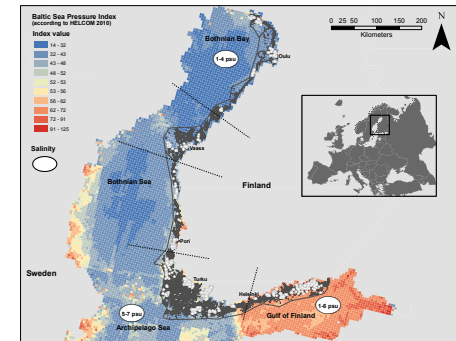


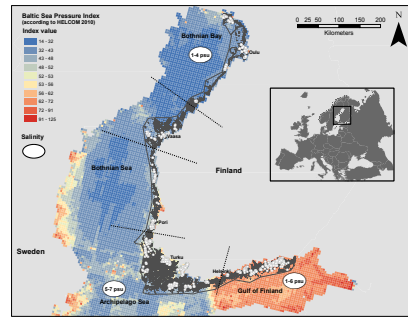
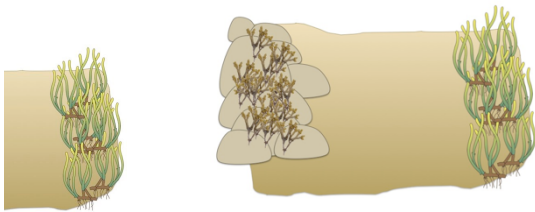
Multiple traits and benthic functioning: from toolbox to application in a system rich in functions but poor in species



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BTA as a valuable toolbox



100 m

1000 m

1000 km

>1000 km

Spatial scale

BTA – Biological Trait Analysis

J. Anim. Ecol. (1977), **46**, 337–365

HABITAT, THE TEMPLET FOR ECOLOGICAL STRATEGIES?

PRESIDENTIAL ADDRESS TO THE BRITISH ECOLOGICAL SOCIETY,
5 JANUARY 1977

BY T. R. E. SOUTHWOOD, F.R.S.

*Department of Zoology & Applied Entomology, Imperial College,
London and Silwood Park, Ascot, Berkshire*

“Habitat templet theory”: The habitat acts as a “filter” for certain characteristics of (a) species

Biological Traits Analysis - categorical traits

For example:

Trait:

Feeding position

Modalities:

Suspension feeder

Surface feeder

Sub-surface feeder

3 0

1 3

0 2



We have scored in total:

25 traits

102 modalities

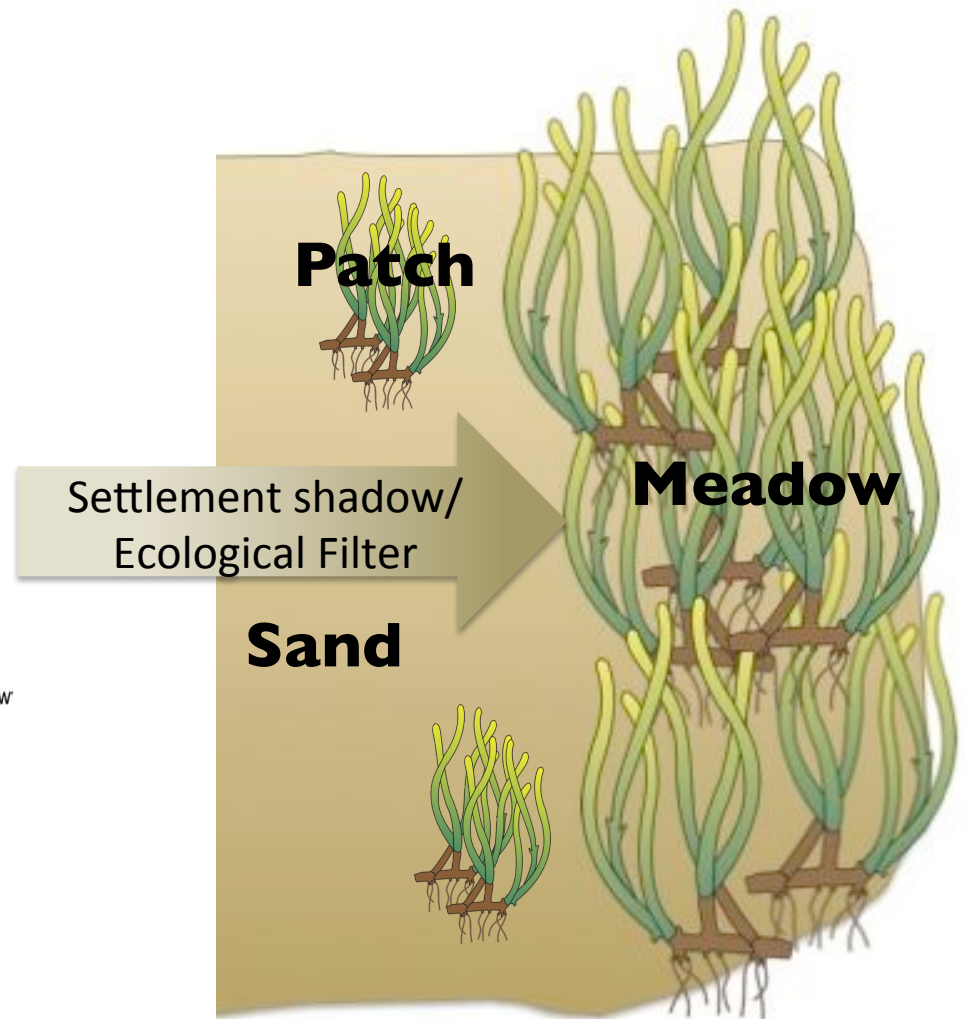
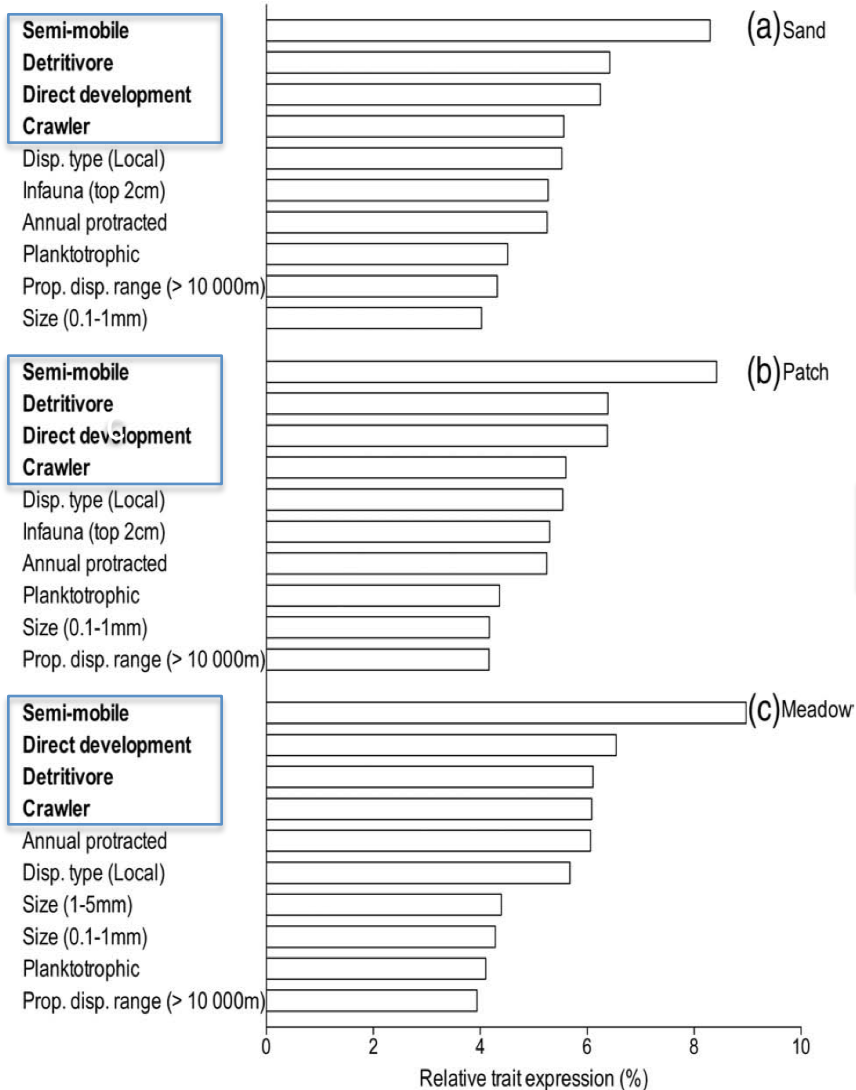
Species	Traits		
	●	●	●
	●	●	●
	●	●	●

