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# An Analysis of the Conflicts which Emerged during the Restoration Project Life-REMAB Conducted on Nyord and Vestamager, and the Effects of these Conflicts on the Breeding Populations of the Meadow Birds, Baltic Dunlin (*Calidris alpina schinzii*), Ruff (*Calidris pugnax*) and Black-tailed Godwit (*Limosa limosa*)

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## Abstract

This study is an analysis of conflicts encountered during the restoration project Life-REMAB conducted on Nyord and Vestamager in Denmark, and of the effects of these conflicts on the breeding populations of the "meadow birds", the Baltic dunlin (*Calidris alpina schinzii*), the ruff (*Calidris pugnax*), and the black-tailed godwit (*Limosa limosa*). Resources used on solving conflicts in restoration projects are taken from the means intended for the actual nature restoration; therefore, developing a procedure to anticipate and manage such conflicts efficiently may release resources for the restoration itself. The conflict analysis has been formulated on the basis of an unravelling of the interests and powers of the stakeholders in both areas in relation to the project; to this end, Conflict Management tools have been applied, and subsequently the conflicts have been mapped by means of Collaborative Learning tools. Local and national breeding data of the three meadow birds have been analysed by using Generalised Additive Models (GAM) and Generalized Additive Mixed Models (GAMM), respectively. The results of the conflict analyses are reviewed and discussed, and the analysis of the breeding data is discussed in relation to the conflicts. The success of the projects, measured in the development of the breeding populations of the meadow birds, has not been very big. In both areas the most conflicting elements are still inferior hydrology, and on Nyord, a high predation rate by foxes still constitutes a serious threat to the meadow birds. A wide range of recommendations for improvements and alternative solutions to the conflicts are presented, including how to anticipate and manage future conflicts in the two areas.

## Preface

This thesis is my Master's thesis in biology. Right from the beginning of my studies, I have been very interested in nature management and restoration as there is so little nature left in Denmark and I do not want to watch passively from the sidelines as it gradually disappears altogether. In the first year of my Master, I followed the course "Conflict Management" and was both fascinated by the principles of "Collaborative Learning", and intrigued by the opportunities of conflict management in relation to nature management and restoration. I got the impression that so far, is has been difficult to establish any unequivocal effects of many restoration projects, and I wondered whether this might be related to conflicts which had arisen during the course of the projects. Time, money, and human resources spent on resolution of such conflict must necessarily be taken from the resources allocated to restorations.

With the present study I wish to clarify whether conflicts affect the rate of success of nature restoration projects. I anticipate that this analysis will shed light on certain elements hitherto uncharted within this topic. Concurrently, I wish to demonstrate an approach by which such conflicts can be anticipated or resolved in the most constructive way, should they occur.

Now, at the end of nine months of work, I would like to thank the people who have helped me. Sincere thanks to my supervisor, Rita Merete Buttenschøn from the Department of Geosciences and Natural Resource Management, for constructive guidance and for calming my tense nerves. Thank you to my co-supervisor, Sebastian Kepfer Rojas from the Department of Geosciences and Natural Resource Management, for performing the statistical analysis, and showing enthusiasm for and confidence in my study.

Thanks to Jørgen Sandby Nielsen from the Nature Agency Storstrøm, and to Sven Norup from the Nature Agency Hovedstaden, for facilitating the contact between me and all the stakeholders at Nyord and Vestamager, and for their generous willingness to help. Moreover, big thanks to all the stakeholders at Nyord and Vestamager without whom my analysis would not have been possible. Also, thanks to Ole Thorup, who has provided data and relevant literature for my study. Furthermore, thank you to Søren Ferdinand Hansen and Søren Ring for enthusiastically explaining the biology of meadow birds and the dynamics of salt meadows, and to Thyge Nygaard for shedding light on some complex situations.

Last, but not least, I wish to express my gratitude to my boyfriend, my family, and my friends for supporting me throughout the project, and especially to my dear mother, Lisbeth Eriksen, for thorough and tireless proofreading

# Contents

# Introduction

During the last decades, the number of species world-wide has declined, resulting in a rapid reduction in biodiversity. The global extinction rate is 1,000 to 10,000 times higher than what can be accounted for by the natural background extinction rate, and these conditions are primarily caused by man. They derive from destruction and fragmentation of habitats due to human activities such as intensification of deforestation and agriculture (Commission of the European Communities 2002).

In the 20$^{th}$ century, the agricultural expansion and intensification in Europe led to loss and deterioration of many natural and semi-natural habitats such as wetlands and heathlands (Tucker, Heath 1994). Agricultural intensification measures, for instance drainage, overgrazing, loss of features like wetlands, and increased use of pesticides and fertilizers are the major causes of biodiversity decline in flora and fauna (Tucker, Heath 1994, Thorup 2004). A contributing factor to the declining biodiversity is habitat loss due to initiatives like urbanisation and increased recreational requirements (Tucker, Heath 1994).

In Europe, farmland birds are among the groups of animals which experience declines, both in population and in diversity, as a consequence of agricultural intensification and habitat loss (Tucker, Heath 1994, Donald et al. 2002). Donald, Green and Heath (2001) have listed the effects of agricultural intensification on farmland birds as a major anthropogenic threat to biodiversity alongside deforestation and climate changes.

"Meadow birds", a group of waders, suffer severely from these effects because they breed in semi-natural habitats like salt marshes, meadows, and other wetland habitats (Tucker, Heath 1994). These birds used to be abundant in Europe but are now declining all over the continent (Thorup 2004). They need extensive agricultural practices, late mowing dates, low grazing pressure, low and slow-growing vegetation, and a high water table in the breeding areas to ensure high breeding success (Beintema, Muskens 1987, Thorup 2003).

In Denmark, too, the farmland birds experienced serious declines through the mid-1900s as a result of the reduction of extensive agriculture (Thorup 2003). Thorup (2003) performed a large-scale investigation of the status of the populations of three meadow birds, the Baltic dunlin (*Calidris alpina schinzii*), the ruff (*Philomachus pugnax*) and the black-tailed godwit (*Limosa limosa*), all over Denmark. The survey established both a continued reduction in sites where these birds breed and a continued decline in numbers of breeding birds across the country. These reductions have occurred despite considerable efforts during the 1980s and 1990s to prevent meadows from disappearing by means of conservation of habitats, designation of Special Protection Areas (SPAs), and subsidies for nature friendly management (Thorup 2003). Still,

Thorup (2003) found that in 10 breeding sites with "meadow bird friendly management", the populations have done much better than in sites without this kind of management. Anyhow, the population levels of the Baltic dunlin and the ruff in 2002 were only 38% and 11%, respectively, of the 1970 level (Thorup 2003). The Danish population of black-tailed godwit experienced a more fluctuated development during the same period of time, but has disappeared from 61% of the breeding sites since 1970 (Thorup 2003).

In 1992, the European Commission established the Natura 2000 network by adopting the Habitats Directive which, together with the Birds Directive from 1979, constitutes EU's nature and biodiversity policy. This operation was carried out in recognition of the continent-wide destruction and fragmentation of wildlife habitats in Europe during the decades leading up to 1992 (Commission of the European Communities 2002).

The EU member states are obliged to ensure and generate favourable conservation status for the habitats and species listed in the annexes of the two directives. They cover over 198 habitat types, 483 plant species, and 230 animal species, 170 of which are bird species.

Among the habitats listed in Annex I of the Habitats directive is the Atlantic Salt Meadow (code 1330) (*Glauco-Puccinellitalia maritimae*) (EU 1992) and thus: "*the Member States shall establish the necessary conservation measures involving ... appropriate management plans ... which correspond to the ecological requirements of the natural habitat types in Annex I and the species in Annex II present on the sites*" (article 6, paragraph 1). Among the bird species listed in the Birds directive, Annex I, are the ruff and the Baltic dunlin (EU 2009) and therefore: "*special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution*" have to be taken (article 4, paragraph 1).

So, the Danish Ministry of Environment recognized that radical measures were needed to fulfil our obligations as an EU member state, and to prevent the more specialised meadow birds from disappearing from Denmark. Therefore, the "Handlingsplan for truede engfugle" (Action plan for endangered meadow birds) (Asbirk, Pitter 2005) was formulated. This led to the implementation of the LIFE-nature project "Restoration of Meadow Bird Habitats", Life-REMAB. The objective of the project was to "… *restore and maintain a favourable conservation status of habitats of Calidris alpina schinzii and Philomachus pugnax in Denmark and in wider perspective in the EU*" (LIFE-Nature 2006). Part of the objective was that by optimising the living conditions for the Baltic dunlin, the ruff and the black-tailed godwit to attain viable populations of these species, other meadow birds would likewise benefit (Asbirk, Pitter 2005) and, consequently, the project would have a broad impact.

The Life-REMAB project was carried out from 2006 through 2009 on four locations, which form part of larger Natura 2000 areas. These are Vestlige Vejler and Harboøre Tange in the north-west of Jutland, Nyord, an island north of Møn, and Vestamager, the western part of the island east of Zealand. The three locations first mentioned are incorporated in the sites which Thorup (2003) identified as the most important contemporary meadow bird localities in Denmark. The last one, Vestamager, was formerly an important meadow bird locality (Thorup 2003).

## Thesis Statement

Interventions concerning environmental and natural resources involve a high degree of complexity because of their nature, the large number of stakeholders often implicated, and the interdependence associated with these topics (Daniels, Walker 2001).

Restoration projects contain both environmental and natural resource issues, and are often implemented in areas with multiple stakeholders, who have different and sometimes opposing interests. Because of the high complexity of such projects, this may lead to conflicts which could impair the results of the restoration project and, at worst, render the project impossible Identification of different interests and conflicts at an early stage of a project, and a review of solutions of other restoration projects already completed are important parameters which could be very useful when such issues are to be addressed in the future. This would facilitate easier implementation of restoration measures, thus resulting in greater success, and in the end save time and money - resources that can be used for other restoration projects.

In this thesis I shall focus on the Life-REMAB projects carried out at Nyord and on Vestamager. I shall identify the conflicts which arose during the project, and how they were handled, by interviewing institutions and people involved in and affected by the projects. Next, I shall evaluate how these conflicts affected the breeding potential of the birds, and then, make proposals for improvements and alternative solutions. Finally, I shall assess whether the overall objective of the project was achieved by analysing trends in the breeding populations of the Baltic dunlin, the ruff and the black-tailed godwit at the two sites.

# Background

## Salt Meadows

Salt meadows are open, terrestrial, marshy habitats which are flooded by salt water. They evolve on protected shores where the wave energy is reduced compared to exposed shores. The reduction in wave energy is brought about by low water depth, by islands in front of a shore which provide shelter, or because the shore is located in a bay. The low wave energy facilitates sedimentation of fine particles such as sand and clay (Vestergaard 2000). The abiotic factors which determine the characteristics of the salt meadow are,

- hydrography: the salinity of the ocean water, the rise in the water table, and the impact of fresh water
- topography – the width of the meadow and the inclination of the terrain
- texture of the substrate – whether the meadow has developed on sand, clay, stone or rock
- agricultural utilisation – whether the land has been used for grazing, hay and grass cutting, or not at all (Figure 1) (Vestergaard 2000).

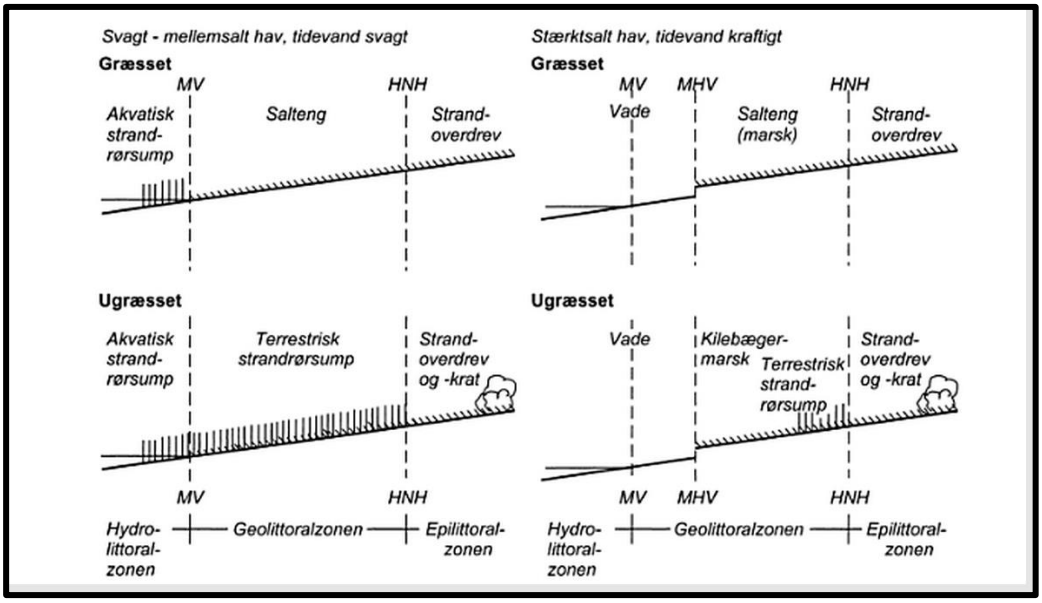


**Figure 1: The littoral zones in different types of salt meadow. The upper two diagrams are grazed meadows; the lower two diagrams are un-grazed meadows. The diagrams to the left display meadows where the ocean water is slightly or moderately salt and the tide is tenuous; the meadows to the right are flooded by water with a high salt concentration, and the tide is powerful. MV = mean tide line; MHV = high tide line; HNH = extreme high tide line. Figure from Vestergaard (2000).**

The flooding by ocean water, together with precipitation and evaporation, determines the water content of the soil and the fluctuations of the ground water table as well. Flooding and precipitation provide water for the meadow, whereas evaporation lowers the water content. These conditions also determine the concentration of salt in the soil of the meadows: Ocean water

increases the salt concentration, evaporation augments it, and precipitation dilutes it. Moreover, in Denmark, the geographic location is of importance, too, as the salinity of the ocean water varies from approximately 34‰ in the North Sea to less than 10‰ in the Baltic Sea (Vestergaard 2000). While the salt meadows on Nyord can be characterised as the type of meadow depicted in the top left corner of Figure 1, Vestamager does not fall under any of the diagrams as it is dammed up, and therefore not flooded by sea water. The meadows on Vestamager are only affected by splashes of salt water when waves hit the dam.

The salt meadow can be sectioned into vertical zones as regards the different plant communities (Figure 2), the littoral zones, determined by the water table fluctuations and the inclination of the terrain:

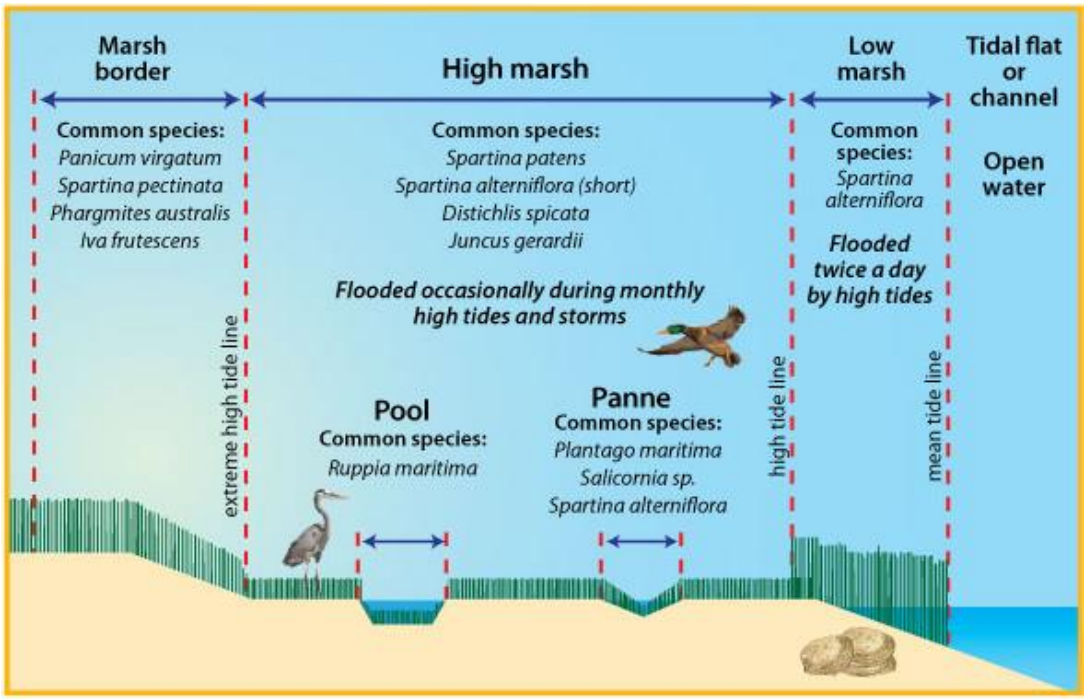


**Figure 2: The littoral zones. Low marsh is flooded twice daily by the tide; High marsh is flooded twice a month at above average tide, the extreme high tide, and irregularly by storm surges. Figure from Maine Sea Grant (n.d.).**

- The geo-littoral zone, which comprise the high and the low marsh, is the central zone of the meadow, and it stretches from the mean tide line (Figure 1 and Figure 2), and constitutes the lower boundary for short, coherent salt meadow vegetation. The upper boundary, the extreme high tide line (Figure 1), is characterised by a shift in the plant community with few salt tolerant species (Vestergaard 2000).
- The epilittoral zone; at the upper border, the marsh border (Figure 2), the salt meadow transforms into beach grassland.
- The hydrolittoral zone; beyond the lower border, the mean tide line, are reed beds or tidal flats and open water.

However, these transition zones can be difficult to recognise in the field.

In addition to the zonation there are hollows, which can turn into small pools because of precipitation or flooding. In dry periods, some transform into salt pannes where the salt concentration may become very high. Moreover, on some grazed meadows on the high marsh or the border, anthills from the yellow meadow ant (*Lasius flavus*) can be found. The top of these anthills are practically never covered by water (Würtz Jensen 1988). Furthermore, the seawater creates tidal channels which are filled with water at high tides and at storm surges, and drain the meadows at low tides (Figure 3). These diverse variations in the topography provide micro habitats for several plant and animal communities which differ from the communities of the zonation.

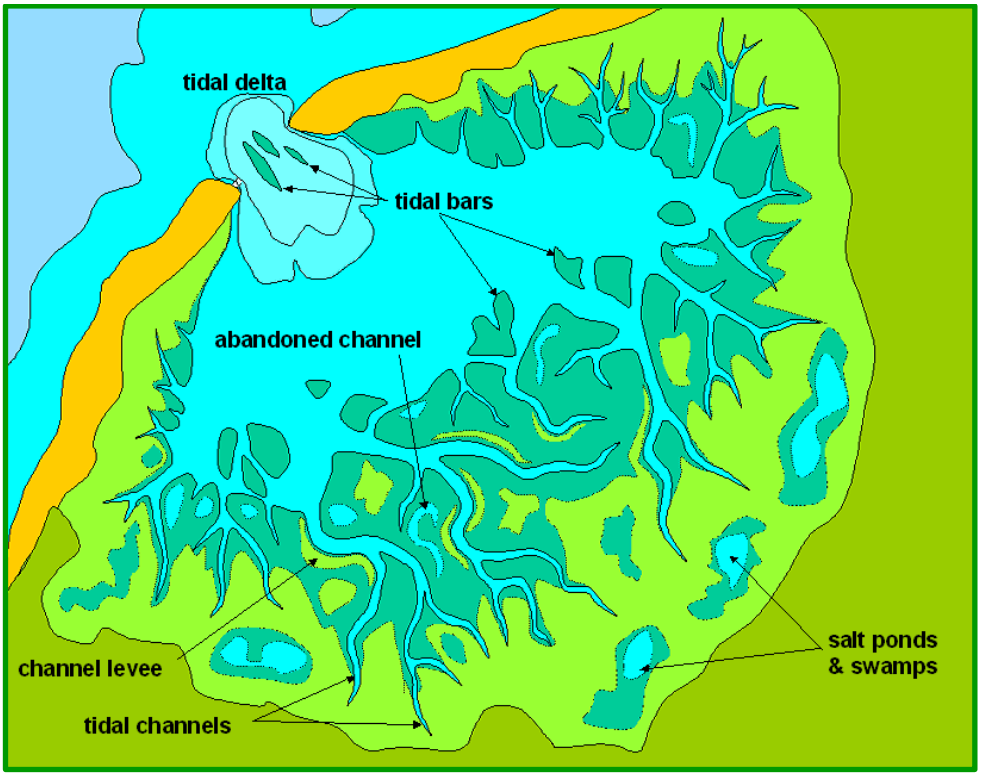


**Figure 3: At high tides the salt meadow is flooded by water which drains from the area through channels, the tidal channels, when the water table drops again. Picture from Wikipedia (2015b).**

The plant species present on salt meadows are salt-tolerant, terrestrial, marshy plants, which have adapted to the strenuous conditions of the meadows as for instance long periods of anaerobe conditions in the root system because of flooding, high salt concentration which makes absorption of water difficult, and mechanical stress from the waves. Development of root systems in the upper, aerobe soil layer, air-tissue surrounding the roots to oxygenate the roots, and salt-excreting glands on the leaves are a few examples of the adaptations which those plants have had to undergo. However, experiments have determined that most of the plants on the salt meadow thrive

better in salt-free soils; nevertheless, in nature they are outcompeted by species which do not tolerate salt (Nygaard 2009). Therefore, the plant communities on salt meadows are unique compared to other meadow plant communities.

Salt meadows are generally eutrophic habitats, rich in nutrient and organic material, e.g. from seaweed, which is brought in from the ocean by the waves. Anyhow, the vegetation is low and grows slowly because of the long periods of oversaturation of the soil, which reduces or stops photosynthesis during these periods. Additionally, nitrogen is a limiting factor which further restricts the plant production (Nygaard 2009).

### The Animals of the Salt Meadow

The zonations of the salt meadow are very different from one another, thereby providing habitat for many different animals. Various water bird species breed, rest during migration, or winter on the meadows, among many others gulls, ducks, and waders (Andreasen 1996). Of amphibians, especially the green toad (*Pseudepidalea viridis*) and the natterjack toad (*Epidalea calamita*) are often found on the meadow.

Some reptiles are able to live on the salt meadows, too, and certain mammals, chiefly mice, rodents and voles can be abundant, and thus attract smaller predators such as stoats. Also insects, molluscs, small crustaceans, and worms are found in large numbers, and function as food resources for the waterbirds (Nygaard 2009).

### Utilisation and Agricultural Intensification

The extensive farming method employed on the Danish salt meadows from the 1500s through the 1800s kept the vegetation low, whereby the areas sustained their sub-climatic stage. Had they not been utilized, in time they would most likely have changed into a climax habitat, e.g. deciduous forest, because of build-up of dead plant material, which raises the ground level resulting in a drier habitat. The utilization of the meadows as grazing area produced areas with considerable topographic variation and vegetation, which has led to high biodiversity on the meadows (Nygaard 2009). In the 1800s, the intensification of farming began, and in the middle of the 1900s it started to pose a threat to the salt meadows. The intensification has led to substantial areal reductions and degradation of the quality of the meadows. Drainage, fertilisation, and pollution are some of the most severe threats. When a salt meadow becomes drier, the plant production increases; the vegetation grows faster, and the salt is washed out of the soil through precipitation. Leaching of fertilisers from surrounding fields along with pollution brings nitrogen into the meadows, and the end result is an even more accelerated increase of the plant production. Moreover, the salt-tolerant species are antagonised by more competitive plants and consequently,

the salt meadow diversifies into another type of habitat, which influences the fauna as well (Nygaard 2009).

## Meadow Birds

In Denmark, the wader bird species which are associated with meadows are,

- Baltic dunlin (Calidiris alpina schinzii)
- black-tailed godwit (Limosa limosa)
- common redshank (Tringa totanus)
- common snipe (*Gallinago gallinago)*
- corn crake (*Crex crex*)
- Eurasian oystercatcher (Haematopus ostralegus)
- Eurasian skylark (*Alauda arvensis*)
- garganey (*Anas querquedula)*
- meadow pipit (*Anthus pratensis*)
- northern lapwing (*Vanellus vanellus*)
- northern pintail (Anas acuta)
- northern shoveler (*Anas clypeata*)
- pied avocet (*Recurvirostra avosetta*)
- ruff (*Calidris pugnax*)
- western yellow wagtail (*Motacilla flava*)
- whinchat (*Saxicola rubetra)*
- white stork (*Ciconia ciconia*)

(Thorup 2003).

My thesis will focus mainly on the so-called "meadow birds", i.e. the Baltic dunlin, the ruff, and the black-tailed godwit (Thorup 2004) because they formed the basis for designation of the areas in which Life-REMAB was conducted (LIFE-Nature 2006).

**Table 1: Status of the meadow birds. LC = least concern; NT = near threatened; VU = vulnerable; EN = endangered (Aarhus Universitet n.d.).**

| | Baltic dunlin | Ruff | Black-tailed godwit |
|---|---|---|---|
| **IUCN red list** | LC | LC | NT |
| **Danish red list** | EN | EN | VU |
| **Birds Directive** | Annex I | Annex I | - |
| **Main threat** | Predation | Grassland management changes | Agricultural intensification |

### Baltic Dunlin

The dunlin (*Calidris alpina*), comprises two subspecies, i.e. the southern (*C. alpina schinzii*) and the northern dunlin (*C. alpina alpina*), the northern dunlin being only a migratory bird in Denmark (Dybbro 2010). The southern dunlin is sub-divided into three biogeographically distinct populations, the Baltic dunlin (Picture 1) being the one which breeds in temperate coastal grasslands and lowland bogs in Denmark, around the Baltic Sea, and at the Wadden Sea (Thorup et al. 2009).

A century ago, the Baltic dunlin was common and abundant in an area stretching from the Baltic countries and Finland across to the Wadden Sea - in Denmark alone, the number of breeding pairs was at a level of between 50,000 and 100,000. Today, the major part of the population breeds in Estonia, Denmark, and Sweden (Thorup 2004). Unfortunately, from 1920 to 1970, the Danish population fell to 1,000 pairs, and simultaneously a considerable decline occurred in Sweden as well (Thorup 2003, 2004). In Denmark, more than half of the population disappeared during the second half of the 1990s, partly due to water management experiments (Thorup 2003).

**Picture 1: Baltic dunlins (*C. a. schinzii*), by Niels Dahlin Lisborg.**

In 2012, there were 135 breeding couples left in Denmark, a decline of 20% to 33% since 1999 (DOF 2006), and when compared to the Danish population size 100 years ago, less than 1% is left (Dybbro 2010). The Baltic dunlin is listed as endangered on the Danish red list (Table 1). The predation rate on eggs and incubating adults is too high for the dunlin populations of Denmark and Sweden to maintain survival rates at a level which would ensure a balanced population (Thorup 2004).

The dunlins arrive at their breeding grounds in March. Across the distribution of the dunlin, its breeding habitats are salt meadows, coastal meadows, and wet upland moors, while in the Arctic it breeds on tundra (Tucker, Heath 1994). In Denmark, it mainly breeds on salt meadows and to a lesser degree on grazed meadows inland (Dybbro 2010). The species displays high site-fidelity to areas with previous breeding success, and is therefore dependent on stable and predictable breeding areas (Thorup 1999). In the beginning of July they start their journey back to the wintering areas (Andreasen 1996, BirdLife International 2015), namely the coastal wetlands in North, Northwest, and West Africa (Thorup et al. 2009).

### Ruff

The ruff (*Calidris pugnax*, or *Philomachus pugnax*) (Picture 2) encompasses a European and an Asian population (BirdLife International 2015) though probably, these are not biogeographically separated (Thorup 2004). The major part of the total population breeds east of the Ural Mountains in the region of Yamal-Nenetsk with an estimate of 2.1 to 3.5 million breeding females (Thorup 2004), while the bulk of the European population breeds in European Russia; other countries with considerable populations are Sweden and Finland. Smaller "West-European" populations are found in England, France, Belgium, the Netherlands, Germany, Denmark, Poland, Estonia, Latvia, and Lithuania; these all show a declining trend (Thorup 2004). In 2004, less than 2,000 females in total bred in these countries whereas, 50 years earlier, the number was ten times higher (Thorup 2004). The current Danish population only consists of approximately 10% of that of 1970 (Dybbro 2010) and the ruff is listed on the Danish red list as endangered (Table 1). Changes in grassland management are the main cause of the declines in the West-European populations (Thorup 2003).

