

# It's the Economy, Stupid:

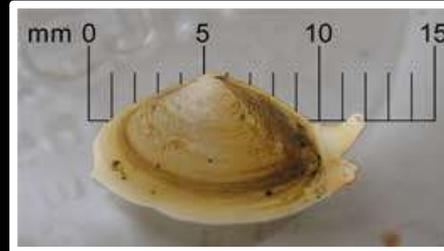
How the Great Recession May Increase the Risk of Shipping – Mediated Introductions of Nonindigenous Species into the San Francisco Bay-Delta



Chris Scianni,  
Raya Nedelcheva, Christopher Brown,  
Jonathan Thompson, Nicole Dobroski

CSLC Marine Invasive Species Program  
Bay-Delta Science Conference  
Sacramento, CA - October 28, 2014

# Nonindigenous Species (NIS)



- Impacts
  - Environmental, Economic, Human Health

**\$120,000,000,000** in losses and damages per year in U.S.

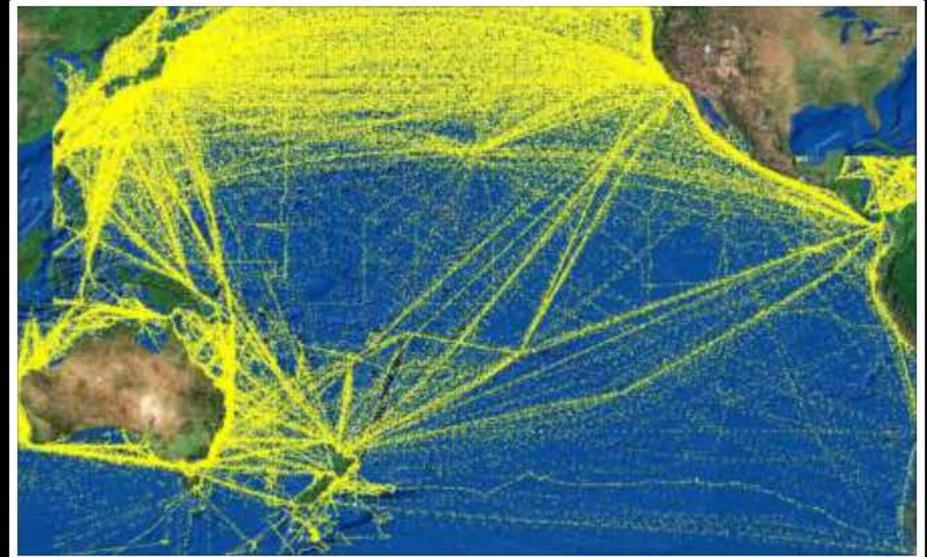
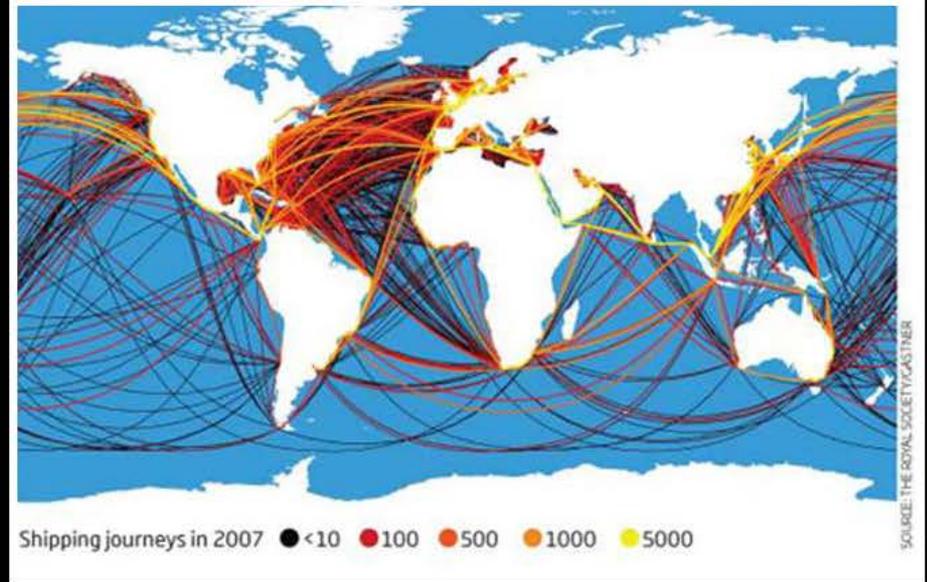
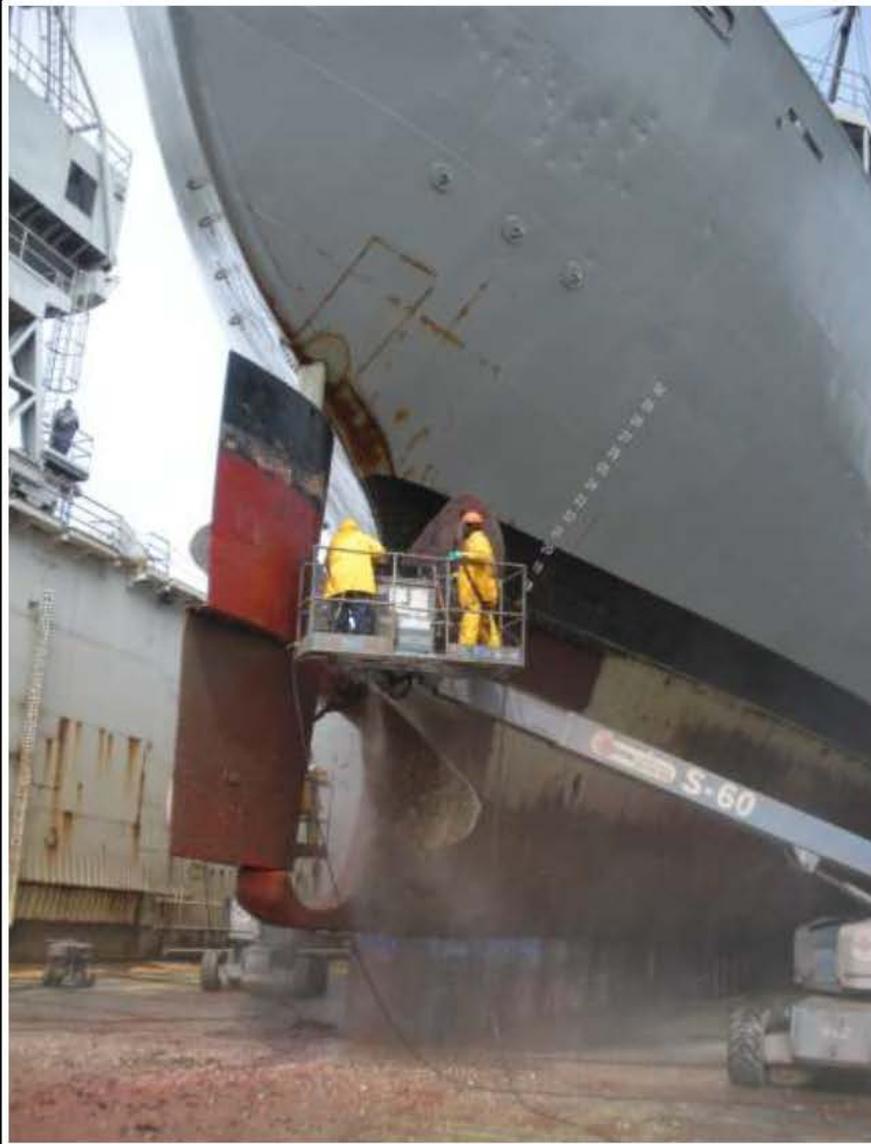
(Pimentel *et al.* 2005)

# Ships as NIS Vectors





# Factors that Influence Biofouling



# Prolonged Residency Periods

- **Negatively affects coating performance**
  - Marine Science and Ecology, 2002. DAFF Report, Australia
  - Floerl et al., 2005. Biological Invasions 7, 459-475

Floerl and Coutts (2009)

