Sandbanks covered all the time (H1110)

This profile document is a description of the features and requirements of habitat type 1110 on the basis of the best available knowledge characteristics. It is one of the background documents used by the Ministry of Agriculture, Nature and Food Quality to draw up of designation orders and management plans for the Natura 2000 sites in which this habitat appears. It concerns specifically the formulation and elaboration of the conservation objectives in those orders and plans. The profile document – in contrast to the designation orders and parts of the management plans themselves – has no legal consequences. No appeal, therefore, can be made to administrative law nor is it subject to an inquiry pursuant to section 3: 4 of the General Administrative Law Act. This 2nd version of the profile document, drafted on 18 December 2008, replaces the 1st version drafted on 15 December 2006.

This profile must be read, interpreted and used in combination with the guide that contains the necessary explanation of the different sections.

Sandbanks which are slightly covered by sea water all the time (H1110)
Abbreviated to: 'Sandbanks covered all the time'

1. Status
Habitat Directive Appendix I (operating since 1994).

2. Profile

Description
The habitat type H1110 'Sandbanks covered all the time' is defined in terms of landscape on the basis of the Earth's surface shapes and water flow (geomorphological and hydraulic characteristics). These are sandbanks in shallow parts of the sea that are continuously under water, whereby the water column seldom reaches a depth of more then 20 metres. Locally hard substrates may occur, such as shell deposits, a peat subsurface, boulder clay or cobbles and so-called biogenic structures formed by organisms.
Sandbanks that clear the water are counted as habitat type H1140 'Mudflats and sandbars'. The boundary between the habitat types H1110 and H1140 are formed by the low water line based on Lowest Astronomical Tide (L.A.T.[1]) above which the littoral (Habitat type H1140 'Mudflats and sandbars') begins. For H1110 only a part may clear the water due to low water caused by the weather.

The entire complex of marine ecotopes[2] like sandbanks, intervening depressions and channels (that may be deeper than 20 metres to a limited extent), hard structures, shell deposits and the water column above can be counted as habitat type H1110.
In clear water photosynthesis may occur up to a depth of around 20 metres but in the predominantly murky coastal area the light tends not to penetrate so deeply. Therefore algae communities can only occur in shallower areas of the habitat type. In the past these areas also contained overgrowth with large eelgrass (*Zostera marina*).

Relative importance within Europe: considerable
The Dutch coast and the Dutch Continental Plate is responsible for a relatively large area of this habitat type in the European Union. The sandbanks of this type occur widespread along the European coasts. A combination of the abiotic and biotic qualities in areas comparable with the Delta and

[1] Tidal banks are shown on sea charts in correspondence with international agreements (without wind or air pressure influences) on the basis of the most recent soundings. The charts are based on a "chart date" according to L.A.T.. Carts whose contours deviate must be reproduced each time the sea charts are revised. This is no formal organisation for this, no international agreements and even the availability is not organised. Sea charts are available everywhere, are regularly updated and and depth contours correspond with the same contours of maps from neighbouring countries.
[2] Ecotope: a geographical, landscape unit that is homogenous within certain borders in terms of the key hydraulic, morphological and physical-chemical environmental factors relevant to the biota.

Wadden Sea occur in very few other places on this scale. Examples are the Danish and Dutch Wadden Sea and the Wash in England.

3. Definition

Assumptions
There has long been discussion in Europe about the definition of the habitat type H1110. The definition provided here is based on the description in the "Interpretation Manual of European Union Habitats"' (European Commission, 2007) that defines habitat type H1110 as follows:

> *"Sandbanks are elevated, elongated, rounded or irregular topographic features, permanently submerged and predominantly surrounded by deeper water. They consist mainly of sandy sediments, but larger grain sizes, including boulders and cobbles, or smaller grain sizes including mud may also be present on a sandbank. Banks where sandy sediments occur in a layer over hard substrata are classed as sandbanks if the associated biota are dependent on the sand rather than on the underlying hard substrata.*
> *Sandbanks seldom lie deeper than 20 metres below the average low water level. The sandbanks may, however, extend beyond a depth of 20 metres."*

As suggested above the deviation from the Interpretation Manual is not due to the average low water line but to using the L.A.T. as upper limit.

The habitat type 'Sandbanks covered all the time' (H1110) occurs as an element of estuaries and of large bays, but on the basis of the 'Interpretation Manual' of the European Commission is not regarded as a separate habitat type but counted as the habitat types 'Estuaries' (H1130)[3] or 'Large bays' (H1160).

In the sublittoral hard structures occur that can be classified as a reef. The manual defines habitat type 'Reefs' (H1170) as follows:

> "*Hard, compact substrates on solid or soft bottoms, which arise from the sea bottom in the sublittoral and littoral. These are rocks and stones as well as biogenic structures. Biogenic structures are hard bottoms of biogenic origin, like mussel beds, created from dead or living animals; thus biogenic hard bottoms form a habitat for epibiotic species.*"

The Netherlands has opted to consider the biogenic structures stated in H1170 not a separate habitat type but to include these structures in habitat type H1110_A (and H1140) where these structures come within the bounds of these habitat types. Biogenic structures are thus characteristic of structures and function of habitat type H1110_A (and H1140). This corresponds with the treatment of habitat types H1140, H1130 and H1160.

Subtypes
Within habitat type H1110 Sandbanks covered all the time the Netherlands currently distinguishes two subtypes. For the future registration of Natura 2000 areas outside the territorial waters even more subtypes will be defined, each of which has its own ecological habitat and respective biotic communities.

H1110_A 'Sandbanks covered all the time' (*tidal area)*
Subtype -A appears predominantly in the Wadden Sea and to a small degree in the former mouth of the Haringvliet. Subtype -A concerns both relatively flat-lying areas like channels in tidal areas. In the relatively flat sections the wave effect is strong, the currents modest and the water depth normally less than 5 metres. Given the limited hydrodynamic, the sediment here ranges from being fine sand to silt. The channels in the tidal areas have a sand sediment due to the relatively high currents. The current shape of these area has come about for a significant part through the damming of large tidal channels (Zuiderzee, Lauwerszee and Haringvliet).

[3] In the Westerschelde is the border between H1130 on the one hand and H1110 and H1140 on the other on the Vlissingen-Breskens line.

H1110_B 'Sandbanks covered all the time' (*North Sea coastal zone*)
Subtype -B concerns the submerged sandbanks of the North sea coast, including the outer deltas in the North Sea coastal zone, the Voordelta, the Westerschelde and the tidal inlets of the Wadden Sea. The dynamic conditions here (higher current speeds and stronger wave effect from the North sea) tend to make for a rougher sandy bottom than in subtype H1110_A. The water depth run as far as the –20 metre depth level. This depth corresponds roughly with the depth at which the bottom is still affected by the effect of the waves. The inflow of freshwater from the rivers via the Haringvliet locks in the Voordelta affects the biodiversity of the subtype.

Vegetation types
Habitat type H1110 is seldom deeper than 20 meter whereby photosynthesis can occur in clear water up around to such a depth. However, the water in the Dutch coastal area is predominantly turbid so the light tends not to penetrate so deeply. Therefore, algae communities can only occur in shallower areas of the habitat type. In the past in subtype -A in the Wadden Sea (and former Zuider Sea) there was extensive overgrowth or a sublittoral broad-leaved form of large eelgrass (*Zostera marina* var. *marina*). This plant was at the time so common that it was cropped on a large scale for use in laying dikes and filling mattresses. These eelgrass beds offered a habitat to various types of fish (like pipe fish, sea sticklebacks, common cuttlefish), invertebrates (several types of snail) and red seaweed. In the Netherlands, however, the eelgrass beds in the sublittoral disappeared in the 1930s due to a disease caused by the pathogen protist *Labyrinthula zosterae* probably in combination with turbidity in the western Wadden Sea in subsequent years as a result of the Zuider Sea being closed off. In the reference period 1960-1990 and in the current situation there is no large eelgrass overgrowth in habitat type H1110 present. Recovery is not considered feasible at this moment.

H1110_A Sandbanks covered all the time (*tidal areas*)

Code vegetation type	**English name vegetation type**	***Scientific name of vegetation type***	**Good/ Moderate**	**limiting criteria**
	Non-vegetated		G	Provided in the silt and fine-sand parts of FGR tidal area or FGR North Sea, insofar as this lies between the -20 metre-depth line and the Lowest Astronomical Tide based low water line, including the intervening deeper depressions and channels, and provided not part of H1130 and H1160.

H1110_B Sandbanks covered all the time (*North Sea coastal zone*)

Code vegetation type	**English name vegetation type**	***Scientific name of vegetation type***	**Good/ Moderate**	**limiting criteria**
	Non-vegetated		G	Provided in the rough-sand parts of FGR tidal area or FGR North Sea, insofar as this lies between the -20 metre-depth line and the Lowest Astronomical Tide based low water line, including the intervening deeper depressions and channels.

4. Quality requirements for habitat type

a. Abiotic preconditions
Subtypes A and B require good water quality. Poorly degradable substances carry risks due to piling up in the food chain. In the past pesticides (like chlorinated hydrocarbon), polychlorinated biphenyls

(PCB's) and anti-fouling agents like tributyltin (TBT) have has negative effects. In recent years the concentrations of these substances in the fat of animals has receded. The water is moderate to rich in nutrients. The clarity of the water is such that photosynthesis by algae is possible.
The salt content varies from light brackishness near the Haringvliet sluices to virtually salt more seawards and along the North Sea coastal zone. Near the sluices of the Haringvliet and the Afsluitdijk the freshwater content of the water may become very high when the river discharge is strong and cause mortality among those susceptible species like shellfish. Given the naturally occurring dynamic both subtypes can withstand a certain degree of seabed disturbance due to natural recovery capacity. **The constant fluctuation of ebb and flow is a key controlling factor in this habitat. The corresponding factors like fluctuations in non-saline, saline, hydrodynamic, dynamic in temperature (summer – winter) and water clarity determine the biodiversity of H1110.**

b. Typical species
In line with the Habitat Directive for all habitat types 'typical species' are selected that jointly form a good quality indicator for the (completeness of the) biotic community of the habitat type. The set of typical species is an indicator for the quality (and thus the condition or preservation) of the habitat type at national level.

The typical species for H1110 are those selected according to the following criteria:
- the species are quantifiable and can be incorporated in the existing monitoring programmes;
- the species are so regularly encountered that trends and/or distribution can be established (and thus not regionally (very) rare);
- the species are not exotic (an exotic species is a species introduced by man since 1900);
- the species can be used as an indicator of a good abiotic status or good biotic structure.

It is not the intention at all to list all typical species that occur in the biotic community of the habitat type (of the separate subtypes). Not all trophic levels (primary producers, animal plankton, large predators) and species groups (like slugs, seaweed) are represented. The selection of species is such that it enables the quality of the habitat to be satisfactorily assessed.

The list below of typical species has been compiled according to the criteria above; the list thus deviates from the 2007 report to the European Commission.

H1110_A Sandbanks covered all the time (*tidal area*)
The internal structure of H1110-A is composed of several components and the associated species. The list below of typical species thus contains those that are typical of the soft substrate of the more dynamic sandbanks of the tidal area, of the water column above and species typical of the hard substrates like the mussel beds.

English name	*Scientific name*	Species group	Category[4]	Substrate
Plumose anemone *	*Metridium senile*	Anthozoans	Cab	Hard
Sargatia troglodyte	*Sagartia troglodytes*	Anthozoans	Cab	Hard
White worm	*Nephtys hombergii*	Chaetopodes	Ca	Soft
Green rag-worm	*Nereis virens*	Chaetopodes	Cab	Soft
	Spio martinensis	Chaetopodes	Cab	Soft
Smooth barnacle	*Balanus crenatus*	Crustacean	Cab	hard
Shore crab	*Carcinus maenas*	Crustacean	Cab	soft/hard
Flying crab	*Liocarcinus holsatus*	Crustacean	Cab	Soft

[4] Belonging to the typical species are: Ca = constant species with indication of good abiotic status; Cb = constant species with indication of good biotic structure; Cab = constant species met indication of good abiotic status and good biotic structure; K = characteristic species; E = exclusive species.

English name	*Scientific name*	Species group	Category[4]	Substrate
Herring	*Clupea harengus*	Fish	Cab	
Sea-snail *	*Liparis liparis*	Fish	Ca	
Shorthorn sculpin	*Myoxocephalus scorpius*	Fish	Ca	
Smelt	*Osmerus eperlanus*	Fish	Cb	
Butterfish	*Pholis gunnellus*	Fish	K + Cab	
Flounder	*Platichthys flesus*	Fish	Cab	
Plaice	*Pleuronectes platessa*	Fish	Ca	
Sand goby	*Pomatoschistus minutus*	Fish	Cab	
Great pipefish*	*Syngnathus acus*	Fish	Cab	
Lesser pipefish	*Syngnathus rostellatus*	Fish	Cab	
Eelpout	*Zoarces viviparus*	Fish	Ca	
Common starfish	*Asterias rubens*	Echinoderms	Cab	soft/hard
Nun	*Macoma balthica*	Molluscs	Ca	Soft
Sand gaper	*Mya arenaria*	Molluscs	Ca	Soft
Mussel	*Mytilus edulis*	Molluscs	Ca	soft

* = species included for the Netherlands in the trilateral Red List (1996) with status 'not endangered'

H1110_B Sandbanks covered all the time (*North Sea coastal zone*)
The list of typical species of subtype H1110_B comprise species that are characteristic of the dynamic sandbanks and channels in the costal zone up a depth of 20 metres. All species are in the Cab category, unless there are clear indications for deviating from this.

English name	*Scientific name*	Species group	Category[5]
Sand mason worm	*Lanice conchilega*	Anthozoans	Cab
Pygospio elegans	*Spiophanes bombyx*	Anthozoans	Cab
	Nephtys cirrosa	Anthozoans	Cab
	Ophelia borealis	Anthozoans	Cab
Burying amphipod	*Bathyporeia elegans*	Crustaceans	Cab
	Urothoe poseidonis	Crustaceans	Cab
Heart urchin	*Echinocardium cordatum*	Echinoderms	Cab
Alder's necklace shell	*Lunatia alderi*	Molluscs	Cab
Cut trough shell	*Spisula subtruncata*	Molluscs	K + Cab
Nun	*Macoma balthica*	Molluscs	K + Cab
Fabulina fabula	*Tellina fabula*	Molluscs	Cab
Little sole	*Buglossidium luteum*	Fish	Cab
Herring	*Clupea harengus*	Fish	Cab
Lesser weever *	*Echiichthys vipera*	Fish	K + Cab
Lesser sandeel	*Ammodytes tobianus*	Fish	Cab
Norwegian sandeel	*Ammodytes marinus*	Fish	Cab
Dragonet	*Callionymus lyra*	Fish	Cab
Plaice	*Pleuronectes platessa*	Fish	Cab
Sole	*Solea vulgaris*	Fish	K + Cab
Whiting	*Merlangius merlangus*	Fish	Cab

* = species included for the Netherlands in the trilateral Red List (1996) with status 'not endangered'

[5] Belonging to the typical species are: Ca = constant species with indication of good abiotic status; Cb = constant species with indication of good biotic structure; Cab = constant species met indication of good abiotic status and good biotic structure; K = characteristic species; E = exclusive species.

c. Other characteristics of a good structure and function
This section describes typifying abiotic and biotic structures and functions. The habitat type has a good quality if it complies to a major extent with these characteristics.

The hydromorphological dynamic present within H1110 is determined by a large number of factors, one of which is the tidal currents whose direction and speed fluctuate during a tide as well as between neap and spring tide. In addition, there is the wave effect whose intensity is linked to the strength of the wind, for example. Also the location within the tide storage area causes local differences in the circumstances that occur. In narrow channels like the Marsdiep there is a surge in the speed of the current and the effect of these hydrodynamic differences is evident in the gradients of the sediment composition. Where there is little dynamic, silt can accrue while in the tidal inlets the sediment that is present is always shifting. The presence of macrobenthos is connected to these hydrological circumstances. A saline gradient may also influence the sedimentation whereby an increase in the salinity of the produces fine particles that sink to the bottom. On the basis of these abiotic factors, generally fine silt sediments occur in sheltered environments and coarser sediments in the more exposed environments.

This has an effect on the composition of the biotic community present. The flat parts of Sandbanks covered all the time have a relatively low biodiversity due to the high dynamic (strong wave effect). In the somewhat deeper surrounding parts (sides of the banks and depressions of channels between the sandbanks) silt and nutrients sink and the wave effect is less strong. The parts normally reveal a higher profusion of species and higher density of organisms. The channels themselves are, moreover, important in terms of the transport of sediment, water, nutrients and larvae. The fish community that uses the habitat comprises species that differ in respect of choice of food (benthos, plankton, shrimp/fish) and life phase (juvenile, adult, dweller) or season (migratory fish, seasonal visitors).

A well functioning habitat type H1110 can be recognised from the composition and age structure of the biotic community there. Many species in the base of the food chain (plankton, bottom animals) live for a very short time. Recovery following a disturbance (like a storm or mechanical intervention) takes place within several years. At the same time the composition of species, extent to which they appear and the biomass differ from place to place and year to year.

The (smaller of large) estuarine transitions from freshwater to seawater have disappeared. Both in the Delta and in the Wadden Sea there is an unnatural divide in the various drainage sluices between fresh (river) water and saline sea water. In the vicinity of these fresh-saline divides substantial freshwater transport occurs so that only species able to withstand the strongly fluctuating saline content can survive. The profusion of species in these circumstances is less than in areas with a more stable saline influence due to the absence of marine species. This difference can also be found in the biodiversity species associated with mussel beds near the Afsluitdijk (subtype H1110_A) and in the dominance of a limited number of estuarine species close to the Haringvliet locks (subtype H1110_B).

The coast area is a productive system based on the formation of organic matter by (single-cell) algae (phytoplankton) that act directly as food (via animal plankton, ground animals and fish) or the decomposition of which acts as food. A further source of food is the transported organic matter and silt. The considerable productivity is also based on rapid turnover and is the basis for the nursery function for may fish species and significant for breeding birds, migratory birds and sea mammals.

H1110_A Sandbanks covered all the time *(tidal area*)
Soft structures, like the eel grass beds, used to be a characteristic part of subtype H1110_A (see above).
Locally occurring hard structures – like mussel beds, mussel parcels, shell deposits, stone and gravel – are part of this subtype. Hard substrates conceal a higher and different biodiversity than the surrounding soft substrate, also serving as a substrate for species associated with a hard subsurface. These are specifically hydroid polyps, sea anemones, bryozoans, sea slug, sea acorns and seaweed that depend on hard substrate. Such structures also offer a habitat to worms, crustaceans and fish.

Biogenic structures in the form of mussel beds in various stages of development are a characteristic part of this subtype. The value of these mussel beds is that they offer a habitat to the associated biotic communities, a source of food for shrimps, crabs and diving ducks (whether the mussel itself or the associated species) and have a function in the nutrient cycle of the ecosystem (water filtering and enrichment of the bottom with highly organic silt).

Mussel beds occur in this naturally dynamic system in various stages of development, divided roughly into three phases:

1. mussel seed banks with, on a stability scale, as extremes sandbanks that occur
    a. at unstable locations and where the mussel seed has little chance of surviving the first winter; this type of mussel seed bank has a very minor role in maintaining the mussel population in subtype H1110_A;
    b. at stable, mild locations and where the mussel seed has a significant chance of surviving the first winter;
2. mussel (seed) banks that have survived the first winter despite the dynamic and predation and appear able to grow into semi-adult mussels;
3. mussel beds older than 1 year/2 winters; these older mussel beds are characterised by the presence of living and dead mussels of different year categories and (gradually) by the characteristic associated flora and fauna (see above).

Key factors for the occurrence and stability of mussel beds are the stability of the subsurface, the hydrodynamic circumstances (current speeds, wave effect in storm), predation and the density of mussels in the banks (number of mussels per square metre). Once stabilised, a sublittoral mussel bed can, despite the dynamic circumstances, extend its lifetime beyond the normal lifetime of a mussel (average maximum of 5 years) through new seeding. Mussel beds may also disappear due to wave or ice action or loss of structure.