**Picture 2: Female ruffs (*C. pugnax*), by Erik Røjgaard. See front page for male ruff.**

Across its range of breeding habitats, the ruff breeds on meadows, bogs and swamps in forests, in mountains, and on tundra (Dybbro 2010). In the autumn, most of the entire population migrates to sub-Saharan Africa while a smaller number, only consisting of males, winter in Western Europe (Tucker, Heath 1994, Dybbro 2010).

### Black-tailed Godwit

The black-tailed godwit covers three subspecies, *L. l. islandica*, *L. l. limosa* (Picture 3), and *L. l. melanuroides* (Trimbos et al. 2014). The breeding habitats of *L. l. limosa* stretch from Western and Central Europe to central Asia and Asiatic Russia (BirdLife International 2015). Most of the

West European population of godwits breed in the Netherlands, the rest in Germany, Belgium, Denmark, France, and the United Kingdom. They all winter in West Africa (Gill et al. 2007).

From 1970 to 1986, the Danish population increased to approximately 900 pairs but then, from 1990 to 2002 it shrunk to around 700 (Thorup 2003).

The Dutch population used to represent 80% to 90% of the European black-tailed godwits (Beintema, Muskens 1987). However, this population has halved since the 1980s alongside the other main European populations in Germany, Poland and Belarus and consequently, the significance of the Danish population has increased (Thorup 2003). The black-tailed godwit is listed as vulnerable on the Danish red list (Table 1). Agricultural intensification is most likely the main cause of the decline in the *L. l. limosa* population (Gill et al. 2007).

**Picture 3: Black-tailed godwit (*L. l. limosa*), by Bjarne Nielsen.**

The godwit breeds from April to the middle of June (Andreasen 1996) and it can breed in many different habitats (Tucker, Heath 1994). In Denmark, it mainly breeds on salt meadows and, though not frequently, inland meadows (Dybbro 2010). In July and August, the godwits migrate south to winter in West-Africa south of Sahara (DOF 2006).

### Requirements for the Breeding Habitat

The meadow birds are dependent on a heterogeneous habitat with possibilities for coverage and blue bands (Picture 4), salt pannes and tidal channels which dry out gradually from May to the end of July, to ensure a varied food supply (see Table 2 for more details).

**Picture 4: Blue bands are belts of bare ground which run all way down to the waterline so that there is free view and passage for the meadow birds to lead their chicks in.**

**Table 2: An overview of the breeding biology of the meadow birds, and of their requirements for the breeding habitat (Andreasen 1996, Thorup 2003).**

| | Baltic dunlin | Ruff | Black-tailed godwit |
|---|---|---|---|
| **DK breeding habitat** | Mainly salt meadow | Mainly salt meadow | Mainly salt meadow |
| **Breeding period** | Start April - end June | End April - end June | April - mid June |
| **Ground water table** | Max 10 to 30 cm below ground from May to first half of June | Max 10 to 30 cm below ground from May to first half of June | Max 30 cm below ground in May |
| **Structure** | Dependent on pannes and tidal channels which gradually dry out from May to June | Dependent on pannes and tidal channels which gradually dry out from May to June | No demands |
| **Vegetation height: nest location/chick foraging area** | 5-15 cm/ 2-20 cm | 10-20 cm/ 10-20 cm | 5-15 cm/ 15-30 cm |
| **Fertilisation** | Vulnerable | Very vulnerable | Tolerates moderately |
| **Salinity** | Up to 10‰ | Max. 5‰ | Up to 10‰ |

## Declines in the Meadow Bird Populations

Open grasslands and meadows used to be widespread both in Denmark and in many other West European countries. Within the former agricultural system, the need for grass and hay for cattle feed was big; yet the exploitation of the meadows was then carried out as extensive farming because of lack of modern technology (Thorup 2003, 2004). Those large, low-lying areas and the

high precipitation both winter and summer combined with grazing and cutting by hand was ideal for preservation of wetlands with short vegetation and therefore, there were large meadows even inland (Thorup 2003). As in the 1800s it was possible to irrigate large areas for optimum development of grass and hay, Thorup (2003) hypothesises that most likely the meadow bird populations peaked in this age.

In Denmark during the second half of the 1800s, the hunting for meadow birds in the breeding period intensified; subsequently, the 1900s brought the reaper, the tractor, and artificial fertilisers and the meadows were transformed into farmland (Thorup 2003). The industrialisation, the technological development, and the intensification of agriculture and forestry have resulted in the loss of numerous lakes, meadows, grasslands, farm roads, and trails. Today, only 20% of the Danish area is actual nature (Naturstyrelsen 2015) and 76% of the remaining meadows and bogs have been assessed to be in moderately or highly unfavourable conservation status (Nygaard 2009). The agricultural intensification occurred in the other West European countries, too, causing habitat destruction and critical declines in many wader species and populations (Thorup 2004).

Birds associated with open habitats, e.g. the Baltic dunlin and the ruff, experienced a significantly more pronounced reduction than other breeding birds in Denmark, (Nyegaard et al. 2014). During the second half of the 1900s three meadow birds, the Baltic dunlin, the ruff and the black-tailed godwit disappeared from many breeding locations in Denmark. However, since large populations still remained at many other locations, the situation was not perceived as being severe. Then in the 1980s, all three species suffered declines, even in Special Protection Areas (SPA's), and in the 1990s, the Baltic dunlin and the ruff started to disappear from nature reserves as well (Thorup 2003). Despite conservation of habitats, designation of SPA's, and subsidies for nature friendly management, the decline in meadow bird populations persisted from 1986 to 2002 (Thorup 2003).

None of the efforts to reverse the negative population trend of the meadow birds through agri-environmental schemes (AES) has had any noticeable effect in Holland, either (Gill et al. 2007). These initiatives focus on delay of mowing dates and improvement of nest protection. Still, even though delayed mowing dates save nests, thereby improving the chance of chick survival, there has been nothing to indicate that any of the measures has improved the breeding rates; the Dutch population has declined more quickly from 2000 onwards than from 1990 to 2000 (Gill et al. 2007). The major shortcoming of the AES is that they do not encompass management of groundwater tables, which is a must for establishing a high table (Gill et al. 2007).

### Meadow Bird Friendly Management

As mentioned, Thorup's study (2003) demonstrated that the previous measures to prevent declines in the populations of breeding meadow birds in Denmark were inadequate. Thorup (2003)

determined that what was needed was "meadow bird friendly management". Because of the extensive agricultural utilisation of the areas in Denmark from the middle of the 1800s to the beginning of the 1900s, which provided practically optimum breeding conditions for the birds, the meadow birds adapted to the meadows. Therefore, to accommodate these, the management of the areas must strive to make the conditions resemble those of the 1800s, which implies higher soil moisture, no pesticides, no or very limited fertilisation, putting the cattle on pastures at a later date, lower grazing pressure, and hay cutting at a later date (Thorup 2003).

However, the actions needed for meadow bird friendly management would entail large interventions and expenses, therefore, funding was needed.

## Life-REMAB

### Restoration of Meadow Bird Habitats (REMAB)

Life-REMAB was a Danish restoration project, co-funded by the EU LIFE programmes for restoration of meadow bird habitats. The LIFE programmes are the funding instrument of the EU for the environmental and climate initiatives launched in 1992 (European Commission 2015).

In Denmark, the LIFE programmes cover three main topics: Environmental Politics and Governance, Nature and Biodiversity, and Information and Dissemination, and the Life-REMAB project falls under the second topic (European Commission 2013).

The objective of Life-REMAB was to restore and maintain favourable conservation status of the habitats of three meadow birds: the Baltic dunlin, the ruff, and the black-tailed godwit. The target habitats of the project, including the species associated to those habitats, were Atlantic salt meadows (1330), Chara (3140), and hard oligo-mesotrophic waters with benthic vegetation of Chara species (3140) as well as habitats of the Eurasian bittern (*Botaurus stellaris*), the black tern (*Chlidonis niger*), and the spotted crake (*Pozana pozana*) (LIFE-Nature 2006).

The project ran from 2006 to 2009 at four important meadow bird locations in Denmark, namely Vestlige Vejler, Harboøre Tange, Nyord, and Vestamager. The project had a total budget of 10.6 million DKK, and the Danish Nature Agency (NST) was responsible for the conduct of the project in cooperation with the Bird Protection Foundation (FVF) (Naturstyrelsen 2015).

As mentioned, I shall concentrate on the projects on Nyord and Vestamager. Below, the designation basis for the project in the two areas is listed (Table 3). Even though the black-tailed godwit does not appear in the Birds Directive, Annex I, the species still got included in the project

as it was deemed one of the most threatened bird species in Denmark alongside the other two meadow birds (Asbirk, Pitter 2005, LIFE-Nature 2006).

**Table 3: List of the habitats and bird species present at Nyord and Vestamager which were directly targeted by the Life-REMAB project (LIFE-Nature 2006).**

| | Habitats Directive annex I habitats | Birds Directive annex I species |
|---|---|---|
| Nyord and Vedelen | Atlantic Salt Meadows (1330) | *Calidris pugnax*<br>*Calidris alpina schinzii* |
| Vestamager | Atlantic Salt Meadows (1330) | *Calidris pugnax*<br>*Calidris alpina schinzii* |

The project areas are marked in Figure 4 and Figure 5. Vestamager is also called Kalvebodfælled, but throughout this thesis, I shall use "Vestamager".


**Figure 4: Nyord and Vedelen. Project areas are marked in blue. Copied by hand from Life-Nature (2006), map from Danmarks Miljøportal (n.d.).**

The sub-projects on Nyord involved,

- Limitation of population of foxes: fox barrier + artificial fox dens
- Grazing of 3 km coastal brim + mowing of reed beds
- Natural hydrology: In 20 places of the log bridges placement of pipes in the crossings for the water to move freely
- Establishment of dam with sluice gate for water flow control (LIFE-Nature 2006).


**Figure 5: Vestamager. Project area is marked in blue. Copied by hand from Life-Nature (2006), map from Danmarks Mijøportal (n.d.).**

The sub-projects on Vestamager involved,

- Limitation of the population of foxes: artificial fox dens
- Clearing of 220 hectares of scrub and forest
- Establishment of 20 floodgates
- 30 artificial fox dens
- Establishment of 5 km walking and cycling paths (path width of 1.5 meters - only room for vulnerable road users)
- Establishment of a new bird watching hide
- App. 1,200 ha grazed by cattle and horses (Naturstyrelsen 2015)

## Area Description of Nyord and Vedelen

Nyord is an island located between the south of Zealand and Ulvshale, the northern peninsula of Møn. It covers an area of 510 hectares, 120 of which are moraine situated at 15 meters above sea level. This is called "Agerlandet" (Figure 6). The rest of the island consists in a small fen and salt meadows and fens, which are flooded at high sea and storms. The meadows are called Nordengene ("Northern Meadows") and Sydengene ("Southern Meadows"), respectively (Figure 6).

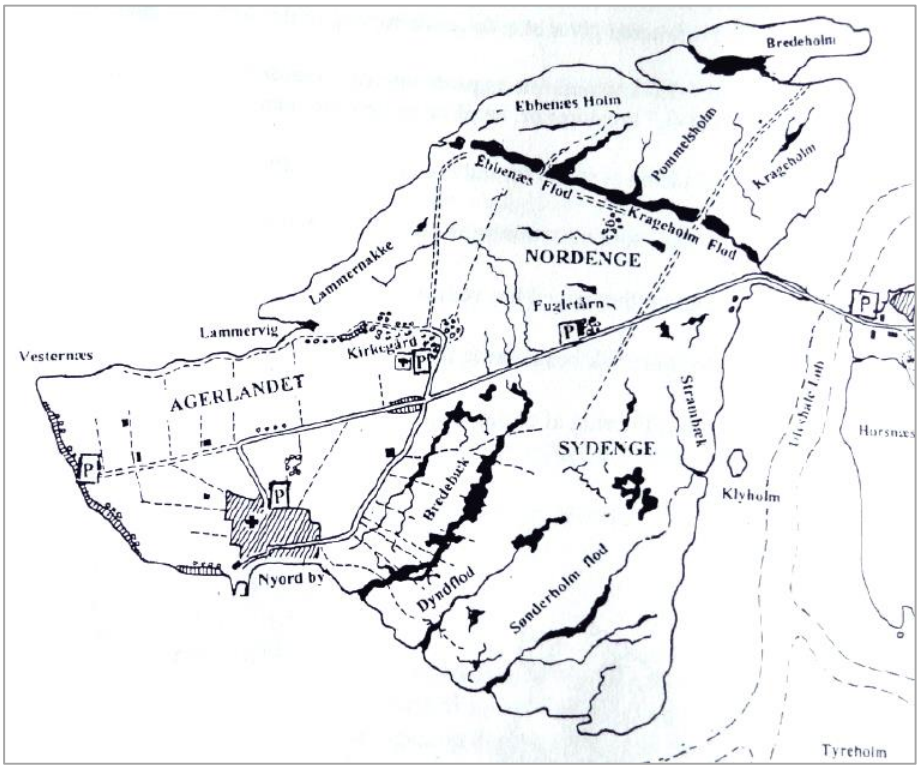


**Figure 6: Map of Nyord with the old, locally used location names. "Agerlandet" to the west is the high arable land, "Nordenge" the Northern Meadows, and "Sydenge" the Southern Meadows. Figure from Ebbensgaard, Hoffmann and Rasmussen (2012).**

These were formed by sand and gravel after the last ice age. In 1968, a bridge was built between Ulvshale and Nyord; until then, the island could only be reached by boat (Ebbensgaard, Hoffmann & Rasmussen 2012). Therefore, many cultural elements of the community of this isolated island are still evident. Agriculture, pilotage services, and fishery were the industries which directed life on the island (Nielsen 2015). The village consisted in 20 farms, each of which possessed small, narrow lots of land scattered all over the island to distribute the resources evenly. Here and there, one may still find remnants of small barns for storing hay, and the "star-system" of fields which spreads from the village outwards, is still visible in the landscape; even today, this system is reflected in the ownership structure (Figure 7).

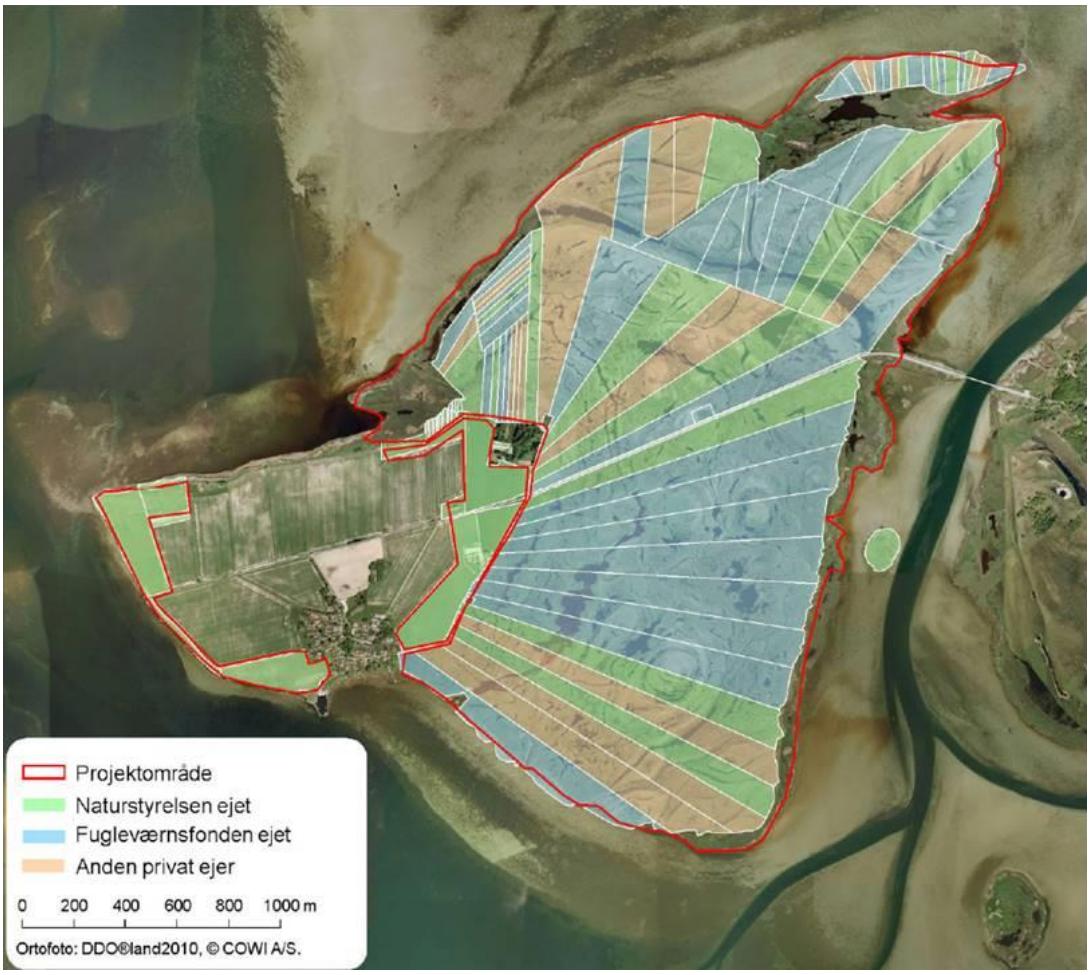


**Figure 7: Map of Nyord with the current ownership structure, which is still arranged in the "star-system" as in medieval times with many long and narrow land registers. The current ownerships are still scattered across the meadows. Figure from Ebbensgaard, Hoffmann and Rasmussen (2012).**

The isolation of the island, which continued far into modern time, combined with traditional farming led to a unique flora and fauna, favouring birds connected to the water. This, together with the cultural history, has gradually deteriorated since the island's connection to the mainland (Ebbensgaard, Hoffmann & Rasmussen 2012). In Table 4, the management history of the island is listed alongside some important events.

Originally, Ulvshale was separated from Møn by a large, shallow lake called Vedelen. It was surrounded by wet meadows, which were also of great importance to the meadow birds, and Baltic dunlins used to breed there. Then in the 1970s, a dike was constructed, and the lake and meadows were pumped dry, whereby the value of the area as a meadow bird habitat deteriorated considerably (LIFE-Nature 2006, Naturstyrelsen 2015).

**Table 4: Management history of Nyord and some significant events. LU = livestock units. AES = Agro-Environmental Schemes. References used are Andreasen (1996) and Ebbensgaard, Hoffmann & Rasmussen (2012) unless otherwise indicated.**

| Year/period | Management | Grazing pressure | Events |
|---|---|---|---|
| **1800 - 1856** | Communal grazing on the salt meadows | | Drainage of Lake Vedelen |
| **1856** | Tethered cattle on communal grazing 15th June, moved every day, began with good grass on fens<br>Outer lot cut for hay followed by grazing<br>Heifers at pasture later | App. 2 LU/ha in early summer | Area divided into small lots<br>Each farm: 10 dairy cows with calves plus pigs, app. 20 ha meadow<br>Other usage: hay, wood and heather cutting, peat excavation, pebble gravel and clay excavation |
| **1919** | Grazing by 234 heads of cattle, 58 horses, 215 sheep<br>App. 370 ha for grazing and hay cutting | | |
| **1939 (Second world war)** | Uniformity of management in some fields and cessation in others | | Drainage continued<br>Intensification of recreational use, e.g. summer houses |
| **Until app. 1960** | App. 240 heads of cattle + horses and sheep<br>Min. 360 ha for grazing and hay cutting | 0.7 LU/ha on meadows | |
| **1968** | App. 170 heads of cattle | | Bridge is built → access for foxes<br>Villagers get work on mainland → cessation of cattle farming and farming |
| **1975 – 1980** | Management ceases | | |
| **1979** | App. 90 heads of cattle<br>Hay cutting only 50% of 1960 level | | |
| **1981** | 113 heads of cattle (Andreasen 1996)<br>Rotational grazing: change from inner to outer fold after hay cutting in July (to minimize parasite infections) | 0.9 LU/ha on meadows | Establishment of 130 ha communal grazing folds, divided into an inner and an outer fold |
| **1982-1996** | First management plan, in effect from 1982 to 1992 | Varying from 0.5 to 2.4 LU/ha on inner folds<br>Varying from 0.2 to 1.0 on inner + outer folds | |
| **1982-1992** | Decrease from 168 to 120 heads of cattle (increase in 1992 to 200 heads)<br>Increase from 260 to 299 ha grazing and hay cutting area | | |

| | | | |
|---|---|---|---|
| **1990** | | | Establishment of wildlife sanctuary on the Southern Meadows |
| **1992** | Second management plan, in effect from 1992 to 1996 | | |
| **1993-1995** | App. 195 heads of cattle<br>App. 332 ha grazing and hay cutting area | | |
| **1997** | Third management plan, in effect from 1998 to 2002:<br>Cattle on pasture at the earliest 1st of June in inner fold<br>Change of fold 15th of July to outer fold after hay cutting | 1.0 on inner folds<br>More than 0.5 LU/ha on inner + outer folds | Double-fences between pastures with high vegetation for nest coverage |
| **1998** | Management plan replaced by AES:<br>Cattle on pasture 1st of June in inner fold<br>Change of fold 15th of July/1st of August to outer fold after hay cutting | 1.6 on inner folds<br>0.8 LU/ha on inner + outer folds | |
| **2006 - 2009** | Agro-Environmental Schemes:<br>Cattle on pasture 1st of June in inner fold<br>Change of fold 15th of July/1st of August to outer fold after hay cutting | 1.6 LU/ha on inner folds<br>0.8 LU/ha on inner + outer folds | Life-REMAB |
| **2012** | AES:<br>Put out to pasture 1/5-20/10 (Recommended earliest 1/6), first grazing in outer or beach folds | 0.4-0.5 LU/ha prescribed in AES | Actual management:<br>- Put out to pasture middle of May<br>- Grazing pressure 0.0-2.56 LU/ha<br>(Andreasen 2008) |

### The Birds on Nyord

Until the middle of the 1980s, 15 pairs of northern shovelers used to breed on the island, but in 2003, only 1 to 3 pairs remained (Thorup 2003) and from 1982 to 2007, populations of many breeding and roosting water birds decreased considerably, some even got close to completely disappearing (Andreasen 1996, 2008). Through the 2000s, too, the decrease continued; in 2001 there were in total 330 to 350 breeding pairs distributed over 28 species whilst in 2011 there were only 130 pairs distributed over 17 species (Andreasen 2011). Then finally, the picture started to change; in 2012 there were between 184 and 198 pairs over 20 species and in 2013, the number had increased to 180 to 200 over 23 species. However, because of a dry period during the breeding season in 2014, the number of breeding pairs was reduced by 40 compared to the previous year (Andreasen 2013, 2014).

There has never been any large breeding population of the Baltic dunlin on Nyord. From 1970 to 1992, a few pairs bred irregularly (Thorup 2003) but since 2004, it has not been observed breeding on the island (Andreasen 2013). In the 1970s, 10 to 15 female ruffs bred on the island but since the 1990s, the number has varied between only 1 and 4 females. It disappeared as a breeding bird after 2003 but then one pair returned in 2012 (Thorup 2003, Andreasen 2014). The population of breeding black-tailed godwit consisted of 10 to 16 pairs from 1970 to 2002; however, it decreased in the middle of this period. In 2003, 10 pairs were observed breeding but the number has decreased since then, now varying from between only a few and 4 or 5 pairs (Andreasen 2013, 2014).

In 2003, Nyord was one of the places which held a minimum of 1% of the overall Danish populations of Baltic dunlins, ruffs, and black-tailed godwits (Thorup 2003), which is why the island was selected for the Life-REMAB project.

In addition to being an important breeding area for many water birds, Nyord also serves as resting area for many migrating birds like geese, swans, ducks, waders, and raptors. Furthermore, several rare birds have been observed on the island, among these the Eurasian dotterel (*Charadrius morinellus*), the golden eagle (*Aquila chrysaetos*), the gyrfalcon (*Falco rusticolus*), the red-breasted goose (*Branta ruficollis*), the short-eared owl (*Asio flammeus*), and the spotted crake (*Porzana porzana*), (Ebbensgaard, Hoffmann & Rasmussen 2012).

### Legislation

Most of Nyord, except the village and the cemetery, is protected (Overfredningsnævnet 1975) and in 1995, the Southern Meadows were designated wildlife sanctuary (Miljøministeriet 1997). All the meadows, three ponds, and the small fen are protected habitats under § 3 of the Nature Protection act. The entire island and Lake Vedelen form part of the designated Natura 2000 area No. 168, "Havet og kysten mellem Præstø Fjord og Grønsund" – Special Protection Area No. 89, Ramsar area No. 22 "Præstø Fjord, Jungshoved Nord, Ulvshale og Nyord", and Special Area of Conservation No. 147 on the basis of the habitats "Atlantic salt meadows" (1330) and "Alkaline fens" (7230). The island is covered by much more legislation which is listed in Appendix 3.

## Area Description of Vestamager

The western part of Amager (Picture 5), the island east of Zealand, is called Vestamager, and covers 2,500 hectares. It is of unique recreational value to the public as it is the only large nature area close to Copenhagen except for Dyrehaven, which is approximately 16 km north of the

capital (Nansen 1993); more than 1.5 million people visited Vestamager in 2003 (LIFE-Nature 2006).

Formerly, the major part of Vestamager was seabed; in 1941, it was dammed and drained and then used as military artillery training area; therefore, this area is now 2.40 meters below sea level. The eastern part of Vestamager has always been above water, and was originally used by the local farmers as communal grazing area. The military terminated their activities in the area in the 1960s, whereupon Vestamager was left untouched because of the existence of many unexploded grenades – until 1983 when it was acquired by NST (LIFE-Nature 2006).

Because the area was left untouched for many years, it underwent a natural succession from seabed, through marshland and reed-bed to willow (*Salix*) and beech (*Betula*) forest. Consequently, Vestamager held a natural flora and fauna as well as a mosaic of habitats such as salt meadows, reed beds, grasslands, lakes, ponds, and forest (Overfredningsnævnet 1990, LIFE-Nature 2006). However, there was no actual management of the areas, so many of the salt meadows transformed into forest (Olsen, Frandsen & Thamsborg 1998) and since 1984 the number of breeding birds has decreased. This led to an acknowledgement of the need for management in order to preserve the diverse habitats (Overfredningsnævnet 1990).

In 1997, the northern area was bisected by the Amager–Øresunds motorway (Wikipedia 2015a). Other significant events including the management history are listed in Table 5.


Picture 5: Map of Vestamager (Naturstyrelsen n.d.).

**Table 5: Management history of Vestamager and some significant events (Overfredningsnævnet 1990, LIFE-Nature 2006, Norup 2015)**

| Year/period | Management | Other usage | Events |
|---|---|---|---|
| ? - 1941 | Communal grazing area for local farmers (eastern part) | | |
| 1941 | | | Damming of seabed (western area)<br>Draining |
| 1941 – 1960s | | Military training area for artillery exercises | |
| 1960s – 1983 | Untouched because of unexploded grenades | | Natural succession: sea bed → marshland →reed bed →willow and beech forest<br>Mosaic of salt meadow, reed beds, grasslands, lakes, ponds and forest → growing into forest |
| 1983 | Untouched because of unexploded grenades | | NST takes ownership of the entire area |
| | | | Decrease in breeding birds<br>Area south of the Zealand Bridge opened to the public |
| 1986 | Introduction of fallow deer | | Afforestation of 30 ha |
| 1990 | | | Protection act |
| 1991 – 1996 | | Recreation | Nature Centre Vestamager is built |
| 1994 | | | User council formed |
| 1997 | | | Amager – Øresunds motorway |
| 1991 – 2000 | Experimental management and grazing pressure | | Project "Forskning vedrørende Naturpleje VESTAMAGER" initiated |
| 1986 – 2006 | | | Clearing of 200 ha forest, damming of 26 ditches, establishment of 8 adjustable wires |
| 2006 – 2009 | | | Life-REMAB |

## The Birds on Vestamager

Vestamager used to be an important meadow bird locality which means that 40 to 50 years ago, at least 3% of the Danish population of one of the three meadow birds bred in this area, but in 2003, none of the populations managed to reach even 1% of the overall Danish population (Thorup 2003).

