**Species dossier:**

# *Brachyptera putata*

## Northern February red

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Female imago of *Brachyptera putata*


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The Riverfly Partnership

NATURAL ENGLAND

COUNTDOWN 2010 SAVE BIODIVERSITY

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# Species dossier: *Brachyptera putata*

## Contents





This dossier is based upon the Species Dossier prepared by Ian Middlebrook as part of the Action for Invertebrates project. For further information on the Action for Invertebrates project visit www.buglife.org.uk

# *Brachyptera putata* (Newman, 1838)
# Northern February red stonefly
# (Plecoptera: Taeniopterygidae)

## Introduction

The Northern February red stonefly (*Brachyptera putata*) is a priority species within the UK Biodiversity Action Plan, and the 'Action for Invertebrates' project is its Lead Partner. The purpose of this dossier is to draw together all available 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 Northern February red is classified as endemic and Nationally Scarce in Great Britain (Bratton, 1990) however it is not listed in the British Red Data Book (Shirt, 1987). It has no formal legal protection, and is not listed in any Schedule of the Wildlife & Countryside Act or in annexes to EU Directives.

## Summary

The Northern February red (*Brachyptera putata*) is an endemic stonefly which has its stronghold in Scotland, particularly north-east Scotland and the Highlands. Outside of Scotland, this species has only ever been found in two area – the River Usk in Wales and the Wye near Hereford. As an endemic species, the UK population is of international significance.

Wide-ranging surveys of sites in north-east Scotland, the Highlands and Herefordshire were undertaken as part of the 'Action for Invertebrates' project (Middlebrook, 2005). These surveys were very successful with many records from rivers where the Northern February red had not previously been found. In Scotland at least, this species seems to be widely distributed where suitable habitat exists.

Key features for maintaining this habitat are high water quality and exposure to winter sunshine. Many of the upland rivers that support this species are also spawning areas for salmon, and are well managed by their estates. However, some lowland sites could benefit from protection against excessive disturbance from livestock.

## Ecology

*Brachyptera putata* is a stonefly that thrives best in highly oxygenated rivers with a shallow or moderate gradient on open heaths or upland pastures. Within this habitat, its larvae are generally found during winter months amongst loose large stones and cobbles, usually below riffles where water flow is moderate. The larvae feed on various species of filamentous algae. The adults typically emerge early in the spring, from February to April. Pryce (2010) reported catching adults between 20th March and 30th April. The peak emergence of males occurred approximately one week before the peak for females. During this study males were also found under stones at the river side. Specimens were found under stones of diameter 13-40 centimetres at distances of between 10 and 300 centimetres from the waters edge. It was found that the optimal location for specimens was on the underside of stones that were far enough from the river not to be wetted on the underside and had a crawl space underneath allowing the formation of a cool, humid pocket of air. They were found clinging to the underside of the rock rather than sitting on the ground below.

This stonefly was originally thought to be associated with the slower reaches of rivers (Hynes, 1967) or the middle and lowland sections of large and medium sized rivers – being absent from the acidic upland sections (Anon, 1999). However, the results of extensive recent surveys suggest that these descriptions are misleading.

Hammett (2004) reports that *B. putata* thrives best in highly oxygenated rivers with a shallow or moderate gradient on open heaths or upland pastures. Within this habitat, larvae are generally found amongst loose large stones and cobbles, usually below riffles where water flow is moderate. Hammett (2004) has also identified the exposure of riverbanks to winter sunshine as a key requirement of suitable habitat, particularly in relation to adult emergence. Winter sunlight would also encourage the growth of larval food when the larvae are most active.

In large rivers, Hammett (2002) suggests that the main centres of population are likely to be found in the upper sections. However, larvae may drift downstream during the course of their development, which is why the stonefly has also been recorded in lower sections.

The larvae of this stonefly appear to need the high oxygen levels that are only found in cold waters in order to remain active. For this reason, they are only found during the winter months. It is currently thought that young larvae descend into deep waters during the summer months, either in rivers or possibly lochs, where they enter a state of diapause (Hammett, 2004).

