

Lessons learned from telemetry: How climate change affects pathways of migratory fish in one of Europe's largest river basins.



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16 April 2024

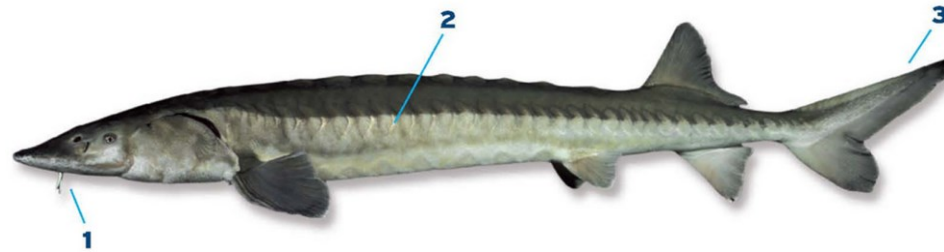
Oosterpoort, Groningen,

The Netherlands

[Freeflowconference.eu](https://www.freeflowconference.eu)



Feasibility of reintroduction of European **sturgeon** in the river **Rhine** basin: disentangling critical interactions between ecology, life history and human impacts.



<u>Name</u>	<u>Role</u>	<u>Daily supervisor?</u>	<u>Funded by</u>	<u>hours/week</u>
Drs. N.W.P. Brevé	PhD candidate		Sportvisserij Nederland	16
Dr. Ir. L.A.J. Nagelkerke	copromotor	yes	2
Prof. Dr. Ir. A. D. Buijse	promotor		0.5
Prof. Dr. A.J. Murk	promotor		0.5



Ministerie van Landbouw,
Natuur en Voedselkwaliteit



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● CITES

● Habitats Directive

● Red List Netherlands

1. General Introduction: Migratory fish of the River Rhine

● II



European eel (*Anguilla anguilla*)



Three-spined stickleback (*Gasterosteus aculeatus aculeatus*)

Diadromous



European smelt (*Osmerus eperlanus*)

Potamodromous



Ide (*Leuciscus idus*)



● II+IV Houting (*Coregonus oxyrinchus*)



● V ● Common barbel (*Barbus barbus*)



● II+V Atlantic salmon (*Salmo salar*)



● II Sea lamprey (*Petromyzon marinus*)



● Common chub (*Squalius cephalus*)



● Sea trout (*Salmo trutta*)



● II+V River lamprey (*Lampetra fluviatilis*)



● II ● Brook lamprey (*Lampetra planeri*)



● II+V ● Allis shad (*Alosa alosa*)



● II+V Twait shad (*Alosa fallax*)



● Common nase (*Chondostroma nasus*)



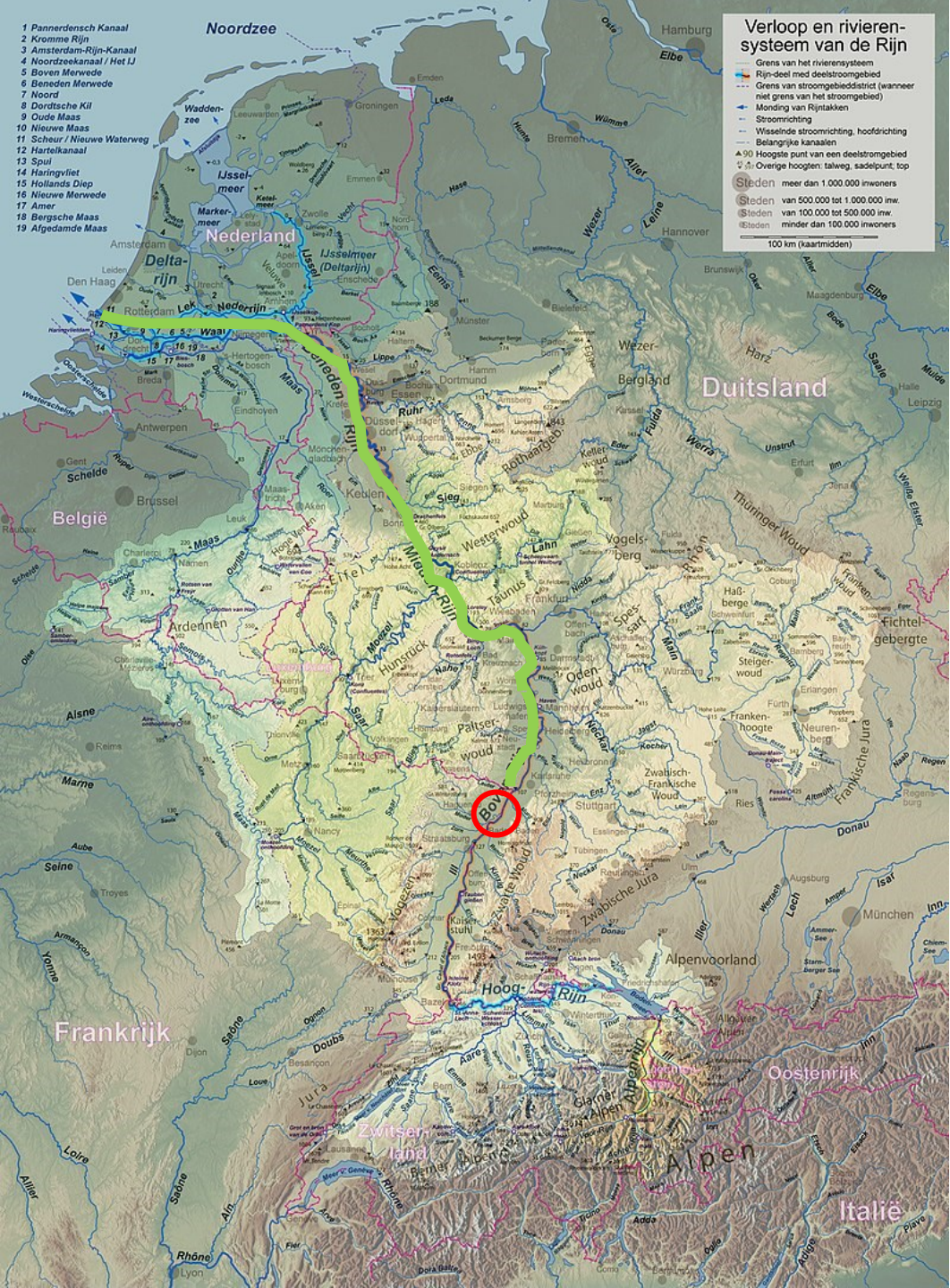
● Common dace (*Leuciscus leuciscus*)



