

Fluctuations in Atlantic Herring (*Clupea harengus*) Populations in the Northwestern Atlantic With Particular Emphasis on the Gulf of St. Lawrence Stocks*

S. N. Messieh

Biological Science Branch, Scotia-Fundy Region, Bedford Institute of Oceanography
Department of Fisheries and Oceans, P. O. Box 1006
Dartmouth, Nova Scotia, Canada B2Y 4A2

Abstract

Atlantic herring (*Clupea harengus*) comprise major commercial fisheries in the northwestern Atlantic. In the late-1960s the fisheries developed rapidly after the introduction of mobile fleet operation, and catches increased to a peak of approximately 1 million tons – ten times higher than the long-term average. However, in the 1970s almost all herring stocks in all NAFO areas declined and at least two stocks in the Magdalen Islands, Gulf of St. Lawrence, and Georges Bank in the Gulf of Maine collapsed. Changes in vital parameters of herring populations in the Gulf of St. Lawrence coincided with the decline in stock size and a period of environmental changes. There were indications that both density-dependent and density-independent factors played a role in these changes. Recruitment by far was the dominant factor in spawning biomass production. Several hypotheses were put forward to explain the recruitment variability. Among these are the influence of temperature on spawning success, oceanic forcing on larval survival, predation on young stages, and mackerel/herring interaction.

Circumstances that coincided with the collapse of the Magdalen Islands stock in the late-1970s were compared with those that led to a similar collapse in the Georges Bank stock. It is concluded that the two areas where the stocks collapsed supported “critical habitats”, transient and fixed habitats in close proximity, that made them vulnerable to fishing pressure by the mobile fleet. The critical habitat hypothesis puts emphasis on the importance of both fishing pressure and environmentally induced variability in herring recruitment.

* The complete report is found in: Messieh, S. N. 1989. Fluctuations in Atlantic Herring Populations in the Northwestern Atlantic, With Particular Emphasis on the Gulf of St. Lawrence Stocks. *In: Proceedings of the International Symposium on Long-term Variability of Pelagic Fish Population and Their Environment*, T. Kawasaki, S. Tanaka, Y. Toba and A. Taniguchi (eds.),

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