

Fish population survey report

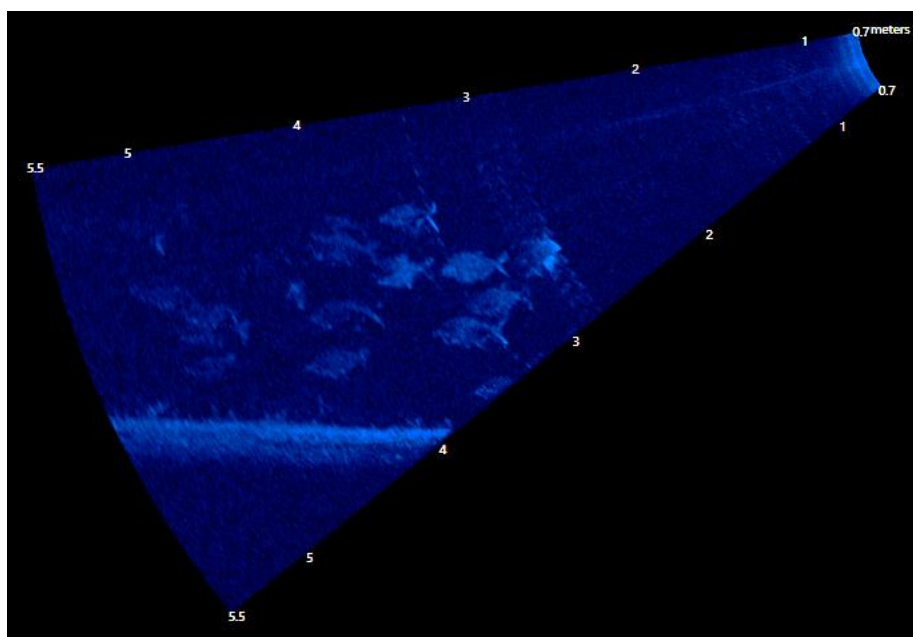
The Middle Level System

August 2023

This report provides a summary of results from recent fish population surveys conducted on the Middle Level System. The surveys were carried out to assess the health of the fishery and enable successful management of our principal fisheries.



Images 1,2&3: A specimen rudd from the Middle Level catchment, a winter match catch of over 12 Kg and an acoustic view of a Middle Level bream shoal.



Summary

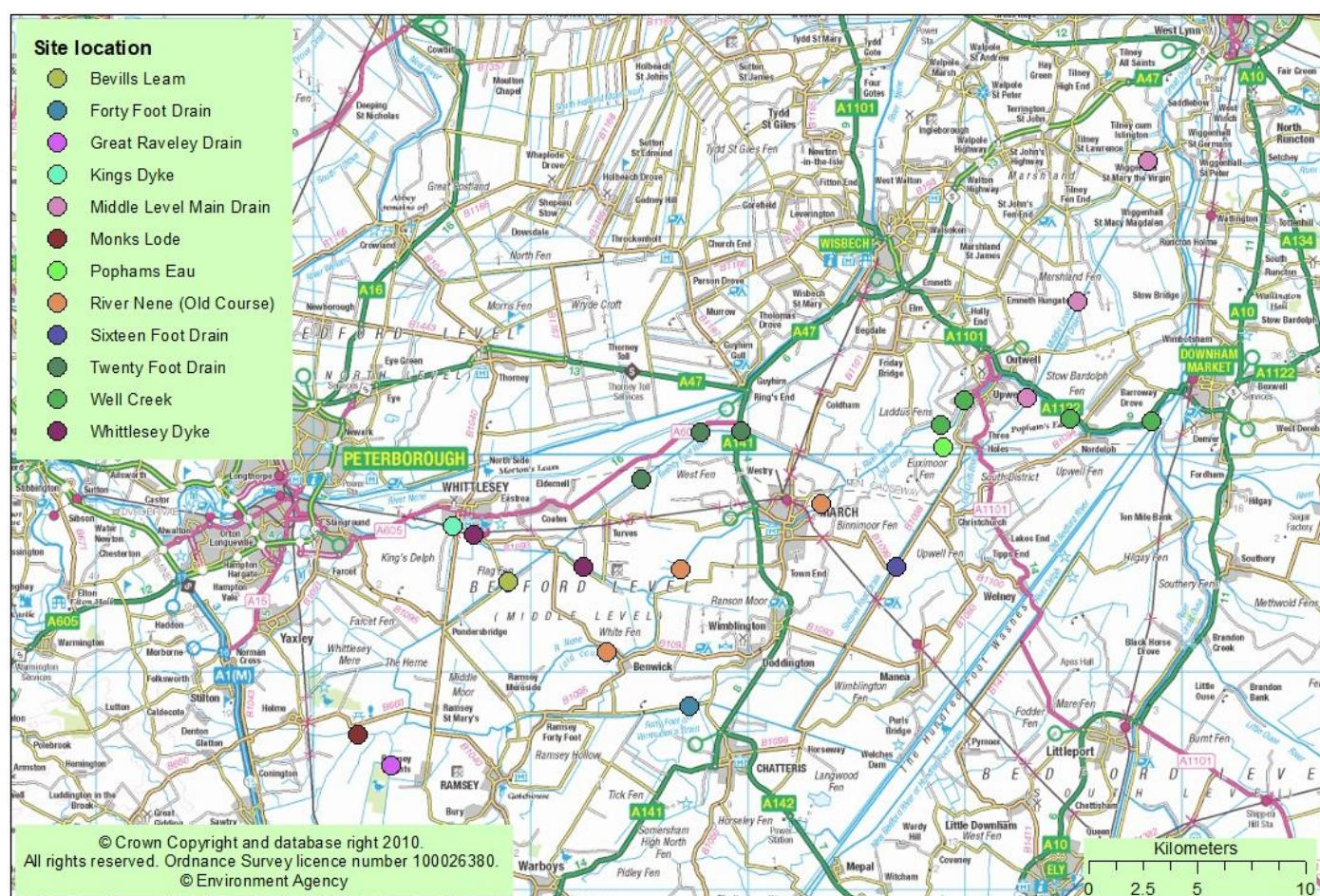
- Eighteen sites were surveyed on the Middle Level System using Seine netting and Electric Fishing with supporting data collected by a variety of hydroacoustic techniques.
- Seine netting and Electric fishing was conducted between the 25th April and the 4th of August 2023
- A total of **10163** fish of sixteen species, including two non-native species, plus one hybrid were recorded.
- Roach were the most numerous species captured (5090 Individuals) followed by silver bream (2191 Ind.)

Introduction to Environment Agency fisheries surveys

The Environment Agency has a statutory duty to maintain, improve and develop fisheries. Our policy is to do this in a way that maximises the social, recreational, and economic benefits arising from the sustainable exploitation of the fish stocks that underpin fisheries. To help deliver this duty, we have a National Fisheries Monitoring Programme (NFMP) to describe the status of our fish populations and inform our fisheries management to meet international (WFD, Eel regulations, ICES reporting), national and local data needs.

Sites are regularly reviewed to maintain a representative sample of fish populations and the water body as a whole to retain a comparable dataset. Sites designated for the national fisheries monitoring programme cannot be altered unless there is a valid health and safety concern or there has been a review of policy during the monitoring period.

Survey locations



Map 1: Survey sites sampled on the Middle Level system 2023

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incident hotline
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floodline
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0845 988 1188

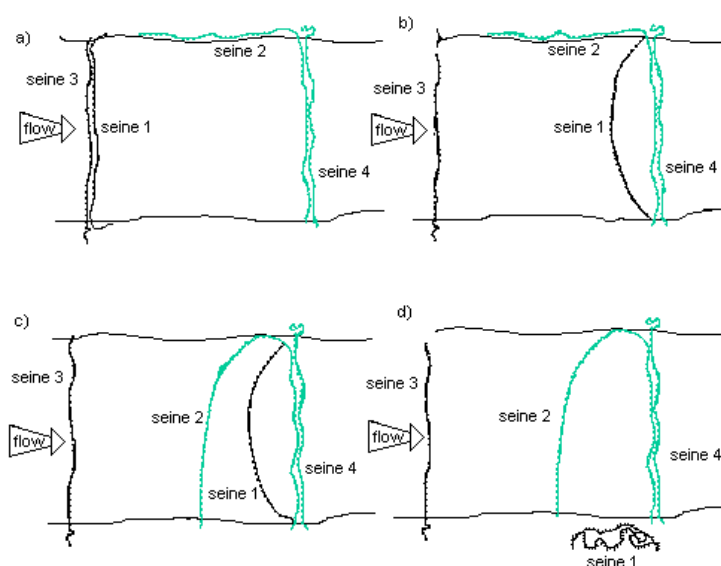
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Table 1: Site location and survey methodology

Table 1	Site Name	Site ID	NGR	Date	Survey method	Survey type
Bevills Leam	Chappel Bridge	4902	TL2896694135	Cancelled	Seine netting	Side scan/Aris
Forty Foot Drain	Badney Drove	4890	TL3733188397	18/07/2023	Seine netting	Catch depletion
Great Raveley Drain	Woodwalton Fen	4909	TL2357585705	28/06/2023	Seine netting	Single catch
Kings Dyke	Whittlesey	4899	TL2640896716	04/08/2023	Electric fishing	Catch depletion
Middle Level Main Drain	Mullicourt Aqueduct	4856	TF5286702609	20/07/2023	Seine netting	Catch depletion
Middle Level Main Drain	Neeps Bridge	4858	TF5517806999	26/07/2023	Seine netting	Single Catch
Middle Level Main Drain	Wiggenhall St Marys	4861	TF5842113502	01/08/2023	Seine netting	Catch depletion
Monks Lode	Charter House Farm	4907	TL2203387115	04/07/2023	Wrap around seine netting	Catch depletion
Nene (Old Course)	Staffurths Bridge	4884	TL3688994706	05/07/2023	Seine netting	Catch depletion
Pophams Eau	Croft House Farm	4862	TF4900000322	02/08/2023	Seine netting	Catch depletion
Sixteen Foot Drain	Bedlam Bridge	4868	TL4681094836	03/08/2023	Seine netting	Catch depletion
Twenty Foot Drain	Holloways Bridge	4873	TL3508198874	25/04/2023	Seine netting	Catch depletion
Twenty Foot Drain	Goosetree Corner	4874	TF3783201011	03/05/2023	Seine netting	Catch depletion
Twenty Foot Drain	Hobbs Lot Bridge	4875	TF3967101084	10/05/2023	Seine netting	Single catch
Well Creek	Marmont Priory	69443	TF4889201327	16/05/2023	Wrap around seine netting	Catch depletion
Well Creek	Outwell	4522	TF4996102476	25/05/2023	Wrap around seine netting	Catch depletion
Well Creek	Salters Lode Well Creek	4517	TF5856001534	25/05/2023	Wrap around seine netting	Catch depletion
Whittlesey Dyke	Ashline Lock	4893	TL2736196321	12/07/2023	Electric fishing	Catch depletion
Whittlesey Dyke	Engine Farm	4895	TL3241694853	06/07/2023	Electric fishing	Catch depletion

Survey methodology

Most sites on the Middle Level system were sampled by **seine netting**. This is our primary survey technique on lowland watercourses where the depth and width of the river channel precludes the use of electric fishing. The seine netting operation starts by staff positioning stop nets across the river channel to isolate the survey area and prevent fish from migrating in and out of the site. A seine net is then laid by boat to encircle the survey area. The net is constructed from 10mm knotless mesh, which is soft to help minimize damage to fish. Floats are attached along the top edge and a lead line is fixed along the bottom to ensure that the net hangs vertically within the water column. The catching net is hauled in by hand and fish are removed and retained in floating keep- cages. The netting operation is

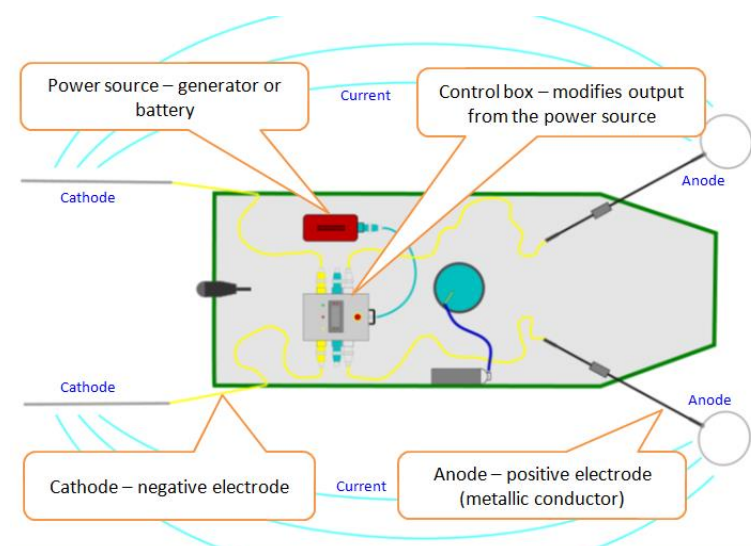


repeated until a 50% reduction in the total number of fish caught in the first catch has been achieved. A variation on this technique is **drag down Seine netting** which starts, as before, with stop nets positioned across the river (nets 3 & 4 in the diagram below). A catching net is then set at the lower extent of the site (seine 2) and a heavily weighted 'driving' net is then laid across the channel (seine 1). Net 1 is drawn downstream driving fish into the catching net. The catching net is then hauled into the bank to encircle the driving seine net, which is then removed. Fish are now contained within the catching net, which may then be retrieved. The netting operation should be repeated until a 50%

reduction in the total number of fish caught has been achieved.

The **electric fishing** survey technique was utilised on the Middle Level in three instances where the channel width, depth or weedy conditions meant that seine nets would have been inefficient or harmful to fish stocks by disturbing sediment accumulations.

The electric fishing method uses the physiological effect of an electric field in water to attract and immobilise fish. Electrodes immersed in the water, stimulate the fish nervous system so that it swims towards the operator, or is unable to swim away, and can then be caught with a hand net. The image (left) shows the typical components of an electric fishing system. In shallow streams, it is generally possible to wade upstream within the channel using generator-powered equipment towed within a small boat. When rivers deepen (or the site depth is variable), electric fishing from within a boat using generator powered equipment is often the preferred method. The boat is manoeuvred downstream on ropes by an operative on either bank controlling the speed,



direction and in-channel positioning. Stop nets are positioned across the channel to isolate the survey site and prevent fish from migrating into and out of the survey area. Similar to seine netting, the operation should be repeated until a 50% reduction in the total number of fish caught has been achieved. the captured fish are measured to the nearest millimetre (to the fork of the tail) and scales are taken from a sub-sample of fish for age, growth, and other statistical analyses at the National Fish Laboratory in Brampton.

Density and standing crop results are derived using Carle and Strub depletion methodology and reported utilising fish greater than 99mm in length (>99mm) as both survey methodologies used lose capture efficiency on fish below this length band. **Numbers and population estimates of juvenile fish and small species should therefore be viewed as a minimum estimate only.**

Split-beam hydroacoustic survey - routine surveys

Our hydroacoustic survey technique utilises sound waves (pings) that are fired across the river channel at a rate of 10 'pings' per second. These 'pings' are reflected to the transducer from objects within the 4m x 10m elliptical beam and depending on the strength of the returning echo the nature of the reflective object can be determined. Solid items such as the far bank, bridge supports and riverbed give extremely strong returns; whilst echoes from fish, or more accurately from fish swim bladders, give a moderate return and surface scatter gives a much weaker echo.

The surveys are conducted at night since fish are distributed more evenly throughout the water column during the hours of darkness and this allows them to be easily distinguished from substrate, macrophyte growth and bankside 'clutter'. After the survey is complete the acoustic echograms are post-processed and interpreted. Output from this analysis is provided as a fish density estimate (Ind./1000m³) and can also be displayed as density groupings in map format.

More detailed information is available in the full Middle Level Main Drain Hydroacoustic report which can be found here: <https://aterforum.co.uk/document/middle-level-2023/>

Side-scan hydroacoustic survey - Investigative & winter aggregation

Although traditional survey techniques are critical for the accurate collection of length data, species composition and scale samples (for age/growth analysis) a major weakness of these is the relatively small area of channel sampled. This is not such an issue when several sites are present, or when fish are widely dispersed along a watercourse, however when stock is tightly shoaled then the likelihood of simply 'missing' the fish is considerably higher. Of course, there is also the slim possibility that a site may happen to contain an unusually large aggregation giving a result that is not at all representative of the river.

To increase our knowledge of fish distribution, and better interpret the routine survey results, we have conducted additional surveys using side-scan acoustic technology. Many of our Fenland drains are insufficiently wide or deep for the split-beam apparatus to be routinely employed; however, it is possible to use a side-scanning sonar (Humminbird Solix) to cover long lengths of the channel and locate shoals at which point a Sound Metrics A.R.I.S acoustic camera could be used for more detailed examination of the fish and differentiate between larger species present. Such a technique will not produce a traditional acoustic population estimate (i.e. fish/1000m3) but will be a useful method of determining the distribution of fish stocks and allow measurement of a sub-sample of the fish for length frequency analysis. Fish lengths for larger species such as common bream are taken from individuals which were well aligned to the transducer and will be sufficiently large to allow a measurement to be taken from the nose to fork of the tail. For smaller species this would be more difficult, and for this reason data for fish <99mm should be considered a whole-body measurement.

Angler participation - The Match Catch database

Fishery performance output will also be included from the EA's Match Catch Database, where available. Rod and line surveys can provide a valuable source of information about fishery performance and may be a sound indicator on the status of exploited stock. The match catch database allows storage of match results in a way that permits rapid analysis of angler catches over time and is a way for anglers to support their fishery and have their say on the quality of sport anglers are experiencing. Such data not only underpins and validates our survey data but, in some cases, also adds to it by including details of species which have not been caught in surveys.

By collecting & providing the EA with catch returns an angling club knows that if there are concerns about the state of its waters, a record of fishery performance will exist against which this may be compared.

- If clubs wish to provide match data for analysis and inclusion in subsequent reports, then this is encouraged and will be greatly valued.

