

Remove or modify structures to increase access for fish and eel

Project Summary

Title: Stoke-on-Trent Fish Passage Improvements

Location: Stoke-on-Trent, England

Technique: Low-cost baffles on weir apron

Cost of technique: ££

Overall cost of scheme: ££

Benefits: ££

Dates: 2011-2013

Mitigation Measure(s)

Remove or modify structures to increase access for fish and eels

Change the way structures are operated to reduce barriers to flow, sediment transport and fish/eel migration

How it was delivered

Delivered by: Environment Agency

Partners: Royal HaskoningDHV; Fishtek

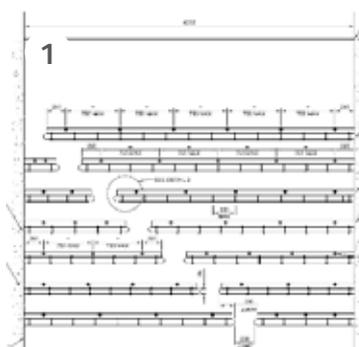


All images © Environment Agency copyright and database rights 2013

Background / Issues

Stoke Weir is a 4 m wide crump weir used to historically gauge river flows for flood warning purposes. The structure was a major barrier to fish passage during most flow conditions, with a drop in water levels of approximately 1.5 m over the structure. Because of the on-going gauging function of the weir, any improvements to fish passage had to avoid adversely affecting the accuracy of the gauging equipment.

In order to improve fish passage over the rump weir without affecting its flow gauging function, a series of low cost plastic baffles were bolted onto the downstream face of the existing weir, creating a minor impoundment over the apron of the weir that retard the flow of water, increasing the water depth and reducing the velocity, therefore, improving fish passage.



(1) Plan of baffles on downstream weir face (crest of weir at top of diagram);
(2) Baffles prior to construction

Step-by-step

Site preparation

- Fish strainers installed upstream of weir to prevent fish from accessing the structure during construction; silt boom placed downstream of weir to minimise the risk of concrete waste being entrained in the river.
- Consultation between Environment Agency hydrometry staff and fisheries staff to agree what compromise could be met regarding water levels for differing functions (fish & gauging).

Installation

- Weir brushed to remove vegetation.
- Hole drilled into weir and individual 200 mm tall, 75 mm thick baffles affixed to the weir face, placed approximately 100 mm downstream from one another. Process repeated for all baffles, working up the weir face.

Post construction

- Pumping equipment and flow barrier removed.
- Monitoring of water levels over the weir. Migratory fish observed passing upstream and impacts on gauging accuracy were minimal following conversion rate calculations (to allow comparison between historical data and new data).



Clockwise from top left:

- (1) Weir prior to baffle installation;
- (2) Site during construction;
- (3) Low cost baffles prior to installation;
- (4) Upstream debris collectors

Benefits

- The weir allows passage for migratory fish (but not for all coarse fish during some flows).
- Approximately 1 km of river open upstream of the structure for additional fish passage and spawning.
- Alone, this scheme has limited effect on water body status, but is part of a catchment-scale fish passage project that has improved the water body for migratory fish.



Lessons Learnt

- The design of the baffle fish pass was a trade-off between improving fish passage for as wide a range of species during as wide a range of flows as possible, and minimising the reduction in gauging accuracy. In the case of the low cost baffles used here, the closer the top baffle is to the weir crest the greater the improvements in fish passage and the greater the impact on flow gauging. A compromise solution was therefore developed that satisfied the structure's hydrometry requirements and those of migratory fish, accompanied with a monitoring programme to determine the success of this approach in improving fish passage whilst not eroding gauging accuracy.

Project contact: Flood and Coastal Risk Management, Wessex Area, Environment Agency