

APPENDIX E: PUBLIC ENGAGEMENT MATERIALS

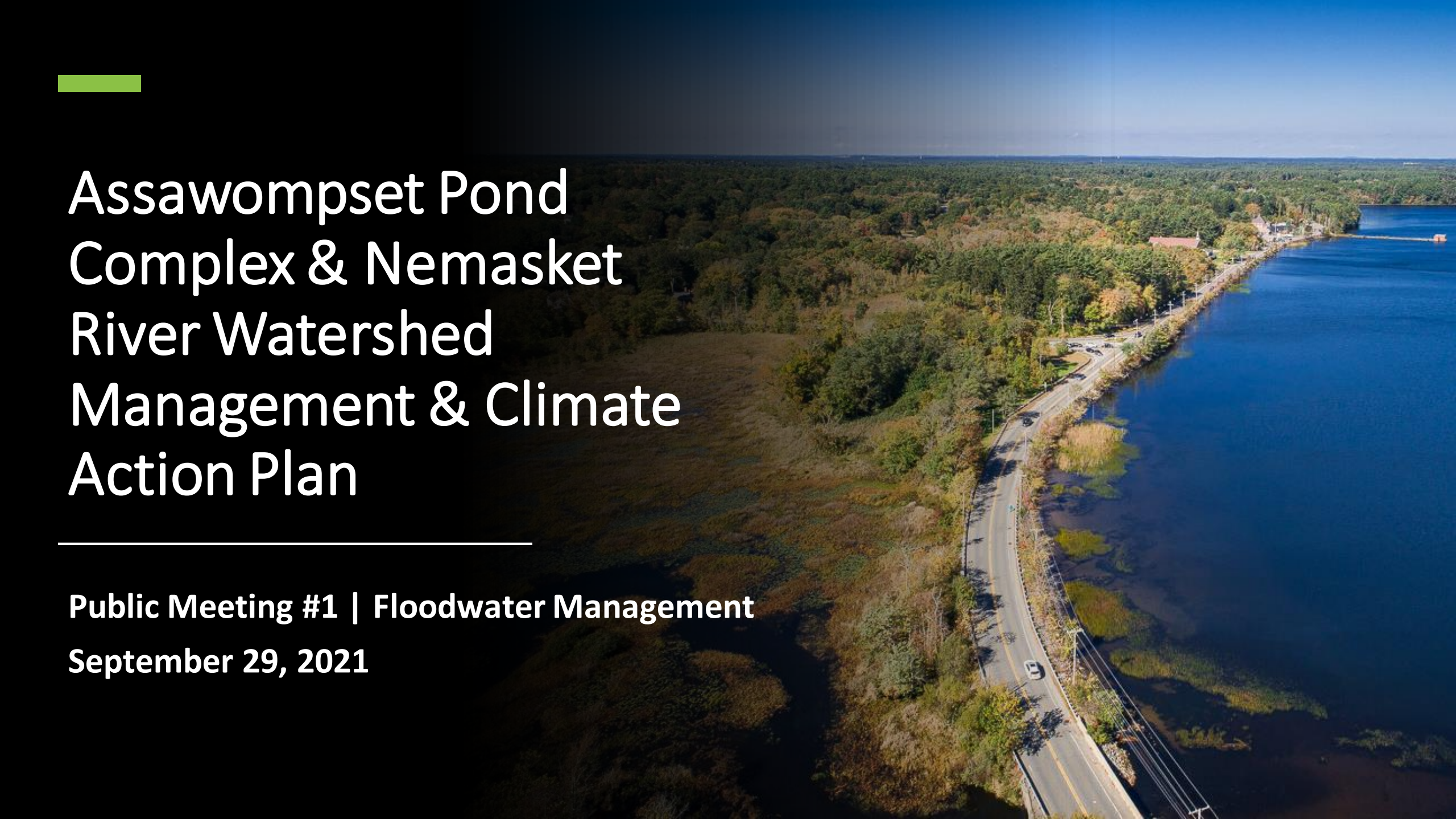
Consisting of:

- Meeting Presentations
- Meeting Notes (from online and in-person sessions, where both were held)
- Meeting Summaries and feedback (a combination of notes, photographs of boards, and any other interactive meeting materials)
- Photos of project staff members at community events
- Meeting advertisements

6 Public Meetings		
Date	Location of In-Person Meeting	Topic
September 29, 2021	Lakeville	Floodwater
October 13, 2021	Taunton	Water Quality
March 23, 2022	Middleborough	Ecology
April 13, 2022	Rochester	Recreation
April 27, 2022w	Freetown	Land Development
July 14, 2022	Lakeville	Meet your Plan Open House

FLOODWATER PUBLIC MEETING MATERIALS

Date:	September 29, 2021
Location:	Ted Williams Camp, Lakeville, MA (outdoor, in-person) and Zoom (online)
Time:	Occurred simultaneously from 5:00 - 7:00 PM

An aerial photograph showing a winding road along the edge of a large body of water, Assawompset Pond. The road is flanked by dense green trees on one side and the water on the other. The water is a deep blue, and the sky is clear. The text is overlaid on the left side of the image.

Assawompset Pond Complex & Nemasket River Watershed Management & Climate Action Plan

Public Meeting #1 | Floodwater Management
September 29, 2021

Let's Keep This Conversation Going!

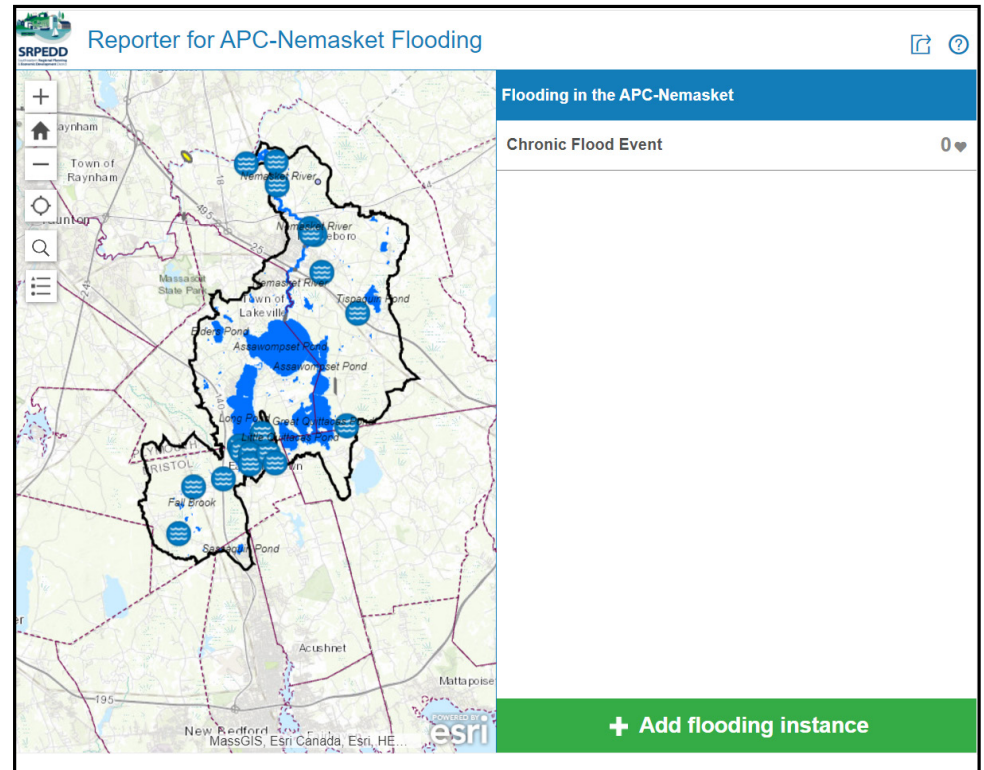
Add your experience and local expertise to the online community watershed management plan map...

The APC-Nemasket Floodwater Reporter

Where do you experience flooding in the Assawompset Ponds Complex or Nemasket River region? Learn more about flood risk in the community and share your input with the **Floodwater Reporter**.

How to use the Floodwater Reporter

1. Visit bit.ly/floodwater-reporter
2. Press the 'add flooding instance' button in the bottom right hand corner
3. Is the flooding chronic (ie, happens seasonally or regularly) or was it a unique event (such as the 2010 floods)?
4. Place a point at the location of the flooding.
5. Comment on other points.



Scan to go to the reporter!

Scan to go to the project webpage!



...and join us for another topic-specific meeting in the project workshop series!

GET INVOLVED!

Join us for in-person, outdoor public workshops! Come to all of them, or to as many meetings as topics interest you. NOTE that there is an online meeting option as well, at the same date and time via Zoom.

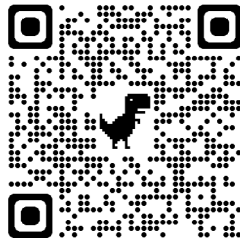
in the

Assawompset Pond Complex and Nemasket River Watershed Management & Climate Action Plan

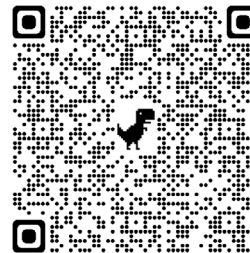
We need your input in a comprehensive evaluation of water-related issues and management solutions across the plan region.

visit the project webpage
www.srpedd.org/apc-nemasket-plan
for full meeting details and registration:

watershed tour
video! ↘



or scan here to
register! ↘



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Land Development	4.27.22 5-7 PM	Freetown
Open House	6.1.22 6-8 PM	Lakeville

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Agenda

- Project overview & vision for the watershed
- Developing plan recommendations: Floodwater Management
 - Issue summary presentation
 - Management actions discussion
- Next Steps
 - Take the virtual watershed tour
 - Future public meeting schedule
 - Submit additional input



Meet the Project Team

APC Management Team

- City of New Bedford Water Division
- City of Taunton Water Division
- APC Ranger
- Middleborough-Lakeville Herring Fishery Commission
- Mass Division of Fisheries and Wildlife
- Select Board Members
- Legislators
- Local Board and Commission Members
- Volunteers

Town Staff

- Patricia Cassady, Middleborough, Conservation Agent
- Laurell Farinon, Rochester, Conservation Agent
- Michele Paul, New Bedford, Director of Resilience and Enviro. Stewardship
- Phillip Duarte, Taunton, City Councilor
- **Freetown seat: OPEN**
- Nancy Yeatts and Lia Fabian, Lakeville

Meet the Project Team



Bill Napolitano
Environmental
Program



Helen Zincavage
Environmental
Program



Courtney Rocha
MVP Coordinator,
Southeast Region



Marea Gabriel
Conservation Projects
Manager



Sara Burns
Water Resource
Scientist



Danica Belknap
Environmental
Program



Benjamin Myers
Environmental
Program



Neal Price
Associate Principal,
Senior Hydrogeologist



Ellie Baker
Senior Environmental
Planner

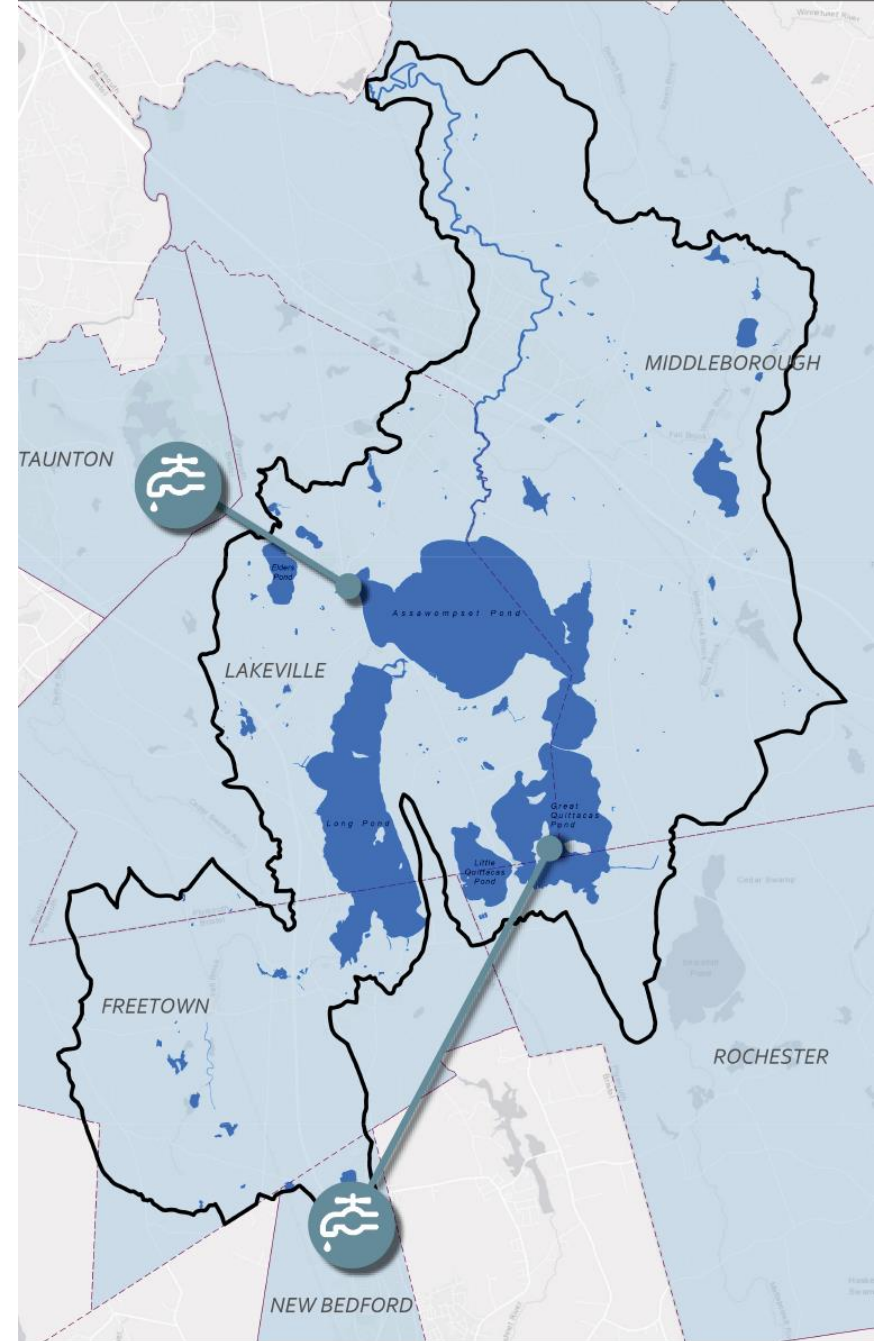


Eric Walberg
Climate Change Specialist,
Walberg Consulting



Role of the Management Plan

- Management Plan is the "Big Tent"
- The Plan will develop comprehensive goals for the entire watershed system.
- Actions prioritized in previous efforts will fit into this comprehensive plan and the goals identified.
- Other recommended actions will also arise.
- A significant contribution of the plan is to see where we can balance potential competing interests and identify where there may be surprising co-benefits.



Overview: Project Goals

A Watershed
Management
& Climate Action
Plan that...

Addresses existing issues.

Sometimes at different scales, but all in service of a watershed that supports human needs while also preserving natural functions and ecology.

Overall watershed issues

- Ex: seasonal drought within watershed

Pinch points disrupting system

- Ex: water movement between APC and Nemasket

Overview: Project Goals

A Watershed
Management
& Climate Action
Plan that...

Addresses dynamic forces shaping the future.

1. Climate Change - for planning purposes, will consider impacts anticipated for 2050 under a high emissions scenario (RCP 8.5)...hope for best but prepare for worse

2. New development

Planning for Dynamic Changes

Climate Change – 2050 / High Scenario / Taunton Basin



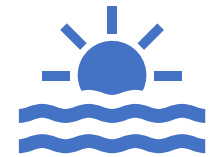
15.2-33.5 additional days
over 90 Degrees F



2.56" additional annual
precipitation (spring and
winter)



2 additional days of
extreme weather per year



1.25 additional consecutive
dry days (summer/fall)

**DRAFT Build-out
(Supply)**

Nemasket Watershed

 Sub-watershed Boundaries (HUC12)

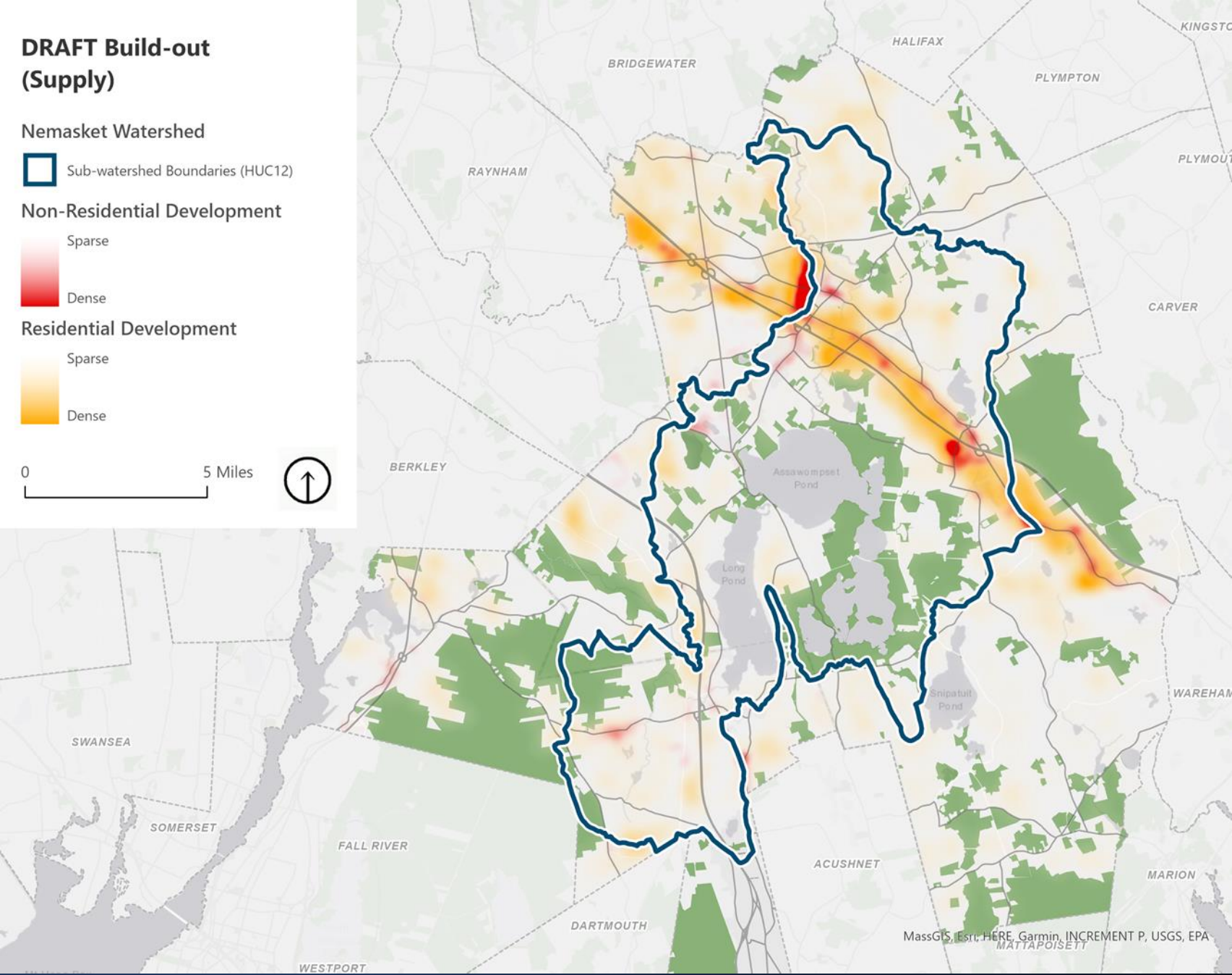
Non-Residential Development

 Sparse
Dense

Residential Development

 Sparse
Dense

0 5 Miles



Planning for Dynamic Changes

**Future Possible
Development Build Out
Scenarios**

Overview: Project Goals

A Watershed
Management
& Climate Action
Plan that...

Is a living document! Meant to be updated into the future and that can reflect changed context or priorities.

Has a substantial focus on managing the competing ecosystem services that benefit the different interests in the watershed

- Ex: increased recreation and water quality
- Ex: water supply capture and flood control

Vision for the Watershed: Management Goal

Overall, in 2050, the APC and Nemasket River are healthy, sustaining life and natural communities, including our own through clean, safe, and reliable water supply. The inhabitants of the watersheds have greater protections from climate hazards, and have developed an environmental ethic based upon choice, not chance, that drives sound local and regional decision-making.

Floodwater Management in the APC & Nemasket

What are the issues?

What impacts have already been observed?

How is climate change likely to impact the issues?

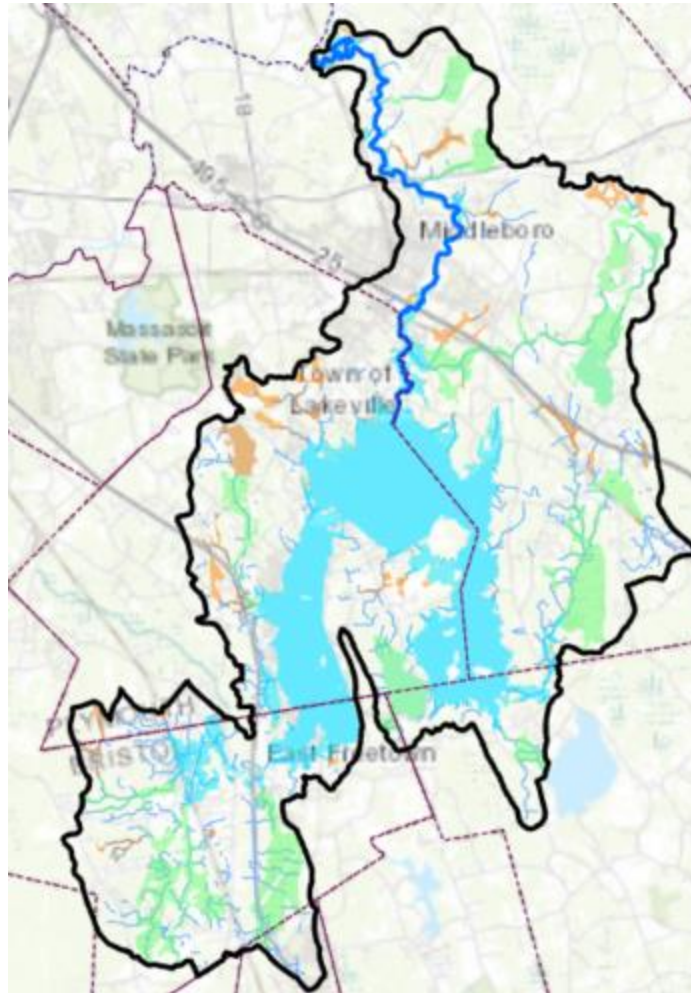
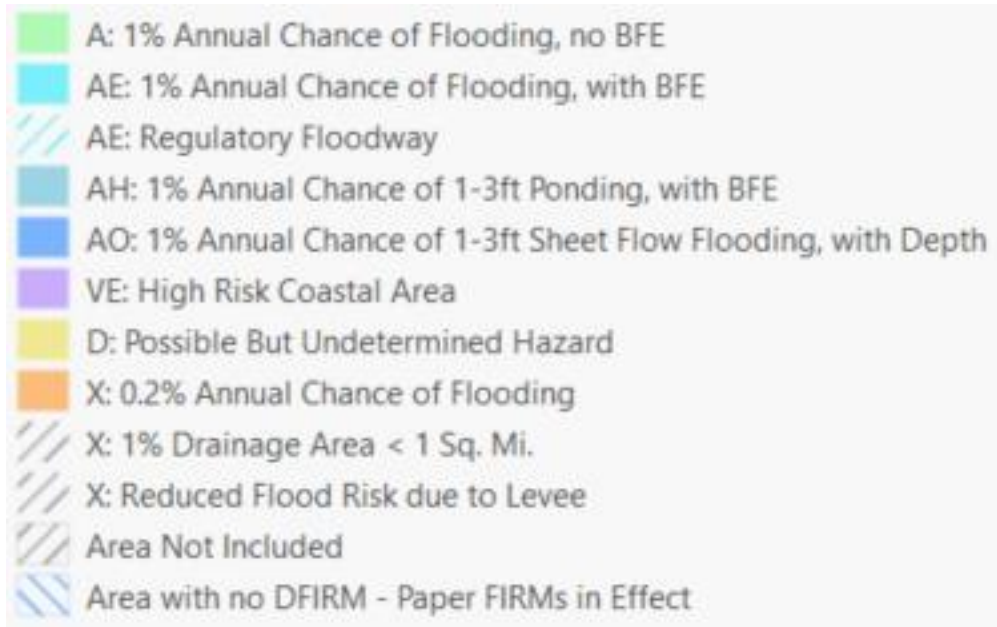
What are the associated co-benefits of taking action?

What are potential management actions and regulatory mechanisms to address the issues?

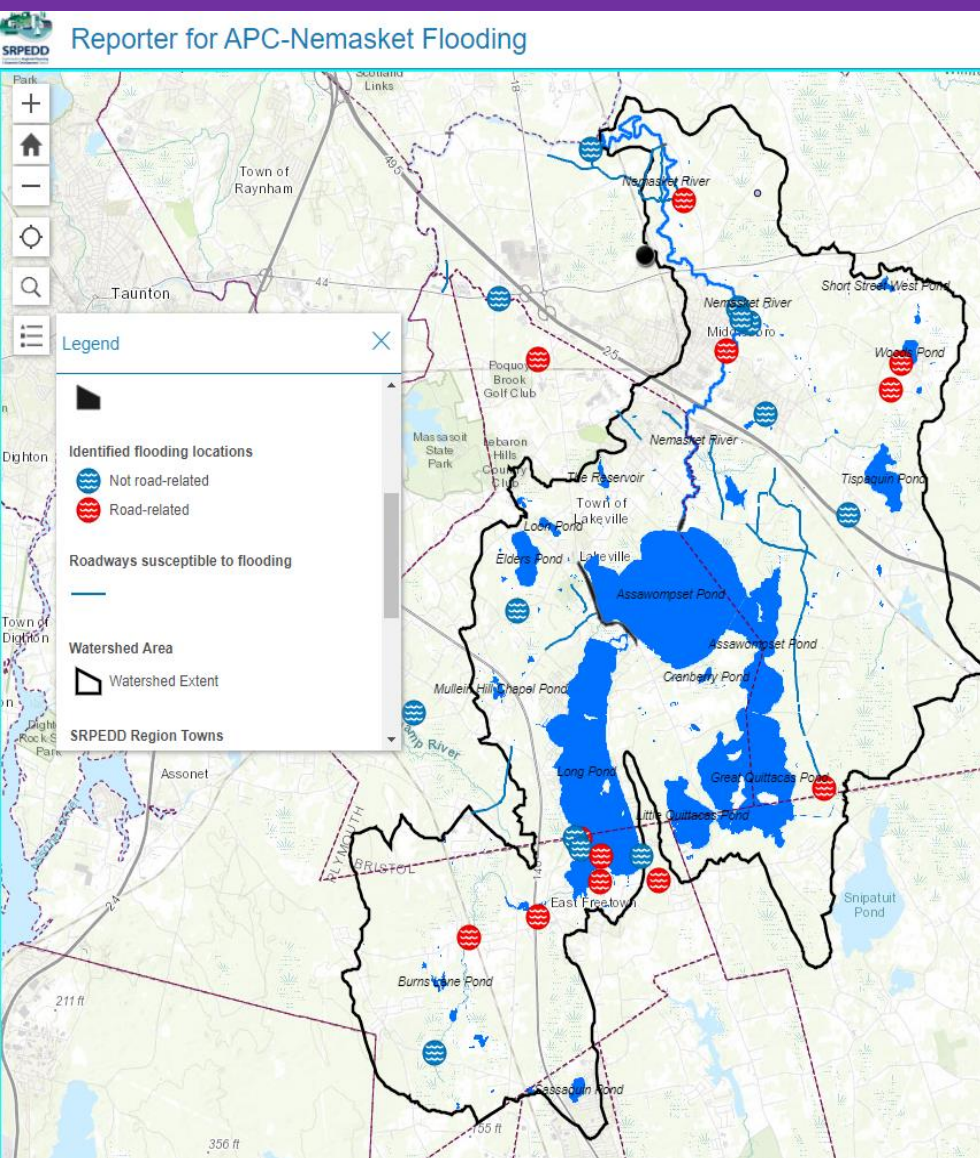
Flooding Issue Overview

- The Assawompset Ponds Watershed has several characteristics that make it prone to flooding.
- Topography, soils, and development patterns all play a role in both creating flood hazards during wet periods and making the watershed slow to drain once flooding has occurred.
- In addition, the role of Assawompset Pond as a water supply reservoir creates requirements to maintain water storage within the watershed.

Flood High Hazard Areas



Flood Impact Areas and Road Closures



Flooding Impacts Observed

Middleborough

- Bascule Dam, Thomas Street Culvert, and Woods Pond dam all potential sources of flooding

Lakeville

- Culverts: Route 105, Snake River, Taunton Street/Poquoy Brook, Cross Street, Pickens Street, Route 18, Snake River, Pierce Avenue/Bittersweet Road, and Country Road by the Eagles Building
- Highland Road, Bedford Street, Taunton Street, and Cross Street frequently inundated
- Captain's Way, Freetown Street, Country Road, Riverside Drive, and Old Powder House have drainage issues

Freetown

- Chippeway Road culvert along Fall Brook was identified as causing frequent localized flooding.

Rochester: Need more input

Climate Change Impacts on Flooding

Projected climate change impacts in southeastern Massachusetts:

- **Increased prevalence of heavy precipitation events:** The continued shift towards heavy precipitation events will increase the threat of flash flooding. This problem likely worsen as urbanization continues and impervious surface area in the watershed increases.
- **Increasing total precipitation:** Increasing total annual precipitation will change the water budget in the watershed resulting in the need to revisit assumptions about water storage capacity of the ponds and flood hazard.
- **Warming temperatures:** Over time this trend will result in a higher percentage of precipitation coming as rain rather than snow. Also, the combination of longer growing season, higher evaporation rates, and increasing evapotranspiration rates will result in reduced soil moisture and reduced stream and pond levels during dry periods.

In combination these factors will likely exacerbate environmental and community impacts associated with both wet and dry periods across seasons. Planning both for more impactful drought periods and increasing flood hazard during wet periods will be required.

Co-Benefits of Flood Mitigation

- Ecology, Unique Habitats and Natural Resources: Strategic land conservation and wetland restoration efforts have the potential to both maintain/increase flood storage capacity and protect/expand important habitat areas. Conversely, development of priority green infrastructure could worsen flooding in the watershed.
- Stormwater Management: measures that increase local infiltration have the potential to both reduce flooding and reduce potential drought impacts, while reducing stormwater runoff volumes.
- Water Quality: Enhanced stormwater management measures have the potential to reduce nonpoint source pollution of the ponds.
- Inter-Agency Cooperation: Improved coordination between local and state operators on roadway drainage systems could help reduce flood impacts.
- Land Development: Placing new development outside of flood hazard areas will also be required to minimize future flood impacts.

Potential Floodwater Management Actions

Store the Floodwater

- Wetland / Floodplain / Bog Conservation and Restoration
- Wetland / Floodplain Replication and Expansion in uplands

Help the Floodwater Flow

- Replace culvert/bridge pinch points
- New APC Dam with greater connection to wetlands
- Remove sediment / vegetation / Wareham St Dam as part of channel restoration

Make Rules that Limit Danger from Floodwater

- Review MOUs and maintenance schedule with MassDOT / MBTA
- Put restrictions on development in the floodplain (zoning overlays)
- Adopt a local stormwater bylaw that is above minimum infiltration rules

Avoid the Floodwater

- Create a regional property buy-out program

Build Infrastructure that Limits Dangers from Floodwater

- Elevate or fix culvert issues below Bedford Street
- Install green infrastructure (swales) to control on-site flooding and flooding along roadways

Potential Floodwater Management Actions

Regulatory mechanisms

- How is new development regulated in the floodplain?
- Are communities protecting floodplain and wetland functions?
- Is the regulated floodplain reflective of future storm events?
- How to protect or relocate existing infrastructure within the floodplain?
- Are communities adequately prepared to respond to recurring extreme flood events?

