The Riverfly Partnership

Volume 4
Issue 2 2017

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From the Anglers' Riverfly Monitoring Initiative (ARMI) Project Manager

Welcome to the second edition of this newsletter for the 2017/18 year. Whilst 2017 has been exceptionally busy for the Riverfly Partnership, with a change of host in April and strategic refocus of ARMI deliverables for this year, the ARMI network also has been in full flow. During the year to date, 54 ARMI training workshops have been delivered to 597 ARMI volunteers and £308,250 of in-kind ARMI coordinator and volunteer time has been committed alongside the rod licence funding which RP receives from the Environment Agency. ARMI volunteers regularly monitor 1955 sites UK wide and continue to detect pollution incidents, reporting vital information to local statutory body contacts. With this firmly in mind, please pay close attention to the notice about ARMI trigger level breach protocols on page 2.

Across the UK, strongly established ARMI hubs and groups are providing the spine to support Riverfly Plus, and other citizen science, initiatives, such as Extended Riverfly (siltation & low flows) and Outfall Safari (developed and first run by the Citizen Crane project in the Crane Valley catchment). RP needs your help to capture evidence of the benefits that ARMI and Riverfly Plus provides across the country; you can read about how to help in the appeal below.

As always, my continued and sincere thanks to every single ARMI volunteer, coordinator, tutor and partner for your ongoing commitment to protecting and conserving our rivers across the United Kingdom. Special thanks to all rod licence paying anglers and the Environment Agency for providing funding support to ARMI in England, to SEPA for providing strategic support to ARMI in Scotland, to RP host the Freshwater Biological Association and to RP Chair, Steve Brooks.

Important appeal for information

As part of the strategic ARMI refocus mentioned above, the Riverfly Partnership will present evidence of the key and wider benefits of ARMI in its financial year-end report to the Environment Agency. To ensure that this is done to the greatest possible effect, I appeal to all ARMI coordinators, tutors, volunteers and statutory body contacts to submit to me (Ben Fitch) case studies, occurring between the beginning of April 2017 and the end of March 2018, in which ARMI or Riverfly Plus initiatives have detected pollution incidents. Please also include information about follow-up statutory body investigations and outcomes.

A Riverfly Partnership website and ARMI database update from Bill Brierley, Chief Executive at the Freshwater Biological Association

"I wanted to give you all a progress update on upgrades to both the Riverfly Partnership website (RP)and ARMI database. There has been significant activity behind the scenes throughout 2017: to upgrade the underlying operational framework, to deliver the scheduled improvements to the database, and migrate the website and database to a cloud based system. Once completed, this will mean improved user-friendliness for the ARMI network in terms of data accessibility and greater flexibility for FBA, as systems host, in terms of maintenance and development potential. Unfortunately, we have also encountered some challenges that resulted in significant delays; in mid-October, a major electricity failure at Freshwater Biological Association (FBA) headquarters in Windermere damaged our IT infrastructure rendering it non-operational for several days. Thankfully, our backup systems did their job and we got RP and ARMI web services back online as quickly as possible. On behalf of FBA and RP, I would like to apologise for this and other hold ups. I would also like to thank you all for your continued patience and commitment to the Anglers' Riverfly Monitoring Initiative."

Riverfly Partnership Photography Competition update

Thank you to everybody who entered the RP photography competition, it was pleasing to end up with almost one hundred images. Judging is currently underway although progress has been slow due to seasonal overseas commitments of one or two of the judges. It is anticipated that a decision on the winner will be reached before the end of the year and plans for an official presentation ceremony in the New Year are being considered. To all competition entrants, thank you for your continued patience; we will be make an official result announcement in due course.

ARMI trigger level breach protocol – important notice for all volunteers, coordinators, tutors and ecology contacts

Recently, there have been several questions regarding the correct protocol for confirming and reporting trigger level breaches including what role the ARMI database plays in the process. The following information, therefore, should provide clarification and serve as a refresher for all ARMI participants and partners.

