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Evaluation of fishway design for German Federal Waterways by means of fish studies

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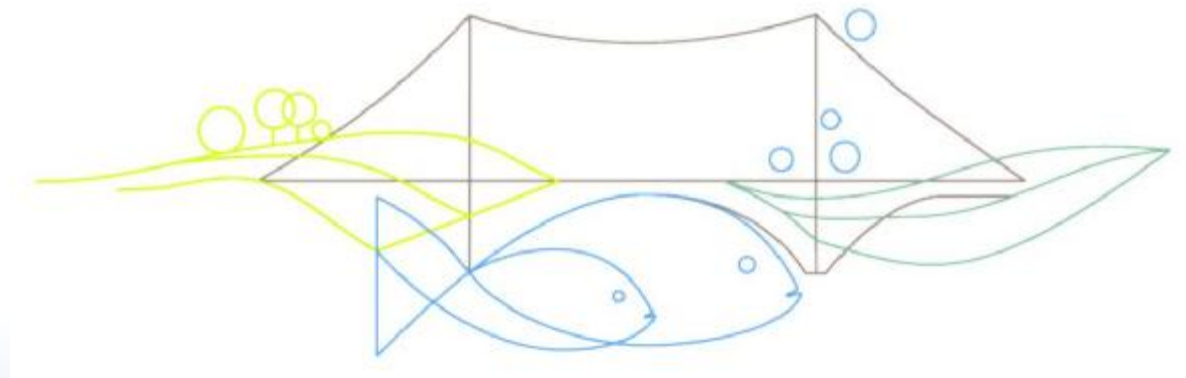
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Evaluation of fishway design for German Federal Waterways by means of fish studies



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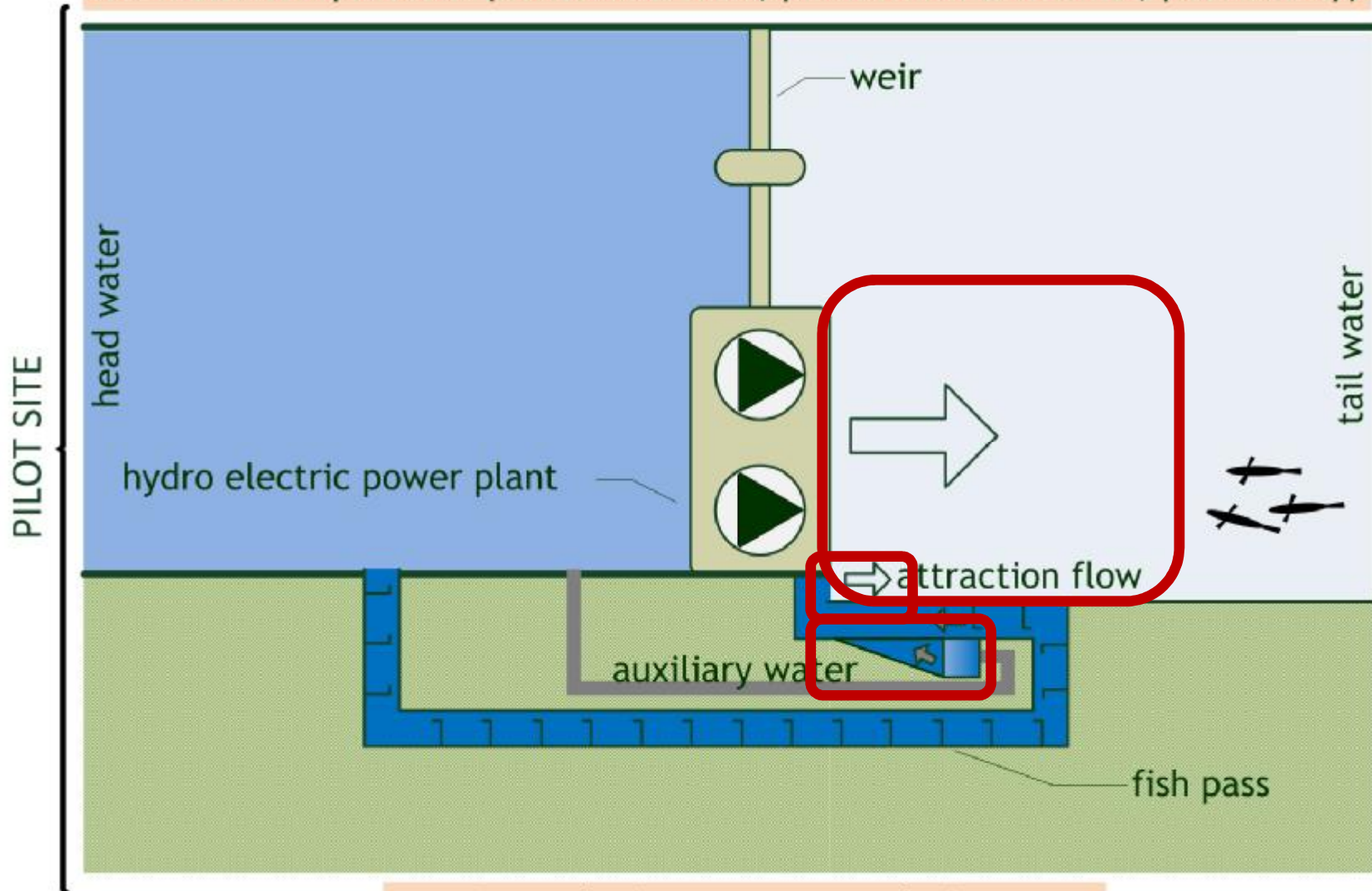
In my presentation, I want to deliver insights into:

