MUNICIPAL ALLIANCE FOR ADAPTIVE MANAGEMENT
MEETING OF THE MEMBERS
DRAFT MINUTES

Meeting Type: **Members Meeting**
Meeting Location: **Rochester DPW**
209 Chestnut Hill Road, Rochester NH

Meeting Date: **February 5, 2026**
Meeting Time: **1:00 pm**

A quorum of Members will be in person, but for those interested in participating remotely please register at the above link.

A full recording of this meeting is available to review for further detail.

1. **Call to order**

The Meeting was called to order at 2:00 pm.

Town/City	Representative	Present
Dover	Tim Puls (TP)	Yes
Portsmouth	Suzanne Woodland (SW)	Yes
Rochester	Gretchen Young (GY)	Yes
Exeter	Stephen Cronin (SC)	Yes (by Zoom)
Newington	Aerial Write (AW)	No
Milton	Richard Krauss	Yes (by Zoom)
Rollinsford	-	No
Epping	Jake Roger (JR)	Yes
South Berwick	Denis Messier (DM)	Yes
Berwick	Jay Wheeler (JW)	Yes

Non-Members:
Kalle Matso, PREP
Chris Whitney, PREP
Daniel Macadam, UNH Stormwater Center
Jamie Houle, UNH Stormwater Center
Jessa Kellogg, Town of Kittery
Steve Couture, NHDES
Stacy Villanueva, Brown and Caldwell
Danielle Gaito, EPA
Melissa Paly, CLF Great Bay Waterkeeper
Jamie McCarty, City of Portsmouth
Tom Swenson, NHDES

Clifton Bell, Brown and Caldwell
Brianna Group, TNC
Renee Bourdeau
Kelsey Meyer
Jim Steinkrauss, Rath, Young & Pignatelli
Jennifer Rowden, Rockingham Planning Commission
Bruce Bain
Ken Edwardson, NHDES
Fiona Worsford, Brown and Caldwell
Amber Hall, City of Somersworth
Michael Bobinsky, City of Somersworth
Michael Cobb, EPA
Sally Soule, NHDES
Elizabeth McKenna, Senator Shaheen office
Kyle Pimental, Strafford Regional Planning Commission
Michael Curry
Sean Greig, Town of Newmarket
Lyndsay Butler, Town of Newmarket
John Storer, City of Dover
Tom Irwin, CLF
Mark Sanborn, EPA Region 1 Administrator
Ken Moraff, EPA Director of Water Division
Jen Czysz, Strafford Regional Planning Commission
Ted Diers, NHDES
Josh Scotton, Town of Newfields

2. Welcome and Introductions

- Gretchen Young (GY), Chair of the Municipal Alliance for Adaptive Management, gave a brief introduction noting that the Great Bay Total Nitrogen General Permit, was approved for 12 NH communities in November of 2020, and took effect in February 2021. The General Permit is unique (by design) in that it allows for regulated communities to opt-in to an Adaptive Management approach to nitrogen reduction. The adaptive management approach is intended to help all parties (communities, regulators and stakeholders) better understand the water quality challenges of the Estuary through data gathering and analysis, implementing and documenting non-point source nitrogen reduction efforts, and charting a course to efficiently and effectively improve water quality in the Great Bay Estuary. To effectuate the collaboration that was envisioned by this adaptive management approach, 8 of the 12 regulated communities have joined together to form the Municipal Alliance for Adaptive Management. Those eight communities include Rochester, Portsmouth, Dover, Exeter, Epping, Newington, Rollinsford, and Milton. Recently the Maine DEP has implemented a very similar permit structure to the NH General Permit, and at the encouragement of Regulators and Stakeholders, those communities are also joining MAAM. So far Berwick and South Berwick have joined, and Kittery is looking to join once their permit is finalized. GY noted that there are 5 primary focus areas including monitoring ambient water quality, tracking reductions and additions of nitrogen, planning and implementing source reductions, providing a collaborative and transparent process for evaluating pollutant loading and contributing stressors, and ultimately developing a timeline and plan to work towards a TMDL or advance restoration plan (ARP) for water quality in Great Bay. Over the last five years, MAAM has done some incredible things including raised and secured approximately $2.8M for monitoring and water quality research; sponsored and promoted the PTAP tracking program which is available to all NH and recently Maine communities at zero cost to the

communities; annually prepared and submitted an updated Adaptive Management Plan for EPA and all Stakeholders to see and comment on; and perhaps most importantly, created a space for ultimate transparent collaboration and stakeholder and regulator participation. GY stated that we are at the end of this first 5-year permit term and are taking the opportunity today to bring all of the participants, stakeholders, regulated communities and other interested parties together to discuss the work done and plans/goals for moving forward.

3. Monitoring/Research and Report Update (Brown and Caldwell)

Stacy Villanueva and Clifton Bell from Brown and Caldwell attended remotely to present. Brown and Caldwell is the consulting firm, who are guiding and informing research and monitoring decisions on behalf of MAAM. Much of the work is done in close partnership with the Piscataqua Region Estuaries Partnership. A copy of the Brown and Caldwell presentation is attached to these minutes.

4. PTAP – Reporting Nitrogen Reductions

Jamie McCarty from the City of Portsmouth, and Jamie Houle of the UNH Stormwater Center were present to present information on the Pollutant Tracking and Accounting Program (PTAP). PTAP is a program that has been developed by stakeholders in partnership with the UNH Stormwater Center and NHDES in response to the EPA's request for a means of tracking non-point source load reductions in the watershed. Jamie McCarty demonstrated how the City of Portsmouth ensures information is input into the PTAP database as part of the planning board approval process. Jamie Houle discussed what data trends are available from PTAP, and how flexible the system can be. Discussion ensued regarding opportunities to continue to build out this database. A copy of the UNH Stormwater Center presentation is attached to these minutes.

5. EPA Update and Discussion

Mark Sanborn started the discussion stating that EPA is committed to regulating what is in statute and law and providing consistency and predictability throughout the agency. Mr. Sanborn stressed the importance to EPA, that data be submitted so that they can get an idea of what is happening in the watershed as the balance of not having a more heavy-handed regulatory requirements. Michael Cobb and Daniell Gaito presented first a chart showing nitrogen load reductions at POTWs and charts generated from PTAP showing non-point source reductions in reporting communities.. EPA encourages towns that are not using PTAP to reach out if assistance is needed. A copy of the EPA slides is attached to these minutes.

