Rijkswaterstaat
Ministerie van Infrastructuur en Waterstaat

Freshwater fishes and the
EU Biodiversity Strategy, 24 -25 November 2022

Peter Philipsen, Nature at Work (Rijkswaterstaat, NL)

National Fishroadmap

A GIS based tool to develop a road network for fish to help navigate densely populated and highly fragmented areas

https://storymaps.arcgis.com/stories/784f89c209bb4362b6453e6ad8f733be

Europe has some of the most endangered freshwater fish in the world…

Terrestrial mammals -25%

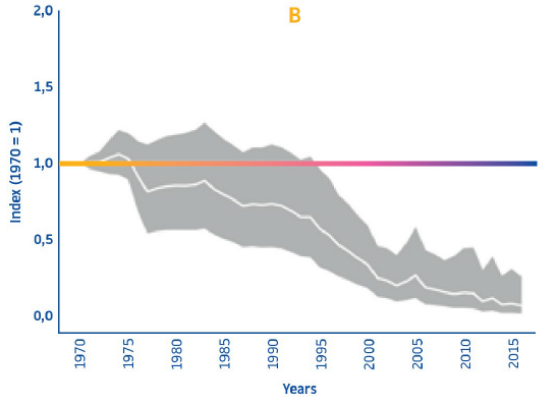
Marine fish -20%

Freshwater fish -65%

Freshwater migratory fish -76%

Problem

FW migratory fish in Europe -93%

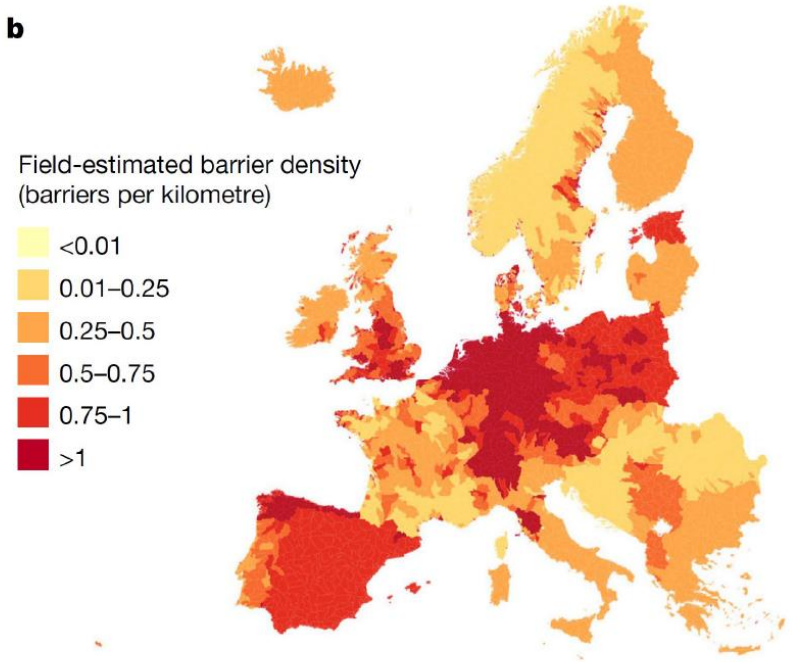


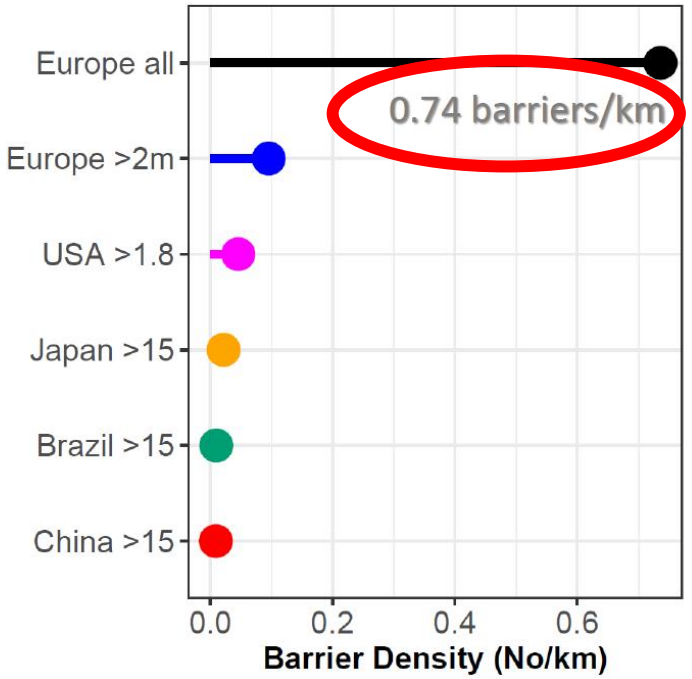
Source: Presentation by Carlos Garcia-De Leaniz (Swansea University) at this event yesterday

Source: AMBER & presentation by Carlos Garcia-De Leaniz (Swansea University) at this event yesterday (adapted)

Problem

..probably because it has some of the most fragmented rivers.....

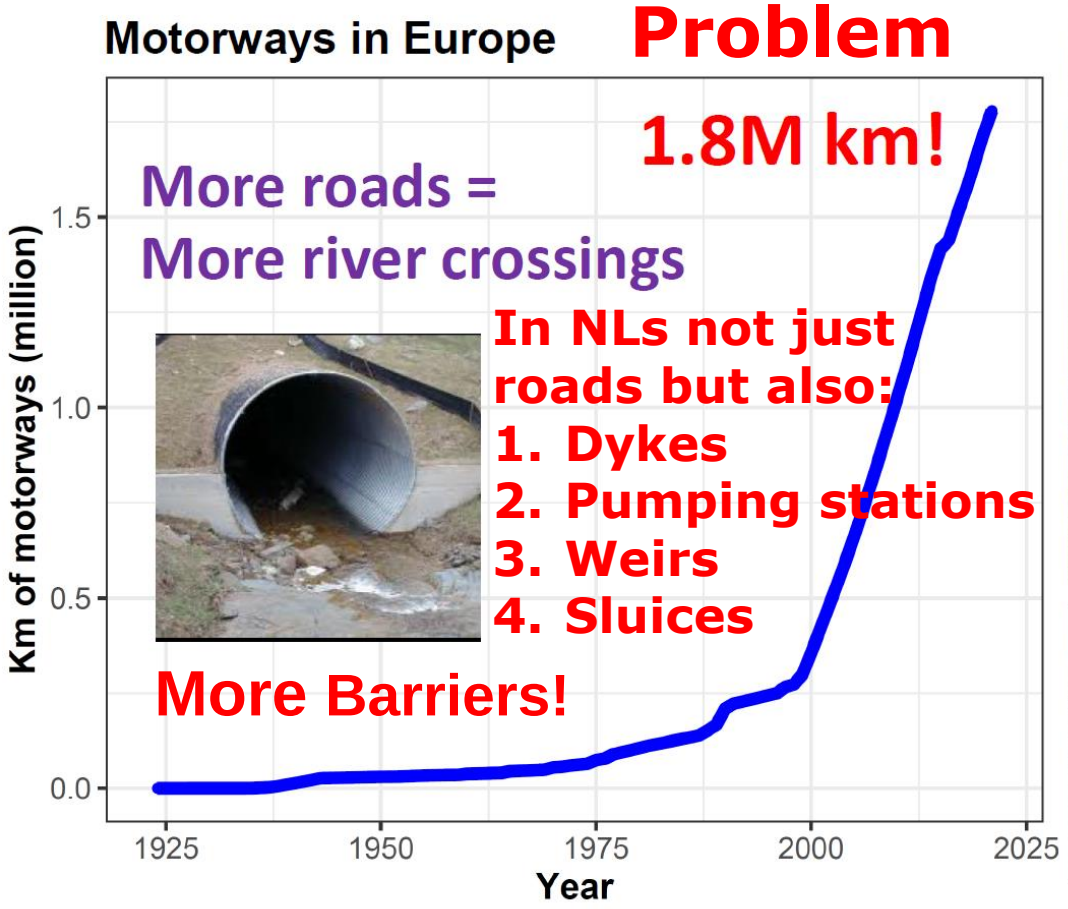




+1.2M barriers

Belletti et al (2020) *Nature*

and criss-crossing rivers for decades…



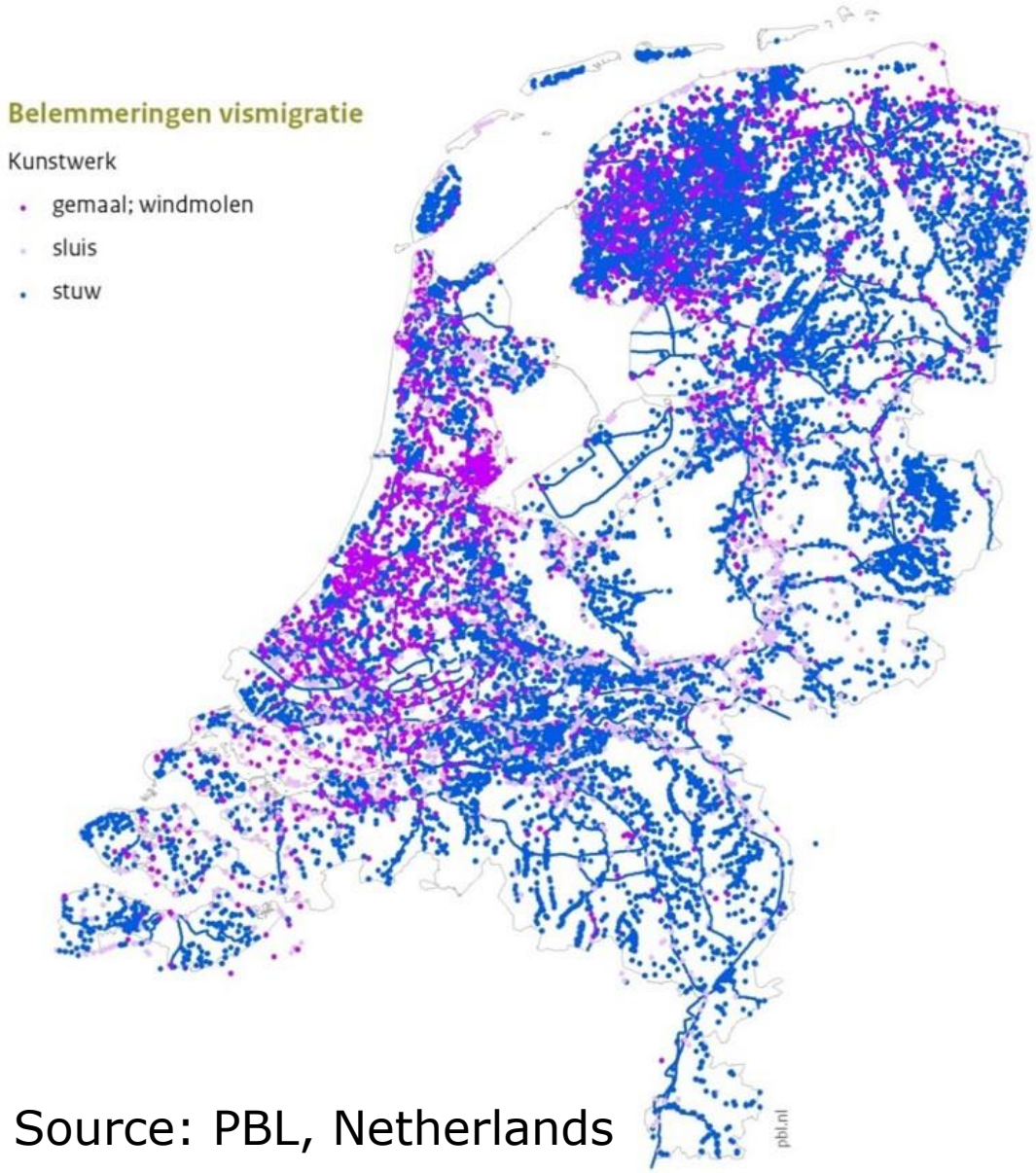
Not just roads

1. Forest tracks
2. Windfarms
3. Railways

Source: AMBER & presentation by Carlos Garcia-De Leaniz (Swansea University) at this event yesterday (adapted)

