A Red List Index for breeding birds in Denmark in the period 1991-2009

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(Med et dansk resumé: Rødlisteindeks (RLI) for danske ynglefugle i perioden 1991 til 2009)

Abstract A red list index (RLI) summarises overall trends in numbers of a specified group of birds. Based on four Danish red lists published since 1990, a red list index on trends in numbers of nationally threatened breeding birds is presented. Initially, the red lists from 1990 and 1997 were revised using current IUCN criteria and categories. It was found that there was a non-significant increase in RLI (i.e. a decrease in threat level) during the period 1990-2009, consisting of a significant increase from 1990 to 1997, a non-significant increase from 1997 to 2003, and a non-significant decrease from 2003 to 2009.

Introduction

The status, distribution and abundance in Denmark are better known for birds than for any other group of organisms. Based on established IUCN criteria from the World Conservation Union, red lists of threatened birds in Denmark have been published regularly since 1974 (Hald-Mortensen 1974, Dansk Ornitologisk Forening 1976, Dybbro 1980, Asbirk & Søgaard 1991, Stoltze & Pihl 1998, Wind & Pihl 2004). Subsequent changes to criteria and categories in 1994 and 2001 have provided more objective methods for red-list classification of taxa (Stoltze & Pihl op.cit., IUCN 2001, Wind 2003).

In order to reflect targets set by the Convention on Biological Diversity (CBD) and the European Union (EU) to reduce or halt the loss of biodiversity by 2010, the Danish National Forest and Nature Agency (now Danish Nature Agency) needed to assess the

trends in Danish biodiversity. A red list index summarises the red list status of a large group of organisms, in this case birds, in order to follow the aggregated trend. As defined, an increase in the index reflects a decrease in threat level – the higher the index, the better the group is doing as a whole, with smaller risk that species will become locally extinct. Birds were obvious candidates for a red list index because much information was available on trends and numbers of species. However, the comparison over years is made difficult because of changes over time to IUCN criteria and categories that affect the selection and status assignment of red-listed species.

For the present study, it was possible to collate adequate information on all Danish breeding birds back to the early 1980s. In consequence, we can present information on status, trend and distribution of Danish breeding birds for the periods 1986-1991 and 1992-1997. It was further necessary to develop retrospective red lists using current IUCN categories and criteria for 1991 and 1997 for use in a red list index, leaving out the earlier Danish red lists on birds.

Application of the IUCN red list evaluation on a local level

The IUCN red list system was designed to indicate the risk that a species went extinct globally. However, since the criteria are numerical the system can be (and has been) used for smaller geographical areas and more species will end up in one of the threatened categories when the considered geographical area is reduced. To cope with this, IUCN provided guidelines for the application of the criteria at local levels (Gärdenfors et al. 2001). These guidelines include criteria for upgrading of taxa to a higher threat category, or downgrading to a lower threat category, under certain circumstances, particularly

- where a species is extending its range into a new area, at least 10 years or three generations should pass before the species is evaluated;
- where a regional population constitutes a small peripheral part of a bigger population, and flow of individuals into the area from neighbouring areas may help a population to sustain itself (so that the real threat is smaller than predicted by a strict application of the IUCN red list system), downgrading may be applicable; and
- where a regional population is a sink, maintained only by immigration from an outside population (so that the risk of disappearance is higher than predicted by IUCN criteria), upgrading may be applicable.

Application of the IUCN red list system in Denmark

When IUCN categories are applied at a local level, and to highly mobile species such as birds, there are a number of situations where the red list evaluation may lead to results that do not reflect the real risk of local extinction.

a) Some species require large territories and exhibit scattered distributions, traits that reflect their biology rather than their vulnerability to extinction. Nevertheless, the IUCN criterion D1 requires at least 1000 breeding individuals for a species to be listed in one of the non-threatened categories. As our baseline, we have used the maximum post-1850 Danish population of a species to define the Danish "carrying capacity" for that species. If a species is close to this maximum level, downgrading the threat category may be applicable. For example, the Peregrine Falcon *Falco peregrinus* is currently re-colonising Denmark after an absence for about 30 years. This species requires a large hunting territory with suitable nesting habitat, which naturally limits the number of possible territories in Denmark to ten or less. With all territories occupied, the Danish breeding population will never exceed 20-30 mature breeding birds, giving the species a status of "critically endangered" (CR) if the IUCN criteria were strictly applied.

