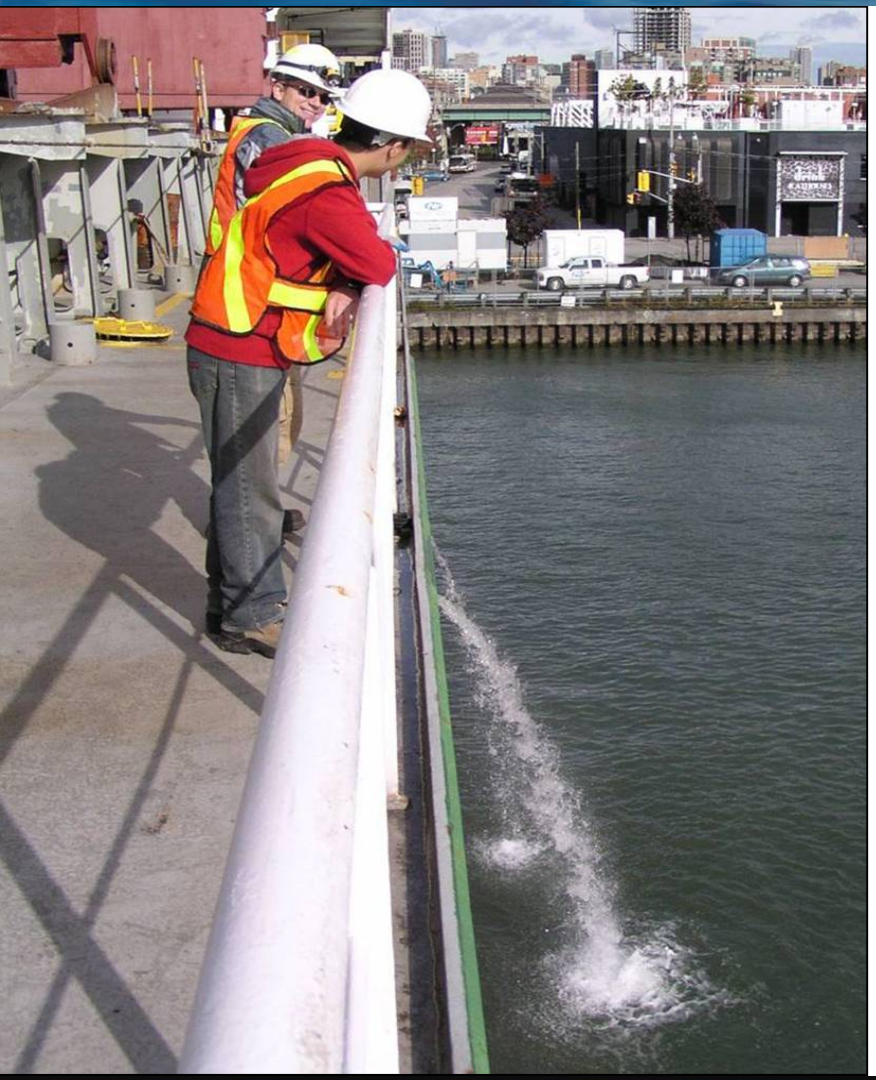
Fisheries and Oceans Canada | Pêches et Océans Canada



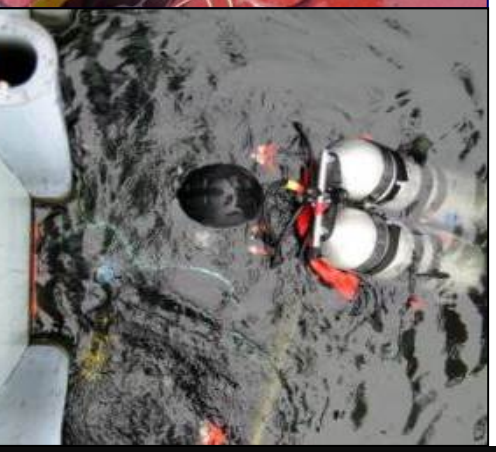
Update on Ballast Water Research in Canada

Sarah Bailey

Fisheries and Oceans Canada

Canada

Recent Projects



- Risk Assessment:
  - Transoceanic vs. coastal vs. domestic
  - Pacific vs. Atlantic vs. Arctic vs. Great Lakes
  - Exchange vs. Treatment
- Management Strategies:
  - Shipboard testing: exchange plus treatment
  - Treatment Efficacy in the Arctic
  - Tools for Monitoring and Enforcement