Regulatory Review: Wetland Bylaws

	Lakeville	Middleborough	Freetown	Rochester
Wetland bylaw	no	Yes	Yes	Yes
Regulated area	N/A	25 ft buffer	100 ft wetland buffer 200 ft river/lake/pond buffer	100 ft wetland buffer 200 ft river/stream buffer
Floodplain elevation	N/A	100 yr floodplain considered in plans	Activities within 100 ft of 100 yr floodplain considered in plans	Not specified
Prohibited Activities (beyond WPA)	N/A	Not specified	No activity within 200 ft of lakes, rivers, ponds	No activity within 25 ft no disturb zone
Mitigation requirements	N/A	2:1 replication required	Full mitigation required Conditions for ensuring replication success	Not specified

Regulatory Review: Floodplain Bylaws

	Lakeville	Middleborough	Freetown	Rochester
Floodplain overlay district	Yes	Yes	Yes	Yes
Floodplain bylaw	Yes	Yes	Yes	Yes
Regulated area	100 yr base flood elevation	100 yr base flood elevation	100 yr base flood elevation	100 yr base flood elevation
Prohibited Activities	Alteration of base flood levels Obstructions to flood flow Permanent structures or storage	Alteration of base flood levels Obstructions to flood flow Permanent structures or storage	Alteration of base flood levels Obstructions to flood flow Permanent structures or storage Alteration of sand dunes New construction below mean high tide	Alteration of base flood levels Obstructions to flood flow Permanent structures or storage
Permitted Uses	Agriculture, forestry, nursery, outdoor recreation, conservation uses Some temporary non-residential structures	Agriculture, forestry, nursery, outdoor recreation, conservation uses Some temporary non-residential structures Essential municipal services Some residential uses (lawns, gardens, parking, storage)	Agriculture, forestry, nursery, outdoor recreation, conservation uses Some temporary non-residential structures	Agriculture, forestry, nursery, outdoor recreation, conservation uses Some non-residential structures

Regulatory Review: Hazard Mitigation Plans

HMP Status	
Freetown	No Plan
Lakeville	Plan in process
Middleboro	2015 Plan expired 9/30/2020
Rochester	2005 Plan expired 1/28/2010 (local adoption of SRPEDD's 2005 Multi-Jurisdictional HMP)

Flood vulnerability assessment	high frequency; extensive severity; affecting limited geographic areas
Floodplains identified	100 yr floodplain
Recorded flood occurrences	100 yr flood events: 3/17/10, 4/1/10
Flood locations	Specific in its identification of numerous locations
Mitigation activities implemented	<ul style="list-style-type: none"> - Assawompset Pond elevation study to optimize pond levels for water supply vs. flood threat - Local planning and bylaws - Drainage facilities maintenance - Development standards to limit encroachment
Recommended mitigation actions	<ul style="list-style-type: none"> - Local education and dam safety programs - Road flooding & culvert mapping & monitoring - Install gauges to monitor APC & Nemasket levels
NFIP data	Included: <ul style="list-style-type: none"> - 34 policies (as of 2010) - 20 claims since 1981 (15 paid out)
Repeat flood loss	- 1 property met FEMA's repetitive loss definition

Management Actions Matrix Explanation

- The management actions matrices will be used capture participant input on management actions to address several topic areas such as floodwater management and water quality protection
- In addition, the matrices will capture participant thoughts on how management actions in one category might impact management actions in other categories.
- The project team has populated the matrices to get the process started but we need your input!

Floodwater Management Focus			T	B						
		EFFECT								
POSSIBLE MANAGEMENT ACTIONS	NOTES	Water Quality	Drinking Water	Storm water Mgmt	Ecology & Habitats	Land Dev.	Inter-Entity Coop.	Rec. Access	Public Stewards	Will this action work under predicted climate conditions? Can it scale / survive?
Store the Floodwater										
Restore/enhance wetland areas that act like a sponge to hold and slowly infiltrate water (including retiring cranberry bogs)		B		B	B	T		(T)		
Expand wetlands into upland or disconnected/disturbed areas and protect buffers, creating additional storage capacity		B		B	B	T		(T)	B	
Help the Floodwater Flow										
Replace culverts at Snake River and Route 105		T (invasives)	(T)	B	B	B	B	T		
Reconnect Assawompset Pond to dam-adjacent wetlands beyond berm by allowing greater overflow during peak rain events				B	B	B		(T)		
Restore the Nemasket River Channel, which would include limited and targeted dredging/vegetation removal (esp. in the first 500 ft) as part of channel restoration		B		B	B			B	B	
Remove the bascule dam to gain topography and reduce impoundment		B		B	B	(T)	B	B	B	
Replace railroad bridge over the Nemasket		B		B	B	B	B	B		
Remove sandbards and MassDOT broken drain (495/44)		B		B	B	B	B	B		
Replace Plymouth Street Bridge in Middleboro		B		B	B	B	B	B		
Replace Murdock Street Bridge in Middleboro		B		B	B	B	B	B		
Cross Street Culvert (Purchase Brook)		B		B	B	B	B	B		

Discussion: Management Actions & Regulatory Approaches

- Do you agree with the issues identified? Have we missed any?
- Do you agree with the potential management strategies identified?
- Which do you think will or won't work?
- Which actions should be prioritized?
- Have any of these strategies been tried before?
- What are potential trade-offs and co-benefits for each strategy?
- Any additional ideas or recommendations?

Thank you for
your time
and input
today!

What next?

Take the virtual watershed tour, access the meeting packet, and learn more about your plan at:

www.SRPEDD.org/apc-nemasket-plan

Share additional thoughts through June 2022:

Drop a Note: bit.ly/comment-apc-nemasket

Drop a Map Point: bit.ly/floodwater-reporter

Public Meeting Schedule

Join us for in-person, outdoor public workshops! Come to all of them, or to as many meetings as topics interest you. NOTE that there is an online meeting option as well, at the same date and time via Zoom.

TOPIC	DATE	LOCATION
Flooding	9.29.21 5-7 PM	Lakeville
Water Quality	10.13.21 5-7 PM	Taunton
Water Supply	11.10.21 5-7 PM	Zoom Only
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Recreation	4.13.22 5-7 PM	Rochester
Land Development	4.27.22 5-7 PM	Freetown
Open House	6.1.22 6-8 PM	Lakeville

Update: In-person meeting now going to take place in New Bedford!

To receive updates on the project status, please make sure that you have signed in for the meeting today, or completed the registration form!

Register for future in-person or virtual meetings:

bit.ly/register-apc

Sign in for today's meeting:

bit.ly/flood-sign-in

All virtual meetings will use the same Zoom meeting link:

<https://us02web.zoom.us/j/8150125172>

PUBLIC WORKSHOP REPORT APC-NEMASKET MANAGEMENT & CLIMATE ACTION PLAN FLOODWATER MANAGEMENT THEME

MEETING BASIS AND GOALS: The Assawumpsot Ponds Complex and Nemasket River Watershed Management and Climate Action Plan Project Team hosted a public engagement session on 9/29/21 designed to inform residents about the project's work to date, educate them about the role of climate change in predicting future precipitation within the watershed, educate them about various aspects of the risks of floodwaters in the community, and - most importantly - to solicit residents' feedback regarding what they see as the most important floodwater-related areas of concern and management actions within the watershed in order to include these insights into the final Plan document.

LOGISTICS: The Project Team hosted concurrent in-person and online events in order to encourage as many participants to attend as possible from throughout the plan region and given personal COVID-19 protocol comfort levels. Both events were hosted in the same timeslot, from 5:00 – 7:00 PM (the in-person event ended half an hour earlier given the loss of daylight.)

The in-person event was hosted in Lakeville, MA from at the Ted Williams Camp. Project Team staff were present from SRPEDD, The Nature Conservancy, and the APC Management Team. The online event was hosted by SRPEDD Staff members, the Horsley Witten Group, and Eric Walberg Consulting. Both meetings featured a presentation on the background material that the project has covered so far, as well as a 'matrix' of potential project recommendations that the team has identified. As comments were provided by the public, their insights and ideas were written on the matrix. Finally, both events ended by giving participants additional information about all Management Plan themes beyond floodwater via pdfs shown in person and provided electronically, in the case of the online meeting, and by announcing the next meeting dates and online portals that provide for additional ongoing engagement. The in-person event had approximately 19 attendees, and the online event, approximately 12.

CONTENT COVERED: This presentation introduced the Watershed Management and Climate Action Plan as a method of creating goals for the watershed system which would address 'dynamic forces shaping the future' such as development patterns and climate change. The Watershed Management and Climate Action Plan is centered on a vision for the watershed where:

"Overall, in 2050, the APC and Nemasket River are healthy, sustaining life and natural communities, including our own through clean, safe, and reliable water supply. The inhabitants of the watersheds have greater protections from climate hazards, and have developed an environmental ethic based upon choice, not chance, that drives sound local and regional decision-making. "

This meeting was focused on the role of flood water and its impacts on communities surrounding the ponds both on a watershed scale and a 'pinch-point' (ie, parcel or culvert) level scale. There have been flooding impacts observed within all of the member communities, which has impacted the region's dams, culverts, roadways, and houses. Through interviews conducted with local fire chiefs and emergency responders, the project team has identified more than two dozen points that experienced significant flooding during the notable 2010 floods. Those floods

were a landmark moment in the region as they exposed the vulnerability of the area to flooding and demonstrated the need for more effective responses to flood pressures. The project team mapped these vulnerable locations and invited meeting participants to share their own knowledge of flood-prone locations through an online 'Flood Locator' where residents can drop a pin indicating chronic or unique flood events.

Climate change will further stress the watershed system through an increased number of heavy precipitation events (more one-off extreme events), an increase in total annual precipitation, and warming temperatures that may result in heat-stressed soils that are unable to retain as much water. Planning for the watershed's climate resiliency means being prepared to address these phenomenon.

The project team highlighted some of the work that these communities have already done in addressing stormwater issues, particularly when it comes to bylaws that restricted development in the floodplains or in heavy flood areas (including the FEMA flood hazard areas). By highlighting previous steps taken, the project team was able to use these proposals to foster a conversation.

When it comes to addressing these impacts and preparing for the future, the Project Team has identified five categories of possible actions:

1. Store the floodwater
2. Help the floodwater flow
3. Make rules that limit danger from floodwater
4. Avoid the floodwater
5. Build infrastructure that limits dangers from floodwater

These actions combine physical interventions with regulatory mechanisms and culture shifts regarding land use, water use, development patterns, and more surrounding the ponds. The project team has identified multiple potential recommendations within these categories that the member communities could follow to foster their resilience and response to flooding.

THEMES IN PUBLIC COMMENT: When considered together, the public described similar experiences and concerns in both the in-person and online meetings.

- Pond water levels. In general, participants thought that the decisions around pond level maintenance and drainage were opaque. There were questions around **who is responsible for maintaining the Assawompset Pond at the set water level?** Especially in why were there issues with the water level over this last summer in perhaps removing boards too late in the season to encourage the ponds to drain over time when conditions today mirror those of fall 2009, which preceded the major flooding events of spring 2010. There were suggestions for more open information and communication, perhaps ideally in a centralized location online where residents could access pond level information and the status of the dam.
- The groups discussed ongoing efforts to better understand **how we can encourage proper management of the APC water levels going into the future**, especially by re-design the Assawompset Pond Dam to be more responsive to drainage issues within the pond. A parallel ongoing project in the Upper Nemasket involves a hydrological and hydraulic study of the dam and Upper Nemasket to Route 105. Part of this analysis looks

at different dam scenarios, some of which are lower and wider than the existing dam, which would allow water to spillover more easily during periods of high water into adjacent wetlands. Removal of the bascule dam could also provide some ability to gain topography of the river bank in this generally low-gradient river system, which drops only 20 feet over its 11-mile course. In keeping with the discussion on hydrology, participants were also curious about the sources of groundwater into the APC and watershed (Groundwater, rivers, precipitation, etc.), and the land profiles that store more water (ie, forests or lawns).

- The link between hydrology and **increasing water flows between components of the APC system in view of pervasive invasive species issues** in Long Pond and the Nemasket River also came up. While increasing the connectivity between Long Pond, Assawompset Pond, and the Nemasket will help floodwater flow, it also opens the risk to migrating invasive plants in Long Pond in to Assawompset Pond. The need to perhaps phase corrective projects so that the invasive species issue is first brought under control before increasing connectivity at the Snake River culvert should be a consideration, as well as gaining additional expertise and information on how Assawompst Pond has thus far seen more limited invasive plant species spread despite activity in Long Pond and the Nemasket.
- Participants were also interested in the sharing of water and resources between communities. The New Bedford and Taunton water suppliers presently sell some of their water to other communities. Perhaps additional relationships could be cultivated so that additional communities could draw from the system during periods of high water [this may be infeasible due to the nature of treatment permits and existing water supply piping and other infrastructure]. On a related note, the idea of instituting a surcharge on these secondary water sales (when the water suppliers sell to other communities outside of Taunton and New Bedford) came up as a method for potentially obtaining long-term funding for flood mitigation and other management needs in the system.
- Finally, residents had an in-depth discussion about the role of **wetlands protections bylaws** and how strengthen the bylaws beyond the state standards can help ensure residents are protected.

FEEDBACK RECEIVED FOR RECOMMENDED ACTIONS: In addition to general comments and questions, members of the public were invited to provide feedback on particular interventions.

The project team proposed several questions:

1. What are the issues?
2. What impacts have already been observed?
3. How is climate change likely to impact the issues?
4. What are the associated co-benefits of taking action?
5. What are potential management actions and regulatory mechanisms to address the issues?

Potential Management Action	Resident Feedback
Topic: Store the Floodwater	

Restore/enhance wetland areas that act like a sponge to hold and slowly infiltrate water (including retiring cranberry bogs)	Project team members must consider the water distribution in the Lower Nemasket's floodplain, as invasive species and habitat degradation could decrease the floodplain's ability to store floodwaters.
Expand wetlands into upland or disconnected/disturbed areas and protect buffers, creating additional storage capacity	Project team members should conduct a cost/benefit analysis and site assessment to identify upland areas which can be reconnected to wetlands.
Topic: Help the Floodwater flow	
Update/replace Assawompset Pond Dam	Project team members should investigate methods for improving <i>management</i> capacity, not just physical hydrological capacity, of water flowing out of the Assawompset Pond Dam. Coordination with the water managers between the towns is insufficient.
Remove sediment deposition in the first 500 feet of the Nemasket	Work with DMF to come up with maintenance permit
Restore the Nemasekt River Channel, which would include limited and targeted dredging/vegetation removal	"The drain is clogged" Wareham Street Dam and the river must be addressed.
Remove the Bascule dam to gain topography and reduce impoundment	Support for this idea – right now seems like this dam only drains the impoundment above it
Allow additional water uses during higher flows	Project team members should investigate methods to allow communities to pump water from the ponds during high water flows, instead of relying on their own town well systems.
Topic: Make rules that limit danger from floodwater	
Pursue regional participation in FEMA's CRS program	Seen as potentially positive as flood insurance rates are high and are difficult to afford.
Review MOUs and procedures with entities like MassDOT that have a role in scheduled maintenance that affects drainage, sedimentation and water flows.	River is still clogged – needs to be addressed
Limit development in the floodplain (floodplain zoning, wetland bylaw, etc.)	Project team should investigate options for land conservation in the watershed at large, and not just around the land adjacent to the ponds (which is already highly protected).
Adopt a local stormwater bylaw that accounts for more intense storms	Project team members should explore options to discourage development of public property, critical infrastructure, and right of ways (such as roadways) within the floodplain.
Support efforts at the state level to increase the size of the storm that must be designed for in construction projects	Project team members should find ways to support the community adoption of more stringent stormwater bylaws and construction standards, particularly when it comes to public infrastructure and roads. The team

	should also support efforts at the state level for improving modelling of climate-change amplified storms.
Improve communications around pond levels	Can we look at new and more automated technologies for maintaining and communicating pond levels? An element of issues now is that the numbers have to be recorded and passed through multiple agencies, and there is no centralized place for information.
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Install green infrastructure to control on-site flooding and runoff from properties abutting the river	How can we incentivize the use of GI by private individuals?

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How to read the matrix:

There are three general types of interactions between management actions and effects.

Visit the project website, scan below

[illegible]

How to read the matrix:

There are three general types of interactions between management actions and effects,

Visit the project website, scan below!

[illegible]



PUBLIC WORKSHOP REPORT APC-NEMASKET MANAGEMENT & CLIMATE ACTION PLAN FLOODWATER MANAGEMENT THEME

MEETING BASIS AND GOALS: The Assawsoompset Ponds Complex and Nemasket River Watershed Management and Climate Action Plan Project Team hosted a public engagement session on 9/29/21 designed to inform residents about the project's work to date, educate them about the role of climate change in predicting future precipitation within the watershed, educate them about various aspects of the risks of floodwaters in the community, and - most importantly - to solicit residents' feedback regarding what they see as the most important floodwater-related areas of concern and management actions within the watershed in order to include these insights into the final Plan document.

LOGISTICS: The Project Team hosted concurrent in-person and online events in order to encourage as many participants to attend as possible from throughout the plan region and given personal COVID-19 protocol comfort levels. Both events were hosted in the same timeslot, from 5:00 – 7:00 PM (the in-person event ended half an hour earlier given the loss of daylight.)

The in-person event was hosted in Lakeville, MA from at the Ted Williams Camp. Project Team staff were present from SRPEDD, The Nature Conservancy, and the APC Management Team. The online event was hosted by SRPEDD Staff members, the Horsley Witten Group, and Eric Walberg Consulting. Both meetings featured a presentation on the background material that the project has covered so far, as well as a 'matrix' of potential project recommendations that the team has identified. As comments were provided by the public, their insights and ideas were written on the matrix. Finally, both events ended by giving participants additional information about all Management Plan themes beyond floodwater via pdfs shown in person and provided electronically, in the case of the online meeting, and by announcing the next meeting dates and online portals that provide for additional ongoing engagement. The in-person event had approximately 19 attendees, and the online event, approximately 12.

CONTENT COVERED: This presentation introduced the Watershed Management and Climate Action Plan as a method of creating goals for the watershed system which would address 'dynamic forces shaping the future' such as development patterns and climate change. The Watershed Management and Climate Action Plan is centered on a vision for the watershed where:

"Overall, in 2050, the APC and Nemasket River are healthy, sustaining life and natural communities, including our own through clean, safe, and reliable water supply. The inhabitants of the watersheds have greater protections from climate hazards, and have developed an environmental ethic based upon choice, not chance, that drives sound local and regional decision-making. "

This meeting was focused on the role of flood water and its impacts on communities surrounding the ponds both on a watershed scale and a 'pinch-point' (ie, parcel or culvert) level scale. There have been flooding impacts observed within all of the member communities, which has impacted the region's dams, culverts, roadways, and houses. Through interviews conducted with local fire chiefs and emergency responders, the project team has identified more than two dozen points that experienced significant flooding during the notable 2010 floods. Those floods

were a landmark moment in the region as they exposed the vulnerability of the area to flooding and demonstrated the need for more effective responses to flood pressures. The project team mapped these vulnerable locations and invited meeting participants to share their own knowledge of flood-prone locations through an online 'Flood Locator' where residents can drop a pin indicating chronic or unique flood events.

Climate change will further stress the watershed system through an increased number of heavy precipitation events (more one-off extreme events), an increase in total annual precipitation, and warming temperatures that may result in heat-stressed soils that are unable to retain as much water. Planning for the watershed's climate resiliency means being prepared to address these phenomenon.

The project team highlighted some of the work that these communities have already done in addressing stormwater issues, particularly when it comes to bylaws that restricted development in the floodplains or in heavy flood areas (including the FEMA flood hazard areas). By highlighting previous steps taken, the project team was able to use these proposals to foster a conversation.

When it comes to addressing these impacts and preparing for the future, the Project Team has identified five categories of possible actions:

1. Store the floodwater
2. Help the floodwater flow
3. Make rules that limit danger from floodwater
4. Avoid the floodwater
5. Build infrastructure that limits dangers from floodwater

These actions combine physical interventions with regulatory mechanisms and culture shifts regarding land use, water use, development patterns, and more surrounding the ponds. The project team has identified multiple potential recommendations within these categories that the member communities could follow to foster their resilience and response to flooding.

THEMES IN PUBLIC COMMENT: When considered together, the public described similar experiences and concerns in both the in-person and online meetings.

- Pond water levels. In general, participants thought that the decisions around pond level maintenance and drainage were opaque. There were questions around **who is responsible for maintaining the Assawompset Pond at the set water level?** Especially in why were there issues with the water level over this last summer in perhaps removing boards too late in the season to encourage the ponds to drain over time when conditions today mirror those of fall 2009, which preceded the major flooding events of spring 2010. There were suggestions for more open information and communication, perhaps ideally in a centralized location online where residents could access pond level information and the status of the dam.
- The groups discussed ongoing efforts to better understand **how we can encourage proper management of the APC water levels going into the future**, especially by re-design the Assawompset Pond Dam to be more responsive to drainage issues within the pond. A parallel ongoing project in the Upper Nemasket involves a hydrological and hydraulic study of the dam and Upper Nemasket to Route 105. Part of this analysis looks

at different dam scenarios, some of which are lower and wider than the existing dam, which would allow water to spillover more easily during periods of high water into adjacent wetlands. Removal of the bascule dam could also provide some ability to gain topography of the river bank in this generally low-gradient river system, which drops only 20 feet over its 11-mile course. In keeping with the discussion on hydrology, participants were also curious about the sources of groundwater into the APC and watershed (Groundwater, rivers, precipitation, etc.), and the land profiles that store more water (ie, forests or lawns).

- The link between hydrology and **increasing water flows between components of the APC system in view of pervasive invasive species issues** in Long Pond and the Nemasket River also came up. While increasing the connectivity between Long Pond, Assawompset Pond, and the Nemasket will help floodwater flow, it also opens the risk to migrating invasive plants in Long Pond in to Assawompset Pond. The need to perhaps phase corrective projects so that the invasive species issue is first brought under control before increasing connectivity at the Snake River culvert should be a consideration, as well as gaining additional expertise and information on how Assawompst Pond has thus far seen more limited invasive plant species spread despite activity in Long Pond and the Nemasket.
- Participants were also interested in the sharing of water and resources between communities. The New Bedford and Taunton water suppliers presently sell some of their water to other communities. Perhaps additional relationships could be cultivated so that additional communities could draw from the system during periods of high water [this may be infeasible due to the nature of treatment permits and existing water supply piping and other infrastructure]. On a related note, the idea of instituting a surcharge on these secondary water sales (when the water suppliers sell to other communities outside of Taunton and New Bedford) came up as a method for potentially obtaining long-term funding for flood mitigation and other management needs in the system.
- Finally, residents had an in-depth discussion about the role of **wetlands protections bylaws** and how strengthen the bylaws beyond the state standards can help ensure residents are protected.

FEEDBACK RECEIVED FOR RECOMMENDED ACTIONS: In addition to general comments and questions, members of the public were invited to provide feedback on particular interventions.

The project team proposed several questions:

1. What are the issues?
2. What impacts have already been observed?
3. How is climate change likely to impact the issues?
4. What are the associated co-benefits of taking action?
5. What are potential management actions and regulatory mechanisms to address the issues?

Potential Management Action	Resident Feedback
Topic: Store the Floodwater	

Restore/enhance wetland areas that act like a sponge to hold and slowly infiltrate water (including retiring cranberry bogs)	Project team members must consider the water distribution in the Lower Nemasket's floodplain, as invasive species and habitat degradation could decrease the floodplain's ability to store floodwaters.
Expand wetlands into upland or disconnected/disturbed areas and protect buffers, creating additional storage capacity	Project team members should conduct a cost/benefit analysis and site assessment to identify upland areas which can be reconnected to wetlands.
Topic: Help the Floodwater flow	
Update/replace Assawompset Pond Dam	Project team members should investigate methods for improving <i>management</i> capacity, not just physical hydrological capacity, of water flowing out of the Assawompset Pond Dam. Coordination with the water managers between the towns is insufficient.
Remove sediment deposition in the first 500 feet of the Nemasket	Work with DMF to come up with maintenance permit
Restore the Nemasekt River Channel, which would include limited and targeted dredging/vegetation removal	"The drain is clogged" Wareham Street Dam and the river must be addressed.
Remove the Bascule dam to gain topography and reduce impoundment	Support for this idea – right now seems like this dam only drains the impoundment above it
Allow additional water uses during higher flows	Project team members should investigate methods to allow communities to pump water from the ponds during high water flows, instead of relying on their own town well systems.
Topic: Make rules that limit danger from floodwater	
Pursue regional participation in FEMA's CRS program	Seen as potentially positive as flood insurance rates are high and are difficult to afford.
Review MOUs and procedures with entities like MassDOT that have a role in scheduled maintenance that affects drainage, sedimentation and water flows.	River is still clogged – needs to be addressed
Limit development in the floodplain (floodplain zoning, wetland bylaw, etc.)	Project team should investigate options for land conservation in the watershed at large, and not just around the land adjacent to the ponds (which is already highly protected).
Adopt a local stormwater bylaw that accounts for more intense storms	Project team members should explore options to discourage development of public property, critical infrastructure, and right of ways (such as roadways) within the floodplain.
Support efforts at the state level to increase the size of the storm that must be designed for in construction projects	Project team members should find ways to support the community adoption of more stringent stormwater bylaws and construction standards, particularly when it comes to public infrastructure and roads. The team

	should also support efforts at the state level for improving modelling of climate-change amplified storms.
Improve communications around pond levels	Can we look at new and more automated technologies for maintaining and communicating pond levels? An element of issues now is that the numbers have to be recorded and passed through multiple agencies, and there is no centralized place for information.
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WATER QUALITY PUBLIC MEETING MATERIALS

Date:	October 13, 2021
Location:	Hopewell Park, Taunton, MA (outdoor, in-person) and Zoom (online)
Time:	Occurred simultaneously from 5:00 - 7:00 PM

An aerial photograph showing a paved road with a yellow center line curving along the edge of a large body of water. The road is bordered by a dense forest of trees with green and yellow foliage. The water is a deep blue. In the distance, a small building and some other structures are visible on the shoreline. The sky is clear and blue.

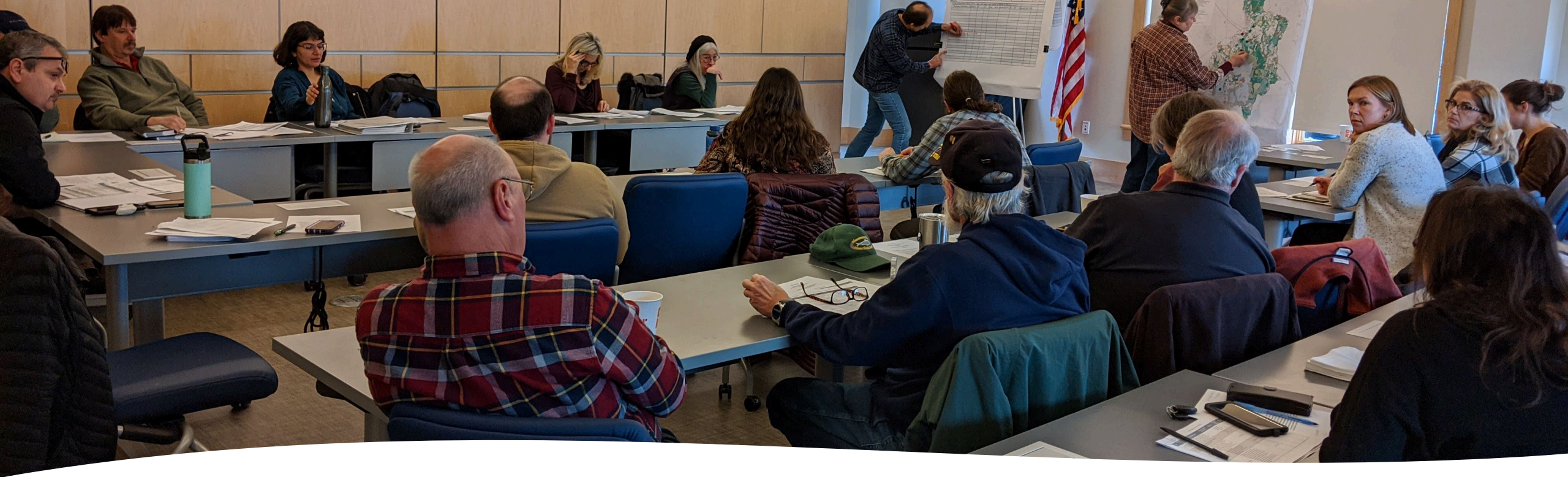
Assawompset Pond Complex & Nemasket River Watershed Management & Climate Action Plan

Public Meeting #2 | Water Quality
October 13, 2021



Agenda

- Project overview & vision for the watershed
- Developing plan recommendations: Water Quality Protection
 - Issue summary presentation
 - Management actions discussion
- Next Steps
 - Take the virtual watershed tour
 - Future public meeting schedule
 - Submit additional input



Meet the Project Team

APC Management Team

- City of New Bedford Water Division
- City of Taunton Water Division
- APC Ranger
- Middleborough-Lakeville Herring Fishery Commission
- Mass Division of Fisheries and Wildlife
- Select Board Members
- Legislators
- Local Board and Commission Members
- Volunteers

Town Staff

- Patricia Cassady, Middleborough, Conservation Agent
- Merilee Kelly, Rochester, Conservation Agent
- Michele Paul, New Bedford, Director of Resilience and Enviro. Stewardship
- Phillip Duarte, Taunton, City Councilor
- **Freetown seat: OPEN**
- Nancy Yeatts and Lia Fabian, Lakeville

Meet the Project Team



Bill Napolitano
Environmental
Program



Helen Zincavage
Environmental
Program



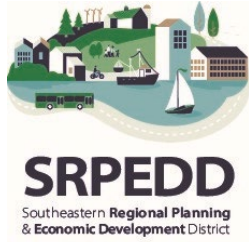
Courtney Rocha
MVP Coordinator,
Southeast Region



Marea Gabriel
Conservation Projects
Manager



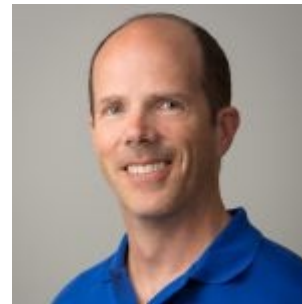
Sara Burns
Water Resource
Scientist



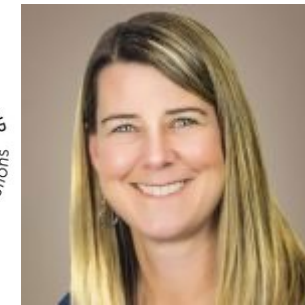
Danica Belknap
Environmental
Program



Benjamin Myers
Environmental
Program



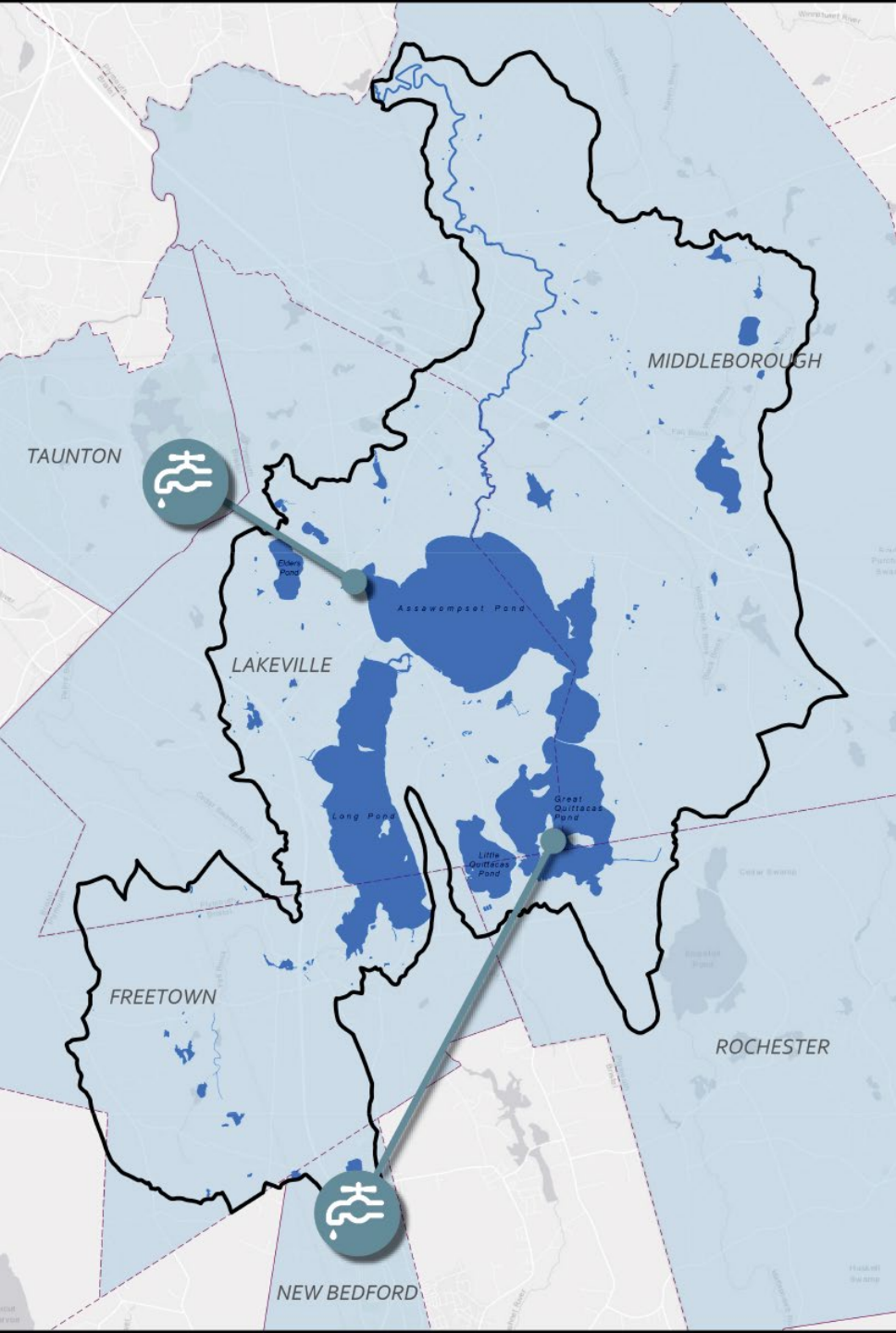
Neal Price
Associate Principal,
Senior Hydrogeologist



Ellie Baker
Senior Environmental
Planner



Eric Walberg
Climate Change Specialist,
Walberg Consulting



Watershed Basics

- Total Plan Area: 44,900 ac = 70 sq. mi.
- Spans the towns of:
 - Freetown
 - Lakeville
 - Middleborough
 - Rochester
 - Small portion of New Bedford

Major Stakeholders

- Pondsides and Riverside Communities and Residents
- New Bedford and Taunton Water Suppliers (250,000 ppl)
- Middleboro-Lakeville Herring Commission
- Wild and Scenic Taunton River Stewardship Committee
- Recreational Interests
- Major landowners, inclusive of state agencies

Role of the Management Plan

- The Plan will develop comprehensive goals for the entire watershed system.
- Address existing issues.
- Look forward to the future (to 2050) and consider recommendations in light of climate change and future development patterns
- A significant contribution of the plan is to see where we can balance different interests and identify where there may be surprising co-benefits.

