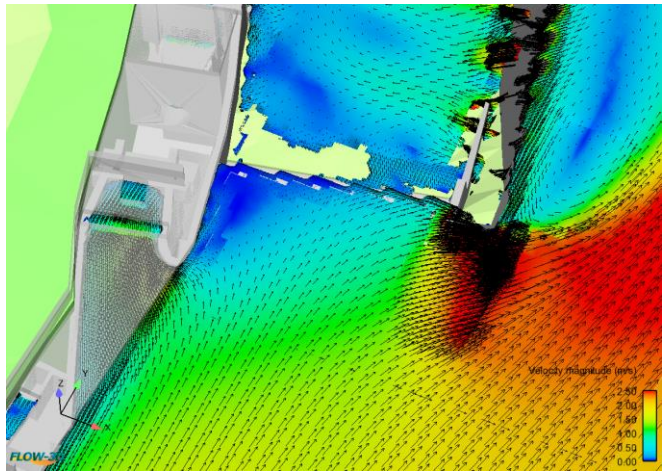
The FIThydro Project

Fishfriendly Innovative Technolgies for hydropower



Atle Harby, SINTEF Energy Research
Peter Rutschmann and Lea Berg
Technische Universität München

FIThydro – Fishfriendly Innovative Technologies for Hydropower

26 partners: 13 research, 13 industrial from 10 EU countries

Goals:

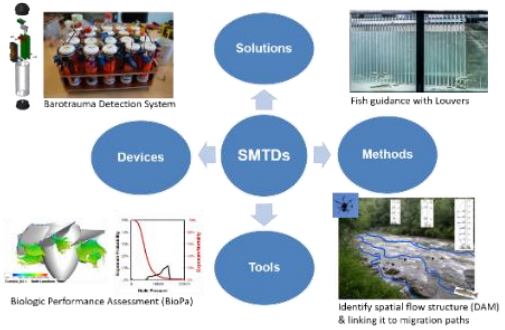
- The project investigates **mitigation** measures and strategies to develop cost-efficient environmental solutions for **sustainable** and **fish friendly hydropower.**
- FIThydro addresses **decision support** in commissioning and operating hydropower plants (HPP) by use of existing and innovative **technologies**.

Budget: 7.2 Mio. €

Duration: November 2016 – October 2020

FIThydro Highlights

SMTDs



Cost Effectiveness Analysis

Mitigation measures

Policy requirements and public acceptance review

Cross-cutting tools

A Decision Support System (DSS) to help practitioners plan, evaluate and find solutions for fish friendly hydropower plants

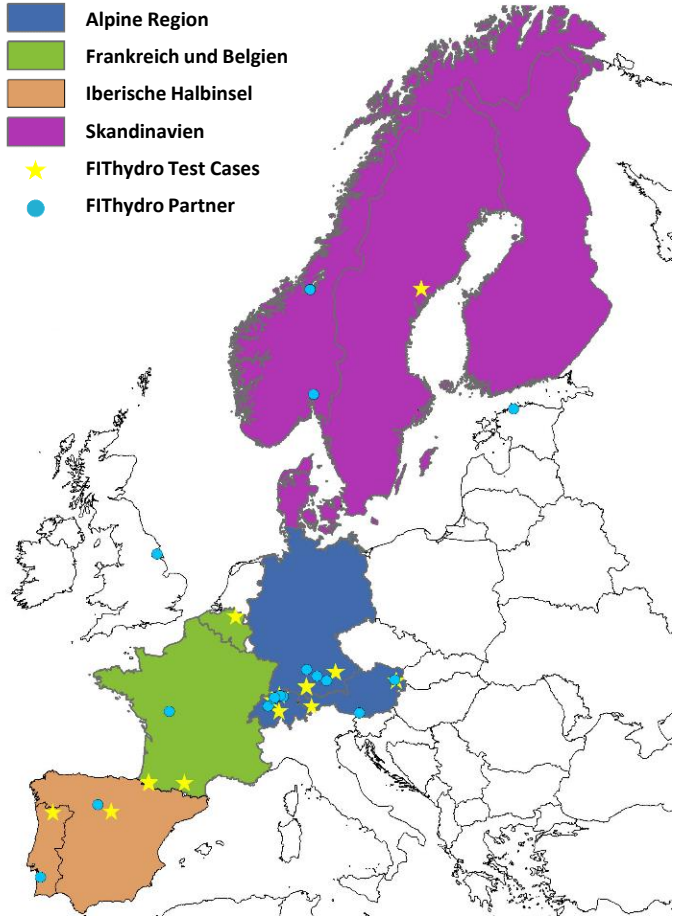
A **wiki** of the mitigation measures as well as methods, tools and devices for planning, implementing and monitoring of such solutions.

