Kurzfassung:

Feasibility of habitat modeling techniques for environmental flow assessments in Northern
Rivers – comparison of models regarding preferences, validation and costs

Several ecohydraulic models are available for detailed studies of shorter river reaches. Most of these models are based on the same basic relationship between hydraulics and biology, but use different modeling approaches, input data and data analysis for the hydraulics and biological input. The objective of this study is to compare the models regarding their relevance in setting seasonal environmental flow requirements for river reaches. This approach focuses on the modeling process in total, how model variables vary as a function of flow in addition to the connection between the physical variables and the biological model. With this as a basis a comparison of four habitat hydraulic approaches were conducted. The software programs in focus were the Norwegian HABITAT (SSIIM hydraulics), the Canadian RIVER2D, the German CASIMIR and the French ESTIMHAB/StatHab. These models have been applied at a ca 40 x 500 meter reach (riffle – pool sequence) in river Surna in Mid-Norway. This reach has been surveyed and measured in detail regarding physical parameters in addition to biological data. The habitat hydraulic software programs were set-up and calibrated. As preference functions for various life stages of brown trout and Atlantic salmon we conducted habitat simulation using either 1) generalized Norwegian preferences, 2) fuzzy logic expert based preferences or 3) generalized preferences from literature. The model results were compared. The results related to setting environmental flow requirements from each model are presented and discussed in relation to the total habitat modeling process regarding each of the compared modeling tools. An evaluation of the pros and cons of each approach are given, with a final recommendation tree for management of trout and Atlantic salmon in Norwegian regulated rivers.