Solent and South Downs: Fish monitoring report 2017

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Foreword

Welcome to the 2017 annual fish report for Solent and South Downs. This report covers all of the fisheries surveys carried out by the Environment Agency in Hampshire and East and West Sussex in 2017. This is the eleventh annual report we have produced.

In 2017, our fisheries monitoring programme mainly focussed on Eel Index surveys which were carried out at 10 sites on the River Itchen and the River Ouse. This work is scheduled every 2 years to monitor the eel populations.

New this year were fish population surveys that were completed under the National Drought Monitoring Network (NDMN). The NDMN aims to generate a robust long-term hydroecological dataset to allow us to better understand the impacts of drought on ecological communities. In the Solent and South Downs we have 8 survey sites; 2 on the River Ouse, 4 on the River Itchen and 2 on the River Test. These sites are to be surveyed annually using a fully quantitative catch-depletion method along with HABSCORE habitat assessment.

We carried out spatial and temporal Principal Brown Trout surveys across the River Meon. This work is scheduled every 6 years so we can now directly compare the data with that collected in 2011. The spatial monitoring provides information on how the distribution of wild brown trout is changing over time, from 11 surveys that cover a large proportion of the Meon. This is complemented by the temporal monitoring programme, which occurs biennially, and reveals changes in trout abundance at 2 sites. Together the spatial and temporal monitoring provide us with a fuller picture, allowing us to gain a greater understanding of the Meon's brown trout population and its variability over time.

We also completed our annual Principal Coarse Fishery (PCF) surveys on the Western Rother and our Transitional and Coastal (TraC) surveys in Southampton Water and the River Adur estuary in spring and autumn.

We now report all our Principal Fishery surveys in a nationally consistent way, so that anglers, fishing clubs, landowners and others can see the publication ahead of this annual report. Consequently, the Principal survey results, for the River Meon and the Western Rother, are freely available as separate reports. However, the information from those reports has also been included here, for convenience.

Weather and climate have a large influence on our fish populations and in 2017 there was much less rainfall than usual. The amount of rain that fell was less than the long-term average in every month of the year except for over part of the summer, with the highest average rainfall recorded in July since 2000. In contrast, the winter preceding the fish surveys was particularly dry, with the lowest average monthly rainfall in December 2016 and January 2017 since 2000. The consequence of this on river flow and fish populations is discussed throughout the report.

Executive summary

In 2017 we carried out a total of 73 fish surveys throughout the Solent and South Downs area, which included 20 Eel Index surveys across the Sussex Ouse and the River Itchen, 13 on the River Meon and 12 estuarine surveys in the spring and 13 in the autumn.

- The Eel Index surveys in the Sussex Ouse and the River Itchen revealed a slight increase in the presence of smaller eels, which could indicate an increase in eel recruitment. However, the numbers of eel's remains at the lowest recorded values and therefore the future of our eel populations is still at risk. Consequently, any work to improve eel passage and habitat, such as installing eel passes and removing obstructions, could play a pivotal role in retaining the presence of this economically and ecologically valued species in our rivers.

- This is the second year that the full wild brown trout monitoring programme has been completed on the River Meon, so data from 2017 has been directly compared to 2011. Trout were found at all 13 sites, but in total, fewer fish were caught in 2017 than in 2011. Below average flows, witnessed in chalk streams across the South East, are likely to have affected the abundance of the species. However, the long-term dataset reveals minimal changes in the abundance of trout and populations do naturally fluctuate. The complex habitat throughout the Meon remains of high quality, facilitating trout resilience to such extreme environmental conditions.

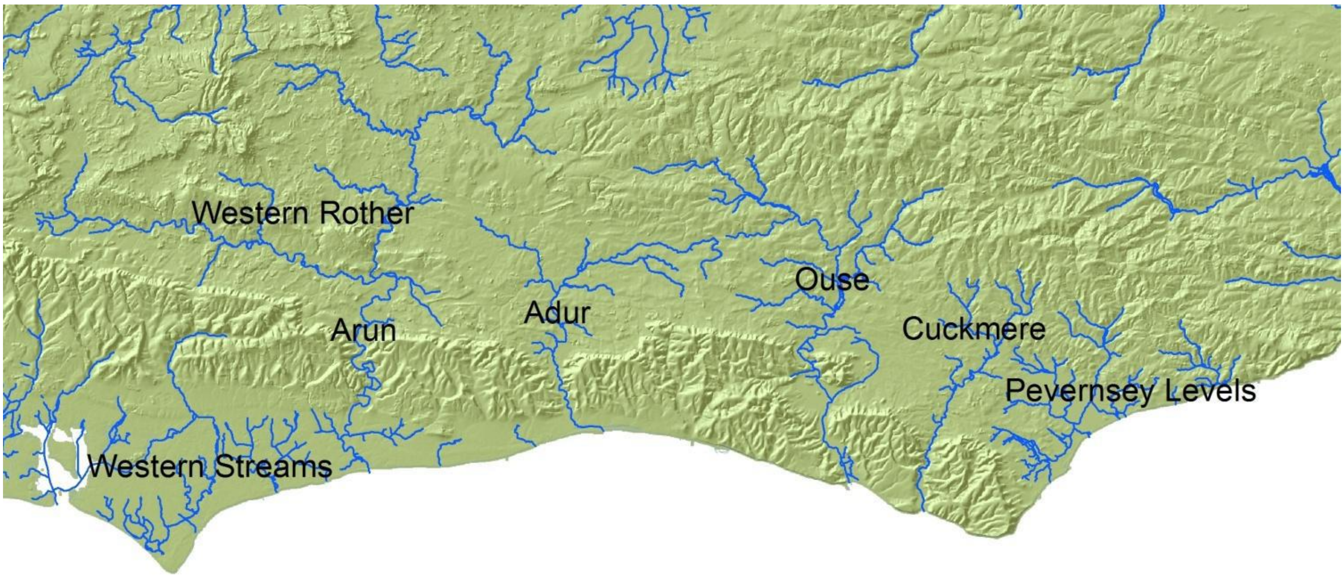
- Based on data from our salmon counters, we estimate that the number of adult salmon migrating into the River Test in 2017 was 1,850 and into the River Itchen was 640. These figures represent 128% and 86%, respectively, of each river's Conservation Limit.

- 2017 was the first year for National Drought Monitoring Network (NDMN) surveys. Completing the NDMN surveys across the Solent and South Downs has provided us with a valuable opportunity to look in detail at the impacts of key environmental variables, such as temperature and flow, on our brown trout populations and the future annual surveys will continue to add to the data set, allowing further insight to be revealed over time.

- Estuarine Transitional and Coastal (TraC) surveys were carried out in the spring and autumn in Southampton Water and the Adur estuary. We caught 29 species of fish in Southampton Water and 15 species in the Adur estuary. It was a good year for juvenile sea bass, with autumn numbers at their second highest recorded levels in Southampton Water and the Adur estuary. Overall, the numbers of fish caught in Southampton Water were average compared to previous years, however there was a notable reduction in the diversity of species and it was the poorest catch on record for the Coastal Survey Vessel otter trawl. Conversely, for the Adur estuary, fish abundance was much higher than average, with record catches of fish caught in both spring and autumn and consequently, for the first time, more fish were caught in the Adur estuary than across Southampton Water.

Rivers of Solent and South Downs

South Downs:



Solent:

Contents

Temperature and rainfall

Climatic conditions have a major influence on fish populations in both freshwater and marine environments. Rainfall can influence flows, for example, high rainfall can lead to flooding and low levels can create drought conditions. Temperature affects the rate of fish growth and also the amount of oxygen available in the water.

The following graphs highlight how these two variables have changed over the 2017 survey year and over the course of our long-term fisheries dataset. Figure TR1 shows for each year, the mean summer and winter rainfall (Romsey rain gauge), and the mean temperature for the summer and the winter preceding the survey year. The temperature data is calculated using the Met Office's Central England Temperature (CET) dataset. Rainfall is measured in millimetres (mm) and temperature in degrees Celsius (°C).

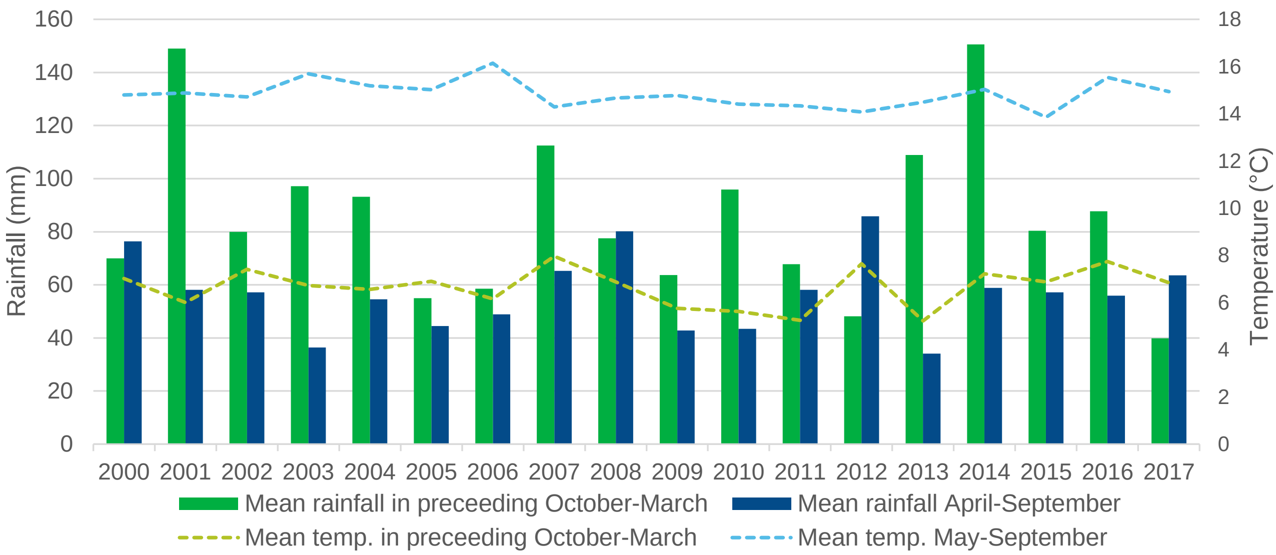


Figure TR1: Mean winter and summer temperature and rainfall over the past 18 years

Figure TR2 shows the mean monthly temperature from October 2016 to December 2017. Also shown is the mean of the previous 17 years and the minimum and maximum mean for each month.

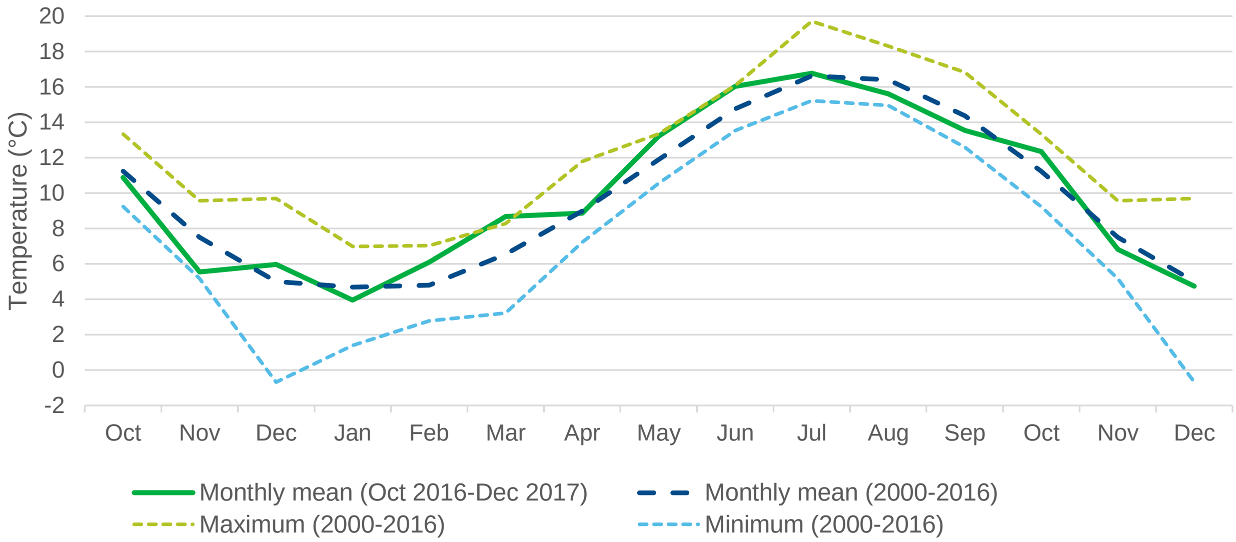


Figure TR2: Monthly mean temperatures (°C) from October 2016 to December 2017

Figure TR3 shows total monthly rainfall between October 2016 and December 2017. This is shown alongside the average monthly total between 2000 and 2016 and the maximum and minimum value for each month during this time period. All values are in millimetres (mm).

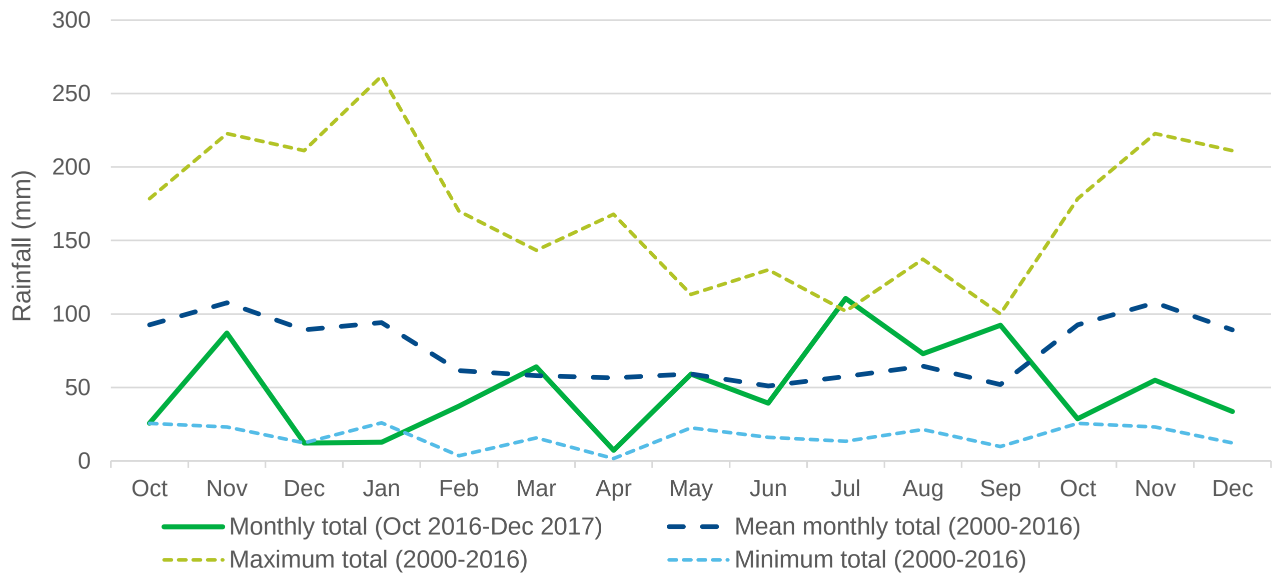


Figure TR3: Monthly rainfall totals from October 2016 to December 2017

Discussion

Figure TR1 gives a general summary of temperature and rainfall conditions in 2017 in the context of the previous 17 years. In contrast to 2016 when summer and winter rainfall were average and the temperatures were at record highs, in 2017 the mean values for summer and winter temperature were roughly average for the long-term period and it was rainfall that was unseasonal. Rainfall during winter 2016/17 was well below average, being the second driest since 2000; the amount of rain that fell between October and December 2016 was the lowest we have recorded. Summer on the other hand was much wetter, the 5th wettest recorded.

Figure TR2 shows the generally average winter and summer temperatures. That being said, the average temperature for March 2017 was higher than the previous maximum since 2000 and May and June 2017 were at their highest long-term average temperatures.

Figure TR3 shows the monthly rainfall totals from winter 2016/17 through to the end of the year and reveals the basis for the low average winter and high average summer rainfall. There was a great deal of variation and comparing the October 2016 to December 2017 rainfall with the long-term monthly averages shows that this winter period was especially dry. December 2016 and January 2017 had less rainfall than the previously recorded minimums in the long-term dataset. This contrasts with the summer where the rainfall was above average and July was another record breaker with more rainfall than we have recorded since 2000.

The lower than average rainfall throughout the winter preceding the summer fish surveys impacted river flows across the region. As this is such a crucial period for salmonid spawning and egg incubation it is likely to have created challenging conditions for migrating and spawning salmonids and this is discussed in more detail in various sections of the report.

Fish survey methods and results

Electric fishing

The majority of fish population surveys were conducted using electric fishing. Electric fishing involves placing an anode (a pole with a large metal ring at the end) into the water. The anode is energised with electricity and a circuit is formed through the surrounding water between the anode and a length of copper braid (the cathode) that is placed in the water a few metres away. The current is controlled via circuitry in a control box and causes fish to swim towards the anode and become partially anaesthetised so they can be collected into a hand net. Captured fish are placed in a container of cool, aerated water and identified and measured before being returned to the river. The type of current used is known as Pulsed Direct Current. Voltage, pulse frequency and pulse width (i.e., duration) are all adjusted at each site with the aim of capturing fish effectively with the lowest current possible. All electric fishing surveys involve the team wading or boating slowly upstream, usually for 100 metres, until they reach a stop net placed across the channel to prevent fish escaping from the survey reach.

Eel Index surveys

Populations of the European eel have reduced by 95% since the 1980's. Under the Eel Regulations 2009, the UK must act to halt and reverse the decline of this ecologically and economically valued species. Our eel monitoring programme, where 10 sites across each Eel Index River are surveyed biennially, collects data on eel status in order to inform appropriate conservation measures. In the Solent and South Downs there are two Eel Index rivers, the River Ouse in Sussex and the River Itchen in Hampshire.

National Drought Monitoring Network (NDMN) surveys

The NDMN is a national network which collects long-term hydroecological data to help us better understand and manage the ecological impact of drought. The NDMN currently comprises of two distinct networks; macro-invertebrates and salmonid fish (salmonid survey sites have been the initial focus, but coarse fish sites are to be added to the network in due course). Each ecological site is paired with a nearby flow gauging station to allow us to effectively establish a link between flow and ecological response.

In the Solent and South Downs, we currently have eight survey sites, two on the River Uck, a tributary of the River Ouse, four on the River Itchen (two on the Candover Brook and two on the Cheriton Stream) and two on the River Test. These sites are to be surveyed annually by catch depletion electric fishing, along with a HABSCORE habitat assessment.

HABSCORE habitat assessment

HABSCORE is a system for measuring and evaluating stream salmonid habitat features. It is based on a series of statistical models (which are both species and age specific) relating salmonid populations to observed habitat variables. The outputs include an estimate of the expected fish populations (the Habitat Quality Score, HQS) and a measure of the degree of habitat utilisation (the Habitat Utilisation Index, HUI).

- The HQS is a measure of the habitat quality expressed as the expected long-term average density of fish (in numbers per 100m²). The HQS is derived by applying the models to habitat and catchment features. The HQS is used as an indicator of the potential of the site, against which the observed size of populations may be compared through the production of the HUI.
- The HUI is a measure of the extent to which the habitat is utilised by salmonids. It is based on the difference between the observed density and that which would be expected under pristine conditions (i.e. the HQS). The HUI statistic is a proportion, so when the observed density and the HQS are the same, the HUI =1, whilst HUI values of less than 1 will occur when observed densities are less than expected, which may indicate a pressure on fish populations other than habitat quality (for example, water quality or barriers to migration)

Fish counters

In the Solent and South Downs we have two fish counters to monitor returning adult salmon. One at Nursling on the Test and one at Gaters Mill on the Itchen. These counters work by detecting a change in resistance when a fish swims over a set of electrodes in the channel. By having three electrodes, we can tell whether the fish is moving upstream or downstream, according to the pair that were triggered first. As the electrodes detect a change in resistivity, a count is made and a photograph is taken either from above (at Nursling) or through a glass screen to the side (at Gaters Mill). The fish counters do not provide an exact count of fish as they only cover one possible route of ascent. However, through previous monitoring, we can estimate the proportion of fish using the monitored route compared to others and we apply a calculation to our count to correct this. Our counts therefore are an estimate of the total number of salmon ascending our rivers each year.

Estuarine transitional and coastal (TraC) surveys

Estuarine fish surveys use a combination of beach seine netting, small beam trawling and fyke netting (a type of static fish trap) instead of electric fishing due to the high conductivity of salt water. For full details of the methods see Section 4 of this report.

Fish survey results

Some surveys discussed in this report involve a single upstream electric fishing run (single run), whereas others involve three successive runs (catch depletion). Single run electric fishing surveys cannot catch every fish in the reach they cover, so the catch is a minimum estimate and gives a general idea of the species present and their abundance, these are semi-quantitative surveys. Catch depletion surveys (three runs) catch the majority, but usually not all of the fish in the survey reach, these are fully quantitative surveys. The difference in catch in each successive run allows a reliable estimate of the total population of each species to be calculated.

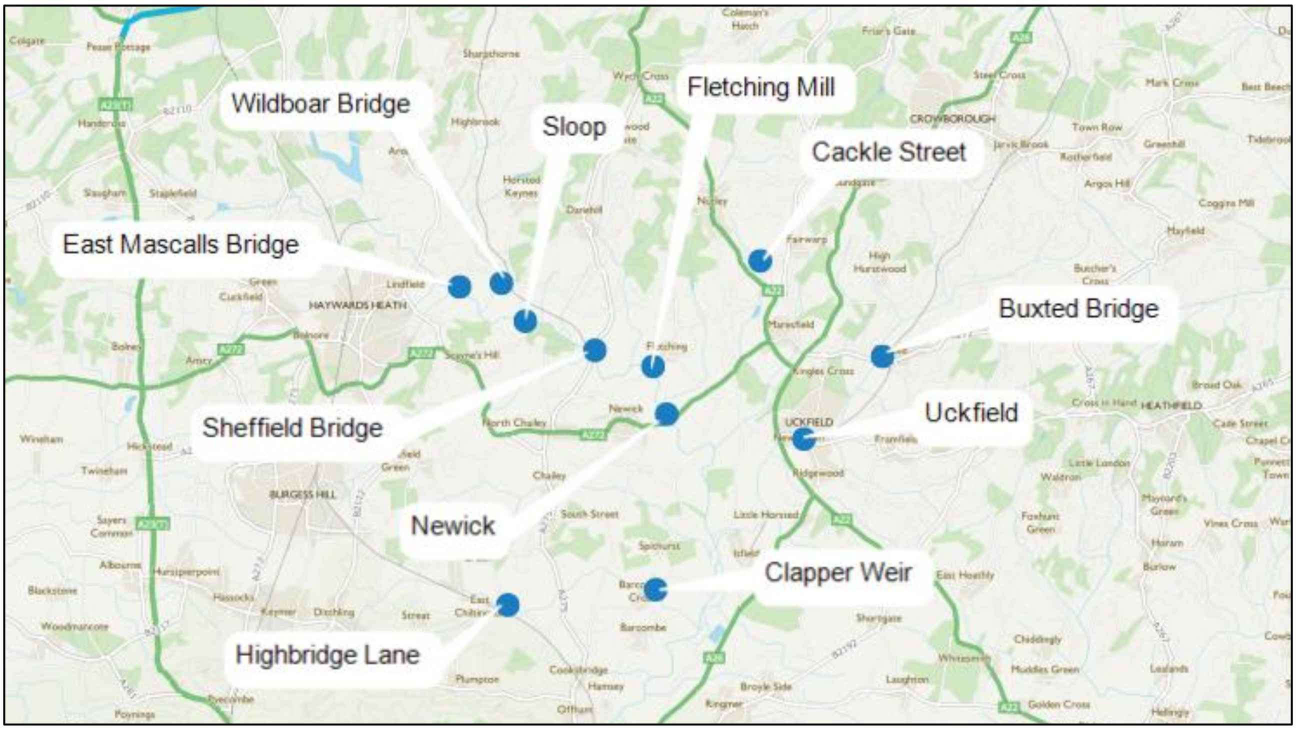
Catch depletion results should not be compared directly with single run results, although sometimes single run results are compared to the first run of a catch depletion survey. The results from both types of survey are expressed as the number or weight of fish per 100m² of river (i.e. within a 10m by 10m area). Sites are listed throughout the report from upstream to downstream.

1. East Sussex

1.1. Sussex Ouse

Eleven surveys were completed on the Sussex Ouse in 2017. Ten of these were Eel Index surveys, some of which also served as Principal Brown Trout (PBT) surveys and/or National Drought Monitoring Network (NDMN) surveys.

Map Ouse 1 shows the locations of each survey site and Table Ouse 1 sets out the purpose for completing each fish population surveys at each site.



Map Ouse 1: Sussex Ouse survey sites, 2017

Table Ouse 1: The survey purpose(s) for each site, Sussex Ouse, 2017

	East Mascalls Bridge	Wildboar Bridge	Sloop	Cackle Street	Sheffield Bridge	Buxted Bridge	Fletching Mill U/S	Newick	Uckfield	Highbridge Lane	Clappers Weir
Eel Index	■	■	■	■	■	■	■	■		■	■
PBT						■				■	
NDMN						■			■		

Ouse: Eel Index

This is the fifth time the Ouse has been surveyed as an Eel Index river. Figure Ouse 1 shows the total number of eels caught at each survey site between 2009 and 2017. Estimated density is not shown as numbers are so low.

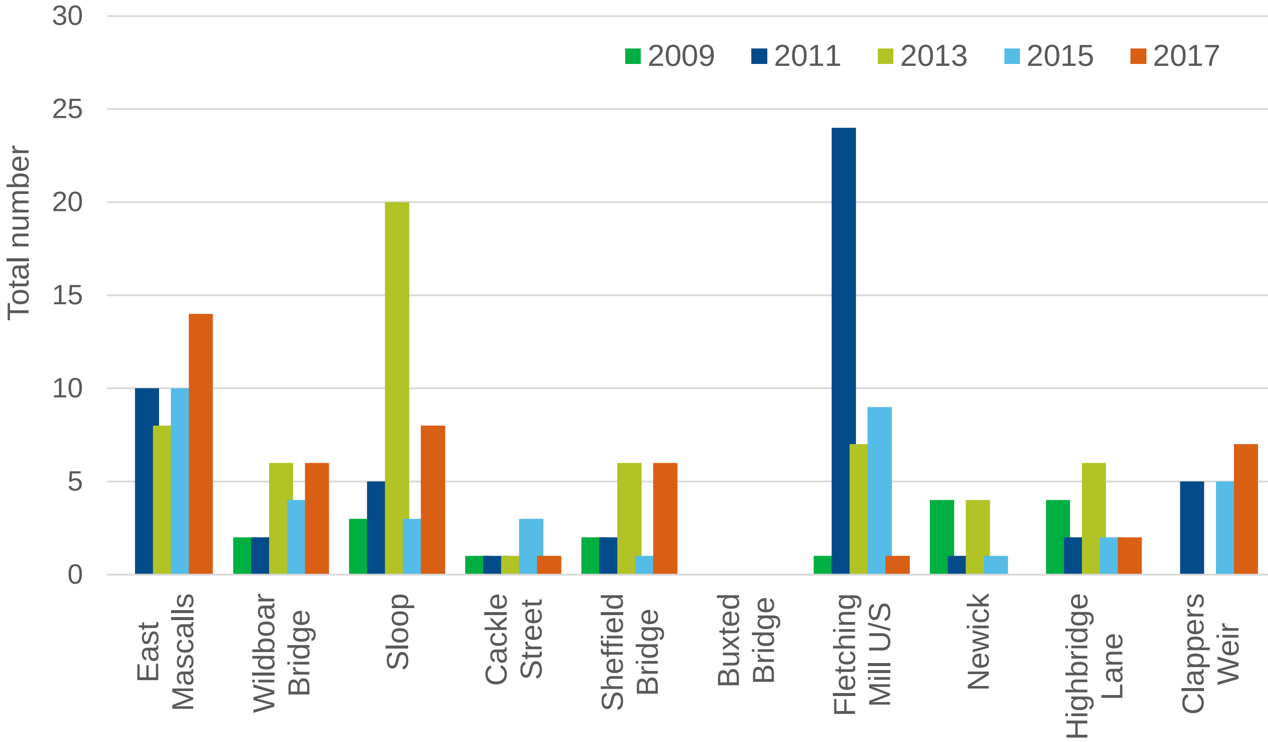


Figure Ouse 1: Total number of eels caught at each site, 2009 - 2017

Figure Ouse 2 is a length frequency histogram depicting the total number of eels caught in 10mm length categories in 2009 (the first Eel Index survey year), 2015 and 2017.

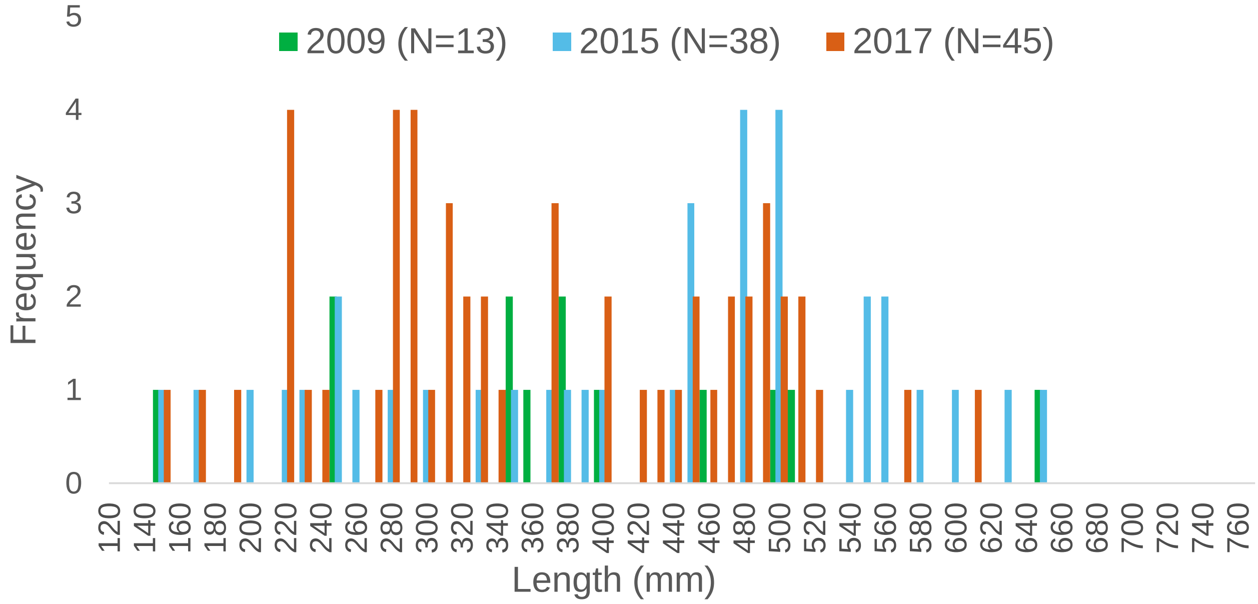


Figure Ouse 2: Length frequency histogram of all eels, 2009, 2015 and 2017

The highest catch of eels on the Ouse in 2017 was at East Mascalls Bridge

An eel from Clappers Weir

Other species

The Eel Index programme also provides a good opportunity to assess the distribution of other species in the Sussex Ouse. Figure Ouse 3 below shows the diversity and abundance of fish species at each site.

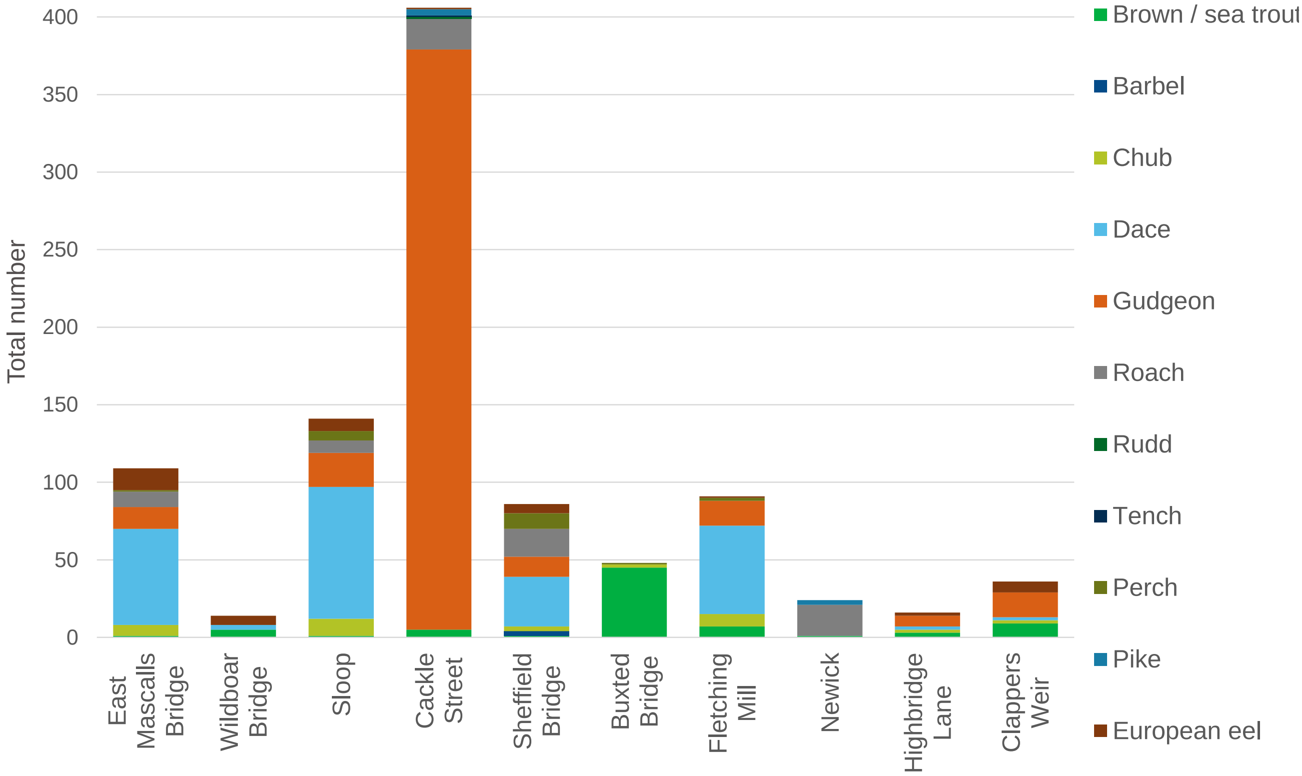


Figure Ouse 3: Total number of fish caught at each site, Ouse, 2017

Figures Ouse 4 to 7 are length frequency histograms, revealing the size structure of the wild brown trout, dace and roach populations across the Sussex Ouse and of gudgeon from the exceptional catch at Cackle Street, respectively.

