South Cumbria Rivers Trust
Riverfly Initiative 2016 Report

A project funded by CaBA & Natural Course

Contractor

This document was produced by the South Cumbria Rivers Trust
Jayne Wilkinson: Catchment Planning and Delivery Officer
The Clock Tower Business Centre, Low Wood, Ulverston, LA12 8LY

Project Funders

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Statement of Ownership

Disclaimer

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SCRT Project Manager

SCRT's project manager for this contract was: Pete Evoy, Trust Manager

Report completed and signed off

Name: Pete Evoy Signature:

Position: Trust Manager Date:

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South Cumbria Rivers Trust
The Clock Tower Business Centre
Low Wood, Ulverston
Cumbria
LA12 8LY

Website: www.scrt.co.uk
Email: info@scrt.co.uk
Telephone: 01539 53004

Registered Charity No: 1114682.
Company Limited by Guarantee No: 5763380

Registered Office: The Refinery, Clock Tower, Low Wood, Ulverston, Cumbria, LA12 8LY.

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Introduction

As part of our monitoring programme South Cumbria Rivers Trust (SCRT), with the aid of volunteers, have undertaken a number of riverfly (invertebrate) surveys as an indicator of water quality. Riverflies spend the majority of their lives in water and are vital components of the food chain, on which fish, birds and mammals depend. The common characteristics amongst riverflies of limited mobility, relatively long life cycles, presence throughout the year (generally) and specific tolerances to changes in environmental conditions make them good indicators for monitoring water quality. Furthermore, different species of invertebrates demonstrate different tolerances to the various forms of ecological stress and are often amongst the most sensitive aquatic species to pollutant stresses.

The riverfly monitoring initiative, under the riverfly partnership, was originally designed to engage anglers with the water quality of local rivers. Although, anglers are still a major part of the initiative it now engages a much wider range of volunteers from a variety of different backgrounds across the UK. Sampling allows volunteers to monitor the health of a local beck, thereby establishing a population baseline and highlighting any deterioration in water quality. Any serious declines in water quality are then reported to the local hub and Environment Agency for further investigation.

Project Aims:

1) Develop a robust scientific evidence base and on-going monitoring programme
2) Support the national riverfly programme
3) Assess invertebrate populations and water quality to support the catchment plans
4) Generate community engagement across South Cumbria
5) Share data with the Becks to Bay partnership and wider public

In South Cumbria the number of volunteers carrying out riverfly surveys has increased yearly. 2016 has seen a particularly notable increase, with volunteers from the recently established Kent Catchment Partnership joining the partnership. Similarly numbers increased from both the Coniston and Crake Catchment Partnership and the Duddon Rivers Association. Whilst previous members have continued to sample throughout the catchments, with many sites now being in the 7th or 8th year of sampling, providing a fantastic baseline and dataset. 22 new volunteers were trained at two training courses run by the Freshwater Biological Association. In total, there are now 41 riverfly volunteers surveying 60 different sites across South Cumbria.

Figure 1. Volunteers undertaking training at the Freshwater Biological Association

Methodology

2.1. Site Selection

Existing volunteers continued to survey at the same sites contributing to an already established dataset. Any new volunteers were allocated a site to suit them based on their location and the contribution to SCRT's work and monitoring programme. All sites are checked with the Environment Agency (EA) to ensure there is no duplication of EA sampling sites.

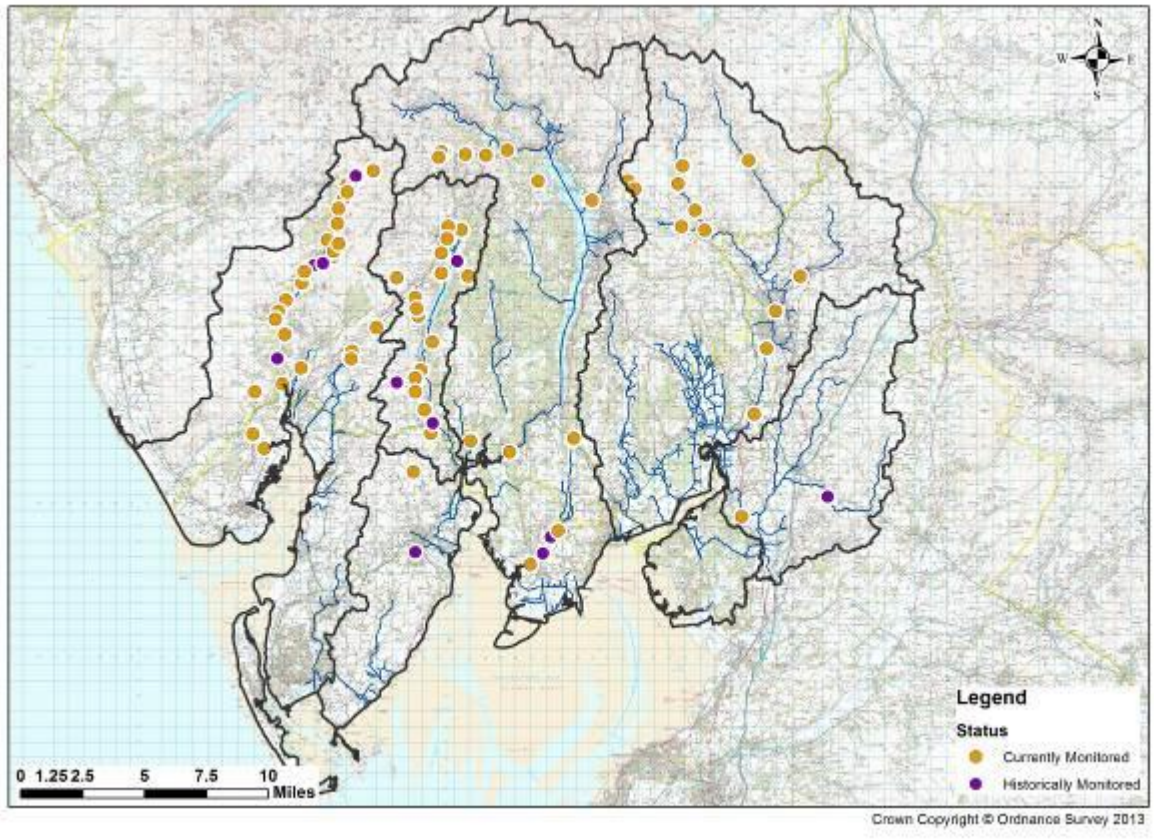


Figure 2. Sites monitored in 2016 and those which have been monitored in the past across South Cumbria.