A Cumulative Impact Assessment (CIA) tool to investigate the impacts of consecutive hydropower plants on fish populations.

Research and innovations at HPPs in Europe

Test Cases:

At 17 HPPs in 4 European regions, i.e. the Iberian Peninsula, France/Belgium, the Alps and Scandinavia, solutions, methods, tools and devices (SMTDs) are tested and improved.



Challenges:

- Fish upstream migration
- Fish downstream migration
- Flow and habitat
- Sediment

Test Cases

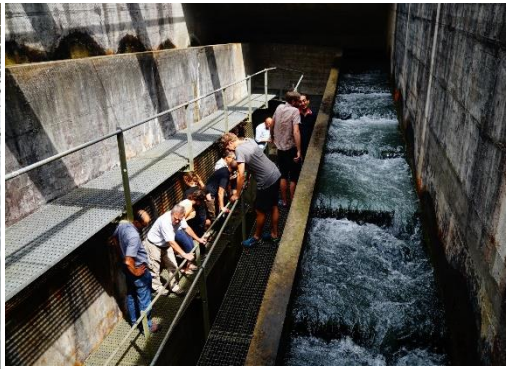
Bathymetry, Switzerland

Fish monitoring, Germany

Sediment analysis, Sweden

Turbine mortality , Switzerland

Habitat, Germany



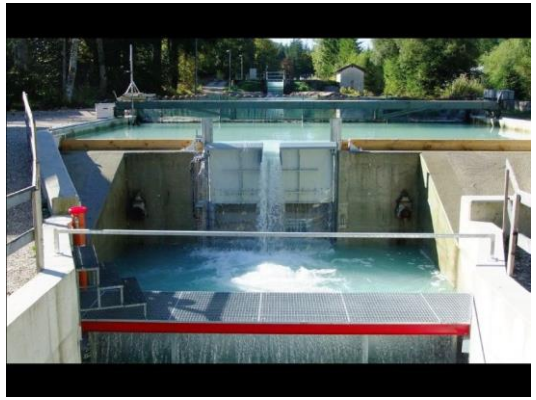
Fish Pass, Switzerland

NTNU Norwegian University of Science and Technology · SWECO · BKW · TALLINN UNIVERSITY OF TECHNOLOGY · LEW · Statkraft · ETH Eidgenössische Technische Hochschule Zürich Swiss Federal Institute of Technology Zurich

