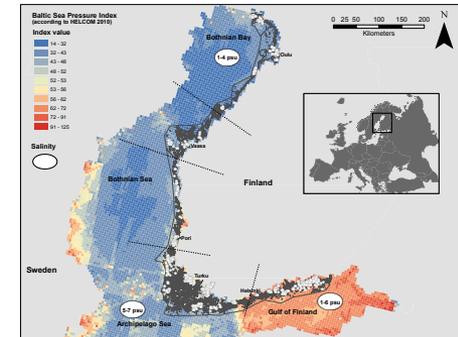


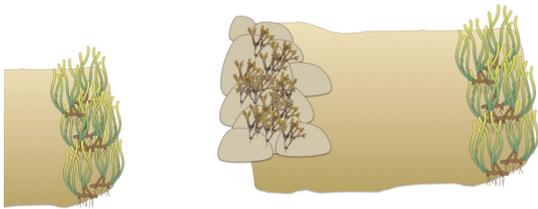
Multiple traits and benthic functioning: from toolbox to application in a system rich in functions but poor in species



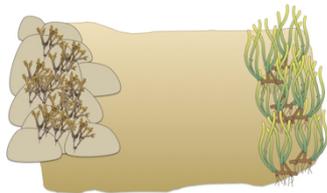
Anna Törnroos, Erik Bonsdorff
(anna.m.tornroos@abo.fi)

Dept. of Biosciences, Environmental and Marine Biology
Åbo Akademi University

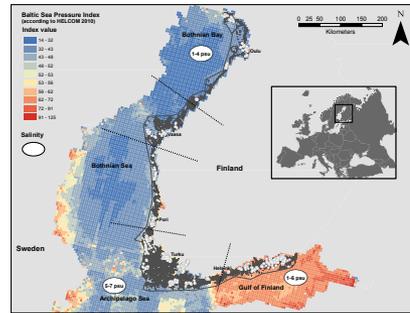
BTA as a valuable toolbox



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

3 0

Surface feeder

1 3

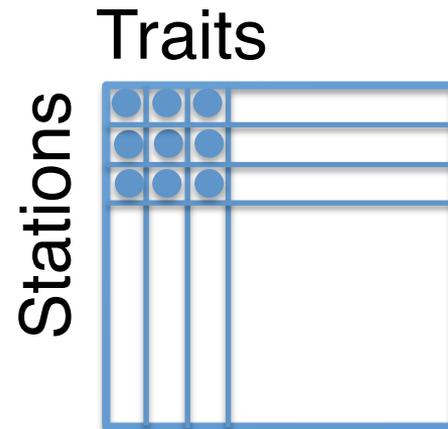
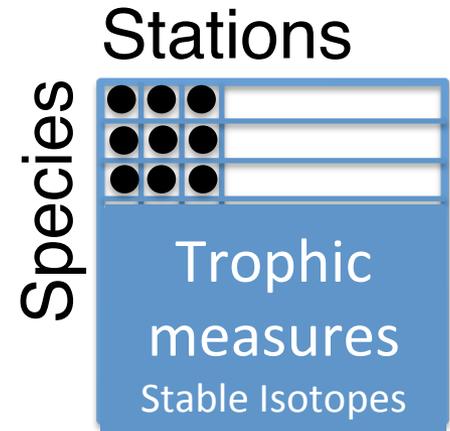
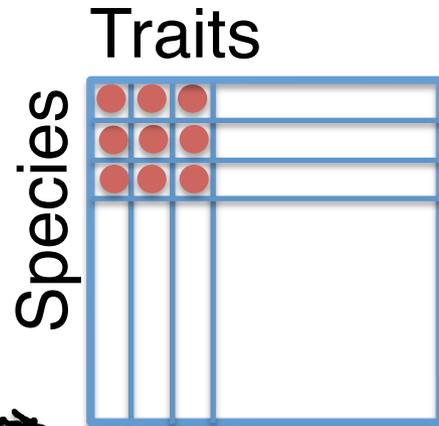
Sub-surface feeder

0 2

We have scored in total:

