Rijkswaterstaat
Ministry of Infrastructure and Water Management

Project Afsluitdijk

Focusing on Nature

Ecology

What does the ecological dike facing the Wadden Sea look like? How do we ensure the return of the extraordinary coastal vegetation? And how do we ensure that migrating bats are not affected by artificial lighting? This brochure explains the way we are aiming to protect infrastructural work.

Project Afsluitdijk

Focusing on Nature

FOREWORD

The construction of the Afsluitdijk in 1932 was an extraordinary feat in our battle against water. But it was also one of the biggest ecological disasters that has ever hit our country. Because no matter how impressive this more than thirty-kilometre-long iconic construction is, it meant the end of the Zuiderzee. And with it, the distinctive fauna and flora of this unique inland sea. The gradual transition from river to sea was reduced to a single line.

No matter how impressive this more than thirty-kilometre-long iconic construction is, it meant the end of the Zuiderzee, a unique inland sea with distinctive fauna and flora.

From a historical perspective, it makes sense to give nature a prominent place now that the dike is being renovated and reinforced. We have already taken the first steps towards realising this. As a member of the Afsluitdijk Project Quality Team, I am supervising the preservation of fauna and flora during and after the work on the dike. In this context, the Fish Migration River that is being constructed serves as more than just a migratory route for fish. It also softens the separation between the saltwater of the Wadden Sea and the freshwater of the IJsselmeer (Lake IJssel). This creates a small-scale freshwater tidal landscape, with a one-meter tidal range. This is the type of landscape that existed in the IJssel estuary before the construction of the Afsluitdijk.

We are also creating a habitat for unique native plant species at the Fish Migration River, using seeds from the National Seed Collection of the Living Archive. We are restoring the original landscape. Because the vegetation will disappear during work on the dike, we are fully committed to ensuring its return, together with the associated animal life. To this end we are collecting seeds and will return them once the work has been completed. The side facing the Wadden Sea is a man-made (anthropogenic) rocky coastline habitat for unique plants such as sea kale and rock samphire. Whereas the wide range of plants growing on the long outstretched verge facing the IJsselmeer often struggle to establish themselves elsewhere in our heavily fertilised country.

Finally, the three junctions along the Afsluitdijk – Den Oever, Kornwerderzand and Breezanddijk – offer plenty of opportunities for nature development, with coastal dune grassland and dune thicket as a rewarding prospect. This will produce a natural environment at a European level.

The ball is now in our court. I hope that in a few years we can conclude that without a doubt, we achieved the results we were aiming for.

Joop Schaminée
Afsluitdijk Project Quality Team
Professor in Systems Ecology, Radboud University Nijmegen and Wageningen University & Research

Reinforcing the Afsluitdijk

...while focusing on nature

The Afsluitdijk has been protecting the Netherlands against sea flooding since 1932. However, the dike no longer meets current water-safety standards. That is why Rijkswaterstaat (the executive agency of the Ministry of Infrastructure and Water Management, dedicated to promote safety, mobility and the quality of life in the Netherlands) is working on reinforcing and renovating the Afsluitdijk and all of its components. We are reinforcing the dike, improving the road surface, and widening the A7 motorway. We are also building new storm surge barriers, reinforcing the construction of the existing discharge sluices and installing eight new discharge sluices, and two pumping stations at Den Oever. This will enable us to drain more excess water from the IJsselmeer into the Wadden Sea.

The Afsluitdijk is a natural habitat to many species of animals and plants and possesses a number of fundamental ecological qualities:

1. The Afsluitdijk is an ecological connectivity zone. Although the Afsluitdijk as such is not a nature area, it does border the IJsselmeer and Wadden Sea, both Natura 2000 areas. The Afsluitdijk is therefore not only a man-made element in the landscape, it is also part of a larger ecological system.
2. The Afsluitdijk provides space for spontaneous nature on a man-made structure. The nature-friendly character of the dike's profile, the open structure of rock-fill and basalt, and large areas of grassland all promote this nature development.
3. The Afsluitdijk forms a natural shelter in a dynamic environment where wind and weather have free rein.

These fundamental qualities are taken into account in our plans to renovate and reinforce the Afsluitdijk. The work will take place in the immediate vicinity of the Wadden Sea and IJsselmeer and can therefore impact the protected natural environment. The Ministry of Economic Affairs granted permits at the beginning of 2016. It is essential that the work must not affect the natural characteristics of the Wadden Sea and IJsselmeer. The Nature Conservation Act also stipulates that we must take protected animal species that occur on or in the vicinity of the Afsluitdijk into account.

