After LIFE Plan Fish Migration River (FMR)

5 October 2025

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Initiatiefnemers Vismigratierivier:

De Vismigratierivier is financieel mogelijk gemaakt door:

1. Introduction

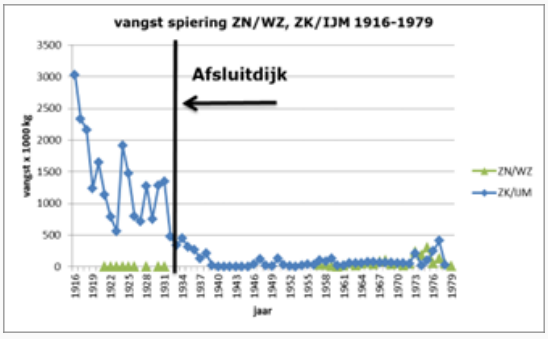
1.1 Introduction

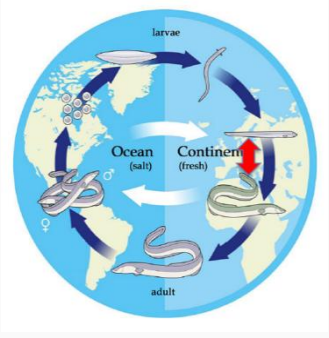
The Afsluitdijk protects our country from the water but is also an obstacle for many fish species. Soon, the Fish Migration River will ensure that fish can swim from salt water to fresh water and vice versa. This is essential if they are to survive. The Fish Migration River is an innovative plan to once again connect the Wadden Sea with the IJsselmeer. The Fish Migration River also contributes to healthy water, the restoration of large numbers of species of flora and fauna in the area, and offers opportunities for recreation.

Fish Migration River: restoration of migratory fish route Wadden Sea and IJsselmeer at Kornwerderzand

Why

So as to grow in size and to breed, migratory fish need both salt water and fresh water. The Afsluitdijk makes it virtually impossible for those fish to migrate between the Wadden Sea and the IJsselmeer. Countless numbers of fish wait in the Wadden Sea in front of the scour sluices. They smell the fresh water and are desperate to reach it, but for most of the fish species the flow velocity is too great: one of the main reasons why the migratory fish stocks are alarmingly low.





Alarming fish stocks (e.g. European smelt) and life cycle of migratory fish (e.g. eel)

How

The Fish Migration River is a winding river, several kilometres long, that runs straight through the Afsluitdijk. This enables migratory fish to move between the saltwater Wadden Sea to the freshwater IJsselmeer whenever they want. The Fish Migration River follows the tides of the Wadden Sea and has several flow velocities. Fresh water and salt water converge gradually, so during their journey the fish can slowly become accustomed to the transition. To allow fish to get through the Afsluitdijk we are making a passage - a 'hole' - in the dike. Innovative valves ensure that the hinterland remains protected in the event of extremely high water levels.

Impression Fish Migration River (source: Feddes Olthof)

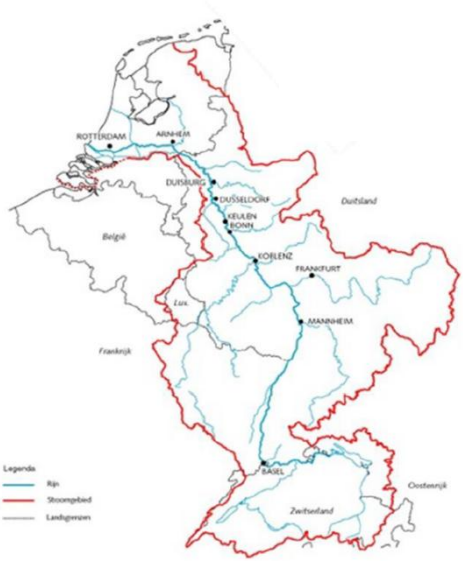
We are creating the Fish Migration River to the west of the scour sluices at Kornwerderzand. This is the ideal spot, because it is here that huge volumes of fresh water are flushed into the Wadden Sea via the Lorentzsluizen. The smell of the fresh water attracts the fish to this spot. The Fish Migration River connects with the deep trenches in the bottom of the Wadden Sea and the IJsselmeer. These trenches form a 'highway' for the fish.

Nature restoration

The Fish Migration River serves to restore an important link in the swimming routes of migratory fish. As a result, the water in the IJsselmeer will become healthier and the quantity of flora and fauna in the area will increase. The recovery of the fish populations is also important for the many birds for which fish are the main source of food. In addition, it offers more potential for recreational fishing and commercial fishing in the long term.

