European River Restoration Conference
Featuring the IRF Riverprize

Connecting River Restoration Thinking to Innovative River Management
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Integrated with the final event of the SEE River project

SESSION 12
CHALLENGES FOR FISH PROTECTION AND HYDROPOWER MANAGEMENT

Evaluation of the Effects of the Mitigation Measures on the Brown Trout Habitat Suitability by Means of Habitat Modelling

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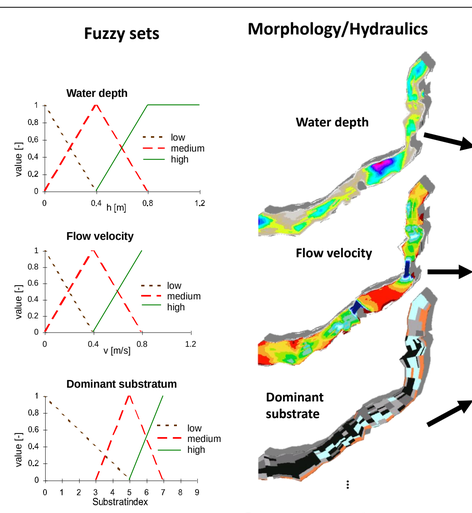
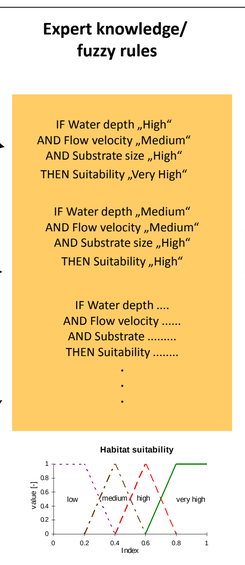
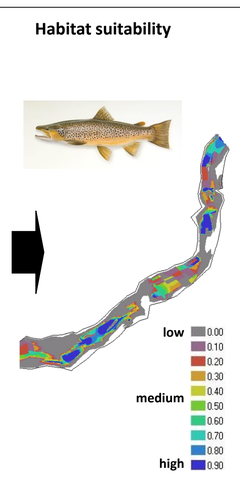
Theoretical background

Concept





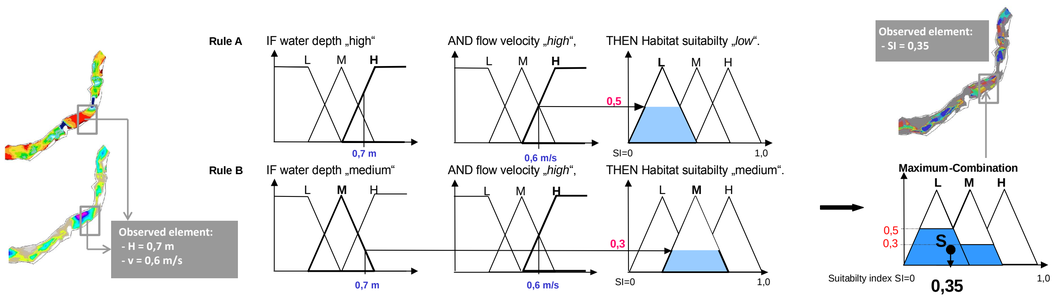


Other relevant habitat parameters (e.g. cover, pool types, portion of gravel fractions)

Quantitative prediction of flow and morphology impacts on fish, invertebrates and macrophytes.

Example

Two parameters are considered - water depth and flow velocity:



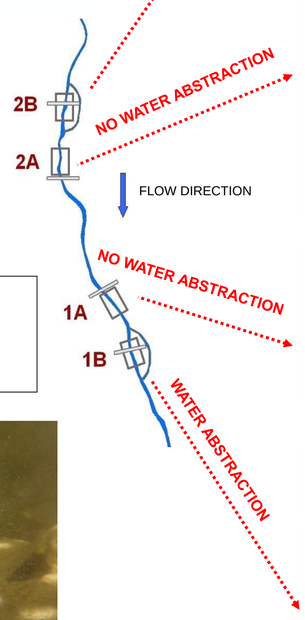
Adopted by: University of Stuttgart Germany and Schneider & Jorde Ecological Engineering