Natura 2000

Due to their unique natural values, the Wadden Sea and IJsselmeer are designated Natura 2000 sites. Natura 2000 is an interconnected European network of protected natural areas that are designated in the Netherlands under the Nature Conservation Act. This means we comply with the commitments set out in the EU Birds and Habitats Directives. As such, certain animal species and their natural habitats are protected in these areas in order to preserve and restore biodiversity (diversity of life forms).

Sophie Lauwaars
Senior adviser for eco-technology and nature legislation at Rijkswaterstaat

'As an eco-technology adviser at Rijkswaterstaat, it is amazing to work on the reinforcement and renovation of the Afsluitdijk, with many different parties involved. In particular because nature plays a central role. The Levvel construction consortium (BAM, Van Oord, Rebel and Invesis), for example, is realising an ecological dike on the verge facing the Wadden Sea and aims to restore its unique plant life. An extra habitat layer has been realised on the dam at Den Oever, so that the colony of spoonbills can breed there again. Also, the lighting on the Afsluitdijk has specifically been chosen to ensure that migrating bats are not disturbed.

My main task is to assess whether the contractual requirements concerning the natural environment are being met. In doing so, I keep in close and informal contact with the ecologists working for Levvel. We visited the dam at Den Oever, for example, to see whether the new habitat layer for the spoonbills was properly prepared. In any event we inspect the various sites a couple of times a year to ensure that the contractual requirements and the environmental permit conditions are sufficiently being taken into account. At Rijkswaterstaat we also carry out formal tests.

I am looking forward to seeing a beautifully renovated Afsluitdijk, on which all ecological measures have been carried out in accordance with the contract. And to the fauna and flora that will return to the dike after completion of the work thanks to these measures. If that happens, the Afsluitdijk will have preserved its unique habitat for nature.'

Ecological work plan

Before the work commenced, Levvel drew up an ecological work protocol. This protocol sets out how the Nature Conservation Act needs to be applied to the existing fauna and flora while work is being conducted. It also states how and when specific work should be carried out. All of the parties involved, but especially the contractors, are well informed about this work protocol.

The permit issued under the Nature Conservation Act also includes the condition that the contractor carrying out the work must draw up an annual ecological work plan. This plan includes the phasing of the work for the following year and the measures taken to prevent any adverse effects occurring to the existing natural environment. Work may only be carried out after receiving written permission from the Ministry of Agriculture, Nature and Food Quality.

Nitrogen

The work on the Afsluitdijk will result in nitrogen emissions in the vicinity. This can lead to eutrophication and acidification of the soil. In the case of eutrophication, the soil becomes rich in nutrients. Plants that absorb a lot of nitrogen, such as grasses and nettles, will then grow faster. And rare plants that thrive in nutrient-poor soil will become overgrown. This in turn will reduce the number of insects and butterflies that depend on those plants. Excessive nitrogen also raises the acidity of the soil. Plants that find it difficult to cope with acidic soil will disappear.

Mowing and removal of the clippings on the salt marsh at Den Oever
Photo: Jan Wessels, Waterbeeld

Acidic soil also contains limited amounts of lime, which can impact negatively on birds. Nitrogen emissions therefore directly influence the vegetation composition in an area and, indirectly, the animals that live there.

Mowing and removal

According to the permit issued under the Nature Conservation Act, since 2017 a small portion of the salt marsh at Den Oever must be mown every year and have the clippings removed. Regular mowing will reduce overgrowth. The vegetation will also become shorter, reducing the amount of nitrogen being absorbed. This area of the salt marsh used to suffer from excessive levels of nitrogen. Annual mowing has neutralised the negative impact caused by increased nitrogen emissions. However, it is important that the clippings are removed. If the clippings are left on the ground, nitrogen levels will increase again after just a few days.

INTERVIEW

‘Looking for the best solutions for nature with all of the parties involved. That is what makes this project so unique.’

‘At the start of Project Afsluitdijk, Rijkswaterstaat recognised the great importance of preserving natural functions. I have been involved with this project since the tendering process, as an ecologist employed by Levvel. Together with my colleagues at Bureau Waardenburg, I advise on all nature-related matters.

