



MODUM

TOWARDS THE MONITORING
OF DUMPED MUNITIONS THREAT

Towards the monitoring of dumped munition threat

Jacek Bełdowski



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In its house beneath the waves, ancient
evil lies sleeping [H.P. Lovecraft]



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Monitoring

- Peak of corrosion (60y for bombs, 120y for projectiles)
- Mass corrosion, mass release
- Dead sea, toxic fish
- Time bomb approach
- Slow corrosion
- Status Quo
- Local pollution in areas nobody cares about
- No accumulation in Biota

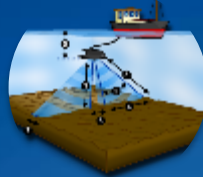


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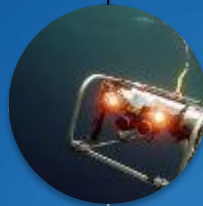
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Tests



Survey



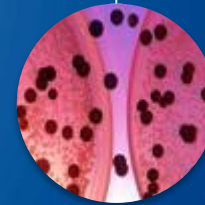
Identification



Sampling



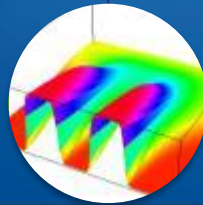
Monitoring



Eco-Risk



Analysis



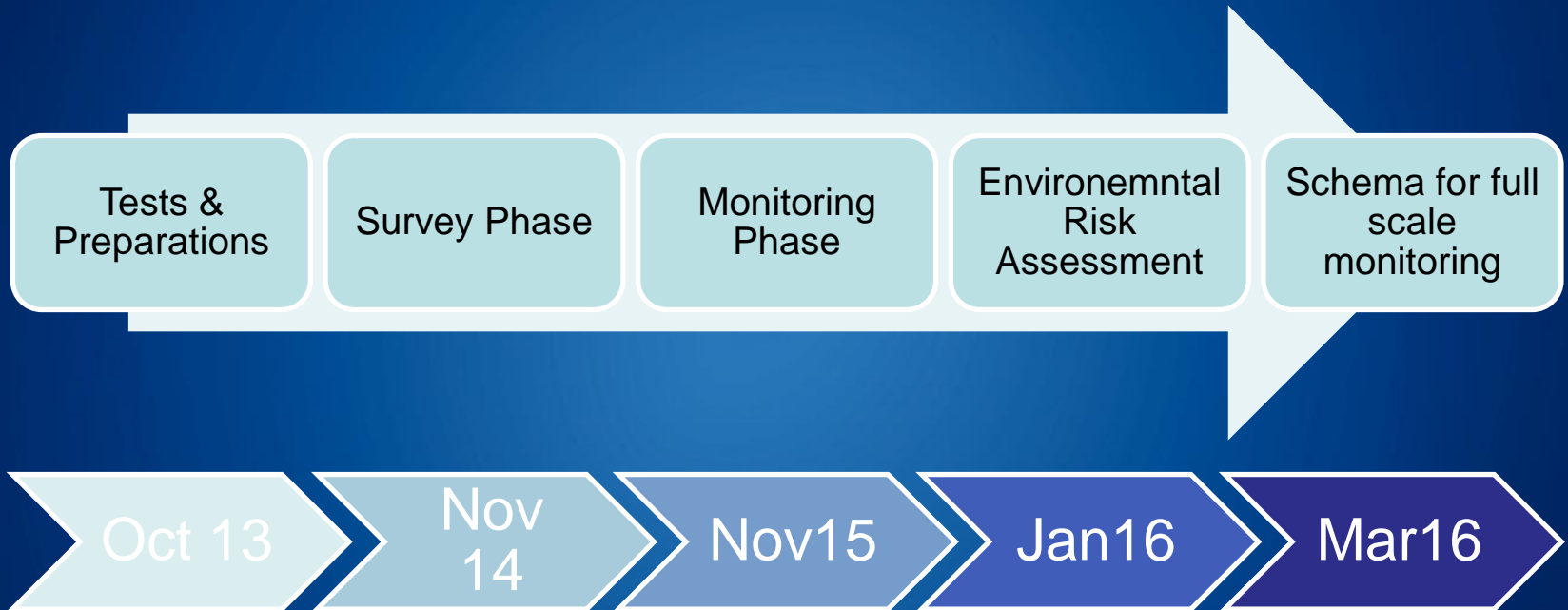
Modelling



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Timeline



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Survey



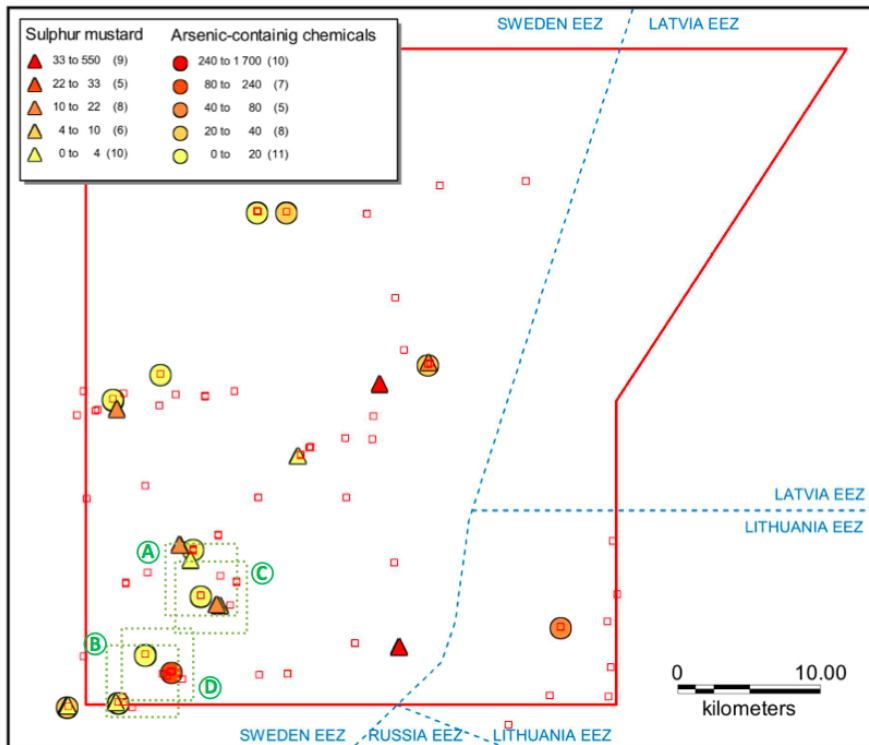
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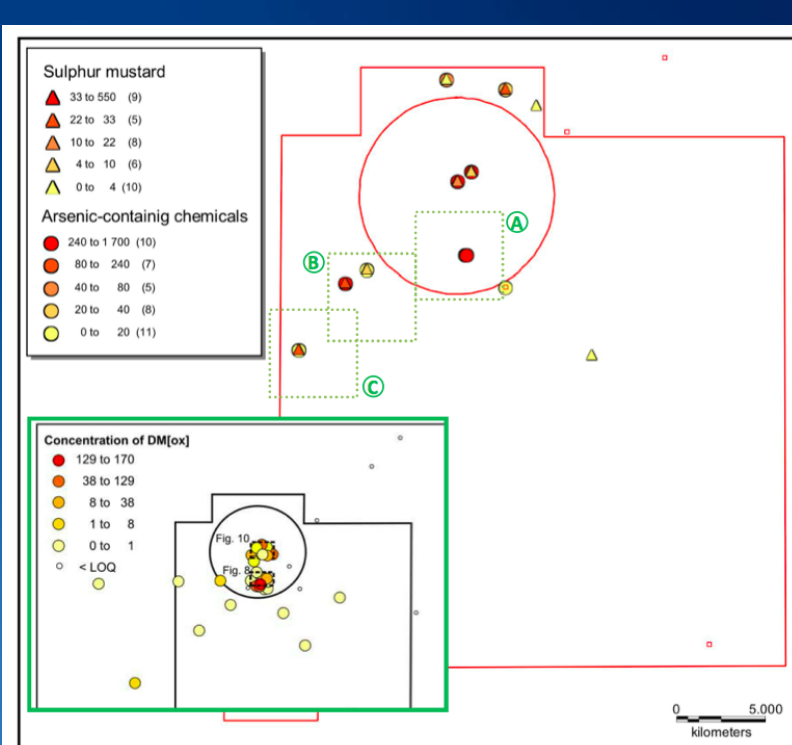
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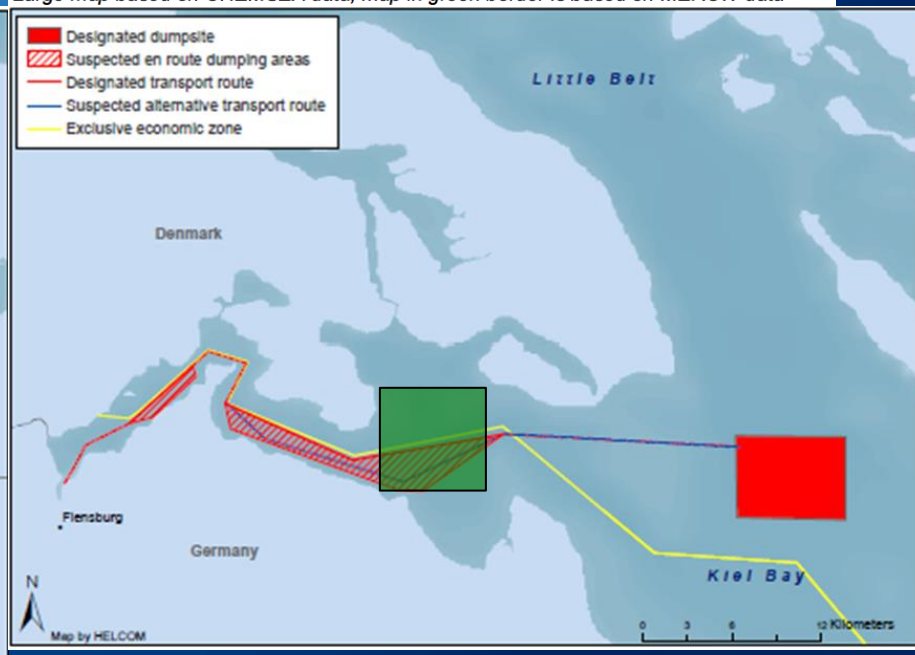
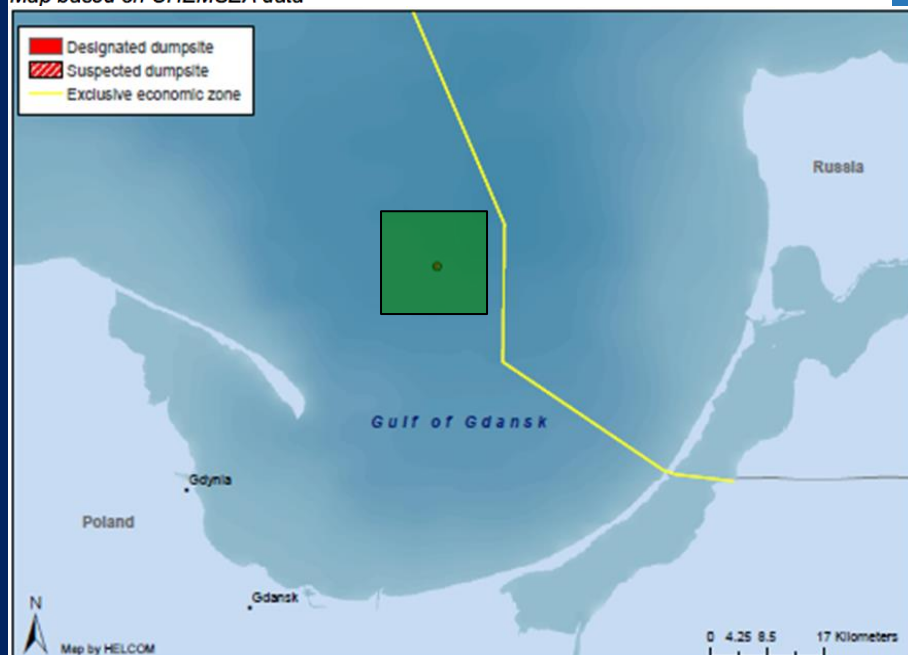
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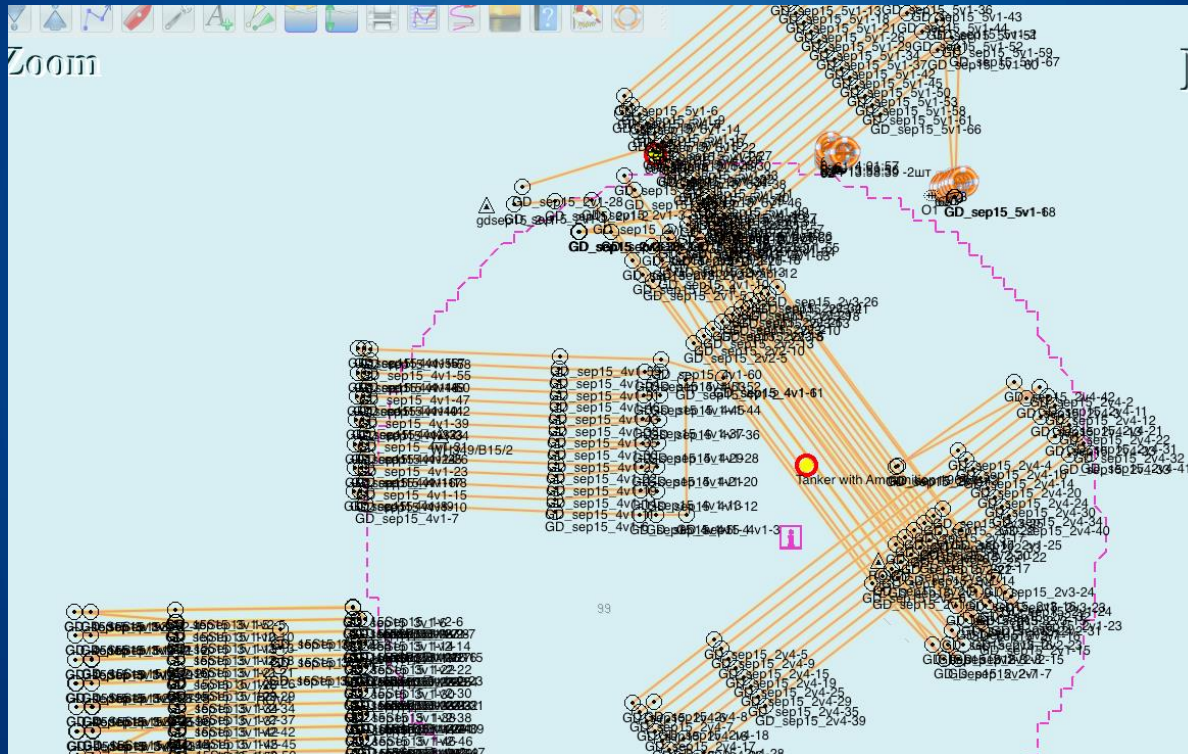
Map based on CHEMSEA data



