

# Breeding Waders and Wet Grassland Habitats in Denmark

John Frikke

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John Frikke, National Environmental Research Institute, Division of Wildlife Ecology, Kalø, Denmark.

## Introduction

In total, seventeen species of waders breed regularly in Denmark. The most characteristic in wet grassland habitats are Lapwing *Vanellus vanellus*, Snipe *Gallinago gallinago*, Black-tailed Godwit *Limosa limosa*, Redshank *Tringa totanus*, Dunlin *Calidris alpina*, and Ruff *Philomachus pugnax* (Dybbro 1981). The most typical and abundant freshwater meadow species are Lapwing, Snipe and Redshank, of which the Lapwing and the Snipe are evenly distributed and occur in both inland and coastal grassland sites. Redshank, like Black-tailed Godwit, Dunlin and Ruff, is primarily distributed in coastal regions and mainly occurs in association with saltmarsh habitats (Dybbro 1976).

The breeding populations of the wader species which are partly dependent on wet grassland habitats have decreased throughout this century. The sub-populations occurring in inland low grassland, marshes, bogs and in sites around fresh-water lakes have decreased in particular (Ferdinand 1980, Dybbro 1985). These negative trends in the wader populations are primarily caused by radical changes in the agricultural utilization of the landscape and by changes in the level of human activities in general (Dybbro 1985). The recent development in the status of wet grassland habitats and wader populations in Denmark is likely to be imminent to huge meadow areas in many other West European countries.

This short paper reports on the status of the wet grassland habitats and their wader populations. Furthermore the protection initiatives which have been put forward to save and restore the remaining grasslands are described.

## Status of wet grassland habitats

The meadow habitat is a result of agricultural exploitation of the landscape and depends completely on farming practise. Grassland was mainly created during the 19th century, when farmers started to intensify grain cultivation. At that time, cattle were needed in order to produce manure for the increasing area of arable land, and huge wetland areas were turned into open grasslands used for grazing or hay production.

At the turn of the century, 10-15% of Denmark was covered with marshes, bogs and wet meadows. Today freshwater meadows only cover some 46,000 ha (1988) or 1% of the national area (Nielsen 1987, Vesselbo 1990). During the period 1950 to 1984 the area of freshwater meadows was reduced by 51% and the rate of loss was 2,800 ha/year (Larsen 1987). The change in total area of cultivated grassland and meadows in Denmark from 1900 to 1984 is shown in Figure 1 (Larsen 1987).

Regulation of 98% of the open streams and the general drainage of meadows for agricultural purposes are the main factors in the reduction of the area of wet grasslands. Drainage started around 1850 and 17% of Denmark was drained up to 1881 and 33% up to 1960 (Ansbæk 1973). Furthermore the total area of larger lakes was reduced by more than 10,000 ha or 5% per decade in the period 1930-1960 (Warncke 1977). Vast meadow areas have been turned into arable land, and the trend has continued: 15% of all remaining wetland localities were destroyed or negatively effected as bird localities in the years 1960-1975 (Ferdinand 1980).

Most wet grasslands have disappeared in

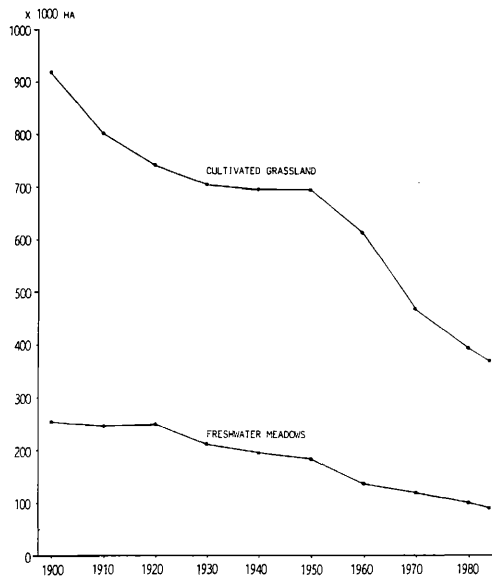


Figure 1. The change in total area of cultivated grassland and freshwater meadows in Denmark from 1900 to 1984 (from Larsen 1987).