b) A species expanding into a new area requires evaluation after 10 years or three generations. For some species, the immigration process is slow, so for a long time the local population is small but still increasing, and still receiving immigrants from an outside population. Downgrading may thus be applicable. For example, the White-tailed Eagle *Haliaeetus albicilla* returned to Denmark as a breeding bird in 1995, increasing to seven pairs in 1999 and 28 in 2009 (Ehmsen et al. 2011). Given the relatively slow reproduction of the species, immigration must have supported the population increase, at least during the initial phase of the colonisation.

   Another scenario is a small but rapidly increasing local population. It may be less threatened than a stable or decreasing population, irrespective of whether it reaches the threshold of 1000 mature individuals. For such a population downgrading may be applicable. The White-spotted Bluethroat *Luscinia svecica cyanecula* re-appeared in Denmark in 1992 after having been absent for about 100 years (Grell et al. 2004). Initially, the immigration was slow, but during the late 1990s the species expanded rapidly to more than 100 pairs (Nyegaard & Grell 2008).

c) External factors may affect the sex or age structure of a population, thereby increasing its general vulnerability, which may justify an upgrade of threat status relative to the status assigned by strictly applying the IUCN criteria. In the 1970s, adult Common Eiders *Somateria mollissima* in oiling incidents showed a 60:40 male:female sex ratio, while recent data from samples of wings contributed by hunters suggest a 70:30 sex ratio in the population (Lehikoinen et al. 2008). If reliable measures of the true sex ratio, these figures indicate a small and decreasing proportion of females in the po-

pulation, with adverse consequences for its stability. So far, the threat category of Common Eider in Denmark has not been upgraded, however.

d) A decrease in the reproductive rate of a long-lived species will affect the age structure. Under extreme circumstances, the species could completely cease to reproduce, yet mature individuals would survive for many years; but even in less extreme cases the extinction risk would be higher than the numbers alone suggest. Actually, there is a risk that slight population decreases found in some tern species in Denmark are caused by more substantial reductions in reproductive success. Hence, significant changes in reproductive success and age structure could warrant an upgrade in threat status.

e) A species that is unable to maintain a stable population in the absence of specific management measures will be more at risk than a species that maintains its population without such measures. Kentish Plover *Charadrius alexandrinus* in Denmark is now restricted to a few areas where public access is regulated, and will probably disappear from the country if these regulations cease. A species that depends on supporting management is therefore at a higher risk than other criteria may suggest, and upgrading might be warranted.

f) A very low population size represent a genetic bottleneck, leading to reduced genetic variability and increased vulnerability to environmental change; it may also impair reproduction. Part of the Swedish population of Short-billed Dunlin *Calidris alpina schinzii* exhibits a high level of homozygosity, and the reproductive output appears to be too low to maintain the population (Blomquist et al. 2010).

Certain species might be subject to effects that both increase and decrease their extinction risk. When implementing the system above to Danish breeding birds we decided that species could not be upgraded by more than two steps or downgraded by more than three steps. An example is the evaluation of White-tailed Eagle, which is categorized as VU** (vulnerable) in 2003, two levels below the one obtained by strictly using the IUCN criteria, where the stars indicate the number of changes. This status was obtained by first downgrading the species three steps, because it is currently undergoing rapid re-colonisation (see above), and afterwards upgrading one step because management of the nesting areas – keeping the public away from the immediate nest surroundings – is necessary.

Methods and materials

A Danish red list for breeding birds, using the new IUCN system applied to local Danish conditions, was developed in 2003 (Wind & Pihl 2004), and re-evaluated by the authors in 2009 in connection with the writing of the current paper. The original categories used in 1990 and 1997 included Extinct (Ex), Endangered (E), Vulnerable (V) and Rare (R), now replaced by the new categories Regionally Extinct (RE), Critically Endangered (CR), Endangered (EN), Vulnerable (VU) and Near Threatened (NT). Based on this revised system, and using all available information on trends (even in neighbouring countries) and distribution of Danish breeding birds, new national red lists were developed for 1991 and 1997 (Table 1).