Large map based on CHEMSEA data; map in green border is based on MERCW data



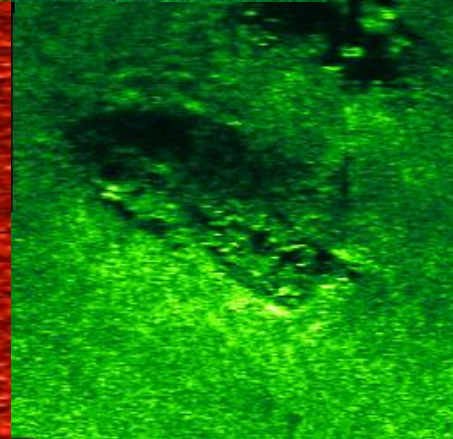
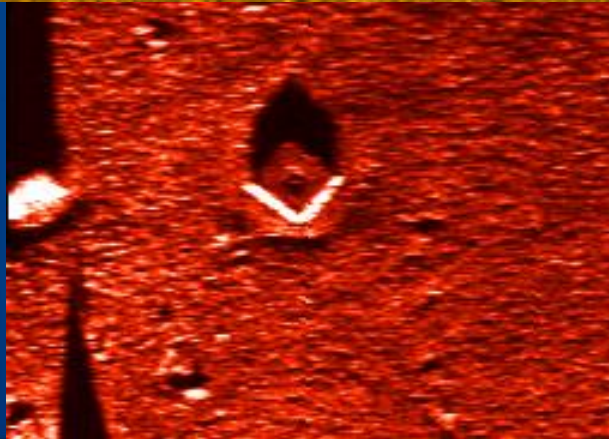
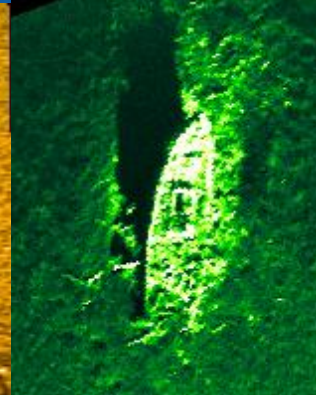
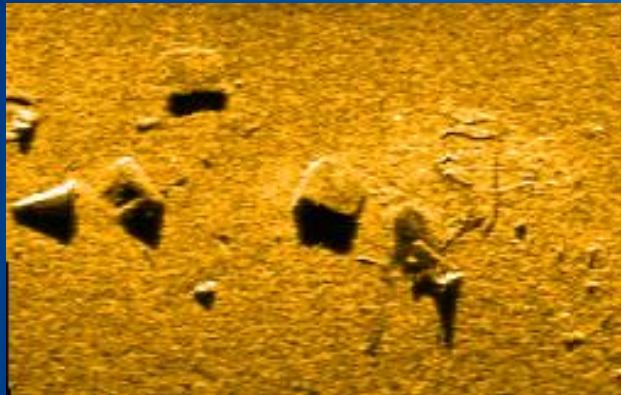
Monitoring



