CASE STUDY

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

Project Summary

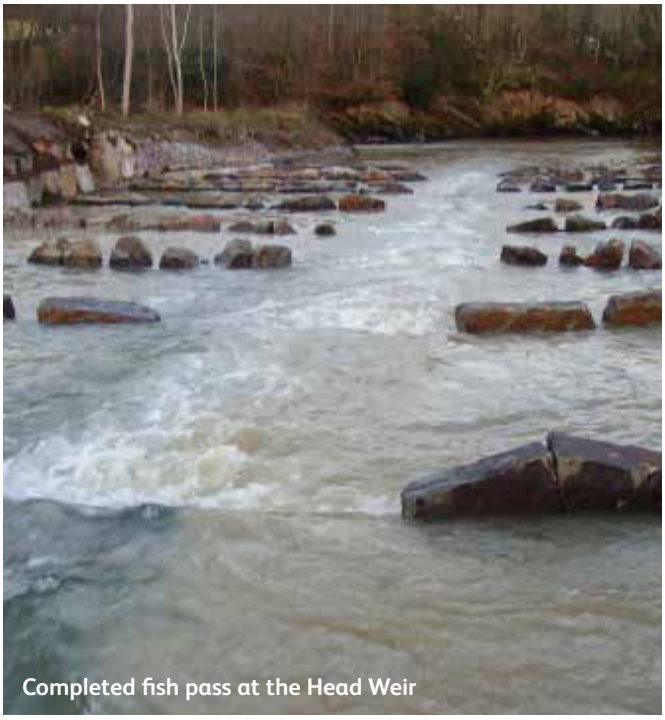
Title: River Mole Head Weir Natural Fish Pass
Location: King's Nympton, Devon, England
Technique: Weir modification to improve fish passage
Cost of technique: £££££
Overall cost of scheme: £££££
Benefits: ££££
Dates: 2009-2011

Mitigation Measure(s)

Change structures or the way they are operated to reduce barriers to flow, sediment transport and fish/eel migration
Remove or modify structures to increase access for fish and eel

How it was delivered

Delivered by: Westcountry Rivers Trust (WRT) via the Catchment Restoration Fund
Partners: Environment Agency; River Taw Fisheries Association; Halcrow.



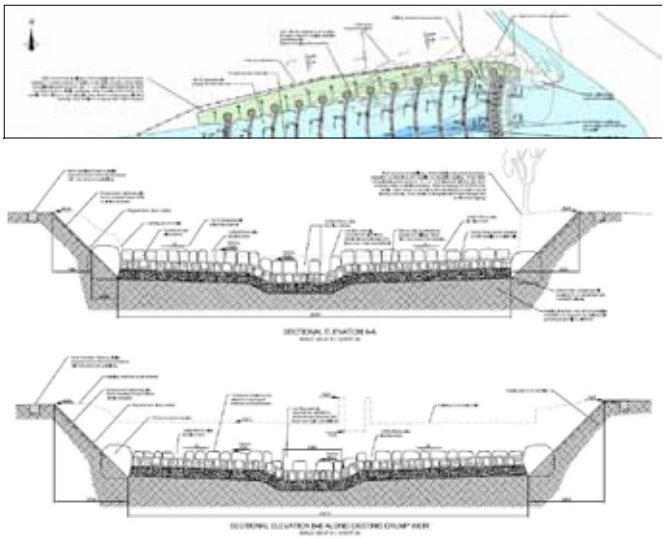
Completed fish pass at the Head Weir

Background / Issues

The River Mole is an important sub-catchment of the River Taw in North Devon and provides the primary spawning and nursery area for Atlantic salmon and sea trout in the Taw catchment. There are no obstructions on the Taw prior to its confluence with the Mole so fish have free access to Head Weir, which prior to its removal, formed the most downstream obstruction on the Mole. The weir was constructed c.1840 to feed an abstraction to the Grade II Listed Head Mill, with the leat diverging from the right bank immediately upstream.

A denil fish pass was constructed in 1991/2 when the weir crest level was raised by the then owners. This fish pass was ineffective due its location in the middle of the weir and the short submerged length at its downstream end. There were a number of unsatisfactory features that reduced the performance of the fish pass, including poor attraction to fish, poor access for maintenance, frequent sedimentation of the exit and blockage of the baffles.

This was identified as an issue in the River Taw Salmon Action Plan (2003) and was contributing towards the water body failing to reach Good Ecological Status.



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Step-by-step

The agreed solution was the modification of the weir and fish pass and its replacement with 11 low stone weirs with a new off-take to supply water to the Head Mill leat.

The design comprised the break-up of the weir and fish pass and the re-grading of the river bed to create a shallower 1 in 30 gradient. New weirs of embedded tombstone shaped boulders were placed in rows perpendicular to flow, with the crest of each boulder bar dropping progressively to create a stepped system. A low flow channel concentrates low flows in the centre of the river.

Prior to construction

- The River Mole was diverted around the site by the creation of a by-pass channel to link in with an existing ditch adjacent to the weir which discharged back into the river downstream of the site.
- An upstream cofferdam was formed from river bed material and sandbags to divert water down the by-pass channel to enable work to be undertaken in relatively dry conditions.

Construction

- Excavators with rock-grabs were used to install the tombstones and blockstones. Larger, 2 and 4 tonne boulders were placed beside and above / below the boulder bars to provide long-term stability. Existing river bed material was used to form the pools between bars.
- A reinforced concrete off-take fitted with a penstock, stop-logs and smolt screen upstream of a 450m diameter pipe conveys water to the leat and mill.

(1) View downstream during construction;
(2) Installing tombstones to low stone weirs

Benefits

- Over 40km of spawning habitat has become accessible with the operation of the new fish pass - this could result in production of up to 2,000 additional salmon smolts each year.
- Naturally-abundant levels of salmon, sea trout and other species will be restored to the River Mole, and improve habitat upstream to Good Ecological Status under the Water Framework Directive.
- Angling opportunities improved above the weir boosting potential economic growth of local communities.
- The scheme, coupled with the closure of a local fish farm, has significantly improved water quality downstream and there will no longer be a deprived reach as a result of unsustainable abstraction.

Lessons Learnt

- Flexible delivery team meant that when issues arose during construction, including flooding of the site during periods of heavy rainfall, work could be suspended during this period for very little cost.
- A policy of local material reuse saved approximately £18K in landfill costs. Material from the demolished weir, excess bed material, and cofferdams was reused after construction to infill the tanks of a nearby defunct fish farm, whilst felled timber was used by landowners for fuel.
- The project has shown that working in partnership is important to achieve desired outcomes and ensure that the environment is managed sustainably for the benefit of wildlife and people.

Project contact: Fisheries and Biodiversity Team, South West Region, Environment Agency