Planning for Dynamic Changes

Climate Change – 2050 / High Scenario / Taunton Basin



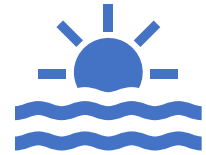
15.2-33.5 additional days over
90 Degrees F



2.56" additional annual
precipitation (spring and
winter)



2 additional days of extreme
weather per year



1.25 additional consecutive
dry days (summer/fall)

**DRAFT Build-out
(Supply)**

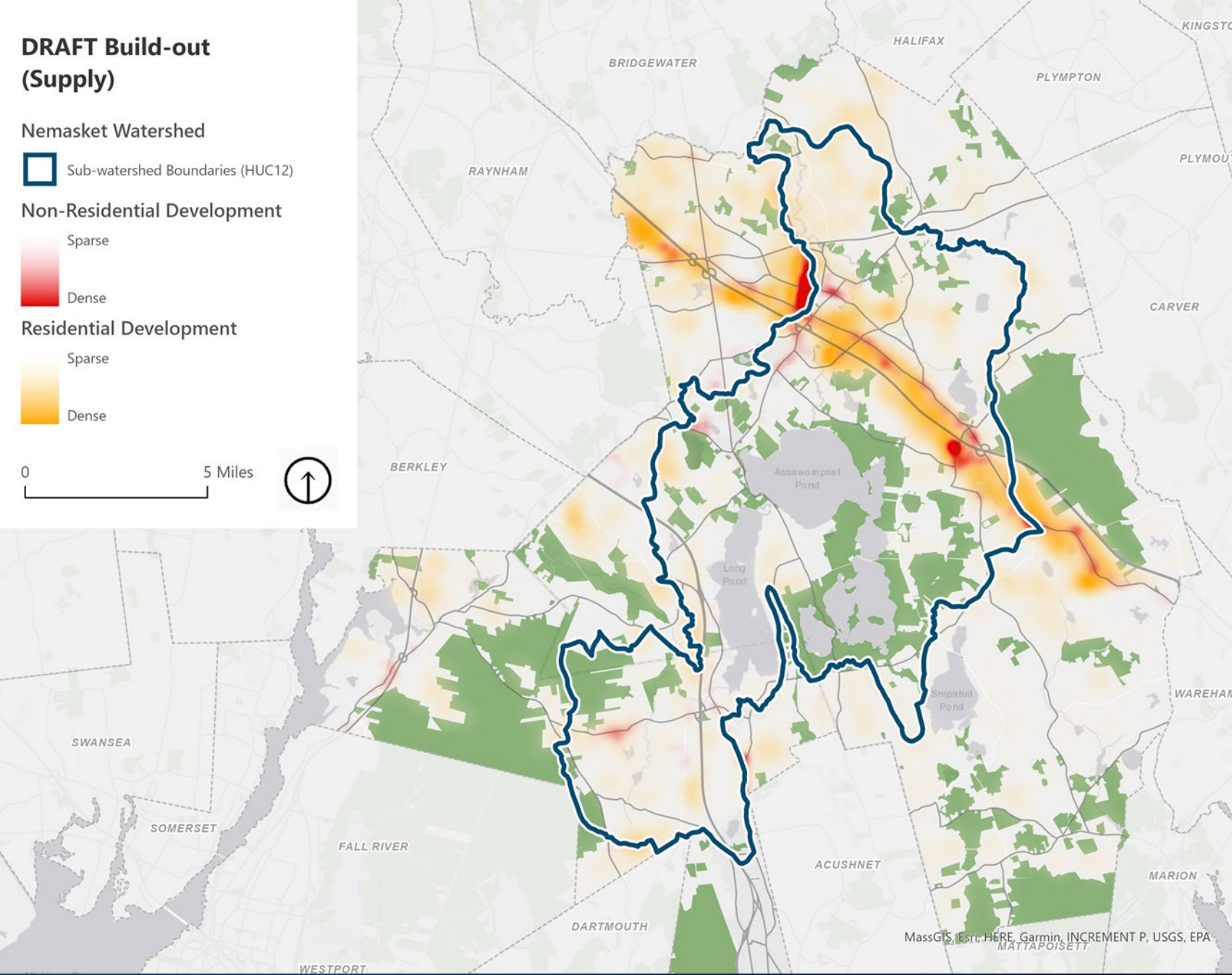
Nemasket Watershed

Sub-watershed Boundaries (HUC12)

Non-Residential Development



Residential Development



Planning for Dynamic Changes

**Future Possible
Development Build Out
Scenarios**

Vision for the Watershed: Management Goal

Overall, in 2050, the APC and Nemasket River are healthy, sustaining life and natural communities, including our own through clean, safe, and reliable water supply. The inhabitants of the watersheds have greater protections from climate hazards, and have developed an environmental ethic based upon choice, not chance, that drives sound local and regional decision-making.

Water Quality in the APC & Nemasket

What are the issues?

What impacts have already been observed?

How is climate change likely to impact the issues?

What are the associated co-benefits of taking action?

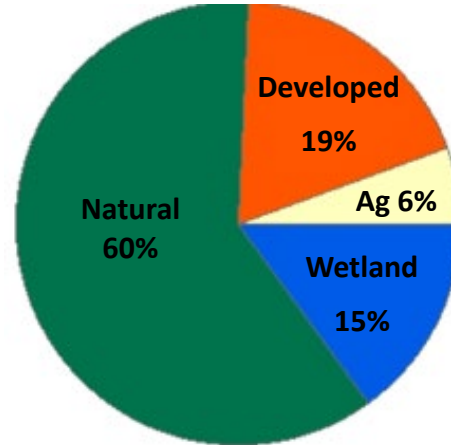
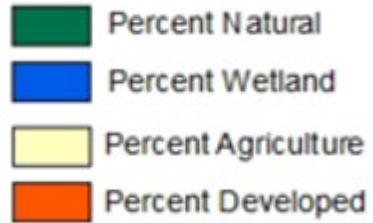
What are potential management actions and regulatory mechanisms to address the issues?

Water Quality – Overview of the Issue

Although largely in natural cover, the APC-Nemasket watershed has several characteristics that make it prone to water quality issues. Many of these are tied to land use and a combination of development and septic systems, stormwater, agriculture, and water withdrawals.

Water Quality Driven By Land use

Nemasket Subbasin



Upper Nemasket River (AP to WWTP):

- Area within 5km radius of Nemasket = 32% Developed
- Area within 100m Stream Buffer = ~15% Developed

DEP Source Water Assessment & Protection (SWAP) Report (2002) -
New Bedford & Taunton Water Supplies '**High Susceptibility Ranking**' due to potential pollution sources:

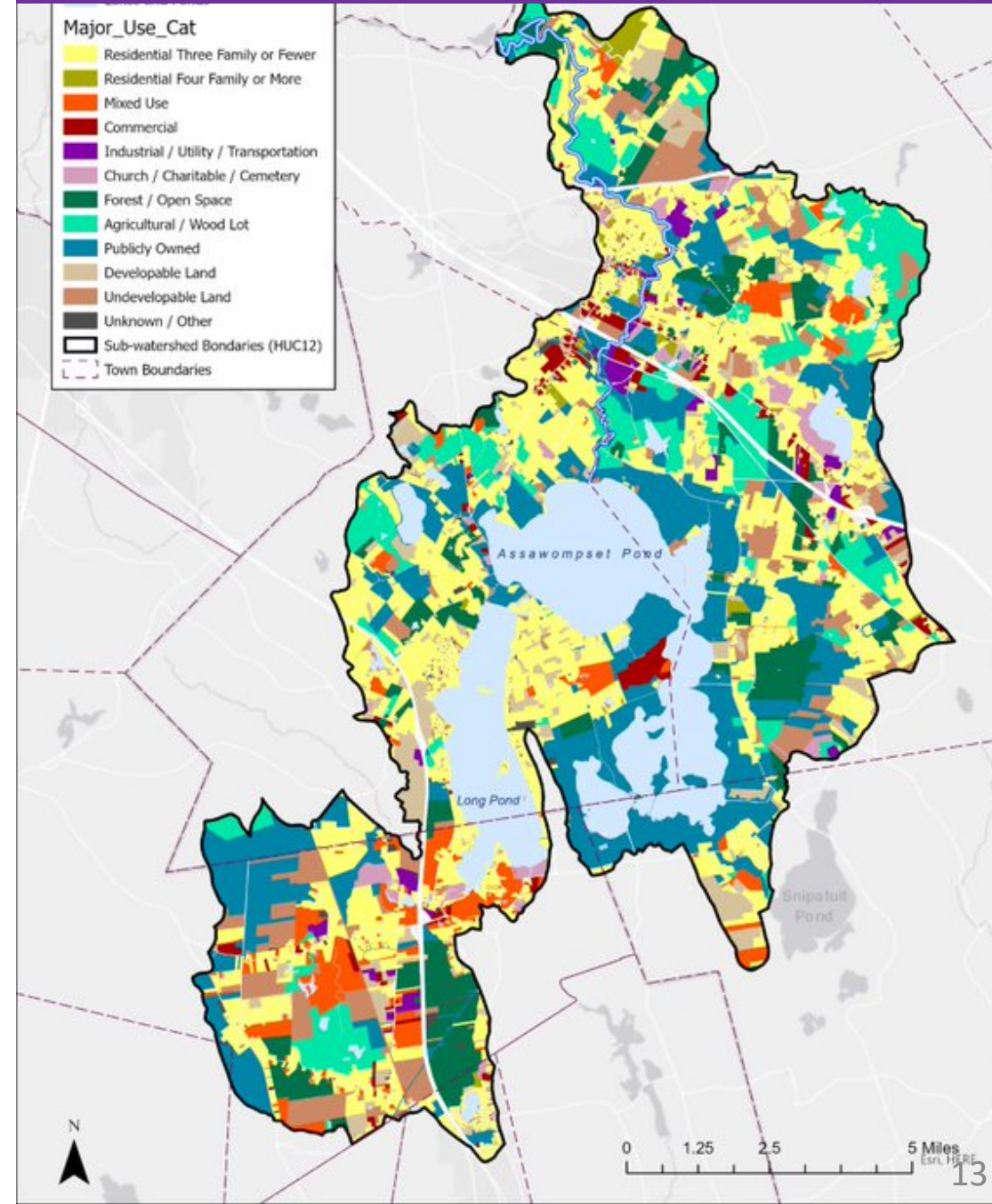
Septic Systems/Cesspools

Cranberry Bogs/Small Horse Farms

Residential Land Use

Local Roads/Highways

APC-Nemasket Land Use



Water Quality – Uses & Impairments

Poor Water Quality Can Pose Health Risks to People/Ecosystems

- **Water Quality Measurements:** dissolved oxygen, bacteria, pH, turbidity, temperature, nutrients, acidity, metals, other contaminants, etc...
- **Water Quality Assessed:** relative to the water's purpose...

Clean Water Act - state monitors water quality for support of *Designated Uses*:

- Fish, other Aquatic Life & Wildlife
- Fish Consumption
- Public Water Supply
- Shellfish Harvesting
- Primary/Secondary Contact Recreation
- Aesthetics

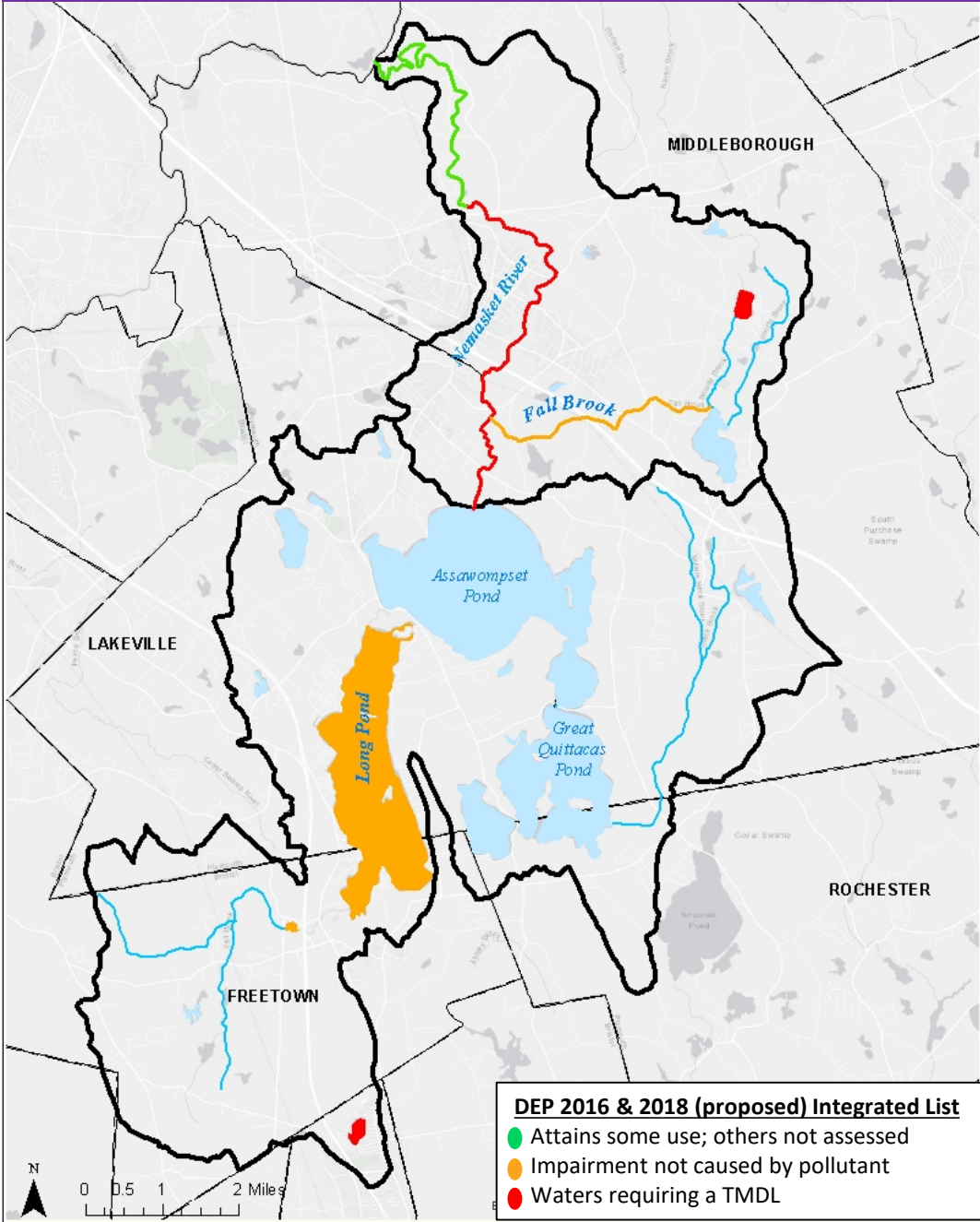
APC-Nemasket – DEP Impaired Waters:

Long Pond	Aquatic Life Use not supported*	Impairment: Non-Native Aquatic Plants (fanwort, milfoil)
Nemasket River (AP to WWTP)	Aquatic Life Use not supported; TMDL required	Impairment: Chronic Aquatic Toxicity, DO, Temp (2018); Alert: benthic macroinvert sample naid worm
Nemasket River (WWTP to Taunton)	Aquatic Life Use fully supporting (fish comm, excellent WWTP effluent)	Alert: Asian Clam present
Fall Brook	Aquatic Life Use not supported*	Impairment: Fish Passage Barrier (2018, 2 dams)

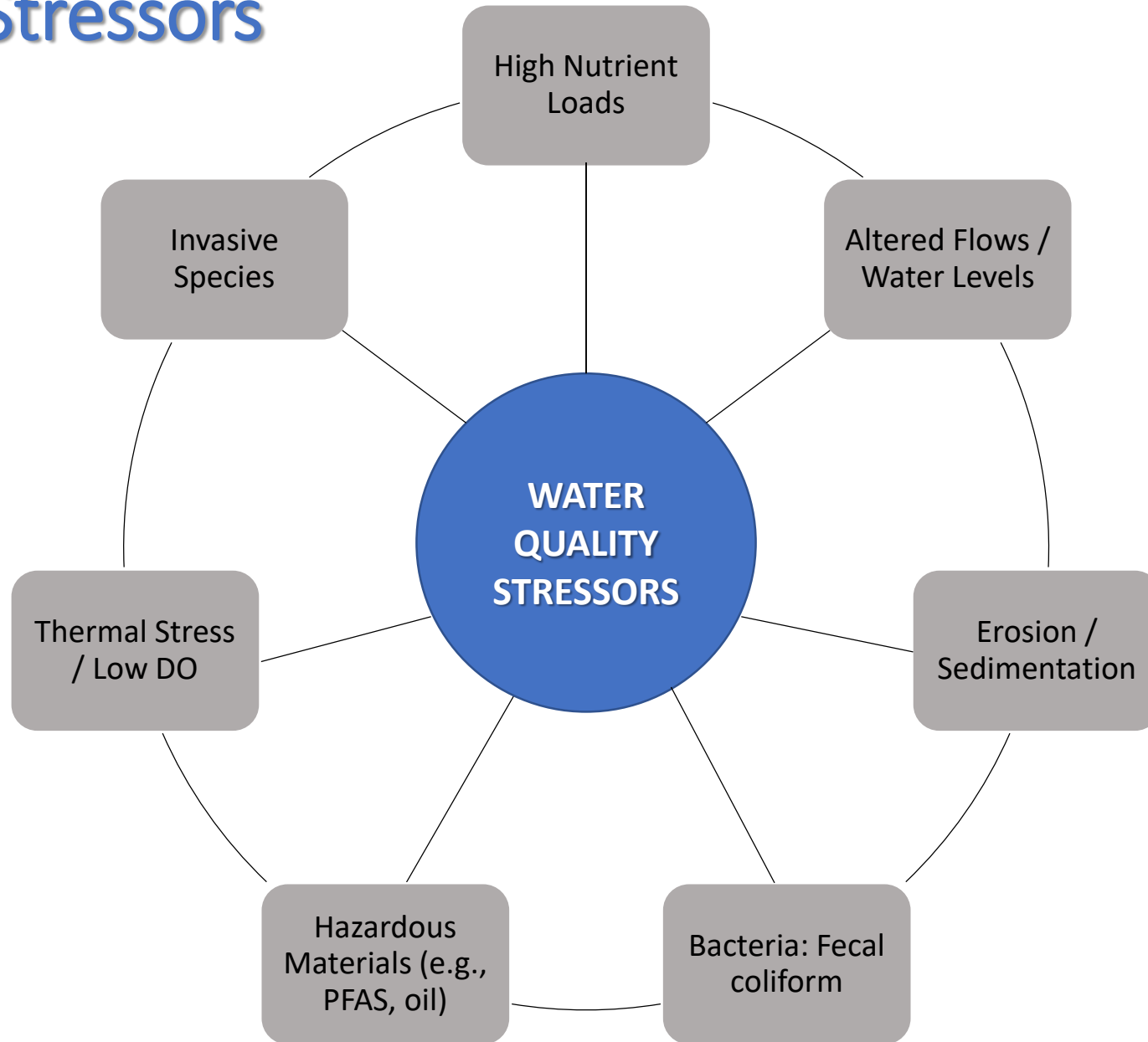
* TMDL not required (non pollutant)

Assawompset, Great/Little Quitticas, Pocksha Ponds not assessed

APC-Nemasket – DEP Impaired Waters



Water Quality – Major Stressors



Stressor: High Nutrient Loads

APC-Nemasket drain to Taunton R Estuary/Mt Hope Bay - where high algae/low DO due to **high nitrogen loads**

- Due to wastewater improvements (new WWTP), **20% nonpoint source nitrogen reduction needed** from ocean & *watershed* to reach allowable estuary loads
- **Phosphorus**: lack of P in environment, so human sources – fertilizer, sewage, sediment – can overload water sources

Sources :

Failing Septic Systems/Cesspools

Stormwater/Impervious Surfaces

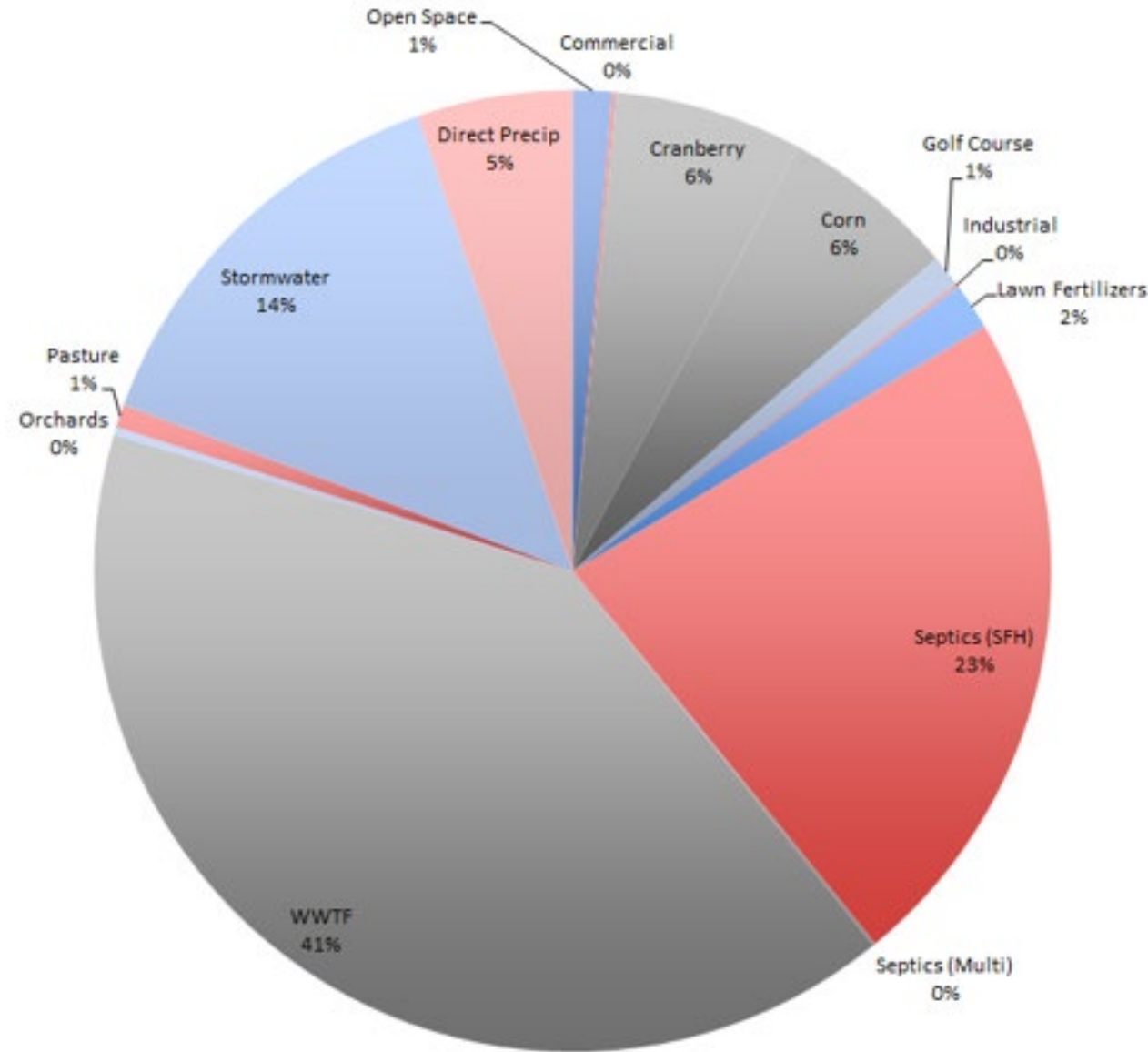
Residential/Commercial Fertilizer Use

Cranberry Bogs

Agriculture

Improperly Sited Development

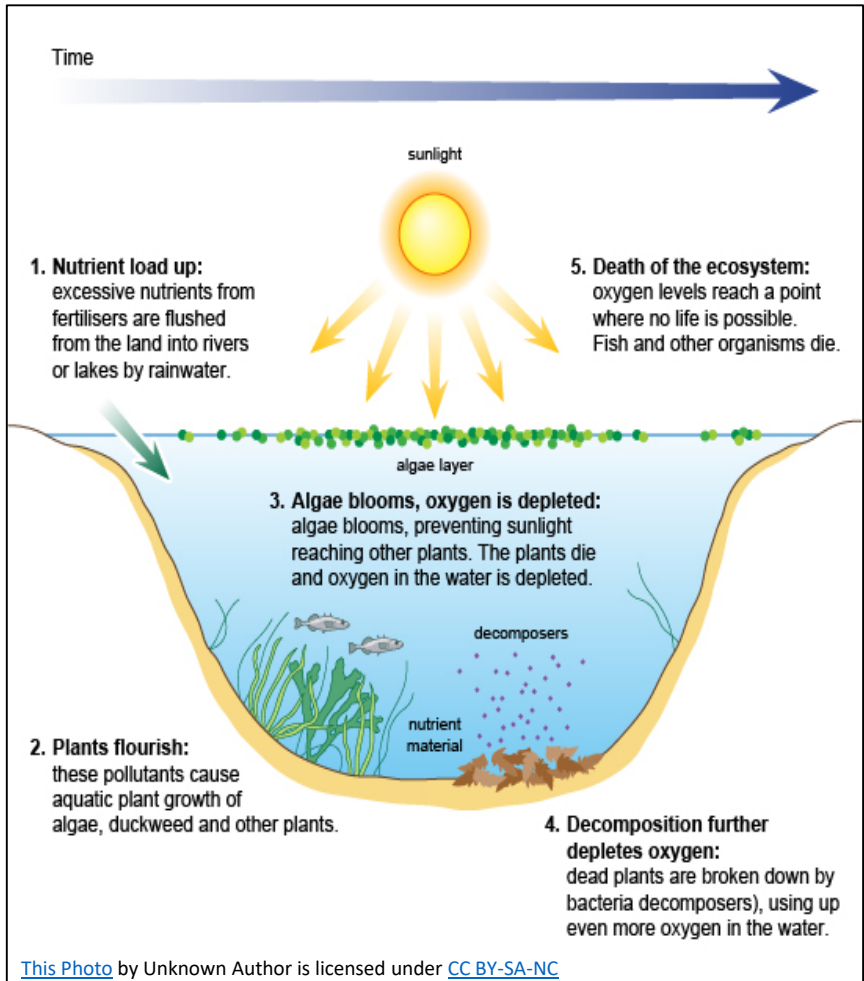
APC-Nemasket: Sources of Nitrogen Loads



Stressor: Low DO, Excessive Plant Growth

Sources:

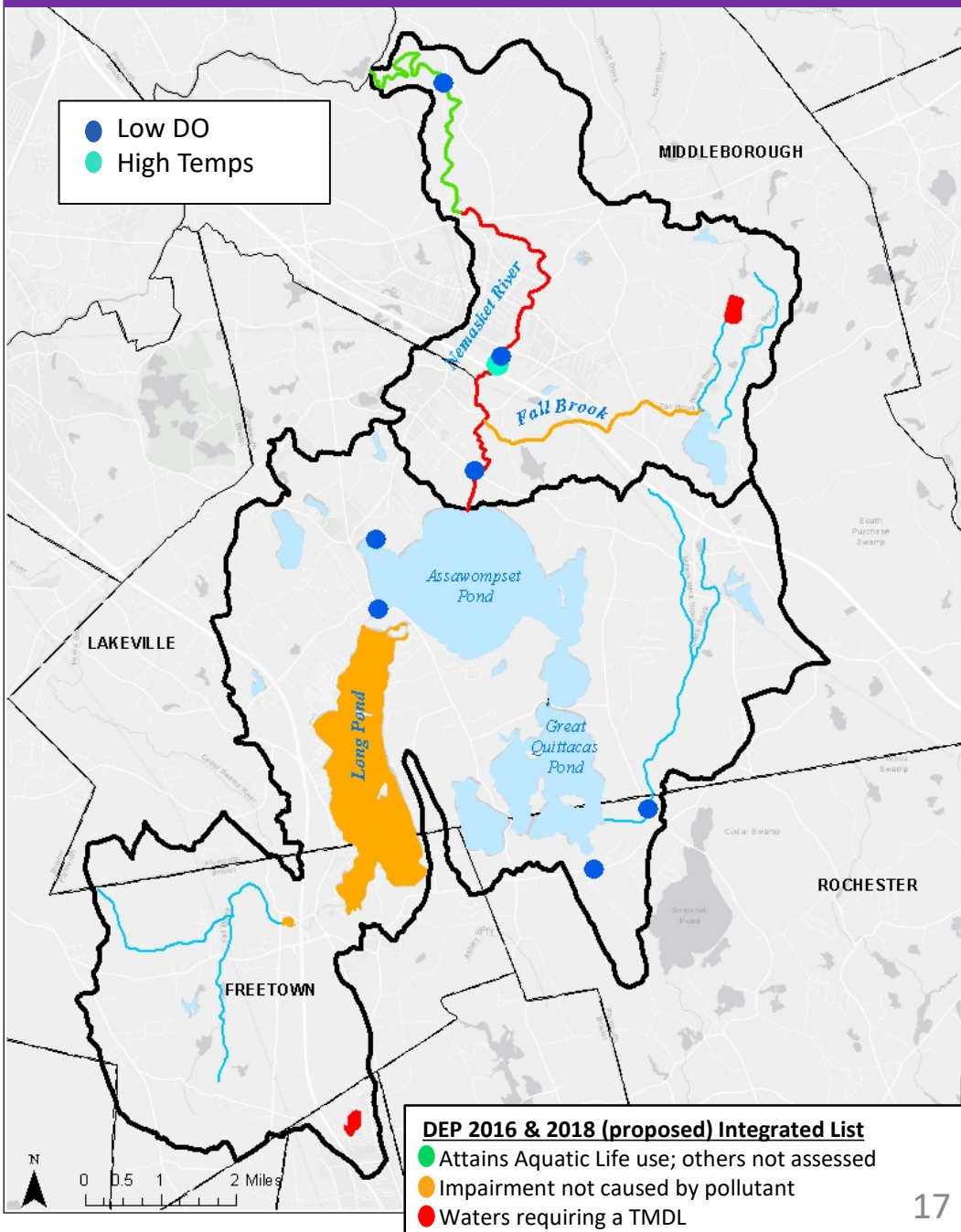
Eutrophication Process



- Presence of Milfoil in Long Pond & Nemasket River indicative of excessive P
- Harmful Algal Blooms can release toxins dangerous to people and animals



APC-Nemasket – Low DO



Stressor: Altered Water Levels, Sedimentation, & Temperature

Sources:

Water Withdrawals – for drinking water, cranberry bog operations, golf course irrigation

Stormwater/Impervious Surfaces – increase volume of runoff carrying sediments / pollution, e.g., Ocean Spray & South Coast Rail parking lots, Rt 44/495 sediment to Nemasket...