Results

- Eighteen sites were surveyed on the Middle Level system by seine netting, electric fishing and hydroacoustic survey between the 25th April and the 4th of August 2023.
- A total of **10163** fish of sixteen species, including two non-native species, plus one hybrid were recorded
- Roach were the most numerous species captured (5090 Individuals) followed by silver bream (2191 Ind.)

For clarity, results will be presented by watercourse (in alphabetical order). Results will be compared at site level and for a combined reach where sufficient data makes this possible.

Table 2: Total number and largest (mm) fish captured for key species during the 2023 survey.

Table 2:	Site Name	Total No of fish	No. Roach	Largest Roach (mm)	No. Silver Bream	Largest S.Bream (mm)	No. Common bream	Largest C.Bream (mm)	No. Rudd	Largest Rudd (mm)
Forty Foot Drain	Badney Drove	700	306	175	17	132	95	475	42	189
Great Raveley Drain	Woodwalton Fen	450	168	215	81	180	16	285	33	180
Kings Dyke	Whittlesey	116	63	232	1	115	4	116	5	121
Middle Level Main Drain	3 x sites combined	1056	236	215	343	185	341	247	12	126
Monks Lode	Charter House Farm	276	156	124	1	70	13	79	89	133
Nene (Old Course)	Staffurths Bridge	772	320	178	37	202	37	202	230	231
Pophams Eau	Croft House Farm	59	36	136	0	0	1	87	2	117
Sixteen Foot Drain	Bedlam Bridge	48	23	107	0	0	2	467	7	105
Twenty Foot Drain	Holloways Bridge	1478	1111		14		40		67	
Well Creek	3 x sites combined	4767	2341	250	1689	280	187	475	218	284
Whittlesey Dyke	2 x sites combined	441	330	172	8	150	8	486	30	330

Bevils Leam

Sites sampled: 1 x acoustic winter survey

Site name: N/A

Year of survey: 2021

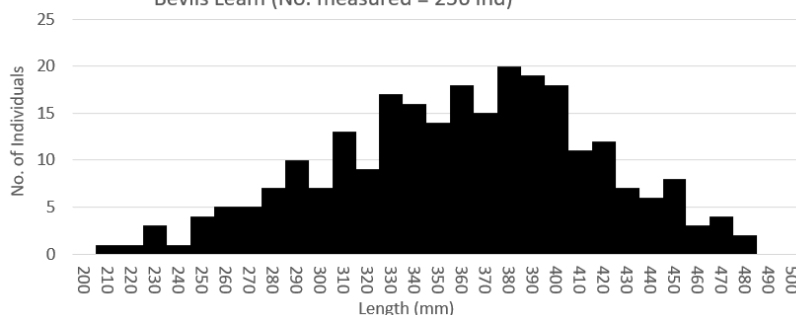
Our survey on Bevils Leam was cancelled in 2023 due to dense macrophyte growth throughout the survey area. If seine netting occurs in such circumstances, there may be unacceptable risk to fish welfare as individuals may become tangled amongst uprooted plants and therefore be subject to mechanical damage suboptimal water quality.

Prior surveys have found that the channel is dominated by populations of roach, common bream, perch and pike and there is no reason to suspect that this species composition will have changed significantly.

Our 2021 winter aggregation acoustic survey identified numerous common bream present and 256 of these individuals have been measured using proprietary software. A length frequency plot derived from the acoustic survey is presented below as **Figure BL1**. The acoustic software suggested that the common bream measured between 215mm and 485mm and averaged 360mm.

The ARIS survey also identified two carp (680mm and 754mm) four tench (198mm – 433mm) and two pike (602mm and 737mm).

Figure BL1: ARIS derived length frequency of common bream in the Bevils Leam (No. measured = 256 Ind)



Match catch data

Match catch data from Bevils Leam was supplied to the EA between 2013 and 2015 and showed an increasing number of anglers were fishing the Bevils Leam and the majority were successfully weighing in following the match. During this period sport seemed to be improving with the average weight caught per angler and average weight caught per hour were increasing.

If further match records are available, then these would be gratefully received and will allow more detailed analysis of fishery performance at this venue.

Year	No. of matches	No. of anglers	No. of anglers weighing in	% of anglers weighing in	Total Weight	Hours Fished	Weight per angler	Weight per hour	Class
2013	4	36	34	94	161-6-0	144	4-7-11	1-1-14	A
2014	7	67	58	87	314-3-0	268	4-11-0	1-2-12	A
2015	6	78	72	92	374-12-0	312	4-12-13	1-3-3	A

The Forty Foot Drain

Sites sampled: 1 x Seine netting (+acoustic winter survey) **Site name:** Badney Drove **Date of survey:** 18/07/2023.

Table FF1	Minimum length	Maximum length	Mean length	Minimum age	Maximum age	Number caught
Species caught (All lengths)						
Roach	67	175	104	1+	5+	306
Perch	51	180	88			199
Common bream	75	475	122	1+	15+	95
Rudd	68	189	98	1+	5+	42
Bleak	76	148	113			23
Silver bream	80	132	102	1+	3+	17
Ruffe	70	102	84			11
Pike	118	445	191			6
Roach x common bream hybrid	95	95	95			1

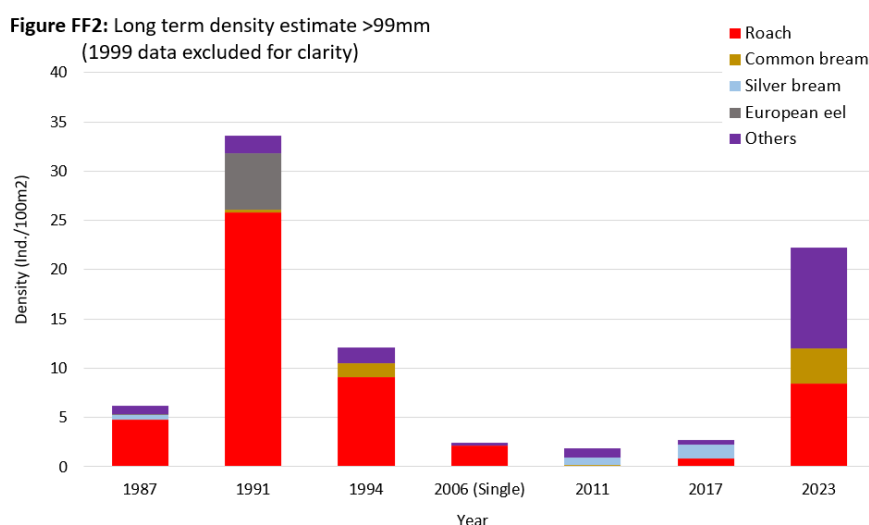
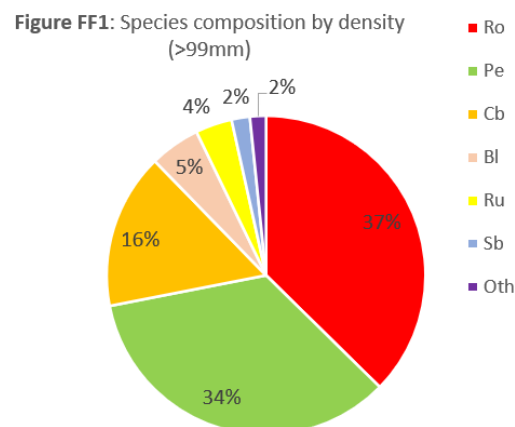
Our 2023 survey at Badney Drove produced a population estimate of 22.68 Ind./100m² which was principally composed of roach and perch. Numerically the catch was principally composed of roach with over 300 individuals recorded which averaged 104 mm long and were aged between 1 and 5 years old (Y.O.). 161 of the roach were >99mm in length and these fish contributed 37% to the overall density estimate at this site with a species population estimate of 8.47 Ind./100m².

Common bream represented 16% of density with a population estimate of 3.75 Ind./100m² and were aged between 1 and 15 years old with the largest individual measuring 475mm. The seine netting survey found a total of 95 common bream present with an average size of 122mm, however acoustic survey has established that large shoals of the species may be encountered on the channel, details follow later in this report.

Age and growth analysis determined that the roach, silver bream and common bream all had slow growth rates, attaining Percentage Standard Growth (PSG) values of 88%, 88% and 87%, respectively. The rudd also showed slow growth rate (PSG = 92%) when compared to their species standard, but this was not as slow as the other species analysed. Comparison of the 2023 catch against prior surveys on the 40ft Drain at Badney Drove (**Figure FF2**) indicates that the recent result represents a considerable improvement over previous three surveys and the current roach population estimate is comparable to that found in 1994. The perch density value may be a slight over estimation of stock, being subject to wide confidence limits.

It should also be noted that data from 1999 has been excluded from figure FF2 for ease of viewing. This is because on that occasion the catch numbered over 10,000 fish, predominantly roach, but it should be remembered that such a shoal of fish will not be representative of the river as a whole and is instead due to aggregation of stock.

Anecdotal evidence has suggested that suggests that some of the best angling on the Forty Foot Drain can be experienced during the winter months when the channels dispersed fish stocks aggregate around features such as bridges or tree cover. The area around Ramsey Forty Foot Village is a well-known local winter hotspot and catches of roach, common bream, tench and predatory species are possible.



Winter acoustic survey

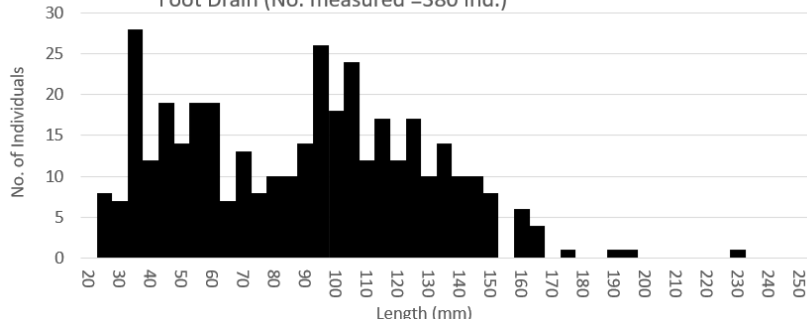
Date of survey: 30/01/2020 **Method:** Humminbird Solix and ARIS

‘Silver fish’ species (roach, rudd, silver bream, bleak and juvenile common bream)

Our side-scan and ARIS survey conducted in early 2020 and conclusively proved that the river channel at Ramsey Forty Foot village is an extremely important overwintering area for coarse fish species, indeed the river at this point which was light-heartedly referred to as ‘fish soup’ by the survey team, aggregated silver fish being stacked throughout the water column from surface to substrate. These fish are clearly visible in **Image FF1**.

A subsample of the ‘silver fish’ were measured and this data is presented as **Figure FF3**. This suggests a maximum size of a little over 200mm, not too dissimilar from the result of the recent netting survey. It is not possible to determine whether these fish are roach, rudd or small common bream as it is not possible to differentiate between smaller individuals of these species using acoustic technology.

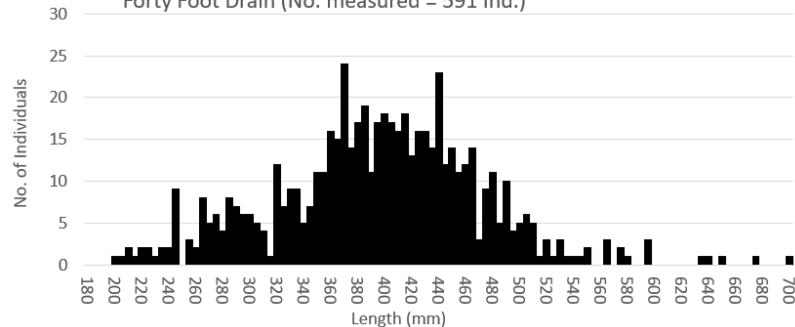
Figure FF3: ARIS derived length frequency of ‘silver fish’ in the Forty Foot Drain (No. measured = 380 Ind.)



Map FF1 (overleaf) demonstrates how tightly aggregated stocks were at the time of survey with very few silver fish observed elsewhere along the channel.

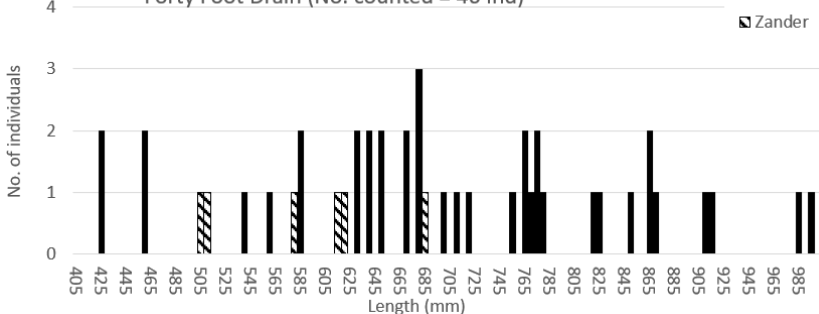
Common Bream: Whilst common bream were regularly observed around Ramsey Forty Foot Village, either as individual fish or forming part of a small group; the species were more widely distributed over the wider channel (see **Map FF2**) and a very large shoal was found close to Leonard Childs Bridge and part of this shoal is displayed as **1FF2**, the fish being visible as pale coloured shapes, the more obvious dark shapes being the acoustic shadow caused by large fish blocking the output from the sounder. A subsample of almost 600 common bream were measured and these produced length values of between 200mm and 700mm. A length frequency plot of this data is provided as **Figure FF4** and shows that most fish were between 320-500mm. It is reasonable to say that anyone able to ‘drop’ onto these shoals may experience some exceptional sport.

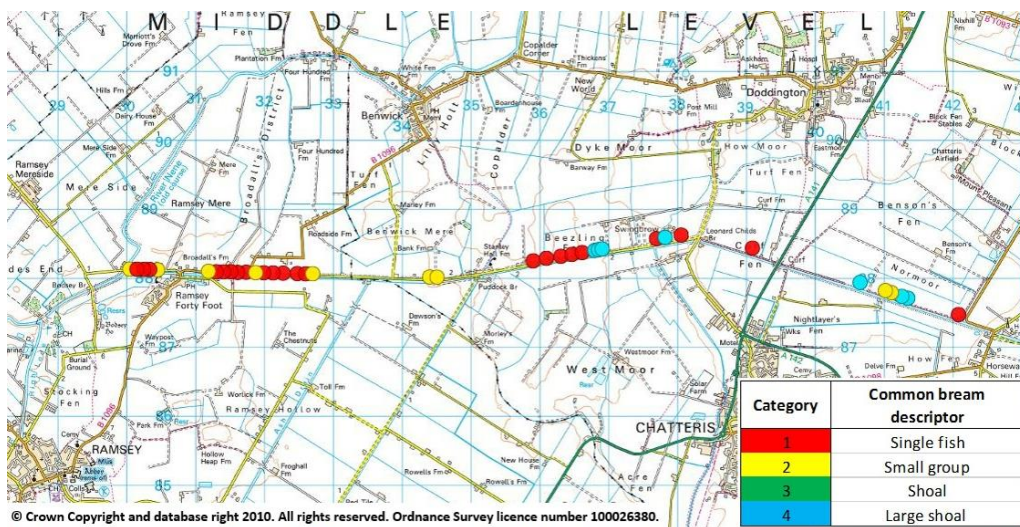
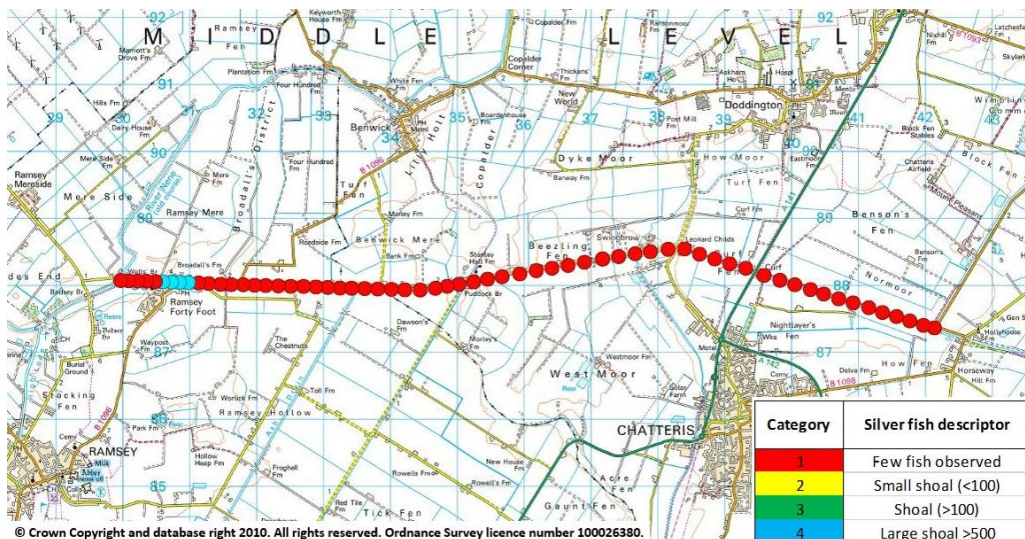
Figure FF4: ARIS derived length frequency of common bream in the Forty Foot Drain (No. measured = 591 Ind.)