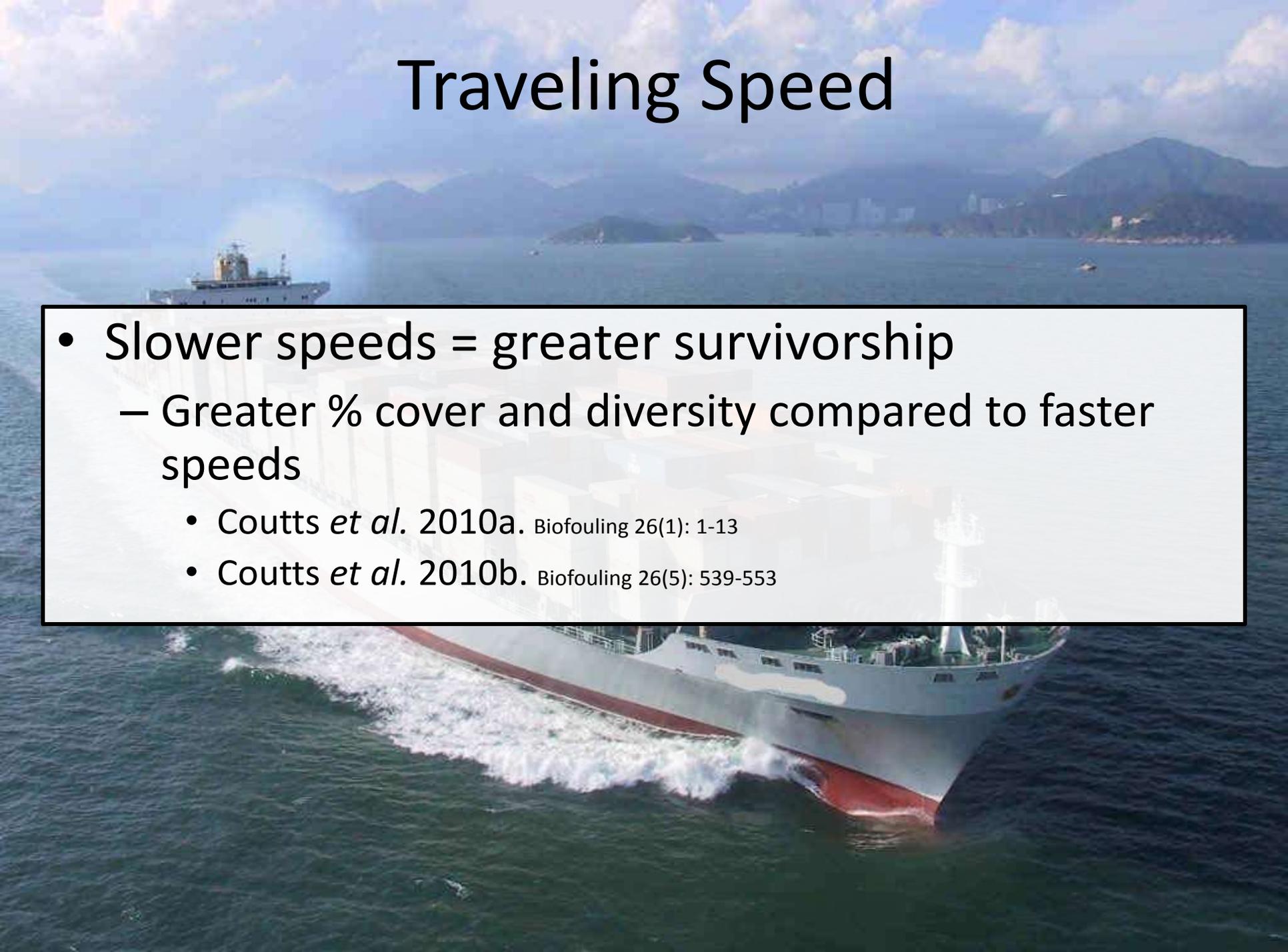
Port of Singapore, May 2009. Images: A. Coutts, May 2009

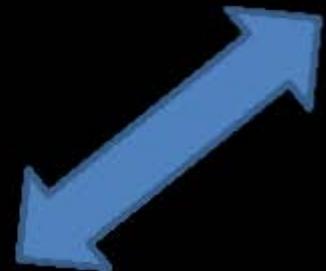
# Prolonged Residency Periods

- **Negatively affects coating performance**
  - Marine Science and Ecology, 2002. DAFF Report, Australia
  - Floerl et al., 2005. Biological Invasions 7, 459-475
- **Positive relationship: residency period and propagule interaction with vessel**
  - Coutts, 1999. Australian Maritime College, Tasmania
  - Floerl and Inglis, 2005. Biological Invasions 7, 589-606
  - Inglis et al., 2008. MAFBNZ Report, New Zealand

# Traveling Speed

- Slower speeds = greater survivorship
  - Greater % cover and diversity compared to faster speeds
    - Coutts *et al.* 2010a. *Biofouling* 26(1): 1-13
    - Coutts *et al.* 2010b. *Biofouling* 26(5): 539-553





# Great Recession Impacts on Maritime Shipping

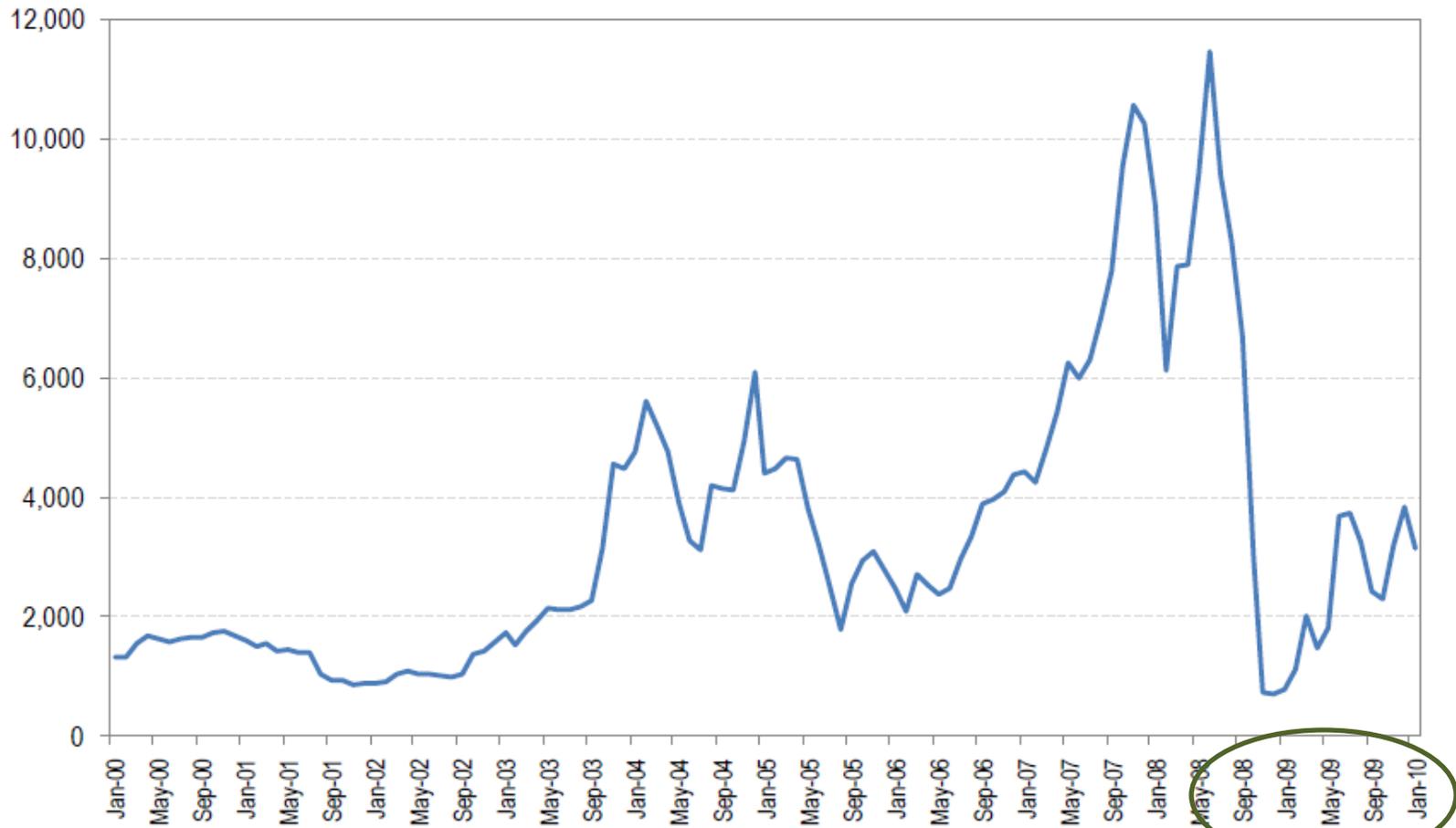


Figure 5 - Baltic Dry Index, 2000-2009 (Monthly Value). Source: The Baltic Exchange.

# Great Recession Impacts on Maritime Shipping

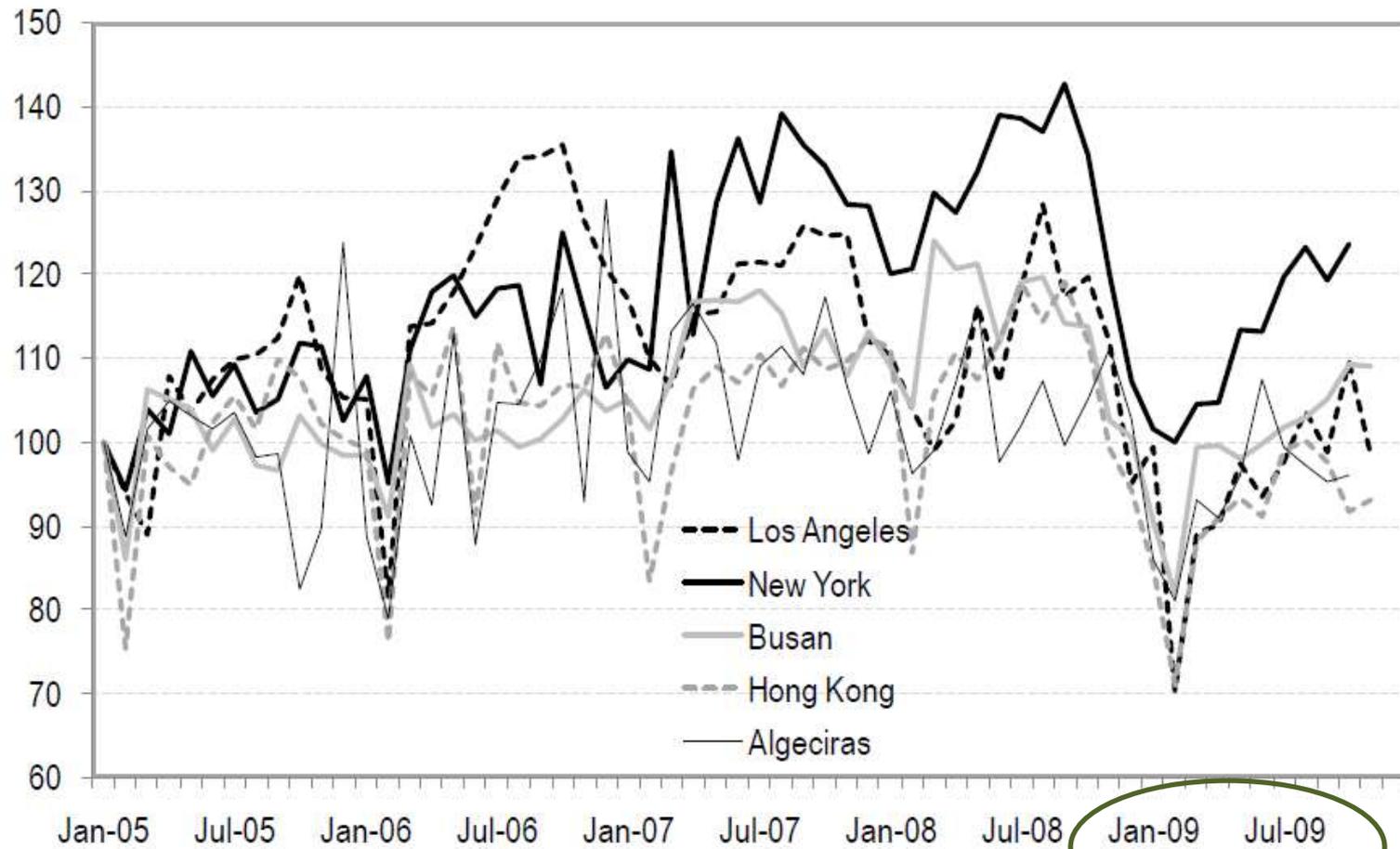


Figure 6: Monthly Total Container Traffic at Selected Ports (Jan 2005=100)

