PREHAB

PREdicting, mapping and valuing bidiversity
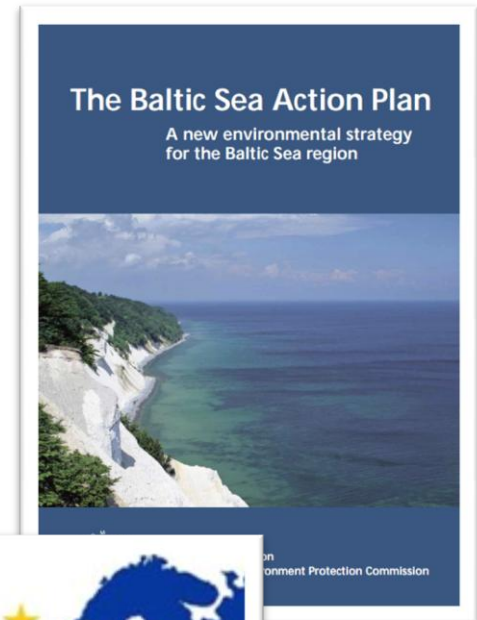in coastal HABitats of the Baltic Sea

RATIONALE

Implementation of Marine Spatial Planning (MSP) and other important policies, e.g. the BSAP and EU-directives (MSFD, WFD) require detailed knowledge about:

- **distribution (i.e. maps), and**

- **value**

of marine biodiversity and its associated goods and services.

The Baltic Sea Action Plan
A new environmental strategy for the Baltic Sea region

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AIMS

To develop and test (in a Baltic-wide context) cost-efficient methods for:

- **predictive mapping of biodiversity**

- **evaluation of (a) ecological effects and (b) economic value of benefits due to different policy scenarios.**

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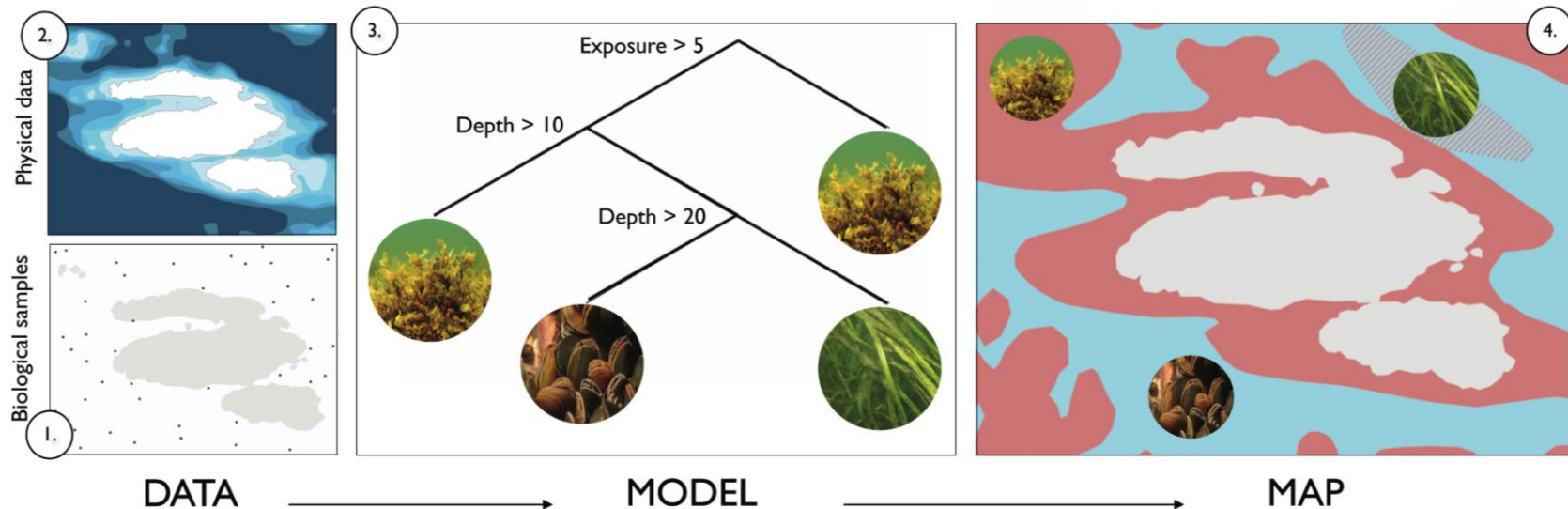
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WHY PREDICTIVE MAPPING?