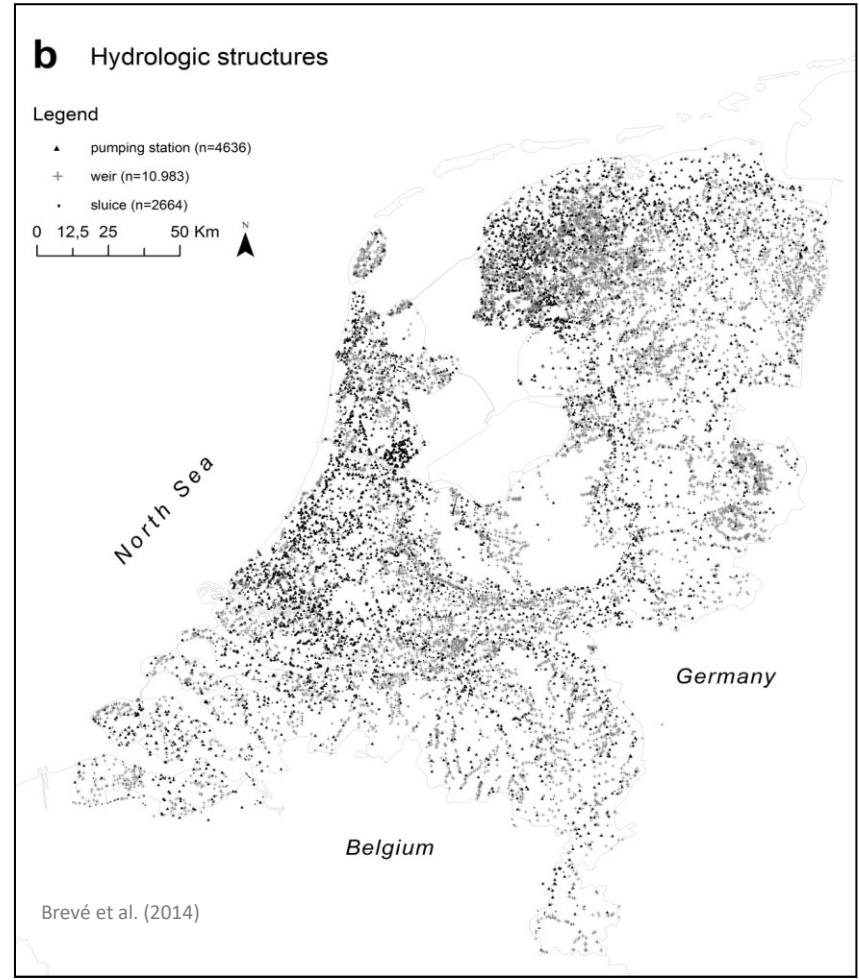
● I ● II+IV ● European sturgeon (*Acipenser sturio*)



● Burbot (*Lota lota*)



Main problem for migratory fish
20.000 migration barriers in the Netherlands alone
 Sluices, weirs, dams, pumping stations...



However, the Rhine's still has an open connection for **850 km**
 Between the North Sea and a first hydro-dam upstream

Historically, sturgeons were mainly caught in the Rhine main stem and North Sea

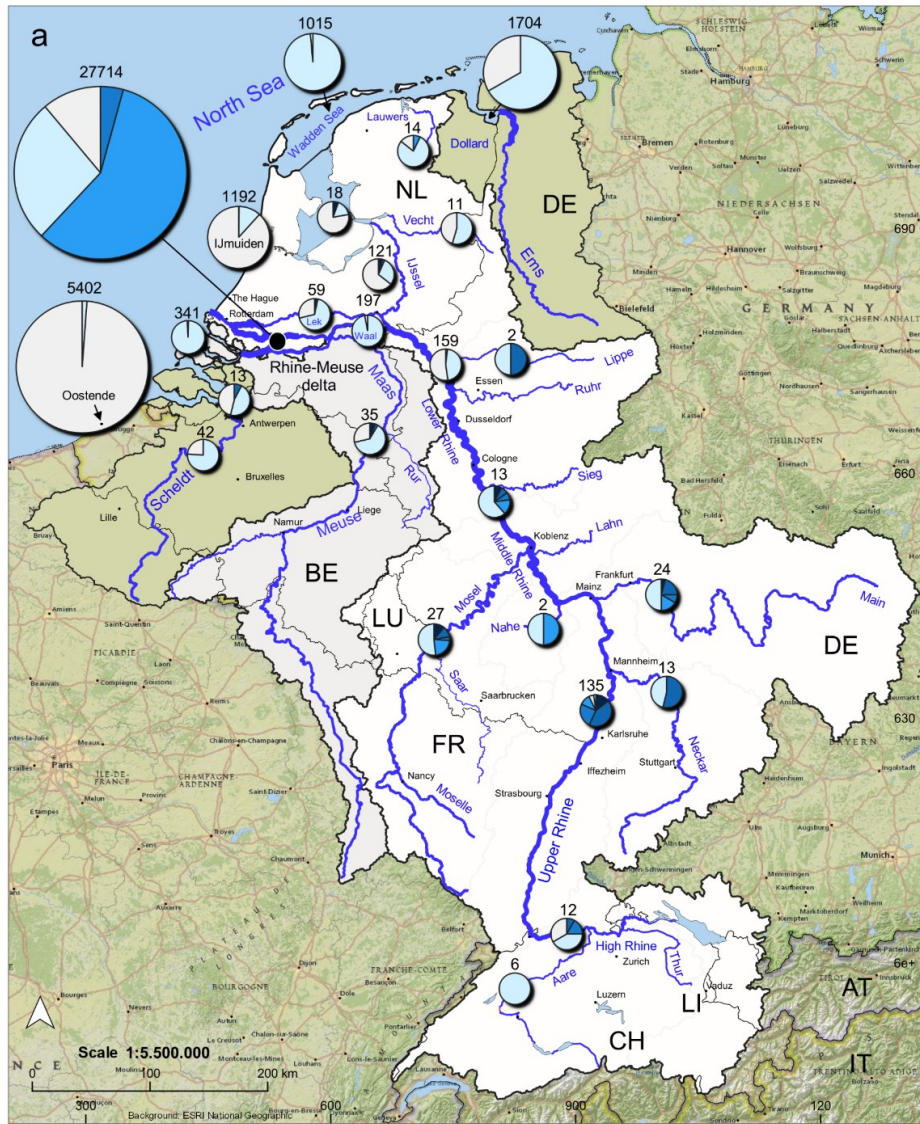


1917 Dordrecht ca. 3 m



1933 IJmuiden ca. 175 kg

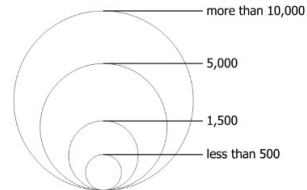
Historical capture reports combined → Sturgeons prefer the main stem of the river Rhine



