



Rijkswaterstaat
Ministry of Infrastructure
and Water Management

Restoring and optimizing ecological connectivity in the North Sea Canal region

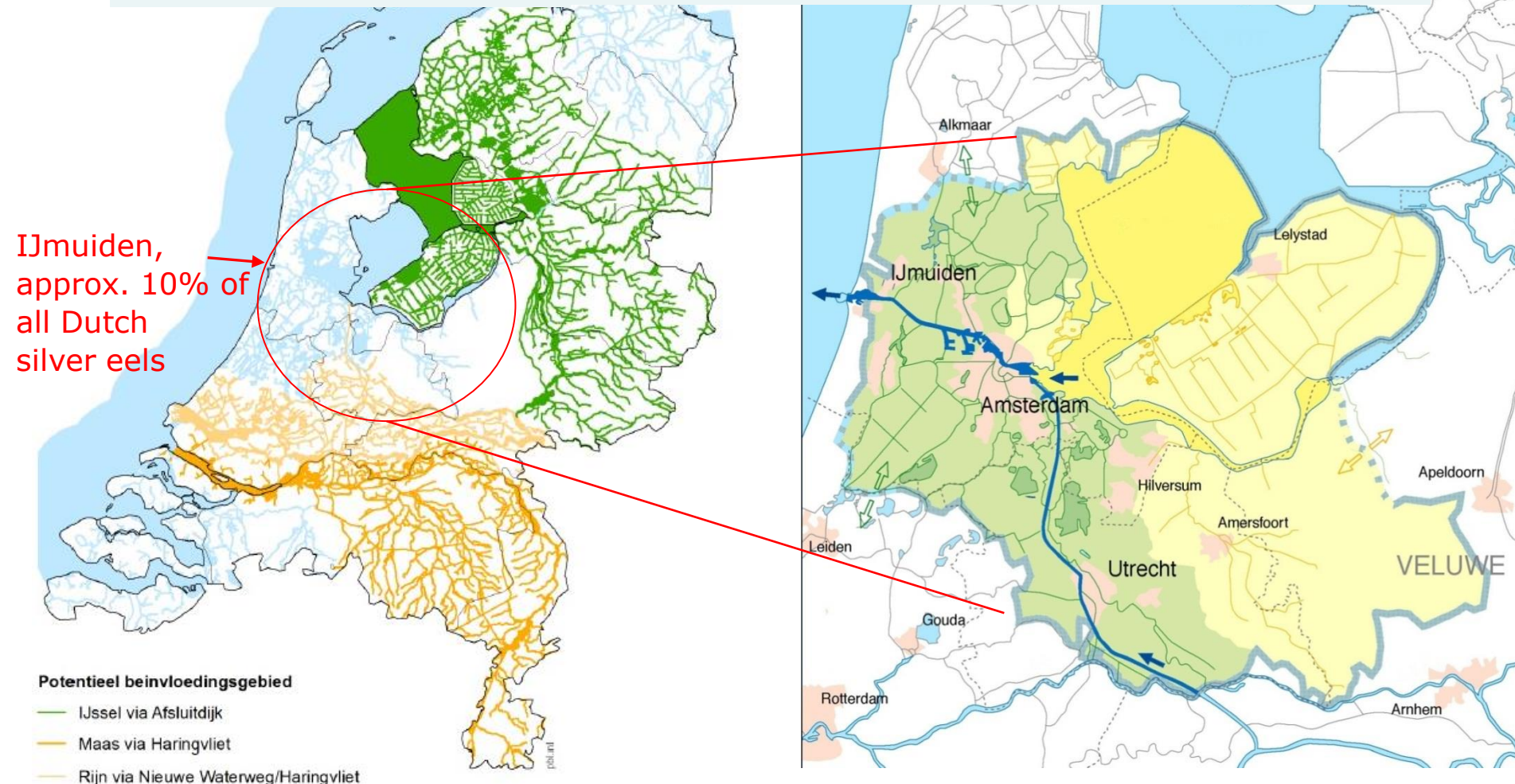
With preliminary results
of research on fish
migration

Marco van Wieringen

14 september 2018 (IENE 2018)



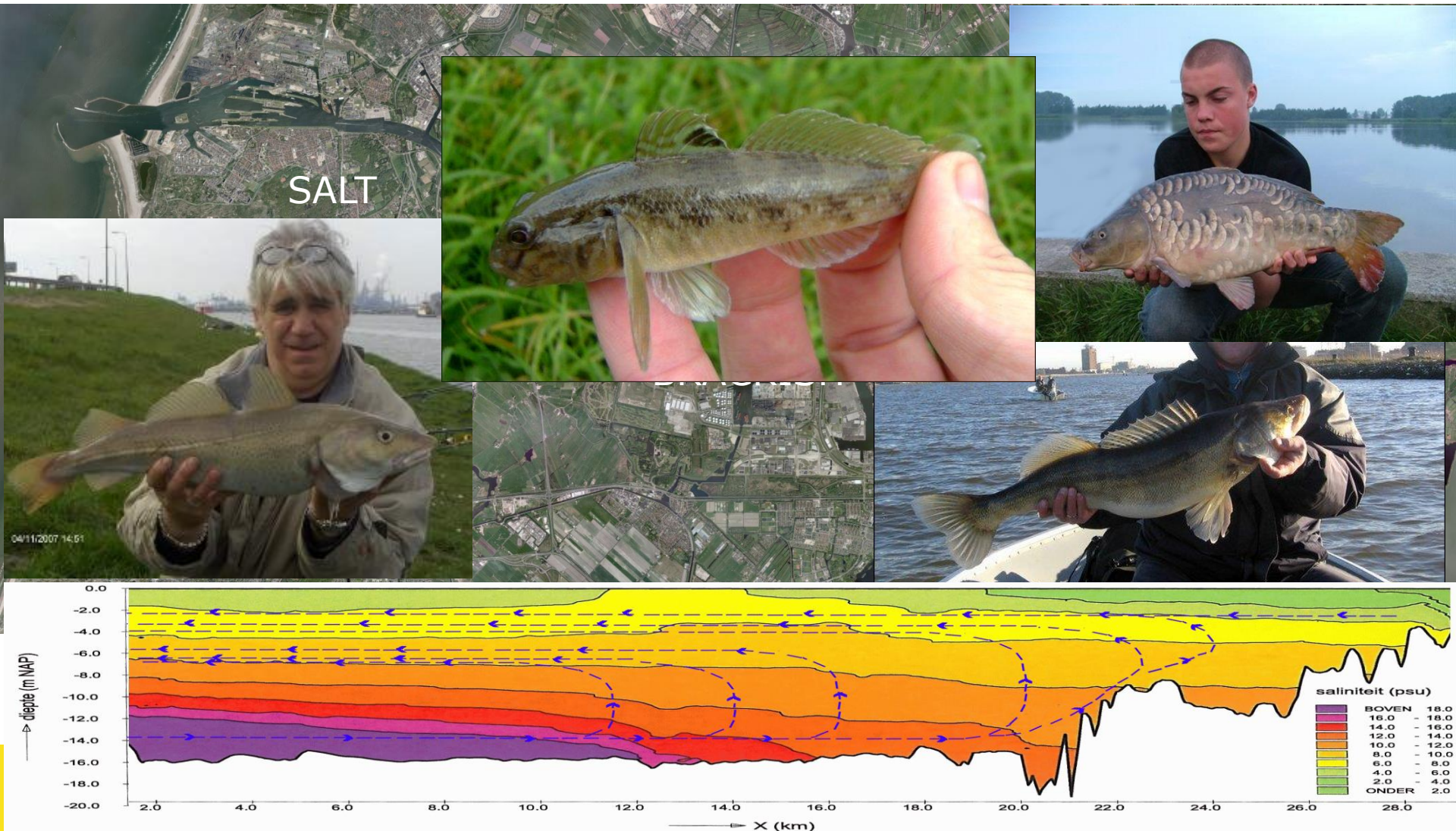
North Sea Canal: 'a highway for fish and ships'