Ken Moraff stated that there is no bar chart that shows the immense improvement in common purpose and strategic collaboration that has occurred over the last few years, but that it is undoubtably making positive impacts to the Great Bay. He stated that the work MAAM is doing is one of the real success stories in Environmental Policy. Suzanne Woodland discussed weather land conservation could better be recognized in the tracking and accounting data. Tom Irwin stated that CLF is concerned about an indefinite continuation. Mark Sanborn noted, and stated that EPA's goal is to provide clear direction and have defined permit expectations. He stated that EPA will look at the progress that has been made and find how best to build on that and continue progress. Mr. Irwin noted that EPA might consider encouraging communities who are not participating in MAAM to join. GY noted that data collection is not just coming from PTAP participation but also from the PREP monitoring efforts, which are expensive and currently being funded largely by MAAM.

6. Next Steps

- MAAM will schedule a meeting in 6-months to get update on the Brown and Caldwell monitoring report.

- MAAM will continue to brainstorm partnerships (potentially with the RPCs) to improve PTAP participation in all communities.

- PTAP may be adjusted to find a way to track conservation of land.

- EPA will consider issuing a letter or something else to specifically encourage non-participating communities to improve data entry in PTAP and funding of ongoing water quality monitoring.

7. **Renewal and Update of Intermunicipal Agreement**

   Suzanne Woodland reminded communities that revised IMAs are needed.

8. **Stakeholder Comment**

   Melissa Paly continued to emphasize how impressive the work that MAAM is doing and encouraged any non-participating communities to join.

9. **Public Comment**

10. **Approval of November 20, 2025, Members Meeting Minutes**

    Motion: SW moved to approve meeting minutes of the November 2025 meeting with the addition of Rollinsford as a member, second by DM.

    Vote Passed 8-0

11. **Other Business**

12. **Schedule Next Meeting**

    Schedule will be done in the future as progress on the monitoring report is made. Meeting will likely be some time in the summer.

13. **Adjourn**

Brown AND Caldwell

Monitoring/Research and Reporting Update

February 5, 2026

Agenda

1. Monitoring and research activities
   - Completed to date
   - Pending data
   - 2026 funding
2. Pollutant reduction progress
3. Report background and contents
4. Initial trends and insights
   - Eelgrass Resilience Project
   - Bio-optical Model
   - WQ Status and Trends
   - TN Areal Loading
5. Next Steps
6. Q & A - Discussion

Monitoring and Research Relevant to the AMP Report

MAAM Funded

Field Monitoring

- Estuarine WQ: 2021 – 2025
- Light Arrays: 2021 – 2025
- Tier 1 Eelgrass: 2021 – 2025
- Tier 2 Eelgrass: 2021 – 2025
- Mussel Watch: 2022

Special Reports and Studies

- Great Bay Bio-Optical Model: 2022 - 2025
- Shoreline Hardening Survey: 2024
- Non-Structural BMP Expert Panel: 2024
- Macroalgae Synthesis Report: 2023
- Light Synthesis Report: 2024
- Ungauged Tributary Discharge Estimates: 2023
- Storm Event Inputs: 2024

Other Pertinent Studies/Datasets

Field Monitoring

- Tier 3 Eelgrass Monitoring
- Tidal Tributary WQ Program
- GB NERR WQ Monitoring
- WWTP Discharge Flows and Concentration
- USGS Gauges
- NOAA Meteorological

Reports and Studies

- PREP SOOE Reports
- Eelgrass Resilience Project
- Long Term Trend Analysis (Spieker and White, Matsuoka)
- Green Crab Abundance Study
- Restoration Project Reports

Pending Data and Results from the First Permit Term

Field Monitoring*

- Estuarine WQ Data: 2023 – 2024
- Estuarine WQ QA/QC Report: 2022
- Light Arrays QA/QC and Field Report: 2021 – 2025
- Mussel Watch Data: 2024
- Tidal Tributary WQ Data: 2024

Special Reports and Studies

- Macroalgae Synthesis Report; 2023
- Light Synthesis Report: 2022
- Ungauged Tributary Discharge Estimates: 2023
- Storm Event Inputs: 2023
- Shoreline Hardening Report: 2025

**2025 field monitoring was completed as expected, data and reports are expected to be complete by May 2026*

MAAM 2026 Funding

Field Monitoring

- Tier 1 Eelgrass Survey
- Estuarine WQ Monitoring
- Light Array Program
- Tier 2 Seagrass Monitoring

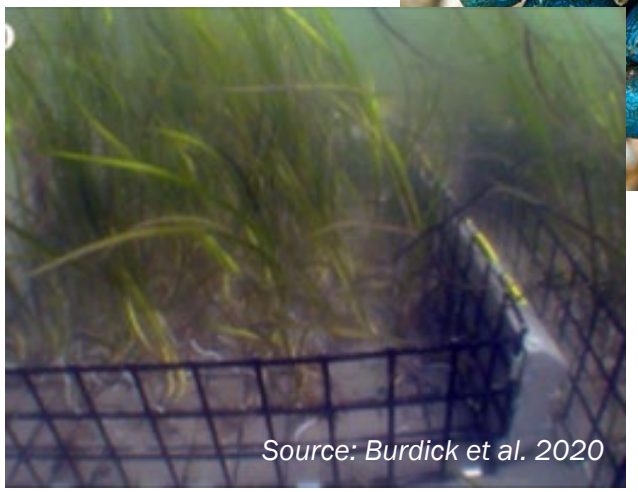
Other Studies and Activities

- Great Bay Bio-Optical Model: Site-specific Kd model
- External Advisors: Lora Harris, Jud Kenworthy, Mike Van Den Heuvel

