

Whitewater Valley Preservation Society (WVPS) commissioned

River Whitewater River Fly Survey 2017

(from source to confluence with River Blackwater)

Introduction to WVPS

WVPS was founded in 1980. Its objectives are to defend the valley from inappropriate development and its resultant impact on the river, and to protect and improve the ecology of the river. We have some 250 members who are residents and riparian owners including valley farmers.

WVPS has been engaged by South East Water as a consultee in the production of the last two 5 year Water Resource Management Plans (WRMP). The Society has actively been involved with the EA and Natural England in the implementation of the Water Framework Directive and the production of the Loddon Catchment Management Plans. It also campaigned for the river during Catchment Abstraction Management Strategy reviews and subsequent Restoring Sustainable Abstraction programmes, which finally resulted in a decision by Natural England that South East Water could no longer assume long term abstraction from the Greywell source.

Salmon and Trout Conservation UK (S&TC) Riverfly census 2015

In 2016, several WVPS committee members read reports in The Times about Salmon & Trout Conservation UK's River Fly Census.

In this report, we have quoted extensively from S&TC's "River Fly Census 2015" to describe the approach and the method. We are most grateful for their help.

The basis of the River Fly Census is that "River flies matter: they and other invertebrates are excellent indicators of water quality, in that they spend most, sometimes all, of their life in water; and they are vital base components of the aquatic food chain. They are leading indicators of ecological distress. Salmon & Trout Conservation UK set aims for their riverfly census which are: to provide a biological picture of the water quality in a river from which they could gauge the river's ecological health; highlight any problems the river might be facing; and take a first step towards identifying solutions to those problems."

As a result of the first S&TC national survey, which shone a light on largely hidden problems particularly in chalk streams, WVPS approached S&TC with a view to having the Whitewater included in the 2017 programme. This required funds, and WVPS is very grateful to South East Water, Hampshire County Council, Hook Parish Council and the Greywell Flyfishers for each adding their contribution to the Society's own funds to commission a survey in 2017, at a total cost of £3,000.

The work on the Whitewater in 2017 was carried out by S&TC and their partner Aquascience using their scientific methodology.

Methodology

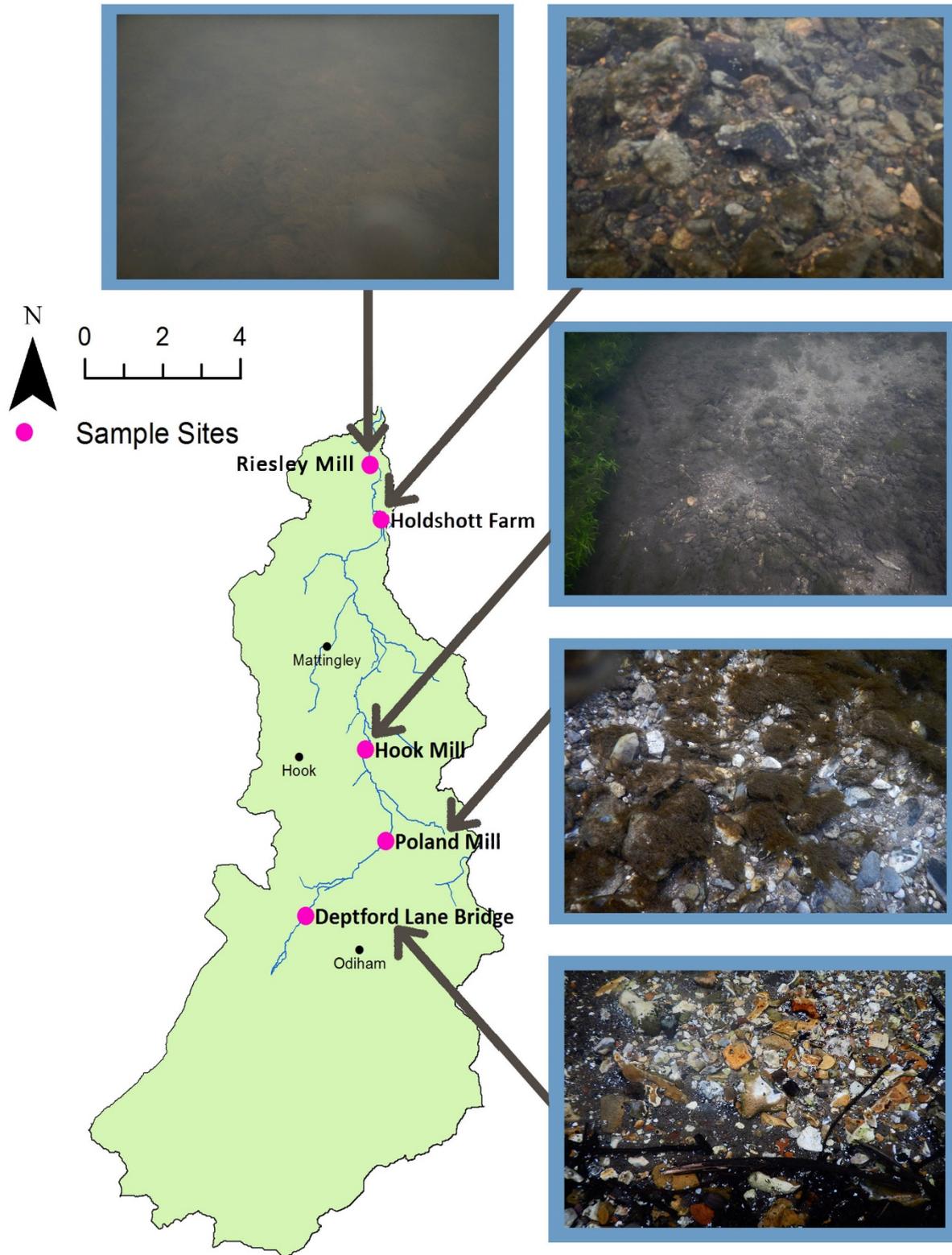
S&TC's fundamental approach is to use survey results to tackle problems identified in our rivers. They have a five point plan of action involving working with the EA, but also challenging them where necessary, especially over the urgent need to identify and regulate polluters.

