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Pioneering Lobster Aquaculture in Rhode Island

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One of the pioneering agencies charged with managing Rhode Island's fisheries resources was the Rhode Island Commission on Inland Fisheries (hereafter the RI Fish Commission or simply 'the Commission'). The RI Fish Commission was formed as a sister agency of the Commission on Shellfisheries by an act of the General Assembly in 1869 to manage and enhance the state's various fisheries, including freshwater trout and bass fisheries and the marine fisheries in Narragansett Bay and the coastal salt ponds. The Commission consisted of a minimum of five commissioners appointed by the General Assembly serving three-year terms. There were additional staff members in the employ of the Commission from time to time. The Commission was obliged to provide an annual report to the General Assembly in January. Early work of the

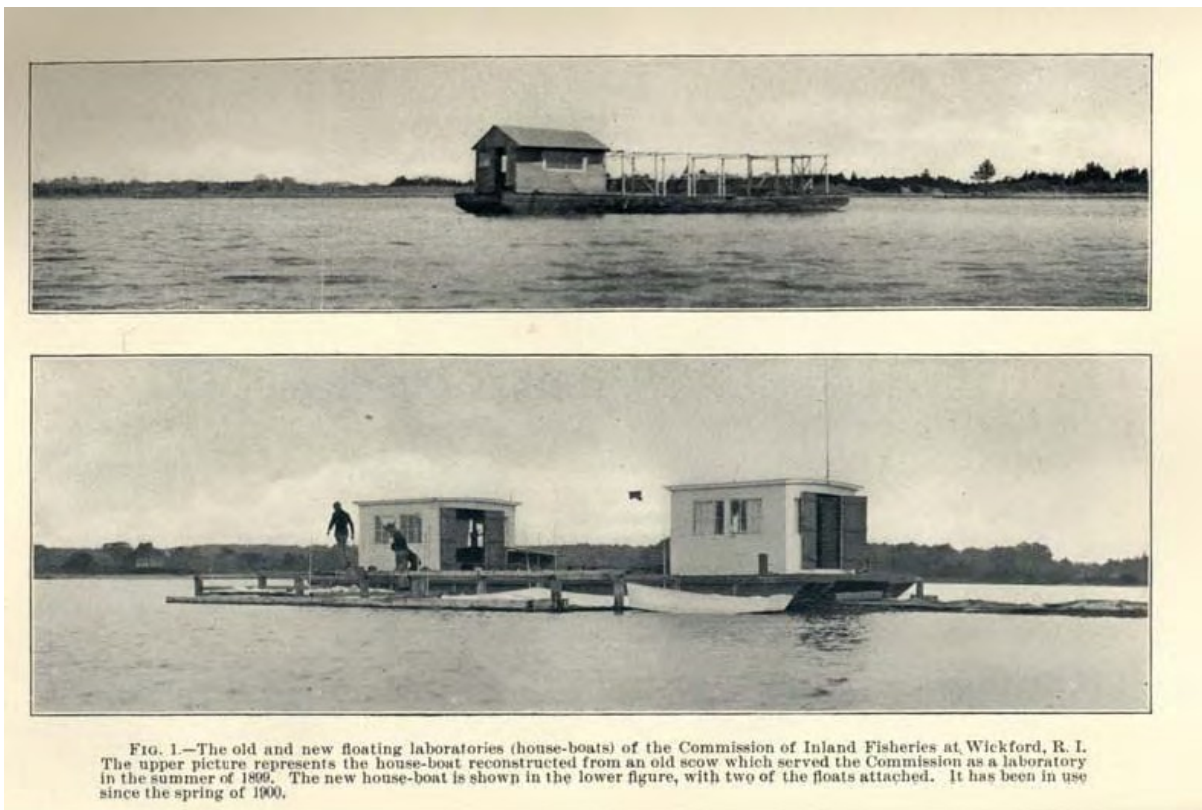


Figure 1 A & 1B. The old and new floating laboratories (house boats) of the Commission of Inland Fisheries at Wickford, R.I. The upper picture represents the house boat reconstructed from an old scow which served the Commission as a laboratory in the summer of 1899. The new house boat is shown in the lower figure, with two of the floats attached. Photos and original caption is from the 1902 32nd Annual Report of the RI Commission of Inland Fisheries.

