

21/09/2017

Curl Brook Electrofishing Survey



Survey Site

Upstream Byletts

Introduction

The aim of this report is to detail the electrofishing survey undertaken on the Curl Brook during the 2015, 2016 & 2017 Wye and Usk Foundation Survey period.

This report is split into chapters describing aspects such as the site, through to the science of the electrofishing survey, and the actual results obtained.

From the results collected during the recent (2015, 2016 and 2017) and future surveys, it will become possible to build up a picture of how the fish stocks within the Curl Brook are behaving.



Picture 1- Curl Brook Brown Trout – Salmo trutta (pass 1)

Contents

Page	Title				
1	Introduction				
2	Contents				
3_/	River Arrow Catchment				
5-4	Overview				
5	What is Electrofishing?				
6	The Science Behind				
0	Electrofishing				
7-8	The Site				
9-10	The Results				
11-12	Summary				
13-15	Future Management				
13 13	Opportunities				
	Trout Numbers in the				
16	Lugg and Arrow				
	Catchment				
17-10	Projects linked to the Curl				
1/-13	Brook Catchment				
20 -24	Appendices				

Curl Brook Catchment Overview

The Curl brook rises above Lyonshall to the South East of Kington. It flows easterly, picking up the Sour Brook before flowing into the River Arrow at Pembridge, Figure 1a. Both the Lugg and the Wye are European Special Areas of Conservation due to their fish, particularly Lamprey and Salmon. The Curl Brook is of special interest due to its waving beds of Water Crowfoot and other wildlife such as Brown Trout, Kingfishers and Otters.



Figure 1. Location of the Curl Brook Catchment and survey sites

The River Arrow is currently failing to meet the required water quality standard as laid out in the European Water Framework Directive. It is rated as moderate to poor along much of its length, but is in good condition above Kington.

The failure of the river is attributed to the surrounding agricultural land use as well as sewage treatment works, with sediment and nutrients impacting on the watercourse. The Arrow, where it does fail, is only just failing and as a farming community there is the opportunity to prove that regulation is not required to bring watercourses draining productive agricultural land into good condition.

The Wye and Usk Foundation are working on a catchment by catchment approach with grant funding and advice to bring the River Arrow up to good ecological status.

Extensive monitoring of the Curl Brook which started in 2013 will lead to an accurate classification. Preliminary evidence shows that if the Curl Brook fails it will be due to high levels of phosphate and sediment; these come from a high number of minor issues having a large total effect.

The Wye and Usk Foundation are looking to alleviate as many of these small problems as possible to help increase water quality.



Picture 2. Typical patch of Ranunculus within the Curl Brook.

What is Electro-Fishing?

Electric fishing (or electro-fishing) has been proven to be a highly efficient and essential technique for monitoring fish populations in rivers and lakes, and performing rescue and relocation work of fish stocks.



Picture 3 - Hand held pole anode

Electro-fishing is the process of catching fish by creating an electrical-field through water, around an anode (on a hand held pole **Picture 3**), and a cathode (trailing behind in the water **Picture 4**).



Picture 4 - Cathode

The Science behind electrofishing

This electric-field develops a voltage along the length of the fish exposed to it, such that 'galvanotaxis stimulates their nervous system, and they are forced to swim towards the anode (the source of the field). The bigger the fish, the more effect the current will have on it.

At the point approaching the source of the field, the fish enters the hold-zone, where the field is then of sufficient strength to temporarily immobilise them and thus aid in their capture. (*Figure 2 red circle*)

At the top and bottom of the 150m survey site, we place nets to stop any fish moving upstream or downstream of the selected site.





The site on the Curl Brook runs along the SSSI site upstream of Byletts (*Picture 5*).

Due to bank protection on both sides of the stream, there is substantial habitat growth which provides ideal cover for juvenile and adult fish.

The 150m site comprised mainly of pool and riffle sequences interspersed with a few deeper pools over 0.5m depth. Average width 2m



Direction of survey team per run

Flow direction

Water Temperature – 13.8°C

Water Conductivity – 319µs

Picture 5. Curl Brook survey site

The principle is that one operator wears the back pack with the anode in their strongest arm and the fish bucket in the free hand, whilst moving upstream, Figure 3.