During the construction phase, of course, the contractor must adhere to the regulations of nature legislation. Our task is to examine the best way of implementing those regulations. It is not always clear for the contractor whether the construction work falls within the legislation.

If the work is covered by the permit issued for the project under the Nature Conservation Act, we advise the contractors on the best way to tackle those activities. If necessary, we will consult with the Ministry of Agriculture, Nature and Food Quality and other licensing authorities in the area of nature legislation, such as the Netherlands Enterprise Agency and both provinces.

During the work, all vegetation, including rare plant species, will be removed from the Afsluitdijk. Our goal at Levvel is to ensure that everything that is destroyed returns to its original state, so that nature can recover quickly. This approach is unique.

We are collecting the seeds of the distinctive coastal flora that grow on the dike and will sow these again on the renovated dike. The rough surface of the Levvel-blocs in the intertidal zone enables various seaweeds and algae to attach themselves. The native herbaceous vegetation and grasses on the dike’s crest (its highest point) and the inner slope will form a perfect habitat for insects. This means that we will have a dike that not only fulfills a civil engineering function, but also provides a place for nature. It is really special to be involved with this project from start to finish.’

Dennis Wansink
Ecologist, Bureau Waardenburg

Levvel
Levvel is responsible for designing and reinforcing the Afsluitdijk. It will also maintain the Afsluitdijk for twenty-five years. Levvel’s design is based on managing risks, seizing opportunities, sustainability and smart applications of proven technology.
The design pays explicit attention to recreation and ecology, through the realisation of a cycle path on the side facing the Wadden Sea over the full length of the Afsluitdijk, the realisation of an ecological dike and installing fish-friendly pumps.

Spoonbills on the ‘Banana’

The Afsluitdijk is not the only construction that needs reinforcement. The same applies to the associated dams. A new revetment was applied along the entire length of the 700-metre long dam at Den Oever. This has consequences for its colony of breeding spoonbills.

Colony of spoonbills

Before the start of the work, a breeding colony of spoonbills with over a hundred nests was established on a secluded dam in the Wadden Sea at Den Oever, named the ‘Banana’ because of its curved shape. The colony has an ecological relationship with the Wadden Sea and IJsselmeer. The spoonbills find food in abundance in the shallow waters: shrimps in the saltwater and sticklebacks, water insects, and dragonfly larvae in the freshwater. The dam also offers te birds ideal conditions for raising their young. The vegetation growing on the dam provides a natural shelter for the spoonbills and material to build nests. The secluded dam is also inaccessible to predators such as foxes, but also to cats and dogs. The same applies to people. The spoonbills can therefore breed in complete peace and safety. Vegetation for building nests is also available within flying distance.

After the work was completed, breeding spoonbills were spotted again in May 2020. And the first hatchlings were once again emerging in June.

The first breeding pairs have been spotted on the Banana. The first birds arrive from Southern Europe and Mauritania every year in March. The last birds return to their overwintering areas at the end of September. During the migration, however, about sixty per cent of the young are killed by hunting, predation, exhaustion and, above all, by high-voltage cables.

Nesting spoonbill
Photo: Jan Wessels, Waterbeeld

Rijkswaterstaat and the spoonbill

During the work on the Banana, which is now completed, we took the colony of spoonbills into account.

- Levvel postponed the work when it emerged that the spoonbill young had not yet fully fledged. The work eventually commenced in mid-September 2019.
- Before the work started, we collected the nesting material and the vegetation growing on the dam.
- The top layer on the dike consists of rubble stone laid in warm asphalt. The open structure provides opportunities for vegetation to take root.
- We then returned the preserved vegetation to the rubble stone layer and returned the nests we had collected.

INTERVIEW

‘The first breeding pairs have already been spotted on the Banana again: a positive result.’

‘The colony of spoonbills at Den Oever is unique. Spoonbills in Southern Europe usually nest high in trees. Here in Den Oever, they nest on the ground on top of the dam. The coarse structure of the dam has enabled vegetation to thrive. The spoonbills enjoy the abundant plant life during the summer months.

It is really wonderful to have such a colony here. With its pure white feathers, fantastic crest and black spoon-shaped beak, the bird certainly captures the imagination. Excursions into the Wadden Sea sail from Den Oever. Together with the seals, the Banana with its colony of spoonbills is a popular destination. These graceful birds can be enjoyed at a safe distance.