In 1970, approximately 4% of the Danish Baltic dunlins bred at Vestamager; however, it had altogether ceased breeding by the end of the 1990s. The ruff used to be a solid breeder but since 1990, it has only been breeding irregularly. The only observation of breeding black-tailed godwit

registered is from 1969-1970 so it seems that Vestamager has not been a suitable habitat for this species (Thorup 2003).

Some other breeding birds at Vestamager which are also listed in the Birds Directive, Annex I, are the pied avocet (*Recurvirostra avosetta*), the Eurasian bittern (*Botaurus stellaris*), the western marsh harrier (*Circus aeruginosus*), and the little tern (*Sternula albifrons*). Species which rest in the area during their migration are the osprey (*Pandion haliaetus*), the peregrine falcon (*Falco peregrinus*), and the smew (*Mergellus albellus*) (Naturstyrelsen Hovedstaden 2014).

## Legislation

Almost the entire Vestamager and the sea surrounding it are designated Natura 2000 area No. 143, "Vestamager og havet syd for" – Special Protection Area No. 111 on the basis of some breeding bird species of which the avocet, the Baltic dunlin, and the marsh harrier are included; Special Area of Conservation No. 127 on the basis of the habitats "Atlantic salt meadows" (1330), and "White dunes and shifting dunes" (2120) and others. In 1990 a protection act became effective, covering the entire area (Overfredningsnævnet 1990) and most of Vestamager is also covered by § 3 under the Nature Protection Act. Additionally, the entire Vestamager and the sea surrounding the area is wildlife sanctuary (Miljøministeriet 2012). Vestamager is covered by much more legislation which is listed in Appendix 3.

# Method

## Case Studies

My study design is composed of two, non-comparative case studies, so this study is qualitative. Flyvbjerg (2004) states that it is possible to generalise from just a few case studies provided that the cases are strategically well-chosen. He categorises a well-chosen case as being either extreme, critical or paradigmatic and - if it is particularly well-chosen - containing elements from more than one of these categories. He further stresses, that when generalising on the basis of only a few case studies, it is important to distinguish between the results which are specific to the case in hand, and those which are general. I have specifically chosen the cases on Nyord and Vestamager as they appear to have been unsuccessful and therefore more likely involved conflicts.

### Qualitative Interviews

In order to identify conflicts in the projects, I have interviewed several of the stakeholders involved in or affected by the restoration projects at Nyord-Vedelen and Vestamager.

I have decided on semi-structured interviews rather than structured and unstructured ones, as this is the standard choice when studying personal experiences in a social context (Brinkmann 2014).

Some people I have interviewed face to face, which is the standard choice in qualitative interview research; most of the interviews, though, have been made over the telephone, and a few were conducted by e-mail.

I had prepared some of the persons for the interview beforehand, either by phone or by mail, when we arranged the time for the actual interview. Due to circumstances, others were interviewed the first time I got hold of them, and were therefore not introduced to my thesis description until immediately before the interview.

The first person I interviewed was Jørgen Sandby Nielsen from NST, region Zealand. I interviewed him face-to-face while he showed me around on Nyord. He helped me with contact information on the rest of the stakeholders on Nyord. Sven Norup from NST, region Capital, helped me get started on Vestamager, and provided me with contact information on the rest of the stakeholders in this area. The stakeholder groups which I have contacted on Nyord and Vestamager are listed in Table 6 and Table 7 under “Results”. The actual individuals, whom I have interviewed, are listed in Appendix 4.

### Question Design

I prepared the questions beforehand, but they did not dictate the course of the interviews. Instead, I mostly preceded the interviews with a short description of my research focus, and then asked the

general question: “How did the activities involved in the restoration project Life-REMAB affect your/the organisation’s interests?” When possible, I let the interviewees talk as much as they wanted, and only when somebody got stuck I put forward a follow-up question, an additional question, or a completely new one which revolved around the specific knowledge of the interviewee. Therefore, the subordinate questions have varied according to the stakeholder group which each individual represented. For example, I asked the farmers if cattle grazing on the areas experienced a different parasite pressure than cattle grazing in other habitat types.

To the first persons I interviewed, I described my project as: “*an analysis of potential conflict situations arising during restoration projects*”. During these interviews I sensed a certain amount of caution regarding the subject. I therefore changed the formulation to: “*how a restoration project may entail costs and/or benefits for the afflicted stakeholders*” in all of the subsequent interviews, assuming that the word “conflict” was what had caused the restraint.

## Conflict Analysis

### Stakeholder Analysis

For clarity, I first developed a stakeholder grid for each area with all the information I presupposed, and knew about the individual stakeholders. This was corrected many times concurrently with the execution of the interviews, and while I obtained information from other sources. I used this as a “rummage-grid” from which I withdrew the stakeholders’ interests and their interrelated status and power for the more thorough analyses later on.

#### *Uncovering Interests*

Conflicts often arise from differences between human positions. A position derives from a person’s interests, which in turn stem from the basic needs of the person in question. A conflict based on positions is generally very difficult to solve (Fisher, Ury & Patton 2012).

A hypothetical example of this could be as follows: An ornithologist does not want boats on a certain lake. Another person thinks that boats should be allowed on that particular lake. Those statements are their positions. If the two of them start arguing over their positions, they will most likely never reach an agreement. When somebody’s position is challenged, the normal reaction is to lock on to that position even harder, which often results in ego and position becoming entangled. This person starts to identify with his or her position and so, to give in would be equivalent to losing face (Fisher, Ury & Patton 2012).

However, if one of the parties in the above example asks: "Why do you think that?" the focus shifts to the interests, which will open to the possibility of the parties' seeing the situation from the other's point of view. They try to understand each other's rationale. The ornithologist may answer that it disrupts the birds breeding on the lake, to which the boat-guy may answer that he wishes for only rowing boats to be allowed, which do not make as much noise as motorboats do, etc. By focusing on interests rather than on positions, you may unravel the root of a conflict more easily, and will more likely reach solutions which meet the needs of both parties (Fisher, Ury & Patton 2012).

Based on the above theory, I started out by identifying the interests of the various stakeholders, mainly through the interviews, but also via different literary sources. I made a grid of the interests (see Table 6 and Table 7) to simplify the relationship between them in the search of nerve centres of opposing interests and in that way, potential origins of conflicts.

### *Stakeholder Type and Status*

Nilsson, Woodford-Berger and Sida (2000) define stakeholders as follows,

- Stakeholders are individual persons, groups and institutions with vested interests in an intervention
- Primary stakeholders are those who will be directly or ultimately affected by an intervention, either positively or negatively
- Secondary stakeholders are intermediaries such as implementing organisations or other individuals, persons, groups or institutions involved

I interpret the difference between the two types of stakeholders like this: the livelihood of the primary stakeholder, his/her everyday life, will be affected by the intervention, whereas that of the secondary stakeholder will not. The secondary stakeholder's involvement in the intervention is professional, or on the behalf of another stakeholder.

- Key stakeholders are the primary and secondary stakeholders who have the power to significantly affect or influence an intervention either positively or negatively during the course, and who share the responsibility for quality and sustainability of subsequent effects and impact (Nilsson, Woodford-Berger & Sida 2000)

Whether a stakeholder is key, and primary or secondary depends on the stakeholder's interest in and power over the course of an intervention in proportion to that of the other stakeholders involved. Coleman (2000) lists tree different types of power:

- Environmental power: the degree to which an individual can influence his overall environment

- Relationship power: the degree to which a person can favourably influence another person
- Personal power: the degree to which a person is able to satisfy his own desires

He points out that power is dependent on both personal and situational factors, and that loss in one type of power may lead to loss or gain in another type of power; for example: A parent loses some degree of power over his or her teenage child (relationship power); as a consequence, the teenager gains personal power.

Through the stakeholder analysis I identified which were primary and secondary, and which were key stakeholders, as defined by Nilsson, Woodford-Berger and Sida (2000) by placing them in relation to each other in a grid–like figure (Figure 8). Eden and Ackerman (1998) have used other terms (Figure 8) and for clarity I have inserted the definitions by Nilsson, Woodford-Berger and Sida (2000) in red in the figure.

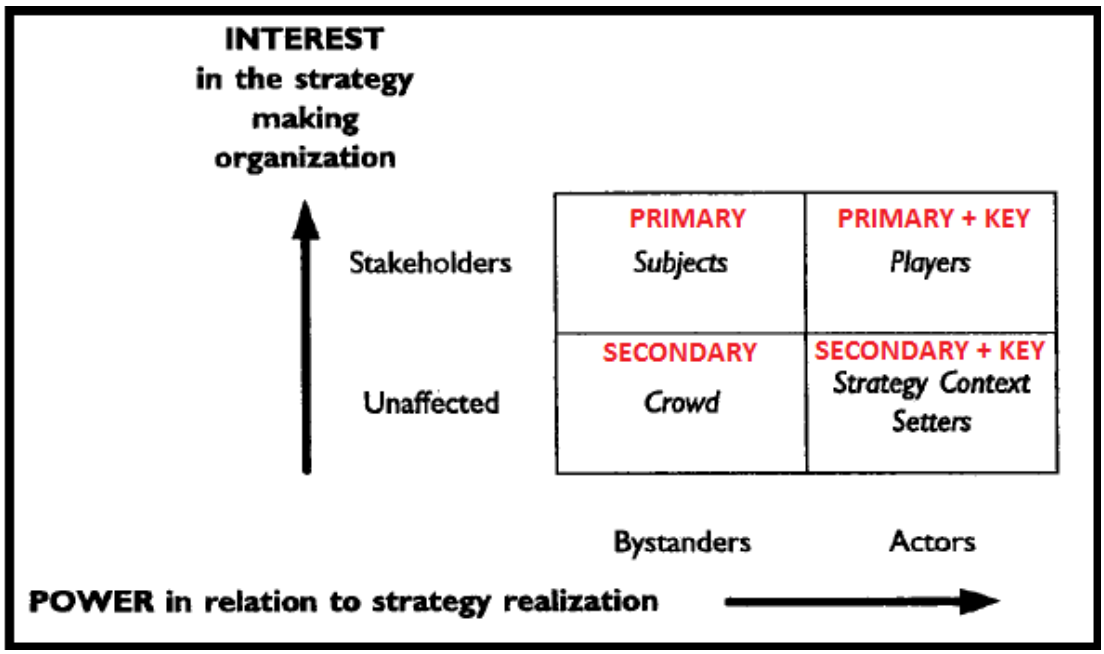


**Figure 8: Modified from Eden and Ackermann (Eden, Ackermann 1998). On the horizontal axis, the degree of power which the stakeholders possess in relation to an intervention increases from left to right. On the vertical axis, the stakeholders' interests in the intervention increase from the bottom to the top.**

## Identifying Conflicts and Developing Improvements and Solutions

There are many definitions of conflicts. I will not list them here, but as Daniels and Walkers (2001) summarise, most of the definitions stress that conflicts are inevitable in human affairs and that they "*involve interdependent parties that perceive some kind of incompatibility*". Furthermore, conflicts concerning environmental issues and natural resources entail a high amount of complexity because of the nature of the issues, the large number of stakeholders, and the interdependence associated with these topics. These factors combined increase the risk of the

parties becoming locked on to their positions and consequently, choosing competitive or disruptive strategies to manage the conflicts (Daniels, Walker 2001) because, as expressed by Daniels and Walker (2001) "*With increased complexity come increased uncertainty and a reluctance to trust or look beyond individual interest*".

I have chosen the Collaborative Learning approach to unravel the conflicts, and work out improvements and solutions. Collaborative Learning has been developed by Daniels and Walker (2001); it is a set of techniques for optimal conflict management, including a wide range of practical tools for conflicts involving multiple parties.

The essential tool in Collaborative Learning is to get all the stakeholders together in a workshop where they go through the processes of uncovering interest and nerve centres of opposing interests, of identifying conflicts, and of working towards improvements jointly. In such a workshop I would be an impartial facilitator, leading the pen on the basis of the stakeholders' statements, mediating in misunderstandings and disputes, and offering my objective knowledge.

With this set-up in mind, I noted down after each interview the elements which the stakeholder perceived as conflicts and problems in the project, and put them all into a "situation map", another tool devised by Daniels and Walker (2001). Little by little, the network of events in the execution of the restoration projects materialized until finally, the situation map contained all the conflicts with all their intertwined compounds. Having completed all the interviews, I looked for overlapping elements in the situation map, and in this way identified one conflict at a time. Then I broke down the map into smaller, manageable sections which each covered their respective conflict, and for the sake of my own understanding, I extracted all information available about that particular issue from the interviews, and added information from the literature (see Figure 9 to Figure 21 in "Results"). Some conflicts overlap, and I have either composed them as such, or separated them, depending on what would provide the clearest and most explanatory presentation.

To generate suggestions for these improvements and alternative solutions, I have read through the literature and asked the stakeholders implicated for their ideas to solutions and their thoughts about my suggestions, again in an attempt to meet the requirements proposed by Daniels and Walkers (2001) for conflict management. Lastly, based on these measures, I have gathered the final set of recommendations presented in the results.

## Breeding Data

### National and Local Bird Surveys

The breeding data on ruffs, Baltic dunlins, and black-tailed godwits is retrieved from Amphi (Amphi 2015). Thorup (2003, 2015) has reviewed large amounts of references and unpublished information, and thus has access to a lot of data. Based on his expert knowledge about the meadow birds, the data which seemed most trustworthy was selected and entered into the Access database Amphi.

For Nyord-Vedelen, data from the following sites has been used. ”Nyord Enge”, ”Ulvshale Vedelen og Hegnede Bugt”, ”Ulvshale Horsnæs”, and ”Ulvshale Nordenge”. I included sites on Ulvshale because Vedelen is located on Ulvshale, so Life-REMAB covered this peninsula as well. For Vestamager, data from the site “Vestamager” has been used.

I have chosen “Pairs max” because breeding ruffs and dunlins are difficult to count. Only birds which breed successfully until the time of counting are included. Therefore, the number of breeding birds registered is more likely the number of successful breeders and consequently, in years with low breeding success, the populations must have been considerably larger (Thorup 2003). To standardize the data, I have chosen “Pairs max” for the black-tailed godwit, too.

### Statistical Analysis

Sebastian Kepfer Rojas has both performed the analysis, and written the method.

Only data from 1970 to 2013 is included in the analysis; before 1970, the number of sites from which data was collected at national level, was very low, which would have increased the uncertainty of the estimates of the models.

The analyses of the population trends for Baltic dunlin, ruff, and black-tailed godwit include time series data from two restored areas (local level) and at national level spanning from 1970 to 2013; for ruff on Vestamager, however, only until 2001, and for the national population of black-tailed godwit until 2014. The number of breeding pairs was used to estimate local and national population trends, based on the statistical framework of Generalised Additive Models (GAM) for local trends, and Generalised Additive Mixed Models (GAMM) for national trends. A log link function and a Poisson error distribution were applied to each analysis, as is appropriate for count-data (ter Braak et al. 1994, Thomas 1996, Fewster et al. 2000). Additive models allow estimation of non-parametric smoothed trends with a predefined level of smoothing. This level is defined by the degrees of freedom, thereby providing the best description of a long-term trend without imposing constraints on its shape (Fewster et al. 2000).

This additive predictor can be obtained through a number of different smoothing techniques, and the result is a curve of any shape, which describes the dependence of the response variable on the covariates (Wood 2006). The degree of smoothing can be modified by altering the degrees of freedom (df) used in the calculation of the model, and can be adjusted depending on the objectives of the study (Hewson and Noble 2009).

Local population trends were modelled separately for each of the species on both localities. The number of breeding pairs was modelled as a function of the observation years. Similarly, national level population trends were modelled as a function of the observation periods within the GAMM framework. An advantage of using GAMMs to model the national population trends is that it allows inclusion of the different localities as a random intercept. In doing so, the differences between the localities are modelled as random variation around the intercept, whereby estimation of one intercept for each locality is avoided. Local and national population trends were visually examined for differences in patterns. Robust statistical comparisons between national and local trends were not possible due to the low number of restoration areas included in this study.

Similarly, direct comparison of population trends before and after restoration was not possible because of incomplete sampling of some of the species in the focal sites as well as few observations after the restoration project in 2006-2009. However, in an attempt to reveal possible changes in the population trends, first derivatives of the fitted trends were calculated to identify statistically significant periods during which the populations were increasing or decreasing. These derivatives were calculated using the method of finite differences. To produce derivatives via finite differences, the values of the fitted trend are computed in a grid of points over the entire data. Then, the grid is shifted a tiny bit and the values of the trend are recomputed at the new locations. The differences between the two sets of fitted values are the first differences of the trend, and give a measure of the slope of the trend at any point in time. Periods where zero is not included in the confidence interval show significant periods of change.

The analysis was conducted using the mgcv library in R (Wood 2006, R Core Team 2009).

# Results

## Nyord

### Stakeholders

The stakeholder groups which I have contacted on Nyord, are listed in Table 6; I shall describe them in more detail below.

The Grazing Guild Nyord Strandenge (the GNS) was formed during the Life-REMAB project with the assistance of Thyge Nygaard, a consultant from the firm Agrovi. In the GNS all the owners of the meadows, both public and private, are represented, and they discuss actions to be taken concerning the management of the marshes.

The villagers are former farmers, or descendants of farmers who used to own the salt meadows. Today, though, they only possess the parcel on which their houses stand. They are primary stakeholders as they are personally affected by interventions concerning the salt meadows because the meadows form part of their culture and everyday life. However, since they have no share of the salt meadows anymore, they are not a part of the GNS, and thus have no influence on the decision-making concerning these areas. Sometimes they are consulted for feedback on measures related to tourism and the likes. In general, though, they do not feel included in the decision-making, which is why "Consulted" appears in parenthesis under "Power" in Table 6. Inclusion in matters concerning Nyord is very important to the villagers. Additionally, they express interest in protection of the birds and the salt meadows as these form part of their cultural heritage, and because of the intrinsic value of a diverse nature in relation to recreation (Table 6). Furthermore, preservation of the culture of the island is highly valued, and as hunting is part of this culture, they also show a certain interest in this (Malmborg 2015, Stolt 2015). An increase in the current level of tourism is considered to be a threat against the culture of the island, which is why they oppose to actions promoting tourism (Table 6) (Malmborg 2015).

The private landowners consist of four persons, three of whom are active in the GNS. The private landowners' main interest is economy as they strive to earn the most off their land and keep the costs at a reasonable level (Table 6) (Sørensen 2015). Consequently, they have an interest in how nature and animal management is run (Table 6). As they receive subsidies through agro-environmental schemes (MVJ) as well as other agricultural support, they also have an interest in bird and nature conservation in order to meet the terms of these subsidies (Table 6). Because they form part of the GNS, they all have the same power as the other representatives in the grazing guild to actively influence decisions on conditions concerning the meadows (Sørensen 2015), thus

they are decision-makers. These factors put together make the private landowners primary and key stakeholders (Table 6).

The Bird Protection Fund (FVF) is a financially independent foundation set up by the NGO, i.e. the Danish Ornithological Society (DOF). The fund acquires areas containing endangered habitats rich in birdlife, and implements nature management in these areas to secure sanctuaries for birds. All areas owned by FVF are bird sanctuaries (FVF n.d). FVF is also represented in the GNS. It is the largest landowner at Nyord, and is therefore president of the guild. The vision and mission of DOF is to promote awareness of and an interest in wild birds and nature conservation. Hence, the organisation works with bird protection and improvement of their habitats, collection and communication of knowledge about birds, bird experiences in nature etc. (DOF n.d.). Accordingly, FVF's interests in the salt meadows are equally divided between protection of the meadow birds and of the habitat salt meadow, nature management, and dissemination of knowledge, and also largely between nature management and fulfilment of obligations connected to Natura 2000 areas (Table 6). In general, FVF does not allow hunting in any of their bird sanctuaries; however, in relation to Nyord, it has entered into an agreement on exchange of user rights with NST and Nyord Hunting Association (described in more detail under the conflict "Disturbance") which is why FVF's opposition to hunting on Nyord is listed in a parenthesis in Table 6. Like the other members of the GNS, the fund is a key stakeholder, and since it is an organisation, it is a secondary stakeholder.

NST is responsible for the protection of § 3 habitats, water plans, and Natura 2000. It consists of local units, which carry out the practical planning, and enforce the legislation. NST is the second-largest landowner on Nyord, and is therefore also represented in the grazing guild. Thus, the agency is a key stakeholder but since it is an authority, it is secondary. As its principal purpose is to carry out the objectives of the nature conservation, and follow the directives issued by the EU, all the interests concerning protection and conservation of the birds and meadows are very important to the agency (Table 6). Likewise, dissemination of knowledge to the public and the public's access to nature are main objectives, both in the nature conservation and in the directives; consequently, these interests are of great concern to the agency, too (Table 6).

Nyord Hunting Association is part of the Hunter's Nature Fund, which owns approximately 18 hectares of salt meadow at Nyord. Hence, the association is represented in the GNS. Hunting is part of the cultural heritage on Nyord. An unwritten rule of the old days allowed everybody to hunt for one's own consumption. In 1971, FVF began to acquire land on the island, and as mentioned, principally the fund is against hunting in all their bird sanctuaries. Then in 1975, the protection of Nyord was imposed (Overfredningsnævnet 1975), which prohibits hunting between

March 15 and July 15, and later the wildlife sanctuary was created (Miljøministeriet 1997), prohibiting hunting on the Southern Meadows all year round. The areas which the Hunter's Nature Fund possesses are all located on the Southern Meadows so the hunters' hunting rights were reduced significantly. To soften the impact of this, NST allowed hunting on their areas on the Northern Meadows (Danmarks Jægerforbund 2008). Almost all the members of the hunting association live at Nyord; conclusively, it is key and primary stakeholder. The main interests are hunting, of course, and subsequently conservation of the birds and the salt meadows - the last two interests mainly to ensure viable populations of the game (Table 6) (Andersen 2015).

The cattle-owners are farmers living on the mainland, who bid for the pastures on the salt meadows (except Nyord Ø-Kød). They are paid by the GNS for having their cattle, mainly beef-cattle, graze on the areas. Therefore, as their income depends on the conditions on the pastures, they are primary but not key stakeholders since they have no say in the decision-making. Their main interests are animal management and economy (Table 6).

The Nyord Association is an umbrella organisation where all organisations on Nyord (Nyord Hunting Association and Nyord Ø-Kød, among others) gather to discuss matters concerning the village, especially how to revive the island by creating new professions to attract families with small children (Malmborg 2015). I have listed the association as a secondary stakeholder because it is an umbrella organisation; it works on behalf of other organisations. Its objective is to attend to the interests of this assembly of organisations, therefore it has vested interests in many areas; its main interest, however, is communication between the villagers, and mediation between the villagers and NST (Table 6) (Malmborg 2015).

Nyord Ø-Kød is a limited liability company, which was formed after the Life project. The reason why I include this stakeholder is that it may become part of potential future conflicts. Nyord Ø-Kød was formed in 2012, and is owned by the villagers and a farmer from the mainland. The vision of the company is to be sole owner of the cattle grazing the areas on Nyord, thus retaining the economy on the island (Nielsen 2015). Its trademark is organic meat and therefore, the stakeholder is equally interested in animal and nature management, and economy (Table 6). I have listed it as a primary stakeholder even though it is a company because its existence is highly dependent on interventions concerning the salt meadows.

I did not get in contact with any summer house owners so the information I have about these is based on secondhand accounts; therefore, I have included them in italic. The reason why I include them at all is that most likely they have been involved in a conflict. The accounts of summer house owners' interests reveal that they were against some of the actions conducted during the Life project. One of these actions is the fox barrier, which was installed to protect the birds, and I

have therefore listed them as being opposed to bird protection, but in parenthesis, and as very interested in free access to and from the island. Another action to which they were opposed, was the flooding of Lake Vedelen and therefore they are listed as opposed to nature management (Table 6). Conclusively, the summer house owners are primary stakeholders but at the most, they are only consulted about decisions on actions.

I contacted the Danish Society for Nature Conservation but they had not been involved in the project (Nygaard 2015).

The tables below do not include all interests, which is why other interests are sometimes mentioned in the descriptions of the conflicts.

**Table 6: Overview of which interests are important to which stakeholders: * = some importance; ** = important; *** = very important; ÷ = the stakeholder opposes to this interest. Not all interests are included. Power categories: Decision Maker = has the power to actively influence the decision making; Consulted = provides knowledge and advice to the decision maker, has the power to influence the decision process; Informed = has no power in the decision process.**

| NYORD | | | INTERESTS | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Stakeholder Type** | **Power** | **Protect Birds** | **Conserve Habitat** | **Nature Management** | **Animal Management** | **Fulfil Natura 2000 Obligations** | **Economy** |
| **Villagers** | Primary | Informed / (Consulted) | ** | ** | | | | |
| **Private Landowners** | Primary + Key | Decision Maker | * | * | * | ** | | *** |
| **FVF** | Secondary + Key | Decision Maker | *** | *** | ** | ** | ** | * |
| **NST Storstrøm** | Secondary + Key | Decision Maker | *** | *** | *** | ** | *** | ** |
| **Nyord Hunting Association** | Primary + Key | Decision Maker | *** | *** | | | | ** |
| **Cattle-Owner** | Primary | Informed | | | | *** | | *** |
| **Nyord Association** | Secondary | Informed | ** | ** | | | | ** |
| **Nyord Ø-Kød** | Primary + Key | Informed | | | *** | *** | | *** |
| ***Summerhouse Owners*** | *Primary* | *Informed / (Consulted)* | *(÷)* | | *(÷)* | | | |

| | | | INTERESTS | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Stakeholder type** | **Power** | **Inclusion** | **Free Access** | **Preserve Culture** | **Hunting** | **Communication /Dissemination of Knowledge** | **Tourism** |
| **Villagers** | Primary | Informed / (Consulted) | *** | *** | *** | ** | | ÷ |
| **Private Landowners** | Primary + Key | Decision Maker | | | | | | |
| **FVF** | Secondary + Key | Decision Maker | | | | ÷ | *** | |
| **NST Stostrøm** | Secondary + Key | Decision Maker | | | * | | *** | *** |
| **Nyord Hunting Association** | Primary + Key | Decision Maker | | | *** | *** | | (÷) |
| **Cattle-Owner** | Primary | Informed | | | | | | |
| **Nyord Association** | Secondary | Informed | | | *** | | *** | (÷) |
| **Nyord Ø-Kød** | Primary + Key | Informed | | | | | | |
| ***Summerhouse Owners*** | *Primary* | *Informed / (Consulted)* | | *** | | | | |

## Conflicts

### *Predation*

The measures to keep down the impact of predation during the Life project were construction of a fox barrier on the bridge between Nyord and Møn, establishment of five artificial fox dens to ease regulation of fox, cutting of reed beds along the coastal brim, and removal of trees in the meadows and along the edges (Naturstyrelsen 2015, Nielsen 2015).

**INFO BOX, Predation**

Chick and egg loss in Danish meadow birds is mainly caused by predation (Schekkerman, Teunissen & Oosterveld 2009).

The predators include the western marsh harrier (*Circus aeruginosus*), the common kestrel (*Falco tinnunculus*), the mink (*Mustela vison*), the red fox (*Vulpes vulpes*), gulls (*Laridae*), and crow birds (*Corvidae*) (Thorup 2003). On Nyord, the worst predators are the fox and crows (Hansen 2015a, Ring 2015).

The fox barrier was installed on the abutment of the bridge on Møn in 2010 (Picture 6). The barrier consists of an electric gate supplemented by a six meter long electric animal fence on the outside of the bridge railing to prevent foxes from going around the gate. The gate is controlled remotely by cars and bikes as they approach, and pedestrians are to use a push-button. The gate is supposed to be open during daytime and closed all through the night (Naturstyrelsen 2015).

