Fish population survey report
Warwickshire River Avon between Evesham and Tewkesbury, 2016

This report provides a summary of results from recent coarse fish population surveys on the Warwickshire River Avon GB109054044403 between Evesham and confluence with the River Severn in Tewkesbury. The surveys were carried out to assess the health of the river and enable successful management of our principal fisheries.

<table>
<thead>
<tr>
<th>Originating team</th>
<th>West Midlands Analysis &amp; Reporting team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author(s)</td>
<td>Nikki Lloyd</td>
</tr>
<tr>
<td>Date</td>
<td>21/03/2017</td>
</tr>
<tr>
<td>Checked by</td>
<td>Martin Fenn</td>
</tr>
<tr>
<td>Sign-off date</td>
<td>22/03/2017</td>
</tr>
</tbody>
</table>
Summary

- 2 sites on the Warwickshire Avon between Evesham and Tewkesbury were surveyed by seine netting fry surveys during September 2016, 2015 and 2014 (and 1 site during September 2013 and 2012);
- 9 different species of fish were recorded and a total of 1212 fish were captured across these 2 sites in 2016;
- Gudgeon and roach were the most widespread species, being recorded in all fry surveys (between 2012 and 2016) at both sites;
- Chub was the most numerous species, accounting for almost half of all the fish caught across both sites in 2016 and more than half of the fish species that are of angling interest.

Site locations

The Warwickshire River Avon is a large river covering a very large area and so it has been split into several waterbodies. This report will cover waterbody GB109054044403- River Avon, Evesham to confluence with the River Severn. This waterbody covers the lower end of the Warwickshire River Avon, from Evesham to its confluence with the River Severn in Tewkesbury.
**Fry survey results**

The way the fry net is deployed and retrieved, means that the area surveyed is not certain and so fry surveys are unsuitable for estimating the population density of fish. This is why the table below shows the number of individuals caught for each species instead of population density estimates. The size range (min – max, mm) for each species recorded during the survey has been included.

**Table 1- Fish species caught at each site in 2016, their abundances and the minimum and maximum size caught for each species.**

<table>
<thead>
<tr>
<th>Fish species</th>
<th>Number caught</th>
<th>Size range</th>
<th>Evesham Sports Ground 2016</th>
<th>Twynning Green 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ruffe [Gymnocephalus cernuus]</td>
<td>0</td>
<td>-</td>
<td>52</td>
<td>1</td>
</tr>
<tr>
<td>Roach [Rutilus rutilus]</td>
<td>55</td>
<td>27-76</td>
<td>32-84</td>
<td></td>
</tr>
<tr>
<td>Perch [Perca fluviatilis]</td>
<td>0</td>
<td>-</td>
<td>15</td>
<td>54-73</td>
</tr>
<tr>
<td>Dace [Leuciscus leuciscus]</td>
<td>5</td>
<td>53-90</td>
<td>35-70</td>
<td>8</td>
</tr>
<tr>
<td>Chub [Leuciscus cephalus]</td>
<td>446</td>
<td>17-40</td>
<td>22-44</td>
<td></td>
</tr>
<tr>
<td>Bleak [Alburnus alburnus]</td>
<td>17</td>
<td>20-38</td>
<td>19-78</td>
<td></td>
</tr>
<tr>
<td>Minnow [Phoxinus phoxinus]</td>
<td>292</td>
<td>19-59</td>
<td>36</td>
<td>1</td>
</tr>
<tr>
<td>3-spined stickleback [Gasterosteus aculeatus]</td>
<td>4</td>
<td>35-40</td>
<td>-</td>
<td>0</td>
</tr>
</tbody>
</table>
Figure 2 - A graph to show the variation in abundance of different fish between sites and between years.
Figure 3 - A graph to show the variation in abundance of each fish species of angling interest between sites and between years.
Gudgeon and roach were the most widespread species occurring at both sites in every year surveyed. These were closely followed by chub, dace and perch which were each missing from just one site on one occasion. 3-spined stickleback were only caught at Evesham Sports Ground in 2016, but not on any other fry survey on the Avon. European eels were also comparatively scarce in the fry surveys compared to other species present and were only caught at Twyning Green, this is to be expected as this survey method is not used to assess European eels.

The graphs are showing that both the abundance and diversity of fish species was poorest at Evesham Sports Ground in 2014. It is not known why the fish population was smaller and less diverse at that point in time. Similarly it is not possible to say whether one site is capable of supporting a better fry population than the other because neither site consistently outperforms the other in terms of fish abundance or diversity of species. Often coarse fish fry population dynamics are linked with water temperature and flows. Environmental variables such as water temperature and flow are unlikely to significantly differ between the two sites on the same day, but it's possible that they could account for differences between years.