Species	Stations		
	●	●	●
	●	●	●
	●	●	●
Trophic measures Stable Isotopes			

Stations	Traits		
	●	●	●
	●	●	●
	●	●	●

Trait expression in relation to seagrass landscape features

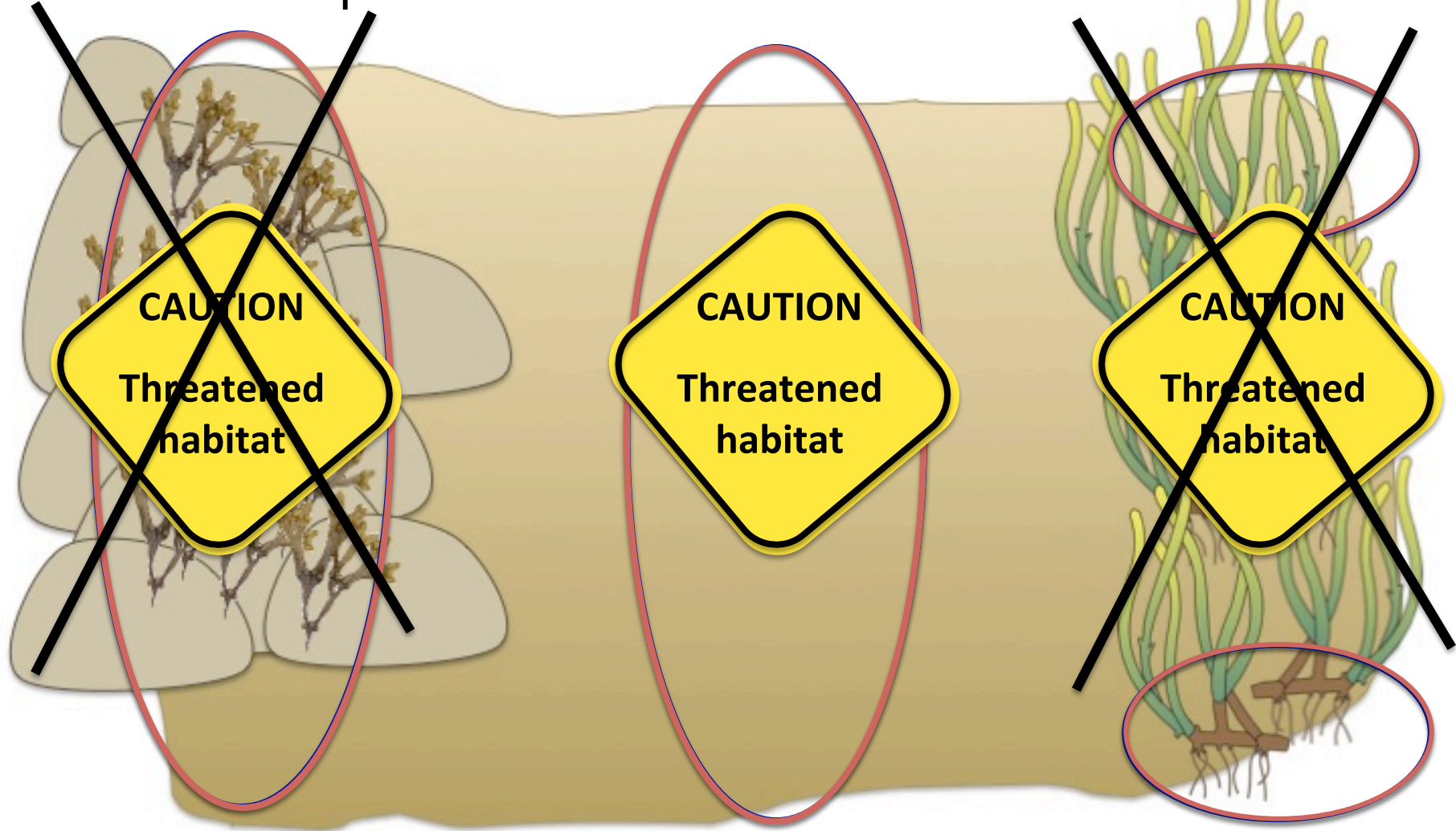
Three Habitats Scale: 100 meters – Landscape



* **Boström C., Törnroos A. & Bonsdorff E. (2010).** Invertebrate dispersal and habitat heterogeneity: Expression of biological traits in a seagrass landscape. *Journal of Experimental Marine Biology and Ecology*, 390: 106-117.

