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Association between longline design and mussel productivity in Prince Edward Island, Canada

A. Drapeau [a], L.A. Comeau [b,*], T. Landry [b], H. Stryhn [a], J. Davidson [a]

[a] Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island, 550 University Avenue, Charlottetown, Prince Edward Island, Canada C1A 4P3
[b] Department of Fisheries and Oceans Canada, Gulf Fisheries Centre, 343 University Avenue, P.O. Box 5030, Moncton, New Brunswick, Canada E1C 9B6

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Abstract

The first objective of this study was to document the design of subsurface longlines used for the farming of blue mussels (*Mytilus edulis*) in Prince Edward Island (PEI), Canada; the second objective was to identify possible associations between longline design and mussel growth. In 2003, SCUBA divers visited 54 farms distributed in 16 culture embayments; they measured the spacing between longlines and the spacing between individual socks (sleeves) attached to longlines; they also sampled one-year-old mussels for the determination of the shell length, condition index, and sock weight. Here we report a remarkable degree of variation in longline configuration, with the following range of values: 1.2 to 3.0 m for sock length, 1.5 to 29.5 m for longline spacing, 26.4 to 62.4 cm for sock spacing, and 6.2 to 179.9 socks/100 m^2 for stocking density at the farm scale. A negative correlation was found between stocking density at the farm scale and total farming area at the bay scale, suggesting that growers adjusted husbandry in relation to the surrounding level of farming activity. In one major culture bay, Tracadie Bay, measurements were repeated over a three-year period (2002–2004). This monitoring led to the discovery of a coordinated effort by growers in raising the average sock spacing by 30% (+11 cm). Multiple regression analyses identified sock spacing as the only explanatory variable correlated with mussel weight in Tracadie Bay. The model suggests that an 11-cm increase in sock spacing can lead to an 18% weight gain for pre-market mussels (~34 mm), the size group investigated in the study. However, this correlation between sock spacing and sock weight was tenuous over the three-year study period, showing up only in 2002. A similar correlation was found between sock spacing and condition index, although only in 2004. We conclude by suggesting that close spacing of mussel socks can negatively affect mussel yield, although only under certain conditions.

Keywords: *Mytilus edulis*; Mussel; Husbandry; Sock; Longline; Stocking density

1. Introduction

Blue mussel (*Mytilus edulis*) culture is a relatively new industry in Canada. It became established in the 1970s and has since grown steadily in terms of production, as of 2004, Canadian mussel production was evaluated at 22,875 t annually (~3% of world-wide production). Nearly 80% of the Canadian production originates from the Atlantic coast, specifically from the province of Prince Edward Island (PEI, Fig. 1). The industry employs over 2500 persons and contributes 106 million CND to the local economy (Department of

* Corresponding author. Tel.: +1 506 851 2723; fax: +1 506 851 2079.
E-mail address: comeaul@dfo-mpo.gc.ca (L.A. Comeau).

