

Jun 19th, 2:10 PM - 2:30 PM

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

Gerrit Fiedler

*Federal Waterways Engineering and Research Institute*

Martin Henning

*Federal Waterways Engineering and Research Institute*

Jennifer Wey

*Federal Institute of Hydrology*

Cornelia Schütz

*Federal Institute of Hydrology*

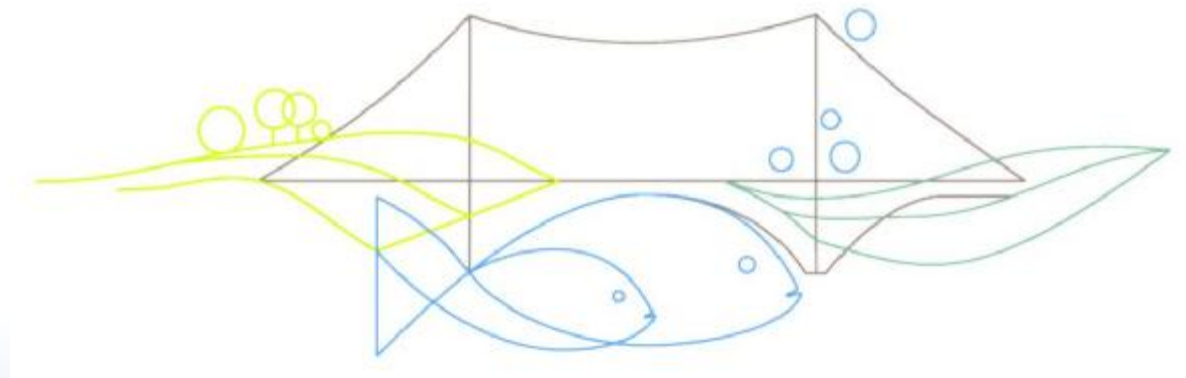
Follow this and additional works at: [http://scholarworks.umass.edu/fishpassage\\_conference](http://scholarworks.umass.edu/fishpassage_conference)

---

Fiedler, Gerrit; Henning, Martin; Wey, Jennifer; and Schütz, Cornelia, "Evaluation of fishway design for German Federal Waterways by means of fish studies" (2017). *International Conference on Engineering and Ecohydrology for Fish Passage*. 19.  
[http://scholarworks.umass.edu/fishpassage\\_conference/2017/June19/19](http://scholarworks.umass.edu/fishpassage_conference/2017/June19/19)

This Event is brought to you for free and open access by the Fish Passage Community at UMass Amherst at ScholarWorks@UMass Amherst. It has been accepted for inclusion in International Conference on Engineering and Ecohydrology for Fish Passage by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact [scholarworks@library.umass.edu](mailto:scholarworks@library.umass.edu).

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



GERRIT FIEDLER, MARTIN HENNING

Federal Waterways Engineering and Research Institute (BAW), Karlsruhe

JENNIFER WEY, CORNELIA SCHÜTZ

Federal Institute of Hydrology (BfG), Koblenz

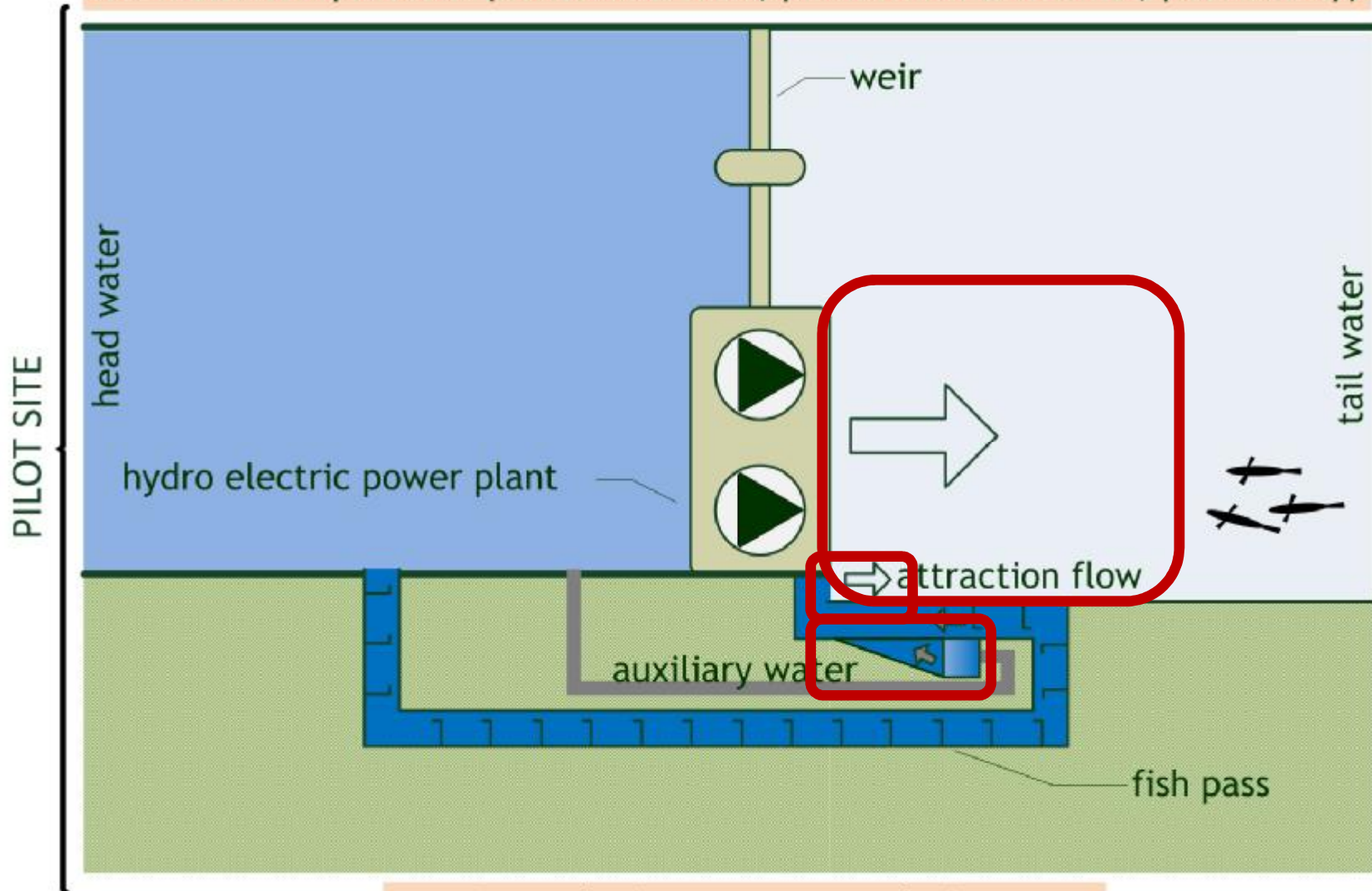
In my presentation, I want to deliver insights into:

