

# **Great Bay Water Quality & Permitting Update**

## **City Council Workshop**

**June 3, 2026**

**By: John B. Storer**  
**Director of Community Services**

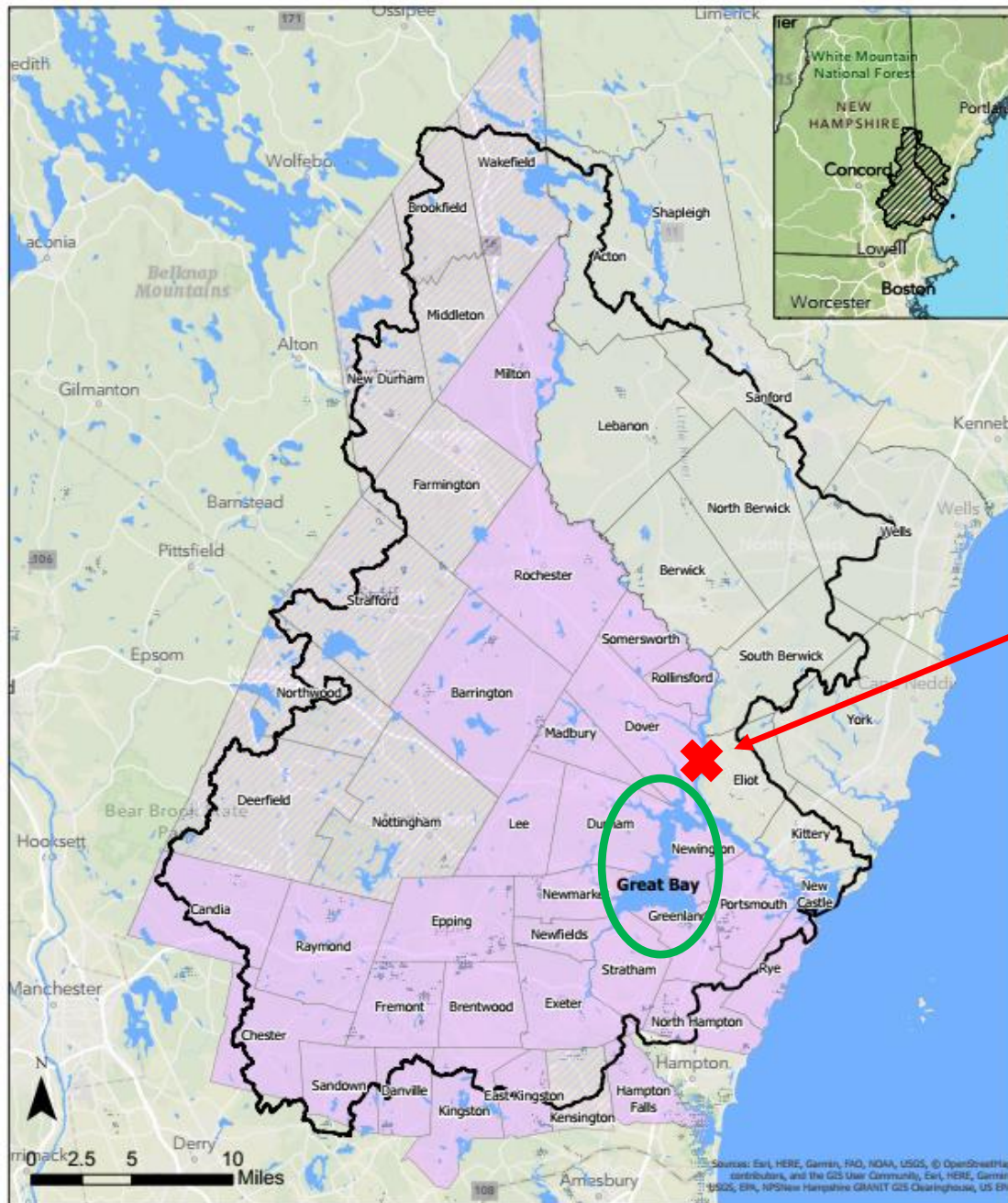
**Kalle Matso, PhD**  
**Executive Director Piscataqua Region**  
**Estuaries Partnership (PREP)**

# Hope to Address

- How is Great Bay doing?
- Explain how might Dover impact water quality
- Review Permitting History & Status
- Clean Water Act (CWA) Permits
  - MS4 - Stormwater
  - NPDES - Wastewater
- Kalle Matso, PhD – Executive Director of Piscataqua Region Estuaries Partnership (PREP)

# Great Bay Estuary Boundary Limits & Contributing Municipalities

Approx. Location  
WWTP Outfall



**The Great Bay Estuary Watershed**  
New Hampshire municipalities within the Great Bay Estuary  
Watershed categorized by MS4 coverage  
Map created February 2023 by the Conservation Law Foundation