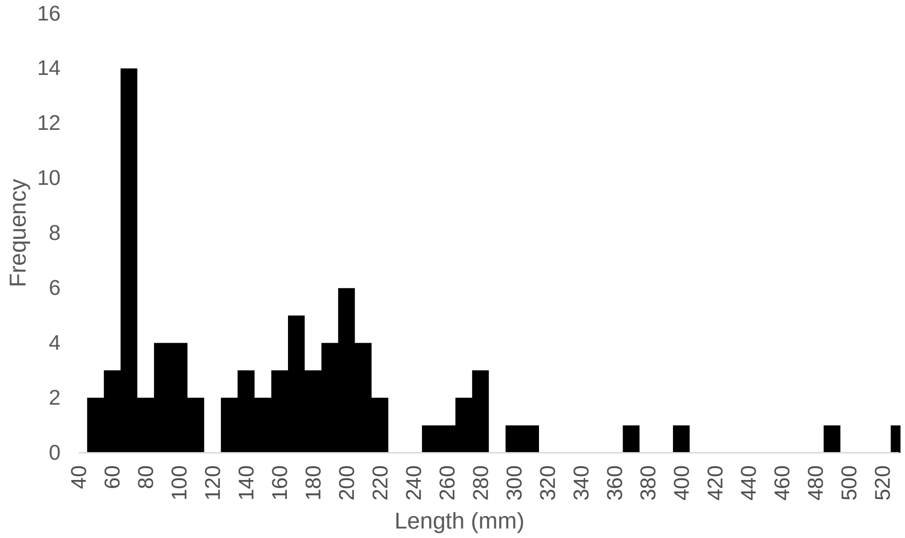


Figure Ouse 4: Length frequency, wild brown trout, Ouse, (N=78)

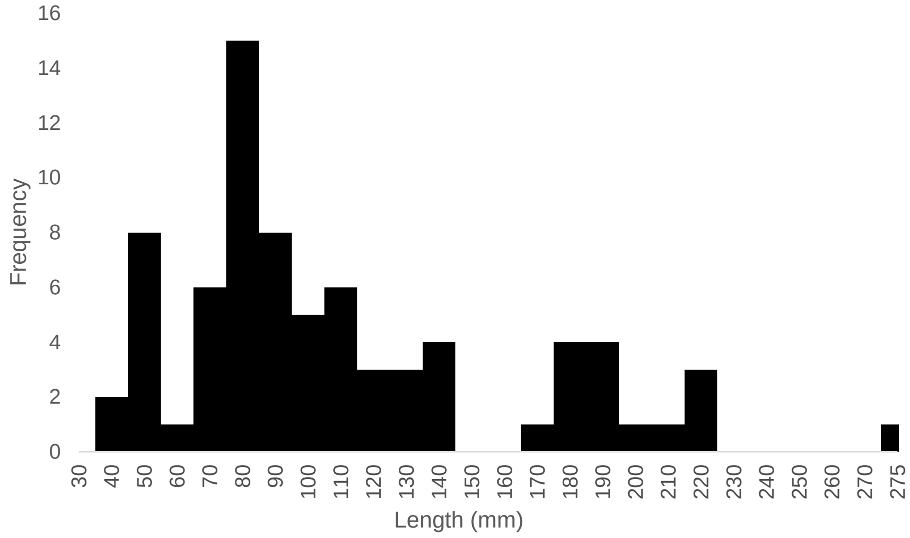


Figure Ouse 7: Length frequency, roach, Ouse, (N=76)

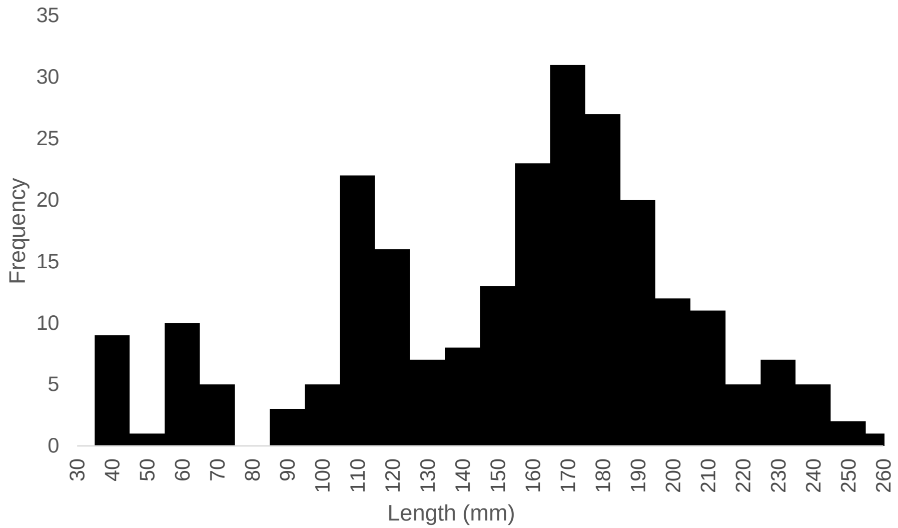


Figure Ouse 5: Length frequency, dace, Ouse, (N=243)

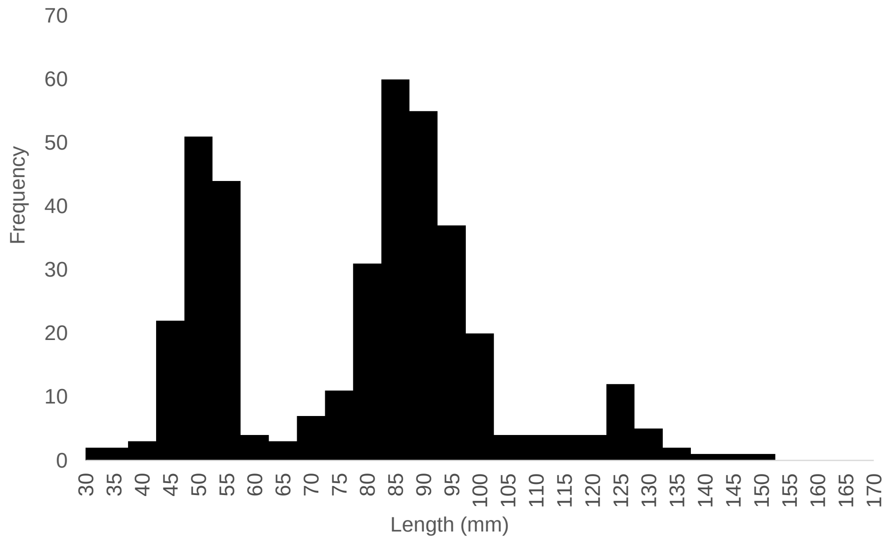


Figure Ouse 6: Length frequency, gudgeon, Clappers Weir, (N=390)

Two principal factors that appear to influence the abundance of dace, chub and roach on the Ouse are summer temperature (positive correlation) and winter flow (negative correlation).

Figure Ouse 8 compares fish density with the average number of degree days above 12°C in the previous 4 years (including the survey year). A degree day is a theoretical unit of one day at one degree, so a 24 hour period where the average temperature was 13°C equals one degree day above 12°C. Figure Ouse 9 compares fish density with the annual average winter flow recorded for the two preceding winters (the flow data is for October to March). The densities shown in both figures are the mean estimated densities for these species at the three sites that have been surveyed since 2001; East Mascalls Bridge, Sheffield Bridge and Sloop. Please note that no fish surveys we conducted in 2012, 2014 or 2016 as since 2011, these are scheduled biennially instead of annually.

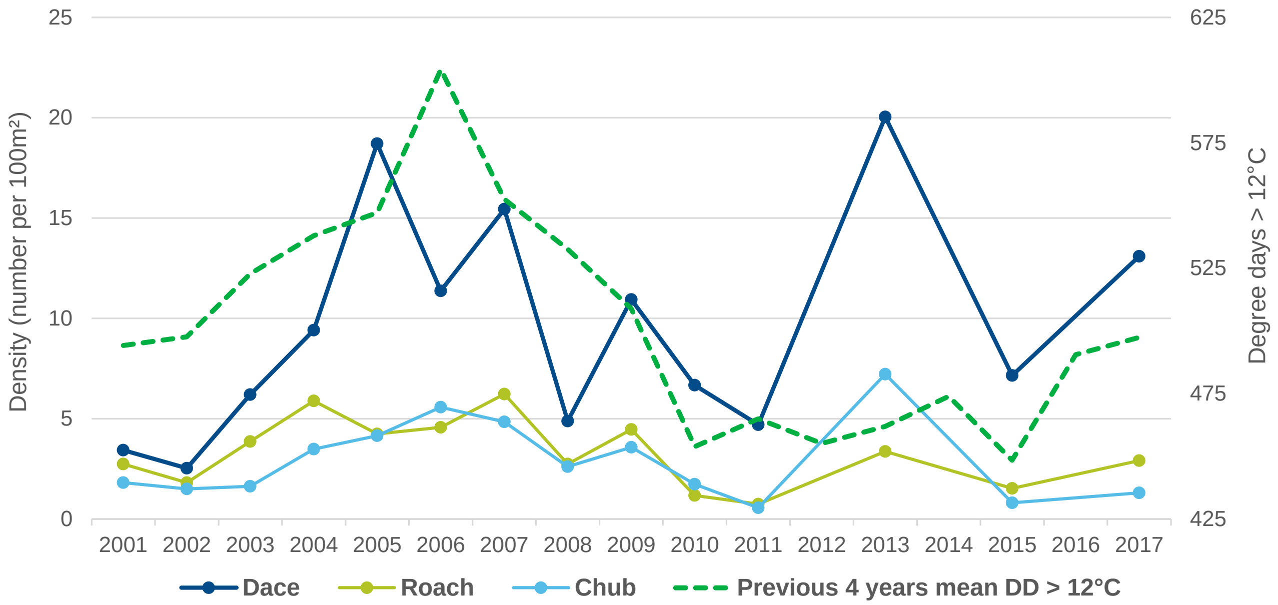


Figure Ouse 8: Average estimated density of dace, roach and chub and degree days > 12°C, 2001 - 2017

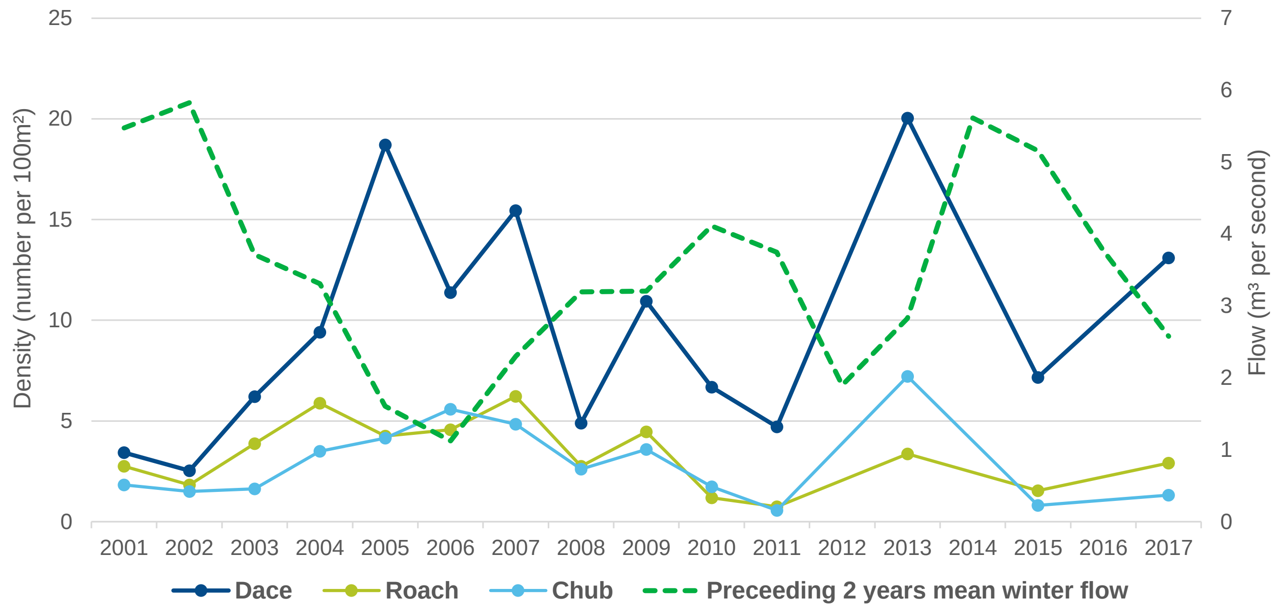


Figure Ouse 9: Average estimated density of dace, roach and chub and the mean winter flow of the preceding 2 years, 2001 - 2017

Discussion

Eels:

The number of eels in the Sussex Ouse remains particularly low. Only 45 individuals were caught across the 10 sites in 2017, increasing marginally from 38 in 2015. Due to the low numbers, eel abundance varies widely because each individual contributes greatly to the total catch. Such variation is particularly evident at Sloop and Fletching Mill. The consistent lack of eels from Buxted Bridge is likely due to the presence of structures such as sluice gates downstream of the site that may be preventing their upstream migration.

The sizes, and therefore ages, of eels caught across the Ouse were similar between 2015 and 2017, though, there were more young eels and fewer older individuals making up the catch in 2017. This suggests that there may have been a slight increase in eel recruitment.

Eel numbers in the Sussex Ouse linger around their lowest recorded levels and therefore the future of our eel populations remains at risk. Consequently, any work to improve eel passage and habitat, such as installing eel passes and removing obstructions, could play a pivotal role in retaining the presence of eels in our rivers.

Other species:

The Eel Index sites across the Sussex Ouse contain distinct and diverse fish populations, both in terms of species abundance and variety. Although predominantly populated by coarse species, such as dace, roach and chub, at Buxted Bridge, brown trout are dominant. In addition, there was an exceptional catch of gudgeon at Clappers Weir, where nearly 400 individuals were caught.

The abundance data for dace, roach and chub correlates closely with summer temperature (specifically the average number of degree days above 12°C in the previous 4 years) and the average flow over the preceding winter. This demonstrates that Ouse coarse fish survey results in any given year reflect the prevailing flow and temperature conditions over previous seasons. Similar observations have been made with regard to other southern coarse fishery rivers, including the Adur, Arun and Western Rother.

One of the barbel caught at Sheffield Bridge

Ouse: Principal Brown Trout

Buxted Bridge on the River Uck and Highbridge Lane on the Bevern Stream are not only Eel Index sites, but also temporal monitoring sites for wild brown trout. They are surveyed biennially to collect data that should reflect variation in trout abundance over time. There are 9 other spatial sites that are surveyed every 6 years to reveal any changes to the distribution of wild brown trout in the Ouse - these will next be surveyed in 2019.

Figure Ouse 10 shows the abundance of brown trout at the two temporal survey sites between 2011 and 2017. The temporal sites were surveyed annually from 2011 to 2013, when the scheduling switched to biennial. The data has been categorised into age classes to allow comparison of the age structures within the populations between the survey years.

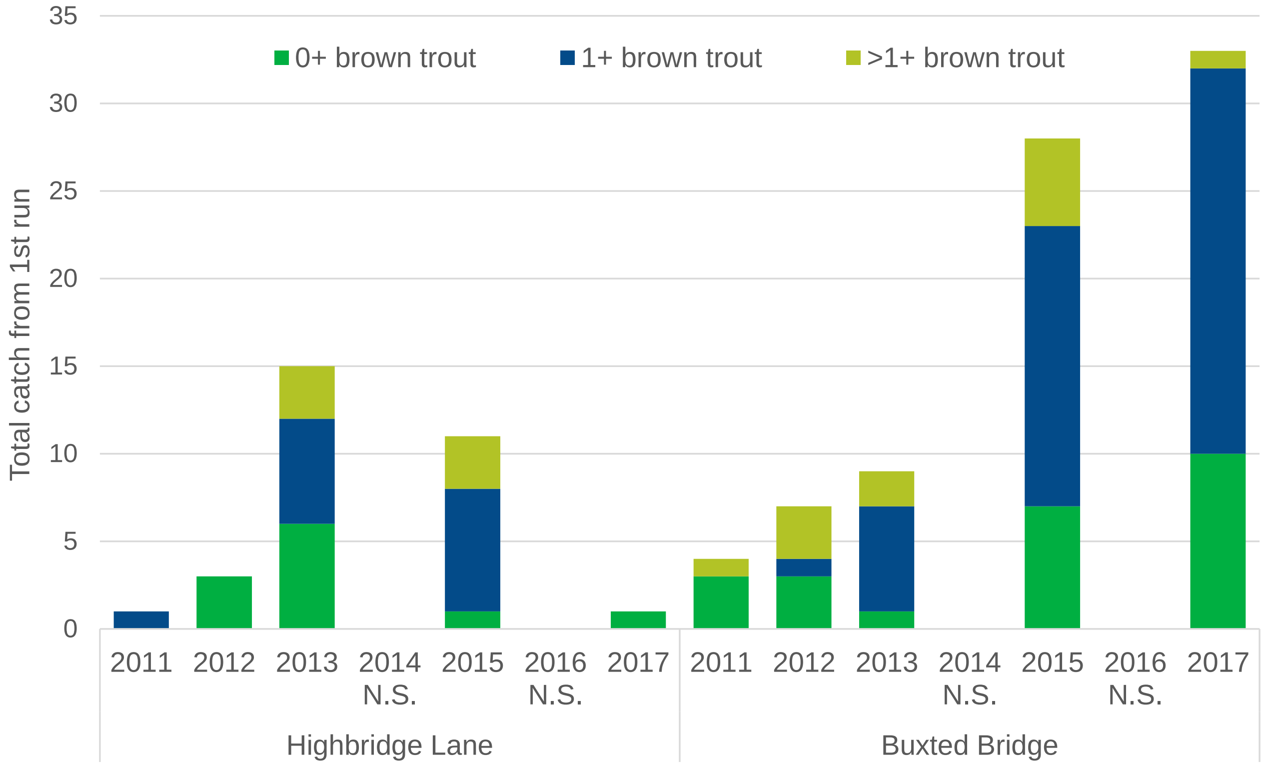


Figure Ouse 10: First run abundance of brown trout, temporal monitoring sites, 2011-2017 (N.S. = no survey)

A trout fry from Highbridge Lane

A young adult from Buxted Bridge

Figure Ouse 11 depicts the age structure of the trout population present at the temporal sites, showing the number of trout present in 10mm length categories.

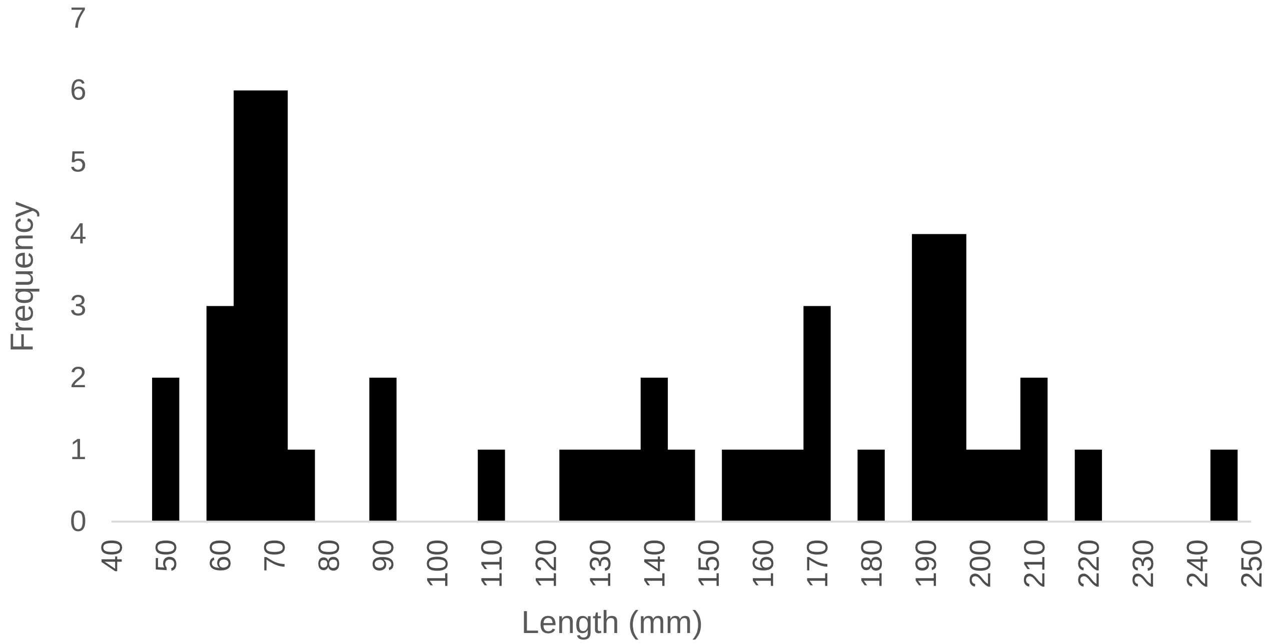


Figure Ouse 11: Length frequency of wild brown trout, Highbridge Lane and Buxted Bridge, 2017 (N=48)

Discussion

The numbers of wild brown trout found at the temporal monitoring sites on the Ouse are highly variable, especially at Highbridge Lane. This is particularly evident for the 0+ fish (young of the year) and is most likely due to altering degrees of spawning success.

There is a strong indication of a growing brown trout population at Buxted Bridge. A high proportion of 1+ fish were present in the trout population at Buxted in 2015 and 2017, but generally fewer adults are present. This suggests that the majority do not take up residency in the river but migrate out to sea after becoming smolts.

Ouse: National Drought Monitoring Network

The River Ouse has two National Drought Monitoring Network (NDMN) sites; Buxted Bridge and Uckfield, both located on the River Uck tributary. Figure Ouse 12 shows the average monthly flow between October 2016 and December 2017, alongside the 8 year mean, minimum and maximum monthly flows. The data is from Isfield gauging station, located just downstream of the sites.

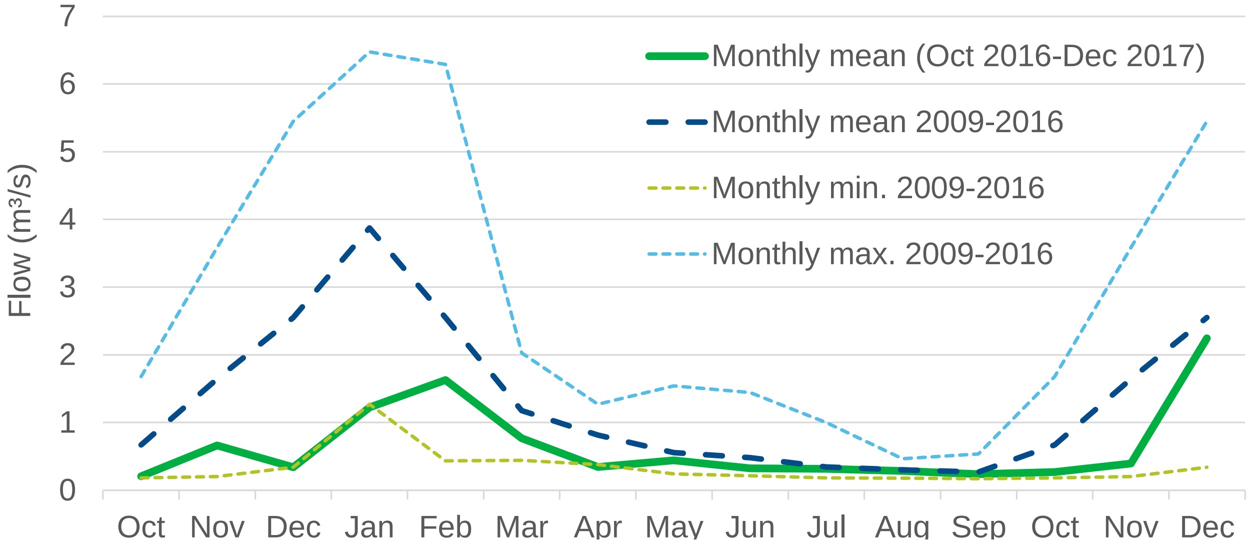


Figure Ouse 12: Mean monthly flow (m^3/s) from October 2016 to December 2017

Although 2017 was the first year for NDMN surveys, we already hold fish data for these sites. However, as there are discrepancies in survey method between the years, to make the data comparable, only fish caught on the first run of the catch-depletion surveys have been used alongside the single run data. Figure Ouse 13 compares the first run densities of brown trout caught at the two sites. The data has been separated into age classes to allow comparison of the age structures within the populations between the survey years.

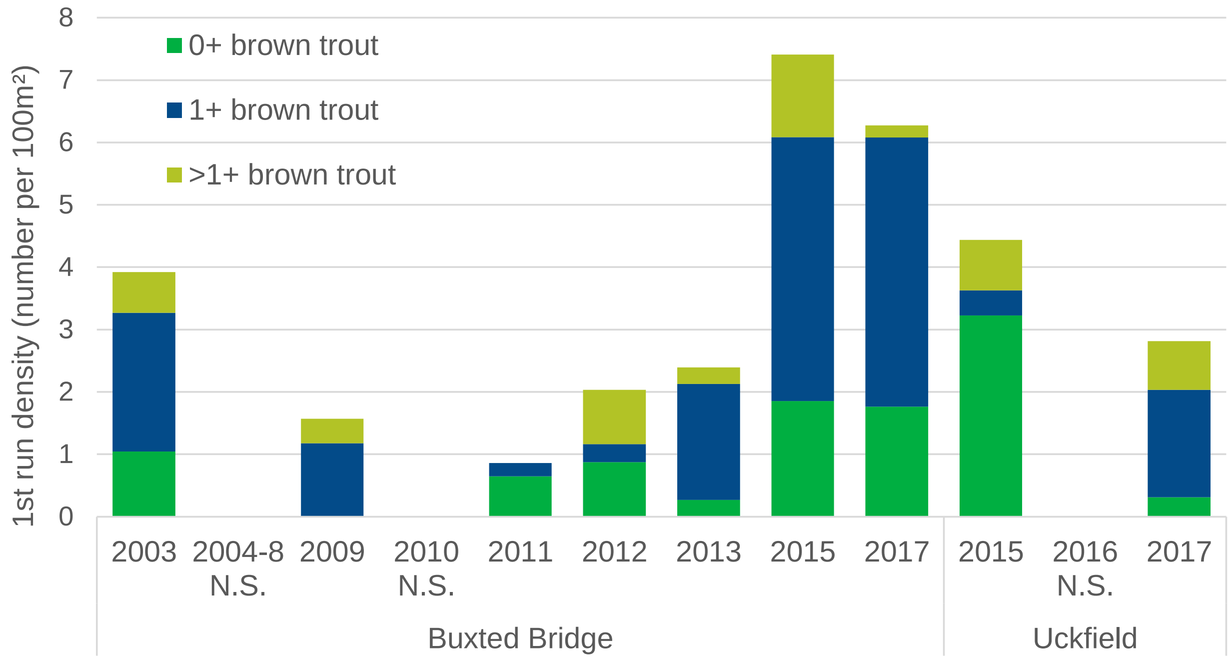


Figure Ouse 13: Density (number per $100m^2$) of wild brown trout, NDMN sites, 2009 - 2017 (N.S. = no survey(s))

The purpose of the NDMN is to reveal any possible impact of drought on fish populations. Figure Ouse 14 demonstrates the relationship between the mean summer flow and the average length of 1+ brown trout at Buxted Bridge.

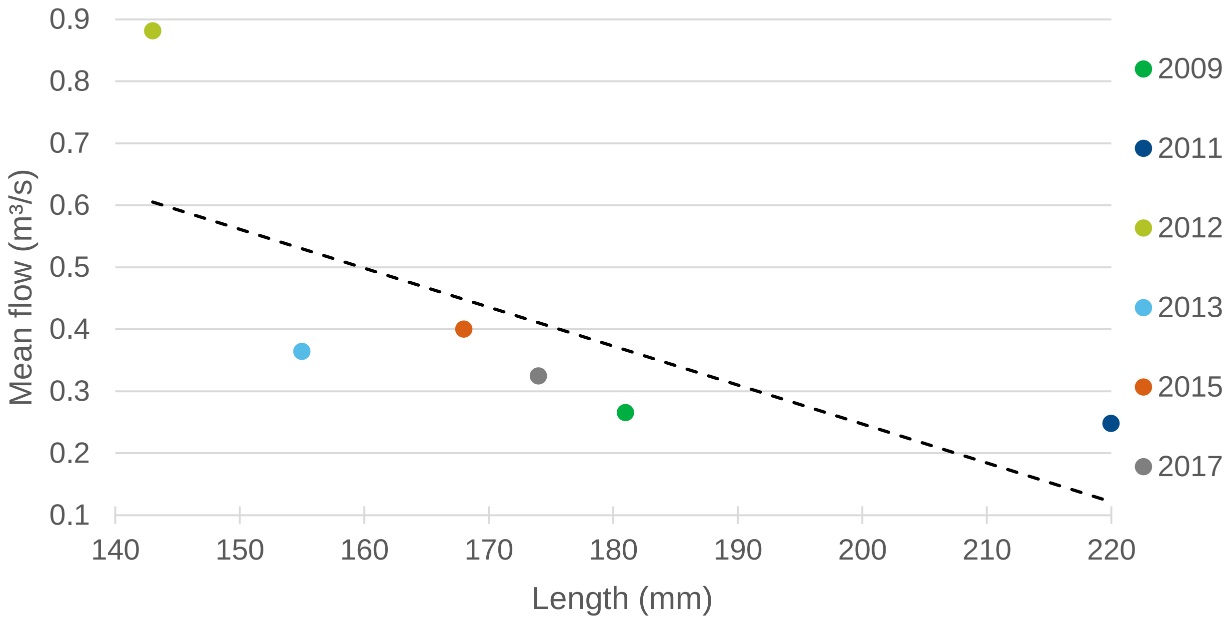


Figure Ouse 14: Mean summer flow (April to September) and the average length of 1+ brown trout at Buxted Bridge, alongside the trend line (correlation = -0.68)

A male sea trout caught at Uckfield, starting to develop a 'kype' (hooked lower jaw) as he prepares for spawning

HABSCORE habitat assessment

Table Ouse 2 below summarises the output from the HABSCORE model, including the observed population size and density, the Habitat Quality Score (HQS) density (the expected density of fish for the habitat) and the Habitat Utilisation Index (HUI) (the proportion of the habitat utilised by salmonids). The key values are the HUI and its corresponding 90% confidence interval.

HUI values of less than 1 will occur when observed densities are less than expected. Additionally, if the upper HUI confidence interval is below 1, this indicates that the observed population was significantly smaller than expected for the habitat. Conversely, if the lower HUI confidence interval is higher than 1, this indicates that the observed population was significantly larger than expected for the habitat.

Table Ouse 2: HABSCORE habitat assessment summary

	Site Name	Buxted Bridge	Uckfield
Trout 0+	Observed population size	17	9
	Observed density (per 100m²)	4.97	3.56
	HQS density (per 100m²)	18.53	32.71
	(confidence interval)	4.9 - 70.15	8.6 - 124.34
	HUI	0.27	0.11
	(confidence interval)	0.04 - 1.79	0.02 - 0.76
Trout <20cm	Observed population size	23	9
	Observed density (per 100m²)	6.73	3.56
	HQS density (per 100m²)	6.19	8.39
	(confidence interval)	1.46 - 26.26	1.9 - 37.05
	HUI	1.09	0.43
	(confidence interval)	0.18 - 6.49	0.07 - 2.62
Trout >20cm	Observed population size	5	5
	Observed density (per 100m²)	1.46	1.98
	HQS density (per 100m²)	2.35	1.41
	(confidence interval)	0.77 - 7.15	0.45 - 4.39
	HUI	0.62	1.4
	(confidence interval)	0.2 - 1.89	0.45 - 4.35

Discussion

Environmental Variables:

River flow in the Uck was less than average in almost every month in 2017, except for the latter part of the summer (July to September), where flow increased to the long-term average. Flow during the winter preceding the summer surveys was low, with January 2017 at its lowest since 2009.

As the site at Uckfield has only been surveyed twice, environmental correlations cannot be inferred, however, there were significantly less 0+ fish caught in 2017, compared to 2015. At Buxted Bridge, the age structure of the population is variable, however, the catches in 2015 and 2017 are remarkably similar, with only a reduction in the number of adult trout evident. Mean summer flow at Buxted correlates with the mean lengths of both 0+ and 1+ fish, but in opposite ways, with 0+ fish being larger with higher summer flows and the 1+ fish smaller.

HABSCORE:

The observed densities for trout of less than 20cm at Buxted Bridge and over 20cm at Uckfield are as expected for the habitat, with HUI values of over 1. However, for 0+ trout, both sites had very low HUIs (27% habitat utilisation at Buxted and 11% at Uckfield) and at Uckfield, the upper HUI confidence interval was less than 1, indicating the population was significantly less than expected for the habitat.

The survey channel at Uckfield, dominated by invasive Himalayan balsam in 2017

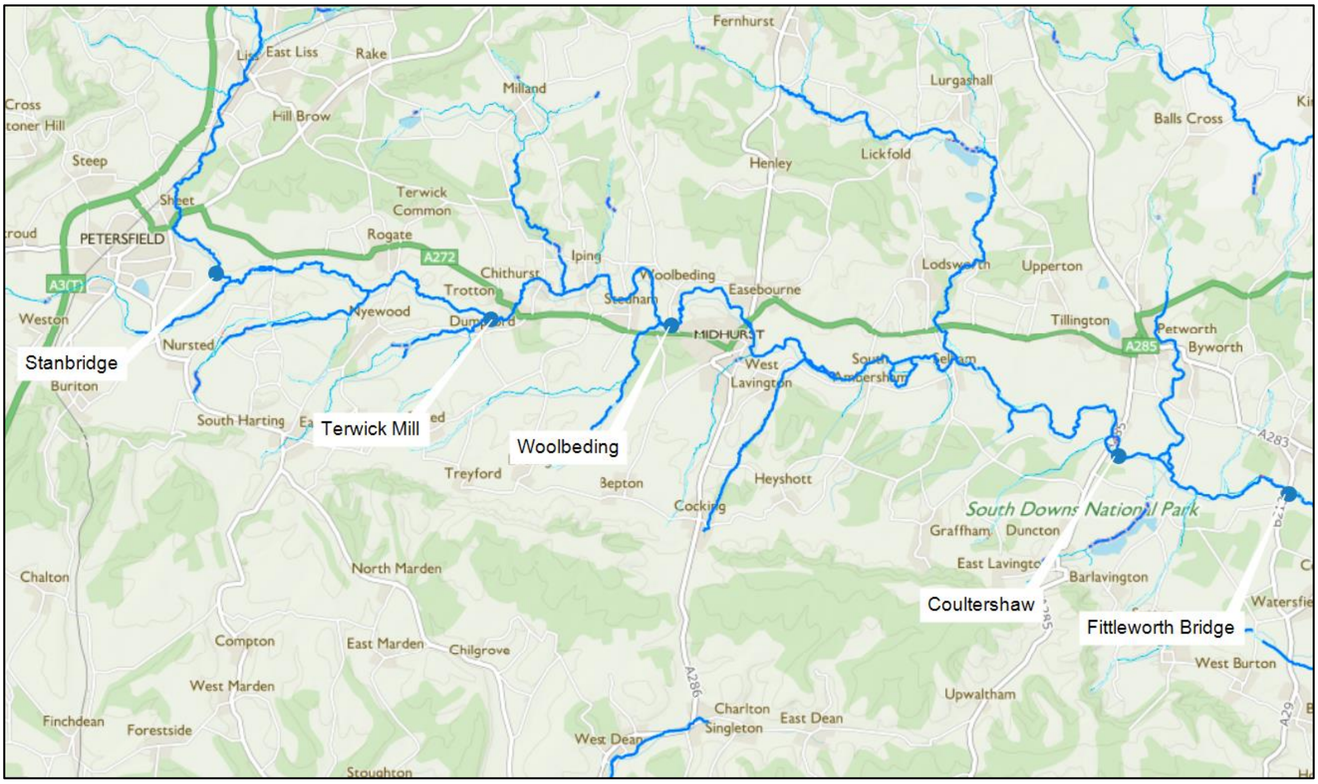
2. West Sussex

2.1. Western Rother

Five surveys were completed on the Western Rother in 2017. These were all Principal Coarse Fishery surveys.

Western Rother: Principal Coarse Fishery

Map Rother 1 shows the location of each survey site.



Map Rother 1: Western Rother survey sites, 2017

Table Rother 1 shows population density estimates (number of fish per 100m², i.e. in a 10m by 10m section of river and size ranges for fish species recorded during the surveys. Minor species (minnow, bullhead, stone loach and brook lamprey) are not included.

Table Rother 1. Population densities (actual number of fish per 100m²) and size ranges (min – max, mm) for key species recorded during the surveys.

		Stanbridge	Terwick Mill	Woolbeding	Coultershaw	Fittleworth Bridge
Brown trout	Density	3.33	0.63		0.10	
	Size range	76 - 280	154 - 325		541	
Chub	Density		0.10			
	Size range		445 - 462			
Common carp	Density				0.10	
	Size range				520	
Dace	Density		0.10	0.09	0.76	0.18
	Size range		104	222	123 - 196	160 - 175
Eel	Density		0.21			0.09
	Size range		290			490
Gudgeon	Density					0.09
	Size range					100
Perch	Density		0.52	0.09		0.18
	Size range		218 - 354	197		184 - 220
Pike	Density		0.42	0.36	0.10	1.17
	Size range			274 - 587	515	114 - 663
Roach	Density				0.10	0.36
	Size range				54	63 - 87

An unexpected find

A grass snake had swum into the stop net at Stanbridge and was safely released prior to the survey

Figures Rother 2 and 3 show fish population density and biomass estimates, respectively, for the major fish species recorded during the surveys.