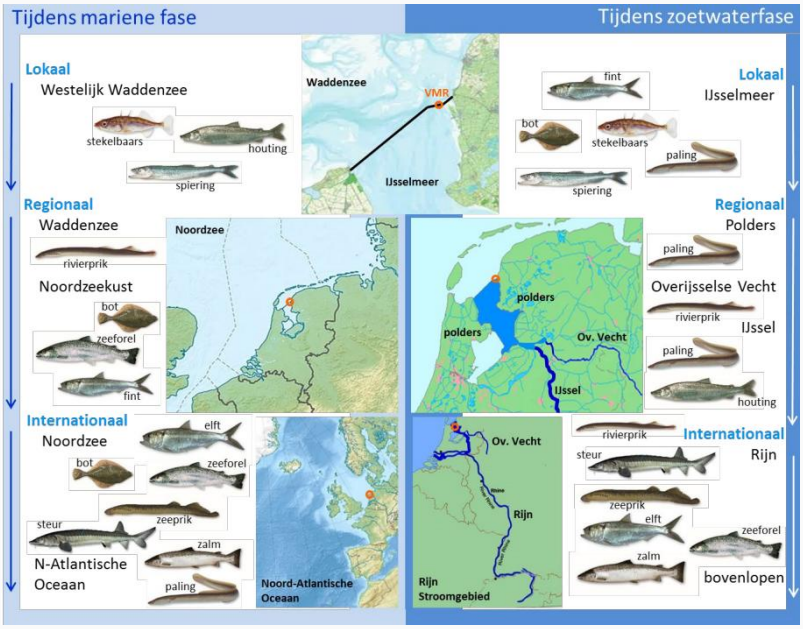
First in the world

The Fish Migration River at Kornwerderzand is the first in the world that is of this size and complexity. Many years of thought went into deciding what the best design would be for all the species of migratory fish. This is the first time anywhere in the world that an artificial tidal river is being built at a point of transition from fresh water to salt water. It is estimated that there are around 200 locations worldwide that would benefit from this innovative approach.
https://www.vismigratierivier.nl/vismigratierivier/



Monitoring and scientific research

To analyse what effect the environment has on the behaviour of migratory fish in the Wadden area, the Fish Migration River will be used as a testing facility. In partnership with parties such as the Waddenacademie, knowledge will be acquired that will answer the research and management questions that are of importance in – and possibly beyond – the Wadden area.



Importance of the Afsluitdijk: 'Outreach' of migratory fish populations (source: Wageningen University)

1.2 Guide

This After LIFE plan describes the strategies for maintaining and optimising the FMR after completion of the project.

An overview is given of the expected results, how those results will be enshrined in policy and programmes, and the strategies for knowledge sharing, monitoring and financing.

2. Goals and expectations of the project

2.1 Goals of the FMR Project

- Improving fish migration between the Wadden Sea and the IJsselmeer.
- Creating a gradual saltwater/freshwater transition.
- Developing a sustainable and cost-effective design for maintenance.

Improving fish migration between salt water and fresh water

Migratory fish need both salt water and fresh water in which to grow and to breed. Because of the advent of barriers like the Afsluitdijk, things have not been going well with these fish species for a long time. Thanks to the Fish Migration River, both big and small fish, strong and weak swimmers, will soon be able to move back and forth between salt water and fresh water. Hopefully, not only will fish populations recover but fish-eating fauna will benefit too.

Creating a gradual saltwater/freshwater transition

At EU level, agreements have been concluded about the natural environment of the IJsselmeer and the Wadden Sea. Restoring saltwater/freshwater transitions and specific populations of migratory fish are important challenges in that context. Within the framework of those agreements, work is under way in relation to the upstream passage of migratory fish everywhere in Europe. This will be successful only when the project involves the entire chain. The measures will not be genuinely effective upstream until the Netherlands opens the 'front door'. That is why it is so important for the Afsluitdijk to open for the passage of fish.

Develop a sustainable and cost-effective design of maintenance

Sustainability: Ensure the long-term functionality and ecological benefits of the FMR.
Monitoring: Implement continuous monitoring so as to evaluate the effectiveness and impact on fish populations.
Maintenance: Develop a maintenance schedule to preserve the structural integrity and ecological function of the FMR.

3. Embedding in policy

Fish are an important element of a healthy ecosystem

At the scour sluices in the Afsluitdijk, Water Framework Directive (WFD) measures have been planned or are already being carried out to improve the fish migration to the greater inland waters. One of those measures is fish-friendly sluice management that facilitates a better passage for fish (by limiting the ingress of salt through the use of siphons). The Fish Migration River at Kornwerderzand is a measure that can give the fish migration a considerable boost. Several bird species also benefit from this gradual saltwater/freshwater transition. At Kornwerderzand, a breeding place for sea birds will be provided in conjunction with the installation of the Fish Migration River.

