



**NATURE AND
NATURAL RESOURCES**

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Assessing the conservation value of wetland bird-life



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Preface

Key aspects of wetland conservation work include research into the current state of wetland sites, the setting of national priorities for their conservation, and practical habitat restoration and management measures. In addition to national surveys and classification, this work should involve the careful prioritization of conservation and administration methods. These are vital issues wherever prompt and effective conservation measures are needed to reduce the threats facing important wetland sites.

A conservation points system for the evaluation of wetland bird fauna has been in use in Finland since 1981. This system was originally developed for the Waterfowl Habitats Conservation Programme (Lintuvesityöryhmä 1981). Subsequent research results and ecological changes have necessitated the renewal of this system, and a working group was duly set up by the Finnish Environment Institute to devise an expanded and updated system. As chairman of the working group acted senior advisor Timo Asanti (Finnish Environment Institute) and the members were senior advisor Esko Gustafsson (Southwest Finland Regional Environment Centre), biologist Harri Hongell (West Finland Regional Environment Centre), senior assistant Petri Hottola (Joensuu University), senior scientist Markku Mikkola-Roos (Finnish Environment Institute), senior advisor Matti Osara (Ministry of Environment, environment chief Juha Ylimaunu (City of Kemi) and managing director Rauno Yrjölä (Environment Research Yrjölä Ltd). As secretary of the working group acted Markku Mikkola-Roos. The First results of the work were presented at the third Finnish Bird Research Conference in Oulu 1995. Although allocating numerical values to natural features is problematic in practical and even ethical terms, the working group concluded that renewing the conservation points system was the only viable option. In addition to values related to breeding birds, the new system also considers the importance of wetland sites as feeding and staging areas during the migration season, as moulting areas, and as feeding areas during the breeding season.

The new conservation value system for wetland bird fauna has been designed to facilitate the classification of wetland sites and the setting of priorities for conservation. The system can also be used to help estimate the need for habitat restoration and management measures, and to evaluate the success of previous restoration measures.

The working group believes that this system can also be beneficially applied by the national and local environmental authorities in other countries than Finland, and by the European Union.

The chairman of the working group would like to thank all the members of the group for their valuable professional contributions to this demanding task. Special thanks are due to Risto A. Väisänen, curator of the Zoological Museum of Helsinki, whose contributions were particularly crucial to the success of the project.

Helsinki, December 2002
Timo Asanti,
Chairman of the working group

Introduction

.....

A new system for calculating the conservation values of wetland bird fauna has become necessary, since the earlier system devised more than twenty years ago for the Waterfowl Habitats Conservation Programme (Lintuvesityöryhmä 1981) has become outdated. In recent years new bird species have spread to Finland, and our knowledge of bird populations and their threatened status have increased considerably. The old conservation points system is no longer suitable for assessing the diversity of wetland bird-life (Hottola 1993), especially since it does not include any means for evaluating the value of border and protective zones of wetlands.

Attempts to find objective measures for the value of aspects of the natural world can be justified when there is a need to find objective criteria to facilitate the effective allocation of the limited resources available for nature conservation. In practice, however, the measurement of such values will always be partly based on subjective views, and this is also true in the new system described here. The end result is inevitably dependent on both the expertise of those compiling the system, and their intuitive analysis of the many factors that must be considered in order to devise a rational and effective tool to facilitate the conservation of the species and habitats we wish to protect.

This study focuses on a means for determining the conservation value of the bird fauna of the limited geographical areas of wetland sites. Assessing the overall conservation value of such habitats would be a much more complex task, involving the consideration of cultural, aesthetic and educational values as well as ecological values.

The working group started by considering whether the old points system could be updated into a usable system or whether there was a better system in active use elsewhere. All the existing points systems in use in Finland or other countries, however, were based on simple subjective estimates of the need to conserve particular species, and how well any species reflected possible threats to natural habitats. The existing systems did not feature any indexes related to evaluations of the characteristics of bird species, their population sizes, or any specific anthropogenic threat.

During discussions with experts, however, the working group learned of a system developed by the Zoological Museum of Helsinki for assessing the value of individual members of vertebrate species. This system produces practically usable indexes that assess vertebrate species according to their threatened status, while also considering their total populations. All bird species can be evaluated within this vertebrate system.

Using this vertebrate formula for the conservation value system makes it applicable for other habitat types than wetlands. The working group decided to use a modified version of the formula used to calculate the value of an individual as the basis for a new system for calculating conservation values. The working group did not have resources to develop a more complete and quantitative index, so it seemed sensible to link the conservation value to the existing definition of the 'financial value of an individual bird' (Väisänen 1996), since both systems focus on threatened status and the need for conservation.

2

Basic principles

The working group has developed a system for assessing the conservation values of wetland bird fauna under four separate categories:

1. **conservation values for breeding birds**
2. **conservation values for passage migrants**
3. **conservation value during the moulting season**
4. **significance as feeding areas during the nesting season**

The following factors should be considered during the application of these categories:

An area is naturally more valuable in terms of its bird fauna where it has high values in all or more than one of these categories. It is not, however, meaningful to combine the values for these four conservation categories into a single index, because the conservation need for an area may be considerable even where an area only has significance within a single category (e.g. as an important staging area for passage migrants). These categories allow a more comprehensive definition of the need for conservation than was possible under the old wetland conservation points system. The new system can also be used as a tool to evaluate important staging areas, as required by the EU.

It should be noted, especially considering the breeding birds category, that the system was largely created as a tool for the environmental administration to justify administrative decisions on conservation policies. The system is not suitable for scientific research into the bird populations of wetlands, where methods related to the study of ecological population dynamics should be applied.

Conservation values for breeding birds

3

Conservation values for breeding bird populations are based on three main factors:

1. The species' population replacement capacity, i.e. the length of time it takes for a generation to be replaced within a natural population.
2. The threatened status of a species in Finland, in Europe or globally.
3. The species' total breeding population in Finland.

Conservation values (SA) for bird species breeding in Finland have been calculated using a modified version of the formula devised by Risto A. Väisänen (1996) to measure the value of individual vertebrates:

$$SA = H \times U / K$$

Where:

SA = the conservation value of an individual of the species
H = the species' population replacement capacity index
U = the species' threatened status index
K = an index expressing the species' total breeding population in Finland

3.1 Population replacement capacity index (H)

A species' population replacement capacity can be roughly deduced from the body weight of an organism, which is linked to biological characteristics such as longevity, reproductive rates and generation length (Günther & Guerra 1955, Lindsted & Calder 1976, Järvinen & Miettinen 1987, Harvey & Pagel 1991). A simple population replacement capacity index can be derived from the weight of an individual, since even under favourable conditions the populations of larger species grow more slowly than those of smaller species.

The relationship between weight and population replacement capacity is, however, only a theoretical generalization, and there are problems concerning its application for birds. The relationship between weight and longevity varies between bird groups, and passerines in particular differ in this respect from other groups (Harvey & Pagel 1991). No better general index suitable for birds has yet been devised, however, and the resources available to the working group did not allow for more detailed studies to compare species' longevity and rates of reproduction in order to discover any significant anomalies where species of similar size would have quite different population replacement capacities. In any case, the present population replacement capacity index represents an easily applicable, purely biological, quantitative species-specific characteristic.

Although the sizes of individual birds do not correlate directly with the total populations of their species (Blackburn et. al 1991), they do often correlate well with the ability of a species to adapt to changes in their environment. Larger species tend to be more specialized and less adaptable (Järvinen & Miettinen 1987).

The species' population replacement capacity index (H) thus also reflects the ability of a species to adapt to possible changes in its habitat.

H can be calculated by taking the decimal logarithm of the species' average weight in grammes. Examples are given here for two extreme cases. The smallest bird in Finland is the Goldcrest 6 g and the heaviest species is the Mute Swan at 12,000 g (average weights from Haartman et al. (1963-1972) and Solonen (1994)). The two species' population replacement capacity indexes are therefore 0.78 and 4.1, respectively. The numerical value of the index thus increases five-fold from the smallest species to the largest.

3.2 Threatened status index (U)

The threatened status of a species is a qualitative classification, whose numerical value increases markedly for species considered to be under greater threat. Eight status categories are used in this system, allocated numerical values that rise approximately by the power of $n^{1.6}$. The most common species are given a value of 1, and the most threatened species a value of 20.

The threatened status categories for bird species were obtained from a major report prepared by the threatened animals and plants monitoring committee (Rassi et al. 2001) as follows:

- U = 1, where a species is not listed as threatened
- U = 2, where a species is classified as locally threatened
- U = 5, where a species is classified as near threatened
- U = 10, where a species is classified as vulnerable
- U = 15, where a species is classified as endangered
- U = 20, where a species is classified as critically endangered or extinct

The working group also used two intermediate categories for certain species (U = 3 and U = 8).

The threatened status of a species in Finland alone was not considered to be an adequate factor to be used directly as a measure of the species' status. The working group resolved that the following factors should also be integrated into the system:

- *Species' population status and trends* globally, in Europe, in the Nordic countries and in Finland (Tucker & Heath 1994, Väisänen et al. 1998). Where species' populations are stable there is no need for any change in the classification unless threats are evident. Clear declining trends are incorporated into the system by raising the classification, while upward population trends reduce the species' threatened status. Attempts have been made to take a European perspective, but for many species the classification has had to be calculated on the basis of the situation in the Nordic countries alone, due to the lack of information on populations in other countries, especially in European Russia.
- *Species for which Finland has special responsibility* are species whose primary range is in Europe, that are threatened, steeply declining or rare in Europe, and of whose European population at least 10% breed in Finland (Tucker & Heath 1994, Rassi et al. 2001). The classifications for such species have been increased by one to reflect this special responsibility, regardless of these species' total populations in Finland.

- Clear trends caused by *anthropogenic threats to species or their habitats* have been considered by raising species' threatened status indexes by one, for instance where a species is subject to persecution or associated with habitats that are disappearing due to human activity.

The reasons for any such changes made in species' threatened status indexes are noted in Appendix 1.

The Finland's 256 breeding bird species have thus been divided into eight categories according to their threatened status index, as shown in the table below.

U-value	No. of species	Proportion (%)
1	93	6
2	34	13
3	42	16
5	45	18
8	12	5
10	14	6
15	8	3
20	8	3

There are no clear general trends concerning reevaluations of the threatened status of Finland's bird species, since the threats and anthropogenic pressures on different species vary considerably. The threatened status index of many raptors and species associated with old-growth forest habitats has been raised to category U=5, for instance.

3.3 Total Finnish population index (K)

The K index is a purely quantitative parameter expressed in terms of total population categories, due to the difficulty of precisely quantifying the numbers of pairs of each species. The total sizes of breeding populations in Finland can vary greatly from year to year due to natural factors such as weather conditions. Such figures also vary according to the methods used by researchers, and it is normally only possible to update such information every 5-10 years, because of the time it takes to collect suitable data. Bird species have been divided into six categories logarithmically by the approximate sizes of their total breeding populations in Finland (according to Väisänen et al. 1998):

K	Breeding pairs
2	< 100
3	101 – 1,000
4	1,001 – 10,000
5	10,001 – 100,000
10	100,001 - 1 million
20	> 1 million

For very rare species, with fewer than 10 breeding pairs or 20 adult birds at the beginning of the breeding season, K = 1 is not used, as this would produce excessively large conservation values. Correspondingly, K = 20 is used for smaller species with more flexible ecological requirements whose populations are over a million pairs, so that their abundance should not be overemphasized.

The total population index as used in this study emphasizes the Finnish dimension of species' status. Modified total population indexes should be devised

according to the circumstances in any other country or region being evaluated in this way.

3.4 Calculating conservation values for species

The average weights, population replacement capacity indexes and total population indexes of bird species breeding in Finland and their conservation values are listed in Appendix 2. An example of how a species' conservation value is calculated on the basis of these indexes is presented below.

The Slavonian Grebe *Podiceps auritus* has an average weight of 560 grammes. The value for the species' population replacement capacity index is obtained by taking the decimal logarithm of its average weight, giving the result $H = 2.7$. The Slavonian Grebe is not classified as threatened in Finland, so the base value for the species' threatened status index is 1, but the total European population of the Slavonian Grebe is just 39,000 pairs, so this factor raises the species' threatened status upwards by one category. Additionally, more than 10% of the species' total European population breed in Finland (+1 category); and the species is restricted to a specific habitat (+1 category). These factors combine to raise the threatened status index for the Slavonian Grebe from $U=1$ to $U = 5$ (see Appendix 1). The species' breeding population in Finland is approximately 4,000 pairs, so its total Finnish population index (K) is 4.

The Slavonian Grebe's conservation value (SA) can therefore be calculated as follows:

$$SA = H \times U/K = 2.7 \times 5/4 = 3.38$$

Among all Finland's breeding bird species the highest conservation value has been given to the Spotted Eagle *Aquila clanga* (33.00) and the lowest to the Willow Warbler *Phylloscopus trochilus* (0.05). The Dunlin *Calidris alpina* represents a special case, since separate values have been calculated for its two subspecies, owing to the differing conservation needs of the two populations. The southerly, endangered subspecies *Calidris alpina schinzii*, which breeds in coastal meadows by the Baltic Sea, is considerably more valuable in conservation terms than the fairly common northerly breeding subspecies *Calidris alpina alpina* (see Appendix 1). Other species have all been evaluated for Finland as a whole, so for instance the threatened regional sub-populations in southern Finland of Willow Grouse *Lagopus lagopus*, Ruff *Philomachus pugnax*, and Siberian Jay *Perisoreus infaustus*, have not been assigned any special threatened status index. These regional variations have nevertheless been taken into account in the assignment of conservation values for these species.

3.5 Calculating conservation values for breeding birds in wetland sites

In calculating the conservation value of the bird fauna of a wetland site by summing the values for each species, the observed numbers of pairs of each species are converted to coefficients by raising them to the power of 0.7, in order to reduce the relative values of pairs within large nesting colonies. The table below shows the effect of such a conversion on the numbers of pairs for local populations up the size of a colony of 10,000 pairs. For comparative purposes the results of a square root conversion (where figures are raised to the power of 0.5) are shown, illustrating how this greatly reduces the coefficient figures.

Unconverted nos. of pairs	$a^{0.7}$	$a^{0.5}$
1	1	1
10	5	3
100	25	10
1,000	126	32
10,000	630	100

Such conversions are done for all species, since in practice it is difficult to draw the line between colonial and non-colonial breeding species.

The conservation value of a whole wetland site (ESA) can then be calculated by multiplying the converted numbers of pairs of each species breeding in the site (M) by the respective conservation values of each species (SA) and summing these products:

$$ESA = \sum_{\text{tot}} (SA \times M)$$

Table 1 illustrates how this calculation works in practice for a single wetland site. Conservation values were calculated for each species breeding in the Siikalah-ti wetland in Parikkala in 1997. Summing these species values gives the total conservation value of the site with respect to breeding birds.

Different groups of birds accounted for the following proportions of the total conservation value of the site: grebes 11.0%; waterfowl 10.5%; rails 17.0%; gulls 25.6%; and passerines 12.3%.

Table I. Calculations of the conservation value of breeding bird populations at Siikalahti, an open wetland without scrub near Parikkala.

Weight = average weight of species in grammes; H = population replacement capacity; U = threatened status index; K = total Finnish population index; SA = species' conservation value = H x U/K; Pairs = no. of pairs breeding in 1992 (Koskimies 1999); M = converted pair numbers; Points = SA x M; % = species share of the total conservation value of the site's breeding birds.

