Behaviour of post-spawned Atlantic salmon (*Salmo salar*) migrating past a hydropower dam.

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ABSTRACT: As the climate crisis unfolds, renewable energy production is becoming increasingly important in the ongoing effort to transition from fossil fuel-based economies to green economies. Hydropower production, one such form of renewable energy production, represents an important industry, but can have negative consequences on ecological communities, and particularly migratory river species. One such species, the Atlantic salmon, *Salmo salar* (hereafter 'salmon'), is negatively affected by hydropower production during its up- and downstream migrations. Dams can impede, hinder, or delay salmon migration. Migration delays can result in lowered fitness, while swimming through turbines can result in injury or mortality. Some life stages of salmon are relatively well-studied, such as the downstream migrating juvenile fish and upstream migrating adults. However, very little is known about the downstream migrating post-spawner adults (hereafter 'kelts'), an important salmon life stage with high conservation value. Particularly, baseline knowledge about how kelts interact with different hydraulic conditions, which is crucial for developing cost-efficient and safe methods to help kelts bypass dams and reduce migratory delays, is limited. Thus, the aim of this work is to gather baseline information about how salmon kelts interact with different hydraulic conditions present at a hydropower dam. To do so, tracking data was collected from forty-eight kelts in the River Orkla, Norway, upstream of the dam at the Svorkmo hydropower plant. This tracking data was coupled with hydraulic data simulated using computational fluid dynamics model (OpenFOAM). We first assessed the passage efficiency of the kelts at the dam. Next, we assessed various characteristics of kelt swimming behaviour, including swimming depth preferences and swimming speeds. These results are a first evaluation of kelt swimming behaviour directly related to the hydraulic conditions present upstream of a hydropower plant. Thus, they should be insightful to those interested in the interaction between hydraulics and fish behaviour, as well as those interested in downstream passage solutions and river management.