HydroCen

NORWEGIAN RESEARCH CENTRE FOR HYDROPOWER TECHNOLOGY

# Fish Passage and fish monitoring technology

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NTNU SINTEF NINA Norsk institutt for naturforskning

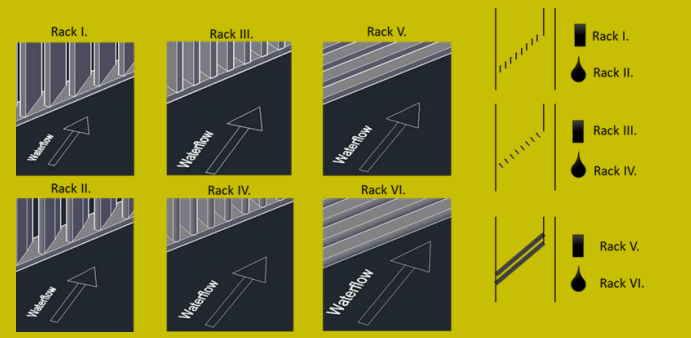
# SAFEPASS

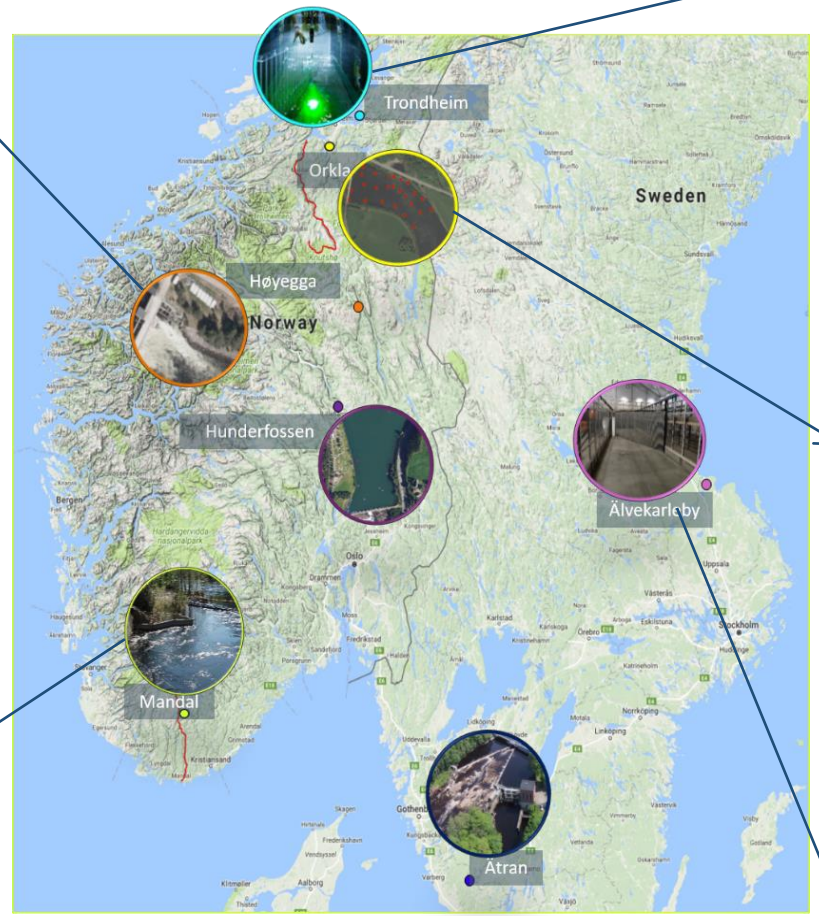
Safe and efficient two-way migration for salmonids and European eel past hydropower structures (2015-2019)

