

The physical benefit of staying close to the ground in benthic fish

Background

Living close to the ground is beneficial for benthic fish as it offers shelter, food and supports camouflage. The fish are assumed able to save energy by lying motionless on the ground. In habitats where swimming becomes increasingly relevant, such as rivers and tributaries, the fish may profit from reduced flow between rocks and boundary layers. The mechanisms behind flow resistance strategies of benthic fish are still poorly understood, as water turbidity, velocity and the variability of living fish behaviour impede quantitative assessments in the field.

How do the experienced hydrodynamics differ between benthic and non-benthic fish at different water depths?

We will measure the physical impact of flow on preserved fish, comparing different fish species (benthic vs. non benthic) at different water depths in our flow channel. The flow channel in combination with our high-tech-3D-Force-Sensor enable high quality-force measurements at standardized flow conditions.

Knowledge gap

In our previous research, we focussed on the development of the force measurement technique, force determination in realistic fish passage models and the comparison of the forces to living fish swimming behaviour. We found the fin adjustment to be an important parameter between benthic and non-benthic fish. However, the impact of body shape became obvious to be rather small. It will need standardized flow conditions and large fish sample sizes to describe the effect of shape adaptation of benthic fish to benthic riverine habitats.

Why we want you

This project will improve understanding of benthic fish flow resistance strategies and their adaptation to flow. We are looking for a highly motivated student with technical understanding and the willingness to share his/her findings with the scientific community by publication.

Research questions for the master thesis

- 1. What is the hydrodynamic difference between benthic and non-benthic fish?
- 2. How do benthic fish profit from staying close to the ground in comparison to non-benthic fish?

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

- Field work
- Fish preservation
- Force measurement

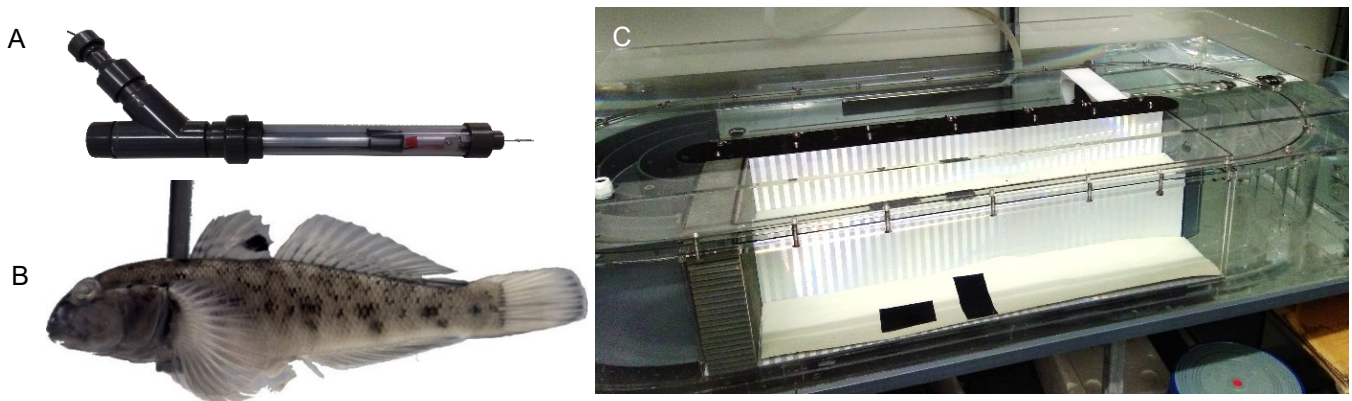


Fig. 1: 3D-Force measurement probe (length: 70 cm) (A), preserved round goby prepared for force measurement on a fixation stick (total length: 9.0 cm) and flow channel (length measuring chamber: 85 cm) (C).

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

We welcome candidates who bring enthusiasm for fundamental science. Experiences in working with fish (on a scientific or private basis) and technical understanding is beneficial.

You should have a background in natural science and we expect independent study of international literature.

Contacts

Please send your application to

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For any questions also feel free to contact

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