Afon Amman, Bynamman, Carmarthenshire

An Advisory Visit by the Wild Trout Trust, August 2013

Contents

Introduction **3**

Catchment and Fishery Overview **4**

Habitat Assessment **6**

Conclusion 16

Recommendations **16**

Making It Happen **18**

Appendices **19**

Introduction

This report is the output of a Wild Trout Trust advisory visit undertaken on selected sections of the River Aman at Brynamman and Galnamman, Carmarthenshire. The request for the visit was made by Mr. Eifion Rogers, who is a local resident and keen angler. The purpose of the visit was to investigate the present quality of the river habitat for wild trout *(Salmo trutta)* and identify possible opportunities for improvement.

Comments in this report are based on observations on the day of the site visit and discussions with Mr Rogers, David Mee of Natural Resources Wales and Gethyn Thomas of the Carmarthenshire Rivers Trust

Throughout the report, normal convention is followed with respect to bank identification i.e. banks are designated Left Bank (LB) or Right Bank (RB) whilst looking downstream.

The Sections of the River Amman visited were at Brynamman near the confluence of the Amman and Nant Garw and through the town of Glanamman.

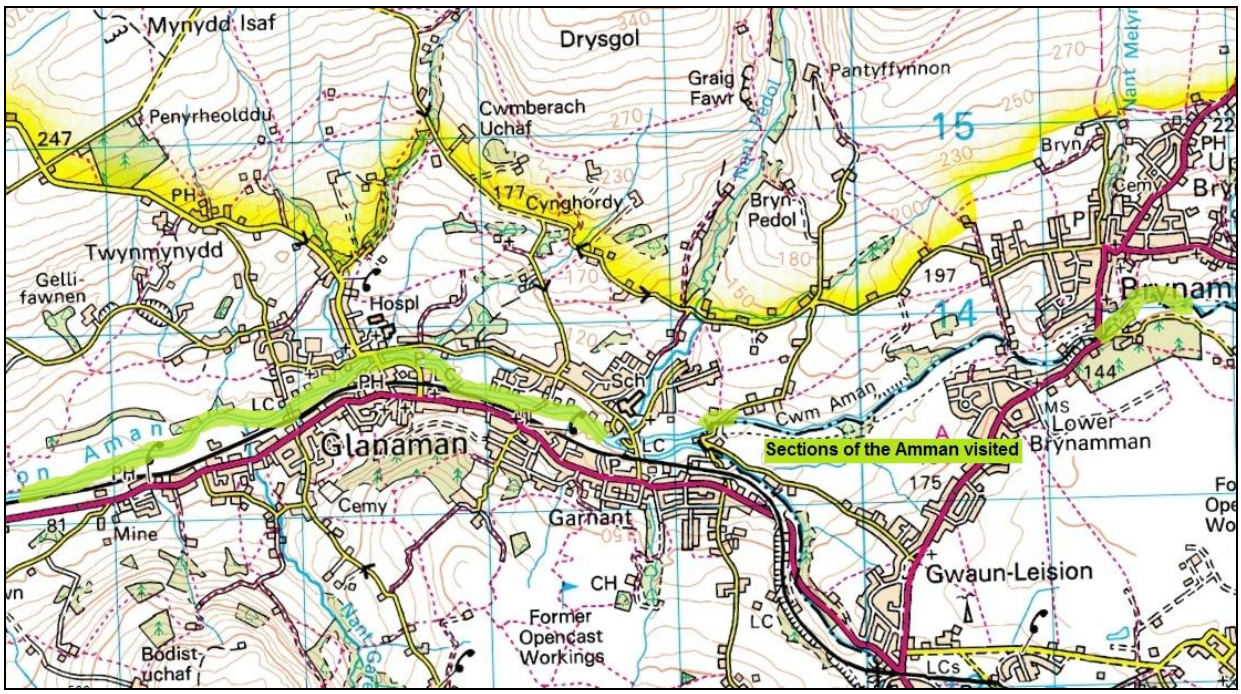


Figure 1: Map showing sections of the River Amman visited

Catchment and Fishery Overview

The source of the River Amman is on the Black Mountain within the Brecon Beacons National Park. It flows south from the mountain range to Rhosamman then west through Brynamman and Glanamman turning south at Ammanford where it meets the River Loughor.