The Research Council of Norway

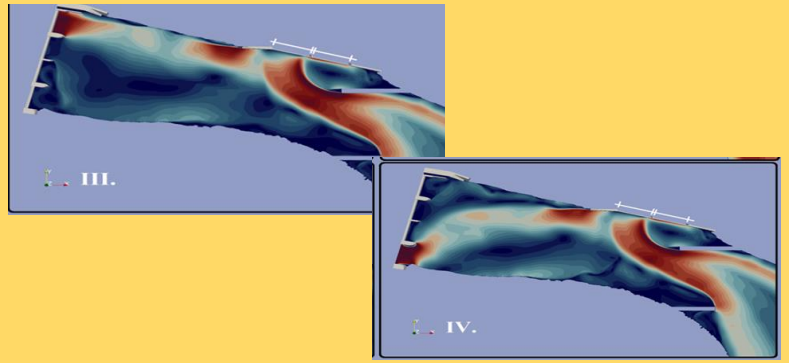
## Hybrid fishway

## Fish- friendly trash-racks( small scale)

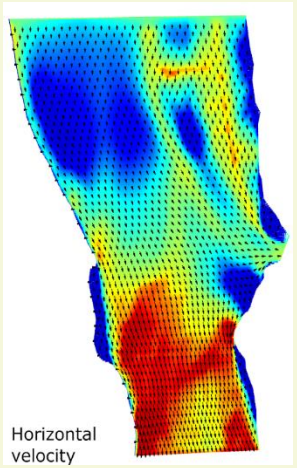


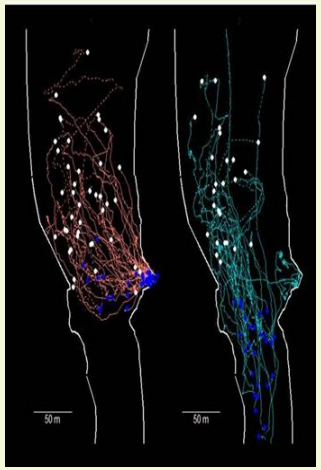




## Mitigation measures (Orkla)

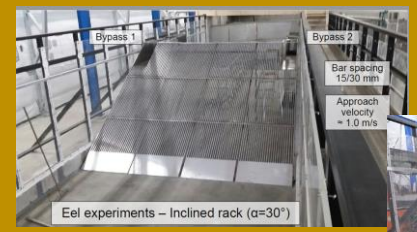



## 3D downstream migration Atlantic salmon smolt (MANDAL)




## Fish- friendly