

Species dossier:

Baetis niger

Southern iron blue

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Female subimago of *Baetis niger*

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***Baetis (Nigrobaetis) niger* (Linnaeus 1761)**
Southern iron blue
(Ephemeroptera: Baetidae)

Introduction

The Southern iron blue mayfly (*Baetis niger*) was listed as a priority species within the UK Biodiversity Action Plan in 2007. The purpose of this dossier is to draw together all information on its ecology and distribution in the UK, in order to assist Government Agencies, Planning Authorities, landowners and conservation practitioners with the implementation of action to conserve this species.

The Southern iron blue has no formal legal protection in the UK, and is not listed in any Schedule of the Wildlife & Countryside Act or in annexes to EU Directives. It is not listed in either the British Red Data Book (Shirt, 1987) or the Status review of British Ephemeroptera (Bratton, 1990).

Summary

This is a widespread species which occupies around 126 10x10km squares in the UK, however the Millennium Fly Trends study reported the Southern iron blue (*Baetis niger*) as one of the most severely impacted species of Ephemeroptera. The larvae are chiefly found on aquatic macrophytes in running waters. In common with other Ephemeroptera, this species relies upon good water quality to survive. It is also thought that this species will be particularly affected by low flows.

UK populations are unlikely to be internationally significant due to the wide distribution of this species in Europe. However, if European populations were to suffer a crash similar to the UK population it is possible that the UK population may become more important in the future.

This insect has a long historical connection with fly-fishing. It is also an excellent indicator of the health of the riverfly fauna.

Ecology

The larvae of *Baetis niger* typically crawl amongst in-stream vegetation in riffle areas of rivers and streams or swim in short, darting bursts amongst the substrate. They feed by scraping algae from submerged stones and other structures, or by gathering or collecting fine particulate organic detritus from the sediment.

There are two generations per year - a slow growing winter generation and a much faster summer generation. This results in a fairly long flight period, with adults being present between April and October.

Elliott (1967) found that *B. niger* is bivoltine with a slow-growing generation and a faster growing summer generation. The winter generation was found to emerge from April to June and the summer generation in August and September. Figure 1 shows that very small nymphs (circa 1mm) were present for a longer time than the flight period of the imago. The total number of nymphs involved in the summer generation was far greater than that of the winter generation and that the maximum density of nymphs was observed in July. Elliott (1967) suggests that this is probably due to the delayed hatching of some eggs, as has been observed in Plecoptera (Hynes, 1961; Illies, 1959).

Landa (1968) also described the life cycle of this species as bivoltine. Eggs laid during the summer hatched as late as the autumn, with larvae developing quickly to become older larvae by late autumn. Adults from this generation emerged the following spring. The eggs

laid by this overwintering generation hatched within 2 to 3 weeks, and the larvae of this new generation developed rapidly within 2 to 3 months through the summer. Adults of this second generation became mature in the autumn and the cycle was repeated.

Sowa (1975) suggests that this species may become univoltine at lower altitudes and recent work on the River Test, Hampshire also found that the summer generation is considerably reduced, if not absent (Craig Macadam, pers. comm.).