Area of field study application

Radovna river characteristics:

- Alpine region river
- Snow-rain regime
- Length = 30 km
- Catchment area: F = 140 km^2
- Mean anual flow: Q_{av} = 8 m^3/s

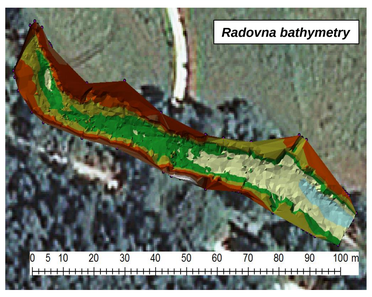
Scheme of 4 selected river sections:
- 1 A, 1 B – no water abstraction
- 2 A, 2 B – water abstraction
- Length of river section: 100 m

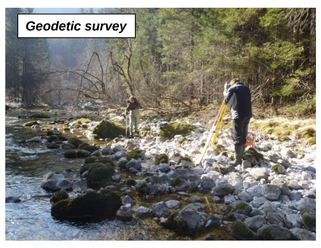


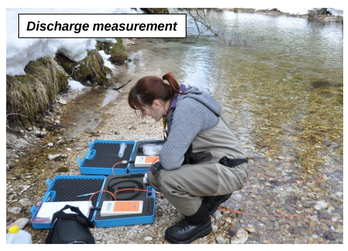
Brown trout (*Salmo trutta fario* Linnaeus, 1758): The target fish species in Radovna river.

