Impact of Hydropeaking on Spawning Substrate of Fish

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**Abstract:** Fishes are the important component of the aquatic ecosystem and bioindicators of the healthy river system. Their abundance and diversity are affected by the changes in flow regime and connectivity of the rivers, mainly due to anthropogenic interventions. Life stages of fish, such as spawning, feeding requires good substrate material in rivers, quality of which are degraded or lost due to hydropeaking operation of hydraulic structures. Understanding hydro morphological changes such as substrate can help predict the impacts of hydropeaking on fish habitat and their distribution. The restoration plan can then be formulated to restore or mimic the change in substrate to its natural state.

We conducted a laboratory experiment (Scale 1:50) to simulate one hydropeaking event, which corresponds to a large flow discharge with a short duration. The experiment was carried out in a curved flume with a dimension of 12 m long, 2 m wide. A 40 cm layer of size-fractionated non-cohesive sediment was spread on the base of the flume. The sediment had a median diameter (D50) of 0.95 mm, D10 of 0.55mm, D90 of 1.94 mm, and geometric standard deviation (σg) of 1.691mm, which represents gravel to cobble bed at a prototype scale. In the experiment we measured the maximum scour and particle size distribution of sediment in vertical layers after a hydropeaking event at 9 different locations in the channel. These arbitrary locations were considered as the areas of the spawning substrate. The maximum scour was measured with the help of scour chains made of light beads in thread. We found that the depth of the spawning substrate increased considerably during hydropeaking event, and we also found change in the particle size distribution of the substrate layer. As some fish species are sensitive to the depth of the spawning substrate and the sediment distributions, these preliminary results can have some implications on the number and diversity of fishes in the river.

**Keywords:** Ecohydraulics, Fish, Hydropeaking, Hydropower, Spawning