Recommendations and guidance for the development of a goose management plan for the trilateral Wadden Sea Region

Goose Management Group

February 2010

Contents

1 Introduction Goose Management

A substantial part of the Wadden Sea Region is one of Europe's outstanding wetland areas. It consists of tidal mud flats and shoals, open sea areas, channels and estuaries, barrier islands, dunes and salt marshes and fertile marshlands, the latter mostly lying behind the dikes. It is a very important breeding area for many species of coastal and meadow birds. With about 10 million waterbirds passing through and using this area, the Wadden Sea is one of the world's most important wetlands for migratory water birds. Because of the international importance of the Wadden Sea Region as a nature area, large parts are protected under national and international laws and associated management schemes.

The mainland part of the Wadden Sea Region is characterized by fertile marshes which have an important function as a feeding area for migratory birds and a breeding area for meadow birds as well as a resting area for waders. The area is also one of the most important wintering and staging areas for Arctic geese. Some goose populations also use the area for breeding. The Wadden Sea Forum welcomes the fact that the goose populations have recovered from low levels some decades ago.

The fertile marshland on the mainland side of the dikes combined with the mild climate create ideal conditions for agriculture in the Wadden Sea Region. The area is known for its considerable production of farm animals like cattle, pigs and

sheep. The area also produces a large volume of high value vegetable crops such as cabbage and potatoes. Many of these products are exported and therefore contribute to foreign currency earnings for Denmark, Germany and The Netherlands.

The agricultural sector is crucial for the economic wellbeing of the communities along the Wadden Sea coast and in many areas agriculture employs up to 20% of the local workforce. Agriculture can also function as a key element in the preservation of cultural heritage and in nature conservation management.

The effective management of geese is an issue of increasing relevance in the Wadden Sea Region. On the one hand, geese "belong" to the area and are a typical element of the Wadden Sea Region biodiversity. They also constitute an important tourist attraction. On the other hand, some goose species cause loss in quantity and quality of some agricultural yields. Agri-environmental payment schemes are in some parts of the area considered as acceptable, whereas in other regions these are insufficient and inflexible, or non-existent. However, goose management effectiveness in general needs improvement.
Numbers of both wintering and nesting geese in the Wadden Sea Region, including the coastal hinterland, have risen during recent decades. The rising goose numbers, and in particular geese foraging in farmland areas inside the dikes, have led to increasing conflicts between agricultural and nature interests. Since geese are highly mobile and cross national borders, effective management needs a regional (international) approach. Various management tools and economic incentives have been used to reduce or compensate for goose damage; however, most of the activities have been local/national and, so far, there has been no coordination between the Wadden Sea countries. The status quo reflects large discrepancies in management objectives and tools used between countries. To improve the management schemes, strategic planning, exchange of knowledge and cross border cooperation is of great importance.

To avoid further conflicts, the most feasible solution is an internationally coordinated and integrated management based on a spatial setup, where the management is differentiated according to the priority of areas. Such an approach must rest upon the identification of areas defined from political, ecological and agricultural criteria, to form the basis of the designation of a network of accommodation areas along goose migratory routes and in the Wadden Sea Region.

In September 2007, a trilateral geese management workshop was held in Rastede, Germany, organized by the agricultural organizations represented in the Wadden Sea Forum (WSF). This workshop resulted in the submission of a letter by WSF to the EU Committee of the Regions, requesting attention for the problem mentioned above, in particular with regard to EU regulations.
This led to a further trilateral workshop on 19–20 November 2008 in Ribe, Denmark, organized by the WSF and the Trilateral Cooperation (TWSC), for intensive discussions of options for managing geese populations and compensating farmers for damage.
There was broad consensus that the best way to deal with geese was a strategic, long-term international approach in which accommodation areas for geese are designated. Within these areas farmers should be paid for providing environmental services, such as letting the geese graze, improving conditions for the geese by optimizing farmland habitats and reducing disturbances. Outside these areas, geese could be deterred through appropriate scaring measures. There was a need to design and prioritize areas suitable for goose management in the wider Wadden Sea area.

The Workshop agreed to set up a goose management working group under the umbrella of the Wadden Sea Forum, which was also supported by the Schleswig-Holstein National Park advisory boards. The working group has developed a recommendations and guidance document as a basis for a strategic goose management plan, being submitted to the 11th Trilateral Wadden Sea Conference (TGC), to be held in Germany in March 2010. The document elaborates the requirements and guidelines for an envisaged common management plan at a later stage and the need for close cooperation and collaboration with the TWSC.
Depending on the decisions at the TGC, the Goose Management Group intends to continue its work to develop a detailed goose management plan in close cooperation of the WSF and the TWSC.

The Goose Management Group consisted of representatives of the responsible administrations, of the agricultural sector, nature and environment NGOs and goose experts from the different regions. The Terms of References of the group are in **Annex 1.**

2 Vision and objectives

Vision

Goose populations have recovered from very low levels a few decades ago and new breeding populations have established in the WSR. These are recognized as natural assets and an important ecosystem component of the Wadden Sea Region. They also constitute a valuable and important recreational resource. The conflicts with the agricultural sector can be resolved by fully involving farmers in cross-border goose management schemes, including the making of adequate payments for their management efforts.

An important aim will be that the three Wadden Sea countries will implement the EU Birds and Habitat directives in a coordinated and harmonized way to conserve the populations of geese and their habitats and to meet the Wadden Sea Region states nature conservation responsibilities for geese.

Objectives

To work towards the vision, the Goose Management Group has identified a set of objectives and actions for effective goose management:

- To implement a joint project of the TWSC and the WSF to develop a plan for sustainable goose management on the basis of the recommendation and guidance document, which serves as an overall management framework to which local solutions are expected to adhere.
- To use the available monitoring data and scientific information for sound management proposals, both concerning the selection of accommodation areas for the geese and the development of a tool box with proper management instruments.
- To develop a spatial and habitat-based approach to goose management in the WSR.
- To improve and where possible harmonize the agri-environmental schemes for maximum effectiveness on goose management and public expenditure.
- To ensure that local stakeholders in conflict areas have strong input to the management details of local schemes and thereby ensure their widespread acceptance.
- To ensure information and knowledge exchange through an established goose management group supported and facilitated by all countries.
- To enhance awareness of the region's natural assets and ecosystem biodiversity and make better use of it by developing a careful eco-tourism business.
- To contribute to the fly-way management for a holistic approach to managing the goose populations involved, including the issues of identifying and achieving favorable and sustainable population sizes.

3 The current situation

3.1 Status of the goose populations occurring in the Wadden Sea area

Introduction

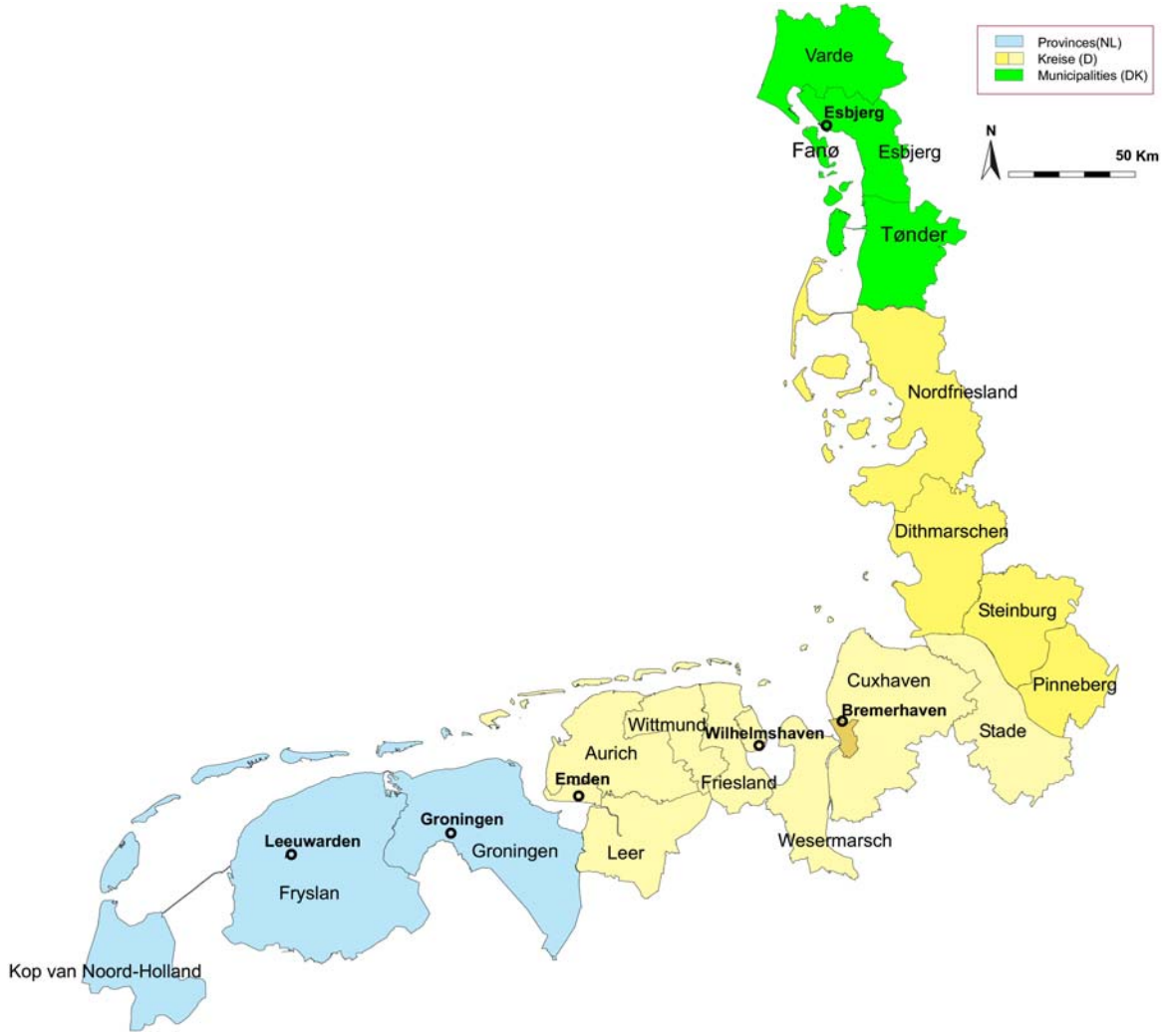


Figure 3.1.1: The Wadden Sea Region

The Wadden Sea Region (see figure 3.1.1) including the adjacent polder areas inside the dikes (approximately up to 20 km inland from the coastal roost sites), is used by several populations of geese, mainly on passage and wintering, but also breeding.

The seven regularly occurring populations are listed in Table 3.1 in order of importance for the Wadden Sea region. The Brent goose, a typical coastal goose that only occurs near salt water, heads the list and is followed by the barnacle goose, an estuarine goose species from the contact zone between fresh and salt water. It ends with the bean goose, which is basically an inland freshwater species.

