

## 4. Conservation status of species listed in Annex II, IV and V of the Habitats Directive

Annex II of the Habitats Directive includes animal and plant species of community interests whose conservation requires the designation of special areas of conservation. Annex IV includes species of community interest in need of strict protection and Annex V includes species of community interest whose taking in the wild and exploitation may be subject to management measures.

### 4.1 Priority species

Two of the species listed in Annex II are *priority* (\*) *species* for the conservation of which the Community has particular responsibility (Table 4.1).

#### 4.1.1 1113\* Houting *Coregonus oxyrhynchus*

Habitats Directive: Priority species. Annexes II and IV - Danish Red List 1997: Rare

##### *Distribution, population size and status*

The Houting is a fish species whose known distribution is the Wadden Sea and possibly adjacent North Sea. Spawning takes place in fresh water in fast running streams over firm bottom substrates.

At the beginning of the 19th century, it was a common species in the Dutch, German and Danish Wadden Sea. However, during the 1920s and 1930s the species gradually disappeared from

the Dutch and German rivers (Jensen et al. in press.).

In Denmark, too, the houting became rare and by 1979-1980, its distribution was confined to the Vidå-system which supported a small population (Sønderjyllands Amtsråd & Ribe Amtsråd 1988). Its decline was possibly caused by the deterioration in the spawning and reproduction conditions caused by extreme stream maintenance, poor water quality, and the installation of dams which prevented it from reaching its spawning grounds. Drainage and canalisation have further reduced winter flooding and thus the nursery habitats used by the developing fry (Sønderjyllands Amtsråd & Ribe Amtsråd 1988).

Because of this decline, Ribe and Sønderjyllands counties initiated a species action plan partly to enhance breeding and reproduction by improving the environment and partly through rearing and restocking houting fry in streams previously inhabited by the species. Thus, to date, a total of 1.7 million houting fry were restocked into six stream systems (Jensen et al. in press.).

##### *Conservation status*

*Localities:* During 1987-1992 599,000 fry were restocked in Vidå, 289,000 in Brede Å, 315,000 in Ribe Å, 138,000 in Kongeå, 179,000 in Sneum Å and 222,000 in Varde Å (Fig. 4.1.1). So far, Vidå is the only stream system where this action has resulted in an acceptable production of subadult houtings. In Brede and Varde Å reproduction does take place, but it is uncertain whether the population there can be made self-maintaining. No self-maintaining population has been estab-

Table 4.1. Conservation status for the two priority species (\*) in Denmark. ◻Stream systems.

Species <i>Scientific name</i>	An- nex	No. of local- ities	Size of popu- lation	%	Conservation status: No. of localities / % of species					National status
					Favourable	Uncertain	Unfavour.	Unknown	Disappear.	
* <i>Coregonus oxyrhynchus</i>	II, IV	8◻	ca 7700	>95%	2 / 59%	2 / 36%	4 / 5%			Uncertain
* <i>Osmoderma eremita</i>	II, IV	10	ca 1200	>95%		9 / >95%	1 / <5%			Uncertain

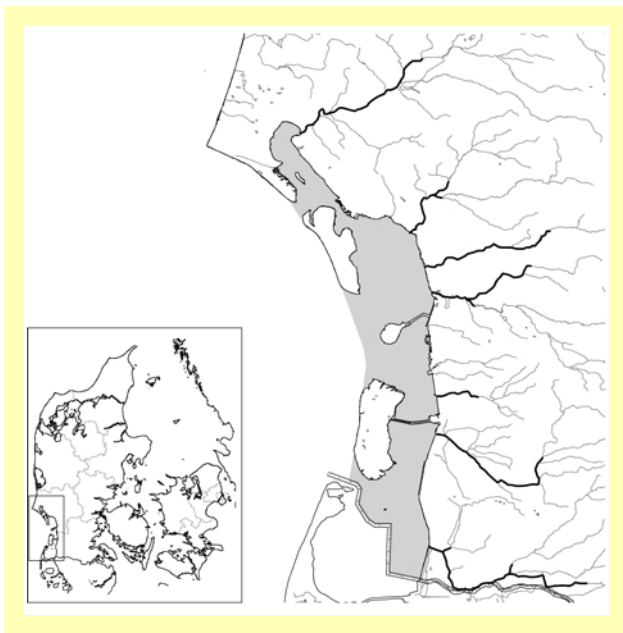


Figure 4.1.1. Houting. Known general distribution in Denmark in 1999. Streams with confirmed breeding are shown in black, the grey shaded area delimits coastal areas thought to constitute the major areas where fry develop to the adult stage.

lished in Sneum Å and Kongeåen. A few individuals have been registered in Brøns and Rejsby Å where no restocking has taken place (Jensen et al. in press.).

The population in each individual stream system has been estimated using the capture-recapture method as follows: Vidå 3,000 (1995), Brede Å 2,000 (1995), Brøns Å 36 (1995), Ribe Å 1,650 (1998), Sneum Å 171 (1998), Varde Å 783 (1997). In addition, Kongeåen is estimated to support <100 and Rejsby Å <25 using other methods (Jensen et al. in press.).

The conservation status of this species (primarily based on its ability to establish self-sustaining populations) is as follows in each of the streams: Vidå and Ribe Å favourable, Brede Å and Varde Å uncertain, and Sneum Å, Kongeåen, Brøns Å, and Rejsby Å unfavourable (Table 4.1).

*Overall status:* Through restocking, the houting has become more widespread in streams flowing into the Wadden Sea, but with only one population apparently capable of maintaining itself, the overall conservation status in Denmark must be characterised as uncertain.

#### 4.1.2 1084\* Hermit Beetle *Osmoderma eremita*

Habitats Directive: Priority species. Annexes II and IV -Danish Red List 1997: Critically endangered

##### *Distribution, population size and status*

The Hermit Beetle exploits hollow deciduous trees, particularly oak and beech, in semi-open or open woods, e.g. in old deer parks. Thus the species often favours parks or avenues in connection with these woods.

Its distribution in Denmark is confined to the islands east of Storebælt and in recent times the species is known only from Zealand and Lolland, although it is known in the past from Falster (last observed in 1938). During 1830-1999 the species was reported from 30 different localities in Denmark. Since 1950, it is known from 14 localities (5 in south Zealand, 4 in northeast Zealand and 5 on Lolland). Mapping in 1993 relocated the species at 10 localities (Martin 1994), 9 of which were still occupied by hermit beetles in 1999: 5 in south Zealand, 1 in northeast Zealand, and 3 on Lolland (Fig. 4.1.2). Even though the figures show a marked decrease in known occupied localities the hermit beetle has been discovered at some new localities on Lolland (Martin 1994). No new localities have been found since 1993. It cannot be, ruled out,



Figure 4.1.2. Hermit Beetle. Confirmed records in Denmark in 1999.

However, that the species may be found at other localities than those investigated.

The number of extant sub-populations at each individual locality was not determined in 1993 which makes it difficult to assess the status of the population overall. The number of host trees has, however, become fewer during the period which probably indicates a decrease in total population size. Swedish data suggest 20 Hermit Beetles per host tree (Ranius 1995), adopting this figure for the Danish situation the known Danish population could equate to approx. 1,200 individuals.

#### *Conservation status*

*Localities:* The conservation status is considered to be uncertain at nine localities and unfavourable in areas where the species could not be relocated (Table 4.1.). Even though eight populations are estimated as stable and only minor changes in habitat are noted, the habitats are not secured against changes in woodland and parkland management. Furthermore, the capacity of the Hermit Beetle to disperse is poor and, as each sub-population becomes more isolated, it is questionable whether the species will survive in the long run – even with no change in existing habitat. Conservation status in the area where the Hermit Beetle was not found is estimated as unfavourable, although the species may continue to exist in the area.



Figure 4.2.1.1. Barbastelle Bat. Confirmed records in Denmark 1973-1994.

*Conclusion:* The national status of the Hermit Beetle is uncertain.

## 4.2 Non-priority species

### 4.2.1 Mammals

#### 4.2.1.1 Barbastelle Bat *Barbastella barbastellus*

Habitats Directive: Annexes II and IV - Danish Red List 1997: Rare

#### *Distribution, population size and status*

The Barbastelle Bat breeds in hollow trees or in houses while its winter quarters are primarily in cellars, abandoned military structures, abandoned ice stores, mine shafts, pits etc. Biotope preferences are not fully known but the species favours deciduous forest. Hunts over forest roads, along edges of woods and hedgerows, possibly also in more open land. Moves from place to place along woodland fringes, hedges etc.

The Barbastelle Bat is rare throughout western Europe. A survey by volunteer observers and special surveys using bat detector devices located a total of 4,707 localities with bats during the Danish bat atlas project 1973-1994 (H. Baagøe unpubl. data). This species was only registered twice: One individual found dead in the street of Vordingborg in the autumn of 1986 and the other registered by detector at Røgbølle Sø, Lolland (Fig. 4.2.1.1). There may be a small population in southeastern Denmark (excluding Bornholm), but it remains a strong possibility that these individuals were actually migrants from Sweden or Germany/Poland, as the species is known to move over long distances of up to 290 km.

Population size of the species and its present status are unknown. Comparison with historical data suggests that the species has been more common during 1850-1950 than now. There is information on 27 Barbastelle Bat localities (in-

volving approx. 60 individuals) out of 562 older known bat localities (before 1973) on Zealand, Lolland, and Falster, including one from Bornholm. The species seems to have been on the decline for many years especially on Zealand and this tendency is reflected in several Western European countries.

#### Conservation status

*Localities:* The habitat at Røgbølle Sø is considered a good biotope for the species. Based on presently available data it is impossible to assess the conservation status of the species in the known areas of occurrence (Table 4.2). Until recently the species was difficult to identify by detectors but a new detector system makes it easy, however, only when the species uses a particular easily distinguishable sonar signal (Ahlén & Baagøe 1999).

*Conclusion:* The species is rare and the present data are not sufficient to assess the national conservation status. Thus the true status of the Barbastelle Bat is unknown.

#### 4.2.1.2 Pond Bat *Myotis dasycneme*

Habitats Directive: Annexes II and IV - Danish Red List 1997: Vulnerable - Danish Amber List 1997: National responsibility species

#### *Distribution, population size and development*

The Pond Bat breeds in houses and hollow trees close to its favoured foraging areas while its winter quarters are usually in chalk pits, crevices, castle cellars etc. Over 90% of feeding takes place above the water surface of lakes and streams with abundant insects (Baagøe 1987, 1991 and unpubl. data). The flight to and from its hunting range is along woodland fringes, hedgerows and other linear features in the landscape.

The Pond Bat is a rare species and its main distribution is limited to Mid- and Eastern Jutland (Fig. 4.2.1.2). During the Danish bat project (H. Baagøe, unpubl. data) in 1973-1994, a total of 4,707 bat localities were located by volunteer observers and bat detectors. The species was

Table 4.2. Conservation status of mammals. \*The number of localities is unknown, but the majority is supposed to belong to this category. \*\*Management areas. #Counties. □ Marine areas/the most important single localities.

Species <i>Scientific name</i>	An- nex	No. of local- ities	Size of popu- lation	% of DK	Conservation status: No. of localities / % of species					National status
					Favour- able	Un- certain	Unfa- vour.	Un- known	Dis- appear.	
<i>Barbastella barbastellus</i>	II, IV	2	Unknown	?				2 / ?		Unknown
<i>Myotis dasycneme</i>	II, IV	52	>2-3000	?	x* / ?					Favourable
<i>Myotis bechsteinii</i>	II, IV	2	Unknown	?				2* / ?		Unknown
<i>Myotis brandtii</i>	IV	93	Unknown	?	x* / ?					Favourable
<i>Myotis daubentonii</i>	IV	453	Unknown	?	x* / ?					Favourable
<i>Myotis mystacinus</i>	IV	77	Unknown	?	x* / ?					Favourable
<i>Myotis nattereri</i>	IV	32	>400	?	(x / ?)			x* / ?		Unknown
<i>Pipistrellus nathusii</i>	IV	126	Unknown	?	x* / ?					Favourable
<i>Pipistrellus pipistrellus</i>	IV	1080	Unknown	?	x* / ?					Favourable
<i>Plecotus auritus</i>	IV	193	Unknown	?	x* / ?					Favourable
<i>Eptesicus serotinus</i>	IV	1546	Unknown	?	x* / ?					Favourable
<i>Vespertilio murinus</i>	IV	759	Unknown	?	x* / ?					Favourable
<i>Nyctalus noctula</i>	IV	354	Unknown	?	x* / ?	(x / ?)	(x / ?)			Favourable
<i>Phocoena phocoena</i>	II, IV	3**	Unknown			2 / ?	1 / ?			Uncertain
<i>Lutra lutra</i>	II, IV	8#	>600?	100%	5 / 95%	2 / 5%	1 / 0%			Uncertain
<i>Halichoerus gryphus</i>	II	7	Ca. 20	>95%	4 / 85%	3 / 15%				Uncertain
<i>Phoca vitulina</i>	II	5/16□	>7120	>95%	5 / >95%					Favourable
<i>Muscardinus avellanarius</i>	IV	56	Unknown	>95%	35 / ?	21 / ?				Uncertain
<i>Sicista betulina</i>	IV	?	Unknown	?				x* / ?		Unknown

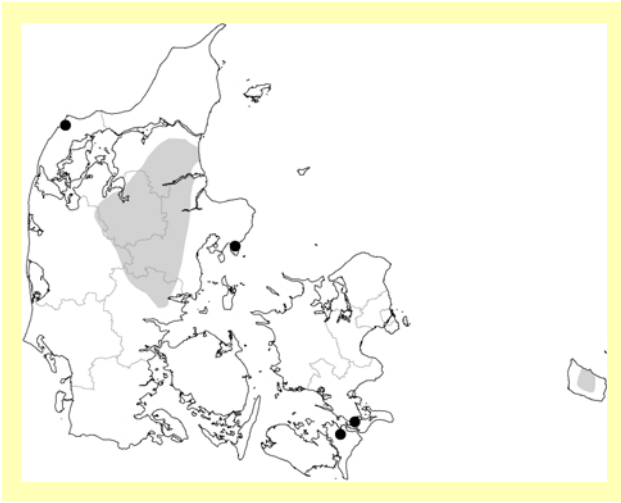


Figure 4.2.1.2. Pond Bat. Confirmed records (solid dots), known general distribution (grey shading) in Denmark 1973-1994.

located at 52 sites, of which 46 were records of individual bats, 27 were detector localities and 5 were proven breeding colonies. A small but apparently viable population was registered in Midjutland, with a few individuals in Mols and Thy. Bornholm is known to support 4 localities, however with irregular appearance and these individuals may be migrants from Skåne or the Baltic States. The only other parts of Denmark in which the species was found are southern Zealand and Falster. These individuals are probably migrants.

Each winter Smidie lime pit in Himmerland houses 200-500 Pond Bats. Mønsted and Daugbjerg lime pits both support 500-1,000 individuals and Tingbæk lime pit holds 0-20 individuals (Baagøe et al. 1988, Degn 1987 and H. Baagøe unpubl. data). In all these places the winter population seems to be stable. Ringed individuals from these lime pits have been relocated in the above mentioned areas in Midjutland (Egsbæk & Jensen 1963, Egsbæk et al. 1971). It is therefore assumed that the present population depends on a combination of suitable winter quarters in the lime pits and the existence of extensive feeding areas in the vicinity.

The current population size is unknown but as the species is easy to locate, the small number of known sites indicates a relatively small population. Based on the figures from the lime pits, however, the population is thought to number

at least 2,000-3,000 individuals. Comparison with historical data suggests that the species occurred on Zealand from the late 1800s until 1961. Despite thorough survey (Atlas project) and the continued existence of good summer biotopes, the species has not been relocated here.

#### *Conservation status*

*Localities:* The Midjutland area in particular maintains important feeding biotopes and reasonable summer roosting quarters (in houses). The conservation status of the wintering population in the lime pits in Jutland is favourable (Table 4.2), but the species here is vulnerable to small changes in the environment (e.g. the physical collapse of the pits, changes in land use at and around the pits, changes in migration routes, as well as various sources of disturbance). The conservation status of the summer population in Midjutland seems to be favourable, but as there is no actual surveillance at present, changes may already have taken place.

*Overall status:* Conservation status seems favourable for the hibernating populations in the core area of the Jutland lime pits as well as for the summer population. However, the size of this population relative to the national population remains unknown.

#### **4.2.1.3 Bechstein's Bat *Myotis bechsteinii***

Habitats Directive: Annexes II and IV - Danish Red List 1997: Rare

#### *Distribution, population size and status*

The Bechstein's Bat favours breeding in hollow trees but will use nesting boxes provided for birds and bats. Winter quarters are generally in hollow trees, occasionally in galleries, rock caves etc. (Baagøe in press/c).

The Bechstein's Bat is rare throughout Europe and its presence in Denmark is thought to be recent (Baagøe & Trolle 1988, Baagøe 1991, in press/a, unpubl. data). A survey by volunteer observers and special surveys using bat detector devices located a total of 4,707 localities with





Figure 4.2.1.3. Bechstein's Bat. Confirmed records in Denmark 1973-1994.

bats during the Danish bat atlas project 1973-1994 (H. Baagøe unpubl. data). The species was only registered in two localities on Bornholm, viz. one individual in a house in Rø and one individual recorded by using a bat detector in Ekkodalen (Fig. 4.2.1.3). The Bechstein's Bat is undoubtedly very rare, but is also difficult to survey by volunteer observers or by the use of detector devices. It cannot be ruled out that these individuals were actually migrants from Sweden or Poland. It is, however, more likely that Bornholm supports a small population, as this species is known to be one of the most sedentary of bat species and rarely flies over open land. Population size and status are unknown (Table 4.2).

#### *Conservation status*

*Localities:* The following areas on Bornholm seem to be favoured by the species: parts of Ekkodalen and old forest in Almindingen, e.g. at Lilleborg. Based on these data it is impossible to assess the conservation status of the species in the known areas of occurrence.

*Overall status:* The species is very rare and the present data are not sufficient to estimate the national conservation status.

#### 4.2.1.4 Brandt's Bat *Myotis brandtii*

Habitats Directive: Annex IV - Danish Red List 1997: Vulnerable

#### *Distribution, population size and status*

The Brandt's Bat breeds in houses, often close to forests but also in hollow trees. Its winter quarters are primarily in galleries, rock caves, cellars etc, although houses and hollow trees may sometimes be used. The species hunts at low to medium heights (1-15 metres) particularly along edges of woods, in glades, gardens, parks or along hedgerows and in some few cases far from wooded vegetation (Baagøe 1987, 1991 and unpubl. data). Bornholm's small woodlands are important hunting territories for this species.

The Brandt's Bat is a rare species in Denmark away from Bornholm where it occurs more often. A survey by volunteer observers and special surveys using bat detector devices located a total of 4,707 localities with bats during the Danish bat atlas project 1973-1994 (H. Baagøe unpubl.). The species was registered at 93 localities. The Brandt's Bat cannot be distinguished from Whiskered Bat by bat detector and consequently the two species are considered as one (see below). With only 23 localities registered by volunteer observers (including the known wintering localities) and 70 detector localities (Brandt's/Whiskered) the Brandt's Bat is considered one of the more rare species in Denmark. The few observations demonstrate that the species is reasonably scarce in Denmark with only local populations on Bornholm (12 localities, 8 of which are breeding localities) and in Mid-jutland (10 localities, 4 out of which are breeding colonies and 4 wintering quarters) and a single observation from Lolland-Falster (Fig. 4.2.1.4). Using bat detectors, 62 sites were located on Bornholm supporting the Brandt's or Whiskered Bats and 6 in Jutland as well as 2 from Lolland-Falster (presumably the Brandt's Bat at these 2 locations). The Brandt's Bat is more frequent on Bornholm compared to the rest of Denmark and on the basis of records from bat detectors, the Brandts/Whiskered Bats are the most commonly registered species on this island.

Approximately 200 Brandt's Bats winter in Smi-



Figure 4.2.1.4. Brandt's Bat. Confirmed records and known general distribution in Denmark 1973-1994. Solid dots: Individuals identified in the hand. Triangles: Localities determined by detector devices supporting Brandt's Bat/Whiskered Bat; outside Bornholm probably Brandt's Bat. Grey shading: Numerous

die Lime pit in Himmerland (H. Baagøe, unpubl. data, B. Jensen unpubl. data), 100-200 individuals are assumed to winter in both Mønsted and Daugbjerg Lime pits (Baagøe et al. 1988) and 1-10 individuals in Tingbæk Lime pit. All these winter populations seem to be stable. The national population size and status are, however, unknown, but Bornholm and Midjutland seem to support viable populations. Historical data suggest that during the late 18th century the species could also be observed on Zealand.

#### Conservation status

**Localities:** Conservation status of the Brandt's Bat seems favourable in most localities (Table 4.2). Bornholm and Midjutland offer good hunting biotopes and a reasonable number of summer quarters (houses). Conservation status of the wintering population is favourable in the Jutland lime pits, but the species is vulnerable to physical changes of these habitats. Information on winter quarters on Bornholm is scarce. There seems to be no decline in numbers in the two summering areas (Midjutland, Bornholm) and the biotopes there, too, seem favourable to the species.

**Overall status:** Estimates are insufficient to offer an overall status of the species, but can be as-

sessed as favourable in the known winter and summer quarters. Thus the national conservation status is estimated favourable.

#### 4.2.1.5 Daubenton's Bat *Myotis daubentonii*

Habitats Directive: Annex IV - Danish Red List 1997: Vulnerable

#### *Distribution, population size and status*

The Daubenton's Bat breeds almost exclusively in hollow trees, but occasionally under old stone bridges close to its hunting range. Its winter quarters are mainly in lime pits, rock clefts, castle cellars etc. More than 90% of hunting takes place above the surface of lakes and streams in sites associated with abundant insect production, but the species also hunts between trees, along woodland fringes etc. (Baagøe 1987, 1991 and unpubl. data).

The Daubenton's Bat is a common species in Denmark. A survey by volunteer observers and special surveys using bat detector devices located a total of 4,707 localities with bats during the Danish bat atlas project 1973-1994 (H. Baagøe unpubl.). This species was one of the most common species, occurring at a total of 453 localities: 356 of which were registered by means of detectors and 97 by volunteer observers (Fig. 4.2.1.5). Each winter Smidie lime pit supports 500-1,200 Daubenton's Bats and the number has been increasing (H. Baagøe, unpubl., B. Jensen, unpubl.). The wintering population for both Mønsted and Daubjerg lime pits in Midjutland is estimated at 3,500-5,000 individuals and stable (Baagøe et al. 1988, unpubl. data). The corresponding figures at the following locations are: Tingbæk Lime pit in Himmerland 150-300 individuals and increasing, lime tunnel at Hasseris 40-50 individuals and declining, and in a bunker at Silkeborg approx. 75 individuals and stable (B. Jensen, unpubl. data), and in Kronborg 5-10 individuals and stable (H. Baagøe and B. Jensen, unpubl. data). Only Smidie, Tingbæk, Hasseris, and Kronborg are counted regularly.

