

Evidence

www.environment-agency.gov.uk

Implications on water quality and sedimentation from the provision of fish access at water-level management structures

Project summary SC110017

The potential impacts on water quality and sedimentation from fish access structures installed on tidal flapped watercourses along the estuarine River Trent were investigated. Only a small number of previous studies have looked at the impacts of flap valves and fish access structure on fluvial and estuarine processes and ecology. All the fish access structures studied during the project had been installed to meet the requirements of the Water Framework Directive (WFD) and Eel Regulations.

In this study a long-term tidal cycle programme measured salinity, turbidity and flow rate at four drains. Three drains had different types of fish access structures (Retarder, Aquatic Control Engineering and Stoneman) installed on their flap valves while the fourth had no fish access structure and was used as a control site. Monitoring was carried out on the neap and spring tides with the fish access structures open and closed. Measurements were taken in the River Trent and at selected points up to 250m upstream in each drain. A one-off survey was also undertaken at a fifth drain during the initial inflow portion of a tidal flushing event – a management option used to clear sediment from a creek on the estuary side of a drain tidal structure. Salinity and turbidity were measured upstream before, during and after the flushing event.

Salinity levels in the drains were found to be very low, with limited variability and generally similar to those in the River Trent. The salinity within a drain was reduced frequently during tidal inflow on the flood tide due to dilution of the water in the drain by the incoming estuarine waters.

However, turbidity was found to vary significantly with the greatest variation being when the fish access structures were open and active. Most changes in turbidity were confined to the start of the flood tide (when water flowed into drains) and the ebb tide (when the drains flowed out into the River Trent). When the fish access structures were closed and inactive, turbidity levels declined significantly and were similar to those measured at the control site.

The distance upstream affected by increased turbidity was also less when the fish access structures were inactive and closed. The source of the increased turbidity was found to be a combination of sediment from the River Trent arriving on the incoming flood tide and bed scour within the drain.

The tidal flushing event survey showed that salinity was initially reduced by dilution from the inflow of estuarine waters, with slight increases after flushing ended due to changes in the salinity of the estuary during the flood tide. Turbidity was found to increase dramatically during tidal flushing but to decrease rapidly after flushing finished. Both salinity and turbidity declined upstream.

The presence of fish access structures on tidal flapped drains had only a limited impact on salinity within a drain but a significant impact on sediment movement into and within a drain. Drains with fish access structures are likely to require additional sediment management but more detailed studies are necessary to quantify the extent of any alteration to the management regime.

This summary relates to information from project SC11017, reported in detail in the following output(s):

Report: SC110017/R

Title: Implications for water quality and sedimentation of provision of fish access at water-level management structures

January 2012

Internal Status: Released to all regions

External Status: Publicly available

Project manager: Graeme Peirson, Evidence Directorate

Research Collaborator: Albert Nottage

Research Contractor: Cascade Consulting
Enterprise House, Manchester Science Park,
Lloyd Street North, Manchester M15 6SE
Tel: 0117 227 9777

This project was funded by the Environment Agency's Evidence Directorate, which provides scientific knowledge, tools and techniques to enable us to protect and manage the environment as effectively as possible.

Further copies of this summary are available from our publications catalogue: <http://publications.environment-agency.gov.uk> or our National Customer Contact Centre: T: 08708 506506
E: enquiries@environment-agency.gov.uk.

© Environment Agency.