

The sensitivity of soft-sediment habitats to disposal of sediments at sea

Aquatic environment and Quality group, ILVO.

Gert Van Hoey, Naomi Breine, Jozefien Derweduwen, Annelies De Backer, Hans Hillewaert, Kris Hostens, Ellen Pecceu, Jan Ranson, Jan Wittoeck

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Introduction

Benthic sea-floor ecosystem



e.g. Fine muddy sand habitat;
Belgian Part of the North Sea

Introduction



MONITORING PROGRAM

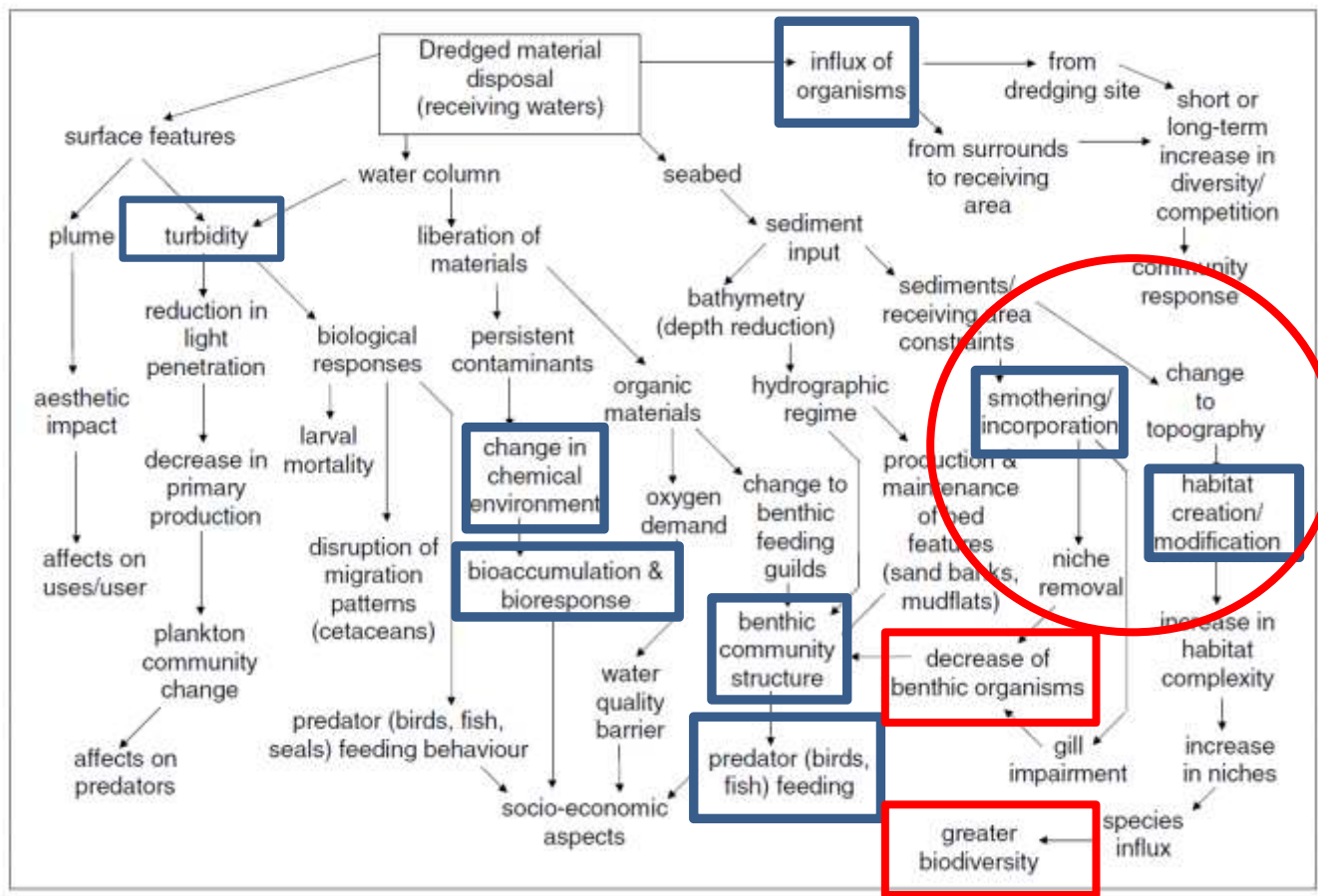
- Impact / control design
- Data from 2005-2015, changes in sampling intensity over the years.
- Autumn samples

Introduction



DREDGE DISPOSAL

MONITORING PROGRAM



Possible effects on the marine ecosystem
(adapted from Elliot & Hemingway, 2002)