National Risk Assessment

- Analysis of relative invasion risk of ballast water among different shipping pathways (e.g., Transoceanic, Coastal or Domestic), ecosystems (e.g., freshwater, brackish and marine), and timescales (annual, per discharge event)
- Arrival and survival potential estimated based on directional shipping networks, biological surveys, environmental similarity between donor-recipient ports (salinity and temperature), and effects of current (BWE) and future (BWT) management strategies
- Findings: BWE effectively reduces invasion risk to freshwater ecosystems but is less protective of marine ecosystems because of greater environmental mismatch between source (oceanic) and recipient (freshwater) ecoregions
- Future requirements for BWT are expected to reduce risk of zooplankton NIS introductions across ecosystem types but are expected to be less effective in reducing risk of phytoplankton NIS

Casas-Monroy et al. 2015. PLOS ONE 10:1-16

Canada

BWE + BWT

- Shipboard testing completed in 2014: 3 successful trials in total
- Findings:
  - BWE+BWT provides a significant additional reduction of plankton abundance compared to BWT alone
  - BWT tanks filled in freshwater ports contained mainly freshwater or euryhaline taxa at discharge, while BWE+BWT tanks contained mainly marine taxa that originated from BWE area
  - environmental mismatching effect is less clear for phytoplankton, since many marine and euryhaline species were observed in the initial ballast water uptake sample of the freshwater ports

Briski et al. *submitted to Environmental Science & Technology*

Canada

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Reliability of Ballast Water Test Procedures (ReBaT)

Dr. Manfred Rolke

Reliability of Ballast Water Test Procedures

Comparison exercise

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Objective:

to conduct **replicated, comparative testing** of different methods for sample collection and sample analysis.

Procedure:

can be divided into two main parts:

- **sample collection** and
- **sample analysis.**

Reliability of Ballast Water Test Procedures

RV METEOR

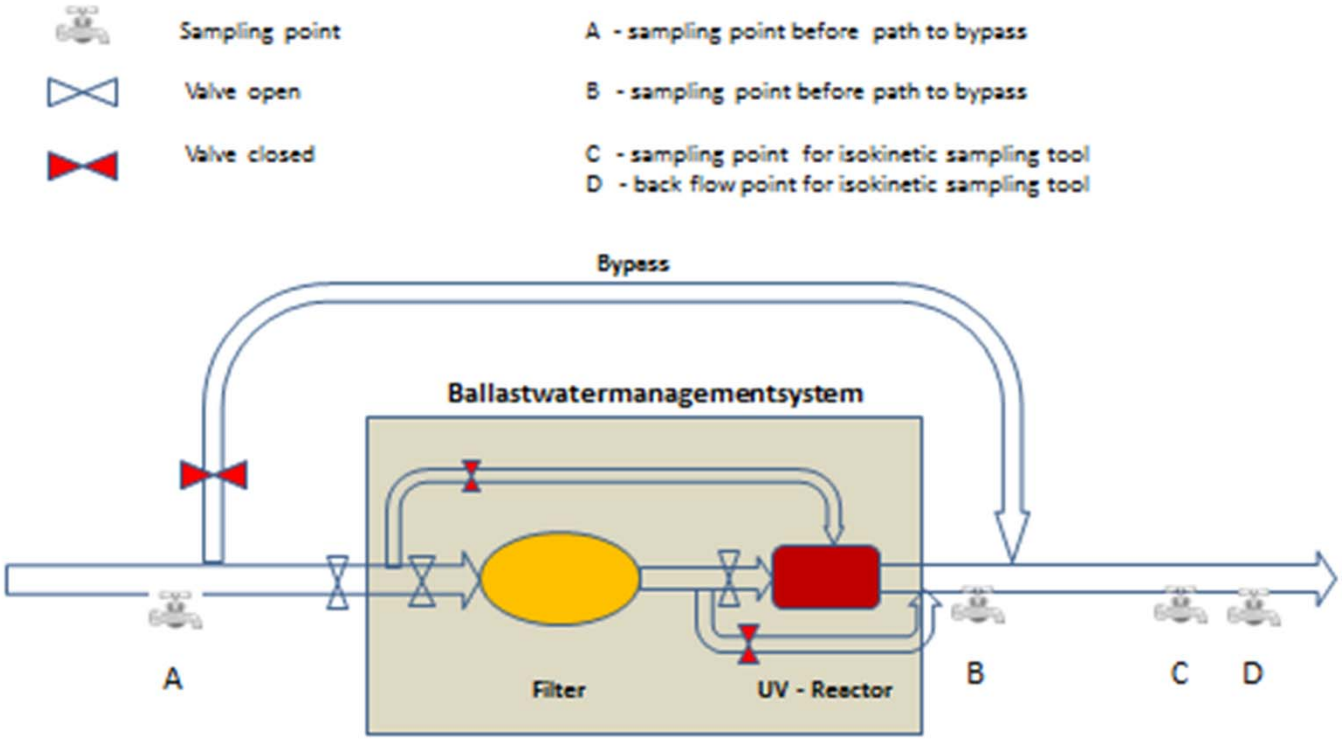
BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

