



Friends of Casco Bay
Casco BAYKEEPER®

Reducing Nutrient Loading through MEPDES Permits

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Friends of Casco Bay
Casco Baykeeper

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 @CascoBay
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Friends of Casco Bay
Casco BAYKEEPER®

Friends of Casco Bay



Works for **Clean Water**

using

Science

Education

Advocacy

Our mission:

*To improve and protect the
environmental health of Casco Bay*



Friends of Casco Bay
Casco BAYKEEPER®

Friends of Casco Bay started as a volunteer organization in 1989



Today, A staff of ten Two boats on the Bay



Our staff is on the water all year



Friends of Casco Bay
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Staff test for:



- Dissolved oxygen, temperature, water clarity, salinity, acidity (pH)
- pH on clam flats
- Nitrogen
- Pesticides
- Toxins and heavy metals
- Investigate anomalies



Monitoring by Staff



Water quality monitoring using data sondes

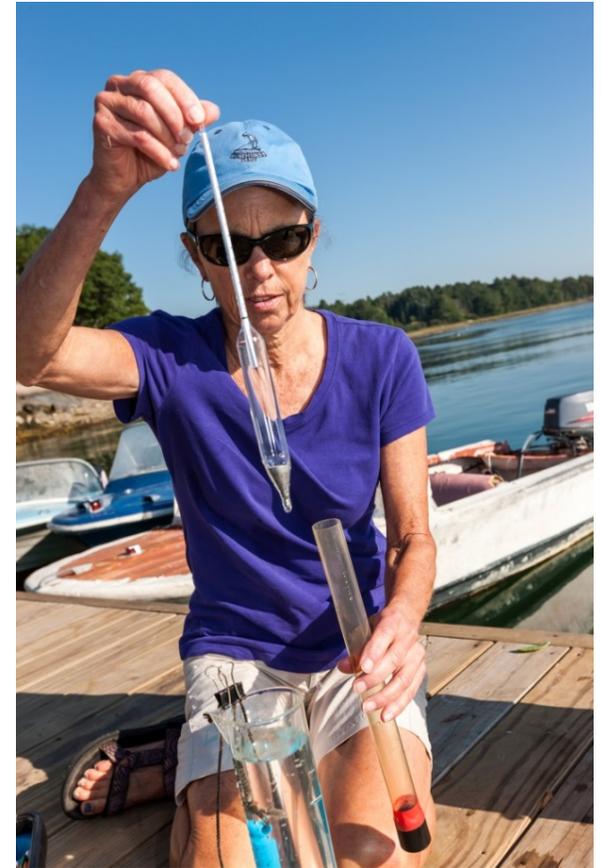
- Three profile sites once a month, surface to bottom
- One unattended sonde



Citizen Stewards



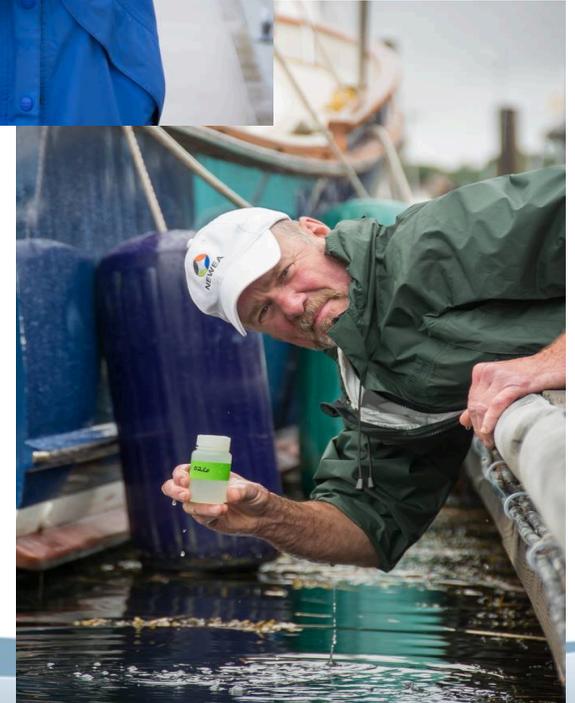
- Sample at 37 sites around the Bay
- 10 Saturdays, April – October
- Sample twice a day: 7 a.m. and 3 p.m.
- Data used to create a picture of the health of Casco Bay



Nabbing Nitrogen

97 volunteers

Sunday, July 10 at 10:10 a.m.



