Watershed Planning, Partnerships, and Public Education to Address Excessive Nutrients in a Mashpee Wampanoag Tribe Ancestral Pond

NALMS Symposium – Lake Tahoe, California/Nevada

November 2024

SUPPORTING [DOING] LEADING

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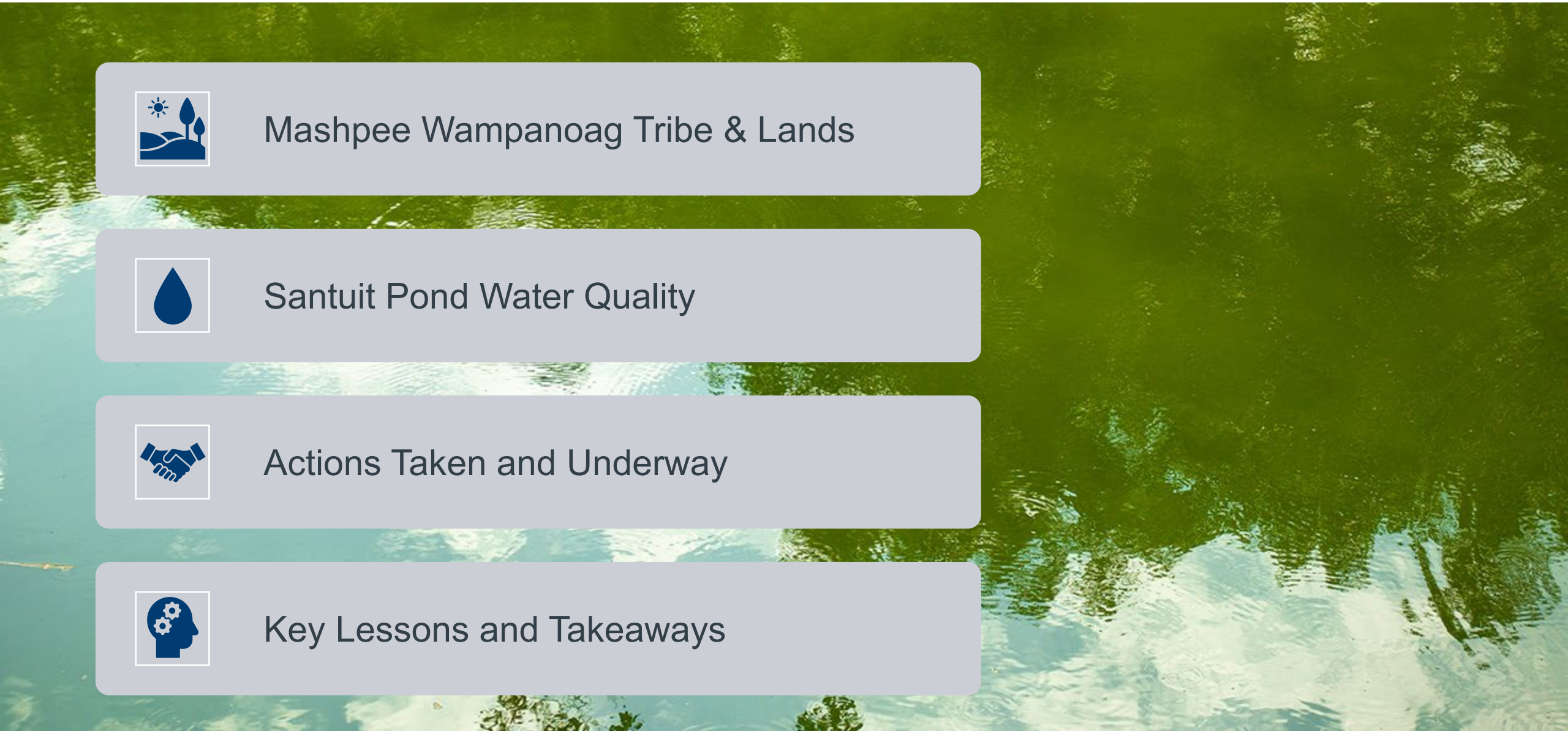
Overview



- Mashpee Wampanoag Tribe & Lands
- Santuit Pond Water Quality
- Actions Taken and Underway
- Key Lessons and Takeaways