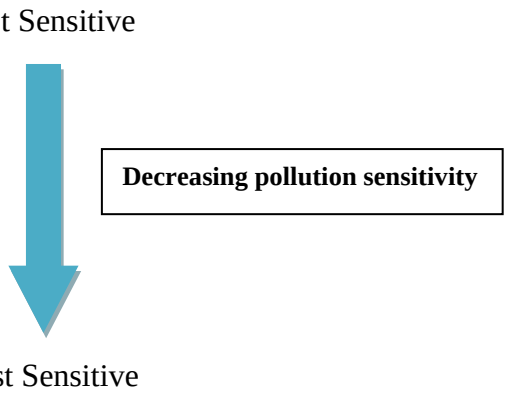
2.2 Sampling Method

Sampling is undertaken monthly between April and September. In South Cumbria, this is restricted to the summer months so as not to disturb spawning fish.

Volunteers record the number of individuals within 8 specific riverfly groups collected in a kick sample, including Mayflies (*Ephemeroptera*), Caddis-flies *(Trichoptera)* and Stoneflies *(Plecoptera).* The methodology used is the same as the Environment Agency's routine sampling method for invertebrates. It involves a three-minute kick-sample, augmented by a one-minute hand search of the substrate and vegetation. The total sampling time (three minutes) is split proportionally according to the relative areas of habitat at the sampling site, i.e. it may be split between pool, riffle and in-river vegetation with relative coverage of each area. This allows comparable samples to be

taken over time. However, where the EA will aim to identify all invertebrate families present, the riverfly initiative is focussed around 8 target groups:

Flat bodied mayfly (Heptageniidae)
Mayfly (Ephemeridae)
Blue-winged Olive Mayfly (Ephemerellidae)
Olives (Baetidae)
Stoneflies (plecoptera)
Caseless Caddis
Cased Caddis
Freshwater Shrimp: Gammarus



These target groups are based around the different tolerances of invertebrate families to pollution, particularly organic pollution, facilitating assessment of how degraded a river system is and highlighting any specific pollution events.

A relative abundance assessment is made for each of the target groups which then equates to a particular score:

Abundance	Score	Estimated Number
1-9	1	Quick Count
10-99	2	Nearest 10
100-999	3	Nearest 100
Over 1000	4	Nearest 1000

The total score for the site is calculated and compared to a 'trigger level'. Trigger levels are set on a site by site basis but are generally a value of 4 for South Cumbria. They are set to provide an indication of when a watercourse may be failing to meet water quality objectives. However, in the Duddon Valley certain becks in the upper catchment where invertebrate populations are stressed by acidic conditions or other natural factors the trigger level may be adjusted. If the total score falls below the trigger level and it is believed that this is due to a pollution event wiping out the invertebrate community then the local co-ordinator is contacted. The local co-ordinator will follow this up by a further sample to confirm the score, before reporting this to the EA as a pollution incident.

Stretches of river with good water quality will contain most of the pollution sensitive invertebrates listed above. However, it must be noted that there are temporal variations and therefore a decline in one species does not necessarily represent a pollution event. For example, Blue Winged Olives (*Ephemerellidae)* are generally only present in late spring and summer.

3. Results

The table below shows the split of sites and volunteers across the five catchments of South Cumbria. It also shows how many results were returned to SCRT during 2016. In general, there is good coverage and a good return rate. However, there is space to increase coverage particularly on the Bela where we now only have one active volunteer and on the Leven, our largest catchment by area.

Table 1. The number of active volunteers, number of sites surveyed and the returns received in 2016.

Catchment	No. of Sites	No. of Returns	No. of Volunteers
Bela	1	7	1
Crake	16	63	26
Duddon	22	55	2 & 2 National Trust Staff *
Kent	11	31	11
Leven (inc. River Eea)	10	19	5
Total	60	175	37

**Note due to the acidic conditions on the Duddon and generally low invertebrate numbers a reduced sampling programme with wider coverage is operated. A total of 33 sites on the Duddon have been agreed and there are a further 4 volunteers trained who due to complications in arranging access permissions with landowners during 2016 will now start their surveys at the beginning of the next season in 2017.*

In general, 2016 has been a good year for riverfly results. There were no breaches of the trigger level which were attributed to a pollution event. However, two sites in the Duddon and one site on Greenburn Beck in Little Langdale fell below the trigger level on a number of occasions, for both of these sites it was believed that these breaches were due to natural background conditions rather than a specific pollution event.

A full copy of the results can be found in the appendix.

It was noted by a few volunteers that there has been a lack of blue-winged olives *(Serratella ignita)* this year. One theory is that this may be a consequence of the severe flooding during December 2015 which may have washed out eggs and disrupted the life cycle of blue-winged olives. Conversely, blue-winged olives are often over recorded (after being confused with other olives, *Batidae)*, particularly during early spring. Blue-winged olives are seasonal and generally only present from late May/ June until the end of autumn; prior to May they are still at the egg stage or are too small to view with the naked eye.

This year has also been the first year where we have uploaded some results to the National Riverfly Database. All members of the Kent Catchment Partnership were registered, and although not all volunteers have internet access there is now a number of results uploaded to this site. These can be viewed at: http://www.riverflies.org/maps-target-group-abundance where maps and graphs of

trends are available. During 2017 volunteers across all catchments will be encouraged to sign up to the National Riverfly Database, with support from SCRT.