Friends of Casco Bay
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As a Waterkeeper organization, we use science and law to advocate for a healthy Casco Bay



Increasing Acidity in Casco Bay

- Increasing Acidity in Coastal Water and possibly in Sediments
 - Caused by fresh water inputs and decomposition of increased organic matter
- Increasing Acidity in the Ocean
 - Caused by increased CO₂ in the atmosphere



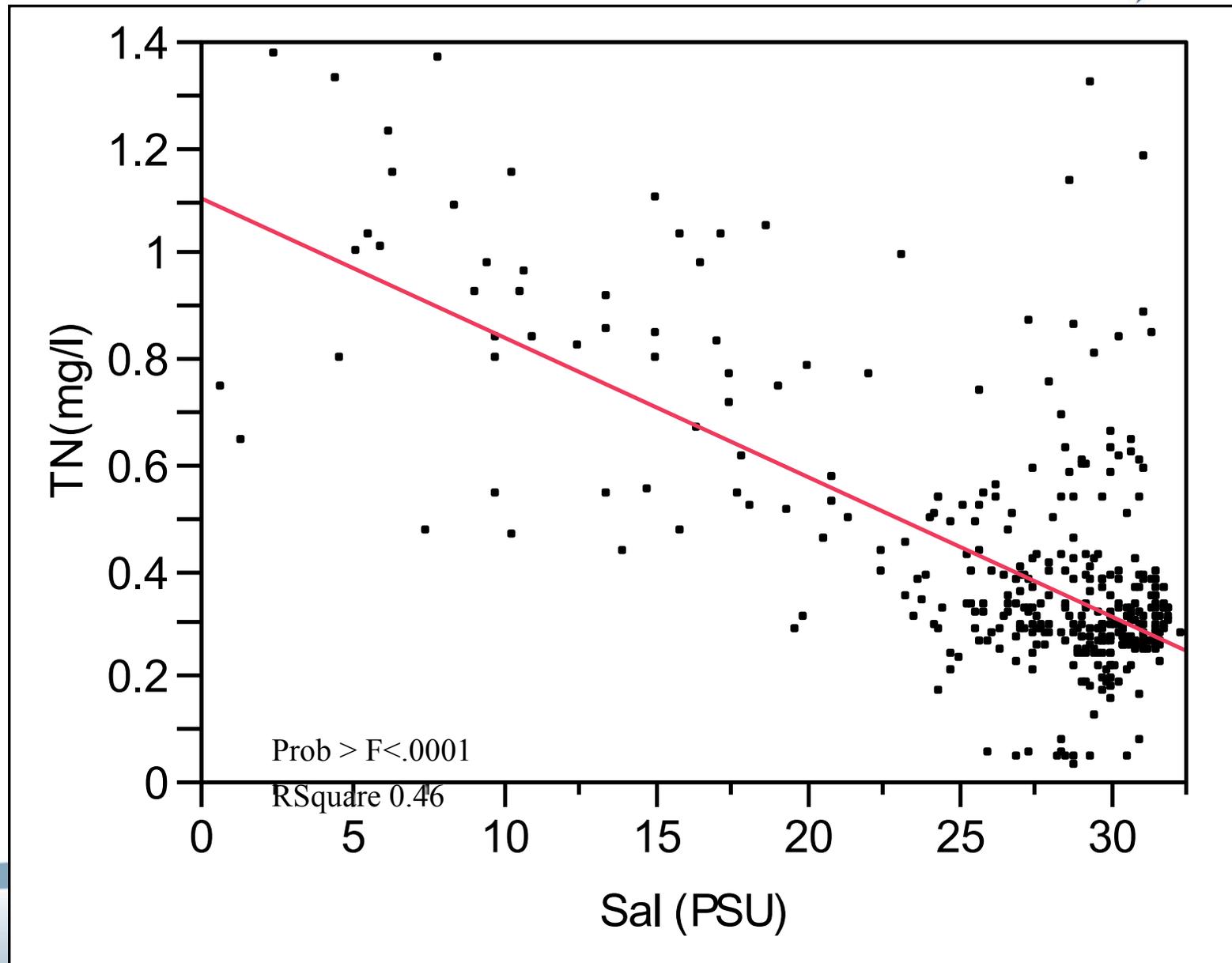


- Nitrogen pollution stimulates algal blooms, which die, decompose and produce CO₂.
- The CO₂ combines with water and forms carbonic acid which lowers coastal pH and increases water and sediment acidity in Casco Bay.