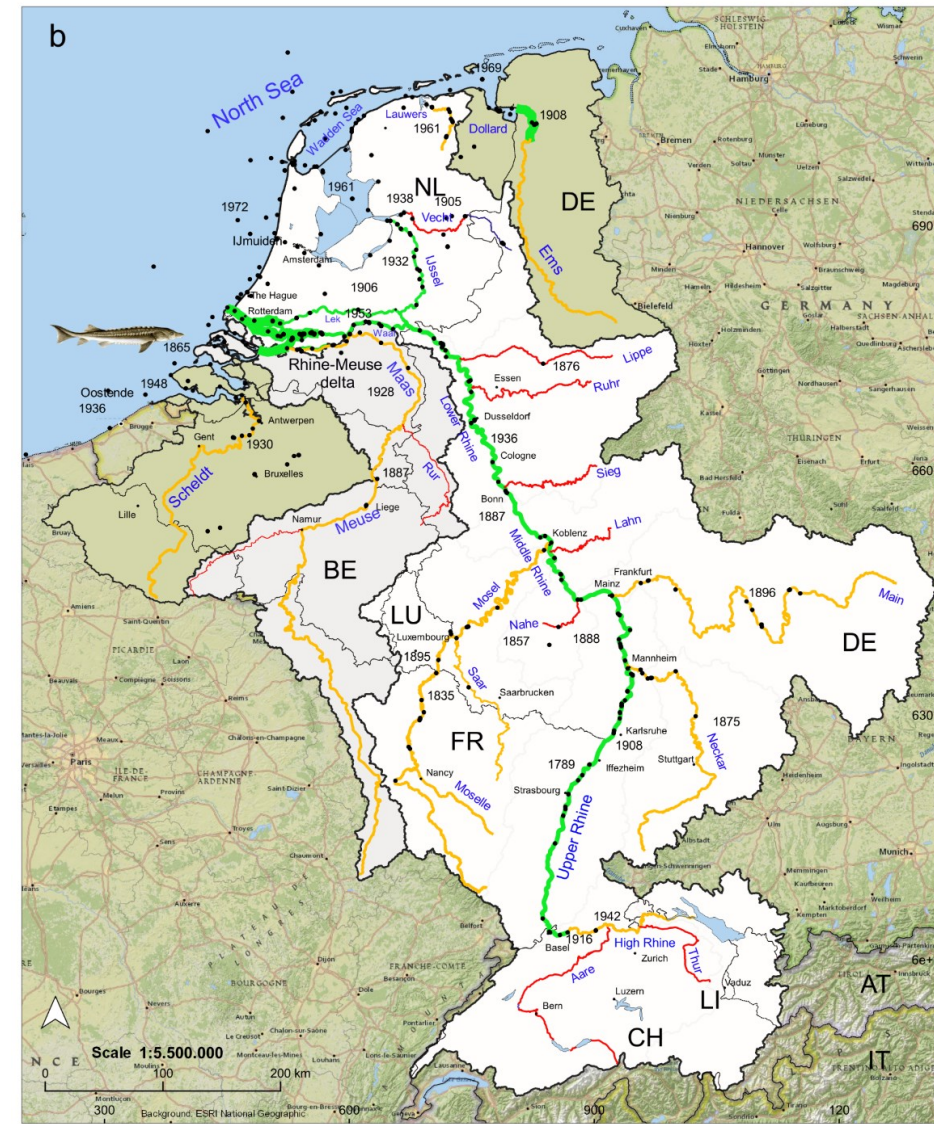
HISTORICAL STURGEON CAPTURES

Total number recorded per century

- 0-1500 n = 37
- 1500-1600 n = 84
- 1600-1700 n = 1,229
- 1700-1800 n = 16,022
- 1800-1900 n = 10,617
- 1900-2000 n = 10,284



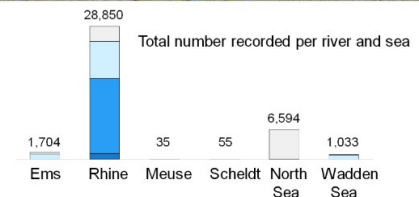
● Rhine-Meuse delta



HISTORICAL STURGEON CAPTURES

Total number recorded per river-section

- >100
 - 10 - 100
 - 0 - 10
- Locations of sturgeon landings or sales
- year = year of last sturgeon reported



European policy

Migratory fish are indicator species of healthy rivers

Good ecological status

European Water Framework Directive

€ 627 Million will be invested by the end of 2027

To improve fish migration in the Rhine

European Habitat Directive / Nature 2000 areas

European Eel Directive

Benelux Directive Free Fish Migration

Species red lists (IUCN)



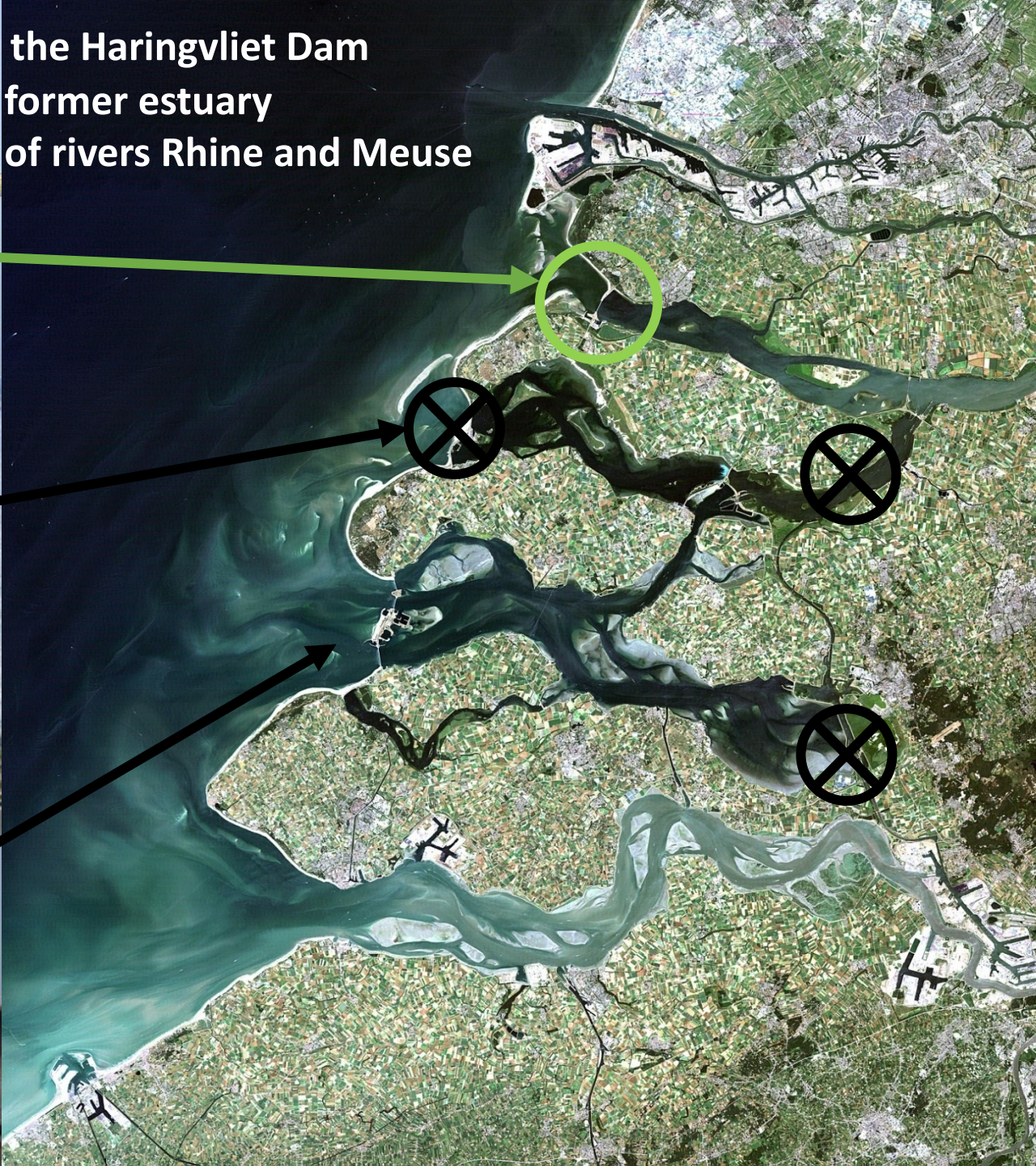
€ 70 million invested to open up the Haringvliet Dam former estuary of rivers Rhine and Meuse



Brouwers Dam – dead end



Storm surge barrier system – sea arm



Good News!

