



Port Biofouling Study and US EPA Vessel General Permit: Ballast Water Results



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Pacific Ballast Water and Biofouling Group

Long Beach

SAFER
GREENER
SMARTER

SGS

SGS

WHAT IS SGS, AND WHAT DOES IT DO?

1878

OUR STORY STARTS IN THE MARITIME INDUSTRY





WHAT IS SGS, AND WHAT DOES IT DO?

1878

WORLD'S LEADING TESTING, INSPECTION, AND CERTIFICATION COMPANY

2025



N°1

World leader



99 250

Employees



>2 700

Offices and
laboratories



5

Focus areas



Global Service
Local Expertise

Study on Port Perspectives for Biofouling Management

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Study Overview

- Global Environment Facility-United Nations Development Programme-International Maritime Organization (**GEF-UNDP-IMO) GloFouling Partnerships Project**
 - **6.5-year** global initiative to protect marine ecosystems from the negative effects of invasive aquatic species (IAS) transferred through biofouling on ships
 - **Objectives:**
 - **build capacity** in developing countries to implement IMO BF Guidelines (and other relevant guidelines)
 - **catalyze reductions in IAS transfer** (also reducing GHG)
- Study on biofouling management in ports
 - Commissioned by the Global Industry Alliance (**GIA) for Marine Biosafety**
 - Timeline: Nov 2023 – April 2024 (Report May 2025)

