Rye Brook Pollution Investigations 2014-2017

Surrey Wildlife Trust

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Summary

Between 2014-2017, 'Riverfly' surveys by Surrey Wildlife Trust RiverSearch volunteers identified falls in aquatic invertebrate diversity at the Broadhurst Road outfall to the Rye Brook in Ashtead, and also a blackening of the substrate where pollution has been entering over a number of years. A high spike in Phosphate levels was also detected at the outfall following a 'mass water sample' in March 2017. The likely sources of pollution were misconnections from local properties to the rainwater sewage network as well as an oil leak from an electrical cable which was damaged during gas maintenance works. The oil leak has now been repaired by UK Power Networks, and Thames Water are currently in the process of carrying out a complex operation to locate the properties with misconnections into the storm sewer. Local organisations and volunteers are exploring the possibility of a more sustainable approach through the design and installation of a vegetated wetland system on Ashtead Common.

Introduction

The Rye Brook is a tributary of the River Mole and runs east to west from Epsom, through Ashtead and on to Leatherhead where it meets the river Mole just north of Leatherhead. Water Framework Directive (WFD) monitoring, carried out by the Environment Agency during 2016, found the stream to be failing for invertebrates and phosphate, with the phosphate partly to blame for the invertebrate failure.

The Rye is vulnerable to pollution where it flows through the urban area of Leatherhead however the dominant issue has been in the suburbs of Ashtead, where for a number of years pollution has been entering the Brook from a storm sewer outfall between Broadhurst Road and Ashtead Common.

Volunteers have been working to restore instream habitat in the Rye Brook as part of the 'Rye Brook Restoration Project, and more recently the 'Rye To Good Project'. The Corporation of London also carried out habitat improvement works in 2004. However the water quality issue is severely hampering efforts to bring the Brook up to a good ecological status in line with the WFD objectives.

Investigations by Surrey Wildlife Trust RiverSearch volunteers between 2014 and 2017 have now revealed the impact of the pollution from the outfall on the local aquatic ecology. This report has been put together using data collected by those volunteers from 3 years of aquatic invertebrate sampling and one mass water quality sampling day.

RiverSearch

RiverSearch is a Surrey Wildlife Trust citizen science project which uses trained volunteers to map, monitor and restore Surrey's rivers. Part of the monitoring involves volunteers carrying out kick samples in the river to test water quality using the Riverfly Partnership methodology.

The Riverfly methodology uses 8 family groups of pollution sensitive macroinvertebrates which are present in the river year round. These include mayflies, caddisflies, stoneflies and freshwater

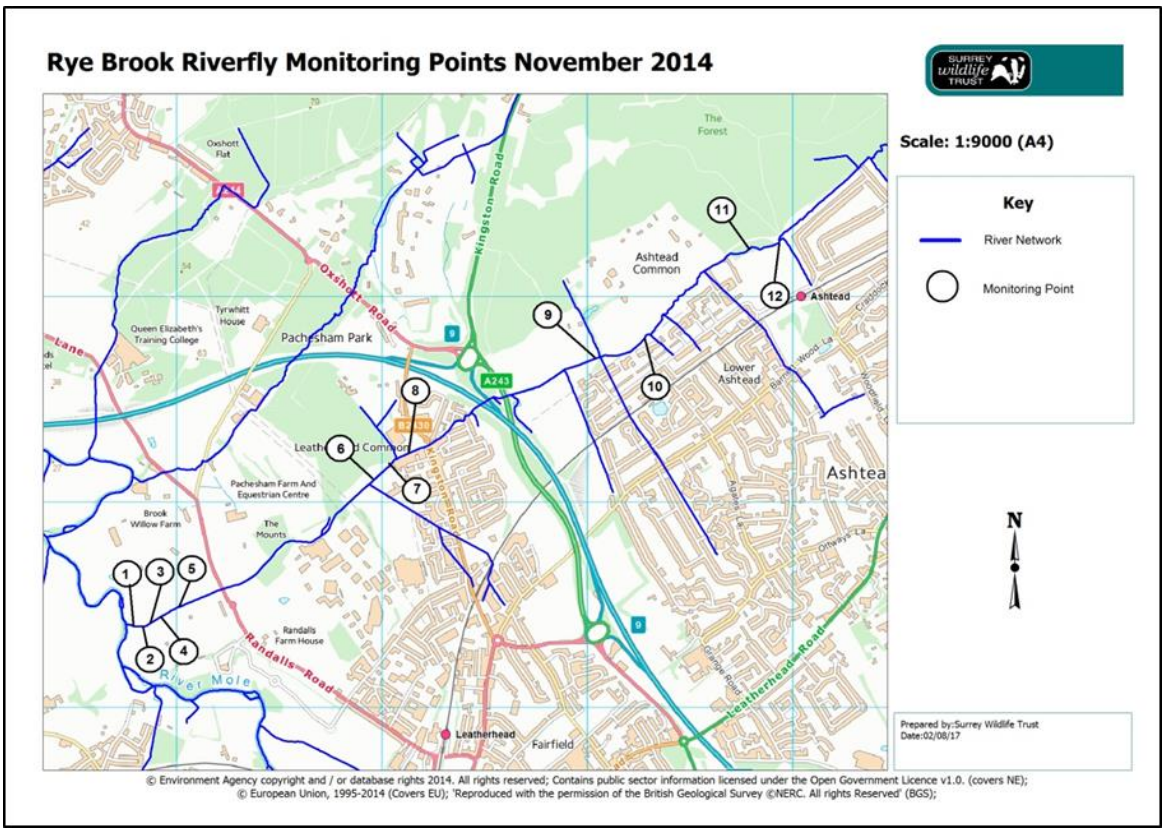
shrimps. The presence or absence as well as abundance of these species is used to highlight water quality issues. Individuals are counted from each of the 8 groups and scores assigned as follows:

No of Individulas	Score (RMI)
1-9	1
10-99	2
100-999	3
>1000	4

Rye Brook surveys 2014

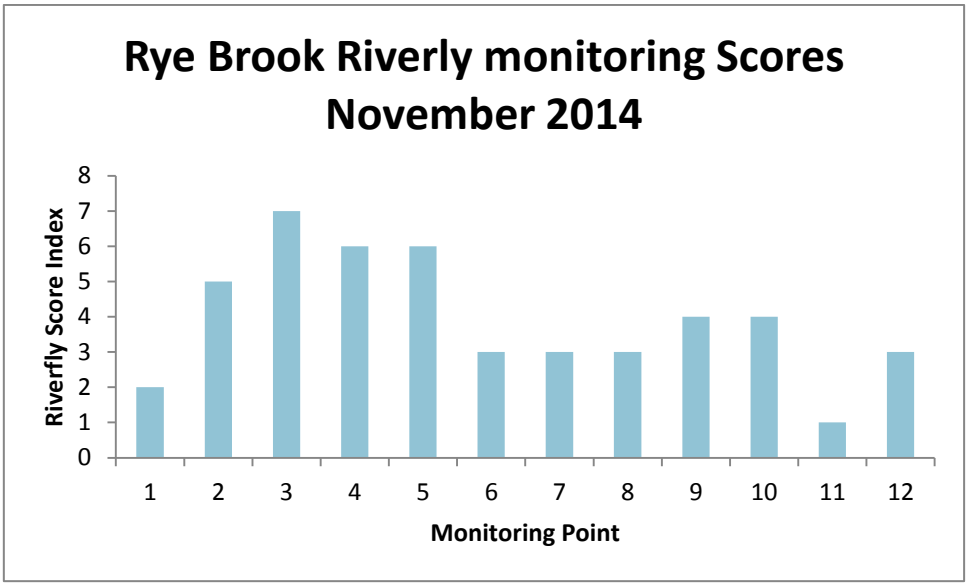
In November 2014, RiverSearch volunteers carried out a number of Riverfly surveys at different points across the Rye Brook. The aim was to sample aquatic invertebrate populations across the length of the Brook in order to pin point pollution issues.

Map 1 below shows the twelve sampling points:



Map 1: Sampling points across the Rye

Graph 1 below shows the results of the 2014 surveys:



Graph 1: November 2014 Riverfly scores

Sites 1-5, located across River Lane Meadows, supported a good amount of suitable habitat as well as fewer pressures from the built environment. Scores peaked at 7 which were the best recorded across the whole Brook although lower than average for this type of stream. The score at site 1 was low due to poor gravel habitat on the riverbed.