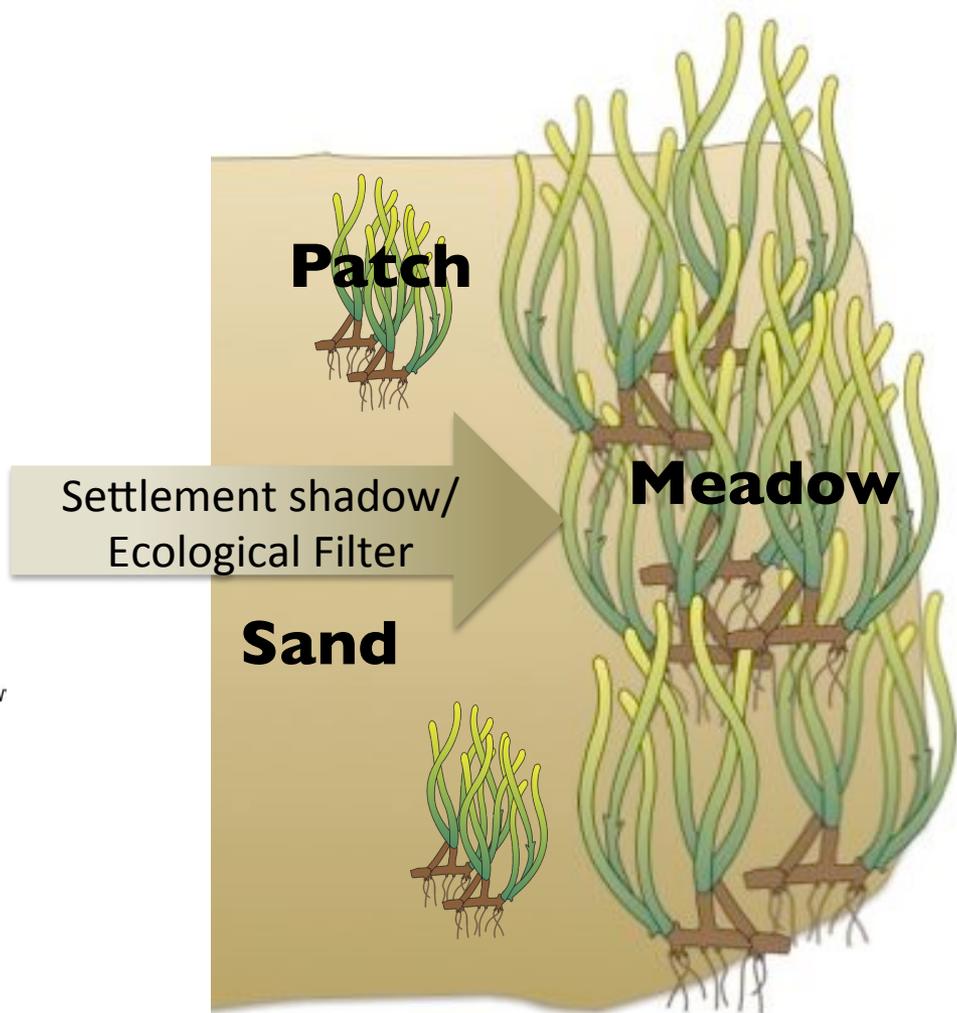
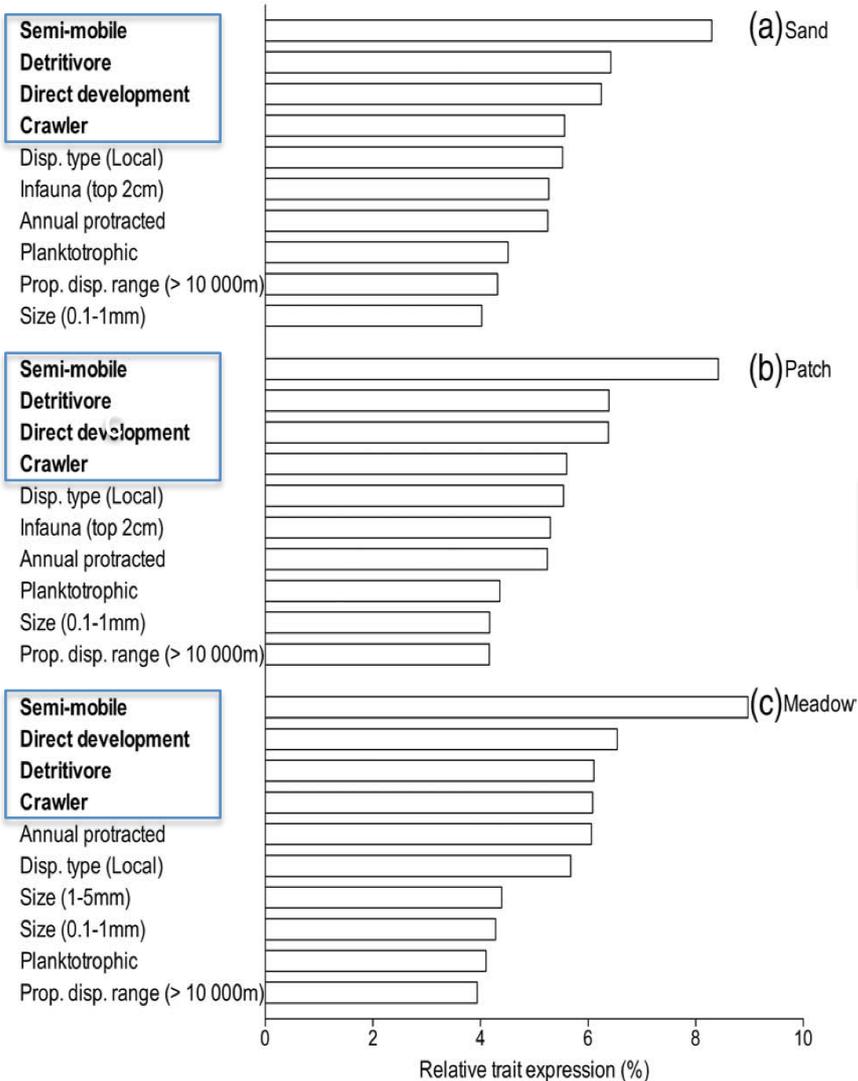
25 traits