**Legend**  
NH Municipalities  
Subject to MS4  
NH Municipalities Not  
Subject to MS4  
Great Bay Estuary  
Watershed



Map Courtesy of  
Conservation Law Foundation



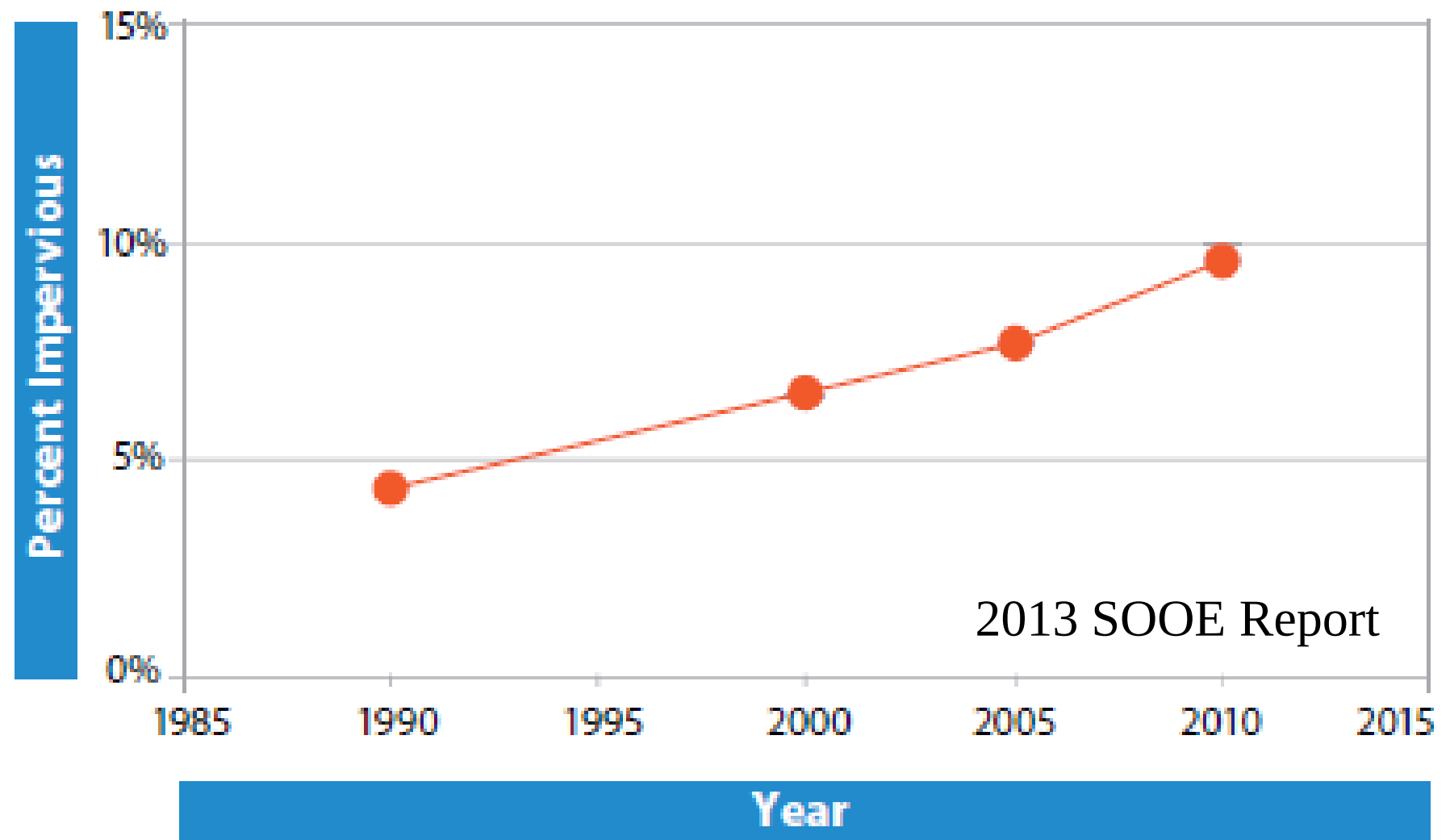
# Dover's Impact on Great Bay

## ➤ Development, Land-Use

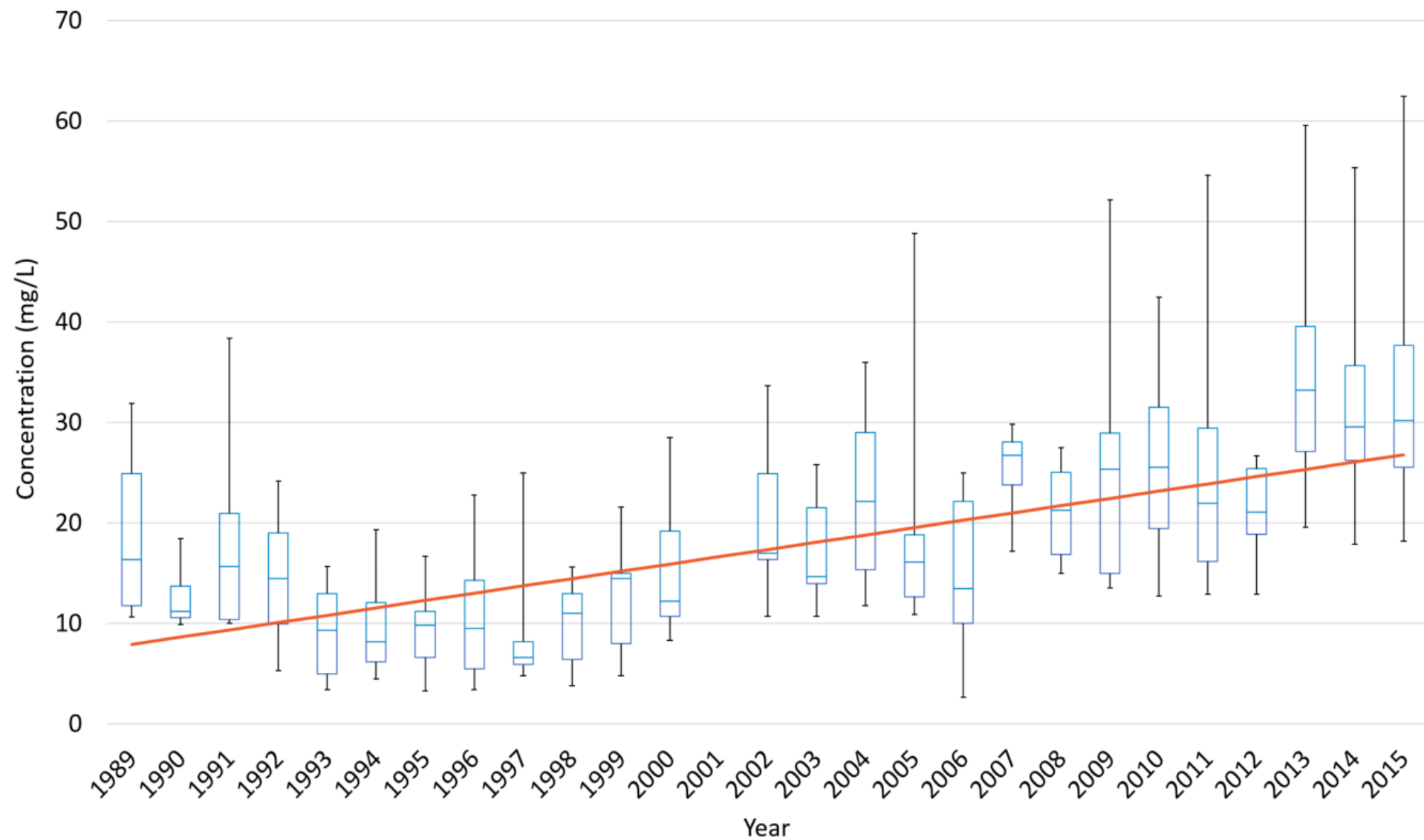
- Significant ongoing development
- Not unique to Dover, but occurring throughout Great Bay Watershed
- Primarily covered by Local Ordinances