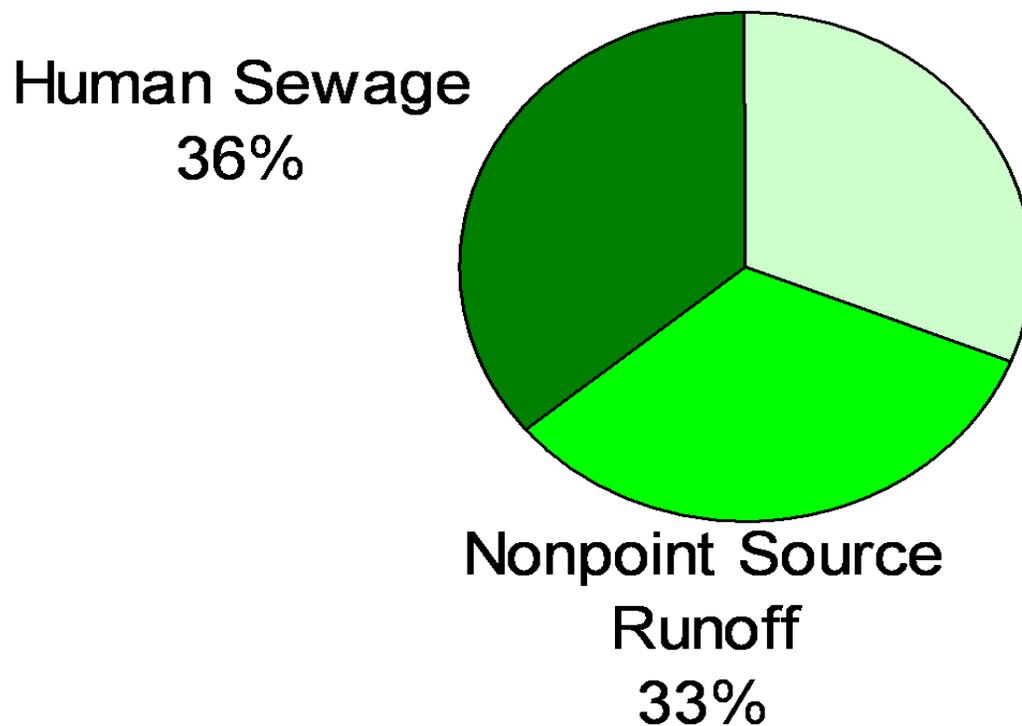


Land-side influence of Nitrogen

- Prob > F<.0001
- RSquare 0.46



Sources of Excess Nitrogen to Casco Bay



Atmospheric
Deposition
31%

Atmospheric sources include emissions from vehicles and industrial sources; nonpoint sources include runoff from farms, lawns, and city streets; and sewage is primarily from wastewater treatment plants.



Clean Water Act



The Clean Water Act (CWA) regulates discharges of pollutants into the waters of the United States and sets water quality standards for surface waters.

Congress enacted the law in 1948, and significantly expanded it in 1972.. 33 U.S.C. §1251 et seq. (1972)



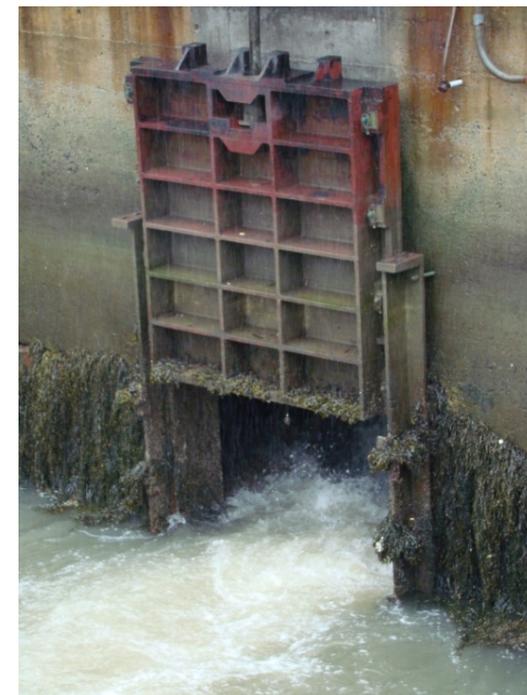


NPDES Permits



Under the CWA you cannot discharge any pollutant from a point source into navigable waters without an EPA National Pollutant Discharge Elimination System (NPDES) permit.

