National Red Lists in Fennoscandian Conservation:
how spatio-temporal dynamics of red-listed species and geographical scale matter for site selection and conservation priorities

Lise Tingstad

Thesis for the Degree of Philosophiae Doctor (PhD)
University of Bergen, Norway
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Scientific environment

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Abstract

The Red List of threatened species is among the best tools available for management and conservation of species. In this thesis, I study nationally red-listed species at various geographical scales from fine-scale forest areas in Norway, to the region of Fennoscandia. I focus on the use of national Red Lists as a tool for assisting conservation priorities, for identification of important habitats for red-listed species, and for selection of sites for conservation.

For national Red List assessments, most species are assessed at a scale smaller than their distribution range, and the national status is therefore often based on assessment of parts of the total population. This might pose challenges to conservation, as the species can have a different status at broader scales. In the first paper of this thesis, I investigate the effects of geographic scale on nationally red-listed species in Fennoscandia. The national Red Lists of Finland, Norway and Sweden was used to create a dataset of 4830 nationally red-listed forest species from the three countries. From this dataset, a subset called "Candidates for a Fennoscandian Red List" was extracted, and for each country this set of candidates, representing the regional level, was compared with the nationally red-listed species not chosen as candidates. Our results showed that the set of "Candidates" from each country represented a similar composition of organism groups and species of similar forest associations, despite including a lower number of species.

In the second paper, the aim was to investigate if ecological documentation in national Red Lists could be sufficient to characterize general habitat associations and important ecological variables for red-listed species in Fennoscandia. The same Fennoscandian Red List dataset was used, and ecological information extracted for each species and used for analyses. Results showed that criteria documentation in national Red Lists can be used to identify habitat associations and important ecological variables for larger groups of red-listed species, and that the information can be arranged for various selections of species, defined either by geographical scales or by conservation interest. Results showed that the ecological information varied with different selections of species and with scale, highlighting the importance of using appropriate information for the selection or geographic scale of choice. Still, red-listed species is a heterogeneous group, and the results showed a course resolution of the data, not favourable for setting of conservation

priorities per se. Even so, the information on red-listed species habitat affiliations and ecology can be valuable as a supplement to national Red Lists. Both these studies on Red Lists in Fennoscandia reveal that combined Red List data can be a source of complementary information that may assist national conservation priorities and assist conservation guidelines for the broader-scale region.

For the second part of the thesis, we scaled down to small-scale forest areas in Norway and investigated red-listed species spatio-temporal dynamics. Red-listed species are often used as target species for conservation sites, but how effectively sites capture red-listed species over time, is less well documented. Loss of effectiveness may be due to at least two different types of dynamics; dynamics caused by compositional changes in Red Lists due to updates, and population dynamics of red-listed species that over time may change both composition and spatial distribution.

In Paper III we investigated the effect of compositional changes in Red Lists for the effectiveness of sites in capturing red-listed species over time. We used occurrence data of red-listed species of bryophytes, macrolichens, polypore fungi and vascular plants from six forest areas in Norway, and four consecutive editions of the Norwegian Red List. We ran a site selection for each area, testing both a hotspot and a complementary site selection strategy. We then estimated the changes in effectiveness of these sites in capturing red-listed species with each new edition of the Red List. Results showed substantial impact of Red List updates on effectiveness of sites in capturing species. The complementary strategy was found to be more effective than the hotspot strategy, but the difference between them decreased over time.

For paper IV, the species occurrence data from two of the six forest areas used in paper III was used, together with data from a re-inventory of these two areas in 2014-15. We investigated spatio-temporal population dynamics of the red-listed species between the two inventories, and found it to be substantial despite an overall similar number of red-listed species. The turnover in species over time was found to alter site selection, as it caused a different set of sites to be selected based on species richness at the two inventories. We also combined the spatio-temporal population dynamics with changes caused by compositional changes in the Red List, and this was found to increase the estimated turnover in species between the two inventories. We therefore argue that both types of dynamics are important to consider when evaluating sites selected for

conservation based on occurrences of red-listed species. Although a better understanding of spatio-temporal dynamics of target species has the potential to improve strategies for a more robust site selection, our studies also suggest that a moderate expectancy to the effectiveness and robustness of fine-scale sites based on snapshot occurrences of red-listed species is warranted.

The results from this thesis show that there is still unused potential in national Red Lists in terms of new ways to combine data to withdraw complementary information, and in terms of better understanding of temporal and spatial patterns of red-listed species that influence conservation based on national Red Lists.

List of individual papers

Paper I — Tingstad, L., Gjerde, I., Dahlberg, A. and Grytnes, J.A. 2017.
The Influence of spatial scales on Red List composition: Forest species in Fennoscandia
Global Ecology and Conservation 11, 247-297.

Paper II — Tingstad, L., Grytnes, J.A., Felde, V.A., Juslen, A., Hyvarinen, E. and Dahlberg, A. The potential to use compiled documentation in Red Lists to characterize red-listed forest species in Fennoscandia and to guide conservation.
Submitted to Global Ecology and Conservation, February 2018

Paper III — Gjerde, I., Sætersdal, M., Grytnes, J.A. and Tingstad, L.
Red List updates and the robustness of sites selected for conservation of red-listed species
Submitted to "Biological Conservation, February 2018

Paper IV — Tingstad, L., Grytnes, J.A., Sætersdal, M. and Gjerde, I.
High spatio-temporal dynamics of red-listed species in two forest areas in Norway
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Specifications of contributions to the individual papers

Contributions	Paper I	Paper II	Paper III	Paper VI
Project/paper idea and design	AD, LT, JAG, IG	AD, LT EH, AJ, JAG	IG, MS	IG, MS, LT, JAG
Data collection (field work)	-	-	IG, MS	LT, MS, IG
Data preparation	LT, AD, EH, AJ, IG	LT, AD, EH, AJ	LT, IG, MS	LT, MS, IG
Statistical analysis	LT, JAG	VAF, JAG, LT	JAG, LT, IG, EHE	LT, JAG, IG
Writing	LT, AD, JAG, IG	LT, AD	IG	LT
Commenting/ Editing	AD, JAG, IG	JAG, EH, AJ, VAF	LT, JAG, MS, EHE	IG, JAG, MS,

LT= Lise Tingstad[1,2], JAG = John-Arvid Grytnes[1], IG = Ivar Gjerde[2], MS= Magne Sætersdal[2], EHE= Einar Heegaaard[2], AD=Anders Dahlberg[3], EH = Esko Hyvärinen[4], AJ= Aino Juslen[5], VAF = Vivian Astrup Felde[1,6]

[1]University of Bergen, Department of Biological Sciences

[2]NIBIO Norwegian Institute of Bioeconomy Research

[3]SLU Swedish University of Agricultural Sciences, Department of Forest Mycology and Pathology

[4] Ministry of the Environment, Finland

[5] Finnish Museum of Natural History, University of Helsinki

[6]Bjerknes Centre for Climate Research, Bergen

Synopsis

Conservation biology can be seen as an interdisciplinary science: It concerns both species and their environments, applying principles of ecology, biogeography and population genetics. At the same time, it may encompass principles of sociology, economy and philosophy. It is also a synthetic field in the way it combines the more traditionally academic disciplines with the more applied areas of wildlife, fisheries and land use management. Through conservation biology, we seek the knowledge of how to take action to avoid species from going extinct and habitats from disappearing. By giving ourselves the task of prioritizing, we make conservation biology also an anthropocentric discipline, as the habitats and species that are being conserved, largely depends on what we choose.

Photo: LT. *Geitaknottane nature reserve*

The Red List of Threatened Species

The issue of biodiversity loss and the increasing amount of threatened species worldwide has reached both political and scientific momentum, locally as well as globally. One of the main drivers of biodiversity loss today is land-use change resulting in habitat fragmentation and degradation, leading directly to loss of biodiversity (IPCC 2013). Despite good intentions, the goal set by the Convention on Biological Diversity of halting biodiversity loss within 2010 has not been achieved. Most indicators of the state of biodiversity showed declines in 2010, while indicators of pressures showed increases (MEA 2005; Butchart et al. 2010). A new goal was set through the Aichi targets, aiming at halting the biodiversity loss by 2020 (CBD 2010). Still, recent projections are not better, showing a worsening situation for 2020 relative to 2010 (IPCC 2013; Tittensor et al. 2014). As resources for conservation are limited, and neither species nor threats are evenly distributed, priorities must be made between habitats, between species, and between different management strategies. In order to make prioritizations, knowledge of species status is crucial. For this, the Red List of threatened species published by the International Union for Conservation of Nature (IUCN) has proven a valuable and powerful tool (Rodrigues et al. 2006; IUCN 2016). IUCN has been assessing species at the global scale for the last 50 years in order to highlight species with an extended risk of going extinct, often set to a certain timeframe in a geographical area. With its objective criteria, scientific basis, and wide coverage across taxonomic groups, the Red List of threatened species is regarded one of the most comprehensive data sources available for the status of threatened and rare species (Gärdenfors et al. 2001; Rodrigues et al. 2006; IUCN 2016). The Red List is published at spatial scales from the IUCN Red List Assessment at global scale, to regional (e.g. at the scale of Europe), and national scale (Gärdenfors 2001; Rodrigues et al. 2006; Zamin et al. 2010). Until today, as many as 26 regions and 113 countries have published national Red Lists following the regional IUCN criteria and guidelines (nationalredlist.org), and the number is still increasing (Azam et al. 2016). Besides identifying species with an increased risk of going extinct, the Red List assessments are important tools for monitoring of biodiversity trends. For example, the Red List Index is a statistical measure of trends for red-listed species that tracks the progress towards the Aichi targets and highlights where to focus conservation efforts (Butchart et al. 2005; Baillie et al. 2008; Bubb et al. 2009).

Countries worldwide have become increasingly interested in conserving biodiversity, and the profile of especially national Red Lists have expanded, and the lists have become more influential on national conservation priorities (Miller et al. 2007). Today they have an important role in informing policy and decision makers, and additionally provide valuable information back to the global Red List (Brito et al. 2010). The Red List is hence both nationally and internationally, directly and indirectly, important for decisions on nature management and conservation of threatened species.

When species are assessed for national Red Lists, they are evaluated according to specific criteria and assigned a threat category (Gärdenfors et al. 2001; IUCN 2012b). The threat categories consist of nine different levels ranging from "least concern" (LC) to "regionally extinct" (RE). In this thesis, the term "red-listed" refers to all species within the categories data deficient (DD), near threatened (NT), vulnerable (VU), endangered (EN), critically endangered (CR) and regionally extinct (RE), and the he species in the categories "not applicable" (NA) or "not evaluated" (NE) are not considered red-listed.

Challenges in using national Red Lists for setting conservation priorities

One obvious challenge with the national Red Lists as a practical conservation tool is that assessment of extinction risk and the setting of conservation priorities are two related but different processes (Keller & Bollmann 2004; Miller et al. 2007). It is a common misconception that Red Lists represent a hierarchical list of priorities for conservation action, and thus that conservation priorities can be based solely on extinction risk (Fitzpatrick et al. 2007). The use of national Red Lists as a direct prioritization tool can lead to sub-optimal conservation decisions, as the Red List status provide only part of the information required for resource allocation (Possingham et al. 2002; Eaton et al. 2005). Even so, national Red Lists are frequently being used in the setting of conservation priorities at different spatial scales (Ricketts et al. 2005; Mace et al. 2008; Martín-López et al. 2011). Due to the extensive use, it is of increasing importance to evaluate the effectiveness of conservation based on Red Lists and to keep exploring the potential for a wise and ecologically sound implementation.

The issue of scale

Species are unevenly distributed, and the definition and choice of spatial scale (the geographical area covered by the assessment) of assessment will naturally affect the results of any inventory (Rahbek 2005). Accordingly, spatial scale can be a strong determinant of the outcome of Red List assessments. Especially when they are performed at sub-global levels, as in national assessments, the spatial scale often affect the species status (Gärdenfors et al. 2001; Rodrigues & Gaston 2002). It has been shown that a smaller area of assessment can lead to higher threat status for red-listed species (Milner-Gulland et al. 2006). In addition, species at the edge of their distribution range tend to be more frequently red-listed, and to be assigned in higher threat categories (Lahti et al. 1991; Gustafsson 1994; Eaton et al. 2005), indicating that larger-scale distribution patterns might influence patterns of red-listing at sub-global levels. Species might be assessed as least concern nationally, while being at risk globally, whereas other species that are not globally red-listed may be listed as threatened within a specific region or country (Mace et al. 2008). It could therefore be relevant to consider threat status at several scales simultaneously. By considering status at both national and broader-scale level, the foundations for national prioritizations can be more adequate than if considering a single national Red List (Keller & Bollmann 2004). A global Red List assessment might be most biologically relevant as it includes the total population of the species, but since most conservation initiatives operate at finer scales, there is a need for Red Lists at sub-global levels. It is here important to point out that sub-global assessments are not mistaken when they set species status that differs from e.g. the global, as they are simply evaluating the risk of extinction within the given geographical region, reflecting the local status of species.

One might argue that species nationally red-listed in more than one country within a broader region potentially are at higher risk than species red-listed in only one country with least concern populations elsewhere in the region. A prioritization that followed this reasoning would assume that the goal of conservation is to conserve species contributing to overall high biodiversity in the region, possibly at the expense of highest national diversity. There are two inherent challenges identified here that arise from assessing species at national scales; nationally red-listed species with viable populations at larger scales (or in neighbouring countries), species that are not nationally red-listed, but threatened by population decline at the larger scale. Within a region like

Fennoscandia, many species are at the northernmost edge of their distribution range, and climatic gradients from the oceanic west to the more continental east might influence distribution patterns across Fennoscandia. This might have impact on the three national Red List assessments in Finland, Norway and Sweden (Gärdenfors 2010; Henriksen & Hilmo 2015b).

We investigated the issue of scale through a study of the nationally red-listed forest species in Norway, Sweden and Finland, where we explore how increasing spatial scale impact the composition of Red Lists, and discuss how national conservation priorities might be complemented by considering species status in a broader geographical region (*Paper I*).

Using criteria documentation to characterize red-listed species

The usefulness of the Red List as a conservation tool derives not only from the threat categories assigned to species, but the wealth of data which supports the assessments (Rodrigues et al. 2006). For each species in the Fennoscandian Red Lists, there is a criteria documentation containing information on the most important ecological features and habitat associations. This information has mostly been used for single species, or for species within the same taxonomic groups at national level. However, the documentation might also contain sufficient information to identify main ecological requirements and habitat affiliations for nationally red-listed species in general, and if data is combined from several national Red Lists, possibly also for the larger region.

As practical conservation is normally not based on single species status alone, but often functions at the level of habitats and areas, conservation of specific habitats is a major approach in the implementation of biodiversity conservation strategies (Keith et al. 2015). As for species conservation, limited resources and competing interests make prioritizations inevitable, also among habitats (Schmeller et al. 2014). In Europe, Natura 2000 and the Ramsar Convention (for wetlands) focus on habitats with high conservation value. There is also a Red List for Ecosystems and habitat types both in Europe (Janssen et al. 2016), and at national levels in Finland and Norway (Raunio et al. 2013; Artsdatabanken 2017), listing nature types at risk. These assessments are based on habitat structures rather than species occurrences and ecologies, and are

hence not necessarily a direct representation of the most important habitats for red-listed species. Setting aside threatened nature types and habitats, and setting aside important sites for threatened species are different processes likely to have different outcomes. It is therefore interesting to identify areas that specifically has been chosen based on the preferences of red-listed species.

We explore the potential to combine criteria documentation from several national Red Lists to withdraw information on the habitat affiliations and ecology of red-listed species in large for a broader region. We investigate how defined habitat associations and ecological variables important to red-listed species vary with scale and with different selections of species based on conservation interest (*Paper II*).

Spatio-temporal dynamics of species and site selection

Nationally red-listed species are often applied as targets for site selection (Ricketts et al. 2005; Rodrigues et al. 2006). At smaller scales in Fennoscandia, the Red Lists are for example applied as a selection tool through the Woodland Key Habitats (WKH) (Timonen et al. 2010) and the Complementary Hotspot Inventory (CHI) (Gjerde et al. 2007). In both of these approaches, occurrences of red-listed species is a central part of the decision base for identification and selection of sites, and the aim is to define habitats that are particularly important to red-listed species. In WKH, red-listed species are used directly as target species, while the CHI -sites are identified by indicator species, and by identification of habitat types of high value for red-listed species (Gjerde et al. 2007; Timonen et al. 2010).

When red-listed species are applied as conservation targets, consecutive updates of Red Lists may affect both number and composition of red-listed species to be recorded at a site. National Red Lists are frequently updated (in the Fennoscandian countries every fifth to tenth year), and with each update some species are removed and some are added. This poses a challenge to the use of red-listed species as targets for selection of conservation sites, as the targets will consist of a different set of red-listed species at two different points in time. This turnover in target species may reduce effectiveness of conservation sites in capturing target species, as sites selected based on one particular Red List may be sub-optimal for capturing red-listed species of later issues. This type of dynamics have received relatively little attention in the literature, but with the frequent use of red-listed species as targets for site selection, it is an important factor for the success of long-term conservation. The changes between Red List editions are commented in national statistics (e.g. (Henriksen & Hilmo 2015b), but the long-term effects, e.g. the accumulated changes through several editions of Red Lists, and the potential consequences this has for the effectiveness of sites in capturing species, has not been reported. The degree of this effect will depend on the magnitude of changes in composition between Red List editions, and the degree of change in spatial distribution and composition of the species considered red-listed. If red-listed species of the new editions tend to occupy the same sites as the old ones, sites will be robust to Red List updates.

Strategies for site selection for conservation have received much attention. One well-known strategy is the selection of so-called "hotspots", first introduced by Norman Myers in the late 80s and applied on a global scale, originally identifying relatively small areas that could sustain a high degree of endemic species (Mittermeier et al. 1998; Myers et al. 2000). Today the hotspot term is most commonly used with reference to regions of higher biodiversity than the surrounding areas (richness hotspots) or with high number of target species (rarity hotspots) (Reid 1998). The hotspot concept applies to any geographic scale, but the effectiveness by which richness hotspots captures e.g. rare species is probably more dependent on scale (Gjerde et al. 2004). Selecting sites for conservation according to a pure hotspot model could potentially lead to less species-rich areas being ignored, as they will rarely be selected given the criteria of high species richness. This might be problematic, as areas with a low total richness might still have endemic, rare or threatened species of high conservation value (Fischer & Lindenmayer 2005). Such areas could still be selected by a complementary site selection strategy. The concept of complementarity is defined as how well different areas complement each other in representing total biodiversity, and is a widely applied strategy (Vane-Wright et al. 1991; Pressey et al. 1993; Justus & Sarkar 2002). It is in some cases referred to as superior to the hotspot approach, as it might be more effective in capturing target species (Justus & Sarkar 2002; Margules et al. 2002). Applying the concept of complementarity allows for selection of sites with lower species richness, and a complementary approach will seek to preserve representatives of the full range of biological diversity (Gjerde et al. 2007).

As red-listed species are frequently being used as target species for site selection, it is interesting to know the effect of Red List updates on the long-term success of sites selected for conservation, and whether the effect differs with the selection strategy applied (*Paper III).*

The Red Lists are not the only factor that changes with time. The distribution and composition of red-listed species within an area also changes over time due to population dynamics, but the persistence of red-listed species in sites over time is less well documented. As red-listed species are often rare, ecological theory predicts a higher frequency of extinction and colonisation events among red-listed species, at least on local scales (Gaston 1994). Spatio-temporal population dynamics of red-listed species can have large consequences for sites selected based on their

presence, as identification of important species or areas of high conservation value are often based on snapshots in time (Margules et al. 1994), and temporal variability ignored (Virolainen et al. 1999; Felinks et al. 2011). Previously selected areas might not capture red-listed species by the same effectiveness at a later point in time. Adler et al. (2005) argued that spatial and temporal patterns are not independent, and that information on both spatial and temporal scales is needed in order to effectively compare patterns on species turnover as well as patterns of species richness. In the following, I refer to "species turnover" as the measurable change in species number and composition within an area over time.

We investigate spatio-temporal dynamics of red-listed species in two forest areas in Norway over a 17-year period, and discuss the potential impacts on the long-term success of sites selected based on occurrences of red-listed species (*Paper IV*). Both turnover in species, and the changes due to Red List updates are likely to influence the robustness of sites, and we therefore in addition investigated the combined effect of these two types of dynamics (*Paper IV*).

Main objectives

In this thesis, I investigate the use of national Red Lists as a tool for prioritization among species, for identification of important habitats, and for site selection. The studies cover various geographical scales ranging from forest areas of 150-200 hectares, to the larger-scale region of Fennoscandia. The topics are discussed in the light of their potential contribution to practical conservation and the setting of conservation priorities.

The thesis considers the following questions:

1. How does an increase in spatial scale from national to regional scale affect composition of species considered red-listed? What are the influence of larger-scale distribution patterns on red-listed species in Fennoscandia? (*Paper I*)

2. Based on compiled information from several national Red Lists criteria documentations, what are the main habitat affiliations and most important ecological variables for red-listed species in Fennoscandia, and how does this vary with geographic scale and selections of species? (*Paper II*)

3. What is the degree of change in composition and spatial distribution of red-listed species in the field when using different Red List issues? How does these changes affect the robustness of sites selected based on occurrences of red-listed species? (*Paper III*)

4. What is the degree of change in composition and spatial distribution of red-listed species in the field caused by population dynamics over time? How does these spatio-temporal dynamics affect the long-term effectiveness of conservation sites in capturing red-listed species (*Paper IV*)

Materials and methods summary

The first two papers of the thesis take a partly explorative approach, as we combine national Red Lists from Norway, Sweden, and Finland to get an overview of the broader-scale perspective of red-listed forest species in Fennoscandia.

For the second part of the thesis (*Paper III and IV*), we take an empirical approach using field data and four consecutive editions of the Norwegian national Red List. This part investigated spatio-temporal population dynamics of red-listed forest species at a fine scale, and dynamics caused by changes in the composition of Red Lists over time. Based on the results, we discuss the role of using Red Lists as a tool for site selection.

Fennoscandian Red List Dataset (Paper I and II)

In Fennoscandia, national Red Lists have been published since the early 80's, and have since 2000 in Finland and 2006 in Norway and Sweden been assessed according to the same IUCN Red List criteria and guidelines (IUCN 2012a). The most recently published national Red Lists are from 2010/2015 in Finland and 2015 in Norway and Sweden (Rassi et al. 2010; Artdatabanken 2015; Henriksen & Hilmo 2015a; Liukko et al. 2016; Tiainen et al. 2016). The lists cover all assessable taxonomic groups, and more than 20 000 species have been evaluated in each country. This places the Fennoscandian Red Lists among the most thorough national assessments available. Since the Fennoscandian Red Lists follow the IUCN criteria and guidelines, they should be largely comparable among countries.

The data source for our first two papers was derived from the most recent national Red Lists of Finland, Norway and Sweden. We compiled a dataset consisting of all 4830 red-listed forest species from these three national Red Lists, including the associated criteria documentation for each species, the Red List status, and the criteria for red-listing. All species with forest as their primary or secondary habitat red-listed in one or more countries were included. This combined dataset is hereafter referred to as "the Fennoscandian dataset" (Supplementary materials *Paper II*). This dataset is also available online from the following link:

https://www.uib.no/en/rg/EECRG/115546/fennoscandian-dataset-red-listed-forest-species. We used the help of specialists from the respective countries to complement information for species lacking assessment in any of the countries.

In paper I, we wanted to investigate how an up-scaling from a national to a regional perspective would affect composition of red-listed species. We did this by selecting a set of species that we named "Candidates for a Fennoscandian Red List" (hereafter CFRL), which included 2780 of the 4830 species in the Fennoscandian dataset (Figure 1). This subset consisted of species red-listed in one, two or all three countries, but excluded all species with a least concern status in any country.

In order to see how composition among organism groups and habitat affiliations varied with scale, we compared the composition in each country's set of nationally red-listed species that were considered CFRL, with the subset that were not considered CFRL in each country. The comparison was done for the proportions of species within the different organism groups, and for groups of similar forest habitat affiliation.

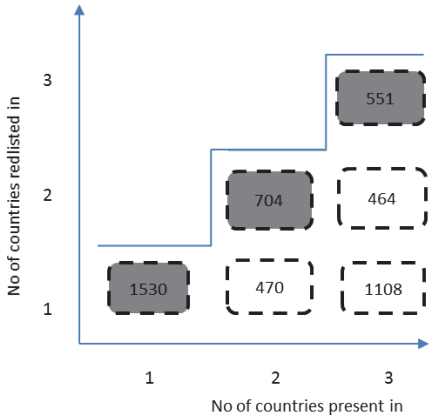

Figure 1: Number of species red-listed in one, two or three of the countries in Fennoscandia; the box in the lower corner shows species that are red-listed in one country and present in one country (n=1530). The next box to the right shows species that are red-listed in one country and present in two countries, and so on. Candidates for the Fennoscandian Red List (CFRL) are in dark grey boxes and species that do not qualify as CFRL are in white boxes (Figure 1, *Paper I*).

In addition, we were interested in the impact of broader-scale distribution patterns, and wanted to investigate how this might affect patterns of red-listing across Fennoscandia. To investigate this, we gathered European distribution data for 1244 red-listed and non-red-listed species within four organism groups (vascular plants, macrolichens, longhorn beetles (*Cerambycidae)* and birds), using the GBIF database (GBIF 2016). The four organism groups were chosen for their relatively well-known distribution patterns, and for representing different functional groups in forest ecosystems. The species were divided into four different distribution categories (east, west, south and Pan-European), and non-red-listed and red-listed species within each group were compared to see whether red-listed species showed a distinct broader-scale distribution pattern from that of non-red-listed species. We also tested whether larger-scale distribution patterns differed between the species selected as CFRL and the other species.

For paper II, we used the Fennoscandian dataset with all 4830 red-listed forest species. This time, the associated criteria documentations for each species were consulted for all available ecological information from the three national Red Lists. The aim was to use this information to gain an overview of the habitat affiliations and important ecological variables for red-listed forest species in Fennoscandia. Beside Red List category, criteria and taxonomical group, information could be extracted for lifeform, forest and tree species affiliation, affiliations to dead wood, old-growth forest, calcareous soils, post-fire-conditions, hollow trees and swamp forest. These six ecological variables where chosen for further analysis due to their frequent appearance in the criteria documentation. Species were also categorized as affiliated with either dead wood (all saproxylic species), living trees (affiliated to a specific tree species, but not saproxylic), or as "forest floor" species.

The quantitative aspect was accounted for through text and illustrated figures showing the number of red-listed species affiliated to different ecological variables and specific tree species. How the defined habitat associations and ecological variables varied depending on selections of red-listed species was exemplified by comparing the proportion of species associated with dead wood, living trees and the forest floor for selections of species from three geographical spatial scales, and for selections based on conservation interest. The geographical scale ranged from the region of Fennoscandia, to national scale (Sweden), to sub-national scale including the northernmost and the southernmost counties in Sweden. The three selections of conservation

interest consisted of all nationally red-listed species in Sweden, species red-listed in all three countries of Fennoscandia, and species red-listed in Sweden and on the IUCN Global Red List.

To group species with similar ecology, principal component analysis (PCA) was used to investigate the variation in distribution of species and taxonomical groups, and their habitat affiliation. In total, four PCAs were done: one for the combined data set of all 4830 red-listed species, and additional three PCAs for each subset of nationally red-listed species in each country (Finland, Norway, and Sweden). This allowed us to investigate the habitat associations and distribution of taxonomical groups at the level of Fennoscandia, but also to detect potential differences or similarities between regional and national scale.

Observational small-scale data (Paper III and IV)

The aim in paper III and IV was to investigate dynamics of red-listed species over time, and we focus on two different, but related aspects of changes experienced by red-listed species. Paper III investigated how regular Red List updates affect the robustness of sites selected based on occurrences of red-listed species. Paper IV investigated the magnitude of spatio-temporal population dynamics in red-listed species over time, and its effects on site selection.

For paper III, we used four consecutive editions of the Norwegian national Red List from 1998, 2006, 2010 and 2015 together with fine-scale occurrence data of red-listed species from six forested areas in Norway, recorded in 1997-98. The sites covered both boreal and hemi-boreal forest, and the species inventory covered bryophytes, macro-lichens, polypore fungi, and vascular plants. In each of 1058 sample plots of 50×50m, exhaustive species survey was carried out, registering occurrences of all species of the four organism groups (Gjerde et al. 2005).

We consulted the four editions of national Red Lists, and investigated how many red-listed species from each edition that were present in the six forest areas. We then estimated the changes in distribution and composition of red-listed species from the Red List of 1998, through the updates of the three consecutive Red Lists from 2006, 2010 and 2015. Two strategies for site selection were tested; a hotspot and a complementary strategy. For each of the two strategies, we ran a site selection based on the 1998 occurrence data, and investigated the effectiveness (sensu

Rodrigues et al. 2000) of these sites in capturing red-listed species of later issues. Effectiveness was defined as the proportion of red-listed species included by selecting 2.5 and 5 % of the sample plots.

Turnover in species within sample plots might be high without this affecting the site selection based on richness of red-listed species. As robustness of sites will depend on the degree of clustering, this was investigated for red-listed species across the study areas for each of the four editions of the Red List.