Mashpee Wampanoag Tribe (MWT) & Lands

- People of the First Light
- Stewards of land and water for 12,000 years
- Land and water are sacred, as well as the life they support – e.g., river herring, American eel, and other fish

"*The Tribe and its members rely on tribal lands and waters for cultural and spiritual nurturing, as well as for basic food and medicine sustenance. In short, the land is everything and water is life. Management of tribal lands must recognize and incorporate this undeniable reverence for the land and waters.*" – Jason Steiding, MWT Natural Resources Director

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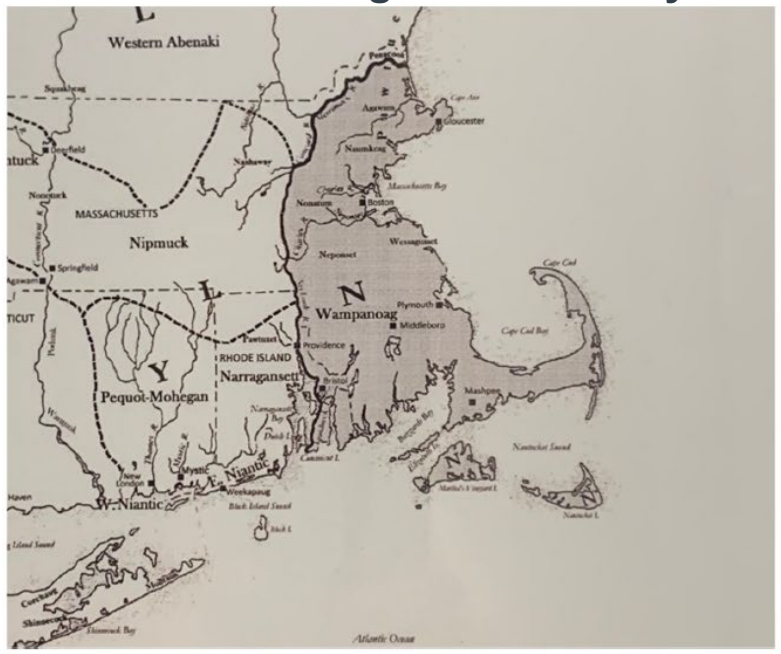
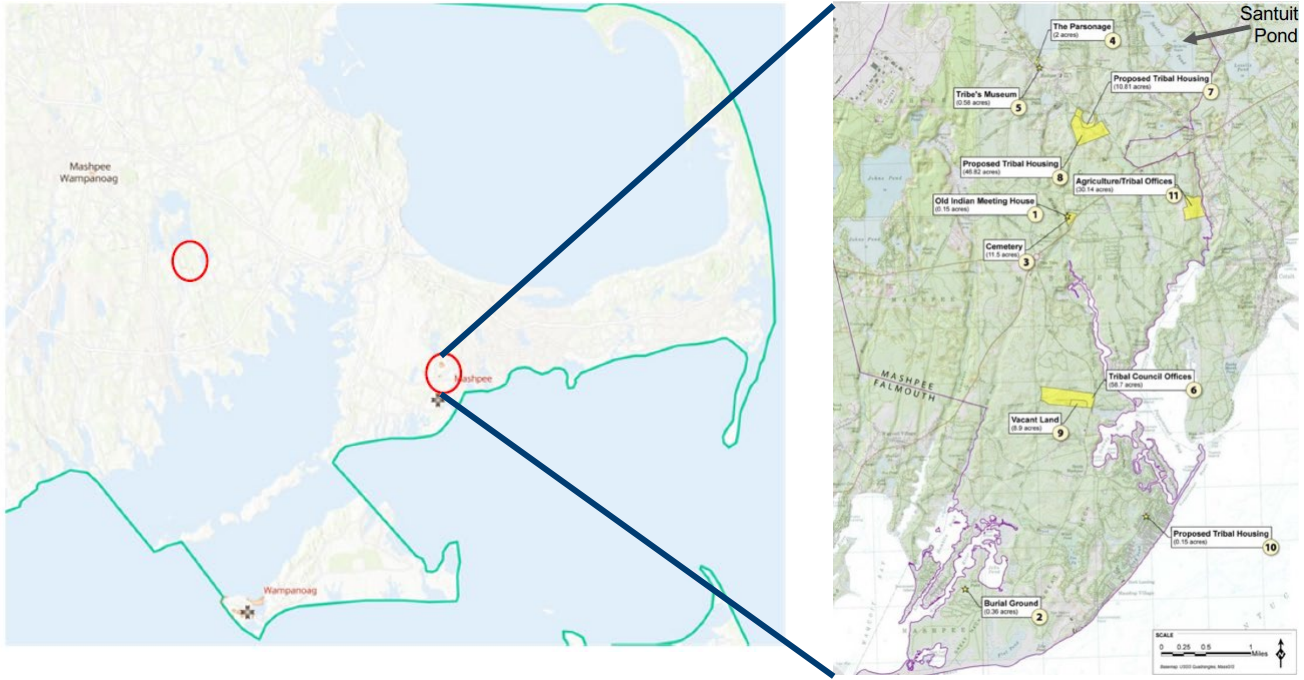
Mashpee Wampanoag Tribe (MWT) & Lands