**FIGURE 1.1** Percent of land area covered by impervious surfaces in the Piscataqua Region watershed, 1990-2010



# TSS at Adam's Point – 2018 SOOE Report



# Dover Land Statistics

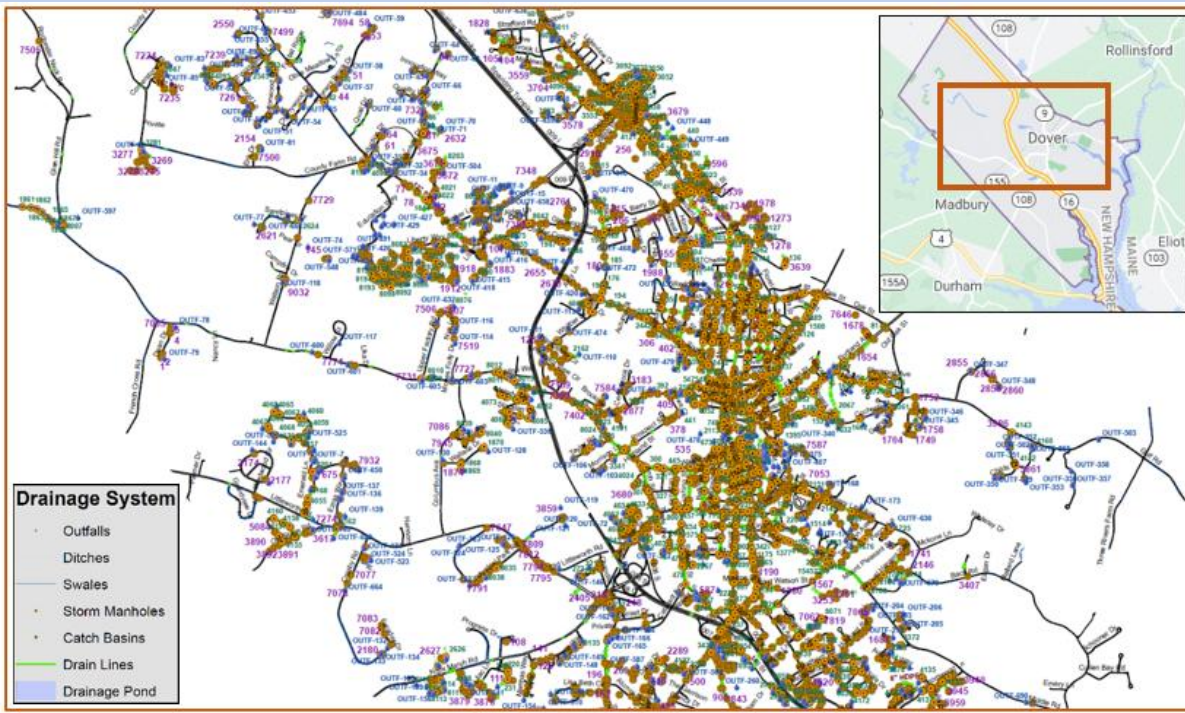
- Dover Land area approx. 27.5 sq miles
  - 25.1 sq miles actually land
  - 2.3 sq miles are water features
  - 2.1 sq miles (8.4%) is City owned/controlled
  - 1.0 sq mile State of NH or DOT (4.0%)
  - 22.0 sq miles privately owned (87.6%)
- 
- **Relatively small area City actually controls**