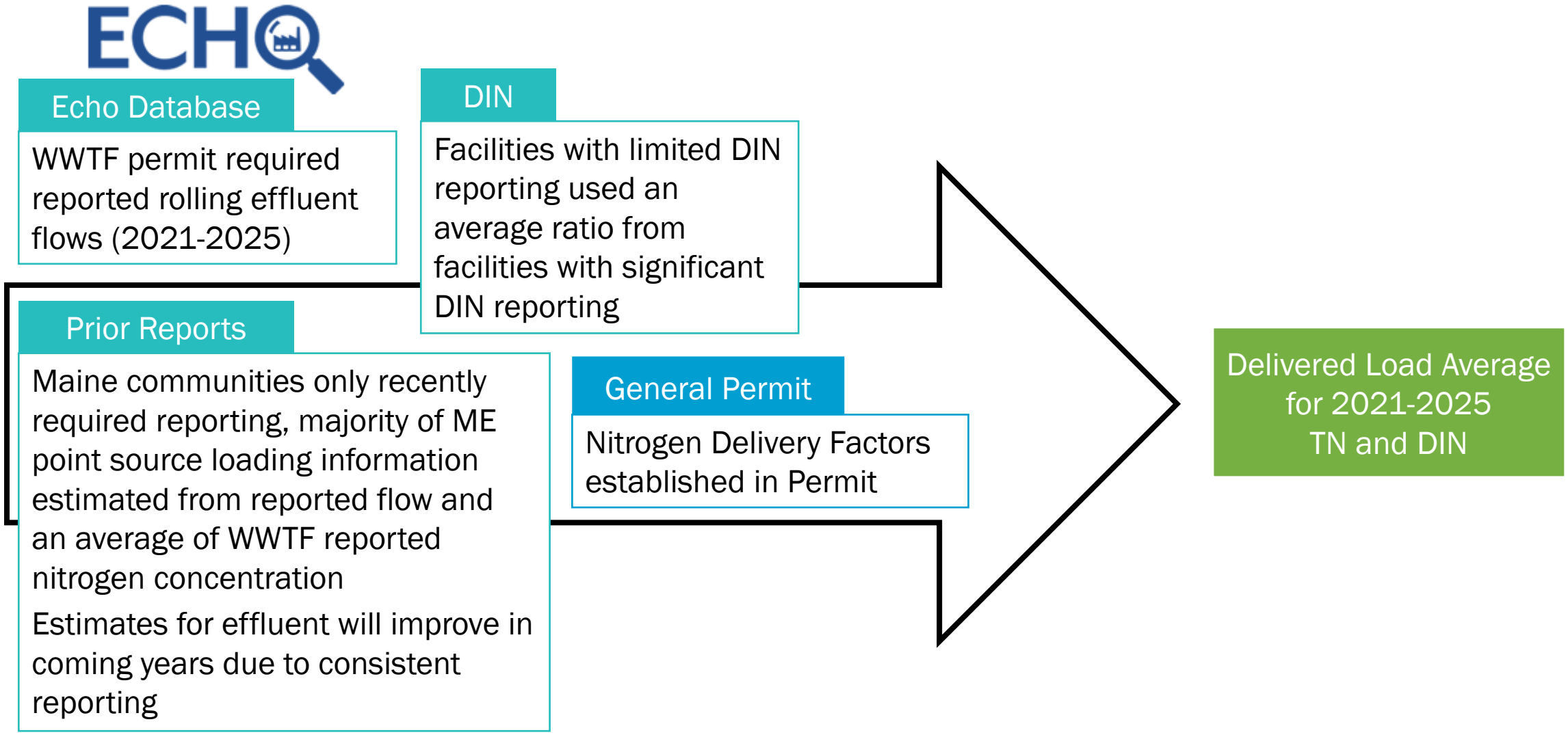
MAAM Coordination and Communication Activities

- $1,795,500 to research and monitoring
- Grant funding for oyster and eelgrass health studies and restoration
- PRMC and PREP TAC activities
- CLF Stakeholder Committee
- Eelgrass Resilience Project PAC
- Annual AMP updates
- MAAM public meetings


Source: nature.org


Source: Burdick et al. 2020

Pollutant Reduction Progress – Point Source



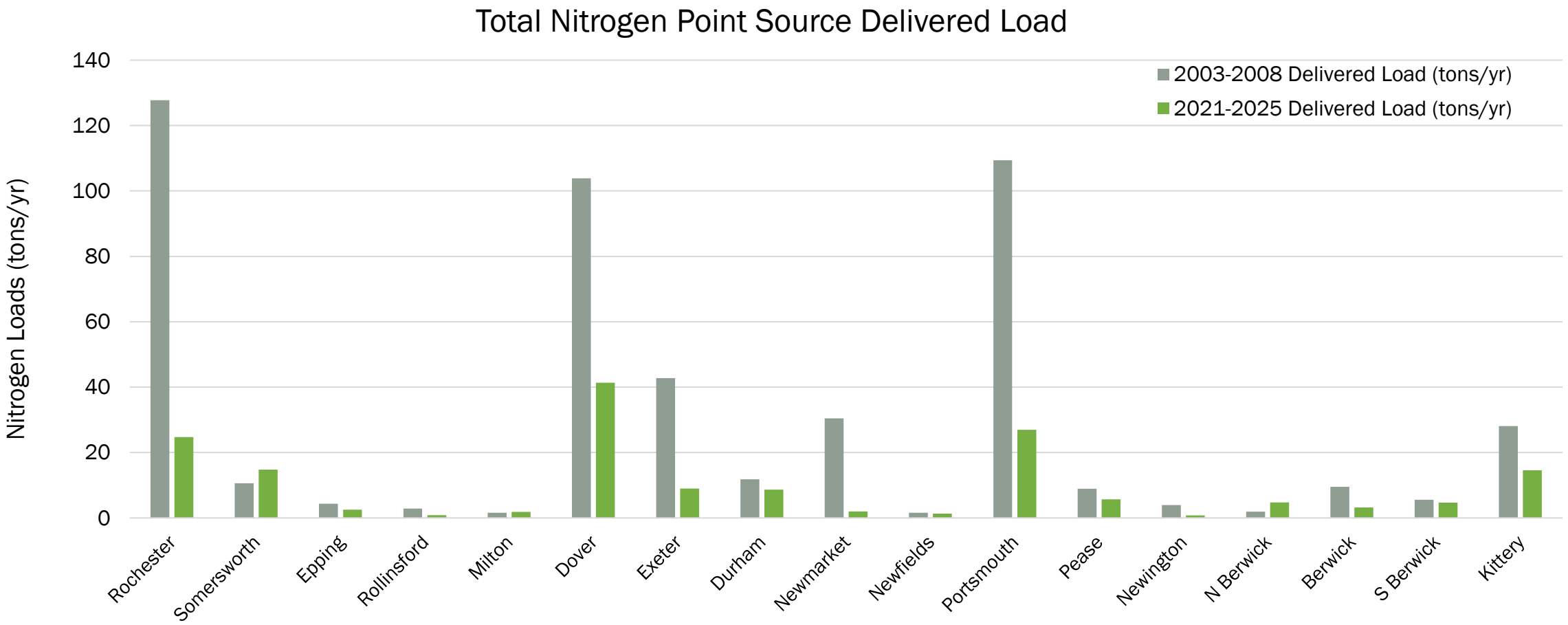
Pollutant Reduction Progress – Point Source

Of note: 2023 State of Our Estuaries Report used different delivery factors than the permit fact sheet for 4 communities

WWTF	SOOE Delivery Factor	Permit Fact Sheet Delivery Factor
Portsmouth	13%	100%
Kittery	14%	100%
Pease	26%	100%
Newington	26%	100%

- Loading estimates presented in next slide are based on delivery factors in permit fact sheet
- Difference in estimation of delivery factors should be taken into account when comparing reported loads from different sources