eastern Denmark, and today the major, original, permanent freshwater meadow areas are found in western Denmark, primarily situated along open water courses (40,000 km in Denmark) and around larger freshwater lakes and fiords (Hald-Mortensen 1988). However, the most important meadows for wader populations are the poldered former saltmarshes along the Wadden Sea coastlines and the brackish meadows in Ringkøbing Fjord (Tipperne), Nissum Fjord and in the Limfjord area (Vejlerne) (Figure 2). These large meadow areas are still to some extent characterized by traditional agricultural usage: permanent grassland used for grazing.

Primary factors in the agricultural usage of wet grasslands are the changes in cattle keeping and breeding, which have caused substantial changes in grazing pressure in inland grassland habitats in particular. Contrary to former times, when dairy cattle were grazing all summer, modern dairy cattle stocks are mostly kept inside the cowhouses all year. Furthermore the number of livestock for meat production, grazing in meadows and wetlands, has been reduced throughout the 20th century. This practice is today mainly found in coastal regions. This development has accelerated since Denmark joined the European Economic Community in 1972, since when several

economic measures have been used to reduce over-production of both milk and meat. The number of farms holding cattle in Denmark decreased from 103,126 in 1970 to 40,707 in 1987 (Vesselbo 1990). This is the main reason why a large proportion of the former grazing areas have been turned into arable fields or are overgrown due to plant succession, which in both cases have changed the habitat.

In addition to the changes in agricultural structure and the general urbanization, large meadow and marsh areas have been used for other human purposes during recent decades. These include road building, summer house areas, camping sites, built-up areas and even for establishing rubbish dumps. The reduction in size and the fragmentation of meadows and the general increase in human recreational activities have negatively effected the wader populations in meadows and marshes (Dybbro 1981).

Freshwater meadows are generally not protected under the Danish nature conservation act; this contrasts with saltmarshes which are protected under section 43 of this law.

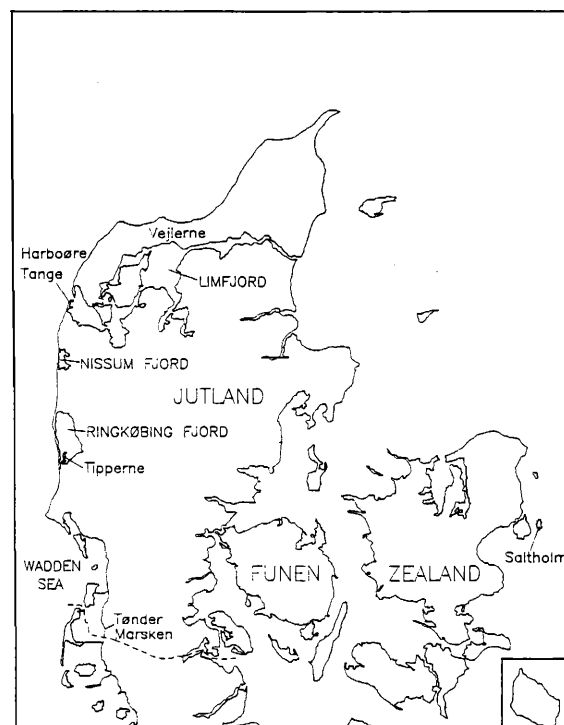


Figure 2. Map of Denmark with the most important wet grassland sites named.

## Status of wet grassland wader populations

Since the 1960s the Danish Ornithological Society has conducted several country-wide surveys and monitoring programmes on bird localities and breeding bird populations. Information on the wader species treated here is mainly based on data obtained from national site registers, the general point count census of breeding birds and the Danish Atlas Project (Dybbro 1976, Ferdinand 1980, Dybbro 1985, Kayser 1985). Black-tailed Godwit, Dunlin and Ruff have been objects of special investigations carried out in 1970 (Dybbro & Jørgensen 1971), 1980 (Hansen 1985, 1989) and 1990 (Hansen pers.com.). Recent national population estimates and the population trends for the wet grassland wader species are shown in Table 1.