Crested Lark was not listed in the original red list from 1990, but considered vulnerable (VU) in the revised list here presented (for 1991). After a rapid decline the species was considered endangered in both the original and the revised list for 1997 (and critically endangered in the 2003 and 2009 red lists). Photo: Carl Erik Mabeck.

The number of species in each of the categories in the revised system is given in Table 2, covering all 210 breeding bird species in Denmark, and in Table 3, covering the 191 species included in the red list index (see below).

In order to describe and evaluate the overall trends in the status of threatened species, Red List Indices (RLIs) for birds were suggested by Butchart et al. (2004) and improved in 2007 (Butchart et al. 2007). The RLI combines information on the red list status of all included species into a single number. The higher the RLI, the less threatened are the birds overall. If there has been an equal number of changes to more threatened categories and less threatened categories between two evaluations, the index remains the same. Obviously, comparison of RLIs will only be meaningful if they are based on exactly the same set of species. This is the reason why only 191 species are used in the red list index (Table 2, 3) although there are 210 species in the

Table 1. The original and the revised red lists for Danish breeding birds in 1990/1991 and 1997 (only species which have changed category in the period are shown). The stars indicate the number of up- and downgrades.

Den originale og den reviderede rødliste for danske ynglefugle i 1990/1991 og 1997 (kun arter, som har skiftet kategori i løbet af perioden, er medtaget). Stjernerne angiver nettoantallet af op- og nedgraderinger.

Species	Red list 1990	Revised Red list 1991	Red list 1997	Revised Red List 1997
Black Grouse *Tetrao tetrix*	E	EN	E	CR
Common Quail *Coturnix coturnix*	R	NT*	R	NT**
Barnacle Goose *Branta leucopsis*	R	NA	R	NA
Eurasian Wigeon *Anas penelope*	R	NA	V	NA
Northern Pintail *Anas acuta*	R	NT*	V	NT*
Garganey *Anas querquedula*	-	VU*	V	NT*
Eurasian Teal *Anas crecca*	-	NT*	-	NT*
Greater Scaup *Aythya marila*	R	NA	-	NA
Common Goldeneye *Bucephala clangula*	R	VU**	R	NT*
Common Merganser *Mergus merganser*	V	VU*	R	VU*
Black-necked Grebe *Podiceps nigricollis*	R	LC**	R	LC**
Black Stork *Ciconia nigra*	Ex	RE	R	RE
White Stork *Ciconia ciconia*	E	CR	E	CR
European Bittern *Botaurus stellaris*	R	NT**	R	LC**
Eurasian Hobby *Falco subbuteo*	V	EN*	E	EN*
Osprey *Pandion haliaetus*	E	RE	E	RE
Red Kite *Milvus milvus*	R	VU*	R	NT**
White-tailed Eagle *Haliaeetus albicilla*	R	RE	R	RE
Hen Harrier *Circus cyaneus*	R	NA	R	NA
Montagu's Harrier *Circus pygargus*	V	EN*	V	EN*
Corn Crake *Crex crex*	E	CR	Ex	VU*
Spotted Crake *Porzana porzana*	R	VU*	V	NT*
Common Crane *Grus grus*	E	CR	R	VU**
European Golden Plover *Pluvialis apricaria*	E	CR	E	CR
Little Ringed Plover *Charadrius dubius*			R	LC**
Kentish Plover *Charadrius alexandrinus*	E	EN	E	EN
Black-tailed Godwit *Limosa limosa*			-	NT*
Eurasian Curlew *Numenius arquatus*	-	NT*	R	NT*
Green Sandpiper *Tringa ochropus*	R	VU*	V	NT**
Wood Sandpiper *Tringa glareola*	E	VU*	V	VU*
Ruddy Turnstone *Arenaria interpres*	V	EN	V	EN
Short-billed Dunlin *Calidris alpina schinzii*			R	VU
Ruff *Philomacus pugnax*	-	VU	V	VU
Little Gull *Larus minutus*	R	RE	Ex	RE
Black-legged Kitiwake *Rissa tridactyla*	R	NT*	R	NT
Gull-billed Tern *Gelochelidon nilotica*	E	CR	E	CR
Sandwich Tern *Sterma sandvicensis*	R	LC		
Little Tern *Sterna albifrons*	R	NT*	R	NT*
Black Tern *Chlidonias niger*	E	EN	E	EN
Common Murre *Uria aalge*	R	NT*	R	NT*
Razorbill *Alca torda*	R	NT*	R	NT*
Black Guillemot *Cepphus grylle*	R	LC**		
Stock Dove *Columba oenas*	-	NT*		
European Turtle Dove *Streptopelia turtur*	R	VU**	R	NT**
Barn Owl *Tyto alba*	E	CR	V	VU*
Eurasian Eagle Owl *Bubo bubo*	Ex	RE	R	NT**
Little Owl *Athene noctua*	V	VU	V	VU
Boreal Owl *Aegolius funereus*			E	NA
Short-eared Owl *Asio flammeus*	R	EN*	E	EN*
European Nightjar *Caprimulgus europaeus*	-	NT*		
Common Kingfisher *Alcedo atthis*	R	VU*	R	LC**
Eurasian Wryneck *Jynx torquilla*	-	VU	R	EN
Lesser Spotted Woodpecker *Dendrocopos minor*	R	NT**	R	NT**
Black Woodpecker *Dryocopus martius*	R	LC**		
Great Grey Shrike *Lanius excubitor*	R	CR	E	CR
Eurasian Golden Oriole *Oriolus oriolus*	-	EN	V	EN
Willow Tit *Poecile montana*	R	VU**	R	NT**
Eurasian Penduline Tit *Remiz pendulinus*	R	NT**	R	LC**
Crested Lark *Galerida cristata*	-	VU	E	EN
Woodlark *Lullula arborea*	-	NT*	R	NT*
Savi's Warbler *Locustella luscinioides*	R	NT**	V	EN*
Great Reed Warbler *Acrocephalus arundinaceus*	V	EN	Ex	EN*
Barred Warbler *Sylvia nisoria*	V	CR	E	CR
Bearded Reedling *Panurus biarmicus*	R	NT**		
Firecrest *Regulus ignicapila*	R	VU**	R	EN*
White-spotted Bluethroat *Luscinia svecica cyanecula*	Ex	RE	R	NT***
Eurasian Stonechat *Saxicola torquatus*	R	NA	R	NA
White-throated Dipper *Cinclus cinclus*	R	NA	E	CR
Tawny Pipit *Anthus campestris*	R	EN	E	EN
Eurasian Rock Pipit *Anthus petrosus*	R	NT**	R	NT**
European Serin *Serinus serinus*	R	EN*	V	EN*
Eurasian Siskin *Carduelis spinus*	-	NT**	-	NT**
Common Rosefinch *Carpodacus erythrinus*	R	NT**	R	NT*

