AMBER & Dam Removal Europe

Traspasando Barreras en los ríos europeos

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Fishfriendly Innovative Technologies for Hydropower (FIThydro)

Adaptación ambiental del uso hidroeléctrico

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0. Who we are

¿Quiénes somos? **Profesores y doctorandos de la ETSIIAA y más...**

Grupo de Ecohidráulica Aplicada

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1. Objectives

a. General overview of the FIThydro project

b. Summarize HPP problems and FIThydro working plan

c. Define the Spanish case of study

d. Show confluences among FIThydro and AMBER

2. Introduction: Key Facts

- 26 partners (13 research, 13 industrial) in 10 European countries
- Total **Budget:** 7.2 Mio. Euro
- FIThydro addresses **decision support** in commissioning and operating hydropower plants (HPP) by use of existing and innovative **technologies**.
- The project investigates **mitigation** measures and strategies to develop cost-efficient environmental solutions for **sustainable** and **fish friendly hydropower.**
- **Case study regions:** France/Belgium, Portugal/Spain, Scandinavia and the Alpine Region.

Partners

Homepage: **www.fithydro.eu**

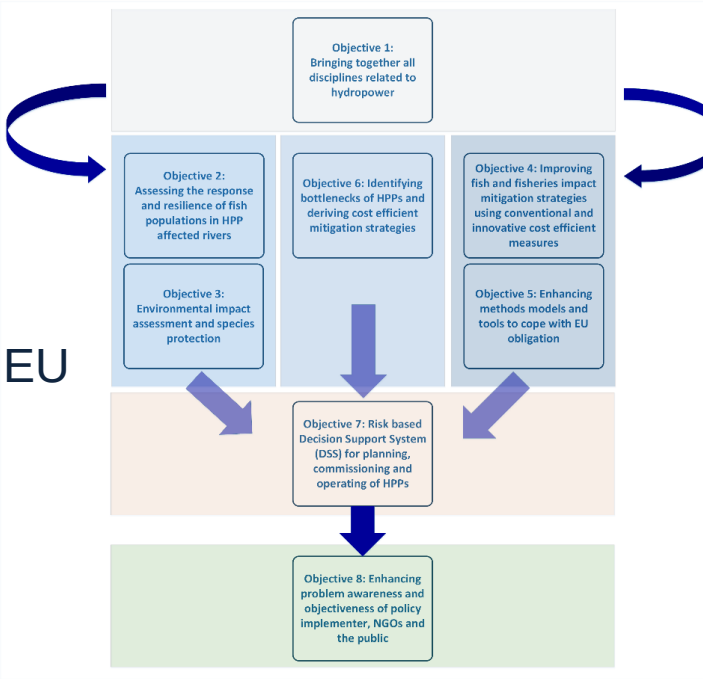
Project Overview

FIThydro concentrates on hydropower and aims to increase both **ecology and production** of hydropower and to support development of **self-sustainable fish populations**.