The food function of mussel beds for birds, that is not as such part of the description of biogenic structures in the aforementioned European 'Interpretation Manual', is important however, given the areas in which this subtype occurs and which are also designated as Bird Directive area. This function is especially significant for growing mussels. Mussel beds are a key source of food for diving ducks. Older mussel beds have a more diverse flora and fauna and are less a source of food for birds.

The existence of the Japanese Oyster, an invasive exotic, is very difficult to contain and it is increasing. This structure-forming organism is expected to play an increasingly influential role in the future. The reefs of the Japanese Oyster offer a habitat for many species that naturally inhabit mussel beds; the associated biodiversity of mussel beds and oyster beds have much in common. Oyster beds have very little significance as a source of food. Too little is still known about the development in the sublittoral. Chapter 7 takes no account of the Japanese oyster in assessing the characteristics of structure and function.

H1110_B Sandbanks covered all the time (*North Sea coastal zone*)
Biogenic structures like mussel beds are not a characteristic part of subtype H1110_B. However, shellfish may be burrowed in the bottom (like *Spisula substruncata*, *Ensis directus*) in such a high density that one may speak of beds. In contrast to mussel and oyster beds, these structures do not form a substrate for associated organisms, they do not rise above the sea bottom and the biodiversity is not higher than in the surrounding environment. Strong fluctuations in the densities of these shellfish occur from year to year. They form a key source of food for seabirds like the black scoter and eider. In addition to shellfish beds, sand mason worms may also appear in high densities and change the sea bottom features. Here, too, there is no associated fauna.

Here and there fragments of peat and stone may be present on the sea bottom but these are of negligible significance for the structure of the sea bottom and the biodiversity. However, artificial hard substrates do appear in the shape of wrecks, breakwaters and dikes. These hard substrates, like mussel beds, often house a higher and different biodiversity than the surrounding soft substrate.

Since these are not natural structures, the associated fauna are not assessed as a quality characteristic of the habitat type.

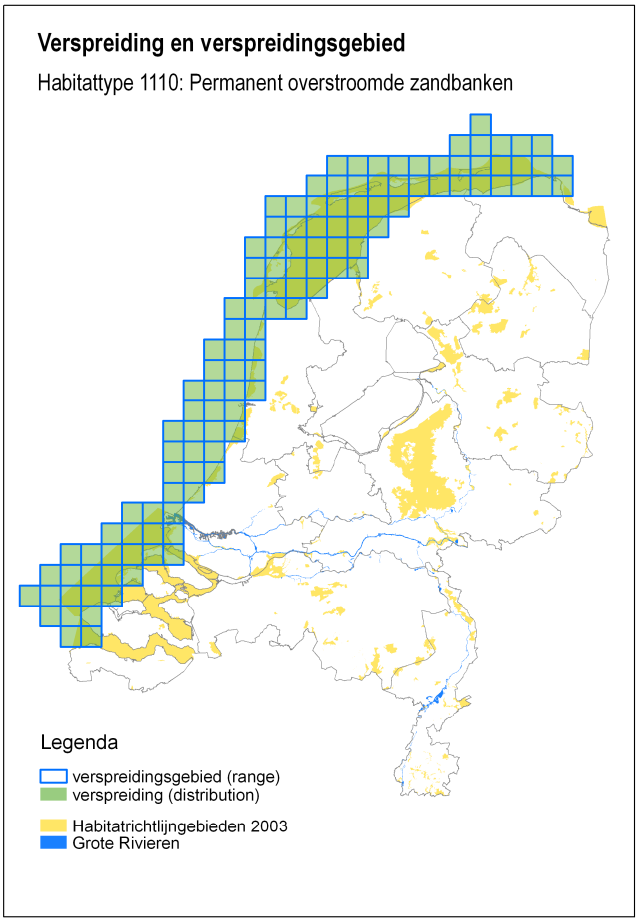
5. Quality requirements of the surroundings

For the habitat type H1110 'Sandbanks covered all the time' the most prominent characteristic is a dynamic (by seawater current) that is higher in subtype H1110_B than in subtype H1110_A. The current is mainly caused by tidal movement, wind and sea currents. This determines erosion and sedimentation and, thereby, bottom structure and the turbidity of the water. The movement of organisms is also dependent on the current. Light is another key causal factor. The water is nutritious of moderately nutritious[6]. The transport of nutrients is determined by the transport via the rivers and the turnover of nutrients in the system itself. Salinity (ratio of brackish water to salt water[7]) and temperature are also important.

6. Current occurrence

Sandbanks covered all the time (H1110) occur in the shallow parts of the sea: the North Sea coastal zone, the channels in tidal areas (Wadden Sea) and in the former estuaries (Haringvliet, Oosterschelde and Zuiderzee). Subtype H1110_B occurs along the entire Zeeland, South and North Holland coast and north of the Wadden islands.
In the Eems-Dollard, the Westerschelde [stet] and the Oosterschelde [stet] Sandbanks covered all the time also occur but are considered here as part of the habitat types H1130 'Estuaries' and H1160 'Large bays' respectively.

[6] At PSU 30; winter DIN 0,06 – 0,22 mg N/l and winter DIP 0.008 – 0.025 mg P/l (combined natural ranges of KRW coastal water types).
[7] 10 to 19 gCl/l..



This distribution map comes from the 2007 report to the European Commission. The gris blocks in the Eems-Dollard area do not, however, belong to the distribution area of H1110.

7. Assessment of the status of national conservation

This part of the profile document presents an explanation of the assessment of the status of the conservation of the habitat type and any subtypes. The method used for this assessment (the assessment aspects and the criteria) was established in 2006 by the Habitats Committee (committee ex. art. 20 Habitat Directive). The assessment is shown in a chart for the years 1994 (when the Habitat Directive came into force), 2004 (basis for the Natura2000 targets document) and 2007 (based on the report to the EU (so-called. art. 17 report)).

Trends until 1994
The Habitat directive came into force in 1994, though this year is difficult to set as a reference point for assessing the status of conservation since how representative that year was could not be determined in advance. The Habitat directive prescribes for the assessment of the status of conservation the use of 'favourable reference values' (FRV's). Since these values (as yet) are absent for this habitat type reference is a longer series of years from the period before 1994, namely 1960 - 1990.

Abiotic
H1110_A Sandbanks covered all the time *(tidal area)*

Before the reference period the construction of the Afsluitdijk (1932) had a major impact on the distribution and surface area of habitat type. Since the construction of the Lauwersmeerdijk (1969) the distribution and surface area of the habitat type in the Wadden Sea has not changed in the main. The surface area and locations of subtype H1110_A is quite stable there.

H1110_B Sandbanks covered all the time *(North Sea coastal zone*)
In the North Sea coastal zone the distribution and surface area of the habitat type have not changed since the construction of the Afsluitdijk and Lauwersmeerdijk though there are natural dynamic processes that do constantly change the position of channels and sandbanks.

In the Delta area the Haringvliet dam (1971), the Brouwers dam (1972) and the Oosterscheldekering (1986) have been constructed in succession. The Haringvliet dam has outlets that allow the transport of freshwater from the Maas and Rhine. In the Brouwerdam a sluice was constructed in 1982 enabling seawater to enter the Grevelingen. The closure of these former estuaries (Haringvliet and Grevelingen) has resulted in amore intermittent influence of freshwater than previously, and this has affected the biodiversity in the vicinity of the Haringvliet dam. Inn addition, there have been changes in current speeds. Former tidal channels have, as a result, been partially or entirely filled up. The open structure of the Oosterscheldekering makes for higher current speeds in the Oosterschelde mouth and the pattern of tidal flows is more complex than for the estuaries referred to above. Although the major morphodynamic changes have occurred for the Deltaworks some developments continue unabated. The morphology of the Voordelta is still not in balance with the new coastline. In spite of this, the surface area of subtype H1110_B is quite stable. The exact locations of subtype H1110_B are, however, being changed due to the locale dynamic.

In the period 1960-1990 there was an increase in the transport of nutrients followed by a fall (and thus the corresponding capacity). Shipping and recreational sailing increased.

Biodiversity
During the last century the biodiversity (species composition and abundance) changed. It is difficult to pin down the driving force behind these changes. Possible factors are changing environmental conditions like more turbidity in the water, the arrival of exotics, warmer climate and human intervention (dams and bottom disturbance).
In the fish fauna changes occurred in the period from 1970. Several fish species that were very common have become scarce (like the sting-ray (*Dasyatis pastinaca*). Several fish species are dwindling (goldsinny *Ctenolabrus rupestris*, lemon sole (*Microstomus kitt*)) or even disappearing (topknot (*Zeugopterus puntatus)* and some species of shark). More southerly species have, by contrast, recently increased in number; the sea bass (*Dicentrarchus labrax*), mullet (*Mulus surmuletus*), sea bream (*Pagellus bogaraveo*), bogue (*Boops boops*) and various species of wrasse.
Sea mammals, too, like the previously abundant harbour porpoise(*Phocoena phocoena*) have begun to revive in recent years. Another indication is that hard substrate species like the sea cypress (the polyp *Sertularia*) are rare in our sea. A development already mentioned above is the disappearance of the sublittoral eel grass (*Zostera marina* var. *marina*) in the 1930s from the shallow, permanently submerged parts of the Wadden Sea (and therewith practically the characteristic attendant fauna).
In addition, there are the exotics that have been introduced and that currently have an important ecological role in the habitat type. Like the American razor shell (*Ensis directus*), present since the beginning of the 1980s in both subtype H1110_A and H1110_B, that has very high densities and biomasses locally. In subtype H1110_A the Japanese oyster (*Crassostrea gigas*), present since the 1990s, now forms oyster beds in both the littoral and sublittoral Wadden Sea.

Recent developments 1994 - 2007
In the period 1994-2007 few major changes have occurred in the composition and abundance of species. Exceptions are the increase of the harbour porpoise, decline of young fish and the appearance of the Japanese oyster. Mineral extraction (shells) is linked to preset quotas through licence extensions. Recreational sailing has increased, with counts from the air showing that in 2005 most recreational vessels in the Wadden Sea were found in the west and in the Voordelta near the Brouwers dam and Haringvliet dam. In the Wadden Sea there are all kinds of experiments with

different types of mussel seed capture installations (MZIs). A Cabinet decision ending mechanical cockle fishing in the Wadden Sea resulted in the closure of this kind of fishing in 2005. Since 2000 the Dutch cutter fleet < 300 pK has been reduced by more than 30%, resulting less fishing intensity in the Wadden Sea and coastal zone.

The transport of fresh water from the IJsselmeer to the Wadden Sea has been less in recent years (from 2003) than in the years before (except for 1996 and 1997 when the transport was even lower). The nutrient transported from the rivers has decreased and average temperatures have increased slightly.

In 1979 shoreface nourishment along the entire North Sea coast began to compensate for the loss caused by coastal erosion. The sand was originally discharged on the beach and since 1993 also under water off the coast. These so-called pre-shore supplementations, up to some 500m off the coast, have become the main method of combating the structural erosion of the Dutch coast. The sand for this is extracted from beyond the (saturated) 20 metre depth line.

Assessment of status of conservation
To assess the status of conservation four criteria established by the EU are used. The reference for the assessment is the period of three decades before the Habitat directive (1994) took effect, namely '1960-1990'.

National conservation objective

H1110 Subtype A 'Sandbanks covered all the time (tidal area)': maintenance of distribution, maintenance surface area and improvement of quality.
H 1110 Subtype B 'Sandbanks covered all the time (North Sea coastal zone)': maintenance of distribution, maintenance surface area and maintenance of quality.

Ambition for the national objective
For the national conservation objective, it is desirable to maintain the current distribution and surface area, within the natural fluctuations and in balance with habitat type H1140. The typical species would have to be stable in the medium to long term to ensure that extinction is prevented. Much of the surface area occupied by the habitat type must have a good structure and function. The requirements regarding structure and function differ per site, so the management plans need further detailing. Specific to habitat type H1110_A 'Sandbanks covered all the time' the quality has to be improved, particularly for biogenic structures like mussel beds.

Assessment of (natural) distribution area aspect: for both subtype H1110_A and subtype H1110_B 'favourable'.
The distribution of the subtypes H1110_A and H1110_B has been more or less stable in recent decades following the last diking (around 1970), within naturally occurring fluctuations.

Assessment of surface area aspect: for both subtype H1110_A and subtype H1110_B 'favourable'.
The surface area of the subtypes H1110_A and H1110_B has been more or less stable in recent decades following the last diking (around 1970), within naturally occurring fluctuations.

Assessment of quality aspect: for both subtype H1110_A and subtype B ' unfavourable–inadequate'.
The assessment is performed by structure and function (the abiotic preconditions and other characteristics of a good structure and function) described in the profile document and the typical species.

1. Structure and function
H1110_A Sandbanks covered all the time *(tidal area*)

What is striking in the structure and function of the system is that the total biomass (production) of fish has declined substantially, possibly due to a falling level of nutrients and/or a change in light climate. Mussel beds in various stages of development are characteristic of subtype A and key ecological functions within the subtype. The mussel beds in older stages are relatively less prevalent. In channels in the eastern part of the Wadden Sea (Eems and Zoutkamperlaag) as well as in the vicinity of the Afsluitdijk and in the Molenrak, some old beds are present. It cannot be claimed with certainty that older stages are less prevalent now than in the reference period but a certain increase in time of the share of old mussel beds is advisable given their ecological value.

H1110_B Sandbanks covered all the time *(North Sea coastal zone*)
What is striking in the structure and function of the system is that the total biomass (production) of fish has declined substantially. The biomass of bottom dwellers has nevertheless increased.
2. Typical species
For a good status of conservation it is desirable that the selected typical species of the habitat type at national level *have stable populations* in the medium to long term in relation to the surface area of the habitat type. For the typical species the trend and current incidence together determine whether a typical species is stable in the medium to long term or whether it will become extinct (that is criterion for the assessment). Whether there is a real risk of extinction can be determined according to the Red List and/or by comparing the actual population size with the minimum for a stable population (FRV). The assumption is that the a habitat type scores unfavourable–bad (red) if at least 25% of the typical species is seriously endangered (or have already disappeared)[8]. A habitat type scores unfavourable–inadequate (orange) if at least one typical species is very rare. In all other cases the habitat type scores favourable (green).

H1110_A Sandbanks covered all the time *(tidal area*)
The *number* of typical species has not fallen since the reference period but has remained stable. This applies to both open water and bottom dweller species. The abundance of the species has changed, however, like the eel pout and the nun (a main food source for young fish). This may have resulted or may result in shifts in ratios between functional groups. The majority of the typical species for subtype H1110_A is common to very common. The assessment of the status of conservation is therefore favourable.

H1110_B Sandbanks covered all the time *(North Sea coastal zone*)
Subtype H1110_B is by nature poorer in biodiversity than subtype H1110_A, due to the higher dynamic and for this subtype the number of typical species has not fallen since the reference period and the majority of the typical species is common to very common. The densities of *Spisula*, a main source of food for sea ducks, reveal strong fluctuations. The assessment of the status of conservation for subtype H1110_B is favourable.

Assessment of future prospects: 'unfavourable–inadequate'.
In assessing future prospects account is taken of the expected impact of national policy and implementation of European law and legislation.

H1110_A Sandbanks covered all the time *(tidal area*)
Recovery of the quality of structure and function is expected through the introduction of the Policy Decree on Shellfish Fishing 2005-2020 and the corresponding aim to improve the ecological adjustment of shellfish fishing. The measures in the decree still lack sufficient focus on the intended recovery of sublittoral mussel beds (subtype H1110_A). Efforts by the shrimp sector to adjust the fishing such that it qualifies for an ecological hallmark will give a boost to the recovery of structures and occurrence of some typical species. In the coming period many of the (dormant) licences for trawling will lapse, which will see fishing intensity decline even more. The existing ruling that only cutters with an engine capacity of less than 300 pk (Eurocutters) may fish within the 12 mile zone is being implemented and this will have a favourable impact on the ecosystem. Fish stocks are not expected to have recovered within the foreseeable future. The Water Directive also aims to achieve a

[8] This corresponds with the Red list categories 'seriously endangered' (very rare and at least 75% less than in 1950) and 'disappeared' (no regular reproduction any longer).

more natural composition and balanced age structure of the species composition in the costal zone. The extent of turbidity of the water column will not become appreciably less in the coming period.

It is not known how much the Japanese oyster will spread at the expense of the mussel beds (subtype H1110_A). For the longer term there is uncertainty about the effect of climate change and the rise of sea levels as well as the consequences for the dynamic and capacity of the coast to adapt. Despite the positive developments in fishing management referred to above and also due in part to all kinds of uncertainties in policy that have not been taken into account, making a favourable status of conservation unreasonable in the short term (2020), future prospects for H1110_A are considered 'unfavourable–inadequate'.

H1110_B Sandbanks covered all the time *(North Sea coastal zone*)
For subtype H1110_B, too, shrimp fishing adjustments are expected to have a positive impact on the recovery of structures and the incidence of some typical species. The constraints on trawling in the 12 mile zone, to cutters with engine capacity of less than 300 pk (Eurocutters), will also have a favourable effect on the ecosystem in subtype H1110_B. Fish stocks are not expected to have recovered within the foreseeable future.

Shoreface nourishment along the entire North Sea coast is combating structural erosion of the Dutch coast, nowadays by so-called pre-shore replenishment, up to some 500m off the coast. This can put local pressure on the bottom fauna. The sand for this is extracted from beyond the (saturated) 20 metre depth line. After a period of increasing pre-shore replenishment in recent years these have now become stable.

Despite the positive developments in fishing management referred to above and also due in part to all kinds of uncertainties in policy that have not been taken into account, making a favourable status of conservation unreasonable in the short term (2020), future prospects for H1110_B are considered 'unfavourable–inadequate'.

Assessment of the Status of Conservation: for both subtype A and subtype B 'unfavourable–inadequate'.

Subtype H1110_A. Sandbanks covered all the time *(tidal area*)

Aspect	**1994**	**2004**	**2007**
Distribution	Favourable	Favourable	Favourable
Surface area	Favourable	Favourable	Favourable
Quality	Unfavourable–inadequate	Unfavourable–inadequate	Unfavourable–inadequate
Future prospects	Unfavourable–inadequate	Unfavourable–inadequate	Unfavourable–inadequate
Assessment CS	**Unfavourable–inadequate**	**Unfavourable–inadequate**	**Unfavourable–inadequate**

Subtype H1110_B. Sandbanks covered all the time *(North Sea coastal zone*)

Aspect	**1994**	**2004**	**2007**
Distribution	Favourable	Favourable	Favourable

Surface area	Favourable	Favourable	Favourable
Quality	Unfavourable–inadequate	Unfavourable–inadequate	Unfavourable–inadequate
Future prospects	Unfavourable–inadequate	Unfavourable–inadequate	Unfavourable–inadequate
Assessment CS	**Unfavourable–inadequate**	**Unfavourable–inadequate**	**Unfavourable–inadequate**

8. Sources

- Alkyon, report A1770R1r2, 2006. Quantitative analysis and forecast of morphological development of the Predelta.
- Berg, S., C. Krog, B. Muus, J. Nielsen, R. Fricke, R. Berghahn, T. Neudecker & W.J. Wolff (1996). Red List of Lampreys and Marine Fishes of the Wadden Sea. Helgoländer Meeresuntersuchungen 50, suppl. 101-105.
- Craeymeersch, J.A.; Escaravage, V.; Steenbergen, J.; Wijsman, J.; Wijnhoven, S.; Kater, B. (2006). De bodemfauna in het Nederlands deel van de Scheldemonding, in: Coosen, J. et al. (Ed.) (2006). Symposium: The Vlakte van de Raan revisited, Oostende, 13 October 2006. VLIZ Special Publication, 35: pp. 85-105.
- Dankers, N., K.S. Dijkema, J.A. van Franeker, M.F. Leopold, C.J. Smit & W.J. Wolff (1993). Natuurlijke systemen in de maritieme invloedsfeer. Concept-rapport IBN-DLO, Texel. Gepubliceerd in: Leerdam, A. van, M.J. Wassen & N. Dankers (1993). Study of near -natural reference ecosystems. Rijksuniversiteit Utrecht, Utrecht.
- Ens, B.J., J.A. Craeymeersch, A.C. Smaal, R. Dekker, J. van der Meer & M.R. van Stralen (2007). Sublitorale natuurwaarden in de Waddenzee: Een overzicht van bestaandekennis en een beschrijving van een onderzoeksopzet voor een studie naar het effect van mosselzaadvisserij en mosselkweek op sublitorale natuurwaarden. Wageningen IMARES, Texel office, Report C077/07.
- European Commission (2007). Update of “Interpretation Manual of European Union Habitats. Appendix 1 Marine Habitat types definitions
- http://www.waddenzee.nl
- http://www.zeegras.nl (modified 24-06-2008)
- Jak, R.G. (2008) (in prep.). Building block document for the profile of Habitat H1110 subtype A. Report Wageningen IMARES.
- Johnston, C.M., C.G. Turnbull & M.L. Tasker (2002). Natura 2000 in UK offshore waters: advise to support the implementation of the EC Habitats and Birds Directives in UK offshore waters. JNCC Report 325, Peterborough.
- Leopold, M.F. & N.M.J.A. Dankers (1997). Natuur in zoute wateren. Background report 2c, Natuurverkenningen 97.
- Lindeboom, H., J. Geurts van Kessel & L. Berkenbosch (2005). Gebieden met bijzondere waarden op het Nederlands Continentaal Plat. Rapport RIKZ/2005.008. Alterra Report 1109. RIKZ, Den Haag / Alterra, Wageningen.