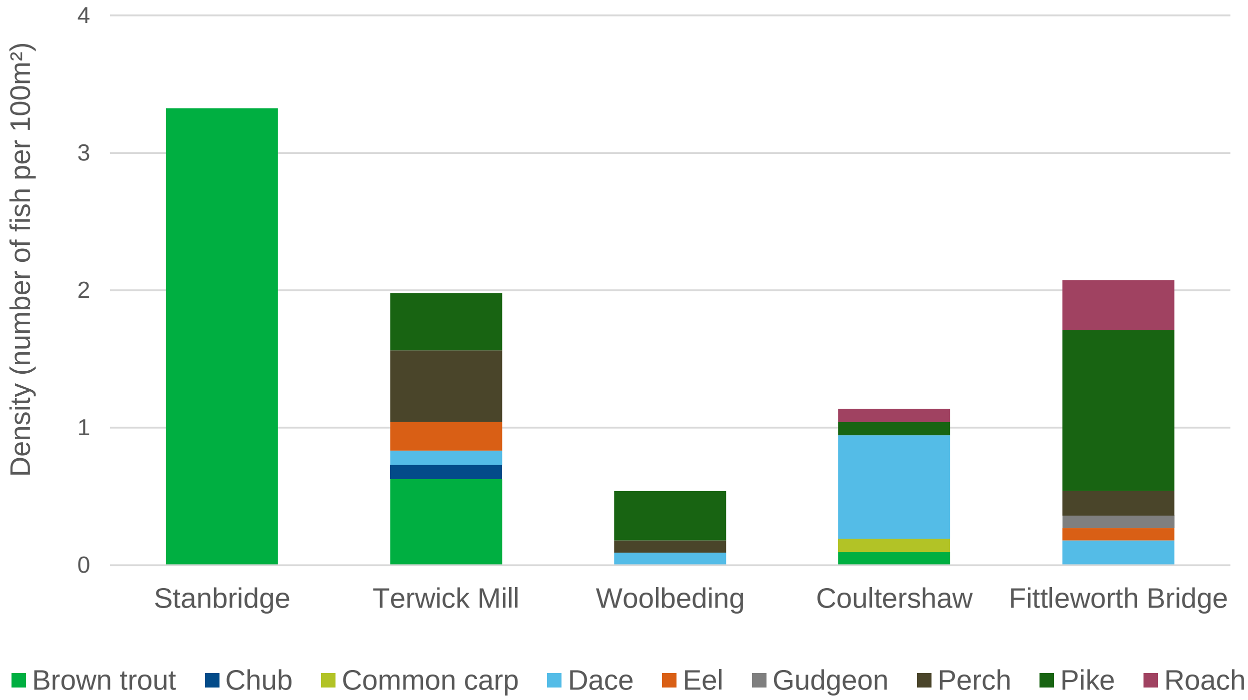


Figure Rother 1: Population density estimates (number of fish per 100m²) across all survey sites, excluding minor species, 2017

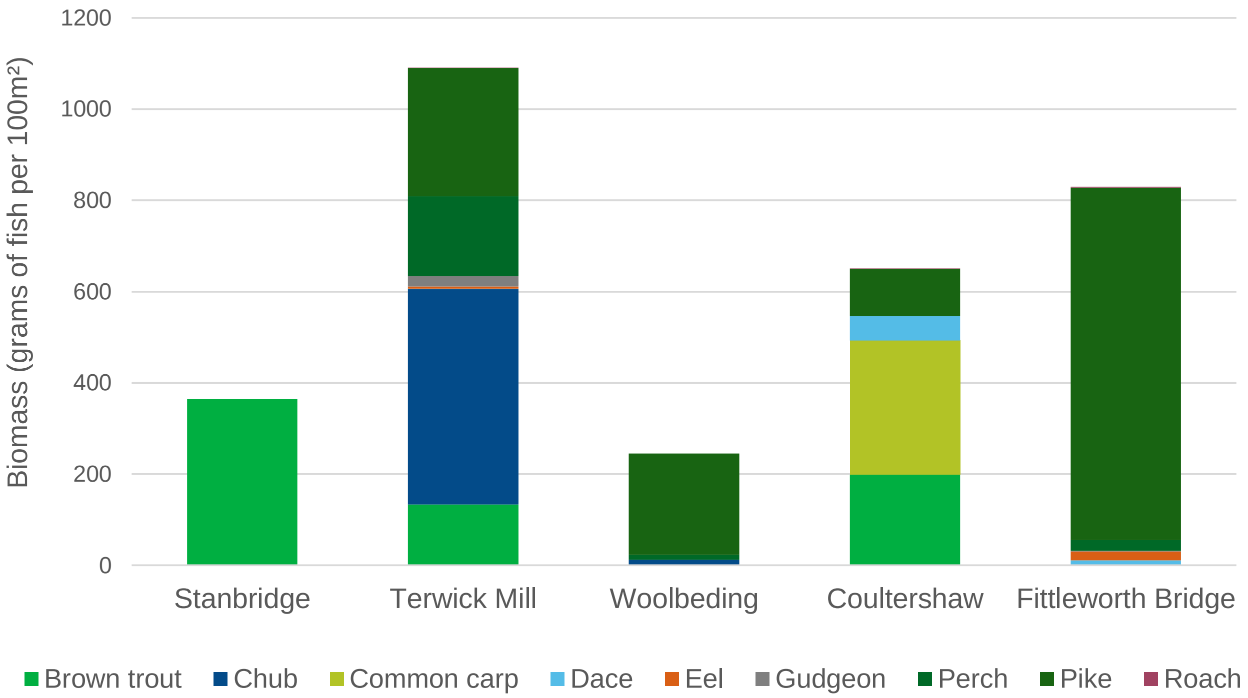


Figure Rother 2: Population biomass estimates (grams of fish per 100m²), excluding minor species, 2017

Figure Rother 3 shows the estimated total numbers of dace and roach recorded from all five survey sites in every survey year. Also shown is the four-year moving average of the number of degree days above 12°C in each year. This unit is a useful indicator of coarse fish reproductive success and juvenile survival.

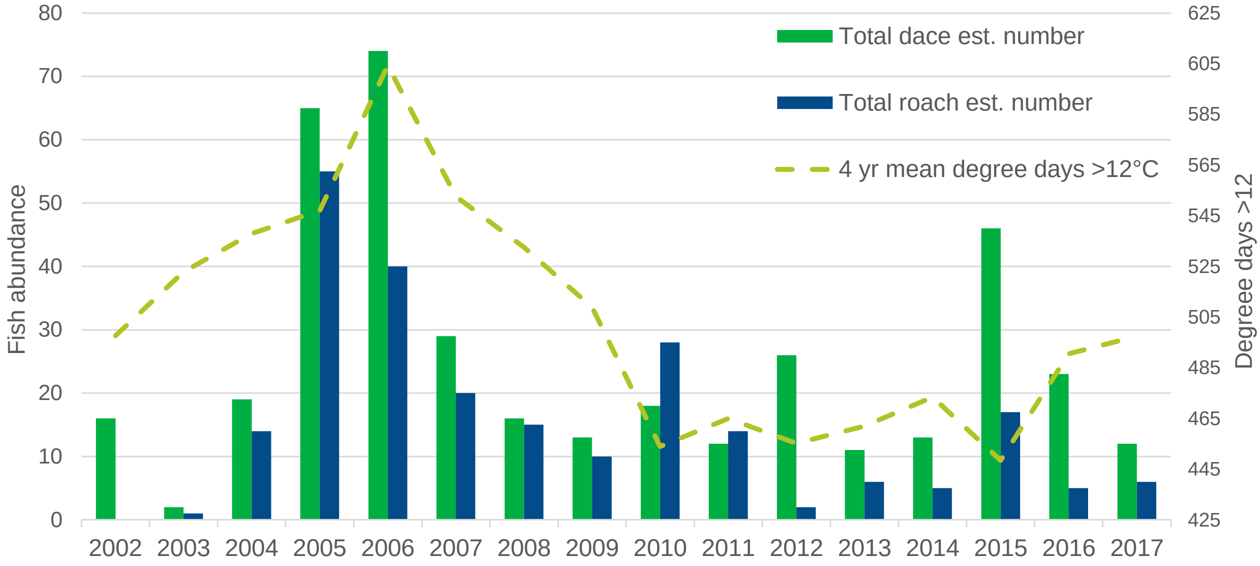


Figure Rother 3: Total estimated number of dace and roach on the Western Rother and moving four-year average of number of degree days above 12°C (correlation = 0.50)

The single common carp from Coultershaw

A pair of perch from Fittleworth Bridge

A juvenile pike from Fittleworth Bridge

An adult pike caught at Terwick Mill

Discussion

Along the Western Rother there is a distinct change in species composition from the headwaters downstream, with brown trout dominant at Stanbridge and coarse fish becoming more prevalent downstream. The two main differences between the river in the region of Terwick and the sites farther downstream, are channel gradient (the upper river is steeper, faster flowing and less silty) and the degree of channel engineering and impoundment, which is greater in the lower reaches.

Dace and roach are typically the most abundant fish species of angling interest in the Western Rother. The total estimated catch of both species (i.e. the sum of all five site estimates) in each year since surveys began in 2002 shows a strong correlation with various environmental factors, especially prevailing temperature and average flow in both summer and winter. The average number of degree days above 12°C in the four years leading up to (and including) the survey year positively correlate. This suggests that in this river, not only is summer temperature a key factor in determining variation in dace and roach abundance, but also that there is a cumulative positive effect of a succession of warm summers and vice versa.

Although variation in dace and roach abundance is linked with temperature and flow, at no time in the past fifteen years has dace or roach abundance been particularly high. Figure Rother 1 demonstrates this, showing that across all sites, densities for these species are less than 1 per $100m^2$. This strongly suggests that the Western Rother’s fish community appears to be under pressure, particularly in the lower reaches. The primary issues are considered to be siltation, impoundment and historic channel modification.

The importance of biosecurity:

Various invasive non-native species are present in our waterways. Himalayan balsam and signal crayfish (pictured below) are easily spread and difficult to eradicate once established.

As we visit many catchments to undertake our surveys, a very important aspect of our work is to carry out biosecurity.

We adhere to the "stop the spread" campaign guidelines and after each survey the equipment is thoroughly *checked, cleaned and allowed to dry* before use at the next site.

Please consider any way in which you can stop the spread and help protect our native species!

Invasive:

Himalayan balsam

Invasive:

Signal crayfish

Biosecurity:

Clean-Check-Dry

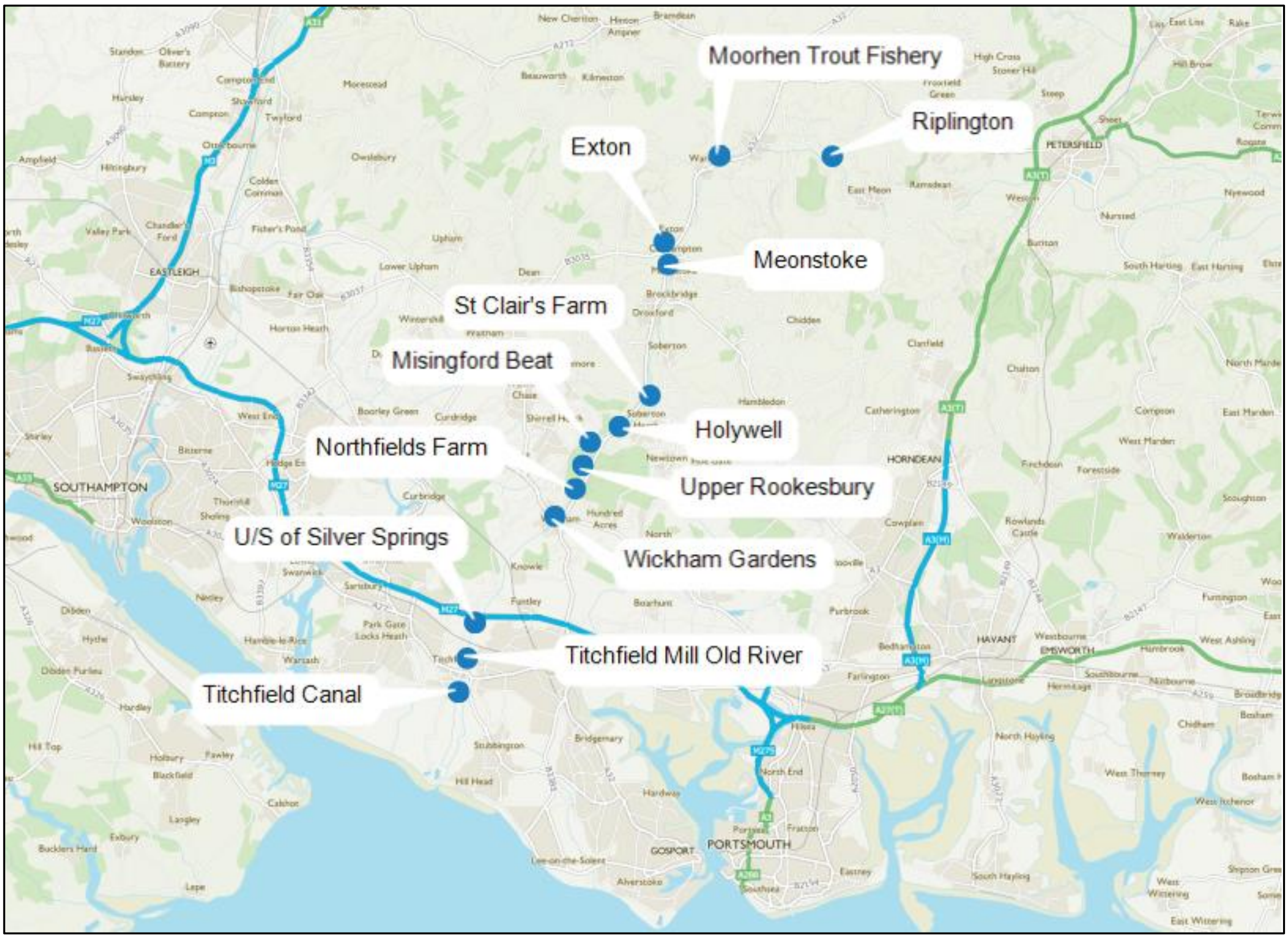
3. Hampshire

3.1. Meon

Thirteen surveys were completed on the River Meon in 2017. These were all Wild Brown Trout surveys that are scheduled every 6 years. We can now directly compare the data with that collected in 2011.

Meon: Principal Brown Trout

Wild Brown Trout monitoring consists of undertaking spatial and temporal surveys at designated sites. The spatial monitoring provides information on how the distribution of brown trout is changing over time from 11 surveys that cover a large proportion of the River Meon. This is complemented by the temporal monitoring programme, which occurs biennially and reveals changes in trout abundance at 2 sites; Upstream of Silver Springs and Mislingford Beat. Together the spatial and temporal monitoring provide us with a fuller picture, allowing us to gain a greater understanding of the Meon's brown trout population and its variability over time. Map Meon 1 shows the locations of each site surveyed in 2017.



Map Meon 1: Meon survey sites, 2017

Table Meon 1 shows population densities (number of fish per 100m², i.e. in a 10m by 10m section of river) and size ranges for fish recorded during the surveys. Minor species are not included.

Table Meon 1. Population densities (actual number of fish per 100m²) and size ranges (min – max, mm) for key species recorded during the surveys

		Riplington	Moorhen	Exton	Meon-stoke	St Clair's Farm	Holywell	Mislingford Beat
B trout	Density	1.60	0.34	7.67	3.59	5.08	4.90	8.39
	Size range	186-300	192	68-294	64-262	63-290	74-245	62-304
Chub	Density					0.39	1.07	0.83
	Size range					395-410	381-449	288-462
Eel	Density	0.40	1.34	0.85	0.85	1.37	2.77	1.65
	Size range	625	414-635	270-610	475-625	273-595	195-610	165-594

		Upper Rookesbury	Northfields	Wickham Gardens	U/S Silver Springs	Titchfield Mill	Titchfield Canal
Salmon	Density				4.06	2.60	0.28
	Size range				48-148	67-136	182
B trout	Density	8.64	3.18	3.18	6.53	18.51	2.47
	Size range	56-212	68-238	64-305	56-430	48-300	64-230
Chub	Density	0.18	0.18	0.43	0.71		0.82
	Size range	452	229	423-441	256-318		207-222
Dace	Density				0.18		5.50
	Size range				176		134-210
Eel	Density	2.94	2.47	4.05	1.59	10.07	10.71
	Size range	175-550	195-505	235-595	135-550	105-445	144-555
Perch	Density			0.87			
	Size range			147-204			
Roach	Density				1.59		1.37
	Size range				100-143		126-158

Figure Meon 1 compares the total number of wild brown trout caught at each site between 2011 and 2017. Survey sites are listed in order from upstream to downstream.

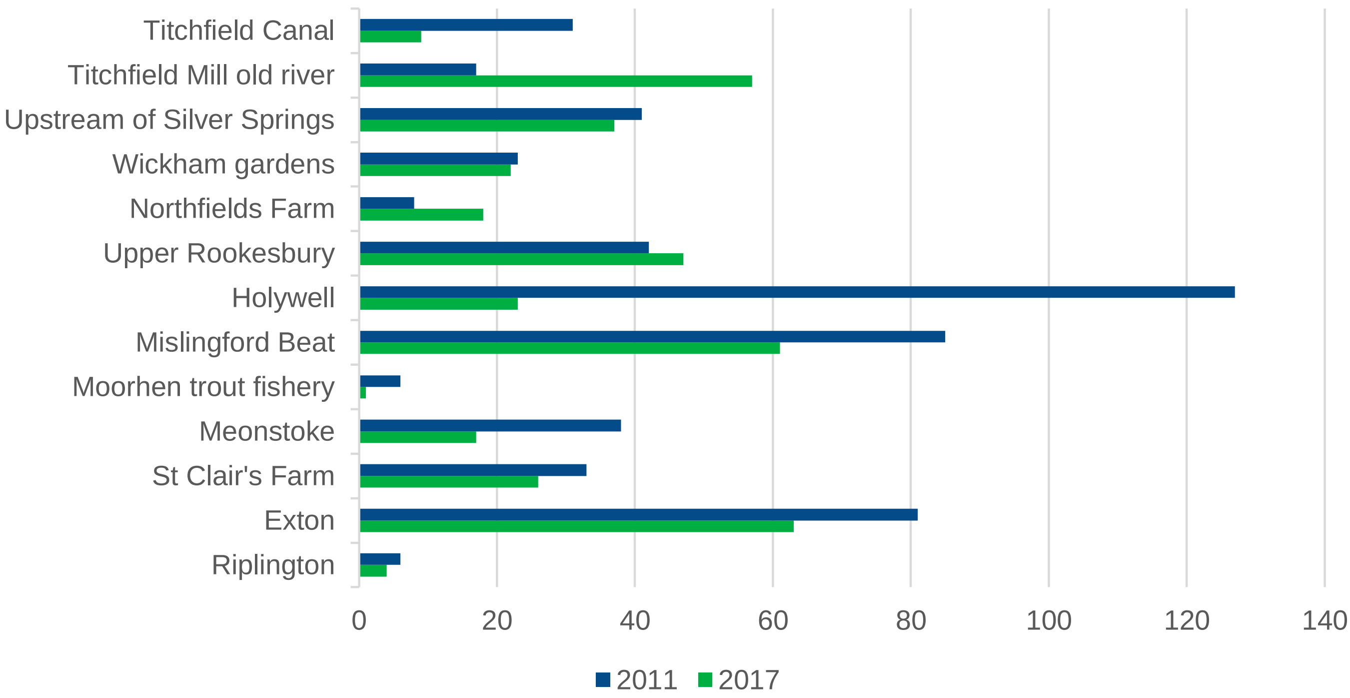


Figure Meon 1: Total number of brown trout caught in 2011 compared to 2017

A tale of two parr: the subtle differences between juvenile salmon (top) and brown trout (bottom).

Salmon have:

- *A more streamlined body*
- *A more deeply forked tail*
- *Larger pectoral fins*
- *A smaller mouth*
- *No white on the anal fin*
- *No red colouration in the adipose fin (although difficult to see in this photograph)*

An adult brown trout caught at Riplington, the last survey site on the Meon.

A total of 385 wild brown trout were caught on the 2017 surveys on the River Meon. Figures Meon 2 and 3 are length frequency histograms showing the numbers of fish in 10mm length classes for 2017 and 2011, respectively. The same axes have been used to allow for direct comparison.

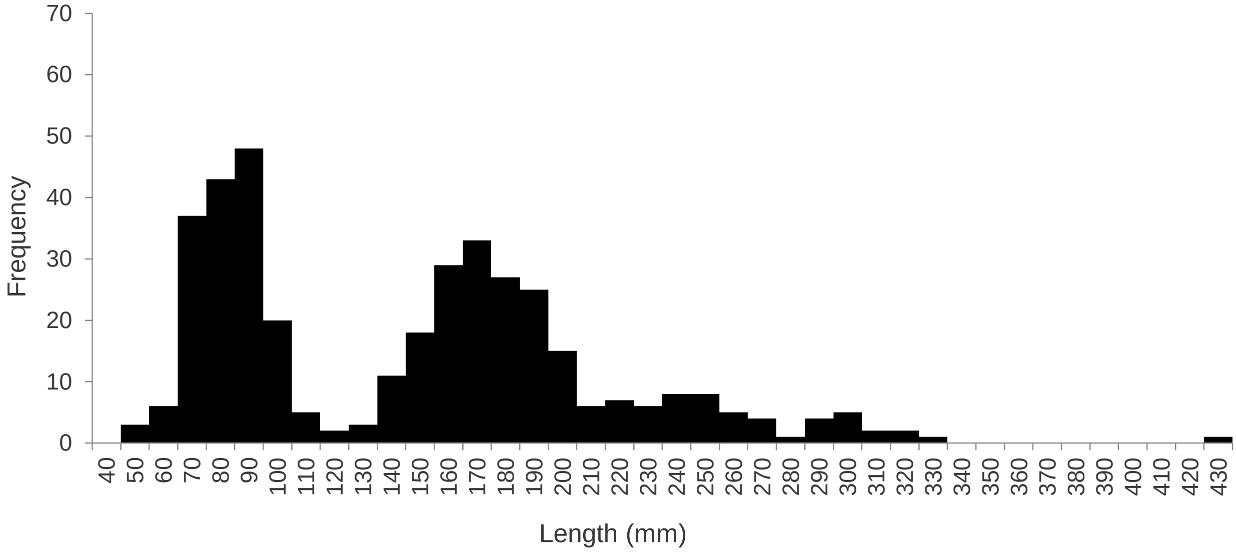


Figure Meon 2: Length frequency histogram of wild brown trout from all surveys, 2017 (N=385)

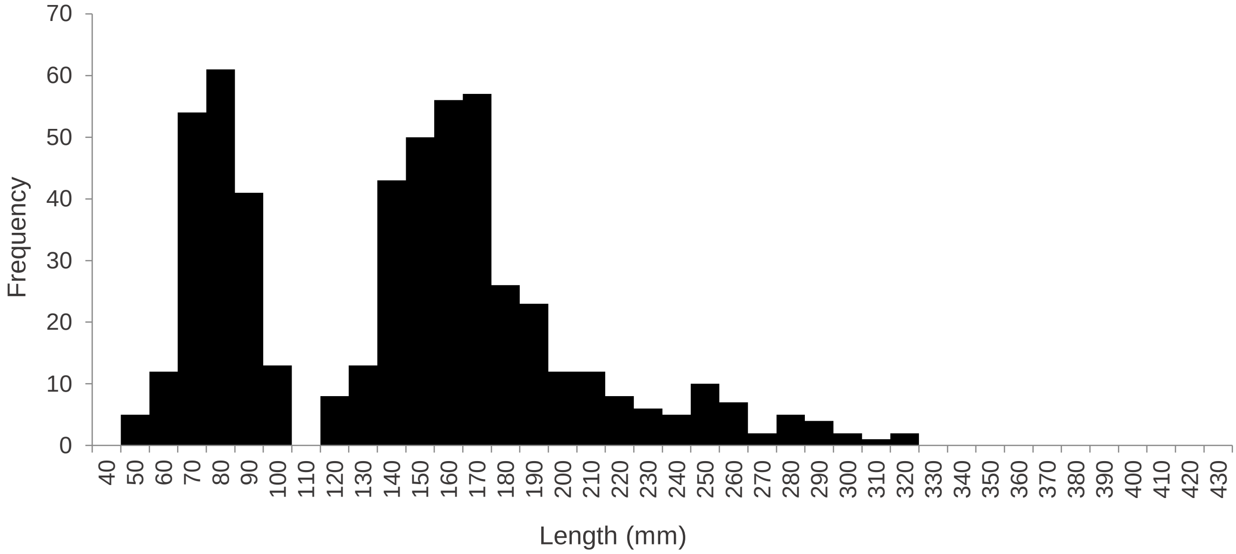


Figure Meon 3: Length frequency histogram of wild brown trout from all surveys, 2011 (N=538)

Temporal monitoring sites

Figure Meon 4 shows the density of each fish species caught at the two wild brown trout temporal monitoring sites over time.

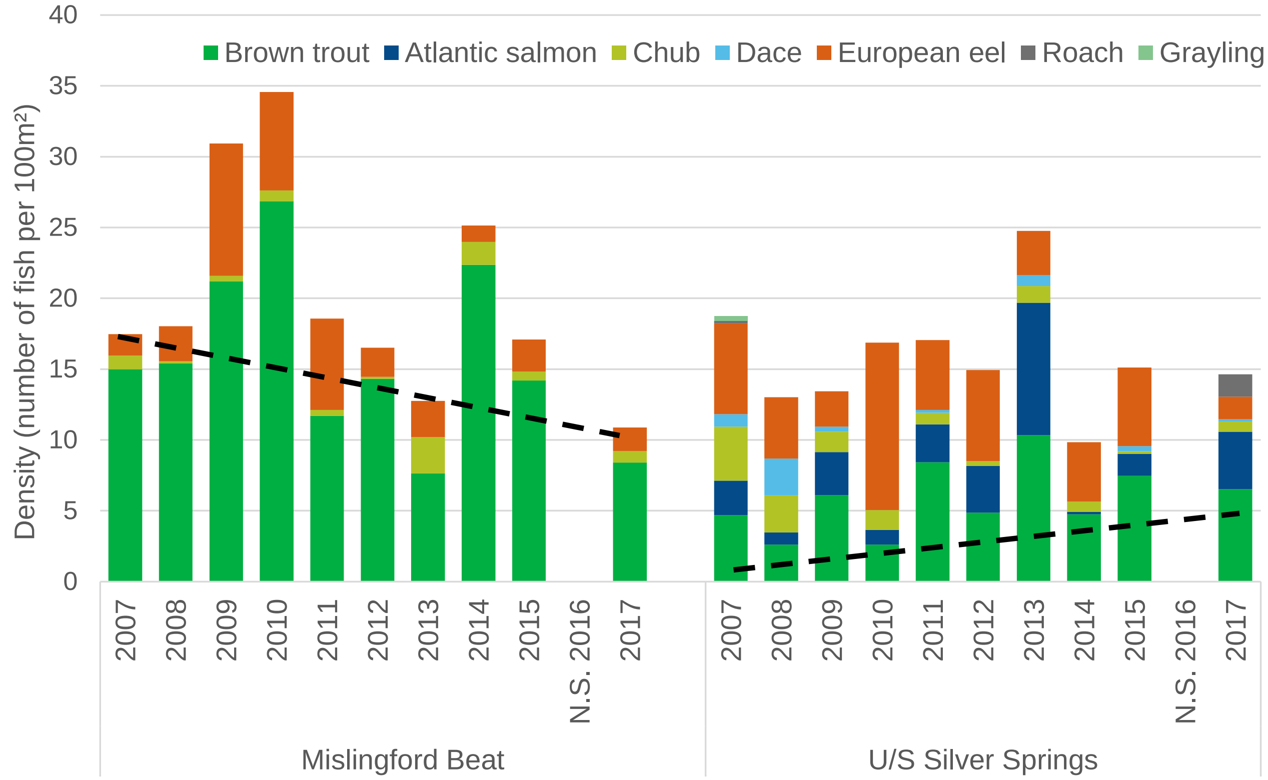


Figure Meon 4: Fish population densities (number of fish per 100m²), temporal monitoring sites, 2007 - 2017 (N.S. = no survey)

Environmental conditions such as flow, can have a significant impact on fish populations. Figure Meon 5 shows the average monthly flow between October 2016 and December 2017 alongside the maximum, mean and minimum monthly flows for the preceding 10 year period. The flow data is from Mislingford gauging station.

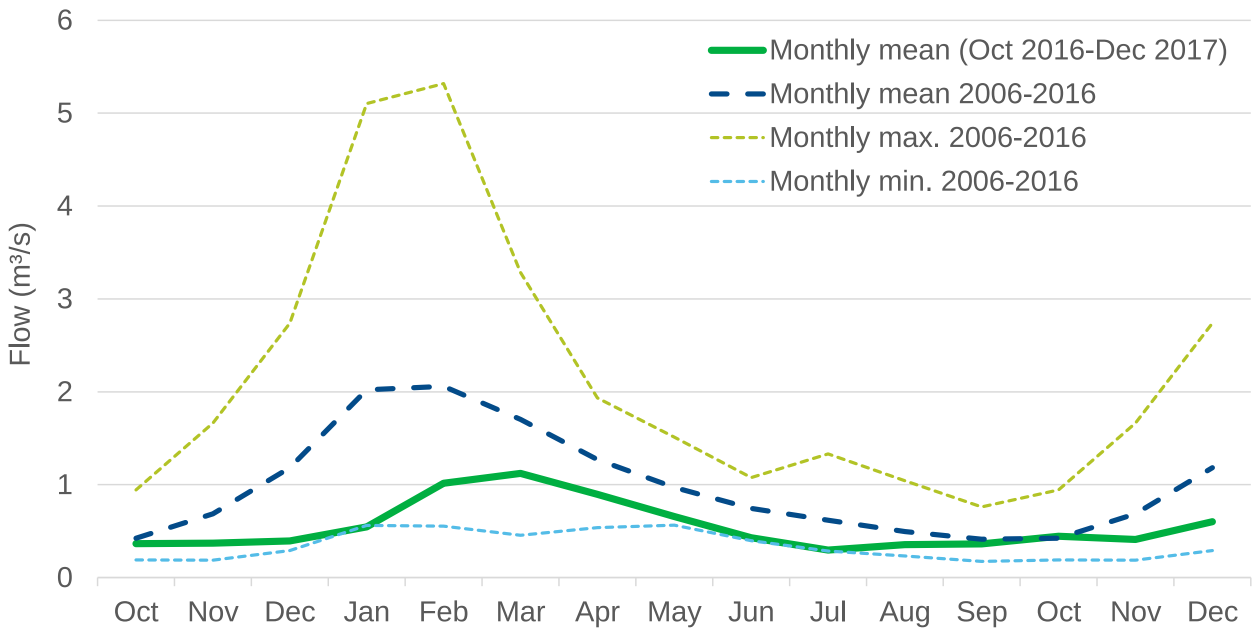


Figure Meon 5: Mean monthly flow (m^3/s) from October 2016 to December 2017

Other species

The Principal Brown Trout programme also provides a good opportunity to assess the distribution of other species in the River Meon. Figure Meon 6 shows the densities of the major fish species caught across all survey sites.

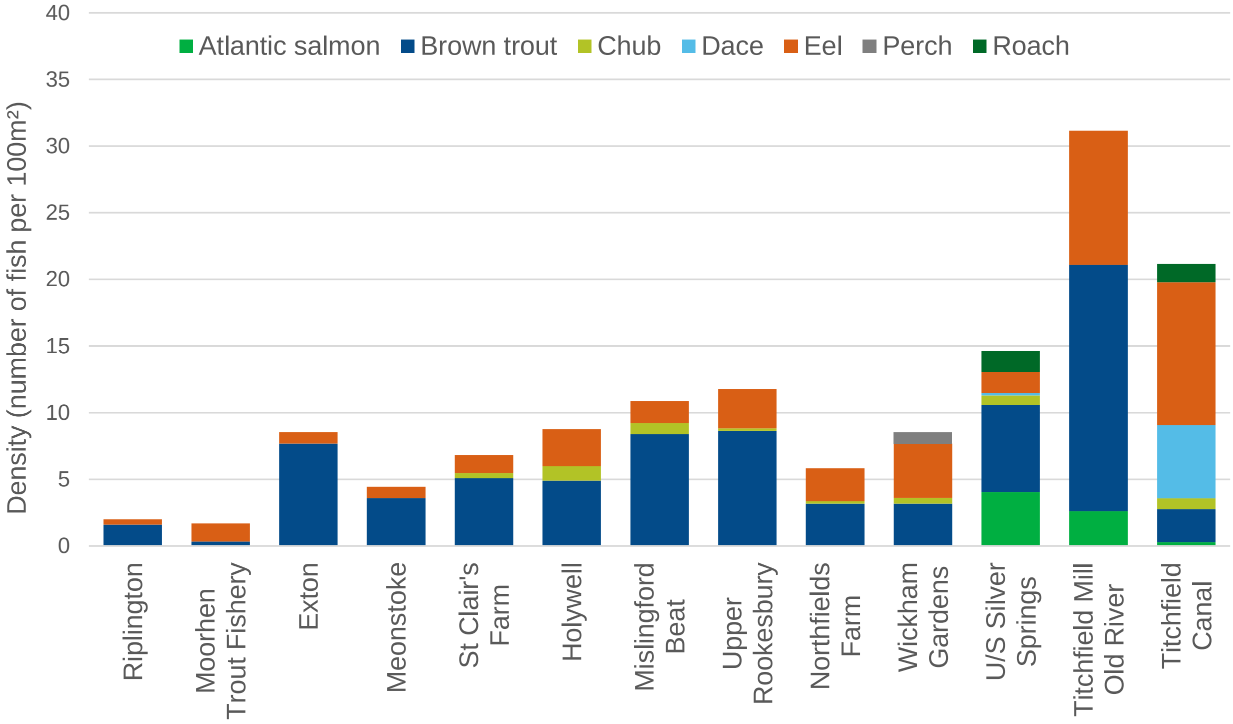


Figure Meon 6: Actual density of fish species caught across the Meon, 2017

An elver from Moorhen

A juvenile eel from Titchfield Canal

A large adult female eel caught at Riplington

The dramatic decline in abundance of the European eel across its range has caused widespread concern because of the species' immense value both economically and ecologically. In Hampshire, only the River Itchen is designated as an Eel Index river and that is surveyed biennially. There is no equivalent programme of detailed eel population monitoring on the Meon so the PBT programme offers us a chance to assess the distribution and abundance of eels in the Meon.

A total of 185 European eels were caught on the 2017 surveys on the River Meon. Figures Meon 7 and 8 are length frequency histograms showing the numbers of fish in 10mm length classes for 2017 and 2011, respectively. The same axes have been used to allow for direct comparison.