Problem

- According to a recent study there are over 60.000 potential barriers to fish migration in the Netherlands (Groen, M., 2021)
- This means on average 1,44 barriers/ km in the Netherlands, eg pumpings stations (purple), sluices (lilac) and weirs (blue).
- In the western - most densely populated and highly fragmented - part of the Netherlands this is probably more than 2 barrriers/ km (personal estimate)



Source: PBL, Netherlands

Solution

A Fishroadmap: Infrastructure designed for fish with Highways, A-roads and B-roads

Source: Rhine-West WFD River Basin Regional Council

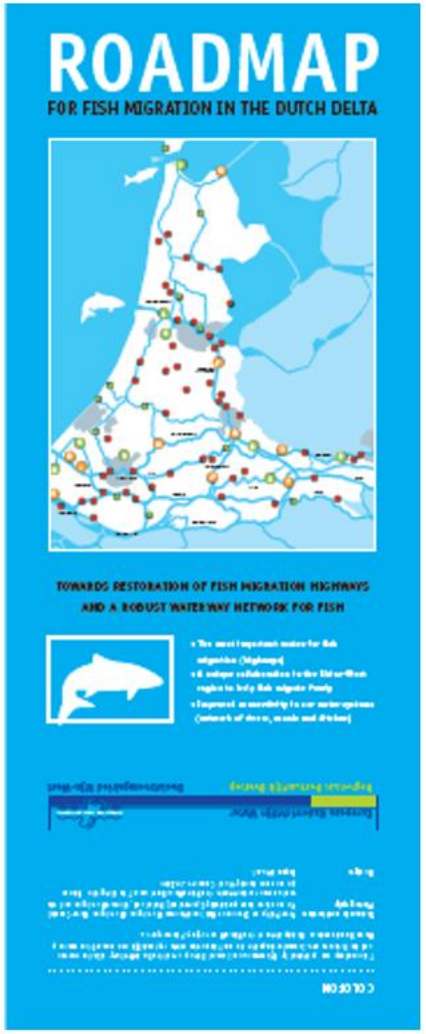
Documentary 'Road to Healthy Water' https://www.youtube.com/watch?v=EDDgbRj2940

NATURE AT WORK

Solution

Developed in the Rhine-West WFD River basin; fish experts prioritizing barriers along fish roads

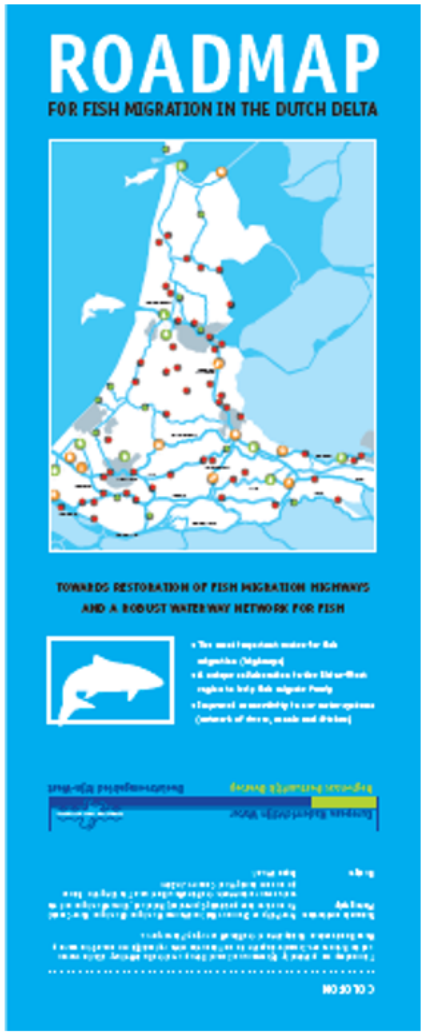
RHINE WEST RIVER BASIN



NATURE AT WORK

RHINE WEST RIVER BASIN

Solution



Working method

-Ecological role & species

-Mapping barriers

-Connectivity maps

-Stakeholder vision

-Prioritization & planning

From thinking in barriers to opening up migration routes

Solution

First GIS Fishroadmap:

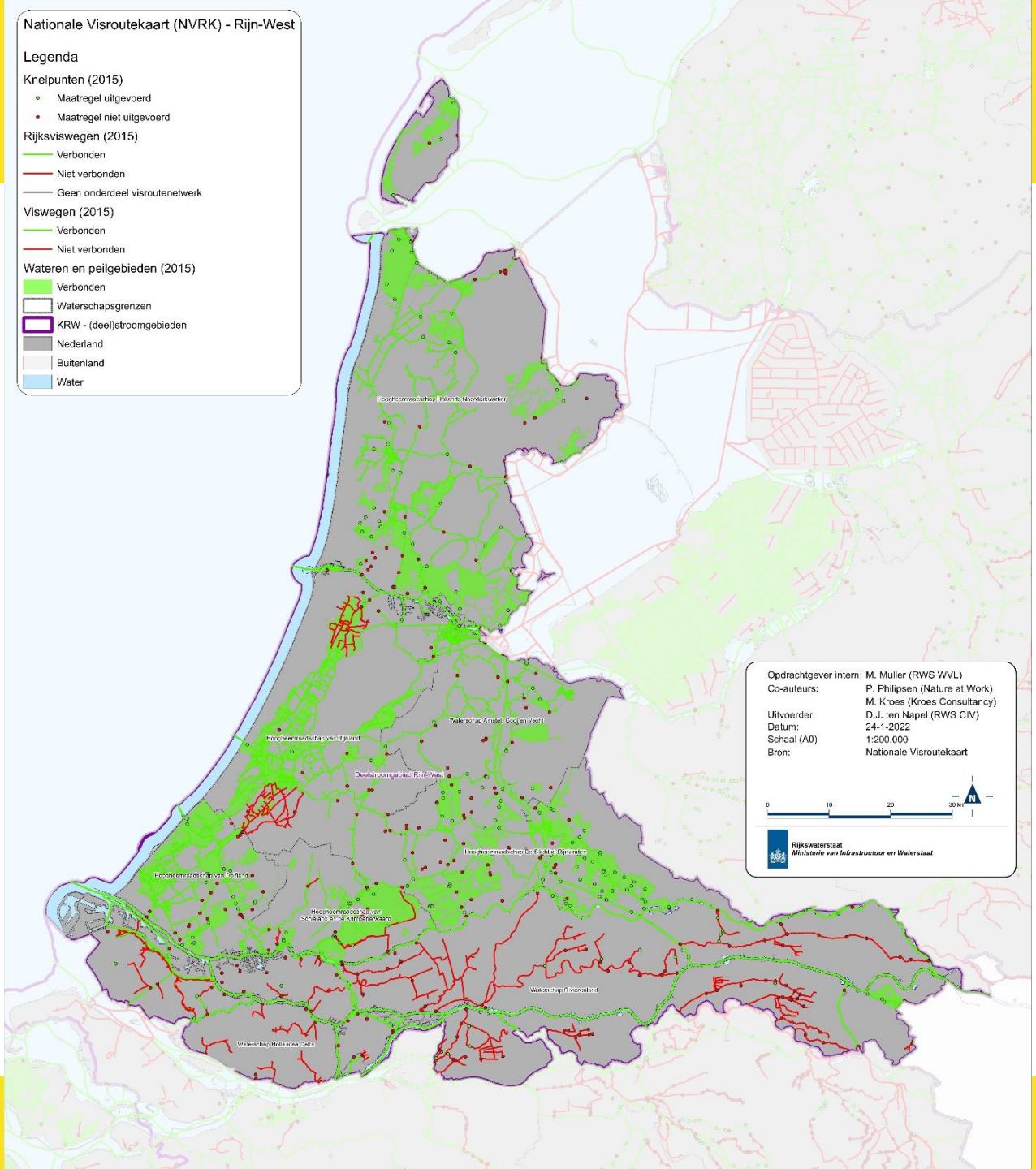
- **In 2015 the focus was on connecting highways (in blue) to A- roads (in red = regional waters)**
- **The focus now (third WFD tranche) is on connecting A-roads to B-roads (polders).**

Source:
Rhine-West WFD River Basin Regional Council, 2015

locnr	naam
1	Gemaal Krassekeet
2	Gemaal Pieter Engel
3	Gemaal 't Leven
4	Gemaal Vier Noorderkoggen
5	Gemaal de Waker
6	Bergsluis
7	Gemaal Commandeurspolder
8	Sluisgemaal bij Leidschendam
9	Gemaal Krimpenerwaard
10	Gemaal Veurink
11	Sluis Hennipsloot
12	Gemaal Spaarndam
13	Julianasluis Gouda
14	Sluis Bodegraven
15	Ipenslotersluis
16	Gemaal de Ruiter
17	Kinderdijk
18	Kilgemalen Biesbos
19	Gemaal Altena
20	Gemaal Tiel
21	Inlaat Doorenburg
22	Stuw/duiker Kortrijk
23	Inlaat Brennerbaan
24	Stuw Seychellenpad
25	Inlaat Haarrijn/de Tol
26	Stuw Kockengen
27	Gemaal Kockengen
28	Vispassage Hollandse Kade
29	Grote Merwedesluis
30	Oranjesluizen