Bridges/Culverts – incorrect sizing/placement leads to erosion/scouring & increased flooding with contaminant loads - Bridge, Vaughn, Wareham Streets

Improperly Functioning Dams – difficult to manage adequate flow & sediment transport - APC, Wareham St.

Increased Water Temperatures – consecutive hotter days, drought, stagnant flow, dam impoundments, & impervious surfaces increase water temps - **warmer water holds less DO**

Loss of Wooded Buffers – shoreline/bank erosion, decreased shade/water cooling, loss of pollution/sediment filtering capacity...

Degraded Wetlands – loss of water/runoff/flood storage & sediment/nutrient retention



Stressor: Bacteria (fecal coliform)

Impacts drinking water and meeting assessed recreation/contact uses

Sources:

Failing Septic Systems/Cesspools – improperly sited, designed, maintained/pumped

Stormwater/Impervious Surfaces – leaking sewer pipes (MS4 improving)

Farms/Livestock – manure management

Waterfowl – large concentrations of gulls & Geese on AP can degrade WQ

Tributary Inputs – older data indicates higher levels at Fall & Bates Brook

WWTP – WQ sampling shows improvement with recent upgrade



Stressor: Hazardous Materials

Sources:

Fuels/Other Hazardous Materials – auto leakage/accidents, spills

PFAS – manufacturing sites, dump sites/landfills, biosolids, leaching to groundwater

Contaminated Sites – flooding migrates contaminants - former DPW, Rockland Industries



Climate Change Impacts on Water Quality

Projected climate change impacts in southeastern Massachusetts:

- **Warming Temperatures:** warmer waters hold less dissolved oxygen and can lead to eutrophication and excess algal growth, which will reduce drinking water quality and degrade habitat for fish and other aquatic species, altering food webs.
- **Extreme Storm Events:** the increased frequency of storms will lead to more water entering the APC-Nemasket - bringing increased sediment, nutrients, disease pathogens, and invasive species - degrading water quality and aquatic habitats. As this pollutant load travels downstream, to estuaries and the ocean, it can lead to blooms of harmful algae and bacteria.
- **Higher Surface Temperatures:** may contribute to making water quality standards or temperature criteria more difficult to attain, as well as lead to greater outbreaks of harmful algal blooms. Thus, efforts to reduce the temperature of treated wastewater discharges may be needed to help maintain water quality.
- **Increasing Total Annual Precipitation:** will change the water budget in the watershed resulting in the need to revisit assumptions about water nutrient loading.

In combination, these and other factors will likely exacerbate environmental and community impacts associated with both wet and dry periods across seasons. Planning both for more impactful drought periods and increased water volume during wet periods will be required to protect water quality.

Co-Benefits of Water Quality Protection

- **Ecology, Unique Habitats and Natural Resources:** Strategic land conservation and wetland restoration efforts have the potential to both filter/reduce pollutants and enhance water quality; riparian restoration has been shown to be most cost-effective phosphorus control (WMOST). Conversely, development of priority green infrastructure could worsen water quality in the watershed.
- **Floodwater Management:** Flooding over built areas has the potential to move and migrate pollutants and debris into the water system; reducing these floodwater extents will minimize this effect.
- **Stormwater Management:** Increased stormwater infiltration decreases runoff that carries pollutant loads into the water system, improving water quality.
- **Inter-Agency Cooperation:** Improved coordination between local and state operators on roadway drainage systems could reduce runoff and help improve water quality.
- **Land Development:** Placing new development outside of riparian areas and adjacent uplands, as well as using LID, will also enhance green infrastructure and improve water quality.
- **Recreational Access:** Increased recreation can encourage users to become stewards of the areas they frequent, potentially building support for water quality improvement measures; watercrafts that move between watersheds could transport invasives that can harm water quality.

Potential Water Quality Management Actions

Physical projects

- Reduce nitrogen & phosphorus
- Manage stormwater runoff and sedimentation
- Identify & mitigate potential hazard contamination
- Manage nuisance vegetation
- Enhance water quality & flow

Regulatory mechanisms

- **Wetland buffer protections**
- Boat washing stations and enforcement
- **Septic system design & maintenance standards**
- **Fertilizer use and agricultural best practices**
- Stormwater regulations favor on-site treatment and infiltration
- Stormwater management/maintenance MOUs
- Coordinate with land owners on water quality protection
- Water quality monitoring programs
- Invasive plant management programs and coordination

Discussion: Management Actions & Regulatory Approaches

- Do you agree with the issues identified? Have we missed any?
- Do you agree with the potential management strategies identified?
- Which do you think will or won't work?
- Which actions should be prioritized?
- Have any of these strategies been tried before?
- What are potential trade-offs and co-benefits for each strategy?
- Any additional ideas or recommendations?

Possible Management Actions:

Reduce Nitrogen and Phosphorus

Utilize existing infrastructure	Upgrade Septic Systems around APC and Long Pond, as appropriate
Install new infrastructure	Install permeable reactive barriers to filter nutrients from groundwater, as appropriate
Update management plans	Implement Integrated Pest Management around the APC to limit pesticide/herbicide treatments
Use appropriate materials	Implement best management practices for de-icing to avoid excessive salting
Collaborate across sectors	Work with golf course, cranberry bog & farm owners to implement water quality protection measures
Enhance local capacity	Identify candidate riparian restoration sites for phosphorus control

Possible Management
Actions:

Manage Stormwater Run-Off / Sedimentation

Protect roadways from flooding	Install green infrastructure to mitigate flooding on roadways Work with MassDOT to explore new road surface quality and road bed design and maintenance standards
Control river-adjacent floodwaters	Install green infrastructure to reduce runoff from properties abutting the river Restore/enhance wetland and riparian areas which store, purify, and infiltrate water
Protect river flow	Restore Nemasket River channel to improve flow and prevent buildup of floodwater (e.g. remove sand bars)
Improve governance	Review MOUs, OOCs and maintenance procedures with oversight entities on draining, sedimentation, and flow
Adopt Bylaw reforms	Adopt bylaws on stormwater control and wetlands protection that account for larger intensity storms
Promote low impact development	Identify and codify low impact development approaches (impervious cover limits, cluster development) into zoning and subdivision/site plan bylaws

Possible Management
Actions:

Identify & Mitigate Potential Hazardous Material Contamination

Expand Monitoring	Increase number of water sampling sites to expand water quality monitoring
Enhance Data	Increase drinking water sampling protocols to better detect regulated and emerging contaminants (e.g. PFAS)
Stop Contaminant Migration	Conduct a vulnerability assessment of harmful pollutants potentially migrating from contaminated sites (especially during flood events) Ensure proper biosolid disposal

Possible Management
Actions:

Manage Invasive Plants / Algae Blooms

Promote good water hygiene	Install Long Pond boat washing station and expand public education regarding invasive species spread
Control Invasives	<p>Increase coordination between town/DPH and local groups to manage invasive aquatic plants (e.g., non-herbicide treatment, mechanical harvesting, etc.)</p> <p>Remove invasive vegetation masses (e.g. first 500ft of Nemasket River, Long Pond)</p>
Leverage Community Engagement	Implement volunteer invasive plant detection, monitoring, and removal protocols

Possible Management Actions:

Enhance Water Quality and Flow

Evaluate and Monitor	Continue to monitor compliance with WMA registration / permit water withdrawal limits and other special conditions (water suppliers, cranberry bogs, golf courses)
Focus on the Nemasket River	Restore the Nemasket River Channel, which would include limited and targeted dredging/vegetation removal (esp. in the first 500 ft), and addressing river crossings impeding flow (e.g. Plymouth St bridge, railroad bridge, Murdock St Bridge, etc.)
Promote Wetlands Continuity	Reconnect Assawompset Pond to dam-adjacent wetlands beyond berm by allowing greater overflow during peak rain events Restore natural wetland habitat and function, including on retiring cranberry bogs
Culvert Replacement	Replace culverts at Snake River/Rte 105 and Squam Brook

Possible Management
Actions:

Address Water Quality through Key Regulations

Wetland Buffer Protection	Adopt local wetland bylaws that protect vegetated buffers that catch & remove pollutants from runoff Establish no-mow buffers on municipal lands
Fertilizer Use	Homeowner education on MDAR fertilizer regulations Reduce / eliminate use on municipal lands & codify best practices
Agricultural Best Practices	Coordinate with landowners on implementing best practices & adopting Conservation Plans Conservation Commission enforcement of wetland protections on farmland
Septic System Design & Maintenance	Encourage the use of nitrogen reducing septic systems.

Wetland Buffer Protection

Vegetated buffers purify runoff & protect water quality

What can towns do?

- Local wetland bylaws can restrict activities in buffer zone
 - Ex: Rochester's bylaw prohibits any activity in the 25ft "no disturb zone"
- Restore altered wetland and riparian buffers
 - Ex. Riverside Park buffer restoration in New Bedford (pictured right)
- Clearly mark no-mow zones (as pictured right)
- SNEP Network Buffer Restoration Toolkit: snepnetwork.org/buffer



Fertilizer Use Regulation

State law	<p>MGL Ch. 262: <i>An Act Relative to the Regulation of Plant Nutrients</i></p> <p>MDAR (MA Dept of Agricultural Resources) regulates fertilizer use</p> <p>Applies to agriculture, lawns & turf</p> <p>Towns unable to further regulate local fertilizer use</p>
Regulations	<p>Homeowners and professionals required to follow UMass Amherst guidelines for nutrient management</p> <p>Phosphorus-containing fertilizers can't be used without a soil test indicating the need (except new lawns)</p> <p>Fertilizer application not allowed within 20 / 10 ft of waterways (depending on application method) or within 100 ft of waters used for drinking water supply</p>
Retailer Requirements	<p>Phosphorus-containing fertilizers must be displayed separately</p> <p>Signs must be posted informing customers about restrictions</p>

What can towns do?

- Coordinate with large landowners on management practices
- Coordinate with retailers on consumer information
- Adopt best practices that reduce or eliminate fertilizer use on municipal lands
- Educate landowners on best practices

Agricultural Best Practices: Farm Conservation Plans

Free Services	Consultation & planning assistance from NRCS Recommend management practices to protect natural resources Choose practices and plan implementation schedule
Unlock \$\$	Keep plan up-to-date and gain access to NRCS programs & grant opportunities
Benefits	Improve soils & crop productivity Reduce soil erosion Protect water quality & wildlife habitat Preserve your land value for future generations

What can towns do?

- Coordinate with large landowners on management practices
- Encourage adoption of Conservation Plans
- Coordinate with NRCS on local issues and best practice recommendations
- Enforce best practices and wetland protections (Conservation Commission)

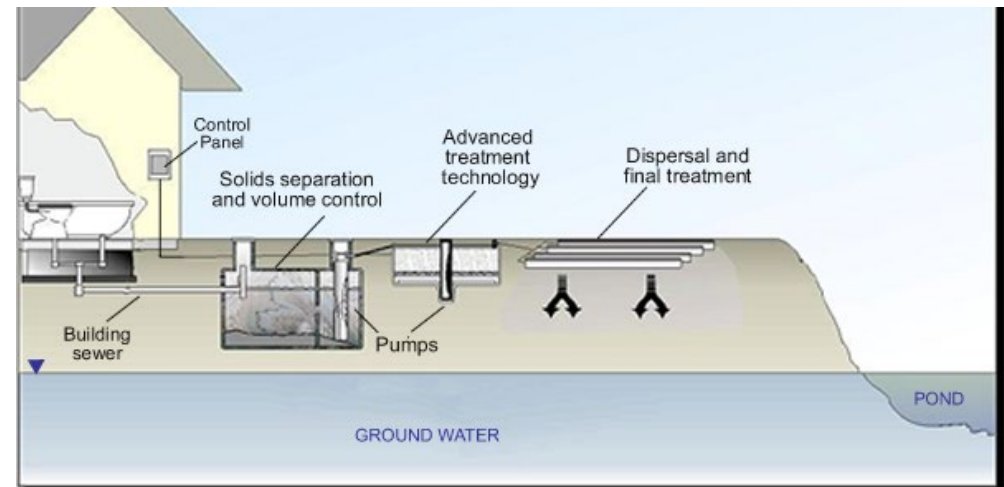


Enhanced Denitrification Septic Bylaws:

Define Applicable Areas	Marion = Townwide Wareham = within 500 ft of surface water (Water Quality Protection Zone) Tisbury = Lake Tashmoo and Lagoon Pond Watershed Nitrogen Management Districts
Define Triggering Events	New Construction Failed Systems Increase in design flow
New Tech	Enhanced Denitrification Technology = any tech approved by DEP for general, provisional, pilot program use for nitrogen reduction

What can towns do?

- Adopt a bylaw that goes above and beyond minimum Title V requirements to a Total Nitrogen effluent limit of 19 mg per liter or less
- Can be townwide or in a more defined area around the APC / Nemasket
- Some permit variances
- Some set sunset provisions



Thank you for
your time
and input
today!

What next?

Take the virtual watershed tour, access the meeting packet, and learn more about your plan at:

www.SRPEDD.org/apc-nemasket-plan

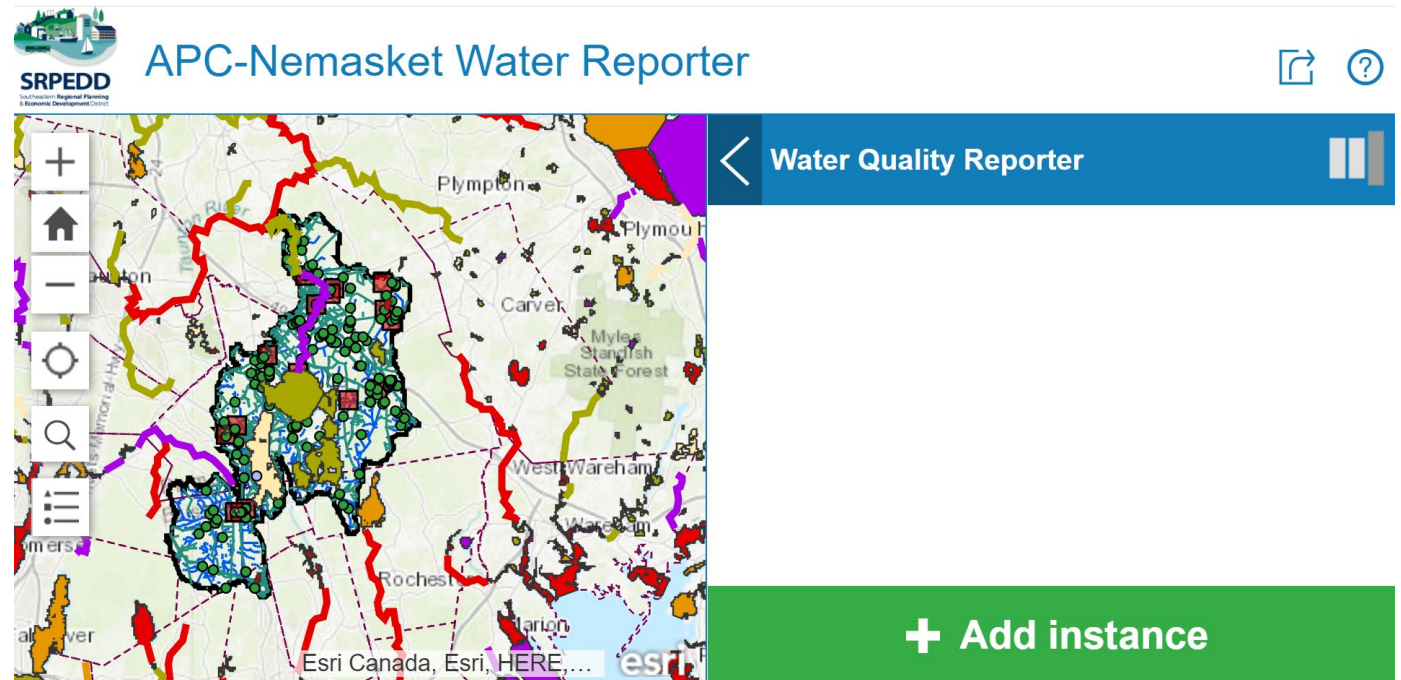
Share additional thoughts through June 2022:

Drop a Note: bit.ly/comment-apc-nemasket

Or... use the Water Reporter!

Extend your voice using the APC-Nemasket Water Reporter

Use the APC-Nemasket Water Reporter to share information on critical flooding and water quality concerns within your community. You can submit your own points or leave comments on previously submitted points to expand the conversation.



To use the reporter, visit:

bit.ly/apc-water-reporter

and follow the on-screen directions.

Public Meeting Schedule

Join us for in-person, outdoor public workshops! Come to all of them, or to as many meetings as topics interest you. NOTE that there is an online meeting option as well, at the same date and time via Zoom.

TOPIC	DATE	LOCATION
Flooding	9.29.21 5-7 PM	Lakeville
Water Quality	10.13.21 5-7 PM	Taunton
Water Supply	11.10.21 5-7 PM	Zoom Only
Unique Habitats	3.23.22 5-7 PM	Middleboro
Recreation	4.13.22 5-7 PM	Rochester
Land Development	4.27.22 5-7 PM	Freetown
Open House	6.1.22 6-8 PM	Lakeville

Update: In-person meeting now going to take place in New Bedford!

To receive updates on the project status, please make sure that you have completed the registration form!

Register for future in-person or virtual meetings:

bit.ly/register-apc

All virtual meetings will use the same Zoom meeting link:

<https://us02web.zoom.us/j/8150125172>

Public Meeting Notes 10/13/21 – Water Quality
IN PERSON SESSION

What can we do to help APC communities improve water quality?

1. Roadway/bridge drainage over and adjacent to our rivers and streams – nature based solutions.
2. Permeable paving in parking lots
3. Reduce impervious surfaces / increase vegetated infiltration areas
4. Grant support for innovative/cooperative APC projects
5. Title 5 property transfers should be monitored; bring back a form of the septic system 100 meters law / betterment program for the APC area
6. Make sure that developers are honoring their covenants; if not, can escrow funds be used for NBS solutions for stormwater?
7. Better engagement with soil coverage and look at what they/we can do to improve conditions,
8. Workshops within the APC for agriculture, golf courses, etc.
9. Work with the USDSA to help develop conservation plans where needed, and revisit existing plans in the face of climate change.
10. Cooperative interdiction of Agriculture Commissions to help address agricultural challenges in the ACP (Taunton, Lakeville, Middleboro, etc.)
11. Follow and extend 'sunset provisions' as needed and appropriate
12. Boat washing station for long pond
13. Retain buffers and change mowing practices
14. Require buffers on APR farms.

APC-Nemasket Watershed Water Quality Meeting – 10 – 13 – 21

ONLINE SESSION

Intro for the APC Management plan and what we can do to show water quality in the APC and Nemasket River including Long Pond

Introductions

- Jack Healey: Emeritus Town Manager of Middleborough, ZBA, Conservation Board,
- Bren Ladino: Office of Long Pond Association – process of becoming a non profit
- Martha: Martha: Officer of Long Pond Association, has waterfront property on long pond
- Pete DeFusco: Sr. Environmental Specialist at Eversource, Volunteer, grew up in free town & big connection to Little Quittacas.
- Merilee Kelly: Conservation Agent at Rochester
- Josh Newhall: Representative Orrall's Office -> Berkley, Taunton, Lakeville and Middleborough
- Skylar Cowley → State Rep. Paul Schmid's office, community affairs and constituent affairs for Long pond → East Freetown. Wanted to say hello.
- Michael Rodrgiues: he is the senator for the region

Once a month we're having a topical meeting reflecting content from the management plan.

Looking at a health ecology approach → looking for resilience to climate

Most assessments are done based on different possible uses of the receiving water → swimming or physical contact or drinking water supply all count for possible uses.

Not sure what's causing the toxicity issue within the river. Need to make a strategy for dealing with this.

Long pond has an impairment due to non-native aquatic plants. Have an interplay between a number of factors incl.

Water quality stressors → different strategies

- High nutrient loads
- Altered flows/water levels
- Erosion / Sedimentation
- Bacteria: Fecal coliform
- Hazardous materials (pfas, oil)
- Thermal stress / low DO
- Invasive species

Wastewater treatment facilities account for 40% of nutrient loading. Stormwater runoff from septic systems at 25% accounts for the other portion of that.

Repetitive problem is low dissolved oxygen

Presence of Milfoil in Long Pond and Nemasket River indicative of excessive P

Harmful algal blooms can release toxins dangerous to people and plants

Sources of altered water levels, sedimentation, and temps

- Water withdrawal
- Stormwater/impervious surfaces
- Bridges/Culverts

Bacteria:

- Failing septic systems/cesspools
- Stormwater/Impervious surfaces
- Farms/Livestock
- Waterfowl
- Tributary Inputs
- WWTP

Hazardous Materials

- PFAS

Climate change impacts:

- Warming temps
- Extreme storm events
- Higher surface temps
- Increasing total annual precipitation: varies regionally, but in the northeast US, the annual increment of precipitation is going up.

Co-benefits of water quality protection

- Ecology, unique habitats: land conservation and wetland restoration efforts have the potential to both filter / reduce pollutants and enhance water quality
- Floodwater manage: flooding in these areas can move pollutions → reduce floodwater to reduce pollution migration.
- Inter-agency cooperation: improved coordination between local and state operators on roadway drainage could be better.

Management Actions

- Physical Projects
- Regulatory mechanism.

Presentation on management actions

- Upgrading septic systems usually puts the cost on private land owners, which is difficult from a private owners' perspective. Some towns offer a 0% loan to assist with
- Skylar Cowley: Rep. Schmid has a bill in legislature that will make it more economically feasible for homeowners to replace their septic systems. The bill works where if someone has a failed septic system, they can go to the Board of Health which will work to connect the board of health and the town to replace the systems. → HB 1009
 - o Westport has a significant issue with soil erosion and degradation of rivers and oceans.
- Jack Healey: the Nemasket River channel has long been backed up, and was only recently had weeds removed from the river. But both the buildup of sand bars and weed growth are a serious detriment to the river, and to the traveling of the fish up the river.

- Jack: This needs to be addressed financially b/c the local community has attempted to raise funds locally and get it done, but we need a constant source of funds for removing weeds and getting sandbars out all up and down the river. This needs to be a regional effort and not just a local effort. We don't have enough financial resources otherwise to get this done. Has to be top of the list. The development committee from the 1990's wasn't successful, we need both equipment and money. This is necessary b/c the fish need to get to the river. – We need to buy the equipment and buy the help to use this to maintain

Roger: if we don't get an annual plan it's all for naught, we need a real source of long-term annual funding.

Martha: I think it's a timely suggestion that we buy equipment like the ecoharvester. It was costly for a small part of what they did → there's a big problem on long pond that would only spread. If we want a rapid response management program, having our own harvester would be a cost effective way to approach it.

- Josh: the third point on governance and MOUs, it sounds like to get a funding mechanism authorized you need cooperation between the towns. At the state level, we need this report to make any action. We've identified the governance issue is not having cooperation between all partners. We need to address that we can't make action on the weeds in the river w/o everyone cooperating

Skylar Cowley: we're trying to push for ARPA funding from federal gov't to get funding for long pond to study invasives.

Martha: As far as the weeds go, the studies that have been completed can be used.

Identify and mitigate potential hazardous material contamination, including water quality monitoring

Remove invasive vegetation:

- Jack Healey: need to get back to the Taunton River, not just the first 500 feet of the Nemasket. You need more attention on that for financial management. That needs to be funded on an annual basis to make sure that the fish can get in and out, and that there is some control so that there isn't just invasives in terms of water quality.
- Helen: Removing the bascule dam is one thing we can do to really help this situation.

Helen: Is there a role for volunteers in this process?

- Bren Ladino: the long association used to have demonstrations on how to get rid of weeds by tearing up the roots. Long Pond could do that again on how to effectively remove weeds from their own property.
- Jack: need to own the equipment. We could have a regional effort to get money and then buy the equipment and have a regional group of volunteers who would be willing to lend their services to the group. Unless you provide the funds and have dedicated people who will do the work themselves it won't work.
- *Where do we dispose of the weeds?*
 - o Martha: there is a pot of money meant for long pond, but it does need to be a regional approach
 - o Caitlin: we had discussed earmarks → its extensive and takes a long time.
- Pete: for liability reasons, make sure that you talk with DEP before starting volunteer weed removal program to make sure it does not need an NOI as per the Wetlands Protection Act
- Josh: there needed to be approval from the federal level that there is a monitor for certain things. There needed to be qualifications
 - o Might be a qualification that is required for the monitor
 - Jack: you should look at not just having the experts there, but also a volunteer

Bren Ladino: could we see a copy of the permitting process to learn what the demands were.

- Martha: Make a list of the different permits required for the different waterbodies.

Helen: we want the management plan to coordinate across these things

Do you have a priority on wetlands buffer?

- Bren Ladino: we should do like what other towns do which is look at restrictions on what fertilizers are allowed to be used on particular properties.
- Bren Ladino: this is something to look at in Lakeville

Towns have to be careful on what they regulate.

- Bren Ladino: need to look at if the 100 ft ban on fertilizers is actually being enforced.
- Martha: if you're on the waterfront, regardless of how you landscape, when there's a hard rain that'll leach directly into the pond. You need to come up with a list of vegetation which people can plant to stop erosion and the migration of what people are planting on their lawns.

Martha: You need to consider geese because once they get onto your properties they defecate and their droppings get washed into the pond.

- Jack, Bren, Martha: they are a major issue.

Enhanced denitrification septic bylaws:

- Go above the Title 5 minimum for Wareham, etc. and they set a septic system limit for these systems at 19 mg / liter or less. Can be a townwide regulation or in a more defined area.
 - o Ex: Wareham has a water quality protection zone that is 500 feet out from a water body.
 - Tisbury has 2 water quality protection areas

Josh Newhall: focusing just on new septic systems is going to miss old septic systems, which is an important and big part of this.

- Martha: having financing available, or 0% financing is necessary. If septic systems aren't up to code year round then they shouldn't be used.
 - o Josh: making a bylaw for new septic systems sounds wise to me.

Need to look at specifics of enforcement.

Other water quality actions that you would want to pursue?

- Josh: we need to consider how bylaws or personal yard care gets enforced. We need enforcement.

Questions

Josh: you mentioned that the DPW didn't find PFAS, but Mass DEP recently found some PFAS in 20.8 PPT instead of 20 PPT in the east Nemasquett (?) → this came last week, and was only a few private wells.

PUBLIC WORKSHOP REPORT APC-NEMASKET MANAGEMENT & CLIMATE ACTION PLAN WATER QUALITY THEME

MEETING BASIS AND GOALS: The Assawompset Ponds Complex and Nemasket River Watershed Management and Climate Action Plan Project Team hosted a public engagement session on **10/13/21** designed to inform residents about the project's work to date, educate them about the role of climate change in predicting future precipitation and temperature impacts within the watershed, educate them about various risks to water quality in the Assawompset Ponds, Nemasket River, and watershed's smaller waterbodies, and - most importantly - to solicit residents' feedback regarding what they see as the most important water quality-related areas of concern and management actions within the watershed in order to include these insights into the final Plan document.

LOGISTICS: The Project Team hosted concurrent in-person and online events in order to encourage as many participants to attend as possible from throughout the plan region and given personal COVID-19 protocol comfort levels. Both events were hosted in the same timeslot, from 5:00 – 7:00 PM.)

The in-person event was hosted in Taunton, MA at the Hopewell Pavilion in Hopewell Park. Project Team staff were present from SRPEDD, The Nature Conservancy, and the APC Management Team. The online event was hosted by SRPEDD Staff members, and Eric Walberg Consulting. Both meetings featured a presentation on the background material that the project has covered so far, as well as a summary of potential project recommendations that the team has identified. The in-person meeting included a printed-out copy of the slide deck and recommendation summary which visitors could take home with them. As comments were provided by the public, their insights and ideas were recorded in meeting notes to be incorporated in the final project. Finally, both events ended by giving participants additional information about all Management Plan themes beyond water quality, via pdfs shown in person and provided electronically for the online meeting, and by announcing the next meeting dates and online portals that provide for additional ongoing engagement. The in-person event had approximately 12 attendees, and the online event, approximately 6.

CONTENT COVERED: This presentation introduced the Watershed Management and Climate Action Plan as a method of creating goals for the watershed system which would address 'dynamic forces shaping the future' such as development patterns and climate change. The Watershed Management and Climate Action Plan is centered on a vision for the watershed where:

“Overall, in 2050, the APC and Nemasket River are healthy, sustaining life and natural communities, including our own through clean, safe, and reliable water supply. The inhabitants of the watersheds have greater protections from climate hazards, and have developed an environmental ethic based upon choice, not chance, that drives sound local and regional decision-making. “

Since this was the second meeting in the series, several participants had participated in previous meetings and had some prior exposure to the introductory content of the project.

This meeting was focused on the water quality of both specific waterbodies within the watershed and a 'watershed-scale' approach to water quality issues. Water quality has been a long-standing issue within the Pond system, owing to the highly developed status of the lands surrounding Long Pond and elsewhere throughout the watershed (although a significant number of the lands directly surrounding Assawompset pond have been purchased and maintained as conservation lands). When evaluated using the Massachusetts Department of Environmental Protection's Water Quality Standards, two water bodies – Long Pond and Fall Brook - do not support natural aquatic life. The Nemasket river is only able to support aquatic life in its lower half; the upper half of the Nemasket (from Assawompset Pond to the Middleborough Waste Water Treatment Plant) is highly toxic and features low dissolved oxygen, extreme temperatures, and invasive macroorganisms. All of these indicators point to a water system that suffers impairments that can lead to a decline in ecosystem health, water flow (through the presence of invasives), and overall efficacy of the watershed in filtering and purifying water.

The project team identified the top 7 major stressors within the waters for summary in the presentation; high nutrient loads, altered flows/ water levels, erosion/sedimentation, bacteria (fecal coliform), hazardous materials (PFAS, etc.), thermal stress / low dissolved oxygen, and invasive species are all stressors on the water quality of the watershed. The watershed's high number of septic systems, residences (which often use fertilizer and other Nitrogen/Phosphorus producing lawn chemicals), paved surfaces and roadways, and cranberry bogs all contribute to high nutrient loads. Invasive species such as Milfoil contribute to eutrophication and low dissolved oxygen. Water withdrawals, impervious surfaces, bridges and culverts, improperly functioning dams, loss of woodland buffers, and degraded wetlands contribute to altered water levels, sedimentation, and temperature fluxes. Failing septic systems, stormwater from impervious surfaces, waterfowl (such as gulls and geese), all contribute to bacteria growth. And finally, fuels and other hazardous materials, manufacturing sites, biosolids, and former industrial sites contribute to hazardous material contamination in the region.

Climate change will further stress the watershed system through an increased number of heavy precipitation events (more one-off extreme events), higher surface water temperatures, increasing total annual precipitation. Planning for the watershed's climate resiliency means being prepared to address these phenomena.

When it comes to addressing these impacts and preparing for the future, the Project Team has identified five categories of possible actions:

1. Reduce Nitrogen and Phosphorous
2. Manage stormwater run-off / sedimentation
3. Identify & Mitigate Potential Hazardous Material Contamination
4. Manage Invasive Plants / Algae Blooms
5. Enhance Water Quality and Flow
6. Address Water Quality through Key Regulations

These actions combine physical interventions with regulatory mechanisms and culture shifts regarding land use, water use, and development patterns surrounding the ponds. The project team has identified multiple potential recommendations within these categories that the member communities could follow to foster their resilience and response to flooding.

THEMES IN PUBLIC COMMENT: When considered together, the public described similar experiences and concerns in both the in-person and online meetings.