Where appropriate they use chemical sampling to zero in on the causes of water quality problems; they are researching how phosphate and sediment harm the early life stages of aquatic invertebrates using blue winged olives as the research species - a once common fly which is now in almost universal decline; they work with the EA to seek ways to take full account of the impact of phosphate and sediment in particular in the official ecological classification of rivers; they challenge the government and its agencies to tackle the sources of these and other stresses on River systems; finally they are keen to extend the range of rivers as well as the life of the survey, all of which requires funding.

The method adopted is to collect invertebrate samples from the 5 selected sites in a river in both spring and autumn. S&TC UK uses the same three minute kick sweep and one minute hand search sample protocol that the EA employs in its own invertebrate monitoring to aid compatibility where relevant. In a 3 minute kick a sweep sample, the river is typically sampled for 15 seconds at 12 points at the sample site to provide a habitat proportional range of sub-sample habitats. At each of these 12 points the sampler stands up-stream of a submerged net and gently kicks the river bed and sweeps through submerged or marginal vegetation using hands or feet. The invertebrates wash into the net. The samples are then taken from the river with the proportion of live animals recorded in situ, fixed in alcohol and sent to the laboratory for analysis by professional freshwater biologists at Aquascience Consultancy Ltd. They use cutting edge biometric techniques to produce detailed ecological information for each site. This species level approach is a much more powerful tool than traditional family level analysis to highlight the pollution threats to our rivers.

Comparing the results of the National 2015 Riverfly Census it is apparent that the Water Framework Directive measure of water quality struggles to capture the often combined impact that nutrients, sediment and organic enrichment are having on the invertebrate life in our rivers. This seems especially true of the chalk streams as well as of some other rivers across the country.

Apologies to Riseley Mill for the mis-spelling below



River Bed Photographs

SPRING 2017

River Whitewater 2017 Results Summary:

The River Whitewater may look clean and beautiful but appearances can be deceptive. Clear does not necessarily mean healthy.

WVPS in conjunction with S&TC selected the 5 locations suitable for survey from the source at Greywell to the confluence with the Blackwater at Riseley.

The detailed results were then analysed at a laboratory and a series of charts produced, using data collected from other chalk streams to suggest conclusions which could be drawn from those comparisons.

Invertebrate scores in the Whitewater are all low for a river of this type.

EPT scores – Ephemeroptera (up-winged flies), Plecoptera (stoneflies) and Trichoptera (caddisflies) - should be around 20, but the highest is 13, and one location scores only 6.

Annual Mayfly species should score 10 but the actual scores were 7, 5, 3, 2 and 1.

Biometric measures use the different sensitivities of aquatic insects to subtle, but lethal, impacts from: sediment, phosphate, organic enrichment and river flow. Species level analysis provides a measure of the impact of these pollutants at each site.

Results show that most sites exhibit sediment pressure in Spring and Autumn.

Phosphate issues are more pronounced in the Autumn and are at or above the line of concern at Deptford Lane Bridge and Holdshott Farm.

Organic Enrichment from slurry and possibly untreated effluent is visible at all sites.

Autumn results reflect the impact of lower flows concentrating the sediment and phosphate load, although the Spring results are not much better.

See the Appendix below for details of the 10 measures of ecological status used to analyse each sample.