Pollutant Reduction Progress – Point Source



Maine communities: based on flow data and average WWTF TN concentration for 2021-2025 Averages
2003-2008 values taken from Trowbridge et al. (2010)

Pollutant Reduction Progress – Non-Point Sources


Source: portsmouth.gov


Source: des.nh.gov


Source: rochesternh.gov


Source: portsmouth.gov

Pollutant Reduction Progress – Total Loading

- Point Sources
  - Several facilities have implemented WWTF upgrades or improvements since permit development period
  - Estimated reduction compared to permit limits: ~100,000 lb/yr TN
- Non-Point Sources
  - Tracked using PTAP
  - As of latest AMP update (Sept. 2025) 21,440 lb/yr TN reduced

Final Report Driver

- Report is a component of the Joint Adaptive Management Plan

  "This [final] report will include status of technical activities and interpretations of stressor-response, including the current understanding of the role of nitrogen and associated loading or concentration thresholds. It will also outline a path forward for refinement of technical tools and completing a TMDL or ARP."

- Voluntary
- But an important contribution to current understanding and future planning
- Currently planned for submittal in December 2026

Final Report Objectives

- Summarize MAAM activities and accomplishments over the permit term
- Recap what we've learned about the receiving waters
- Provide recommendations for future planning/permitting phases

Report Outline

1: Introduction

- Overview of drivers of the report
- Goals and objectives

2: MAAM Activities

- Pollutant Reduction Progress Summary
- Research and Monitoring
- Coordination and Collaboration

3: Stressor-Response Relationships

- Light attenuation
  - Sediment
  - DOC loading
  - Phytoplankton/ N
- Shear stress
- Temperature
- Loss of filter feeders
- Herbivory
- Macroalgae
- Summary: Update overall conceptual model of stressors and role of N

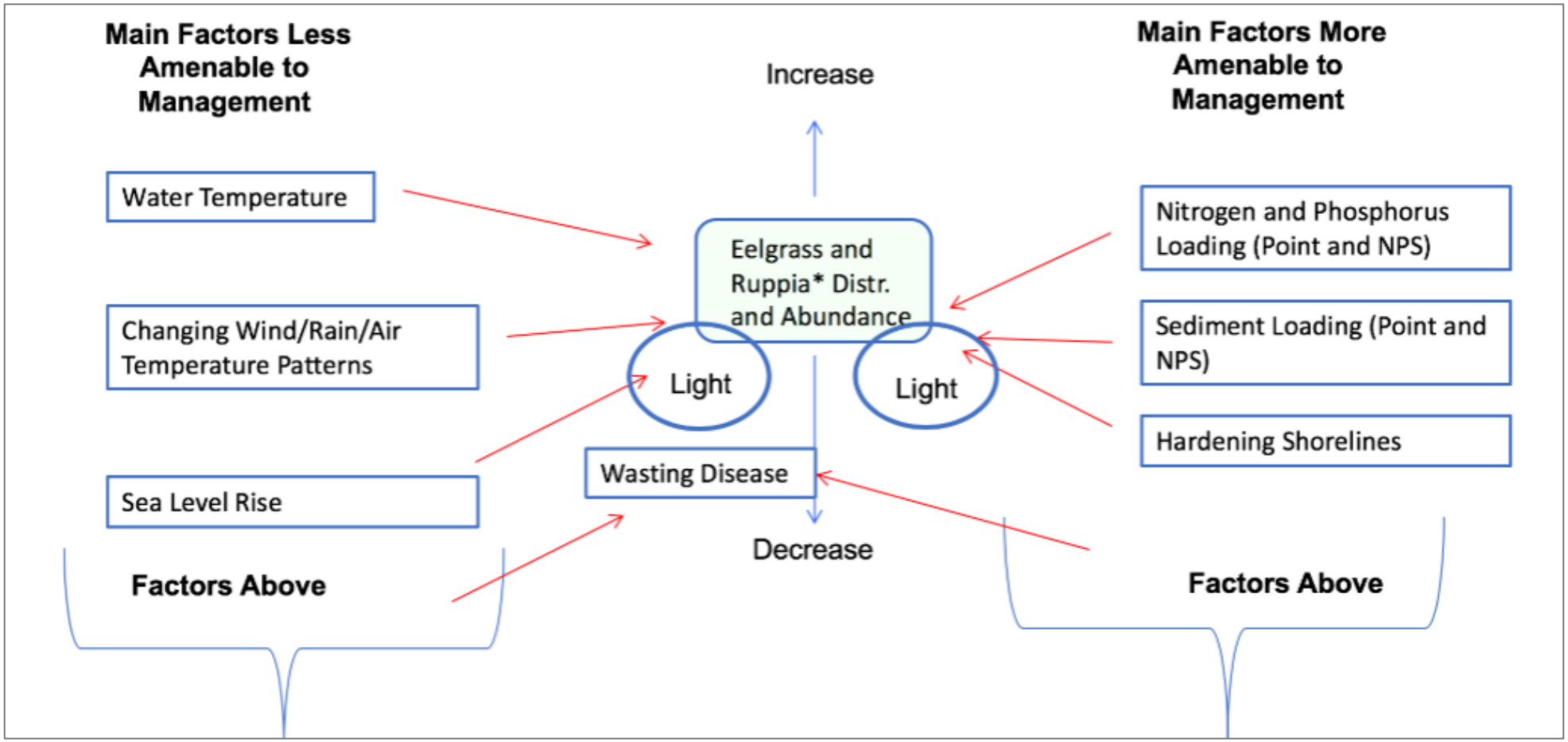
4: TN Thresholds

- Load-Based
  - Revisit areal loading rates
  - historical loading rates/trends
  - Data gaps and issues
- Concentration-Based
  - Pros/cons
  - Compare to other systems

