



Implementation Update on the Shelter Island Yacht Basin TMDL Monitoring Program

**MIACC Fall Meeting
October 16, 2018**

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Agenda

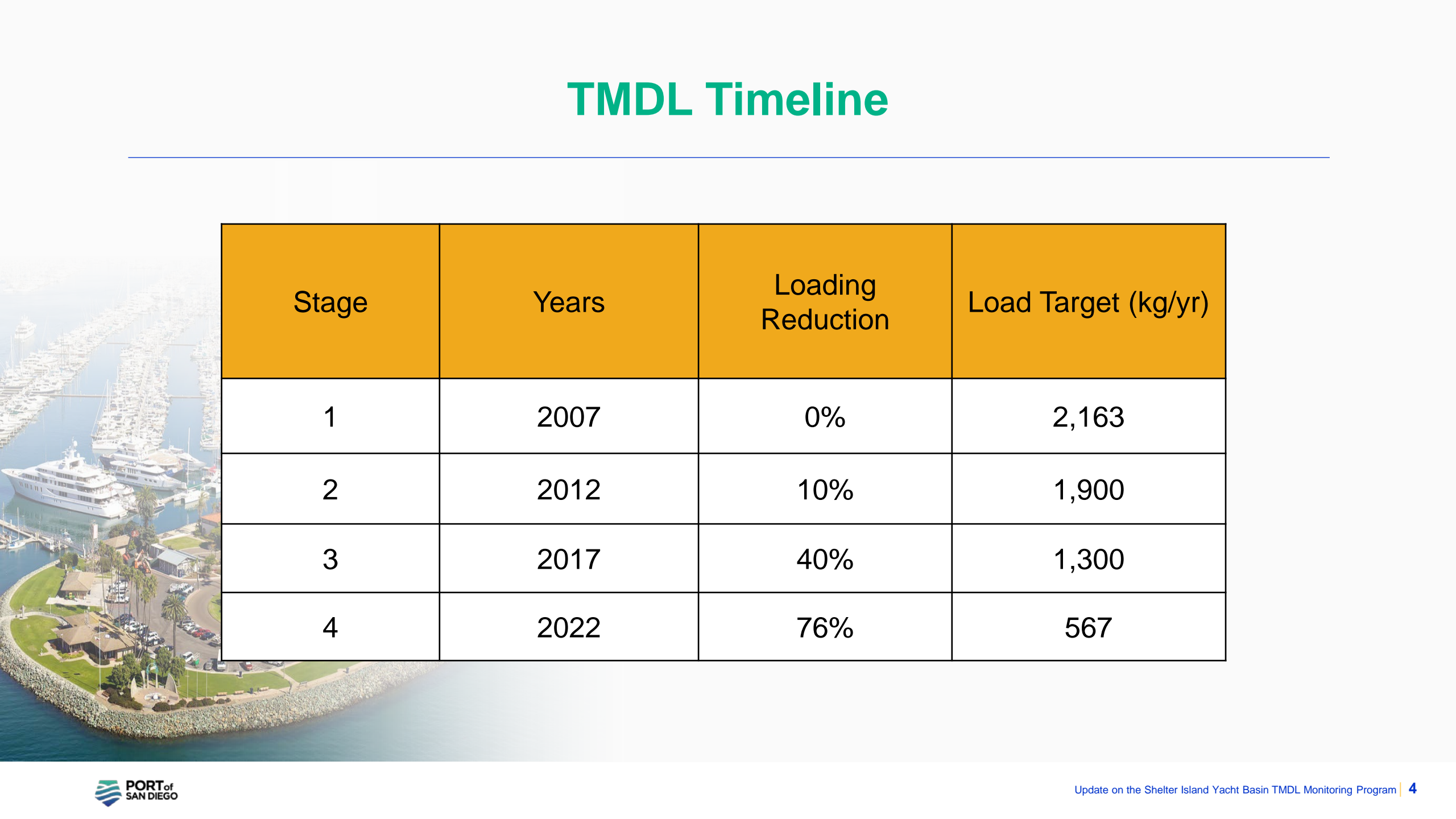
1. TMDL Overview
2. TMDL Milestone
3. Water Quality and Toxicity Data
4. SIYB and Statewide Efforts

TMDL Overview

- Shelter Island Yacht Basin in San Diego Bay
- ~2,300 slips
- 76% load reduction over 17 years
- Subsequent IO to the Port of San Diego to monitor progress annually and report back to San Diego Regional Board



TMDL Timeline



Stage	Years	Loading Reduction	Load Target (kg/yr)
1	2007	0%	2,163
2	2012	10%	1,900
3	2017	40%	1,300
4	2022	76%	567

TMDL Copper Load By Source

Source	Contributions to SIYB (Percent Dissolved Copper)
Passive Leaching	93
Hull Cleaning	5
Urban Runoff	1
Background	1
Direct Atmospheric Deposition	<1
Sediment	0
Total	100