- MWT Trust Lands cover 321 acres across 12 largely non-contiguous parcels, mostly in Mashpee
- This is one tenth of one percent of ancestral lands
- None of the land use around freshwater ponds is under the MWT's control
- Partnership with municipal, state, and federal government is essential for the MWT to meet goals for water and land management

Then: 1630 Wampanoag Nation Tribal and Linguistic Territory

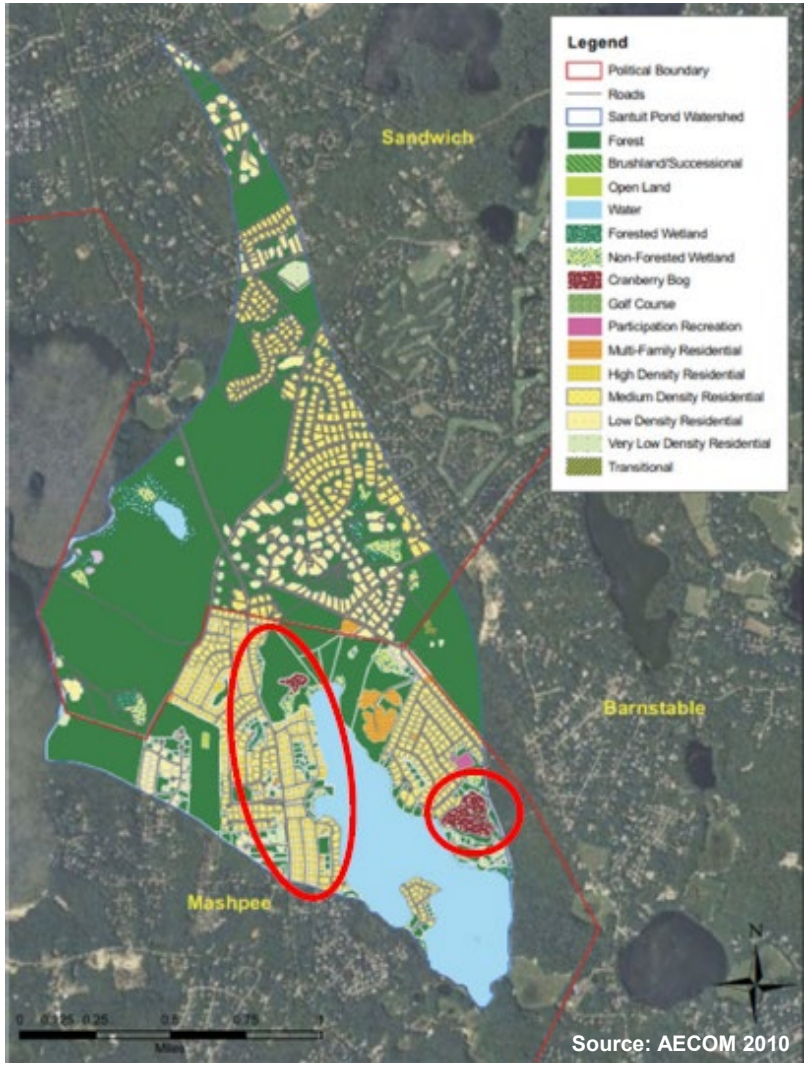


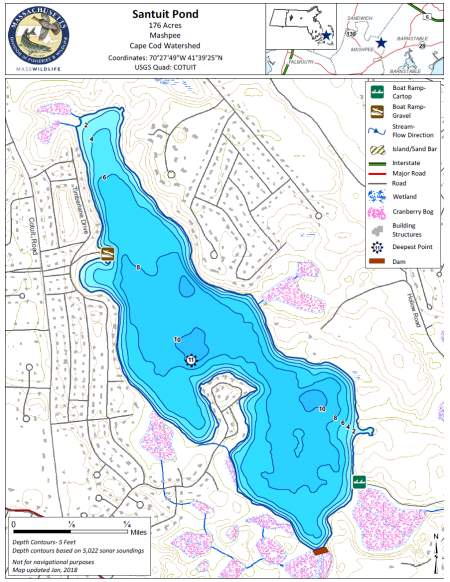
Now: 2024 Tribal Trust Lands



Santuit Pond Water Quality: The Essentials

- 176-acre shallow “Great Pond” located on Cape Cod in the Town of Mashpee
- Mostly groundwater fed - no perennial tributaries
- Discharges to the Santuit River and Popponesset Bay – both are also important water bodies for MWT sustenance and culture
- Spawning habitat for anadromous river herring, which have been on the decline in the region
- Loss of sea run brook trout from system
- Numerous water quality impairments
  - Chlorophyll a
  - Harmful algal blooms