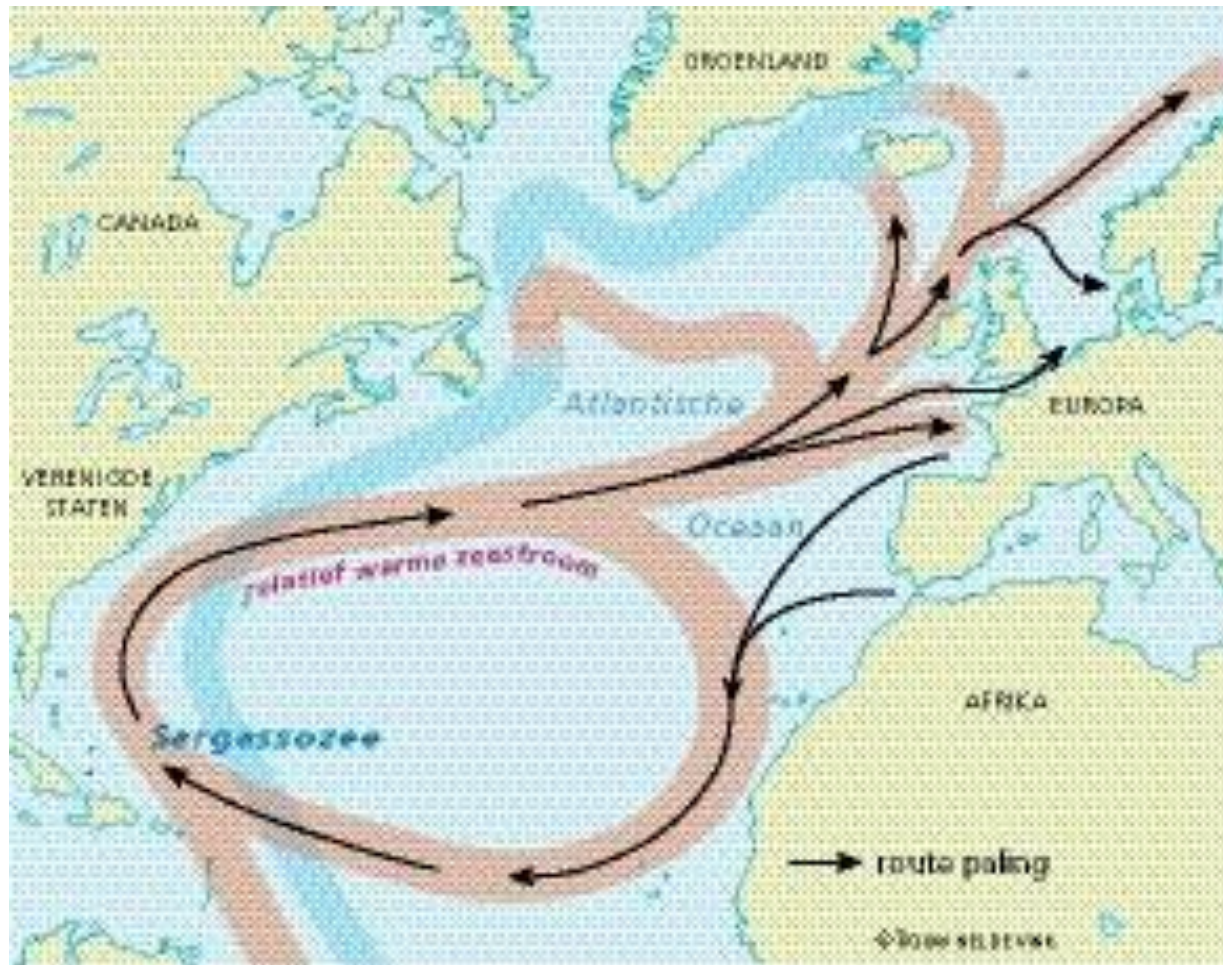


Main ecological asset: salinity transition zone



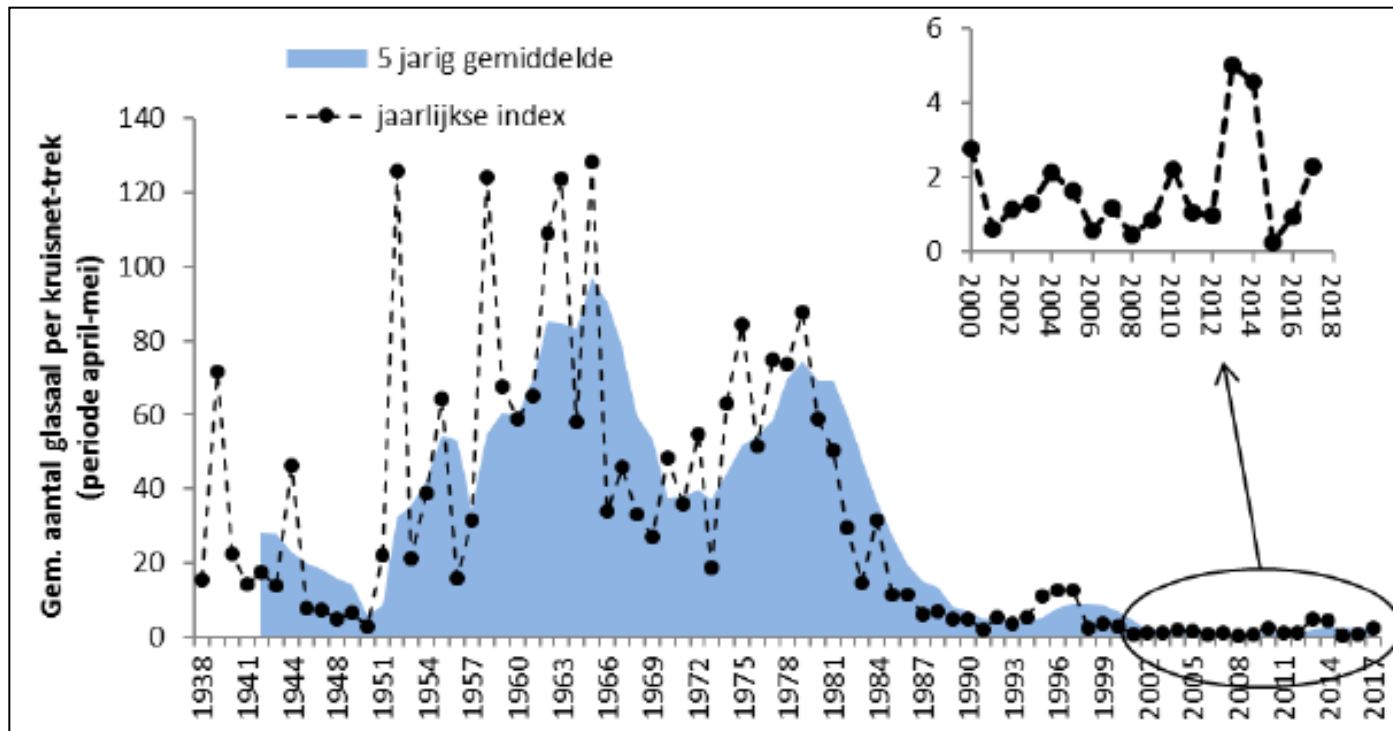


Migratory fish: eel





Influx glass eel at Den Oever (Lake IJssel)





