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A review of the status of the caddis flies (Trichoptera) of Great Britain

Trichoptera

Species Status No.27

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NATURAL ENGLAND

Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Background

Making good decisions to conserve species should primarily be based upon an objective process of determining the degree of threat to the survival of a species. The recognised international approach to undertaking this is by assigning the species to one of the IUCN threat categories.

This report was commissioned to update the threat status of caddis from work originally undertaken in 1987 and 1991 respectively, using the IUCN methodology for assessing threat.

Reviews for other invertebrate groups will follow.

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Further information
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1.1 The Species Status project

The Species Status project is a recent initiative, providing up-to-date assessments of the threat status of taxa using the internationally accepted Red List guidelines developed by the International Union for Conservation of Nature (IUCN) (IUCN, 2012a; 2012b; IUCN Standards and Petitions Subcommittee, 2013, 2014). It is the successor to the JNCC's Species Status Assessment project (http://jncc.defra.gov.uk/page-3352) which ended in 2008. This publication is one in a series of reviews to be produced under the auspices of the new project.

Under the Species Status project, the UK's statutory nature conservation agencies, specialist societies and NGOs will initiate, resource and publish Red Lists and other status reviews of selected taxonomic groups for Great Britain which will then be submitted to JNCC for accreditation (http://jncc.defra.gov.uk/page-1773). This means that the UK's statutory nature conservation agencies and JNCC will be able to publish red lists. All publications will explain the rationale for the assessments made. The approved threat statuses will be entered into the JNCC spreadsheet of species conservation designations (http://jncc.defra.gov.uk/page-3408).

1.2 The status assessments

This review adopts the procedures recommended for the regional application of the IUCN threat assessment guidelines which can be viewed at http://cmsdocs.s3.amazonaws.com/keydocuments/Reg_Guidelines_en_web%2Bcover%2Bbackcover.pdf. Section 3 and Appendix 1 provide further details. This is a two-step process, the first identifying the taxa threatened in the region of interest using information on the status of the taxa of interest in that region (IUCN, 2001), the second amending the assessments where necessary to take into account interaction with populations of the taxon in neighbouring regions (IUCN Standards and Petitions Subcommittee, 2013). In addition, but as a separate exercise, the standard GB system of assessing rarity, based solely on distribution, is used alongside the IUCN system.

1.3 Species status and conservation action

Sound decisions about the priority to attach to conservation action for any species should primarily be based upon objective assessments of the degree of threat to the survival of a species. This is conventionally done by assigning the species to one of the IUCN threat categories. However, the assessment of threats to survival should be separate and distinct from the subsequent process of deciding which species require action and what activities and resources should be allocated.

2 Introduction to the Trichoptera review

All but one species (*Enoicyla pusilla*) of British caddisflies have aquatic larvae and these are familiar insects to anyone sampling freshwaters. The basic biology of almost all species is known and most larvae can be identified, at least when full-sized, using readily available and comparatively inexpensive identification guides, particularly Edington & Hildrew (1995) and Wallace, Wallace & Philipson (2003). The moth-like adults are less well known, but are frequently encountered in light-traps and several are well known to fly-fishing anglers who have given some common names. A new key to adult caddis (Barnard & Ross, 2012) filled a void as the previous key (Macan, 1973) had been out of print for many years.

Trichoptera larvae have featured prominently in all the water quality indices used over the past 40 years. Although this has resulted in the accumulation of very large numbers of records, particualrly of many of the common flowing water species, many taxa were identified to family level only, of little to no value for species distributional studies. Recent scoring systems e.g. the LIFE scores (Extence *et al* 1999) require species level data and there has been a steady, and welcome, move to increasing species-level identification within the three countryside agencies – Environment Agency (for England), Natural Resources Wales, and Scottish Environment Protection Agency. However, still water species have fewer records and very small waterbodies of all types are not usually sampled for water quality assessment. This use in water quality work means caddis are unusual amongst insect groups in having more records for immature stages than for the adults.

Caddis species are being increasingly recorded as a light-trap by-catch by lepidopterists and this will expand considerably, when more work is done on production of identification guides to caddis wing patterns.

Collecting caddis larvae to enable production of identification keys (e.g. Bray, 1966; Edington, 1964; Hiley, 1973; Wallace, 1976; Wallace & Wallace, 1983) has been a major spource of information about the rarer species.

2.1 Taxa considered in this review

The selection of taxa to be included in this review was based on records accumulated by the national recording scheme up to the end of January 2015, approximately 520,000 entries, co-ordinated by the author for the Biological Records Centre (http://www.brc.ac.uk). The scheme includes records from the following sources:

- Historic records as published in the national journals such as the Entomologist's Monthly Magazine, Entomologist, Entomologist's Record & Journal of Variation, Entomologist's Gazette, British Entomological Society publications, and many local journals (23,500 records from 870 publications).
- Voucher specimens available through museums such as The Natural History Museum, National Museum of Scotland, the Hope Department, Manchester Museum, World Museum Liverpool and many smaller but very useful sources such as the Hunterian Glasgow, Cambridge University Zoology Museum, the Tolson Memorial Museum, Castle Museum Norwich, Tullie House Museum and the National Museum of Wales. Twenty three museums produced 32,000 records
- Modern records, arising from the recording activity of the Trichoptera and riverfly recording community, as well as major collating exercises such as done by the

Countryside Council for Wales. Approximately 110,000 records are from this general source.

- Data from water quality surveys by the statutory agencies Environment Agency (England), Natural Resources Wales and Scottish Environment Protection Agency, supplied directly to the recording scheme. Together these accounted for 340,000 records. The majority are of flowing water species.
- The National Biodiversity Network 'Gateway' site in January 2015 produced a further 13,500 records. These came from a mixture of all previously mentioned sources but in particular, Local Record Centres, the Scottish Environment Protection Agency and the nationwide iRECORD data capture system.

The area covered in this review is Great Britain (i.e. England, Scotland, and Wales).

Trichoptera names follow Barnard & Ross (2012). It should be borne in mind that previous reviews used earlier checklists, and that the names used for some species are different.

2.2 Previous reviews

2.2.1 British Red Data Books: 2. Insects (1987)

The first account to identify the threatened British Trichoptera was the *British Red Data Books: 2. Insects* (Shirt, 1987). Data sheets were given for each of the Category 1 (Endangered) and Category 2 (Vulnerable) species.

Table 1. Number of species in different categories in Shirt, 1987

Category 1 Endangered	Category 2 Vulnerable	Category 3 Rare	Appendix No post 1900 records	Probably extinct	RDBK
7	2	8	2	2	1

2.2.2 A review of the Trichoptera of Great Britain (Wallace, 1991)

The *British Red Data Book* volume was followed by the publication of *A review of the Trichoptera of Great Britain* (Wallace, 1991) which summarised the status of all British Trichoptera.

Table 2. Number of species in different categories in Wallace, 1991 (Nationally Notable or rarer)

RDB1	RDB2	RDB3	RDBK	Extinct	Nationally Notable
7	6	7	7	2	15

RDB1 = Red Data Book 1 and covered species regarded as endangered and present in 5 or fewer hectads

RDB2 = Red Data Book 2 covered species regarded as vulnerable to moving into the RDB1 category

RDB3 = Red Data Book 3 covered species regarded as rare, occurring in fewer than 15 hectads

RDBK = Species expected to be RDB1 or RDB2 but under-recorded making grading impossible

Nationally Notable = species occurring in between 15 and 100 hectads; in Wallace (1991) no distinction was drawn between Notable A species (15 - 30) hectads and Notable B (31 – 100) hectads.

The present review has been undertaken to provide an up to date assessment of the status of Trichoptera in the format now almost universally adopted for the assessment of threat in any taxa. It should be borne in mind that the criteria concentrate on imminent danger of regional extinction, in contrast to the earlier assessments which included the identification of Nationally Rare and Nationally Scarce species.

Much new information has become available since the publication of Shirt (1987), which was based on approximately 15,000 records; the current review is based on 520,000.

3 The IUCN threat categories and selection criteria as adapted for Invertebrates in Great Britain

3.1 Summary of the 2001 Threat Categories

A brief outline of the revised IUCN criteria and their application is given below. For a full explanation see Appendix 2 IUCN (2001; 2013) and the IUCN web site (http://www.iucnredlist.org/; www.iucn.org/). The definitions of the categories are given in Figure 1. The categories *Extinct in the wild* and *Regionally Extinct* have not been applied in this review. All categories refer to the status in Great Britain (not globally).

REGIONALLY EXTINCT (RE)
A taxon is Extinct when there is no reasonable doubt that the last individual has died. In this review the last date for a record is set at fifty years before publication.

CRITICALLY ENDANGERED (CR)
A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Table 4).

ENDANGERED (EN)
A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Table 4).

VULNERABLE (VU)
A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Table 4).

NEAR THREATENED (NT)
A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)
A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

DATA DEFICIENT (DD)
A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.

NOT EVALUATED (NE)
A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.

Figure 1. Definitions of IUCN threat categories (from IUCN 2001 with a more specific definition for regional extinction)

Taxa listed as *Critically Endangered*, *Endangered* or *Vulnerable* are defined as Threatened (Red List) species. For each of these threat categories there is a set of five main criteria A-E, with a number of sub-criteria within A, B and C (and an additional sub-criterion in D for the *Vulnerable* category), any one of which qualifies a taxon for listing at that level of threat. The qualifying thresholds within the criteria A-E are detailed in Appendix 2: Summary of IUCN Criteria.

In the main, the status evaluation procedure relies on an objective assessment of the available evidence. In certain cases, however, subjective assessments are acceptable as, for example, in predicting future trends and judging the quality of the habitat and methods involving estimation, inference and projection are acceptable throughout. Inference and projection may be based on extrapolation of current or potential threats into the future (including their rate of change), or of factors related to population abundance or distribution (including dependence on other taxa), so long as these can be reasonably supported. Suspected or inferred patterns in the recent past, present or near future can be based on any of a series of related factors, and these factors should be specified as part of the documentation. Some threats need to be identified particularly early, and appropriate actions taken, because their effects are irreversible or nearly so (IUCN, 2001). Since the criteria have been designed for global application and for a wide range of organisms, it is hardly to be expected that each will be appropriate to every taxonomic group or taxon. Thus a taxon need not meet all the criteria A-E, but is allowed to qualify for a particular threat category on any single criterion.

The guidelines stipulate/advise that a precautionary approach should be adopted when assigning a taxon to a threat category and this should be the arbiter in borderline cases. The threat assessment should be made on the basis of reasonable judgment, and it should be particularly noted that it is not the worst-case scenario that will determine the threat category to which the taxon will be assigned.

The categorization process is only to be applied to wild populations inside their natural range (IUCN, 2001), with a long-term presence (since 1500 AD) in Britain. Taxa deemed to be ineligible for assessment at a regional level were placed in the category of '**Not Applicable (NA)'.** This category is typically used for introduced non-native species whether this results from accidental or deliberate importation. It may also be used for recent colonists (or attempted colonists) responding to the changing conditions available in Britain as a result of human activity and/or climate change.

3.2 Application of the Guidelines to Invertebrates

The criteria A, C, D1 and E are rarely appropriate for caddis flies as population data have not been gathered and quantitative analysis has not been undertaken for this group.

In this Review, **Extent of occurrence** (EOO) is not applied to most species of caddis flies as an agreed methodology for its measurement in relation to these species is not available. There are some instances where the known EOO can be measured but these are the exception. These tend to be species known to occur from one or a few sites and where their habitat resource is easily definable, in a restricted area and where intensive survey work has been undertaken to ascertain their distribution. Where EOO has been applied, the terms of this use has been defined within the status sheets on a species by species basis.

Area of occupancy (AOO) is another measure that is difficult to apply to invertebrate records and populations as defined by the IUCN guidelines (IUCN, 2012a; 2012b; 2013).

"Area of occupancy is defined as the area within its 'extent of occurrence' that is occupied by a taxon, excluding cases of vagrancy. The measure reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may contain unsuitable or unoccupied habitats. In some cases (e.g. irreplaceable colonial nesting sites, crucial feeding sites for migratory taxa) the area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon. The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the taxon, the nature of threats and the available data. To avoid inconsistencies and bias in assessments caused by estimating area of occupancy at different scales, it may be necessary to standardize estimates by applying a scale-correction factor. It is difficult to give strict guidance on how standardization should be done because different types of taxa have different scale-area relationships." (IUCN, 2012a).

The IUCN have recommended a scale of $4km^2$ (a tetrad) as the reference scale (IUCN, 2013). This needs to be applied with caution and there will be instances where a different scaling is more applicable, or where attempting to apply any scale is extremely difficult. For common and widespread species applying this rule will lead to under-estimation of their true AOO and a degree of interpretation is required. This highlights the importance of peer review and shared expert opinion for making decisions on scale. For rarer, more restricted, species the tetrad is more applicable, in particular those species which may occur on a few fragmented sites within the UK and/or whom are often restricted to certain, well-defined habitat types that are easily identified. In most instances, the reviewer (and his peers) is best placed to judge which these species are. The nature of most very rare caddis is that their AoO can be measured at a scale of 1 square kilometre and that is adopted in this review.

3.2.1 The two-stage process in relation to developing a Red List

The IUCN regional guidelines (IUCN, 2003) indicate that if a given taxon is known to migrate into or out of the region it should be assessed using a two-stage approach. Populations in the region under review should firstly be assessed as if they were isolated taxa. They should then be reassessed and can be assigned a higher or a lower category if their status within the region is likely to be affected by emigration or immigration. Although recruitment from abroad has clearly accounted for the establishment of some newcomers to the British fauna, migration within Britain and between Britain and the Continent of populations of caddis flies under threat is not considered to be a significant factor.

3.2.2 The use of the Near Threatened category

The IUCN guidelines recognise a Near Threatened category to identify species that need to be kept under review to ensure that they have not become Threatened. This category is used for species where a potential threat, natural habitat dependency or range change demand frequent review of status.

This category would be best considered for those species that come close to qualifying as CR, EN or VU but not quite; i.e. meets many but not all of the criteria and sub-criteria. For those criteria that are not quite met, there should be sufficient evidence to show that the taxon is close to the relevant threatened thresholds. As such, it is up to the reviewers to provide evidence and methods for discerning this.

The Invertebrate Inter Agency Working Group and JNCC have defined the following for the use of B2bii which is commonly used in reviews. Continuing decline has to be demonstrated – and proven that it isn't an artefact of under-recording. If decline is demonstrated then the reviewer needs to consider whether or not B2a (and B2c if the data is present) is met:

- If 10 or less current localities then Critically Endangered, Endangered, Vulnerable is applicable;
- If 11 or 12 current localities then Near Threatened applies;
- If 13-15 and the taxon can be shown to be vulnerable to a specific and realistic threat, then Near Threatened applies;
- If more than 15 locations then Least Concern applies.

4 GB Rarity Status categories and criteria

At the national level, countries are permitted under the IUCN guidelines to refine the definitions for the non-threatened categories and to define additional ones of their own. The Nationally Rare and Nationally Scarce categories are unique to British invertebrates Broadly speaking, the Nationally Rare category is equivalent to the Red Data Book categories used by Bratton (1991), namely: Endangered (RDB1), Vulnerable (RDB2), Rare (RDB3), Insufficiently Known (RDBK) and Extinct. These are not used in this review. The Nationally Scarce category is directly equivalent to the combined Nationally Notable A (Na) and Nationally Notable B (Nb) categories used in the assessment of various taxonomic groups (e.g. by Hyman and Parsons (1992) in assessing the status of beetles) but never used in a published format to assess caddis flies.

For the purposes of this review, the following definitions of Nationally Rare and Nationally Scarce have been applied:

Nationally Rare	Native species recorded from 15 or fewer hectads of the Ordnance Survey national grid in Great Britain since 31st December 1979 and where there is reasonable confidence that exhaustive recording would not find them in more than 15 hectads. This category includes species that are probably extinct. The subjective application of considering the possible effect of exhaustive collecting has not been applied in the listings in Table 9 and Appendix 1.
Nationally Scarce	Native species which are not regarded as Nationally Rare AND which have not been recorded from more than 100 hectads of the Ordnance Survey national grid in Great Britain since 31st December 1979 and where there is reasonable confidence that exhaustive recording would not find them in more than 100 hectads. The subjective application of considering the possible effect of exhaustive collecting has not been applied in the listings in Table 9 and Appendix 1.

This national set of definitions is referred to as the GB Rarity Status within this document. Importantly, Nationally Rare and Nationally Scarce are not categories of threat. And species can have a rarity status and a threat status, one or the other, or neither.

4.1 Application of these Criteria to Caddis Flies

4.1.1 Choice of date to use as Point of measurement

After careful consideration of the data, this Review uses 1980 as the **point of measurement** as this was judged to be the date most applicable to the data concerned. It would have been more accurate to have different dates for different species, but this was not considered appropriate or in keeping with the methods used by previous reviews. Further qualification of decline, range and occurence is given for those species featured in the Species Account data sheets (section 12).

The last published review of UK caddis distribution was Wallace (1991). That might be seen as a suitable date to choose as the point of measurement. However, it was based on a manuscript prepared several years earlier, and based on the limited amount of data accumulated by the recording scheme to the mid 1980s, about 18,000 records. There was no

numerical analysis of occurrence. Records acquired subsequently included many from earlier years. For these various reasons, Wallace (1991) was not considered a candidate for choosing the point of measurement.

The modern era of caddis recording dates from around 1980 when major larval identification works became available.

In addition to looking at actual records, the reviewer is required to consider if exhaustive recording could move species out of the Nationally Scarce category i.e. occurring in more than 100 hectads. A choice of 1980 as the **Point of Measurement** produces a list of 81 Nationally Rare or Scarce species of which around 10 are thought likely to occur in more than 100 hectads.

A choice of 1990 produces a list of 100 species recorded from less than 100 hectads – over half the species list, and around 27 are thought likely to occur in more than that number. There is also an increase in number of species showing a decline compared with, in that case, pre 1990, and the apparent declines are obviously larger. Therefore a choice of a date later than 1980 would result in more space having to be devoted in this review to justifying the exclusion of species from consideration.

The 31 species in the caddis family Hydroptilidae require the application of different criteria. These are small insects (wing length between 2 and 4.5mm) and are often collectively called ‘micro-caddis’. As adults, no species can be confidently identified in the field and they are often over-looked by general insect collectors. Larvae of most species cannot be identified to species. Where this is possible, respectable numbers of records are often present but all other species qualify as Nationally Scarce or Rare using the 100 occupied hectad cut-off. Analysis of the data suggested that there were only around a third as many records for hydroptilids unrecognisable as larvae, compared with other caddis. As a result any such species occurring in 4 or fewer hectads is regarded as Nationally Rare and one occurring in between 5 and 35 hectads is regarded as Nationally Scarce. A further problem with this family is that the original record cards used to create a distribution atlas for the family (Marshall, 1978b) were lost and, frustratingly, there are still ‘dots’ on the maps in that work which cannot be matched to known literature references or museum specimens. M.I. Crichton did not deal with this family in his studies of captures at Rothamsted traps (e.g. Crichton & Fisher, 1978); because they were irregularly picked out by trap sorters.

5 Methods and sources of information

5.1 Introduction

The most recent published list of scarce and threatened caddis (Wallace, 1991) was based on the Red Data Book criteria used in the British Insects Red Data Book (Shirt, 1987) with the addition of the category RDB K (Insufficiently Known) after Wells, Pyle & Collins (1983).

5.2 Data sources

The author of this Review assessed the status of all the species using the information sources described in section 2.1 and the systems explained in Section 3. The data come from the UK Trichoptera data base, which is publically available via the NBN Gateway, and other data lodged with the NBN (http://data.nbn.org.uk/). All of the data were validated by the author of this review who is the national recorder. The data set used for the analysis of occupied hectads dates from January 2015. The current review is based on 520,000 records.

5.3 The data table

The data that underpin this report are produced as a spreadsheet as Appendix 1. It summarises the relative abundance and conservation threat for all British species. The columns are as follows:

Species name

GB IUCN status (2014)

Qualifying criteria

Rationale

GB Rarity status (2014)

Presence in:

- England
- Scotland
- Wales

Total number of hectads from which there are records up to and including 1979

Total number of hectads from which there were records from 1980-2014

Total number of dual hectads where the species has been recorded in both date classes

5.4 Date classes

This Review uses 1980 as the **point of measurement** between old and recent date classes i.e. any record up to 31.12.1979 is described as pre 1980 and any from 1.1.1980 onwards as post 1980. The use of 1980 was judged to be the date most applicable to the data concerned (see section 4.1.1). It was judged that the adoption of a later date would have resulted in far too many species being found to have fewer than 100 hectads in the modern time period. This would obviously have seriously undermined the value of the assessments made. The use of this date has the consequence that Criterion B2b – continuing decline – has to rely heavily on estimation, inference and projection however where data from later years seems to show a continuing significant change compared with 1980 it is mentioned.

6 Format of the species accounts

6.1 Selection of species to have data sheets prepared

Species accounts have been prepared for each of the species with an IUCN category of Critically Endangered, Endangered, Vulnerable, or Near Threatened. Accounts have also been prepared for species regarded as Data Deficient where it is thought likely they would have qualified as threatened in some way if data had been available. (The status of species classed as being of Least Concern regarding threat of extinction in Great Britain is summarised in Appendix 1.)

Information on each species is given in a standard form. The data sheets are designed to be largely self-contained in order to enable site managers to compile species-related information in site files; this accounts for some repetition between the species accounts.

6.2 The species name

Nomenclature is intended to be as up to date as possible and is based on Barnard & Ross (2012); with the addition of *Triaenodes ochreellus* recently recognised as a British species.

6.3 Stability of the Check-list

Future DNA studies are expected to show that some species are, in reality, complexes of two or more genetically separate species. Old records not backed by voucher specimens will be impossible to assign except on geographic grounds. It is likely that some segregate species will be found to be of conservation significance.

However, on purely morpholoigal grounds there are already two ‘species’ that appear to consist of more than one form. These would seem to be a priority for any DNA work.

Apatania muliebris McLachlan is a parthenogenetic species of, often isolated, spring streams. *A. nielseni* Schmid may occur with it, but Barnard & O’Connor (1987), found no clear morphological boundary between British and Irish specimens that looked like *nielseni* and others that looked like *muliebris*. The aggregate species is of Least Concern.

There are two forms of larva of *Sericostoma personatum* Spence and it is thought one might refer to *Sericostoma schneideri* Klapalek. They might just be two ecological forms as the genitalia differences are very subtle (Malicky, 2004). Barnard & Ross (2012) discuss the matter. Elliott (1970) had also shown variation in larvae of *S. personatum* linked to ecological factors. As an aggregate there are more records than for any other UK caddis species.

6.4 IUCN Category

This lists the IUCN category assigned to the species, and a justification for that is always supplied. Status is largely based on range size and both short and long term trends. Counts of hectads known to be occupied since 1980 were used to establish whether or not a species might be considered rare or scarce. The IUCN guidelines (see Section 3) were then applied to assign species to a threat category.

The IUCN criteria are not rigid about the need for real data, but allow for expert opinion – ‘estimated, inferred, projected or suspected’ are acceptable reasons. In conclusion, assessments of status can only be based on current knowledge, which is very unlikely to be comprehensive in the majority of cases, being based on the experience of a limited number of

active recorders in each generation. The likely national distribution of each species and trends in population size must, therefore, be extrapolated from the available information so as to arrive at the best estimate of the likely national status of each species.

6.5 Distribution

Records held in the UK National Caddis Data Base form the basis for determining the distribution of each species. Reference is made to the Watsonian vice-counties (Dandy, 1969) from which a species is recorded, and where specific sites are mentioned the respective vice county is included.

A note is made of the numbers of hectads and vice counties all dates, pre- and post 1980, from which a species is recorded. International distribution is only referred to where a comment on the species' biogeography is considered particularly useful, e.g. where there is little UK information.

6.6 Habitat and ecology

This section aims to provide an overview of the habitat requirements of each species, based on larvae. The requirements for the adults for habitat resources such as swarming or oviposition sites are little known but will also be critical. Information on the life cycle is also included for some species. There are few clean aquatic habitat types that do not support at least one scarce species. Appendix 1 summarises the requirements of all Caddis species and Appendix 3 groups the Nationally Rare and Scarce species by major habitat.

6.6 Threats

It is those human activities that result in the loss of sites or that change the nature of habitats that are most likely to pose the greatest threats to invertebrate populations. As aquatic insects, caddis are vulnerable to water pollution in its various forms. This could be, but is not, mentioned for every species. Where specific threats might arise they are mentioned.

6.7 Management and conservation

Trichoptera are noted features of conservation interest at very few sites. Where any site has the benefit of statutory protection, by for example being National Nature Reserve (NNR) or Site of Special Scientific Interest (SSSI), this is noted.

Preventative measures and positive action designed to maintain populations are suggested where these are known, or can reasonably be inferred. Inevitably, in many cases, this section tends to be generalised.

6.8 Identification

The latest or most convenient work from which the identity of the species can be determined is stated; both adults and larvae are included. The emphasis is on English language publications, and work in other languages is only referred to where no other options are available.

6.9 Survey & Monitoring

Suggestions for surveying and monitoring the species are given. These are designed to be non-destructive wherever possible and are based on knowledge of the biology and ease of field recognition.

6.10 Published sources

Principal literature references that have contributed distributional information to the Data Sheet are cited here.

7 Species gradings

7.1 Summary of IUCN and Great Britain Rarity Gradings

- 17 species have been given an IUCN threat category of Vulnerable, Endangered or Critically Endangered
- 6 species have been classed as IUCN Near Threatened
- 154 species are classed as Least Concern.
- A further 18 species are described as Data Deficient
- 40 Species are Nationally Rare
- 46 Species are Nationally Scarve

Those species with a conservation status are listed in table 4 below. All species are listed in Appendix 1 (page 92).

Table 4. Alphabetical list of Nationally Rare, Nationally Scarce and IUCN Red Data Book species; data deficient excluded

Scientific name	**Shirt, 1987**	**Wallace, 1991 (see footnote 1)**	**This review GB rarity status**	**This review IUCN status**
Adicella filicornis	Rare	RDB 3	NR	EN
Agrypnetes crassicornis	Endangered	RDB 1	NR	CR
Anabolia brevipennis		Notable	NR	VU
Apatania wallengreni		Regional N.	NS	LC
Athripsodes commutatus		Regional N.	NS	LC
Ceraclea albimacula		Regional N.	NS	LC
Chimarra marginata		Regional N.	NS	LC
Cyrnus insolutus	Endangered	RDB K	NR	EN
Enoicyla pusilla		RDB 3	NS	LC
Ernodes articularis	Rare	Notable	NS	LC
Erotesis baltica	Rare	RDB 2	NR	VU
Glossosoma intermedium	Rare	RDB 3	NR	CR
Grammotaulius nitidus	Endangered	RDB 1	NR	NT
Hagenella clathrata	Endangered	RDB 1	NR	EN
Holocentropus stagnalis		Regional N.	NS	LC
Hydatophylax infumatus		Local	NS	LC
Hydropsyche bulgaromanorum	Extinct?	Extinct	NR	CR
Hydropsyche exocellata	Extinct?	Extinct	NR	CR(PE)
Hydropsyche saxonica	Endangered	RDB 1	NS	LC
Hydroptila angulata		Local	NS	LC
Hydroptila cornuta			NR	VU
Hydroptila lotensis	Vulnerable	RDB 3	NR	NT
Ironoquia dubia		RDB 2	NR	CR
Leptocerus interruptus	Rare	RDB 3	NR	VU
Leptocerus lusitanicus	Endangered	RDB 2	NS	LC

Limnephilus binotatus		Regional N.	NS	LC
Limnephilus bipunctatus		Local	NS	LC
Limnephilus borealis		Notable	NS	LC
Limnephilus elegans		Regional N.	NS	LC
Limnephilus fuscicornis		Regional N.	NS	LC
Limnephilus griseus		Common	NS	LC
Limnephilus hirsutus		Common	NS	LC
Limnephilus ignavus		Regional N.	NS	LC
Limnephilus nigriceps		Regional N.	NS	LC
Limnephilus pati	Endangered	RDB 1	NR	CR(PE)
Limnephilus politus		Regional N.	NS	LC
Limnephilus subcentralis		Notable	NR	NT
Limnephilus tauricus	Vulnerable	RDB 1	NR	VU
Mesophylax aspersus		RDBK	NR	NA (Migrant)
Mesophylax impunctatus zetlandicus		Regional N.	NR	NT
Molanna albicans		Regional N.	NS	LC
Notidobia ciliaris		Regional N.	NS	LC
Oecetis furva		Local	NS	LC
Oecetis notata		RDB 3	NS	LC
Oligotricha striata		Common	NS	LC
Orthotrichia costalis		Local	NS	LC
Oxyethira frici		Regional N.	NS	LC
Oxyethira mirabilis		RDBK	NS	LC
Plectrocnemia brevis		Notable	NS	LC
Psychomyia fragilis		Notable	NS	LC
Rhadicoleptus alpestris		Local	NS	LC
Setodes argentipunctellus		RDB 3	NR	NT
Setodes punctatus	Rare	RDB 2	NR	VU
Stenophylax vibex		Common	NS	LC
Tinodes assimilis		Regional N.	NS	LC
Tinodes dives		Notable	NS	LC
Tinodes pallidulus	Vulnerable	RDB 1	NR	VU
Tinodes maclachlani		Local	NS	LC
Tinodes rostocki		Notable	NR	LC
Tricholeiochiton fagesii		Notable	NS	LC
Trichostegia minor		Regional N.	NS	LC
Ylodes conspersus		Notable	NS	LC
Ylodes reuteri	Rare	RDB 2	NR	VU
Ylodes simulans		RDB 3	NR	NT

[1] Wallace (1991) awarded combined gradings for some species e.g. “Common, would be regionally notable if found in southern England”. This is regarded as “Common” in this current review but “Local and Regionally Notable” is given the higher grading i.e. “Regional N”.