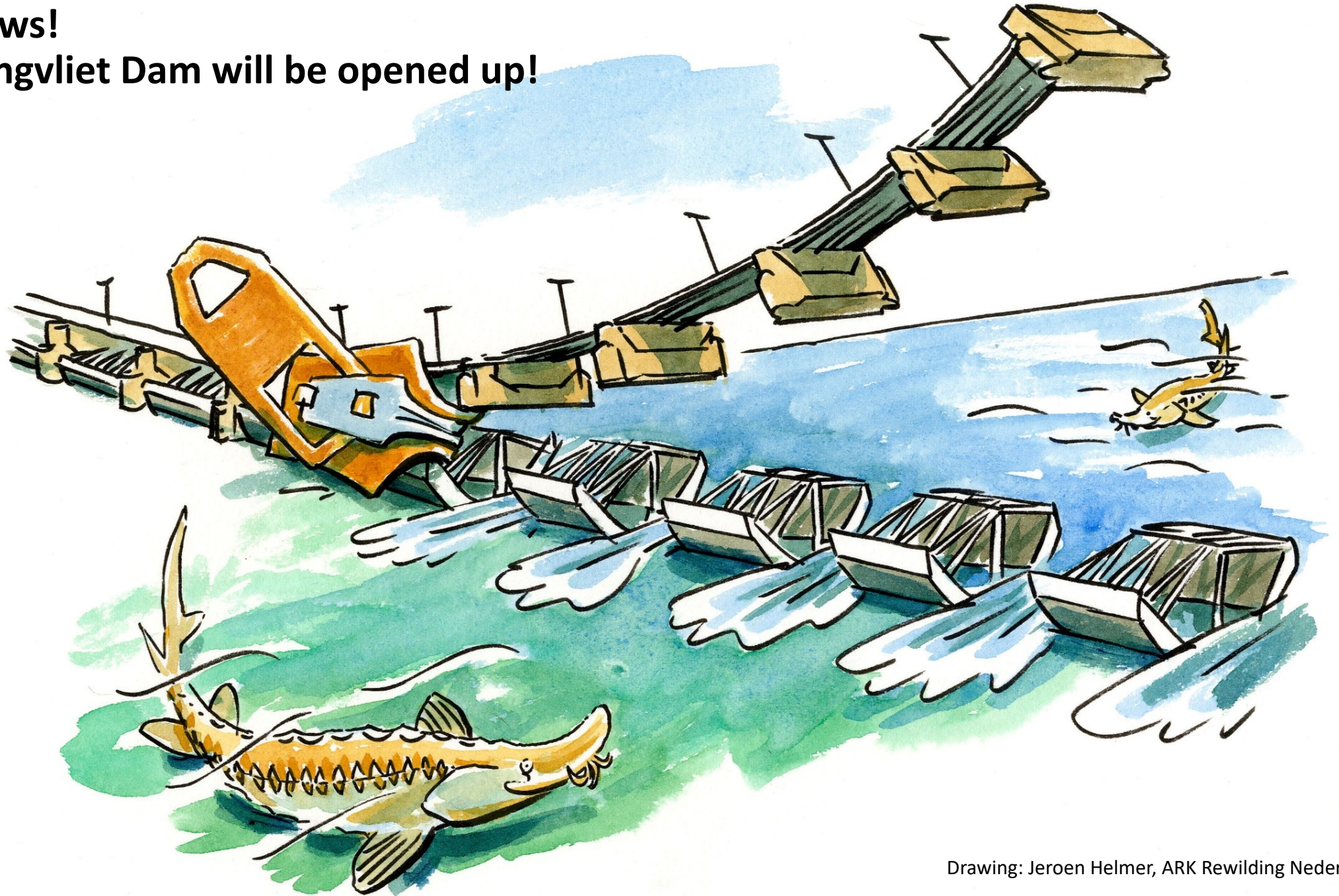
**The Haringvliet Dam discharge sluices will be opened up
To improve fish migration!**

<https://www.rijkswaterstaat.nl/water/projectenoverzicht/haringvliet-haringvlietsluizen-op-een-kier>

<https://www.kierharingvliet.nl/>



Good News!
The Haringvliet Dam will be opened up!



6. European sturgeons tagged for radio telemetry 2012 and 2015

Received: 5 December 2017 | Revised: 26 April 2018 | Accepted: 17 September 2018


DOI: 10.1111/jai.13815



STURGEON PAPER

WILEY Journal of Applied Ichthyology 

Outmigration pathways of stocked juvenile European sturgeon (*Acipenser sturio* L., 1758) in the Lower Rhine River, as revealed by telemetry

Niels W. P. Brevé¹  | Hendry Vis² | Bram Houben³ | André Breukelaar⁴ | Marie-Laure Acolas⁵