This allows the person on the net to have full control over the net during the course of the survey session.

Once a fish is netted, it is then placed in the bucket until the end of the survey where it is counted and released back to the section of river it was captured from.



Figure 3

Results

Below is the table of results for the fish found during the Curl Brook survey for 2017.

Fish Species	S0+	S1+	T0+	T1+	ВН	SL	MW	SB
Run 1	0	0	16	26	50	4	50	12
Run 2	0	0	3	12	21	0	32	6
Run 3	0	0	0	4	8	0	12	0

Table 1. Survey Results (Fish species key can be found below)

Table 2. Survey Results (Fish species key can be found below) 2017

Fish Species	S0+	S1+	T0+	T1+	ВН	SL	MW	SB
No. Caught	0	0	19	42	79	4	94	18
Density per 100m2	0	0	6.3	14	26.3	1.3	31.3	6

Species Key

S0+ - Salmon fry, S1+ - Salmon Parr, T0+ - Brown Trout Fry, T1+ Brown Trout
Parr & Trout > 1 year, BH – Bullhead, SL – Stoneloach, MW – Minnow, SB –
Stickleback.

Detailed fish species key can be found **pg20-21**.

Fish Species	S0+	S1+	T0+	T1+	BH	SL	MW	SB
2015	0	0	28	11	78	21	29	0
2016	0	0	4	52	93	22	74	0
2017	0	0	19	42	79	4	94	29

 Table 3. Survey Results (Fish species key can be found below) 2015-2017.



Figure 4. Results of 2015 (blue), 2016 (red) & 2017 (grey) Electro-Fishing Surveys

Similarly to previous years, there were no Salmon present in this section, there could be a number of factors causing this, including

low water during the migration period or prevention of access due to a blockage further downstream.

Please see Appendices (page 19-20) for fish species key.

Summary

Throughout the length of the Curl Brook, there have been numerous habitat improvements which have created excellent trout habitat. Finding higher number of juvenile trout this year suggests a better recruitment from the 2016 spawning.

Not only were Trout (61) found at the sites but also large numbers of other smaller species. The variety of submerged features and substrate throughout the site provided habitat for Bullheads (79), Stoneloach (4), Minnows (94) and during 2017 Stickleback (29).

Similarly to the 2016 survey, there is an absence of Eels and Lamprey from the site. Normally we would expect to find them along this stretch.



Picture 6. Ideal fish & invertebrate habitat

This report is based on a type of survey known as a Fully Quantitative Survey where nearly every fish in a long length of river is stunned and then handledit is known that all fish and in particular, the bigger fish, can be harmed by this process. WUF therefore recommend that the FQS is only used every 3 years. However another method known as the '5 minute pool and riffle sample' could be used in the intervening years to simply establish the presence or absence of the different classes of fish. This method still provides valuable data and has the benefit of being much less labour intensive and thus cheaper.

Other surveys on the Curl Brook

Approximately 2.5km upstream there is a pool and riffle survey site. This has been fished for two consecutive years starting in 2016.

Below are the results for these two years.

Fish Species	S0+	S1+	T0+	T1+	BH	SL	MW	SB
I								
2016	0	0	3	1	4	0	0	0
2017	0	0	6	3	10	0	0	0

Table 4. Survey Results for upstream 5min pool and riffle survey site 2016-17

With the site being located further upstream, results suggest that the smaller size of the stream and local water quality problems make it currently unable to provide sufficient suitable habitat for the multitude of species that are found at the lower fully quantitative site.

Similarly to the 2016 survey, there is an absence of Eels and Lamprey from the site.

With the previously completed and ongoing project linked to the Curl Brook, there is likely to be an improvement in the number of species further up the catchment in future years.

Future management opportunities

The site of the Curl Brook is for most part a clean and healthy brook. However it was clear that a few small issues could still be resolved to potentially improve the condition of the brook.

