

Properties of HELCOM core indicators:

What the biodiversity assessment tool need to take into account

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Background

- An indicator based biodiversity assessment will be done in HOLAS II
- BalticBOOST project will develop a biodiversity assessment tool
- What the tool need to take into account:
 - GES type
 - Different parameters, temporal & spatial units
 - Aggregation rules
- A set of HELCOM indicators were analysed (Document 3, Annex I) to get an overview of approaches used

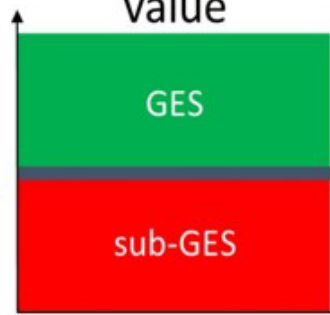
Approach for determining GES

Indicator(s)	Single value	Multiple	Interval	Trend
Abundance of coastal fish key functional groups	✓	✓ ?	✓	✓
Abundance of key coastal fish species	✓	✓		✓
Abundance of salmon / sea trout spawners and smolt	✓			
Abundance of waterbirds in the breeding / wintering season	✓			
Distribution of Baltic seals	✓	✓		
Distribution pattern and extent of benthic biotopes		✓		✓ ?
Lower depth limit of macrophyte communities	✓			
Number of drowned mammals and waterbirds in fishing gears				✓
Nutritional status of marine mammals	✓			
Population structure of long-lived macrozoobenthic species	✓		✓	
Population trends and abundance of seals	✓	✓		✓
Proportion of large fish in the community	✓			
Reproductive status of marine mammals	✓			
State of the soft-bottom macrofauna communities	✓			
White-tailed eagle productivity		✓		
Zooplankton mean size and total stock		✓		

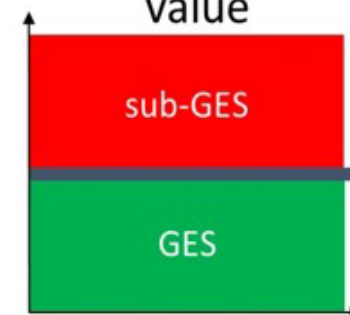
Single GES value

- GES is reached when the indicator value is above a defined level
- The most frequent approach: used in 11 out of 18 HELCOM BD indicators
- Suitable for use in BEAT and NEAT
- Often substituted or combined with other approaches when single value cannot be determined: in 4 out of 11

b) (i) sub-GES baseline for low values value



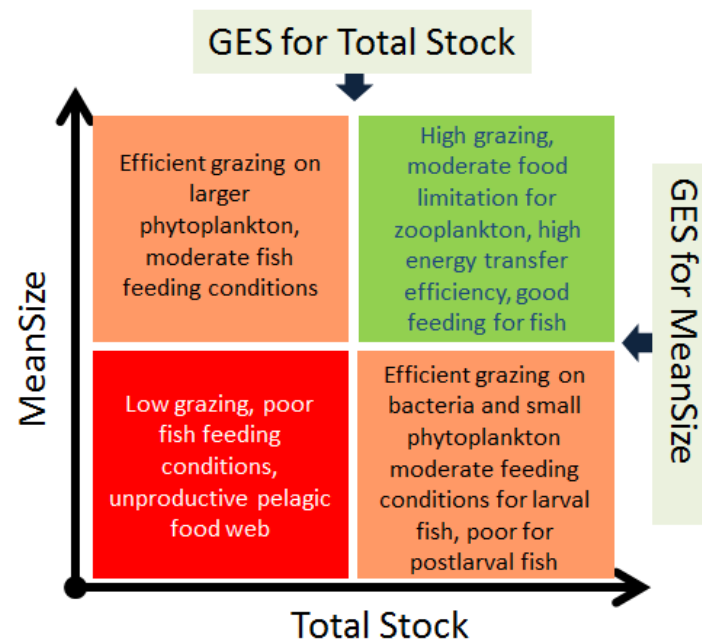
b) (ii) sub-GES baseline for high values value