Fishpassages North Sea Canal: working together





Now it's time to evaluate the measures

Integrated monitoring of fishmigration in the North Sea Canal region 2017-2020

- Eight regional partners concluded an agreement
- Focus on migration of eel (glass eel, silver eel) and three spined stickleback, but also the use of fishpassages by fresh water species as roach, pike-perch, carp;
- Research questions: fluxes of migratory fishes, timing and dispersal, behaviour near obstacles. Do the fishpassages operate as expected?
- Advantages of working together: integrated approach of monitoring migration from inland to the sea, acquisition of knowledge on fishmigration at the level of the whole watersystem, comparison of measures, more funds to do it all.



Monitoring migration silver eel (2017-2018)

Two methods:

- Acoustic telemetry (VEMCO technique)

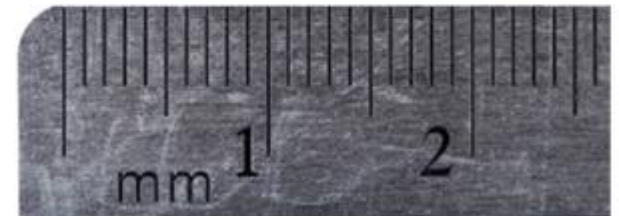


- PIT tags (passive integrated transponder)

Acquire knowledge on:

- Individual behaviour
- Integrated movements of individuals from hinterland to the sea

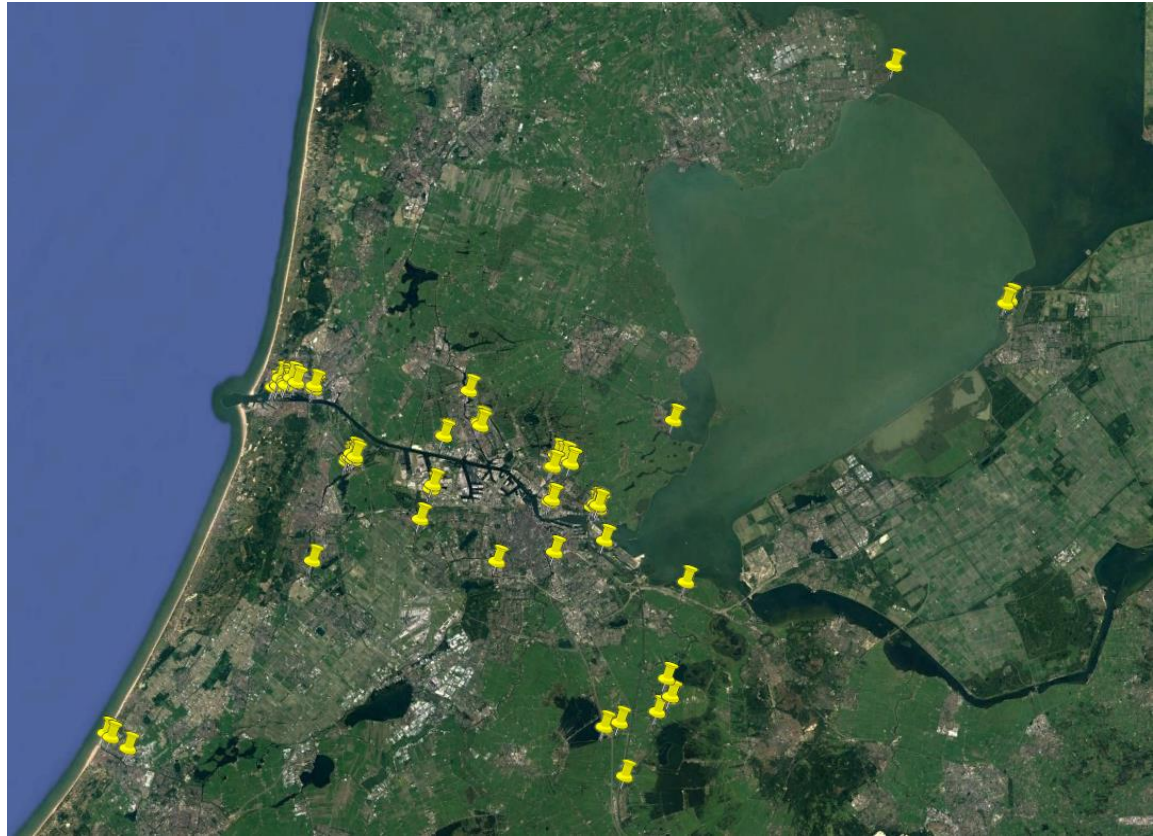
Passive Integrated Transponder (PIT) tags





Network acoustic telemetry (Wageningen Marine Research)