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



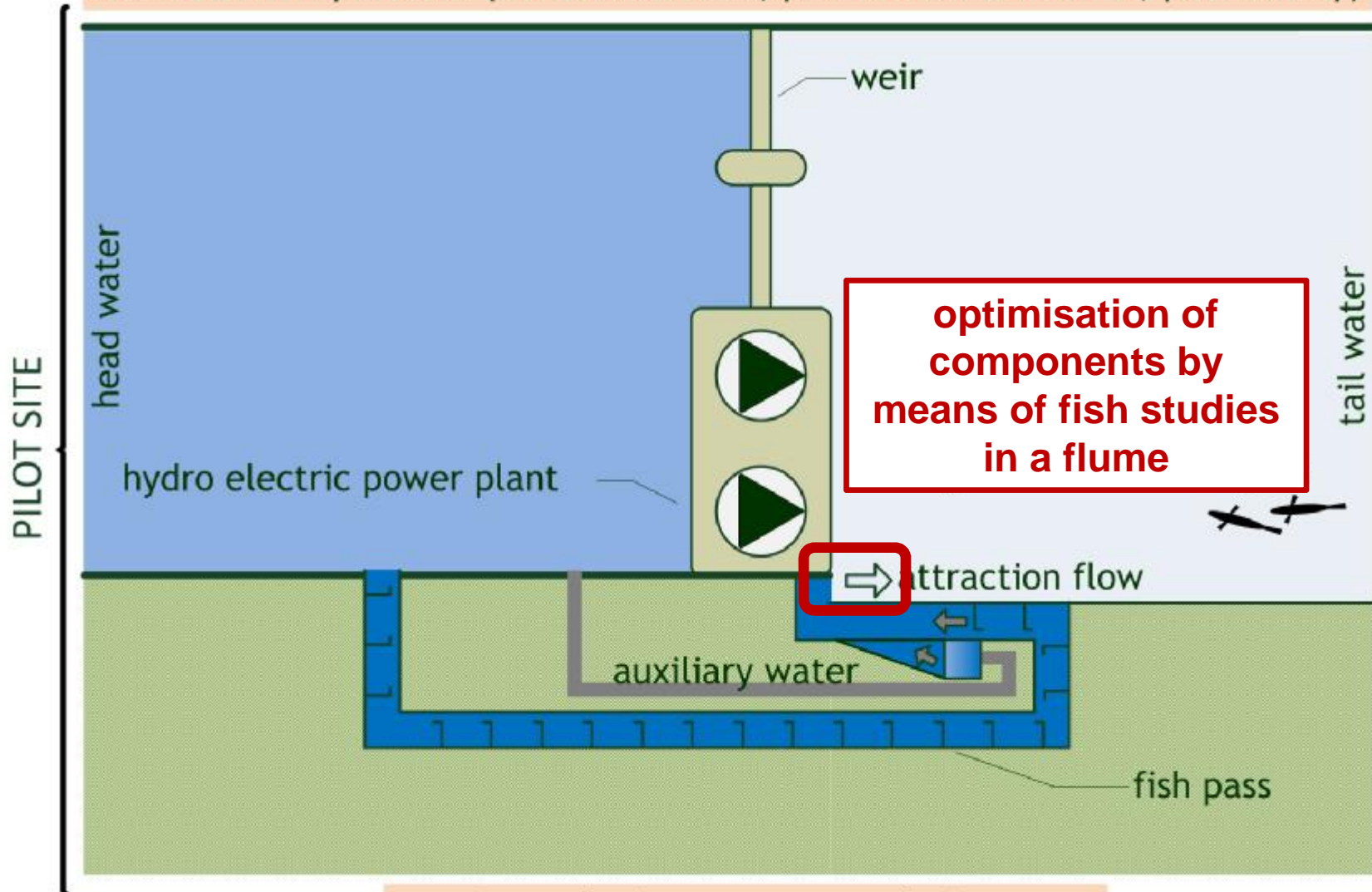
brief overview of our actual work and challenges