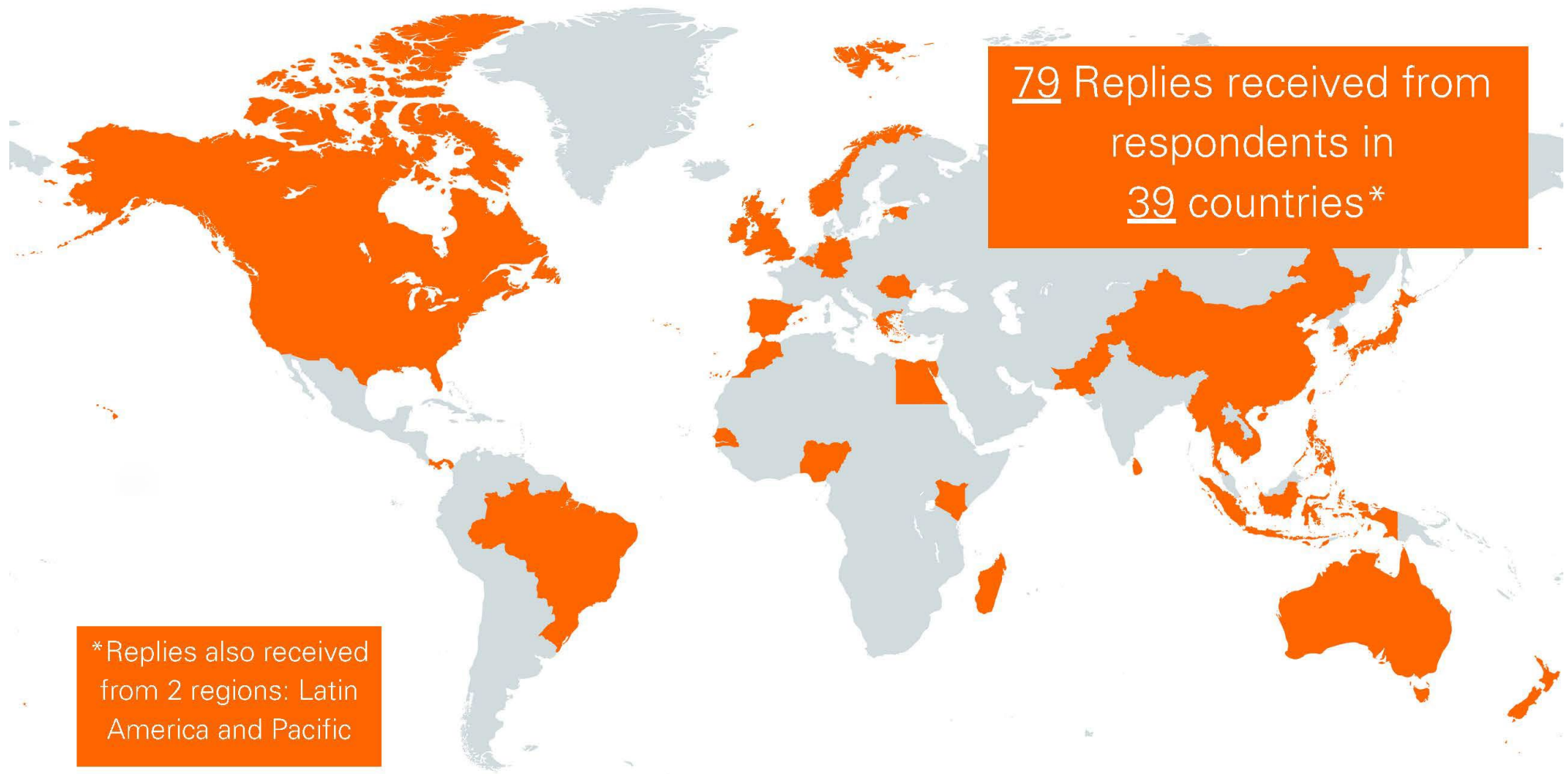


Surveys

- **Port Survey**
 - SGS Affiliates and team members contacted **ports/regions/Administrations**
- **GIA Survey**
 - Interviewed/received feedback from 13 members (GIA members + other stakeholders)
- **Researcher Survey**
 - Contacted International Council for the Exploration of the Sea (ICES) working groups (3) and Global TestNet
 - Met with Prof. James Carlton
- Comprehensive feedback
 - “Bright spots” to make recommendations