**Picture 6: The gate on the bridge between Møn and Nyord. The gate is 1.5 m high and made of a steel frame of only vertical bars with a maximum free distance of 40 mm. It is raised 15 cm above ground in order not to push snow into a heap when opening, and under the gate frame there are vertical spikes, which cut through the snow but prevent foxes from creeping under. Picture by Jørgen Sandby Nielsen.**

Regulation of fox is performed in case the fox barrier does not keep out all the foxes, and is conducted as follows; the fox bitch is shot once she has given birth in the artificial den because only then has she established a territory, and thereby the possibility of another fox taking over the den that year is prevented (Aagaard 2015).

By cutting the reed beds, a larger area is released for the meadow birds to forage in, and the possibility that the marsh harrier should settle is reduced. Hansen (2015a) recounts that predation by crow is a big problem on the island alongside predation by fox, and by removing trees the number of look-out posts for crows is reduced. Nyord Hunting Association conducts the regulation of both fox and crow voluntarily (Nielsen 2015).

**The Conflict**

| Cause of the Conflict | Stakeholders Involved | Interests Affected Negatively |
|---|---|---|
| Reduction of Predation | Villagers, Summer House Owners, Hunters | Free Access, Inclusion, Hunting |

During the restoration project, bushes and shrubs were left on steep slopes and on the cemetery area, areas which the cattle cannot graze anyway; likewise, some reed bed was left on the Northern Meadows for game-cover in order to accommodate the hunters' interests (Nielsen 2015). This could provoke an increase in predation since bush and shrubs work as cover for ground predators and look-out posts for avian predators (Asbirk, Pitter 2005), which is why there is a two-way, red arrow between "game cover" and "reduction of predation" in Figure 9. However, members of the hunting association carry out the regulation of fox and crows voluntarily, thereby limiting predation.

From the beginning, the plan of the fox barrier was met with a lot of opposition, not only from a group of local villagers (Malmborg 2015, Stolt 2015) but possibly from some summer house owners, too (Nielsen 2015), which is indicated by the red arrows from "bridge" to "free access…" in Figure 9. The reason for their opposition was a concern that the mechanism of the gate should fail. For example, they feared that the gate would not open at all times at the risk of trapping an ambulance on the island in case of an emergency, or that it might suddenly close on a vulnerable road user passing it, and squeeze him/her.

The villagers were consulted during the decision-making on the functions of the barrier (Hansen 2015a); however, some of the locals felt that they had little say in the matter (Stolt 2015). This is related to the procedure of implementation of the barrier, which is why there is a red arrow between "procedure" and "inclusion" in Figure 9. An actual resistance group caused operational problems and, on top of that, the gate just did not work as it should (Nielsen 2015). At one time, a

man was prevented from passing it for hours because it did not open (Malmborg 2015). Currently, it has cost 850.000 DKK in installation and operation (Nielsen 2015) and it still does not work (Malmborg 2015). Even if it worked, the current set-up would not be efficient as people have seen foxes crossing the bridge during the day (Malmborg 2015, Sørensen 2015).

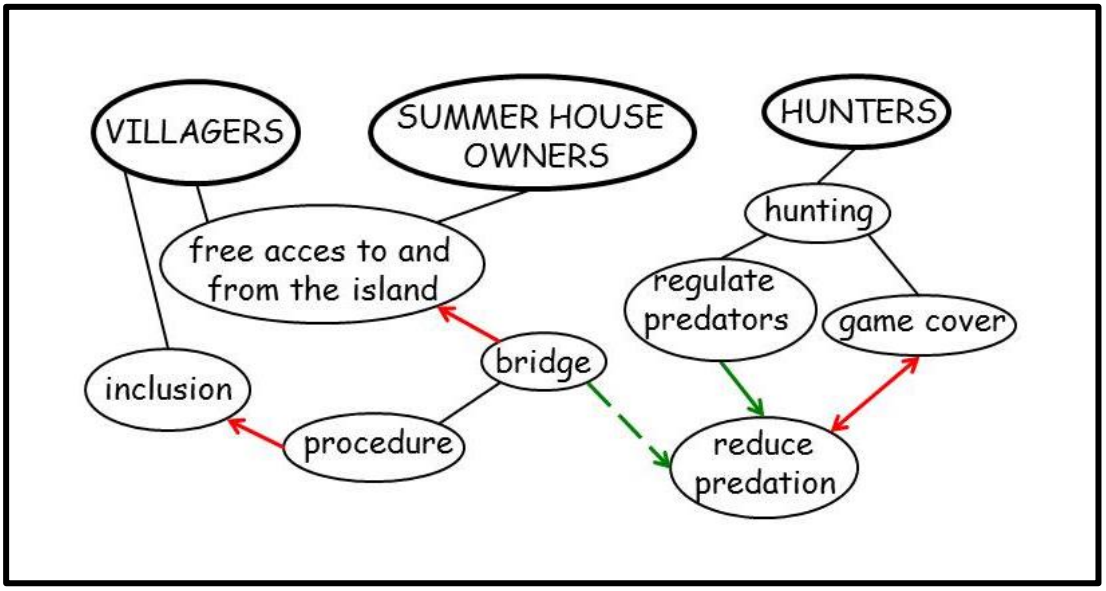


**Figure 9: Situation map of the issue of reducing predators. Stakeholders and elements for designation basis are written in capital letters. Green line = positive connection; Red line = conflicting interests/ elements; Dashed line = potential conflicting or benefitting connections; Black line = connection between stakeholder and their interests or between other intertwined factors.**

Suggestions for Improvements

"Guard on the Spot": To get the barrier up and working, I suggest the establishment of a "guard on the spot" arrangement (which ran in the early implementation phase of the barrier (Malmborg 2015)) where the villagers take turns at keeping log of the operational difficulties, and of contacting the municipality in case of acute malfunction.

Electrical fences: Fencing of the best breeding areas could be another measure to reduce predation from ground predators. The fences should consist of poles with electrical wires powered by rechargeable batteries, as described in the study by Olsen (2003).

Removal of Shrubs: To prevent predation by avian predators, I recommend limitation of the existence of shrubs for game cover to the coastline west of the city since this area is more than 1 km from both the Northern and Southern Meadows, which is what Asbirk and Pitter (2005) recommend.

Lastly, regulation of foxes and crows by the hunters should be continued as part of the everyday management of the meadows.

### *Hydrology*

**INFO BOX, Hydrology**

The meadow birds depend on the groundwater level being 10 to 30 cm below ground from May through the first half of June, and on heterogeneity including wet ponds and dry salt pannes (see Table 2 in "Background", "Meadow Birds") to insure enough food and food variability (Thorup 2003, Ring 2015). Furthermore, the ecology of the salt meadows, i.e. the type of vegetation, the salinity in the soil, and the processes in the soil, is dependent on regular flooding by ocean water and dynamic movement of salt water in the tidal channels (Vestergaard 2000).

**The Problematics**

| Problematics | Stakeholders Involved | Interests Affected Negatively |
|---|---|---|
| Balancing Hydrology, Weather Variations | Summer House Owners | Dry Basements |

Because of the many drainage channels, it is very difficult to retain the water in the meadows, and in years with dry springs and summers, the salt marshes dry out too soon (Ring 2015), which is why there are red arrows from "drain channels" and "dry springs and summers" to "hydrology" in Figure 10. Additionally, in such years the cattle start to "compete" with the birds for water; if there is not enough water in the habitat, it will lead to a shortage of food for the birds. Furthermore, the salt concentration recommended in drinking water for cattle is no more than 4‰ (Thamsborg 1993), but in dry springs and summers there is a risk that the salt concentration on Vestamager exceeds this threshold. This can lead to stomach infections and diarrhoea (Hansen, Thamsborg 1993). The birds, too, are vulnerable to high salt concentrations, and this relationship is depicted by the top "triangle" in Figure 10 (Thorup 2003).

An artificial outlet from the meadows worked poorly, either releasing too little water or, in most cases, too much. Therefore, one sub-project of Life-REMAB was the establishment of a floodgate in the outlet to ease the adjustment of the hydrology in the area.

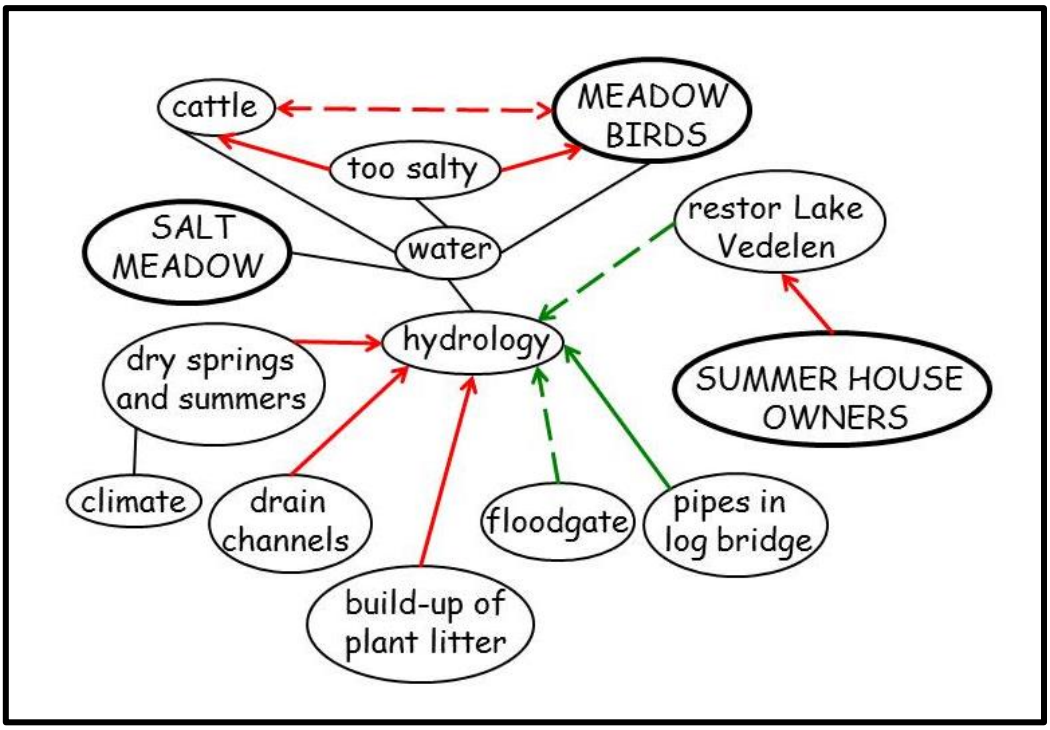


**Figure 10: Situation map of the hydrology problematics. Build-up of plant litter has resulted in a raised ground level, and is therefore a contributing factor to the dryness of the meadows.**

A third subproject was to flood Vedelen, an area which was formerly a lake. However, the summerhouse owners objected to the plan for fear that their basements would be flooded, so instead the area was made only slightly soggy (Nielsen 2015).

**INFO BOX, Lake Vedelen**
Lake Vedelen was an important breeding location for meadow birds until the beginning of the 1970s when it was drained (LIFE-Nature 2006).

An on-going project in the GNS is to improve the watering of the cattle (Nielsen 2015), so this problem will be taken care of.

Suggestions for Improvements

Ditches and pipes: Even though the pipes have improved the natural flow of the water to some extent (Nielsen 2015), the improvement of the hydrology has not worked optimally (Andreasen 2011, Ring 2015). Therefore, it should be investigated whether there still are hidden pipes left (Ring 2015). If so, all of these as well as all ditches, even the smallest, should be blocked efficiently (Andreasen 2011). Furthermore, it should be controlled whether the pipes which have already been blocked, have been blocked correctly (Ring 2015).

### *Disturbance*

In 2008, NST bought the disused farm Hyldevang and, in collaboration with villagers, turned it into a nature centre for communication and outdoor activities (Nyord 2013, Nielsen 2015).

**INFO BOX, Human Disturbance**
Human disturbance in the form of 7 walks a day on a path in a breeding area can lead to habitat loss for and decreased nest attendance by the black-tailed godwit. The breeding birds do not habituate to humans, and groups of humans and humans with dogs will most likely lead to even more disturbances (Holm, Laursen 2009).
On Vestamager it has been observed that northern lapwings (*Vanellus vanellus*) fly up if people get too near to or walk on paths crossing the areas where the birds breed (Jørgensen 2015).

As mentioned before, fundamentally FVF does not allow hunting on their areas, and the opposing interests of FVF and the Nyord Hunting Association have previously led to "local war" between those two stakeholders; the last time a conflict flared up between them was in 2007 (Danmarks Jægerforbund 2008). Therefore, during Life-REMAB the agreement of exchange of user rights was established between the Hunter's Nature Fund on one side and FVF and NST on the other, enabling hunting on a coherent area on the Northern Meadows, areas which are owned by FVF and NST.

**The conflict**

| Cause of the Conflict | Stakeholders Involved | Interests Affected Negatively |
|---|---|---|
| Tourism & Visitors | Villagers, Hunters, FVF, NST, Private Landowners | Inclusion, Hunting, Protect Culture, Peace & Quiet, Privacy |

The earliest dunlins arrive in March (BirdLife International 2015) and as hunting is prohibited only from the 15th of March to the 15th of July (Overfredningsnævnet 1975), these early birds can possibly be scared away from the Northern Meadows by hunting activities; therefore, there is dashed, red line between "hunting" and "peace & quiet".

NST wishes to increase tourism on the island through improvement of the conditions for visitors, for example by paving a footpath which is practically not used today. It runs from Hyldevang to the village along the western part of the Southern Meadows, and will ease pedestrians' access to the areas around the village (Figure 12). At the same time, NST hopes it will lessen the burden of increased tourism on the city. However, improvement of the path will most likely augment human activity near the breeding areas of the meadow birds - some people might even stray off the path onto the meadows - and therefore, it poses a threat to the peace and quiet of the birds, as depicted in Figure 11.

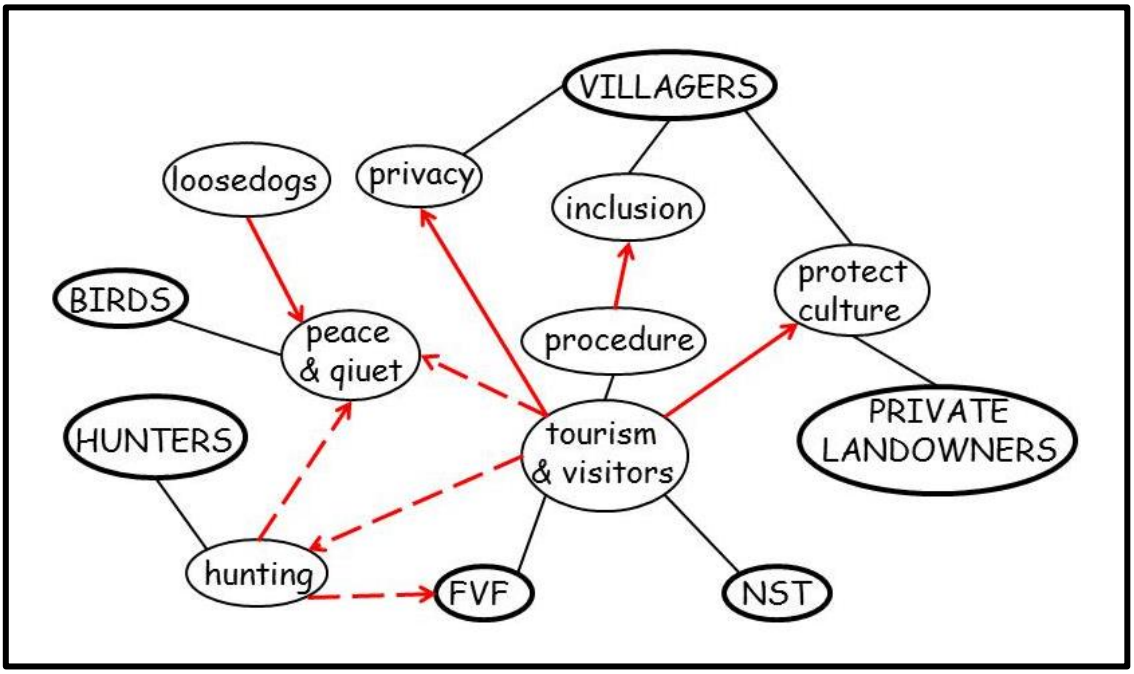


**Figure 11: Situation map of the problematics concerning disturbance. Same symbolism as in Figure 9. Tourism may disturb the breeding birds and the game, which is why there are dashed, red arrows from "tourism & visitors" to "peace & quiet" (for the birds to breed) and "hunting". Hunting may also disturb the birds, thus the dashed, red arrow from "hunting" to "peace & quiet".**

Furthermore, the agency plans to modernise the accommodation and teaching facilities in Hyldevang to attract more visitors such as school classes (Nielsen 2015). However, the villagers and the private landowners are of the opinion that the current level of tourism is high enough (maybe a little too high), and fear that little by little, more visitors to the island will result in loss of the cultural heritage; therefore, there is a red line between "tourism & visitors" and "protect culture" in Figure 11. The villagers also wish to keep some areas to themselves for privacy (Sørensen 2015, Malmborg 2015). Many villagers feel that they are not included in the activities concerning tourism and visitors; they feel that their involvement in Hyldevang Nature Centre consists only of being informed by NST (Stolt 2015). Therefore, a red line connects "inclusion" and "procedure" in Figure 11.

Once in a while, campers in mobile homes who visit the island stay overnight even though this is prohibited, and so they could give rise to disturbance to the birds during the night as well, and risk scaring off the game, which is disadvantageous for the hunters; therefore, "tourism & visitors" might effect "hunting" negatively (Figure 11)

Birds take flight from longer distances from humans with loose dogs than from humans with dogs on leashes or without dogs, and many dog owners do not respect the access regulations in nature (Nyegaard et al. 2014). Also on Nyord, Andersen (2015) has observed both visitors and residents with loose dogs, which may disturb the meadow birds.


**Figure 12: Map of the path, the red line, which NST plans to improve by paving it. From Danmarks Miljøportal (n.d.)**

Suggestions for Improvements

Restriction of access to the footpath: To prevent the enhancement of the footpath from deteriorating the quality of the breeding area, access to the path should be restricted to less than 7 walks per day (Holm, Laursen 2009) or be prohibited during the breeding period. A third solution could be a limited time for access in the daytime.

Signs with rules: The hunters have experienced that visitors are receptive if they are explained the reason behind the rules (Andersen 2015), therefore, signs with regulations for dogs, which also explain why loose dogs are prohibited, should be put up at strategic places near the meadows to lessen disturbance from dogs.

Hunting season: To eliminate the risk that hunting in the end of the season scares off the earliest meadow birds, which arrive in March, the restriction of hunting could be extended so that hunting is prohibited from the 29$^{th}$ of February to the 15$^{th}$ of July.

### *Nature and Cattle Management*

**INFO BOX, Meadow Bird Habitat Requirements**

The birds need a heterogeneous habitat with possibilities for coverage and blue band, salt pannes and tidal channels which dry out gradually from May to the end of July (see Table 2 in "Background", "Meadow Birds"), to ensure a varied food supply (Thorup 2003). Additionally, to meet the requirements of Agri-Environmental Schemes (AES), by which the areas are covered, the salt meadows have to appear grazed as a hole the 31st of August (Ministeriet for Fødevarer, Landbrug og Fiskeri 2015).

**The Conflict**

| Cause of the Conflict | Stakeholders Involved | Interests Affected Negatively |
|---|---|---|
| Economy (Profit vs. Expenses) | Private Landowners, FVF, NST | Economy, Cattle Management, Nature Management |

Management of the nature to meet the requirements for meadow birds' habitat and the requirements of the AES is difficult because of variations in the weather, which is why there is a dashed, red arrow from "weather variations" to "grazing pressure" in Figure 13. Furthermore, no one is responsible for the cattle management, e.g. adjusting the grazing pressure in correlation to the weather, or tending to calving cows, other than the cattle-owners, who live on the mainland. The everyday attendance relies on volunteers, who lack experience in cattle management (Nielsen 2015).

The grazing pressure has to be balanced in such a way that it is high enough to keep up-growth under control and ensure blue band (see Picture 4 in "Background", "Meadow Birds"), but not too high to meet the need for coverage for the birds to place their nests and to lead their chicks in (Thorup 2003, Schekkerman, Teunissen & Oosterveld 2009). Additionally, the risk of nest destruction increases with increased grazing pressure, which is depicted by the dashed, red line in Figure 13 from "grazing pressure" to "bird nests" (Pakanen, Luukkonen & Koivula 2011).

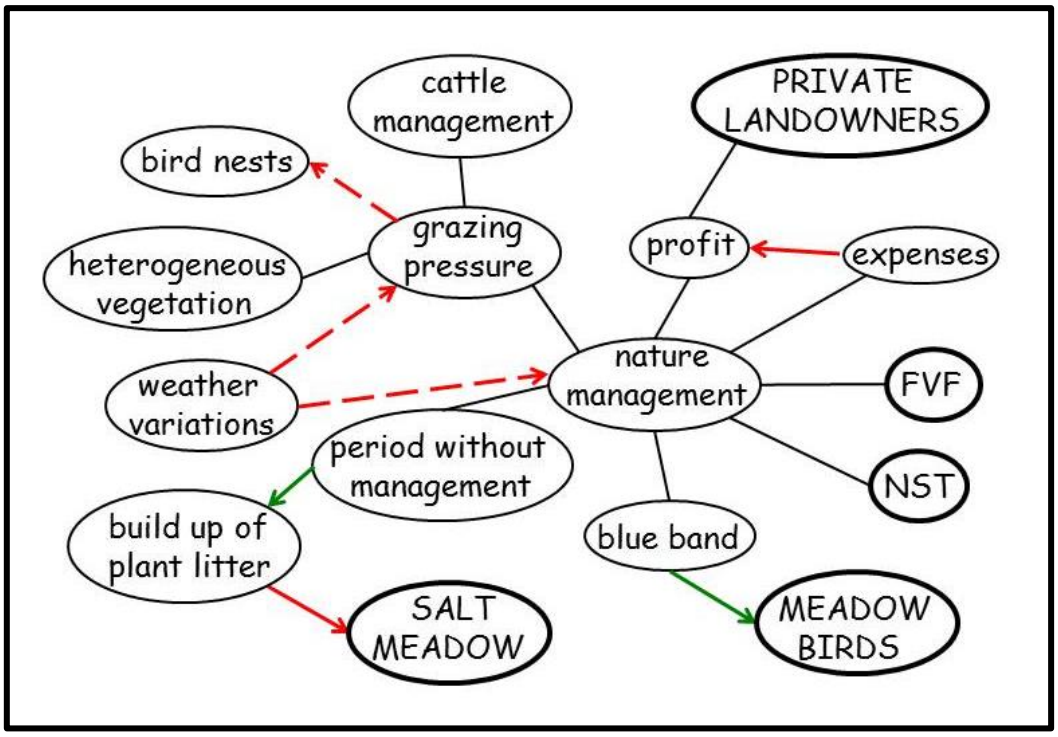


**Figure 13: Situation map of the problematics concerning nature and cattle management.**

As a result of the reduction in hay cutting from the middle of the 1900s and the subsequent period without management (Ebbensgaard, Hoffmann & Rasmussen 2012), there has been a build-up of plant litter, which has resulted in a raised ground table, so the areas have become drier, the invertebrate fauna has changed, and spots of bare mud flats for the birds to forage in have become scarce (Ring 2015). Additionally, the grazing tradition on Nyord has been to leave a brim of reed bed for hunting and reed cutting but this has prevented the existence of blue band (see Picture 4 under "Background", "Meadow Birds") and so, during Life-REMAB the coastal brim was cut, and now grazing takes place all the way down to the shallows (Naturstyrelsen 2015).

To FVF and NST, nature is top priority, so for these stakeholders optimization of management is in focus. Conversely, the private landowners' first priority is to achieve as high a profit on the land as possible and therefore, that their expenses on management are held at a reasonable level (Sørensen 2015). Therefore, as a management tool for solving conflicts between the private and the public landowners, the GNS was formed during the Life-REMAB project.

Suggestions for Improvements

Training programme: To address the complexity of the management of the cattle and the meadows, I advise establishing a training programme for the volunteers.

Nature and cattle management,

- The cattle should be put out on pasture in the inner, middle, and outer fold the 1st of June, the 1st of July, and the 1st of September, respectively. Hay cutting in the outer fold should be carried out around the 15th of July (Andreasen 2008).
- The grazing pressure should be between 0.4 and 1.2 big grazers per hectare depending on the conditions (Buttenschøn 2014).

Build-up of plant litter: Already, hay cutting is carried out, which will reduce further build-up of plant litter and remove excess nutrients (Ebbensgaard, Hoffmann & Rasmussen 2012). Scraping off the top ground layer in the worst areas would further improve the conditions (Nielsen 2015).

### *Pastures for Tender*

**The Conflict**

| Cause of the Conflict | Stakeholders Involved | Interests Affected Negatively |
|---|---|---|
| Pastures for Tender | Private Landowners, FVF, NST | Economy |

Before Life-REMAB was launched, two cattle-owners ("Cattle-owner1" and "…2") used to graze the areas at Nyord. The interests of both parties were economically oriented. Then FVF acquired certain areas which Cattle-owner1 wanted to own; this conflicted with Cattle-owner1's economic interest. In Figure 14, this is depicted by the circle around "FVF" and "land" from which a red arrow points to the economic interest of Cattle-Owner1. Subsequently, Life-REMAB started and the GNS was formed so the pastures were put out to tender, which turned the two cattle-owners into rivals. It led to a grave conflict between them: Cattle-owner1 first tried to persuade Cattle-owner2 into not making a bid for the pastures, then, when the latter refused, Cattle-owner1 began to threaten him. As this did not work either, Cattle-owner1 went even further, trying to sabotage the GNS, which conflicted with his economic interests, too (Nygaard 2015).

Suggestions for Improvements

Facilitator: The details which I have been able to obtain about the conflict, have been scarce, but I would have recommended involving an impartial facilitator to mediate between the stakeholders. Quite often, an impartial party can contribute an overview which might stop a conflict from escalating (Daniels, Walker 2001).

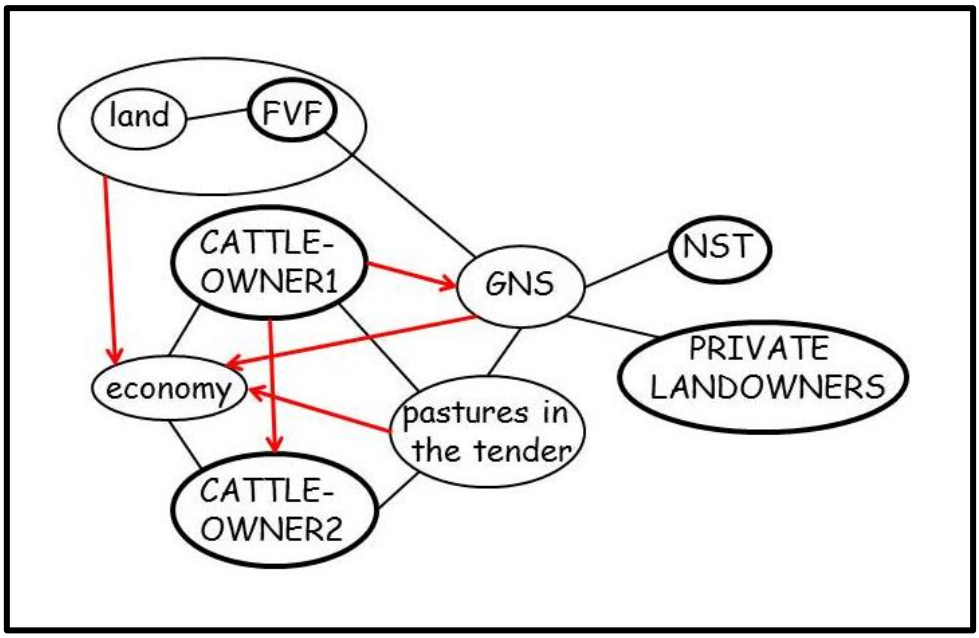


**Figure 14: Situation map of the conflict involving Cattle-owner1. The situation is viewed from Cattle-owner1's perspective. Same symbolism as in Figure 9.**

### *Potential Future Conflicts*

**Conflict A**

| Cause of the Conflict | Stakeholders Involved | Negative Effect |
|---|---|---|
| Revival of the Image of Nyord | Villagers | Loss of Habitat |

To ensure suitable conditions for the meadow bird populations and for the salt marshes in the future, continuation and optimizing of current management is needed.

