THE STORY OF THE BUREAU OF COMMERCIAL FISHERIES BIOLOGICAL LABORATORY WOODS HOLE, MASSACHUSETTS

By Paul S. Galtsoff

I. Early Years of Woods Hole

On a June day in 1871, a large, well-dressed, distinguished man in his fifties stepped briskly from the coach that brought the passengers of the Old Colony Railroad from Monument Beach to Woods Hole. The face of the newcomer, with his well-trimmed, slightly curly beard and shaved upper lip, was familiar to some of the local residents gathered to watch the daily arrival of the coach. They recognized him as an important person from Washington who, in 1863, came here to spend part of the summer fishing and resting. The visitor knew the location of the village's only inn; where most of the tourists stopped and waited for the steamer to take them to the islands. He walked rapidly carrying his briefcase and did not appear to be tired after the 20 mile ride on a dusty road. The train service to Woods Hole was not expected to begin before the next summer when the Old Colony Line promised to open the last section that was now under construction. The event seemed to be trivial, and the arrival of the newcomer was not reported in local newspapers. It marked, however, the beginning of a new era for Woods Hole; for his arrival initiated a long series of events which changed the destiny of a small New England fishing settlement into an internationally famous center of research in marine sciences and oceanic fisheries.

An observant person probably would have noticed on the face of the man the signs of dynamic power, determination, and perseverance which distinguished him from ordinary summer tourists who were coming to Cape Cod in ever increasing numbers. The newcomer was the famous zoologist and naturalist, Spencer Fullerton Baird, Assistant Secretary of the Smithsonian Institution and newly appointed, by President Ulysses Grant, first U. S. Commissioner of Fisheries (fig. 1). He faced the enormous task and great responsibility of organizing the new branch of government service dealing with the conservation of natural aquatic resources which appeared to decline under intensive exploitation.

Figure 1.--Spencer Fullerton Baird, Secretary of the Smithsonian Institution and first Commissioner of U. S. Commission of Fish and Fisheries, from 1871 to 1887. Photograph of a painting in the Regents Room of the Smithsonian Institution. Courtesy of A. Remington Kellogg.

During the following 16 years, the activities of Spencer F. Baird greatly influenced the course of biological research in the United States and put studies of the conservation of marine resources on a sound scientific basis. His achievements in zoological research and its application to conservation greatly advanced the progress of marine biology in the United States. In no other place in the country have the results of his work been felt as deeply as in Woods Hole, where a few years after his arrival the first marine laboratory in the United States was established. The laboratory thrived, and the community developed into one of the world's leading scientific research centers.

To understand this profound change in the destiny of Woods Hole it is necessary to visualize the local conditions as they existed at the time of Baird's arrival. The beginning of Woods Hole dates back to the early 17th century. Five years before the settlement of Jamestown, Virginia, and 18 years before the Pilgrims landed at Provincetown and Plymouth, Bartholomew Gosnold coasted along Cape Cod and Marthas Vineyard, and about May 31, 1602, he is believed to have landed at what is now known as Woods Hole. The Town of Falmouth, of which Woods Hole is presently a part, was first settled in 1659-61 when several persons were granted permission to purchase land. The date of the settlement of Woods Hole took place 17 years later. The town (Falmouth) was incorporated on June 4, 1686, and called Succonessett, the name which later, probably in 1694, was changed to Falmouth. On July 23, 1677, the land around Little Harbor of Woods Hole (fig. 2) was divided among the 13 settlers in "lots of 60 acres upland to a share" and an "Indian deed" confirming the land title was signed by Job Notantico on July 15, 1679 (Deyo, 1890). Fishing, hunting, and sheep breeding were the principal occupations of the early settlers and their descendents. Later on a grist mill was built and salt was made by solar evaporation of sea water in pans built along the banks of Little Harbor.

These quiet, rural conditions, devoid of adventure, persisted until about 1815, when Woods Hole became an important whaling station from which ships operated on the high seas. The whaling industry in the United States became a very profitable business, and Woods Hole was a part of it. In 1854, the total receipts for the American whaling fleet amounted to $10.8 million, the largest part of this amount resulted from whaling carried out by Massachusetts captains. Woods Hole participated in these activities and prospered. It is known that between 1815 and 1860, not less than nine whaling ships were making port at the Bar Neck wharf, which was located where the U.S. Navy building of the Woods Hole Oceanographic Institution now stands. The place was busy processing oil and whalebone and outfitting ships. A bake house for making sea biscuits for long voyages stood next to the present "Old Stone Building" built in 1829 as a candle factory. This conspicuous old landmark on Water Street of Woods Hole, identified by an appropriate bronze plaque,