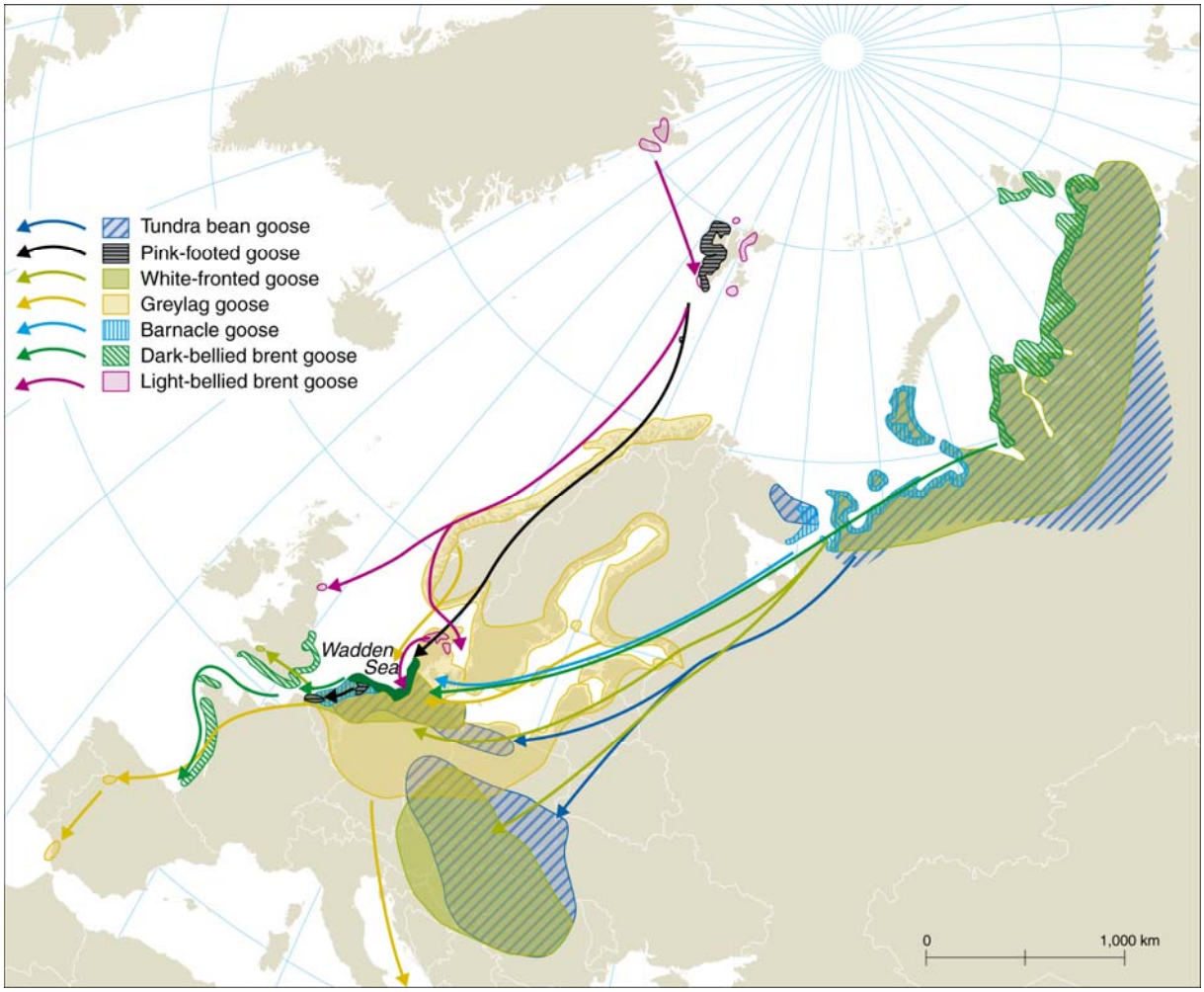


Fig. 3.1.2 Breeding and wintering areas and migratory routes of the 7 goose populations that frequent the Wadden Sea Region.
© NERI Graphics Workshop

Table 3.1 The main populations of geese occurring in the Wadden Sea and their population sizes during the last decade. On top is the most characteristic species for the Wadden Sea. Source: Goose Specialist Group, Wetlands International (Madsen et al. 1999; Ebbinge 2009; A.D. Fox in prep. Koffijberg et al., 2010). Notes: a: population estimate is uncertain; b: no reliable estimate is currently available.

Population	**Breeding / wintering range**	**Population size mid 1990s**	**Population size 2005-2008**	**Annual rate of change**	**Peak numbers Wadden Sea (month)**
Dark-bellied Brent goose *Branta b. bernicla* Knortegås (DK) Ringelgans (D) Rotgans (NL)	West-Siberia DK, D, NL, UK, Fr	265,000	243,000	- 1%	200,000 (4,5)
Light-bellied Brent goose *Branta bernicla hrota*	Svalbard, NE Greenland DK, UK, NL	5,000	8,000	+ 5%	730 (9,10)
Barnacle goose *Branta leucopsis* Bramgås (DK) Weisswangen or Nonnengans (D) Brandgans (NL)	N Russia, Baltic, DK, D, NL	267,000	780,000	+ 10%	c. 600,000 (3,4)
Pink-footed goose *Anser brachyrhynchus* Kortnæbbet gås(DK) Kurzschnabelgans (D) Kleine Rietgans NL)	Svalbard DK, NL, B	35,000	60,000	+ 6%	20,000 (1,2)
Greylag goose *Anser anser* Grågås (DK) Graugans (D) Grauwe gans (NL)	Cont. NW Europe Cont. NW Europe, Spain	200,000	>600,000	+ 9% (+20%)	b
White-fronted goose *Anser albifrons* Blisgås (DK) Bläßgans (D) Kolgans (NL)	N Russia – W Siberia D, NL, B	800,000	1,150,000	+ 3%	b
Tundra bean goose *Anser fabalis rossicus* Sædgås (DK) Saatgans (D) Rietgans (NL)	N Russia Cont. NW and Middle Europe	a	500,000	?	5,000 (1)

These populations can be subdivided into the wintering and staging populations breeding elsewhere, and populations that also nest in the Wadden Sea Region.

In the Wadden Sea proper, the intertidal mudflats, and adjacent saltmarshes, islands and polders, the most characteristic species is the Brent goose. Two subspecies of this small sea goose occur in the Wadden Sea, the very small population of light-bellied Brent goose (*Branta bernicla hrota*), and the larger population of dark-bellied Brent goose (*Branta bernicla bernicla*). These two subspecies prefer to feed in the intertidal zone on eelgrass and green algae in the autumn and winter, shifting to saltmarshes in spring.

Because of the increased numbers since the mid 1970s (actually a recovery from an extremely low population level in the 1950s), Brent geese also started to feed in the adjacent polder areas in some regions, causing agricultural damage particularly because they stay until the end of May before departing to their high-Arctic breeding grounds.

The **dark-bellied Brent goose** is the smallest sized goose species wintering in Western Europe and nests predominantly on the Taimyr Peninsula in northern Siberia. It migrates along the Arctic coast of Russia, through the White Sea and Baltic Sea to arrive in October in the Wadden Sea. It is a strictly coastal species and its preferred food is eelgrass (*Zostera* spec.). In the autumn, most birds first concentrate on the still-existing eelgrass-beds along the coasts of Schleswig-Holstein, Britain and France. They switch later in the season to green algae and, if these stocks are depleted, the birds in England move inland to feed on winter wheat. In mid-winter 80 % of the dark-bellied Brent can be found in Britain and France, 10 % in the tidal SW-part of The Netherlands, and about 10 % in the Wadden Sea, predominantly in the Dutch part. In March, almost all the birds from France and Britain migrate to the Wadden Sea. In April/May, almost the entire population is staging in the Wadden Sea before departing in mid May for the spring migration to Siberia.

In spring, Brent geese feed mainly on the new growth of salt marsh plants, and in some regions (The Netherlands) on grass in the polders fringing on the Wadden Sea. Because they stay so late into spring, these geese have a significant impact on the grass production in some regions (The Netherlands).

Compensation paid to farmers by the Fauna Fund in 2008 was €421.693. The population size of this species was decimated to only 16,000 birds in the early 1950s by strong hunting pressure, but finally after France (in 1966) and Denmark (in 1972) closed hunting, numbers rapidly recovered. By the early 1990s, in the space of just 20 years, numbers were well over 300,000. Hereafter breeding success strongly declined and the population has since declined to the present level of just over 240,000.

The subspecies is fully protected, but some hunting is still occurring in Russia, and in order to protect crops of winter wheat in Britain, licensed shooting of several hundreds Brent geese sometimes takes place.

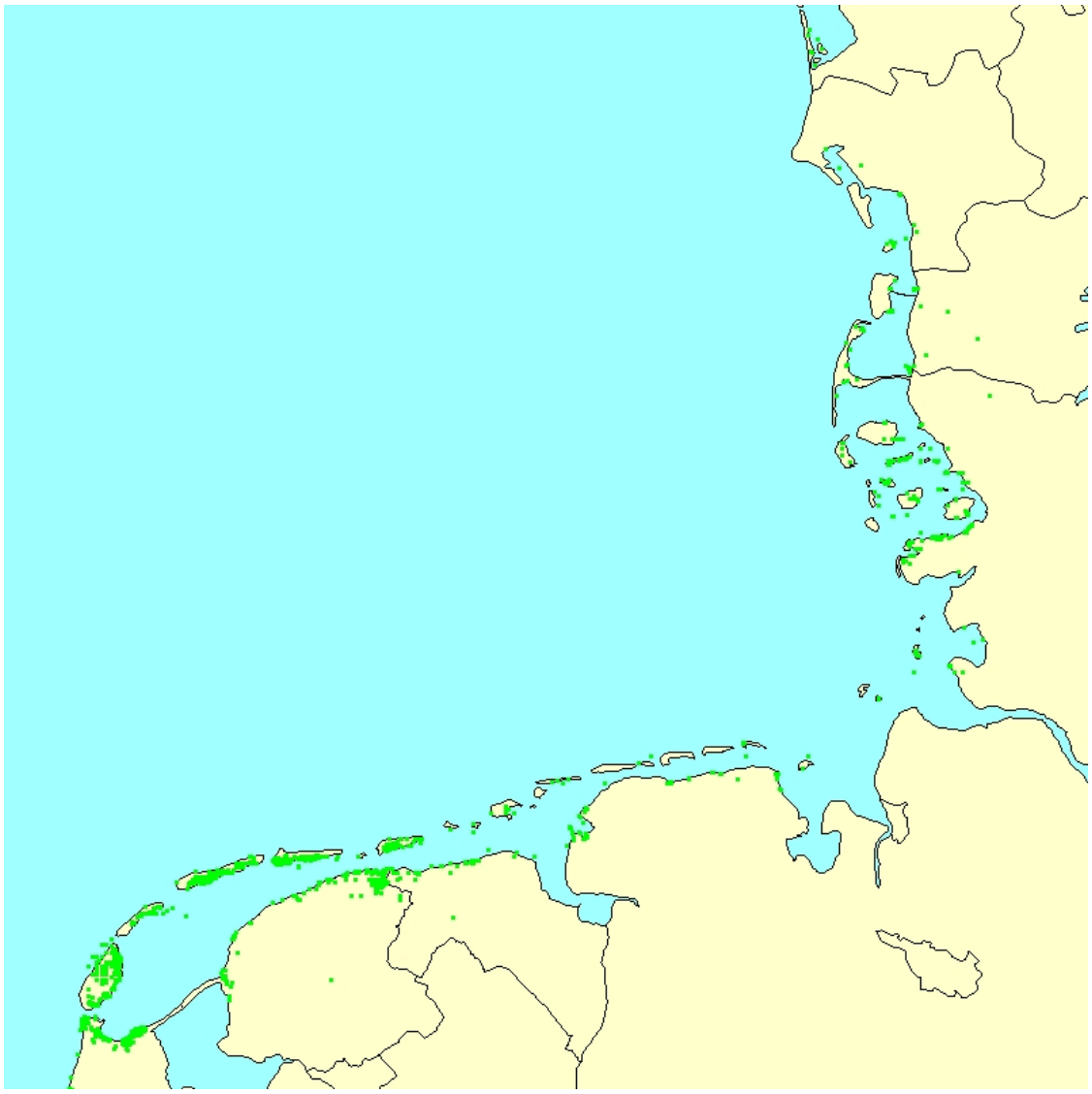


Fig. 3.1.3 Main staging areas of Dark-bellied Brent Geese as indicated by observations of marked geese (from www.geese.org)

The **Light-bellied Brent Goose** from Svalbard/East Greenland.
This population breeds in Svalbard, Franz Josef Land and NE Greenland and winters in Denmark and NE England. The population decreased during the first half of the 20th century but gradually recovered following protection in Denmark in 1972. The population size has fluctuated around 5,000-9,000 during the last decade. The light-bellied Brent goose has a discrete autumn staging area in the northern part of the Danish Wadden Sea, where it feeds on eelgrass. Up to 730 have been observed in recent years. In cold winters, flocks of up to a few hundred can occur in the Dutch and German Wadden Sea and Delta area.

Where fresh water enters the saline Wadden Sea system the **Barnacle Goose** is the typical goose species. When numbers were still low (20,000 in the 1960s – Boyd 1961, Ganter *et al.* 1999) this species only occurred on a limited number of sites, like the Hamburger Hallig, Westerhever, the Eider estuary, the Elbe estuary, and around the now embanked Lauwerszee. Barnacle geese have the shortest bill of all geese and graze the sward very short. It is possible for this reason that the species makes the greatest impact on grass yield loss for farmers.

Nowadays the barnacle geese that occur in the Wadden Sea not only nest in Arctic Russia, but also in the Baltic, and in low numbers also in the Wadden Sea Region. These populations taken together now number 780,000 birds (van der Jeugd, GSG-meeting 2009,Koffijberg *et al.* 2010), and are still increasing at an annual rate of 10 % (Ebbinge 2009). The increase in numbers has resulted in a gradual spread to other areas, where it possibly displaces other goose species (like pink-footed, white-fronted and maybe even Brent geese). Moreover barnacle geese are now staging much longer in the Wadden Sea. In the 1970s, most left the Wadden Sea in March, whereas now they stay well into May. Several hundreds of thousands nowadays skip their former spring staging areas in the Baltic and fly straight to the White Sea, in a similar manner to dark-bellied Brent geese (Eichhorn *et al.* 2009). This extended stay in spring also results in further conflicts with farming interests.