102 modalities



Trait expression in relation to seagrass landscape features

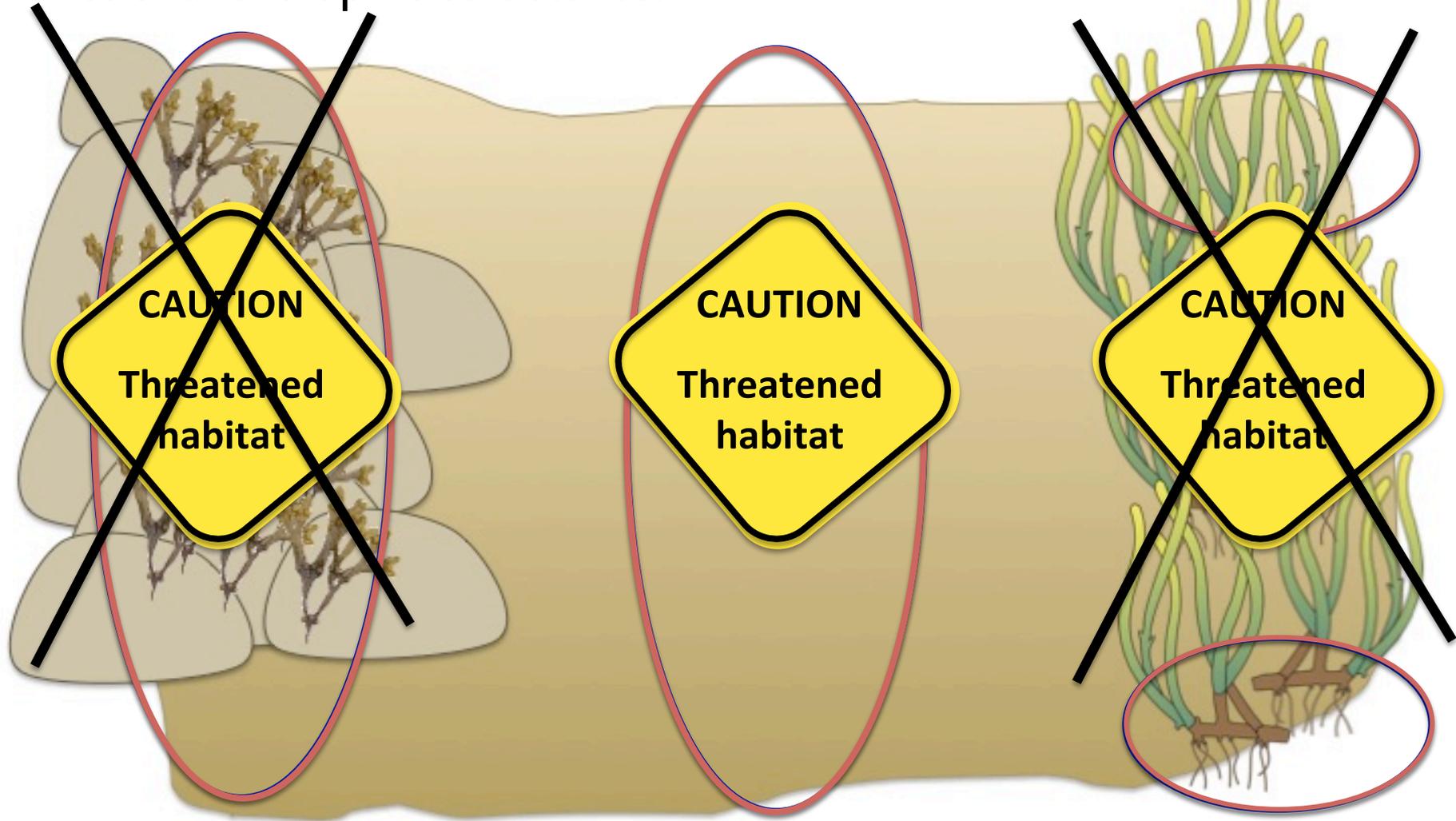
Three Habitats Scale: 100 meters – Landscape



* **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.

