

Restoring Fly Populations

Introduction

Over the past twenty years the fly life on many of our rivers has declined to such an extent that the real challenge of imitative dry fly fishing has diminished, even finding a consistently rising fish can sometimes be a challenge. For a feeding trout to become preoccupied on a particular fly, that species needs to be there in large numbers and that's where a fly fisherman's entomology skills come into play.

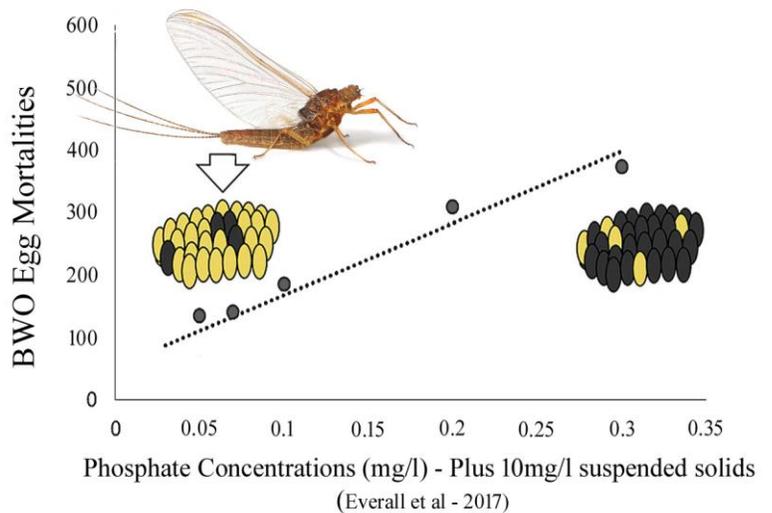
After a pollution incident, downstream drift of invertebrates can lead to a relatively quick recovery on sites just below the pollution site, but sites further downstream can take months or even years to recover and this is when a bit of help is needed. However more long term pollutants such as high levels of phosphates and suspended solids (silt) need to be confronted before any meaningful reintroduction can take place.

After a serious insecticide pollution incident on the River Wey in Surrey, two million Mayfly eggs from the River Test at Leckford (Bennett 2002/2004/2007) together with 30 million Blue Winged Olive eggs from the Hampshire Avon at Amesbury, helped to re-establish the fly life downstream of the pollution site. After a creosote pollution incident on the Derbyshire Wye, a full population of Mayfly was re-established using the eggs from just 60 females. Depleted Grannom populations on the Hampshire Avon upstream of Salisbury are being overcome with the movement of large numbers of eggs from below the city.

However, most of this is not new; Lunn, on the River Test at Houghton (Hills 1934), was incubating Mayfly eggs, moving Grannom eggs and increasing Olive populations (with the use of Fly Boards) over 100 years ago.

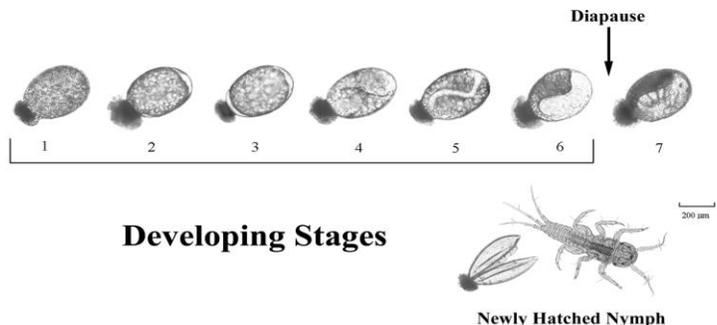
This short paper outlines some methods that can be used to collect eggs to improve Riverfly populations, but two things need to be considered:

1. The reason for the depleted population and if this still exists; ie. high siltation and phosphate levels can play havoc with Riverfly eggs, particularly BWO eggs during the long incubation period (Gilchrist & Bennett 2010, Everall et al 2017).
2. A suitable donor site with a good population of the required species.



The Blue Winged Olive (*Serratella ignita*).

The Blue Winged Olive is recorded as having one generation a year with overwintering eggs; the eggs enter diapause (suspended development) in the penultimate stage of development. Rising water temperatures in the following spring breaks the diapause, allowing the eggs to hatch.



Collecting the egg:

Females returning to the river in the late evening carry an ‘egg ball’ consisting of around 1000 fertilised eggs which are released into fast flowing water (riffles). Flying females (together with the eggs) are collected in a large insect net (keeping the net dry) and transported to nearby premises to separate the eggs.



Egg laying females (Sherry Spinners) on the river in the late evening

The contents of the net (females & eggs) is emptied into a tray filled with tap water* and agitated to allow the eggs to sink to the bottom of the tray where they can be transferred onto glass (or perspex) incubation plates and left for 24 hours to stick. The plates are then upended and placed into a slotted incubation chamber. The eggs darken as they mature.