Commission chronicled in the annual reports of the Commission included the purchase of trout from the fish hatchery owned by the Rowland G. Hazard family in Carolina, RI for the restocking of lakes and streams around the state, as well as experiments into the reproductive biology and artificial propagation of the steamer clam, *Mya arenaria*, and the quahog *Mercenaria mercenaria*. One of the Commission's key contributions to the science and practice of marine aquaculture was their early experiments to hatch and rear larval lobsters for the purpose of restocking the fisheries of Narragansett Bay.

Aquaculture of lobsters in Rhode Island began in 1898 as a result of the appointment of Dr. Hermon Carey Bumpus, Jr. a professor of biology at Brown University as one of the inland fishery commissioners in 1897.¹ The very next year, Bumpus was appointed as the director of the United States Fisheries Commission (now National Marine Fisheries Service) Laboratory at Woods Hole. The three-way partnership of the Commission, Brown University, and the U.S. Fisheries Commission allowed for input of academic researchers and graduate students and partial federal funding of the project.



Figure 2. Lobster hatchery staff cleaning the canvas rearing bags for culturing lobster larvae. Photo is from the 1905 35th Annual Report of the Commission for Inland Fisheries.

The work on culturing lobster larvae began modestly on a modified barge floating in Mill Cove near Wickford (Figure 1A) during the summer of 1899, which was quickly replaced by a larger barge that provided a greater amount of working space (Figure 1 B). Lobster larvae were held in canvas bags suspended from the floating laboratories (Figure 2), which improved survival greatly over the use of tanks in 1898, but it was quickly realized that the survival of lobster larvae was very low due to their cannibalistic tendencies. The larvae needed to be kept in motion to prevent the larvae from eating themselves, so the staff of the laboratory was

augmented and deployed around the clock to stir the water in the culture bags.² A great technical improvement occurred when Dr. Albert D. Mead and his graduate student George H. Sherwood inspired by a ceiling fan in a restaurant designed an propeller apparatus that lifted agitated the water through the bags (Figures 3 & 4), thereby saving a considerable amount of staff time and labor.

The feeding of the lobster larvae was rather labor intensive by current standards and involved the grinding of fish offal and waste meat products and hand feeding the material to the lobsters (Figure 5) on a periodic basis.³ Undoubtedly the purchase, preparation and feeds was a major part of the expenses of the hatchery, and given the methods they used, it would have been a pretty 'messy' process, not only in the feed handling but in the amount of uneaten waste feed escaping from the farm and fouling the waters.