It provides a economically feasible way to interpolate scattered biological data into coherent maps based on traditional species-environment relationships!

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What can be modelled and mapped?

How accurately can it be modelled?

Which are the most useful tools for modeling?

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PREDICTIVE MAPPING WORKS !

- **Useful models of fish and vegetation in all case-study areas!**

- **Need for accurate data on water depth and substrate!**

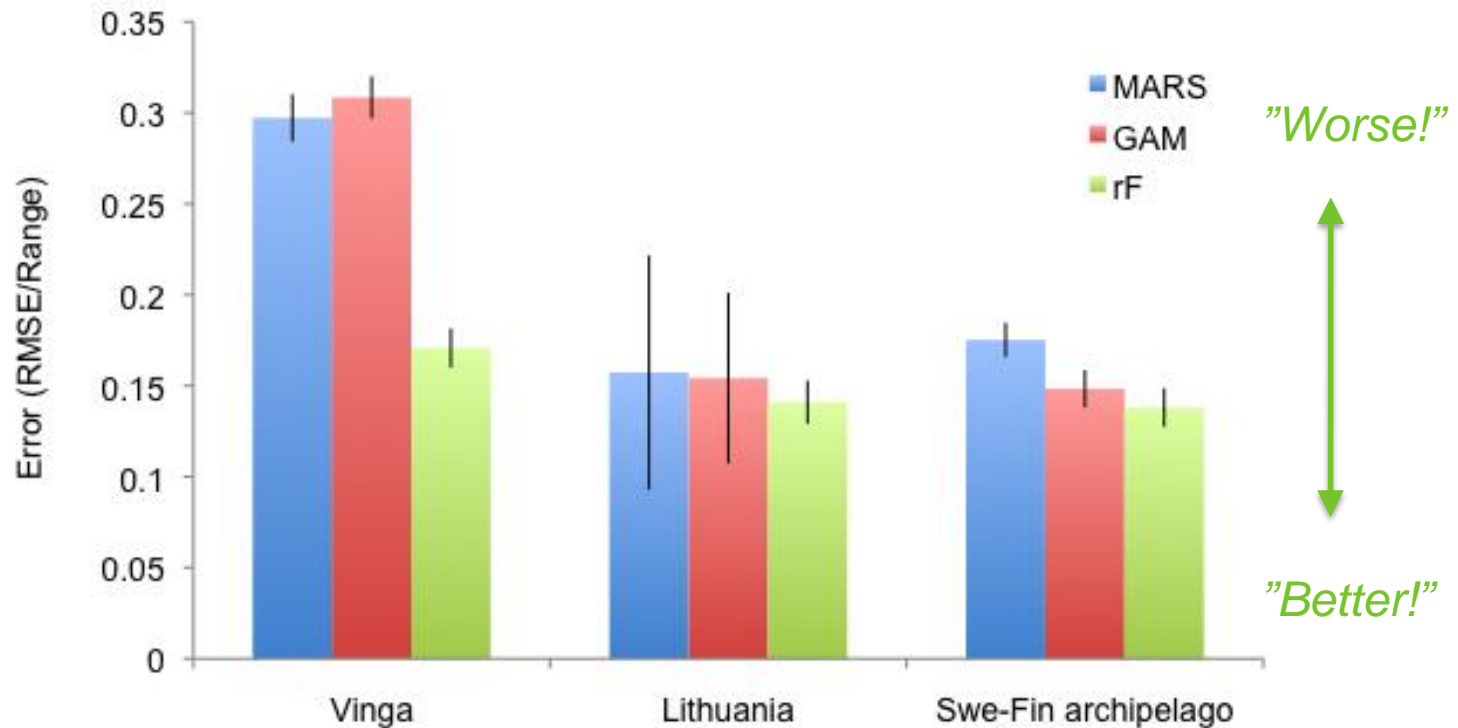- **Quality and amount of biological data important for improving models and maps!**

