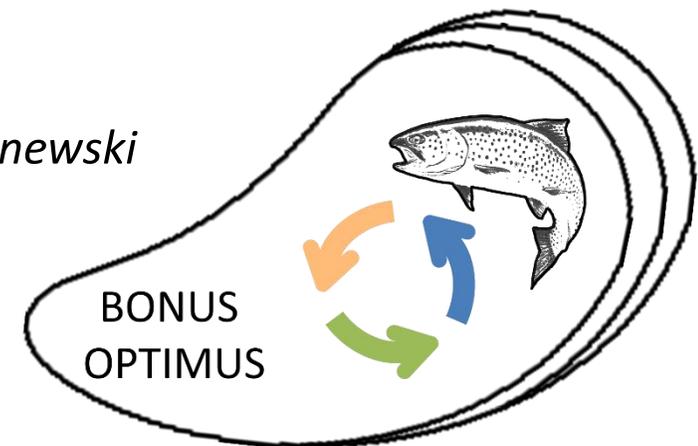


# Mussel farming in Mecklenburg- Vorpommern

Chances and threads in low saline coastal waters

*Anna-Lucia Buer*

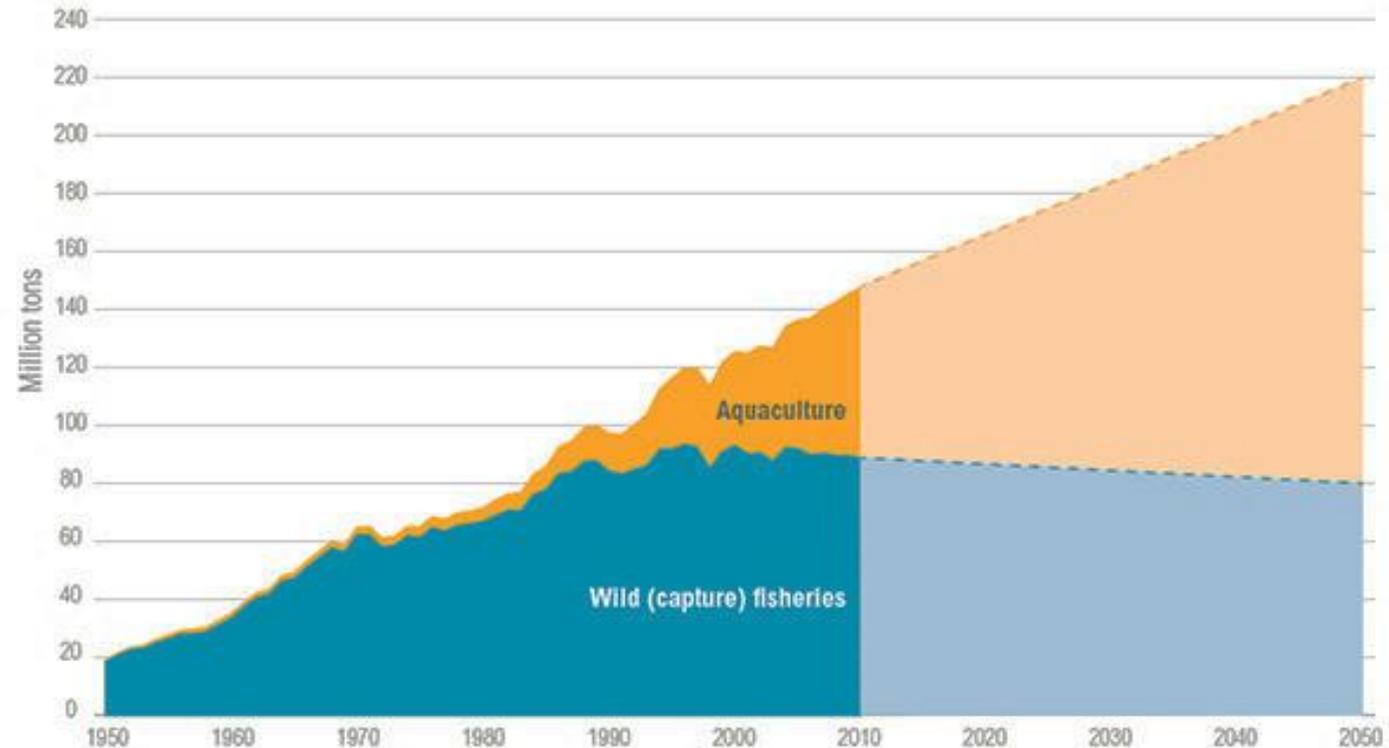
*Lukas Ritzenhofen, René Friedland, Sven Dahlke, Gerald Schernewski*



# Introduction

- Rising demand of high value proteins
- Agriculture at maximum, wild capture fisheries stagnating
- Aquaculture is boosting
- Promotion of *Blue Growth* by the EU (COM (2013) 229)
- Expansion into new areas and sub-optimal conditions
  - Focus: Baltic Sea

Aquaculture Is Expanding to Meet World Fish Demand

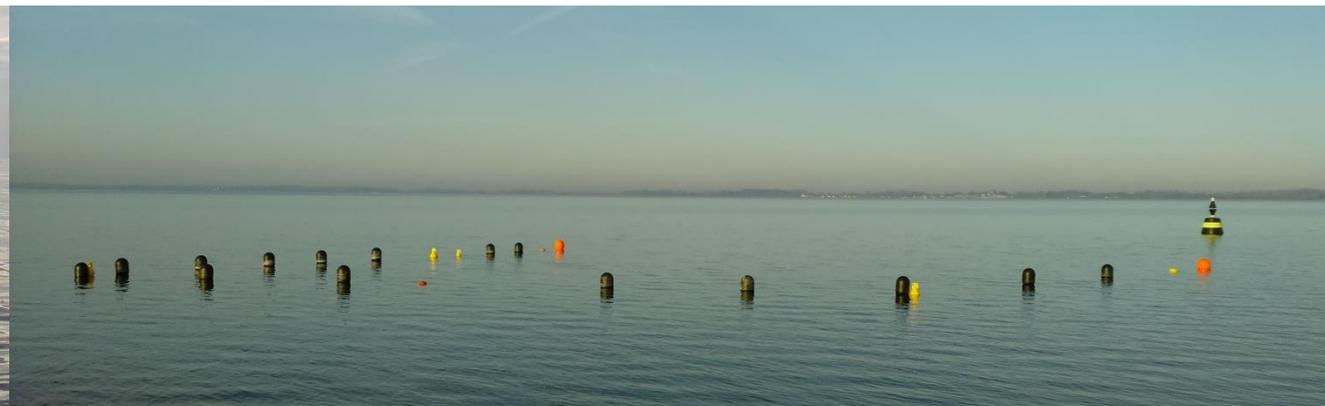


Source: Historical data 1950–2010: FAO. 2014. "FishStatJ." Rome: FAO. Projections 2011–2050: Calculated at WRI, assumes 10 percent reduction in wild fish catch between 2010 and 2050, and linear growth of aquaculture production at an additional 2 million tons per year between 2010 and 2050.