Solution

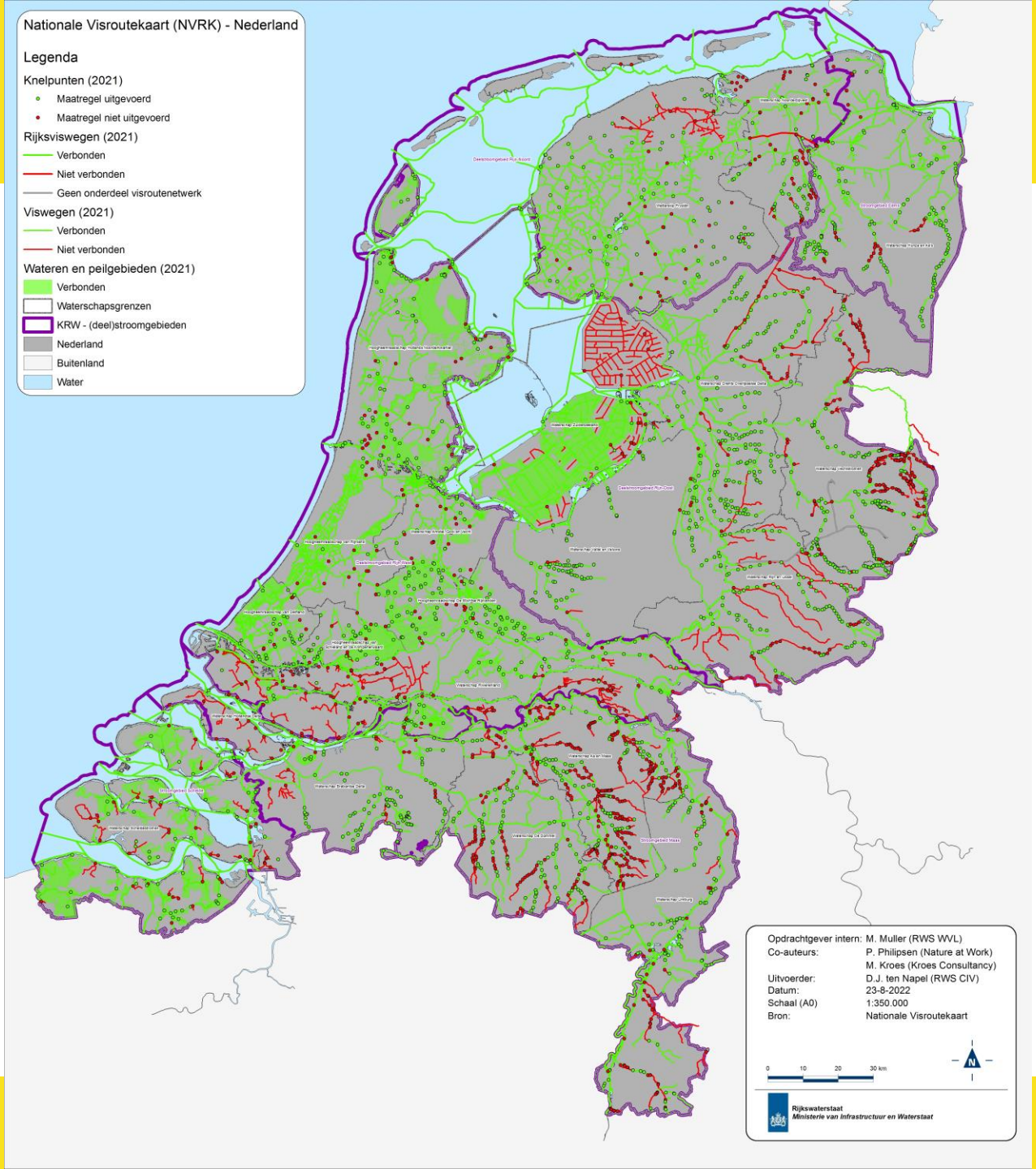
Rhine-West Fishroadmap 2015



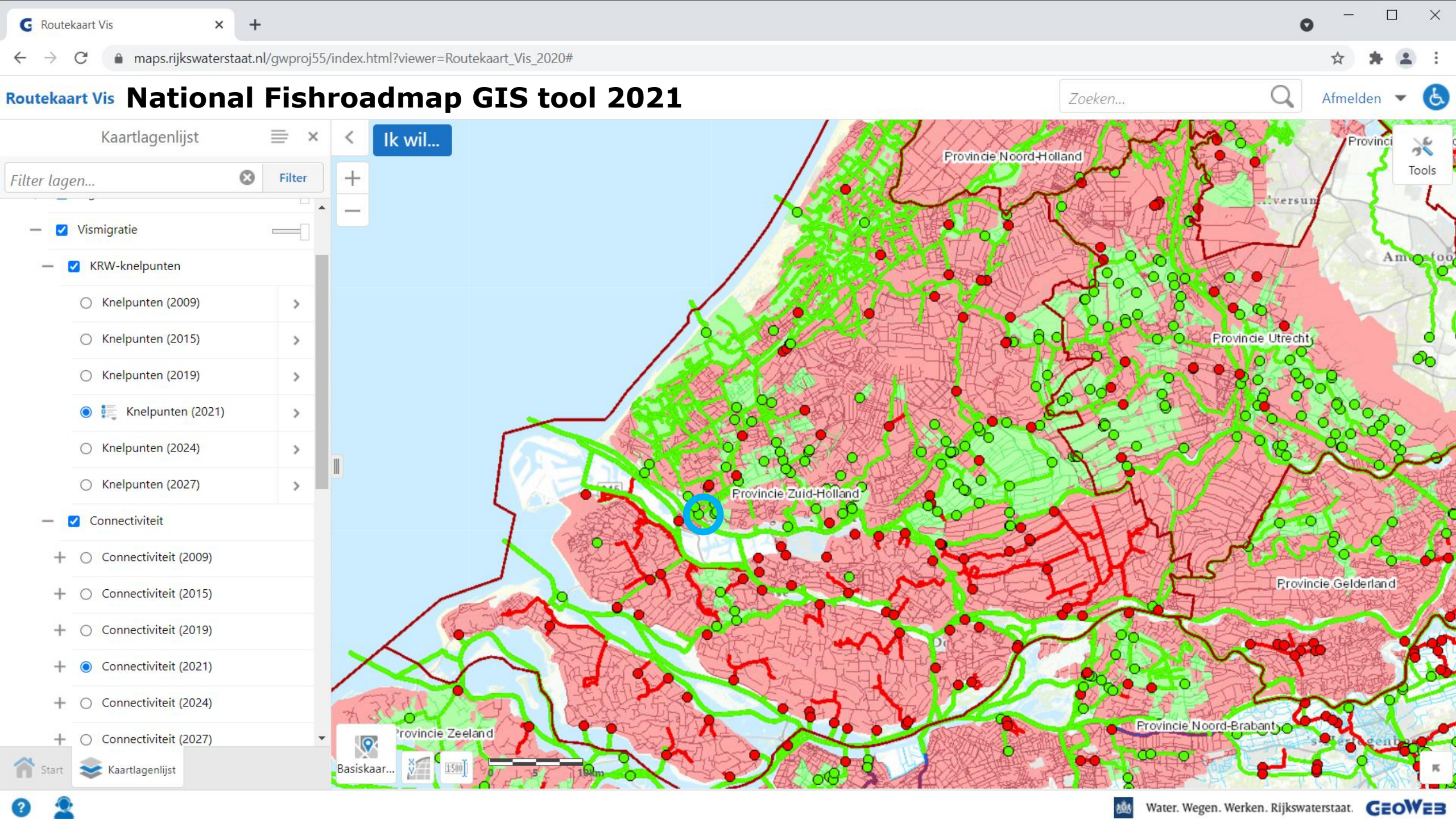
Source:
National Fishroadmap,
Rijkswaterstaat Netherlands

Solution

National Fishroadmap 2021



Source:
National Fishroadmap,
Rijkswaterstaat Netherlands


Routekaart Vis
maps.rijkswaterstaat.nl/gwproj55/index.html?viewer=Routekaart_Vis_2020#
Routekaart Vis
National Fishroadmap GIS tool 2021
Zoeken...
Afmelden
Kaartlagenlijst
Filter lagen...
Filter
Ik wil...
Tools
Vismigratie
KRW-knelpunten
Knelpunten (2009)
Knelpunten (2015)
Knelpunten (2019)
Knelpunten (2021)
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Provincie Noord-Holland
Provincie Utrecht
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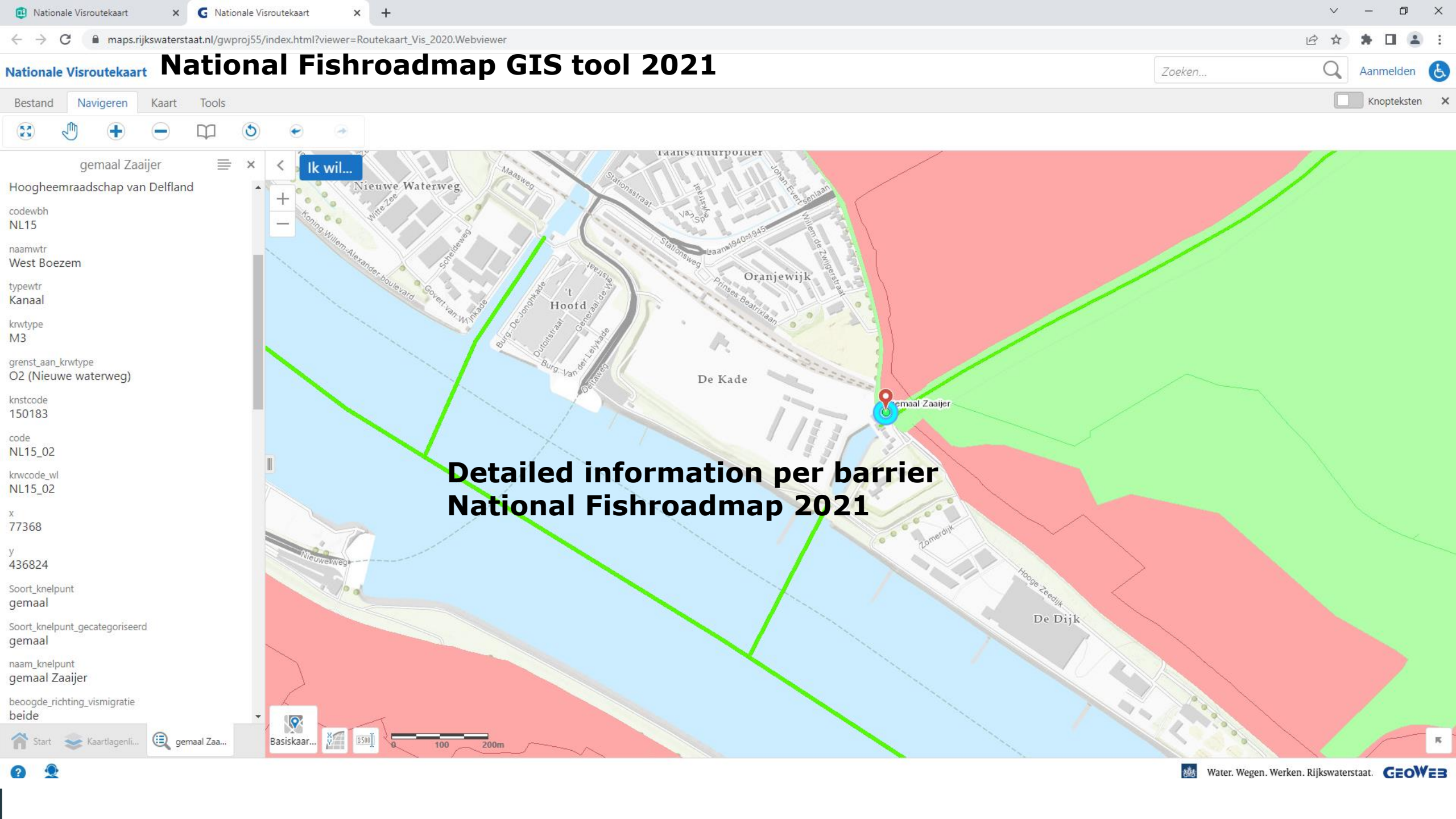
Provincie Noord-Brabant
Provincie Zeeland
Basiskaar...
Start
Kaartlagenlijst
Water. Wegen. Werken. Rijkswaterstaat.
GeoWeb