Survey Responses



*Replies also received from 2 regions: Latin America and Pacific

79 Replies received from respondents in 39 countries*

Not for distribution

Survey Responses



20 countries recommend the use of the 2011 or 2023 IMO Biofouling Guidelines* (51%)

7 Countries have biofouling training in place or planned (18%)

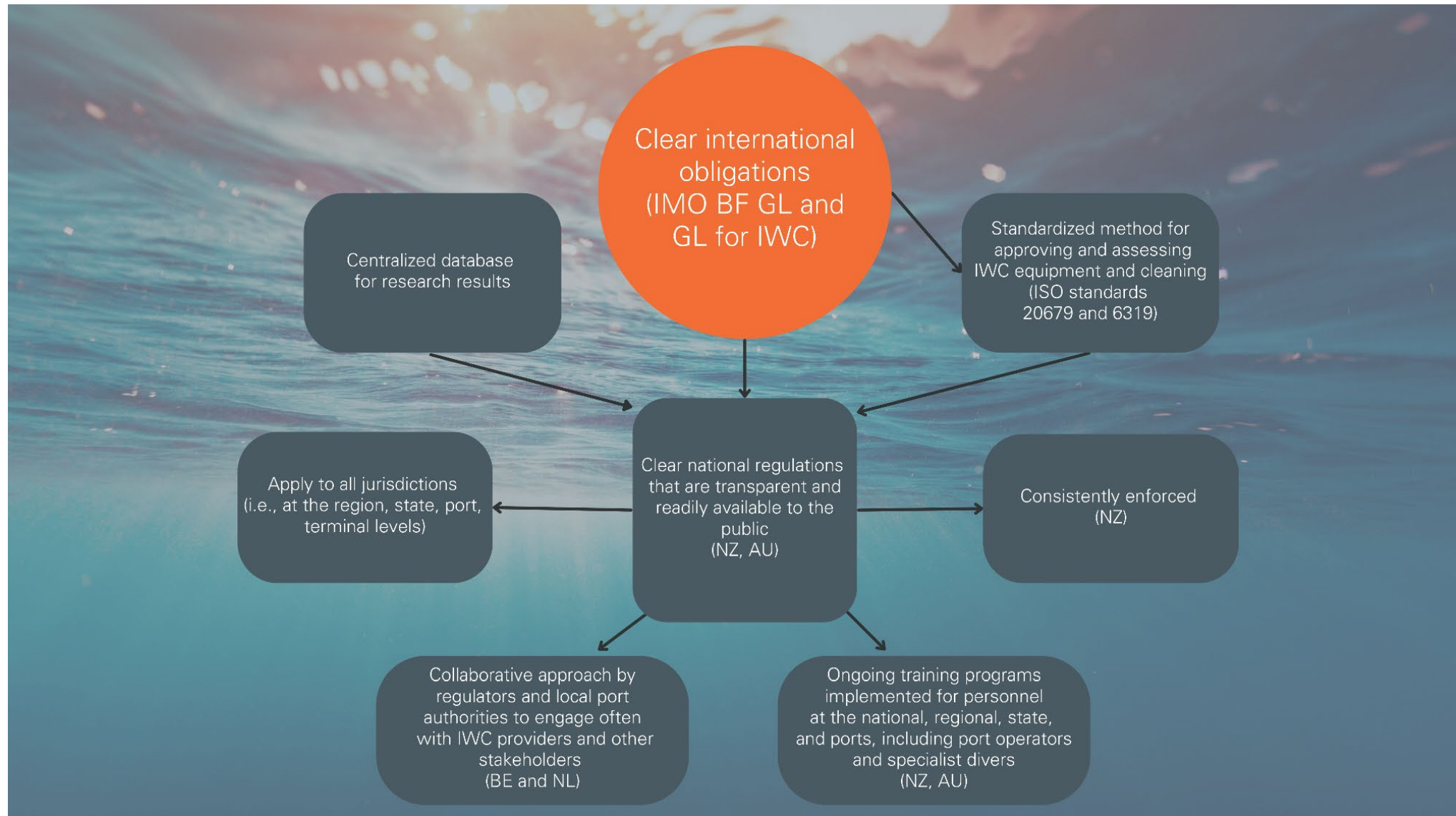
Australia, Canada, Madagascar, New Zealand, Nigeria, Pakistan, and Sri Lanka