Paper IV investigated the magnitude of spatio-temporal population dynamics in red-listed species over a 17-year period, and discussed its consequences for the long-term effectiveness in sites in capturing red-listed species.

We used the fine-scale distribution data from two of the six original study areas from 1997-98, together with new data from re-inventories of these two areas in 2014-15. The re-inventories were performed in 40 randomly selected sample plots in each of the two forest areas. One hemi-boreal ("Kvam") and one boreal ("Sigdal") forest site were selected for the re-inventories. The re-inventories followed the same sampling procedures as in 1997-98, and all species within the same four organism groups were registered. The occurrence data was used to investigate turnover in red-listed species at study area and sample plot level.

In order to compare the two datasets from the two inventories, we estimated Jaccard distance (dissimilarity) index, calculated as $(1-(A \cap B/A \cup B))$, where A and B are the two sets of species compared (Levandowsky & Winter 1971). The index ranges from 0 to 1, where a Jaccard distance index of 1 corresponds to a complete turnover in species composition. We measured turnover for species red-listed according to the most recent Red List at the time of the two inventories; the Red List 1998 as well as the Red List 2015.

The change in rank order of sample plots between the two inventories was estimated by a Kendall's rank correlation co-efficient for each of the two study areas. The rank order is here an estimate for site selection, assuming that sites with more red-listed species would be selected first.

Last, we investigated the combined picture of dynamics by considering both changes caused by updates of the Red List, and spatio-temporal dynamics of the species over the 17-year period between the two inventories.

Results and discussion

The Fennoscandian perspective

Results prom paper I suggest a considerable scale effect regarding which species will be red-listed with an upscaling from a national to a regional perspective. By selecting Candidates for a Fennoscandian Red List (CFRL) from the combined dataset of 4830 red-listed forest species, the overall number of species considered red-listed were reduced with 42% for the Fennoscandian level. In each country, the CFRL included a remarkably lower number of species compared to the number of nationally red-listed species (57-77%). If a goal of high regional biodiversity is prioritized, these results suggest a possibility to identify and possibly prioritize the smaller subset of Candidates for the Fennoscandian level, based on compiled information from several national Red List assessments. We did not attempt to create a regional Red List, as this would be a completely different task and would require a full species assessment following IUCN criteria. Instead, we attempted at illustrating an upscaling to the regional perspective by using existing national Red Lists. The regional perspective is often not considered, as there is currently no such IUCN assessment available. There are available Red Lists at European and global scale, but these assessments are less likely to contribute information directly beneficial for national prioritizations.

We asked how an up-scaling of the national Red Lists to a Fennoscandian level might lead to changes in composition among taxonomic groups or groups of similar habitat affiliation among the species considered candidates for the regional scale compared to those that were not selected. The comparisons of these two groups revealed few significant compositional differences. This means that if a country prioritized the subset CFRL among its nationally red-listed species, the set of species to be prioritized would still have species representatives from all taxonomical groups, and roughly equal proportions of species from each main forest type. Even so, the results did show significant different representation among the CFRL compared to the nationally red-listed species (not selected as CFRL) for some species groups (although less than 5 percent points in difference). For example, CFRL included a higher number of species of lichens and fungi, and

fewer species of Coleoptera in Norway. In Sweden, there were fewer bryophytes, and in Finland, more species of fungi and hymenoptera, and more species associated with old growth forest were among the CFRL. For Finland, CFRL also included fewer species from nemoral forest (Figure 2 and 3, *Paper I)*. This type of information can be an important supplement to the information in national Red Lists, as the status of populations in neighbouring countries are likely to influence the viability of the national populations. The broader-scale status of species should therefore be of direct relevance to national conservation planning. Even so, the most significant effect of upscaling to a Fennoscandian perspective detected here, seem to be the reduced total number of species considered red-listed at the regional scale in comparison to the national scale, and the potential that lies in the use of a combined dataset to identify species that are regionally threatened.

Regarding the European distribution patterns, results showed that red-listed species were more frequently assigned with either a western, southern, or eastern distribution pattern, while non-redlisted species where more frequently assigned "Pan-European". We found that red-listed species with a western European distribution were most frequent in Norway, and that these western species were among the species selected as CFRL. These species are either only found in Norway, or they are also found and red-listed in the other countries. This pattern was repeated in Sweden and Finland, as southern and eastern species respectively, were most frequent and had the highest proportion of CFRL (Figure 4, *Paper I*). This illustrates an impact of wider-scale distribution patterns on Red Lists across Fennoscandia.

The Fennoscandian dataset contains almost 5000 red-listed species, and the subset of CFRL only considers some of the many possible constellations of red-listed species across the region. The subset of CFRL captures species that are red-listed in all countries where they occur in the region. This is excluding all species that have a "least concern"- population in any of the countries. Despite being assessed as "least concern", these species might still be in decline in one or more neighbouring countries, potentially constituting an overall regional decline. One example of a species with this type of constellation is the white-backed woodpecker (*Dendrocopos leucotos),* which is red-listed in Finland and Sweden due to decline, but assessed as "least concern" in Norway. The white-backed woodpecker is not qualified as a Candidate for the Fennoscandian Red List as defined here. Even so, it might still be at risk at the scale of Fennoscandia, due to

declining populations in two out of three countries. The white-backed woodpecker could therefore be annotated a responsibility species in Norway despite its national status as least concern, as Norway might hold the last viable population in the region. This perspective is not readily revealed by the Norwegian Red List, but still relevant for Norway and for management of this species in Fennoscandia. The concept of national responsibility species hence allows for the annotation of species of high conservation concern also among non-red-listed species, given that the broader-scale situation justifies the annotation (Keller et al. 2005). A goal of species conservation should be not only to save the most endangered species, but also to maintain sufficient populations to prevent species from becoming threatened (Pfab et al. 2011). Since the CFRL subset captured roughly half of the species in our dataset, there are many red-listed species with similar constellations as the white-backed woodpecker, with similar challenges to their conservation. Further investigations of these other constellations was beyond the scope of this thesis, but more information could be derived from the combined Red List data with further analyses. From combined data, species could also potentially be selected on various criteria of conservation interest, also beyond national borders or due to similar ecology, as will be discussed further in Paper II.

In paper II, we used the full dataset of the 4830 red-listed forest species in Fennoscandia to create an overview of the habitat affiliations and important ecological variables for the red-listed forest species in general. The compiled data resulted in more than 51 000 records of ecological variables from 96% of the species in the dataset, however with varying level of details. Overall, the results revealed that the criteria documentation in these three national Red Lists are extensive, and that there is a potential to extract and make use of the ecological information for more than single species.

The results revealed that coniferous forest had the highest proportion of affiliated species (68%), and the highest number of obligate species. The high number of associated species in coniferous forest is largely a consequence of coniferous forest constituting about 85% of the total tree volume in the region (FAO 2015). The proportions of species associated to boreal broadleaved and nemoral broadleaved forest are lower, but still substantial, especially in relation to volume of the tree species. In comparison with pine and spruce, nemoral broadleaved trees, and specifically oak (*Quercus robur),* had strikingly high number of associated species in relation to volume

(Figure 2, *Paper II*). Among the ecological variables extracted, old-growth forest and dead wood had the highest number of affiliated species, followed by calcareous soils, post-fire conditions, hollow trees and swamp forest. Dead wood and old-growth forest are recognised as key features important for red-listed species in Fennoscandia (e.g. Tikkanen et al., 2006, Berg et al., 1994), and especially the significance of dead wood for biodiversity is well known and studied in this region (Siitonen 2001; Gustafsson 2002; Timonen et al. 2011; Storaunet & Rolstad 2015). Previous studies have highlighted dead wood of nemoral trees as being of particular importance (Jonsson et al. 2016; Framstad et al. 2017), but our results suggest that dead wood is equally important for red-listed species in coniferous and boreal broadleaved forests. The proportions of species associated to dead wood, living trees and the forest floor was roughly the same considering the three main forest types, but varied both with selections of species at different geographic scales and with various selections of species of conservation interest. This variation illustrates the importance of choosing the appropriate scale for conservation planning, as the relevance in ecological information depends on the geographical region or the selection of species. However, the results from Paper 1 suggested that the effects of such variation is limited, at least for composition among organism groups and main forest type for red-listed species when scaling up from national to regional perspective.

Comparing the distribution of species among the various habitats and ecological variables across the three countries revealed an overall similar distribution regarding species affiliated with dead wood and old-growth forest of coniferous trees, dominated by fungi, lichens and beetles. These taxonomical groups easily dominate the picture because they are the most numerous organism groups among the red-listed species. A more nuanced analysis for the various taxonomical groups would be necessary in order to see the differences between groups more clearly, and to capture details on taxonomical groups with fewer species.

Our study demonstrates that a combined and general description of red-listed forest species' habitats and ecologies based on the documentation in Red Lists is feasible and informative, but will be rather coarse, as red-listed forest species form a heterogeneous group in terms of taxonomy, lifeforms and ecologies. The general information may therefore not be sufficiently detailed for conservation directed to individual or few red-listed species. However, for an overview of ecological patterns of red-listed species, and for any selected geographic area or group of species

of conservation interest, Red List documentations may provide a supporting tool to identify main habitat associations, habitat structures or other ecological variables to consider in conservation. We show that overall ecological characteristics of red-listed species vary at different scales, regions, and with selection of species, underlining the value of using appropriately selected information.

These two studies of Red Lists at the Fennoscandian scale illustrate how combined knowledge from already existing national Red List assessments can be a feasible way of obtaining complementary information for both species status, and general habitats and ecological variables important for red-listed species. This information is not easily revealed by a strict national perspective. The combined Fennoscandian dataset, or the Candidates for the Fennoscandian Red List or any other subset, cannot replace national lists, and this is not suggested. Rather, species status, habitat affiliations and other ecological variables important to red-listed species can be described in more detail by the use of combined data, as more information is made available, and for different geographical scales. Such information is of potential value for facilitation of conservation guidelines at the regional scale. Accounting for the regional perspective might also ease the process of prioritization among species at the national scale, given a goal of overall biodiversity conservation.

Spatio-temporal dynamics of red-listed species and site selection

Communities of species are not static, neither in space nor time, and temporal patterns of biodiversity have received less attention than spatial ones (Magurran et al. 2010). There is hence opportunities for basic research to contribute to the understanding of spatio-temporal patterns of target species. As species distribution patterns change over time, sites selected for conservation may not necessarily continue to serve their original purpose in capturing target species (Rodrigues et al. 2000). Loss of effectiveness over time can be due to at least two different types of dynamics identified here: changes caused by compositional changes in Red List due to updates (*Paper III*), and the spatio-temporal population dynamics of red-listed species (*Paper IV*).

The results from paper III showed that although the number of red-listed species recorded in the study areas were approximately the same at the two inventories, the composition of red-listed

species changed considerably. Approximately one-half of the joint list of species red-listed in 1998 or 2015 were not shared between the two inventories. A similar degree of change in mean species composition due to Red List updates was found for the red-listed species in the six forest landscapes (Jaccard distance 0.47). These compositional changes were found to vary between hemi-boreal and boreal forest areas. An increased clustering of species in hemi-boreal forest areas lead to a similar or slightly increased effectiveness in these sites in capturing species of the species red-listed according to Red List 2015 list as compared to the species red-listed by Red List 1998. The boreal forest sites on the other hand, seem to be less robust to updates in Red Lists in these areas, as species did not appear to be clustered in the same manner as observed for hemi-boreal sites (Figure 3, *Paper III*).

Regarding the two strategies for site selection (hotspot and complementary), the complementary site selection showed a higher effectiveness in capturing red-listed species, also over time. This could be expected, as the complementary strategy is designed to pick up as many target species as possible that is not already represented in a set of sites (Sætersdal et al. 1993; Margules & Pressey 2000). However, complementary selection might be less effective over time if the dynamics in species is high. If the red-listed species that are registered in a site are removed from the Red List due to updates, the site no longer contributes to the effectiveness. The addition or removal of one or two species from the target species pool can easily lead to a change in rank order of sites selected based on a complementary strategy. Hotspots on the other hand, are selected based on a high number of target species, and should be more robust to temporal turnover as hotspots are more likely to remain in the same sites. In our study sites however, the complementary strategy showed the highest effectiveness also over time, but there was a tendency that the difference in effectiveness between the two selection strategies decreased over time (Figure 1 and Table 3, *Paper III*).

In paper IV, we investigated the effects of the spatio-temporal population dynamics in red-listed species by the use of occurrence data of red-listed species from 1997-98 and 2014-15 and the Red Lists from 1998 and 2015.

Results from paper IV revealed substantial population dynamics at the study area level for red-listed species over the 17-year period for the four organism groups investigated. The total number of species in each forest study area was approximately the same for non-red-listed and red-listed

species at the two inventories, and the changes observed are hence mostly due to changes in species composition. The turnover for species red-listed in 1998 was estimated to a Jaccard distance of 0.51 for Kvam and 0.43 for Sigdal study area. This means that almost half of the red-listed species registered in the area have been exchanged or moved to different sample plots during the 17 years from inventory 1 to inventory 2.
At the sample plot level, the turnover was higher than at the study area level, and estimated to a Jaccard distance of 0.85 in Kvam and 0.78 in Sigdal. Turnover has previously been shown to decrease with increasing area (Adler et al. 2005), so a higher turnover at sample plot level could be expected.

In order to include the influence from compositional changes in the Red Lists, we estimated a Jaccard distance using the occurrence data from 1997/1998, and comparing the two sets of species identified using Red List 1998 and Red List 2015. This is similar to the analysis in paper III, however this analysis now considers only two of the originally six areas, and 40 sample plots selected from each study area. The results revealed a substantial impact from the compositional changes in the Red Lists on the observed species dynamics.

Having established that both compositional changes due to Red List updates and spatio-.temporal population dynamics of the red-listed species have an effect on occurrences of red-listed species in the two forest areas, we investigated the combined effect. The combination of the two types of dynamics revealed an almost complete turnover in species between the two inventories, with Jaccard distances of 0.92 and 0.93 for the two study areas, respectively. The inclusion of both types of dynamics in the estimations hence increased the turnover between the two inventories. In Kvam study area, the effect of updates in Red Lists seemed to be the main driver of the observed spatio-temporal dynamics, but when red-listed species are used as targets, both types of dynamics will be in play and should be included in studies of spatio-temporal dynamics.

Despite a high level of spatio-temporal population dynamics, the performance of a site selection based on occurrences of red-listed species is not necessarily eroded over time, as the performance will depend on how the spatial distribution of target species is affected. The rank order of sample plots based on species richness hence does not necessarily change, as was seen for the effects of Red List updates in hemi-boreal forest in paper III, where the new red-listed species tend to occupy the same sites as the old ones. However, this was found to be different when regarding

species population dynamics. Results from paper IV showed that species turnover did lower the effectiveness of previous site selections both in Kvam, representing hemi-boreal forest, and for Sigdal, representing boreal forest. This means that a selection of plots by richness of red-listed species would give a different set of plots in 2015 as compared to 1998 in both areas. The effectiveness of sites originally chosen in 1998 had deteriorated over time, showing a limited robustness of sites based on occurrences of red-listed species in these two forest areas.

It could seem that larger scale provide a higher robustness (*Paper IV*). Besides scale, we discuss three other factors that might at least partly cause the high turnover observed in these two forest areas. Random population dynamics can account for some, as there is continuous movement of species, and colonisations and extinctions in every ecological system. (Virolainen et al. 1999; Magurran et al. 2010). Further, there might be annual variations in the species registered, and as in every field inventory, inventory bias might affect the results. We believe the latter to have had a minimal impact of the results of these studies, as the registrations were performed by competent surveyors, and effort was made to perform the two inventories in a similar manner.

The key challenge for successful conservation may not be to represent all species in a minimum number of sites, but rather to identify robust sites that provide high viability for target species (Felinks et al. 2011). Despite the application of relatively effective strategies for site selection, the effectiveness of capturing target species like the red-listed species might still deteriorate over time. Although a better understanding of spatio-temporal dynamics of target species has the potential to improve strategies for robust site selection, our studies also suggest that a moderate expectancy to the effectiveness and robustness of fine-scale sites based on snapshot occurrences of red-listed species is warranted.

Conclusions

The results from this thesis illustrate a clear scale-dependency of national Red Lists in Fennoscandia. It is consistent throughout the different papers, for the prioritizations among species at national and regional level (*Paper I*), for the definition of important habitats and ecological variables for red-listed species (*Paper II*), and for spatio-temporal dynamics and the selection of sites at a fine scale (*Paper III and IV*). The issue of scale hence seem to be an important determinant of the outcome of conservation based on national Red Lists. Finding one appropriate scale of conservation is not realistic, as it will vary depending on area and species, and probably has to be set for specific cases. Some species can be protected in single sites, while other require conservation action at the landscape scale (Boyd et al. 2008). Some species can be protected nationally, while other species would benefit from a regional perspective. As found in Paper I, many species in Fennoscandia have both red-listed and least-concern-populations, and are assigned different threat categories. This is not due to national Red List assessments being wrong, but the results of the varying conception of threat status throughout a region, should raise awareness. It should not lead to the exclusion of national Red Lists as a tool, but rather lead to investigations of how the process of setting conservation priorities could benefit from considering the regional perspective. Perhaps should the issue of scale and species status in neighbouring countries to a larger extent be part of the knowledge base for national prioritizations. IUCN guidelines and criteria do address the issue of scale in the assessment guidelines, as they state that populations under assessment should be seen in relation to the total distribution of the species. IUCN states that if the area of assessment contains more than a certain percentage of the total population, threat status might be adjusted accordingly (IUCN 2012b). However, such adjustments due to the larger-scale situation are to be annotated in the national Red List assessments, and this seems to be less frequently done, at least for the Fennoscandian datasets considered here, where only 38 species out of 4830 (<1%) have this annotation.

We use Fennoscandia as the study region, but a similar methodology of compiling Red Lists, can be applied for regions and neighbouring countries that have national Red Lists following the IUCN criteria. By compiling the information in one larger dataset, a broader knowledge base for prioritizations is made available. The combined dataset hence enables the possibility to sum up and complement ecological information for red-listed forest species in a broader-scale region, and

subsequently to extract information for smaller selections of red-listed species of interest. These selections are not limited by national borders, and could be chosen by other smaller or larger geographical areas, by ecological affiliations, or by conservation interest (Figure 2). A process where both national Red Lists and a combined Red List dataset is considered might ease setting of national conservation priorities, and make the process more flexible, as it can be combined for different selections of species of interest (Figure 2).

It is important to state that no other assessments at other scales or with other perspective should replace the national Red List, but rather complement it, and assist in the use of this data and the evaluation of Red-List-based conservation. As long as nature management and conservation administration follow national borders, national Red Lists make perfect sense. It is also a question of national interest, and as previously mentioned, the final prioritizations should be, and are, based on more than Red Lists. However, the Red List is probably the most comprehensive tool available, and implementing the consequences of scale on Red List-based conservation, and knowledge of the species status from outside the borders is important for a whole and effective conservation.

Nature is continuous, and ecological communities will change in both space and time, and create challenges to the long-term success of conservation, whether that be prioritization among species, definitions of important habitats, or selection of sites. Consulting information regarding both the status at larger (or smaller) scales (depending on the scale in question), species habitat affiliations and important ecological variables, spatio-temporal population dynamics and dynamics in target species within the given area should give a solid foundation for the process of prioritizations among red-listed species and sites for conservation. There is so much valuable and useful information available in national Red List assessments. By greater awareness of the challenges and potential pitfalls, and by seeking to understand the effects of Red List based conservation better, we can develop national and regional guidelines for an effective and targeted conservation of red-listed species.

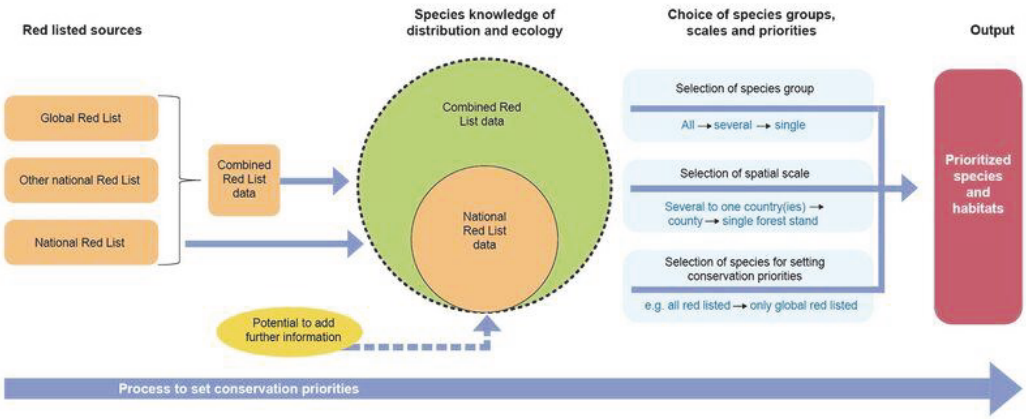

Figure 2: A conceptual framework for the process of identifying/setting conservation priorities using data from single national Red Lists or data from several (national to global) combined Red Lists. The potential to add additional appropriate ecological information is shown. The combined data may after appropriate selection of species groups, spatial scale and which red-listed species to select, be used to facilitate prioritizing of species and habitats of conservation interest.

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Original Research Article

The influence of spatial scales on Red List composition: Forest species in Fennoscandia

L. Tingstad [a, b, *], I. Gjerde [b], A. Dahlberg [c, d], J.A. Grytnes [a]

[a] Department of Biology, University of Bergen, Thor Møhlensgate 54 A, N-5020 Bergen, Norway
[b] Norwegian Institute of Bioeconomy Research, Fanaflaten 4, N-5244 Fana, Norway
[c] Swedish Species Information Centre, Swedish University of Agricultural Sciences, P.O. Box 7007, S – 750 07 Uppsala, Sweden
[d] Department of Forest Mycology and Pathology, Swedish University of Agricultural Sciences, P.O. Box 7026, 750 07 Uppsala, Sweden

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ABSTRACT

National Red Lists are widely used prioritizing tools for nature conservation. However, status and trends of species vary with scale, and accounting for a larger spatial scale may provide complementary perspectives for nature conservation. We investigate effects of up-scaling and influence of wider-scale distribution patterns for composition of Red Lists.
We collated nationally red-listed forest species in Norway, Sweden and Finland, and extracted "Candidates for a Fennoscandian Red List" (CFRL), defined as species red-listed where they appear in the region. For each country, we compared composition of organism groups and forest type associations of species that were national CFRL to the nationally red-listed species not CFRL. European distribution patterns were compared to investigate how broader-scale distribution is reflected in national Red Lists.
Among the 4830 nationally red-listed forest species in Fennoscandia, 58% were CFRL. The fraction of species in the different forest type and species groups differed significantly between the two spatial scales for several groups, although the overall differences in composition were relatively small. Red-listed species had more confined distribution patterns, suggesting that many nationally red-listed species owe their status to being at the edge of their distribution range.
An up-scaling had a large effect on which species designated to a Red List, but a relatively small impact on which organism groups or forest types that contained most red-listed species. A regional perspective generated by compilation of national Red Lists can give valuable complementary information on the status of species and effects of scale.

1. Introduction

The International Union for Conservation of Nature (IUCN) has been assessing the global threat status of species since the 1960's to highlight declining and rare species with a risk of extinction. The result is the IUCN Red List, which with its scientific based criteria and coverage of all multicellular taxonomic groups, forms one of the most comprehensive data sources for nature conservation and management (Lamoreux et al., 2003; Mace et al., 2008; Rodrigues et al., 2006; Zamin et al., 2010). Alongside the IUCN's global Red List, more than one hundred national Red Lists have been produced during the last three

* Corresponding author. Department of Biology, University of Bergen, Thor Møhlensgate 54 A, N-5020 Bergen, Norway.
E-mail address: lise.tingstad@uib.no (L. Tingstad).

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decades to assist biodiversity conservation at the national level (Gärdenfors, 2001; IUCN, 2012a; Miller, 2013; Rodríguez, 2008; Vié et al., 2009) and the number is still increasing (Azam et al., 2016). As available resources for species conservation are limited, and neither species nor threat factors are evenly distributed, biodiversity conservation has to deal with prioritizations. Priorities are set by political goals and economy, and there is today an extensive use of national Red Lists in the setting of conservation priorities at various scales (Keller and Bollmann, 2004; Martín-López et al., 2011; Mittermeier et al., 1998; Possingham et al., 2002; Schmeller et al., 2014).

The definition and choice of spatial scale often directly affect the results of any given study (Rahbek, 2005). Accordingly, spatial scale is a strong determinant of the outcome of Red List assessments. National assessments are likely to give a different outcome than assessments at supra-national scales where larger parts of the distribution range are assessed, and in most cases, extinctions risk will be lower at larger scales. A species, unless it is nationally endemic, simply has a larger population at the global or regional level that inevitable affect its Red List status at a larger scale.

At the same time, large-scale population decline may be underestimated at national scales. Species assessed as "least concern" within a country might have declining populations in neighbouring countries, constituting an overall regional decline. Therefore, the regional situation might differ from the national situation for many species. A few studies have investigated Red List scale dependency by comparing Red List assessments at global and national level, reporting that many species were assigned to lower threat categories on the global list (Gärdenfors, 2001), but that most species on the national lists were not assessed at the global level (Brito et al., 2010; Rodriguez et al., 2000). For many species the national Red List assessment is the only available, comprehensive assessment of its status. When national Red Lists are implemented in conservation, it is therefore important to recognize that Red List assessments bear reference to the area assessed and cannot be directly extrapolated to larger areas. Thus, extinction risks will most likely differ between national, regional, and global scales, and often be lower with increasing spatial scale (Gärdenfors, 2001; Miller et al., 2007).

In this study, we collated individual Red List data for all forest species in the national Red Lists from Norway, Sweden, and Finland to generate a Fennoscandian −level overview of red-listed forest species and to study how scale may affect Red List composition. The Fennoscandian region has several benefits that make it suitable for this study. In addition to being a large connected land area where forest is the most extensive land cover type, approximately 50% of all red-listed species in each of the three countries are associated with forest (Artdatabanken, 2015; Henriksen and Hilmo, 2015; Rassi et al., 2010). The three countries have also published national Red Lists since the early 80's and have followed the most recent IUCN criteria since 2001 (IUCN, 2012b).

Besides different threat levels in different countries, natural geographic distribution patterns may be an important factor causing differences in the content of national Red Lists. Within a region, species at the edge of their distribution range tend to be more frequently represented on national Red Lists and edge of range species have a tendency to be assigned higher threat status (Eaton et al., 2005; Gustafsson, 1994; Lahti et al., 1991). In Europe, large-scale environmental gradients determine natural species distribution with important gradients from east to west and from north to south, including Fennoscandia (Finnie et al., 2007; Rueda et al., 2010). In order to investigate the larger scale effect of European distribution patterns on Fennoscandian forest species, we used data on European extent of distribution for vascular plants, macro-lichens, longhorn beetles, and birds, and looked at differences in geographical distribution between red-listed and non-red-listed species and between groups of red-listed species within and between countries.

We explore how increasing spatial scale impact Red List assessments and our perception of nationally red-listed species, and we discuss accordingly how national conservation prioritizations might be complemented by considering species status in neighbouring countries. Specifically, the aims of this study were to 1) investigate differences in species composition and species habitat affiliation between National Red Lists from Norway, Sweden and Finland and the selected candidates for a regional Fennoscandian Red List from each of these countries, 2) to analyse if differences of scale may relate to European distribution patterns of the species, and 3) to discuss how consideration of larger geographical scales may complement the national perspective in biodiversity conservation priorities.

2. Methods

2.1. The Fennoscandian region

The Fennoscandian region covers 1 171 037 km^2, including Norway, Sweden, and Finland. It stretches 1800 km south to north and encompasses several vegetation zones, from nemoral in the south, through boreo-nemoral to the boreal zone further north (Moen, 1998). Furthermore, there is an additional climate gradient across Fennoscandia spanning 1300 km from the coastal west to the more continental east (Moen, 1998). Forest is the most extensive land cover type across the region and covers 37, 65 and 86% of the land area in Norway, Sweden, and Finland, respectively (forest.fi, 2016; Nibio, 2016; Skogstyrelsen, 2016). Coniferous forest is the most common forest type, constituting more than 75% of the forested area in each country (Nibio, 2016; Skogstyrelsen, 2016), and consists mainly of Norway spruce (*Picea abies)* and Scots pine (*Pinus sylvestris)*, while birch (*Betula* spp.) is the most common deciduous tree (Moen, 1998). Nemoral forest is confined to the southern parts of the region where common tree species are beech (*Fagus silvatica)* ash (*Fraxinus excelsior),* elm (*Ulmus glabra,* lime (*Tilia cordata),* and oak (*Quercus* spp.*)* (Moen, 1998; Parviainen and Västilä, 2011).

2.2. Compilation of the database

To collate the dataset of Fennoscandian red-listed forest species, we used the national Red Lists and associated documentation from Norway, Sweden, and Finland (Artdatabanken, 2015; Henriksen and Hilmo, 2015; Liukko et al., 2016; Rassi et al., 2010; Tiainen et al., 2016). These national Red Lists are all based on IUCN Red List Categories and criteria Version 3.1, 2nd edition.