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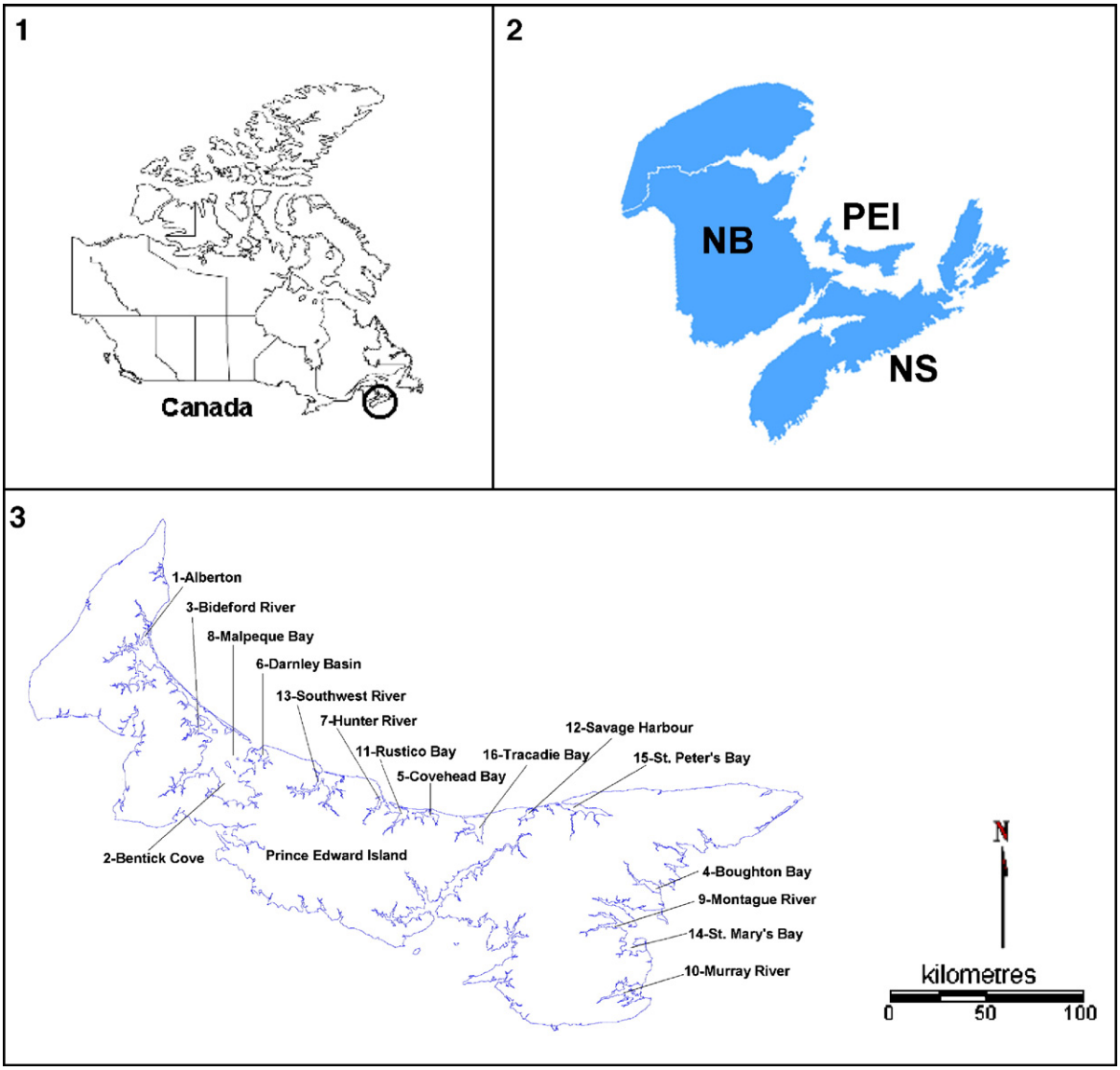

Fig. 1. Map of Canada (1), with inserts of map of Atlantic Canada (2) and Prince Edward Island (3) with the location of sites survey as part of the Island Wide Survey in (IWS) 2003.

Fisheries and Oceans Canada [DFO], Policy and Economics Branch).

Approximately 4500 ha of estuarine waters in PEI are leased out to individuals and companies for the specific purpose of cultivating mussels (DFO Licensing, Charlottetown). This area is divided amongst 320 farms (leases) located in 28 embayments on the northern and eastern sides of the Island. Within individual embayments, total farming area ranges from 5 to 620 ha. Mussels are grown in suspension using a subsurface longline system of individual suspended polyethylene sleeves, commonly referred to as "socks" (Fig. 2). Longlines measure between approximately 100 and 200 m in length. In late autumn, longline buoyancy is reduced in order to lower the culture gear at a safe depth below the winter ice cover. Winter harvesting is regularly practiced by cutting holes through the thick (1 m) ice using mechanical saws. Divers locate the longlines, which are then winched up onto the ice cover (Scarratt, 2000). This specialized approach ensures a year-round production of mussels.

While the industry has grown rapidly over the past decades, there are presently very few coastal sites in PEI where water is sufficiently deep to support new farming operations. This situation is evidenced by a moratorium