trash-racks (larger- scale)





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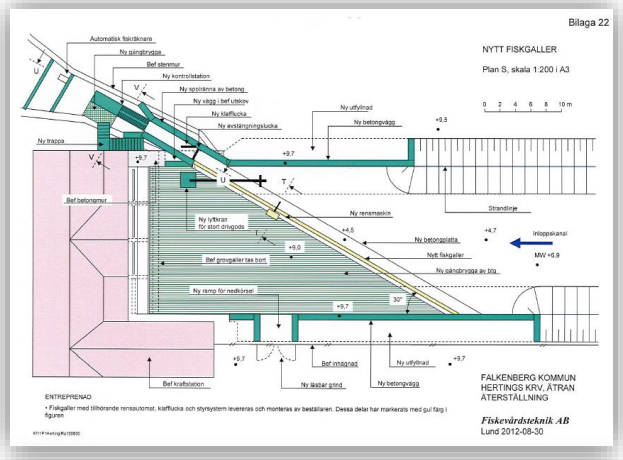
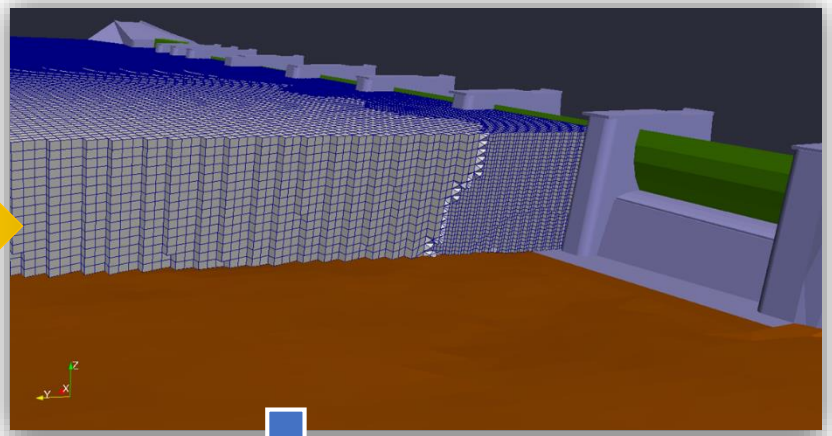
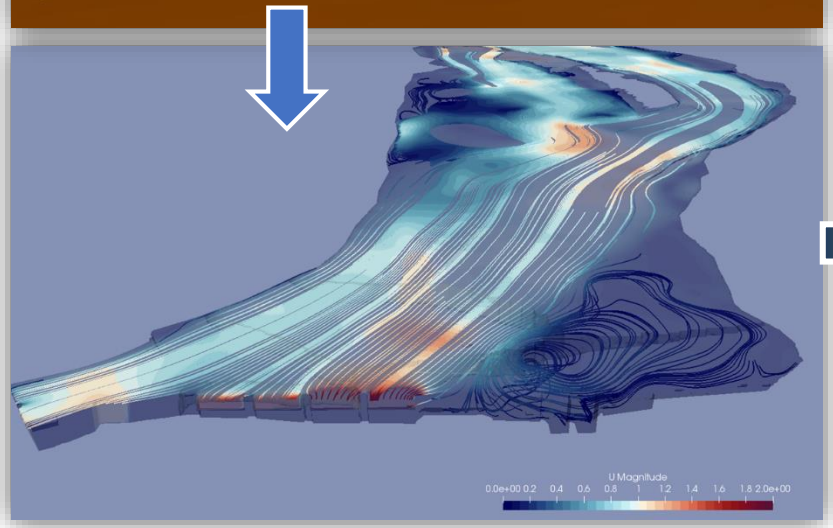
## 4.2. Ecological connectivity for fish in regulated rivers

- Analysis of data from Safepass on fish migratory behaviour and link with Hydraulics
- CFD modelling (SINTEF/NTNU)