The reclamation of the former Lauwerszee in 1969 had unexpected effects on the distribution of barnacle geese and in the late 1970s, in the autumn months, the entire Russian population homed in on the area to feed on glasswort on the extensive plains (*Salicornia europea/stricta*) (Ebbinge et al. 1975). Barnacle geese can and do use this annual plant as a preferred food in the autumn, but only when fresh water is nearby. In Schleswig-Holstein, later embankments (Nordstrander Bucht, Rodenäs Vorland and Meldorfer Bucht) temporarily created similar feeding habitats for barnacle geese. Simultaneously, the management of the vast sheep-grazed forelands in Schleswig-Holstein, Lower Saxony and partly in the Dutch Wadden Sea (Noord-Friesland Buitendijks) changed, because other nature goals were chosen. These salt marshes then became in part less attractive for barnacle geese. However, only one third of the salt marshes in Schleswig-Holstein are ungrazed and large parts of the salt marshes, though still intensively grazed, remain unused by barnacle geese.

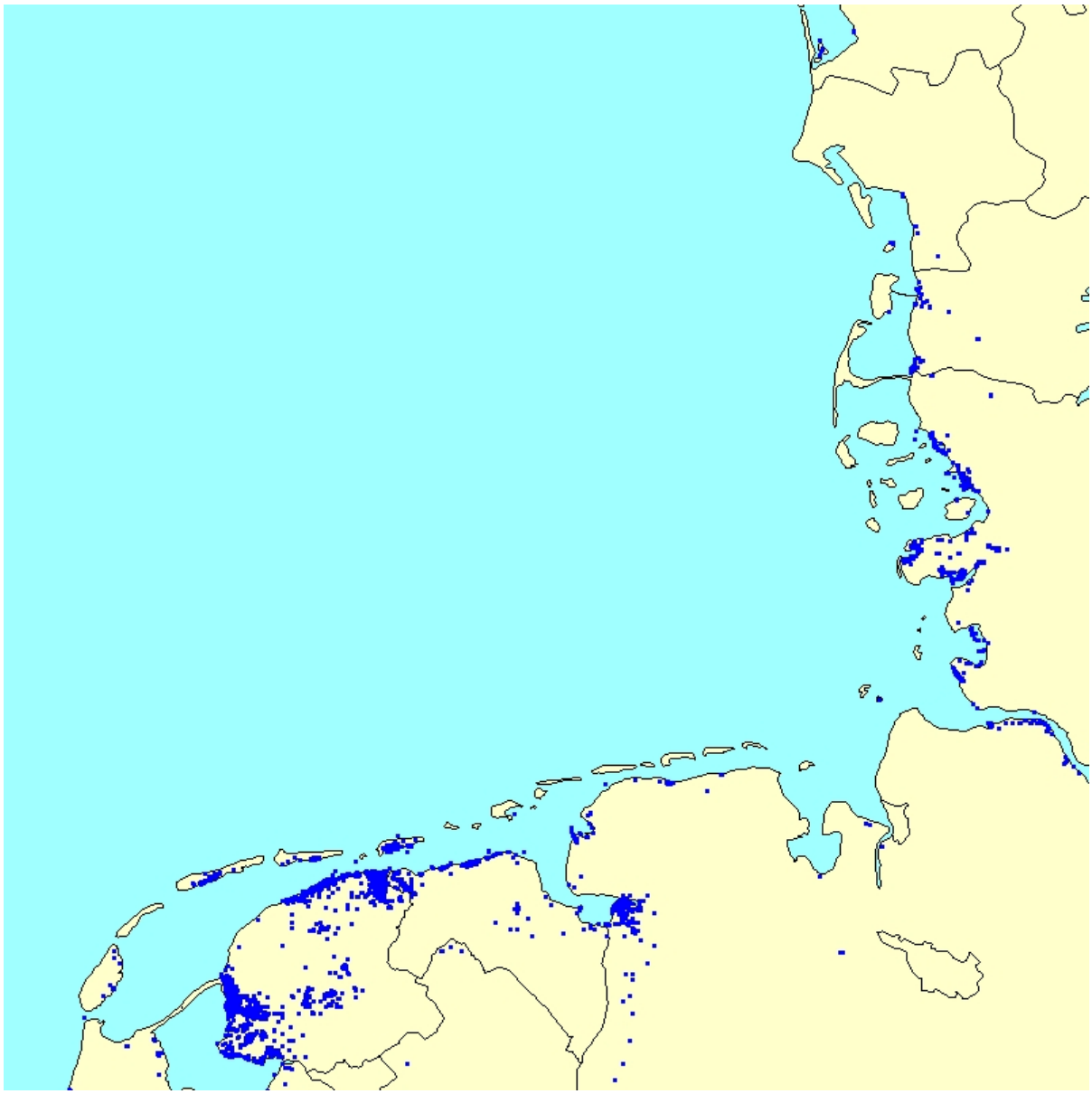


Fig. 3.1.4 Main staging areas of Barnacle Geese as indicated by observations of marked geese (from www.geese.org)

The **White-fronted Goose** is much more an inland species and cannot be considered as a typical Wadden Sea species. However, it does feed in the southern part of the Wadden Sea Region, in particular more inland in Niedersachsen, Groningen and Friesland, and it also roosts in brackish bays like the Dollart area.

The white-fronted goose is a species of the Arctic tundra and has an almost circumpolar breeding range. The nominate subspecies, *Anser a. albifrons*, breeds on the Arctic tundra between the Kanin Peninsula and the Khatanga and Popingay rivers east of the Taimyr Peninsula. It winters in Europe and the Middle East (Madsen *et al.* 1996, Kruckenberg *et al.* 2008).

During the last 20 years, results of the mid winter counts in western Europe show that the winter population increased from 600,000 to 1.1 million birds (Ebbinge 2009). Up to the mid 1990s, the breeding success was high. Since then, breeding success has declined. There is still a considerable amount of hunting of this population in Russia, both in the autumn and in spring, but good data about the magnitude of hunting in Russia is lacking.
In Belgium (since 1960) and The Netherlands (since 2000), white-fronted geese are protected from hunting, but since 2004 in The Netherlands there is licensed shooting of about 30,000 birds annually to prevent agricultural damage or to scare the geese from non-designated feeding areas.
In Lower Saxony there was a hunting ban between 1983-2008, but since 2008, there has been an open season (more than 1,000 birds shot); in Schleswig-Holstein there has been an open hunting season since 2002 (c. 300 individuals shot per year), while there has been an open season in Denmark throughout (few hundreds shot per year). Most white-fronted geese are shot during spring migration in Russia and Belarus (Heyd & Hirschfeld 2005).

White-fronted geese prefer to feed on grassland in floodplains of river valleys and estuaries. Since most of the population is wintering outside the Wadden Sea Region, only some parts of this region are used by the species. Near the Lauwersmeer and Dollard area as well as in the surroundings of the Jadebusen there are well established feeding sites (see map). Some of these areas have been documented as staging sites for white-fronted geese for more than 150 years (e.g., Dollard area, Jaene-Borbach et al. 2001), but increasingly these areas have been taken over by barnacle geese during the last 20 years (Kowallik & Kruckenberg 2008). As a consequence, white-fronted geese established new staging sites at previously abandoned feeding areas. In Germany, claims for agricultural damage caused by white-fronted geese are mainly for arable fields (winter wheat). The risk of significant effects on grassland seems to be relatively low (see Groot Bruinderink 1989, Jaene-Borbach et al. 2001), but a considerable amount of compensation (about €2,267,768 in 2008 [source Faunafonds]) was being paid to farmers. Because in some cases barnacle geese are feeding alongside them (see maps), the actual loss of grass yield might well be attributed to them as well.

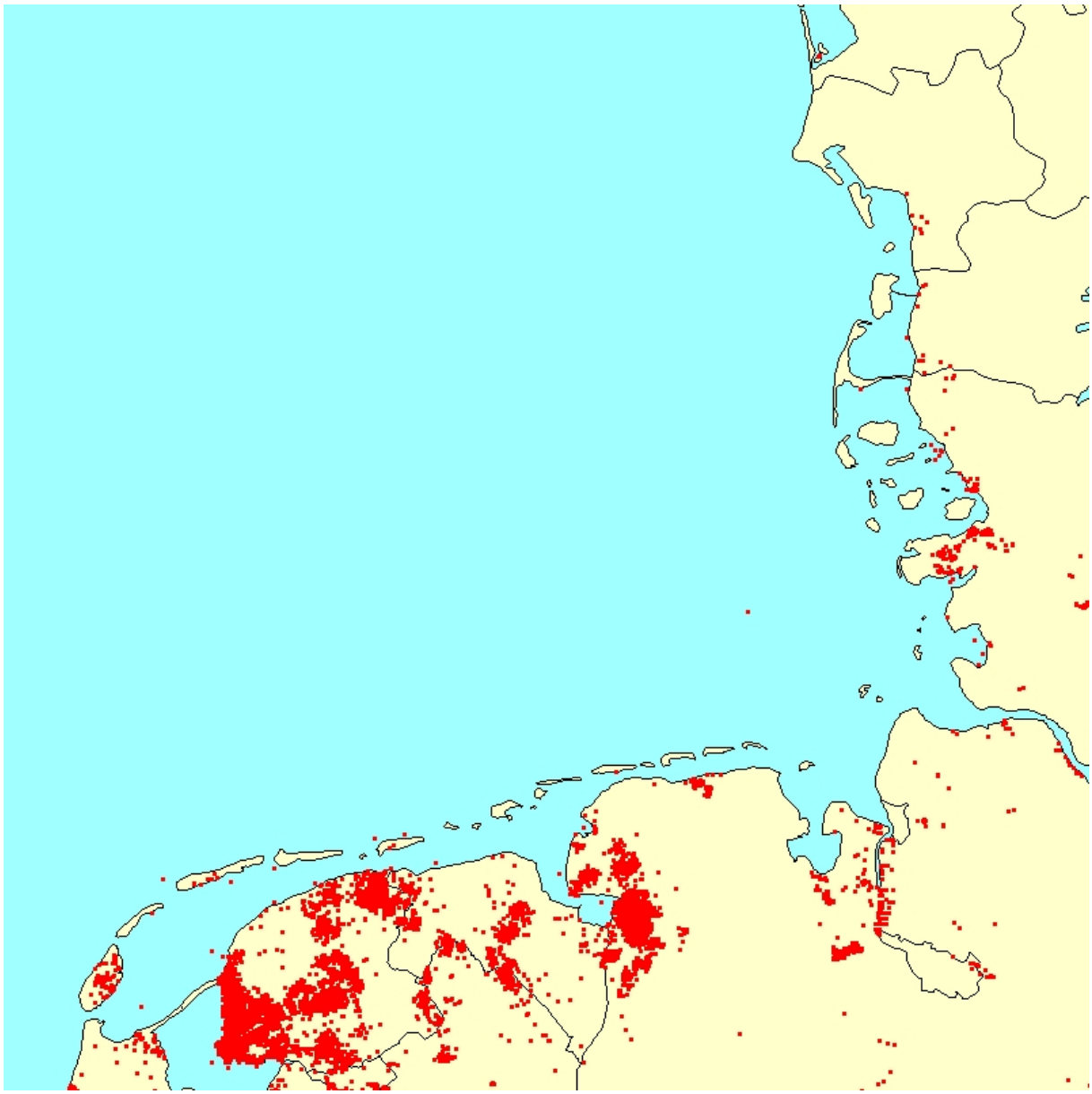


Fig. 3.1.5 Main staging areas of greater white-fronted geese as indicated by observations of marked geese (from www.geese.org)

The **Pink-footed Goose** used to winter in the Wadden Sea a long time ago (on Föhr, at "Rodenäs-Vorland" and near the Jadebusen), but these areas have been abandoned due to cultivation, disturbance and dike-building (Ebbinge *et al.* 1984, Prokosch 1984, Prokosch & Rösner 1991). Important sites in the Danish Wadden Sea were abandoned following embankment in the late 1970s. Formerly (i.e., before the 1990s), the pinkfeet foraged mainly on salt marshes on the foreshores, but nowadays most feed on improved pastures or newly sown winter cereals on fields inside the dikes, and only along the Danish Wadden Sea (mainly during late winter) (Madsen *et al.* 1999). In November most pink-footed geese occur in the 'lake district' of the Dutch province of Friesland, and move on later in winter to Flanders in Belgium. Only stray birds are reported from the Dutch Wadden Sea islands. The population has an open hunting season in Norway (including Svalbard) and Denmark, whereas it is protected in Germany and The Netherlands (since 1976).