# Dover's Impact on Great Bay

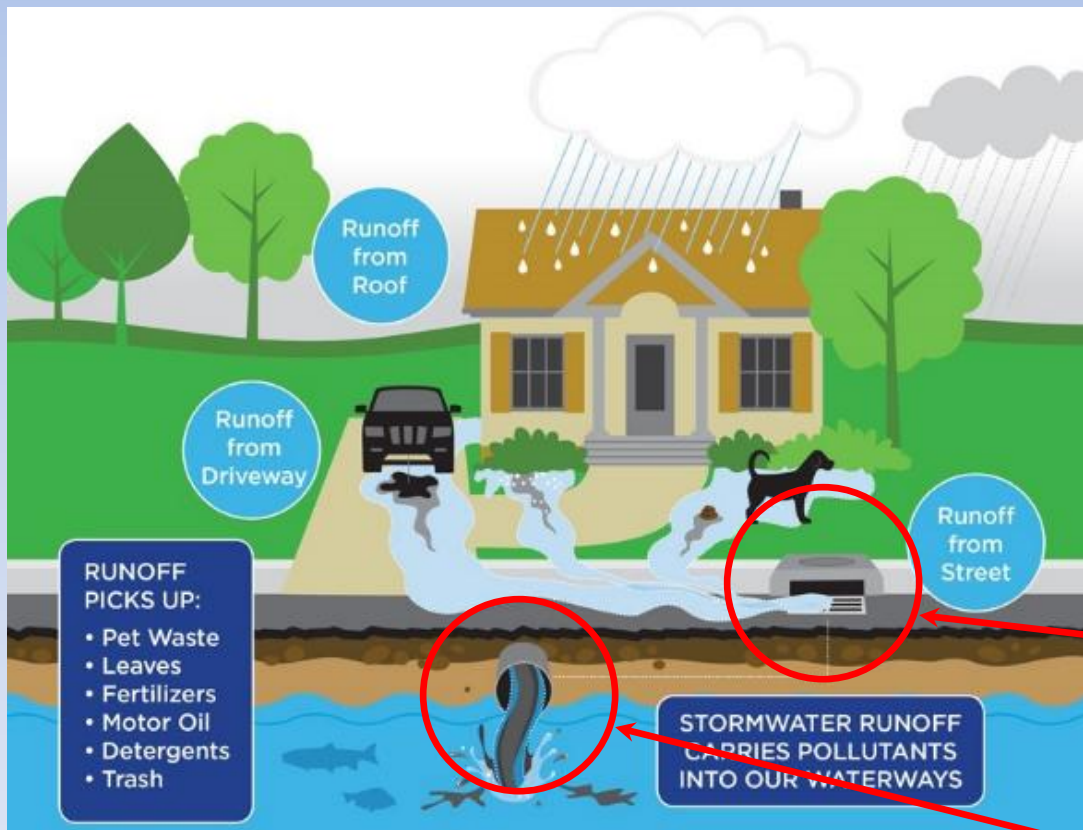
## ➤ Stormwater System

- 778 separate outfalls
- Approx. 5,000 catch basins
- 109 miles of drainage piping





# Stormwater Impacts



What is  
stormwater?

5,000 Catch Basins

778 Outfalls

# Dover's Impact on Great Bay

## ➤ Wastewater Treatment Plant

- Treated 847 million gallons in 2025
- Avg. 2.32 million gallons per day
- 3,268 tons biosolids removed

## ➤ Treatment Priorities

- Total Suspended Solids (TSS)
- Biological Oxygen Demand (BOD)
- Total Nitrogen – (TN)
- Metals



# Permitting?

- Clean Water Act (CWA) – Administered by EPA
- CWA prohibits anybody from discharging “pollutants” through a “point-source” into a “water of the United States” unless they have a NPDES Permit
- NPDES – National Pollutant Discharge Elimination System
- NH DES does not administer NPDES Permits, they are issued via EPA Region 1 out of Boston
- Only 2 other States don’t have Primacy over NPDES (New Mexico & Massachusetts)
- Stormwater (MS4) Municipal Separate Storm Sewer System
- Wastewater – 3 separate NPDES Permits

# MS4 Overview

- General Permit – Statewide for Cities with qualifying systems
- Issued 2017 – remains in effect, Administratively Continued
- Sets “Minimum Control Measures”
  - Public Outreach and Education
  - Public Involvement and Participation
  - Illicit Discharge Detection and Elimination
  - Construction Site Runoff Control
  - Post Construction Management
  - Pollution Prevention and Good Housekeeping



# MS4 Highlights

- Street Sweeping
- Catch Basin Cleaning
- BMP's – Best Management Practices



# WWTP NPDES Permits

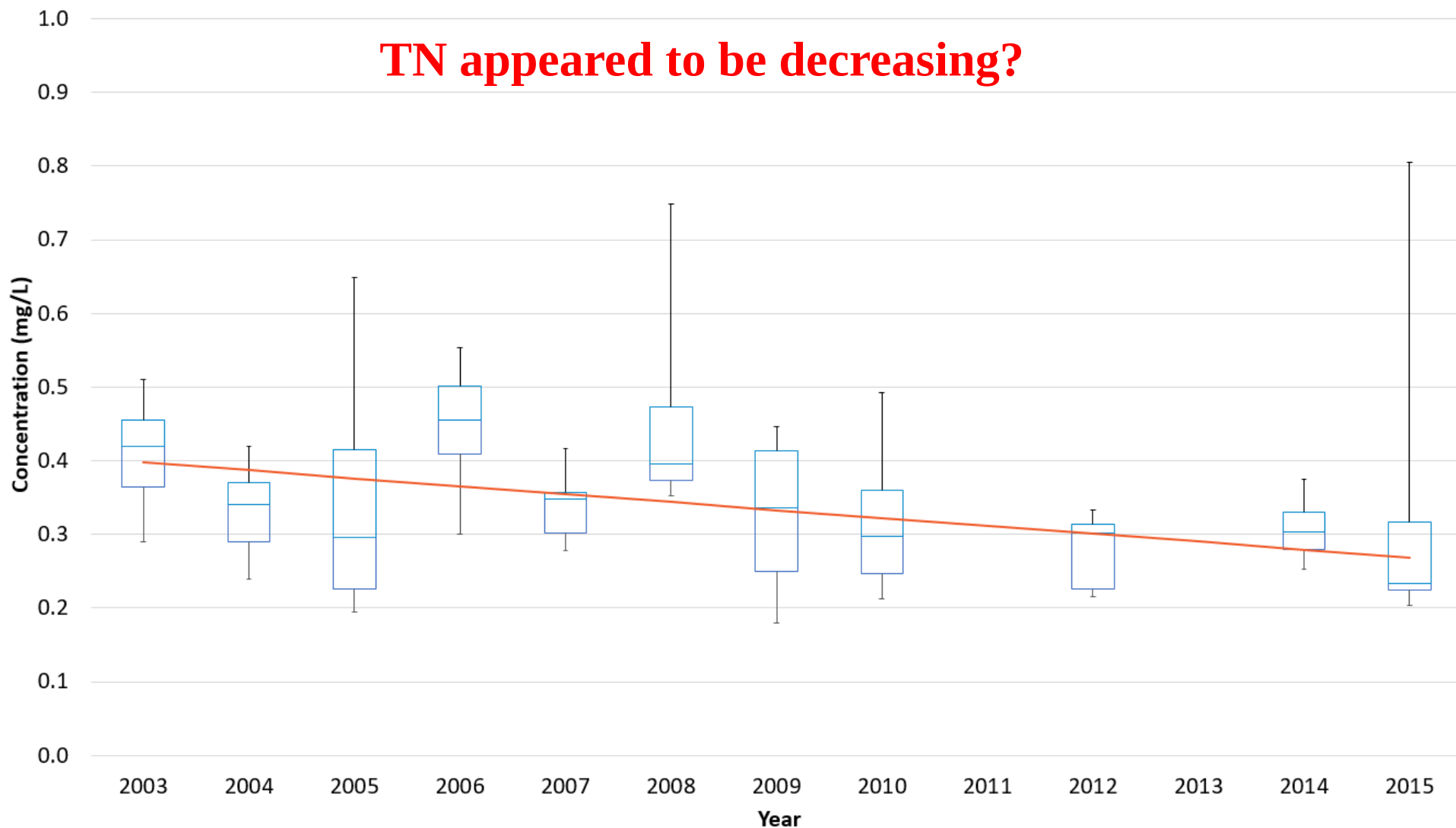
- Individual Permit – August 2006
  - Treatment – TSS, BOD, Bacteria, Metals
- 2009 NHDES published “Numeric Nitrogen Criteria for the Great Bay Estuary”
  - Total Nitrogen (TN) became nutrient of concern
- 2015 – Dover Upgraded WWTP for enhanced TN removal
- Summers, consistently see TN of 5.0 mg/L – with as low as 3.0 mg/L during warmer, ‘growing season months’
- EPA suggested “limits of technology” NPDES individual permits – which would have mandated effluent of 3.0 mg/L.
- Prior to upgrade – Dover might have approached 20.0 mg/L