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Objects

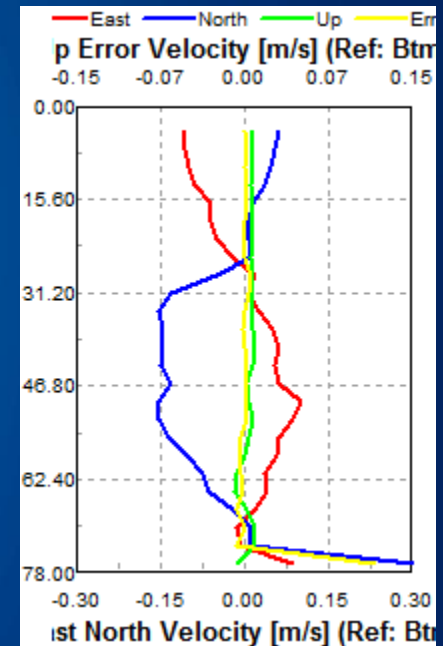
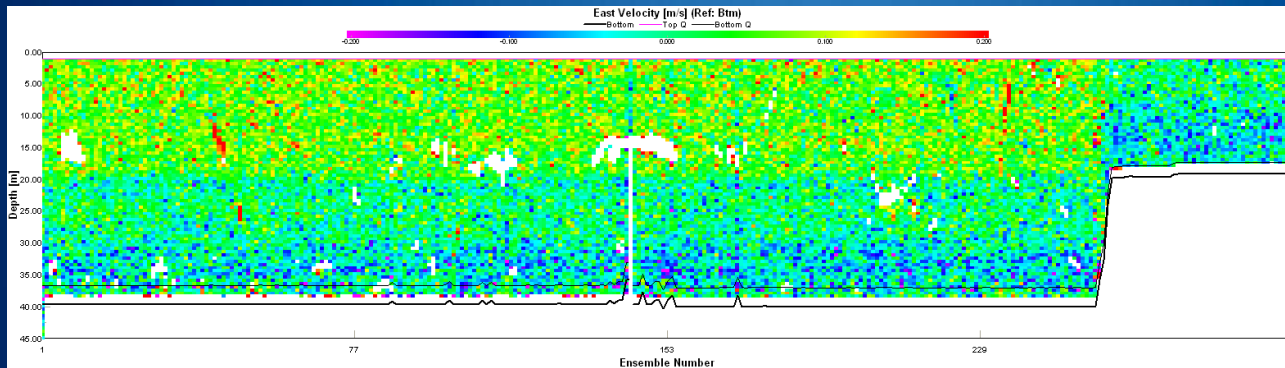