  - Nutrient/eutrophication biological indicators
  - High pH
  - Total phosphorus
  - Transparency/clarity
  - Fish passage and condition





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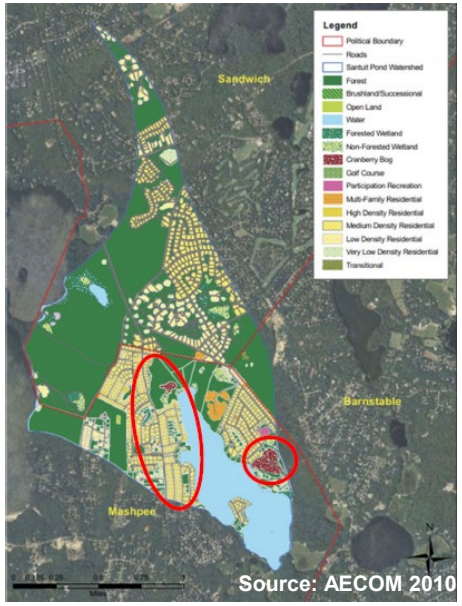
Santuit Pond Water Quality: Watershed Development and Phosphorus Legacy

Source: Cape Cod Commission Chronology Viewer (https://ww2.capecodcommission.org/chronology/)



- Cranberry bog operations adjacent to the pond for decades
  - Fertilizers and other agricultural chemicals discharged to the pond
- Residential development increased substantially from 1970s to early 2000s
  - Increased nutrient loading from septic systems
  - Increased imperviousness and new drainage patterns led to greater nutrient and sediment loading from stormwater runoff
- Over time, these pressures led to filling of the pond with nutrient-rich sediments and conditions ripe for internal loading

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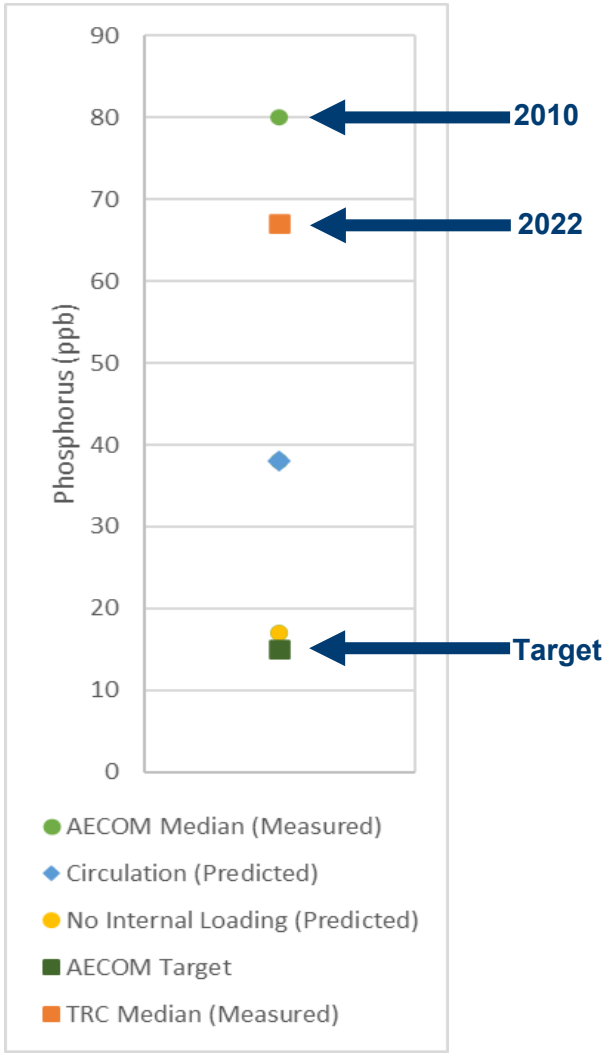
Santuit Pond Water Quality: Phosphorus and Cyanobacteria