Species		Weight (g)	H	U	K	SA	Pairs	M	Points	%
Great crested grebe	<i>Podiceps cristatus</i>	930	3.00	1	5	0.60	7	3.90	2.34	0.74
Red-necked grebe	<i>P. grisegena</i>	840	2.90	3	4	2.18	5	3.09	6.71	2.13
Slavonian grebe	<i>P. auritus</i>	560	2.70	5	4	3.38	18	7.56	25.52	8.10
Bittern	<i>Botaurus stellaris</i>	1,230	3.10	5	3	5.17	7	3.90	20.17	6.40
Whooper swan	<i>Cygnus cygnus</i>	9,050	4.00	5	4	5.00	1	1.00	5.00	1.59
Wigeon	<i>Anas penelope</i>	700	2.80	1	5	0.56	3	2.16	1.21	0.38
Teal	<i>A. crecca</i>	300	2.50	1	10	0.25	17	7.27	1.82	0.58
Mallard	<i>A. platyrhynchos</i>	1,100	3.00	1	10	0.30	7	3.90	1.17	0.37
Garganey	<i>A. querquedula</i>	360	2.60	3	4	1.95	3	2.16	4.21	1.33
Shoveler	<i>A. clypeata</i>	603	2.80	1	5	0.56	7	3.90	2.19	0.69
Pochard	<i>Aythya ferina</i>	870	2.90	2	5	1.16	32	11.31	13.12	4.16
Tufted duck	<i>A. fuligula</i>	720	2.90	1	10	0.29	6	2	0.58	0.21
Goldeneye	<i>Bucephala clangula</i>	750	2.90	1	10	0.29	25	9.52	2.76	0.88
Goosander	<i>Mergus merganser</i>	1,400	3.10	1	5	0.62	2	1.62	1.01	0.32
Marsh harrier	<i>Circus aeruginosus</i>	610	2.80	5	3	4.67	5	3.09	14.40	4.57
Water rail	<i>Rallus aquaticus</i>	95	2.00	3	3	2.00	28	10.30	20.61	6.54
Spotted crane	<i>Porzana porzana</i>	70	1.80	3	4	1.35	31	11.07	14.94	4.74
Little crane	<i>P. parva</i>	50	1.70	5	2	4.25	1	1.00	4.25	1.35
Moorhen	<i>Gallinula chloropus</i>	275	2.40	5	2	6.00	1	1.00	6.00	1.90
Coot	<i>Fulica atra</i>	520	2.70	1	5	0.54	44	14.14	7.64	2.42
Crane	<i>Grus grus</i>	5,000	3.70	5	4	4.63	1	1.00	4.63	1.47
Snipe	<i>Gallinago gallinago</i>	95	2.00	2	10	0.40	52	15.89	6.36	2.02
Woodcock	<i>Scolopax rusticola</i>	300	2.50	1	10	0.25	4	2.64	0.66	0.21
Little gull	<i>Larus minutus</i>	130	2.10	3	4	1.58	20	8.14	12.82	4.07
Black-headed gull	<i>L. ridibundus</i>	265	2.40	2	5	0.96	410	67.44	64.75	20.54
Common gull	<i>L. canus</i>	415	2.60	1	5	0.52	9	4.66	2.42	0.77
Herring gull	<i>L. argentatus</i>	1,050	3.00	1	5	0.60	1	1.00	0.60	0.19
Common tern	<i>Sterna hirundo</i>	120	2.10	1	5	0.42	3	2.16	0.91	0.29
White-backed w'pecker	<i>Dendrocops leucotos</i>	105	2.00	20	2	20.00	1	1.00	20.00	6.34
Lesser spotted w'pecker	<i>D. minor</i>	24	1.40	10	4	3.50	4	2.64	9.24	2.93
Pied wagtail	<i>Motacilla alba</i>	20	1.30	1	10	0.13	3	2.16	0.28	0.09
Whinchat	<i>Saxicola rubetra</i>	16	1.20	1	10	0.12	2	1.62	0.58	0.19
Thrush nightingale	<i>Luscinia luscinia</i>	27	1.40	1	5	0.28	23	8.98	2.51	0.80
Grasshopper warbler	<i>Locustella naevia</i>	13	1.10	2	4	0.55	1	1.00	0.55	0.17
Sedge warbler	<i>Acrocephalus schoenobaenus</i>	12	1.10	1	10	0.11	519	79.55	8.75	2.78
Reed warbler	<i>A. scirpaceus</i>	13	1.10	1	5	0.22	6	3.51	0.77	0.24
Great reed warbler	<i>A. arundinaceus</i>	30	1.50	2	2	1.50	2	1.62	9.57	3.09
Blyth's reed warbler	<i>A. dumetorum</i>	12	1.10	2	4	0.55	1	1.00	0.55	0.17
Whitethroat	<i>Sylvia communis</i>	16	1.20	1	10	0.12	35	12.05	1.45	0.46
Blackcap	<i>S. atricapilla</i>	20	1.30	1	5	0.26	2	1.62	0.42	0.13
Long-tailed tit	<i>Aegithalos caudatus</i>	8	0.90	1	4	0.23	1	1.00	0.23	0.07
Golden oriole	<i>Oriolus oriolus</i>	76	1.90	2	4	0.95	9	4.66	4.42	1.40
Red-backed shrike	<i>Lanius collurio</i>	29	1.50	2	5	0.60	1	1.00	0.90	0.29
Scarlet rosefinch	<i>Carpodacus erythrinus</i>	23	1.40	1	10	0.14	17	7.27	1.02	0.32
Reed bunting	<i>Emberiza schoeniclus</i>	19	1.30	1	10	0.13	165	35.66	4.64	1.47
Total							1,542		315.27	

3.6 Applications of breeding season conservation values

The system described above is suitable for comparing wetlands within the same biogeographical zone. Such comparisons should also be done between sites of similar size. Where sites are of different sizes, a comparable value can be obtained by dividing the sites' total conservation values by their respective areas. If the edges of the vegetation zones are of different length, the values can similarly be divided by their length. This could lead to considerable distortions in comparisons between sites of very different sizes, as there tends to be more 'unused space' in larger sites, as the birds typically cluster into the most favourable areas. The high conservation values of these areas will thus not be apparent if the value for the whole area is simply divided by its total size. Users of the system should be aware of these limitations concerning the system.

Such conservation values can also be used as crude absolute measures of the overall conservation value of a site when the focus is on bird species that are threatened or in need of protection. Conservation values based on an area's bird fauna are also useful indicators of overall biodiversity, particularly since in practical terms birds are much easier and less time-consuming to survey than other species groups. Areas with many breeding bird species also tend to have diverse flora and fauna in general (Bibby et al. 1992). The nature and diversity of wetlands' flora and fauna are often clearly reflected in their bird fauna (Kojärvi-toimikunta 1980, Lintuveysityöryhmä 1981, Koskimies 1989). It must always be remembered, however, that wetlands are protected for their overall value as natural habitats, and not just for their bird fauna.

In order to keep the conservation value system up-to-date, species lists and indexes need to be revised approximately every ten years. Such revisions could usefully be carried out in Finland in co-operation with the threatened animals and plants monitoring committee.

The points scores for each wetland site can be compared when wetlands are designated as regionally, nationally or internationally valuable for their breeding birds, although the setting of threshold points scores for such purposes was not within the scope of this study.

4

Conservation values for passage migrants

4.1 Conservation values for birds migrating through Finland

The migration patterns and conservation needs of passage migrant species in Finland vary considerably. To facilitate the classification of staging areas, migrant species have been divided into four groups (Appendix 3, lists A-D).

The lists only include species that regularly migrate through Finland. Species that do not regularly occur in flocks on migration or habitually use certain staging areas are omitted from the lists. Most passerines belong to this group, for instance.

The lists have been compiled according to the conservation statuses assigned to European bird species by Tucker & Heath (1994), and species have been divided into four categories:

1. Globally threatened species
2. Species whose world distributions are concentrated in Europe, and which have an unfavourable conservation status
3. Species whose world distributions are not concentrated in on Europe, but which have an unfavourable conservation status in Europe
4. Species which currently have a favourable conservation status, but whose distributions are concentrated in Europe

Category 4 is of no importance within this system. The working group has also considered the classifications of species within Finland's national Red List (Rassi et al. 2001), although in conservation work focusing on migratory birds the species' international status is of primary importance.

The waterfowl habitats working group (Lintuvesityöryhmä 1981) included large and easily disturbed species in their classification system. These birds are especially sensitive to changes in their staging areas. Large parts of their total populations may use the same staging areas year after year. Finland has a special responsibility to preserve staging, moulting and feeding areas along the migration routes of these species.

There are additional problems with the direct adoption of species' European classifications. Some easterly species that occur in Finland are inadequately assessed within the European system. Some still numerous species have meanwhile been given a high threatened status due to their declining numbers in other parts of Europe outside their main ranges. In such cases, the classification system has been adapted to give more weight to the situation in Finland and the Nordic region.

4.2 Conservation values for staging areas

Some wetlands or marshes are valuable for bird fauna during the migration seasons as well as the breeding season. The values of some areas for migrating birds can only be evaluated through series of observations made during different periods within the migrating seasons. The best results are achieved when many observa-

tions are compiled over a period of several years. Birds' migratory behaviour varies considerably, and in exceptional circumstances large numbers of individuals and species may occur almost anywhere.

For this reason sites have to be evaluated on the basis of criteria that consider annual variations in migratory behaviour. The conservation value of sites for passage migrants are most suitably assessed in broad categories, each with their own criteria.

The wetland sites valuable for birds migrating through Finland have been divided into four categories on the basis of the criteria described below. In each category, the fulfilling of any one of the criteria is enough to justify the classification of a site within the category concerned. The species lists A-D used for this classification are presented in Appendix 3.

Category I – Internationally important staging areas for migratory birds

Where any of the following occur annually:

- globally threatened migratory bird species (List A)
- significant numbers of regionally endangered migratory bird species (List B)
- several hundred individuals of large sensitive species (List D) or more than 100 herons observed together
- at least 2,000 waterfowl or 1,000 waders observed together at some point during the migration season.

Category II – Nationally important staging areas for migratory birds

Where any of the following occur annually:

- regionally endangered migratory bird species (List B)
- significant numbers of regionally threatened migratory bird species (List C)
- more than a hundred individuals of large sensitive species (List D) or tens of herons observed together
- at least 1,000 waterfowl or 500 waders observed together at some point during the migration season.

Category III – Provincially important staging areas for migratory birds

Where any of the following occur annually:

- regionally threatened migratory bird species (List C)
- tens of large sensitive species (List D) or several herons observed together
- at least 500 waterfowl or 250 waders observed together at some point during the migration season.

Category IV – Locally important staging areas for migratory birds

Where large sensitive species (List D) regularly occur on migration, or tens of waterfowl or waders are observed together annually at some point during the migration season.

4.3 Case study of classification procedures

The Sääperi - Uudenkylänlampi wetland and its surroundings, in Värtsilä, Northern Karelia, has been classified according to its importance for passage migrants within Category I, primarily because it is regularly used as a staging area during the spring migration by flocks of some 300-400 "grey geese" (*Anser ssp.*). The geese stay in the area every year for about 2-3 weeks.

Tens of White-tailed Eagles *Haliaeetus albicilla* (a threatened species) are also recorded yearly at Sääperi during migration, but most of them just pass over, and the lake is of no great importance to the species. The Spotted Eagle *Aquila clanga* is almost a yearly visitor, but records mainly concern occasional birds straying away from their normal routes. Corncrakes *Crex crex* are common breeders in the area, but the species does not appear to use the lake or its surroundings as a staging area.

The following endangered species (from list B) are regularly recorded in the area: Great Snipe *Gallinago media*; Black-tailed Godwit *Limosa limosa*; Lesser Black-backed Gull (nominative race) *Larus fuscus fuscus*; Shore Lark *Eremophila alpestris*; Woodlark *Lullula arborea*; and Yellow-breasted Bunting *Emberiza aureola*. Of these species, only the numbers of Shorelarks and probably also Great Snipe can be regarded as significant. This would also justify classifying the site within Category I.

The other Category I criteria are not met. Only a few herons are ever recorded at any one time. Peak numbers of waterfowl are below 1,500, and wader numbers remain below 1,000. But as was mentioned above, the meeting of any one of the criteria is enough to justify classification.

Conservation values for moulting season resting areas

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Wildfowl typically shed all their flight feathers simultaneously during the moulting season. Finding a safe refuge with plenty of food is vital during this period when the birds are unable to fly, and are exceptionally wary. Birds therefore move to suitable sites for the moulting season. The length of the period during which the birds are flightless varies from species to species. Usually it is about 3-4 weeks, but for Mute Swans, for instance, it is as long as 6-8 weeks. The timing of moulting also varies greatly between species, and even within species according to the individual's gender and age. Usually the flightless period occurs after the breeding season, between midsummer and early autumn (Salminen 1983).

The availability of suitable resting areas for the birds to use during the moulting period is of great significance for the wildfowl of the surrounding areas. This role of certain wetlands must therefore be taken into consideration when evaluating the conservation values of wetland sites for birds. The classification system presented below is a modified version of the system used for the Waterfowl Habitats Conservation Programme (Lintuvesityöryhmä 1981). Three categories were defined according to the following criteria:

- I **Very significant moulting season resting areas**, where more than 5 individuals of endangered species, more than 50 geese or swans, or more than 700 waterfowl regularly gather at some time during the moulting season.
- II **Significant moulting season resting areas**, where individuals of endangered species, more than 20 geese or swans, or more than 200 waterfowl regularly gather at some time during the moulting season.
- III **Areas with some significance as resting areas during the moulting season**, where geese or tens of waterfowl regularly gather at some time during the moulting season.

6

The significance of wetlands as feeding areas during the breeding season

Birds' nesting sites may be situated in different habitats from their feeding areas during the breeding season. Some species make flexible use of several different habitats for feeding, while other species are totally dependent on the proximity of certain types of suitable feeding areas for breeding success, in which case these vital feeding areas need to be protected. As part of this project, the working group listed species that use wetland sites as feeding areas during the breeding season, and thus add to their conservation value.

Sites were considered to be significant feeding areas during the breeding season, if individuals of the following species were regularly observed feeding there during the summer:

Red-throated diver *Gavia stellata*; black-throated diver *G. arctica*; Grey heron *Ardea cinerea*; White-tailed eagle *Haliaeetus albicilla*; Osprey *Pandion haliaetus*; Kestrel *Falco tinnunculus*; Red-footed falcon *F. vespertinus*; Hobby *F. subbuteo*; Peregrine falcon *F. peregrinus*; Crane *Grus grus*; Caspian tern *Sterna caspia*; Black tern *Chlidonias niger*; Nightjar *Caprimulgus europaeus*; or tens of Little gulls *Larus minutus*; or hundreds of Swifts *Apus apus*; Sand martins *Riparia riparia*; Swallows *Hirundo rustica*; House martins *Delichon urbica*; or Starlings *Sturnus vulgaris*.

Testing of the new conservation values system on existing data

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The new conservation values system has been tested on existing data concerning waterfowl populations in Eastern and Western Uusimaa in Southern Finland, and on data on Finland's important bird areas (FINIBA data). The data used in the tests covered a total of more than 39,000 individual birds or pairs.

The following factors were particularly considered during testing:

- The distributions of conservation value points scores within the data.
- The conservation values assigned to species, and their role in the total values for wetland sites.
- The roles and effects of the indexes used in calculating conservation values.
- Sources of error and the suitability of existing guidelines.

7.1 Alternative ways to assess conservation values

There are several alternative ways to assess conservation values other than directly applied conservation points systems. Important examples include:

- 1) Measurable biological and ecological variables that may be calculated per unit area or kilometre of shoreline to make comparisons, e.g.:
 - number of species
 - number of individuals
 - diversity
- 2) Optimization, where choices are made according to specific goals:
 - how to protect all species at the lowest cost
 - which areas should be protected to include all species, etc.
- 3) Decision analysis and weightings where specific issues are given different values, e.g.:
 - threatened status classification
 - water courses classification etc.

The new conservation values system for wetland bird fauna includes certain elements that complicate its practical application. A species' population replacement capacity is at least theoretically a measurable natural parameter, but a species' threatened status listing is based on an assessment of the available knowledge. Data on species' total populations is partly measurable, but in many cases is based on estimates and classification. In general, the conservation values system may be seen more as a tool similar to decision analysis, rather than as a precise measuring instrument.

7.2 Distribution of species' conservation values

Most of the individuals included in the data were assigned conservation values of one or less than one. Very few individuals were given high values. Most of the individuals covered by the data were indeed of common species such as black-headed gull and sedge warbler, whose conservation values are less than one.

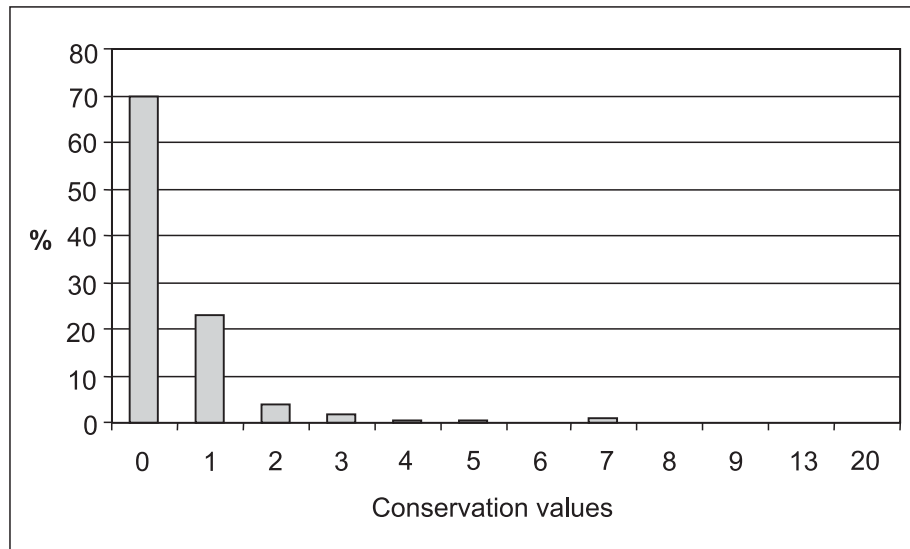


Fig. 1. Distribution of conservation values for individual birds included in the FINIBA data.

7.3 Differences between wetland sites

The conservation values for different sites were significantly affected by the following factors:

- The size and shape of the wetland site
- The biotope
- The accuracy of the data available
- The species considered

The differences between the areas with regard to these factors were very great. The sizes of the areas varied considerably, as did their locations and the accuracy of survey data. The results for each area are shown in Figs. 2 and 3.

The surface area of a wetland is a particularly significant factor. In a study of seabird population data conducted in Finnish waters of the Baltic Sea Heiman (1999) has similarly noted positive correlations between the sizes of islands, the numbers of pairs of birds, and their calculated conservation values, since the number of nesting pairs tends to depend on the size of the island.