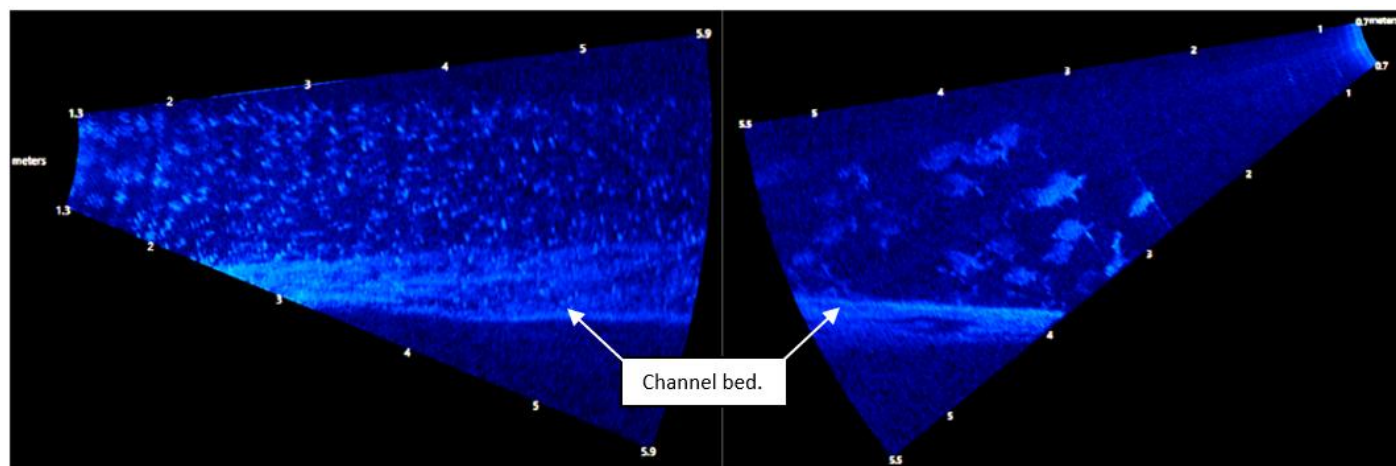
Predatory species: Perhaps unsurprisingly, given the amount of fodder fish present, the acoustic survey also identified pike and zander present, a subsample of these fish have been measured and a length frequency plot is provided as **Figure FF5**. Forty pike and six zander were measured with maximum lengths of 995mm and 685mm respectively.

Figure FF5: ARIS derived length frequency of Pike and Zander in the Forty Foot Drain (No. counted = 46 Ind)





Maps FF1 & FF2 Showing Silver fish and common bream distribution during winter 2020.



Images FF1 & FF2: Shoaling coarse fish and large common bream seen via the ARIS acoustic camera.

Match catch: Data is held for just one match on the Forty Foot which occurred in 2006. The results from this competition indicate that of the 54 anglers competing, 98% weighed in with an average catch of 5lb per angler.

If matches are still held on this section of channel, data would be gratefully received.

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Great Ravely Drain

Sites sampled: 1 x Seine netting Site name: Woodwalton Fen Date of survey: 28/06/2023.

Table GRD1 Species	Minimum length (mm)	Maximum length (mm)	Mean length (mm)	Minimum age	Maximum age	Numbers Caught
Roach	50	215	82	1+	8+	168
Perch	62	128	77			116
Silver bream	40	180	88	2+	6+	81
Rudd	51	180	81	1+	5+	33
Bleak	96	137	111			32
Common bream	54	285	169	1+	8+	16
Ro x cb hybrid	98	154	126			2
Ruffe	101	101	101			1
Tench	63	63	63			1

Note: the results from 2006, 2011 and 2023 are single catch estimates only and, as such, are a minimum estimate of the population only.

Our 2023 survey at Woodwalton Fen found roach and silver bream dominated by density with perch secondary by number caught. Roach contribute almost 40% to the population with a species level density of 3.81 Ind./100m². Roach were found to a maximum length of 215mm although the average length was 88mm meaning that a high proportion of these fish did not count towards the site population estimate. If fish of *all lengths* are used to determine the population, then site level density increases to 35 Ind./100m² with a roach population of 13.3 Ind./100m². Roach were aged to a maximum of 8 years old and exhibited slow growth with a P.S.G value of 79%. Silver bream and rudd were aged to 6 Y.O. and 5 Y.O. respectively and both showed average growth with P.S.G values of 90% and 95% respectively.

The sites population estimate of 10 Ind./100m² is a little above average when compared to the long-term density for this location (9.08 Ind./100m²). The roach population is within the range of values seen previously and sites close to the species long term average of 4.8 Ind./100m², although the recent single catch surveys should not be directly compared to the depletion surveys conducted between 1991 – 1999 as the single catch results may underestimate the population. The 2023 catch was bolstered by the inclusion of silver bream, a species scarcely recorded during previous sampling, but which represented almost a quarter of density in the most recent survey. This is not the only such channel that has seen a growth to the silver bream population, suggesting that the species has fared particularly well within the Middle Level system in recent years.

Figure GRD1: Species composition by density (>99mm)

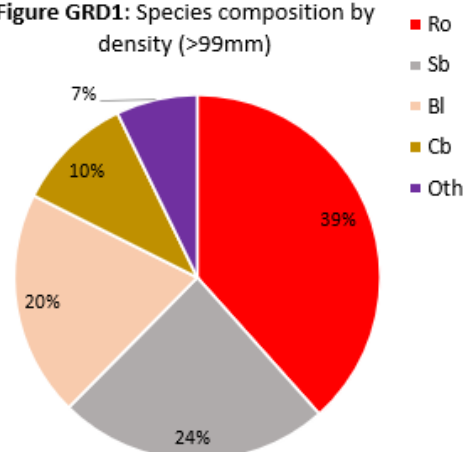
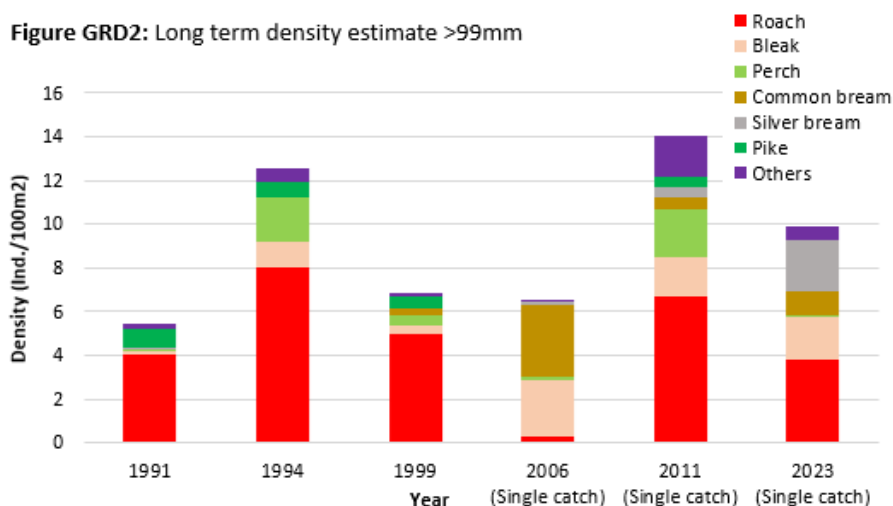


Figure GRD2: Long term density estimate >99mm



No match catch dataset is currently available for this watercourse.

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The Kings Dyke

Sites sampled: 1 x Electric fishing (+acoustic winter survey)

Site name: Whittlesey **Date of survey:** 04/08/2023

Table KD1				
Species	Minimum length (mm)	Maximum length (mm)	Mean length (mm)	Number caught
Roach	80	232	123	63
Perch	76	127	94	37
Rudd	72	121	104	5
Common bream	109	116	112	4
Pike	113	521	249	3
Tench	239	239	239	1
Gudgeon	115	115	115	1
Silver bream	115	115	115	1
Spined loach	59	59	59	1

The Kings Dyke at Whittlesey is one of the few Middle Level sites to be sampled by electric fishing. This is due to its shallow and narrow dimensions and comparatively high clarity of the water. The 2023 survey found a population density of 5.85 Ind./100m² which was principally composed of roach (4.2 Ind./100m²) with perch secondary (0.64 Ind./100m²) followed by rudd, common bream and pike. The 2023 population estimate represents a reduction in density over the 2017 result and roach density is currently comparable to that recorded in the 2011 survey cycle.

The unusually high eel density in 1987 survey had wide confidence limits (+/- 85 Ind./100m²) but this should not detract from the fact that, with almost 180 eels captured, this was an excellent catch of the species. Most surveys at this site have found considerably lower eel density values (<1 Ind./100m²) and the species was absent during 1991 and 2023.

Winter side-scan acoustic survey

Date of survey: 16/01/2020

Method: Humminbird Solix and ARIS

Our winter aggregation survey conducted in 2020 found stock distribution concentrated at either end of the channel with only sporadic representation elsewhere along the channel. A large shoal of common bream was observed close to Stanground Lock and large aggregations of coarse fish (which included large bream) were noted at Whittlesey. A subsample of the fish was counted using the acoustic software and the values derived are presented as length-

Figure KD1: Species composition by Density (>99mm)

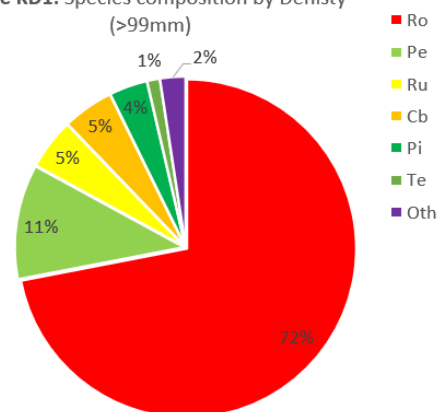


Figure KD2: Long term density estimate (Fish >99mm)

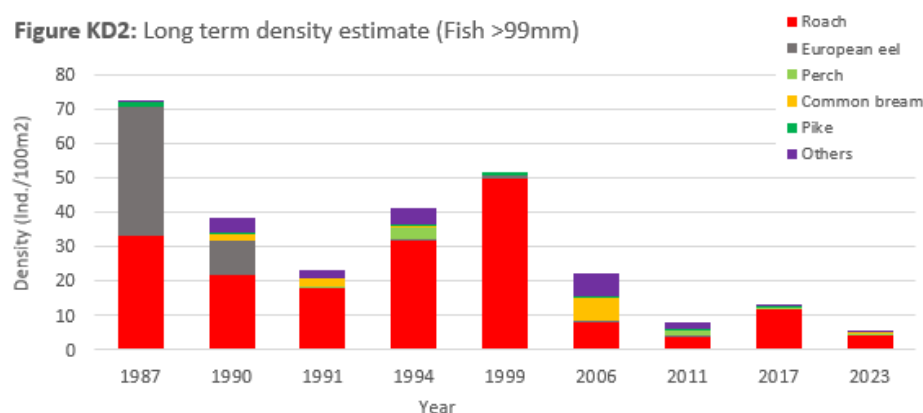
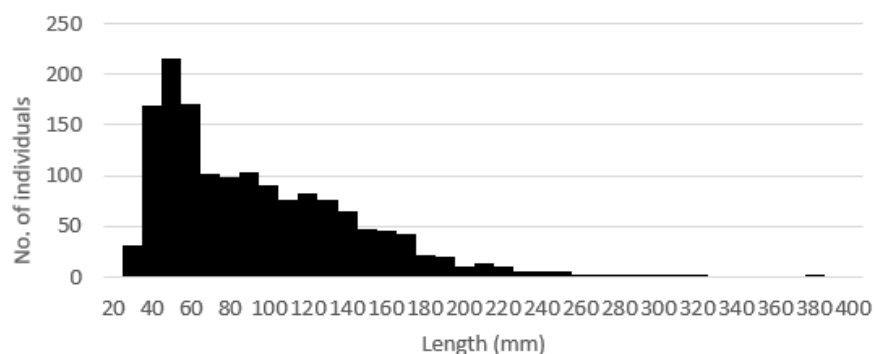


Figure KD3: ARIS derived length frequency of aggregated coarse fish in the Kings Dyke (No. measured = 1517 Individuals)



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incident hotline
0800 80 70 60

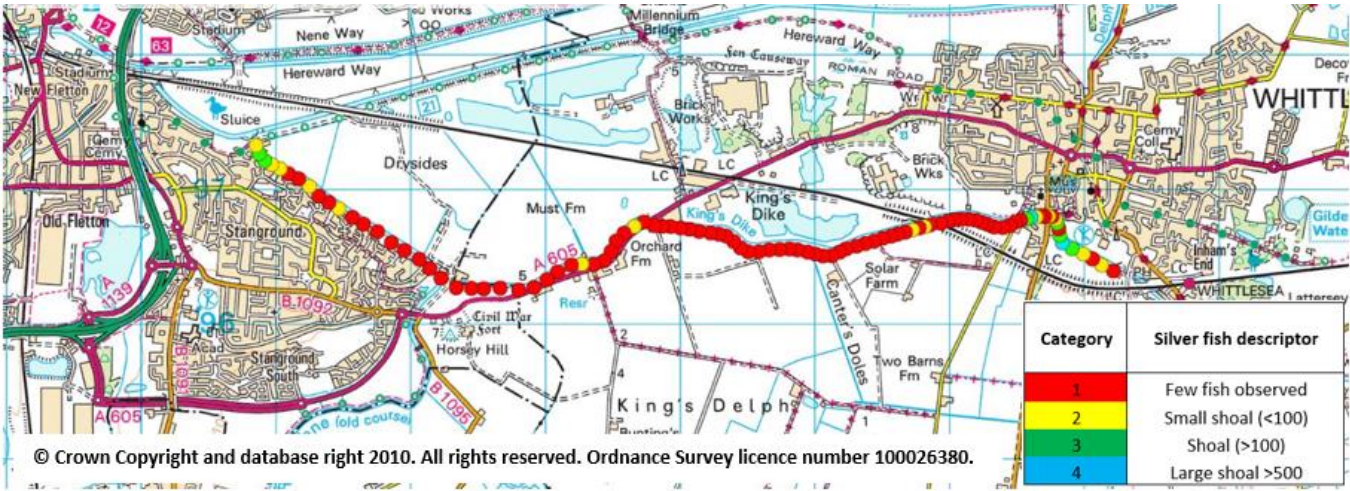
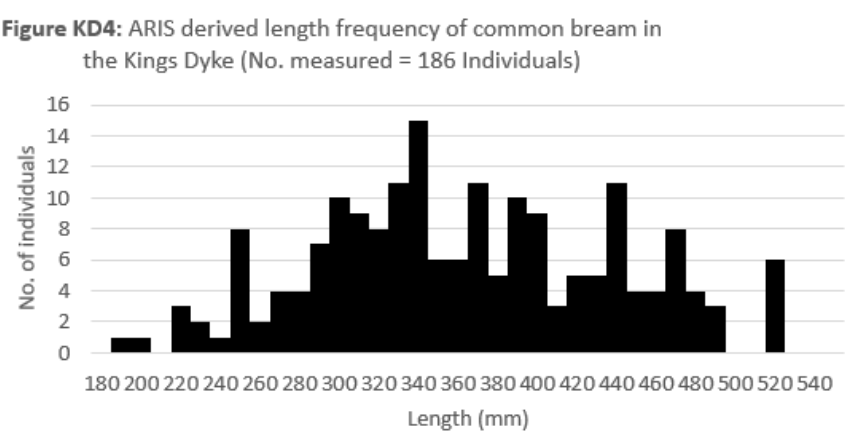
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frequency **Figures KD3 and KD4**. Over 1500 mixed coarse fish were counted and measured using the ARIS software which produced minimum and maximum length values of 30mm and 380mm respectively with an average value of 98mm.

A subsample of 186 common bream were also measured and these produced length values between 190mm and 520mm with an average of 376mm.

The acoustic survey noted several pike present along the survey length and a sufficiently good image was obtained of eight of these which were measured and found to be between 430mm and 970mm in length. The ARIS survey also spotted the characteristic square tails of large tench with two individuals measured at 387mm and 392mm.



Map KD1: Showing fish distribution observed during winter 2020.

Match Catch Data

Match catch data is available from one event that occurred at Whittlesey on 11th February 2024 as part of the HAJAC Winter Lauge matches. The event was fished by 11 competitors over the standard five-hour period and a total of 54 kg of fish were caught with the top three weights all exceeding 7 kg. In terms of fishery performance, the CPUE value derived from this event was 987 g/Hr, a value which comfortably exceeded the A+ rating boundary (> 290 g/Hr)

The match return indicated that roach and perch were the principal and secondary species caught which matches species composition derived from our 2023 seine netting survey.

It should be noted that this A+ fishery performance is likely to have been influenced by seasonal stock distribution as we have previously identified winter shoaling occurring within the angled length at Whittlesey (See **Map KD1** above) which means that the stock density at the time of the February match was likely to be significantly elevated above that which may be expected during the summer where stock will likely to be more dispersed through the river system.



The Middle Level Main Drain

Sites sampled: 3 x Seine netting (+ Hydroacoustic survey) **Site name:** Mullicourt Aqueduct, Neeps Bridge, Wiggenhall St Marys **Date of survey:** 20/07/2023, 26/07/2023, 01/08/2023

Multiple survey methods were used to assess the fish population of the Middle Level Main Drain. An expanded programme of seine netting surveys being supported by acoustic sampling with routine hydroacoustic survey and side-imaging sonar to identify shoals of fish.

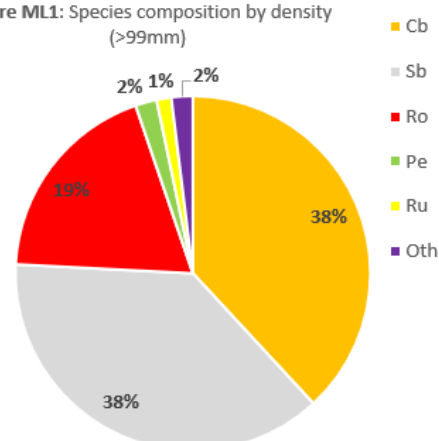
Table ML1	Minimum	Maximum	Minimum	Maximum	Number
Species	length (mm)	length (mm)	age	age	caught
Silver bream	72	185	2	4	343
Common bream	86	247	1	5	341
Roach	24	215	2	7	236
Perch	50	147			101
Rudd	76	126	1	3	12
Ruffe	87	121			9
Pike	113	443			8
Zander	72	109			3
Ro x cb hybrid	120	141			2
Bleak	125	125			1

Traditional netting surveys occurred at Mullicourt Aqueduct, Neeps Bridge and Wiggenhall St Marys with data from these sites used to determine species composition for the channel. This physical data is something that cannot be attained by hydroacoustic survey alone.

Note: Figure ML1 is compiled using data from all three sites sampled whereas long term density expressed as Figure ML2 is provided from Neeps Bridge only, until a larger dataset is available from the re-established sites at Mullicourt and Wiggenhall.