# WWTP NPDES Permits

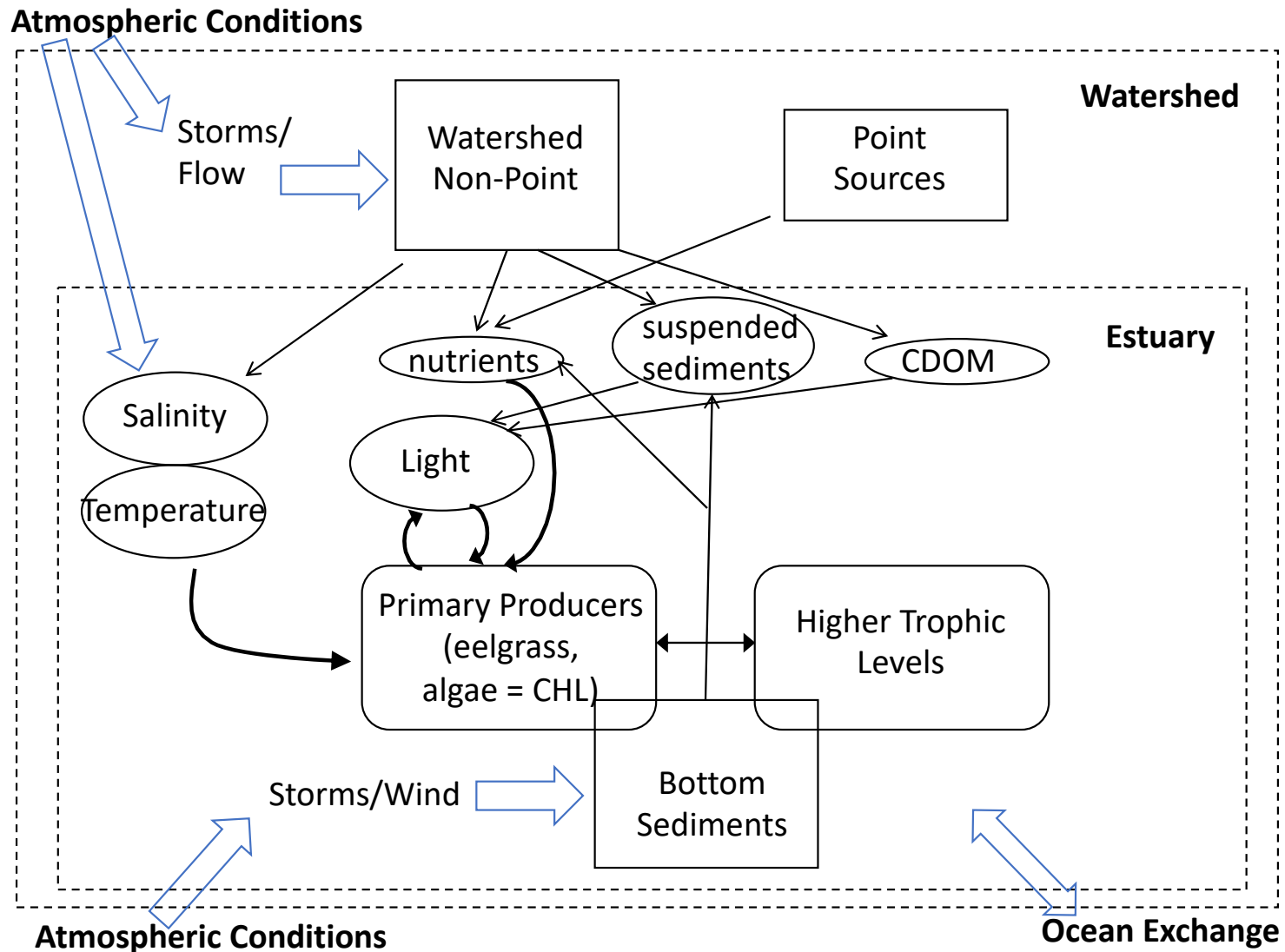
- Dover and several other Great Bay Communities (Portsmouth, Rochester) challenged legitimacy of TN = 3.0 mg/L “limits of technology”
- Dover could have faced \$40 million upgrade at WWTP for minor, incremental TN reductions
- Invest in more holistic upgrades?

