ENVIRONMENT AGENCY
NORTH WEST REGION
NORTH AREA
ECOLOGICAL APPRAISAL & DATA MONITORING TEAM

TECHNICAL MEMORANDUM NB 874 (03/08)
DATE: 16/03/08
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FILE: Riverfly Partnership (Bela)

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RIVER INVERTEBRATE MONITORING FOR ANGLERS - RIVERFLY MONITORING ON THE RIVER BELA 2007

Background

River Invertebrate Monitoring for Anglers is an angler-led initiative, spearheaded by the Riverfly Partnership, which ensures that angling groups can take action to monitor and help conserve the river environment. The Riverfly Partnership consists of more than 35 member organisations, including the Environment Agency, the Freshwater Biological Association (FBA) and in Cumbria the Eden Rivers Trust and South Cumbria Rivers Trust (SCRT).

The Partnership aims to address perceived declines in the abundance of river flies, in particular Mayflies (Ephemeroptera), Caddis-flies (Trichoptera) and Stoneflies (Plecoptera).

A national programme (River Invertebrate Monitoring for Anglers) was launched to train angling groups to monitor the water quality of their local rivers using a simple invertebrate sampling methodology. A number of angling clubs (and other interested parties) were represented at a South Cumbria training weekend held in April 2007 on the River Bela at Beetham.

Once trained, anglers or other interested parties (eg Forestry Commission staff on the R.Duddon catchment) are encouraged to set up monitoring sites following agreement with the Environment Agency contact (usually an Ecological Appraisal Officer). Agreement on site location is needed to ensure avoidance of interference with established monitoring sites and with any Agency activity or ecological feature.

Riverfly sampling at Agency approved sites uses the same methodology as the Agency Ecological Appraisal teams use for routine monitoring - a three-minute kick sample augmented by a one-minute hand search. Whereas we try to identify all benthic macro-invertebrates in a sample (usually to a mixed taxonomic level), for Riverfly monitoring there are only eight target groups to identify:

Cased Caddis
Caseless Caddis
Ephemera Mayflies
Ephemerellidae Mayflies (Blue-winged Olives – "BWO's")
Heptageniidae Mayflies (Flat bodied Mayflies)
Baetidae Mayflies (Olives)
Stoneflies
Freshwater Shrimps (*Gammarus pulex*)

A relative abundance assessment is made for each of the target groups which are then given a score:
Abundance A (1-9 organisms in sample – accurate count) – Score 1
Abundance B (10-99 organisms in sample – nearest 10) - Score 2
Abundance C (100 -999 organisms in sample - nearest 100) – Score 3
Abundance D (1000+ organisms in sample – nearest 1000) – Score 4

The score from each of the identified target groups is added together to give a total score for the sample – this total score is locally known as the "Angler's Score Index" (ASI).

Worked example:

Target Group	Abundance	Score
Cased Caddis	A	1
Caseless Caddis	B	2
Ephemera Mayflies	-	0
Ephemerellidae Mayflies (BWO)	C	3
Heptageniidae Mayflies	B	2
Baetidae Mayflies (Olives)	C	3
Stoneflies	B	2
Gammarus (Freshwater Shrimps)	A	1
	Angler's Score Index (ASI)	**14**

In a healthy river most of the pollution sensitive invertebrates (the target groups) should be present (although may not be found naturally throughout the year – eg BWO's mainly found late Spring-Summer). Declines in water quality are reflected in declines in the abundance and number of different invertebrates present. Sampling a site on a monthly basis (which is generally not possible by the Environment Agency) provides seasonal baseline data from which severe changes in water quality can be easily identified. As well as giving information useful in determining long term trends, the setting of a "trigger level" at each site (typically an ASI of 4) allows severe perturbations in water quality to be identified. If the trigger level is reached then an agreed call-in procedure will allow the Environment Agency to take early action to investigate. It should be understood that natural changes in abundance or indeed presence/absence of target groups may occur from month to month (seasonal life cycles etc) or perhaps due to washout by high flows. The Trigger level of ASI 4 is likely to mean a severe water quality problem however.