Source: 2005 SIYB TMDL

TMDL Milestone

Regulatory Achievements Thus Far: Shelter Island Copper TMDL

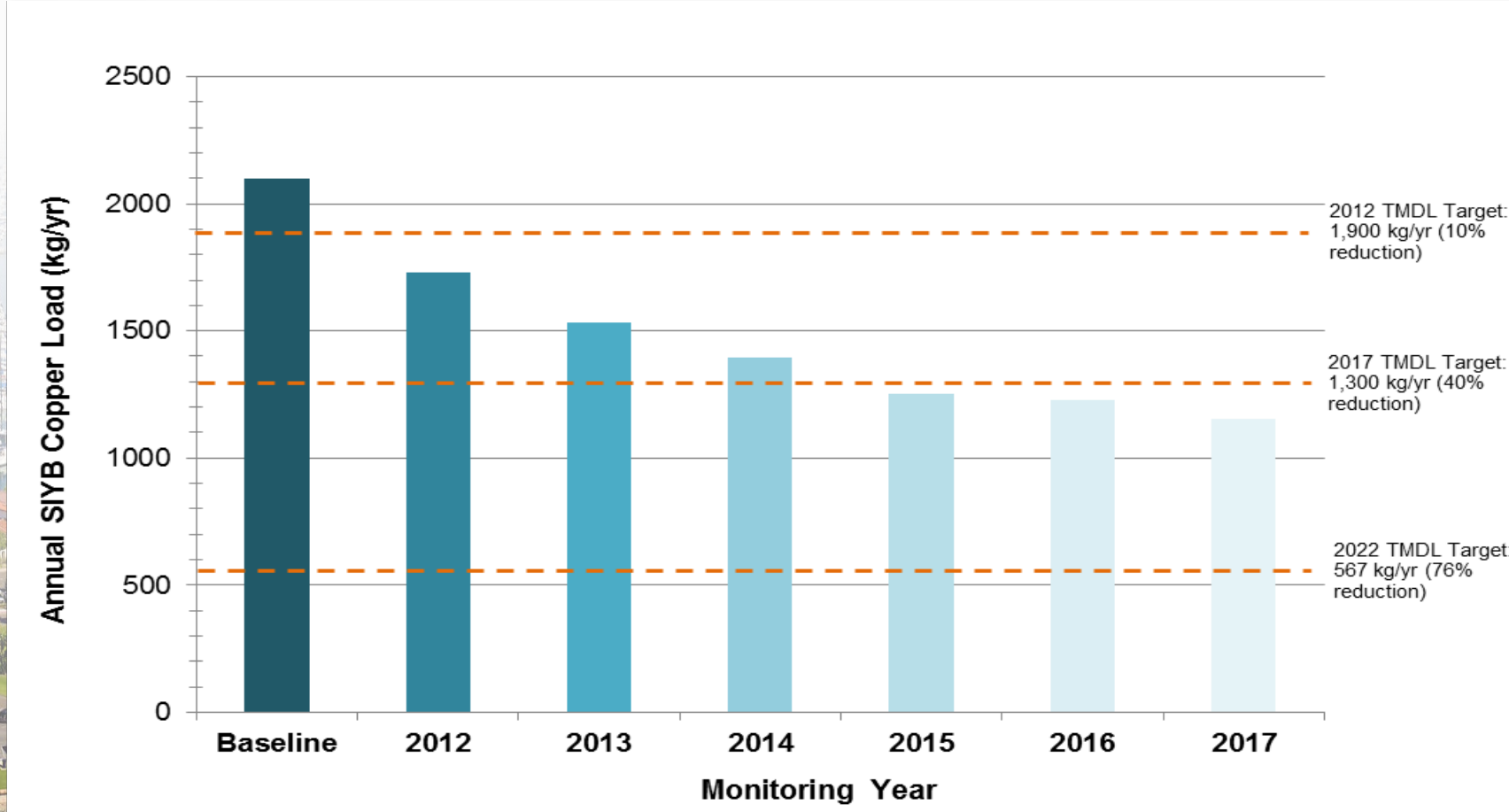
- Continued efforts to identify load reductions from paint, hull cleaning, BMPs, etc.
- Continued tracking and conversion of vessels from copper to non-copper paints
- San Diego Regional Water Quality Control Board confirmed interim compliance

TMDL Compliance Schedule

Stage	Years	Loading Reduction	Load Target (kg/yr)	Actual Loading Reduction
1	2007	0%	2,163	Baseline
2	2012	10%	1,900 ✓	17.6%
3	2017	40%	1,300 ✓	45.4%
4	2022	76%	567	TBD