7.2 Downgraded species

A few species have been down-graded since Wallace's 1991 review. The reason for the increased numbers of records may include more appropriate recording, e.g. use of light traps, but some species do seem to have genuinely increased their range.

Table 5. Threatened or Nationally Rare Species of previous reviews that are now Least Concern and have no GB Rarity Status

Scientific name	**Shirt, 1987**	**Wallace 1991**	**Rationale for exclusion from this review**
Enoicyla pusilla	not listed	RDB3	In only 17 hectads but common within a restricted geographic range. Not apparently threatened.
Hydropsyche fulvipes	Rare	Notable	In 114 post 1980 hectads and the number is rising, due to a better understanding of the species' needs and a better larval key. Widespread species.
Hydropsyche saxonica	Endangered	RDB1	In 89 post 1980 hectads and the number is rising, due to a better larval key. Widespread in England.
Leptocerus lusitanicus	Endangered	RDB2	Showing a clear range expansion and that was noticed some time after the arrival of a new larval key. In 20 post 1980 hectads and the number is rising.
Mesophylax aspersus	not listed	RDBK	A presumed migrant that has apparently not become established.
Oecetis notata	not listed	RDB3	In 19 post 1980 hectads. Common in a few river systems and the number of those is increasing.
Oxyethira mirabilis	not listed	RDBK	11 post 1980 hectad records. Habitat and behavior recently better understood and it appears quite widespread but currently still has few records.
Rhyacophila fasciata (*R. septentri*onis in earlier works)	Rare	Notable	295 post 1980 records, due to a better understanding of the species needs, much increased sampling and a better larval key. Some records likely to be misidentified *R. dorsalis* but thougt not enough to change the opinion this is not a rare caddis.

7.3 GB Nationally Rare and GB Nationally Scarce Species which are of Least Concern using the IUCN criteria

Table 6. Nationally Scarce and Rare species which are recorded from fewer than 100 post 1980 hectads that are not regarded as threatened as they appear not to be declining..

Scientific name	Number of post-1980 hectads
Ceraclea albimacula	91
Chimarra marginata	52
Enoicyla pusilla	17
Ernodes articularis	80
Holocentropus stagnalis	64
Hydatophylax infumatus	92
Hydropsyche saxonica	89
Hydroptila angulata	17
Leptocerus lusitanicus	20
Limnephilus binotatus	94
Limnephilus fuscicornis	79
Notidobia ciliaris	65
Oecetis furva	58
Oecetis notata	19
Oxyethira mirabilis	11
Oxyethira simplex	21
Plectrocnemia brevis	44
Tinodes assimilis	62
Tinodes maclachlani	81
Tricholeiochiton fagesii	10
Trichostegia minor	98

Table 7. Nationally Scarce and Rare Species recorded from less than 100 post 1980 hectads and where an apparent decline is not regarded as significant at this time for the reasons stated

Scientific name	**Number of pre 1980 hectads**	**Number of post 1980 hectads**	**Comments**
Apatania wallengreni	37	32	Northern species, probably no decline.
Athripsodes commutatus	64	33	Mainly a northern species and very localised and difficult to find. Clearly a decline.
Limnephilus bipunctatus	61	61	Locally common.
Limnephilus borealis	26	20	Northern species probably no decline.
Limnephilus elegans	59	49	Probably no decline.
Limnephilus griseus	172	79	Obvious significant decline but well distributed and still common in Scotland and the New Forest.
Limnephilus hirsutus	86	81	Well distributed, probably no real decline.
Limnephilus ignavus	70	26	Obviously a decline. Most records are Scottish, where it remains widespread if uncommon.
Limnephilus nigriceps	35	35	Mainly a northern species.
Limnephilus politus	93	78	Obviously a decline but still a widespread species.
Molanna albicans	29	22	Northern species probably no decline.
Oligotricha striata	76	69	Widespread but declining.
Orthotrichia costalis	36	17	Probable a decline but still a well-distributed micro-caddis.
Oxyethira frici	20	15	A well distributed micro-caddis.
Rhadicoleptus alpestris	33	28	Mainly an upland species, probably no decline.
Stenophylax vibex	92	55	Obvious decline but still widely distributed.
Tinodes dives	42	36	An upland species probably showing no decline. There was a major survey for it in south east wales pre 1980 that must be regarded in analysis. It was found in good numbers in a 2015 survey in the eastern Black Mountains
Tinodes rostocki	16	10	Widely distributed. Found to be common in the major survey of psychomyiid larvae in south east Wales pre 1980. It was found at several sites in the eastern Black Mountains in 2015.
Wormaldia subnigra	96	57	Obvious decline, but still widely distributed.
Ylodes conspersus	35	27	Plenty of post 2000 records. Possibly a decline in area of occupancy but dubious records make analysis of that difficult.

Table 8. Nationally Rare Species which are regarded as having an IUCN Threat category or are Near Threatened

Scientific name	**Number of pre and post 1980 hectads**
Adicella filicornis	5-7
Agrypnetes crassicornis	1-1
Agrypnia picta	?2-0
Anabolia brevipennis	12-10
Cyrnus insolutus	2-0
Erotesis baltica	11-7
Glossosoma intermedium	5-2
Grammotaulius nitidus	23-6
Hagenella clathrata	6-8
Hydropsyche bulgaromanorum	4-2
Hydropsyche exocellata	5-0
Hydroptila cornuta	8-0
Hydroptila lotensis	1-4
Ironoquia dubia	4-2
Leptocerus interruptus	5-4
Limnephilus pati	3-0
Limnephilus subcentralis	12-6
Limnephilus tauricus	3-2
Mesophylax asperses	3-0
Mesophylax impunctatus	11-4
Nemotaulius punctatolineatus	1-7
Orthotrichia angustella	22-2
Setodes argentipunctellus	7-10
Setodes punctatus	4-7
Synagapetus dubitans (new to GB list since earlier works)	0-2
Tinodes pallidulus	2-3
Ylodes reuteri	6-1
Ylodes simulans	7-9

7.4 Data Deficient Species

Table 9. Species regarded as being Data Deficient

Scientific name	Number of pre 1980 hectads	Number of post 1980 hectads	Comments
Agrypnia picta	?	0	Questionably a British species, no voucher specimens. See Species Account.
Hydroptila martini	14	12	Widespread stream species. Only recently recognised as a British species hence few records.
Hydroptila occulta	52	10	Widespread species. Used to include records of *H martini* & *H. valesiaca* hence decline may not be as great as numbers suggest.
Hydroptila pulchricornis	28	5	Stream species that may be genuinely declining.
Hydroptila simulans	27	15	Widespread flowing water species.
Hydroptila sylvestris	7	4	A scarce northern and western species.
Hydroptila tigurina	1	1	see Species Account.
Hydroptila valesiaca	2	4	Scarce spring stream species. Only recently recognized as a British species hence few records.
Ithytrichia clavata	4	0	Presumed this micro caddis is very difficult to find.
Nemotaulius punctatolineatus	1	7	see Species Account
Orthotrichia angustella	22	2	see Species Account
Orthotrichia tragetti	1	0	Only one record. See Species Account.
Oxyethira distinctella	1	0	Only one record. See Species Account.
Oxyethira sagittifera	13	5	Widespread still water species that may be declining.
Oxyethira tristella	11	1	Always rare. 1 modern (Scottish) record and may be more widespread in that country. See species account.
Potamophylax rotundipennis	31	238	Reviewer concerned that some of the dramatic increase in records may be due to inadequacies of his larval key; requires investigation.
Psychomyia fragilis	21	98	Only confidently recorded from chalk/limestone districts in Cumbria, Yorkshire, Derbyshire and South East England; status of other larval records needs investigating
Synagapetus dubitans	0	2	see Species Account.
Triaenodes ochreellus	0	1	See Species Account
Wormaldia mediana	15	11	see Species Account.

8 Species listed by IUCN threat category

In this list the species are given in alphabetical order within categories.

Critically Endangered (includes those that are presumed and possibly extinct)

Agrypnetes crassicornis (McLachlan, 1876)
Glossosoma intermedium (Klapalek, 1892)
Hydropsyche bulgaromanorum Malicky, 1977
Hydropsyche exocellata Dufour, 1841 (presumed extinct)
Ironoquia dubia (Stephens, 1837)
Limnephilus pati O'Connor, 1980 (presumed extinct)

Endangered

Adicella filicornis (Pictet, 1834)
Cyrnus insolutus McLachlan, 1878
Hagenella clathrata (Kolenati, 1848)

Vulnerable

Anabolia brevipennis (Curtis, 1834)
Erotesis baltica McLachlan, 1877
Hydroptila cornuta Mosely, 1922
Leptocerus interruptus (Fabricius, 1775)
Limnephilus tauricus Schmid, 1964
Setodes punctatus (Fabricius, 1793)
Tinodes pallidulus McLachlan, 1878
Ylodes reuteri (McLachlan, 1880)

Near Threatened

Grammotaulius nitidus (Muller, 1764)
Hydroptila lotensis Mosely, 1930
Limnephilus subcentralis (Brauer, 1857)
Mesophylax impunctatus zetlandicus McLachlan, 1884
Setodes argentipunctellus McLachlan, 1877
Ylodes simulans (Tjeder, 1929)

9 Species listed by GB Rarity Status Category

The species are listed in alphabetical order within categories.

Nationally Rare

Adicella filicornis (Pictet, 1834)
Agrypnetes crassicornis (McLachlan, 1876)
Agrypnia picta Kolenati, 1848
Anabolia brevipennis (Curtis, 1834)
Cyrnus insolutus (McLachlan, 1878)
Erotesis baltica McLachlan, 1877
Glossosoma intermedium (Klapalek, 1892)
Grammotaulius nitidus (Muler, 1764)
Hagenella clathrata (Kolenati, 1848)
Hydropsyche bulgaromanorum Malicky, 1977
Hydropsyche exocellata Dufour, 1841
Hydroptila cornuta Mosely, 1922
Hydroptila lotensis Mosley, 1930
Hydroptila sylvestris Morton, 1898
Hydroptila tigurina Ris, 1894
Hydroptila valesiaca Schmid, 1947
Hydroptila pulchricornis Pictet, 1824
Ironoquia dubia Stephens, 1837)
Ithytrichia clavata Morton, 1905
Leptocerus interruptus (Fabricius, 1775)
Limnephilus pati O'Connor, 1980
Limnephilus subcentralis (Brauer, 1857)
Limnephilus tauricus Schmid, 1964
Mesophylax aspersus (Rambur, 1842) MIGRANT
Mesophylax impunctatus zetlandicus McLachlan, 1884
Nemotaulius punctatolineatus (Retzius, 1783)
Orthotrichia angustella (McLachlan, 1865)
Orthotrichia tragetti Mosely, 1930
Oxyethira distinctella Mclachlan, 1880
Oxyethira sagittifera Ris, 1897
Oxyethira tristella Klapalek, 1895
Setodes argentipunctellus McLachlan, 1877
Setodes punctatus (Fabricius, 1793)
Synagapetus dubitans McLachlan, 1879
Tinodes pallidulus McLachlan, 1878

Tinodes rostocki McLachlan, 1878
Triaenodes ochreellus McLachlan, 1877
Wormaldia mediana McLachlan, 1878
Ylodes reuteri (McLachlan, 1880)
Ylodes simulans Tjeder, 1929)

Nationally Scarce
Allotrichia pallicornis (Eaton, 1873)
Apatania wallengreni McLachlan, 1871
Athripsodes commutatus (Rostock, 1874)
Ceraclea albimacula (Rambur, 1842)
Chimarra marginata (Linnaeus, 1761)
Enoicyla pusilla (Burmeister, 1839)
Ernodes articularis (Pictet, 1834)
Holocentropus stagnalis (Albarda, 1874)
Hydatophylax infumatus (McLachlan, 1865)
Hydropsyche saxonica (McLachlan, 1884)
Hydroptila angulata Mosley, 1922
Hydroptila martini Marshall, 1977
Hydroptila occulta (Eaton, 1873)
Hydroptila simulans Mosely 1920
Leptocerus lusitanicus (McLachlan, 1884)
Limnephilus binotatus Curtis, 1834
Limnephilus bipunctatus Curtis, 1834
Limnephilus borealis (Zetterstedt, 1840)
Limnephilus elegans Curtis, 1834
Limnephilus fuscicornis (Rambur, 1842)
Limnephilus griseus (Linnaeus, 1758)
Limnephilus hirsutus (Pictet, 1834)
Limnephilus ignavus McLachlan, 1865
Limnephilus nigriceps (Zetterstedt, 1840)
Limnephilus politus McLachlan, 1865
Molanna albicans (Zetterstedt, 1840)
Notidobia ciliaris (Linnaeus, 1761)
Oecetis furva ((Rambur, 1842)
Oeetis notata ((Rambur, 1842)
Oligotricha striata (Linnaeus, 1758)
Orthotrichia costalis (Curtis, 1834)
Oxyethira frici Klapalek, 1891
Oxyethira mirabilis Morton, 1904

Oxyethira simplex Ris, 1897
Plectrocnemia brevis McLachlan, 1871
Potamophylax rotundipennis (Brauer, 1857)
Psychomyia fragilis (Pictet, 1834)
Rhadicoleptus alpestris (Kolenati, 1848)
Stenophylax vibex (Curtis, 1834)
Tinodes assimilis McLachlan, 1865
Tinodes dives (Picte, 1834)
Tinodes maclachlani Kimmins, 1966
Tricholeiochiton fagesii (Guinard, 1879)
Trichostegia minor (Curtis, 1834)
Wormaldia subnigra McLachlan, 1865
Ylodes conpsersus (Rambur, 1842)

10 Criteria used for assigning species to threatened categories (see Appendix 2 for criteria and categories)

Table 10. IUCN Criteria used for assigning species

Scientific name	Status	Criteria used	Number of pre 1980 hectads	Number of post 1980 hectads
Adicella filicornis (Pictet)	Endangered	B2a; B2b(ii, iv)	5	7
Agrypnetes crassicornis (McLachlan)	Critically Endangered	B2a; B2b(v)	1	1
Anabolia brevipennis (Curtis)	Vulnerable	D2	12	10
Cyrnus insolutus McLachlan	Endangered	B2a; B2b(iv, v)	2	0
Erotesis baltica McLachlan	Vulnerable	B2a; B2b(ii iii, iv)	11	7
Glossosoma intermedium Klapalek	Critically Endangered	B2a; B2b(ii, iv)	5	2
Grammotaulius nitidus (Muller)	Near Threatened	B2a; B2b(ii, iv)	23	6
Hagenella clathrata (Kolenati)	Endangered	B2a; B2b(ii, iii, iv)	6	8
Hydropsyche bulgaromanorum Malicky	Critically Endangered	B2a; B2b(ii, iii, iv)	4	2
Hydropsyche exocellata Dufour	Critically Endangered (Presumed Extinct)	B2a; B2b(ii, iv)	5	0
Hydroptila cornuta Mosely	Vulnerable	D2	8	0
Hydroptila lotensis Mosely	Near Threatened	B2a; D2	1	4
Ironoquia dubia (Stephens)	Critically Endangerred	B2a; B2b(ii, iv)	4	2
Leptocerus interruptus (Fabricius)	Vulnerable	D2	5	4

Scientific name	**Status**	**Criteria used**	**Number of pre 1980 hectads**	**Number of post 1980 hectads**
Limnephilus pati O'Connor	Critically Endangered (Presumed extinct)	B2a; B2b(ii, iii, iv)	3	1
Limnephilus subcentralis (Brauer)	Near Threatened	B2a; B2b(ii, iv)	12	6
Limnephilus tauricus Schmid	Vulnerable	D2	3	2
Mesophylax impunctatus zetlandicus McLachlan	Near Threatened	B2b(ii, iv)	11	4
Setodes argentipunctellus McLachlan	Near Threatened	B2a	7	10
Setodes punctatus (Fabricius)	Vulnerable	D2	4	7
Tinodes pallidulus McLachlan	Vulnerable	B2a; B2b(ii, , iv)	2	3
Ylodes reuteri (McLachlan)	Vulnerable	B2a; B2b(ii, iii, iv)	6	1
Ylodes simulans (Tjeder)	Near Threatened	D2	7	9

11 Acknowledgements

The Review was commissioned by Jon Webb (Natural England). The format is based closely on the recent chrysomelid beetle review by Hubble (2014) and key sections of text have been adopted and adapted for the current Review in order to maintain consistency of approach.

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12 The Data Sheets

The species are listed alphabetically by the name given them in Barnard & Ross (2012). (see page 16 for a description of the various sections)

ADICELLA FILICORNIS

ENDANGERED Criteria B2a; B2b (ii, iv)

Order TRICHOPTERA

Family LEPTOCERIDAE

Adicella filicornis (Pictet, 1834)

Status: This species has apparently disappeared from three of the eight post 1970 sites where it was recorded that have been re-surveyed in recent years; four of the remaining five sites have not been re-surveyed leaving the one post 2000 record. It qualifies for Endangered Status under criterion B2a having a maximum of five known sites which are geographically isolated. Knowledge of the larval habitat enabled the author to find the species at several sites, thus leading to an increase in number of occupied hectads. It has subesequently disappeared from three of the eight. This decline in number of sites means it also qualifies under criteria B2b(ii,iv). AoO equates to a maximum of 6 km^2.

It was described as RDB3 Rare in Shirt (1987) and Wallace (1991).

Hectad coverage: 11 all dates, 5 pre and 6 post 1980; **Vice County coverage** 8 all dates and 3 post 1980

Distribution: The species seems to have a mainly westerly distribution. In 1981, B & I.D.Wallace found it at several adjacent sites just west of Seaton in South Devon but all other records are for isolated sites. This isolation means it is impossible to localise many of the earlier records and the species may well still occur in the general locality given. There are post 1980 records from South Devon in England and Monmouthshire, Merionethshire and Denbighshire in Wales. There are earlier 20th century records from Breconshire (Wales) and Lanarkshire (Sccotland), but the English records from South Hampshire and North-east Yorkshire are 19th century; the latter is not a definite record. It is based on a pupal case on a card in the duplicate collection at the Natural History Museum, London taken by Robert McLachlan at Scarborough in August 1886. It is curious that McLachlan did not publish the record of this very rare caddis and incorrect specimen label attribution must be a possibility. However, it could be he considered it might have belonged to another species, e.g. *Adicella reducta* (McLachlan), then not known as a larva.

Habitat and ecology: The larvae have been found in very small permanent streams close to their origin from groundwater springs. All sites are on quite steep slopes. Some have very hard water and deposit travertine, but others are not so calcareous, though, looking at the surrounding vegetation they are not thought to be base deficient. A notable feature of all sites

is ground instability, though in travertine depositing water this may be “petrified” solid. The sites are often surrounded by slumping ground and fallen trees. A notable feature of the species is the very strong larval case which is a layer of sand grains between an inner and outer layer of silk. In North America, Wiggins (2004) associates similar cases of un-related caddis to be a response to being rolled around in an unstable habitat. In the UK, they might also provide some protection against their sites major predator, the caddis *Plectrocnemia* spp. It is not known if the larvae take two years to complete their life-cycle, as seems to be the case for the superficially similar *Beraea maurus* (Curtis) and *Ernodes articularis* (Pictet) (Family Beraeidae) which may be found with it and where there is often a considerable size range of larvae; Wiggins (1977) notes that some North American beraeids take two years. The larvae are thought to be detritovores or feed on living plant material. Morton (1886) gives an accurate description of the micro-habitat where pupal cases are found – attached to saturated moss in the vertically flowing trickle.

Threats: The very small size of its habitats makes severe physical damage a particular threat. At Wilderness Wood, Gwersyllt, (Denbighshire), the streamlet complex where it occurred was channelled when the public footpath was stabilised. Site managers had to balance the preservation of the instability of the habitat with public safety and increase of access. At Halton Wood (Denbighshire) tree-felling opened upon the habitat to invasion by brambles and other rank vegetation and the caddis has not been seen for several years.

Management and conservation: The exact location of sites should be made known to site managers so that they can, wherever possible, leave them entirely alone and free from things such as stabilisation and tree felling. The Mouse Glen (Lanarkshire) is part of the Clyde Valleys NNR, the Seaton Cliffs (South Devon) and Prisk Wood (Monmouthshire) are within SSSIs, but the other sites do not seem to have statutory protection.

Identification: Larvae – Wallace *et al* (2003) and Wallace (2006); adults – Barnard & Ross (2012).

Survey: This will be a particularly difficult species to monitor. The only feasible life-stage is as larva or pupal case and that can include looking for empty cases washed into small pools along the water-course. The habitats are easily damaged by trampling or moss removal. Population assessment seems impossible to acheve without damage, so monitoring would be restricted to just confirming presence.

Selected published sources of distributional information: Anon (2005), McLachlan (1894), Morton (1884, 1885), Mosely (1929), Wallace (1976)

AGRYPNETES CRASSICORNIS

CRITICALLY ENDANGERED Criteria B2a; B2b (v)

Order TRICHOPTERA

Family PHRYGANEIDAE

Agrypnetes crassicornis McLachlan 1876. (Note this species has oscillated between A*grypnia* and *Agrypnetes* and the present allocation may change again.)

Status: This is a species with a single UK site at where it has declined in abundance. The reasons for the decline are not known. It qualifies as Critically Endangered being restricted to a single site (B2a) with a maximum AoO of $2km^2$. Visits over the last decade by a confirmed expert have also noted a decline in the number of mature adults (B2bv).

It was awarded RDB1 status by Wallace (1991) and Endangered by Shirt, (1987).

Distribution: Known only from MalhamTarn in Mid-west Yorkshire, it was first collected there by several people in the early 1950s, and was still there in 2013, when Sharon Flint found larvae and pupae. There are two post-glacial "fossil" records, from Windermere in Cumbria (Wilkinson, 1981) and Sunbury in Surrey (Gibberd *et al*, 1982).

Chara dominated sites lakes are unusual in the UK and it would have been expected to have been encountered in surveys at other marl lakes.

Habitat and ecology: The larvae live in off-shore *Chara* beds, where they feed predominantly on easily captured prey and dead animal material. They feed during the late summer and autumn and probably then fix their cases to the substratum. Recent collections (2012 & 2013) by Sharon Flint found pupae in late summer but it is not certain if they indicate a late flight period or if, and it would be exceptional among cased caddis, they remain as pupae until the following year. The flightless adults are found sheltering under stones at the margin of the tarn during the day but at night skate over the surface of the lake, having modified legs for the purpose. Holmes (1965) provides an introduction to the natural history of the tarn which is also the subject of regular study symposia. The life cycle is discussed in Bray (1969). The eggs are laid close to the shore and the larvae migrate to the *Chara* beds as planktonic first instar larvae moved by wind and wave action.

Threats: As a single site species this is always vulnerable to catastrophe. Malham Tarn is in sheep country and the recent ban on the extremely toxic cypermethrin based sheep dips is to be greatly welcomed. The species presumably relies on maintenance of extensive *Chara* beds. Work at Bosherston Lakes, Pembroke, has confirmed the sensitivity of *Chara* to phosphates, which, once bound into the sediment, are very difficult to remove from a system sufficiently for *Chara* to regenerate (information from Bob Haycock, retired site manager at Bosherston). The efficiency of phosphate stripping from the effluent of the nearby field studies centre must be continually monitored. As a nationally significant freshwater site it is not anticipated there will be major habitat alteration, but an example of a subtle change that

has been noticed is that *Mystacides longicornis* (L.), was noted as just a single record by Holmes (1963) but was present in countless thousands in 2011.

Holmes recorded that it was common in some years inferring that it was uncommon in other years. However, it is many years since it was noted in nunbers so a general decline seems almost certain. There is no obvious reaons for the decline at Malham. In Finland the Red List status was Near Threatened in 2000 but by 2010 this had become Endangered, without any obvious reason Salokannel *et al* (2010).

Management and conservation: Maintenance of healthy *Chara* seems the pre-eminent requirement. Malham Tarn is a NNR.

Identification: Larvae – Wallace *et al* (2003) and Wallace (2006); adults Barnard & Ross (2012); pupa – Bray (1967)

Monitoring: The larva can be collected from amongst *Chara* that is collected by a weed grapple deployed from a boat. Their characteristic head pattern can be recognised with a hand-lens and they can be returned alive to the lake; this will confirm continued existence at the lake but will provide no quantitative data. The suggested time would probably be from mid August to mid September. Once they are fully-fed they move to the lower parts of the plant and are subsequently more difficult to locate. The adults are attracted to a light run close to the water's edge.

Selected published sources of distributional information: Bray (1964, 1967, 1969), Holmes (1963, 1965), Kimmins (1952), Ross (2008)

AGRYPNIA PICTA

DATA DEFICIENT

Order TRICHOPTERA

Family PHRYGANEIDAE

Agrypnia picta Kolenati, 1848

Status: This species would be a candidate for dropping from the British list as there are no voucher specimens to back any record. However, most of its alleged records are from northern and highland Scotland where it could be so easily overlooked amongst its close relatives. Until any new records transpire it must be classed as lacking any credible data i.e. Data Deficient.

It was given the data deficient RDBK grading in Wallace (1991) and, listed as having no post 1900 records in Shirt (1978).

Hectad distribution: 4 all dates, 0 post 1980; **Vice county distribution** 4 all dates and 0 post 1980.

Distribution: The species was introduced to the British list by McLachlan (1862) on the basis of an adult collected in 1854 on Skiddaw (Cumberland) by T. Chapman and identified as this species by Dr. Hagen, who was McLachlan's predecessor as the country's Trichoptera expert; McLachlan re-identified it as *Agrypnia obsoleta* McLachlan shortly afterwards, McLachlan (1865). The next specimen was taken by Mr. Pryer at a gas lamp in Highgate (Middlesex) in June 1868 but the record cannot now be verified as it was destroyed, along with Pryer's other material in a fire in Japan to where he emigrated, Bray (1964, 1966). J.J.F.X. King recorded a male and female from Loch of Cliff, Unst (Shetland) in 1895; these specimens cannot be located in the King collection at Glasgow's Hunterian Museum, and have not appeared amongst the numerous King specimens that he dispersed to fellow trichopterists; they were also missing when Bray visited the collection in the 1960s. King in his 1896 paper says he initially mistook his pair of *A. picta* for *A. obsoleta.* There are specimens in his collection of *A. obsoleta* from Unst in 1895, a species he did not actually record in his 1896 paper. J.W. H. Harrison recorded it from Loch Eeadar da Bhaile and Loch a Chadarcharnaich, Raasay (North Ebudes) in the mid 1930s but no specimens have been located; it can be presumed they were not amongst the batch he sent to Martin Mosely and that Harrison is thus responsible for the identification.

Habitat and ecology: Larvae would presumably be found in the vegetated parts of lochs and the adult would be capturable by the conventional methods.

Threats and Management and conservation: The uncertain status and lack of any recent records makes it impossible to make any statement here.

Identification: Larvae Wallace *et al* (2003); adults Barnard & Ross (2012); pupa Bray (1967).

Survey & Monitoring: It is recommended that all medium sized pale *Agrypnia* adults collected from northern and north western Scottish lochs be scrutinised. King (1896) mentioned that he had originally identified his two specimens as a variety of *A. obsoleta* but this author believes that confusion with *A. varia* Fabricius is equally likely; their genitalia being superficially similar. It might be significant that King (1890) mentions that the Unst *A. varia* were lighter in colour than those from Highland Scotland. King did not claim to have collected *A. obsoleta* on either of his two trips to Shetland, but both *A.obsoleta* and *A. varia* were recorded as common by Harrison (1937). The larva is very similar to that of *A. pagetana* Curtis but that species is not recorded from northern or north western Scotland. The dark blotches, as opposed to a black band, marking the anterior edge of the pronotum, is a way of distinguishing larvae of *A picta* and *A. pagetana* from *A. varia* and *A. obsoleta.*

Selected published sources of distributional information: Bray (1964, 1966), Heslop-Harrison (1937), King (1890 & 1896), Mclachlan (1862)

ANABOLIA BREVIPENNIS

VULNERABLE D2

Order TRICHOPTERA

Family LIMNEPHILIDAE

Anabolia brevipennis (Curtis, 1834) (in earlier works in genus *Phacopteryx*)

Status: It has currently been recorded at 10 sites post 1980 with an estimated AoO of between 10 & 15 km^2 (VU under D2) and thus qualifies for a status of Vulnerable. There were several historic sites from which it has been lost but this decline is not recent. At present it is thought the species is secure despite having few current sites. However, habitat loss has been noted as being a potential problem. It is a secretive species and likely to be found elsewhere, but it is several years since a new site was discovered.

The species was not featured in Shirt (1987) but it was awarded notable status by Wallace (1991).

Hectad distribution: 18 all dates, 12 pre 1980 and 10 post 1980; **Vice county distribution** 13 all dates and 7 post 1980.