The work carried out on the Banana shaped dam could have a negative impact on the breeding colony. Levvel has been advised to keep the risk of adverse effects to a minimum. For instance, the planning of the work took account of the spoonbill young. Work only started when the young birds had actually fledged and could fly to the mainland. Even though that meant a delay of a few weeks for Levvel.

Once the dam had been strengthened, an eco-layer was applied at the beginning of March 2020. This was a layer of soil mixed with clippings and seeds that we had collected before the work commenced. We hoped that the vegetation would take root before the start of the breeding season. But unfortunately, that was not the case. Nevertheless, we saw the first spoonbills nesting on the Banana in May 2020. It was a really special occasion and wonderful to see the first breeding pairs back again.’

Leon Kelder
Park Ranger for ecology, Staatsbosbeheer

Ecological dike

The Afsluitdijk typifies the Dutch battle against water. However, the hard partition between freshwater and saltwater had a devastating impact on the flora and fauna in the area. We are therefore taking the natural environment into account during the renovation of the Afsluitdijk. To ensure that the unique fauna and flora are preserved.

New revetment

We are revetting the Afsluitdijk with concrete blocks specially developed for this project. The top of the Levvel-blocs has been brushed by machines to produce a rough layer and two cavities have been cut into them. This offers in particular in the intertidal zone (between high tide and low tide) a perfect habitat for crustaceans, algae and seaweeds. Higher up, the cavities offer space for plant growth and small animals. The Quattroblocks, used to cover the upper layer of the dike, have open spaces in which vegetation can develop.

Unique plant species flourish on the revetment of the Afsluitdijk, including sea kale, rock samphire, sea beet and wild cabbage (the parent of all cabbages). These species are characteristic for rocky coastlines, and are scarce in the rest of the Netherlands. A volunteer collects seeds from these plants and, because we want to preserve the plant species, we store them in the National Seed Collection of the Living Archive. Once the construction work is finished, we will sow the seeds on the new revetment. We will carry out tests beforehand to ensure we choose the best method for this.

The grass strip on the dike must be removed for the work. But this will be resown afterwards. For this, we have developed a species-rich assortment of grasses and herbs that are sufficiently erosion resistant. This assortment of grasses and herbs will develop as a species-rich meadow habitat, comparable to that growing on the Frisian Wadden Sea dikes.

The Living Archive

The Living Archive safeguards the diversity of wild plants in the Netherlands. That is why the Living Archive collects seeds of all native plant species for the National Seed Collection. These seeds can be used if the numbers of a species threaten to decline. Seeds from rare and extremely rare plant species were collected on the Afsluitdijk. These are now stored in the Living Archive and will be resown once the work is completed. For more information, please visit www.hetlevendarchief.nl (Dutch only).

