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# Ocean Connections: Potential Measures to Strengthen Diadromous Fish Stocks in the Wadden Sea

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Philippart, Katja, "Ocean Connections: Potential Measures to Strengthen Diadromous Fish Stocks in the Wadden Sea" (2016).  
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# Potential measures to strengthen diadromous fish stocks in the Wadden Sea

Katja Philippart

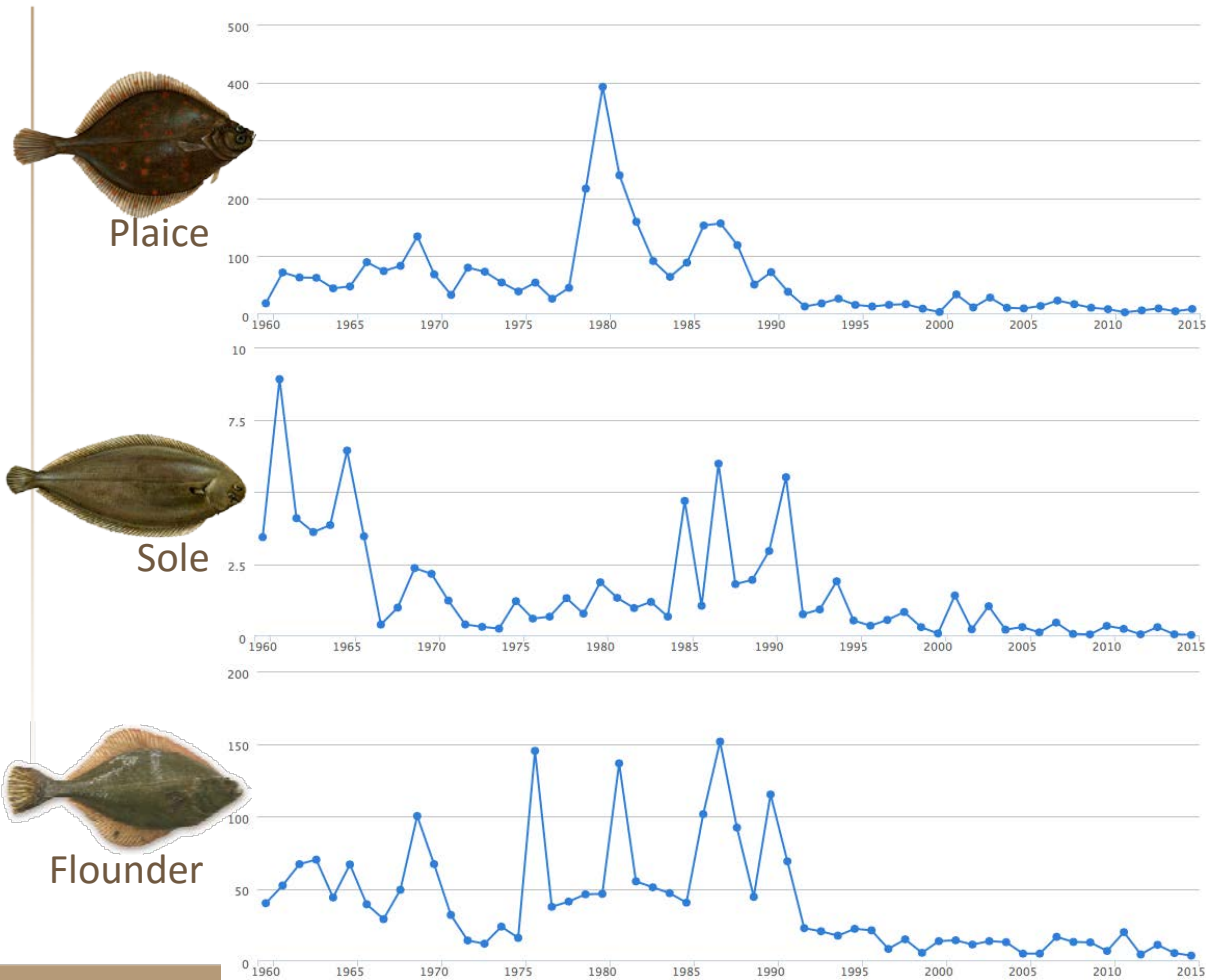
Philippart C.J.M. & M.J. Baptist (2016) An exploratory study into effective measures to strengthen diadromous fish stocks in the Wadden Sea. Position Paper Wadden Academy 2016-02, [www.waddenacademie.nl](http://www.waddenacademie.nl)