Test Cases

Environmental flow, Portugal

Hydropeaking, Austria



Turbine mortality, Germany

Sediment analysis, Sweden

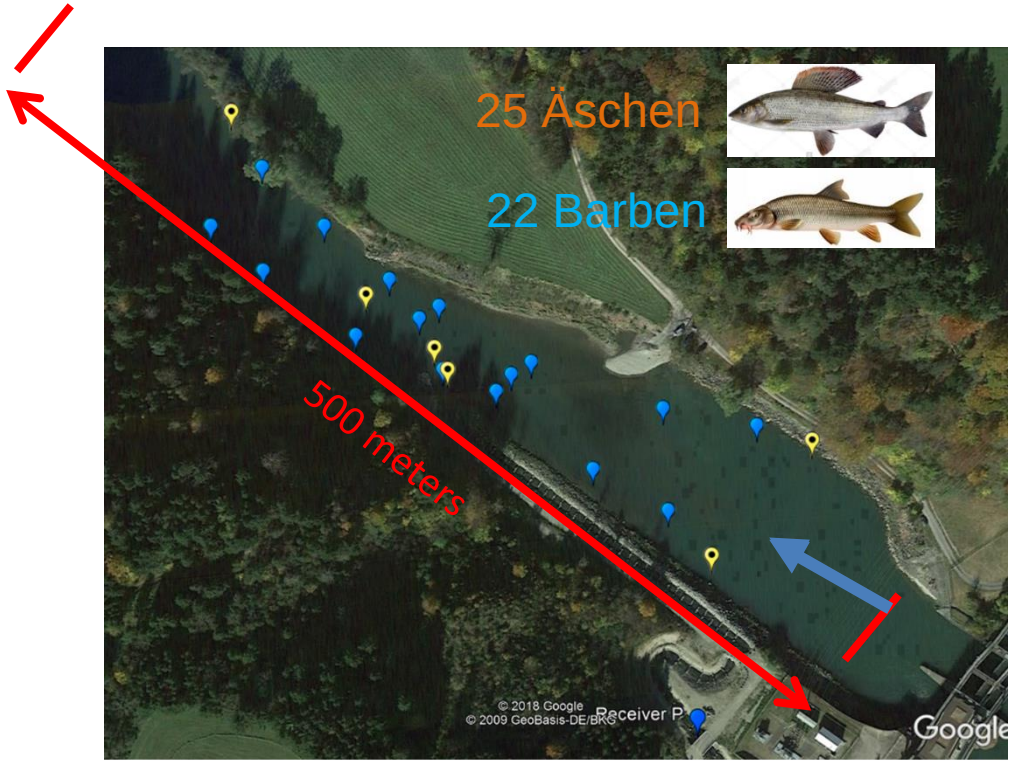
Downstream migration, Switzerland

Telemetry, Austria

Fish swim paths at the Iller River, Bavaria

© Olav König

© Ine Pauwels, INBO



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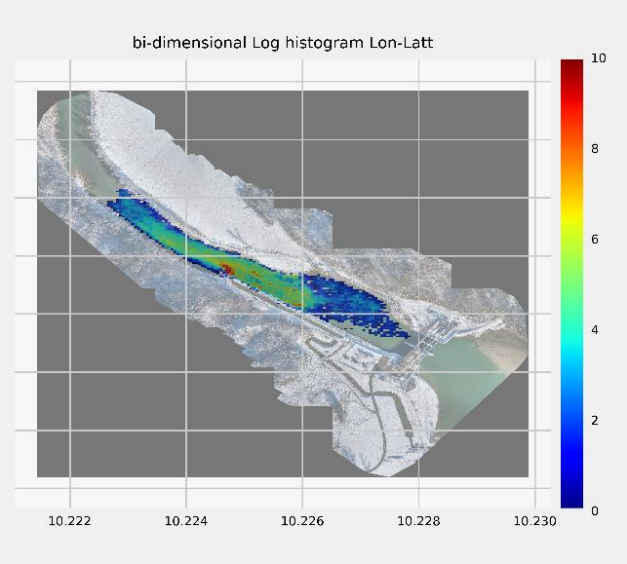
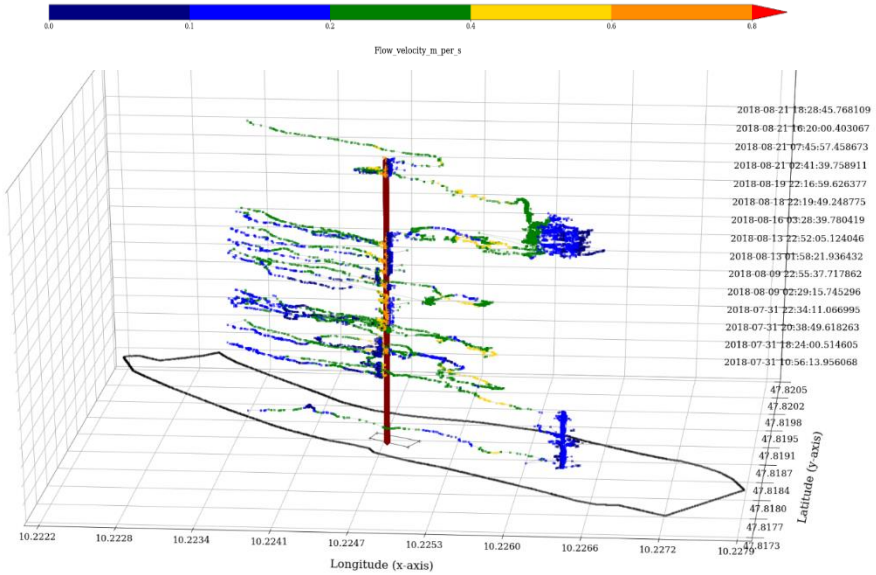
Fish swim paths at the Iller River, Bavaria

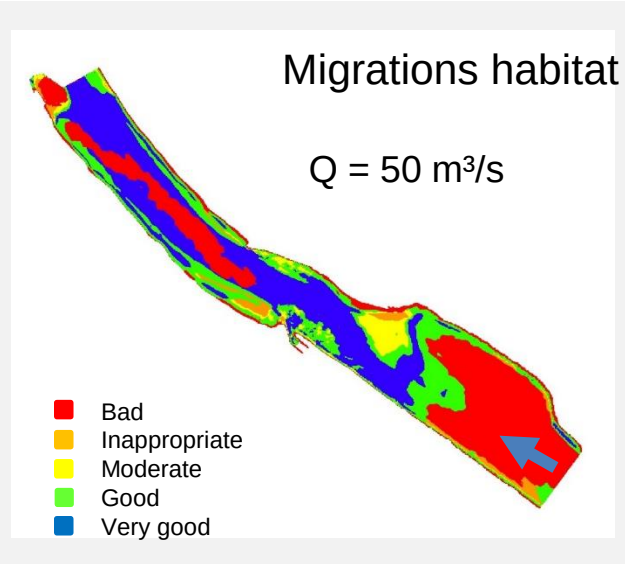
Fish “heatmap” for barbels



3D plot for analyzing fish motion patterns and flow velocities.