- Sources of water contamination. In general, the online and in-person meeting groups agreed that **there is a greater need to reduce the contribution of toxic chemicals and nutrient-loading elements such as nitrogen and phosphorous**. Both groups asked if it would be possible to implement **nature based solutions to deal with stormwater runoff**. This included planting anti-erosion and pro-filtration natural vegetation along waterbody buffers, using permeable paving in parking lots, increasing vegetated infiltration areas. Group participants advocated for town-based solutions, but also the dissemination of information to residences and people living along waterbodies.
- Better septic system controls. There was an agreed need to upgrade septic systems that are likely leaking or causing nitrogen loading into the ponds. Most of these recommendations are centered around **new property developments and sales, including Title 5 Transfers and the mandate of nitrogen-reducing septic systems for new construction**. Some towns already have extensive denitrification requirements for new septic systems. Residents believe that enforcing some type of water quality protection zone that regulates leaching fields and septic systems is a necessary step. Both a 100 foot and 500 foot buffer from wetlands and waterbodies was suggested, as was a septic system limit for the percentage of toxic chemicals released.
- Invasives species control: Invasives species were mentioned extensively in the online discussion, particularly when it came to the possibility of purchasing and maintaining equipment to remove invasive species from Long Pond and the Nemasket river. Invasive species are a long-standing issue within the region as they reduce water quality, out-compete native plants and animals, and interfere with river flow and water levels. Because Assawompset Pond is the drinking water supply reservoir for the cities of Taunton and New Bedford, manual methods of invasives removal are generally preferred to chemical methods. Several members of the Steering Committee coordinated to have a trial removal of invasive plants done in the Nemasket River using a rented 'Eco-Harvester' which proved effective at removing weeds and increasing flow through the Nemasket river. However, residents expressed that any weed removal options would be ineffective without multi-year dedicated funding for the program. This funding would have to cover the cost of renting or purchasing the Ecoharvester. Residents proposed an organization of volunteers comprised from the member communities who would be tasked with running the Ecoharvester. Residents also expressed an interest in training and education programs that teach residents how to deal with invasive species, and pointed out some organizations (such as the Long Pond Association) which have run trainings on this topic in years past.
- Volunteer management. Volunteers appeared as a large force for change in the region, providing support for the weed pull initiatives, workshops for educating land owners about various topics, and general public education.
- Enhanced stormwater control. Enhanced stormwater control would address many of the water quality issues that arise from water running over impervious surfaces such as parking lots and roads. This includes the installation of nature-based solutions (some residents even proposed ensuring that developers are honoring their covenants, and if not, using the funds from Escrow accounts to fund these solutions), working with the USDA to help develop conservation plans where needed, workshops within the APC on proper agricultural uses (and field management for golf courses), restoring wetlands buffers, and better soil management to see what the towns can do to improve soil conditions and infiltration rates.

FEEDBACK RECEIVED FOR RECOMMENDED ACTIONS: In addition to general comments and questions, members of the public were invited to provide feedback on particular interventions.

The project team proposed several questions:

1. What are the issues?
2. What impacts have already been observed?
3. How is climate change likely to impact the issues?
4. What are the associated co-benefits of taking action?
5. What are potential management actions and regulatory mechanisms to address the issues?

Potential Management Action	Resident Feedback
Topic: Reduce Nitrogen and Phosphorus	
Upgrade Septic Systems around APC and Long Pond, as appropriate	Require all new construction to have nitrogen-reducing septic systems. Ensure that all Title 5 transfers are up to code and that they support the goals of septic system reductions.
Work with golf course, cranberry bog, & farm owners to implement water quality protection measures	Project team members should identify methods for workshops within the APC for these parties. The towns should work with the USDA to help develop conservation plans where needed, and revisit existing plans in the face of climate change. There should be greater cooperation between the town's Agricultural Commissions to help address agricultural challenges in the APC
Identify candidate riparian restoration sites for phosphorous control	Land owners should retain buffers and change mowing practices so that they are not impacting the riparian areas. Buffers should also be required on all farms within the region, particularly when they are in close proximity to a riparian area. Towns should adopt wetlands buffers restrictions that go above and beyond state guidelines, and should develop a 'riparian brochure' that describes a list of vegetation which land owners can install to halt erosion and promote riparian health
Topic: Manage Stormwater Run-Off/Sedimentation	
Install green infrastructure to mitigate flooding on roadways and reduce runoff from properties abutting the river.	The project team should investigate options for installing nature-based solutions adjacent to roadways and bridge drainage systems, increasing permeable pavement in parking lots, and reducing impervious surfaces / increasing vegetated infiltration areas. The towns should hold developers to their Covenants to ensure they do not contribute

	to polluted runoff. If they do, the towns should use monies held in escrow to fund NBS,
Review MOUs, OOCs and maintenance procedures with oversight entities on draining, sedimentation, and flow	The Project Team should express the importance of cooperation between the towns in the final report to encourage local actors to work together. The final report should reflect that there are already certain collaborative structures in place to ensure that any state or federal funding will be well used.
Topic: Identify and Mitigate Potentially Hazardous Material Contamination	
Topic: Manage Invasive Plants/Algae Blooms Avoid the Floodwater	
Remove invasive vegetation masses (eg the first 500 feet of the Nemasket River, Long Pond)	Project team members should make it their top priority to identify sources of multi-year, dedicated funding for the removal of invasives from the Nemasket River and Assawompset Ponds Complex. Particularly, any efforts should be focused on deploying manual weed removal technologies such as an Ecoharvester, or volunteer rake-based removal. The team should particularly, and especially, focus on the purchase – rather than rental – of such equipment and can create a volunteer-based network of residents with technical knowledge from around the APC region to help run the equipment. This would limit project costs and enable the people in the region to ensure the project's long-term viability. The Towns in the region should pursue the completion of a recent bathymetric study which can provide a comparison of the
Implement volunteer invasive plant detection, monitoring, and removal protocols	One local organization – the Long Pond Association – used to run trainings on how to effectively remove weeds. The Long Pond Association has indicated that they are willing to re-start these trainings for Long Pond residents. Prior to these trainings, a summary of the latest rules, regulations, and required permits must be created to inform residents about the work required to launch these processes.
Topic: Enhance Water Quality and Flow	
Reconnect Assawompset Pond to dam-adjacent wetlands beyond berm by allowing greater overflow during peak rain events	Project team members must consider options to improve flow between long pond and Assawompset pond in a fashion that recognizes and mitigates the potential for the spread of invasive species between the two ponds.

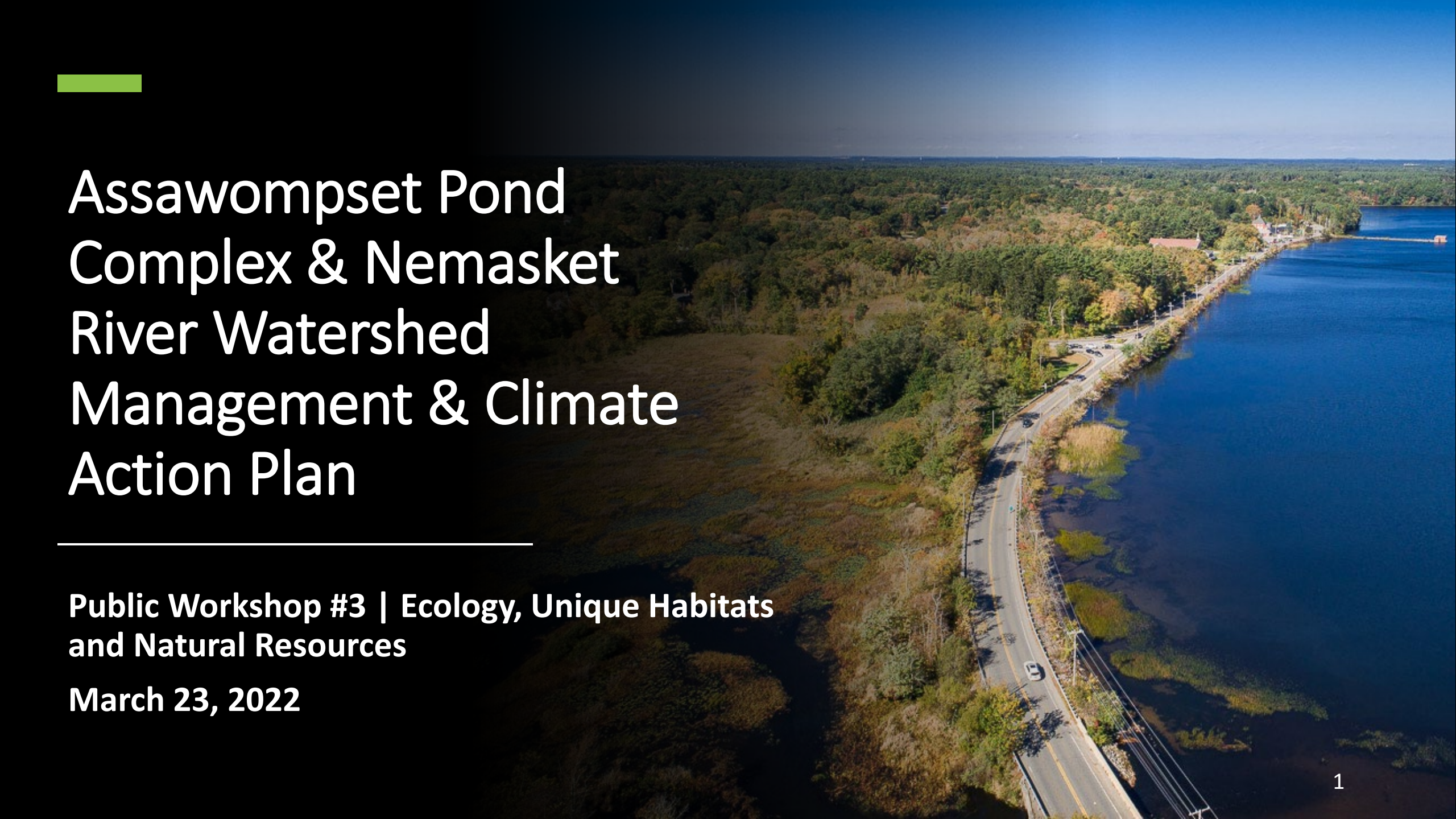
	The towns should engage with their wetlands and analyze soil coverage to see what they can do to improve water quality conditions.
Continue to monitor compliance with WMA registration / permit water withdrawal limits and other special conditions (water suppliers, cranberry bogs, golf courses)	The Project Team and member towns should create workshops within the APC on sustainable agriculture, golf course maintenance, etc.
Topic: Address Water Quality Through Key Regulations	
Coordinate with landowners on implementing best practices & adopting Conservation Plans	Work with the USDA to develop conservation plans where needed, and revise existing plans in the face of climate change.
Conservation Commission enforcement of wetlands protections on farmland.	The Project Team should recommend in the final report that all farms in the APC-Nemasket watershed have buffers. This should also be reflected in town policy and should be supported with various enforcement mechanisms.

NEXT STEPS: The next meeting for the APC-Nemasket Watershed Management and Climate Action Plan will take place on Wednesday, November 11th, from 5 – 7 p.m. This meeting will be online-only due to scheduling conflicts with the City of New Bedford. The topic will be on Water Supply in the watershed.

You can sign-up to receive more information on this topic at: <https://bit.ly/register-apc>

ECOLOGY PUBLIC MEETING MATERIALS

Date:	March 23, 2022
Location:	Middleborough Town Hall, Middleborough, MA (indoor, in-person) and Zoom (online)
Time:	Occurred simultaneously from 5:00 - 7:00 PM

An aerial photograph showing a paved road with a yellow center line curving along the edge of a large body of water. The road is bordered by a dense forest of trees with green and yellow foliage. The water is a deep blue. In the distance, a small building and some other structures are visible on the shore. The sky is clear and blue.

Assawompset Pond Complex & Nemasket River Watershed Management & Climate Action Plan

**Public Workshop #3 | Ecology, Unique Habitats
and Natural Resources**

March 23, 2022

Let's Keep This Conversation Going!

Share your experience and local expertise online and join us for another topic-specific meeting in the project workshop series!

GET INVOLVED!

in the

Assawompset Pond Complex and Nemasket River Watershed Management & Climate Action Plan

Join us for in-person, outdoor public workshops! Come to all of them, or to as many meetings as topics interest you. NOTE that there is an online meeting option as well, at the same date and time via Zoom.

We need your input in a comprehensive evaluation of water-related issues and management solutions across the plan region.

visit the project webpage
www.srpedd.org/apc-nemasket-plan
for full meeting details and registration:

watershed tour
video!



or scan here to
register!

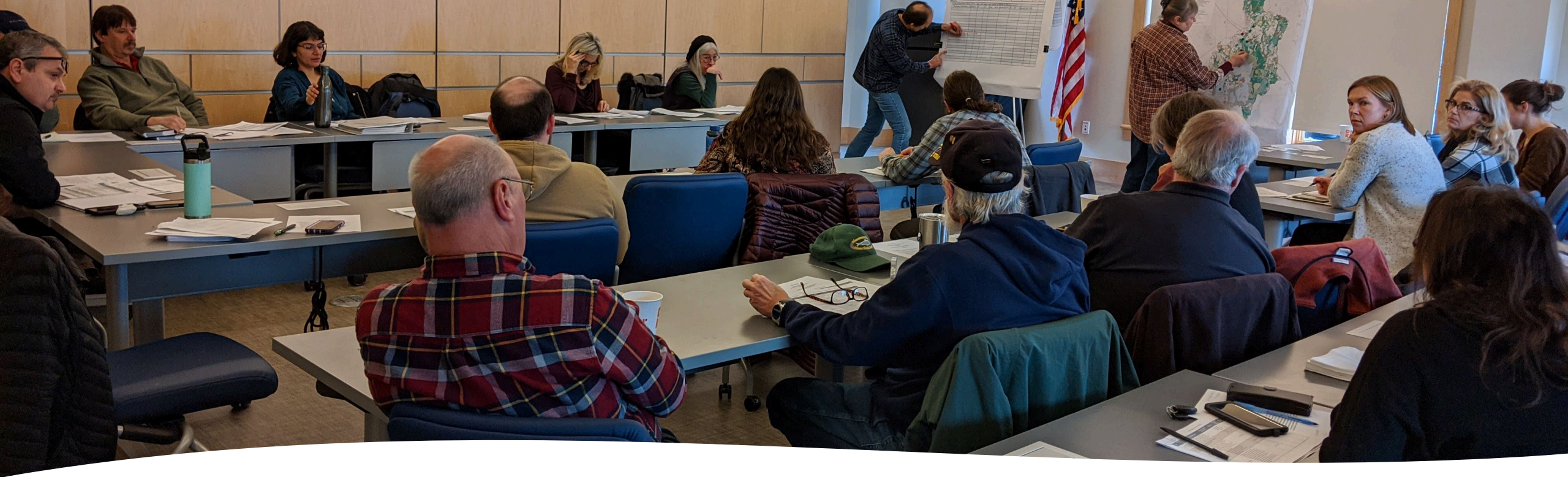


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Flooding	9.29.21 5-7 PM	Lakeville
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Unique Habitats	3.23.22 5-7 PM	Middleboro
Recreation	4.13.22 5-7 PM	Rochester
Land Development	4.27.22 5-7 PM	Freetown
Open House	6.1.22 6-8 PM	Lakeville



Agenda

- Project overview & vision for the watershed
- Developing plan recommendations: Ecology, Unique Habitats, and Natural Resources
 - Issue summary presentation
 - Management actions discussion
- Next Steps
 - Take the virtual watershed tour
 - Future public meeting schedule
 - Submit additional input



Meet the Project Team

APC Management Team

- City of New Bedford Water Division
- City of Taunton Water Division
- APC Ranger
- Middleborough-Lakeville Herring Fishery Commission
- Mass Division of Fisheries and Wildlife
- Select Board Members
- Legislators
- Local Board and Commission Members
- Volunteers

Town Staff

- Patricia Cassady, Middleborough, Conservation Agent
- Merilee Kelly, Rochester, Conservation Agent
- Michele Paul, New Bedford, Director of Resilience and Enviro. Stewardship
- Phillip Duarte, Taunton, City Councilor
- **Freetown seat: OPEN**
- Nancy Yeatts and Lia Fabian, Lakeville

Meet the Project Team



Bill Napolitano
Environmental
Program



Helen Zincavage
Environmental
Program



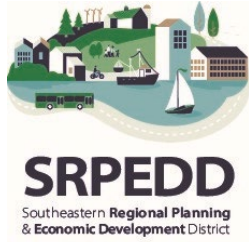
Courtney Rocha
MVP Coordinator,
Southeast Region



Marea Gabriel
Conservation Projects
Manager



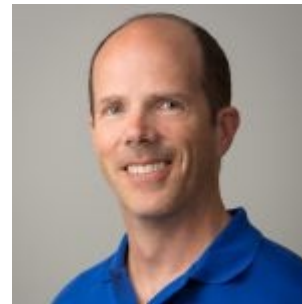
Sara Burns
Water Resource
Scientist



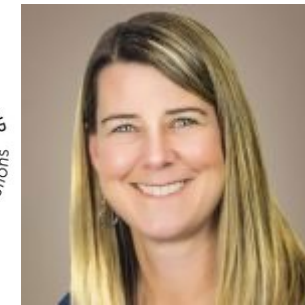
Danica Belknap
Environmental
Program



Benjamin Myers
Environmental
Program



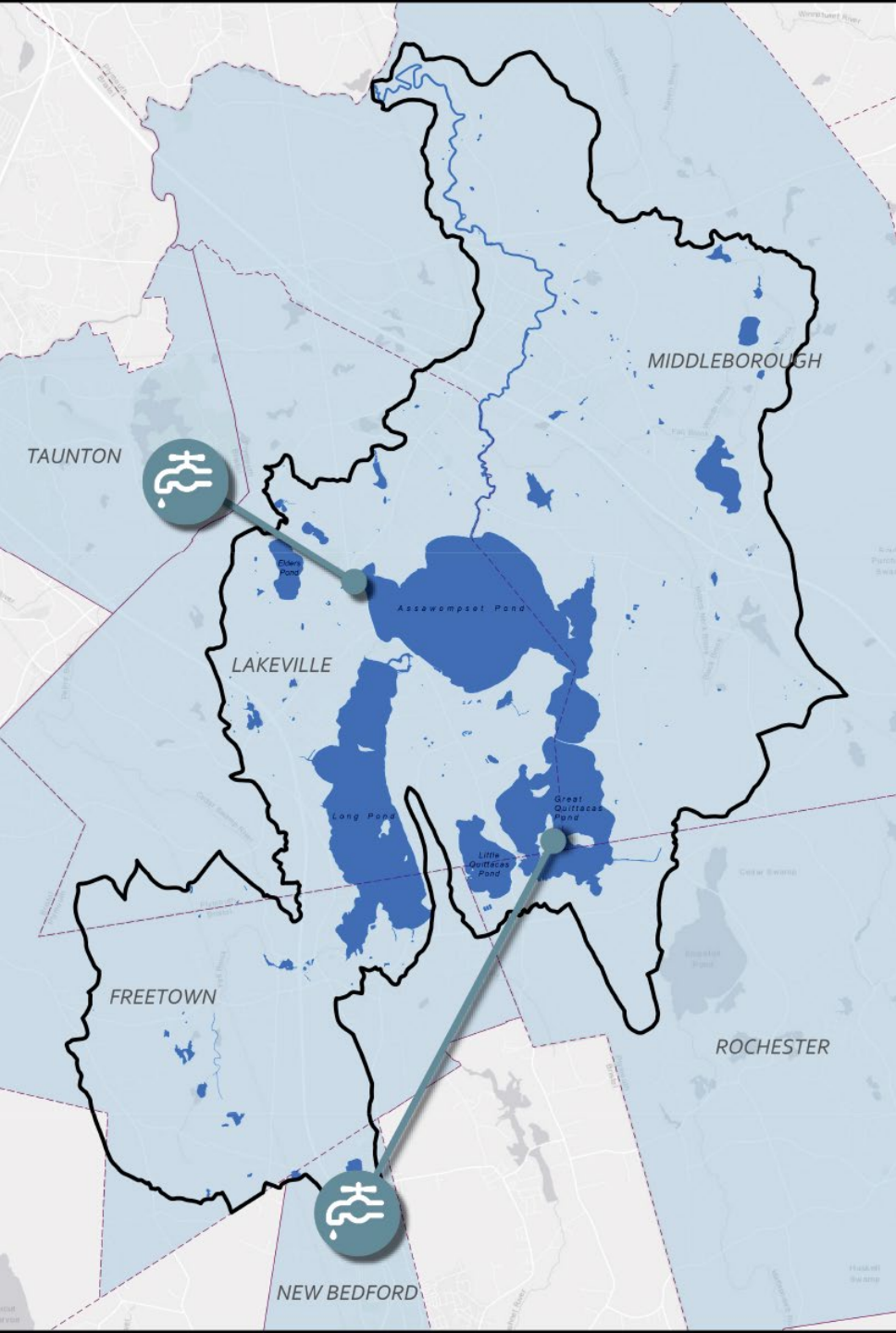
Neal Price
Associate Principal,
Senior Hydrogeologist



Ellie Baker
Senior Environmental
Planner



Eric Walberg
Climate Change Specialist,
Walberg Consulting



Watershed Basics

- Total Plan Area: 44,900 ac = 70 sq. mi.
- Spans the towns of:
 - Freetown
 - Lakeville
 - Middleborough
 - Rochester
 - Small portion of New Bedford

Major Stakeholders

- Pondsides and Riverside Communities and Residents
- New Bedford and Taunton Water Suppliers (250,000 ppl)
- Middleboro-Lakeville Herring Commission
- Wild and Scenic Taunton River Stewardship Committee
- Recreational users
- Major landowners, inclusive of state agencies

Role of the Management Plan

- The Plan will develop comprehensive goals for the entire watershed system.
- Address existing issues.
- Look forward to the future (to 2050) and consider recommendations in light of climate change and future development patterns
- A significant contribution of the plan is to see where we can balance different interests and identify where there may be surprising co-benefits.

Planning for Dynamic Changes

Climate Change – 2050 / High Scenario / Taunton Basin



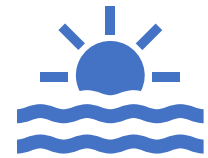
15-23 additional days over 90
Degrees F



2.56" additional annual
precipitation (spring and
winter)



1.5-2 additional days of
extreme weather per year



1.25 additional consecutive
dry days (summer/fall)

**DRAFT Build-out
(Supply)**

Nemasket Watershed

 Sub-watershed Boundaries (HUC12)

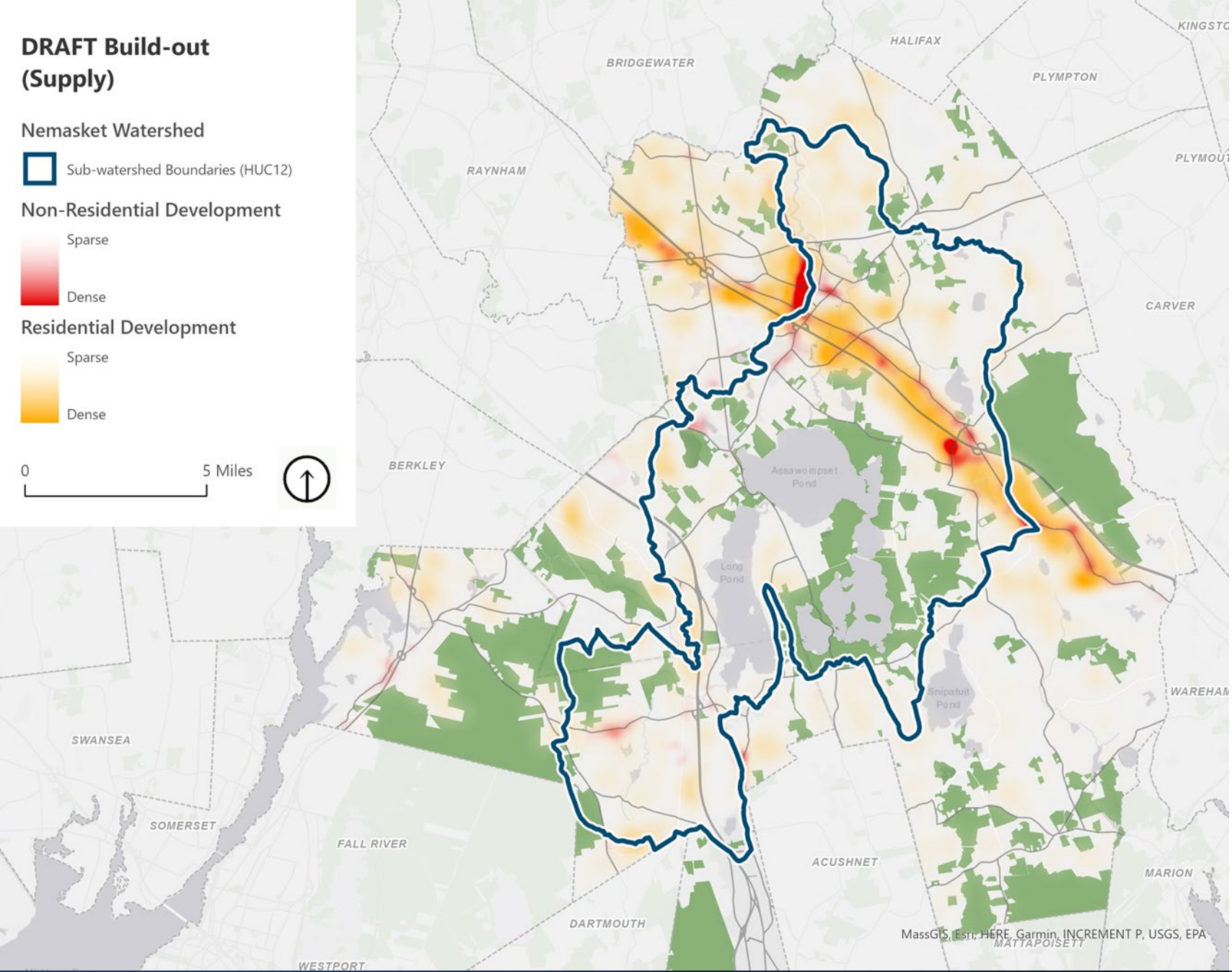
Non-Residential Development

 Sparse
Dense

Residential Development

 Sparse
Dense

0 5 Miles



Planning for Dynamic Changes

**Future Possible
Development Build Out
Scenarios**

Vision for the Watershed: Management Goal

Overall, in 2050, the APC and Nemasket River are healthy, sustaining life and natural communities, including our own through clean, safe, and reliable water supply. The inhabitants of the watersheds have greater protections from climate hazards, and have developed an environmental ethic based upon choice, not chance, that drives sound local and regional decision-making.

Ecology, Unique Habitats, and Natural Resources in the APC & Nemasket

What are the issues?

What impacts have already been observed?

How is climate change likely to impact the issues?

What are the associated co-benefits of taking action?

What are potential management actions and regulatory mechanisms to address the issues?

Ecology, Unique Habitats & Natural Resources – Overview of the Issue

- The APC-Nemasket is critical habitat for the largest herring run in MA
- A variety of wetlands and uplands provide a wide range of habitats rich in biodiversity
- Development in the watershed has resulted in habitat fragmentation, water quality degradation, and is stressing fish, wildlife and plant populations

BioMap2

A Guide for Strategic Biodiversity Conservation

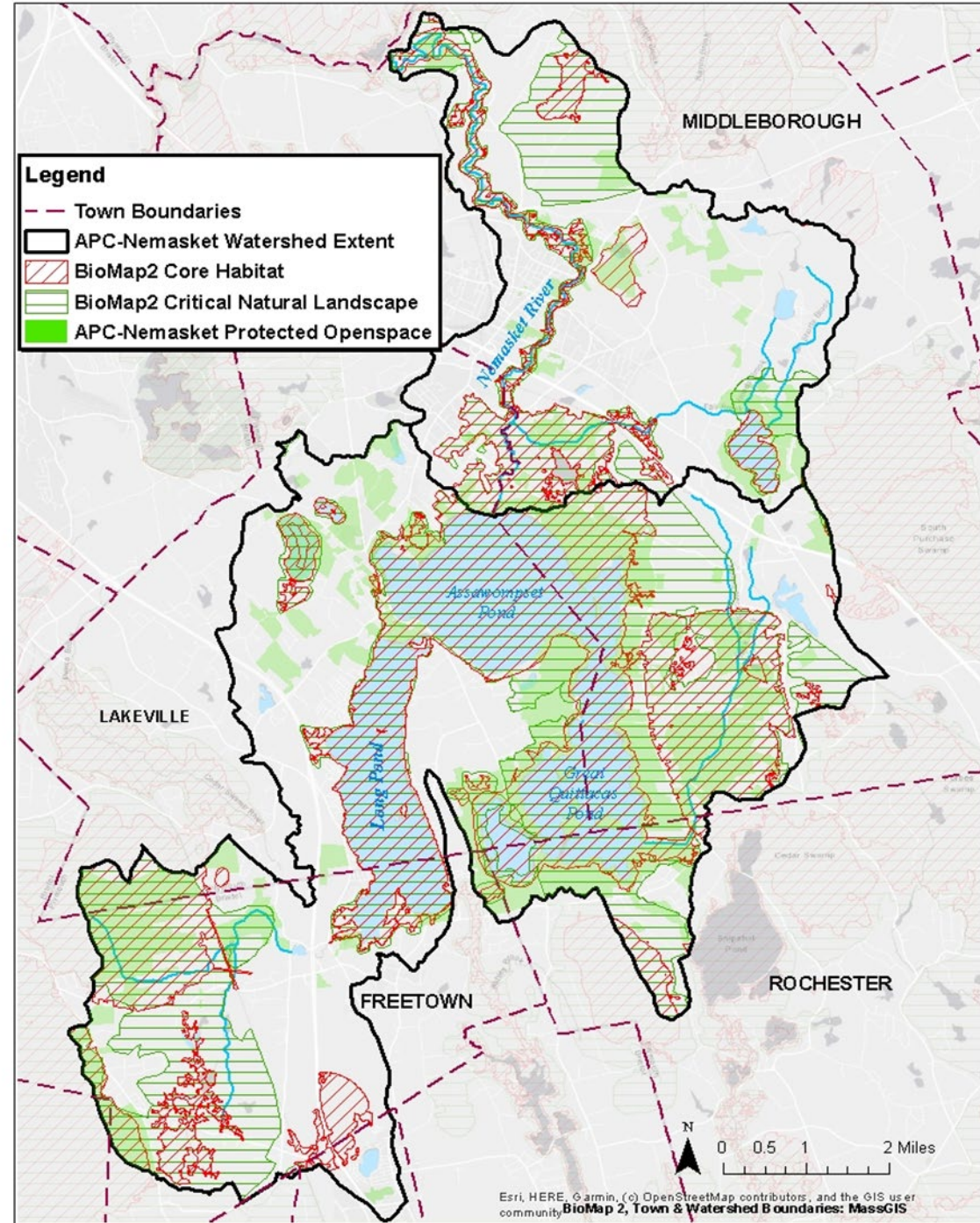
- Highlights areas critical to long-term persistence of rare & native species, exemplary natural communities, and functioning ecosystems
- A key strategy is to focus land protection, stewardship, & management in the areas

APC-Nemasket Basin (45k acres): 23,500 acres (52%) are BM2

- **Core Habitat:** Species of Conservation Concern, exemplary Natural Communities, & intact Ecosystems
- **Aquatic Core:** intact rivers where physical/ecological processes function for fish/aquatic SCC
- **Critical Natural Landscape:** larger landscapes better able to support ecological processes, disturbances, & wide-ranging species.

BioMap2 (23,500 acres) = 29% Protected

BioMap3 is in the works...