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DISTRIBUTION OF SPECIES
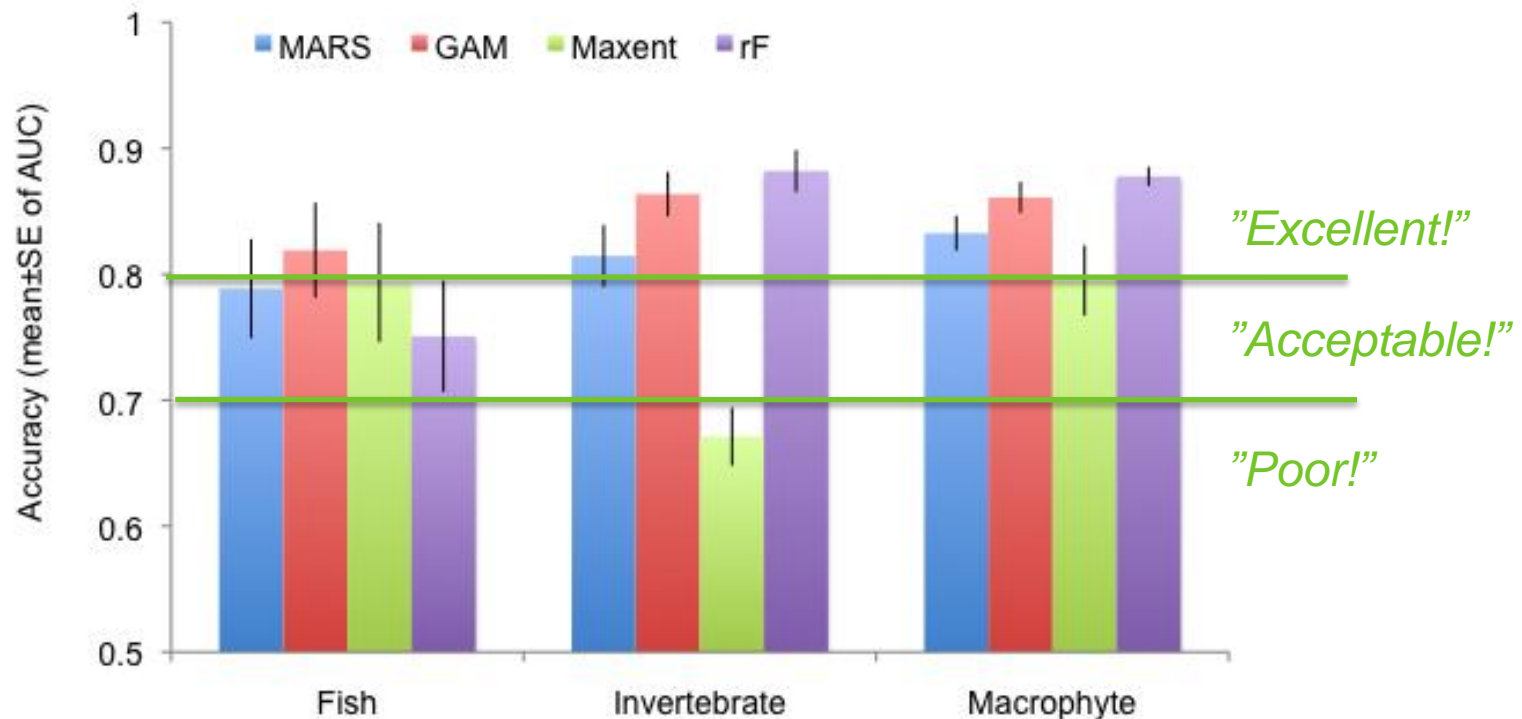
- **Several techniques can provide useful models.**
- **Macrophytes>Invertebrates>Fish (but beware of confounding factors)**

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Abundance

"Worse!"

"Better!"

- **Useful models in all areas!**
- **rF>GAM>MARS**

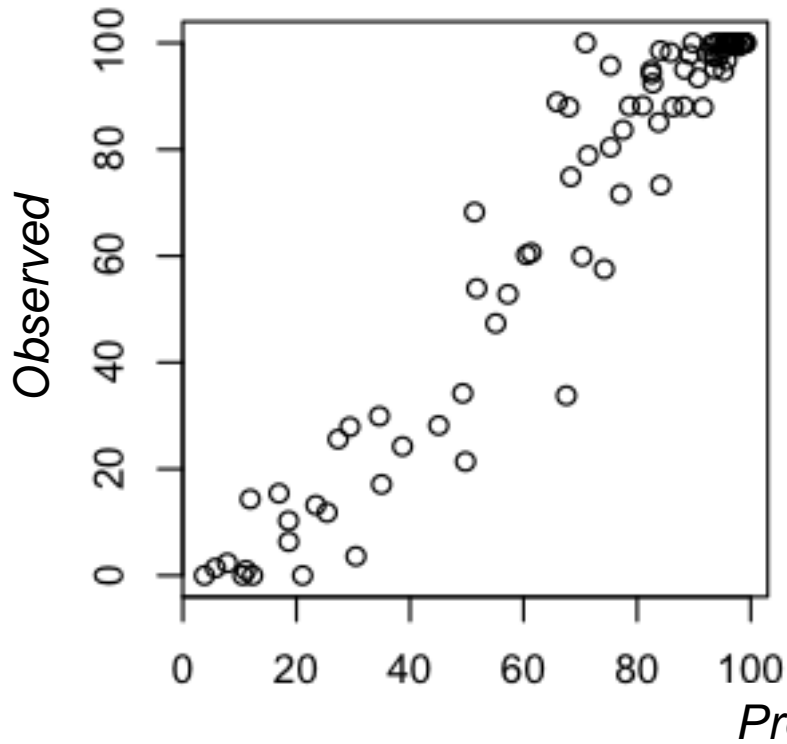*Note: units include %cover, indviduals per m^2 and richness*