# CA Hull Husbandry Reporting Form

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 <input type="checkbox"/>
Yes, partial coat <input type="checkbox"/> Date last full coat applied (Day/Month/Year):
No coat applied <input type="checkbox"/> 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



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



# Prolonged Residency Periods

## Cargo Ships Treading Water Off Singapore, Waiting for Work



Charles Fertwee for The New York Times

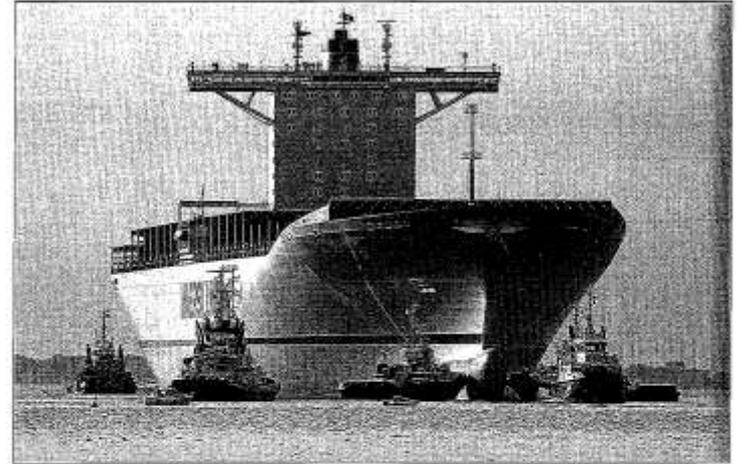
Sunrise in the Strait between Indonesia and Singapore, where 735 cargo ships were gathered Tuesday because of a sharp decline in global exports.

By KEITH BRADSHER  
Published: May 12, 2009

TWITTER

[http://www.nytimes.com/2009/05/13/business/global/13ship.html?pagewanted=all&\\_r=0#](http://www.nytimes.com/2009/05/13/business/global/13ship.html?pagewanted=all&_r=0#)

## More Than 500 Box Ships Laid Up



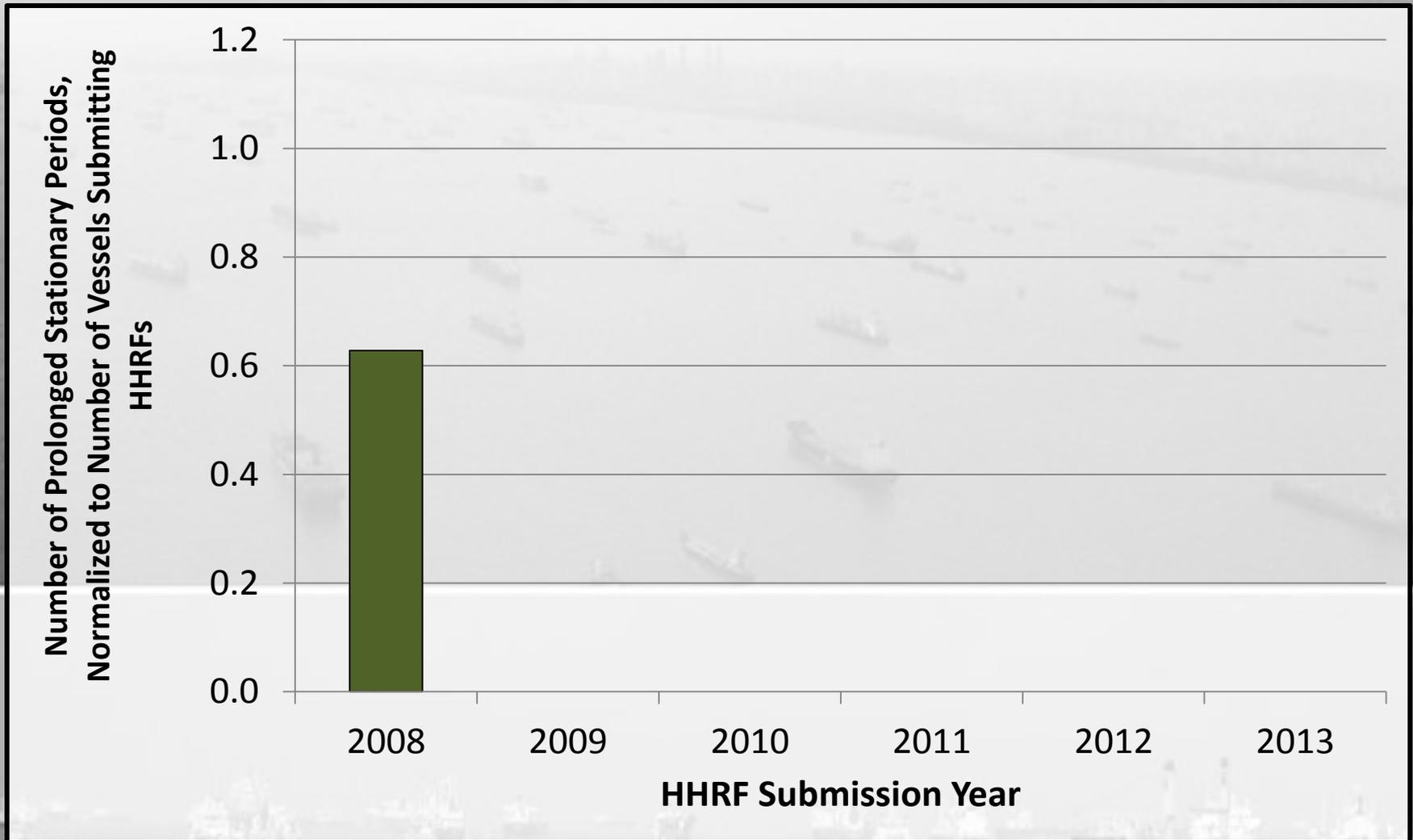
Maersk Line, which has been taking delivery of a large number of container carriers, and is considered the world's largest operator of such tonnage, plans to lay up 25 vessels because of an unprecedented drop in demand. Photo courtesy of Maersk.

The idled fleet of container ships around the world rose to 506 vessels representing 1.34 million TEUs of capacity at the end of April according to AXS-Alphaliner, a Paris-based shipping consultant. The idled vessels represent about 10.6 percent of the world container fleet and it is estimated that the top 20 container ship operators may

report losses exceeding \$4 billion for this year's first quarter alone, the largest ever quarterly loss in the industry's history. Nevertheless, they will also be taking delivery of more capacity, with 44 vessels of 8,000 TEU capacity or greater scheduled to come on line this year and many more ships to follow between 2010 and 2012. **PMM**