Nationale Visroutekaart
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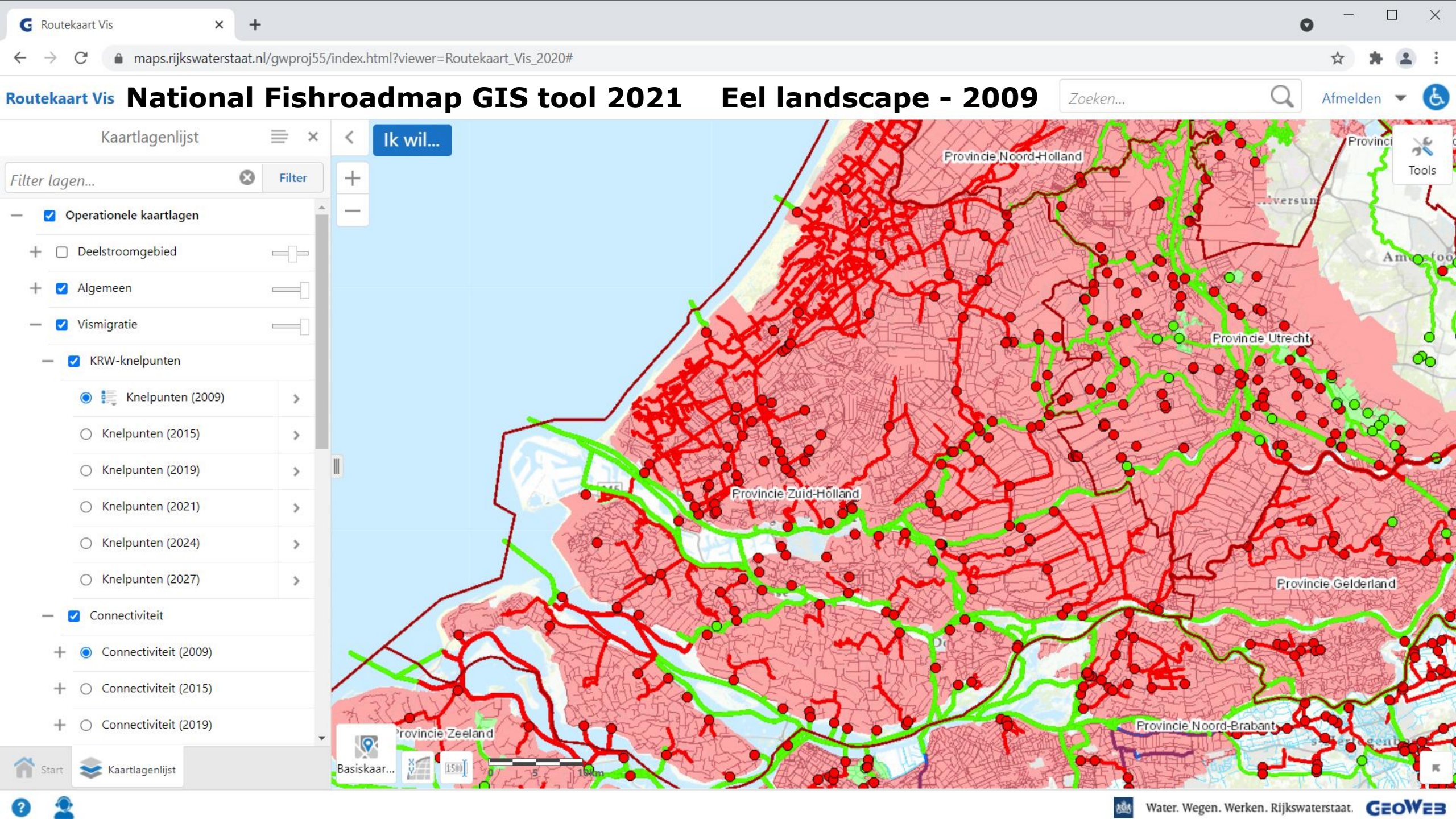
Nationale Visroutekaart
National Fishroadmap GIS tool 2021
Zoeken...
Aanmelden
Bestand
Navigeren
Kaart
Tools
Knopteksten
gemaal Zaaijer
Hoogheemraadschap van Delfland
codewbh
NL15
naamwtr
West Boezem
typewtr
Kanaal
krwtype
M3
grenst_aan_krwtype
O2 (Nieuwe waterweg)
knstcode
150183
code
NL15_02
krwcode_wl
NL15_02
x
77368
y
436824
Soort_knelpunt
gemaal
Soort_knelpunt_gecategoriseerd
gemaal
naam_knelpunt
gemaal Zaaijer
beoogde_richting_vismigratie
beide
Ik wil...
Nieuwe Waterweg
Oranjewijk
't Hoofd
De Kade
De Dijk
gemaal Zaaijer
Detailed information per barrier
National Fishroadmap 2021
Start
Kaartlagenli...
gemaal Zaa...
Basiskaar...
0
100
200m
Water. Wegen. Werken. Rijkswaterstaat.
GEOWEB

How can the Fishroadmap be used?

- To visualize connectivity and to prioritize fish migration measures from sea to source as a result & identify free flowing parts of rivers


Routekaart Vis
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Routekaart Vis
National Fishroadmap GIS tool 2021
Eel landscape - 2009
Zoeken...
Afmelden
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Filter lagen...
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Operationele kaartlagen
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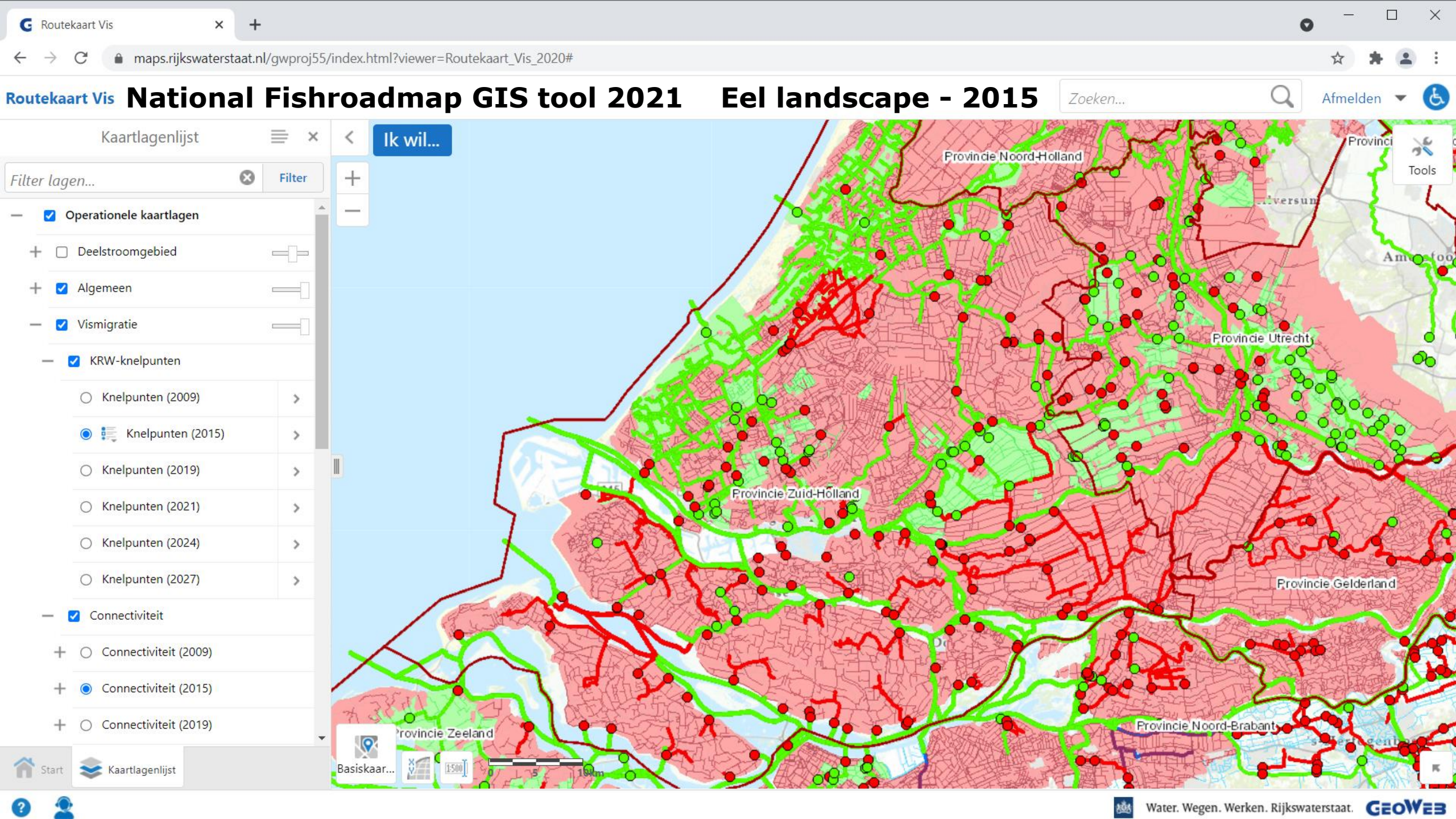
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National Fishroadmap GIS tool 2021 Eel landscape - 2021

