

# ENVIRONMENTAL BENEFITS AND ECOLOGICAL IMPACTS OF MUSSEL FARMS IN THE BALTIC SEA

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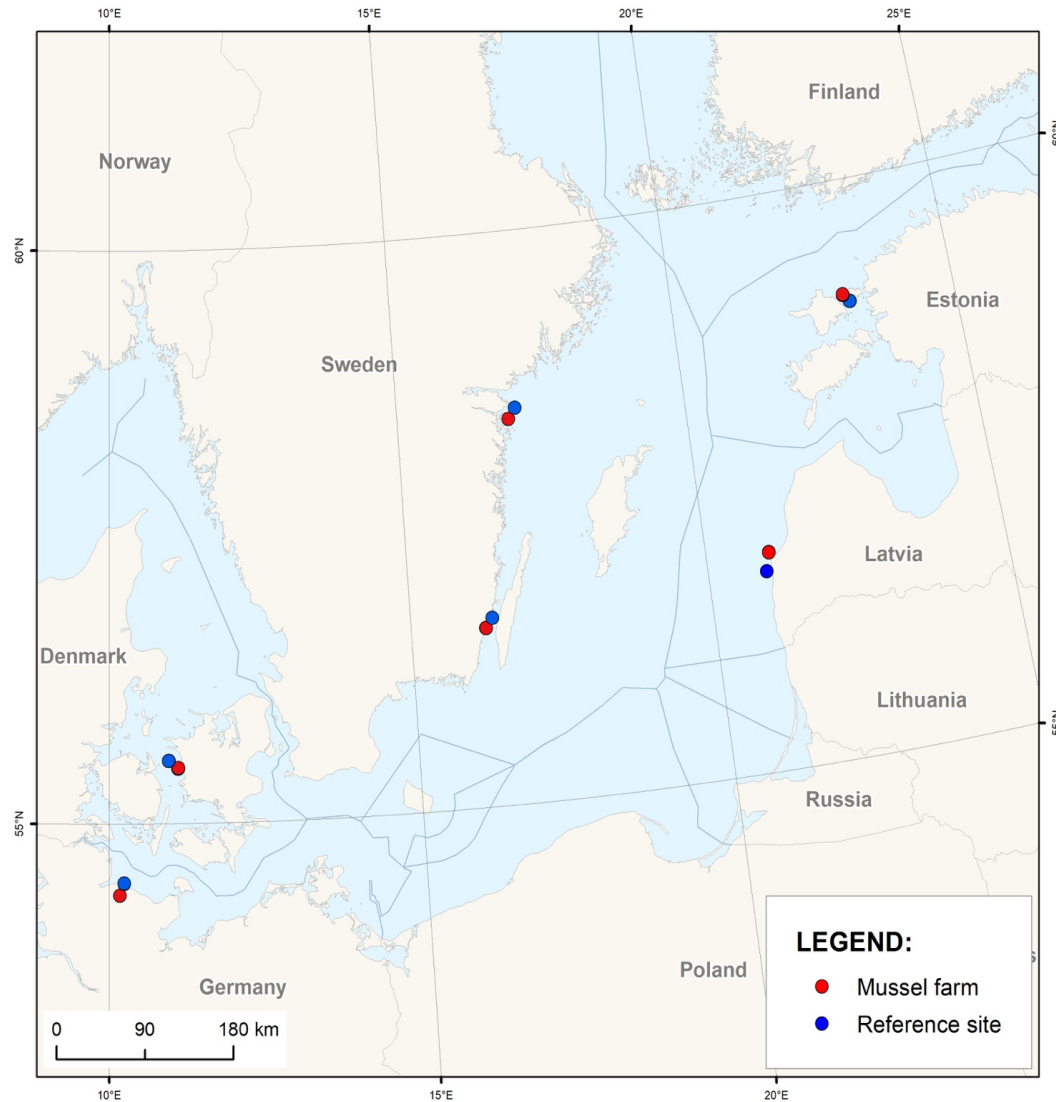
Baltic Sea Mussel Farming and Nutrient Offset Conference,  
Elite Savoy Hotel, Malmo, Sweden  
24 april 2019

- [www.balticbluegrowth.eu](http://www.balticbluegrowth.eu)

# Initial assumptions of study

- Environmental benefits:
  - Removal of nitrogen and phosphorus by mussels;
  - Increase in water transparency in and around mussel farm.
- Ecological impacts as a result of increased sedimentation of organic particles:
  - Depleted oxygen in near-bottom water;
  - Increase of nutrient release from sediments.

