



A Watershed Permit to Facilitate Nitrogen Management in Cape Cod's Pleasant Bay

NEWEA JANUARY 2019

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Photographer: Steve Dunwell



Presentation Overview

- Pleasant Bay is the largest Cape Cod estuary
- Water quality has declined due to excess nitrogen loading
- Nitrogen sources are all non-point and located across 4 towns
- A Targeted Watershed Management Plan synthesized diverse programs of all 4 towns
- MassDEP issued a new Watershed Permit to
 - Sanction the overall approach
 - Give credit to non-traditional technologies
 - Establish an implementation schedule



Today's Discussion

- **Why is a watershed approach needed?**
- **What does the Watershed Permit consist of?**
- **What was the process to complete the permit?**
- **How long will it take to achieve TMDLs?**

Why is a new type of permit needed?

- **Nonpoint sources of pollution don't stop at town boundaries – nor do effective solutions**
- **Mass Estuaries Project (MEP) studies have reinforced the notion of watershed planning**
- **Cape Cod Commission's 208 Update and the Acts of 2014 called for MassDEP to develop a watershed permit program**
- **Need a mechanism to address various implementation approaches—traditional and non-traditional**
- **Economies-of-scale can reduce costs**

Why is a new type of permit needed?

- **There are 7,000 + nitrogen sources**
- **The nitrogen sources are nearly all private**
- **Most of the N sources are septic systems and most of those comply with state sanitary code (Title 5)**
- **Is there federal jurisdiction?**
- **Are the towns responsible?**

What is a watershed permit?

- **Overarching document for implementation of multi-town projects on a watershed scale**
- **Umbrella for a range of permits**
- **Allocation of responsibility to each party**
- **Mechanism to credit non-traditional approaches**
- **Implementation schedule over 40 years**
- **Voluntary program**
- **Allowance for “enforcement forbearance”**

Implementation Schedule

Phase	Years		Brewster		Chatham		Harwich		Orleans		Total kgN/yr*
			Activity	kgN/yr*	Activity	kgN/yr*	Activity	kgN/yr*	Activity	kgN/yr*	
	up to 2018		Res. fertilizer control Capt GC fertigation Capt GC fert. Reduction	121 230 930	Res. fertilizer control Muddy Creek Bridge	247	Muddy Creek Bridge		Res. fertilizer control	241	1,769
			All towns: develop TWMP; execute IMA; obtain Watershed Permit								
1 **	1 to 5	2019 to 2023	Develop denit plan Devel. conting. plan Strengthen GC plan		Harwich connection		Ph 2 sewers Res. fertilizer control	2,672 200	Amended CWMP Lonnie's Pond aqua. PRB evaluation	273	3,145
			All towns: update monitoring data, re-model Bay, evaluate nitrogen trading options, prepare plan for next 5 yr								
2 ***	6 to 10	2024 to 2028	On-site denit systems	118			Ph 3 sewers	1,565	MtgHouse Pond sewers Other aquaculture On-site denit systems	2,014 1,516 674	5,887
3 ***	11 to 15	2029 to 2033	On-site denit systems	118	Frostfish Creek sewers Ryders Cove sewers	803 2,605			On-site denit systems Other aquaculture	675 906	5,107
4 ***	16 to 20	2034 to 2038	On-site denit systems	118	Muddy Creek sewers	1,597			On-site denit systems	675	2,390
	after year 20	after 2038	On-site denit systems	236	Crows Pond sewers Bassing Harbor sewers Pleasant Bay sewers Chatham Harbor sewers	1,214 511 901 5,181	Ph 8 sewers Harwich effl. disposal	970 (867)	****		8,146
TOTAL				1,871	TOTAL	13,059	TOTAL	4,540	TOTAL	6,974	26,444

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Mass Estuary Project (MEP) Sub-Watersheds



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Findings of MEP Technical Report

- **Habitat conditions range from “Healthy” to “Severely Degraded”**
- **Average impairment is “Significant to Moderate”**
- **There has been a 24% loss of eelgrass throughout Pleasant Bay since 1951**
- **Target goals:**
 - ✓ **Eelgrass restoration where historical presence**
 - ✓ **Healthy benthic habitat elsewhere**
 - ✓ **Water column N concentration of 0.35 mg/l (BAN)**
 - ✓ **Reduction in watershed loads by 36%**

