Effects of hydroelectric dam ramping rate regimes on the length-weight relationships of four freshwater fish species

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Abstract

Hydroelectric dams alter the physical environment in downstream river reaches, which can impact the condition of fish populations living in those reaches. However, the operation of hydroelectric dams, including their ramping regimes, can be managed and regulated in an attempt to mitigate possible negative impacts on fish species. Fish length and weight data were collected over a period of nine years from two Northern Ontario boreal forest rivers: the Magpie River (regulated) and the Batchawana River (unregulated). The sampling period included two distinct hydroelectric ramping rate regimes on the regulated river. The weight-length relationships of four numerically abundant fish species with a range of life history characteristics were analyzed to determine the effect of ramping rate regimes on fish condition: Longnose Dace (*Rhinichthys cataractae*), Slimy Sculpin (*Cottus cognatus*), Brook Trout (*Salvelinus fontinalis*) and Trout Perch (*Percopsis omiscomaycus*). The effects of water temperature and discharge on weight-length relationships were also examined to determine if either factor significantly influenced growth patterns. Strategies for identifying the causal mechanisms of differences in fish condition between natural and regulated flows will be discussed.