

# Increased spread rate of the fish round goby in the Baltic Sea

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Magnus Thorlacius, Department of Ecology and Environmental Science at Umeå University shows what makes the round goby spreads in the Baltic Sea. Credit: Magnus Thorlacius

The invasive fish species round goby is spreading at an incredible rate in

the Baltic Sea. In his doctoral dissertation, Magnus Thorlacius at Umeå University in Sweden, presents evidence of asocial behaviour, higher risk tolerance and high activity levels in new populations correlating to the spread. Already three to five years, the fish starts to spread in large numbers to surrounding areas leaving a short window for measures to prevent further spread.

Species invasion is an ever-growing problem worldwide with consequences ranging from negative impacts on native species to whole ecosystem alterations. The round goby (*Neogobius melanostomus*) originates in the Black Sea and the Caspian Sea but was carried to Poland and North America in ballast water of freighters. Since then it has colonised most of the Southern Baltic Sea enclosed by Scandinavia, Finland, the Baltic countries and the North European Plain.

Previous research has shown that individual variation of behavioural patterns which are constant over time and context are important explanation of ecological factors such as spread. To test his hypothesis of what mechanisms drive invasive spread, Magnus Thorlacius, doctoral student at the Department of Ecology and Environmental Science at Umeå University, compared round gobies from Hel and Swarzewo, one of which is the oldest population in the Baltic Sea that was discovered in 1990, located in the Gulf of Gdansk in Poland, with round gobies from new populations in Gotland and Åland, discovered in 2010 and 2011.

Magnus Thorlacius could establish that new populations have higher risk tolerance, [activity levels](#) and a more asocial behaviour than individuals in the older populations. This means that they are more able to cope with unfamiliar environments when it comes to locating food and shelter, and to have greater reproductive success when densities are low. However, round gobies usually become very numerous in invaded areas but asocial behaviour has been connected with dispersal tendency. With mostly asocial behavioural types in invaded areas, they are likely to spread

further much sooner than the behavioural types found in the older populations.

In further support, behaviour was connected with dispersal tendency in the new populations only. Already after two to three years in the new areas, they were found in very high numbers. After another year, individuals with low social tolerance were captured in large numbers for the first time in the surrounding areas.

"This is important information for the construction of control programmes should one try to prevent further spread as the window for such measures may be as little as three to five years," says Magnus Thorlacius.

In the final study, Thorlacius found the round gobies to tolerate extremely high densities in which they became more aggressive and stress tolerant. Stress leads to a release of certain hormones, which can be measured in blood plasma. Individuals that had been held in very high densities had less stress hormones in their blood and were more aggressive than those held in lower densities when measured in standardised conditions (densities).

"Such adaptation makes round gobies all the more likely to negatively affect native species both by taking up space and with direct interactions," says Magnus Thorlacius.

**More information:** [umu.diva-portal.org/smash/record.jsf?pid=diva2%3A874022&dswid=newPopUp](http://umu.diva-portal.org/smash/record.jsf?pid=diva2%3A874022&dswid=newPopUp)

Provided by Umea University

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