Confirming a trigger level breach in the field

1. Collect, clean, sort and score ARMI sample, i.e., three-minute kick/sweep sample plus one-minute manual search of large liftable stones;
2. if the resulting ARMI score indicates a breach of the site trigger level, a second sample must be taken from the same site (varying the sampling route through the site this time to avoid undue influence from the first sample);
3. if the ARMI score, from the second sample, is equal to or greater than the site trigger level, no further action is required other than to submit the results into the online ARMI database (in this case, input the second sample result as the record, adding the first sample data in the additional observations box).
4. If the second sample ARMI score is also less than the site trigger level, the trigger level breach is confirmed and must be reported;
5. it is essential that an immediate **verbal** report of any confirmed trigger level breach is made, by the confirming volunteer monitor, either to their ARMI group coordinator, or, to the statutory body 24hr incident hotline – **0800 807060** (this number services EA, NRW, SEPA & NIEA). If it is only possible to leave a message for the ARMI group coordinator, a report must be made to the 24hr incident hotline;
6. when **verbally** reporting a confirmed trigger level breach to the ARMI group coordinator, the following information must be provided **(**and duplicated in a supporting email):
    i. river name, ARMI site name and location details (registered two letter, ten digit NGR);
    ii. date and time that samples were collected;
    iii. confirmation of a trigger level breach indicating serious pollution as the likely cause, ensuring that full data from both samples is to hand for discussion;
    iv. monitor's full name and contact details;

    ARMI group coordinator will alert the local statutory agency ecology contact and Riverfly Partnership (RP).
7. When **verbally** reporting a confirmed trigger level breach to the 24hr incident hotline, the following information must be provided (in addition to that outlined in point 6 above):
    i. confirm that the incident is being reported by an Anglers' Riverfly Monitoring Initiative group (it may also be necessary to explain that ARMI is a collaborative initiative with the relevant statutory body, i.e., England – EA, Wales – NRW, Scotland – SEPA, Northern Ireland – NIEA);
    ii. confirm the name of the relevant local statutory body ecology contact, requesting that details of the incident be passed to that person and the local duty officer asap;
    iii. request an incident number, to facilitate follow up by monitor/ARMI group coordinator;
    iv. request feedback;

Whether a confirmed trigger level breach is reported as per point 6 or point 7 (above), further actions will be as follows:

- ARMI monitor submits confirmed trigger level breach record into online ARMI database (www.riverflies.org), (in this case, input the first sample result as the record, adding the second (confirming) sample data in the additional observations box).
- relevant statutory body incident investigation and appropriate response action;
- local statutory body ecology contact updates ARMI group coordinator and RP;
- ARMI group coordinator updates volunteer monitors;
- RP update wider ARMI network as appropriate including lessons learnt.

Confirmed trigger level breaches and the national ARMI database

The following screenshots and accompanying notes relate to the entry (and resulting actions) of confirmed trigger level breach records into the online ARMI database:

1. when an attempt to submit a trigger level breach record online is made, this message (fig 1) will appear in a pop-up window.

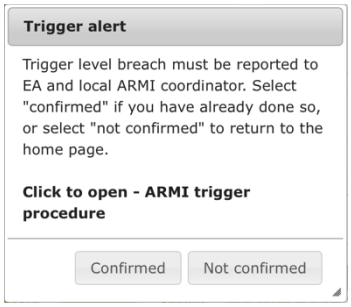


Figure 1

2. If a second sample has not been collected and analysed, 'Not confirmed' must be selected (fig 1) where after a separate message (fig 2) will appear to confirm that the record has been rejected.
The volunteer monitor must repeat the ARMI methodology as per the 'Anglers Riverfly Monitoring Initiative (ARMI): site registration and trigger level procedures' handout (contained within the ARMI workshop participant pack), and points 1-7 above.

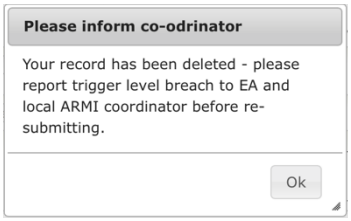


Figure 2

3. If a second sample has been collected and analysed, resulting in a confirmed trigger level breach, 'Confirmed' can be selected (fig 1) and the record will be accepted pending verification by the relevant ARMI group coordinator. A message will appear to confirm this (fig 3). **Please note, this does not constitute reporting of a confirmed trigger level breach.**

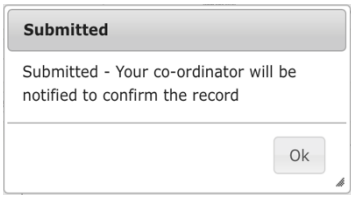


Figure 3

4. When an ARMI group coordinator verifies a confirmed trigger level breach record online, they will have an option to send an automatic email to the local statutory body ecology contact (fig 4).

