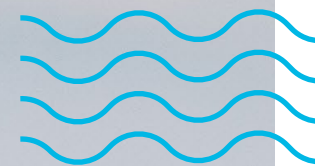
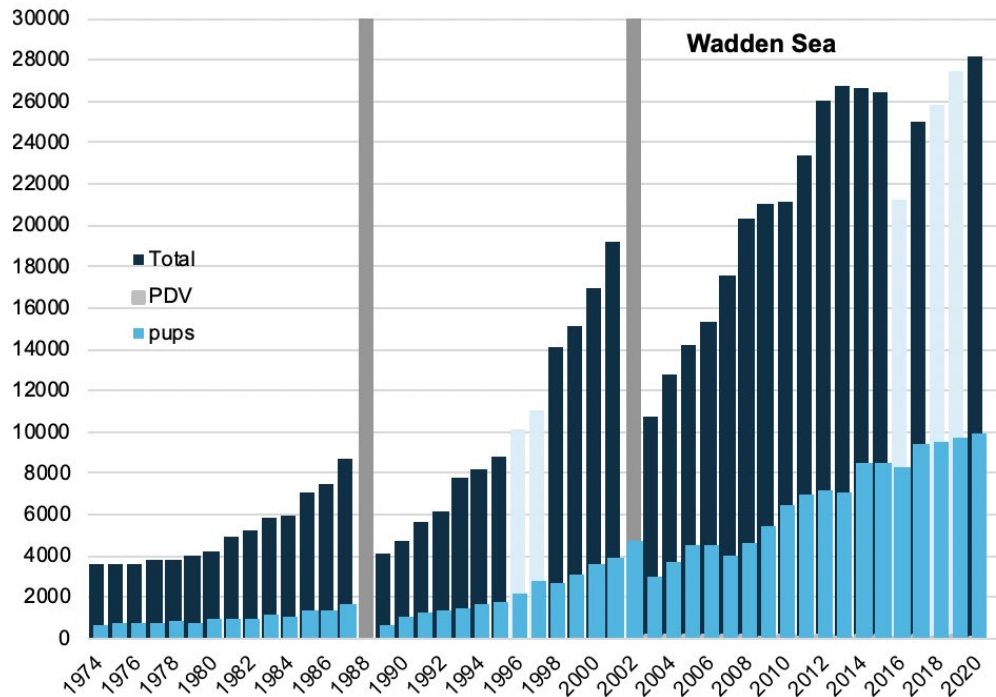


COMMON WADDEN SEA SECRETARIAT

# WADDEN SEA SEAL MANAGEMENT PLAN 2023-2027



# INTRODUCTION



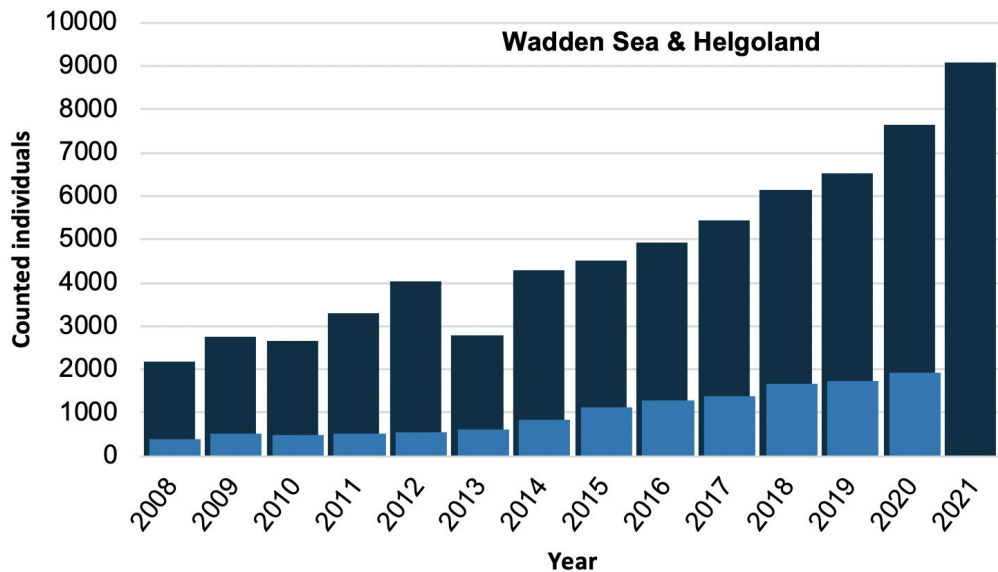
**Figure 1:** The total number of harbour seals counted in the Wadden Sea. The dark blue bars represent the total number of harbour seals during moult (light when counts were incomplete) and the lighter blue bars represent the number of pups. Grey bars indicate numbers counted during outbreaks of the Phocine Distemper Virus (left, Unger et al., 2022, QSR Marine Mammals). The picture on the right shows an adult harbour seal in the typical 'banana pose'.

The North Sea is home to two seal species, the harbour seal (*Phoca vitulina*) and the grey seal (*Halichoerus grypus*). The shallow waters of the Wadden Sea provide these seals with important haul out sites, most often sandbanks, to breed, moult and rest. The seals commute between their haul-out sites in the Wadden Sea and offshore areas, feeding on the way as well as offshore (Vance et al., 2021). Both species reproduce in the Wadden Sea and can therefore be considered indigenous to the area (Orians and Pearson, 1979; Härkönen and Harding, 2001; Russell et al., 2015).

Harbour seals were hunted intensively until the 20th century (e.g. Vooyt et al., 2012), leading to a massive decrease in the population of the Wadden Sea. Pollution, caused by increased industrialisation, further hampered the reproduction of many coastal species (Reijnders, 1986). When the number of harbour seals became alarmingly low, the states bordering the Wadden Sea implemented hunting bans for harbour seals: 1962 in the Netherlands, followed by Germany and Denmark, until an area-wide ban was achieved in 1977 (Reijnders, 1981; 1983). By then, the Wadden Sea harbour seal population was estimated at a mere 4,000 individuals. Pollution hampered a swift recovery, but between 1974 and 1988 the harbour seal population grew about 7% per year (Bresseur et al., 2018). Two outbreaks of Phocine Distemper Virus (PDV) epizootics in 1988 and 2002 reduced the population by 57% and 50%, respectively (Reijnders et al., 1997; Reijnders et al., 2003; Härkönen et al., 2006). After the epizootics, the population recovered and has grown exponentially until approximately 2013, becoming the largest harbour seal population in Europe. Since then, growth has stagnated (26,838 seals counted in 2021), and declining numbers have even been observed in some areas of the Wadden Sea (Galatius et al., 2021; Figure 1). Causes for the changing trend are still unclear.







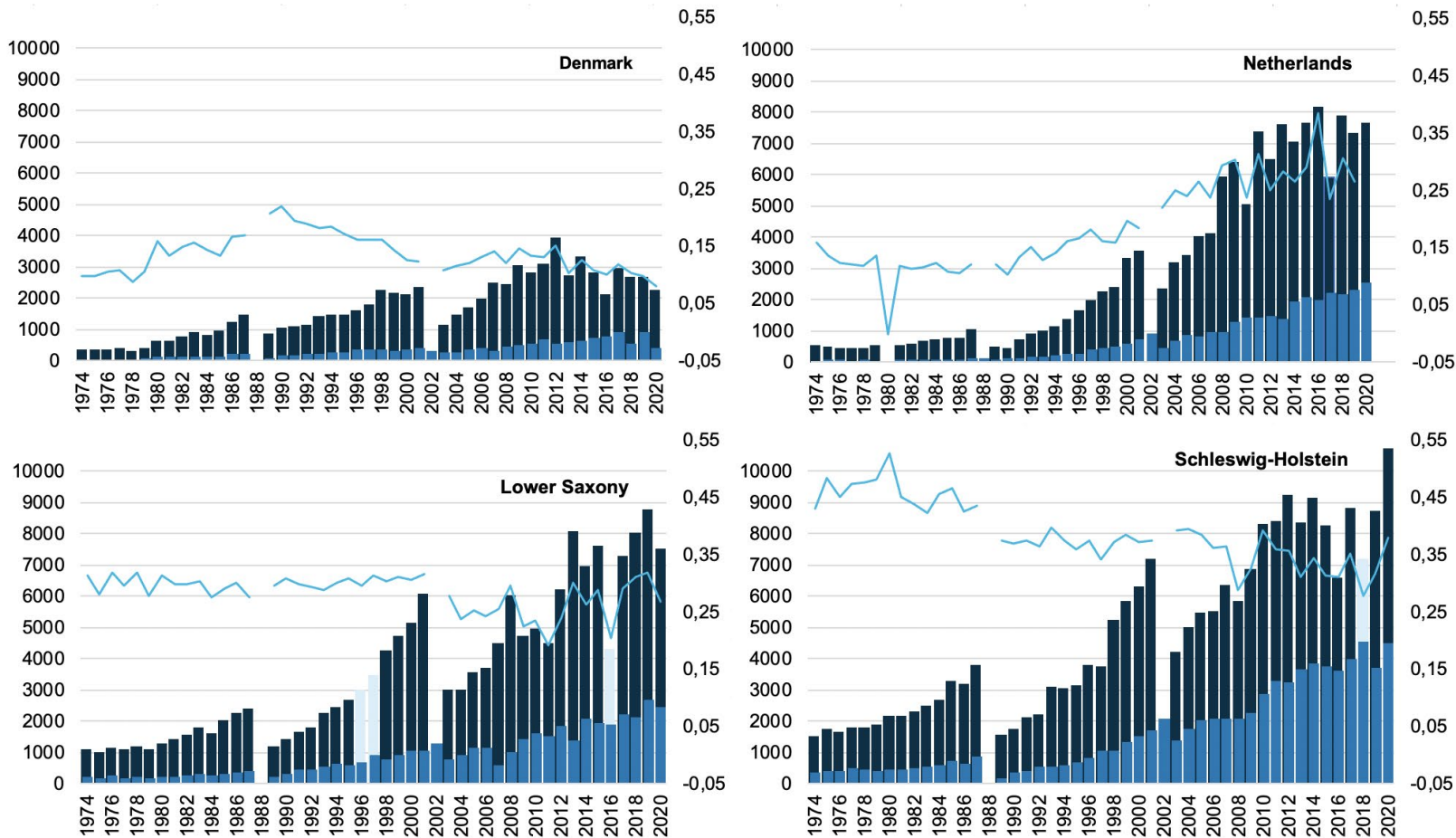
**Figure 2:** The number of grey seals counted during grey seal moult counts in the Wadden Sea Area between 2008 and 2021 (dark bars) and the number of pups counted in the preceding pupping season (light bars) (left, Unger et al. 2022, QSR Marine Mammals). The picture on the right shows two adult grey seals (© Museum Esbjerg).