The project works as a catalyst:

- The Fish Migration River is a Water Framework Directive (WFD) measure and is registered as RWS_X2266-c (Water Quality Portal): Name_problem_area: Afsluitdijk, Kornwerderzand, the Netherlands; Type_transition: Government-government; Type_facility_solution: Fish Migration River; WFD_priority: yes.
- Embedding the FMR/fish migration in the Programmatic Approach to Great Waters (PAGW). FMR is making a connection between two great waters: Wadden Sea and IJsselmeer
- Integration of the FMR/fish migration in national and regional water management programmes (N2000 management plans Wadden Sea and IJsselmeer).
- Part of Meerjarenprogramma Investeringskader Wadden (Multi-year Programme Investment Framework Wadden, IKW)
- Partnership with ministries and local governments to safeguard the continuity of the project.
- Use of the FMR as example project for future fish migration initiatives.
- Iconic project for circular construction https://www.conventionsinfriesland.nl/nl/topsectoren/circulaire-economie

4. Research, monitoring and knowledge sharing

The monitoring plan has been designed to evaluate and optimise the effectiveness and performance of the FMR.

It sets out an approach to studying the performance of the FMR in terms of both abiotic factors (e.g. hydrodynamics and sand transport) and biotic factors (e.g. passage success and fish behaviour). The overall purpose of the research activities is to design an integrated and optimised operation protocol for the FMR. The outcome of the research period, based on research results, includes an optimised operation protocol for the FMR. Additionally, this knowledge of fish behaviour in large saltwater/freshwater transitions will be available for fish migration issues at other locations and details will be published during and after the research period.

The five principal questions that have been identified are:

- Q1: How does the FMR perform from an abiotic perspective? What sedimentation processes, salt contents and dynamics in the currents occur in the various parts of the FMR and how stable is the FMR during extreme conditions?
- Q2: How successful is the passage of the target species through the FMR? Which of the migratory river fish are capable of locating the FMR (attraction efficiency) and of passing through it successfully (passage efficiency), and what is the passage time (delay) or loss of condition?
- Q3: Are there still problem areas in the performance of the FMR? And how can these be improved by the use of targeted measures and optimisation of operation protocols?
- Q4: What are the developments and utilisation of the FMR as a habitat for fish and fish predators? How do the habitats (including dynamics in the currents, salt content and vegetation) develop in the FMR, how are they used by the various species of fish for acclimatisation, foraging and shelter; what fish predators forage in the FMR and around the lock complex at Kornwerderzand?
- Q5: What is the contribution of the FMR to the recovery of fish populations, communities and food chains and to evaluating the effect on the performance of the ecosystem?

The monitoring and research plan is divided into several phases, each of which has specific goals and activities.

4.1 Set-up and phasing of the research and monitoring programme

There are four phases:

- Construction phase (building phase, pre-phase), expected up to the end of 2026
    - Preparations such as permit applications.
    - Organising student jobs and contracts with fishermen.
    - Testing and installing monitoring devices.

- Adjustment phase I (balancing phase I): expected in 2027
    - Evaluating the abiotic performance of the FMR under normal weather conditions.
    - Testing measurement devices and collecting initial data.
- Adjustment phase II (balancing phase II): expected in 2028
    - Optimising the FMR under extreme weather conditions such as storms and drought.
    - Carrying out extensive fish netting programmes and bottleneck analyses.
- Optimisation phase: 2029 onwards.
    - Making adjustments on the basis of the results of the preceding phases.
    - Adapting management protocols and monitoring long-term developments such as vegetation growth.

	Construction phase	Adjustment phase I	Adjustment phase II	Further optimisation
Abiotic factors:	Fit fixed devices	Continuous measurements Flexible measurement units	Continuous measurements Flexible measurement units	Continuous measurements Flexible measurement units
Small fish / tidal migrants	Preparation, Purchase of materials	Pilots, testing the methodology	Intensive measurement campaign net + mark	Adaptive campaign dependent on results of phases I and II
Large fish:	Preparation, Purchase of materials	Installation network, Tagging fish	Tagging fish	Adaptive tagging of fish, dependent on results of phases I and II
Models:	Abiotic models	Abiotic models	Build IBM models	Fine-tuning models calibration, scenario tests
Habitat (use):	Choose fish shelter to be created?	Development of FMR Vegetation, shelter	Development of FMR monitor for predators	Adaptive dependent on results of phases I and II

4.2 Abiotic measurement programme

Monitoring of the abiotic factors in the Fish Migration River (FMR) is essential during the various phases.

- **Water levels:** Measurements at three locations (Wadden Sea, FMR and IJsselmeer).
- **Salt content, temperature, pressure and oxygen:** Measurements at five locations, with profiles being measured every 10 to 15 minutes.
- **Flow velocities and discharge rates:** Measurements at the coupure.
- **Turbidity:** Measurements at three locations.
- **Sediment transport:** Measurements to assess bed erosion.