- Marine Expert Group (2005). New definitions for Habitat 'Sandbanks which are slightly covered by sea water all the time (1110)'. Final Draft, 25 February 2005. Manuscript, 5 pp.

- Molen, D.T. van der (2004, red.). Referenties en maatlatten voor overgangs- en kustwateren ten behoeve van de Kaderrichtlijn Water. Overgangs- en Kustwateren. Report STOWA, Versipn september 2004.

- Nehls, G. & H. Buttger (2007). Spread of the Pacific Oyster Crassostrea gigas in the Wadden Sea: Causes and consequences of a successful invasion. HARBASISNS Report, 54 pp.

- Petersen, G.H., P.B. Madsen, K.T. Jensen, K.H. van Bernem, J. Harms, W. Heiber, I. Kröncke, H. Michaelis, E. Rachor, K. Reise, R. Dekker, G.J.M. Visser & W.J. Wolff (1996). Red List of Macrofaunal Bethic Invertebrates of the Wadden Sea. Helgoländer Meeresuntersuchungen 50, suppl. 69-76.

- Tulp, I., L.J. Bolle &, A. D. Rijnsdorp (2008). Signals from the shallows: In search of common patterns in long-term trends in Dutch estuarine and coastal fish. Journal of Sa Research 60: 54–73.

Fish profiles

This profile must be read, interpreted and used in combination with the guide that contains the necessary explanation of the different sections.

Sea lamprey (*Petromyzon marinus*) **(H1095)**

1. Status

Habitat directive Annex II (effective 1994).

2. Characterisation

Description: Lampreys do not have jaws but a sucker mouth containing teeth. The sea lamprey is yellow-brown in colour with a noticeably marbled pattern. The round body of this eel-like creature is somewhat tapered towards the rear. The sea lamprey can reach a metre or more in length making it the largest lamprey species in Europe. It is a migratory fish: sea lampreys live for a while in the sea with rivers serving as a migrating zone as well as spawning and growing area. For more information concerning lamprey spawn and the lifecycle see also the description of the brook lamprey H1096.

Relative importance within Europe: significant
The sea lamprey occurs in Europe, North Africa and North America. In Europe the sea lamprey is distributed along the coasts and in the large rivers of Norway as far as the Adriatic coast in the Mediterranean Sea. In the northern colder regions the species is traditionally scarce. The majority of the distribution occurs in the West European rivers of Northern Germany and Southern England to Portugal. Most of the large rivers in this region have undergone drastic changes and the spawning and growing regions for the lamprey have been considerably limited by dams, poor water quality and loss of habitat. The Netherlands is the gateway for the spawn populations of the Rhine and Maas river basins. In these two rivers the numbers of sea lamprey have been very low for decades.

3. Ecological requirements

Habitat: The sea lamprey is an anadromous species, that is, this water creature spawns in rivers but grows for the most part in the sea. The species spawns in the middle and upper reaches of rivers where there is a stony, gravel bottom. There may also be sand between the coarser material. The eggs are deposited in a hollow or 'nest' in the gravel and after fertilisation are briefly guarded by the males. Most sea lampreys die after reproduction. After three or four weeks the larvae leave the nest to be carried by the current to the silt-rich parts of the river. Over the next six to eight years the lamprey larvae (known as ammocoetes) live buried in silt-rich bottoms. Once the larvae reach around 15 cm in length a metamorphosis occurs whereby they develop eyes, teeth and reproductive organs. Subsequently the still young lampreys drift off towards the open sea. After around three years in the open sea the fully grown adult sea lampreys head to the rivers during the migration period from February to June, peaking in May to June, to complete their lifecycle. The sea lampreys orientate by specific odours (pheromones) excreted by the buried ammocoetes. In this way a relatively large number of lampreys migrate along rivers to successfully spawn and allow larvae to grow. The sea lampreys do not need to return to the river where they were spawned. They differ in this way from other migratory fish like salmon. For sea lampreys there is much more mixing between populations than for salmon and thus it is unlikely that there are 'separate' populations of different rivers or distinctly 'separate' populations. The specific migratory behaviour of the sea lamprey has an impact on the management or recovery of populations. For the sea lamprey population measures in a particular river probably have a grater 'radiating' effect to other surrounding rivers than for a species like salmon. Little is still known about the sea lamprey, like the open sea areas used by the species. The main spawn and growing areas in rivers are unknown because the buried ammocoetes are hardly ever encountered in standard fish sampling. Specific sampling focusing on lamprey larvae in the rivers still occurs too little in Europe.

Food: The larvae live buried in silt-rich bottoms where they feed on dead organic material (detritus) and plants and animals of the underwater bottom (benthos). In the metamorphosis phase they develop teeth and then they drift off towards the open sea. They then become parasitic and live off the blood and tissue of normally larger fish and even harbour porpoises, dolphins and whales. During their migration upstream in the rivers they do not feed.

4. Current occurrence?

The sea lamprey used to migrate up river from the North sea in the Rhine as far as Basel and in the Maas to deep in Belgium. The sea lamprey is also naturally present in the Schelde and the Eems. The number of observations of this species in the large rivers has fallen considerably since 1960 and hit a nadir in the 1970s and 1980s. Nonetheless, this species has not entirely disappeared from the Maas and Rhine. The sea lamprey uses our country mainly as an area for larvae to grow (ammocoetes) and as a migration path for the migration of adults heading for suitable spawning grounds in Germany and Belgium. And there may well be spawning grounds in our country too: in the Roer, for example, ammocoetes have been found since 2004. Give the large dam just over the border it is likely that spawning has occurred on Dutch territory.

Distribution map Sea lamprey

5. Assessment of national conservation status

Trends in the Netherlands: The sea lamprey used to be a species common to our rivers but the construction of dams ('damming') in the large rivers and their tributaries over the past century has made many spawning grounds inaccessible. Subsequently the numbers of the creature observed in our country fell sharply to a nadir in the 1970-1985. Since around 1985 number increased, probably due to the much improved quality of the water in the rivers, especially the Rhine, though it should be noted that only since 1993 have reliable monitoring data become available on the sea lamprey after recovery had occurred for the main part. Current number are distinctly higher than during the nadir but have not recovered to former levels.

Recent developments: From the fish monitoring by IMARES the numbers of adult sea lampreys reveal little by way of a trend in our river tributaries since 1994 although considerable annual variation has been observed in the numbers migrating upstream.

Trends in the numbers of adult sea lampreys in the fish monitoring by RIVO (number per fyke) show an average trend across all areas and in four areas separately (note that the scale is logarithmic, see Winter et al. 2005).

Assessment aspect natural area of distribution: favourable
Globally the area of distribution of the sea lamprey has remained unchanged though no reproducing population appears to be present any longer in the Schelde river basin.

Assessment aspect population: unfavourable–inadequate
The selected unit for population is the number of migrating sea lampreys since this is monitored. Currently more than 10.000 sea lampreys very probably are migrating again along the Rhine and more than 1,000 along the Maas. There is a lack of good data concerning sea lamprey trends in the Eems. The total number of on-shore sea lampreys is almost a quarter below the favourable reference.

Assessment aspect habitat: unfavourable–inadequate
A major problem in the assessment of the habitat of the sea lamprey is it the lack of knowledge about the chief growing areas of the larvae. Given that growing lampreys generally prefer stiller river areas richer in silt, it might be expected that Dutch parts of the river courses play an important role in this respect.
Much has been done to improve the water quality and adapt the barriers, and this has considerably expanded the habitat of the sea lamprey over recent decades in the river basins of rivers that flow through the Netherlands. In the Rhine the free 'migration' of lampreys is possible from the sea via the Nieuwe Waterweg and the Waal as far as Iffezheim in Germany where the most upstream dam now has a fish ladder. The Haringvliet dam is probably the major obstacle to the route inwards to the Haringvliet. The Afsluitdijk is a key hindrance to sea lampreys wanting to swim up the IJssel via the Wadden Sea. In view of the fact that sea lampreys have been observed on the inside of both dams, some sea lampreys seem able to negotiate the dams, though the size of this part of the population is unknown. The dam in the lower Rhine was recently equipped with fish ladders to allow migrating lampreys to pass through. This also applies to the Maas at Grave and Borgharen as well as the mouth of the Roer (Hambeek) in Roermond. An appreciable part of the former spawning ground of the sea lamprey is still not accessible since the barriers in smaller side streams and brooks are impassable.
Eel fishing using fykes has had more influence on the sea lamprey population than on the river lamprey because the 'migration' tends to take place in the period when fishing is active.

Assessment aspect future prospects: favourable
The main obstacles to the 'migration' of adult sea lamprey in the main tributaries of the Rhine-Maas system are likely to removed in the near future, with proposals concerning modifications in the sluice management and a new inlet structure with a fish passage in the Afsluitdijk currently being detailed. Plans are also being made for a 'slit' in the Haringvliet dam. At present reasonably large numbers of sea lampreys are migrating up the rivers. The contribution of Dutch rivers currently to the growing stage of sea lamprey populations is still not clear since almost nothing is

known about the downstream 'output' of young sea lampreys heading out to sea. All in all, the prospects for the sea lamprey are favourable, given that the situation at the moment has improved considerably and will improve even more in the near future.

National conservation objective:
To expand the size of the habitat and improve its quality for the purpose of population expansion.

Target scenario accompanying the national conservation objective:
- natural area of distribution: 400 10x10 km grid blocks
- population: 15,000 occurring specimens

Assessment: unfavourable–inadequate

Status of conservation			
Aspect	**1994**	**2004**	**2007**
Distribution	favourable	unfavourable –inadequate	favourable
Population	unfavourable– inadequate	unfavourable –inadequate	unfavourable –inadequate
Habitat	favourable	favourable	unfavourable –inadequate
Future	unfavourable– inadequate	favourable	favourable
Final assessment	**unfavourable– inadequate**	**unfavourable– inadequate**	**unfavourable –inadequate**

6. Sources

- Boer, W.F. de, 2001. Verbetering van vismigratie door de Afsluitdijk: wat wil de vis? Working document RIKZ/AB/2001.605x
- Emmerik, W.A.M. van & H.W. de Nie, 2006. De zoetwatervissen van Nederland. Ecologisch bekeken. Vereniging Sportvisserij Nederland, Bilthoven.
- Hardisty, M.W.,1986. *Petromyzon marinus* (Bloch, 1784). In: Holçík (red.). The freshwater fishes of Europe. Volume 1/I Petromyzontiformes: 94-116. Aula-Verlag, Wiesbaden.
- Hardisty, M.W., 1979. Biology of the Cyclostomes. Chapman & Hall, London.
- Kleef, H.L. & Z. Jager, 2002. Het diadrome visbestand in het Eems-Dollard estuarium in de periode 1999 tot 2001. Report RIKZ 2002/060. RIKZ, Haren. http://www.rikz.nl/thema/ikc/rapport2002/rikz2002060.pdf
- Li, W.M., P.W. Sorensen & D.D. Gallaher, 1995. The olfactory system of migratory adult sea lamprey (*Petromyzon marinus*) is specially and acutely sensitive to unique bile-acids released by conspecific larvae. Journal of General Physiology 105 (5): 569-587
- Maitland, P.S. 2003. Ecology of River, Brook and Sea Lamprey. Conserving Natura 2000 Rivers. Ecology Series No. 5. English Nature, Peterborough.

- Nie, H.W. de, 1996. Atlas van de Nederlandse zoetwatervissen. Media Publishing, Doetinchem.

- Patberg, W., J.J. De Leeuw & H.V. Winter, 2005. Verspreiding van rivierprik, zeeprik, fint en elft in Nederland na 1970. RIVO report C004/05. RIVO, IJmuiden.

- Quintella, B.R., N.O. Anrade & P.R. Almeida, 2003. Distribution, larval stage duration and growth of the sea lamprey ammocoetes, *Petromyzon marinus* L., in a highly modified river basin. Ecology of Freshwater Fish 12: 286-293.

- Tulp, I. & J.A. van Willigen, 2003. Zeldzame vissen in het IJsselmeergebied. RIVO report C029/03.

- Vrieze L.A. & P.W. Sorensen, 2001. Laboratory assessment of the role of a larval pheromone and natural stream odor in spawning stream localization by migratory sea lamprey (*Petromyzon marinus*). Canadian Journal of Fisheries and Aquatic Sciences 58 (12): 2374-2385.

- Winter, H.V., I. de Boois, H.A.W. Wiegerinck & H.J. Westerink, 2005. Jaarrapportage Passieve Vismonitoring Zoete Rijkswateren: fuik- en zalmsteekregistraties in 2004. RIVO report C036/05. RIVO, IJmuiden.

This profile must be read, interpreted and used in combination with the guide that contains the necessary explanation of the different sections.

River lamprey (*Lampetra fluviatilis*) **(H1099)**

1. Status:

Habitat directive Annex II (in force 1994)

2. Characterisation

Description: The river lamprey is much like the brook lamprey but is much larger in the adult phase (30 to 50 cm). Juvenile river lampreys have a silvery colour. Upon adulthood they become darker on the back but the flanks and belly remain silver-white. The larvae of the river lamprey have no eyes and look very similar to the larvae of the brook lamprey (*Lampetra planeri*). Compared with the brook lamprey, river lampreys metamorphose (end of the larvae stage) at a shorter length (9-15 cm). Just as the sea lamprey the river lamprey has a sucker disc with teeth. For more information about the larvae and lifecycle see also the description of the brook lamprey H1096.

Relative importance within Europe: large
The area of distribution of the river lamprey is relatively small, confined to Western Europe, the Baltic and a small part of the Mediterranean. River lampreys have become populous in the Maas and Rhine river basins. Exact data about the populations are absent but it can generally be assumed that these rivers make a substantial contribution to the world population of river lampreys.
The river lamprey occurs in the rivers along the Baltic, North Sea, Atlantic costs of Ireland, England and France as well as the West Italian and South France coats of the Mediterranean. The Netherlands lies in the centre of the area of distribution, with the Rhine and Elbe traditionally hosting large populations of river lamprey. In addition, the species is very common in the rivers around the Baltic Sea and along the South England and Ireland coasts. More southerly in Europe the sea lamprey has greater distribution and is more populous than the river lamprey.

3. Ecological requirements

Habitat: The river lamprey is an anadromous species, spawning in rivers and growing in the sea. The river lamprey spawns in the middle of fast-running rivers and in river brooks in sand and gravel beds. The males arrive before the females at the spawning grounds and make a 'nest' where the eggs are deposited. Within two weeks of spawning the adult lampreys die. The larvae emerge from the 'nests' after two to three weeks and drift downstream, settling in the silt-rich stiller parts of the river. After 4 to 6 years the juvenile lampreys (termed ammocoetes) undergo a metamorphosis whereby the acquire eyes, teeth and reproductive organs. The small river lampreys then head downstream towards estuaries, costal areas and the open sea. After growing into adults at sea over a period of two to three years the adult river lampreys head for the rivers. It is assumed that the ammocoetes of this lamprey species, like those of the sea lamprey, also follow the odours (pheromenes) excreted by the adult river lampreys though this is not yet proven (is currently being investigated). In the Baltic there is little evidence that the lampreys return to the rivers they were spawned. The migration of the river lamprey occurs at a quite different period to the sea lamprey, between October and April.

Food: The juvenile river lampreys filter organic material, algae and other small organisms from the water to feed. The adult river lamprey has sharp teeth and eats mainly smaller fish like herring, sprat, smelt and Gadidae. In contrast to the sea lamprey this species is much more predatory than parasitic. However, to a lesser extent, river lampreys are also prey as parasites on larger fish, sucking their blood and 'pilfering' tissue.

4. Current occurrence

The river lamprey is currently observable in all the large flowing waters of the Netherlands. Each year several thousand river lamprey adults are registered within the fish monitoring carried out by IMARES using fykes at thirty sites on behalf of the LNV and Water Department. They are distributed over all the Maas and Rhine tributaries, the Ijsselmeer area and the North Sea Canal. Only incidental observations of this species are know in the South Holland and Zeeland waters since the construction of the Deltaworks. The distribution and incidence of migrating adult river lampreys has been reasonably well documented. Many of the spawning grounds (reproduction sites) will be upstream in Dutch territory, some of which are already known: specifically, the Drentsche Aa, the Roer and side tributaries of the Niers. There are probably more spawning grounds in our country, like the main Waal and Maas rivers. However, it seems that in brooks the larvae (ammocoetes) grow within several hundred metres downstream of the spawning grounds. The spawning grounds of the Drentsche Aa are probably reached via the Eems canal.

Distribution map river lamprey

5. Assessment of national conservation status

Trends in the Netherlands: The river lamprey has a traditional presence in the rivers flowing through the Netherlands. River lampreys are known to have been caught in great numbers in the nineteenth century for use as bait (for cod) by offshore fishermen. The very large catches recorded by the lamprey fishing industry at Arnhem around 1850 and the fact that this was done using very simple baskets are indicative of the abundance of this species.

The construction of structures like dams ('damming') in the large rivers and their tributaries along with the worsening water quality saw numbers drop significantly. In the period 1960-1980 the river lamprey remained in the large rivers but in falling numbers. During the 1980s the species was again frequently observed. The species has probably become more abundant in part through the much improved water quality in the rivers and the construction of fish passages along the many barriers (see also the discussion of sea lamprey). The species is currently very common though not to same mass extent as previously.

Recent developments: Monitoring data from IMARES shows that the species occurs now in large numbers and that these umbers have been regularly increasing since 1993. The strongest increases have been in the Rhine tributaries around the Gelderse Poort and the numbers in the Maas and Ijsselmeer area also appear to be more constant. The numbers may vary a lot from year to year, though this may be attributable to the fact that in some years the start or end of the 'migration' of the lampreys falls within the monitoring period and in other years falls just outside.

Assessment aspect natural area of distribution: favourable
In general the current area of distribution of the river lamprey is comparable with the former natural area of distribution, although there will probably have previously been more river brooks and smaller streams used by river lamprey than now. The distribution in the upper-stream parts outside the Netherlands will have been greater in the past than is now the case. The distribution of the spawning and growing grounds is not adequately known.

Assessment aspect population: unfavourable–inadequate
The number of migrating river lampreys is estimated at 50,000, somewhat lower than the favourable reference.
Currently several thousand river lampreys are caught each year within the RIVO fyke monitoring programme (see above). These catches are only a small part of the fyke database. Furthermore, the 'migration' of river lamprey (with its centre in November-April) is mainly outside the monitoring period (May-October, the period of eel fishing). The Rhine and Maas river basin appear to host rather large populations. As for the 'output' of the young river lamprey that migrate to sea virtually nothing is known.

The recovery of the numbers of river lamprey has not yet occurred everywhere, with the situation in the Schelde river basin still poor.