- the designing process of pilot sites
- component optimisation by means of fish studies
- hydraulic models for attraction/auxiliary flow



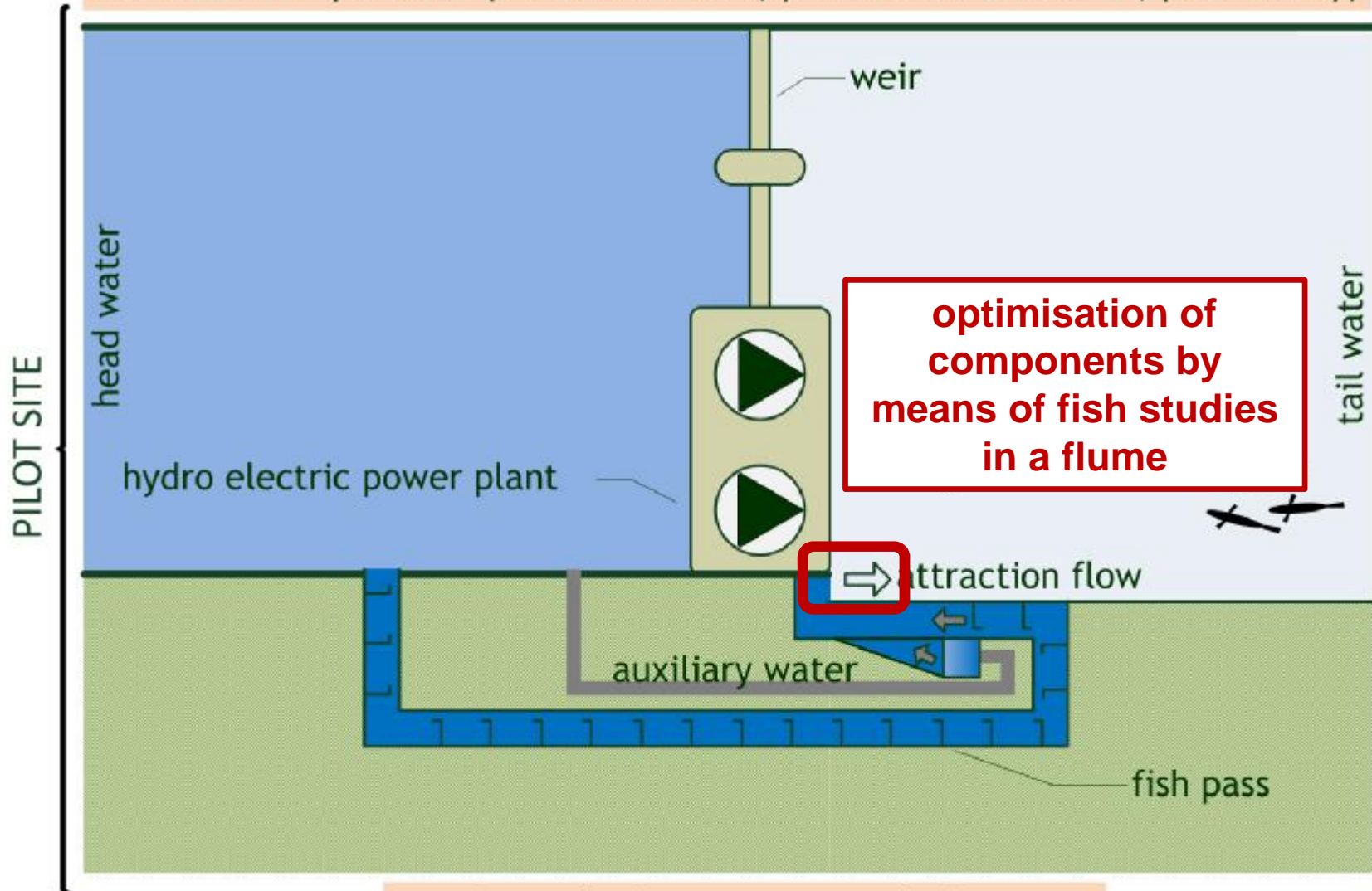
brief overview of our actual work and challenges

IN: research question (attraction flow, position of entrance, passability)



OUT: design recommendations

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OUT: design recommendations

observation area:

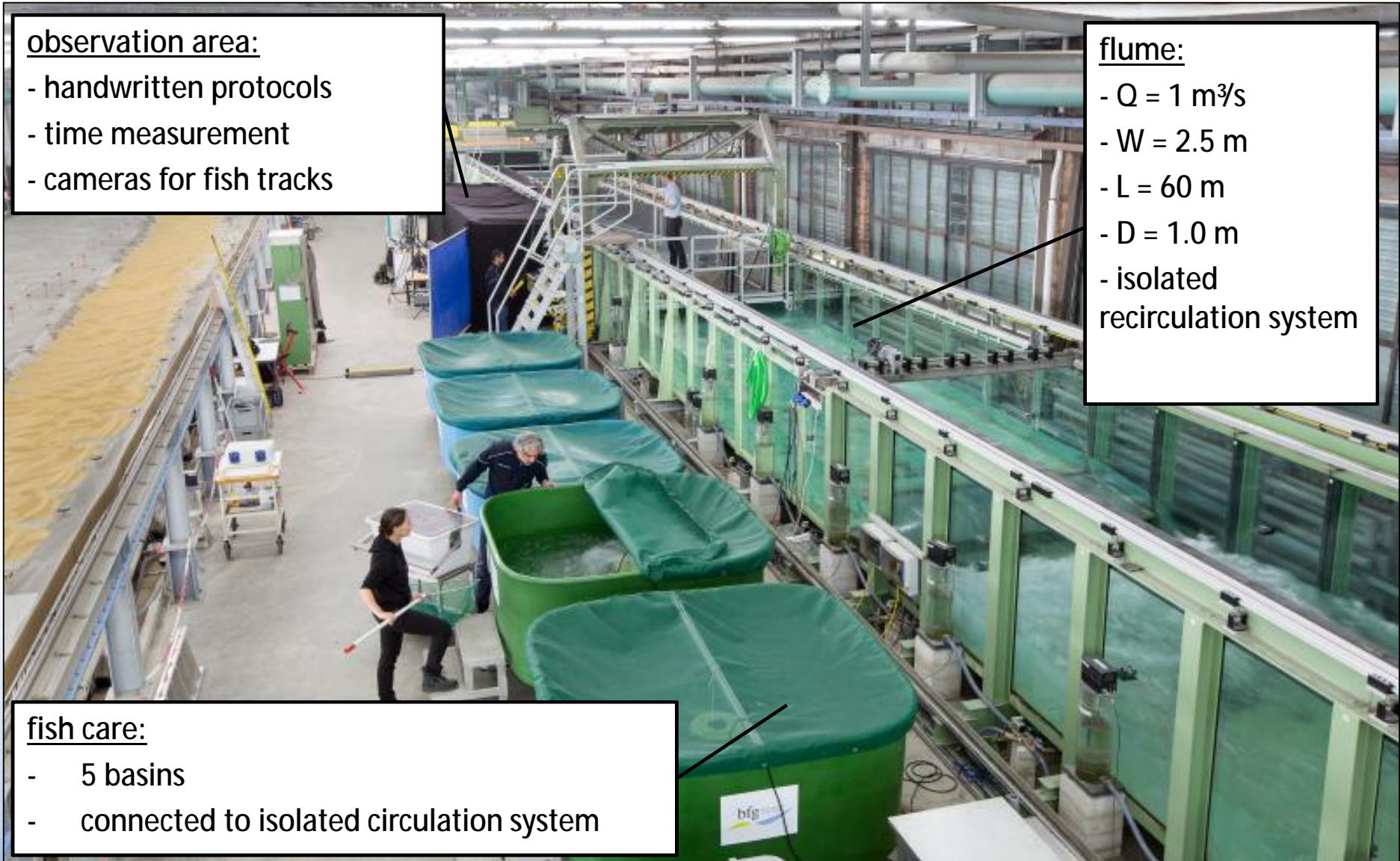
- handwritten protocols
- time measurement
- cameras for fish tracks

flume:

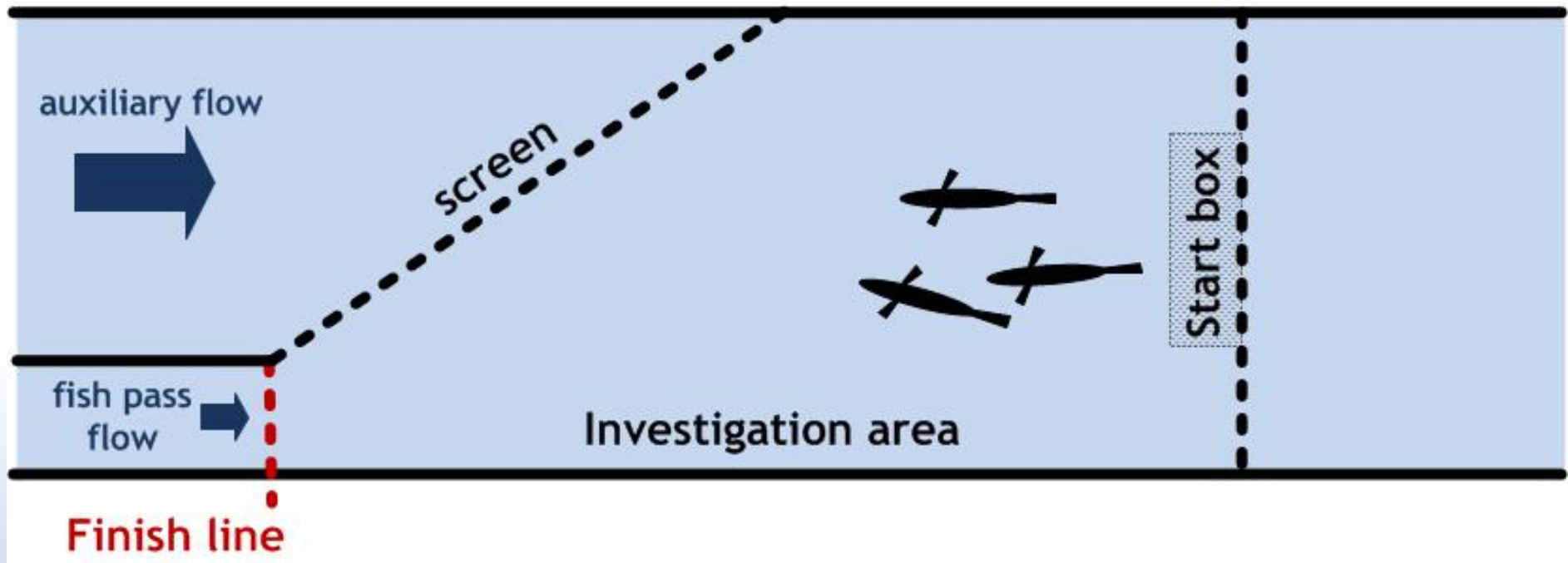
- $Q = 1 \text{ m}^3/\text{s}$
- $W = 2.5 \text{ m}$
- $L = 60 \text{ m}$
- $D = 1.0 \text{ m}$
- isolated recirculation system