CASiMiR model: Preferred hydrodynamic migration habitat



Attraction flow, fish path perference, Limmat River, Switzerland

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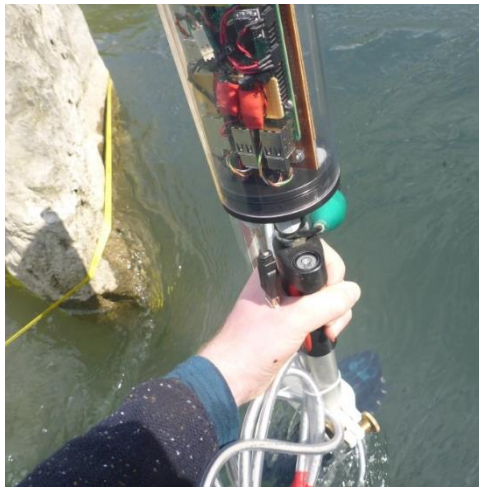

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Fish bypass guiding efficiency, Ariège River, France

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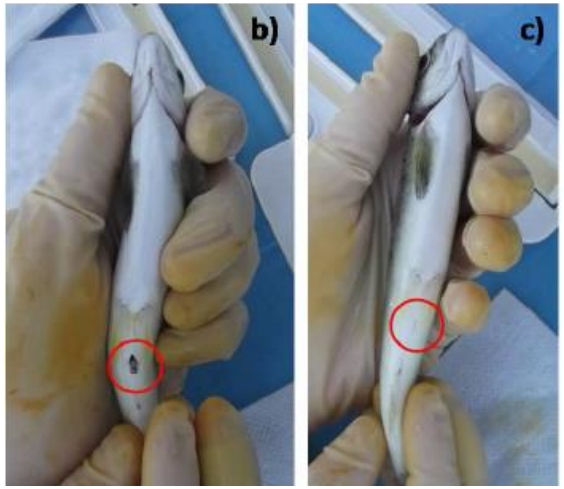

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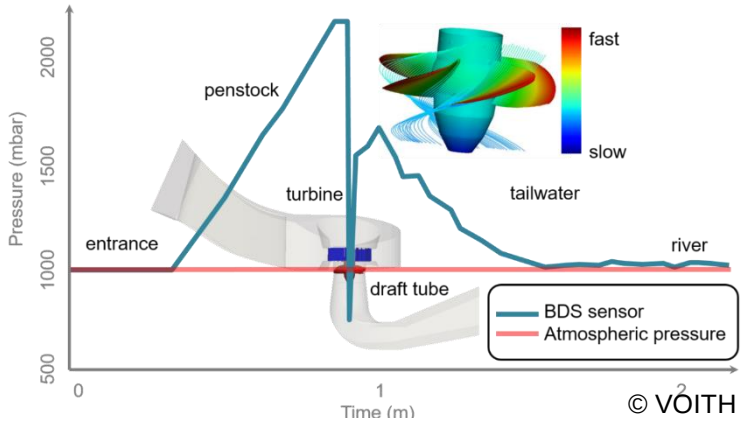
Fish turbine passage, Duero River, Spain

© Francisco Javier Sanz Ronda, Itagra.ct



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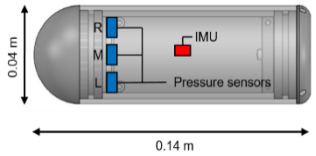

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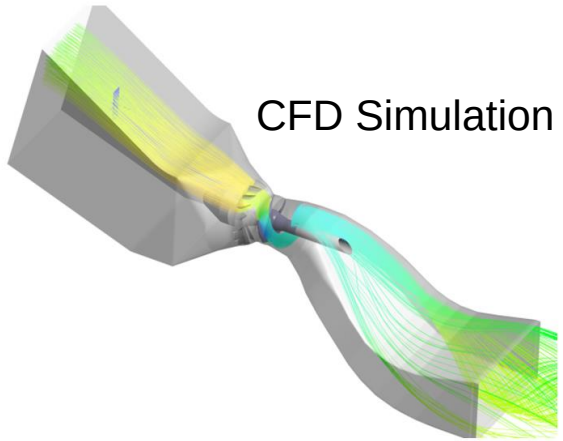
CFD Simulation