5: Recommendations

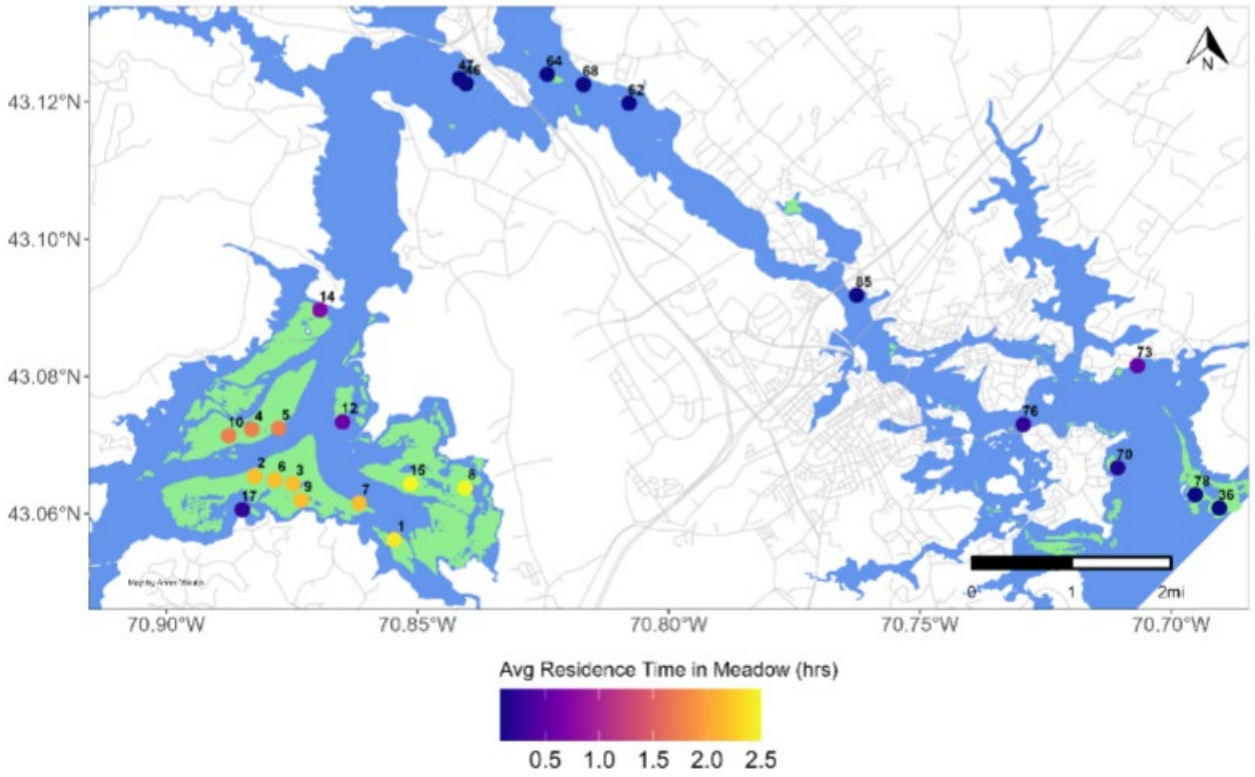
- Continued implementation
- Monitoring and analysis
  - Long-term monitoring
  - Data gaps
  - Technical & modeling tools
- ARP vs. TMDL
- Statement of DES response

Report Will Build Upon Prior Conceptual Models and Recent Monitoring/Research



Source: Integrated Research and Monitoring Plan (RAMP) for PREP (2020)

Eelgrass Resilience Project

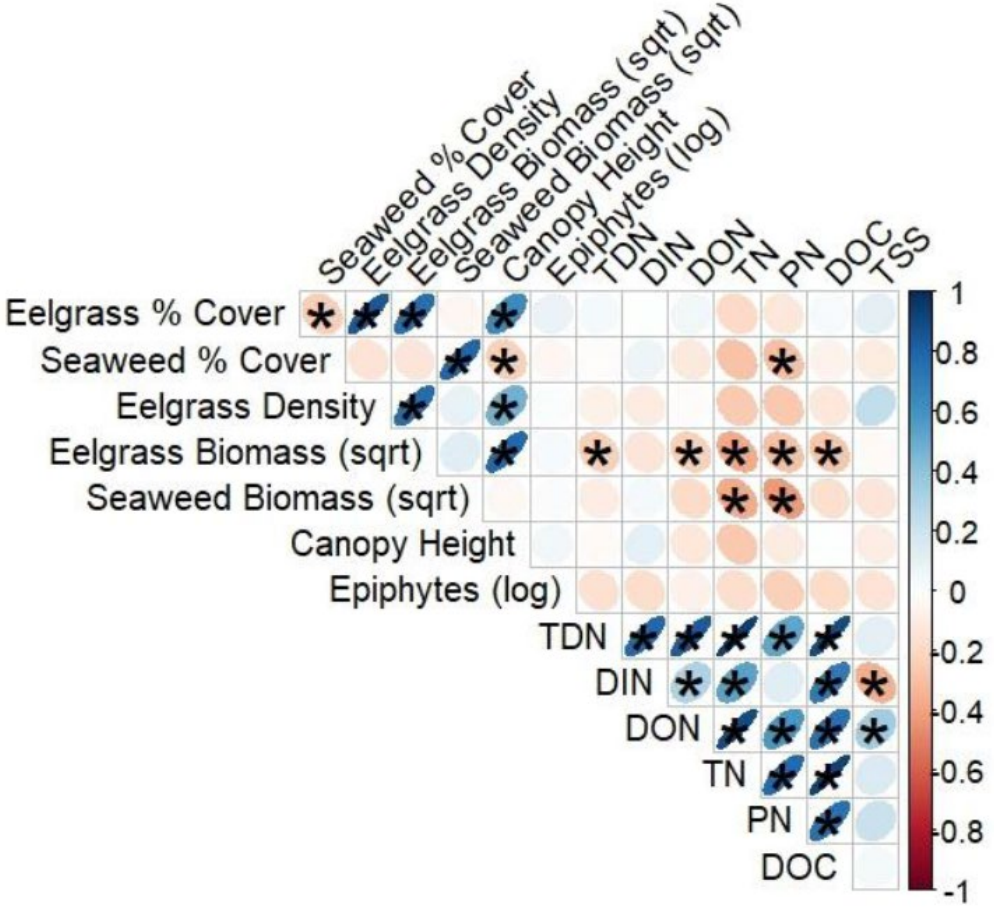


Source: Mikulis et al. (2024)

- Monitoring conducted 2021 – 2023
- Water quality and light attenuation monitoring
- Eelgrass condition and epiphyte monitoring
- Hydrodynamic modeling

