

**ASSESSING THE CONSERVATION STATUS OF BLACKFLIES
(DIPTERA: SIMULIIDAE) IN FINLAND:
BACKGROUND AND METHODS**

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ABSTRACT – Only a third of the 43 000 known species in Finland were assessed for the latest Red Data Book of Finnish species. A national research program aims at improving the knowledge of poorly known taxonomic groups and increasing the proportion of assessed species. One of the poorly known insect families in Finland is that of the blackflies (Diptera: Simuliidae). The conservation status of blackflies is assessed based on the distribution and ecology of the species, following the IUCN Criteria. A list of the provincial distribution of blackfly species recorded in Finland serves as basic information about the distribution of species. The provincial distribution revealed that blackflies have been unevenly surveyed across the provinces of Finland. Currently, insufficient knowledge of ecology and distribution, and taxonomical problems prevent assessment of the conservation status of nearly half of the known blackfly species. The first assessment of the conservation status of Finnish blackflies will be made by 2010, and knowledge of the species' distribution, ecology, and taxonomy is expected to be improved before that.

KEY WORDS: Simuliidae, conservation status, ecology, habitats, taxonomy

INTRODUCTION

The latest Red Data Book of Finland listed 1505 threatened species, only ca. 3% of the 43 000 species known from Finland at the time (RASSI *ET AL.*, 2001). However, only some 15 000 species could be assessed because information on most species was too poor to allow assessment of the conservation status. Beginning in 2003, the Finnish Ministry of the Environment has funded a research program on insufficiently known and threatened forest species (hereafter PUTTE) (MINISTRY OF THE ENVIRONMENT, 2006). The Ministry of the Environment is financing the PUTTE program with 1-1.6 million euros for the period of 2003-2007, making it the biggest investment so far

in taxonomic research in Finland. The aim of the program is to improve the knowledge of all deficiently known taxa, with an emphasis on forested habitats. In the next Red Data Book, scheduled for 2010 (RASSI *ET AL.*, 2001), assessment of the conservation status is expected for a larger proportion of Finnish taxa.

In general, the distribution and ecology of most insect species in Finland are poorly known. Among the least known orders is Diptera, of which less than 10% of the 5,500 species known at the time were covered by the latest assessment (RASSI *ET AL.*, 2001). Blackflies (Diptera: Simuliidae) are among the little known insect taxa included in the PUTTE program, and are supposed to be assessed by 2010. The aim of this paper is to describe the background and methodology use to assess the conservation status of blackflies, and to discuss some preliminary results.

MATERIAL AND METHODS

Assessment of conservation status follows the IUCN (2001) Red List Criteria, with some minor national adjustments used in the previous assessment (RASSI *ET AL.*, 2001). The criteria, as presented by RASSI *ET AL.* (2001), include:

- observed, assessed, predicted, or suspected decline of populations
- geographical range and fragmentation
- population size
- criteria for very small total population or range size
- quantitative analysis of the probability of the species' survival in a given time

All criteria include several optional definitions of conservation status classes. With very few exceptions, where the assessment was based on decline of populations (criterion A), only criteria B or D2 (very small geographical range) were used for the red-listed insect species in Finland (RASSI *ET AL.*, 2001). Those two criteria are also the ones that will be applied for blackflies because existing records (especially old ones) are scanty (ILMONEN & KUUSELA, 2006).

ILMONEN & KUUSELA (2006) reviewed the current knowledge and updated the checklist of blackfly species recorded in Finland, enumerating 52 species. The next step after updating the checklist involves collecting all records of the provincial distribution of Finnish blackfly species, which is still in progress. Assessment of conservation status of species will be based on the extent of their geographical range, e.g., the number and location of provinces where the species has been recorded, and their rarity across Finland. However, the conservation status of habitat types in Finland is being assessed simultaneously (2005-2007) with the species research program (KONTULA & RAUNIO, 2005), allowing the conservation status of species' breeding sites to be also considered. In addition to this a recent study was devoted to the blackflies of Northern Sweden (ADLER *ET AL.*, 1999), providing reference for the species' distribution in Scandinavia.

There are a few general assumptions applicable to the assessment of blackflies:

- widely dispersed, common species are not likely to be threatened
- rare species with limited range may be threatened
- the conservation status of a species is probably related to that of its breeding habitats
- all species are to be assessed regardless of their pest status

Those species with poor information on their distribution and ecology will be assessed as

Data Deficient (DD), i.e., not evaluated further (RASSI *ET AL.*, 2001). Widely dispersed and common species will be assigned Least Concern (LC) status, unless the species' ecology suggests otherwise. All remaining species will be assessed using the B and D criteria until the species can be assigned either LC status or one of the categories for threatened species (IUCN, 2001).

