HydroCen
NORWEGIAN RESEARCH CENTRE FOR HYDRO POWER TECHNOLOGY

FME FORSKNINGS-SENTER FOR MILJØVENNLIG ENERGI
Norges forskningsråd

Webinar: Environmental conditions

2. Fish Passage and fish monitoring technology

Host	HydroCen
Theme Managers	Ana T Silva, Marcell Szabo-Meszaros
Hydrocen partners	NINA, SINTEF, NTNU

Background

Hydropower industry has a long history in USA and Norway. River fragmentation and concomitant negative effects on free fish migration due to the presence of anthropogenic structures is common in both countries. Minimizing such negative environmental disturbances has long been prioritize by researchers and river managers, with strong efforts been devoted to this thematic. Norway and USA exhibit a leading role worldwide in this field of science and technology. Exchange of knowledge among the two countries via the recently established Memorandum of Understanding researchers will allow to increase scientific-based knowledge for the development of sustainable environmental-friendly hydropower.

Main objective

To explore the opportunities for collaboration between Norway and USA aiming to improve scientific knowledge on fish migration, fish passages and mitigation measures of HPP impact on aquatic systems.

Relevant work in the topic

In the past years NINA, SINTEF and NTNU have been developing conjoint research with the support of industry focus on fish up and downstream migration and improving and developing solutions to mitigate Hydropower impact on such phenomena. During 2015-2019 NINA had a large-scale research project (SafePass, funded by the Research Council of Norway and the HP industry) on fish migration solutions past hydropower installations involving both laboratory and largescale field studies. NTNU and SINTEF were main partners in this project. SafePass focused on field studies that linked detailed fish movement (from 2D and 3D telemetry) and hydraulics (CFD modelling) thereby providing vital information of the mechanism fish use during migration past hydropower intakes.

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NTNU NINA Norsk institutt for naturforskning SINTEF

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Atlantic salmon smolt and kelts, brown trout and silver eels were the target species of this project. The project also focused on testing different mitigation measures prior to field implementation by using CFD modelling. SafePass also established the best practice solutions for fish migration in Norway. Upstream migration was also a focus of Safepass with particular emphases on the retrofitting of existent fish passage for inland fish species (white fish, trout, grayling). The research group continues its collaboration and it is currently developing work on this topic in Hydrocen (https://www.ntnu.edu/hydrocen) and at an international level trough the collaboration with European (e.g EU project, FitHydro) and American colleagues.

Potential collaboration

Fish passage science and developing of monitoring technology implies a multi-disciplinary approach that can only be achieved by the joint work of biologist and engineers. The multi-disciplinary team of researchers in Hydrocen from NINA, SINTEF and NTNU have large experience on this topic and aim at advancing the current knowledge by developing innovative solutions for up- and downstream solutions for fish migration. The research team has vast knowledge and research experience on the following topics which can be based for a future collaboration with the USA colleagues: up- and downstream fish migration, hydrodynamics and fish biomechanics, fish behavior, fish conservation, fishways, 2 and 3D telemetry studies, optimization of mitigation measures, CFD modelling and hydraulic data collection and analysis. Exchange of knowledge and transfer of experiences between researchers from Norway and USA emerges as a great opportunity for improving scientific knowledge on this topic, as well as to develop new and expand the applicability of already existent mitigations measures at an intercontinental level.

Why a HydroCen-USA collaboration?

HydroCen offers a unique platform for such collaboration due to its cross-disciplinary nature, as well as its close involvement of the hydropower industry and management. Research on fish passage involves top competence on fish ecology and behaviour, hydraulics and engineering. The interdisciplinary of the research team of Hydrocen in combination with the high competence and motivation found within this organization allows for high level research on this topic. Development of cost-effective practical solution for fish passage and monitoring technology is of high importance for Hydrocen, that aims to “enable the Norwegian hydropower sector to meet complex challenges and exploit new opportunities through innovative technological solutions”.

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