- 1. Throughout the site there was evidence of manmade debris, which included metal objects and the occasional plastic bag. Even though the whole site was predominantly clear, it may be beneficial to remove the debris.
- 2. This site has previously benefited from habitat work on the trees and has also been fenced off from stock on both sides of the brook. This stock exclusion has allowed the banks to re-vegetate and drop into the stream creating excellent fish habitat. Future management such as coppicing and clearing will be needed to stop the brook from being over shaded.
- 3. Silt is apparent throughout the site and may be caused from the erosion of banks and farmland further up the catchment. Although the narrowing of some sections by vegetation in this site allows the scouring of the gravel, it points to a catchment wide management to reduce soil erosion.

 It was noticed that along the banks of the brook were numerous stands of Himalayan Balsam. Below is a map showing the known spread of the invasive weed throughout the Curl Brook Catchment.



Figure 5. Known Himalayan Balsam Coverage

Each plant can produce up to 800 seeds. These are dispersed widely as the ripe seedpods shoot their seeds up to 7m (22ft) away.

Although it is currently believed that the seeds are not viable for more than 2-3 years, they are in fact very resilient to all types of conditions and therefore without committed and continuous control, the seed bank is extremely persistent.

It grows rapidly, spreads easily, out-competes other vegetation and readily colonises new areas. When the plants die down in winter they leave large bare areas that are sensitive to erosion.

Control Methods of Himalayan Balsam

Cut or pull plants in June/July and leave them where they fall.

Follow up in early September - there's always one or two plants that survive or recover.

Using a hedge trimmer makes this less of a chore. It also deals with brambles, grasses, nettles and small trees.

Following cutting, native plants recolonise unsprayed areas much more quickly.

During 2017 both volunteers and the Wye and Usk Foundation started at the top of the infection and got around 2 kilometres downstream. It is hoped that this invasive species can be eradicated from the catchment during 2019.

Please see Appendices (page 24) for current control map.



Picture 7. Himalayan Balsam

Trout Numbers in the Lugg and Arrow catchment

Below are two maps showing the increase in adult trout numbers throughout the Lugg and Arrow catchment. The time scale is 8yrs.



Map 1. Trout numbers 2005



Map 2. Trout numbers 2013 Improvements to habitat, farm infrastructure and fish access have all aided in the increase in fish numbers. Future monitoring will assess the progress and provide a valuable insight into the overall picture of the health of the fish stocks. Trout survey results of the Lugg catchment for 2016 and 2017 can be found on page 18-19.

Projects linked to the Curl Brook Catchment

With the Curl Brook being located within the Arrow catchment, it has benefited indirectly and directly from various projects run by The Wye and Usk Foundation and associated partners. This list will continue to grow as more projects are devised to improve the environment surrounding and including the Curl Brook.

The Tubney Charitable Trust Grant (2006) – Fish access – The Tubney Charitable Trust make grants to other charities that work within certain defined areas, supporting work that benefits species listed in the UK Biodiversity Plan (UKBAP). It has generously supported the Foundation with core funding for various projects. Tubney's funding has enabled us to fully fund our ambitious projects that include building fish passes or removing barriers throughout the Lugg and Arrow, upper Wye and Usk catchments.

The Lugg & Arrow, Leader + (2006-2007) - Engaging with local people and explaining the importance of their rivers .Restoring and correcting some of the factors that limit Lugg and Arrow fisheries - fish passes and habitat restoration. Education - salmon in the classroom. Reared salmon were released by children at various local schools into the Arrow to help restore the run, a useful introduction to biology.

Lugg & Arrow, Radnorshire (2006-2008) - Building on work delivered by the Foundation and its partners within the Leader + Projects downstream in Herefordshire the project's aims are: restoring the riparian habitat so that fish populations become self-sustaining and encouraging the diversification of rural businesses.

LARA (Lugg and River Arrow) Project (2008 – 2011) - In 2008 the Foundation secured funding from the SITA Trust's Enriching Nature Programme for the lower Lugg and Arrow project. With support from the Lugg & Arrow Fisheries Association (LAFA) and from the Wye Salmon Fisheries Owners Association (WSFOA), LARA will improve the biodiversity in the Lugg and Arrow within 10

miles of Leominster's licensed land fill site. The project has 3 main areas of activity: Riverine habitat restoration, fish passage and improving water quality.