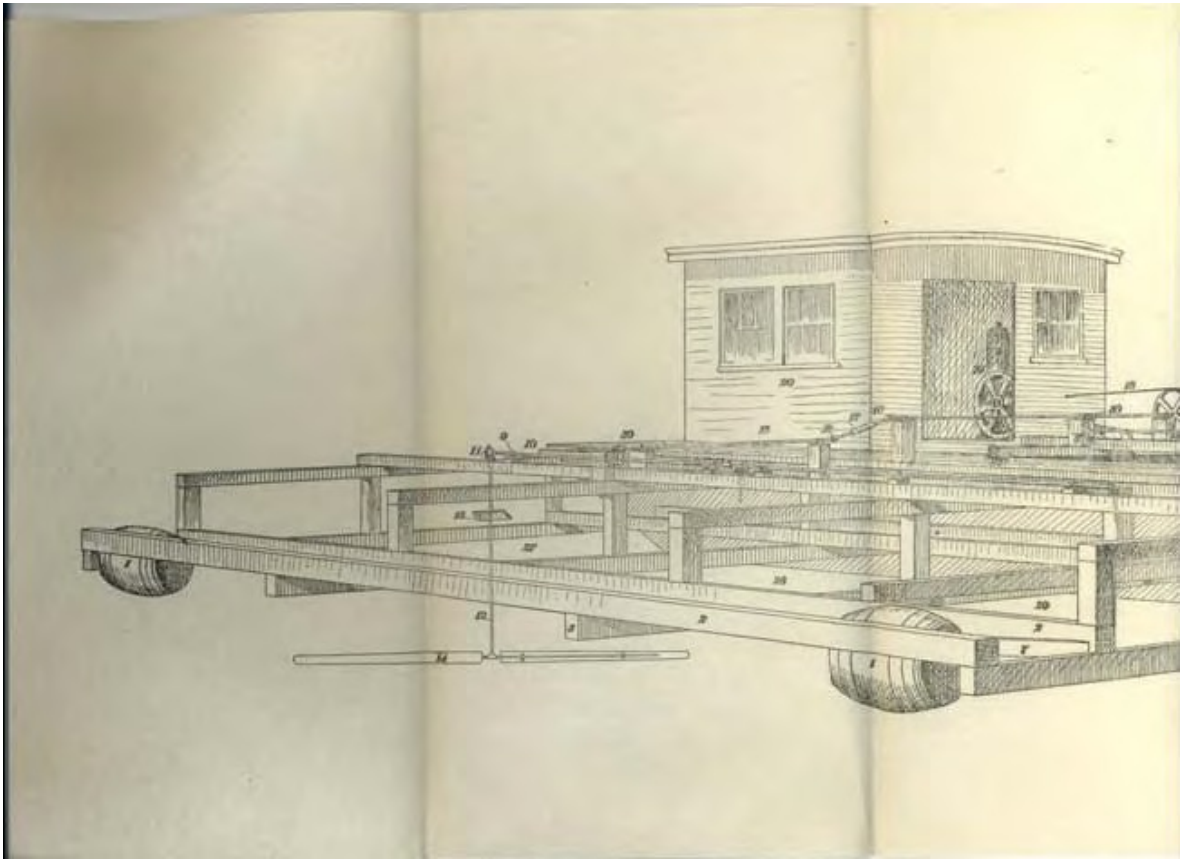


Figure 3. Schematic drawing of the water propeller-agitator designed by Mead and Sherwood for use at the Wickford Lobster Hatchery. The figure shows part of the drive mechanism, the impellor blades, tarred barrel floats and the cabin serving to house the engine to drive the mechanism. This figure is part of the complete schematic drawing in the 1903 33rd Annual Report of the RI Commission of Inland Fisheries.

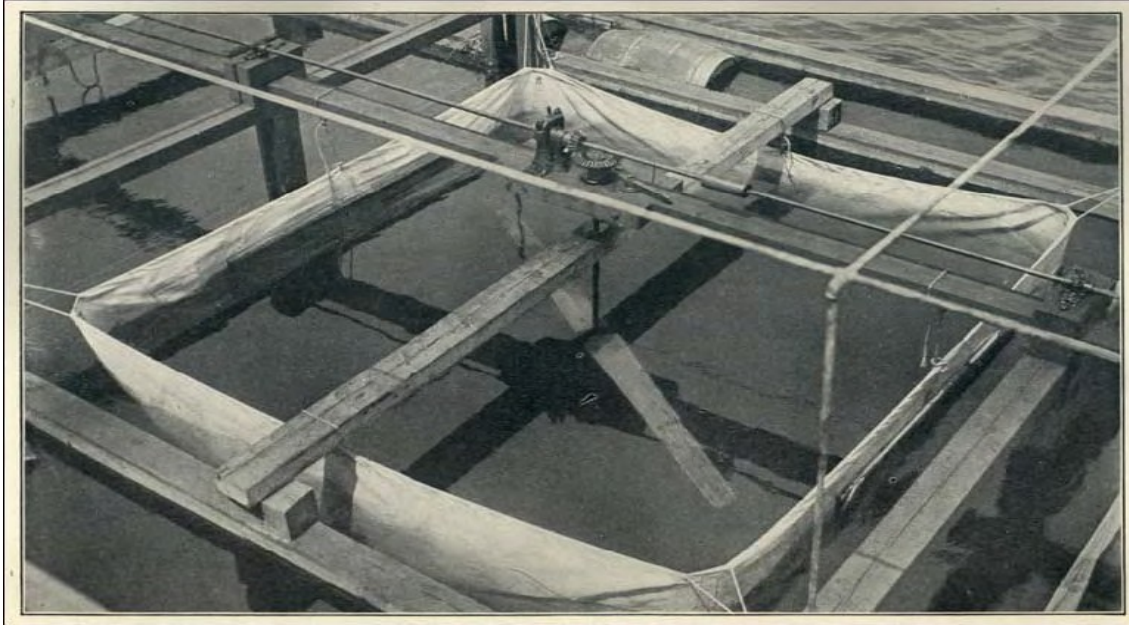


Figure 4. Canvas Bag Rearing chamber for lobsters showing agitator and geared drive mechanism. Photo is from the 1905 35th Annual Report of the RI Commission of Inland Fisheries.



