Investigation of failure of glass eels to migrate through tidal defence barrier on the River Frome (SO7517410472)

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A simple trial at a tidal flap gate showed that glass eel passage was not possible during the tidal phase of active glass eel migration.

Introduction

In the river Severn basin there are a number of gated exits that prevent reflux of tidal water into streams and small tributaries that discharge into the Severn. The tidal flap on the Frome is typical of the defence mechanisms used over several decades to prevent tidal influx. Earlier studies have shown that the swimming velocity of glass eels is limited to 0.5 meters per sec and that glass eel migration was theoretically impossible with a head differential greater than 1.5cms.

However these earlier studies were based on experimental system with uncontaminated surfaces. A further investigation was made to see if theoretical and practical outcomes were the same.

Materials and methods

Two fishing positions were established. One on the outside 10 meters from the tidal flap and the second on the inside of the 8 meters from the tidal flap

These points were fished simultaneously using a Severn hand nets on the rising and falling tide.

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Results

Frome Outfall Date April 3 2011 HW sharpness 20:09 GMT 8.2 Metres 21:09 BST

Time BST	**No of glass eels caught inside gate**	**Time**	**No of glass eels caught outside gate**
Gate has been closed by incoming tide.	Some leakage of water through the gate. Steady trickle only. It was observed that some of the rubber seals on the face of the gates has be damaged.		
22:05			20
	0		17
	0		6
			5
			10
22:15	0		
	0		
	0		
23:15 Gate open	Water flowing through gate		
23:20 to	2		15
	0		12
	0		12
	0		40
01:05	0		30

Discussion

The rise and fall of the tide is at a rate of 25mm per minute in the Bristol Channel/Severn estuary. There can also be a marked difference in levels between the external and internal surfaces of these barriers due to the asymmetric rates of rise and fall of the tide compared with the penned fresh water. As a consequence of these factors the window of opportunity where water velocities are compatible with glass eel migration are limited to just a few minutes each day.

While further resources will need to be allocated to these measurements the initial observation at the Frome outfall confirm the theoretical conclusions that these tidal barriers are generally impassable to glass eels during the tidal phase of the glass eel migration.