University of Massachusetts Amherst ScholarWorks@UMass Amherst

International Conference on Engineering and Ecohydrology for Fish Passage

International Conference on Engineering and Ecohydrology for Fish Passage 2016

Jun 21st, 3:45 PM - 4:00 PM

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

Katja Philippart *Wadden Academy*

Follow this and additional works at: https://scholarworks.umass.edu/fishpassage_conference

Philippart, Katja, "Ocean Connections: Potential Measures to Strengthen Diadromous Fish Stocks in the Wadden Sea" (2016). *International Conference on Engineering and Ecohydrology for Fish Passage*. 46. https://scholarworks.umass.edu/fishpassage_conference/2016/June21/46

This Event is brought to you for free and open access by the Fish Passage Community at UMass Amherst at ScholarWorks@UMass Amherst. It has been accepted for inclusion in International Conference on Engineering and Ecohydrology for Fish Passage by an authorized administrator of ScholarWorks@UMass Amherst. For more information, please contact scholarworks@library.umass.edu.

Potential measures to strengthen diadromous fish stocks in the Wadden Sea

Katja Philippart

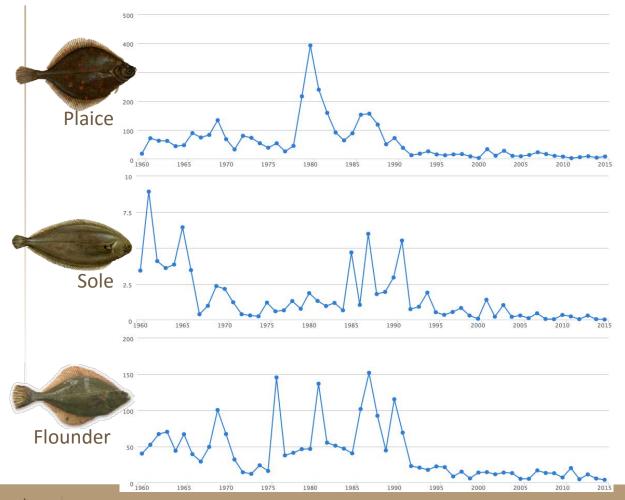
Philippart C.J.M. & M.J. Baptist (2016) An exploratory study into effective measures to strengthen diadromous fish stocks in the Wadden Sea. Position Paper Wadden Academy 2016-02, www.waddenacademie.nl

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



Decline >))'> Habitats >))'> Predation >))'> Fisheries >))'> Migration >))'> Testing Facility >))'> Measures

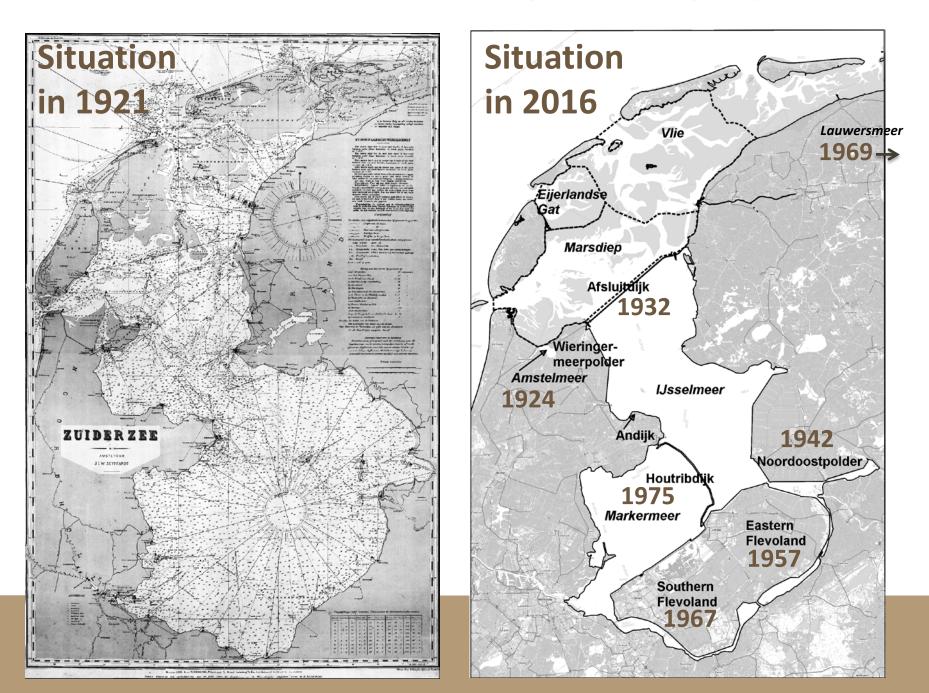
Observed decline in fish stocks in World Heritage Wadden Sea