The population breeds in the high Arctic Svalbard archipelago and migrates via stopover sites in Norway to wintering grounds in Denmark, The Netherlands and Belgium (Madsen *et al.* 1999, Ebbinge 2009).
The population has increased fivefold since the 1960s, and nearly doubled during the last decade (Table 1). The increase has been ascribed to improved survival due to improved protection and better winter feeding conditions as well as a more recent improved survival due to milder winter climate (Madsen *et al.* 1999, Kéry *et al.* 2006). Given its past occurrence in the Wadden Sea, restoration of former wintering areas in Germany could be considered. Recently some pink-footed geese have been observed again in Lower Saxony (see map).

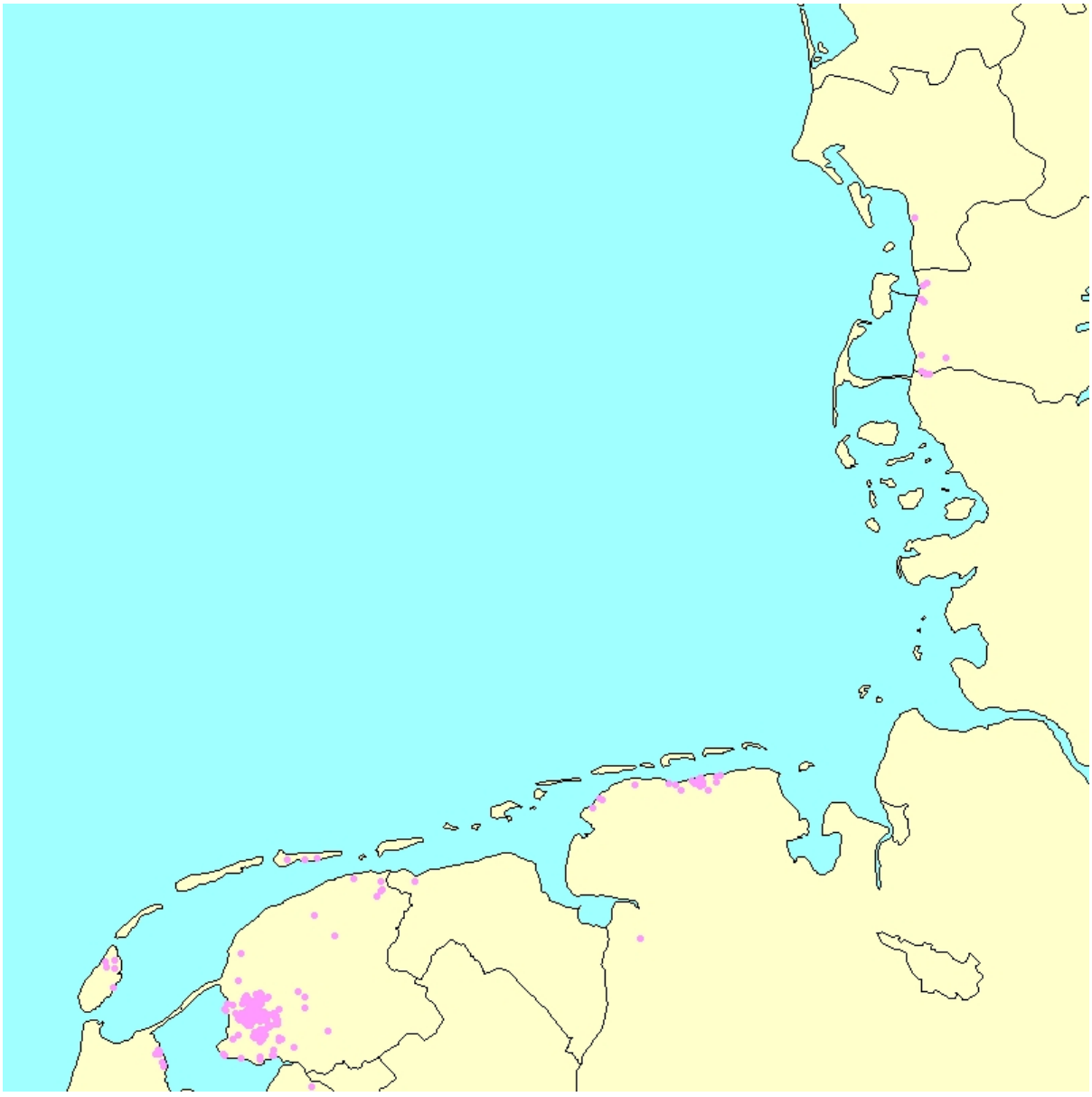


Fig. 3.1.6 Main staging areas of pink-footed geese as indicated by observations of marked geese (from www.geese.org)

The **Bean Goose** has never been known as a real Wadden Sea species in the past, and usually occurs even further inland than the white-fronted goose.
These bean geese all belong to the subspecies *Anser fabalis rossicus*, the so-called tundra bean goose.
This subspecies of the bean goose nests predominantly in the north of the European part of Russia, and migrates mainly through Finland, the Baltic States, Belarus and Poland to winter far inland in eastern Germany. However, up to 200,000 migrate further westward to winter in The Netherlands, and during the last decade a wintering population of 5-10,000 birds has been established on the westernmost Wadden island in The Netherlands, Texel. Also, thousands of tundra bean geese now winter in the Dutch province of Noord-Holland in the Wieringermeerpolder. They roost on the Balgzand and in the Slufter on Texel.
In the Wieringermeer and on Texel these birds feed from late November until late February on arable land, on harvest remains of sugar beet and potatoes. The species is fully protected in The Netherlands and does not cause serious agricultural problems for farmers in the Wadden Sea Region.
During the 1970s to 1980s, the bean goose was a common wintering species in the German part of Dollard area (Gerdes 2000). Nowadays this species winters more to the south, in the maize-dominated Veenkolonieën (prov. Drenthe, NL) and Landkreis Emsland (D) and only occurs in low numbers in the Dollard area.
In Lower Saxony there was a hunting ban for bean geese from 1983 to 2008.
The bean goose has been fully protected from hunting in The Netherlands since 2000, but it is still heavily hunted in Russia.

The **Greylag Goose** is the only goose species in the Wadden Sea which predominantly does not nest in the Arctic, but in the temperate zone. It was almost extinct as a breeding bird in the Wadden Sea Region. However, in the 1960s, hundreds of Norwegian greylags still used the Wadden Sea, e.g. the Boschplaat saltmarsh on Terschelling in spring before migrating to Norway.
The population nowadays breeds in Norway, Sweden, Denmark, Germany, The Netherlands, Belgium and France (Nilsson *et al.* 1999). Traditionally the population wintered in Spain, but with the milder winter climate, they are increasingly wintering in The Netherlands, the Wadden Sea Region and as far north as Denmark and south Sweden. Since the 1960s, the population has increased by nearly 10-fold, and within the last decade by three-fold (Table 1). The increase may partly be attributed to reduced hunting pressure during winter, since they avoid heavy hunting mortality in Spain and France by staying in NW Europe. All over NW Europe, they have expanded the breeding densities and ranges.

For many years attempts have been made (particularly on the Dutch island of Texel) to restore this bird as a breeding bird in The Netherlands. These attempts have finally become very successful. The birds nowadays nest in the dune areas at small lakes, but after the breeding season frequent the polder areas to graze. How to limit this growth or how to reduce the local breeding populations in The Netherlands is currently being investigated by SOVON and Alterra.

In the Wadden Sea Region, greylags forage in a variety of habitats, ranging from salt marshes, pastures, waste grain and root crops as well as winter cereals. The increasing breeding/sedentary populations cause conflicts with agricultural and, depending on the viewpoint, with other nature conservation issues, such as eutrophication of small lakes.

Greylag geese have an open hunting season in the Scandinavian countries, Germany, France and Spain; in The Netherlands there is no open season, but in 2008 almost 80,000 were shot under license.

Trends in wintering and staging geese

The numbers of most goose populations wintering and breeding in Northwest Europe have increased during recent decades. Brent geese are the only exception. The dark-bellied Brent increased markedly until 1991, but since then the population level has dropped from around 300,000 to around 200,000 individuals. Since 1991 breeding has been generally poor, with the exception of only one very good breeding year, 2005. The light-bellied Brent geese are still very low in number, though the trend is an increasing one. All other goose species, which occur in the Wadden Sea are increasing, in particular the barnacle goose and the greylag goose. The Wadden Sea Region is a major staging and wintering and breeding area for several goose species and populations, and conflicts between agricultural interests and farmland feeding geese have been exacerbated. Locally, as small lakes may suffer from eutrophication due to goose droppings, there are also other conflicts.
Some of the species have changed migratory and wintering strategies and site use. This is true for the barnacle goose, which has not only increased its numbers, but also extended the duration of staging in spring by around a month (Koffijberg & Günther 2005). The barnacle has increasingly skipped the traditional spring-staging areas in the Baltic and now stays in the Wadden Sea until mid to late May (Eichhorn *et al.* 2009). Greylag geese have increasingly skipped flying to wintering grounds in Spain and many now winter in the Wadden Sea Region. Pink-footed geese have, on the other hand, departed increasingly earlier from the wintering grounds in Denmark, including the Wadden Sea, towards Norwegian spring staging areas, coinciding with the earlier onset of spring (Tombre *et al.* 2008).
It is difficult to predict the future development of the populations of geese, but it seems realistic that the current positive developments will continue in the near future since the populations themselves, or their actual distribution, are likely to be favoured by the changes in climate occurring now.
Land use in the polder areas of the Wadden Sea Region is likely to change during the coming decades, with increasing winter crops and bioenergy fuel crops; however, in the near future this is not likely to limit the distribution of goose populations (Wisz *et al.* 2008) and probably not their population sizes.
Because it is observed that the geese adapt to new habitats and new migratory strategies, it is likely that the geese will find alternatives.

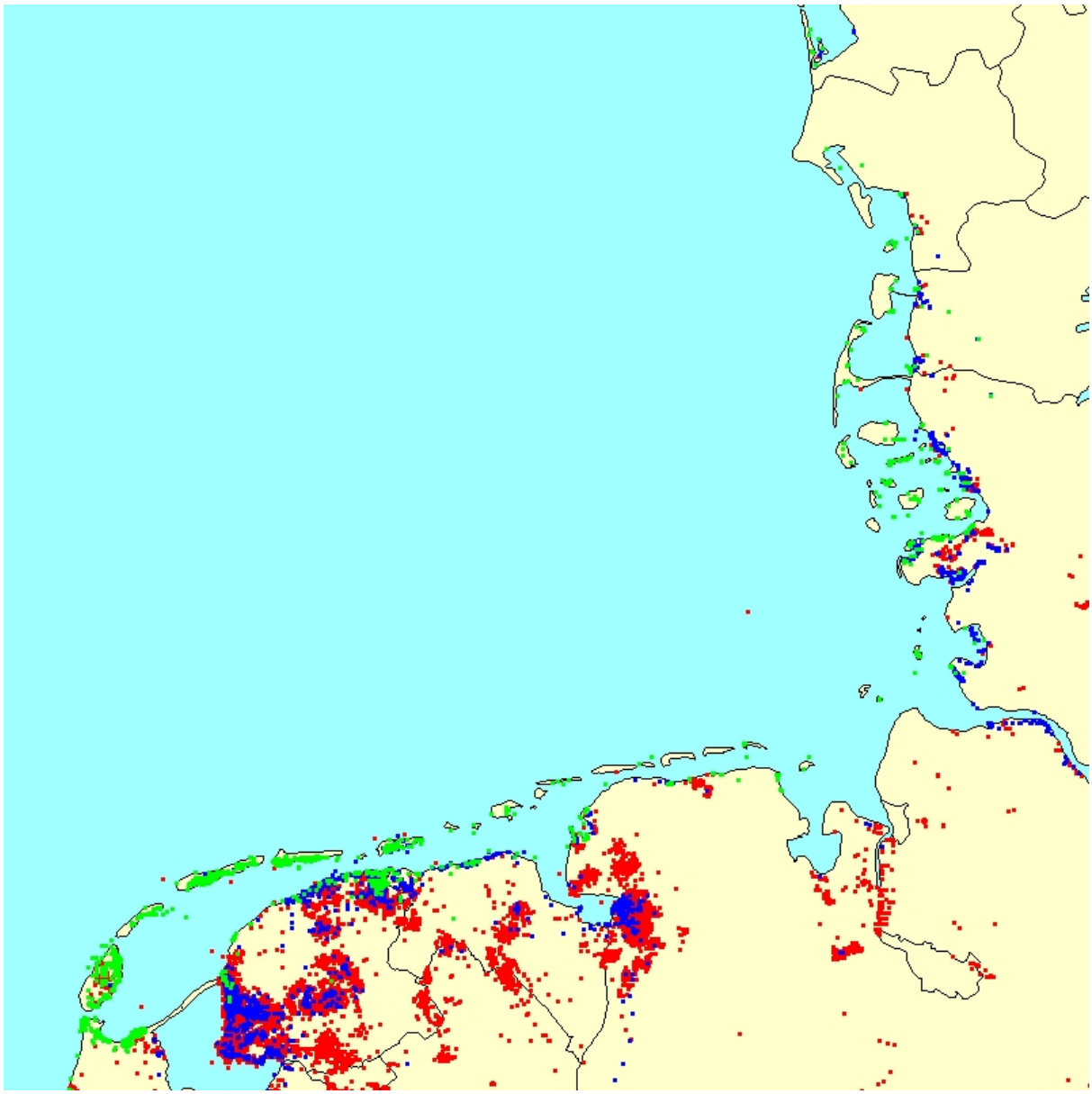


Fig. 3.1.7 Main staging areas of dark-bellied Brent geese (green), plotted over barnacle geese (blue), which are again plotted over greater white-fronted geese (red) as indicated by observations of marked geese (from www.geese.org). This map clearly demonstrates the overlap between feeding grounds of barnacle geese and greater white-fronted geese (compare with the separate maps 3.1.3, 3.1.4 and 3.1.5)