Eelgrass Resilience Project: Examples of Insights

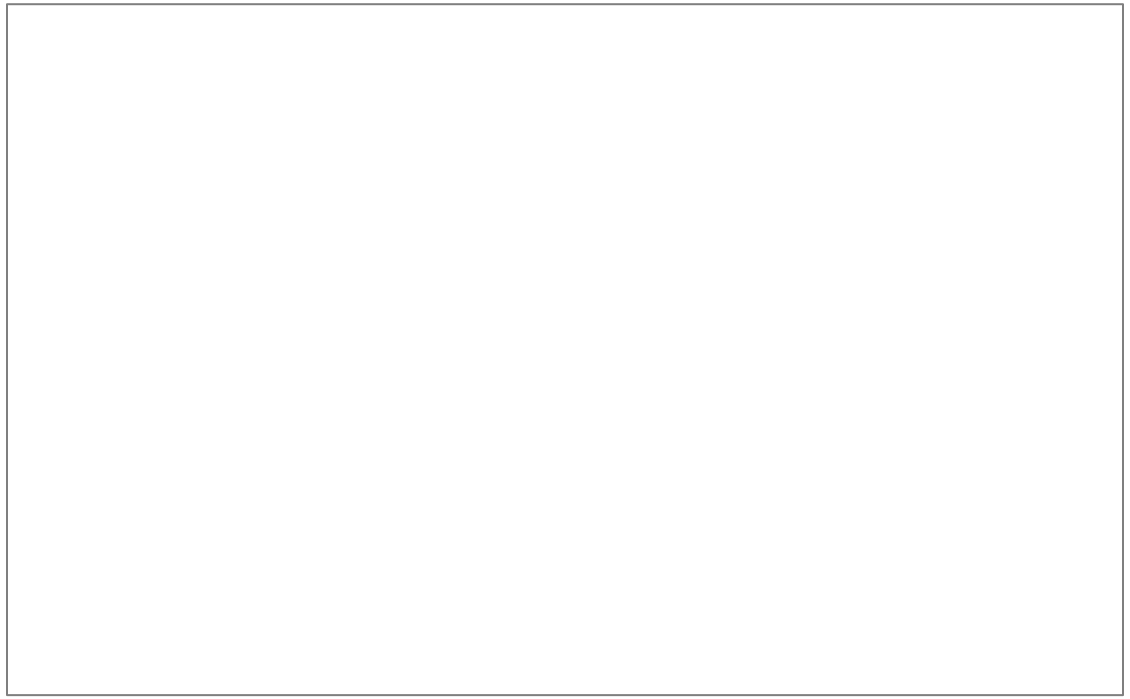
- Confirmation of challenging light environment
- Impacts of wet years
- Importance of shear stress and residence time
- Eelgrass-water quality interactions



Source: Mikulis et al. (2024)

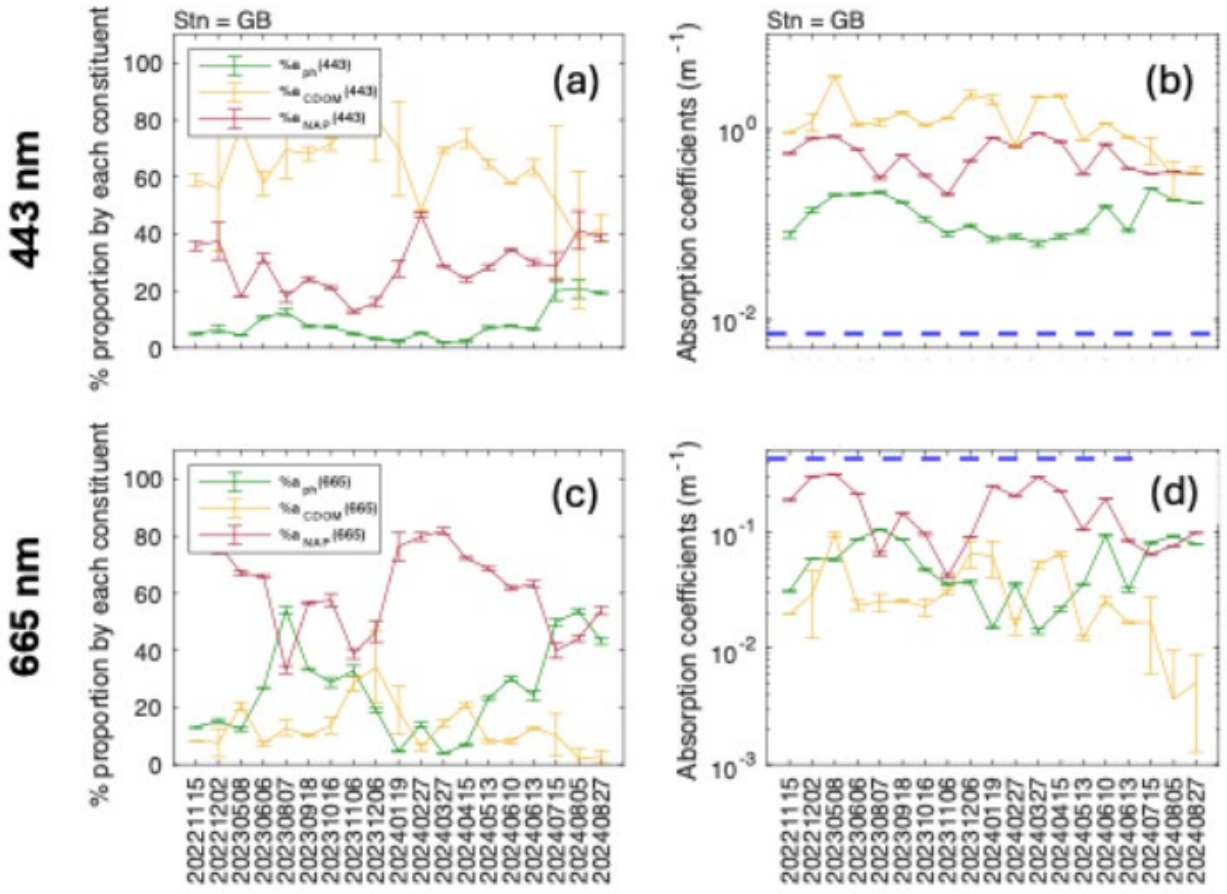
Bio-optical Modeling

- Region-specific model to estimate light absorption by specific constituents
  - Particulates (other than live phytoplankton)
  - Phytoplankton
  - CDOM
- Ongoing: Estimate light attenuation (k_d)



Source: Matsuoka et al. (2026)

Bio-optical Modeling: Examples of Insights



Source: Matsuoka et al. (2026)

- Proportions of absorption by different constituents at different wavelengths, seasons
- Will be able to hindcast
- MAAM comments:
  - Use integrated measures of absorbance
  - Quantify effect of water itself (important at higher wavelengths)

Water Quality Status and Trends Addressed In Various Reports

Non-Parametric Trend Analysis at Adam's Point *from A. Matsuoka (2025)*					
Parameter	Period	Slope of Trend Line			
		Annual	Spring	Summer	Autumn
K_D	2003-2020	--	--	--	--
TSS	1989-2020	+0.320	+0.434	+0.552	+0.335
Chlorophyll-a	1989-2020	+0.069	--	+0.056	--
Total nitrogen	2003-2020	-0.0047	-0.008	-0.0056	-0.0068
Temperature	1989-2020	+0.069	--	+0.056	+0.066