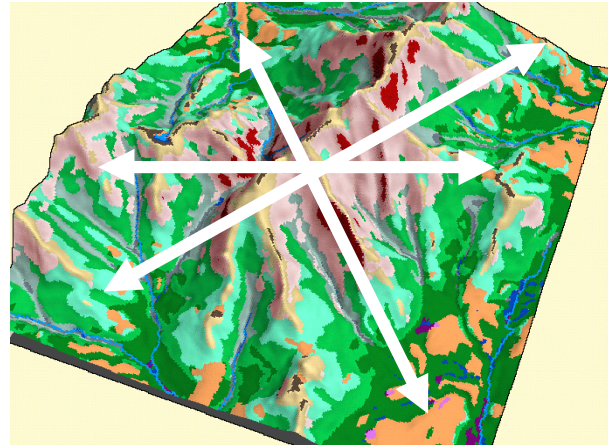
TNC's Resilient Land Mapping Tool

Resilience Scores:

- Estimate capacity of land areas to maintain species diversity & ecological function as the climate changes (range from *Far Below* to *Far Above Average*)

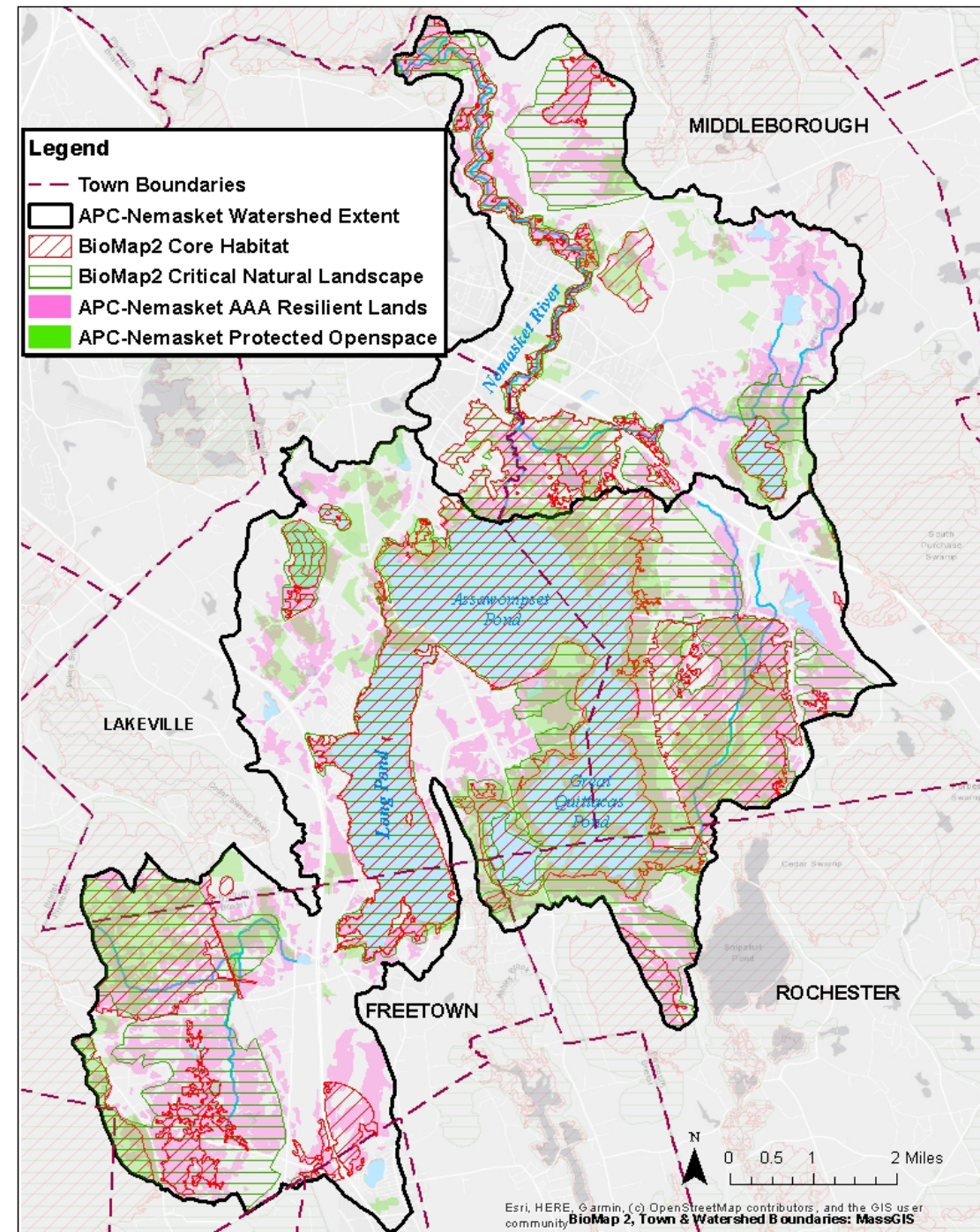
Resilience Based On:

1. **Geophysical Setting** – unique geology, elevation, landforms
2. **High Microclimatic Diversity** – connected areas w/ range of temp/moisture
3. **Connected Landscapes** – less human modification for species movement/dispersal & water movement, etc.



APC-Nemasket Basin (45k acres)

- 17,550 acres (39%) score *All Above Average* Resilience
- 29% Protected



Maintaining Species' Habitat, Intact Landscapes, and Ecosystem Function...

➤ *Maintains Ecosystem Services for Nature and People*

- Forested uplands filter & clean water
- Wetlands mitigate flooding & drought
- Wetlands and forested uplands sequester Carbon
- Intact uplands and healthy aquatic systems provide recreation and enhance quality of life
- Riparian buffers protect water quality and cool water and air temperatures

Although largely in natural cover with extensive protected openspace, several features in the watershed – including development, habitat fragmentation, water quality/quantity – can degrade habitats and stress fish, wildlife and plant populations....

STRESSORS

Altered Water Levels & Flow

Low flows restrict herring migrations and strand/kill mussels
Altered headwater streams reduce coldwater fisheries habitat
Water level fluctuations disrupt native plant growth & important habitats

Water Quality

Stormwater runoff & excessive nutrients reduce DO, increase temperature & turbidity, interfering with mussel & native vegetation growth
Poor water quality degrades habitat and impacts warm & coldwater fisheries

Stream Connectivity & River Fragmentation

Dams, bridges & culverts restrict flow, trap sediment & prevent fish migrations
Artificial impoundments warm water and degrade coldwater fish habitat
Beaver dams may also disrupt flow and limit water resources during drought

Development & Habitat Fragmentation

Land use changes fragment habitat & buffers, increase stormwater runoff, and reduce groundwater recharge
Habitat alterations are disrupting native species, including eagles, Least Bittern, hawks, turtles & rare plants

Invasive Species

Watercraft & excessive nutrients are fueling invasive aquatic plant growth
Excessive aquatic plant growth impedes native habitat growth, water flow, fish migrations, recreation and can cause mussel die-offs



This Photo by Unknown Author is licensed under CC BY-SA

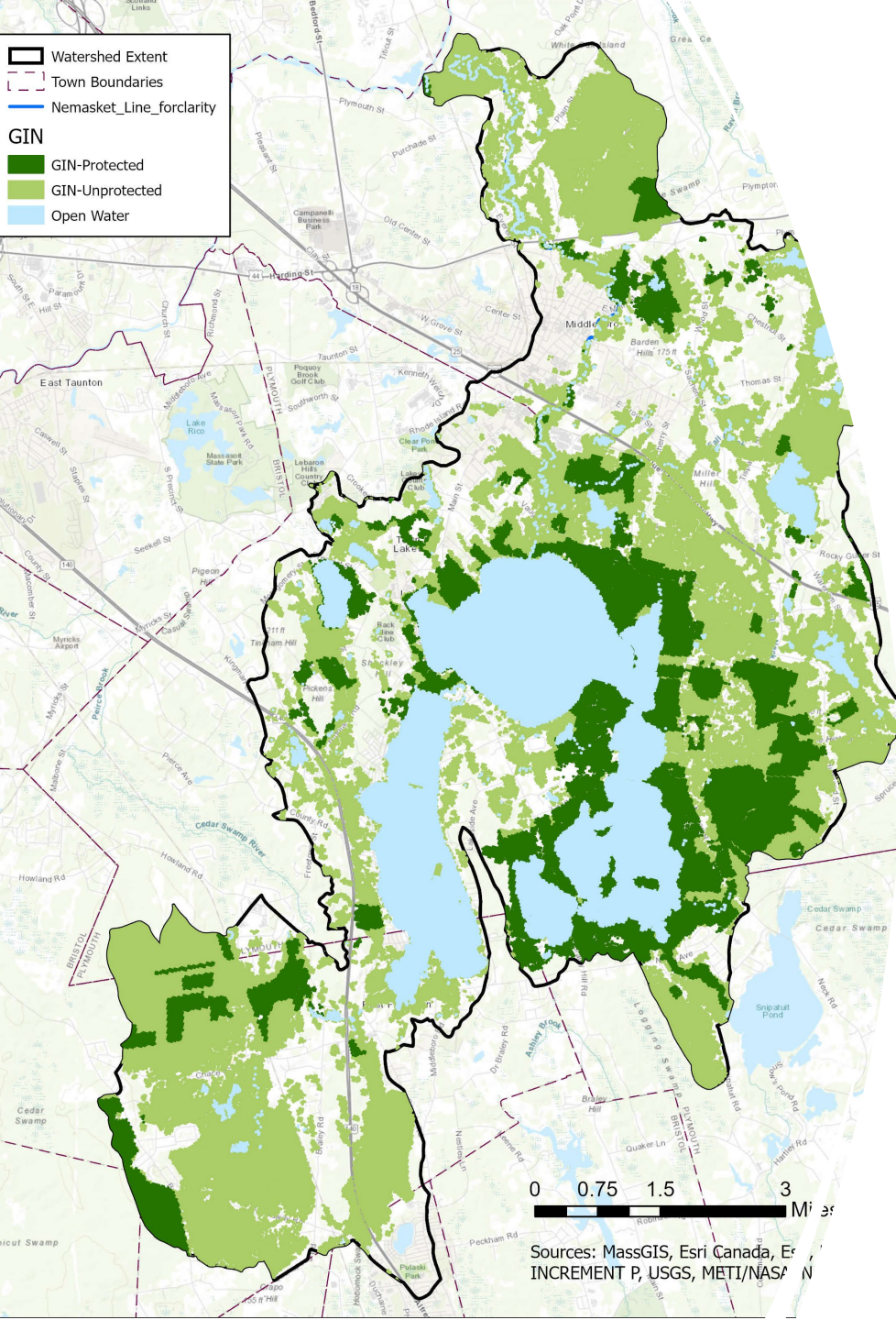
Climate Change Impacts on Ecology, Unique Habitats & Natural Resources

Projected climate change impacts in southeastern Massachusetts:

- **Increase in heavy precipitation:** will increase nonpoint source pollution in the APC-Nemasket - bringing increased sediment, nutrients, and pathogens, degrading water quality and aquatic habitats.
- **Warming Temperatures:** warmer waters hold less dissolved oxygen and can lead to eutrophication and excess algal and plant growth, which degrades water quality and habitat for fish and other aquatic species (e.g., fish kills) and alters food webs.
- **Increased Temperatures, Erratic Precipitation, Droughts:** are predicted to make many **coldwater streams** too warm in summer to support Eastern Brook Trout. Even some warmwater fish could be pushed towards thermal tolerance limits forcing them to seek new cooler habitats *if hydrologic connectivity is intact*.
- **Shortening Annual Ice Cover Duration, Longer Growing Seasons:** will likely benefit aquatic invasive plants (McPhedran) and there's evidence **warmer lake temperatures** favor growth of milfoil species (Patrick et al. 2012).
- **Extreme Weather, Drought, Drier Climate:** estimated will cause 3/4 of **Eagle's** current summer range to become unsuitable by 2080 - although 73% could be expanded to new areas, success will be contingent upon securing suitable food/nesting habitat; breeding habitats are predicted to be sought further N into Canada & Alaska.

Co-Benefits of Ecology, Unique Habitats & Natural Resources Protection

- **Water Quality:** Strategic land conservation and wetland restoration efforts have the potential to both filter/reduce pollutants and enhance water quality; riparian restoration has been shown to be most cost-effective phosphorus control (WMOST). Conversely, development of priority green infrastructure could eliminate habitat for plants/wildlife and degrade water quality in the watershed.
- **Stormwater Management:** Increased stormwater infiltration decreases runoff that carries pollutant loads into the water system, improving water quality and aquatic habitat.
- **Inter-Agency Cooperation:** Improved coordination between local and state operators on roadway/bridge projects could help with implementation of wildlife corridor structures and implementation of green infrastructure/nature based solutions to help improve habitat and water quality.
- **Land Development:** Placing new development outside of riparian areas and adjacent uplands, as well as using LID, will also enhance riparian habitat connectivity, maintain movement/migration corridors, and an enhance water quality.
- **Recreational Access:** Increased recreation can encourage users to become champions of the flora/fauna they encounter and stewards of their habitats, potentially building support for land conservation and habitat management recommendations.



What is Green Infrastructure?

Natural features that perform critical processes and provide benefits to nature and people
(For example: wetlands and floodplains provide stormwater storage and reduce flooding)

The Green Infrastructure Network (GIN) is comprised of:

- TNC Resilient and Connected Landscapes: Areas of Above Average Resilience
- BioMap2 Core & Critical Natural Landscapes
- Areas within 100ft of Surface Waters, Wetlands, and Flood Zones
- Areas vulnerable to sea level rise (elevations 4m and under)

Potential Natural Resource Management Actions

Physical projects

- Improve aquatic habitat and passage
- Control the presence of invasive species
- Prepare forests for climate change
- Protect critical and endangered species and their habitats

Regulatory mechanisms

- Adopt the Community Preservation Act to fund open space protection
- Open Space and Recreation Planning
- Open Space Residential Design
- Allow more flexible subdivision design and zoning dimensions that preserve the existing landscape
- Coordinate invasive plant management programs

Potential Natural Resource Management Actions

Improve aquatic habitat and fish passage

- Address barriers to fish passage in the Nemasket River at dams, fish ladders, and stream crossings (i.e. dam removal, bridge replacement)
- Remove sediment and vegetation impeding flow in the Nemasket River
 - Preserve flow during drought with water use restrictions
- Protect headwater stream flow and shading for coldwater fish
 - Reduce water quality impairments (i.e. septic system upgrades, updated road de-icing procedures near waterways)
- Install green infrastructure (i.e. swales, "country drainage") to mitigate stormwater runoff

Control Invasive Species

- Implement volunteer monitoring & management programs
 - Prevent spread through public education and boat washing stations
- Continue coordinated efforts to remove aquatic invasive plants (i.e. Ecohvester removal)
 - Coordinate with local & state regulatory entities to implement a holistic and integrated management approach that avoids herbicides
- Reduce nutrient loading (i.e. from septic systems around ponds) that fuels aquatic plant growth
- Monitor and treat forest impacts from disease and pests

Protect native species and their habitats

- Prepare habitats for climate change by monitoring changes & introducing resilient species
 - Adopt adaptive forestry management plans that monitor and manage for the future
- Conserve rare & endangered species habitat, preserving large & unfragmented habitats (i.e. land acquisition, conservation restrictions)
- Install wildlife corridor & road crossing structures
 - Support clams and mussels during their spawning season (i.e. removal of competitors)
- Identify & restore/enhance key riparian and wetland areas (including retiring cranberry bogs) and network connections

Protect natural resources through key local regulations

- Allow more flexible zoning and subdivision design to preserve the existing landscape (i.e. low impact development)
- Allow Open Space Residential Design (OSRD) by-right, and require protection of high priority, contiguous parcels
- Update Open Space & Rec Plans, prioritizing high value natural areas for protection (i.e. Green Infrastructure Network)
- Coordinate with neighboring communities to protect connected habitat & corridors
 - Adopt the Community Preservation Act to fund open space protection

Discussion: Management Actions & Regulatory Approaches

- Do you agree with the issues identified? Have we missed any?
- Do you agree with the potential management strategies identified?
- Which do you think will or won't work?
- Which actions should be prioritized?
- Have any of these strategies been tried before?
- What are potential trade-offs and co-benefits for each strategy?
- Any additional ideas or recommendations?

Thank you for
your time
and input
today!

What next?

Take the virtual watershed tour, access the meeting packet, and learn more about your plan at:

www.SRPEDD.org/apc-nemasket-plan

Share additional thoughts through June 2022

Drop a Note: bit.ly/comment-apc-nemasket

Public Meeting Schedule

Join us for in-person, outdoor public workshops! Come to all of them, or to as many meetings as topics interest you. NOTE that there is an online meeting option as well, at the same date and time via Zoom.

TOPIC	DATE	LOCATION
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To receive updates on the project status, please make sure that you have completed the registration form!

Register for future in-person or virtual meetings:

bit.ly/register-apc

All virtual meetings will use the same Zoom meeting link:

<https://us02web.zoom.us/j/8150125172>

END OF PRESENTATION

Appendix slides for reference and additional details follow

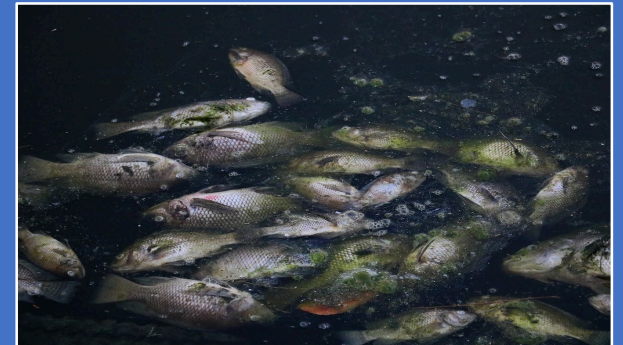
STRESSOR: Altered Water Levels/Flow

Herring	Low flows restrict downstream emigration and drought is linked to juvenile mortality & reduced recruitment
Coldwater Fisheries	Altered flow to spring fed headwater streams reduces habitat and warm water impoundments limit upstream connectivity and dispersal
Freshwater Mussels	Water level fluctuations & dewatering of nearshore sandy areas in APC strand/kill mussels; low flows & loss of stream connectivity can limit host fish passage & reduce mussel dispersal
Coastal Plain Pondshore	Artificially maintained high water levels & prolonged dewatering eliminate naturally fluctuating water levels, preventing CPP plant growth
Turtles	Increased flooding along the Nemasket & water level fluctuations in the APC may limit important basking sites/objects



STRESSOR: Water Quality

Herring	Poor WQ in APC can affect all age classes including eggs
Warmwater Fisheries	Residential/roadway run-off & excessive use of personal watercraft (Long Pond) increases turbidity & aquatic veg reducing water clarity/feeding efficiency (e.g., Bridle Shiners)
Coldwater Fisheries	Land use changes degrade headwater stream habitat due to loss of forested riparian areas, increased water temps, low DO, & reduced groundwater recharge
Freshwater Mussels	Development/impervious surfaces & excessive run-off/nutrients degrade WQ - reduced DO, increased temps, & turbidity - interfere with mussel filter feeding/reproduction (upper Nemasket TMDL not supporting Aqu Life Use)
Birds / Waterfowl	Chemical/sediment runoff and marsh degradation likely cause of recent declines to Endangered Least Bittern populations



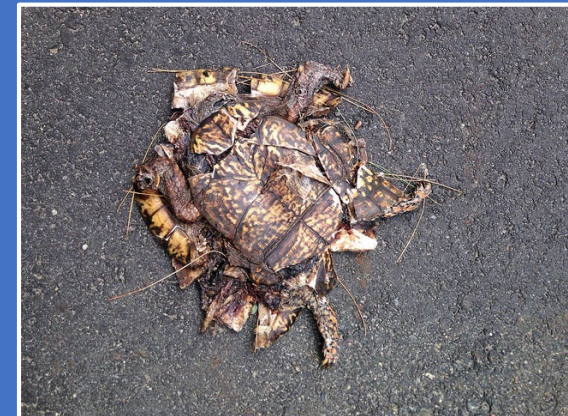
STRESSOR: Stream Connectivity / River Fragmentation

Herring	Pinch points - AP dam, bridges, undersized culverts, sedimentation/emergent plants in sections of Nemasket - restrict DS juvenile emigration & can limit US movements
Coldwater Fisheries	Dams, obstructions, warm water impoundments degrade/fragment coldwater habs for movement & different life stages (e.g., Fall Brk, Little Quittacas & Long Pond tribs, several Nemasket tribs)
Freshwater Mussels	Pinch points (same as above) - limit host fish passage, reduce mussel dispersal, limit US colonization, lead to hab/pop fragmentation compounded by pot'l genetic isolation
Beaver	Beaver dams could disrupt herring runs and during drought may limit water resources for agriculture (e.g., cranberry bogs)



STRESSOR: Development / Habitat Fragmentation

Eagles	Development/disturbance of intact forested shoreline & loss of tall trees eliminate critical buffer from human activities & nesting/roosting/perching sites
Birds	Chemical/sediment runoff and loss of marshes that fringe the APC are likely cause of Endangered Least Bittern declines; loss/fragmentation of forested riparian corridors along the Nemasket reduce important interior forest bird habitat (e.g., rare Sharp-shinned Hawk & Coopers Hawk)
Wetlands & Vernal Pools	Fragments remaining connected VP clusters critical for migration corridors & reduces vegetated buffers to existing swamps & marshes – e.g., Owl Swamp & Nelsons Grove – degrading wetland functions
Coastal Plain Pondshore	Beach development can restrict or eliminate CPP/rare plant growth
Turtles	Threatens some of best remaining rare Box Turtle habitat due to fragmentation of large, intact areas limiting access to nesting sites & increasing road mortality, nesting disturbance, & predation



STRESSOR: Invasive Species

Herring

Watercraft & nutrient loading (septics, lawn management) in Long Pond, APC, & Nemasket can lead to excessive invasive plant growth (milfoil, fanwort) limiting fish movements & restricting juvenile herring emigration

Warmwater Fisheries

Same sources as above; non-native plants displace native submergent vegetation used as cover/spawning habitat for some fish (e.g., rare Bridle Shiner)

Freshwater Mussels

Invasive aquatic plants limit shallow nearshore mussel habitat & host fish movement in Nemasket; dense Asian clams pops can alter aquatic ecosystem processes due to high filtering capacity, stimulating plant/algal growth from excretion/nitrogen release, & reducing DO from massive clam die-off decomposition

Coastal Plain Pondshore

Purple Loosestrife is already well established in the emergent marsh bordering Sampsons Cove & along Pocksha Pond & its spread can reduce available habitat for CPP

Waterfowl / Birds

Invasions of Purple Loosestrife & Phragmites are major threats to marsh habitat of Endangered Least Bittern and other secretive wetland birds



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UGA1391156

Protect Green Infrastructure in Open Space & Rec Plans

Section 1	Plan Summary: Reference state/regional green infrastructure analysis as part of regional context to be considered in the plan
Section 3. A.	Regional Context: Include a more detailed explanation of the state/regional green infrastructure analysis and the regional green infrastructure map
Section 4	Environmental Inventory and Analysis: Include discussion of green infrastructure in pertinent sections
Section 8	Goals and Objectives: Prioritize land conservation to support the local priorities map
Section 9	Five Year Action Plan: Include local priorities map

Open Space Design

- Flexible subdivision regulations
- Smaller lot sizes
- Land set aside for conservation at no cost to town
- By-right is most effective
- Types of OSD:
 - Open Residential Design (OSRD)
 - Natural Resource Protection Zoning (NRPZ)
 - Conservation Subdivision

Conventional Subdivision



Conservation Subdivision



Protect Green Infrastructure in Open Space Design

Set clear criteria
for open space
protection

Require open space dedication to contribute to protection of the local green infrastructure network (link to local priorities map created for your Open Space & Recreation Plan)

Require
protection of the
GIN

When land being subdivided overlaps the green infrastructure network, require on-site protection

Allow TDR for
GIN protection
elsewhere

When land being subdivided does not overlap the green infrastructure network, utilize transfer of development rights (TDR) to protect the network elsewhere in the locality

Aquatic Invasive Plant Management Best Practices

Resources from MA Dept of Conservation & Recreation Lakes and Ponds Program

www.mass.gov/lakes-and-ponds-program

- Aquatic plant ID and management guides
- Weed Watcher volunteer training program
- Boat Ramp Monitor program

Early Detection is Key

Addressing an infestation before plants have had a chance to establish is the best way to ensure eradication

Monitor waterways regularly and be on the look out for invasives
Public education and awareness can help spot invasives early on

Prevent the Spread

Public education and awareness will prevent unintentional contamination and spread

Boat washing stations, especially at already contaminated spots, are essential to prevent boats from introducing invasives elsewhere

Take an Integrated Approach

Invasive control should be in the context of holistic ecosystem management, tailored to specific water body and species present, and address causes (nutrients, re-introduction)

Consider targeted treatments (i.e. physical removal) first & protect native species present

Build in adaptive management and post-treatment monitoring

Use Care with Herbicides

Chemicals should be used as a last resort to reduce collateral damage

Avoid applying in rare or sensitive species habitat & during critical times of year (i.e. spawning or migratory seasons)

Consult with Board of Health, Conservation Commission, MA Natural Heritage Program before application for guidelines and permitting

APC-Nemasket Management Plan – Ecology, Unique Habitats & Natural Resources Public Meeting

3/23/2022, 5-7pm – ONLINE MEETING NOTES

Facilitators: Danica and Eric

Attendees: Martha Worley (Long Pond Association), Mike Schroeder (Lakeville Open Space Committee), Bob McNally (resident, lives on Assawompset Pond), Jack Healey (Middleborough CPC, planning board, zoning board, former town admin)

Notes

- Mike – took a walk around Assawompset Pond – trail off Vaughn St, concerned about amount of debris down and potential fuel for forest fires if we get a dry summer
- Long Pond residents/stakeholders – no issues getting buy-in on invasive plant management
 - Challenge is that people who use pond come from all over, need more oversight at boat launch from environmental police, and for parking situation. Freetown shouldn't be solely in charge.
 - Need to ensure people are using boat washing station if one put in
- Homeowners on pond pull/cut weeds in water by their house and let loose in water, boats also turn up weeds → need more homeowner education on proper way to remove/dispose of weeds
 - No current education materials available
 - Include fertilizer & septic education in any outreach to homeowners
 - Most current residents are year-round, many older folks, service somewhat spotty (virtual engagement a challenge)
 - many have children at Assawompset school
 - Many use Capt Bugs and boat ramp to put in boats
 - Best way to reach – include info in tax bills
 - Does Clark Shores neighborhood have association? (Martha – many neighborhoods have associations, but have had difficulty reaching people from other associations)
- Long Pond Association (non-profit status just approved) interested in more public outreach and homeowner education
 - Particularly for homeowners moving out of cities to countryside and less familiar with septic maintenance
- Septics are big issue (especially age of existing systems) – Buzzards Bay Coalition has wetland friendly septic systems education – homeowner piloting system (Martha mentioned – is this in watershed?)
 - Loan fund for septic upgrades would be huge benefits (many homeowners don't upgrade systems because of how expensive)
 - Focus on helping people do upgrades vs punishing people (people will be more likely to work with to make upgrades)
- Lawn fertilization is a problem due to runoff.

- Parkhurst community has permit to use herbicides for weed control (required to report use to Lakeville ConComm) – are water departments aware?
- Forestry management – plans exist for water protection areas, but don't include removal of downed trees – towns should do something to remove that debris (use horses to limit environmental impact) – largely from red pine die-off recent winter
- Public focus right now on aquatic weeds, but don't recognize the long-term maintenance needs
- Less public interest in bylaw updates
- 2018 bill included \$1M for water quality in Long Pond – need plan for use of those funds to address aquatic weeds long-term
 - Can that be used for larger projects like helping with septic upgrades?
- May 4 Lakeville vote for CPA – CPA would fund a lot of needed projects – Mike made call for people to get out and vote for CPA
- Jack Healey – warehouse facility development proposal on Shopel (sp?) farm – concerned about impacts – trib to Nemasket
- Unaddressed policy issues with regards to Nemasket (Jack) – lot done to help herring, but a lot still left undone – especially zoning around wetlands/streams
 - Zoning issues in waterfront areas
 - Lack of attention to land use and impacts to waterways is causing today's problems – how can we undo?
 - Need to prevent new problems
- Tispaquin Pond – homes being built on it right now, same issues
- Cathedral Camp property in Freetown – potential to purchase/protect now that not being used for camp any longer?
- Squinn / Squim (sp?) Brook near (Long Pond?) boat landing – overflowed during major flood
- Middleborough wastewater treatment plant over capacity – another water quality issue, especially demand for more housing around and linked to train station. Investigate if capacity is really an issue.
- Previous HW study in Lakeville on green development – presented to Lakeville board, unreceptive at time, could present that to all communities today
- Powerful Developer in Lakeville (Mike) agrees that open space development is the way forward, need to clearly define areas that need to be protected and developed in development
 - Lakeville hasn't moved on open space design. People need to be convinced that land can be protected in perpetuity.
- Reed canary grass huge concern taking over marshes, but just removing it all can have negative impacts
- Volunteer monitoring programs – rapid detection/alert is key (invasive plants, culvert issues, etc.), needs to be a regional approach
 - Charles River volunteer monitoring – great system (Mike used to participate in Medford)
 - Need to identify local residents who would be interested in getting involved in monitoring program

APC-Nemasket Public Ecology Workshop – 3 – 23 – 22, In-Person Session

Facilitators: Helen Zincavage and Bill Napolitano

Participants (4): Patricia Cassidy, Tom Barron, Dave Cavanaugh, and Jeff

Workshop Notes:

Patricia Cassidy – the area in Biomap 2 should be an area of critical environmental concern →

- Biomap 2 helps with ecological protection & restoration grants
- Places like turkey swamp, winnetuxet
- Microclimates are important for growing

Jeff: how might critical areas be impacted by preservation?

- Look at the services provided by these areas like mucks and natural bogs
- Understory in nature
- Natural soils and connectivity.

Patricia: zoning is a big driver of this development – if you control that you can drive conservation.

Jeff: how much of protecting these areas is a state issue vs. a local issue? –

- P. Cassidy: this is driven by activity at the local level.
- Jeff: you're going to have more change brought forward in these issues.
- Jeff: but state doesn't directly regulate this?
 - o Patricia Cassidy: the state regulations are there, but it's up to the people at the local level who care about these things to take initiative and implement.
 - o Patricia: ex, 40B developments go to zoning and housing, but they also have to go to Mass Housing
- Jeff: we have good knowledgeable people here who want to talk about these things [in Middleborough], what about other communities that don't?
 - o Patricia: 'there shouldn't be apathy about what is happening out there. A Lot of local government is run by volunteers'

Patricia: we explain that without clean water you won't have any economic development

Bill: Need to build with what nature gives you to work with without trying to make nature work with what you put in.

When you do remove invasive species, you also have to have good development controls.

We've had more flood drought cycles since the late 90's.

(climate change discussion)

Jeff: how do Coldwater streams get their cold aspect? What is the benefit of it?

- They are cold b/c they are spring-fed at the source, and then spring-side buffers and canopies are what keep those areas cool. So if you lose that canopy, it changes the water temperature
- Cold water environments also support macro invertebrates and everything that relies on them.

Patricia:

- We had a development put in around Pratt farm (un-named coldwater fishery – they have underground stormwater management so that it's not held in the sun to heat up before being discharged into the water)
 - o Thrushollow lane off of Brook Street.
 - o Noone has studied the stream since then but could be good to review

Having information on a site ahead of time, you know what applies there

- Patricia: someone might know something about the history of that site, which even the staff might not now
- Bill: you lose the point person in the town, you lose the institutional knowledge

Patricia: you will only protect what you love and what you've experienced.

People don't think that there can be sea level rise in the Nemasket area, but the Taunton is tidal.

- Patricia: in 2010 the Purchase Brook was flowing backwards because the Taunton river was pushing it in the opposite direction.

Discussion on management actions

"what can we do about this?"

Prepare forests for climate change

- Jeff: what are you doing to the forest to prepare it for climate change?
 - o There can be a lack of information to start with, so on large properties, you want a forest management plan
 - o Patricia: we've established forest management plans with a state certified forester to make plans for conserved properties, but individual owners can also have these done.
 - o David Cavanaugh: we're going to have issues in the next few years with a lot of deadfalls – in 1943 there were major forest fires b/c of trees felled in 1938 hurricane – that's the situation that we're in currently – unless it's a currently managed property, that's a big issue
 - o Tom: the APC has a lot of pines felled and a lot of oaks felled from gypsy moths.
 - o Patricia Cassidy: they planted red pines in the APC area a few years ago, and a lot of those died, and that is tinder on the forest floor.
 - o David: the red pines create a desert ecosystem after that.
 - The Red pines were planted in the 1950's and by the civilian conservation corps (and a youth conservation corps later on) around (planted in rows) b/c those were easy to do.
 - At one point their growth was stunted.

- P. Cassady: we then have invasives such as the Norway maple and emerald ash borer as well – so think about it in terms of a vector borne disease for trees.
 - Phil Benjamin (semi-retired) has done a lot of forestry management plans in the APC area (pratt farm, oliver estate property, morgan property [town of Middleborough – used to have stewards, but not anymore, there is a lot of tree fall there], New Bedford) – Patricia has copies of those.
 - Next step is to get funding for people to come in & remove felled trees

Regulatory mechanisms.

- Middleborough has a 1% surcharge CPA act – they thought about getting it out on the ballot - exemptions for 65 and older and doesn't apply to first \$100,000 on a house
 - Get it on the ballot from a town meeting, and then you have a vote on it during next election
 - CPA has: affordable housing, recreation, open space, and historic preservation – Use it to leverage other funds – Middleborough has gotten a lot of funding from other programs

What actions do you want to see happen?