Total Phosphorus in Santuit Pond



- By 2010, internal loading responsible for 78% (296kg) of annual P load
- Stormwater the largest source of external P loading (62% of the remaining budget or 46kg/yr)
- The combination of long-season sediment release and quick hits of stormwater P means cyanobacteria thrive much of the year
- Despite some initial in-pond and watershed project implementation, there has been little improvement since 2010
- Additional action needed to move closer to target annual P load of 71kg

Actions Taken and Underway: Partnerships

Partnerships are essential to tackling the management issues at Santuit Pond.

And counting…

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Actions Taken and Underway: Partnerships – Town of Mashpee

- Partnership with the Town of Mashpee critical to improving water quality
- Some key benefits
  - Town controls land in the watershed and adjacent to pond, MWT does not
    - Opportunity for stormwater improvements on public rights-of-way and lands
    - Staging and access points for in-pond management
  - Town can enact and enforce bylaws and regulations to prevent further degradation of the pond
  - Facilitate improvements in wastewater collection and treatment
  - Coordinate public education and outreach
  - Make the pond system more attractive for grant funding
  - Enhance stewardship of precious natural resources for both the MWT and Town communities

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Actions Taken and Underway: Partnerships – SNEP Network

- Partnership with the Southeast New England Program (SNEP) Network began in 2021 through MOA with the MWT and Town of Mashpee
- Improved access to technical consulting assistance for the MWT and Town of Mashpee
- Some key benefits:
  - Development of an EPA Nine Elements Watershed-Based Plan
  - Stormwater retrofit training of MWT and Town staff
  - Acceleration of watershed stormwater improvements to address external nutrient and sediment loading
  - Design of a nutrient inactivation project to address internal nutrient loading
  - Public education and outreach support, including a website dedicated to Santuit Pond
  - Successful identification of and applications to local, state, and federal funding sources

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Actions Taken and Underway: Partnership Highlights

- Development of a Watershed-Based Plan (SNEP Network)
  - Identifies partnerships and incorporates stakeholder input
  - Sets annual P reduction needed to achieve restoration goals – 81% (308kg)
  - Addresses both external and internal loading
  - Identifies management actions needed to make this happen
  - Lays out implementation schedule and budget
  - Gathers all data and actions in one place
  - **Makes Santuit Pond eligible for s.319 NPS implementation funding**

Phosphorus Watershed-Based Plan

Santuit Pond, Mashpee, MA

December 11, 2022

Prepared By:

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With technical assistance from the SNEP Network, a project of the New England Environmental Finance funded by the U.S. Environmental Protection Agency's Southeast New England Program and partners.

Prepared For:

MassDEP

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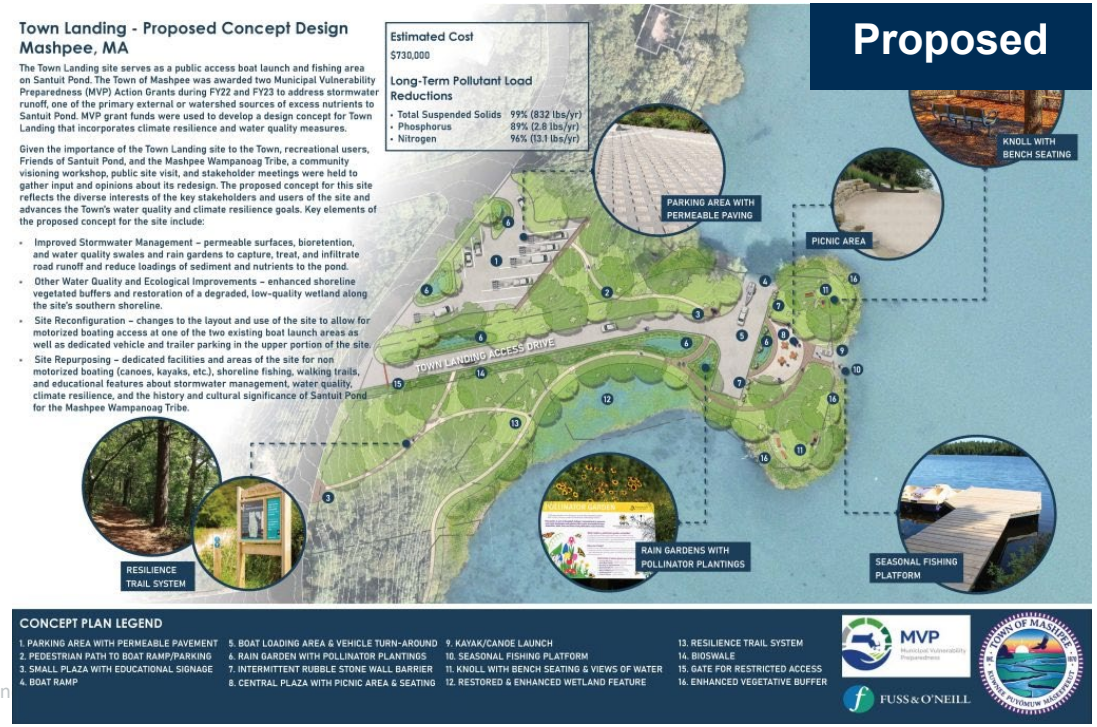
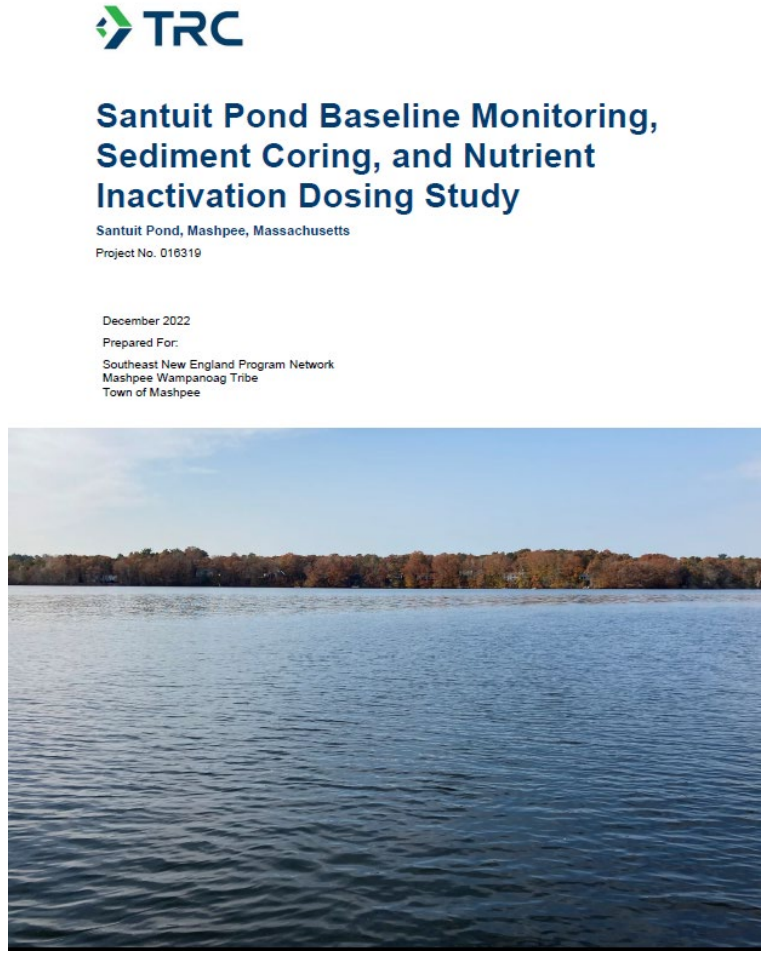
Actions Taken and Underway: Partnership Highlights

- Town Landing as a priority project (Town of Mashpee and Fuss & O'Neill with funding from MA MVP Action Grants)
  - Improved stormwater management
  - Water quality and ecological improvements
  - Site reconfiguration
  - Site repurposing