Distribution: There are post 1980 records from East Anglian vice counties of East Suffok and East and West Norfolk. The Meres and Mosses of north-west England also have a few sites, in the vice counties of Shropshire and Cheshire, but otherwise it is very scarce with one recent Welsh record in Denbighsire and one Scottish site in Dumfriesshire. There are other earlier, often very much earlier, isolated records from north-east Yorkshire and mid-west Yorkshire, Westmorland and West Lancashire.

Habitat and ecology: The larvae are found in shallow pools, in fen carr woodland that have an organic bottom and a very slight water flow through them, and which dry out over the summer. They make their cases from, and eat, dead tree leaves. At Wybunbury Moss (Cheshire), where it is especially common, it is also found in pools which lack apparent water flow and at Redgrave Fen (East Norfolk, East Sufolk) they were found in pools in very dense old reed swamp, and utilised dead reed (*Phragmites)* leaves. The larvae have not been found in the autumn and it may be partitioning off a resource with *Glyphotaelius pellucidus* (Retzius) which feeds on dead leaves in the same pools over the autumn and winter.

Threats: Changes to the water regime in its habitats and also tree removal seem the major threats. At most sites natual succession leads to areas it occupies drying out, it is hoped that new areas would develop, but this must be ensured.

Management and conservation: The pools where it lives can be affected by the ultimate drying out of the fen, but equally would be affected by the raising of the water-levels and ponding of their pools, but in all these instances, it would be hoped that the species would colonise new habitat. All the modern sites are NNR or SSSI.

Identification: Larvae Wallace *et al* (2003) & Wallace (2006); adults - Barnard & Ross (2012).

Survey & Monitoring: The larval cases are very distinctive; *Limnephilus lunatus* Curtis, which may occur in the same places occasionally, may make cases of similar construction but they use living green leaves and/or do not make them of neatly cut discs from dead leaves. *A. brevipennis* cases can be found with larvae and pupae in spring, but persist after emergence and can be found in the dried pools well into summer. The adults do light-trap, but records have only come from close to probable breeding sites; July to September would be the dates for survey. The adult has not been observed flying and is only disturbed from vegetation by beating, and always close to a breeding site. It is possible to distinguish it from other plain brown caddis from the same site by the rounded wings and by their comparatively hairy nature, though not as bristly as those of *Chaetopteryx villosa* (Fab.).

Selected published sources of distributional information: Brindle (1964), Cooke (1882), McLachlan (1862), Pelham-Clinton (1966b), Porritt (1890)

CYRNUS INSOLUTUS

ENDANGERED Criteria B2a; B2b (iv, v)

Order TRICHOPTERA

Family POLYCENTROPODIDAE

Cyrnus insolutus McLachlan, 1878

Status: This qualifies for Endangered by having only 2 certain UK sites (B2a). At one of these, (Blelham Tarn, Westmorland) it has not been re-found despite three recent surveys. This suggests at the least a reduction in population at this site (B2 b(v)) and it would also qualify under criteria B2b(ii, iv) if it has been entirely lost from Blelham. The Berkshire site was investgated in 2015 but the species was not re-discovered. The AoO is at most 2km^2.

It was given Endangered status in Shirt (1987); it was given RDBK status in Wallace (1991) on the basis that, following the then recent discovery of it in Berkshire, that it would turn up elsewhere, but that optimism has not been justified.

Hectad distribution: 4 all dates, 3 pre 1980, 1 (or 0) post 1980; **Vice County distribution** 3 all dates, 1 (or 0) post 1980.

Distribution: There are two English sites. Padworth Oval Pond (Berkshire), where Ian Wallace reared a larva in 1972 and Hans Malicky took adults in 1976, and Belham Tarn (Westmorland), from where it was known between 1941 and 1961. Wallace (1991) claimed the Berkshire site had been Millbarn Pond, but this was due to a misunderstanding. There is an intriguing Welsh record of a larva from Llyn Gynon (Cardiganshire) in 2008, identified

from a sample by Environment Agency Biologist, Mel Lacan. The Polycentropodidae are very conservative regarding their head pattern, which is used to identify this species, and Bert Higler, of the Netherlands, who knew it very well, believed from a photograph that this was a good record for *C. insolutus*. However, *Cyrnus flavidus* McLachlan, which is similar to *C. insolutus* is abundant at the site and this record could refer to an aberrant larva of that species; a larva with a pattern approaching that of *C. insolutus* has been seen by the author of this review. *C. flavidus* was the only one of the two noticed in a short survey there by the Wallaces in 2013. K.E. Carpenter (1927) had published a list for Cardiganshire that included C. insolutus , from flowing water, but there are other records in her list which would be questioned today; there were no comprehensive larval identification keys available to her.

Habitat & ecology: Kimmins took adults from a shaded part of the rocky shore at Blelham which is where John Edington took larvae. Padworth Oval Pond is an acid pool surrounded by vegetation, that lies in deciduous woodland. (Llyn Gynon is a large upland stony lake.) In Ireland adults and larvae were collected from a well-vegetated small pond, O'Connor (1977). It is a common species in Holland. Higler (2007) says larvae have a very specific habitat which is submerged plants of *Stratiotes* near open water while Czachorowski & Kornijow (1995) found it was restricted to shallow water amongst *Myriophyllum*. Intriguingly, in Ireland it is only known from one site (O'Connor, 1977), and that author too expected to find it at many other sites. O'Connor cites an early 1937 work by Klingstedt who also noted few records for a widespread species. Solem (1970) found it new to Norway, but cites a work from1960, by Nybom, that said it was common in in Finland. O'Connor found a larva in the littoral zone in July but in March, larvae were not found in the littoral zone but offshore. He was not able to ascertain if the larvae were on the weed or the substratum debris.

Threats: Blelham Tarn is in sheep country and the recent ban on the extremely toxic cypermethrin based sheep dips is to be greatly welcomed, Shardlow (2006). In 2015 Padworth Oval Pond was found infested with an alien crayfish; every net sweep collected several and no caddis of any kind were found in an autumn visit.

Management and Conservation: Blelham Tarn is an SSSI and a much-studied freshwater site where gross habitat alteration seems unlikely. Padworth Oval Pond is not known to have any special conservation protection. Llyn Gynon is an SSSI within the Elenydd SAC (Special Area of Conservation).

Identification: Larvae – Edington & Hildrew (1995); adults – Barnard & Ross (2012).

Survey & Monitoring: It would seem best to check for the continuing existence of this species at Blelham by a careful and restricted survey of the rocky shore. Kimmins says he was at first alerted to the adults at Blelham by their pale colour, in comparison with other small mottled polycentropodids flying there at the time. This suggests it might be possible to photograph adults, and devise an identification guide to use at that site which would not require the collection of specimens; it is difficult to safely immobilise polycentropodid larvae sufficiently to enable identification with a hand-lens in the field and safe return of the larvae, but collection of larvae in early spring for lab identification is another procedure to see if the

species still occurs at a site. The Padworth site also needs checking again. Malicky captured his specimens by sweep netting. July seems to be the best month to search for adults. Despite Higler's confidence in the identification of the Llyn Gynon material, it would be re-assuring to collect further material, preferably as an adult. The habitat, being bare and un-vegetated is unlike other sites where this species lives.

Selected published sources of distributional information: Carpenter (1927), Edington (1964), Edington & Hildrew (1995), Kimmins (1942), Wallace (1991)

EROTESIS BALTICA

VULNERABLE Criteria B2a; B2b (ii, iii, iv)

Order TRICHOPTERA

Family LEPTOCERIDAE

Erotesis baltica Mclachlan, 1877

Status: The species has only seven modern sites so qualifies for Vulnerable status under criterion B2a. The estimated AoO is 7km^2. Most sites are isolated, with only a series of adjacent north Norfolk fens probably representing an extensive population. It has apparently disappeared from one modern site (Wicken, Cambridgeshire) and, in total, has declined from 11 sites down to seven sites post 1980. It therefore qualifies for Vulnerable status under B2bii, iv. It had been common at the site historically suggesting that loss of suitable habitat was probably to blame (B2biii). There are other historic sites which had large populations but where post 1980 surveys have failed to find the species.

Hectad distribution: 15 all dates, 11 pre 1980, 7 post 1980, (7 post 1989); **Vice County distribution** 6 all dates and 3 post 1980.

Distribution: *Erotesis baltica* is found in four separate areas of the UK.

In England the first is Hampshire where M.E. Mosely took many specimens from the River Test near Romsey in the second half of July 1912; he subsequently recorded adults there up to 1920. Mosely also took it from the River Itchen near Winchester in 1913 There had been no modern records from Hampshire, despite hundreds of samples being collected from the Rivers Itchen and Test by the Environment Agency and Malaise trapping at Leckford by Graham Vick, until a larva turned up in a sample from the Itchen at Itchen Stoke collected in 2005 and identified by David Leeming; Stuart Crofts and Andrew Dixon took an adult nearby in 2015.

The next area is East Anglia. In East Norfolk where there are records from various fens in the 19th and early 20th century. Catfield Fen was a site where Pelham-Clinton took it in 1966 and Martin Drake told me it was taken at four Norfolk Fens in that vice county in 2007, and that it

was an expected species when collecting adult caddis from fens in that area. In Cambridgeshire there are records for Wicken Fen from 1877 to 1983; J.J.F.X. King took many adults at Chippenham Fen in 1882.

In the Westmorland it is known from Blelham Tarn from where it has been recorded from 1941 to 2013 by various recorders; Kimmins also recorded it from Priest Pot, a pool within the fen at Esthwaite in 1941 and N.E. Hickin took it from the Wray Boathouse at the end of August 1938; this last record could be from wind-blown adults from nearby Blelham but also have been from a site, such as Pull Wyke Bay near Blelham, where there was an extensive swamp given the colloquial name Congo Carr by the late T.T. Macan of the Freshwater Biological Association; that site is no more.

In Wales it is known from Cors Goch, Anglesey, where Joan Morgan first took it in 1987 and from where the Wallace family (B.,G.J., I.D., and M.C.) took it as larvae and adults between 2005 and 2007.

Habitat and ecology: This is a species of permanently wet open fen and larvae can be collected in small pools and dykes, and also larger pool and lake margins where they abut fen. At Cors Goch it has not been found in areas that dry out during the summer. Cors Goch is a calcareous fen and Hannigan *et al* (2009) describe a very similar habitat in Ireland, as does Buczynska (*in press*) in Poland. Mosely's Test and Itchen sites are not known but both are calcareous rivers. The former was probably near Mottisfont, Mosely's main haunt and where there was a place entitled "Peat Hole" according to one of his specimen labels on another species in the Natural History Museum (London) collection. This could suggest those river sites were or still are adjoining peat fens. Croft & Dixon's 2015 Hampshire site on the River Itchen adjoined a fen-fringed lake. Other sites though not highly calcareous are not base poor. The larvae have been successfully reared when fed on fine plant roots but not decaying plant debris and plant roots are certainly used in case construction. The larvae with their striped heads and striped cases are probably well camouflaged. They are shy and retreat into their cases, clamping them to something firm with their legs, at the slightest disturbance.

Threats: Drying out of open fens is probably the major threat. In 2007 larvae were only found in areas of Cors Goch that had not surface dried in 2006; they were not found in areas that had contained them in early 2006, but which had subsequently dried out, before re-wetting. At that site, the expansion of a nearby quarry, even though it is allegedly not digging below the water table, remains a concern.

Management and conservation: It seems important to prevent drying out of the fens where it lives and to maintain general surface water throughout the year. Digging pools on the fen surface may provide refuges for the occasional very dry summer, but are not recommended as a permanent way of securing this species at a site. The small pools on the fen surface have a different fauna from larger pools. In addition there can be a tendency for larger pools to drain surrounding areas. However, in time their margins, if dug as scrapes, do seem to provide suitable habitat. The minimum population size that is viable is not known. Scrubbing over of

sites will assist drying out, and might also be prejudicial, for example in swarming behavior where particular cues have been noted as a requirement for other member of the family, Solem & Bongard (1987). All its known sites have either NNR or SSSI status.

Identification: Larvae – Wallace *et al* (2003) and Wallace, (2006); adults Barnard & Ross (2012).

Survey & Monitoring: The larval case is characteristic and easily recognised and they could be released after recording; Identifiable larvae can be collected as early as August but March to May would seem to be good months in which to search. Note that pupal cases persist for several months after emergence and can be found amongst pool debris. This extends the time the species can be recorded. The adults form late afternoon and evening swarms over the fens where it is common, and it also light-traps. It is a rather non-descript grey-brown long-horned caddis that is similar to other genera. However, few other leptocerids species are likely to be encountered in numbers in vegetated fens, but more work is required to refine field characters. Adult records stretch from late May to late August; Martin Drake's records stretched from late May to late July with early July seeming to be the peak.

Selected published sources of information: Hickin (1941), Kimmins (1943), King, J.J.F.X. (1892), Morton (1912), Porritt (1903)

GLOSSOSOMA INTERMEDIUM

CRITICALLY ENDANGERED Criteria B2a; B2b (ii, iv)

Order TRICHOPTERA

Family GLOSSOSOMATIDAE

Glossosoma intermedium (Klapalek, 1892)

Status: There have been no records since 2001 and it had declined from five sites in 1950 to three by 1990 and two by 2001 – a marked, recent decline. There has been extensive and unsuccessful surveying of many Lake District streams, and in other parts of the country in recent years, particularly by Andrew Dixon and Ian Wallace It may be extinct but is currently given Critically Endangered status on the basis it had declined to two sites (B2a) with an AoO of less than 2km^2 by 2001; post 1980 it had been 3km^2. Historically it was probably never more than 8km^2. All sites were geographically isolated, but three – Hayeswater inflow, Kirkstone Beck, and Troutbeck are reasonably close together. The decline in number of sites qualifies it under criteria B2b (ii, iv).

All sites have been re-surveyed in the past year or so, unsuccessfully, particularly by Andrew Dixon.

It was given only RDB3 status by Wallace (1991) on the presumption it would be found in several other Lake District streams; Shirt awarded it rare status. It is a UK BAP species.

Hectad distribution: 5 all dates, 5 pre 1980, 3 post 1980; **Vice County distribution** 1 all dates

Distribution: This has only been definitely recorded from the English Lake District, all sites being in Westmorland. Records from the Hoathwaite Beck that flows into Coniston stretch from 1925 to the 1950s. Those from the Pull Beck that flows into Windermere are from 1955 to the early 1990s. The Hayeswater inflow records are from the 1950s to 2001, the last year for any records. T.T. Macan took a larva from the Troutbeck in 1949, but unfortunately gave no indication of where along the course of that significant stream it had been taken. Recently two pre-pupae were found in general samples taken by Ian Wallace from the Kirkstone Beck in 2001.

It is a species that would be expected to occur in Scotland but on the assumption that it would have an early flight period there too, means it would be missed by the likes of King and Morton whose surveying was restriced to their summer holidays. That the larva cannot be identified in the field from its frequently abundant relatives also makes finding new sites difficult. It has been sought in Scotland, particularly by Stuart Crofts & Andrew Dixon, but without success, to date.

There are other records in collections, and published e.g. Brooker & Morris (1980) and Joyce (1984) but this author feels they should be treated as unconfirmed due to lack of voucher specimens and Mackareth's initial key identifying some *G. boltoni* Curtis as this species. Wallace *et al* (2003) also incorrectly identifies some *G. conformis* Neboiss as *G. intermedium.* Dixon and Crofts examined a large number of *G. conformis* and found a very few that had small outer setae on both sides of the 9th abdominal tergite at the final instar which is claimed to be characteristic for *G.intermedium.* Wallace's key indicates that early instar *Glossosoma* larvae cannot be identified and this is due to these paticular setae being small in other species; a few lavae of *G. conformis* retain small setae into later intars. However, the very small number of records of *G. intermedium* offered to the recording scheme as occasional larvae from new locations suggests it is a rare phenomenon, if this is the reason for those records.

Habitat and ecology: There was a general presumption in the past that the species would prove to be widespread, at least in the Lake District. This has not proved to be the case and detailed searches in 2002, 2003 and 2010 by the author of this review and at other times, up to the present, by Andrew Dixon has failed to find any new sites. More careful examination of its past sites suggests they are not typical streams for the area in being, at least for the Pull Beck and Hayeswater inflow, and possibly Kirkstone Beck, are medium-sized streams arising from base-rich rock – the Coniston Limestones in the case of Pull Beck and the volcanic rocks of High Street for the latter; the chemistry of the Hoathwaite Beck is not known. (Base-enriched streams from Helvellyn proved to be too small for this genus). It is possible there are no other suitable streams. The flight period is in April and May and B. & I.D. Wallace

found that larvae grew very rapidly and by July most were sealed up as resting larvae in pupal cases, in which state they remained until spring, when pupation occurred. Fjellheim & Raddum (1998) found a similar life cycle except that the flight period was July, with larvae sealing up in September; Malicky (2004) gives July as the flight period. In the 1990s the Wallaces observed that most *G. boltoni* were growing over-winter, but in recent years most seem to pass the winter as larvae in sealed-up cases. It is possible they may compete with *G. intermedium* by emerging and laying at the same time, rather than a little later. Wallace (2011b) is a dossier on the species.

Threats: The ban on cypermethrin sheep dips removes a significant threat to this species (Shardlow, 2006). If the species is re-found, landowners and managers need to be made aware of the need to prevent disturbance of the streams as land drainage work could also be problematical. At the Hoathwaite Beck site, the nearby caravan site posed an unusual threat in that children had used the larger stones from the steam to make dams and causeways and such stones are used as pupation sites by caddis including *Glossosoma*.

Management and conservation: The Troutbeck is part of the R. Kent tributaries SSSI but other sites appear to have no statutory protection. Management of the threats is important. At present it is not considered feasible to attempt translocation to re-establish lost populations.

Identification: Larvae – Wallace *et al* (2003), adults - Barnard & Ross (2012).

Survey & Monitoring: Unfortunately neither the adult or larva can be distinguished in the field from its abundant relatives. Its life-cycle may have changed in response to warmer seasons, but sampling at various times in the year by Andrew Dixon found nothing. Surveying will involve regularly collecting samples of *Glossosoma* larvae or pre-pupae for lab identification. In the event it is found, any sampling programme would need to be adjusted to minimise damage.

Selected published sources of distributional and ecological information: Butler (1956), Kimmins (1943), Mackareth (1956), Morton (1925) Wallace (2011b)

GRAMMOTAULIUS NITIDUS

NEAR THREATENED Criteria B2a; B2b (ii, iv)

Order TRICHOPTERA

Family LIMNEPHILIDAE

Grammotaulius nitidus (Muller, 1764)

Status: There are only four localised modern sites (one 1977) but further recent records from a village light trap suggest a further site. The major loss of sites for the species probably occurred a very long time ago when major fenlands around the country were drained.

However, there has been an apparent continuing loss over time as it has failed to be re-found at sites for which there are second half of 20th century records. AoO is particularly difficult to estimate as the area of suitable habitat within sites is unknown, but is likely to be no more than 12km^2. Not knowing the larval habitat requirements means that the species may be declining, or increasing as wetlands are developed for conservation. It could qualify as threatened but given the lack of knowledge about larval habitat requirements and suitable habitat availability create some uncertainty. The number of sites and a historic decline suggest it qualifies for Near Threatened under criteria B2b (ii, iv). The sites are few in number and are isolated, qualifying under criterion B2a.

It was given RDB1 status by Wallace (1991) and endangered by Shirt (1987).

Hectad distribution: 26 all dates, 23 pre 1980, 5 post 1980, (4 post 1989); **Vice County distribution** 12 all dates 4 post 1980.

Distribution: All sites are in England. Its areas are associated with large reed swamps and many are coastal. In the west of England there are records from heaths in North Devon, South Somerset, and North Somerset, with the last record being 1984 from Catcott Heath (North Somerset). In the south of England it used to be common at Deal (East Kent), and the last records for that vice county is Westbere Marshes in 1977. In nearby East Sussex there is an old record for Camber. There are records from coastal areas of North and South Essex, but none for 80 years. The coastal records continue through Suffolk, with Minsmere (East Suffolk) 2004 being the latest, to Norfolk, Lincolnshire and even to south Durham, but the latter records are mid 19th century and the Lincolnshire record early 20th century. Most records come from Wicken Fen, where it persists. It was also recorded in the past from other classic East Anglian fens such as Chippenham (Cambridgeshire) and Redgrave (East Norfok, East Suffok) and several of the Broads. In 2010 and 2014 three adults were light-trapped at Old Weston (Huntingdonshire) by Kevin Royles, but the breeding site is not known.

Habitat and ecology: The larva is unknown in Britain. The larval habitat is like that of its common relative *G. nigropunctatus* Retzius, claimed to be small pools over grown with vegetation and which dry up during the summer. The adult dates of a few in spring, but then the majority in August, are similar to other species from temporary water bodies suggesting an adult diapause. Emma Ross found four adults resting on *Phragmites* stems and there is a major reed-bed development programme at Minsmere; Westbere Marshes also has very extensive reed-beds. Peter Barnard dissected Emma Ross' 2nd September 2005 Wicken Fen specimen and reported it "bursting with eggs".

Threats: Until larval sites have been found it is not possible to make useful statements here.

Management and conservation: The priority is to locate the larval habitat and ensure it is taken into consideration in site management work. Thereare extensive reed bed development programmes aimed at other species such as the bird the Bittern. These may, or may not, be beneficial for this species. All its present sites have high conservation and nature reserve status and Wicken Fen and Minsmere are intensively managed.

Identification: Larvae undescribed. (Aki Rinne has kindly supplied the author with information that shows that the characters used in Wallace *et al* 2003, derived from an inadequate Russian description, do not work. At present the larva cannot be definitely separated from those of *Grammotaulius nigropunctatus* (Retzius). Adults – Barnard & Ross (2012).

Survey & Monitoring: Recording adults must remain the method until such time as larvae have been discovered and characters deduced to enable separation from those of *G. nigropunctatus.* All recent adults have been taken at light. Keeping a voucher specimen is ideal, but at the very least a photograph must be taken which in most cases will enable the species to be recorded. The wings are more pointed than those of *G. nigropunctatus* but it is likely that capture of every specimen will be required "just to be sure".

Selected sources of published information: Anon (1978), Ellis (1965), Grensted (1939a), Morton (1913), Porritt (1913), Ross (2006), Wood (1929), Wormald (1861).

HAGENELLA CLATHRATA

ENDANGERED Criteria B2a; B2b (ii, iii, iv)

Order TRICHOPTERA

Family PHRYGANEIDAE

Hagenella clathrata (Kolenati, 1842)

Status: This species is now most likely found at only five sites. Recent awareness raising for this species and its conspicuous day-flying adult has resulted in additional records, hence there being more post than pre 1980 hectads records. At its three best studied sites it has declined in area of occupancy as habitat has dried out or scrubbed over. With only five isolated locations it qualifies for Endangered under criterion B2a and for that status under B2b (ii, iii, iv) due to continued decline in area of suitable habitat. The post 1980 AoO is estimated at 10km^2 but its post 2000 AoO is estimated at only 6km^2 .

The species was awarded RDB1 status by Shirt (1987) and Wallace (1991). It is a UKBAP species.

Hectad distribution: 12 all dates, 6 pre 1980 and 8 post 1980; **Vice County distribution** 7 all dates, 5 post 1980

Distribution: It is recorded from four discrete parts of the UK.

In Surrey it is known from the commons of Witley, Thursley, Whitmore and Chobham; the latter two in the past couple of years but it has not been re-found recently at the first two. The Middlesex record is late 19th century from Tottenham Marshes, a site presumed to have been

lost to development a very long time ago. Dodd & Wallace (2013) is a modern survey of the Surrey sites.

Most records are from the mosses of the north midlands such as Burnt Wood (now lost) and Chartley Moss (Staffordshire), and the Whixall / Bettisfield / Wem Moss complex (Shropshire, Denbighshire); it has not been recorded from Fenns Moss (Denbighshire) which abuts Whixall Moss; the various mosses of this complex were exploited at different times and the earlier hand-cut method at Whixall (English) as opposed to the later mechanical cutting on the Fenns (Welsh) side is still reflected in their fauna one hundred and fifty years later. Wallace (2009a) provides a recent survey. There are areas of Chartley and the Whixall complex from which it has vanished over the past 20 years.

David Benham's 2012 record for the Roudsea Nature Reserve (Westmorland) is a welcome extension to its known range, but it seems restricted to two small adjacent areas.

In Scotland, the Wigtownshire record is early 20th century. The Kinrara, Aviemore (East Invernesshire) record is for 1968 and Insh Marshes (East Invernesshire) is 1982. There have been some recent survey visits to Insh but not a serious concerted effort to search for the species in the general area in recent years.

Habitat and ecology: The larva lives mainly in small pools, sometimes only inches across, between large tussocks of *Molinia.* The pools are usually roofed over by fallen dead leaves of the grass so that very little open water is apparent. A characteristic of *Hagenella* sites is that there are usually no obvious water bodies. The pools usually dry out during summer but extensive Field Vole runs maintain contact with the water-table and may be important for the survival of the species. The eggs are laid in June and July, and in captivity did not appear to be particularly resistant to drying, unlike those of many limnephilids that use temporary water bodies. It may be that they leave the egg-mass soon after hatching and then burrow into the saturated peat and do not start to develop until the water level rises in autumn; this behaviour has been noted for *Limnephilus luridus* Curtis. Dead birch tree leaves appear to be used for case construction and food. However, other phryganeids are known to be carnivorous, which may be the case for this species too. A full-grown larva was taken in a pit-fall trap at Chartley by Deborah Proctor and this habit was noted in Germany by Hielscher (1997). This may be in response to the pool in which they are living becoming unsuitable but it may also be a normal behaviour as they search for, possibly terrestrial food. The attractive day-flying adults are often seen resting in small trees and bushes which are characteristic for all its sites. In 2014, one of the populations at Roudsea was breeding in bare pools in woodland; cracks in the pool surface caused by trees rocking was seen as a way that contact with water could be maintained over the dry seasons. Wallace (2011a) is a dossier on the species.

Threats: Drying out of habitat due to drainage, drought or scrubbing over seems to be the main threat, as could be over-zealous wetting-up or pool creation schemes. Cattle grazing as used extensively in Surrey to control *Molinia* is also considered potentially detrimental. This was a focus of a detailed modern survey of the Surrey sites (Dodd, 2012).

Conservation and management: Maintenance of a suitable water regime at a site is presumably critical. Drying out, but also damming of drains and ponding are both detrimental. It is possible that slight water-flow through the peat body is necessary. Maintenance of features attractive to voles may also be required. Digging pools within the habitat, for example to encourage dragonflies is undesirable as they act as sumps and drain surrounding marsh; this was observed at Whitmore Common but had been carried out many years before the presence of the species was known to the site managers. Tussocky *Molinia* is regarded as degraded heathland in some classifications and is controlled by cattle grazing which by opening up the pools may be detrimental, but can also produce new pools by poaching. Site managers in Surrey are aware of the need to graze very lightly, or not at all where this species occurs. At Whixall Moss there is a general programme to wet the site and re-start bog formation. However the *Hagenella* area has not been so treated but is presumably benefiting from a general raising in water level; the careful removal of some trees in the *Hagenella* area has also maintained some areas of tussocky *Molinia.* Whilst there cannot be complete confidence it is secure at Whixall, management does seem to be helping maintain or perhaps actually increase the population's AoO.

It is suggested that positive habitat management could also be investigated by digging very small pools between tussock at the margins of the main colonies at Chartley and Whixall. The areas chosen would have been sampled to show they were currently too dry to support the species. The trial would test to what extent habitat can be maintained or created artificially. All current sites are NNR or SSSI.

The adults are not found away from breeding sites suggesting it is not a mobile species and would not move very far to colonise new areas prepared for it, assuming the habitat could be re-created.

Identification: Larvae – Wallace *et al* (2003) and Wallace (2006),

adults – Barnard & Ross (2012); pupa - Bray (1964) and Wallace & Wiggins (1978).

Survey & Monitoring: The larval habitat and the roofed over pools are easily damaged by trampling; *Limnephilus luridus* seems to be the main species of open pools at Whixall. It is suggested that the distinctive adults could be recorded through binoculars on a butterfly type of transect at the edges of the inhabited areas. In the north midlands and in Scotland the records are concentrated into the last week of June and first of July but in Surrey they are out and about in May, and the recent sighting in Cumbia was at the start of June; recorders going out when they believed it could be found may have reinforced an incorrect opinion that it has a very short flight period.

Selected published sources of distributional information: Chappell (1868), Johnson (1961), Kimmins (1934), Morton (1904a), Morton (1916), Wallace (2011a)

HYDROPSYCHE BULGAROMANORUM

CRITICALLY ENDANGERED Criteria B2a; B2b (ii, iii, iv)

Order TRICHOPTERA

Family HYDROPSYCHIDAE

Hydropsyche bulgaromanorum Malicky, 1977

Status: This is currently only known from the lower sections of one river. It has been unsuccessfully sought at nearby similar sites. It qualifies as Critically Endangered due to being restricted to one site (B2a) with a small AoO of 3km^{2}and has declined., Historically it has disappeared from other sites (Bii, iv). There is not enough information about the specific substratum requirements or its past distribution within its site to know if there has been any decline there, but it is also considered very vulnerable to such under criteria B2b(iii) living at the interface of the fresh and brackish sections and in a river where water abstraction may alter the position of that boundary.

It was listed as probably extinct by Wallace (1991) and endangered but probably extinct in Shirt (1987). It is a UK BAP species.