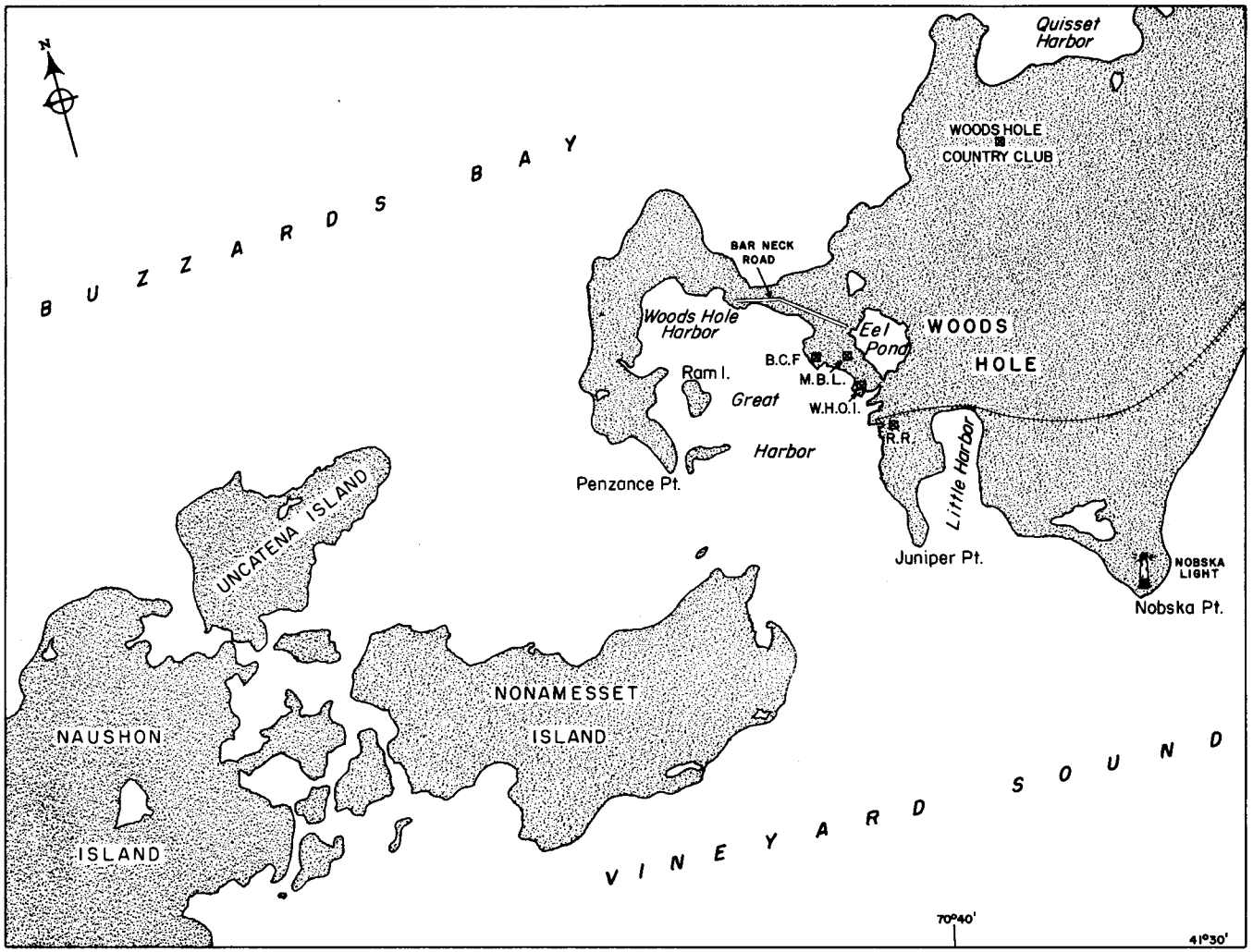

Figure 2.--Map of the present day Woods Hole area and adjacent islands.

Figure 3.--View of Woods Hole from Harbor Hill about 1880. Buildings of the Pacific Guano Works at upper right; candle house at left.

now serves as a warehouse for the Marine Biological Laboratory for storing preserved zoological specimens. About 1860, whaling became less profitable and Woods Hole entered into the second phase of its economic life which was dominated by the establishment and operation of a new commercial venture known as the Pacific Guano Works.

During the years from 1863 to 1889, when the Pacific Guano Works was in operation, the life of Woods Hole centered around the plant which was built at Long Neck near the entrance to what is known now as Penzance Point (fig. 3). Many large sailing vessels carrying sulphur from Italy, nitrate of soda from Chile, potash from Germany, and many schooners under the American flag loaded with guano and phosphorus from the Pacific Coast of South America were anchored in Great Harbor waiting for their turn to unload their cargoes. The number of laborers regularly employed by the Guano Company varied from 150 to 200 men, mostly Irishmen brought in under contract. Several local fishermen found additional employment as pilots for guano ships. The company

maintained a store where various goods such as leather, lead pipe, tin, coal, wood, and other items were bought and sold. The store acted also as a labor housing agency. Through efforts of the business manager of the Guano Company, the Old Colony Railroad was persuaded to extend its branch from Monument Beach to Woods Hole. The establishment of well-organized and reliable transportation to Boston was an important factor in the future life of the community.