Introduction

ASSESSMENT FRAMEWORK

Marine Strategy Framework Directive

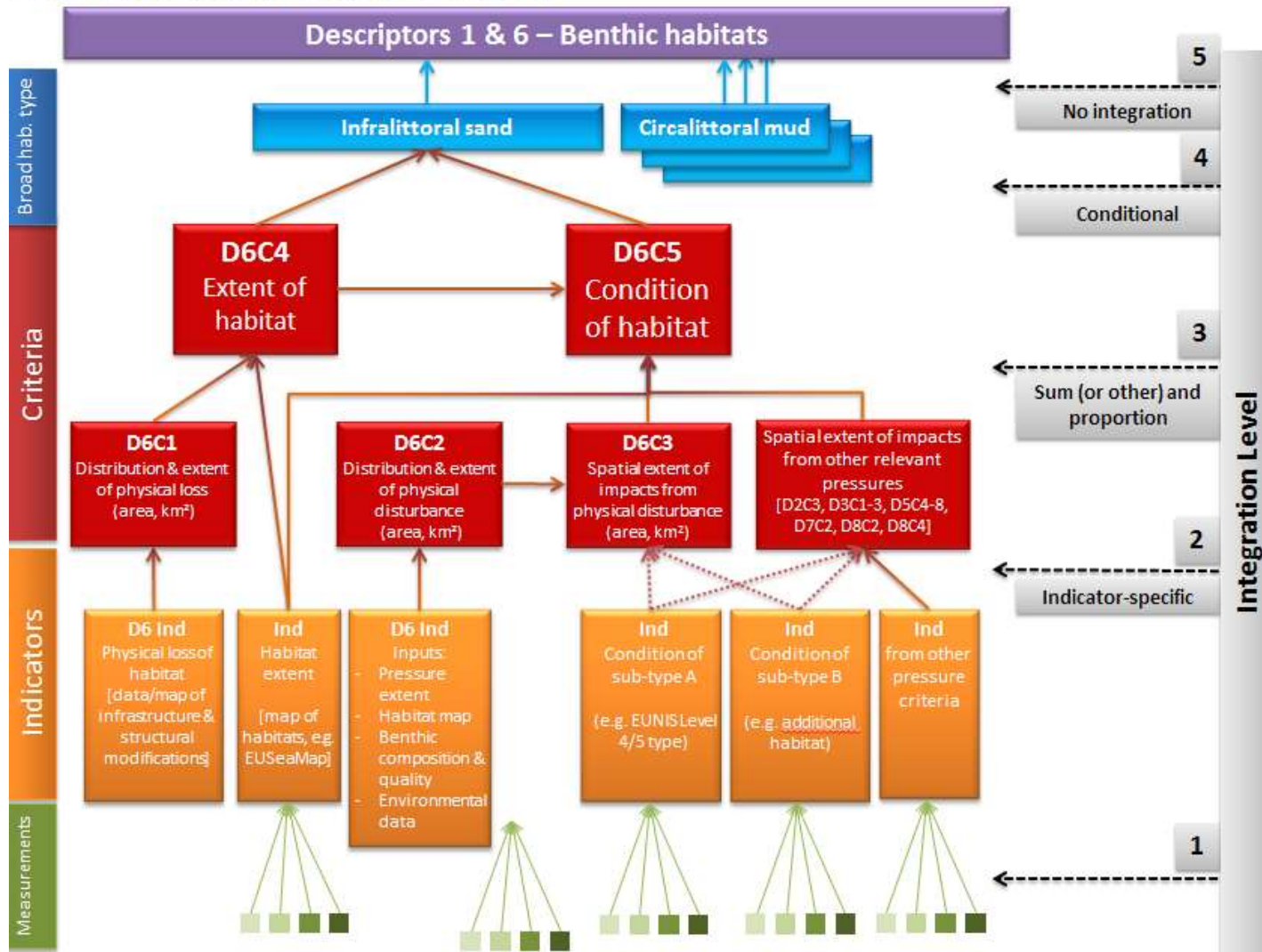


GOOD ENVIRONMENTAL STATUS

- **D1.** Biodiversity is maintained
- **D2.** Non-indigenous species do not adversely alter the ecosystem
- **D3.** The population of commercial fish species is healthy
- **D4.** Elements of food webs ensure long-term abundance and reproduction
- **D5.** Eutrophication is minimised
- **D6.** The sea floor integrity ensures functioning of the ecosystem
- **D7.** Permanent alteration of hydrographical conditions does not adversely affect the ecosystem
- **D8.** Concentrations of contaminants give no effects
- **D9.** Contaminants in seafood are below safe levels
- **D10.** Marine litter does not cause harm
- **D11.** Introduction of energy (including underwater noise) does not adversely affect the ecosystem

Introduction

Scale: Subdivision of the region or subregion,



Key:



Shows there are multiple potential trophic guilds

From Guidance MSFD Art 8 doc.