S&TC uses a standard report to show these results. That report, including a map showing sampling sites, is included below.



Salmon & Trout Conservation

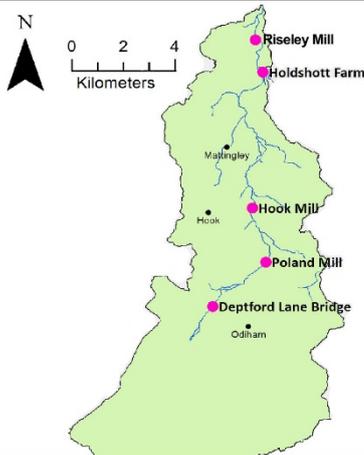
RIVERFLY CENSUS



2017 UPDATE

River Whitewater

Sample Sites



We have five sample sites in total. All sites are kick sampled twice a year (Spring & Autumn) and the samples are analysed in a laboratory.

Due to lack of visibility and safety reasons Riseley Mill could not be sampled properly in Autumn. For this site Autumn results are blank on the graphs.



INVERTEBRATES

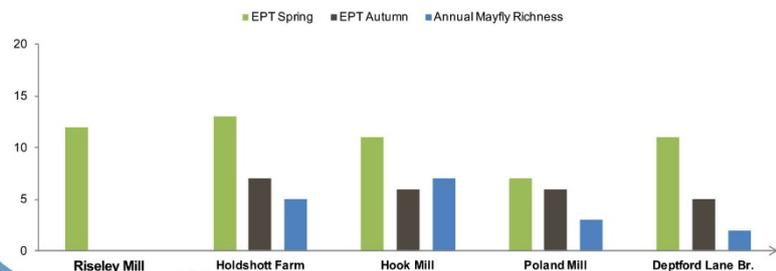
Riverflies (mayflies, stoneflies and caddisflies) are sensitive to pollution. The number of different riverfly species present in a three-minute kick-sweep sample is a fundamental measure of a river's ecological health.

We use a measure of riverfly species richness known as **EPT**. This is derived from the Latin names of the three main riverfly families - Ephemeroptera, Plecoptera and Trichoptera.

The invertebrate scores are all low for a river of this type.

In a healthy system we would expect a spring EPT of around 20 and an annual mayfly species target of 10. All sites fail on both counts.

We were only able to sample Riseley Mill in the spring, hence the empty space on the graph.



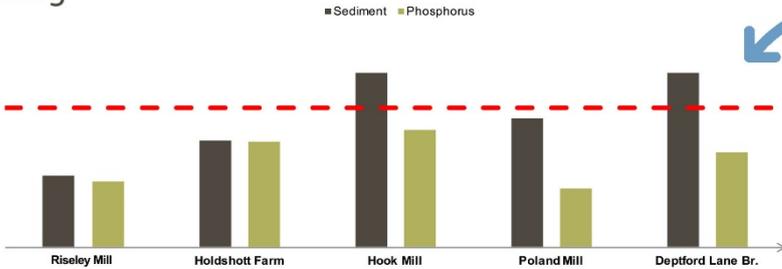
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BIOMETRICS

Biometrics exploit the different sensitivities of aquatic insects to subtle but lethal impacts from **sediment, phosphate (P), organic enrichment** and **flow**. Species-level analysis provides a measure of the impact of these pollutants at a sample site.

The charts show spring and autumn biometrics for sediment and P (the main pollution culprits) at each site. Sites with results above the red line indicate sediment and P are having a potentially detrimental impact on the Whitewater's ecological condition.

Spring

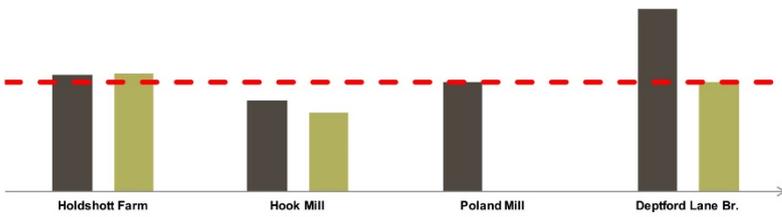


The results show that most sites are exhibiting sediment pressure (near or above the red line) in spring and autumn.

Phosphate issues are more pronounced in autumn and are at or above the line of concern at Holdshott Farm and Deptford Lane Bridge.

