

# Patterns of Management, Compliance, and Geography of Ballast Water in California



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# The Problem

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- **81%** of non-indigenous species (NIS) in California are attributed to commercial shipping, including ballast water and vessel biofouling.
- CA is the “entry point” for **79%** of NIS found on the west coast.
- It has been estimated that more than **7000** species are moved around the world in ballast on a daily basis (Carlton 1999).
- Each ballast water discharge event has the potential to release over **21.2** million individual organisms (Minton et al. 2005).
- Current ballast water regulations are an **interim** measure that reduce, but not eliminate, the potential supply of propagules.

# California Marine Invasive Species Program Authority & Legislative History

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California State Lands Commission • Marine Facilities Division



California Environmental Protection Agency  
STATE WATER RESOURCES CONTROL BOARD

## Origin: 1999 Ballast Water Management for Control of Nonindigenous Species Act (AB 703)

- Ballast water management
- Reporting forms
- Vessel inspections
- Coordinate with sister agencies

## Renewal & Enhancement: 2003 Marine Invasive Species Act (AB 433)

- Coastal voyages
- Performance Standards
- Promote treatment technologies
- Non-ballast vessel vectors (biofouling)



# California Ballast Water Regulatory Timeline

1999 Ballast Water Management for Control of Nonindigenous Species Act

2003 Marine Invasive Species Act

Reporting: 1<sup>st</sup> port call

Reporting: Each port call

Management: Arrivals from outside the US EEZ (west coast mainland) exchange at 200 nm

Management: Arrival or BW from outside the US EEZ (west coast mainland) exchange at 200 nm

Ballast water management: Arrivals from both inside and outside the Pacific Coast Region

Domestic tankers exempt

Domestic tankers not exempt

1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009

# Current State of Regulations

## **Reporting:**

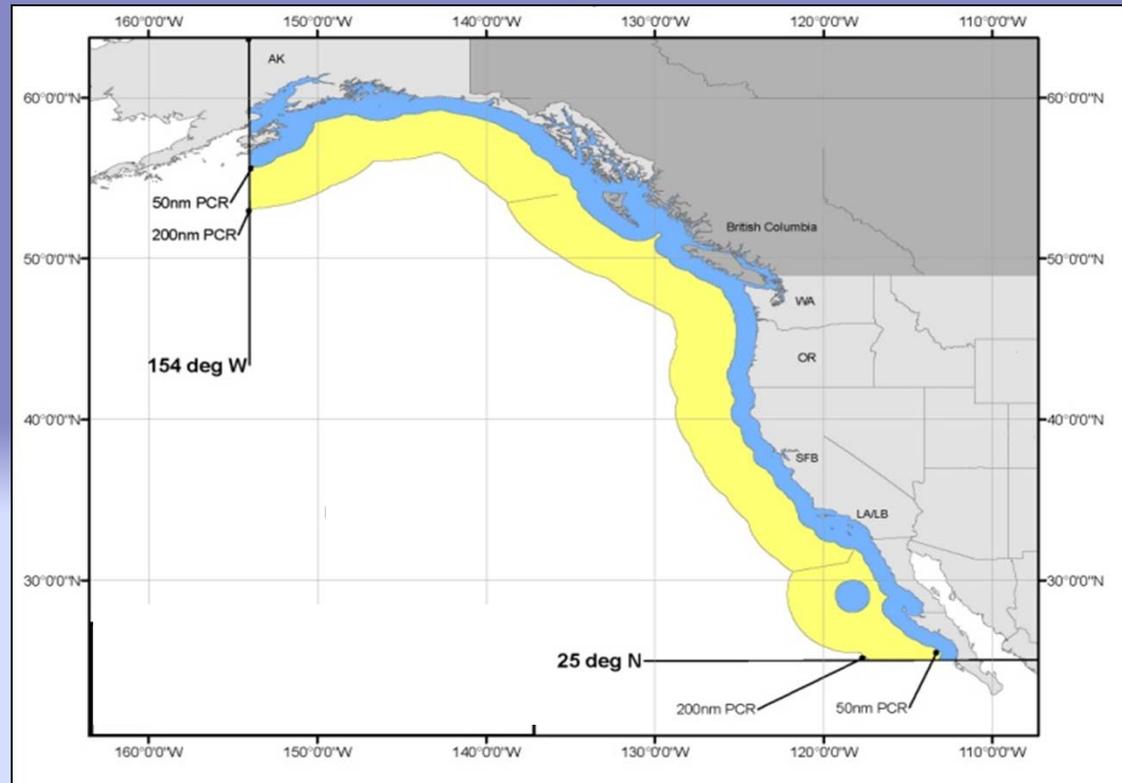
(Effective 1/1/2004)

- Each Port

## **Management:**

(Effective 3/22/2006)

- Creation of the Pacific Coast Region (PCR)



- Arrivals from within, ballast water from within: Exchange >50 nm
- Arrivals from within, ballast water from outside: Exchange >200 nm
- Arrivals from outside: Exchange >200 nm

***No exempted commercial vessels***

# Compliance Evaluation Methods

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## ***Ballast water reporting forms: Database***

- Forms contain information on source, exchange and discharge locations whether in port or open ocean
- Quality controlled database extending back to 2002



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## ***On board ship inspections:***

- 25% of arrivals are boarded by SLC inspectors
- Perform outreach, check ballast logs/management plan, test ballast salinity

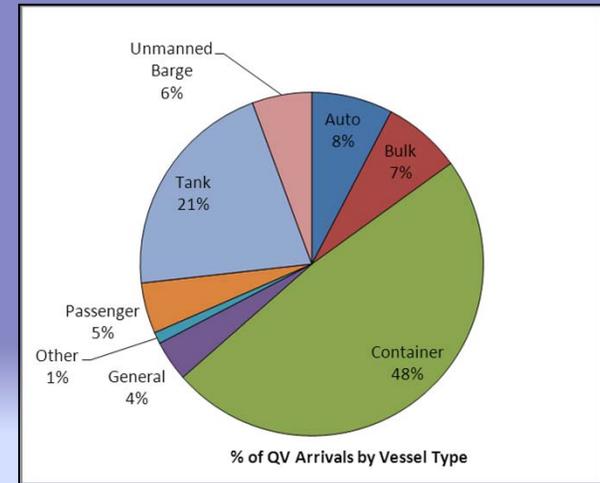
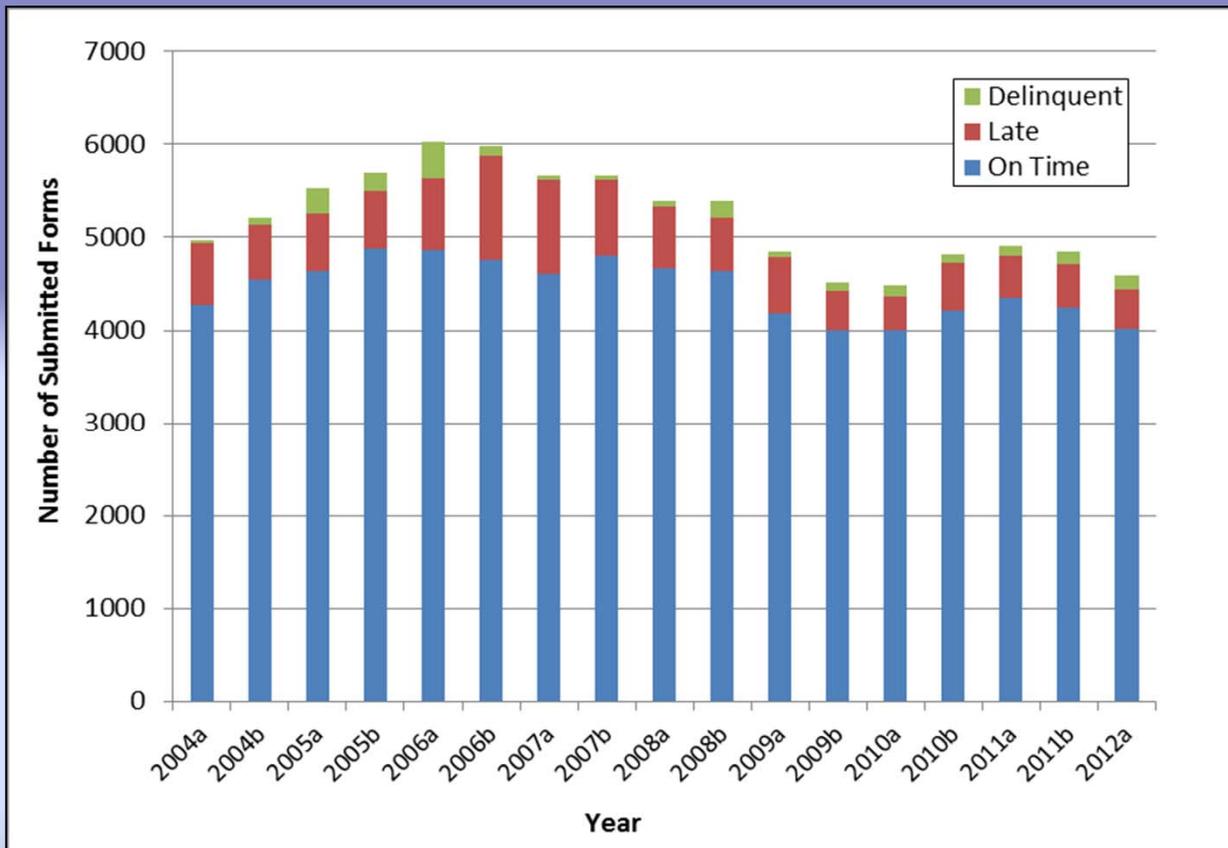
## ***GIS analysis:***

