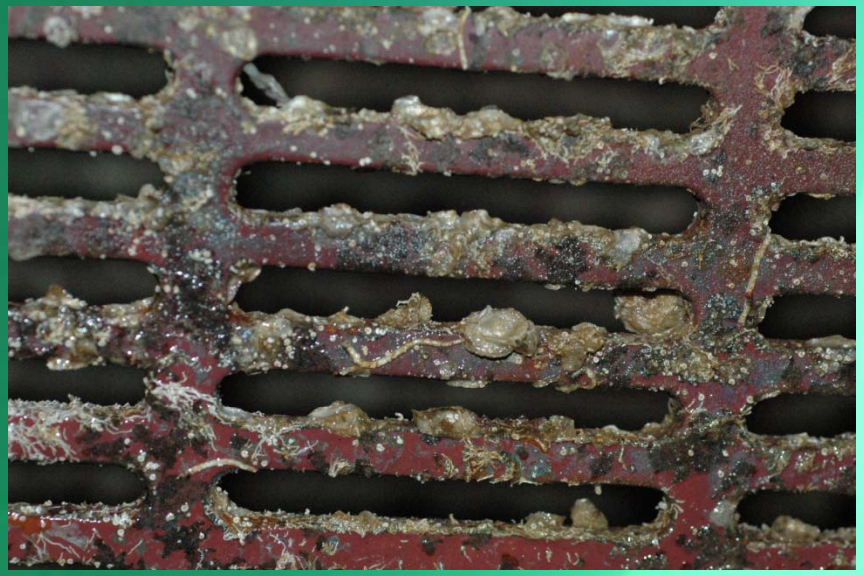
An Overview of the Hull Husbandry Practices and Fouling-Related Voyage Characteristics of California's Commercial Fleet

Chris Scianni
Marine Invasive Species Program
California State Lands Commission
Prevention First, October 20, 2010

Ship Biofouling in CA



Ship Biofouling in CA

2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

<u>Marine Invasive Species Act (2003)</u>
<u>Assembly Bill 433</u>

- Added PRC Section 71210.5
- Required CSLC to evaluate non-ballast water vessel vectors
  - Essentially fouling of vessel hulls, sea chests, gratings, propellers, etc.
  - In consultation with Technical Advisory Group
  - Prepare report on or before March 1, 2006

Ship Biofouling in CA

2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

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Fouling Technical Advisory Group

Information Sharing

Recommendation Development

Workshop
May 11, 2005

Meeting #2
August 3

Meeting #3
October 13

Meeting #4
December 19

Presentations/
Discussion

Information
sharing
inclusive
of recreational
fouling

Discussion:
Focus on
commercial
vessels

Fouling risk
factors

Commercial
vessel
maintenance
frameworks

Potential
management
frameworks for
CA:

Research?
Regulations?
Best Management
Practices?

Potential
Management
Frameworks

Pros?
Cons?

Areas of
Agreement

Ship Biofouling in CA

2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

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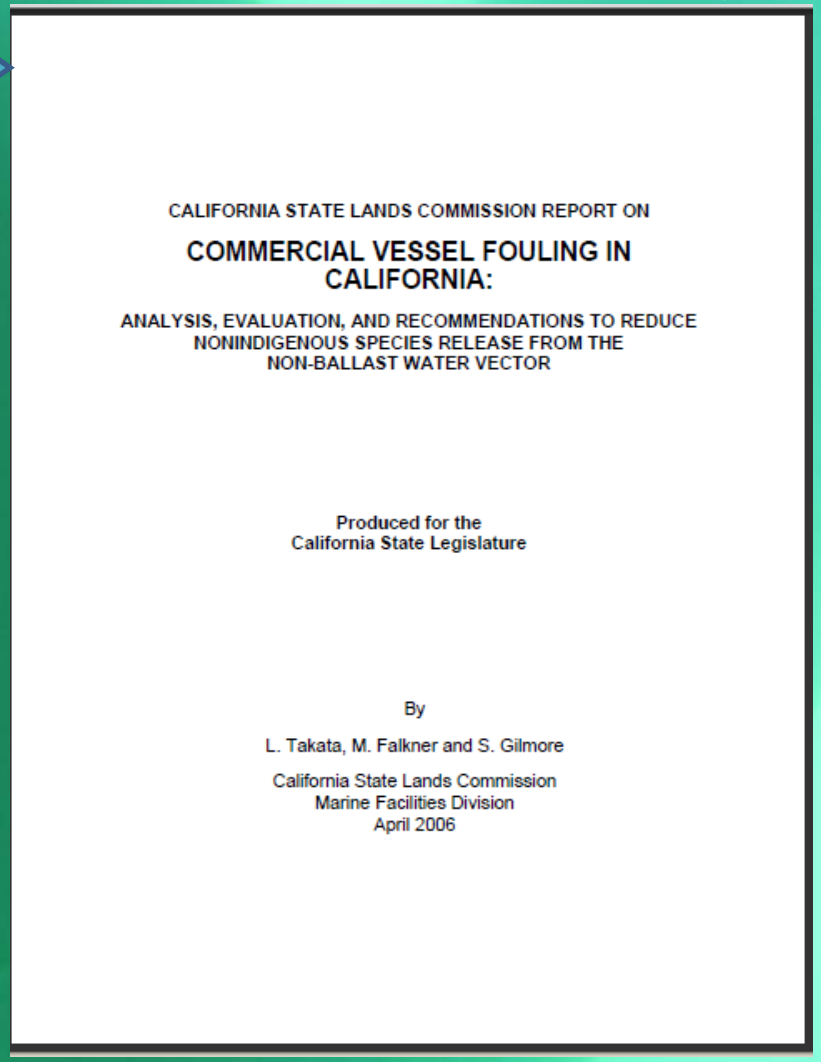
- **2006 Legislative Report**
- **Lack of data, especially for U.S. Pacific coast**
- **Limited information on hull husbandry practices**
- **Requested authority to fill information gaps**



CALIFORNIA STATE LANDS COMMISSION REPORT ON

COMMERCIAL VESSEL FOULING IN CALIFORNIA:

ANALYSIS, EVALUATION, AND RECOMMENDATIONS TO REDUCE NONINDIGENOUS SPECIES RELEASE FROM THE NON-BALLAST WATER VECTOR

Produced for the
California State Legislature

By

L. Takata, M. Falkner and S. Gilmore

California State Lands Commission
Marine Facilities Division
April 2006

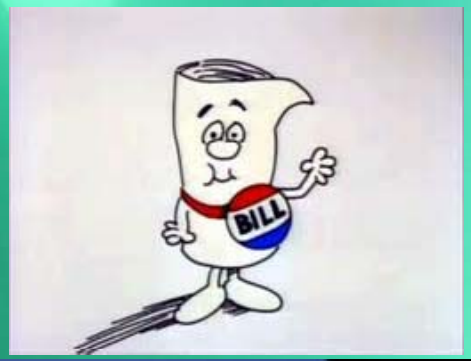
Ship Biofouling in CA

2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

MISA TAG Report

Assembly Bill 740 (2007)

- Defined "regular removal" of fouling organisms
- In-water cleaning must use best available technology economically achievable
- Expanded CSLC authority
  - Fill information gaps
    - Fund targeted research
    - Collect hull husbandry data
  - Develop and adopt regulations
    - By January 1, 2012
    - In consultation with TAG



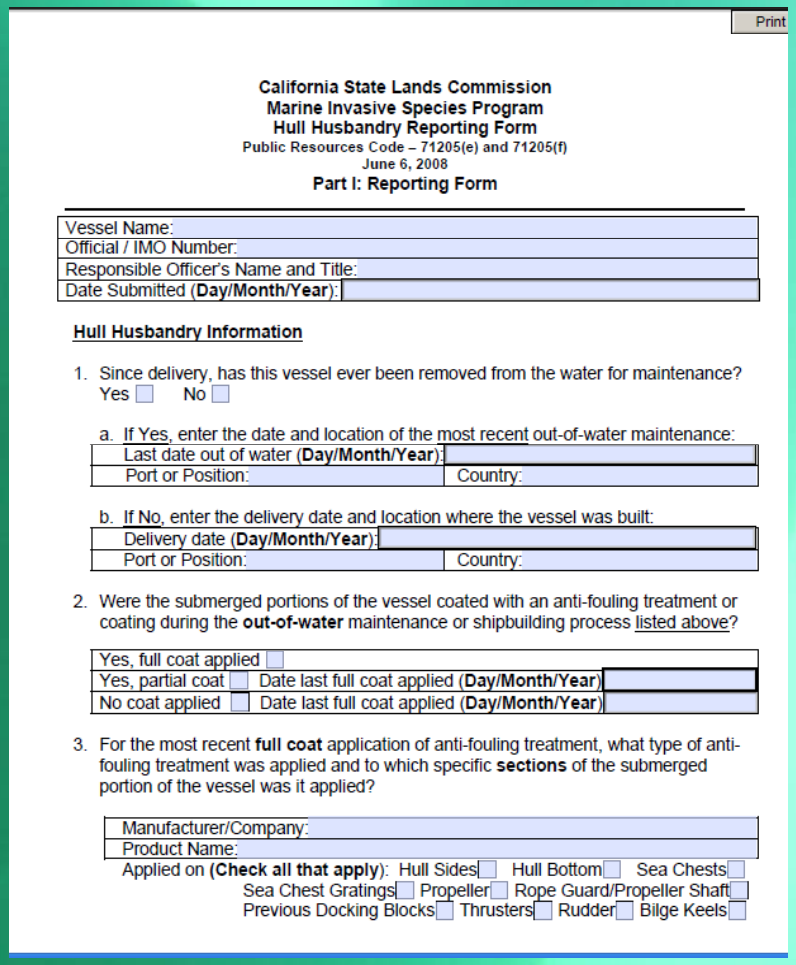
Ship Biofouling in CA

2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

MISA TAG Report

Hull Husbandry Reporting Form

- Developed in consultation with TAG (Dec 2007)
- Distributed to industry Jan 2008
- Mandatory annual submission
- Eleven questions
- Two sections:
  - Hull husbandry information
  - Voyage characteristics