Routekaart Vis | Zoeken... | Afmelden

Kaartlagenlijst

Filter lagen... | Filter

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  - KRW-knelpunten
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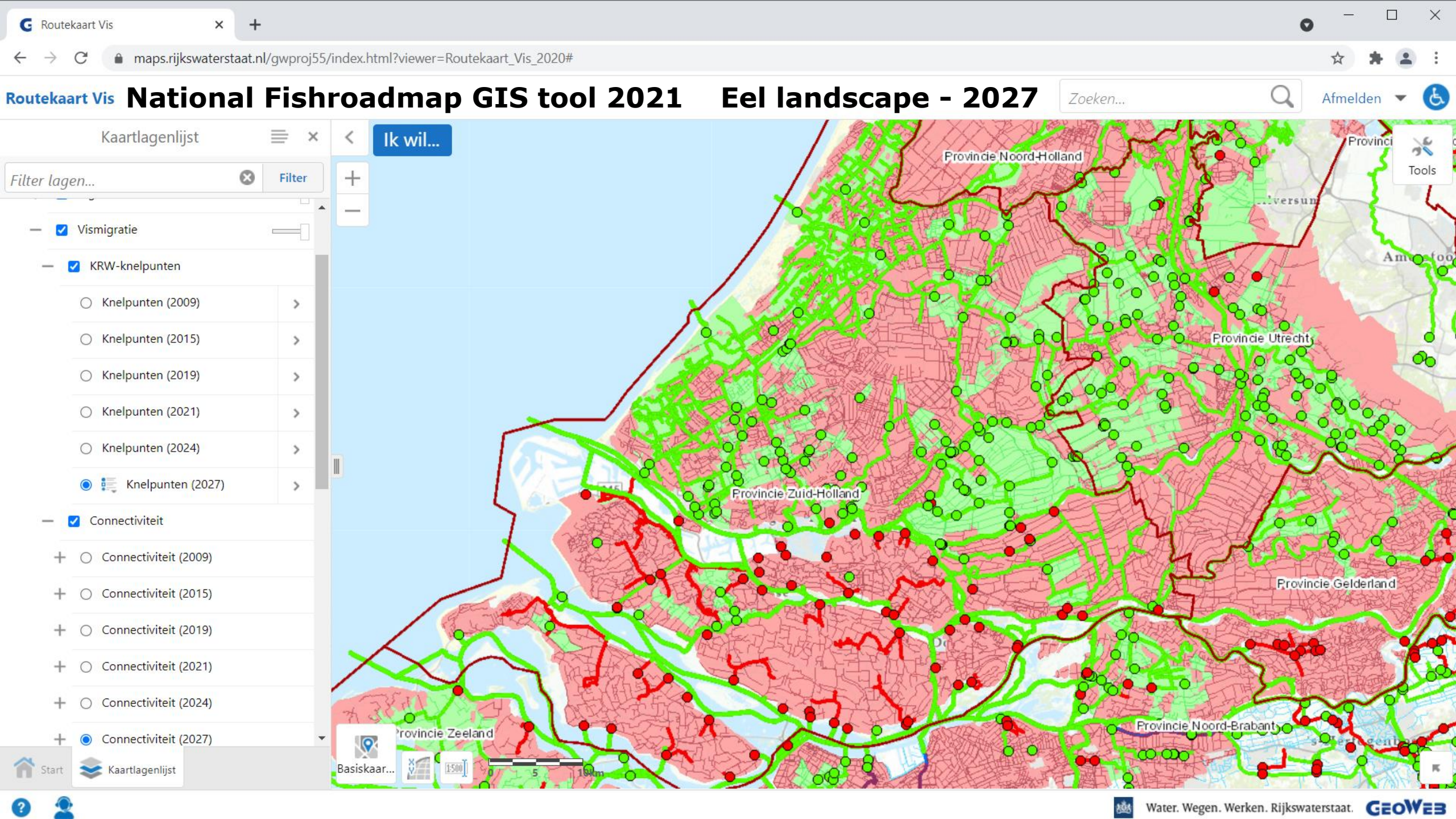
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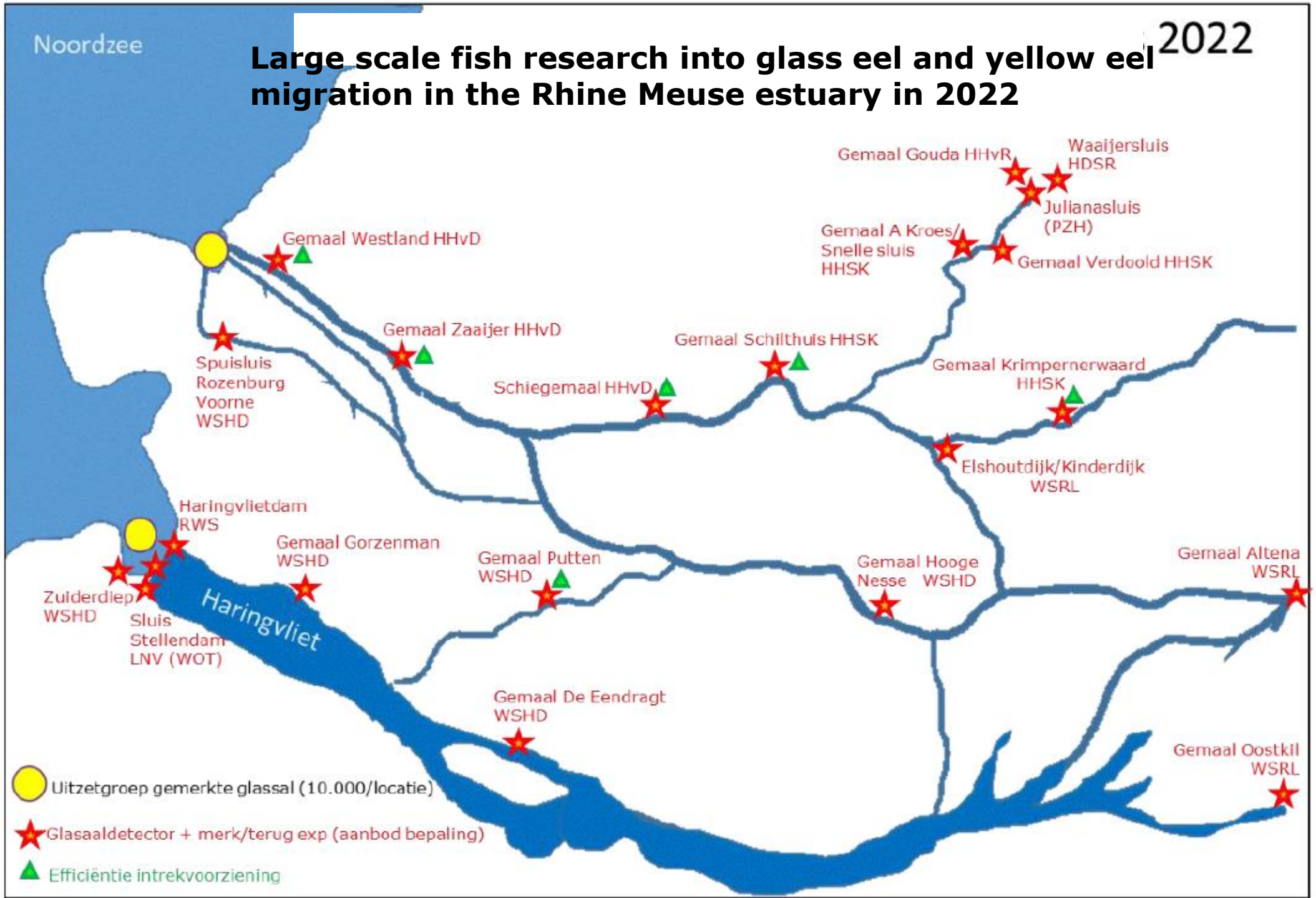
How can the Fishroadmap be used?

- To visualize connectivity and to prioritize fish migration measures from sea to source as a result & identify free flowing parts of rivers

- To link fish monitoring / research data with the goal to optimize fish migration measures at the regional level (with Tom Buijse)

Large scale fish research into glass eel and yellow eel migration in the Rhine Meuse estuary in 2022



Source:
- Wageningen Marine Research
- Rhine-West River Basin Regional Council, 2021

Source:
Ben Griffioen, Wageningen Marine Research , 2021

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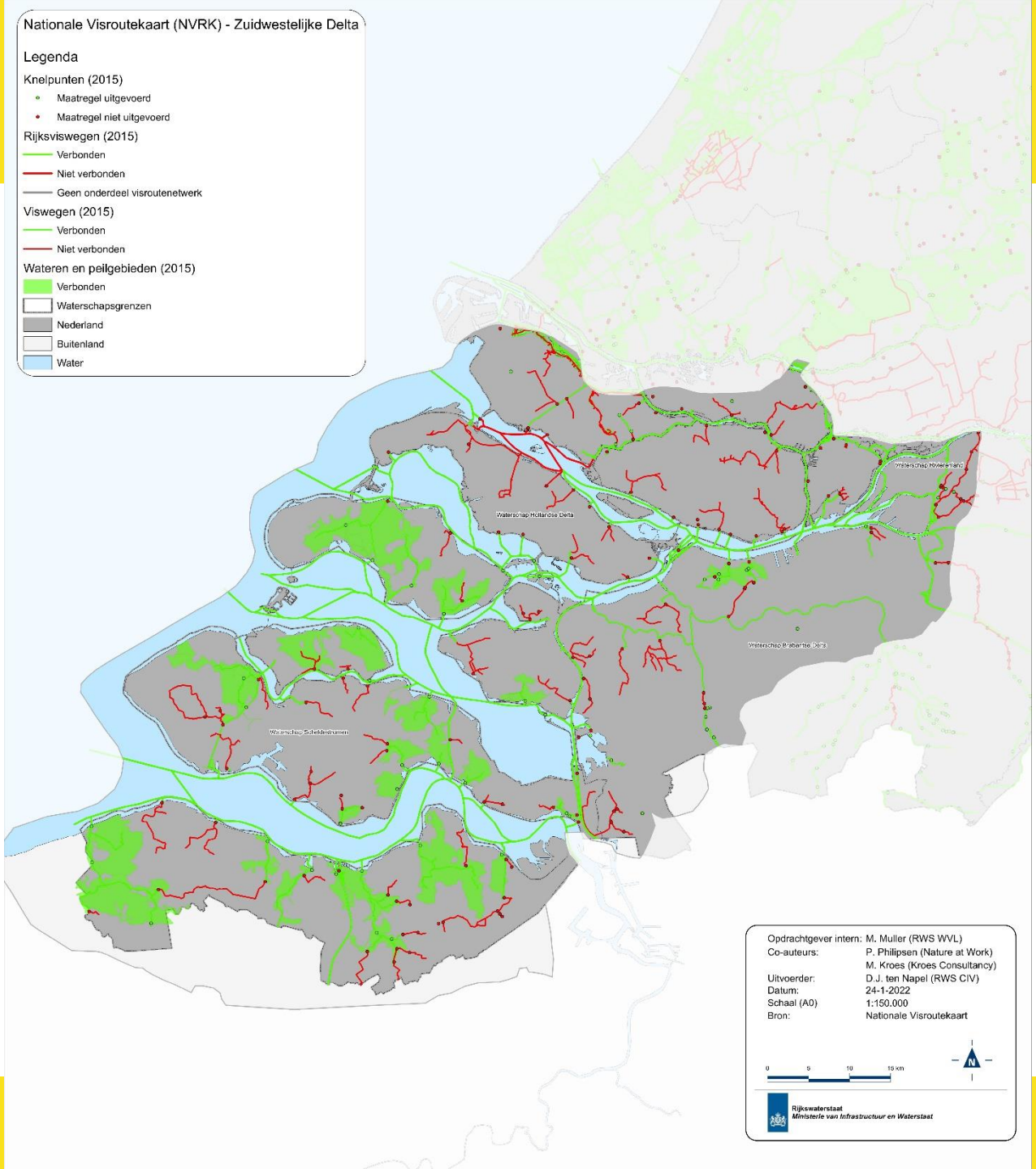
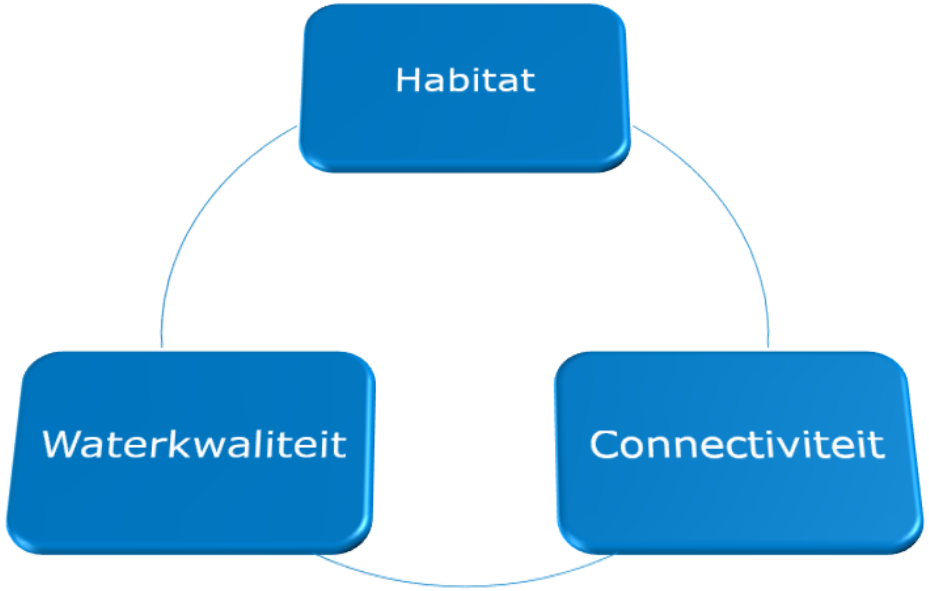


