Pacific Ballast Water Group
16 – 17 April 2013

Non-toxic, economically sound answer to hull-borne invasive species

David Phillips
Hydrex
www.hydrex.us

HYDREX UNDERWATER TECHNOLOGY

ShipHullPerformance.org

ECOSPEED® SHIP HULL PERFORMANCE TECHNOLOGY

Hull-borne non-indigenous species (NIS)

Macrofouling transported on the hulls of ships from one environmental zone to another is considered as big a risk of invasive species translocation as ballast water.

What I'm not going to talk about

- The aquatic invasive species problem
- Ballast water (it's a completely different subject)
- The fact that hull-borne biofouling has been found to be an equal if not greater threat than ballast water

Guidelines, impending regulations

IMO

MEPC 62/24/Add.1
Annex 26, page 1

ANNEX 26

RESOLUTION MEPC.207(62)

Adopted on 15 July 2011

2011 GUIDELINES FOR THE CONTROL AND MANAGEMENT OF SHIPS' BIOFOULING TO MINIMIZE THE TRANSFER OF INVASIVE AQUATIC SPECIES

THE MARINE ENVIRONMENT PROTECTION COMMITTEE,

RECALLING Article 38 of the Convention on the International Maritime Organization concerning the functions of the Marine Environment Protection Committee relating to any

ANZ

ANZECC strategy to protect the marine environment

Code Of Practice

for
Antifouling

and
In-water Hull Cleaning and Maintenance

CA

Title 2, Division 3, Chapter 1,

Article 4.8. ~~The Collection of Information Relating to Hull Husbandry Practices of Vessels for Control of Marine Invasive Species in Waters of California~~
Biofouling Management Regulations for Vessels Operating in California Waters

EU

Our life insurance, our natural capital: an EU biodiversity strategy to 2020

European Parliament resolution of 20 April 2012 on our life insurance, our natural capital: an EU biodiversity strategy to 2020 (2011/2307(INI))

The European Parliament,

– having regard to the communication from the Commission entitled 'Our life insurance, our natural capital: an EU biodiversity strategy to 2020'

Current practices and recommended solutions

1. Ignore and hope it will go away
2. Lobby the legislators and regulatory bodies to maintain the status quo
3. Keep a log of antifouling system applications and maintenance
4. Use the “appropriate” biocidal antifouling coating
5. Underwater cleaning using a “reclaim” system
6. A year from now, consider a method of gauging whether or not the recommendations are effective

The problem with the “solutions”

1. ~~Ignore and hope it will go away~~ (pretty obvious)
2. ~~Lobby the legislators and regulatory bodies to maintain the status quo~~(status quo is not working)
3. ~~Keep a log of antifouling system applications and maintenance~~(may be helpful but no solution)
4. Use the “appropriate” biocidal antifouling coating
5. Underwater cleaning using a “reclaim” system
6. ~~In one year, approve a method of gauging whether or not the recommendations are effective~~ (procrastination)

The problem with the “solutions”

4. Use the “appropriate” biocidal antifouling coating

Problem No. 1. These coatings are *toxic* and contaminate oceans and sediments.

“…an increasing number of studies suggest that most of the biocides used in modern antifouling coatings are highly toxic to a wide range of aquatic non-target organisms.”

(Floerl *et al*., for The Australian Department of Agriculture, Fisheries and Forestry, 2010.)

The problem with the “solutions”

4. Use the “appropriate” biocidal antifouling coating

Problem No. 2. These coatings do not prevent the translocation of NIS, particularly in niche areas, since they require considerable water flow to work and niche areas are protected from the water flow.

The problem with the “solutions”

4. Use the “appropriate” biocidal antifouling coating

Problem No. 3. Macrofouling cannot be removed from soft coatings in the water without damage to coating and/or environment.

“…KEY POINT: [UNDERWATER HULL] CLEANING CAN REMOVE 30% TO 51% OF ONE ENTIRE COAT OF ANTIFOULING PAINT.”
(Mark Ingle, NAVSEA presentation June 2007.)

