

# Dissolved Oxygen and Salmon Cage Culture in the Southwestern New Brunswick Portion of the Bay of Fundy

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**Abstract** Information on the spatial and temporal characteristics of ambient dissolved oxygen in the southwestern New Brunswick area of the Bay of Fundy is presented to help develop an understanding of dynamics of oxygen and salmon cage culture in the region. Some modelling efforts focussed on dissolved oxygen issues associated with fish farming in the area are also presented. A description and application of a simple oxygen depletion index is proposed to help identify the influence of salmon cage culture on the regional and farm-scale dissolved oxygen concentrations. The chapter concludes with a brief summary and discussion of observations and model development required to enhance the understanding of oxygen dynamics in the farms and bays of southwestern New Brunswick. The knowledge can be used by industry in their farm management practices and by environmental regulators in their efforts to define and sustain water quality standards.

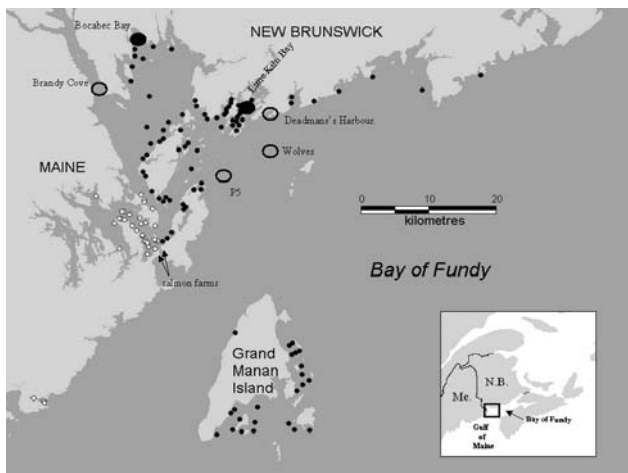


## 1

## Introduction

Commercial salmon cage culture in eastern Canada and the eastern United States began in 1978 in the Deer Island area of southwest New Brunswick. The first commercial harvest occurred in the autumn of 1979 [1]. The industry in southwest New Brunswick (SWNB) and eastern Maine has grown rapidly since its first commercial harvest. In 2003, annual production was about 33 100 tonnes and the value of the industry was \$ 179 million [23].

The growth has manifested itself as increases in the number of farms, the average production per farm, the geographic domain utilized by the industry and the number of farms within each geographic area [2, 3]. The number of grow-out sites has steadily increased over the past 20 years from a single site in 1978 to 95 in 2003 (New Brunswick Department of Agriculture, Fisheries and Aquaculture personal communication; Fig. 1). The spatial distribution of the industry has also increased over the years. In 1980, one farm was located in the Deer Island area and one was in Grand Manan Island. By 1985, the industry had spread to other areas of Deer Island, two locations on Campobello Island and several locations within the Letang Inlet (Back Bay, Lime Kiln Bay and Bliss Harbour). Only one site remained in the Grand Manan area. By 1990, the number of sites in all of the above areas had increased, especially in the Fundy Isles and Letang Inlet areas, and new sites were established in Passamaquoddy Bay. Grand Manan continued to be under-developed with



**Fig. 1** Map of the southwestern New Brunswick area showing the location of salmon farms within Canada (*small black solid dots*) and the United States (*small white solid dots*) portion of the mouth of the Bay of Fundy in recent years