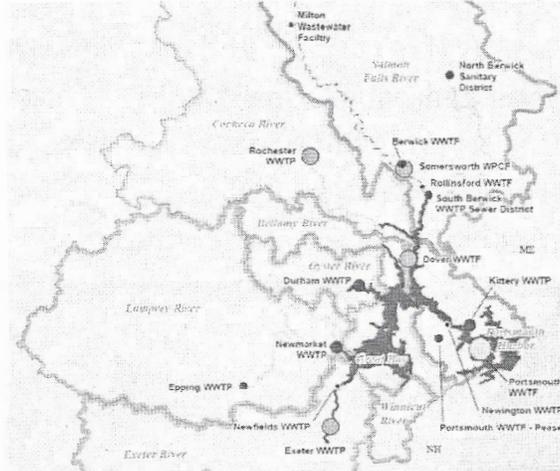


Adaptive Management Permitting for Great Bay

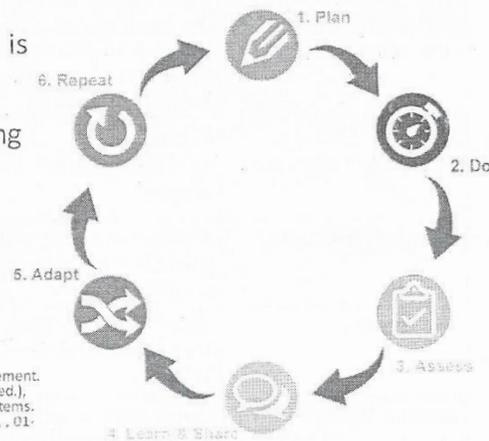


March 8, 2019

1

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.

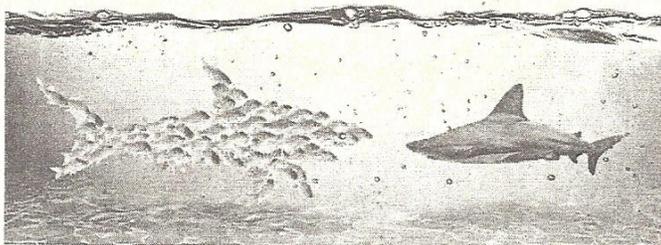
(Allen, C. and A. Garmestani. Adaptive Management. Chapter 1, Craig R. Allen, Ahjond Garmestani (ed.), Adaptive Management of Social-Ecological Systems. Springer Netherlands, Dordrecht, Netherlands, , 01-10, (2015)



2

Great Bay TN General Permit

- All 13 NH WWTFs covered at the same time
- Watershed approach to meet WQS
- Get initial TN reductions sooner
- Greater long-term TN reductions
- Greater opportunity for collaboration



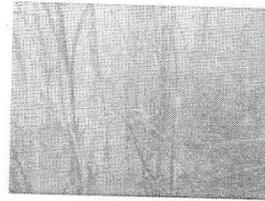
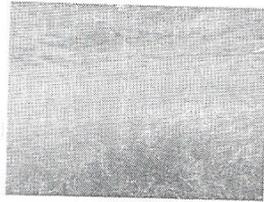
3

Proposed TN General Permit (GP) Approach	
New Scientific Approach	Annual load effluent limits based on scientific literature concerning the effects of total nitrogen loading on estuaries
Point Source Allocations	Hold load reductions already achieved or already in progress.
NPS Load Reductions	Plan and implement practices that will reduce TN loading from NPS inputs (NH WQ Certification requirement)
Track Loads	Quantify and track point source and non-point source loads via effluent monitoring and NPS tracking (PTAPP)
Ambient Monitoring	Participate in Adaptive Management Monitoring Program to assess system response

4

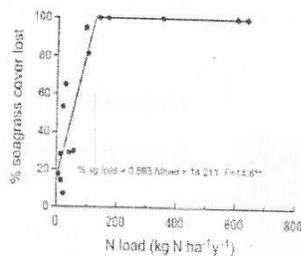
General Permit - Science

- 2018 State of Our Estuary report
 - 14 of 24 indicators “cautionary” or “negative”
 - “Nutrient loading is a critical stressor”
 - “nutrients remain of high concern”
- Eelgrass loss
 - 1996 to 2017 loss of 1300 acres (almost 50%)



5

General Permit - Science

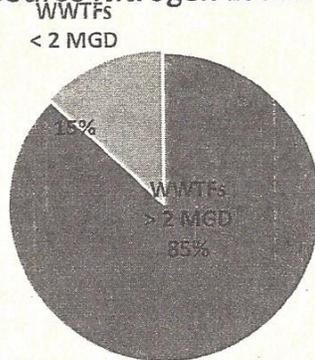


- Literature-based total nitrogen loading threshold to protect eelgrass ranging from 20 – 100 kg/ha-yr
- Narragansett Bay Comparison:
 - From 2000 to 2015 TN loading reduced from 158 to 80 kg/ha-yr
 - Resulted in 37% increase in eelgrass
 - However, DO still in an issue in the upper portions of the estuary
- Initial “Adaptive Management” Target: 100 kg/ha-yr