*In at least one state.

*In at least
1
state



Proposed Model for Global Biofouling Management*



*Bright spots
in
parentheses

US EPA Vessel General Permit: Ballast Water Results Show Improvement over Time

Peter Stehouwer, Guillaume Drillet, Claudio Gianoli,
Li Gang, Aristeia Zacharopoulou, Vladimiro Bonamin,
and Lisa Drake



Data



- **2014 to 2023 (10 Years)**

- Monitoring data: Biological organism + residual biocides and derivatives
- 17,904 annual reports submitted

- **Data cleaning**

1064/17,904, 6%

- **Duplicate annual reports:** Older report was used, and the newer report(s) were removed

- **Analytical data not submitted:** No action

E. coli: 4195/17,904, 23%

- **Unrealistic (or impossible) results:** 0 replaced by lower detection limit; values graphed with/without outliers

0 replaced: 14,015/146,750, 10%

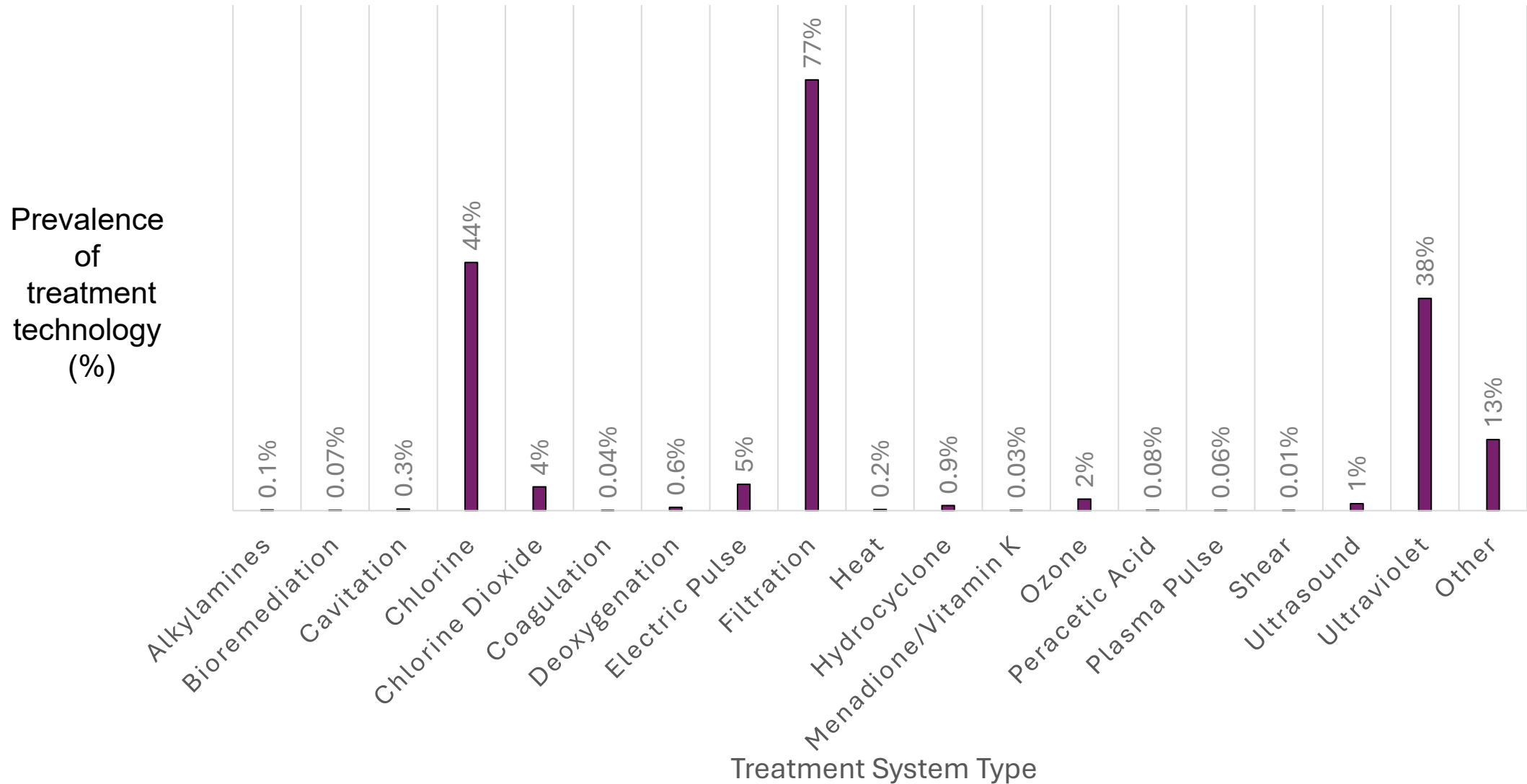
- **No method/“other method” listed:** No action