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Currents

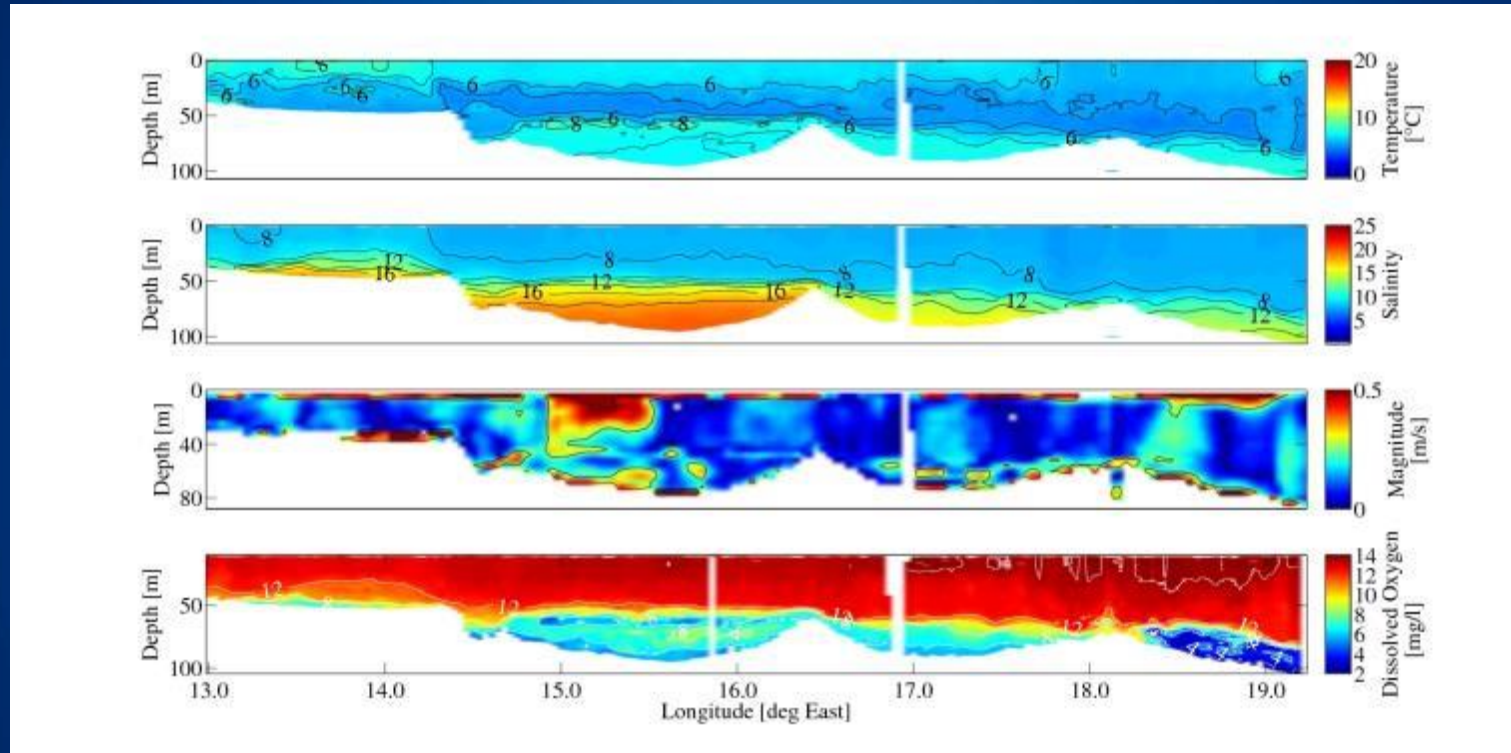
- ADCP short time current changes



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Inflow



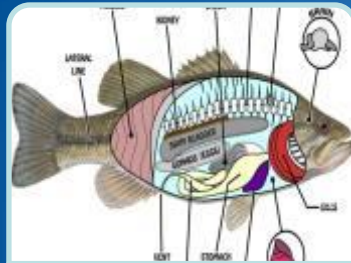
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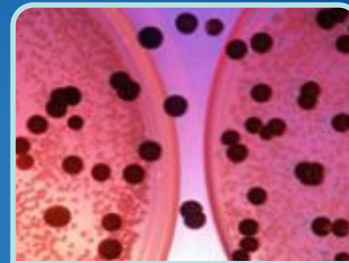
Environmental Risk Assessment Phase



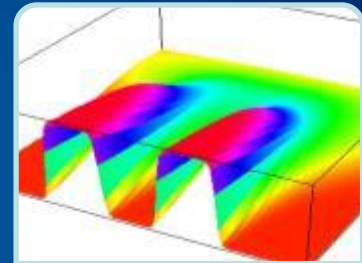
Habitats



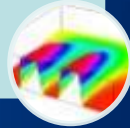
Exposure



Toxicity



Modelling



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ROV



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Precise sampling



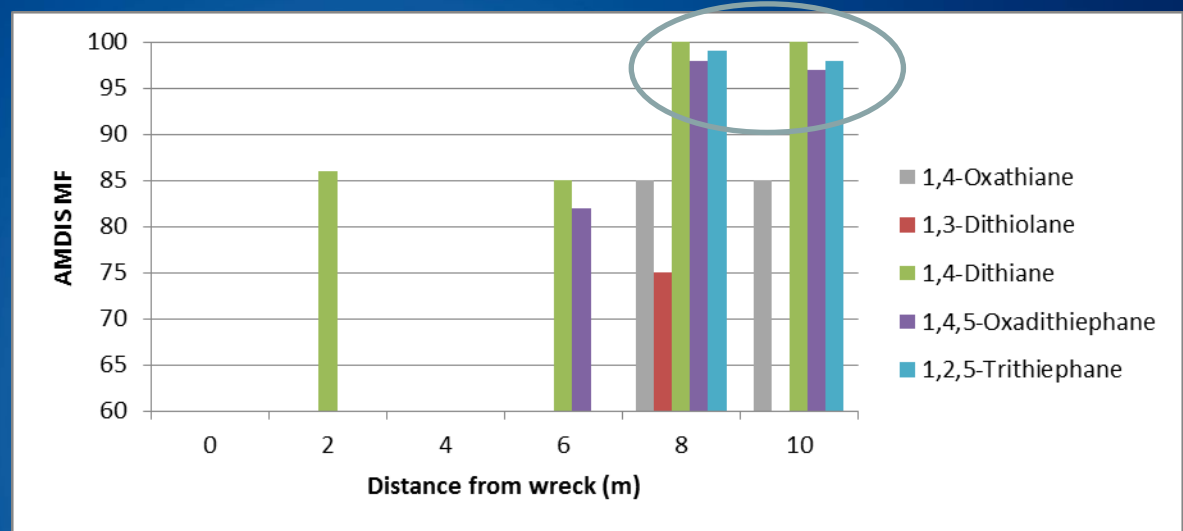
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Analysis results – Samples near Wreck 1

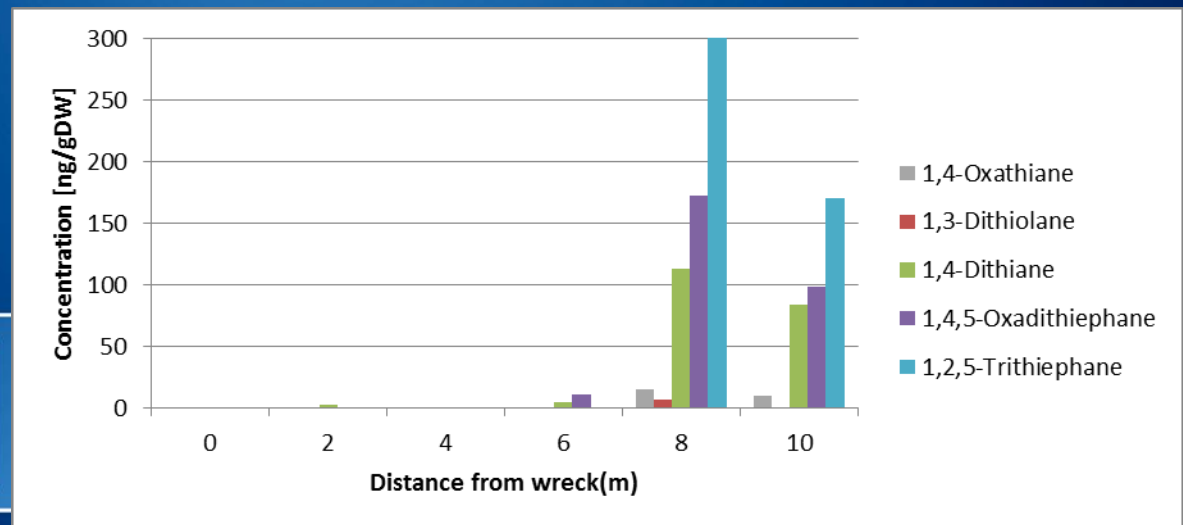
Instant results:

- AMDIS matchfactor
- Retention index
- Estimated conc.