The Daubenton's Bats ringed in lime pits have been recovered throughout Midjutland (Egsbæk

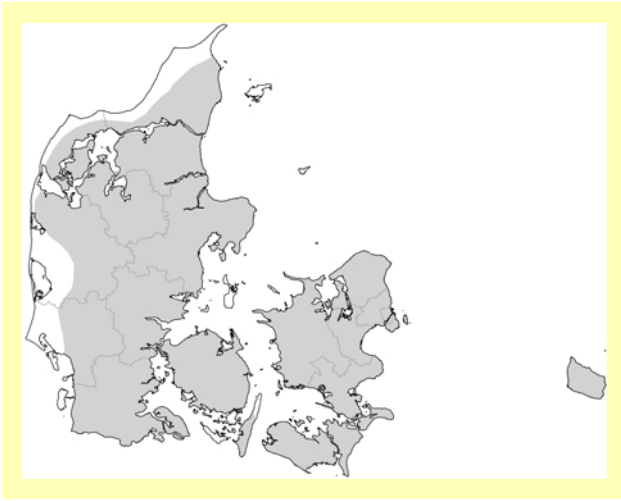


Figure 4.2.1.5. Daubenton's Bat. Known general distribution in Denmark 1973-1994.

& Jensen 1963, Egsbæk et al. 1971) and without doubt most of these individuals use the lime pits on a regular basis. However, it seems likely that the species hibernates at other, currently unknown localities as it is also common in other parts of Denmark. A few reports indicate that the species may also use or hibernate in old wells. This rather suggests that this species is less strongly reliant on the lime pits to sustain the population than, for example, the Pond Bat.

An overall estimate of the total population size does not exist but as the species is frequent and widespread it is likely not small. The trend is unclear but seems to be viable and stable throughout the country. The species is on the increase in many other European countries. This may be due to the fact that the species also hunts over moderately contaminated water surfaces if only insects are plentiful. Comparison with historical data suggests no clear differences in distribution and abundance compared with former times in Denmark.

#### *Conservation status*

*Localities:* Most parts of Denmark offer good hunting biotopes. Even though there is certainly a lack of hollow trees, the species may find its preferred breeding localities throughout the country, as well as suitable winter quarters. Thus the conservation status seems favourable at most localities (Table 4.2). Lack of breeding quarters in hollow trees may, however, be a limiting fac-

tor to the species and the hibernating population in lime pits, bunkers, abandoned military structures etc. is vulnerable to even small changes in the physical conditions (collapse of lime pits and mine shafts, changes in migratory behaviour, human disturbances etc.).

*Overall status:* The Daubenton's Bat is a widespread and common species in Denmark whose conservation status is estimated to be favourable.

#### 4.2.1.6 Whiskered Bat *Myotis mystacinus*

Habitats Directive: Annex IV - Danish Red List 1997: Vulnerable

The Whiskered Bat breeds in houses, often close to forests but also in hollow trees. Its winter quarters are primarily in galleries, rock caves, cellars etc, occasionally also in houses and hollow trees. Hunts at low to medium heights (1-15 metres) particularly along edges of woods, in glades, gardens, parks or along hedgerows and in some few cases far from wooded areas (Baagøe 1987, 1991 and unpubl. data). Bornholm's small woodlands are important hunting territories for the species.

In Denmark the Whiskered Bat occurs only on Bornholm. A survey by volunteer observers and special surveys using bat detector devices located a total of 4,707 localities with bats during the Danish bat atlas project 1973-1994 (H. Baagøe unpubl.). The Whiskered Bat cannot be distinguished from the Brandt's Bat by bat detector and consequently the two species are considered as one. With only 15 localities (4 out of which are breeding localities) registered by volunteer observers and 62 registered by detector devices (Brandts/Whiskered Bat), the species is considered one of the more rare species in Denmark (Fig. 4.2.1.6). Population size and trend are not known but Bornholm may be assumed to support a viable population. Older findings (3) confirm its existence on the island far back.

#### *Conservation status*

*Localities:* Conservation status of Whiskered Bat seems favourable at most localities (Table 4.2).





Figure 4.2.1.6. Whiskered Bat. Known general distribution in Denmark 1973-1994.

Bornholm offers good hunting biotopes and summer quarters (houses) to the species. Very little is known of its winter quarters.

*Overall status:* Estimates are insufficient to offer an overall status of the species, but the national conservation status can be assessed as favourable. There is no indication of decline in the species and an abundance of suitable biotopes remains.

#### 4.2.1.7 Natterer's Bat *Myotis nattereri*

Habitats Directive: Annex IV - Danish Red List 1997: Vulnerable

##### *Distribution, population size and status*

The Natterer's Bat breeds in houses and hollow trees. Winter quarters are mainly cellars, abandoned military structures, lime pits etc. (H. Baagøe, unpubl. data). The species prefers deciduous forest and in particular more open forest (e.g. grazing forest). It hunts at rather low heights (often 1-5 metres) between branches or close along woodland fringes and hedgerows and in wooden gardens, parks and occasionally also over streams and lakes. (Baagøe 1987, 1991 and unpubl. data).

The Natterer's Bat is widespread throughout Europe, but scarce in most places including Denmark. A survey by volunteer observers and spe-

cial surveys using bat detector devices located a total of 4,707 localities with bats during the Danish bat atlas project 1973-1994 (H. Baagøe unpubl.). The species was only represented at 32 localities and is thus a scarce species (Fig. 4.2.1.7). By means of detector devices 14 localities were registered and volunteer observers counted 18 localities including breeding colonies on Lolland and Bornholm, which includes all known wintering localities. The low number of registrations shows that the species is rare but as the Natterer's Bat is a sedentary species, it is tempting to interpret the many widespread locations as representing many discrete local populations. The species may be overlooked at some localities given the methods used.

The Atlas project indicated dense populations on Bornholm and possibly also in parts of Himmerland. Nineteen out of 32 localities were registered on Bornholm, 4 out of which were breeding colonies. Apart from Bornholm only one breeding colony has been found near Nørresø (close to Maribo). Smidie lime pit in Himmerland supports each winter 100-150 Natterer's Bats (H. Baagøe, unpubl. data, B. Jensen, unpubl. data). Mønsted and Daugbjerg lime pits are estimated to each support 50-100 wintering Natterer's Bats, Tingbæk lime pit 10-20 and Kronborg 15-25. In all places the numbers seem stable.

Population size and trend of the Natterer's Bat



Figure 4.2.1.7. Natterer's Bat. Confirmed records (solid dots), known general distribution (grey shading) in Denmark 1973-1994.

are unknown. The total population based on numbers at the known wintering localities is estimated to be 225-400 individuals.

#### *Conservation status*

*Localities:* Generally speaking very little is known about conservation status at the localities but the wintering populations in the lime pits seem stable with a favourable conservation status (Table 4.2). Numbers fluctuate from year to year (best registered in Smidie). The fluctuating number throughout the winter indicates use of other wintering sites, which makes it difficult to estimate the size of the local population wintering in the pits.

*Overall status:* The species is relatively rare and the national conservation status is partly unknown. Counts and estimates from the lime pits and Kronborg show stable wintering populations whereas data are scarce for the summer populations.

#### **4.2.1.8 Nathusius' Pipistrelle *Pipistrellus nathusii***

Habitats Directive: Annex IV - Danish Red List 1997: Vulnerable

#### *Distribution, population size and status*

The Nathusius' Pipistrelle has its summer and winter quarters in both buildings and hollow trees close to forests. The species favours areas rich in deciduous trees and hunts typically at middle heights (5-20 metres) close to trees, along edges of woods, glades etc. and not so often in vegetation (Baagøe 1987, 1991 and unpubl. data). The species is migratory. The Baltic Nathusius' Pipistrelle prefers regular migration in a south westerly direction and is relocated in many mid European countries. The same applies to some Scanian individuals. Migration patterns of the Danish population are unknown nor is there any knowledge whether the Danish winter population is identical to the summer population or to what degree this population actually represents migrants from the north.



Figure 4.2.1.8. Nathusius' Pipistrelle. Confirmed records (solid dots), known general distribution (grey shading) in Denmark 1973-1994.

The Nathusius' Pipistrelle is a relatively rare species in Denmark but its occurrence is not so rare as previously assumed. A survey by volunteer observers and special surveys using bat detector devices located a total of 4,707 localities with bats during the Danish bat atlas project 1973-1994 (H. Baagøe unpubl.). The Nathusius' Pipistrelle was one of the more rare species registered at 126 localities, out of which 93 were located by detector devices and 33 by volunteer observers (Fig. 4.2.1.8). The relatively low number shows that the species is far more rarely occurring than the Pipistrelle Bat. Estimates indicate a frequent occurrence and somewhat more common distribution than previously assumed. Nathusius' Pipistrelle may have been overlooked previously and population figures do not exist.

#### *Conservation status*

*Localities:* Conservation status is estimated favourable in most habitats (Table 4.2). The deciduous forests in Denmark offer excellent hunting opportunities and suitable winter and summer quarters.

*Overall status:* It is a relatively frequently occurring species – more common and more widespread than previously assumed, and conservation status is considered favourable.

#### 4.2.1.9 Pipistrelle Bat *Pipistrellus pipistrellus*

Habitats Directive: Annex IV

##### *Distribution, population size and status*

The Pipistrelle Bat favours areas rich in deciduous trees (H. Baagøe, unpubl. data). Its summer and winter quarters are in both buildings and hollow trees close to forests, and hunting is typically at low to middle heights (1-20 metres) close to trees, along edges of woods, glades and not so often in vegetation (Baagøe 1987, 1991 and unpubl. data).

Within recent years it has been demonstrated that the Pipistrelle Bat can be divided into two species which are distinguishable by differences in sonar frequencies and by DNA. Detector devices reveal that one species uses ultrasound shrieks with frequencies below 50 KHz and has a tongue formed distribution from south up through Jutland where in many places it co-occurs with another species which uses frequencies above 50 KHz. The latter is widespread in Denmark and the most common of these two species. The species have not yet been named and are treated here as one species, viz. the Pipistrelle Bat.

The Pipistrelle Bat is a common species in Denmark apart from Bornholm (one finding), west-



Figure 4.2.1.9. Pipistrelle Bat. Confirmed records (solid dots), known general distribution (grey shading) in Denmark 1973-1994.

ern Jutland and some smaller islands. During the bat atlas project in 1973-1994 a total of 4,707 bat localities were located. The Pipistrelle Bat was one of the most frequent species representing 1,080 localities, out of which 593 were registered by detector devices and 487 by volunteer observers. Many of these localities supported breeding colonies (Fig. 4.2.1.9). Actual population figures do not exist but the species is frequent in most of its natural range. Comparison of number of localities found per hour with detector devices reveals that populations are densest on Zealand, Lolland-Faster-Møn, Funen, and in South Jutland. Status in Denmark seems positive.

##### *Conservation status*

*Localities:* Conservation status is estimated favourable in most localities (Table 4.2). Its natural range in Denmark is rich in favourable hunting localities as well as many buildings offer suitable winter and summer quarters to this species strongly associated with man.

*Overall status:* The national conservation status is assessed as favourable.

#### 4.2.1.10 Brown Long-eared Bat *Plecotus auritus*

Habitats Directive: Annex IV - Danish Red List 1997: Vulnerable

##### *Distribution, population size and status*

The Brown Long-eared Bat has its summer and winter quarters both in buildings and hollow trees close to woods and parks. Only small numbers winter in lime pits, cellars etc. The species typically hunts at low or medium heights (1-15 metres) around trees, in glades along edges of woods and buildings – often in vegetation with leaves and branches offering the preferred prey (Baagøe 1987, 1991 and unpubl. data).

The Brown Long-eared Bat is a relatively commonly distributed species throughout Denmark. A survey by volunteer observers and special surveys using bat detector devices located a to-

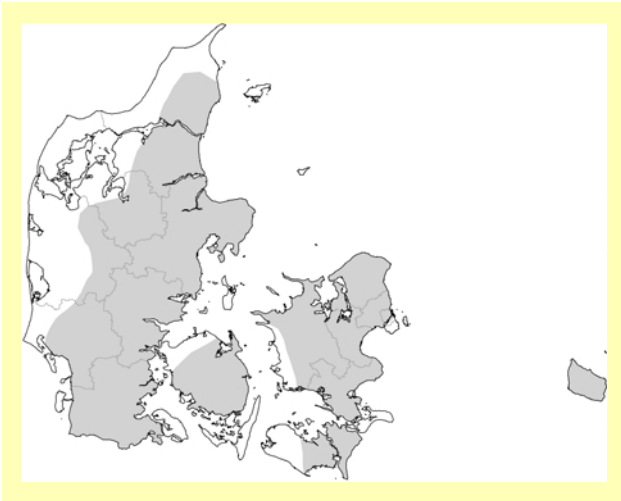


Figure 4.2.1.10. Brown Long-eared Bat. Known general distribution in Denmark 1973-1994.

tal of 4,707 localities with bats during the Danish bat atlas project 1973-1994 (H. Baagøe unpubl.). With a total of 193 localities the Brown Long-eared Bat was one of the less frequent species (Fig. 4.2.1.10). Fifty-two localities were registered by detector devices and 141, some of which included breeding colonies, by volunteer observers. The Brown Long-eared Bat is a sedentary species and the many widespread registrations seem to indicate small local populations. It is probable that the species compared to other species has been overlooked with the methods applied. Population figures do not exist.

#### Conservation status

*Localities:* Conservation status of the species seems favourable at most localities (Table 4.2). Denmark offers favourable hunting localities to the species and suitable summer and winter quarters.

*Overall status:* Conservation status of the Brown Long-eared Bat seems favourable.

#### 4.2.1.11 Serotine *Eptesicus serotinus*

Habitats Directive: Annex IV

#### Distribution, population size and status

The summer and winter quarters of the Serotine

are confined to buildings (small detached houses, 1-2 storey houses in the country). The species is fairly sedentary and hunts at medium heights (5-20 metres) close to trees and edges of woods or over open land – never amongst vegetation (Baagøe 1987, 1991, in press/a and unpubl. data). During late summer and autumn the species exploits to a high degree the abundant insects which are attracted to artificial street lighting, a feature which may have contributed to the relative success of the species (Rydell & Baagøe 1996).

The Serotine is a common species in Denmark except in the northeast of Zealand and in Jutland north of Limfjorden (Baagøe 1986, 1991, in press/b). During the bat atlas project in 1973-1994 a total of 4,707 bat localities were located (H. Baagøe, unpubl. data). The Serotine was the most common species of all bat species, registered at 1,546 localities, of which 654 localities were registered by detector devices and 892 by volunteer observers (Fig. 4.2.1.11). The many known breeding colonies are distributed evenly over its natural range. Precise estimates of the total population size do not exist but the species is common in most parts of its natural range. Comparisons of the number of localities found per hour with detector devices reveal that the populations are more densely distributed in East and South Jutland and on Funen than in West Jutland, on Djursland, in Mid- and South Zealand, Lolland, Falster, Møn and Bornholm. The conservation status of the species in Denmark

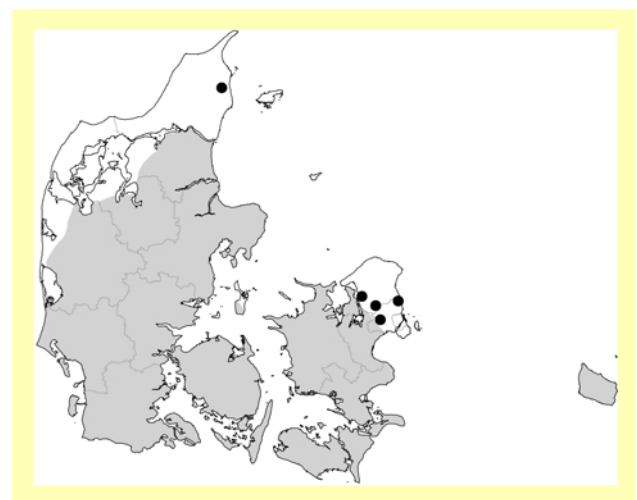


Figure 4.2.1.11. Serotine. Confirmed records (solid dots), known general distribution (grey shading) in Denmark 1973-1994.



seems favourable, perhaps partly due to the fact that the species benefits from some aspects of environmental change caused by man. Comparison with historical data suggests that the species may have increased in number in the last few hundred years (Baagøe 1991 and unpubl. data).

#### *Conservation status*

*Localities:* Conservation status of Serotine seems favourable at most localities (Table 4.2). Denmark offers a wide range of hunting localities and suitable summer and winter quarters are widespread. Its restricted distribution may be due to competition from the Particoloured Bat *Vespertilio murinus* (Baagøe 1986, in press/a and unpubl. data).

*Overall status:* The national conservation status is considered favourable.

#### **4.2.1.12 Particoloured Bat *Vespertilio murinus***

Habitats Directive: Annex IV

#### *Distribution, population size and status*

The summer quarters of the Particoloured Bat are exclusively in buildings (detached houses, 1-2 storey houses in the country, seldom in taller buildings). Its winter quarters are almost totally confined to high-rise blocks of more than four storeys, often in the middle of towns. The species typically hunts over quite open areas, often high above fields, forests and lakes but may also hunt at medium heights (5-15 metres), e.g. above lakes, open fields, glades and fringes of woods (Baagøe 1987, 1991, in press/c and unpubl. data). The Particoloured Bat is a migratory species, particularly in east Europe (Rydell & Baagøe 1994), but the population of Zealand moves only over short distances between its summer and winter quarters. During late summer and autumn, the species exploits the abundant insects which are attracted to artificial lighting, a feature which may contribute to the success of the species (Rydell & Baagøe 1996, Baagøe in press/b and unpubl. data). Many observations, par-

ticularly outside its breeding season west of its distribution range (in Denmark as well as elsewhere in west Europe) prove that the Particoloured Bat roams (Baagøe 1999, in press/c).

The Particoloured Bat is a common species throughout its distribution range in northeast Zealand (Baagøe 1986, in press/c). During the bat atlas project in 1973-1994 a total of 4,707 bat localities were located (H. Baagøe, unpubl. data). The Particoloured Bat was observed at a total of 759 localities: 344 by means of detector devices and 415 by volunteer observers (Fig. 4.2.1.12). Of these, 552 were registered in one restricted area in the northeast of Zealand where 194 summer breeding colonies were located. Thus, the species has a very dense population here (almost 200 breeding colonies). Only 3 other breeding colonies are known from the rest of Denmark (2 elsewhere on Zealand and 1 on Djursland) supplemented by some individual encounters and small and widespread groups of hunting individuals. The town of Århus has a small wintering population. The distribution of the species in Denmark is strongly influenced by the presence of man.

Precise estimates of the total population size do not exist, but the population of northeast Zealand is by far the densest. Outside of Norway and Sweden the population is presumed to be scarce in all European countries, although in Denmark the population trend is apparently positive.



Figure 4.2.1.12. Particoloured Bat. Confirmed records (solid dots), known general distribution (grey shading) in Denmark 1973-1994.



### *Conservation status*

*Localities:* Conservation status of the Particoloured Bat is presumed favourable at most localities (Table 4.2). Denmark offers excellent hunting localities and suitable summer quarters everywhere, whereas winter quarters are confined to towns with high-rise blocks. Its limited distribution may be caused by competition from Serotine (Baagøe 1986, in press/b and unpubl. data).

*Overall status:* Conservation status of the Particoloured Bat is estimated as favourable.

#### **4.2.1.13 Noctule Bat *Nyctalus noctula***

Habitats Directive: Annex IV

#### *Distribution, population size and status*

The Noctule Bat almost exclusively uses hollow trees as its summer and winter quarters, although it has been reported in a few cases to be wintering in buildings. It typically hunts over open areas, high over fields, edges of woods, in glades and over lakes, generally 5-15 metres above the ground (Baagøe 1987, 1991 and unpubl. data). The species is migratory, but migration patterns of the Danish population are unknown. Whether the Danish winter population represents the summer population is unknown, since it is not known to what degree the summer population includes migratory individuals from further north.

The Noctule Bat is a relatively common species in Denmark. During the bat atlas project in 1973-1994 a total of 4,707 bat localities were located (H. Baagøe, unpubl. data). The Noctule Bat was a relatively frequently registered species at 354 localities, of which 283 were located by detector devices and 71 by volunteer observers. Many localities supported breeding colonies, including 20 summer colonies and 9 winter colonies (Fig. 4.2.1.13).

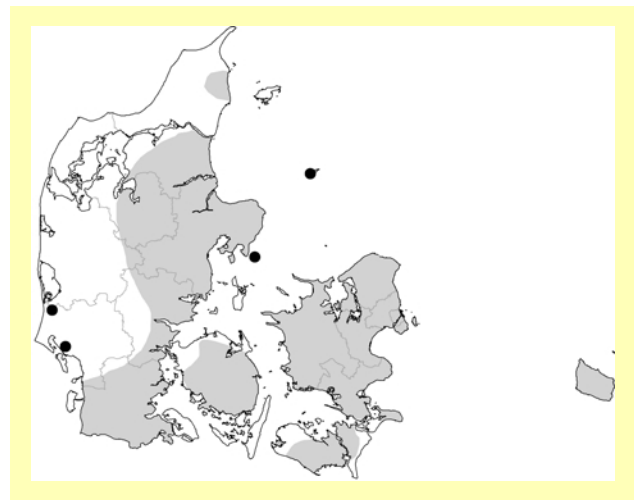


Figure 4.2.1.13. Noctule Bat. Confirmed records (solid dots), known general distribution (grey shading) in Denmark 1973-1994.

Population size is unknown and population trends are not clear, but there seem to be viable populations in most deciduous forest areas and at the same time there is no sign of a drastic decline, since repeated detector observations at a number of key localities show no changes in apparent abundance.

#### *Conservation status*

*Localities:* Conservation status seems mainly favourable for most areas rich in deciduous woodland, even though conditions locally may be unfavourable or uncertain in the future (Table 4.2). Generally, Denmark offers good feeding localities for the species and in particular those areas covered by deciduous trees (e.g. woods, parks, isolated trees) support suitable summer and winter habitats. Its distribution and status may, however, be limited now and in the future by the availability of suitable hollow trees.

*Overall status:* In spite of some uncertainty about suitable summer and winter localities, conservation status of the Noctule Bat is considered to be favourable.

#### 4.2.1.14 Harbour Porpoise *Phocoena phocoena*

Habitats Directive: Annexes II and IV - Danish Amber List 1997: Species requiring special attention

##### *Distribution, population size and status*

The Harbour Porpoise occurs in all Danish marine waters but varies in density geographically as well as seasonally. The current abundance and trends of this species are unknown at present. Analyses of genetic material from many individuals indicate the existence of a number of sub-populations in the North Sea, but exchange between populations and differential migration of the sexes complicate the picture. The same is true for animals using Kattegat-Bælthavet and the inner Baltic. The Harbour Porpoises in the North Sea breed, among other places, along the west coast of Jutland, whereas individuals in the inner waters breed in the waters north of Funen, in the northern parts of Lillebælt, in Smålandsfarvandet, in Sydfynske Øhav and in Sejerøbugten. It is likely that none of the Harbour Porpoise populations occur exclusively in Danish waters.

From a geographical point of view the North Atlantic Ocean has been divided into 13 populations/ICES-areas for the purpose of conservation of the Harbour Porpoise stocks (Jepsen & Gjødsbøl 1998). Three of these apply to Danish waters, namely: The North Sea-Skagerrak (parts of ICES IVa and IVb and IIIa-north), Kattegat-Bælthavet (ICES IIIa-south and IIIb+c) and the inner Baltic Sea (ICES IIIId). In 1994 the first joint survey of the Harbour Porpoises covered the North Sea, Skagerrak, Kattegat, Bælthavet and the West Baltic Sea (Hammond et al. 1994), which resulted in the first reliable estimates of numbers of the Harbour Porpoises in the various areas.