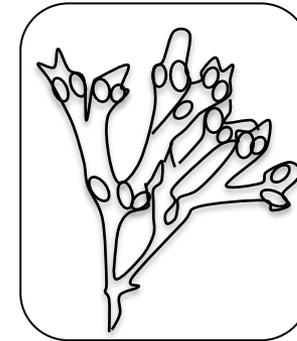
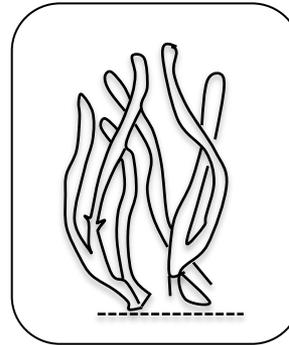
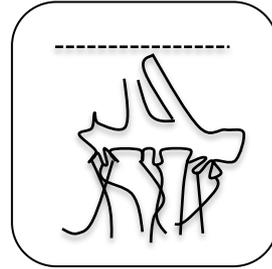
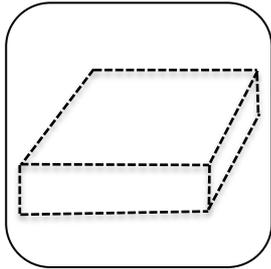
A priori defined coastal habitats –
Do they match taxonomic,
functional & trophic structures?

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:

Input variables:

Taxonomic structure
(4 habitats)

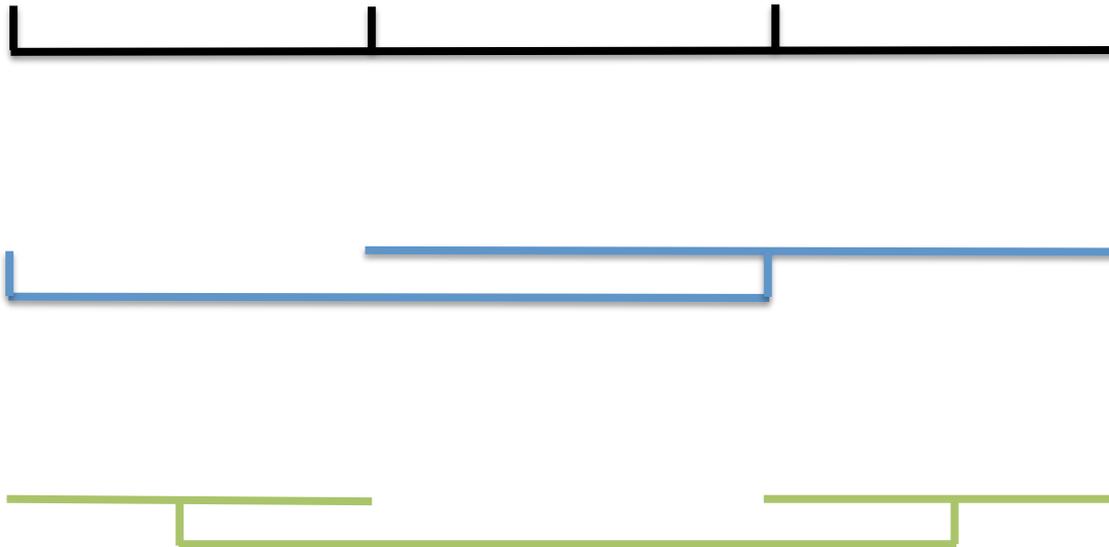
Species abundance

Functional structure
(2 habitats)

Biological traits
(Trait modalities weighted with abundance)

Trophic structure
(2 habitats)

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

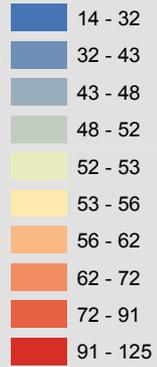


Analysis: PERMANOVA / MDS & Bray-Curtis similarity

* **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)