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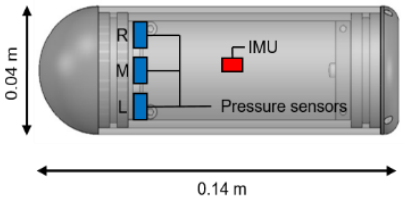
Fish turbine passage, VAO Obernach, Bavaria



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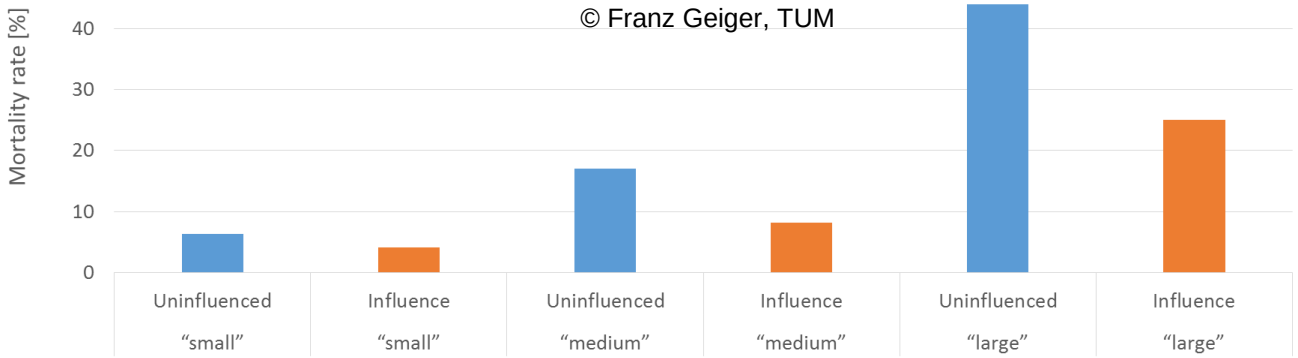

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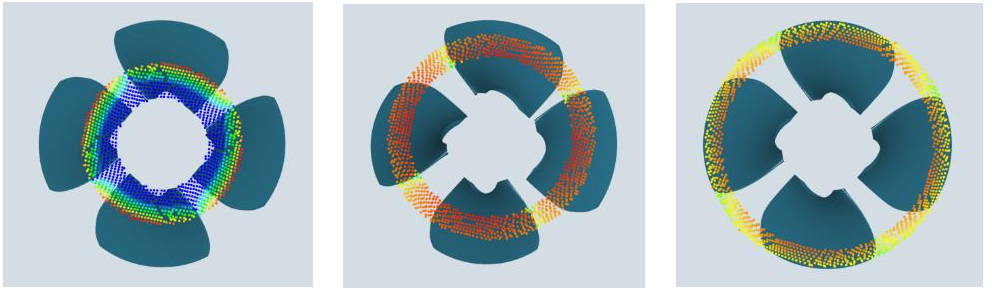

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Spawning habitats, Günz River, Bavaria

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Hydropeaking at the Avelames and Inn River (E/A)

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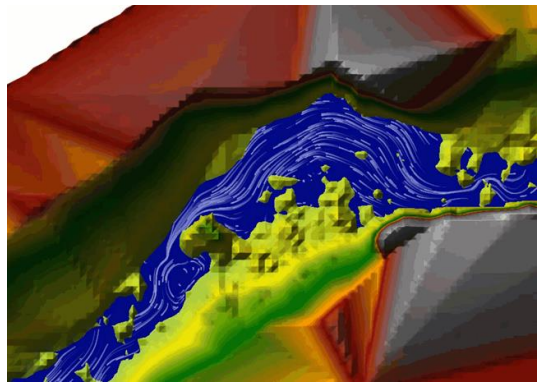

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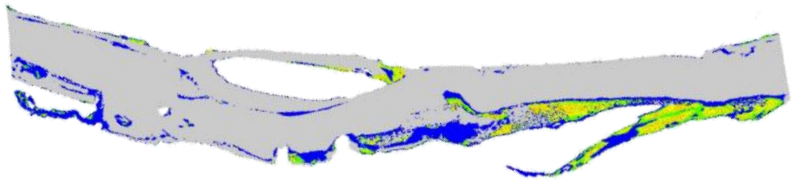
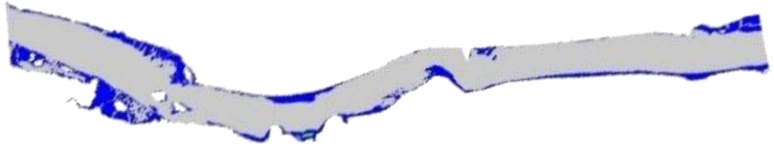
Maximum stranding risk of juvenile graylings
River section 2, Maria Stein