Sites 6 – 12 produced scores between 2 and 4. These sites have urban diffuse pressures from both Leatherhead and Ashtead and the scores indicated a water quality issue. Particularly poor was site 11 at Ashtead Common. This site was located a short distance downstream of the Broadhurst Road storm sewer at TQ17955 59309 which was known to be discharging pollution into the Rye.

Monitoring the outfall

Volunteers returned to the site at Ashtead Common (site 11) in February 2015, to record the extent of the pollution issue from the storm sewer. Sites of similar habitat were sampled up and downstream of the outfall.

Prior to sampling, it was noticed that organic material was coating the river bed at the point of discharge from the outfall (Image 1). This same point released a black oily fluid when the bed gravels were disturbed during the sample.

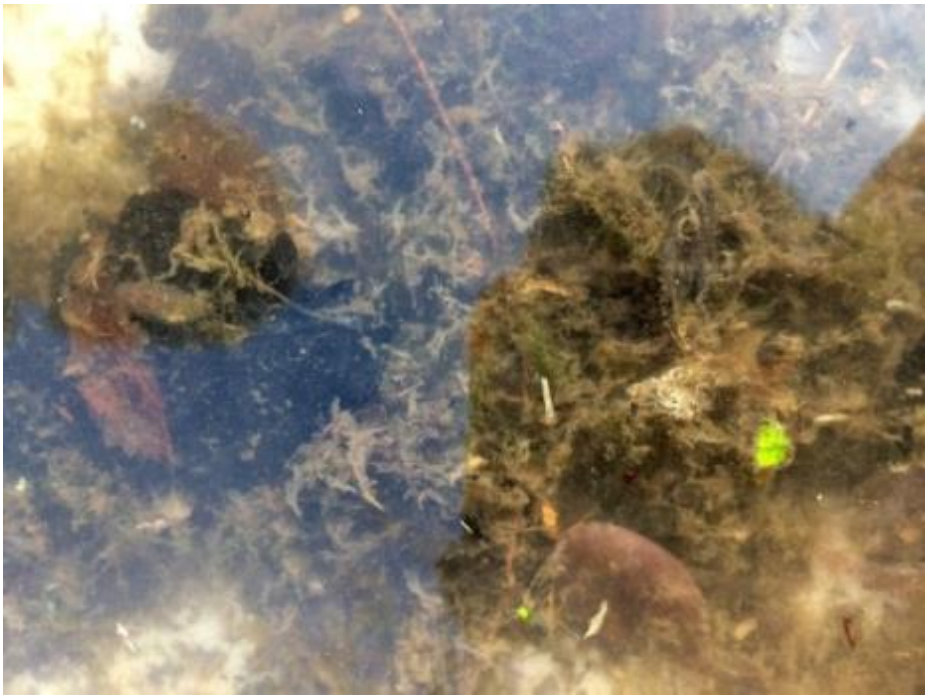
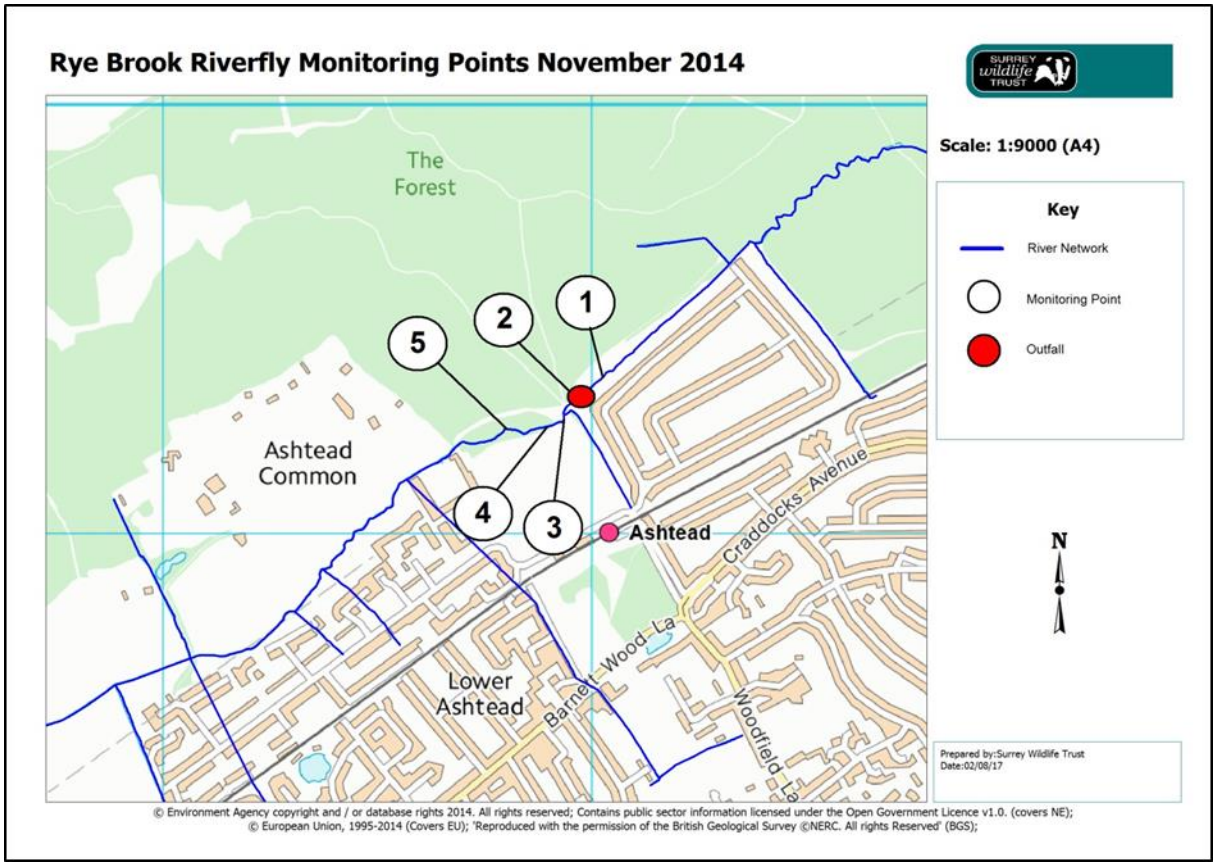