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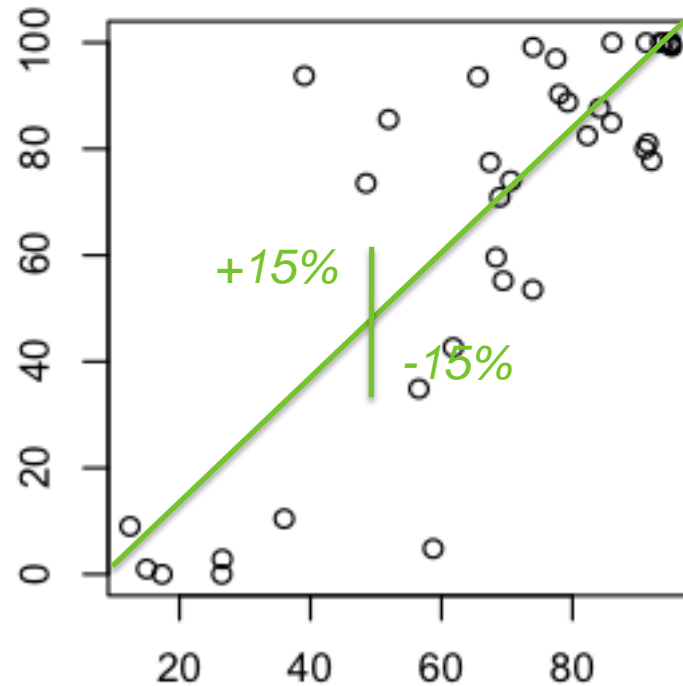
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Example: Total vegetation at Vinga