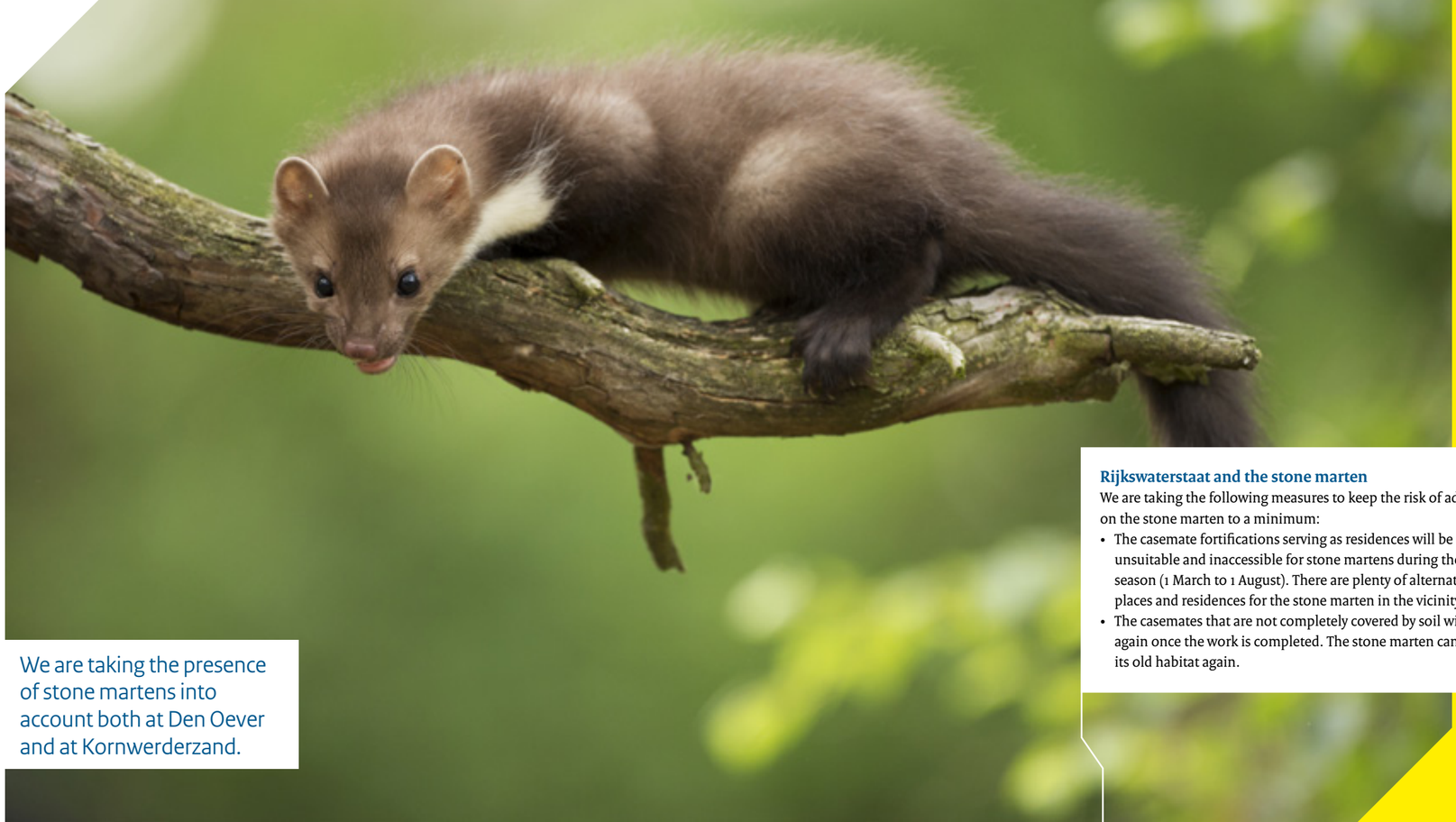
Stone marten in the casemates

Two pumping stations will be installed at the sluice complex at Den Oever to discharge excess water from the IJsselmeer into the Wadden Sea. This work, which involves pile driving, is likely to disturb the habitat of the stone marten.

Stone marten spotted

A motion-sensitive camera and investigation of tracks have led to the discovery of a stone marten in the casemate fortifications on the Robbenplaat near Den Oever. The marten has been spotted several times in different months. This all indicates a permanent residence and perhaps even a reproduction location. We also found droppings and regurgitated remains at two casemates in Den Oever as well as the remains of stone marten prey at Kornwerderzand. Stone martens are known for using multiple hiding places. We therefore suspect that several casemates on Robbenplaat on both sides of the A7 motorway form part of the stone marten's territory.

While the work is being carried out on the sluice complex in Den Oever, the casemate fortifications will temporarily be made unsuitable and inaccessible for stone martens. Stone martens will therefore not be able to settle there during this period. This means that a permanent residence will be temporarily lost. But there are sufficient alternative resting places and residences in the vicinity.



We are taking the presence of stone martens into account both at Den Oever and at Kornwerderzand.

Rijkswaterstaat and the stone marten

We are taking the following measures to keep the risk of adverse effects on the stone marten to a minimum:

- The casemate fortifications serving as residences will be made unsuitable and inaccessible for stone martens during the reproductive season (1 March to 1 August). There are plenty of alternative resting places and residences for the stone marten in the vicinity.
- The casemates that are not completely covered by soil will be opened again once the work is completed. The stone marten can then take up its old habitat again.

Pond bat

Bats migrating to and from Eastern Europe

A new revetment will be installed on the Afsluitdijk that is so hard-wearing that it can withstand the effects of a superstorm. During the renovation, the vegetation on the dike's slopes will disappear. This will have consequences for the bats on and around the dike.