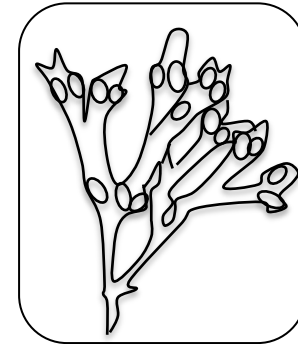
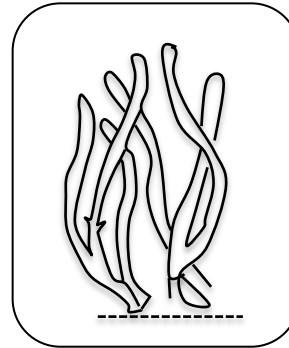
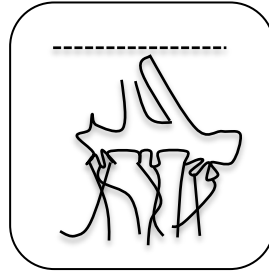
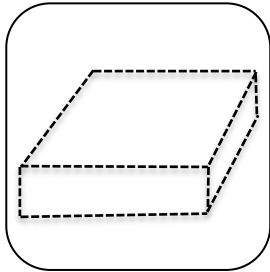
A priori defined coastal habitats –
Do they match taxonomic,
functional & trophic structures?

Four Habitats
Scale: 1000 meters – One Bay



* **Törnroos A., Nordström M.C., & Bonsdorff E. (2013).** Coastal habitats as surrogates for taxonomic, functional and trophic structures of benthic faunal communities. *PLOS ONE in revision*.

Levels of habitat heterogeneity:



Type of community
measure:

**Taxonomic
structure**
(4 habitats)



Input variables:

**Species
abundance**

**Functional
structure**
(2 habitats)



Biological traits
(Trait modalities
weighted with
abundance)

**Trophic
structure**
(2 habitats)



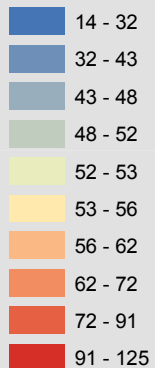
Isotopic niches
(^{13}C and ^{15}N weighted
with abundance)

Analysis: PERMANOVA / MDS & Bray-Curtis similarity

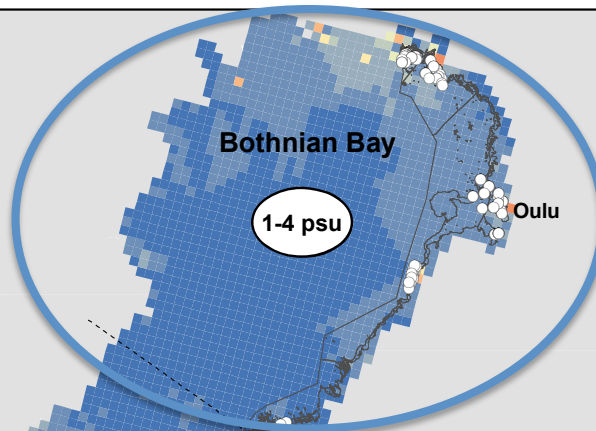
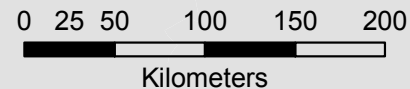
* **Törnroos A., Nordström M.C., & Bonsdorff E. (2013).** Coastal habitats as surrogates for taxonomic, functional and trophic structures of benthic faunal communities. *PLOS ONE in revision*.