Figure 5. A 1904 photograph of the lobster larval feeding method. Photo is from the 1905 35th Annual Report of the RI Commission of Inland Fisheries.



Figure 6. *The dock and lobster hatchery building at the end of Fowler Street in Wickford, RI. The historic postcard photo from ca1910 is from the collection of the author.*

A major part of the work on site at the hatchery was performed by the assistant superintendent Ernest S. Barnes beginning in 1901 and continuing after his appointment in 1906 to serve as superintendent of the hatchery. By 1908 the numbers of lobsters being produced at the hatchery were outstripping the size of the facilities, requiring the establishment of a permanent shore-side support laboratory and docks for the work boats supporting the project (Figure 6). Currently, the location of the old lobster hatchery at the end of Fowler Street in Wickford is occupied by the Department of Environmental Management Division of Enforcement to dock their patrol vessels.

The main purpose of the lobster hatchery was to produce stage 4 and stage 5 lobster larvae for release into Narragansett Bay (Figure 7), for the purpose of enhancing the fisheries. As the lobster hatchery program progressed and the operators developed the expertise in rearing lobsters, the number of larvae stocked in Rhode Island waters grew considerably (Figure 8). As the techniques for rearing larvae became routine by 1936, 1.7 million stage IV larvae were being released by the hatchery annually.⁴ Adjunct to the larval stocking program research was undertaken beginning 1900 on methods to culture lobsters from egg to adult. The 1900-1901 growing seasons produced encouraging results with lobsters ranging in size from 106 to 159 mm total length, with a mean of 122 mm. While these experiments were exploratory and inconclusive, they did demonstrate the biological feasibility of lobster aquaculture. They showed great variability in growth rates among communally reared lobsters, and that greatest growth rates occurred among lobsters reared at lower densities.⁵



Figure 7. Hand stocking of lobster larvae into Narragansett Bay. Photo is from the 1905 35th Annual Report of the RI Commission of Inland Fisheries.

The larval lobster stocking program was very popular with the lobster fishing industry and the hatchery program continued until the late 1940s, when a number of convergent circumstances led to the project's discontinuation. First, in 1935, there was a major change in priorities and reorganization of fisheries management in Rhode Island by the abolition of the Commission and formation of the Department of Fish and Wildlife. Second, hurricanes in 1938 and 1944 severely damaged the hatchery facilities, and third, it was unclear to members of the legislature as to whether stocking of lobster larvae actually made any difference in enhancing lobster fisheries.

Despite the closing of Rhode Island's lobster hatchery, it served an important purpose in providing a vehicle for increasing our understanding of lobster biology and behavior, and it served as a good example of state, federal and academic cooperation in practical problem solving. Ironically, as the lobster hatchery in Rhode Island was being dismantled, with the last lobsters spawned in 1951, a successor hatchery in Martha's Vineyard began operations that same year by the State of Massachusetts, resulting from post-war state appropriations based on recommendations in a 1939 report by the Wickford Lobster Hatchery Superintendent Ernest Brown.⁷ Over the years, leading lobster aquaculturists John Hughes⁸ and Michael Syslo⁹ working at the Martha's Vineyard hatchery followed in the innovative traditions of the Wickford Hatchery in further developing the state of the art of lobster culture. From 1951 through 1963, 2 million Stage IV lobsters were reared and released, averaging 150,000 annually, with a survival rate of about 30%¹⁰. Although annual releases increased to about 500,000 annually in the 1970s, the Massachusetts hatchery's lobster propagation and seeding operations were terminated in 1997 as a shift toward utilizing the facility for other fisheries research projects.