- Evaluates compliance in open ocean
- Helps identify potential underlying reasons for violations



***Goal:*** Describe multi-year patterns in ballast water management and discharges to California waters and identify strategies to help reduce violations

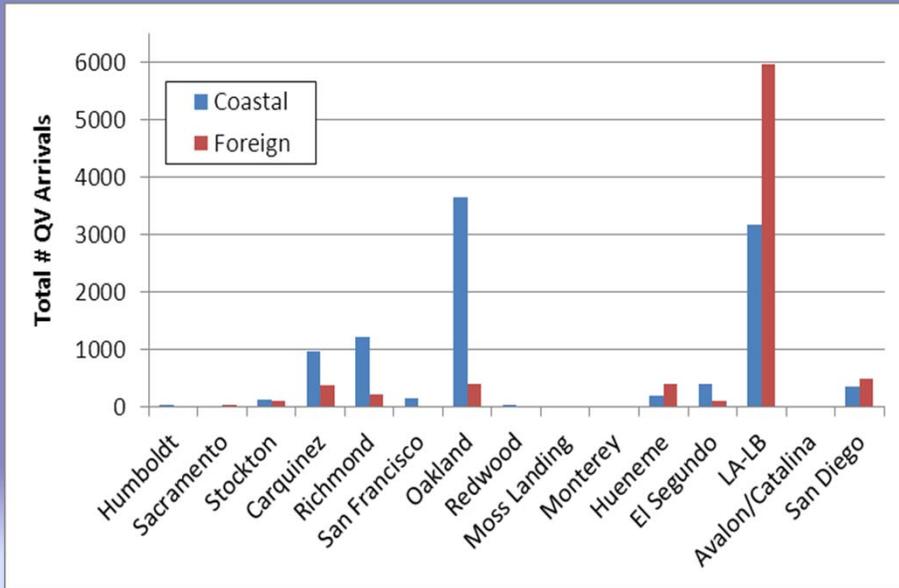
# Ballast Water Reporting Form Submission Compliance



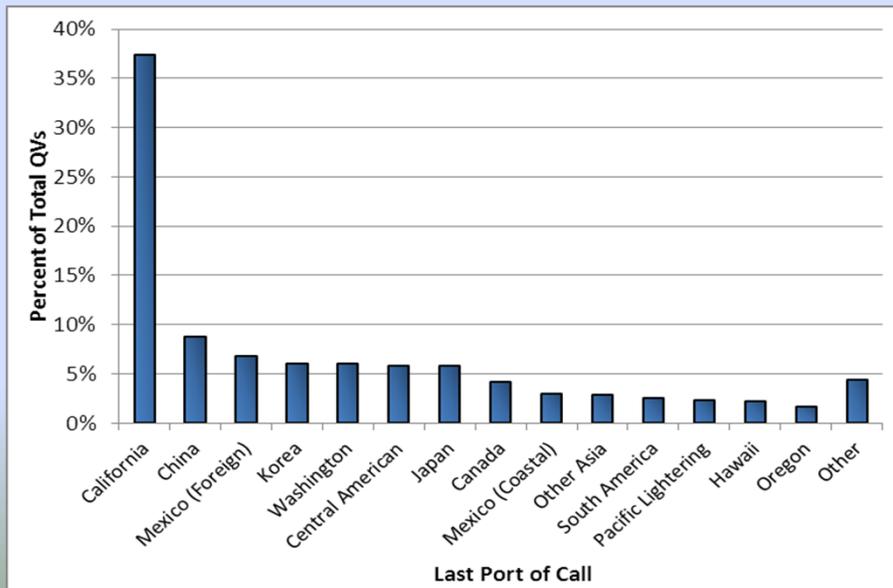
- Nearly half of all arrivals to CA from 2010b – 2012a were container vessels.



# Vessel Arrivals

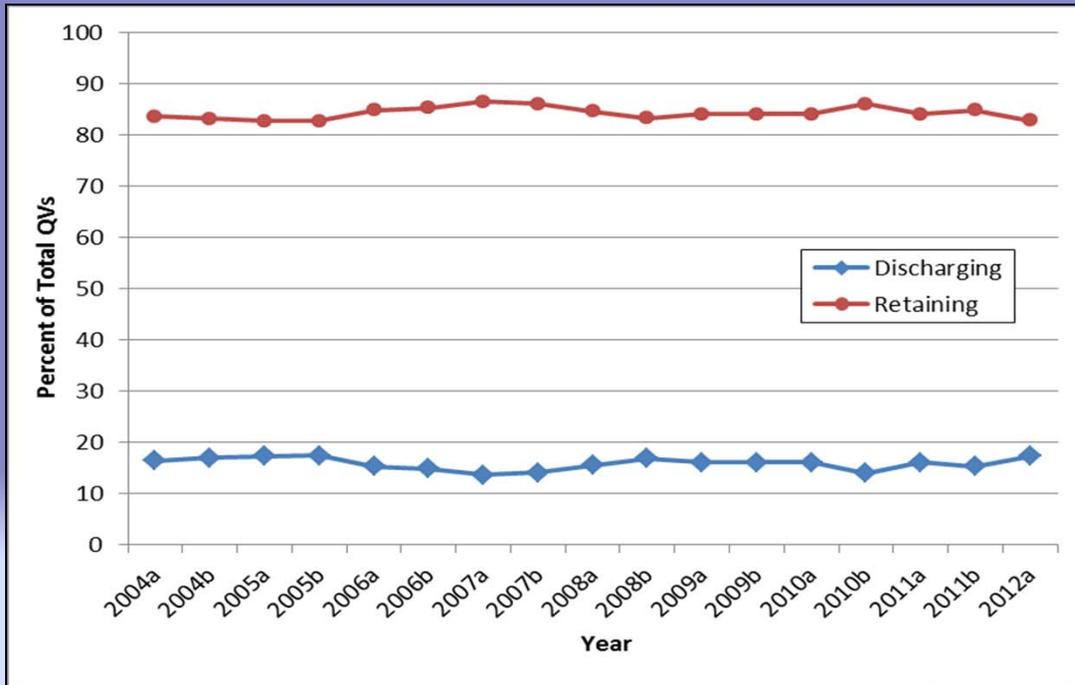


- LA-LB and the Port of Oakland accounted for 71% of all arrivals from 2010b-2012a.
- Foreign arrivals are most common at LA-LB and are double that of coastal arrivals.



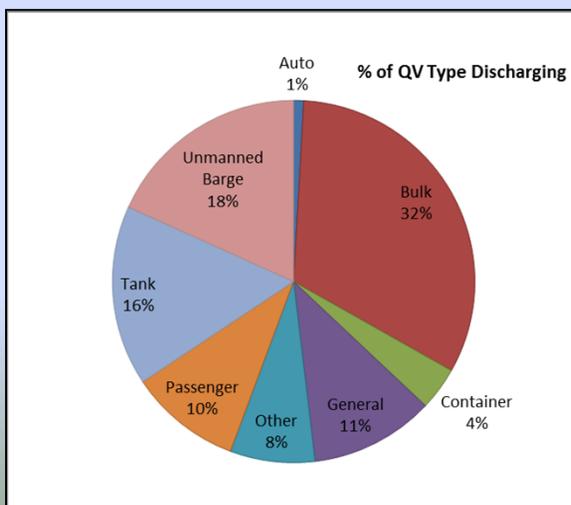
- Of the PCR arrivals, the majority are coming from other CA ports.
- Foreign arrivals are primarily from Asian ports (~20%)