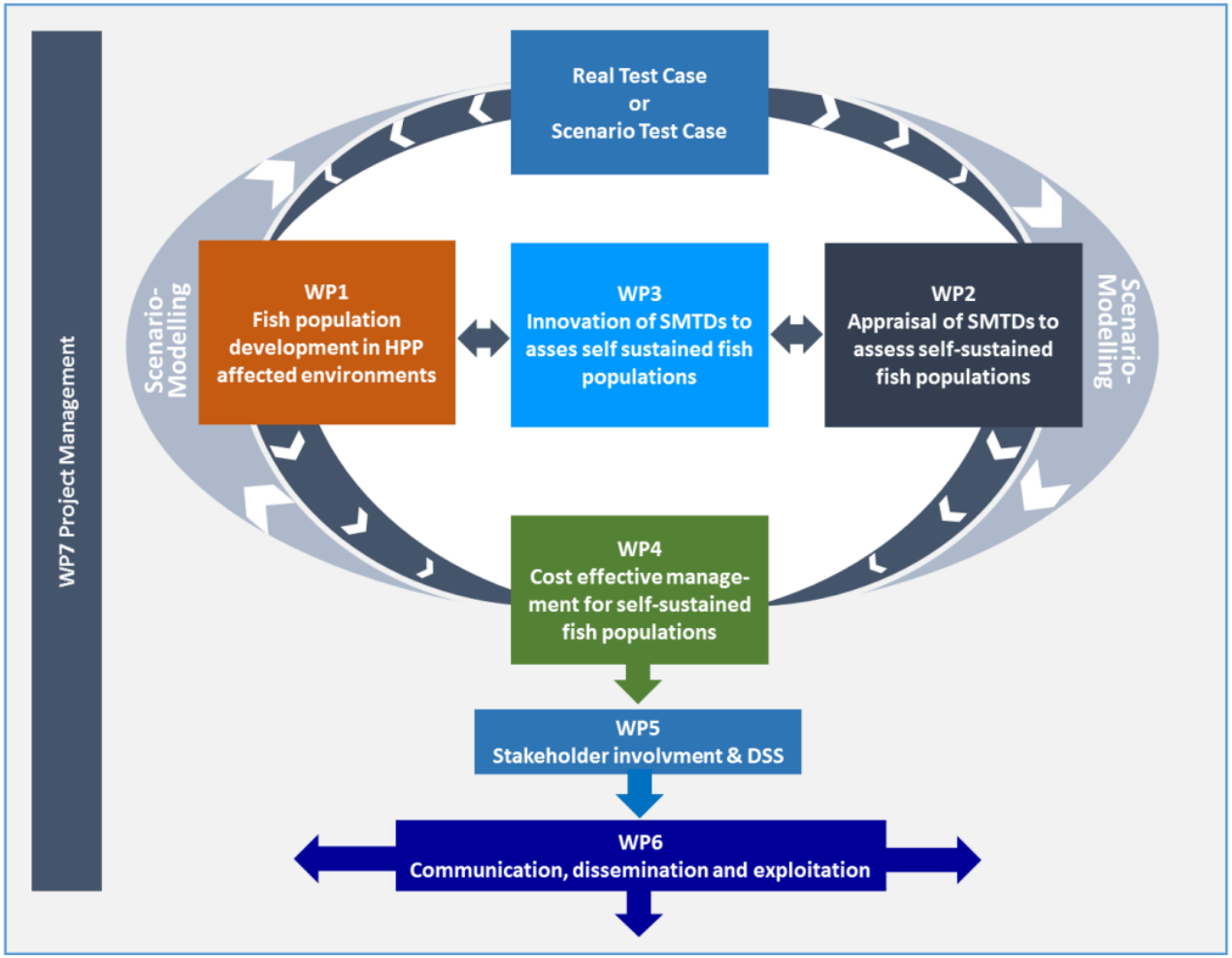
- Bundle competences of the relevant disciplines of science to enhance protection of fish individuals and populations in a most **cost-effective** way and with maximum societal benefit.
- Employing high-end **innovative** technical solutions, methods, tools and devices (SMTDs)