Hectad distribution: 2(3) all dates, 2(3) pre 1980, 1 post 1980; **Vice County Distribution** 2(3) all dates and 1 post 1980; one of the records cannot be localised very well and this accounts for the bracketed figures.

Distribution: It was found in the River Thames between Kew and Richmond (Surrey / Middlesex) between 1862 and 1866, but not since. The 19th century record from Norfolk cannot be further localised. Of interest is a Pleistocene sub-fossil from Happisburgh, Norfolk (Happisburgh Village Website, 2011). M.E. Mosely recorded it from Arundel in West Sussex in 1920 and larvae were found there, in the R. Arun at Stoke, in 2004 as part of an Environment Agency funded survey; P.C. Barnard and E. Ross found a female there in 2005.

There is a chance it might occur in the lowest freshwater sections of other large rivers in the south east of England. Local Environment Agency staff tried identifying all *Hydropsyche* larvae they found from certain rivers in the south east to species, but have not currently found any *H. bulgaromarum.*

Habitat and ecology: On the continent this is a species of the lowest freshwater section of large rivers (Edington & Hildrew, 1995 & Czachorowski & Serafin, 2004). The curious knob on the sub-mentum and unusual arrangement of setae on the head, suggest specialised behaviour compared with other British species in the genus, but this author is unaware of any studies. The larva is associated with hard substratum and Edyta Buczynska, who co-authored a paper about this species Czacharowski & Serafin (2004), told this author that in Poland it was always associated with large stones could be present in large numbers and that turbidity and pollution were not a problem, and that in some sites it was the only caddis. Thus the disappearance from the Thames was probably due to things such as dredging and flow

changes due to embankment building downstream causing loss of stony habitat rather than pollution. Wallace (2011c) is a dossier on the species.

Threats: The River Arun is subject to abstraction and any alteration of the flow regime could detrimentally move the brackish / freshwater interface. Disturbance of the substratum would also be a threat.

Management and conservation: Lack of knowledge of the exact micro-habitat and behaviour of the larvae makes it difficult to be specific about the conservation measure it requires. The vulnerability of larvae to altered flow-rates brought about by abstraction needs noting. It may be able to migrate upstream if the flow rates change slowly, providing there is suitable substratum. Careful survey, followed by substratum replacement before any dredging work was carried out is desirable. The River Arun at Stoke runs through the Arun Banks SSSI. It seems reasonable to speculate that pollution or other habitat degradation on the lower non-tidal Thames was responsible for its disappearance from that river.

Identification: Larvae – Edington & Hildrew (1995); adults, Barnard & Ross (2012)

Survey & Monitoring: The adult does not appear to be particularly distinctive within the genus, consequently it would only be seen by scrutiny of preserved adults, which is particularly tedious in this genus due to the large numbers of very common species that usually dominate samples and the critical examination necessary to detect the subtle differences between species. The larva should be recognisable in the field but how well displaced larvae returned to the river would be able to re-establish themselves is not known.

Selected published sources of distributional and ecological information: Malicky (1984), Wallace (2011c)

HYDROPSYCHE EXOCELLATA

CRITICALLY ENDANGERED (Presumed Extinct) Criteria B2a; B2b (ii, iv)

Order TRICHOPTERA

Family HYDROPSYCHIDAE

Hydropsyche exocellata Dufour, 1841

Status: A presumption of extinction is made for species not recorded since 1900 but as this was seen in 1902 it would qualify only for the status of “Possibly Extinct” but as it has been unsuccessfully sought amongst material collected recently from its main site, which was the lower River Thames, and other similar rivers in south east England it is regarded as presumably extinct.

It was listed as probably extinct by Wallace (1991) and endangered but probably extinct in Shirt (1987).

Hectad distribution: 5 all dates and none post 1902; **Vice County distribution** 3 all dates and none post 1902.

Distribution: It seemed to be mainly restricted to the lower River Thames (vice counties of Surrey and Middlesex) with records from Richmond in the west to Laleham in the east. A record from Beckenham and Southend in south east London (vice county West Kent) may have been wind blown from the Thames but might have come from another river.

Habitat & ecology: This is a species usually associated with the lowest sections of large slow rivers according to Edington & Hildrew (1995). However, Wiggers *et al* (2006) & Higler (2008) describe the habitat in Holland as being rivers of various sizes, but preferring the warmer sections and being able to cope with slight organic pollution.

Management and conservation: Should this be re-discovered, then the larval micro-habitat needs conderation for conservation. It seems reasonable to speculate that pollution or other habitat degradation on the lower non-tidal Thames was responsible for its disappearance from that river.

Identification: Larvae – Edington & Hildrew (1995); adults, Barnard & Ross (2012)

Survey & Monitoring: The adult does not appear to be particularly distinctive within the genus, consequently it would only be seen by scrutiny of preserved adults, which is particularly tedious in this genus due to the large numbers of very common species that usually dominate The larva resembles *H. fulvipes* (*Curtis*). However that is a species of source streams and not to be expected from a lowland river; the 'lyre' mark on the frontoclypeal apotome of *H. fulvipes* and presumably therefore also of *H. exocellata* can be picked out easily. This species would be recognised by the Environment Agency in their programme to identify *Hydropsyche* to species if they come from certain large rivers in the south east of England.

Selected published sources of distributional information: Mclachlan (1864, 1865, 1874-1884)

HYDROPTILA CORNUTA

VULNERABLE Criterion D2 Order TRICHOPTERA

Family HYDROPTILIDAE

Hydroptila cornuta Mosely, 1922

Status: There have been no records since 1938. Before that date there were records from only 8 hectads. 'Micro' caddis of the family Hydroptilidae are generally under-recorded and data deficient compared with other caddis. However records from the continent suggest this can be a very common caddis, sometimes being the dominant hydroptilid. Two of its British sites,

the rivers Test and Thames, have been surveyed for caddis comparatively recently, but only that on the Test has concerned itself with hydroptilid adults. There have been no specific surveys for this species. The lack of records for over 70 years suggests that this species is extinct. However, the under-recording of this species, being widespread in Ireland and its abundance on the continent, and lack of species specific surveys suggest that classing it as extinct may be premature. However, given that searches in at least one of its previous 8 sites failed to record the species, it may be assumed, at best, to occur in 7 sites and possibly / probably declining. Given that, it is tentatively listed as VU D2 with the proviso that further searches are required to establish if it indeed still occurs in Britain.

This species was awarded Local status by Wallace (1991) and not listed by Shirt (1987).

Hectad distribution: 8 all dates, 0 post 1980; **Vice County distribution** 6 all dates and 0 post 1980.

Distribution: Predominantly a species of southern and eastern England and an outlier from Shetland. Most records are from southern England but none later than 1938.

Foreign distribution: In Europe there are many records from Sweden and Finland (GBIF website) but it is regarded as Near Threatened in Norway, Kjaestadt *et al* (2010). At one Portugese river site it was the commonest caddis and taken in large numbers (Terra & Gonzalez (1984), and there are records across the continent. In Ireland there are several modern records from around the country, from rivers and lakes, and it is only regarded as uncommon (information from J.P. O'Connor).

Habitat & ecology: Probably mainly a riverine species. In Poland, Czachorowski (1998) describes it as a species of streams and rivers, but also the *Lobelia* zone of lakes. Bagge (1987, 1995) records larvae from a lake, but particularly also its exit stream. A large number of adults were light-trapped at a river in Portugal (Terra & Gonzalez, 1984).

Management and Conservation: No specific measures are considered.

Identification: Larva undescribed; Adults Barnard & Ross (2012) and Marshall (1978a). Czachorowski (1998) described the larva as living in a sand grain case typical for the genus.

Survey & Monitoring: The larva is un-described. The adult records are from June to August in Britain but from mid May to early September in Ireland, where it seems to be one of hydroptilids with two generations a year as there are no July records (information from J.P. O'Connor).

Selected source of published distributional information: Marshall (1978b), Mosely (1922)

HYDROPTILA LOTENSIS

NEAR THREATENED Criteria B2a; D2

Order TRICHOPTERA

Family HYDROPTILIDAE

Hydroptila lotensis Mosely, 1930

Status: This species was first recorded in 1959 and has subsequently been found only in the middle sections of the River Wye and River Severn. In addition, a group of adults may have come from the Lugg near its junction with the Wye. The AoO will be less than 2,000 km^2 so qualifying under criterion B2a. It qualifies for the status of Near Threatened on the basis of being present in only a few sections of river which makes them susceptible to stochastic extinction rates but not showing a measurable decline.

Wallace (1991) awarded this species RDB2 status and Shirt (1987) awarded it vulnerable status and a data sheet was provided.

Hectad distribution: 5 all dates, 1 pre 1980, 4 post 1980 ; **Vice County Distribution** 4 all dates and 2 post 1980.

Distribution: This species is found in the River Severn, the River Wye and probably its tributary the River Lugg. The vice counties involved are West Gloucestershire, Herefordshire, and Shropshire, in England and Monmouthshire in Wales.

Habitat and ecology: It appears to live in large slow rivers, but more detailed discussion awaits the ability to identify the larva.

Threats: Lack of knowledge of the larval micro-habitat makes it difficult to make any useful comment.

Management and conservation: Until there is information about the larval biology it is not possible to complete this section. The River Wye has SAC protection and the River Lugg, and the River Severn where the species has been recorded, have SSSI status.

Identification: Larva not adequately described to enable identification, see Wallace *et al* (2003); adults Barnard & Ross (2012).

Survey & Monitoring: This species appears to be common where it is found, and it seems feasible to collect larvae and find the micro-habitat, which would inform management. The adults light-trap freely but cannot be separated from related species in the field.

Selected sources of distributional information: Cooter (1987), Marshall (1978b), Miles (1984), Kimmins (1961)

HYDROPTILA PULCHRICORNIS

DATA DEFICIENT

Order TRICHOPTERA

Family HYDROPTILIDAE

Hydroptila pulchriconis Pictet, 1834

Status: This is a micro caddis with a larva that cannot be identified. It does not appear to be recorded in large numbers. These factors mean it will be signifiantly under-recorded. It has apparently declined from 28 hectads pre 1980 to 5 post 1980 and only 3 are post 2000. There has been no focussed survey for this species. It may be significantly declining but until an effort has been made to re-find it, it is not possible to decide if it deserves an IUCN grade.

It was not mentioned in Shirt, and (Wallace (1991) described this species as Local & Regionally Notable.

Hectad distribution: 32 all dates, 28 pre 1980, 5 post 1980; **Vice County Distribution** 29 all dates and 4 post 1980.

Distribution: This seems to be a species of large lakes and large rivers. It remains widely distributed with post 1980 records from Tregaron Bog (Cardiganshire), the River Tummel in Perthshire, Blenheim Palace Lake (Oxfordshire), Whillen Lake (Buckinghamshire) and Cascade Lake (Staffordshire).

Habitat and ecology: More detailed discussion awaits the ability to identify the larva.

Threats: Lack of knowledge of the larval micro-habitat makes it difficult to make any useful comment.

Management and conservation: Until there is information about the larval biology it is not possible to complete this section.

Identification: Larva not adequately described to enable identification, see Wallace *et al* (2003); adults Barnard & Ross (2012).

Survey & Monitoring: Detecting the adults amongst light-trap captures is probably the best way of identifying sites to survey in more detail. A priority for this species would seem to be to survey known sites for adults. Records are from early June to late August making it impossible to decide if it has two generations a year in Great Britain, as is known for other hydroptilids.

Selected sources of distributional information: Crichton (1960, 1965), Kimmins (1943), Marshall (1978a), Morton (1899), Parfitt (1860), Winter (1860)

HYDROPTILA TIGURINA

DATA DEFICIENT

Order TRICHOPTERA

Family HYDROPTILIDAE

Hydroptila tigurina Ris, 1894

Status: Most 'Micro' caddis of the family Hydroptilidae are generally under-recorded and data deficient compared with other caddis. A specific entry has been provided for this species as it is one of the rarer in the family and may have a very small area of occupancy. Its current sites deserve protection. However, it may be more widespread in Scotland and just be particularly difficult to record so Data Deficient seems the appropriate status.

Wallace (1991) awarded this species RDBK status and it was listed as an "Appendix no post 1900 records" rarity in Shirt (1987).

Hectad distribution: 2 all dates, 1 post 1980 and 1 pre 1980; **Vice County distribution** 2 all dates and 1 post 1980.

Distribution: In England there is only one record, that being Ambleside (Westmorland) recorded by J.J.F.X. King in August 1881. He took several specimens as there are 8 in is collection at Glasgow and he distributed others. Unfortunately neither the specimens nor his notebooks provide any further locality detail. However it was most probably the River Brathay. That remained the only UK record until 2008 when David Pryce collected adults from the River Inver below Loch Assynt and in 2010 from the River Inver, Little Assynt and Loch na h-Insse Fraoich (West Sutherland).

Habitat and ecology: Medium-sized fast stony rivers seem to be the habitat.

Threats: No specific threats can be identified, apart from pollution incidents.

Conservation and management: Not enough is known about this species to enable an account to written. The River Brathay, the probable site of King's record, does not currently have any statutory nature conservation protection. The Little Assynt area lochs are designated as SSSIs.

Identification: Larva un-described; adult Barnard & Ross (2012). The Irish pupae had made cases of algal filaments, but it is probably not the only species of the genus to do so and may not always do so. Wallace *et al* (2003) note cases like this have been found occasionally elsewhere in the UK from sites which geographically and ecologically seem unsuitable for *H. tigurina.* Moretti *et al* (1992) noted a population of a foreign species of *Hydroptila* changed its case-making from sand grains to algal filaments according to availability.

Survey & Monitoring: The species may be particularly difficult to collect. Dowling *et al* (1981) record six pupae being collected from a river in Ireland and Dr. O'Connor tells me he

recalls they were from a deep fast section but that he has never found the adult. It was not encountered by D.E. Kimmins during his extensive collecting in the Lake District in 1941 and 1942. Not enough is known about this species to enable an account to written. However, paying particular attention to hydroptilids taken from the deeper parts of such rivers may prove successful.

Selected sources of published distributional information: King (1895)

IRONOQUIA DUBIA

CRITICALLY ENDANGERED Criteria B2a; B2b (ii, iv)

Order TRICHOPTERA

Family LIMNEPHILIDAE

Ironoquia dubia (Stephens, 1837)

Status: This is a rare species with only three modern sites and from which it has not been collected in the past few years despite intensive surveying. It has also not been found in a recent survey at its 1906 Suffolk site. The reasons for the decline are not known. It may be extinct but qualifies as Critically Endangered on the basis of at most one current site and a recent decline in number of the sites and thus of the area it occupies (B2b(ii, iv)). The AoO in 1967 was 3 km^2 which had declined by 1991 to 2km^2 and by 1994 to 1 km^2.

Wallace (1991) awarded this RDB 2 status and Shirt (1987) gave it vulnerable status. It is a UK BAP species.

Hectad distribution: 4 all dates, 4 pre 1980, 2 post 1980; **Vice County distribution** 5 all dates, 1 post 1980.

Distribution: A comprehensive review of the distribution of this species was made by Graham Vick in 1992. All sites are in England. It was recorded from the Honey Brook in the Pamber Forest (North Hampshire) in 1969 and the Lockram Brook at Millbarn (Berkshire), where the latest record was 1991. Most records come from Windsor Forest (Berkshire) with Graham Vick finding collecting several adults from the Badger's Brook in 1994; a visit by Ian Wallace and Graham Vick to both the Millbarn Pond and Windsor Forest sites in early spring 2010 failed to find any larvae of this species.

C. Morley took an adult at light at Monk Soham (East Suffolk), in September 1906; as the adult is recorded as travelling very little from its breeding sites it is probable that it was breeding nearby. Adrian Chalkley investigated the area around Monk Soham recently, but failed to find the species.

The only other record, and only possibly of this species, is from Exeter (South Devon) by E. Parfitt in 1858. However, that record is not mentioned by McLachlan in his publications up to 1874-1884 so is highly suspect.

Habitat and ecology: The sites are small streams that dry up or considerably diminish during the summer. In North America, *Ironoquia* species leave the water and diapause in a cell in the bank until metamorphosing in the autumn and emerging as adults; it is presumed that *I. dubia* does this also. The fact that all four of Peter Hiley's larvae failed to metamorphose and died as larvae when being reared in laboratory containers that were very successful when used with other limnephilids could support the idea that they needed to leave the water. Observations on the continent of it disappearing from larval samples over summer also provide support for this hypothesis Wallace (2011d) which publication is also a dossier on the species.

This is a difficult species to locate and Crichton and Baker (1959) cite observations from Sweden that suggest adults never leave the stream course, so that Crichton's single adult at the Millbarn Pond light trap and Morley's similar record can be considered fortuitously captured vagrants; the former from the Lockram Brook.

Threats: Changes to woodland cover and stream drainage works would seem to be the main threats. Graham Vick mentioned a major summer flood that had rushed along the Badger Brook site a year or so before he and the present author had unsuccessfuly sought the spccies there.That might have damaged the population sufficiently by washing out the diapausing larvae from their bankside debris retreats, leading to its extinction.

Management and conservation: Finding new sites would appear to be a priority. The aim, once located, should be to ensure their water regime and woodland cover remains unaltered as far as possible. Ditching work either in their streams or associated feeders could be a problem. Pamber Forest and Windsor Forest have SSSI designation, and in the case of Windsor it is also SAC. Millbarn Pond and its exit stream have no designation and nor have any sites around Monk Soham.

Identification: larvae – Wallace *et al* (2003) and Wallace (2006); adults Barnard & Ross (2012).

Survey & Monitoring: The Malaise trap method is successful but has the potential to devastate a population if it occupies all the width of a small stream. It is suggested that care is taken not to leave a trap un-checked for many days and to attempt live capture once a site is located, if numbers are to be counted. The adult is not distinctively marked but should be recognisable from other species likely to be encountered at the same time by its plain wings and their very rounded appearance. It is said to be most similar to the rare *Anabolia brevipennis* (Curtis), but without bristly wings. That species is also unlikely to be found with it and seems equally lothe to stray far from its breeding site. The larvae should be easy to recognise in the field due to the case shape and the numerous filaments on the gills.

Selected published sources of distributional and ecological information: Brindle (1964), Crichton (1960), Crichton & Baker (1959), Donisthorpe (1932), Hiley (1970), Morton (1908), Parfitt (1858),Vick (1992), Wallace (2011d)

ITHYTRICHIA CLAVATA

DATA DEFICIENT

Order TRICHOPTERA

Family HYDROPTILIDAE

Ithytrichia clavata Morton, 1905

Status: It is a 'micro' caddis that cannot be separated as a larva, or in the field as an adult, from its common relative *Ithytrichia lamellaris* Eaton. In common with many hydroptilids this will be data deficient. Records from other countries suggest this is not frequently encountered and often taken, when it is, at light. There have been no focussed surveys at any of its three well-localised sites. Until that is done, or other sites appear, it seems difficult to suggest an appropriate IUCN grading. Nevertheless it seems likely it will remain a Nationally Rare species and probably justify a threat grading. If present at its three sites the AoO will be less than $10km^2$.

Hectad distribution: 4 all dates but none post 1980

Vice County distribution: 3 all dates but none post 1980

Distribution: There is a circa 1900 specimen from Hampshire. D.E. Kimmins found it at two Westmorland sites the River Leven at Blackbarrow in 1941 and the River Brathay at Skelwith in 1943 and the species was added to the British list from specimens collected at Llanbedr (Merionethshire) by the Grensteds in 1939. (Wallace, 1991, mentions a record from south-west Scotland. On re-examination of the specimen, an adult in poor condition, he wishes to withdraw the record).

Foreign distribution: This species is widespread in North America, and whilst mainly riverine, Wiggins (1996), also occurs in lakes, Houghton (2012). In Europe there are records from rivers in Finland, Norway and Sweden and also Spain and Portugal. There are still only two Irish records, both from rivers in the south-west (Information from J.P.O'Connor).

Habitat and ecology: This seems to be a species of fast stony rivers. On three of the sites the rivers flow from a lake, but often some distance below. More detailed comments await recognition of the larva. The larvae in this genus graze diatoms from rocks and there is apparently only one generation a year.

Threats: Lack of knowledge of larval micro-habitats makes it difficult to comment but pollution incidents or significant flow changes seem the most obvious threats.

Management and conservation: Until there is information about the larval biology it is not possible to complete this section. None of the sites appear to have any statutory nature conservation designation.

Identification: Larvae probably of this species have been described from North America (see Wallace *et al*, 2003). but this author is unaware of any attempts being made to compare larvae of *I lamellaris* Eaton with these descriptions to try and devise a key to separate the two British species; possible differences in colour of thoracic nota would need careful scrutiny. Adult - see Barnard & Ross (2012).

Survey & Monitoring: Larval and pupal cases of *Ithytrichia* may be common as aggregations attached to larger stones, but are often quite difficult to find. If collected in June, before the flight period, adults could be reared out then identified. The adults will probably not be recognisable, even at a generic level, in the field, but more detailed examination is required. Andersen & Kjaerandersen (2002) report that both species of *Ithytrichia* can be found together. July and August are the months to search for adults and light-trapping at its known sites is suggested as worthwhile.

Selected published sources of information: Grensted (1939b), Kimmins (1943, 1944), Marshall (1978a, b)

LEPTOCERUS INTERRUPTUS

VULNERABLE; D2

Order TRICHOPTERA

Family LEPTOCERIDAE

Leptocerus interruptus (Fab.,1775)

Status: There are modern records from only five river systems restricted to two areas of the country. The sites are surveyed by the Environment Agency and Natural Resources Wales but this species has not been recorded post 2000. This could relate to survey methodology, but could be due to population reductions. The small number of sites and a possible disappearance from some suggests a status of Vulnerable (D2). The limits of distribution on the four rivers are not known so an AoO is difficult to determine but is less than 2,000km^2.

Shirt (1987) and Wallace (1991) awarded this species Rare and RDB3 status.

Hectad distribution: 9 all dates, 5 pre 1980, 4 post 1980; **Vice County distribution** 8 all dates and 3 post 1980.

Distribution: This is a species from a few sites in south-west England, the west midlands, and south east Wales. There is just a general reference to it as a Cornish species in the Victoria County History of 1906 and the records for Taunton (South Somerset) are mid 19th

century. There are post 1980 records for two rivers in South Devon – the Axe and Otter, and in the Welsh Marches there are records for the Wye at Symonds Yat (on the border of Gloucestershire, Herefordshire and Monmouthshire) also its tributary, the lower Monnow. It was also taken from the lower Usk in 1983 (also in Monmouthshire). There is a modern larval record from the River Cerne in Dorset. In Worcestershire there are 19th century records for the Severn at Worcester and its nearby tributary the Teme.

Habitat and ecology: The larva lives amongst roots of marginal vegetation, mainly tree roots, in medium to large, moderately flowing rivers. As with some other leptoceids, populations could be quite large.

Threats: Removal of bankside trees would seem to pose a specific threat to this species.

Conservation and management: It is necessary to maintain healthy marginal trees and their submerged roots. Otherwise, no particular measures are suggested. The Rives Axe and Wye have SSSI and SAC protection but other modern sites appear not to have any statutory notification, however being large rivers they will be scrutinised by the Environment Agency and local angling groups.

Identification: larvae – Wallace *et al* (2003) and Wallace (2006); adults Barnard & Ross (2012)

Survey & Monitoring: The adult is distinctively marked and while the wing pattern resembles that of *Athripsodes bilineatus* (L.) and the var *interjectus* (McLachlan) form of *A. albifrons* (L.). The *Athripsodes* species have quite broad ends to the wings without strongly tapering tips, contrasting with the very pointed wings of the much smaller *L. interruptus*. The second half of July would be the best time to search for the adults which can be beaten, but also presumably form swarms at some time of the day. A very good time to record the species would be as larval and pupal cases attached to submerged tree roots and other vegetation. With care, the tree roots can be lifted from the water, laid in a sorting tray then returned un-damaged, which is important for attached pupae; detached larvae can be released into the submerged root masses. *L. lusitanicus* (McLachlan) is the only larva with which it could be confused and they were found together by C. Denis in Brittany. The best time to survey would be in June.

Selected published sources of distributional information: Fletcher (1877), McLachlan (1862, 1874-1884, 1902), Victoria County History Cornwall (1906)

LIMNEPHILUS PATI

PRESUMED EXTINCT Criteria B2a; B2b(ii, iii)

Presumed Extinct inGreat Britain (but may persist in the Isle of Man)

Order TRICHOPTERA

Family LIMNEPHILIDAE

Limnephilus pati O'Connor, 1980

Status: There have been no post 1900 recordsso it ispresumed to be extinct. (It may persist in the Isle of Man, where it was last seen in 1987).

This was awarded RDB1 status in Wallace (1991) and listed as Endangered in Shirt (1987).

Hectad distribution: 2 all dates, 2pre 1980, 0post 1980; **Vice CountyDistribution** 3all dates and 0 post 1980.

Distribution: The species was described and added to the British list by O'Connor (1980) who summarised all the known records; specimens in museum collections that have not been re-identified tend to be residing under the names *L. hirsutus* (Pictet) or *L. centralis* Curtis.

A centre of distribution was East Anglia, with 19th century records from Redgrave Fen (East Norfolk) and Chippenham Fen (Cambridgeshire). However, most specimens come from the Ballaugh Curraghs on the Isle of Man, with the latest date being 1987.

Habitat and ecology: A fen species but the micro-habitat is not known. As the species has been comparatively recently recognised there are few records from any country. O'Connor & Bond (1981) described the general habitat of the Cabragh Wetlands in Co. Tipperary from where two males and two females were captured in 1994. Alkaline lakes and fens and spring streams feeding them may be significant. The Cabragh site resembled one in Germany (the Mindelsee) where three males had been netted flying by Tobias in 1981 (O'Connor & Bond, *op cit*). Redgrave and Chippenham Fens are both fed by calcareous ground-water. The Isle of Man site is not calcareous, but possibly due to lack of competition, some species on that island have moved out of their expected ecological range. It is very interesting and may be significant that *L, tauricus* Schmid, has also Chippenham Fen and Redgrave Fen as sites. Ian Wallace (1991) speculated, without any justification, that this might have been an acid peat species lost early from the fens when the top peat was cut; he now wishes to withdraw that suggestion. The adult records suggest that this species does not have an adult diapause. However, that does not mean it is necessarily restricted to permanent water at its sites. It could persist as an egg mass, or hatch early and persist over the summer as a first instar larva buried in damp peat; *L. luridus* Curtis adopts both approaches.

Threats: Lack of detailed knowledge of the larval site makes it impossible to make any meaningful comment here. (It does seem to have been much commoner in the past at its Isle

of Man site, The Ballaugh Curraghs. Theirdrying out and scrubbing over may be an issue. Photographs and descriptions of the Curraghs in earlier times, e.g. Blacklock & Carter (1921) indicate a site that was much larger and was much less wooded and wetter. An area of the Ballaugh Curraghs was also lost when the Wildife Park zoo was created in 1963, but the Isle of Man government acquired the remaining Curraghs as a reserve. Ken Bond told Ian Wallace that the Curraghs were continuing to scrub over. However it was designated an internationally important wetland site principally for its ornithological interest, and without knowledge of the habitat requirements of *L.pati* it is not known if current conservation work which involves scrub clearance in places will be of benefit for this species.)

Conservation and management: The lack of knowledge of the larval biology makes it impossible to make any comments. Sites where this species occurred, or which are worth searching, have high conservation status. (There are efforts to increase the amount of surface water in the Curraghs. The Ballaugh Curraghs are an internationally important wetland site (RAMSAR) and have Manx Government protection.)

Identification: larvae – The larva is not known; adults Barnard & Ross (2012).

Survey & Monitoring: Use of light-traps appears to be the best hope of recording the species; it is unfortunate that at present the adult does not seem to be distinctive, necessitating the collection of large numbers of similar species, e.g. *L. hirsutus* which is also found as a larva in streams that flow into fens and swamps, (and has several Curragh records.) The flight times stretch from the end of June to the end of July with a peak at the start of July.

Selected published sources of distributional information: O'Connor (1980), O'Connor & Barnard (1981), O'Connor & Bond (1995)

LIMNEPHILUS SUBCENTRALIS

NEAR THREATENED Criteria B2a; B2b (ii, iv)

Order TRICHOPTERA

Family LIMNEPHILIDAE

Limnephilus subcentralis (Brauer, 1857)

Status: There are few modern records for this species which seemed to be reasonably common in some areas in the past. It is a comparatively conspicuous species that comes to light so there should be more records if it was widespread, locally common, and only poorly recorded due to being restricted to Highland Scotland species where there is comparatively less recording. Consequently a status of Near Threatened is suggested as there are only 6 post 1980 sites. Present known AoO is 5 km^2.

Wallace (1991) awarded it notable status, but it was not mentioned in Shirt (1987).

Hectad distribution: 16 all dates, 12 pre 1980, 6 post 1980, (4 post 1989); **Vice County distribution** 8 all dates and 4 post 1980.

Distribution: The records for this species are restricted to Highland Scotland but in the lower altitude parts, with records from Stirlingshire, Perthshire, Argyll, Aberdeenshire, Moray, Invernesshire and Kintyre.

Habitat and ecology: The larval habitat seems to be vegetated lochs and ponds. *L. subcentralis* may have an adult diapause as it is recorded in early June but the main flight period seems to be late July and August.