The Nathusius' pipistrelle bat

The Afsluitdijk is a popular place for bats. This is exceptional, because bats do not usually like open and windy locations. The Afsluitdijk, however, lies exactly on the route of the Nathusius' pipistrelle bat, which migrates every spring along the Afsluitdijk to its breeding grounds in the Baltic States and Scandinavia before returning again in the autumn to migrate in the opposite direction. The bat mainly migrates along the coast and sees the Afsluitdijk as the coastline. It is a fast and safe route to and from the province of Friesland and North Holland. The Afsluitdijk is a popular resting place for bats in the spring and autumn. And since the area around the dike is teeming with mosquitoes, there is always sufficient food. The bats sometimes pass through here with thousands at the same time.

All the public and site lighting on the Afsluitdijk will be bat-friendly.

In the area around the Afsluitdijk there are more bat species, such as the pond bat, the parti-coloured bat and the common noctule.

Preventing light pollution

Bats are sensitive to blue and ultraviolet light. Conventional street lighting on the Afsluitdijk can disrupt the migration route of bats. That is why we use bat-friendly public lighting with a warm-white light colour. This has a colour temperature of 3,000 Kelvin. The higher the colour temperature, the cooler the light. For comparison, daylight has a colour temperature of about 4,500 Kelvin. Moreover, the lampposts have a horizontal angle of 0 degrees. This means that the light shines straight down. We are also adjusting the height of the lampposts. As a result, there is limited scattering of light towards the IJsselmeer and Wadden Sea, where the bats migrate.

Rijkswaterstaat and the bat

We are taking the following measures to keep the risk of adverse effects on the bat to a minimum:

- No artificial light will be on between sunset and sunrise in March-April and August-September, and work lights will only illuminate the work site. Light pollution in the vicinity will be prevented.
- Lighting on ships, vehicles and at work sites may only be switched on if this is necessary for safe working practices and transportation.
- Lighting used during the work is shielded with the help of special light caps, limiting light pollution in the IJsselmeer and Wadden Sea.
- When in use, the sluice complexes at Den Oever and Kornwerderzand and the new pumping stations in the sluice complex at Den Oever will not lead to an increase in light and/or noise that can hinder the pond bats.
- We will install bat-friendly lights with a warm-white light colour (colour temperature of 3,000 Kelvin).

Migratory fish between the Wadden Sea and IJsselmeer

The Afsluitdijk forms a huge barrier for fish migrating from saltwater to freshwater and vice versa. Rijkswaterstaat removes obstacles for migratory fish as much as possible. De Nieuwe Afsluitdijk (a partnership between the provinces of North Holland and Friesland and the municipalities Súdwest-Fryslân and Hollands Kroon) is realising the Fish Migration River at Kornwerderzand. To achieve this, Rijkswaterstaat is creating an opening in the dike.

