



Flanders
State of the Art

Optimising estuarine management with ecologically validated habitat maps in the Scheldt Estuary

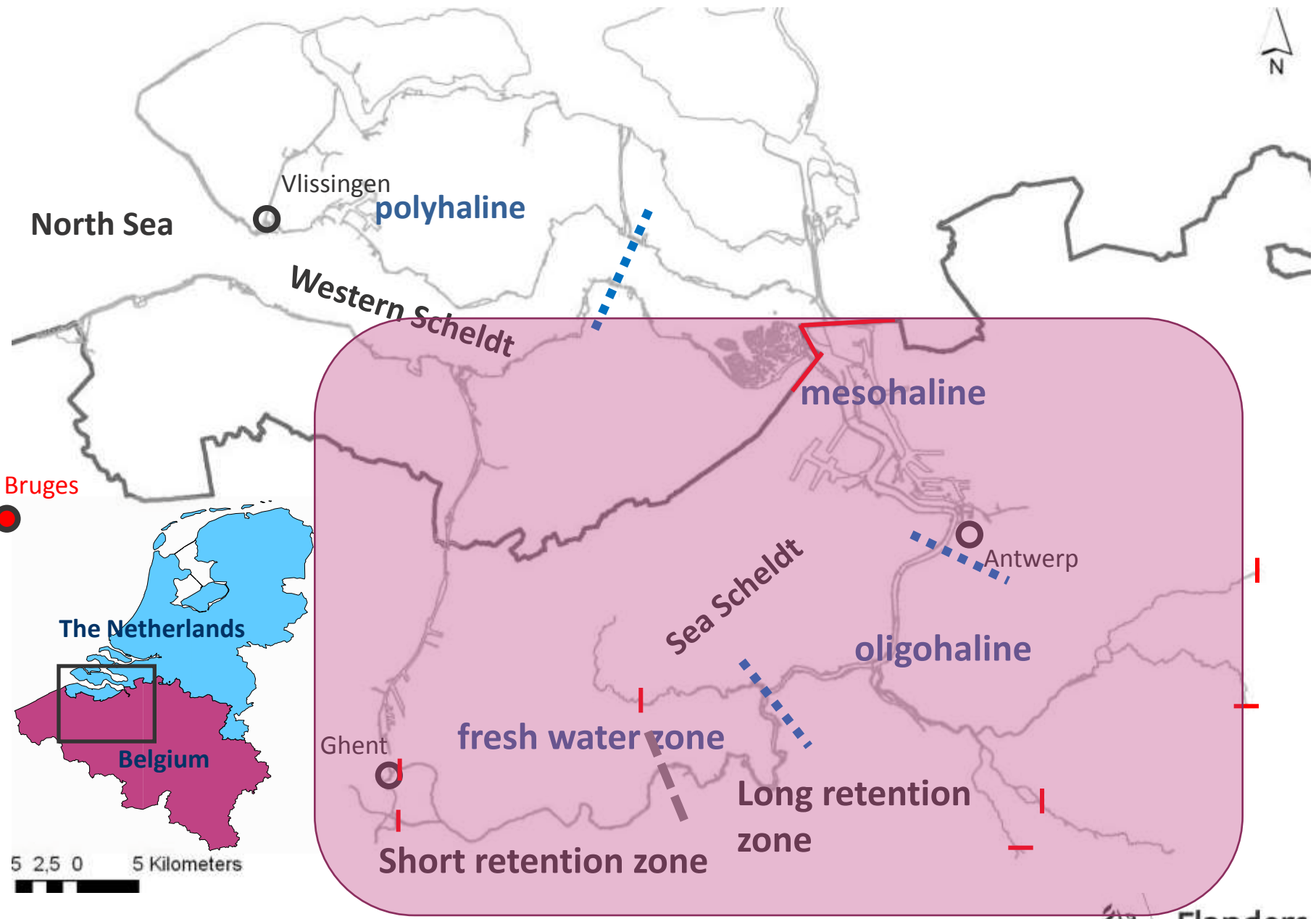
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Vanoverbeke J.^a, Plancke Y.^b & Van den
Bergh E.^a