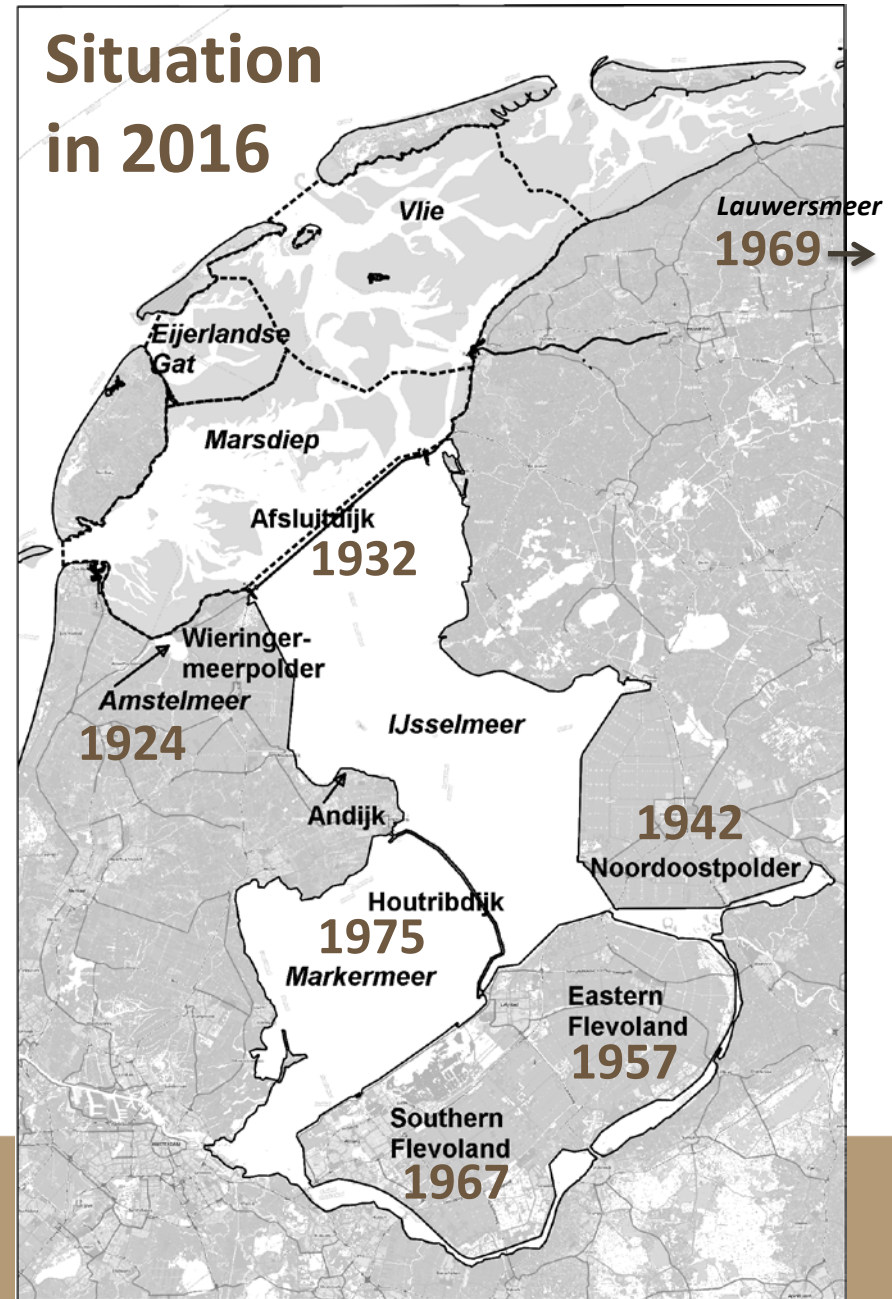
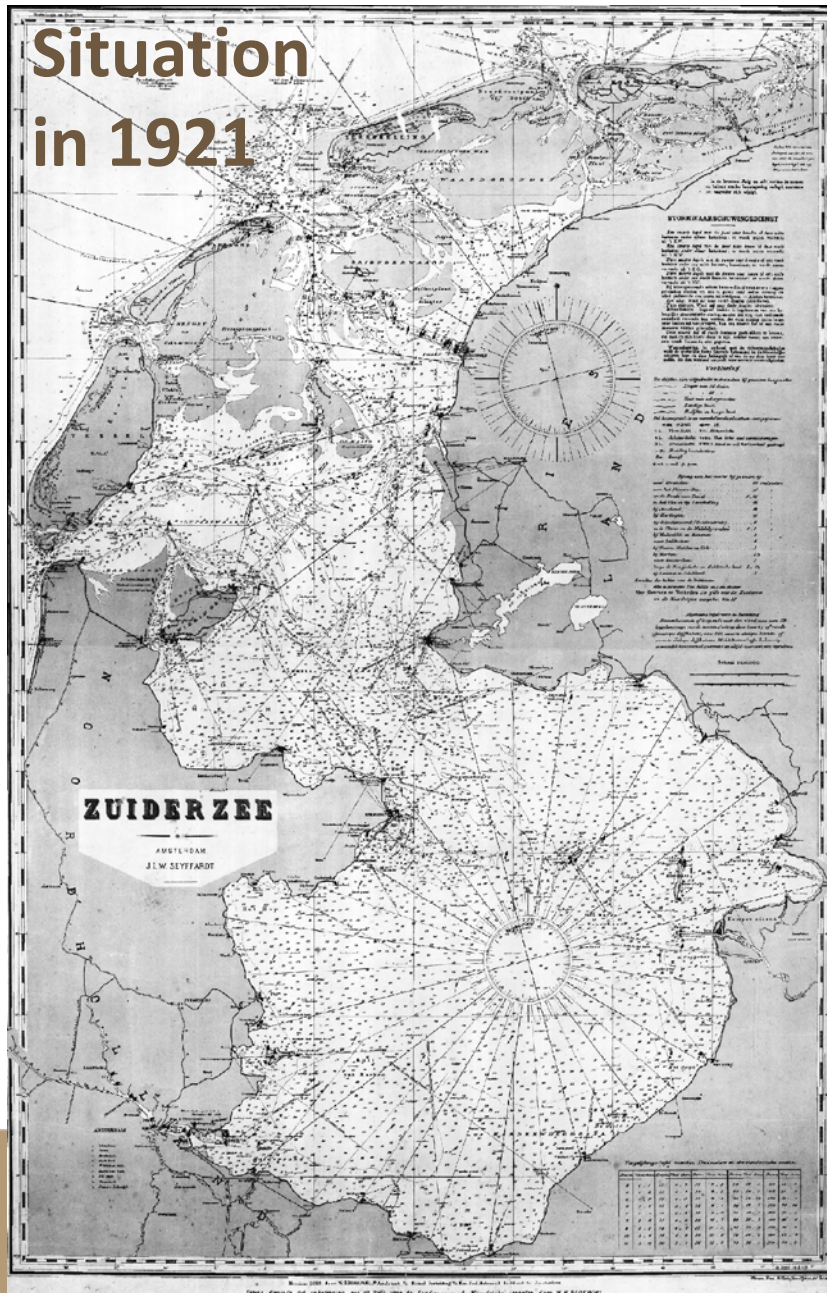
Fish Passage 2016, 20-22 June 2016, Amherst, USA