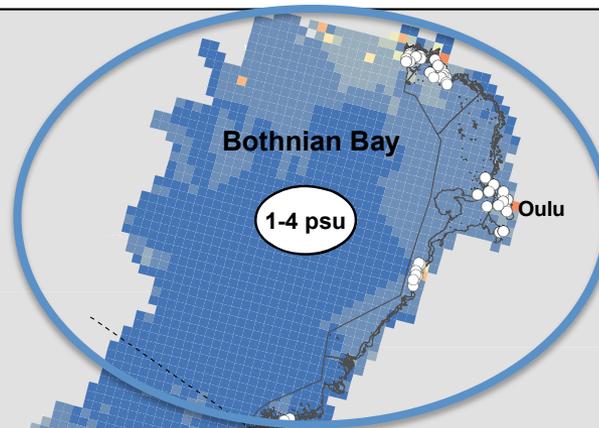
Index value



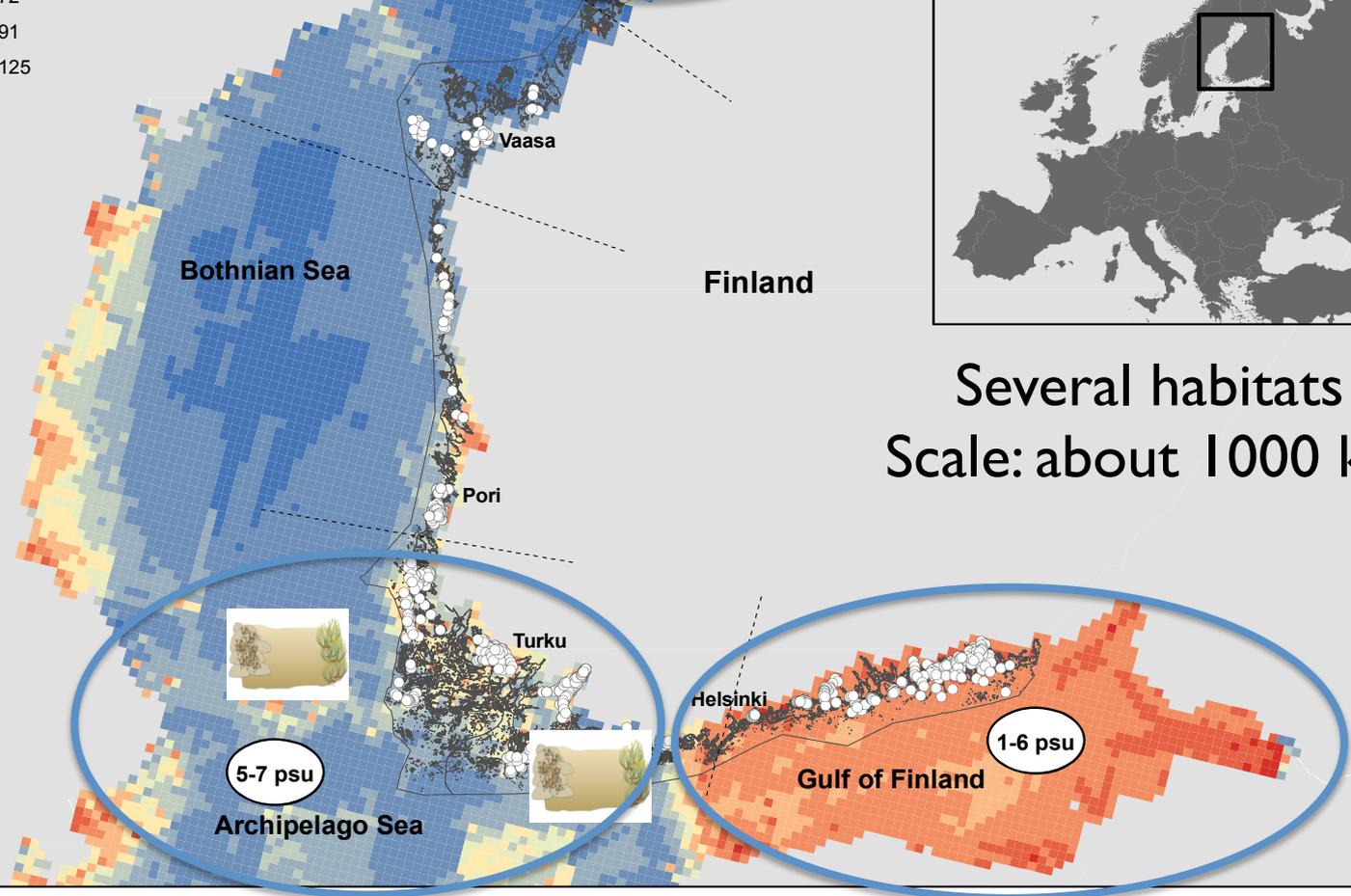
Salinity



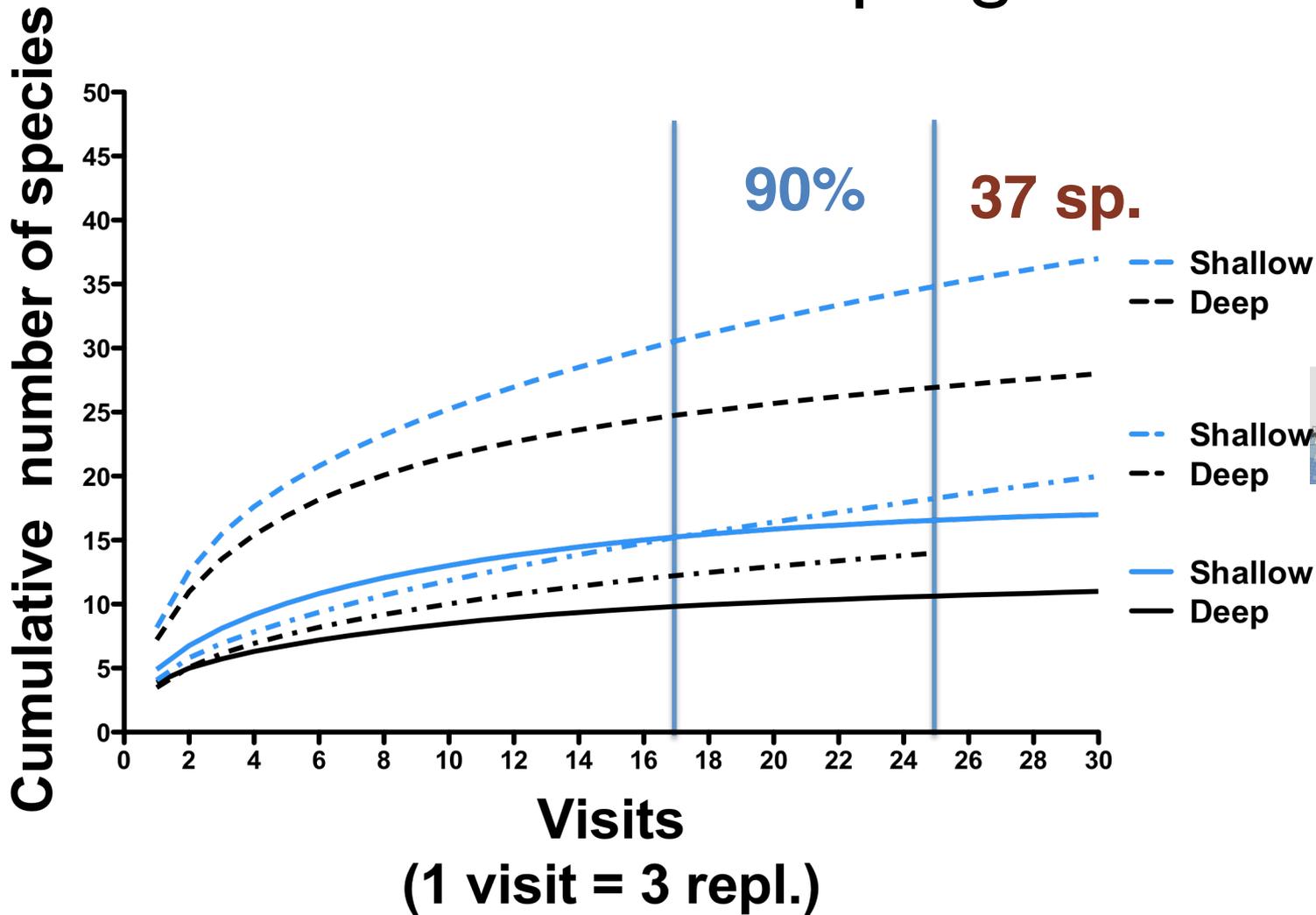