There are locally agreed procedures for collating results and communicating these with the Environment Agency contact. In some areas a regional coordinator may collate results from a number of monitoring groups and pass results onto the Agency contact at agreed intervals. Should a trigger level be reached however then this would be reported to the Agency contact as soon as possible. The data is held by the angling organization and shared with the Agency.

More information on the Riverfly Partnership may be found at www.riverflies.org It is planned to have a Cumbrian Riverfly page and a database of collated results.

Introduction to River Bela Riverfly Monitoring
Following the successful South Cumbria Riverfly Partnership training days in April 2007, an approved routine monitoring site on the River Bela u/s A6 Bridge at Beetham (SD 497 797) was

set up by Milnthorpe Anglers.

There is an Environment Agency routine monitoring site approx. 200m further upstream (SD 498 795). This site has been sampled more or less twice yearly since 1990 allowing target and trigger levels to be set for the Riverfly monitoring site.

At present four pairs of anglers are monitoring the site on a proposed monthly schedule (Spring/Summer and Autumn). It was agreed that Peter Moreton from Milnthorpe Anglers would collate the results for the site and send them to myself as the Environment Agency contact. To date 5 sets of samples have been sent to the Agency with a total of eight participating anglers working in pairs on a monthly rota system. Our thanks must go to those anglers:

Ian McMurdo & John McKay
Peter Moreton & Paul Proctor
Steve Trafford & Jack Holmes
Keith Rodgers & Brian Pickthall

Environment Agency Routine Sampling Site on the Bela
Our routine biological monitoring site (N498) is approx. 200m u/s the A6 bridge at Beetham (SD 498 795) and has been sampled on a regular basis since 1990. Over the years, this sample site has been routinely monitored for a number of reasons – GQA (General Quality Assessment), CAMS (Catchment Abstraction Monitoring Strategy) and also recently for WFD (Water Framework Directive) purposes.

The sampling methodology is the same as for Riverfly monitoring – 3 minute kick sample followed by a 1 minute hand search. For the most part, sampling has been twice a year - Spring (March – May) and Autumn (September – November), although on five occasions a Summer (June-August) sample has been taken. For the most part, samples undergo an initial bankside assessment before being preserved and laboratory sorted at a later date. Samples taken between 1990 and early 1992 were field-sorted only.

Results generally indicate a productive, mildly enriched watercourse. There have been historic sheep dip problems further up the catchment but to date there have been no recorded impacts at this site. The monthly sampling by Milnthorpe Anglers will identify any major problems outside the Agency sampling programme.

Samples from routine site N498 are sorted to a mixed taxonomic level, but it has been possible to produce ASI's by extracting abundances for the 8 Riverfly groups:

Spring - 17 samples with ASI's ranging from 9-17, average 13
Summer - 5 samples with ASI's ranging from 13-19, average 15
Autumn - 16 samples with ASI's ranging from 10-18, average 13