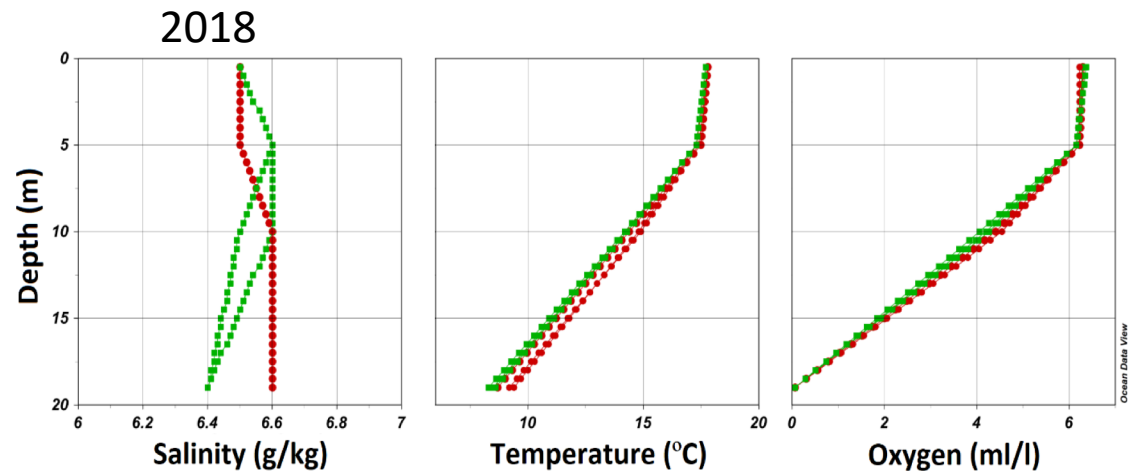
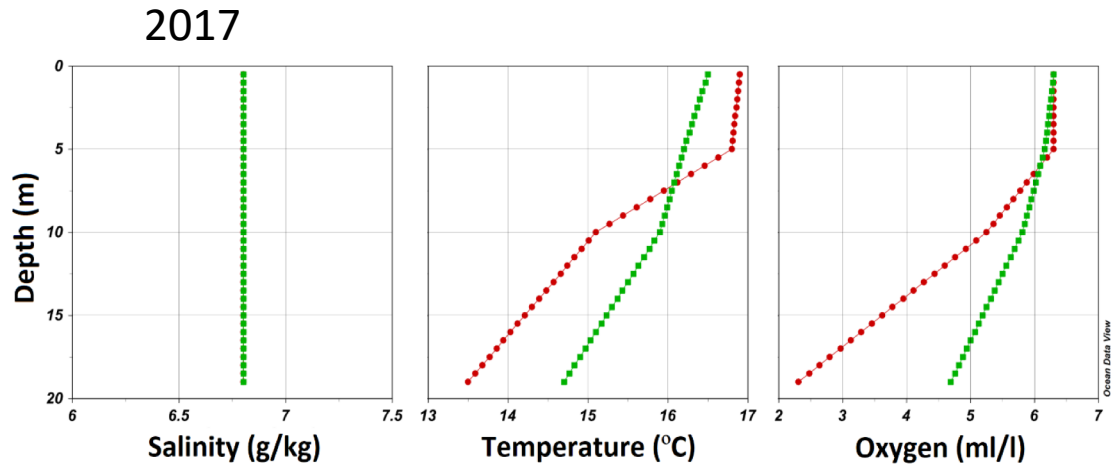
# Spatial span of the study



# Concept

- Three times per year (2017 and 2018) at each location:
  - Vertical profiles of nutrient and oxygen concentrations. Phytoplankton, zooplankton and water transparency in surface water. Zoobenthos, C, N, P in sediments (once per year)
- Continuous:
  - Oxygen, temperature, current speed in near-bottom water (almost all mussel farms)
- Sedimentation experiment:
  - One mussel farm (Kiel)
- Nitrogen and phosphorus content in mussels:
  - All mussel farms