Introduction

Habitat types

Muddy habitat

Fine muddy sand habitat

Sand habitat

Criteria

Extent of habitat

Condition of habitat

Total effect

Distribution and extent of physical disturbance

Spatial extent of impacts from physical disturbance

Per activity

Indicators

Habitat extent

Pressure extent

Indicator for condition

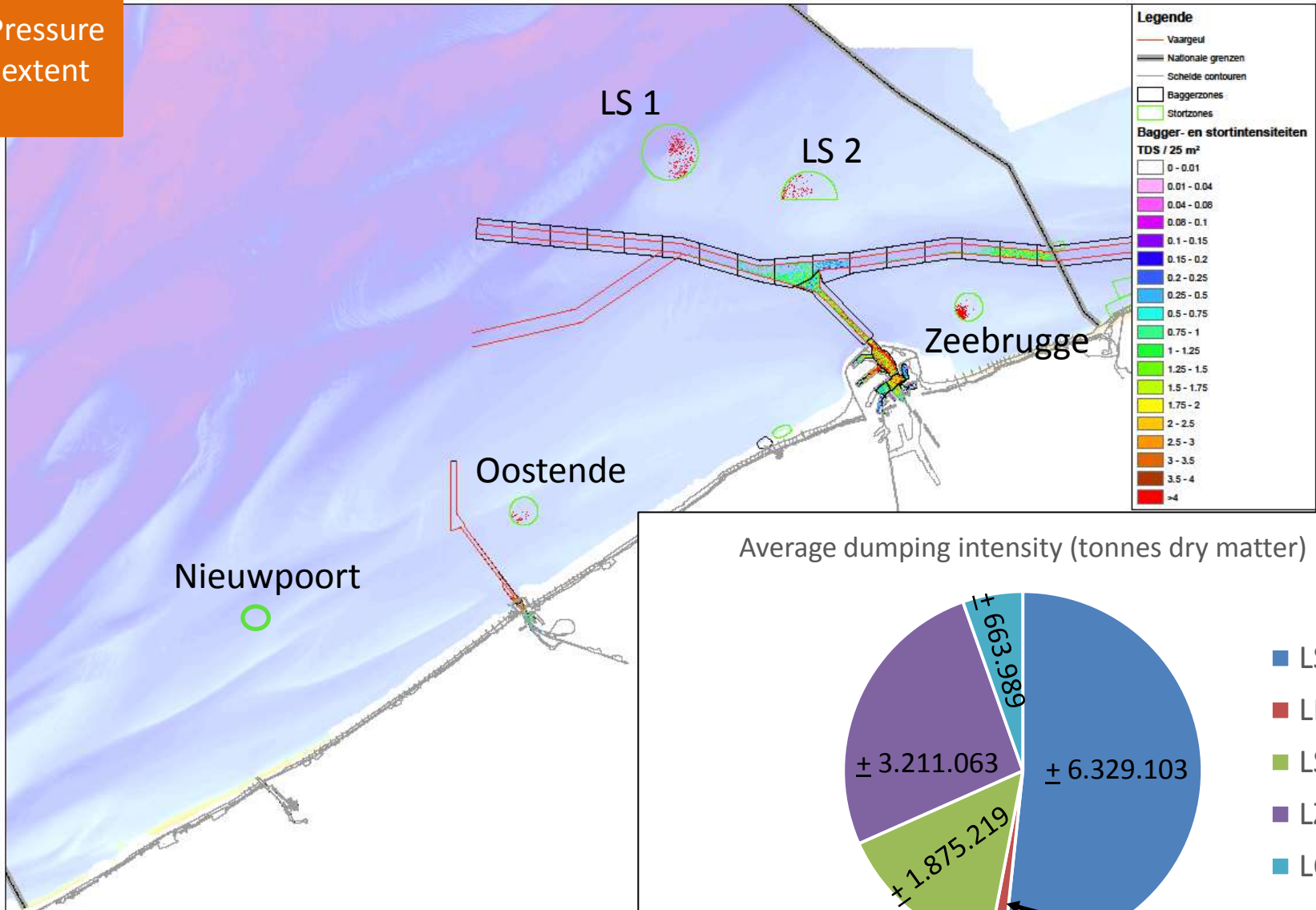
Habitat suitability map

Dumping intensities

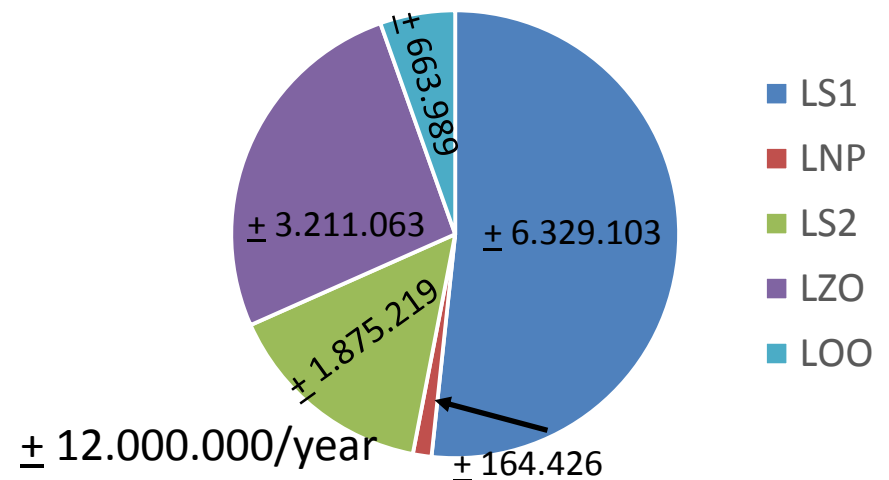
Benthic ecosystem quality index (BEQI, www.beqi.eu)

Pressure extent

Pressure extent



Average dumping intensity (tonnes dry matter)