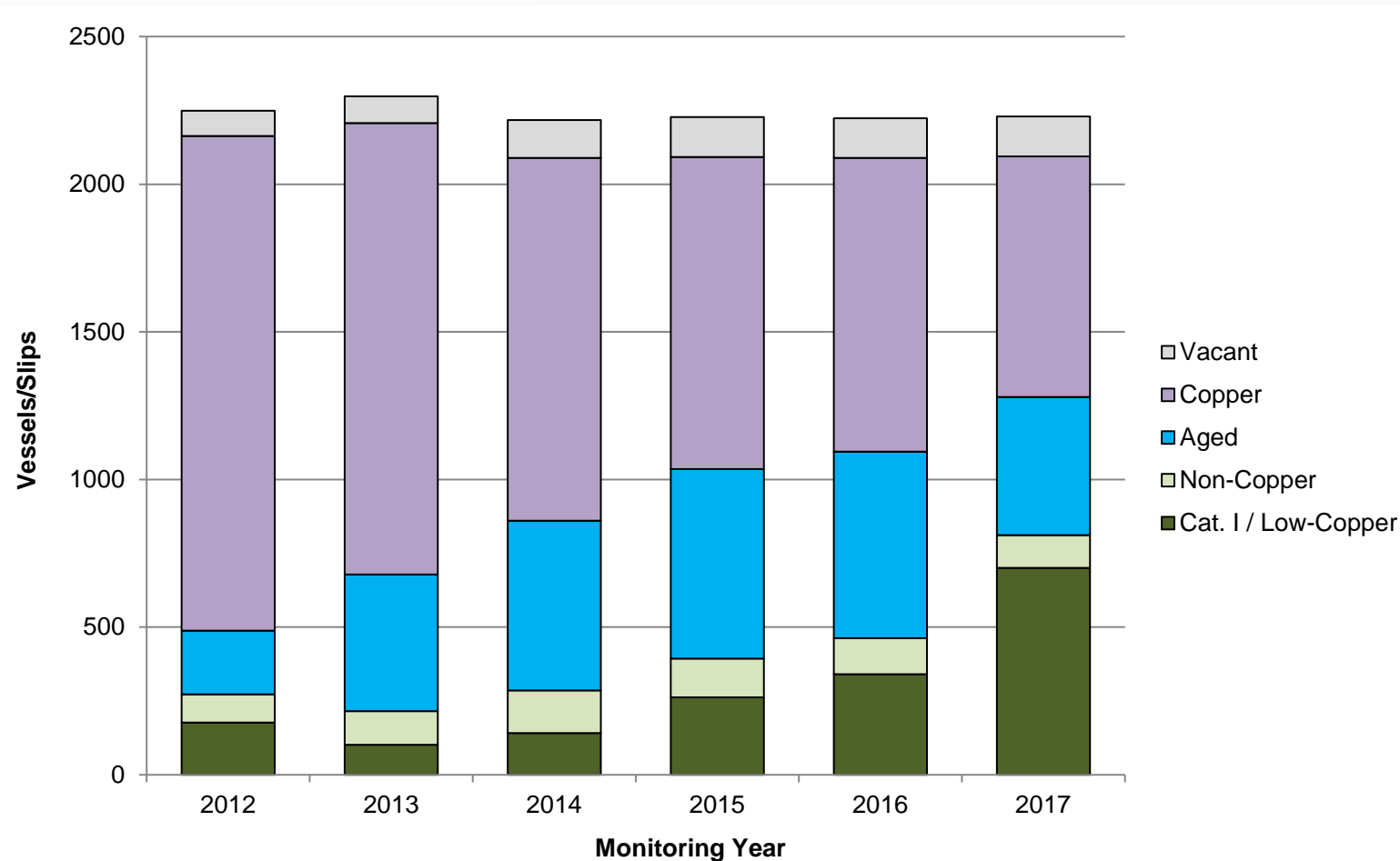
Copper Loading

Annual Copper Load Estimate



Source: 2017 SIYB Annual Monitoring & Progress Report, Amec Foster Wheeler, March 2018