waddenacademie

# Observed decline in fish stocks in World Heritage Wadden Sea





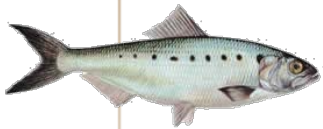
		Cormorants		Seals
		LIJ	WS	WS
	<b>Eel</b>	935.000	0	0
	<b>Herring</b>	0	0	2.420.000
	<b>Twaite Shad</b>	0	25.000	0
	<b>Smelt</b>	39.100.000	860.000	0
	<b>Flounder</b>	0	5.350.000	65.000
		<b>40.000.000</b>	<b>6.200.000</b>	<b>2.500.000 fish y<sup>-1</sup></b>

## By-catch shrimp fisheries in western Wadden Sea



**River Lamprey**

4.500



**Twaite Shad**

210.000



**Smelt**

1.350.000

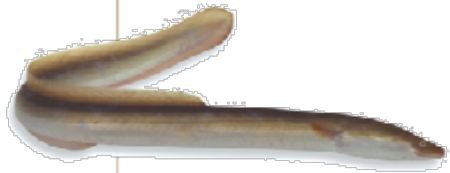


**Flounder**

845.000

**2.400.000 fish per year**

## Targeted fisheries in Lake IJssel



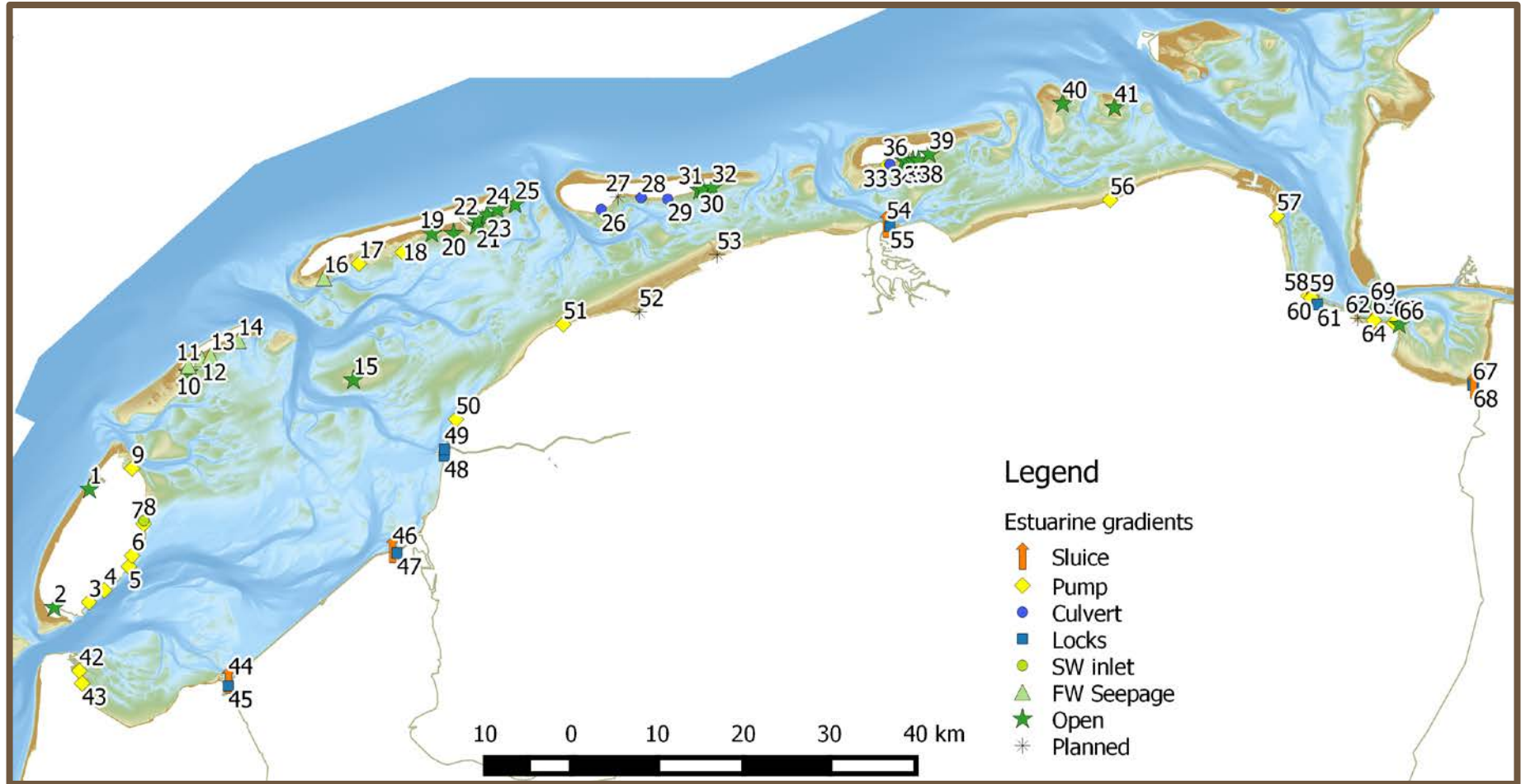