10 Pacific Maritime • June 2009 • [www.pacmar.com](http://www.pacmar.com)

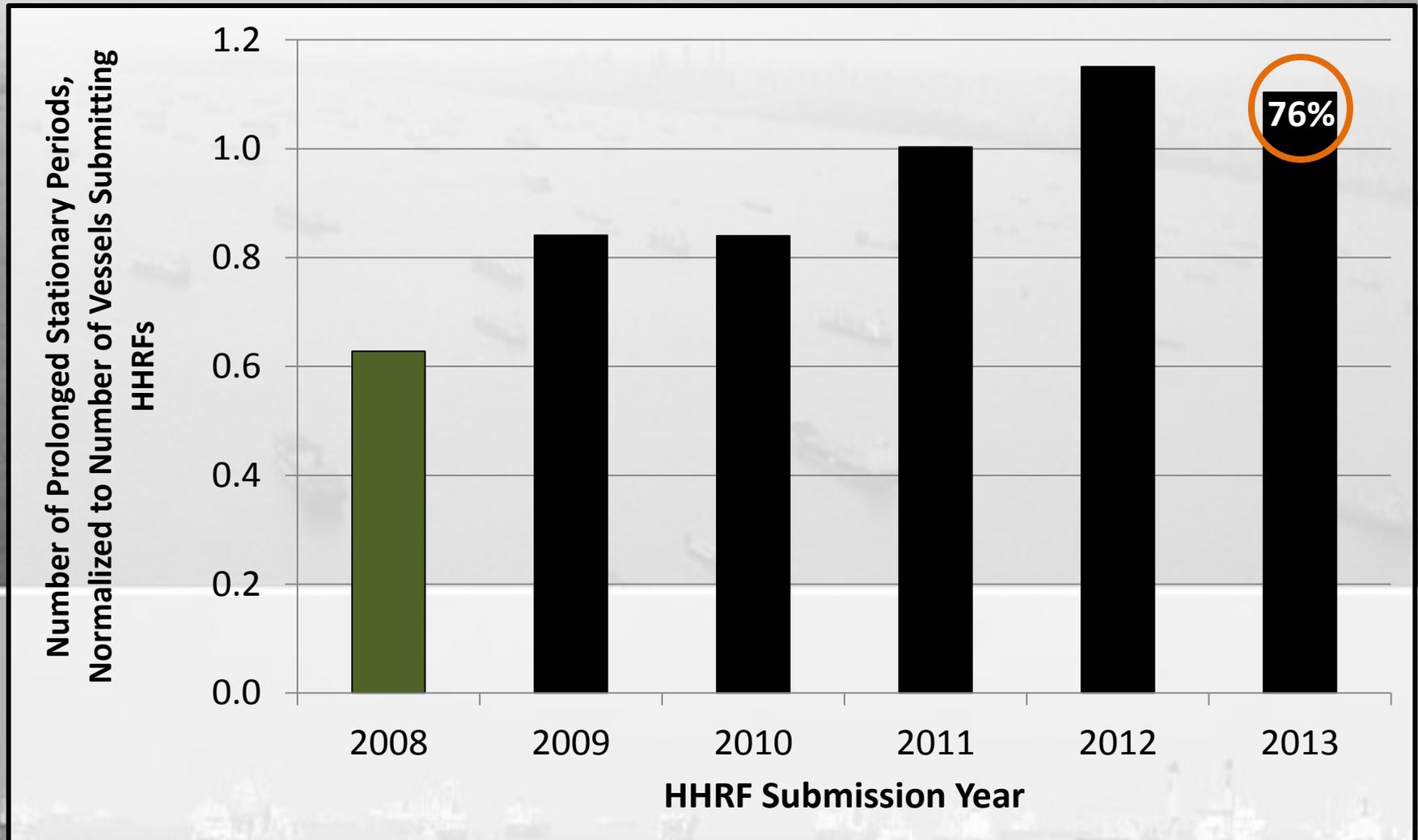
# Prolonged Residency Periods, 10+ Days



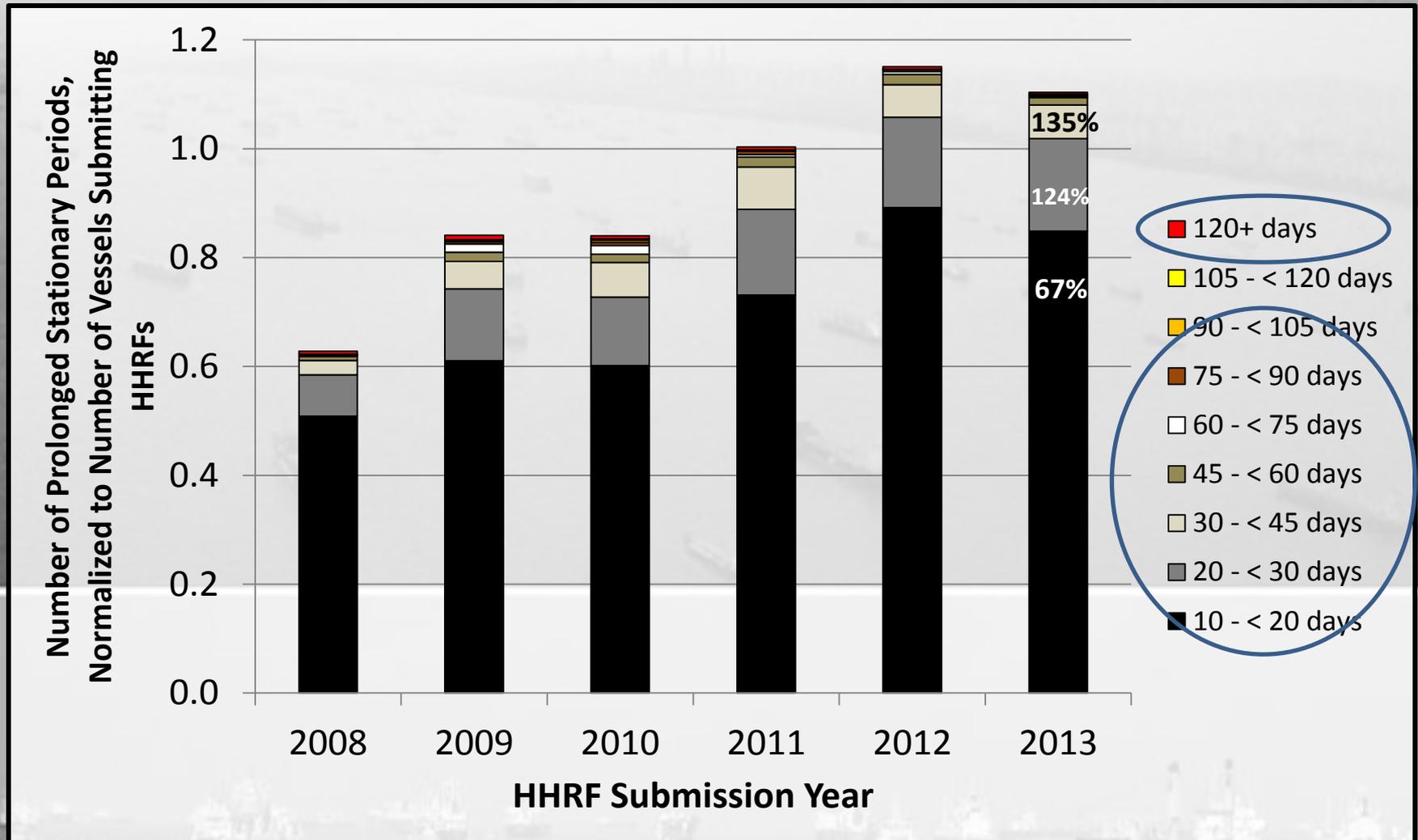
Floerl and Coutts (2009)

Port of Singapore, May 2009. Images: A. Coutts, May 2009

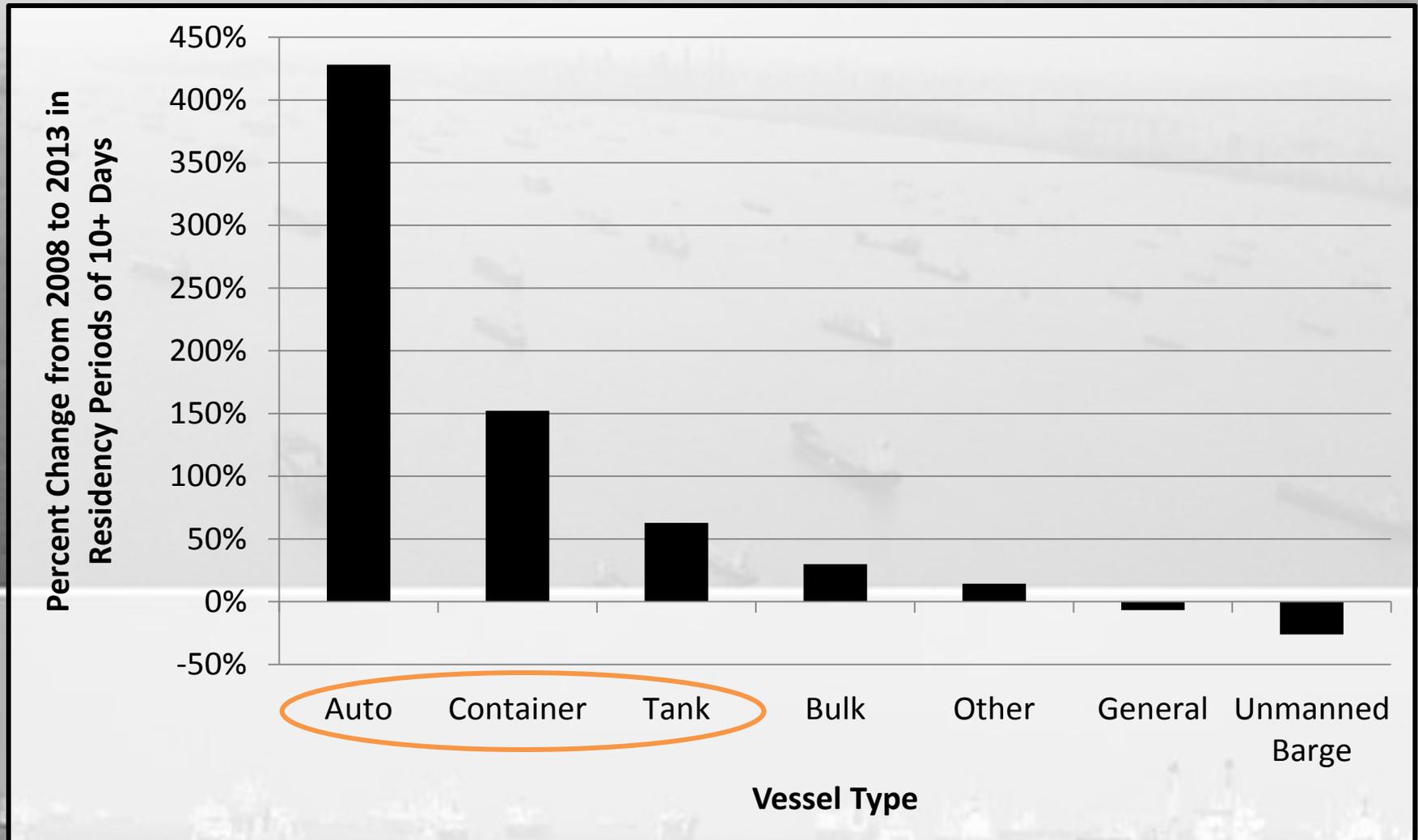
# Prolonged Residency Periods, 10+ Days



# Prolonged Residency Periods, 10+ Days



# Prolonged Residency Periods, 10+ Days



# Traveling Speed

The Economist

Schumpeter  
Business and management

## The shipping industry Slow steaming, uphill

Aug 1st 2012, 11:19 by LC.

IT NEVER rains but it pours for the shipping industry. Since the great recession began in 2009 its troubles have multiplied: first came a price war among operators of container lines; then a slump in rates for chartering the giant bulk vessels that transport coal, iron and grain around the world; and now it has to cope with a glut of all types of vessels, as ships ordered in the boom times are launched into the slump.



