a material contribution to our natural economy and food supply, as well as a material contribution to the health, recreation, and well-being of our citizens" (Sater, 1960). The law established the Bureau of Commercial Fisheries and the Bureau of Sport Fisheries and Wildlife as two independent components of the new Service. The Bureau of Commercial Fisheries under a Director (the position at present is occupied by Donald L. McKernan) consists of four divisions: Biological Research, Industrial Research, Resource Development, and Administration. At the same time the Bureau's field activities, formerly under the direct supervision of the central office in Washington, have been decentralized by establishing five regional offices, and two area offices, each headed by a Regional Director and assisted by an administrative staff. In accordance with the new plan, the Bureau of Commercial Fisheries Biological Laboratory at Woods Hole and other Bureau laboratories in the area, are under the administrative supervision of the Director of Region 3, with headquarters at Gloucester, Mass. John Gharrett

is Regional Director of Region 3 which extends over the New England area and southward including the states of New York, New Jersey, Delaware, Maryland, and Virginia.

Under the new administrative scheme, the general term "field station" applies to any field office of the Bureau other than Regional or area offices, and the term "Biological Laboratory" is used to designate a major research center engaged in biological investigations. The official full title of the Woods Hole Laboratory according to Amendment Two of Reorganization Memorandum No. 10 of November 18, 1958, is as follows: Bureau of Commercial Fisheries Biological Laboratory, Woods Hole, Massachusetts. The major activities of a laboratory are called programs each headed by a program leader. The Laboratory Director has supervision of all the functions of the Laboratory.

On March 1, 1960, when Laboratory personnel moved back to Woods Hole and occupied the new laboratory building, the staff comprised H. W. Graham, Director; Robert L. Edwards, acting Assistant Laboratory Director (now Assistant Director); and the following program leaders: Cod--J. P. Wise; Flounder--F. E. Lux; Haddock--J. R. Clark; Hake--R. L. Fritz; Industrial Fishery--R. L. Edwards; Redfish (formerly called rosefish)--G. F. Kelly; Sea Scallops--J. A. Posgay; Benthic Ecology--R. L. Wigley; Fish Behavior--R. Livingstone; Plankton Ecology--R. R. Marak; Aquarium and Experimental Studies--C. L. Wheeler; Instrumentation and Underwater Television--J. M. Crossen; Port Samples Pool (to obtain data on the commercial landing of fish)--L. H. Couture. The work on estuarine ecology conducted in the past years has been discontinued, and the activities of the Laboratory focused on oceanic fisheries and development of practical measures of management in relation to the U. S. responsibilities to ICNAF.

IV. The Aquarium

The aquarium has always been a vital part of Woods Hole as a scientific and educational center. It was organized by Baird, who strongly believed in the necessity of popularizing marine biology and explaining to the general public the aims and achievements of government research in conservation. No appropriations were made, however, for the operation of the aquarium. It was assumed that this work would be performed voluntarily and jointly by the Director and Superintendent of the Station. For many years R. A. Goffin, collector for the Laboratory and later its Superintendent until 1941, took care of the aquarium to the best of his ability and with limited funds. In arranging the aquarium material, emphasis was placed on New England food fishes and on invertebrates commonly found along the shores and used in the MBL classes and for research. The aquarium doors were open every day from 8:00 a. m. to 8:00 p. m. in order to give the MBL investigators a chance to visit the exhibits between breakfast time and the beginning of morning classes at 9:00 a. m. Another favored time was between 7:00 and 8:00 p. m. The tourists and other visitors usually came between 10:00 a. m. and 5:00 p. m. The aquarium was frequently crowded on holidays, especially when bad weather kept the tourists from the beaches. The visitors were invited to register and write their impressions. Spot checks conducted at various times of the day showed that in the morning and late afternoon hours the ratio of those who signed their names and those who disregarded the request was 1 to 10. During other hours it varied from 1 to 3 to 1 to 5. From these and other checks it was possible to estimate that the number of visitors exceeded 1,000 per day on rainy days and holidays. In 1945-50 the average number of aquarium visitors for the entire 90-day period it was open was about 250 per day.

With the organization of the School of Science for the boys and girls of the parents doing research work at Woods Hole, arrangements were made for the children to have their own tanks for keeping and watching the animals they collected in the sea. The old hatchery provided plenty of room for this purpose. By this policy many acts of juvenile delinquency were prevented since the participants of the "aquarium projects" acted as voluntary guards.

It was my practice to mingle with the crowd and learn directly their reactions to our display. It was a surprise to find out how many college instructors in biology had never seen live dogfish, squid, or other common animals. Some of them admired the graceful movements of the fish, the continuous color change of the squid, the sliding motion of starfish, and the brilliance of our common red sponge. Their previous acquaintance with these

forms of life was only through the unattractive specimens preserved in formalin and used for dissection

On many occasions the aquarium supplied the MBL classes with material for experimentation and dissection. The demonstration of electric discharges by the large electric ray was the most spectacular event carried out for several consecutive seasons on Fisheries grounds by William R. Amberson for the students of his physiology class. The ray was placed on a wide copper plate to which an electrode was attached. The second electrode was placed on the ray's dorsal side, over its electric organ. A chain was formed of 40 to 50 volunteers holding hands and two at the ends touching the poles. The fish was then disturbed, and at the discharge of an electric shock all the hands jerked up simultaneously with loud screams of the participants. The event always attracted numerous spectators.