Estimates from the North Sea based upon the unintentional by-catch of the Harbour Porpoises have also been made (Vinther 1999). Although it is not possible to determine the trend in numbers from a single joint survey, the results of analyses of the numbers in the unintentional by-catch suggest a slight population decline. The

distribution of the species in the Danish North Sea waters probably remains unchanged. The size of the unintentional by-catch in Kattegat and Bælthavet is difficult to assess and thus trends for the species are not available here, but the population is probably unchanged apart from some local variation in numbers. Reliable estimates of the distribution of the species in the inner Baltic Sea do not exist but generally, information suggests a strong decline in population as well as a contraction of natural range. Large numbers are caught in fishing nets in Swedish and Polish waters.

##### *Conservation status*

*Localities:* Due to uncertainty about the definition of population units, it is difficult to make generalisations about the conservation of this species in different parts of the range. It is clear that some elements of the population may be strongly influenced by the level of mortality caused as a result of becoming caught in fishing nets. Thus, the status of the Harbour Porpoise in the North Sea, Skagerrak and Kattegat-Bælthavet may be unfavourable in some parts but generally, an overall estimate characterises both sites as uncertain (Table 4.2). Conservation status in the inner Baltic Sea is considered to be unfavourable.

*Overall status:* Information on trends is uncertain but counts and unintentional by-catch provide some indications of the status of the species. Based on the status of the two largest sub-populations compared to the extensive unintentional by-catch, the overall national status of the Harbour Porpoise is uncertain.

#### 4.2.1.15 European Otter *Lutra lutra*

Habitats Directive: Annexes II and IV - Danish Red List 1997: Vulnerable.

##### *Distribution, population size and status*

The European Otter occurs in stagnant as well as running water, and in salt and fresh water. Lakes, marshes and bogs with extensive areas of reeds are particularly favoured habitats.

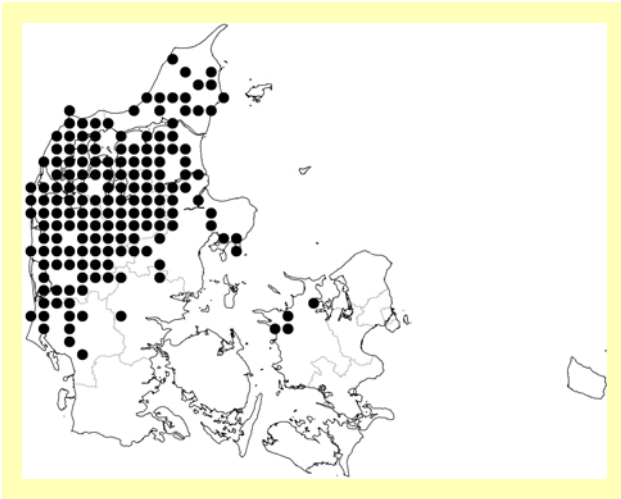


Figure 4.2.1.15. European Otter. Confirmed records in Denmark 1993-2000 illustrated as squares of 10x10 km.

During a country-wide survey in Denmark in 1996, the species was mapped and signs of otters were found in the counties of North Jutland, Viborg, Århus, Ringkøbing, Ribe, Vejle, and West Zealand (Hammershøj et al. 1996). Similar surveys were performed in 1984-1986 (Madsen & Nielsen 1986) and in 1991 (Madsen et al. 1992). These surveys are based on a standard method in which each locality is examined for trace of otters (faeces/foot prints).

Transfer of localities to a UTM-grid of 10 x 10 km squares resulted in otter signs being found in 67 squares in 1984-1986; 95 in 1991 and 134 in 1996. Based on data from the survey in 1996 supplemented with information from the counties and localities with otters found dead since 1993, an analysis in May 2000 found signs of otters in 165 squares (Fig. 4.2.1.15). Population estimates are difficult to assess on this basis, but if it is assumed that each area supports 4-5 individuals, the population can be estimated to be 660-825 individuals.

The game bag statistics show that by the end of the 1950s, the European Otter was widespread throughout the country except for some larger islands, such as Bornholm, Samsø and Læsø. The majority of otters were shot in the western and southern parts of Jutland and on Mid Zealand with fewest on Funen, South Zealand and Lolland-Falster (Jensen 1964). Approx. 200 otters were bagged annually in 1945-1965 after which there was a decline in the bag up to the point of

their protection in 1967 (Strandgaard & Asferg 1980). A questionnaire survey in 1980 revealed a drastic decline in the population at that time (Schimmer 1981). From the mid 1980s, when the first conservation management measures were introduced, this decline stopped and was followed by a recovery in the population. This tendency has further been enhanced by actions stemming from the Danish national management plan for the European Otter (Søgaard & Madsen 1996).

#### Conservation status

*Localities:* In the counties of Viborg and Ringkøbing which are thought to hold 60% of the national population, the status of the European Otter is considered favourable (Table 4.2). To continue to support the increase in numbers in the most important habitats, action plans and nature restoration projects have been carried out, such as those in the Hvidbjerg Å system and Skjern Å. In north Jutland, Århus and Ribe counties (which hold 35% of the national distribution), the status of the European Otter is also considered favourable in spite of the limited distribution, since numbers have increased in suitable habitats. In contrast, the status of the European Otter in Vejle and West Zealand counties (which holds only c. 5% of the population) is considered uncertain due to the restricted occurrence. The species is now absent from South Jutland county, where otters occurred formerly

*Overall status:* Throughout most of the 20th century, the European Otter population in Denmark was in drastic decline. National surveillance has, however, suggested that the population (over the past 10-15 years) has stabilised and may even have increased due to protection measures and restoration of habitats. Compared to the rest of Europe, the Danish otter population in Jutland and Zealand is, however, very isolated. Shaffer (1981) recommends the establishment of a population of 500 sexually mature individuals to maintain sufficient gene flow for a healthy population. This corresponds to an actual minimum population size (see chapter 2.3) of 1,200 and 1,600 otters (Wansink & Ringenaldus 1991). The overall status of the European Otter is therefore considered as uncertain in Denmark.

#### 4.2.1.16 Grey Seal *Halichoerus gryphus*

Habitats Directive: Annex II - Danish Red List 1997. Critically endangered

##### *Distribution, population size and status*

Before 1800, the Grey Seal was a common species in Danish waters and up until 1900 bred at certain undisturbed localities along the Danish coast. Today the species occurs only in Kattegat, the Baltic Sea and the Wadden Sea, but has been reported from Rønland Sandø in Limfjorden in 1998 (Fig. 4.2.1.16).

The Grey Seal is a frequent visitor to Anholt and Læsø in Kattegat. The species has often been observed at Sdr. Rønner (Læsø) but from the mid 1990s Grey Seals have been observed with increasing frequency at Hirtshals, Skagen, Hirschholmene, Frederikshavn, Sæby and Hals, which suggests that the population in the northern parts of Kattegat may be increasing. Maximum numbers on Anholt during aerial surveys in August have fallen from 6-10 individuals in 1988-1992 to 5 individuals in 1994, 4 individuals in 1996, and 3 individuals in 1998 (Heide-Jørgensen & Teilmann 1999). Dead juvenile Grey Seals were found on Anholt in 1982 and 1996 (Heide-Jørgensen et al. 1997). On Hesselø, aerial surveys cannot distinguish the Harbour Seal from the Grey Seal against the stony substrates, whereas on Anholt seals are easily identified at their sand haul-outs.

The Grey Seal occurs in the Baltic Sea at Saltholm, Falsterbo and Rødsand. On Saltholm numbers fluctuate, while in 1996 50 individuals were observed at Falsterbro. At Rødsand, the population size was stable with 6-16 individuals in the 1990s and with 11 individuals present in 1999 (Falster Statsskovdistrikt, unpubl. data). A new-born dead Grey Seal was found here in 1993.

Few Grey Seals were observed in the Wadden Sea before 1980, but during the 1990s, up to five individuals have been seen together (although only males have been recorded to avoid possible confusion with The Harbour Seals). It is therefore likely that the actual numbers in the Wadden Sea may be higher (NERI, unpubl.



Figure 4.2.1.16. Grey Seal. Important localities in Denmark 1998-1999 (solid dots). Potential localities (grey dots).

data). The Grey Seals have never been proved breeding in the Danish part of the Wadden Sea, but the breeding population in Holland and Germany is on the increase (a total of 500-600 individuals). The modest increase in the Danish Wadden Sea probably reflects the increase in the Dutch and German Wadden Sea since the 1980s supplemented by some migratory individuals from the British Isles (S. Tougaard, pers. comm.).

##### *Conservation status*

*Localities:* At four localities, supporting 85% of the total population, the status of the species is considered favourable due to a stable or positive population trend together with stable habitat conditions (Table 4.2). The very few individuals are, however, scattered between several areas with only a few known breeding attempts. An important factor affecting their number is the fact that the most important localities have become seal reserves.

*Overall status:* From a historical point of view the Grey Seal has shown a remarkable decrease in Danish waters, followed by a recovery in most recent decades. The numbers involved suggest that this change is the result of migratory individuals from other neighbouring populations rather than a self-sustaining population of the same individuals. For this reason, the national conservation status of the Grey Seal is considered uncertain.

#### 4.2.1.17 Harbour Seal *Phoca vitulina*

Habitats Directive: Annex II

##### *Distribution, population size and status*

The Harbour Seal numbers were surveyed in 1998 in five marine areas (the Wadden Sea, Limfjorden, northern and southern Kattegat and western parts of the Baltic Sea). Surveys covered all known breeding and haul-out sites (16 localities), of which the Wadden Sea is here considered as one single locality (Fig. 4.2.1.17). A total of maximum 7,120 individuals were counted in aerial counts in 1998 (Laursen 1999). Investigations have shown that a proportion of the seals in the water are not visible from the air, and to correct for this, c. 25% must be added to approximate to the total population size (Heide-Jørgensen et al. 1992, Tougaard 1997).

The trend of the Harbour Seal population has been followed since 1976 when the population numbered c. 2,000 individuals. Numbers increased up to 1987 (c. 6,500 individuals) when a seal epidemic broke out which had almost halved the population by the end of the 1980s. In 1988-1998 the annual growth rate averaged 12-13% in Kattegat, 9% in Limfjorden and 6% in the western part of the Baltic Sea (Heide-Jørgensen & Teilmann 1999) while the rate in the Wadden Sea in 1976-1997 averaged 12% (Tougaard 1997). Some three quarters of the popula-



Figure 4.2.1.17. Harbour Seal. Important habitats in Denmark in 1998.

tion seems to be on the increase and the remainder stable.

##### *Conservation status*

*Localities:* In the marine areas supporting more than 95% of the population, the status of the Harbour Seal is considered favourable due to a mainly positive trend in numbers and stable habitat conditions (Table 4.2). Furthermore, 14 out of 16 known localities (all of which are key areas) have been declared seal reserves.

*Overall status:* The majority of the population appears to be increasing. This fact, combined with stable habitat conditions, suggests that the national conservation status is favourable.

#### 4.2.1.18 Dormouse *Muscardinus avellanarius*

Habitats Directive: Annex IV - Danish Red List 1997: Vulnerable

##### *Distribution, population size and status*

The Dormouse favours dense deciduous or mixed forest in some woodland areas on Funen, Zealand and East Jutland. The species is night active, a climber and a typical animal of woodlands, the only representative of the dormouse family *Gliridae* in Denmark.

Surveys based on numbers of nests were carried out in 1980-1986 and 1989-1992 (H. Vilhelmsen, unpubl. data) and the species was registered at 56 localities (Fig. 4.2.1.18). As some localities supported several separated nests, the total number of sites was 95 in all. Fifty-five were situated on Zealand (c. 58%), 37 on Funen (c. 39%) and 3 in Jutland (c. 3%). The abundance of locations on Zealand was probably the result of more thorough investigations in this part of the country rather than reflecting a qualitative difference in habitats in the various areas.

The discovery of nests has identified the species in several sites not previously registered as wooden areas, e.g. in East Jutland and in some atypical vegetation types. This might mean that



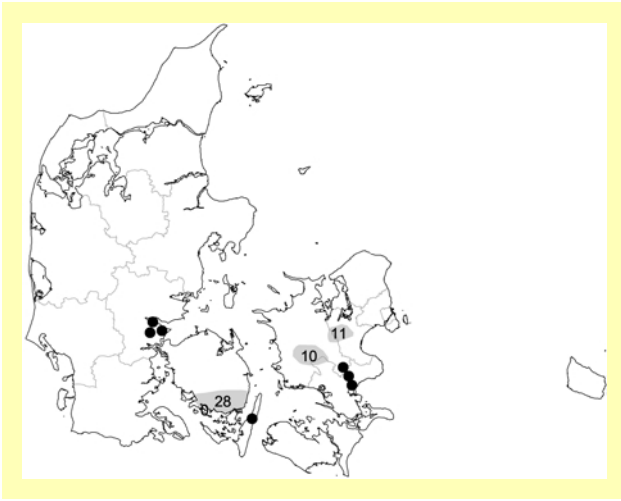


Figure 4.2.1.18. Dormouse. Confirmed records in Denmark in 1980-1986 and 1989-1992. Number of locations illustrated by solid dots/figures in the grey shaded distribution areas.

habitat choice is more varied than previously thought. In the specific key areas of South Funen and Mid- and West Zealand the population is considered to be stable, and despite these new discoveries, there has been no real increase in numbers. At all known localities, the species is highly scattered in its occurrence even in larger continuous woodlands. It often occurs in marginal areas within woodlands (such as glades, peripheral regions of monocultures, edges of woods, along felling tracks and in storm gaps), where management of woodlands is more extensive and plant diversity higher. The population size is uncertain, but live trappings at specific localities show that density does not exceed 3-4 individuals/ha.

#### Conservation status

*Localities:* Based on the surveys in 1980-1986 and 1989-1992 (H. Vilhelmsen, unpubl. data), the conservation status of the Dormouse at the beginning of the 1990s was considered favourable at 35 localities and uncertain at 21 localities (Table 4.2). The local conditions for each of the individual sub-populations are dependent upon traditional woodland management and felling regimes, which do not necessarily provide constant, stable or suitable conditions in adjacent habitats. Suitable Dormouse habitats may become isolated both within individual woodlands (where habitats may become a scattered mosaic)

and between individual forest units when corridors such as hedgerows and bushes are limited. Intensive exploitation of the forests and adjacent lands may in this way reduce the interchange of genetic material.

*Overall status:* The national status of the Dormouse is uncertain. Even though its status is still considered favourable for some of the known sub-populations within its natural range, we lack recent knowledge of its present status and habitat requirements.

#### 4.2.1.19 Northern Birch Mouse *Sicista betulina*

Habitats Directive: Annex IV - Danish Red List 1997: Rare

#### *Distribution, population size and status*

In Denmark the Northern Birch Mouse has been caught or observed in old forests, scrub, meadows and in cultivated fields. In Scandinavia the species is most often observed in birch- and willow scrub. It is difficult to define the habitat choice of the species, since this may vary according to its seasonal requirements, e.g. permanently dry areas such as well drained parts of old forest for hibernation but perhaps different habitats during summer used for foraging and breeding. It is currently considered that favoured habitats are where old forest or bogs adjoin cultivated fields or woodland meadows.

In spite of this rather general habitat definition, the Northern Birch Mouse has only two widely separated key areas in Denmark, viz. western Limfjorden, particularly north of the fjord and in southern Jutland south of a line between Horsens-Varde and north of Haderslev-Ribe (Fig. 4.2.1.19). Only a few individuals have been captured or observed in these areas, and these records are spread throughout the entire 20th century, particularly in the 1940's (Jensen 1993). In more recent times, the species has again been reported from both areas; both through direct observations, captures and through the presence of remains in owl pellets. There are no recent reports from the eastern part of Limfjorden (Ålborg), the area just south of Limfjorden (Fer-



Figure 4.2.1.19. Northern Birch Mouse. Confirmed records (solid dots), known general distribution (grey shading) in Denmark since 1850.

ring) nor from the Horsens area. On the other hand, there are some recent reports from the area west of Kolding.

The size of the Danish population is difficult to assess, partly due to lack of knowledge regarding habitat requirements, but also because there are no specific population estimates nor any knowledge of population trends for the species.

#### Conservation status

*Localities:* Based on existing data it is impossible to estimate the current conservation status in known habitats in Denmark (Table 4.2). The spe-



Figure 4.2.2.1. European Pond Turtle. Confirmed records after 1994.

cies occurs undoubtedly both in the northern and southern parts of Jutland but there is no knowledge of population size and trends.

*Overall Status:* Based on existing data it is not possible to estimate the conservation status of the Northern Birch Mouse. Thus, status is unknown.

## 4.2.2 Reptiles

### 4.2.2.1 European Pond Turtle *Emys orbicularis*

Habitats Directive: Annex IV

#### *Distribution, population size and status*

The European Pond Turtle favours lakes and may reach an age of 120 years. Breeding is only successful during particularly warm summers followed by winters with favourable climate.

The species is known from prehistoric times and remains found in Danish bogs date from approx. 700 BC. Separate sub-populations seem to have existed since the 20th century. Hence, the European Pond Turtle was known from Ribe in the 1930s and up to 1958 from areas between Åbenrå and Haderslev. The species was observed in Skjern Å in 1960 and at Skjern Å's source in the 1970s. In the neighbourhood south of Silkeborg, particularly around Velling, the species has been observed since 1947 and at Sminge Sø northeast of Silkeborg, the species was observed around 1925 and in the 1940s.

During 1995-1999, at least 11 different individuals were found in the neighbourhood of Silkeborg, most from 5 different localities around Velling in the area from Bryrup to Salten, with one single individual at Sminge Sø (Fig. 4.2.2.1). Eight individuals were captured alive and blood samples taken for DNA-analyses. Oviparous females have been found several times, whereas juveniles are difficult to find.

The individuals examined were demonstrably not of the southern European form, but belong to the northern type. Seven of the individuals

Table 4.3. Conservation status of reptiles. \* The number of localities is unknown, but the majority is supposed to belong to this category.

Species <i>Scientific name</i>	An- nex	No. of local- ities	Size of popu- lation	% of DK	Conservation status: No. of localities / % of species					National status
					Favourable	Uncertain	Unfavour.	Unknown	Disappear.	
<i>Emys orbicularis</i>	IV	6?	Unknown	?				6? / ?		Unknown
<i>Lacerta agilis</i>	IV	Many	Unknown			x* / ?				Uncertain
<i>Coronella austriaca</i>	IV	?	?						x	Disappear.

tested had a DNA-type which occurs in East Europe, from the Black Sea to Poland and Lithuania. The eighth individual had a different DNA-type which so far has not been observed elsewhere in Europe, but which is thought related to the Mid European type. No definite conclusions can be drawn from these analyses. Seen from a zoogeographical point of view, it is reasonable to assume that the species has survived from an original Danish relict population which may have been related to the eastern European populations.

#### Conservation status

**Localities:** In the area south of Silkeborg, the species is scattered over a large geographical area. In the most used part of the area, the species is exposed to collection by the uninitiated, but is also subject to traffic kills. There is, so far, no proof of successful breeding in the wild. It is impossible to assess the current population size and its conservation status is unknown (Table 4.3).

**Overall status:** So far it is unknown whether the population relates to released individuals or to a surviving relict population. Should the latter prove to be the case, the species is so scarce that its conservation status would inevitably prove to be unfavourable.

#### 4.2.2.2 Sand Lizard *Lacerta agilis*

Habitats Directive: Annex IV

#### Distribution, population size and status

The Sand Lizard breeds in sunny places in moors, dry grasslands, roadsides, railway embank-

ments, gravel pits, dunes etc., generally in areas with low vegetation and a warm micro-climate.

The species is widely distributed all over Denmark (Fig. 4.2.2.2), but is possibly absent from Falster, Lolland and Langeland. In the atlas survey of 1976-1986, the species was reported in approx. 40% of the acceptably investigated squares (5 km x 5 km), and in approx. 50% of the thoroughly investigated squares (Fog 1993). Thus, the species is almost as common in Denmark as in areas in Central Europe with optimum climate.

Most populations are relatively small, but large populations do exist. Thus, approximately 500 individuals are known from the Mols Bjerge (Jensen 1980) and approx. 150 individuals on Røsnæs (Ravn 1997). These represent, even by international standards, relatively large populations.

The species is, however, decreasing. Sporadic information indicates that approx. 30% of the known populations were lost during approxi-

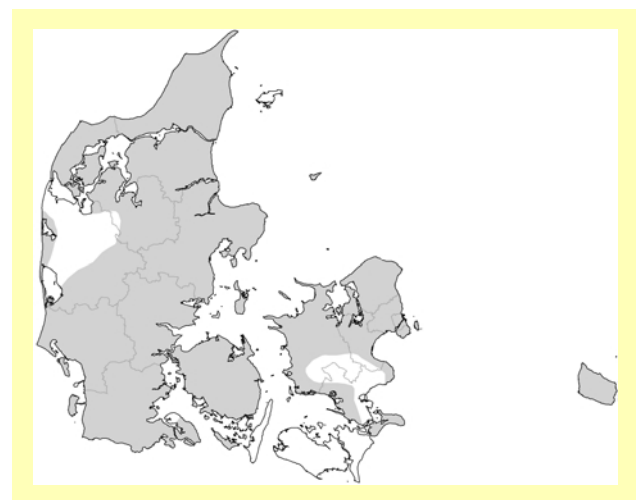


Figure 4.2.2.2. Sand Lizard. Known general distribution in Denmark after 1980.

mately 1945 to 1980 and that the decrease has continued ever since (Fog 1993).

#### *Conservation status*

*Localities:* The species is widely dispersed with indications of declining populations. Thus, conservation status is uncertain (Table 4.3).

*Overall status:* The Sand Lizard is declining without giving great cause for concern at present. Consequently, the national status is uncertain.

#### **4.2.2.3 Smooth Coronelle *Coronella austriaca***

Habitats Directive: Annex IV - Danish Red List 1997: Disappeared

#### *Distribution, population size and status*

The Smooth Coronelle preys on reptiles e.g. lizards and adders and thus its natural range extends to where these prey are plentiful. The species is cryptic and hides frequently and is therefore difficult to monitor.

In Denmark, the Smooth Coronelle is known from Zealand (3 localities), Funen (1-4 localities) and in Jutland-Vendsyssel (2-5 localities). The most recent positive observation was made in 1914, at Hjerl Hede in Northwest Jutland. Later, unconfirmed but likely observations derive from Southwest Jutland (1947), Hjerl Hede (1935, 1958) and Vendsyssel (1979).

As there have been no positive observations for many years and as the number of unconfirmed observations remain few, the species must have decreased considerably and it may well have disappeared. In North Germany and Skåne (Sweden), too, where the habitats are very similar to those in Denmark, the species has also been on the decline.

#### *Conservation status*

*Localities:* During recent years some sporadic attempts have been made to trace the species at

its localities in Vendsyssel where it is thought to have been seen in 1979. The species is, however, often difficult to find and may very well still exist in the area, even though it has not been observed (Table 4.3).

*Overall status:* The Smooth Coronelle has declined and is possibly extinct, as no positive observations have been confirmed since 1914 (excepting one possible observation in 1979).

### **4.2.3 Amphibians**

#### **4.2.3.1 Great Crested Newt *Triturus cristatus***

Habitats Directive: Annexes II and IV - Danish Amber List 1997: Species requiring special attention

#### *Distribution, population size and status*

Great Crested Newt breeds particularly in clean, non-eutrophic, sunny pools and ponds without fish.

