

## SCIENCE

The San Francisco Estuary Institute is working to advance the scientific understanding of how nutrients function in the Bay and what combination of factors could contribute to its decline. This understanding is critical to developing nutrient management policies that will protect the Bay. A cornerstone of the Institute's research is development of a Bay model, as illustrated below.

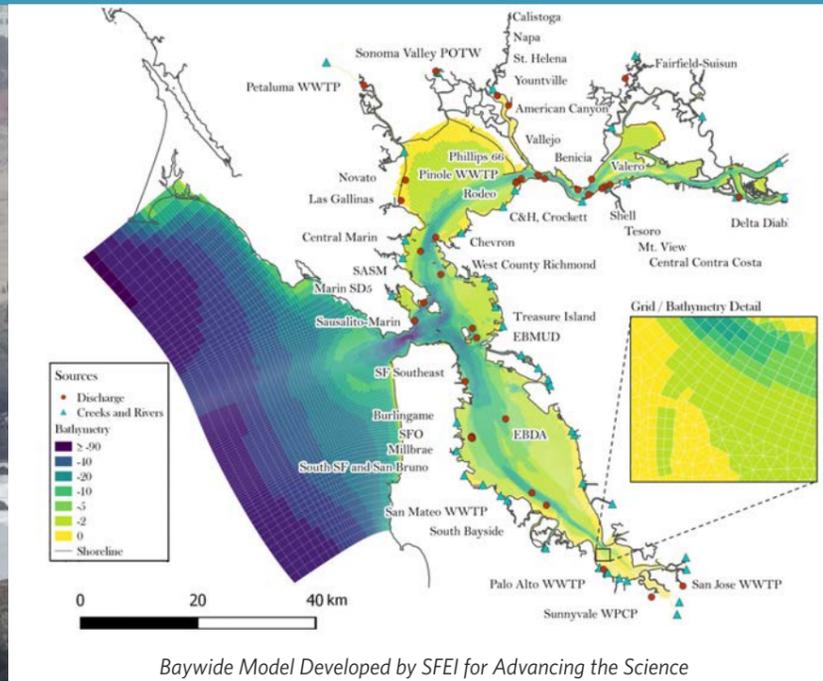
## NEXT STEPS

The collaborative effort to further both the science and the evaluation of management actions.



# NUTRIENT MANAGEMENT in the San Francisco Bay

Every day, each person produces approximately 0.02 lb Ammonia, 0.03 lb Total Nitrogen, and 0.01 lb Total Phosphorus, which is sent to wastewater treatment plants



## WHAT IS THE BAY AREA CLEAN WATER AGENCIES (BACWA)?

BACWA is a joint powers agency formed under the California Government Code by the five largest wastewater treatment agencies in the San Francisco Bay Area. Our members include the many municipalities and special districts that provide sanitary sewer services to more than seven million people. BACWA is dedicated to working with our members, state and federal regulatory agencies, and non-governmental organizations to improve and enhance the San Francisco Bay environment. We provide technical expertise, financial support, and a public utility perspective to ensure that regulations affecting our members are well-informed, thoughtful, and effective.

**7M+**  
SERVICE  
POPULATION

**37**  
WASTEWATER  
TREATMENT PLANTS

**~450**  
MILLION GALLONS PER DAY  
TREATED  
EFFLUENT

### BACWA

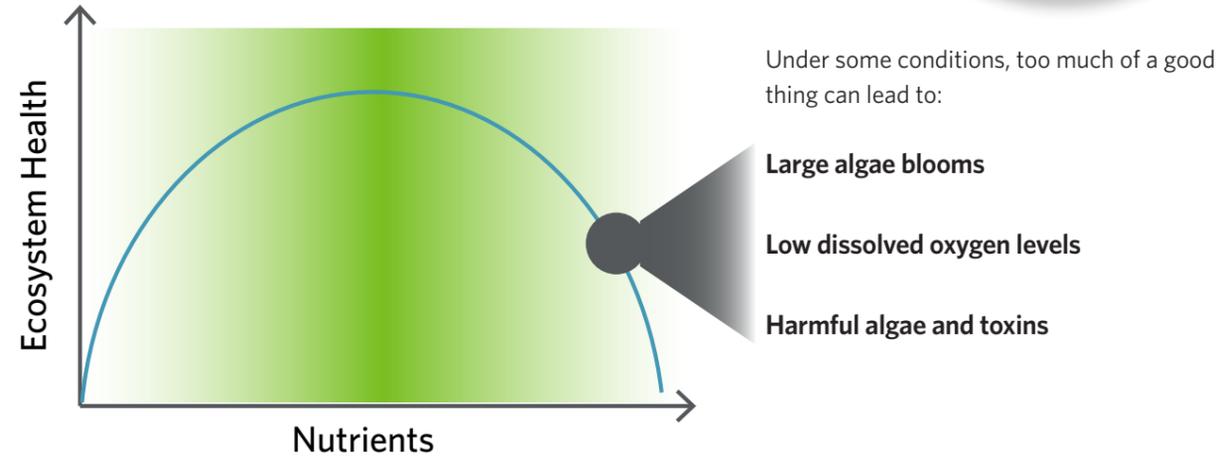
PO Box 24055, MS 59 Oakland, CA 94623  
www.BACWA.org

## BACKGROUND INFORMATION

San Francisco Bay receives some of the highest nitrogen loads among estuaries worldwide, but has yet to exhibit problems typical of nutrient-enriched estuaries. It is not known whether this level of nitrogen loading, which will continue to rise in proportion to human population increase, is sustainable over the long-term. A broad coalition of scientists, engineers, and policy-makers is in the process of evaluating the factors that cause the Bay's resilience, conditions that may lead to a decline in the Bay's health, and potential impacts on human and ecological health. A wide range of monitoring and special studies are underway to understand the implications on Bay water quality associated with changes in nutrient levels and other factors.