Further, detailed studies of meadow- and waterbird populations breeding in special sites (*i.e.* the reserves Tipperne and Vejlerne) have been made during the last couple of decades. In one of the most important meadow sites, Tøndermarsken, in the southern part of the Danish Wadden Sea, the breeding bird populations have been investigated since 1978 (Gram *et al.* 1990). Here the agricultural practise has changed throughout this period and the breeding bird populations have declined, especially because of the reduction of permanent grasslands, and due to the increase in drainage and increased fertilization of both the permanent and the cultivated grasslands (Figure 3) (Gram *et al.* 1990).

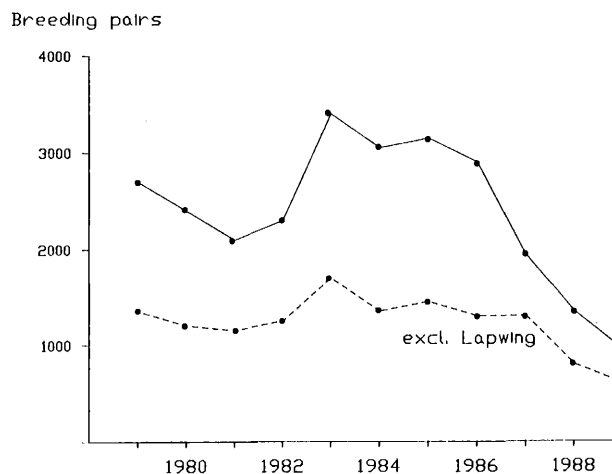


Figure 3. The change in the breeding populations of waterbirds (number of pairs for all species pooled) in Tøndermarsken during 1979-89 (Gram *et al.* 1990).

### Lapwing

In former days the Lapwing was extremely numerous over almost all of Denmark, but the population has decreased significantly during this century. However, it is still the most common and characteristic wader species in inland as well as coastal habitats (Figure 4), and the actual Danish population is estimated to hold 40,000 - 50,000 pairs (Melfotte 1989).

Concurrent with the loss of the most important wet grassland habitats, the Lapwing has disappeared from some regions. In other regions it has shifted to become more abundant breeding in arable land. Studies in Tøndermarsken, which is a stronghold for the Lapwing in Denmark, have shown, however, that there is a very strong correlation between

Table 1. The population sizes in Denmark during 1960-1988 of waders typical of wet grasslands, and the population trends in this century.

| Species/year        | 1960      | 1970      | 1980          | 1988            | trend |
|---------------------|-----------|-----------|---------------|-----------------|-------|
| Lapwing             | ?         | 68,000    | 50,000+       | 40,000 - 50,000 | --    |
| Snipe               | ?         | ?         | 2,000 - 4,000 | 3,500           | -     |
| Black-tailed Godwit | ?         | 450       | 875           | 800             | ++    |
| Redshank            | ?         | ?         | 4,000 - 6,000 | ?               | -     |
| Dunlin              | 600       | 550       | 550 - 600     | 700             | -     |
| Ruff                | 650 - 850 | 500 - 600 | 500           | 800             | -     |