The species occurs only very sporadically in many parts of west and north Jutland. In the rest of Denmark it is very common and most frequently occurring in south east Denmark (Fig. 4.2.3.1). In larger areas where all pools have been examined, the species was found in 5-15% of all

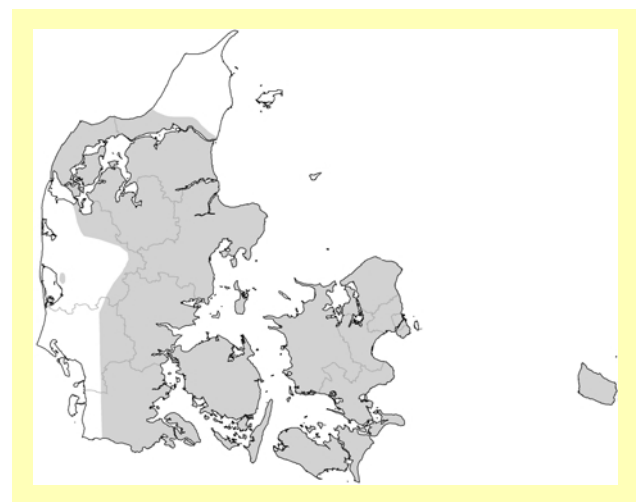


Figure 4.2.3.1. Great Crested Newt. Known general distribution in Denmark based on information after 1985.

Table 4.4. Conservation status of amphibians. \*The number of localities is unknown, but the majority is supposed to belong to this category.

Species Scientific name	An- nex	No. of local- ities	Size of population	% of DK	Conservation status: No. of localities / % of species					National status
					Favourable	Uncertain	Unfavour.	Unknown	Disappear.	
<i>Triturus cristatus</i>	II, IV	Many	?			x* / ?				Uncertain
<i>Bombina bombina</i>	II, IV	10	1750	100%		8 / 80%	1 / 10%	1 / 10%		Uncertain
<i>Rana arvalis</i>	IV	Many	4 millions ?	100%	x / ?	x* / ?	x / ?			Uncertain
<i>Rana dalmatina</i>	IV	Many	300,000 ?	100%	x* / ?					Favourable
<i>Hyla arborea</i>	IV	90	25,000 ?	100%	18 / 20%	70 / 78%	2 / 2%			Uncertain
<i>Pelobates fuscus</i>	IV	136	?	?	1 / 1%	34 / 25%	15 / 11%	86 / 63%		Unfavour.
<i>Bufo viridis</i>	IV	108	10,000 ?	>95%	6 / 5%	41 / 39%	44 / 41%	17 / 15%		Uncertain
<i>Bufo calamita</i>	IV	105	10,000 ?	<50%	3 / 3%	48 / 46%	18 / 17%	36 / 34%		Unfavour.

pools present. Frequency of occurrence may be even higher than this in southeast Denmark. The Great Crested Newt is very common in Denmark, appearing almost every time new pools are created or old waterbodies dredged.

The species will not tolerate poor water quality in the pools and consequently it is showing a general decline in all areas where small waterbodies are not being restored or re-created. However, in areas where active creation of ponds is occurring, numbers may be increasing locally.

#### Conservation status

**Localities:** The species is widespread and rather common. It benefits from pool projects carried out for other amphibian species. The species is,

however, assumed to be declining overall and its conservation status is generally uncertain (Table 4.4), although favourable in areas with pool projects.

**Overall status:** The Great Crested Newt is probably generally declining and its conservation status uncertain in spite of the fact that the species is very common, particularly in southeast Denmark.

#### 4.2.3.2 Fire-bellied Toad *Bombina bombina*

Habitats Directive: Annexes II and IV - Danish Red List 1997: Critically endangered

#### *Distribution, population size and status*

The Fire-bellied Toad breeds in small, usually shallow water ponds that do not dry out before 1 August. The species requires certain water temperatures, water quality and the absence of fish. Outside the breeding season the species may occur at other pools.

Historically, the species was common on the Danish islands from Als in the west to Bornholm in the east, northwards to Tunø, Samsø and Hesselø, but the species has declined markedly. Out of 23 sub-populations known in Denmark in the 1970s, only approx. 8 remain (Fig. 4.2.3.2). By the mid 1980s, all sub-populations were declining. Efforts were made to save the last sub-populations, by dredging and establishing new pools, land purchase of areas particularly important for this species and through programmes

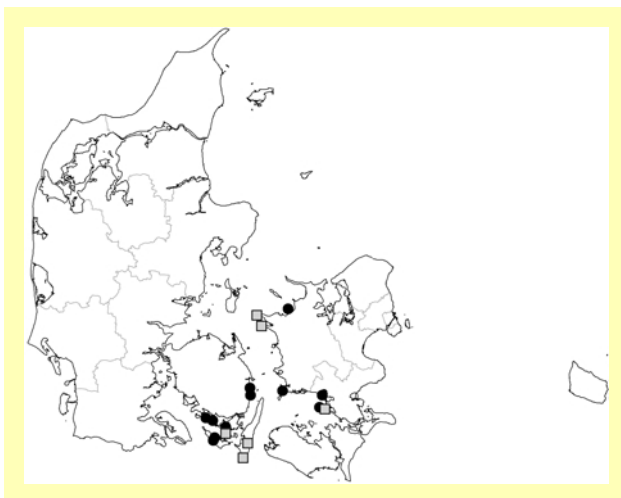


Figure 4.2.3.2. Fire-bellied Toad. Confirmed records in Denmark in 1999. Solid dots represent intact sub-populations and squares reintroduction localities.



of captive breeding and reintroduction (Fog 1993, Fog 1999, Fog et al. 1997).

To maintain genetic variation in the various sub-populations, a breeding stock of at least 500 individuals is required corresponding to an actual population size (MVP, see section 2.3) of 1,000 individuals (Fog 1999).

#### *Conservation status*

*Existing localities:* Seven sub-populations in Denmark currently exist, of which four have increased during recent years and consist of more than 100 individuals. Two sub-populations are relatively stable and comprise some 100 individuals (Fog 1999). In the seventh sub-population, the species has not bred in almost 10 years, and, the population is very small (four individuals in 1999). Therefore, in 1999, a captive rearing programme was initiated to safeguard the population for the future.

An eighth sub-population was re-established as a mixed population, at present comprising approximately 100 individuals which is currently on the increase. A ninth sub-population was last reported active in 1983, when only a few individuals were left; there are no positive observations since then. A tenth sub-population was last observed in 1996.

One sub-population which was thought extinct in 1985, has been the subject of a reintroduction programme using stock from a neighbouring population (Fog 1999).

The largest sub-population at present consists of approx. 850 individuals. Thus no sub-populations approach the number of individuals thought necessary to maintain a healthy population size (see section 2.3) that would secure the survival of the species in Denmark in the long run. The long-term survival potential is, therefore, uncertain for all sub-populations.

*Future localities:* To strengthen survival of the species measures have been taken to establish reserve populations for each of the present populations. This is done by creating new habitats, captive rearing and the reintroducing of stock from existing populations.

*Overall status:* The total population of the Firebellied Toad in Denmark was approx. 1,000 individuals in the mid 1980s and by 1999 approx. 1,750 individuals. Thus, the species has increased in Denmark. The populations, however, are and have been isolated for a long time. None of the sub-populations have reached sufficient numbers to maintain survival in the long run. Consequently, the national conservation status is – in spite of preservation measures – uncertain and without these initiatives, the status would certainly be unfavourable (Table 4.4).

#### **4.2.3.3 Moor Frog *Rana arvalis***

Habitats Directive: Annex IV - Danish Amber List 1997: Species requiring special attention

#### *Distribution, population size and status*

The Moor Frog usually breeds in sunny and shallow water ponds. Outside of the breeding season, the species occurs in meadows, bogs and many other natural wetland habitat types.

The species is widespread in Denmark except for Bornholm and in many parts it is continuously distributed.

The largest and densest populations occur in west and north Jutland and in north Zealand (Fig. 4.2.3.3). Based on surveys of random plots, there is estimated to be approx. 500,000 oviparous females of this species in the Danish farmland landscape. In uncultivated areas, the population is assumed to be much denser, numbering approximately 1,5 million individuals. Including males, the total estimate for the country is therefore c. 4 million individuals, albeit fluctuating from year to year.

The populations in north and west Jutland and on north Zealand do not seem to be declining but may be stable in some of these areas. In contrast, eastern and southern parts of the country show negative trends. The most precise information derives from Århus municipality, from south Funen and from Lolland, where there have been marked declines and the species is now close to disappearance from large areas. It seems particularly hard for the species to compete in

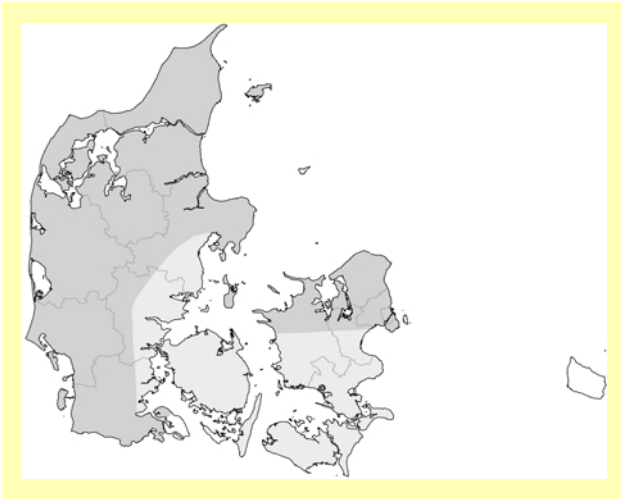


Figure 4.2.3.3. Moor Frog. Known general distribution in Denmark after 1985. Dark shading represents areas with stable populations; light shading represents areas supporting population on a decline.

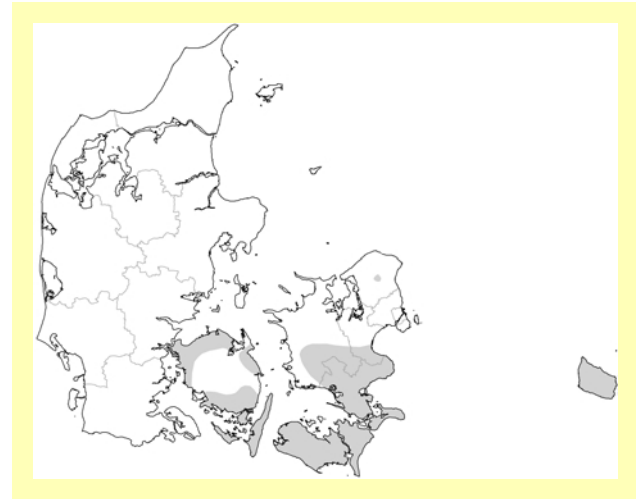


Figure 4.2.3.4. Branching Frog. Known general distribution in Denmark after 1985.

farmland where the species is apparently out-competed by the Common Frog *Rana temporaria* and the Branching Frog *Rana dalmatina*.

#### Conservation status

**Localities:** In northern and western parts of Denmark, populations are evidently stable, whereas southern and eastern areas support populations that are rapidly declining.

**Overall status:** In large areas of Jutland and the northern part of Zealand, the population trends are stable and conservation status favourable. In the rest of the country, the species is rapidly declining and conservation status here is unfavourable. Overall status: uncertain (Table 4.4).

#### 4.2.3.4 Branching Frog *Rana dalmatina*

Habitats Directive: Annex IV - Danish Amber List 1997: Species requiring special attention

#### Distribution, population size and status

The Branching Frog breeds particularly in moderately clean, sunny and often rather deep ponds e.g. marl pits. Outside the breeding season it is

not limited to particular habitats. Largest numbers are, however, to be found in deciduous forests.

The Branching Frog is confined to the southeastern part of the country and is not naturally known to occur in Jutland or in north Zealand (Fig. 4.2.3.4). Within its natural range, the species is continuously distributed and can be observed in most ponds. The assessment of population size has been estimated on the basis of the numbers of oviparous females. Densities vary according to landscape from c. 2 per km<sup>2</sup> in randomly chosen farmland plots to 50-100 per km<sup>2</sup> in farmland with deciduous forest and to approx. 250 per km<sup>2</sup> in a military training area. In the country as a whole the population is roughly estimated to number c. 100,000 females or c. 250,000-300,000 individuals.

Where the species has been reliably surveyed, populations are reasonably stable or even increasing, probably as a result of pond creation projects. In areas where there are no measures to improve ponds, the populations show signs of decline. Expansion is observed particularly in areas where the species ousts the Moor Frog *Rana arvalis*. A reintroduced population north of Hillerød in north Zealand has expanded slowly and the isolated population on Endelave is stable or slowly increasing.

### Conservation status

*Localities:* The population is stable in the majority of its natural range and the conservation status is favourable (Table 4.4).

*Overall status:* There are no indications of a declining tendency over the past 10-15 years in Denmark, indeed in certain areas there is some evidence of expansion. The species reacts positively to the establishment of ponds. Thus, the national conservation status is favourable.

#### 4.2.3.5 Tree Frog *Hyla arborea*

Habitats Directive: Annex IV - Danish Amber List 1997: Species requiring special attention

#### *Distribution, population size and status*

The Tree Frog breeds in clean, sunny ponds with warm fish-free water. Outside the breeding season the species prefers hedgerows, edges of woods, woods and gardens.

The species' former distribution extended from east Jutland in the north to Djursland and Funen, Det Sydfynske Øhav and the islands east of Storebælt. It has disappeared from many parts of this area, e.g. from Falster c. 1965 and from Funen c. 1972 (Fig. 4.2.3.5). In 1989 it was close to extinction on Zealand but was saved at the last moment. In the 1990s, the species was re-introduced in two former localities, one south of Århus and another at Slagelse. Both areas support viable populations now.

Considerable efforts have been made in the 1990s to maintain the species, for example, by improving ponds for all sub-populations. In spite of this, one isolated sub-population has disappeared in southwest Jutland and a few sub-populations from Lolland. Two further sub-populations from Lolland seem presently threatened. The rest of the sub-populations are increasing and are reckoned to be able to survive. Out of c. 90 known sub-populations, two are decreas-



Figure 4.2.3.5. Tree Frog. Confirmed records in Denmark after 1990 (solid dots), known general distribution (grey shading).

ing, c. 35 stable, and c. 50 continuously increasing.

The increase is most dramatic on Bornholm, from c. 1,400 males in 1991 to c. 6,000 males in 1998. On Zealand the population has improved from c. 6 males in 1989 to c. 350 males in 1999. The total present estimate for Denmark is at least 16,000 males corresponding to c. 25,000 individuals incl. females.

### Conservation status

*Localities:* Several sub-populations seem - in recent years - to have increased to a viable population exceeding 500 individuals. For such populations, the conservation status is favourable. Many other, smaller sub-populations, are rapidly increasing and will probably soon attain the same favourable status (Table 4.4). Only a small number of populations, particularly in south Zealand and on Lolland, are currently of unfavourable conservation status.

*Overall status:* c. 90% of the populations existing in 1990 are secured and most of these are increasing. At the present moment, conservation status is considered to be uncertain.

#### 4.2.3.6 Common Spadefoot *Pelobates fuscus*

Habitats Directive: Annex IV - Danish Red List 1997: Vulnerable

##### *Distribution, population size and status*

The Common Spadefoot is a night-foraging amphibian breeding in clean, sunny ponds in fields, in meadows or on heaths. Large fish species are always absent from breeding ponds.

The species is widely distributed in Jutland, Als, Zealand, Neksø, Amager, Lolland and Falster (Fig. 4.2.3.6). The species probably does not occur on Funen and this fact, combined with a geographical variation in the appearance of eggs suggests that two different populations are present in Denmark. Potentially there is a Jutland population originating from Germany and an eastern island population originating from the European continent to the south or south-east (Fog 1993).

The species has been intensively searched for in east Denmark and it is thought that all existing sub-populations are now known. However, the Common Spadefoot is widespread in Jutland and it is highly likely that many more sub-populations could be located than are presently known. Perhaps half of the entire population is reckoned to have been located so far, but a simple method to estimate population size in these

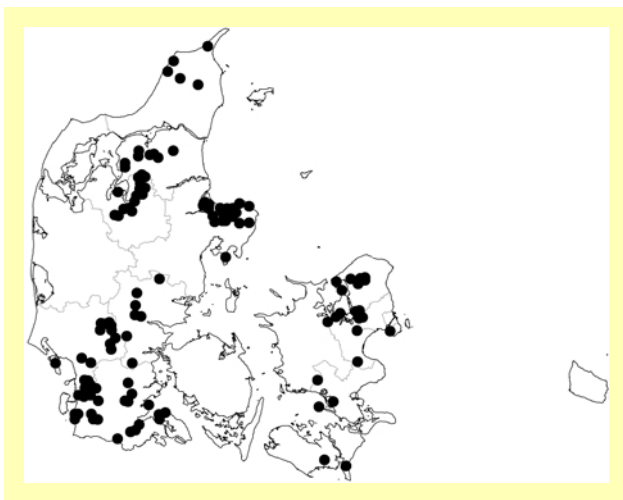


Figure 4.2.3.6. Common Spadefoot. Confirmed records in Denmark after 1985.

areas is hard to find. Where local distribution and abundance of this species have been followed over a period of time and where no conservation measures have been taken, population trends are generally on the decline e.g. in Himmerland, on Lolland and in the Copenhagen area. Pond creation projects have been successful at slowing down or even stopping local declines in numbers. Only in Ribe County have such local conservation measures succeeded in creating a marked increase.

##### *Conservation status*

*Localities:* Many localities in Jutland support rather large and widespread populations, whereas in East Denmark, there are no larger populations left. One such large population persists north of Hillerød in north Zealand distributed over 14 ponds. Most other populations are small and threatened. At present the species is only known from one pond on Lolland. In the long run all east Danish populations risk extinction. The nature conservation status at most localities is either unfavourable, uncertain or unknown (Table 4.4).

*Overall status:* All east Danish populations are small and are in danger of extinction. In many parts of Jutland, the species is widespread, but the tendency is probably for most sub-populations to decline, and thus the overall status must be characterised as unfavourable.

#### 4.2.3.7 Green Toad *Bufo viridis*

Habitats Directive: Annex IV - Danish Red List 1997: Vulnerable

##### *Distribution, population size and status*

The Green Toad breeds most often in coastal zones in various types of ponds, which are characterised by lack of vegetation, with a sunny aspect and lack of large fish species. Outside the breeding season the species uses many different habitats reasonably far from the breeding pond.

The species is confined to southeast Denmark.

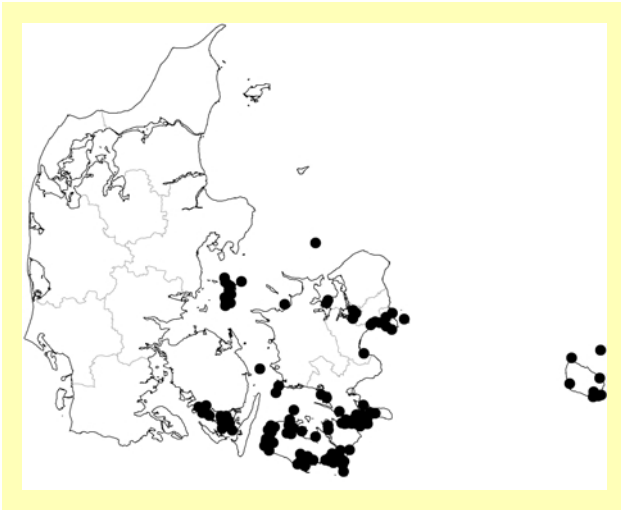


Figure 4.2.3.7. Green Toad. Confirmed records in Denmark after 1990.

Its natural habitat range comprises almost all islands east of Jutland, including some islands where it is now extinct: Endelave, Tunø, possibly Als and probably Læsø (Fig. 4.2.3.7). The present distribution is well covered and the size of most sub-populations is known.

The Green Toad has declined tremendously throughout the 19th and 20th centuries. This decline accelerated until the 1980s when c. 70% of all remaining populations had disappeared within a decade. From 1990 onwards, this tendency was slowed down (but has not stopped) due to the new establishment and restoration of ponds, so that during the 1990s the general decline had become even less pronounced.

The size of sub-populations may fluctuate markedly over a short period of time. Thus, one followed population has increased from c. 3 males in 1988 to c. 700 males in 1995. The largest known population at Stege on Møn numbered 5,000-10,000 individuals in 1993, but by 1998, only 3 individuals were left and 1 was reported in 1999. This dramatic decline was caused by the release of pikes (K. Fog, pers. comm.). The overall national population is estimated at c. 10,000 individuals.

#### *Conservation status*

*Localities:* The Green Toad is presently distributed in c. 108 separated sub-populations, out of which c. 40 populations have been in receipt of

positive management in the form of the establishment and restoration of ponds. By 1996, 148 ponds were established specifically for this species in Denmark and this number has increased since. Nothing so far has been done for the other sub-populations of this species.

Only in six sub-populations, can the conservation status be characterised as favourable due to their abundance and recent marked increases (Table 4.4), and only two are assumed to have reached a viable population of at least c. 500 individuals (Fog 1999). Three other populations may succeed, too, due to a rapid increase in numbers and a sixth is limited in numbers to a size suitable to the carrying capacity of the island in question. Conservation status for 39% of the sub-populations can be characterised as uncertain because the populations are too small, and for 41% conservation status is unfavourable. A small number of sub-populations which are difficult to access have been registered but not investigated in any detail.

*Overall status:* During the 1990s a considerable effort was made for the species and consequently the decrease in overall abundance has been slowed down but not stopped. Thus, conservation status is uncertain.

#### **4.2.3.8 Natterjack Toad *Bufo calamita***

Habitats Directive: Annex IV - Danish Amber List 1997: Species requiring special attention

#### *Distribution, population size and status*

The Natterjack Toad breeds in ponds with few predators like fish and carnivore insects and few competing tadpoles of other amphibians. The water must be sunlit and probably clean. Outside the breeding season the species favours open and poorly vegetated areas like dunes, beaches and meadows.

Originally the species was widespread in Denmark and there still seems to be some coherent sub-populations along most of the west coast of Jutland and along the coasts in the western part of Limfjorden. The precise number of localities and individuals involved in these sub-popula-



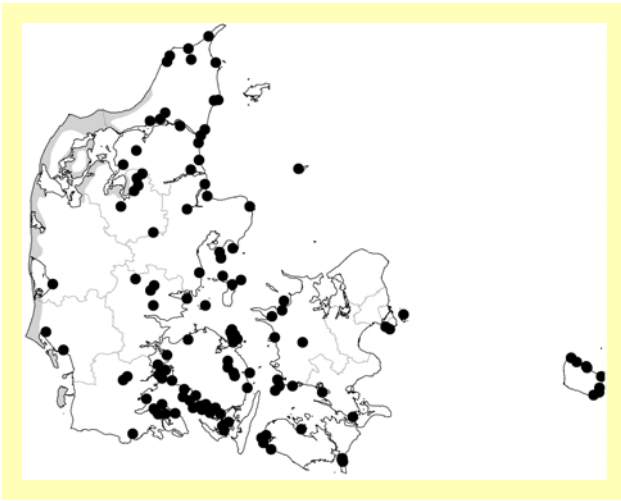


Figure 4.2.3.8. Natterjack Toad. Confirmed records (solid dots: isolated sub-populations), known general distribution (grey shading) in Denmark after 1990.

tions is unknown. In east Jutland and the islands of Anholt, Samsø, Endelave and Als c. 50 sub-populations are presently known but the size of these populations has not been estimated and some existing information is possibly outdated. The islands east of Lillebælt support c. 55 populations distributed in c. 150 ponds with c. 5,000 individuals (Fig. 4.2.3.8).

East Denmark, in particular, has experienced a dramatic decrease, for example, on Zealand only four localities are presently known – all supporting very few individuals. In Himmerland and east Jutland, too, the species has decreased in recent years and it has probably disappeared along the west coast of Sønderjylland.