fish care:

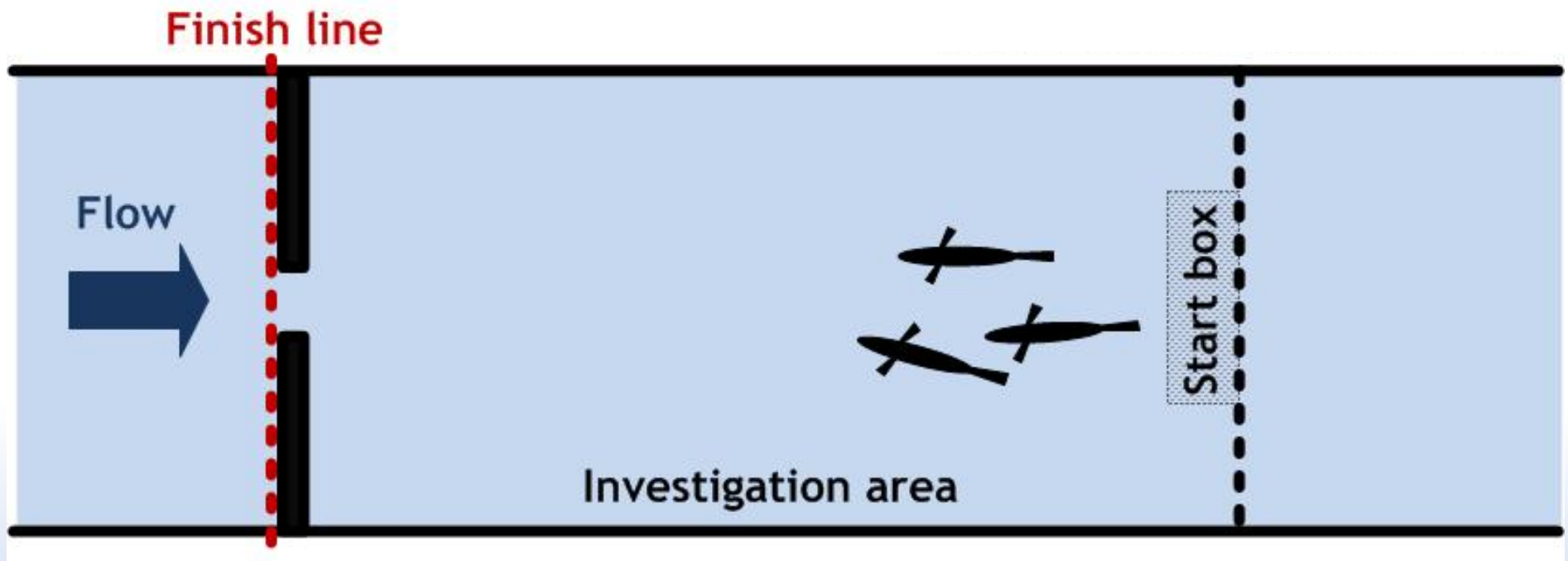
- 5 basins
- connected to isolated circulation system