Competition between goose species is likely to become more prominent, especially with increasing densities of barnacle geese, which will also possibly lead to the displacement of other species (e.g. Kruckenberg & Kowallik 2008). Therefore, it is most likely that the conflicts between geese and agriculture in the Wadden Sea Region will remain or even increase in the near future.

Trends in breeding geese

Greylag geese, which were virtually extinct in the last 100 years and were recovered by re-introductions, are breeding in increasing densities on Wadden Sea islands and in marshes on the mainland, and barnacle geese have started to breed on islands and wet inland sites.

At the moment over the whole of The Netherlands the number of breeding greylag geese increases at a rate of 20% per year, whereas the number of nesting barnacle geese increases at a rate of 40% per year (van der Jeugd *et al.* 2006), and presumably the trend for the Wadden Sea is similar.

In the Dutch part of the Wadden Sea, greylag geese are nesting on all Wadden Sea islands, and in the Lauwersmeer area (van der Jeugd *et al.* 2006).

Along the west coast of Schleswig-Holstein there are about 280 breeding pairs of barnacle geese and nearly 3,000 breeding pairs of greylag geese. Most have little breeding success.

The current positive developments might continue in the near future since populations are likely to be favoured by the present changes in climate and favourable winter feeding conditions (grassland improvement). The inland land use in the Wadden Sea area is likely to change during the coming decades, with increasing winter crops and bio energy fuel crops. However, this will probably not limit goose distribution or numbers in the near future (Wisz *et al.* 2008). Since geese can develop new migratory strategies, it is likely that they will find alternatives. Competition between goose species is likely to become more pronounced.

3.2 Inventory specification on regional level

Denmark

With the increasing numbers and a changing distribution of staging and wintering geese, in the Danish Wadden Sea area the following problems have been identified in relation to farming and geese accommodation: direct damage or loss of crops, loss of grass for grazing and damage to field structure during winter and early spring. Furthermore, veterinarian aspects have been mentioned in relation to farmlands with extraordinary high densities of geese.

So far no compensation payments and agri-environmental schemes have been implemented in relation to goose damage.

The farmers on the island of Mandø are facing great challenges with goose damage to agricultural crops. Over the last couple of years especially, increasing numbers of spring staging barnacle geese, staying until the middle of May, have caused them lower harvest yields and consequent loss of income. In 2008 the value of the damage was estimated at a total of EUR 36,421, ranging from EUR 203 to EUR 529 per hectare (assessed by The Danish Farmers' Association).

On the Danish mainland coast, there are increasing problems with barnacle geese foraging on winter cereal fields during late autumn. The damage has not been quantified.

Schleswig-Holstein

Some decades ago Brent geese were the main focus of interest at the Schleswig-Holstein west coast. During spring they used the Halligen in large numbers, and there were many conflicts between farming and conservation interests in the 1970s. In 1986, the „Halligprogramm“[1] was created, integrating most of the governmental support for the Halligen into one programme (incl. payment for goose damage). The Halligprogramm proved to be very successful both for nature and people and there are now few conflicts over geese. Meanwhile there are even annual ‘Brent goose days’ on the Halligen. 2010 was the 13th occasion[2].

the 1980s barnacle geese began to increase in Schleswig-Holstein and in more recent years breeding greylag geese also increased considerably. These species are an issue mainly on the mainland, though there are some minor conflicts on the islands. For some years there has been no governmental compensation for goose damage outside the Halligen (i.e. on the mainland and on other islands), but agri-environmental schemes have been implemented and these pay the farmers irrespective of whether there is actual goose damage or not. However, the farmers are reluctant to take part in the agri-environmental schemes and the success of this program is rather limited.

Beside this, there is a long-term discussion on how and if saltmarsh management would influence the distribution of geese and the damage pattern for farmers inland. Only about one third of all saltmarshes in Schleswig-Holstein are ungrazed, while the other areas are still grazed and can be used by the geese to a higher extent than the ungrazed areas. A number of the grazed saltmarshes are still not used to their full carrying capacity by the geese. This may be because there is a lot of geese scaring activity, some of it illegal in the protected areas, which succeeds in driving the geese from site to site. This makes it difficult for the birds to settle in areas where their grazing may ease the conflict with farmers. An important development is that the Schleswig-Holstein government recently bought some land for management purposes in an area on Eiderstedt used by barnacle goose.

In 2009, the spatial concept (Go- and No-Go-Areas as in preparation by the trilateral Goose Management Group) was presented in the two advisory boards of the National Park and the „Agrarausschuss des Kreises Nordfriesland“. There was a lively discussion with support of the concept by most participants.

[1] see www.schleswig-holstein.de/UmweltLandwirtschaft/DE/NaturschutzForstJagd/08__VertragsNatSchutz/02__Halligprogram/ein__node.html

[2] see www.ringelganstage.de

Lower Saxony

In Lower Saxony the most important sites for resting Nordic geese are located in the lowlands of the middle and lower River Elbe, in the areas along the lower River Ems, the Leybucht and the Dollart and in the region of Jade and Weser.

In the late 1980s, the increasing numbers of resting geese on the one hand and intensified agricultural land use on the other hand, caused growing conflicts. The willingness to accommodate the geese during spring and autumn migration on grassland and arable land along the coast diminished.
In 1996/97, the effects of resting geese on farm crop yields were investigated and voluntary agreements were made between the farmers and nature protection authorities in the EC funding period 1999- 2004.

The first voluntary contracts were concentrated in the Rheiderland in the region of Ems and Dollart. There, the maximum population numbers in 1996/97 were counted with 31,400 barnacle geese, 41,500 white-fronted geese and 3,700 grey-lag geese. The nature conservation administration succeeded in concluding voluntary agreements for about 6,500 ha grassland until 2007. The farmers agreed to accept the Nordic migratory geese on these areas from November to the end of March.

With the designation of SPAs in 2002 by the federal state of Lower Saxony, the most important resting sites became parts of the ecological network Natura 2000. Meanwhile, the spatial framework for voluntary contracts was extended. Today, all SPAs with special importance for barnacle geese, white-fronted geese, Brent geese, whooper and Bewick's swan are covered. The spatial framework covers about 55,000 ha.

In the current EC-funding period, the federal state of Lower Saxony offers a sum of 160 €/ha for tolerating geese on grassland and 265 €/ha on arable land with rape or winter grain. In April 2009, contracts had been signed covering 6,960 ha under funding scheme 422 (protection of resting geese on grassland) and covering 5,960 ha under funding scheme 421 (protection of resting geese on arable land).

Lower Saxony will examine on a bi-annual basis the effects of increasing geese populations on grassland production. Payments for management schemes on both arable and grass land will be made according to exact yield losses. First results are expected by the end of 2010.

Additionally, a new payment approach for extremely high numbers of resting geese on arable land will be provided (so called management of resting peaks). A committee of farmers and ornithologists will assess the effects of geese grazing on rape, winter wheat and barley and will determine compensation levels on the basis of the estimated reduced production. Again, first results are expected by the end of 2010.

The Netherlands

In 2005, the Dutch governmental bodies formulated a new policy for the management of wintering geese and widgeon in the area, because of the increasing numbers of wintering geese and the increased use of inland habitats by widgeon.

Baseline was the designation of go-areas for geese. The attention was mainly focused on the three species considered to be the greatest nuisance to farmers (white-fronted goose, greylag goose and widgeon) with barnacle goose and pink-footed goose as secondary considerations. The basic principle was that geese were welcomed in the go-areas and were driven out of the no-go areas. The go-areas were selected in agreement with the farmers involved. These farmers are paid for their services through the appropriate agri-environment schemes. Farmers outside the go areas were entitled to disturb the geese and move them on to reduce the damage. However, if the geese failed to move, the farmers were compensated for the damage caused. The damage was estimated by independent organizations.

Since this policy was introduced, the scale of the damage has become well known (Melman *et al.* 2009). The number of goose-days were as follows: 370 million in 2005/06, 317 million in 2006/07 and 350 million in 2007/08. The corresponding payments due to damage were resp. euros 2.3 million, 3 million and 6.4 million. This is only part of the total cost of the policy, since the payments in the go areas also have to be considered. The totals were resp. 12.3, 13.8 and 13.0 million euros per winter season.

In the go-areas, ‘welcoming measures’ include quietness in the field, a ban on disturbance activities, and the provision of adequate food for the geese (e.g. no competition with grazing sheep). A variety of scaring methods has been developed for the no-go areas (gas canons, scarecrows, dog chasing, etc.). In order to get paid for the any goose damage in no-go areas, farmers have to demonstrate that they have used at least three of these measures. The shooting of geese is viewed as a last resort, to be used only when all other measures have evidently failed. The number of white-fronted geese shot were as follows: 33,000 during 2005/06, 29,000 during 2006/07 and 41,000 during 2007/08 (Van der Zee *et al.* 2010). For greylag geese the numbers were resp. 19,000, 22,000 and 43,000; for wigeon 3,300, 2,300 and 3,000. Other species were not allowed to be shot when causing damage. In the go areas, goose watching was promoted as a form of tourism. In particular in The Netherlands, where distances are small, goose-watching day trips proved popular and helped stimulate local entrepreneurship. The fact that money could be made from viewing the birds helped changed the perception that geese were just a pest species. Instead, they could be viewed as natural assets of great value. Making a success of this tourist activity requires close co-operation between farmers and entrepreneurs and their respective lobby groups.

There were basically four different packages under the goose agri-environment scheme during the season 2005/06 to 2008/09 (Van der Zee *et al.* 2010): grasslands (45,000-52,000 ha), arable land (800-4100 ha), green manure crops on arable land (900–3.100 ha), and green manure crops on maize (2.000 – 2.300 ha). The grassland-package is the most important one.
The policy was effective in stopping most complaints concerning goose damage. However, it was not cost-effective: costs increased about six fold. There is still debate surrounding the flexibility of the schemes: farmers prefer flexible (year-to-year, voluntary basis) contracts whilst geese behaviour patterns are changing: however, go areas cannot be changed on a yearly basis.

3.3 Existing guidelines and experiences from other countries

Introduction

Conflicts between wild birds and commercial interests, e.g. agriculture, are not restricted to the Wadden Sea. They occur all over the world. The subject is addressed by *inter alia* AEWA (African_Eurasian Waterbird Agreement), which is basically an agreement on the protection of waterbirds. In its Guidelines (No. 8) on reducing crop damage, damage to fisheries, bird strikes and other forms of conflict between waterbirds and human activities[3], the Agreement examines the major causes of conflict between migratory waterbirds and agriculture, fisheries and aviation. It outlines procedures for investigating the problems and suggests a number of measures that can be taken to reduce the damage. These include keeping birds away from sensitive areas through the creation of physical or ecological barriers; scaring birds away from the site through the use of aerial or ground predators, scarecrows, hunters, guards or loud noises; controlling the populations of the bird species causing the damage through trapping, shooting of adults or destruction of eggs and nests, as far as national and international legislation allows; alternative feeding and roosting areas (secure refuges) at a considerable distance from the sensitive areas; paying compensation to companies or individuals suffering damage; and adopting alternative forms of land use in areas especially prone to damage from waterbirds.
However, in terms of practical measures with potential application in the Wadden Sea situation, there are interesting examples on goose management in two countries, Scotland and Norway.