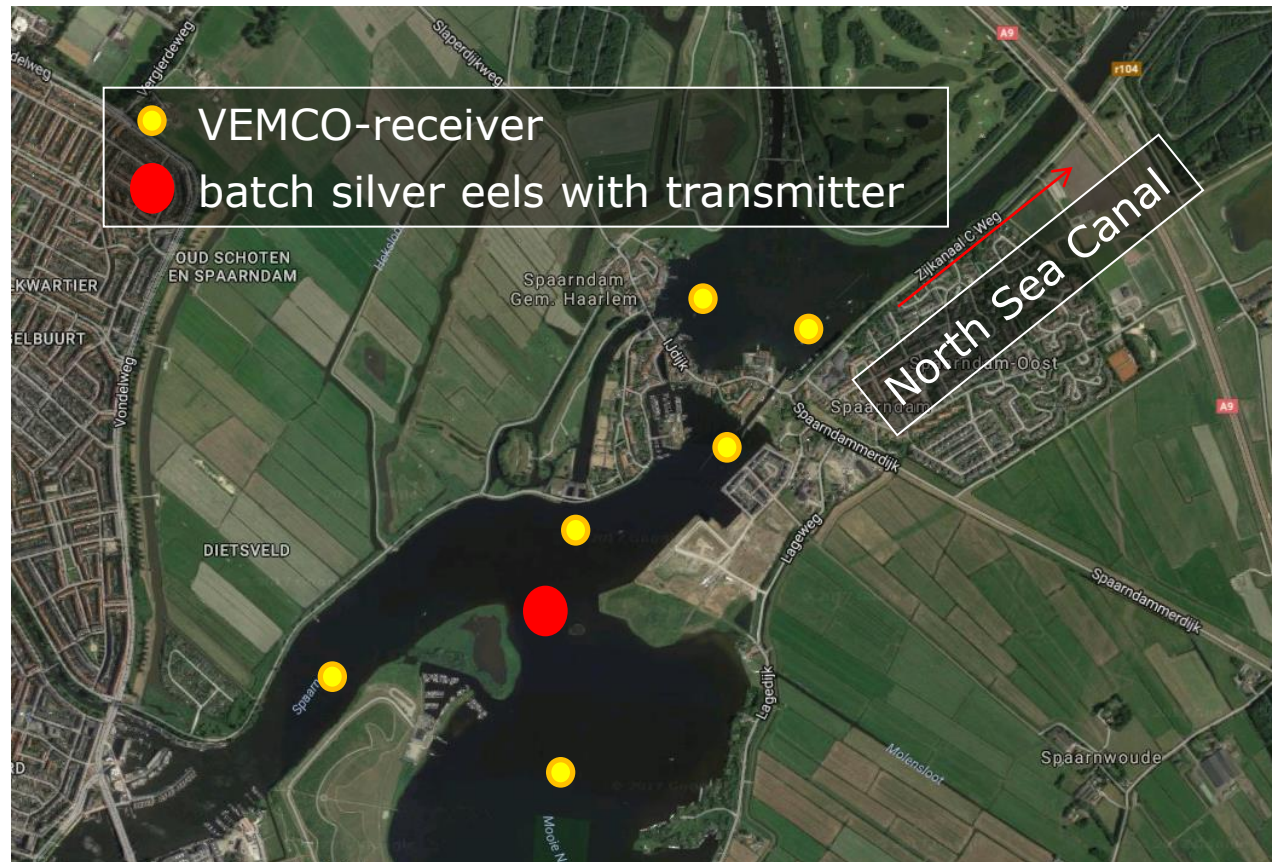
- 64 receivers in the North Sea Canal and its surroundings
- 330 silver eels with transmitter (and PIT tag), released in 13 batches of 15 to 50 animals
- Also over 2200 eels with just a PIT tag (measuring the stock and monitoring three fish passages)





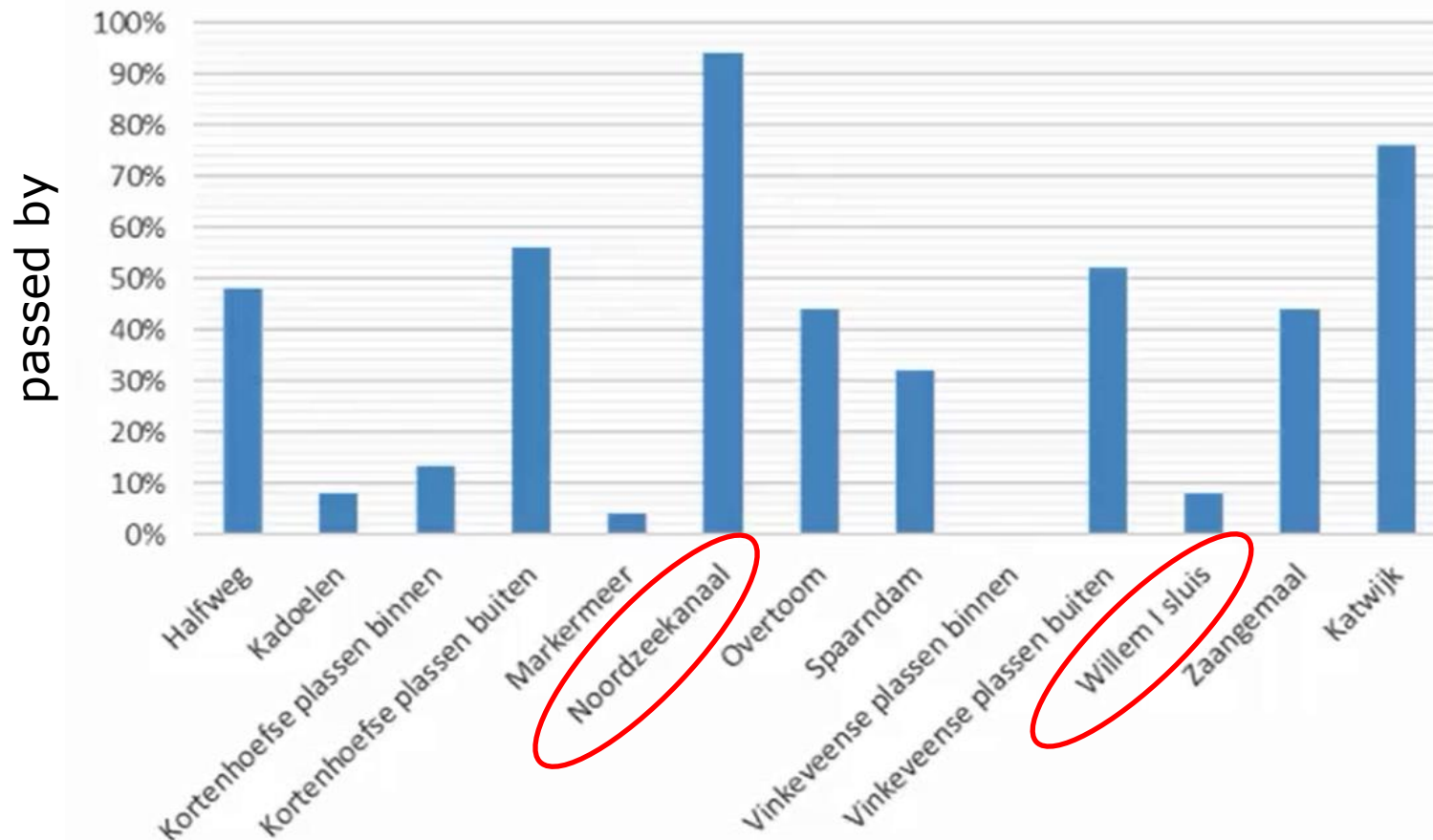
Example: pumping station and sluices at Spaarndam

Receiver:



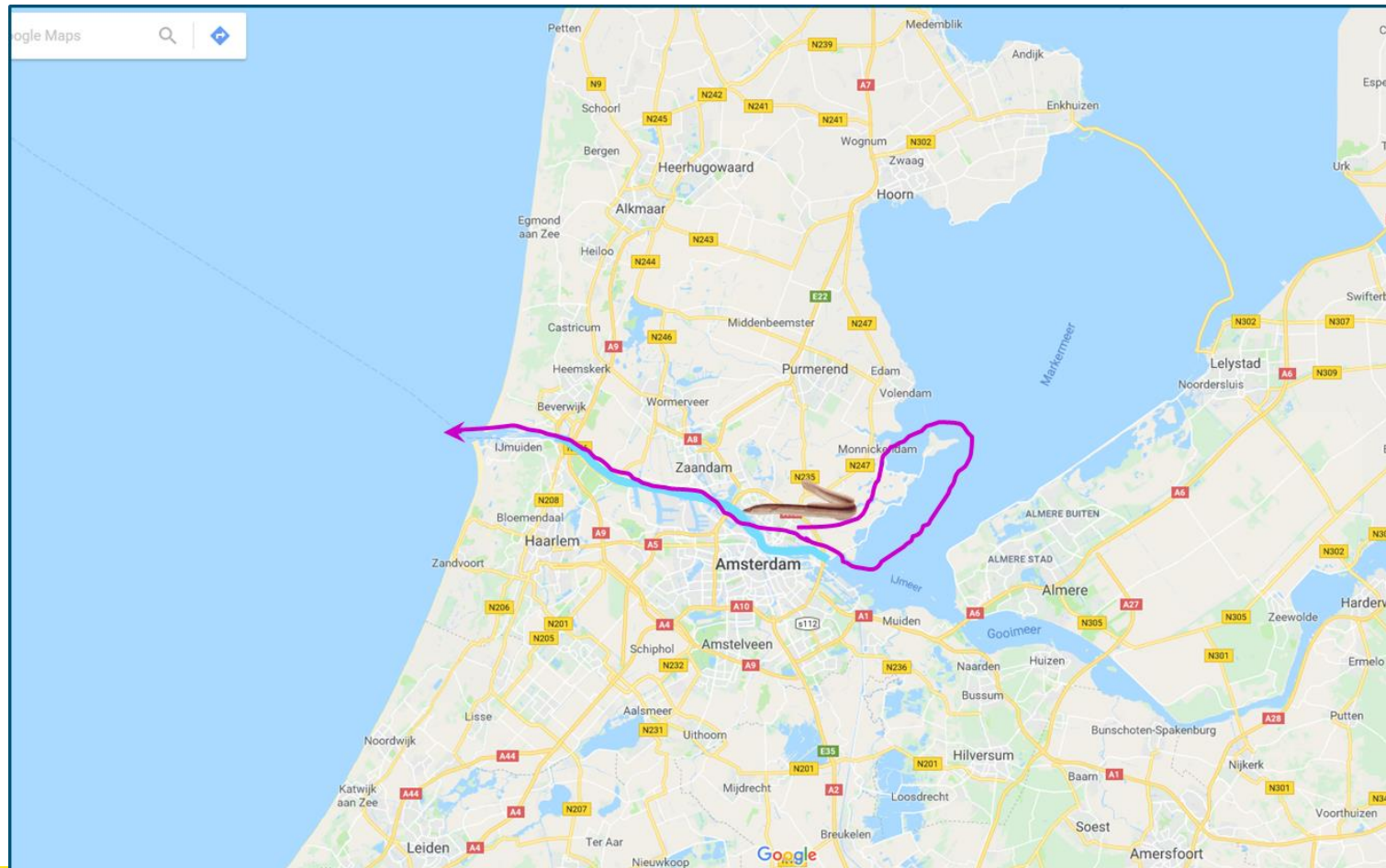


Comparison between obstacles surrounding the North Sea Canal





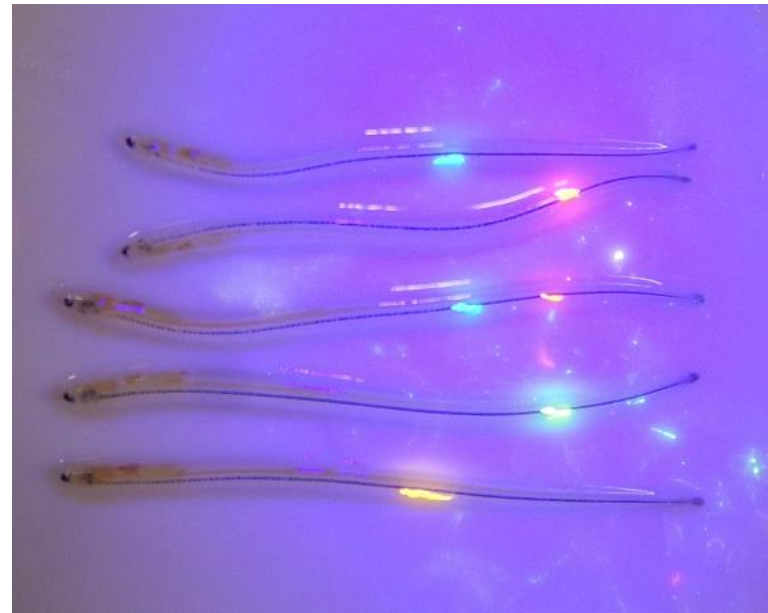
Catched and released in front of the Willem I-sluis taking a detour to reach the sea





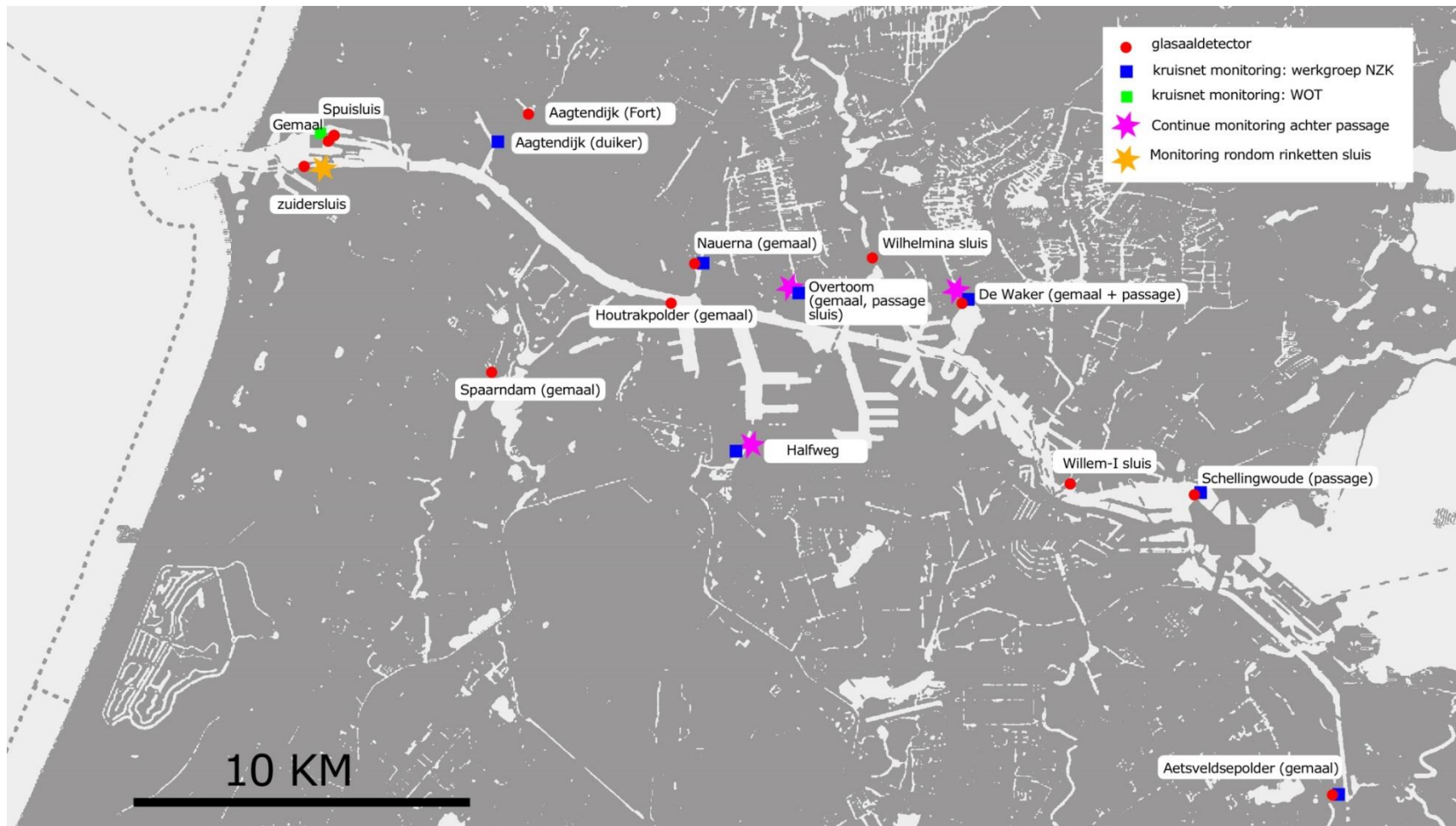
Influx of glass eel and 3-spined stickleback (2018)