<http://www.economist.com/blogs/schumpeter/2012/08/shipping-industry/print>

Los Angeles Times | ARTICLE COLLECTIONS

— Back to Original Article

## Ocean shipping lines cut speed to save fuel costs

'Slow steaming' upsets some customers, who worry about delays in delivery. But it also keeps more ships in service and cuts emissions.

July 31, 2010 | By Ronald D. White, Los Angeles Times

On the high seas, full speed ahead is being replaced by slow and steady.

Eager to cut fuel costs, ocean shipping lines have ordered their sea captains to throttle back the engines for what is quaintly called "slow steaming."

<http://articles.latimes.com/print/2010/jul/31/business/la-fi-slow-sailing-20100731>

The New York Times

This copy is for your personal, noncommercial use only. You can order presentation-ready copies for distribution to your colleagues, clients or customers [here](#) or use the "Reprints" tool that appears next to any article. Visit [www.nytreprints.com](http://www.nytreprints.com) for samples and additional information. Order a reprint of this article now.

February 17, 2010

## Slow Trip Across Sea Aids Profit and Environment

By [ELISABETH ROSENTHAL](#)

It took more than a month for the container ship Ebba Maersk to steam from Germany to Guanajuato, Mexico, but the owner says it was worth it. The ship did two years ago.

But for the owner, the Danish shipping giant Maersk, that counts as progress.

[http://www.nytimes.com/2010/02/17/business/energy-environment/17speed.html?\\_r=0&pagewanted=print](http://www.nytimes.com/2010/02/17/business/energy-environment/17speed.html?_r=0&pagewanted=print)

THE WALL STREET JOURNAL

WSJ.com

BUSINESS | December 30, 2012, 4:11 p.m. ET

## Container Ships Bulk Up, and Slow Down

By INTI LANDAURO

ZEEBRUGGE, Belgium—The new Marco Polo ship can load 16,000 containers and reach a speed of 24 knots, but it is cruising back to China at 14 knots.

The Marco Polo's size and pace on the Europe-to-Asia route show an interesting dynamic at work: As container capacity and declining shipping fares, companies such as CMA CGM of France, owner of the world's biggest-possible ships so they can benefit from economies of scale, and run them at moderate speeds.



The Marco Polo, recently acquired by CMA CGM, is the world's largest container ship and just completed her maiden voyage. WSJ's Inti Landauro reports via @WorldStream.

Slowing down ships, a technique known as slow steaming, helps offset the additional capacity created by their big size. Analysts say the practice has helped avoid a container shipping price war.

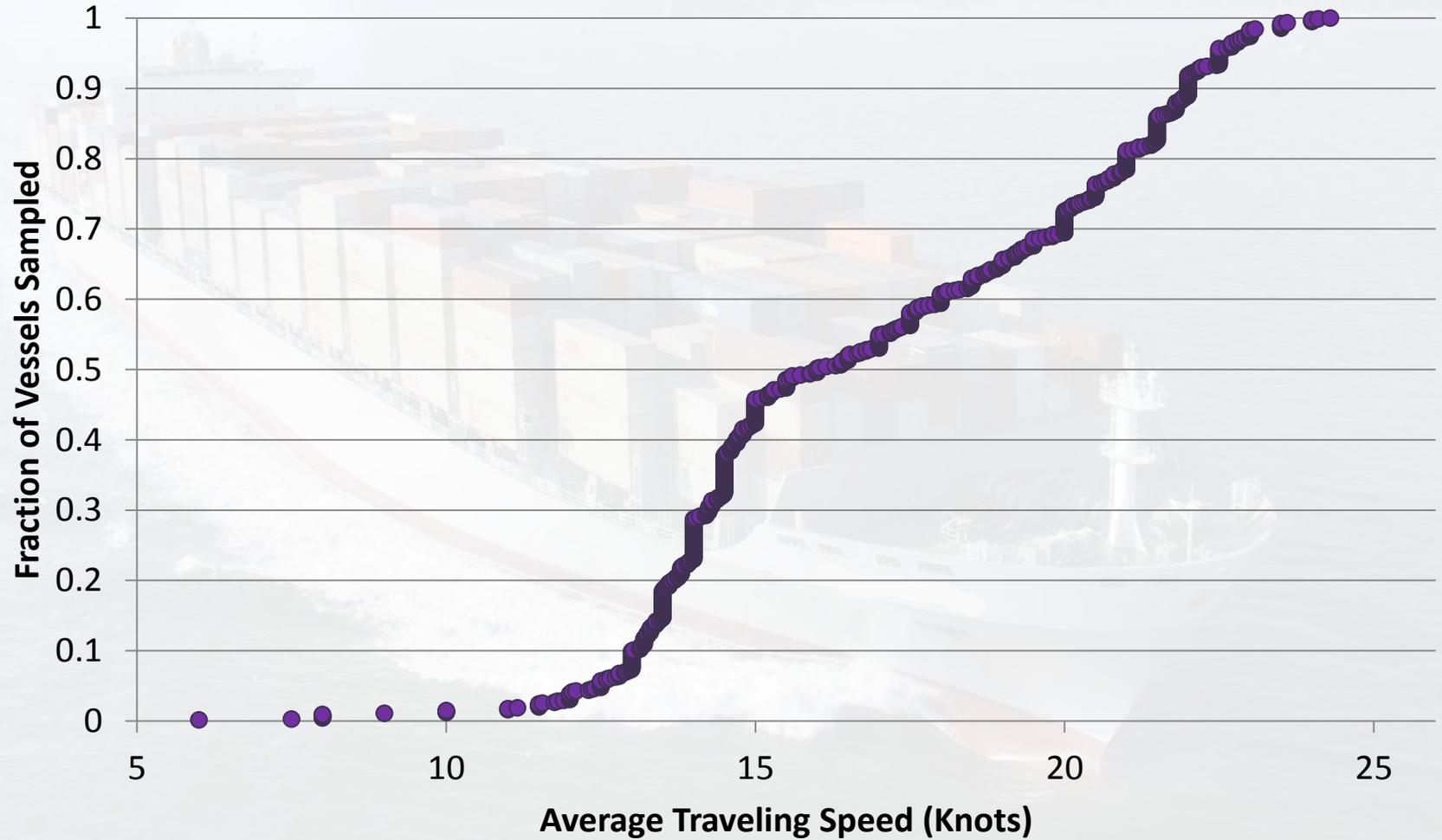
"Surely, if we did not have slow-steaming at all it would be higher than a few dollars per container," said a shipping analyst.

The Marco Polo trumps Maersk Line's Emma Maersk, which carries 15,000 containers, and CMA CGM has orders in place for another 16,000-container ship. Malcom McLean pioneered the concept of shipping containers.

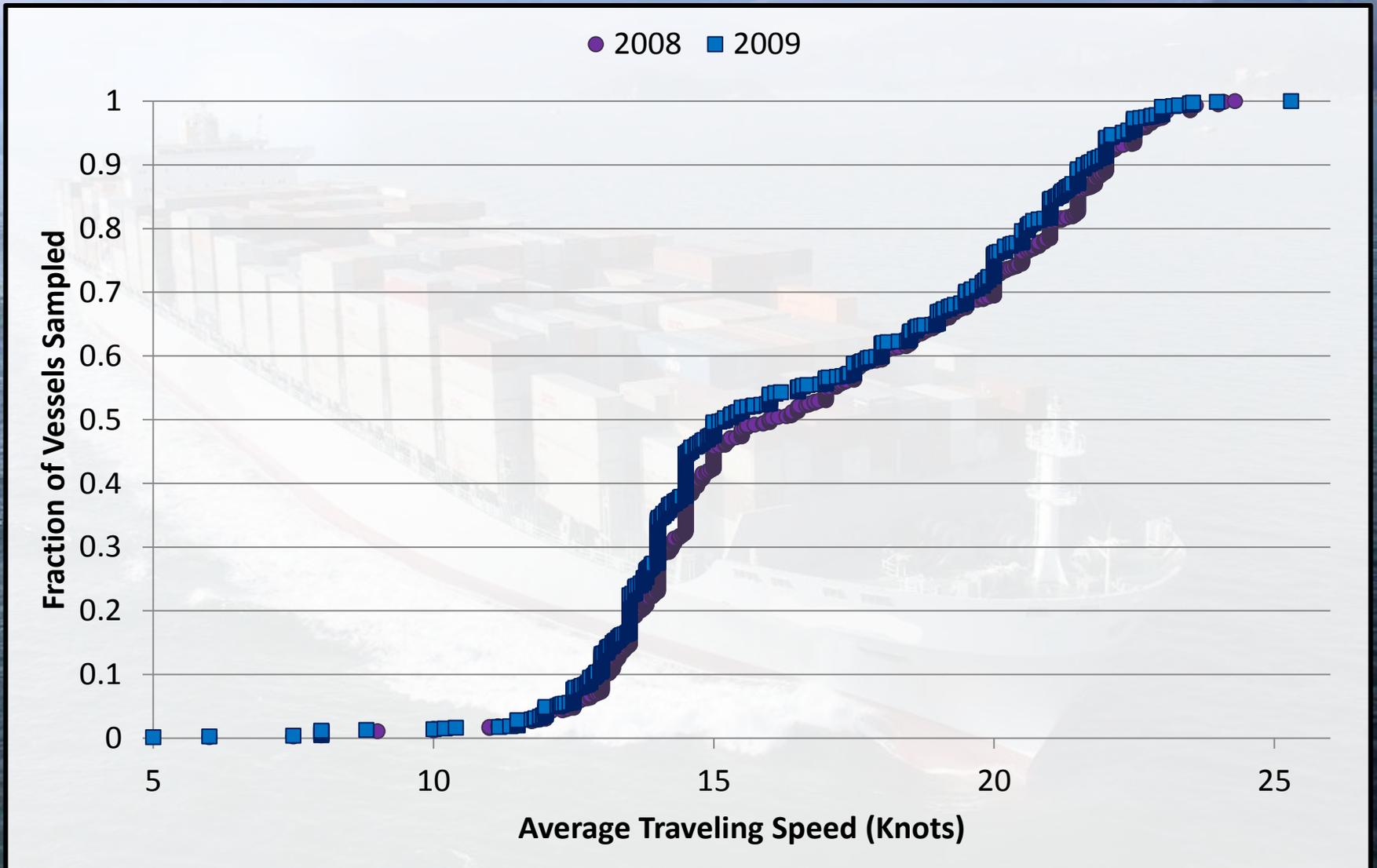
<http://online.wsj.com/article/SB10001424127887323300404578207320544238546.html>