During the course of his surveys, Hammett (2002 and 2004) found larvae of two distinct age classes, including many which he considered too small to reach maturity by the following spring. So it is likely that this is a semivoltine species, and larvae remain in the rivers over two winters. It has also been clearly shown that these larvae feed on various species of filamentous algae (Hammett, 2002).

The adult stoneflies emerge early in the spring, from February to April. The male is short-winged and unable to fly so, whilst larvae may migrate downstream, the return journey could only be completed by a female. There is some evidence to suggest that female larvae drift downstream in greater numbers than males (Hammett, pers. comm.).

## History in Britain

*Brachyptera putata* was for many years one of the most enigmatic members of the order in Britain. The original description of the species, from adults collected at New Lanark, Scotland, placed the species in the genus *Nemoura*; it was reclassified as belonging to the family Taeniopterygidae by Morton (1911). Hynes (1957) confirmed the validity of the species and its position within the genus *Brachyptera*. The larva of this species was first located by Hynes on the River Oykel below Altasmoor on 28th March 1955 where a single fully mature female was found (Hynes, 1956). It appears that the FBA key (Hynes, 1977) was prepared on the basis of this specimen.

The stronghold of this stonefly has always been Scotland. Until recently, the vast majority of records for this species have been generated by the environmental authorities and their agents. In particular, the Scottish Environment Protection Agency (SEPA) and its predecessor have occasionally recorded *B. putata* in the process of their routine monitoring of watercourses. Other records during the 1970s and 80s came from more detailed studies by the Institute for Freshwater Ecology (now CEH) and from Mike Davidson. Most of these records were from the Grampian region – especially the Rivers Dee, Don and Spey.

Outside of Scotland, this species has only ever been found in two areas. In England it is known from Herefordshire, where adults are infrequently recorded, most recently in 1992. In Wales it is known from the River Usk, where it was first found in 1983, although there has only been a single sighting of an adult since that time.

## Recent survey work

In late 2001, Action for Invertebrates commissioned a wide-ranging survey of sites in north-east Scotland. This survey was very successful, particularly in the eastern Highlands where

the species was found at 19 of the 30 sites visited. This included several sites where it had not previously been recorded. Results were not quite so good in other areas. It was not found at any sites on the Deveron or the Don, despite modern SEPA records for those rivers. Overall, *B. putata* was found at 27 of the 54 sites visited (Hammett, 2002).

Further extensive surveys were undertaken two years later – this time targeting sites in the northern and central Highlands. This survey was another great success, with larvae being found at 21 sites in 12 river catchments. The majority of these records were from smaller rivers where *B. putata* had not previously been found (Hammett, 2004)

In Scotland at least, this species seems to be widely distributed where suitable habitat exists. A great deal of valuable data has also been gathered during the course of these two major surveys. This has enabled aspects of the stonefly's ecology and habitat preferences to be clarified, which has lead to the provision of management recommendations.

The Countryside Council for Wales (CCW) has commissioned regular surveys along the River Usk since February 2001, but the stonefly has not yet been found. In 2007 Action for Invertebrates organised a survey to ascertain the status of *B. putata* in the River Wye and its tributaries. Fifteen sites were examined during the initial part of this survey however no larvae of *B. putata* were found (Hammett, 2007).

In his paper on this species Morton (1911) commented on the remarkable similarity of this species with two specimens sent to him from the eastern Carpathian Mountains. Insects from this region have since been described as *Brachyptera starmachi* (Sowa, 1966) and have also been found in Germany (Bavaria) and Austria (Styria) (Graf & Weinzierl, 2003). The possibility of synonymy with this species was investigated by the Riverfly Partnership through funding from Natural England's Countdown 2010 fund.