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



OUT: design recommendations

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



OUT: design recommendations



observation area:

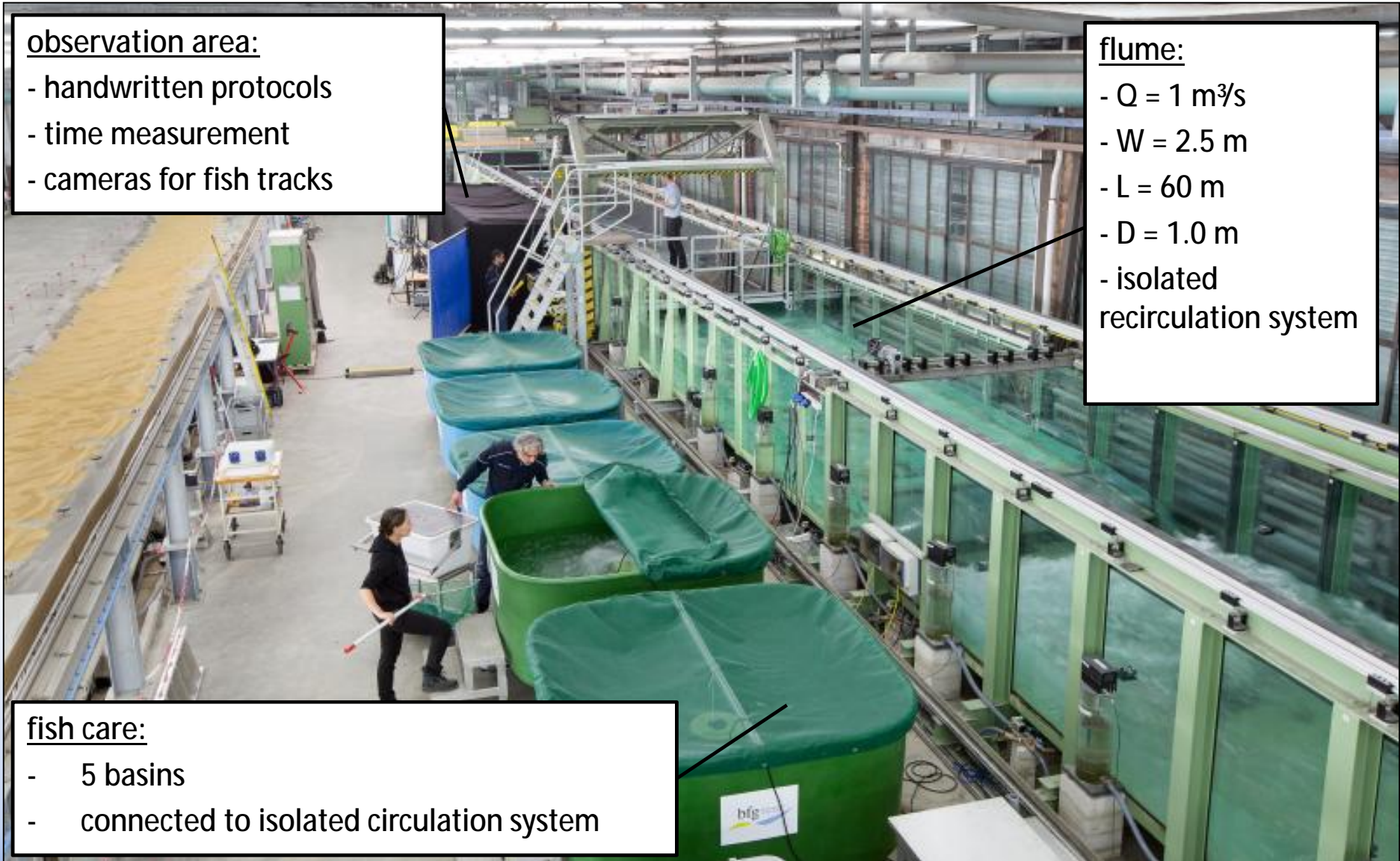
- handwritten protocols
- time measurement
- cameras for fish tracks

flume:

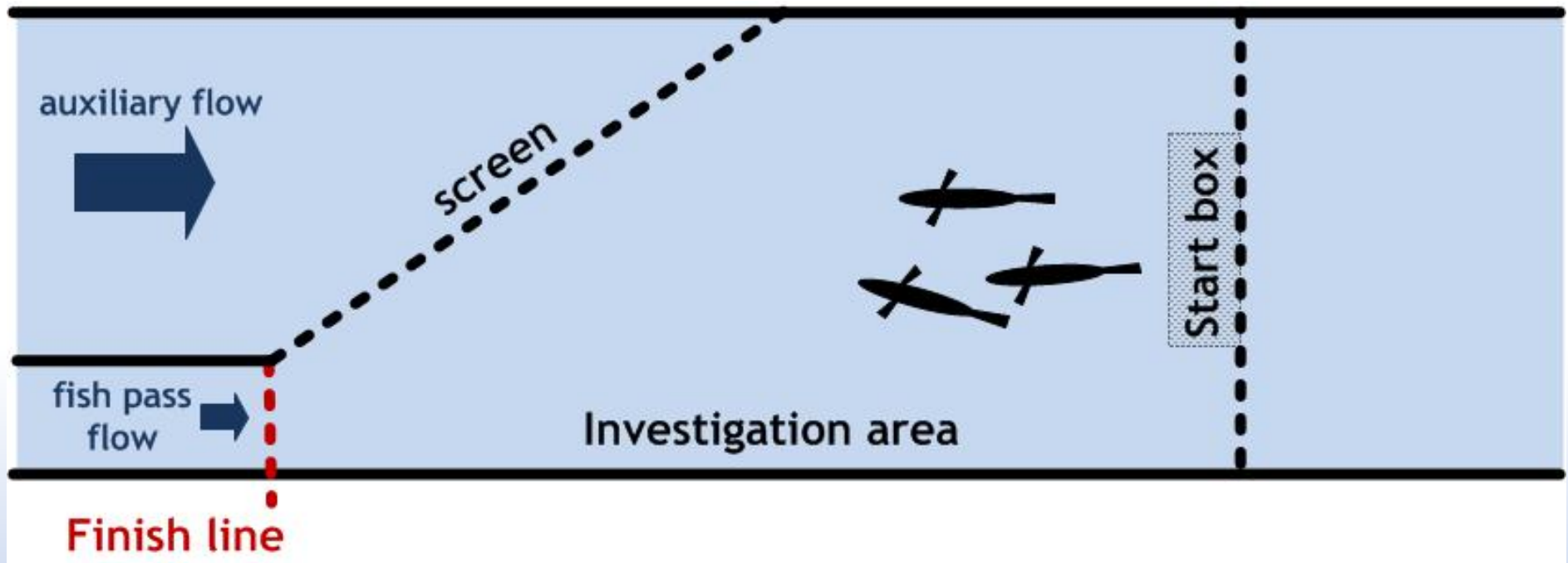
- $Q = 1 \text{ m}^3/\text{s}$
- $W = 2.5 \text{ m}$
- $L = 60 \text{ m}$
- $D = 1.0 \text{ m}$
- isolated recirculation system

fish care:

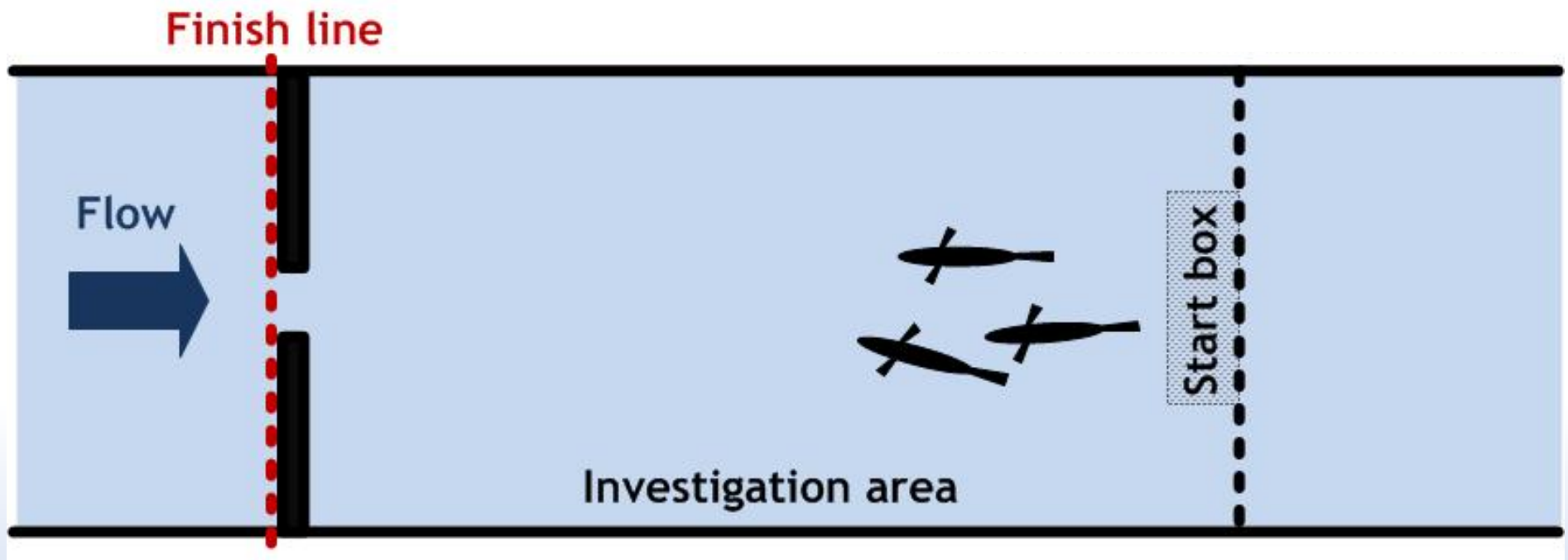
- 5 basins
- connected to isolated circulation system