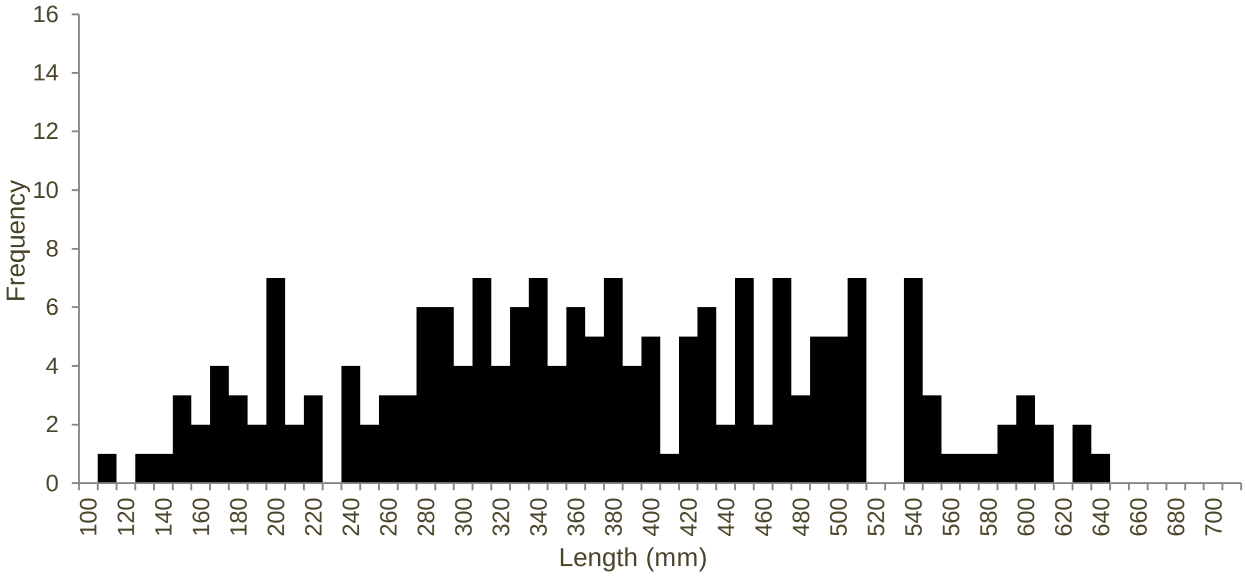


Figure Meon 7: Length frequency histogram of European eel from all surveys, 2017 (N=185)

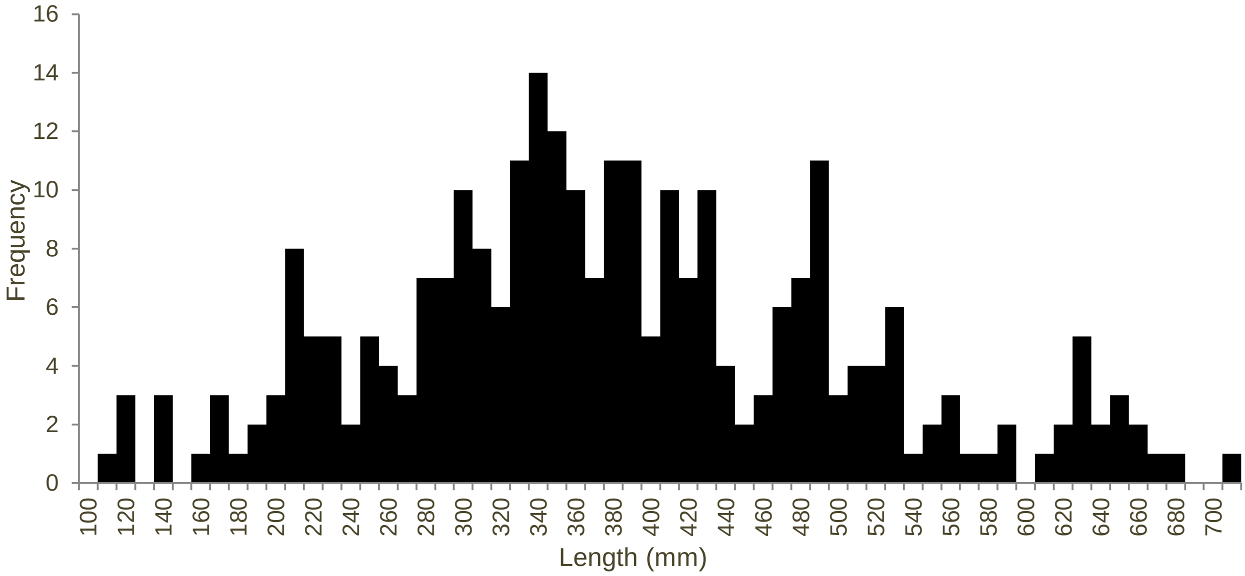


Figure Meon 8: Length frequency histogram of European eel from all surveys, 2011 (N=273)

Likewise, a decline in Atlantic salmon parr numbers has also been recently recorded in the neighbouring Test and Itchen. Figure Meon 9 shows the total number of salmon parr caught at Silver Springs over time.

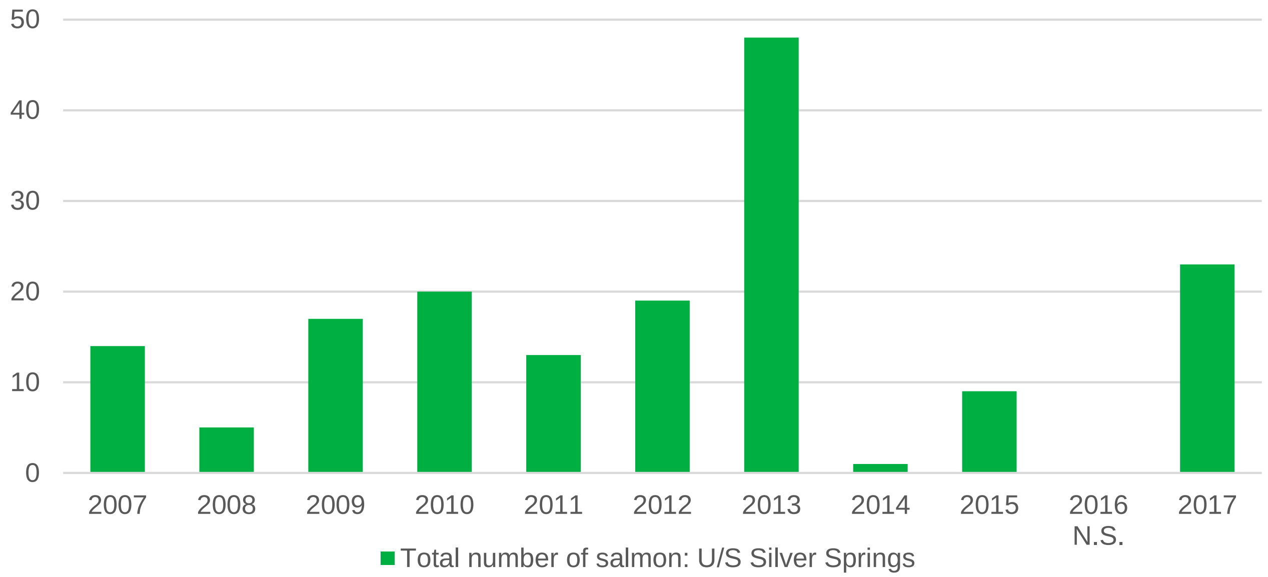


Figure Meon 9: Total catch of salmon parr, U/S Silver Springs, 2007 - 2017 (N.S. = no survey)

Discussion

Brown trout:

A total of 385 trout were caught in 2017, compared to 538 in 2011. The greatest reduction in numbers was at Holywell, but at two sites we caught more trout in 2017 than in 2011, such as at Titchfield Mill Old River where the catch has tripled. Fish abundance and diversity is often variable and although in total there were fewer trout, numbers have fluctuated since 2007 and the overall trend indicates a limited change in trout density at the two sites (less than 5 fish per 100m^2).

There has been less than average flow in the Meon in every month in 2017, with flows at their lowest since 2006 during the 2016/17 winter and throughout summer 2017. The number of 0+ trout (trout born in 2017) recorded at Mislingford each year positively correlates with the mean flow over the preceding January to March (correlation = 0.61) and the total catch of trout was the second lowest recorded at Mislingford following a poor winter flow.

The Meon's trout population has potentially been impacted by prolonged episodes of low flow during critical periods; especially over winter, which is crucial for salmonid spawning and egg incubation. However, populations naturally fluctuate and the complex habitat remains of high quality, thus facilitating trout resilience to such extreme environmental conditions.

Other species:

For the first time, eels were caught at every survey site on the Meon, however, the total number caught has declined by 30% compared to the 2011 catch. The major losses are in the numbers of sub-adults present. A greater number of small eels was recorded than in 2011, which reflects the results from the Eel Index surveys on the Sussex Ouse and River Itchen, potentially indicating a widespread increase in eel recruitment in 2017. Eel distribution is typical across the Meon, with eels being more abundant at the downstream sites, closer to the sea.

The Meon is often overlooked as a salmon river, but in 2017, Atlantic salmon parr were recorded at two sites; Tichfield Mill Old River and U/S Silver Springs. Salmon have been consistently caught at our Silver Springs site over the years and our long-term data set provides evidence that, to the best of our knowledge, salmon spawn in the Meon annually, meaning that here in Hampshire we have a third (to the Test and Itchen) precious, but largely unsung, salmon river.

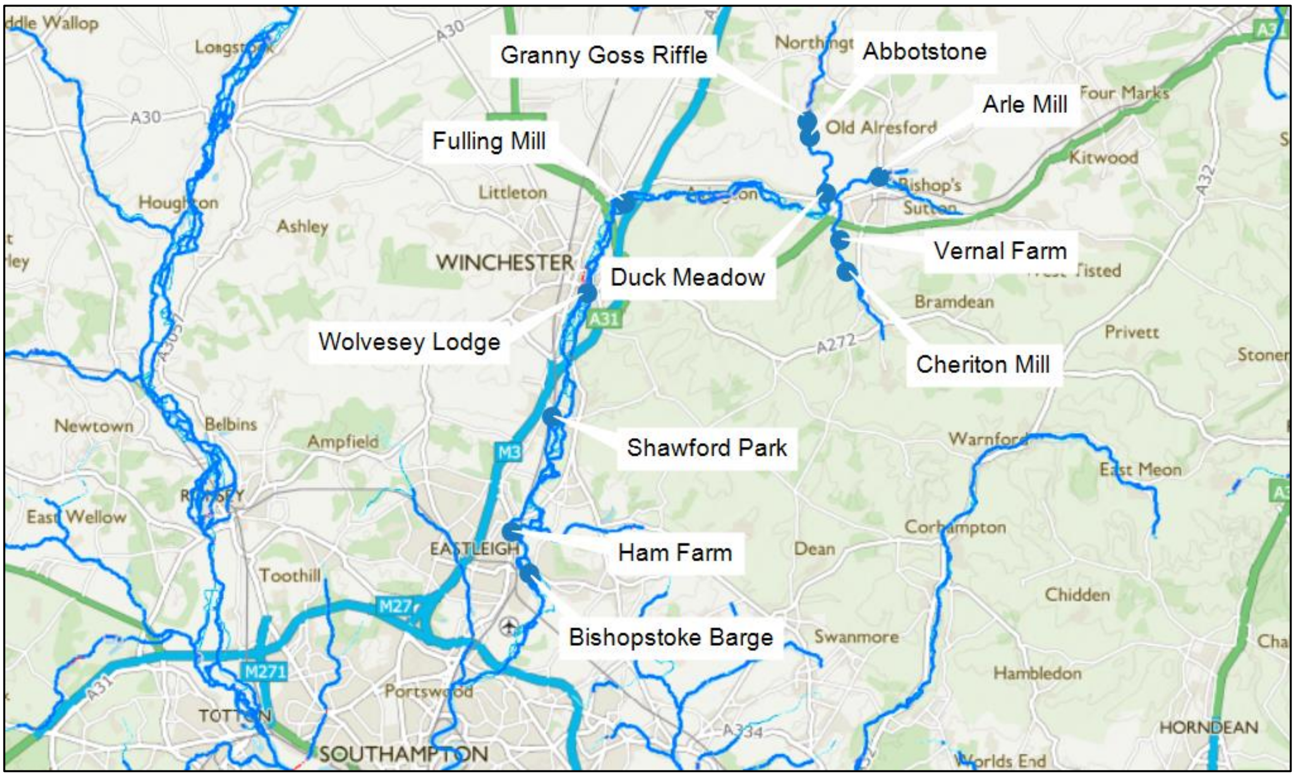
Atlantic salmon are consistently caught at Silver Springs, pictured above

The survey underway at Wickham Gardens, 2017

3.2. Itchen

Eleven surveys were completed on the River Itchen in 2017. The majority of these were Eel Index surveys, others were also National Drought Monitoring Network (NDMN) sites and/or Salmon Action Plan (SAP) or Principal Brown Trout (PBT) survey sites.

Map Itchen 1 shows the locations of each survey site and Table Itchen 1 sets out the purpose for completing each fish population survey at each site.



Map Itchen 1: Itchen survey sites, 2017

Table Itchen 1: Survey sites and purposes, River Itchen, 2017

	Abbotstone	Granny Goss Riffle	Duck Meadow	Cheriton Mill	Vernal Farm	Arle Mill	Fulling Mill	Wolvesey Lodge	Shawford Park	Ham Farm	Bishopstoke Barge
Eel Index	■		■	■	■	■	■	■	■	■	■
NDMN	■	■		■	■						
PBT	■				■						
SAP									■		■

Itchen: Eel Index

Our national eel monitoring programme was initiated in 2009 in response to the severe decline in the abundance of the European eel. Figure Itchen 1 shows the total number of eels caught across all 10 survey sites on the River Itchen between 2009 and 2017. Figure Itchen 2 depicts the spatial variation in eels over time, showing the estimated density of eels at each site.

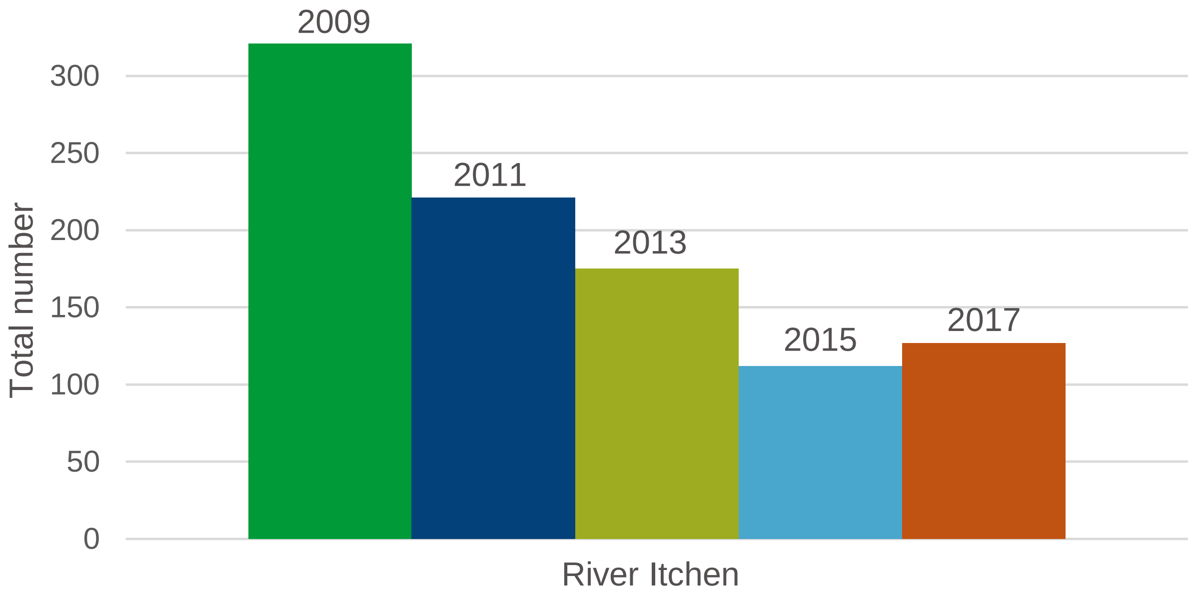


Figure Itchen 1: Total number of eels caught across all sites, 2009 - 2017

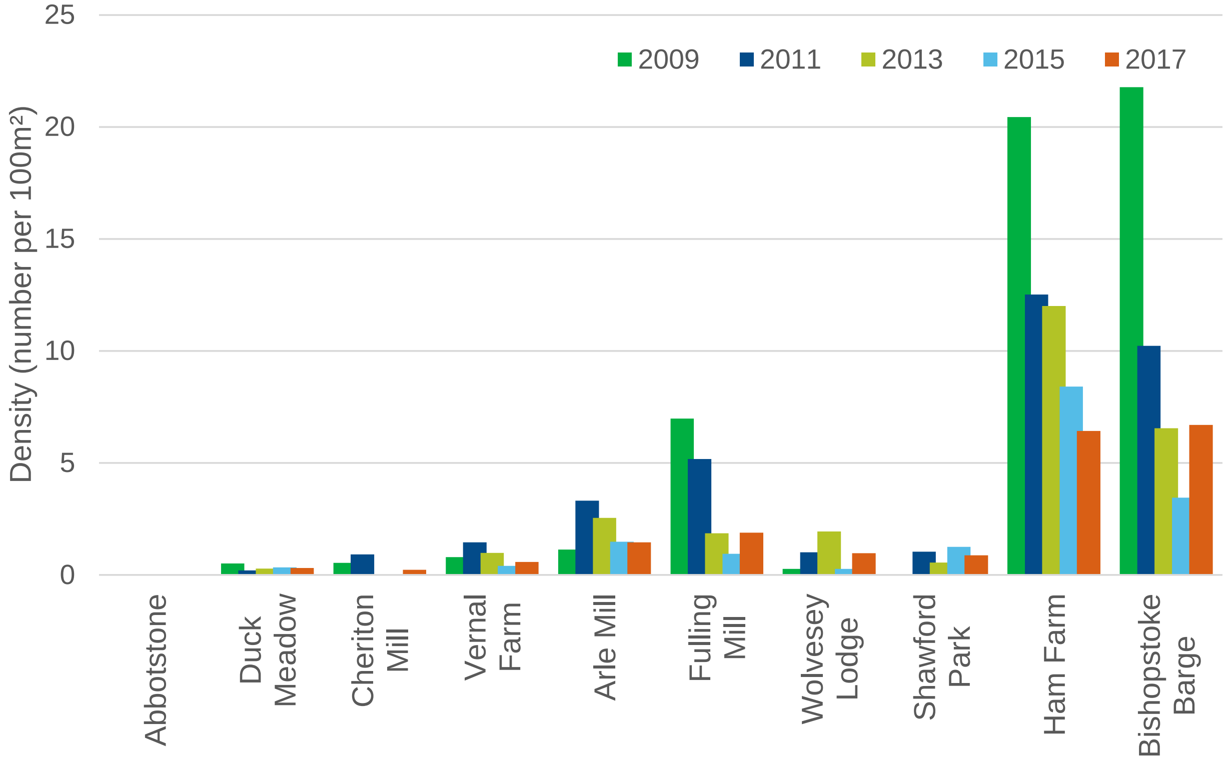


Figure Itchen 2: Estimated density of eels caught at each Eel Index site, 2009 - 2017

Slippery customers - attempts to hold our valued eels for photographs!

To demonstrate how the number of eels of a certain size, and therefore age, has changed since our monitoring began in 2009, Figure Itchen 3 shows the length-frequency of all eels captured in 2009, 2015 and 2017 in 10mm length classes. The presence of a single bar for any length category indicates that eels of that size were only present in that year.

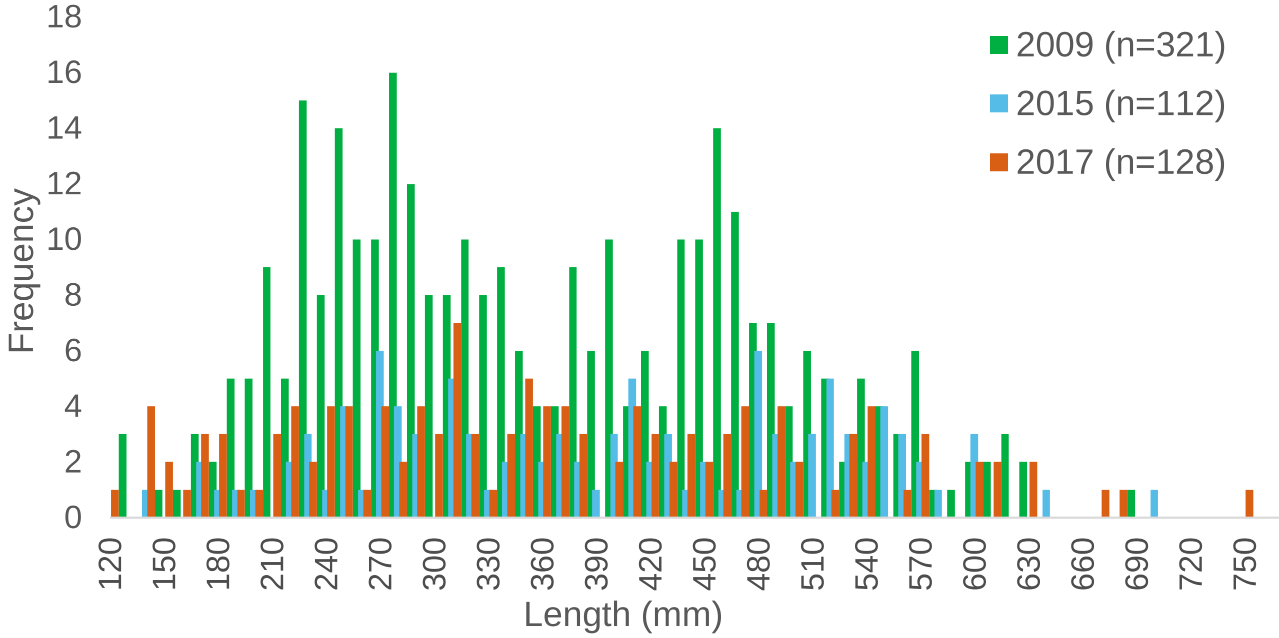


Figure Itchen 3: Length frequency histogram of all eels caught across the River Itchen, 2009, 2015 and 2017

Other species

The Eel Index programme also provides a good opportunity to assess the distribution of other species in the River Itchen. Figure Itchen 4 below shows the diversity and abundance of fish species at each site.

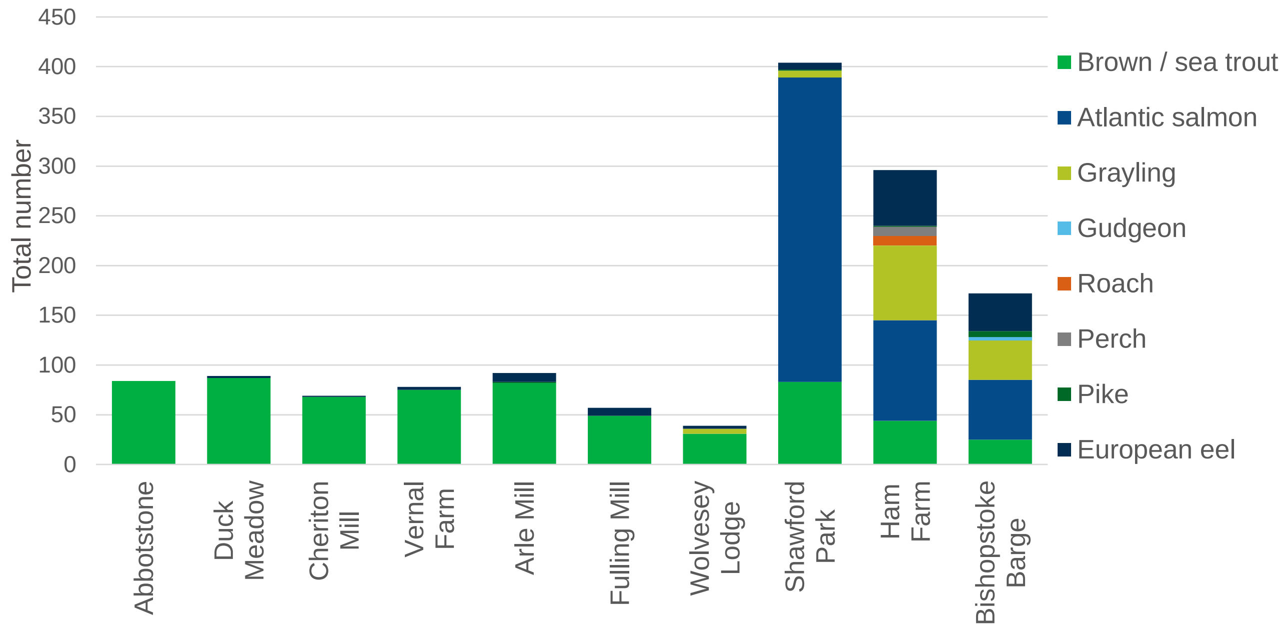


Figure Itchen 4: Total number of fish caught at each site, River Itchen, 2017

Figures Itchen 5 to 7 are length frequency histograms, revealing the size structure of the wild brown trout, Atlantic salmon and grayling populations across the River Itchen.

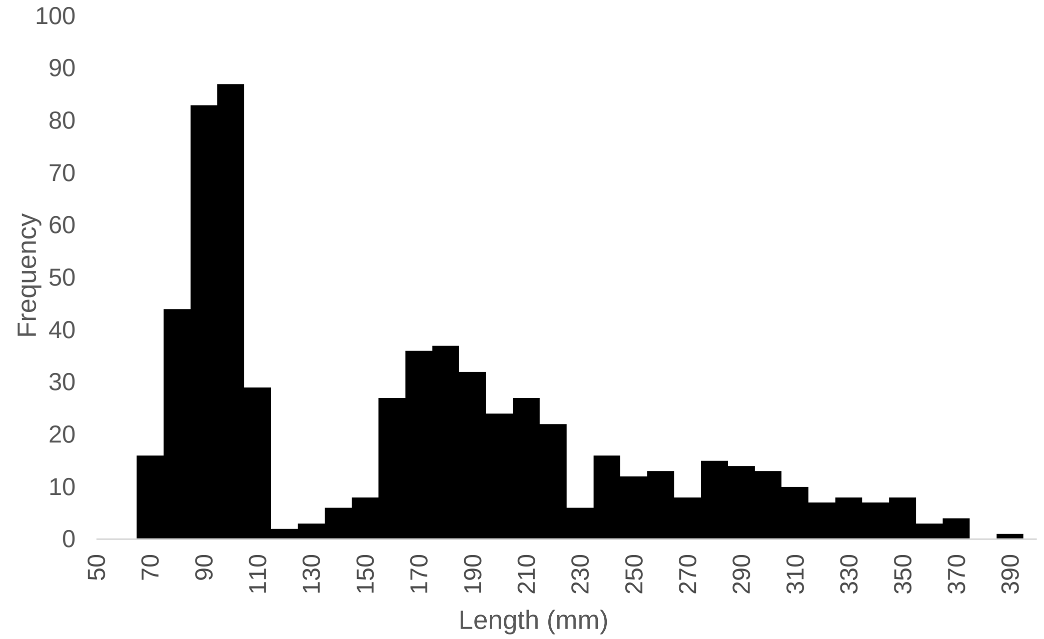


Figure Itchen 5: Length frequency histogram, all wild brown trout, River Itchen, 2017 N=628

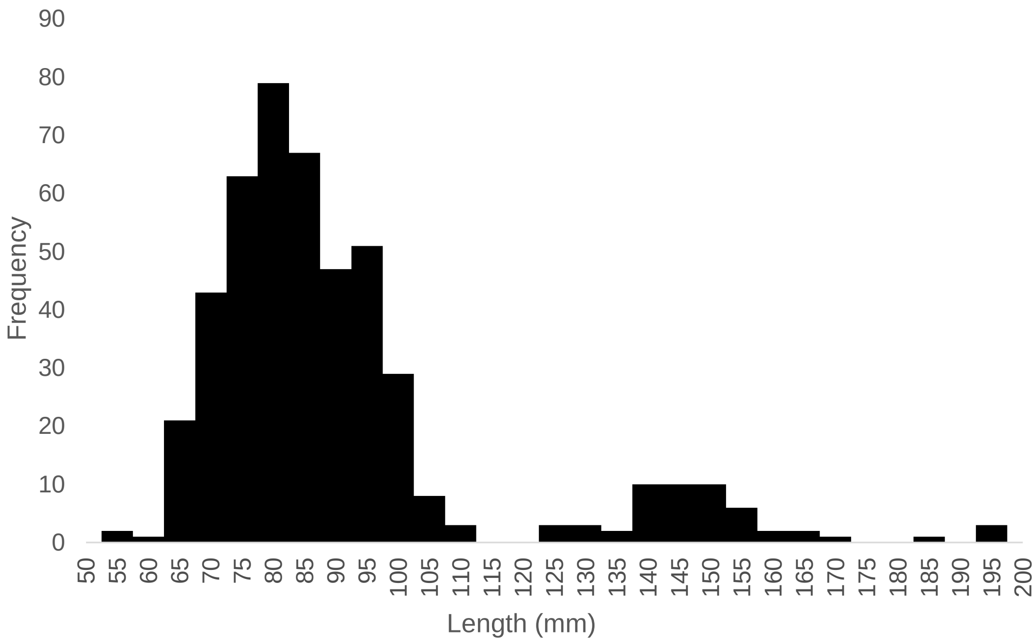


Figure Itchen 6: Length frequency histogram, all Atlantic salmon, River Itchen, 2017 N=467

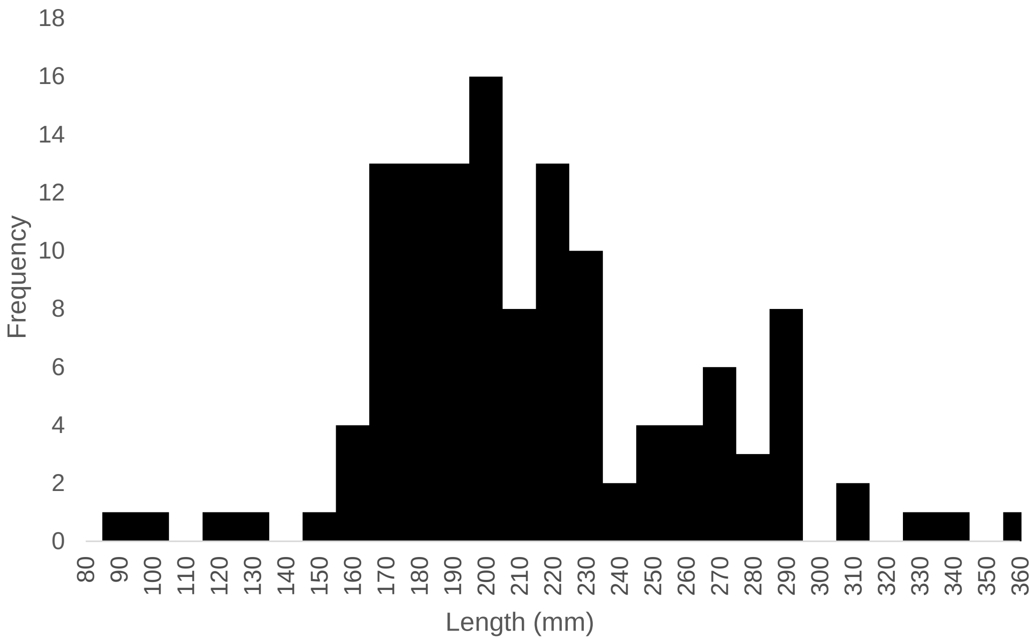


Figure Itchen 7: Length frequency histogram, all grayling, River Itchen, 2017 N=127

Discussion

Eels:

In 2009, a total of 321 eels were caught across the Itchen. In 2017, 127 eels were caught, increasing very slightly from 112 in 2015. The key losses have been eels in the size ranges 200-350mm and 430-490mm. These are eels between approximately five and ten year's old and larger female eels. This loss could be a sign that as adult fish leave the system, either through mortality or outward spawning migration, elvers are not returning to the river in sufficient quantities to replace the stock. In 2015 we only caught six eels smaller than 200mm (less than 5 years old). However in 2017, the catch comprised of individuals belonging to a wider range of year classes and there were notably more small eels, even compared to 2009, indicating a potential increase in eel recruitment.

Eel spatial distribution in the Itchen remains similar to previous years, with the highest densities of eels present in the lower reaches of the river. Lower densities present in the middle reaches and lower still in the upper catchment. Eel numbers in the River Itchen therefore remain similar to their lowest recorded levels.

Other species:
Along the River Itchen there is a distinct change in species composition from the headwaters at Abbotstone downstream to Bishopstoke Barge, with brown trout dominating the catch and coarse species only present in the lower sites.

An adult pike caught at Bishopstoke Barge

One of many salmon parr from Shawford Park

Brook lamprey from Duck Meadow

An adult brown trout caught at Ham Farm

Itchen: National Drought Monitoring Network

The River Itchen has four National Drought Monitoring Network (NDMN) sites; Abbotstone and Granny Goss Riffle are located on the Candover Brook and Cheriton Mill and Vernal Farm are on the Cheriton Stream, both in the upper reaches of the river.

Figures Itchen 8 and 9 show the average monthly flow between October 2016 and December 2017, alongside the 15 or 14 year mean, minimum and maximum flows. The data is from Borough Bridge gauging station for the Candover (Figure Itchen 8) and Sewards Bridge gauging station for the Cheriton (Figure Itchen 9). Both stations are located just downstream of their respective fish survey sites.

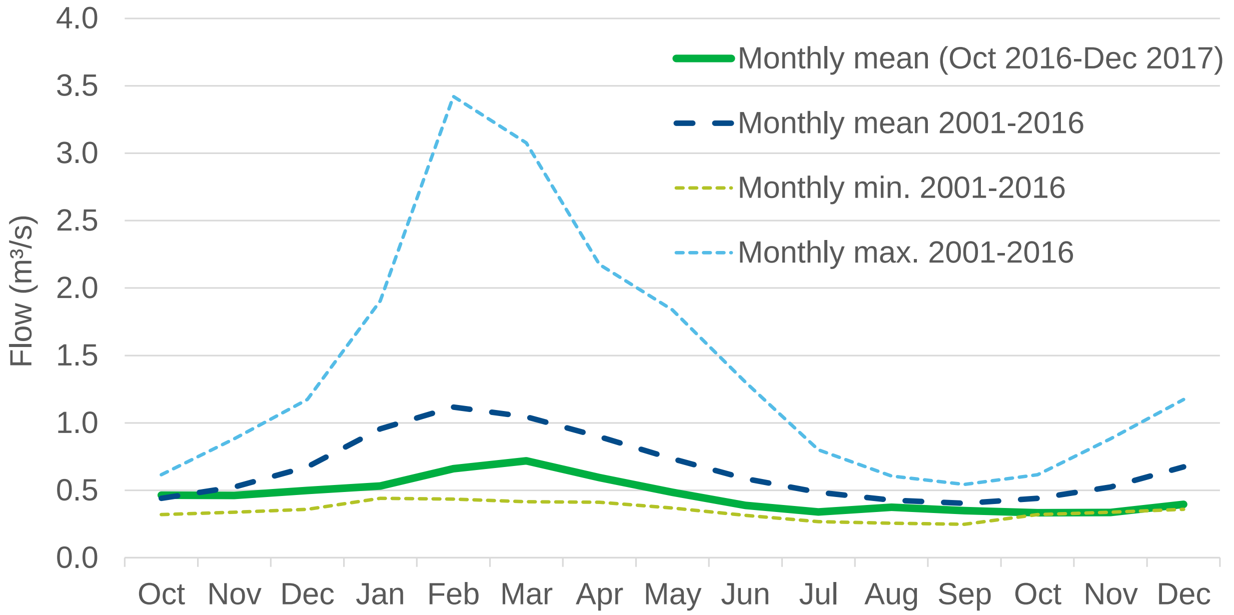


Figure Itchen 8: Mean monthly flow (m^3/s) from October 2016 to December 2017, NDMN sites, Candover Brook

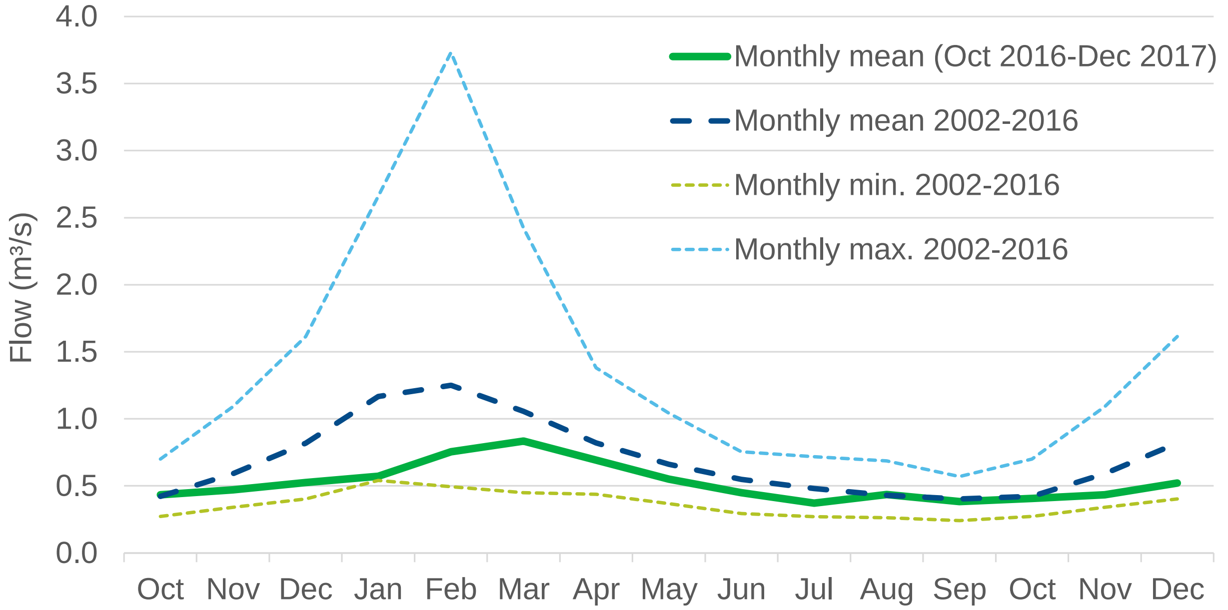


Figure Itchen 9: Mean monthly flow (m^3/s) from October 2016 to December 2017, NDMN sites, Cheriton Stream

Although 2017 was the first year for NDMN surveys, we already hold fish data for these sites. However, as there are discrepancies in survey method between the years, to make the data comparable, only fish caught on the first run of the catch-depletion surveys have been used alongside the single run data. Figures Itchen 10 and 11 compare the first run densities of brown trout at the Candover and Cheriton sites, respectively. The data has been separated into age classes to allow comparison of the age structures within the populations between the survey years.