Grey seals were hunted to extinction along the southern coast of the North Sea by the late Middle Ages (Reijnders et al., 1995). In the mid-20th century however, grey seals from the UK started to recolonise the Wadden Sea, forming small breeding colonies in the German and Dutch part (Reijnders et al., 1995). These breeding colonies continued to grow as young pups from the much larger UK population were being recruited into the breeding population as they got washed to the Wadden Sea and adult grey seals from the UK came in growing numbers outside of the breeding period (Brasseur et al., 2015). Moreover, grey seals were less affected by PDV than the harbour seals (Pomeroy et al., 2005), and the epizootics in 1988 and 2002 hardly affected the population. Thus, the grey seal numbers have grown strongly in the last years, and numbers have now reached around 9,000 (2022 moult count), and grey seals are distributed over the entire Wadden Sea area (Schop et al., 2022; Figure 2).

As top predators, seals are often regarded as sentinels for the health of the ecosystem. They are relatively easy to monitor when coming ashore, and scientific evidence on changes in their population can provide information on the availability of adequate habitat and food resources. Thus, seals are potentially important indicator species for the status of the Wadden Sea and adjacent areas and the effectiveness of conservation measures. Besides their important role in the ecosystem, they are therefore of great importance as indicators of the ecological functionality of the Wadden Sea World Heritage Site.



# BACKGROUND INFORMATION ON THE WADDEN SEA SEALS



**Figure 3:** The number of harbour seals counted in the different Wadden Sea areas. The dark blue bars represent the number of harbour seals during moult (light blue when counts were incomplete) and the lighter blue bars represent the number of pups. The light blue line indicates the relative importance of an area for the population (the numbers in the area compared to the total number in the Wadden Sea) (Unger et al. 2022, QSR Marine Mammals).

## HARBOUR SEALS

Harbour seals haul out on undisturbed sandbanks that are used for breeding, moulting and resting. In the Wadden Sea, breeding takes place between May and August. Although pups are capable of swimming within hours of being born, they are often seen on tidal sandbanks until they are weaned after ~ 24 days (Reijnders et al., 2010a; Brasseur, 2017). In general, harbour seals start to mature sexually at 4 years for males and 3 years for females, with most animals having reached maturity by the age of 6 years (Härkönen and Heide Jørgensen, 1990; Lydersen and Kovacs, 2005). It is not clear if currently the harbour seals in the Wadden Sea follow this same pattern. The peak of the moult is in August.

The diet of harbour seals varies locally and between seasons but consists mainly of benthic fish species such as gadoids, flatfish and sand eels (Gilles et al., 2008; de la Vega et al., 2016; Aarts et al., 2019; Wilson and Hammond, 2019). Studies have shown that harbour seals tagged in the Wadden Sea regularly travel tens of kilometres, occasionally more, into the North Sea to forage (Tougaard et al., 2008; Reijnders et al., 2010b; Brasseur, 2017; Vance et al., 2021). They mainly perform dives to the sea floor, which in the southern North Sea is limited to depths of 50m, though they have been recorded to dive at depths beyond 500m (Rosing-Asvid et al., 2020). Dives in the North Sea generally last 3-4 minutes (Wilson et al., 2015; Vance et al., 2021).

The harbour seal population of the Wadden Sea is the largest in Europe. Recent counts in the Wadden Sea and around Helgoland in 2021 resulted in a total of 10,903 pups in June and a total of 26,838 individuals in August (Galatius et al., 2021). The long-term trend for the pup counts has shown an annual increase of 5% on average between 2012 and 2021. Despite the

ongoing increase in pup numbers, the harbour seal population size seems to have stabilized since 2012 at an estimated 40,000 animals (number controlled for animals at sea), with an average annual growth of 1% per year since 2014 (Galatius et al., 2021b, Unger et al. 2022, Figure 3). This is much lower than the growth rate of 8.7% estimated for 2003-2014 (Brasseur et al., 2018). Currently, it is unknown why the growing annual pup counts, comprising up to 10,000 animals, do not result in growth of moult counts.

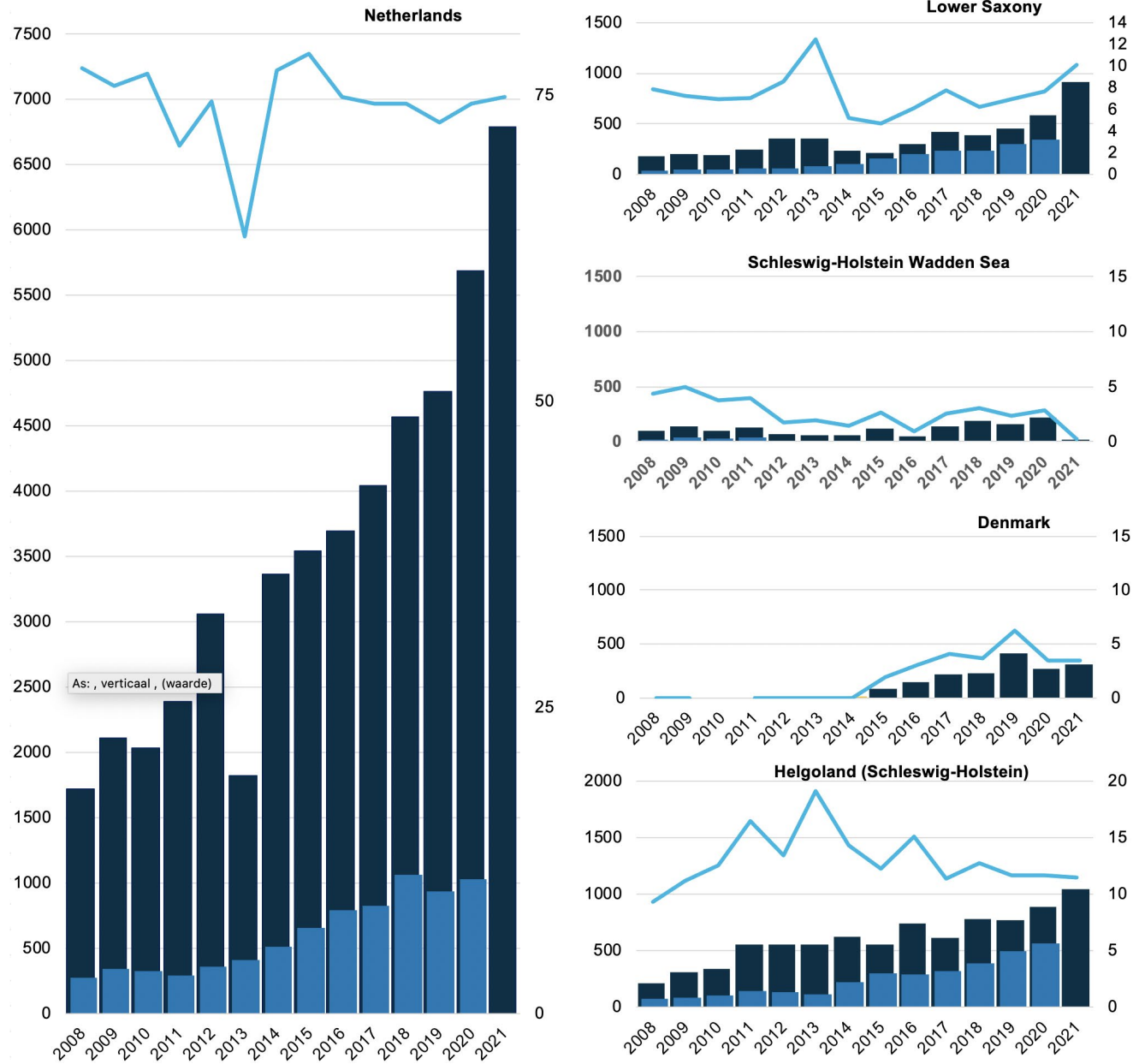
## GREY SEALS

Grey seals mostly haul out on high sandbanks above the intertidal zone, especially during breeding and moulting. Breeding takes place in winter between November and January. Pups are born with thick white fur (lanugo) which protects them from the cold air. Contrary to harbour seals, the pups do not swim readily during the suckling period. The pups are weaned after approximately 15-21 days (Kovacs 1987, Pomeroy et al. 2001) but stay on land for up to a month after the mother has left. Most pups moult during this period. Moult peak of the adults in the Wadden Sea occurs between March and April. Estimates on life history parameters are unavailable for the Wadden Sea, but grey seals in other areas become sexually mature between 3-5 years (females), while males mature at around 6 years (Hewer, 1964).

Grey seals feed mainly on demersal fish species and their diet largely overlaps with that of harbour seals (Wilson and Hammond, 2019; Damseaux et al., 2020). In comparison to their smaller relatives, grey seals from the Wadden Sea area are observed to cover larger distances (McConnell et al., 1999; Jones et al., 2015), even as pups (Peschko et al., 2020), which may also be influenced by seals traversing to and from the UK. Recent studies have shown that some grey seals may

prey on harbour seals as well as other grey seals (van Neer et al., 2021) and harbour porpoises (Bouveroux et al., 2014; van Neer et al., 2020).

During the first coordinated survey in the Wadden Sea in 2006 (including Lower Saxony, Hamburg, Schleswig-Holstein (with Helgoland) and the Netherlands) a total of 2,139 grey seals were counted (Reijnders et al., 2006), while 8,984 grey seals were counted in 2022 (Schop et al., 2022, Unger et al. 2022; Figure 4). The monitoring survey results show an average annual growth rate of 10% over the past five years. Demographic modelling suggested that a proportion of the grey seals observed in the Wadden Sea during the moult surveys returned to the British Isles to breed (Brasseur et al., 2015a). The local grey seal breeding colonies, indicated by the peak of pups born, have grown at an average annual rate of 12% over the past five years (Schop et al., 2022). In addition to an increase in numbers, the distribution of grey seals in the Wadden Sea has expanded. Their range expands towards the northeast and is now also including the Danish waters, where the first pup was born in 2014 (Fast-Jensen et al. 2015).