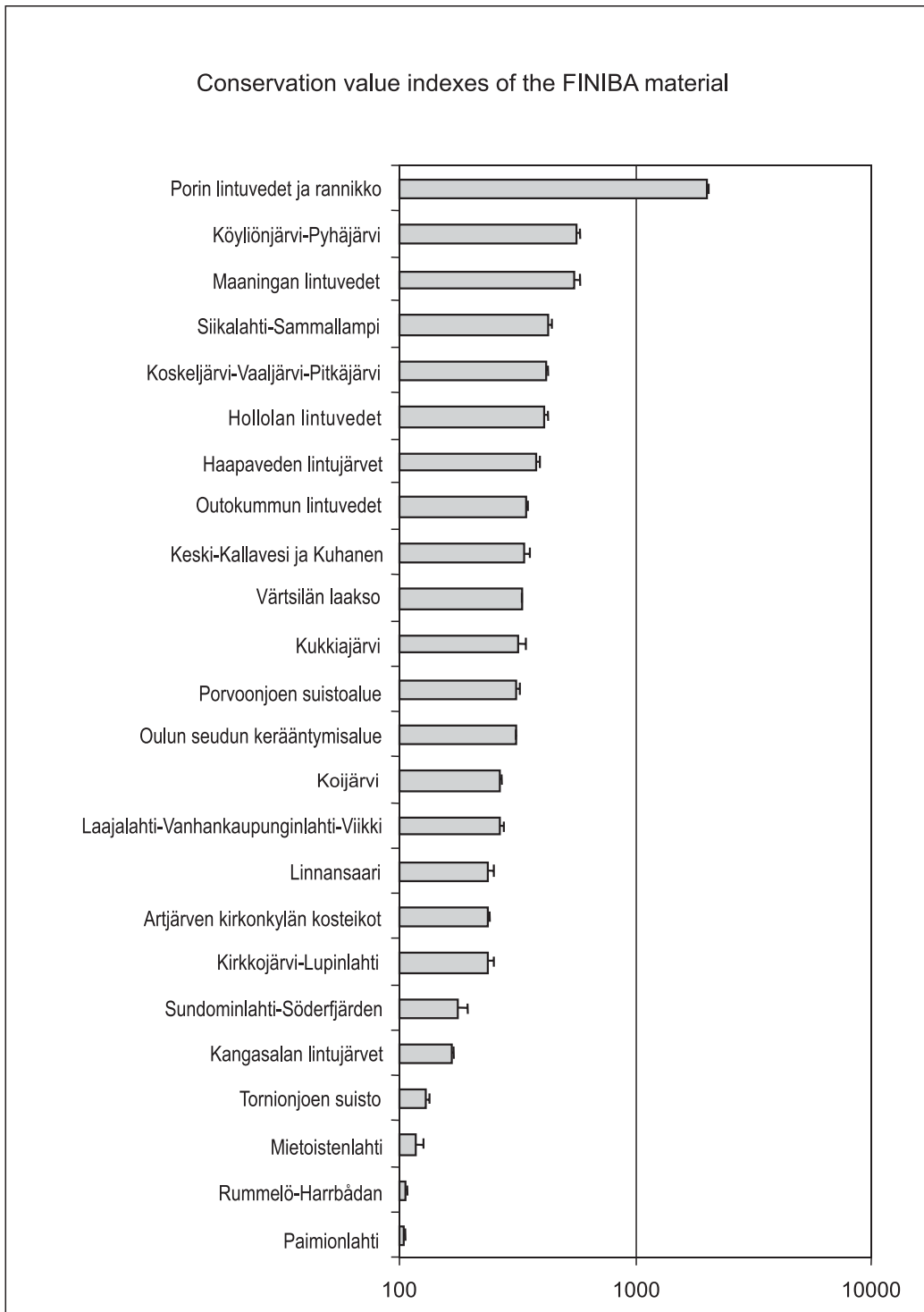


Fig. 2. Conservation values for the wetland sites evaluated.

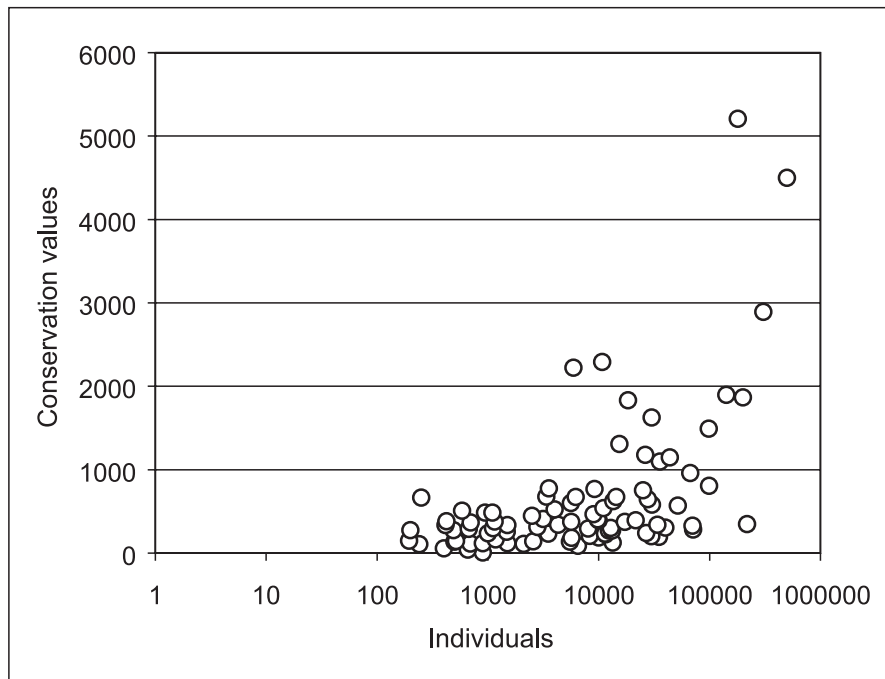


Fig. 3. Conservation values and numbers of individuals by wetland site. The numbers of individuals are also related to the areas of sites and the lengths of shoreline.

7.4 Effects of the indexes on calculations

Conservation values for species evidently vary according to the birds' size. This meant that in practice black-headed gulls, little gulls, lesser black-backed gulls and red-necked grebes were in some respects overrepresented in the total calculated conservation values, considering the numbers of individuals included in the data. An examination of the calculations also reveals that particularly for middle-sized birds the species' threatened status indexes have the most pronounced impact on their conservation value. An increase in a species' threatened status index will have an exaggerated effect on its calculated conservation value.

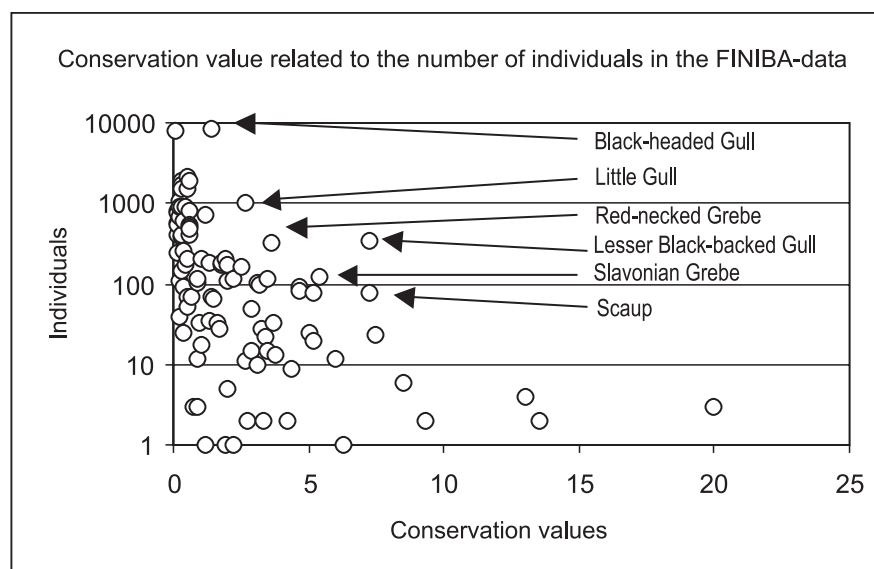


Fig. 4. Conservation values and numbers of individuals before adjustment.

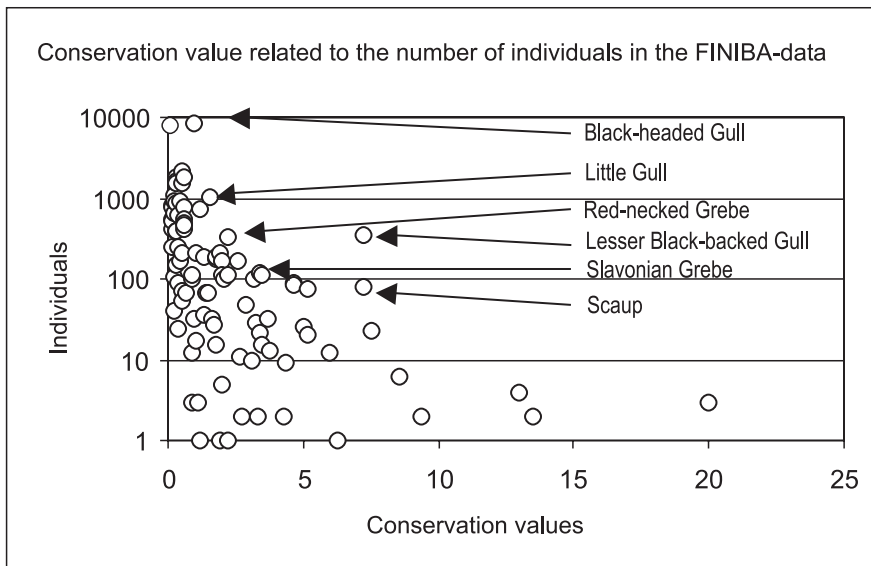


Fig. 5. Conservation values and numbers of individuals, with the threatened status indexes of selected species adjusted downwards.

The conservation values obtained for gulls and terns particularly differed from those of other birds. The deviations within the calculated conservation values were assessed using species' conservation values as varying coefficients. The results indicated that black-headed, lesser black-backed and little gulls were responsible for most of the deviations for many wetland sites. There are two factors behind this trend: firstly, that these species occur in colonies; and secondly that they are medium-sized birds, and thus have correspondingly low population replacement capacity indexes. When the conservation values of different wetland sites are compared, sites colonized by black-headed gulls particularly have significantly higher overall values due to their presence. When other areas than waterfowl habitats were considered, the presence of ruffs *Philomachus pugnax*, wood sandpipers *Tringa glareola*, and broad-billed sandpipers *Limicola falcinellus* disproportionately increased sites' conservation values.

Tests were also carried out to examine how changes in the various indexed factors affected species' conservation values by assigning species with different artificial values. By systematically adjusting the indexes, it was possible to assess the overall degree of sensitivity of the conservation values to changes in the indexes, as illustrated in percentage terms in Figures 6 and 7.

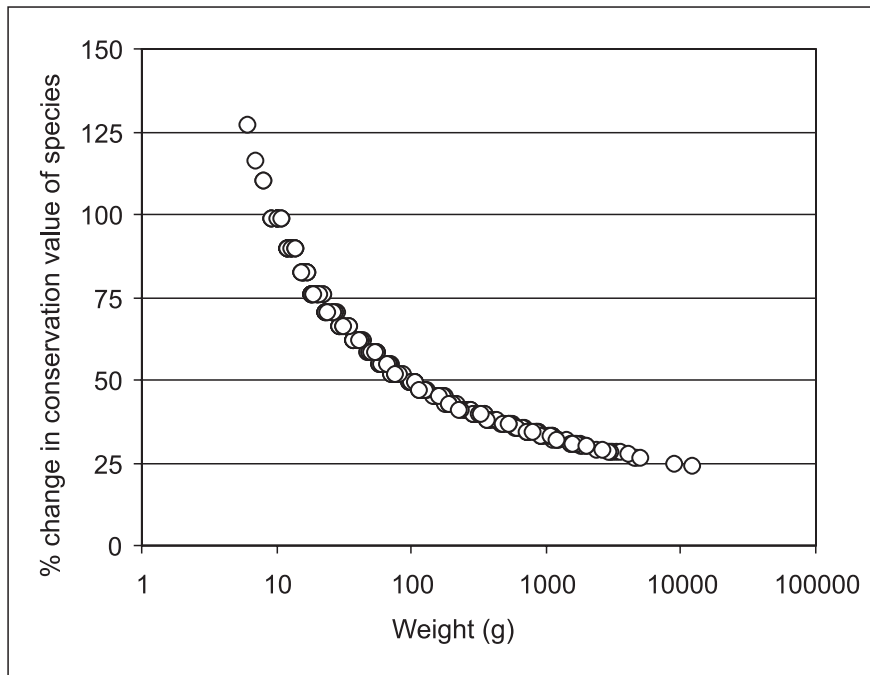


Fig. 6. The sensitivity of species' conservation values with regard to changes in their population replacement capacity indexes, as derived from their average weight. The graph shows how conservation values are more sensitive to changes in population replacement capacity index for smaller, lighter species. For instance, the difference in conservation value between two species of 10 and 100 grammes in weight may be as much as 50%, purely due to their size.

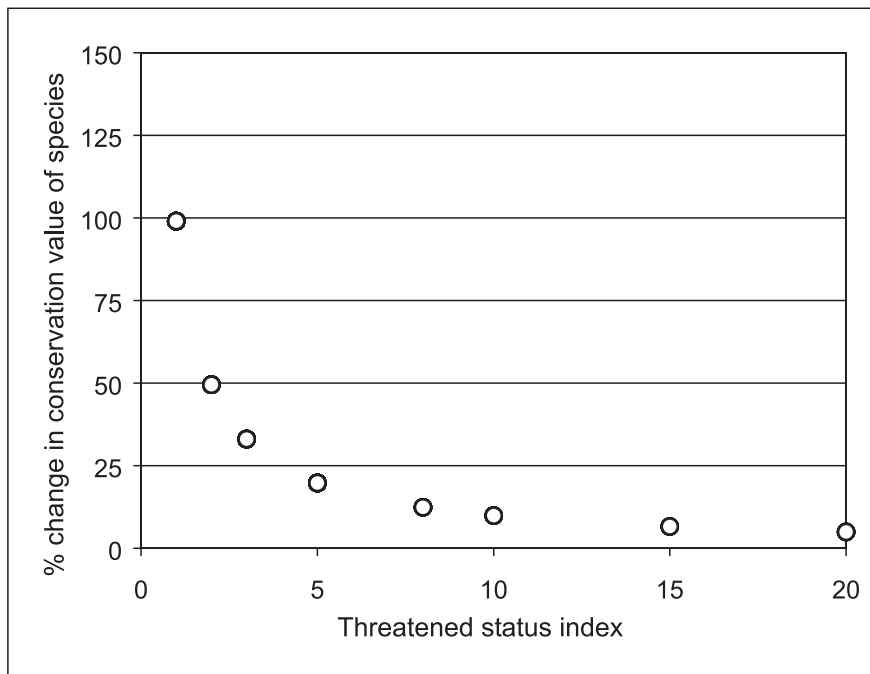


Fig. 7. The sensitivity of species' conservation values with regard to changes in their threatened status index. The graph shows how conservation values are more sensitive to changes in threatened status index for species whose indexes are low. For instance, a rise in status from category 1 (not threatened) to category 2 (locally threatened) may raise a species' conservation value by 100%. Changes in status for more seriously threatened species do not result in such great changes in their conservation values.

A detailed examination of the data reveals that the most important factors determining a species' final conservation status are:

- its threatened status index
- its size

Since average size is an easily measurable characteristic, it is particularly important that evaluations of species' threatened status are accurate.

7.5 Proposed applications of the formula

Although the conservation values produced by the formula cannot be completely accepted without reservations, the formula does seem to serve its purpose well by providing a useful tool for researchers and administrative decision-making. The following principles should always be considered during the application of the formula:

- Areas being compared should be of a broadly similar size.
- Areas being compared should be located in the same biogeographical zone.
- The data used in evaluations should be comparable in terms of the species under consideration and the level of accuracy.

These calculated conservation values thus facilitate the evaluation of wetland sites. The usefulness of conservation values calculated for single sites should not be overestimated, however, especially if little is known about calculation methods, the accuracy of the data used, or the level of experience of the evaluators. Conservation values are most useful when comparing areas that are of similar size and in the same region, and have been evaluated using the same methods. Examples include comparisons of the respective values of wetlands by a local authority or a regional environmental authority, or comparative evaluations of the same wetland before and after habitat restoration work is carried out, in order to assess its impacts. Calculations of conservation values conducted in connection with surveys of species or pair numbers or the compilation of data in connection with threatened status assessments may also provide valuable additional information for ornithologists.

Comparing areas of very different sizes or areas in different biogeographical zones is more complex, since pair numbers and species assemblages may be very different. The presence of colony-nesting species may have an exaggerated effect on figures, especially where large gull colonies are concerned.

It is particularly important that clear documentation is included in every published evaluation on the survey area, surveying methods, and the species included in the surveys, so that wider benefits may be obtained from such evaluations. This is the only way to ensure that new data can be reliably compared with data from other areas.

8

Summary

A conservation points system for the evaluation of wetland bird fauna originally has been in use in Finland since 1981, when it was first devised for the Waterfowl Habitats Conservation Programme. In the light of subsequent research results and ecological changes in wetlands, the Finnish Environment Institute appointed a working group in 1994 to improve and update the system.

Point score values can never completely describe the value of natural features, but they can be very useful in decision-making on conservation policies. In renewing the conservation values system, the working group has aimed to create a useful practical tool to facilitate comparisons between different sites, and to ensure that the limited resources available for conservation are suitably allocated for the protection and management of the most important sites.

The key principle behind the new system is that the conservation values of bird fauna of wetland sites are evaluated in four separate categories: conservation values for breeding birds; conservation values for passage migrants; conservation value during the moulting season; and wetlands' significance as feeding areas during the nesting season.

