NORTH SEA BALLAST WATER

Experiences of On Board Tests with Different Methods for Organism Detection

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Content

- Indicative analysis
- Detailed analysis
- Organism detection tools
- On board tests
- Conclusions

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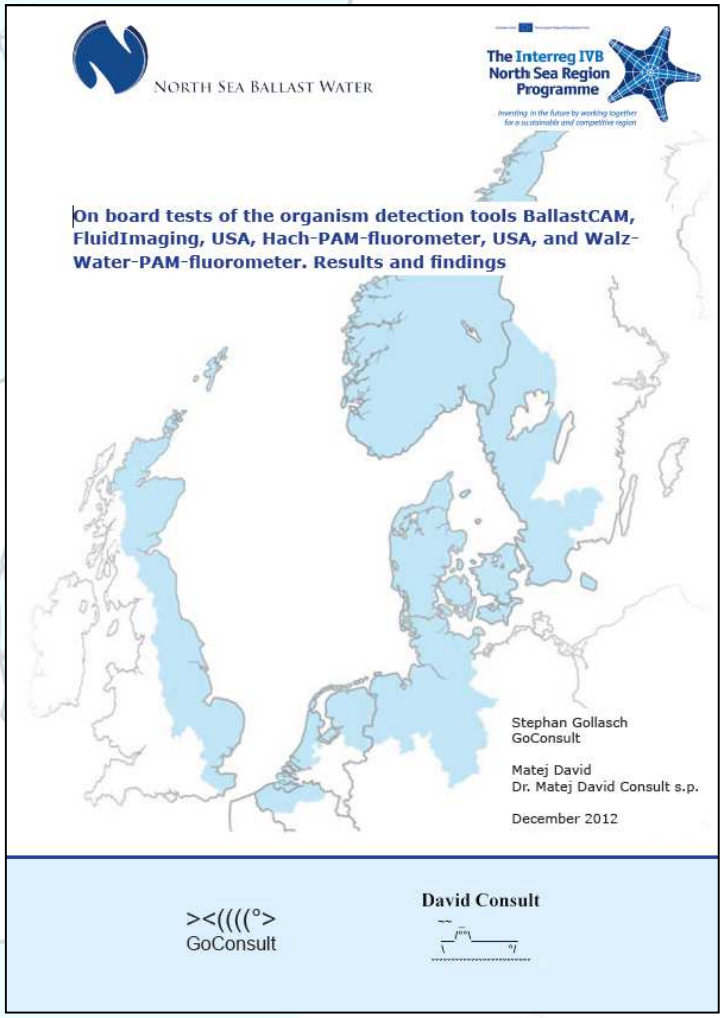
Ballast Water Opportunity

- Screening of organism detection tools
- On board test voyages



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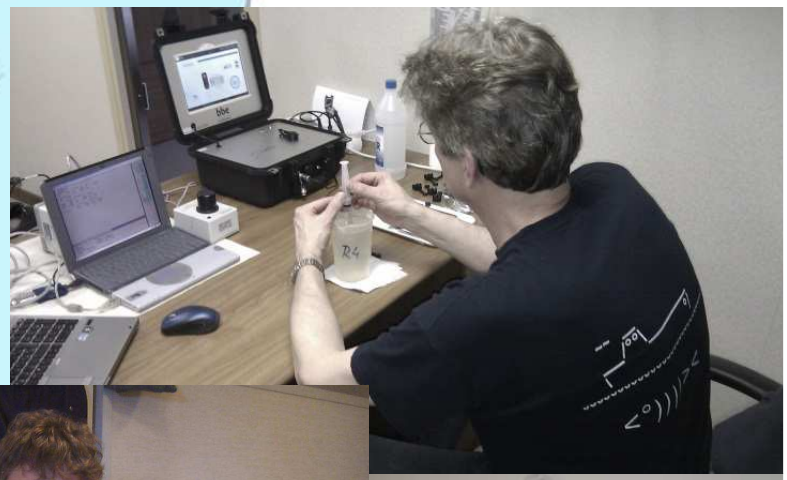
Possible indicative analysis methods