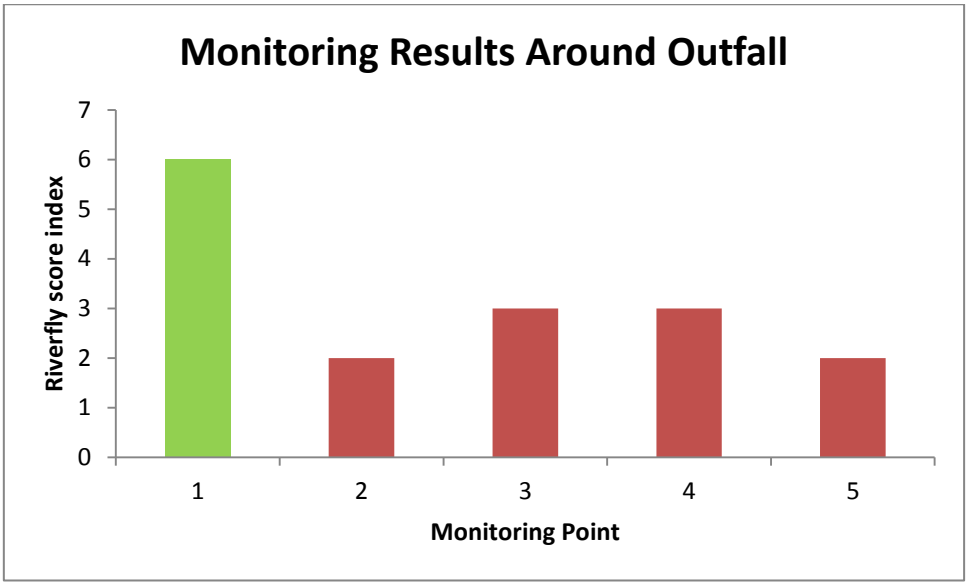
Image 1: Organic material coating the bed

Sampling sites were chosen both up and downstream of the outfall. Their locations are shown on map 2 below:



Map 2: Sampling sites around polluting outfall

Graph 2 displays the results recorded at each of the monitoring points:



Graph 2: 2015 monitoring results around suspected polluting outfall

Sample Point	Location	Score
1	5m upstream of outfall.	6
2	Point of discharge.	2
3	30m downstream of outfall	3
4	60m downstream of outfall	3
5	200m downstream of outfall	2

Table 1: Sample point locations

A score of just 2 was recorded at the outfall, with only 7 individual invertebrates present in the sample. Sites 3 to 5 extended downstream up to 200m from the outfall and showed little improvement. No further surveys downstream were carried beyond point 5.