# Traveling Speed

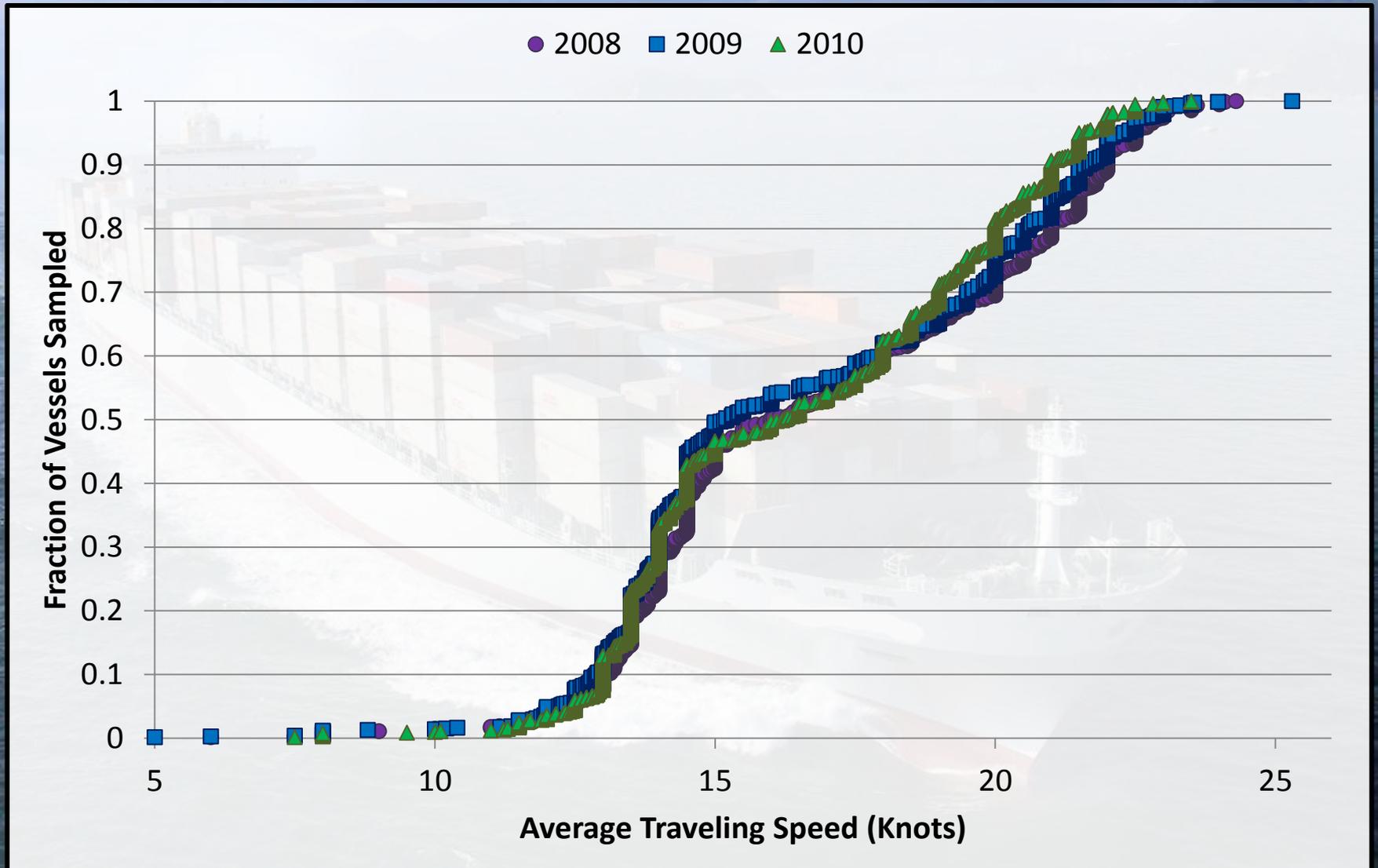
● 2008



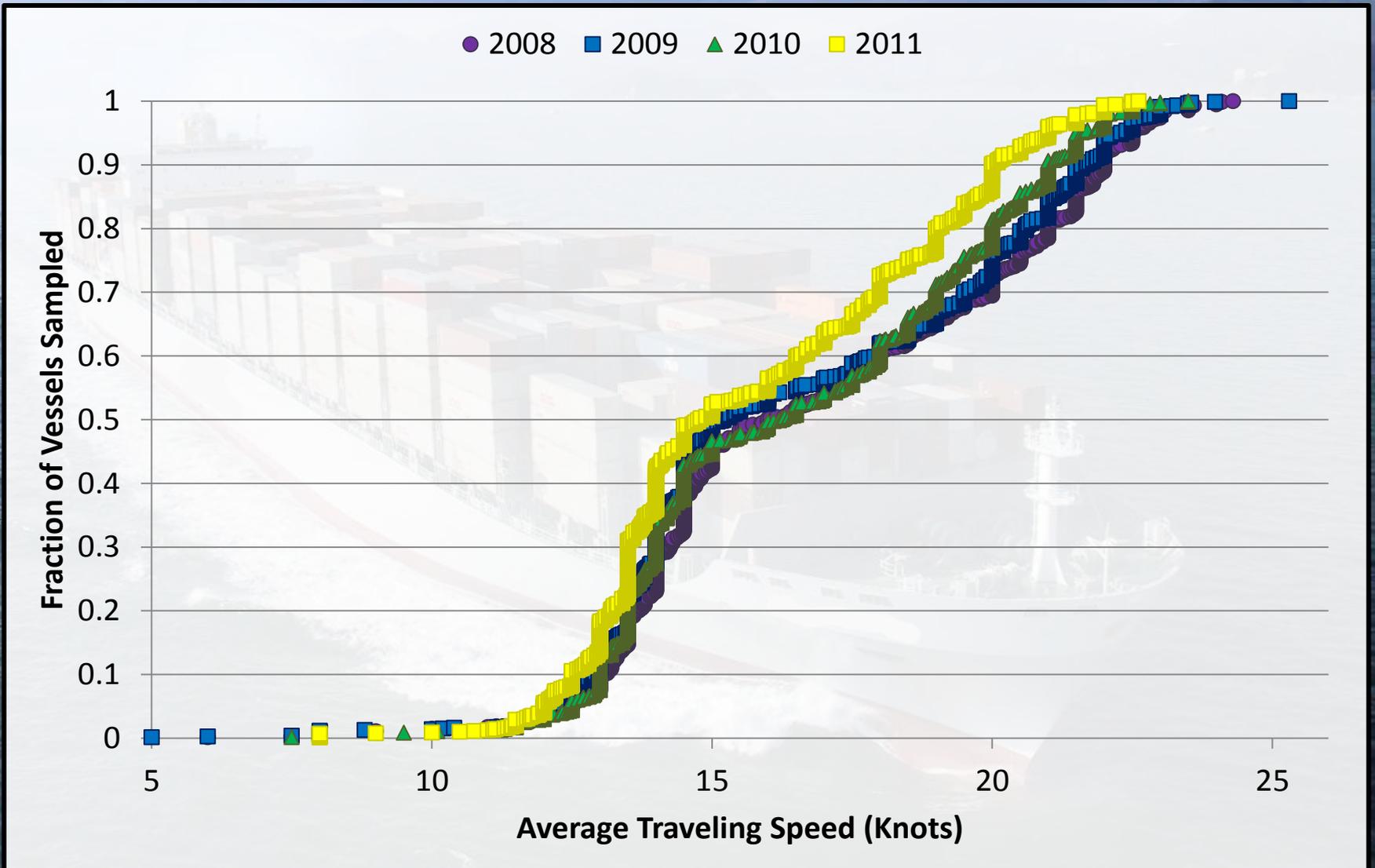
# Traveling Speed



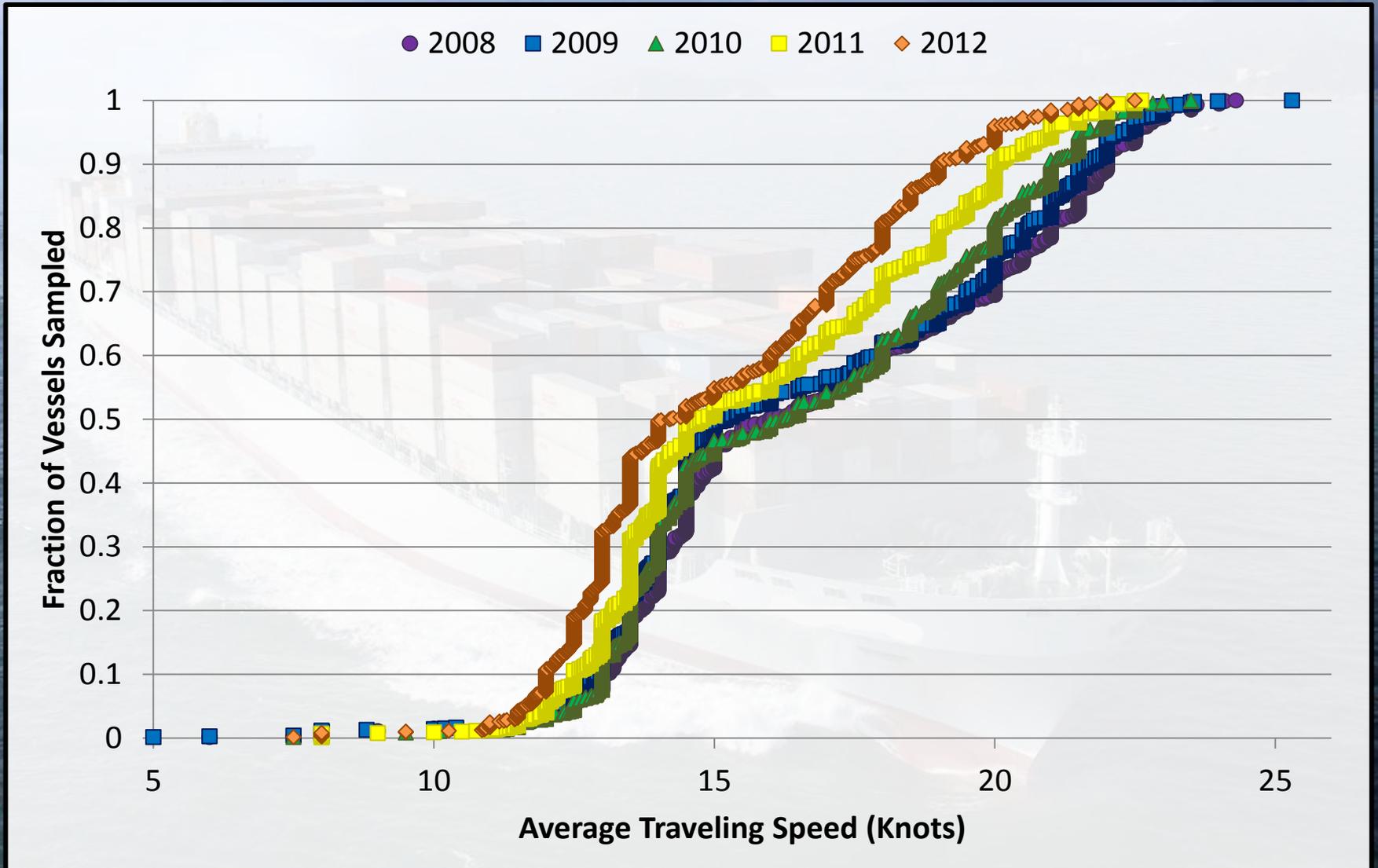
# Traveling Speed



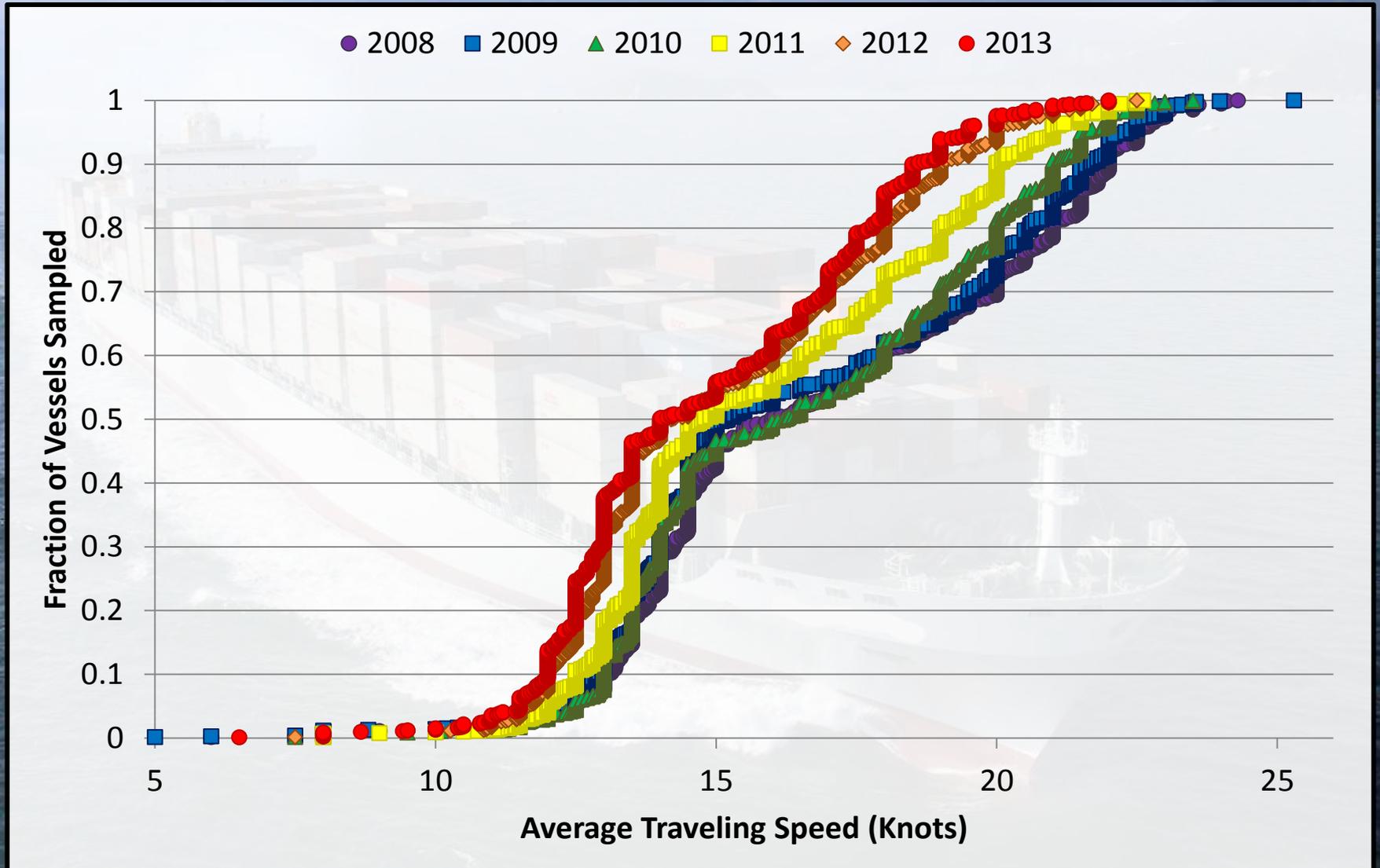
# Traveling Speed



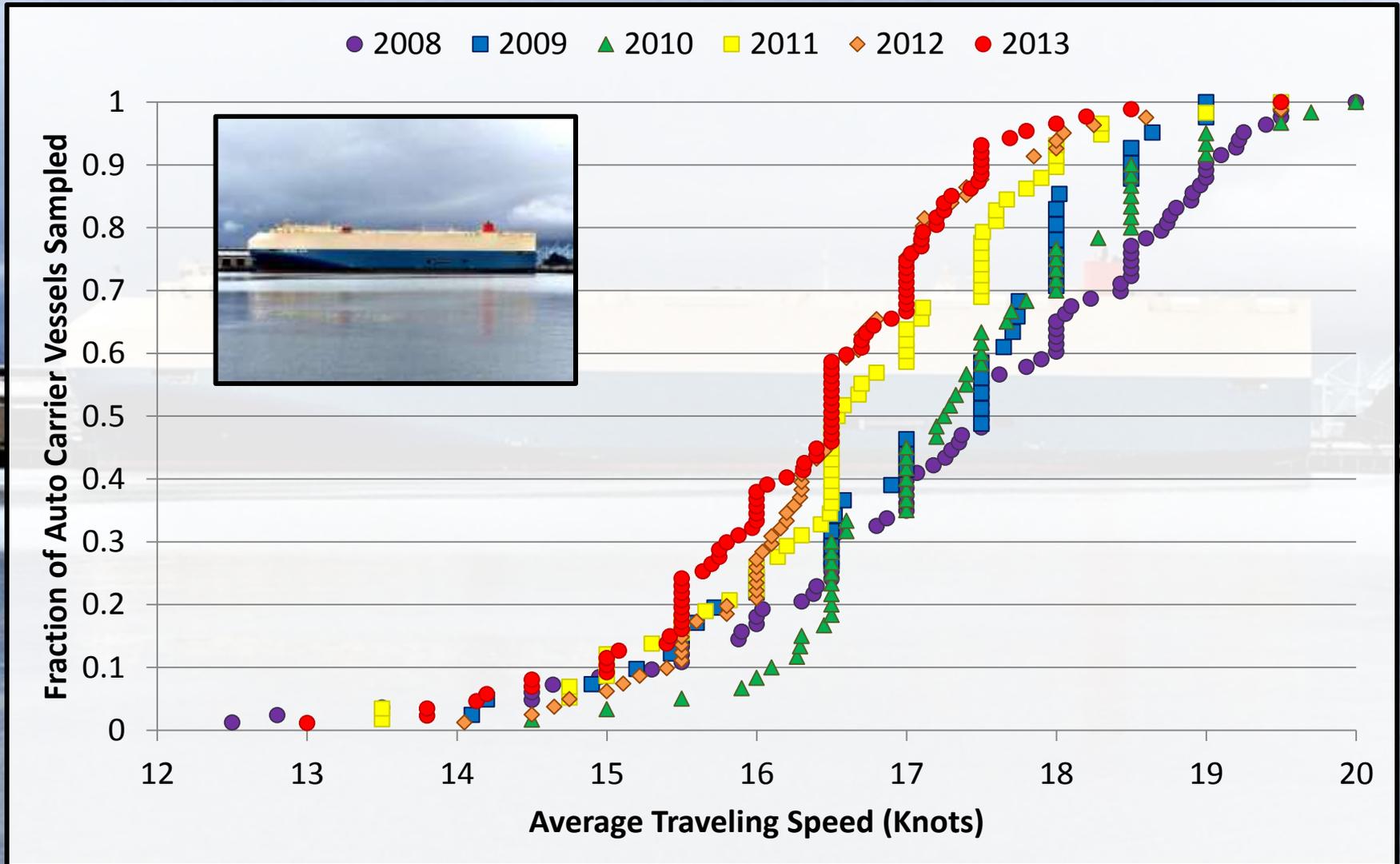