# TN at Adam's Point – 2018 SOOE Report

**TN appeared to be decreasing?**



# Conceptual Model of Great Bay Ecosystem



**Complicated Ecosystem – slide by Wil Wolheim, UNH**



Figure ES: Summary of Non-Point Source Nitrogen Loads to the Great Bay Estuary

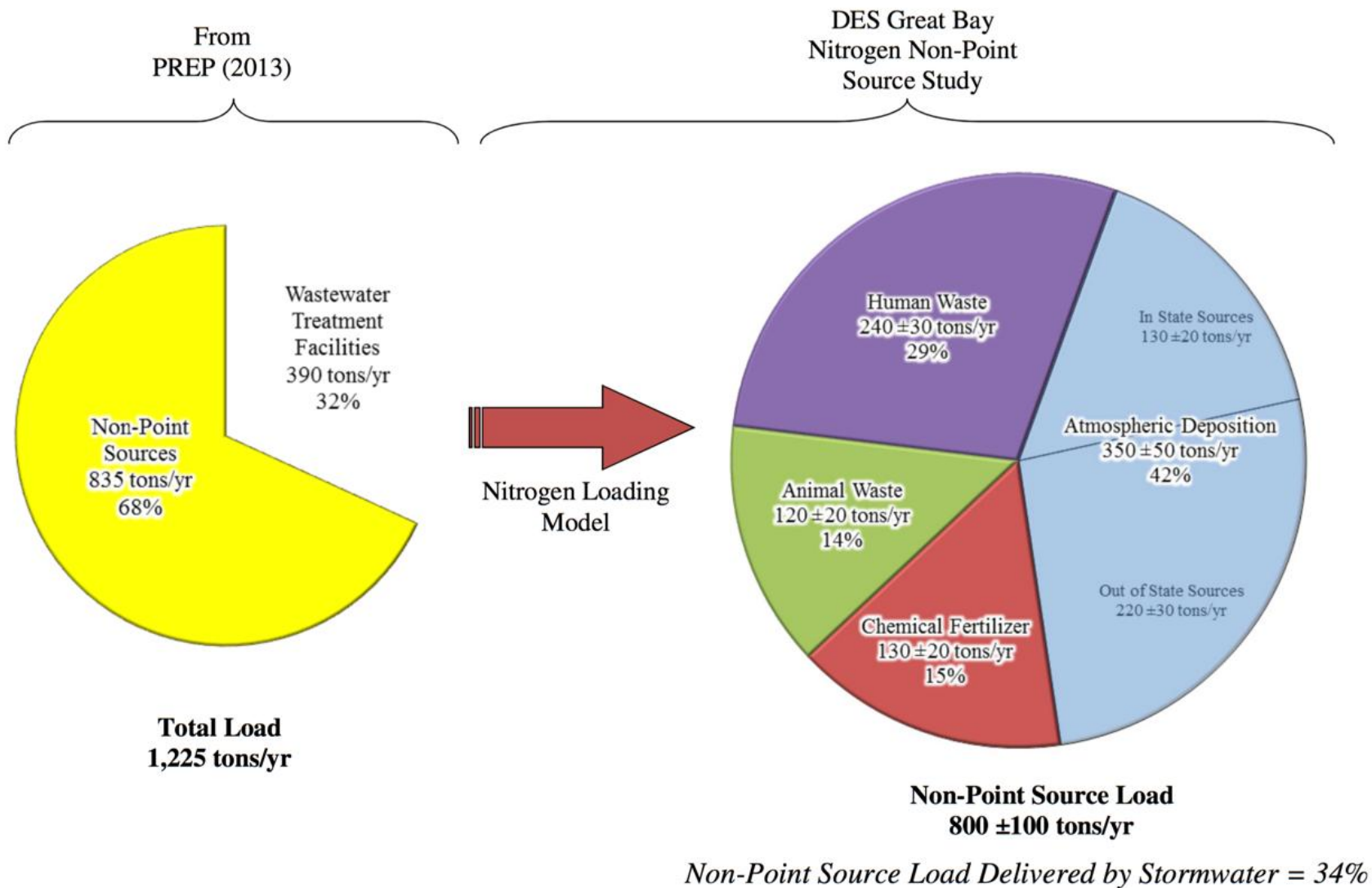


Figure from Great Bay Nitrogen Non-Point Source Study – June 16, 2014

**Non-point sources 68% of TN**

# WWTP NPDES Permits

- FINALLY!!! Circa 2018 discussion of holistic approach – not just set limits at WWTP
- November 2020 – EPA issued Great Bay Total Nitrogen General Permit
  - Applicable to 13 WWTP's
  - 'Hold the Load' at WWTP – regarding TN, no increases
  - Reduce non-point source contributions
  - Implement Adaptive Management Approach
  - Science-based

**Adaptive management** is an approach to natural resource management that emphasizes learning through management where knowledge is incomplete, and when, despite inherent uncertainty, managers and policymakers must act.

(Allen, C. and A. Garmestani. Adaptive Management. Chapter 1, Craig R. Allen, Ahjond Garmestani (ed.), Adaptive Management of Social-Ecological Systems. Springer Netherlands, Dordrecht, Netherlands, , 01-10, (2015)



*Slide from EPA/DES presentation 3/8/19*

# WWTP NPDES Permits

- TN General Permit – led to creation of MAAM – Municipal Alliance of Adaptive Management
  - United regulators, communities, and environmental groups to partner and collaborate
  - 5-yr permit period has expired, but will remain in effect, Administratively Continued
  - MAAM Communities contribute and fund research & monitoring, contributions to PREP, and UNH Stormwater Center for PTAP – Pollutant Tracking and Accounting Project
- November 2025 – EPA issued General Permit for 21 “medium-sized” WWTF’s

# MAAM Communities & Contributions

|                                |               |
|--------------------------------|---------------|
| <b>Costs:</b>                  |               |
| Website                        |               |
| Brown and Caldwell             | \$ 135,790.00 |
| PTAP                           | \$ 50,000.00  |
| PREP Core monitoring/oversight | \$ 466,000.00 |
|                                |               |
|                                |               |
|                                |               |
|                                |               |
|                                | \$ 651,790.00 |