The three seine netting operations produced a mean density estimate of 12.3 Ind./100m² which was equally composed of common bream, silver bream and roach. It should be noted that the catch at Neeps bridge was a single catch only and as such will represent a minimum estimate only. The lowest catch was made at Mullicourt Aqueduct (4.9 Ind. and the highest was at Wiggenhall St Mary 17.5 Ind.)

Figure ML1: Species composition by density (>99mm)



The mean density at Neeps Bridge was 14.6 Ind./100m² a result which, a result closely comparable to the sites long-term average of 14.9 Ind., although there has been considerable variance between catches with a maximum and minimum values of 31 Ind. and 0.5 Ind. respectively.

The apparent prevalence of bream in this survey cycle may explain the cause of the low hydroacoustic population estimate. Bream are less likely to be sampled efficiently by the acoustic apparatus as this benthic species is unlikely to be spread throughout the water column as with roach and therefore evade the acoustic beam.

The seine netting survey principally found common bream between 86mm and 247mm and aged to 5 Y.O. Scale analysis showed that these fish displayed average growth with a percentage growth value of 90 %. Silver bream were numerically dominant, but their smaller average size mean they were not dominant by density estimate. Silver bream were found between 72mm and 185mm and were aged to four Y.O. Silver bream displayed growth similar to common bream displaying average growth and a PSG value of 92%. Roach were recorded between 24mm and 215mm and were aged to a maximum of seven Y.O. The species displayed slow growth with a PSG value of just 84%.

Spring hydroacoustic survey

Date of survey: 20/04/2023 **Method:** HTI Split Beam

- The Middle Level Main Drain (M.L.M.D) was surveyed by hydroacoustic sampling on the 20th of April 2023.
- A total of 25km of channel was sampled.
- Sampling occurred along each bank and both passes were completed on the same night to minimise the influence that fish movement between passes may have on the stock distribution recorded.
- The average fish density derived from the upstream and downstream runs equate to 6.6 fish per 1000m³ and 7.8 Ind./1000m³ respectively, giving an overall population estimate of 7.2 Ind./1000m³.

Results

The fish density estimate derived from each survey reach is provided as **Figure ML3** (below) and **Map ML1** overleaf which display fish density for each 100m length of channel sampled.

Our survey found somewhat clumped fish distribution with higher stock density noted at either extent of the drain; one area centred on Morton’s Bridge, and a second situated between Magdalen Bridge and St Germans. The middle reach between Neeps Bridge and Magdalen Bridges produced the lowest average population estimate, however there were still some areas of elevated density, and these were particularly apparent during the downstream transect.

Long term density

There is currently no viable long-term dataset or population estimate against which this recent survey result can be meaningfully compared because the M.L.M.D has been difficult to sample effectively due to extensive submerged

Figure ML3: Fish density (Ind./1000m3) by survey reach and transect direction

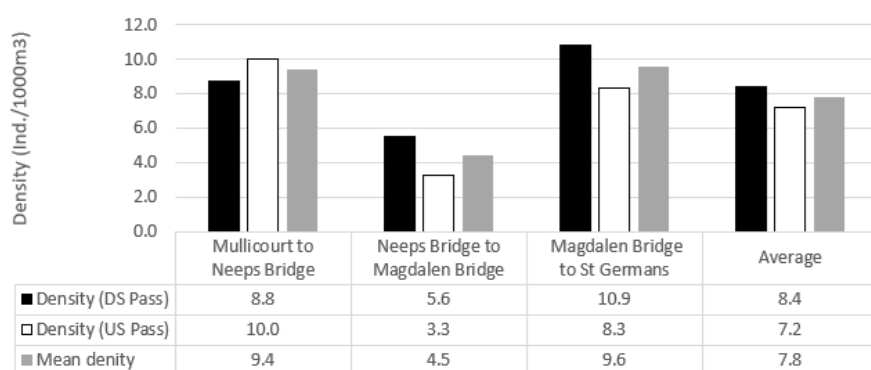
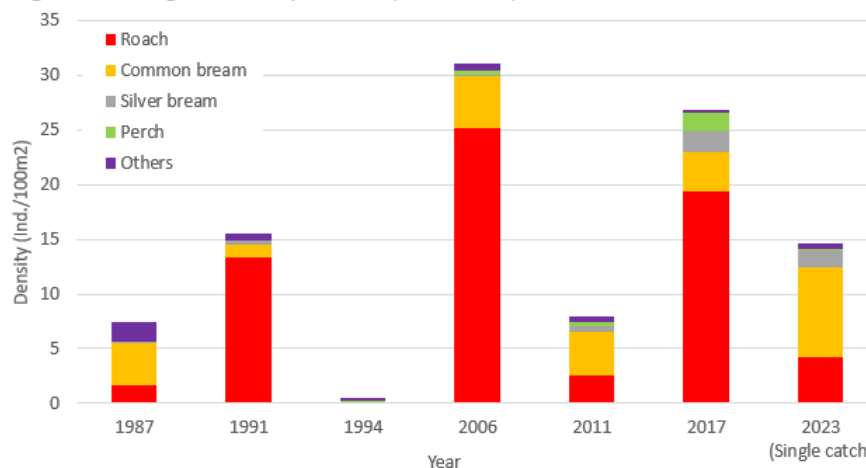


Figure ML2: Long term density estimate (Fish >99mm)



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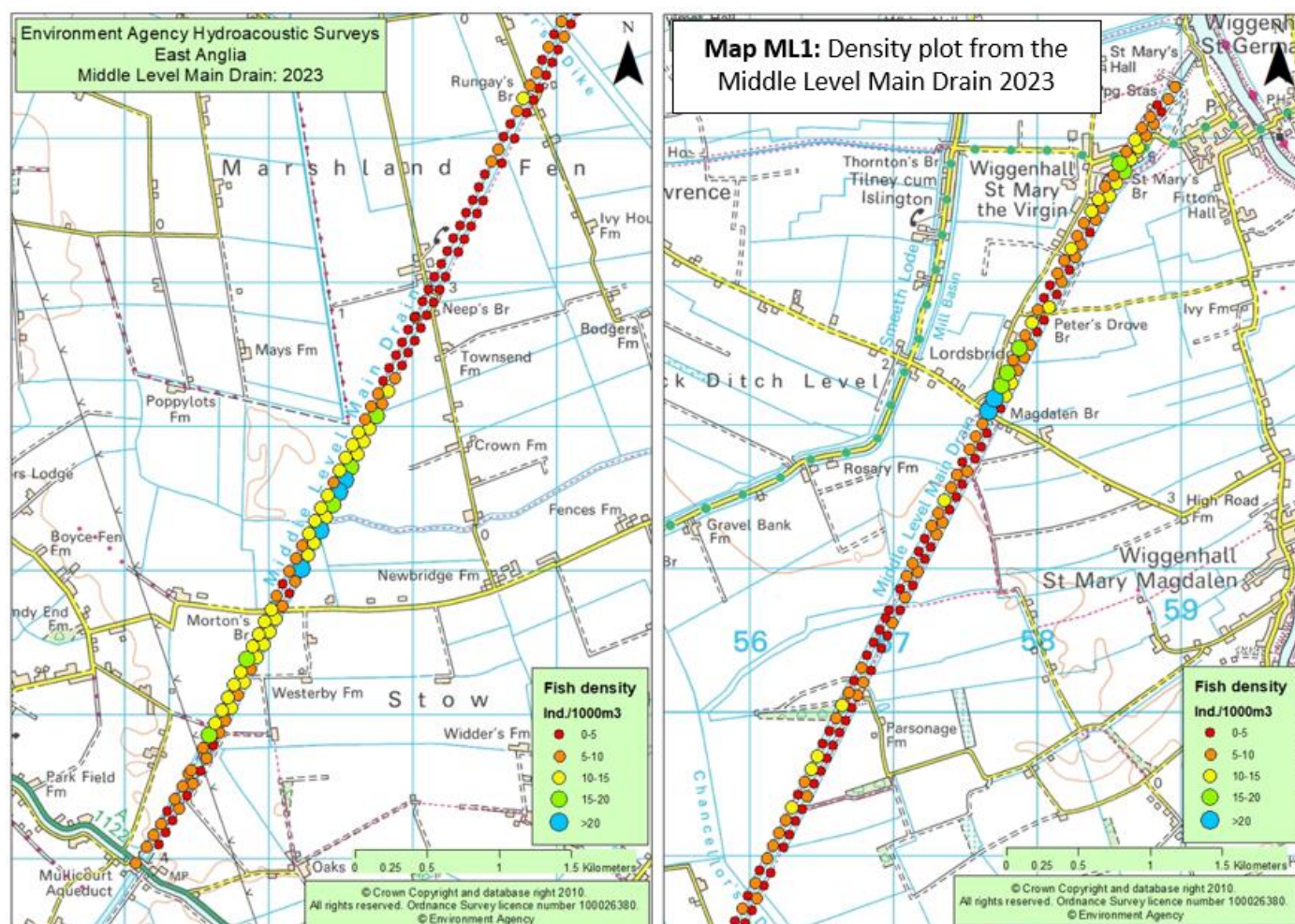
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plant growth that greatly reduced both survey area and sample volume. Because of these issues we attempted to undertake our sampling before plant growth could proliferate, and in this respect the survey was successful with large sample volumes achieved and excellent acoustic images gained throughout the channel length. However, the low water temperature experienced during the rather cool 2023 spring period may have reduced fish activity and dispersal, potentially leading to fewer fish observed during the survey and potentially explaining the clumped distribution noted during the survey.

Match catch data

Match catch data from Bevis Leam was supplied to the EA from two small competitions in 2004 and 2009 which received class C and class A ratings respectively. Unfortunately, the limited number of matches, competitors, and the age of the data, mean that our dataset for this channel is not currently viable for further analysis.

If further match records are available, then these would be gratefully received and will allow more detailed analysis of fishery performance at this venue.



The Middle Level Main Drain at Neeps Bridge

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The Monks Lode

Sites sampled: 1 x Seine netting **Site name:** Charter House Farm **Date of survey:** 04/07/2023

Table MoL1 Species	Minimum length (mm)	Maximum length (mm)	Mean length (mm)	Minimum age	Maximum age	Number caught
Roach	54	124	82	1+	3+	156
Rudd	58	133	84	1+	2+	89
Perch	72	158	88			16
Common bream	58	79	65	1+	2+	13
Silver bream	70	70	70	1+	1+	1
Tench	63	63	63			1

The 2023 survey result at Charter House Farm was a somewhat disappointing catch that was, in terms of density, closely comparable to that found in the prior 2017 survey. Numerically, the 2023 catch was over double that of the prior 2017 result, however less than 10% of the total catch were sufficiently large (>99mm) to count towards this sites population estimate; averaging 82mm long overall, although larger individuals to 124mm were also captured.

The 2023 survey found that roach remained dominant by density with a population density estimate of 0.88 ind./100m². Scale reading found roach were present to a maximum age of 3 Y.O. and that the species showed slow growth with a P.S.G value of 88%.

Rudd were subdominant with a density estimate of 0.61 ind./100m² The species was present to 2 Y.O and also displayed slow growth 82%. Perch were the only other species present that exceeded the >99mm long cut off value.

Habitat data collected during our surveys indicate that there is little cover at this site for fish to utilise and this perhaps explains the prevalence of smaller fish over the last two survey cycles and scarcity of larger individuals.

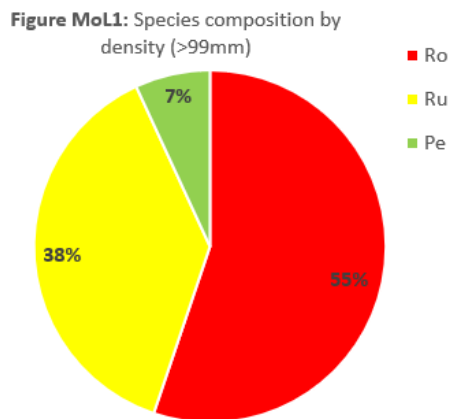
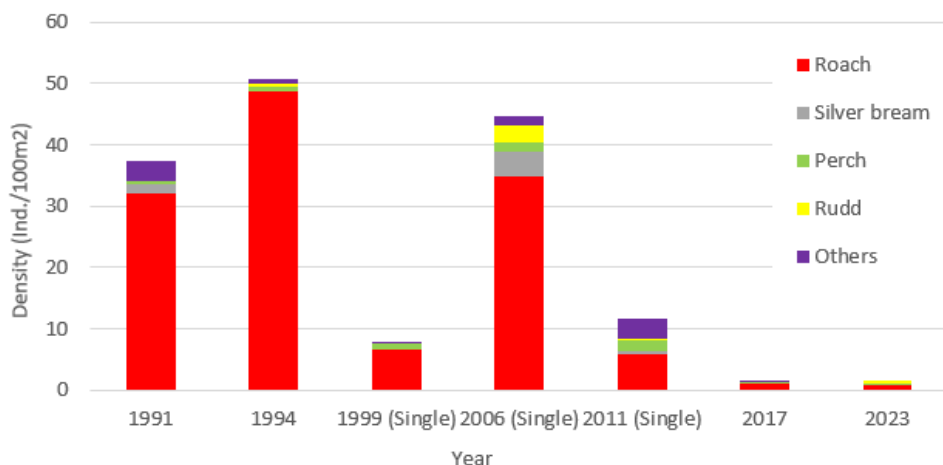


Figure MoL2: Long term density estimate (Fish >99mm)



No match catch dataset is currently available for this watercourse.

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River Nene (Old Course)

Sites sampled: 1 Site names: Staffurths Bridge Dates of survey: 05/07/2023

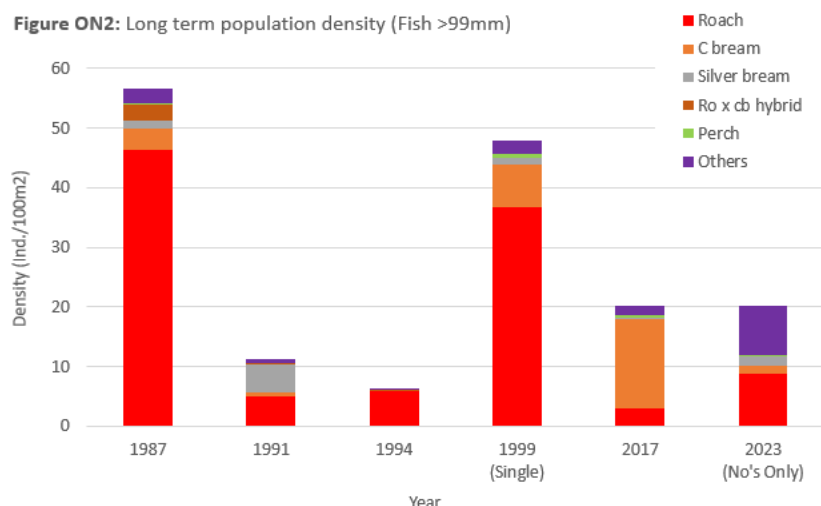
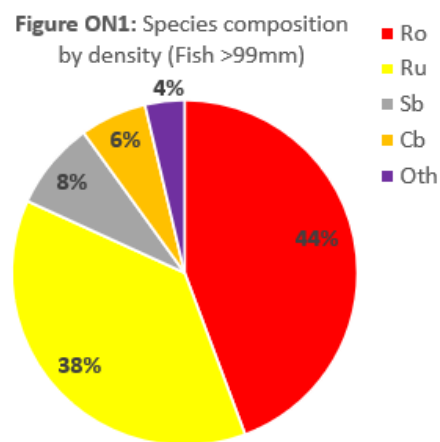
Table ON1	Minimum length (mm)	Maximum length (mm)	Mean length (mm)	Minimum age	Maximum age	Number Caught
Species						
Roach	73	178	97	2+	8+	320
Rudd	68	231	103	2+	8+	230
Perch	64	110	79			91
Silver bream	69	138	95	2+	5+	76
Common bream	73	202	105	1+	4+	37
Bleak	94	127	102			12
Pike	165	675	420			2
Roach x c bream	85	88	87			2
Tench	465	465	465			1
Ruffe	103	103	103			1

Three sites were scheduled to be sampled on the Old Nene in 2023, unfortunately two had to be cancelled due to access issues and dense aquatic plant growth within the survey area. The latter issue would pose an unacceptable risk to fish stocks if sampling occurred as fish can become tangled amongst weed in the net and damaged. Sampling was therefore only conducted at Staffurths Bridge and we will utilise match catch data to support and validate the seine netting result. The cancelled sites at Benwick and Badgeney Pumping Station will be reinstated during the next survey cycle.

The availability of match catch data on the Old Nene has proven particularly valuable in 2023 as the population estimate from the single netting site was subject to wide confidence limits following an uneven size distribution of roach within catches one and two. Although the catch did fit the required 50% numeric depletion, the proportion of fish exceeding 99mm in the first catch was lower than in the second and as such, amongst the subsample of fish used to determine the population estimate, there was no depletion at all (in fact the number of roach effectively doubled!).

The ‘failure’ to deplete meant that the 2023 population estimate at Staffurths Bridge was 159.25 Ind.100m², a value that is easily the highest on record at this location, however this was almost entirely due to the inflated roach population with a species-specific value of 148 Ind./100m² (with +/- confidence limits of 1465). As this species level result is subject to such considerable uncertainty it will be discounted, and density will instead be calculated using the number of roach caught divided by the area sampled. This basic calculation indicates a roach population of 8.91 Ind./100m².

The modified density value of 20 Ind.100m² sits comfortably within the range of previous values found at this site and is closely comparable to that recorded at Staffurths Bridge in 2017, although it is apparent that this earlier result *also* suffered from a poor depletion amongst common bream and may also be considered an overestimation. What we *can* say from the 2023 dataset is that Roach are currently dominant and rudd subdominant with population estimates of 8.91 and 7.54 Ind./100m² respectively. Both species were aged to 8 Y.O. and displayed ‘very slow’ and ‘slow’ growth values with P.S.G values of 78% for roach



and 84% for rudd. Silver bream experienced slowest growth with a P.S.G value of just 72% and such rates are often indicative of a high-density population and correspondingly high competition for food resource.