Point sources are discrete conveyances such as pipes or man-made ditches.



MEPDES Permits



In 2001, EPA delegated its authority to issue NPDES permits in Maine to the Maine Department of Environmental Protection. EPA continues to oversee and maintain enforcement authority.



STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION
AUGUSTA, ME 04333

DEPARTMENT ORDER

IN THE MATTER OF

PORTLAND WATER DISTRICT)	MAINE POLLUTANT DISCHARGE
EAST END WWTF)	ELIMINATION SYSTEM PERMIT
PORTLAND, CUMBERLAND COUNTY, ME)	
PUBLICLY OWNED TREATMENT WORKS)	AND
ME0102075)	WASTE DISCHARGE LICENSE
W002671-5M-L-R)	RENEWAL
	APPROVAL	

In compliance with the applicable provisions of *Pollution Control*, 38 M.R.S.A. §§ 411 – 424-B, *Water Classification Program*, 38 M.R.S.A. §§ 464 – 470 and *Federal Water Pollution Control Act*, Title 33 U.S.C. § 1251, and applicable rules of the Department of Environmental Protection (Department hereinafter), the Department has considered the application of the PORTLAND WATER DISTRICT (PWD/permittee hereinafter), with its supportive data, agency review comments, and other related materials on file and FINDS THE FOLLOWING FACTS:

APPLICATION SUMMARY

The permittee has submitted a timely and complete application to the Department for the renewal of combination Maine Pollutant Discharge Elimination System (MEPDES) Permit # ME0102075/Waste Discharge License #W002671-5M-H-R (permit hereinafter), which was issued by the Department on August 17, 2011, for a five-year term. The permit approved the discharge of secondary treated municipal waste water and allowed an unspecified quantity of primary treated wastewater to bypass secondary treatment at the facility before blending with the secondary treated effluent before discharge to Casco Bay, Class SC. The permit also authorized the discharge of untreated sanitary/storm water from 21 combined sewer overflow (CSO) structures to the Presumpscot River, Casco Bay, Back Cove, Portland Harbor and the Fore River. See Attachment A of the [Fact Sheet](#) for site location maps.

PERMIT SUMMARY

This permit carries forward all terms and conditions of the August 17, 2011, permit except that this permit is;

1. Incorporating the average and maximum numeric concentration limits for total mercury that were originally established in a permit modification dated May 23, 2000.



Through MEPDES Permit can--



- Impose monitoring requirements
- Set limits on amount of N that can be discharged
- Revise terms every 5 Years



How determine if need to set N limits?



- **Numeric Criteria**
- **Narrative Criteria**



Appendix A

LD 1297

Resolve 2007, chapter 49

LR 1895
Item 1

SIGNED on 2007-06-04 - 123rd Legislature

Resolve, Regarding Measures To Ensure the Continued Health and Commercial Viability of Maine's Seacoast by Establishing Nutrient Criteria for Coastal Waters

Preamble. Whereas, nutrient pollution is a source of marine pollution, contributing to nuisance algal growth, harmful red tide, habitat impacts and oxygen depletion in Maine's coastal waters; and

Whereas, nutrient pollution is attributable to several forms of nitrogen entering Maine's coastal waters from diverse sources, including industrial, municipal, residential, atmospheric and nonpoint sources, as well as offshore inputs from natural phenomena; and

Whereas, bays and estuaries in states south of Maine already suffer significant water quality degradation from nutrient pollution; and

Whereas, as an example of known nutrient conditions in Maine, of 655 water samples collected over 6 years at a site in Casco Bay, 12% collected during the critical summer months exceeded the threshold for medium risk for impairment due to nutrients, as defined in national coastal assessments; and

Whereas, in 2001, the United States Environmental Protection Agency requested the State to establish nutrient criteria for state waters; and

Whereas, good progress has been made by the Department of Environmental Protection toward establishing freshwater criteria; however, little progress has been made toward establishing nutrient criteria for marine waters; now, therefore, be it

Sec. 1. Nutrient criteria planning process established. Resolved:

That the Department of Environmental Protection, referred to in this resolve as "the department," shall initiate the development of water quality criteria for nutrients in state coastal waters by developing:

2007 Resolve





Preamble. Whereas, nutrient pollution is a source of marine pollution, **contributing to nuisance algal growth**, harmful red tide, habitat impacts and **oxygen depletion** in Maine's coastal waters; and