MI.GA.DO in southern France

Rearing station of European sturgeon





1 month



12 months



3 months



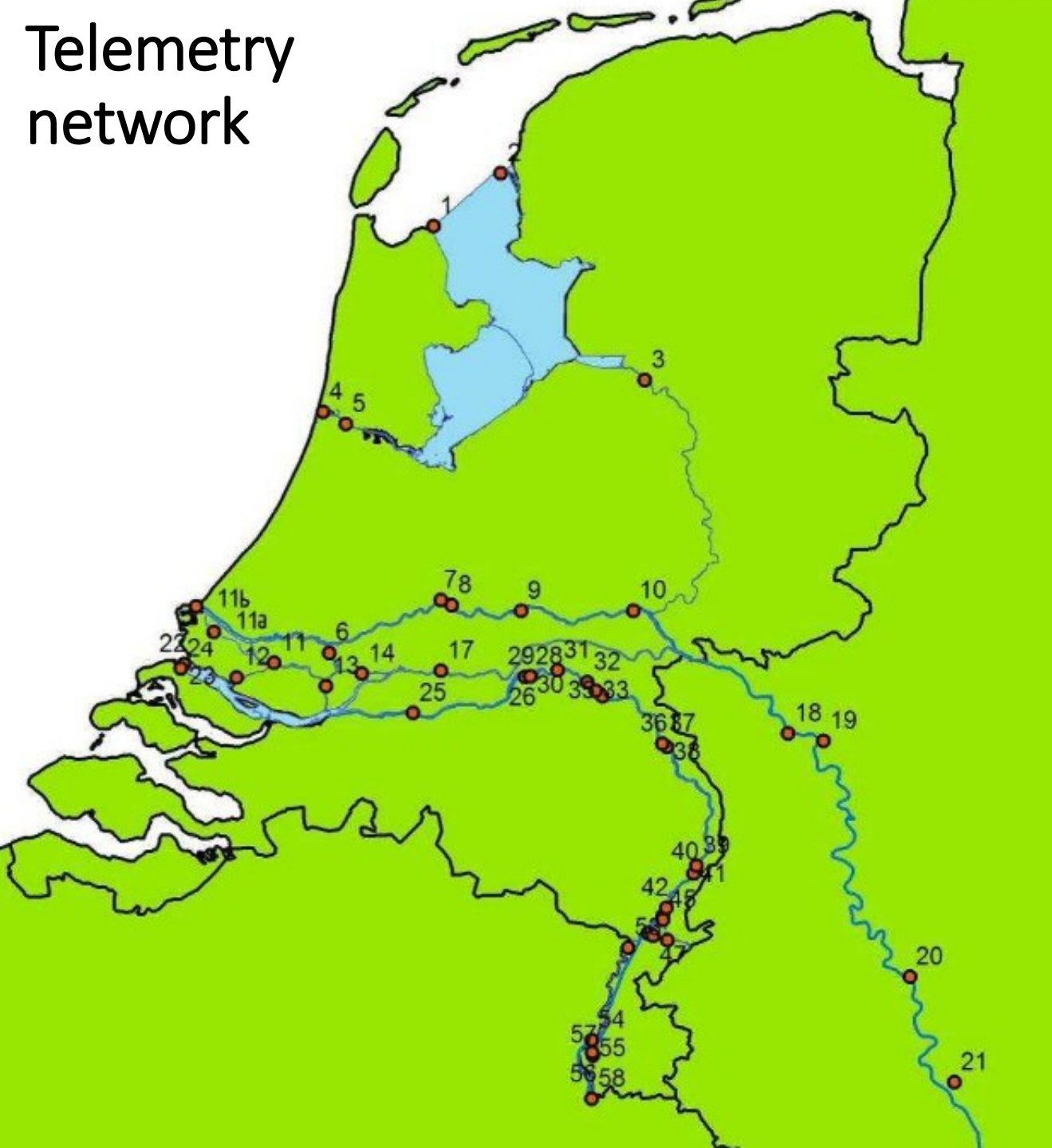
Three years old European sturgeon



Sturgeons were released in the Rhine at the Dutch-German border

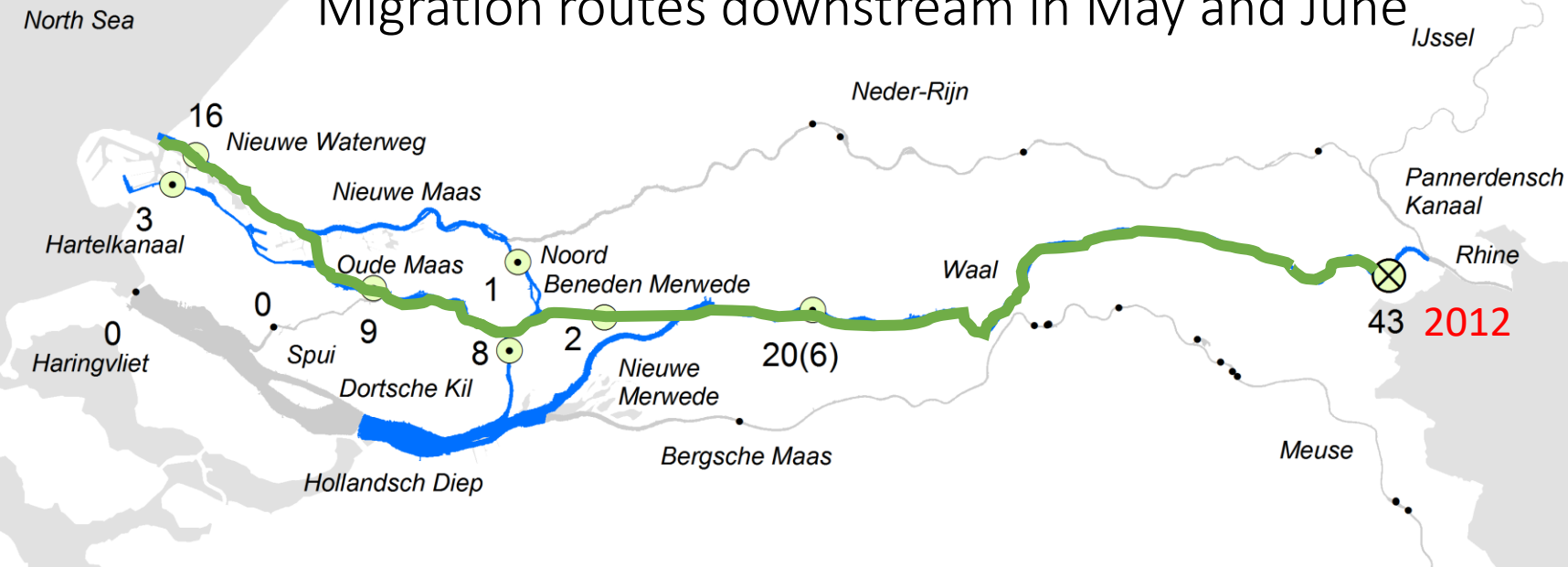


Telemetry network



a

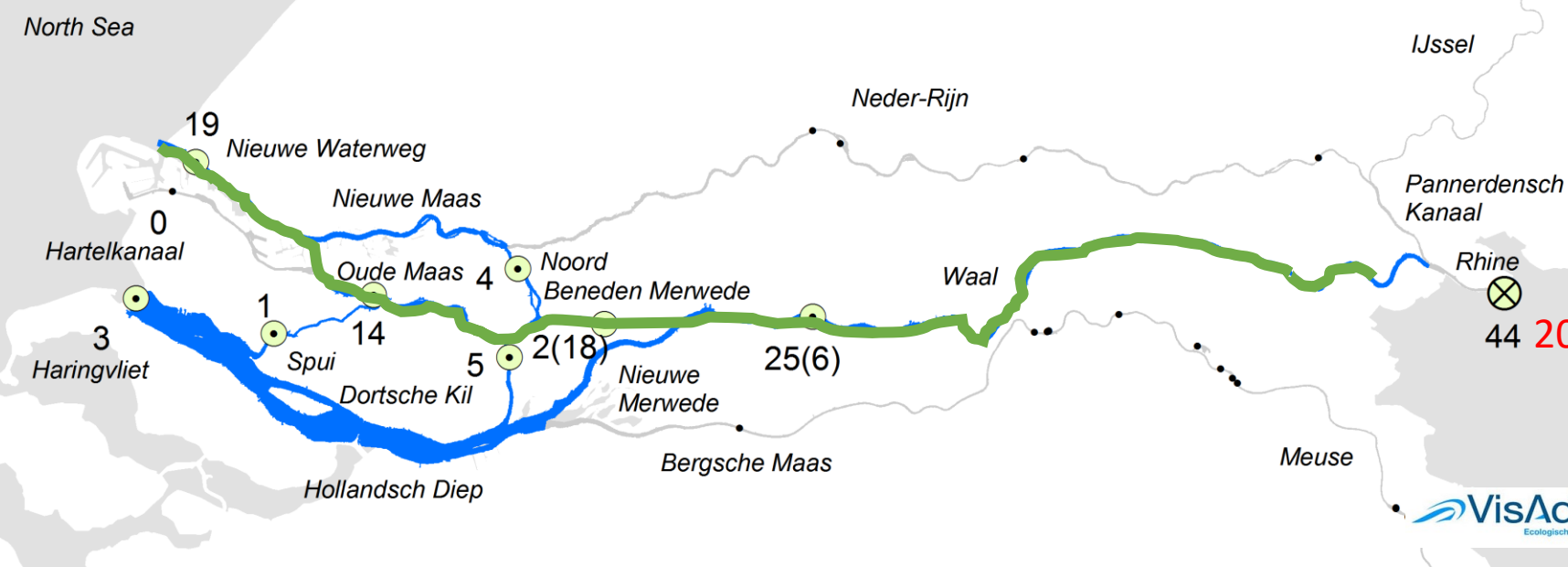
Migration routes downstream in May and June