6

General Permit – Point Source

2012-2016 Average Point Source Nitrogen Loading



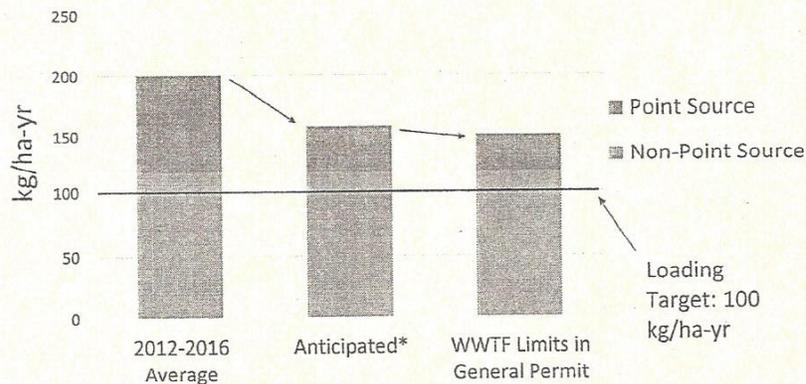
Achievable limits

- 7 WWTFs > 2 MGD: 8 mg/L @ ave. flows
- 10 WWTFs < 2 MGD: "hold load" & optimize

7

General Permit – Point Source

Total Nitrogen Loading to Great Bay Estuary

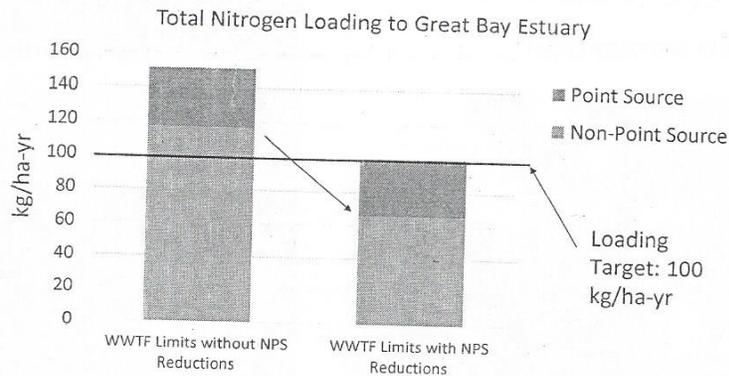


*Anticipated load given recent and ongoing upgrades and optimization efforts

8

General Permit – Non-Point Source

44% reduction target to meet 100 kg/ha-yr



9

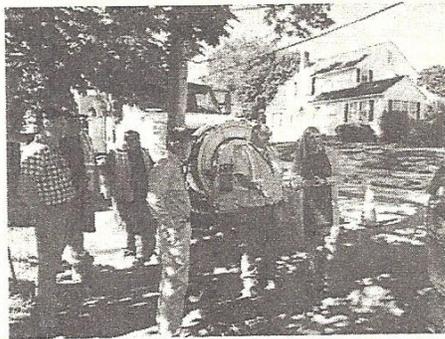
General Permit – Non-Point Source

- NPS requirements based on 401 State Cert
 - Tracking and Accounting through PTAPP
 - Year 1
 - Continuation of current NPS activities
 - Develop a near-term (3 years) Total Nitrogen NPS and Stormwater Control Plan
 - Year 3
 - Establish NPS and Stormwater baseline (e.g., GBNPSS)
 - Develop long-term Total Nitrogen NPS and Stormwater Control Plan to achieve 11% reduction from baseline
 - Years 8, 13, 18
 - Develop new long-term Total Nitrogen NPS and Stormwater Control Plans each 5 years to achieve additional 11% reduction from baseline (44% total by year 23)

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General Permit – Non-Point Source

- PTAPP
- Nitrogen control plan
- Implementation



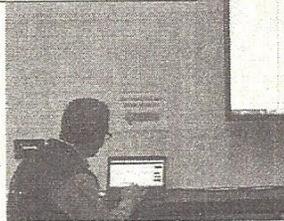
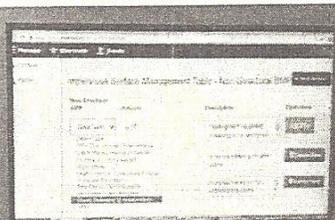
What is PTAPP?