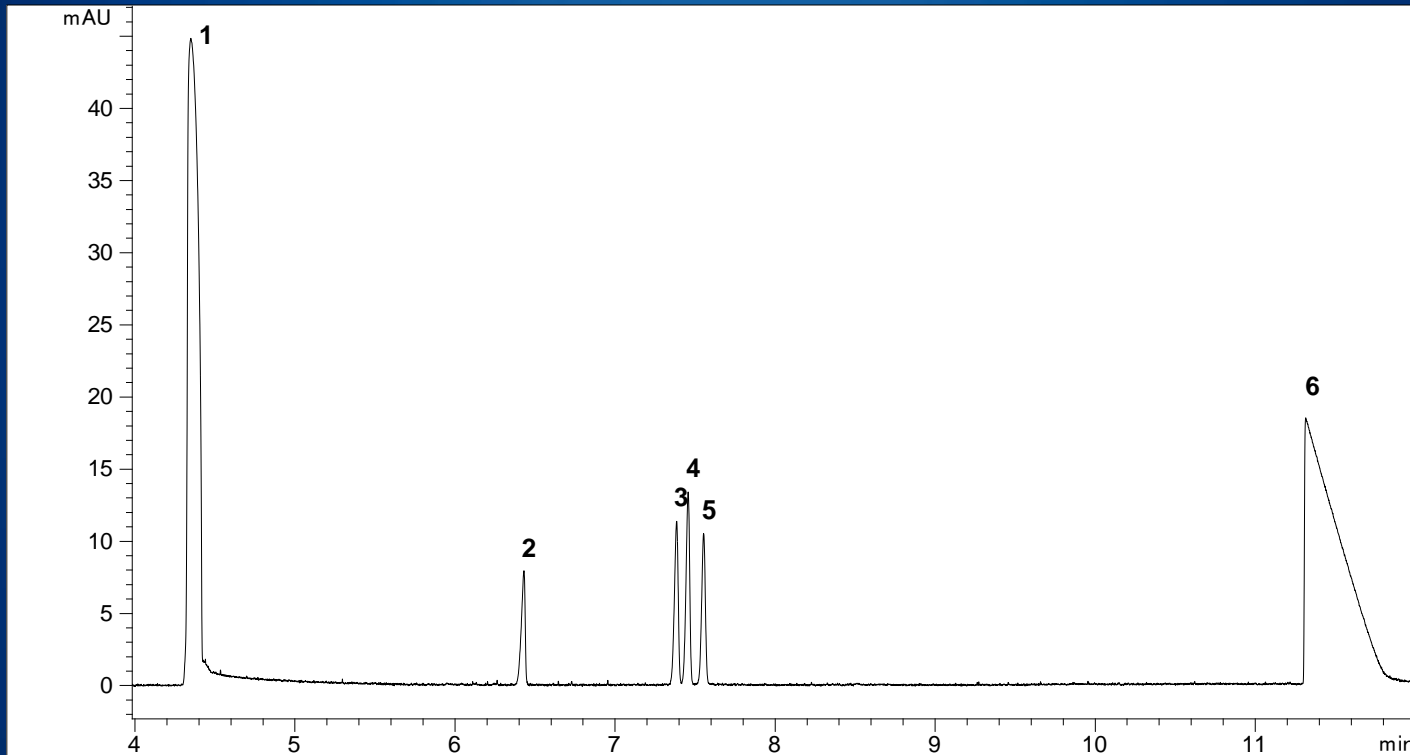


After more detailed data analysis:

- Quantitation



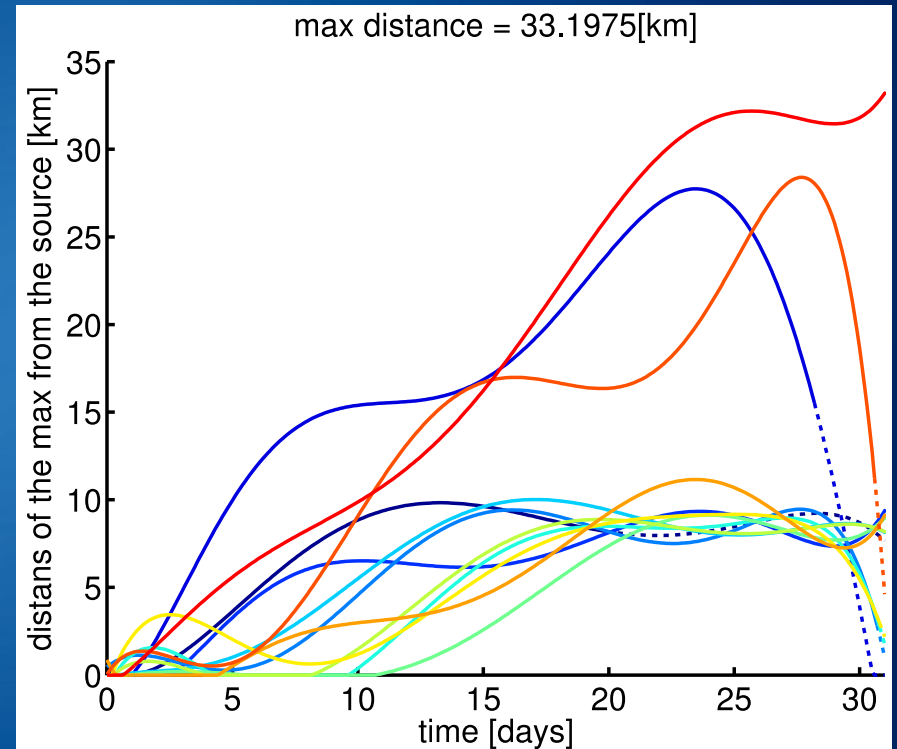
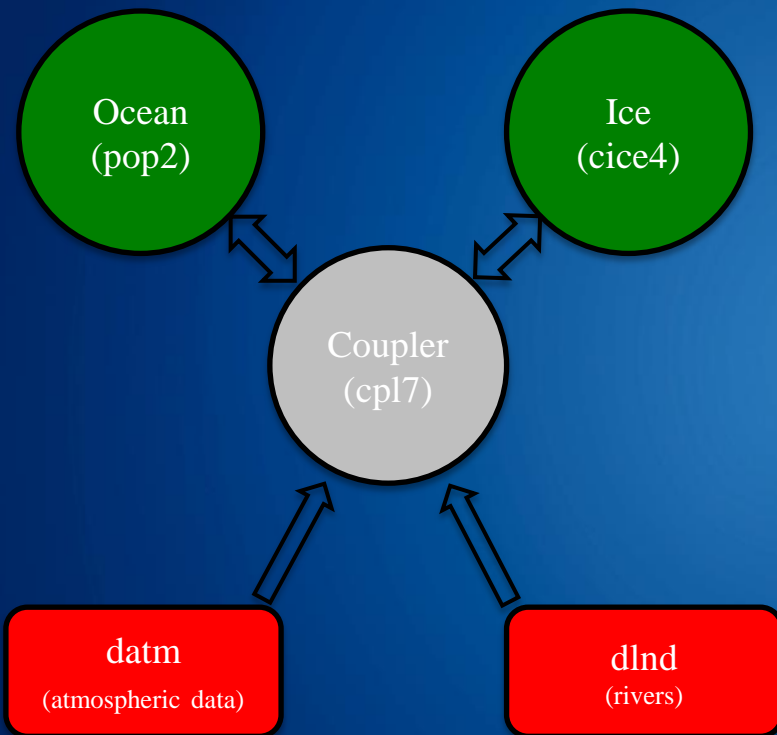
Mobile detection - TUT