- Mark-recapture experiment with VIE-tags (visible implant elastomer)
- Glass eel samplers (12x), volunteers with lift net (9x), monitoring three fish passages



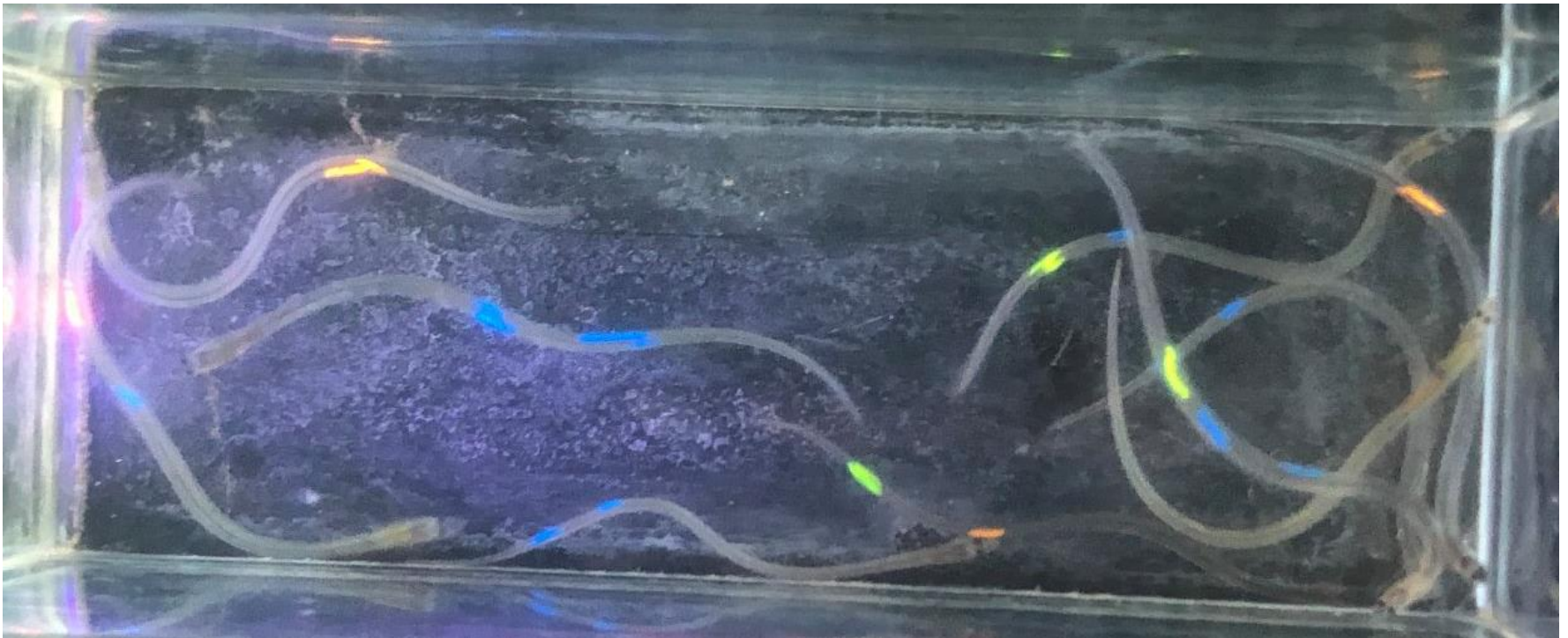


Various catching methods





Some recapture results

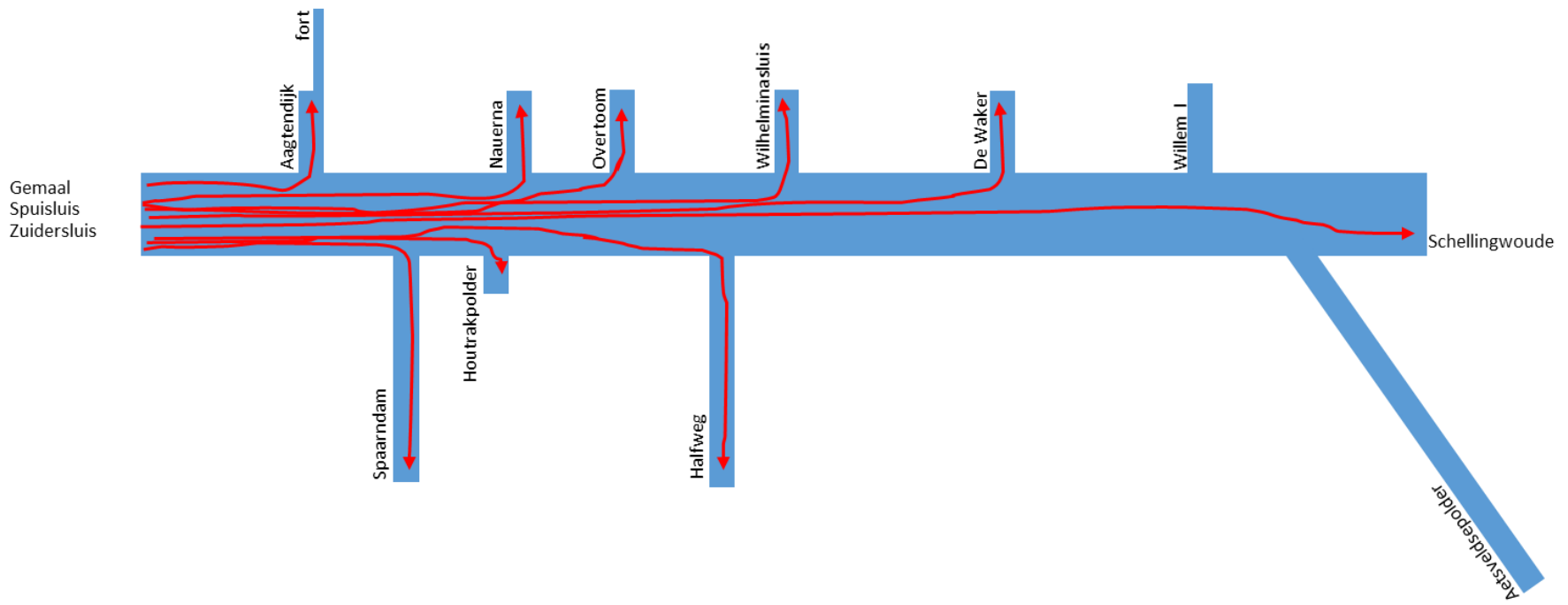






