Will salinity hinder the ongoing northward dispersal of the invasive round goby into the oceanic North Sea?

Behrens, Jane; van Deurs, Mikael; Christensen, Emil Aputsiaq Flindt

Published in:
Book of Abstracts Sustain 2017

Publication date:
2017

Document Version
Publisher's PDF, also known as Version of record

Will salinity hinder the ongoing northward dispersal of the invasive round goby into the oceanic North Sea?

Jane Behrens[1], Mikael van Deurs[1] og Emil A. F. Christensen[1]

1: National Institute of Aquatic Resources, Technical University of Denmark, Kemitorvet B-202. 2800 Kgs Lyngby Denmark
*Corresponding author email: jabeh@aqua.dtu.dk

Non-indigenous species (NIS) can impact marine biodiversity and ecosystem structure and function. Once introduced into a new region, secondary dispersal is limited by the physiology of the organism in relation to the ambient environment and by complex interactions between a suite of ecological factors such as presence of predators, competitors, and parasites. Early prediction of dispersal potential and future `area of impact' is challenging, but also a great asset in taking appropriate management actions. Aerobic scope (AS) in fish has been linked to various fitness-related parameters, and may be valuable in determining dispersal potential of aquatic invasive species in novel environments.

Round goby *Neogobius melanostomus*, one of the most wide-ranging invasive fish species in Europe and North America, currently thrives in brackish and fresh water, but its ability to survive in high salinity waters is unknown to date. We show that AS in round goby is reduced by 30% and blood plasma osmolality increased (indicating reduced capacity for osmoregulation) at salinities approaching oceanic conditions, following slow ramping (5 PSU per week) and subsequent long-term acclimation to salinities ranging between 0 and 30 PSU (8 days at final treatment salinities before blood plasma osmolality measurements, 12±20 additional days before respirometry). Survival was also reduced at the highest salinities yet a significant proportion (61%) of the fish survived at 30 PSU. Reduced physiological performance at the highest salinities may affect growth and competitive ability under oceanic conditions, but to what extent reduced AS and osmoregulatory capacity will slow the current 30 km year-1 rate of advance of the species through the steep salinity gradient from the brackish Baltic Sea and into the oceanic North Sea remains speculative.

Round goby *Neogobius melanostus*
Photo: Peter van der Sluijs

An unintended natural experiment is in progress to test whether the rate of advance slows down. At the current rate of advance the species will reach the oceanic North Sea by 2019/2020, therefore time for taking preventative action is short.