Trends in the numbers of adult river lampreys in the fish monitoring by RIVO (number per fyke) show an average increase (note that the scale is logarithmic) and is strongest in the Gelderse Poort.

Assessment aspect habitat: unfavourable–inadequate
For the habitat of the river lamprey the same problems and improvements generally apply as for the sea lamprey, with a few differences. The river lamprey will spawn to a greater extent in Dutch territory, even though the exact requirements for spawning grounds, and the changes, have been poorly identified. Eel fishing using fykes will have much less of an influence on the river lamprey population since the 'migration' tends to occur outside the eel-fishing period. In the migrating and growing area the situation has considerably improved by the construction of fish passages at weirs and dams, sub-channels and better water quality. For the river lamprey too we know little about the juvenile phase of life: where and how populous the incidence of larvae is and the impact of adsorption by cooling water installations. What is striking, for instance, is the relative abundance of larvae (ammocoetes) in the Roer, even before the fish ladder in the Maas at Grave was ready in 2006. How the river lamprey got to the Roer is not properly known, perhaps via ship locks. Numbers in the Roer have probably been increasing to date now that Grave has a fish passage and the Hambeek, a tributary of the Roer in Roermond, has been restructured. Around 500 river lampreys migrated along the recently built fish ladders on the Lower Rhine in the spring of 2005 (mid March - May, study by RIVO/RIZA, now IMARES/Water Department). The majority of the river lampreys must therefore have already negotiated the fish ladders before mid March.

Assessment aspect future prospects: favourable
The developments as sketched for the sea lamprey will certainly also benefit the river lamprey and further improvements in the water quality (from the Water Directive) and the construction of sub-channels and still parts of the river (from Space for the River) offer promise. Access to river brooks and upper-river parts will also probably improve on account of the Water Directive.

National conservation objective:
Extension of the distribution of spawning grounds and size as well as improvement of habitat to help boost the population.

Target scenario for the national conservation objective:
- natural area of distribution: 400 10x10 km grid blocks
- population: 60,000 migrating specimens

Assessment: unfavourable–inadequate

Status of conservation			
Aspect	**1994**	**2004**	**2007**
Distribution	unfavourable–inadequate	favourable	favourable
Population	unfavourable–inadequate	unfavourable–inadequate	unfavourable–inadequate
Habitat	unfavourable–inadequate	unfavourable–inadequate	unfavourable–inadequate
Future	unfavourable–inadequate	favourable	favourable
Final assessment	**unfavourable–inadequate**	**unfavourable–inadequate**	**unfavourable–inadequate**

6. Sources

- Boer, W.F. de, 2001. Verbetering van vismigratie door de Afsluitdijk: wat wil de vis? Working document RIKZ/AB/2001.605x

- Brouwer, T., B. Crombaghs, A. Dijkstra, A.J. Scheper & P.P. Schollema, 2008. Vissenatlas Groningen Drenthe. Verspreiding van zoetwatervissen in Groningen en Drenthe in de periode 1980-2007. Profiel, Bedum.
- Emmerik, W.A.M. van & H.W. de Nie, 2006. De zoetwatervissen van Nederland. Ecologisch bekeken. Vereniging Sportvisserij Nederland, Bilthoven.
- Gubbels, R. & T. Belgers, 2003. Paaiende rivierprikken in de Roer. Natuurhistorisch Maandblad 92(4): 75-76.
- Nie, H.W. de, 1996. Atlas van de Nederlandse zoetwatervissen. Media Publishing, Doetinchem.
- Holçík, J., 1986. The freshwater fishes of Europe. Volume 1/1 Petromyzontiformes, Aula-Verlag Wiesbaden.
- Hardisty, M.W., 1979. Biology of the Cyclostomes. Chapman & Hall, London.
- Hardisty, M.W.,1986. *Lampetra fluviatilis* (Linnaeus, 1758). In: Holçík (red.). The freshwater fishes of Europe. Volume 1/I Petromyzontiformes: 248-278. Aula-Verlag Wiesbaden.
- Jang, M.-H. & M.C. Lucas, 2005. Reproductive ecology of the river lamprey. Journal of Fish Biology 66: 499-512.
- Kleef, H.L. & Z. Jager, 2002. Het diadrome visbestand in het Eems-Dollard estuarium in de periode 1999 tot 2001. Report RIKZ 2002/060. RIKZ, Haren. http://www.rikz.nl/thema/ikc/rapport2002/rikz2002060.pdf
- Kloppmann, M., M. Zeiler, V. Stelzenmüller, S. Ehrich, G.-P. Zauke & U. Böttcher, 2003. Zur Ausweisung von Natura 2000-Schutzgebieten in der AWZ von Nord- und Ostsee unter Berücksichtigung der FFH-Lebensraumtypen und –Fischarten:http://www.bfa-fish.de/news/news-d/aktuell/FFH-Natura-2000_2_Version_final.pdf.
- Lelek, A., 1987. The Freshwater Fishes of Europe Vol.9. Threatened Fishes of Europe. AULA-Verlag Wiesbaden, Germany.
- Maitland, P.S. 2003. Ecology of River, Brook and Sea Lamprey. Conserving Natura 2000 Rivers. Ecology Series No. 5. English Nature, Peterborough.
- Patberg, W., J.J. De Leeuw & H.V. Winter, 2005. Verspreiding van rivierprik, zeeprik, fint en elft in Nederland na 1970. RIVO-rapport C004/05.
- Sjöberg, K. 1980. Ecology of the European River Lamprey (Lampetra fluviatilis) in Northern Sweden. Canadian Journal of Fisheries and Aquatic Sciences 37:1974-1980.
- Ende, W.P. van den, 1847. Verslag der werkzaamheden Vereeniging tot Bevordering der Inlandsche Ichtyologie: eerste en tweede deel. An. Nijhoff, Arnhem.
- Winter, H.V., I. de Boois, H.A.W. Wiegerinck & H.J. Westerink, 2005. Jaarrapportage Passieve Vismonitoring Zoete Rijkswateren: fuik- en zalmsteekregistraties in 2004. RIVO report C036/05.
- Winter, H.V. & A. Griffioen, 2007. Verspreiding van rivierprik-larven in het Drentsche Aa stroomgebied. Report C015/07. Wageningen IMARES, IJmuiden.

This profile must be read, interpreted and used in combination with the guide that contains the necessary explanation of the different sections.

Twaite shad (*Alosa fallax*) **(H1103)**

1. Status:

Habitat directive Annex II (effective 1994)

2. Characterisation

Description: The twaite shad (*Alosa fallax*) is very much similar to the shad (*Alosa alosa*; see discussion of the shad for differences). De twaite shads that occur in the Netherlands are regarded as the subspecies *fallax*. This subspecies is characterised by a golden brown head, a blue-grey back, a silver-white underside and – often – a row of dark spots (two to eight) on the flanks. The twaite shad can grow to 55 cm in length, making it somewhat smaller than the shads and also more slender. Twaite shads used to be mistaken for young shads, something that the scientific name recalls (fallax = evasive).

Relative importance within Europe: significant
The subspecies *fallax* of the twaite shad originates from the eastern coastal zone of the Atlantic Ocean, from northern Morocco to southern Norway and the Baltic. Other subspecies occur in lakes in Ireland and Italy and in the Mediterranean Sea. Our country lies centrally in the distribution area of the subspecies *fallax*. Large populations are found in the Elbe and in several English and French rivers along the North sea and Atlantic Ocean. The twaite shad died out in the Rhine and Maas with the closure of the Haringvliet as a reproducing (spawning) population in our country. Prior to this the species had already seen numbers fall drastically due to overfishing and worsening water quality.

3. Ecological requirements

Habitat: The twaite shad is an anadromous migrating fish that spends most of its life in coastal areas and estuaries and searches for freshwater tidal areas to spawn. The twaite shad migrates with the tide to estuaries, and the migration is regulated by the water temperature. The spawning period is late spring (May/June) and spawning takes place in shallow water above sandbanks in the freshwater part of the tidal area. After spawning the adult twaite shads return to sea. As for the shads this species can spawn for several years. The eggs are not saltwater proof. They are 'semi-pelagic', they sink to the bottom and drift with the tide gradually towards the more brackish downstream area (in contrast to the shad that spawns in gravel tracts and has larvae the grow in freshwater). The larvae and young fish of the twaite shad gradually move to the downstream parts of the estuary.

Food: The larvae and young twaite shads eat small organisms that drift freely in the water (plankton). The adult twaite shads also feed on shrimp and fish larvae. Adult twaite shads have more distance between the gill appendages and thus they have a coarser water filter than shads.

4. Current occurrence

In our country the Brabantse Biesbosch used to be a key spawning ground for the twaite shad. Very probably the Old Maas, Lek, Eems and Schelde fulfilled a similar function in the past. Nowadays this species occurs in small numbers along the coast in the tidal rivers (also in the Eems and Schelde). In 1999 successful spawning occurred in the German part of the Eems and for the fist time in a long time professional fishermen observed the spawning behaviour of twaite shads in the Nieuwe Merwede in 2005. Whether this suggests that a sustainable spawning population is starting to form is unknown but given the poor quality of the habitat it seems to be a bridge too far for twaite shads in the tidal river area. A specific study in 2006 encountered no young twaite shads. There are currently hardly any suitable and accessible estuaries and freshwater tidal areas for the reproduction of the twaite shad. The status of the twaite shad in the Westerschelde is unknown. However, specimens have been caught but here again the habitat and water quality in the freshwater Schelde are inadequate for a reproducing population. Along the Dutch coast and in fresh-saltwater transitions in river mouths relatively many twaite shads have been observed that will all or nearly all originate from populations of neighbouring countries.

Distribution map twaite shad

5. Assessment national favourable status of conservation

Trends in the Netherlands: In the 16th and 17e centuries there was intensive fishing of twaite shad in the rivers. Later commercial fishing focused on other species. After the sturgeon, salmon, houting and shad were fished out or disappeared, intensive twaite shad fishing began again mainly from 1920-1950. The twaite shad was still reasonably common in the Netherlands in 1970, especially in the tidal rivers. In 1938 a million twaite shads were caught and around 1950 several tens of thousands. When the Haringvliet was closed in 1970, it spelled the end of the twaite shad as a spawning fish species in Dutch rivers. From 1994, however, twaite shads numbers along the Dutch coast have increased again in the tidal rivers. What is noticeable is that for the first time in many years young twaite shads have been signalled in our country over the past few years, mainly in the Eems-Dollard estuary. An occasional young twaite shad has also been found in the Westerschelde and the tidal river area.

Recent developments: There is a positive trend for the twaite shad. The water quality has recently improved and there is an increased in the numbers of twaite shads observed in our country (including young specimens). Most of the observations will, however, be of spawning populations of neighbouring rivers like the Elbe.

Trends in the numbers of twaite shads in the fish monitoring by RIVO (number per fyke), seems to be slightly on the rise at most (note that the scale is logarithmic) but this is not a strong signal.

Assessment aspect natural area of distribution: favourable
The area of distribution of the twaite shad has remained more or less unchanged and complies with the favourable reference, with the remark that the spawning function in our country is still very minimal.

Assessment aspect population: unfavourable–bad
The number of adult specimens currently present is estimated at 3,000, much lower than the favourable reference.
There are a few indications that the twaite shad occasionally propagates in the Biesbosch and largely in the Eems but there does not seem to be a viably self-sustaining spawning population of the species in our country.

Assessment aspect habitat: unfavourable–bad
The main spawning areas of the twaite shad have been lost due to the closure of the Haringvliet and the Afsluitdijk and by the worsening quality of the water (often shy of oxygen) and living conditions in the freshwater tidal area in the Schelde at Antwerp.

Assessment aspect future prospects: unfavourable–inadequate
The future opening of the Haringvliet sluices may make the freshwater tidal area again accessible to the twaite shad. But it is questionable whether the current quality of the water bottom that is polluted by a thick layer of silt still meets the requirements of this species. The tide in that area is and will remain possibly so subdued that its preconditions are not met. For some time free 'migration' has been possible via the Nieuwe Waterweg to the Biesbosch, for example, but a sustainable spawning population has not returned. The spawning and growing conditions are still currently well below par in the tidal river area. Whether a 'slit' in the Haringvliet dam can adequately recover the habitat is the open question. The 'tamed tide' variant of the plan probably offers better chances since this will lead to a larger scale recovery of brackish habitats and estuary character. In the Westerschelde recently efforts have been made to improve the water quality. This and initiatives like the building of a water purification plant for Brussels, as planned for the near future, will probably signal a recovery of twaite shad in the Schelde. The uncertain factor is the quality of the bottom and landscape in the freshwater tidal area in the Schelde. The Eems appears at the moment to be the most suitable area for the twaite shad.

National conservation objective:
Maintain the distribution of spawning grounds, maintain the size and quality of the habitat to boost population.

Target scenario accompanying the national conservation objective:
- natural area of distribution: 350 10x10 km grid blocks
- population: 4,000 adult specimens
For a favourable status of conservation the freshwater tidal area of the Rhine and Maas (the Biesbosch) must again host an important population of the twaite shad. Furthermore, populations of the species must be present in the Eems and Westerschelde.

Assessment: unfavourable–bad

Status of conservation			
Aspect	**1994**	**2004**	**2007**
Distribution	unfavourable–inadequate	unfavourable–inadequate	favourable
Population	unfavourable–bad	unfavourable–bad	unfavourable–bad
Habitat	unfavourable–bad	unfavourable–bad	unfavourable–bad
Future	unfavourable–bad	unfavourable–inadequate	unfavourable–inadequate
Final assessment	**unfavourable–bad**	**unfavourable–bad**	**very unfavourable**

6. Sources

- Boer, W.F. de, 2001. Verbetering van vismigratie door de Afsluitdijk: wat wil de vis? Werkdocument RIKZ/AB/2001.605x.

- Emmerik, W.A.M. van & H.W. de Nie, 2006. De zoetwatervissen van Nederland. Ecologisch bekeken. Vereniging Sportvisserij Nederland, Bilthoven.

- Groot, S.J. de, 1990. The former allis and twaite shad fisheries of the lower Rhine, the Netherlands. J. Appl. Ichthyol. 6: 252-256.

- Gerkens, M & R. Thiel 2001. Habitat use of age - 0 twaite shad (Alosa fallax Lacepede, 1803) in the tidal freshwater region of the Elbe River, Germany. Bulletin Francais de la Peche et de la Pisciculture 362-363: 773-784.

- Kleef, H.L. & Z. Jager, 2002. Het diadrome visbestand in het Eems-Dollard estuarium in de periode 1999 tot 2001. Rrport RIKZ 2002/060. RIKZ, Haren. http://www.rikz.nl/thema/ikc/rapport2002/rikz2002060.pdf

- Kloppmann, M., Zeiler, M., Stelzenmüller, V., Ehrich, S. Zauke, G.-P. & Böttcher, U., 2003. Zur Ausweisung von Natura 2000-Schutzgebieten in der AWZ von Nord- und Ostsee unter Berücksichtigung der FFH-Lebensraumtypen und –Fischarten:http://www.bfa-fish.de/news/news-d/aktuell/FFH-Natura-2000_2_Version_final.pdf.

- Lange, M.C. de & F.T. Vriese, 2007. Visstandbemonstering Benedenrivierengebied 2006. VisAdvies BV, Utrecht.

- Maitland, P.S. & T.W. Hatton-Ellis, 2003. Ecology of the Allis and Twaite Shad. Conserving Natura 2000 Rivers Ecology Series No. 3. English Nature, Peterborough.

- Nie, H.W. de, 1996. Atlas van de Nederlandse zoetwatervissen. Media Publishing, Doetinchem.

- Patberg, W., J.J. De Leeuw & H.V. Winter, 2005. Verspreiding van rivierprik, zeeprik, fint en elft in Nederland na 1970. RIVO report C004/05. RIVO, IJmuiden.

- Winter, H.V., I. de Boois, H.A.W. Wiegerinck & H.J. Westerink, 2005. Jaarrapportage Passieve Vismonitoring Zoete Rijkswateren: fuik- en zalmsteekregistraties in 2004. RIVO report C036/05.

Bird profiles

This profile must be read, interpreted and used in combination with the guide that contains the necessary explanation of the different sections.

Red-throated diver (*Gavia stellata*) A001

1. Status

Bird Directive Annex I (since 1985). Relevant for Natura 2000 as non-breeding bird.

2. Characterisation

Description: The red-throated diver is the smallest representative of the diver family and has a characteristic slender, light upturned bill. In the Netherlands it is a migrating winter guest and numbers range from low to large in the coastal waters of the North Sea. The red-throated divers are coast-bound seabirds that avoid the freshwater of the hinterland and that spend their breeding season in tundras and (wooded) lakes.

Relative importance within Europe: The status of conservation of the red-throated diver population within the European Union is 'unfavourable' according to 'Bird Life' with a Red List status of 'rare'. The breeding area lies in the north of Eurasia and North America. The winter population that is relative for the Netherlands is the Northwest European population living in the Baltic and the coastal waters of the North Sea and eastern Atlantic Ocean, from southwest Norway to Spain[1]. The Netherlands is a core area for the winter distribution of the red-throated diver; in our country there is a relatively important number of this species. The number of birds overwintering in the European Union is estimated at 50,000, with 10,000 the provisional estimate for the Netherlands.

3. Ecological requirements

Habitat: The red-throated diver forages and rests predominantly in loose groups in our North Sea coast zone up to 20 km off the coast. It also forages in inlets and channels between the Wadden islands and in much smaller numbers in the Wadden Sea itself. The favourite food biotope comprises turbid coastal water and an uneven sandy bottom. This coastal water has less salinity than the water in the open sea. The red-throated diver forages when diving, propelling itself with its legs and pursuing the prey to the bottom. The red-throated diver tends to hunt up to depths of 15 m but dives do occur up to a depth of 25 m. It undertakes corrective flights in the first daylight hours due to the passive displacements that the night tide will have produced. Disturbance by shipping causes equally displacements *en masse* of red-throated divers, with distances of up to several hundred metres and even a kilometre.

Food: The red-throated diver eats only fish, hunting all kind of fish from around 4 cm (stickleback) to 25 cm (whiting and cod). It eats bottom-dwelling Gadidae fish, sea scorpions, hooknoses and young flatfish as well as freely swimming species like herring and sprat. In addition, it also feeds on species that occur both on the bottom and higher up the water column like sand eels. Species that originate from freshwater (at drainage sluices) are not scorned.

Refuge: The red-throated diver is highly sensitive to disturbance by shipping and windsurfers, for instance, and oil pollution. Each year a small number of this species is found dead on the Dutch coast, with oil and entanglement in fish nets noticeably often the cause of death. Wind turbines at sea may influence the distribution of foraging birds and local flight movements.

[1] *Waterbird Population Estimates – Third Edition* proposes that the 1% norm of this population is 10,000. According to experts this norm is much too high. In the second edition this norm was just 750.

4. Current occurrence

The area of distribution is actually limited to the coastal zone of the North Sea. Further out, in the open North Sea, the species is very scarce. The same applies to further inland, in the Wadden Sea, IJsselmeer, Delta and the other fresh waters. The red-throated divers that do occur in these places tend to be tainted with oil or otherwise weakened by disease or entanglement.
At sea large densities of red-throated divers are regularly seen off the Brouwers dam, in the coastal zone off the coast of the province of Holland and in the outer deltas between the Wadden islands. Very large numbers may congregate incidentally at strongly developed 'current seams' that reveal a separation between different water masses in the open sea.

5. Assessment national status of conservation

Trends in the Netherlands: In a grey past this species was probably much more populous than in 1980- 2000. Few data are available on the status of the red-throated diver before 1960.

Recent developments: Recently the red-throated diver appears to have been increasing in number, a trend that is mainly evident from the counts made by the Netherlands Sea Bird Group of the migration at sea. Very recently, since the winter of 2004/05, extraordinarily large numbers of the species have been seen for a long time off the Dutch coast.

Assessment aspect natural area of distribution: favourable
The area of distribution of the red-throated diver has not shrunk.

Assessment aspect population: favourable
No exact information is to hand about the numbers but the red-throated diver population appears to have increased rather than decreased over the past twenty years in the Netherlands.