PRELIMINARY RESULTS AND DISCUSSION

During compilation of the local distribution of Finnish blackfly species, it became evident that certain areas of Finland have been better studied than others (Fig. 1). The south-western, central and northernmost parts of the country have higher numbers of recorded species than the areas in between, recorded species richness peaking in the two northernmost provinces. This is probably caused by uneven survey efforts across Finland. For example, the number of species in the eastern part of the country should be much higher, considering its connection with the Russian Karelia-Murmansk region, where 26 (CROSSKEY & HOWARD, 2004) to 37 (USOVA, 1961) species have been recorded. On the other hand, ADLER *ET AL.* (1999) recorded 47 blackfly species from Northern Sweden, which is connected to the north-western part of Finland, where 14 to 37 species have been recorded. Nevertheless, some real patterns of blackfly species richness across Finland may be reflected in the current provincial distribution list. For example, in the southwestern archipelago of Finland streams are rare and the richness of lotic species presumably is generally lower than on the mainland. It is also possible that the actual species richness of blackflies is higher than currently known in Northern Finland, where elevational gradients are more extensive and where streams are more common and diverse than in Central and Southern Finland.

At this stage, 26 (46%) of the 57 species of blackflies recorded from Finland have been given LC status, being common and widespread in either the whole country or its northern part, where anthropogenic disturbance is relatively low. The proportion of provinces occupied by LC species across Finland ranges from 10 to 100%. Four northern species (recorded in 10 to 14% of the provinces) are under consideration for red-listing. These are *Prosimulium ursinum* (Edwards, 1935), *Metacnephia tredecimata* (Edwards, 1920), *Cnephia eremites* Shewell, 1952, and *S. monticola* Friederichs, 1920. Of these species, *P. ursinum* and *C. eremites* are holarctic, *Simulium monticola* is widely disseminated across Europe, and *M. tredecimata* is restricted to Fennoscandia and the northwestern part of Russia (CROSSKEY & HOWARD, 2004).

Altogether, 27 species (47%) are so far placed in the DD category for a number of reasons. For many species, the records are scattered across Finland (up to 43% of the provinces) with wide geographical gaps between records. On the other hand, a number of the DD species can only be identified either as adults or by chromosome analysis, which has not been widely applied in Finland to date (ILMONEN & KUUSELA, 2006). Some of the little known species live in poorly studied habitats, such as small seeps and intermittent streams, and some are taxonomically problematical.

The provisional distribution is constantly being updated, and no fixed conclusions have been drawn so far. New data will be gathered until 2009, and by 2010 our knowledge of the ecology of the blackfly species will hopefully be improved enough to make the first assessment of their conservation status. The assessment of threatened habitat types will be published in 2007, and some of the taxonomical problems are expected to be solved in the near future.

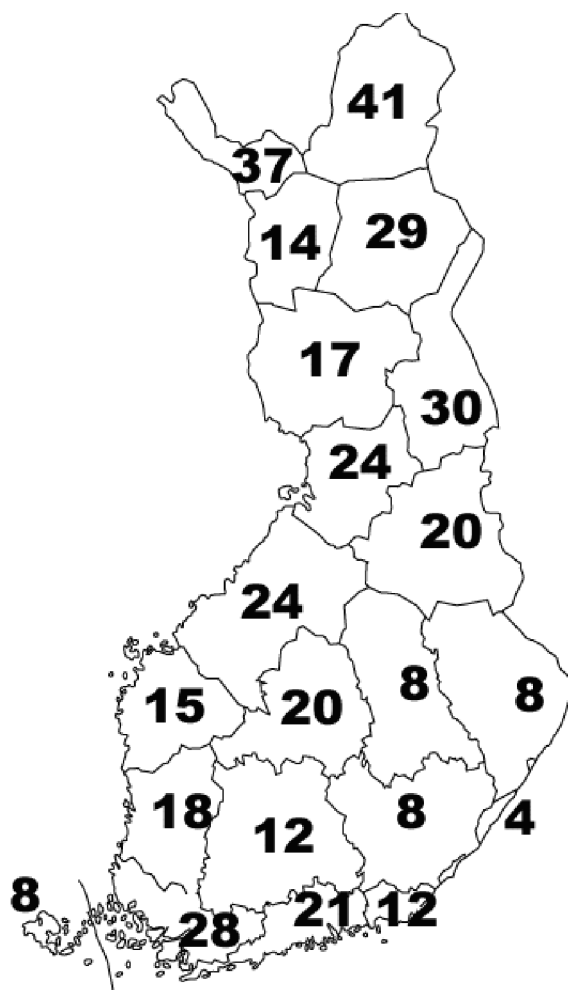


Fig. 1. Number of recorded blackfly (Diptera: Simuliidae) species in the biogeographical provinces of Finland.

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