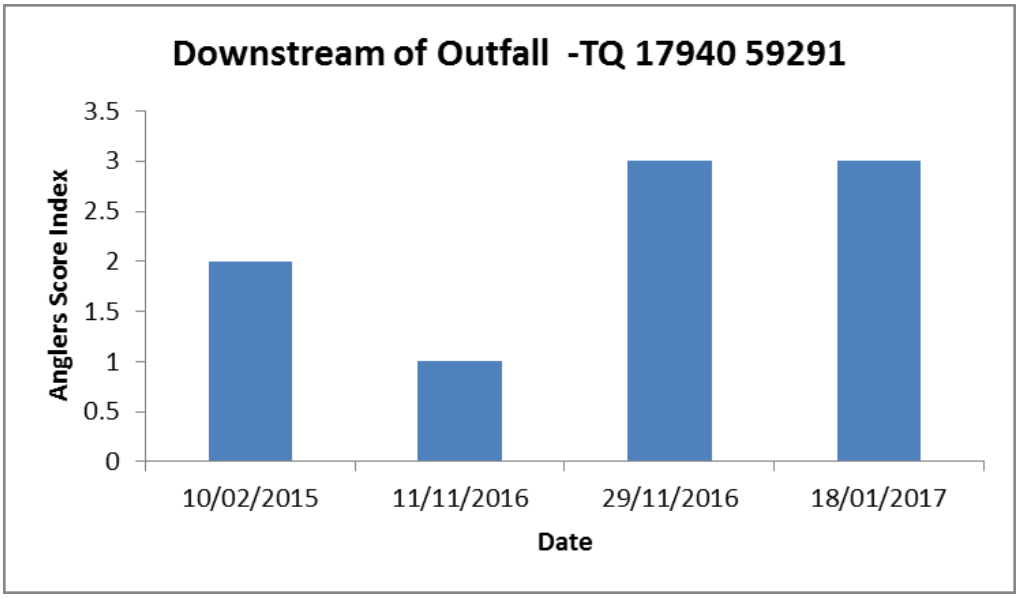
Point 1 was located just 5m upstream of the outfall and showed a vast improvement in the invertebrate population with a score of 6 and over 200 stoneflies present in the sample.

The results indicate that over a distance of only 5m the invertebrate population had crashed suggesting that the outfall was having a serious impact on life in the stream.

Surveys continued at point 3 along the Rye Brook between late 2015 and early 2017. The results are as follows:

Below Outfall

Graph 3 shows that scores directly below the outfall have shown little improvement over the last 2 years due to the continued pollution entering the Brook from this point.