History of Watershed Collaboration led by Pleasant Bay Alliance

1987



ACEC established

1998



RMP adopted by Orleans, Chatham, Harwich and state; IMA establishes Alliance

2003



First of five-year RMP updates

2007



Brewster joins Alliance

2008



Five-year RMP updates, IMA renewal approved by Town Meetings & state

2013



2018



VISIT

www.pleasantbay.org

PBA's Long-term Focus on N Contamination

- **Water quality monitoring – 20+ years data**
- **Support to Bay-wide MEP Tech Report - 19 TMDLs**
- **Effective Watershed Work Group**
- **Input to municipal plans that progressed independently**
- **2017 Composite Analysis**
- **2017 Joint Resolution of 4 Boards of Selectmen**

MassDEP Pilot Project---Coordination by PBA

- Continued the history of collaboration – key to success of pilot
- Convened local, regional, state, federal partners to develop:
 - Inter-municipal agreement
 - TWMP (technical support)
 - Permit conditions and application procedures
- Ensured communications with Select Boards
- Supported Town Meeting authorizations



Pilot Project Coordination

Inter-municipal Agreement (IMA)

- Towns' shares of attenuated nitrogen load
- Towns' commitment to fund measures for mitigating load share
- Benefits to towns for coordinated action
- Cooperation for data sharing, securing funding
- Alliance as coordinating entity



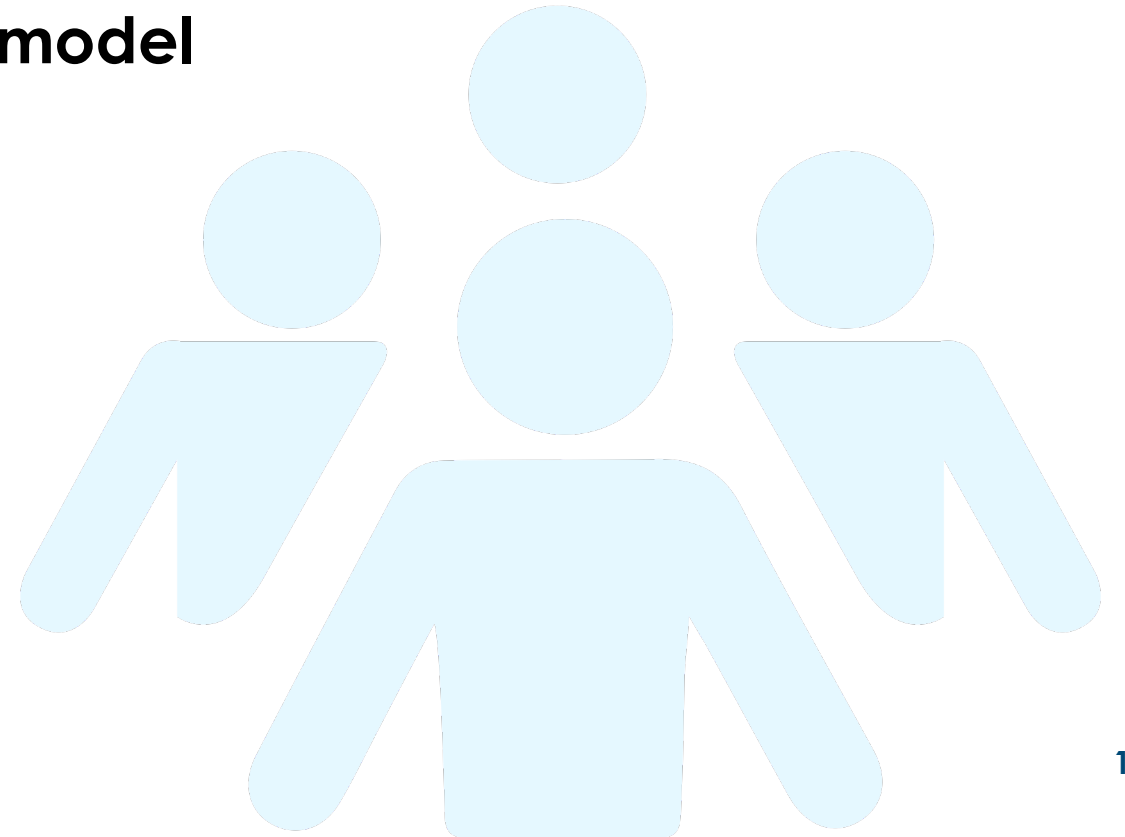
Watershed Permit Implementation

- Supported by \$250,000 Southeast New England Program (SNEP) Watershed Grant.
- SNEP grants funded by U.S. EPA through a collaboration with Restore America's Estuaries.
- www.snepgrants.org



SNEP-Funded Project

- **Implementation plans for NT technologies:**
 - **On-site de-nitrification systems**
 - **Shellfish aquaculture demonstration**
- **Nitrogen trading pilot project**
- **Update water quality-nitrogen loading model**
- **Public outreach**