*Wastewater treatment plants in the Bay Area represent approximately two thirds of nutrient loads to the Bay because they were not designed to remove nutrients*

## NUTRIENTS ARE ESSENTIAL FOR LIFE



## NUTRIENTS DEFINED

Nutrients, such as nitrogen and phosphorus, are naturally present in estuaries and are essential for a properly functioning biological community. The effects of nutrient level changes on a local ecosystem are gauged by a multitude of factors, and determining the appropriate level is a site-specific exercise. A fundamental goal of the ongoing regional scientific effort is learning the ideal range for the Bay and using that information to guide future policy decisions.

### NUTRIENTS OF INTEREST

NITROGEN BASED	PHOSPHORUS BASED
Ammonia	Soluble Phosphorus
Total Nitrogen	Total Phosphorus



BACWA  
(wastewater utilities)



Regional Water Board  
(regulatory)



San Francisco Estuary Institute  
(science)



Non-Govt Organizations  
(NGOs)

The collaborative approach in the Bay Area for managing nutrients has lauded national attention as evidenced by a National Environmental Achievement Award in 2019 from the National Association of Clean Water Agencies (NACWA). NACWA is the nationally recognized leader in legislative, regulatory, and legal clean water advocacy.



## A COLLABORATIVE APPROACH

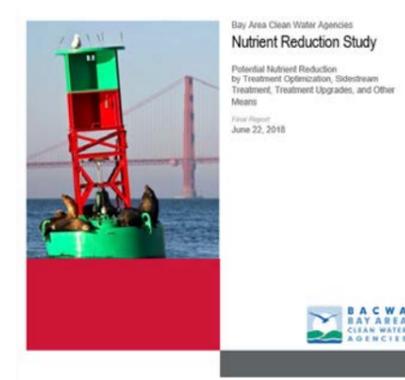
While the impact of nutrients on Bay health is unclear, a collaborative partnership that includes BACWA, the Regional Water Quality Control Board, San Francisco Estuary Institute (SFEI), Baykeeper, and others exists to better understand this situation. This collaborative effort is essential for developing a transparent and effective strategy for managing nutrients in the Bay.

## NUTRIENT REDUCTION STUDY

The Regional Water Board issued a Regional Permit to evaluate nutrient load management strategies at wastewater treatment plants around the Bay (37 in total).

A Nutrient Reduction Study was submitted to the Water Board in June 2018. The 1,400+ page report includes:

- Individual nutrient reduction analyses for all 37 plants
- Aggregation of the results across all plants, including a summary section that compares the reduction strategies for nutrient reduction at high, mid, and low levels



## STUDY RESULTS

### Cost for 10-20% Load Reduction

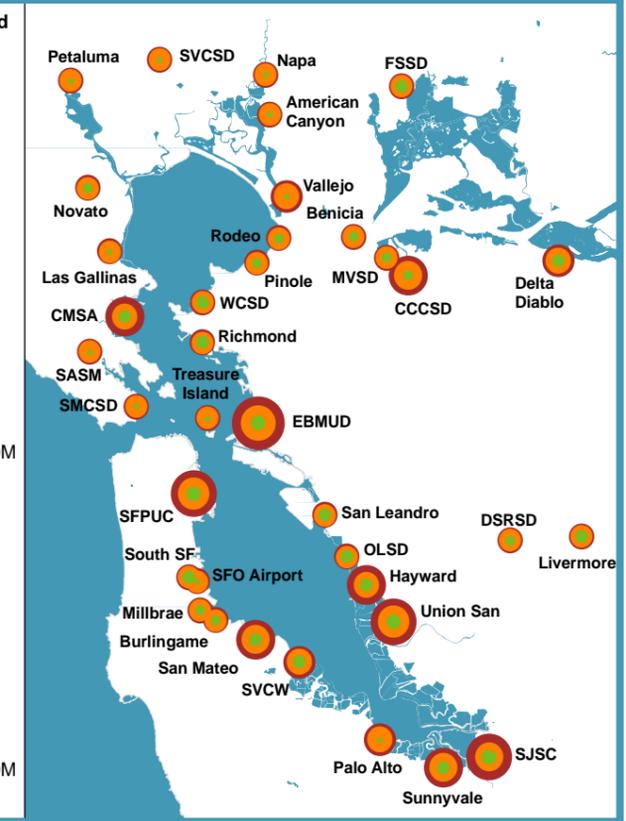
- 0.1M - 2M
- 2M - 10M
- 10M - 20M
- 20M - 74M

### Cost for 60% Load Reduction

- 0.5M - 100M
- 100M - 200M
- 200M - 500M
- 500M - 1,250M
- 1,250M - 2,300M

### Cost for 80% Load Reduction

- 3.7M - 120M
- 120M - 240M
- 240M - 500M
- 500M - 1,250M
- 1,250M - 2,410M



## TARGETED REGION-WIDE SUMMARY

TOTAL NITROGEN LOAD REDUCTION	TOTAL NITROGEN CONCENTRATION	ESTIMATED TOTAL CAPITAL COST
0%	32 mg/l	\$0
10-20%	26 mg/l	\$119M - \$391M
60%	<15 mg/l	\$7 Billion
80%	<6 mg/l	\$8.5 Billion