The catchment drains from a sandstone and mudstone geology in the uplands over superficial Till (unsorted gravel-like deposits) over the South Wales middle coal measures. The steep gradient of the river and the relatively mobile coarse sediment means that the river is very reactive with little opportunity for aquatic vegetation to establish.

The Amman valley lies within the western arm of the South Wales coal field. Until the early 19th century the Amman valley was a sparsely-populated wilderness with a few isolated farms connected by rough mountain roads. Coal was only extracted on a small-scale and was mostly hewn from exposed outcrops for domestic use. There are reports of a mine in the area as far back as 1757 but it was in the 19th century that large-scale mining activities began shaping the landscape. The influx of workers brought in to mine the high quality *anthracite* coal caused the population of the valley to explode from just over 3,000 in 1851, to 11,861 in 1931.

The river was harnessed and controlled by major engineering works and tainted by coal dust and mine effluent. Three tinplate works and a chemical works also discharged into the river reportedly causing it to run yellow. After the steady decline in demand for British coal in Europe during the early-mid 20th century and the mass closure of mines during the 1980s, local industry greatly diminished. Since the decline of heavy industry in the catchment, water quality has recovered significantly.

The majority of fishing on the Amman is controlled by the Clwb Godre'r Mynydd du Shooting and Fishing (CGMD) with most of the remainder being public fishing. The river has a good run of sewin (sea trout) and is reported to have a prolific late-season salmon *(Salmo salar)* run. However, Natural Resources Wales (formally Environment Agency Wales) surveys of the Upper Amman near Brynamman in 2009 recorded poor densities of juvenile trout and an absence of

juvenile salmon (although a single season's sampling may be representative). Under the Water Framework Directive (WFD) the river is listed as failing for fish (especially in the upper reaches) and for water chemistry.

Table 1: WFD information for the River Amman

Site details	
Waterbody Name	Aman - headwaters to confluence with Garnant
Waterbody ID	GB110059032150
Management Catchment	Loughor to Taf
River Basin District	Western Wales
Current Ecological Quality	Moderate Status
Biological Quality:	
A characteristic or property of a biological element that is specifically listed in Annex V of the Water Framework Directive for the definition of the ecological status of a water body (for example composition of invertebrates; abundance of angiosperms; age structure of fish).	
OVERALL BIOLOGICAL QUALITY	Moderate
Fish	Moderate
General Physico Chemical Quality:	
OVERALL PHYSICO CHEMICAL QUALITY	High
Ammonia	High
Dissolved Oxygen	High
pH	High
Phosphate	High
Hydro Morphological Quality:	
OVERALL HYDRO MORPHOLOGICAL QUALITY	Not High
Hydrology	High
Morphology	Good
Specific Pollutants Quality:	
OVERALL SPECIFIC POLLUTANTS QUALITY	Moderate
Ammonia	High
Copper	Moderate
Zinc	Moderate

Habitat Assessment

The Amman flows from its source down through open mountain land as a shallow, rocky stream. It flows under the A4068 at Rhosamman, and is confluenced by the Nant Gawr at SN 71748 13999. Here the land is wooded by shrubs and early coloniser tree species such as ash *(Fraxinus excelsior)*, elder *(Sambucus nigra)* and hazel *(Corylus avellana)* which have established in the redundant spoil heaps of the Brynamman colliery. The river corridor alongside the old colliery also is heavily infested with Japanese knotweed *(Fallopia japonica)*.

Figure 2: The confluence of the Amman and Nant Gawr

Japanese knotweed (JK) is an extremely fast-growing invasive plant. In Japan, JK is controlled by the invertebrates, fungi and plant pathogens of its native ecosystem. In the UK however, there are no natural biological controls. JK can grow up to 10cm per day and spreads via a creeping rhizome network that can stretch up to 3m down and 7m laterally. It quickly out-competes native plant life during summer months but dies back to dry fragile twigs during the winter. This leaves riverbanks exposed and vulnerable to erosion. The species is also notoriously difficult to control as a fragment of rhizome the size of a fingernail can grow into a new plant.