- Accuracy
- Reliability
- Time to a result
- Expertise
- Portability
- Costs



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Two Different Sample Analysis Approaches

- Indicative assessment
  - A „quick and dirty“ check for gross exceedence;
    e.g. 100 orgs = non-compliance
- In-depth assessment
  - A detailed analysis;
    e.g. 10 orgs = non-compliance

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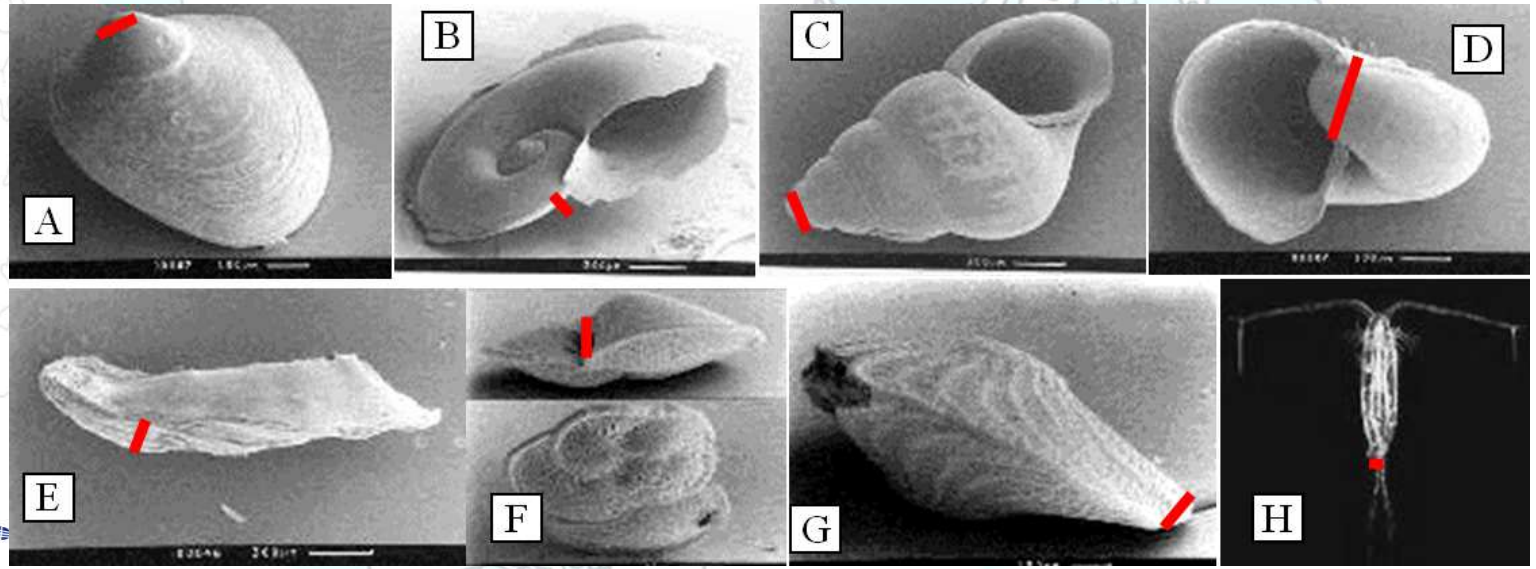
Challenges

- Viability assessment (stains, visual inspection)
- Colony forming units (time to grow)
- Minimum dimension (calculated size, visual inspection)
- Very low numbers of organisms
- „Court-proof“ methods



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On Board Application

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- Organism detection tools, at best, should
  - be easy to carry
  - be of compact design
  - be easy to operate by port State control
  - be robust to work in vessel environment
  - deliver results promptly
  - show a high accuracy
  - be easy to calibrate