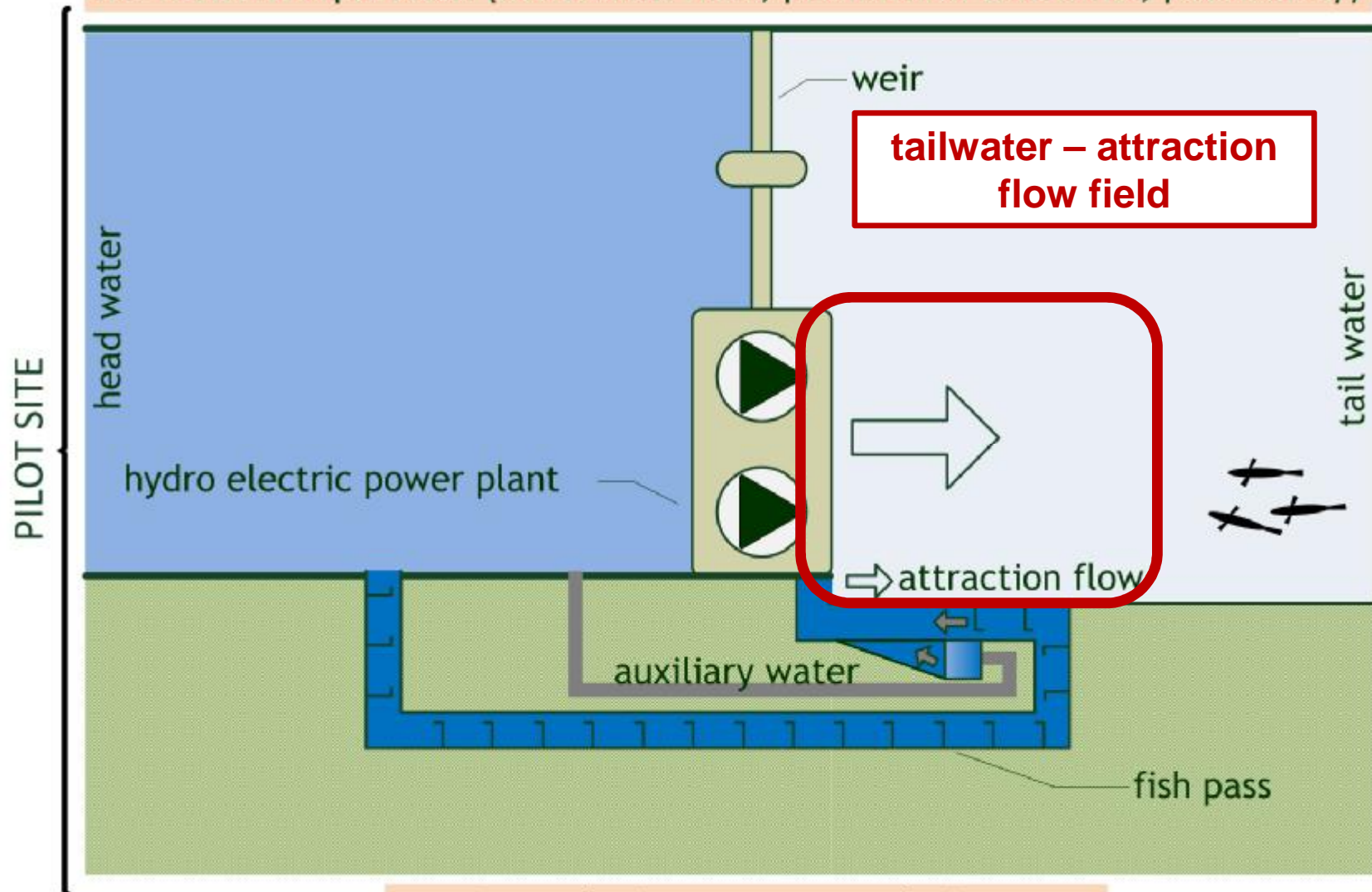
Experiment set up: **Optimisation of the inflow of auxiliary water**