**Eel**      5.870.000



**Smelt**      198.500.000

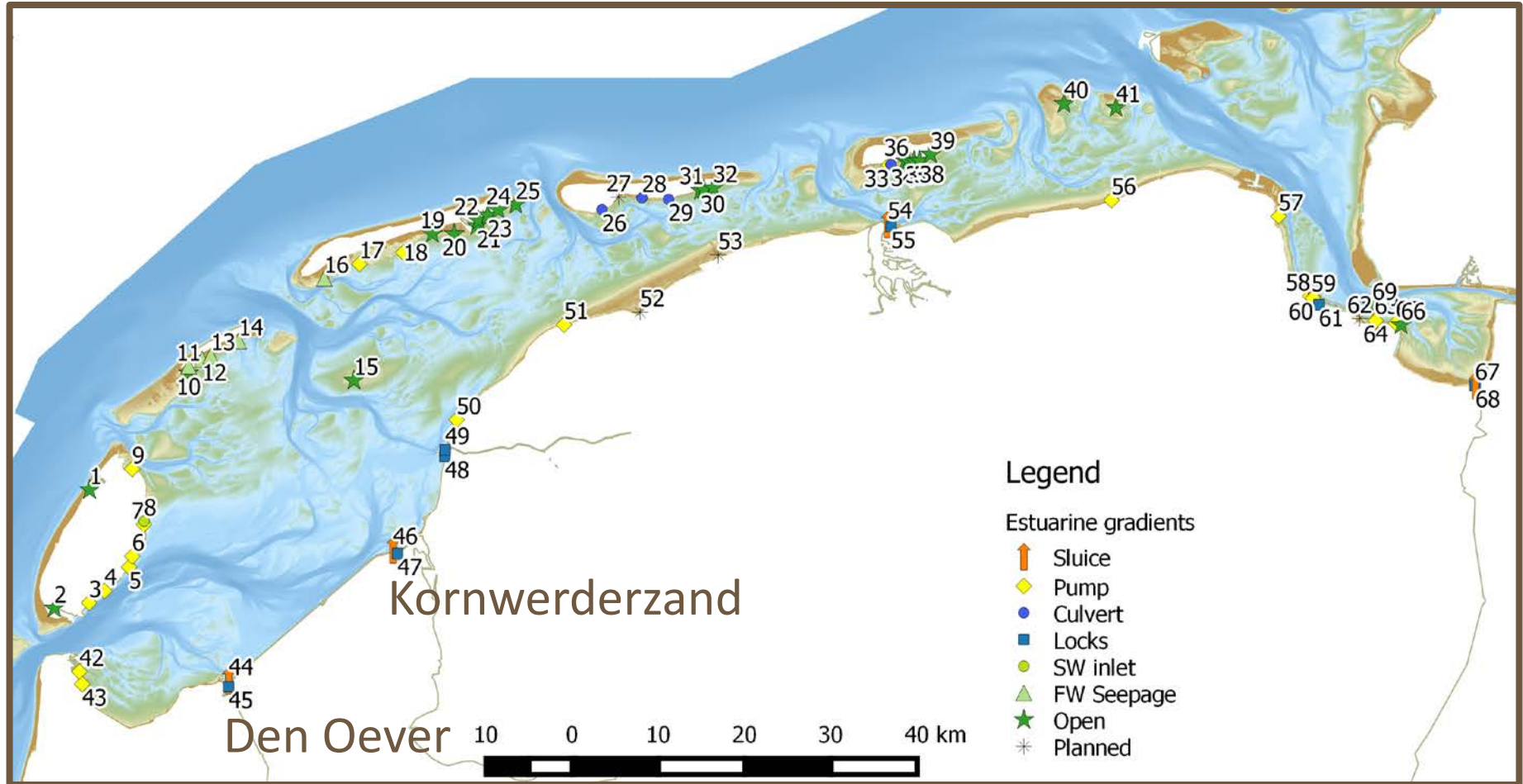
**203.000.000 fish per year**

# Estuarine gradients in the Dutch part of the Wadden Sea

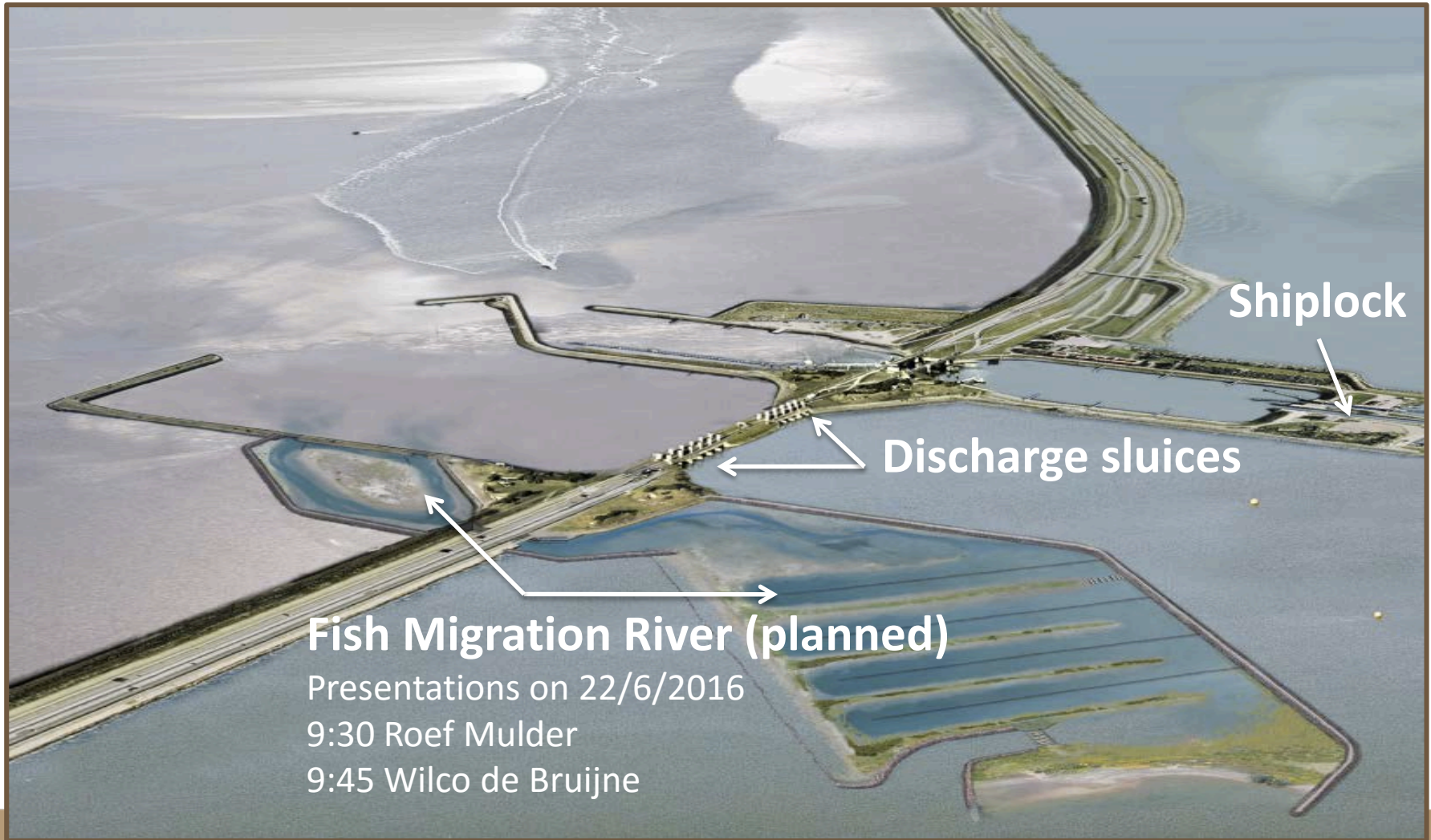




# Estuarine gradients in the Dutch part of the Wadden Sea



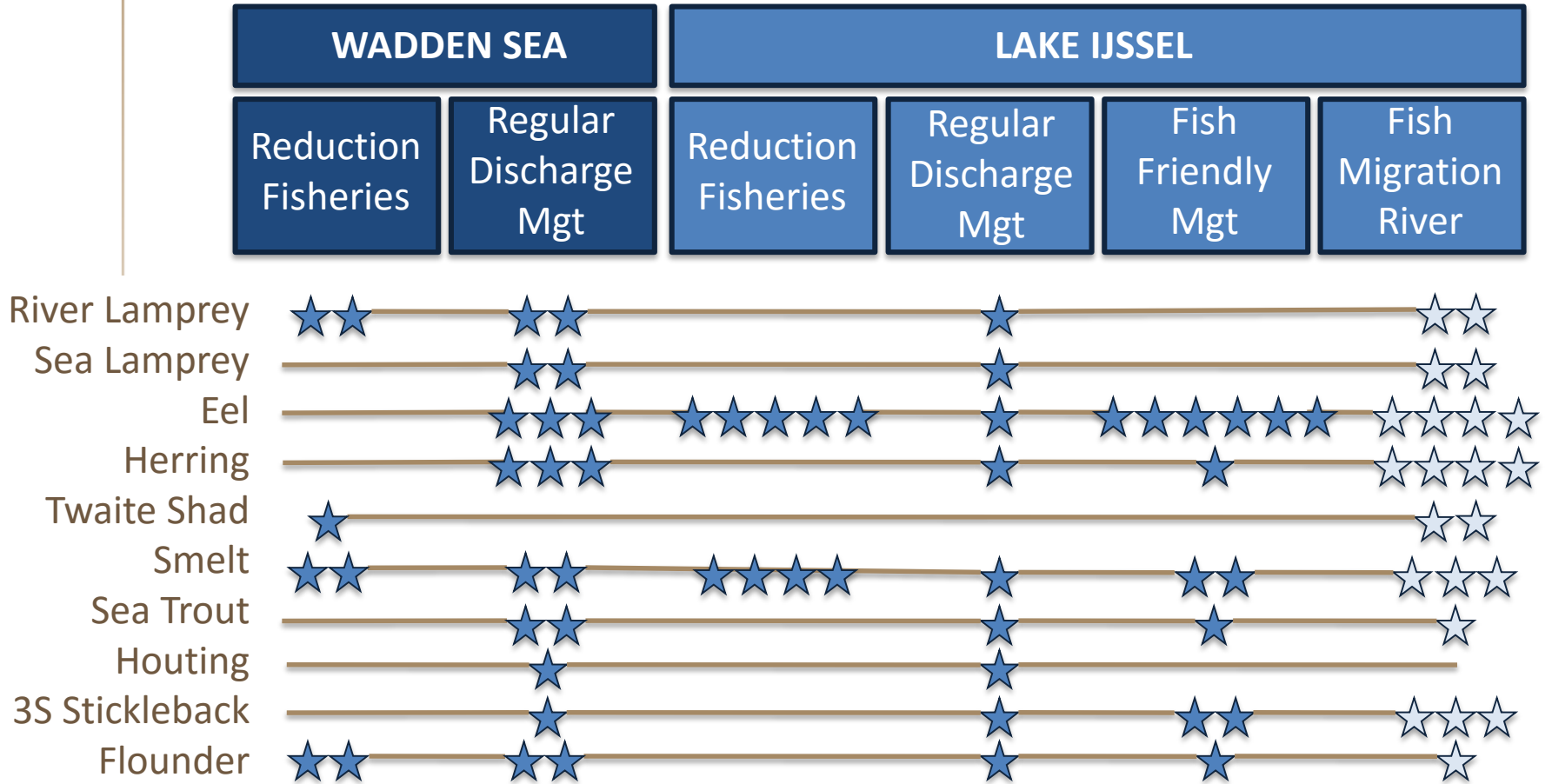
# Kornwerderzand



## Fish passing the Afsluitdijk

		WS → LIJ		LIJ → WS
		RGM	FFM	RGM
	<b>Eel</b>	500	10.500.000	16.000
	<b>Herring</b>	750.000	240.000	28.000.000
	<b>Smelt</b>	350.000	9.700.000	23.000.000
	<b>Flounder</b>	20.000	50.000	2.000.000
		<b>1.100.000</b>	<b>20.500.000</b>	<b>53.000.000 fish y<sup>-1</sup></b>