3.1 Historic Comparisons

3.11 Coniston and Crake

The Coniston and Crake catchment has one of our longest running riverfly programmes and therefore one of our largest historic datasets. Figure 3 below shows the sites within the catchment which have more than three years worth of data between 2009 and 2016: this allows us to assess any trends which may be present. In general, it looks like 2016 has been a relatively good year for riverfly with many of the mean annual scores being the highest recorded over the 7 year period. There appears to be no obvious trend in the data with most sites being well above the trigger level across all years.

3.12 Duddon

South Cumbria Rivers Trust holds riverfly results for the Duddon catchment dating back to 2007; therefore for a few sites we have 9 years of data. A greater number of sites have over 5 years of data, this data has been plotted to review any trends in the data, see figures 4 and 5. Note no statistical analysis has been carried out on this. From the graphs it can be observed that 2016 was a relatively good year with the average for the year often being the highest recorded at an individual site. However, there is various across sites and as such there are no obvious long term trends in riverfly abundance.

4. Catchment Management

Riverfly data is a useful tool for catchment management because it enables us to assess water quality over a relatively large area and record any trends over time. It has added value in that a greater number of people are out on the ground who can be the 'eyes and ears' and report any issues. This data when combined with other data held by the trust, such as that on the Becks to Bay catchment partnership website (btob.scrt.co.uk) can help us to target project to areas of greatest need. Monitoring is essential in order to know where 'issues' are within a catchment and to record any improvements following project delivery. This enables targeted delivery of improvements and maximises resources to where they are best placed.

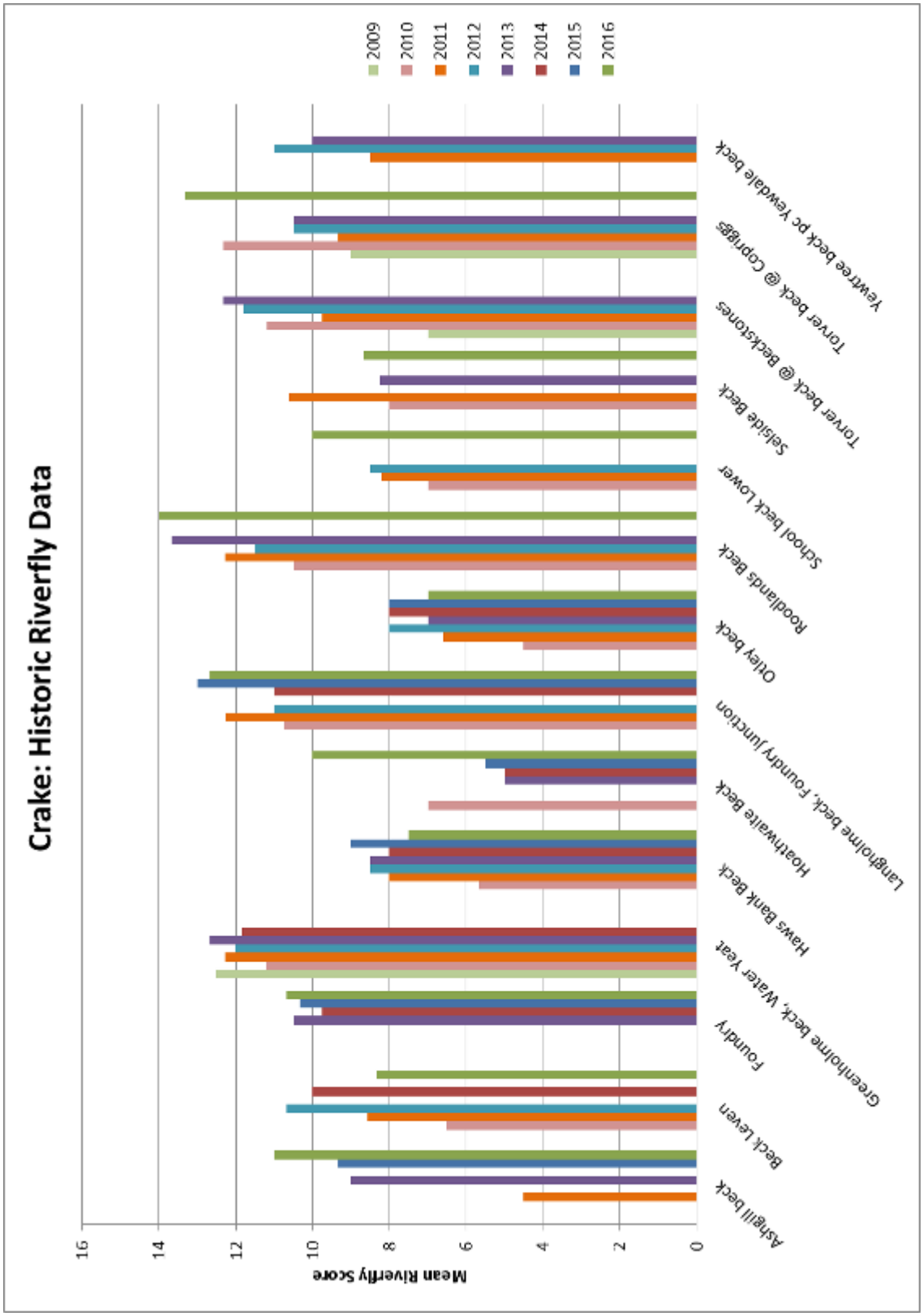


Figure 3. Graph showing historic data for average riverfly scores in the Coniston and Crake catchment where sites have 3 or more years of data.