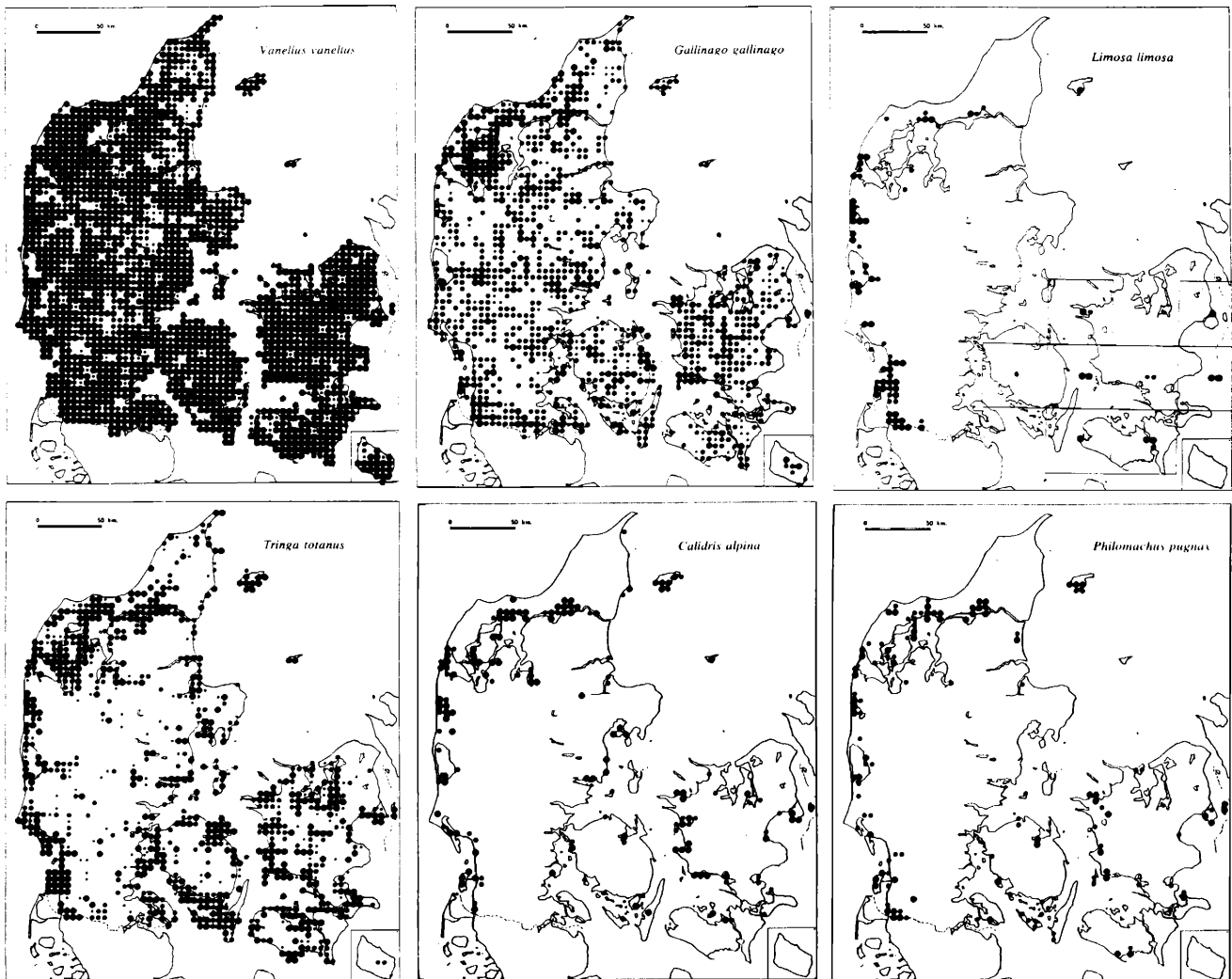


Figure 4. The summer distributions of Lapwing *Vanellus vanellus*, Snipe *Gallinago gallinago*, Black-tailed Godwit *Limosa limosa*, Redshank *Tringa totanus*, Dunlin *Calidris alpina* and Ruff *Philomachus pugnax* in 1971-74 (Dybbro 1976).

the area of permanent grassland and the size and the density of the Lapwing population (Gram *et al.* 1990). In spite of the habitat flexibility of the Lapwing, the Danish population is still decreasing and nationwide surveys in open land carried out from 1976 to 1984 indicated that it has undergone a 50% reduction in this period (Kayser 1985).

The density of Lapwings in wet grasslands can be more than 100 pairs per km<sup>2</sup>, while intensively used agricultural fields seldom hold more than 1 pair per km<sup>2</sup> (Ettrup & Bak 1985). Ettrup & Bak (1985) have also demonstrated that Lapwing pairs breeding in arable land produce less than 0.7 young per year, whereas pairs breeding in wet grassland produce up to 1.2 young per year. Furthermore the same study has shown that Lapwing young reared in meadows are much more vigorous compared to young reared in arable land.