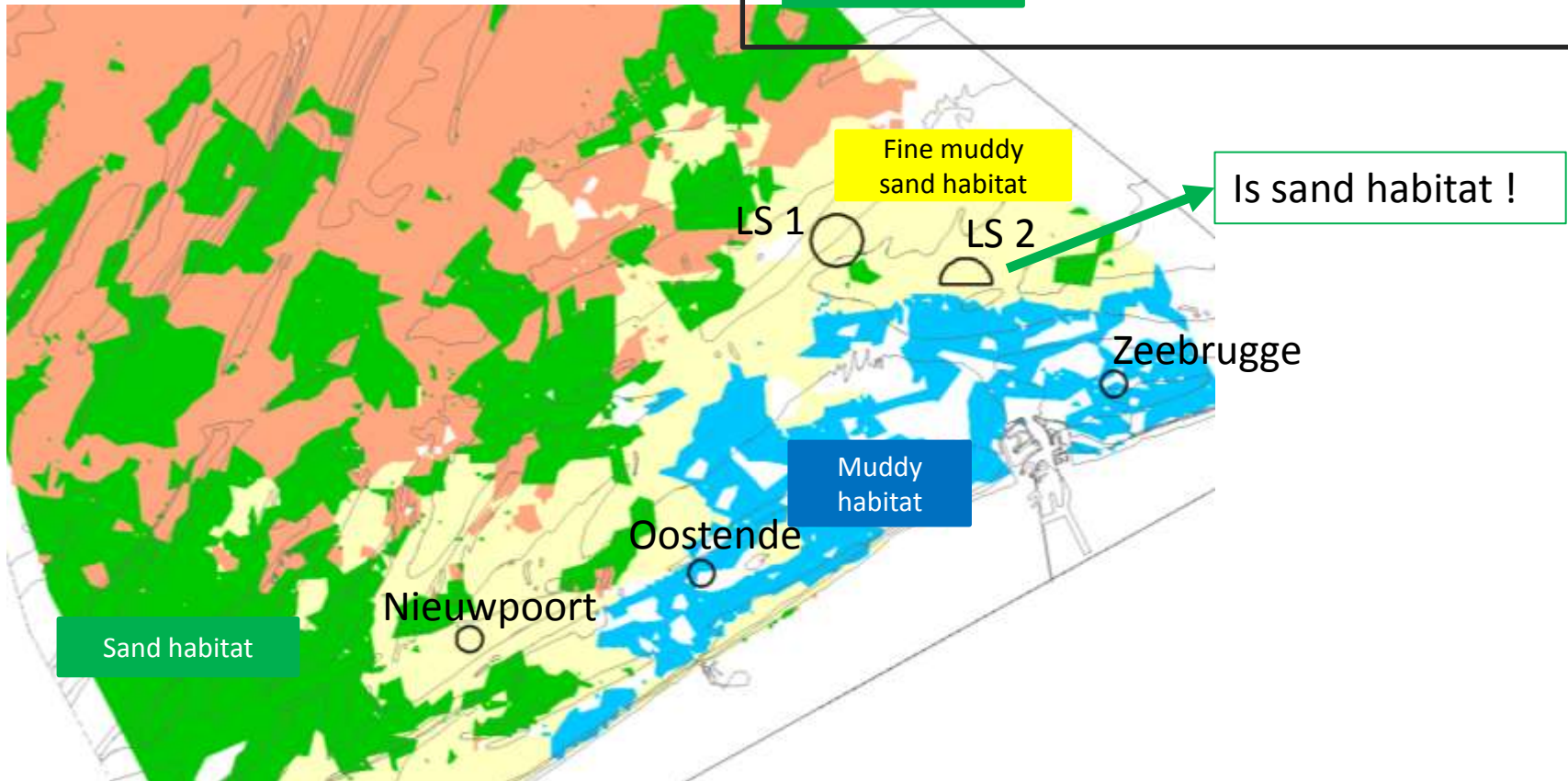
Habitat extent

Habitat extent

In which habitats ...

	Habitat extent	Dumping side extent	
Fine muddy sand habitat	$\pm 566 \text{ km}^2$	8,84 km ²	$\pm 1,5\%$
Muddy habitat	$\pm 232 \text{ km}^2$	3,54 km ²	$\pm 1,5\%$
Sand habitat	$\pm 825 \text{ km}^2$	0,88 km ²	$\pm 0,1\%$

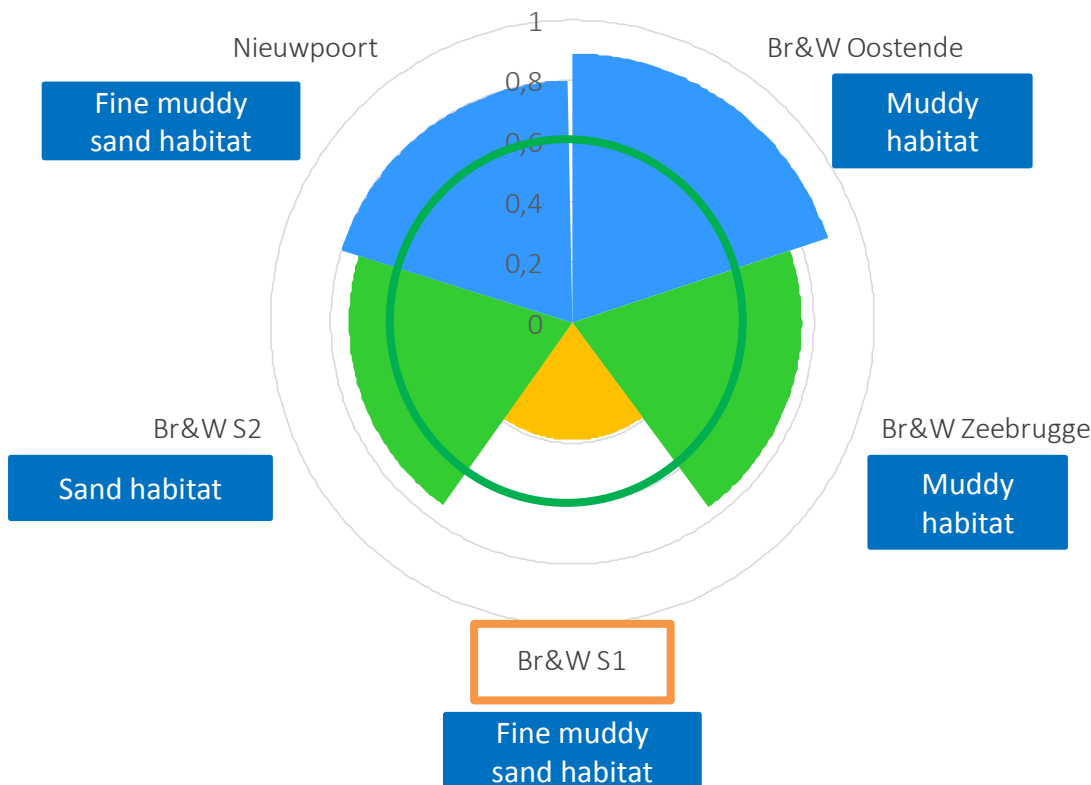
Habitat suitability map



Indicator for condition

Indicator
for
condition

The Ecological Quality Ratio as determined by **BEQI**, indicative for benthic ecosystem structure and quality, has a minimum value of 0,60 in each of the habitat types (Commission Decision 2008/915/EC)



BEQI scores the **relative difference** in benthic community characteristics between the data of the **impacted** area and those of the **control** area.