Construction phase: Building on the numerical modelling that has been developed to get a further understanding of the functions of the FMR. It is important for client, contractor, hydrodynamic expert and fish ecologists to work together to further optimise the design in minute detail for the purposes of hydrodynamics and biotope.

Adjustment phase I: Feeding the numerical model with the continuous abiotic measurements made with fixed and mobile measurement devices. Simulations will be performed to test various management protocols. Model will be validated step by step against measurement results. Management protocols for normal tidal conditions will be established.

Adjustment phase II: Focus on extreme weather conditions such as drought and storms. Similar approach to that in phase I but with the emphasis on more extreme scenarios. Management protocols will be extended to extreme conditions.

Optimisation phase: Long-term monitoring to adjust management protocols on the basis of changing circumstances (e.g. vegetation development, changes in bed depth). Integration of the developed and improved numerical abiotic models with the results of biotic monitoring so as to link and, if necessary, improve the hydrodynamic conditions. Hydrodynamic modelling on the scale of the lock complex, possibly coupled with fish behaviour, in line with what is available for lock complex Den Oever.

4.3 Biotic research and monitoring

As different measurement methods are applied for small fish (tidal migrants) and for larger fish, these are explained separately below. Given that tidal migrants are those that experience the greatest difficulties in the situation before the FMR, and as - thanks to its innovative design with incoming and outgoing tidal regime - the FMR is well suited to the natural behaviour of tidal migrants ('selective tidal transport') and as these fish species are the ones about which the least knowledge exists, a large part of the focus of the research and monitoring programme is directed to small diadromous fish (tidal migrants).

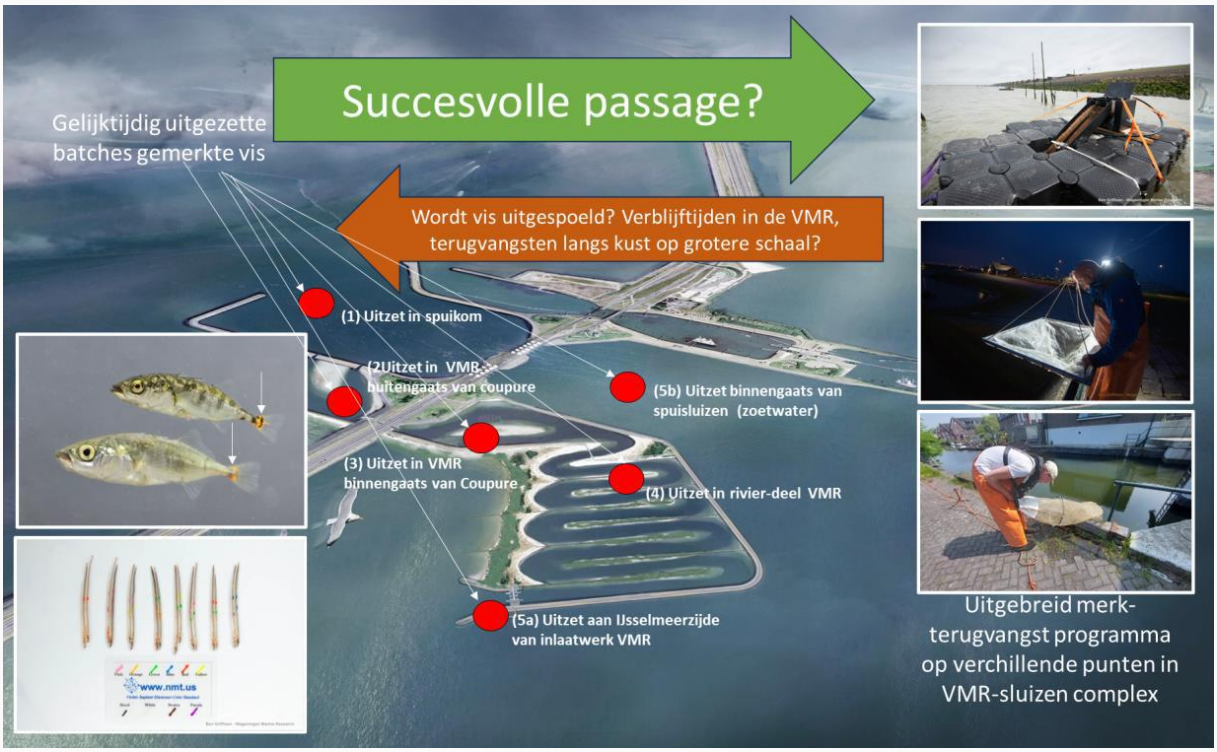
- **Small diadromous fish (tidal migrants):**
  - Extensive fish netting programme and mark & recapture techniques.
  - Use of lift nets, drift nets and elver finders.
- **Large diadromous fish:**
  - Telemetry techniques such as acoustic and PIT tags.
  - Installing receivers and tagging fish.