The new system is based on a model devised by the Finnish Zoological Museum for calculating the conservation value of individual vertebrates in Finland. The formula has been further modified for the purposes of the new system to give due consideration to three key factors: species' population replacement capacities; their threatened status in Finland, in Europe and globally; and their total breeding populations in Finland.

The **conservation value** (SA) for each bird species is calculated by multiplying the species' **population replacement capacity index** (H) by the species' **threatened status index** (U), and then dividing this product by the index describing the size of the species' **total Finnish population** (K). Species' conservation values are listed in Appendix 1.

Population replacement capacity indexes are calculated by taking the decimal logarithm of the species' average weight in grammes. Larger bird species replace their populations more slowly than smaller birds, and are also typically slower to adapt to changes in their habitat, so this index suitably describes these characteristics, even if these general rules do not fully apply to all species. The average weights of bird species are listed in Appendix 2.

Species' threatened status indexes are based on the classification system determined by Finland's threatened animals and plants monitoring committee. The working group additionally incorporated the following factors into this system: current trends and the status of species' populations in Finland, in the Nordic Countries, in Europe and globally; an additional weighting for species for which Finland has special international responsibility; and specific anthropogenic threats to species or their habitats. Based on these considerations, species have been assigned categorical threatened status indexes of 1, 2, 3, 5, 8, 10, 15 or 20. The index for the most common species is 1, and the most endangered species have an index of 20. The grounds for the categorization of each species are listed in Appendix 1.

Species' total breeding populations in Finland are expressed by the following indexes: 2 (fewer than 100 pairs); 3 (101-1,000 pairs); 4 (1,001-10,000 pairs); 5

(10,001-100,000 pairs); 10 (100,001- 1 million pairs); and 20 (more than 1 million pairs).

In calculating conservation values for the bird fauna of a whole wetland site by summing the values for each species, the observed numbers of pairs of each species are converted to coefficients by raising them to the power of 0.7, in order to reduce the relative values of pairs within large nesting colonies. The conservation value of the whole wetland site can then be calculated by multiplying the converted numbers of pairs of each species breeding in the site by the respective conservation values of each species, and then summing these products.

Conservation values for the bird fauna of wetland sites during the breeding season may be compared between sites, as long as certain limitations of the system are considered. Comparisons should only be made between sites of broadly similar sizes within the same biogeographical zone. In order to keep the conservation value system up-to-date, species lists and indexes need to be revised approximately every ten years. Such revisions could usefully be carried out in Finland in co-operation with the threatened animals and plants monitoring committee.

Conservation values for the use of wetland sites as staging areas by passage migrant birds have been classified using information on species' threatened status and the numbers of birds visiting sites. Migrant species are divided into four categories according to their threatened status: 1. Globally threatened species; 2. Species whose world distributions are concentrated in Europe, and which have an unfavourable conservation status; 3. Species whose world distributions are not concentrated in on Europe, but which have an unfavourable conservation status in Europe; 4. Species which have a favourable conservation status, but whose distributions are concentrated in Europe. Category 4 is of no importance within this system.

The classifications of migratory species within Finland's national Red List were given due consideration, although species' international status is of primary importance in conservation work focusing on migratory birds. The sensitivity of certain species to disturbance was also incorporated into the system. The species lists used to classify the conservation status of migratory bird species in Finland are presented in Appendix 3.

Staging areas were classified into four categories on the basis of the following criteria:

Category I – Internationally important staging areas for migratory birds, where any of the following occur annually:

- globally threatened migratory bird species (List A)
- significant numbers of regionally endangered migratory bird species (List B)
- several hundred individuals of large sensitive species (List D) or more than 100 herons observed together
- at least 2,000 waterfowl or 1,000 waders observed together at some point during the migration season

Category II – Nationally important staging areas for migratory birds, where any of the following occur annually:

- regionally endangered migratory bird species (List B)
- significant numbers of regionally threatened migratory bird species (List C)
- more than a hundred individuals of large sensitive species (List D) or tens of herons observed together
- at least 1,000 waterfowl or 500 waders observed together at some point during the migration season

Category III – Provincially important staging areas for migratory birds, where any of the following occur annually:

- regionally threatened migratory bird species (List C)
- tens of large sensitive species (List D) or several herons observed together
- at least 500 waterfowl or 250 waders observed together at some point during the migration season

Category IV – Locally important staging areas for migratory birds, where large sensitive species (List D) regularly occur on migration, or tens of waterfowl or waders are observed together annually at some point during the migration season

The conservation values for wetlands used as **resting areas during the moulting season** are based on the numbers of moulting waterfowl observed. Wildfowl are typically unable to fly for some time during the moulting season when they shed their flight feathers, so the availability of suitable wetland refuges is vital for wildfowl populations, even if these areas are not significant breeding sites.

Three categories of moulting season resting area were defined according to the following criteria:

- I Very significant moulting season resting areas, where more than 5 individuals of endangered species, more than 50 geese or swans, or more than 700 waterfowl regularly gather at some time during the moulting season.*
- II Significant moulting season resting areas, where individuals of endangered species, more than 20 geese or swans, or more than 200 waterfowl regularly gather at some time during the moulting season.*
- III Areas with some significance as resting areas during the moulting season, where geese or tens of waterfowl regularly gather at some time during the moulting season.*

Wetland sites may additionally have high conservation value as **feeding areas during the breeding season**, even for species that nest in other habitats. Many species have specific feeding requirements, and thus depend on the occurrence of certain biotopes in the vicinity of the biotopes where they nest. A list was therefore compiled of the species that significantly use wetland sites as feeding areas during the breeding season, and thus add to their conservation value.

The study concludes with results from the testing of the new points system, and the working group's recommendations on how the calculated conservation values should be used in practice. Factors particularly considered during the testing of the system included: the distributions of conservation value points scores within the data; the conservation values assigned to species and their role in the total values for wetland sites; the roles and effects of the indexes used in calculating conservation values; and sources of error and the suitability of existing guidelines.

The conservation values for different sites were significantly affected by factors such as the size and shape of the wetland site, the biotope concerned, the accuracy of the data available, and the species included in surveys. The size of a site is a particularly crucial factor, since larger sites tend to contain a greater diversity of biotopes, more species, and more pairs. Consequently, comparisons should only be made between areas of broadly similar size.

The numbers of pairs and the various indexes used in the formula clearly affected the final calculated value, so these factors were also tested variously. The occurrence of larger colony-nesting species, for instance, excessively raised conser-

vation values, so the calculation procedure has been modified to account for this, producing values that better reflect the significance of these species in the survey data. Another important factor is the expertise used in assigning species with threatened status indexes. Tests showed that raising a species' threatened status index has a great effect on its final conservation value, especially where species in the lower threatened status categories are concerned.

Assessing the calculated conservation values for wetland sites together with the occurrences of threatened species can provide a good comprehensive picture of the overall value of bird wetlands in conservation terms. The working group believes that the new system for calculating conservation values can be beneficially used in the monitoring and conservation of wetlands in Finland and elsewhere.

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Appendix I. Indexes for the threatened statuses of breeding bird species and regular passage migrant species in Finland

DI in the left-hand column denotes species listed in Annex I of the EU Bird Directive (79/409/EEC). Species' threatened status indexes are listed in column U.

The EU column lists species' EU SPEC classifications, where birds are categorized as: 1. globally threatened species; 2. species whose world distributions are concentrated in Europe, and which have an unfavourable conservation status; 3. species whose world distributions are not concentrated in on Europe, but which have an unfavourable conservation status in Europe; 4. species which currently have a favourable conservation status, but whose distributions are concentrated in Europe.

E = endangered; V = vulnerable; R = rare; D = declined; L = localized; W = wintering population localized.

The SU column lists species' Finnish UHEKS-2000 classifications, which refer to the following statuses: U value of 1 = not threatened; 2 = locally threatened; 5 = near threatened; 10 = vulnerable; 15 = endangered; 20 = critically endangered or regionally extinct. Exceptions from this classification are explained in the comments column, together with comments on species' populations in Finland and Europe.

Finland's share of a species' total European population is reported where it exceeds 10%. Finland has special responsibility for species in cases where this proportion is over 15%, with these species classified as follows: category I = 15-30%; II = 30-45%; III = >45%.

The last figure in each of the comments boxes denotes the overall change in the species' total breeding population in Finland over the period between the early 1970s and the early 1990s (or the late 1990s for threatened and steeply declined species); -2/+2 = decrease/increase of at least 50%; -1/+1 = decrease/increase of 20-49%; 0 = change of less than 20%; +/- = numbers have fluctuated without any clear trend (Hagemeijer & Blair 1997; Tucker & Heath 1994; Rassi et al. 2001; Väisänen et al. 1998; Väisänen 1999)

	Species	U	EU	SU	Comments
DI	Red-throated Diver <i>Gavia stellata</i>	5	3/V	5	European pop. 79 100 pairs. Declined steeply. Finnish pop. 900-1 000 pairs. -1
DI	Black-throated Diver <i>G. arctica</i>	3	3/V	1	European pop. 163 700 pairs. Declined steeply. Finnish pop. 7 000-9 000 pairs. Sensitive to disturbance during nesting. Can get entangled in fishing nets. -1
	Little Grebe <i>Tachybaptus ruficollis</i>	3		1	European pop. 82 700 pairs. Finnish pop. 5-20 pairs. +1
	Great Crested Grebe <i>Podiceps cristatus</i>	1		1	Finnish pop. 50 000 pairs. +2
	Red-necked Grebe <i>P. grisegena</i>	3		1	European pop. 53 900 pairs. Finnish pop. 6 000 pairs. Finland's share 11% significant. +1
DI	Slavonian Grebe <i>P. auritus</i>	5		1	European pop. 39 000 pairs. Finnish pop. 4 000 pairs. Finland's share 10 % significant. Specific habitat requirements. -1
	Black-necked Grebe <i>P. nigricollis</i>	3		1	European pop. 64 900 pairs.
	Cormorant <i>Phalacrocorax carbo</i>	2		1	European pop. 165 000 pairs. Finnish pop. 2002 1 400 pairs (14 colonies). Finnish pop. increased rapidly. +2
	Bittern <i>Botaurus stellaris</i>	5	3/V	5	European pop. 28 000 pairs. Declined steeply. Finnish pop. 300 pairs increased in recent years. Specific habitat requirements. +2

	Species	U	EU	SU	Comments
	Grey Heron <i>Ardea cinerea</i>	2		1	European pop. 144 000 pairs. Finnish pop. 80-150 pairs. +2
	Mute Swan <i>Cygnus olor</i>	2		1	European pop. 56 000 pairs. Finnish pop. 1 800-2 000 pairs. +2
D1	Whooper Swan <i>C. cygnus</i>	5	4/W	1	European pop. 7 400 pairs. Finnish pop. 1 500 pairs. Finland's share 20% very significant. Finland's special responsibility I. +2
	Bean Goose <i>Anser fabalis fabalis</i>	8		5	Pop. of nominative species 7 100 pairs. Declined steeply in recent years. Finnish pop. 1 700 pairs. Finland's share 24% very significant. Special habitat requirements. Vulnerable to serious hunting pressure. Finland's special responsibility I. 0
D1	Lesser White-fronted Goose <i>A. erythropus</i>	20	1/V	20	Globally threatened. Declined steeply in Fennoscandia (pop. 50 pairs). Nesting in Finland restricted to one very small area in recent years. No known breeding 1995-2002. -2
	Greylag Goose <i>A. anser</i>	3		1	European pop. 65 000 pairs. Finnish pop. 1 300-1 500 pairs. +2
	Snow Goose <i>A. caerulescens</i>	1		1	Finnish pop. 0-2 pairs. 0
	Canada Goose <i>Branta canadensis</i>	1		1	Finnish pop. 1 000 pairs. +2
D1	Barnacle Goose <i>B. leucopsis</i>	1		1	Finnish pop. 250 pairs. +2
	Shelduck <i>Tadorna tadorna</i>	5		5	European pop. 44 000 pairs. Finnish pop. 100-140 pairs. +2
	Wigeon <i>Anas penelope</i>	1		1	European pop. 300 000 pairs. Finnish pop. 70 000 pairs. Finland's 21% share very significant. Finland's special responsibility I. +1
	Gadwall <i>A. strepera</i>	3	3/V	1	European pop. 92 000 pairs. Declined steeply. Finnish pop. 70-130 pairs. +2
	Teal <i>A. crecca</i>	1		1	European pop. 1,3 milj. pairs. Finnish pop. 220 000 pairs. Finland's share 17% significant. Finland's special responsibility I. 0
	Mallard <i>A. platyrhynchos</i>	1		1	Finnish pop. 200 000 pairs.
	Pintail <i>A. acuta</i>	3	3/V	1	European pop. 240 000 pairs. Declined steeply. Finnish pop. 25 000 pairs. Finland's share 10% significant. -1
	Garganey <i>A. querquedula</i>	3	3/V	1	European pop. 824 000 pairs. Declined steeply. Finnish pop. 2 000 pairs. +/-
	Shoveler <i>A. clypeata</i>	1		1	Finnish pop. 11 000 pairs. 0
	Pochard <i>Aythya ferina</i>	2	4	1	European pop. 313 000 pairs. Finnish pop. 13 000 pairs. World distribution concentrated in Europe. -1

	Species	U	EU	SU	Comments
	Tufted Duck <i>A. fuligula</i>	1		1	European pop. 718 000 pairs. Finnish pop. 120 000 pairs. Finland's share 17% significant. Finland's Special responsibility I. 0
	Scaup <i>A. marila</i>	10	3/L/W	10	European pop. 66 000 pairs. Finnish pop. 1 200 pairs. Wintering populations localized. Threatened by possible oil spills and hunting. -2
	Eider <i>Somateria mollissima</i>	1		1	European pop. 874 000 pairs. Finnish pop. 180 000 pairs. Finland's share 21% very significant. Finland's special responsibility I. +2
	Long-tailed Duck <i>Clangula hyemalis</i>	1		1	European pop. 429 000 pairs. Finnish pop. 1 500-2 000 pairs. -1
	Common Scoter <i>Melanitta nigra</i>	5		5	European pop. 117 000 pairs. Finnish pop. 1 500 pairs. Declined. -1
	Velvet Scoter <i>M. fusca</i>	5	3/L/W	2	European pop. 84 000 pairs. Finnish pop. 14 000 pairs. Finland's share 17% significant. Wintering populations localized. Threatened by possible oil spills and hunting. Finland's special responsibility I. -1
	Goldeneye <i>Bucephala clangula</i>	1		1	European pop. 292 000 pairs. Declined steeply. Finland's share 62% extremely significant. Finland's special responsibility III. +2
D1	Smew <i>Mergus albellus</i>	5	3/V	1	European pop. 11 800 pairs. Declined. Finnish pop. 1 500 pairs. No longer threatened. Finland's share 13% significant. Finland's special responsibility I. +1
	Red-breasted Merganser <i>M. serrator</i>	1		1	European pop. 76 500 pairs. Finnish pop. 30 000 pairs. Finland's share very significant 39%. Finland's special responsibility II. 0
	Goosander <i>M. merganser</i>	1		1	European pop. 66 900 pairs. Finnish pop. 30 000 pairs. Finland's 45% share very significant. Finland's special responsibility II. +1
D1	Honey Buzzard <i>Pernis apivorus</i>	5	4	5	European pop. 128 000 pairs. Finnish pop. 4 000-5 000 pairs. World distribution concentrated in Europe. Vulnerable to disturbance. -1
D1	Black Kite <i>Milvus migrans</i>	15	3/V	15	European pop. 87 000 pairs. Declined steeply. Finnish pop. 10-15 pairs. -1
D1	White-tailed Eagle <i>Haliaeetus albicilla</i>	10	3/R	10	European pop. 3 300-3 600 pairs. Finnish pop. 150-200 pairs. Pop. increased due to successful conservation measures. Species no longer globally threatened. +2
D1	Marsh Harrier <i>Circus aeruginosus</i>	5		5	European pop. 61 000 pairs. Finnish pop. 300-350 pairs. Specific habitat requirements. +2