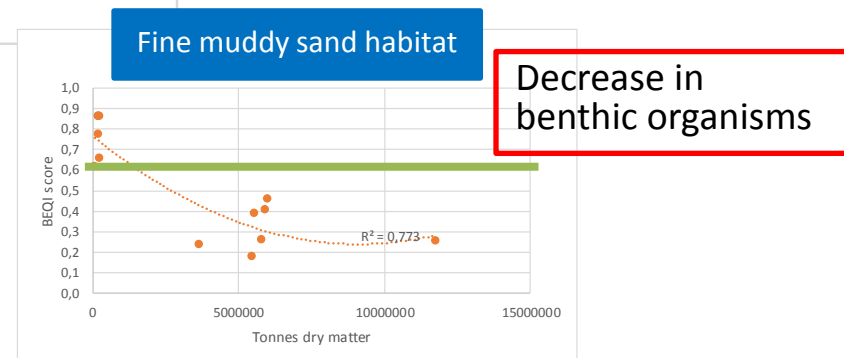
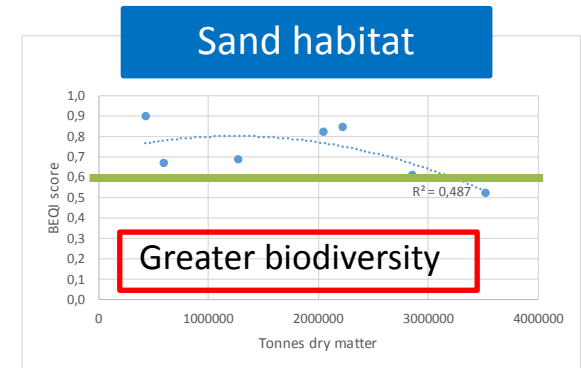
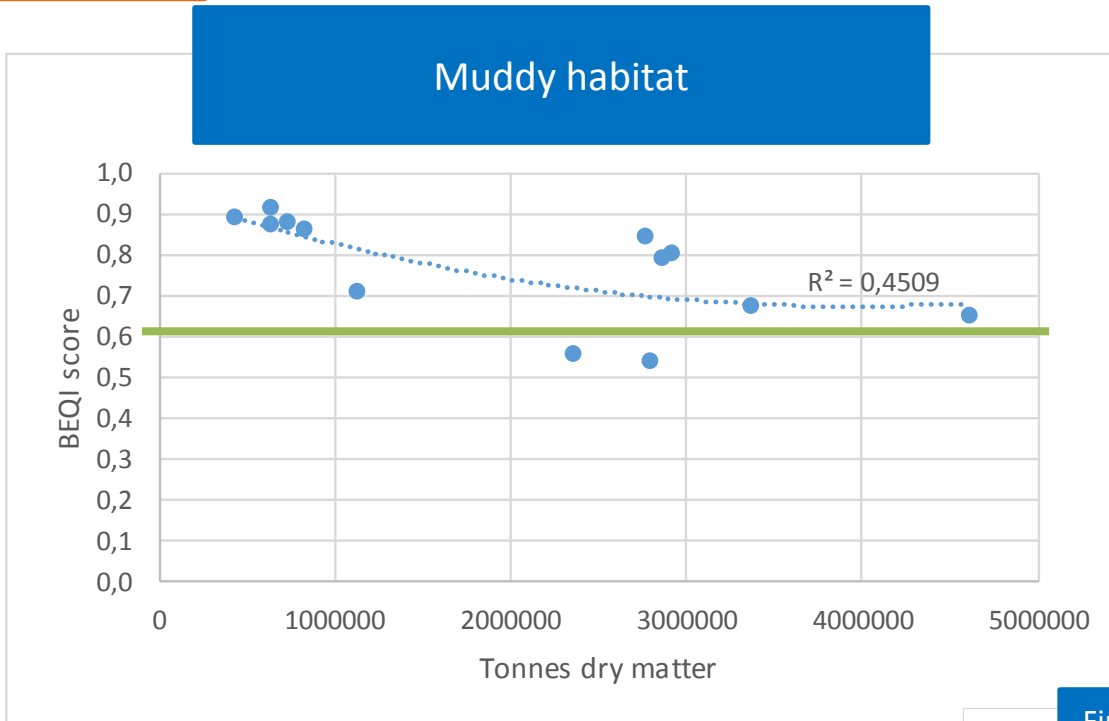
Values above **0,6** means a good comparability.

