PREDICTING THE EFFECT OF MITIGATION MEASURES AT NAVIGATION LOCKS ON FISH BEHAVIOUR

Introduction

Navigation locks play an important role for ship navigation on canals and other regulated waterways worldwide. Unfortunately, these structures may severely impact the aquatic ecosystem and freshwater fish in particular. In Belgium, the Albert Canal is an important migration route for European eel (Anguilla anguilla, critically endangered) and Atlantic salmon (Salmo salar, vulnerable). During their downstream migration, these fish are hampered by six subsequent navigation lock complexes present in the canal. Computational Fluid Dynamics (CFD) modelling can be used to quantify the hydrodynamics in the vicinity of these structures, and thus to investigate possible scenarios before implementing mitigation measures.

Methodology

The first step in developing a CFD model is constructing the mesh. For this thesis, a base mesh is already available, but will have to be adapted according to the investigated scenarios. An example is to implement a by-pass next to the navigation lock complex. In the next step, the open source CFD code OpenFOAM will be used to simulate the resulting flow. For the example, these simulations can be used to calculate which flow is needed to make the by-pass attractive for migrating fish.

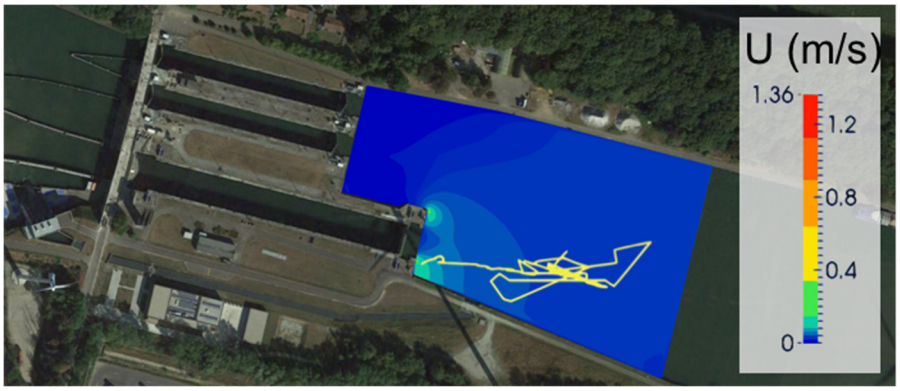

Figure 1 – CFD simulation superposed with fish track.

Objectives of the thesis

The objective of this thesis is to simulate different scenarios by means of CFD modelling, in order to predict the effect of mitigation measures on fish behaviour. The student will gain experience in CFD modelling and insight in the influence of hydrodynamics on fish behaviour.

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BACKGROUND

L&W, B&N, M

LANGUAGE

English/Dutch

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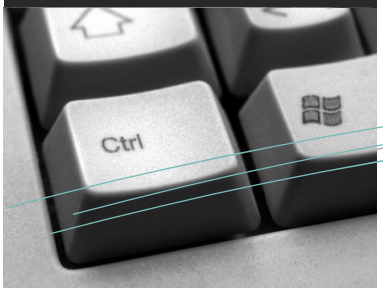

BIOMATH