97.5 m research vessel operated by the German Research Foundation
4 June – 14 June, sailing from Cape Verde to Germany

Reliability of Ballast Water Test Procedures

Sample plan

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE



Schematic view of the BWMS with sampling points

Reliability of Ballast Water Test Procedures

Sample plan

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

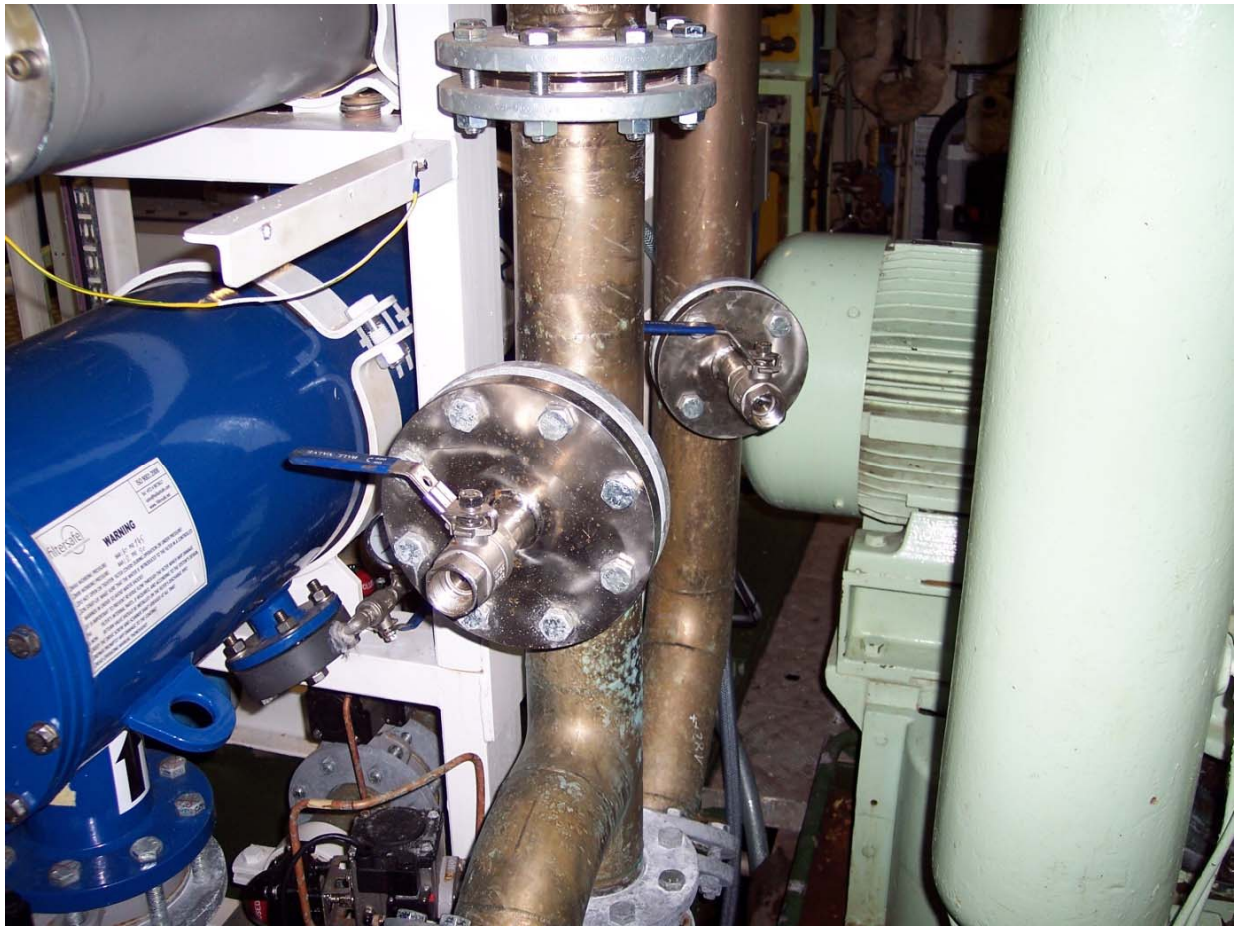
Optimarin BWMS on board METEOR

Optimarin sample ports before and behind the system (picture provided by METEOR)