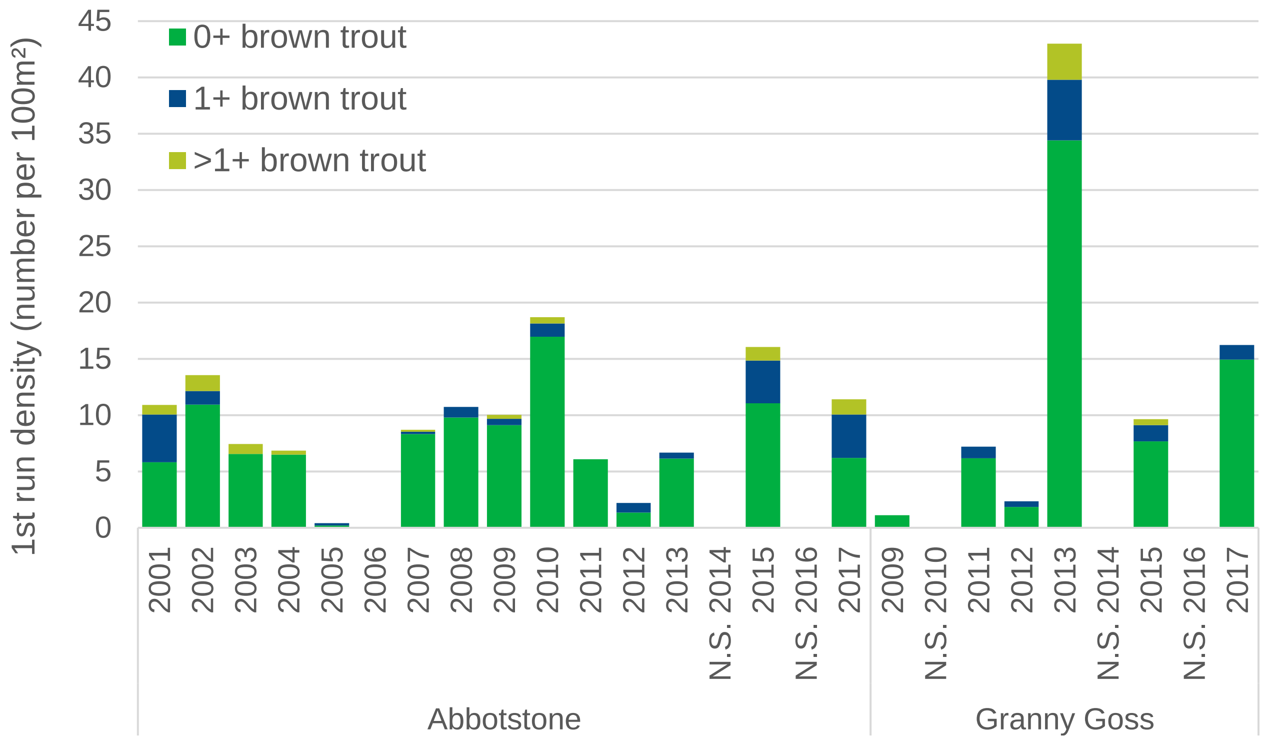


Figure Itchen 10: Density (number per 100m²) of brown trout, Candover Brook, 2001 - 2017 (N.S. = no survey)

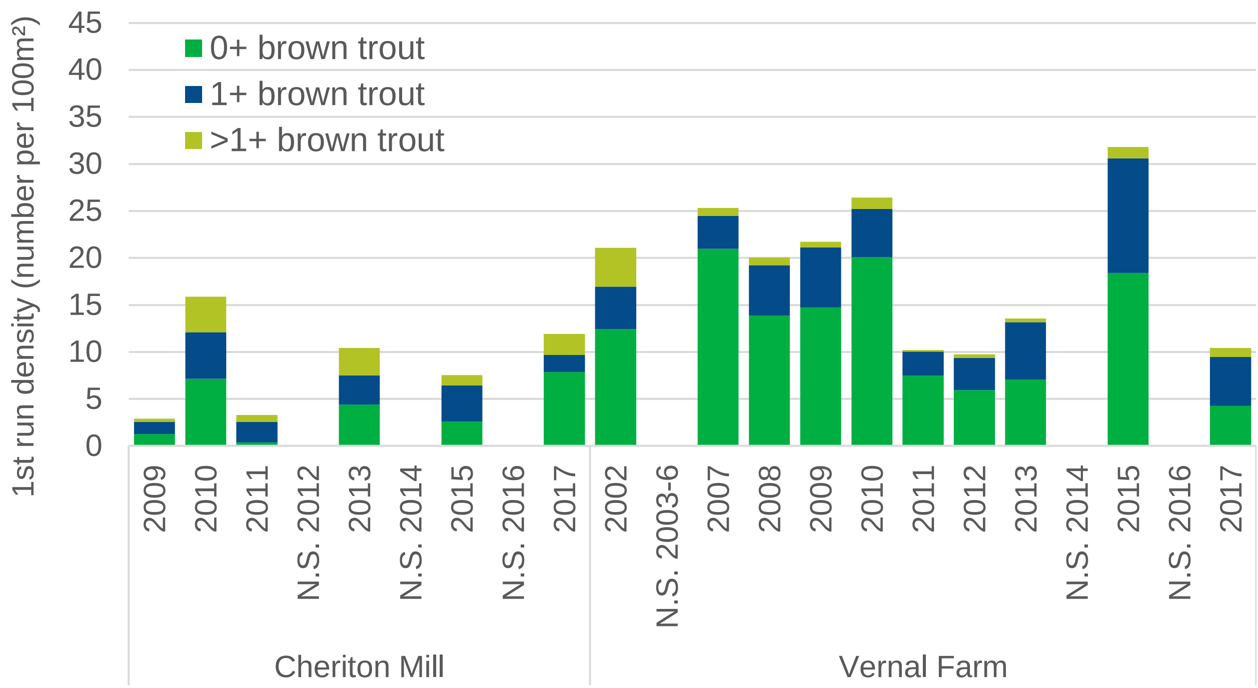


Figure Itchen 11: Density (number per 100m²) of brown trout, Cheriton Stream, 2002 - 2017 (N.S. = no survey)

The purposes of the NDMN is to reveal any possible impact of drought on fish populations. The Temperature and Rainfall section described the below average rainfall experienced in 2017. As previously seen, this has had a direct impact on flow.

In the Candover Brook, trout abundance positively correlates with the average previous winter flow. Figure Itchen 12 shows the flow during the winter preceding the survey (October to March) correlating with the number of 1+ brown trout caught in the first run at Abbotstone over time.

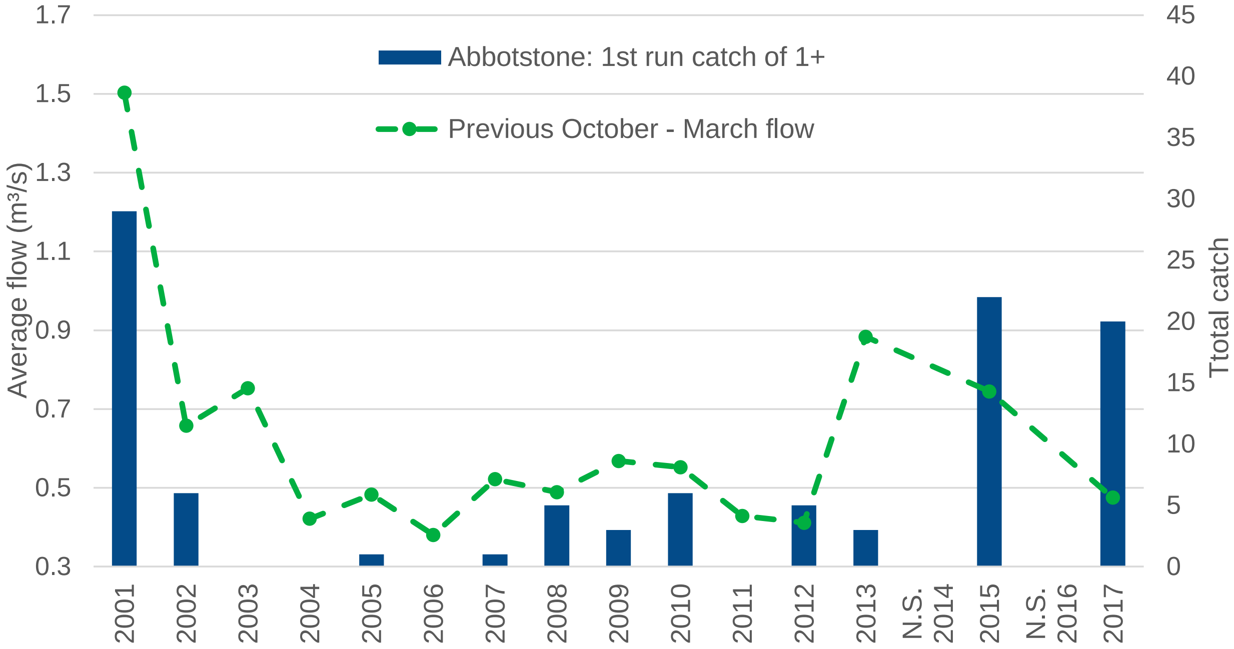


Figure Itchen 12: Average winter flow and total first run catch of 1+ brown trout, Abbotstone (N.S. = no survey, correlation = 0.66)

In addition to flow, there are also correlations between temperature and trout size. Figure Itchen 13 shows that at Granny Goss on the Candover and Vernal Farm on the Cheriton, the mean length of 1+ brown trout is positively correlated with the mean temperature through the previous winter (October to March).

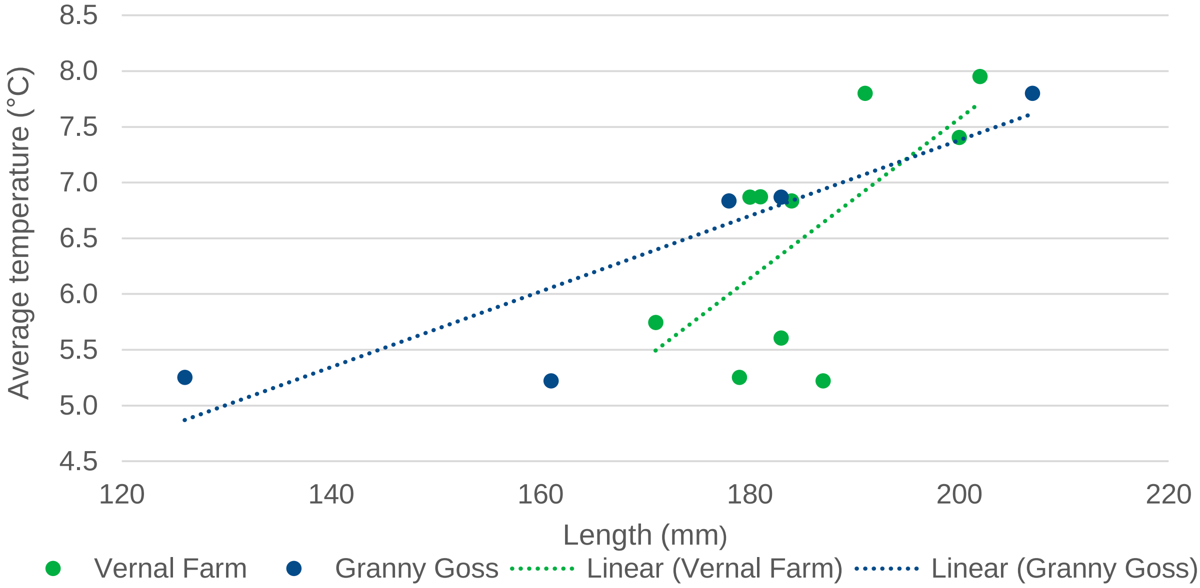


Figure Itchen 13: Average winter temperature and mean 1+ brown trout length, alongside the trend line (Vernal Farm correlation = 0.67, Granny Goss correlation = 0.90)

HABSCORE habitat assessments

Tables Itchen 2 and 3 below summarise the outputs from the HABSCORE models, including the observed population sizes and densities, the Habitat Quality Score (HQS) densities (the expected density of fish for the habitat) and the Habitat Utilisation Indexes (HUI) (the proportion of the habitat utilised by salmonids). The key values are the HUI's and their corresponding 90% confidence intervals.

HUI values of less than 1 will occur when observed densities are less than expected. Additionally, if the upper HUI confidence interval is below 1, this indicates that the observed population was significantly smaller than expected for the habitat. Conversely, if the lower HUI confidence interval is higher than 1, this indicates that the observed population was significantly larger than expected for the habitat.

Table Itchen 2: HABSCORE habitat assessment summary, NDMN sites, Candover Brook

	Site Name	Abbotstone	Granny Goss
Trout 0+	Observed population size	47	120
	Observed density (per 100m²)	9.07	23.8
	HQS density (per 100m²)	4.32	3.96
	(confidence interval)	1.12 - 16.73	1.01 - 15.44
	HUI	2.1	6.01
	(confidence interval)	0.31 - 14.23	0.88 - 40.92
Trout <20cm	Observed population size	26	7
	Observed density (per 100m²)	5.02	1.39
	HQS density (per 100m²)	1.44	1.96
	(confidence interval)	0.34 - 6.16	0.45 - 8.49
	HUI	3.48	0.71
	(confidence interval)	0.58 - 20.81	0.12 - 4.29
Trout >20cm	Observed population size	14	1
	Observed density (per 100m²)	2.7	0.2
	HQS density (per 100m²)	1.31	1.19
	(confidence interval)	0.43 - 4.02	0.4 - 3.59
	HUI	2.06	0.17
	(confidence interval)	0.67 - 6.34	0.05 - 0.57

Table Itchen 3: HABSCORE habitat assessment summary, NDMN sites, Cheriton Stream

	Site Name	Cheriton Mill	Vernal Farm
Trout 0+	Observed population size	29	47
	Observed density (per 100m²)	5.44	10.62
	HQS density (per 100m²)	3.89	4.53
	(confidence interval)	1 - 15.18	1.16 - 17.74
	HUI	1.4	2.34
	(confidence interval)	0.2 - 9.75	0.34 - 16.06
Trout <20cm	Observed population size	31	11
	Observed density (per 100m²)	5.82	2.49
	HQS density (per 100m²)	1.91	1.57
	(confidence interval)	0.44 - 8.31	0.37 - 6.64
	HUI	3.05	1.58
	(confidence interval)	0.49 - 18.87	0.27 - 9.45
Trout >20cm	Observed population size	17	12
	Observed density (per 100m²)	3.19	2.71
	HQS density (per 100m²)	1.5	1.74
	(confidence interval)	0.5 - 4.54	0.57 - 5.31
	HUI	2.13	1.56
	(confidence interval)	0.7 - 6.44	0.51 - 4.76

Discussion

Environmental variables:
The Candover Brook and the Cheriton Stream show very similar patterns of long-term river flow through the year. This is unsurprising as they are both in the headwaters of the River Itchen. As previously mentioned, reduced rainfall in 2017 has resulted in below average flows and in both the Candover and Cheriton, flows were particularly low through winter 2016/17.

Flow has a significant impact on the brown trout population in the Itchen, with links between increases in abundance and periods of higher flow. In the Candover, flow between October and December 2017 (after the surveys) was at the 15 year minimum. If flows remain low throughout the 2017/18 winter, it could create challenging conditions for migrating and spawning sea trout, potentially impacting the abundance of brown trout in 2018, as the populations in these streams are dominated by 0+ fish. The surveys scheduled for summer 2018 should help to reveal if this is the case.

Likewise, temperature has been shown to influence fish growth, affecting the mean lengths of the 1+ fish in particular. This is likely due to a combination of directly influencing their energy demands (requiring more food in warmer conditions) as well as affecting the levels of oxygen in the water (warmer water hold less oxygen). The warmer the winter, the larger the average size of 1+ trout at Granny Goss and Vernal Farm.

HABSCORE:

At Granny Goss, the HUI for 0+ trout is over 6 and the lower confidence interval is close to 1, indicating that the observed population is much higher than would normally be expected for the habitat. However, for trout over and under 20cm, the observed population was less than would be expected.

For the other NDMN sites on the Itchen; Abbotstone, Cheriton Mill and Vernal Farm, the HUI's for all three trout categories are over 1 (i.e., 100% habitat utilisation). So the observed densities are at the levels expected for the habitat at these sites.

Completing the NDMN surveys at these sites has provided us with a valuable opportunity to look in detail at the impacts of key environmental variables (temperature and flow) on the brown trout population and the future annual surveys will continue to add to the data set, allowing further insight to be revealed over time.

HABSCORE habitat assessment underway at Granny Goss Riffle

Itchen: Salmon Action Plan

Two sites on the River Itchen were surveyed under the Salmon Action Plan in 2017; Bishopstoke Barge and Shawford Park. These temporal monitoring sites record parr abundance over time.

Figure Itchen 16 shows the total number of salmon parr caught in the first run at Bishopstoke Barge and Shawford Park alongside the trend line for each. Please note that Shawford Park was not surveyed in 2004, 2007 or 2009.

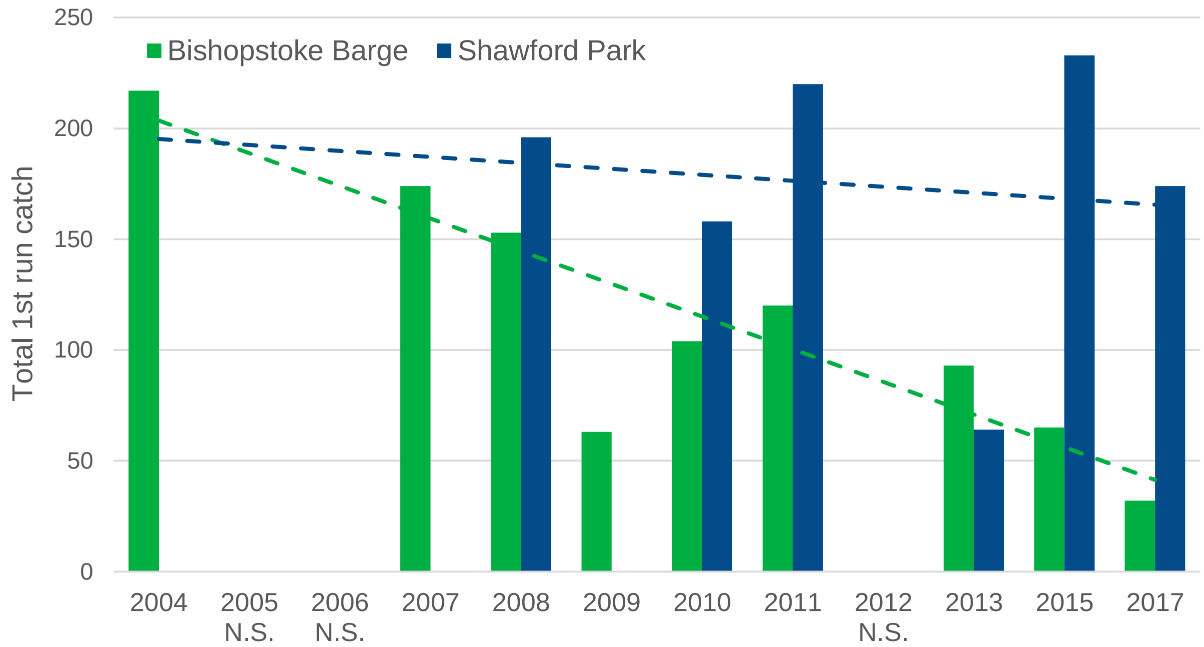


Figure Itchen 16: Total 1st run catch alongside the trend line, salmon parr, 2004 - 2017 (N.S. = no surveys)

Salmon parr abundance is often affected by environmental variables. At Shawford Park, the total number caught on the first run is strongly negatively correlated with the average flow during the winter preceding the survey (October to March).

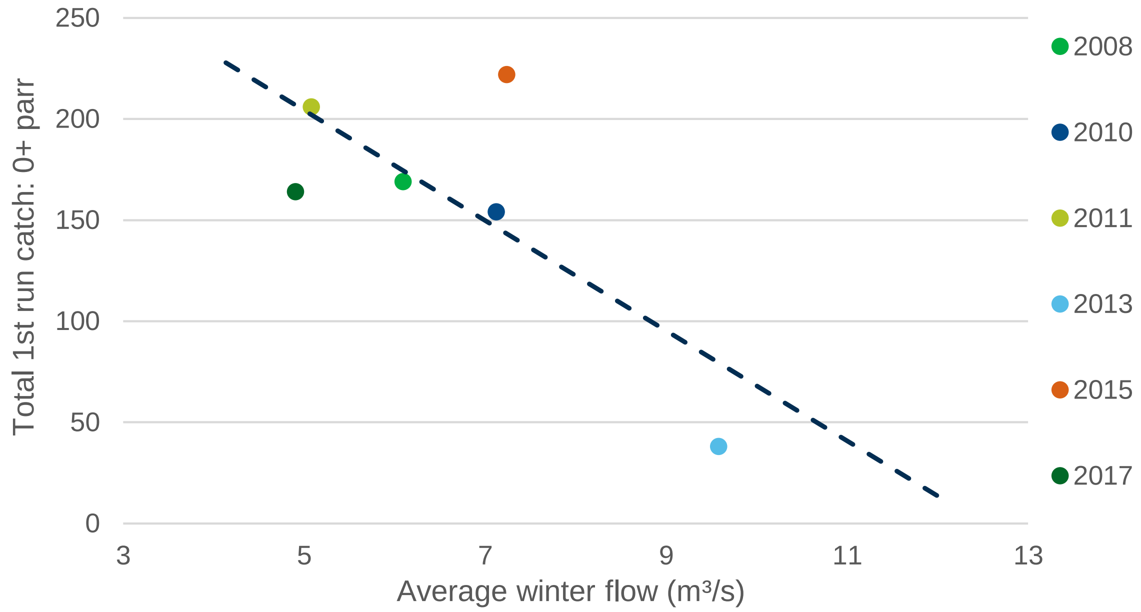


Figure Itchen 17: Average winter flow and total catch of salmon parr at Shawford Park, alongside the trend line (correlation = -0.73)

Figures Itchen 18 and 19 below are length frequency histograms, showing the total number of Atlantic salmon caught at Bishopstoke Barge and Shawford Park, respectively, in 5mm length classes. The figures are plotted on the same scale axes for comparison.

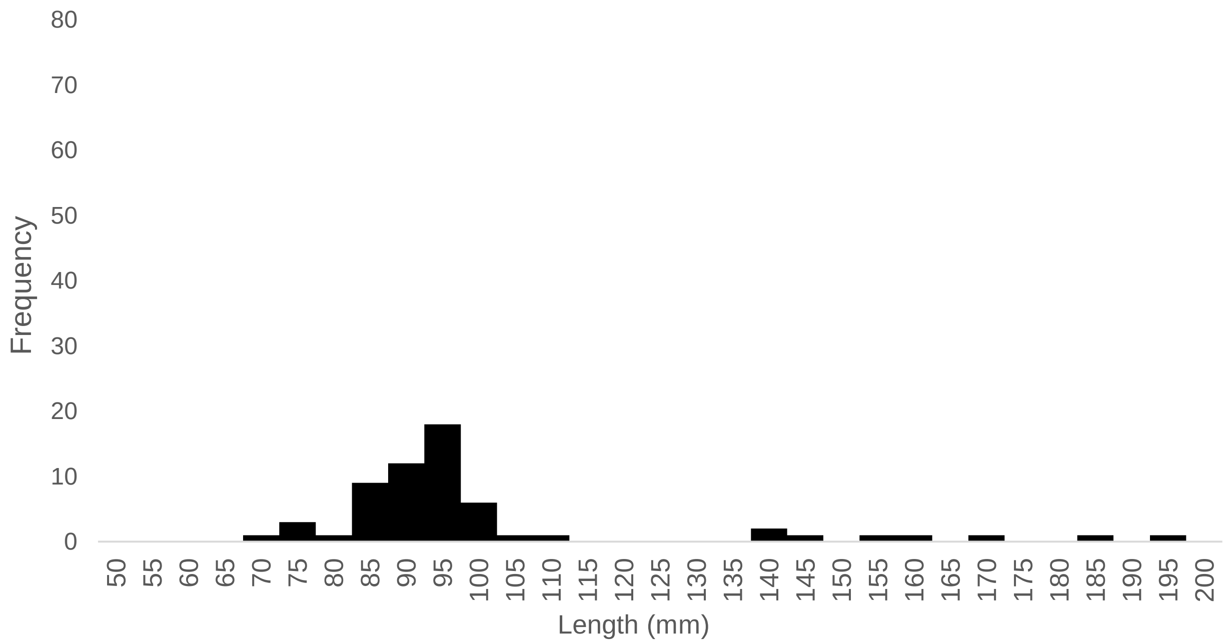


Figure Itchen 18: Length frequency histogram, Atlantic salmon, Bishopstoke Barge, N=60

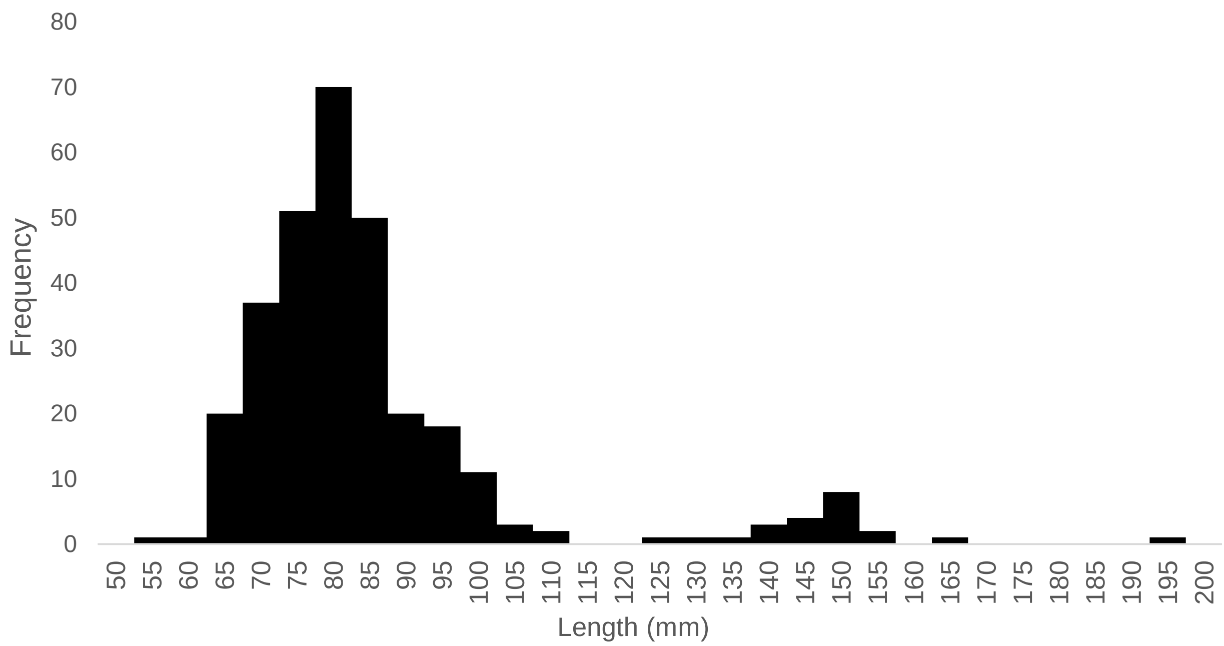


Figure Itchen 19: Length frequency histogram, Atlantic salmon, Shawford Park, N=306

Discussion

In 2015 we saw the highest ever first run abundance of salmon parr at Shawford Park and although slightly fewer fish were caught there in 2017, numbers are still high and the trend line indicates a stable population. However, at Bishopstoke Barge, there is a continued decline in parr numbers.

The team surveying the fantastic salmon parr habitat at Shawford Park, 2017

Itchen: Principal Brown Trout

Two sites on the River Itchen were surveyed for wild brown trout in 2017, these were Abbotstone, in the headwaters and Vernal Farm, further downstream. These sites were previously surveyed annually, but in 2013 the Principal Brown Trout programme switched to biennial sampling.

Figure Itchen 20 shows the total number of wild brown trout caught in the first run at Abbotstone and Vernal Farm alongside their four year moving averages. Please note that Vernal Farm was not surveyed in 2001 nor between the years 2003 and 2006 and no trout were recorded at Abbotstone in 2006.

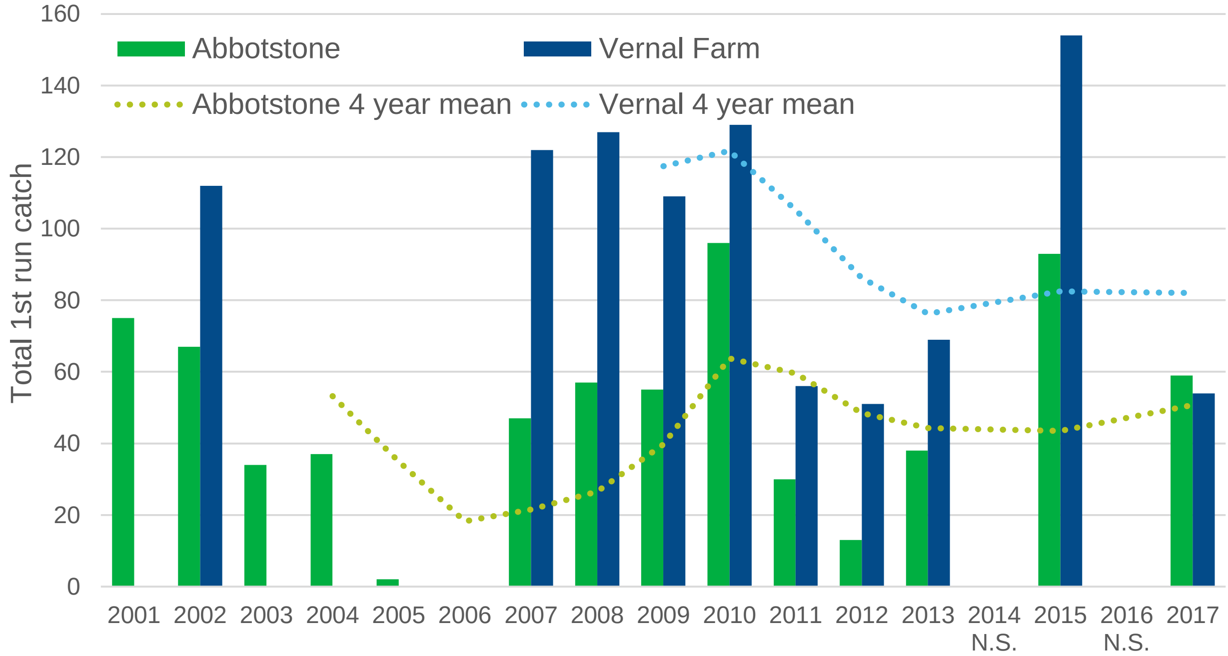


Figure Itchen 20: Total first run catch of wild brown trout alongside the 4 year moving average, Itchen PBT, 2001 - 2017 (N.S. = no surveys)

Fishing at Abbotstone

An adult brown trout from Vernal Farm

Figures Itchen 21 and 22 below are length frequency histograms, showing the number of trout present in 10mm length classes. The histograms reveal the age structure of the brown trout populations at these sites. The figures are plotted on the same scale axes for comparison.