4.3.1 Research and monitoring programme for small diadromous fish (tidal migrants)

The research into small diadromous fish species, which at certain stages of the migration are only a few millimetres long, makes use of an extensive fish netting programme and, if possible, mark & recapture techniques and acoustic transmitters. For very small species such as flounder larvae, which cannot be marked, information is obtained by analysing capture densities and fluxes at strategic locations in and close to the FMR. Fish are marked with VIE tags, PIT tags or small acoustic transmitters so as to determine passage times, passage success and possible leaching. An integral measurement programme with various nets and capturing devices, combined with mark & recapture experiments, is proposed for measuring the following parameters:

- Species, size composition and condition in time & space in the sluice dock, FMR entrance/exit
- Number of balance/species based on densities, fluxes and abiotic dynamics/transformation
- Mark & recapture: passage times, passage success, estimates of absolute numbers in time/space
- Identification of any problem areas and loss amounts
- Input data for linking abiotic models and individual-based modelling

Pilots and initial tests will take place in Adjustment phase I, an intensive measurement campaign in Adjustment phase II.

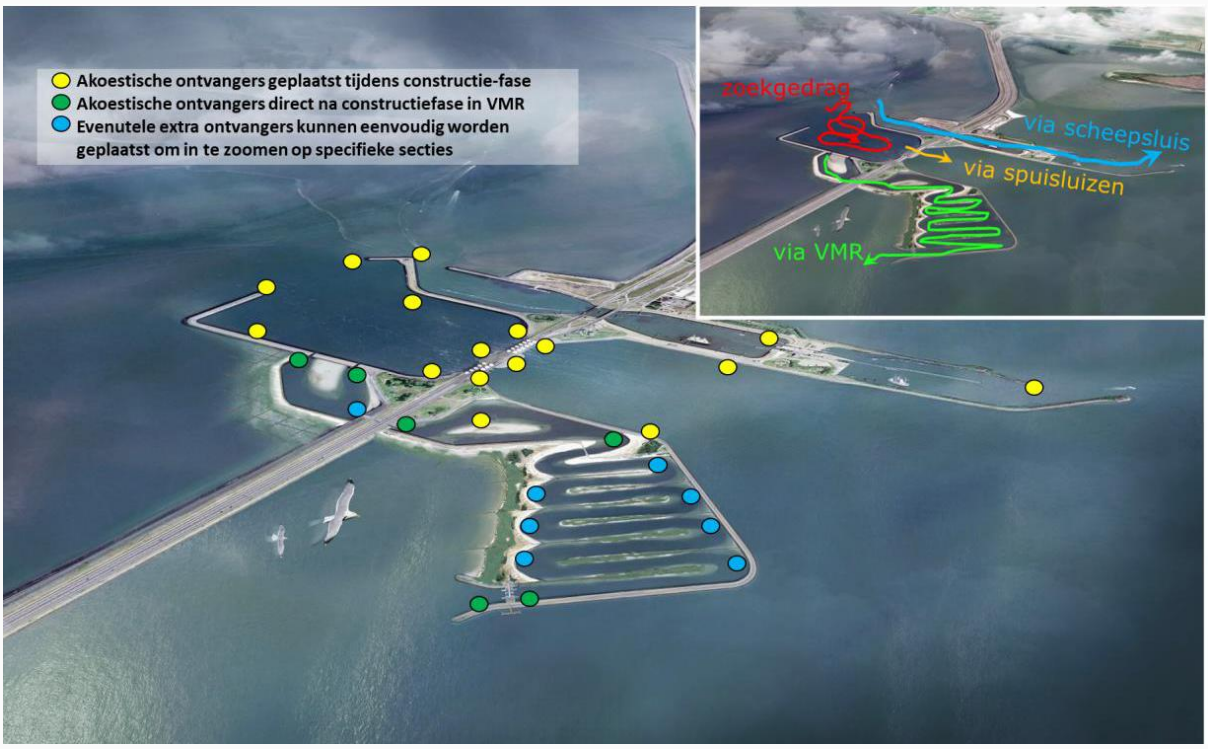


Source: Research and Monitoring plan Fish Migration River (FMR) 2024

4.3.2 Research and monitoring programme for larger diadromous fish (transmitter studies)

The passage success and behaviour of larger diadromous fish is measured using telemetry methods such as transmitter techniques. The rapid developments in telemetry make it possible to measure an increasing number of parameters such as depth, temperature, acceleration and predation events. Smaller fish can now be studied as well, thanks to smaller transmitters and longer battery life. Fish are marked and released close by the complex, enabling a network of acoustic receivers and PIT tag antennae to follow their migration. These techniques give an insight into search behaviour, attraction and passage efficiency, passage times and use of passages. During the construction and adjustment phases, receivers are installed and fish are tagged. Predation losses and potential predators are

identified with transmitters that contain predation and temperature sensors. The results of these phases help to optimise the system for specific species and problem areas.