Updating the Conceptual Model

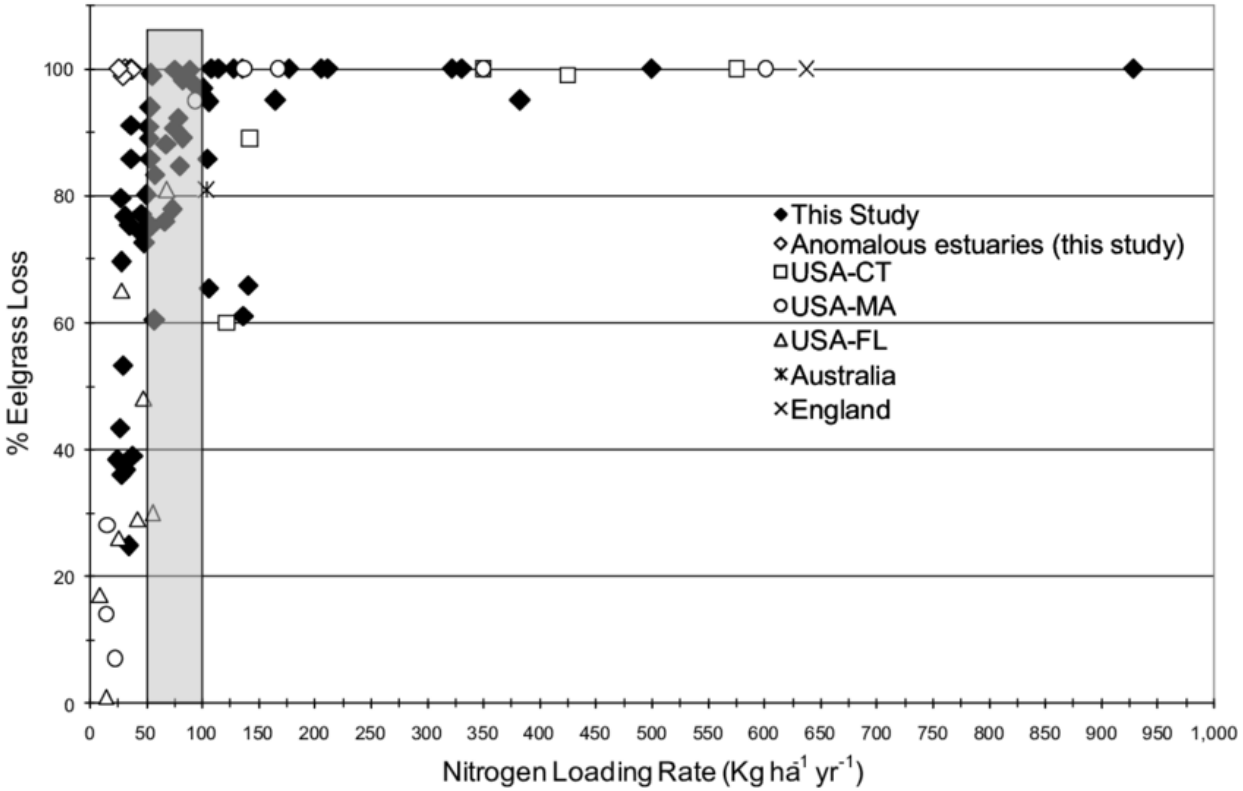
- Multi-stressor environment (long list)
- Recent large declines in eelgrass coverage in Greaty Bay seem to be driven by wet weather impacts to light and physical environment

  …but system less resilient than in past

  - Feedback loops
  - Resuspension of fine particles
  - Loss of filter feeders
- Nitrogen/chlorophyll a contributor but not the master variable
  - Minority contributor to light attenuation
  - Chlorophyll-a may not have changed much since eelgrass was at its peak

(Re)-Calculating Areal Nitrogen Loading Rates

- For comparison to thresholds from Latimer and Rego (2010) which are heavily referenced in the general permit fact sheet:
  - Latimer and Rego is based on TDN, not TN
  - Distinguish between loading to Great Bay and riverine system



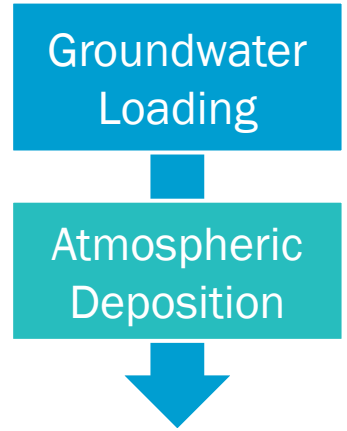
Areal loading

Non-Point Source Loading

2023 SOE Report Values are used as these are the most recent in-water measurements reported

Point Source Loading

- Calculated using reported loading values from ECHO
- Converted to ‘TDN’ using 2009 NHDEP ratio
- (0.73 TDN : 1 TN) for WWTFs



Areal Loading

kg ‘TDN’* /ha estuarine area /yr
kg ‘TDN’* /ha watershed area /yr

**Only Point Source loading is adjusted for TDN.*

(Re)-Calculating Areal Nitrogen Loading Rates

Watershed	kg N ha^{-1} estuarine area yr^{-1}	kg N ha^{-1} watershed area yr^{-1}
Great Bay (all basins)	139.40	2.93
Great Bay	131.17	2.61
Little Bay	58.71	3.46
Upper Piscataqua River	646.47	2.67
Lower Piscataqua River	43.38	9.23

- Compared to the estuaries studied in Latimer and Rego, the Great Bay Estuary has a far greater watershed to estuary ratio
- A target value of 100 kg N ha^{-1} estuarine area yr^{-1} is cited in the permit

Table 2
Summary of nitrogen loading rates for New England and other US estuaries.

	kg N yr^{-1}	kg N ha^{-1} estuarine area yr^{-1}	kg N ha^{-1} watershed area yr^{-1}
Source		This study	
Minimum	43	24	3.1
10th percentile	592	28	5.6
25th percentile	3030	36	7.0
50th percentile	10,500	65	12
75th percentile	29,600	117	19
90th percentile	67,400	311	31
Maximum	365,000	3310	155[a]
Arithmetic mean	29,400 ± 59,100 (24,800)[a]	167 ± 415 (124)[a]	19 ± 26 (17)[a]
Count	74	74	74
Source	(Whitall et al., 2007)[b]	(Whitall et al., 2007)[c]	(Castro et al., 2003)
Casco Bay	983,506	23	5.3
Great Bay	1,663,490	354	6.8
Merrimack River	10,279,096	6424	9.5
Massachusetts Bay	15,476,565	202	49.0
Buzzards Bay	1,066,945	17	21.8
Narragansett Bay	8,444,631	203	27.2
Long Island Sound	39,856,585	122	12.9
Hudson R/Raritan Bay	76,222,208	954	24.0
Barnegat Bay			7.3
Delaware Bay	51,394,927	248	20.2
Chesapeake Bay	147,839,494	270	13.5
Pamlico Sound	45,372,756	1004	18.2