Figure 3: Japanese knotweed infests the river corridor alongside the old Brynamman colliery

JK does not directly support native insects and fiercely out-competes native plants that would normally provide food and habitat for a range of terrestrial invertebrates. Terrestrial invertebrates provide a significant energy subsidy to rivers, including supplement to the trout's diet. This can be especially important in relatively unproductive upland streams.

Despite the knotweed, the river through this reach provides some good quality habitat. The rocky substrate provides good 'pocket water' lies in the lee of larger boulders and a natural sequence of riffles and pools have formed around bends in the river and drops in the bedrock. Low overhead cover is abundant in the form of low-lying branches. Low-lying branches are important for wild trout, providing shade that helps keep the river cool and cover from predators.

In the upper reaches, the steep gradient and frequent high-energy flows deplete the river of small stones and gravel. However, some gravel shoals have been deposited at the edges of pools. These probably provide some suitable trout spawning habitat. Trout need clean, well-oxygenated gravel approximately 10-50mm in diameter in order to successfully cut a redd (gravel nest) and spawn. If the JK infestation is contributing to soil erosion during winter months, the increase of fine sediment into the river could reduce the quality of spawning habitat.

A number of small trout were observed flitting about the pools. In particular, the deep pool upstream of the A4069 road bridge appeared to hold a good number of trout.

Figure 4: Occasional gravel shoals around pools may provide spawning opportunities

Further downstream at Glanamman the river becomes wider and bed depth becomes more uniform with a reduced contrast between pool and riffle habitat. However, the river does retain a relatively pronounced deeper low-flow channel or 'thalweg' providing some depth variation across the channel cross-section.

Large boulders provide pocket-water lies but there is a general paucity of woody debris habitat. In lower-energy systems fallen trees and branches often provide excellent cover for fish as well as habitat for river invertebrates that support the river food-web. However, in upland spate rivers, high energy flows can quickly transport woody debris downstream. In a fully natural system, a steady supply of woody material would enter the river to replace material washed downstream. However, upland rivers flowing through urban and agricultural areas are not supplied with such high volumes of woody debris and many fallen trees are deliberately removed for flood defence purposes.

Although there is a paucity of submerged woody debris, low-lying branches from bankside trees do provide some overhead cover towards the margins of the

river. There is some very good holding habitat where branches provide cover over deeper parts of the river (Fig 6).

Figure 5: A typical view of the Amman through the centre of Glanamman

Figure 6: Low- lying branches over deeper parts of the river provide good holding habitat

Options to further enhance juvenile habitat in the upper reaches are explored in the *Recommendations* section.

From Garnet, through Glanamman to Ammanford, a number of block-stone weirs have been constructed across the channel.

The weirs were installed to control the flow of bed material during high-energy spates and reduce associated erosion and flood risks. The weirs have altered the geomorphology of the river by way of trapping bed load migrating downstream to create shallow glides upstream of the structures and scouring deep pools downstream.

The weir structures act as obstacles for migratory fish running up from the Loughor Estuary and for juvenile salmonids migrating within the river. The cumulative effect of the high number of weirs may significantly impede upstream fish migration, during long periods of low flow.

The weirs vary considerably in terms of their passability for fish, with some appearing to obstruct passage more than others. Fluctuations in water level during spate, or drought conditions, will also affect the head loss across each structure. In times of low-flow the weirs will be more difficult for upstream migration.

Figure 7: A series of block-stone weirs have been constructed across the channel downstream of Glanamman

Figure 8: One of a series of weirs near Glanamman.

In higher flows it is possible that all of the weirs are passable to salmon and sewin. However, research suggests that even the most passable of obstructions can have a considerable impact on fish migration, particularly if fish must overcome consecutive obstacles to reach an upstream habitat.