Print

California State Lands Commission
Marine Invasive Species Program
Hull Husbandry Reporting Form
Public Resources Code – 71205(e) and 71205(f)
June 6, 2008
Part I: Reporting Form

Vessel Name:
Official / IMO Number:
Responsible Officer's Name and Title:
Date Submitted (**Day/Month/Year**):

Hull Husbandry Information

1. Since delivery, has this vessel ever been removed from the water for maintenance?
   Yes ☐ No ☐

   a. If Yes, enter the date and location of the most recent out-of-water maintenance:
   Last date out of water (**Day/Month/Year**):
   Port or Position: Country:

   b. If No, enter the delivery date and location where the vessel was built:
   Delivery date (**Day/Month/Year**):
   Port or Position: Country:

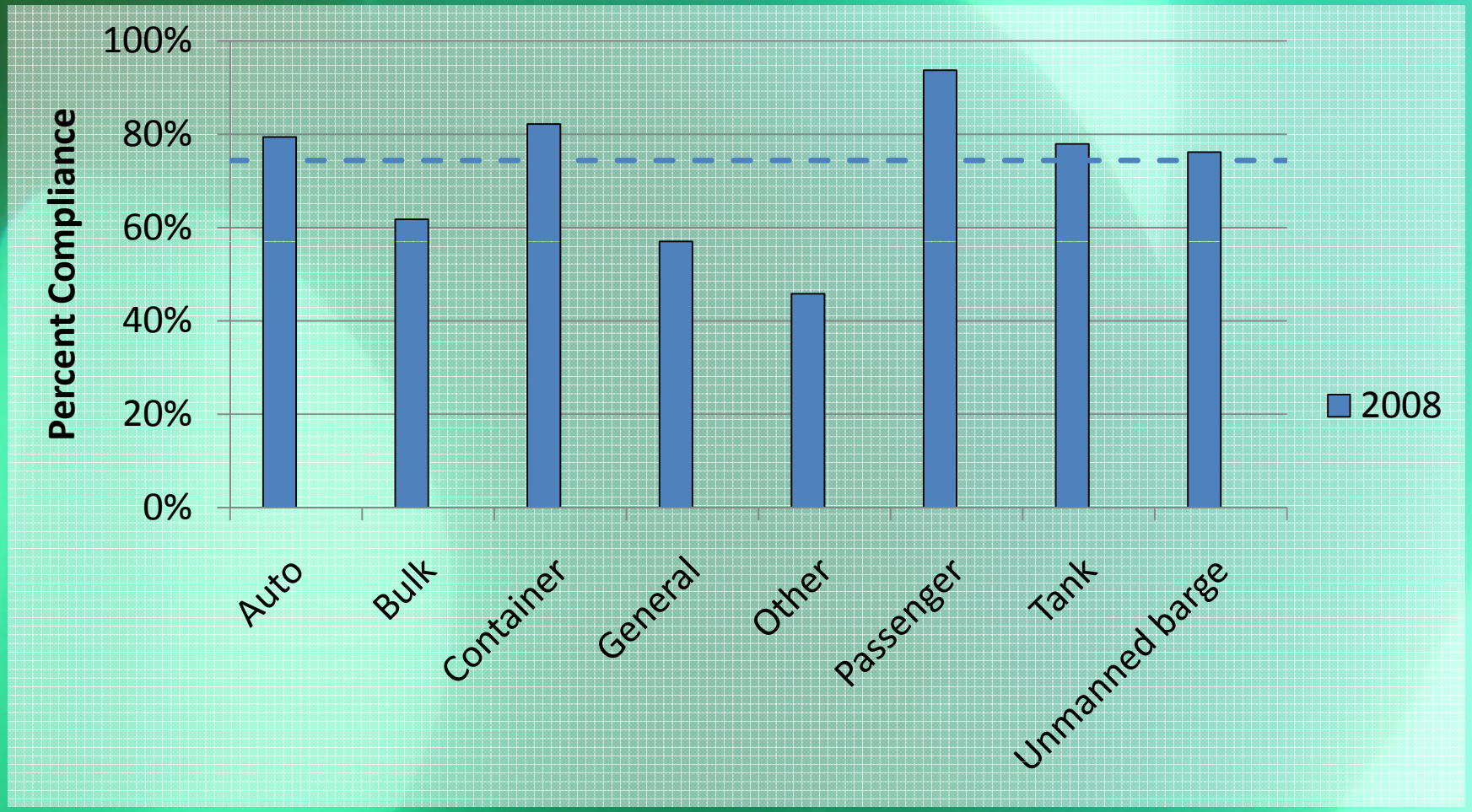
2. Were the submerged portions of the vessel coated with an anti-fouling treatment or coating during the **out-of-water** maintenance or shipbuilding process listed above?

   Yes, full coat applied ☐
   Yes, partial coat ☐ Date last full coat applied (**Day/Month/Year**)
   No coat applied ☐ Date last full coat applied (**Day/Month/Year**)

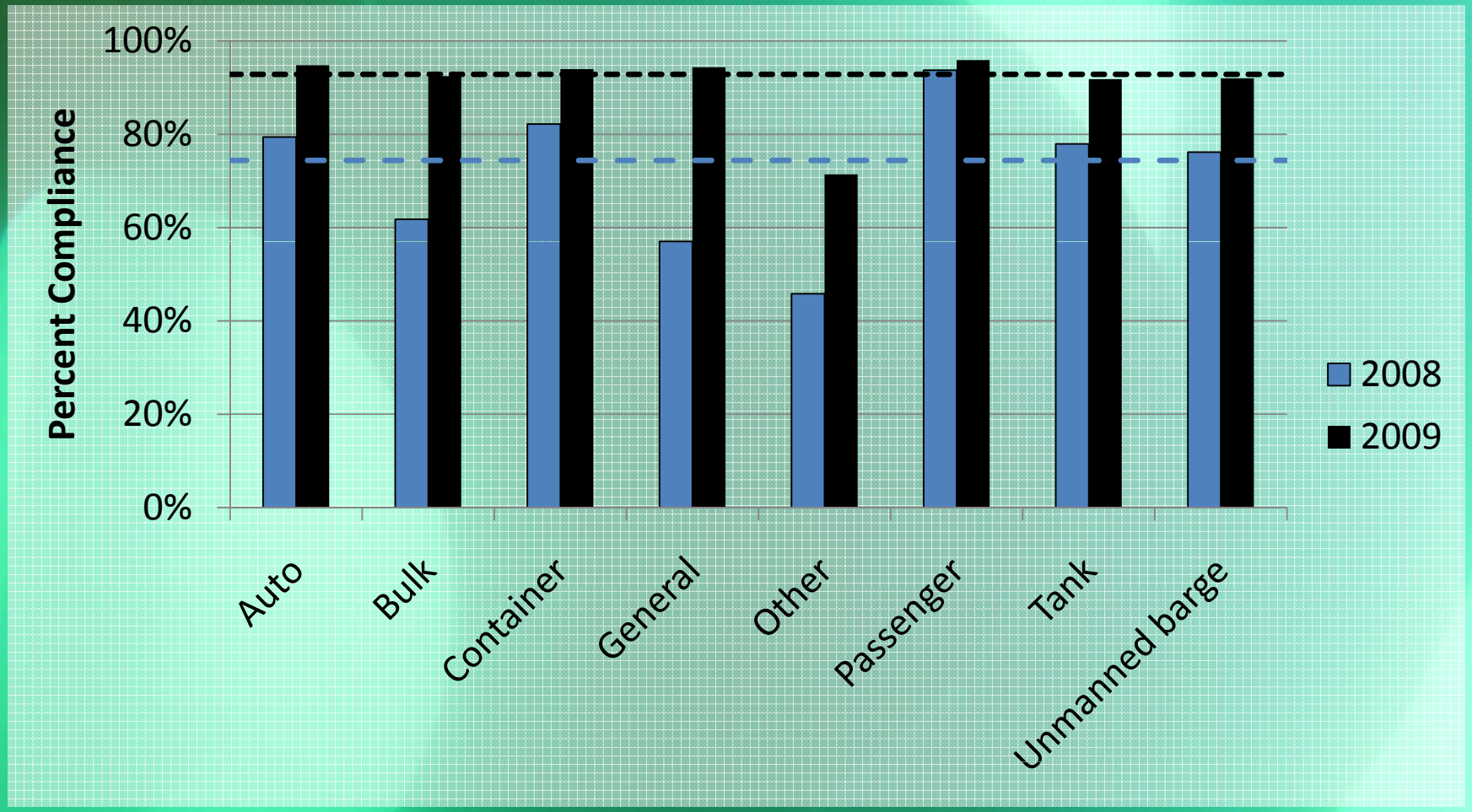
3. For the most recent **full coat** application of anti-fouling treatment, what type of anti-fouling treatment was applied and to which specific **sections** of the submerged portion of the vessel was it applied?