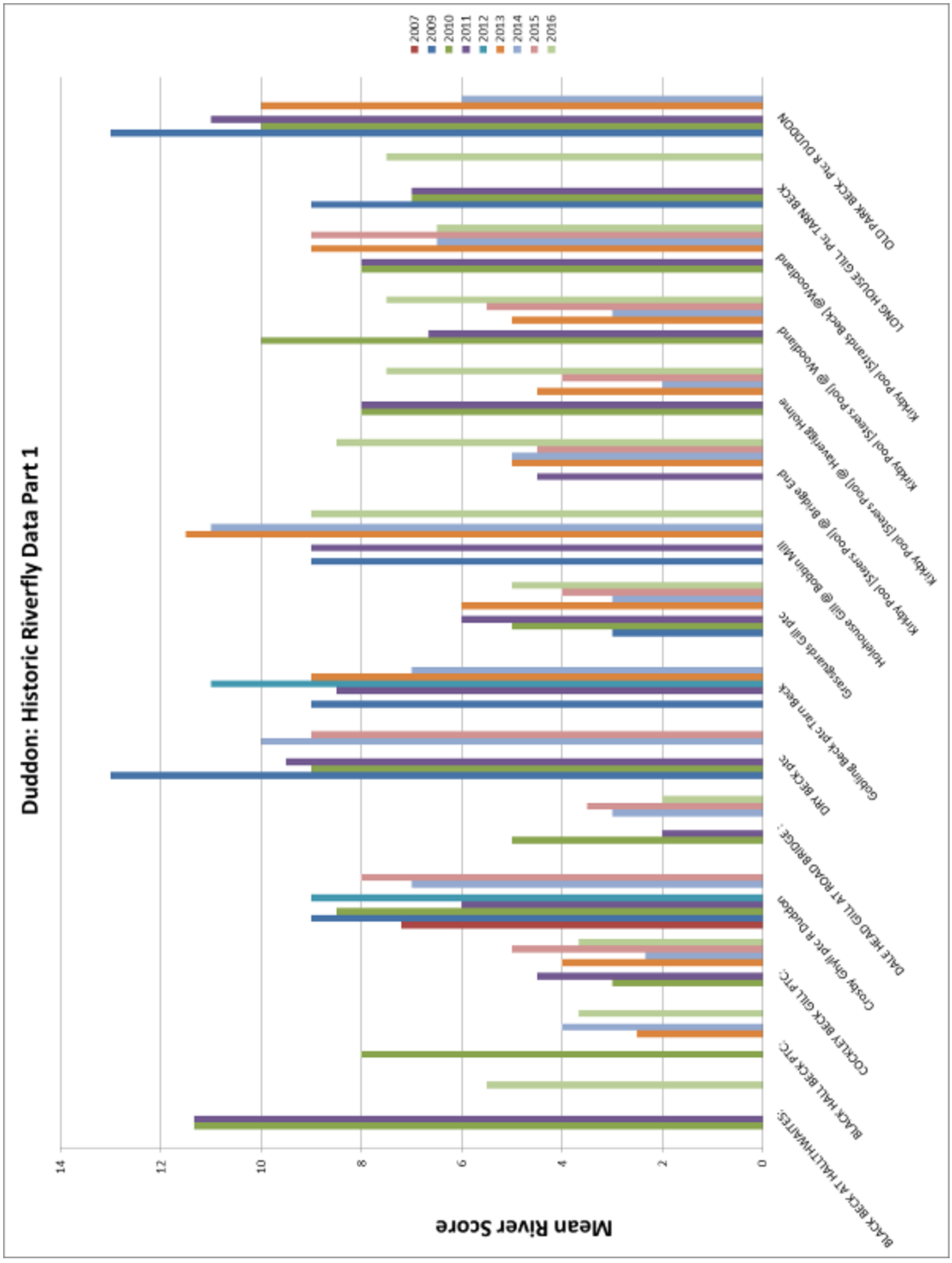


Figure 4. Graph showing historic data for average riverfly scores in the Duddon catchment where sites have 4 or more years of data. Note this is only half the sites which have more than 4 years worth of data, see figure 5 for more information.