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

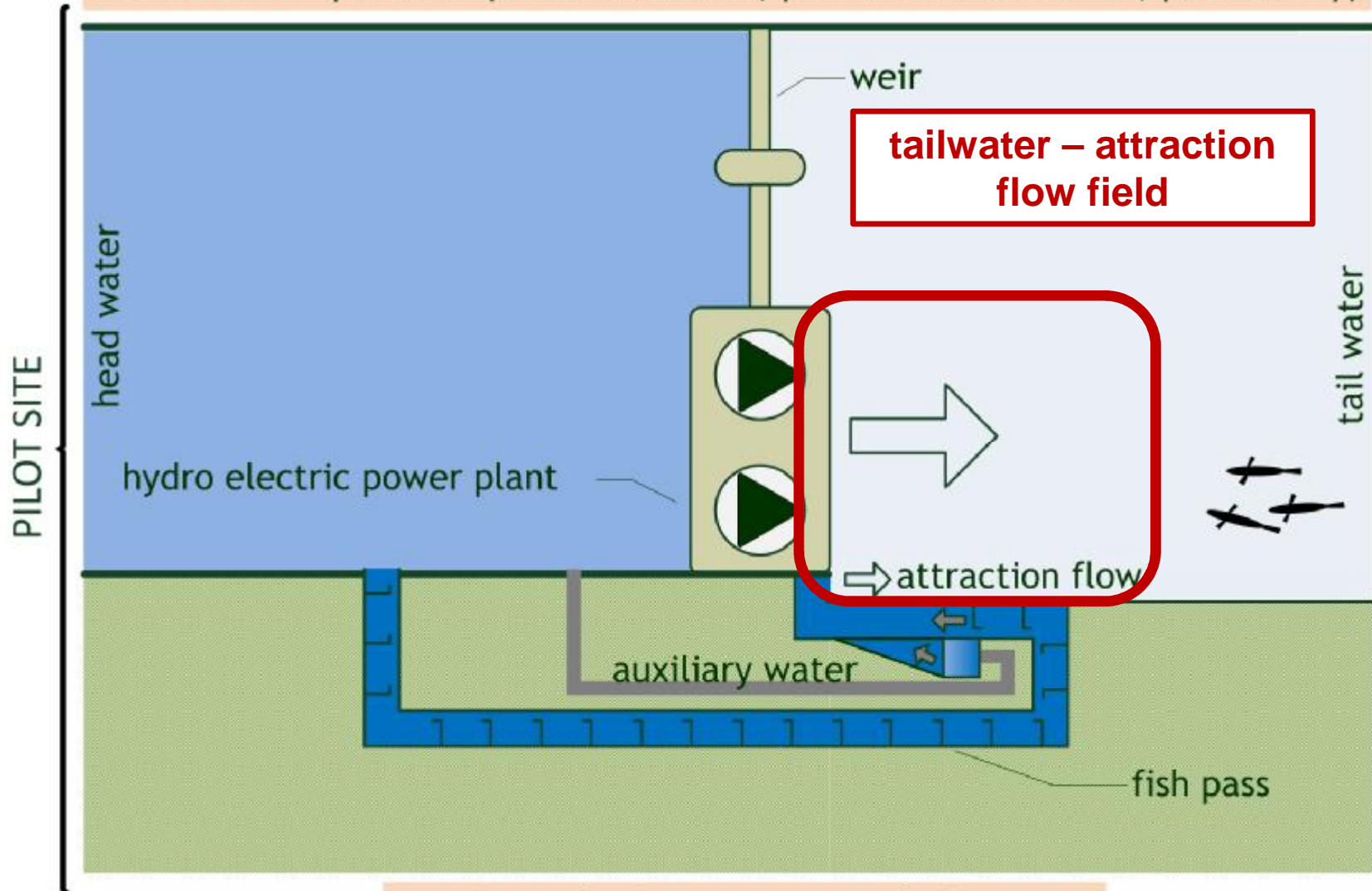


Experiment set up for: **Optimisation of the entrance flow velocity**



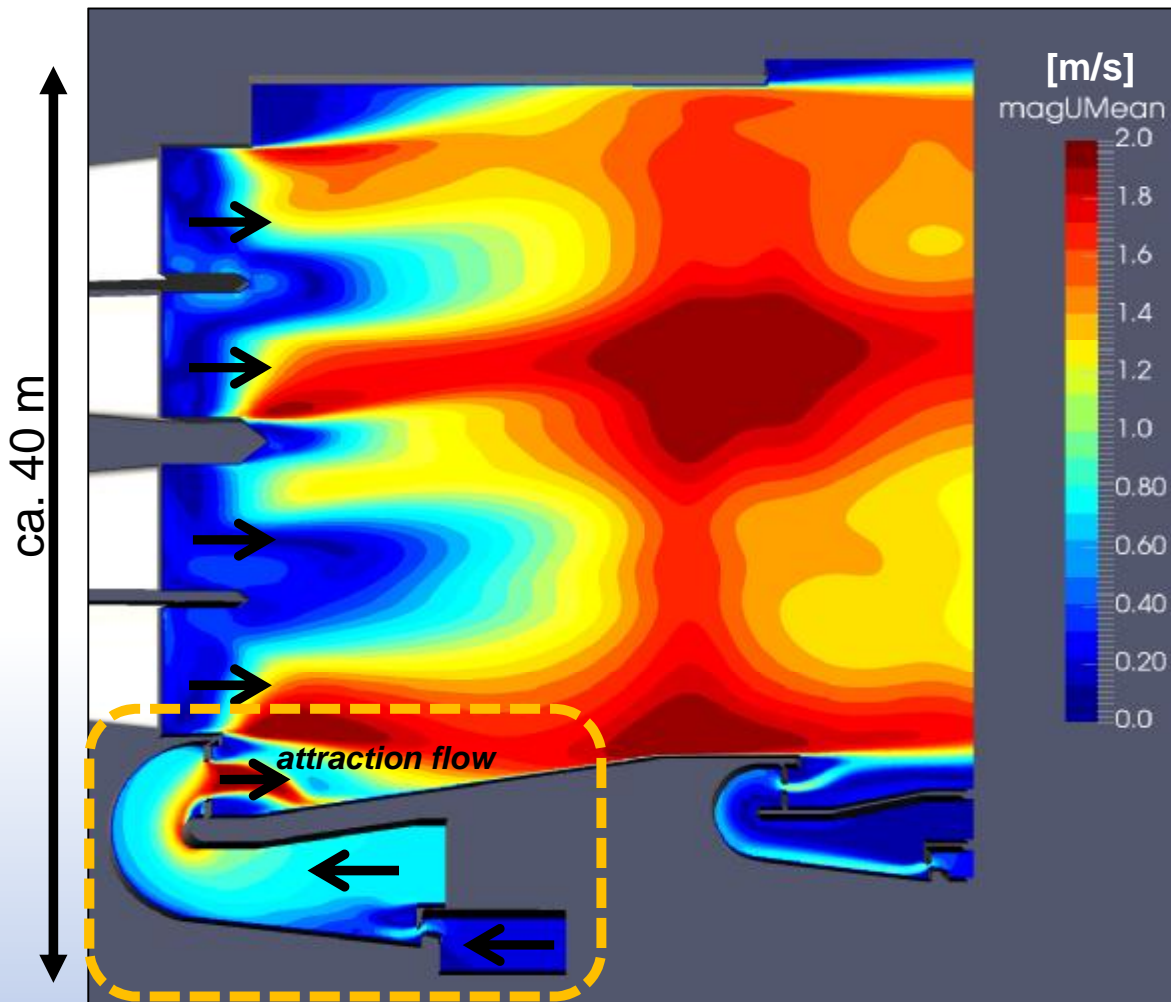