waddenacademie

Van der Veer HW, Dapper R, Henderson PA, Jung AS, Philippart CJM, Witte JIJ & Zuur AF, 2015. Changes over 50 years in fish fauna of a temperate coastal sea: Degradation of trophic structure and nursery function. Estuarine, Coastal and Shelf Science 155, 156-166 www.waddenzeevismonitor.nl



Decline >))'> Habitats >))'> Predation >))'> Fisheries >))'> Migration >))'> Testing Facility >))'> Measures

		Co LIJ	rmorants WS	Seals WS	
	Eel	935.000	0	0	
	Herring	0	0	2.420.000	
Ти	vaite Shad	0	25.000	0	
	Smelt	39.100.000	860.000	0	
	Flounder	0	5.350.000	65.000	
		10 000 000	6 200 000	2 500 000 f	ich v-

40.000.000 6.200.000 2.500.000 fish y⁻¹



Brasseur S, Tulp I, Reijnders P, Smit C, Dijkman E, Cremer J, Kotterman M & Meesters, 2004. Voedselecologie van de gewone en grijze zeehond in de Nederlandse kustwateren. Wageningen, Alterra, Alterra-rapport 905 Leopold MF, Van Damme CJ & van der Veer HW, 1998. Diet of cormorants and the impact of cormorant predation on juvenile flatfish in the Dutch Wadden Sea. Journal of Sea Research 40, 93-107

By-catch shrimp fisheries in western Wadden Sea

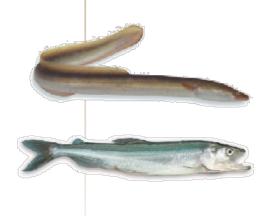
River Lamprey	4.500	
Twaite Shad	210.000	
Smelt	1.350.000	
Flounder	845.000	
	2.400.000 fish per ye	ear



waddenacademie

Glorius ST, Craeymeersch JAM, Van der Hammen T, Rippen AD, Cuperus J, Van der Weide BE, Steenbergen J & Tulp IYM, 2015. Effecten van garnalenvisserij in Natura 2000 gebieden. IMARES Report C013/15. Van Overzee H, Leijzer T, Jansen J, Goudswaard K, Kesteloo J & Quirijns F, 2008. Overzicht van visserij op de Waddenzee. IMARES rapport C118/08 verbeterde versie.