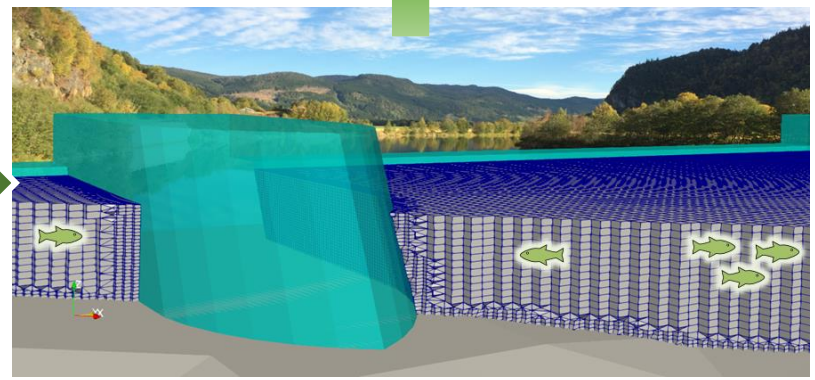
# Field and numerical survey






Local and governing characteristics for



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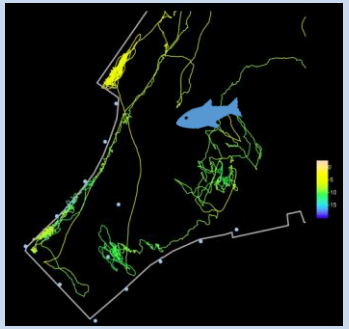
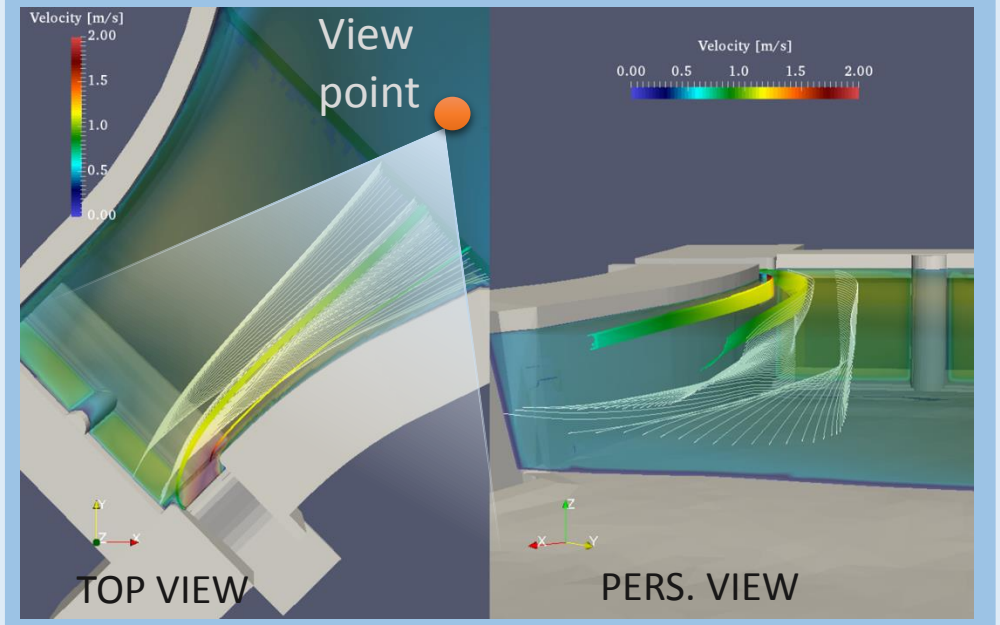
# **Local** and **governing** characteristics

**A)** at known fish positions

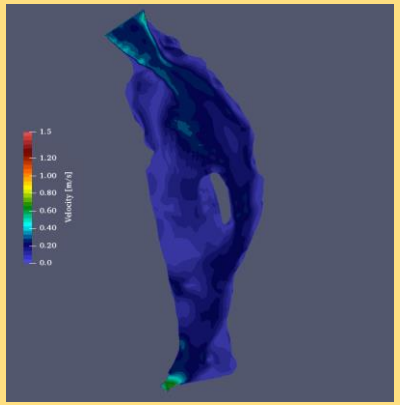


Link observations to simulated flow

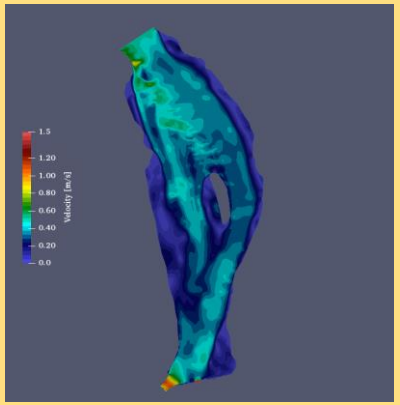
**B)** at relevant locations



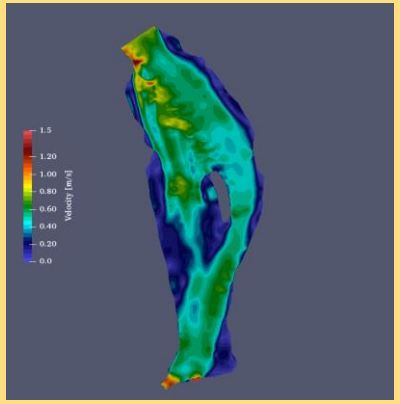

**Scenario 1**



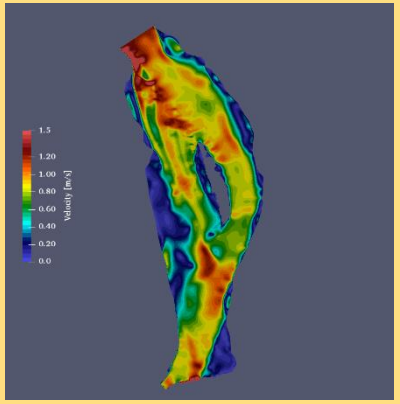
**Scenario 2**



**Scenario *n***



**Scenario *n+1***



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## 4.2. Ecological connectivity for fish in regulated rivers