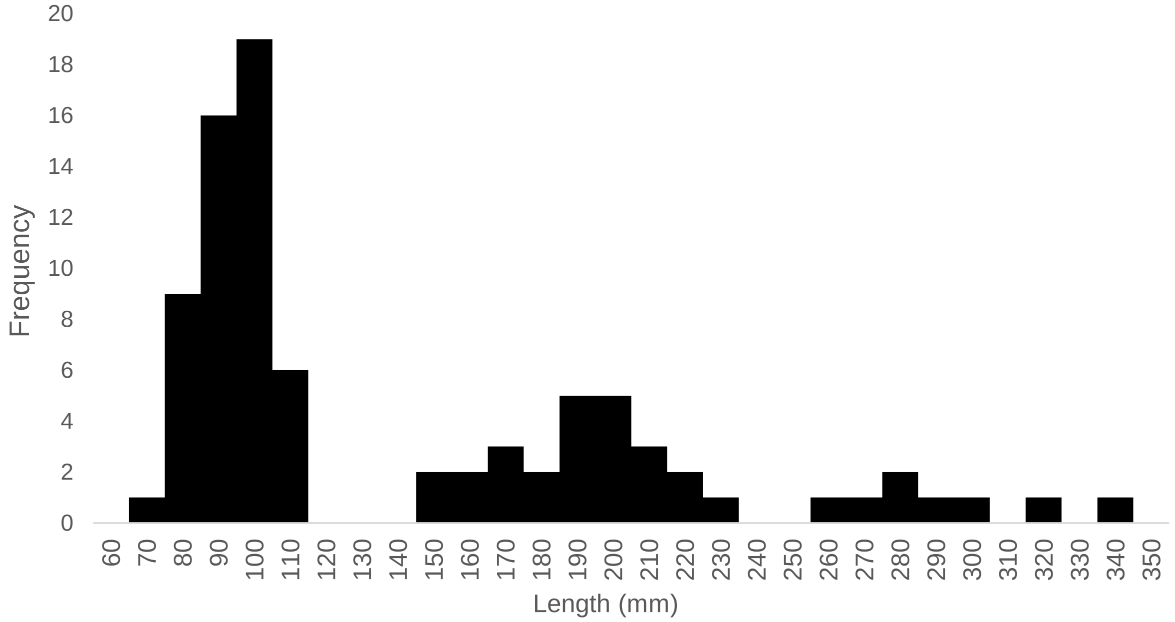


Figure Itchen 21: Length frequency histogram, brown trout, Abbotstone, N=84

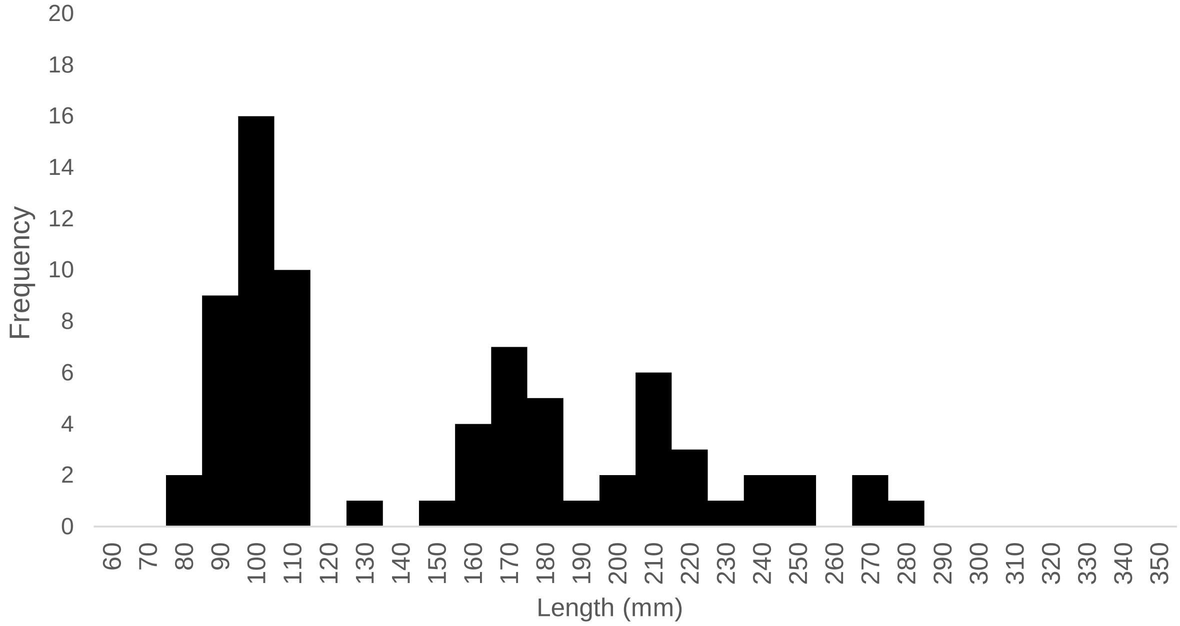


Figure Itchen 22: Length frequency histogram, brown trout, Vernal Farm, N=75

Discussion

Brown trout abundance is highly variable over time, with sharp differences in numbers between some survey years. However, the long-term data indicates that the populations at the two sites are generally stable. The good quality habitat helps provide a favourable environment for the fish. This was the first year that trout abundance at Abbotstone exceeded that at Vernal Farm, which is likely the result of habitat works, especially fencing to exclude cattle.

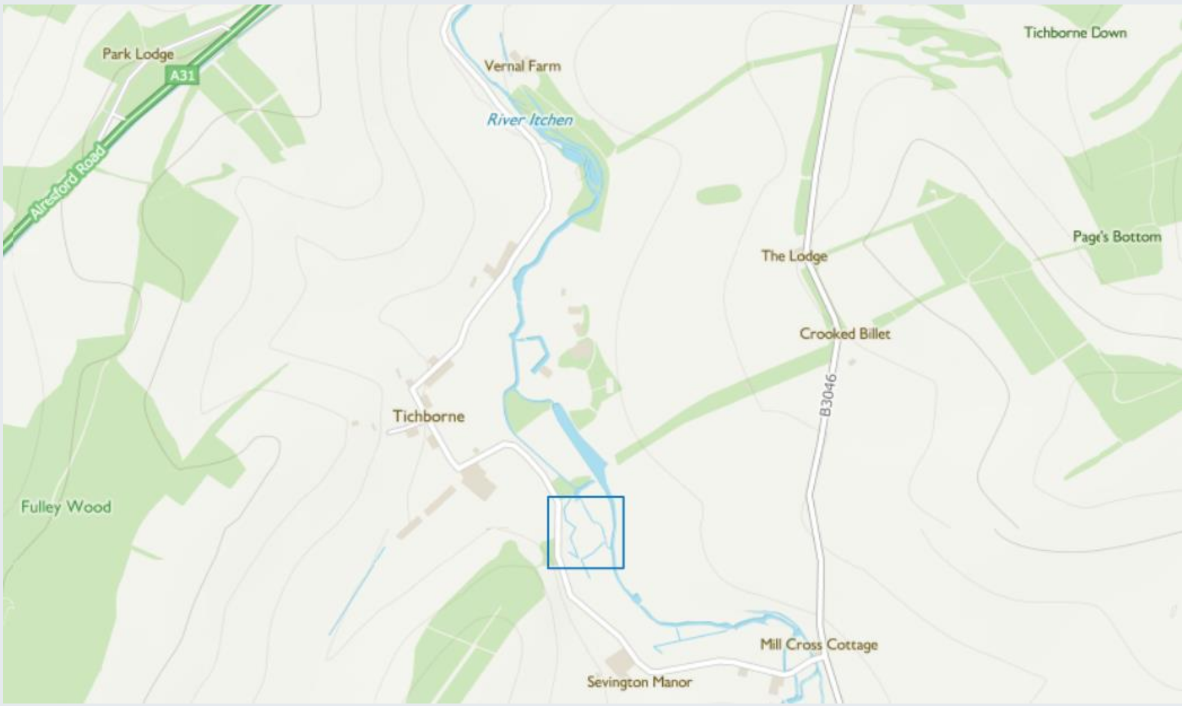
The populations are dominated by 0+ young of the year at both sites, although some older individuals are present, more so at Abbotstone in the upper reaches than Vernal Farm, where individuals may be more likely to migrate the shorter distance out to sea.

Tichborne Park channel restoration

Tichborne Park lies in the Upper Itchen Valley six miles east of Winchester. The project involved removing an on-line lake and restoring the Cheriton Stream, a headwater tributary of the River Itchen.

The lake that was constructed in 1828-1829 as a landscape feature of Tichborne Park, in common with many other man-made on-line lakes, acted as a settlement lagoon for sediments transported by the Cheriton Stream. The lake, or more specifically, the cascade impoundment, had noticeable negative impacts on the upstream section of the Cheriton Stream. The impoundment reduced stream gradient and as a consequence the stream lacked velocity and energy, important characteristics of chalk streams. This resulted in a silty, rather than a clean gravel bed and a shift away from a characteristic plant community. This degraded habitat was largely devoid of the fauna and flora typical of chalk stream habitats for which the River Itchen is of national and international nature conservation importance.

Map Tichborne 1 shows the location on the Cheriton Stream, upstream of the on-line lake.



Map Tichborne 1: Location of channel restoration site on the Cheriton Stream

The project involved the creation of 800 metres of new and restored chalk steam habitat. The new channel now by-passes the former lake which has been infilled with material from the newly cut channel. The former lake has now been designed to offer a diverse area for wildlife and will form important fen/swamp habitat.

Tichborne Park, before and after the channel restoration works

Undertaking the first fish population survey in the restored channel

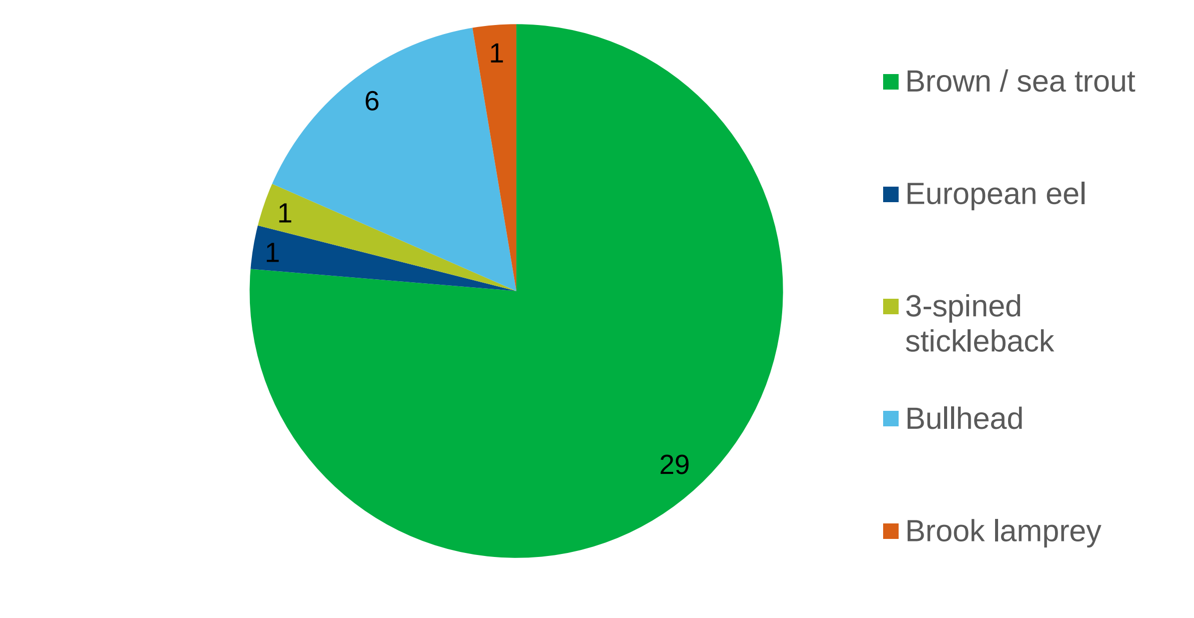


Figure Tichborne 1: Total number of fish caught, 2017

An example juvenile and the adult brown trout caught in the restored stream

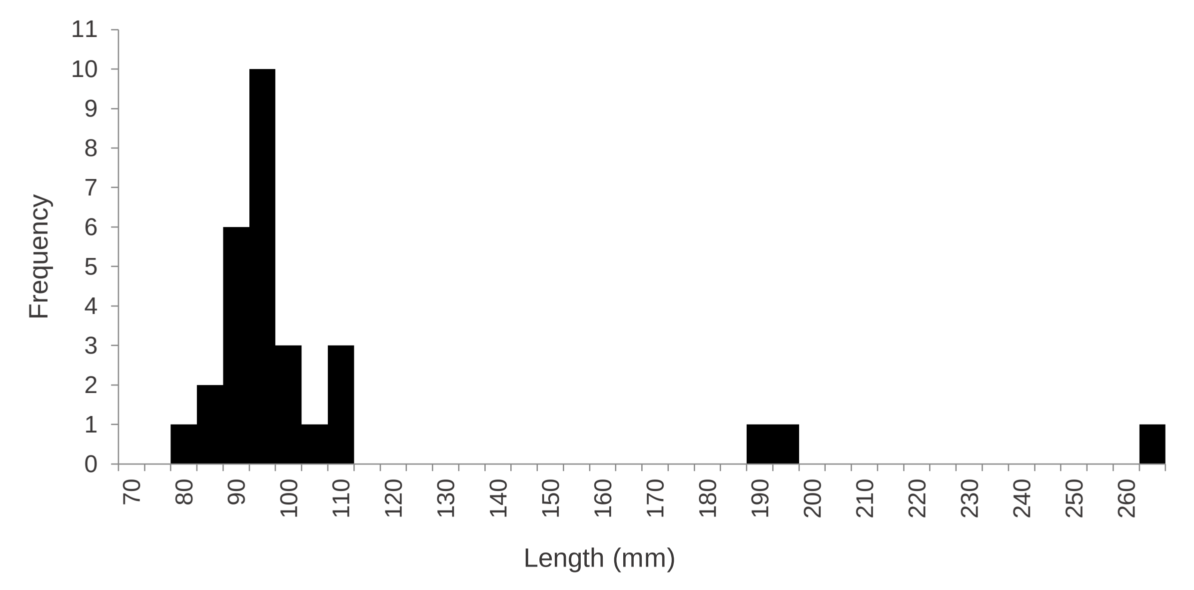


Figure Tichborne 2: Length frequency histogram of wild brown trout, N=29

Discussion

- The channel restoration was finished in April 2017 and the first fish population survey was conducted four months later in August;
- The catch was dominated by wild brown trout, the majority of which were young of the year, although a couple of parr and an adult were also caught;
- A 227mm European eel and a brook lamprey were also found, as well as bullhead and 3-spined stickleback;
- A HABSCORE habitat survey was conducted in order to monitor the physical habitat and track the changes that will occur as the channel becomes more established.

During our survey it was evident that the restored channel was already producing a good flow diversity and macrophytes were starting to establish and it was promising to find that a number of trout had already colonised the stretch.

The restored channel will be surveyed annually in order to track the establishment of the fish population and the habitat.

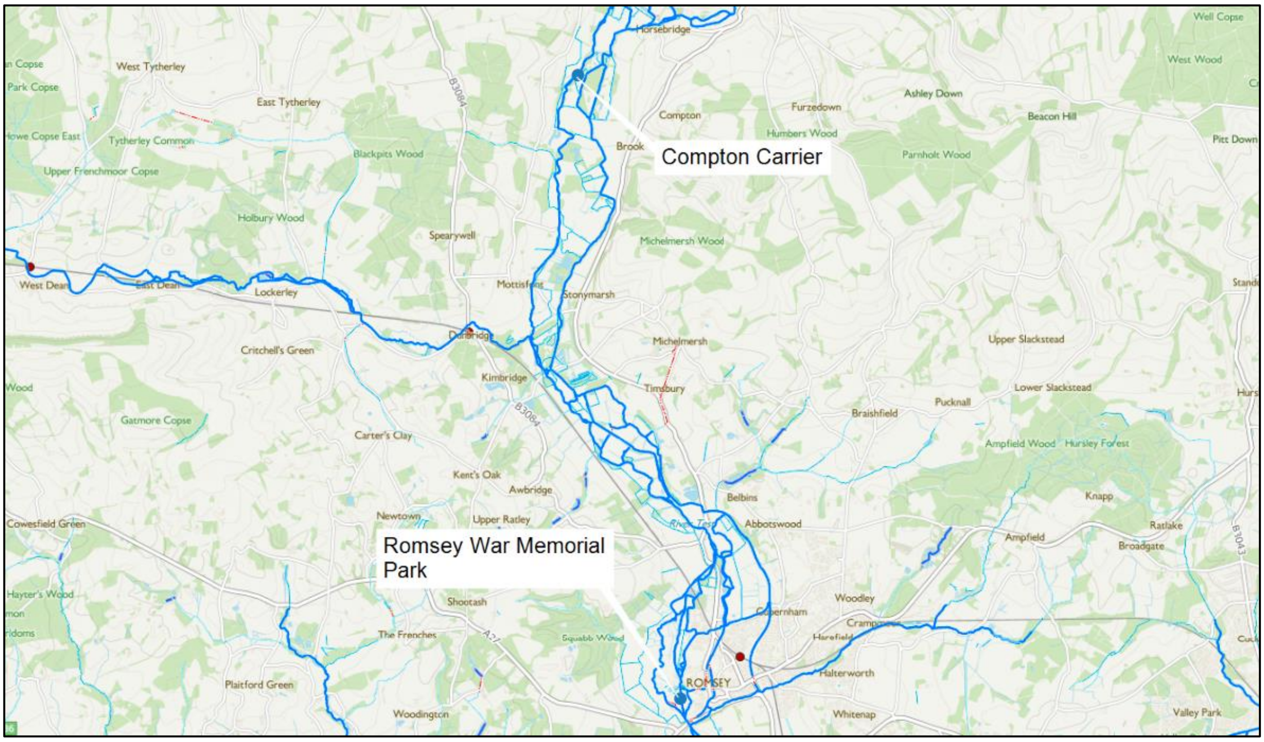
The project, delivered by Aquascience Ltd, was made possible due to the partnership formed between the Environment Agency, Tichborne Estate and Natural England.

3.3. Test

Two surveys were completed on the River Test in 2017. These were for the National Drought Monitoring Network (NDMN).

Test: National Drought Monitoring Network

The River Test has two National Drought Monitoring Network (NDMN) sites; Romsey War Memorial Park and Compton Carrier. Map Test 1 shows the locations of the two survey sites.



Map Test 1: Test survey sites, 2017

Figure Test 1 shows the average monthly flow between October 2016 and December 2017, alongside the 15 year mean, minimum and maximum monthly flows. The data is from Broadlands gauging station, located downstream of the sites, just south of Romsey.

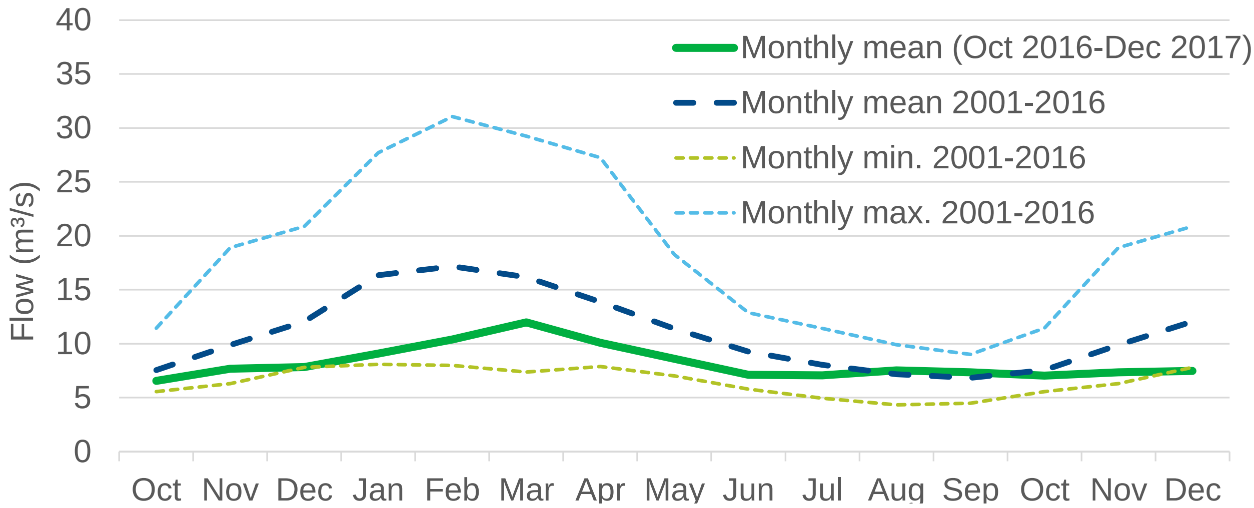


Figure Test 1: Mean monthly flow (m³/s) from October 2016 to December 2017

Although 2017 was the first year for NDMN surveys, we already hold fish data for these sites. However, as there are discrepancies in survey method between the years, to make the data comparable, only fish caught on the first run of the catch-depletion surveys have been used alongside the single run data.

Figure Test 2 compares the first run densities of brown trout caught at the two sites. The data has been separated into age classes to allow comparison of the age structures within the populations between the survey years.

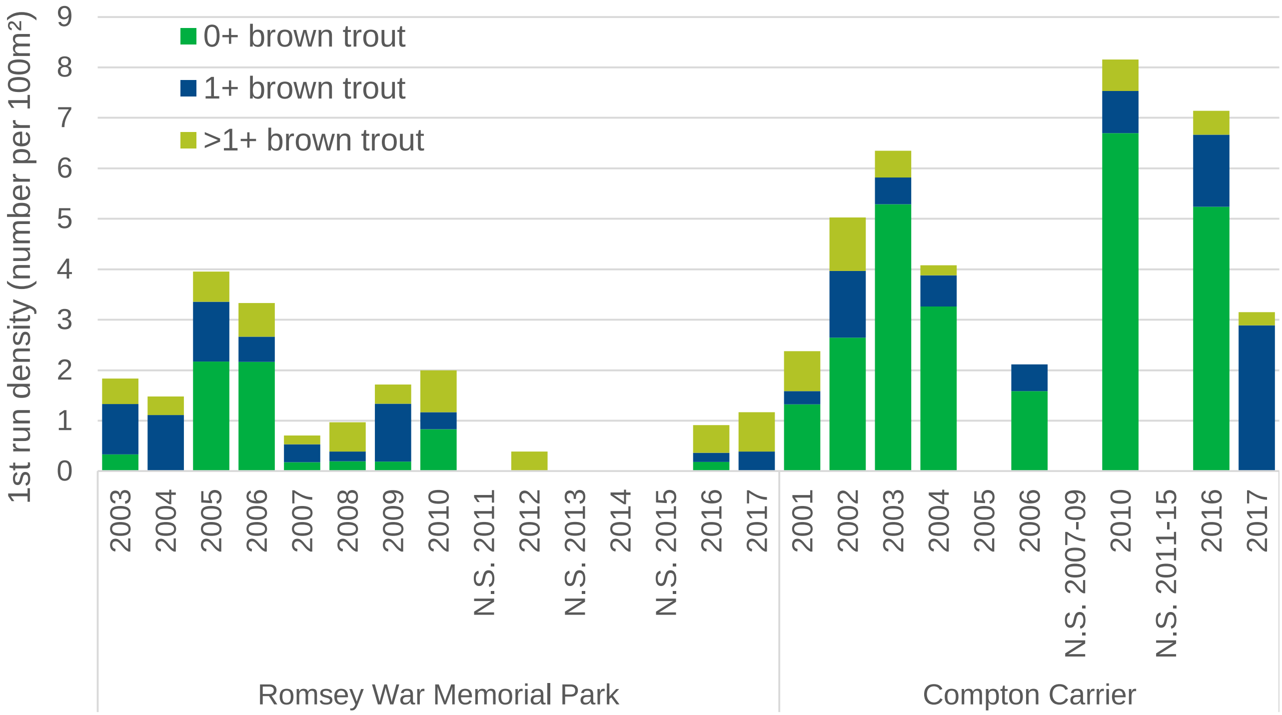


Figure Test 2: Density (number per 100m²) of wild brown trout, NDMN sites, 2001-2017 (N.S. = no survey(s))

Romsey War Memorial Park

Compton Carrier

The purposes of the NDMN is to reveal any possible impact of drought on fish populations. The Temperature and Rainfall section described the below average rainfall experienced in 2017. This has had a direct impact on river flow, as seen in Figure Test 1.

The relationship between river flow and the Test's brown trout population is shown below, with fish size and abundance corresponding to summer and winter flows. Figure Test 3 demonstrates the strong positive correlation between the average size of 1+ fish and the mean summer (April to September) flow at Compton Carrier. Figures Test 4 and 5 depict clear positive and negative correlations between the total number of trout caught in the first run and the mean winter and summer flows at Compton Carrier and Romsey War Memorial Park, respectively.

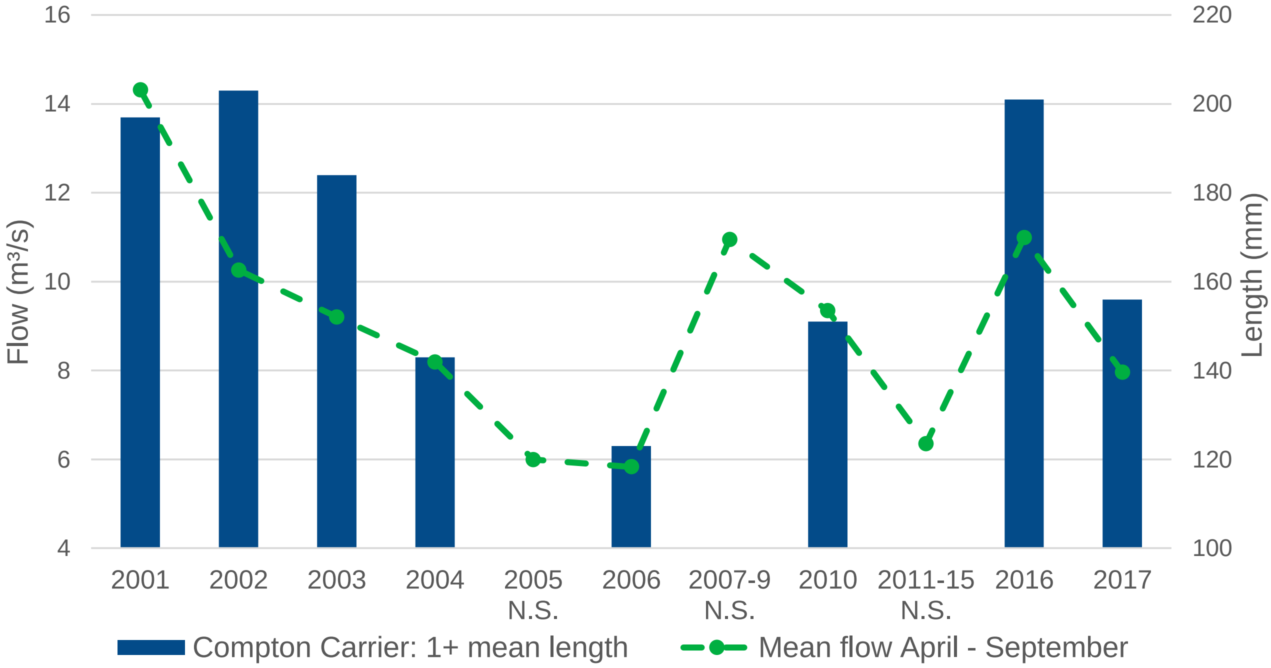


Figure Test 3: Mean summer flow (April to September), alongside the average length of 1+ brown trout, Compton Carrier, 2001 - 2017 (N.S. = no surveys, correlation = 0.81)

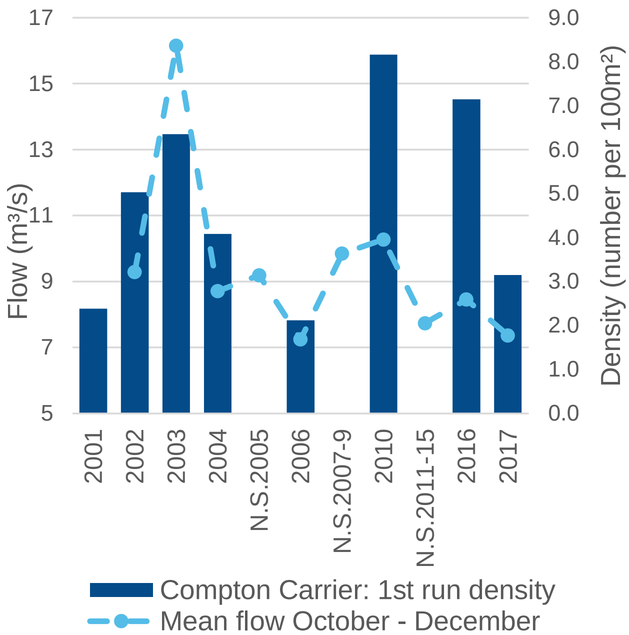


Figure Test 4: Winter flow and 1st run density, Compton Carrier (correlation = 0.68)

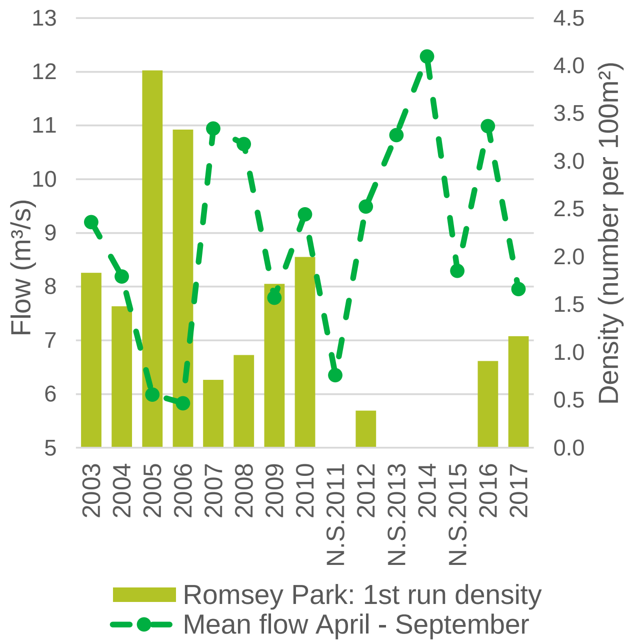


Figure Test 5: Summer flow and 1st run density, Romsey Park (correlation = -0.87)

HABSCORE habitat assessment

Table Test 1 below summarises the output from the HABSCORE model, including the observed population size and density, the Habitat Quality Score (HQS) density (the expected density of fish for the habitat) and the Habitat Utilisation Index (HUI) (the proportion of the habitat utilised by salmonids). The key values are the HUI and its corresponding 90% confidence interval.

HUI values of less than 1 will occur when observed densities are less than expected. Additionally, if the upper HUI confidence interval is below 1, this indicates that the observed population was significantly smaller than expected for the habitat. Conversely, if the lower HUI confidence interval is higher than 1, this indicates that the observed population was significantly larger than expected for the habitat.

Table Test 1: HABSCORE habitat assessment summary

	Site Name	Compton Carrier	Romsey Park
Trout 0+	Observed population size	1	1
	Observed density (per 100m²)	0.25	0.19
	HQS density (per 100m²)	11.86	5.51
	(confidence interval)	2.99 - 46.99	1.35 - 22.44
	HUI	0.02	0.03
	(confidence interval)	0 - 0.16	0 - 0.25
Trout <20cm	Observed population size	12	3
	Observed density (per 100m²)	3.06	0.56
	HQS density (per 100m²)	10.89	1.68
	(confidence interval)	2.5 - 47.35	0.37 - 7.54
	HUI	0.28	0.33
	(confidence interval)	0.05 - 1.71	0.05 - 2.08
Trout >20cm	Observed population size	1	8
	Observed density (per 100m²)	0.25	1.49
	HQS density (per 100m²)	1.19	0.68
	(confidence interval)	0.39 - 3.56	0.22 - 2.11
	HUI	0.21	2.18
	(confidence interval)	0.07 - 0.65	0.69 - 6.87

Discussion

Environmental variables:

Flow in the River Test was below average for the majority of the year, only reaching the mean monthly levels through August and September 2017 and flow during December 2016 was at the 15 year minimum.

The spawning success of adult trout during winter 2016/17 may have been impacted by the low flows. The population at Compton Carrier has historically been dominated by 0+ fish, however in 2017 we caught no young of the year. Though, the survey data may not be fully representative as water in the carrier had been reduced to allow weed cutting to take place in the main channel (see photo below). At Romsey War Memorial Park, the abundance and age structure of the trout population is much more variable, but again we caught no 0+ fish.

Clear links between fish growth and abundance and summer and winter flow have been shown. At Compton Carrier, the 1+ fish are larger in years where there is higher summer flow and we catch more trout in years where the winter flow is higher. At Romsey War Memorial Park, we catch fewer trout in years where the summer flows are higher.

HABSCORE:

At Compton Carrier, the HUI's for all age classes of brown trout were less than 1, indicating that the trout population was less abundant than expected for the habitat. This was especially true for 0+ trout and trout over 20cm, which had 2% and 21% habitat utilisation, respectively, and their upper HUI confidence limits was less than 1, indicating that the observed population was significantly less than would be expected. Although, the weed cutting disruption may have affected the results.

For Romsey War Memorial Park, the population of trout over 20cm was as expected for the habitat, but 0+ trout and trout smaller than 20cm were less (HUI's of 3% and 33%, respectively), with the observed population of 0+ being significantly less than would be expected for the habitat.

Completing these NDMN surveys has provided us with a valuable opportunity to look in detail at the impacts of flow on brown trout populations. The future annual surveys will continue to add to the data set, allowing further insight to be revealed over time.

Cut weed collecting in the pool just upstream of the Compton Carrier site, 2017

3.4. Test and Itchen fish counters

Author: Dom Longley

3.4.1. 2017 salmon counting results

- The River Test salmon counter at Nursling was operational for 86% of the time throughout 2017 and the counter on the River Itchen was operational for 79% of the time.
- The 2017 total estimated salmon run for the Test was 1,850. Estimated egg deposition on the Test represents 128% of the Conservation Limit.
- The 2017 total estimated salmon run for the Itchen was 640. Estimated egg deposition for the Itchen represents 86% of the Conservation Limit.
- Figure Test & Itchen 1 below shows the estimated numbers of salmon migrating upstream into the rivers daily in 2017. Mean daily flow is also given (cubic metres per second - gauged at Broadlands on the Test, Allbrook / Highbridge combined on the Itchen). The dots represent the long-term average flow for each month on the respective rivers, highlighting the generally low flows, particularly early in the year.

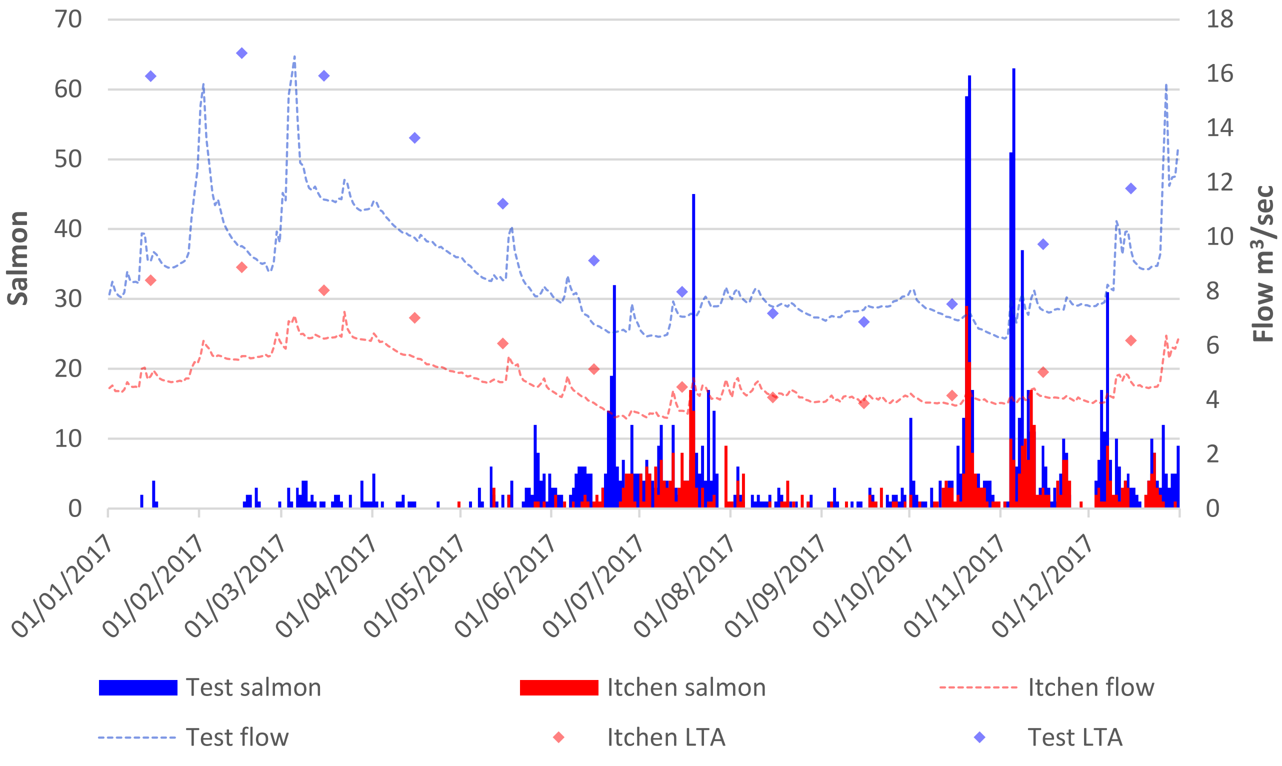


Figure Test & Itchen 1: Daily estimated numbers of upstream migrating salmon, 2017

3.4.2. Salmon counting 1990-2017

Figure Test & Itchen 2 below puts the 2017 counter results into context by setting out the full 28 year Test and Itchen salmon count dataset; 1990 - 2017. For both rivers, the Spawning Escapement (SE), Conservation Limit (CL) and Management Target (MT) values are shown.

Spawning Escapement is the number of salmon estimated to have entered the river and survived to spawn; i.e. Returning Stock adjusted for caught and killed fish (negligible in recent years), as well as a mortality factor for caught and released fish. The Conservation Level is our minimum target for population size, below which the population is considered to be at considerable risk. The Management Target is a higher aspiration and is the population level we aim to exceed. Both are usually expressed in terms of estimated numbers of eggs deposited each year, but for clarity in this graph, the equivalent spawning escapement values have been used.