a

RESEARCH INSTITUTE
NATURE AND FOREST

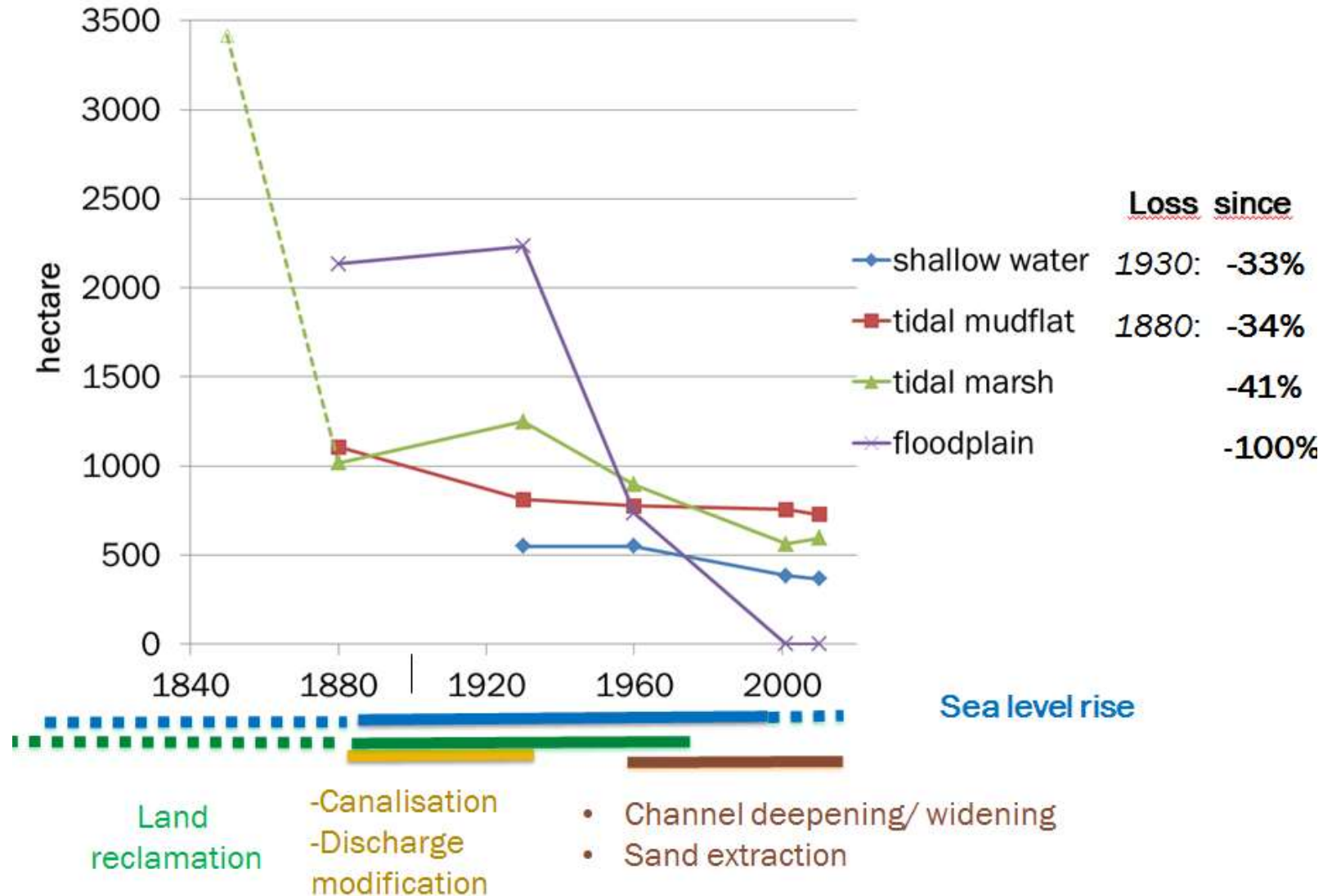
b

Flanders
Hydraulics Research

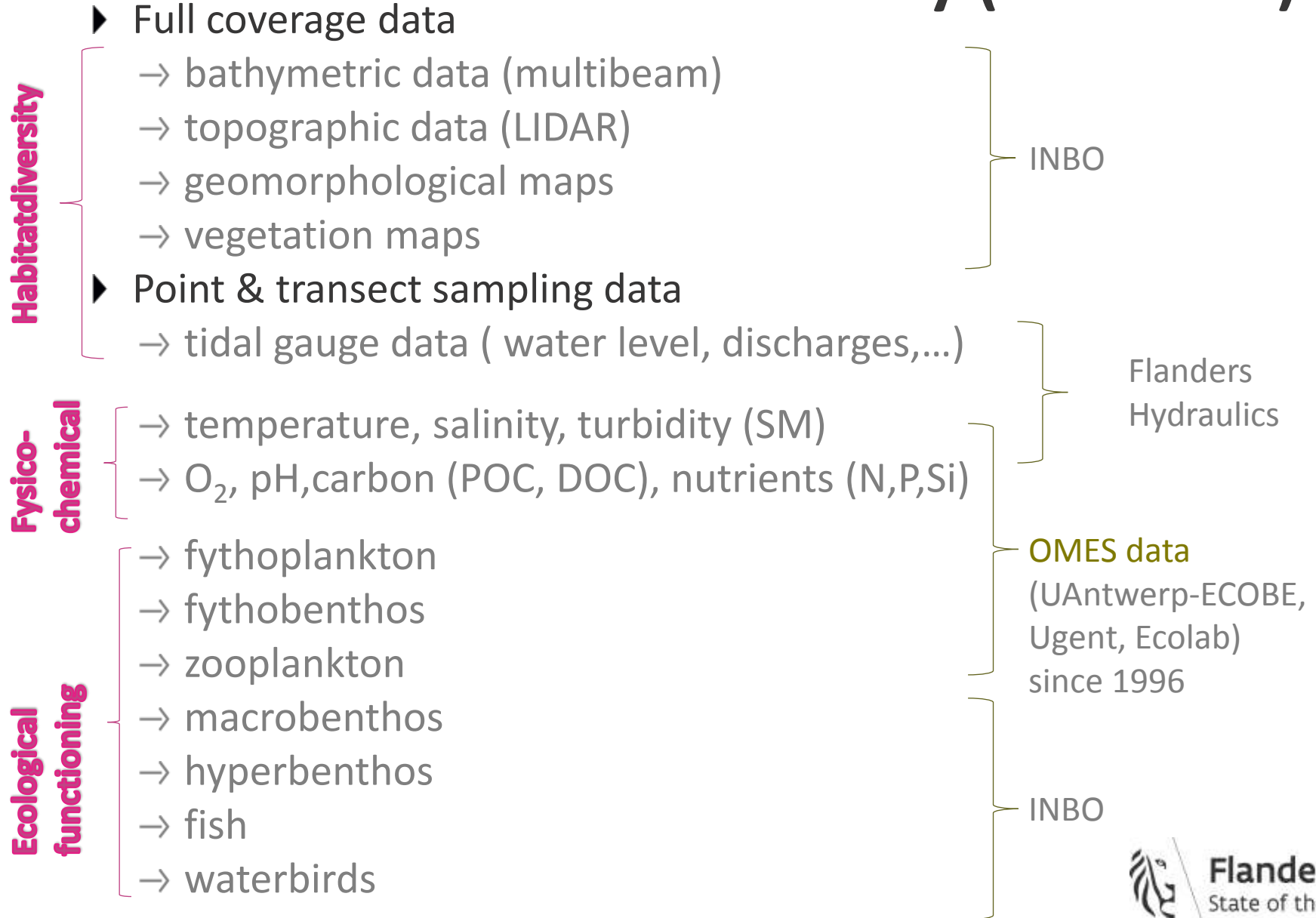


Interventions and habitat evolution

Historical ecotopes



Ecological monitoring along the Scheldt Estuary (MONEOS)



Ecological monitoring along the Scheldt Estuary (MONEOS)

Habitatdiversity

- ▶ Full coverage data
 - Bathymetric data (multibeam)
 - Topographic data (LIDAR)
 - Geomorphological maps
 - Vegetation maps
- ▶ Point sampling data
 - Tidal gauge data (water level, discharges,...)