“…in-water cleaning can physically damage some anti-fouling coatings, shorten coating service life and release a pulse of biocide that can contaminate the environment.”
(New Zealand Ministry of Agriculture and Forestry, Draft Anti-fouling and In-water Cleaning Guidelines, October 2011.)

The problem with the “solutions”

4. Use the “appropriate” biocidal antifouling coating

Problem No. 4. Copper-based AF coatings develop “copper-tolerant” super NIS and therefore worsen the problem.

“Resistance to heavy metals is a potentially important trait for invasive marine species, facilitating their success in invading disturbed, natural communities. ”

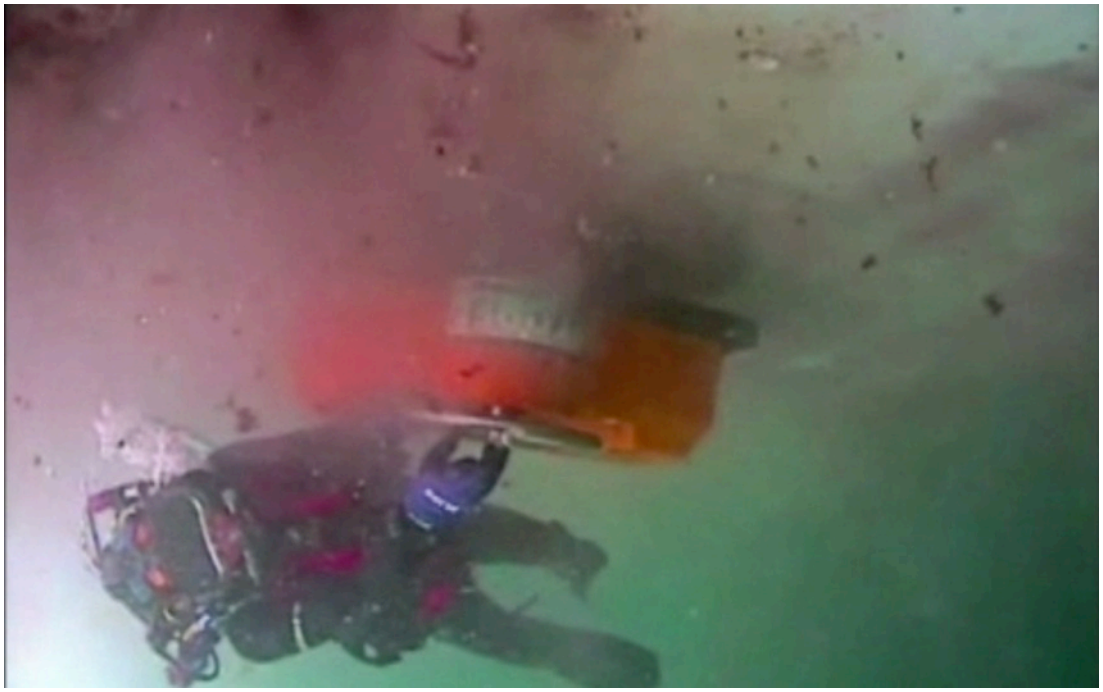
“An accumulation of heavy metals from antifouling paints has the potential to enhance the success of invaders.”

(Jamie Gonzalez, Leigh Johnson, Copper-Tolerant Hull-Borne Invasive Species: Further Analysis, 2008.)

The problem with the “solutions”

5. Underwater cleaning using a “reclaim” system

Problem No. 1. The coatings in general use are not suitable for removal of macrofouling in the water (see previous slides).



The problem with the “solutions”

5. Underwater cleaning using a “reclaim” system

Problem No. 2. “Reclaim” systems do not work.

“− In-water cleaning of hull or niche area surfaces coated in biocidal antifouling coatings should not be permissible because commercially available in-water cleaning technologies are currently not able to capture and contain all biological and paint waste released during the cleaning process.”