Fish migration

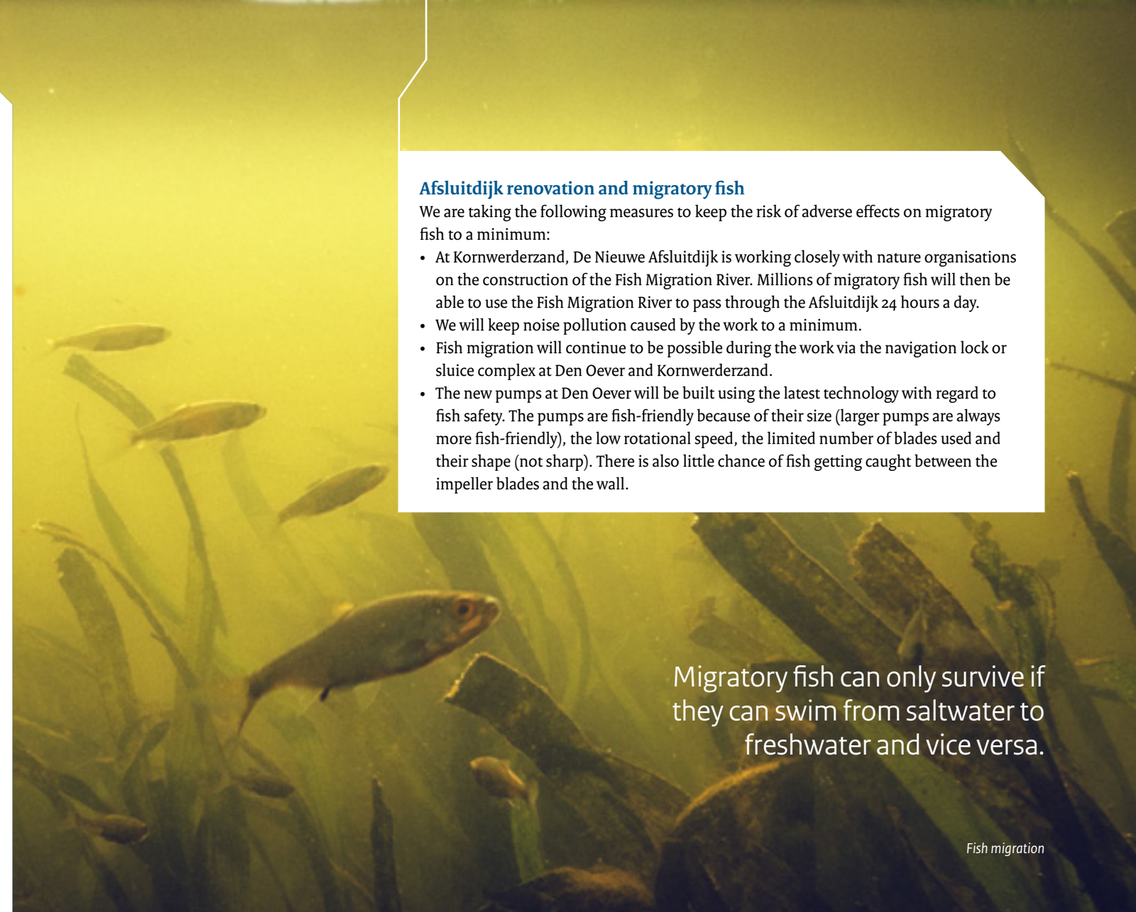
The construction of the Afsluitdijk in 1932 had a major impact on the number of fish in the IJsselmeer. Migratory fish can only survive if they can swim from saltwater to freshwater, and vice versa, to lay their eggs and raise their fry. The construction of the Afsluitdijk meant that the gradual transition from freshwater to saltwater disappeared, which hindered the migration of fish. This had a huge impact on fish stocks. Rijkswaterstaat has already partially restored the connection by introducing the fish passageway in Den Oever and through fish-friendly lock management at Den Oever and Kornwerderzand. At times when the fish are very active – primarily in the evening and at night – we open the navigation locks specially for them so that they can swim into the IJsselmeer. Research has shown that this enables thousands of fish to pass through a lock every hour. This means that 160 million additional fish enter the IJsselmeer every year!

The discharge sluices are opened between 10 and 15 minutes beforehand so that the fish can swim into the IJsselmeer. As a result, 185 million additional fish can pass through the discharge sluices per year.

The collaborative partnership, De Nieuwe Afsluitdijk, is constructing a four-kilometre long Fish Migration River at Kornwerderzand that goes through the Afsluitdijk and winds its way into the IJsselmeer. This is a next step of planned measures to provide access to fish through the Afsluitdijk. The Fish Migration River is an initiative of various nature and fishing organisations. Eel, salmon, stickleback, sturgeon and sea trout will use the Fish Migration River to swim back and forth between the IJsselmeer and Wadden Sea. Freshwater fish that have entered the Wadden Sea through the discharge sluices will be able to return via the Fish Migration River. And saltwater fish like herring and sea bass can find food in the Fish Migration River.

Unique natural area

The Fish Migration River offers the opportunity to restore a unique natural landscape. Before the Zuiderzee was closed off, the IJssel estuary was a freshwater tidal landscape. The gradual transition from fresh to saltwater was the ideal habitat for unique plant species, that have mostly disappeared.The construction of the Fish Migration River will go some way to restoring this indigenous landscape. In the Fish Migration River there is an intertidal difference of one metre. It will create an ideal natural environment for a variety of rare plant species to thrive.



Afsluitdijk renovation and migratory fish

We are taking the following measures to keep the risk of adverse effects on migratory fish to a minimum:

- At Kornwerderzand, De Nieuwe Afsluitdijk is working closely with nature organisations on the construction of the Fish Migration River. Millions of migratory fish will then be able to use the Fish Migration River to pass through the Afsluitdijk 24 hours a day.
- We will keep noise pollution caused by the work to a minimum.
- Fish migration will continue to be possible during the work via the navigation lock or sluice complex at Den Oever and Kornwerderzand.
- The new pumps at Den Oever will be built using the latest technology with regard to fish safety. The pumps are fish-friendly because of their size (larger pumps are always more fish-friendly), the low rotational speed, the limited number of blades used and their shape (not sharp). There is also little chance of fish getting caught between the impeller blades and the wall.