[3] http://www.unep-aewa.org/publications/conservation_guidelines/pdf/cg_8new.pdf

United Kingdom

The United Kingdom has for many years experienced and managed goose-agri-conflict comparable to the present Wadden Sea situation. Particularly in Scotland, goose populations have expanded greatly over the past 20-30 years, and Scotland supports over 400,000 geese for at least part of the winter. A national policy framework has been created, based on national and local management schemes. Further, a national co-coordinating body was set up in May 2000 to implement the national policy framework and to advise Scottish Ministers on goose management. As part of this function, the body conducts a multi-disciplinary review of the national policy framework every five years, and reports its findings to ministers. The latest report (2005)[4] gives the following overall conclusions (selected):

The policies for management of the interaction between geese and agriculture have worked, and the national policy framework has delivered what it set out to do, and perhaps more.

The approach to national and local partnership, the integration of the needs of conservation and agriculture, the evidence base of sound science and the growing recognition of the wider public benefits all contribute to the delivery of the objectives and are all direct consequences of the policy framework established.

The National Goose Management Review Group (NGMRG) and stakeholder representatives have welcomed the opportunity to work together to steer the implementation of the new policy framework.

Local goose management schemes have, as a whole, been successful in delivering the national policy objective of avoiding economic loss to farmers and crofters. This has been achieved primarily by means of direct payments which reflect costs incurred and profits foregone as a result of managing land in a manner consistent with the presence of significant numbers of geese.

In general, the schemes were found to provide good value for money, although the findings of the evaluation indicate that the administration and efficiency of schemes could, in certain respects, be improved.

Experiences and inventories made under the Scottish program were to some degree used as basis for the work and the recommendations of the Wadden Sea GMG. It is recommended that a Wadden Sea Goose Management Plan will take into account further analysis and consultation of authorities and stakeholders in the UK.

Norway

Increasing numbers of spring-staging pink-footed geese in Nord-Trøndelag in mid Norway and Vesterålen in northern Norway as well as barnacle geese in Helgeland in northern Norway have caused increasing conflicts with agricultural interests. Geese compete for pasture grass with livestock and, in Nord-Trøndelag, pink-footed geese also feed on newly sown cereal fields. Since 2006, the Norwegian Ministry of Agriculture has financed an environmental scheme whereby farmers are subsidized for provisioning areas where geese can feed without deliberate scaring. Outside these “refuges”, farmers are allowed to scare geese off the farmland. The subsidy is 36.5 EURO per 0.1 ha pasture and 12.2 EURO per 0.1 ha new-sown cereal field. In Vesterålen, the subsidy is graduated

[4] http://www.scotland.gov.uk/Resource/Doc/201676/0053779.pdf

according to the goose grazing pressure registered in the previous season. The scheme is coordinated by the municipalities and the county councils, and in 2009, a total amount of approximately 365,000 EURO was spent on the scheme (see Tombre *et al.* 2009; Madsen *et al.* 2010). Refuges are selected in a dialogue between the farmers and the local authorities. A prioritization of the geographical distribution and sizes of refuges is based on a scientific assessment. Hence, monitoring of goose use of the area is carried out to evaluate the goose grazing pressure, and in Nord-Trøndelag which has a wide geographic extent, a spatial model of the areas preferred by the geese has been used as a basis for the prioritization (Jensen *et al.* 2008). Hence, there is a close coupling between science and stakeholders in the design and tuning of the program.

Despite the introduction of the environmental subsidy scheme, there is a concern about the continued growth of the populations and their increasing use of farmland for feeding. This has led to a call for an initiative to reduce the population growth of the pink-footed goose in particular. This has now been endorsed by the Norwegian authorities and a campaign to increase hunting of pink-footed geese in autumn has been installed. However, since this will potentially have implications for conservation management policies in the other range states (primarily Denmark, The Netherlands and Belgium), the Norwegian authorities have realized the need to bring this initiative up in an international context. Therefore, an international flyway plan for the population is now planned under the African-Eurasian Waterbird Agreement (AEWA). It will focus on implementing the first European example of an internationally coordinated adaptive management plan for a migratory bird population, with clearly agreed objectives, and a close coupling between management and scientific monitoring and evaluation.

4 A common management - benefits and perspectives

The Wadden Sea is hosting populations of seven species of geese falling under the definition of migratory birds, as defined by CMS, crossing political borders in a predictable and cyclic way. The Wadden Sea populations of geese are hosted by several countries mainly to the north of the Wadden Sea but also to the south (see map 1). They share the responsibility on one hand to conserve these populations and keep them in a favorable conservation status and on the other hand to ensure a sustainable development of the community's commercial and recreational interests.

As the birds are migratory, management initiatives taken in one region or country are likely to have an effect in adjacent regions. Examples of this are that scaring activities to reduce goose grazing on pastures in northern Norway were probably causing a change in the spring migration strategy of the population of pink-footed goose, leading to an increased pressure on staging areas in mid Norway (Madsen 2001; Klaassen *et al.* 2006). Also decisions on livestock grazing in conservation areas influence the carrying capacity for geese there (Bos *et al.* 2005, Koffijberg & Günther 2005), though these decisions have to be balanced with other nature conservation goals.

The Wadden Sea Range States carry a significant share of the conservation obligations, due to the extraordinary importance of the area as a stopover and wintering site for goose populations and biodiversity in general, which has already been formulated and consolidated in several treaties, agreements and institutions. The three Wadden Sea countries are all members of the EU, and hence are obliged by the Birds and Habitat directives to conserve the populations of geese and their habitats; all three countries are parties to the Ramsar Convention and the African-Eurasian Waterbird Agreement under the Bonn Convention, under which Parties are required to co-operate with a view to identifying appropriate techniques to minimize damage, or to mitigate the effects of damage, in particular to crops, caused by populations of waterbirds. Last but not the least, the countries are signatories of the Trilateral Wadden Sea Cooperation. This means that there is a strong commitment to act in cooperation internationally and trilaterally.

In this respect, goose management is an interesting and urgent case, because all three countries 1) experience increasing conflicts between farming interests and geese, 2) share the geese as a resource for nature tourism and in some parts of the area for recreation, and 3) regard geese as a natural asset and part of the protected Wadden Sea ecosystem. Furthermore, the goose conflict presents the countries with so many issues in common that the national management authorities can benefit from learning from each other. The countries have, however, different policies and approaches to the management of geese, which are often directed very locally and sporadically. The shortcomings of local management schemes can be illustrated by the handling of goose-agri-conflicts on the island Mandø in the Danish Wadden Sea. On Mandø, the polder is used for cattle and sheep grazing and the numbers of barnacle geese have increased dramatically during recent years, with a peak of 20,000 individuals in spring. The island is also a Natura 2000 area, partly designated due to the dense community of breeding meadow birds.

Whatever *ad hoc* management option is chosen to resolve the local problem, there will be repercussions for either farming interests, Natura 2000 interests or goose management because the geese will disperse and, most likely, conflicts

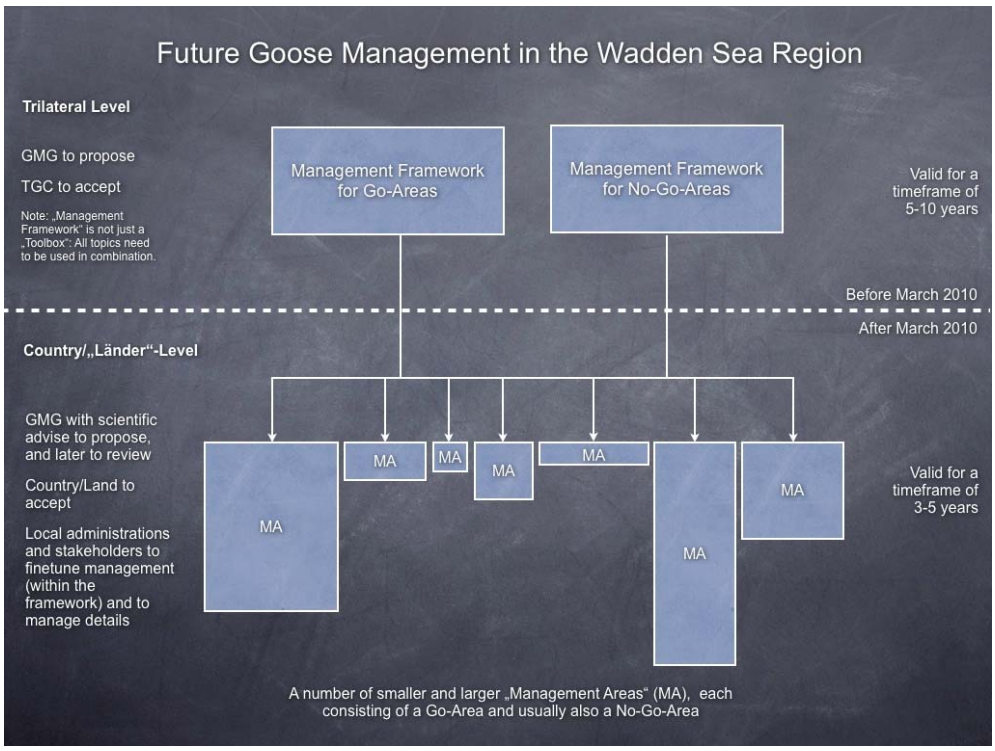
will appear in other areas. Therefore, the longer-term sustainable solution is to put the local conflict into a regional perspective.
It is inevitable that the strong obligations of conservation and conflict resolution can only be fulfilled by a common understanding and a management that is fully integrated and coordinated and which is based on common visions and aims that are concurrently adapted to the dynamics and development of ecosystems and populations. Such a common management must ensure that the Wadden Sea Range countries jointly contribute to the conservation of goose populations at a level that is proportional to the importance of the Wadden Sea as a goose site. At the same time, a common management must aim at sharing benefits and inconveniences of goose populations and establish a joint toolbox to assist stakeholders at all levels to act in accordance with common aims.

4.1 Spatial management

Geese occur not only in the Wadden Sea Cooperation Area but also in the wider Wadden Sea Region and they use natural, semi-natural and agricultural habitats, depending on species, season and agricultural practice. Potentially, the goose-agriculture conflict is likely to escalate as goose populations and densities increase. The only solution seems to be an internationally coordinated and integrated management. This will rest on a spatial setup, where the management is differentiated according to the priorities of specific areas of the Wadden Sea Region – overall management is adapted to the local conditions. At the core of the joint framework is the concept of „Go- and No-Go-Areas“ for geese, with support for geese and their management in the Go-Areas – among them, but not exclusively, the protected areas – while the geese are allowed to be disturbed and forced out of the No-Go-Areas.

Categories of areas as used in this report:

Area	Definition/description	Comments
Population area (flyway)	The total (gross) distribution area of the goose populations staging/wintering in the Wadden Sea region.	At this level, the Group recommends that WS countries support flyway management through engagement in international Governmental cooperation, projects (e.g., the actual planned adaptive flyway management plan for the pink-footed goose), research, monitoring etc.
Wadden Sea Region	This region forms the basis for the work of the Wadden Sea Forum	The GMG recommends that the Wadden Sea Region is the framework for integrated goose management.
The Wadden Sea Cooperation Area	Declaration 2001, Annex II.	The GMG believes this area to be too narrow for an integrated management plan as it does not include important inland goose areas.
Goose Management Areas	Strategically designated areas around conflict sites within the Wadden Sea Region, where conservation and farming interests are prioritized and designated into a system of Go- and No-Go areas with a scientifically defined connectivity.	Management Areas contain: 1. Go-areas with no disturbance policies that encourage geese, and are supported by agri-environmental schemes. 2. No-Go-areas, where farming is prioritized and scaring can or should be introduced. Each Management Area should be structured with an administration and stakeholder group giving advice and ensuring management.



