

Physiological differences between wild and cultured bivalves in Prince Edward Island, Canada



Bivalve culture in Canada increased by 25% from 2000 to 2016. In Prince Edward Island (PEI), bivalves are cultivated in bays and estuaries and there is limited space for further aquaculture expansion. Thus, there is merit in developing a numerical model determining the abundance of bivalve populations in relation to their food availability in order to assess the carrying capacity of shellfish growing areas. This modelling will take into account the different bivalve species present in the bay, as the cultivated *Mytilus edulis* and *Crassostrea virginica* and wild, *M. edulis*, *C. virginica*, *Mya arenaria* and *Mercenaria mercenaria*. As a first step toward a modelling goal, this study compared the physiological differences of the 6 bivalve groups. Three physiological parameters were measured: clearance rate, oxygen consumption and assimilation to determine the energy budget or scope for growth (SFG). These measurements were carried out on individuals contained in metabolic chamber at summer and autumn temperatures (20 and 8 °C, respectively). Our results show that *M. edulis* is best adapted to these temperature in PEI as it maintains

high SFG at both temperatures. For *C. virginica* and *M. arenaria*, high physiological parameters under summer conditions were observed, followed by a decrease in autumn. For *M. mercenaria* rates were low at both temperatures indicating a persistently low growth potential. These results demonstrate the adaptive physiological capacity of each species and provide insight into the underlying reasons some species such as *C. virginica* and *M. mercenaria* are at their northern distribution limit in the Gulf of St. Lawrence. Finally, no differences in the SFG between cultivated and wild bivalves have been observed. These results are discussed within the context of estimating the impact of each bivalve group in bays environment from PEI and particularly on food availability.

Auteurs du document : Valentin Montagnac, Thomas Guyondet, Luc Comeau, Réjean Tremblay

Obtenir le document : EDP Sciences

Mots clés : Bivalves, ecophysiology, carrying capacity, Malpeque Bay

Thème (issu du Text Mining) : MILIEU NATUREL

Date : 2020-08-25

Format : text/xml

Source : <https://doi.org/10.1051/alr/2020008>

Langue : Anglais

Télécharger les documents : <https://www.alr-journal.org/10.1051/alr/2020008/pdf>

Permalien : <https://www.documentation.eauetbiodiversite.fr/notice/physiological-differences-between-wild-and-cultured-bivalves-in-prince-edward-island-canada0>

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