Migratory fish can only survive if they can swim from saltwater to freshwater and vice versa.

Fish migration

De Nieuwe Afsluitdijk
De Nieuwe Afsluitdijk is a partnership between the provinces of North Holland and Friesland and the municipalities Súdwest-Fryslân and Hollands Kroon. Together they develop numerous sustainable projects and initiatives that contribute to strengthening the socio-economic welfare of the regions on both sides of the Afsluitdijk. The New Afsluitdijk partnership aims to make the Afsluitdijk a blueprint for sustainable innovation in the areas of Energy & Water, Nature & Water and Economy & Water.

INTERVIEW

‘The Afsluitdijk deserves to serve as a blueprint for decades to come. That is partly due to the development of the Fish Migration River.’

‘The closing off of the Zuiderzee by the Afsluitdijk was a historic moment. I sometimes call it a forgotten disaster. The natural, brackish transition from freshwater to saltwater disappeared abruptly. Migratory fish could no longer migrate. And this caused damage to fish stocks. Damage that we can now repair by, among other things, the construction of the Fish Migration River.

The project initiators and regional parties in North Holland and Friesland have worked tirelessly to ensure that the Fish Migration River is integral to the plans for the Afsluitdijk. The fact that it has succeeded is fantastic. For the design of the Fish Migration River, we studied fish behaviour. What are the flow rates that fish can handle? Which species of migratory fish does it actually involve? It is a unique starting point.

The new river is also a learning project. We will take a good look at what is happening and learn from new situations. We can then adapt the river to the needs of the migratory fish if necessary. We also want to ensure that visitors can experience the Fish Migration River. Many people are simply unaware of a natural phenomenon such as fish migration. The project also serves as an example of international water management. Rising sea levels mean that fish migration is becoming a growing problem worldwide. How can you take migratory fish into account while at the same time ensuring good water safety? Water managers and policy makers can see how these types of facilities are designed and translated to other situations.

The Afsluitdijk deserves to serve as a blueprint for decades to come. That is partly due to the development of the Fish Migration River.’

Wouter van der Heij
Ecologist, Waddenvereniging

Seals in the Wadden Sea

Seals are sensitive to noise. Noise from up to ten kilometres away can disturb their habitat.

Grey and common seals

The Wadden Sea is home to grey and common seals. They have colonies located near the lock complexes of Den Oever and Kornwerderzand. The seals use the mudflats and sandbanks, visible at low water, during the moulting period and for giving birth and suckling their cubs. The water around the sandbanks serves as a swimming route and provides food in abundance.

Work can disturb the reproductive and resting places of the common and grey seals. And the same goes for their feeding grounds. It seems that the seals leave these mudflats and sandbanks when work is carried out and search out alternatives.

Both species however remain in the vicinity of the Afsluitdijk. There are sufficient alternative habitat and transit areas available. When the work has been completed, the grey and common seals can return to their familiar surroundings.

A soft start to pile driving allows the seals to leave the area without distress.

Seals on the sandbanks

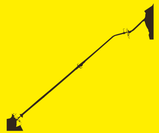
Rijkswaterstaat and the seal

We are taking several measures to ensure the seals are affected as little as possible by the work:

- We will not start any piling work during the reproductive period from June to August. Piling work commenced in April or May will not be interrupted for more than five days during the reproductive period.
- Piling work will always start at a low level and gradually increase to reach full power after fifteen minutes. This soft start allows the seals to leave the piling area without distress.
- The noise level of up to sixty decibels above water may not extend beyond 500 metres.

The Afsluitdijk
Facts and figures

The Afsluitdijk



32 kilometres
is the length of the Afsluitdijk

Spoonbills

100
spoonbill nests were found on a dam (Banana) at Den Oever in 2019

Bats

4 months
a year, between sunset and sunrise, there are no artificial lights on, or work lights only illuminate the work site

Seals

10 kilometres
are the zones around the lock complexes of Den Oever and Kornwerderzand where seals are free to rest

Fish Migration River

4 kilometres
is the length of the Fish Migration River, cutting straight through the Afsluitdijk

Plant seeds

32
plant species were collected on the Afsluitdijk in October 2019

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