Unfortunately, the residents on Nyord are mostly elderly people, so the population is not able to "renew" itself, and therefore the village needs for families with children to settle on the island (Malmborg 2015, Sørensen 2015). However, currently there are not many jobs at Nyord, so attractive jobs have to be invented. An idea, which some residents have come up with, is to produce "Nyord"-branded products; food, art etc. (Malmborg 2015, Nielsen 2015). This may lead to suspension of the protection of 1975 against the planting of apple trees and similar (Nielsen 2015) and thus, little by little the area of salt marsh may be converted into cultivation area through the so-called "salami-method", this is the conflict depicted in Figure 15.

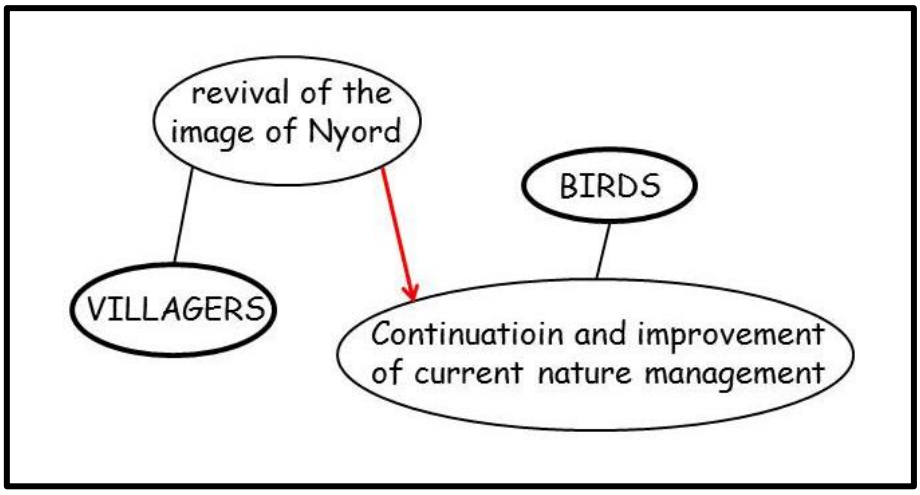


**Figure 15: Situation map of one potential future conflict, Conflict A.**

Suggestions for Handling of the Conflict

Nature in focus: Continuation of application for and implementation of projects with nature in focus may be one solution to prevent the salt meadows from being seized for agricultural purposes, or other projects (Jørgensen 2015). This way, the public's attention is drawn to the area, and it would make the issuance of dispensations from the protection act harder to realise.

Collaborative Learning and inclusiveness: NST, FVF, and the villagers should cooperate on projects which focus on revival of the image of Nyord in order to integrate the nature aspects in the projects, and inform the villagers of the importance of the protection of the salt meadows.

**Conflict B**

| Cause of the Conflict | Stakeholders Involved | Negative Effect |
|---|---|---|
| Pastures for Tender | Private Landowners, Nyord Ø-Kød | Economy |

Another potential conflict (Figure 16) is based on the vision of Nyord Ø-Kød as it strives to be sole owner of the cattle which graze the meadows on Nyord. However, the private landowners underline that the company has to bid for the pastures on an equal footing with the other animal owners (Sørensen 2015). This may result in clashes between the economic interests of Nyord Ø-Kød and the private landowners.

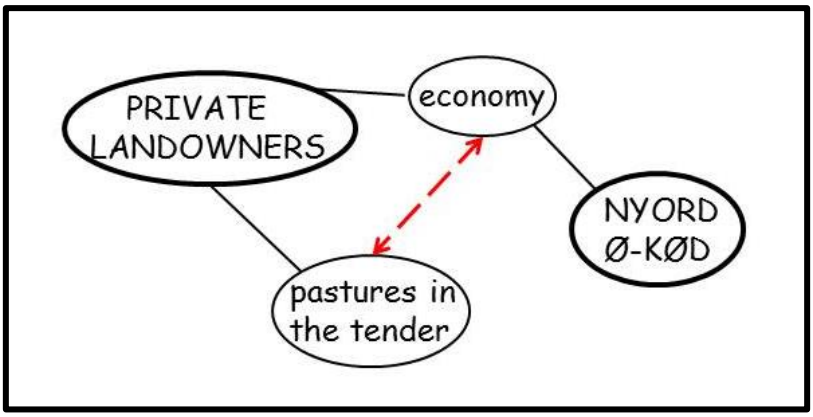


**Figure 16: Situation map of another potential future conflict, Conflict B.**

Suggestions for Handling of the Conflict

Address the conflict: If the conflict arises, it should be addressed without delay, and if it becomes deadlocked, an impartial facilitator should be brought in to prevent another conflict like the "Pastures for Tender" (as was done when the GNS was formed).

## Vestamager

### Stakeholders

Since 1983, NST has been the sole owner of Vestamager (Overfredningsnævnet 1990), so this agency is the decision-maker in all matters concerning the area. Nevertheless, in many projects it consults specialists, for example DOF and Copenhagen Airport, and as it is an authority, it is a secondary key stakeholder. As described in the case of Nyord, the purpose of the agency is to enforce the Nature Protection Act, which concerns nature conservation and public access to nature. Consequently, the interest of the agency is evenly distributed between protection of birds and their habitats, nature management, fulfilment of the Natura 2000 obligations, and dissemination of knowledge (Table 7). The pastures on Vestamager are put out to tender, and consequently grazed by different livestock-owners. As the area is so close to city dwellers, it easily attracts the public's attention if problems arise, for example concerning the animal management. However, the running of Vestamager is in the hands of NST so any negative publicity will affect the agency's reputation directly. Therefore, animal management is also a main interest (Table 7). Additional interests are economy, outdoor life & recreation, and preservation of culture. Protection of culture and that of birds and habitats overlap to some extent as nature is part of the Danish cultural heritage, but I have accentuated this interest explicitly for clarity, and because preservation of culture encompasses more topics.

DOF has a great interest in Vestamager as it is a significant habitat for both breeding and migrating birds. Additionally, it is located very close to the municipality, and is therefore ideal for communicating and sharing bird and nature experiences with the public. The organisation's interests are equally distributed between protection of the meadow birds, conservation of habitats, and dissemination of knowledge (Table 7). Since part of DOF's vision is, "*... to influence legislation and management of birds and nature in Denmark and abroad*" (DOF n.d.), the society is also very vigilant that the laws concerning birds and nature be respected; accordingly, its interest in nature management and fulfilment of the Natura 2000 obligations (Table 7). For the same reasons as NST, DOF is also deeply concerned with protection of culture (Table 7). DOF is a secondary stakeholder at Vestamager.

Amager Nature Centre was built between 1991 and 1996 (LIFE-Nature 2006). It is an organ under NST to facilitate dissemination of knowledge to the public and enable access to the nature, and is therefore not an independent stakeholder. However, some interests are weighted differently as the purpose of the centre is narrower than that of NST, which is why I have included the nature centre as a stakeholder. It is a secondary stakeholder, too, and its main interests are dissemination and

outdoor life & recreation. As the birds and the nature are the main focuses of the dissemination, protection of them are also of interest (Table 7).

The objective of the Outdoor Council is to facilitate the public's access to nature but at the same time heighten the awareness that this must be on nature's terms (Pedersen 2015). Outdoor life forms a substantial part of the Danish culture, and therefore, the council's main interests are outdoor life & recreation, dissemination of knowledge, and preservation of culture. Since outdoor life unfolds in nature, naturally the conservation of habitats and birds are also important aspects (Table 7). The council is a secondary stakeholder, and is consulted on projects concerning visitors' access to Vestamager.

Visitors are primary stakeholders as they are directly affected by projects on Vestamager. Roughly speaking, they are only informed even though hearing processes regarding legal matters must be conducted; therefore I have put "consulted" in parenthesis. The visitors' interests are mainly outdoor life & recreation in the form of easy access to nature, to some extent dissemination as this gives a greater comprehension of nature and preservation of culture because outdoor life forms part of the Danish culture (Table 7). Their interest in protection of birds and habitat is ambivalent as on one hand these parameters are prerequisites for the presence of nature, and on the other may obstruct the visitors' access to nature in certain situations (Table 7) (Pedersen 2015).

The group of animal keepers is made up of many different types. Some are private farmers who bid for the pastures. They are paid through funds which NST has obtained from basic, agricultural, and other types of subsidies. Furthermore, there is a sheep grazing guild. The sheep graze near Amager Nature Centre, and thereby simultaneously serve as an attraction for visitors. Moreover, there is a cattle grazing guild. This consists of city dwellers from Copenhagen, who need a lot of help in the everyday management. In return they graze around 25 hectares free of charge. This construction was established as part of a dissemination project to induce a sense of ownership for the city dwellers, and of doing something good and important for nature. Finally, horses also graze on Vestamager, and these are owned by young girls. The animal keepers are primary stakeholders as their personal income can be affected by actions on the areas. Their interests are mainly animal management and economy (Table 7). The improvement of hydrology has affected the cattle owners somewhat negatively, and initiated a conflict, which I will go into in more detail later, and I have therefore put the minus-symbol in parenthesis under the interest "Conserve Habitat" (Table 7). There are also fallow deer (*Dama dama*), which move freely around the area. They were introduced in the 1980s by the former forester because he envisioned turning Vestamager into something like Dyrehaven (Norup 2015).

Copenhagen Airport is a secondary stakeholder as it is a company. It is consulted on matters which might influence the safety of the airport. It is somewhat negatively positioned to the conservation of habitats (Table 7) as during the Life project, this entailed the clearing of a large area of forest on Vestamager, which might attract large numbers of geese. Furthermore, it is also potentially negative towards outdoor life & recreation (Table 7) if this takes place in areas where it can frighten up large flocks of geese as it may increase the risk of birds strikes. These two issues will be described more thoroughly under "Conflicts".

The legal planning for Vestamager is undertaken by two municipalities jointly, namely Copenhagen and Taarnby. They are secondary key stakeholders as, among other things, they have the authority to grant dispensation from protection acts. I have not been able to get hold of anyone in charge of the nature aspect in either of the two municipalities, so the information I have on these is second-hand. The weighting of the interests differs in the two municipalities.

Copenhagen Municipality is primarily interested in urban renewal to secure the economy, and nature interest is almost non-existent (Adrados 1993, Norup 2015). Additional interests are fulfilment of Natura 2000 obligations, outdoor life & recreation, preservation of culture, and dissemination of knowledge (Table 7).

In Taarnby Municipality, the nature aspect is of high priority (Norup 2015), so fulfilment of Natura 2000 obligations is weighted as highly as economy (Table 7). Additionally, protection of birds and habitats is as important as urban renewal, outdoor life & recreation, dissemination, and preservation of culture (Table 7).

The Danish Society for Nature Conservation (DN) is the only private NGO in Denmark to have the power to bring forward protection cases, so in that respect it is a unique organ within the Danish nature legislation. The society is interested in Vestamager because of the extraordinary nature area it is, and was involved in Life-REMAB as a consultant. It believes that in general, the overall project has benefitted the area (Løbner 2015). However, I was not able to obtain a formal statement from DN as to its specific opinions on the various subprojects under Life-REMAB. Therefore, the division of interests is based on the general objective of DN: "*We are fighting for a sustainable and green Denmark with a rich nature and a clean and healthy environment for the benefit of us all – also in the future*" (DN n.d.). Consequently, conservation of birds and habitats, fulfilment of Natura 2000 obligations, communication nature aspects to the public, outdoor life & recreation, and preservation of culture are of equal concern (Table 7).

I also contacted the Danish Botanical Society, but they had not been involved in the Life project (Dansk Botanisk Forening 2015).

**Table 7: Overview of which interests are important to which stakeholders: * = some importance; ** = important; *** = very important; ÷ = the stakeholder oppose to this interest. Not all interests are included. Power categories: Decision Maker = has the power to actively influence the decision making; Consulted = provides knowledge and advice to the decision maker, has the power to influence the decision maker; Informed = has no power in the decision process.**

| VESTAMAGER | | | INTERESTS | | | | |
|---|---|---|---|---|---|---|---|
| | **Stakeholder Type** | **Power** | **Protect Birds** | **Conserve Habitat** | **Nature Management** | **Animal Management** | **Fulfil Natura2000 Obligations** |
| **NST** | Secondary + Key | Decision Maker | *** | *** | *** | *** | *** |
| **DOF** | Secondary | Consulted | *** | *** | ** | | ** |
| **Amager Nature Centre** | Primary | Consulted | ** | ** | ** | | |
| **Outdoor Council** | Secondary | Consulted | ** | ** | | | |
| **Visitors** | Primary | Informed / (Consulted) | **(÷) | **(÷) | | | |
| **Animal Keeper** | Primary | Informed | | (÷) | | *** | |
| **Copenhagen Airport** | Secondary | Consulted | | (÷) | | | |
| **Copenhagen Municipality** | Secondary + Key | Decision Maker | | | | | ** |
| **Taarnby Municipality** | Secondary + Key | Decision Maker | ** | ** | | | *** |
| **DN** | Secondary | Consulted | *** | *** | | | *** |

| | | | INTERESTS | | | | |
|---|---|---|---|---|---|---|---|
| | **Stakeholder Type** | **Power** | **Economy** | **Urban Renewal** | **Outdoor Life & Recreation** | **Preserve Culture** | **Communication /Dissemination of Knowledge** |
| **NST** | Secondary + Key | Decision Maker | ** | | ** | ** | *** |
| **DOF** | Secondary | Consulted | | ÷ | | | *** |
| **Amager Nature Centre** | Primary | Consulted | | | *** | *** | *** |
| **Outdoor Council** | Secondary | Consulted | | | *** | *** | *** |
| **Visitors** | Primary | Informed / (Consulted) | | | *** | ** | ** |
| **Animal Keeper** | Primary | Informed | *** | | | | |
| **Copenhagen Airport** | Secondary | Consulted | | | (÷) | | |
| **Copenhagen Municipality** | Secondary + Key | Decision Maker | *** | *** | ** | ** | ** |
| **Taarnby Municipality** | Secondary + Key | Decision Maker | *** | ** | ** | ** | ** |
| **DN** | Secondary | Consulted | | ÷ | *** | *** | *** |

## Conflicts

### *Hydrology*

As on Nyord, the dry springs and summers constitute a challenge on Vestamager. An extensive drainage system containing two pump stations keeps the water table at 2.4 meters below the ocean surface (LIFE-Nature 2006). Furthermore, two large drain channels run through the area from Ørestad to lead water from this district into the ocean.

**The Conflict**

| Cause of the Conflict | Stakeholders Involved | Interests Affected Negatively |
|---|---|---|
| Restoration of Hydrology | Visitors, Amager Nature Centre | Recreation, Dissemination Activities |

One of the channels draining Ørestad must be open at all times in order to prevent the district from being flooded in case of heavy rain, which is illustrated by the red, dashed arrow running from "water" to "Ørestad" in Figure 17.

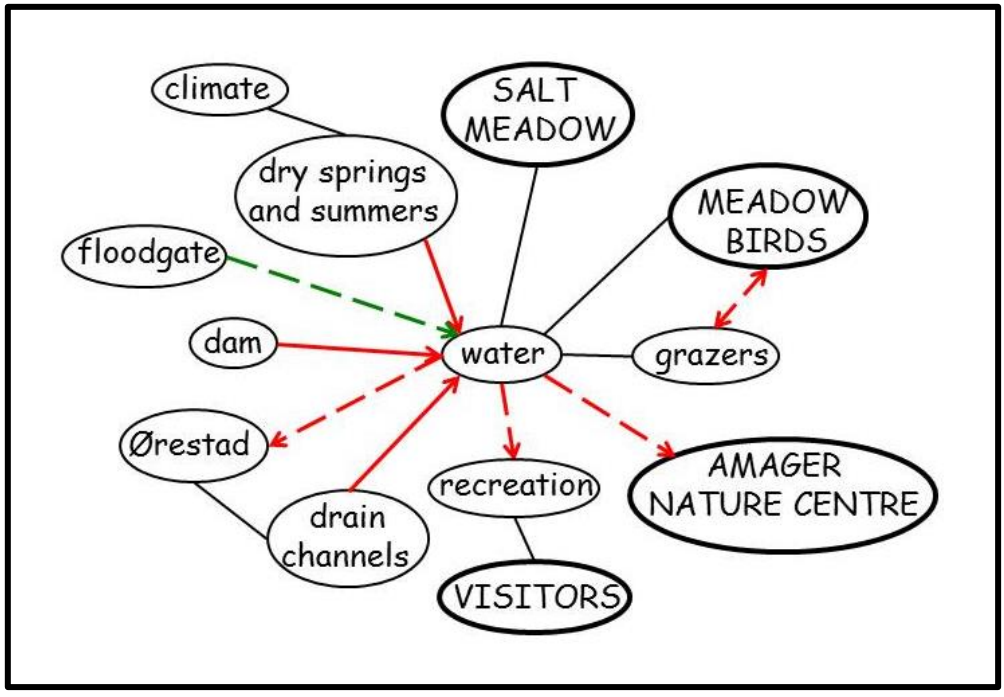


**Figure 17: Situation map of the issue concerning hydrology. The dam, the drain channels, and the dry springs and summers are all factors resulting in the area being too dry.**

During the Life-REMAB project, 20 floodgates were constructed to longer retain the water in the area. Nevertheless, because of the dam the area only receives water from precipitation, and as the sluices can only retain part of the water, in years with dry springs and summers this is not sufficient (Aagaard 2015, Jørgensen 2015). Such years, birds and grazers compete for the water in the area, which is depicted with a dashed red arrow in Figure 17 (Aagaard 2015). Additionally, the floodgates do not work optimally, which makes it difficult to regulate the water table in the

area, thereby causing it to be either too wet or too dry (Jørgensen 2015); therefore the green line in Figure 17 between "flood gate" and "water" is only dashed.

As in general the area is wetter than before Life-REMAB, some recreational facilities have become harder to use, for example small, intimate paths in the wood called "Pinseskoven" and, at times, facilities around Amager Nature Centre, too (Picture 7).

**Picture 7: The areas around Amager Nature Centre are often very wet, and facilities like the table and benches in the distance are not usable when the conditions are like this. By Rebecca Roca-Eriksen, 2015.**

New Projects

Improvement of the hydrology:

1. Redirecting groundwater: Groundwater from under the Øresund motorway is pumped into a small "lake" near Kalvebod Environmental Centre. This water is salty, and is presently led into the sea. However, in a current project the possibilities of leading the water into the salt meadows instead, or use the "lake" as a water reservoir are being looked into (Naturstyrelsen Hovedstaden 2014).
2. Supply line from the Øresund motorway: Cooperation between the Nature Agency and Sund & Bælt to establish a supply line of water from the motorway is reviewed. When it rains heavily, the water falling on the motorway will be led to Vestamager (Naturstyrelsen Hovedstaden 2014).

3. Improvement of the sluices: Is also in progress; it experiments with clogging of some channels and opening of others to direct the water more purposefully around the area in an attempt to retain the water longer (Naturstyrelsen Hovedstaden 2014).

Suggestions for Improvements

Supply line from the Øresund motorway: When the motorway receives a lot of rain water, Vestamager does so, too, but whenever the area is most in need of water, there is no excess from the motorway and therefore, the concept loses some of its advantage to the area. However, the water from the motorway is fresh water, and can therefore be used as drinking water for the cattle. Consequently, the cattle will consume less water directly from the area, and so the area will not dry out quite so fast. An additional improvement could be leading the excess water into the "lake" reservoir described in the "Redirection of groundwater" project.

Accommodate the visitors: To improve the conditions for the visitors' access to the area, pontoon paths or raised paths in the wettest localities could be made.

### *Nature Management*

**INFO BOX, Clearing of Area & Problem Plants**

The Life project included clearing of 220 hectares of shrub and forest, and establishment of nature management through grazing by cattle and horses on 1,200 hectares (LIFE-Nature 2006, Naturstyrelsen 2015) to accommodate the habitat requirements of the meadow birds as described in more detail in Table 2 in "Background", "MeadowBbirds".

On Vestamager there are some problem plants which have to be kept down to prevent the area from growing into scrub, i.e. bush-grass (*Calamagrostis epigejos*), sea-buckthorn (*Hippophaë rhamnoides*) and golden rod (*Solidago sp.*) (LIFE-Nature 2006).

**The Conflict**

| Cause of the Conflict | Stakeholders Involved | Interests Affected Negatively |
|---|---|---|
| Clearing of Shrub and Forest, Animal Grazing | Visitors, Copenhagen Municipality, Former Forester | Outdoor Life & Recreation, Urban Renewal |

As earlier mentioned, the former forester envisioned turning the area into something like Dyrehaven, and therefore introduced fallow deer in 1986, arguing that they could keep the vegetation down and work as an attraction for visitors. Unfortunately, the deer had no impact on the vegetation so the area continued growing into forest. Furthermore, as salt meadow is not a natural habitat for deer, they easily fall prey to many infections, among others the liver fluke

(Norup 2015). In continuation of his vision, the forester also cleared 30 hectares of birch forest and planted oak instead; additionally, he would not allow for the clearing of the entire area as was planned in the Life project (LIFE-Nature 2006, Norup 2015). Therefore, there is a two-direction red arrow between "Dyrehaven" and "clearing of shrub and forest" in Figure 18.

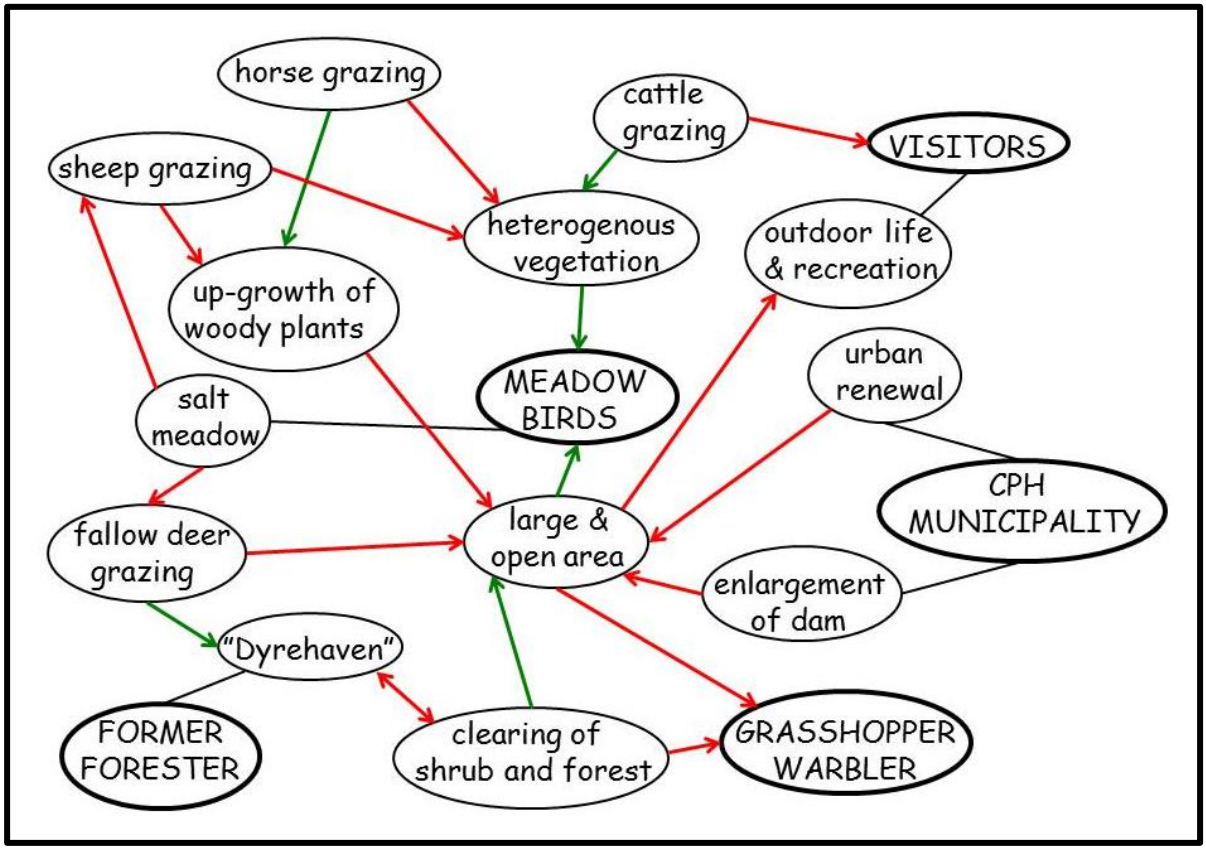


**Figure 18: Situation map of the issue Nature Management. Stakeholders and meadow birds are written in capital letters. Red line = conflicting interests/elements; Green line = positive/benefitting connection; Dashed lines = potential conflicting or benefitting connections; Black line = connection between stakeholders and their interests or between other intertwined factors.**

Horses cannot be used for management, neither in the Klydesø sanctuary nor in other good breeding areas, partly because the owners must be able to access them every day, which would entail too much disturbance, partly because horses move around a lot more than cattle; consequently the risk of nest destruction is higher (Norup 2015). Besides, grazing by horses tends to result in a very short and uniform vegetation height, and horses are not much good at keeping down shrubs and trees (Buttenschøn 2007). Therefore, there is a red arrow from "horse grazing" to "heterogeneous vegetation" and a green arrow from "horse grazing" to "up-growth of woody plants" in Figure 18 (the horses pose no "threat" to shrubs and bushes).

Sheep are better suited for keeping down woody plants than cattle and horses, hence the red arrow from "sheep grazing" to "up-growth of woody plants". Unfortunately, grazing by sheep results in species-poor and grass-dominated vegetation, and most sheep species are not suitable on soft and

humid soil (Buttenschøn 2007); thus the red arrow from "sheep grazing" to "heterogeneous vegetation" and from "salt meadow" to "sheep grazing".

Grazing by cattle, especially suckler cows, leaves diverse vegetation rich in species and herbs, and considerable structural variation (Buttenschøn 2007), and there are hardy races which are well-suited for grazing on meadows. Unfortunately, city dwellers are not used to big animals; they are a little scared of the cows so even though the pens are open to the public, the majority do not enter (Aagaard 2015). Additionally, they are not accustomed to the circumstances which come with livestock. Once a visitor discovered a dead cow before the owner did, and this led to an outcry from the public (Nygaard 2015). Therefore, there is a red arrow between "cattle grazing" and "visitors" in Figure 18.

The long straight paths, reminiscence from the military use, combined with the now very open area because of the clearing of shrub and forest, constitute a landscape barrier. It is difficult for Amager Nature Centre to promote activities on Vestamager in areas far away from the centre when now it is very obvious just how far one has to go to reach the nearest forest (Aagaard 2015). Hence, there is a red arrow running from "large & open area" to "outdoor life & recreation" in Figure 18.

Nature management which benefits salt meadow and meadow birds can be harmful to other species. Vestamager used to hold the largest population of breeding grasshopper warbler (*Locustella naevia*) in Denmark. This species breeds in shrubs, and the population on Vestamager has diminished in the last decade or more (DOF 2015) alongside the changing of management and clearing of area during Life-REMAB. Today, only few grasshopper warblers still breed on Vestamager (DOF 2015), which is why there is a red arrow from "clearing of shrub and forest" to "grasshopper warbler" in Figure 18.