# Ballast Water Management

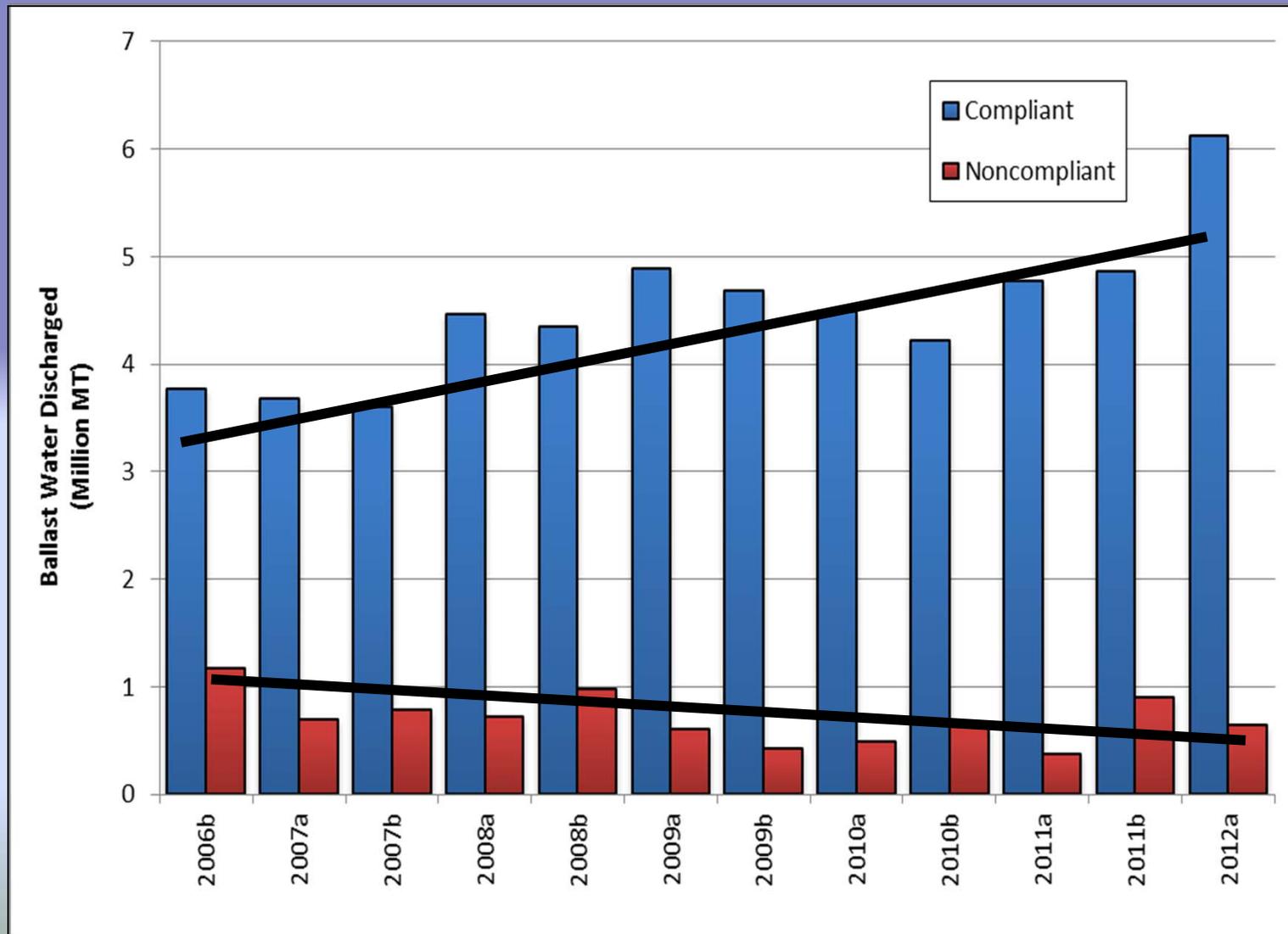


## Management Options

- Retention (~85%)
- Ballast water exchange
- Discharge to a reception facility (none exist)
- Ballast water treatment (previous presentation)

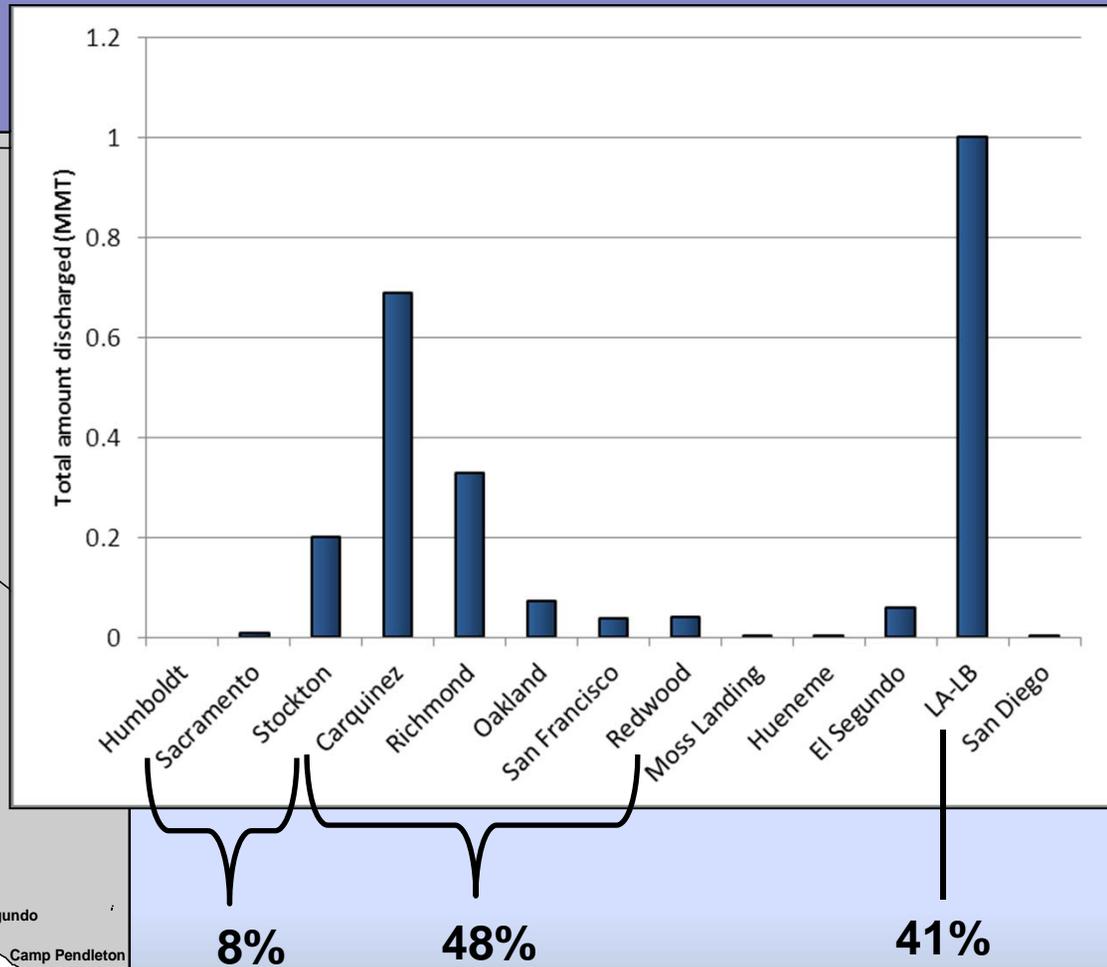
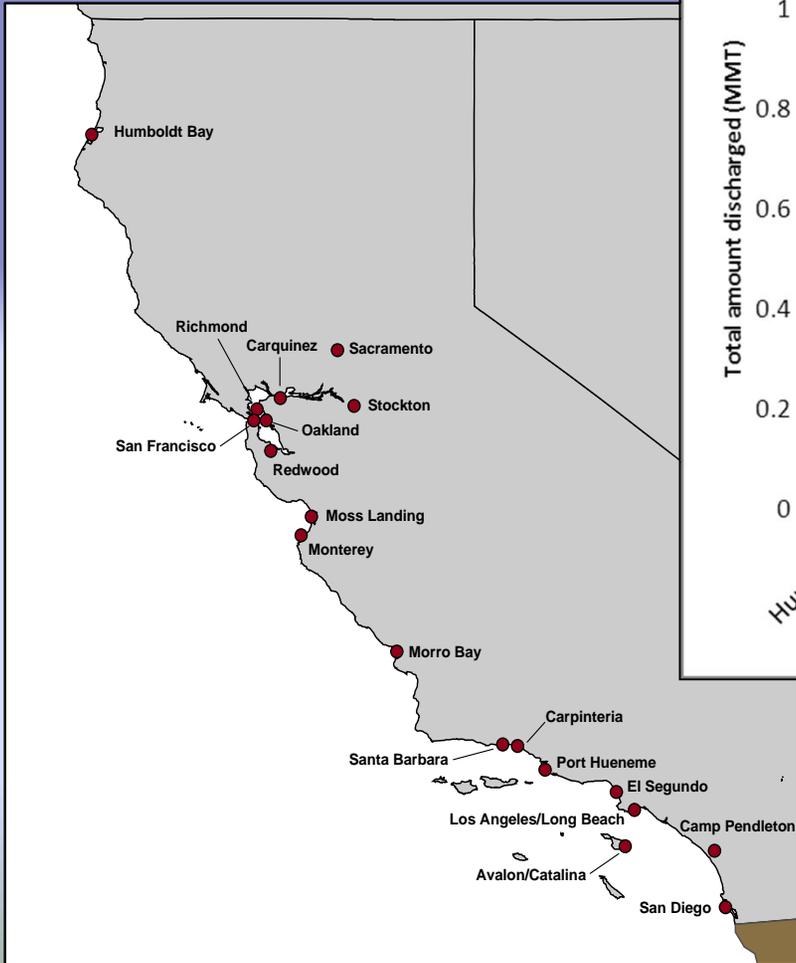