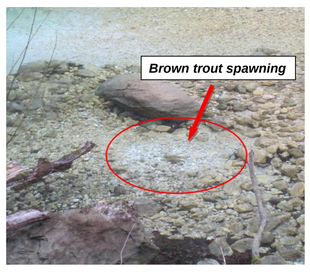
Habitat modelling

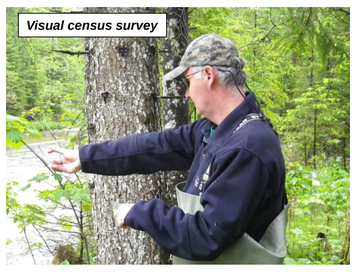
Data acquisition



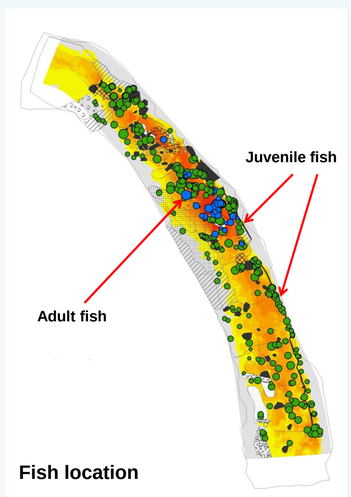


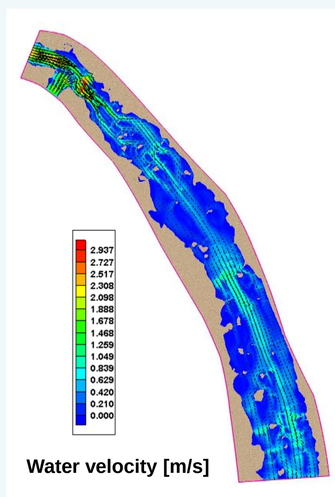




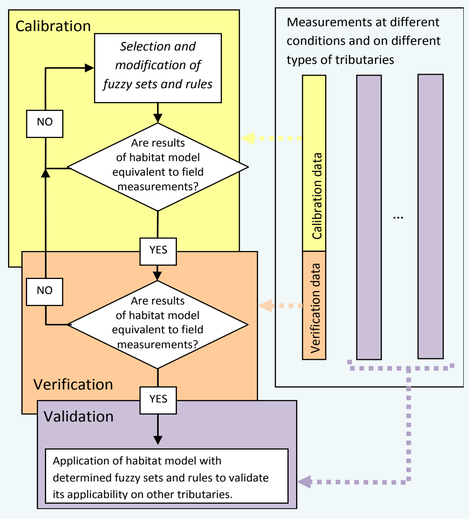


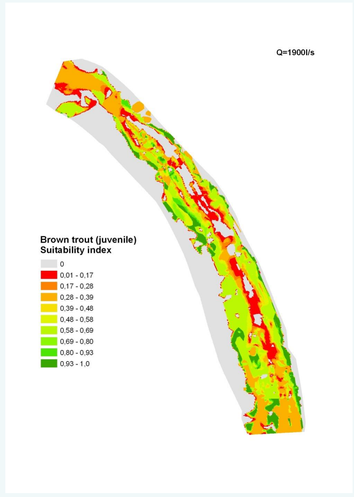
Input data preparation → Hydraulic modelling → Fuzzy sets and rules calibration → Habitat modelling





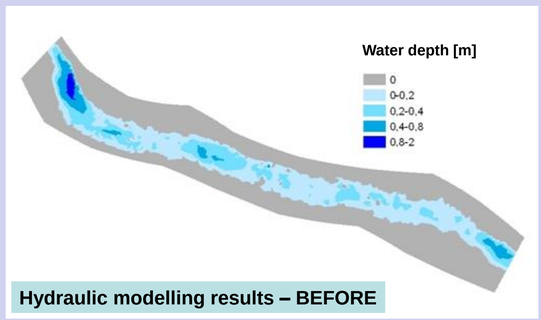
Calibration process scheme



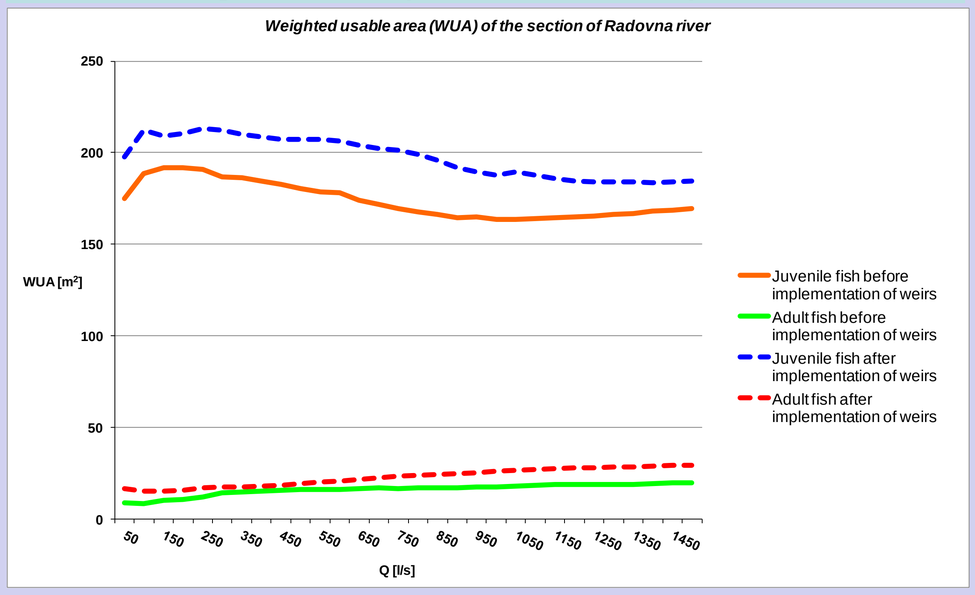


Planning of habitat improvement: Construction of low bottom weirs

The study case of habitat modelling implementation: Habitat modelling indicated, that the most limiting factor for the fish population in the analysed section of river is low water depth. Foreseof two low bottom weirs was chosen as a mitigation measure for improvement of the fish habitat. The results of hydraulic modelling confirmed higher water depth upstream of the weirs. Consequently, the habitat modelling results indicate improvement of fish habitat by the increase of weighted usable area (WUA) for juvenile and adult fish.



Habitat modelling results – comparison of current and planned state



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