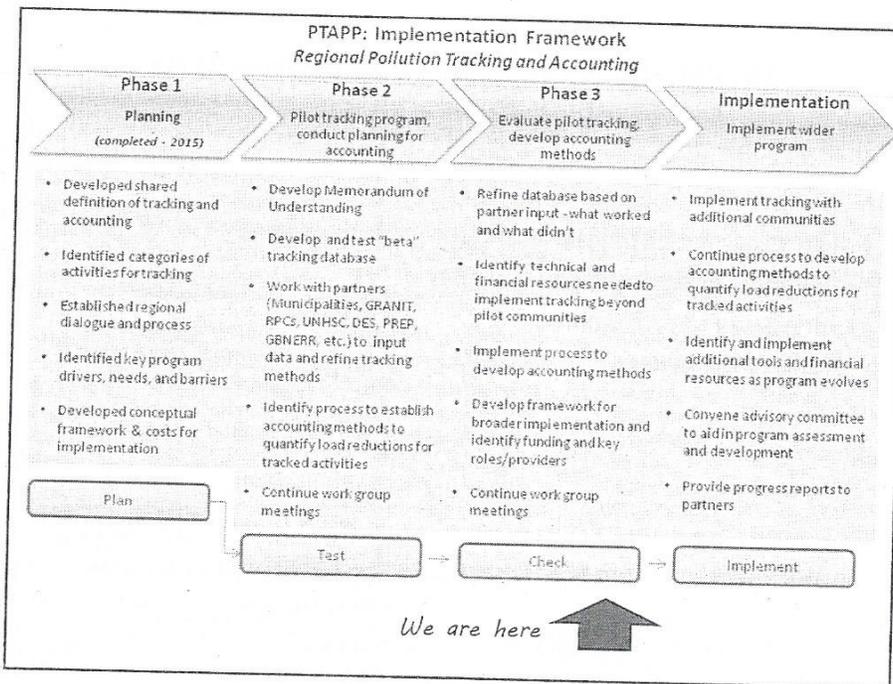
Activity	Tracking Method	Frequency	Responsible Party	Reporting Method	Reporting Frequency	Reporting Location	Reporting Period	Reporting Method	Reporting Frequency	Reporting Location	Reporting Period
Site Inspection	Visual	Quarterly	PTAPP Operator	PTAPP Report	Quarterly	PTAPP Report	Quarterly	PTAPP Report	Quarterly	PTAPP Report	Quarterly
Water Sampling	Sampling	Quarterly	PTAPP Operator	PTAPP Report	Quarterly	PTAPP Report	Quarterly	PTAPP Report	Quarterly	PTAPP Report	Quarterly
Soil Sampling	Sampling	Quarterly	PTAPP Operator	PTAPP Report	Quarterly	PTAPP Report	Quarterly	PTAPP Report	Quarterly	PTAPP Report	Quarterly
Water Quality Monitoring	Monitoring	Quarterly	PTAPP Operator	PTAPP Report	Quarterly	PTAPP Report	Quarterly	PTAPP Report	Quarterly	PTAPP Report	Quarterly
Soil Quality Monitoring	Monitoring	Quarterly	PTAPP Operator	PTAPP Report	Quarterly	PTAPP Report	Quarterly	PTAPP Report	Quarterly	PTAPP Report	Quarterly

TRACKING—Information about activities that may contribute to increases or decreases in pollutant loading

ACCOUNTING—A quantitative method for inventorying and tabulating planning, management, and conservation practices that affect hydrology and water quality

Soils	Existing Conditions		Future Conditions	
	Acres	Land Use Type	Acres	Land Use Type
H	0.56	Commercial/Industrial	0.26	Commercial/Industrial
Totals	0.56		0.26	



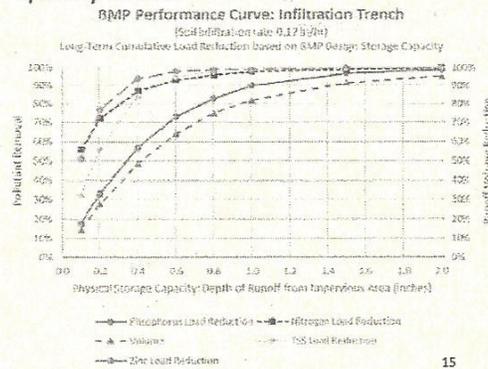


Nitrogen control plan

- How much do I need to reduce?
- Where is the nitrogen coming from?
- What are the methods I can use?
- Short-term actions and longer-term actions.