Proposal for the overall management framework for Go- and for No-Go areas

Topic	Go-Areas	No-Go-Areas
Size	Preferably large and coherent, but adapted to local conditions. Usually there should be no „No-Go-Islands" within a Go-Area. Include transit corridors to No-Go-areas, if not adjacent.	Everything within a local „management unit" which is not a Go-area.
Continuum	Must be designated for a significant span of years, as the geese must to be able to learn where they are welcome.	Must be designated for a significant span of years, as the geese must be able to learn where they are not welcome.
Selection criteria	High goose numbers (potentially). Within 10km of night roost Low farming interests. Grassland. Other criteria.	Low goose potential. Private areas. High farming interests. Arable land. Other criteria.
Costs/ profits	Farmers supported by adaptive agri-environmental schemes to prevent unfair burden caused by geese.	No agri-environmental schemes for geese apply.
Hunting/ control	No hunting of geese or hunting that disturbs geese. No control. No hunting of geese on the daily route between roosting and feeding sites if both are Go-areas.	Hunting following national regulations. Control schemes managed by local administration units.
Scaring and distur-bances	No scaring of geese which are within the area. Disturbances to be avoided as far as possible, particularly in extreme weather (strong frost or thick snow layer).	Active scaring of geese if this is necessary to prevent crop damage. Use of "scaring toolbox".
Habitat	Preferably grassland, rather wet, with places of open water available.	
Infra-structure	Usually no wind turbines and in general as few vertical structures or power lines as possible.	
Active ma-nagement	No artificial feeding of geese. Rather less fertilizer than more.	
Other Birds	Management should also support meadow birds.	
Tourism	Responsible goose tourism should preferably operate in the Go-areas.	Usually no goose tourism supported (even if geese are present).

4.2 Agri-environmental schemes

It is essential, that an integrated cross-border management of goose-agri conflicts in the Wadden Sea Region is supported by economical tools to ensure that farmers are compensated for yield loss via agri-environmental schemes. The traditional mechanism has been direct compensation for the damage caused by geese and documented by the farmer. In recent years, this has been changed into programs where EU-based subsidy systems are tailored to pay farmers for environmental services such as practising "goose-friendly" farming (accommodation).
Integrated management requires the development of local solutions in both a trilateral and European perspective, since an effective measure in one region (e.g. Schleswig-Holstein) will have consequences in another region (e.g. Fryslân). Regional and national solutions thus cannot stand alone. At this moment, the three Wadden Sea countries have very different traditions and approaches in their agri-environmental schemes. In The Netherlands, there is a national system including payment for goose damage and 'goose-friendly' farming agreements under the EU agri-environment schemes. In Germany, there is no direct payment for damage, but there are agreements under the EU agri-environment schemes and under the special "Halligprogramm" that was initiated in 1987. In Denmark, there is at present no system of damage compensation, nor agreements under the agri-environment schemes particularly targeted at goose-agri-conflicts.
Funds for payment schemes may be regional, national or EU-based. In the context of a joint trilateral approach, it seems obvious EU CAP and Environment instruments are further developed in order to pay farmers for environmental services in goose-agri-conflict situations.
The Group recommends national and regional governments of the Wadden Sea countries to utilize existing programs and influence the future development of EU CAP to ensure straightforward measures are in place to finance programs for the sustainable management of geese and agriculture in the Wadden Sea Region.

4.3 Hunting

Hunting for recreation or management

Hunting has been mentioned as a possible tool to support goose management in the No-Go-Areas for geese in the Wadden Sea Region. The following definitions (based on e.g. Kanstrup 2007) are used in the analysis and form the basis for our recommendations.

a) Recreational hunting
Recreational hunting of waterbirds is still occurring in all Wadden Sea range states, though most widespread in Denmark. Recreational hunting of birds is regulated by the EU Birds Directive Article 5, proposing the establishment of a general scheme of protection for all wild birds, and Article 7, specifying the conditions under which recreational hunting can be undertaken. Recreational hunting is regulated by open seasons for particular species (Annex II) or by spatial management (reserves etc.). Hunting provisions of Article 7 do not explicitly refer to the question of SPAs designated for birds listed in Annex I or migratory species (ref. Article 4.2),

It seems recreational hunting could play only a small part in a management scheme in the Wadden Sea Region: if recreational hunting occurs within No-Go-Areas, the side-effect of scaring needs to be considered, as does the fact that some farmers will more readily accept damage caused by geese for the benefit of being able to rent out the hunting right, or indeed, to use the hunting right themselves. Furthermore, recreational hunting outside the Wadden Sea Region is a factor that – due to disturbance - might increase the concentration of geese within the region due to disturbance elsewhere. Also, more intense recreational hunting during autumn migration in the northern parts of the Wadden Sea Region (Denmark) may cause a concentration of geese in the southern parts (SH, NS and TN).

GMG does not recommend increasing recreational hunting in the Wadden Sea Region. However, the sustainability of hunting in the northern part of the region, with emphasis on decreasing the disturbance/harvest-ratio, needs to be ensured.

b) Management hunting – smaller scale
Hunting can be used as a tool to control populations at a local scale and chase birds out of a particular site or area (see also chapter “Scaring”). Such “management hunting” is allowed by EU member states under derogations of the Birds Directive with special reference to Article 9 of the Directive, if it has been demonstrated that there is no other satisfactory solution and to prevent serious damage to e.g. crops. At present, all Wadden Sea countries allow such derogation concerning geese almost irrespective of their listing in Annex I or II in the region.

"Management hunting" under Article 9 has been allowed under general conditions where farmers can authorize it without an individual license as long as certain conditions are fulfilled. Such a system has been in operation in Denmark for decades (e.g. control of greylag goose in July and August). However, in recent years this system has, due to criticism from the EU, been changed into more specific schemes, where individual licenses are granted to farmers upon application. Management hunting is an instrument initiated by the single farmer

or groups of farmers. They may carry out the hunting themselves, task employees or authorize hunters, who will normally be willing to do it voluntarily. Depending on benefits (e.g. numbers of geese to be shot), hunters may offer payment for carrying out the control. However, it is not clear whether such a system would be in line with European and national legislation. Management hunting is also an instrument that ensures the farmers are not left completely without means of defending their crop (a "psychological" element).

GMG regards management hunting of geese under the provisions of Article 9 as an appropriate tool to support the spatial approach in goose-agri-conflicts in the Wadden Sea Region. Management hunting can serve as an instrument to scare geese out of "No-Go" areas under the strict definitions of the management framework and for the schemes for each "Management Area".

c) Management hunting – larger scale (culling)

"Culling" is also a type of management hunting. It covers systematic efforts to reduce population sizes. It is regulated by the EU Birds Directive Art. 9 (derogation). Except for the few cases of netting and gassing of moulting greylag geese in The Netherlands, no existing scheme in the Wadden Sea can be regarded as "culling". As culling aims at reducing population sizes significantly, it can only be applied to migratory populations under the authority of a flyway management plan.

GMG does not regard culling as an appropriate tool to manage goose-agri-conflicts in the Wadden Sea Region.

4.4 Scaring

A traditional tool to reduce goose-agri conflicts is scaring the birds away from fields (i.e. for the Wadden Sea Region the "No-Go-Areas", see chapter 4.1). Experiences and evaluations are known from many places and from the literature. One of the most thorough studies is Bishop (2004[5]). The overall conclusions and recommendations are:

Auditory bird deterrents (e.g. gas cannons, bio-acoustics, acoustics, ultrasonics and high intensity sound) are in general thought to be relatively effective, although subject to habituation and hence of short-term benefit.
The GMG regards some of these techniques as appropriate in a Wadden Sea context, though care has to be taken that the people living in the area are not excessively annoyed by the measures.

Visual techniques (e.g. lasers, dogs, human scarer, scarecrows, raptor models, corpses, balloons, kites, falconry, radio-controlled aircraft, lights, mirrors/reflectors, flags) range from extremely effective (human disturbance) to ineffective (most scarecrows). Effectiveness depends on how real a threat the various predators and models are perceived to be by the geese, or how much that tapes and wires are perceived by the geese to interfere with movement.

The GMG regards some of these techniques as appropriate in a Wadden Se context and recommends further development.

Chemical techniques (taste repellents, behavioral repellents, tactile repellents) are generally found to be very effective in laboratory and cage trials, but less effective in the field. Chemicals are normally not licensed for use as bird repellents.
The GMG regards these techniques as inappropriate in a Wadden Sea context.

Exclusion (nets, wires) is usually effective. Efficacy depends on the degree to which birds are excluded, but the greater the exclusion zone, the more expensive it gets. They therefore tend to be restricted to high value crops or costly damage.
The GMG regards this technique as inappropriate in a Wadden Sea context.

Lethal techniques (shooting, egg destruction, nest destruction) are generally considered to enhance other scaring methods, though this remains largely untested. However, as a means of population control they can be less effective and costly.
The GMG regards shooting in the form of licensed management hunting (see chapter 4.3) as appropriate in a Wadden Sea context.

[5] http://www.defra.gov.uk/environment/quality/noise/research/birdscaring/birdscaring.pdf

Scaring techniques have one overall drawback: they are normally not used in a regionally integrated setup but merely under local or “field”-based conditions. The result is that they mostly tend to scare bird from one field to the next, thus just moving the problem.
The Group regards some of the known techniques as appropriate to further develop and test in an integrated management scheme, first of all to ensure the efficiency of the spatial management as decribed in chapter 4.1. Scaring campaigns must be tailored to the particular area and organized under the guidance of the single management unit. Combinations of techniques, applied in an integrated control strategy, are considered to be more effective than techniques applied singly.

4.5 Knowledge exchange through established GMG

The sustainable development of the management of goose-agri-conflict in the Wadden Sea rests to a very high degree on a common understanding and sharing of knowledge and experiences. Today, there is no cross-border and institutionalized goose monitoring program for areas outside the Wadden Sea itself – which is covered by the monitoring program TMAP - but more sporadic local counting.
The GMG recommends that a standing management group is established under the trilateral cooperation. Experiences from other places, e.g. Scotland, have shown the benefits of a cross-sectional group representing administration and stakeholders from farming and nature in all four major parts of the Wadden Sea Region (i.e. The Netherlands, Niedersachsen, Schleswig-Holstein, Denmark) as well as scientists. In a Wadden Sea context, the primary function of the management group should be ensuring the trilateral cross-border management of geese.

The main tasks of the future Wadden Sea GMG should be:

Common monitoring

The experiences with the approach suggested in this report need to be monitored and evaluated. With regard to the goose monitoring, close cooperation with the Trilateral Monitoring and Assessment Program (TMAP) should be ensured. The TMAP should also consider the data of the wider Wadden Sea Region. The future development of TMAP should consider the needs of the Goose Management Plan.
Further, the GMG should identify agricultural priorities and thereby ensure proper mapping of potential conflict sites and, consequently, assist in the setting up and administration of management units.

Coordination and information

The present level of information about goose-agri-conflict management available in the Wadden Sea Region is rather limited. The GMG would serve as a coordination body to establish an information network locally supported by the members of the group.
The *modus operandi* should be a permanent internet platform based on input from all levels and targeted at users at regional and local level, i.e. regional advisory bodies (GO and NGO), management units, local stakeholders, and – not least – the single farmer.

5 Future management recommendations

The GMG has elaborated recommendations for future management in order to move from a conflict to coexistence. It is proposed to adopt a strategic approach to coordinated goose management, including:

- to establish a trilateral Goose Management Group (GMG) with all sectors and regions represented in order

  to develop a trilateral goose management plan (TGMP) in line with the guidance and recommendations given by this document;
  to monitor and evaluate the experiences with goose management; and
  to provide trilateral information and knowledge exchange.
- to develop a set of agreed management objectives concerning geese and their protection across the trilateral Wadden Sea Region,
- to describe the overall present goose use and prediction of future sustainability of the Wadden Sea Region based on the habitat preferences, spatial interactions and behaviour of the involved goose species. It is important to include both the areas outside the dikes and the polders/mainland areas, because geese traditionally use the whole area as an integral part of their feeding range,
- to analyse the vulnerability of crops and sites in relation to goose distribution and to examine the economic effects of goose grazing,
- to develop and implement a spatial goose management approach as the core of a future strategy with the aim of transforming a conflict situation to a coexistence situation. This will encompass the designation of Go- and No-Go-Areas on the basis of analyzing goose concentrations in defined spatial areas to achieve the most efficient joint management,
- in the framework of a future spatial goose management plan to develop various management tools such as scaring measures, which also include management hunting under the provision of the EU Bird Directive, and to support empirical studies on their effectiveness as well as on predictions of their effects on goose distribution and behaviour,
- to encourage an open dialogue and to strive for good cooperation (horizontal interaction) with farmers and other stakeholders involved in the Wadden Sea Region,
- to develop agri-environmental schemes which allows farmers to be paid for their environmental services related to geese, taking into account that conflicts must be minimized and that costs for tax-payers must be at a level justified by efficiency of the management,
- to further improve the existing monitoring programs in order to support the aims of the goose management plan,
- to encourage national, regional and local bodies to support the further development of eco-tourism as a tool that maximizes the economic advantages of the geese management approach.