INBO

Flanders
Hydraulics

Fysico-chemical

- temp, salinity, turbidity (SM)
- O₂, pH, carbon (POC, DOC), nutrients (N,P,Si)

OMES data
(UAntwerp-ECOBÉ,
Ugent, Ecolab)

Ecological functioning

- fythoplankton
- fythobenthos
- Zooplankton
- Macrobenthos
- Hyperbenthos
- Fish
- Waterbirds

INBO



Water level data at tidal gauge
WL

LIDAR
W&Z

Multibeam
Vlaamse hydrografie/
W&Z / aMT

2D-model
FHR

False colour
W&Z / aMT

- emersion time
- LW percentile
- HW percentile

topogrid

bathymetry grid

velocity map

tidegrid

combigrid

- eGLWS (OFLW30%)

- DD25%
- DD75%

- Hard substrate
- Soft substrate (sandy, muddy)

emersion time grid

waterdepth grid

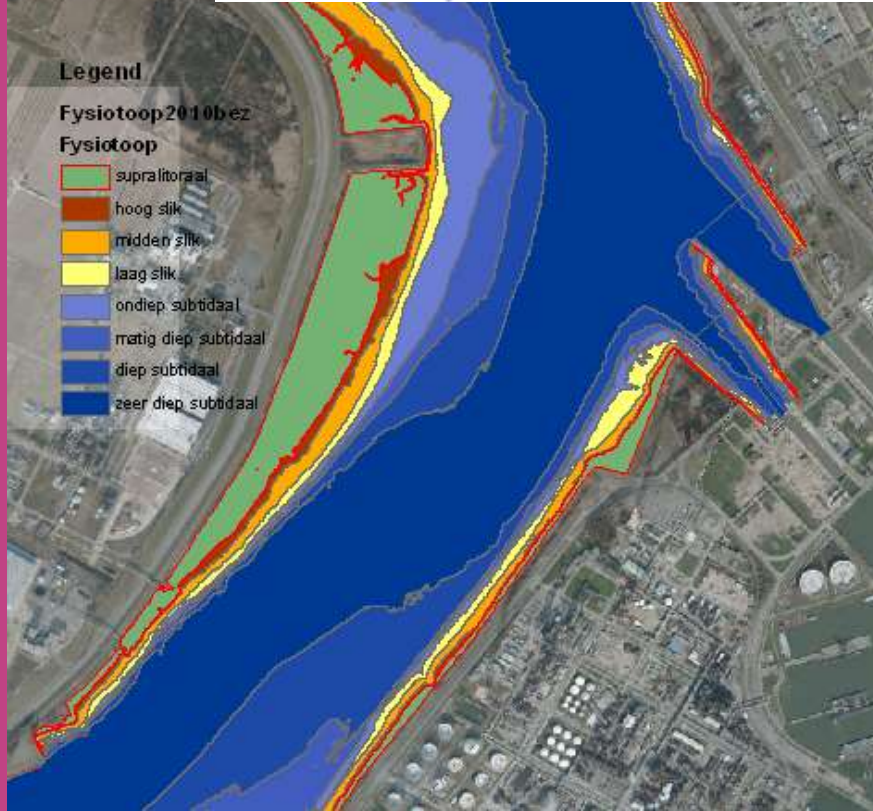
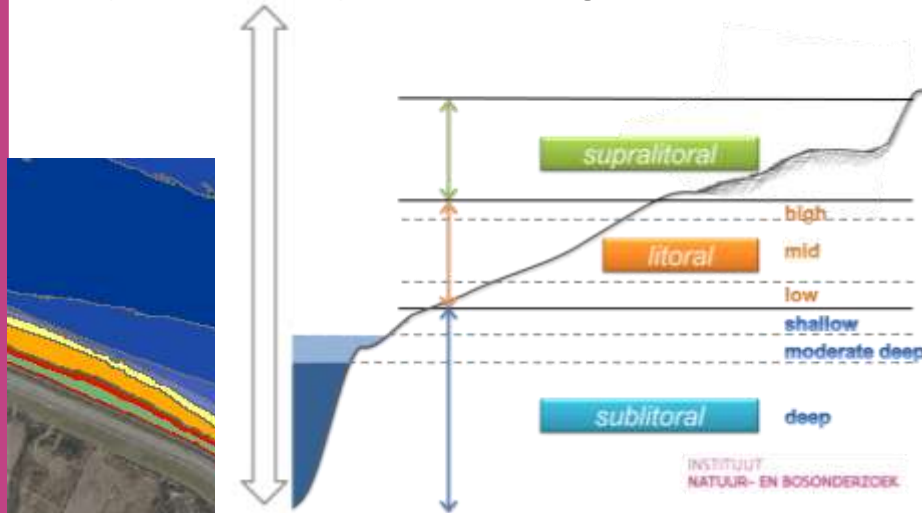
hydrodynamic grid