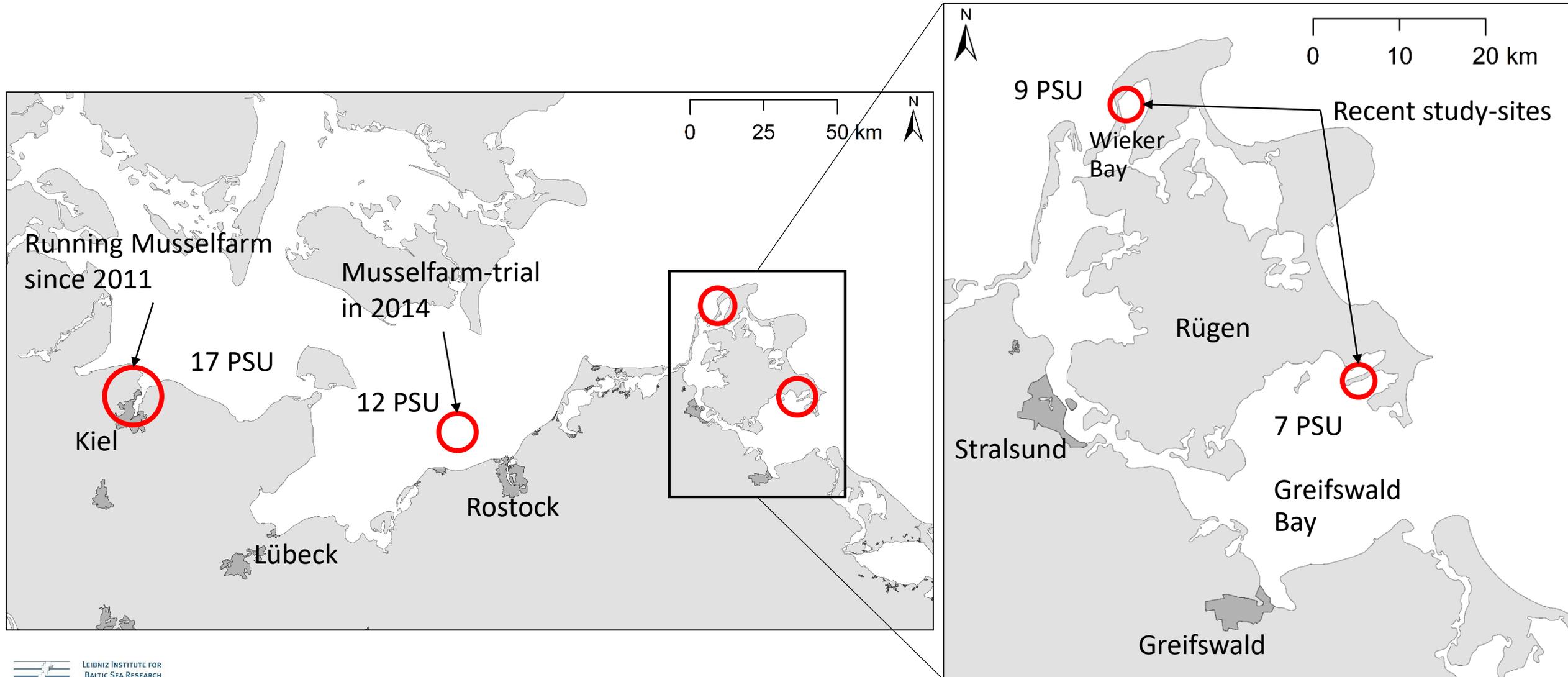
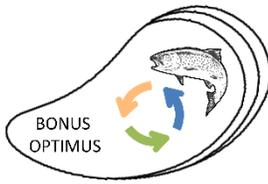
See [www.wri.org/publication/improving-aquaculture](http://www.wri.org/publication/improving-aquaculture) for full paper.

# Shellfish Aquaculture History in Germany

- Few trials of shellfish cultivation in the German Baltic Sea (Möbius 1870, Dröscher 1906, Strassen 1921, Böttcher 1990)
- Further trials in 2011 (Kiel) which lead to the only commercial mussel farm in the German Baltic Sea (*KielerMeeresfarm*)
- and in 2014 (Nienhagen) as well as ongoing trials in Greifswald Bay and Wieker Bay (since 2017)