Baltic Sea Pressure Index
(according to HELCOM 2010)

Index value



Salinity



Finland

Bothnian Sea

Vaasa

Pori

Helsinki

Turku

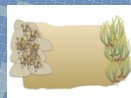
Gulf of Finland

1-6 psu

5-7 psu

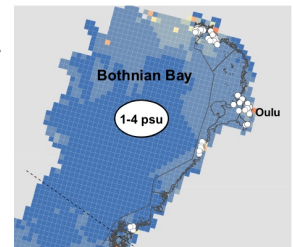
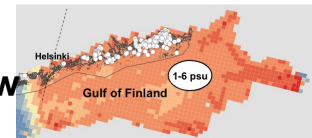
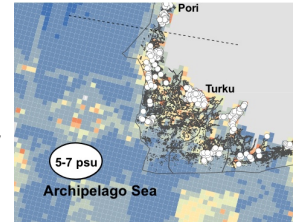
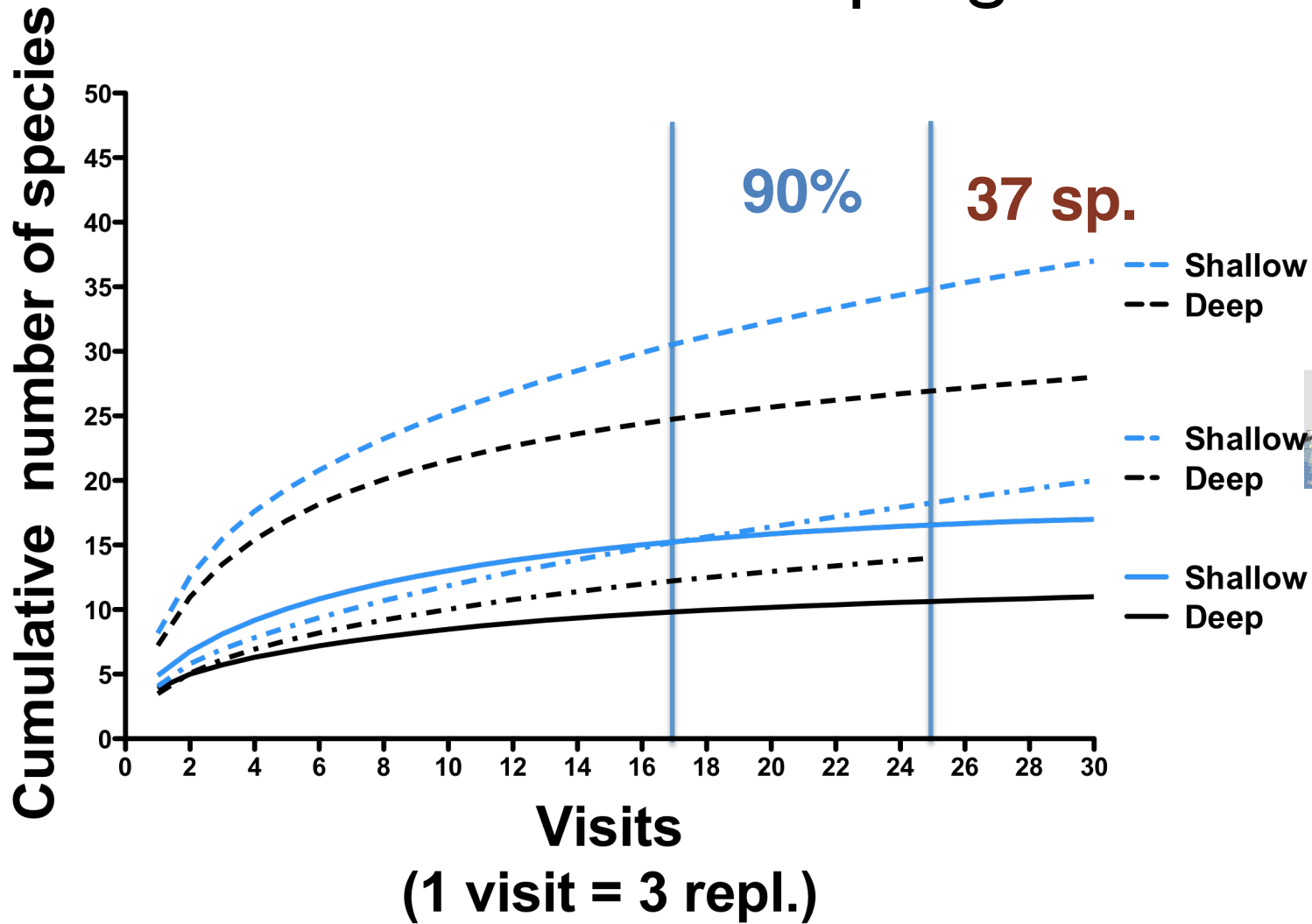
Archipelago Sea