Assessment aspect habitat: favourable
Perhaps with the exception of the refuge factor, the habitat of the red-throated diver in Dutch waters appears to be in order. Even major oil slicks, like that in January 2004 from the Tricolour (Atlantic Seabirds 6(3)-Special Issue) only affected a relatively small portion of the species.

Assessment aspect future prospects: unfavourable–inadequate
In Europe as a whole red-throated diver numbers are falling, possibly due to breeding area problems (acidification of the water). The recent increase in the Netherlands status is thus in stark contrast to this and suggest problems elsewhere in the overwintering area since the situation in the Netherlands does not appear to be much improved. The future prospects are therefore less favourable. On the other hand, the creation of a sea sanctuary in the Voordelta may be favourable to this species.

National conservation objective: maintain size and quality of the habitat.

Target scenario for the national conservation objective: In the Dutch waters it is sufficient to maintain the current situation.

Assessment: unfavourable–inadequate

Assessment Status of Conservation		
Aspect	**1981**	**2004**
Distribution	favourable	favourable
Population	favourable	favourable
Habitat	favourable	favourable
Future	?	unfavourable–inadequate
Final assessment	**favourable**	**unfavourable–inadequate**

6. Sources

- Camphuysen C.J. & Leopold M.F. 1994. Atlas of seabirds in the Southern North Sea. IBN Research report 94/6. NIOZ-Report 1994-8. Institute of Forestry and Nature research, Dutch Seabird Group and Netherlands Institute for Sea Research, Texel.
- Leopold M. F., Skov H. & Durinck J. 1995. The distribution and numbers of Red-throated Divers *Gavia stellata* and Black-throated Divers *Gavia arctica* in the North Sea in relation to habitat characteristics. Limosa 68: 125.
- Ouweneel G.L. 1993a. Roodkeelduikers *Gavia stellata* in het Brouwershavense Gat. Limosa 66: 164-166.
- Zucco C. & Merck T. 2004. Ökologische Effekte von Offshore-Windkraft-Anlagen. Naturschutz und Landschaftsplanung 36: 261-269.

This profile must be read, interpreted and used in combination with the guide that contains the necessary explanation of the different sections.

Black-throated diver (*Gavia arctica*) A002

1. Status:

Bird Directive Annex I (since 1985). Relevant for Natura 2000 as non-breeding bird.

2. Characterisation

Description: the black-throated diver is a medium-sized sea diver and resembles closely the much more common red-throated diver and is often confused with it. In their winter plumage the red-throated divers have the clear white spots or 'pearls' on their backs. The black-throated diver has those pearls in its summer plumage when it is not in the Netherlands. The black-throated diver is somoulthat bulkier than the red-throated diver and has a heavier straight bill.
It is a migrating winter guest in the Netherlands and appears in very small numbers in the coastal waters of the North Sea and freshwaters inland. The black-throated diver nests in the summer on the lakes of the northern woods and tundras. The closest breeding population is in northeast Scotland and southern Scandinavia.

Relative importance within Europe: The status of conservation of the black-throated diver population in the European Union is unfavourable according to 'Bird Life'. The breeding area lies in the north of Eurasia and North America. The breeding population in the EU is considerable with 14,000 – 17,000 pairs. The is a slight fall in numbers with the winter population in the EU only around 8,300 birds. The significance of the Netherlands is probably minor for this species. The winter population that is relevant to the Netherlands comes from Northwest Europe, the Mediterranean, the Black Sea and the Caspian Sea.[2]

3. Ecological requirements

Habitat: The black-throated diver occurs mainly in the coastal zone of the North Sea where depths are up to 30 m and thus probably opt for a habitat that is comparable to the habitat of the red-throated diver. In contrast to the red-throated diver the black-throated diver occurs in small numbers in large inland bodies of water. The ecological requirements of the black-throated divers outside of the breeding season are little known.

Food: The black-throated diver is dependent on fish. Their chosen prey in the Netherlands is unknown. Studies in the Baltic suggest that the black-throated divers eat all kinds of fish they can get down their gullets.

Refuge: There is no reason to believe that this species' susceptibility to disturbance is any different to the red-throated diver. Refuge is important to the black-throated divers and they are sensitive to (oil) pollution. Dead black-throated divers are rarely found on the Dutch coast but more in harsh winters more than in mild winters. The most common cause of death is oil pollution. Just as for the red-throated diver, wind turbines can affect the distribution and flight movements of the black-throated diver. Shipping is probably also the other main source of disturbance.

[2] *Waterbird Population Estimates – Third Edition* proposes that the 1% norm of this population is 10,000. According to experts this norm is much too high. In the second edition this norm was just 1200.

4. Current occurrence

The black-throated diver can be found in all major waters of our country but mostly in the coastal zone of the North Sea. The species only appears in the coastal zone in any significant numbers in the coastal zone In the winter, especially at the Brouwers dam, and in April during the spring migration along the entire coast.

5. Assessment national status of conservation

Trends in the Netherlands: Trends for the black-throated diver are not well known. Sea migration counts suggest a falling trend in the percentage of black-throated divers compared to red-throated divers between 1972 and 1980, after which the share has stabilized to around 10%. Counts at sea reveal much lower percentages (Camphuysen & Leopold 1994). The high numbers of black-throated divers occasionally reported between 1970 and 1980 can probably be retraced to a lack of distinction between the two species (Stegeman & den Ouden 1995).

Recent developments: unknown.

Assessment aspect population: unknown
Several tens to a couple of hundred black-throated divers are winter guests in our coastal waters. (Red-throated divers are in the vast majority but many divers are not reduced to species).

Assessment aspect habitat: unknown

Assessment aspect future prospects: unknown

National conservation objective: maintain size and quality of habitat

Target scenario for the national conservation objective: In Dutch waters maintenance of the current situation is sufficient.

Assessment: unknown.

Assessment Status of Conservation		
Aspect	**1981**	**2004**
Distribution	unknown	unknown
Population	unknown	unknown
Habitat	unknown	
Future	unknown	unfavourable– inadequate
Final assessment	**unknown**	**unknown**

6. Sources

- Camphuysen C.J. & Leopold M.F. 1994. Atlas of seabirds in the Southern North Sea. IBN Research report 94/6. NIOZ-Report 1994-8. Institute of Forestry and Nature research, Dutch Seabird Group and Netherlands Institute for Sea Research, Texel.

- Zucco C. & Merck T. 2004. Ökologische Effekte von Offshore-Windkraft-Anlagen. Naturschutz und Landschaftsplanung 36: 261-269.

This profile must be read, interpreted and used in combination with the guide that contains the necessary explanation of the different sections.

Eider (*Somateria mollissima*) (A063)

1. Status:

Not mentioned in Annex I and a regularly occurring migratory bird as stated in article 4.2 of the Bird Directive. Relevant to Natura 2000 as both breeding and non-breeding bird.

2. Characterisation

Description: The eider is a large, saltwater bound duck. It is a bird that breeds in mudflats and dunes in the vicinity of extensive intertidal areas (Wadden Sea). The breeding grounds of the eider lie in the coastal areas of the moderate and northern climate zones of the northern hemisphere. The populations of Great Britain and Ireland, around the Wadden Sea and the Baltic, Scandinavia as far as Nova Zembla, around the White Sea and the Black Sea belong to the 'nominate' subspecies *mollissima*. The eiders that breed on the Orkneys, Shetlands and Faroes, from Spitsbergen to Northeast Canada, and in other parts of northern North America as far as East Siberia belong to other subspecies. The European birds overwinter in the coastal areas as far as the Gulf of Biscay, with the main concentration along the Danish east coast. The Dutch breeding birds are mainly shore birds or short-distance migratory birds; females remain faithful to their breeding place while males have a more roving tendency.

Relative importance within Europe: The status of conservation of the eider in the European Union is favourable according to 'Bird Life'. For the subspecies *S. m. mollissima* there are five distinct populations. The population relevant to the Netherlands (Wadden Sea and Baltic) estimated at 1,030,000 birds is decreasing.
1. Breeding birds: The incidence of Dutch breeding birds and of the eider lies at the southern border of the European breeding area of distribution. The closest breeding and winter populations of any size can be found in North England and Denmark. The European population as a whole (490,000-610,000 pairs in European Union countries, 2% in the Netherlands) increased in the period 1970-2000. The status of conservation of the European population is considered favourable. Recently, however, there have been sharp local falls of the numbers of breeding birds.
2. Non-breeding birds: The eider is present all year round in the Netherlands, especially in saltwater. A portion of our breeding birds migrate particularly in cold winters southwards, being replaced by Danish and Swedish breeding birds. It is estimated that 100% dwell in areas where the water bird status is monitored ('monitoring areas'). The seasonal maximum of the birds present in the Netherlands (in January and was in 1999/2000 until 2003/2004 an average of around 110,000 birds, which makes the Dutch total an estimated 11% of the international European population.

3. Ecological requirements

Habitat:
1. Breeding birds: The eider is bound to the coastal zone and salt environment both during the breeding season and in winter. The breeding area is mainly restricted to the Wadden islands and the Friesian-Groningen coast. The nesting places are near saltwater (up to 600 m) in open dunes, on salt marshes and to a lesser extent on dikes and piers and in pasture. The eiders often nest in a small hollow in the ground or in the shelter of stones, grass pollen or shrubs of 50-150 cm in height, mainly gorse and creeping willow. They nest on the flood mark, in reed, between ferns or bare branches or on bare ground. They generally breed in colonies, often close to colony breeders like seagulls and sterns (which offers protection despite the higher predation). Directly after hatching the eiders leave with their young for the Wadden coast, forming 'crèches' ('pulli') of large numbers of chicks under the supervision of several females. Intensive hunting by the herring gull

especially of pulli appears dramatic but normally does not affect the population. This predation only occurs if the pulli is in very poor condition and the mortality thus caused is compensated by the eider's relatively long life expectancy.
2. Non-breeding birds: At the end of May the first eiders arrive in the Wadden Sea to moult. In the winter especially large numbers of eiders dwell in our country concentrated mainly in the Wadden Sea. The eiders normally follow the tidal rhythm. During high water the gather at common refuge places like beaches, salt marshes, dikes and open water. The feeding areas are the shellfish beds in the shallow waters of the coast (littoral and sublittoral), especially those parts of the Wadden Sea covered under water all the time and sandbanks that are clear of the water. In times of food scarcity eiders search for food on shellfish beds in the coastal zone of the North Sea. Smaller numbers of eiders forage in the Voordelta and Salt Delta. Overfishing has led to a substantial decline of the natural cockle, mussel and trough shell stocks. In combination with unfavourable natural factors like mild winters, this leads to low larvae descent survival rates, which makes for a serious food scarcity among the eiders. Disturbance by the conscious chasing away of the eider on mussel beds and water pollution can play a negative role in respect of the quality of a location as a habitat for the eider. A higher mortality rate has been caused in the past by oil discharges, for example.

Food: The eiders search for their food in the underwater bottom (benthos) and they are food specialists. They prefer to feed on mussels that take little effort to acquire in the whole shallow coastal zone. The prey is generally got out up to a depth of 5 m and swallowed whole. The eiders do dive up to 15 or 20 m deep but this is less common in our country. Alternative prey, like beach crabs, starfish, cockles, cut trough shells and other shellfish are not the favoured food of eiders since the nutritional quality is low relative to the amount of energy it costs to get hold of and digest alternative prey. Whenever they feed on beach crabs they also run the risk of being contaminated by parasites. The food biotope comprises coastal waters of 20-30 m deep at most. The species forages in the water (dabbling or diving) as well as on uncovered banks and mussel beds. When the food in the Wadden Sea cannot be reached, the species moves to other areas, largely the North Sea coast north of the Wadden islands, the coast of Holland and the Delta area.

Refuge: The eider is like other sea ducks sensitive to disturbance and flies off if approached within a distance of 300 m or more. They are also very sensitive habitat (large open coastal waters). The effect of disturbance on the population is probably moderately large given that the majority of breeding areas lie in enclosed terrain and in the foraging area where no intensive recreation occurs during their presence. Due to the small margins between energy expenditure (searching for and digesting food) and energy yield (food intake) refuge is essential for the eider. In the summer the moulting eiders concentrate elsewhere and they are then even more vulnerable since they cannot fly. Disturbance by water recreation and wind farms along the coast are risks to the eider. The presence of sufficient prey of the right quality is crucial to survival. Shellfish fishery (mussels, cockles, cut tough shells) and mussel seed fishing can lead to a lack of food and the eider leaving for food areas where there is less quality and, ultimately winter mortality and less breeding success. The laying of mussel beds attracts birds that are chased off. Pollution by chlorinated hydrocarbons resulted in the 1960s in mass mortality. Eiders are very sensitive to oil pollution. In the period 1977-97 an average of 26% of dead eiders on the beach were tainted with oil.

Minimum sustainable population size: From a population-ecological perspective at least 20 pairs are required for a sustainable key eider population. For a favourable status of conservation at national scale at least 20 key populations are required (> 400 pairs).

4. Current occurrence

4.1 Breeding birds

Virtually the entire Dutch breeding population of the eider nests on the Wadden islands (specifically Vlieland, Terschelling and Schiermonnikoog). Very small numbers breed along the Friesian-Groningen Wadden coast and in the Delta area (at Neeltje Jans and in the Oosterschelde). The natural distribution concerns only the coast.

Distribution map eider (breeding bird)

4.2 Non-breeding birds

Outside the breeding season the species dwells mainly in the Wadden Sea (where some of the Dutch breeding birds overwinter, supplemented by large numbers of Scandinavian origin). Since the beginning of the 1990s the eiders have been moving more and more towards the bordering North Sea coastal zone partly due to food scarcity.

Distribution map eider (non-breeding bird)

5. Assessment national status of conservation

5.1 Breeding birds

Trends in the Netherlands: After centuries of absence, probably because of exploitation, the eider started to re-establish itself as a breeding bird in the Netherlands. After the Second World War the number of breeding pairs rose sharply. In the period 1960-1970 bird poisoning saw numbers collapse. Following a recovery period around 1990 a lack of shellfish cause that number to drop even more. The Dutch breeding population during the recovery period in 1979-1983 averaged 4,500 pairs. In the period 1999-2003 the population was an average of 9,000 pairs, lower than the period prior to that.

Trends in number of breeding pairs of eider

Recent developments: The Dutch breeding population has shown a slight rise since 1981 (1981-2003). Over the period 1994-2003 the national trend showed a slight decrease.

Assessment aspect natural area of distribution: favourable.
From 1973 to 1977 the breeding area of distribution has grown by 61%. In total the species is present in 56 atlas grid blocks, has disappeared from 3 and has appeared in 16. This expansion, however, relates in terms of numbers to marginal breeding areas (the eider has bred from the end of the 1980s at Neeltje Jans and since the 1990s on the Friesian-Groningen mudflats).

Assessment aspect population: unfavourable–bad.
The status of the breeding population of the eider is assessed as unfavourable–bad due to the poor reproduction in recent times. From around 1975 (4,000 pairs) the breeding population more than doubled but in 1997 there was a sharp drop. The population level of 2003 and 2004 was around 25% lower than the reference figure required for a 'favourable' assessment.

Assessment aspect habitat: unfavourable–bad.
The recent fall in the breeding population of the eider is connected with a fall in the availability of food and the corresponding mortality.

Assessment aspect future prospects: favourable.
The policy decree on shellfish fishing 2005-2020 appears to favour the eider, especially in view of the regulation that 85% of the fished mussel seed in the spring has to be sown on beds in the Wadden Sea.

National conservation objective: Maintain the size and quality of the habitat to maintain a population of at least 8,000 pairs.

Target scenario for the national conservation objective: From a population-ecological perspective a breeding bird population of at least 20 key populations of the eider is necessary comprised of at least 20 pairs (> 400 pairs). If, however, one takes the population level at the turn of the century as the starting point, the maintenance of at least 8,000 is a feasible target. Maintaining the size and quality of the habitat is necessary, whereby sufficient food supply is essential to safeguard the current numbers and current area of distribution.

Assessment: The current situation is unfavourable–bad for the breeding bird population of the eider in view of the recent decline that is probably linked to a loss in the quality of the habitat.

Assessment Status of Conservation		
Aspect	**1981**	**2004**
Distribution	favourable	favourable
Population	favourable	unfavourable–bad
Habitat	favourable	unfavourable–bad
Future prospects	favourable	favourable
Final assessment	**favourable**	**unfavourable–bad**

5.2 Non-breeding birds

Trends in the Netherlands: The trends in the numbers of non-breeding eiders mirrors more or less that of the breeding bird population. Due in part to the limited availability of counts there are considerable fluctuations with no evidence of statistically significant increase or decrease.

Trends in number of non-breeding eiders

Recent developments: The Dutch population of non-breeding eiders shows no significant increase or decrease since 1981 (1981-2003) nor for the period 1994-2003. However, within the separate Bird Directive areas there was strong, significant increase in non-breeding eiders in the period 1981-2003 in the North Sea coastal zone and the Voordelta. This increase is largely attributable to peaks in numbers in 1991 and 1993. In the winters of 1999/2000, 2000/2001 and 2001/2002 the numbers counted were relatively low and there was mass mortality. After the peak season of 1995/1996 with 160,000 birds a reduction to less than 90,000 birds followed in the winter of 2002/2003. In combination with some recovery in the shellfish supply most of the eiders held out through 2002/2003 in the Wadden Sea and there was no increased mortality. In 2003/2004 numbers were again higher so the decrease is no longer statistically significant.

Assessment aspect natural area of distribution: favourable.
The distribution of the eider since 1981 has widened in the sense that since around 1990 (temporarily) a larger share in the North Sea coastal zone and the Voordelta has stayed, though this is probably the result of worsening food supply in the Wadden Sea.

Assessment aspect population: favourable.

Assessment aspect habitat: unfavourable–bad *
Mass mortality and the move of the eiders from the Wadden Sea to the North Sea coastal zone and Voordelta are indicative of a worsening of the quality of the habitat, despite a very tentative sign of recovery.

Assessment aspect future prospects: favourable
The policy decree on shellfish fishing 2005-2020 appears to favour the eider, especially in view of the regulation that 85% of the fished mussel seed in the spring has to be sown on beds in the Wadden Sea.

National conservation objective: Expansion of the size and quality of the habitat with a capacity for a population varying from 115,000 to 140,000 birds (January figures).

Target scenario for the national conservation objective: It is necessary to have a habitat with sufficient size and quality for a seasonal maximum of 115,000-140,000 eiders in the national network of bird monitoring areas on the basis of an average value of the seasonal maximums of 1980/81 until 1996/97 and an adjustment based on the maximum expected capacity in the Wadden Sea.

Assessment: unfavourable–bad *

Assessment status of conservation		
Aspect	**1981**	**2004**
Distribution	favourable	favourable
Population	favourable	favourable
Habitat	favourable	very * unfavourable
Future prospects	favourable	favourable
Final assessment	favourable	very * unfavourable

* Note: Natura 2000 assesses the eider (as non-breeding bird) for the aspect habitat (and thus as a whole) as unfavourable–bad; it is currently being investigated whether future Natura 2000 indicators should be worded unfavourable–inadequate.