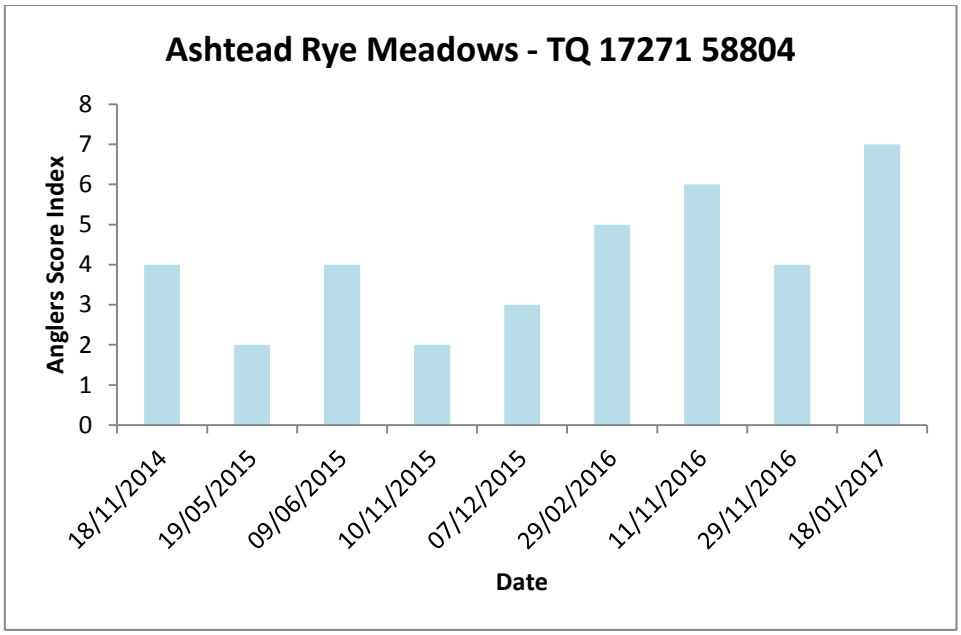


Graph 3: 2015- 2017 results downstream of outfall

Average score = 2.25

Ashtead Rye Meadows

Monitoring has been carried out regularly at Ashtead Rye Meadows which is located 900m downstream of the polluting outfall. Scores remained poor for the whole of 2015 however from early 2016 a slight improvement has been noticed with the highest score yet (7) being recorded in January 2017.



Graph 4: Ashtead Rye Meadows monitoring results 2014 - 2017

Average score = 4.1

The Rye at Tesco

Regular monitoring has also been carried out on the Rye as it runs past Tesco supermarket. This monitoring site is 2.25km downstream from the outfall. The built up area around this stretch leaves it vulnerable to urban diffuse pollution which is reflected in the scores. For example, the scores dropped from a high of 8 in June 2016 to a low of 3 in November 2016, indicating an issue at some point between these dates. The average score however is higher than the other 2 sites.

Graph 5: Rye at Tesco monitoring results 2014 - 2017

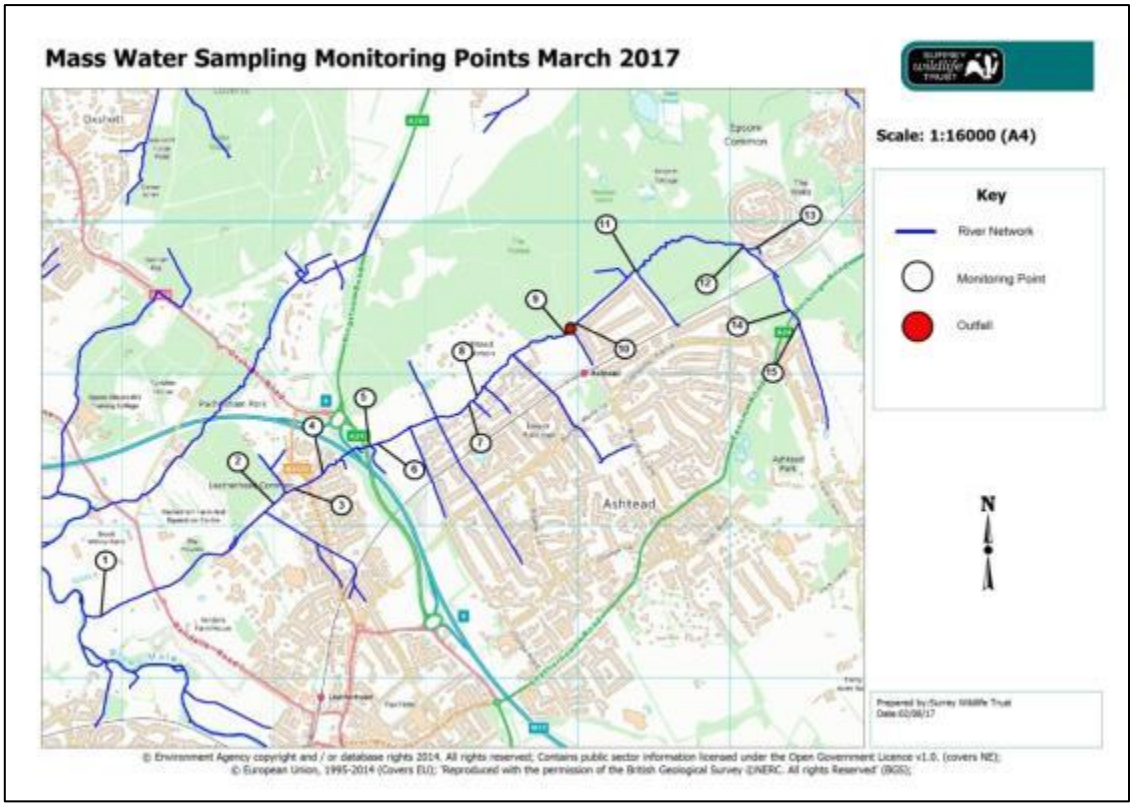
Average score = 6.25

Water quality sampling along the Rye.