Objectives

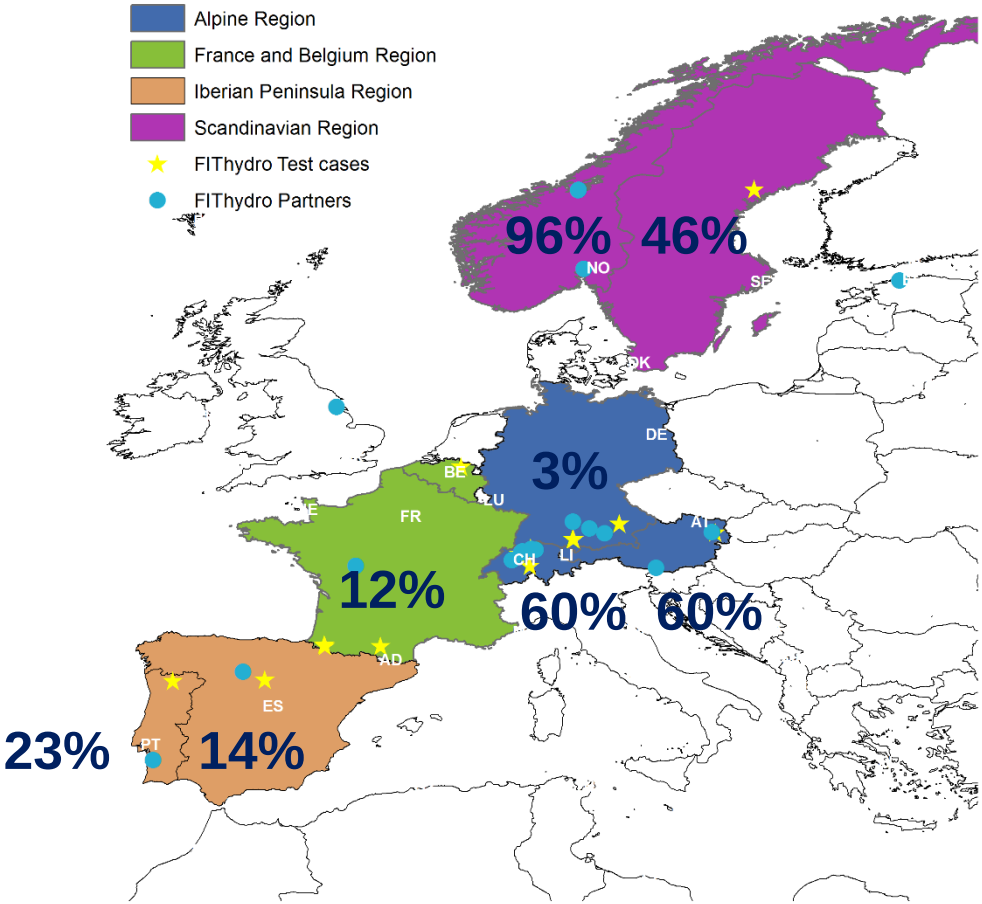
1. Bringing together **all disciplines** related to hydropower.
2. Assessing the response and resilience of **fish populations** in HPP affected rivers.
3. **Environmental** impact assessment and species protection.
4. Improving fish and fisheries impact **mitigation strategies** using conventional and innovative **cost efficient** measures.
5. Enhancing methods models and tools to cope with EU obligation.
6. Identifying **bottlenecks of HPPs** and deriving cost efficient mitigation strategies.
7. Risk based Decision Support System (**DSS**) for planning, **commissioning and operating** of HPPs.
8. Enhancing problem awareness and objectiveness of **policy implementer**, NGOs and the public



Work Packages



3. FIThydro Test Cases



Test Case Challenges

1. Flow and habitat
   - Lack of wetted area
   - Lack of or distribution of spawning habitat
   - Lack of or distribution of rearing habitat
   - Environmental flow in bypassed reach
   - Hydropeaking
2. Sediments
   - Deficit of sediments
   - Surplus of sediments
   - Clogging of substrate

Test Case Challenges

3. Upstream migration
   - Missing fish pass
   - Height drop
   - Missing monitoring
   - Fish pass discharge
   - Missing fishway data
   - Fish entrance
   - Other

4. Downstream migration
   - Missing fish pass
   - Turbine passage
   - Too wide trash rack
   - Missing monitoring
   - Missing fishway data
   - Fish entrance

4. Spanish test case

Test Case – Guma HPP

	Guma
Generation flow	35 m^3/s
Turbines	2 Kaplan
Dam height	8.85 m
Power	2.25 MWh

Test Case – Guma HPP

Test Case – Guma HPP

Pool-type fishway with notches and orifices

Fishway

Downstream river reach

Fish population:

FAMILIA	NOMBRE COMÚN	NOMBRE CIENTÍFICO	ORIGEN
Centrarchidae	Percasol	*Lepomis gibbosus*	Alóctona
	Black bass	*Micropterus salmoides*	Alóctona
Cyprinidae	Alburno	*Alburnus alburnus*	Alóctona
	Carpín	*Carassius auratus*	Alóctona
	Carpa	*Cyprinus carpio*	Alóctona
	Gobio	*Gobio lozanoi*	Traslocada
	Barbo común	*Luciobarbus bocagei*	Autóctona
	Piscardo	*Phoxinus phoxinus*	Autóctona
	Boga del Duero	*Pseudochondrostoma duriense*	Autóctona
Percidae	Lucioperca	*Sander lucioperca*	Alóctona
Poeciliidae	Gambusia	*Gambusia holbrooki*	Alóctona
Salmonidae	Trucha común	*Salmo trutta*	Autóctona

Two Iberian endemism in the Annex II of Habitat Directive 92/43/EEC:

Boga and Bermejuela

IUCN Vulnerable

Assumed environmental problems:

- Low environmental flows in the bypassed section
- Poor habitat conditions in the bypass
- Suboptimal spawning areas
- Fishways entrance attraction problems
- Downstream migration unknown

Test Case – Guma HPP

Scientific objectives

- Reduce environmental problems in this river reach
- Help and facilitate research in native fish ecology, migration and conservation

Attraction flows Fish migration E-flows

Habitat improvement

Spawning areas Species at risk

© Claúdia Baeta

Iberian Barbel
(*Luciobarbus bocagei*, Steindachner, 1864)

© David Perez

Panjorca/ Bermejuela
(*Achondrostoma arcasii*, Steindachner, 1866)

© Filipe Ribeiro

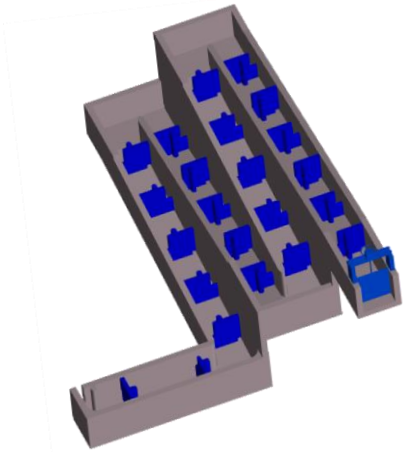
Northern straight mouth nase
(*Pseudochondrostoma duriense*, Coelho, 1985)

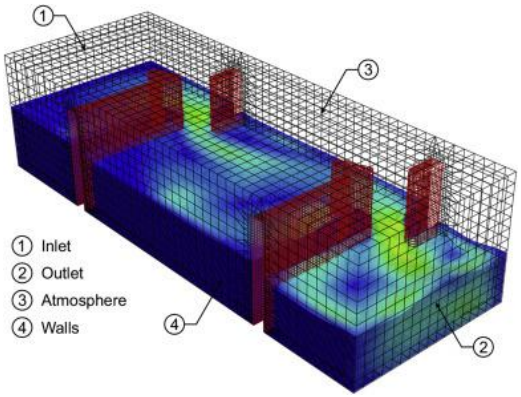
© Marcos Oliveira

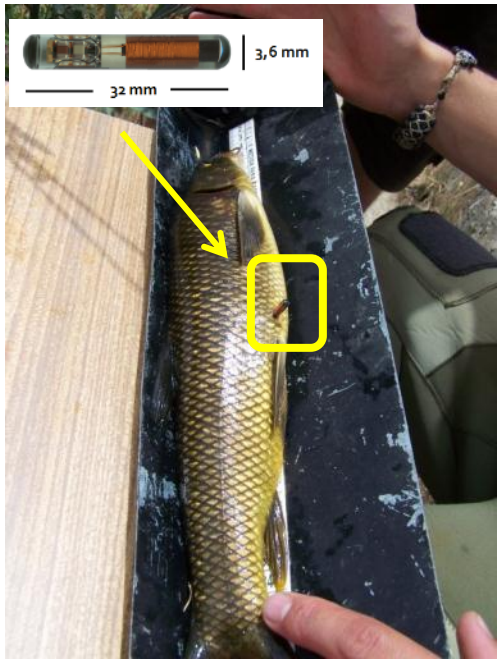
Iberian Chub
(*Squalius pyrenaicus*, Günther, 1868)