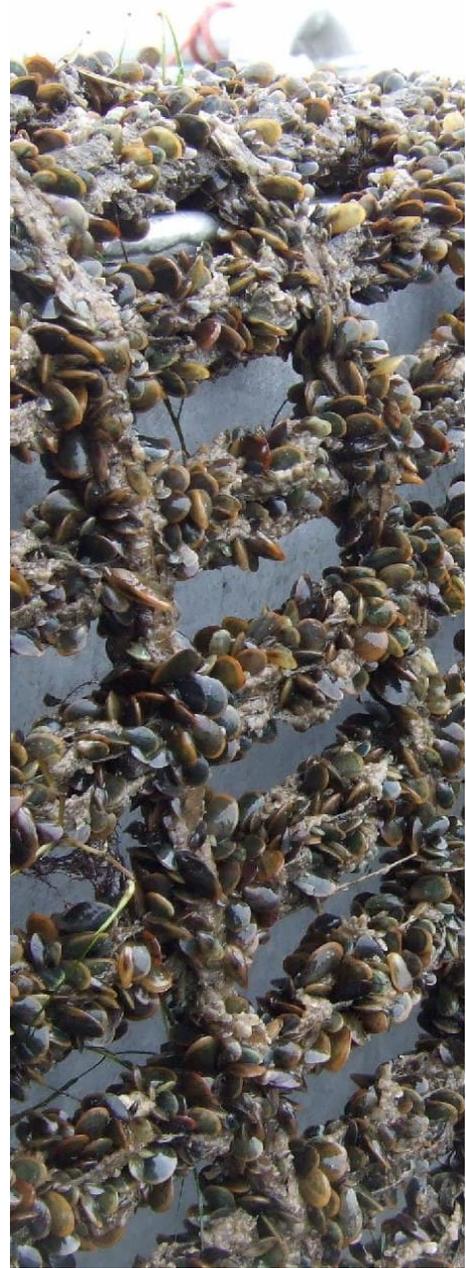


# Mussel farm trials in Germany

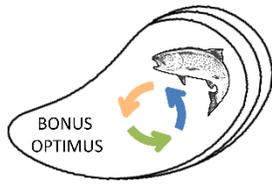


# Open questions

- Natural recruitment / mussel larvae / spat fall
- Natural growth rates along the salinity gradient of the Baltic Sea
- Expected yields → potential of commercial mussel farming
- Threads in the baltic? Ice drift, ...
- Impacts on the environment



# Results from GWB and WB with reference to Nienhagen representing Mussel farming potential in Mecklenburg Vorpommern

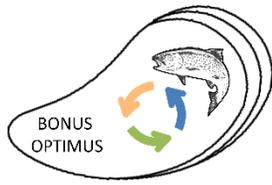


# Natural recruitment

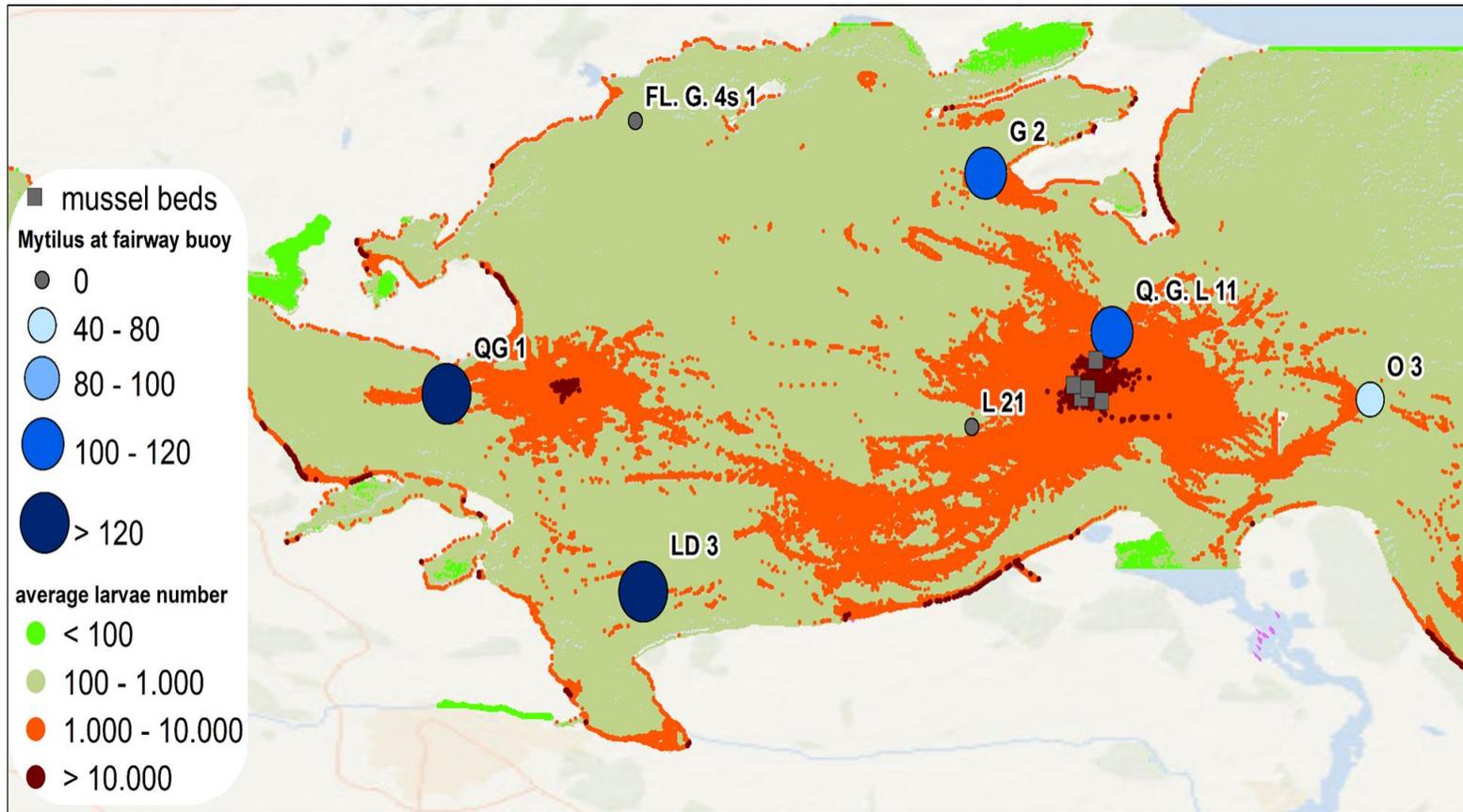
- Mussel settlement occurred at all trial sites with densities of up to 4000 ind / m substrate (collector material) although...
- ... low concentrations of bivalve larvae was found in the surrounding water
- **pointing toward a constant settlement at a low rate**
- Hot summer in GWB and WB caused mussel loss down to only 220 ind/m and non or late re-settlement
- **Recruitment and densities depend on environmental conditions**