Multiple GES values (conditional approach)

- GES is expressed conditionally through more than one parameter that must reach GES simultaneously
- Used in 5 out of 18 HELCOM BD indicators
- Not suitable for use in NEAT
- Possible solutions
 - Develop present indicators further into multiparametric indexes
 - Include further aggregation rules into the assessment tool

Example of combining two GES values: 'Zooplankton mean size and total stock' -indicator



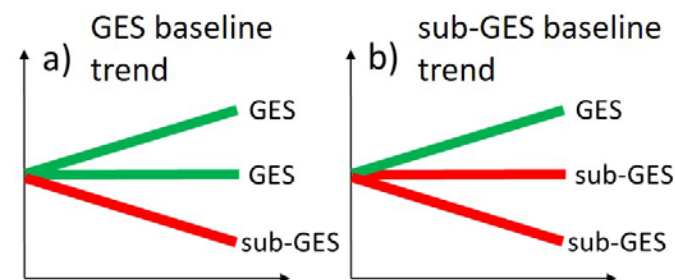
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Trend-based GES

- GES is reached when the indicator value has a desired trend (increasing, decreasing or no trend)
- Often used when a reliable GES value cannot be determined; or in combination with the single value approach
- Used in 5 out of 18 HELCOM BD indicators
- Cannot be applied in BEAT or NEAT assessment tools

- Possible solutions
 - Set an artificial GES value: if desired trend were met, what would be the indicator value in eg. 2020?
 - Treat the slope as it was a single value (set boundary for slope)
 - Develop the assessment tool to allow use of trend-based GES

Example of setting a trend-based GES: 'Abundance of coastal fish key functional groups'

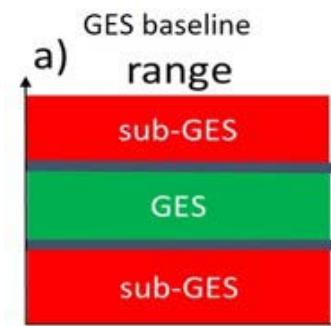


GES interval

- GES is reached when the indicator value is between two boundaries
- Used in 2 out of 18 HELCOM BD indicators
- Cannot be applied in BEAT or NEAT assessment tools

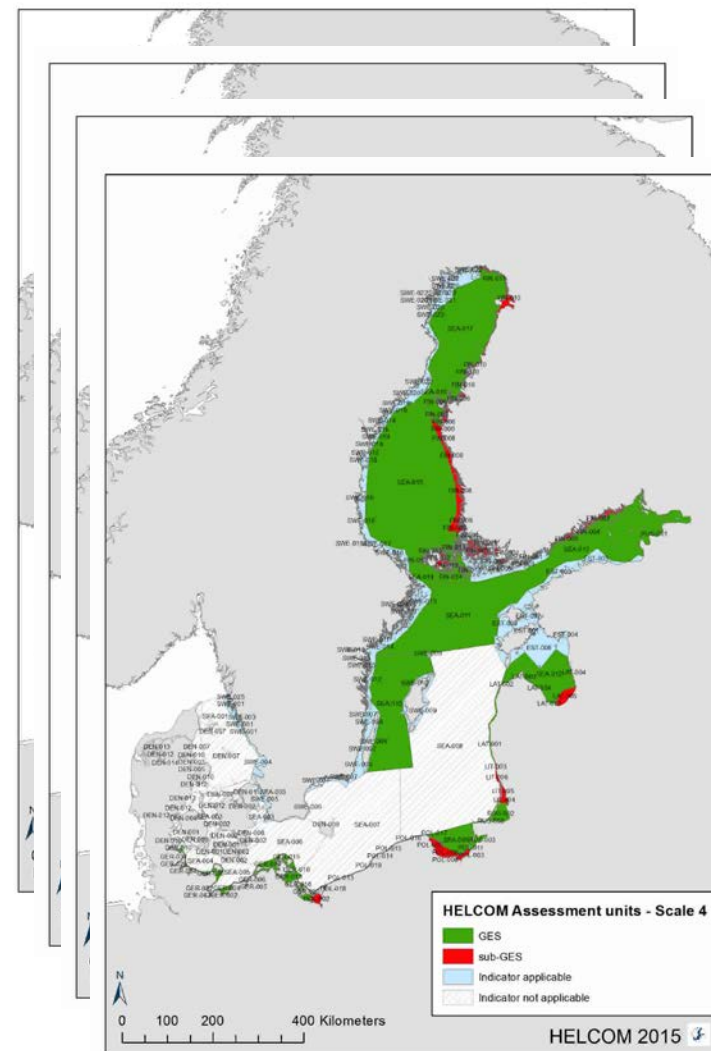
- Possible solutions
 - Developing the indicator further, eg. applying distance from centre of GES interval as indicator value
 - Treat as two single GES values (conditional) and include aggregation rules to the assessment tool
 - Develop the assessment tool to allow use of GES-intervals