Elements of Watershed Permit

- **Three basic documents:**
 - **Permit itself - 12 pages**
 - **TWMP**
 - **Text - 40 pages**
 - **Appendices - 42 pages**
 - **IMA - 8 pages**
- **Most of technical detail is in TWMP**



TWMP = Compilation of Town Plans

- **Individual Town Plans**
 - Completed in 2009 to 2013
 - Orleans now involved in CWMP update
- **Pleasant Bay Composite Analysis**
 - March 2017
- **Targeted Watershed Management Plan**
 - May 2018

Composite Analysis & TWMP are not new plans

Key Elements of TWMP

- 1. Document each town's share of N removal responsibilities (TMDLs)**
- 2. Document each town's planned N removals**
- 3. Identify gaps and overlaps**
- 4. Document intended reliance on non-traditional technologies (NT)**
- 5. Designate "Core Areas" of traditional technology**

Key Elements of TWMP

- 6. Fine-tune contingency plans to address possible less-than-expected NT performance**
- 7. Document expected N growth in each town**
- 8. Identity all projects planned to reduce N**
- 9. Set forth an implementation schedule**

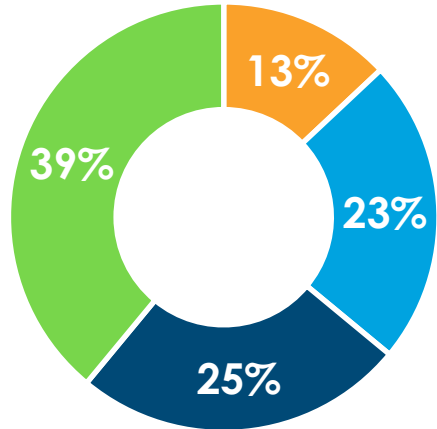
Key Elements of TWMP

- 10. Summarize towns' adaptive management plans**
- 11. Document consistency with 208 Plan Update**
- 12. Set forth permitting considerations for NT technologies**
 - Fertilizer reduction (res. and comm.)
 - Fertigation
 - Aquaculture
 - On-site denitrification
 - Inlet widening

Nitrogen Removal Responsibility

Attenuated N load removal requirement
= 17,700 kg/yr (100%)

Requirement by Town:



BREWSTER — 2,300 kg/yr (13%)



CHATHAM — 4,100 kg/yr (23%)



HARWICH — 4,400 kg/yr (25%)



ORLEANS — 6,900 kg/yr (39%)

Approaches to Nitrogen Management

- Sewering
- Shellfish harvesting
- Fertigation
- Enhanced on-site septic systems
- Fertilizer reduction
- Nitrogen trading
- Inlet restoration

Implementation Plan Elements

	No. Elements	T vs NT	Up to Yr 5	Yr 6 to 20	After Yr 20
Res. fertilizer regs.	4	NT	4		
Capt. GC fertilizer	2	T / NT	1 + 1		
Muddy Creek bridge	1	NT	1		
Sewer projects	11	T	1	5	5
Shellfish harvesting	3	NT	1	1	1
On-site denit. systems	2	NT		1	1
TOTAL	23		9	7	7

N Load Removal Commitments, kg/yr

	Brewster	Chatham	Harwich	Orleans	Total
Year 1 to 5	1,281	247	2,872	514	4,914
Year 6 to 10	118	-	1,565	4,204	5,887
Year 11 to 15	118	3,408	-	1,581	5,107
Year 16 to 20	118	1,597	-	675	2,390
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Sample Commitment by Town

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Sample Commitment by Town

	Chatham	Harwich
Year 1 to 5	Harwich connection (0)	Phase 2 sewers (2,672) Res. Fertilizer controls (200)
Year 6 to 10	None	Phase 3 sewers (1,565)
Year 11 to 15	Frostfish Ck. Sewers (803) Ryders Cover sewers (2,605)	None

When will TMDLs be Met?