N



Several habitats
Scale: about 1000 km



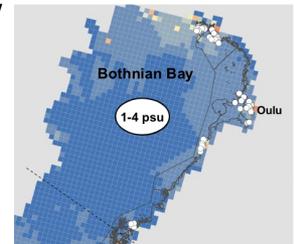
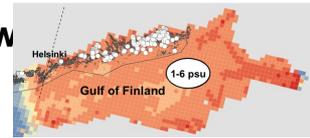
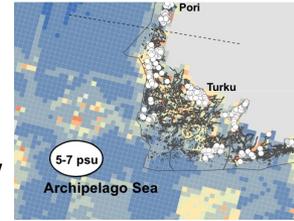
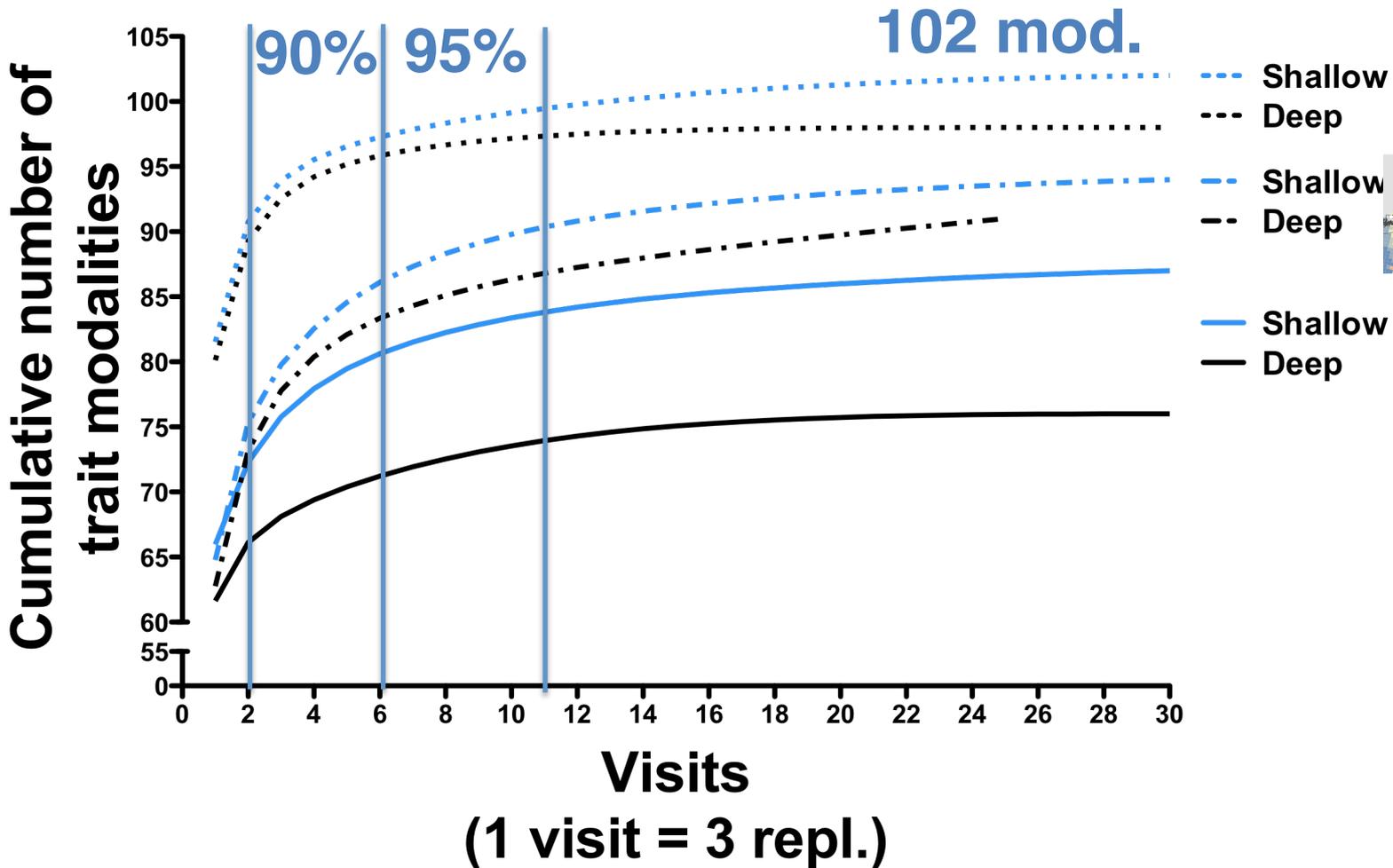
The effect of sampling effort