We selected all red-listed species from each of the three national Red Lists classified with forest landscapes as the primary (obligate forest species) or secondary (species occurring in forest) habitat in at least one of the national Red Lists. Red List documentation from Norway, Sweden and Finland was consulted for available information on Red List status, forest type affiliation, and other habitat attributes of all included species. The forest types included were boreal forest (coniferous and boreal deciduous forest) and nemoral forest (broadleaved forest with warmth-loving tree species). Habitat attributes included were dead wood and old-growth forest. The term "red-listed" species includes species within the Red List categories RE (regionally extinct), CR (critically endangered), EN (endangered), VU (vulnerable), NT (near threatened), and DD (data deficiency) following IUCN's criteria and guidelines version 3.1 (IUCN, 2012b). The IUCN term "threatened species" refers to species within the three categories CR, EN, and VU.

When needed, species names in our dataset were synonymized with the help of species specialists at Swedish Species Information Centre (SSIC), the Norwegian Biodiversity Information Centre (NBIC), and specialists associated with the Finnish Red List Assessments. The 42 subspecies in the dataset were excluded from all analyses, and the combined dataset included 4830 forest-dwelling species red-listed in one or more countries in Fennoscandia (Table 1). We used the help of specialists from the respective countries to complement information for species lacking assessment in any of the countries. These species were assigned to either NA (Not Applicable, i.e. species not resident), NE (Not Evaluated), or LC (Least Concern).

2.3. Selecting candidates for a Fennoscandian Red List

A crude estimation of Candidates for a Fennoscandian Red List was made by combining the information from the three National Red Lists. We selected a subset of species that were red-listed categorized as DD, NT, VU, EN, CR or RE wherever they occur in Fennoscandia, whether in one, two or three countries (Fig. 1). We refer to this subset as "Candidates for a Fennoscandian Red List" (CFRL) (For list of candidates, see Appendix Table A.1). This selection of species implies that nationally red-listed species categorized as LC (least concern, or having viable populations) elsewhere in Fennoscandia are excluded from the regional candidate list. We are aware that some of these excluded species may actually belong to a regional list if following a proper IUCN assessment, e.g. due to overall population decline at the regional level. Likewise some of the species included may not belong to a regional list, e.g. because they exceed the threshold of the small population criteria for red-listing when all populations in the region are summed. Thus our selection is not a result of a comprehensive Fennoscandian status evaluation and must not be seen as such. Nevertheless, we consider our CFRL a list of strong candidates for a regional Red List that are representative enough to carry important information on the effects of up-scaling from national to regional level. A complete Fennoscandian Red List would require a coherent assessment of each species where the combined status and trends in all three countries are considered together and is an extensive commission far beyond the scope of this study.

2.4. Comparing national and Fennoscandian level

Within each country, we compared the composition of candidates for the regional Red List (CFRL) to that of the other nationally red-listed forest species. Comparisons were done for the composition of organism groups and for groups of similar forest habitat affiliations using chi-square tests. The null hypothesis for these tests was that the composition, whether of organism groups or groups of similar habitat affiliation, would be the same for species excluded from the CFRL as for those selected as CFRL.

Altogether, proportions of 14 organism groups were tested: bryophytes, lichens, vascular plants, fungi, arachnids, *Coleoptera*, *Diptera, Lepidoptera, Hymenoptera, Heteroptera*, molluscs, reptiles, birds and mammals. Due to low numbers of red-listed species in the invertebrate groups *Chilopoda*, *Hemiptera, Heteroptera, Hexapoda, Malacostraca, Mecoptera, Myriapoda, Neuroptera, Orthoptera, Paurapoda, Psocoptera, Siphonaptera, Strepsiptera, Thysanoptera,* and *Tricladida*, these were excluded from the analyses.

Table 1
Number and proportion of nationally red-listed species included in the dataset from each of the three countries and Fennoscandia.

	Norway	Sweden	Finland	Fennoscandia
Number of RL[a] forest species	2330	2437	2395	4830
Included as CFRL[b]	1343	1879	1359	2785
(% of RL-species)	57%	77%	57%	58%

[a] RL= red-listed.
[b] CFRL = candidates for a Fennoscandian Red List.

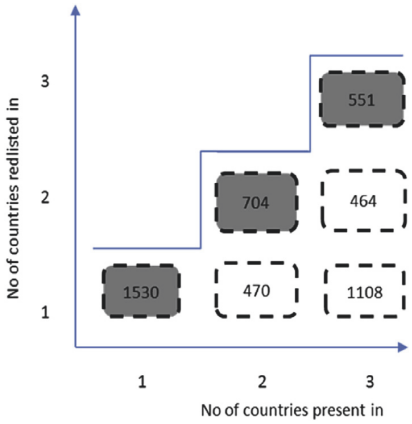

Fig. 1. Number of species red-listed and/or present in one, two or three of the Fennoscandian countries; the box in the lower left corner shows species that are red-listed in one country and present in one country. The next box to the right, shows species that are red-listed in one country and present in two countries and so on. Candidates for the Fennoscandian Red List (CFRL) are in dark grey boxes and species that do not qualify as CFRL are in white boxes.

To investigate the impact of broader scale distribution range on national Red Lists we collected data on natural European distribution for the Fennoscandian vascular plants (n=799), macrolichens (n=215), birds (n=118) and longhorn beetles (*Cerambycidae*) (n=112). Altogether, we collected distribution data on 1244 red-listed and non-red-listed forest species in Fennoscandia. The four organism groups were chosen for their relatively well-known distribution patterns and for representing different functional groups in forest ecosystems.

Lists of the non-red-listed forest species for these groups were compiled using Mossberg and Stenberg (2010) for vascular plants, Perrins (1987) for birds, Ehnström and Holmer (2007) for longhorn beetles, and Foucard et al. (2002), Ahti et al. (2007), Thell and Moberg (2011) and Ahti et al. (2013) for macro-lichens. Macro-lichens were defined according to Krog et al. (1994). For the categorising of species, we divided them into groups with a western, eastern, southern, or Pan-European distribution pattern in Europe using distribution maps published at Encyclopaedia of Life (http://www.eol.org) and GBIF (GBIF, 2016). The geographical distribution categories were defined as follow; southern species are distributed south of 62° north, but also species with only a few scattered records north of 62° were included. Western species have their main distribution in the coastal parts of Europe (present in the Iberia peninsula, Bretagne, the UK, Iceland, or Norway), and including some species with scattered populations in the humid Alps and mountain ranges around the Mediterranean. Eastern species are mainly found in Eastern Europe, and neither in UK, Iberia, nor Bretagne (nor elsewhere along the Atlantic coast). Species with a north-eastern distribution, found in Russia, Baltic, and in Eastern Europe north of the Alps were also included. Species with a widespread distribution all over Europe, or species not qualifying for any of the above-mentioned categories, where assigned to the "Pan-European" category.

We compared red-listed and non-red-listed species from each of the four organism groups to see how they were distributed on the four distribution categories. Among the red-listed species, we also compared the different countries regarding proportions of red-listed species with Pan- European, western, southern, or eastern distribution patterns. This was also done for the CFRL in the four chosen organism groups. Differences in proportions were investigated using chi-square tests. All tests and graphics were performed in R Studio Version 3.3.1 (RStudioTeam, 2015).

3. Results

Among the overall 4830 nationally red-listed forest species in Fennoscandia, 3108 species (64%) are red-listed in one country only, 1168 species (24,2%) in two countries, and 551 (11%) are red-listed in all three countries. Norway and Sweden share the highest number of species (572 species), and fewest species are shared between Norway and Finland (309 species).

3.1. Comparing national and Fennoscandian level

Altogether, 2785 (58%) of the red-listed forest species in Fennoscandia were red-listed in the countries they appear in and considered Candidates for the Fennoscandian Red List (CFRL) (Fig. 1; for full species list see Appendix Table A.1). Hence, 42% of nationally red-listed forest species in Fennoscandia have been assessed as Least Concern (LC) in at least one country. The proportion of nationally listed species included as CFRL varied between the countries, from 57% of nationally listed species in Norway and Finland, to 77% in Sweden (Table 1).

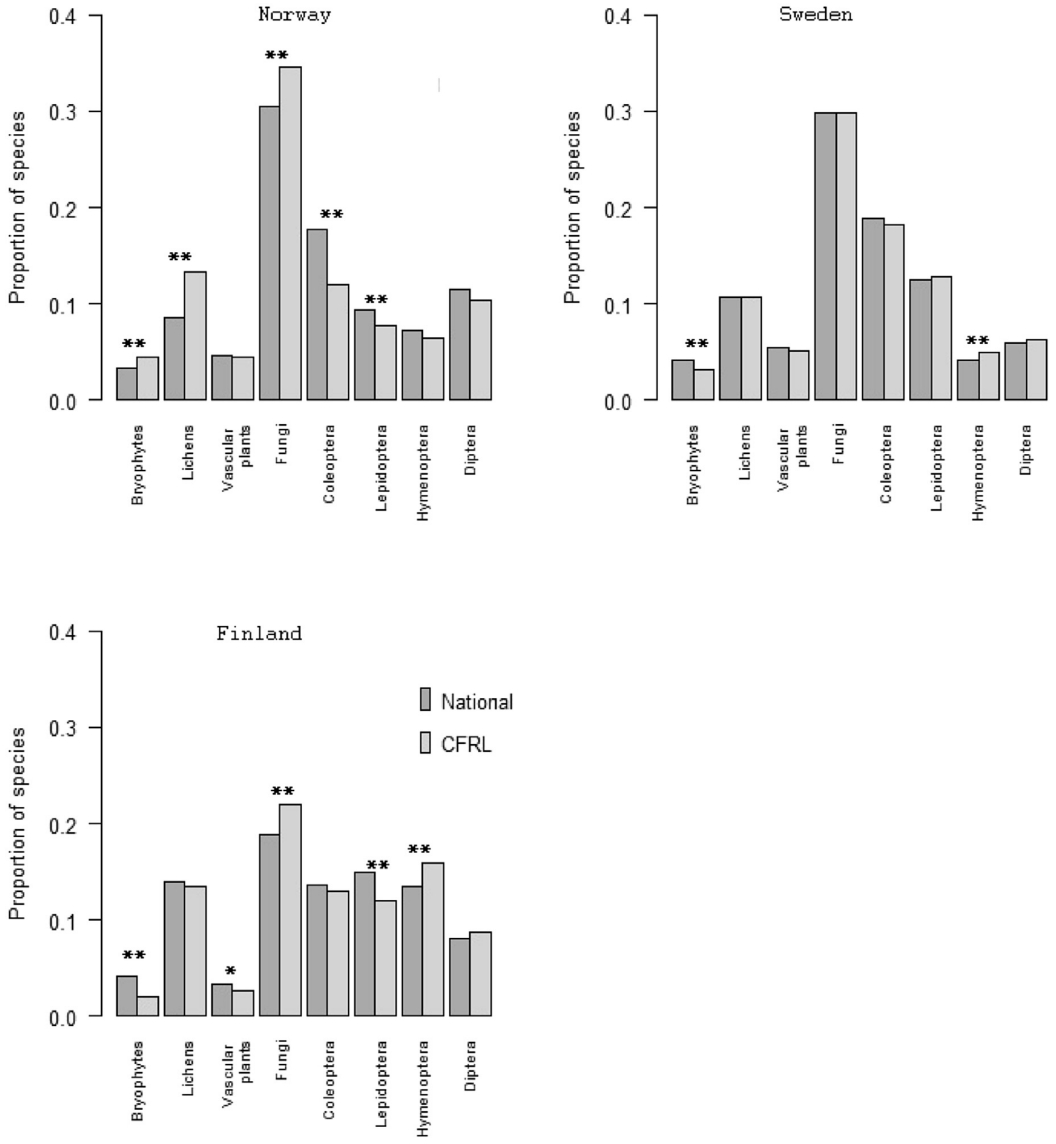

Fig. 2. Proportion of species in different organism groups in the national Red Lists (minus candidates for the Fennoscandian Red List) (dark grey bars) and among the national Candidates for the Fennoscandian Red List (CFRL) (light grey bars) for each country. The eight most species-rich groups are shown. For full test results, see Appendix Table A.2. *= $p < 0.05$, ** = $p < 0.01$.

Of the 14 organism groups tested, the results for the eight most species-rich groups are shown in Fig. 2. Altogether, seven of these eight groups had a significantly different representation among the CFRL relative to the rest of the national Red List in one or more country ($p < 0.05$). In both Norway and Finland, fungi made up a higher proportion of the CFRL, compared to the rest of the national Red Lists (Fig. 2). This means that there are proportionally more fungi species among the national CFRL from Norway and Finland than there are fungi species among the red-listed species not selected as candidates. In Norway, the same pattern was found for bryophytes and lichens. Further, Hymenoptera in both Sweden and Finland make up a higher proportion of the CFRL compared to the rest of the national Red List. For Lepidoptera both in Finland and Norway, and for bryophytes and vascular plants in Finland, and Coleoptera in Norway, the proportion of species from these groups were lower among the CFRL than among the rest of the species on the national Red Lists. For Sweden, a similar pattern was found for

bryophytes. Despite statistical significance, the magnitude of these compositional changes is still relatively small, with a maximum change of five percent points. All test results can be found in Appendix, Table A.2.

Regarding the relative share of red-listed species affiliated with major forest types, changing from national to Fennoscandian scale only lead to relatively small proportional changes (ranging between 0 and 5 percent points) in forest type affiliations, despite significant results. For Norway, there was a higher proportion among the CFRL that were associated with nemoral forest than it was among the other nationally red-listed species ($p < 0.05$) (Fig. 3). In Sweden, there was also proportionally more species associated with nemoral forest among the CFRL ($p < 0.05$) (Fig. 3), while the opposite pattern was found for both coniferous and deciduous forest species. For these species, the proportion of affiliated species was lower among the CFRL than among the rest of the red-listed species. This was also true for the affiliation with both dead wood and old-growth forest in Sweden. For Finland, proportionally fewer of the CFRL species were associated with nemoral forest relative to the rest of Finland's national Red List ($p < 0.01$). This means that the nationally red-listed species found in nemoral forest in Finland, are more likely to be represented elsewhere in the region with a "least concern" status compared to species associated with other forest types. In contrast, species from old-growth forest and species related to dead wood in Finland made up a significantly higher proportion of the CFRL compared to the red-listed species in Finland that are not among the CFRL ($p < 0.01$) (Fig. 4).

The overall proportional changes in Red List categories and criteria for red-listing were found to be small, and all Red List categories are represented among the candidates from each country (Appendix Table A.3 and Table A.4). There were more species in the threatened categories among the national CFRL compared to the national Red List as a whole, and the proportion of species listed nationally as NT was lower among the CFRL.

3.2. European distribution patterns

Among the red-listed species, the proportion showing an eastern, southern or western distribution pattern in Europe was significantly higher than it was among non-red-listed species for the tested organism groups ($p < 0.001$), except birds ($p = 0.063$) (Fig. 4). In total, 64% of the nationally red-listed species were found to have eastern, southern or western distribution patterns in comparison with 21% of the non-red-listed species. This pattern was clear for all four organism groups investigated, but most pronounced for longhorn beetles, where almost all (98%) of the red-listed species belonged to either the western, southern, or eastern distribution categories, compared to 34% of the non-red-listed species (Fig. 4).

Of the red-listed species, macrolichens was the group with the highest proportion of western species, and longhorn beetles had the highest proportions of southern and eastern species (Table 2). Red-listed species with a western distribution were more frequent in Norway, southern species in Sweden, and eastern species in Finland. Finland also had the highest relative proportion (49%) of species with a Pan-European distribution (Table 2). In Norway, all of the species classified as western were among the Candidates for the Fennoscandian Red List. The majority of these were lichens. In Sweden, as much as 89% of the southern species were included as CFRL, and in Finland, the eastern species had the highest proportion of

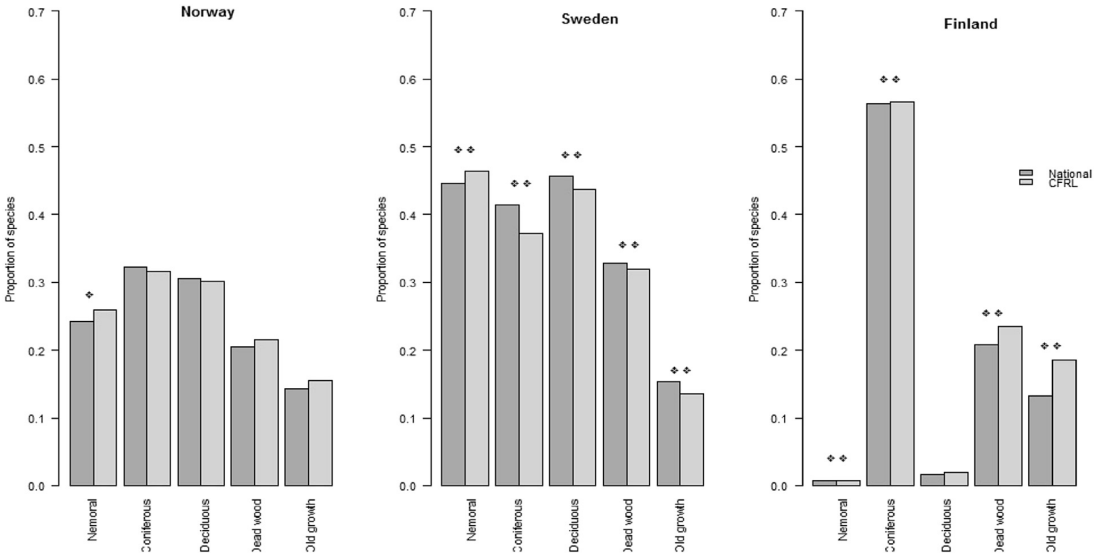

Fig. 3. Proportion of species associated to major forest types in the national Red Lists (minus candidates for the Fennoscandian Red list) (dark bars) and among the candidates for the Fennoscandian Red List (CFRL) (grey bars) for a) Norway, b) Sweden and c) Finland *= $p < 0.05$, ** = $p < 0.01$.

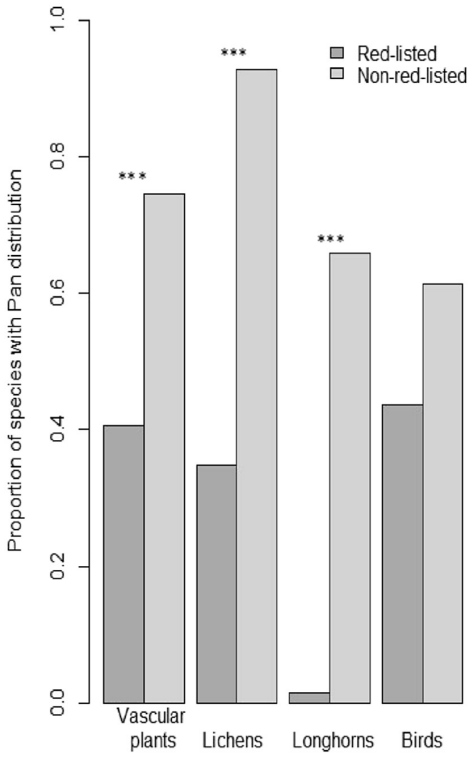

Fig. 4. Proportions of species with a Pan-European distribution among red-listed (dark grey) and non-red-listed (light grey) species. *** = $p < 0.001$.

candidates. Among the 13 species with a western distribution that are nationally red-listed in Finland (n= 203) only 2 were included among the CFRL, indicating that western species resident in Finland have viable populations in the neighbouring countries.

4. Discussion

Our provisional up-scaling of Red List assessments suggests considerable scale effects regarding which species that will be red-listed. In total, 2785 of the 4830 nationally red-listed forest species in Norway, Sweden and Finland were considered Candidates for a Fennoscandian Red List (CFRL) under the criteria of being red-listed (i.e. DD, NT, VU, EN, CR, RE) wherever found in the region. For each country, this number of candidates corresponds to 57–77% of the nationally red-listed species, meaning that the number of national CFRL is considerably lower than the number of nationally red-listed species in each country. There is a higher proportion of CFRL in Sweden, which is partly related to its geographical position. Sweden extends further into the species-rich nemoral zone than the other Fennoscandian countries, supporting red-listed species with southern distribution that are rare or absent from Norway and Finland. Also, the east-west species distribution gradients in Fennoscandia might lead to the centrally positioned Sweden having representatives from both eastern and western red-listed species, and therefore a higher proportion of species qualifying for the Fennoscandian list.

Several conditions may explain the observed differences between the candidates for the Fennoscandian level and the other nationally red-listed species in a country. Besides geographical differences in human impact on species populations, there are clearly natural climate gradients that determine broad species distribution patterns. Species are unevenly distributed throughout their range, being abundant in some areas, and less abundant in others (Murray et al., 1999). Usually species are less abundant towards the edges of their distribution range (Gaston, 1997) and differences increase with distance (Nekola and White, 1999). Thus, nationally rare species might not be consistently rare throughout their geographical range, and only parts of a species' total distribution range will be covered by national assessments, except for global Red List assessments and assessments of geographically restricted species. An expected outcome when the scale of assessment is smaller than the species distribution range, is that threat status will vary with scale. It is therefore important to take scale effects into account when national Red Lists are used as a prioritization tool in conservation.

Table 2
Proportion (given as percentage) of red-listed species from each of the four organism groups divided by the four distribution categories. Results are shown for each country and for the candidates for the Fennoscandian Red List (CFRL).

	n=	Pan-European	Western	Southern	Eastern
Norway					
Vascular plants	88	51.1	3.4	33.0	12.5
Macrolichens	69	29.0	36.2	17.4	17.4
Longhorn beetles	32	3.1	0.0	34.4	62.5
Birds	17	35.3	0.0	11.8	52.9
Sweden					
Vascular plants	119	36.5	8.0	29.2	13.1
Macrolichens	69	36.2	27.5	15.9	20.3
Longhorn beetles	45	0.0	0.0	46.7	53.3
Birds	35	42.9	0.0	20.0	37.1
Finland					
Vascular plants	89	54.4	4.4	15.6	17.8
Macrolichens	63	57.1	12.7	12.7	17.5
Longhorn beetles	30	0.0	3.3	30.0	66.7
CFRL					
Vascular plants	103	37.9	3.9	40.8	17.5
Macrolichens	62	30.6	40.3	14.5	14.5
Longhorn beetles	42	0.0	0.0	47.6	52.4
Birds	19	21.1	0.0	36.8	42.1

An effect of up-scaling may also arise directly from the distribution and availability of the forest habitats in the region. The forest landscapes across Fennoscandia are relatively homogenous and boreal forest extends throughout all three countries. Accordingly, we found largely the same relative number of red-listed species in the major forest types at the national and Fennoscandian scale. The only exception was Norway and Sweden who had a higher, and Finland who had a lower proportion of CFRL from nemoral forest. Nemoral forest is species-rich and covers a larger area in Sweden and Norway compared to Finland. Few nemoral species from Finland qualify as CFRL, and are therefore most likely more abundant in southern Sweden and south-eastern Norway, and at the edge of their distribution range in Finland (forest.fi, 2016; Sandström et al., 2015). The composition and heterogeneity of habitats within a region will inevitable affect the correspondence between a national and a regional Red List. In more heterogeneous parts of the world, a stronger effect of up-scaling could be expected on forest type affiliations. In our study region, however, species distribution at the wider scale seems to be relatively more important than habitat affiliation in explaining differences between spatial scales.

The red-listed vascular plants, lichens, longhorn beetles and birds showed a higher frequency of western, southern, or eastern distribution across Europe compared to the non-red-listed species of the same taxa which typically have a "Pan-European" distribution. This is in line with previous studies, e.g. from a study of vascular plants in Sweden showing that threatened taxa are less widespread than non-threatened taxa which have wider European distributions (Gustafsson, 1994). In addition, we found that species with a western distribution are red-listed in Norway (western part of Fennoscandia) and species with a southern and eastern distribution are red-listed in Sweden and Finland respectively. The pattern is strengthened by the fact that the species in Norway with a western distribution are all Candidates for the Fennoscandian Red List, meaning they are either only found in Norway or red-listed also in the neighbouring countries. One concrete example is the red-listed lichen species in Norway, as they are mostly western species, and also found to have a high proportion of CFRL. This pattern repeats itself for Sweden and Finland, as the highest representation of CFRL in these countries is found among the southern and eastern species respectively. Species in Fennoscandia with a strict western, southern, or eastern distribution pattern at the European scale are likely to be CFRL, indicating influence of wider-scale distribution patterns on the outcome of Red List assessments.

It has been shown that a smaller area of assessment leads to higher threat status for many species (Milner-Gulland et al., 2006). With a strict national focus, one might overlook the fact that some species will be nationally, but not regionally red-listed, and vice versa. There will also be species that qualify for a regional red list, but are not nationally red-listed in all countries within the region. In our dataset, we identified 934 species that were red-listed in one or two out of three countries and have a status of "least concern" in one country. These species were excluded from the CFRL in this current study, but the concept of "national responsibility species" can allow for the annotation of such species as of nationally high conservation concern independent of national Red List category (Schmeller et al., 2014). Such species might therefore be assigned "national responsibility species" also in countries where they have a "least concern" status. Species conservation should not only focus on the most endangered species, but also prevent species with viable populations from becoming threatened (Pfab et al., 2011). A combined supra-national dataset of red-listed species can be useful in assisting the identification of "national responsibility species" by simultaneously consider both national Red List status and the status in neighbouring countries.

When a larger-scale goal for conservation is aimed at, one might argue for a higher national prioritization of habitats that are poorly represented in neighbouring countries, and vice versa. Similarly, identifying changes in the relative importance of habitat types for red-listed species with scale may be useful in national conservation prioritizing. At the species level, one

might also argue for a higher prioritization of species groups that have many species threatened also at the larger scale. For the overwhelming majority of forest species in Fennoscandia, the national Red List status is the only extinction risk estimate available. Of the 4830 species in our dataset, only 2 and 4% are assessed at European and Global level respectively (see Appendix Table A.1). The upscaling from a national Red List to the CFRL of the present study illustrate the potential effects that an up-scaling might have on composition of Red Lists. More generally, our approach of combining the knowledge of already existing national red-list assessments and associated data represents a feasible way of obtaining a source of complementary information on species status in a broader region.

Acknowledgements

We gratefully acknowledge the nearly 300 species experts that have been involved in the national Red List assessment of the species used in this study for the Finnish Ministry of Environment, the Norwegian Biodiversity Information Centre and the Swedish Species Information Centre. We especially thank the species experts at the Swedish Species Information Centre in Sweden, Snorre Henriksen at the Norwegian Biodiversity Information Facility, Esko Hyvärinen at the Finnish Ministry of Environment and Aino Juslén at the Finnish Museum of Natural History for helpful assistance in collecting and preparing data. We would also like to thank other colleagues for helpful comments during the working process. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit.

Appendix

Table A1
Species included as "Candidates for the Fennoscandian Red List" (CFRL), and their status on the European Red List (EU) and the IUCN Global Red List. Species are sorted in alphabetical order.