# Oxygen profile in August in Sankt Anna



Green - mussel farm  
Red – reference site

# Continuous measurement of oxygen in Sankt Anna

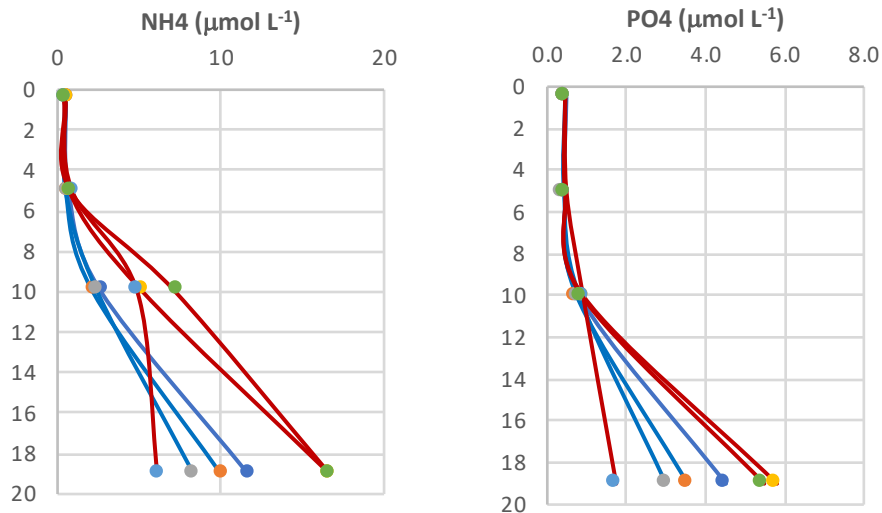


