

Acoustic positioning telemetry in reflective environments: a practical guidance for error analysis

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In Flanders (Belgium), the Albert Canal connecting the river Meuse to the Port of Antwerp and the river Scheldt, is an important migration route for European eel (*Anguilla anguilla*) in the silver eel stage, and Atlantic salmon (*Salmo salar*) in the smolt stage. In the coming years, new hydropower plants are to be constructed at the navigation lock complexes present in the canal. A first hydropower plant with Archimedes screws is already present at the sluice complex of Ham. However, the presence of turbines can cause significant injury to the migrating silver eels and salmon smolts. Additionally, migration might be delayed by the discontinuous sluice operation. Before mitigation measures can be implemented, it is important to gain understanding of the swimming behaviour of downstream migrating fish around the sluice complex. Therefore, we tagged 26 silver eels and 42 salmon smolts with acoustic transmitters in a Vemco Positioning System (VPS) to obtain swimming tracks. These 2D and 3D (10 silver eels) swimming tracks will later be analysed in relation to the hydrodynamics around the sluice complex with Computational Fluid Dynamics (CFD) modelling. Here, we present the first, indispensable, extensive analysis of the VPS tracks and the position errors to obtain knowledge about track accuracy. The analysis revealed the difficulties in using acoustic telemetry in a reflective environment with concrete walls, and indicates how reliable tracks with known accuracy can be nevertheless obtained, thus resulting in a practical guidance for acoustic track analysis in such environments.