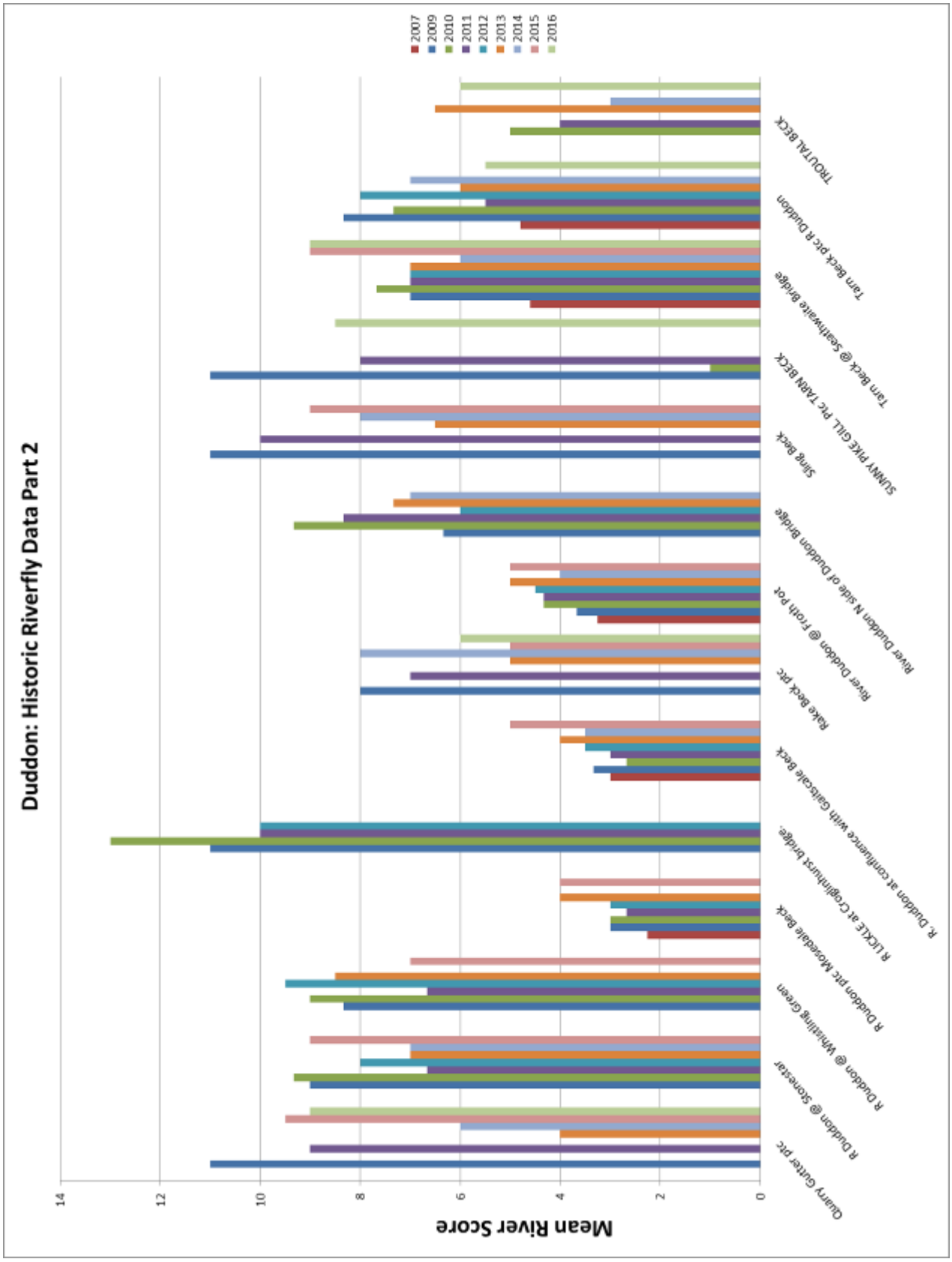


Figure 5. Graph showing historic data for average riverfly scores in the Duddon catchment where sites have 4 or more years of data. Note this is only half the sites which have more than 4 years worth of data see figure 4 for more information.

5. Next Steps for 2017

A refresher session will be held for existing volunteers prior to the start of the 2017 survey season in March/April. Additionally, if there is sufficient demand we will hold further training sessions for any new volunteers. If you are interested in becoming a riverfly volunteer please contact our Monitoring officer: Jayne Wilkinson: jayne@scrt.co.uk.

During 2016 we registered our first sites on the National Riverfly Partnership database and it is our aim during 2017 to expand this to the rest of our volunteers. However, we recognise that not all volunteers use a computer to send through their results and some paper forms will still be required. Therefore, we will also look at uploading historic data or past data from volunteers who aren't online to the national database.

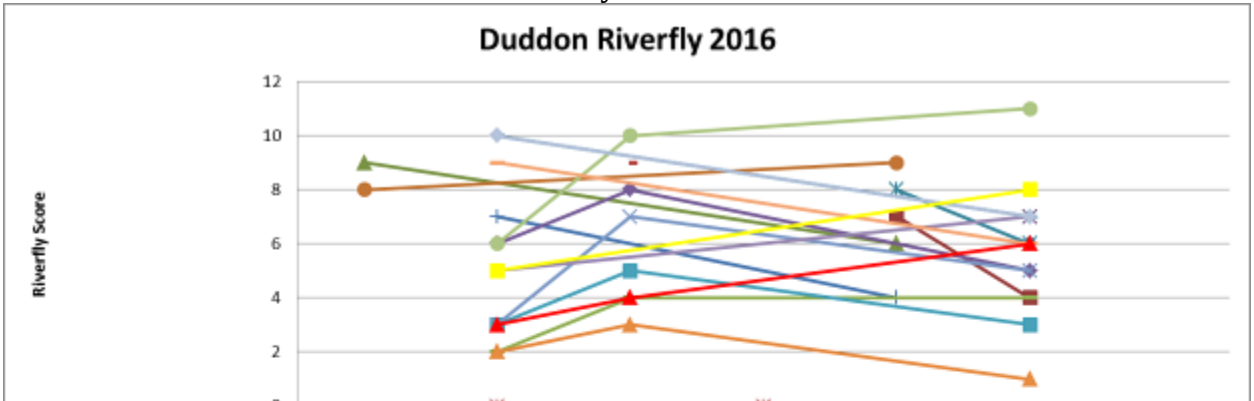
After attending the 4th National Riverfly Conference we are working with the Freshwater Biological Association to develop a project and funding bid to support the continued development of our riverfly programme. This will look to support the existing programme as the foundation of the riverfly programme, but will also investigate options to extend and develop the programme further. Current proposals include building on the platform already used to extend the number of riverfly groups surveyed from 8 to 28, thereby gaining a higher resolution and increasing the power to detect changes in water quality. Other aspects include potentially tailoring riverfly surveys to be more project specific, for example we can target and adapt surveys to monitor river restoration techniques such as large woody debris installation. This will support us in our work for effective evidence based catchment management. There are also options to further tie in the riverfly programme with wider monitoring including the water quality monitoring being trailed under Freshwater Watch and Natural Course.

6. Acknowledgements

We would like to thank the riparian owners who gave us access to carry out the surveys. We would also like to acknowledge to the Freshwater Biological Association and the Environment Agency for their continued support and provision of training to volunteers. Finally, this would not be possible without our dedicated volunteers and we would like to thank you for all your hard work over the years.