Example of GES interval:
'Abundance of coastal fish key functional groups'



Spatial assessment units

- HELCOM Monitoring and Assessment Strategy
 - Hierarchical sub-divisions eg:
 - Baltic sea
 - Sub-basins
 - Sub-basins and coastal regions
 - Sub-basins and coastal regions split into WFD waterbodies/-types



Spatial assessment units

- Sub-basin most common (10 of 18)
- Birds mainly assessed at a Baltic scale (2 of 18)
- Many indicators restricted to coastal or open sea areas (6 of 18)
- WFD indicators calculated at water body/type scale

Possible solutions:

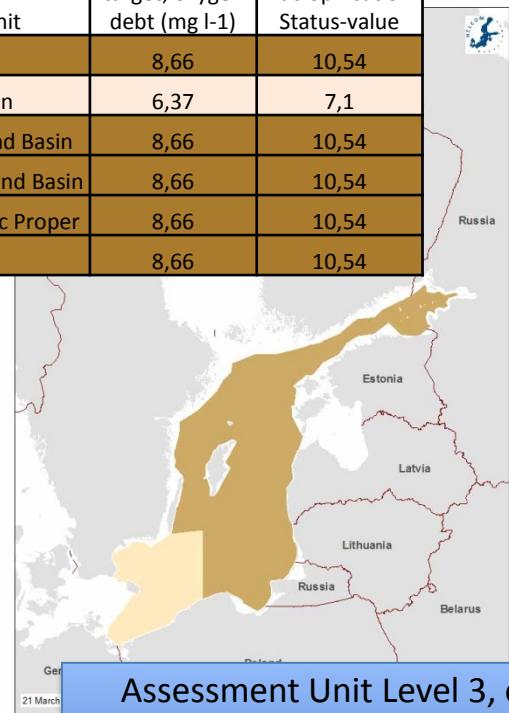
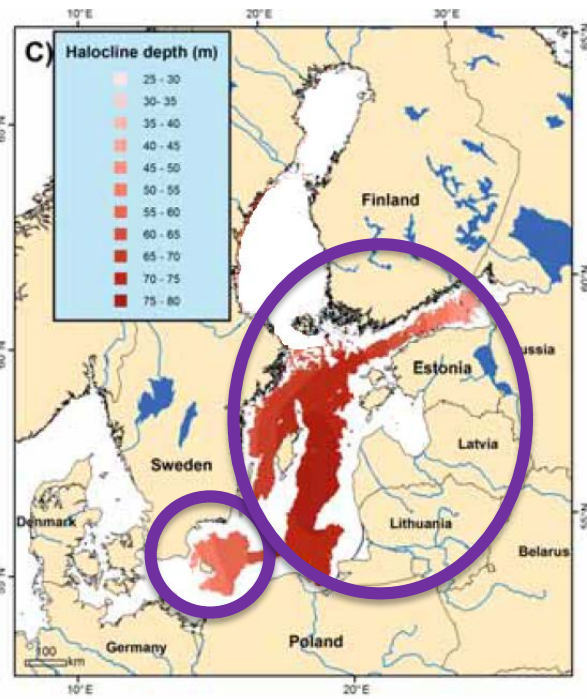
1. When indicator area is larger than assessment unit
 - Down-scaling
2. When indicator area is smaller than assessment unit
 - Areal weighing
 - Up-scaling
 - OOA0