Fish found the sea
Via the Port of Rotterdam.
 Not *via* the Haringvliet Dam



b



7. European sturgeons tagged for **acoustic** telemetry 2023 and 2024

1 **BRIEF COMMUNICATION**

2

3 **Surviving young European sturgeons *Acipenser sturio* go with the flow**

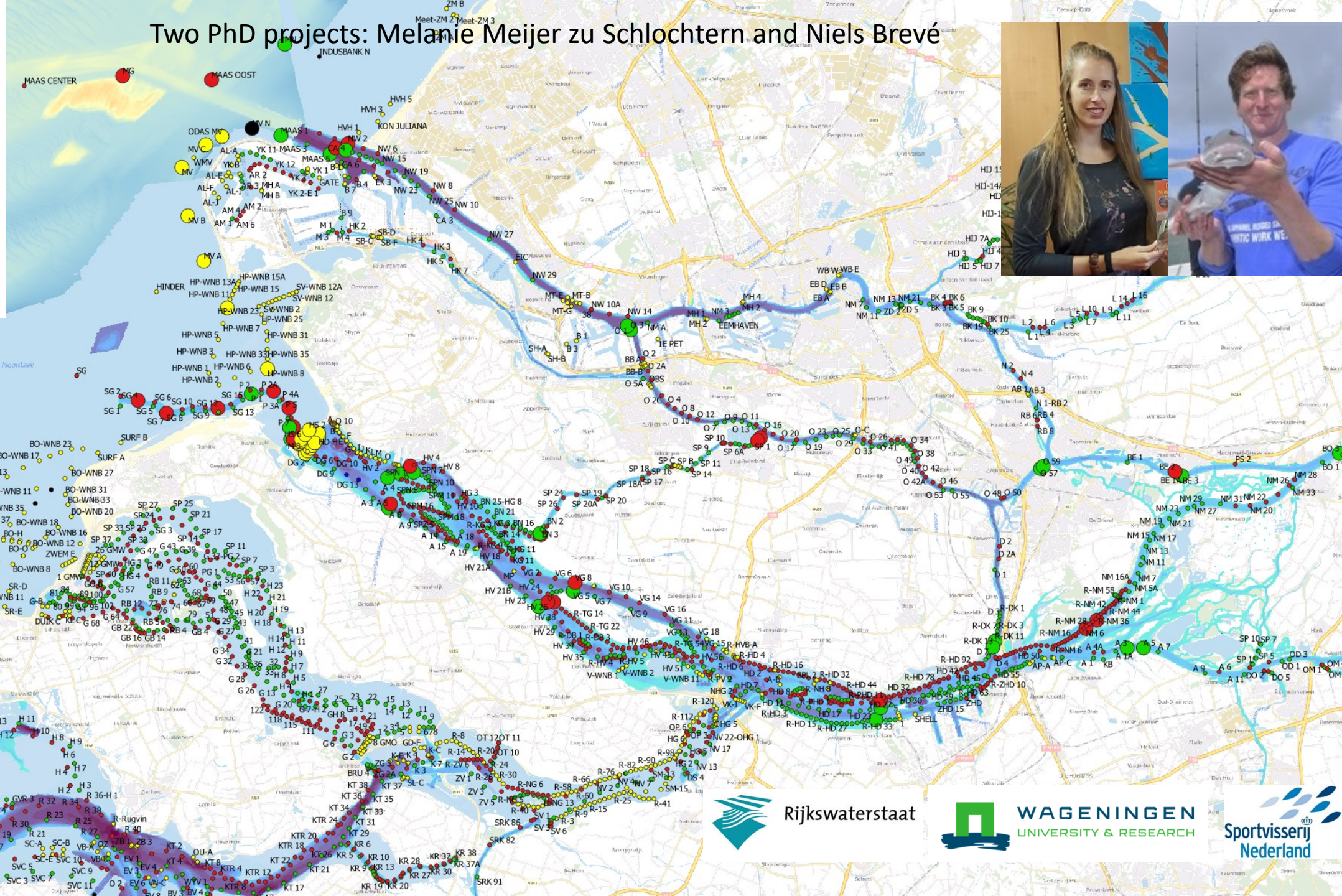
4

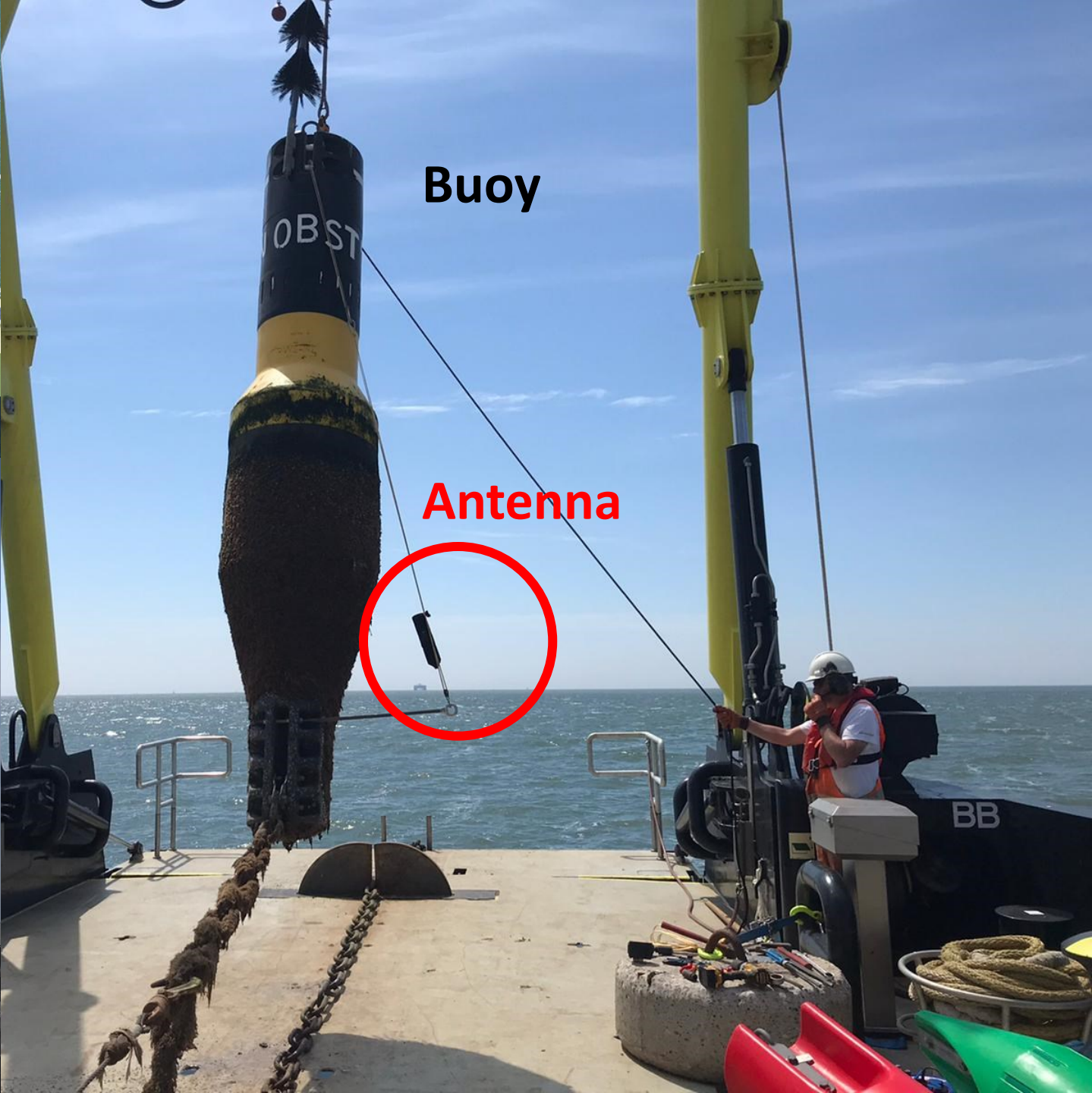
5 Authors: Niels W.P. Brevé^{1,2,3}, Hendry Vis⁴, Remko Verspui³, Vanessa Lauronce⁵, Arno Veenstra⁴, Anthonie D. Buijse^{1,6},