Model fit

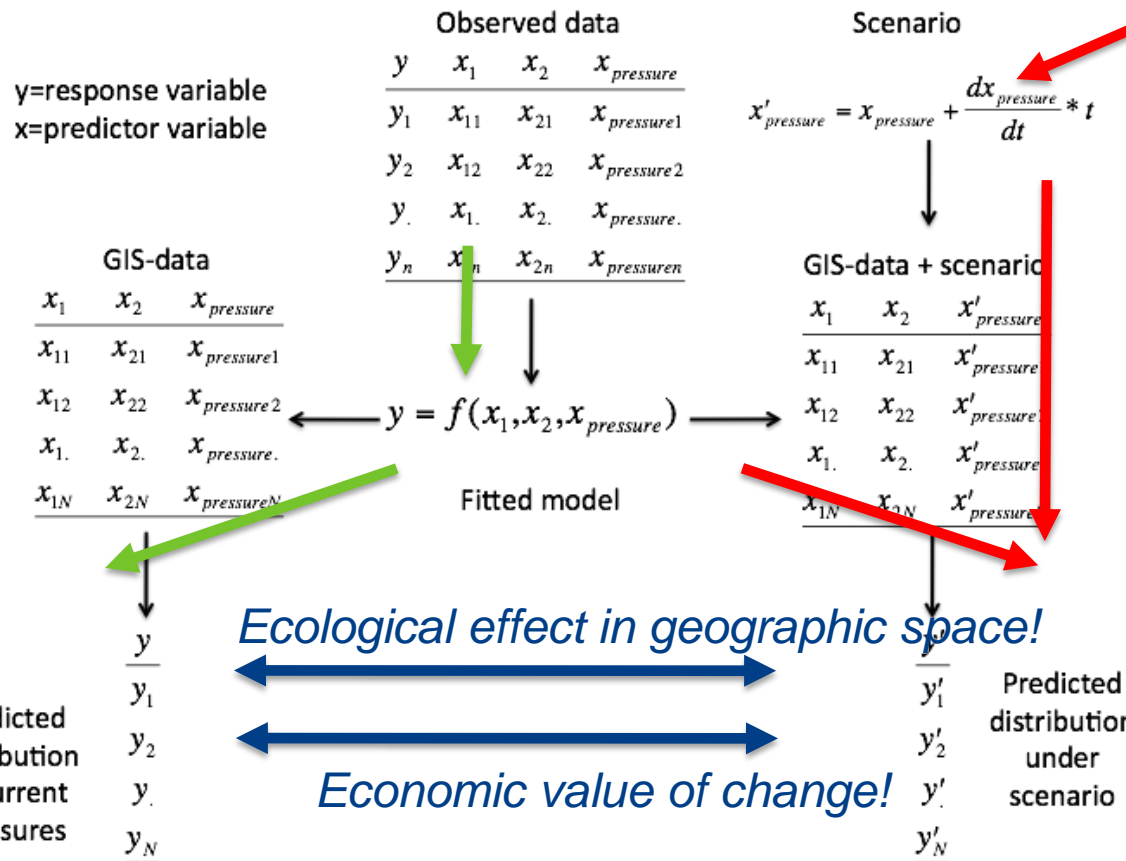External validation

+15%

-15%

EVALUATING MANAGEMENT SCENARIOS!

Pressure indicator

Scenario

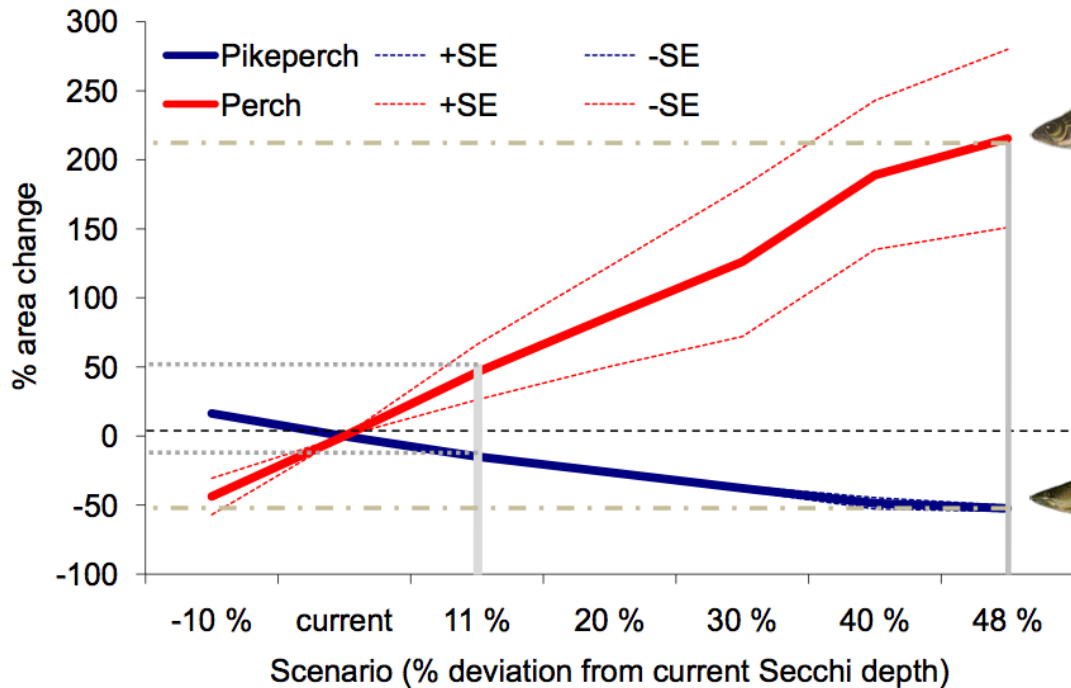*BSAP targets for Secchi depth are transformed into geographic space!*

Observed data

y	x_1	x_2	$x_{pressure}$
y_1	x_{11}	x_{21}	$x_{pressure1}$
y_2	x_{12}	x_{22}	$x_{pressure2}$
$y_.$	$x_{1.}$	$x_{2.}$	$x_{pressure.}$
y_n	x_{1n}	x_{2n}	$x_{pressuren}$

y=response variable
x=predictor variable

Scenario

$$x'_{pressure} = x_{pressure} + \frac{dx_{pressure}}{dt} * t$$

GIS-data

x_1	x_2	$x_{pressure}$
x_{11}	x_{21}	$x_{pressure1}$
x_{12}	x_{22}	$x_{pressure2}$
$x_{1.}$	$x_{2.}$	$x_{pressure.}$
x_{1N}	x_{2N}	$x_{pressureN}$

$$y = f(x_1, x_2, x_{pressure})$$

Fitted model

GIS-data + scenario

x_1	x_2	$x'_{pressure}$
x_{11}	x_{21}	$x'_{pressure}$
x_{12}	x_{22}	$x'_{pressure}$
$x_{1.}$	$x_{2.}$	$x'_{pressure}$
x_{1N}	x_{2N}	$x'_{pressure}$

Ecological effect in geographic space!