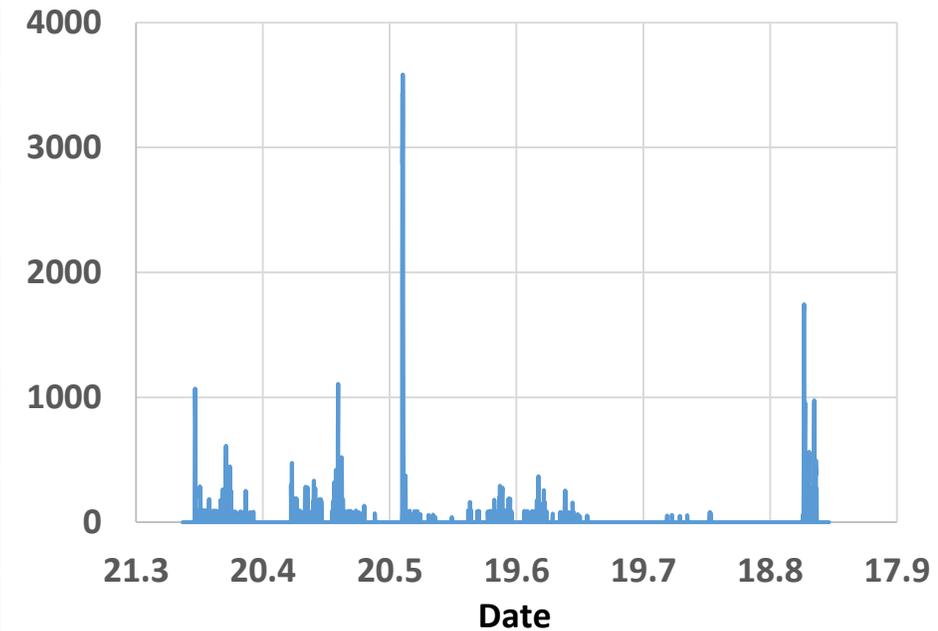
# Outlook: Larvae distribution



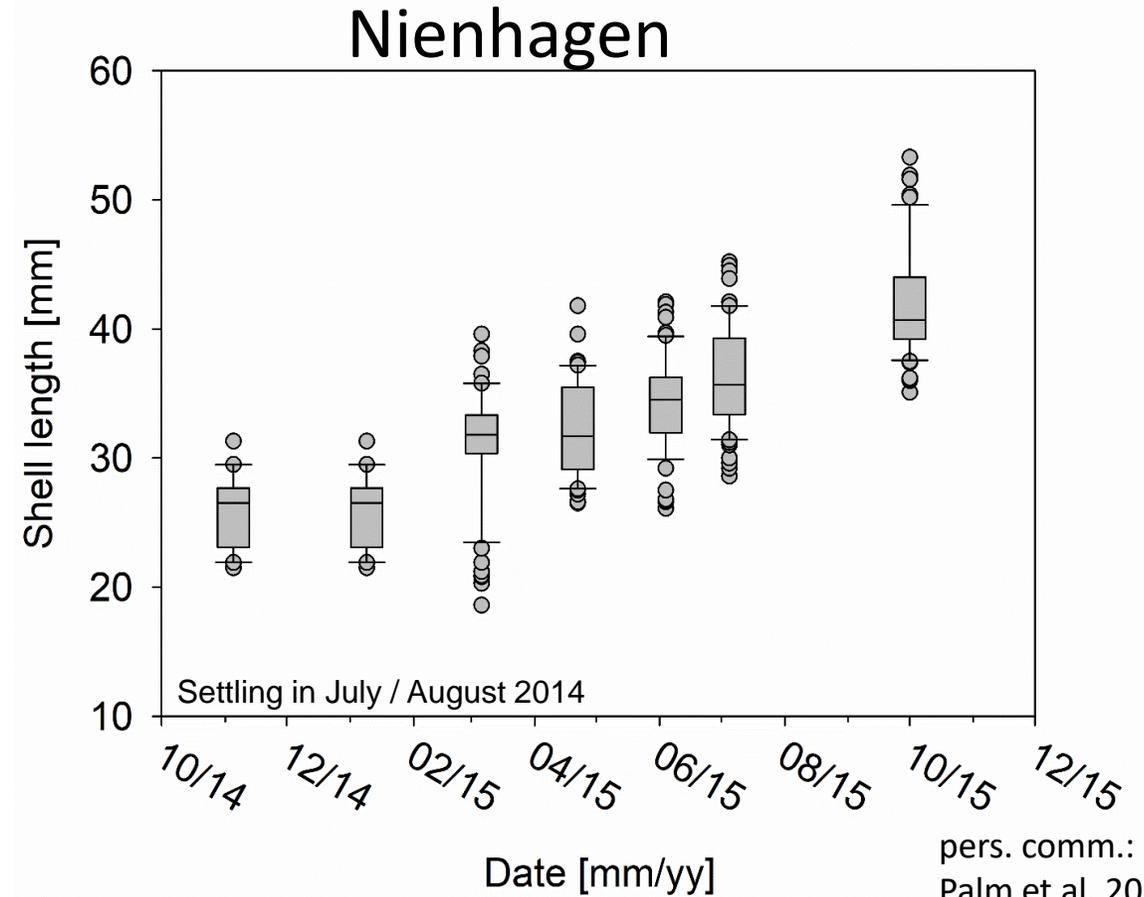
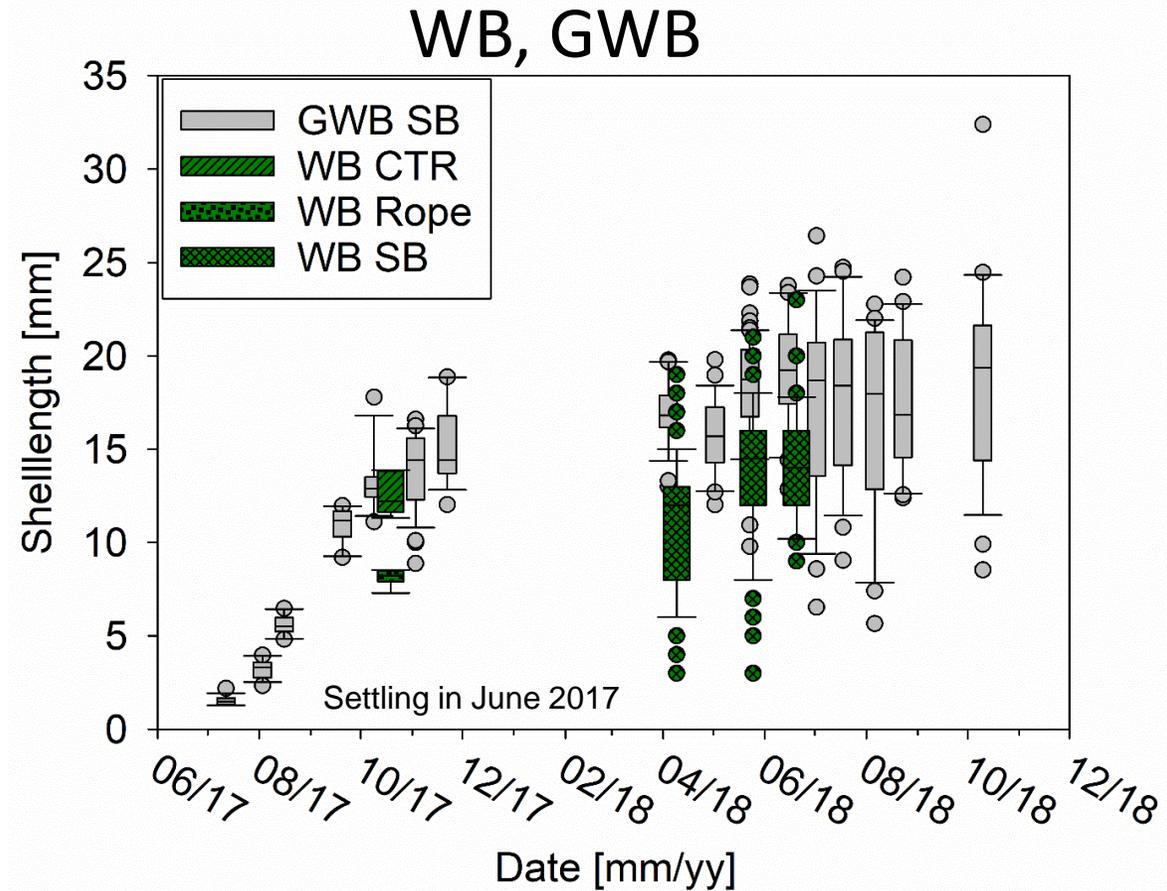
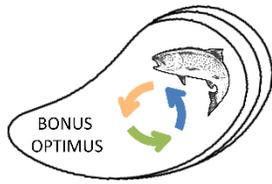
- Modelled larvae distribution based on existing mussel beds and mussel densities at navigation buoys around GWB