Water Framework Directive Funding - This aim of the funding is to improve failing water bodies, for example: those where fish are prevented from accessing; those with habitat issues and those suffering from diffuse pollution. Within this **The Arrow Access Project** takes forward the work done in Leader + to secure access for salmon and trout to the middle and upper reaches of the river. There were four fish passes built in 2010.

Wye (Herefordshire) Improvement Project (WHIP2) (2012-2015) - In June 2012, we started WHIP2, a 3-year project funded by Defra's Catchment Restoration Fund. The project has two main areas of activity: 1. Agricultural diffuse pollution management and 2. Barriers to migration. Farm advisory work commenced in September 2012 with farm visits in upper Arrow, Gladestry, Curl and Tippets catchments. We will have visited nearly 400 farms and produced around 320 'whole farm plans'. These plans will advise of good practice and deliver pragmatic solutions that minimise the risk of that farm contributing to Water Body failure. 80km of riparian fencing will be erected and associated alternative water supplies will be implemented in waterbodies where livestock access is contributing to failure. 96 farm infrastructure improvements will be completed.

Reconnecting the rivers (1996- ongoing) - The Lugg and Arrow (the Wye's largest tributary system) has numerous barriers, which were built in the 18th and 19th centuries to control flooding and erosion, and to provide a water supply for agriculture and milling. A few key periods include - 2004 Lugg Flood alleviation scheme fish passes (EA Wales), 2010 Four more fish passes completed on Arrow to take fish to Kington, 2011 Further improvements to upper Lugg and Arrow access with 8 more fish easements.

Litter Clear-ups (2004 – ongoing) - The Foundation carried out its first organised litter clearances in 2004 and 2005 when groups of volunteers and staff from WUF and Keep Wales Tidy were involved in several exercises on the upper reaches of both rivers. In 2010, Tony Norman (one of WUF's Trustees), took on the considerable challenge of organising the first largescale litter clean-up exercise with an ambitious goal of clearing the whole Lugg and Arrow catchment in 10 weeks. Starting in March 2011, Tony and 220 volunteers from conservation organisations, government bodies, NGOs, fishing clubs, canoe groups, local councils and others collected 671 sacks of litter and single items from the riverbanks.

GO WILD IN THE CURL (2016 – ongoing) - A multi-year project to improve to a high level the water quality and wildlife of the Curl Brook catchment within the context of modern farming. The main aims for this project include -Reduce the concentrations of phosphate in the Curl Brook, reduce the quantity of sediment washing off fields in the catchment, more efficient use of manure and fertiliser, improved soil organic matter levels and increased understanding between the land owners, businesses and residents of the issues currently facing the Curl and shared appreciation of improvements to the environment and landscape.

Appendices:

Fish Species Key

S0+	Juvenile Salmon which is under 1 year old <10cm (Salmo salar)	
S1+	Juvenile Salmon which is over 1 year old >10cm (Salmo salar)	
T0+	Juvenile Brown Trout under 1 year old <10cm (Salmo trutta)	
T1+	Brown trout over 1 year old >10cm (Salmo trutta)	

вн	Bullhead (<i>Cottus gobio)</i>	
SL	Stone loach (Noemacheilus barbatulus)	
MW	Minnow (Phoxinus phoxinus)	
SB	Stickleback (Gasterosteus aculaeatus)	



Wye & Usk Foundation 2016 Trout Survey Results - Lugg Catchment



Adult Trout Numbers

17+

13-17

9-12

4-8

1-3

0

Wye & Usk Foundation 2017 Trout Survey Results – Lugg Catchment

Himalayan Balsam Coverage 2015





Notes			



The Wye & Usk Foundation ACTION FOR FISHERIES

www.wyeuskfoundation.org Reg Charity No. 1080319



www.wyeuskfoundation.org/lafa

The Wye and Usk Foundation The Right Bank The Square Talgarth Brecon LD3 0BW

Tel: 01874 711714