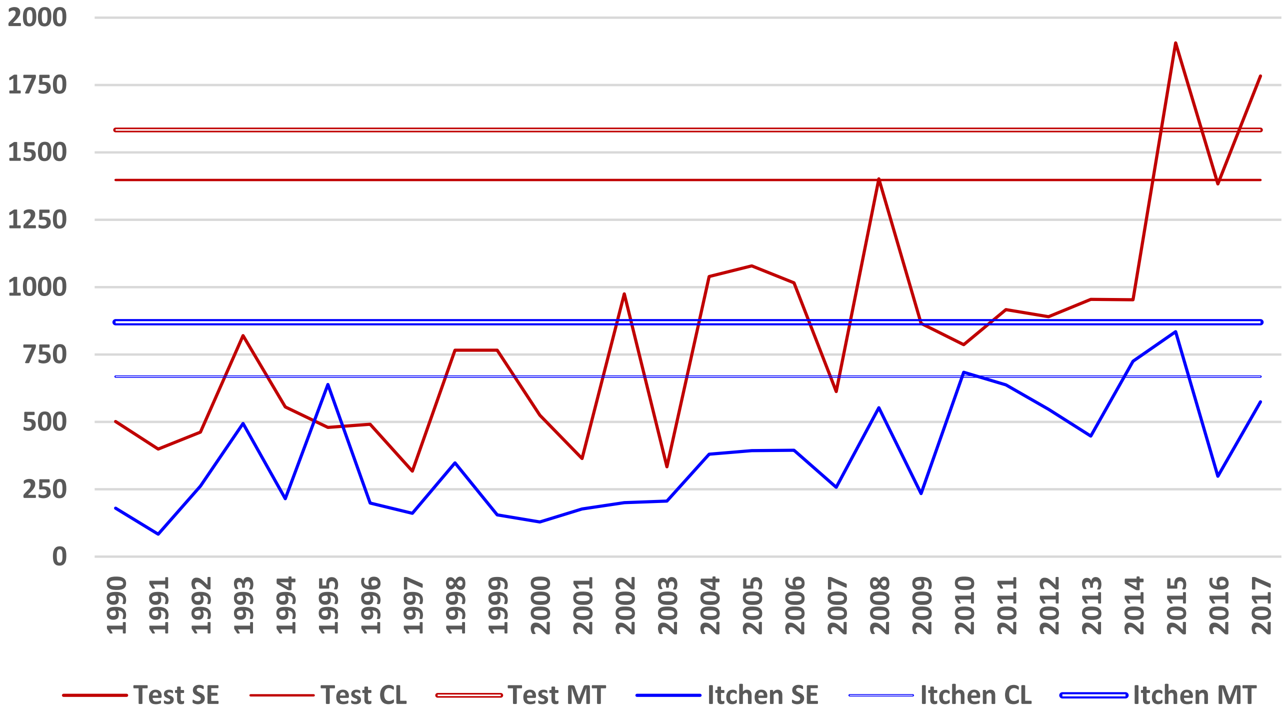


Figure Test & Itchen 2: Test and Itchen salmon count dataset; 1990 - 2017. Spawning Escapement (SE), Conservation Limit (CL) and Management Target (MT)

3.4.3. Counter developments in 2017

Having rebuilt the roof over the Nursling salmon counter in winter 2016, we then installed new electrodes in both counter channels, made of very heavy duty GRP and stainless steel, which immediately improved counter performance and imaging. Construction is currently underway to modify the Itchen salmon counter so that it can be accessed via a side door, rather than the existing hatch and vertical shaft, making working on site far safer.

We are also developing a project for a new, small scale salmon counter on the Little River Test, which will significantly increase the precision of salmon population assessment on the Test as a whole.

An issue that is becoming increasingly relevant to salmon counting on the Test and Itchen is the growing number of large, sea-run, stocked trout that are being caught in the lower river reaches early in the year. Many of these are in the 6-8lb range and would be hard to distinguish from salmon on the basis of an overhead photograph or the counter waveform alone. The best solution may be to improve photography through the use of side-view cameras and better lighting, both of which are in development.

A clear image of a salmon running upstream through the Itchen counter just after 8:00 am on 12th May, 2017.

A large, sea-run stocked trout caught on the lower Test in April 2018.

Note the eroded dorsal fin, typical of a farmed trout. Such fish are often referred to as “slob” trout.

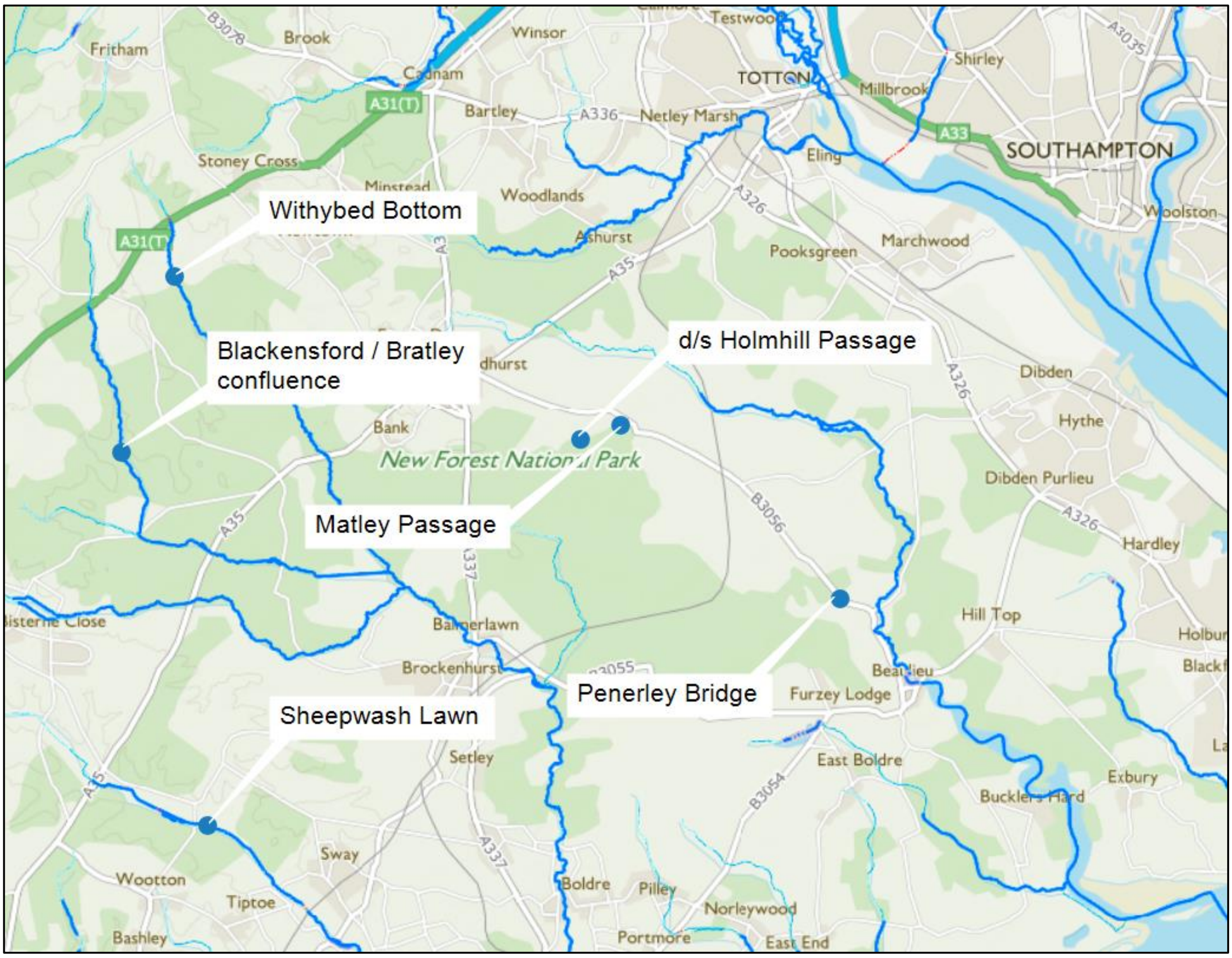
Construction underway on the Itchen counter at Gaters Mill, providing a safe side-access door as an alternative to the vertical ladder and shaft.

3.5. New Forest

We carried out four surveys in the New Forest in 2017; two on the Lymington River and two on the Beaulieu River. All four were Principal Brown Trout temporal monitoring surveys. In addition, two fish relocations also took place.

Map New Forest 1 shows the locations of each site surveyed in 2017. Withybed Bottom and Blackensford / Brately confluence are on the Lymington River and Matley Passage and Penerley Bridge are on the Beaulieu River.

The two fish relocations were located at Sheepwash Lawn on the Avon Water and d/s Holmill Passage on the Beaulieu River.



Map New Forest 1: Locations of sites where surveys were completed in New Forest, 2017

New Forest: Principal Brown Trout

Figures New Forest 1 and New Forest 2 show the density of brown trout caught at sites on the Lymington and Beaulieu Rivers, respectively. A zero catch was recorded at Withybed Bottom in 2010 and Penerley Bridge in 2010 and 2015 due to the sites being dry.

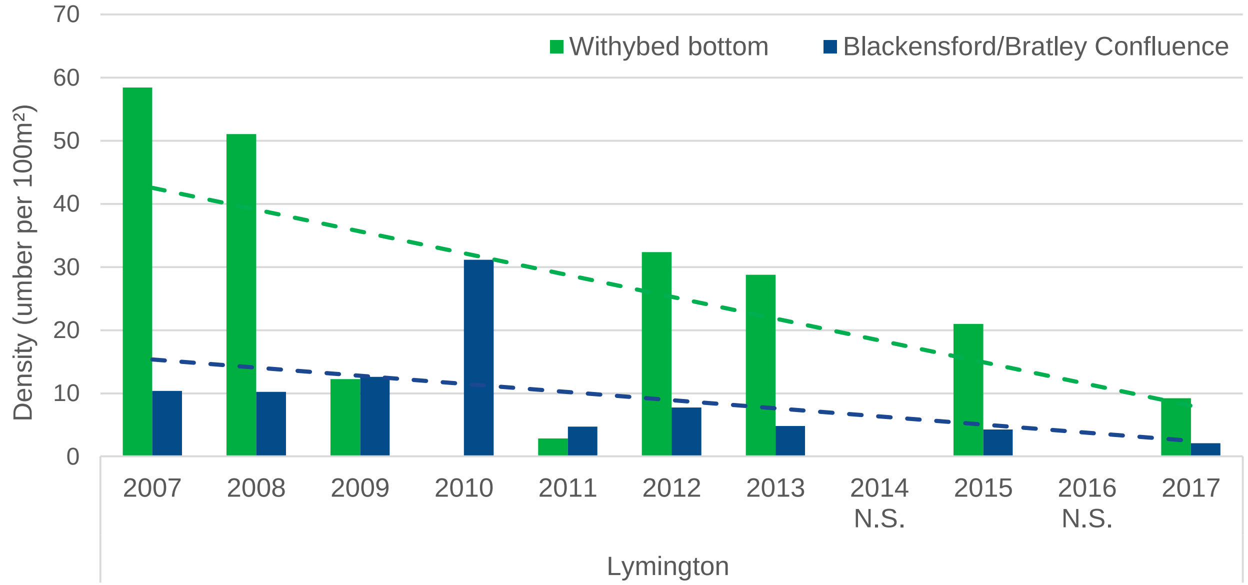


Figure New Forest 1: Brown trout densities alongside the trend line, Lymington, 2007 - 2017 (N.S. = no survey)

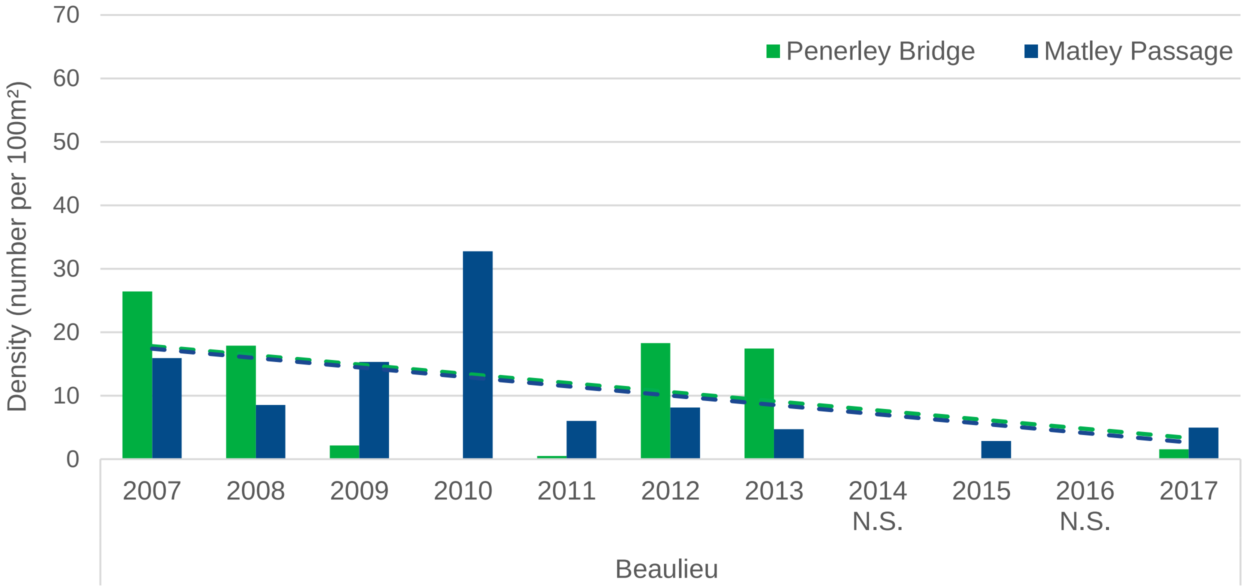


Figure New Forest 2: Brown trout densities alongside the trend line, Beaulieu, 2007 - 2017 (N.S. = no survey)

Dry river channels:

Withybed Bottom

Penerley Bridge

Some of the streams in the New Forest are ephemeral, drying completely when there has been a distinct lack of rain. Figure New Forest 3 shows the density of brown trout at Withybed Bottom on the Lymington and Penerley Bridge on the Beaulieu (pictured above), correlating with the minimum summer (April to September) flow. The flow data used is from Brockenhurst gauging station.

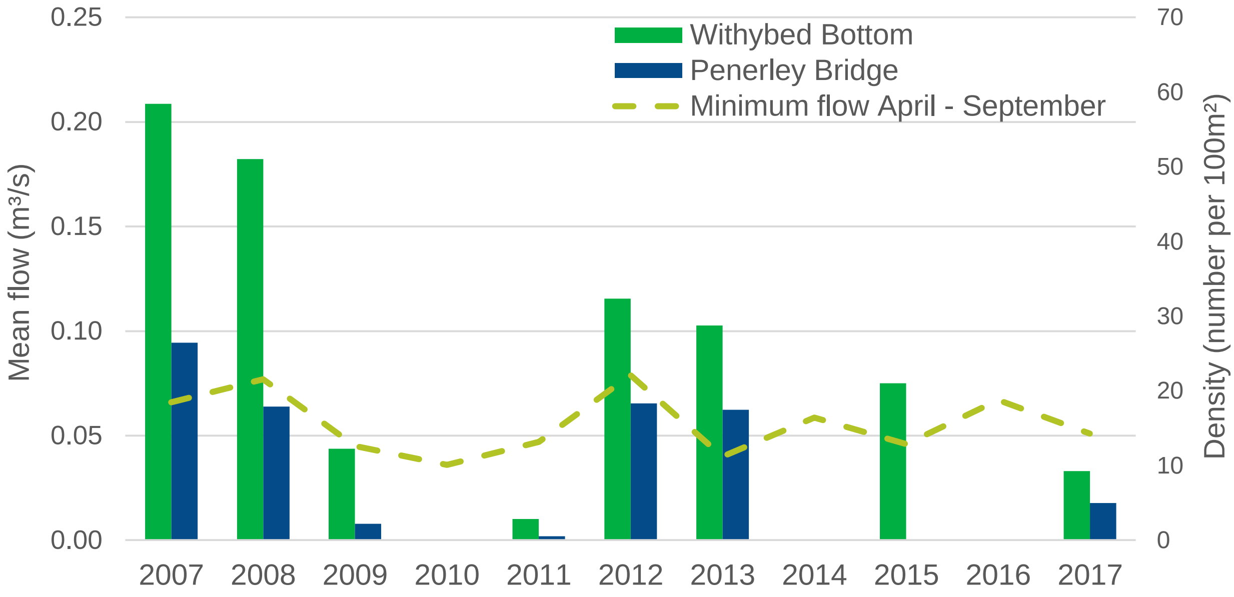


Figure New Forest 3: Minimum summer flow and brown trout density, 2007 - 2017 (Withybed Bottom correlation = 0.74, Penerley Bridge correlation = 0.69)

A total of 35 brown trout were caught across all sites in the New Forest. Figure New Forest 4 is a length frequency histogram showing the number of trout present in 10mm length classes, revealing the age structure of the brown trout populations at these sites.

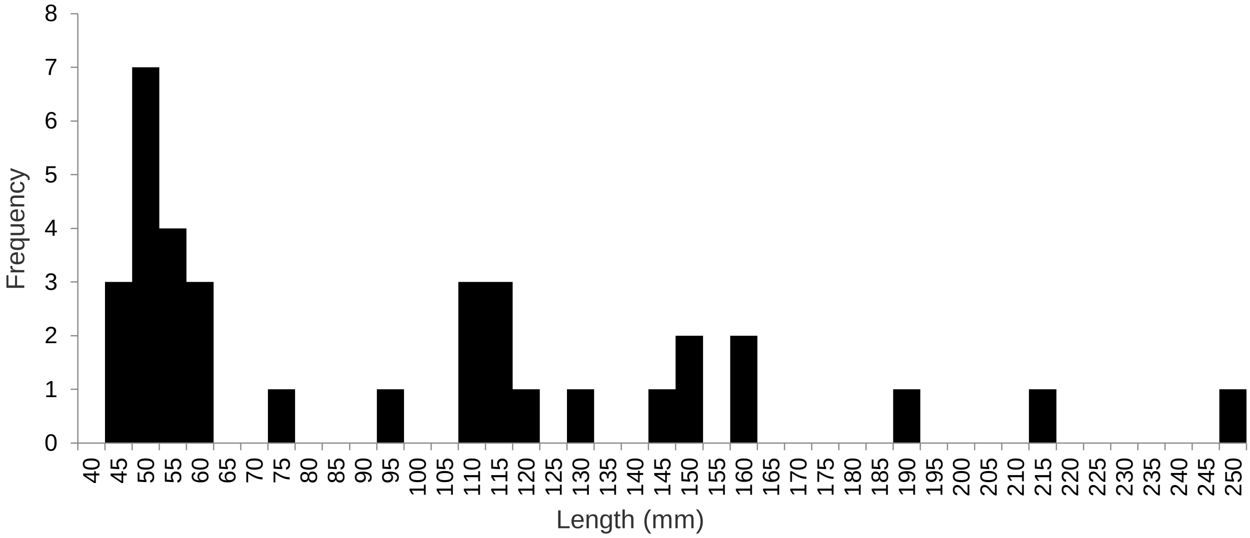


Figure New Forest 4: Length frequency histogram, brown trout, New Forest, 2017, N=35

Discussion

The ephemeral nature of these streams is highly likely to affect the brown trout population. The trend lines for all the Principal Brown Trout sites in the New Forest show a continued decline in brown trout numbers. This is especially evident at Withybed Bottom, where historic densities have dropped from almost 60 fish per 100m² in 2007 to under 10 in 2017. The abundance of trout found here correlates positively with the minimum summer flow, so more fish are caught in years with higher minimum flows. This is unsurprising, as with very low flows, the habitat available to the fish is reduced to a series of pools.

The brown trout caught across the New Forest were predominantly young of the year, but with parr and adults also present.

Fishing the deeper sections and an adult brown trout at Blackensford/Bratley Confluence

New Forest: Fish relocations

The need to complete fish relocations provides us with an opportunity to collect data at sites never surveyed before.

Avon Water: Sheepwash Lawn

We completed a fish relocation at Sheepwash Lawn in order to allow river restoration works to be undertaken by the Forestry Commission under their Higher Level Stewardship Scheme. The Wootton riverine woodlands follow the course of Avon Water across the Open Forest, starting about 750m downstream of the A35 and continuing to the edge of Sway village. The work that has been done here will slow the water flow, allowing time for the wetland habitats to absorb the rainfall and helping to prevent flash floods that can pose a risk to local properties downstream. By restoring the natural watercourses the project is helping to make sure the Avon Water and the surrounding habitats are more resilient in both winter floods and summer droughts.

Beaulieu: d/s Holmhill Passage

Similarly, on the Beaulieu we completed another fish relocation to allow the Forestry Commission to complete river restoration works on the stretch of the river at Holmhill Passage in order to improve the status of this Site of Special Scientific Interest (SSSI). The fish were released just downstream of the improvement works at Ipley Crossroads.

Figure New Forest 4 shows the actual density of all fish caught at the two sites.

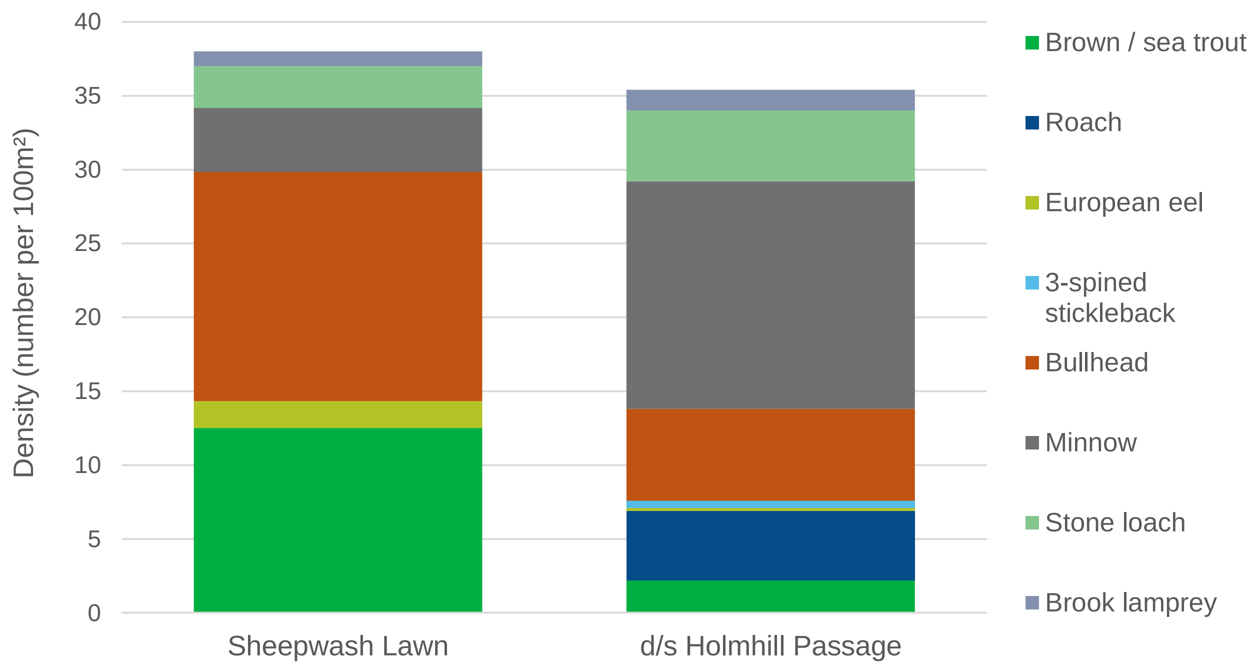


Figure New Forest 4: Total number of fish caught at the two fish relocations sites in the New Forest, 2017

Figure New Forest 5 is a length-frequency histogram, showing the number of wild brown trout caught in 5mm length classes at Sheepwash Lawn.

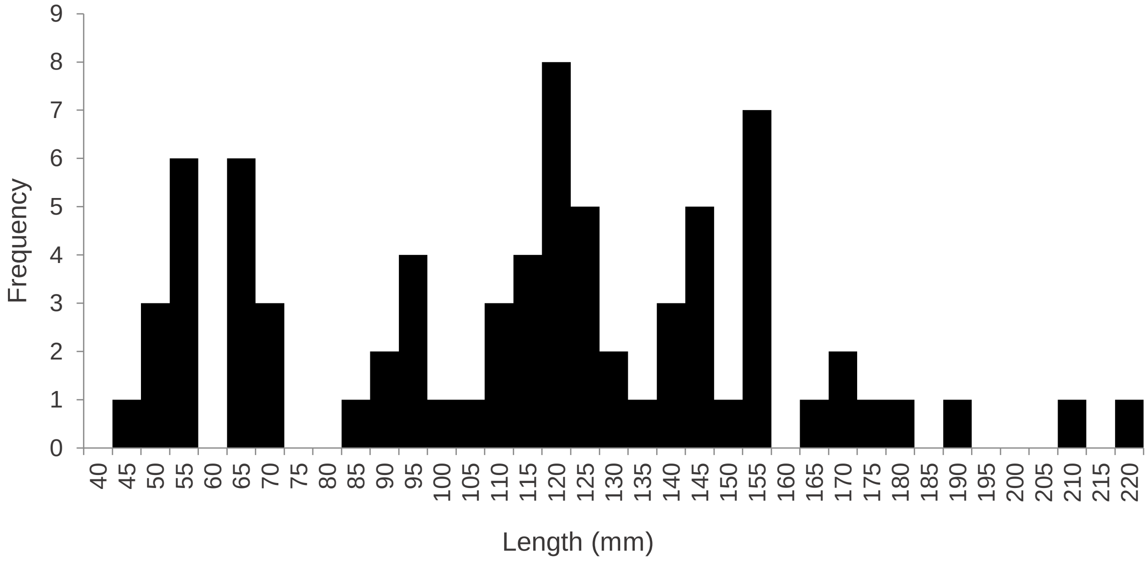


Figure New Forest 5: Length-frequency histogram, brown trout, Sheepwash Lawn, (N=75)

Discussion

In total, 582 fish were caught and relocated; 228 from Sheepwash Lawn and 354 from Holmhill Passage. At Sheepwash Lawn, 6 species were found, including European eel and brown trout, which dominated the catch. At Holmhill Passage, 8 species were found, also including brown trout, European eel and roach, which dominated the catch.

Recording fish population data while performing fish relocations at these sites, prior to restoration work, is beneficial in order to record data at locations not previously visited and to allow for comparisons to be made once the habitat improvements have been completed.

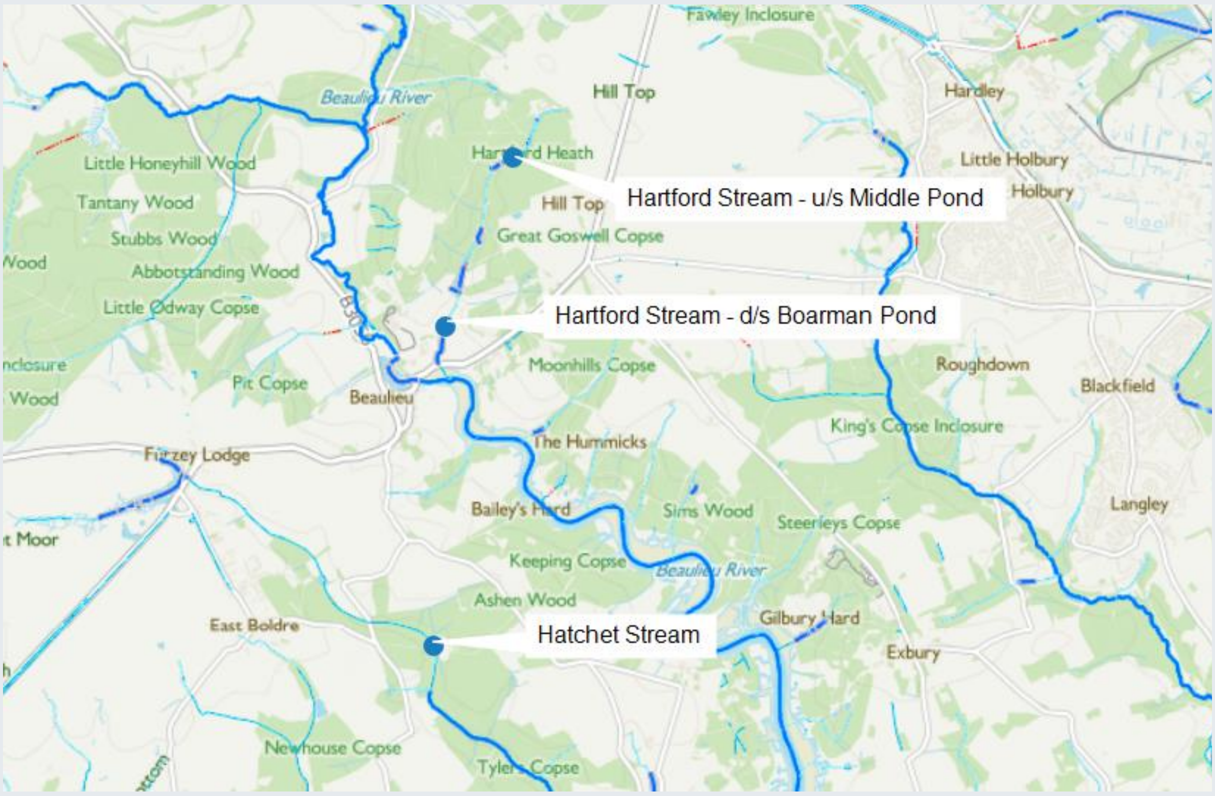
Beaulieu catchment habitat restoration: "Living Waters"

The Freshwater Habitats Trust, on behalf of the New Forest Catchment Partnership, is leading on this Heritage Lottery Funded project which is one of 21 in the New Forest National Park under the Our Past, Our Future Landscape Partnership.

The project aims to protect the outstanding freshwater wildlife of the Beaulieu River. Living Waters will manage and create freshwater habitats and improve connectivity for plants and animals, including declining species such as European eel and the common toad. This will be achieved through improving water quality and freshwater biodiversity, particularly out of the open forest, where water quality testing has highlighted small sources of diffuse nutrient and sediment pollution from farms and a plant nursery.

The Freshwater Habitats Trust and the Beaulieu Estate plan to improve eel passage along a series of medieval fish ponds on the Hartford Stream, a tributary of the Beaulieu River. We completed single run electric fishing surveys at two sites on the Hartford Stream and one on the Hatchet Stream, another tributary of the Beaulieu River, in order to assess what fish species were present.

Map Beaulieu 1 shows the locations of the three survey sites on the Beaulieu River.



Map Beaulieu 1: Locations of sites that were surveyed for the Beaulieu Estate, 2017

The narrow survey site on the Hartford Stream - d/s Boarman Pond

The catches included juvenile brown trout and brook lamprey

Something intriguing in the water at the Hatchet Stream site

Figure Beaulieu 1 shows the total number of each species caught at the three sites on the Beaulieu River. The sites are ordered from upstream to downstream.

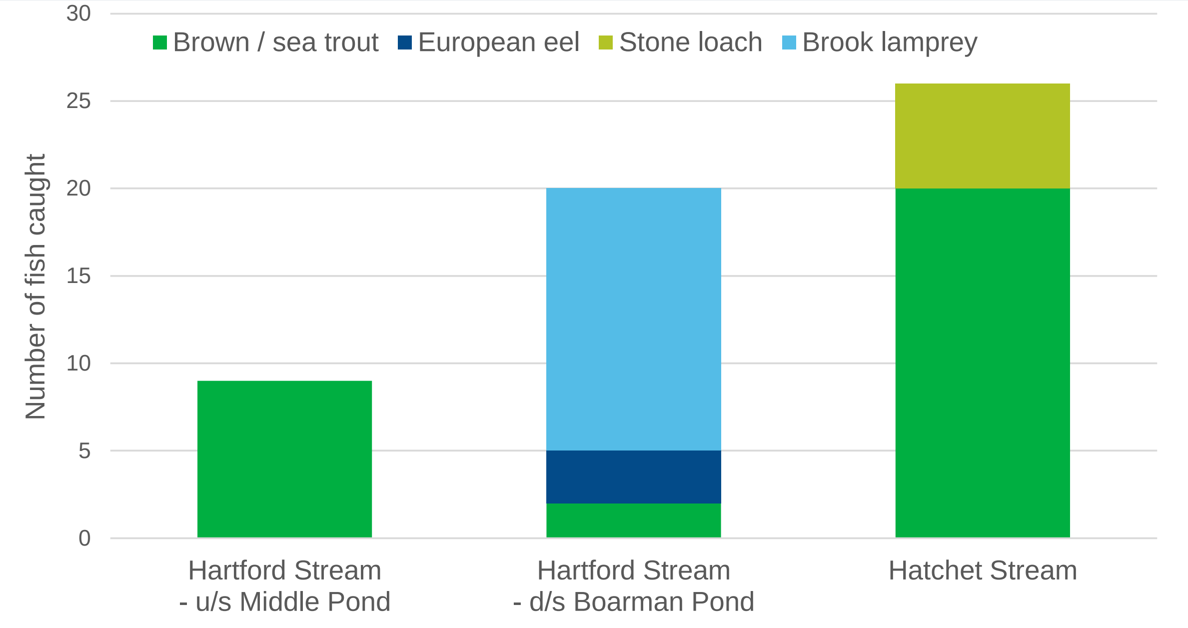


Figure Beaulieu 1: Actual number of fish species caught at each survey site, 2017

Figure Beaulieu 2 is a length frequency histogram, showing the number of wild brown trout caught across all three surveys in 5mm length classes.

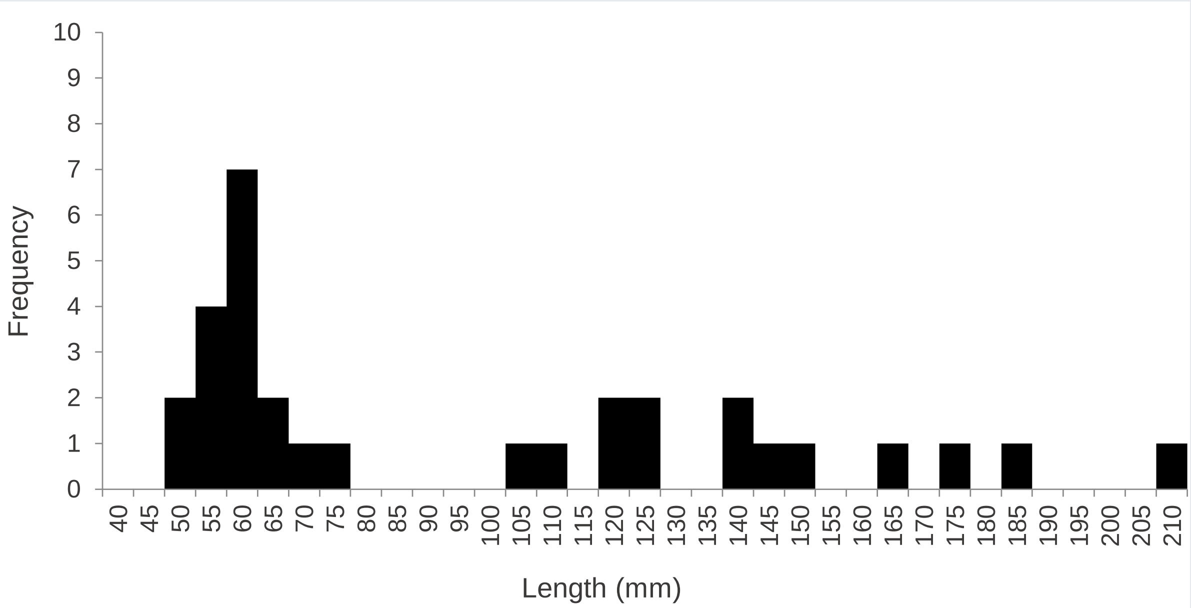


Figure Beaulieu 2: Length frequency of wild brown trout from all surveys, 2017 (N=31)

Discussion

- Wild brown trout were present at all three sites, but they were most abundant on the Hatchet Stream;
- On the Hartford Stream, European eel and brook lamprey were caught at the d/s Boarman Pond site, but not the u/s Middle Pond site, indicating a possible barrier to their migration;
- The brown trout population was dominated by 0+, young-of-the-year fish, but other year classes were also present.