Status-Quo



future



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Sediment management at Moälven and Limmat River (N/CH)

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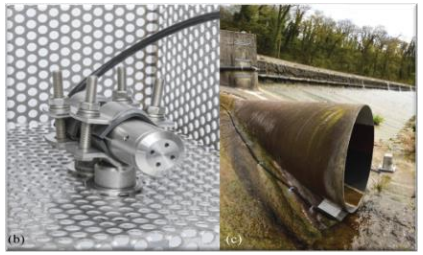

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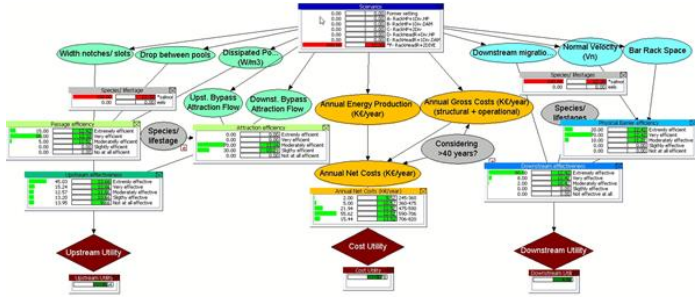
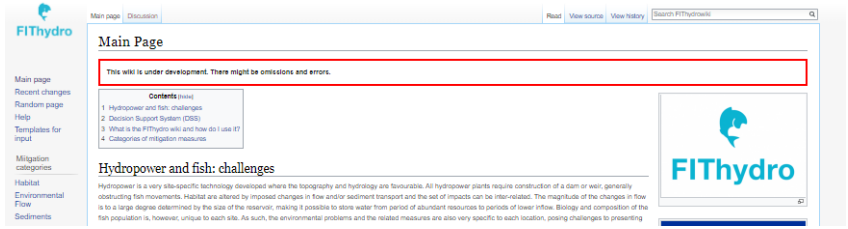
Mitigation measures

- Catalogue of mitigation measures
- Matrix for combination of measures
- Costs of mitigation measures
- Scenarios for cost-effective mitigation