6 AlberTinka J. Murk² & Leopold A.J. Nagelkerke¹



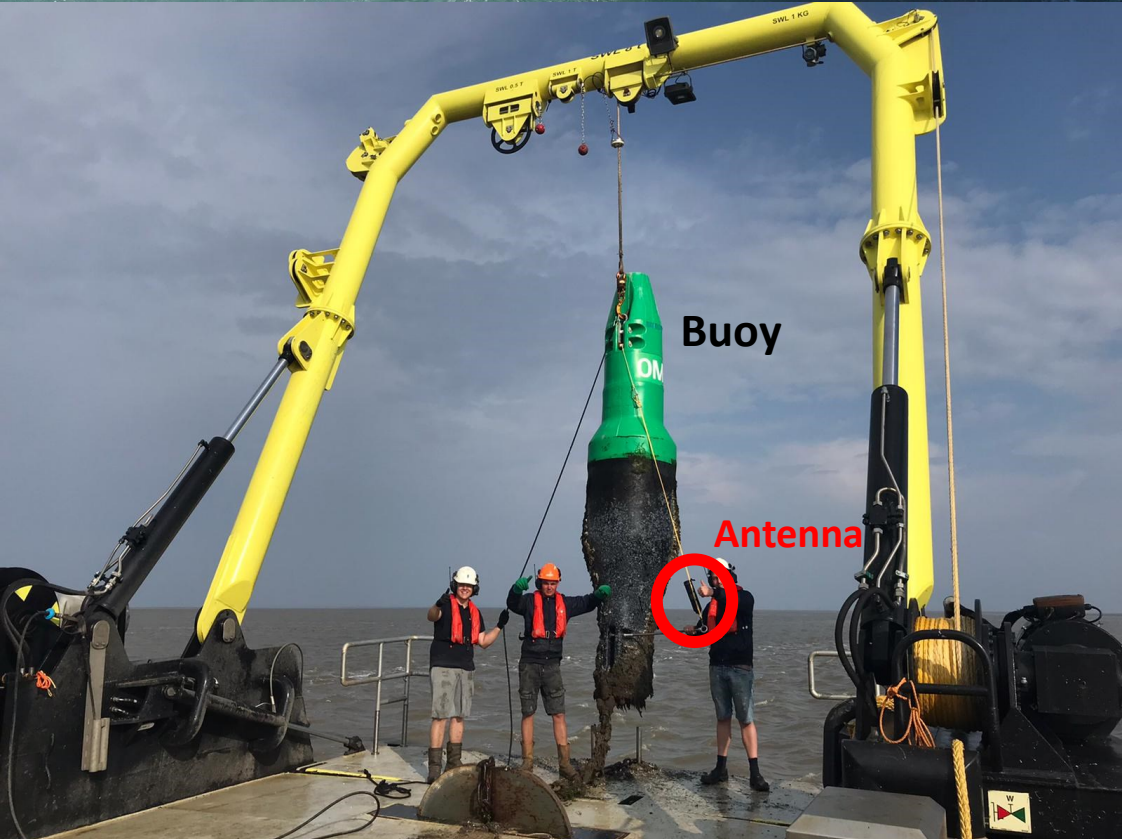
Two PhD projects: Melanie Meijer zu Schlochtern and Niels Brevé