**Figure 4:** The number of grey seals counted in the different Wadden Sea Areas. The bars number of the total number of grey seals during moult (dark blue) and the number of pups (light blue). The light blue line indicates the relative importance of the numbers in the area compared to the total number of grey seals counted during the moult in March-April (Unger et al. 2022, QSR Marine Mammals).



# EFFORTS TO PROTECT THE WADDEN SEA SEAL POPULATIONS



## THREATS

While both Wadden Sea seal populations have seen a substantial recovery over the last decades, the extent of increasing anthropogenic activities is of concern, possibly affecting the carrying capacity of the area for seals. Ongoing growth of human use in the North Sea, for example the large-scale development of wind farms, the increase in shipping, underwater noise, as well as sand mining and decreasing fish stocks might affect the foraging of the seals as well. Within the Wadden Sea area, factors with a potential impact on the seal populations include tourism, shipping, fishery, dredging and pollution (Unger et al. 2022, [QSR Marine Mammals](#)). Also, seal safaris and water sports likely may affect the seals distribution and behaviour, especially on their haul out sites. The additional impact of climate change on seals is difficult to predict as there are many potentially confounding variables, but it is likely to lead to ecological changes, including changes in prey composition and availability as well as the presence of competitors and diseases, which could potentially impact the seal populations.

## THE PROTECTION OF SEALS IN THE WADDEN SEA

Harbour seals and grey seals are listed in Annex II of the EU Habitats Directive and accordingly special areas have been designated for their conservation. Moreover, both species are listed in Annex V, thus their exploitation should be regulated to be compatible with maintaining or attaining a good environmental status as laid down in the Marine Strategy Framework Directive. The protection of the harbour seals in the Wadden Sea is further regulated by the Agreement on the Conservation of Seals in the Wadden Sea ([Wadden Sea Seal Agreement; WSSA](#)) which came into force in 1991 and became the first international, legally binding agreement under the auspices of the UN Convention on the Conservation of Migratory Species of Wild Animals (CMS).

The Trilateral Wadden Sea Cooperation's aim with the agreement is **to achieve and maintain a favourable conservation status for the Wadden Sea harbour seal population** (WSSA, Art. III) through close collaboration in research and monitoring and by increasing the public awareness for seals as an integral part of this ecosystem.

At present the harbour seal population can be regarded as viable ([CMS, website](#)), although natural disease outbreaks may reduce the population size at regular intervals. However, a variety of human activities, some of which are listed above, have the potential to negatively affect the populations. With the Trilateral monitoring and Assessment Programme (TMAP) and the regularly updated Seal Management Plan, the Trilateral Wadden Sea Cooperation can support the assessment of the impact of human activities on the harbour seal population and ensure that the quality of their habitat is sufficiently protected. With the increase in abundance of grey seals in the Wadden Sea, they have been included in the Seal Management Plan elaborated under the WSSA (though they are not covered by the agreement itself). The financial support of the trilateral monitoring by the relevant regional authorities is key to assess the status and trends of the seal populations. Changes need to be observed and, if necessary, the impact of new and developing activities mitigated in the Wadden Sea and adjacent areas and thus contribute to the conservation of the Wadden Sea seals at the national and trilateral level.

# WADDEN SEA SEAL AGREEMENT AND THE SEAL MANAGEMENT PLAN



## 1) Seal Agreement Art. II, III, and IV: Definitions, Purpose and Objective, Conservation and Management Plan

The overall goal of the WSSA is to achieve and maintain a favourable conservation status for the harbour seal population (Art. III), currently defined as favourable if numbers are stable or increasing (taking into account natural fluctuations +/- 10%, TMAP handbook 2008). The Seal Management Plan (SMP) builds on the Art. IV of the WSSA which states that the Parties shall develop a conservation and management plan for the seal population on the basis of the latest scientific knowledge. The SMP shall contain a comprehensive set of actions on research and monitoring, taking of seals, habitat protection, pollution, and the increase of public awareness which are or are to be undertaken by the Parties to achieve the goals of the WSSA. Thus, the SMP is an essential instrument that seeks a balance between conservation and economic development and management of the area (Annex 3). The Parties regularly amend the plan to meet the challenge of protecting the seals of the Wadden Sea, taking into consideration the latest scientific research and information on changes in the conservation needs of the Wadden Sea seals (National responsible authorities and their contact details are listed in Annex 1, the procedures for the update of the Seal Management Plan are outlined in Annex 2).

While the SMP has always covered the Wadden Sea harbour seal population (Art. II, a, c), additional measures for the protection of the grey seal (*Halichoerus grypus*) in the Wadden Sea have been included since the SMP 1996-2000, in accordance with §61 of the Leeuwarden Declaration 1994 (LD). Pursuant to §61LD, the principles and guidelines concerning taking of seals, rehabilitation and releasing of seals, which are given under §60 LD, also apply to the grey seal in the Wadden Sea. Thus, the aim of the latest SMPs has been to restore and maintain viable seal stocks and a natural reproduction capacity, including the survival of juveniles of both seal species (CMS, 2018).



**Seal Agreement, Art. II, a**

"Seal" means an animal of the species *Phoca vitulina*.

**Seal Agreement, Art. II, b**

The "Agreement Area" means the area of water known as the Wadden Sea, including all sandbanks therein as well as all shore areas of the North Sea coasts of Denmark, the Federal Republic of Germany and the Netherlands between Blaavandshuk to the north and Den Helder to the west. The main ranges and the main migration routes are located in the Wadden Sea.

**Seal Agreement, Art. II, d**

"Habitat" means any part of the Agreement Area which is essential to the maintenance of the vital biological functions of seals, including but not limited to breeding, whelping, nursing, feeding or resting;

**Seal Agreement, Art. III**

The Parties shall cooperate closely with a view to achieving and maintaining a favourable conservation status for the seal population

**Seal Agreement, Art. IV**

The Parties shall develop, on the basis of scientific knowledge, a conservation and management plan for the seal population. This plan shall contain a comprehensive statement of actions which are or are not to be undertaken by the Parties to achieve the goals of this Agreement.

**Objective 1: Due to their increasing presence in the Agreement Area and their protection under Annex II and V of the EU Habitats Directive, grey seals (*Halichoerus grypus*) are equally considered under the SMP.**

Target action 1.1: For the implementation of the SMP, grey seals are given the same status as harbour seals, if not specified otherwise.

**Objective 2: The management of the Wadden Sea seal populations takes into account developments outside the Agreement Area, to the extent relevant.**

Target action 2.1: For monitoring and management purposes, distribution maps will be prepared, defining important areas for Wadden Sea seals inside and outside the Wadden Sea, including the important feeding areas in the North Sea and satellite areas used for resting and breeding adjacent to the Agreement Area (i.e. Helgoland, Dutch Delta).

Target action 2.2: Population developments in satellite colonies of the Wadden Sea seal populations, like Helgoland or the Dutch Delta, will be taken into account for the interpretation of population dynamics in the Agreement Area.

Target action 2.3: Potential threats to feeding areas in the adjacent North Sea (see also Objective 7 and 17) will be considered for the development of new management measures for the seal populations in the Agreement Area.

**Objective 3: The moult is a key biological function in seals. During this period, seals spend an extended period of time on land, relying on critical habitats within the Wadden Sea which are essential for the maintenance of the vital biological functions of seals.**

Target action 3.1: For the purpose of the SMP, moult will be considered as a key biological function under Art. II, d when defining essential habitats for seals within the Wadden Sea.

**Objective 4: Criteria are defined to monitor the favourable conservation status of the Wadden Sea seal populations, and changes therein.**

Target action 4.1: In addition to the rate of increase, an (additional) parameter will need to be defined to describe the conservation status of the seal population, acknowledging that changes in the population might occur prior to a decline in numbers.

Target action 4.2: Members of the Expert Group Marine Mammals (EG MM) will continue to take part in discussions (within OSPAR, Habitats Directive and MSFD) regarding the definition of appropriate ranges to assess changes in population sizes and range as an alerting signal to take additional management actions.

**Objective 5: The SMP is reviewed at intervals of 5 years and amended based on the latest scientific findings.**

Target action 5.1: Finalising a period, activities conducted in relation to the objectives of the current SMP will be reviewed.

Target action 5.2: Based on the review (Outcome 5.1) and an assessment of the latest scientific findings with relevance for the management of the Wadden Sea seal populations, the objectives and target actions will be amended for the following period.

Possible caveats in scientific knowledge to support appropriate conservation and management will be indicated, and where needed, research topics to be conducted in the following period will be proposed (Objective 7)

## 2) Seal Agreement, Art. V: Research and Monitoring

Evidence-based management is key to achieve long-lasting and sustainable results in conservation. Over the past decades, the annual monitoring of harbour seals and grey seals in the Wadden Sea conducted as part of the Trilateral Monitoring and Assessment Programme (TMAP Handbook 2008) has provided valuable information to document the development of the seal populations in the Wadden Sea. Links between population declines and anthropogenic effects (e.g. hunting, pollution) as well as natural effects (e.g. disease outbreaks) have been detected. Although the harbour seal population had grown to approximately the level it was at in 1900, and fuelled by immigration from the UK, the grey seal numbers continue to increase, there is therefore the need to continue to closely monitor their developments, especially since local declines in numbers have been observed in some years. For example, one important aspect that raises questions among seal experts in the Wadden Sea is the discrepancy between the increase of the number of harbour seal pups being born and the lack of growth in the number of moulting harbour seals counted in the past 10 years. Whether the observations are caused by a decrease in pup survival or a change in haul-out behaviour during the survey is currently unknown.

In general, there is limited knowledge on how anthropogenic pressures affect the seal populations in the Wadden Sea. Scientific studies are needed to provide insights into potential harmful effects of human activities and provide a basis for the development of adequate monitoring and conservation measures. The coordination of monitoring and research on the seals' biology and habitat use was agreed upon by the Wadden Sea states in the WSSA. As grey seal numbers increase, this species needs to be included in monitoring and research programmes.

### Seal Agreement, Art. V, 1

The Parties shall co-ordinate their research programmes and projects and their monitoring of the seal population to increase their knowledge of the biology and the habitats including harmful effects of human activities on the seal population to provide a basis for measures to improve its conservation status.

### Seal Agreement, Art. V, 2 a

They shall monitor and co-ordinate their research on population trends e.g. through periodic aerial surveys and counts.

### Objective 6: Adaptive management decisions are based on information from relevant monitoring and research programmes and projects to improve the seal populations conservation status.