(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

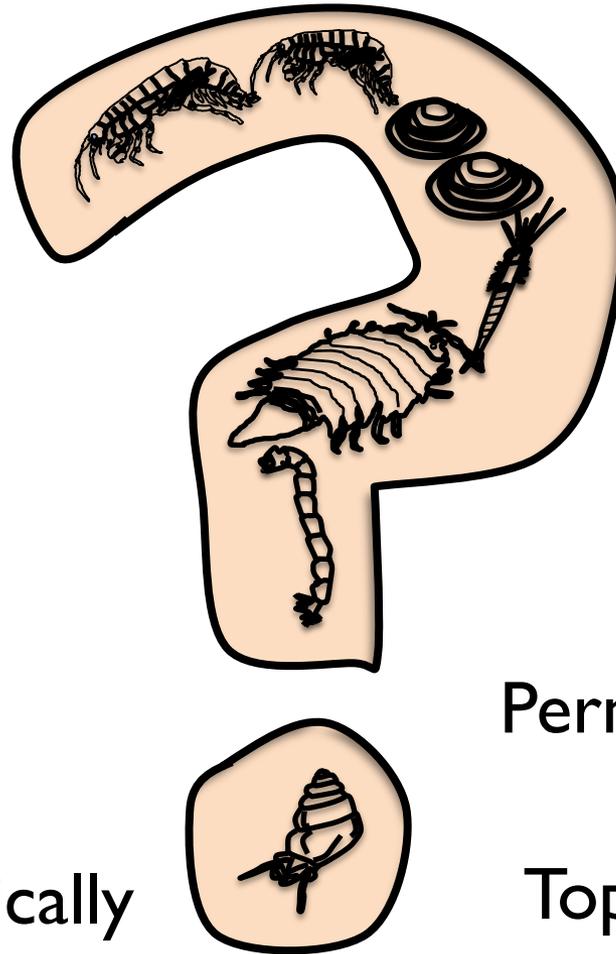
Direct development

Mobile

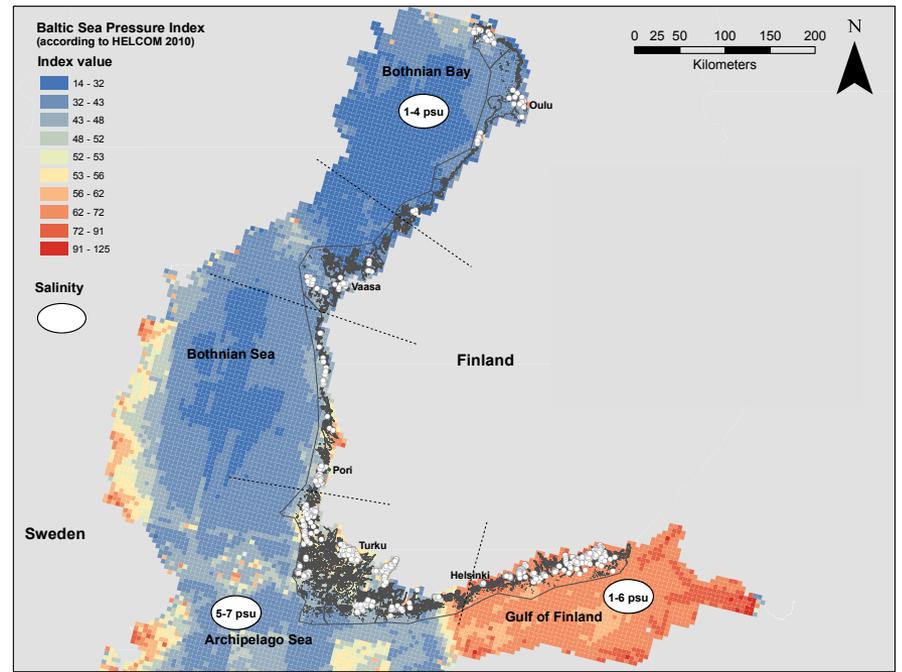
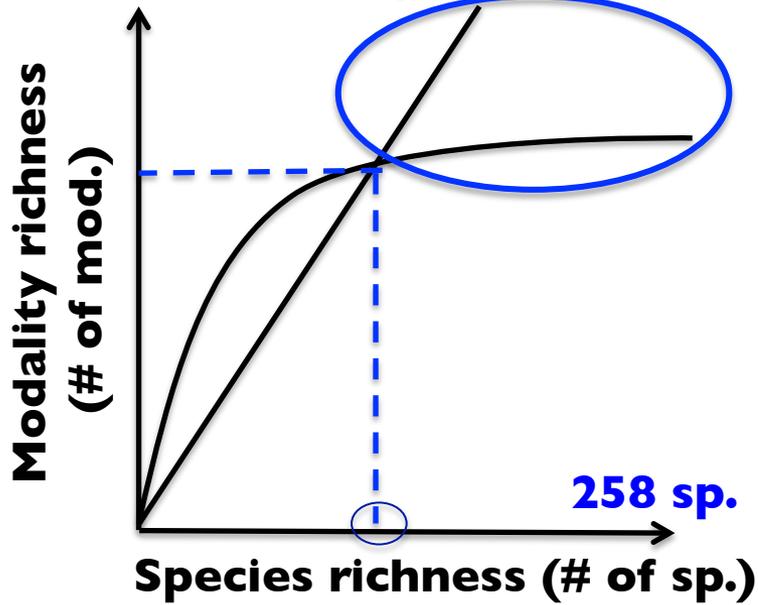
Permanent in/on sediment

Epibenthically

Top 2 cm



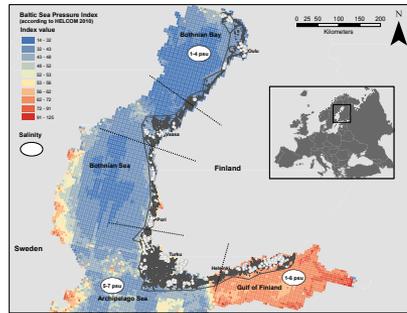
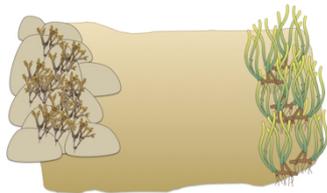
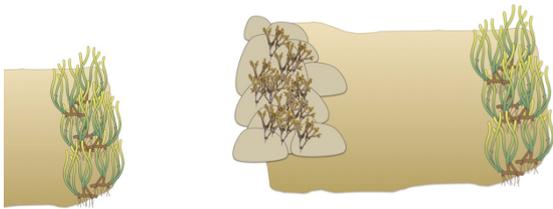
52 modalities (10 traits)



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

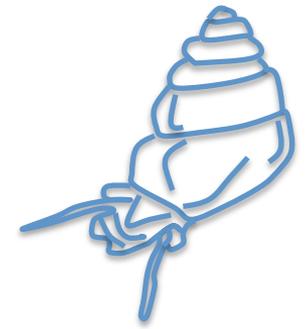
1000 m

1000 km

> 1000 km

Spatial scale

Acknowledgements



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Julie Bremner

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**Maj & Tor Nessling Foundation
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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