Match catch data

The Old Nene has an increasingly useful match catch dataset which currently holds records of one hundred and eleven matches, with almost two and a half thousand competitors and over twelve thousand man/hours fished. Data is currently available from four sites, but for the purpose of this report we shall only examine those with recent addition to the dataset, these being at St Marys Bridge, Benwick and March.

It should be remembered that the fishery performance values that follow are derived almost entirely from matches undertaken during colder months and the most likely reason for the rather exceptional catches that follow are due to anglers exploiting a fish stock that has become aggregated whilst over-wintering. Such fishery performance should not be considered to be representative of the Old Nene as a whole and fish populations at the locations discussed will likely be significantly lower during the warmer months once stock has dispersed throughout the system.

Despite the data being skewed towards the winter, the results certainly demonstrate that, under the right circumstances, the fishery can provide some astonishing results, for example in the 2024 final of the HAJAC Winter League when a group of fifty-five anglers recorded over 1200lb of fish between them with the top three weights each being near to 60lb. This recent match return is presented below as **Table ON2**

In terms of species prevalence, it is heartening to observe that the results from this event validates species composition derived from our seine netting survey with roach, rudd, perch and silver bream considered the species most frequently encountered during the competition.

Name of angling club:	HAJAC Winter League Round 4	Date of match:	03.03.2024
River:	River Nene (Old Course)	Venue:	March
Section / peg fished:	Sections B, C, D, E & F	Number of competitors:	55
Match start time:	10:00	Match duration (hrs):	5

Number of anglers weighing-in:	55		
Total weight caught:	1252-01-00	(lbs/oz) or (g) <i>delete as appropriate</i>	
Winning weight:	58-10-00	(lbs/oz) or (g) <i>delete as appropriate</i>	
2 nd weight:	58-03-00	(lbs/oz) or (g) <i>delete as appropriate</i>	
3 rd weight:	57-13-00	(lbs/oz) or (g) <i>delete as appropriate</i>	

Species Caught In:

Greatest number:	Roach
Second greatest number:	Rudd
Other species present:	Perch & Silver Bream

St Marys Bridge

Match catch data from St Marys Bridge is available from sixty-two matches fished by six-hundred and thirty-two anglers. The dataset is principally composed of matches that occurred between 2021 and 2023 (**Figure ON3**) but a single return is also available from 2005.

Fishery performance, expressed as an average catch in grams per hour fished, is presented as **Figure ON4** and demonstrates that average CPUE values from the past three years have easily exceeded the A+ classification boundary of >290 g/Hr, however it is interesting note that there has been an almost 40% reduction in the average CPUE value of this match section since 2021 when CPUE exceeded 800 g/Hr.

Unfortunately, there are currently no results available from matches fished in 2024 however hopefully data becomes available once the new river season begins.

Although CPUE has declined on this section of channel the reduced values still easily exceed the A+ classification boundary so this location should still offer good sport to the visiting angler.

Individual catch results are presented as **Figure ON5** and these clearly show the prevalence of CPUE values that fall within in the **A+** range, with occasional **A** category results. No major conclusions should be drawn from the rather poor 2005 result, particularly as field notes state that the match was affected by particularly poor fishing conditions, namely very cold weather, clear water and strong wind.

Figure ON6 shows average first, second and third place weights for each year and these values also show a decline over the past three years.

Figure ON3: Number of Anglers and match returns from St Marys Bridge

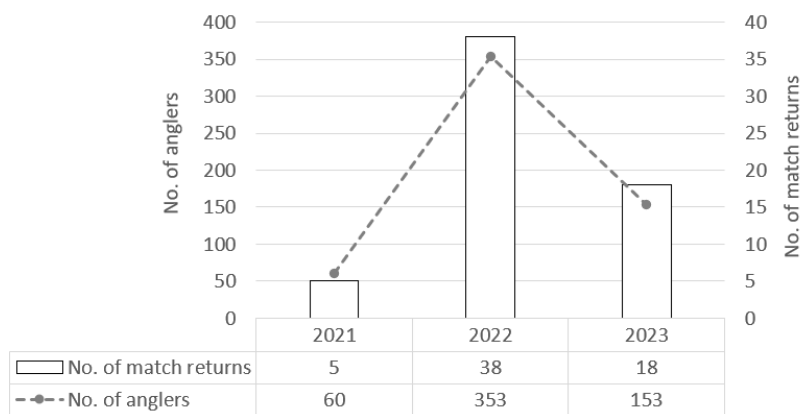


Figure ON4: CPUE (g/Hr) Vs class boundaries

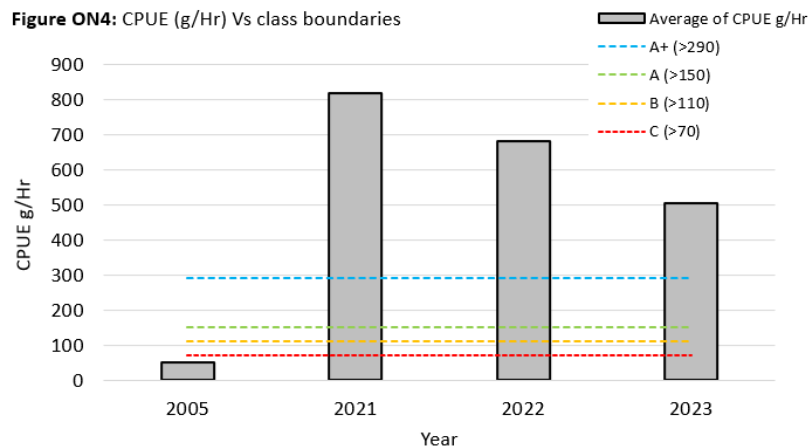


Figure ON5: Individual match CPUE (g/Hr) Vs class boundaries

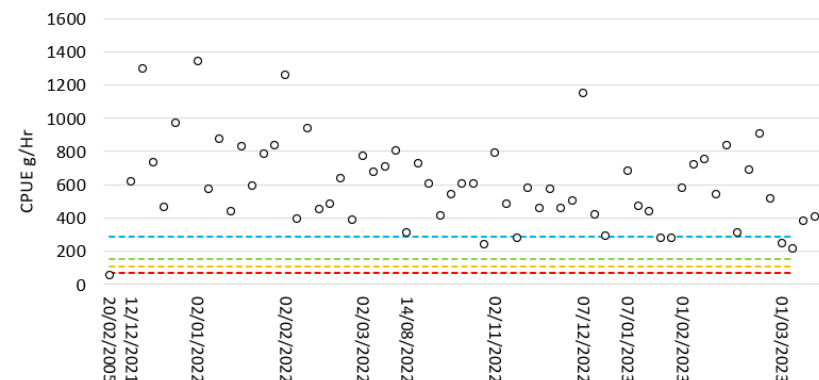
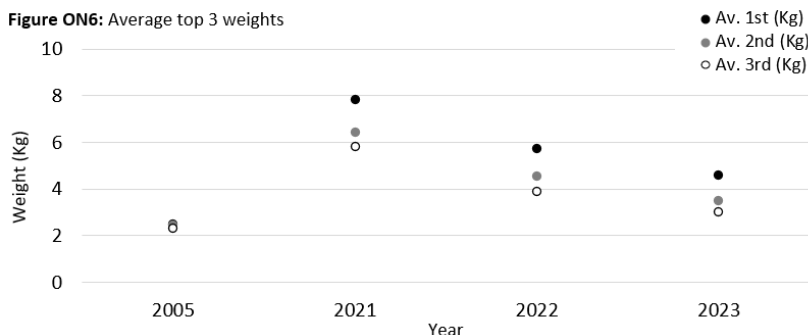


Figure ON6: Average top 3 weights



Benwick This section of the report has been updated to include several match returns from 2024.

Our Benwick dataset currently contains returns from thirty-three matches fished by 1169 anglers and is principally composed of events fished in 2014, 2022 and 2023 but some match returns are also available from six other years including three very recent events in early 2024 (**Figure ON7**).

The yearly CPUE value from Benwick, expressed as average angler catch in grams per hour, is presented as **Figure ON8**. It should be noted that some years have comparatively few returns available for analysis, reducing confidence in that particular years result, however the currently available data suggests that fishery performance has, broadly speaking, been remarkably consistent, with an average catch rate that lies between 600 and 800 g/Hr and comfortably exceeds the **A+** class boundary.

The 2018 CPUE value appears somewhat of an outlier, however this uncertainty is perhaps unsurprising as fishery performance in this year could only be calculated from a single, and particularly strong, match result.

Examination of **Figure ON9** shows that although the 2018 result was the highest recorded in the Benwick dataset, there have been several other events with a CPUE value >1000 g/Hr and of these, two in 2023 and one closely comparable result from 2024.

Individual catch results are presented as **Figure ON9** and show the predominance of catches that fall in the **A+** range with just a single return being noted in 2023 that fell within the **A** category.

Average first, second and third place weights are given as **Figure ON10**. Whilst the average top weight has been remarkably comparable since 2019, the second and third place weights have been slowly increasing over the past three years.

Figure ON7: Number of Anglers and match returns from Benwick

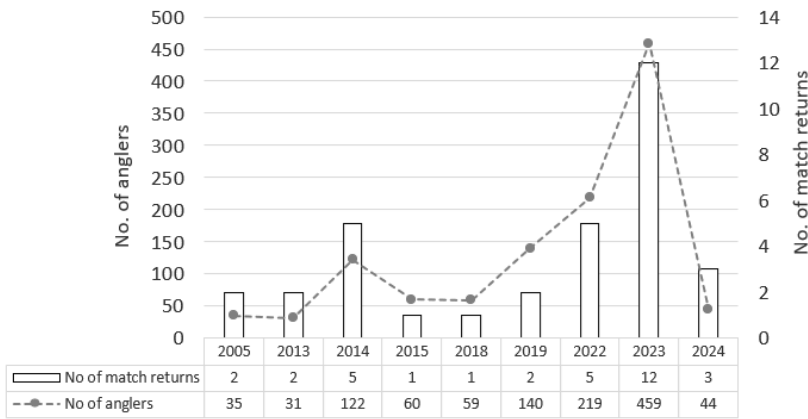


Figure ON8: CPUE Catch rate (g/Hr) Vs class boundaries

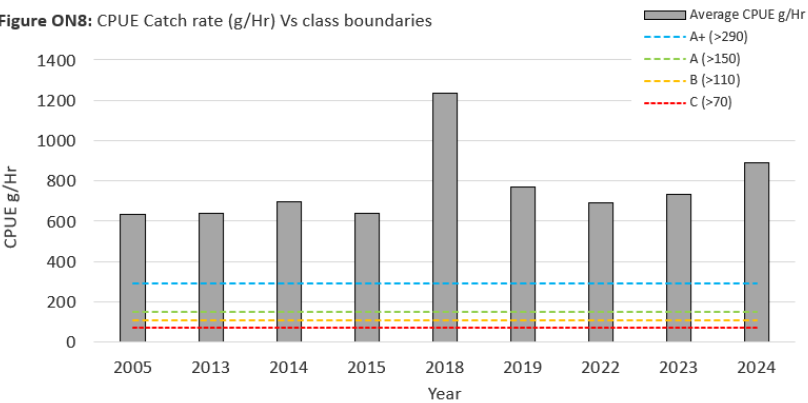


Figure ON9: Individual match CPUE (g/Hr) Vs class boundaries

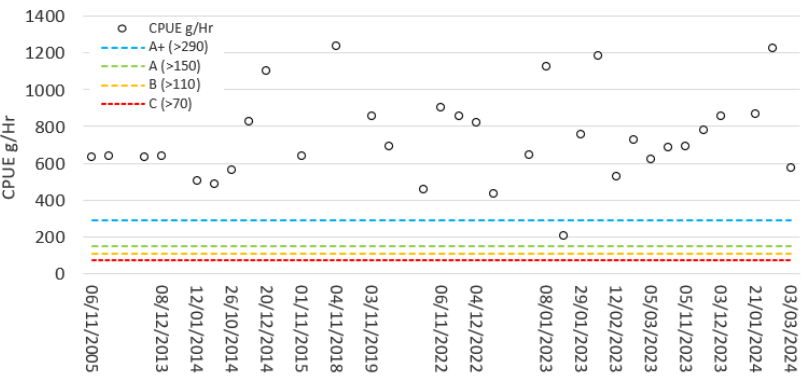
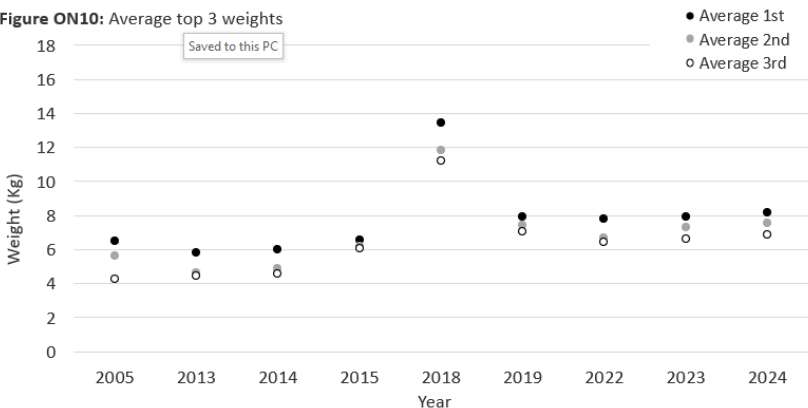


Figure ON10: Average top 3 weights



March

The angled stretch in March currently has provided data from twenty-five matches that were fished by 1280 anglers. The dataset is principally composed of matches between 2023 and 2023 but match returns are also available from 2018 and 2019 and more recent events in 2024, see **Figure ON11**.

CPUE at March has been consistently higher than Benwick with average values for each year dependably exceeding 1000g/hr (only three matches where average CPUE fell below 1000g/hr!) and easily surpassing the A+ classification threshold. To put the quality of sport experienced at this site into some context, if the data from these past five years of matches were classified using metrics for a stillwater fishery then all five years and almost all individual matches would still receive an A+ classification.

The average CPUE values from 2023 and early 2024 match have an average of 1484 g/Hr and 1436 g/Hr respectively, this is a little lower than recorded in 2022, but still some 5 times higher than required to attain an A+ classification.

Figure ON13 shows CPUE from individual matches and demonstrates the full range of values from each match return provided. No individual result fell below the A+ class boundary, the lowest CPUE value on record being 670 g/Hr in 2023.

Figure ON14 presents the average top weight caught has shown a steady decline since 2019; and whilst second and third have shown some loss, this has been much lower potentially suggesting the fishery has become a little less ‘peggy’ with, on average, much tighter results in the top three places.

As already stated, these exceptional CPUE values are most likely due to these winter matches exploiting an aggregated fish stock, and such strong fishery performance should not be expected all year round, however these results demonstrate the potential of this river to provide astonishing sport when environmental conditions are appropriate.

Figure ON11: Number of Anglers and match returns from March

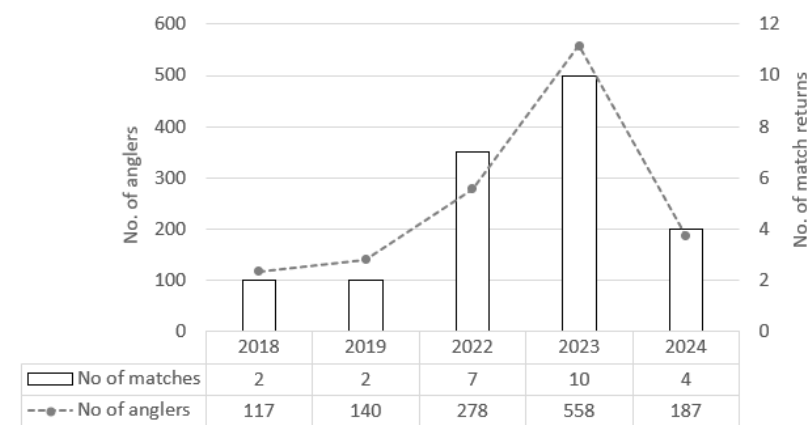


Figure ON12: CPUE Catch rate (g/Hr) & Classification at March

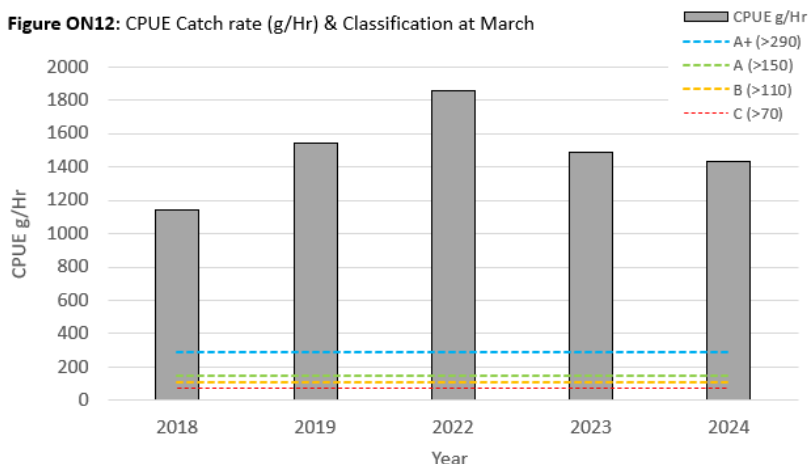


Figure ON13: Individual match CPUE (g/Hr) Vs class boundaries

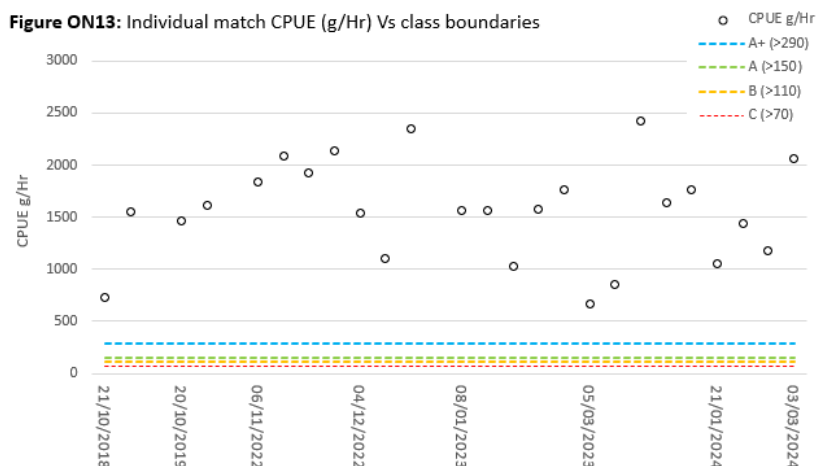
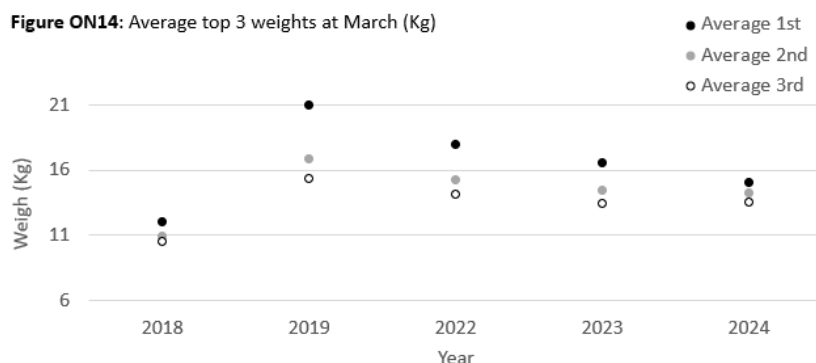


Figure ON14: Average top 3 weights at March (Kg)



Pophams Eau

Sites sampled: 1 x Seine netting

Site name: Croft House Farm

Date of survey: 02/08/2023

Table PE1						
Species	Minimum length (mm)	Maximum length (mm)	Mean length (mm)	Minimum age	Maximum age	Number Caught
Roach	84	136	101	1+	3+	36
Perch	66	147	95			17
Rudd	115	117	116	2+	2+	2
Pike	184	335	260			2
Common bream	87	87	87	2+	2+	1
Roach x common bream	92	92	92			1

The 2023 survey on the Pophams Eau at **Croft House Farm** recorded a disappointing *total* catch of 59 fish and a density estimate of just 1.96 Ind./100m2. This is not quite the lowest catch made at this site (1.67 Ind./100m² in 2011) but is very close. Roach were dominant and aged to a maximum of 3 Y.O. however no growth data is available due to the small sample size. No acoustic or match catch data is available for this channel and as such it is difficult to draw further conclusions. With the exception of 1987/1991 the catches from this channel has been somewhat variable with considerable increases and decreases in population estimate between survey cycles, this is one of the difficulties faced by sampling a single location, particularly if stocks are exhibiting shoaling behaviour, as the risk of simply ‘missing’ a shoal is significant. Acoustic sampling is planned to occur in 2023/24 and this report will be updated if significant findings are made.