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Abia candens	NT	NA	NT		
Abia mutica	NA	NE	NT		
Abia sericea	VU	NT	CR		
Abraeus granulum	NA	NT	NA		
Abraeus parvulus	EN	EN	NA		
Abrothallus peyritschii	NA	NE	DD		
Abrothallus suecicus	NA	NE	DD		
Absconditella celata	NA	NE	DD		
Acalles camelus	NA	NT	NA		
Acalles misellus	VU	NT	NA		
Acalles navieresi	NA	NT	NA		
Acartauchenius scurrilis	NA	DD	VU		
Acasis appensata	EN	VU	VU		
Accipiter gentilis	NT	NT	NT	LC	LC
Acer campestre	NA	CR	NA		
Achalcus bimaculatus	NA	NT	NA		
Achalcus melanotrichus	VU	NT	NA		
Achorotile longicornis	NA	DD	EN		
Acleris quercinana	NA	VU	NA		
Acleris schalleriana	NT	NT	NT		
Aclista evadne	NT	NE	NE		
Aclista ninae	NT	NA	NA		
Aclista relativa	NT	NA	NA		
Acmaeops marginata	EN	EN	NT		
Acmaeops septentrionis	EN	NT	NT		
Acmaeops smaragdula	RE	RE	VU		
Acnemia amoena	NA	NE	VU		
Aconitum napellus	NA	CR	NA		
Acritus homoeopathicus	CR	NA	NA		
Acritus minutus	EN	RE	VU		
Acrolepiopsis betulella	EN	DD	NA		
Acronicta tridens	VU	VU	EN		
Actebia fennica	NA	NA	EN		
Acyrtosiphon chelidonii	NA	NA	VU		
Adelphomyia punctum	NA	NE	VU		
Adialytus thelaxis	NA	NE	NT		
Aeletes atomarius	NA	NT	NA		
Aesalus scarabaeoides	NA	EN	NA	NT	
Aethes kyrkii	NA	NA	EN		

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Aethusa cynapium elata	VU	NA	NA		
Agapetus fuscipes	NA	VU	NA		
Agaricus lanipes	NA	NT	NA		
Agaricus litoralis	NE	NT	NA		
Agaricus phaeolepidotus	NE	DD	NA		
Agathidium plagiatum	NA	VU	NA		
Agathidium pulchellum	NA	EN	VU	NT	NT
Agathomyia zetterstedti	NA	NT	NE		
Agenioideus ciliatus	NA	EN	NA		
Aglaoapis tridentata	NA	VU	RE		LC
Aglaostigma gibbosum	VU	NE	NA		
Agnathosia sandoeensis	NA	EN	NA		
Agonopterix astrantiae	EN	VU	EN		
Agonopterix bipunctosa	NA	VU	NA		
Agrilus ater	NA	NA	VU		
Agrilus convexicollis	NA	VU	NA		
Agrilus cuprescens	NA	NT	NE		
Agrilus delphinensis	NA	NA	CR		
Agrilus guerini	NA	NT	NA		
Agrilus integerrimus	NA	NA	EN		
Agrilus laticornis	NT	NT	VU		
Agrilus olivicolor	EN	NT	NA		
Agriphila poliella	NA	VU°	EN		
Agrochola lychnidis	NA	NT	NA		
Agrocybe firma	DD	NT	NE		
Agrypnia sahlbergi	NA	DD	NA		
Agyrtes bicolor	NA	DD	NA		
Aira caryophyllea	NE	VU	NA		
Albatrellus citrinus	VU	VU	DD		
Albatrellus cristatus	VU	EN	NA		
Alchemilla oleosa	NT	NE	NA		
Alchemilla oxyodonta	VU	EN	NA		
Alchemilla semidivisa	VU	NA	NA		
Alchemilla taernaënsis	NT	NT	NA		
Alcis jubatus	NT	NT	NT		
Alectoria sarmentosa subsp. *Sarmentosa*	NT	NT	NT		
Aleochara haemoptera	NA	NA	RE		
Aleochara ruficornis	NA	NA	VU		
Aleuriella personata	NA	NA	DD		
Aleurodiscus fennicus	NA	RE	DD		
Allecula morio	NA	NT	RE		
Allecula rhenana	NA	VU	NA		
Allium lusitanicum	EN	EN	NA		
Allodia (Brachycampta) pistillata	NA	NE	DD		
Allodia (Brachycampta) subpistillata	NA	NE	DD		
Allodia barbata	DD	NE	NA		
Allodia confusa	NT	NE	NA		
Allodia rindeni	DD	NE	NA		
Allomyella portenkoi	DD	NA	NA		
Allopauropus danicus	NT	DD	NE		
Allygus maculatus	NA	DD	NA		
Alopecosa cursor	NA	CR	NA		
Alopex lagopus	CR	EN	CR		
Alpova diplophloeus	NT	VU	NA		
Altica aenescens	NA	NA	VU		
Amanita ceciliae	NE	NT	NE		
Amanita eliae	NA	EN	NA		
Amanita franchetii	NE	VU	DD		
Amanita friabilis	VU	NT	NT		
Amanita lividopallescens	NE	NT	NE		
Amanita strobiliformis	NA	NT	NA		
Amaurodon cyaneus	VU	NA	VU		
Amaurodon viridis	NT	NA	RE		
Amauronyx maerkelii	NA	DD	NA		
Amiota alboguttata	NE	NT	NE		
Amiota flavopruinosa	NA	NT	NA		
Amischa andreasi	NA	NA	DD		
Ampedus cardinalis	CR	NT	NA	NT	NT
Ampedus cinnabarinus	NT	NT	EN		
Ampedus elegantulus	NA	RE	NA		LC
Ampedus lepidus	NA	NA	VU	DD	

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Ampedus nigerrimus	NA	EN	NA	NT	
Ampedus praeustus	NT	NT	VU		LC
Ampedus rufipennis	NA	VU	NA		LC
Ampedus triangulum	NA	EN	NA		
Amphinema diadema	NE	DD	NA		
Amylocorticium subincarnatum	EN	EN	VU		
Amylocorticium subsulphureum	DD	DD	NT		
Amylocystis lapponica	EN	VU	NT		
Anacampsis fuscella	NA	VU	EN		
Anaclileia dziedzickii	NA	NE	VU		
Anaesthetis testacea	NA	NT	NA		
Anaglyptus mysticus	CR	NT	NA		LC
Anaspis garneysi	NA	DD	NA		
Anaspis ruficollis	CR	NE	NA		
Anastrophyllum cavifolium	DD	DD	EN		
Anastrophyllum donnianum	NT	NA	NA		
Anastrophyllum joergensenii	EN	NA	NA		
Anatella alpina	DD	NA	NA		
Anatella aquila	NT	NE	DD		
Anatella bremia	DD	NE	DD		
Anatella fungina	DD	NE	NA		
Anchinia cristalis	NA	CR	NA		
Ancistronycha cyanipennis	NT	NT	RE		
Ancylis obtusana	NA	NT	NT		
Andrena argentata	NT	NT	NT	DD	
Andrena curvungula	NA	NT	NA	DD	
Andrena fulvago	VU	NT	VU	DD	
Andrena gelriae	NA	EN	VU	DD	
Andrena marginata	VU	NT	CR	DD	
Andrena nanula	VU	VU	VU	DD	
Andrena nigrospina	EN	NT	VU		
Andrena similis	NA	EN	EN	DD	
Andrenosoma albibarbe	NA	NA	CR		
Andrenosoma atrum	NA	RE	NA		
Andricus paradoxus	NA	NE	VU		
Andricus quadricorticis	NA	NE	VU		
Andricus quercusradicis	NA	NE	VU		
Andricus testaceipes	NA	NE	VU		
Anemone sylvestris	NA	NT	NA		
Anemone trifolia	NA	NA	VU		
Aneura maxima	NA	NA	VU		
Aneurus laevis	NT	VU	NA		
Anisoxya fuscula	VU	VU	NA		
Anitys rubens	EN	NT	NA		
Anobium costatum	NA	NT	NA		
Anobium fulvicorne	VU	NT	EN		
Anoecia zirnitsi	NA	NE	NT		
Anogcodes rufiventris	NA	VU	NA		
Anomoloma albolutescens	EN	CR	VU		
Anomoloma myceliosum	VU	EN	NT		
Anomoporia bombycina	EN	EN	NT		
Anoplius aeruginosus	NA	NT	EN		
Anoplius alpinobalticus	NA	VU	RE		
Anotylus tetratoma	DD	NA	EN		
Anser fabalis	VU	NT	VU	LC	LC
Anteon infectum	NT	NE	NE		
Anthericum liliago	NA	EN	NA		
Anthocoris amplicollis	VU	VU	NA		
Anthonomus ulmi	NA	NT	NA		
Anthracobia rehmii	NT	NA	NA		
Anthrax trifasciatus	VU	NT	RE		
Anthrenochernes stellae	NA	NT	NA		
Anthribus fasciatus	NA	NT	RE		
Antipalus varipes	NA	VU	NE		
Antrodia albobrunnea	NT	VU	NT		
Antrodia crassa	CR	CR	EN		
Antrodia infirma	EN	EN	VU		
Antrodia malicola	DD	NA	NA		
Antrodia mellita	VU	VU	NT		
Antrodia primaeva	EN	EN	VU		

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Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Antrodia pulvinascens	NT	NT	VU		
Antrodiella canadensis	CR	NA	EN		
Antrodiella citrinella	VU	CR	NT		
Antrodiella parasitica	DD	VU	VU		
Apatania muliebris	NA	NT	NA		
Apethymus apicalis	NT	NE	NT		
Aphanobasidium subnitens	DD	NA	NA		
Aphanogmus fasciipennis	NT	NE	NE		
Aphanogmus furcatus	NT	NE	NE		
Aphis brunellae	NA	NE	EN		
Aphis craccivora	NA	NE	EN		
Aphis erigerontis	NA	NA	CR		
Aphis selini	NA	NA	VU		
Aphis serpylli	NA	NE	EN		
Aphis triglochinis	NA	NE	VU		
Aphis uvaeursi	NA	NE	DD		
Aphis violae	NA	NA	NT		
Apion atomarium	NA	NT	NT		
Apion melancholicum	EN	NT	NT		
Aplota kadeniella	NA	NA	VU		
Aplota palpella	VU	NT	NA		
Apocheiridium ferum	NA	NT	NA		
Apomyelois bistriatella	NT	NT	NA		
Aporinellus sexmaculatus	NA	VU	CR		
Apotomis demissana	NA	DD	NA		
Aquila clanga	NA	NA	CR		
Arachnopeziza aurelia	NE	NE	CR		
Arachnospila alvarabnormis	NA	EN	NA		
Arachnospila consobrina	NA	NT	EN		
Arachnospila wesmaeli	VU	NT	EN		
Arachnospila westerlundi	VU	VU	NA		
Aradus angularis	NA	VU	VU		
Aradus annulicornis	NA	NA	RE		
Aradus aterrimus	NA	CR	RE		
Aradus bimaculatus	NA	NT	NT		
Aradus laeviusculus	RE	EN	NT		
Aradus truncatus	NT	EN	NT		
Araneus angulatus	NT	NT	NT		
Araneus triguttatus	NA	NT	NA		
Araniella inconspicua	NA	NT	NA		
Archaphorura serratotuberculata	VU	NA	NA		
Archips betulanus	VU	NT	VU		
Arctobius agelenoides	VU	DD	NT		
Arctophila bombiformis	VU	CR	NA		
Arctosa figurata	NA	NT	NT		
Arge cyanocrocea	NA	NE	NT		
Arge enodis	RE	NE	RE		
Arge pullata	NA	NE	VU		
Argyra loewi	NA	VU	NA		
Arhopalus ferus	NA	EN	EN		
Aristolochia clematitis	NA	NT	NA		
Armadillidium opacum	VU	NT	NA		
Arnellia fennica	NT	NT	VU		
Arotes albicinctus	NA	NA	EN		
Arpinia fusispora	NA	DD	NA		
Arrhopalites sericus	VU	NA	NA		
Arthonia anombrophila	NA	CR	NA		
Arthonia boreella	NA	NA	RE		
Arthonia byssacea	CR	VU	CR		
Arthonia caesia	NA	NA	RE		
Arthonia cinnabarina	VU	CR	NA		
Arthonia elegans	VU	NA	NA		
Arthonia helvola	NA	NT	EN		
Arthonia ilicina	VU	NA	NA		
Arthonia incarnata	NA	VU	NT		
Arthonia lirellans	VU	NA	NA		
Arthonia orbillifera	VU	NA	NA		
Arthonia pruinata	NA	NT	NA		
Arthonia stellaris	VU	NA	NA		
Arthonia tenellula	NE	NA	NT		
Arthonia zwackhii	NA	CR	NA		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Arthopyrenia cerasi	NE	NE	DD		
Arthopyrenia cinereopruinosa	NE	NE	NT		
Arthopyrenia subcerasi	NA	NE	NT		
Arthothelium norvegicum	VU	NE	NA		
Arthrolips obscura	NA	RE	RE		
Arthrosporum populorum	NE	NE	NT		
Arum cylindraceum	NA	RE	NA		
Asarum europaeum	VU	NA	NT		
Asemum tenuicorne	NA	EN	NA		
Asindulum nigrum	NA	VU	NA		
Asiraca clavicornis	NT	NA	NA		
Asplenium adulterinum	VU	VU	VU		LC
Asplenium ceterach	NA	CR	NA		
Astata minor	NA	NT	NT		
Astiosoma rufifrons	NA	DD	NA		
Astragalus penduliflorus	NA	EN	NA		
Astrenis sinuata	NA	NE	VU		
Atanycolus denigrator	NA	NE	RE		
Atanycolus ivanowi	NA	NE	RE		
Atanycolus neesii	NA	NE	RE		
Aterpia sieversiana	NA	VU	NA		
Atheloderma mirabile	NA	VU	VU		
Athelopsis lacerata	VU	NT	NA		
Atheta autumnalis	NT	NT	VU		
Atheta liturata	NA	VU	NA		
Atheta pfaundleri	NA	DD	NA		
Atheta taxiceroides	NT	NT	NT		
Athetis gluteosa	NT	NT	EN		
Athrips amoenellus	NA	EN	EN		
Atomaria ihsseni	NA	NA	NT		
Atomaria lapponica	VU	NT	DD		
Atomaria nigripennis	EN	VU	EN		
Atomaria nigriventris	NA	DD	NA		
Atomaria pseudaffinis	NT	DD	NA		
Atomaria rubricollis	NA	DD	NT		
Atomaria scutellaris	NA	DD	NA		
Attagenus punctatus	NA	VU	NA		
Atypus affinis	NA	EN	NA		
Aulogastromyia anisodactyla	DD	NE	DD		
Aulonothroscus laticollis	NA	DD	CR		
Aulops alpina	NA	NA	NT		
Aureoboletus gentilis	EN	VU	CR		
Auricularia mesenterica	NT	NT	NA		
Auriculariopsis albomellea	DD	RE	NA		
Axenyllodes echinatus	VU	NA	NA		
Bacidia absistens	NT	VU	NA		
Bacidia auerswaldii	NE	CR	NA		
Bacidia friesiana	NA	VU	CR		
Bacidia hemipolia	NA	NE	EN		
Bacidia illudens	NE	NE	NT		
Bacidia incompta	EN	EN	NT		
Bacidia laurocerasi	VU	EN	EN		
Bacidia polychroa	NA	VU	CR		
Bacidia rosella	CR	VU	NA		
Bacidia rosellizans	NA	NT	NA		
Bacidina delicata	NA	VU	DD		
Bacidina phacodes	NE	NT	VU		
Bacotia claustrella	NA	NT	NA		
Bactra suedana	NA	NT	NA		
Bactrospora brodoi	EN	VU	RE		
Bactrospora corticola	VU	NT	NA		
Bactrospora dryina	NA	EN	NA		
Bactrospora homalotropa	CR	NA	NA		
Baeospora myriadophylla	VU	DD	EN		
Baetis liebenauae	NA	NT	NA		
Baetis tracheatus	NA	VU	NA		
Baizongia pistaciae	NA	NE	VU		
Balea biplicata	VU	NT	NA		
Balea sarsii	DD	DD	NA		
Balsamia platyspora	DD	NE	NA		

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Baptria tibiale	CR	EN	EN		
Barbastella barbastellus	CR	VU	NA	VU	NT
Barbula crocea	CR	NA	NA		
Baryphyma insigne	NA	NA	DD		
Basalys crassiceps	NT	NA	NA		
Basalys singularis	NT	NA	NA		
Batrisodes adnexus	VU	VU	NA		
Batrisodes buqueti	NA	NA	EN		
Batrisodes delaporti	EN	VU	NA		
Bellardia vespillo	NA	DD	NE		
Belonioscyphella pluriseptata	NA	NA	DD		
Belyta breviscapa	DD	NA	NA		
Bembecia ichneumoniformis	NT	NT	EN		
Bembidion humerale	NA	VU	CR		
Bembidion monticola	NA	NA	VU		
Beraea maura	NT	VU	NA		
Beris fuscipes	NA	NT	NA		
Beris vallata	NA	NT	NA		
Betulaphis brevipilosa	NA	NE	DD		
Betuloxys hortorum	NA	NA	VU		
Biatora aureolepra	EN	NA	NA		
Biatora fallax	NT	VU	VU		
Biatora hypophaea	NT	NA	NE		
Biatora pontica	EN	NA	NA		
Biatora troendelagica	CR	NA	NA		
Biatorella conspurcans	NE	NE	DD		
Biatoridium monasteriense	NT	VU	NT		
Bibio fulvicollis	RE	VU	NA		
Bibio lautaretensis	NT	NA	NA		
Bibio leucopterus	NA	DD	NA		
Bibloporus mayeti	NA	VU	NA		
Bibloporus ultimus	NA	VU	NA		
Biphyllus lunatus	RE	EN	RE		
Biscogniauxia cinereolilacina	NT	VU	NA		
Biscogniauxia marginata	NE	NT	NA		
Biscogniauxia nummularia	NE	DD	NE		
Blepharita amica	NA	NA	VU		
Blera eoa	NA	EN	NA		
Boidinia subasperispora	NT	NT	NT		
Boletina atridentata	NT	NE	NA		
Boletina kivachiana	DD	NE	VU		
Boletina kowarzi	VU	NA	NA		
Boletopsis grisea	VU	VU	NT		
Boletopsis leucomelaena	NT	VU	VU		
Boletus appendiculatus	NE	NT	NE		
Boletus fechtneri	NA	VU	NA		
Boletus legaliae	NA	EN	NA		
Boletus queletii	NA	VU	NE		
Boletus radicans	NA	NT	EN		
Boletus rhodopurpureus	NA	EN	NA		
Boletus rhodoxanthus	CR	EN	NA		
Boletus satanas	NA	EN	NA		
Boletus subappendiculatus	DD	NA	NA		
Bolitophila (Cliopisa) ingrica	NA	NE	NT		
Bolitophila edwardsiana	NT	NE	NA		
Bolitophila limitis	DD	NE	NE		
Bolopus furcatus	NA	NT	NA		
Boloria titania	NA	NA	EN	NT	
Bombus muscorum	NT	NT	NT	VU	
Boros schneideri	NA	EN	VU	VU	
Bostrichopyga borealis	DD	NA	NA		
Bostrichus capucinus	NA	EN	NA		LC
Bothrideres contractus	RE	EN	CR		
Botrychium lanceolatum	VU	VU	VU		
Botrychium matricariifolium	CR	VU	EN	NT	
Botrychium multifidum	VU	NT	NT	DD	
Botrychium virginianum	NA	VU	EN		
Brachmia dimidiella	CR	EN	EN		
Brachycaudus napelli	NA	NE	VU		
Brachycercus harrisella	EN	VU	NA		
Brachygonus dubius	NA	CR	NA		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Brachyopa cinerea	NT	VU	NT		
Brachyopa panzeri	NA	NT	NA		
Brachypeza radiata	VU	NE	NA		
Brachyptera braueri	NA	VU	NA		
Brachytemnus porcatus	NA	NT	NA		
Brachythecium tommasinii	VU	NT	EN		
Bracomorpha rector	NA	NE	RE		
Brevicornu affine	DD	NA	NA		
Brevicornu disjunctum	VU	NA	NA		
Brevicornu occidentale	VU	NA	VU		
Bromus benekenii	NA	NT	CR		
Bryhnia novae-angliae	NA	VU	NA		
Bryodemella tuberculata	NA	VU	CR	VU	
Bryoglossum rehmii	NE	NE	NT		
Bryoria bicolor	NT	EN	EN		
Bryoria nadvornikiana	NT	NT	NT		
Bryoria nitidula	NT	EN	VU		
Bryoria smithii	VU	CR	EN		
Bryoria tenuis	VU	EN	CR		
Bryotropha purpurella	EN	NT	VU		
Bubo	EN	VU	EN	LC	LC
Bubo scandiacus	EN°	CR	CR	LC	LC
Bucculatrix albedinella	EN	NT	EN		
Bucculatrix argentisignella	NA	NA	CR		
Bucculatrix latviaella	NA	NA	CR		
Buchwaldoboletus lignicola	NA	DD	NT		
Buellia epigaea	VU	CR	NA		
Buellia violaceofusca	CR	NT	NA		
Bulgarica cana	DD	NT	EN		
Bunodophoron melanocarpum	NT	NA	NA		
Buprestis novemmaculata	EN	VU	VU		
Buprestis splendens	NA	RE	NA	EN	EN
Buvatina obscurella	VU	NT	NA		
Byssoloma marginatum	VU	CR	NA		
Cacopsylla affinis	VU	NE	RE		
Cacopsylla rhamnicola	VU	NE	VU		
Cacopsylla visci	DD	NE	NA		
Caenis macrura	NA	NT	NA		
Caenolyda reticulata	VU	NE	NT		
Caenophanes incompletus	NA	NE	DD		
Calicium abietinum	EN	VU	EN		
Calicium denigratum	NT	NT	NT		
Calicium lenticulare	EN	CR	RE		
Calicium quercinum	CR	VU	CR		
Caliprobola speciosa	NA	EN	NA		
Caliroa cinxia	NA	NE	EN		
Callicera aenea	VU	NT	NA		
Callicera aurata	VU	NT	NA		
Callimorpha dominula	NA	NT°	NT		
Callisto insperatella	NT	NE	NT		
Calocybe chrysenteron	NA	NE	NT		
Calocybe onychina	NT	NT	NT		
Caloplaca coralliza	DD	VU	NA		
Caloplaca demissa	VU	NE	NA		
Caloplaca furfuracea	NE	EN	RE		
Caloplaca lucifuga	VU	NT	CR		
Caloplaca pleiophora	NA	NA	RE		
Caloplaca proteus	NA	CR	NA		
Caloplaca suspiciosa	NA	DD	NT		
Caloplaca tristiuscula	NE	DD	NA		
Caloplaca ulcerosa	EN	EN	NA		
Caloptilia cuculipennella	NT	VU	EN		
Caloptilia onustella	NA	NA	NT		
Calvia quindecimguttata	NA	NA	RE		
Calyciphora albodactyla	CR	VU	VU		
Calypso bulbosa	NA	NT	VU	NT	
Camarophyllopsis atropuncta	EN	NT	NA		
Camarophyllopsis foetens	VU	NT	VU		
Camarophyllopsis hymenocephala	EN	VU	NA		
Camarophyllopsis micacea	EN	NT	NA		

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Camarophyllopsis schulzeri	NT	NT	NT		
Camarophyllus lacmus	NT	VU	NT		
Camarops lutea	NA	NT	NA		
Camarops polysperma	NA	NT	NT		
Camarops pugillus	NA	DD	NA		
Camarops tubulina	NT	NT	NE		
Campanula barbata	NT	NA	NA		
Campanula cervicaria	NT	NT	VU		
Camponotus fallax	NA	CR	NA		
Camponotus vagus	VU	RE	VU		
Candelabrochaete septocystidia	VU	NT	NE		
Candelariella kuusamoënsis	NE	NE	NT		
Canis lupus	CR	VU	EN	LC	LC
Cantharellus melanoxeros	NT	NT	NA		
Capnia nigra	NA	DD	NA		
Capnia vidua	NA	DD	NA		
Capperia britanniodactylus	EN	NA	NA		
Carabus convexus	RE	VU	VU		
Carabus intricatus	NA	VU	NA		LR/nt
Cardiophorus asellus	NA	NT	VU		
Cardiophorus gramineus	NA	CR	NA	NT	
Carex atherodes	NA	VU	NT	DD	LC
Carex hartmanii	VU	VU	EN		
Carex heleonastes	NT	EN	VU		DD
Carex pendula	NA	RE	NA		
Carex rhynchophysa	VU	NT	NT		
Carex stylosa	EN	NA	NA	LC	
Carlina vulgaris vulgaris	NT	NA	NA		
Carphacis striatus	NA	VU	NT		
Carphoborus cholodkovskyi	NT	NT	VU		
Carphoborus minimus	NA	NA	VU		
Carphoborus teplouchovi	NA	NT	NA		
Carpodacus erythrinus	VU	VU	NT	LC	LC
Cartodere satelles	VU	NA	NA		
Caryocolum blandelloides	NT	NT	EN		
Caryocolum huebneri	NA	NT	NA		
Caryocolum petryi	NA	VU	CR		
Caryocolum schleichi	NA	EN	EN		
Caryocolum viscariella	NT	NT	NA		
Catapyrenium psoromoides	EN	VU	CR		
Catillaria ameibospora	NA	NE	DD		
Catillaria minuta	NA	NT	NA		
Catillochroma pulverea	NA	VU	NA		
Catocala pacta	NA	VU	NT		
Celothelium ischnobelum	NE	CR	NA		
Celypha aurofasciana	NT	VU	NA		
Cenocoelius analis	NA	NE	DD		
Centromerus pabulator	DD	NT	NA		
Centromerus persimilis	NA	DD	NT		
Cephalanthera damasonium	NA	EN	NA		LC
Cephalanthera rubra	EN	VU	CR		LC
Cephalcia alashanica	NA	NE	NT		
Cephalcia erythrogaster	NA	NE	NT		
Cephalcia masuttii	NA	NA	RE		
Cephalozia lacinulata	NA	NA	RE		
Cephalozia macounii	NA	CR	CR		
Cephaloziella massalongi	NE	DD	CR		
Cephaloziella stellulifera	NE	DD	DD		
Ceraceomyces sulphurinus	NA	VU	VU		
Ceraclea excisa	NA	NT	NA		
Cerambyx cerdo	NA	CR	NA	NT	VU
Cerambyx scopolii	NT	NT	NA		LC
Ceratinella major	NA	DD	NA		
Ceratocombus corticalis	NA	NA	VU		
Ceratophyllus indages indages	NA	NA	VU		
Ceriana conopsoides	VU	NT	NT		
Ceriporia excelsa	NT	NT	NT		
Ceriporia metamorphosa	VU	NA	NA		
Ceriporiopsis subrufa	DD	NA	NA		
Cerocephala cornigera	NT	NE	NA		
Ceruchus chrysomelinus	EN	EN	EN	NT	NT

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Cerylon impressum	CR	VU	NT		
Cetrelia olivetorum	VU	CR	EN		
Ceutorhynchus larvatus	NA	NA	NT		
Ceutorhynchus pallidicornis	NA	NT	VU		
Chaenotheca cinerea	EN	EN	CR		
Chaenotheca gracilenta	NT	VU	VU		
Chaenotheca hispidula	VU	NT	RE		
Chaenotheca hygrophila	EN	NA	EN		
Chaenotheca laevigata	VU	NT	VU		
Chaenotheca sphaerocephala	EN	VU	VU		
Chaenotheca subroscida	NT	NT	NT		
Chaenothecopsis fennica	NT	NT	NT		
Chaenothecopsis haematopus	NA	VU	NE		
Chaenothecopsis montana	VU	DD	NT		
Chaenothecopsis rubescens	NA	NA	RE		
Chaenothecopsis viridialba	NT	NT	NT		
Chaenothecopsis zebrina	NA	DD	NA		
Chaetodermella luna	NT	NT	NA		
Chaetosiphella berlesei	NA	NE	DD		
Chalazion sociabile	DD	NA	NA		
Chalcophora mariana	CR	EN	RE		
Chalcosyrphus nigripes	NA	VU	DD		
Chalcosyrphus piger	EN	NT	VU		
Chamaemyces fracidus	CR	EN	VU		
Chamonixia caespitosa	NT	VU	EN		
Chanoma vorbringeri	DD	DD	NA		
Charmon cruentatus	NA	NE	DD		
Cheilosia barbata	NA	NA	DD		
Cheilosia fasciata	NT	NA	NA		
Cheilosia vulpina	VU	NA	NA		
Cheiracanthium pennyi	NA	EN	NA		
Cheiridium museorum	VU	NT	NA		
Chernes vicinus	NA	DD	NA		
Chimaphila umbellata	EN	EN	NT	VU	
Chionodes ignorantellus	NT	NT	NT		
Chloantha hyperici	NA	NT	NA		
Chlorita dumosa	NA	EN	NT		
Chlorophorus herbstii	CR	VU	EN		LC
Chlorophorus varius	NA	DD	NA		LC
Choerades fuliginosus	NA	NA	CR		
Choerades igneus	VU	VU	EN		
Choerades lapponicus	NA	EN	CR		
Choerades rufipes	NA	RE	NA		
Choragus horni	NE	NT	NA		
Choragus sheppardi	NT	VU	VU		
Chromosera cyanophylla	CR	NE	NA		
Chrysis brevitarsis	NA	NT	EN		
Chrysis fasciata	NA	CR	NA		
Chrysis graelsii	NA	NA	EN		
Chrysis ignita	VU	NA	NA		
Chrysis iris	NA	NT	CR		
Chrysis rutilans	NA	NA	NT		
Chrysis vanlithi	NA	DD	NA		
Chrysis westerlundi	NA	NA	NT		
Chrysoclista linneella	NT	VU	VU		
Chrysopa commata	NA	NA	NT		
Chrysopa dasyptera	NA	NA	NT		
Chrysopilus asiliformis	NA	EN	NA		
Chrysopilus erythrophthalmus	NA	VU	NA		
Chrysopilus laetus	NA	VU	NA		
Chrysosplenium tetrandrum	NA	NT	NA		
Chrysotoxum octomaculatum	VU	EN	RE		
Chrysura radians	VU	NT	NA		
Cicadetta montana	NT	NT	EN		
Ciconia nigra	NA	RE	NA	LC	LC
Cimbex fagi	NA	DD	NA		
Cinara hyperophila	NA	NE	DD		
Cinara pinihabitans	NA	NE	VU		
Cinara piniphila	NA	NA	VU		
Cinara smolandiae	NA	NE	VU		