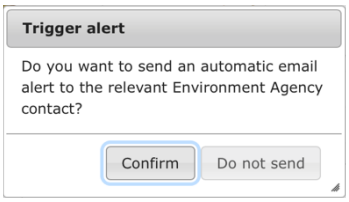


Figure 4

5. If the ARMI group coordinator selects 'Confirm' (fig 4) an automatic email is triggered and a confirmation message will appear at the top of the next screen (fig 5). **Please note, selecting this option does not constitute reporting of a confirmed trigger level breach. Currently, all automatic trigger level breach emails are sent to the national ARMI Project Manager at the Riverfly Partnership for information only. If an ARMI group coordinator picks up a trigger level breach record from the 'Coordinator homepage' section of the ARMI database, of which they were previously unaware, urgent contact must be made with the relevant monitor(s) to ascertain if the breach has been confirmed, and whether a verbal report has been made to the relevant statutory body. If trigger breach confirmation and/or verbal reporting are outstanding, ARMI group coordinator must liaise with the relevant monitors to ensure satisfactory completion as soon as possible.**

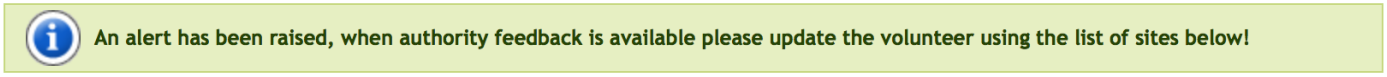


Figure 5

ARMI volunteers record rare mayfly on River Severn

Earlier on this year, Helen and Dave Read became the first ARMI volunteers to record the rare Yellow Mayfly *Potamanthus luteus*. The Yellow Mayfly is one of Britain's rarest species of mayfly having only been known to exist in Rivers Wye and Exe (recorded by Dr Cyril Bennett some years ago), also historically in Rivers Usk and Thames, until recent recordings at various locations in the River Severn.

The distinctive yellow/brown nymphs live amongst stones and sand at the edges of flowing water, feeding on microscopic pieces of plant material. Adults emerge from late Spring to early Autumn during the evenings and may be attracted to lights along the bankside; the positioning of artificial light sources close to the river bank may also have contributed to decline of the species by impacting upon breeding activity.

Helen and Dave carry out monthly Riverfly monitoring to help form an ongoing picture of the health of the River Severn, as part of Severn Rivers Trust ARMI Hub.


Mike Handyside
(Flyfishing & Flytying – October 2017

"Riverfly sampling is a great focus to get out on the river each month to enjoy local wildlife. We are excited to be making a difference" Helen Read.

Severn Rivers Trust (SRT) regularly trains Anglers' Riverfly Monitoring Initiative volunteers to regularly sample water quality at a river site local to them, also providing them with a free sampling kit and guide to rare species, such as the Yellow Mayfly, and invasive species to look out for, such as the Killer Shrimp *Dikerogammarus villosus*. To date, SRT has trained 422 volunteers to sample river invertebrates with 130 sites on 60 different rivers and streams being actively monitored as a result.

Critically Endangered Stonefly (*Isogenus nubecula*) Rediscovered after 22 Year Absence

After a 22-year absence the critically endangered stonefly *Isogenus nubecula* has been rediscovered in the River Dee in North Wales by John Davy-Bowker of the Freshwater Biological Association. Part of an ancient group of insects that have changed little since the Permian period 250 million years ago, stoneflies are typically found in cool, well oxygenated waters and are particularly susceptible to pollution. Generally taking a year to mature, they grow as nymphs clinging under stones in fast flowing areas of streams and rivers, in the spring emerging into winged adults which mate and lay the next generation of eggs.