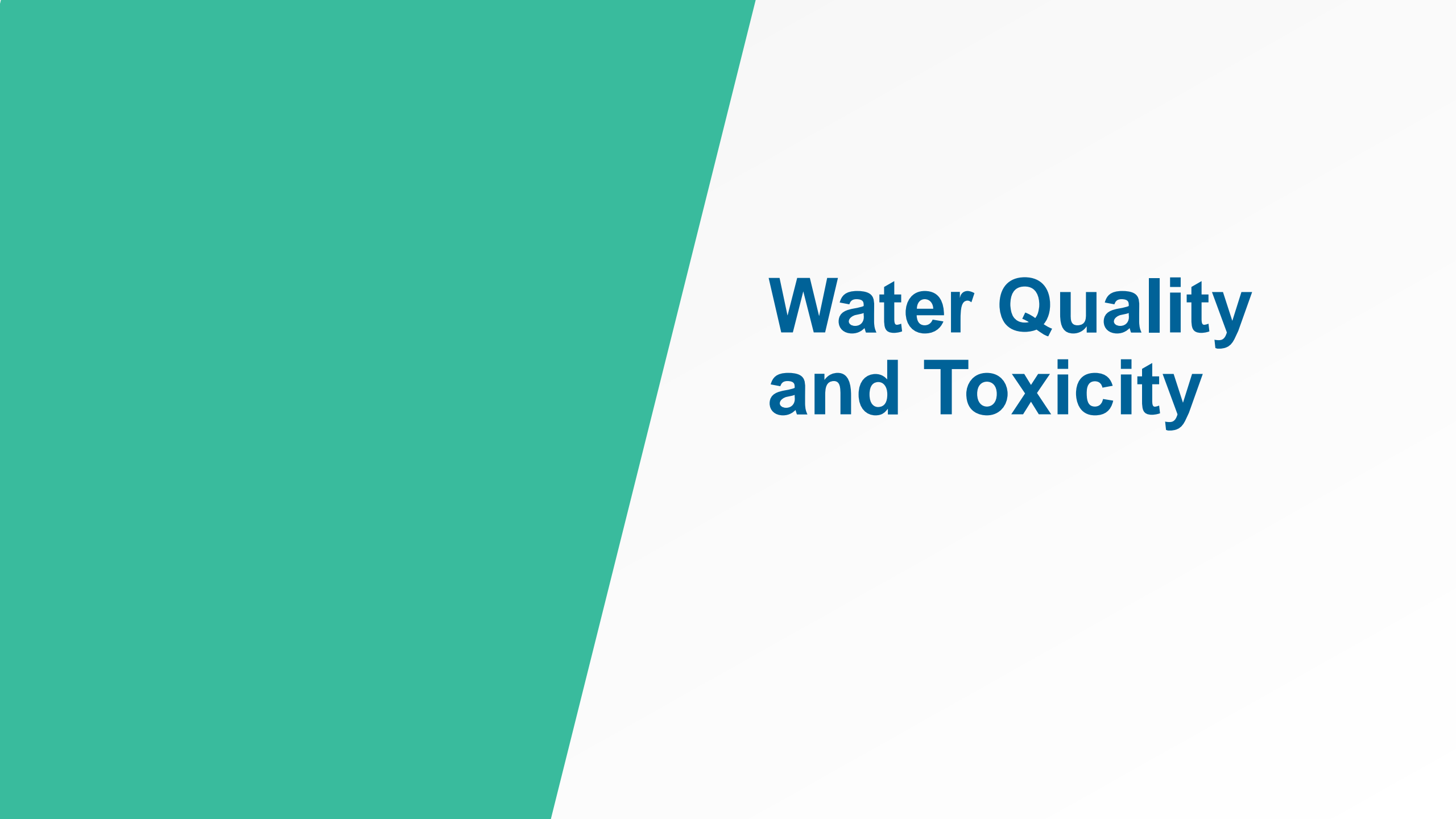
Annual Load Categories per TMDL Year



Source: 2017 SIYB Annual Monitoring & Progress Report, Amec Foster Wheeler, March 2018

Annual Load Calculations

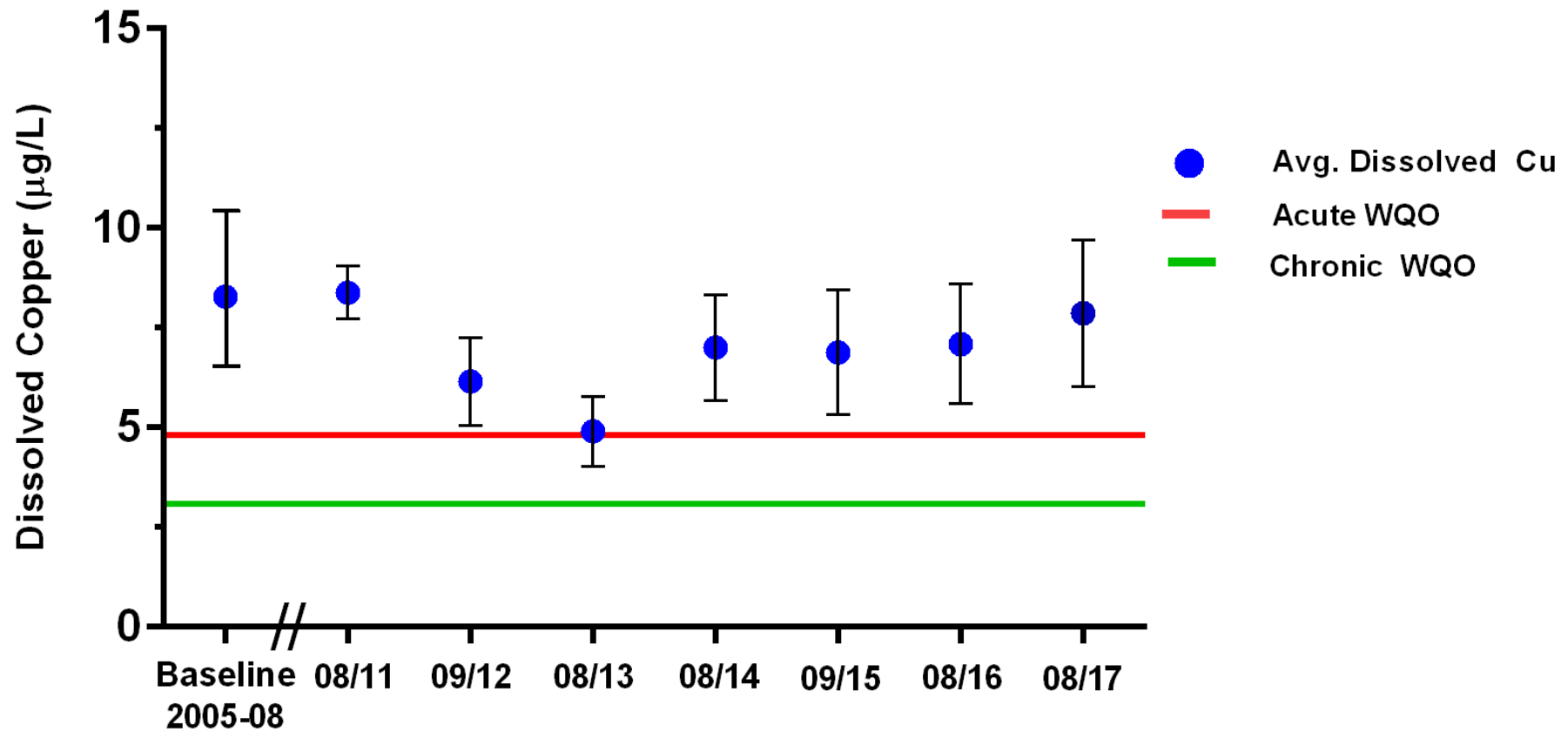
- Copper loading tracked annually
- Each category of paint assigned a load (example: high copper paints and unknowns= full load, Cat 1 paints= half load non-copper paints= zero load).
- Approach vetted with the Regional Board prior to implementation.
- Loading reductions calculated by comparing to assumptions found in the Regional Board's 2005 TMDL:
 - All 2,363 SIYB slips or buoys occupied by a number of vessels
 - All 2,363 recreational vessels moored within SIYB have copper-based paints 100% of the time
 - Annual loading from passive leaching basin wide equals 2,000 kg/yr
 - Annual loading from hull cleaning equals 100 kg/yr
 - Average annual loading per vessel with copper hull paint equals 0.9 kg/yr