Table 2. The distribution on category and year for 210 red list evaluated species together with the total number of red listed species for each year.
Fordeling i kategori og år af de 210 rødlisteevaluerede arter, og det totale antal rødlistede arter i de fire evalueringsår.

Year of red listing	**1991**	**1997**	**2003**	**2009**
Regional extinct (RE)	17	15	13	12
Critically endangered (CR)	8	7	8	8
Endangered (EN)	11	14	13	13
Vulnerable (VU)	15	8	13	15
Near threatened (NT)	19	23	19	25
Number of red listed species	70	67	66	73
Least concern (LC)	121	125	129	124
Not applicable (NA)	19	18	15	13
Total number of species evaluated	210	210	210	210

Table 3. The distribution on category and year for 191 species included in the Red List Index.
Fordeling i kategori og år af de 191 fuglearter, som indgår i rødlisteindekset.

Year of red listing	**1991**	**1997**	**2003**	**2009**
Regional extinct (RE)	17	15	12	12
Critically endangered (CR)	8	6	8	8
Endangered (EN)	11	14	12	12
Vulnerable (VU)	15	8	14	13
Near threatened (NT)	19	23	16	22
Least concern (LC)	121	125	129	124
Number of species included in the Red List Index	**191**	**191**	**191**	**191**

current red list. For each species included in the index, the threat category is translated to a number or weight (W), such that higher threat categories are given larger weights: 0 for Least Concern (LC), 1 for Near Threatened (NT), 2 for Vulnerable (VU), 3 for Endangered (EN), 4 for Critically Endangered (CR), and 5 for Regionally Extinct (RE). The sum (T) of all individual species values is called the the "current threat score":

$$T = \Sigma W_c \times N_c$$

where W_c is the weight for category c, N_c the number of species in category c.