In March 2017 RiverSearch volunteers teamed up to carry out a mass water sample across the length of the Rye Brook to take a snap shot of the water quality at a particular moment in time.

The volunteers collected water samples to test for ammonia and phosphate which are both linked to pollution.

Map 3 below shows the points which were sampled by the volunteers:

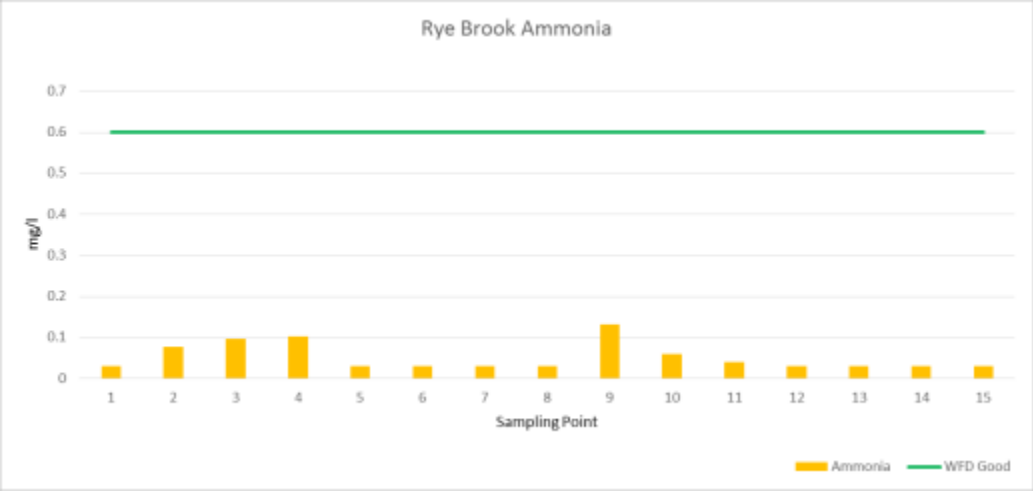


Map 3: Mass water sample monitoring points

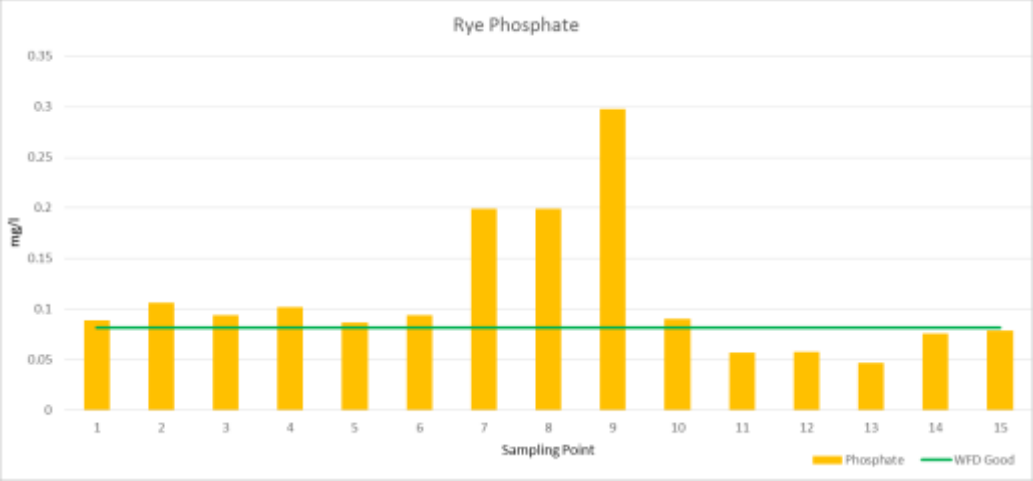
Point	Location
1	River Lane Meadows
2	West Hill School
3	Tesco
4	Rye Brook Road
5	Kestrel Field downstream of M25 outfall
6	Kestrel Field upstream of M25 outfall
7	Ashtead Rye Meadows downstream of outfall
8	Ashtead Rye Meadows upstream of outfall
9	Wood Field downstream of polluting outfall
10	Wood field upstream of polluting outfall
11	Ashtead Common
12	The Wells
13	The Wells
14	Dorking Road- downstream side
15	Dorking Road-upstream side