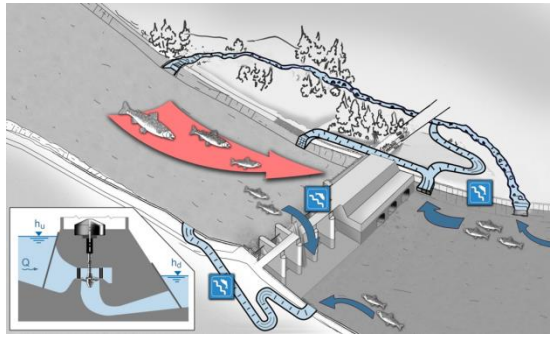


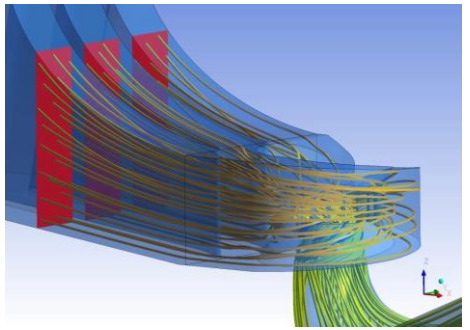


Wiki

Solutions, methods, tools and devices

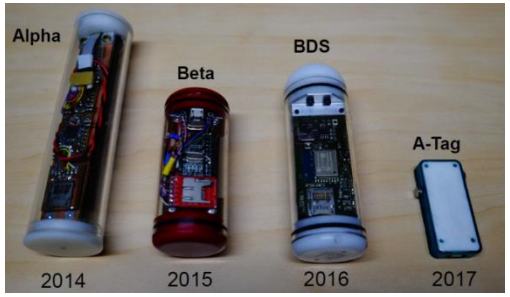
Solutions

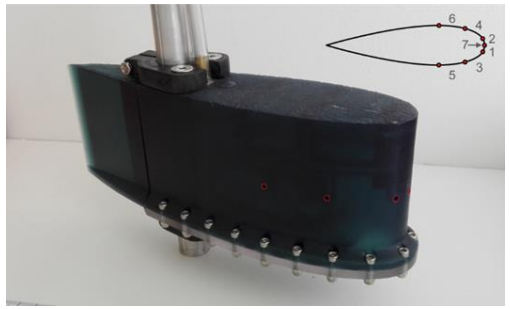




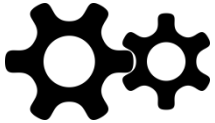
Methods

WP4

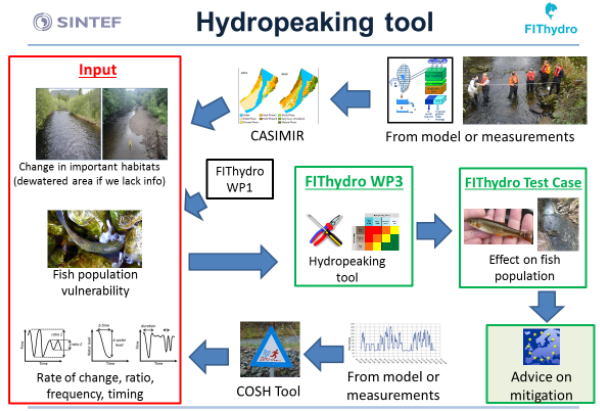




Devices



Tools



Outcome of WP4

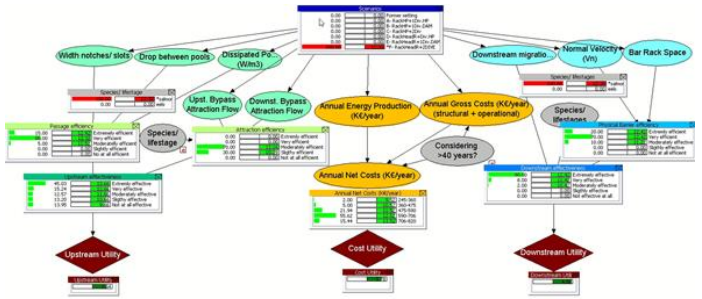
Methods, tools, devices

Mitigation measures, costs and effectiveness

Decision Support

