San Francisco Bay Water Quality Trading Program Public Update

The Freshwater Trust
BACWA
SFEI

October 29, 2026

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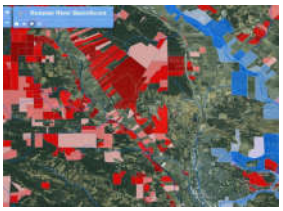
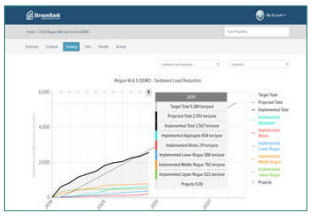
The Freshwater Trust - Independent Non-profit

40 years of restoring water and meeting Clean Water Act

Habitat & Flow Restoration



Program Analytics & Design



Program Administration

UNITED STATES WATER PRIZE

- Customized Program Design
- Science, Facts, and Analytics
- Objective Recommendations

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Nitrogen comes from our homes and is treated at wastewater treatment plants prior to Bay discharge

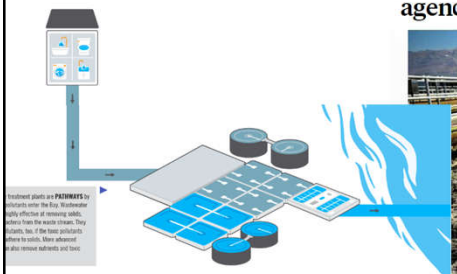

Image: Pulse of the Bay 2019

San Francisco Chronicle

Poop and pee cause algae blooms in S.F. Bay. Water agencies will spend $11 billion to fix the problem

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WQT Authorization

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Office of Water
Water Quality Trading Policy
January 13, 2003

I. Background and Purpose of the Policy

The Clean Water Act (CWA)[1] was enacted in 1972 to restore and maintain the chemical, physical, and biological integrity of the nation's waters. It established a national policy that called for the discharge of pollutants to be eliminated and established interim goals for protecting fish, wildlife and recreational uses. The CWA also established a national policy for development and implementation of programs so the goals of the Act could be met through controls of point and nonpoint sources of pollution. Congress recognized and preserved the primary responsibilities and rights of the States to prevent, reduce and eliminate pollution.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEB 6 2019

OFFICE OF WATER

MEMORANDUM

SUBJECT: Updating the Environmental Protection Agency's (EPA) Water Quality Trading Policy to Promote Market-Based Mechanisms for Improving Water Quality

FROM: David P. Ross
Assistant Administrator

TO: Regional Administrators, Region 1-10

Purposes of this Memorandum

1) To reiterate the EPA's strong support for water quality trading and other market-based programs to maximize pollutant reduction efforts and improve water quality.
2) To accelerate the adoption of market-based programs that will incentivize implementation of technologies and land use practices that reduce nonpoint pollution in our Nation's waters.
3) To provide additional guidance to states, tribes, and stakeholders regarding the use of market-based programs to reduce water pollution at lower overall cost.
4) To promote increased investment in conservation actions.

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NPDES Permit CA0038873
Nitrogen Watershed Permit

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
1515 Clay Street, Suite 1400, Oakland, California 94612
waterboards.ca.gov/sanfranciscobay

ORDER R2-2024-0013
NPDES PERMIT CA0038873

The following dischargers (collectively, Dischargers and, individually, Discharger) are subject to waste discharge requirements (WDRs) set forth in this Order, for the purpose of regulating nutrient discharges to San Francisco Bay[1] and its contiguous bay segments:

"As part of their regional coordination strategy, Dischargers may propose a formal nutrient trading or offset program to achieve final effluent limits for total inorganic nitrogen."

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What is Water Quality Trading?

Enables permittees to coordinate actions to meet permit limits and realize water quality outcomes more efficiently.

No trade may impair a designated use, create a hot spot, or violate antidegradation rules – per Clean Water Act.

Follows the same public reporting required by current permits

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Potential Benefits of Water Quality Trading

COST SAVINGS.
Meet aggregate load targets without every facility independently building treatment.