# Compliance of Discharged Ballast Water Over Time

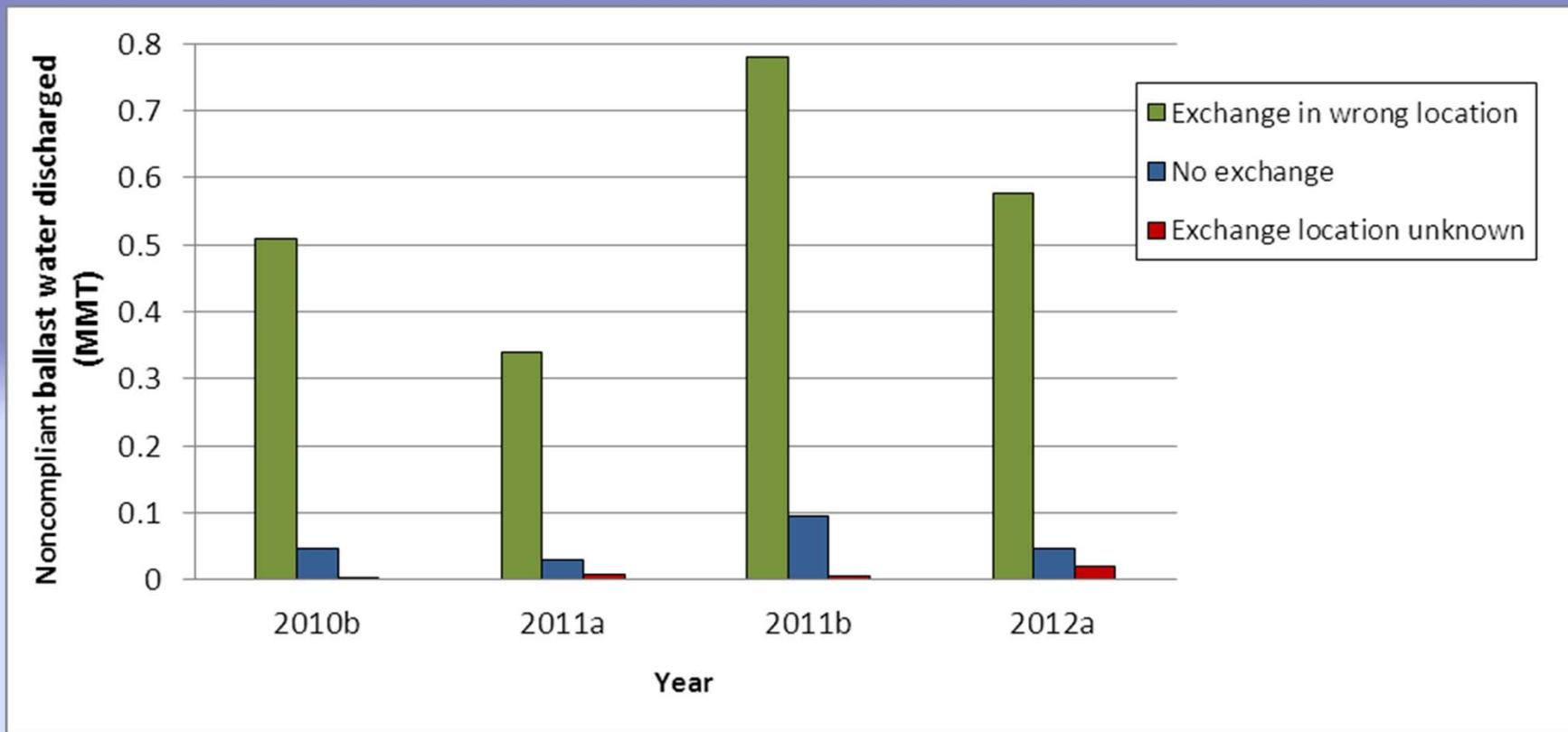


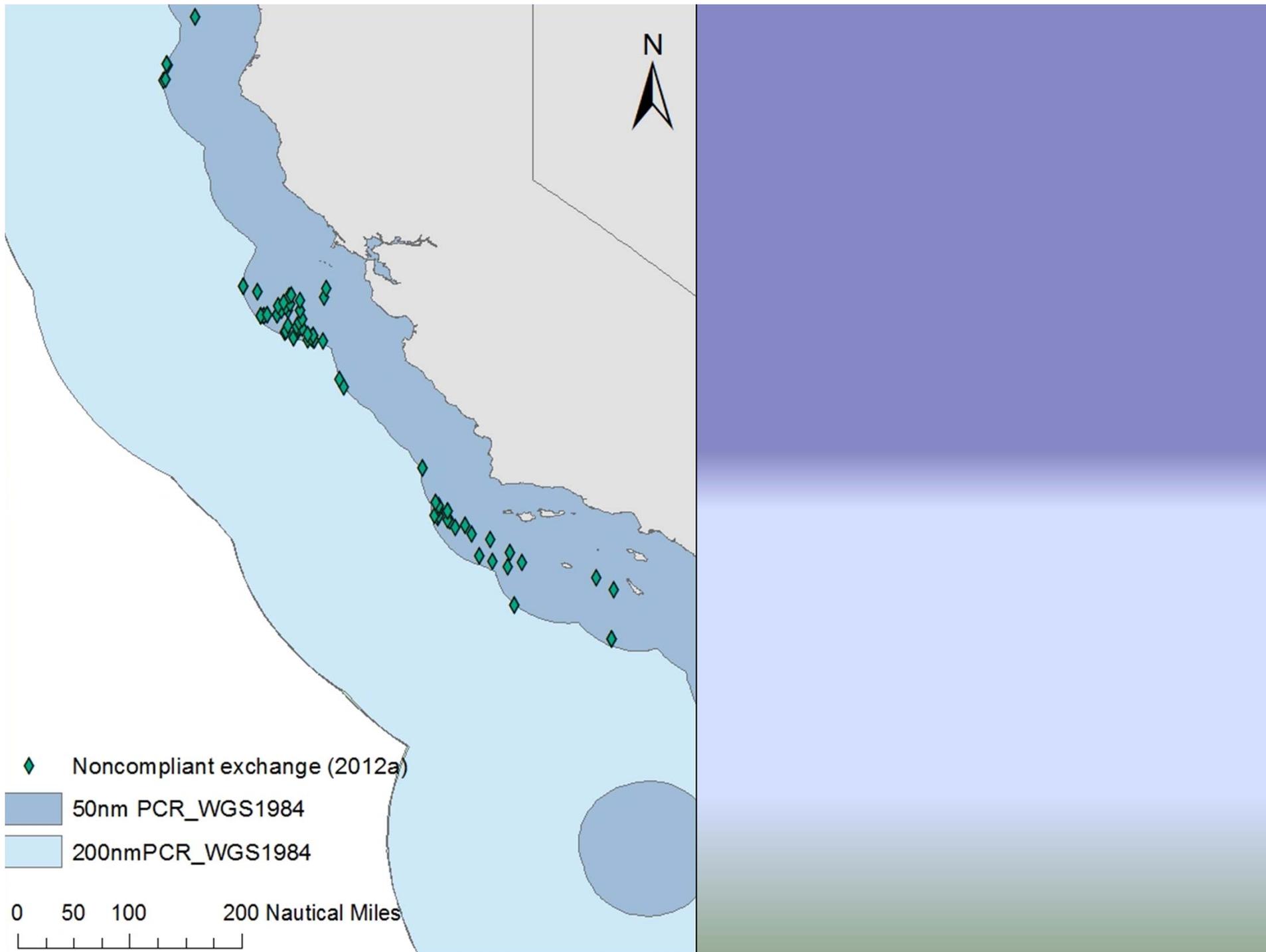
# Focus on Geography

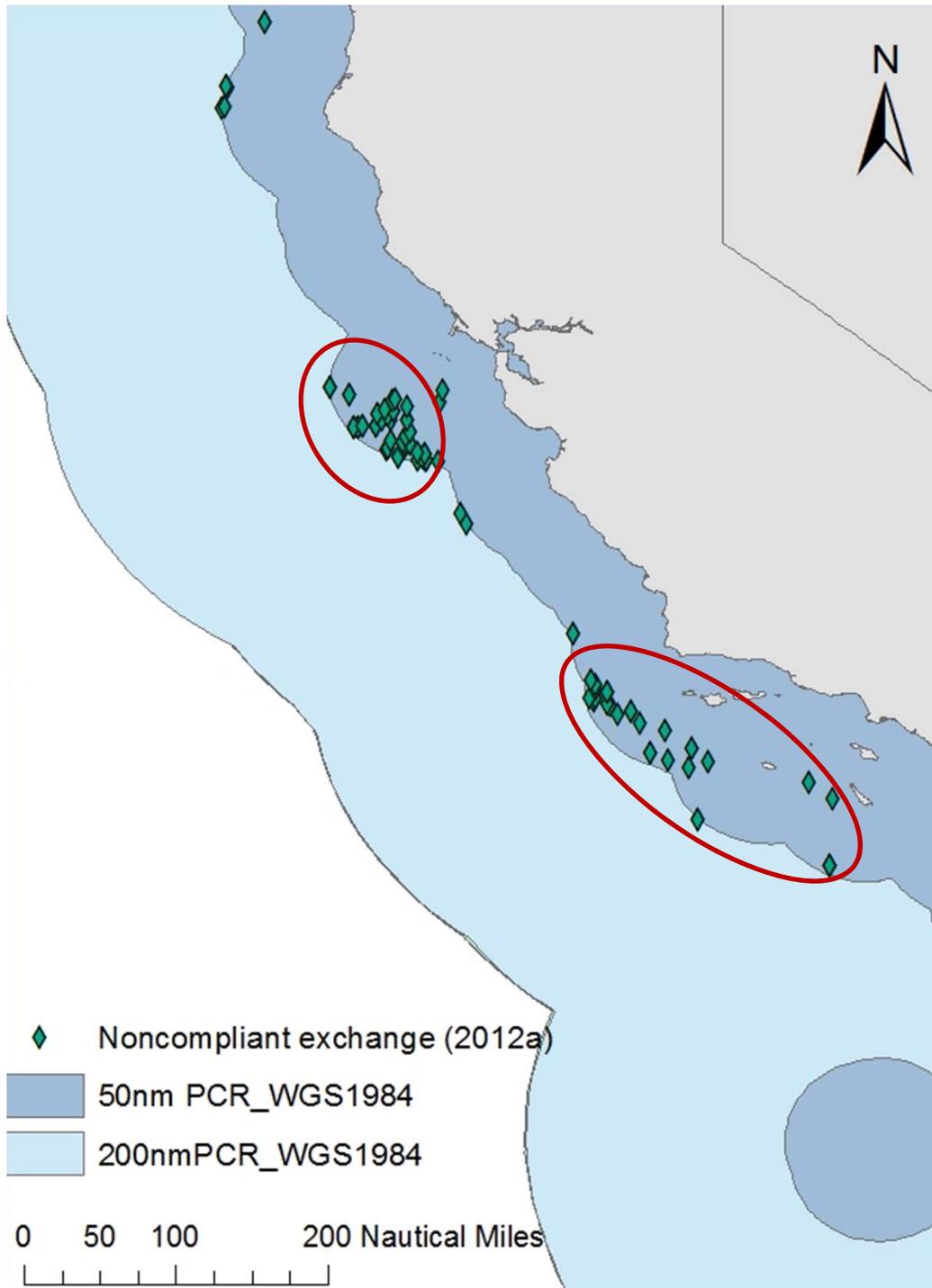
## Noncompliant Discharges By Discharge Port