Glass eel has a good dispersion over the area

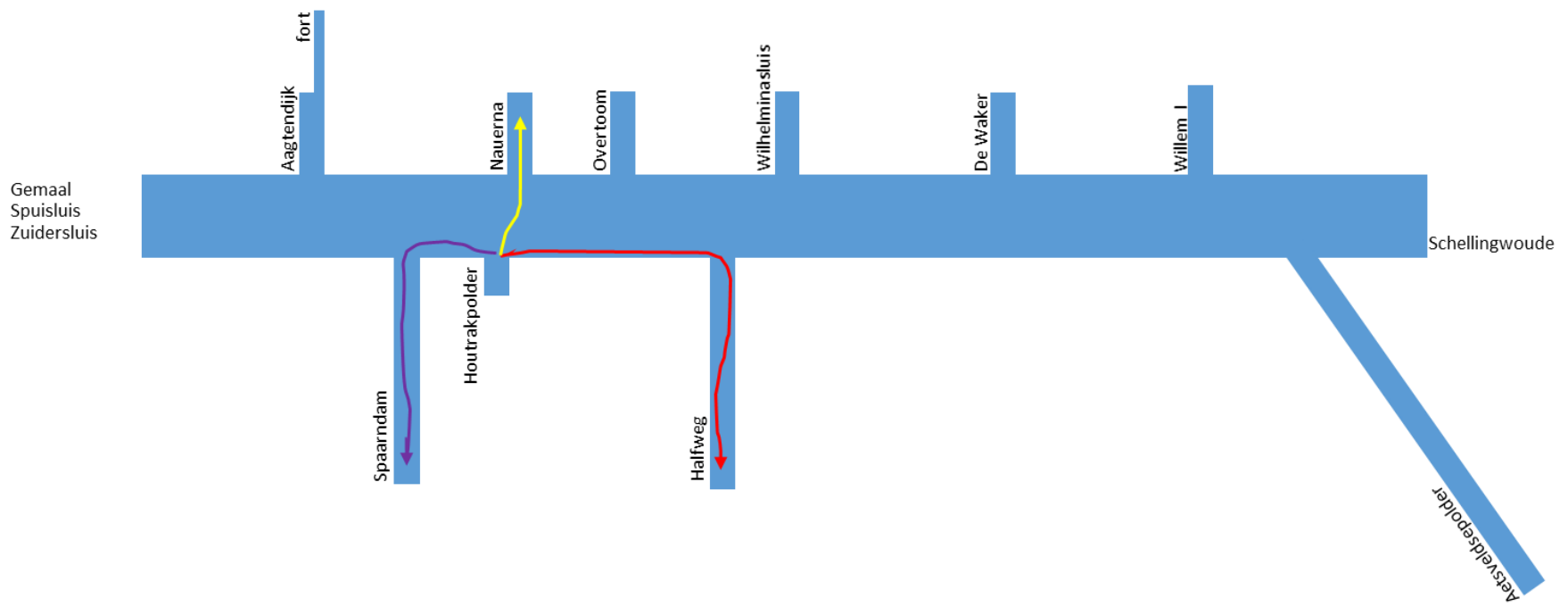
Vanuit IJmuiden





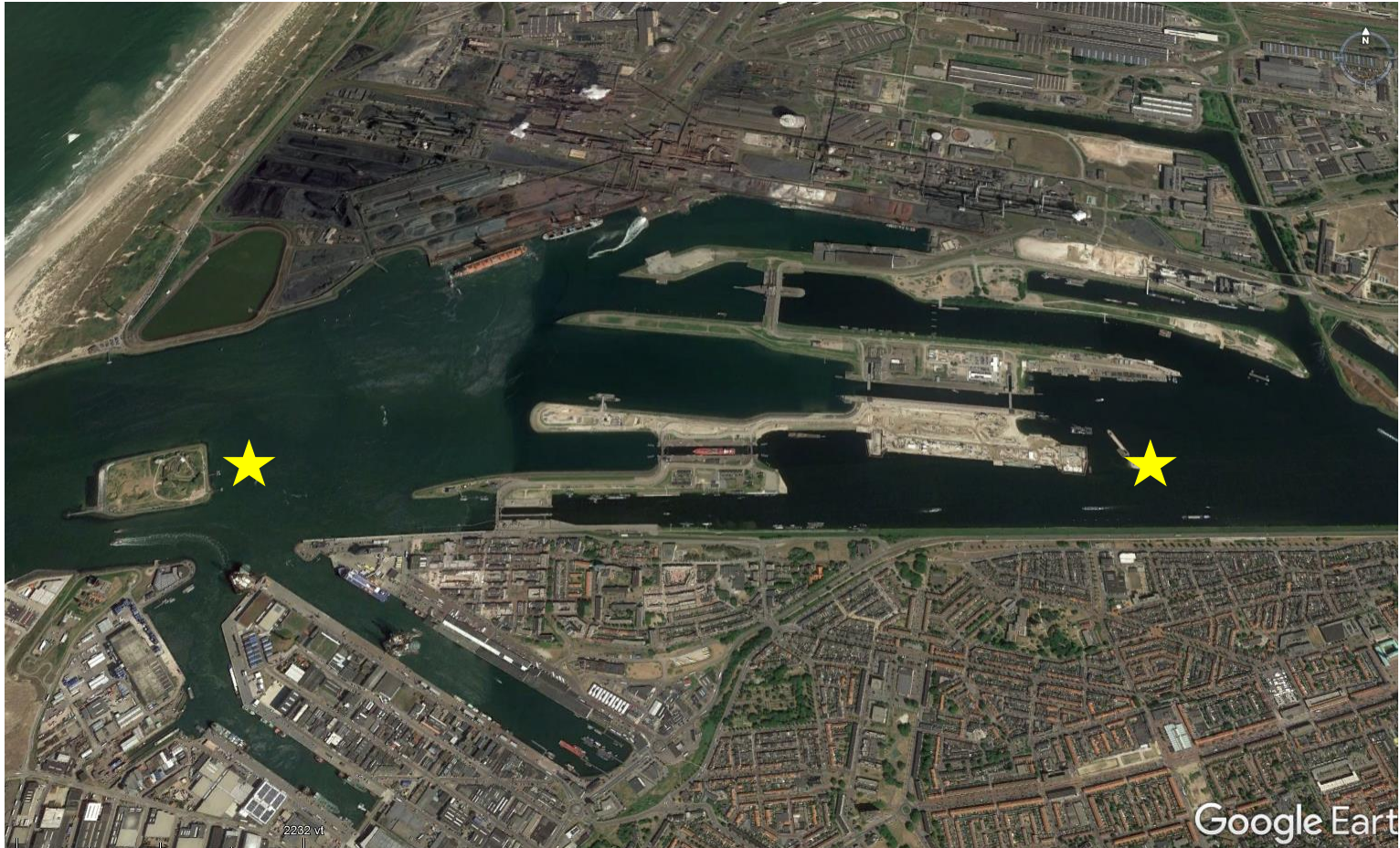
When the entrance is blocked, glass eel tries its luck elsewhere

Vanuit Houtrakpolder





Are the sluices at IJmuiden a barrier?