COLLABORATION.
Watershed-wide coordination and shared solutions.

FLEXIBILITY.
Purchase credits or co-fund treatment upgrades rather than pursuing a full capital project.

ENVIRONMENTAL BENEFIT.
Safeguards ensure water quality improvements.

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Existing WQT Programs

WQT allowed since 2003.

WQT Programs across the U.S.

Lessons From 20+ years of programs.

Case Study: Chesapeake Bay Exchange, VA

Buyer: 130+ Wastewater Treatment Plants

Seller: Other Point Sources or the Exchange

Exchanges: Virginia Nutrient Credit Exchange Association or directly between sources

Driver: Chesapeake Bay TMDL: Mandates tributary specific nutrient reductions
Virginia General Permit: Implements WLAs and guides trading activities

Compliance Options:
- Upgrade facility for individual compliance
- Purchase credits on the Exchange
- Independent trades between sources
- Bubble WLAs for multiple facilities in close proximity and under same ownership

Case Study: Long Island Sound, CT

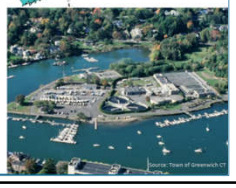
Participants: 79+ POTWs

Trading Mechanism: Credit Exchange managed by DEP using standard rates set by Nutrient Credit Advisory Board

Driver: Nitrogen TMDL: 65% reduction in nutrient loading from baseline levels by 2014
General Permit: Implements the TMDL and creates framework for permittees

Options:
- Technological solutions for facility to achieve individual compliance with General Permit
- Purchase excess pollution reductions from another facility to achieve joint compliance

With trading program: $300 – 400 million saved by not forcing all municipalities to upgrade at once



Each facility needs to consider their own value for participating in a WQT program.

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Analytical Approach

- Discharger Discussion
- Economic Modeling
- Nutrient Modeling (SFEI)
- Regulator Engagement
- Stakeholder Communication
- Science & Research Review

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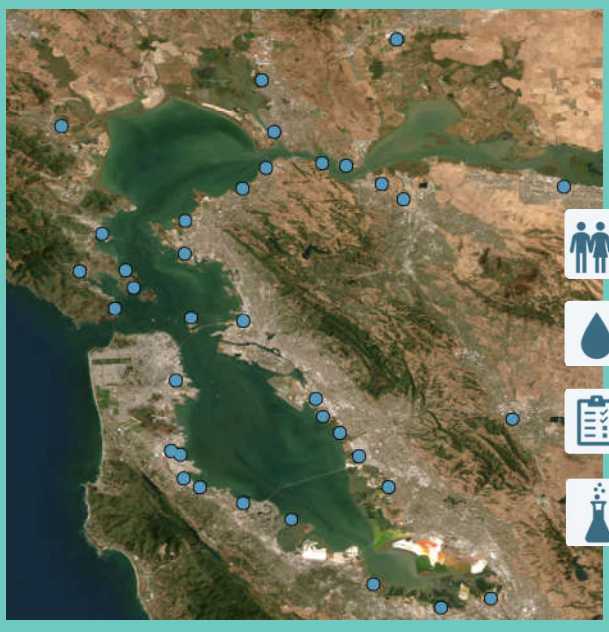

36 WWTP evaluated for WQT

~6,300,000 People Served

385 MGD Avg Dry Season Flow

26,700 kg/d TIN Final EL

-20,149 kg/d TIN Reduction
from Dry TIN Pre-2025 (2026 GAR)

-17,700 kg/d TIN Reduction from 2022 Dry Loads

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Realities Shaping Program Design

- **Conservative approach.** Dischargers need assurance that their pathway will satisfy their obligations.
- **Ratepayer Protection.** Investment outside the local community requires strong justification.
- **Planning horizons.** Design and construction timelines require 5-10 years.

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BACWA WQT Workshop

- EBMUD Hosted – Oakland, CA
- Presented Findings
- Forum to Share Perspectives

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What We Are Hearing From WWTPs

- **82%** need a 10-year or longer planning horizon.
- **74%** say WQT influences their investment decisions.
- **98%** interested in developing a WQT program.