Method: 11,093/146,750, 8%

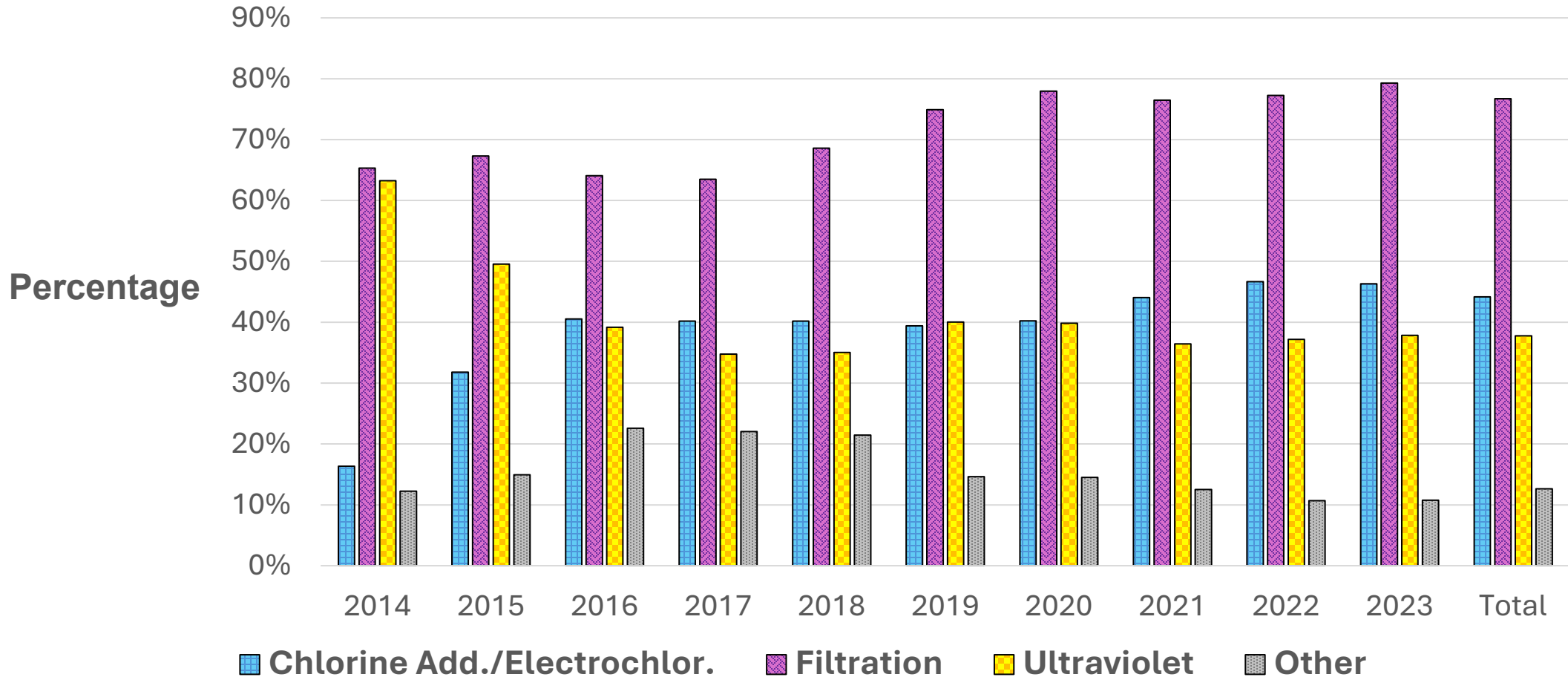


Stehouwer et al.,
in prep

Results – Treatment Technologies

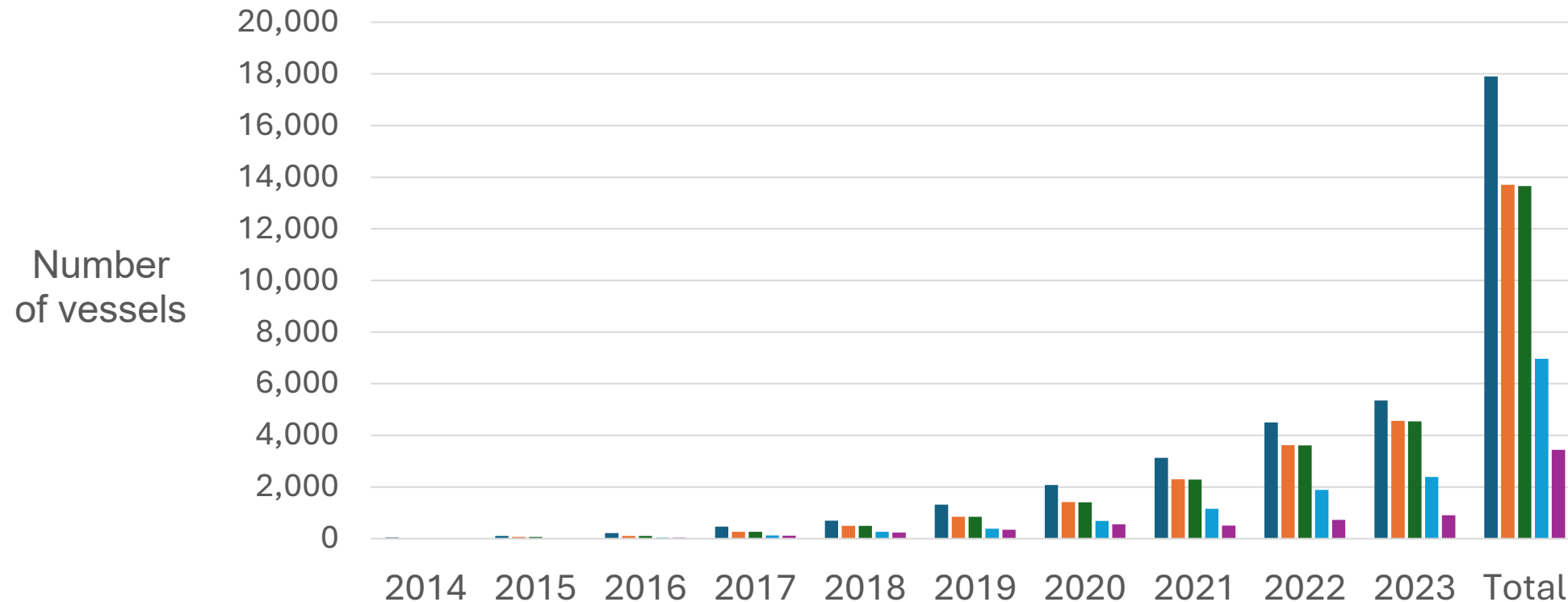


Results – Treatment Technologies



- Most systems used a filter
- Initially, UV > chlorine, but since 2016, UV \approx or < chlorine