Economic value of change!

Predicted distribution at current pressures

y
y_1
y_2
$y_.$
y_N

Predicted distribution under scenario

y'
y'_1
y'_2
$y'_.$
y'_N

SCENARIOS FOR COASTAL MACROPHYTES!
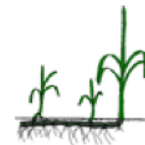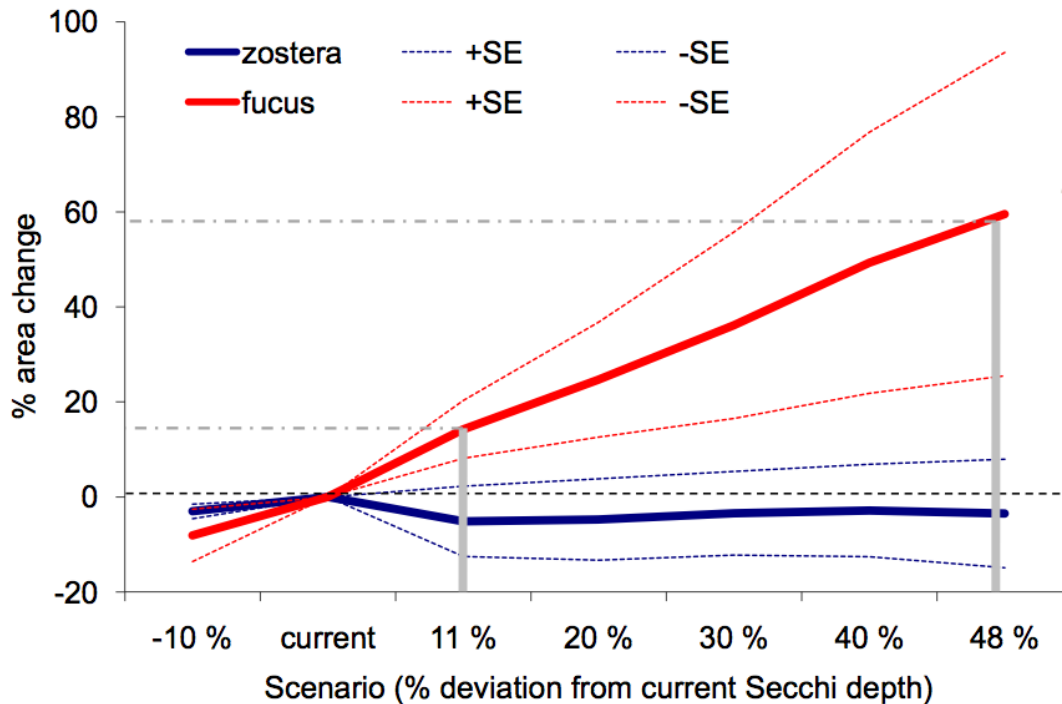
Varying eco-logical responses to BSAP eutrophication targets!

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PREHAB

Varying eco-logical responses to BSAP eutrophication targets!

Conflicts interest?

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HOW DO WE VALUE IMPROVEMENTS DUE TO MANAGEMENT ACTIONS?

Attribute	Country	Mean citizen WTPs (€)	Aggregated national WTPs (millions of €)
Amount of healthy vegetation (macrophytes)	Swe	2,8	18,5
	Fin	0,9	3,8
	Lit	0,3	0,8
Preservation of currently pristine areas	Swe	2,1	13,9
	Fin	1,0	4,3
	Lit	0,2	0,6
Size of fish stocks	Swe	2,3	15,6
	Fin	0,7	3,1
	Lit	0,2	0,6

"Willingness to pay" for improvement in eutrphication is larger than the costs, but different among regions!

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USER-FRIENDLY WEB RESOURCE!

Recommendations and examples for local managers on the web!

www.prehab.gu.se

SEE YOU THERE!

THANK YOU FOR LISTENING!

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