Modelled amount of Larvae at the Farm-unit (50x50m), 2016



# Growth rates – measured



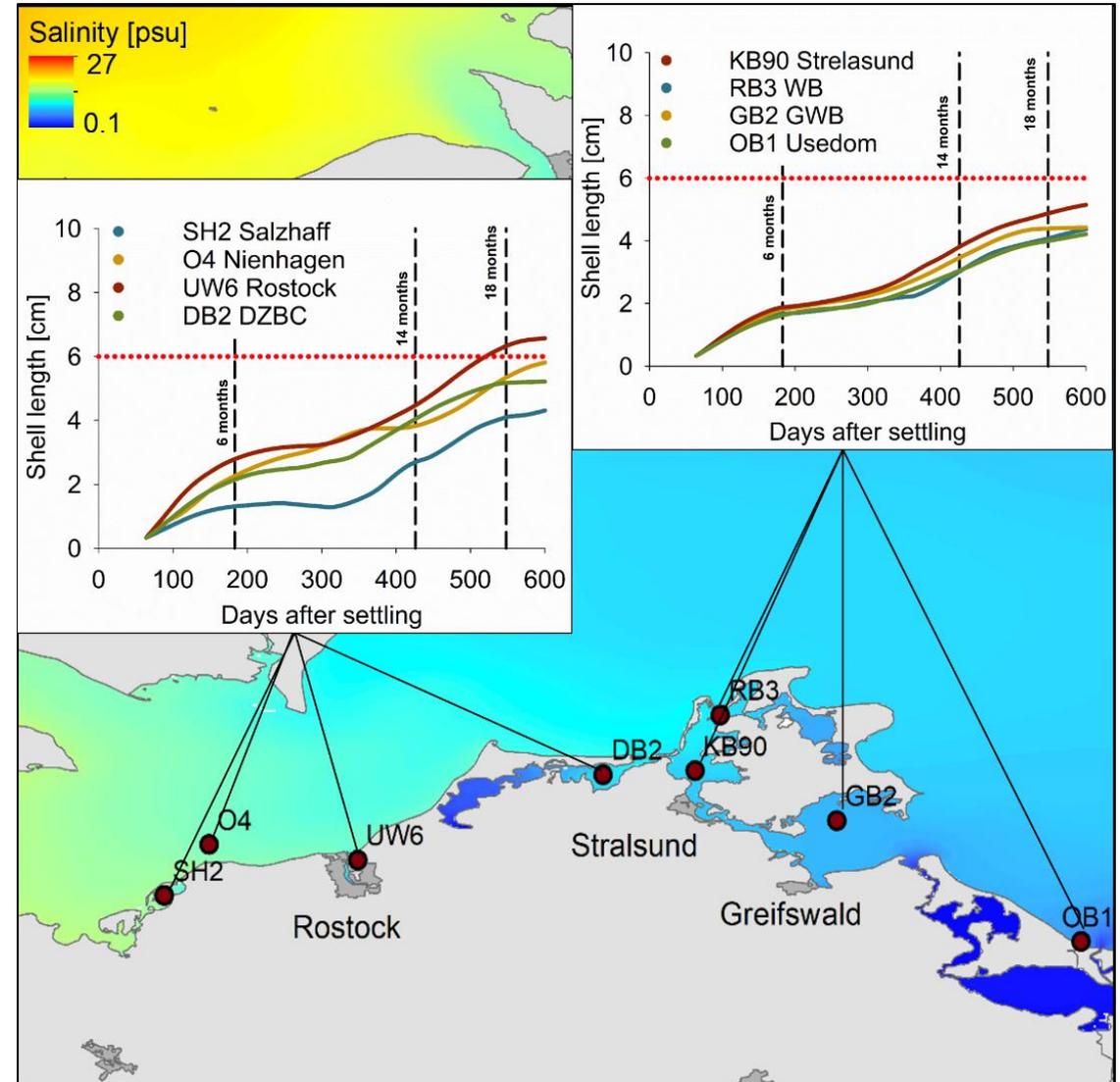
pers. comm.: F. Peine  
Palm et al. 2015

# Growth rates – DEB modelled

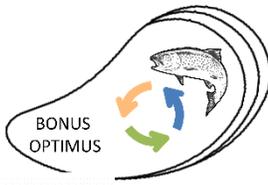
- Based on environmental monitoring data (Sal, Chl, Temp) of LUNG MV (2014-2016)
- Maximum values: neglecting food depletion, predation, mussel loss and assuming mild winters (2014-2016)

Shell length:

→ Only Rostock and Nienhagen site reaching nearly 6 cm in 18 months

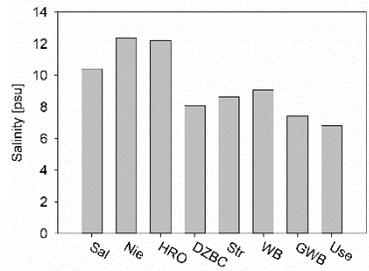


# Expected yields (per 1 ha farm unit)

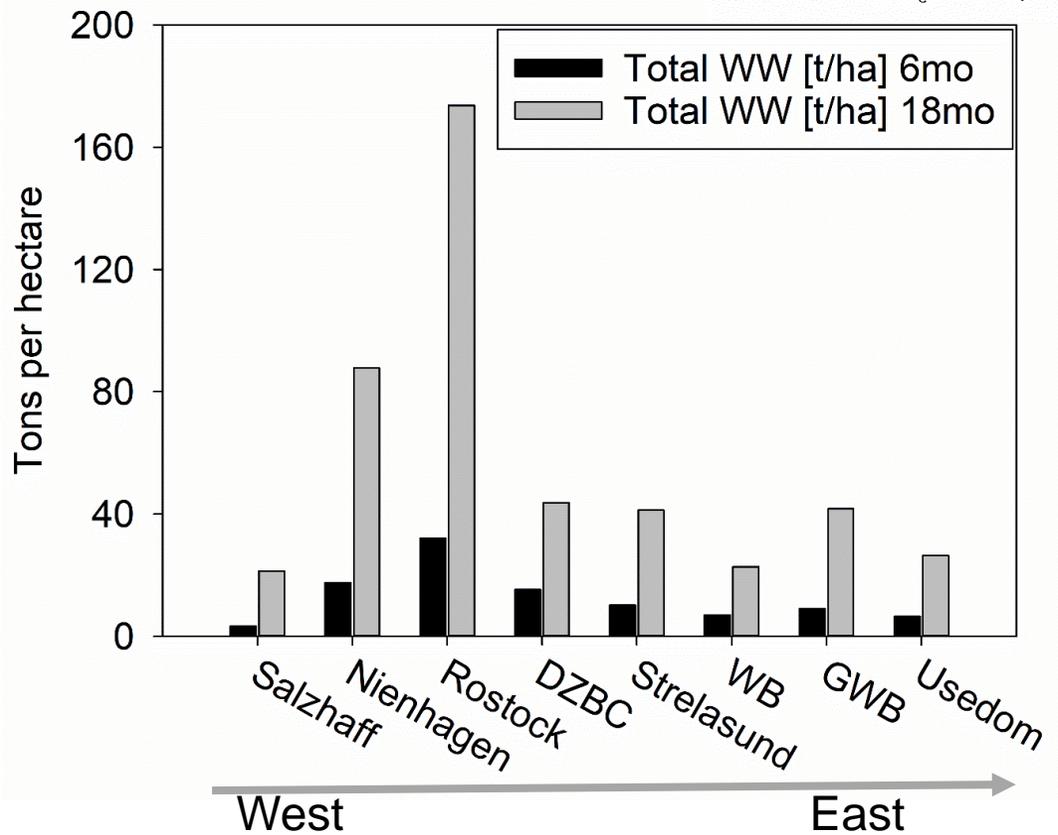


- 2000 or 500 ind/m CL, 3 m Collector depth ea. 0.5 m, 14 LL a 100 m

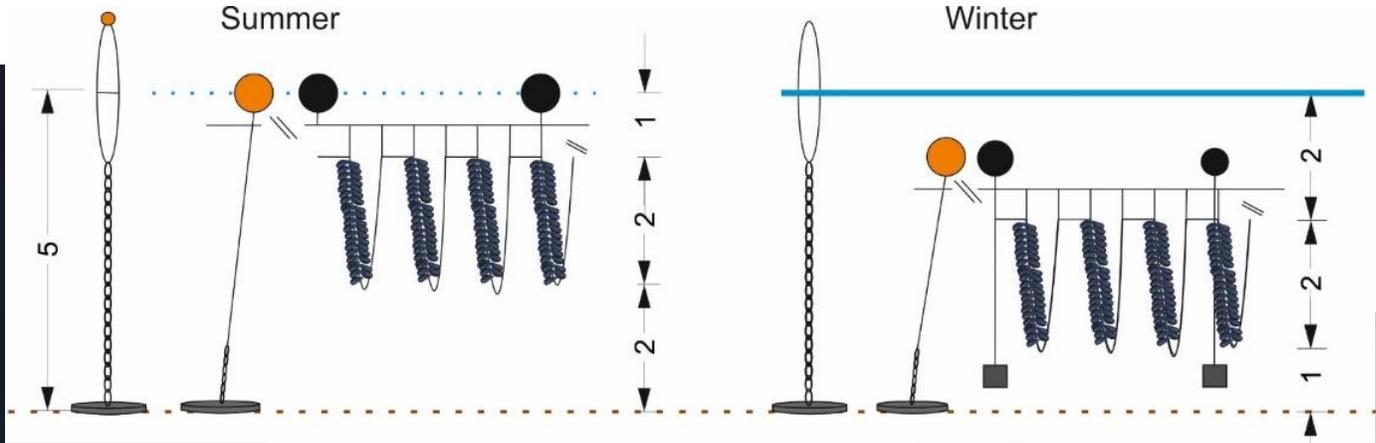
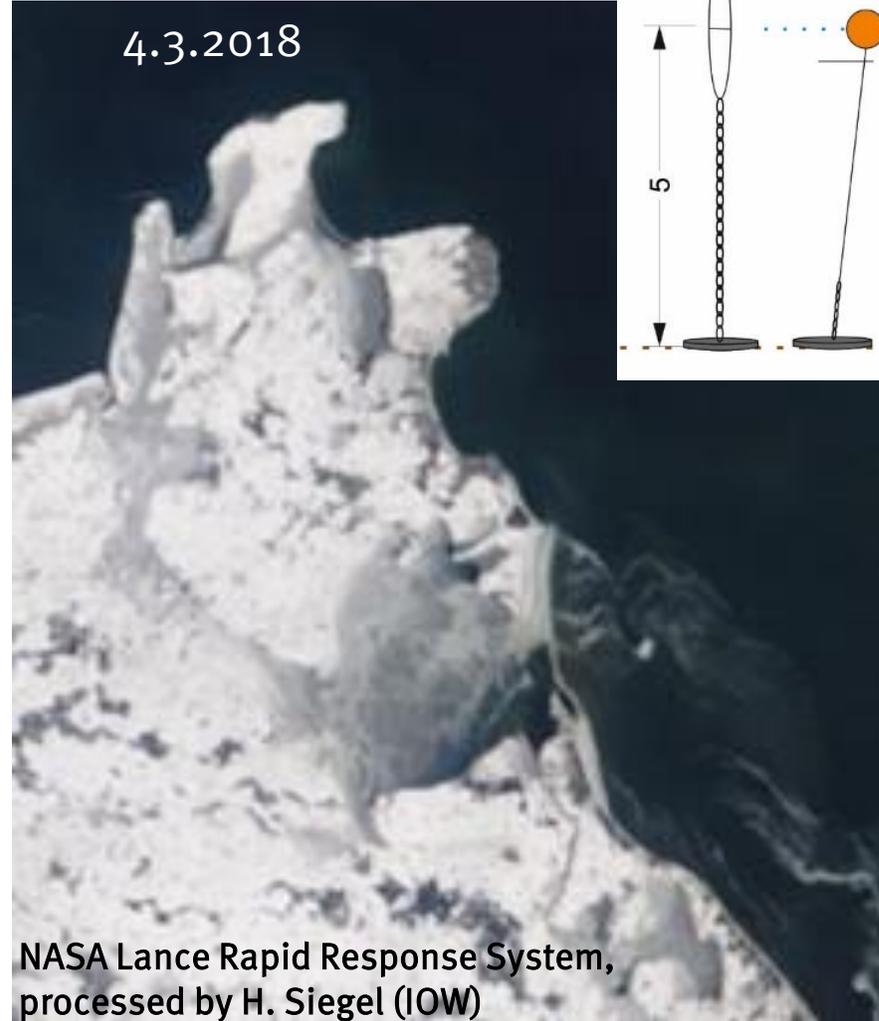
→ Mussel production for human consumption up to Rostock possible, further east other usages of small size mussels (mussel meal, nutrient remediation, ...)