Fysiotope map

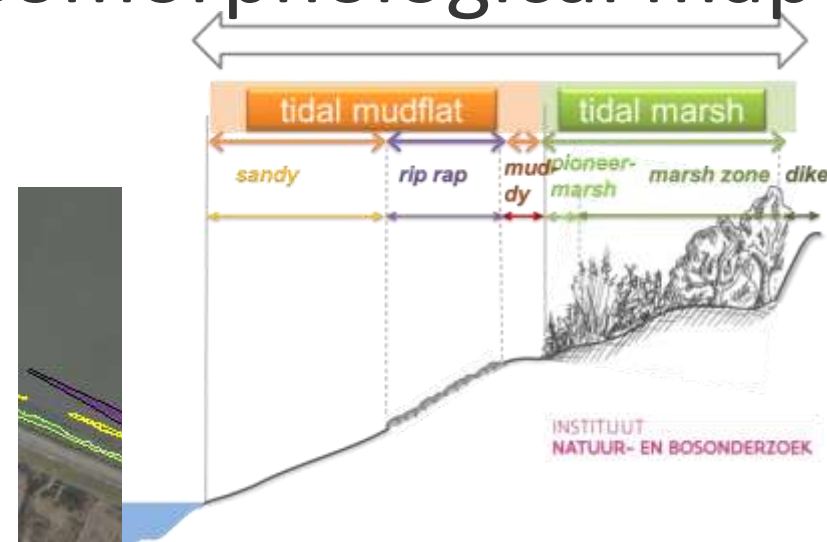
Geomorphological map

Ecotopes map

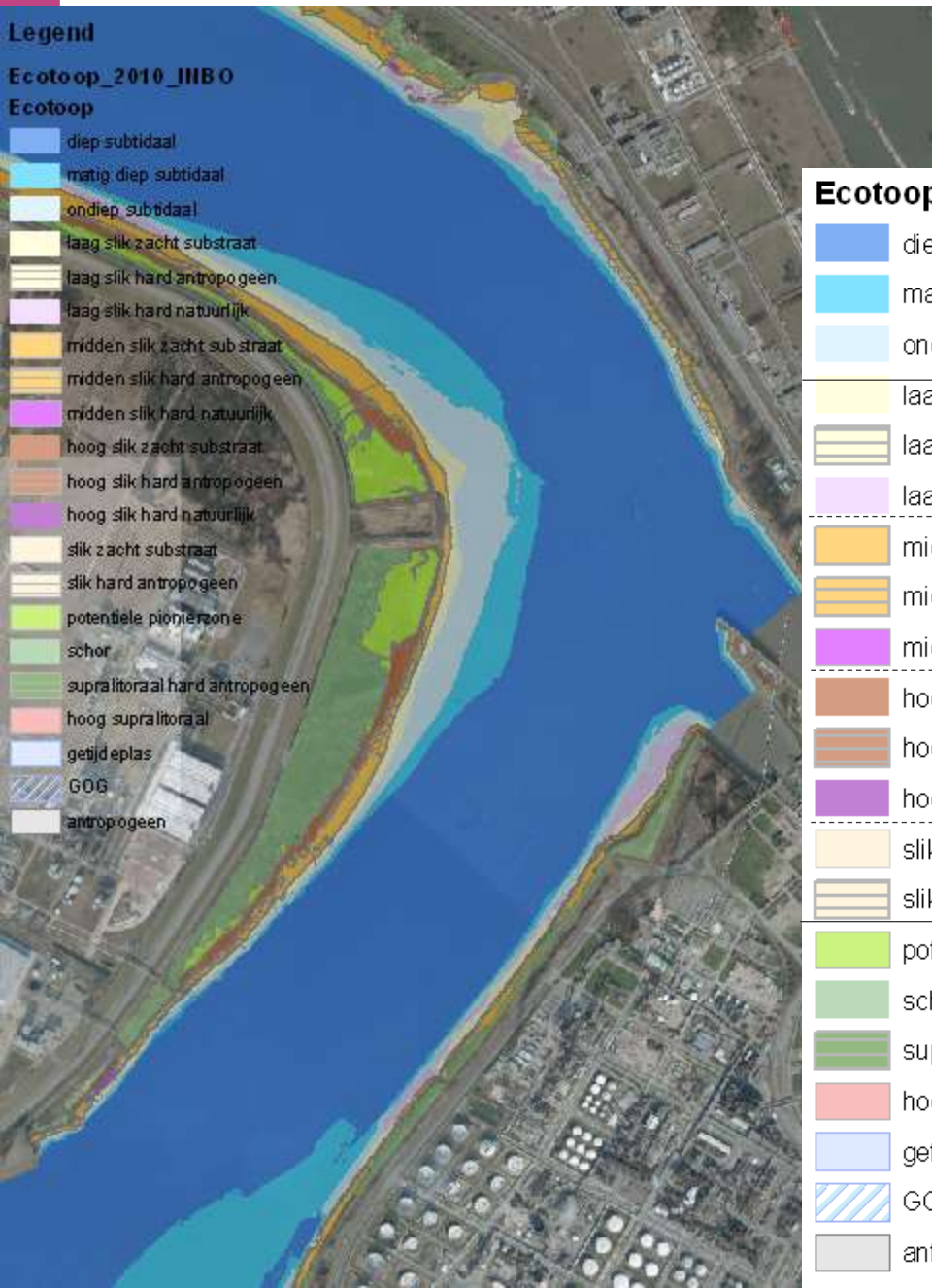
Fysiotope map



Geomorphological map



Ecotope map



Legend

Ecotoop_2010_IHBO

Ecotoop

- diep subtidaal
- matig diep subtidaal
- ondiep subtidaal
- laag slik zacht substraat
- laag slik hard antropogeen
- laag slik hard natuurlijk
- midden slik zacht substraat
- midden slik hard antropogeen
- midden slik hard natuurlijk
- hoog slik zacht substraat
- hoog slik hard antropogeen
- hoog slik hard natuurlijk
- slik zacht substraat
- slik hard antropogeen
- potentiele pionierzone
- schor
- supralitoraal hard antropogeen
- hoog supralitoraal
- getijdewas
- GOG
- antropogeen

Ecotoop

- diep subtidaal
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deep

moderate deep

shallow

low

mid

high

Sublitoral zone

Litoral zone

Supralitoral zone

Uses of this habitat tool

- ▶ monitoring tool for habitat evolutions
 - Historical ecotopes (lower resolution)
 - Ecotopes since 2001 (high resolution)important for 6 yearly evaluation of the Scheldt Estuary (started 2009)
- ▶ environmental impact assessments of
 - dredging/ widening in the Sea Scheldt
 - sediment dumping
 - ...