Permit Required Compliance Milestone Reporting (GAR) April 1, 2027

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The Basics: WQT Framework

Trading Area: San Francisco Bay Watershed

Pollutant: Total Inorganic Nitrogen (TIN)

Credit:1 kg TIN for the dry season (May 1 – Sept 30)

Participants: Dischargers with TIN effluent limits → 36

Credit Life = 1 Year

No Banking of Credits

Post-Season Reconciliation

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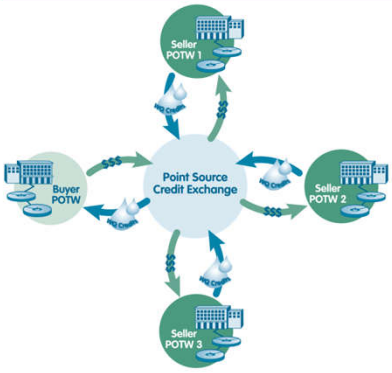
Transactional Options

(1) Peer-to-Peer

(2) Central Exchange

Credit Price - TBD



Exchange Functions

- Annual Credit Reconciliation
- Reporting & accounting
- Forecast credit supply & demand
- Sets prices

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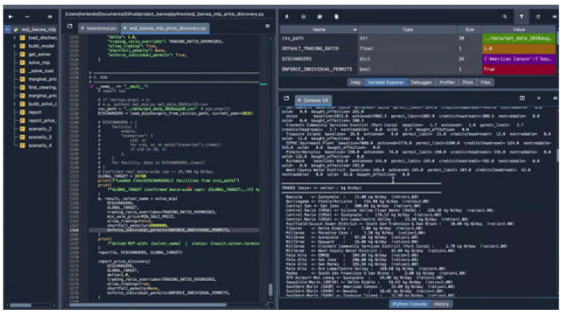
Credit Supply Modeling

Mixed Integer Programming (MIP)

- Closed-form **cost minimization model**
- Meet individual permit discharge limits by technology AND/OR purchasing from dischargers who are over treating

Monte Carlo Simulation

•Likelihood of being a buyer/seller
•Likelihood of WQT delivering better outcome than individual on-site action



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How will trades impact water?

Clean Water Act Requirement:
No trade may impair a designated use, create a hot spot, or violate antidegradation rules.

Program design must comply with local, state, and federal law, and protect against unintended consequences.

Well designed WQT programs save money for communities and result in the same or better water outcomes than each facility acting on their own.

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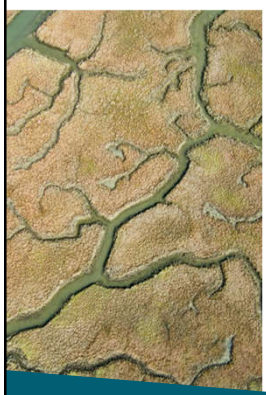

Nutrient tracking with SFEI's tracer model

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SAN FRANCISCO ESTUARY INSTITUTE

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Rachel Allen, rachela@sfei.org

Oct 29, 2026

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A research institute that **delivers visionary science to revitalize nature**

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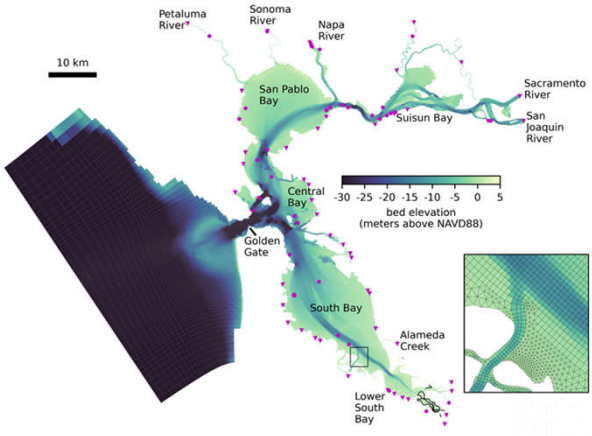
SFEI's San Francisco Bay hydrodynamic model simulates physical processes and is the backbone for other models