Whereas, nutrient pollution is attributable to several forms of nitrogen entering Maine's coastal waters from **diverse sources, including industrial, municipal,** residential, atmospheric and nonpoint sources, as well as offshore inputs from natural phenomena; and

Whereas, bays and estuaries in states south of Maine **already suffer significant water quality degradation from nutrient pollution**; and

Whereas, as an example of known nutrient conditions in Maine, of 655 water samples collected over 6 years at a site in Casco Bay, **12% collected during the critical summer months exceeded the threshold for medium risk for impairment due to nutrients, as defined in national coastal assessments**; and

Whereas, in 2001, the United States Environmental Protection Agency requested the State to establish nutrient criteria for state waters; and

Whereas, good progress has been made by the Department of Environmental Protection toward establishing freshwater criteria; however, little progress has been made toward establishing nutrient criteria for marine waters



DEP shall initiate development of nutrient criteria in state coastal waters, including:



1. A conceptual plan to establish nutrient criteria for all coastal areas;
2. A work plan and timeline for approved nutrient criteria for coastal waters;
3. A report on available technological approaches to nutrient reduction of wastewater, including projected costs on a per unit basis; and
4. An inventory of significant point and nonpoint sources of nutrients to the waters of Casco Bay





Casco Bay a Priority



- Receiving water for most populated watershed;
- Bordering one of most developed regions;
- Facing the effects of future development;
- **High concentrations of nutrients;** and
- **Comprehensive set of available nutrient data**



DEP completed report to legislature in 2008



Since then, no further development numeric criteria

Executive Summary – Key Findings

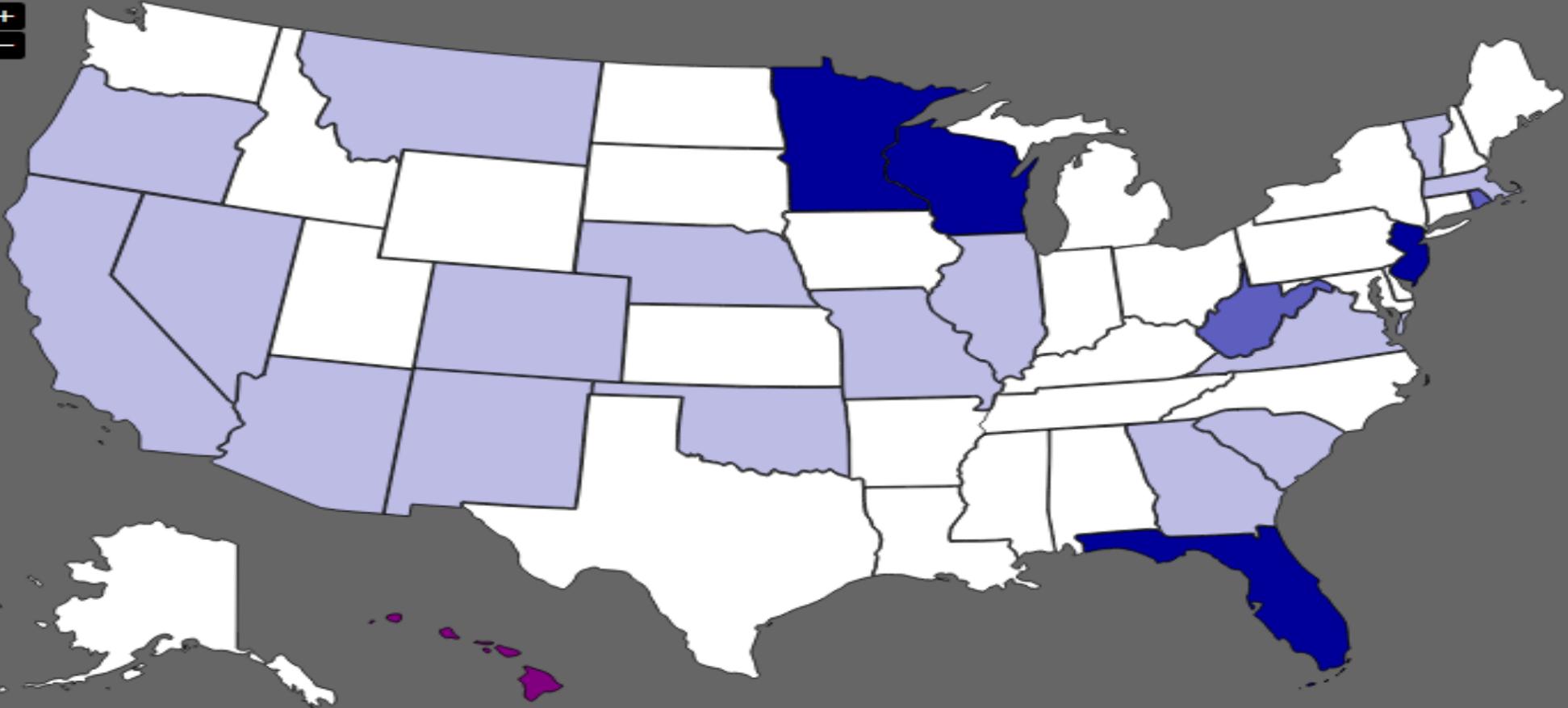
- This report was required by Resolve 2007, chapter 49 enacted by the 123rd Maine Legislature. This resolve directed the Maine Department of Environmental Protection (DEP) to develop a conceptual plan to establish nutrient criteria for all coastal areas of Maine, with an initial focus on the waters of Casco Bay.