Target action 6.1: A database of recent and ongoing research projects and scientific articles and reports on seals relevant to the Wadden Sea populations will be established to ensure adequate information exchange.

Target action 6.2: The availability of existing datasets for trilateral analysis related to the management of the seal populations will be explored.

### Objective 7: Increased knowledge on the biology of the Wadden Sea seal populations and related key management issues is obtained.

Target action 7.1: The most urgent research priorities for the effective management of the Wadden Sea seal populations at the trilateral level will be identified in consultation with scientists and managers.

Target action 7.2: A trilateral research proposal on the feeding ecology of the Wadden Sea seals and the changes in both space and time shall be developed to identify the population's habitat and resource needs inside and outside the Wadden Sea, considering potential intra- and interspecific competition. Possible overlaps with other trilateral task and expert groups (e.g. Swimway and World Heritage) will be explored.

### Objective 8: Monitoring under the Trilateral monitoring and assessment programme (TMAP) is conducted annually to assess changes in population trends and distribution of the Wadden Sea seals.

Target action 8.1: Five aerial surveys per species will be conducted annually (3 pup surveys and 2 moult surveys), carried out by designated institutions (Objective 22) on a long-term basis to guarantee reliability and accuracy of data. Surveys are harmonised between the countries (in terms of time and methods, e.g. survey window, digital photography) to obtain comparable results for the assessment of population sizes and other demographic parameters.

Target action 8.2: Besides the annual TMAP monitoring, additional research is needed to determine the pupping and moulting peaks and haul out patterns to adjust to confirm the existing correction factor.

Target action 8.3: Steps will be taken to assess the suitability of climate neutral monitoring options, considering potential negative impacts (e.g. through disturbance) on seals, with the aim to work towards a climate neutral monitoring in 2030. New technologies, such as remotely installed cameras, drones, or remote sensing will be explored to investigate their potential in supporting or replacing flights.

Target action 8.4: Monitoring results (numbers and distribution) will be analysed by the EG MM and reported on an annual basis.

**Seal Agreement, Art. V, 2 b**

They shall monitor and co-ordinate their research on seal migration.

**Seal Agreement, Art. V, 2 c**

They shall monitor and co-ordinate their research on seal population parameters, e.g. diseases, survival, age structure, sex ratio.

**Objective 9: Migratory movements of seals in the Wadden Sea and between adjacent areas in the North Sea are assessed.**

Target action 9.1: Movements of seals between the Wadden Sea and adjacent areas shall be investigated to enable better advice on spatial planning of activities in the North Sea, especially with regards to new activities in the area such as offshore windfarms.

**Objective 10: Population parameters and disease outbreaks are monitored through the TMAP monitoring (Objective 8) and a trilateral stranding network.**

Target action 10.1: Possibilities of harmonization of national data collection on stranded animals (e.g. age, sex, cause of death) will be mapped and reachability of a trilateral stranding network will be investigated.

Target action 10.2: Standardised necropsies and disease monitoring will be conducted on a relevant subset of stranded seals per region to monitor cause of death and the emergence and impact of pathogens (e.g. PDV, H5N1). Tissue samples will be collected from these animals and stored in tissue banks to monitor long-term developments in pathogens and pollutants (see also Objective 17).



### 3) Seal Agreement, Art. VI: Taking

The rescue and rehabilitation of seals in the Wadden Sea, being defined as the temporary holding of a wild animal with the intent of releasing it back into its natural habitat, is a measure performed in some areas to support the wild populations. The necessity of such activity is debated as population numbers are above the limit that has been suggested to ensure a probability of persistence above 99 % over a 200-year period (Olsen et al., 2013). In the Leeuwarden Declaration 1994 (§§56-61), all three Wadden Sea States strongly affirmed that the rehabilitation of seals is not necessary from a conservation perspective and that the taking of seals should be reduced to a minimum. Taking into account ethical considerations, legislations as well as management practices of the three countries, the following guidelines were developed:

*§ 60.1 only a very limited number of persons in each country shall be authorised to decide on the handling of diseased or weakened seals or abandoned pups, including taking and releasing of the animals, and only such animals may be taken which have a chance to survive;*

*§ 60.2 seals rehabilitated shall only be released into the wild on a permit granted by the national authority responsible for nature conservation and management if the following criteria are met: (i) the seal has not been treated with specific groups of medicine to be further specified, (ii) the seal does not carry pathogens alien\* to the wild population; (\*Definition of alien pathogen: Pathogens which are normally not found in the Wadden Sea area.), (iii) the seal is released as soon as possible but no later than half a year after it has been brought in for rehabilitation, and (iv) the seal has not been kept in a centre where species of animals alien to the Wadden Sea, or marine mammals not resident in the Wadden Sea, are held;*

#### Seal Agreement, Art. VI, 1

The Parties shall prohibit the taking of seals from the Wadden Sea.

#### Seal Agreement, Art. VI, 2, first part

The competent authorities may grant exemptions from the prohibition referred to in the first paragraph authorizing persons to take seals:

- for institutions to be designated performing scientific research into the conservation of the seal population in the Wadden Sea or the conservation of the Wadden Sea ecosystem, insofar as the information required for such research cannot be obtained in any other way; or
- for institutions to be designated nursing seals in order to release them after recovery, insofar as these are diseased or weakened seals or evidently abandoned suckling seals.

#### Objective 11: Authorities confirm Art VI of the WSSA and §§56-61 of the Leeuwarden Declaration (1994).

Target action 11.1: Serious efforts will be made to implement provisions in national legislation to prevent the taking of seals, in accordance with the Leeuwarden Declaration.

#### Objective 12: Exceptions to the taking and releasing of seals in the Wadden Sea are minimized to the lowest level possible, by applying guidelines for handling and releasing diseased and weakened seals or evidently abandoned pups (LD §60).

Target action 12.1: Institutions having been granted exemptions for the capturing, holding and rehabilitation of seals by designated national authorities (Objective 22). No new institution shall be granted exemptions for the taking and rehabilitation of seals from the Wadden Sea. Target action 12.2 It is preferred that only seals from the Wadden Sea area shall be kept in facilities granted exemption for the capturing, holding and rehabilitation of seals. Target action 12.3: Seals that are to be released shall not receive any systematic or preventive treatment, unless any effects on the wild population can be ruled out. Target action 12.4: Exchange and dialogue with the seal centres shall be fostered to enhance transparency of processes.

The implementation of the Leeuwarden declaration differs between countries. In Denmark, the release of animals from captivity is forbidden, leading to a complete stop of rehabilitation efforts. In Germany and the Netherlands, a limited number of designated seal centres are active in the rehabilitation, especially of pups and yearlings. In the Netherlands, where the numbers of rehabilitated seals were extremely high (Brasseur, 2018), new regulations were introduced in the Dutch “seal agreement” which resulted in a significant change in practices.

To minimise the risks associated with the rehabilitation and release of seals, clear rules need to be defined. The seal populations need to be resilient towards future threats, resulting, for example, from global warming and the ongoing human development of coastal waters in favour of food and energy. The natural adaptive potential of the seal populations should not be weakened by the reduction of natural selection processes or potentially higher burdens of pathogens due to rehabilitation. Thus, it is important to discuss whether the higher chances of survival of individual seals outweigh the negative effects of captivity, like habituation to human presence or the exposure to pathogens, especially multi-resistant bacteria, which may affect the wild population.

Exchange of information and coordination of research activities with the seal centres on taking and releasing of seals and its impact on the wild population, also within the framework of the trilateral stranding network, is required. Annual reporting on the taking, treatment and release of seals to the coordinating institution will provide necessary data. Changes in management shall be discussed with the seal centres based on the acquired scientific evidence, prioritizing the survival of the wild population.

#### **Seal Agreement, Art. VI, 2, second part**

Seals which are clearly suffering and cannot survive may be killed by the persons referred to in this paragraph.

#### **Seal Agreement Art. VI, 3**

Any Party having granted exemptions as mentioned above shall notify the other Parties as soon as possible and provide them an opportunity for review and comment.

#### **Objective 13: Only persons who have been trained and are authorised may handle dead or live seals on the beach (Objective 22).**

Target action 13.1: Institutes and organisations with permission to handle wild seals, will keep a record of the personnel qualified to do so, which means that they have been designated by the authorities as in Objective 22.

Target action 13.2: Based on the experience of trained personal and existing protocols on the handling of seals in the wild, standards of best practices will be developed for the assessment and handling of stranded seals in the Wadden Sea.

Target action 13.3: Information on handling of wild seals shall be shared with the general public to increase awareness and recognition.

#### **Objective 14: Reports on all recorded stranded seals (live or dead), including those captured and taken to rehabilitation and their potential release, is collected by local authorities in each region and provided annually to the coordinating institution (CWSS).**

Target action 14.1: Develop standardised reporting protocols in collaboration with the relevant stakeholders to facilitate reporting on handling of seals.

Target action 14.2: All recorded stranded seals (live or dead) including those captured and taken to rehabilitation are documented and reported to the competent authorities (see also Objective 10).

Target action 14.3: The EG MM will use the data to provide better advice on the population development (i.e. signalling local issues in survival/diseases; relating rehabilitation efforts to changes in colony size) in regular reports.

Target action 14.4: Projects aimed at evaluating the impact of seal rehabilitation on the Wadden Sea seal populations shall be developed in collaboration with the authorised seal centres.

#### 4) Seal Agreement, Art. VII: Habitat

To ensure the natural behaviour and development of the Wadden Sea seal populations, all habitats that are essential for maintaining the vital biological functions of seals should be adequately protected. Seals are semi-aquatic mammals. They forage and travel at sea, spending >75% of their time in the North Sea and coastal areas. Their terrestrial haul out sites, mostly located within the Wadden Sea, are linked to for example breeding, moulting and resting.

Activities at sea, such as fishing, dredging, or shipping and construction of wind farms, potentially influence the seals' foraging or transiting, ultimately affecting their physiology, behaviour and habitat choice. Disturbance near haul outs may cause animals to rush into the water, leading for example to energy loss, during breeding to the separation of mothers and pups and when recurrent to the vacating of the haulouts. Currently, many harbour seal haul out sites are protected during breeding and moulting, while for grey seals adequate protection may be lacking.

Many new anthropogenic pressures affect seals at sea, rather than in the Wadden Sea. As the WSSA aims for the "preservation of areas which are essential to the maintenance of the vital biological functions of seals" adverse effects on the Wadden Sea seal populations resulting from activities outside the Agreement Area should be assessed and management measures explored. For example, there is no or little information on seal bycatch.