- Tom Barron: the dam has been wide open since September and the water hasn't been getting out b/c the gradient, sedimentation, and invasives below the bascule dam (which hasn't made a difference) – years ago the bascule dam did make a difference when the river was clear. In a drought the dam was nothing.
 - Patricia: there wasn't a lot of change
 - The bascule dam drains 200 feet up the river, but not to the APC.
 - river and ecological restoration of the nemasket key to habitat issues
- Dick Turner would say that the dam where its located is not the initial channel – the dam never used to flood until they put in the concrete rip rap and barriers.

Helen: What is the plan on the invasives removal?

- David Cavanaugh: have the state come in and do the sediment and invasives removal. Our goal was to do the test project and get more communities in to get more political pull. We wanted to bring in the politicians to say 'we did this' and then be able to get more state resources for additional removal. We think we need \$1-2 million.
 - The Middleborough-Lakeville herring commission doesn't have jurisdiction over the whole river.
 - Patricia Cassady: we need DER
 - David Cavanaugh: we have two fish ladders going through parks, but we have no maintenance jurisdiction on the parkland.
- Tom Barron: Our intent was to prove that a volunteer group can do this. We did this for \$14,000 (not including Bill's white paper) We were hoping that people would get excited including the legislators.
- Tom Barron: we have to figure out who gets the permits

- David Cavanaugh if we can use the same data that we have from the half-mile survey and pilot project to apply for permits for the rest of the river, that would be best. Otherwise, it would be more expensive.
 - o Overarching species relevant to the permit is red bellied cooter
 - o Bristol Aggie does a rearing program for red bellied cooter
 - o Dr. Paget – professor at Bridgewater state – does research on different types of turtles and how they do seed dispersal in the river.

David Cavanaugh (joking); you could introduce fish that eat milfoil

- Tom Barron: the issue with grass carp is that even if they're called sterile, you can't guarantee that you get sterile carp & then they are prolific eaters and re-creators.

David Cavanaugh: The MIDDLEBOROUGH LAKEVILLE HERRING FISHERIES COMMISSION still has some funding left over for test projects, they could try to amend their current permit (need to talk to DEP) to ask if they could go in again and do a new area

- It would be nice to go above Vaughn street but issues with access – there is rip-rap there, and the beach has to be exposed enough (doing it in August would mean you meet 200 feet before hitting a sandbar)

Everyone was in favor of doing a weed removal project, but it took the MLHFC to do this

What else do we need to do?

- Patricia Cassady: Land Protection – we're trying to acquire the Paconi property along the river – considered a NBS to protect land against climate change & use OSRP funding
- *How much of land preservation is proactive vs. taking opportunities?*
 - o Paconi property was a Ch 61A notice to the conservation board & they already had a proposal
 - o Patricia: the issue is that chapter 61A notice gives you only 120 days to respond, and you have to meet the purchasing agreement – for the Paconi farm that was \$6.1 million (it was commercially zoned which was valued more) – Dave Cavanaugh; “the towns can't afford to fund that”
 - o In Middleborough, have a permanent open space committee more proactive about reaching out to these properties about 61, 61A or 61B (recreation) – ex. Camp Avoda (ch 61B) is one such property.
 - Keep conservations open with landowners –
 - o Conservation Agents are often so overwhelmed with wetlands protection in town, that the land preservation can't be a focus
 - In the 1960's the conservation commissions were supposed to be the primary bodies focused on conservation of land. But then they were given the wetlands protection act and that really took over the majority of their work – that also has legal deadlines attached to it.
- *“Would it make sense to have an APC open space committee doing open space support across the watershed, using delegates from the town?”*

- People do want to have this included as a goal.
 - Direct them to meet at least twice annually or at least quarterly
 - Patricia: I'd like to see that function more like the community preservation committee works. *The town of Acton has a permanent open space committee (conservation commission which created this as a subcommittee)*
 - Ex: Making an operating manual
 - Patricia: "the state is more apt to listen to a group of citizens on a committee than town staff b/c the citizens are the ones who are supposed to hold the power in our system"
- Dam removal
 - Wareham Street Dam – removing that dam could mean that we are thinking about the flow as well.
 - Patricia: general sense that most people in Middleborough are ok to remove that dam.

The flooding in 2010 has caused a lot of change.

- Tom: To the people on the ponds, nothing has been done to alleviate the flooding issues – they need some positive results b/c the dam has been wide open since sept. 1st and the water level has gone down 2 inches to 53' and the high water level is 52.8'
- Patricia Cassidy: they do need to see solutions, just takes a lot of time to pull together information.

What can we do to get the public more involved & get more volunteers out?

- David Cavanaugh: there needs to be more publicity, need more people to be sent out information
- Patricia: get information out to people along the rivers.
- Jeff: there is some FB
 - Patricia: but FB is so rogue that you don't get accurate information sometimes
 - David Cavanaugh: it isn't central enough b/c you post to your own private sphere
- Tom Barron: could you send it out with MGED bills or the quarterly newsletter

Patricia: do the people on long pond know about these meetings?

- Nancy Yeatts and Martha Whorley are sharing information.

Where are volunteers?

- Likely be from the same pool of people who are already active
- Tom: people just aren't volunteering – finance committees, planning committees, etc. We have a lot of people who are interested, but to get them to come to meetings is difficult, especially the younger generation.
- Patricia: There are people who can't come to Conservation Commission meetings and that's difficult. People are distracted. Hard to get parents involved with scouting. Young people who are 22 are busy in college & working.

- USDA used to have watershed teams and you got a clipboard, a map, and a team – you would have a USDA mentor in the local field office and they would work with you.

Other things?

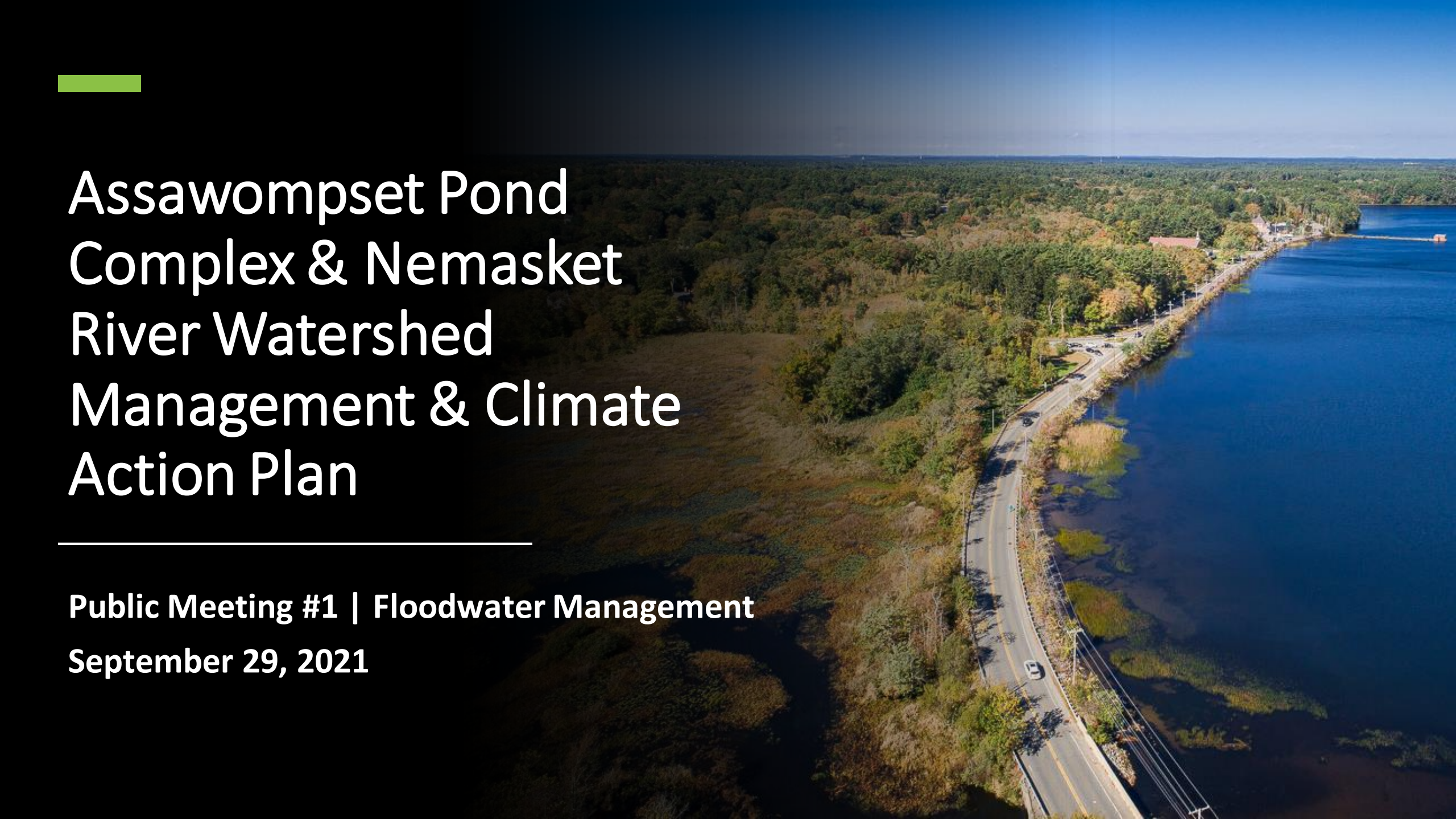
- Make sure to repurpose the DPW site to be a community asset. – that could also be an educational opportunity.

Questions or suggestions:

1. Bio Map 2 % → re-investigate ACEC designation
 2. What zoning change analyses might be appropriate in high value habitat areas?
- Ben: public education & advocacy campaigns → support retention of institutional knowledge

RECREATION AND STEWARDSHIP PUBLIC MEETING MATERIALS

Date:	April 13, 2022
Location:	Gifford Park, Rochester, MA (outdoor, in-person) and Zoom (online)
Time:	Occurred simultaneously from 5:00 - 7:00 PM

An aerial photograph showing a winding road along the edge of a large body of water, Assawompset Pond. The road is paved and has a yellow center line. To the left of the road is a dense forest with trees in various shades of green and brown, indicating autumn. To the right of the road is the pond, which is a deep blue color. In the distance, a small building with a red roof is visible on the shore. The sky is clear and blue.

Assawompset Pond Complex & Nemasket River Watershed Management & Climate Action Plan

Public Meeting #4 | Recreation & Stewardship
Gifford Park, Rochester | Zoom
April 13, 2022, 5-7 PM

Let's Keep This Conversation Going!

Share your experience and local expertise online and join us for another topic-specific meeting in the project workshop series!

GET INVOLVED!

in the

Assawompset Pond Complex and Nemasket River Watershed Management & Climate Action Plan

Join us for in-person, outdoor public workshops! Come to all of them, or to as many meetings as topics interest you. NOTE that there is an online meeting option as well, at the same date and time via Zoom.

We need your input in a comprehensive evaluation of water-related issues and management solutions across the plan region.

visit the project webpage
www.srpedd.org/apc-nemasket-plan
for full meeting details and registration:

watershed tour
video!



or scan here to
register!

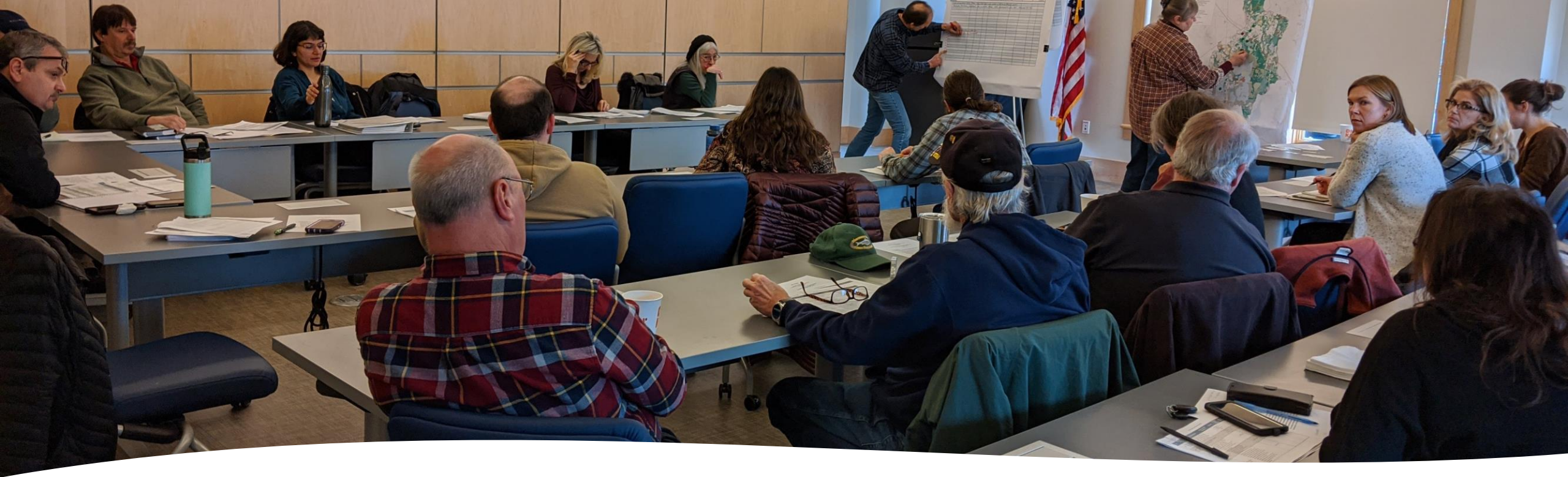


TOPIC	DATE	LOCATION
Flooding	9.29.21 5-7 PM	Lakeville
Water Quality	10.13.21 5-7 PM	Taunton
Water Supply	11.10.21 5-7 PM	Zoom Only
Unique Habitats	3.23.22 5-7 PM	Middleboro
Recreation	4.13.22 5-7 PM	Rochester
Land Development	4.27.22 5-7 PM	Freetown
Open House	6.1.22 6-8 PM	Lakeville



Agenda

- Project overview & vision for the watershed
- Developing plan recommendations: Recreation & Stewardship
 - Issue summary presentation
 - Management actions discussion
 - SWOT Analysis



Meet the Project Team

APC Management Team

- City of New Bedford Water Division
- City of Taunton Water Division
- APC Ranger
- Middleborough-Lakeville Herring Fishery Commission
- Mass Division of Fisheries and Wildlife
- Select Board Members
- Legislators
- Local Board and Commission Members
- Volunteers

Town Staff

- Patricia Cassady, Middleborough, Conservation Agent
- Merilee Kelly, Rochester, Conservation Agent
- Michele Paul and Chance Perks, New Bedford, Environmental Stewardship Dept
- Phillip Duarte, Taunton, City Councilor
- Deborah Pettey, Freetown, Interim Town Administrator
- Nancy Yeatts and Lia Fabian, Lakeville

Meet the Project Team



Bill Napolitano
Environmental
Program



Helen Zincavage
Environmental
Program



Courtney Rocha
MVP Coordinator,
Southeast Region



Marea Gabriel
Conservation Projects
Manager



Sara Burns
Water Resource
Scientist



Danica Belknap
Environmental
Program



Benjamin Myers
Environmental
Program



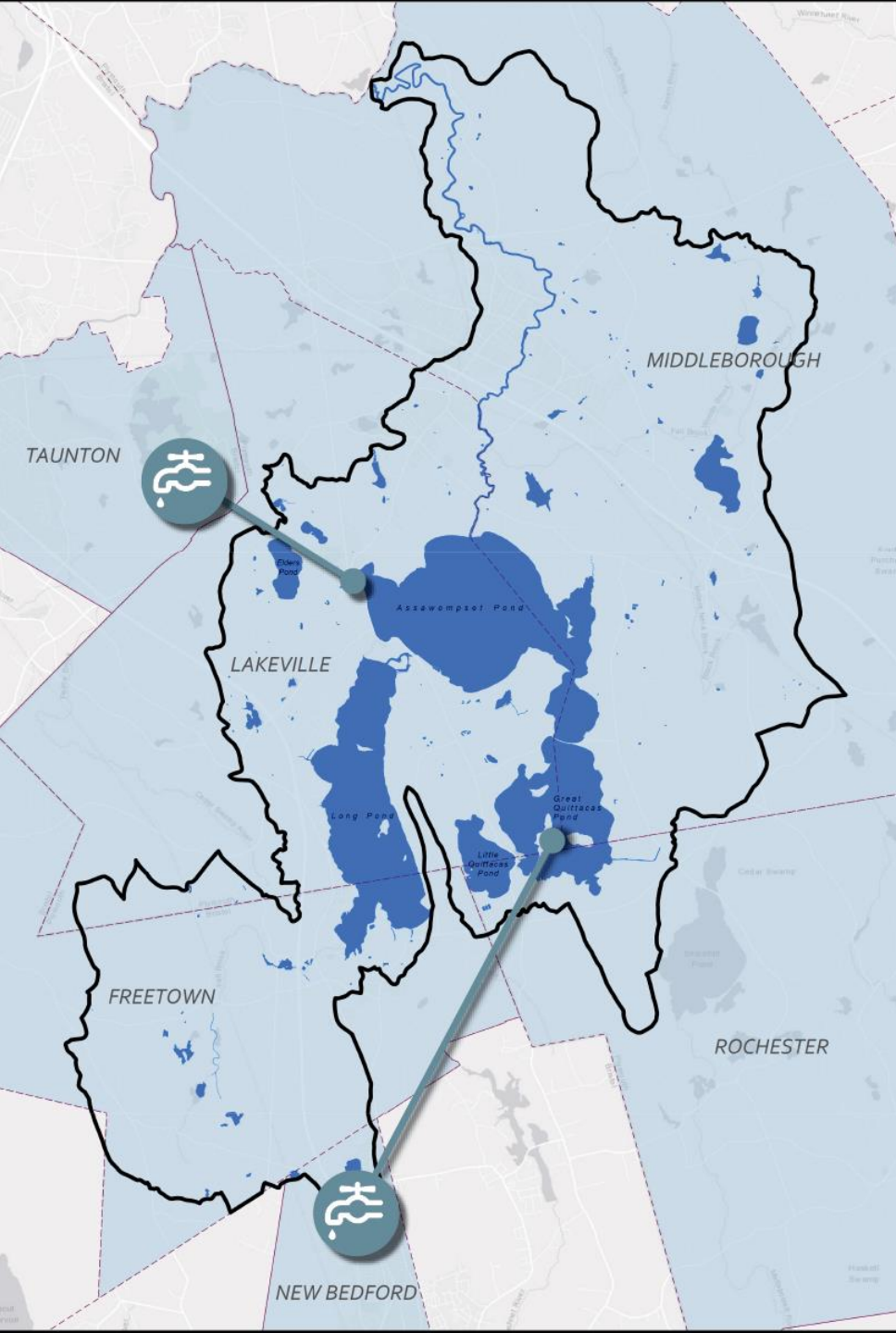
Neal Price
Associate Principal,
Senior Hydrogeologist



Ellie Baker
Senior Environmental
Planner



Eric Walberg
Climate Change Specialist,
Walberg Consulting



Watershed Basics

- Total Plan Area: 44,900 ac = 70 sq. mi.
- Spans the towns of:
 - Freetown
 - Lakeville
 - Middleborough
 - Rochester
 - Small portion of New Bedford

Role of the Management Plan

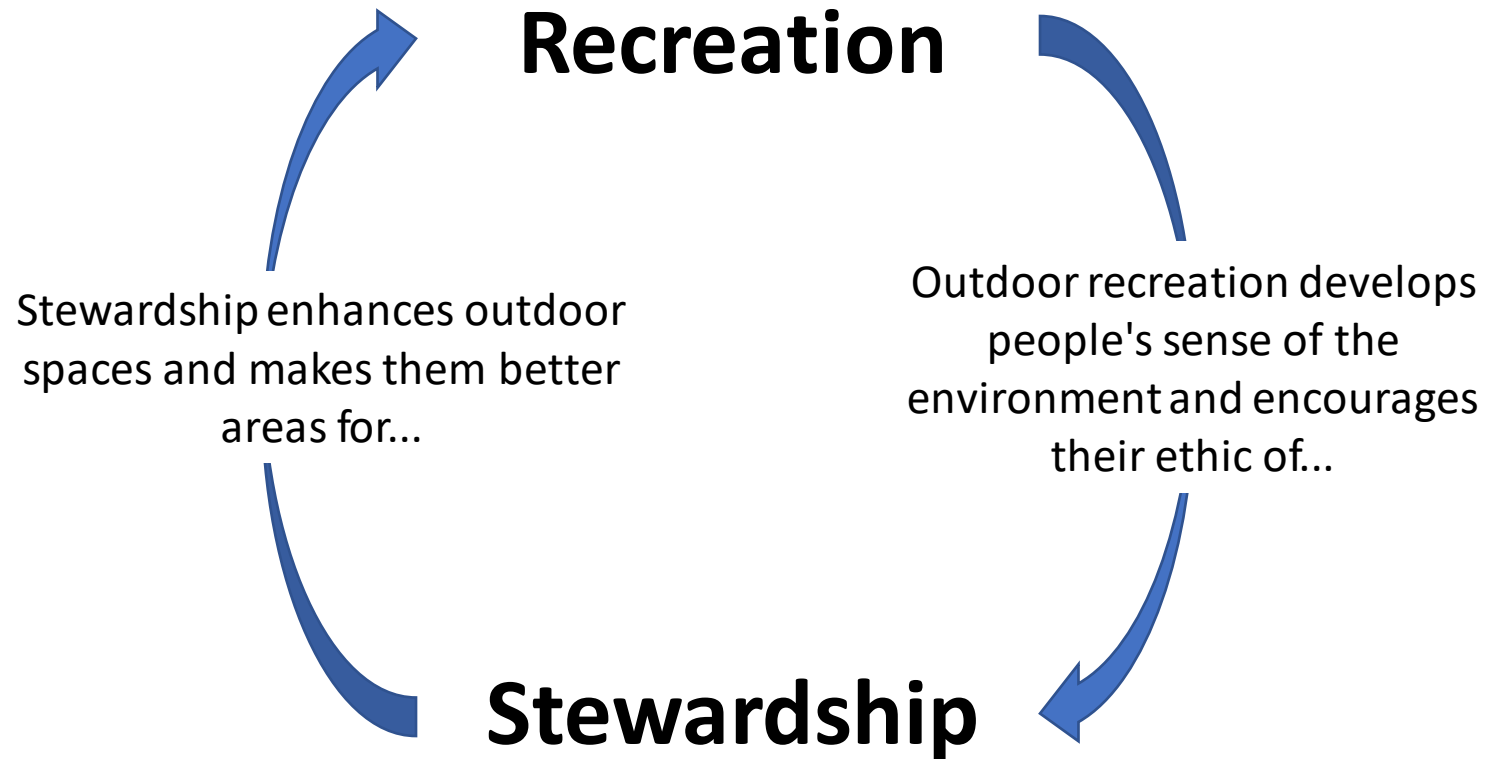
- The Plan will develop comprehensive goals for the entire watershed system.
- Address existing issues.
- Look forward to the future (to 2050) and consider recommendations in light of climate change and future development patterns
- A significant contribution of the plan is to see where we can balance different interests and identify where there may be surprising co-benefits.

Vision for the Watershed: Management Goal

Overall, in 2050, the APC and Nemasket River are healthy, sustaining life and natural communities, including our own through clean, safe, and reliable water supply. The inhabitants of the watersheds have greater protections from climate hazards, and have developed an environmental ethic based upon choice, not chance, that drives sound local and regional decision-making.

Recreation & Stewardship – Defined and Interconnected

Individual or group activities done indoors or outside which can be physical or passive (generally centered around the Ponds, the Nemasket River, and in upland parks)



“The responsible use and protection of the natural environment through conservation and sustainable practices to enhance ecosystem resilience and human well-being.” - NOAA

Recreation & Stewardship – Overview of the Issue

Outdoor recreation is a key quality-of-life factor and regular pastime for many people. Recreational activities, however, can degrade the very outdoor spaces that call to recreators if not managed responsibly, particularly in a system like the APC-Nemasket where there are habitat and drinking water supply protections in play. How can we recreate responsibly, enjoying the outdoors while also enhancing resource-protective stewardship ethics?

Watershed Stewardship Capacity

Town Staff

- Pondside communities' Parks and Recreation Departments largely run by volunteer commissions (Middleborough has greatest capacity with 4 staff members)
- Middleborough Conservation Commission organizes volunteer stewards

Land Trusts

- Rochester Land Trust only known local land trust (currently no land held within watershed)
- Wildlands Trust (regional)

Local Environmental Groups

- Long Pond Association (Lakeville & Freetown)
- Middleborough-Lakeville Herring Fishery Commission
- Middleborough High School & Environmental Club
- Sustainable Middleborough (clean energy & climate change focus)
- Middleborough Tourism Board (organize local events)
- New Bedford Green Team (occasional stewardship events in watershed)

State and Regional Entities

- State: DCR, DER, DEP Southeast Regional Office
- Environmental nonprofits: Mass Audubon, The Nature Conservancy Massachusetts
- Watershed groups: Taunton River Stewardship Council, Taunton River Watershed Alliance, Buzzards Bay Coalition

Recreation & Stewardship Management Goals

Provide quality outdoor recreational opportunities that do not impair natural resources and public water supplies

Increase public awareness of outdoor recreation opportunities, use regulations & stewardship guidelines

Increase local capacity for enforcement of proper outdoor recreation uses and regulations, and public education

Cooperatively and strategically expand the watershed's open space network and recreational programming and activities

Increase local capacity of town staff and volunteer networks to manage and enhance open space for both ecological function and recreational opportunities

Management Challenges & Potential Actions

Public Information & Signage

- Universal informational signage explaining allowed uses, rules, and public access boundaries
- Public education to increase awareness of responsible recreation and environmental stewardship

Invasive Plant Management

- Coordination between towns and local stewardship groups on volunteer invasive plant management efforts
- Target and eliminate sources of nutrient pollution to the system
 - Prevent spread through public education and boat washing stations

Open Space Protection & Management

- Strategically expand the watershed's open space network
 - Enhance land and water trails through regular maintenance
- Cooperative regional stewardship

Recreational Programming

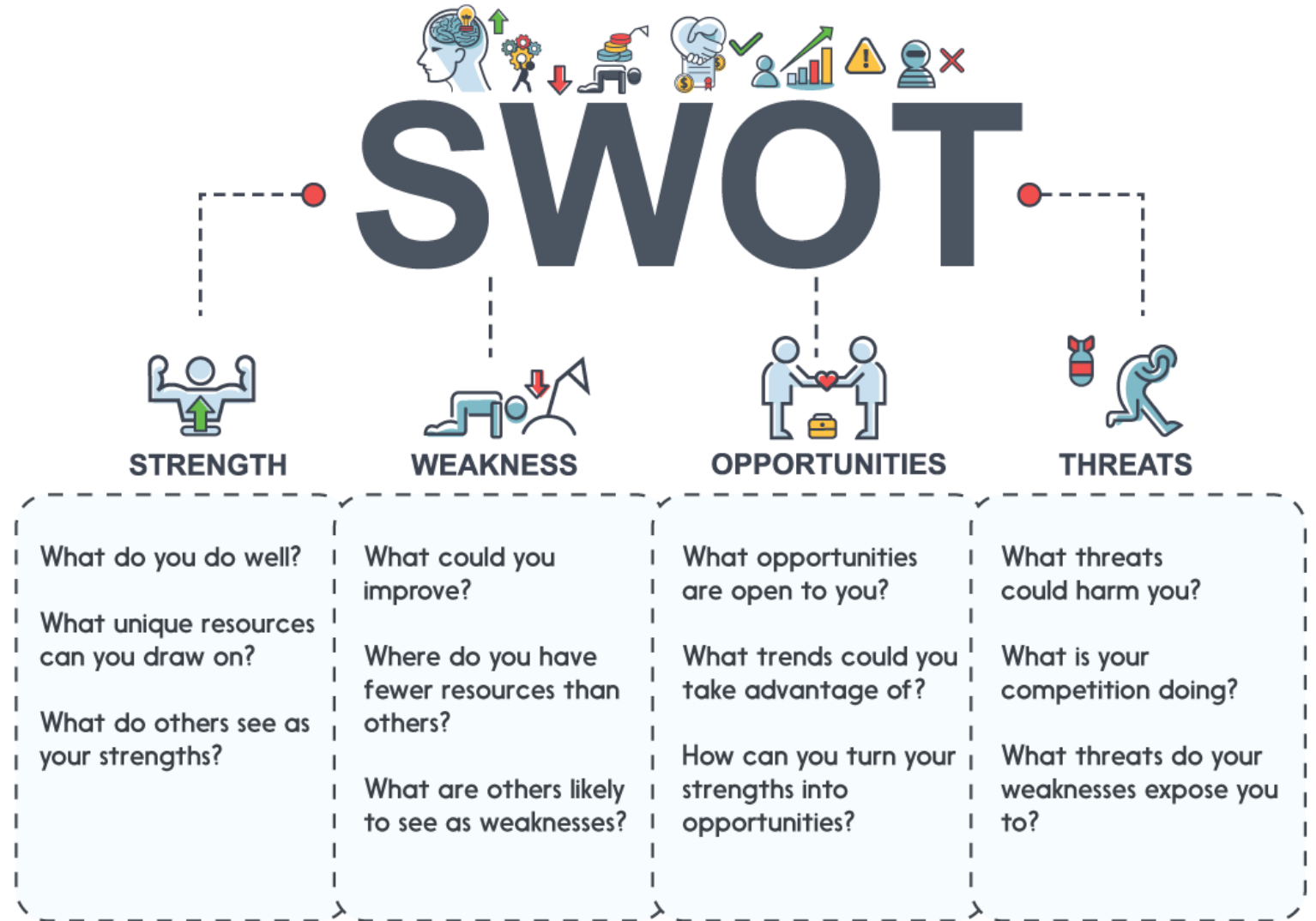
- Expand spiritual, cultural, and historic education and recreational programming opportunities
- Local adoption of Community Preservation Act to fund open space & recreation

Enforcement of Recreational Use Rules

- Formalize funding stream for APC Rangers program and enforcement
- Advertise rules and regulations for public recreation on town websites and with clear signage at public sites

Discussion:

SWOT ANALYSIS



Thank you for
your time
and input
today!

What next?

Take the virtual watershed tour, access the meeting packet, and learn more about your plan at:

www.SRPEDD.org/apc-nemasket-plan

Share additional thoughts through June 2022

Drop a Note: bit.ly/comment-apc-nemasket

Public Meeting Schedule

Join us for in-person, outdoor public workshops! Come to all of them, or to as many meetings as topics interest you. NOTE that there is an online meeting option as well, at the same date and time via Zoom.

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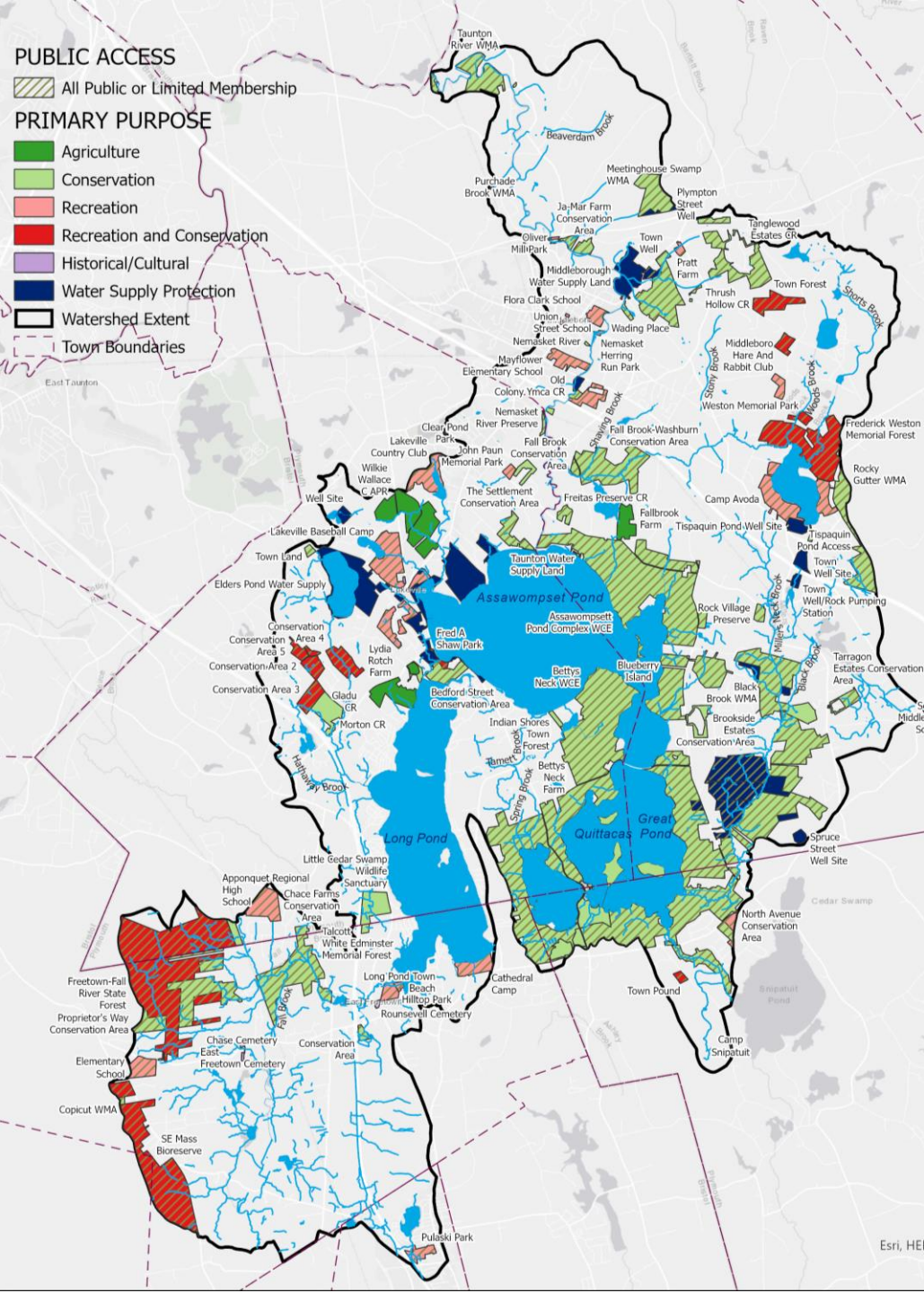
To receive updates on the project status, please make sure that you have completed the registration form!