Our main interest is to follow how this value changes over time, relative to the worst possible case where all the species have disappeared from the area. This situation is described by the maximum threat score (M), given by

$$M = W_{EX} \times N_s$$

where N_s is the total number of species included in the assessment, and W_{EX} is the weight assigned to the maximum category RE, i.e., $W_{EX} = 5$. The RLI is then calculated as

$$RLI = (M-T)/M$$

giving an index that increases with a decreasing overall threat.

The original formula excluded species evaluated as Data Deficient (DD) or Extinct (Ex) prior to the first evaluation (although none of these were relevant in the Danish case). N was held fixed at 191 species for the purposes of this analysis (i.e. M = 955). Note that species expanding into Denmark after the first period (1986-1991) were not included in the RLI.

To investigate whether there was a general trend in red list status for Danish species, we tested the change in red list levels between consecutive periods by means of Wilcoxon's signed test for matched pairs.

Results

Red list indices were calculated on the basis of the retrospective red lists for 1991 and 1997 and the red lists for 2003 and 2009. These four indices varied between 0.792 and 0.818. For comparison, the RLI values using the IUCN criteria in a strict sense, without up- or downgrading, are also shown; they varied between 0.731 and 0.754 (Table 4).

There was no significant change in the RLIs between 1991 and 2009 (Wilcoxon Signed Rank test, P = 0.18). However, comparisons between subperiods revealed a significant increase in RLI from 1991 to 1997 (P = 0.03), i.e. more species evaluated to a lower threat category than to a higher, but only insignificant changes between 1997 and 2003 (P = 0.50) and between 2003 and 2009 (P = 0.53). Trends in median values were similar for values based on the Danish system and values based on the unmodified IUCN system (Spearman Rank Correlation, P = 1.0).

In 1991, 70 of the 191 species were assigned to one of the threatened categories (CR, EN, VU, NT or RE). In 1997 the number had fallen to 66, since European Bittern *Botaurus stellaris*, Stock Dove *Columba oenas*, European Nightjar *Caprimulgus europaeus*, Common Kingfisher *Alcedo atthis*, Bearded Reedling *Panurus biarmicus* and Penduline Tit *Remiz pendulinus* had changed status from a threatened category to Least Concern (LC), and Short-billed Dunlin and Black-tailed Godwit *Limosa limosa* had moved to a threatened category. At the same time, Eurasian Eagle Owl *Bubo bubo* and White-spotted Bluethroat had returned as Danish breeding birds.

In 2003, 62 species were assigned to one of the threatened categories. Common Quail *Coturnix coturnix*, Common Crane *Grus grus*, White-spotted Bluethroat, Willow Tit *Poecile montana* and Eurasian Siskin *Carduelis spinus* were assigned to LC, whereas Penduline Tit had changed category from LC to Vulnerable (VU). At the same time, Black Grouse *Tetrao tetrix* had become regionally extinct in Denmark, while Eurasian Spoonbill *Platalea leucorodia*, White-tailed Eagle and Osprey *Pandion haliaetus* had returned as Danish breeding birds after varying periods of absence.

In 2009, the number of threatened species had increased to 67. New to the Red List in one of the threatened categories were Common Pochard *Aythya ferina*, Common Snipe *Gallinago gallinago*, Common Tern *Sterna hirundo*, Whinchat *Saxicola rubetra* and European Pied Flycatcher *Ficedula hypoleuca*, while Barred Warbler *Sylvia nisoria* had disappeared and Red-crested Pochard *Netta rufina* and Peregrine Falcon had returned as Danish breeding species.

During the three periods between the four red lists the number of changes in the species threat status appears from Table 5. Seen over the entire period, 24 species have changed to a category of less threat while 20 species have changed to a category of higher threat. This is fewer than the total number of changes since some species have changed more than once.

Table 4. The red list index (RLI) for Danish breeding birds over the period 1991 to 2009 using the Danish system of up- and downgrading (top), and using the strict IUCN system (bottom), respectively.
Rødlisteindeks (RLI) for danske ynglefugle i perioden 1991 til 2009 ved brug af det danske system for op- og nedlistning (øverst) såvel som ved strikt anvendelse af IUCN's system (nederst).