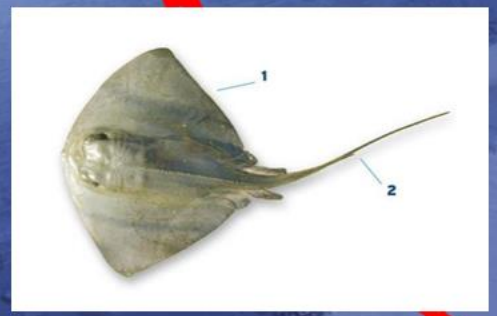
Source:
National Fishroadmap,
Rijkswaterstaat Netherlands

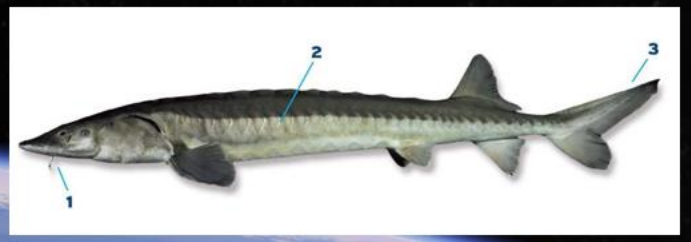
Fishroadmap integrated N2000/WFD approach

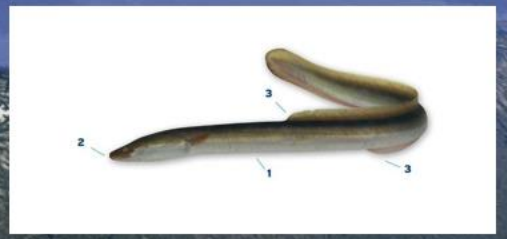
- Rhine-Meuse and Scheldt mouths are one estuary, not separate rivers
  - Interconnected water bodies (WFD)
  - Lifecycles for different fish species (N2000 estuarine habitats are biodiversity rich)
  - Include Scheldt river basin (cross boundary)
- Integrate N2000 and WFD (habitat – water quality and connectivity)

Source: Rijkswaterstaat Sea and Delta Region (Wouter Quist and Peter Philipsen)







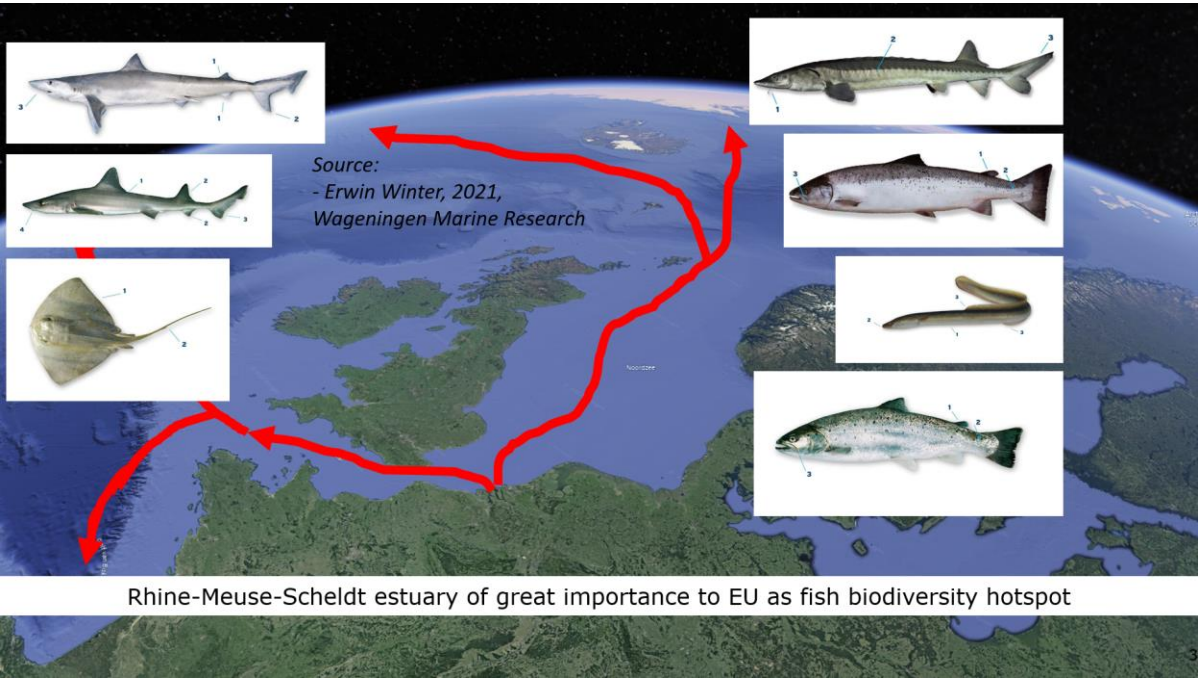


Source:
- Erwin Winter, 2021,
Wageningen Marine Research

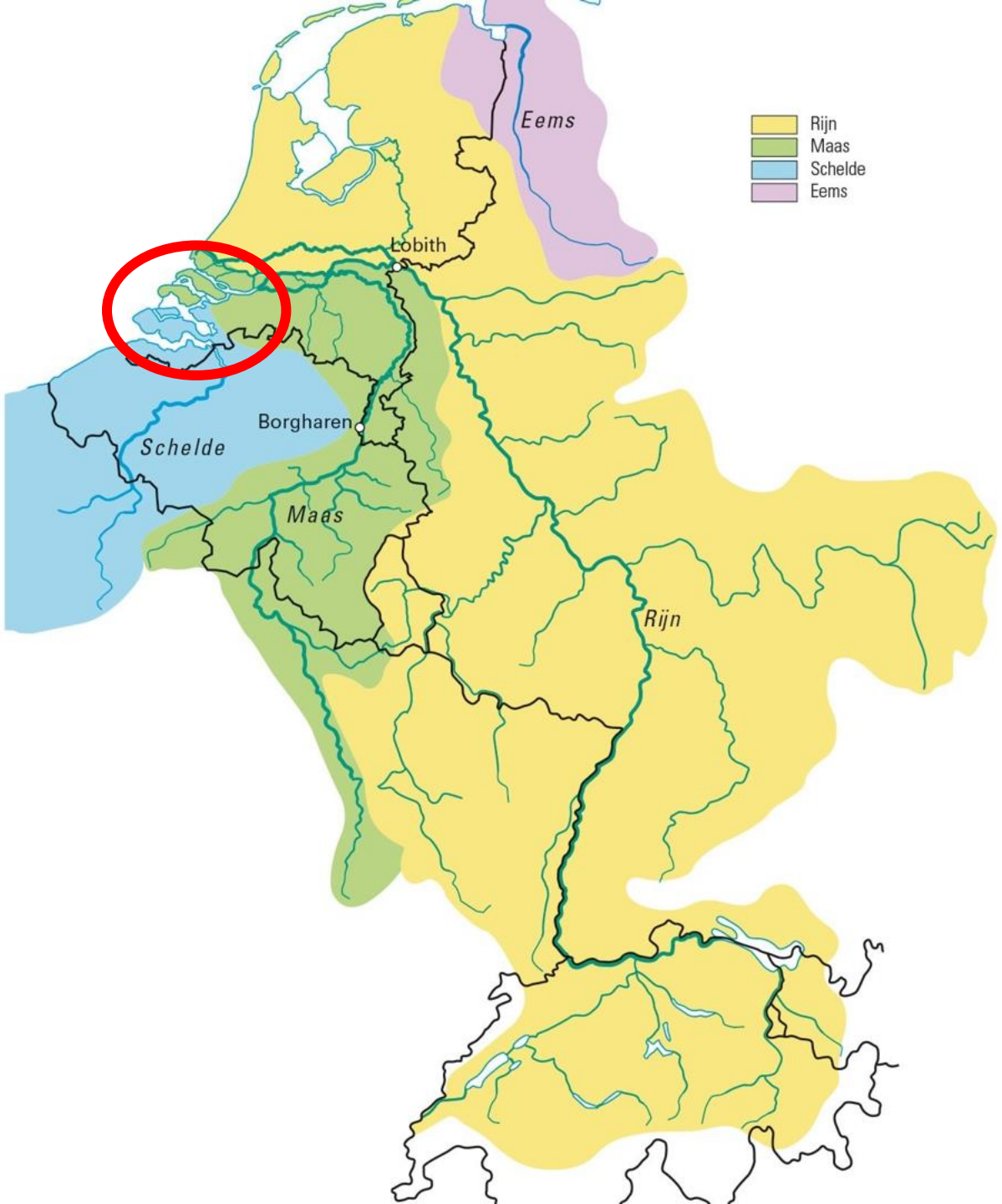
Noordzee

Rhine-Meuse-Scheldt estuary of great importance to EU as fish biodiversity hotspot