Threats: It is difficult to envisage specific threats as the sites are usually un-developed but damage to marginal marshes should be avoided.

Conservation and management: Development of sites for fisheries would be a problem but there are usually good controls exercised on such activities. The ban on certain sheep-dip products (Shardlow, 2006) is to be welcomed as removing another possible threat. Otherwise it is difficult to envisage major threats to its habitats. Some sites have statutory conservation protection.

Identification: larvae – Wallace *et al* (2003); adults Barnard & Ross (2012).

Survey & Monitoring: The larvae are not particularly easy to find and it can be difficult to wade out to the edge of marginal swamps to reach areas that can be sampled. Nevertheless they were taken from three sites by surveyors from Pond Conservaton (now entitled the Freshwater Habitats Trust). There may be considerable numbers of similar-looking limnephilid larvae present (*L. borealis* (Zetterstedt), *L. lunatus* Curtis, and *L. nigriceps* (Zetterstedt)), but interestingly only *L. borealis* was found at the same time by the Pond Conservation surveyors and then only at one of the sites. The adult bears a close resemblance to some specimens of the abundant *L. lunatus*. *L. subcentralis* always has ginger-coloured wings that lack any dark brown colouration bordering the lunar mark. Only a minority of *L. lunatus* have gingery wings and have the lunar marking bordered by dark brown or black. *L. borealis*, which is another *lunatus* 'look-alike' and one which has been recorded from the same sites as *L. subcentralis*, always has dark brown wing markings. It is suggested that a way of finding new locations is to examine all ginger "lunatus" from likely sites. With a hand-lens the genitalia of all three, particularly the females, are clearly different allowing insects to be released if that is desired; the adults can be initially anaesthetised with carbon dioxide or be restrained by holding them by the closed wings, when they usually arch their abdomen allowing comparatively easy examination of the genitalia. Late July and August would seem the best time to search for the adult.

Selected published sources of distributional information: King (1881, 1886, 1912), Morton (1923)

LIMNEPHILUS TAURICUS

VULNERABLE Criteria D2

Order TRICHOPTERA

Family LIMNEPHILIDAE

Limnephilus tauricus Schmid, 1964

Status: There are only three modern records,one from 1969 the other two post 1980. These are geographically isolated and small in size qualifying the species as Vulnerable under criterion D2. A specific decline in modern times cannot be determined as other sites that have been re-surveyed in the hope of re-finding this (and *Limnephilus pati*) are historic with the youngest being 99 years ago. At Cors Erddreiniog (Anglesey), it has only been recorded from one small area of this large site. The current AoO is about 3 km^2.

Wallace (1991) awarded this RDB1 status and it was classed as Vulnerable (RDB2) in Shirt (1987).

Hectad distribution: 5 all dates, 3 pre 1980, 2 post 1980, (2 post 1989); **Vice County distribution** 6 all dates and 2 post 1980.

Distribution: The species was added to the British list by O'Connor & Barnard (1981) who summarised all the known records; specimens in museum collections that have not been re-identified tend to be residing under the names *L. hirsutus* (Pictet) or *L. centralis* Curtis. In England, there are records of single specimens from a fen at Leckford (North Hampshire) in 2003 and a 1969 record from Woohampton Reed Bed (Berkshire). The historic 19^{th} century records are from, Redgrave Fen (East Norfolk, East Suffolk) and from Chippenham Fen (Cambridgeshire). In Wales it was recorded from one small area of Cors Erddreiniog (Anglesey) in 2006 and 2007. (Wallace, 2009b).

Habitat and ecology: It is clearly a species of fens, but the larval habitat is not yet clear. Peter Hiley took it from a small ditch but it could have washed from elsewhere on the site. However, he did not find any more despite later searches and B & I.D. Wallace were equally unsuccessful there in 1984. The Cors Erdreinniog site is a flowing permanent water area within the general fen. Despite several searches in late 2006 and early 2007, larvae have not been found. (It is of considerable interest that *L. pati* O'Connor, another very rare fen species has been found at Chippenham and Redgrave Fens and also at their Irish site, the Cabragh Wetlands, Tipperary (O'Connor & Bond, 1995).) The species probably has an adult diapause as the females captured in early August 2007 at Cors Erddreiniog were not ready to lay until early September.

Threats: Lack of detailed knowledge of the larval micro-habitat makes it difficult to be specific. Changes to water-level regimes are likely to prove most significant.

Conservation and management: Until there is more detailed knowledge of the larval requirements it would seem desirable to try and maintain existing sites as they are. Cors Erddreiniog is a NNR and the River Test, its marshes and the Woolhampton Reed-beds, have SSSI protection. The East Anglian 19th century sites are NNR.

Identification: The larva is not adequately described by Wallace *et al* (2003) to enable certain identification. Wallace (2009b) provides notes that will be incorporated into a list of updates to Wallace *et al* 2003 in due course. The adult can be identified using Barnard & Ross (2012).

Survey & Monitoring: The adult is one of the small uniformly marked "gingery" *Limnephilus* group but with work it is expected to be recognisable in the field from species such as *Limnephilus centralis* but separation from *L. hirsutus* is expected to always be difficult. Light-trapping is likely to be a good method of recording it from suitable sites. The flight times stretch from the start of July to the middle of August.

Selected published sources of distributional information: O'Connor & Barnard (1981), O'Connor & Bond (1995)

MESOPHYLAX IMPUNCTATUS

NEAR THREATENED Criteria B2b(ii, iv)

Order TRICHOPTERA

Family LIMNEPHILIDAE

Mesophylax impunctatus McLachlan, 1884

Discussion on nomenclature: *M. impunctatus* was considered to exist as two subspecies in the British Isles *impunctatus impunctatus* McLachlan, 1884 which occurred over most of the country and *impunctatus zetlandi*cus McLachlan, 1884, a small form that occurred in Shetland. The restricted range of *zetlandicus* would have automatically suggested a significant conservation grading – providing the sub-specific validity was recognised. However, Fauna Europaea (2005), reflecting the views of Peter Barnard and Hans Malicky, indicates that all *impunctatus* in the British Isles should be assigned to sub-species *zetlandicus*, and that furthermore it is endemic, with *impunctatus impunctatus* being the form in the rest of Europe, where it is widespread.

Status: As a northern species it is likely to be under-recorded. There is a scatter of 12 modern records across Scotland and it still occurs at Malham (Mid-west Yorkshire). Nevertheless it seems to be disappearing from the Lake District, with only three modern records, two from Derwentwater (Cumberland). This is an endemic form whose apparent decline should be particularly watched. It comes close to qualifying to B2a(iv) and is in decline. Consequently a status of Near Threatened is proposed.

Wallace (1991) awarded this Common and Regionally Notable Status. It was not mentioned in Shirt (1987).

Hectad distribution: 23 all dates, 17 pre 1980, 11 post 1980, (6 post 1989); **Vice County distributon** 14 all dates and 8 post 1980.

Distribution: A lake species which disperses as an adult and light–traps away from its breeding sites. It is a northern species with no Welsh records and post 2000 English records restricted to MalhamTarn (Mid-west Yorkshire). All but one English Lake District record are from Westmorland (VC 69). It seems to have declined there considerably and the latest record is 1994. The modern Scottish records come from eleven vice counties that include Orkney and Shetland.

Habitat and ecology: This author found larvae particularly associated with the *Littorella* sward of lakes; it is not known if they could also utilise *Isoetes.* Holmes (1965) apparently knew the larva, even though it had not by then been keyed out. He recorded it from under stones generally in the stony littoral at Malham Tarn and Sharon Flint has recently taken it away from *Littorella*, which is now very scarce at Malham. J.J.F.X. King indicates that on Shetland adults could be swept commonly along the Crussafield Burn at Unst which could suggest this was a stream species there, but it is also possible they were just sheltering. The adult records are for late May and June and again from late August to October. This strongly suggests an adult diapause and that is supported by dates of capture of larvae, and finding only empty pupal cases during summer.

Conservation and management: No specific recommendations are made. The aim would be to maintain the water level regime unaltered as the larval habitat seems to be in the shallows. Some sites have nature conservation designation.

Threats: It is difficult to envisage specific threats to the species, other than major changes to water levels, e.g. conversion of sites to reservoirs, which would adversely affect the *Littorella* sward. It is possible it is a northern species under pressure.

Identification: Larvae Wallace *et al* 2003; adults Barnard & Ross (2012).

Survey & Monitoring: One easy way to record the species in the past was to look under stones that occur within the *Littorella* sward. However, this must be done cautiously as the habitat can be damaged. As on the seashore and in rivers, make sure the stone is replaced but note that even then disturbance will have occurred. It is recommended that only a proportion of stones are over-turned. Light-trapping the adults is also a good way of recording this species but the breeding site is not then known and several records come from sites not by lakes. Unfortunately, the adult has similar wing-markings to several other caddis, such as *Micropterna* species; these large caddis can be picked out of a net or light-trap ‘egg–box’ with finger and thumb, when they will usually arch the abdomen making the genitalia easy to observe - that of the female, with its keel being particularly distinctive. Late August and September seem to be the time when they are most susceptible to being light-trapped.

Selected published sources of distributional information: Andrew (1986), Crichton (1971), King (1883b, 1890, 1896), Morton (1904b 1923, 1931), Wormell (1963)

NEMOTAULIUS PUNCTATOLINEATUS

DATA DEFICIENT

Order TRICHOPTERA

Family LIMNEPHILIDAE

Nemotaulius punctatolinetaus (Retzius, 1783)

Status: There are only 9 small locations, restricted to Caithness, Sutherland and Speyside. The conspicuous adult light-traps, and the larva is large and distinctive. There can be reaonable confidence, despite it being a northern Scottish species, that it would have been recorded if it occurred commonly elsewhere. There is no evidence of a decline. The current AoO is small, estimated at less than 10km2 but its exact occurrence within the Flow Country is not known due to lack of recent active recording and it may be far commoner than the records suggest. There is a strong need for further survey of the Flow Country and until there is a better idea as to its real AoO then Data Deficient seems an appropriate status.

Wallace (1991) awarded this species RDB2 status and it was described as, rare but only recently recorded, in Shirt (1987).

Hectad distribution: 8 all dates, 1 pre 1980, 7 post 1980, (6 post 1989); **Vice County distribution** 4 all dates and 4 post 1980.

Distribution: This fine insect is only known from four northern mainland Scottish vice counties of East Invernesshire, East and West Sutherland and Caithness.

(Another published record of egg masses from Millbarn Pond in Berkshire by Middleton (1977), was successfully proved by Ian Crichton (1987) to have been *Glyphotaelius pellucidus* (Retzius) and was based on the mistaken belief that *Nemotaulius* was the only limnephilid to lay eggs above water; Gullefors (1994) correctly described the eggs and egg-laying.)

Habitat and ecology: The larva feeds on macrophytes such as broad leaved *Potamogeton* species, from which it also makes it case. In captivity a larva sealed up its case and fixed it to somewhere firm when it had finished feeding in the autumn. This could explain why Peter Hiley was unable to find any at the Aviemore site in a spring sampling session. The adult, which in captivity, emerged in spring, also entered a diapause. These observations would suggest the active time for this species is quite short, relying on feeding up from July to mid winter. However, in a letter, Ian Crichton says that Gullefors found that in the wild, larvae feed up by the end of winter but do not emerge until between July and September. Gullefors

gave Crichton some eggs which he reared on and had most adults emerging between January and March, but that some were still larvae at the end of that time.

Threats: Loss of habitat by drainage and forestry seem to be the main threats.

Conservation and management: The integrity of the flow country's mix of small Dubh Lochans within peat bog must be maintained, as must the small ponds in Speyside. The sites fall within SSSIs.

Identification: Larvae Wallace *et al* (2003) and Wallace (2006); adult Barnard & Ross (2012).

Survey & Monitoring: The larva can be identified in the field and returned. Sampling the sites can be difficult. The adult will be recognised in light trap captures but it is not known how far from its site it will fly. The short period of active feeding means that Autumn is the best season for larval surveys.

Selected published sources of distributional information: Pelham-Clinton (1966a), Spirit (1986), Spirit & Ryrie (1991)

ORTHOTRICHIA ANGUSTELLA

DATA DEFICIENT

Order TRICHOPTERA

Family HYDROPTILIDAE

Orthotrichia angustella (McLachlan, 1865)

Status: This is one of the rarer 'micro'caddis with a larva that cannot be identified so would be expected to be under-recorded. There are only two modern records for this species suggesting that there may have been a serious decline as it is recorded from 22 hectads before the cut-off date. It is also a species that may be found in large numbers so would be expected to have been found more frequently. There has been no focused recording work on this species and no survey work has been done in the areas where it may be abundant. This, coupled with the fact that there are few experts who work this group, makes drawing conclusions from the two recent records very difficult. The absence of any focussed surveys, and lack of knowledge of the best way of undertaking them to find it suggests a status of Data Deficient is apppopriate.

This species was awarded Local status by Wallace (1991) and not listed by Shirt (1987).

Hectad distribution: 24 all dates, 22 pre 1980, 2 post 1980, (2 post 1989); **Vice county distribution** 15 all dates and 2 post 1980.

Distribution: A species of large rivers and lakes. Most sites are English. The most recent sites are Caldecotte Lake (Buckinghamshire), Fradly Junction Pond (Staffordshire), and (1972) the River Thames at Dorchester (Berkshire/Oxfordshire).

Habitat and ecology: The habitat distinction between this species and the commoner *O. costalis* (Curtis) is not known. O'Connor & Wise (1984) record taking large numbers of this species (also recording *O. costalis).*

Threats: No specific threats are known.

Conservation management: No specific recommendations are made.

Identification: Llarva not adequately described to enable identification, see Wallace *et al* (2003); adults Barnard & Ross (1912).

Survey & Monitoring: The only feasible way at present is to collect adults by various methods and July is probably the most productive month. Pupae can also be reared. Large numbers of its commoner relative will probably be obtained but once a site has been discovered it should be possible to monitor populations.

Selected sources of published distributional information: Haines (1922), Kimmins (1943), King (1883a, c), Marshall (1978a), Routledge (1933), Scott (1924)

ORTHOTRICHIA TRAGETTI

DATA DEFICIENT

Order TRICHOPTERA

Family HYDROPTILIDAE

Orthotrichia tragetti Mosely, 1930

Status: No new information has appeared since the publication of Wallace (1991). This remains an enigmatic species recorded by a major expert on the family Hydroptilidae. The lack of recent records (Jane Marshall reported that she had unsuccessfully sought the species at its site in the 1970s) has led to speculation it might have been introduced as a passenger on water weed put into an artifial fishing lake but no reference that this happened at the site is known and the recorder makes no allusion to this in his monograph (Mosely, 1939). Data Deficient seems the obvious status to award.

Wallace (1991) listed the status as "? Extinct introduction"; it was not mentioned in Shirt (1987).

If this species is re-discovered it will probably justify a revised grading.

Distribution: Tragett's Lake, Awbridge Danes, Romsey (South Hampshire) – the type locality – 1915 and 1932.

Identification: Larva described but no identification key has been constructed to the genus see Wallace *et al* (2003) for details); adults - Barnard & Ross (2012).

Selected sources of published information: Mosely (1939)

OXYETHIRA DISTINCTELLA

DATA DEFICIENT

Order TRICHOPTERA

Family HYDROPTILIDAE

Oxyethira distinctella McLachlan, 1880

Status: No new information has appeared since the publication of Wallace (1991). This remains an enigmatic species recorded by a major expert on the family Hydroptilidae. The lack of recent records (Jane Marshall reported that she had unsuccessfully sought the species at its site in the 1970s) has led to speculation it might have been introduced as a passenger on water weed put into an artifial fishing lake but no reference that this happened at the site is known and the recorder makes no allusion to this in his monograph (Mosely, 193 Data Deficient seems the obvious status to award.

Wallace (1991) listed the status as "? Extinct introduction"; it was not mentioned in Shirt (1987).

Distribution: Tragett's Lake, Awbridge Danes, Romsey (South Hampshire), around 1915.

Identification: larva described but no identification key has been constructed to the genus see Wallace *et al* (2003) for details); adults - Barnard & Ross (2012).

Selected sources of distributional information: Mosely (1939)

OXYETHIRA SAGITTIFERA

DATA DEFICIENT

Order TRICHOPTERA

Family HYDROPTILIDAE

Oxyethira sagittifera Ris, 1897

Status: This species is recorded from 14 pre 1980 but only 5 post 1980 hectads with only two of them being post 2000. It is a predominantly a northern and western species. It has not been the subject of any focused recording effort where it might be supposed to be more common. This is compounded with it being a micro caddis with an unidentifiable larva, meaning it is only identifiable s an adult and thus for a limited active period in any given year. Therefore under-recording may be the cause of the apparent decline, but until better data is available, its status is uncertain. It has therefore been classed as Data Deficient.

Hectad distribution: 19 all dates, 13 pre 1980 and 5 post 1980; **Vice county distribution** 18 all dates 5 post 1980.

Distribution: This is widespread but there are very few records. The post 1980 records are Loch na h-Insse Fraoich (West Sutherland), Long Loch of the Dungeon (Dumfriesshire), Bryn Cader-faner (Merionethshire), Gors Lwyd (Cardiganshire/Montgomeryshire), Cors Bryn Mawr (Camarthenshire).

Habitat and ecology: This seems to be a flowing water species but the nature of that can vary from an upland trickle to a lowland river. In Holland it was also found in shallow acidic lakes Wiggers *et al* (2006). Most UK sites are upland and acidic and include bogs, probably their drainage streams, and larger streams.

Threats and Management and Conservation: Nothing is suggested as the larval requirements are not understood.

Identification: The larva has not been adequately described to enable identification, see Wallace et al (2003); adults - Barnard & Ross (2012)

Survey & Monitoring: The larva has been reared to the adult on several occasions suggesting it may be common where found, and that was mentioned by Kimmins (1943). Collecting adults or rearing immatures could be a possible way of monitoring known populations. Surveying past sites seems to be a priority for this species.

Selected published sources of distributional information: Elliott (1967a,b), Kimmins (1943), Marshall (1978a)

OXYETHIRA TRISTELLA

DATA DEFICIENT

Order TRICHOPTERA

Family HYDROPTILIDAE

Oxyethira tristella Klapalek, 1895

Status: There is only one modern record, - the first for 70 years. This is one of the 'micro' caddis and with a larva that cannot be identified so will be particularly under-recorded. There are only 10 earlier records. The modern 2010 record is from a remote part of Scotland where it may prove to be widespread as it is predomantly a northern species. A status of Data Deficient has been chosen.

Wallace (1991) awarded this RDBK status but it was not mentioned in Shirt (1987).

Hectad distribution: 12 all dates, 11 pre 1980, 1 post 1980, 1 post 1989; **Vice county distribution** 6 all dates and 1 post 1980.

Distribution: This is a widely distributed species but with very few records. There are records for the first half of the 20th century from Dorset and Oxfordshire in England and Caernarvonshire, in Wales. The Scottish records from East Invernesshire and Argyll are 19th century and the only modern record of any kind is by David Pryce from a site in Assynt, West Sutherland in 2010. In Europe it is predominantly a northern species with many Scandinavian records (GBIF.org).

Habitat and ecology: Not enough is known about this species to decide upon the preferred habitat, but it seems most likely to be flowing water.

Threats: Lack of detailed knowledge of the larval habitat makes it impossible to be specific about threats.

Conservation and management: Not enough is known about this species to enable an account to be written. The locations of most are too vague to see if any have statutory nature conservation protection, and the modern Little Assynt site is not within an existing SSSI .

Identification: larva not adequately described to enable identification, see Wallace *et al* (2003); adults - Barnard & Ross (2012).

Survey & Monitoring: Not enough is known about this species to enable an account to written.

Selected sources of published distributional information: Haines (1922), Morton (1899)

SETODES ARGENTIPUNCTELLUS

NEAR THREATENED Criteria B2a

Order TRICHOPTERA

Family LEPTOCERIDAE

Setodes argentipunctellus McLachlan, 1877

Status: This species is found at only 7 sites and thus seems vulnerable, despite currently being abundant in Windermere and Coniston in the Lake District. It is extremely local, being typically absent from apparently suitable neighbouring water-bodies. There is currently no evidence of a decline so a status of Near Threatened seems appropriate. AoO is estimated at about 55km^2.

The species was given a grading of RDB3 by Wallace (1991) and it was listed as rare in Shirt (1987).

Hectad distribution: 12 all dates, 7 pre and 10 post 1980; **Vice county distribution** 4 all dates and 3 post 1980

Distribution: This is recorded from only four vice counties in Britain and is very restricted in all of them. It is a riverine species in the south west from the Erme (South Devon) Taw (South Devon) and especially the Torrridge (North Devon). Elsewhere it is a lake species with records from Windermere (Westmorland) and Coniston (Westmorland), where it is abundant, and Derwentwater (Cumberland). Otherwise the only other record is from Mochrum Loch (Wigtownshire). 1961 Records for the Cornish rivers the Lerryn and Valency (East Cornwal) deserve consideration, but may be due to inadequate identification works available at the time. A notable feature of this insect is that it may be restricted to particular water bodies and absent from close neighbors. For example there appear to be many other Lake District lakes that would seem suitable, and it was not found in Mochrum Loch's close neighbours. A record from Skokholm is thought to be an error (Fox,1956).

Habitat and ecology: At Windermere, and Coniston, the only sites where I.D. Wallace has found it abundantly, the larvae are found in huge numbers on the stones of the littoral zone. They grow in the spring and pass the winter as large aggregations squeezed into the gap between the stone and the sandy substratum. It is surprisingly not abundant at any other site. The food is not known.

Threat: It is not thought that the species is under any particular threat, but any change in water level regime could be damaging.

Conservation and management: It is not thought the species requires any particular conservation management. Only Mochrum Loch appears to have any statutory nature conservation value but various planning agencies and the Environment Agency are presumed to keep a pretty close watch on the other lakes and rivers.

Identification: Larvae Wallace *et al* 2003, Wallace 2006, adults - Barnard & Ross (2012).

Survey & Monitoring: The distinctive adult appears to be nocturnal and will light trap and can be recognised in the field. It is very well camouflaged when resting on twigs in the day-time. The larva is equally distinctive. A good time to undertake any quantitative work would probably be spring when the larvae are active on the stones, or early autumn when the pupal cases of the past generation can be counted on the larger stones where they concentrate.

Selected published sources of distributional information: Claridge & Staddon (1960), Fletcher (1877a), Fox (1956), Hickin (1941), King (1881, 1883, 1884), McLachlan (1877,1884), (Morton (1899, 1906), Kimmins (1943, 1944, 1945), Routledge (1933)

SETODES PUNCTATUS

VULNERABLE D2

Order TRICHOPTERA

Family LEPTOCERIDAE

Setodes punctatus (Fabricius, 1793)

Status: The only modern records are from the River Severn. This is not an easy species to record so it is not known if there has been any decline in that river. The difficulties of finding the larvae may be the reason it has not been found for many years from the River Wye, but that river is frequently sampled by the Environment Agency and National Resources Wales. Distributional limits in the Severn are not known and it is probably restricted to particular zones but modern records extend along about 35 kms within Shropshire which would give an AoO of 35km^2. That it now may occur in only one, albeit large, site (D2) exemplifies how stochastic events make it vulnerable to extinction and a status of Vulnerable is applied.

Wallace (1991) gave this a grade of RDB2 and it was categorised as Rare in Shirt (1987).

Hectad distribution: 6 all dates, 4 pre 1980, 7 post 1980; **Vice County distribution** 5 all dates and 2 post 1980.

Distribution: There are certain records from five vice counties, but this is misleading as one site, Symonds Yat, is on the borders of two English and one Welsh vice county. The latest River Wye record was a larval case taken in the 1960s.

The River Severn is its major site, with the Buildwas Riffles in Shropshire being where it has been taken most frequently, the latest in 2013.

Habitat and ecology: The larva has an armoured rear end which resembles those of a North American species whose biology was studied by Merrill & Wiggins (1971). The larvae of that species burrow through coarse sand hunting particularly for chironomid larvae. The

single larva taken in 1973 gave little clue as to the biology as it was just noted as having been found under a stone. The Buildwas riffle site has not been investigated but a clue to the likely habitat was found east of Shrewsbury. The River Severn is generally a deep swift river with few riffle sites but the bottom has many large stones and in their lea, aggregations of coarse sand and debris build up; it was from such a place that the single empty case was found – admittedly it could have come from elsewhere but these pockets of coarse sand are common and the rest of the sandy bottoms that the species probably requires appears more consolidated. The River Severn has very few areas where traditonal kick sampling can be safely carried out by Environment Agency staff, which could account for the regularity of records from sites such as the Buildwas Riffles.

Threats: If the hunch about the larval site is correct, it probably requires regular spates to prevent consolidation. These spates can cause major flooding of property and there have been efforts to regulate the river, e.g. building the Clywedog Dam in Radnorshire, to regulate the Severn, but more may be proposed.

Conservation and management: Further survey is required to confirm the larval habitat and then the management of the river can be studied with a view to assisting the species.

Identification: Larvae Wallace *et al* (2003), Wallace (2006), adults Barnard & Ross (2012)

Survey & Monitoring: The larval sites are potentially deep and dangerous. The adult is not particularly distinctive but can probably be distinguished from other species likely to be found with it. It is thought that *Leptocerus tineiforms* Curtis, which flies widely from its lake breeding sites, may prove the most similar superficially in light-trap captures, which seems the only easy way to record the species. However, the handful of records from the Environment Agency will probably be the main source of data.

Selected published sources of distributional information: Crichton (1982), Fletcher (1889)

SYNAGAPETUS DUBITANS

DATA DEFICIENT

Order TRICHOPTERA

Family GLOSSOSOMATIDAE

Synagapetus dubitans McLachlan, 1879

Status: This species was first recorded in 2011 and is currently known from 10 sites in two geographically separated hectads. It has not so far been found elsewhere, despite being sought in some of the other areas where travertine springs are common. The sites are small, geographically isolated, and easily damaged. It is thought inevitable that many will have been lost over time, as has been observed for them in Cheshire and North Wales. The number of

current sites would qualify for a grading of at least Near Threatened but there has not been a wide enough survey of travertine sites across the country to be confident that it is restricted to Yorkshire.

The AoO is currently 7 km^2. It would qualify for Vulnerable if in decline. As it isn't, a status of NT seems appropriate.

Its discovery post-dates Wallace, (1991) and Shirt, (1987).

Hectad distribution: 2 all dates 2 post 1980; **Vice county distribution** 3 all dates 3 post 1980.

Distribution: Only recently added to the UK list with all records being from Yorkshire, from the vice counties of North-east, Mid-west, and North-west and all post 2011. The centres of distribution are in the vicinity of Hack Fall and near Rievaulx.

Habitat and ecology: This species appears restricted to travertine depositing spring streams; the habitat in Europe is the same.

Threats: The principal threat would seem to be from disturbance due to activities such as forestry.

Conservation and management: The presence of the populations should be drawn to the attention of landowners. Some sites fall within larger SSSIs.

Identification: Larvae Waringer & Graf (2011); adults Barnard & Ross (2012).

Survey & Monitoring: The adult is one of the small uniform brown caddis and not distinctive. Stuart Crofts has been able to detect the subtle differences between the larvae and those of *Agapetus fuscipes*, with which they frequently occur, but they are only apparent when the larva is killed or evicted from its case. Larval cases at some times have a surrounding collar of small sand grains and the pupal case is fragile and roughly formed of large grains, unlike the neat rounded cases of *Agapetus fuscipes* which occurs with it at most sites.

Distribution reference: Crofts (2011)

TINODES PALLIDULUS

VULNERABLE Criteria B2a; B2b (ii, iv)

Order TRICHOPTERA

Family PSYCHOMYIIDAE

Tinodes pallidulus Mclachlan, 1878

Status: There are records from six modern sites. Three are close neighbours, but the others are geographically spread. It has disappeared from two older sites since the 1950s due to habitat degradation. With one exception the sites are small and easily damaged. It qualifies for Vulnerable Status by being present on six sites (B2a) having been lost from a further two (B2b (ii, iv)). The AoO is 6 km^2.

It was given RDB1 status in Wallace (1991) and Vulnerable in Shirt (1987).

Hectad distribution: 8 all dates, 2 pre 1980, 6 post 1980; **Vice County distribution** 6 all dates and 5 post 1980.

Distribution: A very localised species from several widely scattered stream sites. Records are from two sites in Surrey, from which it seems to have disappeared, the Wood Brook (Leicestershire), three streams in the Wyre Forest on the Worcestershire/Shropshire border, the Hendre (Monmouthshire) and a tributary of the canal at Bournewood (East Kent). There are other larval records from South Devon, South-west Yorkshire and Mid-west Yorkshire but not backed by voucher specimens. An investigation of the Dowles Bork and its tributaries in the Wye Forest during 2015 revealed an extremely large population. Nevetheless it is within a small area.

Habitat and ecology: This species seems to have a preference for ancient woodland sites, but is not restricted to them. Hickin (1967) describes the small stream larval habitat and that the galleries were found to extend above the water-level; this is not unusual for the genus. In the Dowles Brook they were found on stones and bedrock in shallow water, including places where parts of the galleries were just covered in a water film; most stones in the shallows had galleries.

Threats: The species is vulnerable to pollution and physical alterations to the water-course. Hickin notes that his larvae were on dumped bricks, and these should not necessarily be regarded as detrimental to the habitat. Consideration of this species' requirements should be made if culverts have to be repaired at its sites.