(Oliver Floerl et. al, Review of biosecurity and contaminant risks associated with in-water cleaning, 2010.)

The bleak picture…

- ✓ Hull-borne NIS constitute a problem that needs to be eliminated
- ✓ Current practices do not prevent the transport of NIS via ship hull fouling
- ✓ Current guidelines and proposed regulations do not offer an effective solution to the problem

The simple solution

1. Decide that the elimination of hull-borne NIS translocation is important/essential

The simple solution

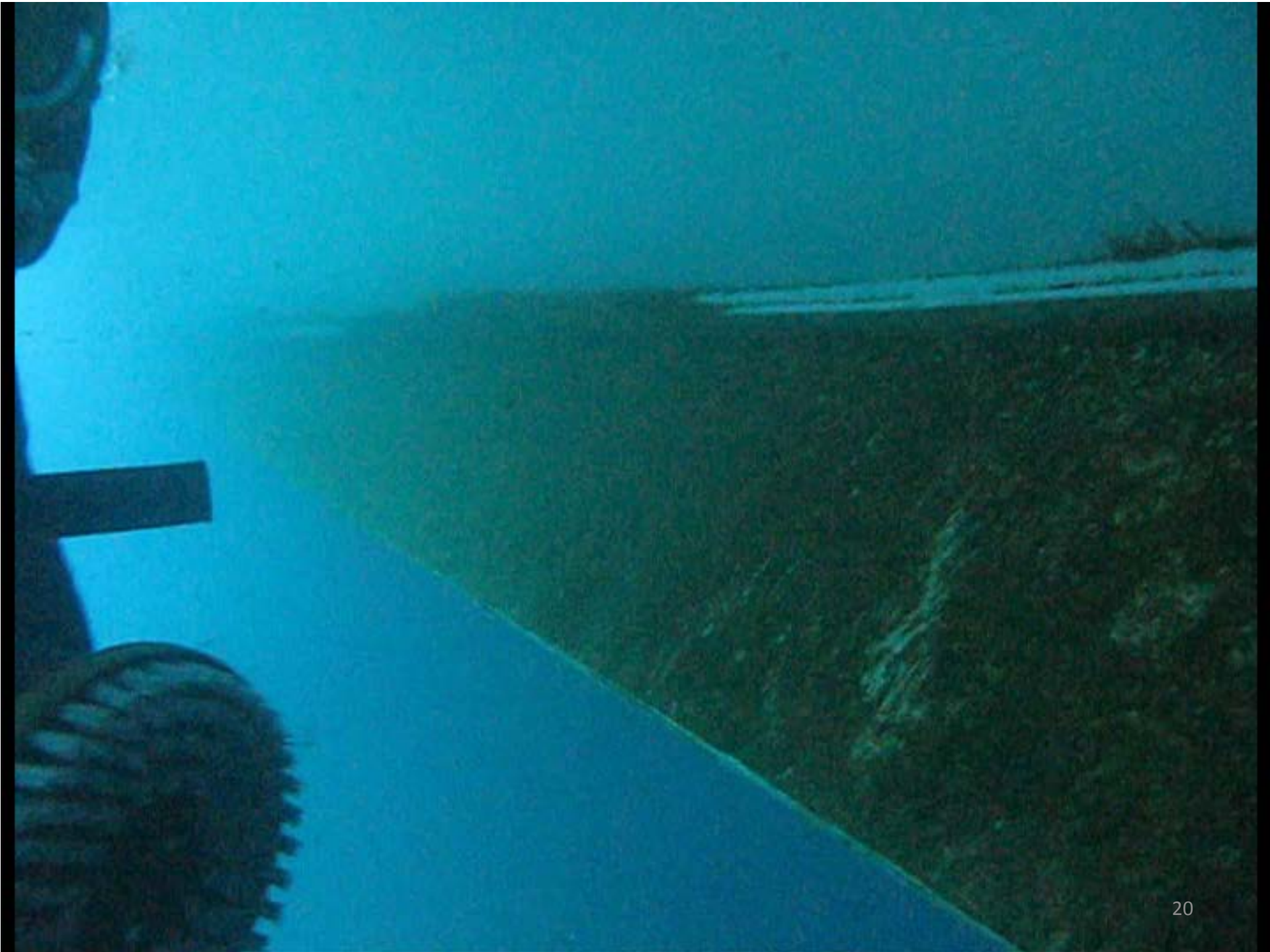
1. Decide that the elimination of hull-borne NIS translocation is important/essential
2. Use hard, non-toxic hull coating systems which can be cleaned as often as needed