Due to its extensive occurrence in west Jutland, the species, on a national basis, is not particularly threatened. In Funen county the species benefits from pond projects which in several places have enabled the recovery of threatened sub-populations. Likewise, local initiatives in Copenhagen, Storstrøm and Bornholm counties have secured habitats and halted declines for some sub-populations.

#### Conservation status

*Localities:* The distribution of the Natterjack Toad along the entire west coast of Jutland from Skallingen to Jammerbugten may suggest that all belong to one single sub-population. Conser-

vation status of this population is probably favourable but the trends in abundance are not known. In the rest of the country, only three sub-populations are of a viable population size and are increasing. Many other, fairly stable sub-populations are, however, of such a magnitude that conservation status may be characterised as close to favourable. Nine sub-populations are increasing but are still not of a size to be reckoned to achieve favourable conservation. A further 14 sub-populations are thought to be declining and together with four relatively stable, but small sub-populations, it adds up to 18 sub-populations with unfavourable conservation status. Many other sub-populations are difficult to estimate (Table 4.4).

*Overall status:* The Natterjack Toad has decreased dramatically in recent years and presently the species may risk future extinction on Zealand. Thus, on a national scale, conservation status must be characterised as unfavourable.

## 4.2.4 Fish

### 4.2.4.1 Sea Lamprey *Petromyzon marinus*

Habitats Directive: Annex II - Danish - Amber List 1997: Species requiring special attention

#### *Distribution, population size and status*

The adult Sea Lamprey is a parasite of fish that lives at sea and migrates up rivers to spawn. As far as it is known the larvae live for 3-5 years in fresh water before they turn into adults and migrate into the sea, where they may stay for more than 30 years.

Previously the species was widespread throughout the whole country; in fresh water, however, it is most common in west Jutland (Fig. 4.2.4.1). To-day, the species is only known from fjords and streams in north- and west Jutland. There are no estimates of population size, but the general opinion is that the species is rare compared to the River Lamprey *Lampetra fluviatilis* in most studied areas. Lack of adequate data precludes any conclusions as to whether the species is on the increase or decreasing. The conservation sta-



Figure 4.2.4.1. Sea Lamprey. Confirmed records in Denmark after 1990.

tus for most populations is unknown, a few seem to be stable and one population seems to be increasing. Most observations are based on a single or very few individuals, generally from fishermen reporting on the rare by-catch of the species in their fishing tackle.

#### Conservation status

*Localities:* Conservation status may be summarised as favourable at localities where the species is regularly observed, and this is probably due to improvements in water quality and positive waterway management of streams. The conservation status of the species is generally unknown throughout most parts of its natural habitat range (Table 4.5).

*Overall status:* The national conservation status

of the Sea Lamprey is unknown due to data deficiencies.

#### 4.2.4.2 Brook Lamprey *Lampetra planeri*

Habitats Directive: Annex II - Danish Amber List 1997: Species requiring special attention

#### *Distribution, population size and status*

The Brook Lamprey is a sedentary fish favouring small streams. The larvae reach the adult stage at 3-5 years of age. The change starts in the autumn and ends during spring, after which the species spawns. When spawning is completed, the adults die as amongst the other lamprey species.

The Brook Lamprey is known to have been widespread in the past, except on Lolland-Falster. Since 1990, it has been observed in 10 out of 14 counties (Fig. 4.2.4.2), and in all 10 counties the species is a common visitor in many large and small streams. There is no precise information on population size but the species is commonly distributed in most places. There is no indication of a negative trend in occurrence or population density.

#### Conservation status

*Localities:* Conservation status of The Brook Lamprey is judged to be favourable as the water quality and physical conditions in most streams have improved in recent years (Table 4.5).

Table 4.5. Conservation status of fish. \*Until 1960. #Skjern Å/River.

Species Scientific name	An- nex	No. of local- ities	Size of popu- lation	%	Conservation status: No. of localities / % of species				National status
					Favourable	Uncertain	Unfavour.	Unknown Disappear.	
<i>Petromyzon marinus</i>	II	12	?		5 / ?			7 / ?	Unknown
<i>Lampetra planeri</i>	II	100	?		Many / ?	Few / ?			Favourable
<i>Lampetra fluviatilis</i>	II, IV	18	?		4 / ?			14 / ?	Unknown
<i>Acipenser sturio</i>	II, IV	0	0						Disappear.
<i>Cottus gobio</i>	II	1*	0						1 Disappear.
<i>Alosa fallax</i>	II, V	6	?					6 / ?	Unknown
<i>Alosa alosa</i>	II, V	1	?					1 / ?	Unknown
<i>Salmo salar</i>	II, V	36983	750#	?	1 / ?		2 / ?	1? / ?	Unfavour.
<i>Cobitis taenia</i>	II	7	Many	?	6 / ?	1 / ?			Favourable
<i>Misgurnus fossilis</i>	II	1?	?					1? / ?	Unfavour.

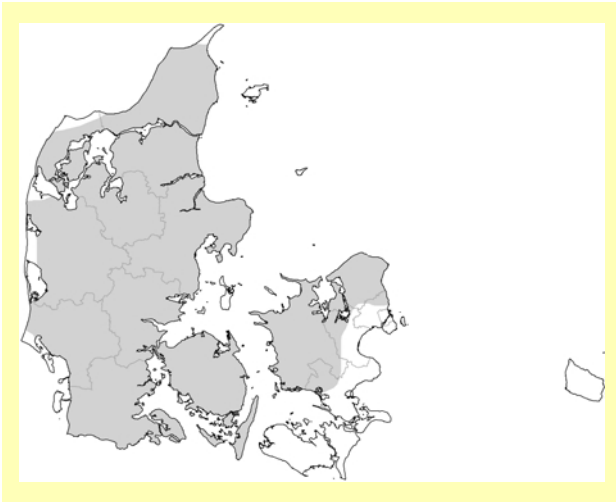


Figure 4.2.4.2. Brook Lamprey. Confirmed records in Denmark after 1990.

*Overall status:* The national conservation status of the Brook Lamprey is considered favourable although generally, the data are insufficient to make a full assessment.

#### 4.2.4.3 River Lamprey *Lampetra fluviatilis*

Habitats Directive: Annexes II and IV - Danish Amber List 1997: Species requiring special attention

##### *Distribution, population size and status*

The River Lamprey is a migratory fish, which lives at sea and enters the rivers to spawn. The larvae live 3-5 years in fresh water before they turn into the adult form and migrate to the sea.

The species is known to have been historically widespread throughout the country, both along the coasts and in fjords, and in most of the large stream systems. It has always been most numerous in west Denmark. The species is still widespread, but occurs predominantly in streams in Jutland (Fig. 4.2.4.3). It may very well occur in considerably more streams than reports currently show or may be mistaken for the Brook Lamprey. The fish survey methods used in large streams in Denmark are not very suitable for detecting this species, and consequently its occurrence is often overlooked.

The species seems unable to pass fish ladders,

hence dams and other obstructions limit its distribution in many streams. There are no population estimates for Denmark; the trend for most sub-populations is unknown, although some seem to be stable (3), increasing (1) or declining (1). Some observations are based on only a few reported individuals.

##### *Conservation status*

*Localities:* Conservation status may be characterised as favourable at the localities where the species has been observed, because of recent improvement of the physical and chemical properties of the streams involved. In some river systems, obstructions have been removed from streams favoured by the species. The conservation status is, however, unknown for most of the localities where the species occurs (Table 4.5).

*Overall status:* The national conservation status of the River Lamprey is considered unknown, as available data are insufficient.

#### 4.2.4.4 Sturgeon *Acipenser sturio*

Habitats Directive: Annexes II and IV - Danish Red List 1997: Disappeared

##### *Distribution, population size and status*

The Sturgeon is a marine demersal fish. In



Figure 4.2.4.3. River Lamprey. Confirmed records in Denmark after 1990.

spring, the sexually mature fish migrate up rivers to spawn in rapid currents in deep water.

All information relating to the distribution of the species in Denmark derives from old fishing reports as there have never been actual surveys of this species. In the 19th century, capture of the species was quite a normal occurrence along the Danish coasts, in fjords and bays, but catches decreased up to the year 1900. There were reports of captures in Danish streams, too, the majority from Jutland such as Sneum Å, Varde Å, Skjern Å, Gudenåen and Kolding Å together with a few reports from Funen/Zealand, for example in Odense Å. The last reported capture of the species in a Danish stream happened in Frijsenvold Fiskegaard in the Gudenåen on 7 May 1901. Whether the species spawned in Danish streams before the year 1900, is not known.

Reductions in the numbers captured along Danish coasts and in streams coincided with the decline in the west European populations. The Sturgeon caught in Danish streams may have been strays from other populations. Today, the species is almost extinct in Europe including the Baltic Sea (last individuals caught in 1950, 1967, 1971 and 1984). The last two self-maintaining populations occur in the rivers of Gironde (France) and Rioni (Georgia).

#### *Conservation status*

*Localities:* Conditions suitable for this species are thought not to exist in any Danish streams at the present (Table 4.5). Furthermore, since the species is close to extinction in western Europe, there are no populations from which immigrants may be recruited.

*Overall status:* The Sturgeon is extinct in Denmark and there is no chance of its natural re-occurrence.

#### **4.2.4.5 Miller's Thumb *Cottus gobio***

Habitats Directive: Annex II - Danish Red List 1997: Disappeared

#### *Distribution, population size and status*

The Miller's Thumb favours cool, fast running streams over stony bottoms in clear water, rich in oxygen or in the surf zone of oligotrophic lakes.

In Denmark, the species is only known from one stream system, viz. Susåen. Up to c. 1960, the species was very numerous in several localities along this stream, e.g. at Holløse Mølle, Herlufsholm and Maglemølle flood-gate (Otterstrøm 1912, Ejby-Ernst & Nielsen 1981). In a very thorough survey in 1960 and the following years, the species was not located in any of these habitats.

#### *Conservation status*

*Localities:* The Miller's Thumb has disappeared from Susåen and thus, from Denmark (Table 4.5). The species is extinct, probably due to contamination of the stream by the extent and frequency of silage during the 1950s (Ejby-Ernst & Nielsen 1981).

*Overall status:* The Miller's Thumb has disappeared from Denmark. As it is a sedentary species, it is not likely to re-colonise.

#### **4.2.4.6 Twaite Shad *Alosa fallax***

Habitats Directive: Annexes II and V - Danish Red List 1997: Critically endangered

#### *Distribution, population size and status*

The Twaite Shad lives in the sea as a shoaling fish exploiting areas close to the coast at depths down to 100 m. During early summer, the sexually mature Twaite Shad runs upriver to spawn, and during autumn the fry descend again to salt water.



Figure 4.2.4.6. Twaite Shad. Confirmed records in Denmark after 1970.

The species is often caught along Danish coasts and in fjords. Most reports are from fishermen. Some individuals have been captured during surveys of a more general character, but this species has never been the subject of a specific survey. Almost all captures are from salt water, e.g. the Wadden Sea, Ringkøbing Fjord, Nissum Fjord, Limfjorden, Randers Fjord etc. (Fig. 4.2.4.6). There is no information on population size or trend, but fishermen are of the opinion that the population of Ringkøbing Fjord is increasing; during recent years there have been weekly captures of the species in the season. In some cases, spawning adults and fry have been searched for in the outflow from Limfjorden, but without successful result.

The species is generally thought to be on the decline in its natural habitat range.

#### Conservation status

*Localities:* The only regular captures from fresh water and thus from potential spawning localities are from Ribe Å where the species is caught annually, but where the conservation status is unknown (Table 4.5). Nor is it known whether spawning takes place here or in any other Danish streams.

*Overall status:* The national conservation status of the Twaite Shad is unknown due to lack of observations. If the few reports available reflect

the frequency of the species, the conservation status is probably likely to be unfavourable.

#### 4.2.4.7 Allis Shad *Alosa alosa*

Habitats Directive: Annexes II and V - Danish Red List 1997: Critically endangered

#### *Distribution, population size and status*

The Allis Shad lives in the sea as a shoaling fish, exploiting areas close to the coast at depths down to 100 m. In early summer, the sexually mature Allis Shad migrate up stream to spawn, and during autumn the fry descend to salt water.

The species is only caught incidentally along the Danish coasts and in fjords, and all reports are from the by-catch of fishermen. The only locality where it has been caught is Ringkøbing Fjord. As the Twaite Shad is also frequently caught in this fjord, some individuals may be mis-identified species.

The species is generally considered to be on the decline in its natural habitat range.

#### *Conservation status*

*Localities:* The only regular capture site is Ringkøbing Fjord where the conservation status is unknown (Table 4.5). It is unlikely that the species spawns regularly in Danish streams.

*Overall status:* The national conservation status of the Allis Shad is unknown due to lack of observations. If these few reports reflect the frequency of the species, its conservation status is probably unfavourable.

#### 4.2.4.8 Salmon *Salmo salar*

Habitats Directive: Annexes II and V - Danish Red List 1997: Critically endangered

#### *Distribution, population size and status*

The Salmon is a long-distance migrant, devel-





Figure 4.2.4.8. Salmon. Confirmed breeding records in Denmark after 1990. Solid dots: original Salmon species, squares: Salmon of foreign origin.

oping as fry in freshwater headwaters, but living in salt water from which it migrates back to spawn in the very streams from which the individual originated. The fry descend to the sea after 1-3 years in the stream.

For many years it has been known that Skjern Å supported a population of the Salmon which showed little genetical influence from other stock. In 1999, some streams, known to support the species in recent times, were investigated in west Jutland. Tissue samples from the species (fry and sexually mature individuals) were taken and DNA analyses were compared to DNA from old (50-150 years) fish scale samples from original individuals of each individual stream. In this way, remnants of the original population, were found in further two stream systems, viz. Ribe Å and Varde Å (S. Berg, pers. comm.). It is assumed that Storåen, too, supports an original population. Moreover, Vidåen, Sneum Å, Brede Å, Kongeåen and Gudenåen support stock of non-native origin. In very recent years, a few stray individuals have been registered in 6-7 other streams on the east and west coasts of Jutland (Fig. 4.2.4.8). It is possible that these originate from stock in other streams.

In 2000-2001 a management plan is being drawn up which synthesises the available knowledge relating to the Danish Salmon populations.

#### Conservation status

*Localities:* At one locality with a genetically original population, conservation status is estimated as favourable. At all other localities, the conservation status is unfavourable due to very small populations and/or poor physical conditions in the rivers or because of the presence of obstructions that hinder movements to and from spawn localities (Table 4.5).

*Overall status:* The national conservation status of the Salmon is unfavourable as there is only one population in Denmark with a positive tendency.

#### 4.2.4.9 Spined Loach *Cobitis taenia*

Habitats Directive: Annex II - Danish Red List 1997: Vulnerable

#### *Distribution, population size and status*

The Spined Loach is a sedentary demersal fish of clear, fast-flowing waters or in large lakes with sand bottoms.

The Spined Loach has always been a rare fish species in Denmark. The species is or has been widespread in 3 water systems on Funen, 5 on Zealand and 1 on Lolland. In recent years, it has been found to occur in all 3 water systems on Funen (Odense Å, Stavis Å and Vindinge Å) and in 4 out of 5 water systems on Zealand (Susåen,



Figure 4.2.4.9. Spined Loach. Confirmed records in Denmark after 1990.

Tude Å, Halleby Å and Køge Å, but has disappeared from Fladså; Fig. 4.2.4.9). Likewise, it has disappeared from Maribo Søndersø on Lolland. There is only very little, old information on population density at some localities, like e.g. >2 individuals/m<sup>2</sup> in Susåen at Rødebro in 1967 and 0.6 individuals/m<sup>2</sup> in Tude Å at Skatholm in 1979. Population estimates of entire water catchments are not available; Funen county estimates, however, that the population in Odense Å exceeds 10,000 individuals today. The species is probably most numerous in Susåen where it is widespread throughout the catchment; in Halleby Å water system on the other hand, it has only been observed at one locality. In the habitats where this species occurs, there is nothing to imply that it is declining.

#### Conservation status

*Localities:* At all localities except for one, conservation status is favourable (Table 4.5), supported by the apparent stable population densities and its numerous occurrence in the water systems where it occurs. The physical and water chemistry properties of these streams have generally improved in recent years.

*Overall status:* The national conservation status of the Spined Loach is judged to be favourable.

#### 4.2.4.10 Weatherfish *Misgurnus fossilis*

Habitats Directive: Annex II - Danish Red List 1997: Critically endangered.

The Weatherfish is a sedentary fish living in small lakes and canals with soft bottoms.

In Denmark, the species is only known from ditches and canals in the lower part of Vidåen,

and from adjacent ponds and small lakes. The last reports on the Weatherfish in Denmark are from Sølsted Mose north of Tønder where a few individuals were found in the beginning of 1980. Whether the species is still in this area is unknown.

#### Conservation status

*Localities:* It is uncertain whether the Weatherfish is still to be found in Denmark. Thus, conservation status is unfavourable (Table 4.5). The species has obviously decreased in the only water systems from which it is known.

*Overall status:* The national conservation status of the Weatherfish is unfavourable.

### 4.2.5 Butterflies

#### 4.2.5.1 The Large Copper Butterfly *Lycaena dispar*

Habitats Directive: Annexes II and IV - Danish Red List 1997: Disappeared

#### Distribution, population size and status

The Large Copper Butterfly favours large marshes and moors rich in vegetation and canals and streams with abundant vegetation of water dock *Rumex hydrolapathum* which, in Denmark, was also the host plant of the species (Stoltze 1996).

The Large Copper Butterfly was only known from Horreby Lyng on Falster in Denmark, where it was reported from 1934 till 1955. The species is probably immigrated from north eastern Germany.

Table 4.6. Conservation status of butterflies - *Lepidoptera*. \*1934-1955. #Until 1961. □Until 1981. ^After 1980.

Species <i>Scientific name</i>	An- nex	No. of local- ities	Size of popu- lation	% of DK	Conservation status: No. of localities / % of species					National status
					Favourable	Uncertain	Unfavour.	Unknown	Disappear.	
<i>Lycaena dispar</i>	II, IV	1*	0						1	Disappear.
<i>Euphydryas aurinia</i>	II	22	?		1 / ?	3 / ?	17 / ?	1 / ?		Unfavour.
<i>Parnassius mnemosyne</i>	IV	19#	0						19	Disappear.
<i>Coenonympha hero</i>	IV	20□	0						20	Disappear.
<i>Maculinea arion</i>	IV	7^	100-300	100%	1 / 100%		2 / 0%			Unfavour.

### Conservation status

*Localities:* The Large Copper Butterfly has not been registered in Denmark since 1955 (Table 4.6). Stoltze (1996) assesses that drainage followed by overgrowth of vegetation caused the species to disappear from Horreby Lyng, but he cannot exclude the fact that collection may also have contributed. If this locality is to be re-established, reinvasion will have to take place, but there are still populations close to the Baltic Sea coast in Germany and Poland.

*Overall status:* The Large Copper Butterfly has disappeared from Denmark and natural resettlement seems unlikely right now.

#### 4.2.5.2 Marsh Fritillary *Euphydryas aurinia*

Habitats Directive: Annex II - Danish Red List 1997: Critically endangered

##### *Distribution, population size and status*

The Marsh Fritillary lives in wet heaths and unfertilised meadows on poor soil with abundant devil's-bit *Succisa pratensis*, the preferred host plant (Stoltze 1996).

Previously, the species was widespread throughout the country and particularly in Jutland. After 1900, there are only – outside Jutland – positive reports from Zealand where the species could be found at Tisvilde until 1923. In Jutland, the species was locally distributed in the first part of the 20th century. The species has experienced a drastic decline during the last part of the 1900s and is now scarce and confined to a very few localities in north Jutland.

In 1998, the species was searched for in 21 Jutland localities known to have supported the species in the beginning of the 1990s (Fig. 4.2.5.2). The Marsh Fritillary was located at only four of these sites (Stoltze 1999). The species has also been registered at Napstjert Mose (P. Stadel Nielsen, pers. comm.). P. Nielsen (pers. comm.) estimates that, in 1999, 6-10 localities in Jutland still supported the species.

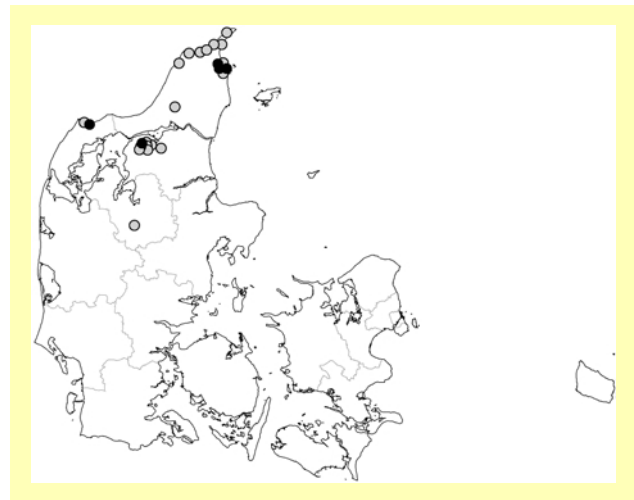


Figure 4.2.5.2. Marsh Fritillary. Known general distribution in Denmark in 1998-1999 (solid dots) and areas searched without success (grey dots).

### Conservation status

*Localities:* The Marsh Fritillary was found at Tolshave, Råbjerg Mose, Lundby Hede, Vullum Sø and Napstjert Mose – all localities in north Jutland. As the species often occurs in small, well-defined parts of large areas, it cannot be ruled out that it may be overlooked at some localities; nor can it be ruled out that the species may occur elsewhere. Conservation status is favourable at 1 site, uncertain at 3 and unknown at 1. In the 17 areas where the species was not located in 1999, conservation status is unfavourable (Table 4.6).

*Overall status:* The national conservation status of the Marsh Fritillary is unfavourable as the species has disappeared from several localities.

#### 4.2.5.3 Clouded Apollo *Parnassius mnemosyne*

Habitats Directive: Annex IV - Danish Red List 1997: Disappeared

##### *Distribution, population size and status*

The Clouded Apollo occurred in large numbers, typically in glades in old deciduous forests with rich leaf mould which supported *Corydalis intermedia*, the most important forage plant for the Clouded Apollo.



Figure 4.2.5.3. Clouded Apollo. Distribution of all historical records from Denmark.

The species was last reported in Denmark in 1961, and is today considered extinct. The Clouded Apollo was reported on Funen, Langeland and Lolland-Falster up to 1900 after which it only occurred on Zealand (Fig. 4.2.5.3). After 1922, populations were known in Knudsskov at Knudshoved Odde up to 1948 and in Jægerspris Nordskov up to 1961 (Stoltze 1996).

#### Conservation status

*Localities:* The species has not been reported in Denmark since 1961 (Table 4.6). The chance of its re-occurrence at Danish localities in the near future is estimated as poor (Stoltze 1996). The species has shown a dramatic decline in the



Figure 4.2.5.4. Scarce Heath. Distribution of all historical records from Denmark.

southern part of Sweden, which would form a potential recruiting area for any natural resettlement of Denmark.

*Overall status:* The Clouded Apollo has disappeared from Denmark and it cannot be expected that the species will re-appear naturally, irrespective of management or re-establishment measures.

#### 4.2.5.4 Scarce Heath *Coenonympha hero*

Habitats Directive: Annex IV - Danish Red List 1997: Disappeared

#### *Distribution, population size and status*

The Scarce Heath favours moist woodland meadow and glades in woods rich in mixtures of grasses. Cock's foot *Dactylis glomerata* is known as forage plant from studies in captivity. Forage plant of the species in Danish habitats is, however, unknown (Stoltze 1996).