   Manufacturer/Company:
   Product Name:
   Applied on (**Check all that apply**): Hull Sides ☐ Hull Bottom ☐ Sea Chests ☐
   Sea Chest Gratings ☐ Propeller ☐ Rope Guard/Propeller Shaft ☐
   Previous Docking Blocks ☐ Thrusters ☐ Rudder ☐ Bilge Keels ☐

HHRF Submission Compliance

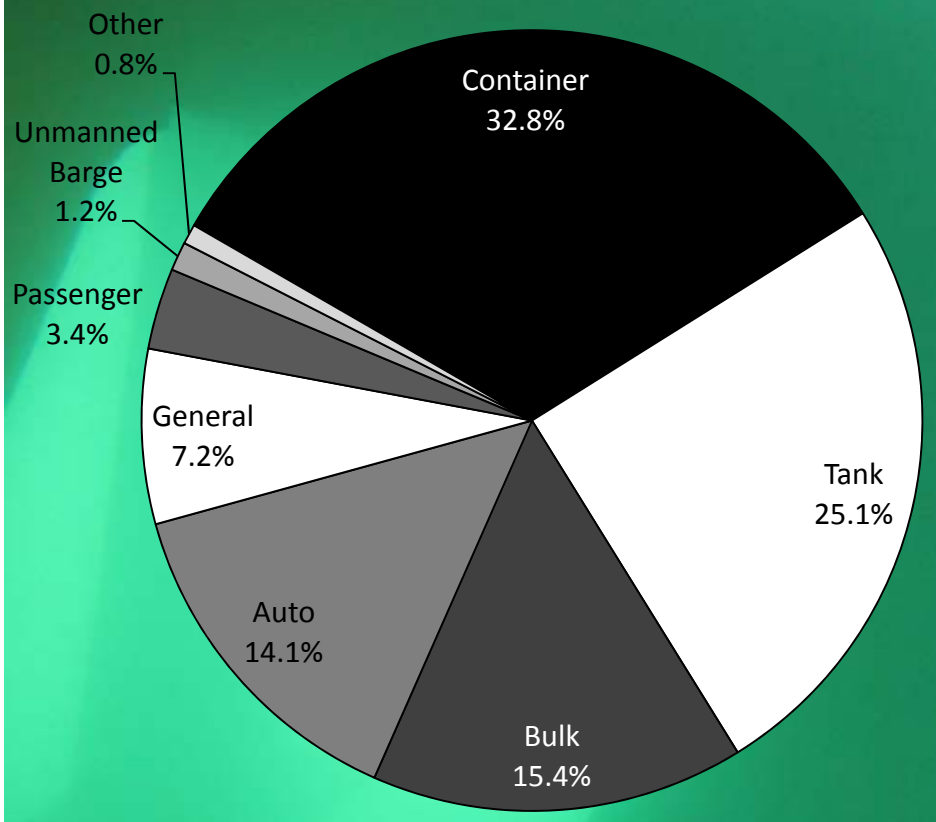