As mentioned under the stakeholder description, the interests of Copenhagen Municipality are mainly urban renewal, recreation and the likes – the focus is not nature (Adrados 1993, Norup 2015). During the hearing of the enlargement of the dam, DOF complained that: "*...already several times significant parts of the Natura 2000 area has been involved in Ørestad, motorways, railways, environmental centre and golf course, without the requirement for compensatory creation of nature*" (Transportministeriet 2009). Furthermore, Copenhagen Municipality wrote in a memo: *"... that in the future it should be possible to ensure the dike*

**INFO BOX: Enlargement of Dike**

In 2010 a dispensation from the protection of 1990 was given to enlarge the dike around Vestamager. The reason was to ensure the Natura 2000 area and the urban areas surrounding it from flooding in case of a tidal wave (Naturklagenævnet 2010). Another reason was that Copenhagen Municipality needed to expose of an excess of 700,000 $m^3$ clean soils from excavation (Naturklagenævnet 2010). As a result, 4.5 hectares of salt marsh and 9.3 hectares of other protected areas were lost to this project (Naturklagenævnet 2010).

*further*" (Københavns Kommune 2011). Therefore, the risk of the area being turned into urban area by the "salami-method" is ever present (Jørgensen 2015).

New Projects

Keep down woody plants: An experiment to keep bush-grass down on Vestamager is currently running. The grass is burned in the winter (until 15th of March), and in the spring cows are put out to graze the fresh sprouts, which they gladly do. Once the cows have grazed the sprouts, they are replaced by sheep while the cattle are put out on another area with fresh bush-grass sprouts. Furthermore, to keep sea-buckthorn under control, it is consistently cut down with machines which crush the wood, and the golden rod is kept down by the cattle which have no problem with this task (Norup 2015).

Animal concerns: The issue concerning fallow deer is currently dealt with by shooting down the oldest and the sickest animals. The plan is to reduce the population significantly, and maintain it this way. Horses only graze areas near Amager Nature Centre so that the owners can access them easily. Also, sheep are limited to pens near the centre, except in the experiment mentioned above, and these three types of grazers are mainly on the area to accommodate visitors (Norup 2015).

Compensation area: To compensate for the area lost to the dam, snipe scraping has been conducted in several places in the Klydesø sanctuary (Aagaard 2015, Norup 2015). The top layer of the soil is scraped off, so the ground is left bare. The idea behind this is to facilitate the creation of a larger area of salt meadow (Jørgensen 2015).

Signs with information: In an upcoming project, signs will be placed at the entrances to the pens with directions on how to behave around the cattle, and the phone number of the cattle owner in case of problems like sick or dead animals (Aagaard 2015).

Suggestions for Improvements

To ease the challenge of disseminating knowledge of the area, Amager Nature Centre could arrange "treasure hunts" or quizzes where visitors would have to access the area to gather information about the habitat and its fauna.

### *Disturbance*

**The Conflict**

| Cause of the Conflict | Stakeholders Involved | Interests Affected Negatively |
|---|---|---|
| Clearing of Shrub and Forest, Enhanced Access for the Public | Visitors, Copenhagen Airport | Airport safety |

There are multiple activities going on at Vestamager, for example horseback riding, tours from Amager Nature Centre, bird watching etc. Jørgensen (2015) has observed that, "*... in some locations outside the bird sanctuary, there are many lapwings and there are good meadow bird conditions. The trails in this location go around the area. At another location there are also good meadow bird conditions, but the trails go through the area and the birds fly up when people walk on the paths*". These factors, combined with NST's and the visitors' interest in increased access to the area, inflict disturbance on the birds if they take place too close to the breeding areas (Holm, Laursen 2009), which is depicted by a red arrow from "access & recreation" to "peace & quiet" in Figure 19.

The increased open area on Vestamager combined with enhanced management of the area on Vestamager, Saltholm, and Aflandshage has gradually led to increased populations of geese and other water-birds in these bird sanctuaries near Copenhagen Airport (Hansen 2012). If the birds take many local flights in the area to seek food or roosting places in a sanctuary on the other side of the airport, they may cross the approach and departure corridors of the airplanes, and the risk of bird strikes increases. The risk is further augmented if the birds are disturbed by human activities (Hansen 2012) as this may lead to a seemingly diminished area for food-seeking and roosting in the area where the disturbance takes place. Therefore, there are dashed red arrows from "access & recreation" and "clearing of shrub and forest" to "Copenhagen Airport" (Figure 19).

**INFO BOX, 5 km Paths**

The objective of the Protection Act of 1990 is maintenance and enhancement of the nature at Vestamager as well as maintenance and regulation of the public's access to and recreational use of the area (Overfredningsnævnet 1990). To meet the objective of the protection act, one sub-project in Life REMAB was the establishment of 5 km of walking and cycling paths to create easy accessibility for the public (LIFE-Nature 2006). Another sub-project was the clearing of 220 hectares of shrub and forest to make the area suitable for breeding waders (Naturstyrelsen 2015).

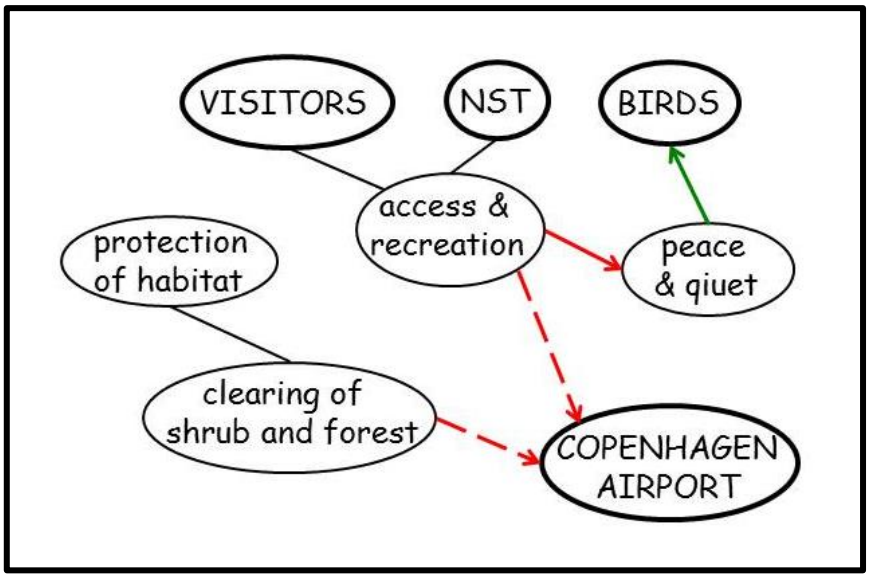


**Figure 19: Situation map of the disturbance conflict. Same symbolism as in Figure 18.**

Precautions Taken during Life-REMAB

Enhanced access: The width of the 5 km long walking and cycling paths which were established during the Life project are 1.5 meters to ensure that only vulnerable road users can access them (LIFE-Nature 2006). Furthermore, for the sake of the need for peace and quiet of the breeding birds, a new bird watching hide was built at the edge of the bird sanctuary with a narrow brim of reed bed between the path to the hide and the sanctuary to conceal bird watchers from the birds (Picture 8).

**Picture 8: View of the Klydesø sanctuary from the path to the bird hide. By Rebecca Roca-Eriksen, 2015.**

### *Salinity*

**The Conflict**

| Cause of the Conflict | Stakeholders Involved | Interests Affected Negatively |
|---|---|---|
| Salt Meadow Turning Fresh | Cattle Owner | Economy |

The Baltic dunlin, the ruff, and the black-tailed godwit are only dependent on wet habitats for breeding; whether the habitat is a salt meadow or fresh meadow is not important (Tucker, Heath 1994, Dybbro 2010). However, the ruff is very sensitive when it comes to the actual content of salt in the water, and it stops breeding in areas where the salinity is 5‰ or more, while dunlins and black-tailed godwits tolerate a salinity of up to 10‰ (Thorup 2003). Additionally, the salinity of drinking water for cattle should not be over 4‰ as a higher content may cause illnesses such as diarrhoea (Hansen, Thamsborg 1993).

On the other hand, if the northern area of the habitat becomes too fresh, there is a risk that the salt meadow might turn into fresh meadow since the main water supply comes from precipitation because of the dam, and this already reduces the impact of the sea water considerably. Furthermore, the enlargement of the dam, which also included a thickening of it, may have led to an even smaller impact of salt water because, as DOF has objected, "…*a thickened dam will prevent penetration of salt water and consequently lead to a more fresh area to the detriment of the habitat costal lagoon*" (Naturklagenævnet 2010). Aagaard (2015) also expresses this concern as he has observed changes in the flora in the northern areas.

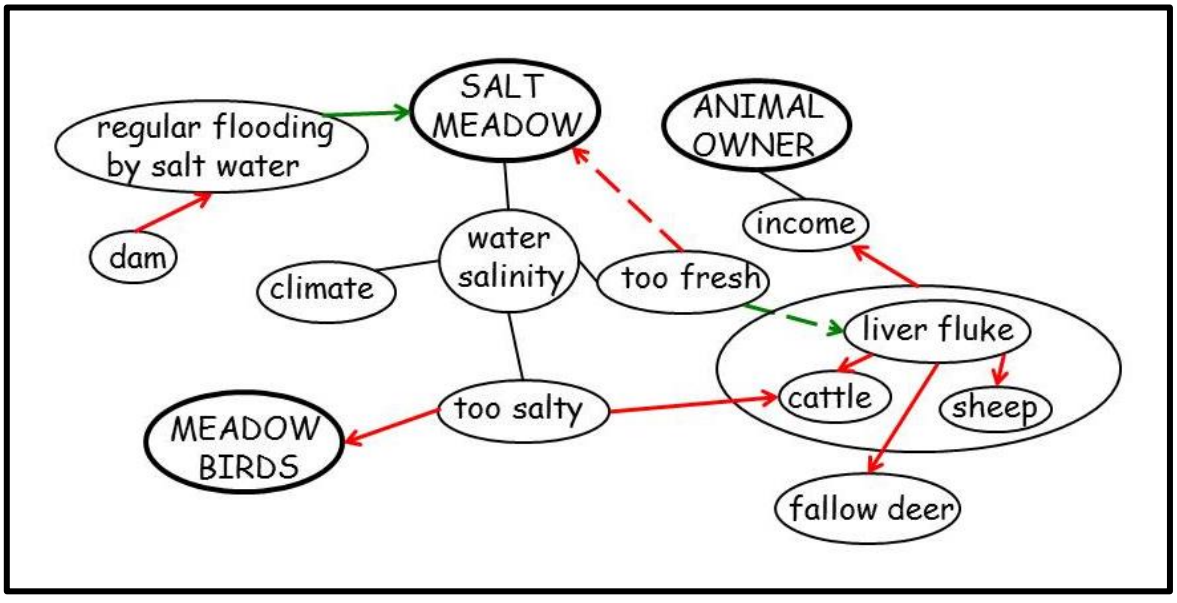


**Figure 20: Situation map of the problematics concerning salinity.**

Additionally, the fallow deer and the cattle may become infected with the liver fluke (*Fasciola hepatica*). A cattle owner, who grazed the areas during Life, recounts that when he got his cattle back in the stables in wintertime, all of them had contracted the fluke (Jacobsen 2015). Therefore, as there is less meat to sell, and the liver has to be discarded, these infections mean lost income for the cattle-owners.

**INFO BOX, Liver fluke**

The host of the liver fluke, the dwarf pond snail (*Galba truncatula*), lives in freshwater, and is not present in areas which are flooded by salt water (Buttenschøn 2007). The fluke causes suffering for the animal infected and they become emaciated. Sheep can also get infected, which may result in their death (Hofstätter 2005, Buttenschøn 2007).

Suggestions for Improvements

Salt water impact: Perforation of the dam to allow the inflow of salt water could be a solution. This, in combination with the on-going project mentioned under "Hydrology" which experiments with directing the water purposefully around the area (Naturstyrelsen Hovedstaden 2014), might facilitate the transport of the salt water to the northern locations. Hopefully, this could also reduce the number of fluke infections in the cattle.

Liver fluke prevention: The following, more extensive measures could be taken;

- Letting new animals gradually acclimatise when introducing them to the pastures in order that they build up immunity; optimally, the animals should be bred in the areas (Buttenschøn 2007).
- Reinforcement of the immune system of the animals by minimising the stress factors. This requires good physical conditions such as shelter and nutritional (Buttenschøn 2007).
- Changing of folds during the season. Another effective initiative which, in combination with communal grazing between or rotational grazing by different animal species, would be even more efficient. However, rotational and communal grazing should not be used in the Klydesø sanctuary because, as mentioned, sheep do not thrive on soft, moist ground, and horses increase the risk of nest destruction (Buttenschøn 2007).

## *Predation*

### The Conflict

The fox has proven to be the worst predator for lapwings on Vestamager but crows, too, can be a local problem (Olsen 2003). During Life-REMAB, thirty artificial fox dens like the ones on Nyord were established to regulate the fox population.

**INFO BOX, Predation**

Chick loss is mainly caused by predation (Schekkerman, Teunissen & Oosterveld 2009).

Asbirk and Pitter (Asbirk, Pitter 2005) advise that shrub be removed in a radius of 1 km from breeding areas as it works as cover for ground predators, and resting place and look-out for airborne predators.

Marsh harriers and Eurasian bitterns (*Botaurus stellaris*) have been breeding irregularly on Vestamager since 2004 (DOF 2015); as they are both listed in the Birds Directive, annex I (EU 2009), NST is obliged to secure their survival and reproduction. They both breed in reed beds (Gejl 2010) and so, an area of reeds was left untouched in the Klydesø sanctuary during the Life project (Norup 2015). Unfortunately, marsh harriers constitute a potential threat to the meadow birds (Thorup 2003), which is why there is a dashed, red arrow from "marsh harrier" to "meadow birds" in Figure 21.

The fallow deer are grazers all year round and consequently, to meet the requirements of the Animal Welfare Act they are supplementarily fed (Fødevareministeriet 2014); however, if there is a lot of easily accessible food lying around, it might attract crows (SNS 2005).

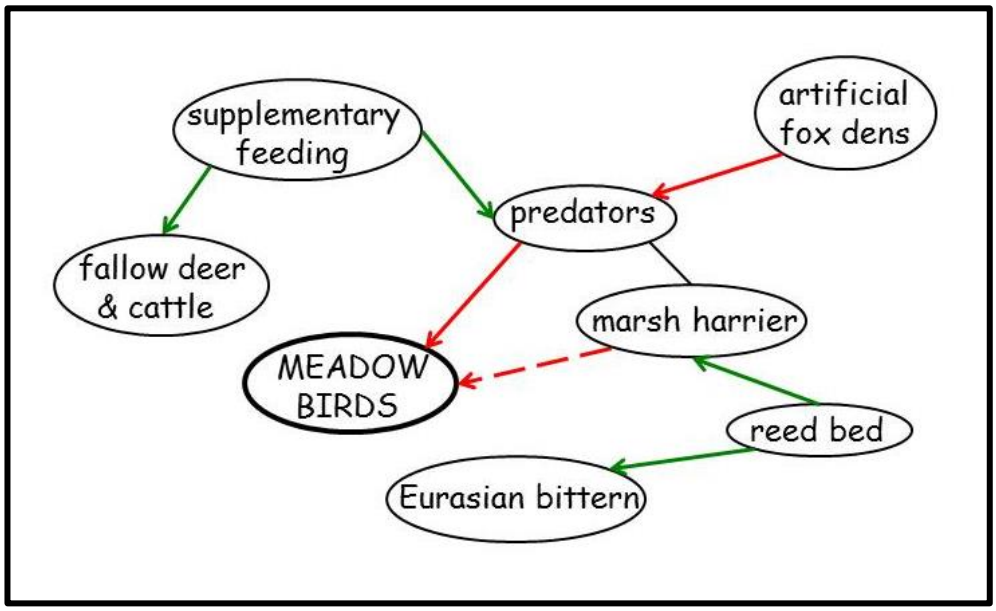


**Figure 21: Situation map of the predation problematic. Supplementary feeding might attract predators, which is why there is a green arrow thence to predators. Marsh harrier is a potential predator on meadow birds, hence the dashed, red arrow from marsh harrier to meadow birds.**

New Projects

Limiting supplementary feeding: As mentioned under the conflict "Nature Management", the population of fallow deer is regulated by shooting many of the animals (Norup 2015), whereby the need for supplementary feeding will decrease, so attraction of crows because of left-overs will most likely not be a big problem in the future.

Small breeding islands: Incorporated in the project of improving the hydrology on Vestamager is a sub-project, the objective of which is to create small breeding islands by lowering the ground around two mounds at the area called "Koklapperne". This will produce a moat round the mounds, which will be filled with water in the springtime, and thereby prevent foxes and other ground predators from preying on the birds which breed on the mounds (Naturstyrelsen Hovedstaden 2014).

Suggestions for Improvements

Fencing: Enhanced protection against predation by foxes can be achieved by fencing with electrical wires in the breeding areas of the meadow birds (Olsen 2003) as described for Nyord.

Removal of reed beds: To prevent the marsh harrier from breeding on Vestamager, removal of the reed beds which were left standing during Life-REMAMB, is advisable.

## Statistical Analysis of Breeding Data

### Nyord

The population of Baltic dunlins at Nyord has been declining significantly throughout the analysed time period (Figure 22); this means that each trend is decreasing significantly more than the previous trend. With the exception of one pair in 2004, from 2003 onwards the species has not bred on the island (Appendix 5).

The ruff population shows an increasing trend until the late 1970s when a decrease sets in. This continues until the beginning of the 2000s when a slight increase occurs; this changing point is significantly positive compared to the trends of the previous years (Figure 23).

The population of black-tailed godwits is on a slight decline until 1990 when it shows a marked drop, which is followed by an increase in the mid-1990s. Then, as of 2000 the population decreases again until 2009 when once more the trend is up (Figure 24). None of these change points are significant.

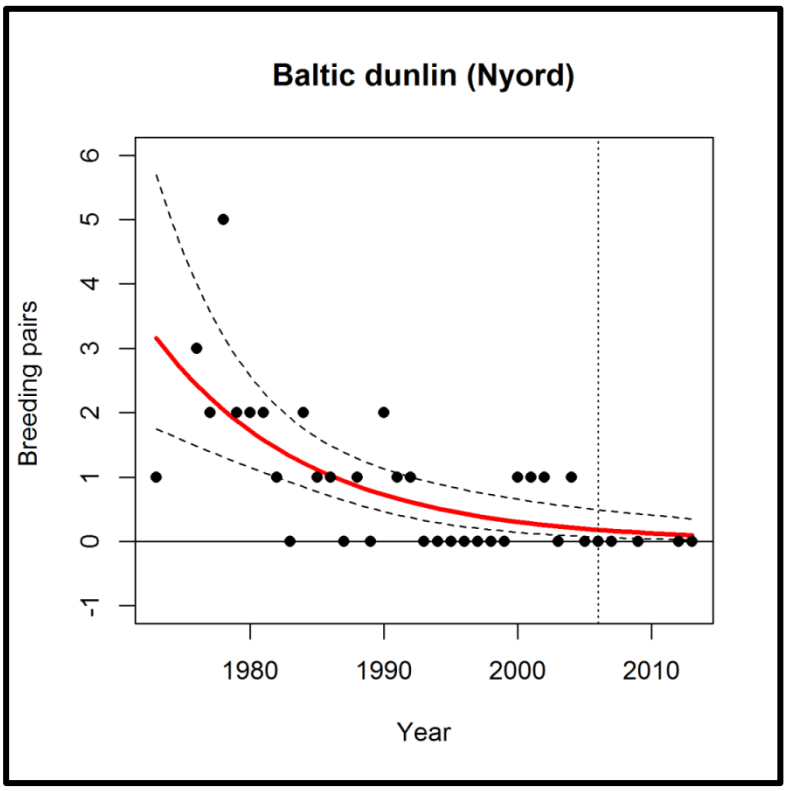


**Figure 22: Population trend for Baltic dunlin on Nyord. The curve is red because this is a significantly negative population trend. Dashed lines indicate the 95 % confidence interval.**

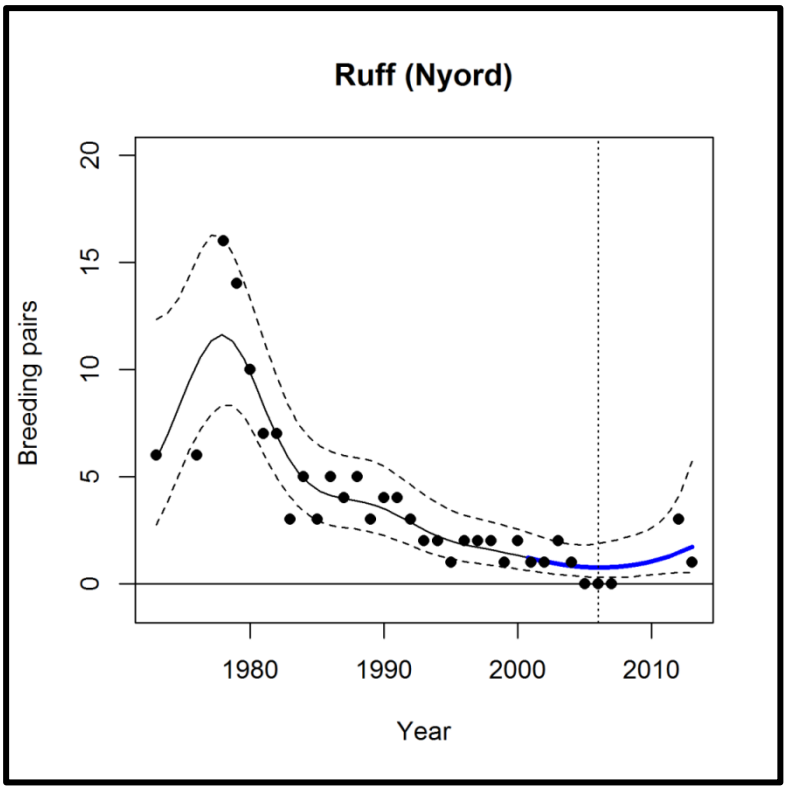


**Figure 23: Population trend for ruff on Nyord. The blue part of the curve illustrates a significant, positive change point when the population starts to increase.**

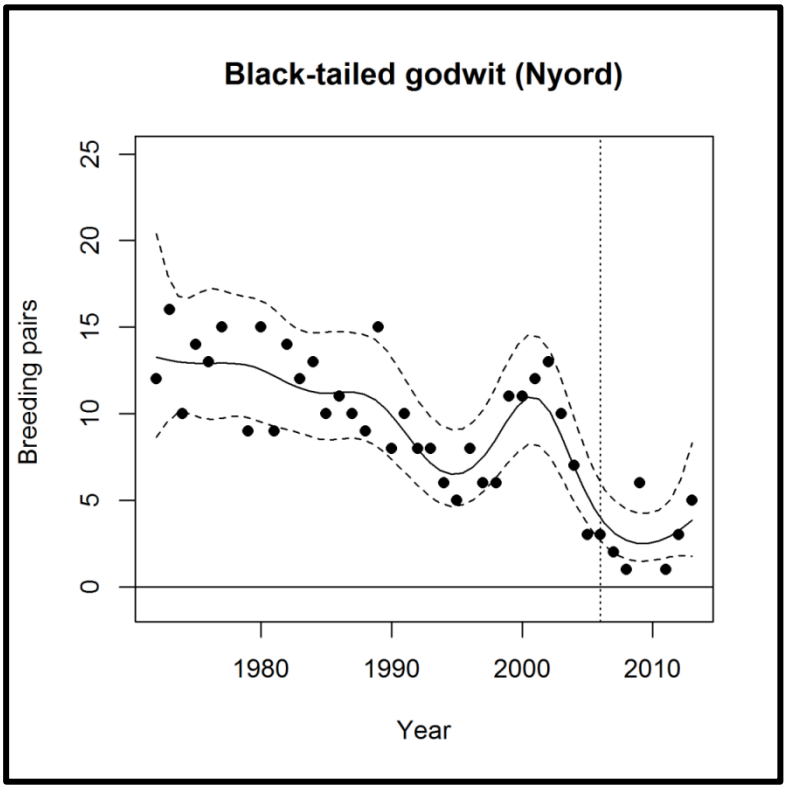


**Figure 24: Population trend for black-tailed godwit on Nyord. None of the change points are significant.**

## Vestamager

The Baltic dunlin population at Vestamager is stable until the mid-1980s when it decreases abruptly (Figure 25). From 2000, there are no breeding pairs in the area until 2007 when one pair is observed, and again in 2013 one pair is breeding in the area, so the curve flattens by the end of the period (Figure 25 and Appendix 5).

The ruff population experiences a slight increase until the middle of the 1970s when this is followed by a decline. Then it increases somewhat during the mid-1980s when another decline sets in. As of 1990, the ruff ceases to breed in the area with the exception of two pairs in 1993, one pair in 1997, and two pairs in 2001 (Figure 26, Appendix 5).

The black-tailed godwit did not breed on Vestamager until 2013 when one pair was observed (Figure 27).

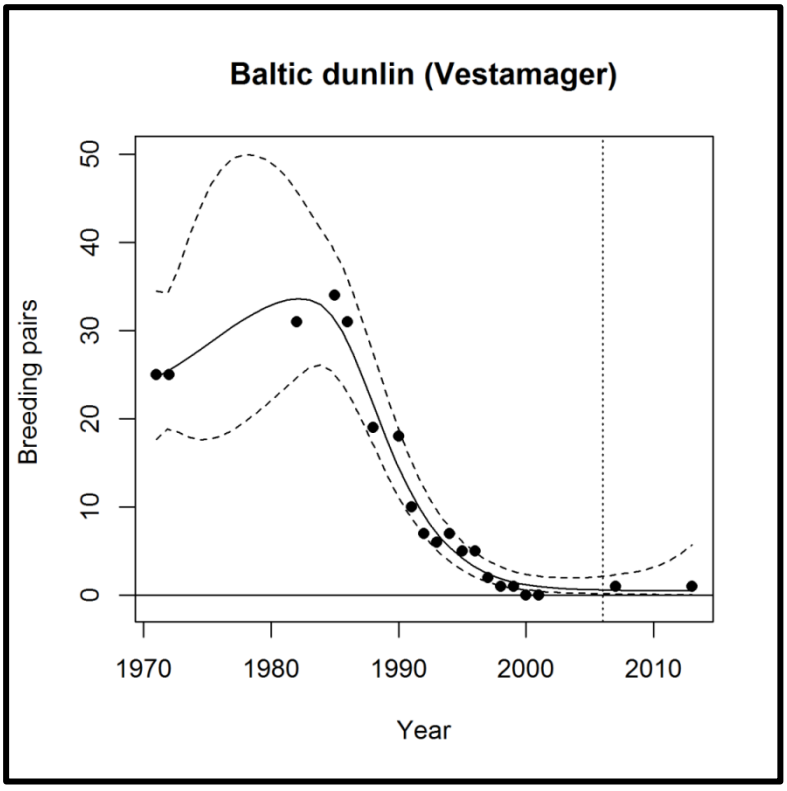


**Figure 25: Population trend for Baltic dunlin at Vestamager. There are no significant change points in the population trend.**

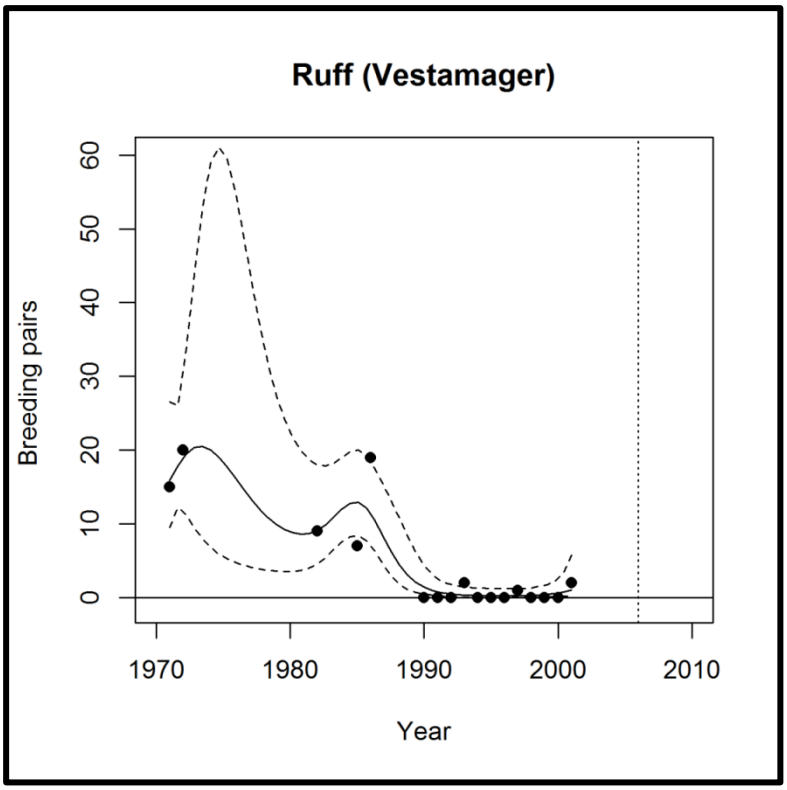


**Figure 26: Population trend for ruff at Vestamager. There are no significant population trends.**

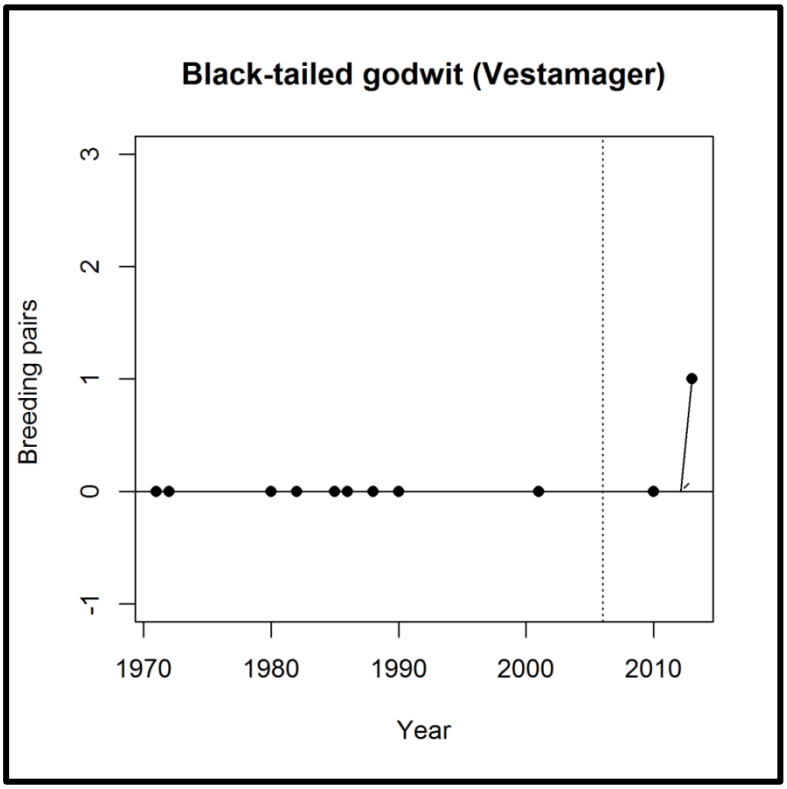


**Figure 27: Population trend for black-tailed godwit at Vestamager. The species did not breed in the area until 2013.**

## National Populations

The national population trends for the Baltic dunlin and the ruff resemble each other, both showing an increase until 1990, followed by relatively steep decline until 2006 when they seem to level off, the ruff population even showing a slight increase (Figure 28 and Figure 29).