	Species	U	EU	SU	Comments
D1	Hen Harrier <i>C. cyaneus</i>	8	3/V	5	European pop. 27 000 pairs. Declined steeply. Finnish pop. 3 000 pairs. Decline indicated by reduced numbers of migrating birds. Finland 's share 11% significant. -1
D1	Montagu's Harrier <i>C. pygargus</i>	5	4	1	European pop. 33 000 pairs. Finnish pop. 2-5 pairs. World distribution concentrated in Europe. Vulnerable to persecution and collecting. +2
	Goshawk <i>Accipiter gentilis</i>	3		1	European pop. 159 000 pairs. Finnish pop. 5 500 pairs. Vulnerable to persecution and collecting. -1
	Sparrowhawk <i>A. nisus</i>	2		1	European pop. 315 000 pairs. Finnish pop. 13 000 pairs. +1
	Buzzard <i>Buteo buteo</i>	2		1	European pop. 903 000 pairs. Finnish pop. 8 000 pairs. Vulnerable to persecution. 0
	Rough-legged Buzzard <i>B. lagopus</i>	3		1	European pop. 114 000 pairs. Finnish pop. 2 000 pairs. Vulnerable to persecution. +/-
D1	Spotted Eagle <i>Aquila clanga</i>	20	3/E	20	European pop. 880 pairs. Declined steeply. Globally very endangered. -1
D1	Golden Eagle <i>A. chrysaetos</i>	10	3/R	10	European pop. 5 500-6000 pairs. Finnish pop. 360-380 pairs. Vulnerable to persecution. Disturbance during nesting in Finland. 0
D1	Osprey <i>Pandion haliaetus</i>	8	3/R	5	European pop. 7 900 pairs. Finnish pop. 1 000 pairs. Finland 's share 13% significant. Dependent on artificial nests in many areas. Finland 's special responsibility I. 0
	Kestrel <i>Falco tinnunculus</i>	5	3/D	5	European pop. 349 000 pairs. Finnish pop. 2 000 pairs. -2
D1	Merlin <i>F. columbarius</i>	10		10	European pop. 42 000 pairs. Finnish pop. 2 000-2 500 pairs. Declined. -1
	Hobby <i>F. subbuteo</i>	3		1	European pop. 74 000 pairs. Finnish pop. 2 500-3 000 pairs. -1
D1	Gyr Falcon <i>F. rusticolus</i>	15	3/V	15	European pop. 850-1 250 pairs. Extremely vulnerable to persecution and collecting. -1
D1	Peregrine <i>F. peregrinus</i>	15	3/R	15	European pop. 6 000-7 000 pairs. Finnish pop. 110-130 pairs. Vulnerable to persecution and collecting. +2
D1	Hazel Grouse <i>Bonasa bonasia</i>	1		1	Finnish pop. 260 000 pairs. -1
	Willow Grouse <i>Lagopus lagopus</i>	2		2	European pop. 2 milj. pairs. Finnish pop. 83 000 pairs. Declined in Finland at southern parts of it 's distribution. -1
	Ptarmigan <i>L. mutus</i>	2		1	European pop. 762 000 pairs. Finnish pop. 1 000-4 000 pairs. Nesting habitats limited. +/-
D1	Black Grouse <i>Tetrao tetrix</i>	3	3/V	5	European pop. 1 013 000 pairs. Declined steeply. Finnish pop. 170 000 pairs. Finland 's share 17% significant. Finland 's special responsibility I. -1

	Species	U	EU	SU	Comments
D1	Capercaillie <i>T. urogallus</i>	5		5	European pop. 811 000 pairs. Finnish pop. 140 000 pairs declined. Finland's share 17% significant. Finland's special responsibility I. -1
	Grey Partridge <i>Perdix perdix</i>	5	3/V	5	Vulnerable to changes in habitat.
	Quail <i>Coturnix coturnix</i>	5	3/V	20	Finnish breeding pop. on edge of range, fluctuates according to weather conditions during migration etc.
	Pheasant <i>Phasianus colchicus</i>	1		1	Finnish pop. 15 000 pairs. 0
	Water Rail <i>Rallus aquaticus</i>	3		1	European pop. 190 000 pairs. Finnish pop. 200-600 pairs. Specific habitat requirements. +2
D1	Spotted Crake <i>Porzana porzana</i>	3	4	1	European pop. 86 000 pairs. Finnish pop. 1 000-2 000 pairs. World distribution concentrated in Europe. Specific habitat requirements. +1
	Little Crake <i>P. parva</i>	5	4	1	European pop. 50 000 pairs. Finnish pop. 1-10 pairs. World distribution concentrated in Europe. Specific habitat requirements. +2
	Baillon's Crake <i>P. pusilla</i>	8	3/R	1	European pop. 4 100-7 800 pairs. Specific habitat requirements.
D1	Corncrake <i>Crex crex</i>	5	1/V	5	European pop. 123 000 pairs. Finnish pop. 500-1 000 pairs. Globally threatened. Pop. in Finland no longer declining over last 15 years, and increased 2000-2002. +/-
	Moorhen <i>Gallinula chloropus</i>	5		10	European pop. 1 milj. pairs. Finnish pop. 50-200 pairs. Finnish breeding pop. on edge of range, fluctuates according to weather conditions during migration etc. +/-
	Coot <i>Fulica atra</i>	1		1	Finnish pop. 12 000 pairs. +1
D1	Crane <i>Grus grus</i>	5	3/V	2	European pop. 53 000-68 000 pairs. Finnish pop. 4 000-19 000 pairs. Finland's share 8-28% significant. Finland's special responsibility I. +1
	Oystercatcher <i>Haematopus ostralegus</i>	1		1	Finnish pop. 3 600 pairs. +1
	Little Ringed Plover <i>Charadrius dubius</i>	1		1	Finnish pop. 5 000 pairs. -1
	Ringed Plover <i>C. hiaticula</i>	3		2	European pop. 96 000 pairs. Finnish pop. 10 000 pairs. Finland's 10% share significant. -1
	Kentish Plover <i>C. alexandrinus</i>	8	3/D	1	European pop. 20 000 pairs. Declined. Nests on sandy shores, so subject to disturbance during nesting.
D1	Dotterel <i>C. morinellus</i>	5		5	European pop. 48 000 pairs. Finnish pop. 1 500-3 000 pairs. +/-
D1	Golden Plover <i>Pluvialis apricaria</i>	2	4	1	European pop. 570 000 pairs. Finnish pop. 40 000 pairs. World distribution concentrated in Europe. -1

	Species	U	EU	SU	Comments
	Lapwing <i>Vanellus vanellus</i>	2		2	Finnish pop. 60 000 pairs. -1
D1	Little Stint <i>Calidris minuta</i>	2		1	European pop. 100 000 pairs.
	Temminck's Stint <i>C. temminckii</i>	10		10	Fennoscandia pop. 10 000 pairs. Finnish pop. 1 000-3 000 pairs. Declined steeply in coastal areas and Lapland. -2
	Purple Sandpiper <i>C. maritima</i>	10	4	10	European pop. 40 000 pairs. Finnish pop. 5-20 pairs. World distribution concentrated in Europe. 0
	Dunlin <i>C. alpina alpina</i>	3	3/V	1	Wintering numbers in Europe declined steeply. Finnish pop. 200-700 pairs. 0
	<i>C. a. schinzii</i>	20	3/V	20	European pop. declined steeply. Baltic pop. 1,500 pairs, North Sea pop. 5,000 pairs. Icelandic pop. 200,000 pairs. Finnish pop. 55 pairs in 2002. Declined by 40-60% over last 10 years. Specific habitat requirements. -2
	Broad-billed Sandpiper <i>Limicola falcinellus</i>	8	3/(V)	5	European pop. 16 900 pairs. Finnish pop. 15 000 pairs. Finland's share 89% extremely significant. Suffers due to mire drainage. Finland's special responsibility III. -1
D1	Ruff <i>Philomachus pugnax</i>	5	4	5	European pop. 3,3 milj. pairs. Finnish pop. 30 000 pairs. World distribution concentrated in Europe. -1
	Jack Snipe <i>Lymnocyptes minimus</i>	5	3/(V)	1	European pop. 48 300 pairs. Finnish pop. 10 000 pairs. Finland's share 25% very significant. Wintering pop. declined steeply. Suffers due to mire drainage. Finland's special responsibility I. 0
	Snipe <i>Gallinago gallinago</i>	2		2	Finnish pop. 130 000 pairs.
D1	Great Snipe <i>Gallinago media</i>	20	2/V	20	European pop. 220 000 pairs. Declined steeply. World distribution concentrated in Europe. 0
	Woodcock <i>Scolopax rusticola</i>	1		1	Finnish pop. 120 000 pairs. 0
	Black-tailed Godwit <i>Limosa limosa</i>	10	2/V	15	European pop. 177 000 pairs. Declined steeply. Finnish pop. 25-35 pairs. World distribution concentrated in Europe. 0
D1	Bar-tailed Godwit <i>L. lapponica</i>	8	3/L/W	5	European pop. 5 400 pairs. Finnish pop. 300 pairs. Finland's share 6% significant. +/-
	Whimbrel <i>Numenius phaeopus</i>	2	4	2	European pop. 245 000 pairs. Finnish pop. 40 000 pairs. Declined. Finland's share 16% significant. World distribution concentrated in Europe. Finland's special responsibility I. -1

	Species	U	EU	SU	Comments
	Curlew <i>N. arquata</i>	3	3/D/W	2	European pop. 165 000 pairs. Declined. Finland's share 30% very significant. Suffers due to habitat loss. Declined steeply in farmland. Finland's special responsibility II. -2
	Spotted Redshank <i>Tringa erythropus</i>	5		1	European pop. 33 000 pairs. Finnish pop. 17 000 pairs. Finland's share 52% extremely significant. Finland's special responsibility III. 0
	Redshank <i>T. totanus</i>	2	2/D	1	European pop. 378 000 pairs. Declined. Finnish pop. 7 000 pairs. World distribution concentrated in Europe. Pop. in Nordic region stable. +1
	Marsh Sandpiper <i>T. stagnatilis</i>	5		1	European pop. 32 000 pairs. Finnish pop. 0-5 pairs. +2
	Greenshank <i>T. nebularia</i>	3		1	European pop. 99 000 pairs. Finnish pop. 30 000 pairs. Finland's share 30% very significant. Finland's special responsibility II. 0
	Green Sandpiper <i>T. ochropus</i>	1		1	Finnish pop. 65 000 pairs. +1
D1	Wood Sandpiper <i>T. glareola</i>	3	3/D	2	European pop. 665 000 pairs. Declined. Finnish pop. 250 000 pairs. Declined steeply. Finland's share 39% very significant. Finland's special responsibility II. -2
	Terek Sandpiper <i>Xenus cinereus</i>	20		20	Pop. in European Russia estimated at 10 000 pairs. Elsewhere in Europe only 50-100 pairs, of which 15-20 pairs breed in Finland. Finnish pop. vulnerable to disturbance. 0
	Common Sandpiper <i>Actitis hypoleucos</i>	1		1	European pop. 721 000 pairs. Finnish pop. 250 000 pairs. Finland's share 35% very significant. Finland's special responsibility II. 0
	Turnstone <i>Arenaria interpres</i>	3		1	European pop. 24 100 pairs. Finnish pop. 4 300 pairs. Finland's share 18% significant. Finland's special responsibility I. 0
D1	Red-necked Phalarope <i>Phalaropus lobatus</i>	3		1	European pop. 394 000 pairs. Finnish pop. 15 000 pairs. Nesting sites in S. Finland evidently being abandoned. 0
	Arctic Skua <i>Stercorarius parasiticus</i>	3		1	European pop. 51 000 pairs. Finnish pop. 500-550 pairs. +2
	Long-tailed Skua <i>S. longicaudus</i>	5		1	European pop. 37 000 pairs. Finnish pop. 100-2 000 pairs. +/-
	Little Gull <i>Larus minutus</i>	3	3/D	1	European pop. 26 700 pairs. Declined. Finnish pop. 10 000 pairs. Finland's share 38% very significant. Finland's special responsibility II. +2
	Black-headed Gull <i>L. ridibundus</i>	2		10	European pop. 2,5 milj. pairs. Finnish pop. 100 000 pairs. Declined. -1
	Common Gull <i>L. canus</i>	1	2/D	1	European pop. 524 000 pairs. Finnish pop. 50 000 pairs. World distribution concentrated in Europe. 0

	Species	U	EU	SU	Comments
	Lesser Black-backed Gull <i>L. fuscus</i>	10	4	10	Pop. of nominative species in Europe 15 000 pairs. Finnish pop. 7 000 pairs. Declined steeply. Finland's share 47% very significant. Finland's special responsibility III. -2
	Herring Gull <i>L. argentatus</i>	1		1	Finnish pop 30 000 pairs. +2
	Great Black-backed Gull <i>L. marinus</i>	2	4	1	European pop. 116 000 pairs. World distribution concentrated in Europe. +1
D1	Caspian Tern <i>Sterna caspia</i>	15	3/(E)	10	European pop. 6 300 pairs. Threatened. Finnish pop. 720 pairs. Declined steeply. Finland's share 12% significant. Vulnerable to disturbance when nesting. -1
D1	Sandwich Tern <i>S. sandvicensis</i>	5	3/D	1	European pop. 130 000 pairs. Vulnerable to disturbance when nesting.
D1	Common Tern <i>S. hirundo</i>	1		1	European pop. 250 000 pairs. Finnish pop. 50 000 pairs. Finland's share 20% very significant. Finland's special responsibility I. 0
D1	Arctic Tern <i>S. paradisaea</i>	1		1	Finnish pop. 55 000 pairs. +1
D1	Little Tern <i>S. albigrons</i>	15	3/D	15	European pop. 28 000 pairs. Finnish pop. 45-55 pairs. Vulnerable to disturbance when nesting. +2
D1	Black Tern <i>Chlidonias niger</i>	10	3/D	10	European pop. 70 000 pairs. Finnish pop. 15-25 pairs. Specific habitat requirements. +2
	Guillemot <i>Uria aalge</i>	10		10	Baltic pop. 15 000 pairs. Finnish pop. 32-40 pairs. Declined dramatically in E. Gulf of Finland due to large-scale deaths. Limited nesting sites. Vulnerable to oil spills and disturbance when nesting. +/-
	Razorbill <i>Alca torda</i>	3	4	1	European pop. 484 000 pairs. Baltic pop. 15 000 pairs. Finnish pop. 6 200 pairs. Finland's share 41% of Baltic pop. very significant. Vulnerable to oil spills and disturbance when nesting. Finland's special responsibility II. +1
	Black Guillemot <i>Cepphus grylle</i>	5	2/D	5	European pop. 126 000 pairs. Finnish pop. 10 000 pairs. Baltic pop. 16 000 (C.g. grylle) 16 000 pairs, of which Finland's share 63% extremely significant. Vulnerable to oil spills, predation by mink, and fishing by-catch. Finland's special responsibility (III). +1
	Rock Dove <i>Columba livia</i>	1		1	Finnish pop. 40 000 pairs. -1
	Stock Dove <i>C. oenas</i>	2	4	2	European pop. 539 000 pairs. Finnish pop. 5 000-8 000 pairs. World distribution concentrated in Europe. -1

	Species	U	EU	SU	Comments
	Wood Pigeon <i>C. palumbus</i>	1	4	1	European pop. 10,2 milj. pairs. World distribution concentrated in Europe. 0
	Collared Dove <i>Streptopelia decaocto</i>	5		10	European pop. 6,7 milj. pairs. Finnish pop. 70-130 pairs. Declined during the last decade. -
	Turtle Dove <i>S. turtur</i>	8	3/D	10	European pop. 3,7 milj. pairs. Finnish pop. 50-100 pairs. Suffers from agricultural changes in Russia. +/-
	Cuckoo <i>Cuculus canorus</i>	5		5	European pop. 2,2 milj. pairs. Finnish pop. 60 000 pairs. Declined steeply. -2
D1	Eagle Owl <i>Bubo bubo</i>	5	3/V	1	European pop. 17 600 pairs. Declined steeply. Finnish pop. 3 000 pairs. Finland's share 17% significant. Finland's special responsibility I. +2
D1	Snowy Owl <i>Nyctea scandiaca</i>	15	3/V	15	European pop. 1 500 pairs, of which <50 in Finland even in best years. Vulnerable to persecution when nesting. +/-
D1	Hawk Owl <i>Surnia ulula</i>	5		1	European pop. 39 800 pairs. Finnish pop. 4 000 pairs. Finland's 10% share significant. +/-
D1	Pygmy Owl <i>Glaucidium passerinum</i>	5		1	European pop. 63 300 pairs. Finnish pop. 10 000 pairs. Finland's share 16% significant. Finland's special responsibility I. 0
	Tawny Owl <i>Strix aluco</i>	3	4	1	European pop. 502 000 pairs. Finnish pop. 2 000 pairs. World distribution concentrated in Europe. -1
D1	Ural Owl <i>S. uralensis</i>	3		1	European pop. 348 000 pairs. Finnish pop. 3 500 pairs. 0
D1	Great Grey Owl <i>S. nebulosa</i>	15		1	European pop. 500-1 500 pairs. Finnish pop. 300-1 500 pairs. Finland's share >60% extremely significant. Vulnerable to persecution and collecting. Finland's special responsibility III. +/-
	Long-eared Owl <i>Asio otus</i>	2		1	European pop. 364 000 pairs. Finnish pop. 5 000 pairs. +/-
D1	Short-eared Owl <i>A. flammeus</i>	5	3/V	1	European pop. 49 000 pairs. Declined steeply. Finnish pop. 5 000 pairs. Finland's share 10% significant. +/-
D1	Tengmalm's Owl <i>Aegolius funereus</i>	5		1	European pop. 80 000 pairs. Finnish pop. 15 000 pairs. Finland's share 19% significant. Finland's special responsibility I. +/-
D1	Nightjar <i>Caprimulgus europaeus</i>	8	2/D	5	European pop. 465 000 pairs. Declined. Finnish pop. 3 000 pairs. Declined. -1
	Swift <i>Apus apus</i>	2		2	Finnish pop. 50 000 pairs. -1
D1	Kingfisher <i>Alcedo atthis</i>	5	3/D	1	European pop. 84 000 pairs. Declined. Specific habitat requirements and sensitive to pollution. +/-
	Wryneck <i>Jynx torquilla</i>	10	3/D	10	European pop. 540 000 pairs. Declined. Finnish pop. 25 000 pairs. Declined steeply. Suffers due to intensification of agriculture.