Indicator for condition

Indicator
for
condition

Linking pressure with condition

Difference in sensitivity of habitats



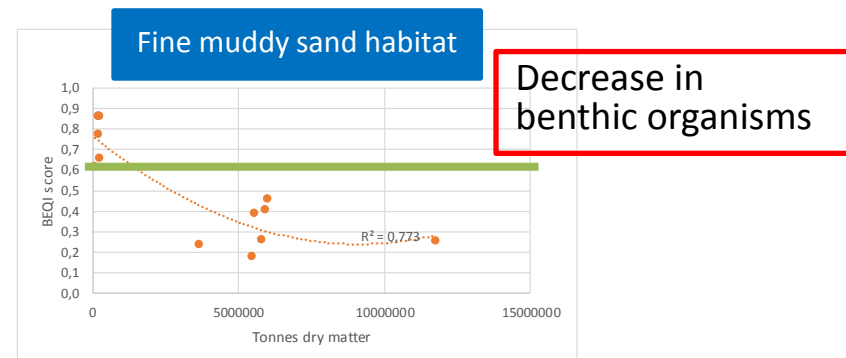
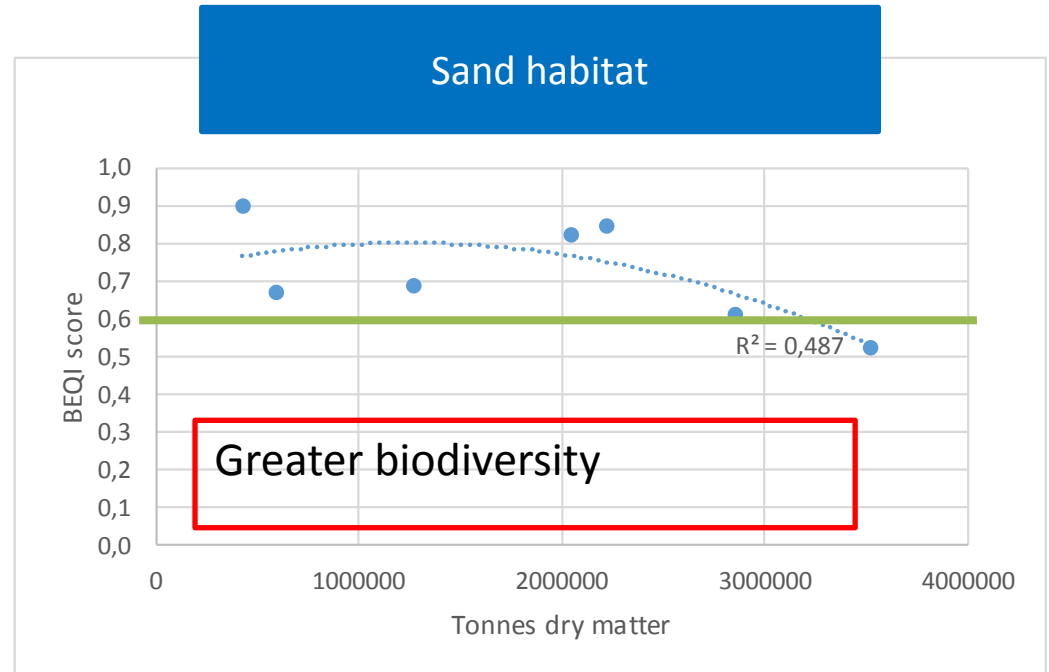
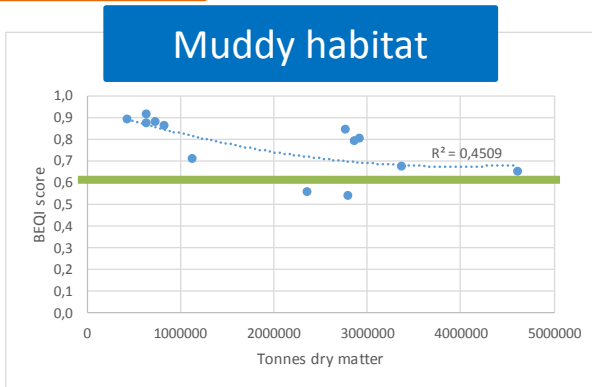
Polynomial (2nd order) trend line