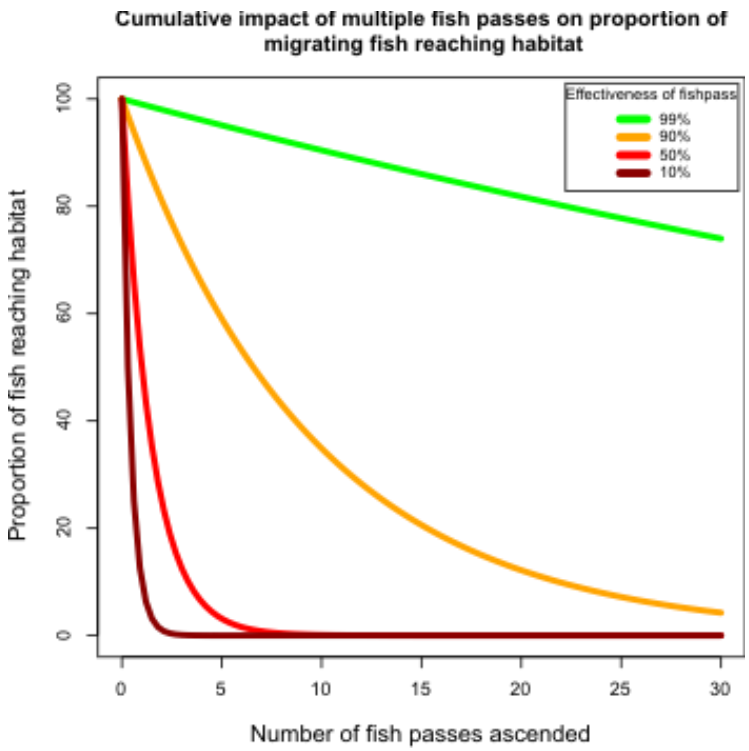


Figure 9: Graph showing the cumulative effect of multiple obstacles to fish passage on upstream migration (courtesy of Dr E Shaw, Catchment Science Centre, University of Sheffield).

Improving fish passage up through the Amman may help to boost the number of fish successfully running to the upper reaches to spawn. However, the perceived role of the weirs in flood risk management makes their removal unlikely to be a feasible option (David Mee pers comms 2013).

Along with the block stone weirs, a number of other weirs are known to hinder fish passage to the upper reaches of the Amman. Natural Resources Wales (NRW) officers are aware of the issues and are attempting to improve habitat connectivity. However, improving fish passage can be an expensive undertaking and budgetary constraints mean that spending is more likely to be opportunistic rather than strategic.

During high flows, structures in upland rivers endure considerable erosive forces. Substantial hard-engineering bank protection works have been installed along much of the Amman between Glanamman and Ammanford.

Figure 10: Hard-engineered bank protection on the Amman downstream of Glanamman

At SN 66073 13346, the bank protection has failed, highlighting the erosive power of the Amman during spate conditions.

Figure 11: Bank protection works failing at SN 66073 13346

Downstream of Brynaman at Garnent, a large, impassable weir recently collapsed during a flood. The collapse of this structure provided an opportunity to open up the upper reaches of the Nant Garnent tributary to salmon and sewin and provide access to additional spawning and nursery habitat.

Figure 12: The Weir at Garnent (SN 69406 13131) before collapse (courtesy of Natural Resources Wales)

Figure 13: The weir at Garnent, September 2013 (courtesy of Natural Resources Wales)

The Garnent tributary confluences with the Amman downstream of Brynamman and the collapse of the weir may not improve fish passage into the Upper Amman directly. However, this example serves to highlight the impermanence of man-made structures on upland rivers and the opportunities to improve fish passage when structures begin to fail.

The restoring of natural sediment transport and natural erosion/deposition patterns may increase habitat variation, creating different microhabitats that benefit the specific life-cycle stages of salmonids as well as biodiversity in general. How the river responds to the collapse of the weir will be an interesting case study that may provide evidence to support the removal of impoundments on the Amman.