	Species	U	EU	SU	Comments
D1	Grey-headed Woodpecker <i>Picus canus</i>	5	3/D	5	European pop. 125 000 pairs. Declined. Finnish pop. 2 000 pairs. Declined. Suffers due to intensification of forestry. 1
D1	Black Woodpecker <i>Dryocopus martius</i>	2		1	European pop. 55 000 pairs. Finnish pop. 11 000 pairs. Declined. -1
	Great Spotted Woodpecker <i>Dendrocopos major</i>	1		1	Finnish pop. 240 000 pairs. +/-
D1	White-backed Woodpecker <i>D. leucotos</i>	20		20	European pop. 67 000 pairs. Critically endangered in Finland (20-30 pairs). Most threatened by habitat loss. Global pop. not concentrated in Europe.
	Lesser Spotted Woodpecker <i>D. minor</i>	10		10	European pop. 244 000 pairs. Finnish pop. 5 000 pairs. Declined. Suffers due to intensification of forestry. -2
D1	Three-toed Woodpecker <i>Picoides tridactylus</i>	10	3/D	5	European pop. 88 500 pairs. Declined. Finnish pop. 17 000 pairs. Finland's share 19% significant. Suffers due to intensification of forestry. Finland's special responsibility I. -1
D1	Woodlark <i>Lullula arborea</i>	5	2/V	5	European pop. 1,4 milj. pairs. Finnish pop. 800 pairs. Declined steeply. Pop. in SW Finland recovered in recent years. -2
	Skylark <i>Alauda arvensis</i>	1	3/V	1	European pop. 37-160 milj. pairs. Declined steeply. -1
	Shore Lark <i>Eremophila alpestris</i>	20		20	European pop. 326 000 pairs of which only 9 700 pairs outside Russia. Finnish pop. 0-10 pairs. Declined steeply in Nordic countries. -2
	Sand Martin <i>Riparia riparia</i>	2	3/D	1	European pop. 5,4 milj. pairs. Declined. Finnish pop. 70 000 pairs. -1
	Swallow <i>Hirundo rustica</i>	1		1	Finnish pop. 170 000 pairs. -1
	House Martin <i>Delichon urbicum</i>	1		1	Finnish pop. 120 000 pairs. -1
	Tawny Pipit <i>Anthus campestris</i>	3	3/V	1	European pop. 660 000 pairs. Declined steeply. Finnish pop. 0-2 pairs. -1
	Tree Pipit <i>A. trivialis</i>	1		2	Finnish pop. 2,2 milj. pairs. 0
	Meadow Pipit <i>A. pratensis</i>	1	4	1	European pop. 12 milj. pairs. World distribution concentrated in Europe. 0
	Red-throated Pipit <i>A. cervinus</i>	5		1	European pop. 45 000 pairs. Finnish pop. 3 000 pairs. +/-
	Rock Pipit <i>A. petrosus</i>	1		1	Finnish pop. 1 600 pairs. +1
	Yellow Wagtail <i>Motacilla flava</i>	1		2	European pop. 4 milj. pairs. Finnish pop. 600 000 pairs. -1
	Citrine Wagtail <i>M. citreola</i>	3		1	European pop. 316 000 pairs, of which only 300-500 outside Russia. Finnish pop. 0-3 pairs. +2

	Species	U	EU	SU	Comments
	Grey Wagtail <i>M. cinerea</i>	2		1	European pop. 723 000 pairs. Finnish pop. 0-10 pairs. +1
	Pied Wagtail <i>M. alba</i>	1		1	Finnish pop. 800 000 pairs. 0
	Waxwing <i>Bombycilla garrulus</i>	3		1	European pop. 366 000 pairs. Finnish pop. 20 000 pairs. +/-
	Dipper <i>Cinclus cinclus</i>	5		5	European pop. 180 000 pairs. Finnish pop. 250 350 pairs. 0
	Wren <i>Troglodytes troglodytes</i>	1		1	Finnish pop. 33 000 pairs. +/-
	Hedge Accentor <i>Prunella modularis</i>	1	4	1	European pop. 13,9 milj. pairs. World distribution concentrated in Europe. +2
	Robin <i>Erithacus rubecula</i>	1	4	1	European pop. 68 milj. pairs. World distribution concentrated in Europe.
	Thrush Nightingale <i>Luscinia luscinia</i>	1	4	1	European pop. 1,2 milj. pairs. World distribution concentrated in Europe. +2
D1	Bluethroat <i>L. svecica</i>	1		1	Finnish pop. 130 000 pairs. 0
	Red-flanked Bluetail <i>Tarsiger cyanurus</i>	15		10	European pop. 300 pairs. Finnish pop. 100 pairs. Finland 's share 33% very significant. Species used in Finland as best bird indicator of natural old-growth forest habitat, on which it is completely dependent. Finland 's special responsibility II. +2
	Black Redstart <i>Phoenicurus ochruros</i>	1		1	Finnish pop. 5-20 pairs. +2
	Redstart <i>P. phoenicurus</i>	1	2/V	1	European pop. 2,6 milj. pairs. Declined steeply. Finnish pop. 590 000 pairs. Finland 's share 23% very significant. World distribution concentrated in Europe. Finland 's special responsibility I. -1
	Whinchat <i>Saxicola rubetra</i>	3		5	European pop. 3 milj. pairs. Finnish pop. 480 000 pairs. Declined steeply. -2
	Stonechat <i>S. torquatus</i>	3		1	Subsp. <i>S.t.maura</i> occasionally breeds in Finland, and in Europe only regularly breeds in Russia. +2
	Wheatear <i>O. oenanthe</i>	3		5	European pop. 6,2 milj. pairs. Finnish pop. 290 000 pairs. -1
	Ring Ouzel <i>Turdus torquatus</i>	5	4	5	European pop. 279 000 pairs. Finnish pop. 150 pairs. World distribution concentrated in Europe. 0
	Blackbird <i>T. merula</i>	1	4	1	European pop. 43,4 milj. pairs. World distribution concentrated in Europe. +1
	Fieldfare <i>T. pilaris</i>	1	4/W	1	European pop. 9 milj. pairs. World distribution concentrated in Europe. 0
	Song Thrush <i>T. philomelos</i>	1	4	1	European pop. 16 milj. pairs. World distribution concentrated in Europe. 0
	Redwing <i>T. iliacus</i>	1	4/W	1	European pop. 6 milj. pairs. World distribution concentrated in Europe. 0

	Species	U	EU	SU	Comments
	Mistle Thrush <i>T. viscivorus</i>	1	4	1	European pop. 2,6 milj. pairs. World distribution concentrated in Europe. 0
	Grasshopper Warbler <i>L. naevia</i>	2	4	1	European pop. 647 000 pairs. Finnish pop. 5 000 pairs. World distribution concentrated in Europe. +1
	River Warbler <i>L. fluviatilis</i>	2	4	1	European pop. 710 000 pairs. Finnish pop. 300 pairs. World distribution concentrated in Europe. +2
	Savi's Warbler <i>L. luscinioides</i>	2	4	1	European pop. 212 000 pairs. World distribution concentrated in Europe. +2
	Sedge Warbler <i>Acrocephalus schoenobaenus</i>	1	4	1	European pop. 5,5 milj. pairs. World distribution concentrated in Europe. +1
	Paddyfield Warbler <i>A. agricola</i>	2		1	European pop. 176 000 pairs.
	Blyth's Reed Warbler <i>A. dumetorum</i>	2		1	European pop. 328 000 pairs, of which outside Russia 10 000-13 600 pairs. Finnish pop. 7 000 pairs. +2
	Marsh Warbler <i>A. palustris</i>	1	4	1	European pop. 2 milj. pairs. World distribution concentrated in Europe. +2
	Reed Warbler <i>A. scirpaceus</i>	1	4	1	European pop. 3,2 milj. pairs. World distribution concentrated in Europe. +1
	Great Reed Warbler <i>A. arundinaceus</i>	8		10	European pop. 2,5 milj. pairs. Finnish pop. 20-100 pairs. Specific habitat requirements. +2
	Booted Warbler <i>Hippolais caligata</i>	8		1	European pop. 10 000 pairs. Finnish pop. 0-10 pairs. +1
	Icterine Warbler <i>H. icterina</i>	1	4	1	European pop. 4,6 milj. pairs. World distribution concentrated in Europe. +1
D1	Barred Warbler <i>Sylvia nisoria</i>	3	4	2	European pop. 561 000 pairs. Declined in recent years. World distribution concentrated in Europe. -1
	Lesser Whitethroat <i>S. curruca</i>	1		1	Finnish pop. 270 000 pairs. 0
	Whitethroat <i>S. communis</i>	1	4	1	European pop. 10,5 milj. pairs. World distribution concentrated in Europe. 0
	Garden Warbler <i>S. borin</i>	1	4	1	European pop. 12,7 milj. pairs. World distribution concentrated in Europe. 0
	Blackcap <i>S. atricapilla</i>	1	4	1	European pop. 24,2 milj. pairs. World distribution in Europe. 0
	Greenish Warbler <i>Phylloscopus trochiloides</i>	3		1	European pop. 344 000 pairs, concentrated in Russia, with only 28 000 pairs elsewhere. Finnish pop. 2 000-5 000 pairs. +1
	Arctic Warbler <i>P. borealis</i>	3		1	European pop. 3,2 milj. pairs, concentrated in Russia, with only 3 000-5 000 pairs elsewhere. Finnish pop. 2 000-5 000 pairs. +/-
	Wood Warbler <i>P. sibilatrix</i>	1	4	1	European pop. 38 milj. pairs. World distribution concentrated in Europe. +2

	Species	U	EU	SU	Comments
	Chiffchaff <i>P. collybita</i>	5		10	European pop. 48 milj. pairs. Fennoscandian race <i>abietinus</i> declined in Finland by 80% in 20 years to current pop. <100,000 pairs. -2
	Willow Warbler <i>P. trochilus</i>	1		1	Finnish pop. 10 milj. pairs. 0
	Goldcrest <i>Regulus regulus</i>	1	4	1	European pop. 42 milj. pairs. World distribution concentrated in Europe. +/-
	Spotted Flycatcher <i>Muscicapa striata</i>	1	3/D	1	European pop. 10,9 milj. pairs. Declined. 0
D1	Red-breasted Flycatcher <i>Ficedula parva</i>	5		5	European pop. 3,5 milj. pairs of which outside Russia 343 000 pairs. Finnish pop. 1 000-2 000 pairs. -1
D1	Collared Flycatcher <i>F. albicollis</i>	2	4	1	European pop. 494 000 pairs. World distribution concentrated in Europe.
	Pied Flycatcher <i>F. hypoleuca</i>	1	4	1	European pop. 8,4 milj. pairs. World distribution concentrated in Europe. +2
	Bearded Tit <i>Panurus biarmicus</i>	5		5	European pop. 403 000 pairs. Finnish pop. 400-900 pairs. Specific habitat requirements. +2
	Long-tailed Tit <i>Aegithalos caudatus</i>	1		1	Finnish pop. 4 000-10 000 pairs. Pop. viable. 0
	Willow Tit <i>Parus montanus</i>	1		1	European pop. 36,5 milj. pairs. Finnish pop. 910 000 pairs. Declined steeply. -2
	Siberian Tit <i>P. cinctus</i>	5		5	European pop. 520 000 pairs. Finnish pop. 40 000 pairs. Suffers due to intensification of forestry. -1
	Crested Tit <i>P. cristatus</i>	1	4	2	European pop. 7,4 milj. pairs. Finnish pop. 330 000 pairs. World distribution concentrated in Europe. -1
	Coal Tit <i>P. ater</i>	1		1	Finnish pop. 50 000 pairs. +1
	Blue Tit <i>P. caeruleus</i>	1	4	1	European pop. 18,2 milj. pairs. World distribution concentrated in Europe. +2
	Azure Tit <i>P. cyanus</i>	5		1	European pop. 32 000 pairs of which 400-1 000 outside Russia. +/-
	Great Tit <i>P. major</i>	1		1	Finnish pop. 770 000 pairs. 0
	Nuthatch <i>Sitta europaea</i>	1		1	Finnish pop. 0-20 pairs. +/-
	Treecreeper <i>Certhia familiaris</i>	1		1	Finnish pop. 100 000 pairs. -1
	Penduline Tit <i>Remiz pendulinus</i>	2		1	European pop. 132 000 pairs. Finnish pop. 0-3 pairs. +/-
	Golden Oriole <i>Oriolus oriolus</i>	2		1	European pop. 1,7 pairs. Finnish pop. 4 000-6 000 pairs. Declined. -1
D1	Red-backed Shrike <i>Lanius collurio</i>	3	3/D	5	European pop. 3,2 milj. pairs. Finnish pop. 50 000 pairs. Declined. -1
	Great Grey Shrike <i>L. excubitor</i>	5	3/D	5	European pop. 330 000 pairs. Declined. Finnish pop. 4 000 pairs. Declined. -1

	Species	U	EU	SU	Comments
	Jay <i>Garrulus glandarius</i>	1		1	Finnish pop. 140 000 pairs. 0
	Siberian Jay <i>Perisoreus infaustus</i>	5	3/D	5	European pop. 207 000 pairs. Finnish pop. 40 000 pairs. Finland 's share 19% significant. Finland 's special responsibility I. -1
	Magpie <i>Pica pica</i>	1		1	Finnish pop. 170 000 pairs. +1
	Nutcracker <i>Nucifraga caryocatactes</i>	2		1	European pop. 241 000 pairs. Finnish pop. 1 500-2 300 pairs. Both races that breed in Finland have specific habitat requirements. +1
	Jackdaw <i>Corvus monedula</i>	1	4	1	European pop. 8,4 milj. pairs. World distribution concentrated in Europe. -1
	Rook <i>C. frugilegus</i>	1		1	Finnish pop. 6 000 pairs. +1
	Hooded Crow <i>C. corone cornix</i>	1		1	European pop. 9,3 milj. pairs. Finnish pop. 200 000 pairs. Declined steeply. -2
	Raven <i>C. corax</i>	1		1	Finnish pop. 170 000 pairs. +1
	Starling <i>Sturnus vulgaris</i>	3		5	European pop. 55 milj. pairs. Finnish pop. 50 000 pairs. Declined steeply. -2
	House Sparrow <i>Passer domesticus</i>	2		5	European pop. 86 milj. pairs. Finnish pop. 300 000 pairs. Declined steeply. -2
	Tree Sparrow <i>Passer montanus</i>	1		1	Finnish pop. 400 000 pairs. +2
	Chaffinch <i>Fringilla coelebs</i>	1	4	1	European pop. 117 milj. pairs. World distribution concentrated in Europe. 0
	Brambling <i>F. montifringilla</i>	1		1	Finnish pop. 1,7 milj. pairs. 0
	Serín <i>Serinus serinus</i>	1	4	1	European pop. 12 milj. pairs. World distribution concentrated in Europe. Nordic and Baltic pops. declined. +/-
	Greenfinch <i>Carduelis chloris</i>	1	4	1	European pop. 13,3 milj. pairs. World distribution concentrated in Europe. +2
	Goldfinch <i>C. carduelis</i>	1		1	Finnish pop. 6 000 pairs. -1
	Siskin <i>C. spinus</i>	1	4	1	European pop. 5,9 milj. pairs. World distribution concentrated in Europe. +/-
	Linnet <i>C. cannabina</i>	1	4	1	European pop. 5,9 milj. pairs. World distribution concentrated in Europe. -2
	Twite <i>C. flavirostris</i>	2		1	European pop. 291 000 pairs. Finnish pop. 0-10 pairs. Suitable nesting habitat limited in Finland. 0
	Redpoll <i>C. flammea</i>	1		1	Finnish pop. 400 000 pairs. +/-
	Arctic Redpoll <i>C. hornemanni</i>	2		1	European pop. 327 000 pairs. Finnish pop. 1 000-5 000 pairs. +/-

	Species	U	EU	SU	Comments
	Two-barred Crossbill <i>Loxia leucoptera</i>	3		1	European pop. 34 000 pairs of which outside Russia 1 000 pairs. Finnish pop. 500 pairs. +/-
	Crossbill <i>L. curvirostra</i>	1		1	Finnish pop. 260 000 pairs. +/-
	Parrot Crossbill <i>L. pytyopsittacus</i>	3	4	1	European pop. 121 000 pairs. Finnish pop. 36 000 pairs. Finland's share 30% very significant. World distribution concentrated in Europe. Finland's special responsibility II. +/-
	Scarlet Rosefinch <i>Carpodacus erythrinus</i>	1		1	Finnish pop. 410 000 pairs. +1
	Pine Grosbeak <i>Pinicola enucleator</i>	3		2	European pop. 77 800 pairs. Finnish pop. 34 000 pairs. Finland's share 44% very significant. World distribution concentrated in Europe. Finland's special responsibility II. 0
	Bullfinch <i>Pyrrhula pyrrhula</i>	1		1	Finnish pop. 210 000 pairs. 0
	Hawfinch <i>Coccothraustes coccothraustes</i>	3		5	European pop. 1,3 milj. pairs. Finnish pop. 200-400 pairs. +1
	Lapland Bunting <i>Calcarius lapponicus</i>	1		1	Finnish pop. 40 000 pairs. +/-
	Snow Bunting <i>Plectrophenax nivalis</i>	1		1	Finnish pop. 4 000 pairs. -1
	Yellowhammer <i>Emberiza citrinella</i>	1	4	1	European pop. 51 milj. pairs. Finnish pop. 1,1 milj. pairs. World distribution concentrated in Europe. 0
D1	Ortolan Bunting <i>E. hortulana</i>	10	2/(V)	10	European pop. 675 000 pairs. Declined steeply. Finnish pop. 180 000. Declined 60-70% in 20 years. Finland's share 27% very significant. -2
	Rustic Bunting <i>E. rustica</i>	1		1	Finnish pop. 230 000 pairs. -1
	Little Bunting <i>E. pusilla</i>	3		1	European pop. 323 000 pairs of which outside Russia 7 100 pairs. Finnish pop. 5 000 pairs. Increased. +2
	Yellow-breasted Bunting <i>E. aureola</i>	20		20	European pop. outside Russia 152-202 pairs. Pop. in European Russia 32 000 pairs. Finnish pop. declined from 30-50 pairs in mid 1990s to 1-5 pairs in 2002. -2
	Reed Bunting <i>E. schoeniclus</i>	1		1	Finnish pop. 300 000 pairs. -1

Appendix 2. Calculations of conservation values (SA) for bird species breeding in Finland

Weight = Average weight of bird species in grams.