HHRF Submission Compliance

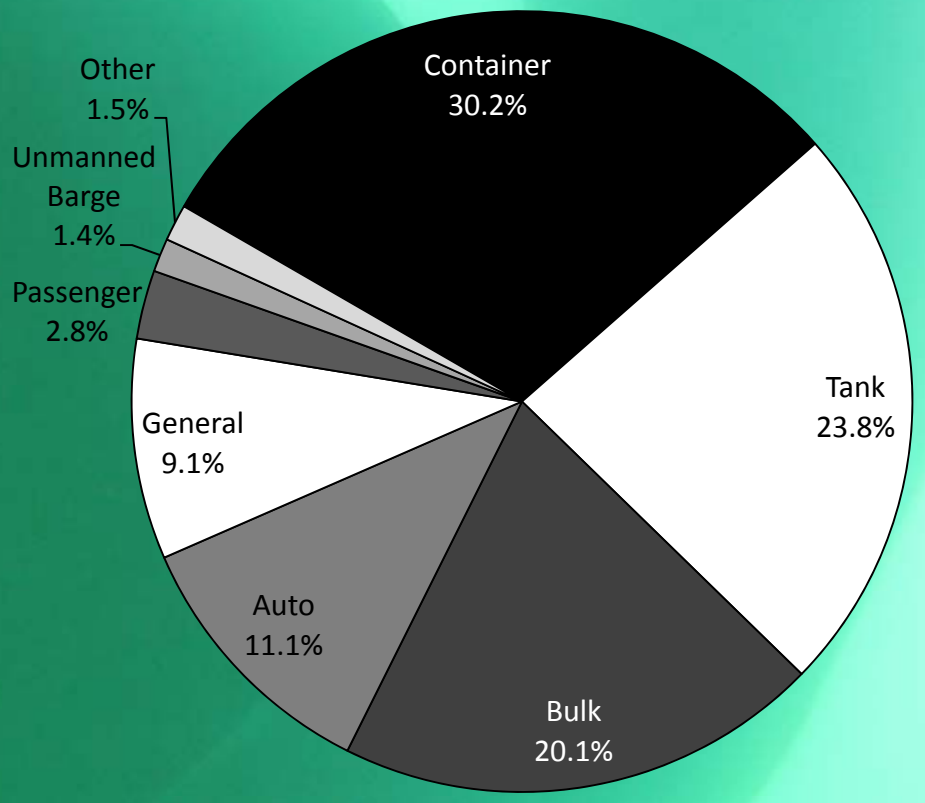


California Vessel Population

2008

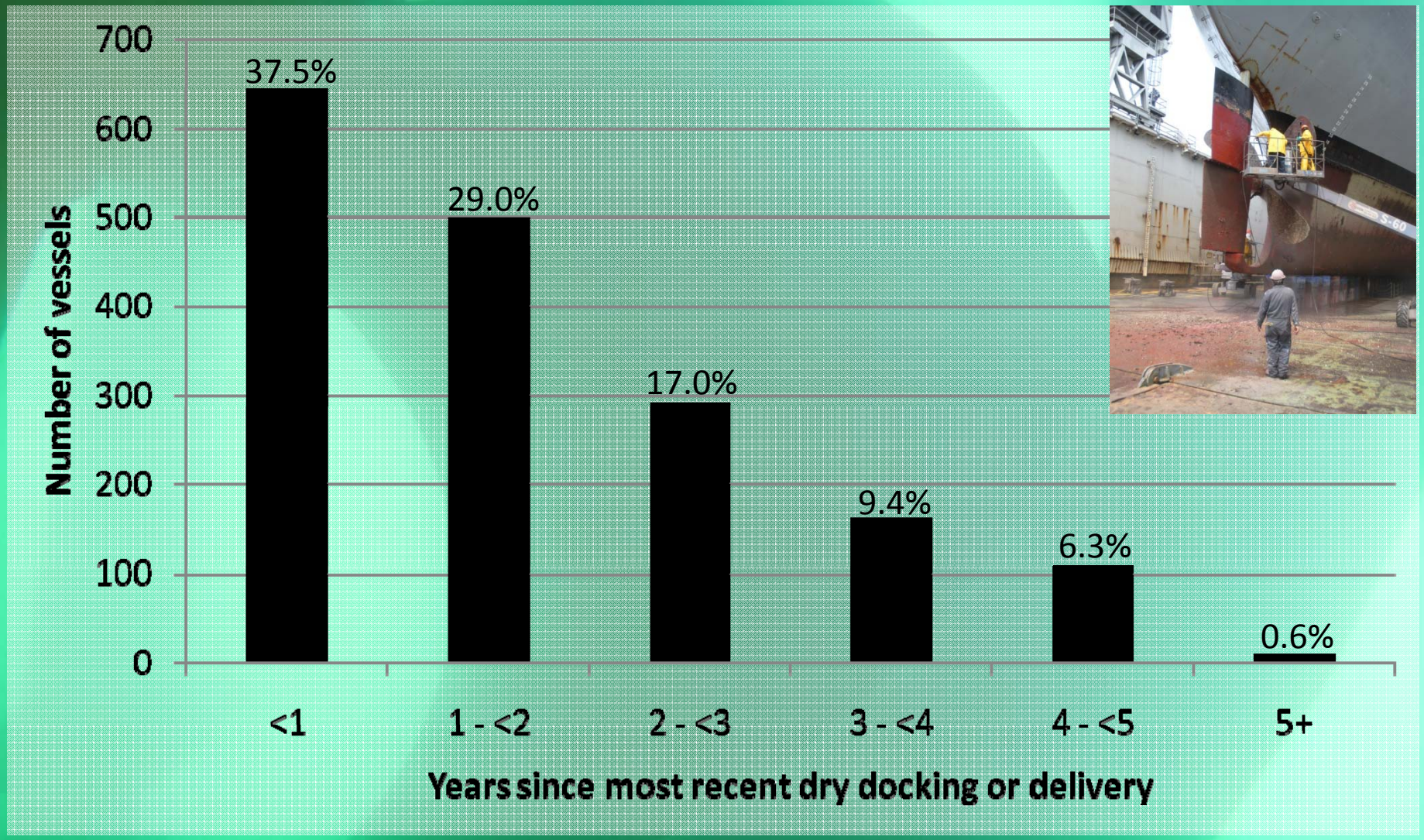


2009

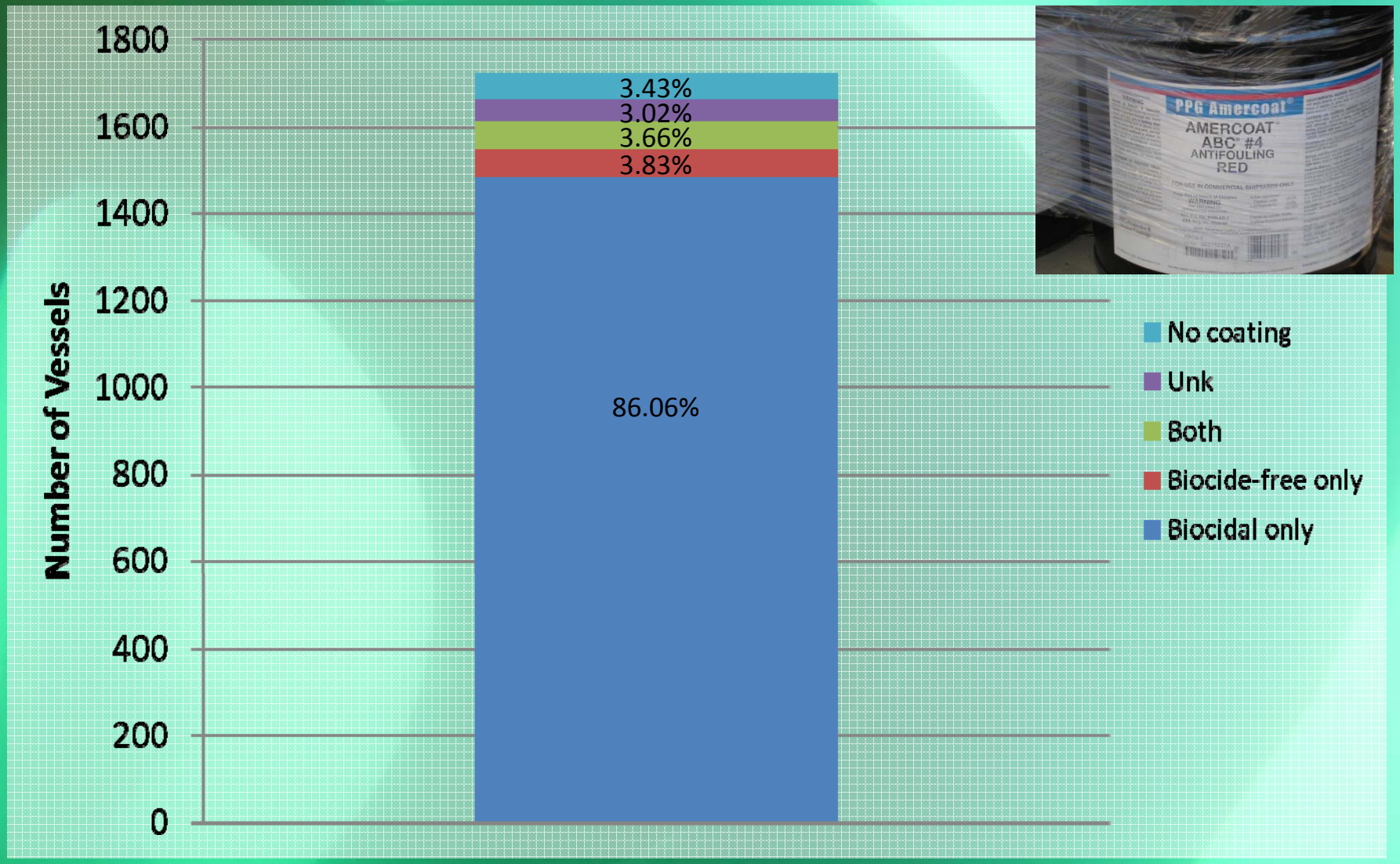


Hull Husbandry Information

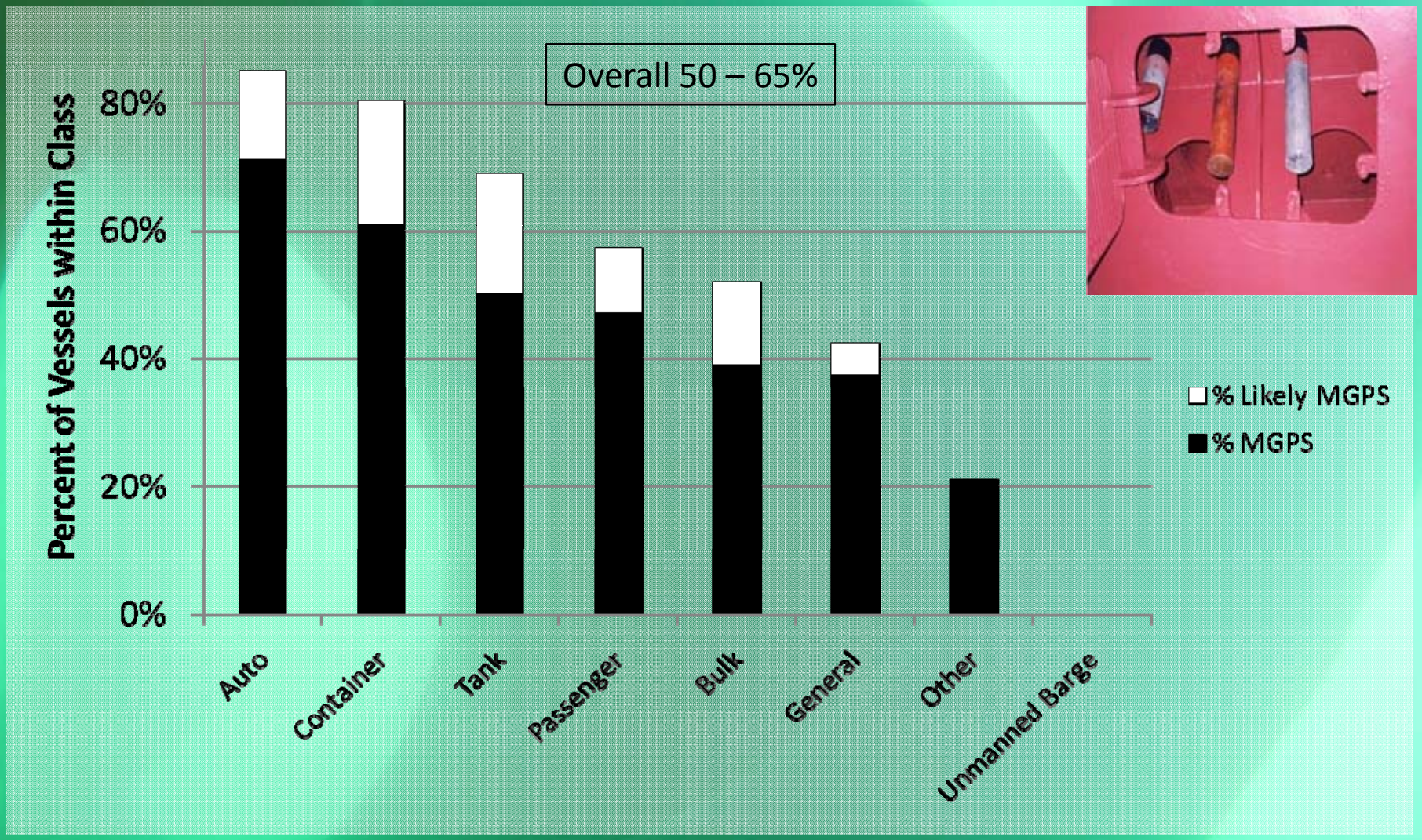
Vessels dry docked or delivered within each of the past 5 years



