USE OF ENVIRONMENTAL AND ECONOMIC FACTORS TO CHECK BIOLOGICAL FLUCTUATIONS IN MAINE LOBSTER POPULATION

By Robert L. Dow*

After two decades (1919-1940) of low fishing intensity (6.5 million pounds annually), the Maine lobster (Homarus americanus) fishery expanded rapidly (15.8 million pounds annually) during World War II and subsequent years (1941-1951) to enter a period of high yield (22.4 million pounds annually). The years with greater landings were associated with intensive fishing activity. Since 1919, an unaccounted for variance in the yield of the fishery has not exceeded ± 10 percent. Biological sampling indicates that the catch now consists of approximately 90 percent newly-recruited post-moult lobsters.

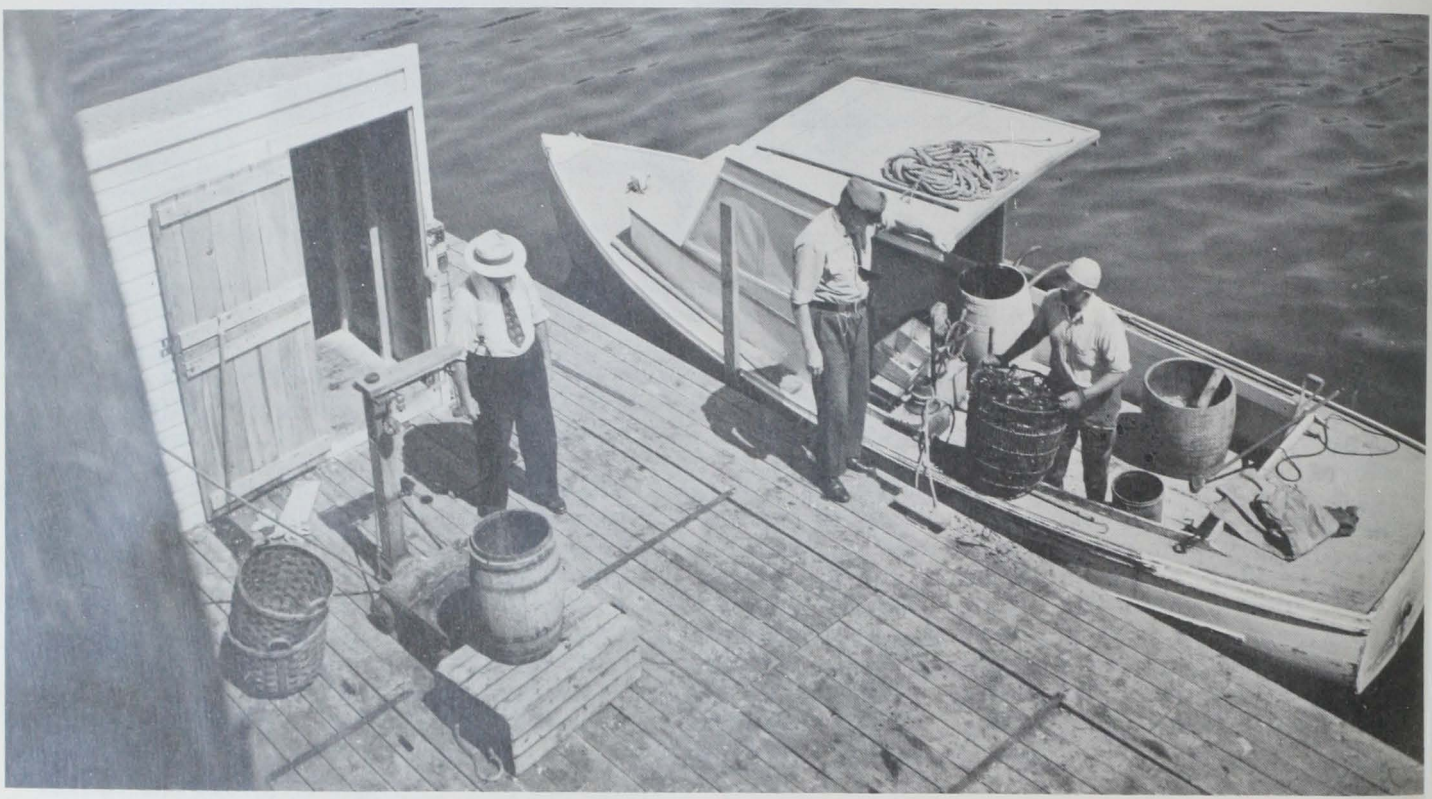

Fig. 1 - A Maine fisherman unloads his catch of lobsters at a selling dock.

The influence of environmental and economic factors on landings from the fishery has been reported by several investigators. Average April-May sea water temperature is associated with the number of lobsters available to the post-moult July-August fishery. The July-August supply regulates the summer price which, in turn, influences fishing intensity during both the lobster seasonal year (July-June) and the calendar years following (R. L. Dow 1961).

Since it is possible to predict landings and, by inference, available abundance, by the measurable variables: temperature, landed value, and fishing intensity, any significant (± 10 percent) deviation from prediction is indicative of probable biological changes; i.e., frequency of moult, natural mortality, or year-class survival.