H = population replacement capacity index;

U = threatened status index;

K = population size index;

SA = H x U/K

Species		Weight (g)	H	U	K	SA
Red-throated Diver	<i>Gavia stellata</i>	1630	3,20	5	3	5,33
Black-throated Diver	<i>G. arctica</i>	2350	3,40	3	4	2,55
Little Grebe	<i>Tachybaptus ruficollis</i>	175	2,20	3	2	3,30
Great Crested Grebe	<i>Podiceps cristatus</i>	930	3,00	1	5	0,60
Red-necked Grebe	<i>P. grisegena</i>	840	2,90	3	4	2,18
Slavonian Grebe	<i>P. auritus</i>	560	2,70	5	4	3,38
Black-necked Grebe	<i>P. nigricollis</i>	310	2,50	3	2	3,75
Cormorant	<i>Phalacrocorax carbo</i>	3130	3,50	2	4	1,75
Bittern	<i>Botaurus stellaris</i>	1230	3,10	5	3	5,17
Grey Heron	<i>Ardea cinerea</i>	1060	3,00	2	3	2,00
Mute Swan	<i>Cygnus olor</i>	12000	4,10	2	4	2,05
Whooper Swan	<i>C. cygnus</i>	9050	4,00	5	4	5,00
Bean Goose	<i>Anser fabalis</i>	3300	3,50	8	4	7,00
Lesser White-fronted Goose	<i>A. erythropus</i>	1770	3,20	20	2	32,00
Greylag Goose	<i>A. anser</i>	3500	3,50	3	4	2,63
Snow Goose	<i>A. caerulescens</i>	3000	3,50	1	2	1,75
Canada Goose	<i>Branta canadensis</i>	4600	3,70	1	3	1,23
Barnacle Goose	<i>B. leucopsis</i>	1800	3,30	1	3	1,10
Shelduck	<i>Tadorna tadorna</i>	1200	3,10	5	3	5,17
Wigeon	<i>Anas penelope</i>	700	2,80	1	5	0,56
Gadwall	<i>A. strepera</i>	710	2,90	3	2	4,35
Teal	<i>A. crecca</i>	300	2,50	1	10	0,25
Mallard	<i>A. platyrhynchos</i>	1100	3,00	1	10	0,30
Pintail	<i>A. acuta</i>	737	2,90	3	5	1,74
Garganey	<i>A. querquedula</i>	360	2,60	3	4	1,95
Shoveler	<i>A. clypeata</i>	603	2,80	1	5	0,56
Pochard	<i>Aythya ferina</i>	870	2,90	2	5	1,16
Tufted Duck	<i>A. fuligula</i>	720	2,90	1	10	0,29
Scaup	<i>A. marila</i>	880	2,90	10	4	7,25
Eider	<i>Somateria mollissima</i>	2000	3,30	1	10	0,33
Long-tailed Duck	<i>Clangula hyemalis</i>	663	2,80	1	4	0,70
Common Scoter	<i>Melanitta nigra</i>	1050	3,00	5	4	3,75
Velvet Scoter	<i>M. fusca</i>	1500	3,20	5	5	3,20
Goldeneye	<i>Bucephala clangula</i>	750	2,90	1	10	0,29
Smew	<i>Mergus albellus</i>	550	2,70	5	4	3,38
Red-breasted Merganser	<i>M. serrator</i>	950	3,00	1	5	0,60
Goosander	<i>M. merganser</i>	1400	3,10	1	5	0,62
Honey Buzzard	<i>Pernis apivorus</i>	820	2,90	5	4	3,63
Black Kite	<i>Milvus migrans</i>	860	2,90	15	2	21,75
White-tailed Eagle	<i>Haliaeetus albicilla</i>	4500	3,70	10	3	12,33
Marsh Harrier	<i>Circus aeruginosus</i>	610	2,80	5	3	4,67
Hen Harrier	<i>C. cyaneus</i>	390	2,60	8	4	5,20
Pallid Harrier	<i>C. macrourus</i>	375	2,60	10	2	13,00

Species		Weight (g)	H	U	K	SA
Montagu's Harrier	<i>C. pygargus</i>	300	2,50	5	2	6,25
Goshawk	<i>Accipiter gentilis</i>	1100	3,00	3	4	2,25
Sparrowhawk	<i>A. nisus</i>	200	2,30	2	5	0,92
Buzzard	<i>Buteo buteo</i>	850	2,90	2	4	1,45
Rough-legged Buzzard	<i>B. lagopus</i>	910	3,00	3	4	2,25
Spotted Eagle	<i>Aquila clanga</i>	1850	3,30	20	2	33,00
Golden Eagle	<i>A. chrysaetos</i>	4100	3,60	10	3	12,00
Osprey	<i>Pandion haliaetus</i>	1700	3,20	8	3	8,53
Kestrel	<i>Falco tinnunculus</i>	185	2,30	5	4	2,88
Merlin	<i>F. columbarius</i>	165	2,20	10	4	5,50
Hobby	<i>F. subbuteo</i>	218	2,30	3	4	1,73
Gyr Falcon	<i>F. rusticolus</i>	1535	3,20	15	2	24,00
Peregrine	<i>F. peregrinus</i>	900	3,00	15	3	15,00
Hazel Grouse	<i>Bonasa bonasia</i>	350	2,50	1	10	0,25
Willow Grouse	<i>Lagopus lagopus</i>	585	2,80	2	5	1,12
Ptarmigan	<i>L. mutus</i>	545	2,70	2	4	1,35
Black Grouse	<i>Tetrao tetrix</i>	1100	3,00	3	10	0,90
Capercaillie	<i>T. urogallus</i>	2850	3,50	5	10	1,75
Grey Partridge	<i>Perdix perdix</i>	345	2,50	5	4	3,13
Quail	<i>Coturnix coturnix</i>	115	2,10	5	2	5,25
Pheasant	<i>Phasianus colchicus</i>	1125	3,10	1	5	0,62
Water Rail	<i>Rallus aquaticus</i>	95	2,00	3	3	2,00
Spotted Crake	<i>Porzana porzana</i>	70	1,80	3	4	1,35
Little Crake	<i>P. parva</i>	50	1,70	5	2	4,25
Baillon's Crake	<i>P. pusilla</i>	41	1,60	8	2	6,40
Corncrake	<i>Crex crex</i>	152	2,20	5	3	3,67
Moorhen	<i>Gallinula chloropus</i>	275	2,40	5	2	6,00
Coot	<i>Fulica atra</i>	520	2,70	1	5	0,54
Crane	<i>Grus grus</i>	5000	3,70	5	4	4,63
Oystercatcher	<i>Haematopus ostralegus</i>	480	2,70	1	4	0,68
Little Ringed Plover	<i>Charadrius dubius</i>	40	1,60	1	4	0,40
Ringed Plover	<i>C. hiaticula</i>	58	1,80	3	4	1,35
Kentish Plover	<i>C. alexandrinus</i>	44	1,60	8	2	6,40
Dotterel	<i>C. morinellus</i>	120	2,10	5	4	2,63
Golden Plover	<i>Pluvialis apricaria</i>	185	2,30	2	5	0,92
Lapwing	<i>Vanellus vanellus</i>	206	2,30	2	5	0,92
Little Stint	<i>Calidris minuta</i>	28	1,40	2	2	1,40
Temminck's Stint	<i>C. temminckii</i>	26	1,40	10	4	3,50
Purple Sandpiper	<i>C. maritima</i>	74	1,90	10	2	9,50
Dunlin	<i>C. alpina alpina</i>	53	1,70	3	3	1,70
Dunlin	<i>C. a. schinzii</i>	47	1,70	20	2	17,00
Broad-billed Sandpiper	<i>Limicola falcinellus</i>	37	1,60	8	5	2,56
Ruff	<i>Philomachus pugnax</i>	150	2,20	5	5	2,20
Jack Snipe	<i>Lymnocyptes minimus</i>	68	1,80	5	5	1,80
Snipe	<i>Gallinago gallinago</i>	95	2,00	2	10	0,40
Great Snipe	<i>G. media</i>	172	2,20	20	2	22,00
Woodcock	<i>Scolopax rusticola</i>	300	2,50	1	10	0,25
Black-tailed Godwit	<i>Limosa limosa</i>	290	2,50	10	2	12,50
Bar-tailed Godwit	<i>L. lapponica</i>	285	2,50	8	3	6,67
Whimbrel	<i>Numenius phaeopus</i>	380	2,60	2	5	1,04
Curlew	<i>N. arquata</i>	735	2,90	3	5	1,74
Spotted Redshank	<i>Tringa erythropus</i>	143	2,20	5	5	2,20
Redshank	<i>T. totanus</i>	107	2,00	2	4	1,00

Species		Weight (g)	H	U	K	SA
Marsh Sandpiper	<i>T. stagnatilis</i>	72	1,90	5	2	4,75
Greenshank	<i>T. nebularia</i>	180	2,30	3	5	1,38
Green Sandpiper	<i>T. ochropus</i>	80	1,90	1	5	0,38
Wood Sandpiper	<i>T. glareola</i>	60	1,80	3	10	0,54
Terek Sandpiper	<i>Xenus cinereus</i>	71	1,90	20	2	19,00
Common Sandpiper	<i>Actitis hypoleucos</i>	48	1,70	1	10	0,17
Turnstone	<i>Arenaria interpres</i>	104	2,00	3	4	1,50
Red-necked Phalarope	<i>Phalaropus lobatus</i>	35	1,50	3	5	0,90
Arctic Skua	<i>Stercorarius parasiticus</i>	460	2,70	3	3	2,70
Long-tailed Skua	<i>S. longicaudus</i>	245	2,40	5	3	4,00
Little Gull	<i>Larus minutus</i>	130	2,10	3	4	1,58
Black-headed Gull	<i>L. ridibundus</i>	265	2,40	2	5	0,96
Common Gull	<i>L. canus</i>	415	2,60	1	5	0,52
Lesser Black-backed Gull	<i>L. fuscus</i>	715	2,90	10	4	7,25
Herring Gull	<i>L. argentatus</i>	1050	3,00	1	5	0,60
Great Black-backed Gull	<i>L. marinus</i>	1565	3,20	2	4	1,60
Caspian Tern	<i>Sterna caspia</i>	600	2,80	15	3	14,00
Sandwich Tern	<i>S. sandvicensis</i>	250	2,40	5	2	6,00
Common Tern	<i>S. hirundo</i>	120	2,10	1	5	0,42
Arctic Tern	<i>S. paradisaea</i>	105	2,00	1	5	0,40
Little Tern	<i>S. albifrons</i>	57	1,80	15	2	13,50
Black Tern	<i>Chlidonias niger</i>	74	1,90	10	2	9,50
Guillemot	<i>Uria aalge</i>	900	3,00	10	2	15,00
Razorbill	<i>Alca torda</i>	710	2,90	3	4	2,18
Black Guillemot	<i>Cephus grylle</i>	430	2,60	5	5	2,60
Rock Dove	<i>Columba livia</i>	360	2,60	1	5	0,52
Stock Dove	<i>C. oenas</i>	275	2,40	2	4	1,20
Wood Pigeon	<i>C. palumbus</i>	500	2,70	1	10	0,27
Collared Dove	<i>Streptopelia decaocto</i>	190	2,30	5	2	5,75
Turtle Dove	<i>S. turtur</i>	125	2,10	8	2	8,40
Cuckoo	<i>Cuculus canorus</i>	107	2,00	5	5	2,00
Eagle Owl	<i>Bubo bubo</i>	2625	3,40	5	4	4,25
Snowy Owl	<i>B. scandiaca</i>	2020	3,30	15	2	24,75
Hawk Owl	<i>Surnia ulula</i>	295	2,50	5	4	3,13
Pygmy Owl	<i>Glaucidium passerinum</i>	61	1,80	5	4	2,25
Tawny Owl	<i>Strix aluco</i>	520	2,70	3	4	2,03
Ural Owl	<i>S. uralensis</i>	790	2,90	3	4	2,18
Great Grey Owl	<i>S. nebulosa</i>	1070	3,00	15	3	15,00
Long-eared Owl	<i>Asio otus</i>	290	2,50	2	4	1,25
Short-eared Owl	<i>A. flammeus</i>	315	2,50	5	4	3,13
Tengmalm's Owl	<i>Aegolius funereus</i>	123	2,10	5	5	2,10
Nightjar	<i>Caprimulgus europaeus</i>	71	1,90	8	4	3,80
Swift	<i>Apus apus</i>	42	1,60	2	5	0,64
Kingfisher	<i>Alcedo atthis</i>	37	1,60	5	2	4,00
Wryneck	<i>Jynx torquilla</i>	37	1,60	10	5	3,20
Grey-headed Woodpecker	<i>Picus canus</i>	127	2,10	5	4	2,63
Black Woodpecker	<i>Dryocopus martius</i>	330	2,50	2	5	1,00
Great Spotted Woodpecker	<i>Dendrocopos major</i>	88	1,90	1	10	0,19
White-backed Woodpecker	<i>D. leucotos</i>	105	2,00	20	2	20,00
Lesser Spotted Woodpecker	<i>D. minor</i>	24	1,40	10	4	3,50
Three-toed Woodpecker	<i>Picooides tridactylus</i>	68	1,80	10	5	3,60
Woodlark	<i>Lullula arborea</i>	29	1,50	5	3	2,50

Species		Weight (g)	H	U	K	SA
Skylark	<i>Alauda arvensis</i>	37	1,60	1	10	0,16
Shore Lark	<i>Eremophila alpestris</i>	37	1,60	20	2	16,00
Sand Martin	<i>Riparia riparia</i>	14	1,10	2	5	0,44
Swallow	<i>Hirundo rustica</i>	19	1,30	1	10	0,13
House Martin	<i>Delichon urbica</i>	17	1,20	1	10	0,12
Tawny Pipit	<i>Anthus campestris</i>	24	1,40	3	2	2,10
Tree Pipit	<i>A. trivialis</i>	23	1,40	1	20	0,07
Meadow Pipit	<i>A. pratensis</i>	18	1,30	1	10	0,13
Red-throated Pipit	<i>A. cervinus</i>	21	1,30	5	4	1,63
Rock Pipit	<i>A. petrosus</i>	25	1,40	1	4	0,35
Yellow Wagtail	<i>Motacilla flava</i>	18	1,30	1	10	0,13
Citrine Wagtail	<i>M. citreola</i>	20	1,30	3	2	1,95
Grey Wagtail	<i>M. cinerea</i>	18	1,30	2	2	1,30
Pied Wagtail	<i>M. alba</i>	20	1,30	1	10	0,13
Waxwing	<i>Bombycilla garrulus</i>	56	1,70	3	5	1,02
Dipper	<i>Cinclus cinclus</i>	62	1,80	5	3	3,00
Wren	<i>Troglodytes troglodytes</i>	10	1,00	1	5	0,20
Hedge Accentor	<i>Prunella modularis</i>	19	1,30	1	10	0,13
Robin	<i>Erithacus rubecula</i>	16	1,20	1	10	0,12
Thrush Nightingale	<i>Luscinia luscinia</i>	27	1,40	1	5	0,28
Bluethroat	<i>L. svecica</i>	18	1,30	1	10	0,13
Red-flanked Bluetail	<i>Tarsiger cyanurus</i>	14	1,10	15	2	8,25
Black Redstart	<i>Phoenicurus ochruros</i>	17	1,20	1	2	0,60
Redstart	<i>P. phoenicurus</i>	15	1,20	1	10	0,12
Whinchat	<i>Saxicola rubetra</i>	16	1,20	3	10	0,36
Stonechat	<i>S. torquatus</i>	15	1,20	3	2	1,80
Northern Wheatear	<i>Oenanthe oenanthe</i>	23	1,40	3	10	0,42
Ring Ouzel	<i>Turdus torquatus</i>	101	2,00	5	3	3,33
Blackbird	<i>T. merula</i>	101	2,00	1	10	0,20
Fieldfare	<i>T. pilaris</i>	105	2,00	1	20	0,10
Song Thrush	<i>T. philomelos</i>	69	1,80	1	10	0,18
Redwing	<i>T. iliacus</i>	60	1,80	1	20	0,09
Mistle Thrush	<i>T. viscivorus</i>	115	2,10	1	5	0,42
Grasshopper Warbler	<i>Locustella naevia</i>	13	1,10	2	4	0,55
River Warbler	<i>L. fluviatilis</i>	18	1,30	2	3	0,87
Savi's Warbler	<i>L. luscinioides</i>	16	1,20	2	2	1,20
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	12	1,10	1	10	0,11
Paddyfield Warbler	<i>A. agricola</i>	10	1,00	2	2	1,00
Blyth's Reed Warbler	<i>A. dumetorum</i>	12	1,10	2	4	0,55
Marsh Warbler	<i>A. palustris</i>	12	1,10	1	4	0,28
Reed Warbler	<i>A. scirpaceus</i>	13	1,10	1	5	0,22
Great Reed Warbler	<i>A. arundinaceus</i>	30	1,50	8	2	6,00
Booted Warbler	<i>Hippolais caligata</i>	10	1,00	8	2	4,00
Icterine Warbler	<i>H. icterina</i>	13	1,10	1	5	0,22
Barred Warbler	<i>Sylvia nisoria</i>	30	1,50	3	3	1,50
Lesser Whitethroat	<i>S. curruca</i>	13	1,10	1	10	0,11
Whitethroat	<i>S. communis</i>	16	1,20	1	10	0,12
Garden Warbler	<i>S. borin</i>	20	1,30	1	10	0,13
Blackcap	<i>S. atricapilla</i>	20	1,30	1	5	0,26
Greenish Warbler	<i>Phylloscopus trochiloides</i>	7	0,85	3	4	0,64
Arctic Warbler	<i>P. borealis</i>	9	1,00	3	4	0,75
Wood Warbler	<i>P. sibilatrix</i>	10	1,00	1	10	0,10
Chiffchaff	<i>P. collybita</i>	8	0,90	5	5	0,90