Need to improve the typology using 2D numerical model results

- Extension with flow velocity data
- ecological validation of the new habitat typology

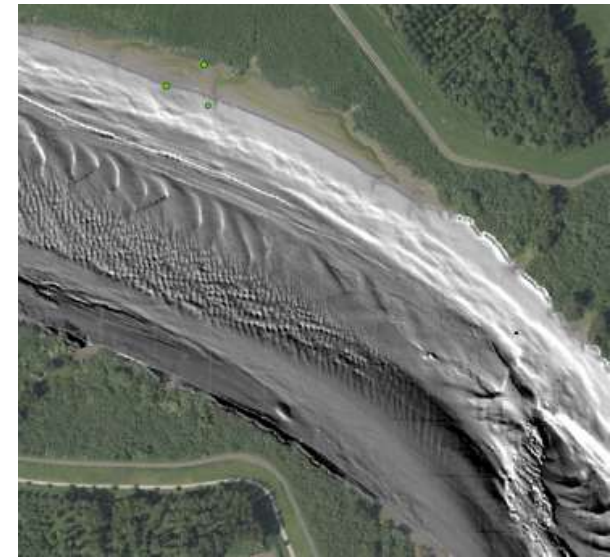
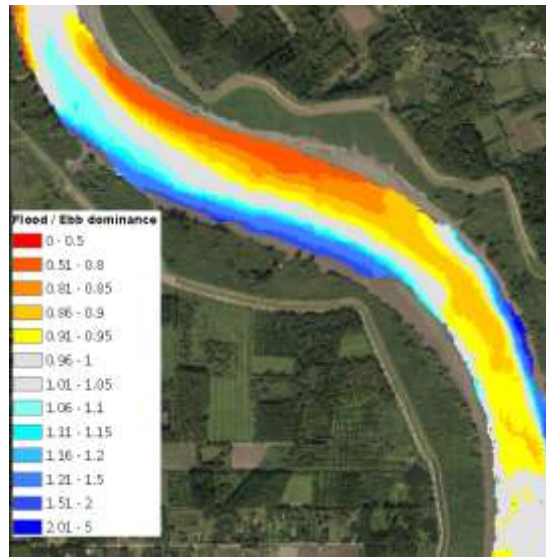
Aim Habitatmapping project

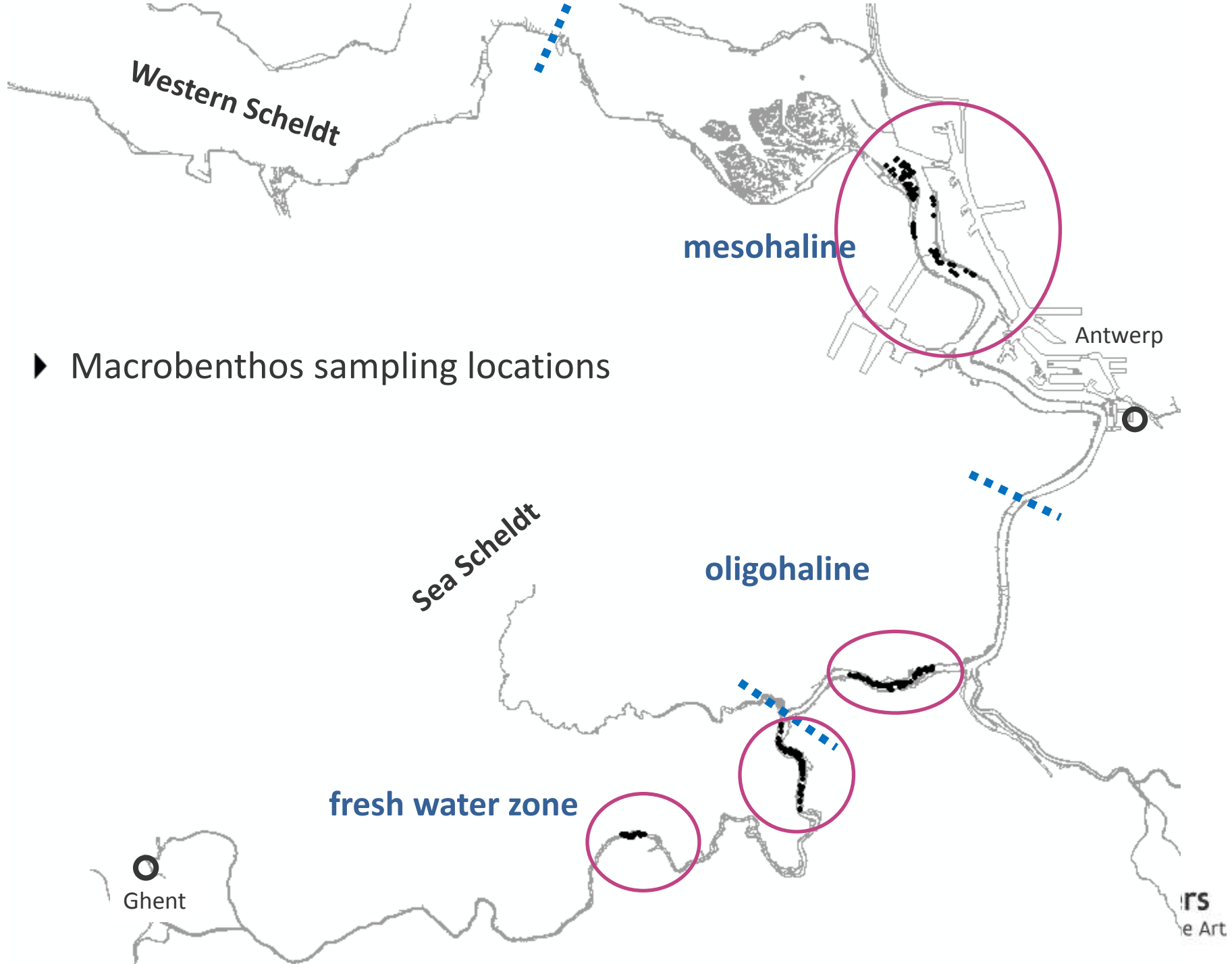
- characterise benthic species & communities
- to develop a improved validated habitat typology
- ▶ Method:
 - Per salinity/ retention zone
 - Macro & hyperbenthos sampling
- ▶ Benthos ~ habitat characteristics
 - Hydrodynamics
 - × 2D NEVLA model output(period: June)
 - × Flood & ebb velocities (max, avg, intervals,...)
 - Sediment
 - Water depth
- ▶ Presence/absence & density

Hydromorphological data

- ▶ Output 2D numerical model (NEVLA)
 - Flood & ebb velocities (max, avg,...)
 - Flood dominance
 - Time period velocity exceed 0.65m/s