Figure PE1: Species composition by density (>99mm)

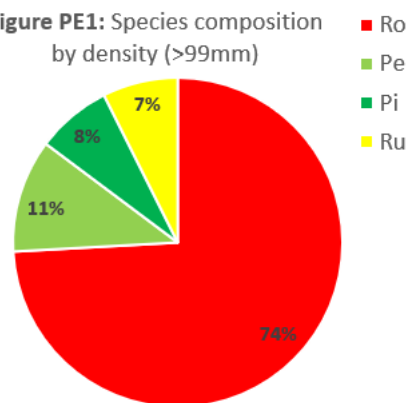
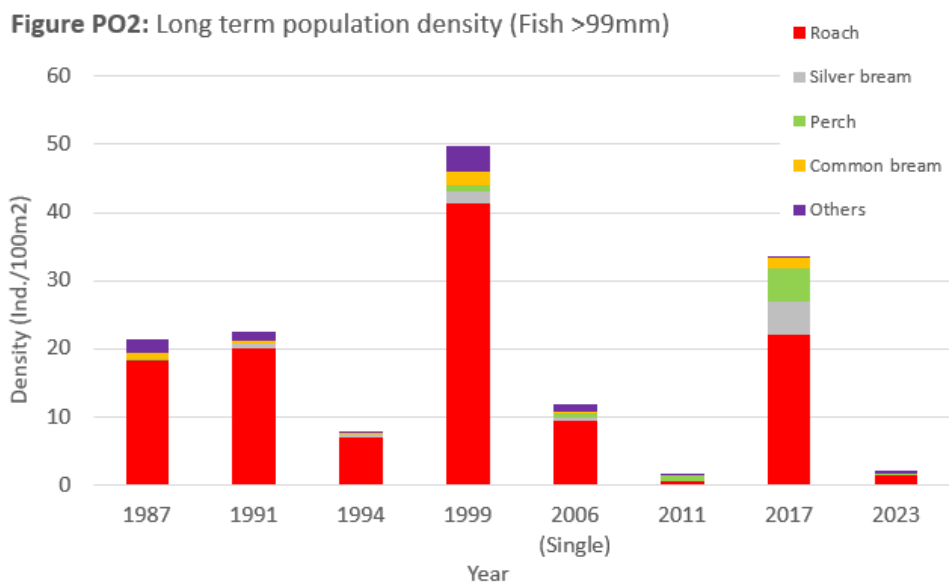


Figure PO2: Long term population density (Fish >99mm)



No match catch dataset is currently available for this watercourse.

The Sixteen Foot Drain

Sites sampled: 1 x Seine netting

Site names: Bedlam Bridge

Dates of survey: 03.08.2023

Table: SF1	Minimum length (mm)	Maximum length (mm)	Mean length (mm)	Minimum age	Maximum age	Number Caught
Roach [<i>Rutilus rutilus</i>]	78	107	94	1+	2+	23
Perch [<i>Perca fluviatilis</i>]	62	114	94			14
Rudd [<i>Scardinius erythrophthalmus</i>]	74	105	91	1+	2+	7
Common bream [<i>Abramis brama</i>]	95	467	281	2+	13+	2
Roach x common bream hybrid	99	110	105			2

The 2023 survey on the Pophams Eau at Bedlam Bridge recorded a disappointing *total* catch of 48 fish giving a density estimate of just 0.95 Ind./100m². This is not quite the lowest density made at this site (0.8 Ind./100m² in 1993) but is remarkably close. The catch was principally composed of roach and perch with rudd, and common bream also present. This is the first data collected from the 16ft Drain since 2011 and, as this channel is represented by a single site, it is difficult to draw any firm conclusions on this particular result in isolation.

Historic data suggests that the density estimate has shown rapid changed previously (1987-1993) although population density had seemed comparatively stable subsequently. The 2023 result could possibly represent a short-term reduction (such as 1987 and 1993) and may be at site level only. The inclusion of one large common bream (**Image SF1** below) certainly suggests a larger population of this shoaling species is present nearby.

The small number of fish sampled meant that it was not possible to determine growth rates, which may have helped infer whether populations were in fact higher than the survey suggests (often indicated by low P.S.G values).

Due to this poor result and the paucity of recent survey data, it is suggested that this channel should be considered a priority to be assessed during the next round of winter aggregation acoustic surveys. This will hopefully be undertaken in 2024.

Table SF2: Species composition by density (>99mm)

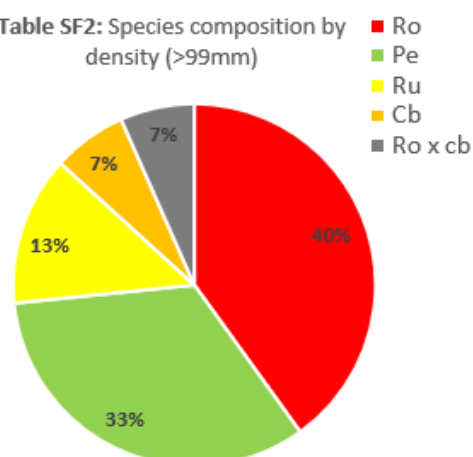
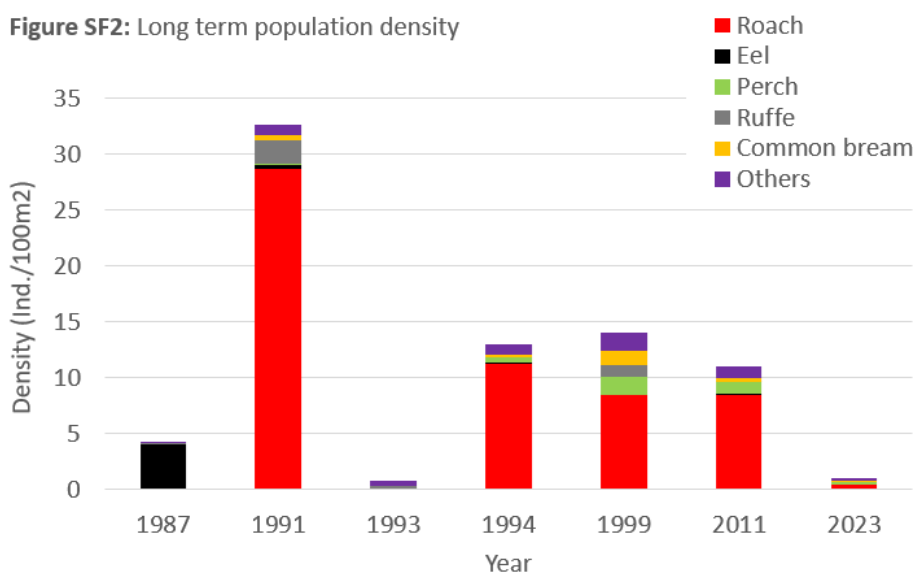


Figure SF2: Long term population density



No match catch dataset is currently available for this watercourse.

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The Twenty Foot Drain

Sites sampled: 3 x Seine netting

Site names: Holloways Bridge
Goose Tree Corner
Hobbs Lot Bridge

Dates of survey: 25.04.2023
03.05.2023
10.05.2023

Table TFD1						
Species	Holloways Bridge No.	Goosetree Corner No.	Hobbs Lot Bridge No.	Minimum length	Maximum length	Total number
Roach [<i>Rutilus rutilus</i>]	31	126	954	62	224	1111
Perch [<i>Perca fluviatilis</i>]	77	53	54	56	192	184
Rudd [<i>Scardinius erythrophthalmus</i>]	30	13	24	65	345	67
Ruffe [<i>Gymnocephalus cernuus</i>]	43	1	1	60	106	45
Common bream [<i>Abramis brama</i>]	0	1	39	62	485	40
Silver bream [<i>Abramis bjoerkna</i>]	0	10	4	59	116	14
Pike [<i>Esox lucius</i>]	4	1	1	346	645	6
Roach x C. bream hybrid	0	1	4	85	118	5
Bleak [<i>Alburnus alburnus</i>]	0	0	3	123	139	3
Tench [<i>Tinca tinca</i>]	1	1	0	293	505	2
Bullhead [<i>Cottus gobio</i>]	1	0	0	69	69	1

The 2023 survey of the Twenty Foot Drain found roach the primary species across the three sites sampled representing 65% of the population density estimate. Roach density ranged from 0.05 Ind./100m² at Holloways Bridge to a maximum of 10.9 Ind./100m² at Hobbs Lott Bridge. Perch were subdominant by density (16%) followed by rudd (7%) and common bream (6%). Density at site level varied between 1.4 Ind./100m² at Goosetree Corner and 14.8 Ind./100m² at Hobbs Lott Bridge.

The poor catches at Holloways Bridge and Goosetree Corner causes that the mean 2023 population estimate to be a somewhat disappointing 5.95 Ind./100m².

Most fish caught during 2023 were small individuals (<99mm long) meaning that they cannot count towards the overall density estimate, however these smaller fish alone would produce a population estimate of 21.4 Ind./100m² with minimum and maximum densities of 9 and 45 Ind./100m² respectively.

Looking at annual sampling conducted between 2003 and 2006 (**Figure TF2**), it is apparent that there have been unusually rapid changes in density between consecutive survey cycles, suggesting stock migration or aggregation is influencing our results. It should also be noted that the 2011 survey suffered from very wide confidence limits and has also been heavily skewed by an exceptional catch made at Hobbs Lot Bridge where an aggregation of over 3700 fish were caught, representing 75% of the total catch during that survey cycle. Elsewhere catches were significantly lower with an average of 320 fish (varying between 32 and 776 fish) across

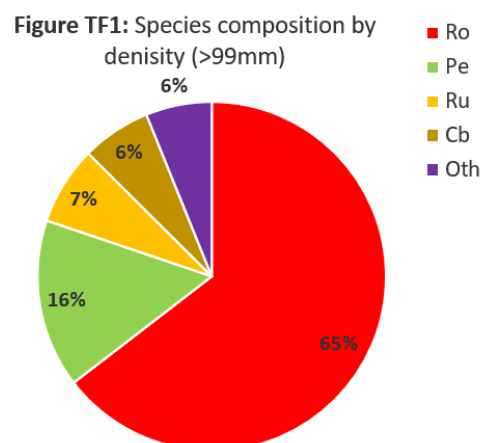
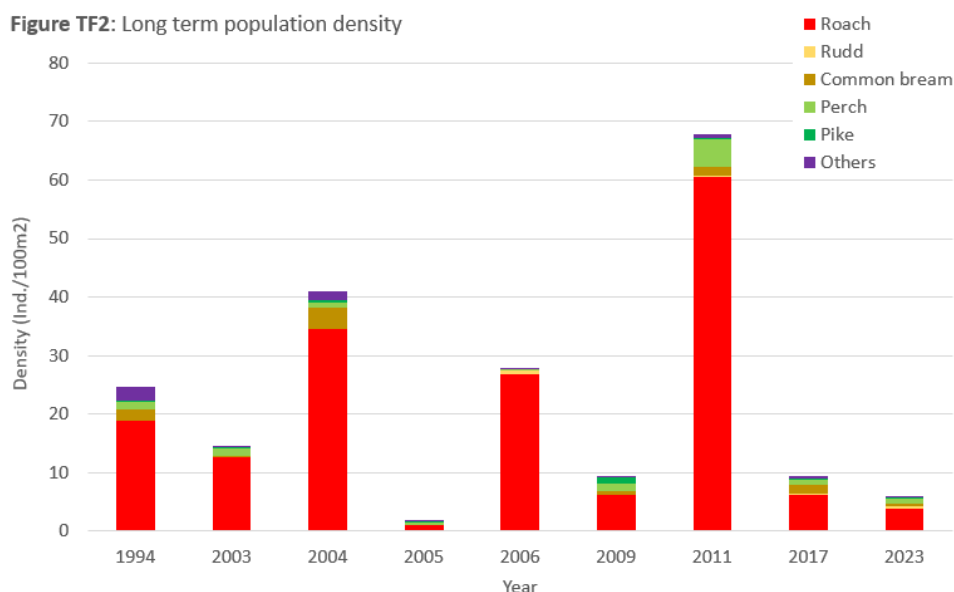


Figure TF2: Long term population density



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the four remaining sites sampled. Total catches of fish in 2023 ranged between 187 and 1084 individuals at site level. Of the one hundred and eleven scales collected during sampling and submitted to the national fisheries laboratory, one hundred and eight were aged, the remainder being replacement scales. Roach, rudd and common bream were all found to display average growth with PSG values of 95%, 109% and 94% respectively. Roach were aged to 6+ Y.O, common bream to 14+ Y.O. and rudd to 11+ Y.O.

The 2023 survey report suggests that anglers should experience sport at most locations, although most fish encountered will be smaller individuals, however, common bream to 485 mm, tench to 505mm and rudd 345 mm shows that larger fish are present for those that take time to locate them. In terms of predatory species, pike and perch were present at all sites sampled.

Unfortunately, we do not have any recent match data on which we may validate our current dataset or draw any further conclusions.



Images TF1 and TF2: Rudd and tench from the Twenty Foot Drain



Image TF3: Sampling the Twenty Foot Drain at Holloways Bridge

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The Well Creek

Sites sampled: 3 x Seine netting

Site names: Marmont Priory
Outwell Common
Salters Lode

Dates of surveys: 16/05/2023
17/05/2023
25/05/2023

Table WC1: Species	Marmont Priory No.	Upwell No.	Salters Lode No.	Min length (mm)	Max length (mm)	Total number
Roach [<i>Rutilus rutilus</i>]	895	1392	54	60	250	2341
Silver bream [<i>Abramis bjoerkna</i>]	679	754	256	55	280	1689
Perch [<i>Perca fluviatilis</i>]	78	118	22	50	274	218
Rudd [<i>Scardinius erythrophthalmus</i>]	175	43	0	50	284	218
Common bream [<i>Abramis brama</i>]	27	98	62	114	475	187
Bleak [<i>Alburnus alburnus</i>]	21	31	6	71	140	58
Ruffe [<i>Gymnocephalus cernuus</i>]	1	21	0	56	107	22
Pike [<i>Esox lucius</i>]	5	11	0	257	960	16
Zander [<i>Sander lucioperca</i>]	1	3	9	152	670	13
European eel [<i>Anguilla anguilla</i>]	0	0	3	360	534	3
Bitterling [<i>Rhodeus sericeus</i>]	0	2	0	68	71	2
Total	1882	2473	412	-	-	4767

Note: The roach catch at Marmont Priory was subject to poor catch efficiency which greatly reduced the suitability of this data for use in a depletion calculation, causing extremely wide confidence limits for the species data at this site. The current pollution estimate, derived using Carle & Strub depletion calculation, is 727.8 Ind./100m² with confidence limits of +/-10967. Because of this issue with roach data at this site the species density has instead been manually calculated based on the number of fish caught (>99mm) and the area sampled only which produces a modified population value of 19.9 Ind/100m². All analysis and figures that follow will use this latter value.

The 2023 survey cycle found that silver bream were dominant by density with a mean population estimate of 14.4 Ind./100m². Roach were subdominant with a revised density of 10.9 Ind./100m². Common bream ranked third by density (3.7 Ind./100m²) followed by rudd (1.1 Ind./100m²). Overall, the Well Creek had a mean population density of 32.2 Ind./100m², a value around 20% less than recorded in the previous 2017 survey (41 Ind./100m²).