Results – Data Submissions

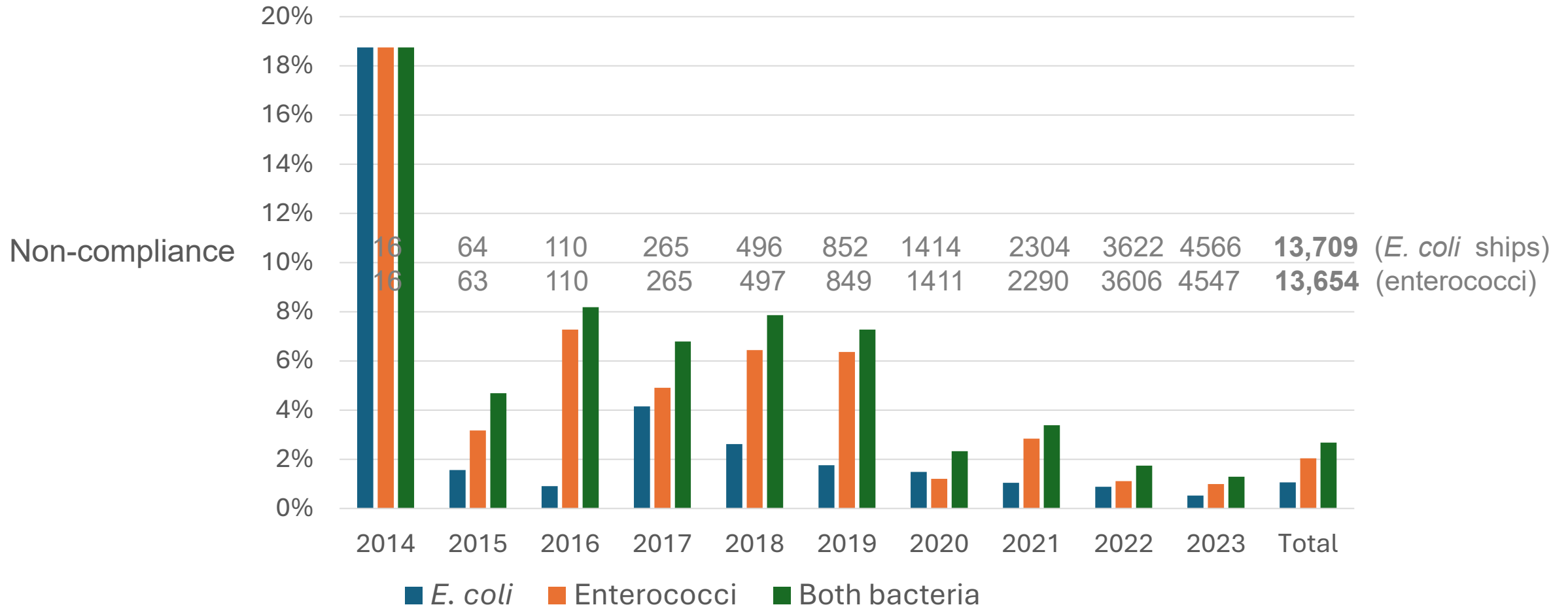


TRO = total residual oxidizers

■ Treatment system type ■ E.coli ■ Enterococci ■ TRO ■ Chlorine Dioxide

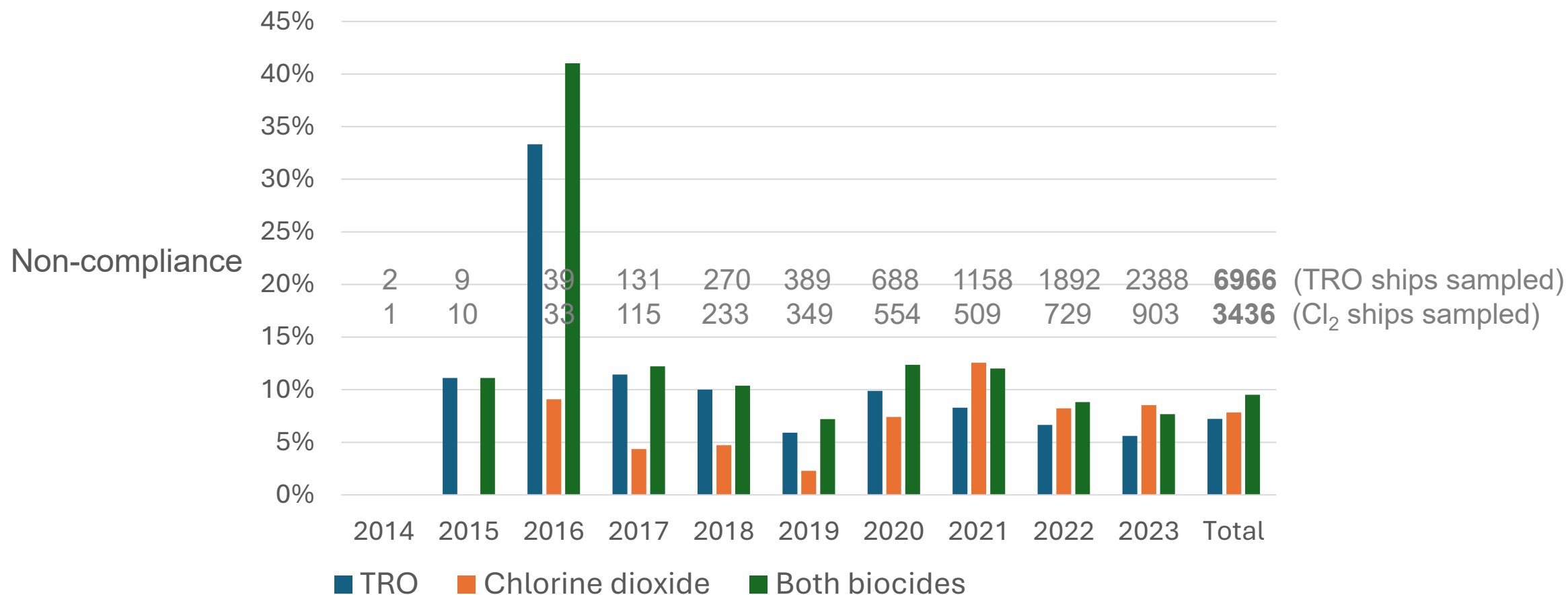
- Discrepancy in # of reports (treatment system type) submitted and data submitted
- Most installations in 2020-2023

Results – Bacteria



- Non-compliance decreased over time to <3%; trend as in Drillet et al. 2023
- In nearly all cases, enterococci was more non-compliant vs. *E. coli*

Results – Residual Biocides (Total Residual Oxidants [TRO] and Chlorine Dioxide)



- Non-compliance improved over time to <10%
- Initially TRO non-compliance was higher than chlorine dioxide; reversed later

Conclusions



- Global biofouling management: moving forward, benefit from programs/lessons learned
- Future databases would **benefit greatly from safeguards**
- Missing bacteria data: **~25%** of the 17,904 annual reports
- Most ballast water treatment systems used a **filter**
 - Most used **UV or chlorine** for disinfection (~50:50)
- Mean non-compliance was **<3%** for bacteria (with non-compliance generally higher for enterococci) and **<10%** for biocides
- **Improvement over time:** Non-compliance rates were lowest for bacteria and biocides (in nearly all years) in 2020-2023



Thank you!

Do you have any questions?

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