#### Seal Agreement, Art. VII, 1

The Parties shall take appropriate measures for the protection of habitats. They shall pay due regard to the necessity of creating and maintaining a network of protected areas also in the migration areas of the seals in the Agreement Area and of ensuring the preservation of areas which are essential to the maintenance of the vital biological functions of seals.

**Objective 15: An adequate number of protected areas, covering the main breeding, nursing, moulting and resting areas of seals, exist for seals in the Agreement Area and in adjacent areas and appropriate measures are taken to ensure that their vital functions are preserved.**

Target action 15.1: The protection status of the haul-out sites (i.e. breeding, moulting and resting sites) for seals in the Wadden Sea as well as the foraging grounds and migration routes in offshore areas (Objective 2 and 9) shall be assessed to verify that suitable habitats are protected appropriately.

Target action 15.2: Changes in seal numbers per catchment area in the last decade in relation to natural dynamics of sand banks as well as human activities (see Objective 16) will be evaluated to assess the suitability of current boundaries of seal reserves.

Target action 15.3: Key breeding, resting and moulting habitats for grey seals will be identified and if needed, new seal reserves for grey seals established in the Agreement Area.



**Seal Agreement, Art. VII, 2**

The Parties shall preserve habitats and seals present from undue disturbances or changes resulting, directly or indirectly, from human activities.

**Objective 16: The geographical scope of possible disturbances of seals at seal reserves is known.**

Target action 16.1: An evaluation on the spatial scale of potential disturbances caused e.g. by tourism, fisheries, mining, shipping, construction, energy developments within the Agreement Area will be conducted.

Target action 16.2: Habitat requirements of seals and possible areas of conflict with human activities will be identified.

Target action 16.3: Disturbing activities in seal reserves will be prohibited at least during breeding and moulting. For harbour seals this should cover the period from 15 May to 01 September; for grey seal from 15 November to 15 January for breeding and in March and April for moulting.

**Objective 17: Human activities known to affect the natural behaviour of seals are limited or mitigated to the extent possible.**

Target action 17.1: An inventory of bycatch monitoring efforts shall be made and evaluated for their accuracy to record seal bycatch in the Wadden Sea and adjacent waters (supplementing recent ICES WGBYC studies) and, if necessary, potential further measures shall be explored.

Target action 17.2: The legal basis for the use of mitigation measures that prevent seals from drowning in nets shall be assessed.

Target action 17.3: As part of the stranding data, information on drowning of seals shall be collected to gain a better understanding of drowning and entanglements, both in standing nets and ghost nets.

Target action 17.4: The impact of tourism on seal habitats will be investigated with the aim to develop sustainable guidelines for tourism operations.

**Seal Agreement, Art. VII, 3**

The Parties shall have regard to the protection of habitats from adverse effects resulting from activities carried out outside the Agreement Area.

**Objective 18: Wide-ranging consequences of human activities outside the agreement area (e.g. prey depletion, oil spills and pollution from dredging, wind farms, detonation of bombs and shipping) on the seal populations are considered for management purposes, and lacks of knowledge and thus additional research needs identified.**

Target action 18.1: EG MM will conduct a workshop to discuss the potential impact of human activities and developments in adjacent areas, including the cumulation of effects, to give specific recommendations on their implication for the management of the seal populations in the Agreement Area and future research needs.

Target action 18.2: A review of the existing literature on effects of increased shipping, but also air traffic, on seals and changes in the traffic volume across the Wadden Sea will be conducted to gain a better understanding on the how the resulting noise pollution may affect the distribution of seals in the Wadden Sea.

Target action 18.3: Options for contributing to monitoring and assessing activities outside the Agreement Area that may have a negative impact on the Wadden Sea seal populations, or the availability of such data as part of monitoring activities carried out under NATURA 2000 or OSPAR, will be explored.

### 5) Seal Agreement, Art. VIII: Pollution

Pollution of the marine ecosystem has been identified as one of the key issues that hampered the recovery of the harbour seal population after the implementation of the hunting bans. Since then, considerable efforts have been made to reduce the levels of chemical pollutions in the Wadden Sea and the adjacent North Sea. However, with new technologies and economic growth, new sources of pollution have emerged, most notably the noise pollution, adding to the environmental pressure seals are facing.

Monitoring of pollution level is taking place under various international agreements and in response to EU laws. The Wadden Sea states have agreed to identify sources of pollution and investigate their impact on the Wadden Sea seal populations. Even low levels of substances may accumulate in seals, as top predators in the Wadden Sea food chain, causing physiological responses and potentially becoming of concern for the conservation of the seal populations. Similarly, investigations into the impact of different pathogens falls under this article.

**Seal Agreement, Art. VIII, a**  
The three Wadden Sea States shall endeavour to identify the sources of such pollution.

**Seal Agreement, Art. VIII, b**  
The three Wadden Sea States shall co-ordinate their research projects regarding seal diseases and the effects on the seal population of such substances, e. g. organochlorine compounds, heavy metals and oil, and agree on methods which permit a comparison of research results.

**Seal Agreement, Art. VIII, c**  
The three Wadden Sea States shall monitor in the Agreement Area, in particular in seal tissues and in organisms which are preyed upon by seals, the levels of those substances which in the light of the results of research appear to play a major role in the conservation status of the seal population.

**Objective 19: Coordinated efforts are taken to further reduce pollution of the North Sea and the Wadden Sea for the benefit of the Wadden Sea seal populations.**

Target action 19.1: Actions shall take into account the assessment results for pollution levels in the Wadden Sea seals, in line with the agreements defined by WFD, MSFD, Natura 2000 and OSPAR.

Target action 19.2: Efforts shall be made to identify sources of noise pollution, linked for example to shipping activities and the energy developments, and explore possible mitigation strategies.

**Objective 20: Monitoring of selected pollutants affecting seals is conducted on a regular basis (see Objective 10 for diseases).**

Target action 20.1: Levels of selected chemical pollutants in seal tissue shall be monitored on a regular basis for a subset of the stranded seals necropsied in each region (Objective 10). Comparisons with tissue samples collected from live seals could contribute to Objective 21. Target action 20.2: Comparative analysis shall determine the correlation between levels of chemical pollutants in seal tissue, fish tissue and in bird eggs. The latter is being monitored under TMAP and used for assessments of pollutant levels in the Wadden Sea but may not be adequate to monitor the accumulation of chemicals in the food web and the pollution levels in seals using offshore foraging grounds.

Target action 20.3: Given its current relevance, a specific focus shall be on the monitoring of changes in seals foraging behaviour and habitat use in relation to wind farms (noise pollution vs artificial reefs). Monitoring will mostly be done locally, and the research results shared trilaterally.

**Objective 21: Increased knowledge exists on the physiological and behavioural impact of selected pollutants on seals**

Target action 21.1: Support will be provided for ongoing and future research aimed at identifying the threshold levels of chemical pollutants above which physiological and behavioural impacts on seals can be expected.

Target action 21.2: Experts will be invited to discuss existing research on health assessments and investigations into the impacts of pollutants, in the light of possible links to the management of the Wadden Sea seal populations.

Target action 21.3: The use of seals as bioindicators of the condition of the Wadden Sea ecosystem and anthropogenic impacts will be determined based on joint inventory of existing research on top predators.

## 6) Seal Agreement, Art. IX: Responsible Authorities

In each country, dedicated authorities and institutions are responsible for the implementation of this WSSA and the SMP. Close collaboration between these organisations is expected both at the local, as well as the trilateral level. Regular updates of activities conducted by each organisation shall be reported to and discussed by the EG MM (Annex 1).

### Seal Agreement, Art. IX

Each Party shall inform the other Parties of the authorities which shall be responsible for the implementation of this Agreement

### Objective 22: Specific authorities/institutions are designated responsible for different aspects linked to the implementation of the SMP.

#### Designated authorities/institutions responsible for the trilateral monitoring of seals.

Denmark: Department of Ecoscience, Aarhus University

Schleswig-Holstein: Landesbetrieb für Küstenschutz, Nationalpark und Meeresschutz Schleswig-Holstein, Nationalparkverwaltung (LKN.SH); Ministerium für Energiewende, Klimaschutz, Umwelt und Natur des Landes Schleswig-Holstein;

Hamburg: Behörde für Umwelt, Klima, Energie und Agrarwirtschaft (BUKEA)

Lower Saxony: Niedersächsisches Landesamt für Verbraucherschutz und Lebensmittelsicherheit (LAVES): Harbour seal;

Nationalparkverwaltung Niedersächsisches Wattenmeer (NLPV): Grey seal

The Netherlands: Wageningen Marine Research (WUR)

#### Designated national authorities responsible for granting exemptions from taking and releasing of seals.

Denmark: Danish Environmental Protection Agency

Schleswig-Holstein: Landesbetrieb für Küstenschutz, Nationalpark und Meeresschutz Schleswig-Holstein, Nationalparkverwaltung (LKN.SH) (inside the conservation area); Landesamt für Landwirtschaft, Umwelt und Ländliche Räume (outside the conservation area)

Hamburg: Behörde für Umwelt, Klima, Energie und Agrarwirtschaft (BUKEA)

Lower Saxony: Counties of Aurich and Cuxhaven, further agencies may be involved by the counties: Harbour seal; District Conservation Authorities: Grey seal

The Netherlands: Ministry of Agriculture, Nature and Food Quality.

#### Designated scientific institutions (1) and seal rehabilitation centres (2) with exemptions for the taking of live and dead seals:

Schleswig Holstein: Institute for Terrestrial and Aquatic Wildlife Research (ITAW), University of Veterinary Medicine, Hannover (TIHO) (1), Seehundstation Friedrichskoog (2)

Lower Saxony: Niedersächsisches Landesamt für Verbraucherschutz und Lebensmittelsicherheit (LAVES) (1); Institute for Terrestrial and Aquatic Wildlife Research (ITAW) - University of Veterinary Medicine, Hannover (TIHO) (1) Seehundstation Norden / Norddeich (2) The Netherlands: Wageningen Marine Research (WUR) (1), Zeehondencentrum Pieterburen (2); Ecomare, Texel (2), Aseal Stellendam (2), Zeehondenopvang Terschelling (2), Zeehondenopvang (2)



## 7) Seal Agreement, Art. X: Public Awareness

Seals are amongst the most iconic species in the Wadden Sea and an integral part of the Wadden Sea ecosystem. Due to their high visibility and impressive size, they are a flagship attraction for tourists in the area and thus bring economic benefit to local enterprises, while at the same time they are playing a key and regulating role as apex predators in the ecosystem. Thus, there is a natural interest in these animals.