Surveys were undertaken in March 2009 to collect fresh adults to compare with *B. starmachi* and to collect larvae and adults for photographing. Despite extensive surveys in areas where *B. putata* has been recorded in the past, no adults and only one larva was found. It is likely that this survey was undertaken after the main flight period (Hammett, pers. comm.). A second survey was undertaken in 2010 which included kick sampling, sweeping, active searching of stones and the use of a Malaise trap to investigate the flight period of the species. Adults collected during this survey were compared with *B. starmachi* by Peter Zwick and were found to be quite different, thus confirming the endemic status of *B. putata* (Pryce, 2010).

## Survey methods

The larvae of this stonefly can be found during the winter by a form of 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. However, the habitat of this stonefly presents particular problems and requires some adaptation of the technique. In particular, there are typically a lot of large stones on the riverbed that would not be displaced by casual 'kicking'. Such stones must be deliberately dislodged, by hooking a foot underneath them (for example), in order to disturb smaller material underneath.

Adults have a short emergence period and are perhaps less easily found. They might be found by searching on riverside vegetation and stones, or the females could be netted in flight. Most records from Hereford appear to have resulted from the adult fly being attracted to light. This technique has not, as yet, been deliberately employed to look for this species, but it could be an option for some future surveys. Pryce (2010) found that the most successful method for finding adults was turning over stones on gravel bars and along the banks of the watercourse, however only males were found using this technique.

Malaise trapping can potentially provide very high quality data on species phenology, however the down side is that it traps indiscriminately and the by-catch can be substantial.

## Identification

This species belongs to the family Taeniopterygidae, of which just three other members are found in Britain, and it is most likely to be confused with the more common *Brachyptera risi*. A key to the adults and nymphs of stoneflies is available from the Freshwater Biological Association (Hynes, 1977), and this can generally be used to distinguish *B. putata* from most other species.

Reliable identification is easiest with the adult stonefly, for which the FBA key is entirely adequate. The female has three dark bands across its wings, as well as dark wing tips, whilst the male is short-winged and unable to fly.

This stonefly is most likely to be encountered as an aquatic larva. Like other stonefly larvae it has two cerci (tails) projecting from the rear of its abdomen. In *B. putata* these are of a similar length to its antennae and typically as long as the main body.

However, identification of larvae is not so straightforward, and some of the features noted in the FBA key are not always reliable in separating the larvae of *B. putata* from *B. risi*. This is particularly true of abdominal markings, which Hammett (2005) has found to vary greatly between sites and instars. Examination of the genitalia under a microscope is the most reliable means of identification.

Hammett (2002) noted some distinguishing features that might help in the field. In particular, the underside of the body is more or less translucent in *B. putata* (at least for younger instars) such that the colour of the gut contents is clearly visible. This is especially obvious when the gut contains green filamentous algae. In contrast, the body of *B. risi* is well-pigmented.

*B. putata* larvae always has a clearly defined dark area at the base of the tibia (see below), whilst, if there is any dark pigment on the tibia of *B. risi*, it is ill-defined.

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.

**Larva of *Brachyptera putata***

**Female imago of *Brachyptera putata***

**Male imago of *Brachyptera putata***

## Threats

Many of the upland rivers that support this species are also spawning areas for salmon. As a consequence they are well protected and carefully managed by the estates that own them. In such cases, no further specific measures should be required for the conservation of this stonefly.

There are three key features that must be maintained to support populations of this stonefly. They are clear stony riverbeds, high water quality and exposure of the river and its banks to winter sunshine. Any operations that affect the bed material such as dredging, channel modifications or gravel removal could damage the habitat and should be avoided.

Whilst most deciduous riparian woodland is relatively open in winter, conifer plantations would be detrimental. There are already some concerns over a trend towards afforestation schemes following recent legislation giving crofters more power (Hammett, pers. comm.).

In lowland areas the riverbanks are sometimes unprotected from livestock on more heavily grazed pasture. The resulting disturbance of the riverbed, together with the potential eutrophication or pollution of the water, may lead to a deterioration of the habitat. In particular, Hammett (2002) noted this to be the case along parts of the River Don and Forss Water. Where this is happening, consideration should be given to fencing off the animals from the river. However, Hammett (2004) also suggests that it may not be necessary to conserve sites in lower sections of large rivers if large populations exist upstream.

