**IMPACT OF CASCADE DAMS ON FISH HABITATS AND ALLEVIATION MEASURES IN UPPER YANGTZE RIVER**

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Water temperature and flow velocity are key habitat factors affecting fish spawning. The cascade reservoirs changed river’s natural hydrological process and water temperature rhythm. The impact of cascade dams on fish habitats has received widespread attention, but most studies focus on the impacts of flow velocity alteration of fish spawning ground, and less attention has been paid to the impact of water temperature process changes on fish reproduction, especially the impact of water temperature on fish gonad development. This study considered dual habitat impact factors for fish spawning including flow velocity and water temperature. We carried out fish spawning and reproduction experiments, by setting up different experimental scenarios of water temperature (high temperature, normal temperature, low temperature) and flow rate (flowing, static), and analysed the impact mechanism of the flow velocity and water temperature on fish reproduction. Based on the long-term field observation data of the cascade reservoirs in the upper reaches of the Yangtze River and the experimental results, the threshold ranges of the flow rate for fish spawning and egg hatching were determined, as well as the rhythmic requirements of the threshold of the accumulated temperature of gonad development and critical water temperature of spawning. In addition, the ecological flow was proposed to synchronously meet the needs of hydrological and water temperature processes for the target fish reproduction. Furthermore, we utilized the environmental DNA-based technology and traditional investigation methods to select the compensation tributaries for habitat requirements of target fishes. The feasibility and efficiency of removing small hydropower dams in tributaries which were considered as a habitat compensation measure were also tested. Overall, this study has provided an important basis on which to better understand the impact mechanism of dam construction on key factors of fish habitat, and propose the alleviation measures for the restoration of fish spawning habitat, which is conducive to promoting the coordinated development of hydropower development and ecological protection.