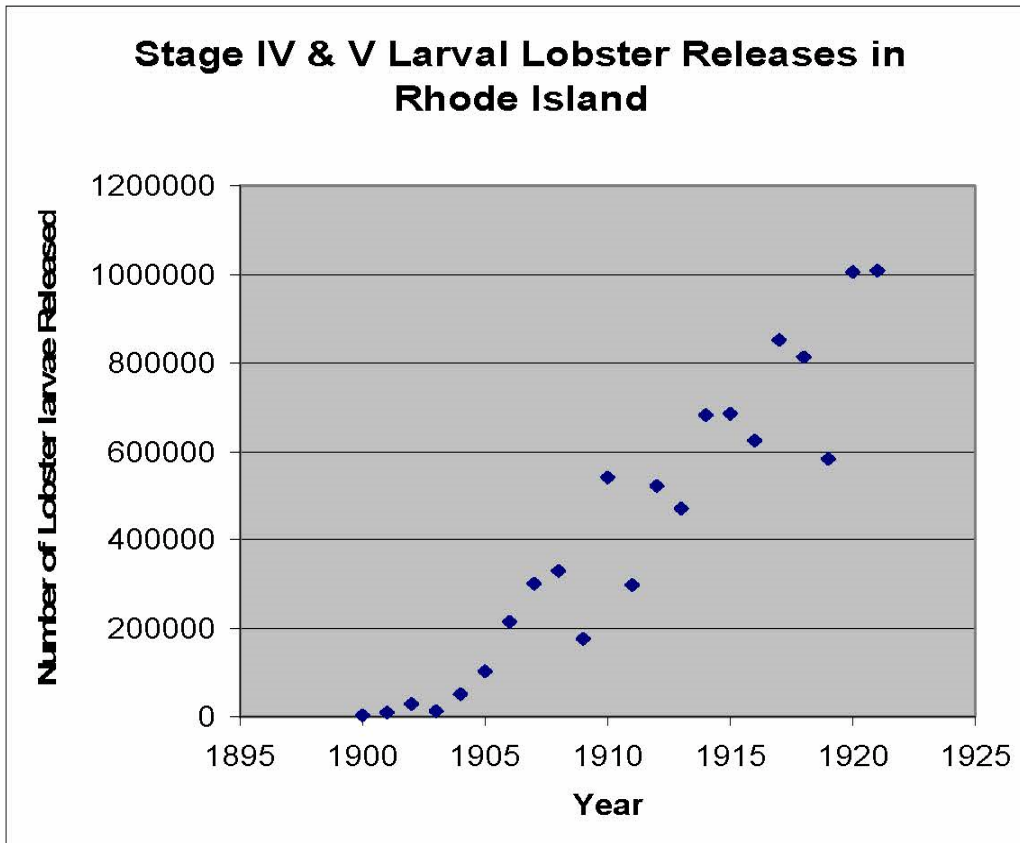


Figure 8. *The production of larval lobsters in Rhode Island using the technique of floating rearing chambers grew considerably during the first quarter of the 20th Century. Data from table in the 52nd Annual Report of the RI Commissioners of Inland Fisheries (1922).*

As the fortunes of the lobster industry wax and wane, there are perennial expressions of interest in establishing hatcheries similar to the one pioneered right here in Rhode Island. But the nagging problem of clearly demonstrating the efficacy of such projects continues to be an open question. Most recently, Kathleen M. Castro of the University of Rhode Island and co-workers has investigated this problem by stocking artificial and natural reefs with hatchery-reared and wild lobsters.¹² Their finding strongly suggest that hatchery reared lobsters may have behavioral characteristics that subject them to predation at much higher rates than wild juveniles, thereby calling into question the value of larval stocking to restore or enhance capture fisheries. Although it is doubtful that the Wickford Lobster Hatchery or its successor on Martha’s Vineyard ever did very much to enhance lobster populations in Southern New England, their pioneering science and technology development did advance our knowledge about this very economically important fisheries species. Who knows the future? If capture fishery supply of lobsters were short and there were sufficient market demand, the economics of growing lobsters using methods pioneered in the Rhode Island and Massachusetts hatcheries might be borrowed to build a new aquaculture industry at some time.

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