Experiment set up for: **Optimisation of the entrance flow velocity**

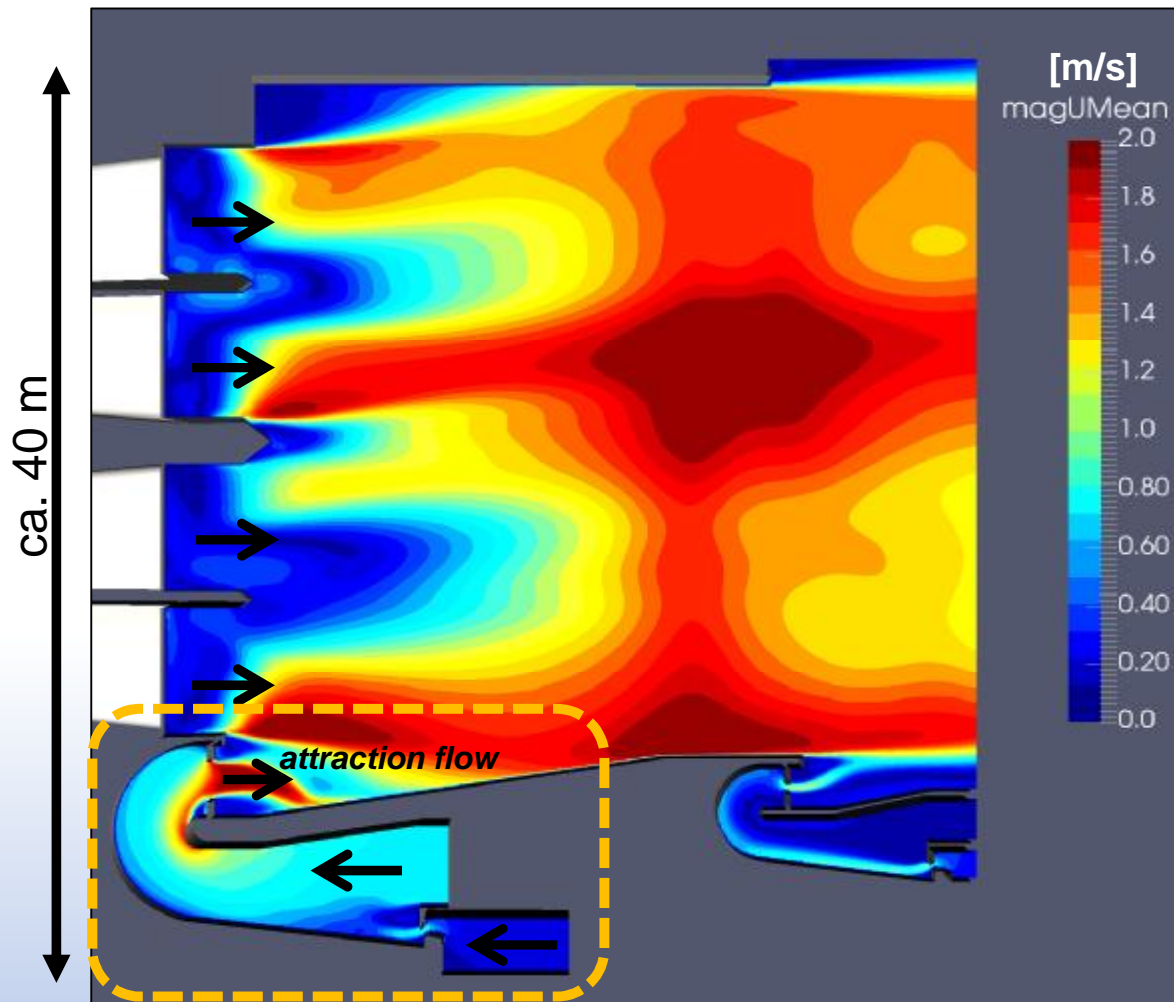


IN: research question (attraction flow, position of entrance, passability)