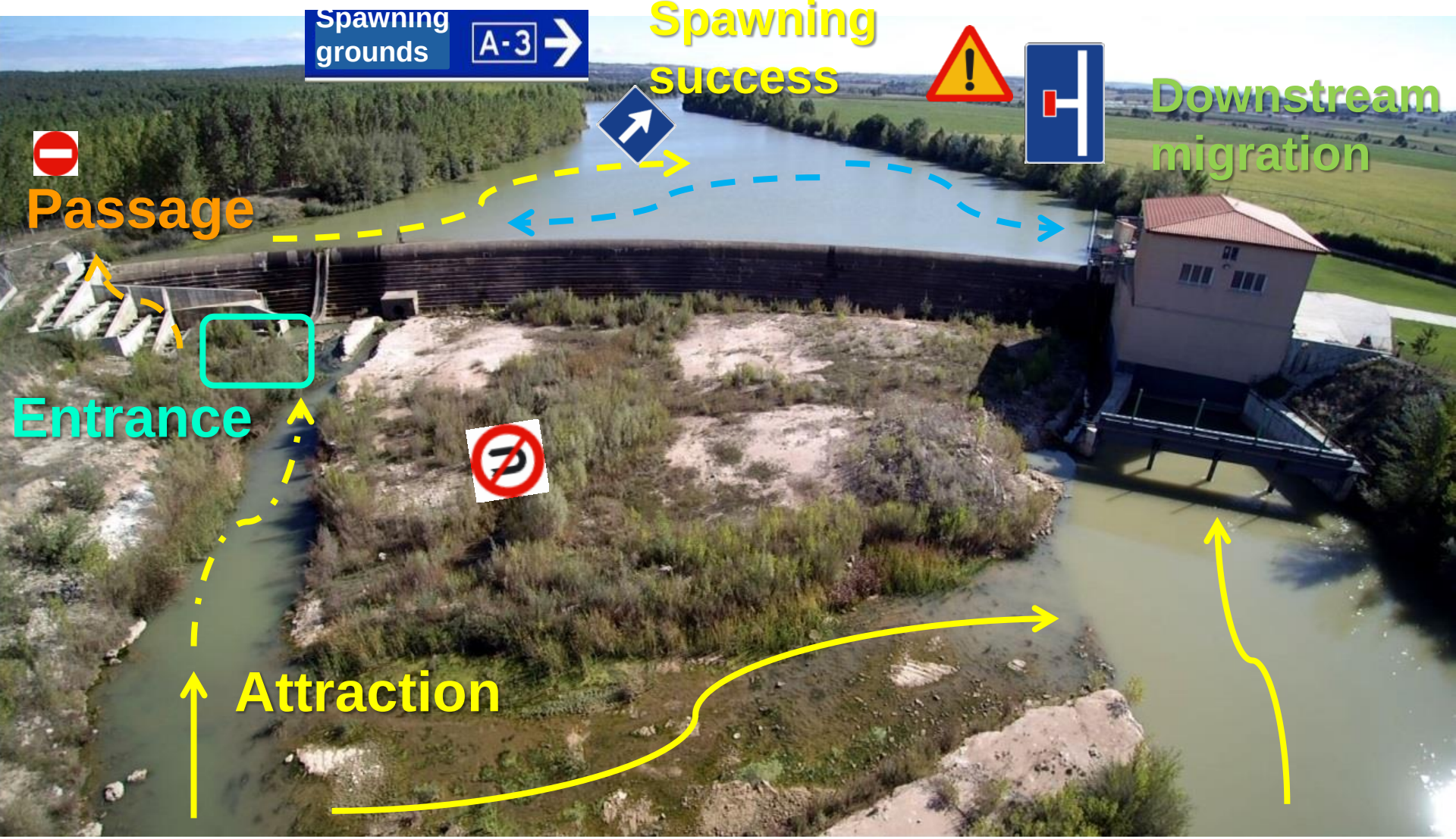
1. Fish migration:

- PIT-tag
- Radio-telemetry
- CFD



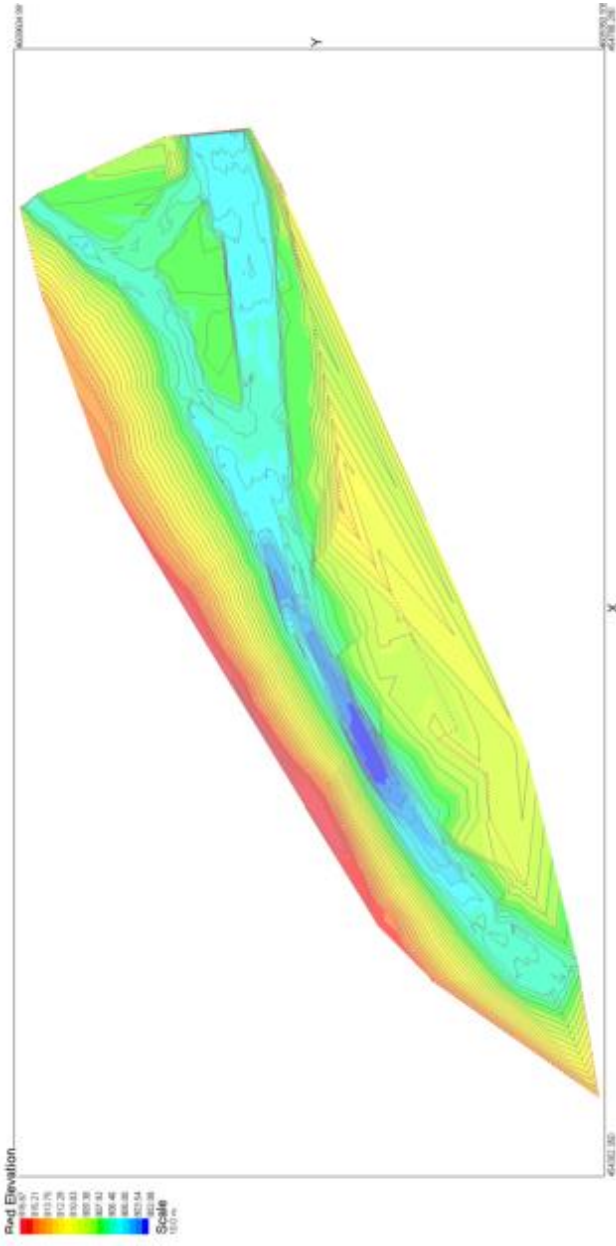





Spawning grounds
A-3
Spawning success
Downstream migration
Passage
Entrance
Attraction

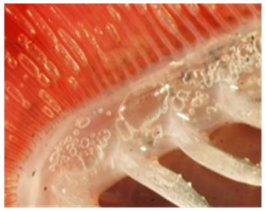
2. Attraction/e-flows and spawning areas:

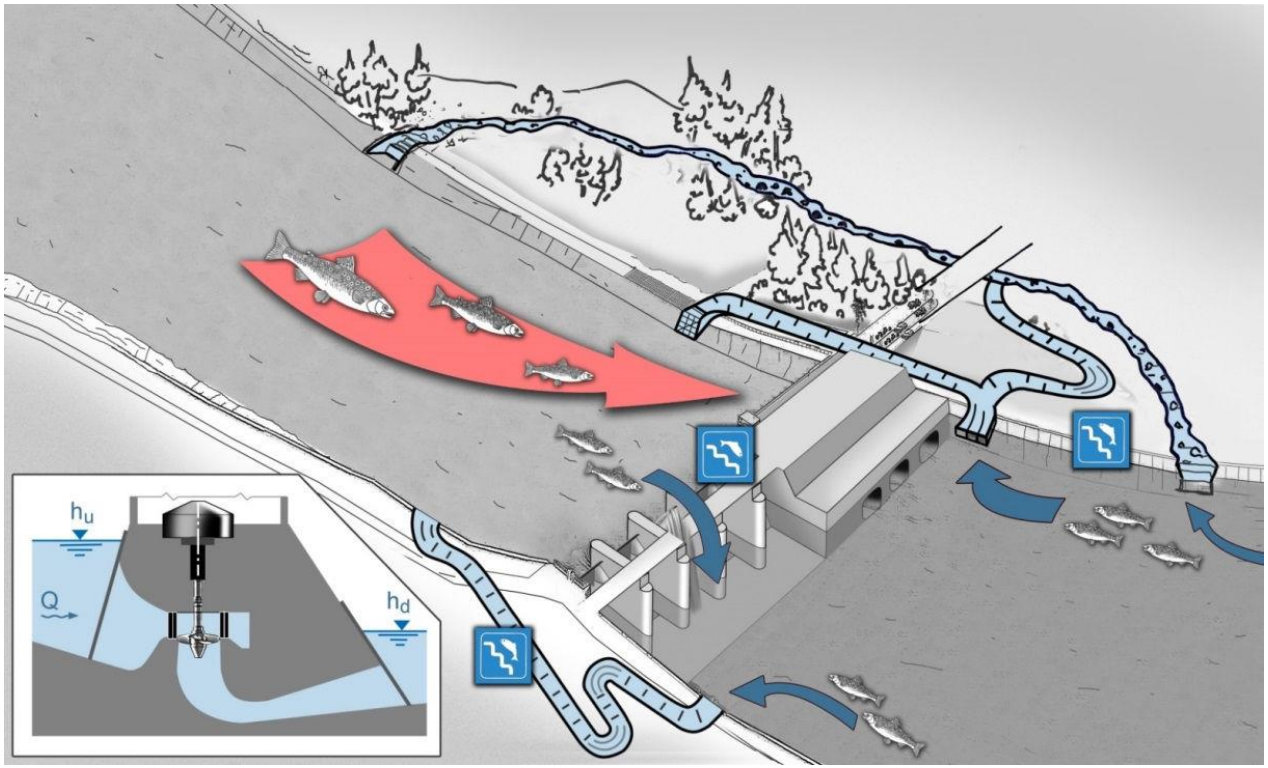
- CFD
- River bottom surveys
- Larvae sampling
- Direct observation

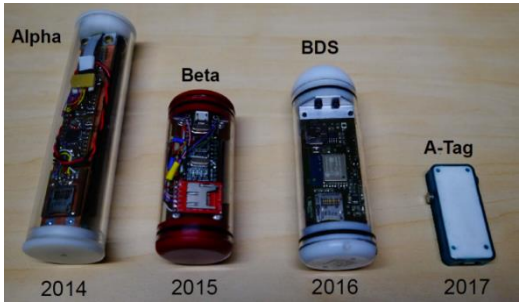


3. Downstream migration:

- Routes: PIT-tag and Radio-telemetry
- Survival: CFD/BDS/BioPA







5. FIThydro and AMBER

AMBER:

Adaptive Management of Barriers in European Rivers

More effective ecosystem restoration in the EU

FIThydro:

Fishfriendly Innovative Technologies for Hydropower

Developing the next generation technologies of renewable electricity and heating/cooling

Cooperation: FIThydro and AMBER

Technical Cooperation:

- The EU barrier atlas on hydroelectric dams
- Effect of hydropower plants/barriers on the upstream and downstream reach
- Habitat Assessment (Telemetry, Drones)

Dissemination:

1. Website visibility as “related Project”
2. Exchange user networks and subscribe to newsletters to maximize reach and impact.

Cooperation: FIThydro and AMBER

Scientific Cooperation

- Workshop following the review meeting of FIThydro
  - Substrate and Sediment Management
  - Environmental Flow
  - Guidelines for data akquisition at the Test Cases with focus on hydromorphology and habitat data
  - Cooperation in developing tools like the decision support systen, the cumulative impact analysis or the agent base fish motion modeling
- Follower project on cost efficiency comparison of removing barriers instead of HP mitigation measures

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www.fithydro.eu

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See also: **www.amber.eu**

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