Figure 4- A graph to show the total number of fish species caught at each fry survey site each year.
Figure 5 - A length frequency distribution graph for the total number of bleak caught at Evesham Sports Ground in 2016.

Figure 6 - A length frequency distribution graph for the first 100 chub caught at Evesham Sports Ground in 2016.*

Figure 7 - A length frequency distribution graph for the total number of dace caught at Evesham Sports Ground in 2016.
Figure 8- A length frequency distribution graph for the first 100 gudgeon caught at Evesham Sports Ground in 2016.

Figure 9- A length frequency distribution graph for the total number of roach caught at Evesham Sports Ground in 2016

* Graph only includes the 100 fish that were measured. After the first 100 of each fish species was caught the rest of that species were counted and not measured, so could not be plotted in the graph.

Data from the graphs above suggest that in 2016 the site at Evesham Sports Ground was supporting a single year class of 0+ bleak and chub. At the same time this site was also supporting two separate year groups (most probably 0+ and 1+) of dace. The length frequency data for roach suggests there were also at least two separate year groups of roach occupying this site during the survey as well. Whilst the vast majority of gudgeon caught on the same fry survey were between 25 and 50mm and as such are probably all 0+ fish, there were also separate clusters of larger sized gudgeon. This suggests that adult...
gudgeon were occupying the same habitat at this site, in conjunction with the juvenile gudgeon.

The larger variation in size of chub and gudgeon compared to bleak and dace is probably due to chub and gudgeon typically spawning multiple times during the year, whereas bleak and dace don’t adopt the same strategy. The most frequent size of the dace caught in the 2016 fry survey at Evesham Sports Ground was double that of chub, which is because dace spawn earlier in the year (early spring) while chub spawn late spring to summer, so the dace fry have had longer to grow.

![Figure 10](image10.png)  
**Figure 10-** A length frequency distribution graph for the total number of bleak caught at Twyning Green in 2016

![Figure 11](image11.png)  
**Figure 11-** A length frequency distribution graph for the total number of chub caught at Twyning Green in 2016
Figure 12- A length frequency distribution graph for the total number of dace caught at Twyning Green in 2016

Figure 13- A length frequency distribution graph for the total number of gudgeon caught at Twyning Green in 2016

Figure 14- A length frequency distribution graph for the total number of perch caught at Twyning Green in 2016
Data from the graphs above suggest that in 2016 the site at Twyning Green was supporting a single year class of 0+ chub. Although fewer chub were caught at Twyning Green than Evesham Sports Ground, their average size was slightly larger than those caught at Evesham Sports Ground. The larger size at Twyning may be a result of reduced competition.

The 2016 data from Twyning Green shows that more than one year group of bleak was present at the fry site. Whilst the majority caught were 40mm or less (0+ fish), one of the bleak was 75mm, which is large enough to be a young adult. About half of the gudgeon caught at Twyning Green were juveniles (0+ fish no larger than 50mm). Whilst the rest of the gudgeon caught at this site were 85mm or greater, implying that adults were occupying the same habitat at this site. The perch caught at Twyning Green were all similar in size (between 50 and 70mm) and still juveniles. Perch don’t usually predate other fish until they are 120mm in size, so they’re probably using this habitat for the same reason as the other species of fry.

The length frequency data for roach is not normally distributed for the 2016 Twyning Green survey, making it difficult to interpret. The variation in size of this species and its relative abundance compared to other species, suggests that this site provides good habitat for juvenile roach though.
Hydroacoustic survey results

Hydroacoustic surveys can be used to estimate population densities for combined fish species, but it is not possible to tell which species of fish are present within the survey reach using only hydroacoustic data.

The graph above shows that the highest mean fish density recorded on a hydroacoustic survey on the River Avon was during 2008, when a mean density of 89 fish per 100m was recorded. No hydroacoustic surveys were carried out during 2011, 2012 or 2016, but the available data suggests there was a decline in mean fish densities from 2008 to 2013. Mean fish densities recorded on hydroacoustic surveys have fortunately increased since 2013, with mean fish densities of more than 70 fish per 100m being recorded in 2014 and 2015.

Hydroacoustic survey data from 2015, 2014 and 2013 in the form of fish density distribution maps are presented over the page. They show a generalised improvement in fish densities each year between 2013 and 2015.

The lowest mean fish density on the River Avon was recorded in 2013 and was less than 5 fish per 100m. The reason why fish densities were so low in 2013 is unknown. Although the mean fish density was close to 5, certain 100m sections of river surveyed detected less than 1 fish per 100m. The highest density of fish recorded during the 2013 hydroacoustic survey was 47 fish in a 100m stretch. Whilst this is far greater than the mean density for 2013, its low compared to the highest densities achieved in other years.

The highest density of fish recorded during the 2014 hydroacoustic surveys was 259 fish in a 100m stretch of the River Avon. Whilst 8 fish per 100m was the lowest density of fish recorded during 2014.