Targeted fisheries in Lake IJssel



5.870.000 Eel

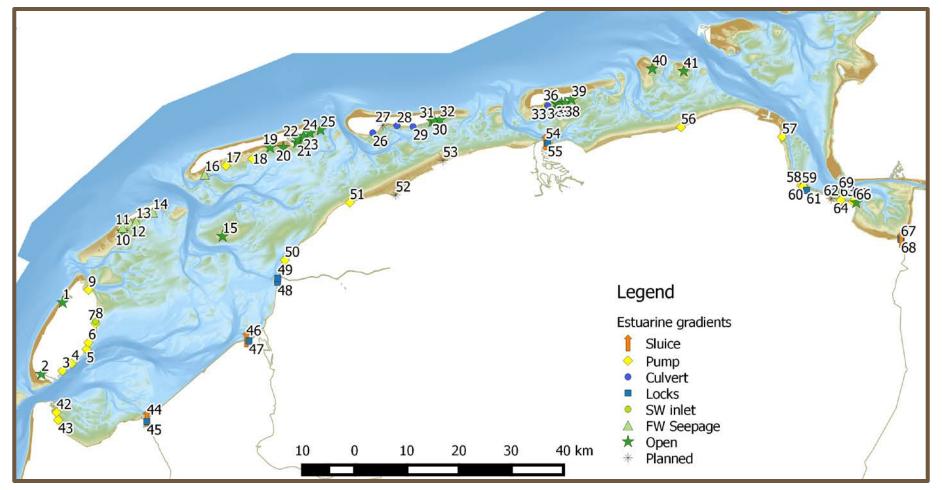
Smelt 198.500.000

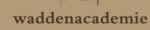
203.000.000 fish per year



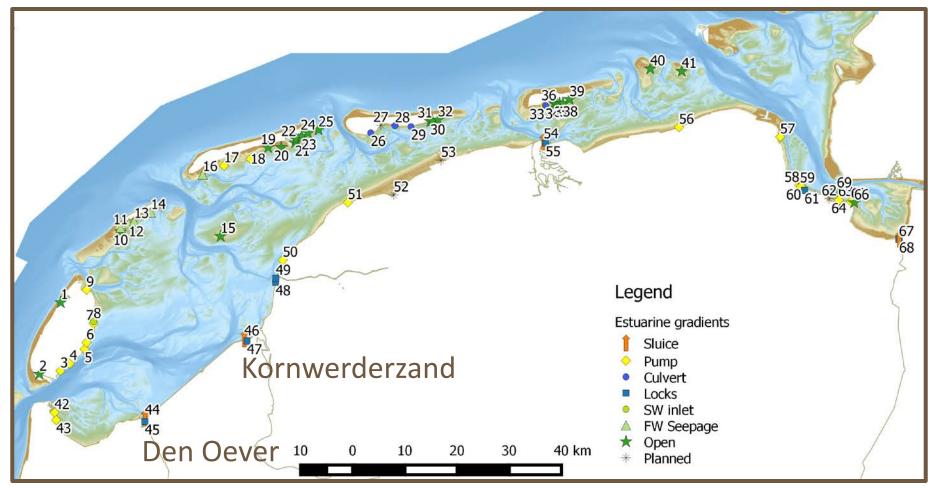
De Boois IJ, Van Overzee HMJ, De Graaf M, Van Keeken OA, Kuijs EKM, Van Os-Koomen E, Westerink HJ & Wiegerinck JAM, 2014. Toestand vis en visserij in de zoete Rijkswateren. Deel III: Data. Report IMARES C060/13 De Graaf M & Deerenberg CM, 2015. Report on the eel stock and fishery in the Netherlands 2013. Report IMARES waddenacademie C003/15

Estuarine gradients in the Dutch part of the Wadden Sea





Estuarine gradients in the Dutch part of the Wadden Sea





Kornwerderzand

Discharge sluices

Shiplock

Fish Migration River (planned)

Presentations on 22/6/2016 9:30 Roef Mulder 9:45 Wilco de Bruijne



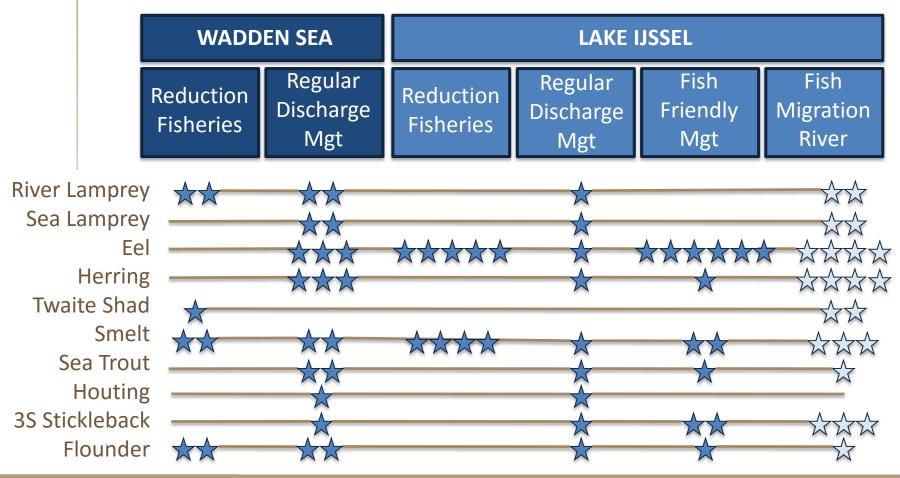
	Fish passing the Afsluitdijk			
	WS →LIJ		LIJ 🗲 WS	
	RGM	FFM	RGM	
Eel	500	10.500.000	16.000	
Herring	750.000	240.000	28.000.000	
Smelt	350.000	9.700.000	23.000.000	
Flounder	20.000	50.000	2.000.000	
	1 100 000		F2 000 000 fiel	

1.100.000 20.500.000 53.000.000 fish y⁻¹



Kruitwagen G & Webers HAAM, 2009. Metingen vismigratie via de spuicomplexen in de Afsluitdijk:
oplegnotitie najaar 2009. Witteveen+Bos, Deventer
Vriese FT, Hop J & De Bruijne W, 2015. Eindrapport testfase project visvriendelijk sluisbeheer
Afsluitdijk en Houtribdijk. Arcadis Nederland B.V. rapport C01021.200821.