# Continuous measurement of oxygen in Musholm

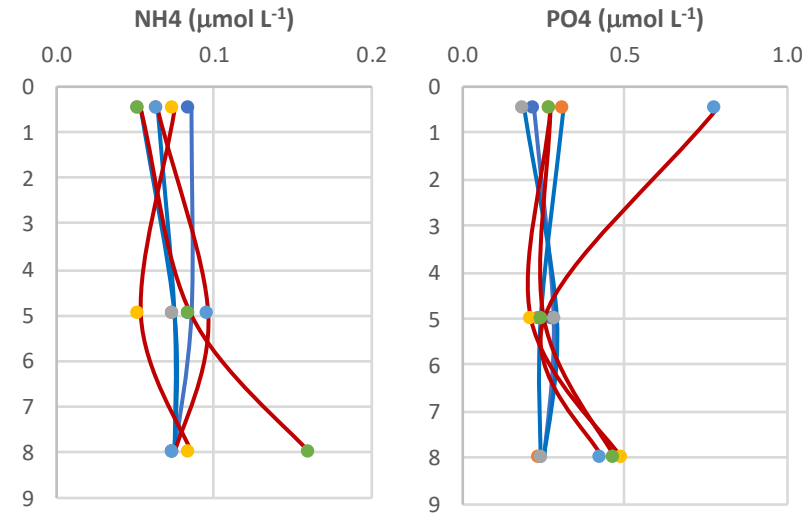


# Ammonium and phosphate profiles

Sankt Anna, August 2018

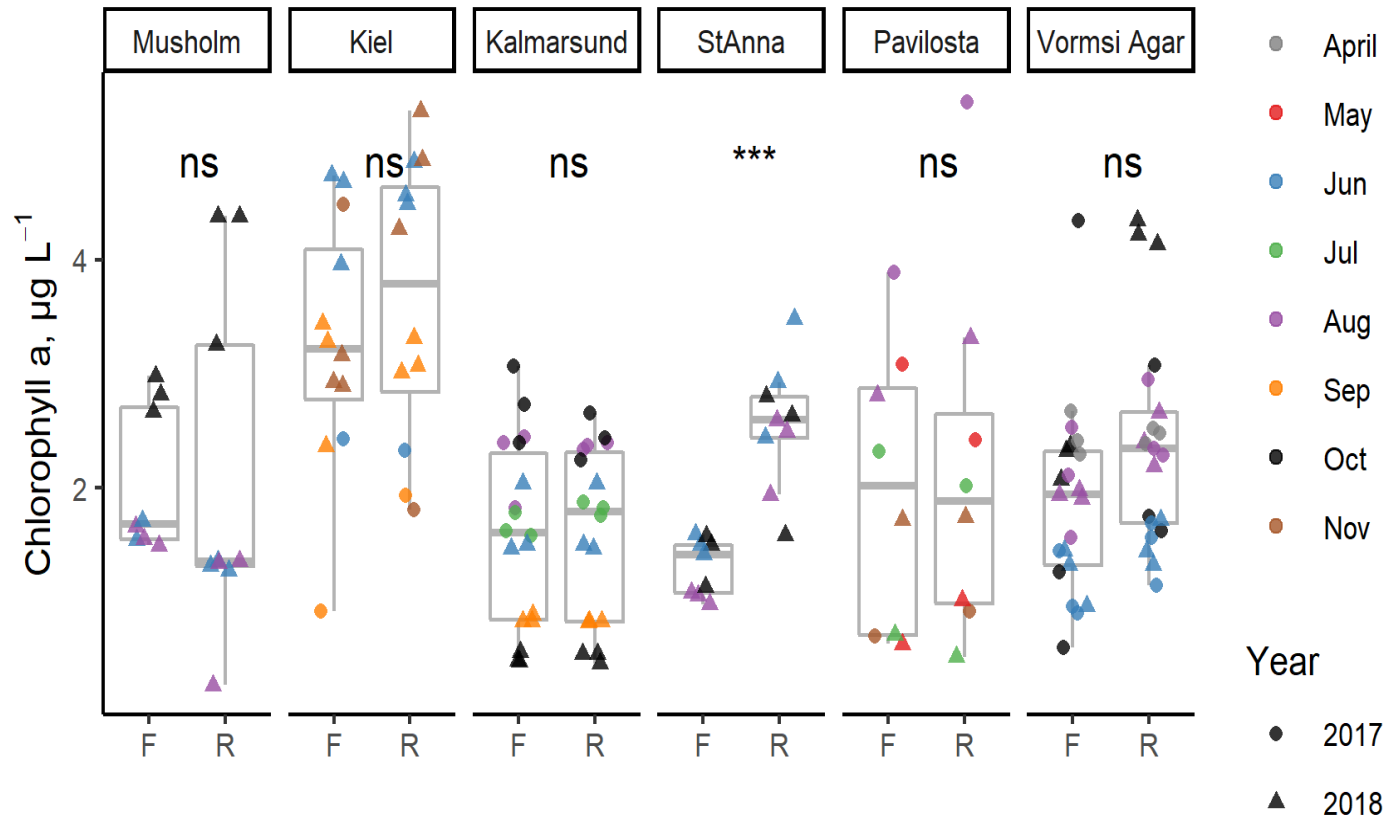


Kiel Bay, September 2018