The Pacific Guano Works was established by the shipping merchants of Boston who were seeking cargo for the return voyage of their ships (Pacific Guano Company, 1876). The guano deposits of one of the Pacific islands seemed to furnish this opportunity. As soon as the joint stock company was organized in 1859 with the capital of $1 million, arrangements were made almost immediately by which the newly formed concern came into possession and control of Howland Island. This island is located in the middle of the Pacific Ocean at longitude 177° W., a short distance north of the Equator, about 1,500 miles true south from Midway Island of the Hawaiian archipelago. At the same time appropriate plant and docking facilities were built at Woods Hole and 33 large sailing ships became available for hauling guano. Unlike the well-known guano islands off the coast of Peru, Howland Island is located in the zone of abundant rainfall. Consequently, the guano deposits of the island were leached of organic components and consisted of highly concentrated phosphate of lime.

Fertilizer produced by the company was made by restoring the lost organic matter of the phosphate rock by adding the right proportion of organic constituents which were obtained from menhaden, pogy, and other industrial fish which abound in Cape Cod waters. The rock was pulverized and purified by washing; fish brought in by local fishermen were first pressed to extract oil, and the residue digested with sulphuric acid, washed, and dried. Acid was produced locally from sulphur imported from Sicily, and the digestion of fish flesh was carried out in large lead-lined vats. The plant was well equipped with machinery needed for the process and even had a chemical laboratory where chemists made the necessary analyses. Various sheds for storage and drying, barracks for laborers, and a business office completed the facilities.

When the deposits of phosphate rock on Howland Island were exhausted, the company acquired title to the Greater and Lesser Swan Islands from the U.S. Government. These islands are located in the Caribbean Sea at latitude 17° N. and longitude 83° W. off the coast of Honduras. The islands are only 400 miles from Key West, Florida, and 500 miles from New Orleans. They contained good-quality phosphate rock and being much closer to Woods Hole greatly reduced the voyage time and cost of delivery.

Further expansion of the company consisted in the acquisition of Chisolm's Island near the coast of South Carolina, construction of a plant for cracking and washing phosphate rock on the Ball River side of the island, and establishment of a processing plant in Charleston, S. C. From the initial production (in 1865) of 7,540 sacks of fertilizer weighing 200 pounds each, the output reached 11,420 tons in 1871 (the year of Baird's arrival) and continued to grow until the combined annual production in 1879 of the works at Woods Hole and Charleston reached from 40,000 to 45,000 tons of guano fertilizer.

Baird was greatly impressed by the idea of utilizing menhaden and other fishes for the production of guano fertilizer and considered it a worthwhile project. In a letter dated October 18, 1875, to John M. Glidden, treasurer of the Pacific Guano Works Company, Baird urged him "to make a display of your wares at the centennial (in Philadelphia), as this is one of the most important interests in the United States." He writes further that "there is no species (of fish) worked up elsewhere comparable to the movement with the menhaden, or pogy, as to numbers and the percentage of oil. The combination, too, of the pogy scrap with the South Carolina phosphates and the guanos of the West Indies and of the Pacific, are also quite novel, and as being especially an American industry, are eminently worthy of full appreciation."

While the scientists, agriculturalists, and stockholders of the company thought very highly of the guano works, the existence of a malodorous plant was not appreciated by the residents of Woods Hole who suffered from a strongly offensive odor whenever the wind was from the west. Woods Hole might have continued to grow as one of the factory towns of Massachusetts but, fortunately for the progress of science and good fortune of its residents (except those who invested their savings in the shares of Pacific Guano Works), the company began to decline and became bankrupt in 1889.

Cessation of business and heavy monetary losses brought financial disaster to many residents of Woods Hole. The gloom prevailing in the village after the closing of the guano works began to dissipate, however, with the development of Woods Hole as a place of scientific research and with the increasing tourist trade. The factory buildings were torn down, the chimney which dominated the Woods Hole landscape was dynamited, and over 100,000 pounds of lead lining the acid chambers were salvaged (Crowell, 1961). Large cement vats and the remnants of the old wharf remained; in the following years the latter became a favored place for summer biologists to collect interesting marine animals and plants.

The years from 1871 to the death of Baird in 1887 were the formative period of the new era of Woods Hole as a scientific center.