The background is split diagonally from the top-left to the bottom-right. The upper-left portion is a solid teal color, while the lower-right portion is white.

Water Quality and Toxicity

Water Quality

Average Dissolved Copper



Source: 2017 SIYB Annual Monitoring & Progress Report, Amec Foster Wheeler, March 2018

Toxicity

- No acute toxicity to fish larvae
- Chronic toxicity observed each year at only 1-2 stations: SIYB-1 (2012-2017) and SIYB-2 (2012, 2015, 2017)
- Each toxicity hit occurred where concentrations have been greater than $\sim 10 \mu\text{g/L}$



Location	Aug. 2011	Oct. 2011	2012	2013	2014	2015	2016	2017
SIYB-1	--	X	X	X	X	X	X	X
SIYB-2	--	--	X	--	--	X	--	X*
SIYB-3	--	--	--	--	--	--	--	--
SIYB-4	--	--	--	--	--	--	--	--
SIYB-5	--	--	--	--	--	--	--	--
SIYB-6	--	--	--	--	--	--	--	--
SIYB-REF	--	--	--	--	--	--	--	--

***Prior to 2017, all toxicity samples analyzed were unfiltered samples. For 2017, both filtered and unfiltered samples were analyzed. At SIYB-2, toxicity was observed in the unfiltered sample; no toxicity was observed in the filtered sample.**

Copper Reduction Program-Overview



The diagram consists of five blue, rounded rectangular boxes arranged in a circular pattern. Each box contains white text representing a component of the Copper Reduction Program. The background of the slide features a faint, light-colored image of a harbor with a large ship and a coastal town.