Source: Research and Monitoring plan Fish Migration River (FMR) 2024

4.4 Development of habitats and shelter in relation to predation in the FMR

The Fish Migration River (FMR) can serve as habitat in the transition zone between salt water and fresh water, providing acclimatisation, shelter and foraging opportunities. The effectiveness of the FMR is influenced by structures such as boulders, by sediment composition and by vegetation. The habitat development is monitored accurately during adjustment phases I and II. Maintenance and modifications, such as vegetation management and the addition of habitat structures, could be needed to optimise the effectiveness, especially if predation losses are high. Predation by birds, fish and seals could cause considerable losses. Potential solutions include providing extra shelter. Intensive measurement campaigns will take place, during which it will be established how many and which fish-eating birds and marine mammals are present in the FMR and around the lock complex at Kornwerderzand.

4.5 Linking abiotic dynamics and fish behaviour by means of modelling

To further study the findability of the entrances (attraction) and passage behaviour of some of the target species in relation to abiotic dynamics (e.g. current conditions and patterns, salt content gradients) and stimuli both in the FMR and around the lock complex, several modelling techniques can be combined. Individual-based modelling (IBM) is a very suitable

method of linking individual fish movements with hydrodynamic models that have been developed for the FMR and the lock complex at Kornwerderzand. IBM models can be used to generate and test process knowledge against field surveys. When these IBM models have been properly validated with field data (of both the results of the studies of the tidal migrants and the telemetry study of larger fish), they can also be used as a tool to explore various management protocols and to evaluate their effectiveness with respect to target species. The IBM models that will be developed as part of ongoing Haringvliet-kier studies can serve as a basis for modifying them and applying them to the FMR.

4.6 Cooperation and knowledge exchange

Cooperation and knowledge exchange between ongoing and future projects are important in getting a better understanding of the fish migration patterns, factors that determine passage success and ecosystem functions - at various scale levels from local (FMR) complex level to ecosystem level - of adjacent bodies of water. Technical developments are occurring rapidly, such as video monitoring, eDNA analyses and specific transmitter technologies (telemetry methods). In the field of acoustic telemetry, for instance, the number of national and international networks of receivers is increasing quickly; for this purpose, an international partnership has been set up with a central database: the European Tracking Network (ETN). This makes data exchange easier and improves the understanding of fish migration across different water systems and regions. In addition, fish tagged for other studies could turn up in the research area around the FMR and, conversely, fish tagged for the FMR can also be followed on a larger scale, for example sea bass that have been tagged in the western Wadden Sea for the Swimway project have been found as far away as the English Channel at Cornwall (England).

Examples of ongoing projects in the Netherlands: the Wadden Tools - Swimway Wadden Sea, Haringvliet-kier en Zuidwestelijke delta, Ruim Baan voor Vissen, Vissen voor Verbinding, Eems Vissen in Beeld and Wadden Tools - Waddenmozaïek (Wadden Mosaic) projects. These projects provide valuable insights into fish migration patterns, habitat connectivity and ecosystem dynamics.

The research and monitoring plan focuses in particular on acquiring process knowledge to be able to evaluate the performance of the FMR and to optimise and restore fish migration opportunities for a wide range of migratory fish species in the FMR and around the lock complexes. The extent to which this also has an impact on a larger scale on fish populations, fish communities and food chains in bodies of water that are connected via the FMR depends on many factors. For specific populations, other problem areas could arise in their life cycle that prevent the effects of restored fish migration between the Wadden Sea and the IJsselmeer from becoming immediately apparent.

An analysis of species-specific trends in long-term fish monitoring programmes in adjacent water systems could identify correlational links between the FMR and population trends. An overview is given of long-term data series (>10 years) from various monitoring programmes, which can be used for that purpose. More in-depth research methods such as micro-chemical analyses and genetics can provide insights into the contribution of various

subpopulations to the total population in adjacent saltwater and freshwater water systems and basins.

Another challenging step is an analysis of changes in fish communities and food chains. A lot of process knowledge and research data is needed in order to identify them. Evaluating the effect of the FMR on the food chains requires in-depth studies covering several trophic levels and taxa on both the Wadden Sea side and the IJsselmeer side.