- Existing ambient nutrient data are insufficient to make a determination of both coastal water quality or to ascribe relevant nutrient criteria at this time. Review of initial data indicates that nutrient concentrations in coastal Maine waters and Casco Bay waters are generally below values expected to elicit a negative environmental response.
- There is an essential need for the collection of data for Maine coastal waters outside of Casco Bay. Associated water quality data, such as chlorophyll and oxygen measurements, are needed to strengthen the relationship of this data to nutrient concentrations.
- Methods to assess other effects (e.g. green algae production, loss of submerged aquatic vegetation) need to be developed and implemented as an additional means to assess nutrient effects.
- An additional two to four years of both ambient water quality and wastewater effluent data may be required, depending on the availability of monitoring resources, to determine a final approach to criteria development and expected costs of implementation. The most expeditious means to develop marine nutrient criteria is through a data-distribution approach. Final draft criteria could be developed by 2012 assuming there is sufficient additional data and staff available in the next few years.
- Additional work is needed to assess the terrestrial nonpoint source load to Casco Bay as well as develop mitigation strategies. This could be accomplished using existing computer models and land use data. Implementation of marine nutrient criteria should be done with an understanding of the relative contribution that point and nonpoint sources have, and how controls placed on each relate to criteria attainment.
- An assessment of the ability to remove nitrogen from the seven largest waste treatment facilities that discharge to Casco Bay should be undertaken to more precisely understand facility-specific, as well as any incidental environmental, costs associated with nitrogen removal. Those costs may be extrapolated to other facilities along the coast if it is determined that nitrogen removal will be required.
- The DEP does not presently have sufficient staff and monitoring resources to conduct much of the needed data acquisition and research required to construct a draft rule. Reliance must therefore be made on the U.S. Environmental Protection Agency (EPA) and interested groups to provide data and resources needed to complete the development of nutrient criteria.