	1991	1997	2003	2009
RLI index incl. up- and downgrading	0.792	0.812	0.818	0.816
RLI index strictly using the IUCN system	0.731	0.748	0.754	0.752

Table 5. Relative changes in threat status of Danish breeding birds in the period 1991 to 2009.
Ændringer i trusselsstatus for danske ynglefugle i perioden 1990-2009.

Number of species	1991-1997	1997-2003	2003-2009	1991-2009
More threatened	7	13	9	20
Less threatened	18	14	4	24

Discussion

Above, we adjusted the IUCN Red List system to Danish conditions, i.e., those of a small geographical area on the border of several biogeographical zones. The adjustment consists of a set of rules for up- and downgrading species relative to the IUCN Red List evaluations. We believe that this adapted system more precisely describes the risk of extinction of Danish breeding birds.

After application of this adapted system to the four Danish red lists from 1991, 1997, 2003 and 2009, Red List Indices were calculated as suggested by Butchart et al. (2004, 2007). Compared to the IUCN Red List system, this changes the general level of the indices, but not the trend. The indices show a significant increase from 1991 to 1997, followed by an insignificant increase 1997-2003 and an insignificant decrease 2003-2009. Overall, there is a minor, insignificant increase from 1991 to 2009.

Some factors affecting the overall trend can be identified. The starting point (1991) was only a few years after three consecutive cold winters (1984/85-1986/87), so for some species vulnerable to such conditions the population may still have been rather low. Another factor is that there has been a number of re-colonisations of Denmark by species that had for some time been absent. As an example, Eurasian Eagle Owl returned in 1984 after a large scale re-introduction programme in Germany of captive-reared birds (Frikke & Toft 1997). The reduction in threat status from regionally extinct (RE) to near threatened (NT) diminishes the weight on the indices from 5 to 1. Other species that have returned are White-spotted Bluethroat (status as least concern (LC)), Spoonbill (near threatened (NT)), White-tailed Eagle (vulnerable (VU)), Osprey (critically endangered (CR)), Red-crested Pochard (vulnerable (VU)), and Peregrine Falcon (vulnerable (VU)).

Butchart et al. (2004) and EEA (2007) both interpret changes in a RLI in relation to CBD's and EU's intention to have slowed down or stopped the loss of biodiversity by 2010. Increasing the RLI means improving the average population status of the considered species, so probably meaning that the extinction rate has slowed down, but not necessarily that biodiversity loss has ended. In the Danish example, Black Grouse and Barred Warbler disappeared during a period of increasing RLI.

The increase during 1991-2009 in RLI for breeding birds in Denmark did not attain statistical significance, so cannot demonstrate that the CBD target of reducing the rate of biodiversity loss has been met. The EU target of halting biodiversity loss is only met when all species are assessed to have attained least concern (LC) status and the RLI has reached a value of 1. Or, depending on interpretation, when new species immigrate at a rate at least equalling the rate of extinction.

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Resumé

Rødlisteindeks for danske ynglefugle i perioden 1991 til 2009

Fugle er den bedst kendte gruppe af organismer hvad angår antal, udbredelse og bestandsudvikling. Det var derfor naturligt at vælge danske ynglefugle, da Skov- og Naturstyrelsen ønskede et mål for biodiversitet som svar på Biodiversitetskonventionens og EU's krav om at mindske eller stoppe tilbagegangen i biodiversitet i 2010. Et rødlisteindeks (RLI) for en specificeret gruppe af danske ynglefugle ville sammenfatte deres bestandsudvikling i et enkelt tal.

Problemet var, at de rødlister, der indtil da var udgivet, havde anvendt forskellige sæt af kategorier og kriterier. Men efter at have konsulteret tilgængelige data hos DOF syntes det at være muligt at udarbejde retrospektive rødlister for 1991 og 1997 efter de kriterier og kategorier, som i dag anvendes internationalt, og et samarbejde mellem DMU og DOF blev indledt, med støtte fra Skov- og Naturstyrelsen Rødlister over trusselsbilledet for de danske ynglefugle har været udgivet jævnligt siden 1974. De første bygger alene på ekspertvurderinger, men i 1994 udviklede den internationale naturbeskyttelsesorganisation IUCN et sæt af kategorier og kriterier til rødlistning af alle organismer, og den danske rødliste fra 1997 anvendte dette system. En større revision, som bl.a. førte til nye kategorier og et langt mere præcist sæt af kriterier, blev offentliggjort i 2001. De efterfølgende danske rødlister fra 2003 og 2009 har anvendt dette reviderede system.