Isogenus nubecula has been progressively lost from most of Western Europe. Whilst still found in Sweden, Eastern Europe and further east, its West European distribution has been confined to the River Dee in Wales. Even here its distribution had been shrinking and by the early 1990's its presence was confined to just a handful of sites. In 1995 during routine monitoring by the Environment Agency (now Natural Resources Wales) just a single individual was found. This was the last recorded presence of the species in Western Europe.

Despite numerous return surveys the species could not be found. In a recent review by Craig Macadam, Conservation Director at Buglife, *Isogenus nubecula* was assigned the international threat status 'Critically Endangered' to reflect its rarity and decline.

Despite its demise, not everyone gave up on this iconic Riverfly, and in early March this year John Davy-Bowker, a freshwater biologist with Freshwater Biological Association revisited its former site once again. After several hours of diligent hunting John was delighted to find *Isogenus nubecula* nymphs, albeit in low numbers, but alive and well in the Welsh River Dee once more.

Samples have now been returned to the FBA River Laboratory in Dorset and a follow up survey has been carried out by colleague Mike Hammett from Anglesey. Both John and Mike are rearing adults from the nymphs they have collected and are gathering as much information as they can to understand what makes this iconic species so rare.

From Craig Macadam's blog, 'Mostly about Mayflies': Identifying the British species of Leptophlebiidae

There are three genera of Leptophlebiidae present in the British: *Habrophlebia*; *Leptophlebia*; and *Paraleptophlebia* comprising one, two and three species respectively. This guide is designed to help with the identification of these species.

First steps

Mature nymphs are easy to take to genus if they still have their gills attached (Figure 1). I say 'if' as gills on Leptophlebiid nymphs seem to be a bit of an optional extra as they readily fall off during sampling and handling.

Habrophlebia **Leptophlebia** **Paraleptophlebia**

Figure 1: Gill shape of Leptophlebiidae genera

Habrophlebia has multiple branching gills, like little trees. The gills of *Paraleptophlebia* are like little letter 'Y's or tuning forks. Those of *Leptophlebia* are similar but broaden out from the base to form a flattened plate. Be careful because the gills of immature *Leptophlebia* don't broaden out until the nymphs are about half grown and until then they resemble the strap-like gills of *Paraleptophlebia*. This often catches people out and a number of records of *Paraleptophlebia werneri* – a relatively rare species – have turned out to be immature *Leptophlebia marginata*. So, if you've got a small specimen (<5mm) or the gills are damaged you'll have to look at the mouthparts to separate the genera. The idea of looking at mouthparts usually fills the novice with dread but it's actually relatively straightforward. First, you'll need a preserved specimen as you'll need to detach the head from the body and then 'pick out' the mouthparts under a microscope with a fine needle. You're looking for the maxilla and the maxillary palp. The image at https://www.for.gov.bc.ca/hts/risc/pubs/aquatic/mayfly/assets/ms1996-5.jpg should help you locate them. Once you've found them the genus can be confirmed as follows. In *Habrophlebia* and *Leptophlebia* the maxillary palp is shorter than the maxilla, whereas in *Paraleptophlebia* the maxillary palp is longer than the maxilla (Figure 2).

Habrophlebia **Leptophlebia** **Paraleptophlebia**

Figure 2: Maxilla and Maxillary Palps of Leptophlebiidae genera

Taking it to species

Habrophlebia is easy to take to species – or it should be! There is only one species, *Habrophlebia fusca*, known from the British Isles and if you've checked what's left of the gills and confirmed with the mouthparts you're there! However, keep an eye out for the possibility of European species turning up in the UK. *Thraulus* spp. are similar to *Habrophlebia* but the first gill is made up of two simple branches (like a letter 'Y' or a tuning fork – see *Paraleptophlebia* below). Other European species of *Habrophlebia* might also appear in the UK. *Habrophlebia fusca* has 2 to 4 filaments on the small branch of gills 2 to 6. If you suspect you've got a different *Habrophlebia* sp. or *Thraulus* sp. then get in touch with the Ephemeroptera Recording Scheme.