Indicator for condition

Indicator
for
condition

Linking pressure with condition

Difference in sensitivity of habitats



Polynomial (2nd order) trend line

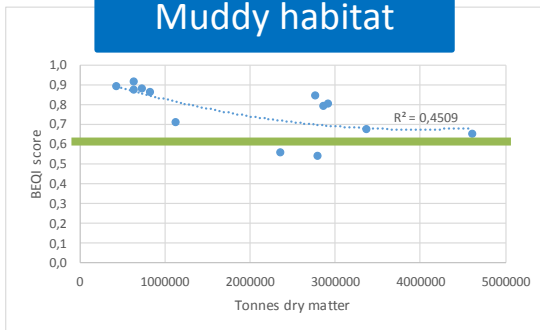
Indicator for condition

Indicator for condition

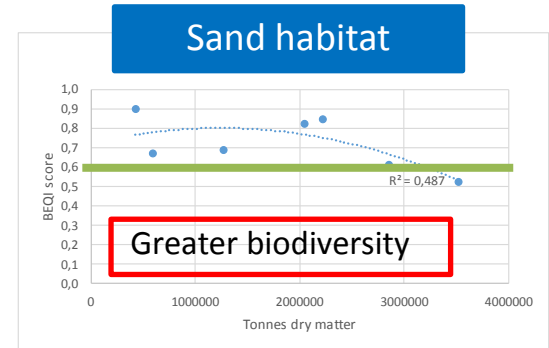
Linking pressure with condition

Difference in sensitivity of habitats

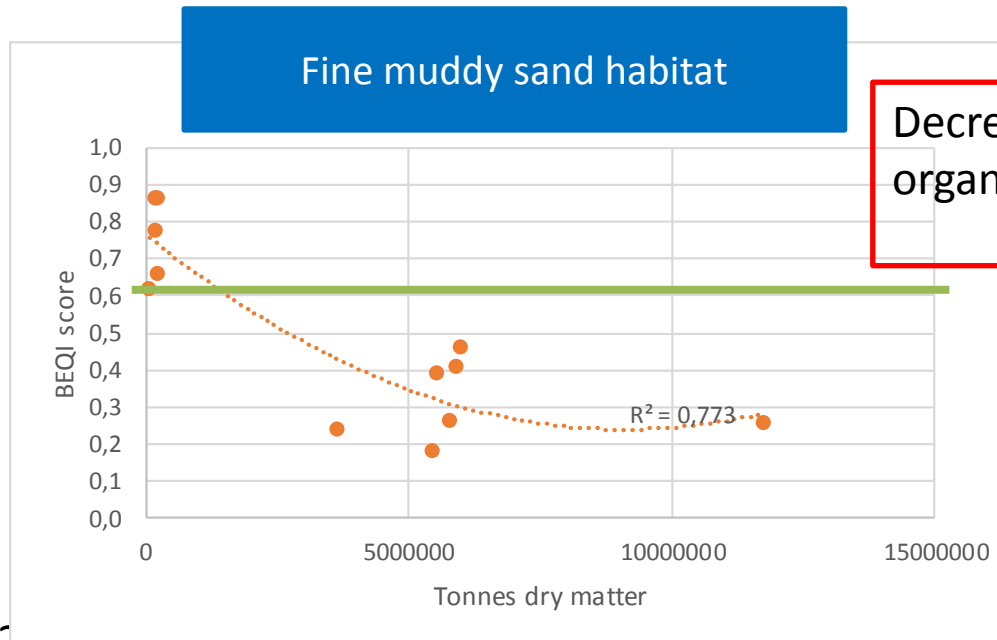
Muddy habitat



Sand habitat



Fine muddy sand habitat



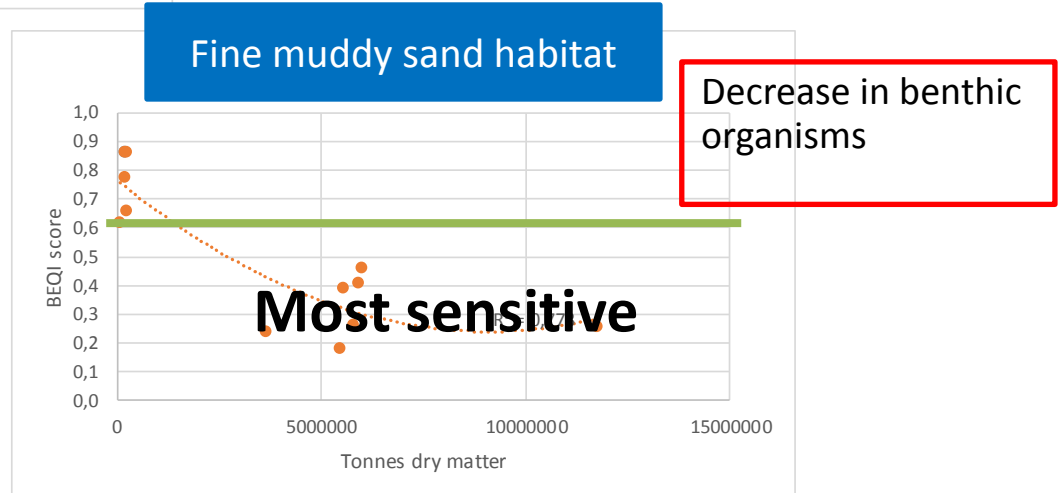
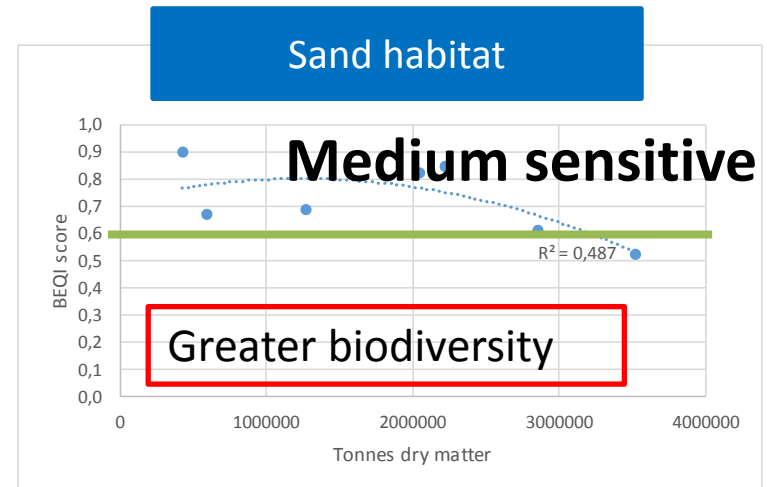
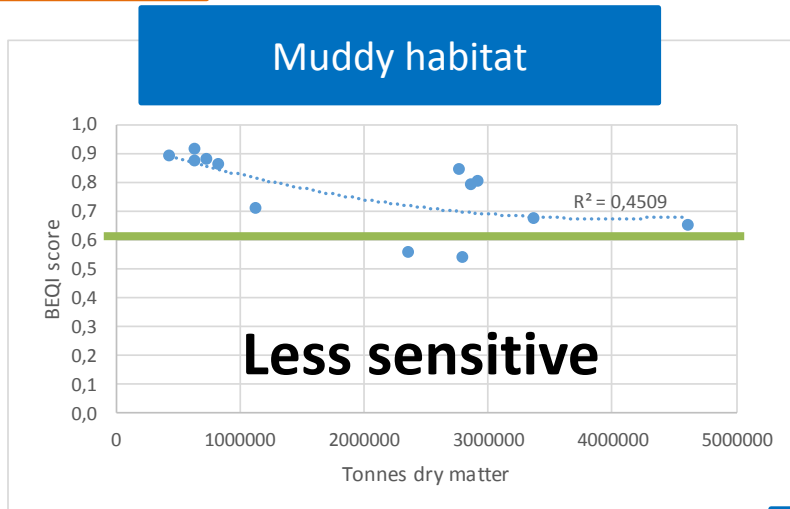
Decrease in benthic organisms