The simple solution

1. Decide that the elimination of hull-borne NIS translocation is important/essential
2. Use hard, non-toxic hull coating systems which can be cleaned as often as needed
3. Thoroughly clean the hulls of ships before microfouling turns into macrofouling (also most cost-effective from a fuel savings point of view and helps reduce GHG emissions)

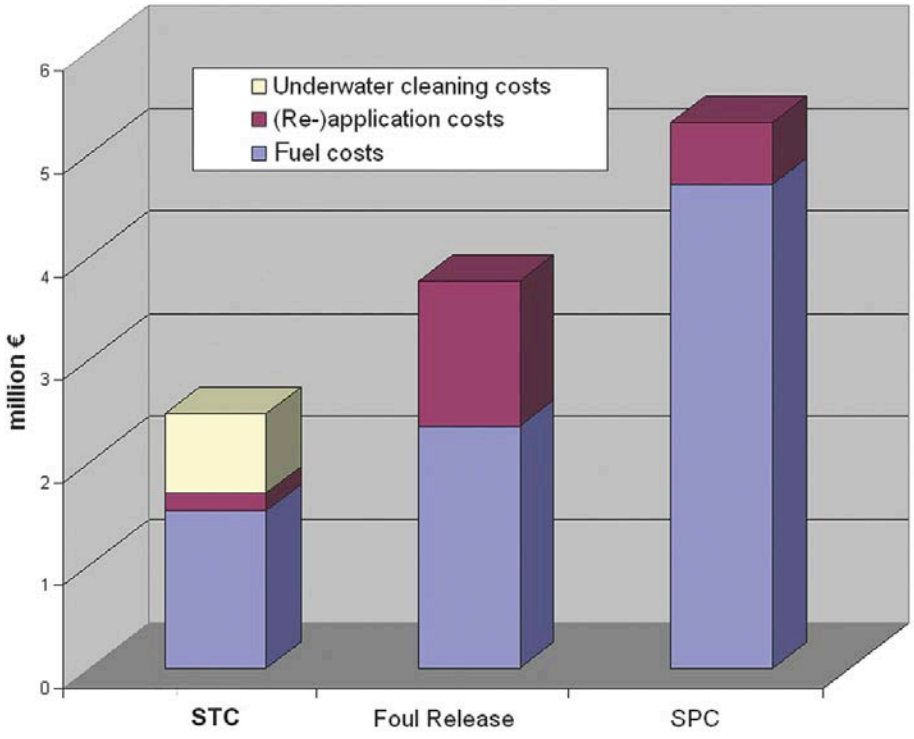
The simple solution

1. Decide that the elimination of hull-borne NIS translocation is important/essential
2. Use hard, non-toxic hull coating systems which can be cleaned as often as needed
3. Thoroughly clean the hulls of ships before microfouling turns into macrofouling (also most cost-effective from a fuel savings point of view and helps reduce GHG emissions)
4. Clean ships *before* they sail (then they will arrive at their destination with a clean hull)



The simple solution

1. This solution is economically very viable



Total ownership cost associated with different coating types.