Many curious remarks were heard and comic incidents happened around the outdoor pool. By long-established tradition, two young harbor seals were kept every summer in a large sea-water pool behind the sea wall. The lovable animals, adored by the public, spent most of their time on a small raft anchored in the pool. They became tame within a short time of their capture and came close to the wall to accept mackerel or other fish offered to them. At feeding time a large crowd would always be standing on the walls of the pool. Besides the seals, sea turtles and large sharks occasionally were placed in the pool. There was always a discussion about the dangers of sharks, their attacks on humans and questions why the seals were not afraid of them. I noticed late one afternoon, a large group of men loudly arguing some question and refreshing themselves with frequent excursions to hip-pocket flasks. To prevent possible unpleasantries I moved close to the group and heard how one rather fat and vociferous fellow proposed a bet of $5 to $25 that he would enter the water where sharks were swimming and remain there immobile for 10 minutes. The bet was accepted, and the man stripped to his bathing trunks, stepped into the water while his companions anxiously looked at their watches. When he successfully emerged from the pool and collected his bet, I quietly remarked that the large sand sharks in the pool are sluggish animals which subsist on small fish and never attack humans. Since the explanation was not appreciated by the winner, I hastily retreated to my quarters.

The seals were the darlings of Woods Hole. People loved them, and used thousands of films photographing them and asked endless questions about their habits. There were many visitors to the aquarium, including some local fishermen

who with great regularity came to see the exhibits and always commented on the condition or rarity of the specimens they saw. Who knows how many of them became naturalists and conservationists as a result of these first impressions of life in the sea?

The aquarium serves educational purposes by emphasizing to the public the value and necessity of conservation of aquatic resources. In designing the new aquarium the Bureau attempted to carry on the tradition of Spencer F. Baird. It is housed in a modern building and uses modern techniques for exhibiting fish and telling the story of conservation of marine resources. There are 16 tanks for display of local marine animals and plants, and no attempt is made to entertain the visitors with trained animals or to show exotic species. As in the past, the aquarium is open only during the summer. Shortly after Labor Day its facilities are used for experimental research.

In spite of the very modest character of the aquarium it attracted over 200,000 visitors in the summer of 1961. This tremendous interest in marine science on the part of the American public points up the need for more marine museums and aquaria in accessible places to satisfy the desire to learn about the sea. The Bureau's aquarium is designed to tell the story of marine conservation and to give to the public an idea of the research being conducted at Woods Hole. It cannot do more than this. The usefulness of the public exhibits of the Fisheries Biological Laboratory and their educational value cannot be denied.

V. Outlook for the Future

Effective management of fisheries resources of the open ocean presents a great challenge that can be met by well-planned, year-round observations conducted without interruption for a number of years. The most important scientific phase of this research is concerned with the causes of the great fluctuations in the abundance of fish stocks. For the past hundred or more years these fluctuations have greatly affected the fishing industries of this country and in Europe. Frequently the cause was attributed to one or another factor--such as overfishing, changes in ocean currents, or temperature deviations from the expected average--without actually ascertaining all the complicated interrelationships between the welfare of a fish population, environmental changes, and the effects of man's activities. The intricate picture of life in the open ocean cannot be elucidated by a single short-term observation in a restricted area. The census of fish populations should be taken from year to year together with measurements of changes that may occur in the oceanic environment, particularly in climate and weather, observing the pattern of currents, and determining the abundance of the food supply for different species. Life in the ocean does not remain stable. Contrarily, it is in a state of unstable equilibrium in which the struggle for existence gives temporary predominance to one group which in turn may be replaced by another. For an understanding of such interactions, long-continued and well-planned observations are needed.

An evaluation of the events that take place among free-living and rapidly moving marine populations cannot be made by studying a single species of commercially important fish. All species of fish compete for space and food and are directly or indirectly dependent on the abundance of zooplankton and bottom organisms which in turn are controlled by the abundance of microscopic plants and bacteria. In final analysis the entire food chain in the ocean from mineral salts, necessary for microscopic plants, to the abundance of the giants of the sea--sharks, tunas, and whales--depends on sun energy absorbed by the surface of the ocean. Therefore, it is clear that biological observations on a marine population must be based on detailed oceanographic studies. The needs and tolerances of various species for temperature, salinity, oxygen, and food must be known in order to interpret possible effects of slight changes in the environment. To this long array of particulars must be added the study of the behavior of fish, and diseases which sometimes decimate the entire population. This type of work requires the facilities of a modern laboratory and

availability of a sea-going research vessel. Continued and uninterrupted observations in the open ocean are essential for the success of this work. It is apparent that the work of such magnitude can not be carried on by a single institution. Together with a number of organizations and agencies concerned with marine sciences, the Fisheries Biological Laboratory at Woods Hole is ready to contribute its share in oceanographic research and to assume a leading role in the studies of fisheries, their conservation and utilization, the goal which was formulated 90 years ago by Baird. It is remarkable that the present day ideas of oceanic research are essentially those which the great founder of this Laboratory so eloquently expressed in his reports, in his statements to Congress, and in his remarkable instructions to the men he sent to explore the secrets of the ocean.

Let us hope that the ideals of Spencer F. Baird shall remain alive and will continue to stimulate the young generation of scientists who have now at their disposal the wonderful tools of research that could not have been imagined at the time the first marine biological station in the United States was founded.

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