Nutrient criteria for marine waters, Maine DEP 6-25-08 Page 2 of 25



States with Total Nitrogen or Total Phosphorus Criteria

1998 2008 2013 2014 2015 Current 2016* 2017* 2018* 2019* 2020*



	District of Columbia
	American Samoa
	Commonwealth of Northern Marianas
	Guam
	Puerto Rico
	US Virgin Islands

Level 5	Complete set of N and P criteria for all watertypes**
Level 4	2 or more watertypes with N and/or P criteria
Level 3	1 watype with N and/or P criteria
Level 2	Some waters with N and/or P criteria
Level 1	No N and/or P criteria

* Progress expected by December 31st of the selected year based on milestone information provided by the state or territory.

** "Watertypes" on the national maps and tables within this webpage refers to three watertypes: *lakes/reservoirs, rivers/streams, and estuaries*. Criteria for additional watertypes are included under the State/Territory Details tab.



Narrative Criteria:

The reasonable potential for the discharge of total nitrogen to cause or contribute to non-attainment of applicable water quality standards in marine waters.

- 0.32 mg/L for the protection of aquatic life using eelgrass as the indicator.
- 0.45 mg/L for the protection of aquatic life in marine waters using dissolved oxygen as the indicator.

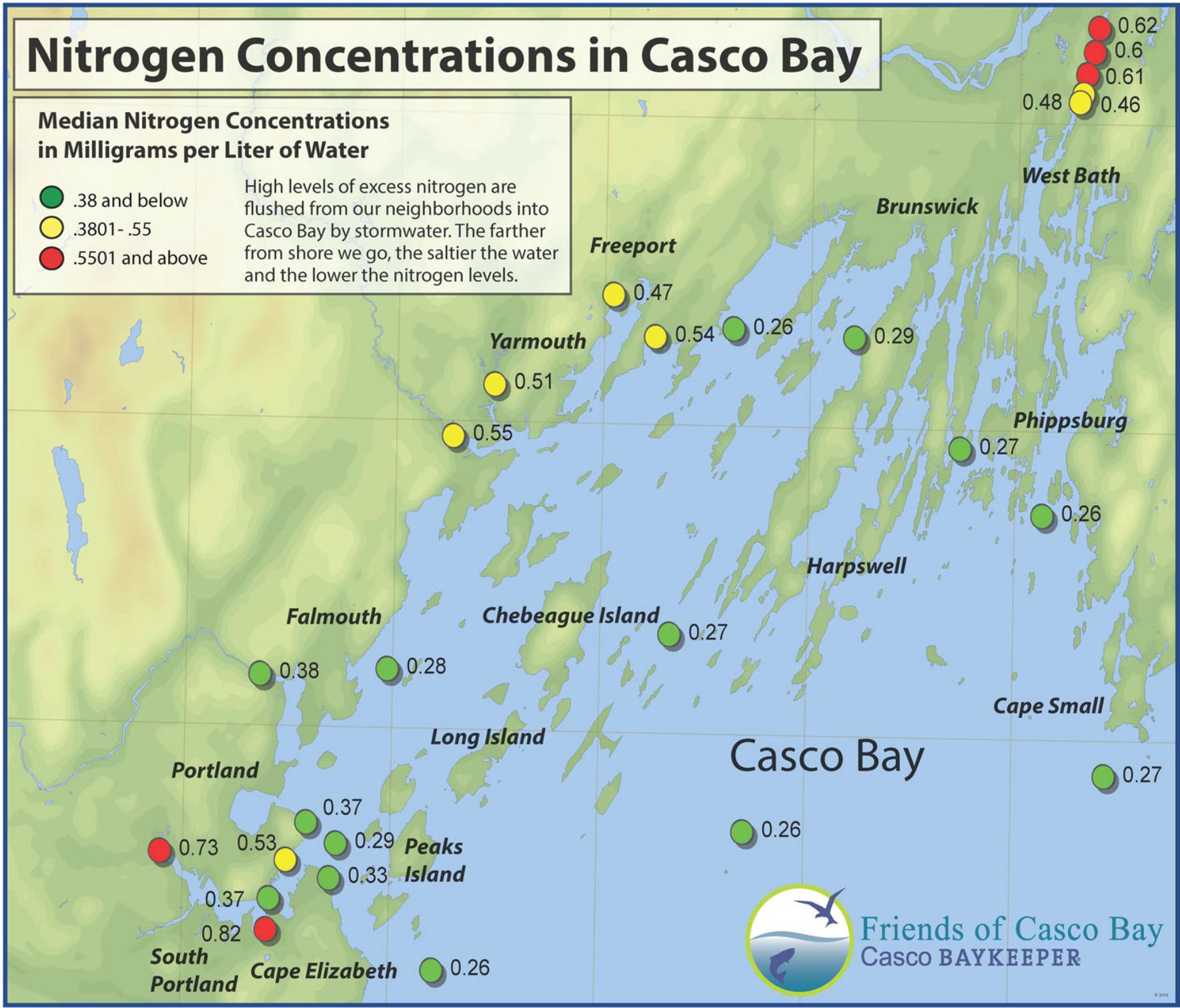
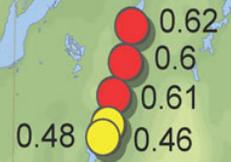