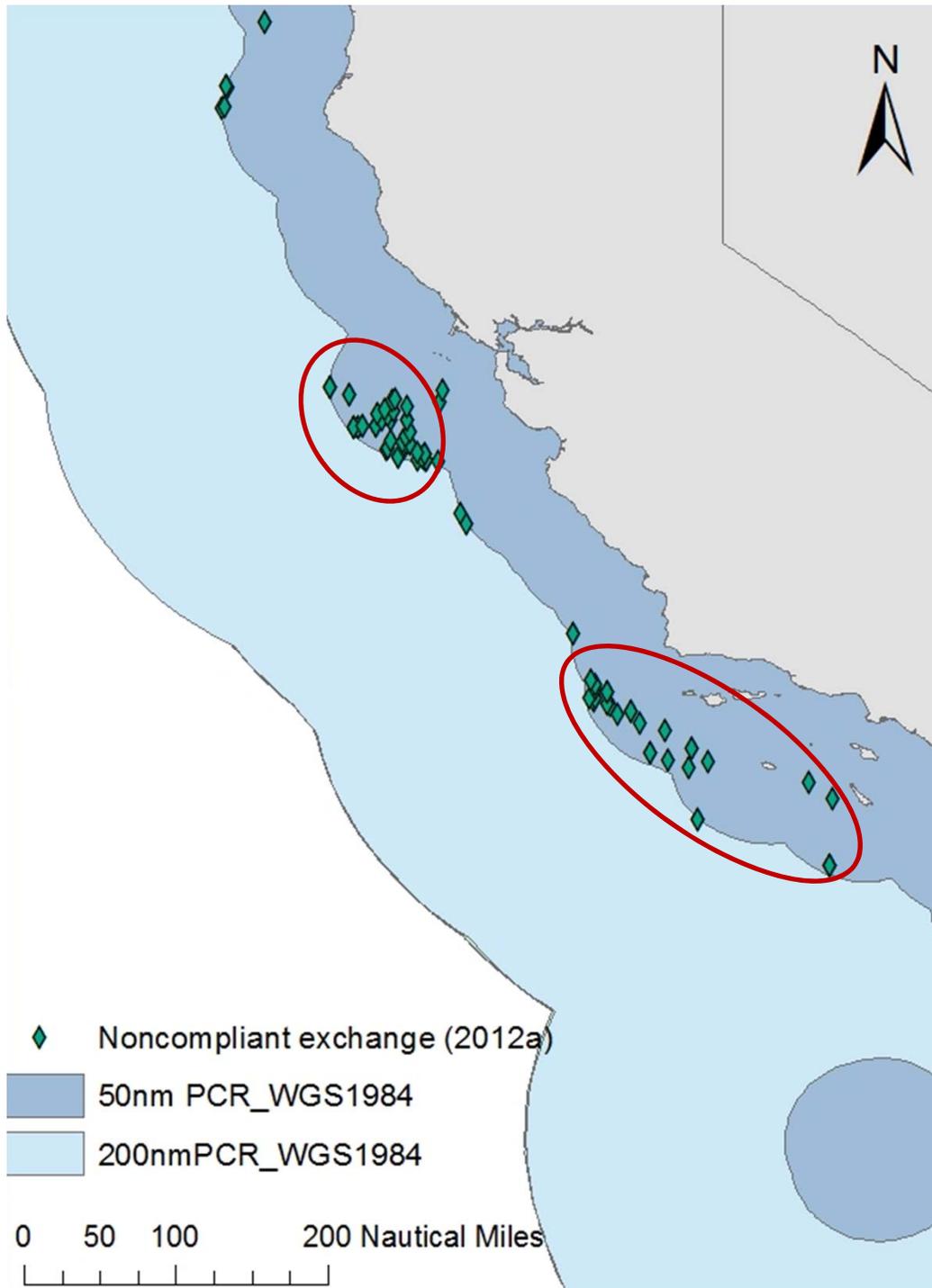
# Breakdown of Noncompliant Discharges







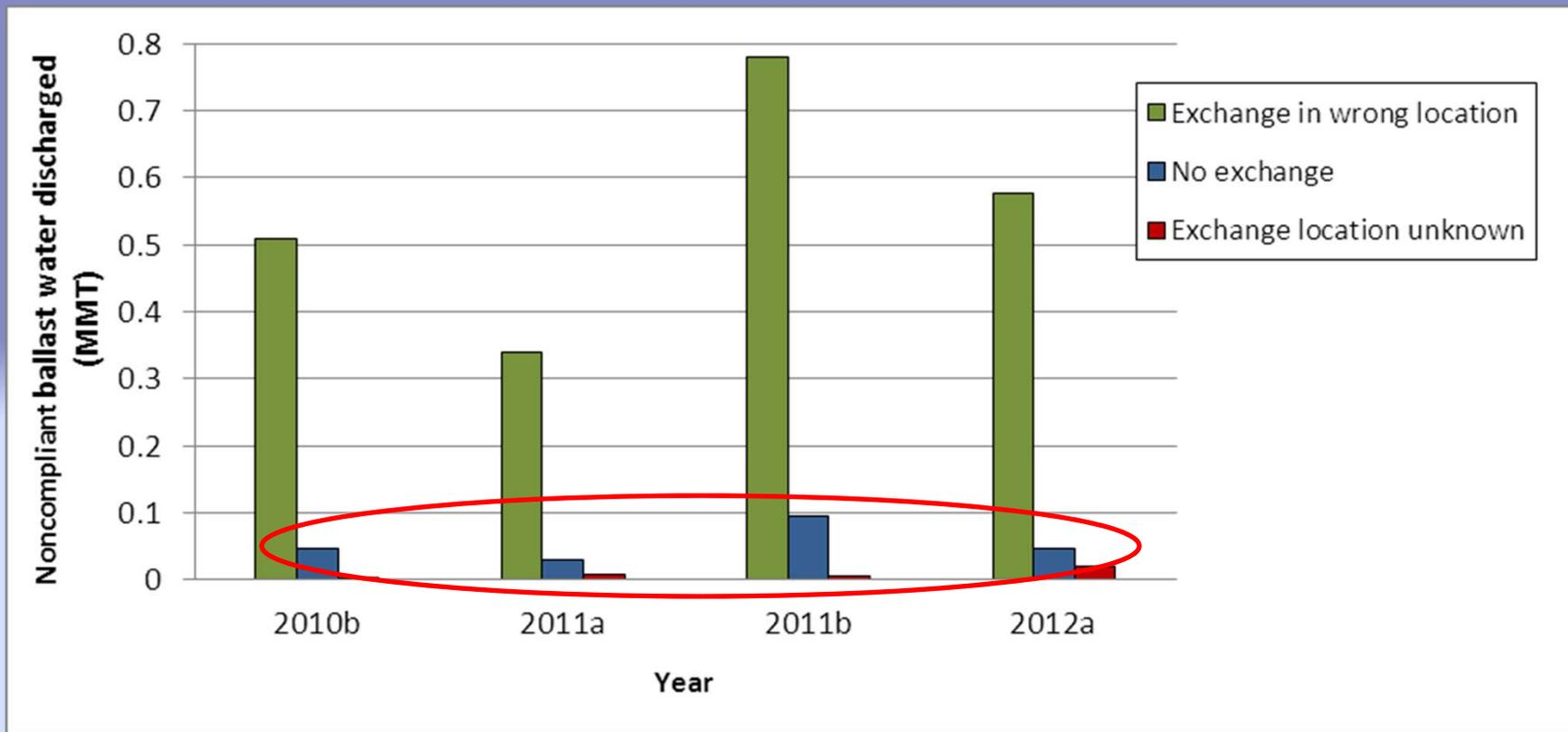
- Exchange violations within the PCR are often due to ships being too close to islands
- Legal exchange must occur 50 nm from ANY land
- Often misinterpreted as 50 nm from coast



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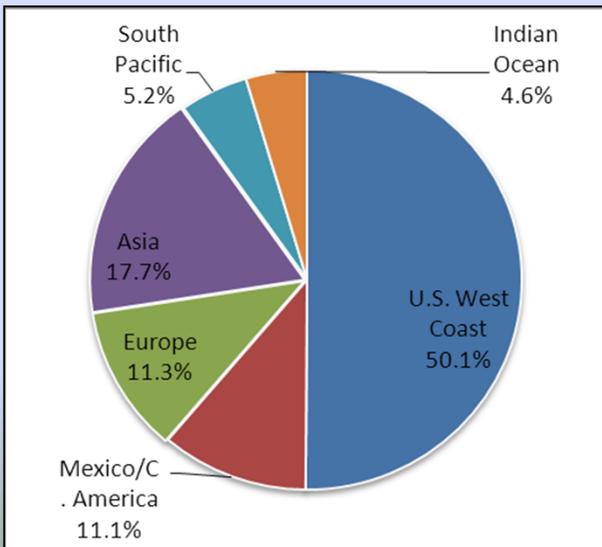
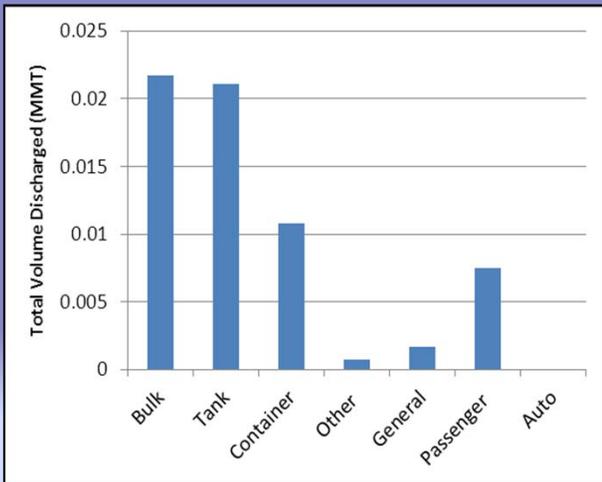
**SOLUTION:** Outreach to ship's crews regarding exchange requirements near Farallone Islands, Channel Islands, etc.