Sweden



Several habitats
Scale: about 1000 km

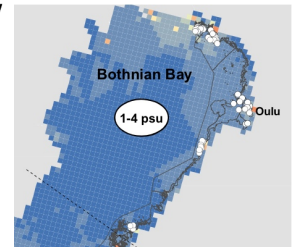
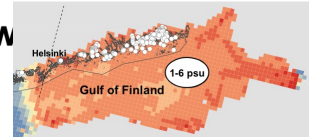
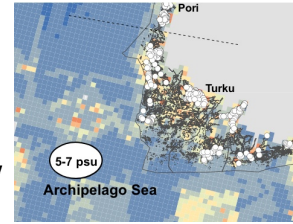
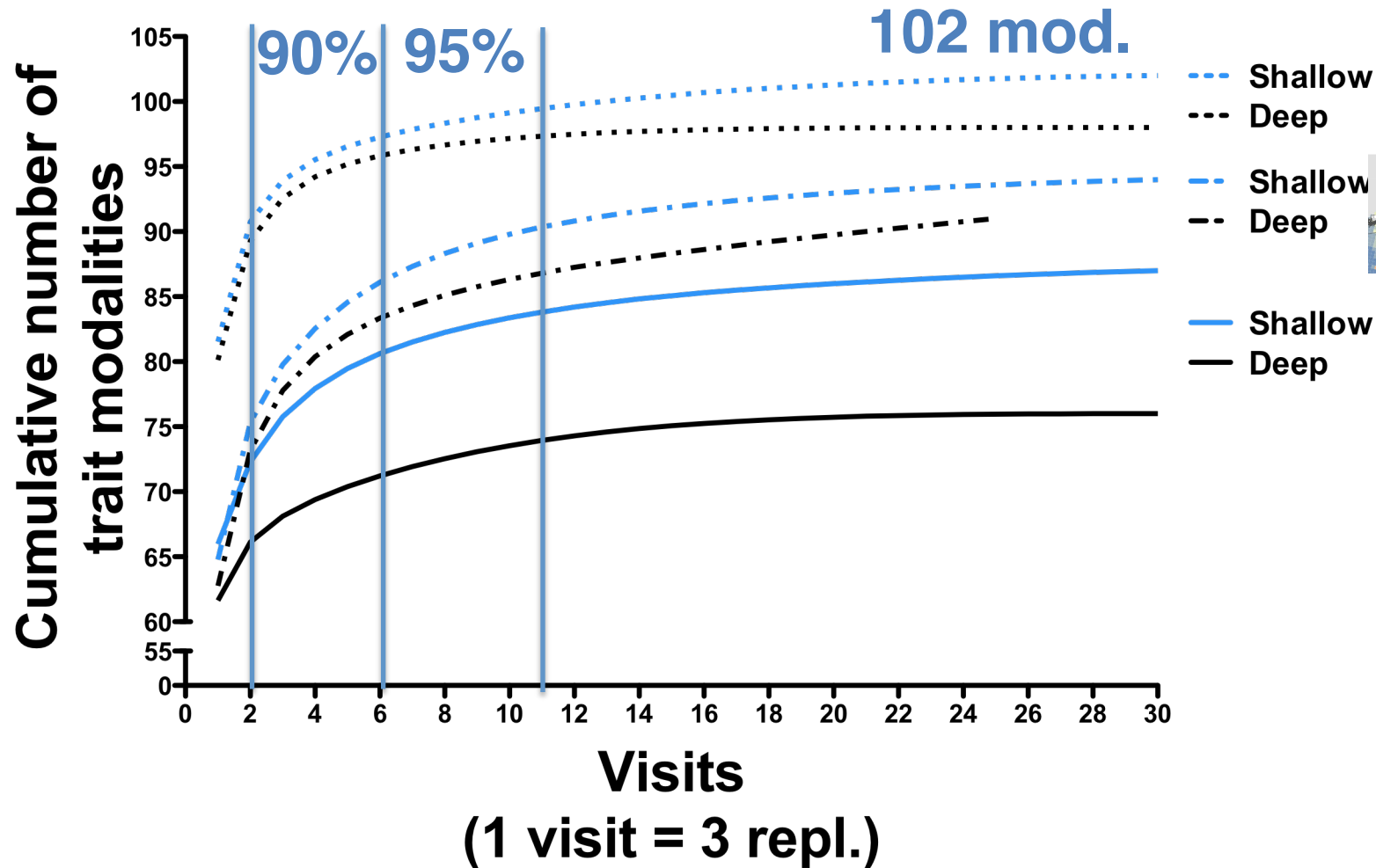
The effect of sampling effort