**Policy Development/
Legislation**

Testing & Research

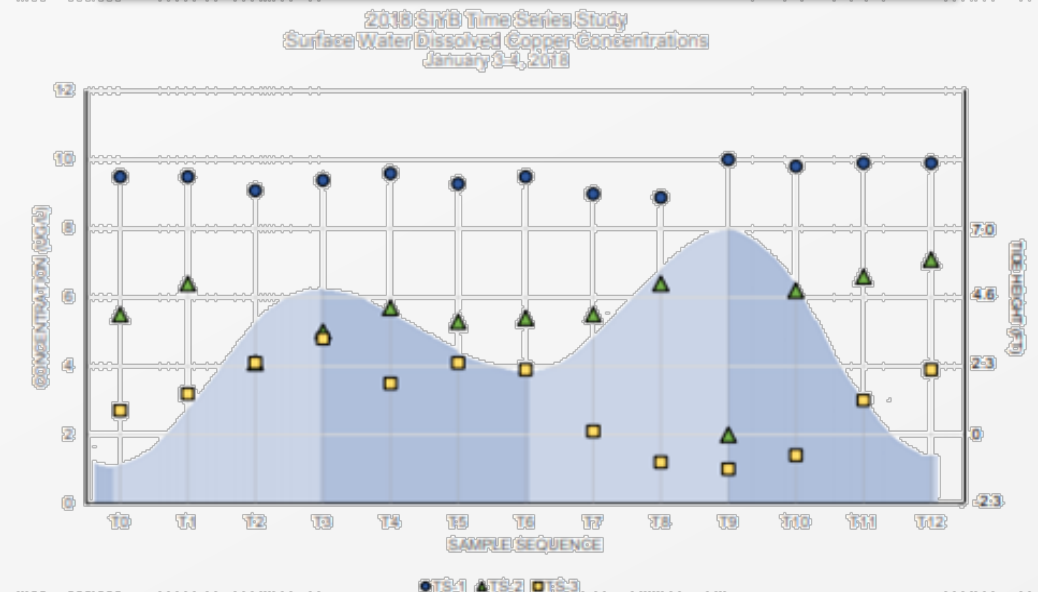
Hull Paint Transition

Education & Outreach

**Monitoring &
Data Assessment**

Key Initiatives in 2017

- Study of SIYB tidal influence completed
- Copper remediation pilot projects through Blue Economy Incubator
- Culvert feasibility assessment ongoing
- Dept. of Pesticide Regulation Copper leach rate regulation (effective July 1, 2018)



Source: 2017 SIYB Annual Monitoring & Progress Report, Wood, March 2017

Major Accomplishments of CRP during Interim Compliance Stage 3

Copper Reduction Program Component	Initiative	2013	2014	2015	2016	2017	Direct (D) or Indirect (I) Load Reduction?	Completed (C) or On-Going (O)	5 Year Summary
Policy Development/Legislation	AB 425	Pot Sponsored Bill	Leach Rate Established (DPR)	-	-	DPR Leach Rate Regulation Adopted	D	O	<ul style="list-style-type: none"> • 1 State Bill Sponsored • 5 Comment letters submitted regarding copper related issues • 19 IWHC Enforcement Actions
	EPA	-	BLM Letter	-	BLM Letter	Registration Review Letter	I	C	
	IWHC	1st Full Year of Regulation	Regulations remain in place: Permits issued and reissued, continued enforcement				D	O	
Testing and Research	Paint Research	Port Grant funded research	On-going additional research and information dissemination				D	C (Grant), O (research)	<ul style="list-style-type: none"> • Early stage paint research funded by Port grant • Continued research by Port staff and dissemination of what is learned to boatyards, marinas, boaters • BEI established and RFP issued for technology solutions to copper issues
	Other Technologies	-	-	-	Blue Economy Incubator (BEI) established, RFP released	2 BEI copper-related projects selected	D	O	
	Culvert Feasibility	Tidal Flushing Modeling	-	-	Engineering culvert Feasibility Study	Continued internal feasibility discussions	D	O	
Hull Paint Transitions:	Port Fleet	Full fleet converted and maintained with non-copper hull paint					D	O	<ul style="list-style-type: none"> • Entire Port vessel fleet converted to non-copper hull paint resulting in 11.01 kg/yr load reduction • 41 total vessels converted to non-copper hull paint under the 319(h) grant resulting in 36.9 kg/yr load reduction
	Private Recreational Boats ¹	27 vessels converted under 319(h)	5 vessels converted under 319(h)	7 vessels converted under 319(h)	Conversions maintained		D	C	
Education and Outreach	Events	Signature hull paint expo event launched; Boating event outreach	Signature expo; Boating event outreach	Boating event outreach	Signature expo; Boating event outreach	-	I	O	<ul style="list-style-type: none"> • 23 booths at boated related events (reaching 260,700 people) • 4 Expos hosted • 3 brochures/print materials created • Over 500 print materials distributed to boatyards • 2,226 views on Web-Based calculator • 962 views on Boater Testimonial video • 7 Press Releases • 4 newspaper articles
	Web Material	Paint Conversion Cost Calculator completed	On-going updates of special website, Peer-based testimonial video available to view				I	O	
	Print Material	Press Releases	Paint information packets	Boater Paint Brochure, Press Releases	Press Releases, Newspaper Articles		I	O	

Major Accomplishments of CRP during Interim Compliance Stage 3

Copper Reduction Program Component	Initiative	2013	2014	2015	2016	2017	Direct (D) or Indirect (I) Load Reduction?	Completed (C) or On-Going (O)	5 Year Summary
Monitoring and Assessment	Annual Water Quality Monitoring	Annual water quality monitoring for dissolved copper at TMDL stations					I	O	<ul style="list-style-type: none"> • Annual compliance monitoring show meeting interim TMDL target load reductions <ul style="list-style-type: none"> • 2 updates to CSM • 1 Modeling Study • 2 Special Studies • 1 completed RHMP cycle and planning 2018
	Conceptual Model	Updated		-	-	-	I	C	
	Water Column Special Study	-	-	Development	Final report	-	I	C	
	24 hr. Tidal Special Study	-	-	-	-	Development	I	O	
	RHMP Core Monitoring	Core monitoring conducted	Data analysis and draft reporting		Final report	2018 core monitoring planning	I	C (2013) O (2018)	
	Modeling Study	Development	Final report	-	-	-	I	C	