Table 2: Monitoring point locations

The samples were sent off to the National Laboratory Service for analysis:



Graph 6: Ammonia levels across the monitoring points



Graph 7: Phosphate levels across the monitoring points

Graph 7 shows that phosphate levels increase roughly by a factor of 3 from 0.09mg/l to 0.3mg/l immediately downstream of the storm sewer outfall (point 9), indicating that the discharge is polluting the stream. Phosphate returned to a more stable level of around 0.09mg/l at Kestrel Field (point 6), 1.7km from the outfall. Levels at Ashtead Rye Meadows (point 7) were still high at 0.2mg/l, over 1km downstream of the outfall.

Phosphate levels rise again slightly as the Rye runs into the urban stretch at Leatherhead.

Ammonia remained within permitted amounts across the whole of the Rye however the results show roughly a 2 fold increase at the Outfall (point 9) from 0.06mg/l to 1.3mg/l. Levels drop to a low of 0.03mg/l across Ashtead Rye Meadows and Kestrel Field however increase to 0.1mg/l when the Rye runs into the urban stretch at Leatherhead (point 4).

Conclusion

A spike in phosphate levels at the storm sewer outfall, alongside the poorest recorded Riverfly results, indicate that pollution is entering the Rye at this point. Across the Brook the phosphate readings appear to have a negative correlation with the invertebrate scores i.e. where phosphate readings are higher, macro invertebrates are struggling.

The Riverfly data suggests that the scale of degradation caused by the pollution extends far downstream. It has not been possible to map the full extent of the damage however the poor Riverfly results and high phosphate readings at Ashtead Rye Meadows likely indicate that the pollution is affecting the Rye for up to and possibly over 1km.

Ammonia remains within permitted limits however does show an increase at the outfall.

2km downstream at Tesco, the average Riverfly scores are better, despite the fact the stream runs through the most built up area along the Rye. This stretch however appears to be affected by intermittent pollution issues and phosphate is higher than just upstream.

Remedial Action

On 19 June 2017 Surrey Wildlife Trust organised a meeting of the 'Rye To Good' Project Partners to discuss possible actions to remedy the situation which was attended by RiverSearch monitors, Friends of Teazle Wood, Friends of Ashtead Rye Meadows, The Corporation of London (Ashtead Common), and South East Rivers Trust. The EA sent an update on communications with Thames Water and UKPN about the outfall.

Whilst pleased that issues at the Broadhurst Culvert where at last being addressed, the group felt a sustainable approach to the management of the issues was needed. This would ensure that improvements towards Good Ecological Status, currently being pursued by the project partners, were not subject to future deterioration from new misconnections and cable leaks. It was noted that the cost of periodic maintenance of a vegetated wetland system was likely to be less than that of remediating the impact of the pollution incident. A project to install a vegetated wetland treatment pond on Ashtead Common was proposed.

The Environment Agency subsequently reported that UKPN and Thames Water have identified the location of the leak from their cable. They have now contained the leak and made a repair. Thames Water has also identified a number of mis-connections in the rainwater sewer network that flows out of the outfall and are working to track down the exact locations and get them rectified. The mis-connections are likely to be from properties that have plumbed in appliances like washing machines to the rain water drain rather than the foul sewer. Locating and rectifying these misconnections can take time but we are now on the way to getting the outfall cleaned up.

Despite these actions the Project Partners felt, for the reason outlined above, that proceeding with working up the vegetated wetland proposal was desirable and South East Rivers Trust were asked to draw up options and costings for delivery.

Acknowledgements

This report would not have been possible without the dedication of Caroline Cardew Smith, Nigel Bond and Keith Lelliott whose commitment to regularly monitoring the Rye Brook over the past 3 years has yielded a huge amount of data.

Peter Ehmann of the Environment Agency, for supporting staff and volunteers.

Jim Jones of Surrey Wildlife Trust, for coordination of the mass water sampling.

Graphs 6 & 7 put together by Peter Ehmann of the Environment Agency.