Conservation and management: The small streams which the larva inhabits often have a limited number of hard substratum sites suitable for colonisation. Care should be taken when disturbing these within a water-course, and consideration could be given to strategically placing stones or bricks within the stream, with some of the items only partly submerged. The Monmouthshire Hendre site does not appear to have any statutory nature conservation protection but the other current sites appear to have SSSI or higher grading.

Identification: Larvae Edington & Hildrew (1995), adults Barnard & Ross (2012)

Survey & Monitoring: It is difficult to envisage any sampling that will not be potentially damaging where there are small populations in a small stream; the large Dowles Brook population woud seem to lend itself to population estimation by gallery counting. Neither larvae nor adults can be distinguished in the field.. Taking small samples of larvae needs to be considered. If artificial substratum has been used then a few stones or bricks could be

removed occasionally. Adults will probably light-trap and will be amenable to collection by sweeping and are also taken in Malaise Traps. The latter need to be used carefully as damage could be done to small sub-populations. The identification characters in the key to *Tinodes* larvae can be very subjective but the distinct head pattern feature of this species seems to be consistent and satisfactory.

Selected sources of published distributional information: Armitage (1982), Greenwood *et al* (2001), Hickin (1953, 1967), Jenkins (2003), Kimmins (1949)

TRIAENODES OCHREELLUS

DATA DEFICIENT

Order TRICHOPTERA

Family LEPTOCERIDAE

Triaenodes ochreellus McLachlan, 1877

Status: Asingle male was taken in a lght trap at Old Weston, Huntingdonshire, by Kevin Royles, on 18.7.2010, and another on 19.7.2013. Professor Hans Malicky, Europe's foremost Trichoptera expert confirmed the identity of the first male, and believes that taking it twice over a three year period suggests it is established. Mr.Royles knows of no obvious way these specimens could have been accidental imports. As a recent discovery in Britain and a possible introduced species the category 'NA' might be appropriate but it may also be an overlooked native so the category 'DD' has been chosen.

Hectad distribution: 1 post 1980; **Vice County distribution** 1 post 1980.

Distribution: Old Weston is a small village surrounded by arable farmland. There are no significant water bodies in the village or its immediate surroundings. Nevertheless, Mr Royles has built up an impressive list of species, many associated with larger water bodies such as rivers, lakes and large fens. It is likely that the *T. ochreellus* specimens also came from afar, but looking at other caddis taken at the time gives no clue as to where that might be.

Habitat and Ecology: The adults are presumed to be typical leptocerids in being comparatively short-lived and normally not voluntarily moving from the water body where they lived as larvae. European records are from Portugal, Spain and southern France. Where a habitat is mentioned it is riverine, but it must not be presumed that is so in this country.

Identification: Notes on separating adults and larvae of this species from its close relatives are being prepared. The ochreous colour of the wings and the distinctive male genitalia might have drawn attention to this species in the past if long-established but any females and larvae

are quite likely to have been passed off as belonging to the abundant widespread species *T. bicolor,* Curtis.

Surveying for this species: The identification notes will be designed to alert recorders to look out for this species.

WORMALDIA MEDIANA

DATA DEFICIENT

Order TRICHOPTERA

Family PHILOPOTAMIDAE

Wormaldia mediana McLachlan, 1878

Preliminary note: Records of this species are confusing. Mosely (1939) synonymised *W. mediana* with *W. occipitalis*, but this was reversed by Kimmins (1953). Therefore between 1939 and 1953 several records of *W. mediana* will be amongst those of *W. occipitalis* and there may be voucher specimens in existence, but without careful examination of all likely specimens, and they are not easy to separate, these records will remain 'hidden'. D.E. Kimmins and E.C. Pelham-Clinton can be presumed to have examined the collections under their care at the Natural History Museum and National Museums of Scotland respectively.

Status: This species cannot be separated from *W. subnigra* at the larval stage. This reduces the number of potential records and is one reason for their paucity. Recent searches by the Wallaces failed to re-find it at two modern North Wales and one Lake District site. It may be declining but further survey of other past sites is required. Although there are few enough sites to qualify for Near Threatened, re-inforced by possible loss of three sites, there are enough known sites that have not been re-surveyed recently, and with a wide geographic spread to suggest that Data Deficient would be a better grade. It is hoped the taxonomic problems might be resolved to make it easier to reconise this species amongst general collections of *Wormaldia* larvae.

It was awarded "Local and Regionally Notable" status in Wallace (1991) but not mentioned in Shirt (1987).

Hectad distribution: 26 all dates, 15 pre-1980 and 12 post 1980; **Vice County distribution** 22 all dates and 11 post 1980.

Distribution: There are records from widely separated regions, but with few records from any. Post 1989 records are from Ashberry Pastures (North-east Yorkshire) Afon Alun (Pembrokeshire), Craig Ddu (Carmarthenshire), several large streams and small rivers in the eastern Cheviots(North Northumberland), the Fealar Gorge (East Perthshire), the River Lossie (Moray) and the River Feshie (East Invernesshire).

Habitat and ecology: The larvae are found in swift-flowing stony large streams and small rivers. It has not been found to co-exist with *W. subnigra* McLachlan. The latter, a more common species, is found in waters that probably have more suspended organic material, and are warmer. A typical *subnigra* site would be the exit of a lake, or a lowland river, whereas the typical *mediana* site is upland and does not have a significant lake on the course; the exception is the Afon Clywedog at Cyffylliog (Denbighshire) one of whose branches is the exit of a small reservoir, but well upstream. The Lake District illustrates the site differences with *mediana* being on the Stock Ghyll (Westmorland), a short stream running straight from the fells, and nearby *subnigra* was the species from the nearby Easedale River (Westmorland) that flows from Easedale Tarn. The eggs probably over-winter, as larvae appear first as tiny specimens in late spring.

Threats: It is possible this species suffered from Cypermethrin sheep dip pollution (Shardlow, 2006). The larvae feed by filtering fine particles from the flowing water, and it lives in sites that have no buffering by a lake along their course. This also makes it particularly vulnerable to siltation from any up-stream engineering works.

Conservation and management: It is important not to cause major mechanical disruption upstream of its sites.

Identification: Larvae cannot be certainly separated from those of other *Wormaldia*, see Edington & Hildrew (1995). However the author of this review has found that they closely resemble those of *W. subnigra.* Adult males - Barnard & Ross (2012); the female cannot be certainly distinguished from *W. occipitalis* (Pictet) but Barnard & Ross suggest a tentative character.

Survey & Monitoring: The larvae have been common where found, and it is suggested that careful kick-sampling, or stone turning upstream of a sampling net, will provide material for monitoring. Unfortunately it will only be recorded as *Wormaldia mediana/subnigra* until adults had also been collected from the site. Adults will probably always be indistinguishable form those of *W. occipitalis* in the field, but live adults of *W. subnigra* are considerably darker, sometimes almost black..

Selected published sources of published distributional information: King & Morton (1884), Kimmins (1936, 1953), Morton (1899a,b), McLachlan (1874-1884)

YLODES REUTERI

NEAR THREATENED Criteria B2a; B2b (ii, iii, iv)

Order TRICHOPTERA

Family LEPTOCERIDAE

Ylodes reuteri (Mclachlan,1880)

Status: There are only 6 sites and only 1 post 1980. Of the pre 1980 sites, it seems to have disappeared from one site. The lack of recent records suggests it is not likely to be anything other than a rare species and a status of Near Threatened is proposed to reflect that small number of records and the certain loss of one site.

The post 1960 AoO is estimated as 20 km^2 and the post 1980 at 13 km^2. Most of that area is taken by one Orkney site, where it still exists. It was given RDB2 status in Wallace (1991) and described as rare in Shirt (1987).

Hectad distribution: 6 all dates, 6 pre and 2 post 1980; **Vice County distribution** 5 all dates and 1 post 1980.

Distribution: This is a widely dispersed coastal and estuarine species but with very few records. There are records from single sites in Isle of Wight, West Kent, East Suffolk and South-east Yorkshire; the only other record is from an unusual brackish loch on Orkney, with that site furnishing the only post 1989 records. The definite East Suffolk specimen was residing under the name *Y. conspersus* in the Hope Department and John Gray (1982) found that a specimen, also probably from Suffolk, in the Ipswich Museum, had also been placed under *Y. conspersus.* Unfortunately voucher specimens have not been located to support other records of *conspersus* from still water sites in Suffolk and Norfolk, which may well prove to have been *Y. reuteri*.**Habitat and ecology:** This is a brackish water species. Healy (1997) studied it near Wexford in Ireland. She found it lived in the most weakly saline zone. It can live in both still and slightly flowing water. The larva is found, as for other members of the genus, amongst vegetation. The food of the larva is unknown and may be material grazed from plants rather than the plants themselves. Despite being taken regularly as an adult at Loch Harray, larvae have not been collected so the micro-habitat there is unknown.

Threats: The species is in a very vulnerable habitat due to the squeeze between land and sea as sea-level rises, and catastrophic inundnation by the sea during severe storms. Loch Harray is a geo-morphological oddity but man-made barriers maintain the water–level and salinity regime. Coastal sites such as in the Thames estuary are vulnerable to development.

Conservation and management: The priority would seem to be to try and locate the larval breeding sites in the Isle of Wight, Kent, Essex, Suffolk and Norfolk. Once identified, the sites should be considered from the point of view of maintaining the salinity regime. It is important to ensure that the salinity regime at Loch Harray is not disturbed. Most sites have, or will be found to have, some degree of nature conservation designation.

Identification: Larvae Wallace *et al* (2003), Wallace (2006); adults Barnard & Ross (2012).

Survey & Monitoring: The adult light-traps, which can give an indication of its presence in an area, but the breeding site may be small and at a distance. Larval recording in the late spring is likely to be the best time to monitor the species, once larval sites have been identified.

Selected sources of published information: Andrew (1986), Barnard (1979), Berry (1985), Brindle (1966), Ellis (1965), Gray (1982), Kimmins (1964), Whitebread (1979)

YLODES SIMULANS

NEAR THREATENED Criterion D2

Order TRICHOPTERA

Family LEPTOCERIDAE

Ylodes simulans (Tjeder, 1929)

Status: There are certain records from only 5 rivers of which 3 are post 1980; two other rivers have not been surveyed recently. All its sites and potential sites are surveyed by the statutory agencies. In the past it has been found to be very common at some, but there is only one post 2000 record from the agencies, at the De Lank River (East Cornwall). At Carrog (Merionethshire) on the River Dee, the Wallaces found larvae in 2007 and Emma Ross took adults in 2008 – yet National Resources Wales has failed to take larvae at nearby sites on the river. There are several possible reasons why larvae might have been missed, but it may be a species in decline as it is usually common where found. The small number of sites qualifies it for Near Threatened under criteron D2 (but not Vulnerable as further survey may re-find it at one or two other locations). The AoO is difficult to estimate as the geographic limits of the species on each river is not known, but may be up to 60 km^2.

Wallace (1991) awarded this species RDB3 status but it was not mentioned by Shirt (1987).

Hectad distribution: 16 all dates, 7 pre and 9 post 1980; **Vice county distribution** 6 all dates and 4 post 1980.

Distribution: The rivers where it has been found are the River Forth (Stirlingshire), River Dee (Denbighshire/Merionethshire) River Teifi (Carmarthenshire/Cardiganshire/Pembrokeshire), Western Cleddau (Pembrokeshire), and the De Lank River (Cornwall). There are also records for the River Teme at Ludlow (Shropshire) where it may co-exist with *Y. conspersus* (Rambur), but the identity of *Ylodes* in that river needs checking; there is also a record of an adult from Upper Maund (Herefordshire) that may have bred from the River Lugg.

Habitat and ecology: The larvae are found in the weed-beds of stony rivers. In the River Forth they were found amongst *Myriophyllum* but in the River Dee are amongst *Ranunculus*. The larvae seem to overwinter at an early instar.

Threats: A species that occurs in relatively few river systems is vulnerable to pollution, particularly by pesticides. Unlike its relative, *Y. conspersus*, it is probably less vulnerable to low water flows caused by water abstraction as the sites are not used in that way; flows in the

River Dee are actually boosted by abstraction as it used as a means of taking water from Bala Reservoir to a Cheshire abstraction point.

Conservation and management: No specific recommendations are made. The Dee, Western Cleddau and Teifi are SSSI and SAC in part).

Identification: Larvae Wallace *et al* (2003), Wallace (2006); adults, Barnard & Ross (2012).

Survey & Monitoring: The easiest way to monitor this species is by collecting larvae in early summer. Whilst the species is very similar to the other two members of the genus, they have only been found together at one site, R. Teme, Ludlow, presuming identifications were correct. That means the larvae could be released after recording them at many sites. It would seem important to re-survey all its past rivers to see if it still present. (That would also clarify which *Ylodes* species were found on the River Teme at Ludlow, and confirm its presence in the River Lugg.)

Selected sources of published information: Berry (1985), Crichton & Fisher (1978), Jenkins (1979), Jenkins & Mold (1975), Littlewood (1995), Morton (1906), Ross (2010)

13 References and Further reading

References

Andersen, T. & Kjaerandersen, J. 2002. First record of the microcaddisfly *Ithytrichia clavata* Morton from Norway (Trichoptera: Hydroptilidae). *Norwegian Journal of Entomology* **49**: 93-94.

Andrew, R. 1986. Orkney Mainland and Hoy Caddis Survey, 1986. *British Ecological Society Interim Report, SEPG* **number 426**.

Anon 1978. Field meetings Westbere Marshes, Kent - 9th July 1977 Church Wood Kent - 10th July 1977. *Proceedings of the British Entomological and Natural History Society* **for 1978**: 127-128.

Anon. 2005. Gwent survey uncovers 'signficant' insects. *Naturalworld Wales* **Winter 2005**.

Armitage, P. 1982. The invertebrates of some freshwater habitats on the Axmouth-Lyme Regis National Nature Reserve. *Proceedings of the Dorset Natural History and Archaeological Society* **104**: 149-154.

Bagge, P. 1987. Emergence and distribution of Hydroptilidae in the littoral and other biocoenoses of Lake Konnevesi (central Finland). *Proceedings of the 5th International Symposium on Trichoptera 1986*: 337-341.

Bagge, P. 1995. Emergence and upstream flight of lotic mayflies and caddisflies (Ephemeroptera and Trichoptera) in a lake outlet, central Finland. *Entomological Fennica* **5**: 91-97.

Barnard, P.C. 1979. *Triaenodes reuteri* McLachlan in Essex, with a note on the identification of the female (Trichoptera, Leptoceridae). *Entomologist's Gazette* **29**: 244-245.

Barnard, P.C. & O'Connor, J.P. 1987. The populations of *Apatania muliebris* McLachlan in the British Isles. *Entomologist's Gazette* **38**: 263-268.

Barnard, P.C. & Ross, E. 2012. The adult Trichoptera (caddisflies) of Britain and Ireland. *Handbooks for the identification of British Insects* **1** (17) 192 + iv pages.

Blacklock, B. & Carter, H.F. 1921. Observations on mosqutoes in the Isle of Man. *Annals of Tropical Medicine and Parasitology* **15**: 73-90.

Berry, R.J. 1985. The Natural History of Orkney. *Collins*.

Bray, R.P. 1964. Studies on the British Phryganeidae (Trichoptera) with special reference to the taxonomy and larvae. *Unpublished PhD Thesis, University of Newcastle upon Tyne*.

Bray, R.P. 1966. Records of the Phryganeidae (Trichoptera) in northern England 1961-1964, with a summary of the distribution of the British species. *Transactions of the Natural History Society of Northumberland and Durham* **15**: 226-239.

Bray, R.P. 1967. The taxonomy of the larvae and pupae of the British Phryganeidae (Trichoptera). *Journal of Zoology (London)* **153**: 223-224.

Bray, R.P. 1969 The life-cycle and growth of some British Phryganeidae (Trichoptera) *Entomologist's Monthly Magazine* **105**: 75-84.

Brindle, A. 1964. Notes on *Anabolia (Phacopteryx) brevipennis* (Curtis), and *Ironoquia dubia*. *Entomologist's Record & Journal of Variation* **76:** 289-292.

Brindle, A. 1966. The larva of *Triaenodes reuteri* McLachlan (Trichoptera, Leptoceridae). *Entomologist's Record & Journal of Variation* **78**: 130-133.

Brooker, M.P. & Morris, D.L. (1980). A survey of the macro-invertebrate riffle fauna of the rivers Ystwyth and Rheidol, Wales. *Freshwater Biology* **10**: 459-474.

Butler, P.M. 1956. The influence of the Coniston Limestone on the fauna and flora. A preliminary investigation. *The Naturalist* **for 1956**: 97-106.

Buczynska, E. *et al, in press*. What do we really know about insect biodiversity: the case of a red-listed caddisfly *Erotesis baltica* McLachlan, 1877 (Trichoptera: Leptoceridae) in Poland. *Journal of the Entomological Research Society.*

Carpenter, K.E. 1927. Faunistic ecology of some Cardiganshire streams. *Journal of Ecology* **15**: 33-54.

Chappell, J. 1868 Capture of *Neuronia clathrata*, trichopterous insect new to Britain.*Entomologist's Monthly Magazine* **4**: 204-205.

Claridge, M.F. & Staddon, B.W. 1960. *Stemelmis canaliculata* Gyll. (Col., Elmidae): a species new to the British List. *Entomologist's Monthly Magazine* **96**: 141-144.

Cooke, B. 1882. Contribution to a list of the Neuroptera, (in the Linnnaean sense) of Lancashire and Cheshire. *The Naturalist* **for 1882**: 110-111.

Cooter, J. 1987. *Hydroptila lotens*is Mosely (Trichop., Hydroptilidae) in Hereford. *Entomologist's Monthly Magazine* **123**: 148.

Crichton, M.I. 1960. A study of captures of Trichoptera in a light trap near Reading, Berkshire. *Transactions of the Royal Entomological Society of London* **112**: 319-344.

Crichton, M.I. 1965. Observations on captures of Trichoptera in suction and light-traps near Reading, Berkshire. *Proceedings of the Royal Entomlogical Society, London series A.* **40**: 101-108.

Crichton, M.I. 1971. A study of caddis flies (Trichoptera) of the family Limnephilidae, based on the Rothamsted Insect Survey, 1964 – 1968. *Journal of Zoology (London)* **163**: 533-563.

Crichton, M.I. 1982. Records of caddis flies (Trichoptera) from Rothamsted light traps at field centres. *Field Studies* 5: 569-579.

Crichton, M.I. 1987. A study of the egg masses of *Glyphotaelius pellucidus* (Retzius) (Trichoptera: Limnephilidae). *Proceedings of the 5th International Symposium on Trichoptera, 1986.* Dordrecht.

Crichton,M.I. & Baker, B.R. 1959. Records of Trichoptera from the Reading area, 1957-1958. *Entomlogist's Monthly Magazine* **95**: 85-87.

Crichton, M.I. & Fisher, D. 1978. Life histories and distribution of British Trichoptera, excluding Limnephilidae and Hydroptilidae, based on the Rothmasted Insect Survey. *Holarctic Ecology* **1**: 31-45.

Crofts, S.M. 2011 *Synagapetus dubitans* McLachlan, 1879 (Trichoptera, Glossosomatidae) a caddisfly new to Great Britain. *Entomologist's Monthly Magazine* **147**: 32.

Czachorowski, S. 1998. Chrusciki (Trichoptera) jezior Polski – charakterystyke rozmiesz czenia larw. Wyd. 156 pages. WSP Olsztyn.

Czachorowski, S. & Kornojow, R. 1995. Analysis of the distribution of caddis larvae (Trichoptera) in the Elodid Zone of two lakes of East Poland, based on the concept of habitat islands. *Polskie Archivuum Hydrobiologii* **40**: 165-179.

Czachorowski, S. & Serafin, E. 2004. The distribution and ecology of *Hydropsyche bulgaromanorum* and *Hydropsyche contubernalis (Trichoptera: Hydropsychidae*) in Poland and Belarus. *Lauterbornia* **50**: 85-98.

Dandy, J.E. 1969. Watsonian Vice-counties of Great Britain. *Ray Society.*

Dodd, S. 2012. Report on a survey of Whitmoor and Chobham Comons, Surrey, for adults of the UK BAP Riverfly species: the Window-winged Caddis *Hagenella clathrata* (Kolenati). *Report produced by Surrey Wildlife Trust.*

Dodd, S. & Wallace, I.D. 2013. Report on a survey of Whitmoor and Chobham Commons, Surrey (VC17), for larvae and adults of the UK BAP Riverfly species the Window Winged Caddis *Hagenella clathrata* (Kolenati). *Report producd by Surrey Wildlfe Trust.*

Donisthorpe, H. St. J. 1932. *Stenophylax dubius*, Steph., a very rare Trichopteron inWindsor Forest. *Entomologist's Record and Journal of Variation* **44**: 160.

Dowling, C, O'Connor, J.P. & O'Grady, M.F. 1981. A baseline survey of the Caragh, an unpolluted river in southwest Ireland: observations on the macroinvertebrates. *Journal of Life Sciences Royal Dublin Society* **2**: 147-158.

Edington, J.M. 1964. The taxonomy of British polycentropid larvae. *Proceedings of the Zoological Society of London* **143**: 281-300.

Edington, J.M. & Hildrew, A.G. 1995. A revised key to the caseless caddis larvae of the British Isles with notes on their ecology. *Scientific Publications of the Freshwater Biological Association* **53**: 1-134.

Elliott, J.M. 1967a. Life histories and drifting of Trichoptera in a Dartmoor stream. *Archiv fur Hydrobiologie* **63**: 203-237.

Elliott, J.M. 1967b. The food of trout (*Salmo trutta*) in a Dartmoor stream. *Journal of Animal Ecology* **4**: 59-71.

Elliott, J.M. 1970. A note on variation in larvae of *Sericostoma personatum* (Trichoptera). *Entomologist* **103**: 213-214.

Ellis, A.E. 1965. The Broads *New Naturalist Series, Collins*.

Extence, C.A., Balbi, D.M. & Chadd, R.P. 1999. River flow indexing using British benthic macroinvertebrates: a framework for setting hydroecological objectives. *Regulated Rivers: Research and Management* **15**: 543-574.

Fauna Europeaea 2005 http://www.faunaeur.org (March 2005 release).

Fjellheim, A. & Raddum, G.G. 1998. Life cycle and drift of *Glossosoma intermedia* (Trichoptera: Glossosomatidae) in western Norway. *Verhandlungen der Internationalen Vereinigung für Theoretische und Angewandte Limnologie* 26: 2048-2052.

Fletcher, J.E. 1877a. Occurrence of a probable new species of *Setodes* in Britain. *Entomologst's Monthly Magazine* **17**: 70.

Fletcher, J.E. 1877b. Re-occurrence of *Setodes interrupta* in Worcestershire. *Entomologist's Monthly Magazine* **17**:: 117.

Fletcher, J.E. 1889. Occurrence in Worcestershie of *Setodes punctatus* F., a species of Trichoptera new to Britain. *Entomologist's Monthly Magazine* **25**: 383.

Fox, M.W. 1956. The Trichoptera of Skokholm. *Entomologist's Monthly Magazine* **92**: 40-41.

GBIF Global Biodiversity Information Facility. http://www.gbif.org.

Gibberd *et al* (1982). Middle Devensian deposits beneath the "Upeer Floodplain" terrace of the River Thames at Kempton Park, Surrey, England. *Proceedings of the Geological Association* **3**: 275-328.

Gray, J.R.A. 1982. *Trianeodes reuteri* McLachlan (Trichoptera : Leptoceridae) an early British record. *Entomologist's Gazette* **33**: 256.

Greenwood, M.T., Bickerton, M.A. & Petts, G.E. 2001. Assessing adult Trichoptera communities of small streams: a case study from Charnwood Forest, Leicestershire, UK. *Aquatic Conservation: Marine and Freshwater Ecosystems* **11**: 93-107.

Grensted, L.W. 1939a. Trichoptera in the Chitty collection. *Journal of the Society for British Entomology*. **for 1939**: 265-267.

Grensted, L.W. 1939b. *Ithytrichia clavata* Morton (Trich., Hydroptilidae) new to Britain. *Entomologist's Monthly Magazine* **74**: 235.

Gullefors, B. 1994. Egg-laying and egg masses of the caddisfly *Nemotaulius punctatolineatus* (Retzius) (Trichotera: Limnephilidae). *Entomologist's Gazette* **45**: 141-149.

Haines, F.H. 1922. Trichoptera in Dorset. *Entomologist* **55**: 104-108.

Hannigan, E., Kelley-Quinn, M., O'Connor, J.P. 2009. Notable caddisflies (Trichoptera) from Scragh Bog, Co. Westmeath, incuding *Erotesis baltica* McLachlan new to Ireland. *Bulletin of the Irish Biogeographical Society* **33**: 76-80.

Happisburgh Village Website. 2011. http://www.happisburgh.org/history/archaeology (accessed 25/05/11).

Healy, Benda 1997. Long-term changes in a brackish lagoon, Lady's Island Lake, south-east Ireland. *Biology and Environment: Proceedings of the Royal Irish Academy* **97B**: 33-51.

Heslop-Harrison, J.W. 1937. The Trichoptera of the Isle of Raasay and of the adjacent islands of South Rona and Scalpay. *Procceedings of the Univesity of Durham Philosophical Society* **10**: 329-331.

Hickin, N.E. 1941. Some records of Trichoptera in the Lake District. *Entomologist's Monthly Magazine* **76**: 252-253.

Hickin, N.E. 1953. *Tinodes pallidula* McLachlan (Trichoptera, Psychomyidae), a second British station. *Entomologist* **86**: 113.

Hickin, N.E. 1967. Caddis larvae. *Hutchinson, London.*

Hielscher, M. 1997 Ein Nachweis vin *Hagenella clathrata* (KOLENATI, 1848) *(*Insecta: Trichoptera) im NSG "Lengener Meer" (Lkr. Leer, Niedersachsen). *Beitrage zur Naturkunde Niedersachsens* **50**: 162-165.

Higler, L.W.G. 2007. Life cycles of some stagnant water caddis flies. *Lauterbornia* **61**: 11-26.

Higler, L.W.G. 2008. Versriedingsatlas Nederlandse kokerjuffers (Trichoptera).*European Invertebrate Survey – Nederland.*

IUCN. 2012a. *IUCN Red List Categories and Criteria*. Version 3.1. 2nd Edition, IUCN Species Survival Commission. IUCN, Gland.

IUCN. 2012b. Guidelines for Application of IUCN Red List Criteria at Regional and National Levels. Version 4.0, IUCN Species Survival Commission. IUCN, Gland.

Jenkins, R.A. 1979. Records of Trichoptera from south-west Wales. *Entomologist's Gazette* **30**: 31-42.

Jenkins, R.A. & Mold, M.D. 1975. *Triaenodes simulans* Tjeder (Trichoptera: Leptoceridae) from a river in south west Wales. *Entomologist's Record & Journal of Variation* **87** : 302-303.

Joyce, A.A. 1984. Caddisflies (Trichoptera) from a stream on the east coast of Sutherland. *Entomologist's Gazette* **35**: 249-255.

Kimmins, D.E. (1964) The British species of the genus *Athripsodes* with comments on the species described by Stephens (Trichoptera, Leptoceridae). *Entomologist's Gazette* **15**: 153-180.

Hiley, P.D. 1970. New records of *Limnephilus nigriceps* (Zetterstedt), *Rhadicoleptus alpestris* (Kolenati) and *Ironoquia dubia* (Stephens) in Britain. *Entomologist's Record and Journal of variation* **82**: 234.

Hiley, P.D. 1973. The taxonomy of certain caddis-fly larvae, together with an investigation into factors limiting the distribution of selected species. *Unpublshed PhD thesis, University of Newcastle upon Tyne.*

Holmes, P.F. 1963. Trichoptera *in* Insects of the Malham Tarn Area. *Proceedings of the Leeds Philosophical and Literary Society (Scientific Section).* **9(2)** 31-35.

Holmes, P.F. 1965. The natural history of Malham Tarn. *Field Studies* **2**: 199-223.

Houghton, D.C. 2012. Biological diversity of the Minnesota Caddisflies (Insecta, Trichoptera). *Zookeys* **189.**

Hubble, D.S. 2014. A review of the scarce and threatened beetles of Great Britain. The leaf beetles and their allies Chrysomelidae, Megalopodidae and Orsodacnidae. Species Status No. 19. *Natural England Commisioned Report NECR161*. www.gov.uk/natural-england

IUCN 2001. *IUCN Red List Categories.* Prepared by the IUCN Species Survival Commission. As pproved by the 40th Meeting of the IUCN Council, Gland, Switzerland, The World Conservation Union. Updated 2000 on line as version http://www.iucnredlist.org/info/categories_criteria2001

Jenkins, R.A. 2003. *in* A review of Wildlife in Wales. *Natur Cyrmru* **8**.

Johnson, C. 1961. *Neuronia clathrata* Kol. (Trichoptera) in Salop. *Entomologist* **95**: 152.

Kimmins, D.E. 1934. British Ephemeroptera, Plecoptera and Trichoptera in 1933. *Entomologist's Monthly Magazine* **for 1934**: 62-66.

Kimmins, D.E. 1936. British Ephemeroptera, Plecoptera and Trichoptera in 1935. *Journal of the Society for British Entomology* **1**: 147-151.