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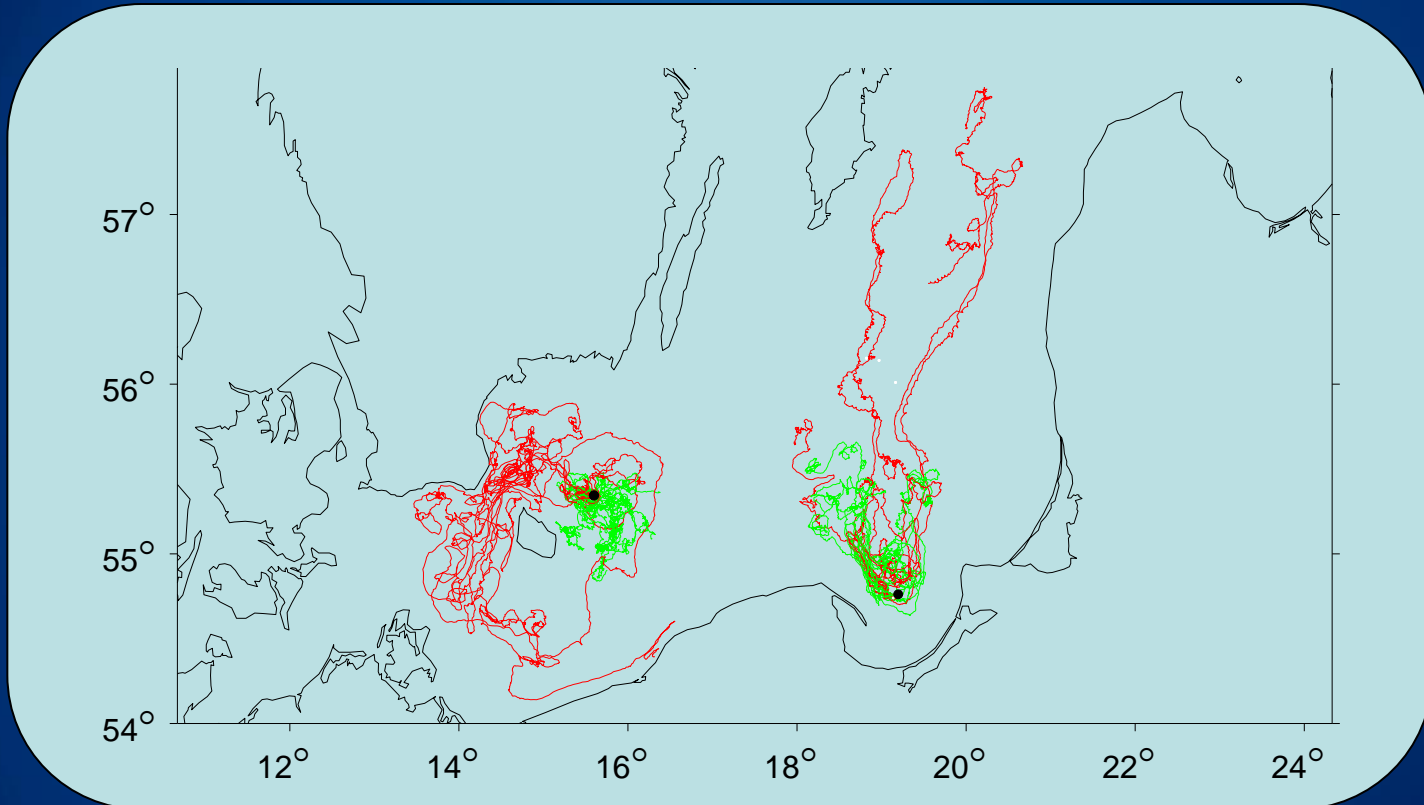
Modelling - IOPAS