# Breakdown of Noncompliant Discharges

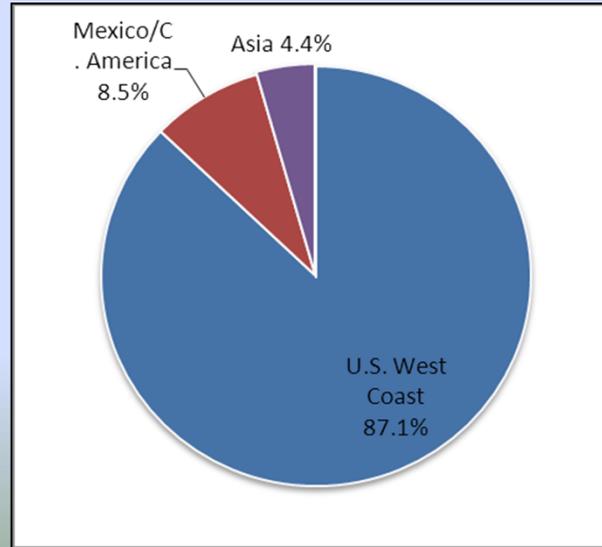
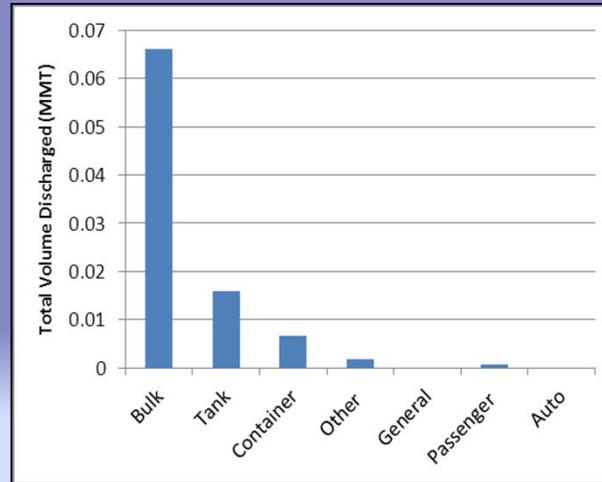


# Unexchanged Ballast Water

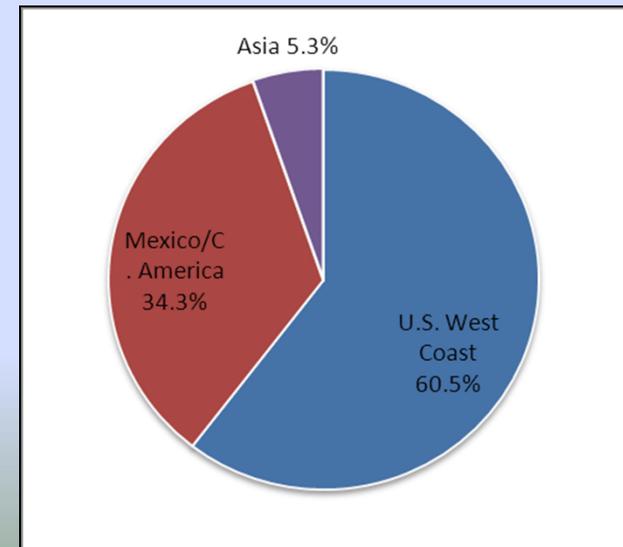
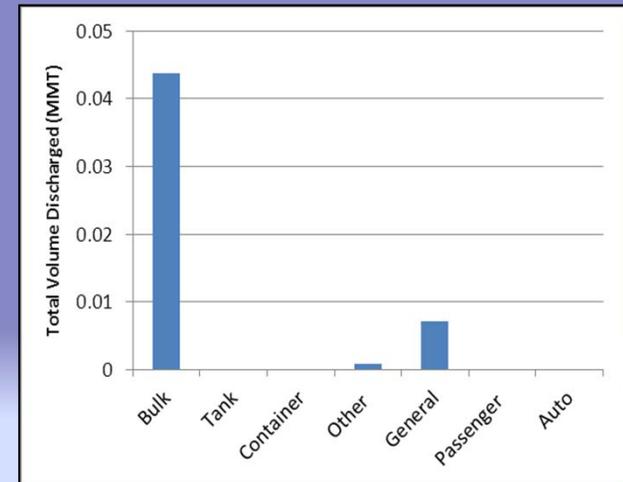
**Los Angeles/Long Beach**  
0.06 MMT