An East Atlantic Swimway in line with East Atlantic Flyway



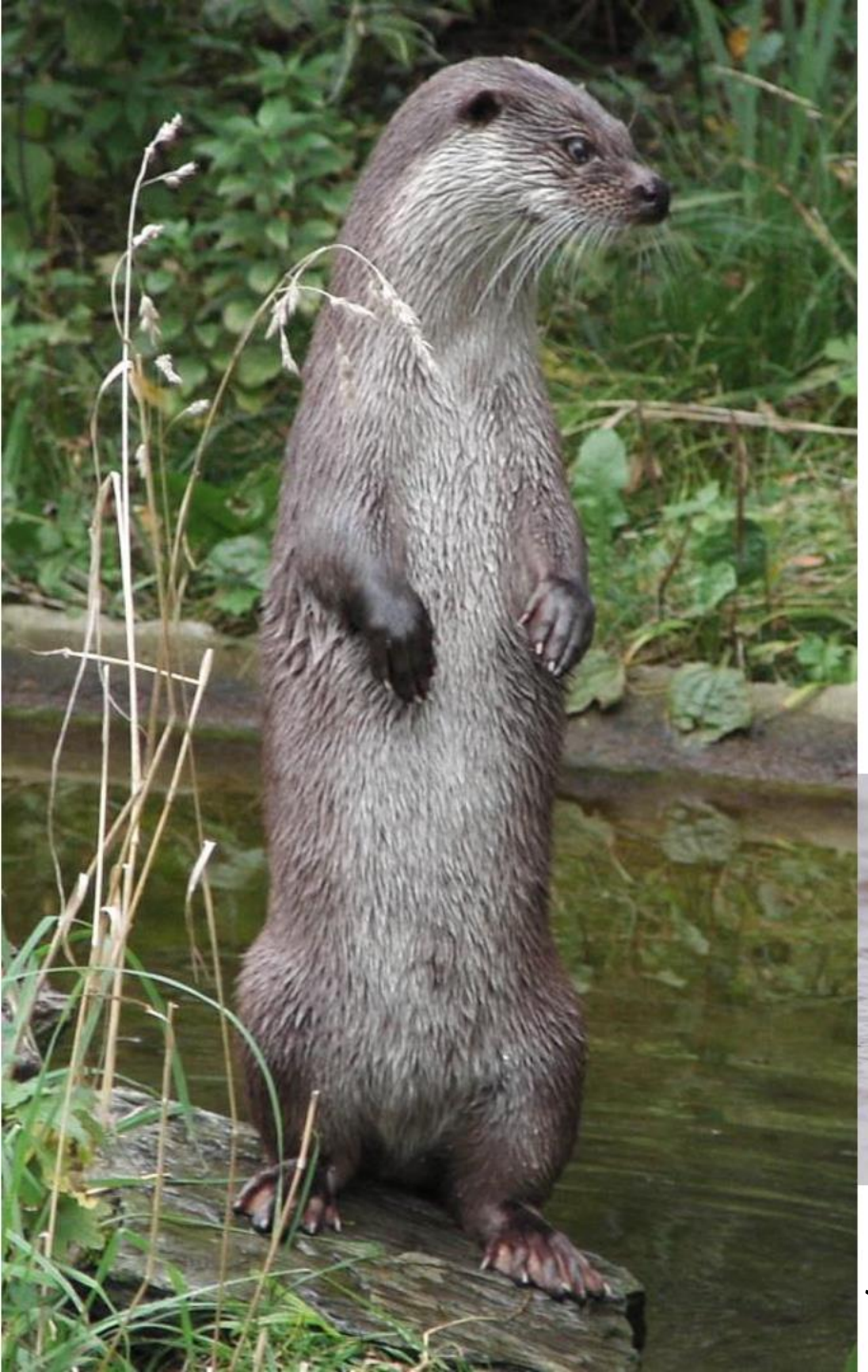
Rhine-Meuse-Scheldt estuary of great importance to EU as fish biodiversity hotspot

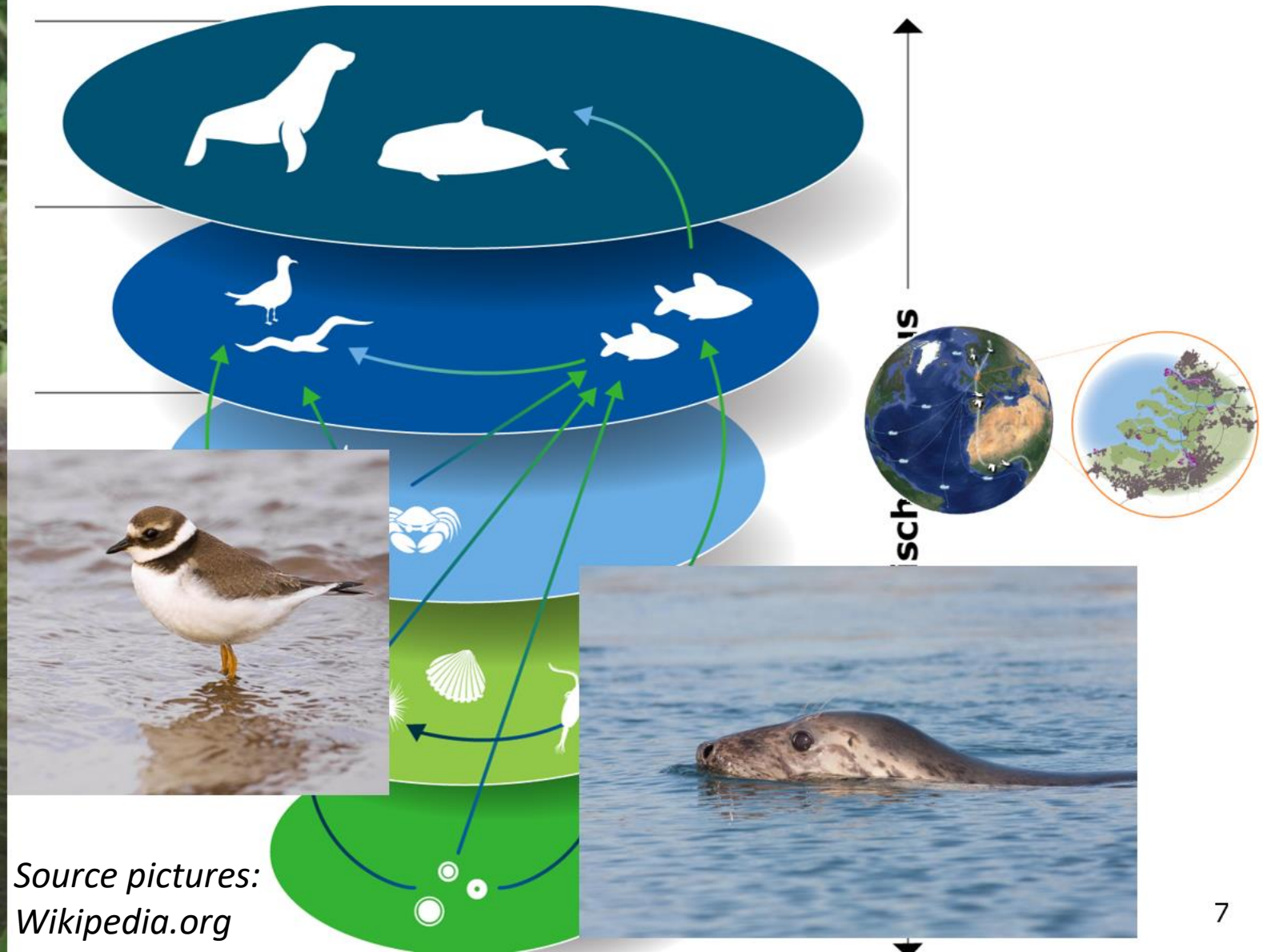


Ecological function fish

- Life cycle:
  - Spawning;
  - Fouraging;
  - Nursing;
- Gateway to 3 river basins totalling 242.000 km^2;
- Connection between river basins (gene transport).

Significance bigger than fish





Source pictures:
Wikipedia.org

Source:
- National Fishroadmap, Rijkswaterstaat Netherlands
- Stroming Consultancy https://www.stroming.nl/

Rhine-Meuse-Scheldt Fishroadmap as a base for:

An integrated approach to N2000 & WFD (and implementation of new EU Nature Restoratian Law)

How can the Fishroadmap be used?

- To visualize connectivity and to prioritize fish migration measures from sea to source as a result & identify free flowing parts of rivers
- To link fish monitoring / research data with the goal to optimize fish migration measures at the regional level (with Tom Buijse)
- To link WFD measures with N2000 measures in practice
- To prioritize rivers for dam removal and nature restoration, opportunity for hydropower to offset ecological damage

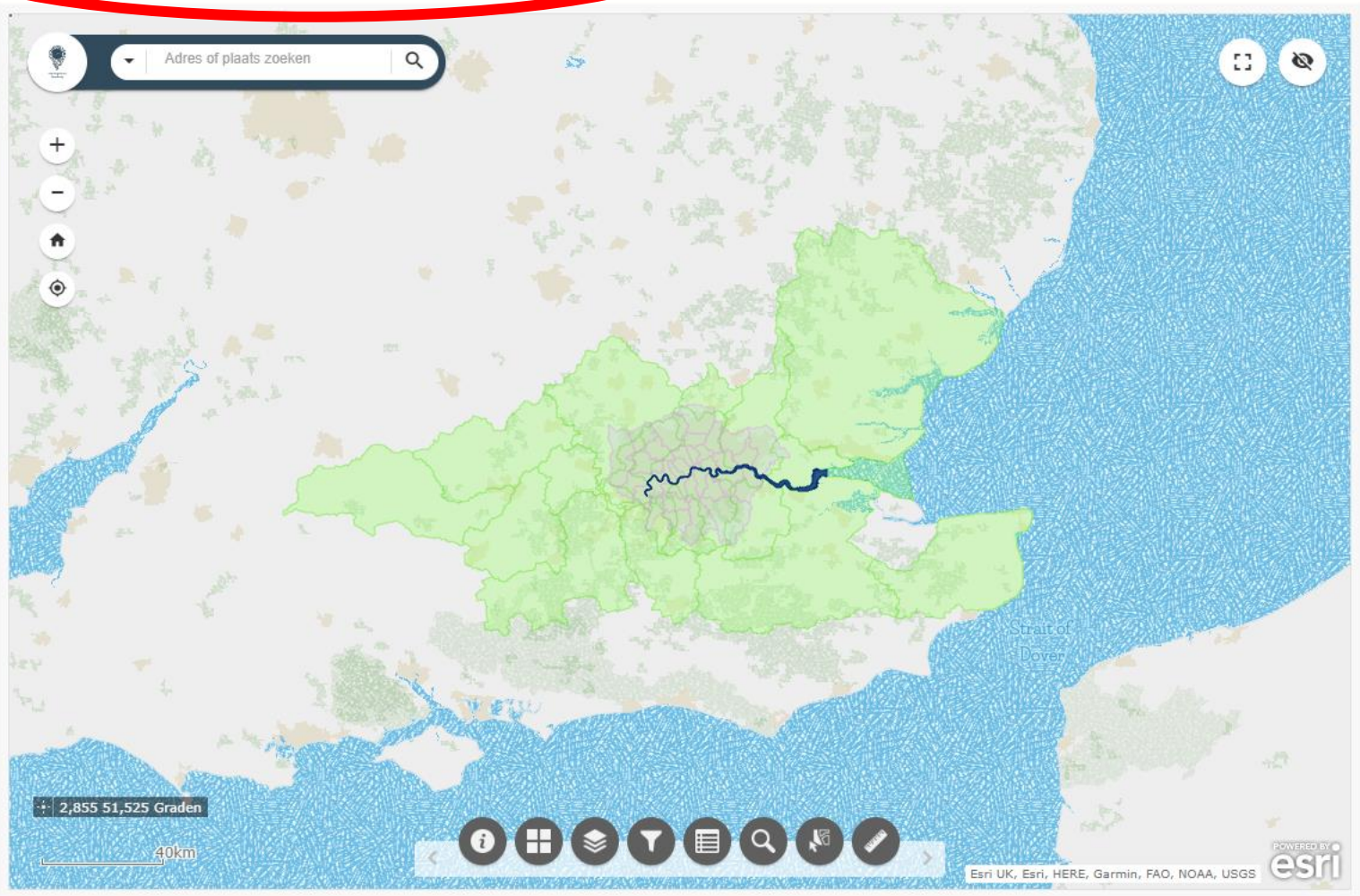
Fish Migration Roadmap

fishroadmap.london

Aanmelden

Greater Thames Estuary Fish Migration Roadmap

NATURE AT WORK



The most important element of the above interactive map is the filter function which allows the barrier data to be filtered based on barrier and pass type, river, eel priority, category, upstream river habitat and connectivity gain, and so on.