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Modelling - IORAS

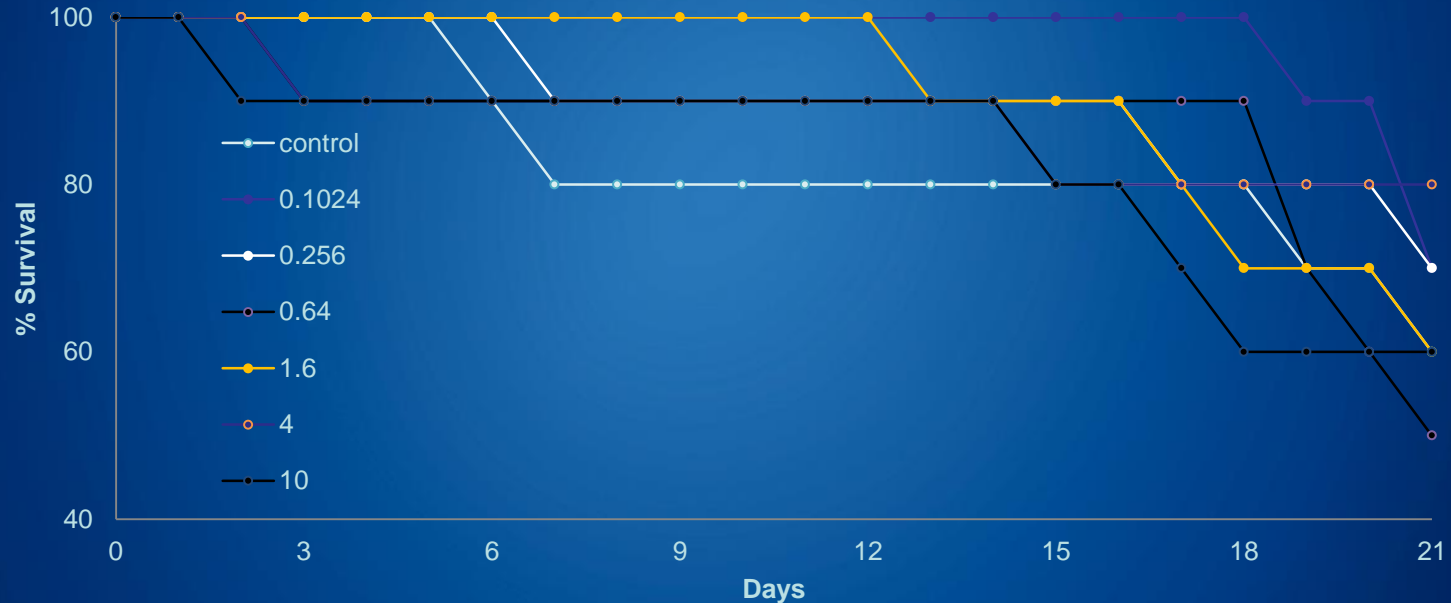


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Toxicity Tests (AU)

Survival of parent daphnids

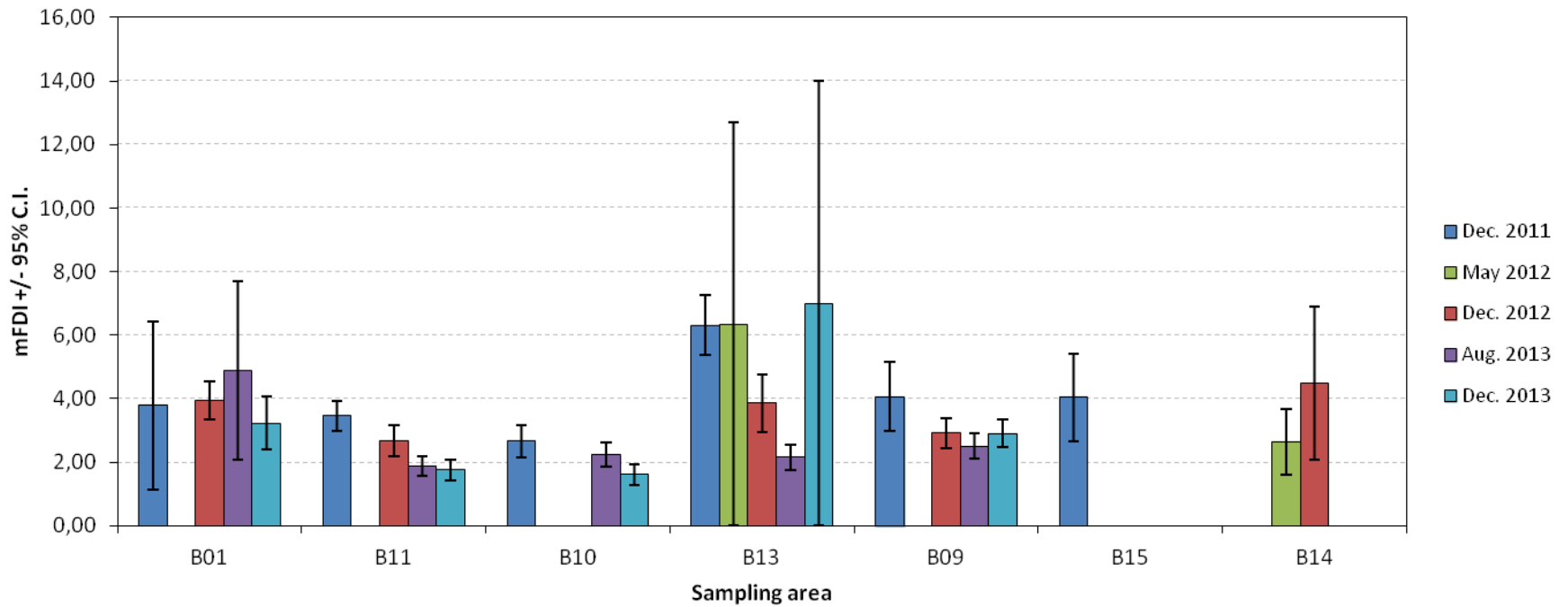


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Fish disease index:

Fish Disease Index (FDI)



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