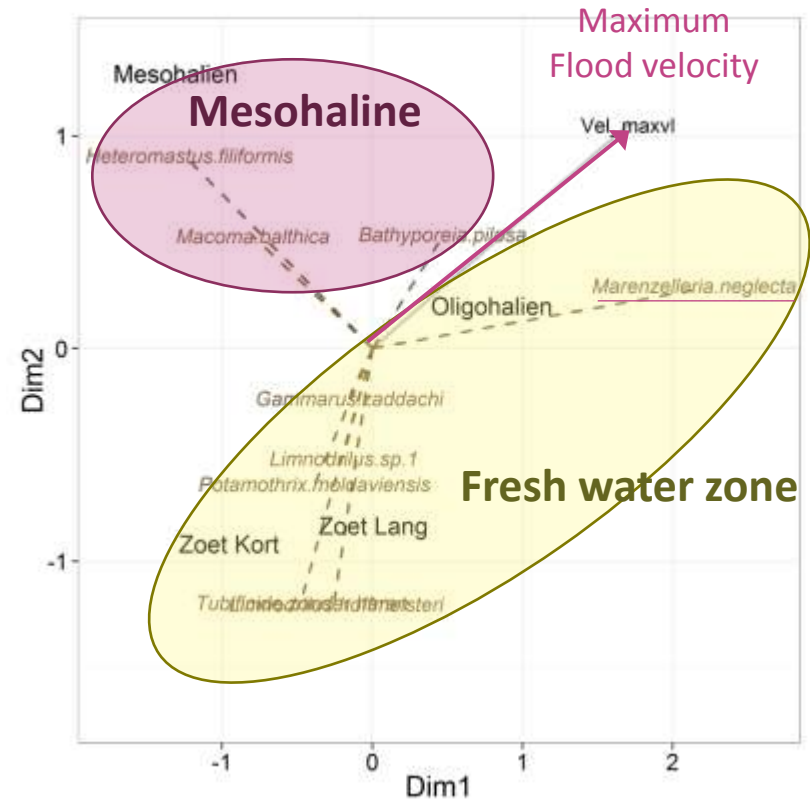
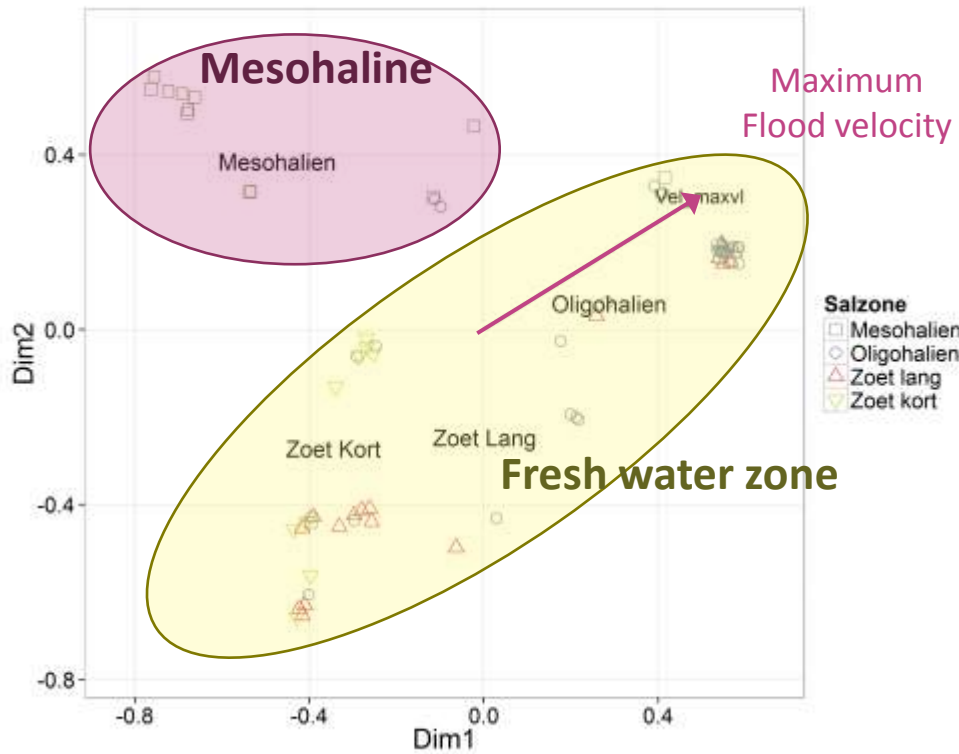
- ▶ Geomorphological maps
 - Multibeam
 - Sediment
 - × Silt
 - × Coarse sand





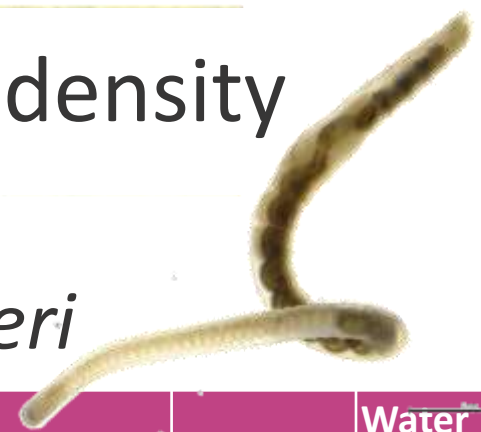
Present macrobenthic community

Multivariate analyses => species composition model



Univariate analysis macrobenthic density

► e.g. *Limnodrilus hoffmeisteri*



	Model area	Salinity zone	Geomorph forms	Max. Flood velocity	Max. Flood dominance	D50 (log)	Water depth (sqrt)
Total density	totaal	***	ns	*** / -	* / +	ns	* / -