6. Sources

- Berrevoets, C. & F.A. Arts, 2003. Midwintertelling van zee-eenden in de Waddenzee en de Nederlandse kustwateren, januari 2003. Rapport RIKZ/2003.008. Rijksinstituut voor Kust en Zee, Middelburg.
- Camphuysen, C.J., 1996. Ecologisch profiel van de Eidereend *Somateria mollissima*. RIKZ werkdocument 96.146x. Rijksinstituut voor Kust en Zee.
- Camphuysen, C.J., Berrevoets C.M., Cremers H.J.W.M., Dekinga A., Dekker R., Ens B.J., van der Have T.M., Kats R.K.H., Kuiken T., Leopold M.F., van der Meer J. & Piersma T., 2001. Mass-mortality of common eiders (*Somateria mollissima*) in the Dutch Wadden Sea, winter 1999/2000: starvation in a commercially exploited wetland of international importance. Biological Conservation 106: 303-317.
- Desholm, M., Christensen T.K., Scheiffarth G., Hario M., Andersson A., Ens B., Camphuysen C.J.,Nilsson L., Waltho C.M., Lorentsen S-H., Kuresoo A., Kats R.K.H., Fleet D.M. & Fox A.D., 2002. Status of the Baltic/Wadden Sea population of the Common Eider *Somateria m. mollissima*. Wildfowl 53: 167-203.
- Ens, B.J. & Kats R.K.H., 2004. Evaluatie van Voedselreservering Eidereenden in de Waddenzee-rapportage in het kader van EVAII deelproject B2. Alterra rapport 931, 1-155. Alterra, Wageningen.
- Jong, M.L. de, Ens B.J. & Kats R.K.H., 2003. Aantallen Eidereenden in en rond het Waddengebied in de winter van 2002/2003. alterra rapport 794, Alterra, Wageningen.
- Leopold, M.F., 1993. Spisula's zeeëenden en kokkelvissers: een nieuw milieuprobleem op de Noordzee. Sula 7 (1): 24-28.
- Leopold, M.F., 1996. *Spisula subtruncata* als voedselbron voor zee-eenden in Nederland. BEON Report 96-2. Rijksinstituut voor Kust en Zee, Den Haag.
- Oosterhuis, R. & K. van Dijk, 2002. Effect of food shortage on the reproductive output of Common eiders Somateria mollissima breeding at Griend. Atlantic Seabirds 4: 29-38.

- Swennen, C., 1991. Ecology and population dynamics of the Common Eider in the Dutch Wadden Sea. PhD thesis, Rijksuniversiteit Groningen.

- Tulp, I., Schekkerman H., Larsen J.K., van der Winden J., van der Haterd R.J.W., van Horssen P., Dirksen S. & Spaans A.L., 1999. Nocturnal flight activity of sea ducks near the windfarm Tunø Knob in the Kattegat. Report 99.64. Bureau Waardenburg bv, Culemborg.

- Zucco C. & Merck T., 2004. Ökologische Effekte von Offshore-Windkraft-Anlagen. Naturschutz und Landschaftsplanung 36: 261-269.

This profile must be read, interpreted and used in combination with the guide that contains the necessary explanation of the different sections.

Black scoter (*Melanitta nigra*) A065

1. Status:

Not mentioned in Annex I and a regularly occurring migratory bird as stated in article 4.2 of the Bird Directive. Relevant to Natura 2000 as a non-breeding bird.

2. Characterisation

Description: Outside the breeding time the black scoter is a coastal sea bird. In the Netherlands it is a migratory bird overwintering in large numbers and as summer guest in very small numbers. In some years groups of several hundred to thousands of black scoters moult in the summer.

Relative importance within Europe: The status of conservation of the black scoter population in the European Union is favourable according to 'Bird Life'. The breeding areas in the European Union for sojourning black scoters lie in North Europe and West Siberia. Overwintering areas lie along the coasts of the Baltic, North Sea and western Atlantic Ocean. Southerly the black scoter occurs as far as Mauritania. The winter population is estimated at 1,600,000 birds, 3% of which sojourn in Dutch waters.

3. Ecological requirements

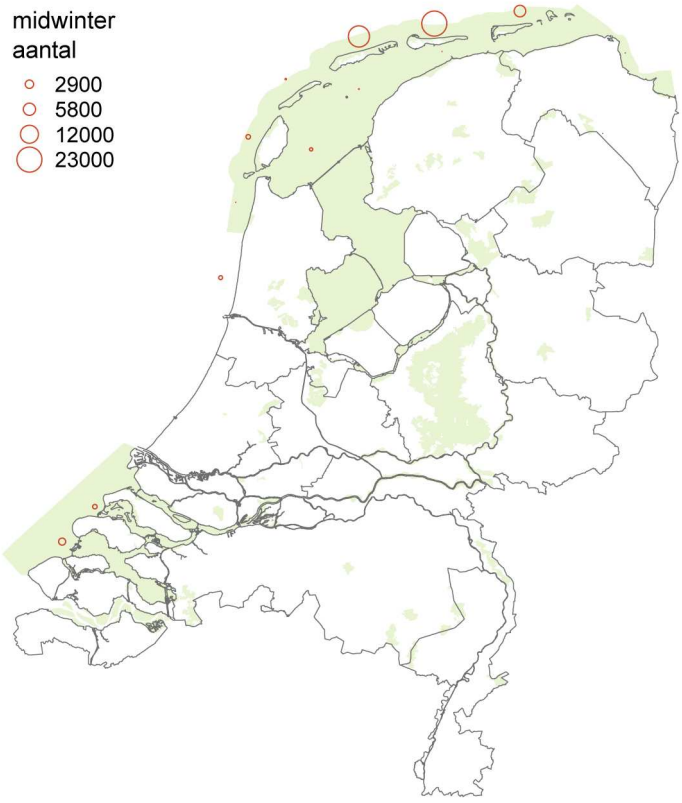
Habitat: The black scoter only seeks out saltwater when a guest in the Netherlands. Its food biotope comprises the shallow coastal waters rich in shellfish beds. It is mainly a North Sea bird. In the western Wadden Sea smaller numbers of black scoters sojourn (the numbers were greater in the past). The birds form groups and do not touch land when either resting or searching for food. At night the black scoters often drift with the ebb and flow of the food areas and this 'drifting' is corrected in early morning by flight movements.

Food: The black scoter searches for food in the underwater bottom (benthos) and is a food specialist. Its main source of food was until recently the cut trough shell *Spisula subtruncata* that it would normally fish up to a depth of 5-15 m. This shell species has been in decline so now the birds forage mainly on American sword razors other razor shell species. It is assumed that the food quality of this alternative prey species is less for the black scoter than the cut trough shell.

Refuge: The black scoters depend on a number of key shell beds where their prey occur in large concentrations. Refuge in these crucial foraging areas is vital. Shipping, commercial fishing and wind farms would have a negative impact on the presence of the black scoter in these places. In some years some several thousands of moulting black scoters concentrate in our coastal waters. Moulting causes them to lost the power of flight and then they are more vulnerable to disturbances. In the past shellfish fishing had led to a decrease in the food supply causing black scoters to seek new sources of food. They are extremely susceptible to oil pollution since they permanently swim around on the water in large flocks.

4. Current occurrence

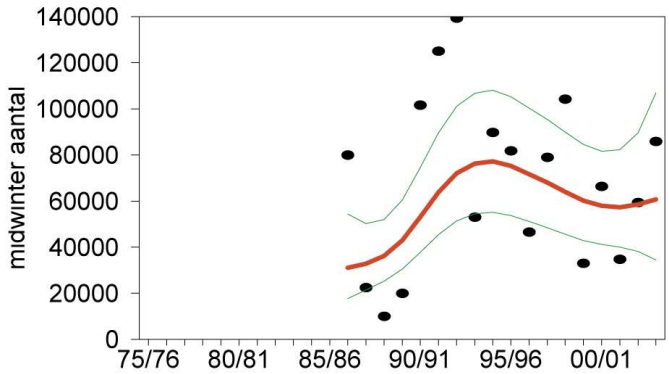
The distribution of the black scoter within the Netherlands is limited to the coastal waters of the North Sea, Voordelta and, to a lesser extent, the Wadden Sea. Sometimes black scoters are found on the inland waters but then they tend to be sick or tainted with oil.



Distribution map for the black scoter

5. Assessment of the national status of conservation

Trends in the Netherlands: The black scoter is present in our waters in fluctuating numbers and their presence depends strongly on the food supply. Numbers in recent times is likely to have varied from a floor of several tens of thousands or less to a ceiling of 135,000 birds, this latter figure established in the period 1990-1995. The species moves easily in large numbers over great distances. Mass movement within the Netherlands or to and from other countries within the overwintering area that stretches from Norway to NW Africa is common for the black scoter.



Trends in number of black scoter

Recent developments: Good counts for the black scoter population have been available only since the winter of 1986/87. The trend cannot be established any further due to the major year-on-year fluctuations.

Assessment aspect natural area of distribution: favourable
The area of distribution of the black scoter has not changed to any significant degree.

Assessment aspect population: favourable
The trend in numbers could not be established for the black scoter. The population appears to be more stable than decreasing.

Assessment aspect habitat: unfavourable–inadequate
The banks with high concentrations of cut trough shells (*Spisula subtruncata*) disappeared several years ago. The black scoters have switched to razor shells in part (American sword razor *Ensis directus*) but the question is whether this shell will be equally as suitable as the trough shells in time.

Assessment aspect future prospects: the future prospects are by definition uncertain for this migratory species. As long as a more or less natural status of large parts of the coastal zone can be guaranteed the long-term presence of the black scoter in our waters does not seem to be under threat. For this species the trends in the Netherlands depend in part on trends elsewhere.

National conservation objective: Maintain size and quality of habitat with a capacity for a population of an average of 68,500 birds (January numbers).

Target scenario for the national conservation objective: Maintaining the current situation is sufficient for this species.

Assessment: unfavourable–inadequate

Assessment Status of Conservation		
Aspect	**1981**	**2004**
Distribution	favourable	favourable
Population	favourable	favourable
Habitat	favourable	unfavourable–inadequate
Future	favourable	favourable
Final assessment	**favourable**	**unfavourable–inadequate**

6. Sources

- Berrevoets C. & Arts F.A. 2003. Midwintertelling van zee-eenden in de Waddenzee en de Nederlandse kustwateren, januari 2003. Rapport RIKZ/2003.008. Rijksinstituut voor Kust en Zee, Middelburg.
- Leopold M.F. 1993. Spisula's zeeëenden en kokkelvissers: een nieuw milieuprobleem op de Noordzee. Sula 7 (1): 24-28.
- Leopold M.F. 1996. *Spisula subtruncata* als voedselbron voor zee-eenden in Nederland. BEON Report 96-2. Rijksinstituut voor Kust en Zee, Den Haag.
- Leopold M.F., Baptist H.J.M., Wolf P.A. & Offringa H. 1995. De Zwarte Zee-eend *Melanita nigra* in Nederland. Limosa 68: 49-64.

- Tulp I., Schekkerman H., Larsen J.K., van der Winden J., van der Haterd R.J.W., van Horssen P., Dirksen S. & Spaans A.L. 1999. Nocturnal flight activity of sea ducks near the windfarm Tunø Knob in the Kattegat. Report 99.64. Bureau Waardenburg bv, Culemborg.

- Wolf P. & Meininger P.L. 2004. Zeeën van Zee-eenden bij de Brouwersdam. Nieuwsbrief NZG 5 (2).

- Zucco C. & Merck T. 2004. Ökologische Effekte von Offshore-Windkraft-Anlagen. Naturschutz und Landschaftsplanung 36: 261-269.

This profile must be read, interpreted and used in combination with the guide that contains the necessary explanation of the different sections.

Little gull (*Larus minutus*) (A177)

1. Status:

Bird Directive Appendix I (since 2004). Relevant to Natura 2000 as non-breeding bird.

2. Characterisation

Description: The little gull is a small elegant gull whose breeding area stretches from Finland to deep in Siberia, with outposts to the west as far as the Netherlands. The European population comprises 22,000 – 34,000 pairs with an accent on Finland and Russia. Little gulls overwinter in large freshwater lakes like the IJsselmeer and the Caspian Sea, but mainly at sea; from the Baltic in the north to the Mediterranean in the south as far as the vicinity of Newfoundland. The little gull migrates over our country especially in April-May and October-November.

Relative importance within Europe: The status of conservation of the little gull population in the European Union is favourable according to 'Bird Life'. The Netherlands is a significant migration area even though the birds only stay a short time. A large portion of the European population migrate through the Netherlands: an estimated 84,000 birds, more than 50% of the population. As a overwintering area the Netherlands is much less significant. An estimated 5% maximum overwinter in our country.

3. Ecological requirements

Habitat: The little gull sojourns in our country on large water bodies, large freshwater lakes, freshwater marshes and rivers. The coastal area contains the main concentration of the distribution in a 30 km wide strip along the Zeeland-Holland coats on the North Sea, within a 10 km wide strip along the Wadden islands and on the open water of the Ijsselmeer area. The little gull likes to forage along watersheds like so-called current seams.

Food: The little gull eats fish. It seeks food while flying above the surface of the water and grabs its prey flying along the surface. In the Ijsselmeer area in the winter the little gull eats mainly small smelt and ruffe, 80 mm maximum. Elsewhere it probably eats fish of a similar size. Little is known about its diet.

Refuge: The little gull seeks food in the spring also in areas with very intensive recreation. It appears to be fairly insensitive to disturbance, mainly because its predominant refuge areas are water.

4. Current occurrence

Migration of the little gull occurs along the coast in our country. In the spring the little gull can be sighted quite a lot migrating over the interior. The little gull winters on the IJsselmeer.

5. Assessment national status of conservation

Trends in the Netherlands; recent developments: Sea migration counts indicate a possible increase of passing little gulls. The peak of the migration now seems to be two weeks earlier in spring than in the 1970s and 1980s. This impression is attributable to the lesser significance of the IJsselmeer as a overwintering area.

Assessment aspect natural distribution: favourable
The distribution of the little gull is not substantially different.

Assessment aspect population: unfavourable–inadequate
The little gull population overwintering in the IJsselmeer is probably declining.

Assessment aspect habitat: unfavourable–inadequate
The decline of little gulls overwintering in the IJsselmeer may be the result of the decline in the smelt there.

Assessment aspect future prospects: unfavourable–inadequate
If the decline of little gulls overwintering in the IJsselmeer is related to the decline in the smelt stocks there, and that this is a consequence of climate change, then the future prospects for the IJsselmeer in any case are not favourable.

National conservation objective: maintain size and quality of habitat.

Target scenario for the national conservation objective: A recovery of the food supply in the IJsselmeer is necessary for a favourable status of conservation of the overwintering population of the little gull.

Assessment: unfavourable–inadequate

Assessment status of conservation		
Aspect	**1981**	**2004**
Distribution	favourable	favourable
Population	favourable	unfavourable–inadequate
Habitat	unknown	unfavourable–inadequate
Future	favourable	unfavourable–inadequate
Final assessment	**favourable**	**unfavourable–inadequate**

6. Sources

- Keijl G.O. & Leopold M.F. 1997. Massaal foeragerende Dwergmeeuwen *Larus minutus* voor de Hollandse kust in april 1996. Sula 11: 17-20.
- Voslamber B. 1991. Meeuwen in het IJsselmeergebied: voedseloecologie van zeven op het meer voorkomende soorten. Intern rapport 1991-9 liw. Rijkswaterstaat, Directie Flevoland. Lelystad.

This profile must be read, interpreted and used in combination with the guide that contains the necessary explanation of the different sections.

Lesser black-backed gull (*Larus graellsii*)[3] A183

1. Status

Not mentioned in Annex I and a regularly occurring migratory bird as stated in article 4.2 of the Bird Directive. Relevant to Natura 2000 as breeding bird.

2. Characterisation

Description: The sturdy seagull with its dark back is now our most common breeding bird and has thus surpassed the herring gull. The lesser black-backed gull breeds in colonies in coastal dunes, outer dike soil and artificial biotopes. It collects food both at sea and on cultivated farmland. The Dutch population migrates and winters in southern climes as far as Morocco.

Relative importance within Europe: Lesser black-backed gulls breed mainly in West Europe and more recently also in Greenland. The species lives along the coasts of Southern Europe to the south of Scandinavia. The European population (240,000-260,000 pairs in European Union countries) increased strongly in the period 1970-2000. The Dutch share within the EU is relatively high (33%).

3. Ecological requirements

Habitat: The breeding biotope of the lesser black-backed gull is virtually limited to coastal locations. Nesting occurs in open dunes and on salt marshes, industrial areas, sand-in-water slurry building terrains and islands in enclosed inlets, and nowadays also on the roofs of buildings and sluice complexes. The species often breeds together with herring gulls but within the colony takes the grassier and marshier spots. The costal breeders forage at sea on fish, especially fish thrown overboard. The lesser black-backed gull also seeks its pry on grassland and building land as well as rubbish dumps.

Food: The food of the lesser black-backed gull comprises both marine prey (mainly fish) and small land animals that occur in farmland, both in arable land and grassland as well as rubbish dumps. The species forages at great distance from the colony, generally within a range of 135 km from the colony, but distances of up to 200 km are also known.

Refuge: As a colony bird the lesser black-backed gull is very sensitive to disturbance (at a distance of > 300 m). Alarm in the colony is considerable upon approach. Sensitivity to disturbance of the habitat is average to major: it is a half-open to open landscape. The effects of disturbance on the population are probably minor given that most breeding colonies can be found on inaccessible terrain. Land recreation is the greatest threat to their refuge.

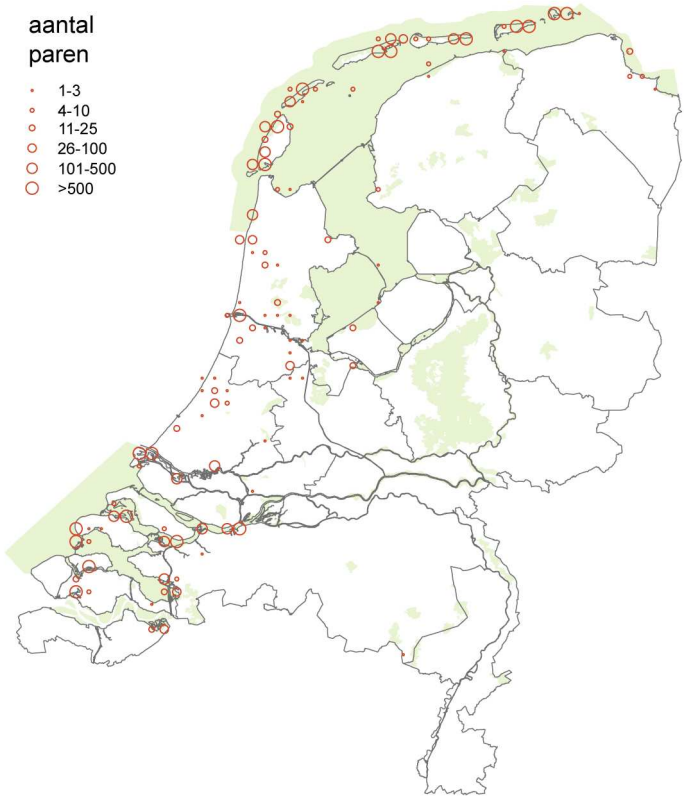
Minimum size of sustainable population: From a population-ecological perspective a sustainable key population of the lesser black-backed gull requires at least 20 pairs. For a favourable status of conservation at national scale at least 20 key populations are required (>400 pairs).

4. Current occurrence

The concentration of the distribution of the lesser black-backed gull lies in the Wadden and Delta areas. The largest colonies are on the Boschplaat on Terschelling, in De Geul on Texel and the

[3] In *Waterbird Population Estimates – Third Edition* with the scientific name *Larus fuscus graellsii*.

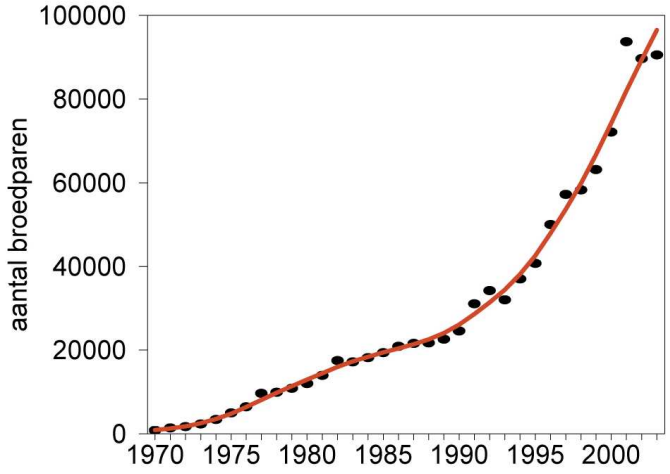
Europoort-Maasvlakte. Large colonies are on Schiermonnikoog and Schouwen. Inland the species nests on roofs in towns in North and South Holland. The natural distribution is exclusively the coast with marginal occurrence inland.