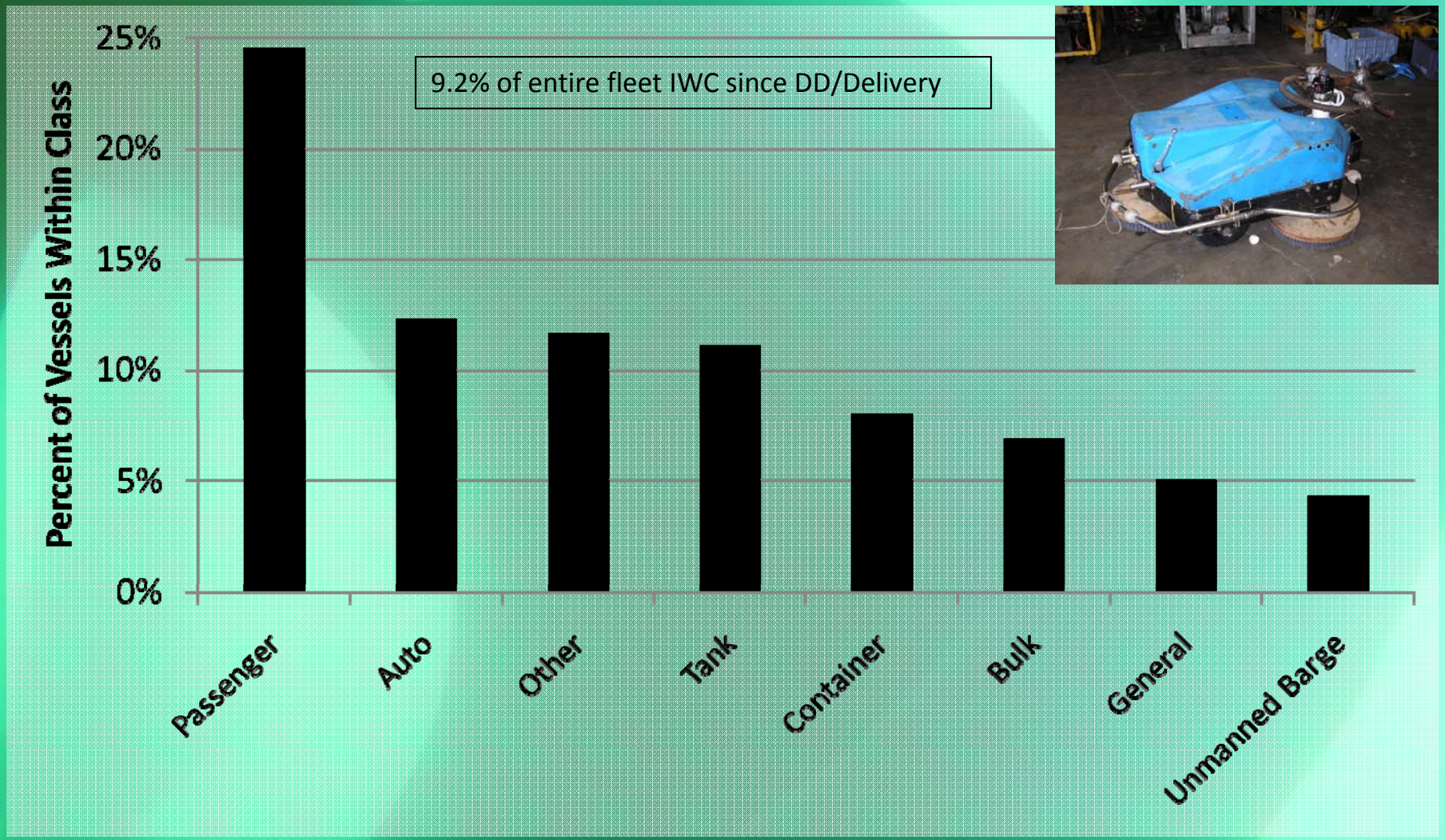
Per Ship Antifouling Coating Use



Percent of Vessels within Class with MGPS Installed



In-Water Cleaning by Vessel Class

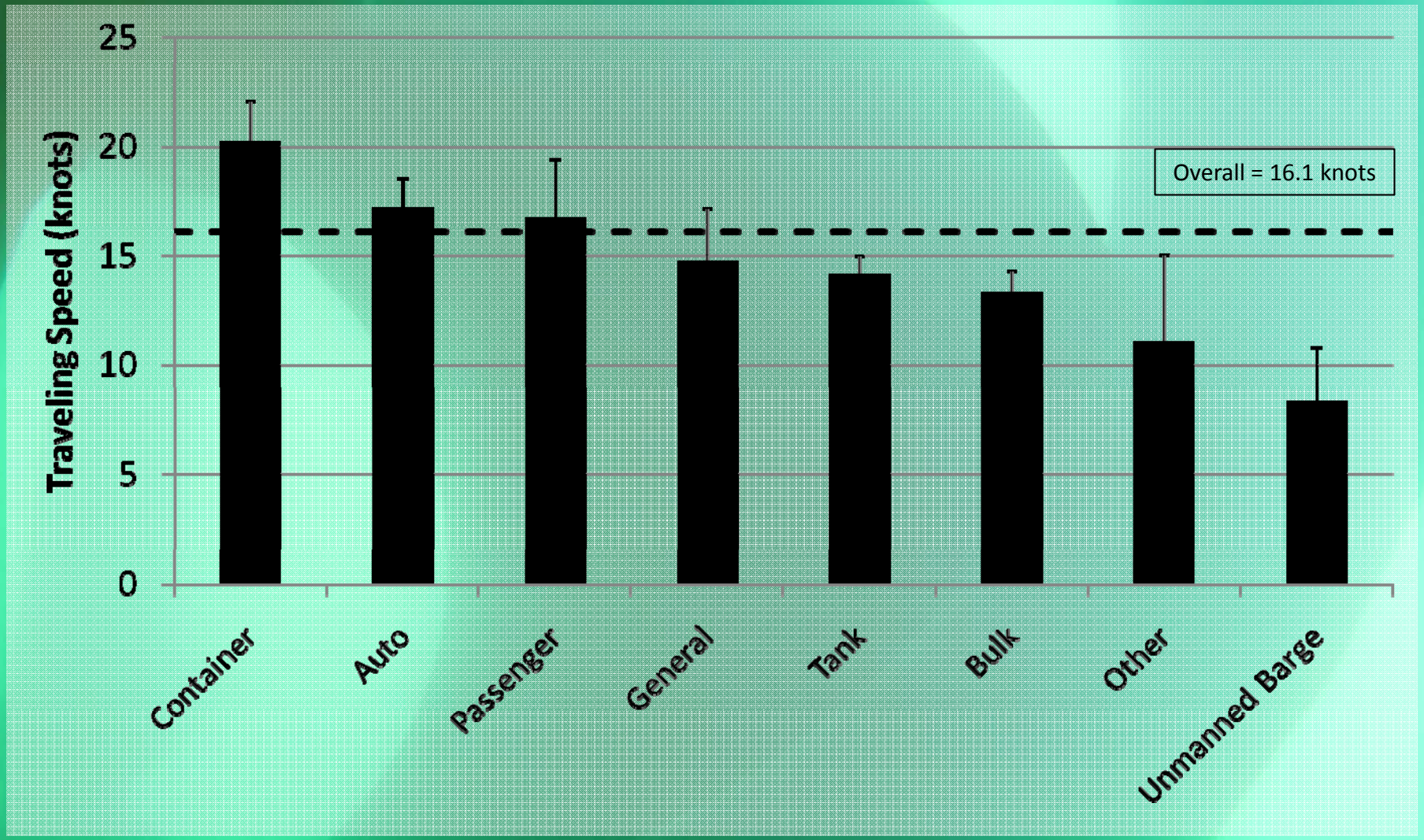


Hull Husbandry Practices Overview

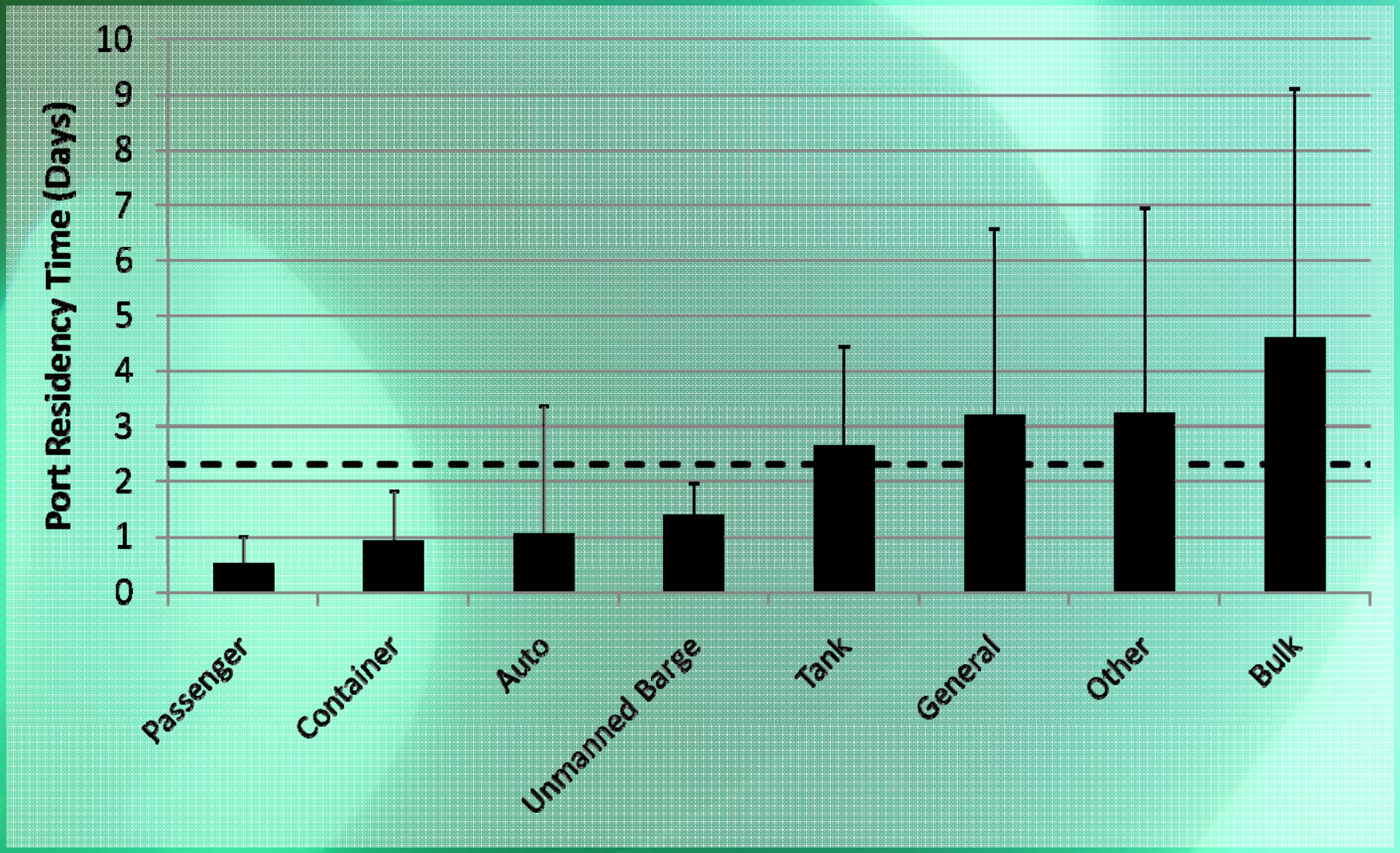
- Majority dry docked or delivered within past 2 years
- 86% of vessels used strictly biocidal AF
  - 7.5% used biocide-free AF
- 50-65% of vessels utilizing MGPS
- 10% cleaned IW since DD/Delivery
  - Including 25% of Passenger vessels
  - 6.54% were cleaned in CA waters