Hydrodynamic Model

The hydro model is a highly calibrated and validated model of salt, temperature, water levels, and velocity from 2013 to 2023



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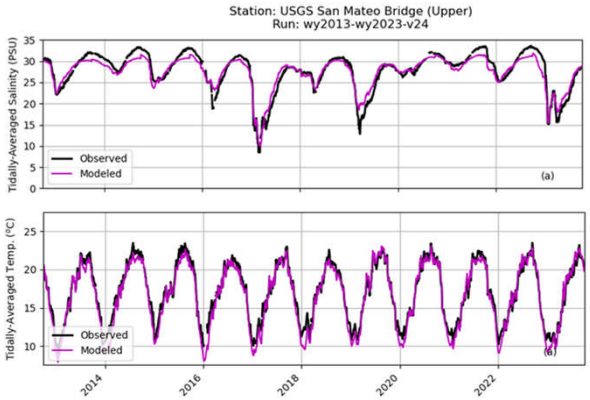

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The tracer model can be used as a rapid way to assess management scenarios

Tracer Model

One tracer for each modeled source:

- POTW
- Refineries
- Ocean + Delta

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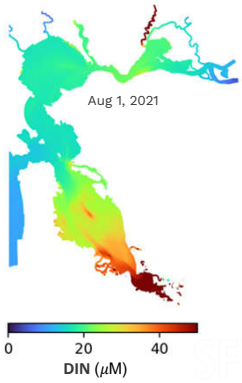

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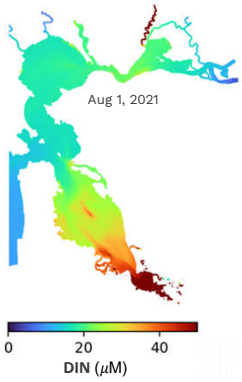
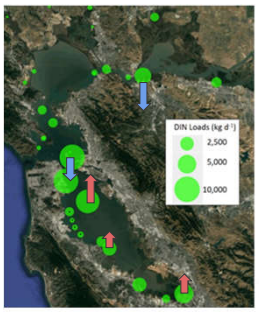


How do trading scenarios impact concentrations across the Bay?



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Compliance Options

Without WQT → On-Site Treatment

WQT → Flexibility to Suit Circumstances

Figure 1: Hierarchy of Compliance Options with WQT

1. On-site Treatment/Upgrades
2. Water Quality Trading Credits
   A. Peer-to-Peer Trading – Buyers & Sellers Negotiate Agreement
   B. Central Exchange – Follows Exchange Bylaws

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Schedule

2026-2028:

- WQT Program Design & Testing

Facilities Compliance Plans Due – Permit Deadline April 1 2027

2029:

- Permit Renewal
- Public Comment
- WQT Program Formalized in Permit

2034:

- Final Effluent Limit Deadline
- WQT Program Operational

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Schedule

2026-2028:

- WQT Program Design & Testing

Public Engagement Suggestions?

2029:

- Permit Renewal
- Public Comment
- WQT Program Formalized in Permit

2034:

- Final Effluent Limit Deadline
- WQT Program Operational

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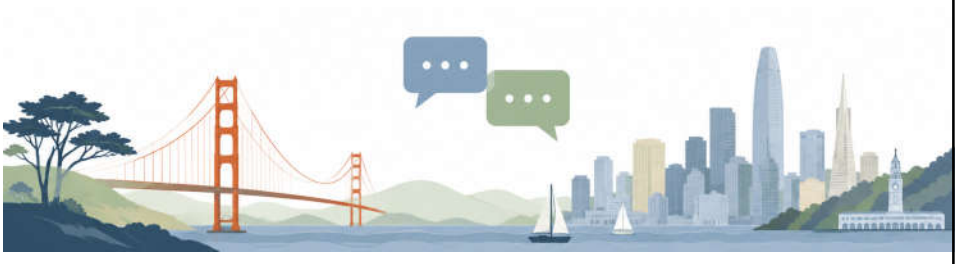
Discussion



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Resources

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