Species		Weight (g)	H	U	K	SA
Willow Warbler	<i>P. trochilus</i>	9	1,00	1	20	0,05
Goldcrest	<i>Regulus regulus</i>	6	0,78	1	10	0,08
Spotted Flycatcher	<i>Muscicapa striata</i>	16	1,20	1	20	0,06
Red-breasted Flycatcher	<i>Ficedula parva</i>	10	1,00	5	4	1,25
Collared Flycatcher	<i>F. albicollis</i>	13	1,10	2	2	1,10
Pied Flycatcher	<i>F. hypoleuca</i>	13	1,10	1	10	0,11
Bearded Tit	<i>Panurus biarmicus</i>	16	1,20	5	3	2,00
Long-tailed Tit	<i>Aegithalos caudatus</i>	8	0,90	1	4	0,23
Willow Tit	<i>Parus montanus</i>	11	1,00	1	10	0,10
Siberian Tit	<i>P. cinctus</i>	12	1,10	5	10	0,55
Crested Tit	<i>P. cristatus</i>	12	1,10	1	10	0,11
Coal Tit	<i>P. ater</i>	9	1,00	1	5	0,20
Blue Tit	<i>P. caeruleus</i>	11	1,00	1	10	0,10
Azure Tit	<i>P. cyanus</i>	12	1,10	5	2	2,75
Great Tit	<i>P. major</i>	20	1,30	1	10	0,13
Nuthatch	<i>Sitta europaea</i>	18	1,30	1	2	0,65
Treecreeper	<i>Certhia familiaris</i>	10	1,00	1	5	0,20
Penduline Tit	<i>Remiz pendulinus</i>	11	1,00	2	2	1,00
Golden Oriole	<i>Oriolus oriolus</i>	76	1,90	2	4	0,95
Red-backed Shrike	<i>Lanius collurio</i>	29	1,50	3	5	0,90
Great Grey Shrike	<i>L. excubitor</i>	65	1,80	5	4	2,25
Jay	<i>Garrulus glandarius</i>	161	2,20	1	10	0,22
Siberian Jay	<i>Perisoreus infaustus</i>	82	1,90	5	5	1,90
Magpie	<i>Pica pica</i>	235	2,40	1	10	0,24
Nutcracker	<i>Nucifraga caryocatactes</i>	192	2,30	2	4	1,15
Jackdaw	<i>Corvus monedula</i>	226	2,40	1	5	0,48
Rook	<i>C. frugilegus</i>	470	2,70	1	4	0,68
Hooded Crow	<i>C. corone cornix</i>	525	2,70	1	10	0,27
Raven	<i>C. corax</i>	1195	3,10	1	4	0,78
Starling	<i>Sturnus vulgaris</i>	76	1,90	3	5	1,14
House Sparrow	<i>Passer domesticus</i>	32	1,50	2	10	0,30
Tree Sparrow	<i>Passer montanus</i>	23	1,40	1	4	0,35
Chaffinch	<i>Fringilla coelebs</i>	22	1,30	1	20	0,07
Brambling	<i>F. montifringilla</i>	22	1,30	1	20	0,07
Serín	<i>Serinus serinus</i>	12	1,10	1	2	0,55
Greenfinch	<i>Carduelis chloris</i>	29	1,50	1	10	0,15
Goldfinch	<i>C. carduelis</i>	18	1,30	1	4	0,33
Siskin	<i>C. spinus</i>	13	1,10	1	20	0,06
Linnet	<i>C. cannabina</i>	17	1,20	1	5	0,24
Twite	<i>C. flavirostris</i>	17	1,20	2	2	1,20
Redpoll	<i>C. flammea</i>	14	1,10	1	10	0,11
Arctic Redpoll	<i>C. hornemanni</i>	14	1,10	2	4	0,55
Two-barred Crossbill	<i>Loxia leucoptera</i>	29	1,50	3	3	1,50
Crossbill	<i>L. curvirostra</i>	41	1,60	1	10	0,16
Parrot Crossbill	<i>L. pytyopsittacus</i>	56	1,70	3	5	1,02
Scarlet Rosefinch	<i>Carpodacus erythrinus</i>	23	1,40	1	10	0,14
Pine Grosbeak	<i>Pinicola enucleator</i>	51	1,70	3	5	1,02
Bullfinch	<i>Pyrrhula pyrrhula</i>	31	1,50	1	10	0,15
Hawfinch	<i>Coccothraustes coccothraustes</i>	53	1,70	3	3	1,70
Lapland Bunting	<i>Calcarius lapponicus</i>	26	1,40	1	5	0,28
Snow Bunting	<i>Plectrophenax nivalis</i>	35	1,50	1	4	0,38
Yellowhammer	<i>Emberiza citrinella</i>	31	1,50	1	20	0,08
Ortolan Bunting	<i>E. hortulana</i>	24	1,40	10	5	2,80

Species		Weight (g)	H	U	K	SA
Rustic Bunting	<i>E. rustica</i>	19	1,30	1	10	0,13
Little Bunting	<i>E. pusilla</i>	15	1,20	3	4	0,90
Yellow-breasted Bunting	<i>E. aureola</i>	21	1,30	20	2	13,00
Reed Bunting	<i>E. schoeniclus</i>	19	1,30	1	10	0,13

Appendix 3. Conservation value listings for migrant bird species in Finland

List A – Globally threatened migratory bird species

Globally threatened species occurring in Finland

- Lesser White-fronted Goose (*Anser erythropus*)
- Steller´s Eider (*Polystica stelleri*)
- Spotted Eagle (*Aquila clanga*)
- Corncrake (*Crex crex*)

List B – Regionally endangered migratory bird species

Including: species whose primary range is in Europe, which are listed as threatened in Europe; species listed as critically endangered, endangered or vulnerable in Finland; and certain species whose populations have declined steeply in recent years.

The redshank *Tringa totanus* has been omitted from this list, as the species is relatively common in Finland, its biotope requirements on migration are flexible, and it rarely flocks. Similarly the black-headed gull *Larus ridibundus* and the common gull *Larus canus* have been omitted as both species are considered to be reasonably common in Finland and Scandinavia. The populations of both species in Europe as a whole are also large, even though their populations are declining in many areas.

- | | |
|---|---|
| Scaup (<i>Aythya marila</i>) | Terek Sandpiper (<i>Xenus cinereus</i>) |
| White-tailed (<i>Haliaeetus albicilla</i>) | Lesser Black-backed Gull (<i>Larus fuscus fuscus</i>) |
| Golden Eagle (<i>Aquila chrysaetos</i>) | Caspian Tern (<i>Sterna caspia</i>) |
| Merlin (<i>Falco columbarius</i>) | Little Tern (<i>Sterna albifrons</i>) |
| Gyr Falcon (<i>F. rusticolus</i>) | Guillemot (<i>Uria alpe intermedia</i>) |
| Peregrine (<i>F. peregrinus</i>) | Black Guillemot (<i>Cepphus grylle grylle</i>) |
| Moorhen (<i>Gallinula chloropus</i>) | Snowy Owl (<i>Nyctea scandiaca</i>) |
| Temminck´s Stint (<i>Calidris temminckii</i>) | Woodlark (<i>Lullula arborea</i>) |
| Purple Sandpiper (<i>C. maritima</i>) | Shore Lark (<i>Eremophila alpestris</i>) |
| Dunlin (<i>C. alpina schinzii</i>) | Ortolan Bunting (<i>Emberiza hortulana</i>) |
| Great Snipe (<i>Gallinago media</i>) | Yellow-breasted Bunting (<i>E. aureola</i>) |
| Black-tailed Godwit (<i>Limosa limosa</i>) | |

List C – Regionally threatened bird species

Including: threatened species whose primary range is not in Europe; species listed in Finland as near threatened or regionally declined; and species for which Finland has special responsibility within Europe.

The velvet scoter *Melanitta fusca*, red-breasted merganser *Mergus serrator*, goosander *M. merganser*, ruff *Philomachus pugnax* and wood sandpiper *Tringa glareola* are considered to be so abundant in Finland that they will be adequately met through the consideration given to the use of wetland staging areas by larger numbers of waterfowl and waders. Certain larger, sensitive species that meet the criteria for list C have been included in List D.

Red-throated Diver (<i>Gavia stellata</i>)	Osprey (<i>Pandion haliaetus</i>)
Bittern (<i>Botaurus stellaris</i>)	Kestrel (<i>Falco tinnunculus</i>)
Bean Goose (<i>Anser fabalis</i>)	Ringed Plover (<i>Charadrius hiaticula</i>)
Shelduck (<i>Tadorna tadorna</i>)	Dotterel (<i>C. morinellus</i>)
Gadwall (<i>Anas strepera</i>)	Bar-tailed Godwit (<i>Limosa lapponica</i>)
Pintail (<i>A. acuta</i>)	Broad-billed Sandpiper (<i>Limicola falcinellus</i>)
Garganey (<i>A. querquedula</i>)	Jack Snipe (<i>Lymnocyptes minimus</i>)
Common Scoter (<i>Melanitta nigra</i>)	Spotted Redshank (<i>Tringa erythropus</i>)
Smew (<i>Mergus albellus</i>)	Little Gull (<i>Larus minutus</i>)
Black Kite (<i>Milvus migrans</i>)	Nightjar (<i>Caprimulgus europaeus</i>)
Marsh Harrier (<i>Circus aeruginosus</i>)	Dipper (<i>Cinclus cinclus</i>)
Hen Harrier (<i>C. cyaneus</i>)	Starling (<i>Sturnus vulgaris</i>)
Montagu's Harrier (<i>C. pygargus</i>)	

List D. Large species sensitive to disturbance

Grey Heron (*Ardea cinerea*)
 Bewick's Swan (*Cygnus columbianus*)
 Whooper Swan (*C. Cygnus*)
 Pink-footed Goose (*Anser brachyrhynchus*)
 White-fronted Goose (*A. albifrons*)
 Greylag Goose (*A. anser*)
 Barnacle Goose (*Branta leucopsis*)
 Brent Goose (*B. bernicla*)
 Crane (*Grus grus*)

Documentation page

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Title of publication	Assessing the conservation value of wetland bird-life	
Parts of publication/ other project publications	The publication is also available in the Internet: http://www.environment.fi/publications	
Abstract	<p>This report sets out a new points system for assessing the conservation value of wetland bird-life. The system has been designed to replace a previously used points-rating system, to meet the need for an improved tool for application in the protection and monitoring of bird wetlands. The new system also facilitates the calculations used to evaluate and compare bird wetlands. Values can be calculated for species nesting or feeding in wetlands during the breeding season, for the birds visiting on migration or present during the moulting season, and for the overall value of a wetland in conservation terms on a points scale.</p> <p>The system also facilitates assessment of the need for habitat restoration work or other forms of habitat management. It can also be applied in the re-evaluation of previous habitat restoration plans. The working group believes the new system devised in Finland can be applied widely by environmental authorities at the municipal, national and EU levels.</p> <p>The report also describes how the new conservation point values system has been tested, and presents the working group's recommendations for its practical use.</p>	
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Julkaisun nimi	Kosteikkojen linnuston suojelu-arvo	
Julkaisun osat/ muut saman projektin tuottamat julkaisut	Julkaisu on saatavana myös internetistä: http://www.environment.fi/publications	
Tiivistelmä	<p>Julkaisussa esitellään uusi lintuvesien suojelupistejärjestelmä. Järjestelmä korvaa aiemmin käytössä olleen pisteytysjärjestelmää. Työn perustana on ollut tarve uudistaa ja kehittää suojelupistejärjestelmää, jota voidaan käyttää apuna lintuvesien suojelussa ja seurannassa. Uusi järjestelmä helpottaa lintuvesien suojelupistearvon laskentaa ja alueiden vertailua. Järjestelmässä voidaan arvioida lajin pesimäaikainen suojelu-arvo, lintuveden kokonaissuojelupistearvon, muuton-aikainen linnustoarvo, alueiden sulkasadon aikainen linnustoarvo sekä pesimäaikaisten ruokailualueiden arvo.</p> <p>Järjestelmän avulla voidaan arvioida kohteiden kunnostus- ja hoitotoimenpiteiden tarvetta ja kiireellisyyttä. Se soveltuu myös vanhojen kunnostussuunnitelmien uudelleenarvioimiseen. Työryhmä katsoo, että Suomessa kehitetty järjestelmä soveltuisi työkaluna laajemminkin valtiollisten ja kunnallisten ympäristöviranomaisten sekä Euroopan Unionin käyttöön.</p> <p>Raportissa selostetaan myös suojelupistejärjestelmän testausta sekä annetaan työryhmän suositukset suojelupistearvon käytöstä.</p>	
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Publikationens titel	Våtmarksfåglarnas skyddsvärde	
Publikationens delar/ andra publikationer inom samma projekt	Publikationen finns tillgänglig också på internet: http://www.environment.fi/publications	
Sammandrag	<p>Publikationen presenterar ett nytt skyddspoängssystem för fågelvatten som ersätter ett tidigare poängsättningsystem. Arbetet har utgått från behovet att förnya och utveckla systemet som används som verktyg vid skydd och uppföljning av fågelvattnen. Det nya systemet gör det lättare att räkna skyddspoängvärdet för ett fågelvatten och att jämföra olika områden. Man kan bedöma skyddsvärdet för en art under häckningstiden, helhetsvärdet av ett fågelvatten, fågelbeståndets värde under flyttningstiden, skyddsvärdet av ett område under fjäderfällningen samt värdet av ett matanskaffningsområde under häckningstiden.</p> <p>Med hjälp av detta system kan man bedöma hur stort och hur brådskande behovet av restaurerings- och skötselåtgärder är. Det kan också tillämpas vid nya bedömningar av gamla restaureringsplaner. Arbetsgruppen anser att det i Finland utvecklade systemet kunde vara användbart även i större sammanhang som verktyg för statliga och kommunala miljömyndigheter och för Europeiska Unionen.</p> <p>Rapporten redogör också för testningen av skyddspoängssystemet samt ger arbetsgruppens rekommendationer om användningen av skyddspoängssystemet.</p>	
Nyckelord	Skyddspoängssystem, fågelsjöar, hotade arter, naturskydd, restaurering, fågelbeståndet, värde	
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NATURE AND NATURAL RESOURCES

Assessing the conservation value of wetland bird-life

A conservation points system for the evaluation of wetland bird-life has been in use in Finland since 1981, but more recent research results and ecological changes have necessitated the renewal of this system. The new system assesses the conservation value of the bird-life of wetland sites in four separate categories: conservation values for breeding birds; conservation values for passage migrants; conservation values during the moulting season; and wetlands' significance as feeding areas during the nesting season.

The new system for defining conservation values for breeding birds is based on a formula that uses three key factors: species' population replacement capacities; their threatened status in Finland, in Europe and globally; and their total breeding populations in Finland. The **conservation value (SA)** for each bird species during the breeding season is calculated by multiplying the species' population replacement capacity index (H) by the species' threatened status index (U), and then dividing this product by an index describing the size of the species' total Finnish population (K), using the formula $SA = H \times U / K$. Conservation values for the bird-life of a whole wetland site are calculated by summing the values for each observed species, calculated by multiplying the conservation value of each species by the numbers of pairs of each species (with pair numbers converted to coefficients to reduce the significance of pairs in large nesting colonies).

Wetland sites used as staging areas by passage migrant birds have been classified into four categories using information on species' threatened status and the numbers of birds visiting sites. The sensitivity of certain species to disturbance was also incorporated into the system. **Wetlands used as resting areas during the moulting season** were classified into three categories defined according to the numbers of moulting waterfowl observed. Wetland sites may additionally have high conservation value as **feeding areas during the breeding season** for species that nest in other habitats. A list was therefore compiled of the species that significantly use wetland sites as feeding areas during the breeding season, thus adding to their conservation value.

The new system for calculating the conservation value wetland bird-life has been designed to facilitate the classification of wetland sites and the setting of priorities for conservation. The system can also be used to help estimate the need for habitat restoration and management measures, and to evaluate the success of such measures. The authors believe that this system can also be beneficially applied by the national and local environmental authorities in other countries than Finland, and by the European Union.

The publication is available also in the internet:
<http://www.environment.fi/publications>

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