The Scarce Heath was last reported in Denmark in 1981, but Stoltze (1996) could not exclude the possibility that the species might still be found in one of the woods of east or mid Zealand. The species is only reported on Zealand where it has been numerous at certain localities (Fig. 4.2.5.4). Since 1960, the species was only known from Lellinge and Vemmetofte where it was relatively numerous until it disappeared in 1981 (Stoltze 1996).

#### *Conservation status*

*Localities:* The Scarce Heath has not been seen in Denmark for 20 years and management or re-establishing measures of habitats will hardly have any effect as natural resettlement is unlikely (Table 4.6). Stoltze (1996) considered that there may be a very small chance of the species being overlooked in the woods of mid or east Zealand. The species is therefore considered extinct.

*Overall status:* The Scarce Heath has most likely disappeared from Denmark and natural resettlement is unlikely.

#### 4.2.5.5 Large Blue Butterfly *Maculinea arion*

Habitats Directive: Annex IV - Danish Red List 1997: Critically endangered

##### *Distribution, population size and status*

The Large Blue Butterfly favours dune heaths and dry unfertilised grasslands with thyme *Thymus* sp. which is the most important forage plant. On Møn, however, oregano *Origanum vulgare*, is an equally important host plant (Nielsen & Bittcher 1997, Nielsen 1999). The caterpillar can pupate only in the nests of the Red Ant *Myrmica sabuleti* (Stoltze 1996).

The Large Blue Butterfly was previously widespread but local on Bornholm, Møn, north and west Zealand, Djursland and north Jutland. It now only occurs with certainty at Høvblege on Møn (Fig. 4.2.5.5). There is a slight chance that the species may still persist at Grønnestrand where it was last observed in 1994 and at Bulbjerg where the species was last seen in 1997 (Stoltze 1999).

The species disappeared from south Funen in the last century, from Bornholm in 1961, east Jutland in 1962, and Zealand in 1989. The Large Blue Butterfly has been reported from seven localities in Denmark since 1980. In north Zealand,



Figure 4.2.5.5. Large Blue Butterfly. All areas of records in Denmark after 1990 (solid dots) and extinct populations (grey dots).

over that time, the species has disappeared from Lumsås and Melby Overdrev, where it was last observed in 1983, and from the neighbourhood of Rørvig where the last observation was in 1989. In north Jutland, the species has disappeared from Hammer Bakker where it was last observed in 1987. Stoltze (1996) assesses that the species may have been overlooked at a very few localities in north Jutland or Zealand. In spite of intense searches in 1998 and 1999, the species was not located in any of these localities (Bech et al. 1999 and 2000).

##### *Conservation status*

*Localities:* The population has, since 1997, experienced an increase on Møn and is now estimated at 100-300 individuals per season. Since 1991, efforts have been made to improve this habitat by means of modifying cultivation through mowing and clearing of trees and bushes. Furthermore, since 1996, its breeding range is being expanded by laying fallow an adjacent field (Nielsen 1999). Conservation status of this population is favourable (Table 4.6).

At the localities of north Jutland it has been impossible to implement adequate management measures as the reasons for the decline of the Large Blue Butterfly and its host ant species are unknown (Gadeberg 1997). Conservation status at these localities is unfavourable or disappeared.

*Overall status:* The national conservation status of the Large Blue Butterfly is unfavourable as the species has disappeared from several localities. The only positive, remaining population is, however on the increase and intensive management measures are being carried out to secure the species here.



## 4.2.6 Dragonflies

### 4.2.6.1 Green Club-tailed Dragonfly *Ophiogomphus cecilia*

Habitats Directive: Annexes II and IV - Danish Red List 1997: Rare

#### *Distribution, population size and status*

The Green Club-tailed Dragonfly breeds in clean, well-oxygenated streams, where the larvae buries itself in sand or gravel, predominantly in fast-running streams. It is most numerous in the lower parts of the stream catchment system.

The Green Club-tailed Dragonfly has, since the beginning of the last century, been known in Denmark from four large, stream systems in Jutland, viz.: Varde Å, Skjern Å, Karup Å and Gudenåen. Within the last decade, the species has been located in the three last mentioned river systems, but, since 1943, it has not been observed in Varde Å.

Observations in 1999 show that the species is still to be found in Skjern Å, Karup Å and Gudenåen (Fig. 4.2.6.1). In all three river systems, both imagines and exuvier were found in reasonable numbers.

#### *Conservation status*

Localities: The Green Club-tailed Dragonfly was previously considered rare and scarce and in the 1970s (Jensen 1972) on a marked decline. The species, however, seems to be increasing and there is no doubt that the improvements in stream quality have had a positive effect. The breeding localities of the species are not threat-



Figure 4.2.6.1. Green Club-tailed Dragonfly. Confirmed records in Denmark in 1999.

ened and appear to be in a satisfactory condition (Table 4.7).

*Overall status:* It may be concluded that the Green Club-tailed Dragonfly continues to thrive in reasonable numbers, showing stable population trends in the three mentioned stream systems. As it is, however, uncertain whether these subpopulations are sufficient to survive in the long run, the general conservation status of this species and its habitat is uncertain.

### 4.2.6.2 Large White-faced Darter *Leucorrhina pectoralis*

Habitats Directive: Annexes II and IV - Danish Red List 1997: Critically endangered

#### *Distribution, population size and status*

The Large White-faced Darter breeds particularly in clean, stagnant, oligo- or mesotrophic lakes

Table 4.7. Conservation status of dragonflies - *Odonata*. \*Stream system. \*\*898-1912. #The number of localities is unknown, but the majority is supposed to belong to this category. □1959-1961.

Species Scientific name	Annex	No. of localities	Size of population	% of DK	Conservation status: No. of localities / % of species					National status
					Favourable	Uncertain	Unfavour.	Unknown	Disappear.	
<i>Ophiogomphus cecilia</i>	II, IV	3*	?		3 / 100%					Uncertain
<i>Leucorrhina pectoralis</i>	II, IV	4	?				4 / 100%			Unfavour.
<i>Leucorrhina caudalis</i>	IV	Few**	0						x# / ?	Disappear.
<i>Leucorrhina albifrons</i>	IV	1□	0						1	Disappear.
<i>Aeshna viridis</i>	IV	6	?		5 / ?			1 / ?		Uncertain



Figure 4.2.6.2. Large White-faced Darter. Confirmed records in Denmark 1990-1999; recovered in 1999 (solid dot), no recovery in 1999 (grey dots).

and ponds but may also be observed at peat-stained woodland lakes and in old, partly overgrown peat cuttings with acid water. It favours sunny localities rich in vegetation of water plants and bog mosses. The breeding localities of the species are generally very sensitive to scrub encroachment, which leads to eutrophic and over-shadowed conditions.

The Large White-faced Darter has, since 1764, been found at about 20 localities partly in northeast Zealand, partly in mid and east Jutland. In recent decades, the species has declined strongly and during the last 10 years it has only been reported at the following localities in northeast Zealand: a peat bog at Tikøb Langesø (one individual in 1992), at a small pond north of Asserbo Ruin (imagines and exuviae in 1995 and 1997, respectively), Vaserne at Holte (one teneral male in 1999) and Kattehole Mose at Allerød (imagines and exuviae in 1992-1998 – in all seasons but decreasing from c. 25 imagines in 1992 to 2 imagines in 1998; Fig. 4.2.6.2).

Registrations at 1999 in these four localities resulted in only one individual sighting at Vaserne.

#### Conservation status

*Localities:* The Large White-faced Darter is strong-

ly declining. Any remaining populations are undoubtedly very small and the species is probably close to extinction in Denmark (Table 4.7). The species may occur in several of its habitats on northeast Zealand – primarily in Kattehole Mose which probably supports/has supported the most stable breeding population. The small ponds of the habitat are, however, heavily over-shadowed and suffering from eutrophication. It is very likely that the total population in Kattehole Mose is located in one sunny pond, the environment of which has been cleared of surrounding tree and bush vegetation.

*Overall status:* The general conservation status of the Large White-faced Darter and its habitats is unfavourable.

#### 4.2.6.3 Bulbous White-faced Darter *Leucorrhina caudalis*

Habitats Directive: Annex IV - Danish Red List 1997: Disappeared

#### *Distribution, population size and status*

The Bulbous White-faced Darter breeds in clean, slightly nutrient-rich lakes and ponds and in small peat-stained woodland lakes. The species prefers warm and sunny localities rich in vegetation of floating plants like e.g. pondweed *Potamogeton* sp., yellow waterlily *Nuphar lutea* and white waterlily *Nymphaea alba*.

The Bulbous White-faced Darter was known in a few lakes and ponds of northeast Zealand in 1898-1912, possibly earlier. Wesenberg-Lund studied this species in the vicinity of Hillerød where it occurred frequently around 1910.

#### *Conservation status*

*Localities:* The Bulbous White-faced Darter has not been reported since 1912 (Table 4.7).

*Overall status:* The species has disappeared from Denmark.

#### 4.2.6.4. Eastern White-faced Darter *Leucorrhina albifrons*

Habitats Directive: Annex IV - Danish Red List  
1997: Disappeared

##### *Distribution, population size and status*

The Eastern White-faced Darter breeds in clean, slightly acid lakes and ponds and in peat-stained woodland lakes. The species prefers more oligotrophic and acid water than its close relative, the Bulbous White-faced Darter *Leucorrhina caudalis* but prefers, likewise, sunny localities, rich in floating leaf vegetation. Furthermore, it can be found in sites rich in bog moss vegetation.

Only few individuals of the Eastern White-faced Darter were found in Denmark at Store Gribsø in Gribskov in 1959 and 1961.

##### *Conservation status*

*Localities:* The Eastern White-faced Darter has not been reported in Denmark since 1961 (Table 4.7).

*Overall status:* The species has disappeared from Denmark.

#### 4.2.6.5 Green Hawker *Aeshna viridis*

Habitats Directive: Annex IV - Danish Red List  
1997: Vulnerable

##### *Distribution, population size and status*

The Green Hawker breeds partly in sunny, meso- or oligotrophic lakes and bogs situated in woodland (northeast Zealand), and in warm, canals and ditches rich in vegetation (the marsh in southwest Jutland). The female almost always oviposits her eggs into the plant of water soldier *Stratiotes aloides*, and, thus, the species is normally to be found only in places where this plant occurs.

The Green Hawker has been known in Denmark



Figure 4.2.6.5. Green Hawker. Confirmed records in Denmark in 1999 and Kulemose in 1994.

since the end of the 1800s. The species is primarily found in northeast Zealand where it has been reported from 25 localities over the years. Furthermore, in 1988, it was observed in an area in Tøndermarsken and in 1994 in Kulemosen on Funen (E. Vinther, pers. comm.). In the last decade, the Green Hawker has been found altogether in six sites in northeast Zealand, on Funen and in Tøndermarsken.

Observations in 1999 show that the species still occurs at four localities in northeast Zealand and in Tøndermarsken (Fig. 4.2.6.5). At all localities, imagines were found in reasonable numbers, while exuviae were registered in large numbers in several of the northeast Zealand habitats. Kulemose was not surveyed in 1999.

##### *Conservation status*

*Localities:* The Green Hawker probably breeds in relatively healthy populations at the five examined Danish localities where status is assumed favourable, while status is unknown in Kulemosen (Table 4.7). Compared to other investigations during the last 10 years, the different populations seem to be quite stable. Likewise, status of breeding localities seems relatively stable, but through overshadow and overgrowth, the habitats of Zealand will deteriorate in a short while. In the process of dredging suitable waters, it is of vital importance to create optimum conditions for the hostplant, water soldier.

*Overall status:* Conservation status of the Green Hawker is uncertain as the number of sites is limited.

## 4.2.7 Beetles

### 4.2.7.1 Great Diving Beetle *Dytiscus latissimus*

Habitats Directive: Annexes II and IV - Danish Red List 1997: Critically endangered

#### *Distribution, population size and status*

The Great Diving Beetle favours clean lakes with clear or pale brown water with an abundant supply of summer populations of large caddis worms (the food of the larvae).

The Great Diving Beetle has been found at c. 60 localities distributed throughout the country since the 1700s (Holmen 1993, Pedersen 1994, M. Holmen, pers. comm.). Assessment of conservation status is based on the six sites where the species has been reported within the last 20 years and which are thought to constitute the majority of the existing breeding population (Fig. 4.2.7.1). The species was last found, in a few numbers, at one locality in 1994 during a survey of previously occupied and possible habitats (Pedersen 1994).

In 1994, the species was thought to occur at three out of the six most recent locations. Small populations may be difficult to detect and the species has not been systematically surveyed in all Danish lakes. Furthermore, the species is a powerful flier and is therefore capable of airborne dispersal. The conservation status is assessed to be stable at one locality and negative or unknown



Figure 4.2.7.1. Great Diving Beetle. Confirmed records in Denmark 1994 (solid dot) and 1975-1991 (grey dots).

at all other, currently known localities. Generally speaking, many lakes are subject to influence by factors known to have a negative impact on the species, primarily eutrophication (which possibly reduces food resources of the larvae, reduces dispersal and exchange of genetic material).

#### *Conservation status*

*Localities:* In 1 of the 6 most recently occupied sites, conservation status is judged to be favourable. This is based on the fact that here, the scarce, but stable population occurs in a suitable habitat (Table 4.8). At 3 sites, the situation is unfavourable either because (i) lack of recovery of a former large population has not taken place because positive management is required or (ii) the current sites no longer offer suitable habitat. In 2 sites, former scarce populations have not been recovered and the species is thought to have disappeared.

Table 4.8. Conservation status of beetles - *Coleoptera*. \*Until 1966.

Species Scientific name	An- nex	No. of local- ities	Size of popu- lation	%	Conservation status: No. of localities / % of species					National status
					Favourable	Uncertain	Unfavour.	Unknown	Disappear.	
<i>Dytiscus latissimus</i>	II, IV	6?	?	100%?	1 / ?		3 / ?	2 / ?		Unfavour.
<i>Graphoderus bilineatus</i>	II, IV	4?	?	100%?	1 / ?	1 / ?	1 / ?	1 / ?		Unfavour.
<i>Lucanus cervus</i>	II	5*	0						5 / 100%	Disappear.
<i>Limoniscus violaceus</i>	II	1**	0						1 / 100%	Disappear.

*Overall status:* The national conservation status of the Great Diving Beetle is unfavourable. There is only one positively confirmed finding in 1994 where the population seemed stable. Furthermore, the species has not been recovered at five localities where it has occurred within a 20-year period, although small or reduced populations may have been overlooked at three of the localities.

#### 4.2.7.2 Dipping Beetle *Graphoderus bilineatus*

Habitats Directive: Annexes II and IV - Danish Red List 1997: Critically endangered

##### *Distribution, population size and status*

The Dipping Beetle favours in particular clean lakes with clear or pale brown water, usually edged with sedge *Carex* sp. or moderately oligotrophic ponds with abundant summer populations of small water fleas close to the bank (which form the diet of the larvae).

Since the mid 1800s, the Dipping Beetle has been observed at over 35 Danish localities from east Jutland and eastwards (Holmen 1993, Pedersen 1994, Hansen et al. 1999, O. Vagtholm, pers. comm., M. Holmen, pers. comm.). Conservation status is based on the status at four Danish localities where the species has been observed



Figure 4.2.7.2. Dipping Beetle. Confirmed records in Denmark 1994-1999 (solid dots) and 1976-1980 (grey dots).

during the last 20 years and which may represent breeding populations. The species was only found at one locality in 1994 during a survey of the former known haunts and a number of potential habitats elsewhere (Pedersen 1994). Since then, the species was rediscovered in the same site in 1995-1996 and at two further localities in 1998-1999 (Fig. 4.2.7.2).

##### *Conservation status:*

*Localities:* At one of the four localities, conservation status is assessed as favourable due to a possible stable occurrence in spite of some deterioration of the water environment (Table 4.8). Conservation status at one locality is thought to be uncertain. This is caused by falling numbers in the population and need for management measures. At another locality, status is unfavourable due to the lack of recovery of a small population, the poor quality of the water environment and the need for management measures. At another locality where conservation status has not been determined, a formerly scarce population has not been rediscovered, although the habitat seems favourable to the species to the present day.

*Overall status:* The national conservation status of the Dipping Beetle is unfavourable. During 1994-1999, there are only confirmed observations from three Danish localities and at least on two of the four localities where the species has been observed since 1980, the population is thought to have declined or disappeared.

#### 4.2.7.3 Stag Beetle *Lucanus cervus*

Habitats Directive: Annex II - Danish Red List 1997: Disappeared

In Denmark, the Stag Beetle favoured old open deciduous forests, where the species in particular was associated with oak, beech and ash. Elsewhere in Europe, the species is also reported breeding in coniferous trees and outside forests in heaps of sawdust e.g. at sawmills and (less frequently) in heaps of compost in parks and gardens.

The Stag Beetle was probably widespread in



most regions of Denmark (maybe except for north Jutland, Lolland and Falster) until the mid 1800s. Apparently, the species disappeared first from Zealand where the last known reported individual was from Næsbyholm in 1873 (Martin 1993). From Jutland, the Funen-area, Møn and Bornholm the species was still reported or observed during the 1900s. The last known observation from Jutland concerned an individual in 1931 from Fakkegrav, although an individual was ostensibly photographed from this site on an oak in 1966. Another individual may have been observed here in 1970 (Fig. 4.2.7.3). From Funen, the species was particularly known from Æbelø where it was protected in 1924 and observed on a few occasions up to 1954, at which time a specimen was removed from the island (Rørth & Michelsen 1962). Subsequently there have been no observations from Æbelø. On Møn, the last observation was made in Klinteskov in 1910. From Bornholm, the last positive observation is from 1955 where a female was captured, photographed and released in the Habbedal-area at Olsker, and from the same area, there is reliable information on some individuals which were observed on broken branches of cherry trees in about 1959 (Stoltze 1989).

At all these localities, the species has been looked for in recent years in vain. It cannot be ruled out, however, that there may exist a small population at one or more of these localities or elsewhere where conditions are favourable for the species.



Figure 4.2.7.3. Stag Beetle. Confirmed records in Denmark 1910-1966.

#### *Conservation status*

*Localities:* The Stag Beetle has been searched for in all former locations in Denmark, but in vain (Table 4.8).

*Overall status:* The Stag Beetle has not been registered with certainty since 1966 and the species is thought to have disappeared from Denmark.

#### **4.2.7.4 (Violet Click Beetle) *Limoniscus violaceus***

Habitats Directive: Annex II - Danish Red List 1997: Disappeared

#### *Distribution, population size and status*

The species which has recently been named 'violsmelder' in Denmark, favours old deciduous forests where it breeds in hollow trees close to the ground. In Denmark, the species has only been observed in oak (in one single tree). Outside of Denmark, the species is known from beech, elm, ash and oak, but is primarily observed in old long-established beech forests.

The Violet Click Beetle has only been observed at one locality in Denmark: Bognæs Storskov in Roskilde Fjord (Martin 1989). The species has probably always been rare in Denmark because this is the northern limit of its distribution. Thus, it has never been observed in Sweden and in Germany the most northerly observation is from Brandenburg.

The Violet Click Beetle was observed on Bognæs in 1924 in the remains of a hollow oak on Egehoved. A total of three individuals were found. Since then the species has been searched for at Bognæs in vain, despite the remaining hollow trees at this site, and at other suitable localities in Denmark. The species is difficult to detect in its larval form, as well as an adult beetle, which is why it cannot be ruled out that the species still occurs in Denmark.

#### *Conservation status*

*Localities:* The Violet Click Beetle has only been

found at one locality in Denmark and was last observed in 1924 (Table 4.8).

*Overall status:* It is considered that the Violet Click Beetle has disappeared from Denmark.

## 4.2.8 Snails

### 4.2.8.1 Geyer's Whorl Snail *Vertigo geyeri*

Habitats Directive: Annex II

#### *Distribution, population size and status*

The Geyer's Whorl Snail is a northerly distributed species with a relict distribution, confined to well-defined habitats, namely calcareous localities where the species particularly favours withered leaves of sedges *Carex* sp. The local population size is often small. Almost all formerly known Danish localities are or were important botanical localities.

During c. 1900-1970, the species was reported from 14 sites in Denmark, distributed between north Jutland, Zealand and Bornholm. Only 12 of these have a precise indication of the locality.

In 1999, another search of the same 10 localities was carried out and only one locality in mid Jutland, where it was last observed in 1936, was found to support the species (Fig. 4.2.8.1). Several other localities offered habitats that may be suitable for the species, but as it is difficult to detect, it is possible that the species may have been overlooked. If this is the case, the size of the population is hardly very big.



Figure 4.2.8.1. Geyer's Whorl Snail. Sites supporting the species in Denmark in 1999 (solid dots). Historical records 1900-1970 (grey dots).

#### *Conservation status*

*Localities:* The species was observed in 1999 in a meadow/marsh area in mid Jutland where four individuals were detected during three hours of search. The small number of individuals found confirms that the population size is probably small. The monitored area is possibly too heavily grazed to be suitable, whereas the rest of the locality lacks grazing. Thus, conservation status is uncertain at this locality, whereas it is unknown at all the other historical localities (Table 4.9).

*Overall status:* The few observations resulting from the survey in 1999 tend to suggest that the Geyer's Whorl Snail has strongly decreased even though it may have been overlooked. The national conservation status is unknown.

Table 4.9. Conservation status of snails - *Gastropoda*. \*900-1999. #1877-1999. □1864-1999.

Species <i>Scientific name</i>	An- nex	No. of local- ities	Size of popu- lation	%	Conservation status: No. of localities / % of species					National status
					Favourable	Uncertain	Unfavour.	Unknown	Disappear.	
<i>Vertigo geyeri</i>	II	14*	?			1 / ?			13 / ?	Unknown
<i>Vertigo angustior</i>	II	55#	?			1 / ?			54 / ?	Unknown
<i>Vertigo moulinsiana</i>	II	43□	?		1 / ?	1 / ?			41 / ?	Unknown

#### 4.2.8.2 Narrow-mouthed Whorl Snail *Vertigo angustior*

Habitats Directive: Annex II

##### *Distribution, population size and status*

The Narrow-mouthed Whorl Snail favours two habitat types, namely wet calcareous habitats like lime ponds and base-rich meadows and dry habitats such as half-shaded slopes and stone fences. Population size is usually small and the species is thus difficult to detect.

Between 1877 and 1974 the species was registered in c. 54 sites in Denmark (Fig. 4.2.8.2).

In 1999 it was searched for at six known, formerly occupied localities but without success. In one of the sites, where the species was numerous a hundred years ago, no specimens were found in spite of a thorough monitoring programme and the existence of apparently suitable habitat. These negative results indicate that the species is experiencing a general decrease. On the other hand, the species was detected in 1999 in Himmerland at a locality new to the species during surveys for the Geyer's Whorl Snail.

##### *Conservation status*

*Localities:* The locality where the species was de-



Figure 4.2.8.2. Narrow-mouthed Whorl Snail. Site supporting the species in Denmark in 1999 (solid dot). Historical records in 1877-1974 (grey dots).

tected in 1999 is left in a natural state and is designated as an area of outstanding natural beauty. The snails were found in a very small area of the sedge marsh and it remains unknown whether the species is confined to this small area. Continued scrub and woodland encroachment with shading alders will, in the long term, threaten the survival of the species. Thus, conservation status is assessed as uncertain at this locality, whereas it is unknown in the rest of the sites occupied historically (Table 4.9).