(EstimateS – Sampled based sp. rarefaction curves)

* **Törnroos, A. & Bonsdorff E. (2012).** Developing the multitrait concept for functional diversity: Lessons from a system rich in functions but poor in species. *Ecological Applications*, 22: 2221–2236.

Traits tell us more with less effort!



* **Törnroos, A. & Bonsdorff E. (2012).** Developing the multitrait concept for functional diversity: Lessons from a system rich in functions but poor in species. *Ecological Applications*, 22: 2221–2236.

Functional “**type organism**”

Solitary

Medium size (1-3 cm)

Diffusive mixing

Sexual reproduction

Local dispersal
(10-1000m)

Gonochoristic
(separate sexes)

Detritivore

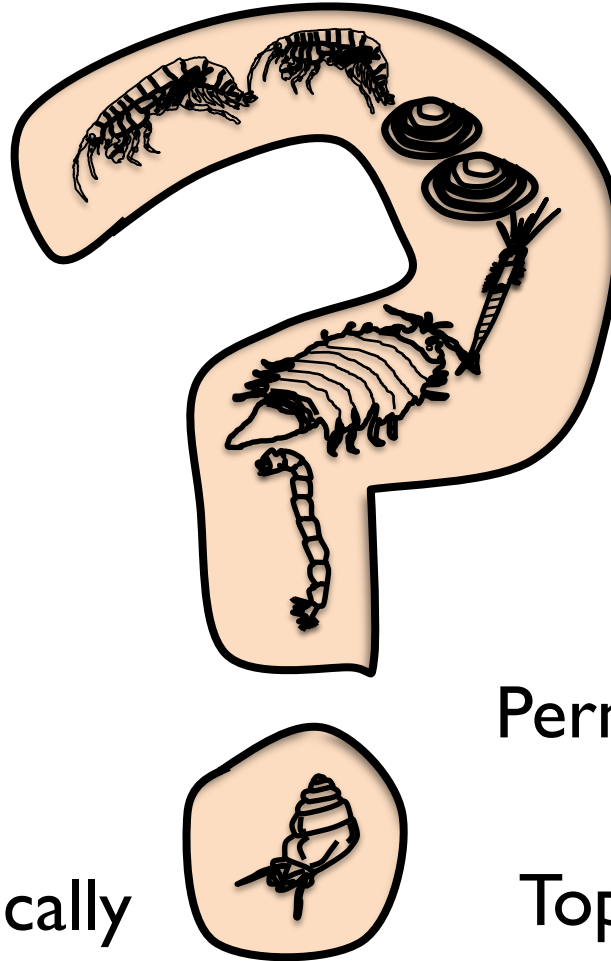
Direct development

Mobile

Permanent in/on sediment

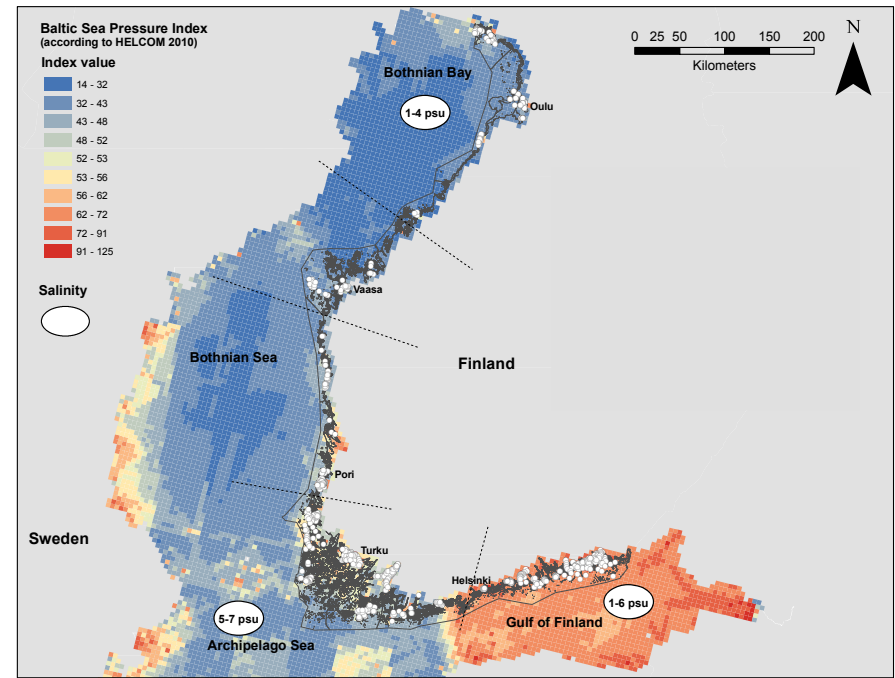
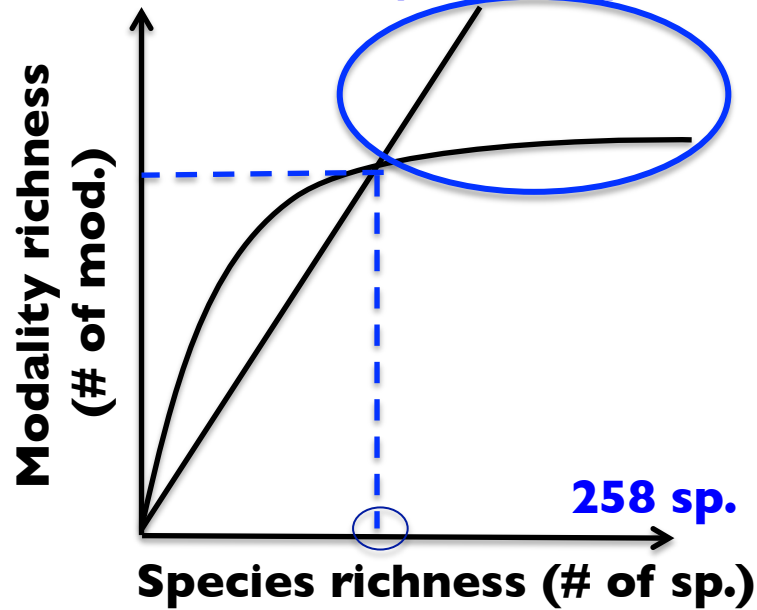
Epibenthically

Top 2 cm