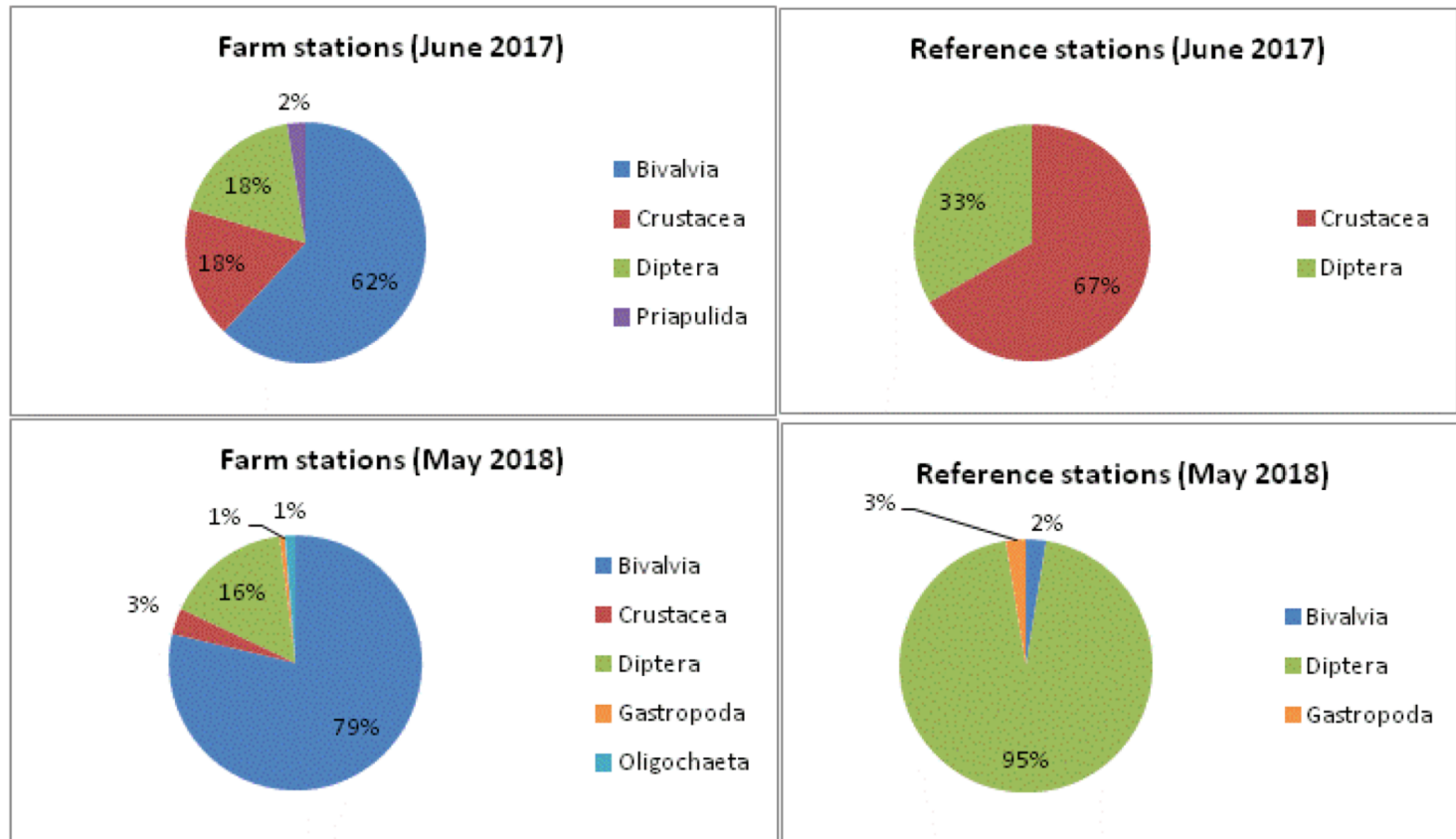




# Chlorophyll a

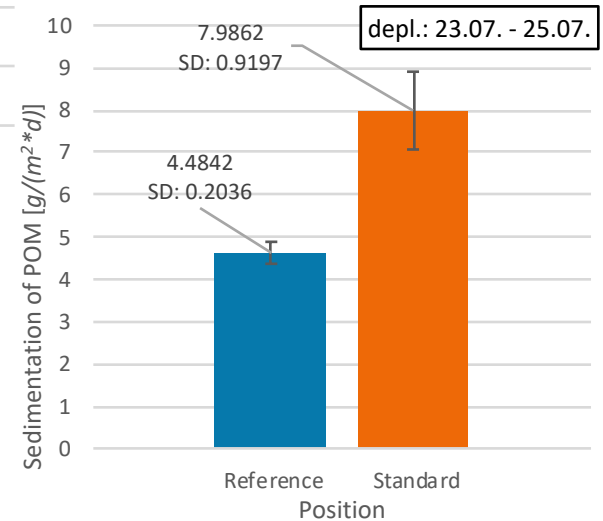
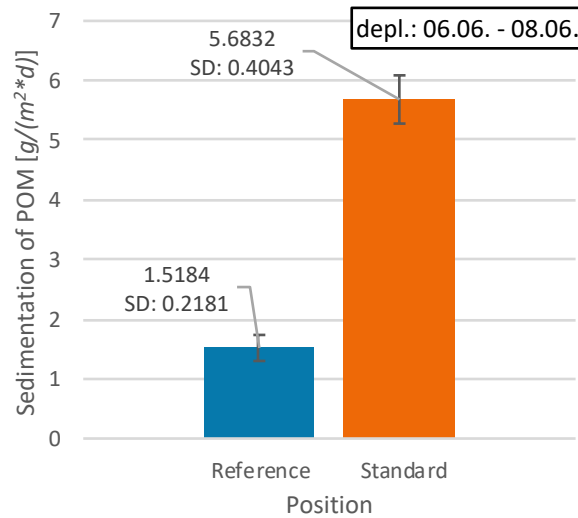
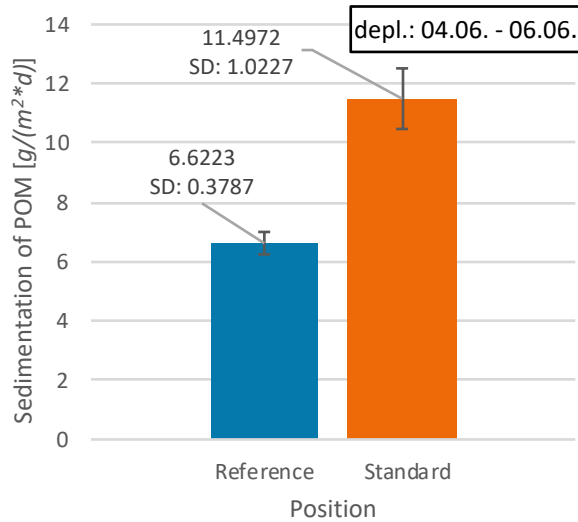