(* Eggs are fine in tap water and this overcomes any biosecurity problems - but they must be placed into the river before they hatch)



Separating the eggs from the females



Incubation chamber containing five plates

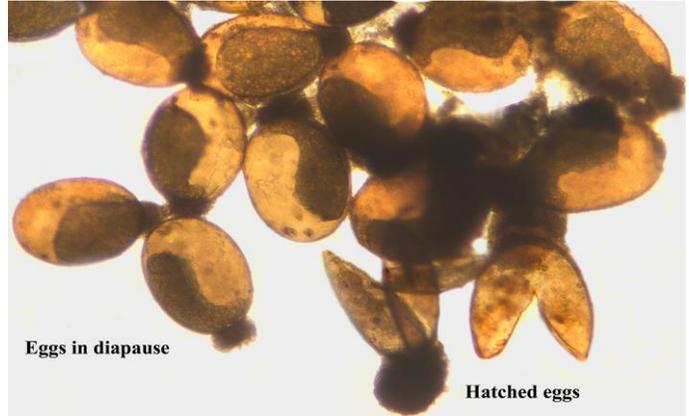
Large numbers of eggs can be kept over the winter period using a relatively small incubation chamber and with a minimum of attention – mild aeration and occasional water changes, but they must be kept in an unheated area. Whilst this will overcome the effects of silt & phosphate on the eggs, the next generation will still suffer heavy losses if these pressures still exist in the river.

Releasing the eggs;

In early March, the eggs need to be moved into the river before they hatch and one way of doing this is by suspended the incubation plates below a 'Fly Board' (described later) out in the main flow of the river. In late May, a small sample of the eggs can be removed and checked under a microscope when most (probably all) will have hatched.



Incubation plates suspended below a Fly Board



BWO eggs coming out of diapause (x400)

Eggs can also be incubated and released into the river using white bathroom tiles loaded with eggs (on the upper surface) and slid into grooves on the underside of a modified 'Fly Board'.



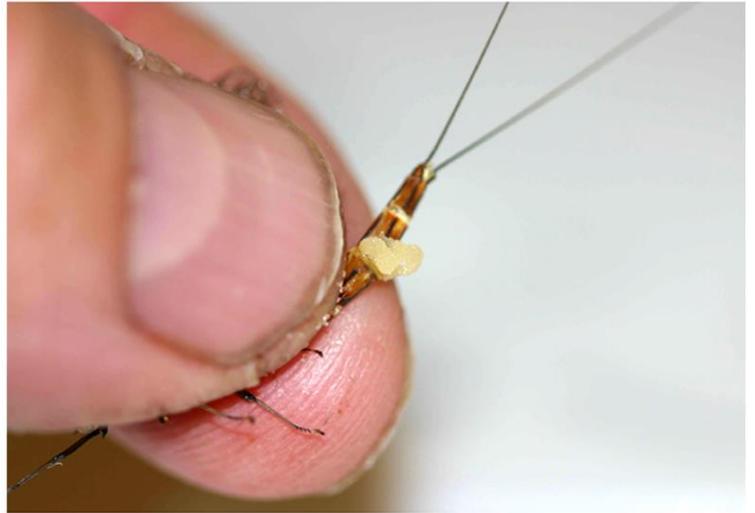
Tiles positioned underneath a Fly Board

The Mayfly (*Ephemera Danica*).

Collecting the eggs;

Mayfly eggs can be collected in the same way as the BWO except that the eggs need to be ‘milked’ out of the females and allowed to sink onto the incubation plates and remain undisturbed for 24 hours. Each female produces 4000 - 5000 eggs but inevitably some will be empty as they will have already been released into the river.

The eggs darken as they mature (unfertilised eggs remain white) and will hatch in about 24 days. Development stages (similar to BWO) can be checked under a microscope but they must be placed into the river before they hatch.



“Milking” eggs from a female

Olives (*Baetis species*)

Female Olives crawl down on rocks, plants etc. to lay their eggs under the water. ‘Fly Boards’ (planks of untreated wood – the older the better) placed out in the main flow of the river provide a convenient landing platform with easy access to the underside of the board on which to lay their eggs well out of reach of bottom feeding predators.



Fly Board positioned out in the main flow of the river

If the board is placed (out in the main flow) in an area containing a good population, large numbers of eggs can be quickly collected and then moved to an area where the population is low



Female laying eggs on the underside of a Fly Board



Fly Board covered with several layers of Olive eggs

Grannom (*Brachycentrus subnubilus*).

As with the Olives, female Grannom crawl down under the water to lay their eggs. Fly Boards can therefore be used to collect eggs during the adult emergent period (mid-April), and then moved to the new site; the eggs hatch in about 21 days.



Grannom eggs on a Fly Board

Egg laying females are particularly attracted to old posts in the river; upending the Fly Board can therefore improve the numbers of eggs collected.



Egg laying Grannom females congregating on an upturned Fly Board

References:

- Bennett, C. J., 2002. A seven year study of the breeding cycle of the mayfly *Ephemera danica* on the River Test at Leckford in Hampshire. John Spedan Lewis Trust for the Advancement of the Natural Sciences – Leckford Survey Record No. 7.
- Bennett, C. J., 2004. Species Recovery of the Mayfly (*Ephemera danica*) on the River Wey in Surrey. John Spedan Lewis Trust for the Advancement of the Natural Sciences – Leckford Survey Record No. 79
- Bennett, C.J., 2007. The ecology of a seven year study of the life cycle of the mayfly *Ephemera danica*. Freshwater Forum 27, 3-14
- Bennett, C., Gilchrist, W., 2010. Chapter 22. Riverflies. In: Maclean, N. (Ed.) Silent Summer. The State of Wildlife in Britain and Ireland. Cambridge University Press, Cambridge, UK.
- Everall, N.C., et al. 2017. Sensitivity of the early life stages of a mayfly to fine sediments and orthophosphate levels. Environmental Pollution.
- Hills, J. W., 1934, River Keeper, the life of William James Lunn. (London: Geoffrey Bles Ltd.).

Dr. Cyril Bennett MBE
(email - freshins@btinternet.com)
August 2018