Climate change will also play an increasingly big role in evaluating the effectiveness of the FMR in the long term: Rising sea levels and an increase in extremes in both peak drainage and very dry summers as a result of climate change can influence the performance of the FMR in various ways. The management protocols will probably have to be modified regularly for that purpose. Climate change can, however, have an effect on species compositions and on the target species for the FMR: European smelt and salmonids, for example, are cold-water species that are increasingly suffering the negative consequences of extremely high temperatures. It is important to consider the long-term consequences of climate change on fish populations in evaluations and in patterns of expectation relating to the effects of the FMR on ecosystems.

- Train personnel and volunteers in monitoring and maintenance. Encourage local communities to take part in monitoring and research activities.
- Organise workshops and training courses for those involved.
- Develop educational programmes and materials for the general public, to inform them of the importance of the FMR and the ecological benefits. Also by means of excursions.
- Regular updates and reports via the project website and social media. Maintain transparent communication channels with interested parties and the general public.

5. Elaborated Research and Monitoring Programme for the Fish Migration River

5.1. Objective

The objective of this program is to monitor, evaluate, and optimize the functioning of the Fish Migration River (FMR) at Kornwerderzand. This will be achieved through a phased approach, ultimately resulting in a robust operational protocol and scientific substantiation of ecological effects on fish migration, populations, and the ecosystem.

5.2. Phasing and Activities

Phase	Period	Activities	Indicative Budget (€)
Construction Phase	Until 2027	Installation of measurement equipment (abiotic), design and testing of fish traps, development of telemetry network	400,000
Adjustment Phase I	2027	Model validation, initial tagging (PIT/acoustic), testing of nets and traps	500,000
Adjustment Phase II	2028	Intensive netting campaigns, mark-recapture experiments, bottleneck analysis, habitat monitoring	800,000
Optimization Phase	From 2029	Adjustments based on results, monitoring of effects, modeling of behavior vs. hydrodynamics	500,000
Communication & Publication	2025–2030	Media and public campaigns, scientific publications, stakeholder meetings	100,000
Project Management & Evaluation	2024–2030	Consortium coordination, reporting, evaluation and adjustments	200,000

Total Budget: €2,500,000

5.3. Monitoring Plan

Abiotic Monitoring

- Locations: Wadden Sea, FMR, IJsselmeer
- Parameters: salinity, temperature, oxygen levels, current velocity, turbidity, sediment transport
- Frequency: continuous, with profile measurements every 10–15 minutes

Biotic Monitoring

- Small fish: lift nets, drift nets, traps, elver detectors, VIE tags
- Large fish: fish traps, beach seines, PIT tags, acoustic transmitters
- Frequency: seasonal, intensive during migration periods (Feb–Jun)

Model Development

IBM models linked to hydrodynamics
Scenario analysis for management protocols

5.4. Justification of Activities

All proposed activities are grounded in:

- Peer-reviewed studies and previous pilot projects (Griffioen et al., Winter et al.)
- International collaboration (ETN, Swimway, Haringvliet Sluice)
- Proven techniques: VIE tagging, PIT telemetry, acoustic transmitters
- Validation through field measurements and model calibration

5.5 Governance and Partners

Programme executed by consortium:

- Wageningen Marine Research (WMR)
- Wadden Academy
- Province of Fryslân
- It Fryske Gea
- Sportvisserij Nederland
- International partners via ETN

6. Management and maintenance

The Fish Migration River will be managed and maintained sustainably. This will be done on the basis of an integral Management & Maintenance plan. The management and maintenance of the Fish Migration River is structurally embedded in the provincial budget. The FMR is an asset of the Province of Fryslân.

The FMR is made up of various objects, such as dams, breakwaters, sand dams, paths, estuarine parts and artworks, as well as measurement locations and power supply.

Themes in the Management & Maintenance plan are:

- Structural integrity: Regular inspections of and repairs to the FMR infrastructure.
- Sediment control: Monitoring and managing sediment levels to prevent erosion and preserve the quality of the habitat.
- Adaptive measures: Implementing climate-adaptive measures to tackle changes in sea level and weather patterns.

6.1 Accessibility of FMR

Accessibility is an important issue with respect to the Fish Migration River. The FMR is located on the western side of the sluice complex, which means it is predominantly accessible to large equipment only via the water. For large-scale management and maintenance, an occasional exit from the A7 can be used, but this is not possible for everyday maintenance. The FMR is easily accessible on foot to recreational visitors.

- Recreational visitors: There is a walking route for visitors.
- Maintenance equipment: Various types of maintenance equipment are needed, varying from small-scale to large-scale, both on land and on water.