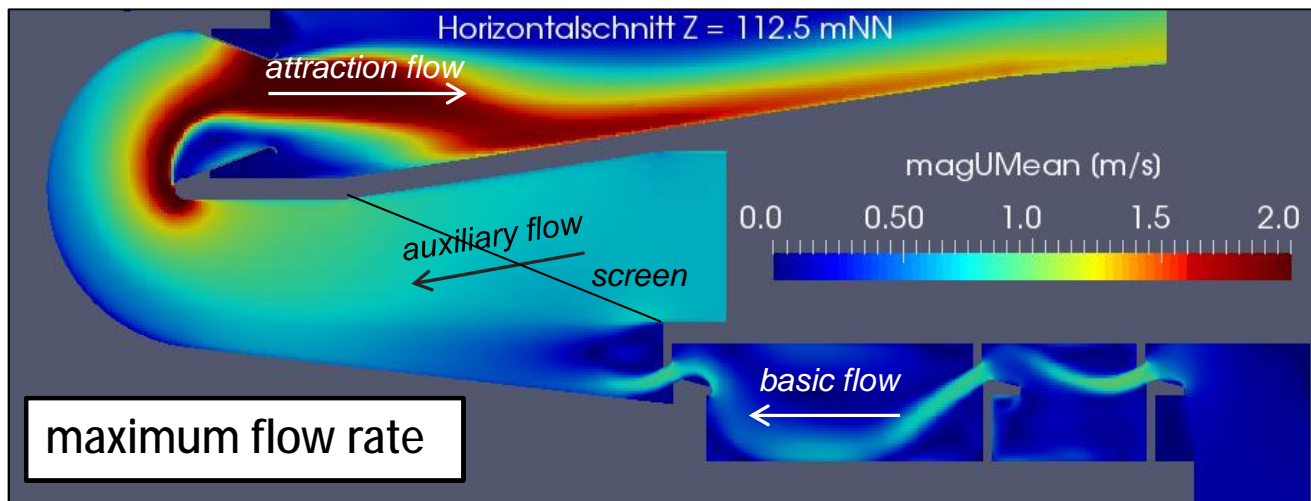
OUT: design recommendations

CFD-studies: **How to optimise attraction flow investigation**



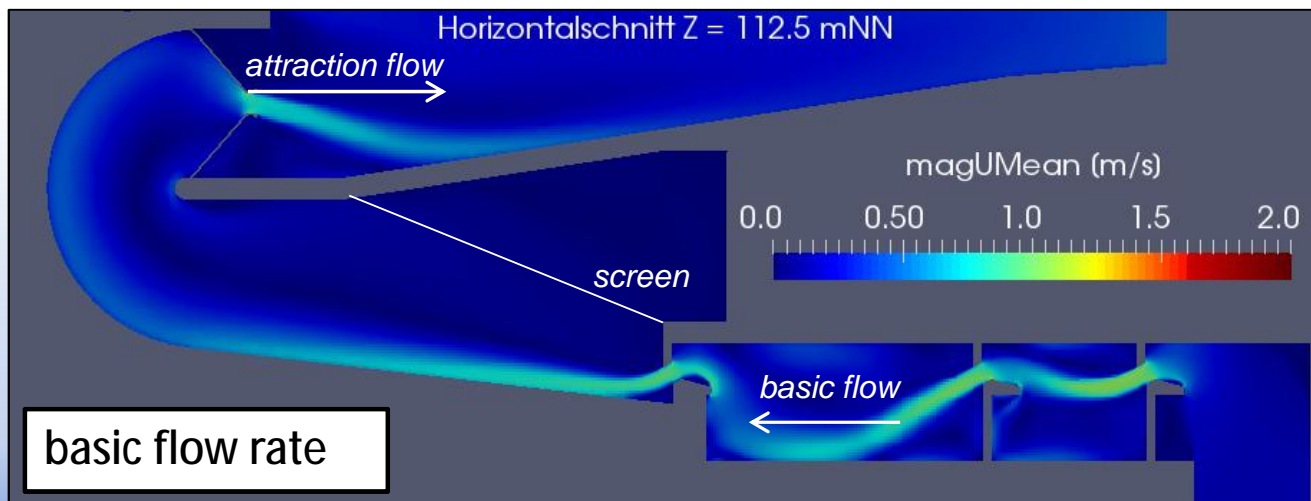
- Calibrate with help of field measurements
- Find scenarios for attraction-flow investigation
- Interpretation of flow fields regarding swimming performance
- Scenarios should be different enough to expect a considerable effect on fish numbers

CFD-studies: **How to optimise attraction flow investigation**

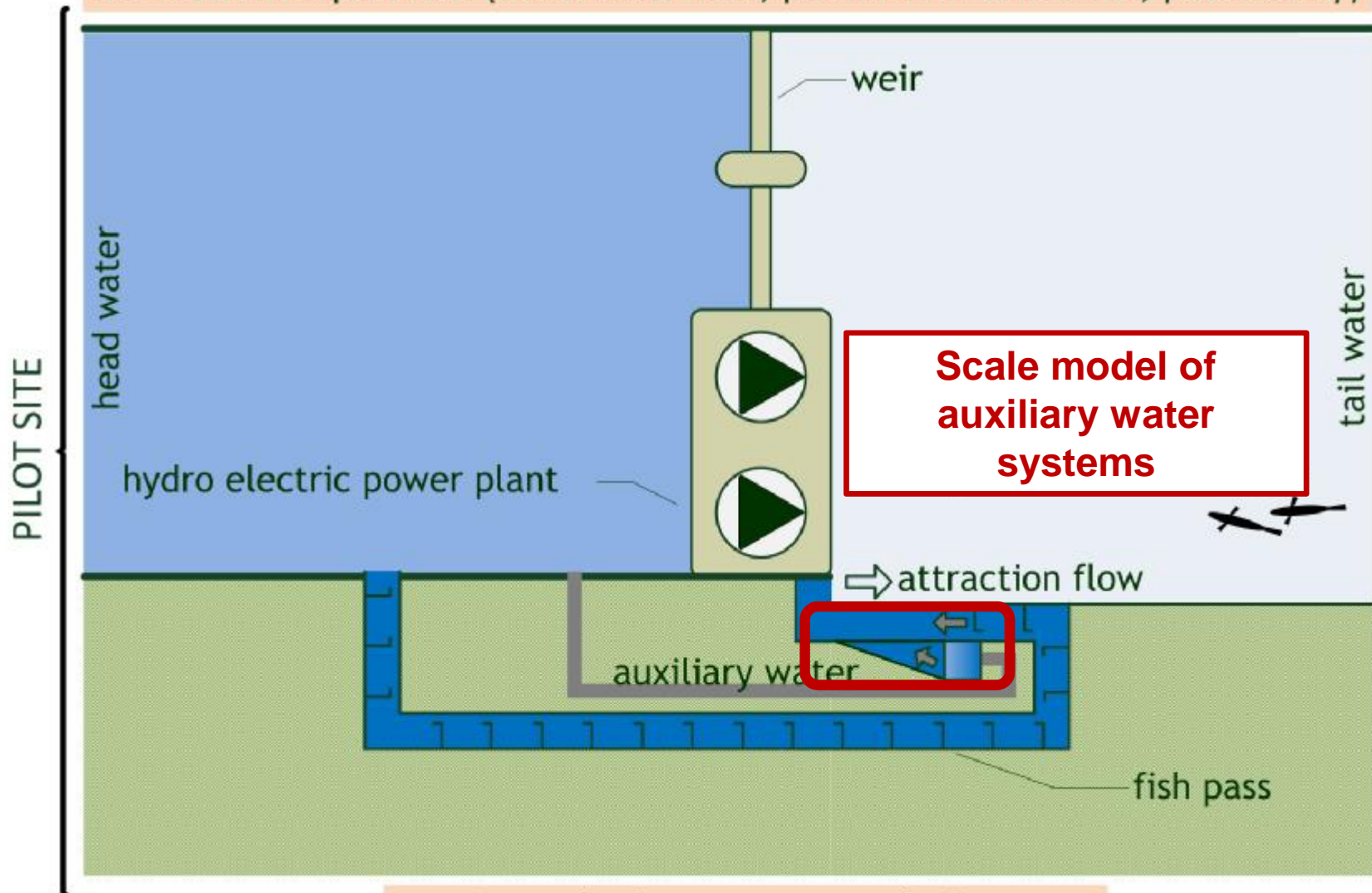


Challenges regarding attraction flow studies:

- large range of flow rates necessary → Large entrance pool
- How to ensure a comparable situation between different scenarios?