The most complete long-term dataset collected on the Well Creek is located at Salters Lode with eight surveys having been undertaken since 1989. Density data from these surveys is presented as **Figure WC2** and shows that the 2023 result represents the highest density estimate to be found at Salters Lode to date (50.4 Ind./100m²) with the prevalence of silver bream (26.4 Ind./100m²) and their importance to the overall catch at this site being clearly apparent, representing over 50% of the population estimate.

Common bream density is currently a third lower than 2017, but the species population remains above the long-term density average for this site, similarly, Roach density has fallen by more than half since the previous survey,

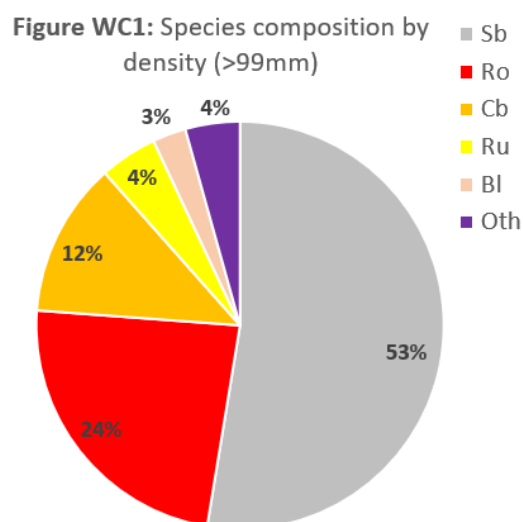
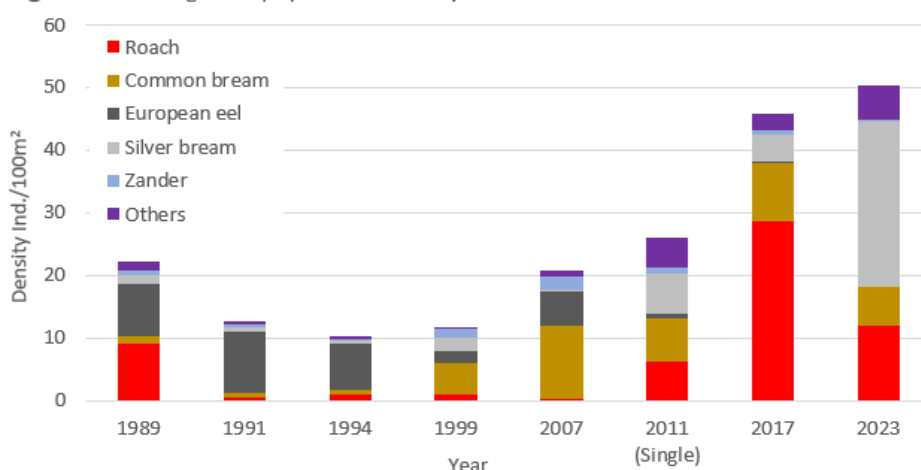


Figure WC2: Long term population density at Salters Lode



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although the species long-term density also remains comfortably above the long-term average value at this site. Density at the two remaining sites have shown an overall drop, falling by around 40% at Marmont Priory and 50% at Outwell, AT Marmont Priory this reduction was largely caused by a reduction in common bream and bleak, whilst at Outwell the reduction in density was principally seen amongst the sites roach population. It is interesting to note that the silver bream, which had shown such growth at Salters Lode, also increased raising from 4.2 Ind./100m² to 12.8 Ind./100m² and 2.2 Ind./100m² to 3.9 Ind./100m² at Marmont Priory and Outwell respectively.

Of the subsample of 219 scales submitted to the National Fisheries Laboratory, 207 were aged, with the remainder being replacement scales. When compared to their respective species' standards the silver bream and rudd displayed average growth rates, attaining PSG values of 102% and 92% respectively. Common bream were found to be displaying slow growth (PSG 85%) whilst roach showed a very slow growth rate (PSG 79%). Scale reading determined that silver bream were present to 9+ years old, rudd 14+ Y.O, common bream 15+ Y.O and roach 10+ Y.O.

In terms of predatory species, perch and zander were found in all three surveys, whilst pike were found at two locations. No particularly large specimens were recorded from any of the predatory species, however all reached sizes sufficient to offer good angling potential.

Side-scan acoustic survey

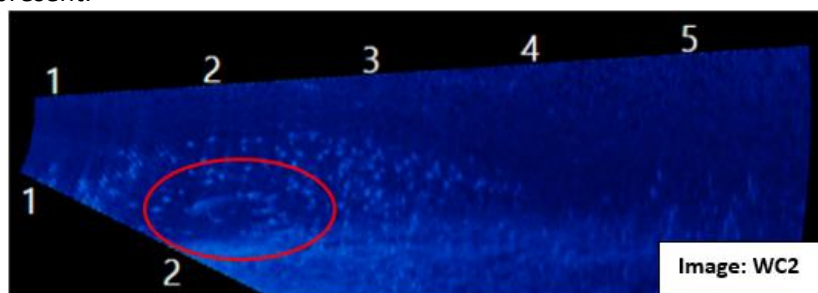
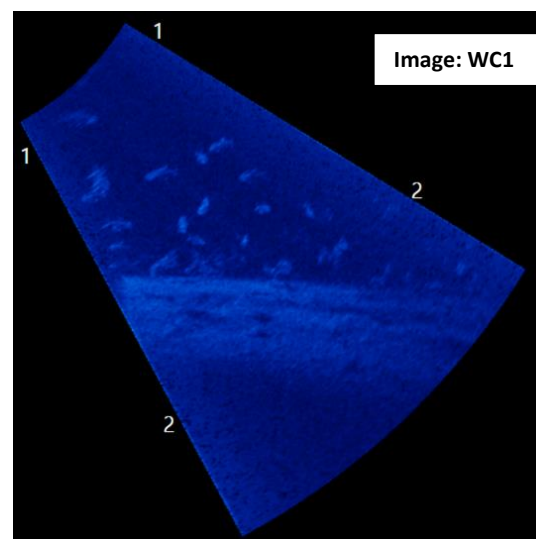
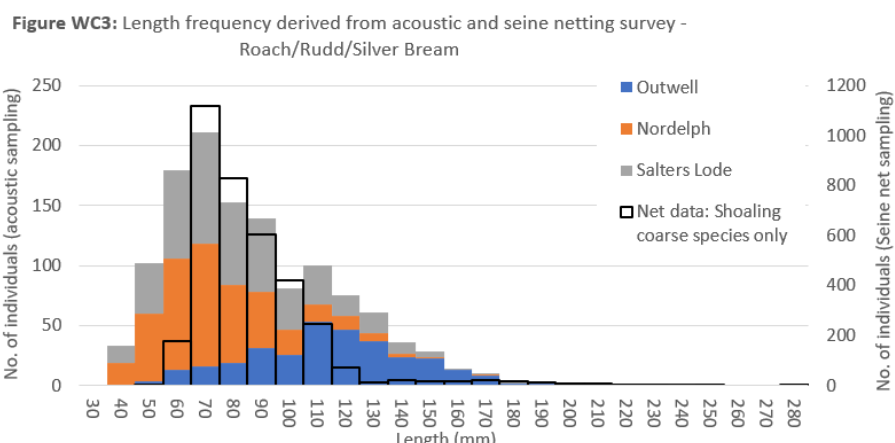
Date of survey: 14/02/2023

Method: Humminbird Solix and ARIS

The Well Creek was subject to a winter acoustic survey in February 2023 and aggregations of fish were observed and sampled along the length of the channel. The acoustic images of individual fish have subsequently been measured using proprietary software and the output of this analysis has been used to create length frequency plots for shoaling silver fish species and for large common bream and is displayed against similar data derived from our seine netting surveys.

Figure WC3 shows length distribution of shoaling coarse species from the three sites sampled by acoustic survey appears to show a reasonable fit with length distribution from the two survey techniques with a natural preponderance of juvenile fish apparent. The acoustic survey recorded a considerably higher proportion of smaller individuals, this is perhaps unsurprising as seine netting loses efficiency on individuals <99mm long. It appears that acoustic sampling also indicates a larger share of individuals than the seine netting data; however, it should be recognised that the acoustic survey is a subsample of winter aggregated stock and, as such, may represent a better overall image of the population structure than the 'dispersed' summer population, where numerous factors at site level may dictate the density and composition of the population present.

Image WC1 shows a typical rolled ARIS image of the aggregated coarse fish whilst **Image WC2** shows a similar shoal that appear unconcerned by the large pike (circled) lying torpid amongst them.



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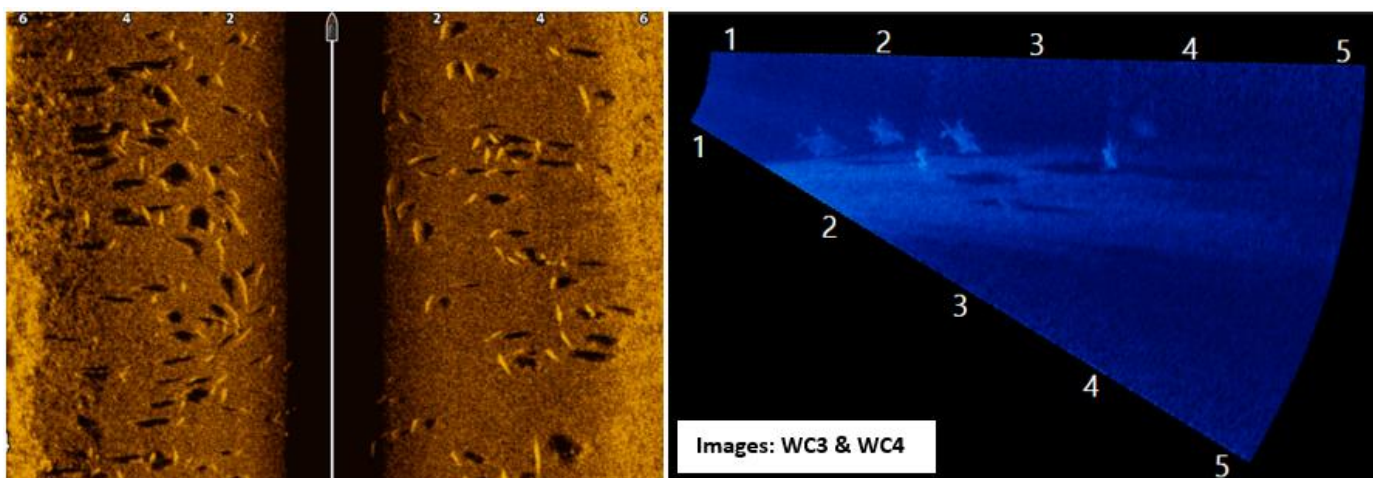
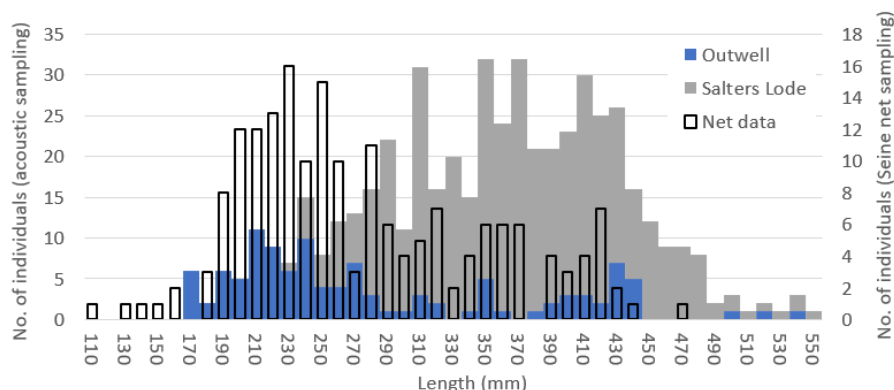
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Common bream were very easy to locate and identify due to their characteristic slab-sided shape. **Images WC3** shows a shoal of common bream observed close to Salters Lode via a side-scan fish finder and **Image WC4** shows a rolled ARIS image that allowed easy identification of the species.

A sub-sample of over five hundred common bream were assessed and length values were determined between 170mm and 550mm with an overall average of 356mm. This data does not include bream from younger year classes which would be almost impossible to distinguish from roach etc. and likewise, it is probable that the length frequency data for 'shoaling coarse fish' contained juvenile bream amongst the roach and silver bream.

Figure WC4: Length frequency derived from acoustic and seine netting survey - Common bream



When this data is plotted as **Figure WC4** it is apparent that the seine netting survey did achieve a reasonable sub-sample of the bream population; however, our seine netting sampling does appear to underrepresent the older component of the population, likely because the acoustic survey was able to directly target the highly mobile common bream shoals which are infrequently encountered during routine netting surveys. This demonstrates the value of using multiple survey methods to describe a fish population, using seine netting to collect physical data such as scale samples for age and growth analysis alongside acoustic survey techniques for data validation, stock distribution and additional length frequency data.



Image WC5: A pike such as which may be caught on the Well Creek

The Well Creek continues to offer excellent angling potential for a number of species and angling disciplines. More information can be found at: <http://www.wellcreektrust.org.uk/>

No match catch dataset is currently available for this watercourse.

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The Whittlesey Dyke

Sites sampled: 2 x Electric fishing

Site names: Ashline Lock
Engine Farm

Dates of survey: 12/07/2023
06/07/2023

Species	Ashline Lock	Engine Farm	Min length (mm)	Max length (mm)	Min age	Max age	Total No.
Roach [<i>Rutilus rutilus</i>]	66	264	66	172			330
Perch [<i>Perca fluviatilis</i>]	39	6	50	220			45
Rudd [<i>Scardinius erythrophthalmus</i>]	12	18	59	330	1+	14+	30
Common bream [<i>Abramis brama</i>]	6	3	138	486	3+	14+	9
Silver bream [<i>Abramis bjoerkna</i>]	1	7	82	150	2+	4+	8
Pike [<i>Esox lucius</i>]	5	3	530	730			8
Bleak [<i>Alburnus alburnus</i>]	0	5	80	143			5
Tench [<i>Tinca tinca</i>]	2	2	176	250			4
Ruffe [<i>Gymnocephalus cernuus</i>]	1	0	70	70			1
Spined loach [<i>Cobitis taenia</i>]	1	0	59	59			1

The 2023 survey of the Whittlesey Dyke found a roach population that were dominant by density, representing 81% of the population, with rudd were subdominant by density, followed by common bream and perch.

Both 2023 surveys on the Whittlesey Dyke provided catches which were a marked improvement over the previous 2011 and 2017 survey cycles, although the population estimate remains considerably lower than observed during the 1990s.

Throughout the 1990's, surveys conducted at Ashline Lock generally found a roach population composed of several hundred fish (occasionally several thousand) which peaked in 1991 and declined over subsequent surveys. The 2023 survey appears to show growth to the roach population at both sites sampled, the population estimate raising from 1.15 to 3.71 Ind./100m² at Ashline Lock and 1.23 to 10.71 Ind./100m² at Engine Farm. Combining the data from these two sites indicates that the overall Whittlesey Dyke density estimate has increased almost four-fold from 2.3 to 8.8 Ind./100m².

A subsample of the fish captured during these surveys were aged and analysis by the NFL demonstrated that, when compared to their species standard, the roach displayed slow growth rate (PSG = 84%) and rudd showed an average growth rate (PSG = 100%). Rudd were aged to 14+, common bream to 14+, roach to 7+ and silver bream to 4+. Due to the limited sample size of rudd, common bream and silver bream, this may not be a true representation of these species' overall populations.

Figure WD1: Species composition by density (>99mm)

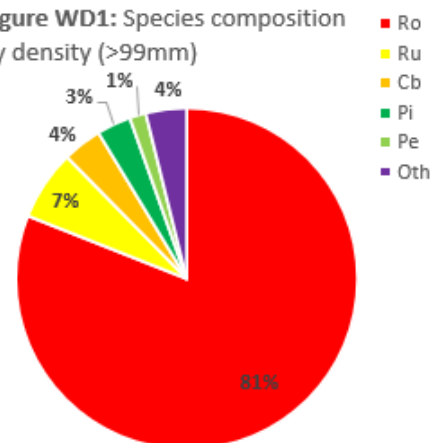
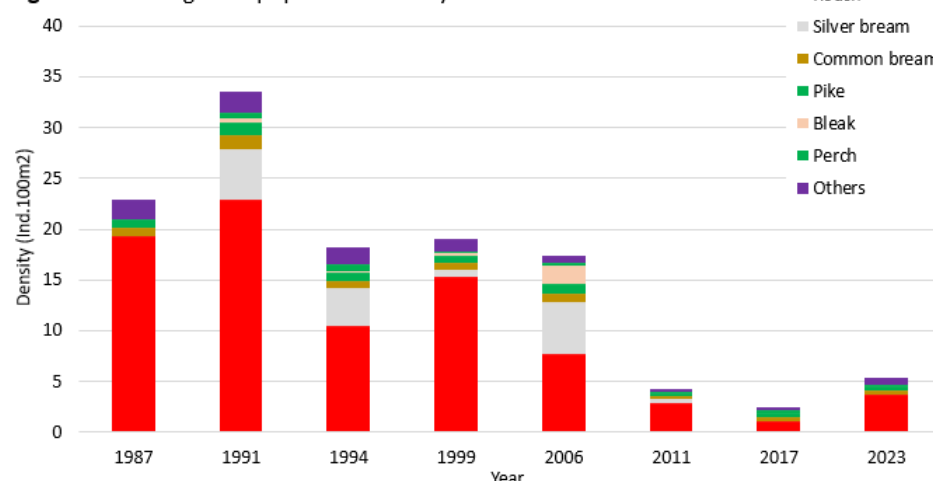


Figure WD2: Long term population density at Ashline Lock



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Match Catch

The match-catch database holds some returns from the Whittlesey Dyke; however, this is predominantly from 2013, 2014 and 2015 with few returns after this. Thankfully, some recent data is available from 2022 and 2023 (five and two match returns respectively) and some simple analysis has been conducted on these returns, however it should be remembered that any conclusions are based on a somewhat small dataset and may not be representative of wider fishery performance. Most of the returns on the database are from Ashline Lock and Cock Bank with a small number from Factory Bank (29, 15 and 3 returns respectively). The match return data confirms roach dominant species, with representation from common bream, rudd perch etc.