Reliability of Ballast Water Test Procedures

Sample plan

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE



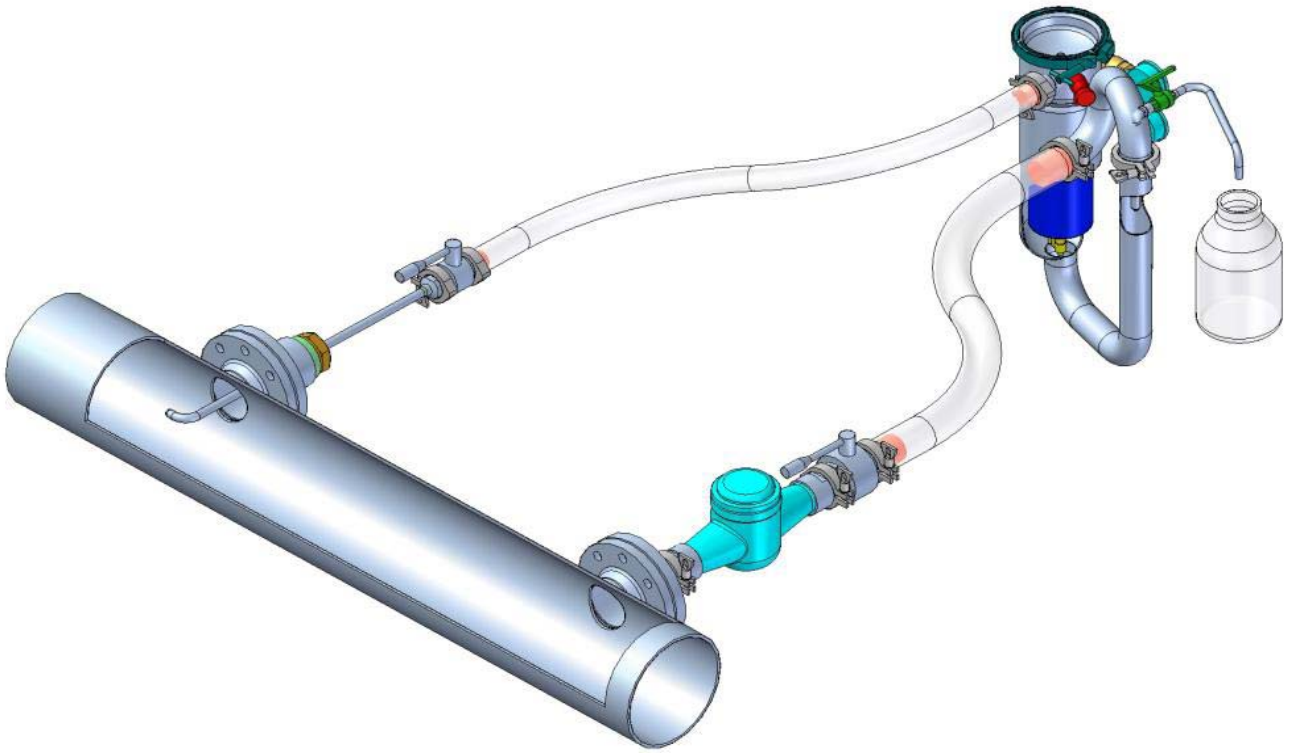
Middle of the room, look from bow to stern

Optimarin sample ports before and behind the system

(picture provided by METEOR)