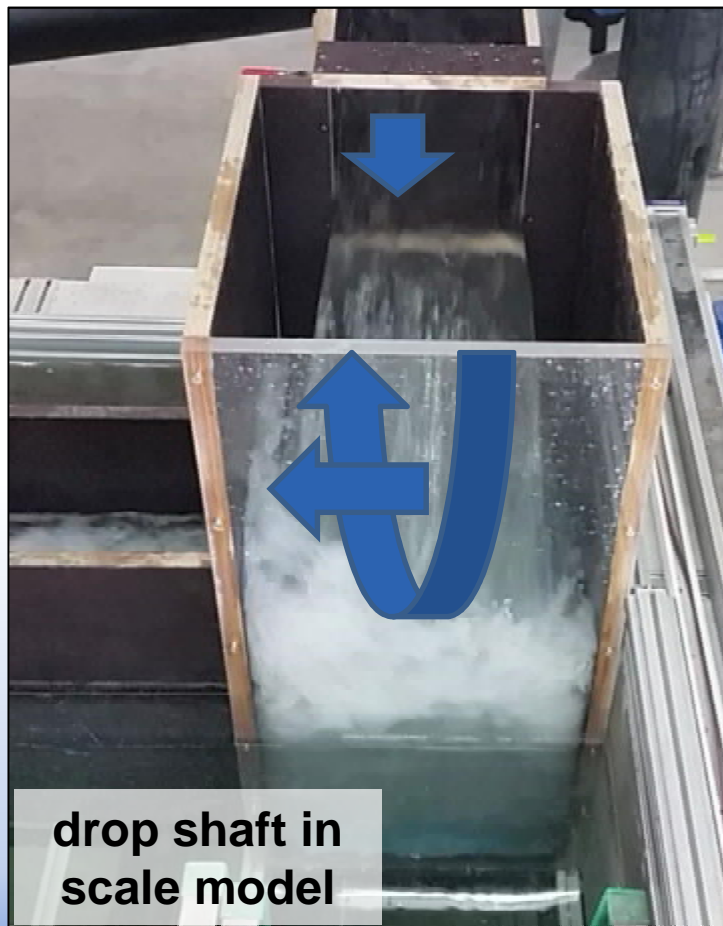
IN: research question (attraction flow, position of entrance, passability)



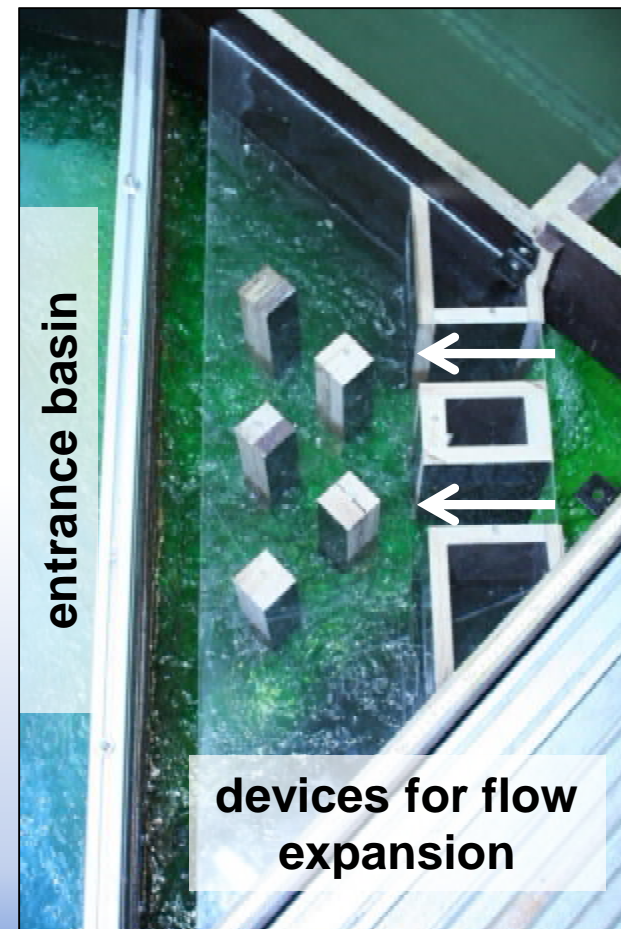
OUT: design recommendations

Research question: **How to discharge auxiliary water inside the entrance basin**

1) energy dissipation



2) flow expansion



IN: research question (attraction flow, position of entrance, passability)

Challenges for realisation of pilot sites:

- to design experiments regarding the interaction of fish and hydraulics (flow interpretation)
- to design fish studies in respect to the hydraulic conditions
- the design and evaluation of investigation scenarios difficult
- methods of fish counting are challenging (à next talk)
- Auxiliary water discharge inside of entrance basin
- ...

We would be happy to get in contact with other researchers who have to deal with comparable problems.

PILOT SITE

OUT: design recommendations

Thanks!

Joint project
"ecological connectivity"

of Federal Institute of Hydrology and
Federal Waterways Engineering and Research Institute