Indicator for condition

Indicator
for
condition

Linking pressure with condition

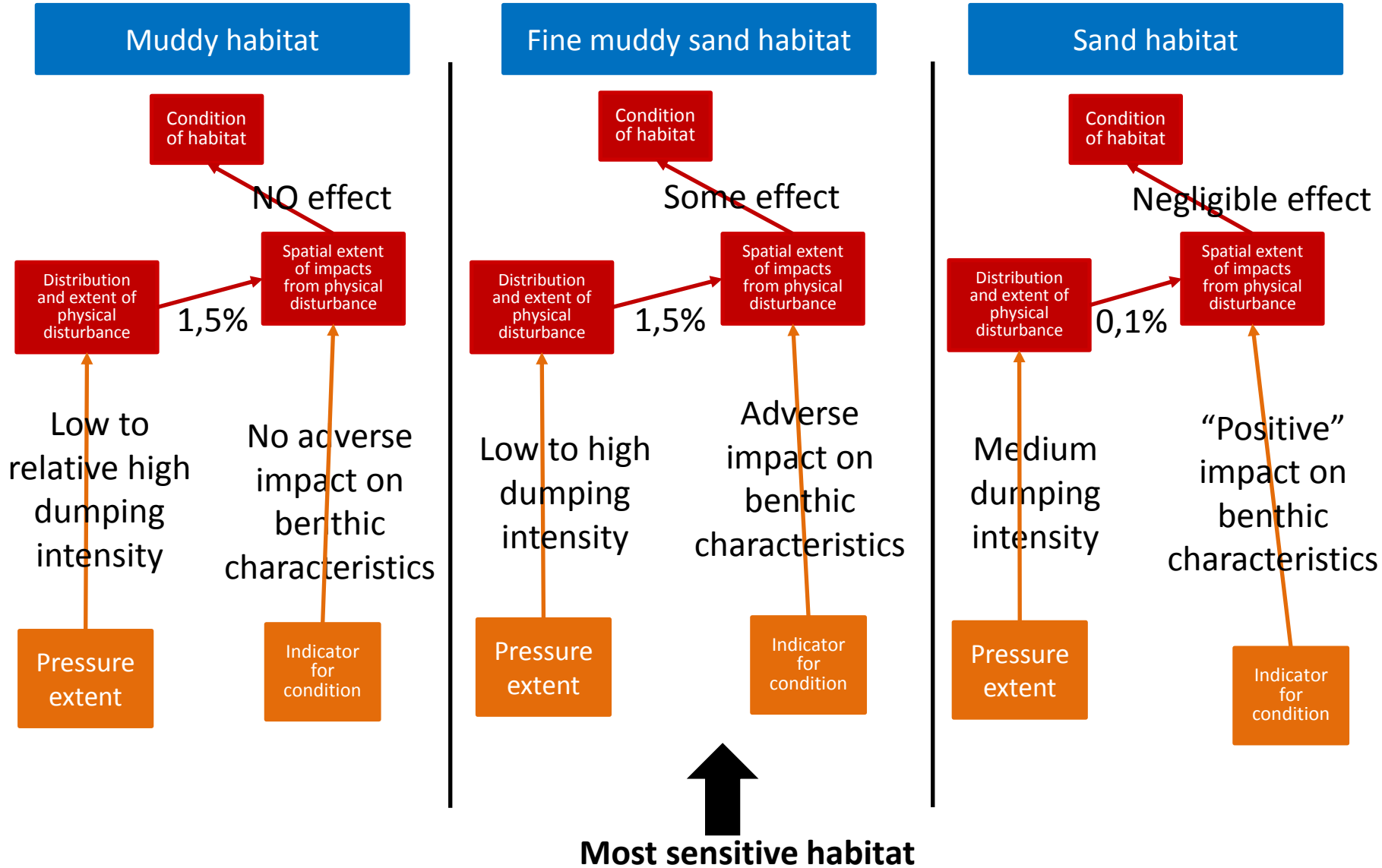
Difference in sensitivity of habitats



Polynomial (2nd order) trend line

Conclusion

DREDGE DISPOSAL with muddy sediments





Vlaanderen
is landbouw & visserij

ILVO

Flanders research institute for
agriculture, fisheries and food

Thank you



Flanders research institute for agriculture,
fisheries and food

Ankerstraat 1

8400 Oostende – Belgium

T + 32 (0)59 56 98 47

Gert.vanhoey@ilvo.vlaanderen.be

www.ilvo.vlaanderen.be

https://www.researchgate.net/profile/Gert_Van_Hoey

51°19'N 51°20'N 51°21'N 51°22'N 51°23'N

3°8'E 3°10'E 3°12'E 3°14'E 3°16'E

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