

## Ecotoxicological effects of antifouling paints and disinfectants on invasive gobies

### Background

Since 2012, invasive round gobies have been spreading from Basel along the river Rhine. One way for round gobies to reach new waters is by placing their sticky eggs on boat hulls, which might then be moved, unintentionally carrying the eggs. Typically, round gobies harm colonized ecosystems by competing with native fish for food and shelter, or preying on eggs and juveniles.

#### Can we prevent this way of translocation?

Many boats are coated with so-called antifouling paints to prevent mussels and algae to grow on the boat hulls (Fig. 1A). They contain chemical compounds (biocides), which are released from the paint matrix, to provide a constant threshold concentration of the biocide in water, therefore inhibiting the development of fouling communities. However, more or less severe adverse effects on the aquatic environment have been found for all types of antifouling paints.

Another way of preventing the translocation of invasive species by boats is to clean and disinfect them before every long-distance transport. There exists an array of cleaning detergents and disinfectants for this purpose.

#### Knowledge gaps

Round gobies stick their eggs on hard substrates and guard them. To date it is unclear if round gobies use substrates with antifouling paint as nesting opportunities. Additionally, it is not known which effect antifouling paints have on the developing embryos (Fig. 1 B) on varnished substrates.

Assuming round gobies spawn on boat hulls and the embryos develop healthily, the next step to prevent translocation would be to clean the boat. It is not known yet how round goby eggs react to most of the common disinfectants.

### Why we want you

This project will contribute important answers to applied questions in invasion biology. Like much of the research in the MGU, it has high chances to influence practice and policymaking. We are looking for a student with interest in applied research questions, who is eager to find solutions to actual ecological problems.

### Research questions for the master thesis/theses

- Are antifouling paints preventing round gobies from spawning on a substrate?
- Are eggs on antifouling paint developing differently from eggs on untreated substrates?
- Are common disinfectants effective against round goby eggs? Which dose is necessary for detrimental effects?

The two-part nature of the research topic would allow for a **tandem Master thesis for two interested students** that could work closely together. If there is only one interested candidate the topic would be **limited according to the interests of the student**.

Depending on expertise and interests, the master student can develop and use different methods to assess these questions, for example:

- Standard ecotoxicological methods: fish embryo test, dose-response curves
- Behavioural ecology set-ups
- Ecological/Zoological field work

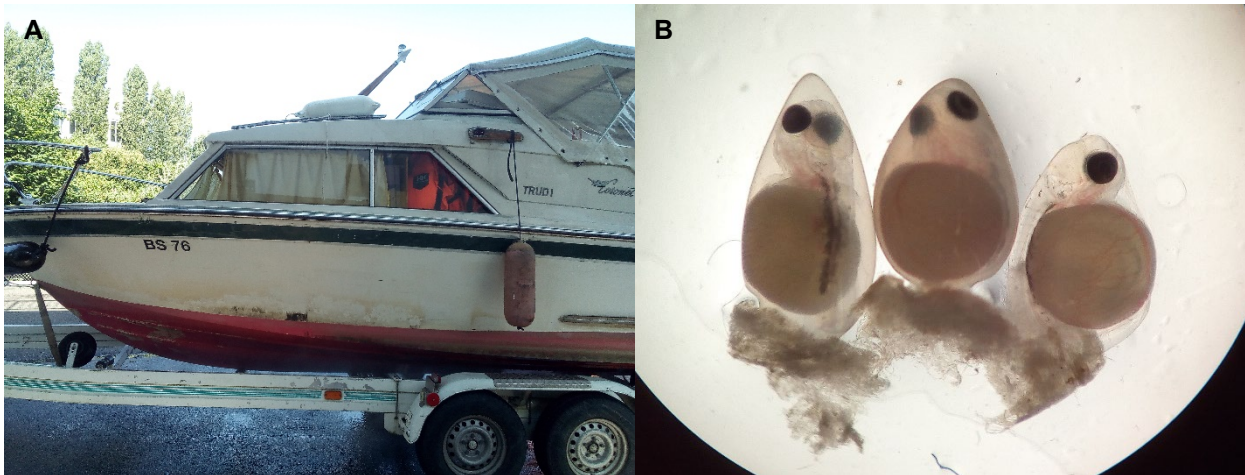


Fig.1. Boat with red antifouling paint (A). Healthily developing goby embryos (B).

## Supervision

The project is embedded in a larger project funded by the BAFU and the cantonal authorities. It aims at contributing the scientific background for the development of measures preventing further spread of the invasive gobies. The student will be part of a project team, the “goby team” composed of 5-7 students, PhD candidates, postdocs and the project leader Prof. Dr. Patricia Holm. Hypothesis and methodological approaches will be developed together. Supervision will also include the participation in regular group meetings.

## Requirements

Ideally you should have a background in biological sciences. Good knowledge of German is not required, but an asset (fieldwork might involve talking to locals). Independent study of international literature is expected.

We welcome candidates who bring enthusiasm for applied, problem oriented science. Experiences in working with fish (on a scientific or private basis) OR/AND experiences with ecotoxicology are advantageous. Average physical fitness is required for fieldwork project components (cycling several km, carrying moderate weights etc.).

## Contacts

Please send your application to

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