Example of small-scale and large-scale maintenance equipment on water

Example of small-scale and large-scale maintenance equipment on land

6.2 Management and maintenance activities

These are the main maintenance activities for the Fish Migration River (FMR) as described in the Management & Maintenance plan:

General inspections and monitoring

- Visual inspections: Periodic visual inspections of sand, stones, concrete, steel and timber above the waterline.
- Dive inspections: Underwater inspections of concrete, steel and timber.
- Monitoring: Use of drones, laser scanning, multibeam and probes to monitor erosion, vegetation development and water levels.

Maintenance of breakwaters and sand dams

- Adding protective lining: Periodically adding riprap and falling aprons to control potential erosion.
- Reprofiling: Reprofiling ridges and embankments of sand dams to prevent potential loss of material.
- Vegetation management: Annual mowing to prevent vegetation succession on sand dams and breakwaters.

Maintenance of paths

- Minor and major maintenance: Periodic maintenance of footpaths and paved paths, including cleaning and repair.
- Pressure washing: Pressure washing paths annually.

Maintenance of estuarine parts

- Reprofiling: Reprofiling the bird island and shallows to control potential erosion.
- Adding new sand: Periodically adding sand on the bird island and in shallows.
- Vegetation management: Annually removing vegetation on the bird island.

Maintenance of the river on the IJsselmeer side

- Adding rubble: If necessary, periodically adding rubble to protect the bed.

Maintenance of mooring

- Pressure washing: Annual cleaning of decking boards to remove algae.
- Replacement: Periodic replacement of safegrip strips, decking boards and the entire scaffolding structure.

Maintenance of the shut-off structure on the IJsselmeer side

- Cleaning: Periodic cleaning of the shut-off structure above and below the water.
- Repairs: Repairing damaged concrete, seals, guardrails, and mechanical and electrical installations.
- Replacements: Replacing water flow deflectors, bulkheads, sluice doors, guardrails, valves, actuators, supply and data cables, and various installation work.

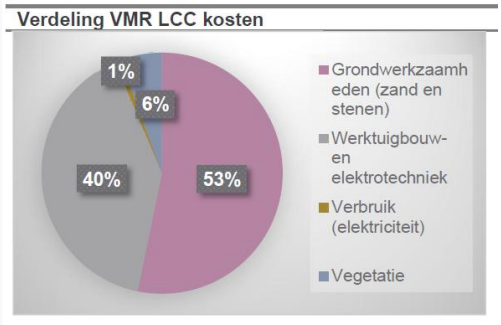
Maintenance of coupure

- Inspections: Periodic visual inspections of electrical installations.
- Major maintenance: Major maintenance of electrical installations and replacement of SCADA, switch boxes, supply and distribution, PLC, cables and sensors.

These activities are essential for preserving the structural integrity and ecological function of the Fish Migration River.

Costs

- **Investment costs:** Three separate investment estimates for the FMR, the shut-off structure and the coupure.
- **LCC costs:** Life-cycle costs (LCC) are subdivided into various categories, such as groundwork, mechanical engineering and electrical engineering, consumption and vegetation management. Given the nature of the management and maintenance work, the illustration below shows the cost distribution:



7.Conclusion

Significant results have already been achieved. It is hard to express in figures, but the reputation and importance of large-scale fish migration has been put on the map. Globally, there is enormous interest in the initial experience with this world first. Consequently, the partners involved take the view that the project has given a major impulse to the implementation of fish migration.

Nature is complex, however, and it cannot be predicted how exactly the natural environment will develop. This is due in part to the unknowns, such as climate change, as well as uncertainty over the precise effect of system interventions.

A transitional approach, with the ecosystem as the point of departure, is the basis for the success of the project. One of the main benefits of the project is that a large variety of partners are involved. The project provided the opportunity to nature organisations and governmental bodies to work together in a way that is different from traditional projects. The project gave time for co-creation and there was also more time to get an understanding of each other's interests and internal issues. The Province of Fryslân is acting as client on behalf of five initiators. Through collective approaches such as WFD and PAGW and by developing a collaborative approach, a shared ownership with the Ministries of Infrastructure and Water Management (I&W) and Agriculture, Fisheries, Food Security and Nature (LVVN) was created.

After the completion of the Fish Migration River, the aim is to preserve the Fish Migration River, and to perform research and monitoring so as to gain more knowledge for the benefit of similar situations in other parts of the world. The knowledge and skill gained from this in the areas of science, hydraulic engineering, cooperation, circularity and communication will be passed on. The objective of this After LIFE plan is to maintain and continue developing the results.

The After LIFE plan for the Fish Migration River ensures the long-term success and durability of the project. The implementation of robust monitoring, maintenance and community engagement strategies will enable the FMR to continue providing ecological benefits and support fish migration in the years ahead. In this context, the partners of the Fish Migration River play an important role in preserving and continuing to develop ideas, including of course within their own organisations in the broadest sense.