Appendix I

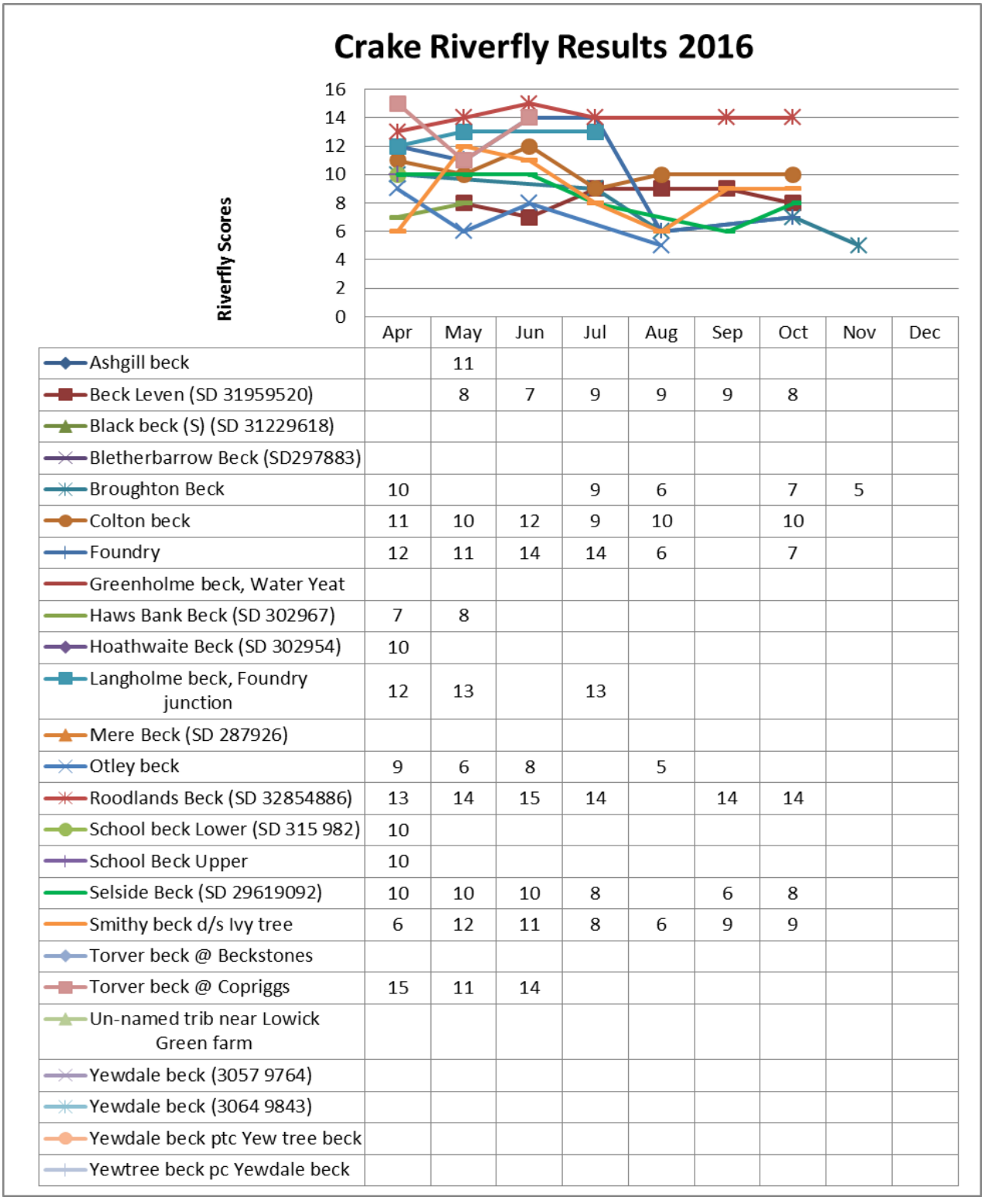
Table of sites and scores for the 2016 riverfly season in the Duddon catchment



	April	May	June	July	August	Sept	Oct
Cragg Hall						6	
Hallthwaites					7	4	
Longhouse Gill	9				6		
Black Beck @ Stonebridge						7	
Black Beck @ Strands Bridge					8	6	
Sunny Pike Gill	8				9		
Tarn Beck		7			4		
Tarn Beck Seathwaite			9				
NT: Black Hall		2	4			4	
NT: Castle Howe		6	8			5	
NT: Cockley Beck		3	5			3	
NT: Dale Head		2	3			1	
NT: Grassguards		3	7			5	
NT: Mosedale Beck		0		0			
NT: Quarry Gutter		6	10			11	
NT: Rake Beck		5				7	
NT: Steers Pool Bridge End		10				7	
NT: Steers Pool Haverigg		9				6	
NT: Steers Pool Woodland		10				7	
NT: Strands Beck		5				8	
NT: Troutal Beck		3	4			6	

Appendix II

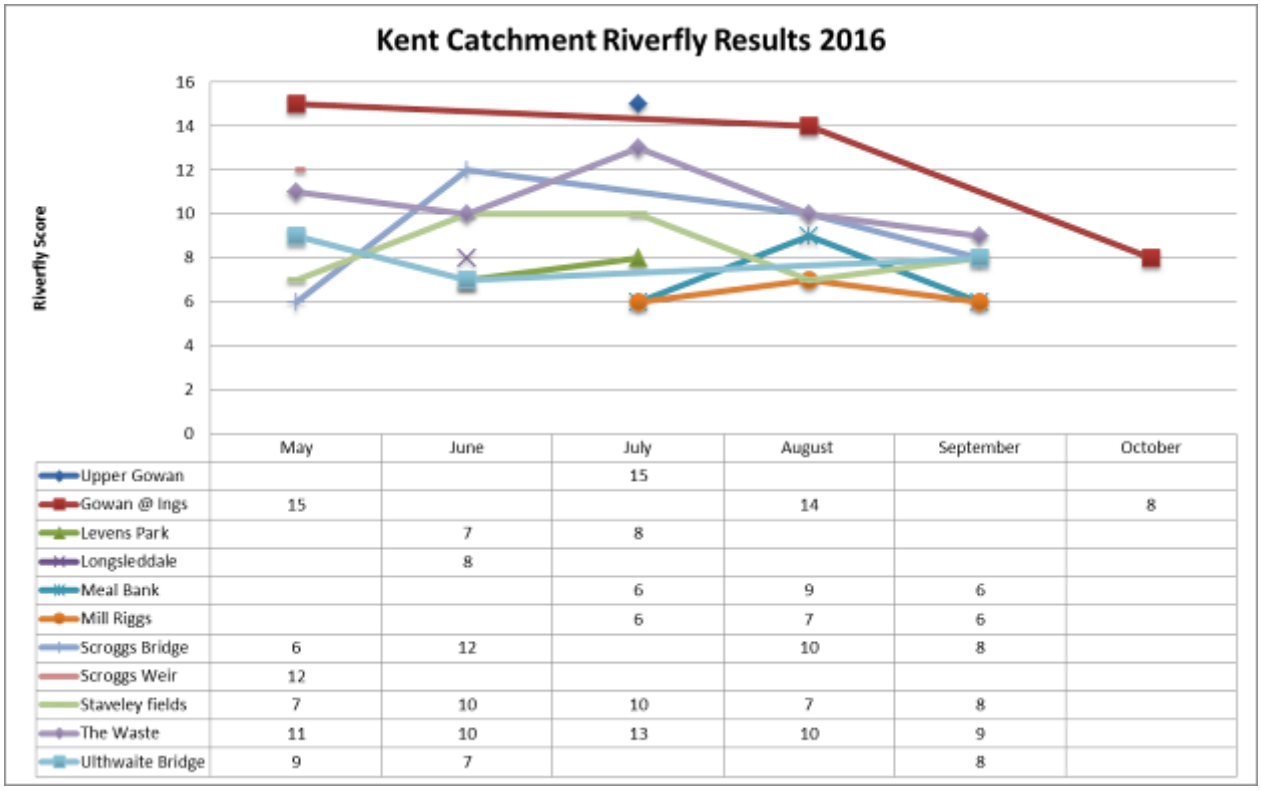
Table of sites and scores for the 2016 riverfly season in the Coniston and Crake Catchment