Voyage Characteristics

Mean Traveling Speed (knots)



Mean Port Residency Time (days)

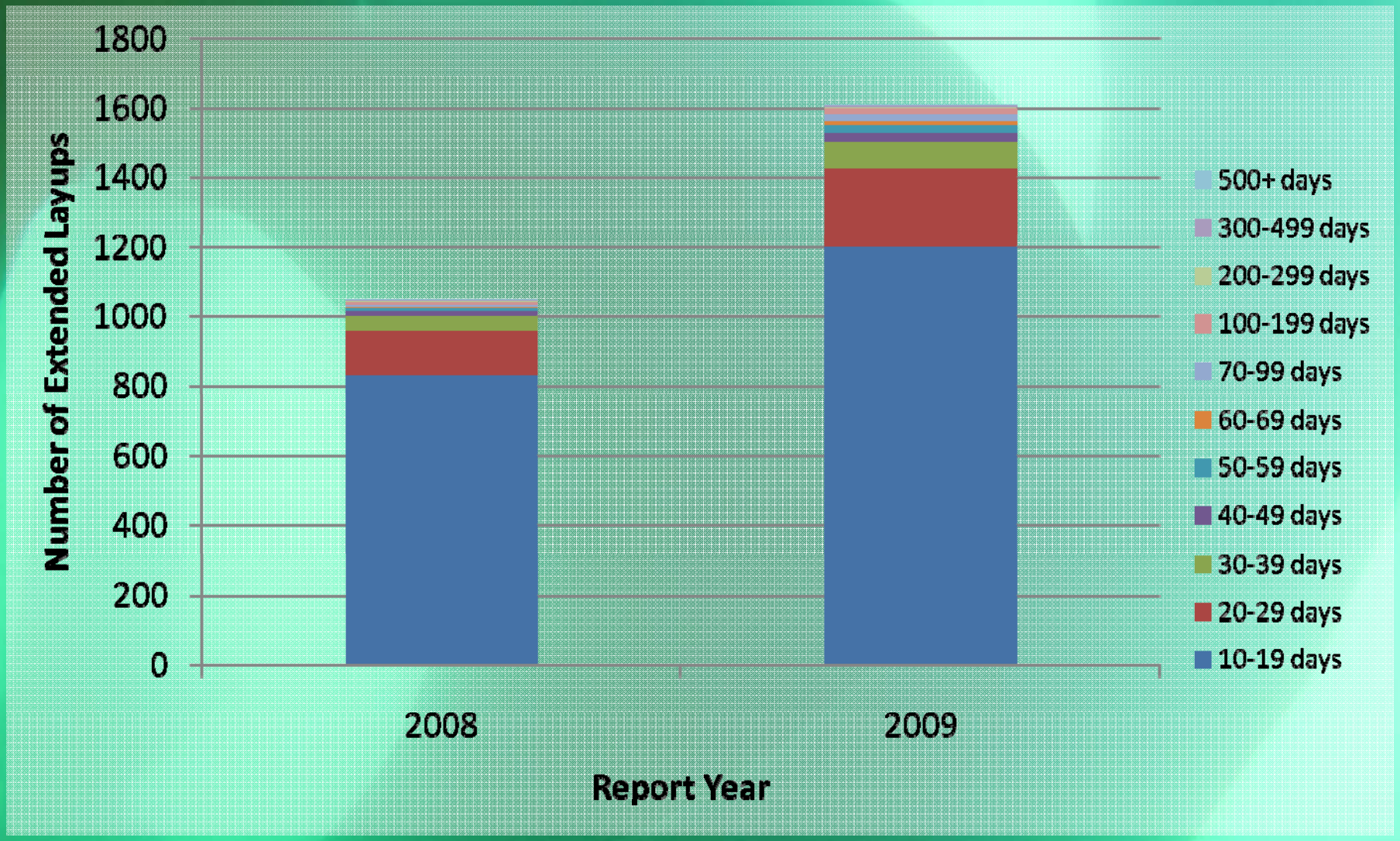


Traveling Speed and Port Residency

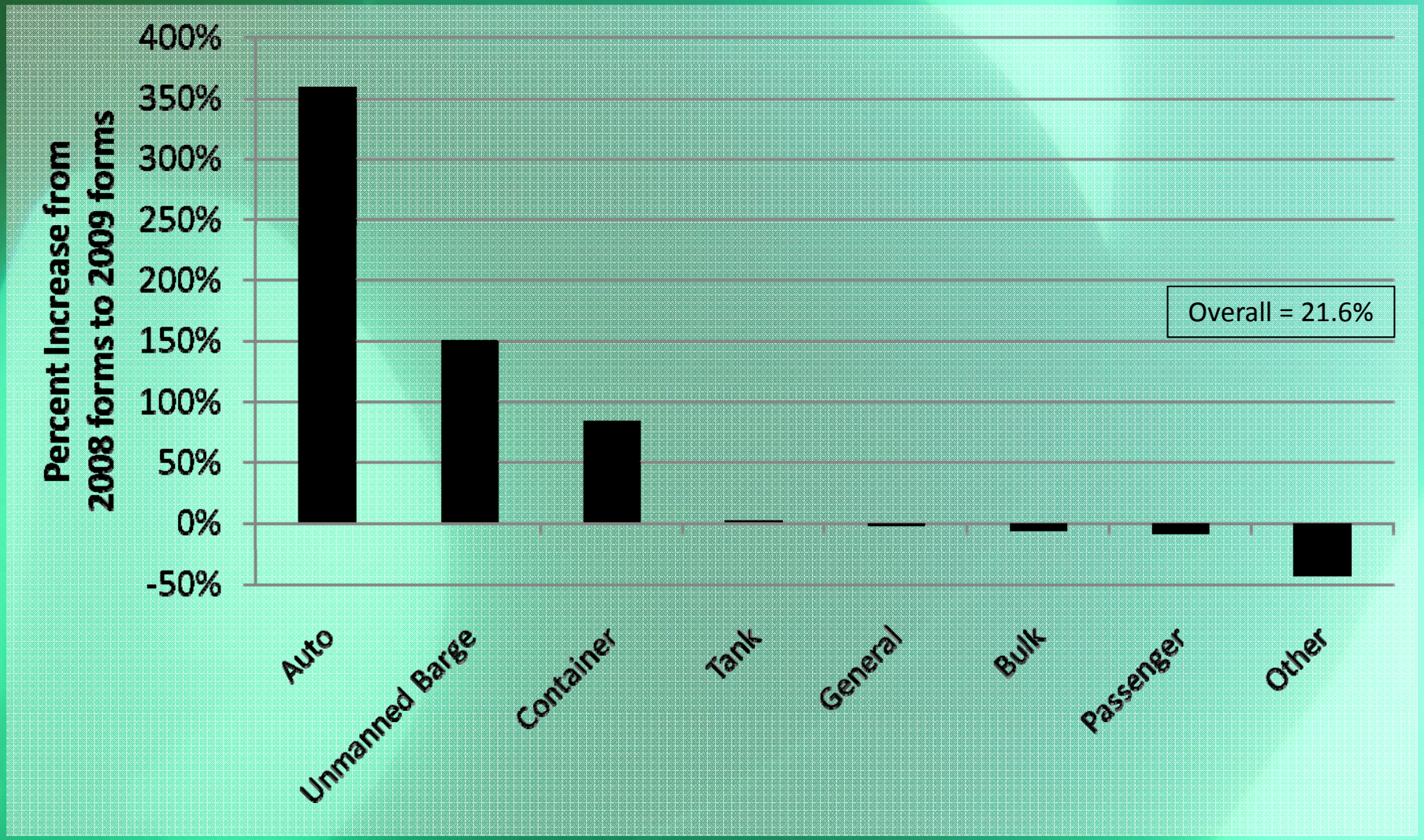
- Auto, Container, & Passenger vessels all exhibited characteristics thought to result in lower potential for fouling accumulation
  - Travel at elevated speeds (16.8 knots and greater)
  - Short port residency times (average 1.06 days or shorter)
- Bulkers, and 'Other' vessels all exhibited characteristics thought to result in greater potential for fouling accumulation
  - Travel at slower speeds (averaged 13.3 knots or slower)
  - Long port residency times (average 3.2 days or greater)

Floerl and Coutts (2009)
Port of Singapore, May 2009. Images: A. Coutts, May 2009