# Macrozoobenthos in Sankt Anna

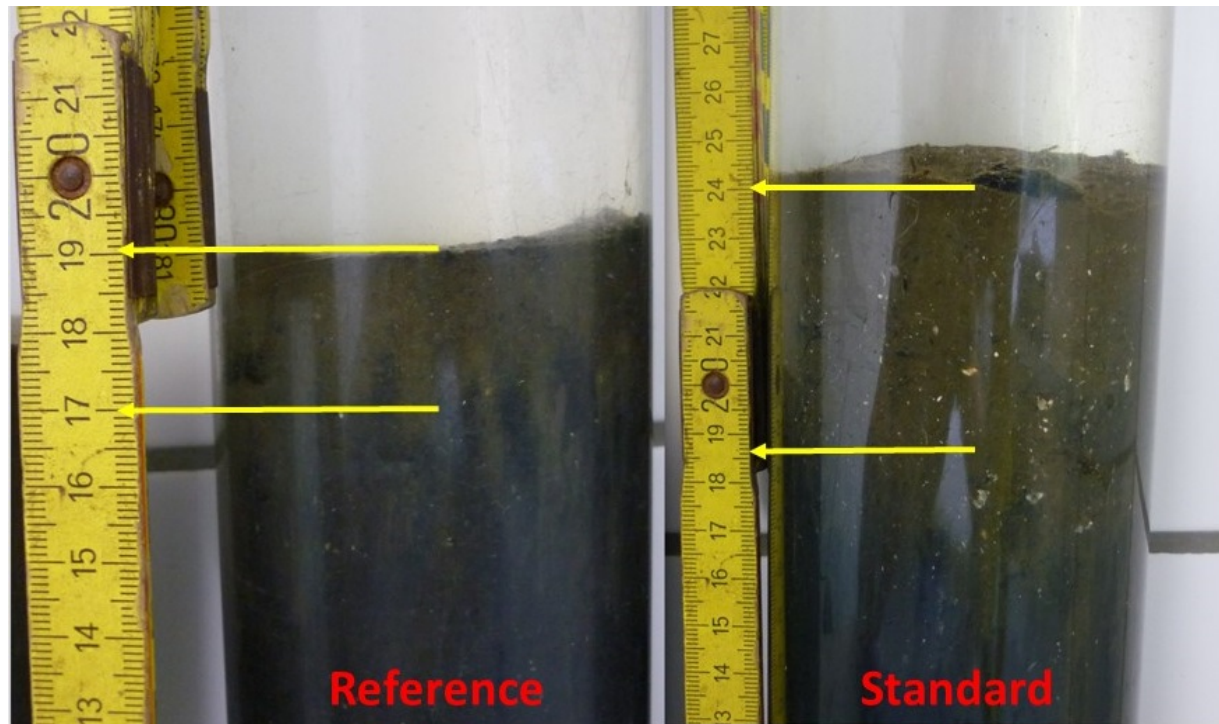


Bivalvia - *Limecola balthica*

# Sedimentation rates in Kiel farm

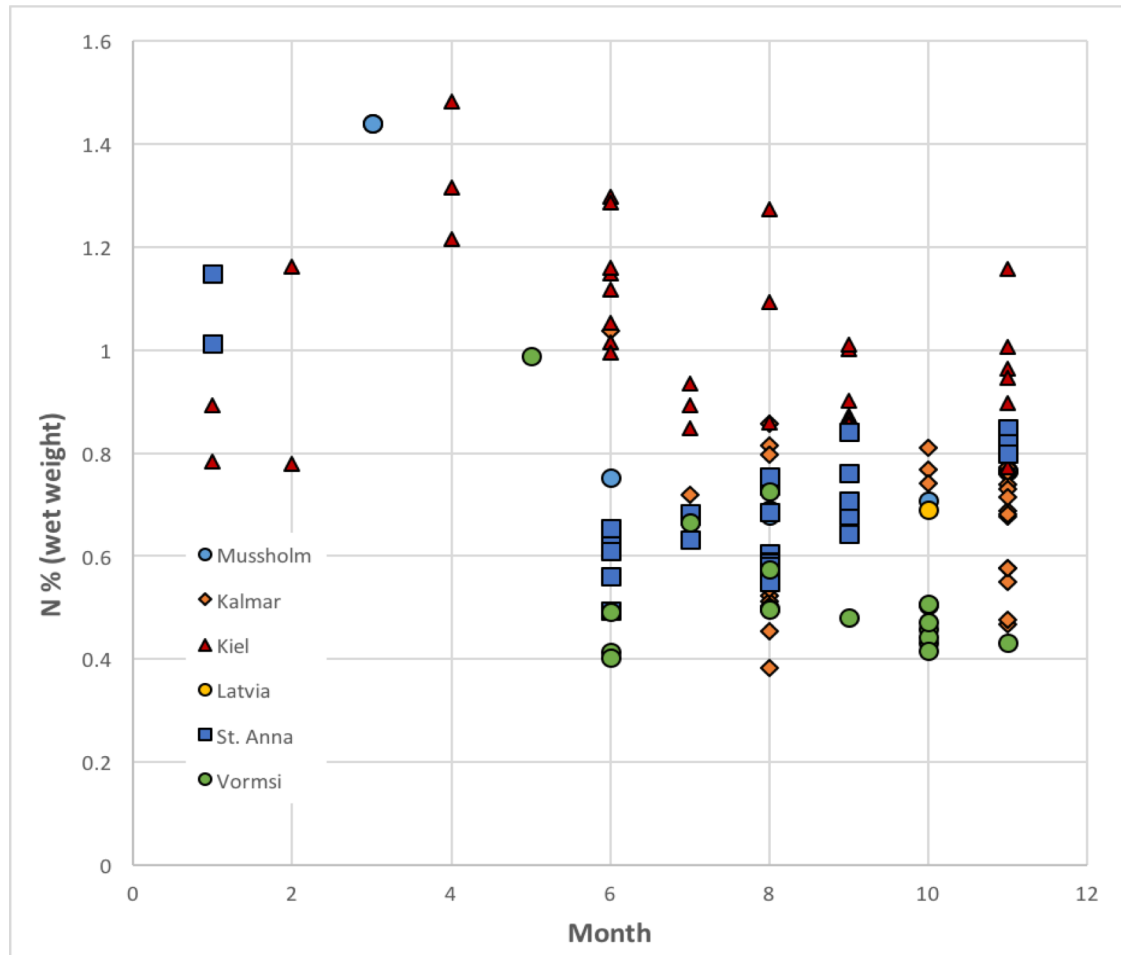


# Effect of sinking particles on sediments



Site	Mussel farm (n=5)			Reference (n=5)		
	TC (% dw)	TN (% dw)	TP ( $\mu\text{g/kg dw}$ )	TC (% dw)	TN (% dw)	TP ( $\mu\text{g/kg dw}$ )
Kiel Bay	6.86 (6.15-7.56)	0.7 (0.58-0.82)	477 (451-496)	5.96 (5.04-6.88)	0.55 (0.45-0.68)	493 (469-532)

# Nitrogen content in mussels



# Removal capacity of nitrogen and phosphorus

- Assuming average concentration 0.77 % of N and 0.06 % of P, 156 kg of N and 12 kg of P can be "harvested" from 1 ha per growth cycle (1.5-2 years).

# Conclusions

- Environmental impacts of mussel farms proved to be negligible,
- Special consideration should be given to mussel farm site selection,
- The mussel farms can serve as local additional measures to remove N and P from water, and improve water quality.

# Complete report of environmental impacts

- **Report “Ecological impacts at the small-scale commercial mussel farms in the Baltic Sea” will be available at BBG webpage**  
<https://www.submariner-network.eu/projects/balticbluegrowth>



# Thank you!



EUROPEAN UNION  
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