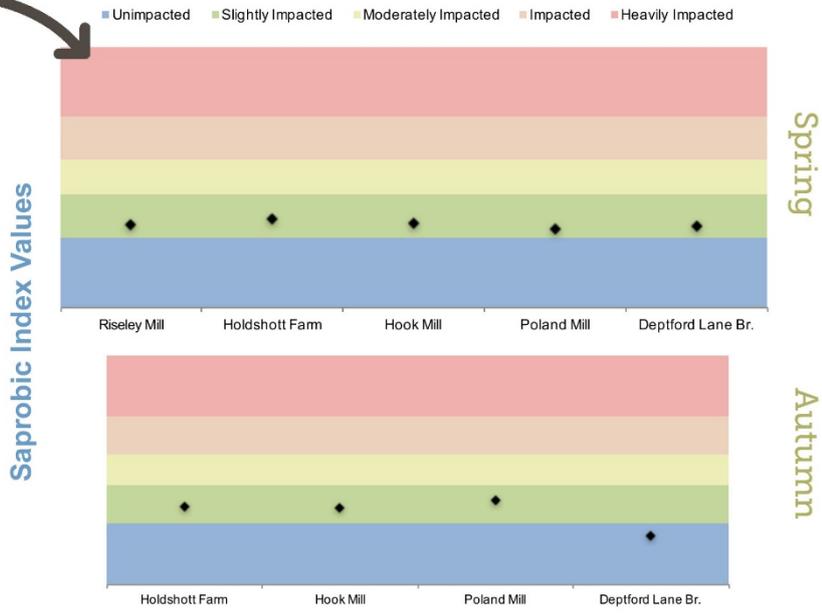
Autumn results reflect the impact of lower flows concentrating the sediment and phosphate load. Despite this, the spring results are not much better.

Autumn



The sites also all show signs of slight organic enrichment measured by the Saprobic index.

Organic enrichment results from slurry and, possibly, septic tanks.



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Conclusions

The survey results show a serious divergence from the ecological status to be expected for a designated SINC.

Issues identified include discharges to the river from Sewage Treatment Works, agricultural run-off, other sources of phosphates, subsidiary flows into the river, road run-off, siltation and flow.

The fact the results appear to be consistent along the entire 9 mile stretch of the river suggests that the factors affecting the river quality will need further study.

Future Plans

Since 2017 was a low flow year it was recommended that WVPS should endeavour to find funding for a second year of surveys.

WVPS is grateful to South East Water and Hampshire County Council for committing funds to allow the Society to commission a new series of surveys in similar locations in 2018.

Meanwhile, the 2017 results will be circulated to the Environment Agency, Natural England, Hampshire Wildlife Trust, The Wild Trout Trust, South East Water and Thames Water, who will be invited to comment with the intention of identifying immediate actions which can be undertaken by the responsible bodies to start to address the issues.

WVPS will start to organise river walks during wet periods to identify both where run off is occurring and the possible sources of sediment and pollution. This will be in conjunction with desk work to identify licensed dischargers so that monitoring can take place.

Appendix

Detailed description of the S&TC analysis, which is performed at species level providing much higher resolution than family level data.

The difference between species and family level analysis is akin to the resolution of a microscope compared to a magnifying glass. The species level analysis tells us more about the overall health of a river including the subtle early effects of decay. For example, certain species of river flies such as the mayfly (*Ephemera danica*) or the large dark olive (*Baetis rhodani*) are more tolerant of siltation than the blue winged olive (*Serratella ignita*) or Southern Ireland blue (*Baetis niger*). So merely counting the number of olive nymphs will not tell you much about the impact of siltation. The same is true of other forms of stress.

The S&TC analysis derives 10 measures of the ecological status of each sample site from the site's species-level community fingerprint. There are six traditional measures and four biometric measures.

The six "traditional numeric measures" which include species richness (the number of species) and abundance (number) provide variable measures of ecological condition and broad-brush water quality. These are the Biological Monitoring Working Party (BWMP) score, Average Score Per Taxon (ASPT), species richness (R), Ephemeroptera-Plecoptera-Trichoptera (EPT) richness, Community Conservation Index (CCI) and total invertebrate abundance. Further information on these is available on request.

The four biometric measures provide a fingerprint of the river's ecology in terms of the impact of four measures of environmental stress:

Nutrient pollution (Total Reactive Phosphorus Index or TRPI)

Organic pollution (Saprobic Index or SI) from, for example, slurry

Sedimentation (Pressure Sensitive Index or PSI) from, for example, agricultural runoff

River flow (Lotic Invertebrate Index for flow evaluation or LIFE) from, for example, water abstraction.

Different species of aquatic invertebrates have different tolerances to these four stress metrics. So, qualifying (and quantifying) the presence, absence and number of a particular species and then comparing with four stress indices creates a biometric fingerprint of the river sample point. These indices correlate closely with chemical analysis results. For example, the high levels of P (phosphate) detected in chemical sampling on the Upper Itchen correlate with the biometric results from the same site.

Thus, from an analysis of the richness and abundance of various species in the samples, the ecological state of the river can be accurately benchmarked.