	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ashgill beck		11							
Beck Leven (SD 31959520)		8	7	9	9	9	8		
Black beck (S) (SD 31229618)									
Bletherbarrow Beck (SD297883)									
Broughton Beck	10			9	6		7	5	
Colton beck	11	10	12	9	10		10		
Foundry	12	11	14	14	6		7		
Greenholme beck, Water Yeat									
Haws Bank Beck (SD 302967)	7	8							
Hoathwaite Beck (SD 302954)	10								
Langholme beck, Foundry junction	12	13		13					
Mere Beck (SD 287926)									
Otley beck	9	6	8		5				
Roodlands Beck (SD 32854886)	13	14	15	14		14	14		
School beck Lower (SD 315 982)	10								
School Beck Upper	10								
Selside Beck (SD 29619092)	10	10	10	8		6	8		
Smithy beck d/s Ivy tree	6	12	11	8	6	9	9		
Torver beck @ Beckstones									
Torver beck @ Copriggs	15	11	14						
Un-named trib near Lowick Green farm									
Yewdale beck (3057 9764)									
Yewdale beck (3064 9843)									
Yewdale beck ptc Yew tree beck									
Yewtree beck pc Yewdale beck									

Appendix III

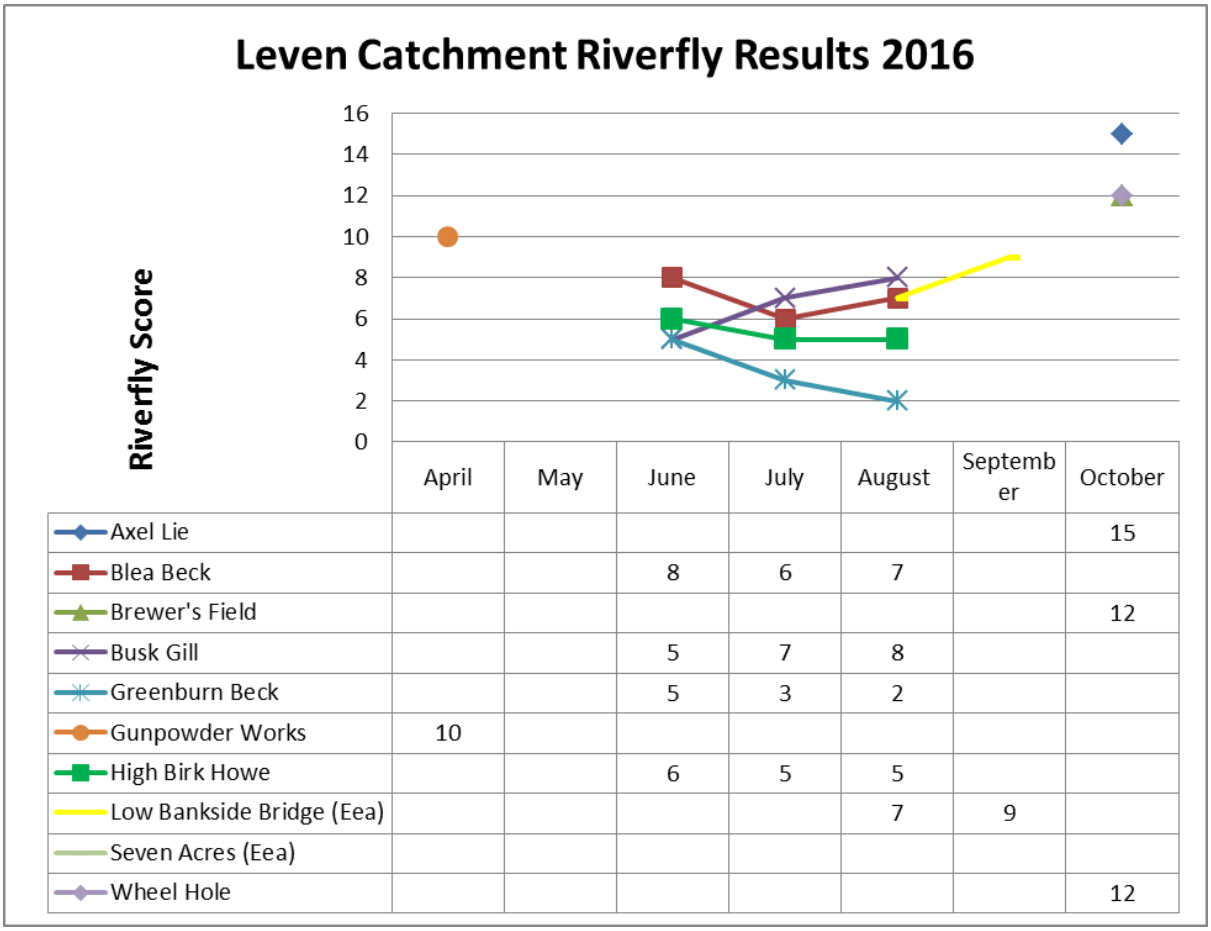
Table of sites and scores for the 2016 riverfly season in the Kent Catchment