IN: research question (attraction flow, position of entrance, passability)



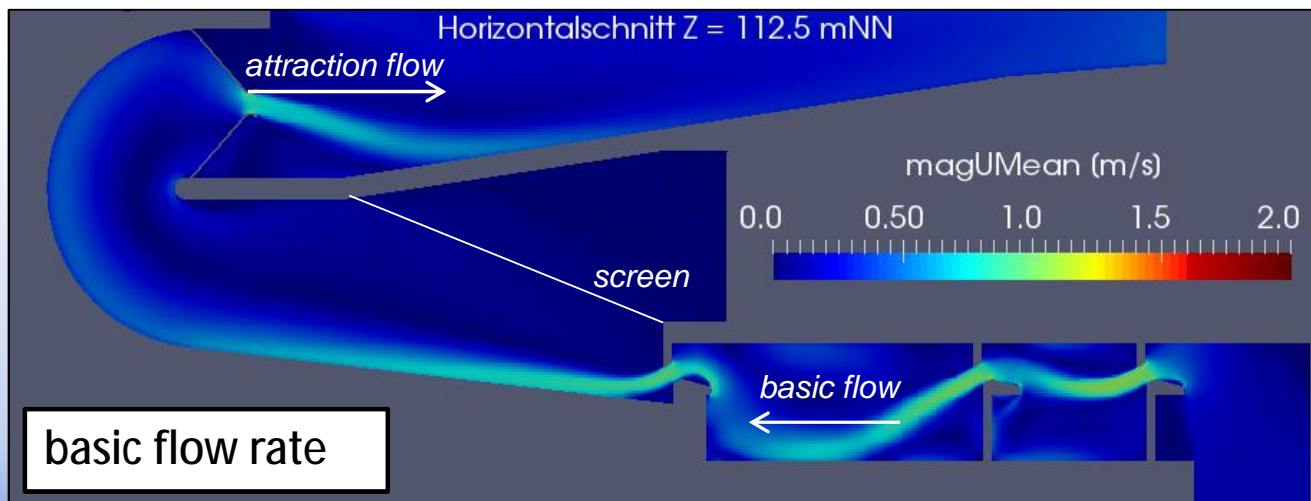
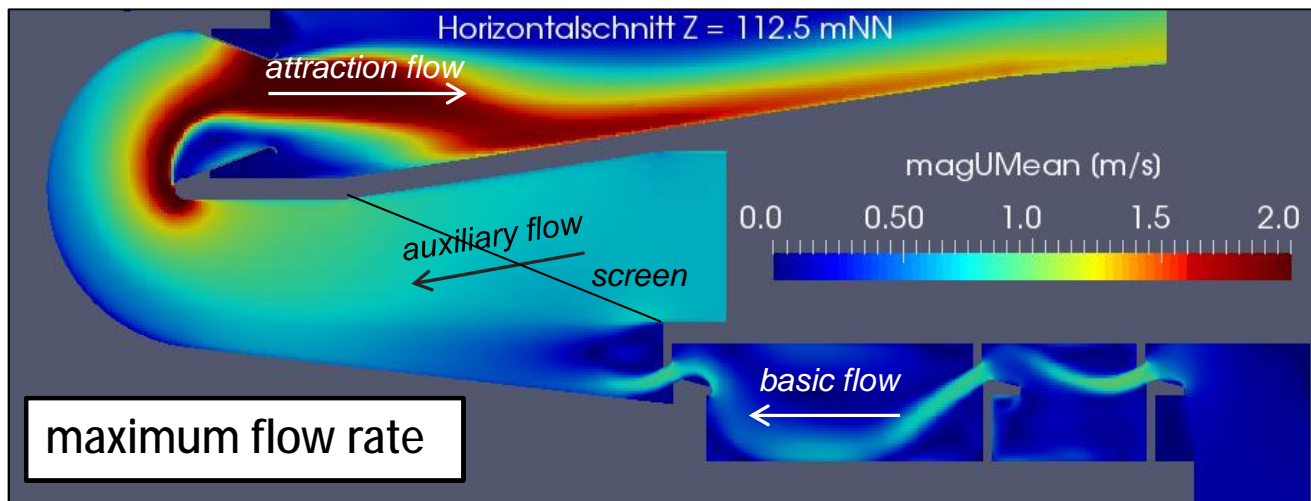
OUT: design recommendations