2015 saw the highest density of fish for all 3 years reviewed in this report. The greatest density of fish during 2015 was 426 fish in a 100m stretch of the River Avon. 3.4 fish per 100m was the lowest density of fish recorded during 2015 hydroacoustic surveys.

It would appear that where the River Avon skirts past Bredon is a consistent hotspot area, across the years, for supporting a higher density of fish.
Figure 17 - A map showing the hydroacoustic survey results from 2013

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Customer service line: 03708 506 506
Incident hotline: 0800 80 70 60
Floodline: 0345 988 1188
0845 988 1188
Figure 18 - A map to show the results of the 2014 hydroacoustic survey on the River Avon

Customer service line: 03708 506 506
Incident hotline: 0800 80 70 60
Floodline: 0345 988 1188
0845 988 1188
Figure 19 - A map showing the results of the 2015 hydroacoustic survey on the River Avon
EQSD survey results

An EQSD survey was carried out for the first time on the River Avon in 2016. The river was electric-fished using a boom boat between Strensham (SO 91835 40025) and Tewkesbury (SO 90006 34988). The results are in Table 2 below.

Table 2- A table to show the fish species caught between Strensham and Tewkesbury during the 2016 EQSD survey, their abundances, the minimum and maximum size of measured fish (not all fish caught were measured) and the age range of some fish.

<table>
<thead>
<tr>
<th>Fish Species</th>
<th>Number caught</th>
<th>Size range (mm)</th>
<th>Age range (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bleak ([<em>Alburnus alburnus</em>])</td>
<td>247</td>
<td>40-137</td>
<td></td>
</tr>
<tr>
<td>Chub ([<em>Leuciscus cephalus</em>])</td>
<td>51</td>
<td>97-200</td>
<td>3+</td>
</tr>
<tr>
<td>Common bream ([<em>Abramis brama</em>])</td>
<td>11</td>
<td>100-461</td>
<td>2+ to 11+</td>
</tr>
<tr>
<td>Common carp varieties ([<em>Cyprinus carpio</em>])</td>
<td>1</td>
<td>521</td>
<td></td>
</tr>
<tr>
<td>Dace ([<em>Leuciscus leuciscus</em>])</td>
<td>29</td>
<td>82-163</td>
<td>2+ to 4+</td>
</tr>
<tr>
<td>European eels &gt; elvers ([<em>Anguilla anguilla</em>])</td>
<td>4</td>
<td>200-366</td>
<td></td>
</tr>
<tr>
<td>Gudgeon ([<em>Gobio gobio</em>])</td>
<td>1</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>Perch ([<em>Perca fluviatilis</em>])</td>
<td>10</td>
<td>55-147</td>
<td></td>
</tr>
<tr>
<td>Pike ([<em>Esox Lucius</em>])</td>
<td>8</td>
<td>241-828</td>
<td></td>
</tr>
<tr>
<td>Roach ([<em>Rutilus rutilus</em>])</td>
<td>126</td>
<td>60-181</td>
<td>2+ to 6+</td>
</tr>
<tr>
<td>Silver bream ([<em>Abramis bjoerkna</em>])</td>
<td>2</td>
<td>64-224</td>
<td></td>
</tr>
<tr>
<td>Zander ([<em>Sander lucioperca</em>])</td>
<td>4</td>
<td>517-725</td>
<td></td>
</tr>
</tbody>
</table>

The EQSD surveys found a variety of different fish species, which is further evidence to show that the River Avon is capable of supporting a range of fish. The sizes of the fish that were measured showed that there was variation in size within species which generally implies a range of ages of fish. The scale data that was collected from some of the fish species and analysed supports this generalisation. The data in Table 2 shows that there are individuals within the common bream population up to 11 years old.

Match catch records

Table 3- A table to show the match catch records sent in by angling clubs for the River Avon from 2012 to 2016

<table>
<thead>
<tr>
<th>Match Date</th>
<th>Venue</th>
<th>Species caught</th>
<th>Total weight of fish caught</th>
</tr>
</thead>
<tbody>
<tr>
<td>16/06/2015</td>
<td>Pensham, River Avon</td>
<td>Roach, Bream, Perch, Chub</td>
<td>17 lbs</td>
</tr>
<tr>
<td>08/03/2015</td>
<td>Pensham, River Avon</td>
<td>Bream, Perch, Roach, Chub</td>
<td>248 lbs</td>
</tr>
</tbody>
</table>

Each of the matches displayed in Table 3 above were 5 hours in duration, but they didn’t all have the same number of anglers competing. The number of competitors ranged from 8 to 11 for each match. One of the

<table>
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<th>customer service line</th>
<th>incident hotline</th>
<th>floodline</th>
</tr>
</thead>
<tbody>
<tr>
<td>03708 506 506</td>
<td>0800 80 70 60</td>
<td>0345 988 1188 0845 988 1188</td>
</tr>
</tbody>
</table>
anglers didn’t weigh-in their fish in the 2012 Mythe Farm match, whilst 3 refrained from weighing-in their catch in the June 2015 match at Pensham. Although the total weight of fish caught at Pensham in March 2015 was far greater than all the other matches combined, it also had the most anglers weighing their fish. A single angler in this match caught 198 lbs and 6oars of fish!