### Snipe

The Snipe is difficult to survey, but the total breeding population is estimated to be 3,500 pairs (Meltofte 1989). Before the intensive drainage and cultivation of the Danish landscape, the population is estimated to have been much larger than recent numbers indicate. No detailed studies have, however, been performed to document this decrease. The Snipe is still a common and widespread breeding wader species (probably mainly due to habitat flexibility) in the remaining wet grasslands and in marsh areas around fresh water lakes in most regions within Denmark (Figure 4).

### Black-tailed Godwit

In the beginning of this century the Black-tailed

Godwit was few in number and only found in western Jutland (Hørring 1926). From about 1925, the species dispersed to a number of localities in eastern Denmark (Salomonsen 1963). Today it is still mostly distributed in the western and northwestern parts of the country, where the Black-tailed Godwit is breeding in both saltmarshes, brackish meadows and freshwater meadows (Figure 4). The most important of the 60 breeding sites are found along the Wadden Sea coast (Tøndermarsken), in Ringkøbing Fjord (Tipperne) and in the Limfjord (Vejerne) (Hansen 1989).

The population has increased substantially, in coastal habitats in particular, and the number of breeding pairs has increased from 350 to more than 800 in the years 1970-1988 (Hansen 1989, Table 1). At the same time the Black-tailed Godwit has spread to some wet grasslands in Zealand in eastern Denmark. Reasons for this trend may be increasing restoration and management activities in the major breeding sites and the protection of this species since 1982. Previous to this date the Black-tailed Godwit was hunted from 1 August.

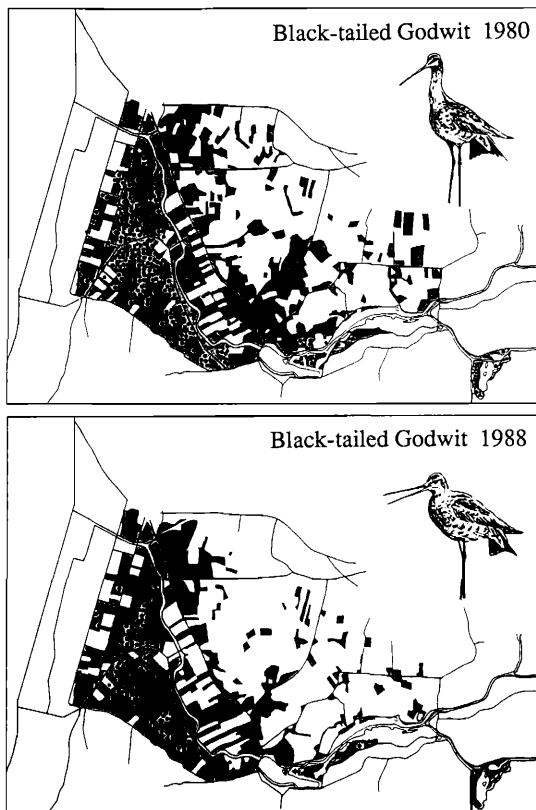


Figure 5. Map of grasslands (shaded) in Tøndermarsken in 1980 and 1988 with territories (black dots) of Black-tailed Godwits *Limosa limosa* (Gram *et al.* 1990).

In contrast to the general positive population development in Denmark, studies in Tøndermarsken have shown that the Black-tailed Godwit is very vulnerable towards changes in the size of the grassland area, the water-level and the grazing practise. Here the number of breeding pairs dropped from 200 to 100 within the period 1980 to 1988 (Figure 5, Gram *et al.* 1990).

### Redshank

The Redshank is widely distributed along all coastlines of Denmark, mainly breeding in saltmarshes. It is still found in wet grassland sites along many rivers and streams (Figure 4). The extensive poldered marshes along the Wadden Sea are strongholds for the Redshank population (Meltofte 1989).

Due to its wide distribution and the lack of special monitoring programmes, it is difficult to establish exact population trends for Redshanks. However it is well known that the Redshank has disappeared from large wet grassland areas where the agricultural usage has changed substantially or where they have been destroyed (Dybbro 1981).