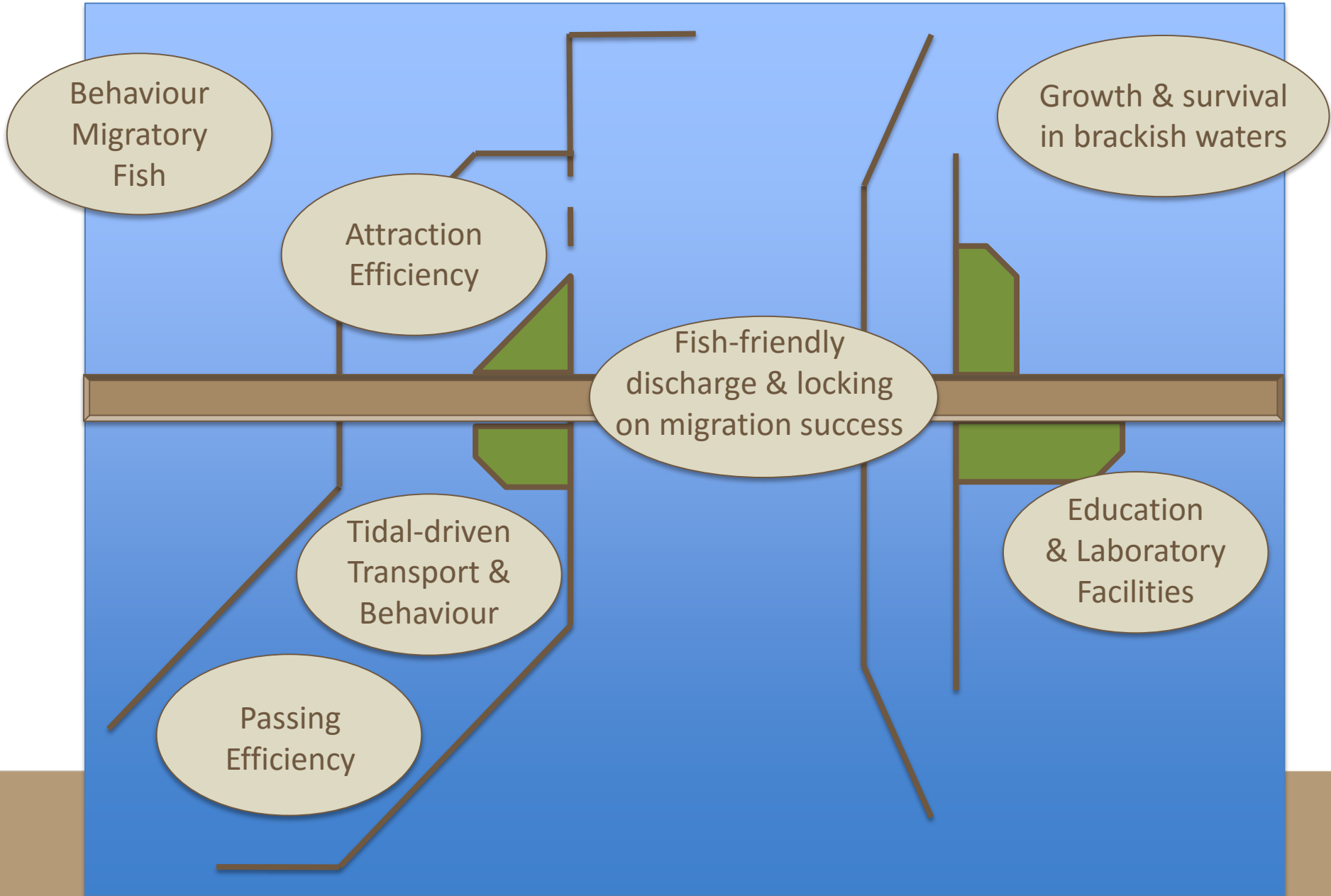
## Relative effectiveness of measures to strengthen diadromous fish stocks in the western Wadden Sea

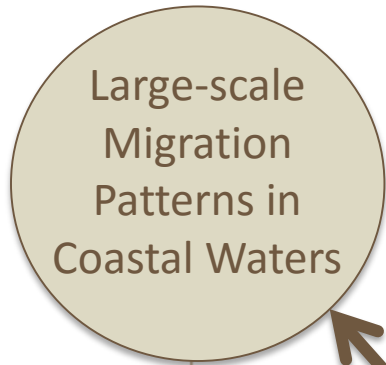


★ fish numbers ("order of magnitude")

prognosis!

# Migratory Fish Testing Facility Kornwerderzand



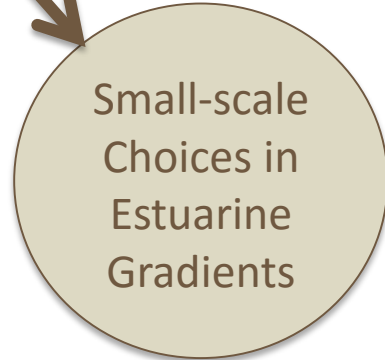


Large-scale  
Migration  
Patterns in  
Coastal Waters

### Wadden Sea

- Preferred & possible “swim ways”
- Seasonality (match/mismatch)
- Impacts of human activities