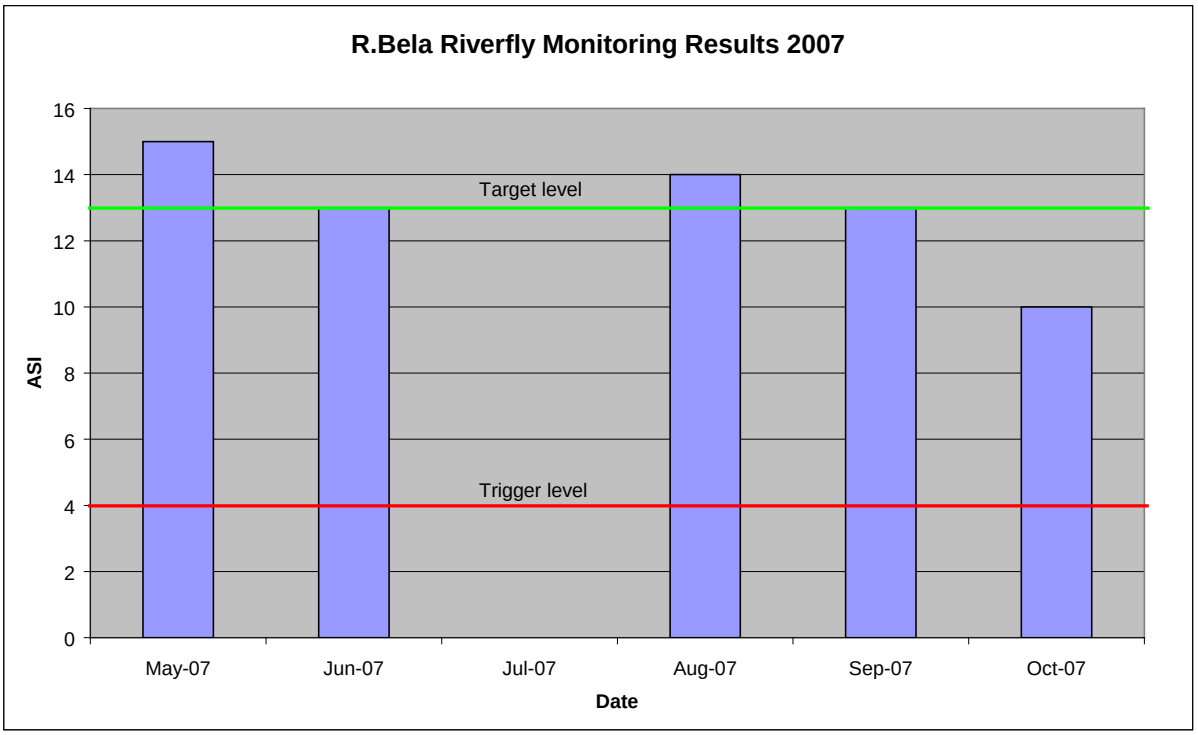
From these results it seems sensible to set a **Target level** of ASI 13 for the Riverfly monitoring site. A **Trigger level** of 4 is being set for all sites unless there are other circumstances (eg the very impoverished sites on the Duddon catchment which are probably subjected to occasional acid-stress).

For information and of potential interest to the anglers, a list of further identified taxa within each of the target groups is given in Appendix 1

The Riverfly Monitoring Site
Milnthorpe Anglers Riverfly monitoring site on the Bela is u/s the A6 bridge and just upstream of the ford (SD 497 797), some 200m downstream of our routine monitoring site.

The following table shows the results received:

Target Group	22/05/07	22/06/07	06/08/07	16/09/07	27/10/07
Cased Caddis	B (40)	B (30)	B (20)	B (10)	A (8)
Caseless Caddis	B (60)	B (10)	A (1)	A (5)	A (8)
Ephemera Mayflies	-	-	-	-	-
Ephemerellidae Mayflies (BWO)	B (20)	B (30)	B (30)	A (2)	-
Heptageniidae Mayflies	B (40)	A (8)	A (3)	B (10)	C (200)
Baetidae Mayflies (Olives)	C (600)	C (200)	C (500)	C(100)	C (200)
Stoneflies	B (50)	A (4)	B (10)	B (10)	-
Gammarus (Freshwater Shrimp)	B (40)	B (20)	C (200)	B (20)	B (30)
Angler's Score Index (SCI)	**15**	**13**	**14**	**13**	**10**



NB There was no result for July 2007 and high flows prevented sampling in November. I understand that monitoring is scheduled to re-start this month.

As can be seen from the results, all target groups were recorded apart from *Ephemera* Mayflies. Although they are known to be present in the Bela, at our routine site (N498), they have only been recorded once (a single specimen in December 1997) since 1990. As expected, Ephemerellidae (BWO's) were recorded at reasonable abundance May-August with a couple found in September and apparently absent in October.