Kimmins, D.E. 1942. *Cyrnus insolutus* McL., new to Britain. *Entomologist* **75**: 66-68.

Kimmins, D.E. 1943. A list of Trichoptera (Caddis) of the Lake District with distributional and seasonal data. *Journal of the Society of British Entomology* **2**: 136-157.

Kimmins, D.E. 1944. Supplementary notes on the Trichoptera of the English Lake District. *Entomologist* **77**: 81-83.

Kimmins, D.E. 1945. Lake District Trichoptera in the Dale Collection. *Entomologist*. **78**: 17.

Kimmins, D.E. 1949. *Tinodes pallidula* McLachlan: an addition to the British list of Trichoptera. *Entomologist* **82**: 269-272.

Kimmins, D.E. 1952. *Agrypnetes crasssicornis* Mclachlan, a caddis fly new to Britain. *Annals and Magazine of Natural History(series 12)* **5**: 1039-1043.

Kimmins, D.E. 1953. A key to the European species of *Wormaldia* (Trichoptera, Philopotamidae) with descriptions of two new subspecies. *Annals and Magazine of Natual History (series 12)* **6**: 801-808.

Kimmins, D.E.1961. A species of *Hydroptila* (Trichoptera) new to Britain. *Entomologist's Gazette* **12**: 32-34.

Kimmins, D.E. 1963. The British species of the genus *Mesophylax*, with further records of the occurrence of *Mesophylax aspersus*. *Entomologist's Gazette* **14**: 24-26.

Kimmins, D.E. 1964. *Triaenodes simulans* Tjeder in Britain (Trichoptera, Leptoceridae). *Entomologist* **97**: 40-44.

King, J.J. 1881a. *Limnophilus subcentralis*, Brauer, in Scotland. *Entomologist's Monthly Magazine* **18**: 72.

King, J.J. 1881b. *Setodes argentipunctellus*, McLach, occurs in profusion on the Brathay River at Brathay Church, Ambleside. *Entomologist's Monthly Magazine* **18**: 163.

King, J.J.F.X. 1883a. Notes on the Neuroptera of Strathglass, Invenesshire. *Entomologist's Monthly Magazine* **19**: 8-12.

King, J.J.F.X. 1883b. A new Trichopteron. *Entomologist* **19**: 138.

King, J.J.F.X. 1883c. Notes on the Neuroptera of Langdale. *Entomologist's Monthly Magazine* **19**: 8-12.

King, J.J.F.X. 1886. Notes on the Neuroptera of Rothiemurchus and Kingussie. *Transactions of the Natural History Society of Glasgow* **for 1886:** 354-361.

King, J.J.F.X. 1890. Neuroptera from the island of Unst. *Entomologist's Monthly Magazine* **26**: 176-180.

King, J.J.F.X. 1892. Capture of *Erotesis baltica*, McLach., in quantity. *Entomologist's Monthly Magazine* **28**: 246-247.

King, J.J.F.X. 1895. Addition of two species of Hydroptilidae to the British list. *Entomologist's Monthly Magazine.* **30**: 112.

King, J.J.F.X. 1896. Notes on Trichoptera (including *Agrypnia picta*, Kol.) taken in Unst (Shetland), 1895. *Entomologist's MonthlyMagazine* **32**: 151-152.

King, J.J.F.X. 1912. *Limnophilus subcentralis*, Brauer, near Nethy Bridge. *Entomologist's Monthly Magazine* **48**: 46.

King, J.J. & Morton , K.J. 1884. Insecta Scotica – Trichoptera. *Scottish Naturalist* **7**.

Kjaestadt, G. Andersen, T., Olsvik, H.A., Btittain, J.E. 2010. Ephehermeroptera Odonata, Plecopera, Trichoptera. pages 227-234 *of* Kalas, J.A., Wiken, A. Henriksen, S. & Skjelseth, S. Eds), The 2010 Norwegian Red List for Species. *Norwegian Biodiversity Information Centre.*

Littlewood, S.C. 1995. Trichoptera (less Hydroptilidae) of the River Teme at Ludlow, Shropshire. *Entomologist's Monthly Magazine* **131**: 83-93.

Macan, T.T. 1973. A key to the adults of the British Trichoptera. *Scientific Publications of the Freshwater Biological Association* **28**: 1-151.

Mackareth, J.C. 1956. Taxonomy of the larvae of the British species of the family Glossosomatinae (Trichoptera). *Proceedings of the Royal Entomological Society of London (Series A)* **31**: 167-172.

Malicky, H. 1984. The distribution of *Hydropsyche gutt*ata Pictet and *H. bulgaromanorum* Malicky (Trichoptera : Hydropsychidae), with notes on their bionomics. *Entomologist's Gazette* **35**: 257-264.

Malicky, H. 2004. *Atlas of European trichoptera.* 2nd edition. Springer, Dordrecht.

Marshall, J.E. 1977. *Hydroptila martini* sp.n. and *Hydroptila valesiaca* Schmid (Trichoptera: Hydroptilidae) new to the British Isles. *Entomologist's Gazette* **28**: 115-122.

Marshall, J.E. 1978a. Trichoptera: Hydroptilidae. *Handbooks for the Identification of British Insects 1* **14(a)**: 1-31.

Marshall, J.E. 1978b. Trichoptera Hydroptilidae Caddisflies (Part 1) *Provisional Atlas of the insects of the British Isles* **8** Institute of Terrestrial Ecology, Huntingdon.

McLachlan, R. 1862. Notes on British Trichoptera, with descriptions of new species etc. *Entomologist's Annual* **for 1862**: 21-37.

McLachlan, R. 1864. Notes on British Trichoptera. *Entomologist's Annual* **for 1864**: 140- 153.

McLachlan, R. 1865. Trichoptera Britannica. *Transactions of the Royal Entomological Society of London* **3(5)**: 1-184.

McLachlan, R. 1874-84. A monographic revision and synopsis of the Trichoptera of the European fauna. *London.*

McLachlan, R. 1877. Description of a new species of *Setodes* occurring in the British Isles. *Entomologist's Monthly Magazine.* **14**: 105-106.

McLachlan, R. 1882. Note on *Setodes argentipunctellus. Entomologist's Monthly Magazine* **19**: 21.

McLachlan, R. 1894. *Adicella filicornis* Pict., in the New Forest. *Entomologist's Monthly Magazine* **30**: 185-186.

Mclachlan, R. 1902. A small contribution to knowledge of the neuropterous fauna of eastern south Devon. *Entomologist's Monthly Magazine* **38**: 235-238.

Merrill, D. & Wiggins, G.B. 1971. The larva and pupa of the caddisfly genus *Setodes* in North America (Trichoptera: Leptoceridae). *Life Sciences Occasional paper of the Royal Ontario Museum* 19.

Middleton, M.I. 1977. The possible discovery of the egg masses of *Nemotaulius punctatolineatus* (Retzius) in Britain (Trichoptera: Limnephilidae). *Entomologist's Gazette* **28**:45-50.

Miles, B.E. 1984. Some Herefordshire Trichoptera (Caddis-flies). *Transactions of the Woolhope Natural History Society* **44**: 301-309.

Moretti, G.P., Cianficconi, F., Corallini Sorcetti, C. & Boscherini, A. 1993. Fluctuations of Trichoptera in Lake Trasmeno (Italy). *Proceedings of the 7th International Symposium on Trichoptera 1992*: 223-228.

Morton, K.J. 1884. *Adicella filicornis*, Pict.; an addition to the British Trichoptera. *Entomologist's Monthly Magazine* **21**: 91.

Morton, K.J. 1885. *Drepanapteryx phalaenoides*, L., in Scotland : a re-discovery. *Entomologist's Monthly Magazine* **22**: 139-140.

Morton, K.J. 1886. Notes on some spring-frequenting Trichoptera. *Entomologist's Monthly Magazine* **23**: 146-150.

Morton, K.J. 1899a. Entomological notes from Glen Lochay and Loch Tay including a record of an *Oxyethira* new to Britain. *Entomologist's Monthly Magazine* **35**: 53-55.

Morton, K.J. 1899b. Neuroptera and Trichoptera observed in Wigtownshire during July, 1899, including two species of Hydroptilidae new to the British list. *Entomologist's Monthly Magazine* **35**: 278-281.

Morton, K.J. 1904a. *Neuronia clathrata*, Kol., in Wigtownshire. *Entomologist's Monthly Magazine* **40**: 281-282.

Morton, K.J. 1904b. Neuroptera and Trichoptera observed in the Lake District. *Entomologist's Monthly Magazine* **40**: 52-54.

Morton, 1906. *Triaenodes reuteri*, McLach., a species of Trichoptera new to Britain. *Entomologist's Monthly Magazine* **42**: 270-271.

Morton, K.J. 1908. Some scarce British Neuropteroidea from Suffolk. *Entomologist's Monthly Magazine* **44**: 42-43.

Morton, K.J. 1912. *Erotesis baltica*, McLachl., from Hampshire. *Entomologist's Monthly Magazine* **48**: 241.

Morton, K.J. 1913. The Odonata, Trichoptera, Neuroptera and Plecoptera of Wood Walton Fen, Huntingdonshire. *Entomologist's Monthly Magazine* **49**: 241-247.

Morton, K.J. 1916. Chartley Moss and its Neuroptera. *Entomologist's Monthly Magazine* **52**: 257-259.

Morton, K.J. 1923. Neuroptera (in the Linnaean sense) from Argyllshire. *Entomologist's Monthly Magazine* **59**: 9-12.

Morton, K.J. 1925. *Mystrophora intermedia Klap.*, new to the British fauna and *Apatania muliebris* McLach., two species of Trchoptera from the Lake District. *Entomologist's Monthly Magazine* **61**: 130-131.

Morton, K.J. 1931. *Mesophylax impunctatus* McLach. at Windermere and in the Isle of Skye. *Entomologist's Monthly Magazine* **67**: 250-251.

Mosely, M.E. 1922. Two new Britsh species of Hydroptila. *Transactions of the Entomological Society of L ondon* **for 1922**: 178-180.

Mosely, M.E. 1929. Trichoptera, Ephemeroptera, Plecoptera and Neuroptera of Breconshire. *Entomologist's Monthly Magazine* **65:** 208.

Mosely, M.E. 1939. The Britsh Caddis Flies (Trichoptera). *Routledge London.*

O'Connor, J.P. 1977. Lough Derrygeeha, Co. Clare, a new locality for *Cyrnus insolutus* McLachlan (Trichoptera: Polycentropodidae). *Entomologist's Record and Journal of Variation* **89**: 309-310.

O'Connor, J.P. 1980. *Limnephilus pati* sp. N. (Trichoiptera: Limnephilidae), a cadddisfly new To Great Britain and Ireland. *Irish Naturalist's Journal* **20**: 129-133.

O'Connor, J.P. & Barnard, P.C. 1981. *Limnephilus tauricus* Schmid (Trichoptera: Limnephilidae) new to Great Britain, with a key to the *L. hirsutus* (Pictet) group in the British Isles. *Entomologist's Gazette* **32**: 115-119.

O'Connor, J.P. & Bond, K.G.M. 1995. *Limnephilus pati* O'Connor rediscovered and *L.tauricus* Schmid (Trichoptera: Limnephilidae) new to Ireland. *Entomologist's Gazette* **46**: 207-208.

O'Connor, J.P. & Wise, E.J. 1984. Observations on the Trichoptera of the Killarney Lakes. *Irish Fisheries Investigations* **74.**

Parfitt, E. 1858. The Phryganidae near Exeter. *Entomologist's Weekly Intelligencer* **5**: 141.

Parfit, E. 1860. Note on *Hydroptila pulchricornis* and *H. tineoides. Zoologist* **18**: 7111.

Pelham-Clinton, E.C. 1966a. *Nemotaulius punctatolineatus* (Retzius), a caddis-fly new to the British Isles (Trichoptera, Limnephilidae). *Entomologist's Gazette* **17**: 7-8.

Pelham-Clinton, E.C. 1966b. A further British Record of *Anabolia brevipennis* (Curtis) (Trichoptera, Limnephilidae). *Entomologist's Record & Journal of Variation* **78**: 269.

Porritt, G.T. 1890. [on Phacopteryx brevipennis] *Entomologist's Monthly Magazine* **26.**

Porritt, G.T. 1903. An excursion to the Norfolk Broads principally in quest for Odonata. *Entomlogist's Monthly Magazine* **for 1903**: 251-252.

Porritt, G.T. 1913. *Platycelis roeselii*, Hagen, etc., on the Lincolnshire coast. *Entomologist's Monthly magazine* **39**: 16-17.

Ross, E. 2006. Caddis Flies (Trichoptera) collected from Wicken Fen, Cambridgeshire and Minsmere, Suffolk during 2004-2005. *British Journal of Entomology and Natural History* **19**: 206-208.

Ross, E. 2008 Caddisflies (Trichoptera) collected in the Malham Tarn area (Yorkshire) in July 2006 and 2007. *British Journal of Entomology and Natural History* **21**: 152-153,

Ross, E. 2010 Adult caddisflies (Trichoptera) collected in Wales and Shropshire in July 2008. *British Journal of Entomology and Natural History* **23**.

Routledge, G.B. 1933. The Neuroptera etc., and Trichoptera of Cumberland, Westmorland and North Lancashire. *Transactions of the Carlisle Natural History Society* **5**: 44-60.

Salokannel, J, Rinne, A. & Ilmonen, J. 2010, Trichoptera. pages 471-475 *of* Rassi *et al* The 2010 Red List of Finnish species. *Ymparistoministerio & Suomen ymparistokeskus, Helsinki*. 685 pages.

Scott, H. 1924 Coleoptera, Trichoptera, Diptera, etc., at light. *Entomologist's Monthly Magazine* **60**: 154.

Shardlow, M. 2006. Sheep-dip banned to save rivers. *Pesticide News (the Journal of Pesticide Action UK*. **No. 72**: 3-4.

Shirt, D.B., (Ed.) 1987. *British Red Data Books 2. Insects.* Peterborough, Nature Conservancy Council.

Solem, J.O. 1970. Trichoptera new to Norway. *Norsk Entomologisk Tiddskrift* **17**: 93-95.

Solem, J.O. & Bongard, T. 1987. Flight patterns of three species of lotic caddisflies. *Proceedings of the 5th International Symposium on Trichoptera 1986.* 223-228.

Spirit, M.G. 1986 Freshwater Invertebrates of Caithness. *Unpublished report from Caithness & Sutherland District Council Community Programmes Agency* **1986.**

Spirit, M.G. & Ryrie, J.L. 1991. The freshwater invertebrates of the Dunbeath estate, Caithness. *Glasgow Naturalist* **22**: 47-58.

Terra, L.S.W. & Gonzalez, M.A, 1984. Notes on the distribution of caddisflies in Portugal. *Proceedings of the 4th International Symposium on Trichoptera 1983*: 391-396.

Vick, G.S. 1992. The caddisfly *Ironoquia dubia* (Stephens) in Britain (Trichoptera: Limnephilidae). *Entomologist's Gaxette* **43**: 297-302.

Victoria County History, Cornwall 1906. [Insect section].

Wallace, I.D. 1976. The taxonomy of larvae of the British species of the family Leptoceridae (Trichoptera), with notes on their general biology. *Unpublished PhD Thesis, University of Newcastle upon Tyne*.

Wallace, I.D. 1991. A review of the Trichoptera of Great Britain. *Research and Survey in Nature Conservation* **32**: 1-59.

Wallace, I.D. 2006. *Simple key to caddis larvae*. Shrewsbury, Field Studies Council, 59 pages.

Wallace, I.D. 2009a. *A survey for the Nationally Scarce caddisfly Hagenella clathrata (Kolenati) on Fenn's, Whixall, Bettisfield, Cadney and Wem Mosses. A report for the Countryside Council for Wales (R001964).* Countryside Council for Wales, unpublished.

Wallace, I.D. 2009b. *The status and distribution of the rare caddisfly Limnephilus tauricus (Schmid) on Cors Erddreiniog National Nature Reserve. A report for the Countryside Council for Wales (R001971).* Countryside Council for Wales, unpublished.

Wallace, I.D. 2011a. [on *Hagenella clathrata*] http://www.buglife.org.uk/Resources/Buglife/Documents/Sp.%20Mg%20Sheet%20-%20Window%20winged%20sedge%20SD%20IW%20FINAL%20110711.pdf

Wallace, I.D. 2011b [on *Glossosma intermedium*] http://www.buglife.org.uk/Resources/Buglife/Documents/Small%20grey%20sedge%20sheet.pdf

Wallace, I.D. 2011c [on *Hydropsyche bulgaromanorum*] https://www.buglife.org.uk/sites/default/files/Hydropsyche%20bulgaromanorum%20species%20dossier.pdf

Wallace, I.D. 2011d [on *Ironoquia dubia*] https://www.buglife.org.uk/sites/default/files/Ironoquia%20dubia%20species%20dossier.pdf

Wallace, I.D. & Wiggins, G.B. 1978. Observations on the larva and pupa of the caddisfly genus *Hagenella* (Trichoptera: Phryganeidae). *Proceedings of the 2nd International Symposium on Trichopera, 1977* 165-173.

Wallace, I.D. & Wallace, B. 1983. A revised key to larvae of the genus *Plectrocnemia* (Polycentropodidae: Trichoptera) in Britain, with notes on *Plectrocnemia brevis* McLachlan. *Freshwater Biology***13**: 83-87.

Wallace, I.D., Wallace, B. & Philipson. G.N. 2003. Keys to the case-bearing caddis larvae of Britain and Ireland. *Scientific Publications of the Freshwater Biological Association* **61**: 1-259.

Waringer, J. & Graf, W. 2011. Atlas of Central European trichoptera Larvae. *Eric Mauch, Germany.*

Wells, S., Pyle, R.M. and Collins, N.M. (1984) *The IUCN Invertebrate Red Data Book.* IUCN, Gland, Switzerland.

Whitebread, S.E. 1979. *Triaenodes reuteri* McLachlan in Kent (Trichoptera: Leptoceridae). *Entomologist's Gazette* **29**: 156.

Wiggers, R., van den Hoek, T., van Maanen, B., Higler, B. & van Kleef, H. 2006. Some rare and new caddis flies recorded from the Netherlands (Trichoptera). *Nederlandse faunistische mededlingen* **25**: 53-68.

Wilkinson, B. 1981. Quaternary sub-fossil Trichoptera larvae from a site in the English lake District. *Proceedings of the 3rd International Symposium on Trichoptera Series Entomologica* **20**: *409-419.*

Wiggins, G.B. 1977 & 2nd edition1996. Larvae of the North American Caddisfly Genera (Trichoptera).*University of Toronto Press, Toronto, Canada.*

Wiggins, G.B. 2004. Caddisflies the underwater architects. *University of Toronto Press, Toronto, Canada*.

Winter, W. 1860. Phryganidae in the Fens. *Entomologist's Weekly Intelligencer* **9**: 188-189.

Wood, A.H. 1929. The Trichoptera of Wicken Fen page 479-487 *in* Gardiner, J.S. & Tansley, A.G. The Natural History of Wicken Fen (Part 3), *Bowes and Bowes, Cambridge.*

Wormald, P.C. 1861. Neuroptera. *Entomologist's Weekly Intelligencer* **9**: 115.

Wormell, P. 1963. Entomology of the Isle of Rhum, Appendix 12. *Biological Journal of the Linnaean Society* **18**: 322-324.

Further Reading

AINSWORTH, A.M., SMITH, J.H., BODDY, L., DENTINGER, B.T.M., JORDAN, M., PARFIITT, D., ROGERS, H.J. & SKEATES, S.J. 2013. Red List of Fungi for Great Britain: Boletaceae. A pilot conservation assessment based on national database records, fruit body morphology and DNA barcoding. *Species Status Assessment* No 14, ISSN 1473-0154, Joint Nature Conservation Committee, Peterborough.

ALEXANDER, K.N.A. (2014) *A review of the beetles of Great Britain: The Soldier Beetles and Their Allies.* Species Status No.16 Natural England Commissioned Reports, Number 134.

ALEXANDER, K.N.A, DODD, S. & DENTON, J.S. (2014) *A review of the beetles of Great Britain: The Darkling Beetles and Their Allies* Species Status No. 18. Natural England Commissioned Reports, Number 148.

BRATTON, J.H. (ed.). 1991. *British Red Data Books: 3. Invertebrates other than Insects.* Nature Conservancy Council, Peterborough.

CHEFFINGS, C. & FARRELL, L. (eds). 2005. The Vascular Plant Red Data List for Great Britain. *Species Status Assessment* No **7**, ISSN 1473-0154, Joint Nature Conservation Committee, Peterborough.

DAGUET, C., FRENCH, G. & TAYLOR, P. (eds.). 2008. The Odonata Red Data List for Great Britain. *Species Status Assessment* No 11, ISSN 1470-0154, Joint Nature Conservation Committee, Peterborough.

FOSTER, G.N. 2010. A review of the scarce and threatened Coleoptera of Great Britain Part (3): Water beetles of Great Britain. *Species Status* 1. Joint Nature Conservation Committee, Peterborough.

FOX, R., WARREN, M.S. and BRERETON, T.M. 2010. A new Red List of British Butterflies, *Species Status* 12; 1-32. Joint Nature Conservation Committee, Peterborough.

HUBBLE, D.S. 2014. *A review of the scarce and threatened beetles of Britain. The leaf beetles and their allies. Chrysomelidae, Megalopodidae and Orsodacnidae.* Species Status No.19. Natural England Commissioned Reports, Number 161.

IUCN. 1994. *IUCN Red List Categories and Criteria: Version 2.3*, IUCN Species Survival Commission. IUCN, Gland.

IUCN. 2001. *IUCN Red List Categories and Criteria: Version 3.1*. IUCN Species Survival Commission. IUCN, Gland and Cambridge.

IUCN. 2003. Guidelines for Application of IUCN Red List Criteria at Regional Levels: Version 3.0. IUCN Species Survival Commission IUCN, Gland and Cambridge.

IUCN, 2013. *Guidelines for Using the IUCN Red List Categories and Criteria*. Version 10, IUCN Species Survival Commission. IUCN, Gland.

MACADAM, C (2015) *A Review of the Stoneflies (Plecoptera) of Great Britain.* Species Status No.20 Natural England Commissioned Reports, Number 174.

SHIRT, D.B. 1987. *British Red Data Books: 2 Insects*. Nature Conservancy Council, Peterborough.

WOODS, R.G. & COPPINS, B.J. 2012. A Conservation Evaluation of British Lichens and Lichenicolous Fungi. *Species Status Assessment* No 13, ISSN 1473-0154, Joint Nature Conservation Committee, Peterborough.

Appendix 1 A complete listing of all UK Trichoptera species reviewed

Species Name	GB IUCN Status	Qualifying Criteria	Rationale	GB rarity Status (2014)	Presence in England	Presence in Scotland	Presence in Wales	AoO(hectads) <1980	AoO(hectads) 1980-2014	Dual Hectads
Adicella filicornis	EN	B2a + B2b(ii, iv)	A species of isolated very small spring streams. Only 6 modern post 1970 sites and it has apparently disappeared from 3 of them.	NR	E	S	W	5	7	1
Adicella reducta	LC		Widespread and locally common species amongst vegetation, especially tree roots, in flowing water.		E	S	W	84	376	40
Agapetus delicatulus	LC		Widespread and common in stony streams and rivers in Scotland, Wales, Northern and South-western England.		E	S	W	88	126	21
Agapetus fuscipes	LC		Widespread and abundant stream species.		E	S	W	322	1168	204
Agapetus ochripes	LC		A widespread and often abundant river species.		E	S	W	156	218	48
Agraylea multipunctata	LC		Widespread and very common in still waters.		E	S	W	122	385	53
Agraylea sexmaculata	LC		Widespread and common still-water species.		E		W	40	148	18

Agrypnetes crassicornis	CE	B2a + B2b(v)	One UK site with only a few individuals seen in recent years. Lake species.	NR	E			1	1	1
Agrypnia obsoleta	LC		Widespread and common in upland tarns and small lakes. A northern and western species.		E	S	W	117	111	19
Agrypnia pagetana	LC		In still waters in lowland England, Wales and southern Scotland, locally common.		E	S		67	106	19
Agrypnia picta	DD		No modern records and all are probably based on misidentifications so status as a UK species is doubtful. A still-water species.	NR	E	S		0	0	0
Agrypnia varia	LC		Widespread and common in still water.		E	S	W	223	225	58
Allogamus auricollis	LC		Scotland, northern England, a few Weslsh sites, also Herefordshire. A locally common river species.		E	S	W	103	175	31
Allotrichia pallicornis	LC		A ‘micro-caddis’ but with an identifiable larva so encountered in water quality surveys. Widespread river and large stream species.	NS	E	S	W	37	96	7
Anabolia brevipennis	VUL	D2	Only 10 post 1980 sites and few post 2000 records but a difficult species to find. Several earlier records. A carr woodland species.	NR	E	S	W	12	10	3
Anabolia nervosa	LC		Widespread and very common in all sorts of permanent waters.		E	S	W	435	896	259
Apatania muliebris	LC		A widespread but local spring stream species. Partheogenetic so several species may lurk under this name.		E	S	W	53	152	12

Apatania wallengreni	LC		Qualifies as Nationally Scarce. A northern and western species with consequently few records. The early flight period exacerbates the scarcity of records. It is widespread particularly in Scotland and also found in the Lake District and Wales.	NS	E	S	W	37	32	11
Athripsodes albifrons	LC		Widespread and common river species but local in Scotland.		E	S	W	201	491	96
Athripsodes aterrimus	LC		Widespread and common still or slow flowing water species.		E	S	W	376	806	193
Athripsodes bilineatus	LC		Widespread and common river and stream species but local in southern England.		E	S	W	163	498	60
Athripsodes cinereus	LC		Widespread and common in larger permanent waters.		E	S	W	354	980	222
Athripsodes commutatus	LC		Mainly a Northern and Western species so consequently few records. Decline may reflect change of recording from adult to larva, but may be genuine.	NS	E	S	W	64	33	3
Beraea maurus	LC		Widespread and locally common species in spring streams, especially when shaded.		W	S	W	138	428	47
Beraea pullata	LC		Widespread and common flowing marsh species.		E	S	W	134	335	40
Beraeodes minutus	LC		Widespread but local species associated with roots of marginal vegetation, mainly in flowing water.		E	S	W	46	300	16
Brachycentrus subnubilus	LC		Widespread and locally abundant river species.		E	S	W	150	849	126

Ceraclea albimacula	LC		Widespread locally common species. Feeds on sponge in flowing water.	NS	E	S	W	53	91	11
Ceraclea annulicornis	LC		Widespread in stony rivers, and occasionally lake shores.		E	S	W	108	157	42
Ceraclea dissimilis	LC		Widespread and common in stony lakes rivers and large streams.		E	S	W	172	334	71
Ceraclea fulva	LC		There is a good cover of records across the country but it can be difficult to find larvae in the southern part of its range. A still water species with larva feeding on sponge.		E	S	W	107	104	22
Ceraclea nigronervos	LC		Widespread and locally common in stony lakes and rivers. The larva feeds on sponge.		E	S	W	123	148	30
Ceraclea senilis	LC		It is undergoing a significant northward expansion in range. A still or slow-flowing water species whose larva feeds on sponge.		E	S		35	117	8
Chaetopteryx villosa	LC		Widespread and common species of streams, rivers and stony lake shores.		E	S	W	280	1043	191
Cheumatopsyche lepida	LC		Locally common species of large rivers in England Wales, and Scotland north to the Clyde		E	S	W	68	201	40
Chimarra marginata	LC		Mainly northern and western, which probably accounts for some of the scarcity of records of this very local fast-flowing river species.	NS	E	S	W	40	52	12
Crunoecia irrorata	LC		Widespread and common species of permanently flowing trickles and oozes, especially if shaded.		E	S	W	148	450	61

Cyrnus flavidus	LC		Widespread and locally common species of still water.		E	S	W	141	303	49
Cyrnus insolutus	EN	B2a + B2b(iv,v)	Only two certain UK sites. Unsuccessful surveys at one and no recent surveys at the other. A still water species.	NR	E		W	2	0	0
Cyrnus trimaculatus	LC		Widespread and common species mainly of still and slowly flowing water.		E	S	W	310	538	128
Diplectrona felix	LC		Widespread species of small streams. Common in the west.		E	S	W	109	369	62
Drusus annulatus	LC		Widespread and common stony stream and river species.		E	S	W	323	938	227
Ecclopteryx dalecarlica	LC		Widespread stony river and large stream species that is not found in south east England and East Anglia.		E	S	W	149	403	82
Ecnomus tenellus	LC		It has a secretive adult during the day and a larva that lives often very deep. Its range may be expanding.		E		W	40	125	14
Enoicyla pusilla	LC		Very restricted species but widespread within that very restricted range. Terrestrial woodland species.	NS	E			12	17	8
Ernodes articularis	LC		A species of travertine springs and oozes in the south and west.	NS	E		W	7	28	3
Erotesis baltica	VUL	B2a + B2b(ii,iii,iv)	A species of very few permanently wet fens and only widespread in one small area of North Norfolk; may have disappeared from Wicken Fen, its only modern Cambridgeshire site. Only single modern sites for Wales, Lake District and Hampshire.	NR	E		W	11	7	4