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Cinereomyces lenis	NT	VU	NT		
Cinetus antennatus	NT	NA	NA		
Cinetus breviflagellatus	NT	NA	NA		
Cinna latifolia	NT	VU	NT		LC
Circus cyaneus	EN	NT	VU	NT	LC
Cis fusciclavis	NA	NT	NA		
Cis rugulosus	NA	NT	NE		
Cladius grandis	NT	NE	NE		
Cladius ulmi	NT	NE	NE		
Cladonia callosa	NT	NA	NA		
Cladonia incrassata	CR	NT	CR		
Cladonia krogiana	NT	NA	NA		
Cladonia parasitica	NT	NT	VU		
Cladosporium arthoniae	NA	DD	NA		
Clastobasis alternans	NA	NE	DD		
Claurouxia chalybeioides	NE	NT	DD		
Clausilia dubia	DD	NT	CR		
Clavaria asperulospora	EN	VU	EN		
Clavaria atrofusca	NA	NE	CR		
Clavaria flavipes	VU	VU	NE		
Clavaria pullei	VU	EN	NA		
Clavariadelphus helveticus	NA	VU	NA		
Clavicorona cristata	CR	CR	EN		
Clavulicium macounii	VU	VU	NA		
Clavulinopsis cinereoides	NT	VU	NA		
Clavulinopsis umbrinella	NT	NT	NA		
Clepsis illustrana	NA	DD	EN		
Clepsis neglectana	NA	VU	EN		
Clepsis nybomi	NA	DD	NA		
Clibanites paradoxa	NA	NA	DD		
Cliorismia ardea	NA	VU	NA		
Cliostomum corrugatum	EN	NT	EN		
Cliostomum leprosum	VU	NT	NT		
Clitellaria ephippium	EN	VU	NA		
Clitocybe gilvaoides	NA	NA	NT		
Clitocybe globispora	NA	NA	DD		
Clitopilus paxilloides	VU	NA	NA		
Cloeon schoenemundi	NA	VU	NA		
Cnephasia alticolana	NA	NA	EN		
Coccotrema citrinescens	NT	NA	NA		
Cochliarium cuneiventris	DD	VU	NA		
Cochlicopa nitens	NA	EN	NA		LR/lc
Cochlodina orthostoma	NA	NA	VU		
Cochylidia heydeniana	NT	NT	EN		
Coelioxys conoidea	NA	CR	VU		LC
Coelioxys lanceolata	EN	NT	VU		LC
Coeloides filiformis	NA	NE	VU		
Coelosia limpida	DD	NE	NE		
Coelotes atropos	NA	NT	NA		
Coenomyia ferruginea	NA	EN	NA		
Coenonympha hero	EN	NT	NA	VU	
Coleocentrus caligatus	NA	NE	VU		
Coleocentrus exareolatus	NA	NA	RE		
Coleocentrus excitator	NA	NE	NT		
Coleocentrus heteropus	NA	NE	RE		
Coleophora adjectella	VU	EN	NA		
Coleophora albella	VU	EN	EN		
Coleophora amellivora	NA	EN	EN		
Coleophora badiipennella	EN	NT	EN		
Coleophora carelica	NA	NA	CR		
Coleophora colutella	VU	RE	VU		
Coleophora filaginella	NA	NA	EN		
Coleophora follicularis	NA	NT	CR		
Coleophora gallipennella	NT	NT	NA		
Coleophora hackmani	EN	VU	EN		
Coleophora lassella	NA	DD	NA		
Coleophora lineolea	NA	NT	NA		
Coleophora lixella	NA	NT	EN		
Coleophora pulmonariella	NA	CR	NA		
Coleophora solitariella	NA	VU	NT		
Coleophora sylvaticella	VU	NA	NA		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Coleosporium pulsatillae	NA	NA	EN		
Collema conglomeratum	EN	NA	NA		
Collema curtisporum	EN	VU	CR		
Collema fragrans	CR	EN	CR		
Collema occultatum	VU	NT	DD		
Coltricia cinnamomea	VU	VU	CR		
Colydium elongatum	EN	EN	NA		
Colydium filiforme	RE	EN	NA		
Conalia baudii	NA	NA	CR		
Conferticium ravum	EN	NT	VU		
Coniocleonus hollbergi	VU	VU	NT		
Coniocleonus nebulosus	RE	RE	VU		
Conobathra tumidana	NT	VU	NA		
Conohypha albocremea	VU	VU	NA		
Coprinopsis insignis	NA	NT	NA		
Coprinopsis stangliana	NA	NA	VU		
Coracias garrulus	NA	RE	NA	LC	LC
Coronella austriaca	NT	VU	VU		LC
Corticaria alleni	NA	VU	VU		
Corticaria crenicollis	NA	NT	NA		
Corticaria inconspicua	NA	DD	VU		
Corticaria planula	NA	RE	VU		
Corticeus fasciatus	CR	VU	NA		
Corticeus fraxini	EN	VU	NT		
Cortinarius albogaudis	NA	NA	VU		
Cortinarius alboglobosus	NE	NA	NT		
Cortinarius alcalinophilus	NA	VU	NA		
Cortinarius anisochrous	NA	NE	VU		
Cortinarius anserinus	EN°	NT	NA		
Cortinarius aprinus	VU	NA	NA		
Cortinarius arcifolius	EN	VU	NA		
Cortinarius arcuatorum	NA	VU	NA		
Cortinarius areni-silvae	NT°	NT	NA		
Cortinarius argenteolilacinus	VU	EN	NE		
Cortinarius atrovirens	NA	VU	NA		
Cortinarius aureifolius	NA	NE	NT		
Cortinarius aureocalceolatus	NA	DD	NA		
Cortinarius balteatoalbus	EN	NE	NE		
Cortinarius barbaricus	NT	VU	DD		
Cortinarius bovinaster	NA	NA	NT		
Cortinarius bovinus	NT	VU	NT		
Cortinarius bulbopodius	EN	VU	NA		
Cortinarius bulliardii	NA	VU	NA		
Cortinarius caerulescens	NA	VU	NA		
Cortinarius caesiocanescens	EN	VU	VU		
Cortinarius caesiocinctus	EN	VU	NT		
Cortinarius caesiocortinatus	EN	VU	NA		
Cortinarius caesiolatens	NA	EN	NA		
Cortinarius cagei	NT	VU	NA		
Cortinarius camptoros	EN	VU	NA		
Cortinarius catharinae	EN	DD	NA		
Cortinarius cedretorum	NA	DD	NA		
Cortinarius chevassutii	CR	NA	NA		
Cortinarius cinnabarinus	VU	NT	EN		
Cortinarius cisticola	EN	NT	NA		
Cortinarius citrinoolivaceus	NA	VU	NA		
Cortinarius citrinus	NA	NT	NA		
Cortinarius coerulescentium	EN	VU	NA		
Cortinarius cordatae	CR	VU	NA		
Cortinarius cotoneus	VU	NT	NA		
Cortinarius croceocoeruleus	EN	NT	NA		
Cortinarius dalecarlicus	EN	EN	VU		
Cortinarius dionysae	NA	NT	VU		
Cortinarius diosmus	EN	VU	NT		
Cortinarius ectypus	NT	VU	NT		
Cortinarius elegantissimus	NA	VU	NA		
Cortinarius eucaeruleus	EN	VU	NA		
Cortinarius flavovirens	EN	VU	VU		
Cortinarius foetens	NA	EN	NA		
Cortinarius fraudulosus	NT	VU	NA		

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Cortinarius fulvocitrinus	NA	VU	NA		
Cortinarius fuscobovinus	NA	NE	NT		
Cortinarius fuscoperonatus	VU	VU	CR		
Cortinarius gracilior	EN	DD	NA		
Cortinarius haasii	NA	EN	NA		
Cortinarius harcynicus	NA	NT	NA		
Cortinarius hinnuleoarmillatus	NA	VU	VU		
Cortinarius holophaeus	EN	NA	NA		
Cortinarius humicola	EN	VU	NA		
Cortinarius humolens	CR	VU	NA		
Cortinarius inexspectatus	EN	VU	NA		
Cortinarius ionodactylus	NA	VU	NA		
Cortinarius langeorum	NA	VU	NA		
Cortinarius latobalteatus	VU	NA	NA		
Cortinarius lepistoides	NA	DD	NA		
Cortinarius luhmannii	NA	VU	NA		
Cortinarius lustrabilis	DD	NA	DD		
Cortinarius lustratus	VU	NA	NA		
Cortinarius luteoimmarginatus	EN	VU	NA		
Cortinarius magicus	NA	NT	NA		
Cortinarius majoranae	NA	VU	NA		
Cortinarius meinhardii	VU	NT	VU		
Cortinarius melanotus	NA	VU	NA		
Cortinarius moënne-loccozii	NA	EN	NA		
Cortinarius molochinus	CR	DD	NA		
Cortinarius multiformium	EN	EN	NA		
Cortinarius nanceiensis	VU	VU	NA		
Cortinarius niveoglobosus	NA	DD	EN		
Cortinarius odoratus	NA	EN	NA		
Cortinarius olearioides	VU	NT	NA		
Cortinarius osloensis	EN	NA	NA		EN
Cortinarius osmophorus	EN	VU	NA		
Cortinarius parevernius	DD	NA	NA		
Cortinarius phaeosmus	VU	NT	NA		
Cortinarius phrygianus	EN	NT	NT		
Cortinarius pini	VU	VU	NA		
Cortinarius platypus	NA	EN	NA		
Cortinarius praestans	NT	NT	NA		
Cortinarius prasinocyaneus	CR	EN	NA		
Cortinarius prasinus	CR	EN	NA		
Cortinarius pseudoarcuatorum	NA	VU	NA		
Cortinarius pseudoglaucopus	EN	VU	NT		
Cortinarius pseudovulpinus	EN	EN	NA		
Cortinarius quercilicis	NA	VU	NA		
Cortinarius rapaceotomentosus	NA	VU	NA		
Cortinarius rubrovioleipes	EN	NA	NT		
Cortinarius rufoolivaceus	CR	NT	NA		
Cortinarius russeoides	NA	NT	NA		
Cortinarius saporatus	VU	EN	NA		
Cortinarius sodagnitus	CR	EN	NA		
Cortinarius spectabilis	NA	VU	NA		
Cortinarius splendens	EN	VU	NA		
Cortinarius suaveolens	EN	EN	NA		
Cortinarius terpsichores	EN	VU	NA		
Cortinarius tiliae	EN	NA	NA		
Cortinarius tofaceus	VU	NT	NE		
Cortinarius turgidus	DD	VU	NA		
Cortinarius variiformis	NA	VU	NA		
Cortinarius vesterholtii	EN	EN	NA		
Cortinarius violaceomaculatus	VU	VU	NA		
Cortinarius vulpinus	EN	NT	NA		
Cortinarius xanthochlorus	NA	VU	NA		
Cortinarius xanthophyllus	NA	VU	NA		
Cortinarius xanthosuavis	NA	VU	NA		
Corydalis cava	NA	NT	NA		
Corynis amoena	NA	NA	VU		
Cosmia affinis	NA	EN	NA		
Cosmia diffinis	NA	VU	NA		
Cosmia pyralina	NA	NT	NT		
Cosmotriche lobulina	VU	NT	NT		
Cossonus cylindricus	NA	EN	VU		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Cossonus linearis	NA	VU	NA		
Cossonus parallelepipedus	EN	VU	CR		
Costaconvexa polygrammata	NA	NT[▽]	NA		
Cotoneaster kullensis	NA	EN	NA		
Cotylidia muscigena	NE	NA	VU		
Cotylidia pannosa	NA	EN	NA		
Crabro maeklini	NT	NT	NT		
Craniophora ligustri	NA	NT	NA		
Craterellus cinereus	VU	NT	NA		
Crepidodera lamina	NT	NA	NA		
Crepidophorus mutilatus	EN	VU	EN	NT	NT
Crepidotus cinnabarinus	VU	VU	NA		
Crepis praemorsa	NT	NT	EN		
Cresponea chloroconia	NA	NA	RE		
Cresponea premnea	NA	DD	NA		
Cresporhapsis wienkampii	NA	NA	DD		
Criorhina floccosa	NA	VU	NA		
Cristinia gallica	VU	DD	VU		
Cristinia rhenana	DD	NA	NA		
Crossocerus binotatus	NA	EN	NA		
Crossocerus exiguus	NA	NT	NT		
Crustoderma corneum	NT	NT	NT		
Crustoderma dryinum	VU	VU	NT		
Crustomyces subabruptus	NE	VU	NE		
Cryphaea heteromalla	EN	CR	NA		
Cryptocephalus cordiger	NA	VU	RE		
Cryptocephalus exiguus	CR	VU	VU		
Cryptocephalus flavipes	NA	NA	RE		
Cryptocephalus saliceti	NA	NA	VU		
Cryptolestes duplicatus	NA	VU	NA		
Cryptolestes weisei	NA	NA	VU		
Cryptomyzus korschelti	NA	NE	NT		
Cryptophagus cylindrellus	NA	NT	NA		
Cryptophagus fallax	VU	NT	NT		
Cryptophagus fuscicornis	VU	NT	NT		
Cryptophagus intermedius	NA	NT	NA		
Cryptophagus laticollis	NA	DD	NA		
Cryptosphaeria eunomia	NE	NT	NA		
Ctenophora nigriceps	NA	DD	NE		
Ctenophora ornata	NA	VU	NA		
Cucujus cinnaberinus	NT	EN	CR	NT	NT
Cucujus haematodes	NA	NA	RE	EN	
Cyanopterus flavator	NA	NE	RE		
Cyanopterus nigrator	NA	NE	RE		
Cyanopterus obscuripennis	NA	NE	RE		
Cyanostolus aeneus	NT	NT	VU		
Cyclophora annularia	NA	NA	NT		
Cydia cornucopiae	NA	EN	VU		
Cydia gemmiferana	NA	NT	NA		
Cydia leguminana	NA	EN	EN		
Cydia pallifrontana	NA	NT	NA		
Cyllodes ater	NA	VU	NT		
Cynips quercusfolii	NA	NE	VU		
Cypha nitida	EN	NT	NA		
Cyphelium karelicum	VU	VU	VU		
Cyphelium lucidum	VU	DD	NA		
Cyphelium pinicola	VU	VU	NA		
Cyphelium sessile	NA	VU	RE		
Cyphelium tigillare	NT	NT	VU		
Cyrtanaspis phalerata	NA	VU	CR		
Cyrtopogon flavimanus	NA	NA	NT		
Cyrtopogon lapponicus	NA	EN	DD		
Cyrtopogon pulchripes	NA	NA	VU		
Cystodermella ambrosii	NA	NA	NT		
Cystolepiota adulterina	EN	VU	VU		
Cystolepiota bucknallii	EN	NT	NA		
Cystolepiota hetieri	EN	NT	NA		
Cystolepiota icterina	NA	VU	NA		
Cystolepiota moelleri	NA	VU	EN		
Cystopteris sudetica	EN	NA	NA		

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Dacne rufifrons	NA	RE	NA	DD	
Dactylospora lobariella	NA	DD	NA		
Daldinia fissa	NE	DD	NA		
Danacaea nigritarsis	NA	DD	NA		
Danacaea pallipes	NA	RE	NA		
Dasystroma salicella	NA	VU	NA		
Dasytes nigrocyaneus	EN	VU	NA		
Decantha borkhausenii	EN	NT	VU		
Decapauropus helveticus	DD	DD	NE		
Decapauropus multiplex	DD	NT	NA		
Decapauropus tenellus	NT	DD	NE		
Decapauropus verticillatus	DD	NT	NA		
Degelia atlantica	NT	NA	NA		
Degelia cyanoloma	NT	NA	NA		
Deltote deceptoria	NA	VU°	NA		
Dendrochernes cyrneus	VU	NT	NT		
Dendrocopos medius	NA	RE	NA		
Denisia albimaculea	NA	EN	NA		
Denisia stroemella	EN	NT	VU		
Denticollis rubens	EN	EN	NA		LC
Dentipellis fragilis	NT	NT	NT		
Dermestoides sanguinicollis	NA	RE	NA		
Dermoloma josserandii	EN	VU	VU		
Dermoloma pseudocuneifolium	VU	VU	VU		
Desmazierella piceicola	NA	NA	DD		
Diaphorus exunguiculatus	DD	NA	NA		
Diasemia reticularis	EN	CR	CR		
Diastrophus mayri	NA	NE	DD		
Dicerca aenea	CR	RE	NA		
Dicerca alni	NA	NT	VU		
Dicerca furcata	EN	VU	VU		
Dicerca moesta	VU	NT	VU		
Dichelyma capillaceum	NA	NT	EN		
Dichoglena nigripennis	NT	NT	NT		
Dichomitus squalens	EN	EN	VU		
Dicranum muehlenbeckii	NA	RE	NA		
Dicranum viride	NT	EN	EN		
Dicycla oo	NA	NT	NA		
Didymodon glaucus	NT	CR	NA		
Didymodon sinuosus	NA	EN	NA		
Dimerella lutea	EN	EN	CR		
Dinetus pictus	NA	NA	RE		
Dioctria linearis	NA	RE	NA		
Diodontus tristis	VU	VU	CR		
Diphasiastrum tristachyum	EN	VU	EN		
Diplocephalus dentatus	NA	DD	NA		
Diplomitoporus crustulinus	VU	VU	VU		
Diplomitoporus flavescens	VU	VU	NT		
Diplotomma pharcidium	NA	NE	VU		
Dipoena braccata	NA	VU	NA		
Dipoena melanogaster	VU	NT	NA		
Dipogon vechti	EN	NT	VU		
Dircaea australis	NA	VU	NA		
Dircaea quadriguttata	NA	RE	VU		
Dirrhagofarsus attenuatus	NA	NA	CR	DD	
Disciseda candida	CR	VU	NA		
Disogmus quinquedentatus	NT	NA	NA		
Ditomyia fasciata	NA	RE	NA		
Ditrichum pallidum	NA	RE	NA		
Ditylus laevis	NA	NA	EN		
Docosia flavicoxa	NT	NE	NE		
Docosia fuscipes	NT	NE	NA		
Dolichoderus quadripunctatus	EN	NA	NA		
Dolichomitus aciculatus	NA	NA	NT		
Dolichomitus agnoscendus	NA	NE	NT		
Dolichomitus dux	NA	NE	VU		
Dolichomitus messor	NA	NE	NT		
Dolichomitus sericeus	NA	NA	NT		
Dolichomitus speciosus	NA	NE	VU		
Doloploca punctulana	NA	NT	NA		
Dorcatoma ambjoerni	NA	EN	NA		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Dorcatoma janssoni	NA	VU	NA		
Dorcatoma minor	NA	VU	NA		
Doros profuges	EN	NT	NT		
Drapetes mordelloides	NE	VU	EN		
Drapetis incompleta	DD	NE	NA		
Drapetis ingrica	VU	NE	NE		
Drapetis stackelbergi	NT	NA	NA		
Dreposcia umbrina	NA	VU	NA		
Dromaeolus barnabita	CR	CR	NA		LC
Dufourea minuta	RE	EN	VU	NT	
Dynatosoma dihaeta	NA	NE	NT		
Dynatosoma majus	NA	NE	NT		
Dysaphis newskyi	NA	NE	DD		
Dysauxes ancilla	NA	CR	NA		
Dystebenna stephensi	NA	VU	NA		
Eana derivana	NA	NT	NA		
Ecclisopteryx dalecarlica	NA	NT	NA		
Echemus angustifrons	NA	NT	NA		
Echinoderma calcicola	NA	EN	NA		
Echinoderma echinacea	EN	NT	NA		
Echinoderma hystrix	VU	EN	NA		
Echinoderma jacobi	VU	EN	NA		
Echinoderma perplexa	VU	VU	NA		
Echinoderma pseudoasperula	NT	VU	NA		
Ectemnius fossorius	RE	RE	NT		
Ectoedemia amani	EN	NT	NA		
Ectoedemia liebwerdella	VU	NA	NA		
Ectrepesthoneura nigra	NT	NA	NA		
Ederranus sachalinensis	NA	NA	RE		
Eichleriella leucophaea	NT	NA	NA		
Eilema pygmaeolum	NA	NT	EN		
Elachista bruuni	NA	NA	EN		
Elachista chrysodesmella	NA	EN	NA		
Elachista cinereopunctella	VU	VU	NA		
Elachista eskoi	EN	VU	VU		
Elachista megerlella	NA	NT	NA		
Elachista occidentalis	EN	NA	NT		
Elachista ornithopodella	NA	NA	NT		
Elachista quadripunctella	RE	EN	NA		
Elachista tetragonella	NA	EN	NT		
Elachista unifasciella	NA	NT	NA		
Elampus constrictus	NT	NT	NT		
Elaphomyces aculeatus	NA	EN	NA		
Elaphomyces anthracinus	NT	VU	NT		
Elaphomyces maculatus	VU	EN	NA		
Elaphomyces septatus	NA	EN	NA		
Elaphomyces virgatosporus	EN	VU	NA		
Elasmomyces krjukowensis	DD	VU	NA		
Elater ferrugineus	CR	VU	NA	NT	
Elatobia fuliginosella	NT	VU	VU		
Electrogena affinis	NT	VU	NA		
Eledonoprius armatus	NA	CR	NA		
Elephantomyia (Elephantomyia) edwardsi	NA	NE	VU		
Eliomys quercinus	NA	NA	RE	NT	NT
Elixia flexella	NT	NT	EN		
Emberiza hortulana	CR	VU	EN	LC	LC
Emberiza rustica	CR	VU	NT	VU	VU
Empis dasychira	DD	NA	NA		
Ena montana	NA	NT	NA	LC	LC
Encalypta spathulata	EN	EN	NA		
Endocarpon psorodeum	NA	VU	VU		
Endothenia nigricostana	NA	NT	EN		
Enicmus brevicornis	EN	VU	NA		
Ennearthron pruinosulum	NA	EN	NA		
Enterographa crassa	NE	EN	NA		
Enterographa hutchinsiae	NE	EN	NA		
Entoloma ameides	NT	NT	NE		
Entoloma bloxamii	VU	VU	NA		
Entoloma callirhodon	EN	NA	NA		
Entoloma carneogriseum	DD	DD	NE		

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Entoloma catalaunicum	VU	NT	NE		
Entoloma chloropolium	NE	NT	NA		
Entoloma coeruleoflocculosum	VU	NA	NA		
Entoloma corvinum	NT	NT	NT		
Entoloma dichroum	VU	NT	NE		
Entoloma griseorubidum	NA	NT	NA		
Entoloma prunuloides	NT	NT	EN		
Entoloma queletii	NT	NT	VU		
Entoloma querquedula	NT	NA	NA		
Entoloma roseum	EN	EN	NA		
Entoloma scabiosum	NT	NT	NA		
Entoloma strigosissimum	NT	NT	EN		
Entoloma testaceum	DD	NA	NA		
Entoloma turci	NT	NT	NA		
Entoloma viiduense	NA	DD	DD		
Entoloma weholtii	EN	NA	NA		
Entoloma xanthoserrulatum	NA	NA	DD		
Eopyrenula septemseptata	NE	CR	NA		
Ephemera glaucops	NA	NT	NA		
Epicallima formosella	NA	CR	NA		
Epicypta limnophila	VU	NE	NE		
Epicypta scatophora	NA	NA	DD		
Epipactis phyllanthes	NA	VU	NA	LC	LC
Epiphloea byssina	NE	VU	VU		
Epipogium aphyllum	VU	NT	VU		LC
Eptesicus serotinus	NA	EN°	NA	LC	LC
Epuraea excisicollis	NA	DD	NA		
Epuraea fuscicollis	NA	VU	NA		
Epuraea silesiaca	NA	VU	NT		
Epyris bilineatus	VU	NE	NA		
Erastia salmonicolor	NE	EN	VU		
Erebia polaris	NT	NA	NT		LC
Eremobina pabulatricula	EN	EN	NT		
Ergates faber	NA	NT	NA		LC
Eriocampa dorpatica	NA	NA	NT		
Eriocampa umbratica	NT	NE	NT		
Erioderma pedicellatum	CR	RE	NA		CR
Ernodes articularis	NA	DD	NA		
Erysiphe prunastri	NA	NA	NT		
Ethmia dodecea	NA	RE	NA		
Ethmia quadrillella	RE	NT	VU		
Euceros pruinosus	NA	NE	NT		
Euchalcia modestoides	NA	NA	NT		
Eucnemis capucina	EN	VU	NT		LC
Euconnus wetterhallii	VU	NT	NT		
Eucosma saussureana	EN	NT	EN		
Eucosma scorzonerana	EN	VU	DD		
Eucosma suomiana	VU	DD	VU		
Eudicrana nigriceps	NA	NE	VU		
Eudonia laetella	EN	NT	NT		
Eulamprotes superbella	NA	NT	VU		
Eulithis pyropata	NA	NA	NT		
Eumerus grandis	NA	EN	CR		
Eupachygaster tarsalis	NT	NT	NA		
Eupelmus fuscipennis	NA	NA	VU		
Eupeodes biciki	VU	NA	DD		
Euphydryas aurinia	NA	VU	EN		LC
Eupithecia distinctaria	NA	VU	NA		
Eupithecia immundata	NT	VU	VU		
Eupithecia insigniata	NA	NT	NA		
Euplectus bonvouloiri	NA	VU	NA		
Euplectus duponti	NA	NT	NA		
Euplectus tholini	NA	VU	NA		
Eupteryx collina	NA	NA	CR		
Euroleon nostras	NA	VU	NA		
Eurydema dominulum	NA	NT	NT		
Euryptilium gillmeisteri	VU	NA	NA		
Eurytoma brunniventris	NA	NE	NT		
Eurytoma minutula	NA	NE	DD		
Eurytrichothrips affinis	NA	NA	VU		
Euryusa coarctata	NA	VU	NA		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Euryusa optabilis	NA	VU	NA		
Euryusa sinuata	EN	VU	NA		
Eustrophus dermestoides	NA	NA	CR		
Euthiconus conicicollis	EN	VU	NA		
Eutypella dissepta	EN	NT	NA		
Eutypella stellulata	VU	NT	NE		
Euxoa adumbrata	RE	NT	VU		
Euxoa recussa	NA	NT	NA		
Euxoa vitta	NA	NT	NA		
Euzophera pinguis	NT	NT	NT		
Evagetes gibbulus	NA	CR	RE		
Evagetes subglaber	EN	EN	EN		
Evernia divaricata	VU	VU	VU		
Evernia illyrica	NA	RE	NA		
Evernia mesomorpha	NT	VU	NT		
Exechia nigrofusca	NA	NE	NT		
Exechia papyracea	NA	NE	NT		
Exechiopsis (Exechiopsis) distendens	NA	NE	NT		
Exechiopsis (Exechiopsis) grassatura	VU	NE	DD		
Exechiopsis (Exechiopsis) hammi	NA	NE	NT		
Exechiopsis (Exechiopsis) intersecta	NA	NE	NT		
Exechiopsis (Xenexechia) davatchii	NA	NE	NT		
Exechiopsis forcipata	VU	NE	NA		
Exeristes arundinis	NA	NE	NT		
Exeristes longiseta	NA	NE	NT		
Exeristes roborator	NA	NE	NT		
Exocentrus adspersus	NA	NT	NA		
Exoprosopa capucina	NA	NA	NT		
Fagivorina arenaria	RE	EN	NA		
Fenella monilicornis	NA	NE	DD		
Fenusa ulmi	NT	NE	VU		
Ferreola diffinis	NA	VU	VU		
Fibriciellum silvae-ryae	DD	DD	DD		
Fibricium lapponicum	VU	VU	NT		
Fibrodontia gossypina	NA	DD	NA		
Fischerula macrospora	NA	EN	NA		
Fistulina hepatica	NT	NT	NT		
Floccularia straminea	CR	EN	NA		
Fomitopsis rosea	NT	NT	NT		
Frantisekia mentschulensis	NA	EN	NA		
Frullania bolanderi	VU	VU	NA		
Frullania oakesiana	EN	EN	CR		
Funalia gallica	NA	EN	NA		
Funalia trogii	VU	CR	VU		
Fuscopannaria ahlneri	EN	EN	NA		
Fuscopannaria confusa	EN	NT	CR		
Fuscopannaria ignobilis	NT	NA	NA		
Fuscopannaria mediterranea	NT	NT	CR		
Fuscopannaria sampaiana	VU	RE	NA		
Gabrius bescidicus	NA	VU	EN		
Gagitodes sagittatus	NA	NT	NT		
Galeatus spinifrons	CR	VU	EN		
Galerina pruinatipes	NA	NA	EN		
Galeruca melanocephala	NA	VU	RE		
Galium rotundifolium	NA	VU	NA		
Galium schultesii	NA	NA	CR		
Galium sterneri	NT	NA	NA		
Gallinago media	NT	NT	CR	LC	NT
Ganoderma australe	DD	EN	NA		
Ganoderma pfeifferi	NA	EN	NA		
Ganoderma resinaceum	NA	EN	NA		
Gautieria graveolens s.lat.	NA	VU	NA		
Gazoryctra ganna	NA	RE	NA		
Geastrum berkeleyi	NA	EN	NE		
Geastrum corollinum	NA	EN	NA		
Geastrum coronatum	CR	NT	NA		
Geastrum elegans	CR	EN	NE		
Geastrum fornicatum	CR	EN	NA		
Geastrum minimum	NT	VU	VU		
Geastrum pseudolimbatum	NA	VU	NA		