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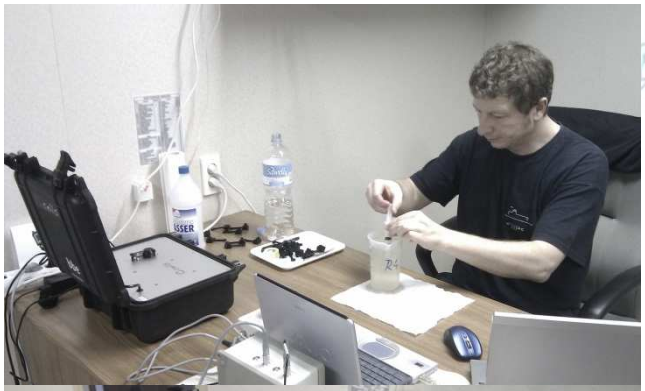
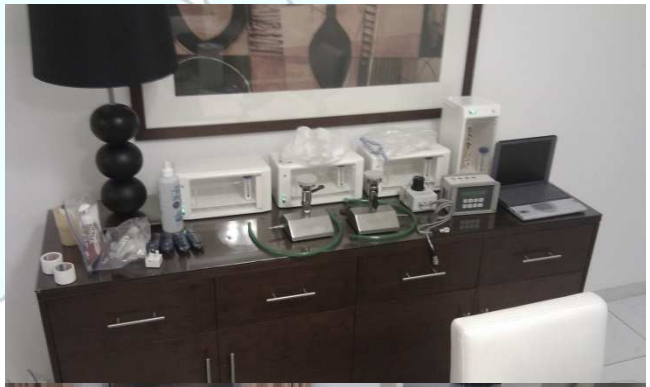
Gear





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Results from On Board Gear Tests

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	Stereo-micros-cope	Micros-cope	Flow-cam-era	Flow-cyto-metry Accuri	Walz PAM	Hach PAM	bbe 10 cells	IDEXX / Möller & Schmelz
Portable	++	-	-	-	++	+++	++	---
Compact	++	---	-	-	++	+++	++	---
PSC Operation	--	---	--	--	++	+++	++	---
Robust	++	---	+	+	+++	+++	+++	++
Time to result	20 mins	30 mins	30 mins	10 mins	20 mins	10 mins	10 mins	2 days
Accuracy	+++	+++	+	++	++	++	++	+++
Calibration	no	no	no	yes	yes	yes	yes	no
Indicative	yes	yes	yes	yes	yes	yes	yes	no
Detailed	yes	yes	no	no	no	no	no	yes
Organisms	>50	>10	>10	10-50	10-50	10-50	10-50	bacteria
Counts	yes	yes	yes	yes	no	no	yes	yes

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Suggestions

- Start with one method to evaluate one organism group in D-2
- Should this show presence or high numbers, take result as indication of a failed treatment system
- Should this show absence or low numbers, continue with second (and third) D-2 organism group to confirm results
- The easiest to start with may be the analysis for phytoplankton (Pulse-Amplitude Modulated fluorometry , PAM), followed by bacteriae (hand-held fluorometer) and zooplankton (stereomicroscope)

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Indicative Analysis Approach