The simple solution

1. This solution is economically very viable
2. It can be encouraged by ports by
   1. Offering incentives to ships arriving with clean hulls and non-toxic coating systems
   2. Penalizing ships arriving with macrofouling which could cause NIS invasion
   3. Make heavily fouled ships go to drydock for hull cleaning if they are to use the port

Requirements

1. Hard, long-lasting, non-toxic, fuel-efficient, cleanable coating
2. Routine in-water cleaning of the main hull and the niche areas, nooks and crannies

Benefits

1. Environmental
    1. Non-toxic
    2. Opens the door to eliminating hull-borne NIS
    3. Is also the most cost-effective approach to hull protection and biofouling control

Benefits

1. Economical
    1. Fuel savings
    2. Savings on drydocking time and frequency
    3. Savings on reapplication
    4. Cleaning niche areas is an excellent opportunity for inspection and condition based maintenance
    5. Saves environmental clean-up costs

How to get there

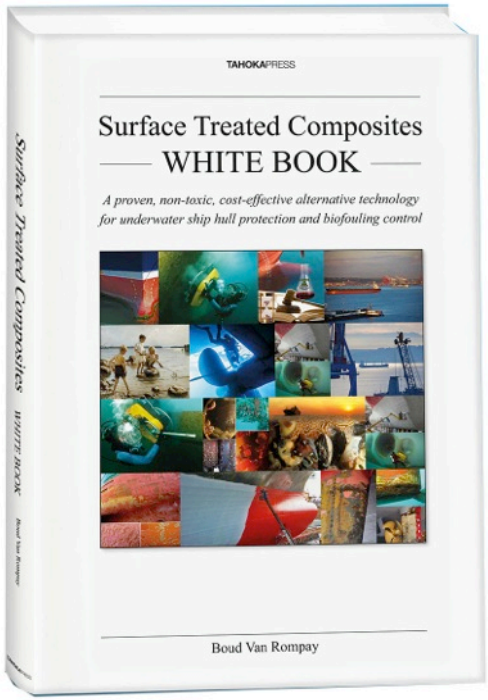
1. Current fleet mostly has AF coatings. Phase these out (they're on the way out anyway as they ruin the environment and are not very effective)
2. Gradually shift over to a long-lasting hard, cleanable coating
3. Clean ships before macrofouling develops
4. Clean ships before they sail if the hull is fouled after a lengthy stay in port
5. Include full cleaning of the niche areas
6. Develop faster and cheaper cleaning
7. Encourage the above by a system of penalties and rewards
    1. Discounted port fees for ships with hard coatings and clean hulls
    2. Force drydocking for cleaning on ships that come into port with macrofouling

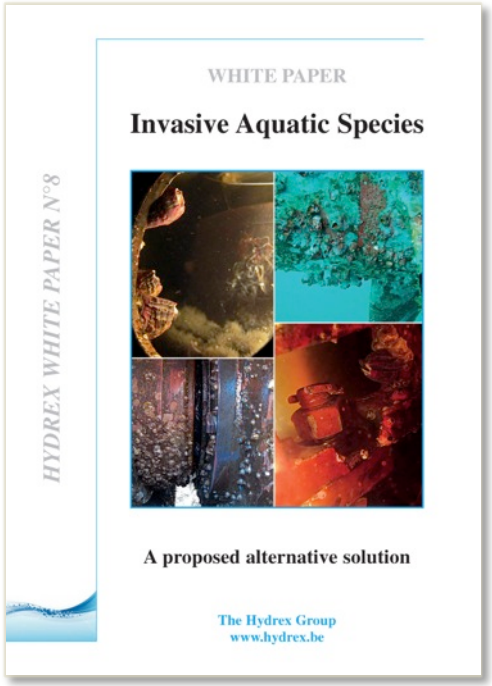
Research project

1. Disney Cruise Ships
2. Florida Institute of Technology (Geoff Swain & Team)

Questions?

For further information





www.shiphullperformance.org

www.hydrex.us

Thank You!

David Phillips

dphillips@hydrex.us