The national population of black-tailed godwits increases until 1980 when this is followed by a small decrease until the end of the 1990s. Then, from 2006 it starts to decline slightly again (Figure 30).

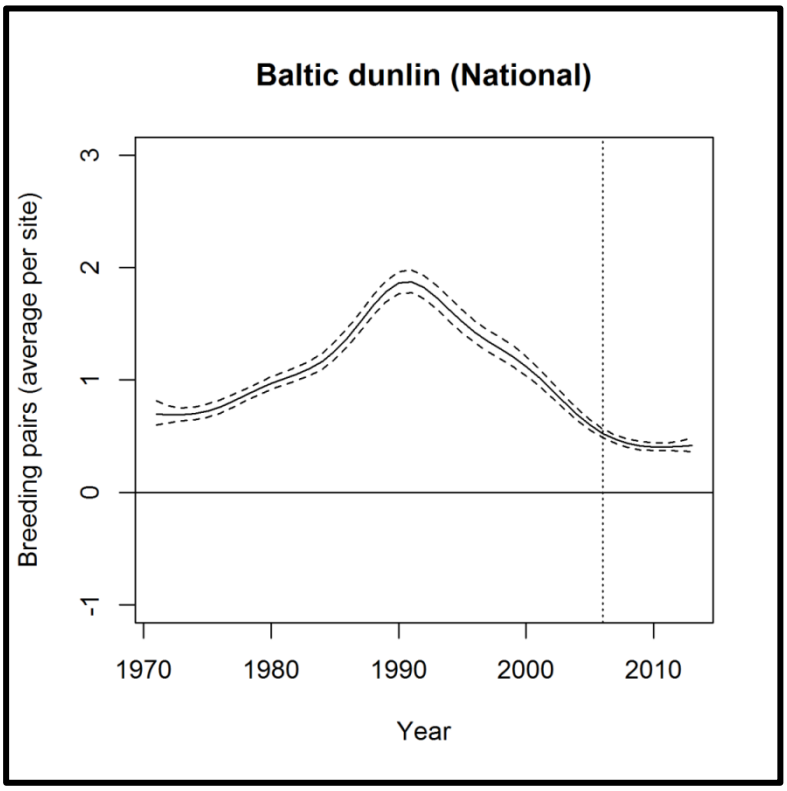


Figure 28: National population trend for Baltic dunlin.

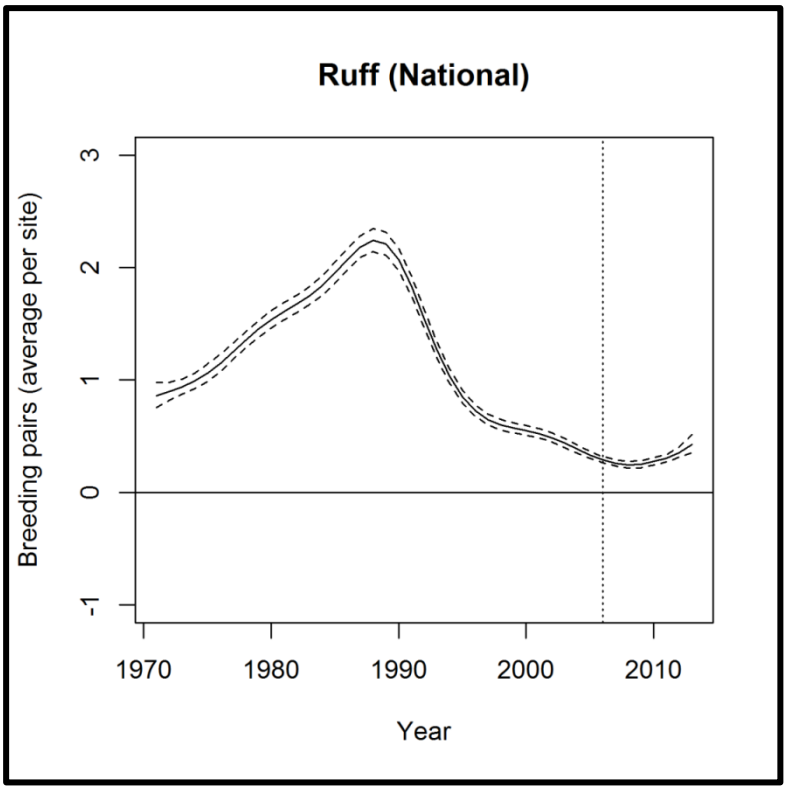


Figure 29: National population trend for ruff.

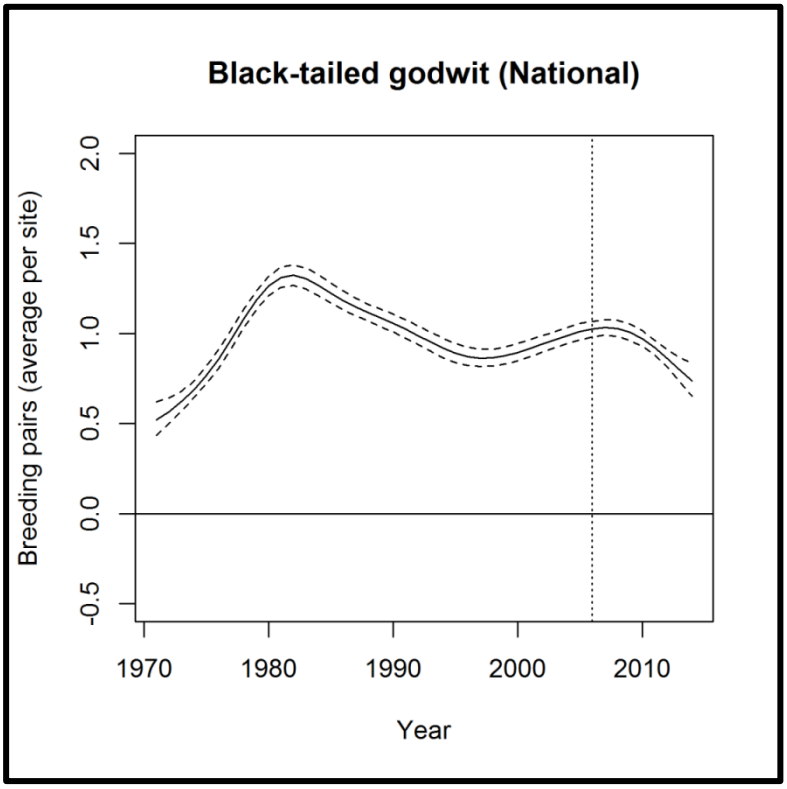


Figure 30: National population trend for black-tailed godwit.

# Discussion

## Method

### Case Studies

This study has been qualitative, based on only two cases, namely the Life-REMAB restoration projects conducted on Nyord and Vestamager. According to Flyvbjerg (2004), case studies are the best way to learn about human behaviour. The objective of my study is to uncover conflicts which most of all arise from human behaviour. Human behaviour derives from each individual's interests, which in turn basically stem from his or her needs (Fisher, Ury & Patton 2012). Conflicts are context-dependent, and the best way to fully learn about the context is through case studies (Flyvbjerg 2004).

As described before, if one wishes to generalise from only a few case studies, these have to be well chosen (Flyvbjerg 2004). The two cases on restoration of salt meadows can be defined as paradigmatic. They were designed to restore and maintain favourable conservation status of meadow birds thereby following the paradigm that restoration of salt meadows will contribute to improving the living conditions of the birds, and fulfilling the country's obligations to the EU. Furthermore, the cases can be characterized as extreme, since the restoration projects, at first sight, seemed to have had no positive effect on the meadow bird populations. Accordingly, these cases were particularly well-chosen.

I deliberately selected those specific cases because of their apparent "lack of success" as I reasoned that this parameter would lead me to the cases which most likely contained conflicts. Referring to my thesis statement, I wanted to investigate whether conflicts affect the level of success of restoration projects, so had I chosen a case at random, I might have risked picking one which would contain only few conflicts, or none at all. Furthermore, cases chosen randomly, or because they are representative, would probably not have been the best design for this study since they rarely contain a very big body of information. Therefore, they cannot contribute to: "… *clarifying the deeper causes behind a given problem and its consequences*" (Flyvbjerg 2004), which was my objective as I needed to understand the conflicts thoroughly to be able to make proposals for improvements and alternative solutions.

### Qualitative Interviews

I decided to interview the persons directly involved in or affected by the restorations projects since only they can explain their experiences from their point of view and in detail, and therefore are the experts in this field (Brinkmann 2014). My approach was phenomenologically positioned interviews as I was interested in the conflicts experienced. What mattered was *what* the

interviewee told me about, and not *how* he or she explained it, which would be the focus in a discourse positioned interview (Brinkmann 2014).

Frequently, emotions and positions are deeply enmeshed in conflicts, thereby contributing to the complexity of a conflict (Fisher, Ury & Patton 2012). The best way to elucidate emotions and positions is through qualitative methods (Brinkmann 2014), so I chose this design in the interviews with the purpose of uncovering underlying emotions and relevant details in the conflicts. Therefore, I did not interview each and every person or institution involved in the projects; instead, I selected the interviewees on the basis of their roles in the interventions, and tried to find at least one representative of each stakeholder group who, in my judgement and based on communication with other stakeholders, best represented that particular stakeholder group. I chose this approach over randomly selected persons because of my qualitative focus: I did not intend to uncover general conflicts in restoration projects, but wished to clarify the specific conflicts in these two cases in as much detail as possible.

I selected semi-structured interviews rather than structured and unstructured ones, as they are exceptionally useful when studying personal experiences in a social context (Brinkmann 2014). The semi-structured method allows the interview to flow more or less like a normal dialogue, except that the interview has a specific purpose where the exchange of experiences is more or less unilateral. Additionally, the semi-structured interview facilitates the questions to be directed towards the purpose of the research project (Brinkmann 2014). Furthermore, I interviewed the stakeholders individually instead of in groups, both because it simplifies the planning, and because conflict-ridden subjects can be taboo (Brinkmann 2014). For example, had I conducted the interviews in groups, I might have risked one or more stakeholders having refrained from recounting certain details for fear of rekindling a conflict. Additionally, based on this problematic, I have decided not to include the records of the interviews in this report.

### *Question Design*

Ideally, I should have interviewed everyone face to face and one at a time, as this is the best way to create interpersonal contact, and to account for contextual sensitivity, such as taboos (Brinkmann 2014). However, it is a very time-consuming form, and several times it was complicated to arrange a meeting; therefore many stakeholders were interviewed over the telephone.

Preferably, every person should have been prepared for the interviews in the same way in order that they were all introduced to the focus of my research a while before answering questions, thereby being able to recollect the events at their leisure. However, as mentioned before, during

the first couple of interviews, I sensed a certain restraint in the interviewees, and suspecting that the word "conflict" in my description of my project might be the cause of this, I refrained from using it from then on. Apparently, my assumption was correct as the rest of the interviewees seemed to recount their memories more freely.

### Conflict Analysis

The conservative policy on conflict solving is a consultation-oriented approach. In consultation it is predominantly the party with most power, i.e. the decisive authority, who pushes through his decision. The parties who have the least power in a conflict, often citizens, are only invited for feedback in terms set by the decisive authority so, in the end, primary stakeholders who do not have much power, have little or no leverage in the process of the actual decision-making. The philosophy is: "*Inform and educate; command and control*". An alternative orientation is the policy of consensus, which can be defined as either approval or absence of active opposition to a solution. Authorities and citizens alike participate in the decision-making, but this approach carries the risk of not all parties being wholeheartedly committed to or supportive of the solution. The philosophy is: "*Full support of the agreement*". However, even if a party expresses serious concerns about the decision but agrees to stand aside, consensus is still considered to have been reached (Daniels, Walker 2001).

In Collaborative Learning, a key concept is conflict *management*, which equates progress with success, in contrast to the former two policies which focus on conflict resolution. In Collaborative Learning progress, not solution is emphasised. There may not be one immediate solution to very complex conflicts, but a conflict may be mitigated. However, if the spotlight is turned blindly on finding *the right* solution, small progresses which could be essential for managing the conflict might be overlooked. Thus, Collaborative Learning is process-oriented, and attaches great importance to inclusiveness of all parties at all stages of the process. The philosophy is: *"Active, learning-based participation*". Learning-based participation originates from the conviction that all parties possess unique and special knowledge which might be useful in achieving progress. Another cornerstone of the approach is systems thinking in the sense that a situation including all parameters - the conflict, the parties involved, the context etc., is viewed as a system. The whole is more, and greater than the sum of its parts. This belief is also essential to the actual management of the conflict because in very complex situations regarding environmental issues, it is unlikely that only one or maybe a few should hold the answer to an acceptable solution for all parties. However, the shared knowledge of all the individuals involved may lead to progress and ultimately, to a sustainable solution. Conclusively, Daniels and Walker (2001) stress that generally, this mutual exchange of knowledge and active learning leads to a greater appreciation

of the situation and of improvements or solutions with secondary benefits such as "*enhanced sense of accomplishment among participants, deeper sense of community, and increased acceptance of the legitimacy of the values of other groups*".

In this study, I have not been able to establish workshops including all stakeholders as I lacked the resources for repetitive meetings up until the time when decision on improvements and changes were made. Neither have the situation maps of the conflicts been prepared in cooperation with the stakeholders, as ideally, they should have been. Still, these principles have inspired me in my choice of methods. Therefore, the presenting of both the knowledge about the conflicts, the maps of the conflicts and suggested improvements, and the alternative solutions are based on statements from and discussions with the stakeholders, and I have endeavoured to be as true to them as possible. The ultimate objective of my thesis is to propose improvements and alternative solutions to the conflicts, mainly on behalf of the requirements of meadow birds. Still, I have included conflicts not directly affecting the viability of the birds, because resources spent on such conflicts means less resources for the objective of the projects.

## Conflicts

### Nyord

#### *Predation*

Andreasen (2012, 2013, 2014) has observed that the number of foxes on Nyord has decreased over the last couple of years, and that the measures taken to reduce foxes may have minimal effect on the water birds on Nyord. Yet, he points out that predation on fluctuating populations could affect the remaining species markedly, and that measures like the fox barrier may be important to quickly attain better breeding results (Andreasen 2009). Additionally, Ring (2015) still considers predation the most significant threat to waders and meadow birds on Nyord, mainly predation by foxes but to some extent also by corvids (*Corvidae*) and, to a lesser degree, kestrels. Besides, Andreasen (2014) has observed flocks of crows and foraging marsh harriers on the meadows during the entire breeding period, and he points out that foxes caused the disappearance of an avocet colony on Nyord (Picture 9) (Andreasen 1996).

**Picture 9: Pied avocet (*R. avosetta*), by Niels Dahlin Lisborg.**

Therefore, an upgrading of predator control should be a top priority (Ring 2015), also as a preventive means, should the number of foxes increase again. First and foremost, this requires making the fox barrier work (Andersen 2015). Moreover, the barrier should be closed by default both day and night (Ring 2015), and not only from sunset to sunrise as first intended, as the foxes cross it during the day, too (Malmborg 2015, Sørensen 2015).

The villagers are the ones directly affected by the barrier and so, they know what properties it should have. Therefore, the ideal scenario would be putting them in charge of the "guard on the spot" arrangement, and of keeping a log. This way it might be possible to get to the bottom of the

problems. However, for such a service to work it is of utmost importance that a body within the municipality knows what the issue is about, and is ready to respond quickly in the event of an urgency, which was not the case the first time this arrangement ran (Malmborg 2015). Otherwise it will be difficult to build up the villagers' trust in the function of the barrier.

Olsen (2003) found that fencing in the areas where lapwings breed, affected predation and hatching rates significantly, resulting in a lower predation rate and a higher hatching success. However, it did not completely eliminate predation by mammalian predators; it seemed that the foxes were able to jump through in cases of fence failures. Furthermore, Olsen (2003) concluded that it would not be a suitable permanent management tool since establishment and maintenance of the fences are very costly and in time, compensation predation by avian predators might occur. Additionally, flooding carries large amounts of eelgrass (*Zostera*) in over the salt meadows on Nyord, and this destroys the fences around the pastures (Nygaard 2015); it will most likely present a problem to the "fox-fences", too. Still, all things considered, I believe that fencing in breeding areas can be a strong tool in helping the meadow birds reach a viable population size which hopefully, over time, will be able to withstand the predation level without the fences. Besides, removal of the shrubs would also contribute to preventing the potential compensation predation by avian predators in the fenced areas. Removal of reed beds is not necessary, though, as for many years now, the marsh harrier has only bred in few numbers on the island (DOF 2015).

Lastly, regulation of foxes and crows by the hunters should be continued as part of the everyday management of the meadows.

### *Hydrology*

A search for hidden drain pipes and optimisation of the work which has already been done on blocking them, involve costs. Therefore, such extensive improvements of the tidal channels could prompt a conflict as the private landowners might object because it would involve a reduced economic surplus for them. Nevertheless, I believe that such conflict can be addressed in the GNS.

The purpose of restoring Lake Vedelen was to create a suitable habitat for the meadow birds to re-colonise (LIFE-Nature 2006). However, I doubt that this will happen in that it has been made only slightly wet. Ideally, it should be examined whether a proper restoration of the lake would lead to flooding of the basements in the summer houses. Still, when resources are scarce, this initiative is not of top priority as it is a small area compared to the meadows at Nyord ( Figure 4 in "Background", "Life-REMAB").

### *Disturbance*

Apparently, frequent nest control like catching of adults on nests and colour-marking of newly hatched chicks, measures which may well be categorised as extreme disturbance, seems to have no influence on the breeding success of the Baltic dunlin (Thorup 1995). Furthermore, Thorup (2003) and Andreasen (1996, 2014) assess that disturbance is not a problem on Nyord. However, the study by Thorup was carried out many years ago, and since then, tourism has increased to a present level of around 180,000 to 200,000 a year (Malmborg 2015, Sørensen 2015). Additionally, Andreasen (2012) mentions that the reason why he did not see many visitors might be that he made his observations either very early in the morning or in the evening. Moreover, even though the tourist season runs approximately from spring to the autumn holidays (Nielsen 2015), Sørensen (2015) recounts that "… *there are more and more people on either side of the two periods*". Lastly, as mentioned before, the black-tailed godwit appears to be highly sensitive to human disturbance (Holm, Laursen 2009) and therefore, disturbance is an important parameter to take into account when assessing improvements of the area.

Restriction of the access to the footpath will conflict with the objective of the enhancement of the path. Increased tourism on the island is a fact and so, guidelines on moving around in the area so as to minimize the disturbance as much as possible to both meadow birds and villagers should be included in the improvement of conditions for tourists and visitors. To ensure a reasonable result, the design of such improvements should be overseen by FVF.

The agreement of exchange of user rights works well; the areas which the Hunter's Nature Fund owns are scattered across the Southern Meadows because of the scattered ownership structure depicted in Figure 7 (in "Background", "Area Description of Nyord and Vedelen") but as a result of the agreement, the hunters can now hunt on a relatively large, coherent area on the Northern Meadows. At the same time, an equivalent area on the Northern Meadows is free from hunting, and from the perspective of the birds, this large, coherent area gives more peace in total (Ring 2015). Nevertheles, some of the people from the time when hunting was free on the island still live in the village, and the old "war" may only fully die out together with those (Hansen 2015b). However, today, few hunt on Nyord (Hansen 2015b), so changing the hunting season will probably not be necessary.

### *Nature and Cattle Management*

The Grazing Guild Nyord Strandenge works very well as a forum for solving conflicts between the landowners' differing interests (Sørensen 2015), and the organisational dealing with acquisition of grazers to the pastures has been systematized. Before the GNS, each stakeholder had to find a cattle-owner on his own but with the guild, a reliable framework for the grazing and

the economy has been established and optimised (Hansen 2015a). Furthermore, Nielsen and Ring (2015, 2015) recount that the grazing of the coastal brim has been fairly positive, and has increased the presence of blue band.

Nevertheless, even in 2012, three years after the termination of Life-REMAB, Andreasen (2012) observed that the management of the areas still did not follow the recommendations made at a meeting in 1997. The cattle were still put out to pasture in the middle of May, but some of the meadow birds brood until the end of June, which is why the recommendations prescribed 1st of June as the earliest date. The management pattern was further characterised by unpredictability with regard to the sequence in which the various areas were grazed, and the size of the folds, which resulted in a vegetation cover with no variation (Andreasen 2008). Furthermore, the unpredictability of the management pattern may be the reason for the diffuse breeding observations which Andreasen (2011) made in 2011; the water birds changed territories, interrupted their breeding course, and had few broods. Therefore, the management of the areas should be tightened up and the recommendations by Andreasen (2008) and Buttenschøn (2014) should be followed.

### *Pastures for Tender*

The former chairman of the grazing guild spent much time and energy on solving this conflict. However, it was a very unpleasant conflict for the parties involved; as it is still smouldering, I was not able to get many details about it, and it is not evident how the conflict was solved. Nevertheless, I recommend that experience gained by this and similar conflicts should be documented for future utilisation.

### *Potential Future Conflicts*

Addressing potential future conflicts is very diffuse because of the many hypothetical elements. However, it is also the instrument for anticipating and preparing for such conflicts with a view to appropriately applying the resources for a given restoration project. Moreover, by using Collaborative Learning tools, e.g. the workshop, where all stakeholders come together to present their perspective on a situation (Daniels, Walker 2001), the diffuse elements may become more concrete and the solutions more comprehensive.

I believe that in general, the villagers should be included more in projects which affect them significantly. For example, they could have one or two representatives in the GNS. More inclusion of the villagers may lead them to get a sense of ownership of the projects and a more profound, overall sense of responsibility, thereby leading to positive responsiveness to rules and changes (Daniels, Walker 2001). When hunters confront people with loose dogs, the villagers tend

to be less receptive than the visitors (Andersen 2015). Therefore, inclusion of the villagers in projects, e.g. projects revolving around tourism and visitors, might make them more receptive to the consequences these factors bring along. Inclusion may be a lengthy and expensive process but experience shows that projects based on inclusiveness of affected stakeholders are longer-lasting than projects made without their involvement (Daniels, Walker 2001).

## Vestamager

### *Hydrology*

Inexpedient hydrology is the biggest threat to the salt meadow on Vestamager (Naturstyrelsen Hovedstaden 2014) and therefore, it is very inspiring that so many projects on improving the hydrology are in process. Unfortunately for the recreational activities in the area, this will make Vestamager even wetter. Consequently, the improvement of recreation facilities should be prioritised, too, even though it will involve expenses for construction of the facilities and future maintenance.

### *Nature Management*

Hay cutting on Vestamager is not realistic because the areas are so vast. It would be too expensive, and even the most diligent of volunteers would eventually bite the dust. Even mechanical mowing is impossible because of the many explosion holes from grenades (Norup 2015). Therefore, the refinement of the grazing by the different animals, which currently takes place on the area through the different experiments, is crucial for the maintenance of the salt meadow.

A representative from DOF told me that snipe scraping does not work (Jørgensen 2015) so to guard against the "salami-methods", which are exerted by Copenhagen Municipality, an efficient means could be a steady continuation of applying for funding projects which are focused on the interests of nature (Jørgensen 2015). This way, the public's attention is drawn to the area, and it would make the issuance of dispensations from the protection act a lot harder to realise.

As to the issue of reduction of grasshopper warblers on Vestamager, prioritisation is sometimes needed in nature management and restoration projects, even at the expense of other valuable species. This must be said to have been the case when shrubs were removed from most of the area on Vestamager to accommodate the meadow birds.

### *Disturbance*

The reduction of the width of the walking and cycling paths keeps the noisy means of transport away, and the brim of reed bed conceals visitors on their way to the bird hide; as the birds habituate to the bird hide, these are sustainable measures considering the welfare of the birds (Jørgensen 2015).

However, apparently the opening of the areas surrounding the bird sanctuary for easier access has increased the level of disturbance of birds (Jørgensen 2015). Moreover, NST envisages making the beach at the other side of the dam more attractive to visitors such as mountain bikers, to draw activities to the south of Vestamager as well (Norup 2015). Most likely, this will lead to higher activity near the bird sanctuary, and since the black-tailed godwit is very sensitive to disturbance (Holm, Laursen 2009), the chance of a breeding population settling in the area is small.

On the other hand, the factors mentioned in the discussion on extreme disturbance on Nyord seem to have no influence on the breeding success of the Baltic dunlin (Thorup 1995). Furthermore, Thorup (2003) assesses that disturbance is not a problem on Vestamager; this study was carried out many years ago, though, and from 1998 to 2003 the number of visitors increased from 1 million to 1.5 million a year (LIFE-Nature 2006). On top of that, and as mentioned before, the area has since become much more easily accessible, and other water bird species react differently to disturbance. An example hereof is that recreational utilisation affects breeding arctic terns (*Sterna paradisaea*) and breeding little terns (*Sternula albifrons*) (Københavns Amt n.d.). Therefore, great caution should be exercised in projects which increase the public's access to the area, and it is advisable to include DOF in the design. Additionally, an investigation should be conducted to determinate which areas outside of the bird sanctuary are suitable for breeding meadow birds, and any paths passing through these areas should be diverted.