In historical documents and in old books the present name Woods Hole is spelled in a different way. The old name "Woods Holl" is considered by some historians of Cape Cod (Conklin, 1944) to be a relic of the times prior to the 17th century when the Norsemen visited the coast. The "Holl", supposed to be the Norse word for "hill", is found in the old records. The early settlers gave the name "Hole" to inlets or to passages between the islands, such as "Robinson's Hole" between Naushon and Pasque Islands, or "Quick's Hole" between Pasque and Nashawena Islands, and Woods' Hole between the mainland and Nonamesset Island. In 1877 the Postmaster General ordered the restoration of the original spelling "Wood's Holl", which remained in force until 1896 when the United States Post Office changed it back to Woods Hole and eliminated the apostrophe in Wood's. The change was regretted by the old timers and by C. O. Whitman who had given the specific name "hollensis" to some local animals he described.

At the time of his arrival at Woods Hole in 1871, Baird was well known to the scientific circles of this country and abroad as a naturalist, student of classification and distribution of mammals and birds, and as a tireless collector of zoological specimens. He maintained voluminous correspondence with the scientists in the United States and Europe, and was Permanent Secretary of the recently organized American Association for the Advancement of Science. To the general public he was known as a contributor to a science column in the New York Herald and author of many popular magazine articles. His newly acquired responsibilities as Commissioner of Fisheries greatly added to his primary duties as Assistant Secretary of the Smithsonian Institution which was primarily responsible for the establishment of the National Museum in Washington. As a scientist, Baird belonged to the time of Louis Agassiz, Th. H. Huxley, and Charles Darwin. Like Agassiz he attended medical college but never completed his studies, although the degree of M. D. honoris causa was later conferred upon him by the Philadelphia Medical College.

In the words of Charles F. Holder (Holder, 1910), "he was a typical American of the heroic type. A man of many parts, virtues, and intellectual graces, and of all the zoologists science has given the world . . . . he was most prolific in works of practical value to man and humanity."

Commissioner Baird attended many Congressional hearings and conferences with state officials and fishermen at which the probable causes of the decline of fisheries were discussed and various corrective measures suggested. From the lengthy and frequently heated discussions and evidence presented by the fishermen and other persons familiar with the fisheries problems, he became convinced that an alarmingly rapid decrease in the catches of fish had continued for the last 15 or 20 years. Such a decline was particularly noticeable in the case of scup, tautog, and sea bass in

the waters of Vineyard Sound. It was logical, therefore, that the new Commissioner of Fisheries would select for his initial activities the New England coastal area where the fishing industry was of greatest importance as a politico-economical factor.

Woods Hole, however, was not a significant fishing center. In the "Fisheries and Fishing Industry of the United States" prepared and edited by Goode (1884-87) for the 1880 Census (fig. 4), the fishing activity at Woods Hole is described in the following words: "Of the male inhabitants only seven are regularly engaged in fishing, the remainder being employed in the guano factory, in farming and other minor pursuits . . . . There is one ship carpenter in Wood's Holl, but he finds employment in his legitimate business only at long intervals. Of sailmakers, riggers, caulkers, and other artisans there are none. Four men are employed by Mr. Spindel, during the height of the fishing season, in icing and boxing fish. The boat fishery is carried on by seven men from April until September, inclusive. Only three species of fish are usually taken, namely, scup, tautog, and sea bass. The total catch of each fisherman is about 15 barrels, or about 2400 pounds. In addition about 6,720 lobsters are annually taken."

Before selecting a location for permanent headquarters for the work on fishery management and conservation, Baird undertook extensive explorations of the fishing grounds off the entire New England Coast. Section 2 of the Joint Resolution Number 8 of Congress gave the Commissioner full authority to carry out the necessary research. In part it reads as follows: "and further resolved, That it shall be the duty of the said Commissioner to prosecute investigations and inquiries on the subject, with the view of ascertaining whether any and what diminution in the number of the food-fishes of the coast and the lakes of the United States has taken place; and, if so, to what causes the same is due; and also, whether any and what protective, prohibitory, or precautionary measures should be adopted in the premises; and to report upon the same to Congress." Section 4 of the same Resolution contains an important clause which authorizes the Commissioner of Fisheries "to take or cause to be taken, at all times, in the waters of the sea-coast of the United States, where the tide ebbs and flows, and also in the waters of the lakes, such fish or specimens thereof as many in his judgement, from time to time, be needful or proper for the conduct of his duties as aforesaid, any law, custom, or useage of any State to the contrary notwithstanding."

The significant words "where the tide ebbs and flows" were interpreted by Baird in a very broad scientific sense which extended the authority for his investigations to the offshore areas of the open ocean.

Pounds and weirs were most frequently accused by the public as destructive methods of fishing responsible for the decline in the abundance of food fishes along the coast. Although Baird gave very

Figure 4.--George Brown Goode, Director of the National Museum and assistant to Baird in Woods Hole.