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Geastrum saccatum	NA	EN	NE		
Geastrum schmidelii	CR	NT	EN		
Gelatoporia subvermispora	VU	NT	NT		
Gelechia jakovlevi	NA	NA	NT		
Genea verrucosa	NA	NT	NA		
Gentianella campestris	NT	NA	EN		
Geoglossum simile	NT	NT	NA		
Geophilus carpophagus	VU	VU	RE		
Geopora cooperi	NE	VU	NA		
Geranium bohemicum	NT	NT	NT		
Geranium lanuginosum	NA	EN	NA		
Geranium palustre	NA	EN	NA		
Gerris gibbifer	NA	NT	NA		
Gilpinia fennica	NA	NA	VU		
Gilpinia socia	NA	NA	NT		
Gilpinia sp.*cf.excisa*	NA	NA	VU		
Glaucopsyche arion	NA	NT	CR		
Globicornis corticalis	NA	NT	NA		
Globicornis nigripes	NA	NT	NA		
Gloeocystidiellum clavuligerum	DD	NA	NA		
Gloeohypochnicium analogum	EN	VU	NA		
Gloeophyllum abietinum	NT	NT	NT		
Gloeophyllum carbonarium	NA	EN	EN		
Gloeophyllum protractum	VU	VU	VU		
Gloiodon strigosus	NT	VU	NT		
Gnathoncus nidorum	NA	NT	VU		
Gnophomyia acheron	NA	NA	VU		
Gnophomyia viridipennis	NA	NA	VU		
Gnorimoschema herbichi	NA	VU	VU		
Gnorimoschema nordlandicolellum	NA	CR	VU		
Gnorimoschema streliciellum	NA	NA	EN		
Gnorimoschema valesiellum	NA	VU	VU		
Gnorimus nobilis	NT	NT	NA		LC
Gnorimus variabilis	NA	EN	NA	NT	
Gnoriste apicalis	EN	NE	VU		
Gnoriste harcyniae	NT	NE	NA		
Gomphillus calycioides	CR	NA	NA		
Gomphus clavatus	NT	VU	NT		
Gonotropis gibbosa	NA	DD	NA		
Gootiella tremulae	NA	NE	RE		
Gorytes neglectus	NA	NA	NT		
Gorytes quinquecinctus	NA	VU	NT		
Gracillaria loriolella	VU	NA	NA		
Grammoptera abdominalis	NA	DD	NA		
Graphis elegans	VU	NA	NA		
Grapholita caecana	NA	VU	EN		
Grapholita discretana	CR	DD	EN		
Greenomyia baikalica	VU	NE	VU		
Greenomyia mongolica	VU	NE	NA		
Gregopimpla inquisitor	NA	NE	NT		
Grifola frondosa	VU	NT	NT		
Gulo gulo	EN	VU	EN	VU	LC
Gyalecta derivata	EN	EN	NA		
Gyalecta flotowii	VU	VU	CR		
Gyalecta friesii	NT	NT	CR		
Gyalecta ophiospora	NE	EN	NA		
Gyalecta subclausa	NE	NT	CR		
Gyalecta truncigena	VU	VU	CR		
Gyalecta ulmi	NT	VU	NT		
Gymnocarpium continentale x dryopteris	NT	NA	NE		
Gymnopilus bellulus	NE	NA	DD		
Gymnopilus odini	NT	NT	NA		
Gymnopternus blankaartensis	NA	NT	NA		
Gymnopus brassicolens	NT	VU	NA		
Gymnopus erythropus	NE	NT	NA		
Gymnopus fusipes	NT	NT	NA		
Gymnopus hariolorum	NT	VU	NE		
Gymnostomum calcareum	NA	EN	NA		
Gynaephora selenitica	NA	NA	VU		
Gyromitra fastigiata	NE	EN	NA		
Gyromitra parma	NA	EN	NA		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Gyromitra sphaerospora	VU	VU	VU		
Gyromitra splendida	NA	VU	NE		
Gyrophaena kangasi	NA	NA	DD		
Gyrophaena nitidula	NA	RE	NA		
Gyrophaena rugipennis	NA	DD	NA		
Gyroporus castaneus	NT	NT	EN		
Hadena albimacula	NT	NT	NT		
Hadena confusa	NA	NT	NA		
Halictoxenos spencei	NA	NA	NT		
Halictoxenos tumulorum	NA	NA	NT		
Halictus maculatus	NA	NA	NT		LC
Halticus luteicollis	NA	EN	NA		
Hamamelistes betulinus	NA	NE	NT		
Hamearis lucina	NA	VU	NA		LC
Hapalopilus aurantiacus	NT	VU	NT		
Hapalopilus croceus	CR	CR	CR		
Haplocladium microphyllum	NA	RE	NA		
Haploporus odorus	VU	VU	NT		
Haploporus tuberculosus	NT	NT	NA		
Haplothrips acanthoscelis	NA	NA	NT		
Hardya tenuis	NA	NT	RE		
Harpalus anxius	NA	NT	RE		
Harpalus nigritarsis	NA	DD	NT		
Hedychridium chloropygum	NA	NA	VU		
Hedychridium zelleri	NA	NA	VU		
Heinemannia festivella	NA	NT	NA		
Heinemannia laspeyrella	EN	EN	VU		
Heliothis viriplaca	NA	VU°	VU		
Helophilus bottnicus	NA	RE	RE		
Helvella cupuliformis	DD	DD	NE		
Helvella lactea	NA	VU	NE		
Helvella oblongispora	NE	NA	VU		
Helvella pedunculata	NE	NA	NT		
Hemaris tityus	NA	NT	NA		
Hemerobius marginatus lapponicus	NA	NE	DD		
Hemichroa crocea	NT	NE	NE		
Hephathus achilleae	NA	NA	VU		
Herbertus aduncus	NT	NA	NA		
Herbertus dicranus	VU	NA	NA		
Herbertus stramineus	VU	NA	NA		
Hericium erinaceus	CR	CR	NA		
Herina paludum	NA	NE	RE		
Heterocladium flaccidum	NA	DD	NA		
Heterocladium wulfsbergii	NT	NA	NA		
Heterodermia speciosa	EN	VU	EN		
Heterogenea asella	NT	NT	NT		
Heteromeringia nigrimana	NA	NT	NA		
Heterothera serraria	NA	VU	NA		
Hilara pilosa	VU	NE	NA		
Hippocrepis emerus	EN	EN	NA		
Hirtodrosophila lundstroemi	NA	DD	NE		
Histeromerus mystacinus	NA	NE	VU		
Hohenbuehelia auriscalpium	NE	NE	DD		
Hohenbuehelia longipes	EN	DD	CR		
Hohenbuehelia nigra	DD	NA	NA		
Hohenbuehelia tremula	NT	NE	NE		
Hohenbuehelia valesiaca	VU	NA	NA		
Holopyga inflammata	NA	NA	RE		
Holopyga metallica	NA	NA	CR		
Homalocephala albitarsis	NT	NE	NE		
Homolobus flagitator	NA	NE	DD		
Homoneura consobrina	DD	NE	NA		
Hoplitis robusta	NA	NA	CR		LC
Hordelymus europaeus	NA	VU	NA		
Horisme aemulata	NA	EN	NA		
Horisme vitalbata	NA	NT	NA		
Hormopeza copulifera	NA	VU	NE		
Hormopeza obliterata	EN	NT	NE		
Hydnellum auratile	VU	VU	EN		
Hydnellum compactum	VU	VU	NA		VU

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Hydnellum cumulatum	NA	EN	CR		
Hydnellum gracilipes	VU	VU	NT		VU
Hydnellum mirabile	VU	EN	VU		VU
Hydnellum spongiosipes	EN	NA	NA		
Hydnobolites cerebriformis	NT	VU	NE		
Hydnotrya michaelis	DD	VU	NE		
Hydnum albidum	EN	VU	NA		
Hydraecia petasitis	NA	NT	NA		
Hygroaster nauseosodulcis	DD	NA	NA		
Hygrocybe aurantiosplendens	NT	NT	EN		
Hygrocybe colemanniana	VU	NT	VU		
Hygrocybe constrictospora	NA	NT	VU		
Hygrocybe fornicata	NT	NT	NT		
Hygrocybe ovina	VU	VU	CR		
Hygrocybe russocoriacea	NT	NT	NT		
Hygrohypnum montanum	VU	VU	CR		
Hygrohypnum norvegicum	VU	VU	NA		
Hygrohypnum subeugyrium	DD	VU	NA		
Hygrophoropsis olida	VU	VU	NT		
Hygrophorus arbustivus	NE	EN	NA		
Hygrophorus atramentosus	EN	VU	VU		
Hygrophorus calophyllus	EN	EN	RE		
Hygrophorus chrysodon	EN	NT	EN		
Hygrophorus cossus	CR	NT	NA		
Hygrophorus gliocyclus	NT	VU	NT		
Hygrophorus hyacinthinus	EN	EN	VU		
Hygrophorus inocybiformis	VU	VU	NT		
Hygrophorus latitabundus	NA	VU	NA		
Hygrophorus nemoreus	NT	NT	EN		
Hygrophorus penarioides	NA	VU	NA		
Hygrophorus poetarum	NA	VU	NA		
Hygrophorus purpurascens	VU	EN	EN		
Hygrophorus russula	NT	NT	NA		
Hygrophorus unicolor	NA	NT	NA		
Hylaeus pictipes	RE	NT	EN	LC	
Hylochares cruentatus	NA	NA	EN	EN	
Hylurgus ligniperda	NA	DD	NA		
Hymenochaete ulmicola	VU	VU	NT		
Hymenogaster luteus	NA	NT	NA		
Hymenophorus doublieri	CR	VU	CR		
Hymenoscyphus albidus	NA	DD	NA		
Hypebaeus flavipes	EN	VU	NA		
Hyperaspis inexpectata	NA	NA	VU		
Hypericum tetrapterum	NA	NT	NA		
Hyperoscelis eximia	EN	NT	VU		
Hyphoderma deviatum	NT	DD	VU		
Hyphoderma griseoflavescens	NT	NE	NA		
Hyphoderma involutum	VU	VU	NA		
Hyphoderma macedonicum	VU	VU	NA		
Hyphoderma orphanellum	NT	NT	NA		
Hyphoderma subclavigerum	DD	DD	NA		
Hyphodontia curvispora	VU	VU	NT		
Hyphodontia flavipora	NA	NA	DD		
Hyphodontia halonata	VU	VU	DD		
Hyphodontia latitans	NA	NA	EN		
Hyphodontia pilaecystidiata	NA	VU	VU		
Hyphoraia aulica	NA	EN	EN		
Hypnogyra angularis	NA	VU	VU		
Hypnum sauteri	EN	NA	NA		
Hypocenomyce anthracophila	VU	NT	NT		
Hypocenomyce castaneocinerea	VU	NT	NT		
Hypochaeris maculata	NA	VU	NA		
Hypochnella violacea	NA	EN	NA		
Hypochnicium cymosum	NT	VU	NA		
Hypochnicium vellereum	VU	NT	NT		
Hypocoprus latridioides	EN	DD	DD		
Hypocrea nybergiana	NA	NT	NA		
Hypocrea seppoi	NA	DD	NA		
Hypomyces porphyreus	NE	VU	NA		
Hypotrachyna laevigata	VU	NA	NA		
Hypotrachyna sinuosa	EN	NA	NA		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Hypoxylon fuscopurpureum	EN	NA	NA		
Hypoxylon vogesiacum	NT	VU	NE		
Hypoxystis pluviaria	NA	VU	VU		
Hypulus bifasciatus	NA	VU	NT		
Hypulus quercinus	EN	NT	NA		
Ibalia jakowlewi	NA	NA	VU		
Ibalia leucospoides	NA	NE	RE		
Idaea dilutaria	NA	VU	NA		
Idaea trigeminata	NA	NT	NA		
Impatientinum balsamines	NA	NE	VU		
Impleta consorta	NA	NE	NT		
Infurcitinea argentimaculella	NT	NT	DD		
Inocellia crassicornis	DD	EN	NA		
Inocybe aeruginascens	NA	NA	RE		
Inocybe decemgibbosa	NA	NA	EN		
Inocybe fibrosa	NA	EN	NA		
Inocybe fibrosoides	NE	VU	NA		
Inocybe haemacta	NA	DD	NA		
Inocybe multicoronata	NA	NA	CR		
Inocybe mytiliodora	NA	NA	EN		
Inocybe queletii	NE	NA	DD		
Inocybe quietiodor	NA	DD	NA		
Inocybe tenebrosa	VU	DD	NA		
Inocybe tricolor	NE	VU	NA		
Inonotopsis subiculosa	CR	VU	EN		
Inonotus cuticularis	VU	VU	NA		
Inonotus dryadeus	CR	VU	NA		
Inonotus dryophilus	NE	VU	VU		
Inonotus hispidus	EN	VU	CR		
Inostemma hemicerum	NT	NE	NA		
Ionomidotis irregularis	NA	NA	CR		
Ipa (Lepthyphantes) keyserlingi	NA	VU	VU		
Iphiaulax impostor	NA	NE	RE		
Ipidia sexguttata	NA	NA	CR		
Ipimorpha contusa	NT	NA	VU		
Irpicodon pendulus	NT	NT	NT		
Ischnoceros caligatus	NA	NE	NT		
Ischnoderma resinosum	VU	VU	NA		
Ischnodes sanguinicollis	NA	EN	NA	VU	
Ischnomera caerulea	VU	VU	NA		
Ischnomera cinerascens	EN	NT	NA		
Ischnomera cyanea	NA	VU	NA		
Ischnomera sanguinicollis	EN	EN	NA		
Isoptena serricornis	NA	NT	NA		
Isorhipis marmottani	EN	VU	NA		
Isothecium holtii	NT	NA	NA		
Itoplectis clavicornis	NA	NE	VU		
Itoplectis curticauda	NA	NE	VU		
Janssoniella ambigua	NA	NE	NT		
Jodia croceago	NA	RE	NA		
Julus scanicus	NA	VU	VU		
Junghuhnia lacera	DD	NT	NA		
Kageronia orbiticola	NA	NT	NA		
Kaltenbachiella pallida	NA	NE	RE		
Karsholtia marianii	VU	NT	NA		
Karstenella vernalis	NA	NA	CR		
Kessleria fasciapennella	NA	DD	NA		
Klimeschia transversella	NA	NT	EN		
Kneiffiella alienata	VU	VU	NA		
Kneiffiella efibulata	DD	DD	NA		
Kneiffiella microspora	NA	DD	NA		
Konowia betulae	NA	NA	NT		
Konowia megapolitana	VU	DD	VU		
Korynetes ruficornis	NA	VU	NA		
Kurzia sylvatica	DD	EN	NA		
Labidostomis humeralis	NT	NT	NA		
Lacerta agilis	NA	VU	NA	LC	LC
Laciniaria plicata	NA	NT	NA		
Lacon lepidopterus	NA	RE	VU	NT	
Lacon querceus	NA	CR	NA	NT	

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Lactarius acris	NT[b]	NT	NA		
Lactarius decipiens	NA	NT	NA		
Lactarius luridus	NT	NE	NA		
Lactarius mairei	NE	VU	NA		
Lactarius rubrocinctus	NE	NT	NA		
Lactarius zonarius	NA	DD	NA		
Lactuca quercina	NA	VU	NA	LC	
Laelius borealis	NA	NE	NT		
Laelius parcepilosus	NA	NA	NT		
Laelius virilis	NA	NA	NT		
Laemophloeus monilis	CR	VU	NA		
Lamellocossus terebra	VU	NT	VU		
Lamiastrum galeobdolon montanum	CR	NA	NA		
Lampropteryx otregiata	NA	NT	NA		
Lamprotes c-aureum	NA	RE	NT		
Laphria ephippium	NA	VU	NA		
Lappula deflexa	NT	VU	VU		
Larca lata	NA	NT	NA		
Larinioides ixobolus	NA	NA	RE		
Lasioglossum nitidiusculum	VU	VU	CR	LC	
Lasioglossum sexmaculatum	RE	NT	NA	EN	
Lasioglossum sexnotatulum	NA	CR	CR	EN	
Lasionectria mantuana	NA	NA	NT		
Lasius alienus	NA	DD	NA		
Lasius bicornis	NA	EN	NA		
Laurilia sulcata	VU	VU	NT		
Lauxania minor	DD	NA	NA		
Lecania fuscella	NE	EN	EN		
Lecania koerberiana	NA	VU	CR		
Lecania subfuscula	NE	NE	DD		
Lecanographa amylacea	NA	VU	NA		
Lecanographa lyncea	NA	CR	NA		
Lecanora anopta	NE	NE	DD		
Lecanora apochroeoides	NA	NA	RE		
Lecanora cinereofusca	EN	NA	NA		
Lecanora exspersa	NA	NA	VU		
Lecanora glabrata	NE	NT	NA		
Lecanora impudens	NT	VU	NA		
Lecanora pseudohypopta	NA	NA	DD		
Lecanora retracta	NA	DD	NA		
Lecanora scanica	NA	CR	NA		
Lecanora sublivescens	NA	VU	NA		
Lecanora umbricolor	NA	NE	EN		
Lecanora vacillans	NA	EN	NA		
Leccinum crocipodium	EN	EN	CR		
Lecidea apochroeella	NE	NE	EN		
Lecidea enclitica	NE	NE	RE		
Lecidea exsequens	NE	NA	DD		
Lecidea koskinenii	NA	NA	DD		
Lecidea microphaea	NA	NE	VU		
Lecidea olivascens	NE	NE	DD		
Lecidea paraclitica	NE	NE	NT		
Lecidea phaeopelidna	NA	NA	DD		
Lecidea phaeostigmella	NA	NA	DD		
Lecidea phaeotera	NA	NA	DD		
Lecidea plebeja	NE	NE	DD		
Lecidea subfuscescens	NE	NA	DD		
Lecidea subhumida	NA	NA	DD		
Lecidea tianensis	NA	NA	DD		
Lecidella laureri	NE	DD	NA		
Lecidella xylophila	NE	CR	NA		
Leia longiseta	VU	NA	NA		
Leiopus punctulatus	NA	VU	RE		
Lemonia dumi	NA	VU	NT		
Lentaria epichnoa	NT	NT	NA		
Lentinus tigrinus	NA	EN	NA		
Lepidomyces subcalceus	NE	DD	NA		
Lepiota audreae	VU	NE	NT		
Lepiota forquignonii	NA	VU	NA		
Lepiota fuscovinacea	EN	EN	CR		
Lepiota grangei	EN	VU	VU		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Lepiota griseovirens	NA	NT	NA		
Lepiota ignivolvata	NA	VU	NA		
Lepiota lilacea	NA	VU	NA		
Lepiota ochraceofulva	NA	VU	NE		
Lepiota pseudolilacea	VU	VU	NA		
Lepiota rufipes	EN	NE	VU		
Lepiota setulosa	VU	VU	NT		
Lepiota tomentella	EN	VU	NA		
Lepista subconnexa	DD	NA	NE		
Leptacis nydia	NT	NE	NE		
Leptarthrus vitripennis	NA	EN	NA		
Leptodromiella crassiseta	VU	DD	NE		
Leptogium burgessii	VU	NA	NA		
Leptogium cochleatum	VU	NA	NA		
Leptogium diffractum	NA	EN	NA		
Leptogium hibernicum	CR	NA	NA		
Leptogium intermedium	NE	NE	NT		
Leptogium rivulare	EN	EN	RE		NT
Leptogium subtile	NE	NE	VU		
Leptoplectus spinolai	VU	VU	NA		
Leptoscyphus cuneifolius	CR	NA	NA		
Leptosporomyces mundus	EN	NA	NA		
Leptosporomyces roseus	NA	DD	NA		
Leptothorax goesswaldi	NA	EN	NA		
Leptura nigripes	RE	EN	EN		
Leptura thoracica	NA	NA	CR		
Lestica alata	NA	EN	EN		
Letharia vulpina	NT	NT	RE		
Leucoagaricus sublittoralis	NA	DD	NA		
Leucobryum juniperoideum	NA	NT	NA		
Leucocarpia dictyospora	NA	NE	DD		
Leucopaxillus gentianeus	EN	NT	NT		
Leucopaxillus paradoxus	NT	EN	NA		
Leucopaxillus rhodoleucus	VU	NT	NA		
Leucopaxillus subzonalis	NA	VU	NT		
Leucopaxillus tricolor	EN	EN	EN		
Leucopholiota decorosa	NA	NA	CR		
Leucoptera lathyrifoliella	RE	NA	EN		
Leucoscypha ovilloides	NA	NA	VU		
Levipalpus hepatariellus	NA	VU	EN		
Libnotes (Afrolimonia) ladogensis	NA	NA	NT		
Lichinodium ahlneri	NT	RE	NA		
Limenitis camilla	NA	RE	NA	LC	
Limnephilus tauricus	NA	DD	NA		
Limonia badia	NA	NA	NT		
Lindtneria leucobryophila	DD	VU	EN		
Lindtneria trachyspora	EN	VU	RE		
Liodopria serricornis	NT	NT	NT		
Liotryphon caudatus	NA	NE	NT		
Liotryphon crassiseta	NA	NE	VU		
Lissodema denticolle	NA	NT	NA		
Lithobius lapidicola	NA	NT	NA		
Lithospermum officinale	NT	NT	NA		
Lobaria hallii	VU	CR	NA		
Longitarsus apicalis	EN	NT	VU		
Lopadostoma pouzarii	VU	NT	NA		
Lopheros rubens	CR	EN	VU		
Lophozia elongata	EN	NT	DD		
Lophozia polaris	EN	NT	NT		
Lopinga achine	NA	NT	VU	VU	
Lopinga achine rambringi	NA	NT	NA		
Lopinga achine suecica	NA	VU	NA		
Lordiphosa acuminata	NA	DD	NA		
Loricula ruficeps	NA	EN	NA		
Lunaria rediviva	NA	NT	NA		
Luzula divulgata	NA	NT	NA		
Lycaena helle	VU	EN	EN	EN	
Lyciella subpallidiventris	DD	NA	NA		
Lycoperdina bovistae	NA	NT	NA		
Lycoperdon atropurpureum	NA	EN	NA		

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Lycoperdon caudatum	NT	VU	VU		
Lycoperdon decipiens	NA	NT	NA		
Lycoperdon mammiforme	EN	VU	NA		
Lycopodium zeilleri	VU	VU	NA		
Lycorina triangulifera	NA	NE	VU		
Lyctus linearis	EN	VU	RE		
Lymexylon navale	CR	NT	NA		
Lynx lynx	EN	VU	NT	LC	LC
Lyophyllum eustygium	VU	NT	NA		
Lysimachia nemorum	NT	NT	NA		
Macaria loricaria	NA	NT	NA		
Macrobrachius kowarzii	EN	NA	NA		
Macrocera crassicornis	NA	NA	VU		
Macrocera pusilla	NA	NA	DD		
Macrogastra ventricosa	NT	VU	VU		
Macrophya carinthiaca	NA	NA	NT		
Macrorrhyncha rostrata	NA	NT	VU		
Macrosiphum lisae	NA	NE	EN		
Macrosiphum melampyri	NA	NE	NT		
Malacodea regelaria	EN	VU	NT		
Malaxis monophyllos	NA	VU	EN	NT	
Mallota cimbiciformis	NA	NT	NA		
Mallota megilliformis	EN	VU	NT		
Malthinus balteatus	VU	NT	NA		
Malthinus facialis	VU	NT	NA		
Malthinus seriepunctatus	NT	NT	NA		
Malthodes dispar	NA	NT	NA		
Manda mandibularis	NA	NT	NA		
Maniola lycaon	NA	NA	EN		
Mannia triandra	NA	CR	NA		
Manota unifurcata	EN	NE	VU		
Margaritifera margaritifera	NA	EN	NA	CR	EN
Maronea constans	NA	RE	NA		
Martynovella nana	DD	NA	NA		
Matsucoccus matsumurae	NA	NE	DD		
Medetera inspissata	DD	NE	NA		
Medon dilutus	NA	VU	NA		
Medon rufiventris	NA	DD	NA		
Megachile bombycina	NA	NA	RE	DD	
Megachile lagopoda	CR	NT	NT	LC	LC
Megachile pyrenaea	RE	VU	EN	DD	
Megacoelum infusum	VU	NT	NT		
Megalaria laureri	NA	EN	NA		
Megalospora pachycarpa	EN	NA	NA		
Megarhyssa superba	NA	NE	NT		
Megastigmus dorsalis	NA	NE	NT		
Megatoma pubescens	EN	VU	NT		
Megophthalmidia crassicornis	VU	NE	NA		
Melandrya barbata	EN	EN	CR		
Melandrya caraboides	EN	EN	NA		
Melangyna ericarum	NT	NA	NA		
Melanogaster tuberiformis	NE	VU	NA		
Melanohalea elegantula	VU	NT	NA		
Melanomphalia nigrescens	NA	VU	NA		
Melanophyllum eyrei	VU	VU	CR		
Melica picta	NA	NA	NT		
Meliceria tragardhi	NA	VU	NA		
Melitaea britomartis	NA	CR	NA	NT	
Melitaea cinxia	NA	NT	NA	LC	
Melitaea diamina	VU	NT	EN	LC	
Melitta melanura	NA	CR	NA	EN	
Melitta tricincta	NA	NT	NA	NT	
Meloe brevicollis	RE	EN	RE		
Meloe proscarabaeus	EN	NT	EN		
Menegazzia subsimilis	VU	CR	NA		
Menegazzia terebrata	NT	VU	EN		
Menephilus cylindricus	NA	VU	NA		
Merrifieldia leucodactyla	NA	NT	NT		
Merrifieldia tridactyla	NA	NT	EN		
Mesopolobus albitarsus	NA	NE	NT		
Mesopolobus xanthocerus	NA	NE	NT		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Mesosa curculionoides	VU	EN	NA		
Mesosa myops	NA	NA	VU		
Mesosa nebulosa	VU	NT	NA		
Methocha articulata	EN	EN	NT		
Metopolophium tenerum	NA	NE	DD		
Meum athamanticum	VU	NA	NA		
Micanthulina pseudomicantula	NA	NA	VU		
Micarea anterior	NA	NE	VU		
Micarea eximia	NE	NE	VU		
Micarea hedlundii	EN	VU	VU		
Micarea melaeniza	NA	RE	NA		
Micarea stipitata	CR	NA	NA		
Micridium angulicolle	NA	VU	NA		
Microbisium suecicum	NT	DD	NA		
Microdiprion fuscipennis	NA	NA	RE		
Microglossum atropurpureum	VU	VU	NA		
Microglossum fuscorubens	VU	NE	NA		
Microglossum olivaceum	VU	NT	NA		
Micropeplus latus	NA	VU	NA		
Microphor crassipes	DD	NE	NE		
Microplana terrestris	NA	DD	NA		
Microrhagus emyi	NA	VU	NA	LC	LC
Microsania straeleni	NA	NT	NE		
Microsania vrydaghi	NA	VU	NA		
Miltogramma ibericum	NA	NT	NE		
Milvus migrans	NA	EN°	CR	LC	LC
Mimumesa atratina	NA	NT	NA		
Mimumesa littoralis	NA	NT	EN		
Mimumesa spooneri	EN	EN	EN		
Miota avia	NT	NA	NA		
Mniotype bathensis	NA	NA	VU		
Moehringia lateriflora	VU	VU	NT	LC	
Moelleropsis nebulosa	EN	EN	VU		
Mompha sexstrigella	NA	NA	NT		
Mompha terminella	NA	NT	NT		
Mongolojassus sibiricus	NA	NA	VU		
Monochamus urussovii	RE	EN	NT		
Monochroa ferrea	EN	EN	VU		
Monoclona silvatica	DD	NA	NE		
Monophadnoides ruficruris	DD	NA	NA		
Morchella pseudoviridis	DD	NA	NA		
Mordella brachyura	VU	NT	NE		
Mordellaria aurofasciata	EN	NA	NA		
Mordellistena neuwaldeggiana	EN	NT	NA		
Mordellochroa tournieri	NA	VU	EN		
Muellerella hospitans	NA	NE	VU		
Multiclavula mucida	NT	VU	VU		
Mycena alba	NT	NE	NA		
Mycena austera	DD	NA	NA		
Mycena fagetorum	NT	DD	NA		
Mycena kuehneriana	DD	NA	NA		
Mycena lammiensis	NA	NA	NT		
Mycena obtecta	DD	NA	NA		
Mycena occulta	NA	NA	NT		
Mycena oregonensis	NT	VU	NT		
Mycena pseudopicta	VU	NE	NA		
Mycena terena	DD	NA	NA		
Mycenastrum corium	EN	NT	NA		
Mycetochara humeralis	VU	NT	NT		
Mycetophagus quadriguttatus	NA	NT	VU	LC	
Mycetophila boreocruciator	NT	NE	NA		
Mycetophila confusa	VU	NE	NA		
Mycetophila deflexa	NA	NA	NT		
Mycetophila distigma	DD	NE	NA		
Mycetophila haruspica	DD	NE	NA		
Mycetophila immaculata	EN	NE	NT		
Mycetophila lastovkai	VU	NE	NA		
Mycetophila morata	NA	NE	DD		
Mycetophila ostentanea	NA	NA	VU		
Mycetophila pecinai	NA	NE	VU		