In regard to the potential conflicts with Copenhagen Airport, further investigations are needed to establish how increased activity could disturb roosting geese and other roosting waterbirds (Hansen 2012). If such studies indicate that human disturbance will increase the activity of the waterbirds in the local area, observations of their flight routes during the night and observations conducted on the east coast of Amager between the airport and Saltholm may be needed (Olsen 2011). Lastly, this risk must be taken into account when projects for improvement of human recreation are designed.

### *Salinity*

I have not been able to determine whether the habitat shows signs of changing into fresh meadow, but in a basis-analysis performed by the Copenhagen County (Københavns Amt n.d.), they state

that in the long run, this might occur. Nevertheless, Buttenschøn (2015) has observed many strawberry clovers (*Trifolium fragiferum*) in the areas near Amager Nature Centre, which is in the northern part of Vestamager. The strawberry clover is a very characteristic, salt-tolerant meadow plant (Würtz Jensen 1988); consequently, if this area were turning into fresh meadow, the strawberry clover would be outnumbered by other, more competitive species (Vestergaard 2000).

If a habitat is in the process of changing, it could eventually conflict with the designation of the area as to its inclusion in the Natura 2000 area. Therefore, to determine whether this is the case, a thorough vegetation analysis must be carried out. Nevertheless, it may be difficult to detect such changes because of the zonation of the vegetation of salt meadows. Furthermore, in her bachelor project, Kock-Jensen (2006) found that rather than being divided into this zonation, the vegetation on Vestamager is characterised by a mosaic of middle marsh, high marsh, and marsh border, which makes such an analysis even more complicated. She also hypothesises that it will be difficult to restore the vegetation community of low marsh because of the lack of regular flooding (Kock-Jensen 2006).

### *Predation*

The marsh harrier has proven to be a threat to the Baltic dunlin at Tipperne (Nyegaard et al. 2014) and a prioritisation similar to that of the grasshopper warbler may be needed, entailing removal of the reed beds in the Klydesø sanctuary. Notwithstanding, the Eurasian bittern is a merit to Vestamager (SNS 2005). Therefore, such prioritisation should only be made if the marsh harrier increases in numbers and becomes a threat to the meadow birds. Therefore, monitoring the development of the marsh harrier population is advisable.

**Picture 10: Fox (*V. vulpes*), by Vivi Solbjerg.**

Fencing in breeding areas may not be necessary because, according to Aagaard (2015), the regulation of foxes (Picture 10) with the artificial fox dens works well. Nevertheless, Beintema and Muskens (1987) found that a collapse in vole populations led to intensified predation on bird nests by ground predators the following year. Therefore, as long as the breeding numbers of the meadow birds are still very small, I recommend that all tools available be used to support the populations in reaching viable population sizes. However, the economy will always be a limiting factor, which must be taken into account, too.

### Future Conflict Management

In these conflict analyses, I have mainly focused on conflicts affecting the meadow birds, and to a lesser degree on conflicts affecting the salt meadows. In future analyses of conflicts in restoration projects, effects on other organisms such as plant species, mammals, amphibians etc. should be included as well.

## Breeding Data

### Nyord

The Baltic dunlin does not seem to have benefitted from any of the restoration measures on Nyord (Figure 22). This may be due to declines in the overall European population (Wetlands International 2015), which leaves little recruitment potential.

The decrease in the ruff population at Nyord from 1970 to 1980 (Figure 23) may be explained by the 50% reduction in the hay cutting level in 1979 (see Table 4 under "Background", "Area Description of Nyord and Vedelen"). This decrease occurred because the traditional farming ceased and the outer parcels, where the meadow birds breed, were given up first. At the same time the bridge was built (Ebbensgaard, Hoffmann & Rasmussen 2012).

The decrease in the population of black-tailed godwit on Nyord after 1990 (Figure 24) is most likely a response to the overgrowing of the area. The following increase from the middle of the 1990s until the early 2000s may have come about because this was a period with stable management patterns and so, the birds could choose nest places based on their experience of the safest sites. The subsequent decrease occurs concurrently with a period of unpredictable dates for both release of cattle, change of folds, grazing pressure, and hay cutting (Andreasen 2008).

On Nyord, the dunlin did not seem to react to the establishment of 130 hectares of grazing folds on the southern marshes in 1981 (Figure 22). The ruff and the godwit may have shown a reaction, the populations stabilizing shortly from 1981 to 1990 (Figure 23 and Figure 24).

### Vestamager

The population of Baltic dunlins on Vestamager was stable until the mid-1980s when it decreased, too (Figure 25); this could be explained by the area changing into forest.

The small increase in the ruff population on Vestamager from 1970 to the end of the 1980s (Figure 26) may have occurred in response to the favourable succession of changes of the habitat, which took place (Table 5 under "Background", "Area Description of Vestamager").

On Vestamager, 30 hectares of afforestation was carried out in 1986 (Overfredningsnævnet 1990) and at the same time both the ruffs and dunlins showed sharp declines (Figure 25 and Figure 26).

Both Nyord and Vestamager have experienced drainage. As for Vestamager, this was a necessity for the salt marsh to develop, but in both areas the drainage became too intense, and the subsequent overgrowing of the area was probably the last straw for the meadow bird populations, so conservation and nature friendly management was not enough to stop the decline in the populations efficiently.

Life-REMAB might have had a positive effect on the ruff at Nyord and on the Baltic dunlin on Vestamager. The significant turning point in the middle of the 2000s when the number of breeding ruffs on Nyord began to increase (Figure 23) suggests that the Life project may have been beneficial for the species; however, this should be interpreted with caution as the significance is based on a difference between zero and 3 (Appendix5). On Vestamager, one pair of dunlins bred in 2007 after an absence of 7 years and again one pair in 2013. However, like for the ruff on Nyord, this is too weak a basis to conclude anything upon as 5 years passed in-between with no breeding dunlins (Figure 25).

In 2013, one pair of godwits suddenly bred (Figure 27) on Vestamager; it has practically never bred in the area before except from one pair in 1969 and 1970 (Appendix 5); however, this event might just as well be attributed to the continuation of improvement of the hydrology after the Life project.

### National Populations

The increase until 1990 in the national population trends of the Baltic dunlin and the ruff (Figure 28 and Figure 29) may have been caused by the national protection and nature friendly

management which took place during the 1980s and 1990s, securing a stable area of meadow and salt meadows (Thorup 2003). However, since the middle of the 1900s, the European populations of these species have been declining (Wetlands International 2015) and so the overall recruitment potential has shrunken, which may explain the subsequent decline in Denmark.

The national population of godwits shows a similar tendency as those of ruffs and Baltic dunlins (Figure 30) though less pronounced and with an earlier maximum. The European population of this species has also declined since the 1950s (Wetlands International 2015). So, when both national and European populations decline, the appearance of breeding black-tailed godwits on Vestamager as well as the increase in dunlin at this site and in ruff at Nyord might be stronger indications of good habitats than originally assumed. These events were not caused by a "fill up" of other habitats of better quality. There cannot be much competition for habitats when the overall populations are declining. Furthermore, in 2014, the ruff was observed on Vestamager, at first 20 territory assertive males, and later 4 males singing, which are very reliable indications of breeding ruffs (DOF 2015, Thorup 2015). Additionally, the avocet has started to breed on Vestamager (in 2011, 2013 and 2014) (DOF 2015), which it has never done before (Thorup 2015).

### Wintering Areas

Conditions in wintering areas probably also impact on the populations and, likewise, conditions on migration routes. Ruffs winter in Africa south of Sahara, where they experience big fluctuations in winter precipitation (Thorup 2003). Thorup (2003) reasons that less precipitation leads to smaller wintering areas, which most likely has a negative effect on the ruff.

For the black-tailed godwit, extensive drainage and damming since the 1960s along its migratory routes and in the wintering sites in Iberia and West Africa are additional threats. Mortality rates in wintering areas appear to be higher in years with low rainfall because it results in high densities of birds in small areas. There is no evidence that climatic and habitat changes in non-breeding areas are the cause of declines - yet, these factors may escalate declines as the birds are dependent on relatively small areas of rice fields (Gill et al. 2007).

Climate changes seem to be pushing the southern borderline of the dunlin's area of distribution north towards central Scandinavia, simultaneously shifting it further towards the east (Nyegaard et al. 2014). As today, Denmark is located in the southern periphery of this area, such climate changes will most probably lead to even fewer numbers of breeding dunlins in the future.

## Conclusion and Perspective

The objective of the Life-REMAB project was to: *"… restore and maintain a favourable conservation status of habitats of Calidris alpina schinzii and Philomachus pugnax in Denmark…"*. If the success of the project is assessed on the basis of the development of the breeding populations of the Baltic dunlin and the ruff, the effect has not been very big. Neither of the species has reached viable populations sizes in either of the two areas. Even so, one could speculate that the situation may have been much worse, had the projects not been implemented at all. It is likely that the continuing improvements of the hydrology in the two areas are the reason for the positive observations of the ruff and the black-tailed godwit on Nyord and Vestamager. Besides, other wader birds may well have benefitted from the restorations of the habitats.

Climate changes, regional fluctuations in populations, and conditions in wintering areas all have an impact on the development of the meadow birds populations, and it is therefore not possible to determine how much the conflicts have affected the success of the projects undertaken on Nyord and Vestamager. However, there is little doubt that the resources used for solving conflicts have been taken from those allocated to the actual projects. On Nyord predation and inexpedient hydrology is still the main threats to the meadow birds. When managing the area the main element which should be taken into account is the balance between the villagers' interests, and the requirements of the meadow birds. Consequently, a representative of the villagers should take part in a decision council, for example the Grazing Guild Nyord Strandenge. At Vestamager the poor hydrology still pose a significant threat to the meadow birds, too. Vestamager is primarily used for recreational activities; therefore, the Outdoor Council should have a greater influence on some of the decision-making processes alongside DOF.

I believe that fundamentally, the planning phase of restoration projects should incorporate anticipation of conflicts through analyses of stakeholders, and inclusion of those who will be affected the most by interventions. Furthermore, in projects which affect as many stakeholders as in the case on Nyord and Vestamager, I would advise the application of Cooperative Learning tools, especially a workshop where stakeholders can present their views of a situation and contribute their knowledge to the project. I am convinced that solutions reached this way will be more sustainable than those produced by only professionals and experts.

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# Appendices

## Appendix 1; Species Names in Latin, English, and Danish

| Latin | English | Dansk |
|---|---|---|
| **BIRDS** | | |
| ***Alauda arvensis*** | Eurasian skylark | Sanglærke |
| ***Anas acuta*** | Northern pintail | Spidsand |
| ***Anas clypeata*** | Northern shoveler | Skeand |
| ***Anas querquedula*** | Garganey | Atlingand |
| ***Anser erythropus*** | Lesser white-fronted goose | Dværggås |
| ***Anthus pratensis*** | Meadow pipit | Engpiber |
| ***Aquila chrysaetos*** | Golden eagle | Kongeørn |
| ***Asio flammeus*** | Short-eared owl | Mosehornugle |
| ***Botaurus stellaris*** | Eurasian bittern | Rørdrum |
| ***Branta ruficollis*** | Red-breasted goose | Rødhalset gås |
| ***Calidiris alpina schinzii*** | Baltic dunlin | Engryle / Alm. Ryle |
| ***Calidris pugnax / Philomachus pugnax*** | Ruff | Brushane |
| ***Charadrius morinellus*** | Eurasian dotterel | Pomeransfugl |
| ***Ciconia ciconia*** | White stork | Hvid stork |
| ***Circus aeruginosus*** | Western marsh harrier | Rørhøg |
| ***Crex crex*** | Corn crake | Engsnarre |
| ***Egretta garzetta*** | Little egret | Silkehejre |
| ***Falco peregrinus*** | Peregrine falcon | Vandrefalk |
| ***Falco rusticolus*** | Gyrfalcon | Jagtfalk |

| | | |
|---|---|---|
| ***Falco tinnunculus*** | Common kestrel | Tårnfalk |
| ***Gallinago gallinago*** | Common snipe | Dobbeltbekkasin |
| ***Haematopus ostralegus*** | Eurasian oystercatcher | Strandskade |
| ***Limosa limosa*** | Black-tailed godwit | Stor kobbersneppe |
| ***Locustella fluviatilis*** | Eurasian River Warbler | Flodsanger |
| ***Locustella naevia*** | Common grasshopper warbler | Græshoppesanger |
| ***Mergellus albellus*** | Smew | Lille skallesluger |
| ***Motacilla flava*** | Western yellow wagtail | Gul vipstjert |
| ***Pandion haliaetus*** | Osprey | Fiskeørn |
| ***Phalaropus lobatus*** | Red-necked phalarope | Odinshane |
| ***Porzana porzana*** | Spotted crake | Plettet rørvagtel |
| ***Recurvirostra avosetta*** | Pied avocet | Klyde |
| ***Saxicola rubetra*** | Whinchat | Bynkefugl |
| ***Sterna paradisaea*** | Arctic tern | Havterne |
| ***Sternula albifrons*** | Little tern | Dværgterne |
| ***Tringa totanus*** | Common redshank | Rødben |
| ***Vanellus vanellus*** | Northern lapwing | Vibe |
| **OTHER ANIMALS** | | |
| ***Epidalea calamita*** | Natterjack toad | Strandtudse |
| ***Fasciola hepatica*** | Liver fluke | Lever ikte |
| ***Galba truncatula (Lymnaea truncatula)*** | Dwarf pond snail | Pytsnegl |
| ***Lasius flavus*** | Yellow meadow ant | Gul engmyre |
| ***Mustela erminea*** | Stoat | Lækat |
| ***Mustela vison*** | American mink | Mink |

| | | |
|---|---|---|
| ***Pseudepidalea viridis*** | Green toad | Grønbroget tudse |
| ***Vulpes vulpes*** | Red fox | Ræv |
| **PLANTS** | | |
| ***Betula*** | Beech | Bøg |
| ***Calamagrostis epigejos*** | Bush-grass | Bjerg-rørhvene |
| ***Hippophaë rhamnoides*** | Sea-buck-thorn | Havtorn |
| ***Salix*** | Willow | Pil |
| ***Solidago sp.*** | Golden rod | Gyldenris |
| ***Trifolium fragiferum*** | Strawberry clover | Jordbær-kløver |

## Appendix 2; Technical Terms in English and Danish, and Abbreviations

| English | Dansk | Abbreviations |
|---|---|---|
| **Agreement of exchange of user rights** | Magelægsaftale | |
| **Agri-Environmental Schemes** | Miljøvenlige Jordbrugsforanstaltninger | AES |
| **Bird Protection Fund** | Fugleværnsfonden | FVF |
| **Danish Ornithological Society** | Dansk Ornitologisk Forening | DOF |
| **Floodgate** | Stemmeværk | |
| **Grazing Guild Nyord Strandenge** | Græsningslauget Nyord Strandenge | GNS |
| **Mowing / Hay cutting** | Høslæt | |
| **Nature Agency (former Forest and Nature Agency)** | Naturstyrelsen (tidligere Skov- og Naturstyrelsen) | NST (SNS) |
| **Salt meadow** | Strandeng | |
| **Salt panne** | Salt pande | |
| **Tidal channels** | Loer | |
| **United grazing/Communal grazing** | Samgræsning | |

## Appendix 3; Overview of the Legislation Covering the Areas

**SPA = Special Protection Area; SAC = Special Area of Conservation. Nbl = Naturbeskyttelsesloven; Skl = skovloven; Pl = Planloven.**

| NYORD & VEDELEN | | | |
|---|---|---|---|
| **PROTECTION** | **LEGISLATION** | **OBJECTIVE** | **COVERAGE** |
| **Natura 2000 area no. 168 "Havet og kysten mellem Præstø Fjord og Grønsund":**<br>**SPA no. 89**<br><br>**Ramsar area no. 22 "Præstø Fjord, Jungshoved Nord, Ulvshale og Nyord"**<br><br>**SAC no. 147** | Nbl | Fulfil DK's international obligations in the areas<br>Ensure favourable conservation status for species and habitats which form the designation basis for the area | Entire Nyord + Vedelen |
| | The Birds Directive | Conserve, protect and restore areas where migrating and threatened birds roost and breed | |
| | The Ramsar Convention | Conserve, protect and promote protection and restoration of wetlands, especially for roosting and breeding water birds | |
| | The Habitats Directive | Counteract the increasing abuse and loss of wetlands now and in the future<br>Protection of characteristic flora and fauna, especially water birds | |
| **Protection Act (1975)** | Nbl chap. 6 | Ensure meadows grazed by cattle to favour the bird life<br>Ensure the public's access<br>Ensure favourable conservation status<br>Maintain the meadows in 1970's conditions.<br>Prevent construction of summer houses and farm buildings | Almost entire Nyord |

| | | | |
|---|---|---|---|
| | | Ensure habitats for meadow birds<br>Permission to remove self-sown up growth | |
| **Protected Habitats** | Nbl § 3 + Skl § 28 | Protection against changes of the current state<br>Prevent changes of lakes (over 100 $m^2$), meadows, beach swamps etc. | All, except the south-west tip of Nyord |
| **Nature and Wildlife Sanctuary (1995)** | Lov om Jagt og Vildtforvaltning + Bekændtgørelse om Ulvshale-Nyord Vildtreservat | Protect and nurture the country's wildlife populations and ensure roosting and foraging areas for migratory birds<br>Ensure both water and land at Ulvshale and Nyord as roosting and breeding areas for waterfowl | South-eastern tip + Vedelen |
| **Strandbeskyttelseslinje** | Nbl § 15 | | Almost all around Nyord + Vedelen |
| **Kystnærhedszonen** | Pl Kap. 2 a | The country's coastal areas must be kept free of buildings and installations which do not depend on the coast | Entire Nyord |
| **Kirkebeskyttelseslinje** | Nbl § 19 | | Around church |
| **Beskyttede sten- og jorddiger** | Museumsloven § 29a | | Here and there |

SPA = Special Protection Area; SAC = Special Area of Conservation. Nbl = Naturbeskyttelsesloven; Skl = skovloven; Pl = Planloven.

| VESTAMAGER | | | |
|---|---|---|---|
| **PROTECTION** | **LEGISLATION** | **OBJECTIVE** | **COVERAGE** |
| **Natura 2000 area no. 143 " Vestamager og havet syd for"**<br><br>**- SPA no. 111** | Nbl | Fulfil DK's international obligations in the areas<br><br>Ensure favourable conservation status for species and habitats which form the designation basis for the area | Almost entire Vestamager except part of the northern area |
| | EUs Fuglebeskyttelsesdirektiv | Conserve, protect, and restore areas where migrating and threatened birds roost and breed | |
| **- SAC no. 127** | EUs Habitatdirektiv | Counteract the increasing abuse and loss of wetlands now and in the future<br><br>Protection of characteristic flora and fauna, especially waterbirds | |
| **Protection Act (1990)** | Nbl chap. 6 | Protect against physical changes<br>First of all, protection of salt meadows, and of breeding and resting birds (LIFE-Nature 2006)<br>Protection of the landscape values attached to the area<br>Maintain and regulate the public's access to the area and its use for recreational purposes | Entire Vestamager |
| **Protected Habitats** | Nbl § 3 + Skl § 28 | Protection against changes of the current state<br><br>Prevent changes of lakes (over 100 $m^2$), meadows, beaches, swamps etc. | Most of Vestamager |

| | | | |
|---|---|---|---|
| | | Ensure the public's access | |
| **Nature and Wildlife Sanctuary** | Lov om Jagt og Vildtforvaltning | Protect natural and cultural values associated with the shallow parts of the sea surrounding Amager<br>Regulate traffic and hunting to protect the bird life in the area<br>Ensure compliance of the international obligations of Denmark | Almost entire Vestamager and the sea surrounding the area |
| **Strandbeskyttelseslinje** | Nbl § 15 | | The entire coast of Vestamager |
| **Fredskov** | | | Pinseskoven and small forest in north |
| **Skovbyggelinje** | | | Pinseskoven, forest area at Svenskerholmen, and forest around Nature Centre Vestamager |
| **Søbeskyttelseslinje** | | | Klydesø and Birkedam |
| **Åbeskyttelseslinje** | | | All the channels in the area |
| **Kystnærhedszonen** | PL Kap. 2 a | The coastal areas must be kept free of buildings and installations which do not depend on the coast | Entire coast of Vestamager |

## Appendix 4; Overview of the People Interviewed

**F-F = face-to-face interview, T = telephone interview, M = e-mail interview. (P) = prepared, (UP) = unprepared. Agrovi: knowledge centre for farmers and other self-employed. FVF = Bird Protection Fond. NST = Nature Agency. DN = Danish Nature Society for Nature Conservation.**

| **NYORD** | |
|---|---|
| **Interviewees** | **Type of interview** |
| **Agrovi, consultant: Thyge Nygaard** | F-F (P) |
| **FVF, professional, landowner: Søren Ring (current representative)** | T (UP/P) |
| **FVF, professional, landowner: Søren F. Hansen (representative during Life-REMAB)** | T (UP) |
| **NST, professional, landowner: Jørgen S. Nielsen (representative, current + during the last part of Life-REMAB)** | F-F (P) |
| **Nyord association: Esther Malmborg (vice chairman, private, partly resident)** | T (P) |
| **Nyord hunting association: Stig Andersen (chairman, current + during Life-REMAB)** | T (P) |
| **Nyord hunting association: Per Hansen (member of the association before and after protection of Nyord)** | T (P) |
| **Private farmer: Niels Erik (livestock owner)** | T (UP) |
| **Private landowner: Ole P. Sørensen** | F-F (P) |
| **Private, resident: John Stolt (lived most of his life on Nyord)** | T (UP) |
| **Storstrøm's Conservation Committee: Thyge Andersen (nature manager from 1975 to 1982)** | T (P) |
| **VESTAMAGER** | |
| **Interviewees** | **Type of interview** |
| **By&Havn: Peter Larsson** | T (P) |
| **Copenhagen airports: Mogens Andersen** | T (P) |
| **DN-København: Ove Løbner** | T (U) |
| **DN-Taarnby: Heidi Jaque** | T (P) |

| | |
|---|---|
| **DOF: Peter S. Jørgensen (representative during Life-REMAB)** | F-F (P) |
| **Farmer: Jørgen Jacobsen** | T (P) |
| **Outdoor Council (represent outdoor people): Svend-Erik F. Pedersen** | T (P) |
| **Nature Centre Vestamager: Jes Aagaard** | F-F (P) |
| **NST, professional landowner: Sven Norup** | F-F (P) |
| **Sheep Grazing Guild: Jonas Morsing** | F-F (U) |
| **Tårnby Municipality: Hans O. Andersen** | M |

## Appendix 5; Breeding Data

**Site; Nyord Enge, Ulvshale Vedelen og Hegnede Bugt, Ulvshale Horsnæs, and Ulvshale Nordenge.**

| Baltic Dunlin | | Ruff | | Black-tailed Godwit | |
|---|---|---|---|---|---|
| **Year** | **Pairs max total** | **Year** | **Pairs max total** | **Year** | **Pairs max total** |
| **1969** | 26 | 1969 | 40 | 1964 | 8 |
| **1970** | 4 | 1970 | 9 | 1966 | 5 |
| **1973** | 1 | 1973 | 6 | 1969 | 22 |
| **1976** | 3 | 1976 | 6 | 1970 | 18 |
| **1977** | 2 | 1978 | 16 | 1972 | 12 |
| **1978** | 5 | 1979 | 14 | 1973 | 16 |
| **1979** | 2 | 1980 | 12 | 1974 | 10 |
| **1980** | 2 | 1981 | 7 | 1975 | 14 |
| **1981** | 2 | 1982 | 7 | 1976 | 13 |
| **1982** | 1 | 1983 | 3 | 1977 | 15 |
| **1983** | 0 | 1984 | 5 | 1978 | 2 |
| **1984** | 2 | 1985 | 3 | 1979 | 10 |
| **1985** | 1 | 1986 | 5 | 1980 | 15 |
| **1986** | 1 | 1987 | 4 | 1981 | 11 |
| **1987** | 0 | 1988 | 5 | 1982 | 14 |
| **1988** | 1 | 1989 | 3 | 1983 | 13 |
| **1989** | 0 | 1990 | 4 | 1984 | 13 |
| **1990** | 2 | 1991 | 4 | 1985 | 10 |
| **1991** | 1 | 1992 | 3 | 1986 | 11 |
| **1992** | 1 | 1993 | 2 | 1987 | 10 |
| **1993** | 0 | 1994 | 2 | 1988 | 9 |
| **1994** | 0 | 1995 | 1 | 1989 | 15 |
| **1995** | 0 | 1996 | 4 | 1990 | 8 |
| **1996** | 0 | 1997 | 2 | 1991 | 10 |
| **1997** | 0 | 1998 | 2 | 1992 | 8 |
| **1998** | 0 | 1999 | 1 | 1993 | 8 |
| **1999** | 0 | 2000 | 2 | 1994 | 6 |
| **2000** | 1 | 2001 | 1 | 1995 | 5 |
| **2001** | 1 | 2002 | 1 | 1996 | 8 |
| **2002** | 1 | 2003 | 2 | 1997 | 6 |
| **2003** | 0 | 2004 | 1 | 1998 | 6 |
| **2004** | 1 | 2005 | 0 | 1999 | 11 |
| **2005** | 0 | 2006 | 0 | 2000 | 11 |
| **2006** | 0 | 2007 | 0 | 2001 | 12 |
| **2007** | 0 | 2012 | 3 | 2002 | 13 |
| **2009** | 0 | 2013 | 1 | 2003 | 10 |
| **2012** | 0 | | | 2004 | 7 |
| **2013** | 0 | | | 2005 | 3 |
| | | | | 2006 | 3 |
| | | | | 2007 | 2 |

| | | | | | |
|---|---|---|---|---|---|
| | | | | 2008 | 1 |
| | | | | 2009 | 6 |
| | | | | 2011 | 1 |
| | | | | 2012 | 3 |
| | | | | 2013 | 5 |

**Site; Vestamager.**

| Baltic Dunlin | | Ruff | | Black-tailed Godwit | |
|---|---|---|---|---|---|
| **Year** | **Pairs max total** | **Year** | **Pairs max total** | **Year** | **Pairs max total** |
| **1960** | 2 | 1960 | 15 | 1960 | 0 |
| **1961** | 10 | 1961 | 12 | 1961 | 0 |
| **1962** | 10 | 1962 | 15 | 1962 | 0 |
| **1963** | 10 | 1963 | 15 | 1963 | 0 |
| **1964** | 25 | 1964 | 18 | 1964 | 0 |
| **1965** | 20 | 1965 | 20 | 1965 | 0 |
| **1966** | 15 | 1966 | 25 | 1966 | 0 |
| **1967** | 15 | 1967 | 30 | 1967 | 0 |
| **1968** | 10 | 1968 | 25 | 1968 | 0 |
| **1969** | 7 | 1969 | 15 | 1969 | 1 |
| **1970** | 25 | 1970 | 10 | 1970 | 1 |
| **1971** | 25 | 1971 | 15 | 1971 | 0 |
| **1972** | 25 | 1972 | 20 | 1972 | 0 |
| **1980** | 4 | 1980 | | 1980 | 0 |
| **1982** | 31 | 1982 | 9 | 1982 | 0 |
| **1985** | 34 | 1985 | 7 | 1985 | 0 |
| **1986** | 31 | 1986 | 19 | 1986 | 0 |
| **1988** | 19 | 1990 | 0 | 1988 | 0 |
| **1990** | 18 | 1991 | 0 | 1990 | 0 |
| **1991** | 10 | 1992 | 0 | 2001 | 0 |
| **1992** | 7 | 1993 | 2 | 2010 | 0 |
| **1993** | 6 | 1994 | 0 | 2013 | 1 |
| **1994** | 7 | 1995 | 0 | | |
| **1995** | 5 | 1996 | 0 | | |
| **1996** | 5 | 1997 | 1 | | |
| **1997** | 2 | 1998 | 0 | | |
| **1998** | 1 | 1999 | 0 | | |
| **1999** | 1 | 2000 | 0 | | |
| **2000** | 0 | 2001 | 2 | | |
| **2001** | 0 | | | | |
| **2007** | 1 | | | | |
| **2013** | 1 | | | | |