WFD Classification

The stretch of the River Avon covered in this report is waterbody GB109054044403- River Avon from confluence Workman Bridge, Evesham to confluence River Severn. This waterbody is designated as a highly modified waterbody which means it is classified on its potential not by status. It was designated as highly modified due to its importance as a navigational waterbody and flood protection grounds, as well as being urbanised. It has not been classified for fish since Cycle 2 began, mainly because it is not possible to fish it effectively using standardised WFD approved methods. This waterbody was classified as High potential for fish when it was last classified during Cycle 1. The most recent Cycle 2 classification for the overall waterbody is Moderate potential which is being driven by phosphate failures.

Analysis of data from fry surveys, hydroacoustic surveys, EQSD surveys and match catch data suggest that the River Avon supports a wide range of coarse fish species, including both adults and juveniles and that it is capable of supporting high density fish populations.

Health of fish population

- Mean fish densities were at their highest during the 2008 hydroacoustic survey and their lowest during the 2013 hydroacoustic surveys. Yet by the following year (in 2014) the mean fish density had improved to be almost as high as 2008. Demonstrating that the River Avon supports a varying abundance of fish over time.
- The greatest numbers of juvenile fish (more than double the amount caught in any other year fished between 2012 and 2016) were caught at the Twyning Green fry site in 2013.
- There is less juvenile fish data available for the Evesham Sports Ground, which has only been fished between 2014 and 2016. But the greatest abundance of fish recorded at this site was in 2016. The abundance of fish species of angling interest was around 700 individuals but the total abundance of all fish species caught at this site in 2016 was close to 1000.
- To summarise the overall health of the coarse fish community on this stretch of the River Avon varies with time. There has consistently been a good mix of species present during fry surveys, even though their abundances have varied considerably over time. There is some good habitat available to support the abundance of juvenile fish.
- The abundance of juvenile fish present on the River Avon proves that there is a breeding fish population present. The scale data from the EQSD survey showed that some of the bream were at least 11 years old.
- Drawing on data from fry surveys, match catch data and EQSD survey data we know that the River Avon is capable of supporting all of the following coarse fish species- 3-spined stickleback, bleak, chub, common bream, common carp varieties, dace, eels, gudgeon, minnow, perch, pike, roach, ruffe, silver bream and zander. It may support other additional species, but the species above were the only ones there is evidence for.
**Planned actions**

Currently there is a fish pass at Pershore, which was installed as part of a hydropower and another functioning fish pass at Evesham. There are plans in place to create a bypass channel at Abbey Mill weir in Tewkesbury and it is likely that a fish pass will be added to Nafford weir as part of a proposed hydropower scheme. The Environment Agency has been tasked with addressing the issue of fish passage over all of the River Avon weirs but at present there is no funding or definite plans in place for any other fish passage schemes on other weirs not mentioned above.

**Next survey**

The next hydroacoustic survey for the River Avon is scheduled for summer 2017 and the next fry surveys are scheduled for autumn 2017.

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If you would like to discuss the information presented in this report, please contact:

- Nikki Lloyd - West Midlands, Analysis and Reporting
- 03708 506 506
- enquiries@environment-agency.gov.uk

If you would like to discuss future management of this fishery, please contact:

- Brecht Morris - West Midlands, Fisheries, Biodiversity and Geomorphology
- 03708 506 506
- enquiries@environment-agency.gov.uk

Before you go fishing don’t forget:

- You must have a valid [Environment Agency rod licence](https://environment-agency.gov.uk/rodlicensing) and permission from the fishery owner;
- You must comply with the [fisheries byelaws](https://environment-agency.gov.uk/rodlicensing);
- The coarse fish close season (15th March to 15th June inclusive) applies to all rivers, streams and drains in England and Wales but not most still waters. Stillwater fishery owners can still have their own close season and rules, so please check with them before setting out.

**Report illegal fishing:**

If you see any fishing, netting or trapping you think may be illegal, please do not tackle it yourself. Call us immediately on 0800 80 70 60 and tell us:

- Exactly where the alleged offence is taking place;
- What is happening;
- How many people are involved and their descriptions;
- The registration numbers of any vehicles involved.

If you prefer to remain report an environmental crime anonymously call Crime stoppers on 0800 555 111 or [https://crimestoppers-uk.org/give-information/give-information-online/](https://crimestoppers-uk.org/give-information/give-information-online/).