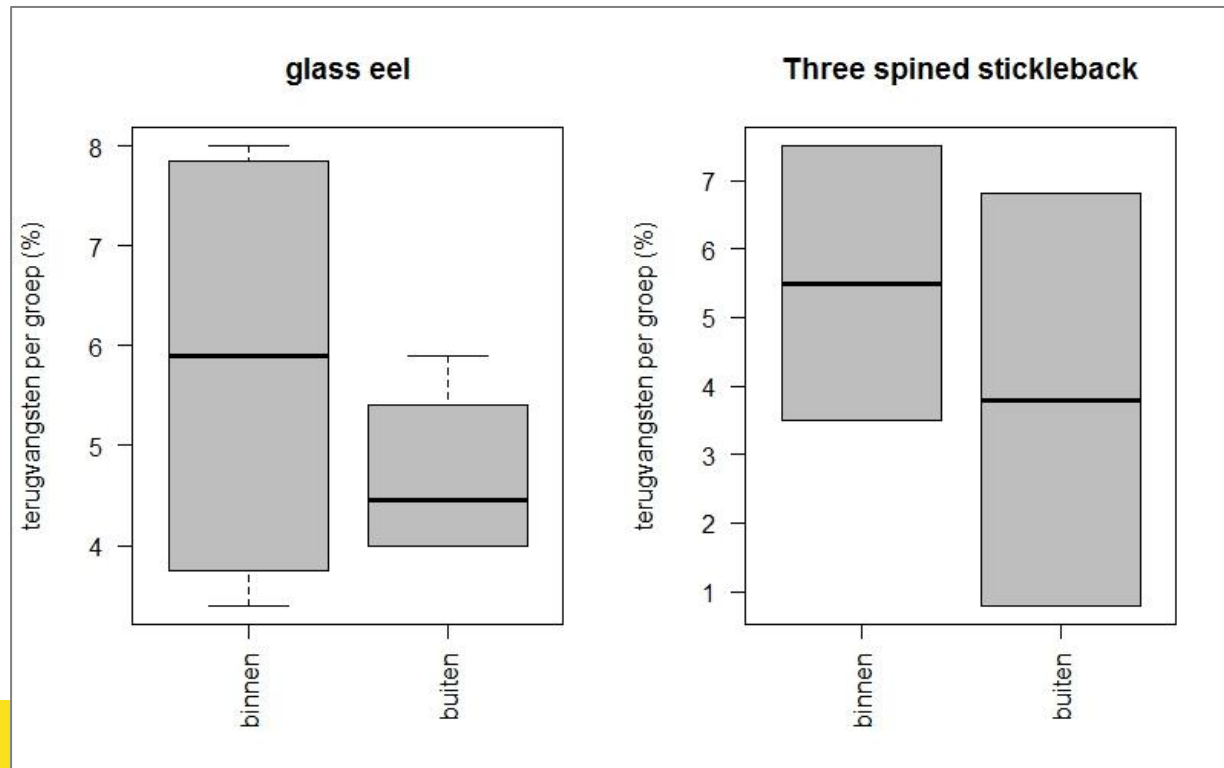


Sea sluices
seems not to
be a barrier:

Recapture
percentage of
fish released
at the sea
side is
comparable
with that of
the canal side

Also delay is
minimal for
both species

recapture	mark	%	location	species
112	1943	5.8	inside	glasaal
100	2036	4.9	outside	glasaal
28	508	5.5	inside	three spined stickleback
19	509	3.7	outside	three spined stickleback





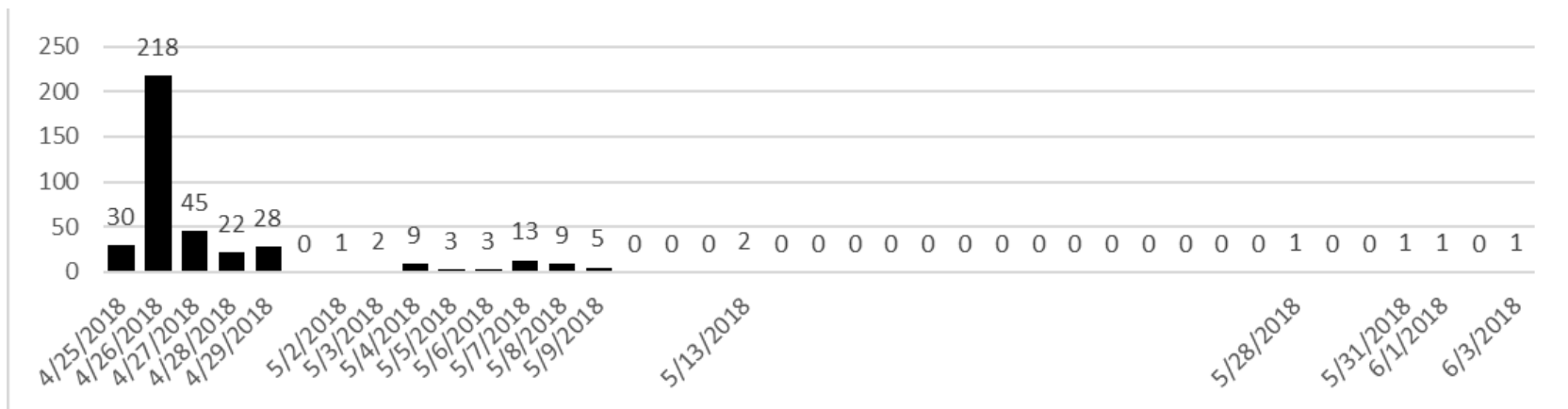
Halfweg fishpassage

- Catch behind fishpassage 454.967 glass eels
- Lift net: 306 glass eels
- Passage effectivity (local mark-recapture experiment): 78.5%

Time of residence near the fishpassage:

Release marked glass eels: 24 april (blue-blue)

Latest recapture: 3 june (40 days)





De Waker fishpassage

- Catch behind fishpassage 760 glass eels
- Lift net: 739 glass eels
- Passage effectivity (local mark-recapture experiment): 0.4%
- After taking some adjustments: 8.0%

Time of residence near the fishpassage:

Release marked glass eels:

24 april (yellow-yellow) & 5 juni (orange-orange-blue)

Latest recapture:

5 june (42 days yellow-yellow)

25 june (20 days orange-orange-blue)



Thank you for your attention!

More info:

Marco.van.wieringen@rws.nl

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Ben Griffioen & Erwin Winter
(Wageningen Marine Research)