Actions Taken and Underway: Partnership Highlights

- Reduction of internal P loading (SNEP Network and TRC)
  - Collection of in-pond water quality and sediment core data, including P fractionation analysis
  - Initial assessment of options for in-pond water quality improvements
  - Feasibility and dosing recommendations for nutrient inactivation program
  - Cost estimates for implementation
  - Support for funding requests



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Actions Taken and Underway: Public Engagement and Education

- Critical to building consensus and support for action
- Town of Mashpee
  - Public meetings / presentations to Select Board
  - Written briefs
- Mashpee Wampanoag Tribe
  - Presentation to the Tribal Council
- Lake residents and community organizations
  - Mailings
  - Workshops
  - One-on-one meetings
- General public
  - Santuit Pond website via SNEP Network
  - Local cable access TV broadcasts
  - Social media campaigns

https://snepnetwork.org/the-santuit-pond-learning-hub/

What's New on The Pond?

What's New on The Pond?

Stormwater Retrofits

The Mashpee Wampanoag and Town of Mashpee participated in the 2021-2022 SNEP Network Stormwater Planning Series which guided them through the process of developing a conceptual design for a nature-based stormwater retrofit at Santuit Pond Town Landing. Additionally, the Town of Mashpee was awarded Municipal Vulnerability Program (MVP) grants in 2021 and 2022 to conduct a detailed survey to identify opportunities to improve stormwater management and pollution runoff around the pond. The grants also advanced the development of stormwater retrofit designs at several locations, and construction of stormwater retrofits along Timberlane Drive.

The Town of Mashpee hosted a Santuit Pond Town Landing Community Visioning Workshop on November 19, 2022 to share concepts for stormwater improvements and other possible enhancements to the Town Landing site and collect feedback from the public and key stakeholders. The Santuit Pond Town Landing proposed concept design was developed by Fuss and O'Neill in partnership with the Town of Mashpee and the Mashpee Wampanoag Tribe.

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Key Lessons and Takeaways

- MWT has a 12,000 year-old history with the Santuit Pond system but no direct control over its watershed or the resulting impaired condition
- Ongoing pollution from the watershed combined with legacy nutrients and other pollutants in sediments makes the restoration of Santuit Pond particularly challenging
- Partnering with the broader community at all levels of civic organizations and government has been necessary to gain traction
- Successful projects beget successful grant applications
- Improvements that benefit the MWT will also extend to a diverse range of other users and stakeholders – increases buy-in over time

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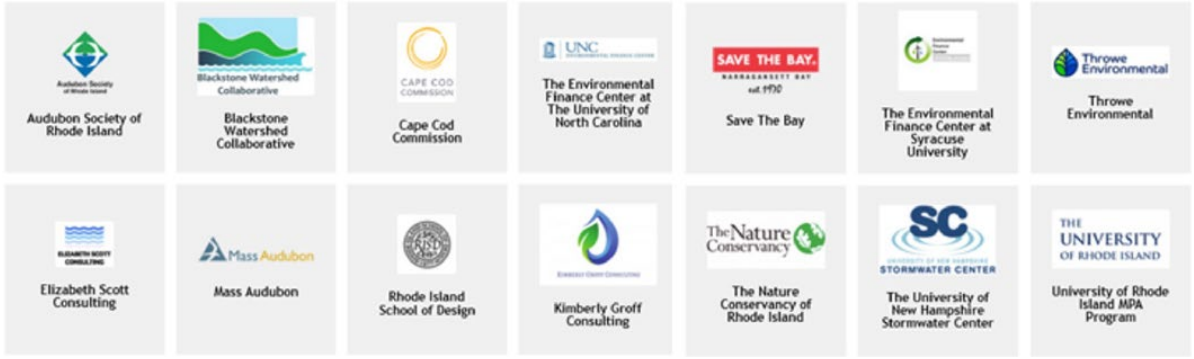
Acknowledgments

This presentation is based on an earlier version developed and presented by co-authors Kimberly Groff and Jason Steiding.

The SNEP Network is a collaborative network of partners that provide FREE technical assistance to communities to address their stormwater management, financing, water quality and habitat restoration, green infrastructure, low impact development, and watershed-scape conservation and restoration needs.

SNEP NETWORK



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Thanks!

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