Linked with ongoing research & monitoring programs



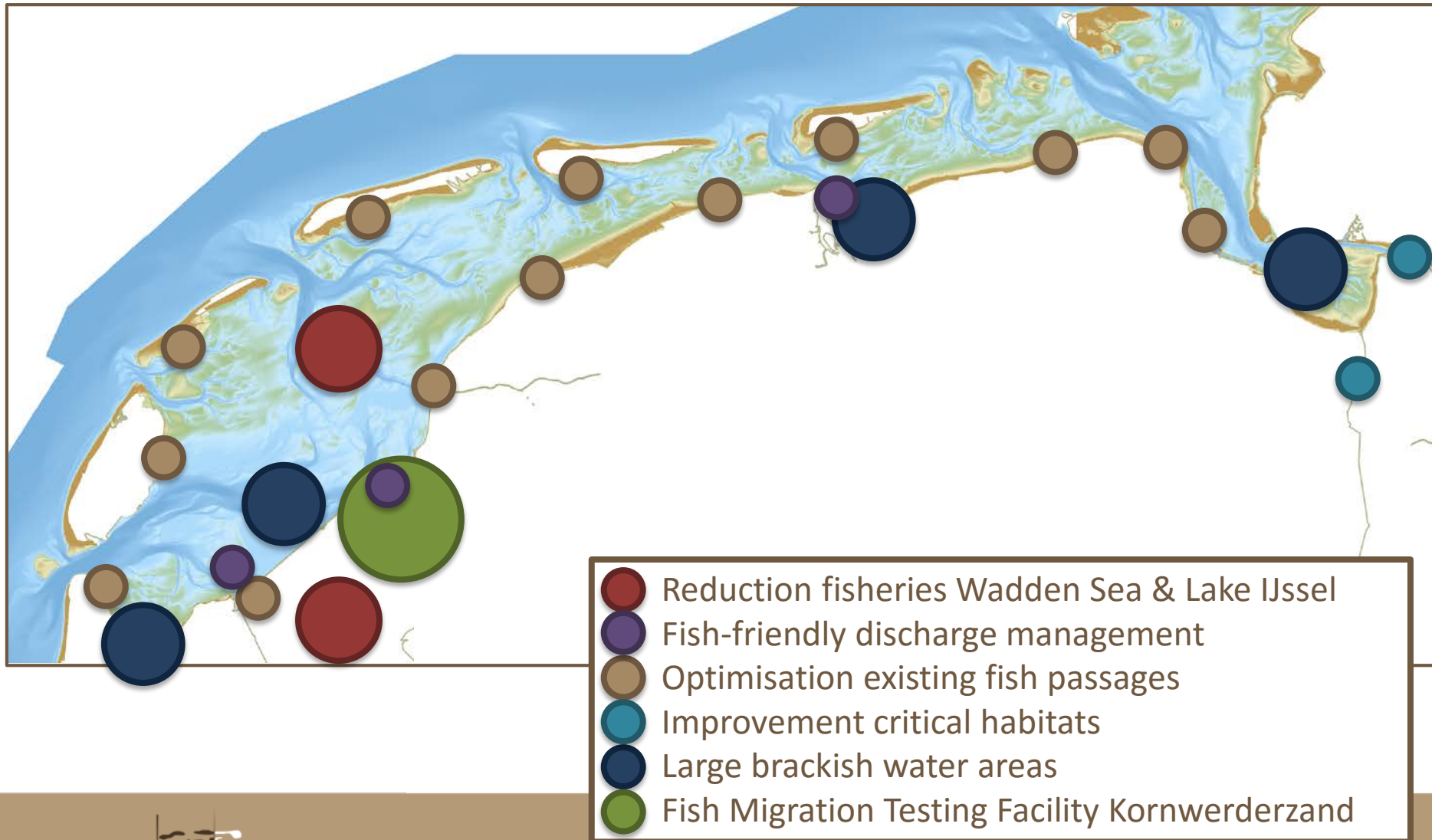
Small-scale  
Choices in  
Estuarine  
Gradients

### Migratory Fish Testing Facility Kornwerderzand

- Water temperature
- Currents
- Tide
- Salinity
- Turbulence
- Substrate
- Food availability
- Predation pressure



## Potential measures to strengthen diadromous fish stocks in the Wadden Sea



## ABSTRACT

The strong decline in Wadden Sea fish since the 1980s has called for action to strengthen local diadromous fish stocks. A recent explanatory study showed that most promising potential measures to strengthen local fish stocks and other natural values of this region include reduction of fishing efforts, provisioning of suitable habitats (such as brackish zones) and facilitation of fish migration.

Reduction of shrimp fishing in the Wadden Sea would decrease mortality of diadromous fish (4 million per year), and be beneficial for additional natural values of the Wadden Sea (e.g. mussel beds, birds, seals). Reduction of fishing activities for Eel and Smelt in the adjacent Lake IJssel would favour local fish stocks, and also enhance the supply of fish (e.g. Smelt) to Wadden Sea stocks.

Estuarine gradients in the Wadden Sea vary from small tidal creeks at the islands to large freshwater sluices along the mainland coast. Present natural estuarine gradients should be safeguarded and, if necessary (e.g. Ems estuary), be improved for provisioning suitable habitats for migratory fish. Furthermore, several areas are potentially suited for turning into large brackish habitats, but actual suitability still needs to be checked by means of feasibility studies.

Fish migration could be facilitated by means of improving the connectivity within freshwater systems, and between freshwater systems and the sea. Potential measures include fish-friendly discharge management and fish passages, ranging from relatively simple (e.g. fish ladder) to very complex (e.g. Fish Migration River) solutions. At present, however, the attraction and passing efficiencies of such fish passages cannot be quantified due to a lack of data.

Setting up a Migratory Fish Testing Facility and an integrated monitoring program will not only lead to more efficient and effective investments in fish passages in the Wadden Sea, but could be of international interest as well.