A management programme carried out at the Tipperne reserve in western Jutland has shown that the Redshank population is very sensitive to changes in vegetation. Restoration of open, grazed meadows in the reserve is believed to be the major reason for an increase in number of breeding pairs from 15-35 pairs in the late 1960s to 355-440 pairs in 1986 (Meltofte 1987, Thorup 1988).

### Dunlin

In the 1920s and 1930s the Dunlin was a common breeding bird in Denmark, not only in coastal meadows but also in many wet grassland sites along rivers and around lakes (Hørring 1926). However in many inland sites the Dunlin has decreased or disappeared during recent decades (Dybbro & Jørgensen 1971, Hansen 1985). This decrease is believed mainly to be caused by the cessation of grazing in many inland and small meadow areas. The Dunlin is dependent on short, grazed grassland

vegetation and is therefore today mostly distributed in the western parts of Denmark (Figure 4, Hansen 1985). In West Jutland the population has even increased locally so much that the total population has shown a positive development in recent years (Hansen 1989). This is especially due to the Tipperne reserve in RingkøbingFjord, where intensive meadow management has been carried out during the last two decades (Hansen 1989).

The latest survey of the Dunlin population shows, that a maximum of 700 pairs are breeding (Table 1), of which 425 pairs are found in three sites in western and northwestern Jutland (Hansen 1989). At the same time this survey shows that the numbers of localities holding Dunlins have decreased significantly and that the species has mostly disappeared from localities which held only a few pairs (Hansen 1989).

The Danish Dunlin population belongs to the subspecies *schinzii* which is known to be decreasing in numbers in its total breeding range (Piersma 1986). Furthermore, the Danish breeding grounds are the southernmost in the breeding range of *schinzii* and this may additionally affect the observed changes in population structure.

## Ruff

During the last few decades, the Ruff population in the southern parts of its breeding range has decreased considerably, largely due to agricultural improvements to its preferred breeding habitats (Piersma 1986). Very little is known about the Danish Ruff population in former days. Heilmann & Manniche (1939) give hunting and cultivation of breeding habitat as reasons for drastic decreases in the Ruff population. Today the Danish population is mainly found in western Jutland in wet meadows or saltmarshes along the outer coastlines or along fiords, and there are very few at inland sites (Figure 4, Dybbro 1976).

The Danish breeding population fluctuates in size between years. Recent site register investigations have shown that the Ruff has disappeared from a number of sites in recent decades (Dybbro 1985, Hansen 1985). It is

especially the small populations that have disappeared or have been reduced: In 1970 10 localities with 3-10 females/pairs per site supported a total of 71 females/pairs. In 1988 only 6 of these localities held reeves and supported a total of only 12 females/pairs (Hansen 1989). However, the five largest sub-populations have increased in the same period: from 250 females/pairs in 1970 to 550 females/pairs in 1988 (Hansen 1989), causing the general increase in the total population (Table 1). A further fragmentation of the Ruff population in Denmark is, however, also the result. The trend in the largest populations is primarily caused by active management initiatives in the protected marsh and saltmarsh areas (Table 2).

## Protection initiatives

Due to the fact that meadows and wet grasslands are generally not protected under the nature conservation act and that the existence of this important habitat type is dependent on the agricultural practise in Denmark, different initiatives and indirect protection measures have been suggested during the last two decades, in order to maintain and to manage the unprotected meadow areas.

In protected areas and reserves where the freshwater meadow habitats are important elements in the ecosystems (as in Tøndermarsken, Tipperne and Vejlerne), management programmes have been improved to secure most of the breeding wader populations (e.g. Thorup 1988). Different types of management have proved to be an efficient tool in increasing the densities of breeding waders. Species such as Black-tailed Godwit, Dunlin and Ruff react on a local level extremely positively to management in protected areas. This is the major reason why the total populations of these species have stopped decreasing or have even increased during the last two decades (Table 2).