Distribution map of the lesser black-backed gull

5. Assessment national status of conservation

Trends in the Netherlands: The lesser black-backed gull only established itself in the Netherlands in 1926, first on Terschelling and later further along the coast. Around 1940 the national population was 15 pairs. Since 1970, after the end of 40 years of herring gull control (where lesser black-backed gulls also suffered), the species has increased strongly at around 30% each year.



trends in numbers of breeding pairs of lesser black-backed gull

Recent developments: The Dutch population of the lesser black-backed gull reveals a strong increase since 1981 (1981-2003) (significant, > 5% annually). In 1994-2003 the national trend revealed a strong increase too (significant, > 5% annually).

Assessment aspect natural area of distribution: favourable
The area of distribution of the lesser black-backed gull has increased considerably since 1973-1977, by 328%. The area has expanded fourfold. In total the species appeared in 114 atlas grid blocks, has disappeared from around 8 and appeared in 77. In the west of the country colonies left the dunes for the great part after expansion of the fox population. New (smaller) gull establishments occurred on roofs in urban areas, including IJmond, Leiden and Rotterdam, and lesser black-backed gulls also moved to the Wadden and Delta areas.

Assessment aspect population: favourable
After the major expansion of the area of distribution numbers of lesser black-backed gulls also increased, beginning around 1970 and then exponentially up to around 1995. After this the population growth appears to have levelled off. Neighbouring countries also witnessed spectacular increases in numbers. In 1998-2000 the national breeding population of the lesser black-backed gull was estimated at 58,500-72,000 pairs. In 2001 numbers still rose strongly and in 2002 stabilised to around 90,000 pairs. The Dutch breeding population of the lesser black-backed gull in the period 1979-1983 averaged 14,000 pairs and 1999-2003 82,000 pairs.

Assessment aspect habitat: favourable
Intensive nest predation by foxes has led to the disappearance of colonies of the lesser black-backed gull in the dunes of the Holland coast and a move to urban areas where breeding is sometimes considered a nuisance. Regionally signals suggest a lack of food at breeding time: reproduction in the Wadden has been modest.

Assessment aspect future prospects: favourable
The future prospects for the lesser black-backed gull are favourable.

National conservation objective: Maintain size and quality of habitat to maintain a population of 43,000 pairs[4]. This is based on the average of the period 1993-1997, a period used in the system for selecting Bird Directive areas.

Target scenario for the national conservation objective: Maintaining a population level of at least 43,000 pairs of the lesser black-backed gull is desirable. From a population-ecological perspective a minimum of 20 key populations of at least 20 pairs (> 400 pairs).

Assessment: favourable

Assessment status of conservation		
Aspect	**1981**	**2004**
Distribution	favourable	favourable
Population	favourable	favourable
Habitat	favourable	favourable
Future prospects	favourable	favourable
Final assessment	**favourable**	**favourable**

6. Sources

[4] This has changed in respect of the Natura 2000 document.

- Camphuysen, C.J. 1995. Herring Gull *Larus argentatus* and Lesser Black-Backed Gull *L. fuscus* feeding at fishing vessels in the breeding season: competitive scavenging versus efficient flying. Ardea 83: 365-380.

- Meininger, P.L. & Strucker, R.C.W. 2001. Kustbroedvogels in het Deltagebied in 2000. Rapport 2001.015. RIKZ, Middelburg.

- Noordhuis, R. & A.L. Spaans 1992. Interspecific competition for food between Herring *Larus argentatus* and Lesser Black-backed Gulls *L. fuscus* in the Dutch Wadden Sea area. Ardea 80: 115-132.

- Spaans, A.L. 1998. Breeding Lesser Black-backed Gulls *Larus graellsii* in the Netherlands during the 20th century. Sula 12: 175-184.

Sea mammal profiles

This profile must be read, interpreted and used in combination with the guide that contains the necessary explanation of the different sections.

Harbour porpoise (*Phocoena phocoena*) **H1351**

1. Status:

Habitat Directive Annex II (effective 1994)

2. Characterisation

Description: The harbour porpoise, one of the smallest dolphins, appears regularly in Dutch coastal waters, with observations of harbour porpoises in our waters most prevalent in the winter months, alone or in small groups. Coast observations reveal a strong increase from 1994.

Relative importance within Europe: significant
The harbour porpoise occurs throughout the North Atlantic, the White Sea, Greenland and Iceland in the north to the Atlantic coast of North Africa in the south. A small population lives in de Baltic while an isolated population is known to inhabit the Black Sea and harbour porpoises appear in the Greek part of the Mediterranean Sea.

The total population in the North Sea was estimated both in 1994 and 2005 to be 250,000 specimens, making the harbour porpoise more populous than the common seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*). The closest large concentration of the species to our country is in the German part of the North Sea west of the Wadden island Sylt (around 30,000 animals in the whole of the German part); as far as is know this is the main reproduction area in the central North Sea. Recently high densities were also registered off the coast of North Holland. The total numbers of harbour porpoises in waters of the European Union (including Exclusive Economic Zones) is estimated to be in the region of half a million. Until recently the Dutch share was certainly minor. It appears that with a shift in the North Sea from north to south, the Dutch part is growing at the moment but it remains to be seen whether this is incidental.

3. Ecological requirements

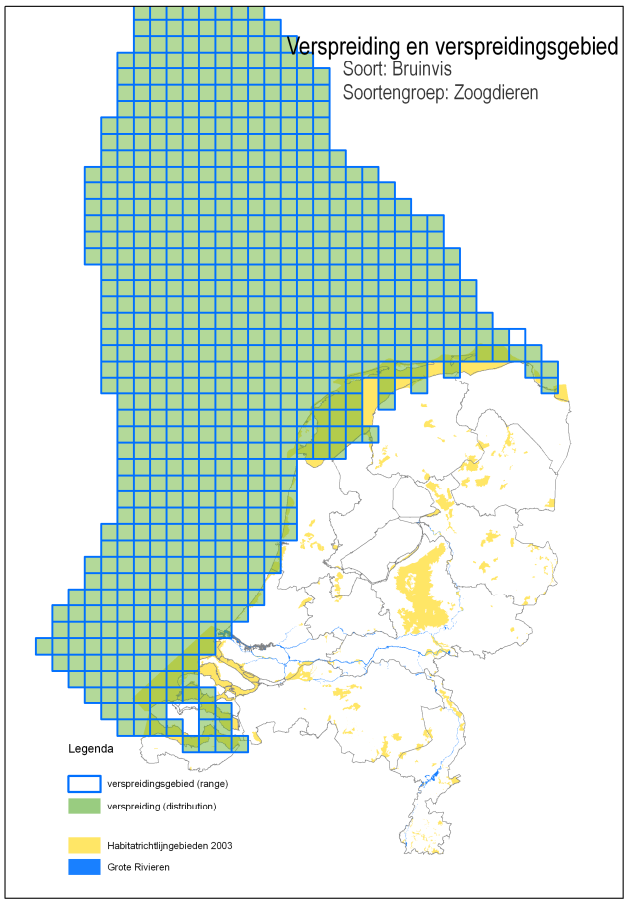
Habitat: The harbour porpoise occurs throughout shallow seas and coastal waters or in the moderate and sub-arctic parts of the northern hemisphere. They used to swim up rivers. Little is known about the habitat requirements of harbour porpoises but they avoid ships and are sensitive to noise under water.

Food: Harbour porpoises feed on fish like whiting, cod and herring as well as flatfish. The choice of food depends on the local supply and this differs per regional. They use echolocation to hunt.

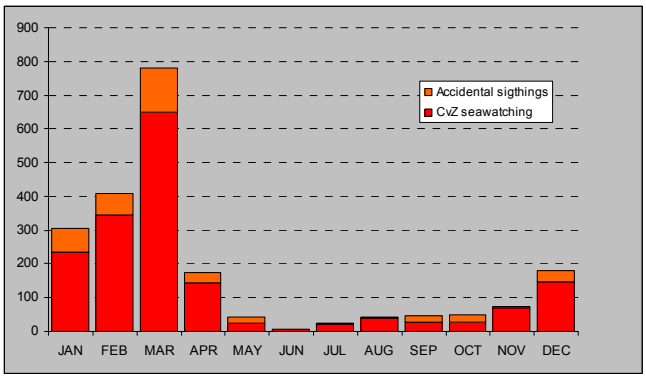
4. Current occurrence

In the Dutch part of the North Sea harbour porpoises are seen regularly, though not in large numbers, but since 1994 the frequency of the sightings and reported numbers have been increasing. This recurrence has been well documented on the basis of seabird migration counts (1972 to date), in which harbour porpoises are also registered. Currently the harbour porpoise is particularly in winter and early spring a frequent coastal dweller. In recent years a few harbour

porpoises have been seen regularly in the Wadden Sea, the Oosterschelde and, occasionally, the Westerschelde.



Distribution map for the harbour porpoise

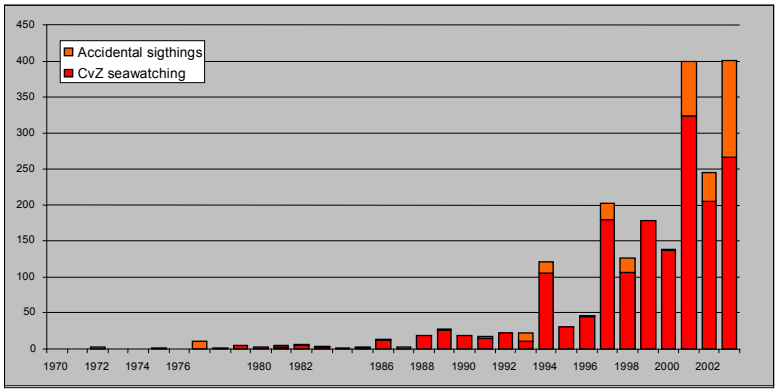


Seasonal pattern of harbour porpoises observed from the coast since 1970 (Marine Mammal Database; updated 3/1/2004, http://home.planet.nl/~camphuys/Cetacea.html)

5. Assessment national status of conservation

Trends in the Netherlands: The harbour porpoise used to be a common phenomenon in Dutch waters and up until the 1950s sightings of harbour porpoises along the beach or in rivers was not unusual. After 1950 the sightings fell sharply and around 1970-1980 a harbour porpoise was rarely reported. After 1990 both sightings of living creatures as well as stranded harbour porpoises began to increase. In 2004 very high numbers were observed along the North Holland coast. In 2005 the entire North Sea was the field of study into dolphins and whales (SCANS-II). The final

results have yet to be published but an initial conclusion is that the numbers of harbour porpoises in the North Sea have not risen as a whole but that there has been a major shift from north to south.



Harbour porpoises observed from the coast since 1970 (Marine Mammal Database; updated 3/1/2004;http://home.planet.nl/~camphuys/Cetacea.html)

Recent developments: Since around 1990 the number of sightings of harbour porpoises in the Netherlands has increased. The question is whether this is a consequence of a rise in the (local) population size or a temporary influx (emigration) of animals from other areas. Recently mothers have been sighted with calves in Dutch waters. According to the Red List base report the Dutch population was estimated in 2006 at 15,000 to 19,000 adult animals.

Assessment aspect natural area of distribution: favourable
The harbour porpoise is present throughout the Dutch part of the North Sea.

Assessment aspect population: unfavourable–bad
While numbers of harbour porpoises in Dutch waters have increased strongly in recent years, they still fall more than 25% short of the favourable reference. The assessment of the population as "unfavourable–bad" is partly based on the fact that the harbour porpoise still reproduces to a limited extent in Dutch waters.

Assessment aspect habitat: unfavourable–inadequate
In recent years many hundreds of dead harbour porpoises have washed up on the Dutch coast, a great many having drowned by entanglement. It is still not clear to what extent this mortality affects the population as a whole.

Assessment aspect future prospects: unfavourable–inadequate
European policy compels the reduction of mortality through fishing nets, but it questionable whether this will succeed and it is also unclear how far the recent recovery of numbers in Dutch waters is sustainable.

National conservation objective:
Maintain distribution, size and quality of habitat to maintain the population.

Target scenario for the national conservation objective:
- natural area of distribution: 568 10x10 km grid blocks
- population: 25,000 specimens
Return of a reproducing population of harbour porpoises along the entire Dutch coast, including the Delta area, is necessary for a favourable status of conservation. Limitation of mortality by fishing nets is important.

Assessment: unfavourable–bad

Status of conservation

Aspect	1994	2004	2007
Distribution	unfavourable–bad	unfavourable–bad	favourable
Population	unfavourable–bad	unfavourable–bad	unfavourable–bad
Habitat	unfavourable–inadequate	unfavourable–inadequate	unfavourable–inadequate
Future prospects	unfavourable–inadequate	unfavourable–inadequate	unfavourable–inadequate
Assessment CS	**unfavourable–bad**	**unfavourable–bad**	**unfavourable–bad**

6. Sources

- Berrevoets, C.M. & F.A. Arts, 2005. Monitoring van zeevogels en zeezoogdieren op het Nederlands Continentaal Plat 1991-2005 : verspreiding, seizoenspatroon en trend van zeven soorten zeevogels en de Bruinvis. Report RIKZ/2005.032

- Camphuysen C.J., http://home.planet.nl/~camphuys/Bruinvis.html

- Camphuysen, C.J., 2004. The return of the harbour porpoise (*Phocoena phocoena*) in Dutch coastal waters. Lutra 47: 113-122.

- Camphuysen, K. & G. Peet, 2006. Walvissen en dolfijnen in de Noordzee. Fontaine Uitgevers bv/ Stichting De Noordzee.

- Hammond, P.S., H. Benke, P. Berggren, D.L. Borchers, S.T. Buckland, A. Collet, M.P. Heide-Jørgensen, S. Heimlich Boran, A.R. Hiby, M.F. Leopold & N. Øien, 1995. Distribution and abundance of harbour porpoises and other small cetaceans in the North Sea and adjacent waters. Final Report to the European Commission. LIFE 92-2/UK/O27.

- Hammond, P.S., P. Berggren, H. Benke, D.L. Borchers, A. Collet, M.P. Heide-Jørgensen, S.Heimlich, A.R. Hiby, M.F. Leopold & N. Øien, 2002. Abundance of Harbour Porpoise and other small cetaceans in the North Sea and adjacent waters. Journal of Applied Ecology 39: 361-376.

- Kinze, C.C., 1994. *Phocoena phocoena* (Linneaus, 1758) – Schweinswal oder Kleintümmler (auch Braunfisch). In: D. Robineau, R. Duguy & M. Klima (red.). Handbuch der Säugetiere Europas. Band 6: Meeressäuger. Teil I Wale und Delphine – Cetacea. Teil IA. Einführung, Monodontidae, Phocoenidae, Delphinidae: 242-264. AULA-Verlag, Wiesbaden.

- Lindeboom, H., J. Geurts van Kessel & L. Berkenbosch, 2005. Gebieden met bijzondere waarden op het Nederlands Continentaal Plat. Rapport RIKZ/2005.008. Alterra Report 1109. RIKZ, Den Haag / Alterra, Wageningen.

- Poot, M.J.M., H.A.M. Prinsen, C. Heunks, P.W. van Horssen, T.J. Boudewijn & S. Dirksen, 2005. Voortgangs- en veldwerkrapportage 2: januari t/m maart 2005. Perceel 4: Vogels. Nulmeting in kader van Monitoring en Evaluatie Porgramma, Project Mainport Rotterdam – MEP MV2. Report bureau Waardenburg 05-054, Culemborg.

- Reeves, R.R., B.D.Smith, E.A.Crespo & G.N. di Sciara, 2003. Dolphins, Whales and Porpoises 2002-2010. Conservation Action Plan for the World's Cetaceans. IUCN/SSC Cetaceans specialist group.

- Reijnders, P.J.H., 1992. Harbour porpoises Phocoena phocoena in the North Sea: numerical responses to changes in environmental conditions. Neth. J. Aquat. Ecol. 26: 75-86.
- Smeenk, C., 1987. The harbour porpoise Phocoena phocoena (L., 1758) in The Netherlands: stranding records and decline. Lutra 30: 77-90.
- Smeenk, C., 2003. Strandingen van Cetacea op de Nederlandse kust in 1993-1997. Cetacea stranded on the Dutch coast in 1993-1997. Lutra 46(1): 45-64.
- University of St. Andrews, http://biology.st-andrews.ac.uk/scans2
- Zoogdiervereniging VZZ, 2007. Basisrapport voor de Rode Lijst Zoogdieren volgens Nederlandse en IUCN-criteria. VZZ report 2006.027. Second revised print. Zoogdiervereniging VZZ, Arnhem.

This profile must be read, interpreted and used in combination with the guide that contains the necessary explanation of the different sections.

Grey seal (*Halichoerus grypus*) H1364

1. Status

Habitat Directive Annex II (effective 1994).

2. Characterisation

The grey seal is the 'prodigal child' for the Netherlands, having disappeared from Dutch waters in the Middle Ages returning during the course of the last century to reclaim the western Wadden Sea. The difference between male and female grey seals is distinct. The males are up to 2.5 m long and weigh 170 to 350 kg; the maximum length of the females is just over two metres and they weigh between 120 and 220 kg. Grey seals have a longer snout than common seals. The young are born with a thick white coat that they lose two weeks after birth. In those first two weeks young grey seals cannot swim.

Relative importance within Europe: significant
The grey seal occurs on the east and west Atlantic coasts. There are three distinct metapopulations: one in the west, on the Canadian coast, one in the eastern part of the Atlantic Ocean and a small one in the Baltic. The Dutch animals belong to the eastern metapopulation that stretches from Iceland, Norway and the White Sea in the north to Brittany in the south. The largest colonies of this population live around Iceland, the Faeroe islands, Norway, along the northwest coast of Scotland and near Murmansk in Russia. Around 100,000 grey seals live in the European Union, with 0.4 % in the Netherlands in 2001.

3. Ecological requirements

Habitat: Since the grey seal only just returned to the Netherlands after centuries of absence its biology and behaviour has been little studied. General knowledge about the species is supplied by the United Kingdom where the species is common. The habitat of the grey seal comprises haul-outs and an aquatic environment.

Haul-outs are used all year round for resting. During reproduction (December-January) and the moulting period (April-March) they are more intensively visited. The haul-outs of the grey seals are sandbanks that are submerged at normal high tides. This is important for young grey seals – in contrast to young common seals – since they cannot swim. Higher lying beaches and dunes offer more protection against flooding but are less suitable as haul-outs since grey seals that lie on beaches and dunes along the Dutch coast are generally getting disturbed or 'saved'. Grey seals are regularly found on the same sandbanks as common seals. The young remain at least three weeks in the nurseries at resting places when they are suckled by their mothers. In the weeks following weaning they lose a lot of weight until they learn the art of catching fish.

Food: grey seals eat mainly fish, the choice of which depends on the fish species present in a region. In general many, wide-ranging species tend to be found in the diet of the grey seals.

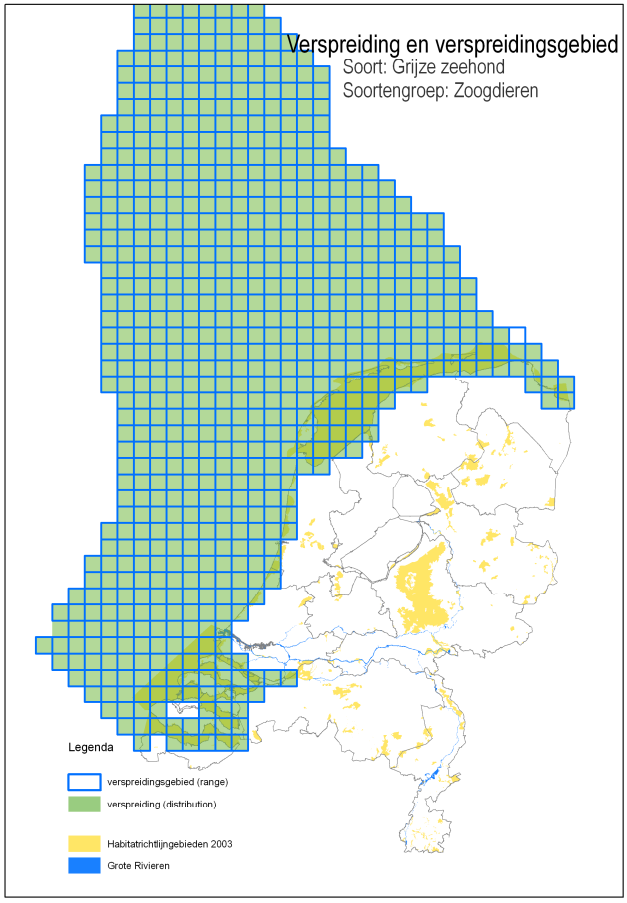
4. Current occurrence

In the Netherlands there are currently (in 2006) around 2,000 grey seals sighted mainly on sandbanks in the western part of the Wadden Sea and Voordelta. Knowledge about the species

from other areas suggest that their habitat covers a great deal of the North Sea. Sightings of seals at sea are rare since they take the opportunity there to quickly become 'invisible' by diving.