Measures shall be taken to inform the general public on the conservation status of the seal populations and the measures that have been taken in relation to the SMP to improve the conservation status of the Wadden Sea seal populations. Increased knowledge on how seals are impacted by human activities will contribute to the understanding of the protective rules (e.g. keeping appropriate distances) needed to safeguard the animals they share the habitat with. Further, the public shall learn how they contribute to the implementation of the SMP. Thus, it is part of the SMP to develop activities to educate the public and raise awareness, also in relation to the taking and rehabilitation of seals.

### Seal Agreement, Art. X

The Parties shall take such measures as may be required to make the general public aware of the conservation status of the seal population, of the content and aims of this Agreement, and of the measures they have taken pursuant to this Agreement, including the Conservation and Management Plan, to improve this conservation status.

### Objective 23: The public is informed about the important role of seals in the Wadden Sea ecosystem and their general conservation needs.

Target action 23.1: Information on the aims of the WSSA and the SMP, the views on rehabilitation, and the need to manage the Wadden Sea as a nature area with the lowest possible human interference shall be shared with the general public. The state agencies responsible for seal management (Objective 17) should bring this message to the public. Target action 23.2: Monitoring results of grey seals (1st July) and harbour seals (1st November) will be disseminated jointly by the EG MM and the CWSS on an annual basis. Target action 23.3: Awareness campaigns shall ensure that the public is informed about what disturbs seals, how to avoid it, and what to do if they find a live or dead seal on the beach. In this regard, the use of Apps for observations/citizen science projects related to seals shall be explored and, if useful, promoted.

Within the framework of the current SMP no concrete objectives and target actions were considered as not being necessary and therefore no concrete objectives been developed for the following articles of the WSSA:

**Article I:** This Agreement shall be deemed to be an agreement as defined in Article IV paragraph 4 of the Convention on the Conservation of Migratory Species of Wild Animals signed at Bonn on 23 June 1979.

**Article II, c:** For the purpose of this Agreement, "seal population" means all seals which, at any time, are present in the Agreement Area.

**Article II, e:** For the purpose of this Agreement, "Convention" means the Convention on the Conservation of Migratory Species of Wild Animals signed at Bonn on 23 June 1979.

**Article II, f:** For the purpose of this Agreement, the terms defined in Article I, sub-paragraphs 1 (a) to (d) and 1 (l) of the Convention shall have the same meaning in this Agreement.

**Article IV, 4:** The Parties shall take appropriate action to suppress illegal hunting and taking of seals.

**Article VII, 4:** The Parties shall explore the possibility of restoring degraded habitats and of creating new ones.

**Article XI – XVIII.**

## REFERENCES

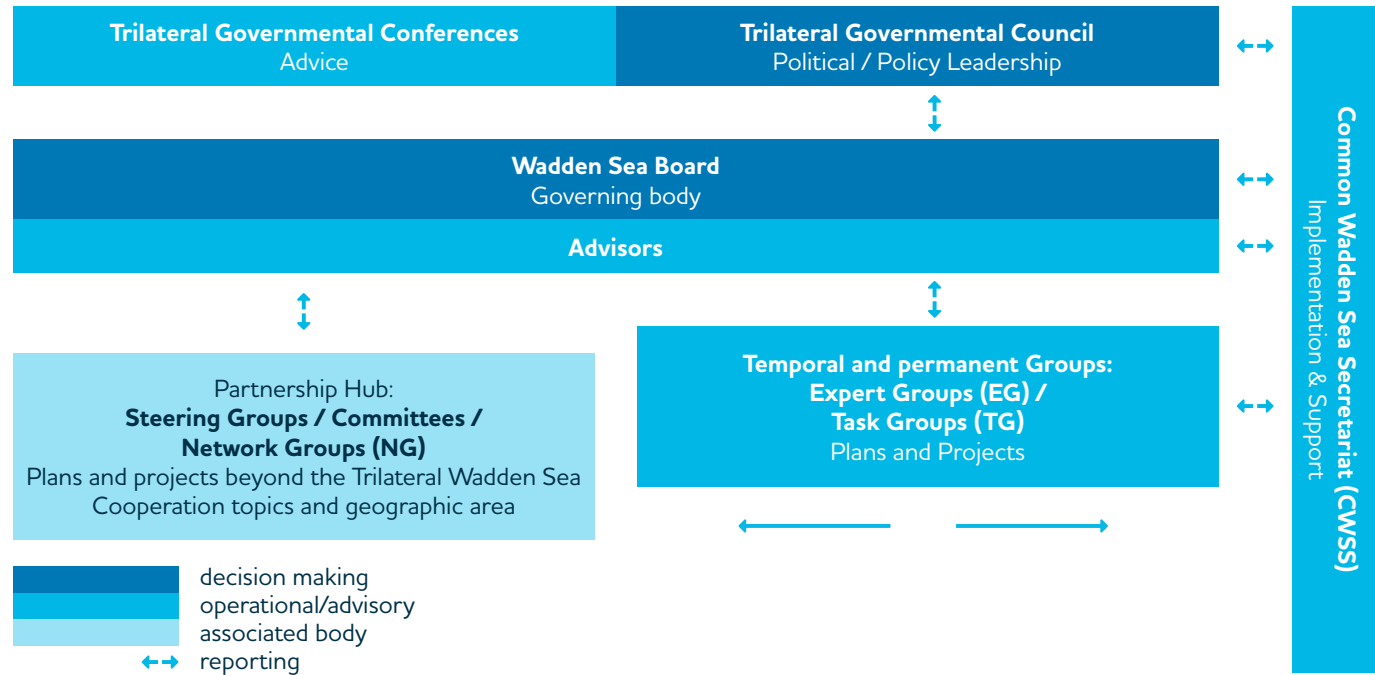
- Aarts, G., Brasseur, S., Poos, J., Schop, J., Kirkwood, R., Van Kooten, T., Mul, E., Reijnders, P., Rijnsdorp, A. and Tulp, I. (2019) *Top-down pressure on a coastal ecosystem by harbor seals*. *Ecosphere* 10(1): e02538.
- Bouveroux, T., Kiszka, J., Heithaus, R., Jauniaux, T. and Pezeryl, S. (2014) *Direct evidence for gray seal (Halichoerus grypus) predation and scavenging on harbor porpoises (Phocoena phocoena)*. *Marine Mammal Science*.
- Brasseur, S. M., van Polanen Petel, T. D., Gerrodette, T., Meesters, E. H., Reijnders, P. J. and Aarts, G. (2015) *Rapid recovery of Dutch gray seal colonies fueled by immigration*. *Marine Mammal Science* 31(2): 405-426.
- Brasseur, S. M. (2017) *Seals in motion - How movements drive population development of harbour seals and grey seals in the North Sea*. PhD thesis, Wageningen University.
- Brasseur, S. M. (2018) *Stranding and rehabilitation in numbers: population development and stranding data on the Dutch coasts 1990-2016: analysis of new data from a public database*.
- Brasseur, S. M., Reijnders, P. J., Cremer, J., Meesters, E., Kirkwood, R., Jensen, L. F., Jess, A., Galatius, A., Teilmann, J. and Aarts, G. (2018) *Echoes from the past: regional variations in recovery within a harbour seal population*. *PLoS one* 13(1): e0189674.
- Damseaux, F., Siebert, U., Pomeroy, P., Lepoint, G. and Das, K. (2020) *Habitat and resource segregation of two sympatric seals in the North Sea*. *Science of The Total Environment* 764: 142842.
- de la Vega, C., Lebreton, B., Siebert, U., Guillou, G., Das, K., Asmus, R. and Asmus, H. (2016) *Seasonal variation of Harbor Seal's diet from the Wadden Sea in relation to prey availability*. *PLoS one* 11(5): e0155727.
- Fast-Jensen, L., Galatius, A., Teilmann, J. (2015) *First report on a newborn grey seal pup (Halichoerus grypus) in the Danish Wadden Sea since the 16<sup>th</sup> Century*. *Marine Biodiversity Records* 8: 1-4.
- Galatius, A., Abel, C., Brasseur, S. M., Jeß, A., Meise, K., Meyer, J., Schop, J., Siebert, U., Teilmann, J., and Thøstesen, B. (2021) *Harbour Seals surveys in the Wadden Sea and Helgoland in 2021*. Common Wadden Sea Secretariat
- Gilles, A., Andreassen, H., Müller, S. and Siebert, U. (2008) *Nahrungsökologie von marinen Säugetieren und Seevögeln für das Management von NATURA 2000 Gebieten*. Teil: Marine Säugetiere. Final report, submitted to the German Federal Agency for Nature Conservation (BfN). F+E FKZ 805(85): 018.
- Härkönen, T. and Harding, K. (2001) *Spatial structure of harbour seal populations and the implications thereof*. *Canadian Journal of Zoology* 79(12): 2115-2127.
- Härkönen, T., Dietz, R., Reijnders, P., Teilmann, J., Harding, K., Hall, A., Brasseur, S., Siebert, U., Goodman, S. J. and Jepson, P. D. (2006) *The 1988 and 2002 phocine distemper virus epidemics in European harbour seals*. *Diseases of aquatic organisms* 68(2): 115-130.
- Härkönen, T., Heide-Jørgensen, M.P. (1990) *Comparative life histories of East Atlantic and other harbor seal populations*. *Ophelia* 32: 211-235.
- Hewer, H. R. (1964) *The determination of age, sexual maturity, longevity and a life-table in the grey seal (Halichoerus grypus)*. *Proceedings of the Zoological Society of London* 142: 593-624.
- Jones, E. L., McConnell, B. J., Smout, S., Hammond, P. S., Duck, C. D., Morris, C. D., Thompson, D., Russell, D. J., Vincent, C. and Cronin, M. (2015) *Patterns of space use in sympatric marine colonial predators reveal scales of spatial partitioning*. *Marine Ecology Progress Series* 534: 235-249.
- Kovacs, K. (1987) *Maternal behaviour and early behavioural ontogeny of grey seals (Halichoerus grypus) on the Isle of May, UK*. *Journal of Zoology* 213:697-715.
- Lydersen, C., Kovacs, K. (2005) *Growth and populations parameters of the world's northernmost harbour seals Phoca vitulina residing in Svalbard, Norway*. *Polar Biology* 28: 156-163.
- McConnell, B., Fedak, M., Lovell, P. and Hammond, P. (1999) *Movements and foraging areas of grey seals in the North Sea*. *Journal of Applied Ecology* 36(4): 573-590.
- Olsen, M.T., Andersen, L.W., Dietz, R., Teilmann, J., Härkönen, T., Siegismund, H.R. (2013) *Integrating genetic data and population viability analyses for the identification of harbour seal (Phoca vitulina) populations and management units*. *Molecular Ecology* 23: 815-831.
- Orians, G. H. and Pearson, N. E. (1979) *On the theory of central place foraging*. *Analysis of ecological systems*: 155-177.
- Peschko, V., Müller, S., Schwemmer, P., Mercker, M., Lienau, P., Rosenberger, T., Sundermeyer, J. and Garthe, S. (2020) *Wide dispersal of recently weaned grey seal pups in the Southern North Sea*. *ICES Journal of Marine Science* 77(5): 1762-1771.
- Pomeroy, P.P., Fedak, M.A., Rothery, P., Anderson, S. (2001) *Consequences of maternal size for reproductive expenditure and pupping success of grey seal at North Rona, Scotland*. *Journal of Animal Ecology* 68: 235-253.
- Pomeroy, P.P., Hammond, J.A., Hall, A.J., Lonergan, M., Duck, C.D., Smith, V.J., Thompson, H. (2005) *Morbillivirus neutralising antibodies in Scottish grey seals Halichoerus grypus: assessing the effects of the 1988 and 2002 PDV epizootics*. *Marine Ecology Progress Series* 287: 241-250.
- Reijnders, P. (1981) *Management and conservation of the harbour seal, Phoca vitulina, population in the international Wadden Sea area*. *Biological Conservation* 19(3): 213-221.
- Reijnders, P. (1983) *The effect of seal hunting in Germany on the further existence of a harbour seal population in the Dutch Wadden Sea*. *Zeitschrift Für Säugetierkunde* 48: 50-54.
- Reijnders, J.H. (1986) *Reproductive failure in common seals feeding on fish from polluted coastal waters*. *Nature* 324: 456-457
- Reijnders, P., van Dijk, J. and Kuiper, D. (1995) *Recolonization of the Dutch Wadden Sea by the grey seal Halichoerus grypus*. *Biological Conservation* 71(3): 231-235.
- Reijnders, P., Ries, E. H., Tougaard, S., Nørgaard, N., Heidemann, G., Schwarz, J., Vareschi, E. and Traut, I. M. (1997) *Population development of harbour seals Phoca vitulina in the Wadden Sea after the 1988 virus epizootic*. *Journal of Sea Research* 38(1-2): 161-168.
- Reijnders, P., Brasseur, S. and Brinkman, A. (2003) *The phocine distemper virus outbreak of 2002 amongst harbour seals in the North Sea and Baltic Sea: spatial and temporal development, and predicted population consequences*. *Management of North Sea harbour and grey seal populations: proceedings of the International Symposium at EcoMare, Texel, The Netherlands November 29-30, 2002*. Common Wadden Sea Secretariat [etc.]. 19-25.
- Reijnders, P., Brasseur, S., Abt, K., Siebert, U., Stede, M. and Tougaard, S. (2006) *Aerial Surveys of Harbour and Grey Seals in the Wadden Sea in 2006*. Wadden Sea Newsletter 2006
- Reijnders, P., Brasseur, S. M. and Meesters, E. H. (2010a) *Earlier pupping in harbour seals, Phoca vitulina*. *Biology letters* 6(6): 854-857.
- Reijnders, P., Brasseur, S. M., Tougaard, S., Siebert, U., Borchardt, T. and Stede, M. (2010b) *Population development and status of harbour seals (Phoca vitulina) in the Wadden Sea*. NAMMCO Scientific Publications 8: 95-105.
- Rosing-Asvid, A., Teilmann, J., Olsen, M.T., Dietz, R. (2020) *Deep diving harbor seals (Phoca vitulina) in South Greenland: movements, diving, haulout and breeding activities described by telemetry*. *Polar Biology* 43: 359-368.
- Russell, D. J., McClintock, B. T., Matthiopoulos, J., Thompson, P. M., Thompson, D., Hammond, P. S., Jones, E. L., MacKenzie, M. L., Moss, S. and McConnell, B. J. (2015) *Intrinsic and extrinsic drivers of activity budgets in sympatric grey and harbour seals*. *Oikos* 124(11): 1462-1472.
- Schop, J., Abel, C., Brasseur, S., Galatius, A., Jeß, A., Meise, K., Meyer, J., van Neer, A., Stejskal, O., Siebert, U., Teilmann, J., Thøstesen, C.B. (2022) *Grey seal numbers in the Wadden Sea and on Helgoland in 2021-2022*. Common Wadden Sea Secretariat
- TMAP monitoring handbook. (2008). <https://www.waddensea-worldheritage.org/resources/tmap-handbook-text-2008>
- Tougaard, J., Teilmann, J. and Tougaard, S. (2008) *Harbour seal spatial distribution estimated from Argos satellite telemetry: overcoming positioning errors*. *Endangered species research* 4(1-2): 113-122.
- Unger, B., Baltzer, J., Brackmann, J., Brasseur, S., Brüggemann, M., Diederichs, B., Galatius, A., Geelhoed, S.C.V., Huus Petersen, H., IJsseldijk, L.L., Jensen, T. K., Jess, A., Nachtsheim, D., Philipp, C., Scheidat, M., Schop, J., Siebert, U., Teilmann, J., Thøstesen, C.B., van Neer, A. (2022) *Marine mammals*. In: *Wadden Sea Quality Status Report*. Eds: Kloepper, S. et al., Common Wadden Sea Secretariat, Wilhelmshaven, Germany. van Neer, A., Gross, S., Kesselring, T., Grilo, M. L., Ludes-Wehrmeister, E., Roncon, G. and Siebert, U. (2020) *Assessing harbour porpoise carcasses potentially subjected to grey seal predation*. *Scientific Reports* 10(1): 16345. <https://doi.org/10.1038/s41598-020-73258-y>.
- van Neer, A., Gross, S., Kesselring, T., Grilo, M. L., Ludes-Wehrmeister, E., Roncon, G. and Siebert, U. (2021) *Assessing seal carcasses potentially subjected to grey seal predation*. *Scientific reports* 11(1): 1-9.
- Vance, H., Hooker, S., Mikkelsen, L., van Neer, A., Teilmann, J., Siebert, U. and Johnson, M. (2021) *Drivers and constraints on offshore foraging in harbour seals*. *Scientific reports* 11(1): 1-14.
- De Vooy, K.G.N., Brasseur, S., van der Meer, J., Reijnders, J.H. (2012) *Analyses of four centuries of bounty hunting on seals in Zeeland, SW-Netherlands*. *Lutra* 55: 55-65.
- Wilson, L. J. and Hammond, P. S. (2019) *The diet of harbour and grey seals around Britain: Examining the role of prey as a potential cause of harbour seal declines*. *Aquatic Conservation: Marine and Freshwater Ecosystems* 29: 71-85.
- Wilson, R. P., Liebsch, N., Gomez-Laich, A., Kay, W. P., Bone, A., Hobson, V. J. and Siebert, U. (2015) *Options for modulating intra-specific competition in colonial pinnipeds: the case of harbour seals (Phoca vitulina) in the Wadden Sea*. *PeerJ* 3: e957..