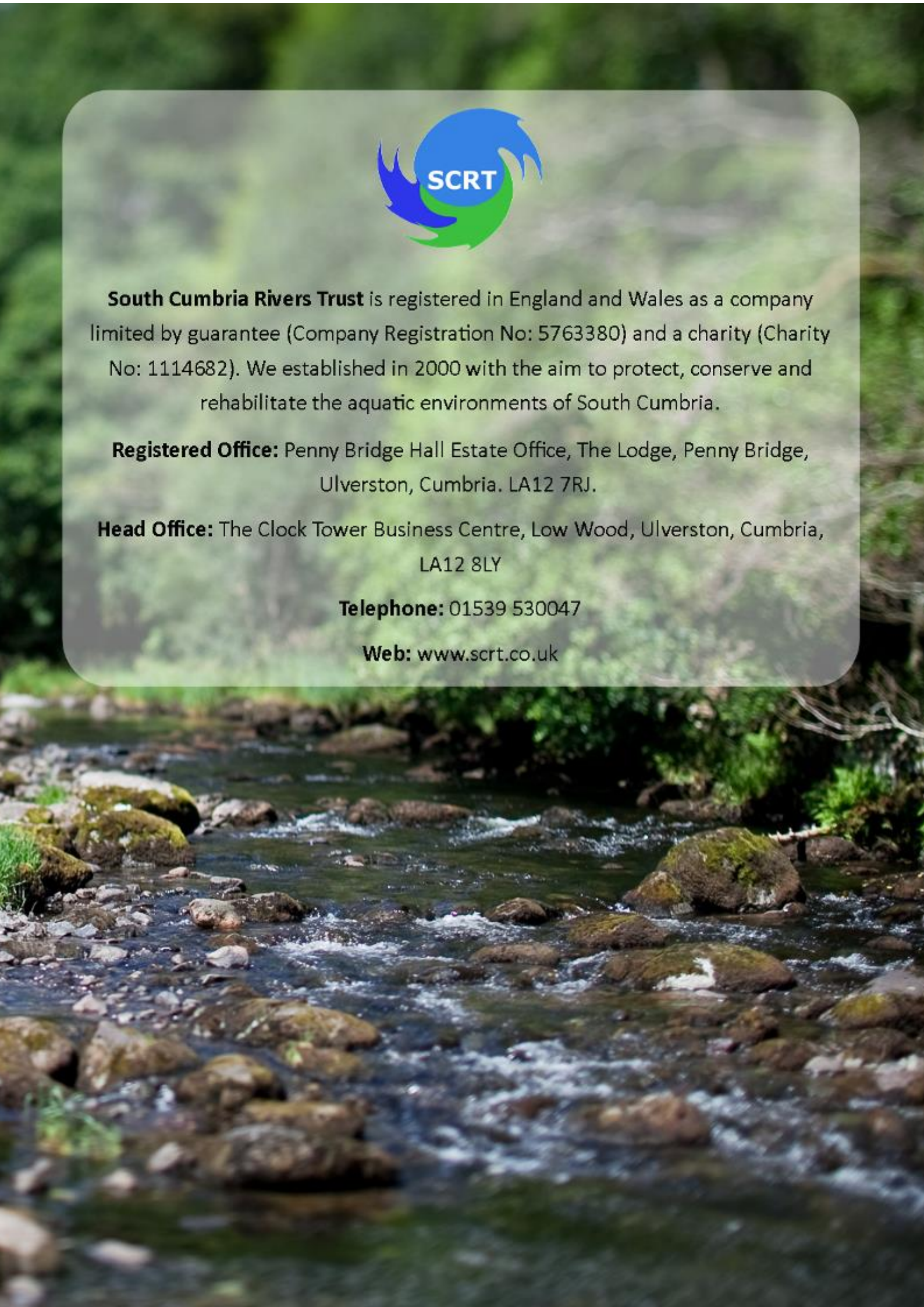
	May	June	July	August	September	October
Upper Gowan			15			
Gowan @ Ings	15			14		8
Levens Park		7	8			
Longsleddale		8				
Meal Bank			6	9	6	
Mill Riggs			6	7	6	
Scroggs Bridge	6	12		10	8	
Scroggs Weir	12					
Staveley fields	7	10	10	7	8	
The Waste	11	10	13	10	9	
Ulthwaite Bridge	9	7			8	

Appendix IV

Table of sites and scores for the 2016 riverfly season in the Leven Catchment



	April	May	June	July	August	September	October
Axel Lie							15
Blea Beck			8	6	7		
Brewer's Field							12
Busk Gill			5	7	8		
Greenburn Beck			5	3	2		
Gunpowder Works	10						
High Birk Howe			6	5	5		
Low Bankside Bridge (Eea)					7	9	
Seven Acres (Eea)							
Wheel Hole							12



South Cumbria Rivers Trust is registered in England and Wales as a company limited by guarantee (Company Registration No: 5763380) and a charity (Charity No: 1114682). We established in 2000 with the aim to protect, conserve and rehabilitate the aquatic environments of South Cumbria.

Registered Office: Penny Bridge Hall Estate Office, The Lodge, Penny Bridge, Ulverston, Cumbria. LA12 7RJ.

Head Office: The Clock Tower Business Centre, Low Wood, Ulverston, Cumbria, LA12 8LY

Telephone: 01539 530047

Web: www.scrt.co.uk