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

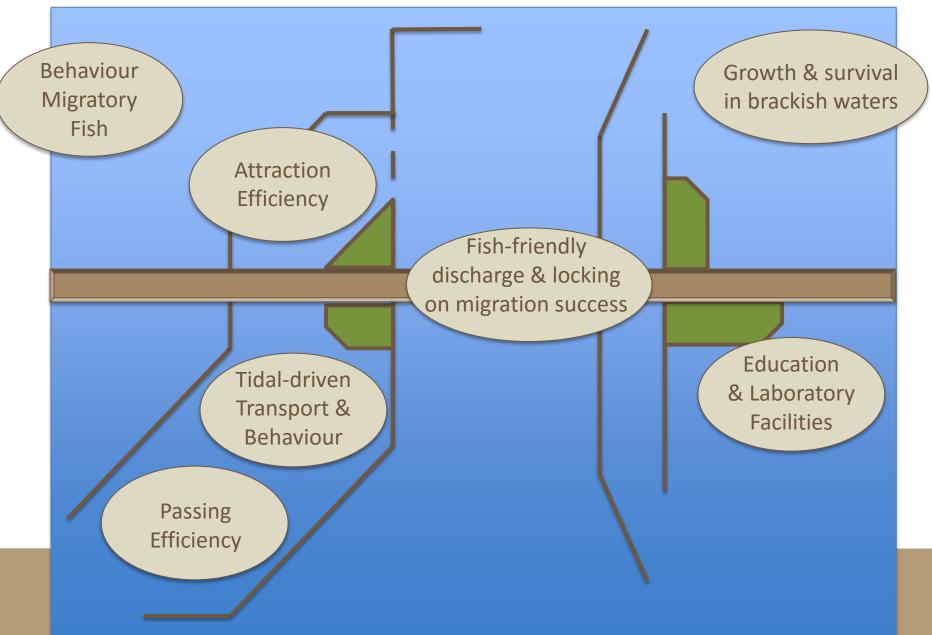


fish numbers ("order of magnitude")

prognosis!

waddenacademie

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

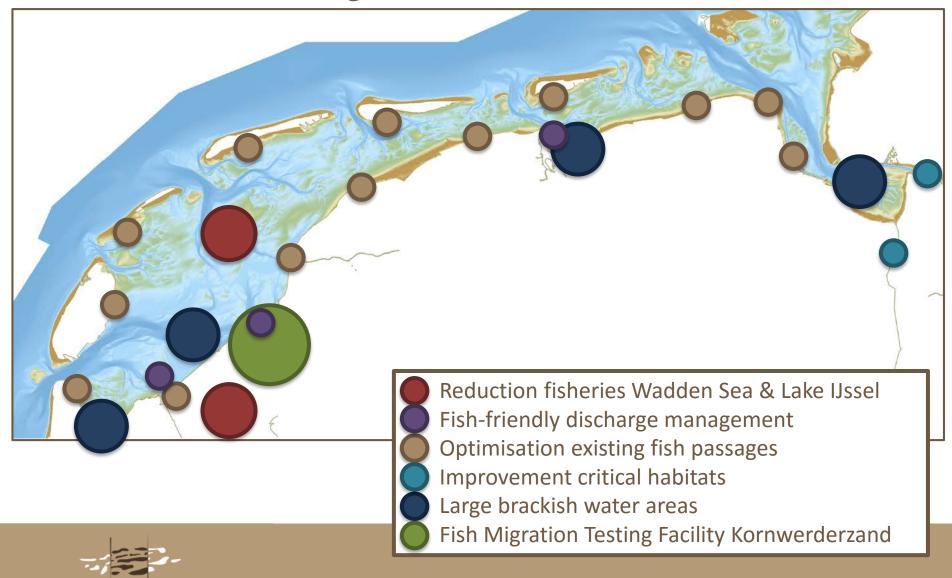
Small-scale Choices in Estuarine Gradients

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



waddenacademie

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.