As the adults of this species are potentially attracted to light, the positioning of bankside lights, such as road lights, may also have a deleterious effect on populations.

## Action Plan for the Northern February Red (*Brachyptera putata*)

1 Produce advice for Rivers HAP group on the requirement of *Brachyptera putata* by the end of 2011.

2 Develop a common standards monitoring protocol to enable monitoring of population size and range by the end of 2011.

3 Undertake monitoring of this species at all extant sites. A minimum of 10 sites per year.

4 Continue survey work to determine the status of this species, to identify key populations, and to identify new sites.

5 Conduct targeted autecological research focussing on the life cycle and adult emergence sites.

6 Encourage Environment Agency staff to identify all Taeniopterygidae to species in samples from the Welsh River Wye and the River Usk.

7 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.

8 Ensure the requirements of the species are taken into account in response to applications for forestry development in upland areas.

9 Ensure that this species is represented on all relevant LBAPs.

10 Promote opportunities for the appreciation of the species and the conservation issues associated with its habitat.

**Additional actions to be delivered through the Rivers Habitat Action Plan**

11. Ensure good water quality at current and historic sites.

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## Appendix 1 Records of (*Brachyptera putata*) from the UK

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

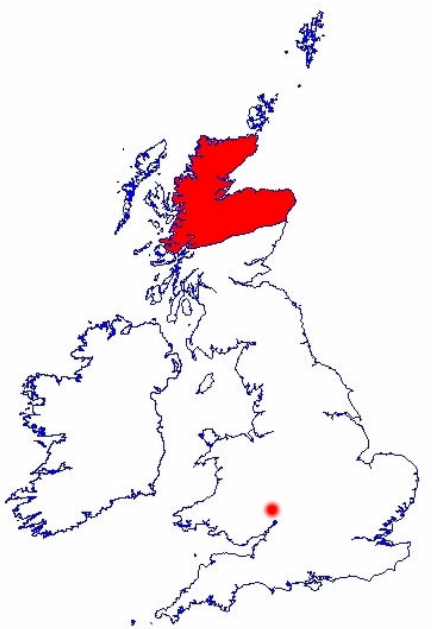

Fig. 1 Generalised distribution map of confirmed records for *Brachyptera putata* in the UK

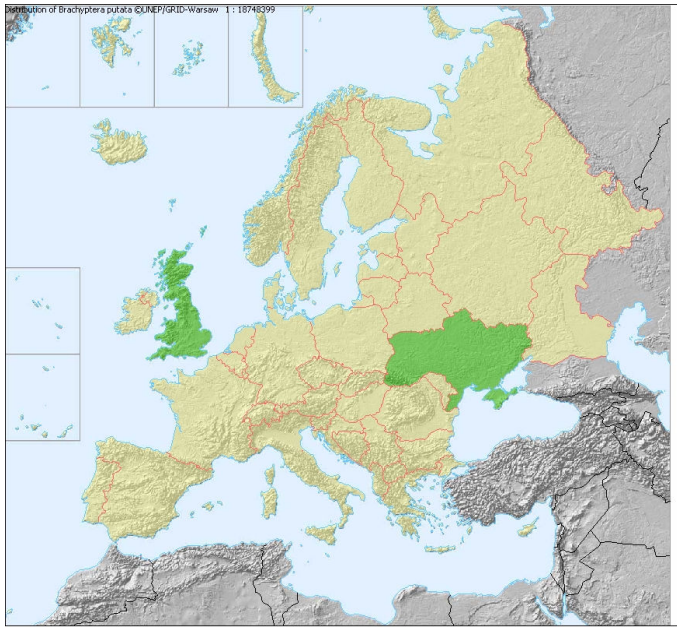

Fig. 2 Distribution of *B. putata* in Europe (from Fauna Europaea) (Green = Present; Pink = Absent; Beige = No data)