The major difficulties in preserving the unprotected grasslands lie with the fact that meadows are traditionally regarded as farmland, and that the economic compensations that the farmers demand are often too high to allow protection according to

**Table 2. Outline of management programmes in five important wader localities. The quoted sources are explaining the observed increase in populations of Black-tailed Godwit, Dunlin and Ruff as a result of the management.**

| locality          | management   | maximum number of pairs:<br>species | before after |       | source                           |
|-------------------|--|-------------------------------------|--------------|-------|----------------------------------|
|                   |  |                                     | before       | after |                                  |
| Vejlerne<br>1988  | rising the water level<br>(1979 -)   | <i>Limosa limosa</i>                | 59           | 125   | Jensen & Christensen             |
|                   |  | <i>Calidris alpina</i>              | 80           | 109   |                                  |
|                   |  | <i>Philomachus pugnax</i>           | 22           | 70    |                                  |
| Harboøre<br>Tange | restoration of cultivated<br>meadows (1978 -)  | <i>Limosa limosa</i>                | 4            | 28    | Hansen pers. comm.               |
|                   |  | <i>Calidris alpina</i>              | 35           | 125   |                                  |
|                   |  | <i>Philomachus pugnax</i>           | 6            | 14    |                                  |
| Tipperne          | conversion of reedbeds to<br>open meadows (1972 -)<br>Controlling predators                | <i>Limosa limosa</i>                | 37           | 145   | Mortensen 1981<br>Mortensen 1988 |
|                   |  | <i>Calidris alpina</i>              | 7            | 135   |                                  |
|                   |  | <i>Philomachus pugnax</i>           | 57           | 250   |                                  |
| Wadden<br>Sea     | establishment of a salt-<br>water lagoon next to<br>reclaimed salt marshes<br>(1983/84 -)  | <i>Limosa limosa</i>                | 30           | 42    | Nøhr & Gram 198                  |
|                   |  | <i>Calidris alpina</i>              | 4            | 4     |                                  |
|                   |  | <i>Philomachus pugnax</i>           | 32           | 49    |                                  |
| Saltholm          | control of predators:<br>removal of 50% of the<br>Herring Gull population<br>(1975 - 1984) | <i>Limosa limosa</i>                | 4            | 12    | Jensen 1987                      |
|                   |  | <i>Calidris alpina</i>              | 9            | 15    |                                  |
|                   |  | <i>Philomachus pugnax</i>           | 32           | 49    |                                  |

the Conservation of Nature Act. During recent years several proposals have been made in the Danish Parliament to change the Conservation of Nature Act in order to include wet grasslands. However, since 1988 negotiations regarding the construction of an entirely new nature conservation act have impeded the extension of the existing law so far.

As already mentioned, developments in the agricultural politics within the European Economic Community and alternative environmental initiatives, have resulted in several steps forward in the maintenance and restoration of meadow areas. First of all the subsidies to farmers draining permanent grassland were removed in 1985, and second, the declining economic development in agricultural products within the EC in recent years has made it less profitable to cultivate meadow areas. Huge grassland areas have been or will be set-aside. Furthermore, public awareness and environmental politics in recent years have concentrated on pollution caused by modern farming. These discussions have resulted in demands for a ban on cultivation of

wet soils next to watercourses, in order to turn such meadow areas into buffer zones or 'filters' protecting the water from being polluted with fertilizers.

It remains to be established if it is possible to maintain the set-aside meadow areas as grasslands, or if they will be used for other secondary agricultural productions such as christmas-tree production, and finally, if the marginal farmland will be left to natural succession.

The latest, and most interesting development in the protection of wet agricultural areas is an arrangement between EC and the State of Denmark, in which it is possible to subsidize farmers who are willing to utilize meadows and other 'environmentally vulnerable areas' in the traditional way. To receive subsidies the farmers have to make management contracts with the regional county councils. Under these contracts the grasslands have to be grazed, and drainage, fertilization and use of pesticides and other environmental poisons are prohibited.

Approximately 25,000 ha have been recognized as such 'environmentally vulnerable areas' in Denmark, and contracts covering 15,678 ha have been established so far (Jordbrugs-direktoratet in litt.). This new arrangement will probably be extremely important in the future protection of wet grassland and of the avifauna depending on this habitat.

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