Evaluating Flow Ramping Effects at Run-of-River Hydroelectric Projects

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Abstract

Run-of-river hydroelectric projects do not have many of the environmental issues associated with large storage projects, however, they do have the potential to increase flow ramping rates. Flow ramping (a rapid decrease in water level downstream of dams and powerhouses) can strand and isolate fish, cause mortality, and violate the Fisheries Act.  High rates of hourly stage change have been documented at some run-of-river facilities during both planned and unplanned operations, and fish kills have been observed, though the frequency and magnitude of these events is not well understood.   Generic protective stage change rates (ramping rates) provide a starting point for setting flow change rates at hydroelectric plants, however it is not known whether these are sufficiently protective or too restrictive. Accordingly, ramping rates have been set for individual projects based on field testing of hydrometric response, patterns of habitat dewatering, and fish behavior.  Alternative metrics of ramping impact have been developed and are now being evaluated via ongoing monitoring, however, interpretation of these results is hampered by a lack of information on habitat use, fish behavior, and physical factors influencing fish stranding.  Applied research into habitat use, behavioral responses to flow change, and population modeling of the effects of flow ramping would allow for more effective management of flow ramping issues.