Buoy

Antenna



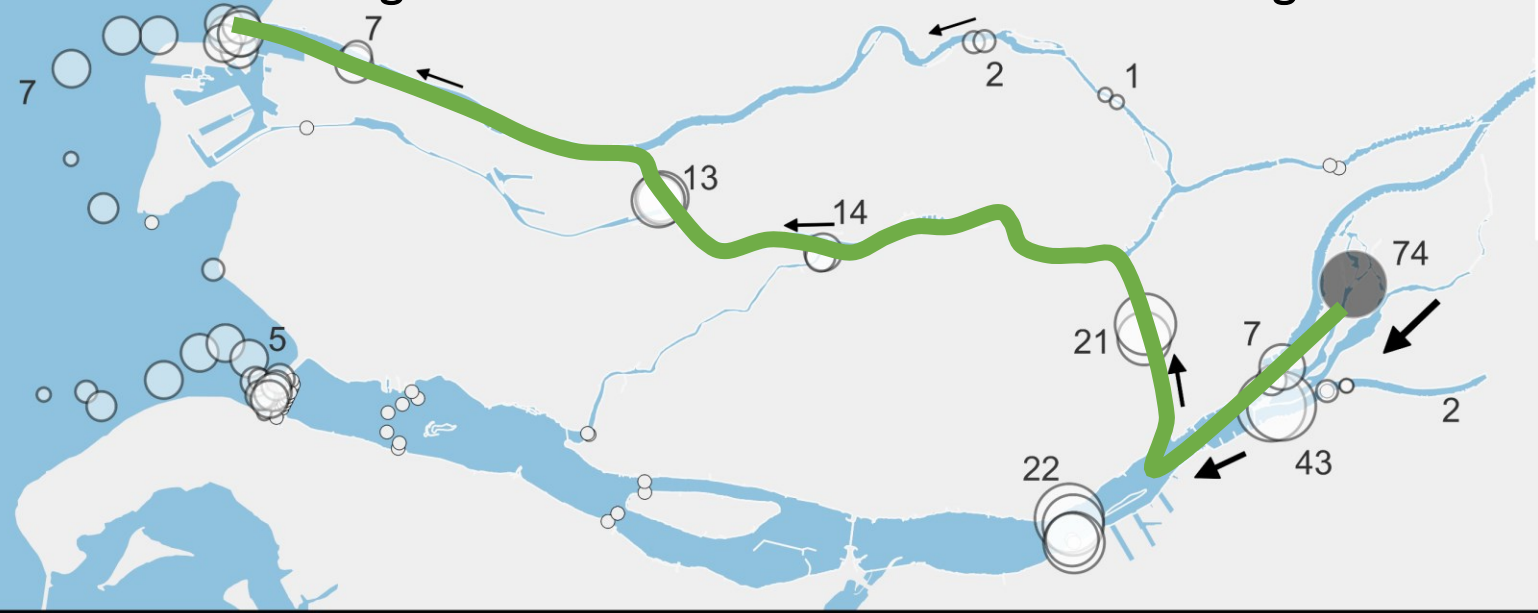
Buoy

Antenna

a

Déjà vu

Migration routes downstream in June and August



2023



b

North Sea

Nieuwe Waterweg

Nieuwe Maas

Oude maas

Dordtsche Kil

Biesbosch

Haringvliet

Amer

Haringvliet Dam

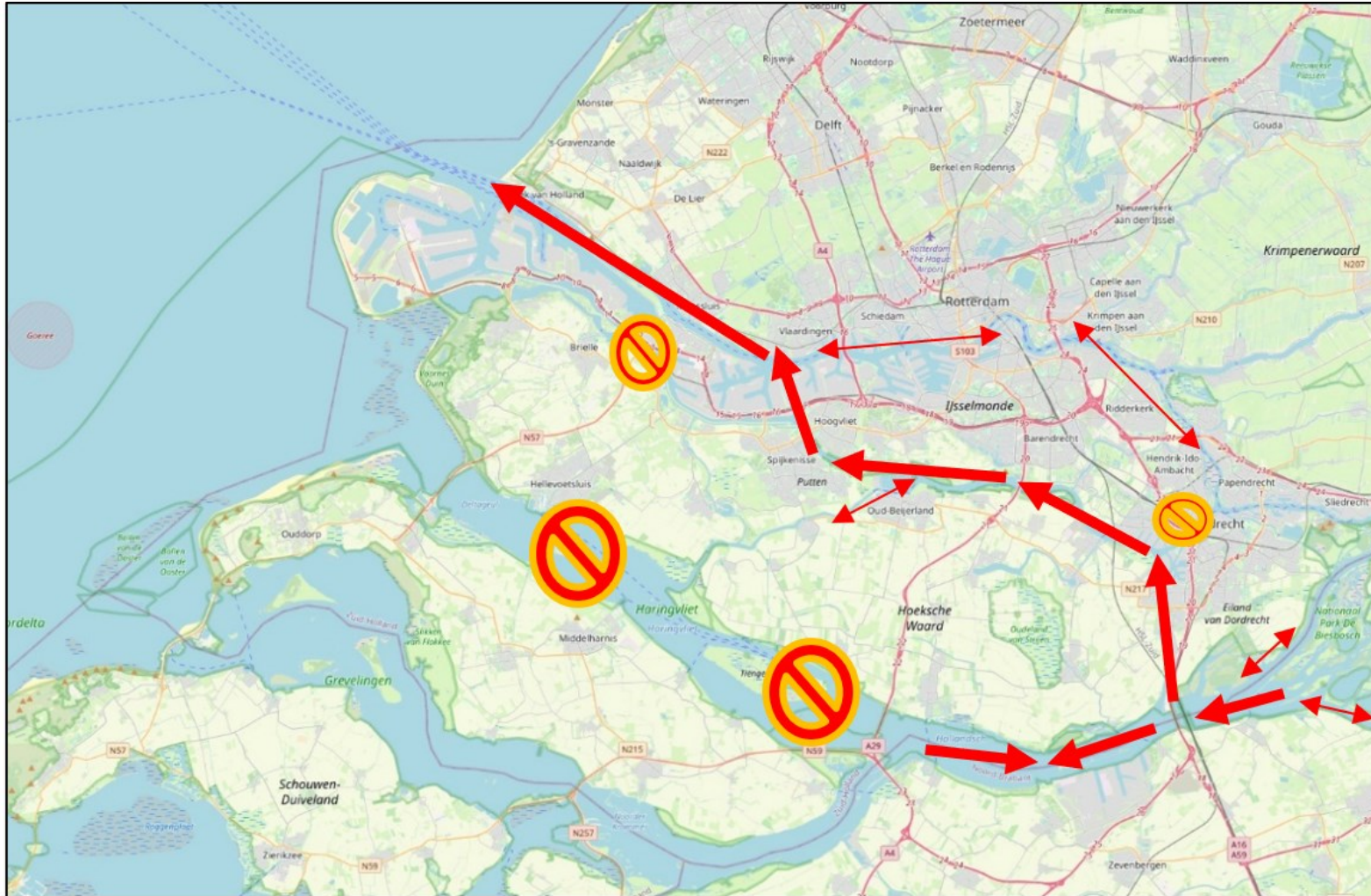
Hollandsch Diep

10 km



Conclusion: Sturgeons Go with the flow

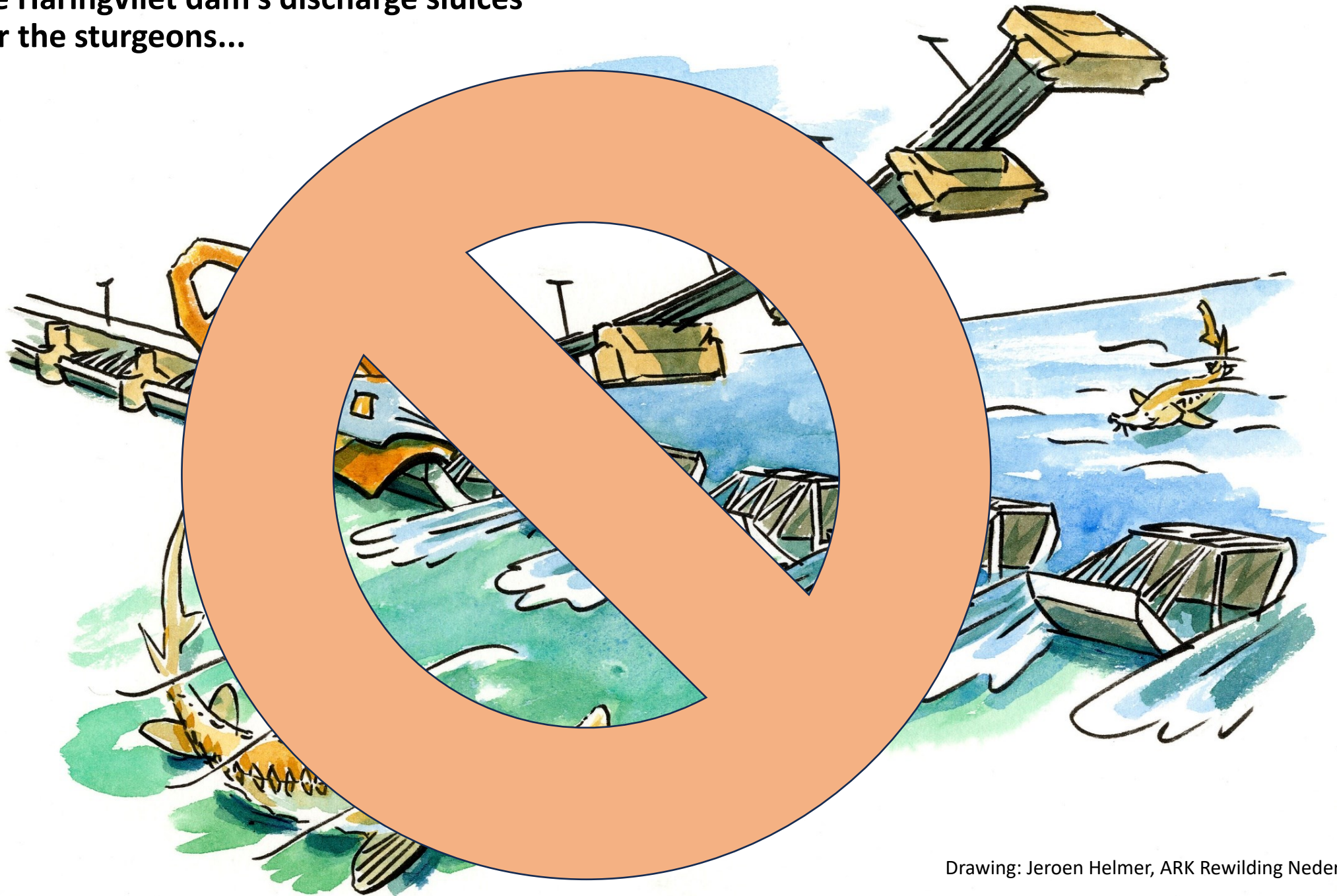
The Historical estuary of rivers Rhine and Meuse is **CLOSED** during DRY summer months.



The port of Rotterdam is the main highway for fish and ships.



Conclusion: The Haringvliet dam's discharge sluices
Do **not work** for the sturgeons...



Drawing: Jeroen Helmer, ARK Rewilding Nederland

Thank you so much for your attention!