See example on Oxygen debt indicator

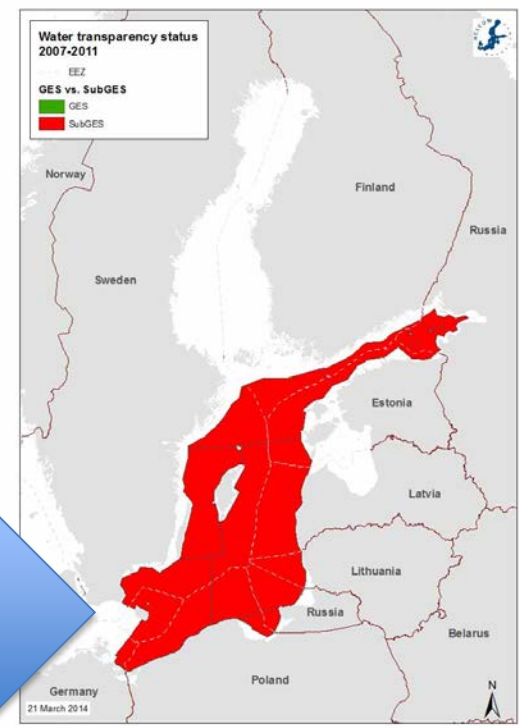
Lessons learned on spatial aggregation from HELCOM eutrophication work

- simplified example, oxygen debt indicator

Assessment Unit	(GES-boundary target; oxygen debt (mg l-1))	Calculated Eutrophication Status-value
Gdansk Basin	8,66	10,54
Bornholm Basin	6,37	7,1
Eastern Gotland Basin	8,66	10,54
Western Gotland Basin	8,66	10,54
Northern Baltic Proper	8,66	10,54
Gulf of Finland	8,66	10,54



Assessment Unit Level 3, only applicable off-shore and in basins with below-halocline water



Temporal assessment units

- The indicators are generally assessed with 1-5 years interval → suitable for the HOLAS II assessment
- The 'Population trends and abundance of seals' indicator is assessed over a 10 year period if populations are at the target reference level, but as monitoring is done every year it does not pose a problem

Biodiversity components and MSFD criteria

	1.1	1.2	1.3	1.4	1.5	1.6	1.7	3.2	4.1	4.2	4.3	5.3	6.1	6.2	8.2	D10	D11
Mammals	1 (4)	1 (4)	4						(5)		1 (4)				(4)	(1)	(1)
Birds	(4)	3 (1)	1 (1)						(2)		1 (3)				1		
Fish		3				1		1	(2)	1	(4)						
Zoobenthos			1			2						(1)		2			
Phytobenthos				1							(1)		(1)				
Zooplankton											1						
Phytoplankton																	
Benthic habitats	(1)	(1)		1	1	(1)			(1)		(1)		1				

(Secondary criteria in brackets)

- Adding national indicators would (most likely) increase the coverage

Aggregation needs for multiparametric indicators

Examples:

- Distribution of Baltic seals: overlap between species = OOAO
- Coastal fish indicators: majority rules, tie = OOAO
- Conditional GES approach = OOAO

- Spatial aggregation – indicators assessed at different scales

Points for discussion

- Can "interim threshold GES" be used in cases where a trend based approach is being applied?
- How to deal with indicators that have different GES approach depending on baseline data, population status or sample type?
- "Within tool" or "prior to tool" aggregation of indicator parameters? How to retain transparency?
- Aggregation rules:
 - Ecosystem component
 - MSFD criteria
 - Spatially
 - "within indicator"
 - etc?