Results are all well above the trigger level and apart from the October result have reached or surpassed the target level. The October result recorded 5 of the 8 target groups and the presence of Heptageniidae Mayflies at Abundance C (200 estimated) indicates no serious water quality problems.

As well as the natural variations discussed earlier, there are bound to be some operator differences, particularly with 4 pairs of anglers sampling on a rotation system. This should improve with experience and if more sites are set up on the catchment (as is planned) then ideally the same sampling pair could sample their own site exclusively. For interest however, some swapping of sites may be desirable.

The Future

To their credit, Milnthorpe Anglers have taken on board the Riverfly monitoring with great enthusiasm. They themselves have identified the need to expand their monitoring programme to allow their trained samplers to have more hand-on experience with the scheme. Current proposals are to set up Riverfly monitoring sites on Lupton and Stainton Becks on the Bela catchment. We have current and historic sites on these watercourses so it will be possible to set realistic target levels for the new sites as well as keeping the Trigger level at ASI 4. Historic sheep dip problems have been identified on these becks (or tribuatries of them) and so this will prove to be an invaluable surveillance programme. The becks also contain native Crayfish (*Austropotamobius* pallipes) and in addition to recording the target groups, the anglers will be encouraged to report presence/abundance of this species for our own records.

It should also be noted that Riverfly monitoring sites have also been established on the Duddon, Crake and Leven catchments in South Cumbria and on the Petteril and Eamont in North Cumbria. In addition, a new monitoring site on the River Kent has now been set up (today!) and the first result already reported.

There will be two more training days this year – May 10th at FBA Windermere and at the Agency's office in Penrith on May 17th. It is to be hoped that more Riverfly monitoring sites will be set up across the county following these training days.

Brian Ingersent
Ecological Appraisal Officer

Appendix 1

Identified Taxa Within Target Groups – Routine Site N498 (1990-2007)

Target Group	Further Identification
Cased Caddis	Glossosomatidae Goeridae Hydroptilidae Lepidostomatidae Leptoceridae Limnephilidae Sericostomatidae
Caseless Caddis	*Rhyacophila* Hydropsychidae Polycentropodidae Psychomyiidae
Ephemera Mayflies	*Ephemera* (probably *E.danica*)
Ephemerellidae (BWO's)	*Seratella* (probably *S.ignita*)
Heptageniidae Mayflies	*Ecdyonurus* sp. *Electrogena lateralis* *Heptagenia sulphurea* *Rhithrogena semicolorata*
Baetidae Mayflies (Olives)	*Alainites muticus* *Baetis rhodani* *Baetis scambus*
Stoneflies	Chloroperlidae (including *C.torrentium*) Leuctridae (including *L.geniculata*) Nemouridae Perlidae Perlodidae (including *Isoperla grammatical* & *Perlodes microcephala*)
Freshwater Shrimps	*Gammarus pulex* (*Crangonyx pseudogracilis* also recorded)

RIVERFLY MONITORING TARGET GROUPS

Olives
(Baetidae)
Slim, fast moving, small gills along the side

Flat Bodied (Stone Clinging)
(Heptageniidae)
Flattened body, spider like & slow moving

Mayfly
(Ephemeridae)
Large with tusk-like projections from the head. Gills feathery and positioned over the back

Blue-Winged Olive
(Ephemerellidae)
Four pairs of gills visable and held over the back. Moves slowly with a rocking horse movement

Stonefly
Two tails - long antenna

Caseless Caddis

Rhyacophilidae

Polycentropidae

Hydropsychidae

Cased Caddis
(Cases constructed of various materials)

Plant Stems etc.

Plant material
(Square case)

Sand Grains
(Round Case)

Sand Grains
(Flat Case)

Shells &
Sand Grains

Plant Material

Plant Material
(Round Case)