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Fig. 2 - Typical Maine boat hauling in a lobster trap.

Subnormal winter-spring sea water temperature is associated with delayed moult and a depressed first-half lobster-year catch. Recovery of the fishery during the second-half of the lobster year or during the following calendar year indicates that the decline in the rate of recruitment caused by retarded growth has been temporary only. Failure of recovery despite a return to favorable water temperature levels would serve to warn of the probability of a more significant biological change. The effect of this modification might not become evident, in the case of year-class survival, for a period of five years or more, while any change in the rate of natural mortality would require confirmation by other evidence.

The table shows the order of magnitude relation among the several variables and landings during the decade 1952-1961, is therefore proposed as a means of checking the biological fluctuations in the Maine lobster population.

The Order of Magnitude Relation in the Maine Lobster Fishery Among the Several Variables and Landings in the Decade 1952-61

Current Year				Following Year		
Year	April-May Sea Water Temp.	July-Aug. Lobster Landings	July-Aug. Price	Year	Jan.-June Lobster Landings	Jan.-Dec. Lobster Landings
	°F.	Million Lbs.	¢/Lb.		(Million Lbs.)	
1953	50.0	8.1	33	1954	3.6	21.7
1955	48.6	8.3	32	1956	3.2	20.6
1954	48.5	8.1	34	1955	3.8	22.7
1957	48.0	7.8	35	1958	4.4	21.3
1952	47.6	7.1	42	1953	4.1	22.3
1960	46.6	6.5	44	1961	4.3	20.9
1958	45.8	6.0	50	1959	4.4	22.3
1956	45.0	5.1	50	1957	4.1	24.4
1959	44.8	5.3	51	1960	4.5	24.0
1961	44.5	4.7	59	1962	-	-

In 1961, the lowest May sea water temperature since 1943 retarded the rate of sublegal lobster recruitment by approximately 6.5 percent below that predicted. The duration of this influence may be appraised by the behavior of the fishery during 1962 and subsequent years.

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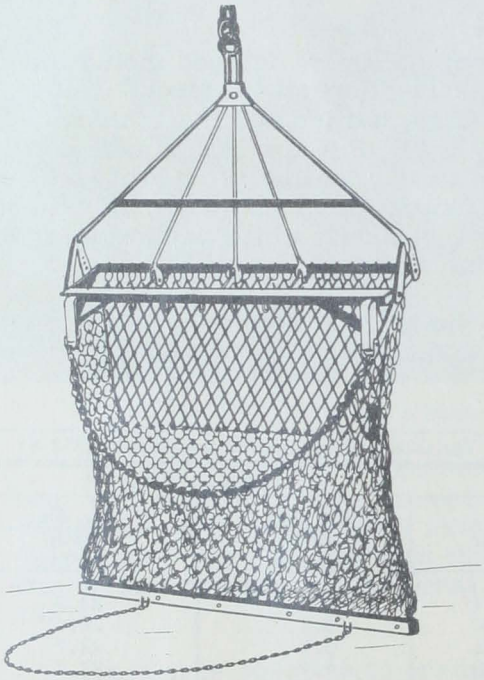
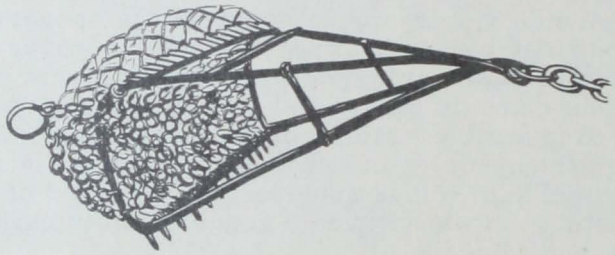
COMMON DREDGES

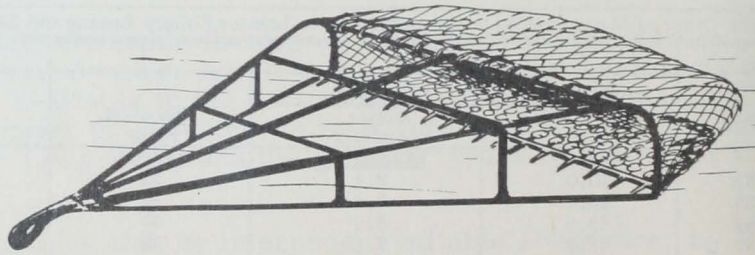
The common dredge consists of a metal triangular or oblong frame, to which is attached a bag net made of iron rings, S-hooks, and/or cotton cording. The frame is equipped with a raking bar generally with teeth on the lower edge. The implement is used in gathering shellfish (oysters, crabs, and scallops). There is really no standard design for a dredge; each fisherman has his own ideas on what makes an efficient gear and modifies and alters the basic design to suit himself. Dredges are of various sizes and dimensions.



Scallop dredge



Oyster dredge



Crab dredge

Note: Excerpt from Circular 109, Commercial Fishing Gear of the United States, for sale from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., single copy, 40 cents.