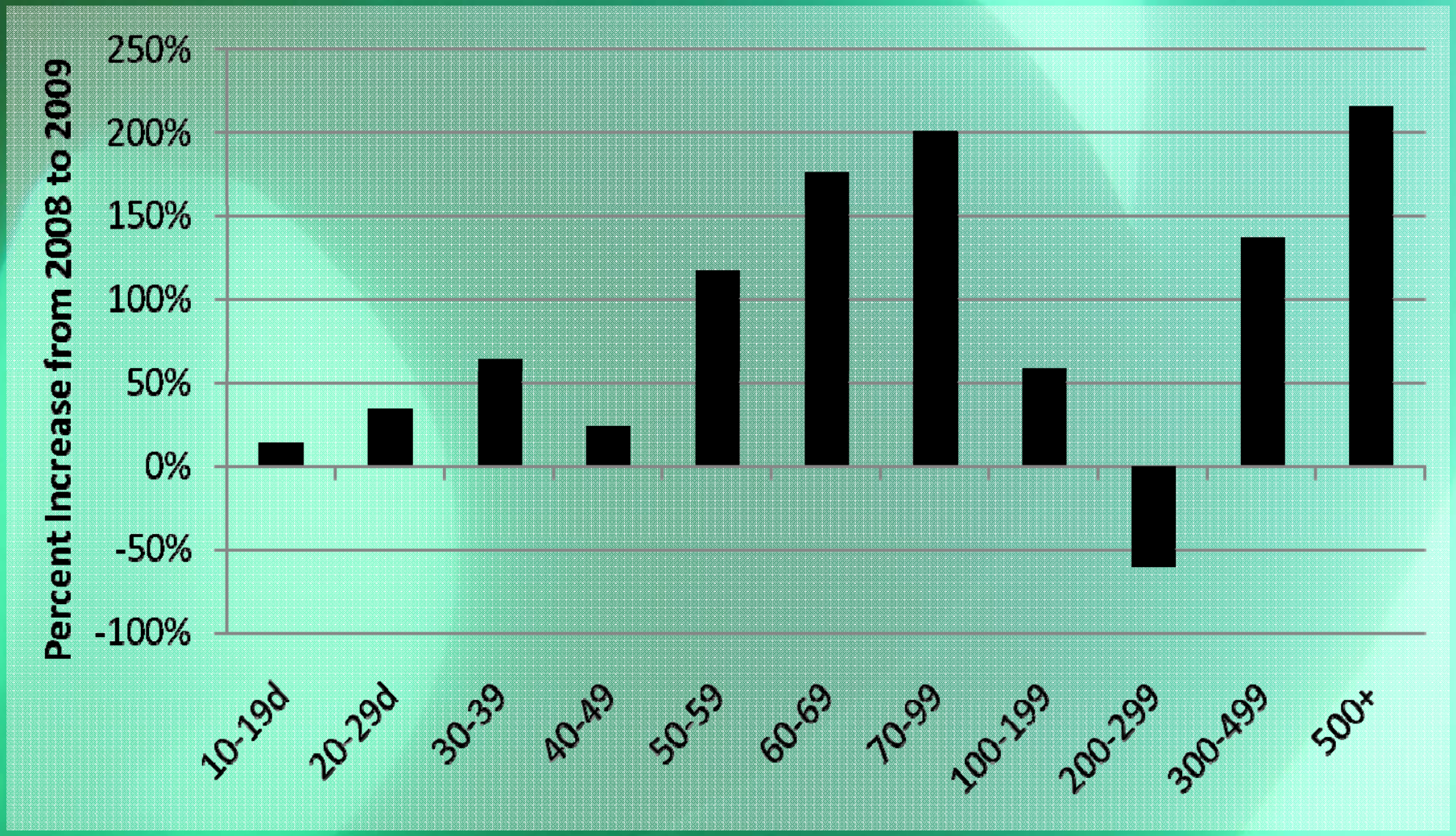
Total Number of Extended Layups by Duration



Percent Increase in Per Capita Extended (10+ day) Layups



Percent Increase in Per Capita Layups of Specific Durations Reported in 2008 and 2009



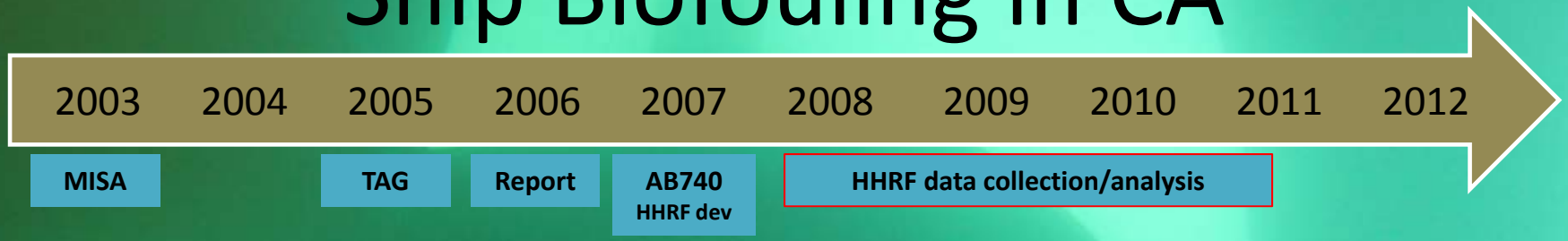
Extended Layups Overview

- Large increase in the total number of 10+ day layups
  - 21.6% on per capita basis
  - Most pronounced in Auto Carriers (360% increase), Unmanned Barges (150%), Container Vessels (84%)
- Large increase in layups of various durations
  - Most pronounced in 500+ day, 70-99 day, and 60-69 day layups

What the Hull is Going on With CA Fleet?

- Majority of fleet recently (2-3 years) dry docked or delivered (i.e. young AF coatings)
- Speeds and port residency times suggest potential gradient of perceived risk of fouling accumulation
- Large increases in number and duration of extended layups
  - Especially for Auto, Container vessels, Unmanned Barges

Ship Biofouling in CA



Ship Biofouling in CA

2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

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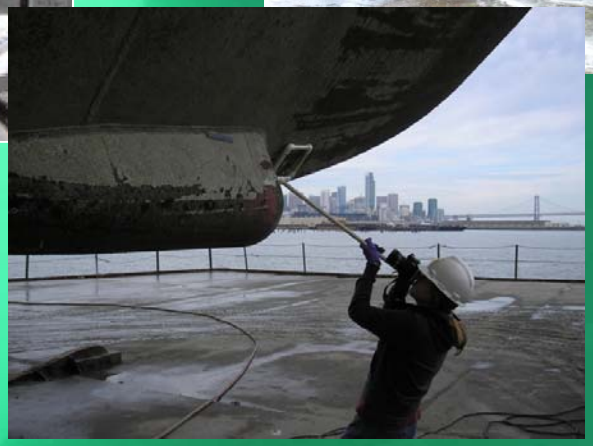
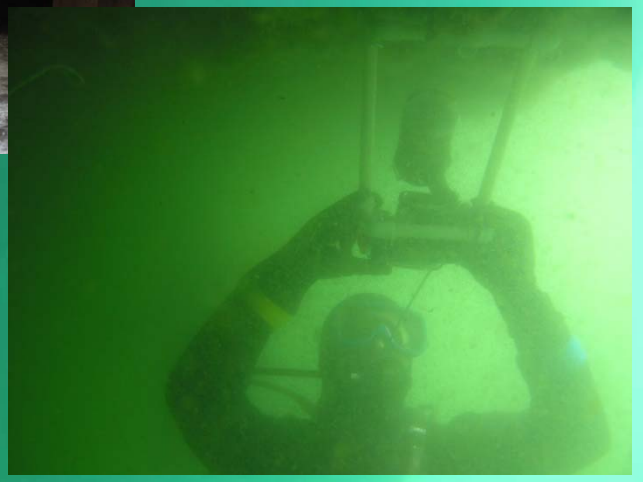
AB740
HHRF dev

HHRF data collection/analysis

Aquatic Bioinvasions Research and Policy Institute – Research





Ship Biofouling in CA

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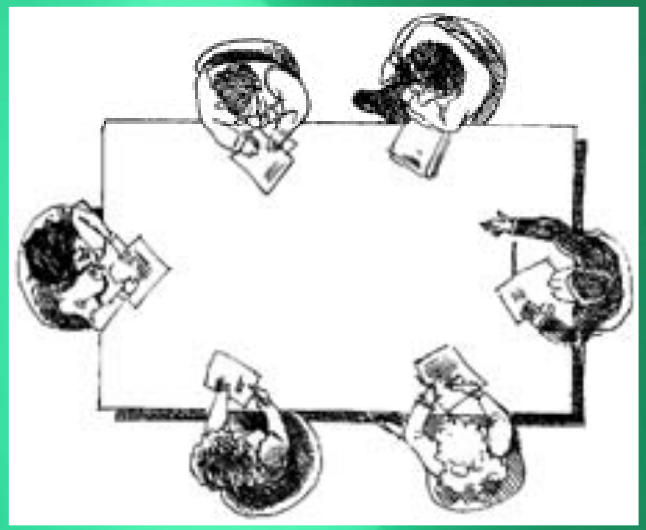