| Facility Name | Total Permitted Flow (MGD) | Share  | 2022          | 2023          | 2024          | 2025          | 2026          |
|---------------|----------------------------|--------|---------------|---------------|---------------|---------------|---------------|
|               |                            |        | \$ 422,805.00 | \$ 519,684.00 | \$ 440,751.00 | \$ 641,173.52 | \$ 651,790.00 |
| Rochester     | 5.03                       | 22.73% | \$ 120,835.75 | \$ 126,893.71 | \$ 105,070.03 | \$ 152,848.52 | \$ 148,147.48 |
| Portsmouth    | 6.13                       | 27.70% | \$ 147,261.06 | \$ 154,643.83 | \$ 128,047.57 | \$ 186,274.58 | \$ 180,545.54 |
| Dover         | 4.7                        | 21.24% | \$ 112,908.16 | \$ 118,568.68 | \$ 98,176.76  | \$ 142,820.64 | \$ 138,428.06 |
| Exeter        | 3                          | 13.56% | -             | \$ 75,682.14  | \$ 62,666.02  | \$ 91,162.11  | \$ 88,358.34  |
| Pease ITP     | 1.2                        | 5.42%  | \$ 28,827.61  | \$ 30,272.85  | \$ 25,066.41  | \$ 36,464.84  | \$ 35,343.33  |
| Epping        | 0.5                        | 2.26%  | -             | -             | \$ 10,444.34  | \$ 15,193.69  | \$ 14,726.39  |
| Newington     | 0.29                       | 1.31%  | \$ 6,966.67   | \$ 7,315.94   | \$ 6,057.72   | \$ 8,812.34   | \$ 8,541.31   |
| Rollinsford   | 0.15                       | 0.68%  | \$ 3,603.45   | \$ 3,784.11   | \$ 3,133.30   | \$ 4,558.11   | \$ 4,417.92   |
| Milton        | 0.1                        | 0.45%  | \$ 2,402.30   | \$ 2,522.74   | \$ 2,088.87   | \$ 3,038.74   | \$ 2,945.28   |
| Kittery       |                            | 0.00%  |               |               |               |               | \$ -          |
| Berwick*      | 0.38                       | 1.72%  |               |               |               |               | \$ 11,192.06  |
| South Berwick | 0.65                       | 2.94%  |               |               |               |               | \$ 19,144.31  |

\*Permitted Flow of 1.1 MGD does not align with operating capacity; 0.38 MGD being used based on 20-yr projected growth and operating capacity.



# PREP Workplan – Funding request

Summary of PREP 2026 Monitoring Proposals & MAAM Funding Request

| Study Name                                                                                  | Previous MAAM Expenditures |           |           |           | 2026 Request |          | Study Description                                                                                                                                                                       | Notes                                                                                                                                                              |
|---------------------------------------------------------------------------------------------|----------------------------|-----------|-----------|-----------|--------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                             | 2022                       | 2023      | 2024      | 2025      | Cost         | Priority |                                                                                                                                                                                         |                                                                                                                                                                    |
| Light and Bio-optical Model (Formerly "Turbidity")                                          | \$60,000                   | \$67,000  | \$79,920  | \$70,113  | \$73,568     | 1        | GBE-specific Kd ( $\lambda$ ) model. To have robust optical model, data collection in the GBE waters is ongoing.                                                                        | Report from work funded in 2022 in progress. 2026 request is a continuation of a multi- year workplan.                                                             |
| Tier 1 Seagrass Monitoring                                                                  | \$75,000                   | \$75,000  | \$77,500  | \$100,580 | \$74,189     | 1        | Continuation of annual aerial imagery mapping of seagrass.                                                                                                                              |                                                                                                                                                                    |
| Tier 2 Seagrass Monitoring                                                                  | \$53,000                   | –         | \$55,000  | \$72,028  | \$124,589    | 1        | Continuation of work that started in 2021. Annual study that includes characterization of seagrass density and morphology, macroalgal abundance and type, and sediment characteristics. |                                                                                                                                                                    |
| Estuarine WQ Monitoring                                                                     | \$41,000                   | \$64,000  | \$66,000  | \$120,960 | \$58,014     | 1        | Ongoing estuarine water quality monitoring program for a more comprehensive understanding of water quality patterns.                                                                    | MAAM would be providing a portion of overall study cost.                                                                                                           |
| External Advisors                                                                           | \$25,000                   | \$10,000  | \$25,000  | \$31,500  | \$103,515    | 1        | Funding for engaging external advisors to review and provide guidance on scientific methods and results.                                                                                | External advisors: time and expenses for Lora Harris, Jud Kenworthy, expenses only for Mike Van Den Heuvel                                                         |
| Light Array Program                                                                         | \$29,000                   | \$42,000  | \$43,400  | \$56,325  | \$32,445     | 2        | Continuation of annual work that started in 2021. Provides high resolution data on the light environment in the estuary.                                                                | If not funded, the dataset collected through 2025 will provide important info about the light environment and duration, frequency, and timing of low light events. |
| Green Crab Monitoring                                                                       | –                          | –         | –         | –         | \$46,620     | 3        | Estimated cost. Design and implementation of a monitoring plan focused on green crab abundance in GBE.                                                                                  | BC and PREP agree that a green crab- workplan is not needed in 2026. Near term focus should be on reviewing recent data collected by others.                       |
| Historical TN Loading Calculation                                                           | –                          | –         | –         | –         | \$79,565     | 3        | Estimated cost. Calculate historical (i.e. late 1990's and early 2000's) annual TN loads to the estuary with methods comparable to those currently used.                                | BC and PREP agree that this effort is not a high priority for 2026 MAAM funding.                                                                                   |
| Previous studies funded by MAAM, for which additional MAAM funding is not requested in 2026 |                            |           |           |           |              |          |                                                                                                                                                                                         |                                                                                                                                                                    |
| Storm Add-On to Eelgrass Stressor Project                                                   | \$5,000                    | \$91,000  | –         | –         | –            | –        | Implementation of a study to investigate the impacts of storm events and inputs on water quality in GBE.                                                                                | In progress, results to be reported in Feb. 2026.                                                                                                                  |
| Tributary Discharge Measurements                                                            | –                          | \$5,000   | –         | –         | –            | –        | Estimating discharge measurements for Bellamy, Great Works, and Salmon Falls Rivers. Part of a stated commitment in MAAM AMP.                                                           | In progress, results to be reported in Feb. 2026.                                                                                                                  |
| Macroalgal Dynamics Synthesis and Recommendations                                           | –                          | \$25,000  | –         | –         | –            | –        | Compilation, review, and synthesis of green and red macroalgae status and trends in GBE, identifying data gaps, and development of a monitoring plan (if needed).                       | Report pending; scheduled for completion in spring 2026.                                                                                                           |
| Shoreline Hardening Survey                                                                  | –                          | \$15,000  | –         | –         | –            | –        | A survey to determine the location and extent of hardened shoreline in GBE.                                                                                                             | Data and methods summary report will be available in December 2025.                                                                                                |
| Tier 3 Seagrass                                                                             | –                          | \$33,000  | –         | –         | –            | –        | Continuation of annual Tier 3 Seagrass (aka SeagrassNet) program; long-term monitoring of fixed transects.                                                                              | Will be conducted with other funding sources through 2027.                                                                                                         |
| Estuarine WQ Monitoring                                                                     | –                          | \$20,000  | –         | –         | –            | –        | Funding to buy new sondes.                                                                                                                                                              |                                                                                                                                                                    |
| Mussel Watch                                                                                | \$7,300                    | \$10,000  | –         | –         | –            | –        | Analysis of bivalve tissue to measure toxic constituents.                                                                                                                               |                                                                                                                                                                    |
| Non-Structural BMP Expert Panel                                                             | –                          | –         | \$30,000  | –         | –            | –        | Literature review of nitrogen reduction credits from non-structural BMPs.                                                                                                               | 2024 work complete. No follow on work suggested at this time.                                                                                                      |
| 5% Contingency                                                                              | –                          | \$19,500  | \$13,345  | –         | –            | –        | Not included for 2026.                                                                                                                                                                  | Costs for 2026 include inflation adjustment and overhead costs.                                                                                                    |
| Total                                                                                       | \$107,300                  | \$409,500 | \$310,245 | \$381,392 | \$433,874    | 1        |                                                                                                                                                                                         |                                                                                                                                                                    |
|                                                                                             |                            |           |           |           | \$466,319    | 1 & 2    |                                                                                                                                                                                         |                                                                                                                                                                    |