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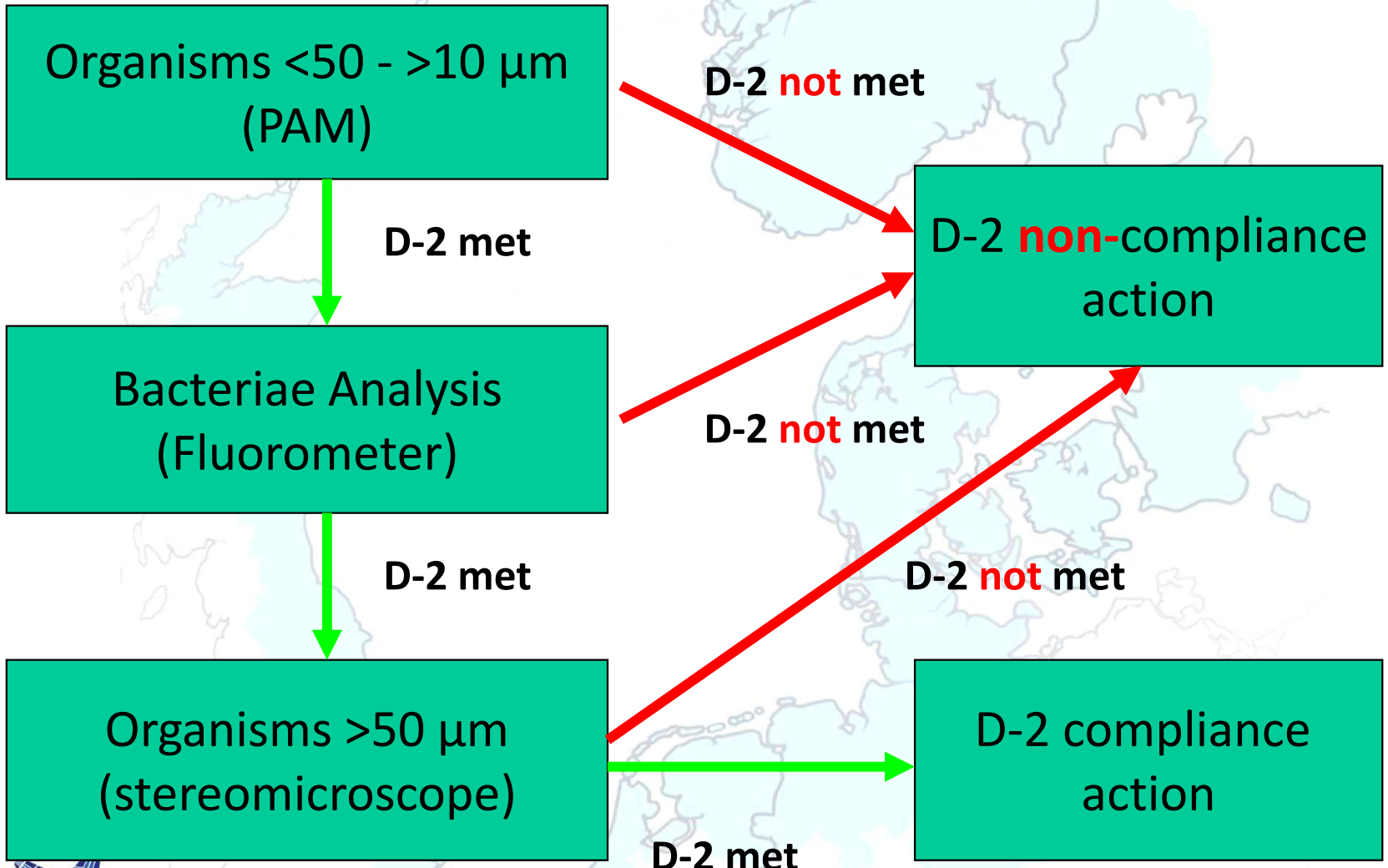

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More Suggestions

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- Consider to equip a van with organism detection technology
- Drive from vessel to vessel in a port
- Send sampling team on board and deliver the samples as soon as possible to van for analysis
- In this scenario the organism detection tools would not need to be carried on board
- Sampling team “only” to board the vessel, no need to bring organism detection team onboard as well

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Conclusions

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- Methods exist to proof D-1 and D-2 compliance in the laboratory
- Today´s organism detection technology seems to be suitable for an on board application for indicative analysis
- Compromise needed considering what can be done when working on a vessel (number of samples, volumes)
- Harmonized approach, not that one vessel is compliant in one port, but not in another
- An indicative assessment may be followed by an in-depth inspection
- What to do in case of proven non-compliance? No ballast water discharge!

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SEVENTH FRAMEWORK PROGRAMME VECTORS

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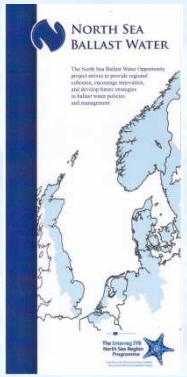
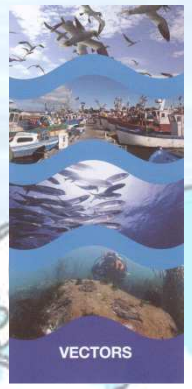
Vectors of Change in Oceans and Seas Marine Life, Impact on Economic Sectors

Ballast Water Opportunity





www.NorthSeaBallast.eu

www.marine-vectors.eu

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Acknowledgements

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- Test voyage 2009
- Test voyages 2010
- Test voyage 2012

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Aquaworx clear solution

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Thank you very much
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