



## **Development of an inflow controlled environmental flow regime for a Norwegian river**

Knut Alfredsen (1), Atle Harby (2), Tommi Linnansaari (3), and Ola Ugedal (4)

(1) Norwegian University of Science and Technology, Hydraulic and Environmental Engineering, Trondheim, Norway (knut.alfredsen@ntnu.no, +4773591298), (2) SINTEF Energy research, Trondheim, Norway, (3) University of New Brunswick, Fredericton, NB, Canada, (4) Norwegian Institute for Nature Research, Trondheim, Norway

For most regulated rivers in Norway the common environmental flow regime is static and shows very little variation over the year. Recent research indicate that flow regimes that follow the natural inflow variation can meet the ecological and social demands for water in a better way. The implementation of a variable environmental flow regime provides many challenges both related to defining flow for various species and user groups in the river, but also due to practical implementation, legislation and control. A inflow controlled flow regime is developed for a Norwegian river regulated for hydro power as a pilot study. The regime should meet ecological demands from Atlantic salmon and brown trout, recreational use of water and visual impression of the river. This should be achieved preferably without altering the energy production in the hydro power system. The flow regime is developed for wet, dry and normal discharge conditions based on unregulated inflow to the catchment. The development of the seasonal flow requirements for various targets identified is done using a modification of the Building Block Method. Several options are tested regarding the integration of the flow regime into the operational strategy of the hydropower plant, both using real time prognosis of inflow and combinations with historical data. An important topic in selecting the release strategy is how it meets current Norwegian legislation and how well future documentation and environmental control can be carried out. An evaluation protocol is also proposed for the flow regime to test if the ecological targets are met.