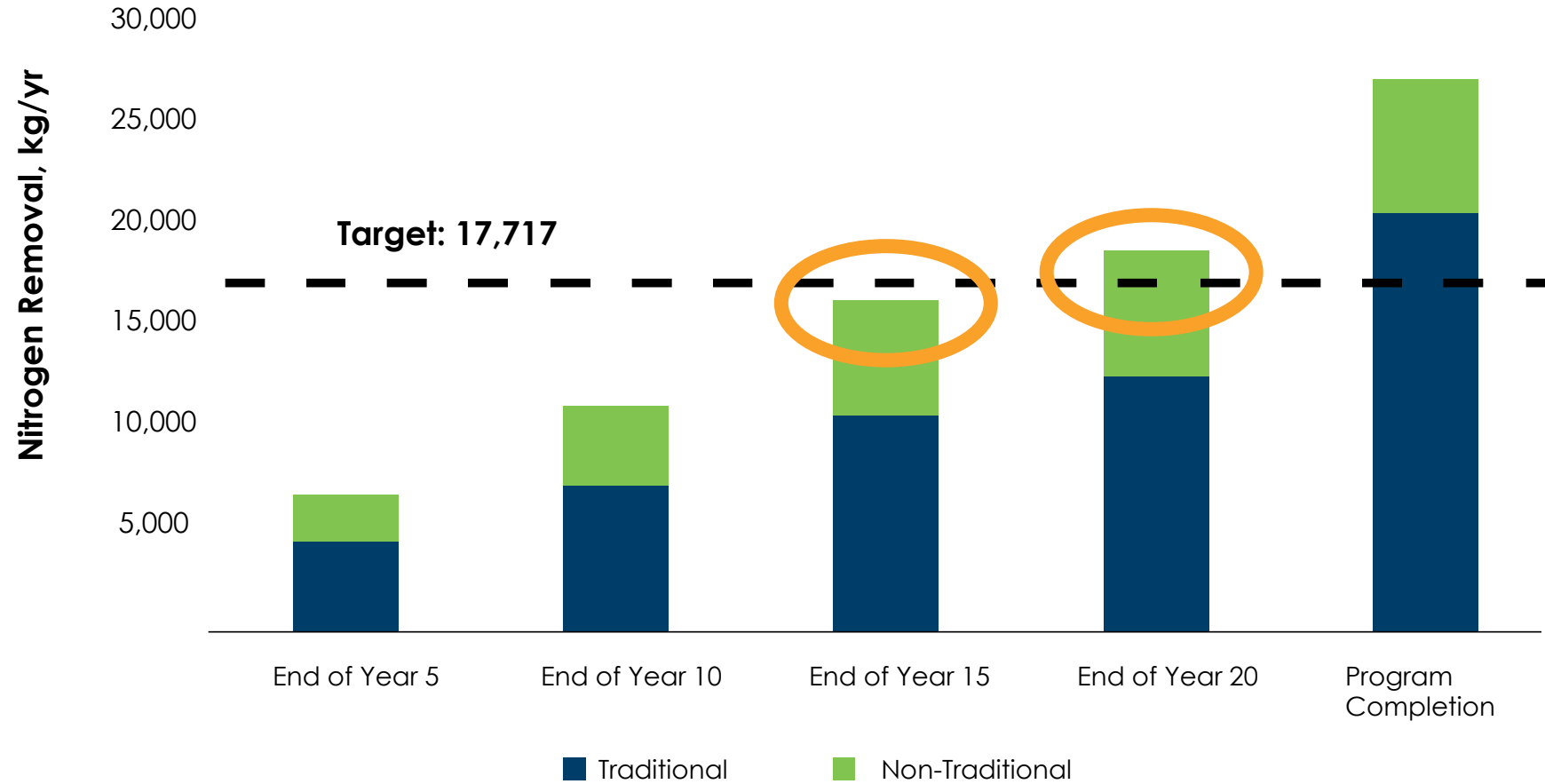
Based on current loads, no growth

Year	No Growth
End of Year 5	28%
End of Year 10	62%
End of Year 15	90%
End of Year 20	103%
FULL PROGRAM	149%

*Aggregate removals, not specific to sub-embayments

Implementation Progress

Cumulative Nitrogen Removal, kg/yr by Technology Type



When will TMDLs be Met?

Impact of Growth Assumptions

Year	No Growth
End of Year 5	28%
End of Year 10	62%
End of Year 15	90%
End of Year 20	103%

When will TMDLs be Met?

Impact of Growth Assumptions

Year	No Growth	With Growth
End of Year 5	28%	
End of Year 10	62%	
End of Year 15	90%	
End of Year 20	103%	75% to 80%

***Growth could slow compliance by 25% to 30%**

Permit Considerations for Non-Traditional Technologies

- Nitrogen removal mechanisms
- Basis for effectiveness
- Outline of formal program
- Monitoring requirements
- Basis for credit
- Sample calculations

Conclusion



PERMIT

Permit issued in
August 2018



LOCATION

First of its kind in
Massachusetts



TEAM

Culmination of
efforts of many
partners



TIME

Aggressive goals
set and completed
in record time

Contact Information



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THANK YOU