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

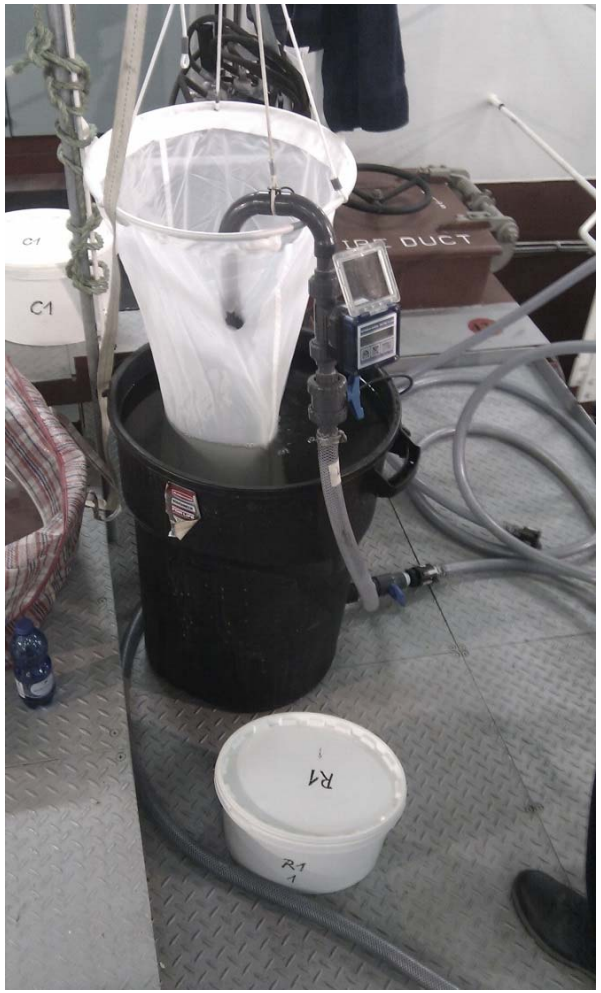
SGS sampling skid



Reliability of Ballast Water Test Procedures

Traditional sampling

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE



Net sampling skid,

(picture provided by Stephan Gollasch)

Reliability of Ballast Water Test Procedures

Potential participants

Participant	Analysis Method/Type	Size Class
Nick Welschmeyer	ATP assay with improved extraction protocol	<10
Nick Welschmeyer	MLML (steamlined) bulk FDA method	<10
Nick Welschmeyer	Var fluorescence w/ BW	<10
Sarah Bailey	Hach brand hand-held fluorometer	>10 <50
Julie Vanden Byllaardt	microscopy	>10 <50
Lawrence Younan	Digital cytometer	>10 <50
Lawrence Younan	Ballast CheckTM 2 (PAM fluorometer)	>10 <50
André Zaake	bbe - 10 cells	>10 <50
Satake	Satake Pulse Counter	>10 <50
Marcel Feldhuis	Total phytoplankton, biomass and photosynthetic activity	>10 <50
Marcel Feldhuis	fractionated phytoplankton biomass/photosynthetic activity	>10 <50
Marcel Feldhuis	filter concentrated biomass/phytosynthetic activity PAM	>10 <50
Nick Welschmeyer	Var fluorescence w/ BW	>10 <50
Nick Welschmeyer	ATP assay with improved extraction protocol	>10 <50
Nick Welschmeyer	MLML (steamlined) bulk FDA method	>10 <50
SGS	ATP	>10 <50

Reliability of Ballast Water Test Procedures

Potential participants

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

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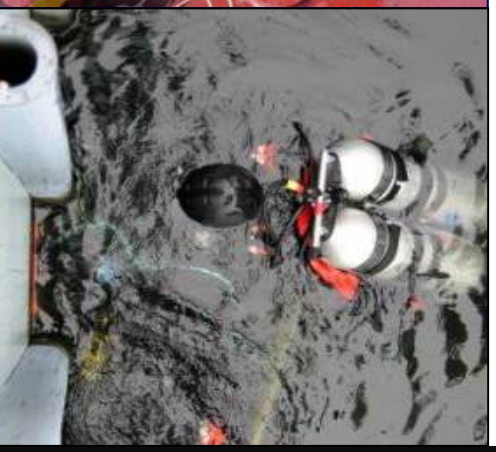
Nick Welschmeyer	MLML (steamlined) bulk FDA method	>50
Nick Welschmeyer	ATP assay with improved extraction protocol	>50
SGS	ATP	>50
Derek Price	Speedy Breedy	bacteria
Marcel Feldhuis	Total bacteria	bacteria
Marcel Feldhuis	growth response bacteria	bacteria
SGS	FISH	bacteria
SGS	IDEXX	bacteria
SGS	ATP	bacteria
Lothar Schillak	TRITON BW BacTest EC	Bacteria (E. coli)

Anticipated Outcomes



- Results will be publicly available through publication in scientific journal(s) in due course

- Comparison of 3 sample collection devices
- Comparison of analysis methods
  - For untreated water (intake)
  - For treated water (UV)

Upcoming Meeting

GloBallast Partnerships

6th GEF-UNDP-IMO GloBallast R&D Forum and Exhibition on BWM will be held in Canada

14-16 October 2015

The venue is still to be confirmed (Montreal???)

Details of the forum will be posted at:
http://globallast.imo.org

Canada

Questions?

Funding Partners:

Canada