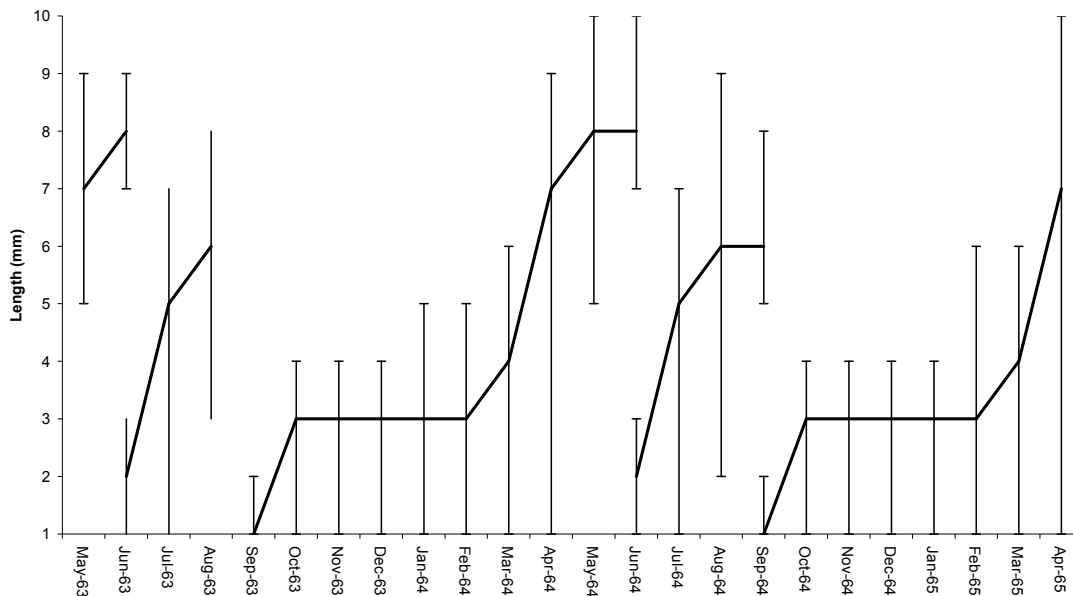


Fig. 1: The lifecycle of *Baetis niger* (after Elliott, 1967)

Emergence of the adults is thought to occur at the surface of the water during daylight hours. The males of this species can be found swarming throughout the day and often swarming continues until dusk.

Once mated, the female fly pulls herself under the water surface to lay her 1200 eggs directly on a partly submerged stone. In some cases she will fly to the river, where she descends to the surface of the water and releases her eggs in several batches by dipping the tip of her abdomen onto the water surface.

History in Britain

Baetis niger is a widespread, though localised species which is found in running waters throughout the British Isles with the exception of Ireland. The Ephemeroptera Recording Scheme has records of this species from 126 hectads.

Concern over the status of this species was raised in the late 1990s as anecdotal records were made of low numbers of specimens. The Millennium Chalk Streams Fly Trends Study (Frake and Hayes, 2001) reported that in the chalkstreams of southern England *B. niger* had suffered a 66% decline in the abundance of adult flies since the 1970s and was thought to be the most severely impacted species of Ephemeroptera. Landa et al. (1997) also reported the loss of *B. niger* from two streams in the Czech Republic over a period of 15 years although did not offer any discussion on the reasons for this loss.

B. niger is widespread in Europe, reaching Scandinavia and Russia in the north and the Iberian peninsula in the south.

Survey methods

The larvae of this species can be collected by kick-sampling along suitable stretches of river. This is a standard technique employed by biologists to sample aquatic invertebrates and entails disturbing a section of the riverbed. Invertebrates are dislodged and collected in a water net held just downstream. Adults can be collected by examining bankside trees and other vegetation. Alternatively, they can be caught as they swarm near the water.

Identification

Baetis niger and *B. digitatus* are both narrow-bodied larvae which have a black band across their tails. *B. niger* and *B. digitatus* are the only Baetidae with only 6 pairs of plate-like gills. Separation of nymphs of *B. niger* and *B. digitatus* can be achieved by examination of the last gill. In *B. digitatus* the hind edge of the gill is slightly concave resulting in a different shape when compared to other Baetidae species, including *B. niger*.

The adult fly is small with two tails and small oval hindwings. The sub-imago has dull yellow green eyes in the female and dull red brown eyes in the male. In both sexes the wings are a dull grey blue colour and the body is dark brown which is sometimes tinged with olive. The legs are pale to dark olive brown, whilst the tails are dark grey. The imago has transparent wings and pale grey legs and tails. The body in the female is dark claret brown, whilst in the male it is translucent white, with the last three segments being dark orange brown.

Baetis niger and *B. digitatus* can be distinguished from other adult Baetidae by the presence of only two veins on the oval shaped hind wing, the second of which is forked. The only other Baetidae species with a forked vein is *B. muticus*, however this species has a third vein which runs along the lower edge of the wing. It is often difficult to see the third vein, and care must be taken to double check whether it is present or not. Separation of adults of *B. niger* and *B. digitatus* is not reliable at present.

If in doubt it is best to refer to specialist keys. There are a number of identification guides available: Elliott, et al. (1983) for adults; Elliott and Humpesch (2010) for larvae; Harker (1989) and Macadam and Bennett (2010) for both adults and larvae.

If you are in any doubt over the identification of adults or larvae, please contact Buglife – The Invertebrate Conservation Trust, who can arrange for them to be checked by an expert.