Water quality is an issue for many rivers that flow through areas with an industrial mining heritage. Acidic water draining through mines can mobilise minerals (including heavy metals) from the local geology. Once exposed to oxygen, iron-rich mine leachate often precipitates into a red-ochre coloured ferric hydroxide sludge. In some situations staining can be caused by a group of bacteria that derive energy by oxidising dissolved ferrous iron to produce insoluble ferric oxide. Both chemical and biochemical oxidation of iron can cause

a degree of de-oxygenation within watercourses but the effect normally looks worse than its actual impact on water quality.

The results of chemical monitoring in the Amman suggest that pH and dissolved oxygen are not considered to be problems. Elevated levels of copper and zinc are contributing to the present WFD status but overall water quality has significantly improved over the past 20 years.

Figure 14: Red-ochre discharge entering the river at Glanamman.

Combined sewerage outfalls (CSOs) however, are a significant point-source pollution risk and have been attributed to fish kill incidents within the catchment. (David Mee pers comms 2013). During periods of prolonged heavy rainfall, the flow of excess stormwater can exceed sewer capacity, causing raw sewerage to discharge into rivers.

Although fish-kill pollution events are uncommon, population recovery in upland reaches can take several years, especially if fish passage is a problem.

Conclusion

Habitat within the Upper and middle reaches of the Amman is largely as would be expected for an upland spate river. Productivity is low and it is unlikely that there is sufficient food available to support a large resident trout population. A high percentage of the trout population is likely to smolt and run to sea and the population is therefore heavily reliant on returning sea trout.

Fish passage is problematic and salmonids running the Amman must overcome a high number of obstacles in order to reach the headwaters above Brynamman. The fact that some fish are able to complete the migration is encouraging but the passability of structures varies according to flow conditions and some years may be better than others.

Fish survey data suggests that the wild trout population in the Upper Amman can vary significantly from year to year (see Appendix 1 below). Fluctuations in weather and flow are likely to strongly influence both the number of salmonids reaching the upper Amman and the survival rates of eggs and fry. At present there are not enough data available to identify any clear population trends but it is possible that recovery from past pollution incidents have been hindered by unfavourable flows over the past few years.

Recommendations

In order to improve the Upper Amman for wild trout, the following actions are recommended:

- Engage with the Carmarthenshire Rivers Trust (CRT) and consider getting involved with fish passage improvements and water quality monitoring. The CRT has been successful in acquiring funding for various river improvements over the past few years and continues to do important work in the wider River Loughor catchment.

- Consider setting up a local community group focussed on championing and improving the River Amman. This could be an informal group that meet up from time to time in a local pub, or could be a more structured

organisation with specific roles assigned to individuals in the group. Bear in mind that a group that can demonstrate it is structurally organised is more likely to secure funding to undertake improvement works. There are specific funding streams aimed at such groups in Wales e.g. Environment Wales: http://www.environment-wales.org/grants/130

- Consider introducing some stable woody debris habitat into the upper reaches of the river near Brynamman. Small cabled tree kickers and occasional pleached (hinged) low branches could increase juvenile/overwinter survival/retention during spate flows by creating slack water spots. Fixed woody debris would also provide additional cover from bird predation. Shade is a vital component of trout habitat and it is important to not be too over-zealous with tree works. The introduction of woody debris into the river should not be at the expense of valuable bankside tree cover (especially on upland rivers where so much of the foodweb depends on leaf litter inputs).

- Raise awareness within the local community (and anglers) of the importance of fish passage. NRW and the CRT may have records of which structures pose the biggest problems. Explore options to improve fish passage over problem structures.

- The Japanese Knotweed infestation needs to be addressed. As well as posing an increased soil erosion risk, JK, if left unchecked can out-compete most native species, reducing local biodiversity and valuable food-chain subsidies to the river. The knock-on effect could be a reduction in invertebrate diversity or abundance; and a consequent reduction in food for trout.
  The Environment Agency's Code of Practice provides useful information on controlling JK

http://www.environment-agency.gov.uk/homeandleisure/wildlife/130079.aspx

Treating such a large infestation could be expensive. It may be beneficial to engage with the local council, NRW, and the Carmarthenshire Rivers Trust and explore options for funding a control/eradication programme.