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Mycetophila pyrenaica	VU	NE	NA		
Mycetophila sigmoides	DD	NA	VU		
Mycetophila spectabilis	NT	NE	NA		
Mycetophila triangulata	NA	NA	VU		
Mycetoporus bruckii	NT	DD	NT		
Mycoaciella bispora	VU	NE	NA		
Mycomicrothelia confusa	NE	NA	DD		
Mycomya (Mycomya) collini	DD	NA	VU		
Mycomya (Mycomya) forestaria	NA	NE	NT		
Mycomya (Mycomya) karelica	NA	NA	NT		
Mycomya (Mycomya) parva	NA	NE	VU		
Mycomya britteni	VU	NE	NE		
Mycomya digitifera	NT	NA	NE		
Mycomya mituda	EN	NE	NE		
Mycomya tridens	VU	NA	NA		
Mycosphaerella chimaphilae	NA	EN	NE		
Myolepta dubia	NA	VU	NA		
Myosotis secunda	VU	NA	NA		
Myotis alcathoe	NA	CR	NA		
Myotis bechsteinii	NA	CR	NA	VU	NT
Myotis dasycneme	NA	EN	NA	NT	NT
Myotis nattereri	CR	VU	EN	LC	LC
Myrinia pulvinata	NT	VU	NT		
Myriosclerotinia luzulae	NT	NA	NE		
Myrmeleon bore	EN	NT	NT		
Mythicomyces corneipes	VU	DD	VU		
Nacerdes carniolica	NA	VU	NA		
Nasonovia altaensis	NA	NA	EN		
Nearctaphis vera	NA	NA	EN		
Neckera pennata	VU	VU	VU		
Neelus murinus	DD	NA	NA		
Nehalennia speciosa	NA	EN	EN	NT	NT
Nemapogon falstriellus	NA	EN	NA		
Nemapogon fungivorellus	EN	NT	EN		
Nemapogon gliriellus	NA	EN	NA		
Nemapogon inconditellus	NA	EN	NA		
Nematopogon adansoniellus	NA	VU	NA		
Nemophora cupriacella	NA	VU	EN		
Nemoura arctica	NA	NT	NA		
Nemoura dubitans	NA	VU	NA		
Nemoura viki	NA	DD	NA		
Neoalticomerus formosus	NA	VU	NE		
Neoempheria bimaculata	NA	NE	NT		
Neoleucopis freyi	DD	NA	NA		
Neoxorides varipes	NA	NE	RE		
Nephrotoma lundbecki	DD	DD	NA		
Nephus bipunctatus	NT	NA	NA		
Neuratelia nigricornis	NT	NA	NA		
Neuratelia sintenisi	NA	NE	NT		
Neuratelia subulata	NT	NA	NA		
Neurigona erichsoni	NE	VU	NA		
Neuroterus albipes	NA	NE	NT		
Neuroterus tricolor	NA	NE	RE		
Nevraphes perssoni	NA	VU	DD		
Niditinea truncicolella	NT	NT	NT		
Niesslia lobariae	NA	DD	NA		
Nivellia sanguinosa	CR	RE	VU		
Nola karelica	NT	NT	EN		
Nomada baccata	CR	EN	VU	NT	NT
Nomada facilis	NA	EN	NA	LC	
Nomada obtusifrons	VU	VU	EN	NT	
Nomada opaca	NA	NT	NA	NT	
Nomada subcornuta	CR	NT	EN		
Nosodendron fasciculare	NA	EN	NA		
Nothocasis sertata	NA	EN	NA		
Nothochrysa capitata	VU	NE	NA		
Nothochrysa fulviceps	VU	NE	NA		
Nothorhina punctata	NT	NT	NT		
Nothoserphus boops	NT	NE	NE		
Notocelia tetragonana	VU	NT	VU		
Notolaemus castaneus	NA	VU	NA		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Notolaemus unifasciatus	NA	VU	NA		
Notolopha sibirica	DD	NE	NE		
Nyctalus leisleri	NA	CR	NA	LC	LC
Nycteola svecica	EN	RE	NA		
Nysson mimulus	NA	NT	EN		
Oberea linearis	EN	NT	NA		
Obrium brunneum	NA	NT	NA	LC	
Ocalea rivularis	NA	DD	NA		
Octavianina asterosperma	EN	VU	NA		
Octotemnus mandibularis	RE	EN	RE		
Ocys harpaloides	VU	NA	NA		
Odonticium romellii	NT	NT	NT		
Odonticium subhelveticum	VU	NA	NA		
Odontocerum albicorne	VU	NT	NA		
Odontocolon spinipes	NA	NE	NT		
Odynerus melanocephalus	RE	NT	RE		
Oebalia unistriata	NA	VU	NA		
Oedalea tibialis	EN	NE	NA		
Oligia versicolor	NA	NT	NA		
Oligomerus brunneus	NA	VU	NA		
Oligoporus floriformis	NT	VU	NA		
Oligoporus septentrionalis	NT	DD	NA		
Omalus biaccinctus	VU	NT	VU		
Onnia triquetra	EN	EN	CR		
Onycholyda sertata	NE	NE	NT		
Oomorphus concolor	NA	NT	NA		
Opegrapha culmigena	NA	EN	NE		
Opegrapha niveoatra	NE	NE	RE		
Opegrapha ochrocheila	VU	NT	NA		
Opegrapha subparallela	NA	NA	RE		
Opegrapha vermicellifera	VU	NT	NA		
Ophiogomphus cecilia	NA	NT	NA	LC	LC
Opilo domesticus	CR	VU	NA		
Opilo mollis	VU	NT	NA		
Orbilia comma	NT	VU	NA		
Orchesia luteipalpis	VU	VU	NA		
Orchis spitzelii	NA	VU	NA	NT	
Orgilus obesus	NA	NA	VU		
Oriolus oriolus	NA	VU	EN	LC	LC
Orobanche reticulata	NA	EN	NA		
Orthotomicus longicollis	RE	VU	VU		
Orthotrichia angustella	NA	NT	NA		
Orthotrichia tragetti	NA	NT	NA		
Orthotrichum patens	VU	EN	CR		
Orthotrichum scanicum	CR	RE	NA		LC
Orthotrichum stellatum	CR	NA	NA		
Orussus abietinus	NA	NT	RE		
Osmia niveata	NA	CR	NA	LC	
Osmia svenssoni	NA	DD	NA	DD	DD
Osmoderma eremita	CR	NT	VU	NT	NT
Osmylus fulvicephalus	NA	NT	NA		
Osphya bipunctata	EN	VU	NA		
Otidea concinna	VU	NA	CR		
Otidea phlebophora	NE	NE	EN		
Ovalisia rutilans	EN	NA	EN		
Oxybelus argentatus	EN	NT	VU		
Oxycera trilineata	EN	VU	RE		
Oxychilus glaber	NA	VU	NA		
Oxychilus navarricus	DD	NA	NA		
Oxylaemus variolosus	NA	VU	NA		
Oxypoda serpentata	NA	NA	DD		
Oxyrrhynchium pumilum	EN	EN	NA		
Oxyrrhynchium speciosum	DD	NT	NA		
Pachyneura fasciata	VU	VU	NE		
Pachyphiale carneola	VU	VU	NA		
Pachyphleus citrinus	NT	DD	NT		
Pachyphloeus melanoxanthus	NT	DD	NA		
Pallavicinia lyellii	NA	RE	NA		
Palloptera bimaculata	NA	VU	NA		
Pammene suspectana	NT	NT	VU		

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Pamphilius aucupariae	NA	NA	NT		
Pamphilius brevicornis	NA	NA	RE		
Pamphilius inanitus	NT	NE	VU		
Pamphilius latifrons	NE	NE	VU		
Pamphilius thorwaldi	NA	NA	EN		
Pandivirilia melaleuca	NA	VU	NA		
Panellus violaceofulvus	DD	NA	NA		
Panemeria tenebrata	NA	RE	VU		
Panteles schuetzeanus	NA	NE	NT		
Pantoclis zorayda	NT	NA	NA		
Panurgus banksianus	VU	NT	NA	LC	
Paracharactus gracilicornis	NE	NE	VU		
Paraleptophlebia werneri	NT	DD	RE		
Paraleucobryum sauteri	NA	VU	NA		
Parapiophila caerulescens	DD	NE	NA		
Parapiophila lonchaeoides	DD	NE	NA		
Paratalanta hyalinalis	NT	NT	EN		
Pareulype berberata	NA	VU	NA		
Parmeliella testacea	EN	NA	NA		
Parmotrema arnoldii	CR	NA	NA		
Parmotrema crinitum	VU	NA	NA		
Parna apicalis	NA	NA	VU		
Parnassius apollo	NT	NT	EN	NT	VU
Parnassius apollo apollo	NA	NT	NA		
Parnassius apollo scandinavicus	NA	EN	NA		
Parnassius mnemosyne	NT	EN	VU	NT	
Paullicorticium allantosporum	NT	NT	NA		
Paullicorticium ansatum	NT	NT	NT		
Paullicorticium delicatissimum	NT	NT	NA		
Pauropus lanceolatus	DD	NT	NE		
Pcocidus flavonimbatus	NA	NA	NT		
Pediacus depressus	EN	VU	VU	LC	
Pedicia littoralis	NA	VU	NA		
Pedostrangalia pubescens	RE	NT	VU		
Pedostrangalia revestita	NA	EN	NA		
Pelecocera lusitanica	NA	VU	NT		
Pelecotoma fennica	NA	NA	NT		
Pelecystola fraudulentella	NA	EN	NA		
Peltigera monticola	NE	NE	DD		
Peltigera retifoveata	CR	NE	CR		
Peltula euploca	NT	VU	NA		
Pempeliella dilutella	NA	NT	EN		
Pempeliella ornatella	NA	NT	EN		
Pemphredon beaumonti	VU	NT	EN		
Pemphredon fennica	NA	EN	NE		
Pemphredon mortifer	NA	NT	NA		
Peniophora lilacea	NA	VU	NA		
Peniophora septentrionalis	DD	DD	NT		
Peniophorella guttulifera	NT	NT	NT		
Pentaphyllus testaceus	NA	NT	VU		
Peplomyza discoidea	NA	NE	VU		
Perenniporia fraxinea	NA	CR	NA		
Perenniporia medulla-panis	VU	NT	VU		
Perenniporia subacida	EN	VU	NT		
Perenniporia tenuis	VU	VU	CR		
Periclista lineolata	NA	NA	VU		
Perithous divinator	NA	NE	NT		
Perithous septemcinctorius	NA	NE	VU		
Perittia obscurepunctella	NA	VU	EN		
Perizoma hydrata	NA	NT	NA		
Pernis apivorus	NT	NT	EN	LC	LC
Perotettix pictus	VU	NA	VU		
Pertusaria atropallida	NA	NA	DD		
Pertusaria flavocorallina	CR	CR	NA		
Pertusaria ophthalmiza	VU	NT	NT		
Pertusaria stenhammarii	NA	DD	NA		
Pertusaria trachythallina	EN	NA	NA		
Pertusaria velata	NA	CR	NA		
Petractis hypoleuca	CR	EN	NA		
Peziza celtica	DD	NA	NA		
Peziza perparva	NA	NA	DD		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Peziza prosthetica	DD	NA	NA		
Peziza vaccinii	NT	NA	NA		
Phacopsis vulpina	NA	VU	NA		
Phaenolobus terebrator	NA	NE	NT		
Phaeocalicium tremulicola	NA	NE	NT		
Phaeophyscia constipata	VU	CR	NT		
Phaeophyscia kairamoi	NT	VU	RE		
Phanerochaete jose-ferrairae	NA	NE	NT		
Phellodon secretus	VU	VU	VU		
Pherbellia hackmani	NA	DD	DD		
Philereme transversata	NA	NT	VU		
Philereme vetulata	NT	NT	VU		
Philodromus poecilus	NA	VU	NT		
Philodromus praedatus	NA	NT	NA		
Philodromus rufus	DD	NA	NA		
Phlaeothrips bispinosus	NA	NA	NT		
Phlaeothrips coriaceus	NA	NA	DD		
Phlaeothrips denticauda	NA	NA	DD		
Phlebia bresadolae	EN	DD	RE		
Phlebia centrifuga	NT	VU	NT		
Phlebia coccineofulva	EN	EN	NA		
Phlebia diffissa	VU	NT	NT		
Phlebia femsjoeensis	VU	NT	NA		
Phlebia georgica	NT	DD	NA		
Phlebia lindtneri	VU	VU	VU		
Phlebia ryvardenii	NA	EN	NA		
Phlebia unica	NT	NT	NA		
Phlebiella insperata	DD	NA	EN		
Phloeophagus lignarius	VU	NT	RE		
Phloeophagus thomsoni	NA	NT	NA		
Phloeopora opaca	NA	NA	VU		
Phloiophilus edwardsii	NA	NT	NA		
Pholiota mucigera	NA	NA	CR		
Pholiota squarrosoides	NA	NT	NT		
Phoroctenia vittata	VU	NT	NT		
Photedes captiuncula	NA	NT	NA		
Phronia elegans	VU	NE	NT		
Phronia gracilis	NA	NA	NT		
Phronia subsilvatica	NA	NE	DD		
Phrudus compressus	NA	NA	NT		
Phrurolithus minimus	NA	VU	NA		
Phryganophilus ruficollis	EN	EN	VU	NT	
Phtheochroa schreibersiana	NA	EN	RE		
Phthinia congenita	NA	NE	NT		
Phyllodrepa salicis	EN	VU	NE		
Phyllonorycter issikii	NA	NA	NT		
Phyllonorycter lantanellus	NA	NA	CR		
Phyllonorycter populifoliella	VU	NE	NA		
Phyllonorycter schreberellus	NA	NT	NA		
Phylloscopus borealis	EN	EN	VU		LC
Phymatodes pusillus	NA	VU	NA		
Phymatura brevicollis	VU	VU	VU		
Physcia dimidiata	NT	NA	NA		
Physcia leptalea	EN	VU	RE		
Physcia magnussonii	VU	VU	NA		
Physconia detersa	NT	DD	NT		
Physconia grisea	EN	NT	NA		
Physisporinus rivulosus	NA	NA	VU		
Physodontia lundellii	VU	VU	NT		
Phytobaenus amabilis	NA	RE	NT		
Phytocoris insignis	NA	NA	VU		
Phytometra viridaria	NA	NT	NA		
Pilophorus robustus	VU	EN	EN		
Piloporia sajanensis	NA	EN	EN		
Pimpinella major	NA	NT	CR		
Pimpla spuria	NA	NE	NT		
Pimpla strigipleuris	NA	NE	NT		
Pinumius areatus	NA	NA	VU		
Piogaster pilosator	NA	NE	EN		
Pipistrellus pipistrellus	VU	CR	NA	LC	LC

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Pipizella virens	NA	NT	NA		
Piptoporus quercinus	EN	EN	NA		
Pistius truncatus	NA	EN	NA		
Pityogenes irkutensis	VU	NT	VU		
Placusa pumilio	NA	NT	NA		
Plagiochila exigua	NT	NA	NA		
Plagiochila spinulosa	VU	NA	NA		
Plagiomnium drummondii	NA	NA	VU		
Plagionotus detritus	NA	EN	NA	LC	
Planaphrodes nigrita	DD	NA	VU		
Planococcus vovae	NA	NE	EN		
Plasteurhynchium striatulum	EN	VU	NA		
Platycis cosnardi	NA	VU	NA		
Platydema violaceum	NA	VU	CR		
Platyderus depressus	NT	NA	NA		
Platygloea disciformis	NT	NE	NA		
Platyla polita	NA	VU	NA	LC	LC
Platylomalus complanatus	EN	NA	NA		
Platynus krynickii	NA	NT	NA		
Platynus longiventris	NA	CR	NA		
Platypalpus subbrevis	NT	NE	NE		
Platypalpus zetterstedti	DD	NE	NE		
Platypus cylindrus	NA	RE	NA		
Platyrhinus resinosus	NT	NT	NT		
Platysoma compressum	NA	VU	NE		
Platysoma elongatum	NA	RE	RE		
Plebeius nicias	VU	VU	NT		
Plebejus argyrognomon	NA	EN	NA	LC	
Plecotus austriacus	NA	CR	NA	LC	LC
Plectocarpon lichenum	NA	VU	VU		
Plectocarpon nephromeum	NE	EN	DD		
Plectocarpon scrobiculatae	NA	EN	NA		
Plectophloeus nitidus	EN	VU	VU		
Plectophloeus nubigena	NA	NT	NA		
Plegaderus dissectus	NA	NT	NA		
Plegaderus sanatus	NA	EN	NA		
Pleotrichophorus duponti	NA	NE	VU		
Pleotrichophorus persimilis	NA	NE	VU		
Pleurospermum austriacum	NA	EN	NA		
Pleurotus calyptratus	VU	EN	EN		
Pleurotus cornucopiae	VU	NA	NA		
Pluteus aurantiorugosus	EN	EN	NA		
Pluteus chrysophaeus	VU	VU	NE		
Pluteus hispidulus	NA	DD	NE		
Pluteus insidiosus	NA	NA	DD		
Pocota personata	EN	NT	NA		
Poecilolycia vittata	NA	NE	NT		
Poeltinula interjecta	NA	CR	NA		
Polia lamuta	NA	CR	NT		
Polistes biglumis	EN	VU	NA		
Polydrusus marginatus	RE	NA	NA		
Polyergus rufescens	NA	EN	NA		
Polypodium interjectum	VU	VU	NA		
Polyporus badius	VU	NT	VU		
Polyporus pseudobetulinus	NA	VU	VU		
Polyporus tuberaster	NT	NT	NA		
Polyporus umbellatus	VU	NT	NT		
Polytrichastrum pallidisetum	DD	DD	DD		
Porina glaucocinerea	NA	NA	RE		
Porina leptalea	NE	VU	VU		
Porina nigratula	NA	NA	DD		
Porostereum spadiceum	VU	NA	NA		
Porpidia hydrophila	VU	NT	NA		
Postia balsamea	VU	EN	DD		
Postia ceriflua	EN	VU	VU		
Postia guttulata	VU	NT	NT		
Postia immitis	NA	NA	DD		
Postia lateritia	VU	VU	NT		
Postia mappa	NA	DD	EN		
Postia parva	NT	NT	NT		
Postia perdelicata	EN	NA	EN		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Postia persicina	NA	NA	CR		
Potamophylax rotundipennis	NA	DD	NA		
Potentilla incana	NA	EN	NA		
Potentilla multifida	NA	VU	NA		
Praia taczanowskii	DD	DD	NT		
Preohylax lessonae	CR	VU	NA		
Primula elatior	NA	NT	NA		
Priobium carpini	NA	VU	NT		
Priocnemis confusor	NA	EN	NA		
Priocnemis minuta	NA	VU	CR		
Prionomastix morio	NA	NE	RE		
Prionus coriarius	CR	NT	NT	LC	
Prionychus melanarius	VU	VU	VU		
Pristerognatha penthinana	EN	VU	NA		
Prociphilus bumeliae	NA	NE	NT		
Pronectria robergei	NE	NE	DD		
Pronectria santessonii	NA	NE	DD		
Prosopistoma pennigerum	NA	RE	NA		
Prosopothrips vejdovskyi	NA	NA	NT		
Prostomis mandibularis	NA	EN	NA	NT	
Protodontia piceicola	VU	VU	NA		
Protodontia subgelatinosa	NE	NT	NA		
Protomerulius caryae	VU	VU	NT		
Protoparmelia oleagina	NT	VU	EN		
Protothelenella xylina	NA	NA	DD		
Protounguicularia nephromatis	NA	NE	DD		
Psamathocrita osseella	NA	EN	NA		
Psarus abdominalis	NA	RE	NA		
Psathyrella jacobssonii	NA	DD	NT		
Psathyrella leucotephra	NA	DD	NA		
Pseudanostirus globicollis	NA	NA	VU		
Pseudatemelia subochreella	NA	NT	NA		
Pseudeuparius sepicola	VU	NT	NA		
Pseudexechia canalicula	DD	NE	NE		
Pseudicius encarpatus	NA	NT	NT		
Pseudoclavellaria amerinae	RE	DD	EN		
Pseudocyphellaria crocata	VU	NA	NA		
Pseudocyphellaria intricata	VU	NA	NA		
Pseudocyphellaria norvegica	VU	NA	NA		
Pseudoheptamelus runari	NA	NA	NT		
Pseudoleskeella papillosa	EN	NT	NT		
Pseudombrophila petrakii	NA	NA	DD		
Pseudoptilinus fissicollis	NA	VU	NA		
Pseudorchis albida	NT	EN	NT		
Pseudorhyssa alpestris	NA	NE	NT		
Pseudorhyssa nigricornis	NA	NE	NT		
Pseudosagedia borreri	NE	CR	NA		
Pseudosagedia grandis	NE	RE	CR		
Pseudosagedia interjungens	NE	CR	NA		
Pseudotephritis trypetoptera	VU	NE	NT		
Pseudotomentella humicola	NA	NA	DD		
Psilocephala imberbis	DD	NT	NT		
Psilota atra	EN	VU	NA		
Psilota innupta	NA	RE	NA		
Psilus rufipes	VU	NE	NA		
Psophus stridulus	VU	EN	VU	LC	
Psora testacea	NA	VU	NA		
Psora vallesiaca	VU	EN	NA		
Psoroglaena abscondita	NA	NA	DD		
Ptenidium gressneri	EN	NT	NA		
Pterella grisea	NA	NT	NE		
Pteromalus apum	NA	NE	NT		
Pteromalus aureolus	NA	NE	NT		
Pteromys volans	NA	NA	NT	DD	LC
Ptiliolum stockmanni	NA	NA	CR		
Ptinus bicinctus	EN	NT	NT		
Ptinus lichenum	NA	NT	NA		
Ptiolina oculata	NT	NA	NE		
Ptychoptera longicauda	NA	NT	NA		
Puccinia adoxae	VU	NA	NT		

(*continued on next page*)

Table A1 (continued)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Puccinia blytiana	NT	NA	NA		
Puccinia intybi	NA	NA	EN		
Pulmonaria officinalis	NA	NT	NA	LC	LC
Pulsatilla patens	NA	NT	EN	DD	
Punctelia ulophylla	VU	NA	NA		
Punctularia strigosozonata	NA	NA	VU		
Pycnoporellus alboluteus	CR	CR	EN		
Pycnora praestabilis	EN	VU	NA		
Pyrausta cingulatus	NA	VU	EN		
Pyrausta nigratus	NA	NT	RE		
Pyrausta ostrinalis	NA	NT	EN		
Pyrausta sanguinalis	CR	VU	EN		
Pyrenopsis furfurea	NE	NE	DD		
Pyrenula coryli	NE	CR	DD		
Pyrenula macrospora	EN	NA	NA		
Pyrenula nitida	EN	NT	NA		
Pyrenula nitidella	CR	EN	NA		
Pyrenula occidentalis	NT	CR	NA		
Pyropyxis rubra	NA	NE	VU		
Pyrrhia exprimens	NA	NA	EN		
Pyrrhospora subcinnabarina	EN	NA	NA		
Pytho abieticola	CR	VU	VU	LC	
Pytho kolwensis	NA	EN	EN	DD	
Quedius fulgidus	EN	NT	RE		
Quedius lundbergi	NA	NT	VU		
Quedius truncicola	EN	VU	NA		
Radiigera flexuosa	NA	CR	NA		
Radulodon eriksonii	VU	VU	VU		
Rainieria calceata	NA	EN	NA		
Ramalina baltica	CR	NT	EN		
Ramalina calicaris	DD	VU	NT		
Ramalina canariensis	CR	NA	NA		
Ramalina elegans	CR	NE	NT		
Ramalina obtusata	CR	VU	CR		
Ramalina roesleri	NA	VU	CR		
Ramalina sinensis	NT	NT	NT		
Ramalina thrausta	VU	EN	VU		
Ramaria aurea	EN	NA	NA		
Ramaria bataillei	EN	VU	NA		
Ramaria broomei	NT	EN	EN		
Ramaria brunneicontusa	NT	NA	NA		
Ramaria echinovirens	NA	EN	NA		
Ramaria fennica	EN	EN	VU		
Ramaria flavobrunnescens	NT	NT	NT		
Ramaria flavosalmonicolor	NA	VU	NA		
Ramaria formosa	NT	NT	NA		
Ramaria fumigata	NA	NT	NA		
Ramaria ignicolor	NT	NE	VU		
Ramaria largentii	NT	VU	NA		
Ramaria mairei	NT	NT	NA		
Ramaria rubella	NA	NE	CR		
Ramaria rufescens	VU	VU	NE		
Ramaria sanguinea	VU	VU	NA		
Ramaria subbotrytis	EN	VU	NA		
Ramaria subdecurrens	DD	NA	NA		
Ramaricium alboochraceum	NE	NA	VU		
Ramariopsis pulchella	NA	VU	NE		
Ramariopsis subtilis	NT	NT	NA		
Ramonia chrysophaea	NA	VU	CR		
Ramonia luteola	NA	NE	RE		
Rana dalmatina	NA	VU	NA	LC	LC
Ranunculus polyanthemos	NA	NT	NA		
Refractohilum galligenum	NA	NE	NT		
Regulus ignicapilla	NA	VU°	NA	LC	LC
Remiz pendulinus	NA	EN	EN□	LC	LC
Repetobasidium conicum	DD	DD	NA		
Repetobasidium vestitum	DD	DD	DD		
Rhabdepyris myrmecophilus	VU	NE	NA		
Rhabdoweisia crenulata	NT	NA	NA		
Rhacopus sahlbergi	EN	VU	NT	LC	
Rhagio immaculatus	EN	RE	NA		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Rhagio notatus	NA	NA	DD		
Rhagium sycophanta	NA	NT	NA		
Rhaphidicyrtis trichosporella	NA	NA	DD		
Rheum rhaponticum	RE	NA	NA		
Rhingia rostrata	NA	RE	NA		
Rhithrogena germanica	NA	NT	NA		
Rhizophagus brancsiki	NA	VU	NA		
Rhizophagus puncticollis	NA	NA	RE		
Rhodocybe stangliana = Squamanita stangliana?	VU	NE	NE		
Rhodoscypha ovilla	NT	DD	NA		
Rhodotarzetta rosea	NT	NA	VU		
Rhodotus palmatus	EN	CR	NA		
Rhopalomesites tardii	EN	NA	NA		
Rhynchaenus rufus	NA	NT	NA		
Rhynchostegiella teneriffae	CR	EN	NA		
Rhynchostegium arcticum	DD	NA	NA		
Rhynchostegium confertum	NT	VU	NA		
Rhynchostegium megapolitanum	NA	NT	NA		
Rhyncolus punctatulus	NA	VU	NA		
Rhyparia purpurata	NA	NA	NT		
Rhyparochromus phoeniceus	RE	NA	NT		
Rhysodes sulcatus	NA	RE	NA		
Rigidoporus obducens	VU	VU	DD		
Rinodina colobina	NE	EN	CR		
Rinodina disjuncta	EN	NA	NA		
Rinodina endophragmia	NE	CR	NA		
Rinodina fimbriata	NE	CR	DD		
Rinodina flavosoralifera	NT	NA	NA		
Rinodina isidioides	CR	NA	NA		
Rinodina muscicola	NA	NA	DD		
Rinodina polyspora	NA	CR	CR		
Rinodina sheardii	NT	CR	NA		
Rinodina stictica	CR	NA	NA		
Rocetelion humerale	VU	NT	VU		
Roncus lubricus	VU	NA	NA		
Ropalophorus clavicornis	NA	NE	DD		
Ropalopus femoratus	NA	VU	NA	LC	LC
Ropalopus macropus	NA	RE	NA		
Rosa inodora	VU	EN	NA		
Rosalia alpina	NA	RE	NA		VU
Rubus cyclomorphus	NT	NA	NA		
Rubus dissimulans	NT	VU	NA		
Rubus flaccidifolius	NA	VU	NA		
Rubus langei	VU	NA	NA		
Rubus pyramidalis	NA	EN	NA		
Rubus sciocharis	NA	EN	NA		
Rubus silvaticus	NA	EN	NA		
Rubus steracanthos	CR	CR	NA		
Rubus vigorosus	NA	CR	NA		
Rugosomyces ionides	EN	VU	NA		
Rugosomyces obscurissimus	DD	NT	NE		
Rushia parreyssii	NA	VU	NA		
Russula carpini	NA	NT	NA		
Russula curtipes	NT	NT	NA		
Russula decipiens	NT	NE	NT		
Russula emeticicolor	NE	VU	NA		
Russula fulvograminea	NE	DD	NT		
Russula innocua	DD	NE	NA		
Russula laeta	NE	VU	NE		
Russula melitodes	NE	NA	NT		
Russula melliolens	NT	VU	NA		
Russula pallidospora	NA	NA	DD		
Russula rubra	EN	NE	NA		
Russula rutila	NT	NT	NA		
Russula torulosa	NE	NT	NA		
Russula vinosobrunnea	NA	NT	NA		
Russula viscida	NE	DD	NA		
Russula zvarae	NE	NE	EN		
Ruthenica filograna	NA	NA	VU		
Rutylapa ruficornis	NA	VU	NA		