*Overall status:* Until further monitoring is initiated it can be assumed that the species is on the decline and has disappeared from many of the formerly occupied sites. It is, however, possible, that the species does still occur in several places. The national conservation status is unknown.

#### 4.2.8.3 Desmoulin's Whorl Snail *Vertigo moulinsiana*

Habitats Directive: Annex II

##### *Distribution, population size and status*

The Desmoulin's Whorl Snail favours the stems of marsh vegetation, particularly leaves of sedge *Carex* sp. on the banks of lakes and larger streams.

Between 1864 and 1977 the Desmoulin's Whorl Snail was registered from c. 43 sites, mainly distributed on the islands with a few records in east Jutland (Fig. 4.2.8.3). The number of individuals at one locality can be numerous, with many individuals on each sedge plant.

The species was, in particular, found in numerous numbers in the Mølleå-system north of Copenhagen. Monitoring of the area in 1999 resulted in relocation in two-three sites where it had last been observed in 1936.

Eutrophication of wetlands causes sedge belts to shrink or be completely succeeded by willow scrub and forests of reeds. Should this happen, the species will become scarce or disappear completely. The species has, however, survived eutrophication of Mølleåen, and it may well be that the species has survived in many other locali-

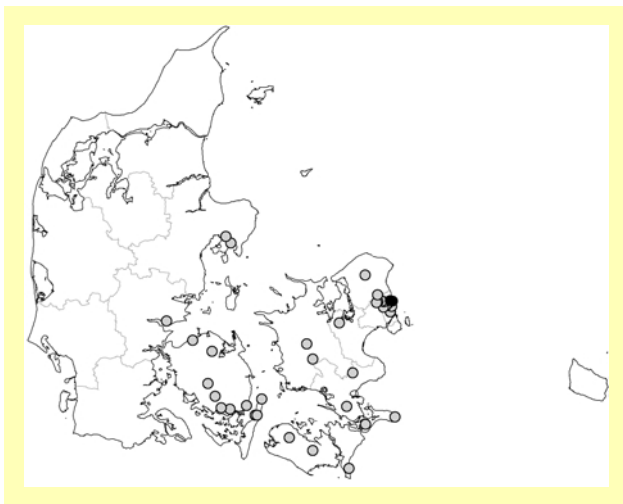


Figure 4.2.8.3. Desmoulin's Whorl Snail. Site supporting the species in Denmark in 1999 (solid dot). Historical records in 1864-1977 (grey dots).

ties. The possibility remains that it is still to be found in the majority of its former localities.

#### Conservation status

**Localities:** In 1999, the Desmoulin's Whorl Snail was registered between Rådavad and Strandmøllen where it was very scarce. The biotope was not ideal for the species (being rather too shaded) but as this area is left in a natural state, the conservation status may, nevertheless, be characterised as favourable. The species was furthermore registered in 1999 at Stampen at which locality the extent of suitable vegetation is very limited. Thus, the situation here for the species is uncertain. In all other documented sites occupied in historical times, the conservation status is unknown (Table 4.9).

**Overall status:** The Desmoulin's Whorl Snail may be found at several localities in east Denmark, but a detailed mapping and consequent conservation status awaits a survey. Thus, the national conservation status is unknown.

## 4.2.9 Bivalves

### 4.2.9.1 Freshwater Pearl Mussel *Margaritifera margaritifera*

Habitats Directive: Annexes II and V - Danish Red List 1997: Critically endangered

#### *Distribution, population size and status*

The Freshwater Pearl Mussel favours clean streams where reproduction of the species depends on host fish like salmon or trout.

The species in Denmark has only been observed from the lower part of Varde Å. The Freshwater Pearl Mussel was stocked in 1910-1912 in Skjern Å, Sneum Å and Kongeåen, but it remains unknown whether the species has maintained itself in these streams (Mandahl-Barth 1949).

Restoration of parts of Varde Å in the 1970s revealed that the species is still occurring here but the population consists of only older individuals.

#### *Conservation status*

**Localities:** The Freshwater Pearl Mussel has recently only been registered on a reach of Varde Å east of Varde. It looks as if the species has ceased to maintain a self-perpetuating population as elsewhere in many other European streams (Alvarez-Claudio et al. 2000; Table 4.10).

**Overall status:** The national conservation for the Freshwater Pearl Mussel is unfavourable as the only known Danish occurrence is no longer self-maintaining.

Table 4.10. Conservation status of bivalves - *Bivalvia*.

Species <i>Scientific name</i>	An- nex	No. of local- ities	Size of popu- lation	%	Conservation status: No. of localities / % of species				National status
					Favourable	Uncertain	Unfavour.	Unknown Disappear.	
<i>Margaritifera margaritifera</i>	II, V	1	?				1 / 100%		Unfavour.
<i>Unio crassus</i>	II, IV	?	?						Unknown

#### 4.2.9.2 Thick Shelled River Mussel *Unio crassus*

Habitats Directive: Annexes II and IV

##### *Distribution, population size and status*

The Thick Shelled River Mussel in Denmark favours streams with stony, gravelled or sandy bottoms and strong or moderately flowing water where reproduction of the species depends on host fish: minnow, stickleback or various carps.

The species has previously been widespread throughout the country and has been reported from Jutland, Funen and Zealand, although the distribution of the species has always been dispersed (Mandahl-Barth 1949).

At the beginning of 1990, observations were made in Lyngbygård Å in east Jutland and in mid 1980 in Suså at Holløse Mølle on Zealand. As there have been no changes of the environment in these two places, the species is assumed to still live here.

##### *Conservation status*

*Localities:* Conservation status is unknown at recent localities (Table 4.10). There have been no

proper survey or monitoring of the Thick Shelled River Mussel which explains why the species may have been overlooked at several localities.

*Overall status:* The national conservation status of the Thick Shelled River Mussel is unknown due to insufficient data.

#### 4.2.10 Vascular plants

##### 4.2.10.1 Little Grapefern *Botrychium simplex*

Habitats Directive: Annexes II and IV - Danish Red List 1997: Critically endangered

##### *Distribution, population size and status*

The Little Grapefern favours peaty coastal dry grasslands and stabilised green dunes. The Little Grapefern was searched for in 1997-1998 at Saltbæk Vig where it is assumed to still occur (Wind et al. 1999).

The species was first reported in 1890 at the now drained Gårdbogård Sø northwest of Frederikshavn where it has not been rediscovered since. Up to 1950 the species was registered from seven sites (Wind 1992).

Table 4.11. Conservation status of vascular plants - *Tracheophyta*.

Species Scientific name	An- nex	No. of local- ities	Size of popu- lation	%	Conservation status: No. of localities / % of species					National status
					Favourable	Uncertain	Unfavour.	Unknown	Disappear.	
<i>Botrychium simplex</i>	II, IV	1	?	100%			1 / 100%			Unfavour.
<i>Saxifraga hirculus</i>	II, IV	17	app. 2900	>95%	3 / 88%	3 / 11%	11 / 1%			Unfavour.
<i>Luronium natans</i>	II, IV	10	?	100%	7 / ?		1 / ?	2 / ?		Uncertain
<i>Najas flexilis</i>	II, IV	2	small	100%			1 / 100%		1	Unfavour.
<i>Cypripedium calceolus</i>	II, IV	2	445	100%	2 / 100%					Uncertain
<i>Liparis loeselii</i>	II, IV	18	>5500	100%	5 / 92%	3 / 7%	10 / 1%			Unfavour.
<i>Lycopodium selago</i>	V	45	?	>75%?		45				Uncertain
<i>Lycopodium alpinum</i>	V	3	0	>95%		3			?	Uncertain
<i>Lycop. tristachyum</i>	V	13	?	>95%?		13				Uncertain
<i>Lycop. complanatum</i>	V	3	>850	>95%	1 / 95%		1 / 5%	1 / 0%		Unfavour.
<i>Lycop. clavatum</i>	V	184	?	>75%?		184				Uncertain
<i>Lycop. annotinum</i>	V	154	?	>75%?		154				Uncertain
<i>Lycop. inundatum</i>	V	73	?	>75%?		73				Uncertain



### *Conservation status*

*Localities:* At one locality - probably the most important historical and possibly the only remaining population of the species in Denmark - conservation status is uncertain. The species at this locality is of unfavourable status due to the fluctuating number of individuals combined with the strong isolation of the habitat (Table 4.11).

*Overall status:* The national conservation status of the Little Grapefern is unfavourable in spite of insufficient knowledge of distribution and the status at the only confirmed haunt of the species.

#### **4.2.10.2 Yellow Marsh Saxifrage *Saxifraga hirculus***

Habitats Directive: Annexes II and IV - Danish Red List 1997: Vulnerable

#### *Distribution, population size and status*

The Yellow Marsh Saxifrage favours wet open clearwater springs and spring bogs with summer-cold water spring (Palludella springs).

The Yellow Marsh Saxifrage was searched for in 1998 in 17 sites that were known to support the species within the last 20 years (Wind et al. 1999). The species was located at seven of these localities totalling c. 2,900 individuals (Fig. 4.2.10.2).



Figure 4.2.10.2. Yellow Marsh Saxifrage. Confirmed records in Denmark in 1998 (solid dots) and 1969-1990 (grey dots).

Status is stable at three localities and declining or unknown at the remaining four localities.

Before 1950, the Yellow Marsh Saxifrage was positively reported from c. 90 localities, primarily in mid and north Jutland and in north Zealand (Wind 1988).

### *Conservation status*

*Localities:* At three localities holding barely 90% of the recent population, conservation status is considered to be favourable based on stable numbers and suitable habitats (Table 4.11) whereas conservation status is thought uncertain at three localities holding c. 10%, due to negative trends in numbers of plants or lack of information. Conservation status at 11 localities holding barely 1% is unfavourable due to a decline or disappearance of the species supplemented by a need for management measures in several habitats. Generally speaking, the recent known localities are strongly isolated as a result of the intensive exploitation of the adjacent landscape which reduces the potential for the exchange of genetic material.

*Overall status:* The national conservation status of the Yellow Marsh Saxifrage is judged unfavourable, because of the decline in the majority of the populations, and the need for management of the habitats to avoid scrub encroachment. Furthermore, the species has not been relocated at 10 localities where it was observed in the last 20 years.

#### **4.2.10.3 Floating Water Plantain *Luronium natans***

Habitats Directive: Annexes II and IV - Danish Red List 1997: Critically endangered - Danish Amber List 1997: Species of national responsibility

#### *Distribution, population size and status*

The Floating Water Plantain favours streams and canals with slowly flowing water, in ponds with stagnant water and at the bottom of dune ponds. The species occurs only in west Jutland.



Figure 4.2.10.3. Floating Water Plantain. Confirmed records in Denmark 1995-1999.

In 1998, the Floating Water Plantain was searched for at 5 localities, 4 of which were inhabited by the species (Wind et al. 1999). At further 3 localities, Ringkøbing county council district located the species in 1995 and 1997 (Moeslund 1996, 1997a, 1997b), and in 1999 the species was observed at new localities at Skjern Å and Nissum Fjord. Altogether the Floating Water Plantain occurs at 9 localities in west Jutland at Ringkøbing and Nissum fjords (Fig. 4.2.10.3).

The Floating Water Plantain was previously observed at c. 25 localities in the area between Nissum Fjord and Ribe (Mikkelsen 1943).

#### Conservation status

*Localities:* At seven localities, conservation status of the Floating Water Plantain is presumed favourable due to stable or positive population trends and stable conditions in the habitats. At one locality, conservation status is assumed to be unfavourable as the species has not been relocated here and at two newly registered localities, the conservation status is unknown (Table 4.11).

*Overall status:* Even though conservation status is predominantly favourable at individual localities, the national conservation status is assumed to be uncertain based on the fact that the spe-

cies occurs at few localities with a limited geographical distribution. This makes the species vulnerable to declines and for many sites, it is uncertain whether a self-maintaining population occurs.

#### 4.2.10.4 Slender Naiad *Najas flexilis*

Habitats Directive: Annexes II and IV - Danish Red List 1997: Critically endangered

#### *Distribution, population size and status*

The Slender Naiad favours open sandy or calcareous sea bottoms in shallow marine waters.

In 1998 the Slender Naiad was monitored at two formerly known localities, at one of which the species was relocated (Wind et al. 1999). Nors Sø in Thy is now probably the only habitat in Denmark and at Fil Sø the Slender Naiad was last observed in 1947 (Løjtnant & Worsøe 1977). A herbarium specimen of the Slender Naiad from Thy in 1961 was later questioned for its authenticity (Moeslund & Schou 1993).

The Slender Naiad was mapped in 1998 in Nors Sø, estimated to be confined to 1.6-2.0 m depth. During the period since the species was first observed at the locality in 1993 (Moeslund & Schou 1993), the population has decreased. At the same time the extent of all kinds of vegetation has increased, and the growth of algae in Nors Sø has reduced the transparency of the water column.

#### *Conservation status*

*Localities:* The conservation status in Nors Sø is presumed to be unfavourable due to a negative population trend and uncertain habitat quality. Since 1947, the species has not been relocated in Fil Sø, so the species is assumed to have disappeared from there (Table 4.11).

*Overall status:* The national conservation status of the Slender Naiad is presumed unfavourable.

#### 4.2.10.5 Lady's Slipper Orchid *Cypripedium calceolus*

Habitats Directive: Annexes II and IV - Danish Red List 1997: Rare

##### *Distribution, population size and status*

The Lady's Slipper Orchid in Denmark favours light open situations on calcareous soils in woodland and on slopes.

In 1998, two viable populations of the Lady's Slipper Orchid were found in Himmerland (Fig. 4.2.10.5); at neither site did the habitats seem in need of special management measures to secure the species (Wind et al. 1999). The Lady's Slipper Orchid was observed for the first time in Himmerland in 1884 (Grøntved 1948) whereas one individual was found in the other habitat in 1973. One of the populations account for c. ¼ of all individuals and has a stable tendency while the other one has increasing numbers of individuals.

There are indications of reports of this species from other places in Denmark, e.g. from Møns Klint before 1800, but these are questionable. Other records relate to plants artificially introduced, all of such populations have now disappeared.

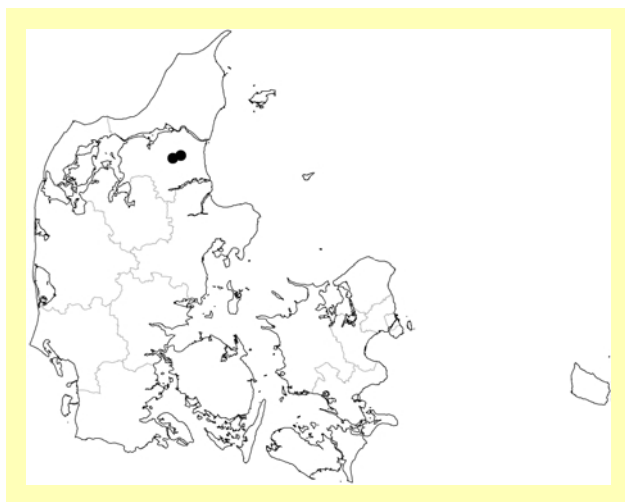


Figure 4.2.10.5. Lady's Slipper Orchid. Confirmed records in Denmark 1998-1999.

##### *Conservation status*

*Localities:* In the two sites supporting the current population, the conservation status of the Lady's Slipper Orchid is assumed to be favourable due to stable or increasing occurrence at sites with stable habitat conditions (Table 4.11).

*Overall status:* As the total population of the Lady's Slipper Orchid occurs in small and isolated populations which are vulnerable to negative factors, the national conservation status of this species is uncertain.

#### 4.2.10.6 Fen Orchid *Liparis loeselii*

Habitats Directive: Annexes II and IV - Danish Red List 1997: Vulnerable

##### *Distribution, population size and status*

The Fen Orchid favours calcareous bottom in moist meadows and bogs and in dune slacks (alkaline fens).

The Fen Orchid was monitored in 1997 and 1998 at 18 localities where the species has been reported during the past 10 years (Wind et al. 1999). At 10 localities the species was positively relocated totalling c. 5,500 plants and in 1999 relocated at a further locality (Fig. 4.2.10.6). In 4 of the 11 relocation areas supporting approx. half of the national population, the trend is positive, while the trend is stable or decreasing at 3 localities supporting c. 1%, and unknown at 4 lo-



Figure 4.2.10.6. Fen Orchid. Confirmed records in Denmark 1997-1999 (solid dots) and 1985-1995 (grey dots).

calities supporting c. 47% of the national population. One of these 4 localities supports 44% of the total population. At most localities where the Fen Orchid was not rediscovered, only one or two individuals had previously been reported.

Generally speaking, the Fen Orchid has decreased dramatically during the 1900s (Vinther 1985). Before 1950, the species was known from c. 75 localities mainly distributed throughout the islands (Grøntved 1948).

#### *Conservation status*

*Localities:* At five localities supporting more than 90% of the recent population, conservation status is presumed favourable due to stable or increasing numbers and suitable habitats without any apparent need for management action (Table 4.11). Conservation status of three populations supporting just under 10% is assumed uncertain due to a very small number of individuals in two habitats and some need for management actions in the third habitat (to prevent scrub encroachment). The conservation status of the remaining 10 localities holding c. 1% of the total population, is presumed unfavourable due to falling numbers and the need for management actions at two localities (scrub encroachment/water regulation) and there were no rediscoveries of the species at seven localities.

*Overall status:* The national conservation status of the Fen Orchid is presumed unfavourable based on the recent population size and trend, like e.g. apparent extinction at seven localities and a general decline of the species throughout the 1900s.

#### **4.2.10.7 Fir Clubmoss *Lycopodium selago***

Habitats Directive: Annex V - Danish Red List 1997: Rare

#### *Distribution, population size and status*

The Fir Clubmoss occurs sporadically in most

areas of the country, present in open sites with oligotrophic soil on heaths, in dune- and heath-plantations and on banks in both open landscapes and coniferous plantations.

A coordinated field registration of the Fir Clubmoss on a national basis has not been carried out since Topografisk-botaniske Undersøgelser (TBU) (Topographical-botanical Surveys) survey No. 18 covering the pteridophytes (Wiinstedt 1953). A few areas have been researched during the last 10 years. Hence, in northwest Jutland the species was registered in 12 squares (1 x 1 km) in 1991-1998 (Søndergård 1998a) and on north and eastbound banks along main road No. 26 in 1992 (Bavnhøj & Kjærgaard 1995). The species was relocated at 16 localities in Grib Skov in 1990-1997 of which 12 populations were still in existence in 1997 (Dalgaard 1998). Supplementary information reveals registration of the species at 21 other localities in Denmark in 1980-2000. Thus, the Fir Clubmoss is represented at 45 known localities (Fig. 4.2.10.7).

The Fir Clubmoss occurs typically as very few individual plants at each locality, but it can be more numerous, as for example, at the south Jutland site thought to support the largest population, which held c. 100 individuals in 1990 (Wind 1994).

The population in Grib Skov counted 1-72 individuals (Dalgaard 1998). Aggressive invasion of herb vegetation erodes the habitats and may, in

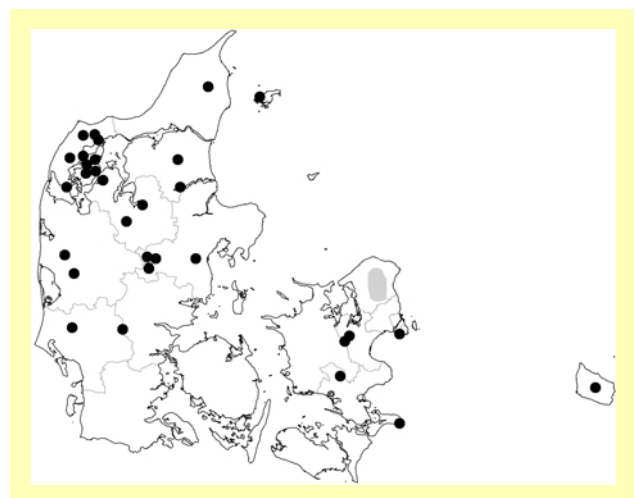


Figure 4.2.10.7. Fir Clubmoss. Confirmed records (solid dots), known general distribution (grey shading) in Denmark 1980-2000.

only few years, cause an apparent well-established population to decline or completely disappear.

#### *Conservation status*

*Localities:* A quantitative, local evaluation of conservation status of the Fir Clubmoss is not possible based on the existing knowledge. A qualitative comparison between the distribution map in TBU No. 18 and Fig. 4.2.10.7 reveals that the habitats of the species have been reduced to one third. The main distribution of the Fir Clubmoss has changed and the species can no longer be relocated in many areas, formerly known to support the species (east and south Jutland and Funen). The frequency and extent of suitable habitat on Zealand and in many parts of Jutland have been reduced except in north Zealand and northwest Jutland where searches have resulted in several new discoveries of localities. This positive result implies that the Fir Clubmoss will remain in Denmark as long as suitable habitats are available.

*Overall status:* The national conservation status of the Fir Clubmoss must be characterised as uncertain as information on population size and the need for management at each of the habitats are not available (Table 4.11).

#### **4.2.10.8 Alpine Clubmoss *Lycopodium alpinum***

Habitats Directive: Annex V - Danish Red List 1997: Disappeared

#### *Distribution, population size and status*

The Alpine Clubmoss favours clear and open soil at oligotrophic, sandy localities in moors and gravel pits, which are constantly disturbed, preventing more vigorous vegetation from establishing itself.

The Alpine Clubmoss was not included in the NERI monitoring of red listed vascular plants, as it was not rediscovered in 1990 in the last known habitat north of Viborg, nor in the two other known habitats in Vendsyssel and on An-



Figure 4.2.10.8. Alpine Clubmoss. Previous registrations in Denmark.

holt (Fig. 4.2.10.8). The Danish population must be characterised as marginal in relation to the main distribution of the species (circumpolar, arctic-alpine and sub-alpine).

New populations may establish themselves in suitable areas, like e.g. abandoned mineral workings such as gravel pits, containing oligotrophic soil or on heaths subject to man-made disturbances, but the occurrence of the species will only be temporary due to transient light and micro-climatic conditions before more aggressive colonisers move in.

#### *Conservation status*

*Overall status:* At present the national conservation status must be characterised as uncertain with the possibility that the species may have disappeared (Table 4.11).

#### **4.2.10.9 Pursh Deeproot Clubmoss *Lycopodium tristachyum***

Habitats Directive: Annex V - Danish Red List 1997: Vulnerable

#### *Distribution, population size and status*

The Pursh Deeproot Clubmoss favours oligotrophic soil on heaths in areas where all other vegetation is low. In areas subject to scrub en-



croachment, over-shading ousts the species and consequently favoured management actions include the removal of heath peat, heather harvest or burning of scrub. The species reproduces by lateral shoots which produces many branched aerial shoots. Opening of the vegetation enhances the possibility of dispersal for the species.

The Pursh Deeproot Clubmoss is very rare in Denmark and the species is only to be found in Jutland and in one area in north Zealand. After the publishing of *Topografisk-botaniske Undersøgelser* (TBU) No. 18 (Wiinstedt 1953), the distribution of the Pursh Deeproot Clubmoss was mapped on a national basis during a mapping of moors and commons by Feltbotanisk Klub. In 1980-1989 the species was reported in 10 squares (5 x 5 km) supplemented by a report of the species from Skovbjerg Bakkeø in 1990 (Pitter & Rasmussen 1990). In 1998 the species was found on heathland in west Jutland (Hammer 1999) and rediscovered in Grib Skov in 1995 (Dalgaard 1996). During registration of pteridophytes in 1991-1998 in northwest Jutland, the Pursh Deeproot Clubmoss was not found (Søndergård 1998a). Thus, the Pursh Deeproot Clubmoss is known to occur at 13 localities (Fig. 4.2.10.9).

