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MITIGATION MEASURES FOR FISH PASSAGE IN STANDARD BOX CULVERTS: PHYSICAL MODELLING

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Abstract:

Road crossings and culverts are common man-made structures along river courses, ranging from national highways to rural roads and urban networks. Present expertise in culvert hydraulic design is deficient because many empirically-based guidelines are often inadequate for fish passage. This project focused on the development of simple solutions for box culverts, with the aim to maximise slow flow regions suitable for small-bodied fish passage and to minimise the reduction in discharge capacity. Herein a physical study of box culvert was performed under controlled flow conditions, and seven designs were tested. In all the cases, the turbulence of the flowing waters was used to assist with fish migration. One baffle configuration presented promising results: i.e., small corner baffles. The triangular baffle system produced little additional afflux, while creating excellent recirculations both upstream and downstream of each baffle. Another configuration was based upon a rough bed and sidewall, enhancing secondary currents and recirculation in the corner region. This resulted in flow conditions that would be suitable to small-bodied fish passage.

Keywords: Standard box culvert; Small fish passage; Baffles; Rough boundaries; Secondary currents; Physical modelling.

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