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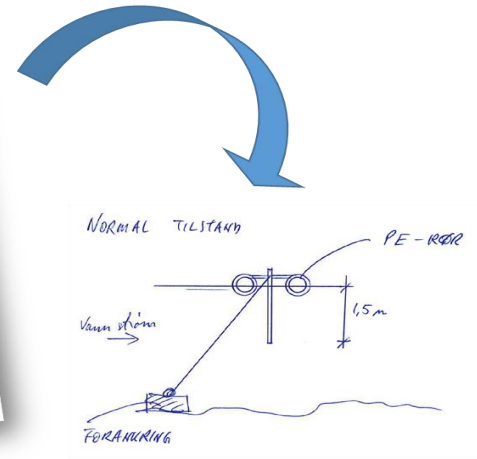
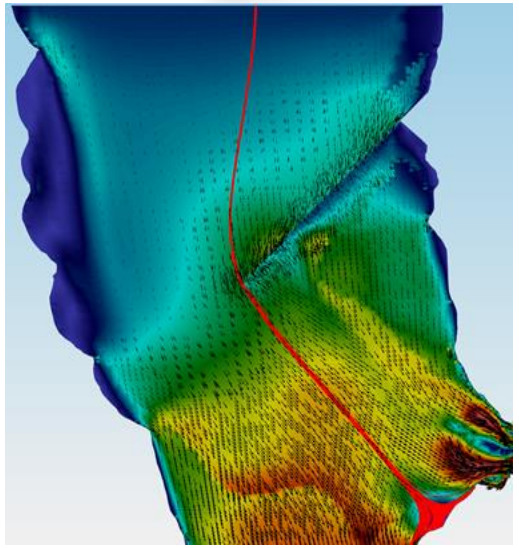
- CFD modelling (SINTEF/NTNU)
- Development of guidance structures and mitigation measures

## From theory to practice

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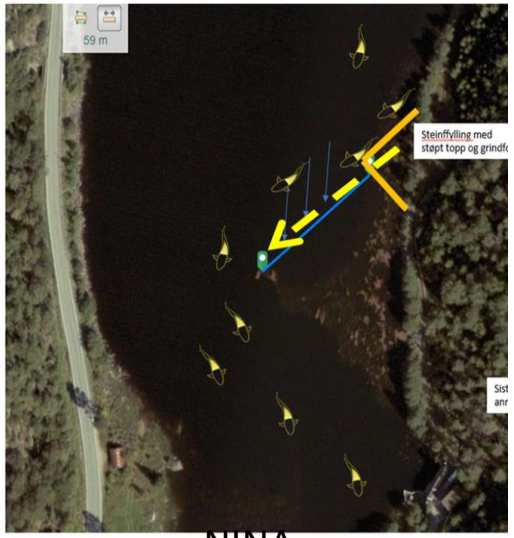


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# What can NORWAY  bring to the table

- ❑ Up- and downstream fish migration,
- ❑ Hydrodynamics and fish biomechanics,
- ❑ Fish behavior,
- ❑ Fishways,
- ❑ 2 and 3D telemetry studies,
- ❑ Optimization of mitigation measures,
- ❑ CFD modelling and hydraulic data collection,
- ❑ Analyzes of hydraulic conditions.

**Exchange of knowledge and transfer of experiences** between researchers from **Norway and USA** emerges as a great **opportunity for improving scientific knowledge** on fish passage and monitoring technology

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# Thank you!

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