Ashline Lock

CPUE values from Ashline Lock show that, overall, each year has attained A status, and except for 2015, have generally received A+ for fishery performance (**Figure WD4**).

Individual match returns from all three locations (Ashline Lock, Cock Bank and Factory Bank) shows that match performance has not consistently fallen within the upper range, indeed some C & D class returns have been received, however on average the good catches heavily outweigh the poor and there are many factors that will influence fishery performance such as environmental conditions, angler ability etc. (**Figure WD5**). The CPUE value for 2005 is based on a single match return, with but a small number of anglers fishing (No.=8) and this value should be treated with some caution for this reason.

Figure WD6 shows the average 'top 3' winning weights from the five years where data is present. It is apparent that fishery performance in 2005 has also been positively influenced by the winning angler either fishing a 'flyer' peg (or putting in a masterclass in competitive angling!) as their 7kg catch far exceed the runner-up 2nd and 3rd places. The weight of fish caught during the 2005 match was not an outlier but did sit amongst the upper values for this location and as there are no moderate or poor returns to 'ground' this result; the CPUE for the whole year is elevated.

Figure WD3: Number of anglers and match returns from Ashline Lock



Figure WD4: CPUE catch rate (g/Hr) Vs class boundaries

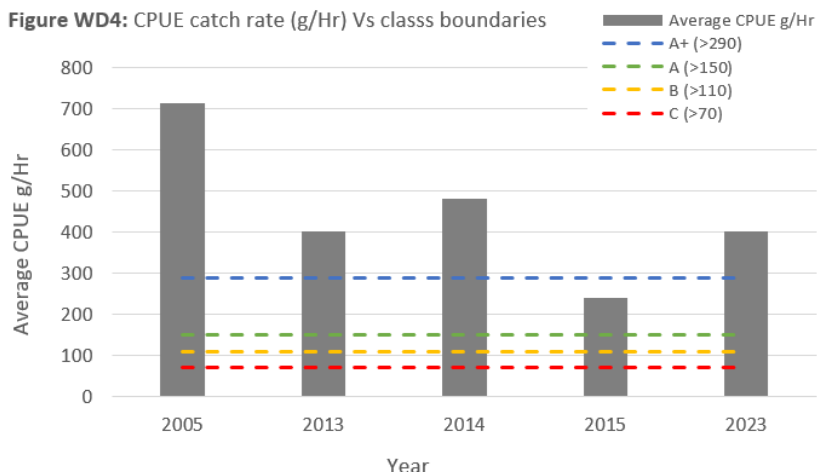


Figure WD5: Individual match CPUE catch rate (g/Hr) Vs class boundaries

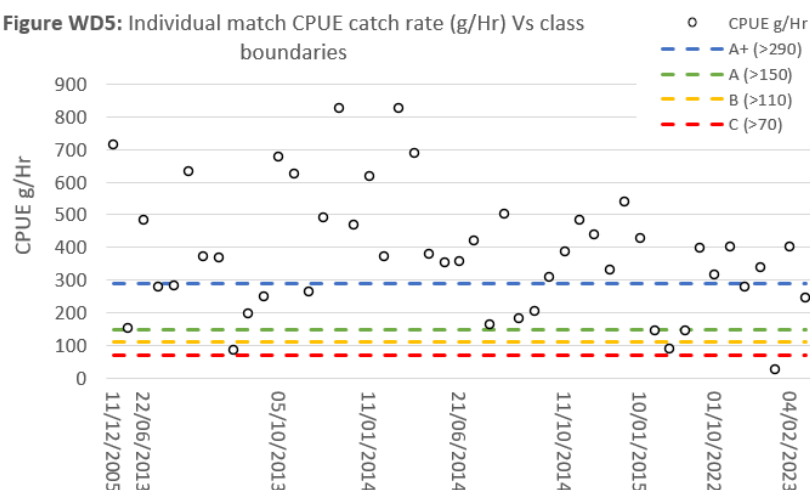
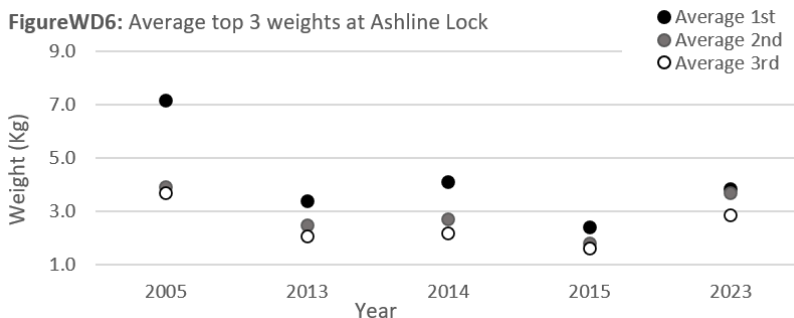


Figure WD6: Average top 3 weights at Ashline Lock



Cock Bank

Results from Cock Bank are available from fifteen matches between 2005 and 2023, unfortunately, as with Ashline Lock, the spread of this data is heavily weighted to 2013 and 2014 with scant returns from subsequent years in the dataset (**Figure WD7**).

It is interesting to note that the single 2005 result at Cock Bank also has a winning angler that far exceeded the catch of the remaining competitors. Unfortunately, the rest of the competitors did not do so well with a total of 21 Kg caught between the twenty-eight anglers (and over fifty percent of this being the 3 top weights) Notes from the match suggest that cold, clear conditions experienced during the event had perhaps made the venue somewhat ‘peggy’ with fish shoaling around areas of cover. Despite this, the 2005 match received a CPUE value close to the A/A+ boundary.

The 2013 dataset, compiled from 6 matches saw the fishery achieve A+ whilst subsequent years have either been A class or just over the A+ threshold. (**Figure WD8**) The 2023 CPUE value is also drawn from just one return, however it is possible that further data will become available as the season progresses. These match returns do indicate that, despite the despite the comparatively low population density determined by seine netting, the Whittlesey Dyke can provide good sport during the correct environmental conditions, and it is hoped that the apparent increase to the roach population will further improve fishery performance. Any available match returns from this water will be gratefully received and included in future reports.

Images WD1 & WD2 (right) show quality rudd and common bream recorded during the 2023 survey cycle.



Figure WD7: Number of anglers and match returns from Cock Bank

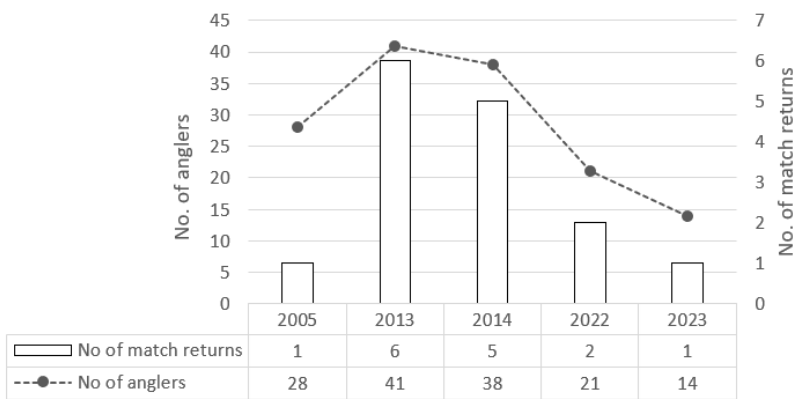


Figure WD8: CPUE catch rate (g/Hr) Vs class boundaries

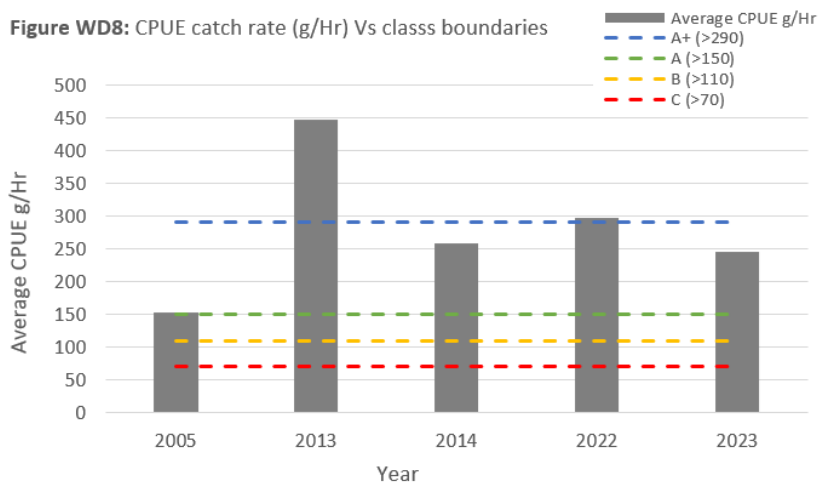
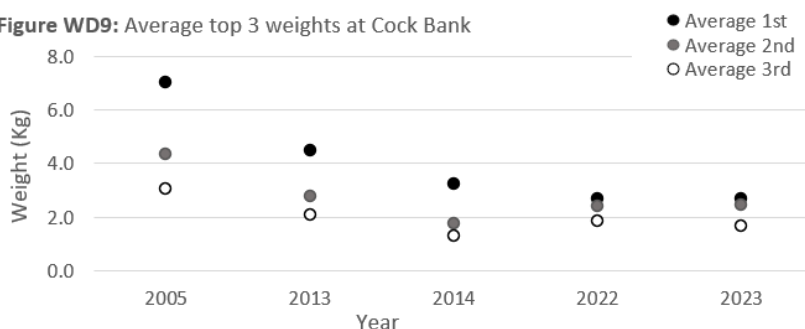


Figure WD9: Average top 3 weights at Cock Bank



Conclusions:

The results of the 2023 survey cycle have, perhaps predictably, been somewhat mixed; and once again, some sites have produced their highest density estimates on record, whilst some sites have produced their lowest. Historic data shows that there has frequently been significant changes in population density between survey cycles and in some instances this change was so rapid, such as between annual surveys, that changes in stock distribution can be the only realistic explanation. As some channels are subject to a single sample site then this means that there will be some inherent uncertainty of the dataset, particularly if fish are showing clumped distribution. Our observations are frequently being made on single sites, particularly on the lesser drains, although we have increased our survey coverage during in this survey cycle, and as such these results can be somewhat hit or miss and this is where the use of additional complimentary survey techniques can support and validate the traditional survey methods.

This report represents our first attempt to combine routine survey techniques with multiple complimentary survey techniques, such as side scan data and match catch analysis, to better describe fish stocks present and, equally importantly, the angling potential within the catchment. It is hoped that this approach will be of interest to the wider angling community.

Our survey techniques, and angling match returns have demonstrated that the middle level system retains the opportunity to provide some astonishing silver fish catches, contain some huge shoals of bream and offer opportunities for specimen rudd, quality tench and a surprisingly large amount of silver bream which appear to have shown strong population growth on multiple channels. In terms of predatory species, pike, perch and zander were regularly encountered during our surveys with pike present at all but three sites and some good-sized specimens, both pike and zander, also being observed using the side scan apparatus. The angling community has previously requested that the location of predatory species should not be widely disseminated, and this has been adopted where possible in this report, to protect these surprisingly delicate species from overexploitation.

Finally, if your club fish matches on the Middle Level Catchment and are not currently providing match return data, please consider supplying this, both to help support your fishery and to allow further analysis within the next report. The process of providing match data is extremely quick and simple and can be sent to us via email using the template at the rear of this report.

If you have any questions, please reach out to us at angcentral.frb@environment-agency.gov.uk

Management Options:

- It is suggested that the programme of side-scan and ARIS acoustic surveys continue as staff availability allows.
- The 16 ft drain should be a priority due to the poor catch made in 2023.
- The 20ft Drain should also be surveyed due to the popularity of the fishery and the lack of any other form of supporting data.

Justin Mould

Fisheries Analysis and Reporting Officer

Next survey due

Summer 2026

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Non-native species:

Zander are present across the Middle Levels system, and whilst not universally popular have a dedicated following from anglers who enjoy the sport and challenge this species provides. **Bitterling** have been captured in the Well Creek but are of no angling interest.

Chinese Mitten Crab are present across the Middle Level catchment and may be encountered in surprisingly high densities, particularly during the autumn/winter when the species are migrating back to the sea to spawn.

Although not known to be present on the Middle Level system anglers should make themselves aware of the risk to fisheries posed by the aquatic plant **Floating Pennywort** (*Hydrocotyle ranunculoides*) which has been observed on the nearby Great Ouse, Cam and Ely Ouse. In its native range, floating pennywort occurs in slow-flowing warm and nutrient rich water in Argentina, Brazil, Paraguay and southern states of the USA. Floating pennywort is an invasive weed in North-western Europe and was first naturalised in the UK in 1990 as an introduction from garden ponds. Since then it has become widespread in the south and east of England and is spreading rapidly north and westwards. Floating pennywort is found in and around canals, lakes, rivers, streams, ditches and ponds. It roots along waterbody margins, growing up to a rate of 20cm per day, and spreads out onto the water as dense interwoven mats above and beneath the surface which can quickly overwhelm a waterbody and impede water flow. Very large infestations may interfere with navigation, prevent angling access and increase the risk of flooding. Another important consideration is the detrimental effect of floating pennywort on native plant and animal species. The dense growths result in native plants being shaded out and may obstruct native air-breathing insects from reaching the water surface. In addition, the water beneath mats can become deoxygenated resulting in fish mortality and changes to the invertebrate community.

Floating pennywort is usually spread by vegetative propagation, with very small fragments of the plant able to form new colonies. Landowners are responsible for undertaking swift and effective action to control floating pennywort on their land. Under the provisions of the Wildlife and Countryside Act (1981) it is illegal for landowners to allow floating pennywort to spread from their property.

Anglers should adhere to the check, clean, dry protocol to help avoid spreading this plant on their equipment such as landing nets and keep-nets. Anglers using weed rakes should be particularly careful not to disturb or break up clumps of pennywort as this could cause the spread of fragments, which may then root elsewhere.

If you think you have found floating pennywort please report it to anglian-invasive@environment-agency.gov.uk providing a photograph and detail of the location, preferably including a grid reference.

Dikerogammarus haemobaphes [Dh] also known as '**Demon shrimp**' are an invasive amphipod (freshwater shrimp) originally from the Ponto-Caspian region where Europe meets Asia and the Middle East. First discovered in the UK in 2012 the shrimp has spread rapidly and is now present in many of our rivers including the Thames, Trent and Great Ouse. Although smaller than their better known relative, the killer shrimp (*Dikerogammarus villosus*) they may still have the potential to disrupt ecosystems by replacing or partially replacing native freshwater shrimps (*Gammarus spp.*). The spread of Dh can be prevented by following the check-clean-dry methodology of checking all kit for any life, cleaning it off either where you have been fishing or well away from any watercourses and then drying it for 48 hours before using it elsewhere.



customer service line
03708 506 506

incident hotline
0800 80 70 60

floodline
0345 988 1188
0845 988 1188

www.gov.uk/environment-agency

Additional information

If any angling matches are held throughout this river length then angling clubs are encouraged to provide match results to feed into the Environment Agencies Match Catch Database which analyses angler catches to assess fishery performance. The output of this database can also be used as supporting evidence to assist analysis of routine survey results. Match return cards and more information on the Match Catch Database can be obtained from Fisheries Biodiversity and Geomorphology (FBG) Officer Chris Middleton. chris.middleton@environment-agency.gov.uk

Anglers can also keep up to date with all things fisheries & enforcement related by following the local Angling Trust Eastern Region and Lower Ouse & Fenland Fisheries Consultative Association (LOFFCA) Facebook pages.

<https://www.facebook.com/AnglingTrustEastEnglandRegion/>

<https://www.facebook.com/LOFFCA/>

For information regarding the Fisheries Improvement Programme, please follow the link below:

<https://www.gov.uk/government/news/fisheries-projects-needed-to-improve-the-environment>

For information regarding the Angling Improvement Fund (AIF) administered by the Angling Trust, please follow the link below:

<http://www.anglingtrust.net/landing.asp?section=1094§ionTitle=Angling+Improvement+Fund>

Before you go fishing don't forget:

❑ You must have a valid Environment Agency rod licence and permission from the fishery owner;

❑ You must comply with the fisheries byelaws;

❑ 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 stillwaters. 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 Crimestoppers on 0800 555 111 or <https://crimestoppers-uk.org/give-information/give-information-online/>.

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Environment Agency Match Record

(Please complete after each match and return by email to chris.middleton@environment-agency.gov.uk)

Name of angling club:		Date of match:	
River:		Venue:	
Section / peg fished:		Number of competitors:	
Match start time:		Match duration (hrs):	

Number of anglers weighing-in:			
Total weight caught:		(lbs/oz) or (g) <i>delete as appropriate</i>	
Winning weight:		(lbs/oz) or (g) <i>delete as appropriate</i>	
2 nd weight:		(lbs/oz) or (g) <i>delete as appropriate</i>	
3 rd weight:		(lbs/oz) or (g) <i>delete as appropriate</i>	

Species Caught In:

Greatest number:	
Second greatest number:	
Other species present:	

River Conditions:

Level		Colour		Condition		River Temp	
Low		Clear		Falling		Cold	
Normal		Coloured		Steady		Normal	
High		Green		Rising		Warm	

Weather Conditions:

Brightness		Wind		Rain	
Dull		Still		Dry	
Changeable		Light		Drizzle	
Bright		Moderate		Light	
		Strong		Heavy	
				Hail	
				Sleet	
				Snow	

Any other comments:

STOP THE SPREAD



Are you unknowingly spreading invasive species on your water sports equipment and clothing?

Invasive species can affect fish and other wildlife, restrict navigation, clog up propellers and be costly to manage. You can help protect the water sports you love by following three simple steps when you leave the water.

CHECK

Check your equipment and clothing for live organisms - particular in areas that are damp or hard to inspect.

CLEAN

Clean and wash all equipment, footwear and clothes thoroughly. Use hot water where possible. If you do come across any organisms, leave them at the water body where you found them.

DRY

Dry all equipment and clothing - some species can live for many days in moist conditions. Make sure you don't transfer water elsewhere.

For more information go to www.nonnativespecies.org/checkcleandry



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