Systemet er udviklet til rødlistning på globalt plan. Ved brug på regionalt eller lokalt plan kan der være situationer, hvor bestandstal alene giver et misvisende billede, hvorfor IUCN nedsatte en gruppe til at udarbejde retningslinjer for anvendelse af rødlistesystemet i mindre geografiske områder (Gärdenfors et al. 2001). Under visse omstændigheder kan der her opgraderes til en mere truet kategori eller nedgraderes til en mindre truet. Kriterium D1 siger eksempelvis, at hvis der er mindre end 1000 yngledygtige individer af en art, er arten sårbar. Anvendt efter pålydende vil dette kriterium betyde, at flere danske ynglefugle, specielt arter med store krav til territoriet, aldrig vil kunne nå op på et ikke-truet niveau.

Danmark er geografisk et lille område, som samtidig ligger på grænsen til flere biogeografiske regioner. På den-

ne baggrund har Danmarks Miljøundersøgelser i samarbejde med DOF udviklet et system til op- og nedgradering af trusselsstatus efter en række regler, således at vurderingerne passer bedre til danske forhold. Resultaterne heraf præsenteres i nærværende artikel.

Samtidig har en engelsk gruppe udviklet matematikken til et rødlisteindeks (RLI), så op- og nedgange i den samlede liste kan påvises efter statistiske metoder. Metoden går i korte træk ud på at udvælge en fast gruppe organismer og efterfølgende sammenligne det øjeblikkelige trusselsbillede med det værst tænkelige for hver af de rødlister, der indgår i undersøgelsen.

For at kunne bruge de ældre danske rødlister i disse beregninger, har vi udarbejdet retrospektive rødlister for 1991 og 1997 efter IUCNs nye kategorier og kriterier tilpasset danske forhold. På baggrund af dem og de to andre rødlister for danske ynglefugle (2003, 2009), der er udgivet efter 1990, har vi derefter beregnet RLI. Til sammenligning præsenteres desuden RLI, hvor IUCNs kriterier og kategorier er brugt uden modifikation. De sidste indekser viser samme tendens som det tilpassede. Den samlede udvikling over perioden har været positiv, med en stigende tendens i RLI (faldende samlet trussel) frem til 2003, og derefter en svagt faldende tendens (øget trussel). Der var med andre ord flere fremgange end tilbagegange i perioden 1991 til 2003, mens det var omvendt fra 2003 til 2009.

En vigtig årsag til dette forløb er formentlig de tre isvintre i 1985-1987, som betød, at flere ynglebestande stadig var små ved vurderingen i 1991. Det har også betydet en del for RLI, at seks arter, som tidligere ynglede i Danmark, er vendt tilbage som ynglefugle. F.eks. begyndte Stor Hornugle igen at yngle i Danmark i 1984 efter omfattende udsætninger i Tyskland, og den er i dag vurderet som næsten truet (NT). Som regionalt uddød (RE) vægtede den med 5 på RLI, mens den som NT vægter med 1. Denne "fremgang" fra 5 til 1 svarer til, at fire fuglearter går frem fra næsten truede (NT) til ikke truede (LC). De øvrige tilbagevendte arter er Skestork, Havørn, Fiskeørn, Rødhovedet And og Vandrefalk.

RLI for ynglefugle i Danmark viser ikke nogen statistisk signifikant udvikling, og der kan derfor intet konkluderes om hvorvidt Biodiversitetskonventionens mål om at reducere tilbagegangen i biodiversitet er opfyldt. EUs mål om at stoppe tabet af biodiversitet er derimod ikke opnået, i hvert fald ikke, hvis det skal gælde hvert enkelt medlemsland, og hvis tab ikke kan modregnes i gevinster, idet Danmark i denne periode har mistet både Urfugl og Høgesanger som ynglefugle. I denne strenge fortolkning vil EUs mål for Danmarks vedkommende først være opfyldt, når indekset er nået op på 1,0.

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