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Rymosia istrae	DD	NE	NA		
Rymosia pinnata	NA	NE	NT		
Sagina × normaniana	NA	VU	NA		
Salebriopsis albicilla	NT	VU	NA		
Santessoniella arctophila	NE	NE	EN		
Saprinus rugifer	RE	EN	VU		
Sarcodon fuligineoviolaceus	EN	EN	VU		
Sarcodon joeides	EN	VU	NA		
Sarcodon lepidus	NA	VU	NA		
Sarcodon leucopus	NT	EN	VU		
Sarcodon lundellii	NT	VU	VU		
Sarcodon martioflavus	VU	VU	EN		
Sarcodon pseudoglaucopus	NA	VU	NA		
Sarcodon versipellis	NT	VU	RE		
Sarcodontia crocea	NA	CR	CR		
Sarcosoma globosum	EN	VU	NT		NT
Sarcosphaera coronaria	VU	NT	EN		
Satyrium ilicis	NA	NT	NA	LC	
Saulcyella schmidtii	NA	EN	NA		
Scambus atrocoxalis	NA	NE	NT		
Scambus brevicornis	NA	NE	NT		
Scambus planatus	NA	NA	NT		
Scambus strobilorum	NA	NE	NT		
Scapania apiculata	VU	EN	CR		
Scapania brevicaulis	EN	VU	NA		
Scapania carinthiaca	VU	EN	CR		
Scapania crassiretis	NT	VU	NA		
Scapania glaucocephala	EN	EN	NA		
Scaphisoma balcanicum	VU	NT	RE		
Scaphisoma subalpinum	NA	NT	NA		
Sceptonia flavipuncta	NA	NE	NT		
Schismatomma cretaceum	NA	CR	NA		
Schismatomma graphidioides	NA	EN	NA		
Schismatomma pericleum	VU	NT	CR		
Schrankia taenialis	NA	NT	NA		
Sciarosoma borealis	NE	NE	NT		
Sciophila antiqua	NA	NE	VU		
Sciophila balderi	VU	NA	NA		
Sciophila bicuspidata	EN	NA	NA		
Sciophila distincta	NT	NA	NA		
Sciophila exserta	VU	NA	NA		
Sciophila interrupta	VU	NE	NA		
Sciophila limbatella	NT	NE	VU		
Sciophila salassea	NT	NE	EN		
Sciophila setosa	NA	NE	VU		
Sciota rhenella	NA	NA	NT		
Sciria advena	NA	NA	NT		
Sciuro-hypnum flotowianum	DD	NA	NA		
Scleroderma cepa	NE	VU	NE		
Sclerogaster compactus	EN	DD	EN		
Scleropauropus lyrifer	NT	NA	NA		
Sclerophora amabilis	VU	EN	NA		
Sclerophora coniophaea	NT	NT	NT		
Sclerophora farinacea	VU	VU	CR		
Sclerophora pallida	NT	VU	VU		
Sclerophora peronella	NT	VU	VU		
Scolia hirta	NA	NT	NA		
Scolitantides orion	CR	EN	EN	LC	
Scolytus mali	NA	NT	NA		
Scoparia conicella	NA	NT	NA		
Scopula rubiginata	NA	NT	VU		
Scotodes annulatus	NA	NA	NT		
Scrobipalpula diffluella	EN	NT	VU		
Scrophularia umbrosa	NA	CR	NA		
Scydmaenus perrisii	VU	NT	NA		
Scymnus silesiacus	NA	NT	NA		
Scytinostroma galactinum	VU	NT	NT		
Seligeria acutifolia	VU	NT	NA		
Seligeria calcarea	NA	EN	RE		
Seligeria campylopoda	EN	EN	VU		
Seligeria oelandica	VU	VU	NA		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Seligeria patula	VU	EN	NA		
Semblis phalaenoides	NA	NT	NA		
Sericoda bogemannii	NA	RE	VU		
Serinus serinus	NA	VU°	NA	LC	LC
Serratula tinctoria	CR	NT	NA		
Sesia bembeciformis	EN	VU	NT		
Sesia melanocephala	VU	NT	NT		
Setema cereola	VU	NT	NA		
Setodes punctatus	NA	VU	NA		
Shargacucullia scrophulariae	NA	VU°	NA		
Sialis sibirica	NA	DD	NA		
Silusa rubiginosa	VU	VU	NT		
Silvanus unidentatus	VU	VU	EN		
Siphlonurus armatus	NA	NT	NA		
Sistotrema citriforme	VU	VU	NA		
Sistotrema dennisii	DD	NA	DD		
Sistotrema pistilliferum	NE	DD	NA		
Sisyra dalii	NA	NT	NA		
Sisyra jutlandica	NA	DD	NA		
Sisyra terminalis	NA	NT	NA		
Sitobion dryopteridis	NA	NE	NT		
Sitobion equiseti	NA	NE	NT		
Skeletocutis borealis	DD	DD	VU		
Skeletocutis brevispora	VU	VU	NT		
Skeletocutis chrysella	VU	VU	NT		
Skeletocutis jelicii	EN	EN	EN		
Skeletocutis lilacina	EN	VU	VU		
Skeletocutis ochroalba	DD	VU	NE		
Skeletocutis odora	VU	VU	NT		
Skeletocutis stellae	VU	VU	VU		
Smaragdina affinis	NA	NA	NT		
Sonronius anderi	NA	VU	VU		
Sophronia humerella	NA	NT	EN		
Sorbus aria	NT	NA	NA		
Sorbus lancifolia	CR	NA	NA		
Sorbus meinichii	NT	NA	CR		
Sorbus neglecta	EN	NA	NA		
Sorbus subarranensis	NT	NA	NA		
Sorbus subpinnata	NT	NA	NA		
Sorbus subsimilis	NT	NA	NA		
Sorbus teodori	NA	VU	NA	DD	DD
Sowerbyella brevispora	NA	NA	VU		
Sowerbyella densireticulata	NA	DD	NA		
Sowerbyella imperialis	VU	NT	CR		
Sowerbyella radiculata	VU	VU	CR		
Sowerbyella rhenana	EN	DD	NA		
Spaelotis suecica	NT	VU°	NT		
Sphaeriestes reyi	VU	VU	NE		
Sphecomyia vespiformis	EN	VU	VU		
Sphex funerarius	NA	VU	NA		
Sphinctrina anglica	NA	EN	RE		
Sphinctrina leucopoda	NA	EN	NA		
Sphinctrina porrectula	NA	NA	RE		
Sphinctrina turbinata	EN	VU	RE		
Sphiximorpha subsessilis	NA	EN	RE		
Splachnum melanocaulon	VU	NT	EN		
Spongipellis delectans	NA	VU	NA		
Spongipellis fissilis	EN	VU	NT		
Spongipellis pachyodon	NA	RE	NA		
Spongipellis spumea	EN	NT	NT		
Squamanita fimbriata	CR	NA	NA		
Squamanita odorata	VU	NE	NE		
Squamanita paradoxa	EN	VU	NE		
Squamarina degelii	VU	EN	NA		
Squamarina gypsacea	CR	VU	NA		
Staurolemma omphalarioides	VU	NA	NA		
Steccherinum aridum	DD	DD	NA		
Steccherinum collabens	VU	VU	NT		
Steccherinum robustius	NA	VU	NA		
Steccherinum subcrinale	DD	NA	NA		

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Stelis phaeoptera	RE	NT	NT	DD	
Stelis signata	NA	NA	NT	LC	
Stellaria fennica	EN	CR	NT		
Stellaria neglecta	NA	NT	NA		
Stenagostus rhombeus	NA	VU	NA	LC	
Stenagostus rufus	CR	VU	NA	LC	LC
Stenaphorura denisi	VU	NA	NA		
Stenocybe flexuosa	EN	NA	NA		
Stenodynerus bluethgeni	NA	NT	NA		
Stenostola ferrea	VU	NA	NA		
Stenus gallicus	NA	DD	NA		
Stenus glabellus	NA	NT	NA		
Stenus providus	VU	NT	NA		
Stenus sylvester	EN	DD	NT		
Stephanopachys substriatus	CR	NT	NT	LC	
Stephensia bombycina	NA	EN	NA		
Stephensia brunnichella	EN	NT	EN		
Stephostethus attenuatus	NA	NA	VU		
Stereocaulon coniophyllum	VU	CR	EN		
Stereocaulon delisei	VU	RE	NA		
Stereocaulon incrustatum	NE	EN	VU		
Stereocorynes truncorum	NA	VU	NA		
Sterictiphora sorbi	NA	NA	NT		
Stethoconus cyrtopeltis	NA	NA	DD		
Sticta canariensis	VU	NA	NA		
Stictis populorum	NA	NE	NT		
Stictoleptura scutellata	NA	VU	NA		
Stigmella dorsiguttella	NA	NT	NA		
Stigmella lemniscella	CR	NT	NT		
Stigmella lonicerarum	NA	NT	EN		
Stigmella sakhalinella	EN	DD	NA		
Stigmella ulmivora	EN	NT	VU		
Stigmidium degelii	NA	EN	NA		
Stilbops ruficornis	NA	NE	CR		
Stilpnogaster aemula	NA	CR	NA		
Stiromoides maculiceps	NA	NA	EN		
Strangalia attenuata	RE	NT	CR		
Strangospora microhaema	NE	NE	DD		
Streptopelia turtur	NA	NA	CR	VU	VU
Strigula jamesii	NE	EN	NA		
Stromatinia rapulum	NT	NA	NE		
Strongylognathus testaceus	NA	EN	NA		
Strongylophthalmyia pictipes	NA	NE	VU		
Strophosoma fulvicorne	EN	NT	VU		
Subulicium minus	NA	DD	NA		
Subulicium rallum	DD	DD	NA		
Suillosporium cystidiatum	DD	DD	DD		
Suillus spectabilis	NA	NA	EN		
Sus scrofa	NA	NA	DD	LC	LC
Syarinus strandi	NT	NA	NA		
Sycophila biguttata	NA	NE	NT		
Sycophila flavicollis	NA	NE	NT		
Sylvia nisoria	CR	VU	VU	LC	LC
Symballophthalmus pictipes	DD	NE	NA		
Symmerus annulatus	NT	NE	VU		
Symmerus nobilis	NT	NT	VU		
Symmorphus fuscipes	NA	EN	RE		
Symmorphus murarius	RE	NT	CR		
Symphylella elongata	NA	DD	NA		
Synacra incompleta	NT	NA	NA		
Synanthedon andrenaeformis	NA	NT	NA		
Synanthedon soffneri	NA	NA	DD		
Synanthedon vespiformis	NA	VU	NA		
Synchita separanda	NA	EN	NA		
Synchita variegata	NA	NT	NA		
Syngrapha hochenwarthi	NA	VU	NA		
Synplasta bayardi	NA	NE	VU		
Synplasta dulcia	NA	NE	NT		
Synplasta ingeniosa	NA	NE	NT		
Synplasta pseudingeniosa	DD	NE	DD		
Syntemna morosa	NA	NE	NT		

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Syntemna oulankaensis	NA	NA	VU		
Syntrichia laevipila	VU	EN	NA		
Systenus leucurus	NA	NT	NA		
Systenus scholtzi	EN	VU	NA		
Syzygospora lapponica	NA	NA	DD		
Szczawinskia leucopoda	NT	RE	NA		
Tabanus miki	NA	RE	NE		
Tachinus bipustulatus	NA	RE	NA		
Tachyusida gracilis	NA	VU	NA		
Taeniolella verrucosa	NA	EN	NA		
Taphrina ulmi	NA	NT	VU		
Tarnania dziedzickii	DD	NE	NA		
Tarnania nemoralis	VU	NE	NA		
Tarsiger cyanurus	NA	EN°	NT	LC	LC
Tayloria acuminata	NT	NA	NA		
Tayloria serrata	EN	EN	NA		
Tayloria tenuis	NT	NT	NT		
Tectella patellaris	NT	NE	NE		
Telenomus aradi	NT	NE	NE		
Telenomus brevis	NT	NE	NE		
Telenomus ciliatus	VU	NA	NA		
Telenomus heydeni	NT	NA	NE		
Telenomus punctiventris	NT	NE	NE		
Temnoscheila caerulea	NA	EN	NA		
Temnostoma angustistriatum	CR	NA	VU		
Temnostoma carens	NA	NT	NT		
Temnostoma meridionale	NA	NT	NA		
Temnostoma sericomyiaeforme	VU	NT	NT		
Temnothorax affinis	NA	NT	NA		
Temnothorax parvulus	NA	VU	NA		
Tenebrio obscurus	NA	NA	RE		
Tenebrio opacus	NA	VU	NA		
Tenthredo amurica	NA	NE	RE		
Tenthredo eburata	NA	NE	VU		
Tenthredo eburneifrons	NA	NA	RE		
Tenthredo fagi	VU	NE	EN		
Terana caerulea	NT	NA	NA		
Teredus cylindricus	NA	CR	NA		
Teretrius fabricii	NA	RE	VU		
Tetragoneura obirata	DD	NE	DD		
Tetrastichus heeringi	NA	NE	NT		
Tetrastichus leocrates	NA	NE	NT		
Tetrastichus miser	NA	NE	NT		
Tetratoma desmarestii	NA	VU	NA		
Tetrodontium ovatum	NT	VU	NT		
Tetropium aquilonium	NA	DD	NT		
Tetrops starkii	VU	NT	NA		
Thamnobryum neckeroides	NA	DD	NA		
Thamnobryum subserratum	NA	EN	NA		
Thanatephorus terrigenus	NE	DD	VU		
Thaumanura carolii	DD	NA	NA		
Thelenella modesta	NE	NE	RE		
Thelenella pertusariella	NE	NE	DD		
Thelocarpon depressellum	NA	NE	VU		
Thelocarpon intermediellum	NE	NE	NT		
Thelopsis flaveola	VU	VU	NA		
Thelopsis rubella	VU	VU	NA		
Thelotrema macrosporum	EN	NA	NA		
Thelotrema petractoides	EN	NA	NA		
Thelotrema suecicum	NT	NT	NA		
Theridion familiare	NA	NT	NA		
Theridion montanum	VU	NT	NT		
Theridion palmgreni	NA	NA	NT		
Therioaphis brachytricha	NA	NE	EN		
Theronia atalantae	NA	NE	RE		
Theronia laevigata	NA	NE	RE		
Thiasophila inquilina	EN	NT	NT		
Thomisus onustus	NA	NT	NA		
Thrips robustus	NA	NA	NT		
Thrips urticae	NA	NA	DD		

(*continued on next page*)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Thujacorticium zurhausenii	EN	NA	NA		
Thymalus oblongus	VU	VU	NA		
Thymus serpyllum	NA	NT	NA	LC	
Tilia platyphyllos	NA	CR	NA	LC	LC
Tipula (Pterelachisus) matsumuriana pseudohortensis	NA	NA	VU		
Tipula (Pterelachisus) octomaculata	NA	NA	NT		
Tipula (Pterelachisus) stenostyla	NA	NA	VU		
Tipula autumnalis	NA	EN	NE		
Tipula crassicornis	DD	DD	NE		
Tipula jutlandica	NA	DD	NE		
Tipula kaisilai	NA	NT	NA		
Tipula middendorffi	DD	NA	NA		
Tipula pauli	NA	DD	NA		
Tipula persignata	NA	DD	NA		
Tipula zonaria	NA	VU	NA		
Titanosiphon artemisiae	NA	NA	VU		
Tomentella calcicola	VU	NA	NA		
Tomostethus nigritus	VU	NE	VU		
Toninia candida	VU	CR	NA		
Toninia tumidula	NA	CR	NA		
Tortula laureri	CR	NA	NA		
Trachelipus ratzeburgi	NT	NT	NA		
Tragosoma depsarius	VU	NT	EN		
Trametes suaveolens	EN	EN	NT		
Trapeliopsis viridescens	NE	CR	RE		
Trapeliopsis wallrothii	VU	EN	NA		
Trechispora candidissima	DD	NT	NT		
Tremella hypocenomycis	NA	NA	DD		
Tretomyces lutescens	DD	VU	NA		
Triaspis striola	NA	NE	DD		
Triaxomasia caprimulgella	CR	EN	NA		
Trichaptum laricinum	NT	NT	NT		
Trichaptum pargamenum	NE	NA	NT		
Tricharina ochroleuca	DD	NA	NA		
Tricharina praecox	DD	NA	NE		
Trichaster melanocephalus	EN	NT	NE		
Trichiosoma groenblomi	NA	NA	RE		
Trichoglossum walteri	VU	VU	EN		
Tricholoma acerbum	EN	EN	NA		VU
Tricholoma alboconicum	DD	NA	NA		
Tricholoma argyraceum	DD	NA	NA		
Tricholoma basirubens	NA	VU	NA		
Tricholoma borgsjoeënse	VU	VU	NT		VU
Tricholoma bresadolanum	NA	VU	NA		
Tricholoma dulciolens	EN	VU	NT		
Tricholoma filamentosum	VU	VU	NA		
Tricholoma ilkkaii	NA	VU	NA		
Tricholoma joachimii	EN	EN	NA		
Tricholoma olivaceotinctum	NT	VU	NA		
Tricholoma orirubens	NA	VU	NA		
Tricholoma roseoacerbum	NA	VU	NT		
Tricholoma sejunctum	EN	NT	NA		
Tricholoma sudum	NE	VU	NE		
Tricholoma sulphurescens	NT	DD	NT		
Tricholoma ustaloides	VU	NT	NA		
Trichonta aberrans	VU	NA	NA		
Trichonta delicata	VU	NA	DD		
Trichonta lyrica	VU	NA	NA		
Trichonta patens	DD	NA	DD		
Trichonta tristis	VU	NE	NA		
Trichonta trivittata	VU	NE	NE		
Trichonyx sulcicollis	EN	NT	VU		
Trichophaga scandinaviella	NT	NT	NT		
Trichophaga tapetzella	NA	RE	NA		
Trichopria tenuicornis	NT	NE	NE		
Trichosea ludifica	NA	RE	NT		
Trichosiphonaphis corticis	NA	NE	VU		
Trifolium alpestre	NA	EN	NA	LC	
Trifolium montanum	VU	NT	NA		
Trigonaspis megaptera	NA	NE	VU		
Trimorus brevicollis	NT	NE	NE		

Table A1 (continued)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Trinodes hirtus	NA	NT	NA		
Trioxys falcatus	NA	NE	DD		
Trioxys ibis	NA	NA	DD		
Trioxys pannonicus	NA	NA	RE		
Trogulus tricarinatus	DD	NT	NA		
Tromatobia variabilis	NA	NE	NT		
Tropideres dorsalis	VU	NT	NT		
Trypophloeus discedens	NA	NT	NT		
Tuber aestivum	NE	VU	NA		
Tuber foetidum	DD	NA	NE		
Tuber mesentericum	NA	VU	NA		
Tubulicrinis cinctus	NE	DD	NA		
Tubulicrinis confusus	NE	NE	DD		
Tubulicrinis eventi	VU	NE	NA		
Tubulicrinis regificus	DD	DD	NA		
Tubulicrinopsis cystidiata	NA	NA	DD		
Tuckermannopsis ciliaris	NA	NA	RE		
Tulasnella cystidiophora	NA	NA	DD		
Typhochrestus sylviae	DD	NA	NA		
Tyromyces albarubescens	NA	EN	NA		
Tyromyces kmetii	NT	DD	NT		
Tyromyces wynnei	EN	VU	NA		
Udea accolalis	NA	NA	EN		
Ulmus glabra	VU	CR	VU		
Ulmus glabra	VU	CR	NA		
Ulmus glabra montana	VU	NA	NA		
Ulmus laevis	NA	VU	VU		
Ulmus minor	NA	CR	NA		
Uloma culinaris	EN	NT	NA		
Umbilicaria subglabra	NA	RE	NA		
Uncobasidium luteolum	DD	DD	NA		
Upis ceramboides	CR	VU	NT		
Upupa epops	NA	RE	NA	LC	LC
Urnula craterium	NE	EN	VU		
Urocerus fantoma	NA	DD	VU		
Urocystis melicae	NT	NA	NE		
Urocystis paridis	NA	NA	VU		
Ursus arctos	EN*	NT	NT□	LC	LC
Urytalpa atriceps	NA	NT	DD		
Urytalpa trivittata	VU	VU	NE		
Usnea ceratina	NA	RE	NA		
Usnea cornuta	NT	NA	NA		
Usnea flammea	NT	NA	NA		
Usnea fragilescens	VU	NA	NA		
Usnea glabrata	EN	CR	CR		
Usnea longissima	EN	VU	RE		
Usnocetraria oakesiana	CR	NA	NA		
Ussurinus nobilis	NA	NA	VU		
Vanonus brevicornis	NA	VU	NA		
Variimorda basalis	NA	NA	VU		
Variimorda villosa	NA	VU	VU		
Veraphis engelmarki	NA	DD	DD		
Veronica montana	NA	VU	NA		
Verrucaria carbonella	NA	NE	EN		
Vertigo genesii	NT	NT	EN	LC	LC
Vertigo geyeri	VU	NT	NT	LC	LC
Vertigo moulinsiana	NA	VU	NA	VU	VU
Vertigo ultimathule	DD	DD	NA	NT	NT
Vicia dumetorum	NA	VU	NA		
Vicia orobus	NT	NA	NA		LC
Vicia pisiformis	EN	EN	NA		LC
Victrix umovii	CR	CR	DD		
Villa cingulata	NT	VU	CR		
Villa paniscus	EN	VU	NA		
Vincenzellus ruficollis	NA	VU	NA		
Viola elatior	NA	EN	NA		
Viola stagnina	NA	NT	NA		
Viola uliginosa	NA	NT	EN		
Volvariella caesiotincta	VU	VU	EN		
Volvariella surrecta	NT	NT	VU		

(continued on next page)

Table A1 (*continued*)

Species (n=2785)	Norway	Sweden	Finland	EU	IUCN
Wagaicis wagai	NA	NA	CR		
Wagneriala minima	VU	VU	VU		
Walckenaeria incisa	NA	NT	NA		
Wankeliella pongei	DD	NA	NA		
Willemia unispina	DD	NA	NA		
Wormaldia occipitalis	NA	VU	NA		
Xanthia gilvago	NT	NT	NA		
Xanthochilus quadratus	NA	EN	NA		
Xanthoperla apicalis	NA	NT	NA		
Xenasma pulverulentum	VU	NT	NA		
Xenasma rimicola	VU	DD	DD		
Xenylla tullbergi	VU	NA	NA		
Xerocomus depilatus	NA	VU	NA		
Xerocomus impolitus	VU	VU	CR		
Xerocomus pelletieri	DD	EN	NA		
Xerula caussei	NA	DD	NA		
Xerula longipes	NA	VU	CR		
Xestia alpicola	NA	NT	NA		
Xestia borealis	NA	EN	VU		
Xestia distensa	NA	VU	NT		
Xestia ditrapezium	NA	RE	NA		
Xestia fennica	NA	VU	NA		
Xestia gelida	EN	VU	VU		
Xestia laetabilis	NA	NT	NA		
Xestia rhaetica	NT	NE	NA		
Xestia sincera	EN	EN	VU		
Xestia speciosa	NA	NT	NA		
Xiphydria picta	NA	DD	VU		
Xorides alpestris	NA	NE	NT		
Xorides ater	NA	NE	VU		
Xorides brachylabis	NA	NE	VU		
Xorides depressus	NA	NE	EN		
Xorides gravenhorstii	NA	NE	VU		
Xorides irrigator	NA	NE	NT		
Xorides niger	NA	NA	RE		
Xorides praecatorius	NA	NE	NT		
Xorides sepulchralis	NA	NE	NT		
Xylaria corniformis	NA	EN	NA		
Xylaria friesii	NA	RE	NA		
Xyleborus monographus	CR	NT	NA		
Xyletinus longitarsis	VU	NT	NA		
Xyletinus tremulicola	NA	NT	VU	NT	NT
Xyletinus vaederoeensis	NA	VU	NA		
Xylobolus frustulatus	NT	NT	VU		
Xylodon spathulatus	DD	NT	NA		
Xylodon tuberculatus	DD	DD	NA		
Xylodromus testaceus	NA	VU	NA		
Xylolaemus fasciculosus	NA	RE	NA		
Xylomoia strix	NA	NA	DD		
Xylomya czekanovskii	NA	EN	VU		
Xylomya maculata	NA	EN	NA		
Xylophagus kowarzi	NT	NT	NT		
Xyloschistes platytropa	NA	NA	DD		
Xylota abiens	NA	NT	NA		
Xylota suecica	NT	NT	NT		
Xylota xanthocnema	VU	NT	DD		
Xystophora carchariella	NA	EN	NA		
Yponomeuta irrorellus	NA	NT	NA		
Zaglyptus multicolor	NA	NE	NT		
Zavaljus brunneus	NA	EN	NT		
Zelotes puritanus	NT	NT	NA		
Zilla diodia	NA	DD	NA		
Zygaena lonicerae	EN	NT	VU		
Zygaena minos	NA	NT	NA		
Zygaena osterodensis	EN	NT	RE		
Zygodon dentatus	VU	NA	NA		
Zygota caligula	NT	NA	NA		

Table A2
Number and proportions of species in different organism groups on a national versus candidates for Fennoscandian redlist (CFRL) for a) Norway, b) Sweden and c) Finland. P-values are derived from chi-square tests. NB! Organsim groups with very few individuals were omitted from statistical analyses. *p<0.05,**p<0.001.

	National		National CFRL		*P-value*
	#	%	#	%	
a) Norway	2279		1316		
Bryophyta	78	3.4	59	4.5	***0.0018****
Lichens	197	8.6	179	13.6	***2.2E-16****
Tracheophyta	108	4.7	61	4.6	*0.837*
Fungi	705	30.9	464	35.3	***7.58E-07****
Arachnida	28	1.2	14	1.1	*0.509*
Coleoptera	411	18.0	161	12.2	***2.2E-06****
Diptera	266	11.7	140	10.6	*0.074*
Lepidoptera	214	9.4	105	8.0	***0.0046****
Hymenoptera	170	7.5	86	6.5	*0.054*
Heteroptera	52	2.3	16	1.2	***0.0001****
Mollusca	10	0.4	9	0.7	*0.082*
Reptilia	3	0.1	2	0.2	*1*
Aves	23	1.0	12	0.9	*0.728*
Mammalia	14	0.6	8	0.6	1
b) Sweden	2376		1827		
Bryophyta	102	4.3	59	3.2	***3.90E-06****
Lichens	260	10.9	200	10.9	*0.9003*
Tracheophyta	132	5.6	95	5.2	*0.096*
Fungi	729	30.7	563	30.8	*1*
Arachnida	44	1.9	37	2.0	*0.353*
Coleoptera	461	19.4	344	18.8	*0.173*
Diptera	145	6.1	119	6.5	*0.174*
Lepidoptera	300	12.6	242	13.2	*0.254*
Hymenoptera	99	4.2	92	5.0	***0.00021****
Heteroptera	26	1.1	22	1.2	*0.497*
Mollusca	16	0.7	15	0.8	*0.197*
Reptilia	4	0.2	4	0.2	*0.621*
Aves	43	1.8	22	1.2	***9.35E-5****
Mammalia	15	0.6	13	0.7	*0.566*
c) Finland	2362		1335		
Bryophyta	97	4.1	27	2.0	***8.03E-9****
Lichens	335	14.2	182	13.6	*0.366*
Tracheophyta	79	3.3	35	2.6	***0.03****
Fungi	449	19.0	299	22.4	***7.03E-6****
Arachnida	32	1.4	13	1.0	*0.094*
Coleoptera	327	13.8	177	13.3	*0.33*
Diptera	192	8.1	119	8.9	*0.147*
Lepidoptera	354	15.0	163	12.2	***6.4E-06****
Hymenoptera	324	13.7	217	16.3	***8.24E-05****
Heteroptera	105	4.4	69	5.2	*0.072*
Mollusca	22	0.9	7	0.5	***0.0312****
Reptilia	2	0.1	1	0.1	*1*
Aves	32	1.4	18	1.3	*1*
Mammalia	12	0.5	8	0.6	*0.323*

Table A3
Number of nationally red-listed species in each Red List category among the nationally red-listed species that are not candidates, and among the Candidates for the Fennoscandian Red List (CFRL) within each country.

	Red List Category	National Red List		CFRL	
		#	%	#	%
Norway	RE	45	1.9	36	2.7
	CR	121	5.2	109	8.3
	EN	436	18.8	301	23.0
	VU	692	29.8	395	30.2
	NT	756	32.6	335	25.6
	DD	270	11.6	134	10.2
Sweden	RE	88	3.6	75	4.0
	CR	113	4.6	95	5.1
	EN	345	14.2	306	16.3
	VU	730	30.0	605	32.2
	NT	934	38.3	622	33.1
	DD	227	9.3	176	9.4
Finland	RE	153	6.4	112	8.3
	CR	162	6.8	122	9.0
	EN	332	13.9	207	15.3
	VU	607	25.4	358	26.4
	NT	934	39.1	415	30.6
	DD	201	8.4	140	10.3

Table A4
Number of nationally red-listed species red-listed by each IUCN- criteria (A-D) among the nationally red-listed species and among the Candidates for the Fennoscandian Red List (CFRL) within each country. Decline = criteria A and C and combinations of these. Please note that species may be listed by more than one criteria. Criteria A-D follow IUCN definitions.

	Norway		Sweden		Finland	
	NRL	CFRL	NRL	CFRL	NRL	CFRL
	2330	1343	2437	1879	2389	1359
Criteria						
A	186	130	421	265	381	177
B	1084	513	1066	852	1300	708
C	577	421	362	285	225	137
D	395	288	516	414	631	364
Decline	790	519	1015	793	1310	500

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