Nitrogen Concentrations in Casco Bay

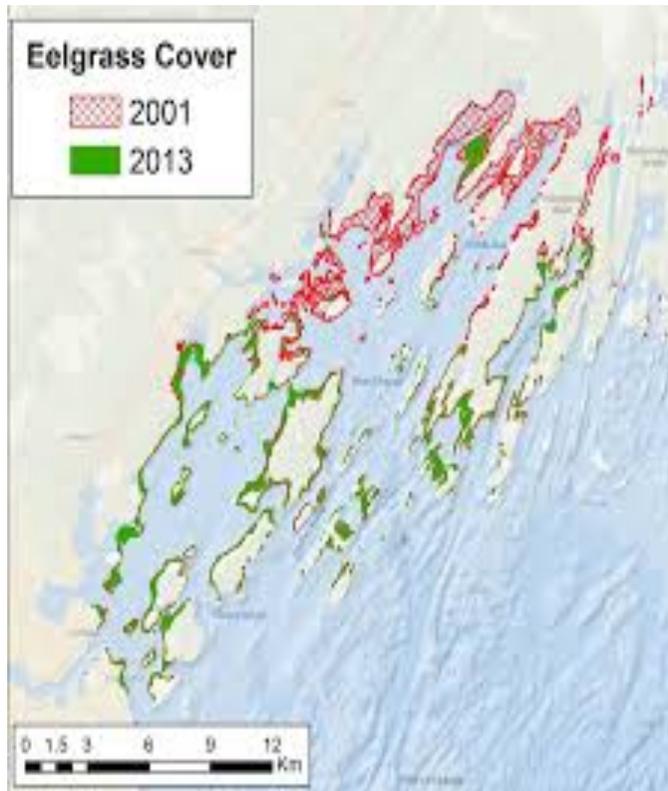
Median Nitrogen Concentrations in Milligrams per Liter of Water

- .38 and below
- .3801- .55
- .5501 and above

High levels of excess nitrogen are flushed from our neighborhoods into Casco Bay by stormwater. The farther from shore we go, the saltier the water and the lower the nitrogen levels.



Eelgrass as Indicator of Too Much Nitrogen



Excerpt from EPA report

August 2016



General Conclusions: The measured shoot density at East End Beach is similar to the shoot density, I measured in Great Bay (which is well understood to have eutrophication problems) at the beginning of August. Numerically it is the lowest shoot density of the 9 meadows I have taken samples from in 2016. In addition, it appears the deep edge of the meadow may be retreating into shallower water. This is a sign of a meadow experiencing light limitation and may also be a sign of eutrophication. Finally, the prevalence of epiphytes and nuisance algae can also be signs of eutrophication. Due to the abnormally dry period during the growing season this year, it is likely that eutrophication issues are predominantly being driven by wastewater discharges and not stormwater inputs. It is likely that meadows at Fort Gorges and Mackworth Island are being impacted by eutrophication, though the full impact is being somewhat mitigated by the presence of grazers that reduces/eliminates the epiphytic cover.





Do dilution factors apply?



How far do we look?

Traditionally three ranges of dilution.

Acute	17.4:1
Chronic	74.8:1
Harmonic Mean	224:1



Far field dilution:

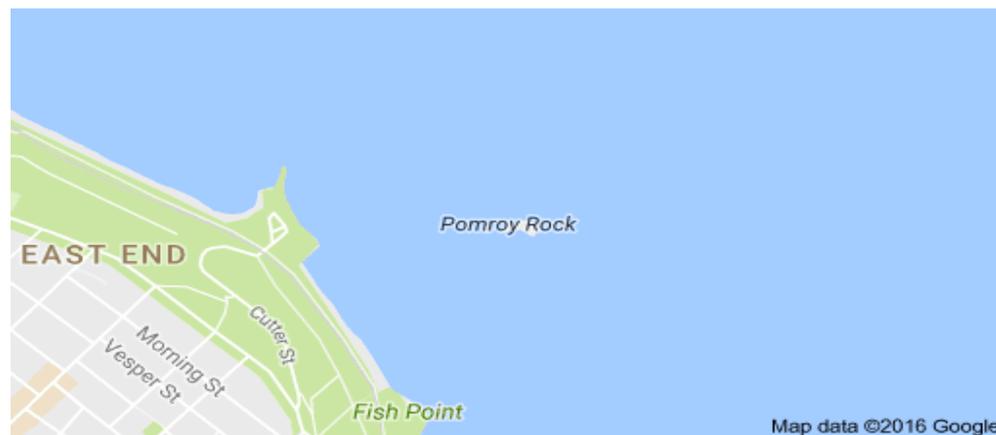
East End Discharge: 1970:1

Freeport: 2444:1





Far field dilution is not used elsewhere in the country and does not analyze reasonable potential in the near field.



- Both EPA and Friends of Casco Bay have questioned its use.





Questions for this group:

- Should we develop numeric nutrient criteria?
- Consistent with 2007 Resolve, should we treat Casco Bay as a priority?
- How should the reasonable potential of N in effluent be evaluated?
- Should we develop nutrient or other criteria for coastal acidification?