Modelled total macrobenthic density

Shallow waters



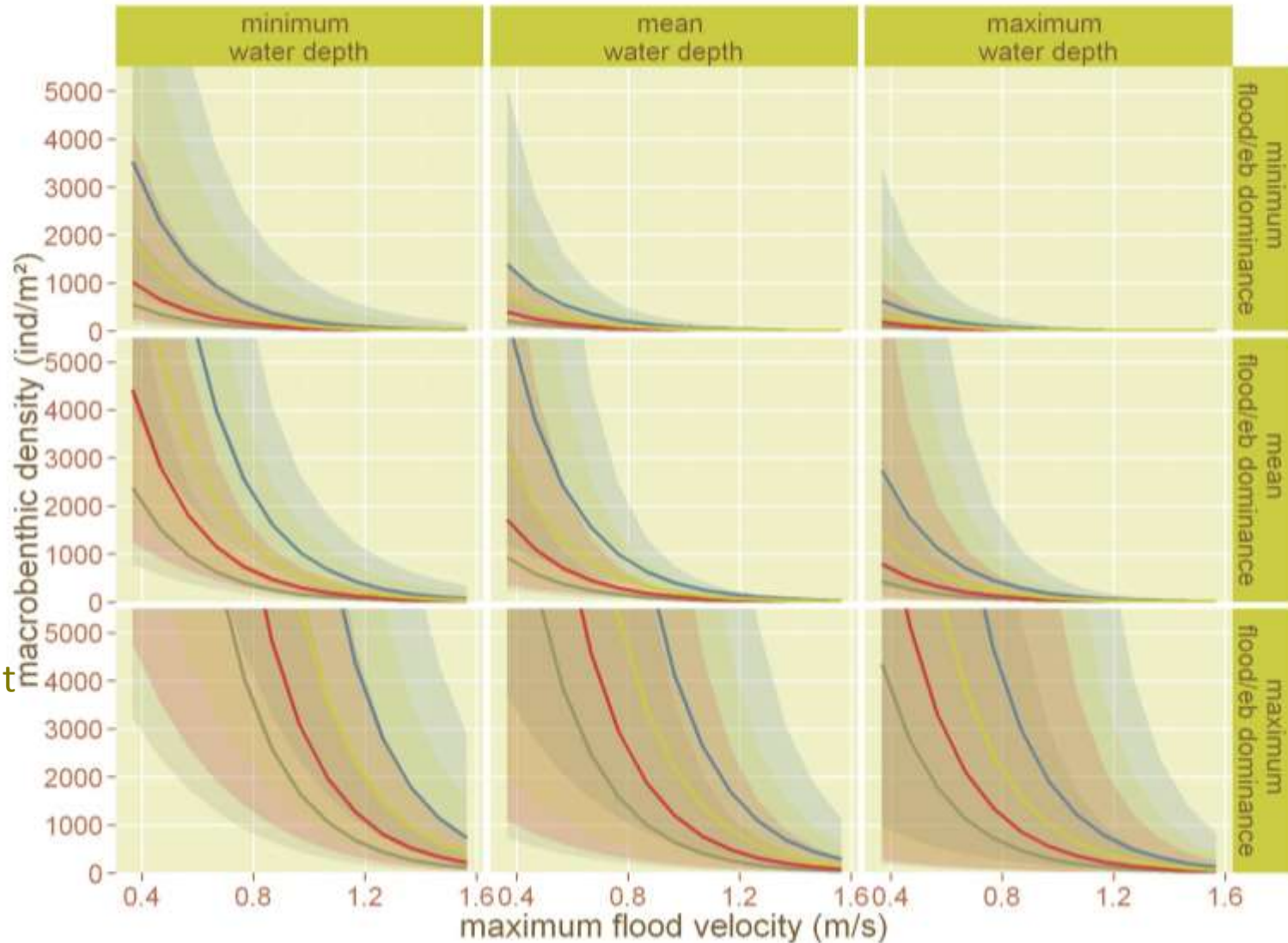
Deep waters

salinity zone — mesohaline — oligohaline — fresh - long retention — fresh - short retention