# EPA Letter



## REGION 1

BOSTON, MA 02109

### VIA EMAIL

April 13, 2026

Municipal Alliance for Adaptive Management (MAAM)

RE: Progress Review for Adaptive Management for the Great Bay Total Nitrogen General Permit

Dear Members,

EPA was pleased to participate in the February 5, 2026 MAAM meeting to discuss the progress Great Bay communities are making to reduce nitrogen loads and restore this critical estuary. We appreciate the work that has been done since the issuance of the recently expired Great Bay Total Nitrogen General Permit (GBTNGP), which was structured to facilitate the State of New Hampshire and Great Bay municipalities' goal to prioritize reducing nonpoint sources and stormwater point sources of nitrogen.

It is important to recognize that this approach has achieved significant nitrogen reductions, including a 70% reduction in nitrogen loading from wastewater treatment plants (WWTPs) and initial steps toward nitrogen reduction from nonpoint sources. Eleven of the 12 GBTNGP permitted municipalities have submitted Adaptive Management Plans indicating their intention to pursue nonpoint source and stormwater point source reductions in addition to achieving the WWTP point source effluent limitations in the permit.<sup>1</sup> Within the permit's framework, municipalities may use both approaches to reduce nitrogen, and progress in reducing nonpoint sources will support the case to retain this flexible, adaptive approach in a renewed permit.

MAAM has been an important factor in the success of this work with its coalition providing an exemplary model of communication and collaboration among New Hampshire and Maine towns, the NH Department of Environmental Services (NHDES), EPA, and public stakeholders, and will be critical to continuing the success of the current approach.

<sup>1</sup> Adaptive Management Plans are posted on EPA's Great Bay Total Nitrogen General Permit website at: <https://www.epa.gov/npdes-permits/great-bay-total-nitrogen-general-permit>.

# EPA Letter -continued-

The permit's framework of nonpoint source reduction prioritization works best when all MAAM municipalities participate in these reduction activities. Also essential to the success of this approach is the efficient and timely reporting of the reductions achieved by MAAM communities which ensures this information is properly recorded in NHDES's Pollutant Tracking and Accounting Project (PTAP) database, which is available to EPA as well.

When it comes time to issue the next version of the GBTNP, current and up-to-date information from the municipalities about nitrogen reductions will be a key factor in demonstrating that the permit's approach still provides a path to meet water quality goals.<sup>2</sup> That is why we encourage all Great Bay municipalities to make reporting their nitrogen reduction activities in PTAP a priority.

EPA continues to support a regulatory framework that encourages permittees to actively reduce nitrogen from both point and nonpoint sources. The flexible GBTNGP approach, which couples voluntary reductions in nonpoint source and stormwater point source nitrogen loads with reasonable point source effluent limitations, has been a promising framework to achieve the overall level of nitrogen reduction needed to restore Great Bay to environmental health.

Active investments across the watershed to further reduce nonpoint source and stormwater point source loads combined with consistent and accurate reporting of reduction data in PTAP will help support the case to continue this flexible, locally-driven approach.

If you have questions, please reach out to my staff. Questions about WWTP effluent limits may be directed to Michael Cobb at [cobb.michael@epa.gov](mailto:cobb.michael@epa.gov). Questions about adaptive management or nonpoint source and stormwater point source controls may be directed to Danielle Gaito at [gaito.danielle@epa.gov](mailto:gaito.danielle@epa.gov). We look forward to continued partnership as we work together to restore Great Bay.

Sincerely,

**KENNETH MORAFF**  
Digitally signed by  
KENNETH MORAFF  
Date: 2026.04.13  
16:57:16 -0400

Ken Moraff  
Water Division Director  
EPA Region 1

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<sup>2</sup> Many communities have been using the Pollutant Tracking and Accounting Project (PTAP) developed by the New Hampshire Department of Environmental Services and the UNHSC as an effective way to track and report structural and non-structural stormwater control measures. The PTAP database is available at <https://ptapp.unh.edu/>. Information about PTAP training and resources is available at <https://www.nhdes.gov/nh-resources/pollutant-tracking-and-accounting-project-ptap>. Tom Swenson at NHDES ([thomas.d.swenson@des.nh.gov](mailto:thomas.d.swenson@des.nh.gov)) can provide information about upcoming trainings.