# Traveling Speed



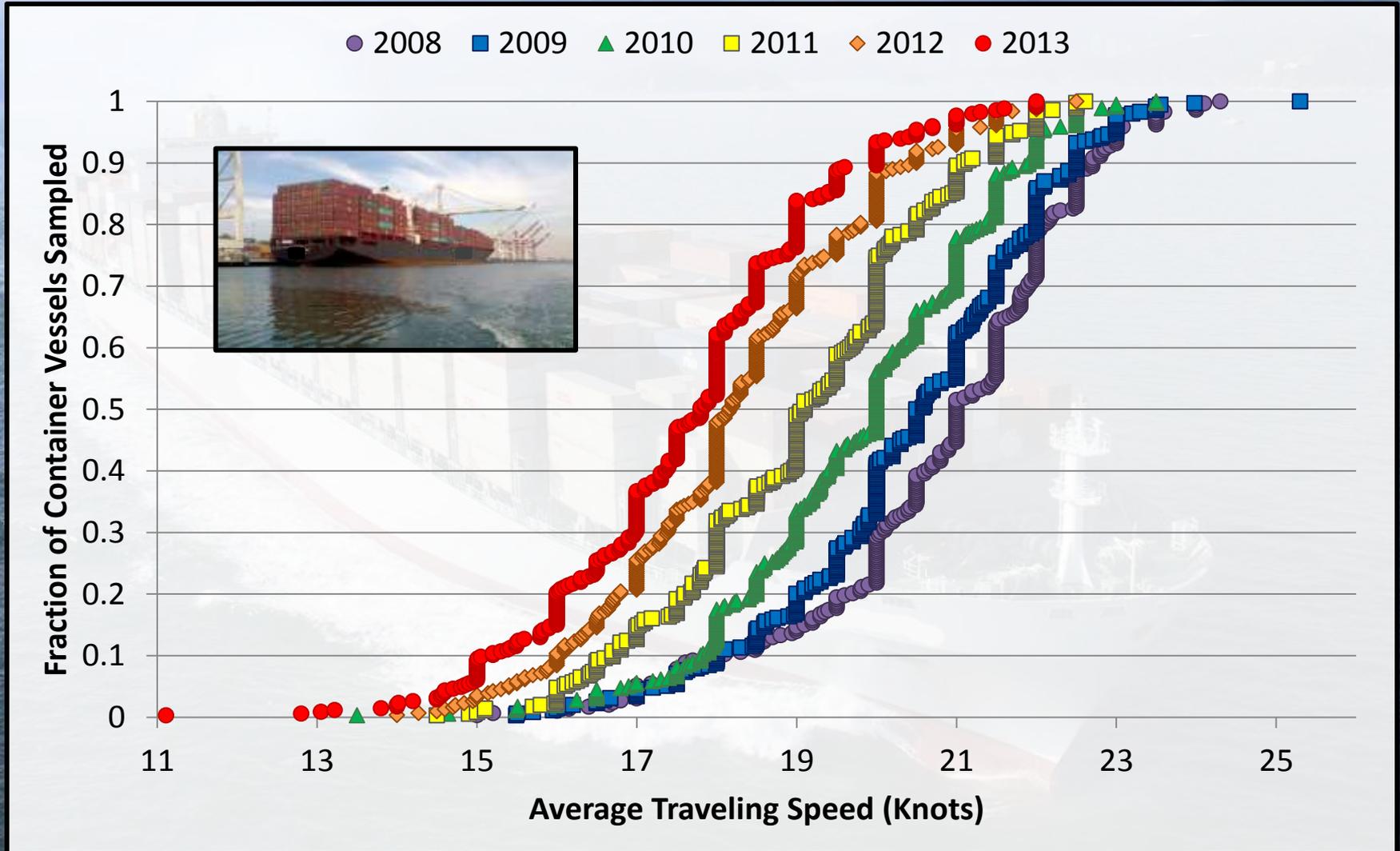
# Traveling Speed



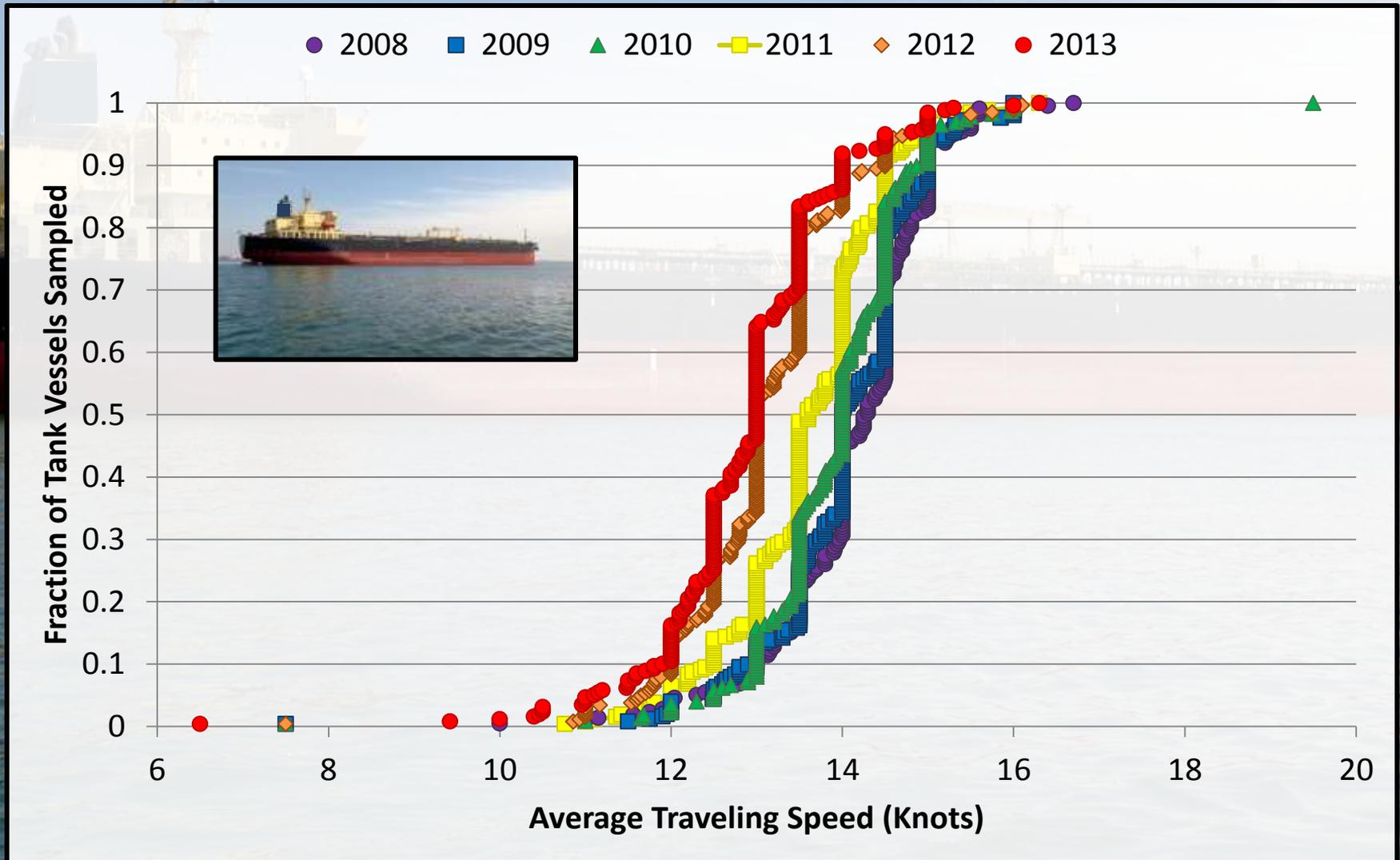
# Traveling Speed – Auto Carrier Vessels



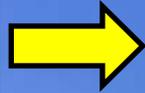
# Traveling Speed – Container Vessels



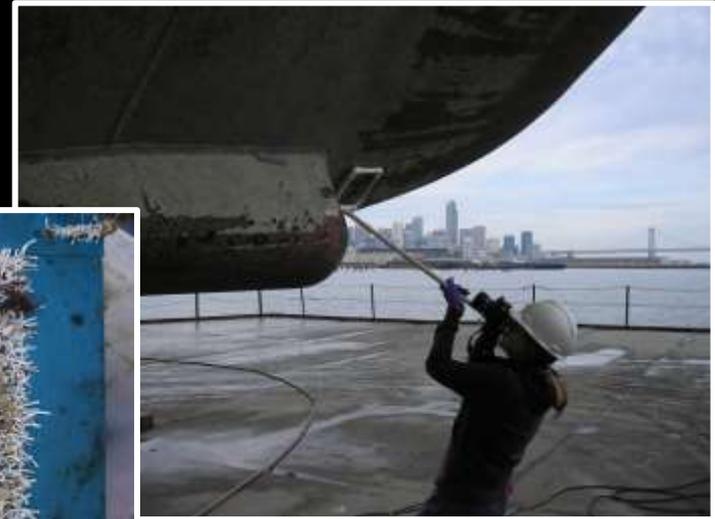
# Traveling Speed – Tank Vessels



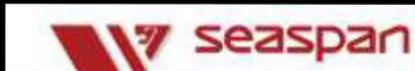
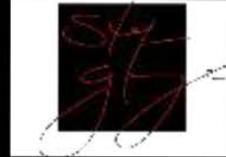
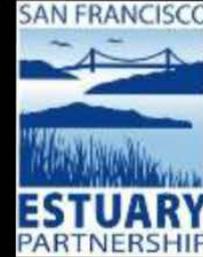
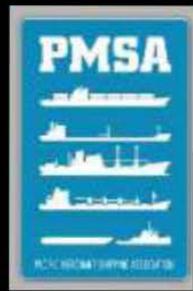
# Great Recession Impacts on NIS Introduction Risk



# Biofouling Patterns



# Regulation Development Process



# Thank You



Chris.Scianni@slc.ca.gov  
(916) 574-0209