#### *Conservation status*

*Localities:* Information on the Pursh Deeproot

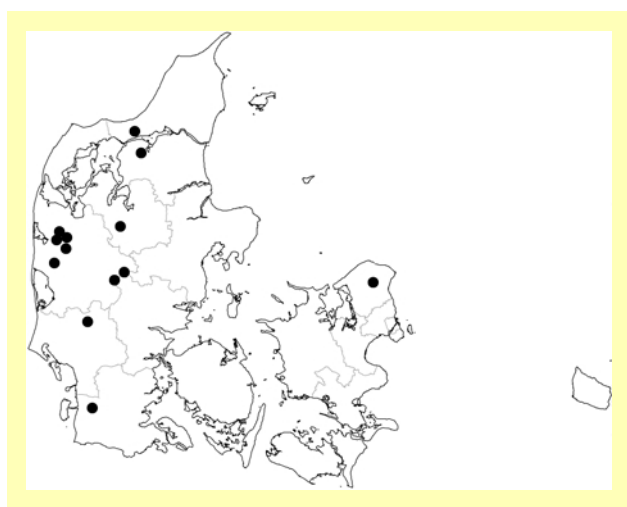


Figure 4.2.10.9. Pursh Deeproot Clubmoss. Confirmed records in Denmark 1980-2000.

Clubmoss is too sporadic to assess its present quantitative conservation status at a local level. A qualitative comparison between distribution map in TBU No. 18 and Fig. 4.2.10.9 reveals that the number of suitable habitats has been reduced to one quarter of its former distribution. The main distribution of the species is unchanged as the species can still be found in west Jutland, however, with a marked decreasing frequency. Apart from the rediscovery at a locality in north Zealand there are no other reports from other parts of the country which indicate that the species may have disappeared from Bornholm.

*Overall status:* The national conservation status of the Pursh Deeproot Clubmoss must be characterized as uncertain due to lack of information on each individual population size and the need for habitat management (Table 4.11).

#### 4.2.10.10 Groundcedar *Lycopodium complanatum*

Habitats Directive: Annex V - Danish Red List 1997: Critically endangered

#### *Distribution, population size and status*

The Groundcedar reproduces itself vegetatively with above ground offshoots and by airborne spores. In Denmark, the species favours poor, clear and open soil on hilly heaths, in clear and open, species-rich heath vegetation and in half-shade among low vegetation in oligotrophic plantations.

The Groundcedar is known from approx. 35 localities in the 20th century, including some 25 in Jutland, 3-4 on Zealand, Falster and Bornholm. The species has disappeared from most of these localities due to changes in habitat management resulting in a more homogenous vegetation or encroachment by scrub and woodland. Since 1975, the species has only been reported from four localities, in most cases, it must have disappeared from the other localities more than 25 years ago.

In 1999, the Groundcedar was monitored at three localities in Jutland known to be the most likely locations in Denmark within the last 20 years

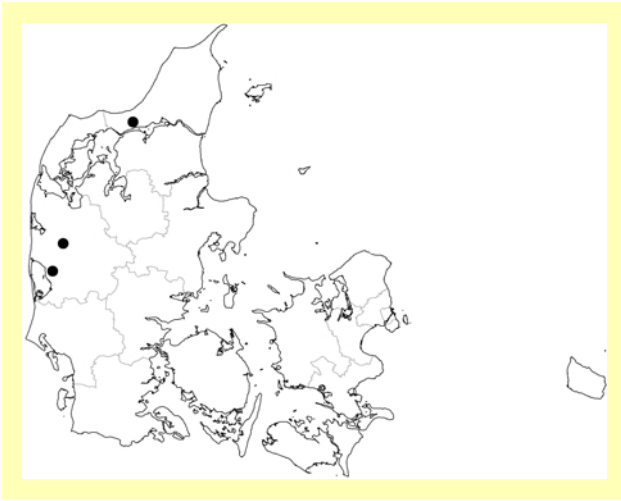


Figure 4.2.10.10. Groundcedar. Confirmed records in Denmark 1996-1999.

(Wind 2000). The species was observed in two of these localities supplemented by information from Ringkøbing county council district on one further locality (Fig. 4.2.10.10). The population trend at the two localities is unknown while at the third it is presumed to be declining. One population is thought to number 800 individuals, the other 54 while the number is unknown in the third.

The taxonomic status of the Danish distribution of the Groundcedar is being revised as research shows that the species easily cross-breeds with the closely related Pursh Deeproot Clubmoss. Examinations of herbarium specimens prove that cross-breeding between the two species has been observed in Denmark.

#### Conservation status

*Localities:* Conservation status at one locality is presumed favourable due to the present conditions of the habitat while at the other, status is unfavourable, due to scrub encroachment and lack of management action. The conditions at the third locality are unknown (Table 4.11).

*Overall status:* The national conservation status of the Groundcedar is unfavourable as survival of the remaining populations cannot be guaranteed in the long run. One of the habitats need gentle cultivation to maintain clear and open areas, whereas the two others need surveillance.

#### 4.2.10.11 Running Clubmoss *Lycopodium clavatum*

Habitats Directive: Annex V

The Running Clubmoss occurs scattered throughout the country in clear and open sites with oligotrophic, often bare soil amidst heaths, dune and heath plantations, and on banks and abandoned mineral extraction areas, such as gravel pits.

The Running Clubmoss reproduces itself vegetatively and thus, typically, spreads in a carpet-like vegetation, such that only one or a few individuals are capable of covering considerable areas. In other sites, species distribution is reduced to some few individuals due to lack of clear and open areas. In Atlas Flora Danica (unpubl. data) 49 localities are registered, of which 25 populations hold less than 10 individuals, 14 populations 10-100 individuals and 10 populations more than 100 individuals.

There have been no field observations of the Running Clubmoss, on a national basis, since the publishing of Topografisk-botaniske Undersøgelser (TBU) No. 18 (Wiinstedt 1953), but information from a few areas in Denmark does exist based on research during the last 10 years. Thus, from northwest Jutland: the species occurred in 76 squares (1 x 1 km) in 1991-1998 (Søndergård 1998a); on north and eastbound banks along main road 26 in 1992 (Bavnhøj & Kjærgaard 1995), from dune plantations in 1996-1998 in Thy: 57 populations (Søndergård 1998b), at Grib Skov: 24 habitats in 1990 (V. Dalgaard, pers. comm.). During the ongoing research for Atlas Flora Danica, The Running Clubmoss has been observed at 49 localities (unpubl. data). Vejle county e.g. has reported four habitats in the county and NERI received information on 31 other locations in Denmark in 1980-2000. Thus, the species has been reported at a total of 184 localities (Fig. 4.2.10.11).

#### Conservation status

*Localities:* It is not possible quantitatively to estimate the present conservation status at locality level due to lack of information on the trend



Figure 4.2.10.11. Running Clubmoss. Confirmed records (solid dots), known general distribution (grey shading) in Denmark 1980-2000.

of the Running Clubmoss. Comparison, on a qualitative basis, between distribution map in TBU No. 18 and Fig. 4.2.10.11 shows that the number of sites known to support the species has fallen by one third. By 1950 it was possible, although scattered, to observe the Running Clubmoss in suitable areas throughout most of the country, whereas now, the species is confined to dune and coastal grasslands and edges of forests. Apart from the many observations in the Grib Skov complex, the species is relatively scarce on the main islands. On the other hand, searches in suitable habitats have resulted in many new discoveries of the species, and consequently it may be assumed that the Running Clubmoss will remain in Denmark as long as suitable habitats are present.

*Overall status:* The national conservation status of the Running Clubmoss is uncertain due to lack of information on population size and trend and management plans for the habitats (Table 4.11).

#### 4.2.10.12 Stiff Clubmoss *Lycopodium annotinum*

Habitats Directive: Annex V

##### *Distribution, population size and status*

The Stiff Clubmoss occurs scattered throughout

the country in open sites with oligotrophic soil conditions, often uncovered soil like heaths, dune and moorland plantations, usually in connection with young plantations, and on banks and abandoned mineral extraction areas, such as gravel pits.

Very little is known about the abundance of the species. The Stiff Clubmoss reproduces itself vegetatively and thus, typically, spreads a carpet-like vegetation, hence only one or a few individuals are capable of covering considerable areas. In other sites, species distribution is reduced to some few individuals due to increasing shading in suitable areas.

There have been no field observations of the Stiff Clubmoss on a national basis, since the publishing of *Topografisk-botaniske Undersøgelser* (TBU) No. 18 (Wiinstedt 1953), but results from a few areas in Denmark exist based on research carried out during the last 10 years. Thus, from northwest Jutland the species has been reported from 39 squares (1 x 1 km) in 1991-1998 (Søndergård 1998a); on north and eastbound banks along main road 26 in 1992 (Bavnhøj & Kjærgaard 1995), from dune plantations in 1996-1998 in Thy: 33 populations (Søndergård 1998b), at Grib Skov: 13 habitats in 1990 (V. Dalgaard, pers. comm. 1990). During the ongoing research for *Atlas Flora Danica*, the Stiff Clubmoss has been observed at 65 localities (unpubl. data). Vejle county for example, has reported four habitats in the county and NERI received information on 33 other locations in Denmark in 1980-2000. Thus, this species has been reported from a total of 154 localities (Fig. 4.2.10.12).

##### *Conservation status*

*Localities:* It is not possible quantitatively to estimate the present conservation status at locality level due to lack of information on the trend of the Stiff Clubmoss. Comparison, on a qualitative basis, between distribution map in TBU No. 18 and Fig. 4.2.10.12 shows, that the number of reported sightings is unchanged, although the distribution of the Stiff Clubmoss has changed. Ribe and Sønderjylland's counties for example supported only very few individuals in 1980-2000; the species has become rare on the main islands and has disappeared from Lolland and

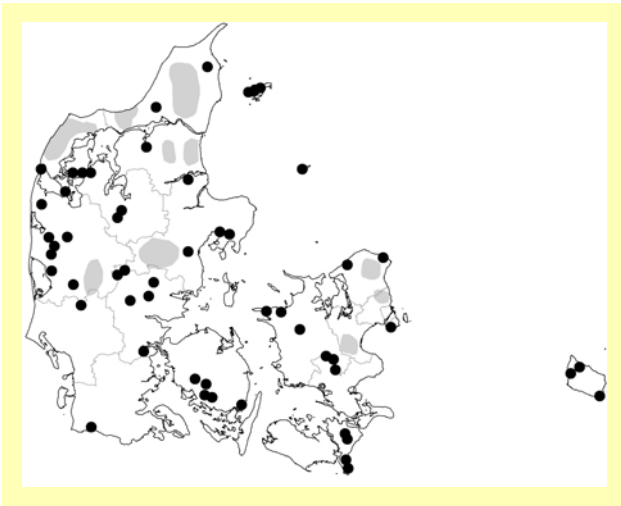


Figure 4.2.10.12. Stiff Clubmoss. Confirmed records (solid dots), known general distribution (grey shading) in Denmark 1980-2000.

Møn. On the other hand, research in suitable habitats has resulted in many previously unknown localities, and consequently it may be assumed that the Stiff Clubmoss will remain in Denmark as long as suitable habitats are present.

*Overall status:* The national conservation status of the Stiff Clubmoss is uncertain due to lack of information on population size and trend and management plans for the habitats (Table 4.11).

#### 4.2.10.13 Bog Clubmoss *Lycopodium inundatum*

Habitats Directive: Annex V

##### *Distribution, population size and status*

The Bog Clubmoss favours oligotrophic, sandy bottoms in places which are typically covered by water during the winter. Its ability to compete with other vegetation is poor and thus competition from more vigorous species is a threat for the Bog Clubmoss.

Apart from scattered occurrences in Thy and west Jutland, the Bog Clubmoss is now very scarce or has disappeared from most parts of the country, largely as a result of the disappearance of suitable habitats. In Atlas Flora Danica, 24 observations are reported, of which 4 populations support less than 10 individuals, 13 popu-

lations 10-100, and 7 more than 100 individuals (unpubl. data). Otherwise, there is no information on population size of the species. It is typical for many populations to comprise relatively few individuals scattered over large areas of suitable habitats.

There have been no field surveys of the Bog Clubmoss on a national basis, since the publishing of Topografisk-botaniske Undersøgelser (TBU) No. 18 (Wiinstedt 1953). In a monitoring of the Bog Clubmoss in northwest Jutland, 32 squares (1 x 1 km) were registered in 1991-1998 (Søndergård 1998a). During the ongoing research for Atlas Flora Danica, the Bog Clubmoss has been observed at 16 localities. NERI received information on 29 other locations in Denmark in 1980-2000. Thus, a total of 73 localities have been registered (Fig. 4.2.10.13).

##### *Conservation status*

*Localities:* It is not possible quantitatively to estimate the present conservation status at locality level due to lack of information on the trend of the Bog Clubmoss. Comparison, on a qualitative basis, between distribution map in TBU No. 18 and Fig. 4.2.10.13 shows that the number of localities has been reduced to one third in that period. By 1950 it was possible, although scattered, to observe the Bog Clubmoss in suitable areas throughout most of the country. Now, the species is confined to dune areas/plantations

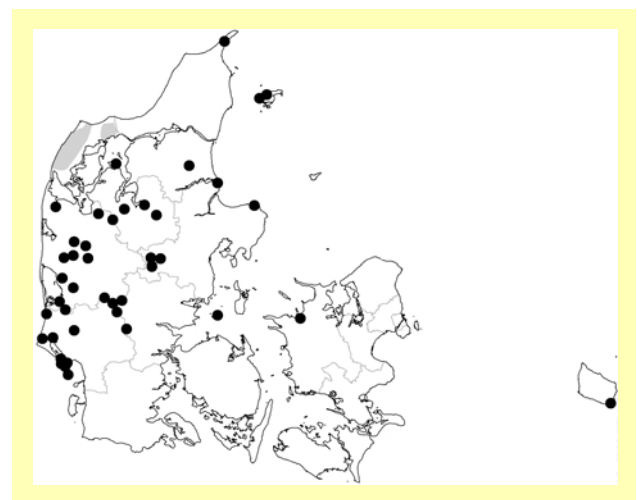


Figure 4.2.10.13. Bog Clubmoss. Confirmed records (solid dots), known general distribution (grey shading) in Denmark 1980-2000.



and acidic fens in heaths and dune slacks in Jutland, particularly west of the Ice Age border and in Thy. The species is only known from two areas on the main islands, viz. Zealand and Bornholm. The Bog Clubmoss will presumably continue to decline as long as suitable habitats disappear caused by conditions like falling ground water tables, impacts of airborne eutrophication and scrub encroachment.

*Overall status:* The national conservation status of the Bog Clubmoss is uncertain due to lack of information on population size and trend and management plans for the habitats (Table 4.11).

## 4.2.11 Mosses

### 4.2.11.1 *Dichelyma Moss Dichelyma capillaceum*

Habitats Directive: Annex II

#### *Distribution, population size and status*

The *Dichelyma Moss* favours stones, branches, the base of trees/scrubs growing close to slowly running water and along lakeshores (in the zone which is periodically flooded). This environment is often rather oligotrophic/mesotrophic.

The species was only recovered once in Denmark, viz. at Sortesø in Tegstruphegn in 1884. Repeated monitoring of this locality in the 1990s, latest in December 1999, were unsuccessful in locating the species.

#### *Conservation status*

*Localities:* It is most unlikely that the *Dichelyma Moss* still occurs at Sortesø, as this species is an easily recognisable moss which has been extensively surveyed at the locality (Table 4.12). Although it cannot be ruled out that the species may occur in other parts of the country, this fact is presumed most unlikely.

*Overall status:* The *Dichelyma Moss* has disappeared from Denmark.

### 4.2.11.2 *Green Shield Moss Buxbaumia viridis*

Habitats Directive: Annex II

#### *Distribution, population size and status*

The *Green Shield Moss* is a moss which favours very decomposed, barkless logs of both deciduous and coniferous trees. The logs must be at a state where the surface structure is decomposed and to establish itself it is important to avoid competition from large forest floor mosses. Due to the fact that the *Green Shield Moss* requires special habitats combined with a poor competitive ability in comparison with other plants, it is not supposed to grow at the same place for a prolonged period, whereas if new dead wood is constantly available, the species should be able to maintain itself in a restricted woodland area. The species is capable of growing on the ground in Denmark and the most recent observation comes from a substrate of decomposing pine needles (S. Lægård, pers. comm.).

Table 4.12. Conservation status of mosses - *Bryophyta*. \*1884. #Before 1900.

Species <i>Scientific name</i>	An- nex	No. of local- ities	Size of popu- lation	% of DK	Conservation status: No. of localities / % of species					National status
					Favourable	Uncertain	Unfavour.	Unknown	Disappear.	
<i>Dichelyma capillaceum</i>	II	1*	0						1 / ?	Disappear.
<i>Buxbaumia viridis</i>	II	14	?			2 / ?		3 / ?	9 / ?	Unfavour.
<i>Orthotrichum rogeri</i>	II	1#	0						1 / ?	Disappear.
<i>Meesia longiseta</i>	II	3#	0						3 / ?	Disappear.
<i>Hamatocaulis vernicosus</i>	II	11	? / small		1 / ?	1 / ?	1 / ?	?	8 / ?	Unfavour.





Figure 4.2.11.2. Green Shield Moss. Confirmed records in Denmark after 1980 (solid dots) and before 1980 (grey dots).

In Denmark, the Green Shield Moss has been reported from 14 localities of which 9 observations date from before 1906, 3 observations were made in north Jutland in 1957-1969, whereas the species is only found in Grib Skov and Torup plantation after 1980 (Fig. 4.2.11.2). Here, the species was rediscovered in 1990 and 1991, after which it disappeared from the almost unrecognisable log which was covered by carpet-like forest floor mosses (K. Damsholt & K. Thinggaard, pers. comm.). It is most likely that the Green Shield Moss occurs in Grib Skov due to the fact that the species is adapted to airborne dispersal through the release of abundant small spores and that locally, suitable habitats are available. Torup Plantage, where the last known observation of the species was made in 1997, was revisited in 1998, but by this time the Green Shield Moss could not be found (S. Lægård, pers. comm.).

#### Conservation status

*Localities:* At the two localities, where the Green Shield Moss has been observed after 1980, Grib Skov and Torup Plantage, conservation status is presumed uncertain (Table 4.12). At the 9 localities where the species was observed before 1906, conservation status must be characterised as disappeared and unknown at the 3 remaining localities.

*Overall status:* It may be concluded that in re-

cent times, the Green Shield Moss has only been located on a few occasions, but it is difficult to assess whether this is caused by a real decline or an extensive monitoring. Consequently conservation status must be characterised as unfavourable.

#### 4.2.11.3 Roger's Bristle-moss *Orthotrichum rogeri*

Habitats Directive: Annex II

#### *Distribution, population size and status*

The Roger's Bristle-moss is an acrocarpous moss, creating low hillocks on the bark of deciduous trees with nutrient-rich bark in clear and open environments.

The Roger's Bristle-moss was observed once in Denmark. In the 1800s the species was sampled from a tree on Møns Klint. The species has been searched for on several occasions, the last time being during the autumn of 1999, but was not rediscovered. This area is extensive and the species ought to be continuously monitored on Møns Klint and in other potential habitats.

#### *Conservation status*

*Localities:* The Roger's Bristle-moss was monitored in the autumn of 1999 on Møns Klint but without being recovered (Table 4.12). The *Orthotrichum*-species have proved to be very sensitive to certain kinds of air pollution (Gilbert 1970). Thus, reduction of SO<sub>2</sub>-emission, during recent decades, may have a positive effect on possible survival of the species. Hence, it was recently rediscovered both in Norway (K. Thinggaard, pers. comm.) and in Sweden (Hylander 1998), and for the first time observed in southwest Germany (Schäfer-Verwimp 1994).

*Overall status:* Taking into consideration that the Roger's Bristle-moss was not reported for more than 100 years, it is most likely that it has disappeared from Denmark. The species is, a member of the genus, *Orthotrichum*, which is diffi-



Figure 4.2.11.4. Meesia Moss. Distribution of all historical records from Denmark.

cult to determine in the field, and hence it may still occur in Denmark.

#### 4.2.11.4 Meesia Moss *Meesia longiseta*

Habitats Directive: Annex II

##### *Distribution, population size and status*

The Meesia Moss favours minerogenous or mesotrophic fens and spring areas e.g. characterised by *Paludella squarrosa*.

The Meesia Moss was twice reported, viz in Horreby Lyng, Falster and Hjortesø around Hvalsø, Zealand, in the 18th century. Furthermore, Odgaard (1988) reports an observation of the species from Lyngby Åmose north of Copenhagen (Fig. 4.2.11.4). Subsequently the species was searched for in all three areas but without result.

Today, the potential habitats of the species (*Paludella squarrosa* in particular) are greatly reduced compared to their extent in the 18th century.

##### *Conservation status*

*Localities:* All three locations have changed and are for instance, influenced by lowering of the water level (Table 4.12).

*Overall status:* The Meesia Moss has probably disappeared from Denmark.

#### 4.2.11.5 Slender Green Feather-moss *Hamatocaulis vernicosus*

Habitats Directive: Annex II

##### *Distribution, population size and status*

The Slender Green Feather-moss favours clear and open mesotrophic fens and spring areas but is not particularly related to calcareous localities. The species is known from various localities in Jutland and on Zealand. There is, however, some doubt about the occurrence of the species, as quite a lot of museum material has proved to be erroneously labelled. The Slender Green Feather-moss is reported from three localities on Zealand where the species was reported with certainty or most likely had occurred previously (Christiansen & Moeslund 1983). The species was searched for in all three localities in 2000 but was not rediscovered (Fig. 4.2.11.5). Two of the areas have changed, particularly as regards scrub encroachment. Apparently, the third locality (Ll. Rørbæk) has not changed, and all other species cited by Christiansen & Moeslund (1983) were relocated, except for the Slender Green Feather-moss.

In 2000 the species was searched for in Jutland



Figure 4.2.11.5. Slender Green Feather-moss. Distribution in Denmark 2000 (solid dots). No recovery 2000 (grey dots).

in a selection of nine localities which might potentially support the species. In spite of thorough monitoring, the species was only rediscovered at three localities, one of which seemed to support a stable population trend.

#### *Conservation status*

*Localities:* In one of the localities in Jutland, conservation status is presumed favourable based on abundant plants and suitable habitats (Table 4.12). At another locality, conservation status is presumed uncertain, in spite of the fact that the species seems to thrive, but a visit in April 2000 gave the impression of an excessive grazing pressure by red deer in the adjacent fens. At a third locality, conservation status is presumed unfavourable. The occurrence of the species which seems to have declined for a number of years, as well as all the other species of *Paludella* springs, is presumed threatened by overgrowth

due to change in grazing practice. All other localities were not monitored and thus, the precise status cannot be confirmed.

The Slender Green Feather-moss was not rediscovered at five of the eight monitored localities in Jutland which indicates that the species has disappeared or that its occurrence is so scarce that the species was overlooked in spite of thorough examination. For the two most southerly situated localities in Jutland, the existence of the species is unlikely, as habitats are no longer suitable due to scrub encroachment and eutrophication from the adjacent farm.

*Overall status:* The national conservation status of the Slender Green Feather-moss is unfavourable, as most of the monitored localities demonstrate a declining trend combined with a need for either management actions or adjustment of management at two out of three localities in Jutland where the species is observed.