Glossosoma boltoni	LC		Widespread and very common except in the south east where it does not occur.		E	S	W	234	480	119
Glossosoma conformis	LC		Widespread and very common except in the south east where it does not occur. Often in smaller streams than *G. boltoni.*		E	S	W	115	225	38
Glossosoma intermedium	CE	B2a + B2b(ii,iv)	Became restricted to two sites during the 1990s and then seemed to go from them too.themtoo, A stream species.	NR	E			5	2	2
Glyphotaelius pellucidus	LC		Widespread and common mainly still water species.		E	S	W	307	750	177
Goera pilosa	LC		Widespread and common stony stream river and lake species.		E	S	W	239	810	149
Grammotaulius nigropunctatus	LC		Widespread and common species of grassy marshes that dry up over summer.		E	S	W	164	136	35
Grammotaulius nitidus	NT	B2a; B2b(ii, iv)	Historic decline and few modern sites. Lack of knowledge of exact larval requirements makes specific conservation measures difficult to plan.	NR	E			23	6	2
Hagenella clathrata	EN	B2a + B2b(ii,iii, iv)	At all its few studied sites it has undergone considerable reduction in area occupied. It is a species of marginal areas of bogs.	NR	E	S	W	6	8	2
Halesus digitatus	LC		Widespread common stream and river species.		E	S	W	211	664	85
Halesus radiatus	LC		Widespread and common river stream and lake species.		E	S	W	346	1207	227
Holocentropus dubius	LC		Widespread and locally common especially in upland peaty lakes.		E	S	W	72	186	17

Holocentropus picicornis	LC		Widspread and fairly common still water species.		E	S	W	139	209	38
Holocentropus stagnalis	LC		Prefers marshes and may be under-recorded compared with others in the genus but still appears very local and virtually absent from Scotland and the south east.	NS	E	S	W	32	80	9
Hydatophylax infumatus	LC		A widespread species of streams and rivers, but never found frequently as it has a secretive adult and larva.	NS	E	S	W	38	92	8
Hydropsyche angustipennis	LC		Widespread and common species of outflows of ponds and lakes north to the central lowlands of Scotland.		E	S	W	257	978	195
Hydropsyche bulgaromanorum	CE	B2a + B2b(ii,iii,iv)	Only one current site and that vulnerable to comparatively slight changes in habitat due to water flow changes.	NR	E			4	2	1
Hydropsyche contubernalis	LC		Widespread and common species of larger rivers, unless nutrient poor, so scarce in Scotland.		E	S	W	121	421	74
Hydropsyche exocellata	CE (E)	B2a +B2b(ii, ,iv)	Last record 1902. Restricted to River Thames. Presumed extinct.	NR	E			5	0	0
Hydropsyche fulvipes	LC		A new larval key and more recording from spring streams is constantly increasing the number of records.		E	S	W	29	114	10
Hydropsyche instabilis	LC		Widespread and common species of rivers and large streams.		E	S	W	238	823	149
Hydropsyche pellucidula	LC		Widespread and common species of streams and rivers.		E	S	W	425	1449	367

Hydropsyche saxonica	LC		The rarest of the common Hydropsychidae but the new larval key is leading to a steady increase in records of this stream species.	NS	E	S	W	3	89	1
Hydropsyche siltalai	LC		Widespread and common species of streams and rivers.		E	S	W	489	1713	434
Hydroptila angulata	LC		This is a 'micro-caddis' with an un-identifiable larva so is consequently under-recorded. Seems to be a river species.	NS	E	S	W	14	17	1
Hydroptila cornuta	VU	D2	No records since 1938; 8 records in total. Elsewhere in Europe sometimes taken in large numbers.	NR	E	S		8	0	0
Hydroptila forcipata	LC		A widespread common stony river and stream species.		E	S	W	104	68	8
Hydroptila lotensis	NT	B2a + D2	Found only in 2 large rivers and probably one of their tributaries.	NR	E		W	1	4	1
Hydroptila martini	DD		A 'micro-caddis' with an unidentifiable larva so is consequently under-recorded. Also only recently recognised as a UK species. Widespread stream species.	NS	E	S	W	14	12	0
Hydroptila occulta	DD		Earlier records include *H. martini* and *H. valesiaca* so decline probably not as marked as might appear. Nevertheless appears to be scarce. Flowing water species.	NS	E	S	W	52	10	0
Hydroptila pulchricornis	DD		As a 'micro-caddis' will be under-recorded but still seems to be declining and deserving of its status. Streams especially lake exits.	NS	E	S	W	28	5	1

Hydroptila simulans	DD		A flowing water species and will be under-recorded as a 'micro-caddis' with unidentifiable larva.	NS	E	S	W	27	15	1
Hydroptila sparsa	LC		A widespread flowing water species. A 'micro-caddis' with an unidentifiable larva hence under-recorded and certain to occur in many more hectads.		E	S	W	107	96	17
Hydroptila sylvestris	DD		A rare Scottish hydroptilid with an unidentifiable larva so likely to be significantly under-recorded but still appears to be genuinely rare.	NR	E	S		7	4	3
Hydroptila tigurina	DD		A very rare caddis with one 19th century Lake District records and a few from North-west Scotland.	NR	E	S		1	1	0
Hydroptila tineoides	LC		It is a widespread and common species of lakes, rivers and streams.		E	S	W	94	52	7
Hydroptila valesiaca	DD		This is a 'micro-caddis' with an unidentifiable larva so is consequently under-recorded. Also only recently recognised as a UK species. It appears to breed in spring streams.	NR	E	S		2	4	0
Hydroptila vectis	LC		It is a widespread stream species.		E	S	W	84	61	6
Ironoquia dubia	CE	B2a + B2b(ii,iv)	The only post 1980 records are from two small streams in south east England, neither of which produced any specimens when examined recently.	NR	E			4	2	2

Ithytrichia clavata	DD		A rare hydroptilid with a very common relative but inseparable as larvae makes this inevitably under-recorded. Nevertheless, with only 3 records it is regarded as probably truly rare.	NR	E		W	4	0	0
Ithytrichia lamellaris	LC		An assumption has been made that records for the genus will be this species. The larvae of the two cannot be separated.		E	S	W	34	176	18
Lepidostoma basale	LC		Locally common in rivers and streams, except in Scotland. Associated with dead wood.		E	S	W	73	257	39
Lepidostoma hirtum	LC		A widespread and common species of stony lakes rivers and streams.		E	S	W	355	1222	273
Leptocerus interruptus	VU	D2	There are records from 6 river systems but none post 2000. Especially associated with tree roots.	NR	E		W	5	4	1
Leptocerus lusitanicus	LC		This is still a scarce species but seems to be increasing its range. It lives in slowly flowing rivers and gravel pits.	NS	E			4	20	2
Leptocerus tineiformis	LC		A widespread and common pond and lake species in midland and southern England, but also found in Wales and northern England and seems to be increasing its range.		E		W	65	190	25
Limnephilus affinis	LC		A widespread and common species of still waters that dry up over summer. Especially common in saltmarshes.		E	S	W	333	272	87
Limnephilus auricula	LC		A widespread and common species of marshes that dry up over summer.		E	S	W	405	507	139

Limnephilus binotatus	LC		A widespread and locally common species of fens and marshes.	NS	E	S	W	63	93	15
Limnephilus bipunctatus	LC		Widespread but very local, which is surprising as it breeds in very small temporary pools which is a very common habitat.	NS	E	S	W	61	61	2
Limnephilus borealis	LC		Seems to be widespread in Highland Scotland where it lives in lochs of various sizes.	NS		S		26	24	3
Limnephilus centralis	LC		A widespread and common species of water bodies that dry up over summer/ Especially streams and flowing marshes.		E	S	W	375	382	115
Limnephilus coenosus	LC		Predominantly a northern and western and upland species so will be comparatively under-recorded, It is an expected species from moorland peat pools across its range.		E	S	W	94	113	22
Limnephilus decipiens	LC		Mainly restricted to the southern half of England where it is a widespread and often common still water species.		E		W	51	118	14
Limnephilus elegans	LC		This is a species of upland peat swamps and lowland raised bogs. It will be under-recorded but seems to justify the grade of Nationally Scarce.	NS	E	S	W	58	48	10
Limnephilus extricatus	LC		A widespread and common species of the weedy edges of flowing marshes and streams.		E	S	W	175	462	62

Limnephilus flavicornis	LC		A widespread and common still-water species that uses whole water bodies that dry-up over summer, or the winter-wet summer-dry edges of permanent waters.		E	S	W	274	506	135
Limnephilus fuscicornis	LC		A widespread but local lowland species with a very secretive adult and a larva that is only occasionally encountered.	NS	E	S	W	55	79	8
Limnephilus griseus	LC		A species that seems to be declining significantly but hopefully will not pass into the Near Threatened category. The habitat is temporary pools in acid heath and in Sphagnum areas. Probably widespread in Scotland.	NS	E	S	W	172	76	22
Limnephilus hirsutus	LC		A widespread but uncommon species which breeds in small streams and marshes, often highly calcareous, or with flocculent iron depositing, that are infrequently sampled.	NS	E	S	W	84	77	10
Limnephilus ignavus	LC		This is a predominantly northern species only widespread in Scotland.. Elsewhere there are a scatter of records. Will be under-recorded but it may be declining significantly for reasons that are not known.	NS	E	S	W	70	26	2
Limnephilus incisus	LC		A widespread common species of non-acidic marshes and fens with tussocky vegetation, that dry-up over summer.		E	S	W	200	142	34
Limnephilus lunatus	LC		An abundant widespread species found in all types of permanent water body.		E	S	W	221	1314	428

Limnephilus luridus	LC		A widespread and common species of acidic marshes and bogs, also, woodland pools.		E	S	W	221	247	61
Limnephilus marmoratus	LC		A widespread and common species of still waters of all types, usually ones that dry up to a central wet area.		E	S	W	392	710	179
Limnephilus nigriceps	LC		This is a predominantly northern species but also found in eastern England. The larva has only been recognised comparatively recently, which coupled with a very late adult flight period will make this species comparatively under-recorded.	NS	E	S	W	35	35	4
Limnephilus pati	CE	B2a + B2b(ii, iii)	There have been no English records for over 100 years and it is probably extinct, but it may still occur in the Isle of Man.	NR	E			2	0	0
Limnephilus politus	LC		A widespread still water species that extends north to the central lowlands of Scotland. It is only common in the south east of England. It may be declining.	NS	E	S	W	93	78	19
Limnephilus rhombicus	LC		A widespread and common species of all types of water body that retain some water over summer.		E	S	W	215	452	92
Limnephilus sparsus	LC		A widespread and common species of grassy marshes that dry-up over summer.		E	S	W	529	406	141
Limnephilus stigma	LC		A species that is rare in the south of England and Wales. It lives in temporary grassy marshes.		E	S	W	111	102	15

Limnephilus subcentralis	NT	B2a + B2b(ii,iv)	A species of Highland Scotland lochs and ponds but with very few modern records.	NR		S		12	6	2
Limnephilus tauricus	VUL	D2	Very few localities and occurs in a restricted area at the one Welsh site, suggesting specialised habitat requirements. They would seem to be associate with slowly flowing water in marshes.	NR	E		W	3	2	0
Limnephilus vittatus	LC		A widespread and common species of a wide range of water bodies that dry-up or summer.		E	S	W	381	357	99
Lype phaeopa	LC		A widespread and common species of streams and rivers but with few Scottish records. Under-recorded due to inadequacies in larval key.		E	S	W	139	350	45
Lype reducta	LC		A widespread and common species of streams. Significantly over-recorded due to inadequacies with the larval key.		E	S	W	49	827	28
Melampophylax mucoreus	LC		A local species, widespread in England but very restricted in Scotland and Wales. Commonest in alkaline waters.		E	S	W	77	209	45
Mesophylax aspersus	MIGRANT		Only a handful of records. and no evidence of breeding.	Migrant	E			3	0	0
Mesophylax impunctatus zetlandicus	NT	B2b(ii,v)	A widespread northern and western species lake which is one reason for the comparatively small number of records. It may be declining significantly e.g. very few recent Lake District records.	NR	E	S		17	11	4

Micropterna lateralis	LC		A widespread and common species of streams and ditches that dry-up over summer.		E	S	W	171	462	48
Micropterna sequax	LC		A widespread and common species of small streams.		E	S	W	227	695	87
Molanna albicans	LC		Common in small lakes in upland north Wales and widespread across Scotland north of the Forth /Clyde but found in comparatively few waters in that country.	NS	E	S	W	29	22	6
Molanna angustata	LC		A widespread and common species in the midlands and south of England. One Scottish and a handful of Welsh records.		E	S	W	193	561	128
Mystacides azurea	LC		A widespread and common species of streams rivers and stony lakes.		E	S	W	387	1029	252
Mystacides longicornis	LC		A widespread and common species of larger permanent still waters.		E	S	W	255	852	160
Mystacides nigra	LC		A widespread but only locally common species of a wide range of permanent water bodies.		E	S	W	158	278	278
Nemotaulius punctatolineatus	DD		Few sites, restricted to the Flow Country in Scotland, where it may be common, but that needs to be determined. also found at a few places on Speyside.	NR		S		1	7	1
Neureclipsis bimaculata	LC		A widespread if local species usually restricted to lake exit sites.		E	S	W	77	216	31

Notidobia ciliaris	LC		This is mainly a south eastern species. The habitat is the roots of marginal grasses of rivers and canals. Even within its range there are comparatively few records.	NS	E		W	57	65	15
Odontocerum albicorne	LC		A widespread and common species of stony streams and rivers.		E	S	W	248	1059	201
Oecetis furva	LC		A widespread species, but coastal marshes in the south east of England is the only area where this is a species that can be expected to be found.	NS	E	S	W	24	58	6
Oecetis lacustris	LC		A widespread and common species of ponds and lakes, but with no records from northern Scotland.		E	S	W	125	216	25
Oecetis notata	LC		The number of sites is steadily increasing suggesting it may be spreading. A river species.	NS	E		W	17	19	5
Oecetis ochracea	LC		A widespread and common species of lakes and larger ponds.		E	S	W	190	245	61
Oecetis testacea	LC		A widespread and commons species of stony streams, rivers and lakes, but absent from eastern England.		E	S	W	81	252	41
Oligotricha striata	LC		This is a widespread species that is probably under-recorded. but probably justifies it status as Nationally Scarce It lives in small permanent acidic pools.	NS	E	S	W	76	69	14
Orthotrichia angustella	DD		It seems to have declined significantly. A widespread still-water species. That can be common. A survey methodology is required.	NR	E	S		22	2	0

Orthotrichia costalis	LC		It is a widespread and locally common species. As a hydroptilid 'micro-caddis' with an unidentifiable larva it will be comparatively under-recorded.	NS	E	S	W	36	17	2
Orthotrichia tragetti	DD		Only recorded twice. From a fishing lake It is thought the species might have been introduced with weed but then died out.	NR	E			1	0	0
Oxyethira distinctella	DD		Only recorded once, from a fishing lake. It is thought the species might have been introduced with weed but then died out.	NR	E			1	0	0
Oxyethira falcata	LC		It is a widespread species of streams, and also upland flowing marshes. A micro cadis with an inidentifiable larva.		E	S	W	43	54	3
Oxyethira flavicornis	LC		A widespread and common species of lakes. A mcro caddis with an unidentifiable larva.		E	S	W	96	63	8
Oxyethira frici	LC		A widespread but locally common flowing water species. A micro caddis with an unidentifiable larva.	NS	E	S	W	20	15	3
Oxyethira mirabilis	LC		A 'micro caddis' with an undentifiable larva, so consequently will besignificantly under-recorded. Added to that it is a species of upland water-shed mires. Until very recently there were no post 1980 records as the habitat was not known.	NS	E	S	W	1	11	0
Oxyethira sagittifera	DD	B2b(ii,iv)	As a hydroptilid 'micro caddis' with an unidentifiable larva this will be significantly under-recorded. It is a widespread species of lakes and ponds but may be declining.	NR	E	S	W	13	5	1

Oxyethira simplex	LC		As a hydroptilid 'micro caddis' with an unidentifiable larva it will be significantly under-recorded. Widespread and locally common with records from streams rivers and lakes.	NS	E	S	W	19	21	1
Oxyethira tristella	DD	B2b(ii,iv)	A hydroptilid 'micro-caddis with an undentifiable larva so consequently will be significantly under-recorded. Even after taking that into consideration there are few records and only one recent one. That was from north-west Scotland where survey might prove it widespread therefore DD seems a appropriate grade.	NR	E	S	W	11	1	0
Philopotamus montanus	LC		A widespread and common species of fast-flowing streams and rivers in the north and west. No records from south east England and East Anglia.		E	S	W	270	482	136
Phryganea bipunctata	LC		A widespread and common species of permanent still water.		E	S	W	203	517	84
Phryganea grandis	LC		A widespread and common species of permanent still water.		E	S	W	199	421	87
Plectrocnemia brevis	LC		A very local species, restricted to small shaded streams and trickles where travertine is depositing.	NS	E		W	5	44	4
Plectrocnemia conspersa	LC		A widespread and common species of streams and flowing marshes.		E	S	W	416	1189	250
Plectrocnemia geniculata	LC		A widespread stream species.		E	S	W	115	355	38
Polycentropus flavomaculatus	LC		A widespread and common species of stony streams rivers and lakes.		E	S	W	651	1427	493

Polycentropus irroratus	LC		A widespread but local species of streams rivers and lakes.		E	S	W	108	199	26
Polycentropus kingi	LC		A widespread species. Mainly northern and western but distribution clouded by over-recording due to an inadequate larval key.		E	S	W	91	592	48
Potamophylax cingulatus	LC		A widespread and common species of streams and rivers and very occasionally lake shores in Scotland.		E	S	W	268	765	146
Potamophylax latipennis	LC		A widespread and common species of stony streams rivers and lake shores.		E	S	W	360	998	223
Potamophylax rotundipennis	DD		A widespread but very local species of streams and rivers that have a sandy substratum. Probably over-recorded due to problems with the larval key.	NS	E	S	W	31	238	9
Psychomyia fragilis	DD		Records confirmed by adults are only from England and from travertine depositing streams and rivers. Suspected problems with larval key mean that single records from many other sites are probably incorrect.	NS	E	S?	W?	21	98	10
Psychomyia pusilla	LC		A widespread and common species of rivers and large streams.		E	S	W	212	506	121
Rhadicoleptus alpestris	LC		A species of water-shed marshes in upland Wales and northern England, also raised bogs. Very rare in Scotland.	NS	E	S	W	33	28	5
Rhyacophila dorsalis	LC		A widespread and common species of streams and rivers.		E	S	W	665	1655	580

Rhyacophila fasciata	LC		A widespread species that may be common in travertine-depositing streams but found also in smaller numbers in other non-acidic streams. Inadequacies in the larval key have probably led to over-recording.		E	S	W	52	295	23
Rhyacophila munda	LC		A widespread but never abundant stream and river species in Scotland, Wales, northern and south-western England.		E	S	W	72	204	36
Rhyacophila obliterata	LC		A widespread stream and river species in Scotland, Wales, northern and south-western England.		E	S	W	154	266	57
Sericostoma personatum	LC		A widespread and common species of streams, rivers and lakes. Even commoner than data suggests as most of an additional 6000 records from the Environment Agency described as Sericostomatidae probably refer to this and not *Notidobia cilaris*, but are omitted from the calculations.		E	S	W	435	1746	387
Setodes argentipunctellus	NT	B2a	There are certain records from 3 rivers in south-west England, 3 Lake District lakes and Mochrum loch in Galloway. It is abundant in Windermere and Coniston.	NR	E	S		7	10	5
Setodes punctatus	VU	D2	Modern records only from the River Severn where there are several sites. Older records for the River Wye. Given the grading due to being recorded recently from one site	NR	E		W	4	7	0

Silo nigricornis	LC		Widespread stream and river species but only common in south east England where it may be abundant in waters running from the chalk.		E	S	W	100	352	54
Silo pallipes	LC		Widespread and common stream and river species.		E	S	W	281	1022	195
Stenophylax permistus	LC		Widespread and common species of small streams and ditches that dry-up over summer.		E	S	W	267	308	85
Stenophylax vibex	LC		The adult is conspicuous and light traps. It is widespread but the small number of records probably reflects a genuinely scarce species.	NS	E	S	W	90	55	9
Synagapetus dubitans	DD		Only recently added to UK list. A very restricted Yorkshire species of small vulnerable travertine-depositing spring streams.	NR	E			0	2	0
Tinodes assimilis	LC		There is a strong concentration of records in the west. A species of very small streams.	NS	E	S	W	38	54	5
Tinodes dives	LC		This is a species of upland limestone streams and as this habitat is not common in GB, neither is the caddis.	NS	E	S	W	42	36	11
Tinodes maclachlani	LC		Qualifies for Nationally Scarce but is a widespread and locally common species of small streams and trickles so will be under-recorded.	NS	E	S	W	69	79	5
Tinodes pallidulus	VUL	B2a +B2b(ii, ,iv)	There are only 6 post 1980 sites, and only the Wyre Forest has adjacent sites. It lives in streams.	NR	E		W	2	3	0

Tinodes rostocki	LC		A rare stream species that is only widespread and fairly common in the Brecon Beacons and Black Mountains of south east Wales. It is recorded from enough sites to suggest that it does not justify a Near Threatened grading.	NR	E		W	16	10	2
Tinodes unicolor	LC		This is a species of travertine depositing streams in England and Wales. It is an expected species in such waters.		E		W	35	131	6
Tinodes waeneri	LC		A widespread and common species of stony lakes, and rivers and occasionally streams.		E	S	W	447	996	265
Triaenodes bicolor	LC		A widespread and common pond and lake species.		E	S	W	181	336	59
Triaenodes ochreellus	DD		A recent addition to the GB list and not yet taken as a larva so habitat not known	NR	E			0	1	0
Tricholeiochiton fagesii	LC		This is a widespread species but with few scattered records. New sites are being found quite often but it is thought likely it will always be considered rare. Most records are as the unmistakable larva.	NS	E	S	W	3	10	1
Trichostegia minor	LC		It is a widespread and common species in most of England but scarcer in Wales and just reaches southern Scotland. Lives in pools and marshes that dry-up in summer and are choked with rotting leaves over-winter.	NS	E	S	W	50	98	24

Wormaldia mediana	DD		It has only been identifiable as an adult comparatively recently and is still not identifiable as a larva. It may have significantly declined post 2000 so a grading of DD has been chosen. It is mainly a northern and western species.The habitat is small fast stony rivers.	NR	E	S	W	15	12	1
Wormaldia occipitalis	LC		A widespread and common species of small streams and larger trickles, but absent from south east England and East Anglia.		E	S	W	152	299	55
Wormaldia subnigra	LC		A widespread species of rivers, especially those that flow from lakes. It may be declining.	NS	E	S	W	95	56	12
Ylodes conspersus	LC		More or less restricted to the south of England, where in the chalk rivers it is very common.	NS	E			35	27	9
Ylodes reuteri	VUL	B2a; B2b(iii, iv)	Only one post 1980 site,, Loch Harray a brackish water in Orkney. Other older sites are all associated with salt marshes in the south and east of England.	NR	E	S		6	1	1
Ylodes simulans	NT	D2	Was found in only 5 river systems. Only 2 post 2000 so may be declining. Individual populations may be large.	NR	E	S	W	7	9	4

Appendix 2 Summary of IUCN criteria

Summary of the five criteria (A–E) used to evaluate if a taxon belongs in a threatened category (Critically Endangered, Endangered or Vulnerable)

	Critically Endangered	Endangered	Vulnerable
A. Population reduction			
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%

A1. Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible **AND** understood **AND** have ceased, based on and specifying any of the following:

(a) direct observation

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality

(d) actual or potential levels of exploitation

(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

A2. Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased **OR** may not be understood **OR** may not be reversible, based on (a) to (e) under A1.

A3. Population reduction projected or suspected to be met in the future (up to a maximum of 100 years) based on (b) to (e) under A1.

A4. An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a maximum of 100 years in future), and where the causes of reduction may not have ceased **OR** may not be understood **OR** may not be reversible, based on (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)			
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²

AND at least 2 of the following:

(a) Severely fragmented, **OR**

Number of locations	= 1	≤ 5	≤ 10

(b) Continuing decline observed, estimated, inferred or projected in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** area, extent and/or quality of habitat; **(iv)** number of locations or subpopulations; **(v)** number of mature individuals.

(c) Extreme fluctuations in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** number of locations or subpopulations; **(iv)** number of mature individuals.

C. Small population size and decline			
Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of C1 or C2:			
C1. An observed, estimated or projected continuing decline of at least (up to a maximum of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
(up to a max. of 100 years in future)			
C2. An observed, estimated, inferred or projected continuing decline **AND** at least 1 of the following 3 conditions:			
(a i) Number of mature individuals in each subpopulation:	≤ 50	≤ 250	≤ 1,000
or			
(a ii) % of mature individuals in one subpopulation =	90–100%	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals.			

D. Very small or restricted population			
Either:			
Number of mature individuals	< 50	< 250	**D1.** < 1,000
D2. *Only applies to the VU category*. Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.			**D2.** typically: AOO < 20 km² or number of locations ≤ 5
E. Quantitative Analysis			
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

Appendix 3 Major habitat preferences of the Nationally Rare, Scarce and Threatened Trichoptera of Great Britain

Main Habitat type	Threat category
Flowing Water (Rivers and large streams)	
Athripsodes commutatus	
Ceraclea albimacula	
Chimarra marginata	
Glossosoma intermedium	Critically Endangered
Hydatophylax infumatus	
Hydropsyche bulgaromanorum	Critically Endangered
Hydropsyche exocellata	Critically Endangered
Hydropsyche saxonica	
Hydroptila angulata	
Hydroptila lotensis	Near Threatened
Hydroptila martini	
Hydroptila occulta	
Hydroptila pulchricornis	
Hydroptila simulans	
Hydroptila sylvestris	
Hydroptila tigurina	
Ironoquia dubia	
Ithytrichia clavata	
Leptocerus interruptus	Near Threatened
Leptocerus lusitanicus	
Limnephilus fuscicornis	
Notidobia ciliaris	
Oecetis notata	
Orthotrichia angustella	
Orthotrichia costalis	
Oxyethira sagittifera	
Oxyethira tristella	
Psychomyia fragilis	
Setodes argentipunctellus	Near Threatened
Setodes punctatus	Vulnerable
Tinodes dives	

Tinodes pallidulus	Vulnerable
Tinodes rostocki	
Wormaldia mediana	
Wormaldia subnigra	
Ylodes conspersus	
Ylodes simulans	Near Threatened
Small streams and trickles	
Adicella filicornis	Endangered
Ernodes articularis	
Hydroptila martini	
Hydroptila valesiaca	
Ironoquia dubia	Critically Endangered
Limnephilus bipunctatus	
Limnephilus hirsutus	
Mesophylax asperses	
Oxyethira simplex	
Plectrocnemia brevis	
Synagapetus dubitans	
Tinodes assimilis	
Tinodes dives	
Tinodes maclachlani	
Tinodes pallidulus	Vulnerable
Tinodes rostocki	
Still water (Lakes, larger ponds and canals)	
Agrypnetes crassicornis	Critically Endangered
Agrypnia picta	
Apatania wallengreni	
Cyrnus insolutus	Endangered
Holocentropus stagnalis	
Hydroptila angulata	
Hydroptila cornuta	
Hydroptila occulta	
Leptocerus lusitanicus	
Limnephilus borealis	

Limnephilus nigriceps	
Limnephilus subcentralis	Near Threatened
Mesophylax impunctatus	Near Threatened
Molanna albicans	
Nemotaulius punctatolineatus	
Notidobia ciliaris	
Oecetis furva	
Oligotricha striata	
Orthotrichia angustella	
Orthotrichia costalis	
Orthotrichia tragetti	
Oxyethira distinctella	
Oxyethira sagittifera	
Psychomyia fragilis	
Setodes argentipunctellus	Near Threatened
Tricholeiochiton fagesii	
Trichostegia minor	
Ponds (small)	
Holocentropus stagnalis	
Oligotricha striata	
Tricholeiochiton fagesii	
Trichostegia minor	
Fens (non-acidic) and associated pools ditches dykes and streams	
Anabolia brevipennis	Vulnerable
Erotesis baltica	Vulnerable
Holocentropus stagnalis	
Grammotaulius nitidus	
Limnephilus binotatus	
Limnephius pati	Critically Endangered
Limnephilus tauricus	Vulnerable

Bogs (acidic)	
Hagenella clathrata	Endangered
Limnephilus elegans	
Limnephilus griseus	
Oligotricha striata	
Oxyethira mirabilis	
Rhadicoleptus alpestris	
Brackish water	
Ylodes reuteri	Near Threatened
Terrestrial	
Enoicyla pusilla	

Summary

39 species associated with larger flowing waters (rivers, larger streams, canals) - 9 of them have an IUCN Threat category

16 species associated with smaller flowing waters (small streams and trickles) - 3 of them have an IUCN Threat Category

28 species associated with larger still waters (Lakes, ponds and canals) - 5 of them have an IUCN Threat Category

4 species associated with small ponds - 0 have an IUCN Threat Category

7 species associated with non-acidic fens (and their associated natural pools ditches and streams) - 4 of them have an IUCN Threat Category

6 species associated with acidic bogs (and their associated natural pools ditches and streams) - 1 of them has an IUCN Threat Category

1 species, with a Threat Category is associated with brackish water and 1 species that is terrestrial does not have a Threat Category

(Note that several species appear in more than one category)

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