**San Francisco Bay**  
0.09 MMT

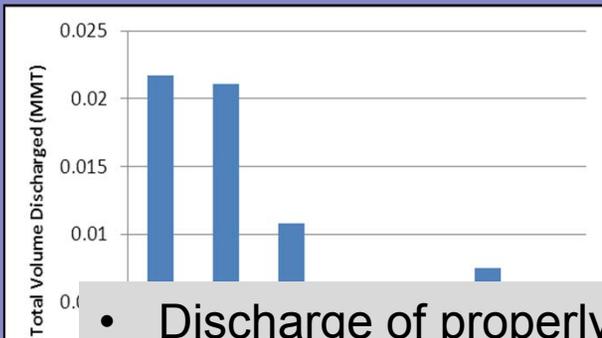


**Sacramento/Stockton**  
0.05 MMT

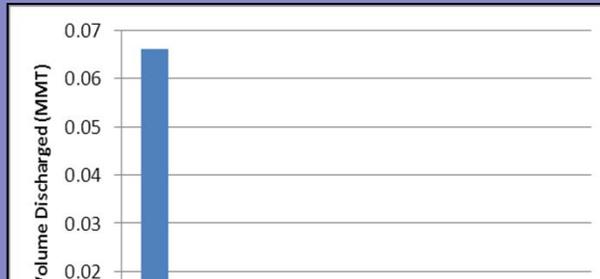


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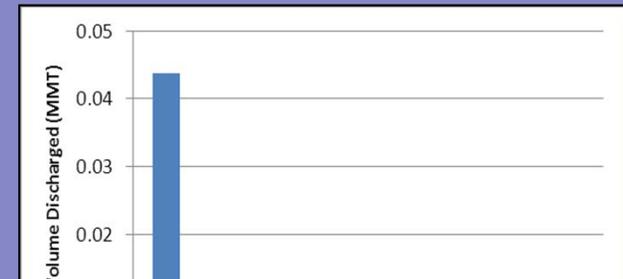
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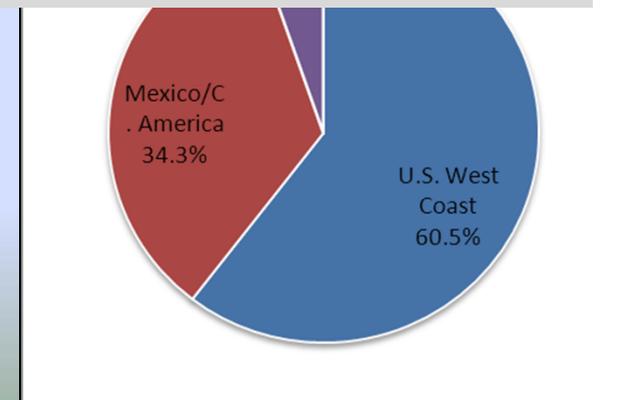
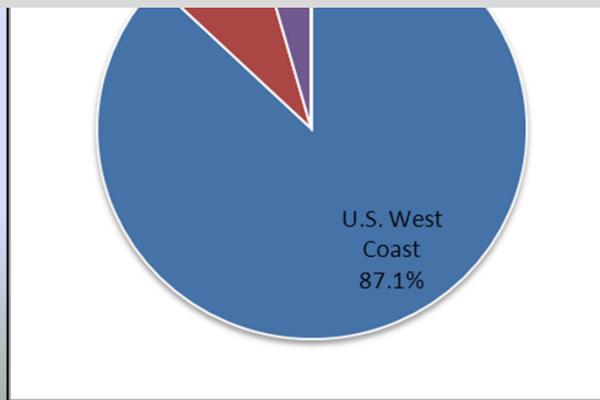
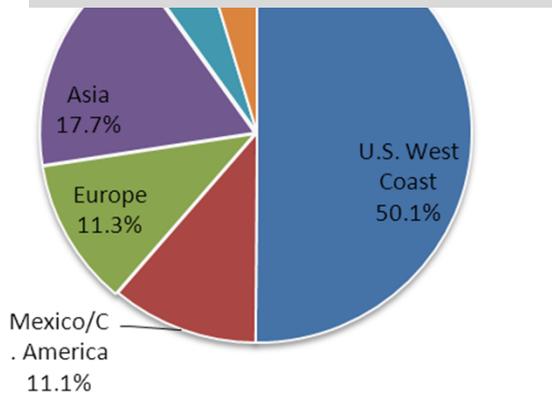
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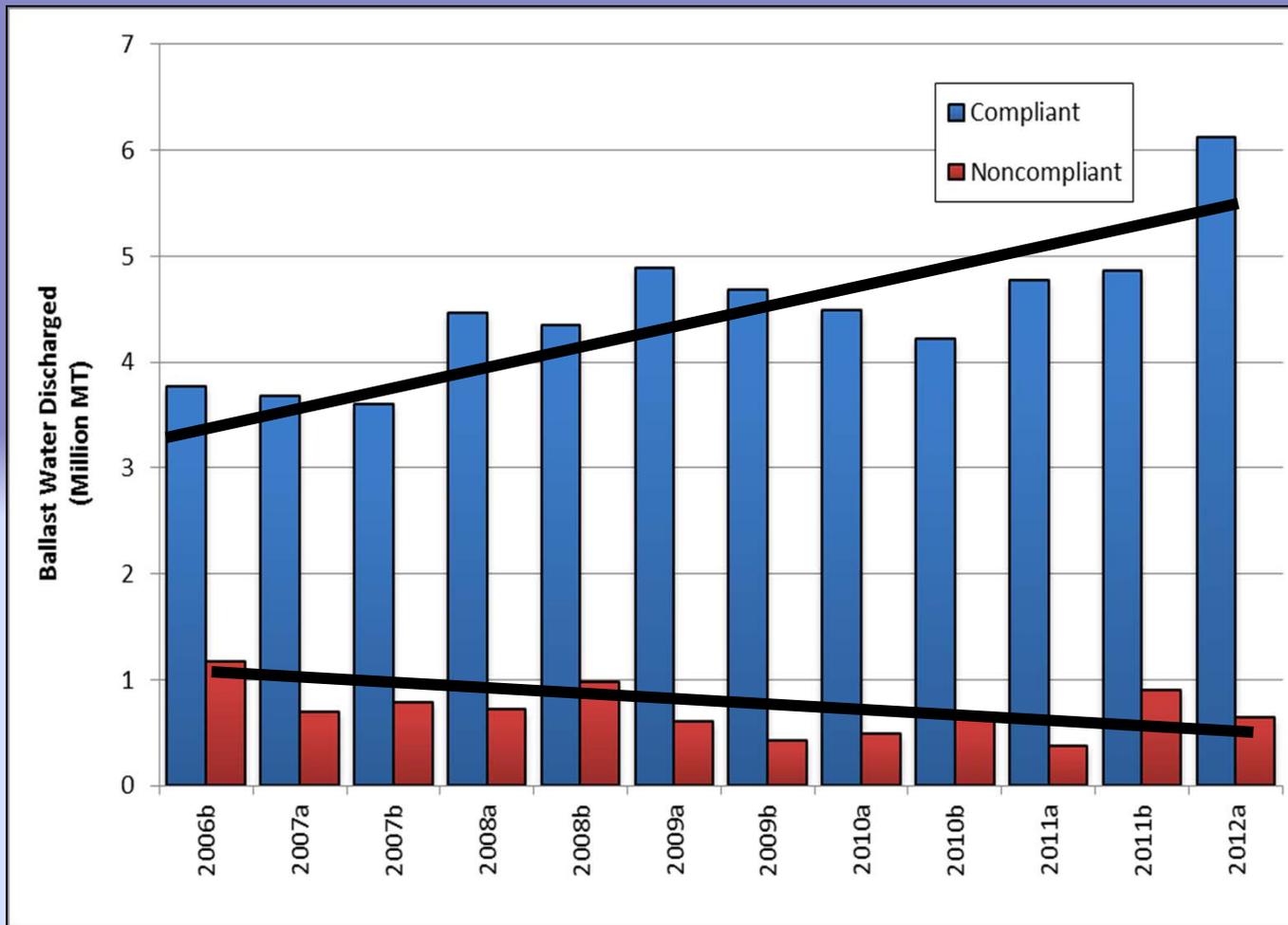
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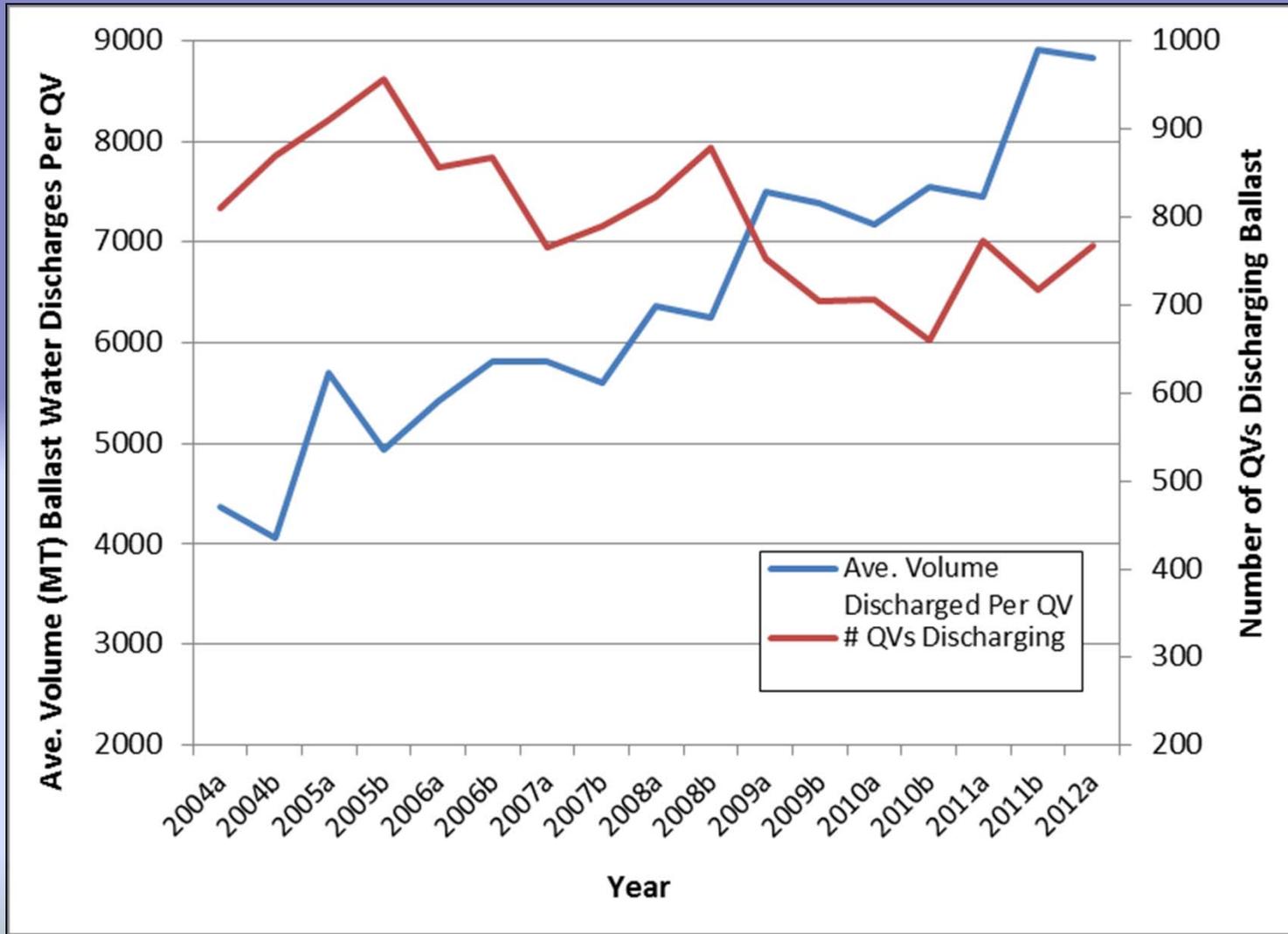
- Discharge of properly managed ballast water in the U.S. varies greatly by geography (Miller et al., 2011).
  - West coast = ~6% unexchanged discharges
  - East coast = ~23% unexchanged discharges
  - Gulf coast = ~21% unexchanged discharges



# Compliance of Discharged Ballast Water Over Time



# Ballast Water Discharges



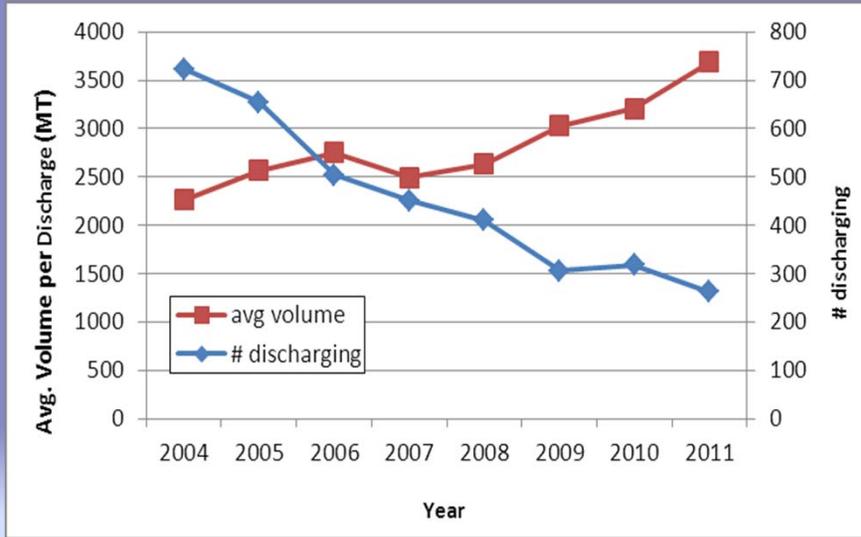
# Concerning?