Multiple benefits of stormwater treatment

- Not just TN – TSS, bacteria, TP, flooding
- Can occur with other infrastructure improvements
- Greening of communities – quality of life
- Air quality improvements
- Climate resiliency



General Permit – Non-Point Source

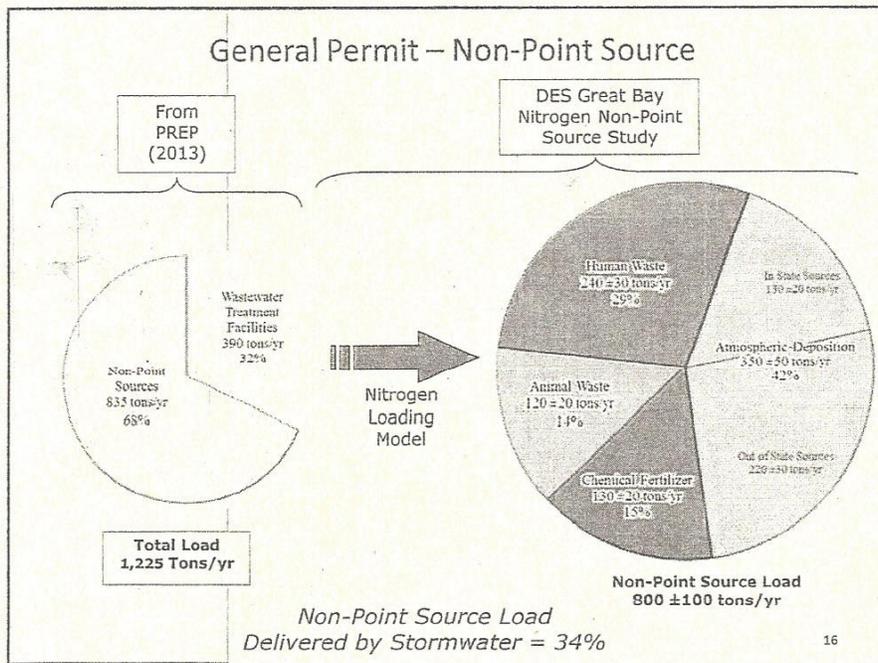
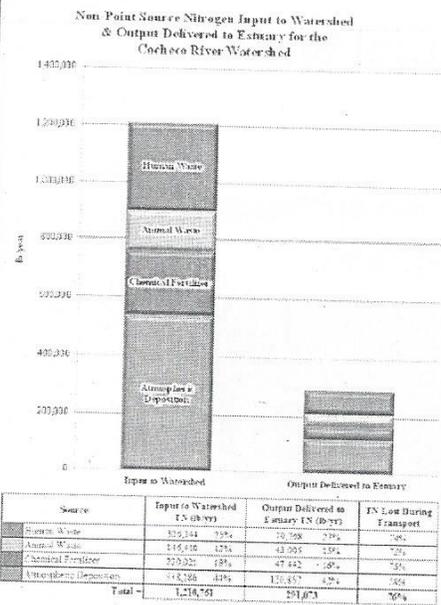


Figure 17: Inputs and Outputs of Non-Point Source Nitrogen by Source Type for the Cocheco River Watershed



Nitrogen Reduction plan

- Low hanging fruit
- Areas with multiple benefits
- Align with longer term stormwater strategies
- Target highest load areas

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Implementation



Non-structural BMPs

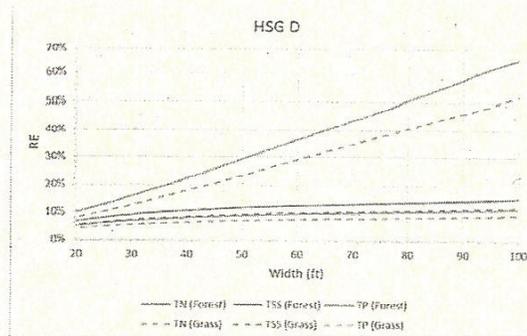
- Leaf pickup
- Dog waste ordinances and outreach
- Fertilizer laws and restrictions



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Structural BMPs

- Redevelopment projects
- Road projects
- New development – SWA model ordinance



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General Permit – Ambient Monitoring

- Purpose – Track response of the estuary to reduced nitrogen loading
- Expands upon monitoring already being performed
- Annual monitoring contains four parts:
 1. Head of tide monitoring
 2. Estuarine chemistry
 3. Eelgrass
 4. Sediment



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General Permit – Ambient Monitoring

Head of tide monitoring:

- 2/month for:
 - total dissolved nitrogen
 - ammonia
 - nitrate/nitrite
 - total particulate nitrogen



Estuarine monitoring:

- 16 monitoring sites (up from 11 in 2018)
- Include datasondes at each new location
- 1/month for:
 - total dissolved nitrogen
 - ammonia
 - nitrate/nitrite
 - total particulate nitrogen
 - dissolved oxygen
 - chlorophyll 'a'
 - light attenuation

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General Permit – Ambient Monitoring

- Annual report – Includes summary of all monitoring results and trends
- Cost allocated among all communities
- Able to be adjusted as necessary

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Questions?

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