To separate the two *Leptophlebia* spp. take a look at the gills (Figure 3). In *L. vespertina* the wide part of the gills tapers gradually towards the tip, whereas in *L. marginata* the wide part ends abruptly about halfway along the gill. To confirm the identification, you can take a look at the claws (Figure 4). If the teeth cover nearly the whole length of the claw it's *L. vespertina*, if they stop short (3/4 along the claw) it's *L. marginata*. If you really want to be sure check the bristles on the femur (Figure 5). These bristles are, I have to admit, difficult to see but if you've got enough magnification (between x60 and x100) and have decent lighting you should be able to make them out. In *Leptophlebia marginata* the bristles are simple and pointed whereas in *L. vespertina* they have many little points up the sides which gives them a feathery, spiky appearance, or at lower magnification, a fuzzy, indistinct outline.

Leptophlebia marginata

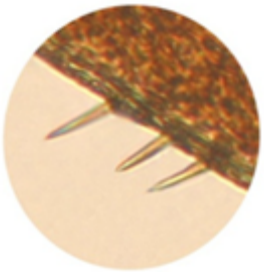
Leptophlebia vespertina

Figure 3: Gills of mature *Leptophlebia* spp.

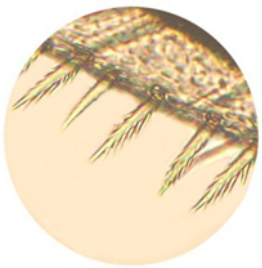
Leptophlebia marginata

Leptophlebia vespertina

Figure 4: Teeth on tarsal claw of *Leptophlebia* spp.



Leptophlebia marginata



Leptophlebia vespertina

Figure 5: Bristles on the femur of *Leptophlebia* spp.

You can compare the relative size of the first and second gills to separate *Paraleptophlebia submarginata* from *P. cincta* and *P. werneri*. The first gill is around half the size of the second in *P. submarginata*, whereas in the other species they are of a similar size, however as you rarely have a full complement of gills I usually skip this step. As a result, you'll have to look at the coverage of teeth on the claws and the shape of the bristles on the femur to make an identification. In *Paraleptophlebia submarginata* and *P. cincta* the teeth cover just over half the length of the claw, whereas in *P. werneri* they cover around three quarters (Figure 7). If you think you've got a specimen of *Paraleptophlebia werneri* then you're either really lucky (it's a highly localised species of winterbournes and ditches), or more likely, you've got an immature specimen of *Leptophlebia marginata* – look again at the mouthparts to separate the genera. The final thing to look at is the spines on the underside of the hind femur. Again, these are difficult to see but with the right magnification and lighting you should be able to pick them out. In *Paraleptophlebia submarginta* they are cylindrical with blunt tips, whereas in the other species they taper to a point which is blunt in *P. cincta* and pointed in *P. werneri*.

P. submarginata

P. cincta/werneri

Figure 6: Comparison of first and second gills in *Paraleptophlebia* spp.

P. submarginata*/*cincta

P.werneri

Figure 7: Teeth on tarsal claw in *Paraleptophlebia* spp.

P. submarginata

P. cincta

P. werneri

Figure 8: Spines on underside of hind leg of *Paraleptophlebia* spp.

So, there you have it. The identification of British Leptophlebiidae is relatively straightforward once you get the hang of it. Remember not to force an identification– if you can't see the feature or discern the differences between species it's okay to leave the identification at the genus level. Please also remember to add your records to iRecord (www.brc.ac.uk/irecord). You can add images to your records which will help with the verification process.

Acknowledgements

The photographs in this guide are copyright Cyril Bennett. The diagrams in figure 2 are Peters, W.L. and Edmunds, G.F. (1970). Revision of the Generic Classification of The Eastern Hemisphere Leptophlebiidae (Ephemeroptera). Pacific Insects 12(1): 157-240. The diagrams in figure 8 are taken from Macan T.T. (1952). Taxonomy of the British species of Leptophlebiidae (Ephem.). Hydrobiologia 4(4):363-376. All other line diagrams were produced by Rory McCann and are taken from Macadam, C. and Bennett, C. (2010). A Pictorial Guide to British Ephemeroptera. Field Studies Council, Shrewsbury.

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