**ANNEX 1: RESPONSIBLE NATIONAL AUTHORITIES AND LINES OF REPORTING/DECISION MAKING**

<p><b>Denmark:</b>                  Ministry of Environment and Food of Denmark                  Environmental Protection Agency                  Haraldsgade 53                  DK - 2100 Copenhagen                  T + 45 72 54 40 00</p>	<p><b>Federal Republic of Germany:</b>                  Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection                  Division N I 5 – Marine Nature Conservation                  Robert-Schumann-Platz 3                  53175 Bonn                  T + 49 (0)228 99 305-2629</p>
<p><b>The Netherlands:</b>                  Ministry of Agriculture, Nature and Food Quality                  Bezuidenhoutseweg 73                  NL - 2594 AC Den Haag                  T + 31 70 3798911</p>	<p><b>Coordinating Institution:</b>                  Common Wadden Sea Secretariat                  Virchowstr. 1                  D - 26382 Wilhelmshaven                  T + 49 (0)44 21 – 91 08 0                  E-mail: info@waddensea-secretariat.org</p>

The coordinating institution shall be informed about all developments and activities which concern the Conservation and Management of the Wadden Sea seal populations and regular reports on the status of the Wadden Sea seal populations shall be made public. Due to the federal structure of Germany, responsibility for the SMP with regard to nature conservation law lies primarily with the competent state ministries of Lower Saxony, Schleswig-Holstein and Hamburg.

Within the framework of the Trilateral Wadden Sea Cooperation (TWSC), the Task Group Monitoring and Assessment (TG MA) and the Task Group Management (TG M) are of importance for the implementation of the Seal Management Plan. They are policy task groups with a limited timeframe and defined tasks, for which the Wadden Sea Board (WSB) may allow exceptions. They report directly to the WSB and are chaired by experienced administrative/ministerial representatives. The Expert Group Marine Mammals oversees the implementation of the current SMP and advises on topics for the new SMP. As an Expert Group (EG), it has operational and advising tasks and reports to the CWSS, although the WSB may allow exceptions. EGs are chaired by CWSS staff or others and on a yearly basis the CWSS reports to the WSB about the outcomes and the further necessity of the groups. If the structure of the trilateral groups should change within the next review cycle of the Seal Management Plan, the responsibilities should be transferred to a corresponding successor group.