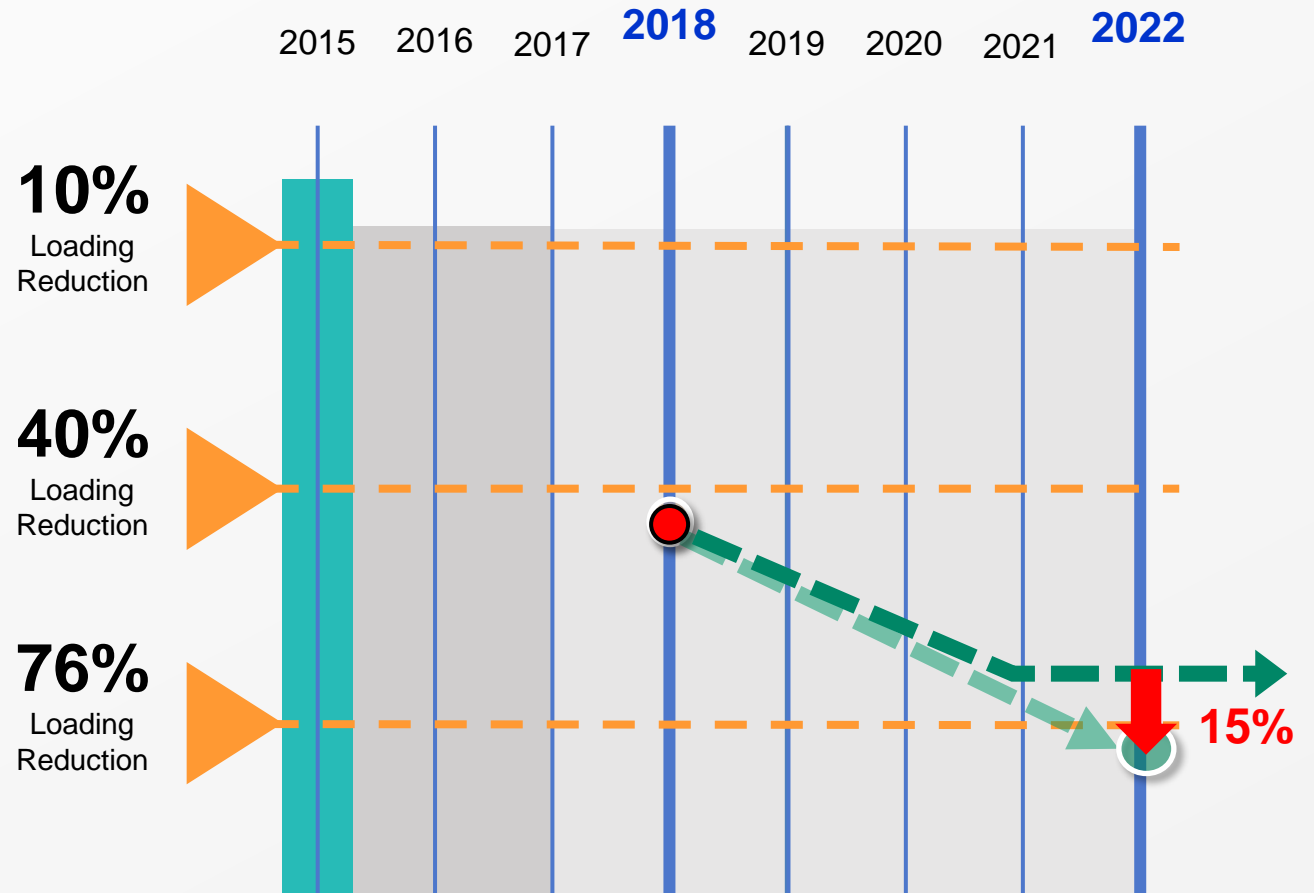
Port was directly involved in the conversions of private recreational vessels through the 319 (h) Grant program.

A large teal-colored graphic element consisting of a diagonal line running from the top-left towards the bottom-right, creating a triangular shape on the left side of the slide.

Shelter Island Yacht Basin and Statewide Efforts

Dept. of Pesticide Regulation: Copper Paint Rule

- Statewide Regulation started July 1, 2018
- CAT 1 copper paints only available option for recreational boats
- Applies to point of sale (boatyards)
- 3-year average life cycle of paints
- Potential to reduce copper load by ~338 kg/yr (61% total loading reduction) by 2021



Education and Outreach Efforts



What is the difference between biocide hull paint and non-biocide hull paint?

Biocide hull paints are toxic and act similarly to pesticides that prevent infestations of insects or weeds on your lawn.

Biocide paints contain copper or zinc or other active ingredients (e.g., formaldehyde) to prevent fouling on boat hulls. However, biocide paints are also known to be toxic to marine organisms.

Non-biocide paints do not contain active ingredients, making them much environmentally friendly. These paints are typically made of plastic, chemicals, and epoxy materials.



Marinas in Southern California impacted by copper pollution include Marina del Rey, Newport Bay and Shelter Island Yacht Basin. For more information on the regulations and requirements in these areas, contact the local Regional Water Quality Control Board.