6 References

Boyd, H. 1961. The number of Barnacle Geese in Europe 1959-1960. Wildfowl Trust Annual Report 12:116-124

Ebbinge, B., K. Canters and R. Drent 1975. Wildfowl 26: 5-19

Ebbinge, B.S. 1979. Brandganzen en hun voedsel hoofdstuk 5: pp 38-45 In: werkgroep Lauwersmeer: De Lauwersmeer, Harlingen 1979

Ebbinge, B.S. 1983 Barnacle Goose Pp 6-27 in Wolff, W.J. (Ed.) Ecology of the Wadden Sea, Volume 2. A.A. Balkema, Rotterdam, The Netherlands

Ebbinge, B.S. ,Fog, M. & Prokosch, P. 1983 Brent Geese in Wolff, W.J. (Ed.) Ecology of the Wadden Sea, Volume 2. A.A. Balkema, Rotterdam, NL

Ebbinge, B.S. , van der Meulen, H. & Smit, J.J. 1984. Changes in winter distribution and population size of the Pink-footed Geese in Svalbard. Norsk Polar Institutt Skrifter 181:11-17

Ebbinge, B.S. 1992. Regulation of numbers of Dark-bellied Brent Geese Branta b. bernicla on spring staging sites. Ardea 80:203-228

Ebbinge, B.S., 2009. Evaluatie opvangbeleid 2005-2008 overwinterende ganzen en smienten. Deelrapport 4. Invloed opvangbeleid op de internationale verspreiding van overwinterende ganzen in NW-Europa. Wageningen, Alterra, Alterra-rapport 1842.

Eichhorn, G., Drent, R.H., Stahl, J., Leito, A. & Alerstam, T., 2009. Skipping the Baltic: the emergence of a dichotomy of alternative spring migration strategies in Russian barnacle geese. Journal of Animal Ecology 78, 63-72

Fox, A.D., Madsen, J., Boyd, H., Kuijken, E., Norriss, D.W., Tombre, I.M. & Stroud, D.A., 2005. Effects of agricultural change on abundance, fitness components and distribution of two arctic-nesting goose populations. Global Change Biology 11, 881–893.

Ganter, B., Larsson, K., Syroechkovskiy, E.V., Litvin, K.E.. Leito, A. & Madsaen, J. 1999. Barnacle Goose (Branta leucopsis): Russia/Baltic pp 270-283 In: Madsen, J., Cracknell, G. & Fox, A.D. (Eds.), 1999. Goose Populations of the Western Palearctic. A review of status and distribution. Wetlands International Publication No. 48. Wetlands International, Wageningen, The Netherlands. National Environmental Research Institute, Rønde, Denmark.

Gerdes, K. 2000. Die Vögel des Landkreis Leer und der Nordseeinsel Borkum. – Verlag Schuster, Leer.

Groot Bruinderink, G.A. 1989. The impact of wild geese visiting improved grasslands in the Netherlands. Journal of Applied Ecology 26: 131-146.

Heyd, A. & A. Hirschfeld 2005. Jagdbedingte Mortalität von Zugvögeln in Europa: Streckenzahlen und Forderungen aus Sicht des Vogel- und Tierschutzes. – Ber. Vogelschutz 42: 47-74

Jaene-Borbach, J., H. Kruckenberg, P. Südbeck & G. Lauenstein 2001. Arktische Gänse als Rastvögel im Rheiderland - Eine Studie zur Ökologie und zum Einfluss auf den Ertrag landwirtschaftlicher Kulturen. – Landwirtschaftskammerverlag, Oldenburg.

Jensen, R.A., Wisz, M.S. & Madsen, J. 2008: Prioritizing refuge sites for migratory geese to alleviate conflicts with agriculture. - Biological Conservation 141: 1806-1818.

Kéry, M., Madsen, J. & Lebreton, J.-D. 2006. Survival of Svalbard pink-footed geese *Anser brachyrhynchus* in relation to winter climate, density and land use. - Journal of Animal Ecology 75(5): 1172-1181.

Klaassen, M., Bauer, S., Madsen, J. & Tombre, I. 2006: Modelling behavioural and fitness consequences of disturbance for geese along their spring flyway. - Journal of Applied Ecology 43: 92-100.

Kruckenberg, H., A. Kondratyev, J.H.Mooij, C. Zöckler & E. Zaynagutdinova 2008. White-fronted Goose Flyway Population Status. – Angewandte Feldbiologie 2: 1-68.

Kruckenberg, H. & Kowallik, C., 2008. Verdrängen Weißwangengänse *Branta leucopsis* die Blässgänse *Anser albifrons* aus ihren Nahrungsgebieten am Dollart? Vogelkdl. Ber. Niedersachs. 40, 417-426.

Koffijberg, K. & Günther, K ., 2005. Recent population dynamics and habitat use of barnacle geese and dark-bellied Brent geese in the Wadden Sea. Migratory Waterbirds in the Wadden Sea 1980–2000. Wadden Sea Ecosystem No. 20 (eds. J. Blew & P. Südbeck), pp. 149–170. Common Wadden Sea Secretariat, Wilhelmshaven, Germany.

Koffijberg, K.,Beekman, J., Cottaar, F.,Ebbinge,B. van der Jeugd, H., Nienhuis, J., Tanger, D. Voslamber,B. & van Winden, E. 2010. Doortrekkende en overwinterende ganzen in Nederland. De Levende Natuur 111:3-9

Madsen, J., Cracknell, G. & Fox, A.D. (Eds.), 1999. Goose Populations of the Western Palearctic. A review of status and distribution. Wetlands International Publication No. 48. Wetlands International, Wageningen, The Netherlands. National Environmental Research Institute, Rønde, Denmark.

Madsen, J. 2001: Choice of spring migration strategies by pink-footed geese Anser brachyrhynchus and consequences for spring fattening and fecundity. – Ardea 89(special issue): 43-55.

Madsen, J., Tombre, I.M., Bjerrum, M., Nicolaisen, P.I., Hansen, F. & Ødegaard, P.I. 2010: Biologisk evaluering av tilskuddsordningen for forvaltning av kortnebbgjess i Nord-Trøndelag, våren 2009. – NINA Rapport 540, 22 pp.

Nilsson, L., Follestad, A., Koffijberg, K., Kuijken, E., Madsen, J., Mooij, J., Mouronval, J.B., Persson, H., Schricke, V. & Voslamber, B. 1999. Greylag Goose *Anser anser*: Northwest Europe. Pp. 182-201. in: Madsen, J., Cracknell, G. & Fox, A.D. (eds) Goose Populations of the Western Palearctic. A review of status and distribution. Wetlands International Publication No. 48. Wetlands International, Wageningen, The Netherlands. National Environmental Research Institute, Rønde, Denmark. 344 pp.

Prokosch, P. 1984. The wintering sites of Svalbard Pink-footed Geese *Anser brachyrhynchus* in Germany – present situation. - Nor. Polarinst. Skr. 181: 25-28.

Prokosch, P. & H.-U. Rösner (1991): Kurzschnabelgans - Anser brachyrhynchos. In: Berndt, R.K. & G. Busche (Hrsg.): Vogelwelt Schleswig-Holsteins, Bd. 3: 57-59. Neumünster.

Rutschke, E. 1987. Die Wildgänse Europas, Aula, Wiesbaden.

Tombre, I. M., Høgda, K.A., Madsen, J., Griffin, L.R., Kuijken, E., Shimmings, P., Rees, E. & Verscheure, C., 2008. The onset of spring and timing of migration in two arctic nesting goose populations: the pink-footed goose *Anser brachyrhynchus* and the barnacle goose *Branta leucopsis*. Journal of Avian Biology 39, 691-703.

Tombre, I.M., Madsen, J. & Bakken, J. 2009: Registreringer av rastende gjess i Vesterålen: Resultater fra våren 2009. – NINA Rapport 527, 71 pp. (NINA Rapport; 527).

Van Eerden, M. Zijlstra, M. van Roomen, M.& Timmerman, A., 1996. The response of Anatidae to changes in agricultural practice: long-term shifts in the carrying capacity of wintering waterfowl. Gibier Faune Sauvage 13, 681-706.

Van der Jeugd, H., Voslamber, B., van Turnhout,C.,Sierdsema,H.,Feige, N.,Nienhuis, J. & Koffijberg, K. 2006. Overzomerende ganzen in Nederland: grenzen aan de groei? Sovon-Onderzoeksrapport 2006/02, SOVON Vogelonderzoek Nederland, Beek-Ubbergen.

Wisz, M., Dendoncker, N., Madsen, J., Rounsevell, M., Jespersen, M., Kuijken, E., Courtens, W., Verscheure, C. & Cottaar, F., 2008. Modelling pink-footed goose (*Anser brachyrhynchus*) wintering distributions for the year 2050: Potential effects of land use change in Europe. Diversity and Distributions 14, 721-731.

Pictures distributed by: Engelmoer, Meinte
Hofeditz, Frank
Rösner, Hans-Ulrich
Vollmer, Manfred

Annex 1

Goose Management Group
Terms of Reference
(as revised and agreed by the SC on 24 April 2009)

BACKGROUND

The proper management of geese is an issue of increasing relevance in the Wadden Sea Region due to increasing numbers of geese and improved cropping systems favored by geese. On the one hand geese are a natural part of the Wadden Sea and adjoining mainland coastal areas and are a typical element of the Wadden Sea Region biodiversity for which the Wadden Sea states have an international responsibility. They also constitute an important touristic attraction.
On the other hand, some goose species cause increasing damage to farmlands, while current management schemes for geese are highly variable between countries and liable to further improvement and harmonization.
On 19-20 November 2008, a trilateral workshop on goose management was held in Ribe. The workshop, organized jointly by the Environment Centre Ribe, the Wadden Sea Forum and the Common Wadden Sea Secretariat, was attended by some 30 representatives from science, agriculture, nature conservation societies, hunters and responsible authorities. It was agreed to establish a working group to prepare recommendations and guidance for the development of a trilateral management plan for the accommodation of geese in the Wadden Sea Region, to be submitted to TGC 11.

RESPONSIBILITY

The Goose Management Group acts under the auspices of the Wadden Sea Forum (WSF).

COMPOSITION

The Goose Management Group will consist of representatives of the responsible administrations, of the agricultural sector, nature and environment NGOs and goose experts. The secretarial work will be carried out by the Wadden Sea Forum Secretariat.

TASKS

1. To develop recommendations and guidance for the development of a trilateral goose management plan to accommodate geese in the Wadden Sea Region, based upon the following premises
   a. the positive use of the existing national and international regulations, in particular the framework regulations of the EU;
   b. the recognition of geese as a valued and natural asset of the Wadden Sea Region and the international obligation to accommodate the populations;
   c. the development of recommendations for improvement and harmonization of management schemes for geese;
   d. the relevance of a plan to be considered and applied in a wider integrated coastal management framework.

2. To provide advice on the incorporation of the recommendations into the policies of higher levels like EU, TWSC and AEWA.

3. To provide a platform for knowledge and information exchange.

4. To report to the WSF plenary.

TIMETABLE

The work of the Goose Management Group will start as soon as possible after the adoption of the Terms of Reference. The draft final report, or an interim report, shall be submitted to the WSF in the 2nd half of 2009.

A recommendations and guidance document for the development of a trilateral goose management plan will be discussed and agreed by the WSF, respectively the Steering Committee and finally submitted to the 11th trilateral Governmental Wadden Sea Conference.

Goose Management Group
Members

Chair

- Niels Kanstrup, biologist/wildlife consultant (DK)

Denmark

- Jesper Madsen, scientist
- Kresten Fromsejer, Danish agriculture
- Jan Steinbring Jensen, administration, (John Frikke, Ministry of Env.)
- Marco Brodde, Danish Ornithological Society

Schleswig-Holstein

- Melf Melfsen/Susanne Werner, agriculture
- Fridtjof Ziesemer/Walther Petersen Andresen, LLUR
- Hans-Ulrich Rösner/Frank Hofeditz, WWF

Lower Saxony

- Erich Hinrichs, agriculture
- Martin Wendeburg, NLWKN Oldenburg, administration
- Helmut Kruckenberg, NABU

The Netherlands

- Hilbrand Sinnema, agriculture
- Meinte Engelmoer/Ettienke Bakker, Provincie Fryslân
- Bart Ebbinge, scientist

Trilateral Wadden Sea Cooperation

- Folkert de Jong, CWSS

Secretariat

- Manfred Vollmer, WSF