There are interesting behavioural observations of grey seals on the beaches of the Wadden islands and along the cost of North Holland. Numbers of these seals are probably underestimated since small groups of grey seals may lie amongst larger groups of common seals, leaving the younger animals in particular difficult to make out. Grey seals tracked in other areas using transmitters sometimes move several hundred kilometres. In principle, the seals may span and move around the entire Netherlands Continental Plate (NCP). No migration data are known of the Dutch colonies of the animals.

The Dutch grey seals tend to stay mainly on high sandbanks in the west of the Wadden Sea like Richel (east of Vlieland) and the Vliehors (western shore of Vlieland). In the North Sea coastal zone the sandbanks of the Engelschhoek (in the sea channel between Vlieland and Terschelling) and Noorderhaaks (southwest of Texel) are important for the grey seal. Most of the young are born on Richel while only a few are born on the Vliehors and Noorderhaaks. All these haul-outs are not ideal for the reproduction of the grey seals since they can become flooded, especially during bad weather. In the summer, after the reproduction period, the seals spread out somewhat. The grey seal has established itself in recent years in the Delta area which now has around 200 specimens, mainly in the Voordelta where reproduction has lately been recorded, namely on the Bollen (bulges) of the Ooster.

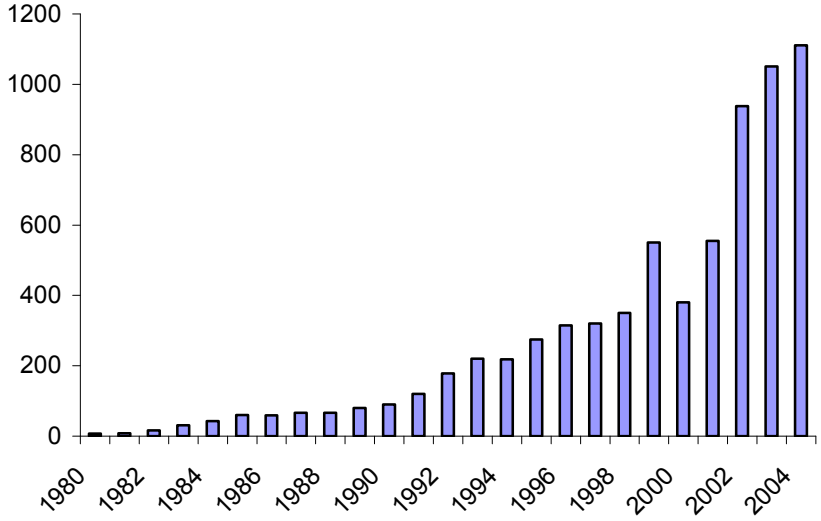


Distribution map for grey seal

5. Assessment national status of conservation

Trends in the Netherlands: Archaeological finds reveal that until the Middle Ages grey seals were a general phenomenon in the Wadden area when the species was probably even more common in the North Sea than the common seal. In the Middle Ages they were wiped out by man in the Wadden see. From 1950 occasional grey seals were spotted in the western part of the Wadden

Sea. The number grew after the species gained better protection in Great Britain. Observations from 1980 during the period when the animals moult reveal that the colony in the Netherlands had grown by an average of 20% per year to around 1,000 animals in 2004. The speed of this growth is about one and a half times the biologically feasible maximum reproduction speed and can only be explained by an influx of animals from other areas, namely the British islands (the Farne islands especially). It is expected that the more the population reaches the capacity of the area, the less important this 'influx' will be for the conservation of the Dutch colonies. In contrast to the common seals, grey seals are not, or hardly, affected by the seal virus.



Number of sighted grey seals in the western Wadden during moulting (March/April)

Recent developments: In the period 1994-2004 the population growth of the grey seal has in our country steadily increased.

Assessment aspect natural area of distribution: favourable
The current area of distribution is not below the favourable reference and is not decreasing. The area of distribution of (populations of) the species has spread since the 1980s to the Wadden area and very recently a population has become established in the Delta area.

Assessment aspect population: favourable
The total population is not below the favourable reference. The population of the grey seal is currently growing steadily and is regarded as sustainable, although this is partly dependent on migration from abroad.

Assessment aspect habitat: unfavourable–inadequate
Many of the suitable haul-outs for seals on the islands and mainland are currently not being used because there is too much disturbance. The high sandbanks that the animals now prefer fro their young are regularly submerged causing some deaths among the young. It is not yet clear whether the current habitat is adequately suitable for a sustainable population if there were no immigration. For the moment further knowledge is lacking on the aquatic habitat of the grey seal.

Assessment aspect future prospects: favourable
Given the rapid growth of the colony of grey seals it can be assumed that the capacity of the Wadden Sea is not yet hindering the population size and growth. However, it unknown if, and if so, to what extent the population can continue to grow. Part of the growth can be attributed to migration from Scotland, though the share of this influx and whether the colony can sustain itself without this migration are unknown. Only if more is known about how the grey seal lives at sea can the effects of this be incorporated into the estimates of future prospects.

National conservation objective:

Maintain distribution, size and quality of habitat to maintain the population.

Target scenario for the national conservation objective:
- natural area of distribution: 645 10x10 km grid blocks
- population: 1800 specimens
The current trend in numbers for the grey seal is assessed as favourable as long as immigration continues. As for the habitat there need to be at least five locations of favourable circumstances for the young to grow up an get enough rest if the habitat is to be considered favourable.

Assessment: unfavourable–inadequate

Status of conservation			
Aspect	**1994**	**2004**	**2007**
Distribution	favourable	favourable	favourable
Population	unfavourable–inadequate	favourable	favourable
Habitat	unfavourable–inadequate	unfavourable–inadequate	unfavourable–inadequate
Future prospects	unfavourable–inadequate	favourable	favourable
Assessment CS	**unfavourable–inadequate**	**unfavourable–inadequate**	**unfavourable–inadequate**

6. Sources

- Berrevoets, C.M., R.C.W. Strucker, P.L Meininger, F.A. Arts & S. Lilipaly, 2005. Watervogels en zeezoogdieren in de Zoute Delta 2003/2004. RIKZ report 2005.011.

- Brasseur, S.M.J.M., I. Tulp, P.J.H. Reijnders, C.J. Smit, E.M. Dijkman, J.S.M. Cremer, M.J.J. Kotterman & H.W.G. Meesters, 2004. Voedselecologie van de gewone en grijze zeehond in de Nederlandse kustwateren. I Onderzoek naar de voedselecologie van de gewone zeehond. II Literatuurstudie naar het dieet van de grijze zeehond. Alterra report 905. Alterra, Wageningen.

- Jong, G.D.C. de, S.M.J.M. Brasseur & P.J.H. Reijnders, 1997. Grey seal *Halichoerus grypus*. In: P.J. H. Reijnders, G. Verriopoulos & S.M.J.M. Brasseur (red.). Status of Pinnipeds relevant to the European Union. IBN Scientific Contributions 8: 58-75. DLO Institute for Forestry and Nature Research (IBN-DLO), Wageningen.

- Reijnders, P.J.H., K.F. Abt, S.M.J.M. Brasseur, S.M.J.M., C.J. Camphuysen, B. Reineking, M. Scheidat, U. Siebert, M. Stede, J. Tougaard & S. Tougaard, 2005. Marine mammals. In: K. Essink, C. Dettmann, H. Farke, K. Laursen, G. Lüerssen, H. Marencic & W. Wiersinga (red.). Wadden Sea Quality Status report 2004. Wadden Sea Ecosystem No. 19: 305-318. Trilateral Monitoring and Assessment Group, Common Wadden Sea Secretariat, Wilhelmshaven.

- Reijnders, P., S. Brasseur, J. van der Toorn, P. van der Wolf, I. Boyd, J. Harwood, D. Lavigne & L. Lowry, 1993. Status survey and conservation action plan. Seals, fur seals, sea lions, and walrus. IUCN/SSC Seal Specialist Group.

- Zoogdiervereniging VZZ, 2007. Basisrapport voor de Rode Lijst Zoogdieren volgens Nederlandse en IUCN-criteria. VZZ report 2006.027. Second recised print. Zoogdiervereniging VZZ, Arnhem.

This profile must be read, interpreted and used in combination with the guide that contains the necessary explanation of the different sections.

Common seal (*Phoca vitulina*) H1365

1. Status:

Habitat Directive Annex II (effective 1994).

2. Characterisation

Description: The common seal is the most common seal in the Netherlands. During weaning and in the moulting period, in the summer months, the animals are frequently seen on the sandbanks in the Wadden Sea and in the Delta area. Outside this period they regularly visit sandbanks to rest. The animals are difficult to observe directly in the water. They regularly undertake foraging journeys of more than 100 km.

Relative importance within Europe: large
The common seal occurs along the coasts of all saltwater bodies of the moderate climate zones of the northern hemisphere, and is thereby the most widely distributed seal. There are five distinct subspecies. The metapopulation in the eastern part of the Atlantic ocean belong to the subspecies *vitulina*. The area of distribution ranges from Spitsbergen, Murmansk and Iceland to the British islands, Ireland and the southwest Baltic, along the North Sea and Brittany. The animals in the Netherlands are part of the so-called Wadden Sea population that stretches from Esbjerg in Denmark to Den Helder in the Netherlands where there is a quarter of this population. In the Delta area is also a group of common seals, which reproduces hardly at all and is thus dependent on the immigration of animals from the surroundings, namely the Wadden Sea. Around 70,000 common seals live in the European Union, 4% in the Netherlands.

3. Ecological requirements

Habitat: The habitat of the common seal comprises haul-outs and an aquatic environment. A seal always lies close to water and the haul-outs are used all year round. During weaning and moulting the haul-outs are visited for longer periods. The common seal uses tidal banks in Dutch waters as haul-outs. At high water these are submerged so the animals have to swim. This is feasible since young common seals lose their long-haired fur even before birth and can immediately swim with their mothers. In less disturbed areas (as in Scotland) of where there is no other obvious alternative, the animals use beaches or rocky coasts. In those areas common seals always dare to take such options whenever it befits them. In the Netherlands weaning females leave the water at every low water period to wean with their young for the four-week weaning period. During the post-weaning weeks the young lose a lot of weight.

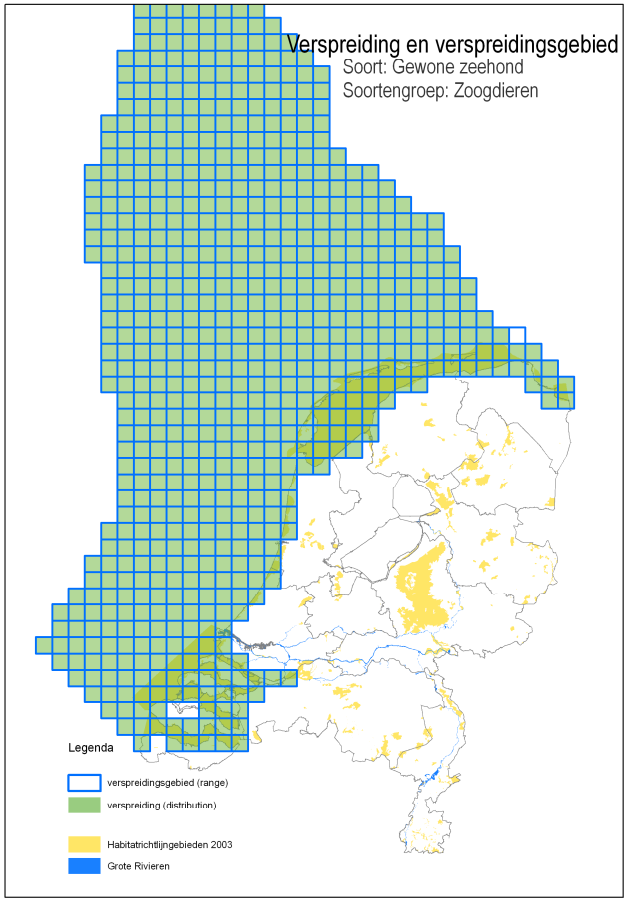
The moulting period depends of age: young common seals moult in early summer while females that have had young are the last to moult at the end of the summer. Individual animals appear to show a certain degree of fidelity to haul-outs despite the fact that the animals use several such sites, even very distant from each other.

Much less is known about the aquatic habitat of the common seal. They mate under water. In winter many animals migrate to the North Sea. Mating areas, foraging sites and migration routes have not yet been identified.

Food: Common seals eat fish almost exclusively.

4. Current occurrence

The haul-outs of the common seal can be found throughout the Wadden Sea. Most of the young are born in the eastern part. Haul-outs are also known in the Delta area where a modest group of common seals find a place to rest. Common seals are seldom observed on the beaches of the Wadden islands nor along the North Holland coast. In principle, common seals can move across the whole NCP (Netherlands Continental Plate) but indications suggest that they do not go further than a hundred to a hundred and fifty kilometres from the coast.
A small group of around 100 specimens use the Delta area.



Distribution map for the common seal

5. Assessment national status of conservation

Trends in the Netherlands: Despite a certain pressure from hunting around 1900 at least 7,000 to 16,000 common seals must have lived in the Dutch Wadden Sea; in the Delta area from 6,000 to 11,000. These figures derive from hunting statistics. In the period 1960-1975 the number of animals fell partly due to PCB pollution. The numbers reached a 'critically' low level: there were less than 500 animals in the Dutch Wadden Sea and the seals in the Delta area had virtually disappeared. In the entire international Wadden Sea only 3,800 animals were counted.

In order to save the species the hunt in Germany and Demark was also stopped and the population began to grow. Despite the outbreak of the seal disease, Phocine Distemper virus (PDV) in 1988, the population managed to recover very well. In 2002 more than 20,000 common seals were counted, 4,500 in the Dutch Wadden Sea. The population was again hit by the PDV virus and more than 50% of the population perished. It appears that the population has again recovered. Probably the population in the Wadden Sea is still well below the capacity of this habitat, something that can be assumed from the fact that there is no evidence (even for the 20,000 international animals counted in 2002) of density-dependent processes. In the Delta area the number of animals counted is under 200, despite a slight rise.

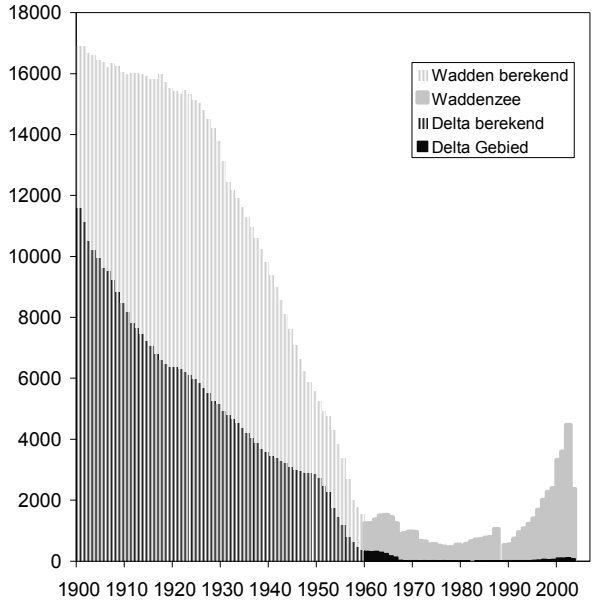
Recent developments: In the period 1994-2004 the growth continued gradually despite a second seal virus epidemic.

Assessment aspect natural area of distribution: favourable
The area of distribution of the species has been stable through the centuries, with the note that the small population in the Delta area cannot sustain itself due to a too low rate of birth.

Assessment aspect population: favourable
The population has been growing since the nadir of the 1950s, despite being hit twice by the seal virus (see figure).

Assessment aspect habitat: favourable
In the Wadden Sea the haul-outs are well protected, especially during weaning and moulting (15 May –1September). In the Delta area the suitable habitat has been cut down considerably since the construction of the Deltaworks and partly due to being not tranquil enough for good reproduction.

Assessment aspect future prospects: favourable
Given the steady growth of the colony of common seals it can be assumed that the population size is still below the capacity of the Wadden Sea and thus there is still room for further growth. As for the grey seal there is still not enough knowledge of the sea habitat, whereby negative effects that may happen there in the future cannot be predicted.



Number of common seals in the Netherlands since 1900

National conservation objective:
Maintain distribution, expand size and improve quality of the habitat to expand the population.

Target scenario for the national conservation objective:

- natural area of distribution: 645 10x10 km grid blocks
- population: 4500 specimens
The favourable reference includes a small population (of some 200 animals) in the Delta area. In current circumstances it is unlike that a much larger population will occur there due to disturbance, restricted habitat and pollution.

Assessment: favourable

Status of conservation			
Aspect	**1994**	**2004**	**2007**
Distribution	favourable	favourable	favourable
Population	unfavourable–inadequate	favourable	favourable
Habitat	favourable	favourable	favourable
Future prospects	favourable	favourable	favourable
Assessment CS	**unfavourable–inadequate**	**favourable**	**favourable**

6. Sources

- Berrevoets, C.M., R.C.W. Strucker, P.L Meininger, F.A. Arts & S. Lilipaly, 2005. Watervogels en zeezoogdieren in de Zoute Delta 2003/2004. RIKZ report 2005.011.

- Brasseur, S., I. Tulp & P. Reijnders, 2006. Verspreiding en voedselkeus van zeehonden uit de Waddenzee, fase 1. De Levende Natuur 107(4): 157-161.

- Brasseur, S.M.J.M., I. Tulp, P.J.H. Reijnders, C.J. Smit, E.M. Dijkman, J.S.M. Cremer, M.J.J. Kotterman & H.W.G. Meesters, 2004. Voedselecologie van de gewone en grijze zeehond in de Nederlandse kustwateren. I Onderzoek naar de voedselecologie van de gewone zeehond. II Literatuurstudie naar het dieet van de grijze zeehond. Alterra report 905. Alterra, Wageningen.

- Jong, G.D.C. de, S.M.J.M. Brasseur & P.J.H. Reijnders, 1997. Harbour seal *Phoca vitulina vitulina*. In: P.J. H. Reijnders, G. Verriopoulos & S.M.J.M. Brasseur. Status of Pinnipeds relevant to the European Union. IBN Scientific Contributions 8: 76-97. DLO Institute for Forestry and Nature Research (IBN-DLO), Wageningen.

- Reijnders,P., S. Brasseur, J. van der Toorn, P. van der Wolf, I. Boyd, J. Harwood, D. Lavigne & L. Lowry, 1993. Status survey and conservation action plan. Seals, fur seals, sea lions, and walrus. IUCN/SSC Seal Specialist Group.

- Reijnders, P.J.H., S.M.J.M. Brasseur & A.G. Brinkman, 2000. Habitatgebruik en aantalsontwikkelingen van gewone zeehonden in de Oosterschelde en het overige Deltagebied. Alterra report 078. Alterra, Wageningen.

- Ries, E.H., 1999. Population biology and activity patterns of harbour seals (Phoca vitulina) in the Wadden Sea. IBN Scientific Contributions 16.

- Zoogdiervereniging VZZ, 2007. Basisrapport voor de Rode Lijst Zoogdieren volgens Nederlandse en IUCN-criteria. VZZ report 2006.027. Second revised print. Zoogdiervereniging VZZ, Arnhem.