Marina del Rey
LOS ANGELES REGION (09)
<http://www.sanandreas.org/boating/boatpaint/boatpaint.htm>

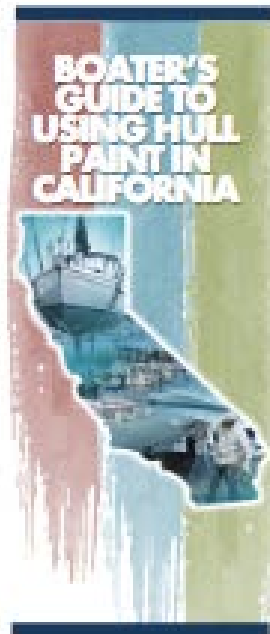
Newport Bay
SANTA MONICA REGION (10)
<http://www.sanandreas.org/boating/boatpaint/boatpaint.htm>

Shelter Island Yacht Basin
SANTA MONICA REGION (10)
<http://www.sanandreas.org/boating/boatpaint/boatpaint.htm>

This material was prepared by the Port of San Diego in collaboration with the County of Los Angeles, Department of Boating and Yachting, the California State Parks Division of Boating & Yachting, and the California Coastal Commission.



JANUARY 2018
in support of the TMDL



Are you looking to repel your boat hull?

Selecting a paint for your boat is far from a one-size-fits-all strategy. Key considerations include available hull paints, paint longevity, cleaning needs, and potential environmental concerns.

Copper is commonly used in hull paint to slow or stop the growth of marine life (fouling) on boat hulls by releasing copper (leaching). However, copper hull paints have been identified as the largest source of copper pollution in marinas.

As a part of the solution, use this guide to select a hull paint that minimizes (e.g., non-biocide paint) or reduces (lower leach rate copper paint) the release of copper into the environment.



BOATER'S GUIDE TO USING HULL PAINT IN CALIFORNIA

PAINT OPTIONS

<h4>Non-Biocide Paints</h4> <p>The most environmentally friendly approach:</p> <ul style="list-style-type: none"> Hull paints that do not contain metals (such as copper or zinc) or other active ingredients. Estimated average useful life: 8-12 years. Recommended cleaning: Every 2 to 4 weeks (frequency and method vary by product and season). Long-term benefits include longer useful life (reduced hull rot). This may offset higher upfront application cost when compared to biocide paints. Use of non-biocide paints is encouraged statewide, especially in waters impacted by copper pollution. <p>Paint Examples:</p> <ul style="list-style-type: none"> Interlux® Triple-Blend® 300 Interlux® VC Performance Epoxy Interlux® Performance Coatings® 	<h4>Non-Copper Biocide Paints</h4> <ul style="list-style-type: none"> Hull paints containing zinc or other non-copper active ingredients (e.g., Tealox®) to prevent marine growth on boat hulls. Estimated average useful life: up to 2 years. Recommended cleaning: Every 2 to 4 weeks (frequency and method vary by product and season). Non-copper biocide paints do not result in the release of copper. However, these paints release other active ingredients that may lead to future water quality impacts. <p>Paint Examples:</p> <ul style="list-style-type: none"> Interlux® Super ProGuard Interlux® Triple-Blend® 300 Interlux® Performance Coatings® 	<h4>Lower Leach Rate* Copper Paints</h4> <ul style="list-style-type: none"> Hull paints with leach rates of or below 0.4 µg/cm²/day. Estimated average useful life: 2-3 years. Recommended cleaning: Wait a minimum of 30 days after applying new hull paint before initiating cleaning. Boaters are encouraged to clean their hulls only when needed, no more frequently than once every 30 days. Use of lower leach rate copper paints is encouraged statewide, especially in waters impacted by copper pollution. <p>Paint Examples:</p> <ul style="list-style-type: none"> Interlux® Super ProGuard Interlux® Triple-Blend® 300 Interlux® Performance Coatings® 	<h4>Higher Leach Rate* Copper Paints</h4> <p>Use of higher leach rate copper paints is discouraged statewide.</p> <ul style="list-style-type: none"> Hull paints with leach rates above 0.4 µg/cm²/day. Estimated average useful life: 2-3 years. These paints may be discontinued in the future due to leaching concerns. Frequent and aggressive cleaning of higher leach rate copper paints is discouraged, as cleaning increases the release of copper into the water. <p>Paint Examples:</p> <ul style="list-style-type: none"> Interlux® Ultra Interlux® Triple-Blend® 300 Interlux® Performance Coatings®
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*California Department of Pesticide Regulation (CDPR) has categorized registered copper paint leach rates as low (0.4 and <0.4 µg/cm²/day) based on their product specific leach rates.

Hull paint life span estimates based on manufacturer's claims.

Cleaning frequency recommendations based on use of non-biocide hull paint cleaning and Southern California boating conditions. Paints are listed by manufacturer and paint name. Paint examples represent products known to be used by California boaters.

The manufacturer's environmental products have been selected for endorsement or recommendation for use.

For more information on available copper hull paint and more information on CDPR's regulation efforts, visit the website: <http://www.cdpr.ca.gov/boats/registration/boatpaint/boatpaint.htm>

www.boating.org/boats/boatpaint/boatpaint.htm
January 2018

Ongoing Adaptive Management



Hull Cleaning



Hull Paints



Alternative Mechanisms?



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