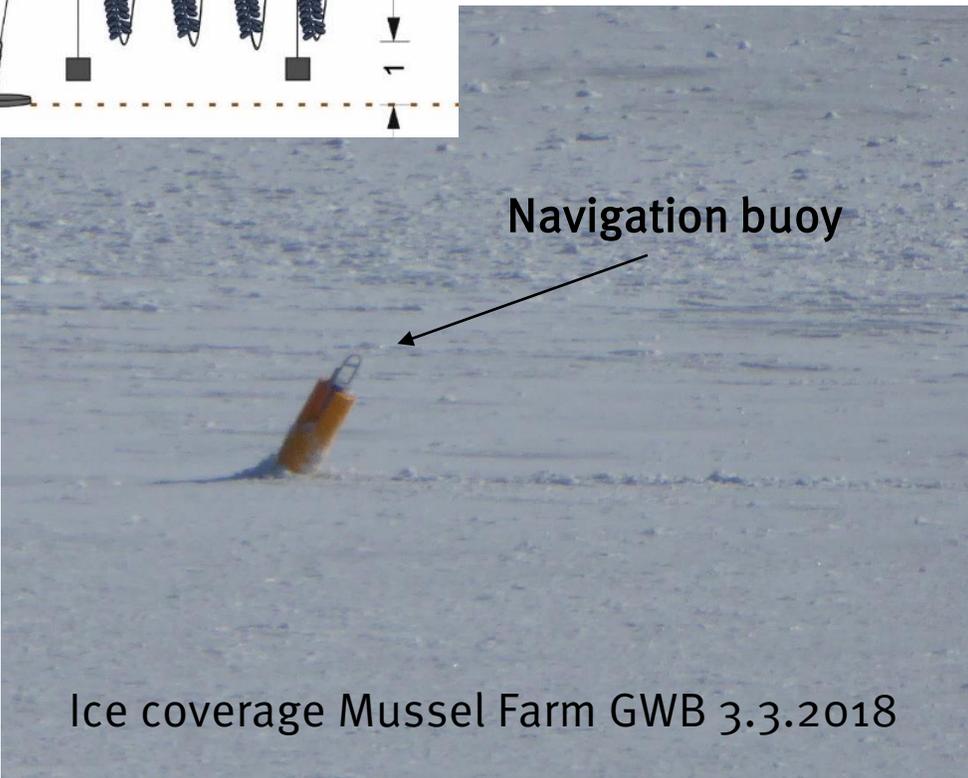
Maximum values (2014/15):