Ship Biofouling in CA

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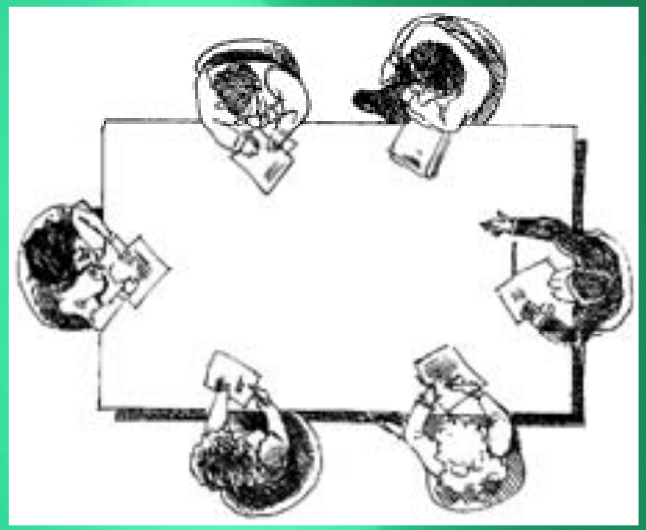
Technical Advisory Group

OAL Rulemaking



California Code of Regulations

Thank You

For more information:
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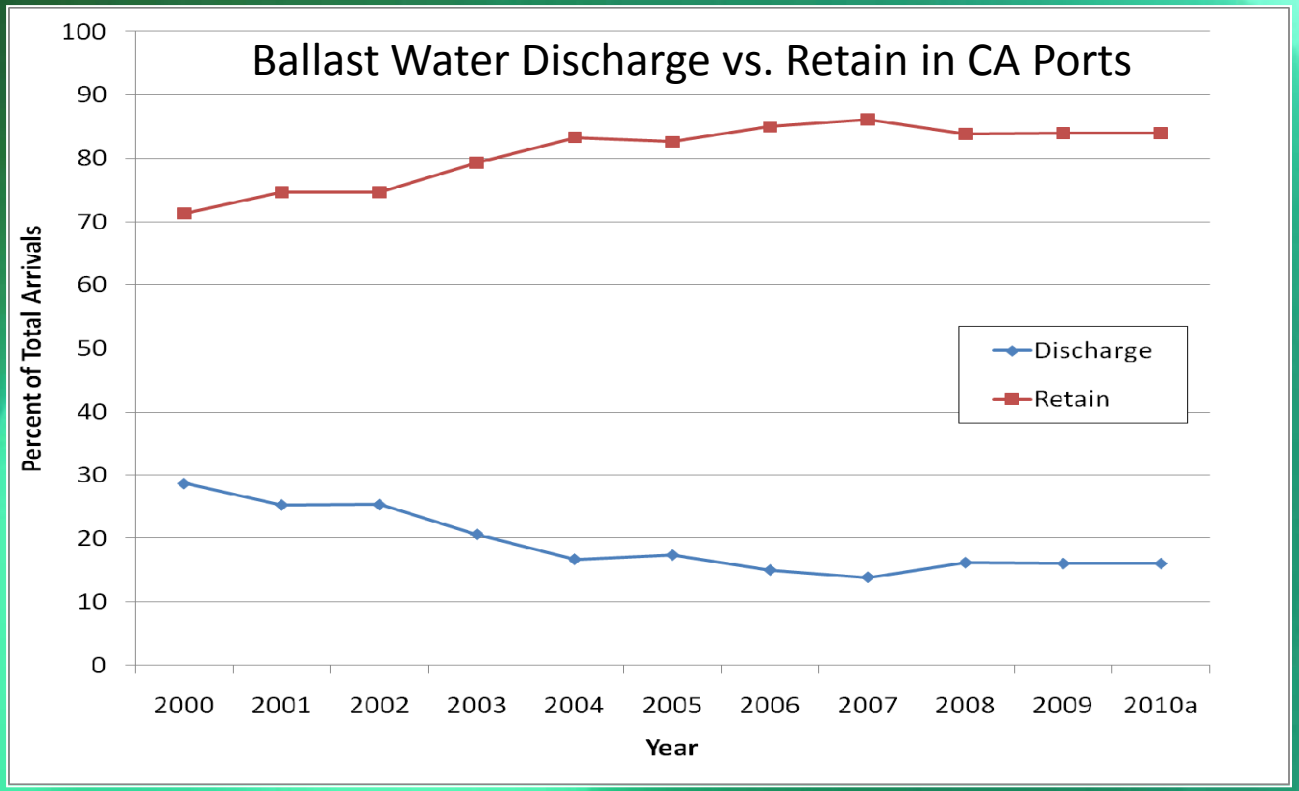
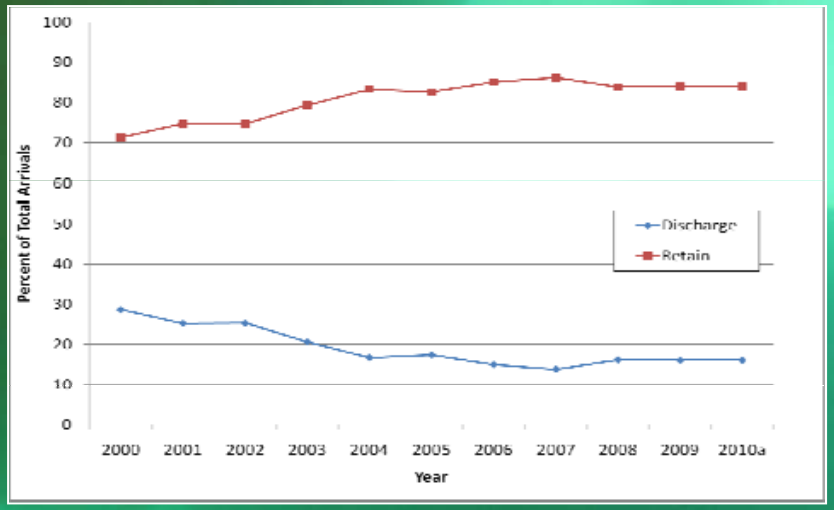
Maurya.falkner@slc.ca.gov
www.slc.ca.gov


Ballast Water Discharge vs. Retain in CA Ports
Percent of Total Arrivals
100
90
80
70
60
50
40
30
20
10
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010a
Year
Discharge
Retain

SAFE
RISK
SAFE


100
90
80
70
60
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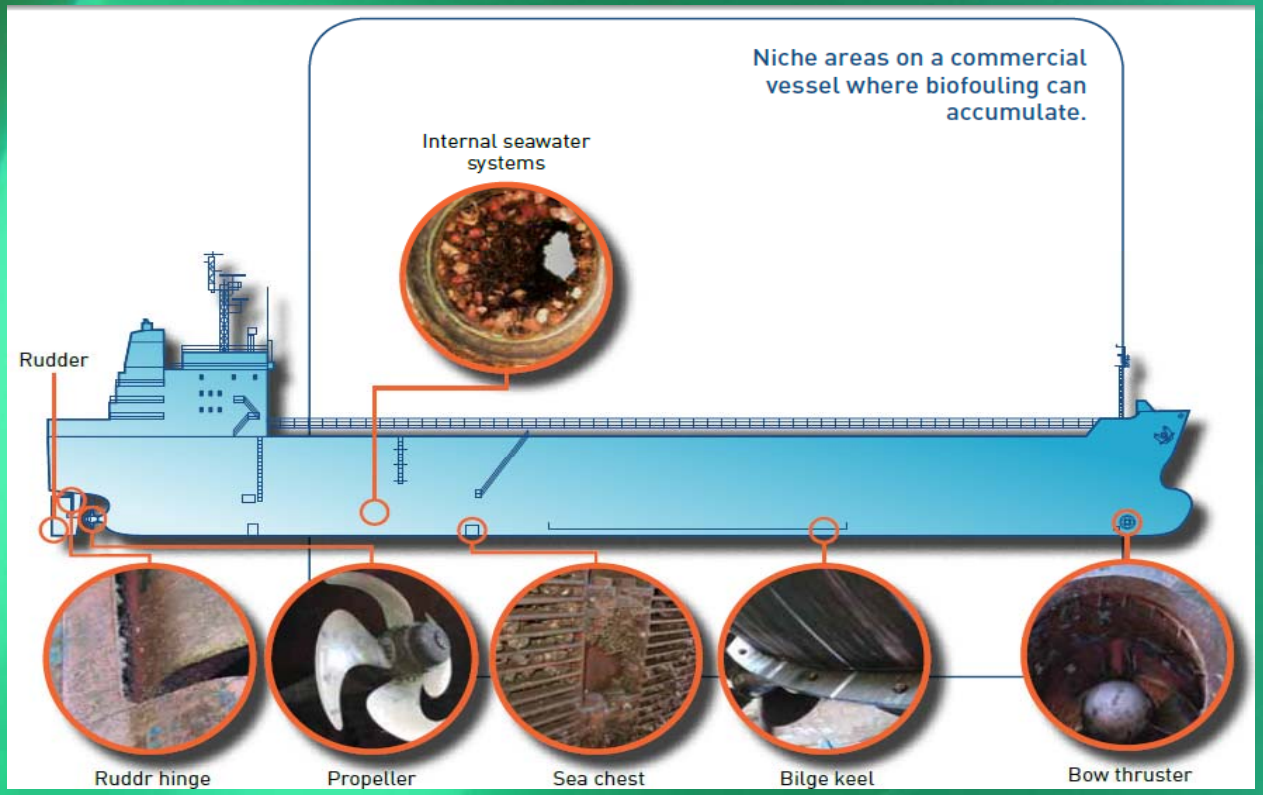
40
30
20
10
0
Percent of Total Arrivals
Discharge
Retain
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010a
Year

SAFE
RISK
SAFE


Niche areas on a commercial vessel where biofouling can accumulate.
Internal seawater systems
Rudder
Ruddr hinge
Propeller
Sea chest
Bilge keel
Bow thruster

RISK
RISK
RISK