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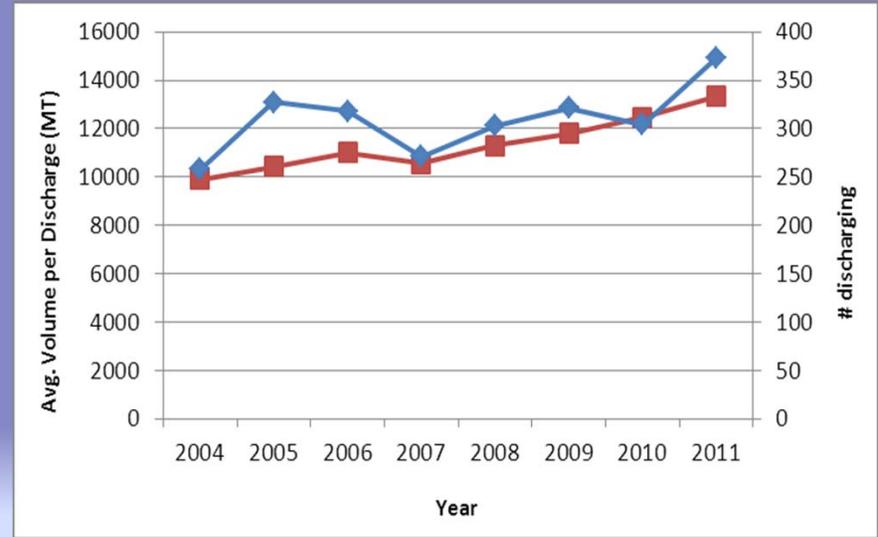
- Ballast water exchange typically eliminates between 70% and 99% of the organisms originally taken into a tank while the vessel is in or near port (MacIsaac et al. 2002, Wonham et al. 2001, USCG 2001, Zhang and Dickman 1999, Parsons 1998, Cohen 1998).
- Despite a high discharge compliance rate in California, this trend represents an **increase** over time in the per discharge risk of NIS introduction

# Ballast Water Discharges

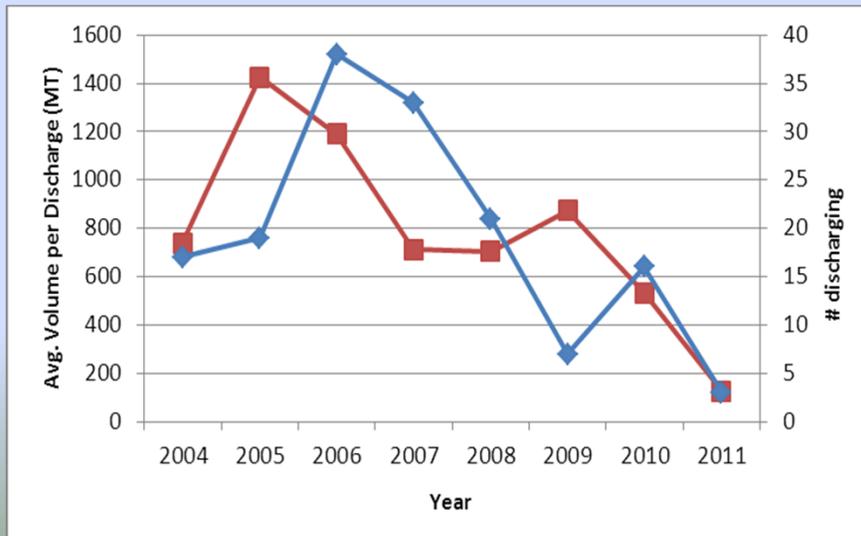
## Container



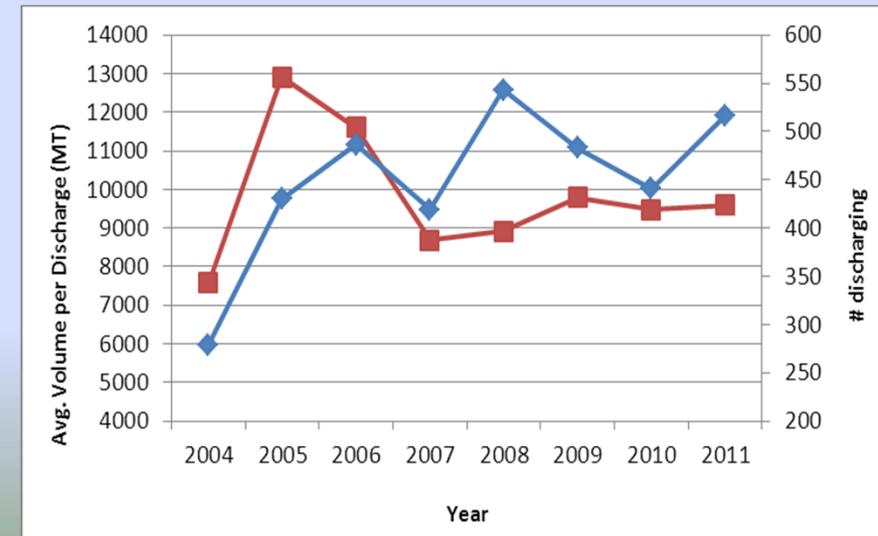
## Bulk



## Auto

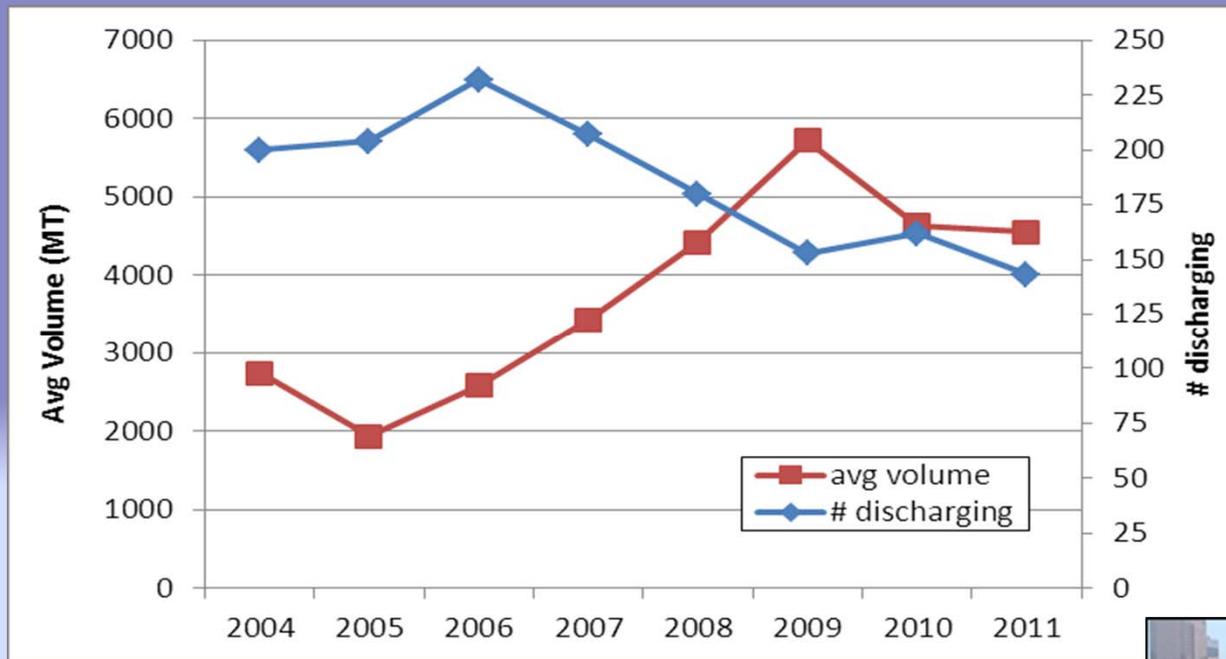


## Tanker



# Ballast Water Discharges

## Unmanned Barge



- Barges face operational difficulties with ballast exchange, which allows the majority to claim legitimate safety exemptions.
- While some barge companies have configured their barges to allow for exchange, the majority discharge unmanaged ballast water.



# Summary

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- The ports of LA-LB and Oakland continue to be the most active ports in CA in terms of vessel arrivals.
- The majority of ships calling on CA manage their ballast water correctly, which has been consistent across regulatory frameworks.
- Most non-compliant discharges are due to operational error or incorrect geography and not intentional non-management.
  - Potential confusion regarding exchanging ballast 50 nm from shore vs. 50 nm from any land mass (e.g. Channel Islands).
- Bulkers and tankers are the largest contributors of improperly exchanged ballast water.
- The higher volume of discharged ballast water (compliant or not) per vessel discharge create an increased risk of NIS introduction per discharge (Illustrates the need for alternative management/treatment systems).

Questions?