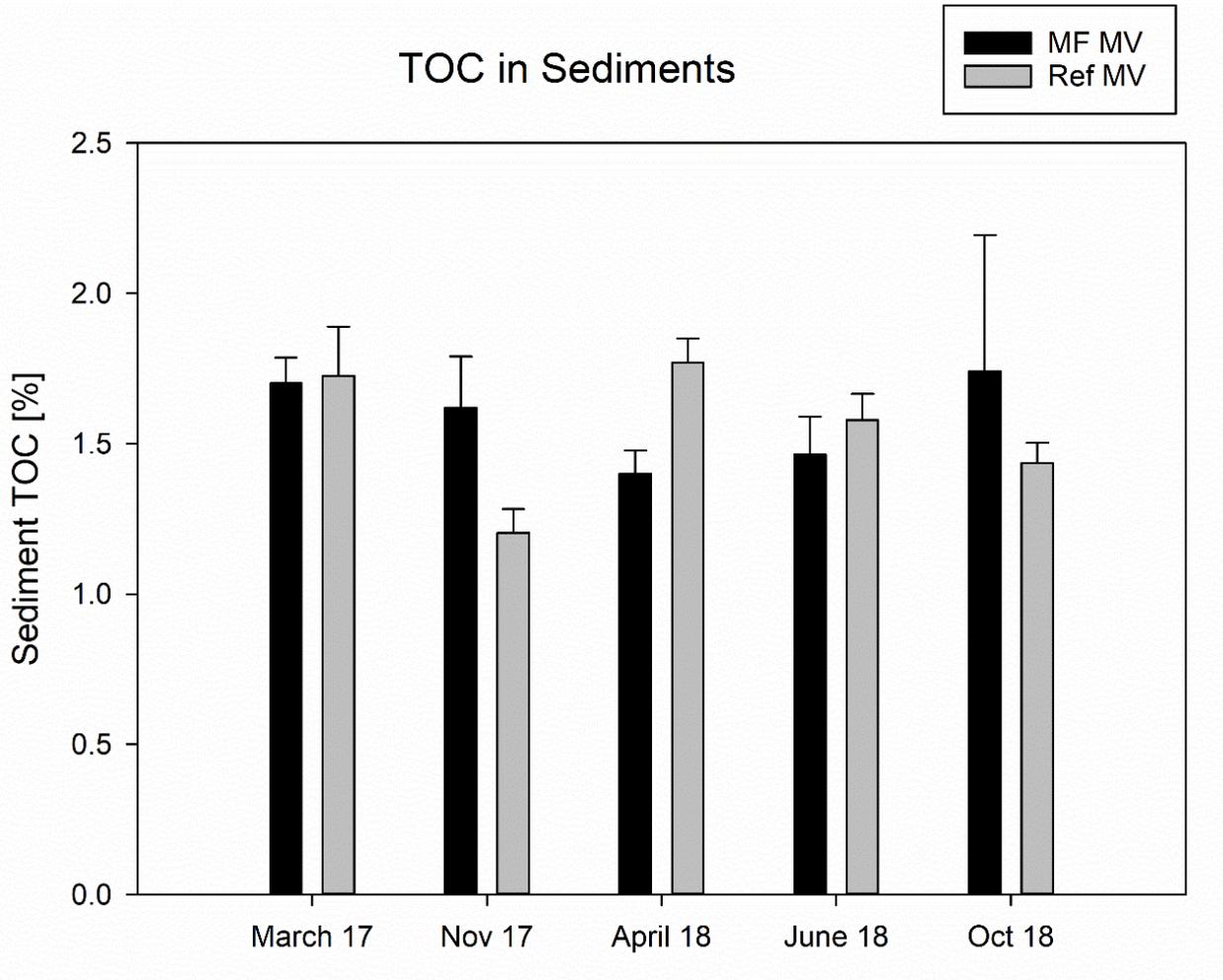
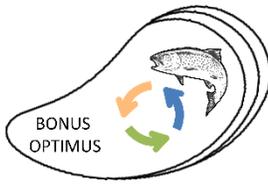
# Threads: ice (drift)



Submerging prevented any damages on the farm and mussels survived the winter  
→ easy and low-cost option using additional weights



# Environmental impact



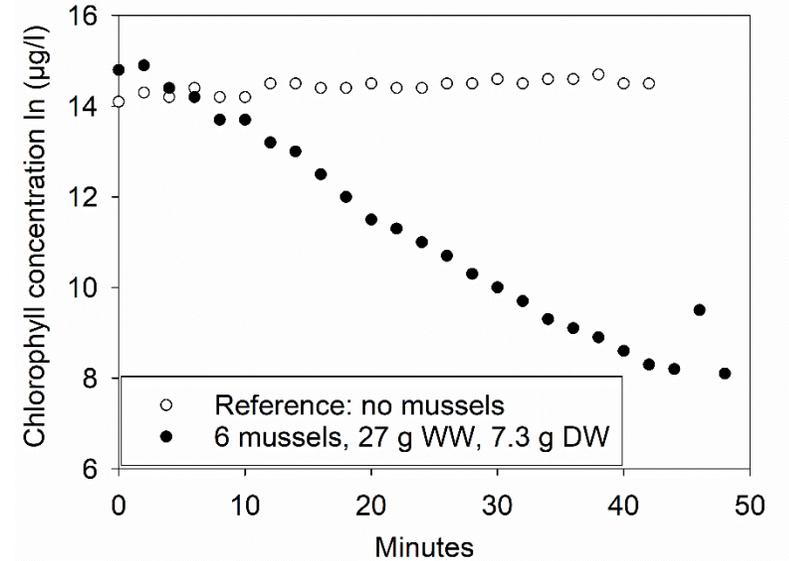
Main concern is usually enriched sediments below MF and hence hypoxia.

Results of the small scale farm in GWB show no significant effects.

Higher TOC levels under MF after summer but recovered after winter.

# Additional: Filtration potential

- Mussels are known to clear the surrounding water by filtering particles
- Clearance rates highly variable depending on mussel and environmental condition
- Literature states up to 5 l/h/ind (Strohmeier et al. 2012)
- Own measures average to 70 ml/h/ind for small sized mussels (< 2 cm) in 7 psu but highly variate



Mussels of WB, 10 psu,  
L = 35.5 ± 3 mm, 0.8 l/h/ind

→ **Potential to improve water transparency**

# Additional: nutrient remediation (N&P)

e.g. Nienhagen (pers. comm. F. Peine):

1.6 mgP/gDW<sub>total</sub> (0.7 mgP/gWW<sub>total</sub>), 27 mgN/gDW<sub>total</sub> (11 mgN/gWW<sub>total</sub>)

→ With 1 ha farm (max. values modelled: 7 t DW<sub>total</sub> after 6 mo) remove

190 kg N and 11 kg P

Own measures (GWB):

24 mgN/gDW<sub>total</sub> (9.5 mgN/gWW<sub>total</sub>)

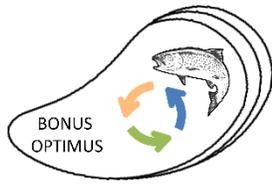
→ With 1 ha farm (max. values modelled: 4 t DW<sub>total</sub> after 6 mo) remove

86 kgN

P-measures in progress...

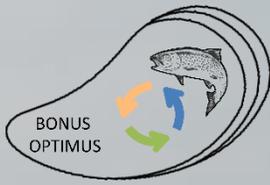
→ **Potential to improve water quality in regards to WFD**

# Conclusion



- Is there natural recruitment of mussel spat in the southern Baltic Sea? **YES!**
- Is there potential of commercial mussel farming at new sites in the Baltic Sea, MV, Germany? **DEPENDING ON THE USAGE: up to Rostock production for regional human consumption possible, further east mussel meal production and nutrient remediation.**
- Benefits  
Nutrient remediation and water transparency improvement.
- Risks  
TOC: **at small densities at a minimum or recoverment after winter.**  
Ice-damage: **SUBMERGE MF!**

# Many Thanks for Your Attention



Thanks to:



BONUS OPTIMUS project has received funding from BONUS (Art 185), funded jointly by the EU and Baltic Sea national funding institutions.