* **Törnroos A. & Bonsdorff E. (2012).** Developing the multitrait concept for functional diversity: Lessons from a system rich in functions but poor in species. *Ecological Applications*, 22: 2221–2236.

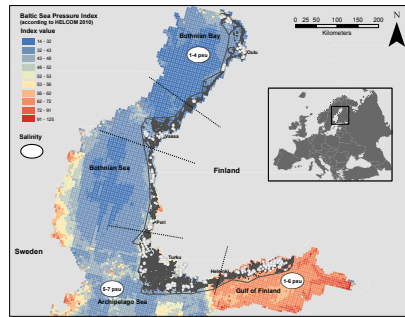
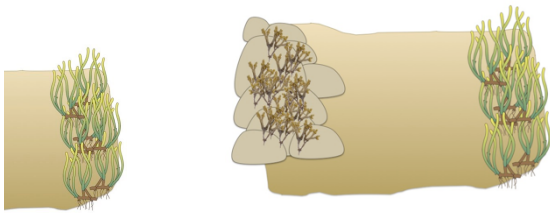
52 modalities (10 traits)



Several habitats
Scale: > 1000 km

* Törnroos A., Bremner J., Garcia C., Blomqvist M., Warzocha J., Josefson A., Bonsdorff E. (2013). Functional trait diversity along a gradient from high to low biodiversity. *In prep.*

BTA as a valuable toolbox



100 m

1000 m

1000 km

>1000 km

Spatial scale

Acknowledgements



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Julie Bremner

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Stiftelsen för Åbo Akademi

Picture credits (Fucus sp. Zostera sp.): University of Maryland Center for Environmental Science
(ian.umces.edu/imagelibrary/)



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