Baetis niger subimago © Stuart Croft

Threats

Water pollution is the most obvious threat to this species. In common with other Ephemeroptera, this species relies upon good water quality. Pollution events, whether persistent or catastrophic, could lead to the local extinction of this species. High levels of suspended silt are likely to be particularly damaging to this species, and other mayflies.

Any operations that affect the bed such as dredging, channel modifications or gravel removal could damage the habitat and should be avoided. Gross alterations to the aquatic vegetation structure (such as weed cutting) may be detrimental to this species. Similarly, changes to the riparian habitat, whether through flood defence work or removal of bankside trees may result in a loss of habitat for the adult insect.

It is also thought that this species could be affected by low flows. Abstraction; whether for irrigation, water supply or other purposes should be carefully considered where this species is present.

Action Plan for the Southern iron blue (*Baetis niger*)

- 1 Undertake research into the factors causing the decline in this species.
- 2 Produce advice for Rivers HAP group on the requirements of *Baetis niger*.
- 3 Conduct targeted autecological into the larval habitat requirements of this species.
- 4 Engage with local government and planning authorities to ensure that this species is afforded adequate consideration and, where possible, it and its associated habitats are protected from damaging development through the planning process.

- 5 Ensure that this species is represented on all relevant LBAPs.
- 6 Continue survey work to determine the status of this species, and to identify new sites.
- 7 Investigate population dynamics of this species through repeated quantitative surveys.

Appropriate management, particularly of water quality, river morphology and the riparian habitat of rivers where this species occurs will help this species and other aquatic invertebrates. In particular, ensuring that river channel management, such as weed-cutting, is sympathetic to the needs of this species, will be beneficial.

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Appendix 1 Records of (*Baetis niger*) from the UK

Specific records for this species can be found using the NBN Gateway (http://data.nbn.org.uk/index_homepage/index.jsp).

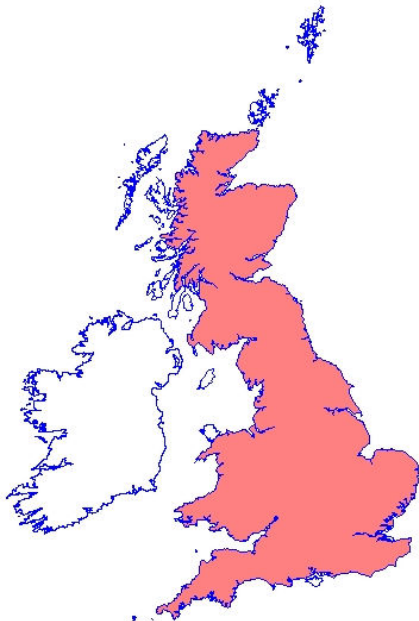


Fig. 1 Generalised distribution map of confirmed records of *Baetis niger* in the UK

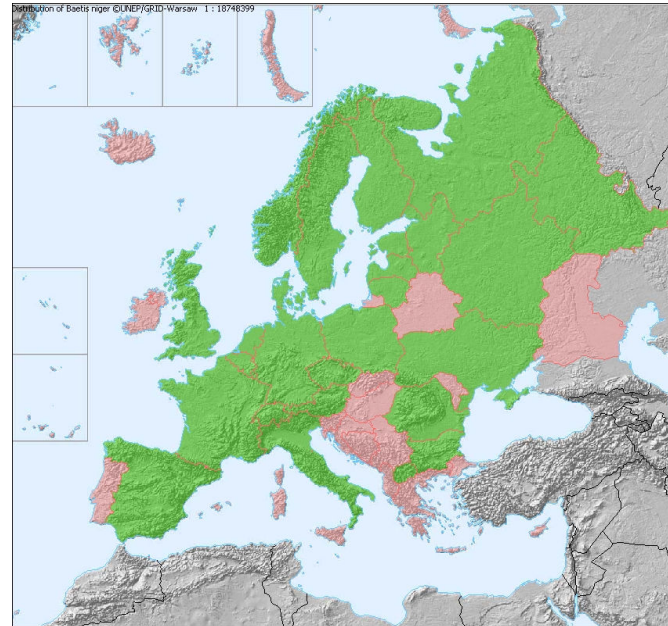


Fig. 2 Distribution of *B. niger* in Europe (from Fauna Europaea) (Green = Present; Pink = Absent; Beige = No data)