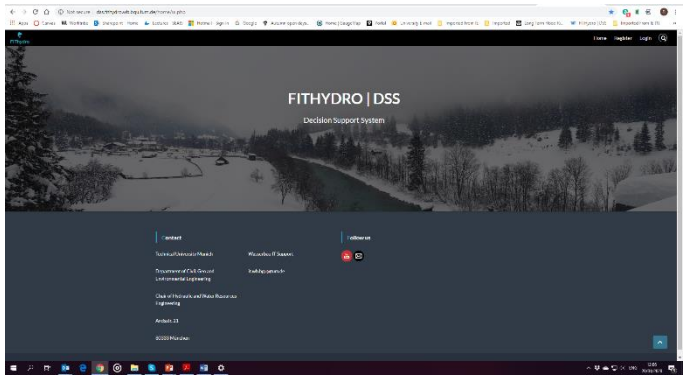
Reports, articles

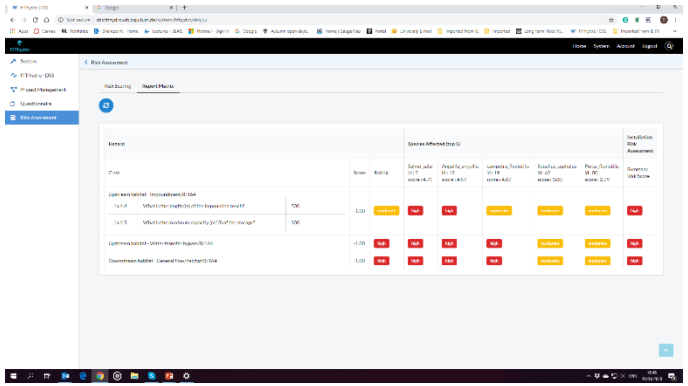
Wiki



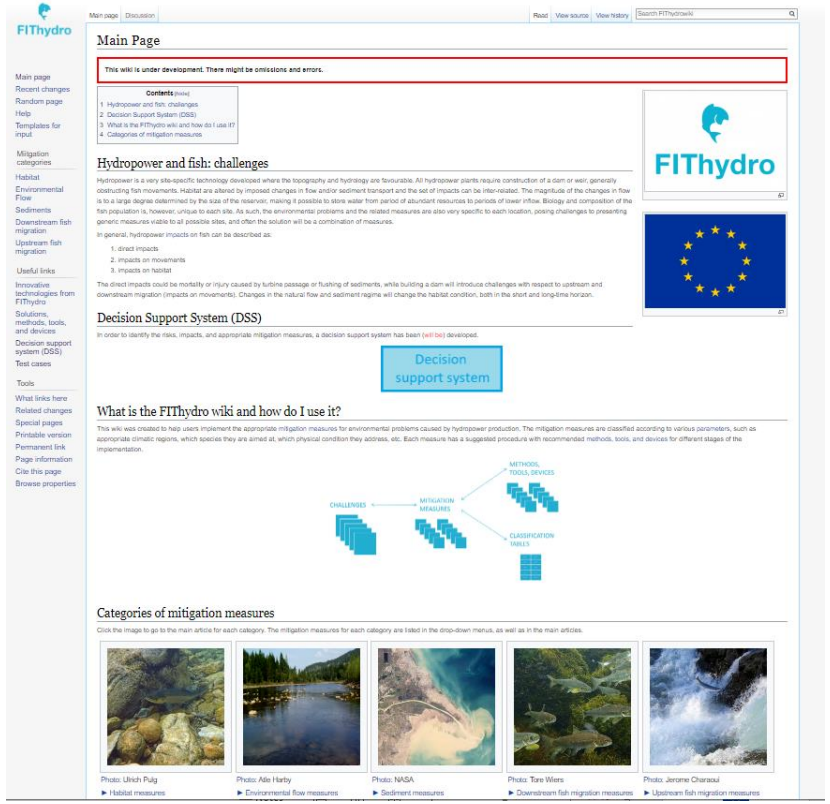
Combining mitigation measures + testing

FIThydro tools





Decision Support System (DSS)



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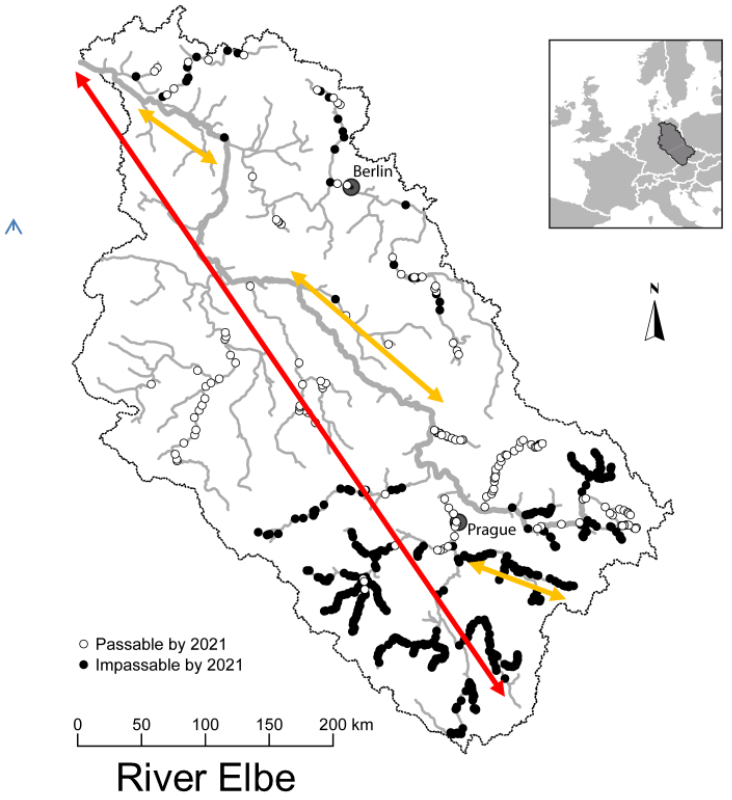
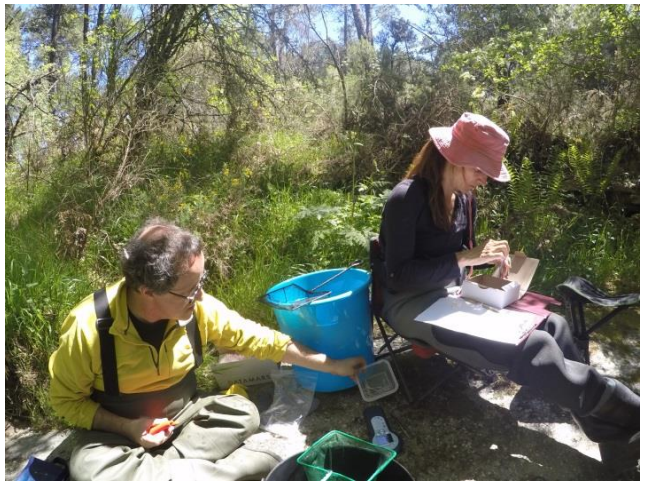


Cumulative Impact Assessment (CIA)

Thank you for your attention!



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