A large proportion of adult wild brown trout in the New Forest streams migrate out to sea, explaining why the bulk of the trout caught were juveniles. Most of the adult trout we caught were from the u/s Middle Pond site, which is likely due to a barrier preventing trout migration downstream, as well as eel migration upstream. Therefore, the fish population here may be fairly isolated.

These three sites on the Beaulieu River had not been surveyed for fish before and it was noted that the Hartford Stream, with its perennial, spring-fed nature, has high quality physical habitat. The survey results indicate that the stream has more potential than we had expected and therefore it is well worth improving fish passage and habitat where possible.

The data collected will be used within the Living Waters project to supplement survey and monitoring work on wetland plants and invertebrates on the Hartford Stream and elsewhere in the catchment. The survey results will also be critical for awareness raising and will be presented to the water quality monitoring volunteers and the local community at a bespoke event in 2018.

4. Estuarine fish monitoring

Our Transitional and Coastal (TraC) fish monitoring programme involves the use of a range of survey methods, which, in combination, allow us to monitor the presence and diversity of estuarine fish species over time.

In the Solent and South Downs this monitoring is completed in Southampton Water and the River Adur estuaries. Near to the shoreline, three different netting techniques are employed; seine netting, fyke netting and beam trawling, and in deeper water, an autumn otter trawl survey is also carried out in Southampton Water.

Seine netting

A seine net survey consists of a semi-circular sample, taken with a 45 metre net set from a boat. This is performed twice in the same location.

Loading the seine onto the boat

Setting the net in a semi-circle

Hauling the seine by hand

Assessing the catch

Beam trawling

The beam trawl is 1.5 metres wide and is towed from a boat for exactly 200 metres parallel to the shore. This is carried out once at the same location as the seine net is hauled.

The beam trawl and seine

Trawling in action

Fyke netting

Each fyke survey consists of two double ended fyke nets, set close to the shore in 1 metre depth of water at low tide and left for 24 hours.

Preparing to set the fyke nets

A marker buoy aids identification for collection

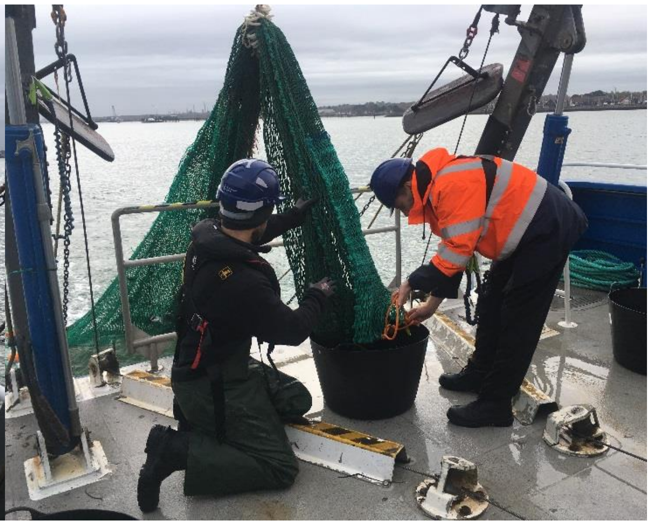
Drying the fykes after retrieving the catch

Otter trawling

A Coastal Survey Vessel (CSV) performs the autumn otter trawl near to the edge of the maintained shipping channel, around 600 metres east of Hythe in Southampton Water. This survey comprises of two 15 minute trawls.

The CSV "Severn Guardian" used in 2017

The otter trawl gear ready for deployment



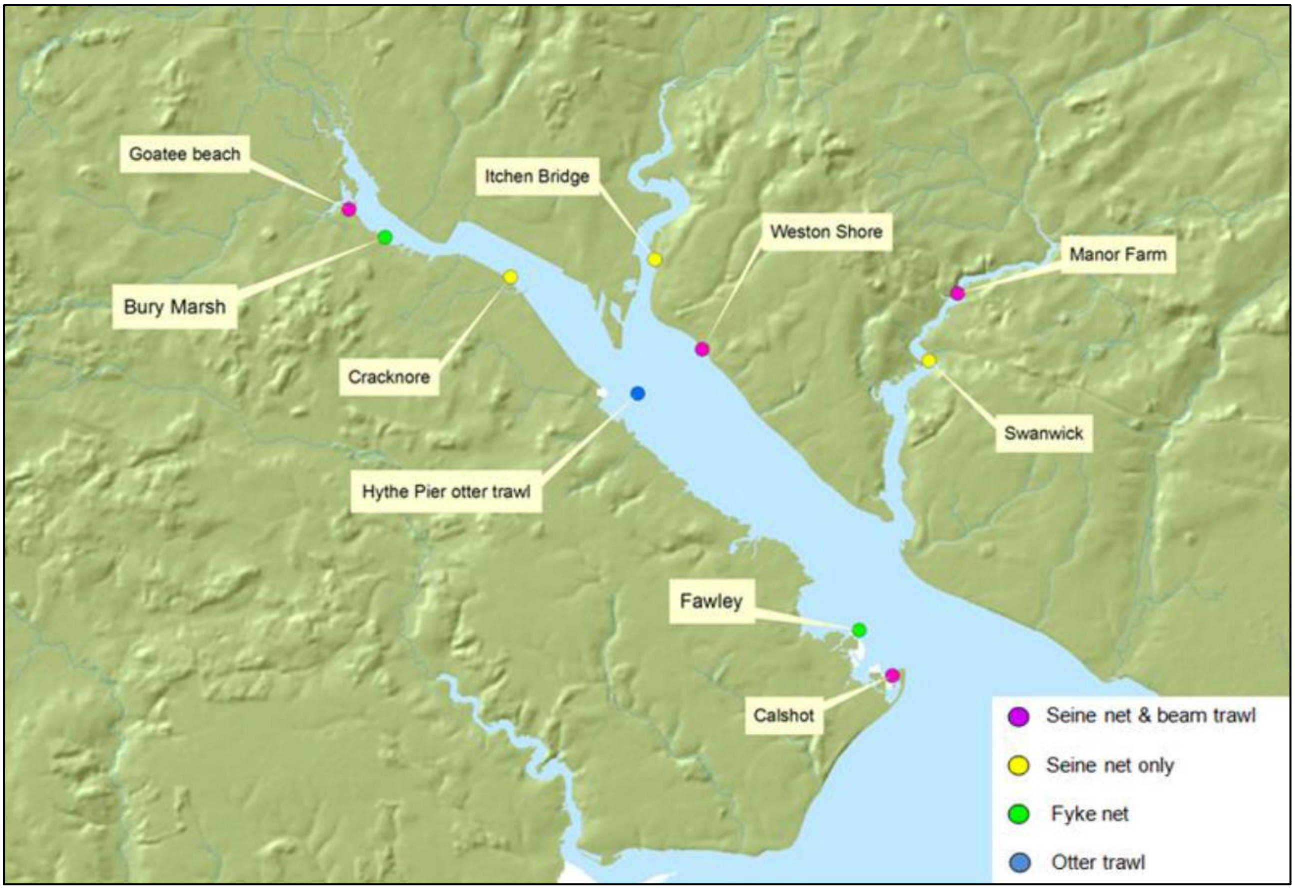
Trawling underway

Releasing the catch from the cod end

4.1. Southampton Water

In 2017 the Southampton Water Transitional and Coastal (TraC) fish monitoring programme included routine beach seine and beam trawl surveys at 4 sites, beach seine only surveys at 3 sites (where beam trawling would be hazardous) and fyke net surveys at a further 2 sites. This work was completed in the spring and then repeated in the autumn.

Map Soton Water 1 shows the TraC monitoring sites in Southampton Water, coloured according to the types of survey carried out at each location.



Map Soton Water 1: Fish monitoring sites, Southampton Water, 2017

Summary

- 29 species were found in Southampton Water in 2017;
- A total of 8,803 individual fish were caught across spring and autumn surveys;
- The catches were average in terms of fish abundance compared to previous years, however there was a notable reduction in the diversity of species caught;
- Juvenile bass numbers were lower in autumn compared to 2016, however, the catch was still higher than every other survey year.

Colourful wrasse: Corkwing (top) and Ballan (bottom) wrasse

An adult golden grey mullet

By-catch: juvenile squid

The survey underway at Itchen Bridge

Figure Soton Water 1 and 2 show the abundance of each species caught in the spring and autumn surveys in Southampton Water in 2017, and in the CSV otter trawl in autumn 2017, respectively. Where the bar appears absent, this is where only very few or single individuals were caught.

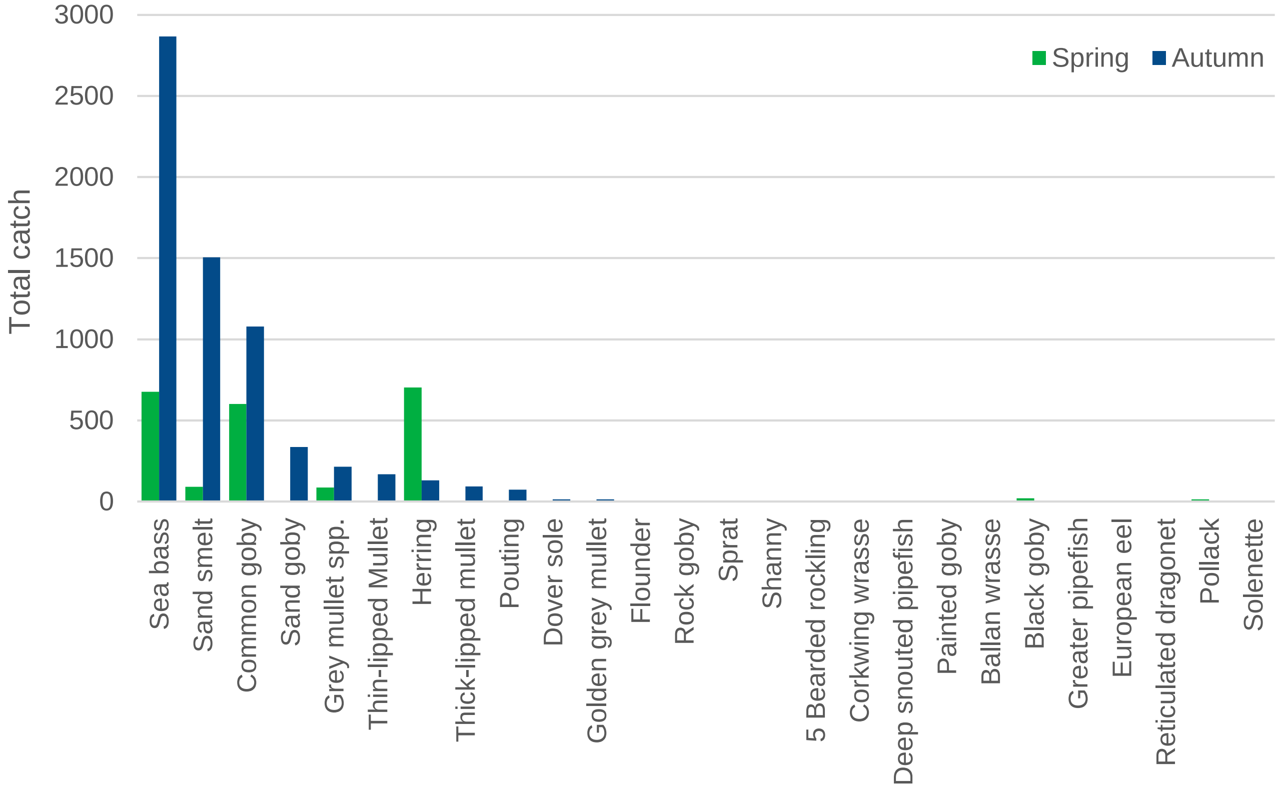


Figure Soton Water 1: Total number of fish caught in seine, fyke and beam trawls, Southampton Water TraC, 2017

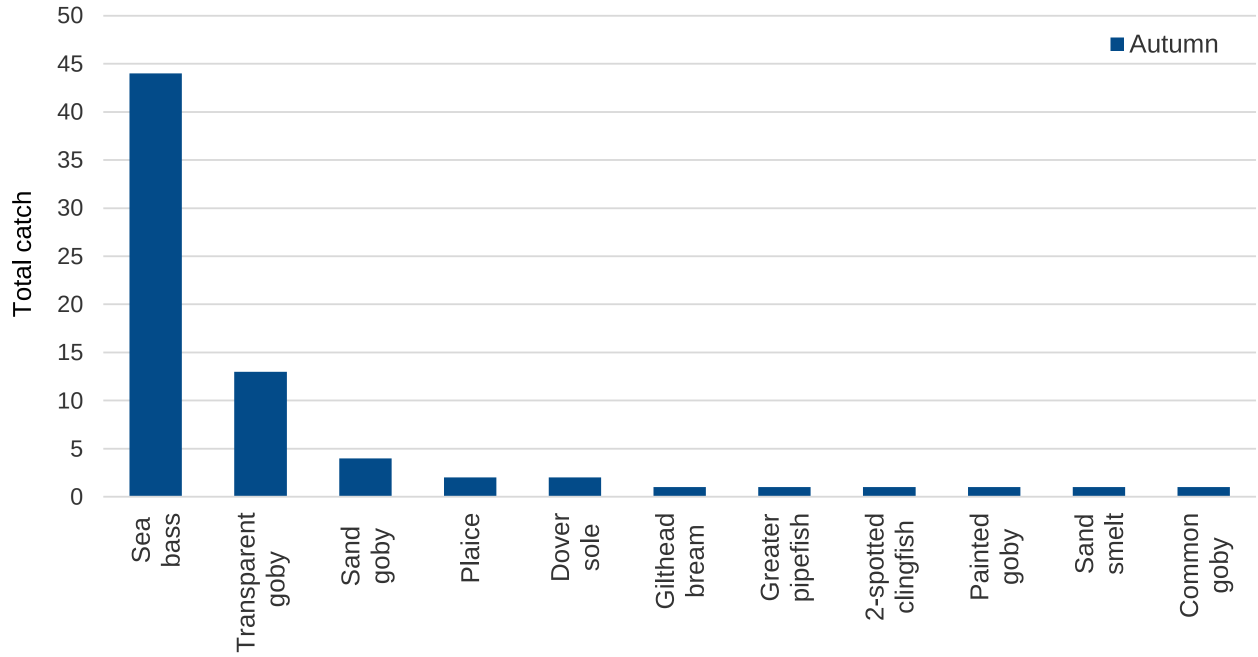


Figure Soton Water 2: Fish abundance, CSV otter trawl, Southampton Water TraC, autumn 2017

The autumn CSV otter trawl has taken place annually since 2009. Figure Soton Water 3 shows the catch-per-unit-effort (the number of fish caught per minute of trawling) for all fish caught during the autumn CSV otter trawl compared to flatfish species over time.

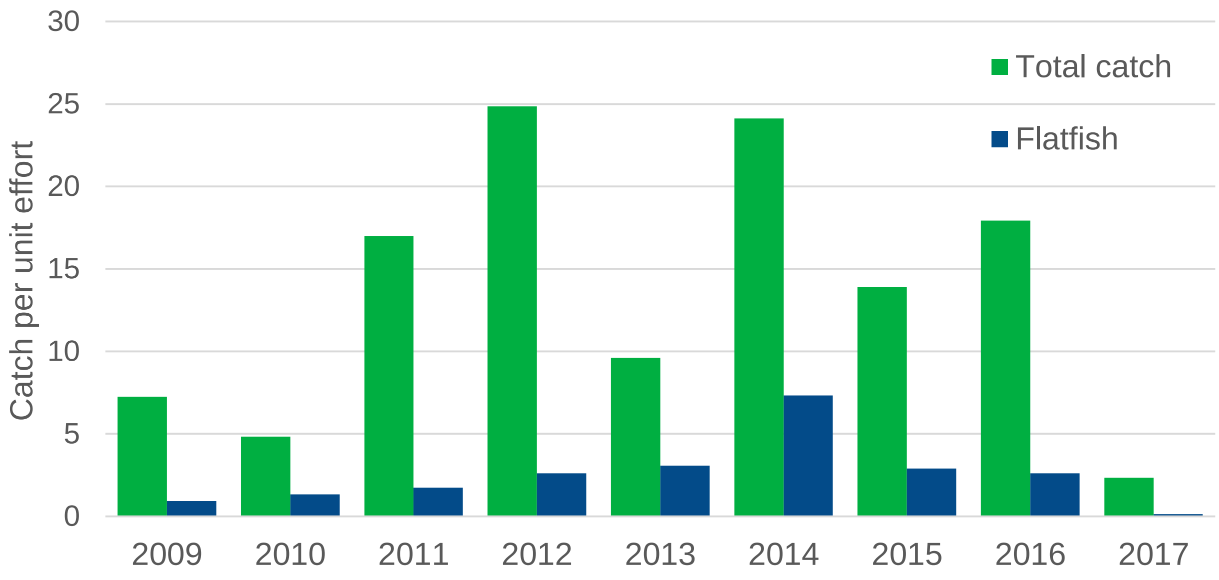


Figure Soton Water 3: Catch-per-unit-effort for total catch and flatfish, CSV trawl, 2009-2017

Likewise, the in-shore surveys have taken place since 2007 and Figure Soton Water 4 shows the total spring and autumn catch for seine net, beam trawl and fyke net surveys for each year from 2007 to 2017.

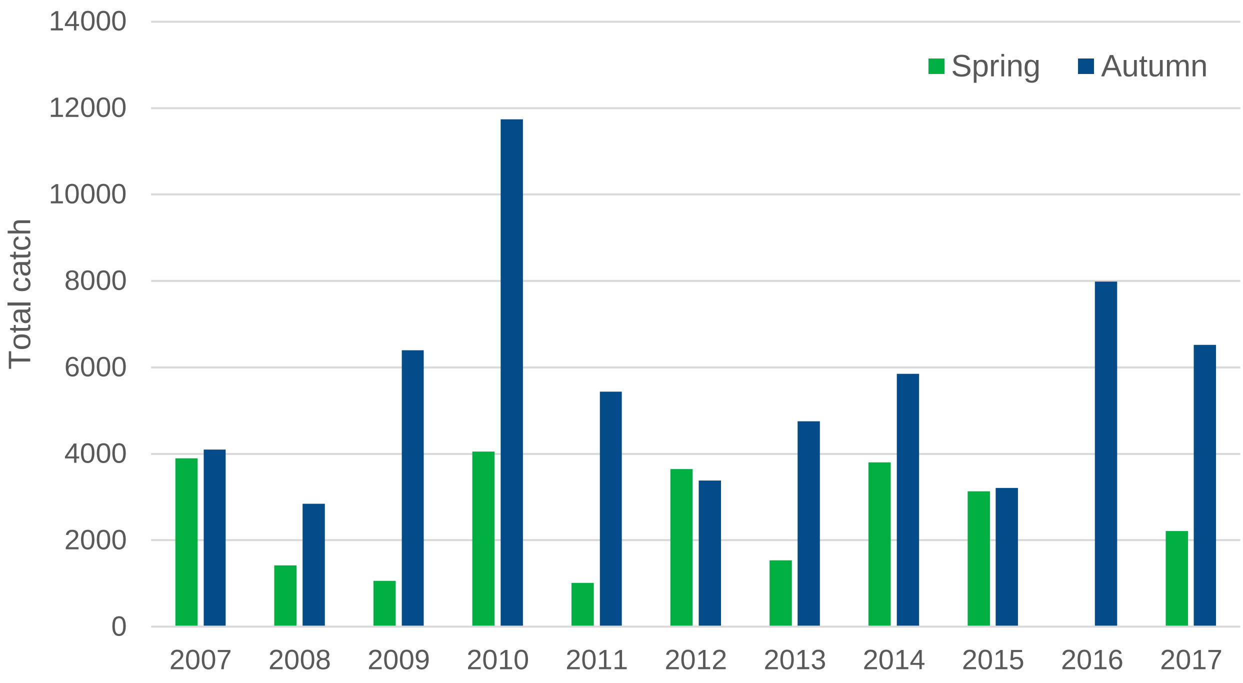


Figure Soton Water 4: Total catch for seine, fyke and beam trawls, Southampton Water, spring and autumn, 2007-2017

Fawley fyke: pouting

Bury Marsh fyke: greater pipefish

Goatee Beach: flounder

Manor Farm: juvenile sea bass

Colleagues from NE assist us with a beach clean prior to the survey at Itchen Bridge

Students from Sparsholt College get hands on at Western Shore

Sea bass

Southampton Water is an important sea bass nursery and Figure Soton Water 5 demonstrates how the spring juvenile bass catch relates to average winter sea surface temperatures, please note there was no survey in 2016.

The average sea surface temperature is calculated by taking an average of the mean monthly sea surface temperatures as recorded at the Hayling Island data buoy. The winter sea surface temperature uses data from November to March.

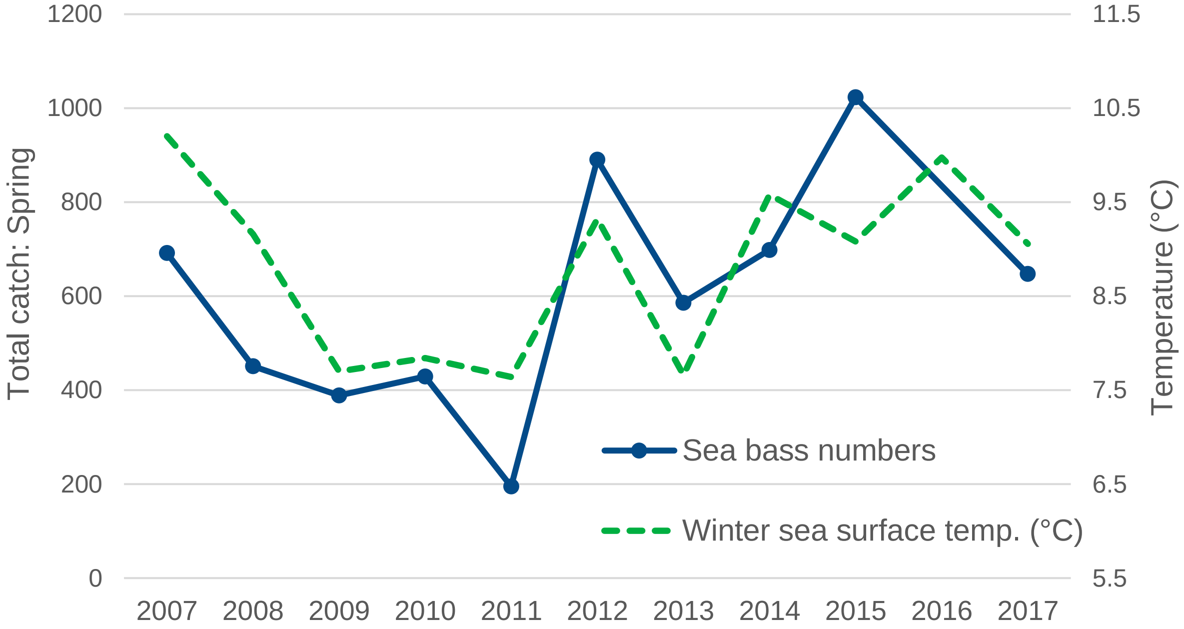


Figure Soton Water 5: Juvenile bass abundance in spring compared to winter sea surface temperature, Southampton Water, 2007 - 2017 (correlation = 0.64)

Discussion

In 2017, the overall catch was more diverse than in 2016, where only 19 species were found (although only autumn TraC surveys took place). However, we still caught fewer species than we would normally expect. Therefore, although overall fish abundance remains average, we caught fewer types of fish, just more of them.

Sea bass numbers were high in autumn, the second highest recorded. This is likely due to the warmer summer sea surface temperatures. Correspondingly, there was a reduction in the spring catch, which may have been be caused by the decrease in winter sea surface temperature.

CSV Trawl:

For the CSV autumn otter trawl, the catch was less diverse and fish were less abundant than expected. The catch-per-unit-effort was the lowest recorded as only 70 individuals were caught, compared to over 500 in 2016. Particularly low was the number of flatfish, the lowest ever recorded for a CSV trawl. However, a gilthead bream and a 2-spotted clingfish were caught for the first time.

The results of the 2018 autumn CSV trawl should reveal whether the poor catch was a one-off or indicative in a decline in species diversity.

CSV new finds: gilthead bream (left) and 2-spotted clingfish (right)

CSV by-catch: a bucket load of star fish

CSV challenging ID: transparent gobies

4.2. Adur Estuary

In 2017 we carried out 3 routine surveys on the Adur estuary; at Ladywell Stream, Old Toll Bridge and Kingston Beach. At each site we completed a seine net survey followed by a beam trawl.

As with Southampton Water, these Transitional and Coastal (TraC) surveys were completed in the spring and repeated again in the autumn in 2017. The locations of the survey sites are shown on Map Adur 1 below.

Map Adur 1: Fish monitoring sites, River Adur estuary, 2017

Summary

- We recorded 15 species in the Adur estuary in 2017 and a total of 12,745 individual fish were caught across spring and autumn surveys;
- Fish abundance was much higher than average, with a record total number of fish caught in both spring and autumn catches;
- Juvenile sea bass numbers were at their highest and their second highest recorded levels in spring and autumn, respectively;
- Grey mullet species dominated the catch in spring and pelagic species in autumn and garfish were recorded for the first time.

Figure Adur 1 shows the numbers of each species caught in spring and autumn in 2017. Where the bar appears absent this is where only very few or single individuals were caught. Please note that 'grey mullet spp.' refers to grey mullet that were too small to speciate in the field and these were typically less than 5cm long.

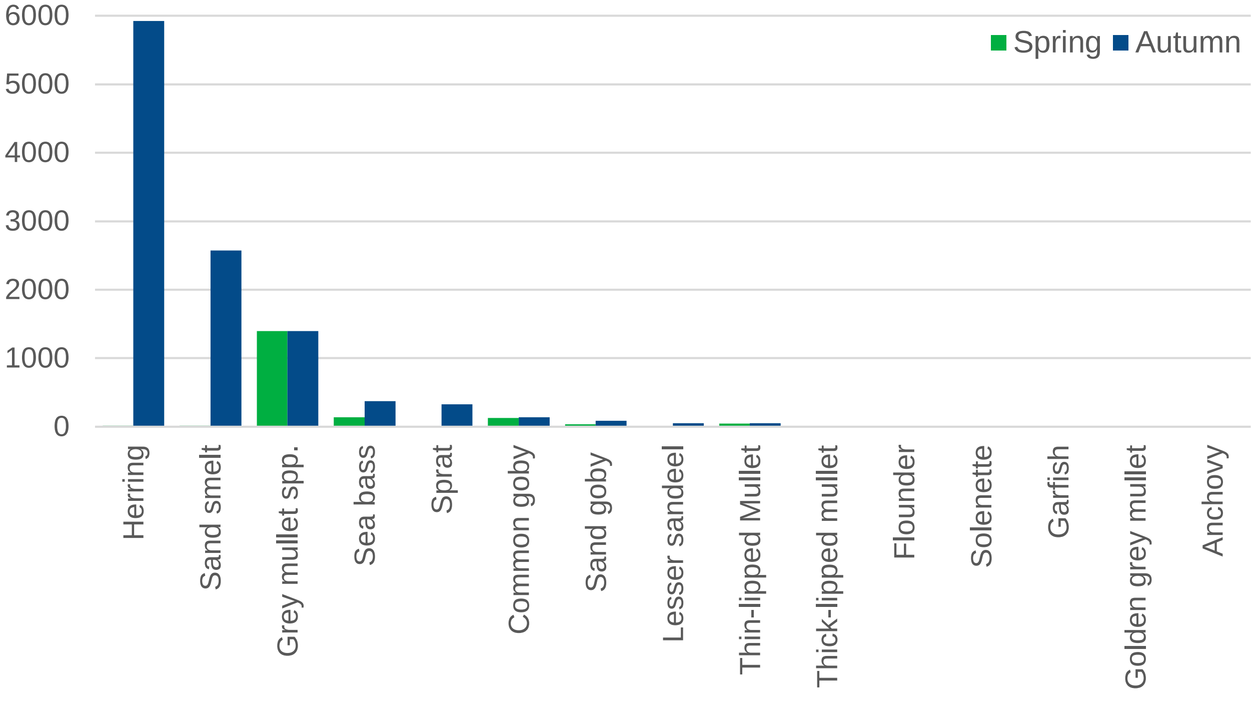


Figure Adur 1: Total number of fish caught in seine, fyke and beam trawls, Adur estuary, spring and autumn, 2017

Figure Adur 2 shows the size of the catch in 2017 and how this relates to the total catch in previous years. Please note that there was no spring survey in 2016.

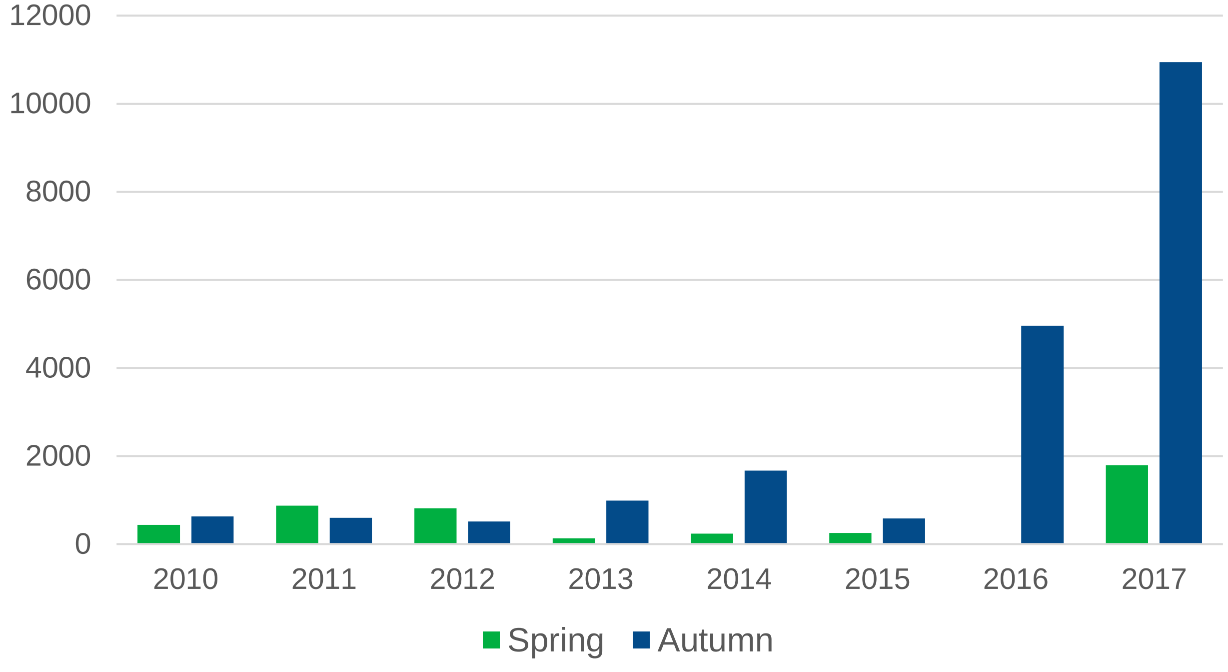


Figure Adur 2: Total catch for seine, fyke and beam trawls, Adur estuary, spring and autumn, 2010 - 2017

Kingston: sprat (top) vs. herring (bottom)

Kingston: 1st recording of garfish

Kingston: the single anchovy

Ladywell Stream: an adult grey mullet

Ladywell stream: sea bass

Old Tollbridge: record catch of lesser sandeel

Sea bass

Figure Adur 3 compares autumn juvenile bass catches to average summer sea surface temperatures. The average sea surface temperature is calculated by taking an average of the mean monthly sea surface temperatures as recorded at the Hayling Island data buoy from May to September.

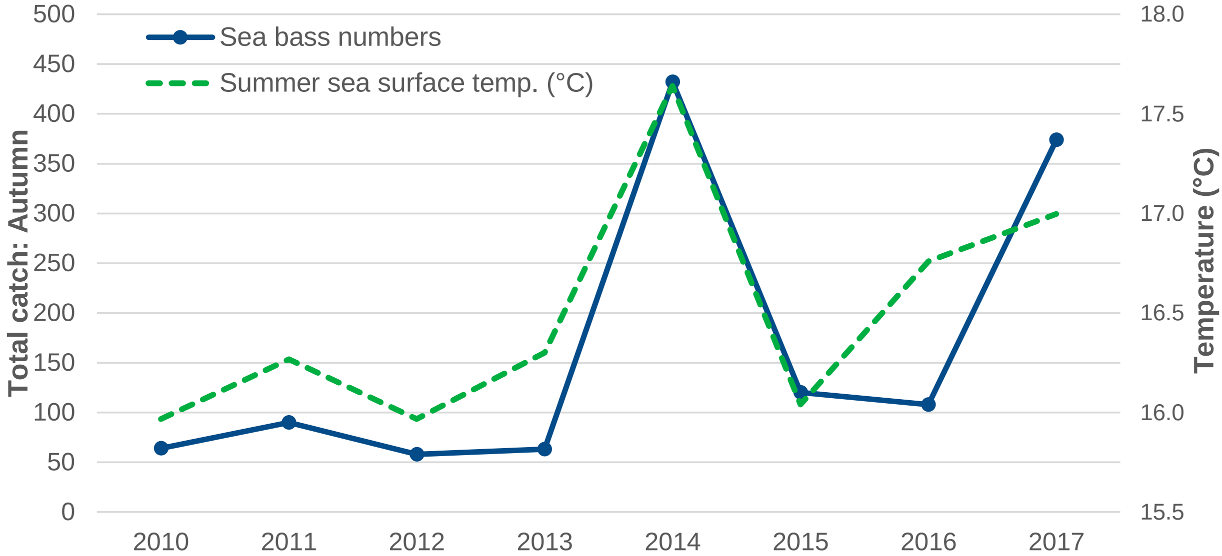


Figure Adur 3: Juvenile bass abundance in autumn compared to summer sea surface temperature, Adur estuary, 2010 - 2017 (correlation = 0.90)

Discussion

2017 was another record breaker for the Adur estuary, both in terms of species diversity and fish abundance. Fish numbers were much higher than average, with record total catches in spring and autumn. Juvenile sea bass numbers were at their highest and their second highest recorded levels in spring and autumn, respectively. This is likely due to the warm summer and winter sea surface temperatures. In autumn, catches of sand smelt, herring, sprat and lesser sandeel exceeded all previous records.

Quite surprisingly and for the first time, more fish were caught in the Adur estuary than across all the Southampton Water surveys with almost 13,000 individuals found across the three sites. This is mainly due to the unexpected and exceptional catch of 6,000 herring and sprat caught at Kingston Beach. In 2016, there were 4,000 herring caught there, so the autumn 2018 surveys will reveal whether this pattern continues.

Good seamanship:

We offered a tow to two distressed sailors during our survey at Kingston Beach in spring 2017

Looking forward

In 2018 we have a varied and interesting programme with a particular emphasis on coarse fishery surveys.

In summary, the programme in 2018 will include:

- Our annual Principal Coarse Reference surveys on the Western Rother;
- Principal Coarse Fishery temporal surveys on the Adur, Wallington, Hamble and Cuckmere, as well as Principal Coarse Fishery spatial surveys on the Test, Eastern Yar and Sussex Ouse;
- National Drought Monitoring Network surveys on the Test, Itchen and Sussex Ouse;
- Salmon Action Plan temporal surveys on the Test;
- Various WFD surveys across the catchment, including the New Forest and on the Isle of Wight;
- TraC surveys in the spring and autumn in Southampton Water and Adur estuaries.

Acknowledgements

As always, we would like to express our gratitude to all the landowners, keepers, fishing clubs and stakeholders who have allowed us riverbank access in 2016. It would be impossible for us to carry out these important surveys without your cooperation, assistance and local knowledge and it is greatly appreciated - thank you.

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