From AMP (section e.2)

Illustration of MAAM Anticipation Milestones Associated with Proposed Completion Timeline for Final Plan – Final timeline to be dictated by NHDES

Activity	First Permit Term					Second Permit Term				
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Monitoring & scientific studies	■	■	■	■	■	■	■	■	■	■
Synthesis and interpretation of first term monitoring			■	■	■					
Proposal: Restoration planning approach (TMDL vs. alternative)				■						
Reach consensus on restoration planning approach					■					
Modeling/technical analysis to support restoration plan					■	■	■	■		
Draft plan								■	■	
Final plan										■

2026 Planned Activities

- Continued implementation
- AMP report
- Collaboration with PREP
  - TAC Activities
  - Long-term data analysis (led by S. Lyubchich)
  - Synthesis reports on macroalgae and light
  - Reports on storm event monitoring and tributary discharge estimates
  - Next phase of bio-optical model
- Integration of Maine communities into MAAM
- Coordination with EPA and NH DES

Beyond 2026

- Additional exploration of source/controls on suspended particulates
- More data on macroalgae
- Application of bio-optical model (e.g., hindcasting, forecasting)
- Other types of modeling?

Thank you.

– Questions?

Brown AND Caldwell

Getting to Know PTAP – purpose, data entry and outcomes

PTAP to verify GBTNGP Compliance

MAAM Dashboard:

- 2025 PTAP Dashboard

MAAM Reports Submitted to EPA annually

- MAAM Report Summary

Portsmouth entries:

- 2025 Portsmouth Entries

All MAAM all entries

- All MAAM PTAP Entries 2025

PTAP to verify MS4 Compliance Site Plan Review Regulations

- Site Plan Review Regulations
  - http://files.cityofportsmouth.com/files/planning/SitePlanReviewRegs.pdf
- Presented to Planning board on Sept. 17th 2020
  - https://youtu.be/1_519hXl6HU
- Accepted by Planning board on Nov. 19th, 2020
  - https://youtu.be/ATjYVfXW5qk

Pollutant Tracking and Accounting Project (PTAP)

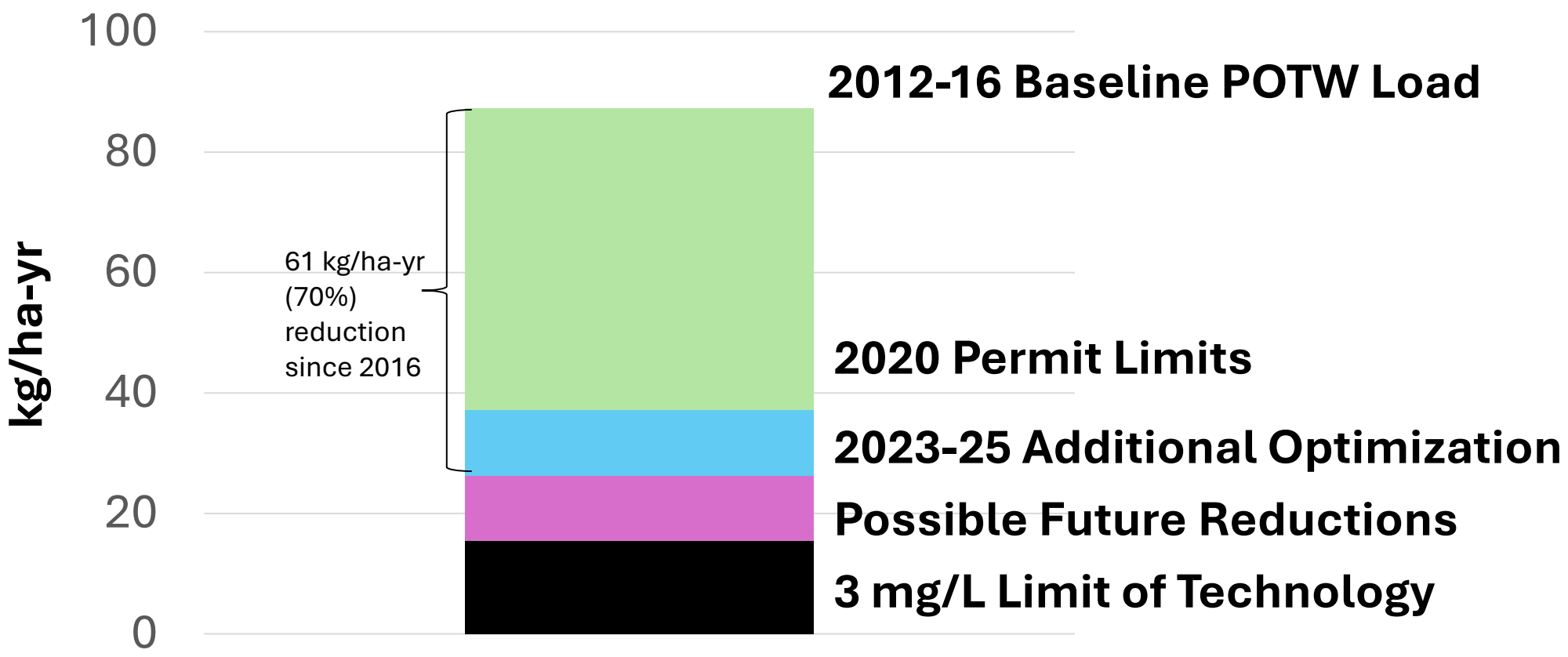
PTAP allows communities and other organizations to track nutrient reductions associated with both structural and non-structural best management practices (BMPs) while also allowing direct integration of nutrient reduction data into EPA's BMP Accounting and Tracking Tool (BATT).

The Pollutant Tracking and Accounting Project, or better known as PTAP, was created by NHDES and UNH to allow a consistent way for communities and other organizations within EPA Region 1 to track their nutrient reductions from both structural and non-structural BMPs. PTAP is funded by the Municipal Alliance for Adaptive Management and is available for all communities to use, including those authorized under both the NH MS4 Permit and Great Bay Total Nitrogen General Permit.

Upcoming Workshops

Great Bay TN Update
February 2026

TN Reductions: POTWs



TN Reductions: Stormwater Control Measures 2020-2025