Obtaining funding to Train and equip volunteers could be a cost-effective method of control.

Making It Happen

The Wild Trout Trust's Upland River Habitat Manual has useful information on the problems faced by upland rivers. The manual also contains advice on setting up river conservation groups and how to undertake certain activities. Section 5 of the manual contains a pro-forma for identifying and reporting obstructions and offers advice on how to cost-effectively ease fish passage.

PDF versions of WTT habitat manuals can be downloaded for free from our website http://www.wildtrout.org/content/wtt-publications

The Wild Trout Survival Guide also contains useful guidelines for assessing habitat and planning and delivering enhancement projects. This is available in paperback for £10.

The Carmarthenshire Rivers Trust can be contacted on (01558) 668697. The CRT's Chairman Gethyn Thomas is local to the Amman and has good local knowledge on the river. Gethyn can be contacted at gethynthomas@thecrt.co.uk

More information on the present condition of the Amman can be obtained from David Mee, Fisheries Management Team Leader at NRW

david.mee@cyfoethnaturiolcymru.gov.uk
/david.mee@naturalresourceswales.gov.uk

(01792) 325615

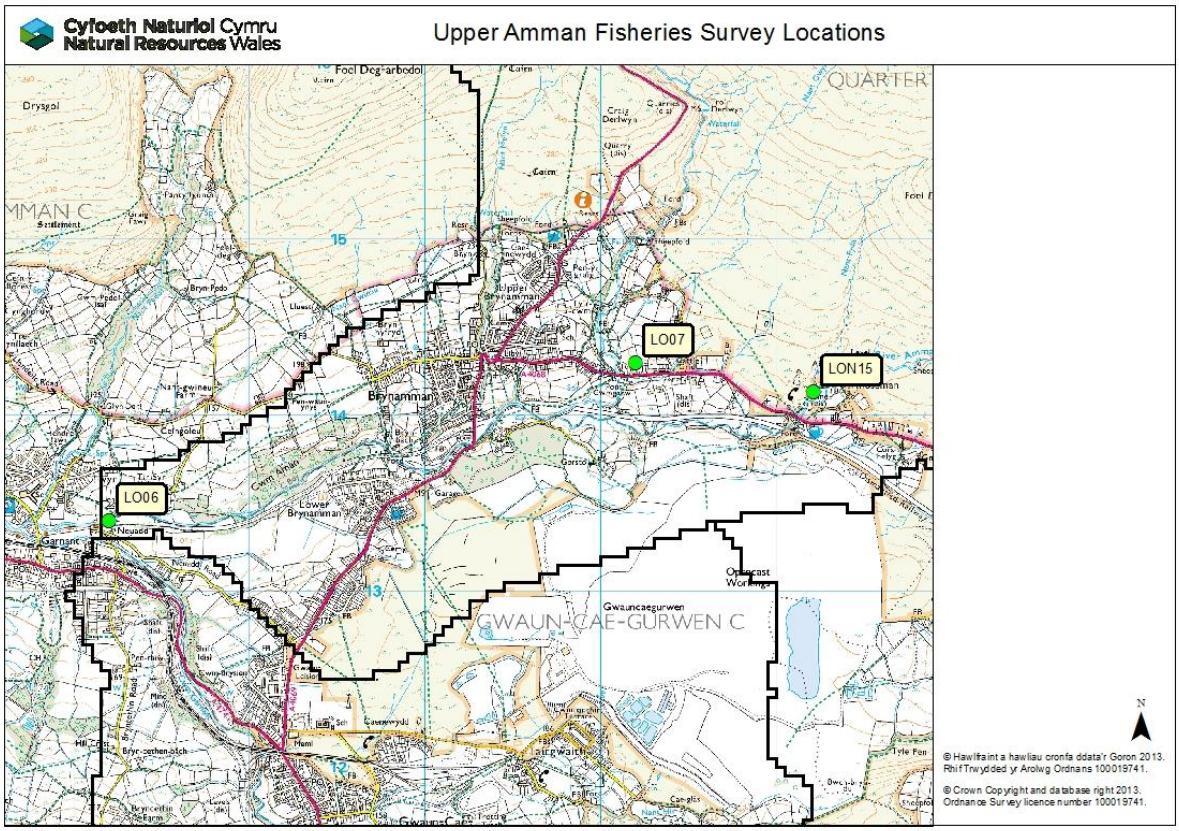
Disclaimer

This report is produced for guidance and not for specific advice; no liability or responsibility for any loss or damage can be accepted by the Wild Trout Trust as a result of any other person, company or organisation acting, or refraining from acting, upon guidance made in this report.

Appendix – Fish Survey data (courtesy of Natural Resources Wales)

Upper Amman Fisheries Survey Data

Fisheries surveys have been carried out at a total of 3 survey locations on the upper River Amman and its tributaries in recent years. The locations of these surveys are shown in the map below.



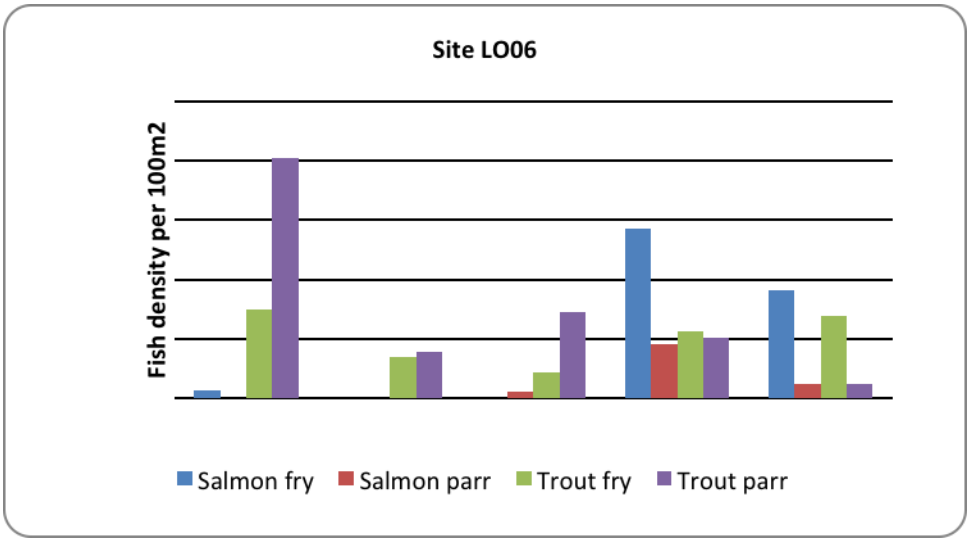
Data from the most recent fisheries surveys undertaken at these sites (2009) contribute to the current Water Framework Classification for this waterbody. The waterbody encompasses the whole of the upper River Amman and its tributaries, as far downstream as Garnant, and the overall classification for the waterbody is currently 'Moderate' for fish. The individual classifications for each of the 3 survey sites are shown in the table below.