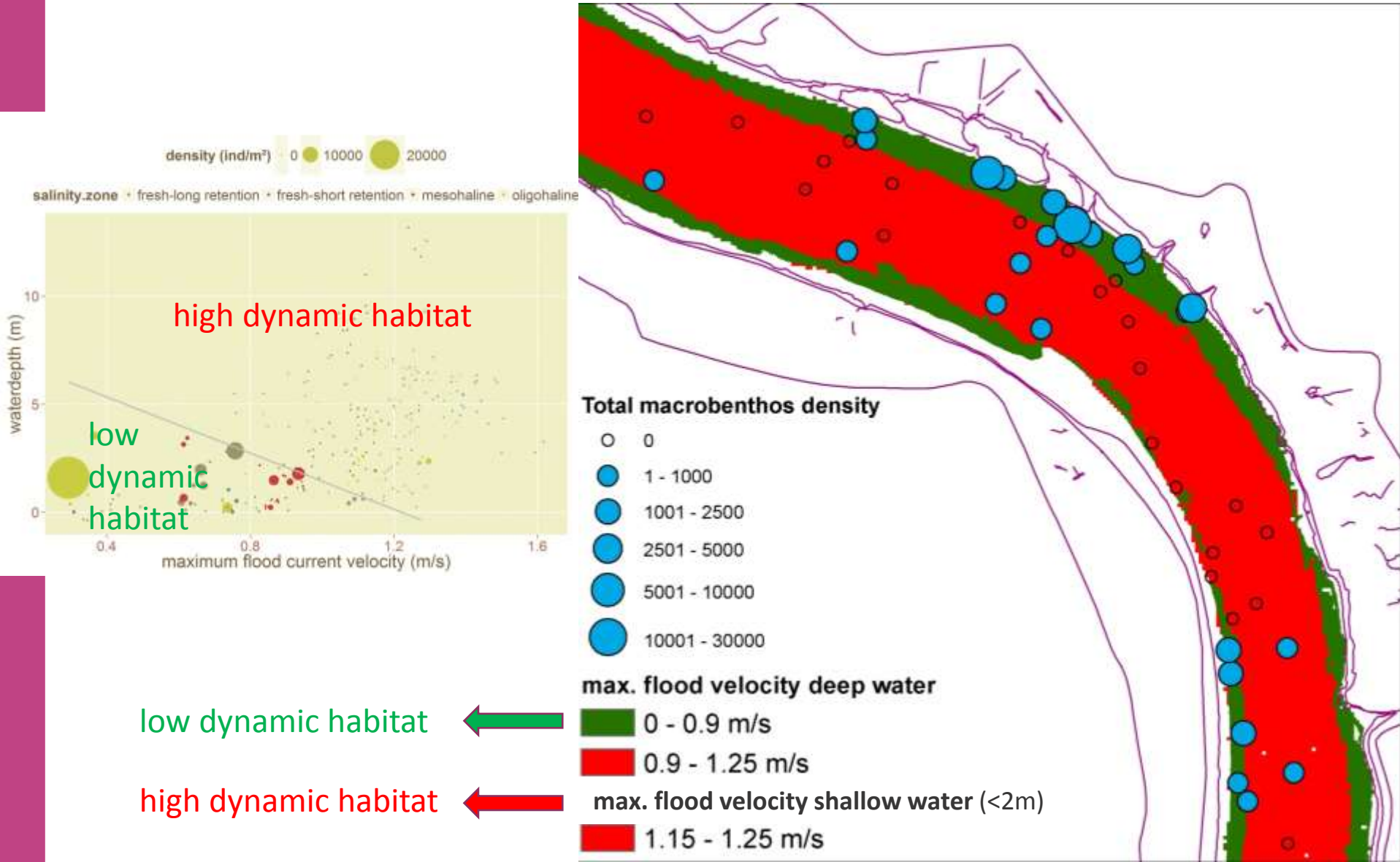
Ebb dominant



Flood dominant



Mapping habitats of benthic density



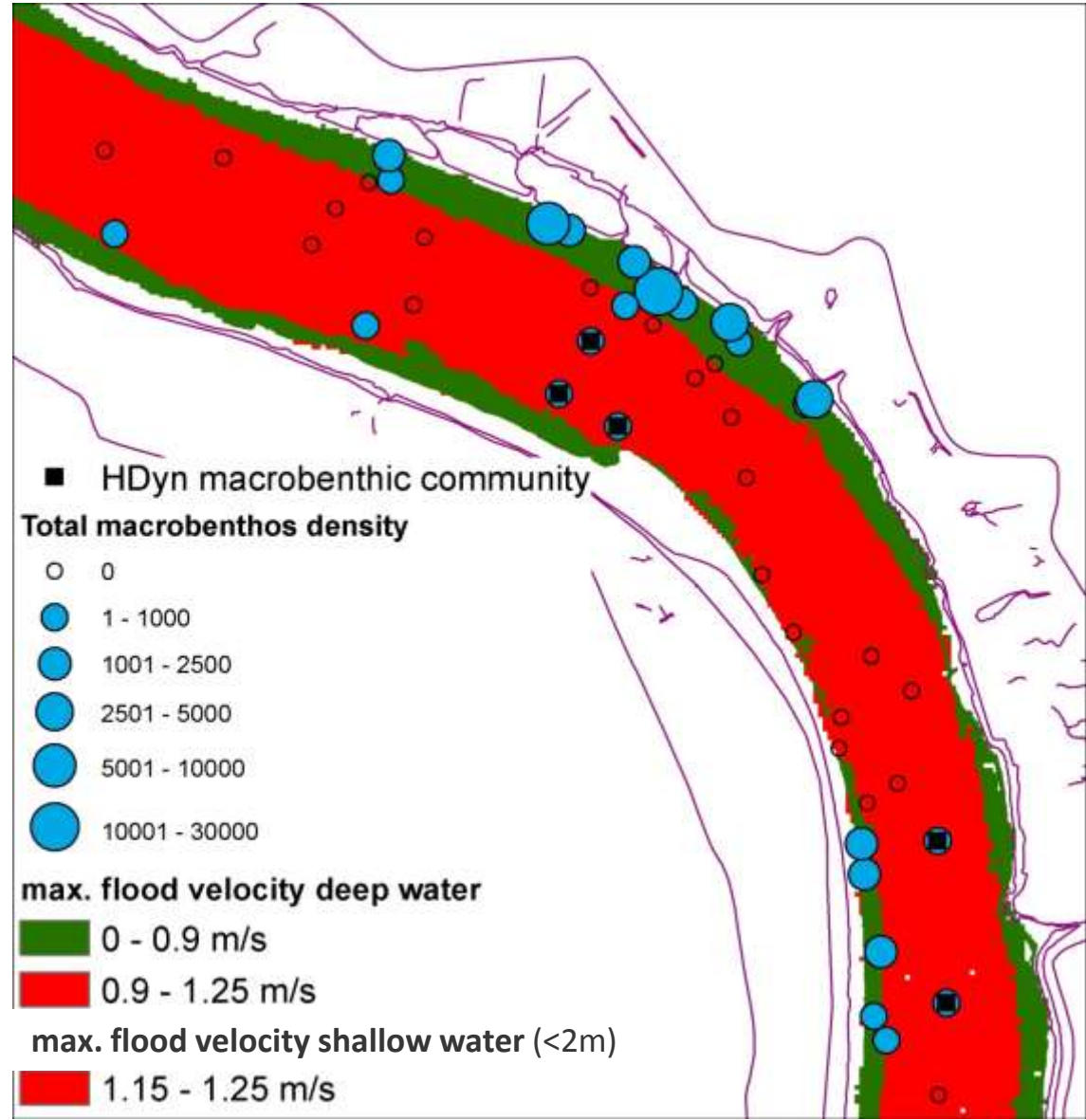
Mapping habitats of benthic density

► macrobenthic community of high velocity habitat :

→ *Bathyporeia pilosa*

→ *Gammarus zaddachi*

→ *Marenzelleria neglecta*



Conclusions & future work

Main explaining variables

- For macrobenthic species & communities
 - => salinity, flood velocities & waterdepth
- Hyperbenthic species => flood dominance and ebb velocities
- Diversification of habitat typology based on different functional groups

Future work:

- habitat characterisation of tidal mudflat
 - × Macro- & hyperbenthos
 - × Birds (preliminary results => poster Van Ryckegem et al.)
- Use ecologically validated instrument for assessments of antropogenic measures
- Use for sampling stratification in future monitoring

Propositions

- **Habitat modelling can replace more expensive ecological sampling!**

Thank you!

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