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**

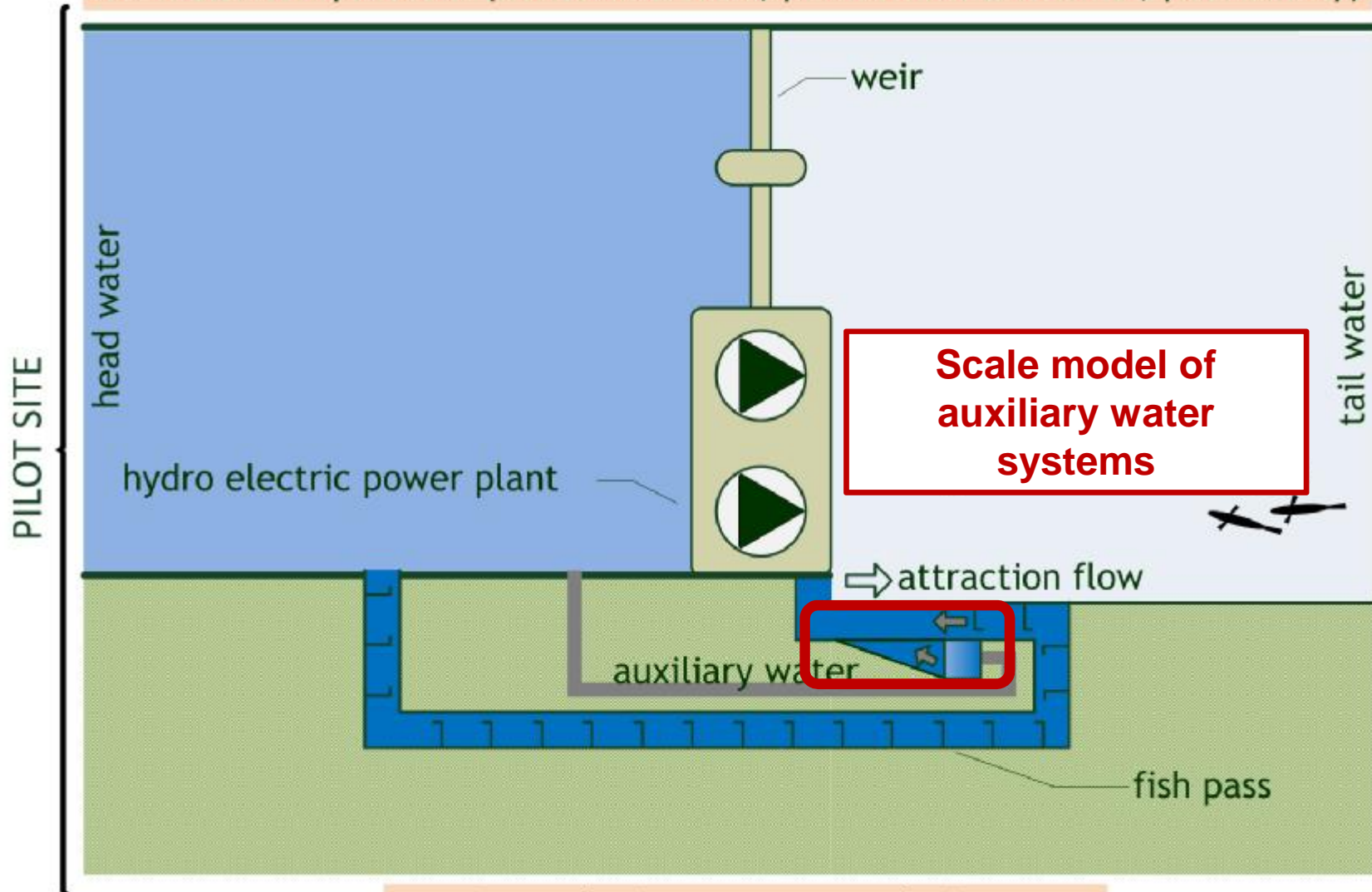


Challenges regarding attraction flow studies:

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



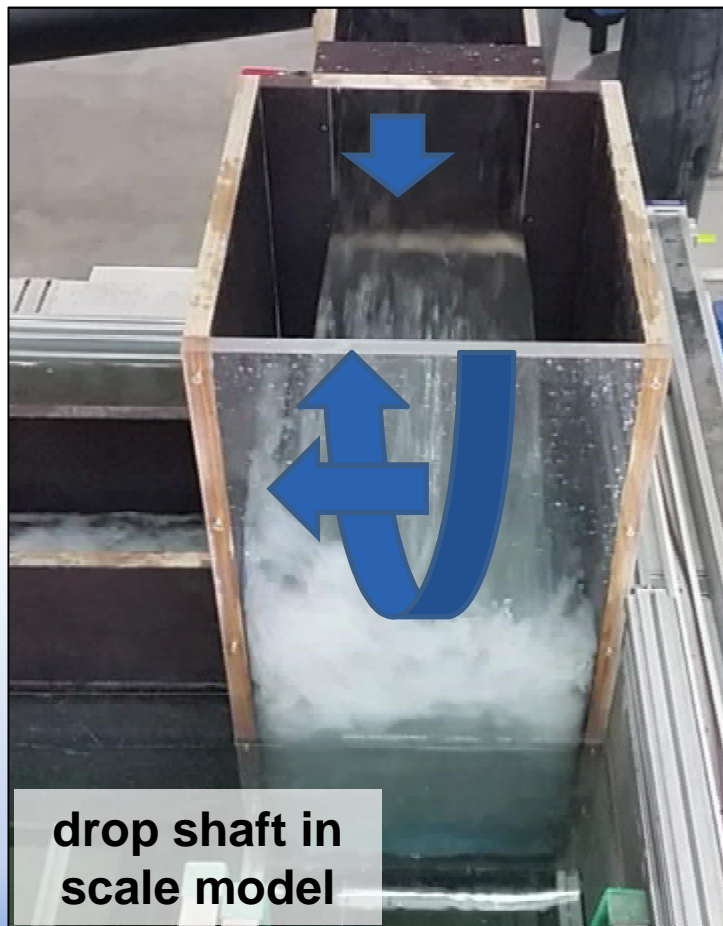
IN: research question (attraction flow, position of entrance, passability)



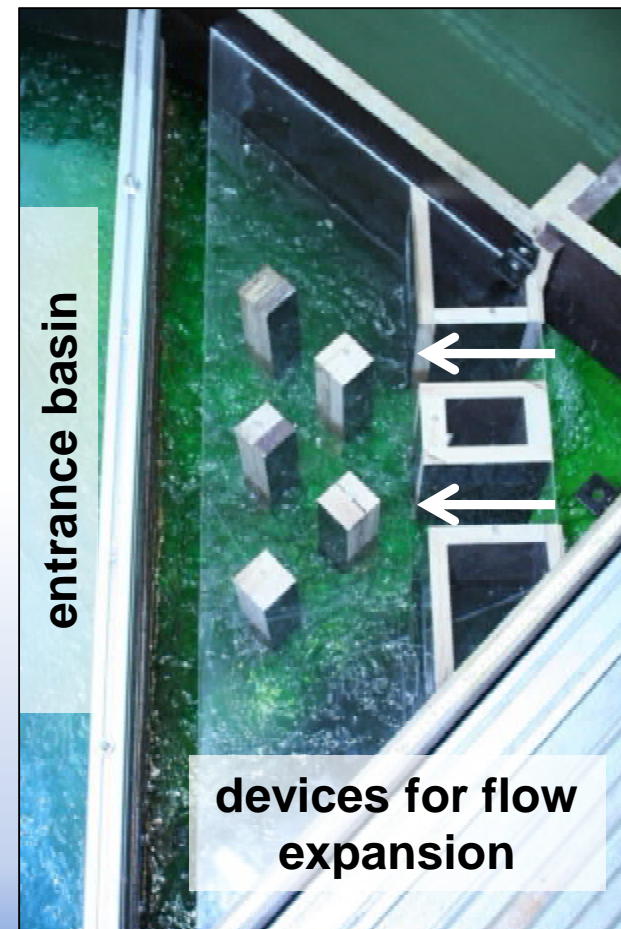
OUT: design recommendations

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 hydraulic conditions
- water-flow fields (swirling jets) 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.**

OUT: design recommendations

Thanks!

Joint project  
"ecological connectivity"

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