**Figure A.1.** Organisational structure of the Trilateral Wadden Sea Cooperation (TWSC).



## MEMBERS OF THE EXPERT GROUP MARINE MAMMALS:

CHAIR		SECRETARY
<p><b>Ms Ursula Siebert</b> Institute for Terrestrial and Aquatic Wildlife Research (ITAW), University of Veterinary Medicine Hannover Werftstr. 6, D-25761 Büsum Phone: +49(0)511 856 8158 E-Mail: Ursula.Siebert@tiho-hannover.de</p>		<p><b>Ms Kristine Meise</b> Common Wadden Sea Secretariat Virchowstraße 1, D-26382 Wilhelmshaven Phone: +49 4421 9108 16 Mobile: +49 4421910816 E-Mail: meise@waddensea-secretariat.org</p>
DENMARK		
<p><b>Mr Anders Galatius</b> Department of Ecoscience, University of Aarhus Frederiksborgvej 399, DK-4000 Roskilde Phone: +45 87158694 E-Mail: agj@dmu.dk / agj@ecos.au.dk</p>	<p><b>Ms Charlotte Bie Thøstesen</b> Fishery- and Maritime Museum Tarpbagevej 2, DK-6700 Esbjerg Phone: +45 2964 1388 E-Mail: cbt@fimus.dk</p>	<p><b>Mr Jonas Teilmann</b> Department of Ecoscience, University of Aarhus Frederiksborgvej 399, DK-4000 Roskilde Phone: +45 21 42 42 91 E-Mail: jte@dmu.dk</p>
GERMANY		
<p><b>Ms Julia Meyer</b> Environmental authority of the free Hanseatic city of Hamburg (BUKEA), National Park Administration Hamburg Neuenfelder Straße 19, D-21109 Hamburg Phone: + 49 (0)40 42840 2169 E-Mail: julia.meyer@bukea.hamburg.de</p>	<p><b>Mr Ole Stejskal</b> Food and Veterinary Institute Oldenburg Lower Saxony State Office for Consumer Protection and Food Safety Martin-Niemöller-Str. 2, D-26133 Oldenburg Phone: +49(0) 441 9713 703 E-Mail: ole.stejskal@laves.niedersachsen.de</p>	<p><b>Mr Florian Carius</b> National Park Authority Lower Saxony Virchowstr. 1, D 26382 Wilhelmshaven Phone: +49 4421 911 289 E-Mail: Florian.Carius@nlpv-wattenmeer.niedersachsen.de</p>
<p><b>Mr Armin Jeß</b> Schleswig-Holstein Agency for Coastal Defense, National Park and Marine Conservation, National Park Authority Schloßgarten 1, D-25832 Tönning Phone: +49(0) 4861 616 21 E-Mail: Armin.Jess@lkn.landsh.de</p>	<p><b>Ms Britta Diederichs</b> Schleswig-Holstein Agency for Coastal Defense, National Park and Marine Conservation, National Park Authority Schloßgarten 1, D-25832 Tönning Phone: +49(0) 4861 616 22 E-Mail: britta.diederichs@lkn.landsh.de</p>	
NETHERLANDS		
<p><b>Ms Sophie Brasseur</b> Wageningen Marine Research Postbus 57, NL-1780 AB Den Helder Phone: +31(0) 317 487 072 E-Mail: sophie.brasseur@wur.nl</p>	<p><b>Ms Jessica Schop</b> Wageningen Marine Research Postbus 57, NL - 1780AB Den Helder Phone: +31 (0)317 487 093 E-Mail: jessica.schop@wur.nl</p>	<p><b>Ms Meike Scheidat</b> Wageningen Marine Research Postbus 68, NL-1970 AB IJmuiden Phone: +31 (0)317487108 E-Mail: meike.scheidat@wur.nl</p>

## ANNEX 2:

# PROCEDURAL AGREEMENT ON THE UPDATE OF THE WADDEN SEA SEAL MANAGEMENT PLAN

Timeline	Actions to be taken	Responsibility
November 2024	Internal mid-term review - Assess current status of the implementation of the SMP 2023-2027 - Discuss further steps for its implementation	EG MM
November 2026 - January 2027	Final review of the SMP 2023-2027: - Summarize key activities - Provide overview on key literature	EG MM
January - March 2027	Provide recommendations for the SMP 2028-2032	EG MM
Beginning of April 2027	Meeting EG MM and TG M (+ relevant people from the competent management authorities & ministries) - discuss review and recommendations	EG MM, TG M
April - May 2027	Draft the SMP 2028-2032 based on the review and recommendations provided by the EG MM	CWSS
May - June 2027	2-3 Revision rounds within the EG MM with final discussion at the end of June 2027	CWSS, EG MM
July 2027	Submission to the TG-M	CWSS
July - August 2027	Revision of the SMP 2028-2032	TG-M
September 2027	Final discussion on controverse objectives and key action points, with participation of the chair of the EG MM (and other regional experts), if necessary	TG-M
October 2027	Final consultation with the ministries	CWSS, TG-M
October 2027	Finalize SMP 2028-2032 and submit to the WSB	CWSS
November 2027	SMP 2028-2032 presented to and endorsed by the Wadden Sea Board	CWSS, WSB
December 2027	Submission to CMS	CWSS

## PURPOSE

The Seal Management Plan (SMP) builds on the Art. IV of the WSSA which states that the Parties shall develop a conservation and management plan for the seal population on the basis of the latest scientific knowledge. The SMP shall contain a comprehensive set of target actions on research and monitoring, taking of seals, habitat protection, pollution, and the increase of public awareness which are or are to be undertaken by the Parties to achieve the goals of the WSSA. Thus, the SMP is an essential instrument that seeks a balance between conservation and economic development and management of the area. The Parties are required to regularly review the plan and the status of its implementation. Every 5 years the plan shall be amended to meet the challenge of protecting the seals of the Wadden Sea, taking into consideration the latest scientific research and potential changes in the conservation needs of the Wadden Sea seals.

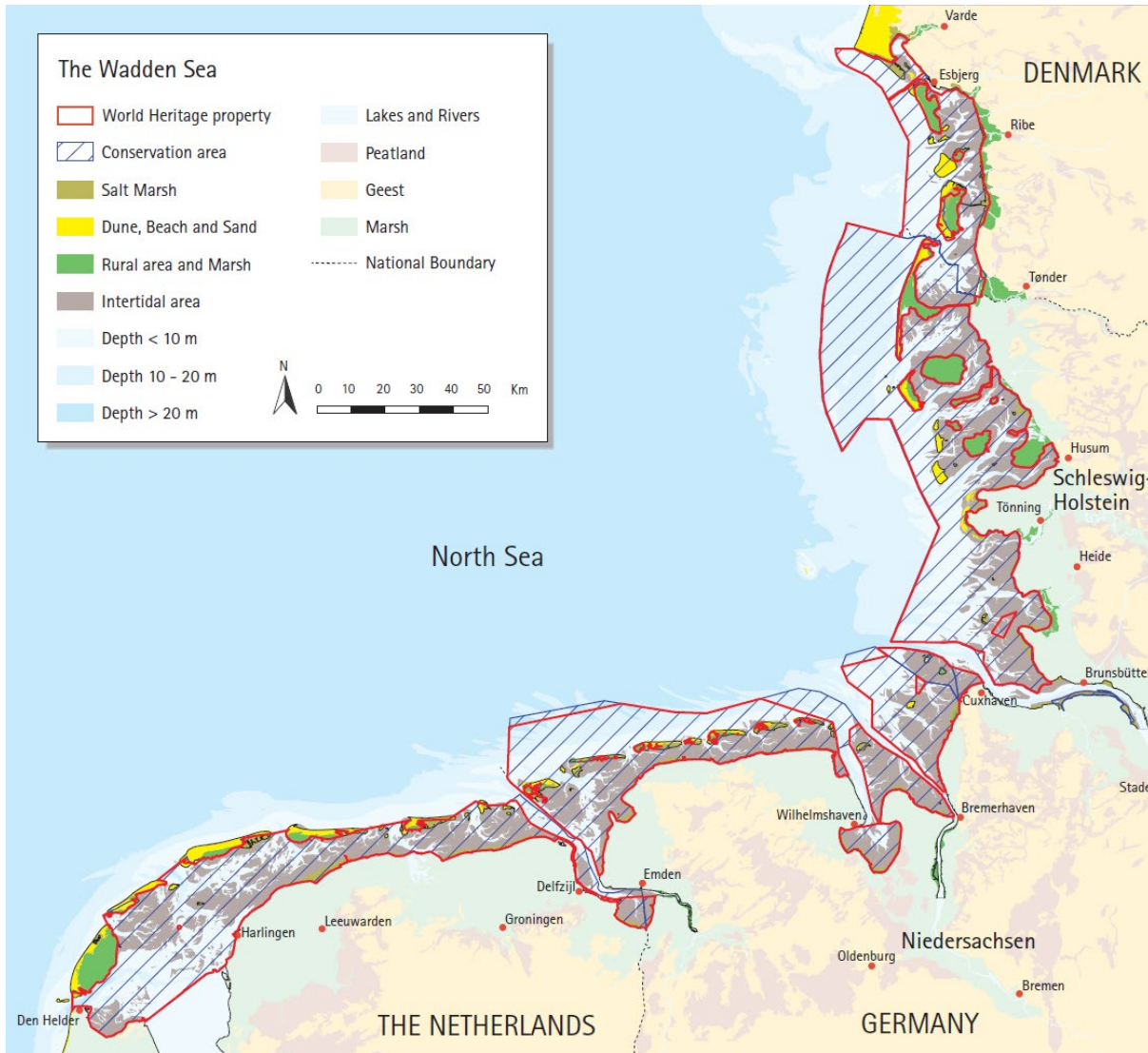
With the increased abundance of grey seals in the Wadden Sea, this species has been included in the Seal Management Plan (though they are not covered by the agreement itself).

## RESPONSIBILITIES:

The trilateral Expert Group Marine Mammals (EG MM) is responsible for evaluating the most recent SMP and formulating – if necessary, in cooperation with further experts – an outline for the new SMP every five years.

- The Task Group Management (TG M) is responsible for revising – if necessary, in cooperation with relevant colleagues from the management authorities – and adopting the new SMP as drafted by EG MM.
- The Wadden Sea Board is responsible for endorsing the new SMP.
- CWSS is responsible to present the SMP to the WSB and share the endorsed SMP with CMS.

ANNEX 3:



**Figure A.3:** The Wadden Sea conservation area is the key implementation area. Developments outside the area, e.g. Helgoland, Dutch Delta, estuaries and the North Sea are considered for certain aspects of the SMP, if a link with developments of the Wadden Sea seal populations is expected.

**Publisher:** Common Wadden Sea Secretariat

**Coordination:** Kristine Meise/ Common Wadden Sea Secretariat

**Cover image:** © Janis Meyer/ Waddenagenda

**Design:** Kollektiv-media.com

**This publication should be cited as:** Common Wadden Sea Secretariat (2022)

Wadden Sea Seal Management Plan 2023-2027.

Common Wadden Sea Secretariat, Wilhelmshaven, Germany.