Source:
Thames River Basin Fish Roadmap, Thames Estuary Partnership and Nature at Work, 2021

Fish Migration Roadmap

fishroadmap.london

Aanmelden

Greater Thames Estuary Fish Migration Roadmap

Improving waterways & habitats for migratory fish species

Man-made barriers, such as dams and locks, make the journey of migratory fish species much more difficult. Sometimes these barriers prevent migration altogether, which can be catastrophic for populations of threatened species such as the *European eel*. Making sure all species can complete their migratory journeys is key to maintaining their diversity and healthy populations.

The Greater Thames Estuary Fish Migration Roadmap is an exciting project committed to making migration easier for the fish species in the Thames River Basin and adjacent catchments. Headed up by the *Thames Estuary Partnership* and *Nature at Work*, the project brings together all the data needed to improve river connectivity.

Nature at Work

The RoadMap for FishMigration

The Greater Thames Estuary Fish Migration Roadmap is based on the conceptual framework of the Roadmap for Fish Migration in the Dutch Delta project, developed by Peter Philipsen (Nature at Work),

The RoadMap for FishMigration is now adopted nationally in the Netherlands.

Source:
Thames River Basin Fish Roadmap, Thames Estuary Partnership and Nature at Work, 2021

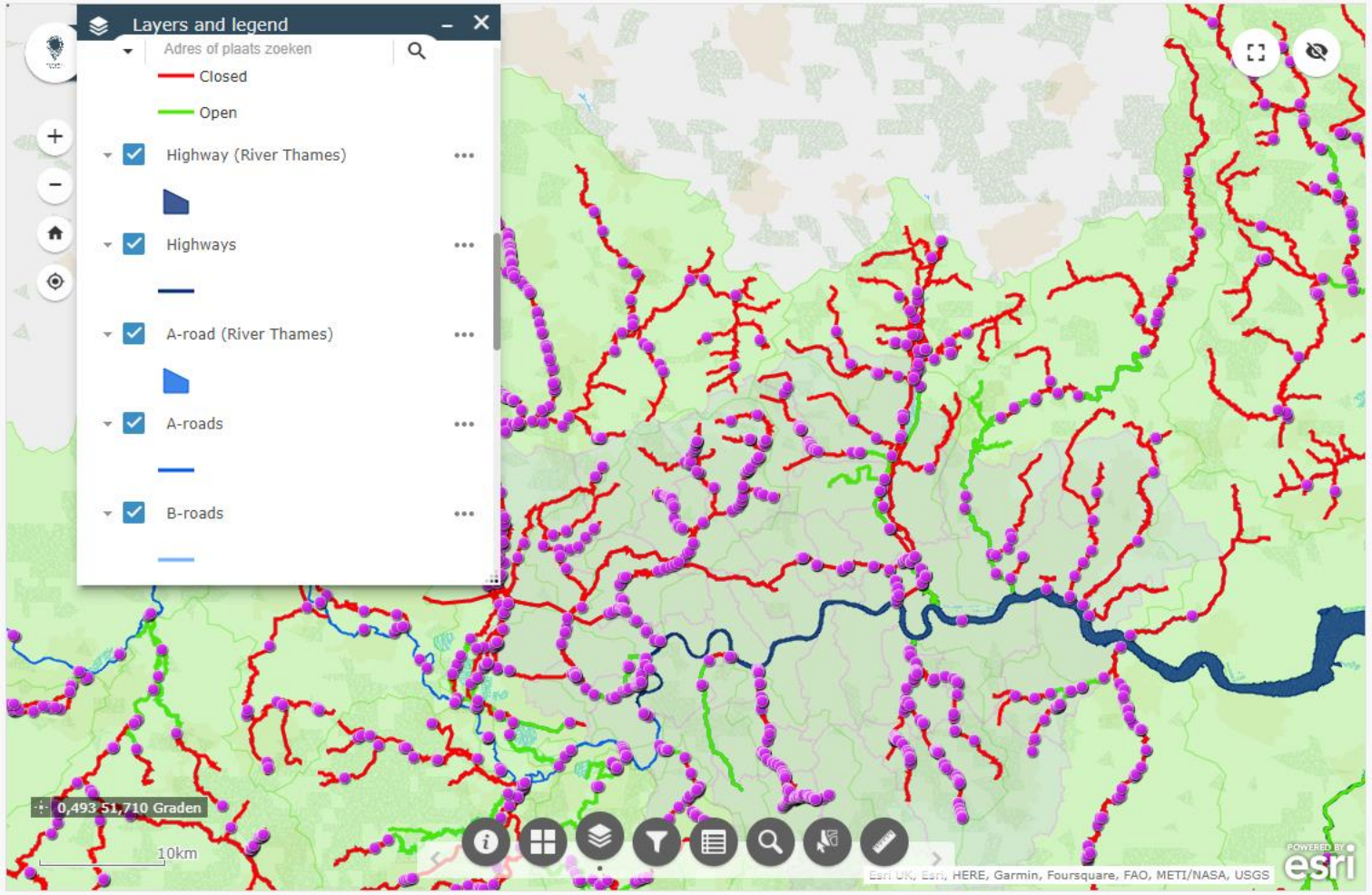
Fish Migration Roadmap

fishroadmap.london

Aanmelden

Greater Thames Estuary Fish Migration Roadmap

NATURE AT WORK



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Source:
Greater Thames Estuary Fish Roadmap, Thames Estuary Partnership and Nature at Work, 2021

Ecological reference: waters were the main 'roads' in the pre-industrial landscape

Source: Essex Fish-roadmap, 2021 Essex commitatus by Joan Blaue, anno 1645.

Vision

Removal of dams/ barriers

RIVERS BLACKWATER AND PANT PROJECTS

15 Remove weirs so that the mill race and main channel have better connectivity

There are two weirs either end of the mill race which control the flow between this channel and the main channel. If these were removed or reduced then the connectivity between the two channels would be improved and create a more natural habitat in the mill race.

On the day of the survey the mill race had a high water level but a static flow, whereas the main channel had a low water level but a faster flow.

The weirs will also be acting as a barrier preventing species moving between the two channels, and moving further upstream.

RBD/catchment/river/tributary

Rivers Blackwater and Pant

WFD water body status

Poor

WFD overall status objective

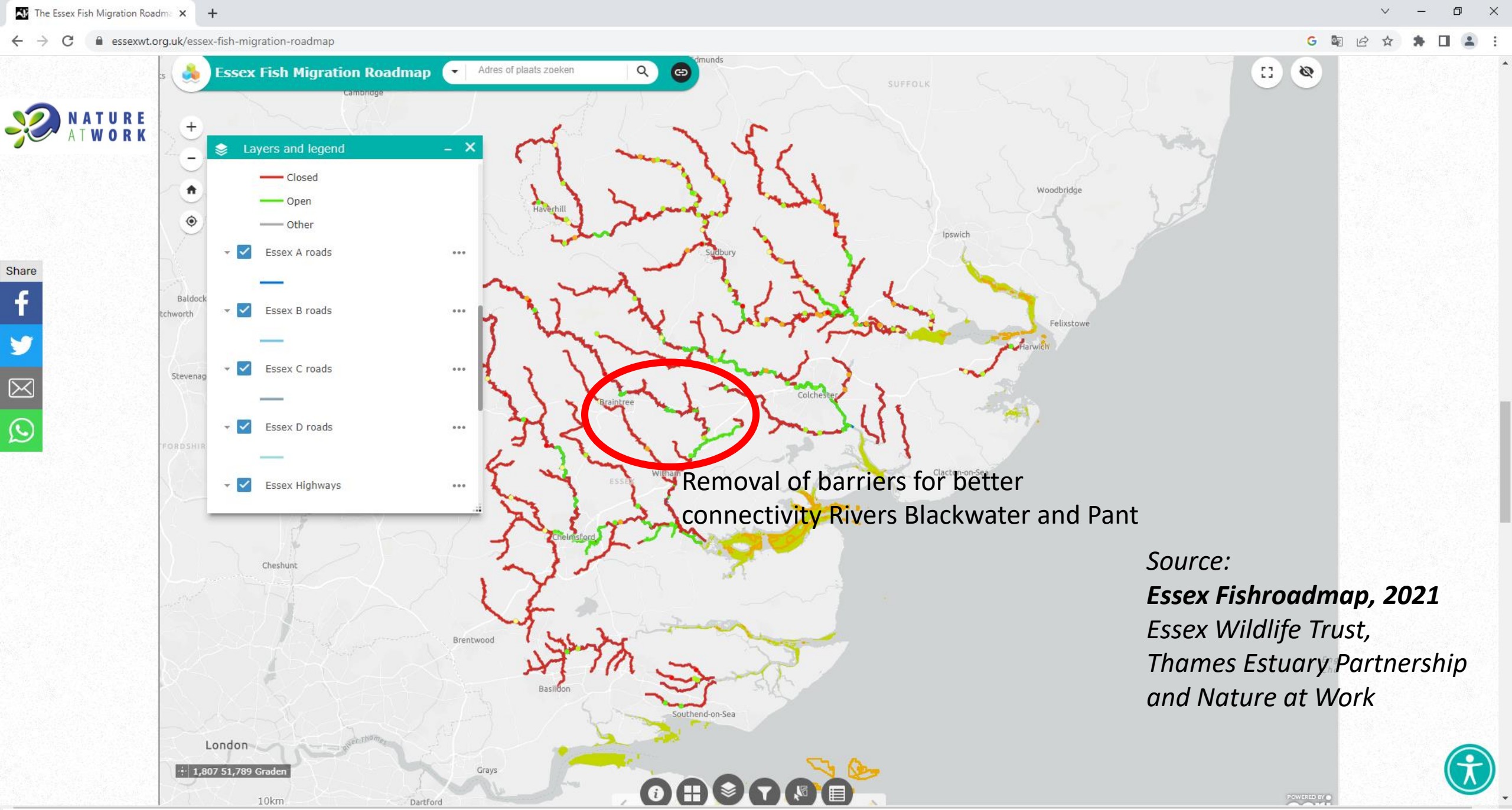
To achieve Good ecological status by

Project type

Removal of barriers

Benefiting species and/or habitats

Removal of barriers will allow better migration of fish, etc. It will also create better connectivity between the mill race and the main channel.


The Essex Fish Migration Roadm
essexwt.org.uk/essex-fish-migration-roadmap
Essex Fish Migration Roadmap
Adres of plaats zoeken
Layers and legend
Closed
Open
Other
Essex A roads
Essex B roads
Essex C roads
Essex D roads
Essex Highways
Share
NATURE AT WORK
Removal of barriers for better connectivity Rivers Blackwater and Pant
Source:
Essex Fishroadmap, 2021
Essex Wildlife Trust,
Thames Estuary Partnership
and Nature at Work

Rijkswaterstaat
Ministerie van Infrastructuur en Waterstaat

Thanks from the Team

Marjoke Muller, Marcel Bommelé, Dick ten Napel, Herman Hootsen, Martin Kroes and Peter Philipsen

National Fishroadmap

A GIS based tool to develop a road network for fish to help navigate densely populated and highly fragmented areas

https://storymaps.arcgis.com/stories/784f89c209bb4362b6453e6ad8f733be