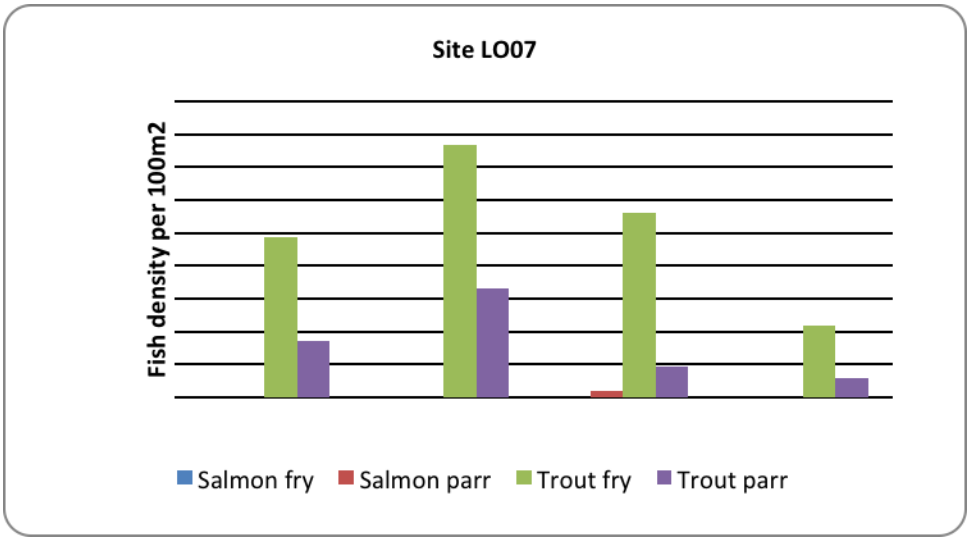
Catchment	River	Site Code	NGR	Last Survey	Class	Reason for Failure
Loughor	Amman	LO06	SN6920013400	2009	High	-
Loughor	Garw	LO07	SN7220014300	2009	Poor	Poor densities of juvenile trout and an absence of juvenile salmon
Loughor	Amman	LON15	SN7321214134	2009	Poor	Poor densities of juvenile trout and an absence of juvenile salmon

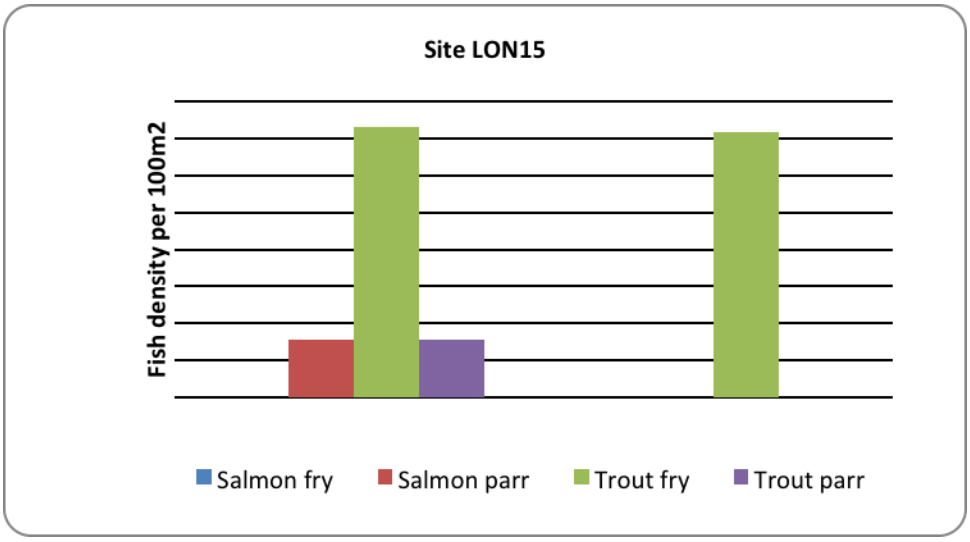
Fisheries sites contributing to overall WFD classification for waterbody GB110059032150

The failure of the Amman waterbody to achieve 'Good Ecological Status' for fish is due to poor densities of juvenile trout and an absence of juvenile salmon at sites on the Garw and the Amman above Brynamman.

Data are also available for a number of fisheries surveys undertaken previously at these fisheries survey sites. These are summarised in the figures below.







Amman Fisheries Survey Data 1991 to 2009

The data for the lower site (LO06) show that numbers of juvenile salmon have improved at this site in recent years, whilst numbers of juvenile trout are more variable. On the other hand, juvenile salmon have only been recorded on one occasion at the upper two survey sites (LO07 and LON15), whilst juvenile trout numbers show a decline on the most recent survey (2009). All three sites are due to be resurveyed in 2015.

Water Framework investigations have identified a number of possible barriers to fish migration affecting the upper Amman, and have also highlighted potential water quality issues associated with sewage and industrial discharges.