Register for future in-person or virtual meetings:

bit.ly/register-apc

All virtual meetings will use the same Zoom meeting link:

<https://us02web.zoom.us/j/8150125172>



Existing recreational access & public information

	Lakeville	Middleborough	Freetown	Rochester
Recreational rules and/or guidelines	<ul style="list-style-type: none"> - No rules or regulations in bylaws or on town website - Motor Boat ban on Loon Pond - APC brochure linked on town website includes general uses allowed and guidelines for land-based recreation 	<ul style="list-style-type: none"> - No rules or regulations in bylaws or on town website 	<ul style="list-style-type: none"> - Recreational Facilities bylaw authorizes enforcement by town - No outdoor recreational use or guidelines posted on town website 	<ul style="list-style-type: none"> - No rules or regulations in bylaws - ConComm website has downloadable trail guide with recreational use guidelines
Public information accessible online	<ul style="list-style-type: none"> - APC page on town website with map & access guidelines - limited info on Park Commission website 	<ul style="list-style-type: none"> - Rec info on town website limited to event registration and facility reservation info - Discover Middleborough website has outdoor recreational info 	<ul style="list-style-type: none"> - No park dept website - Limited info posted on ConComm page 	<ul style="list-style-type: none"> - Parks Commission page limited to facility use request form - Separate ConComm & Town Forest Committee website has outdoor recreation details with downloadable public trail guide

THREATS

- Control invasive weeds that limit/degrade recreation
- Pinch points filling in channel
- Sediment near APC Dam
- Projects that would remove recreation assets are not desirable, and the public perception that this might happen could be a barrier; be sure to clarify + communicate
- People's unpoliced habits... for example if a boat wash station goes in, w/o an attendant, what would happen?

OPPORTUNITIES

- local narrative about why stewardship is important
- more weed pull → good for recreation + ecology (co-benefit)
- innovative approaches to sediment/water draining technologies esp. when dam infrastructure is renovated/replaced
- potential dredging (targeted)
- Start w/ young people - curriculum that is transferable b/w communities
 - building stewardship for the long haul → Sandwich, MA example
 - Britton + Norfolk Aggie [ethanol]
- Middleborough 4H - events. Big in Plymouth County overall
- established conservation organized network
 - keep conducting proactive efforts
- Apps/ is there a role? QR codes → existing resources / temporary signage

Opportunities

Continued

- More visibility for this partnership effort/the groups that are involved
- implementation committee for mgmt plan
- town/city agendas - get on select Board/Council meetings more often
- permitting → streamline process, learn about process through specific project applications
 - green/nature-based projects are new,
 - so things are a bit less streamlined
- work w/ private landowners to clarify/improve portage
- utilize volunteer network like Scouts to get interim work done
- continued eco-harvesting projects to maintain clear water
 - keep up maintenance + invasive mgmt plan
- public is eager for solutions + approachable/willing to cooperate
- continued acquisition of land by water suppliers to preserve watershed
- increased usage due to COVID; populations of recreators higher
- parking areas - plan to put signs/educational info
 - make it easy/convenient to comply
 - trash cans near trails
- communicate w/ consistent materials/pamphlets
- QR codes @ kiosks → place @ head of/along trails
- School Committee / Guidance / volunteers / specific names and coordinators of clubs
 - database of teachers looking for school opportunities for students

STRENGTHS

- fishing, boating, tubing
- whole complex - groups dev. plan
- Farming (Lakesville passed Right To Farm)
 - Bristol Ag
 - Middleboro 4H
- land conservation comm.
- Herring Festival
- State + Fed partners, Reps/Senator support to bring in funding
- Regional Collaboration
 - SRPEDD
 - "one message"
- public opinion - Ready to do something now, i.e., invasives, CPA now support for this work
- watershed - no city if don't have H₂O ~~and~~

WEAKNESSES

- Pinch points
- Sediment @ dam - US + DS
- Rochester & Freetown become part of APC (Fred)
- Inter-Agency Cooperation
harder w/ cities than towns "holder is taller"
→ get plans together w/ multi town/city agreement so when funding comes ready to go.
- Permitting
- Enhance ability to package Key Acts etc...
easements so avoid private property.
- Don't want to lose rec. gpps
- geese → invasives - no invasive plan historically

Strengths-Weaknesses-Opportunities-Threats Boards, Online Session



Analysis

Weaknesses

Areas for improvement

very little awareness of trails available around APC (Lakeville), poor signage at Betty's Neck, access road could be improved

lack of signage about allowed uses

trash

lack of awareness of what people can/should do on/around ponds

lack of signage at APC dam - tell people not to bring kayaks over dam

lack of youth engagement (esp girl scouts)

not adequate funding for APC rangers

limited opportunities for volunteers to encourage stewardship (cannot provide enforcement - security issues)

nemasket river not wide enough to accommodate motor boats (some people do use them, create wakes, disturb waterfowl, fish)

Threats

Where you are at risk

fishing line often found tangled at canoe launches

upland invasive plants (bittersweet, others)

riparian invasives (i.e. knotweed) impacts river banks/stability

Long pond boat ramp increases competition with non-locals

higher usage on weekends - need more ranger coverage during those times

some trails overused (near causeway, Quittacas shore on Middleborough side) plymouth gentian exists nearby, could threaten

previous flooding over bedford st near tamarak park - could future storms threaten those areas?

future rain/storms - can existing infrastructure withstand it (i.e. dams like APC)

APC-Nemasket Management Plan Public Workshops 4 – 13 – 22 Recreation Online Session

Participants: Cynthia Salamon (Lakeville resident, rec user, interested in climate resilience), Mike Schroeder, Sherri Barron

SWOT Analysis:

1. Current strengths

Cynthia Salamon – Lakeville approved the community preservation act

The fact that the upper nemasket has trails for kayaking and fishing

Enhancing the program – canoe access could be improved so people can more easily get into the river (opportunity)

Cynthia: strength: when there are opportunities to educate & share info, people are generally supportive – pilot project to remove weeds in the Nemasket river – pilot program last summer done

Networks of connected lands

2. Threats

Signage issue in the upper nemasket: people aren't supposed to take their kayaks over the dam – they take their kayaks from bridge street – need some signage to remind them of that.

The nemasket river doesn't support outboard motors – it's usually in the spring. These outboard motors create wakes which disturb nesting water and bird fowl.

Fishing lines often caught up on the Canoe line lodges

Towns don't want to put trash receptacles in b/c those will attract trash

- Nothing like the regular APC area

Japanese knotweed is one example of a very bad thing

- Riparian invasives (Japanese knotweed, bittersweet)

There was a walk that Mike Schroeder took in 2020 around the causeway – there was a short trail near Quitticas, and it seemed to be overused (ground was bare of understory) and there were a lot of people using it – if there are people using a single trail so much that it tramples the understory.

A couple of steeper areas out there which are just rocks – that the more use leads to more people and more trash

Other threats: flooding around Bedford St. near Tamarack park – with climate change & more severe storms, could be physical risks associated with that. Higher amount of water over short time causing local flooding – dam at top of nemasket river

Pre-covid shutdowns Nancy Yeatts organized things around Betty's Neck and they were well attended and were varied.

3. Weaknesses

Vaughn Street – need more parking available

There is a lot of trash that gets strewn about.

Cynthia: there is no handicap access from Betty's neck. Need to have some access expanded.

- Tamarack park in Lakeville could be a good example – a motorized wheelchair can go through it. However that is small – it has a paved parking area

Make Schroeder: the APC management team does not have enough funding for its rangers

- People who are trying to bring their kayaks in or go swimming along quittacas pond – it is more about an education thing rather than need

The Middleborough gazette discontinued as of December last year – need different informational outlets. The cable access is mostly less effective

4. Opportunities

Betty's neck access road could be improved

There is a lot of land available and a lot of great trails, bug signage is a key issue – one little sign at gate close to parking area close to morgan property – a lot of people don't realize that people can't go swimming – rangers are always there trying to educate people

- Last year there was Nancy Yeatts who put up signs about pocksha pond, but those went away rapidly – they weren't robust enough to work

The environmental activists for Massachusetts southeast

- o Invasive removal projects

Long pond boat ramp increases competition with non-locals – would be good for a boat wash station

Public education initiatives:

- Taking people on nature walks – don't seem to be very well attended, but they encourage people to be excited – there needs to be a game aspect such as scavenger hunts or etc.

Lakeville CPA: when larger tracts of land become available, the CPA is an opportunity to preserve more property – Lakeville CPA is set at 1%

Cynthia: we have some diversity – APC is the home of the red bellied cooter – we need to have more education on this topic & how people think

- Getting the word out is very hard – social media is helpful, signage is necessary, signage in these areas

Around little quittacas there is just a single gate

- There is a kiosk around battery park – Mike needs more help maintaining this
- The target group to educate people – if there is a way to advertise in the schools and do this *months* ahead of time – involving young people in educational programs
- That is pretty much absent – could have boy and girl scouts (most importantly girl scouts)

Parks and recreation departments tend to focus too much on just sports fields


Some paired recreational programming could work, but occasionally that will require a fee – some people seem willing to do that

Electronic sign near old town hall for advertisement – the Lakeville community website (town admined website) is where Cynthia Salamon would get.

Trying to get the word out – ‘maybe there is a banner that can come out and tell people that there is something to look at.

LAND DEVELOPMENT PUBLIC MEETING MATERIALS

Date:	April 27, 2022
Location:	Council on Aging Building, Freetown, MA (outdoor, in-person) and Zoom (online)
Time:	Occurred simultaneously from 5:00 - 7:00 PM

An aerial photograph showing a winding road along the edge of a large body of water, Assawompset Pond. The road is paved and has a yellow center line. To the left of the road is a dense forest with trees in various shades of green and brown, indicating autumn. To the right of the road is the pond, which is a deep blue color. In the distance, a small building with a red roof is visible on the shore. The sky is clear and blue.

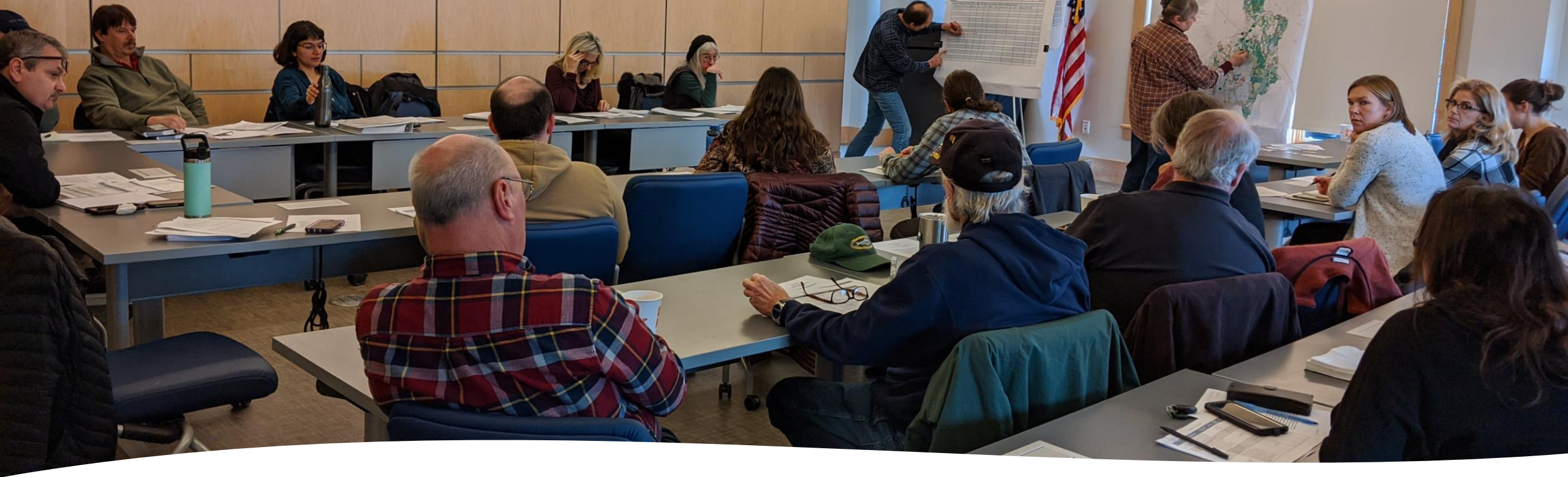
Assawompset Pond Complex & Nemasket River Watershed Management & Climate Action Plan

**Public Meeting #5 | Land Development
Freetown Council on Aging | Zoom
April 27, 2022, 5-7 PM**



Agenda

- Project overview & vision for the watershed
- Developing plan recommendations: Land Development
 - Issue summary presentation
 - Management actions discussion
 - SWOT analysis
- Next Steps



Meet the Project Team

APC Management Team

- City of New Bedford Water Division
- City of Taunton Water Division
- APC Ranger
- Middleborough-Lakeville Herring Fishery Commission
- Mass Division of Fisheries and Wildlife
- Select Board Members
- Legislators
- Local Board and Commission Members
- Volunteers

Town Staff

- Patricia Cassady, Middleborough, Conservation Agent
- Merilee Kelly, Conservation Agent and Nancy Durfee, Town Planner, Rochester
- Michele Paul and Chance Perks, New Bedford, Environmental Stewardship Dept
- Phillip Duarte, Taunton, City Councilor
- Deborah Pettey, Freetown, Interim Town Administrator
- Nancy Yeatts and Lia Fabian, Lakeville

Meet the Project Team



Bill Napolitano
Environmental
Program



Helen Zincavage
Environmental
Program



Courtney Rocha
MVP Coordinator,
Southeast Region



Marea Gabriel
Conservation Projects
Manager



Sara Burns
Water Resource
Scientist



Danica Belknap
Environmental
Program



Benjamin Myers
Environmental
Program



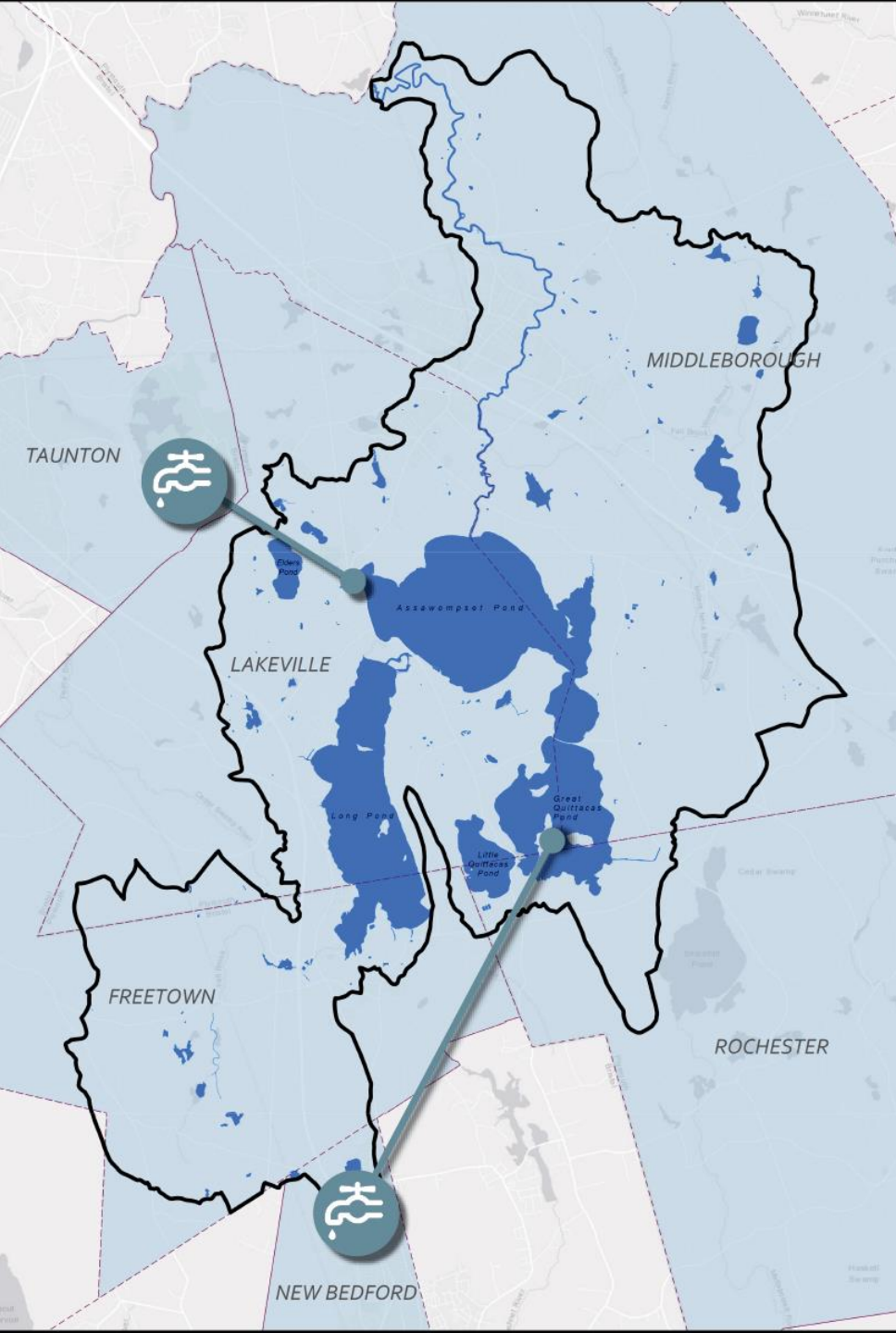
Neal Price
Associate Principal,
Senior Hydrogeologist



Ellie Baker
Senior Environmental
Planner



Eric Walberg
Climate Change Specialist,
Walberg Consulting



Watershed Basics

- Total Plan Area: 44,900 ac = 70 sq. mi.
- Spans the towns of:
 - Freetown
 - Lakeville
 - Middleborough
 - Rochester
 - Small portion of New Bedford

Role of the Management Plan

- The Plan will develop comprehensive goals for the entire watershed system.
- Address existing issues.
- Look forward to the future (to 2050) and consider recommendations in light of climate change and future development patterns
- A significant contribution of the plan is to see where we can balance different interests and identify where there may be surprising co-benefits.

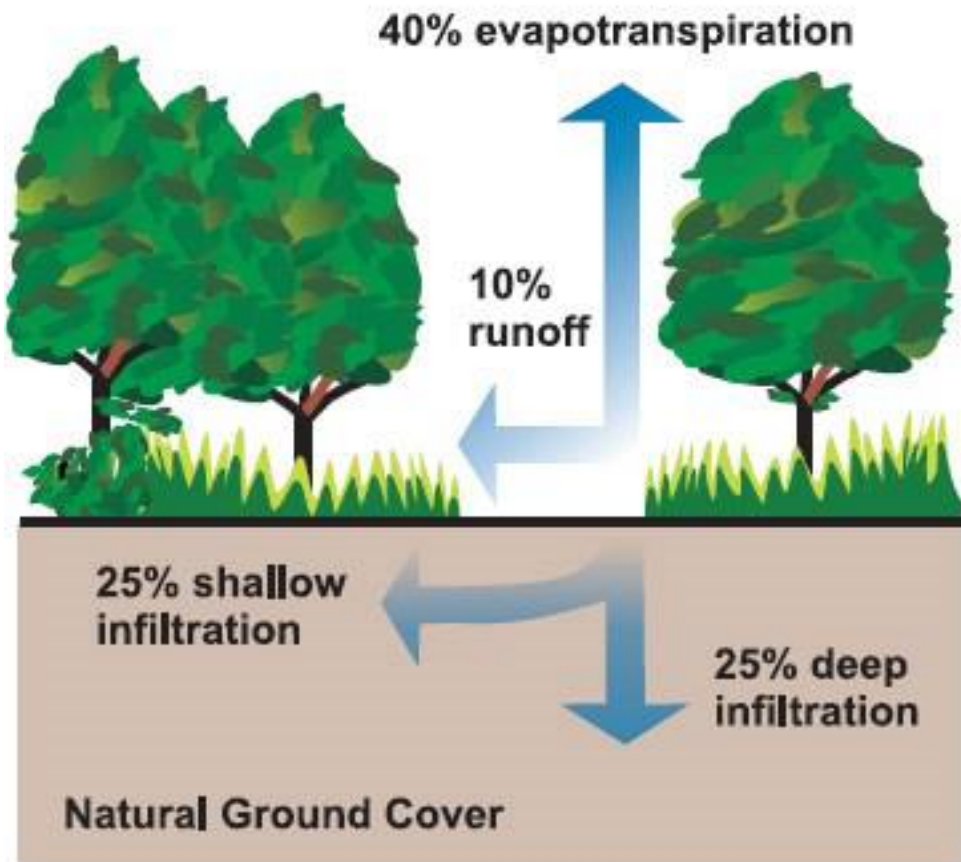
Vision for the Watershed: Management Goal

Overall, in 2050, the APC and Nemasket River are healthy, sustaining life and natural communities, including our own through clean, safe, and reliable water supply. The inhabitants of the watersheds have greater protections from climate hazards, and have developed an environmental ethic based upon choice, not chance, that drives sound local and regional decision-making.

Land Development – Overview of the Issue

Development of natural areas has the potential to increase stormwater runoff, reduce water quality, and fragment and degrade wildlife habitat. Proactive community planning can help direct new development to the most appropriate areas within the watershed, allowing communities to grow as needed while limiting the negative environmental impacts.

Development & Stormwater



Climate change

**Sprawling
Development**

increased
precipitation

increased
temperature

impervious
surfaces

stormwater &
WQ issues

flooding &
infrastructure
damage

heat-related
illnesses

stresses to
natural
environment



Low Impact Development (LID)

Design that works with nature to manage stormwater and decrease the impact of development on surface and groundwater



- Manages stormwater as **close to its source** as possible
- Treats **water as a resource**, not just a waste product
- **Preserves** natural landscape and recreates natural features

Learn more at www.MassAudubon.org/lidcost



Implementing LID

Limit development's impact on nature	Protect valuable natural areas
<ul style="list-style-type: none">• Priority Development Areas (PDAs)• Ch 43D expedited permitting• Allow Open Space Design (OSD) by-right• More flexible Zoning and Subdivision regulations• Encourage LID practices that reduce sprawl in local zoning and subdivision regulations• Adopt stormwater bylaw and/or permitting system to reduce negative impacts of stormwater runoff	<ul style="list-style-type: none">• Priority Preservation Areas (PPAs)• Open Space and Recreation Plan (OSRP)• Conservation Restriction (CRs)• Transfer of Development Rights (TDRs)• Ch 61 tax reductions• Community Preservation Act (CPA)

LID in Local Regulations

ACTION	HOW	RESULT
Reduce sprawling development	<ul style="list-style-type: none">• Zoning, Subdivision regulations• Adopt Open Space Design	<ul style="list-style-type: none">• Open space protection and access• Limit environmental impacts
Decrease impervious area	<ul style="list-style-type: none">• Zoning, Subdivision regulations• Site Plan Review	<ul style="list-style-type: none">• Mitigate flooding• Alleviate heat impacts
Infiltrate stormwater	<ul style="list-style-type: none">• Subdivision regs• Site Plan Review• Stormwater bylaw/regulations	<ul style="list-style-type: none">• Improve water quality• Recharge groundwater supply
Utilize green infrastructure	<ul style="list-style-type: none">• Subdivision regulations• Construction Design Guidelines• Stormwater bylaw/regulations	<ul style="list-style-type: none">• Longer lasting, less costly maintenance• Mitigate climate change• Community co-benefits (aesthetics, health)
Rainfall utilized as a resource	<ul style="list-style-type: none">• Subdivision regulations• Site plan review• Stormwater bylaw/regulations	<ul style="list-style-type: none">• Reduced water costs• Protect water supply

Land Development Management Goals

1

Proactively plan for future development by prioritizing areas for protection and development

2

Reduce the environmental impacts of development through low impact development and stormwater management practices

3

Build for the future and ensure all new and re-development is designed for future climate projections

4

Work with nature to preserve and leverage natural functions that provide community resilience

5

Encourage more flexible housing options and development practices to limit sprawl

Potential Management Actions

Improved Stormwater Management

- Limit conversion of natural areas to impervious cover that contributes to stormwater runoff
- Prioritize on-site treatment and infiltration in drainage designs
- Disconnect impervious areas from water bodies to improve water quality

Proactive Land Use Planning

- Prioritize areas for development vs. protection in Master Plans
- Prioritize valuable natural areas for protection in Open Space Plans
- Encourage development in priority development areas through expedited permitting

Low Impact Housing & Development Design

- Enable more multi-family housing options in zoning
 - Encourage cluster developments and Open Space Design (OSD) to minimize development's footprint
- Allow more flexible lot dimensions and designs in zoning and subdivision

Build for the Future

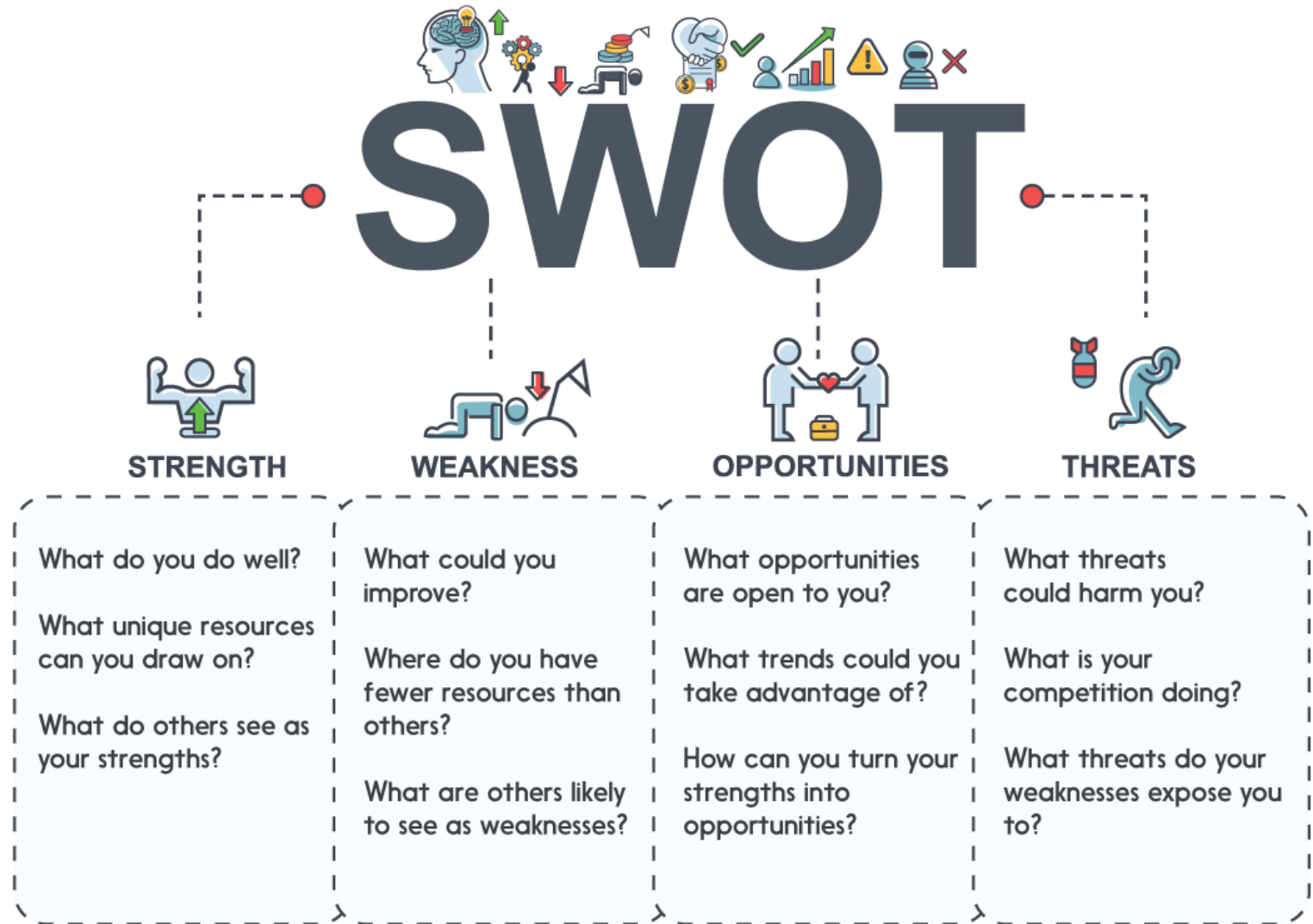
- Consider climate change and rainfall projections in construction design & planning
 - Build all new infrastructure to withstand larger storm events
 - Require climate resilience considerations in all site plans

Work with Nature

- Leverage natural functions that protect communities from flooding, extreme heat, and intense storms
- Enable flexible site plan design that conforms to, rather than alters, nature
 - Favor “green” stormwater infrastructure over “gray”

Discussion:

SWOT ANALYSIS



Thank you for
your time
and input
today!

What next?

Take the virtual watershed tour, access the meeting packet, and learn more about your plan at:

www.SRPEDD.org/apc-nemasket-plan

Share additional thoughts through June 2022

Drop a Note: bit.ly/comment-apc-nemasket

Public Meeting Schedule

Join us for in-person, outdoor public workshops! Come to all of them, or to as many meetings as topics interest you. NOTE that there is an online meeting option as well, at the same date and time via Zoom.

TOPIC	DATE	LOCATION
Flooding	9.29.21 5-7 PM	Lakeville
Water Quality	10.13.21 5-7 PM	Taunton
Water Supply	11.10.21 5-7 PM	Zoom Only
Unique Habitats	3.23.22 5-7 PM	Middleboro
Recreation	4.13.22 5-7 PM	Rochester
Land Development	4.27.22 5-7 PM	Freetown
Open House	6.1.22 6-8 PM	Lakeville

To receive updates on the project status, please make sure that you have completed the registration form!

Register for future in-person or virtual meetings:

bit.ly/register-apc

All virtual meetings will use the same Zoom meeting link:

<https://us02web.zoom.us/j/8150125172>

END OF PRESENTATION

Dive into your local community's development regulations in the summary slides that follow

APC Communities Regulatory Review: Stormwater Management

*Measures reviewed: MS4
permitting, local Stormwater
Bylaws, Subdivision Rules &
Regulations, Site Plan Review*

	Freetown	Lakeville	Middleborough	Rochester
MS4 Regulated?	Y	Y	Y	N
Stormwater bylaw?	N - Illicit discharge detection only	N - Illicit discharge detection only	Y - standalone bylaw and thorough rules & regs	N- regulated in subdivision rules & regs
Enforcement/ Oversight	Building Commissioner	Building Commissioner	Board of Selectmen, Stormwater Committee	Planning Board
Stormwater Permit	N	N	Y, over 10,000 sq. ft.	N, but SW Management Plan required for SPR and reviewed by other depts
LID Stormwater management	not specified; bylaw targets illicit discharges	not specified; bylaw targets illicit discharges	required with clear guidelines, design standards	enabled and preferred in performance standards, but should be more clearly encouraged upfront

APC Communities Regulatory Review: Impervious Cover Controls

*Measures reviewed: Zoning
bylaws, Subdivision Rules &
Regulations*

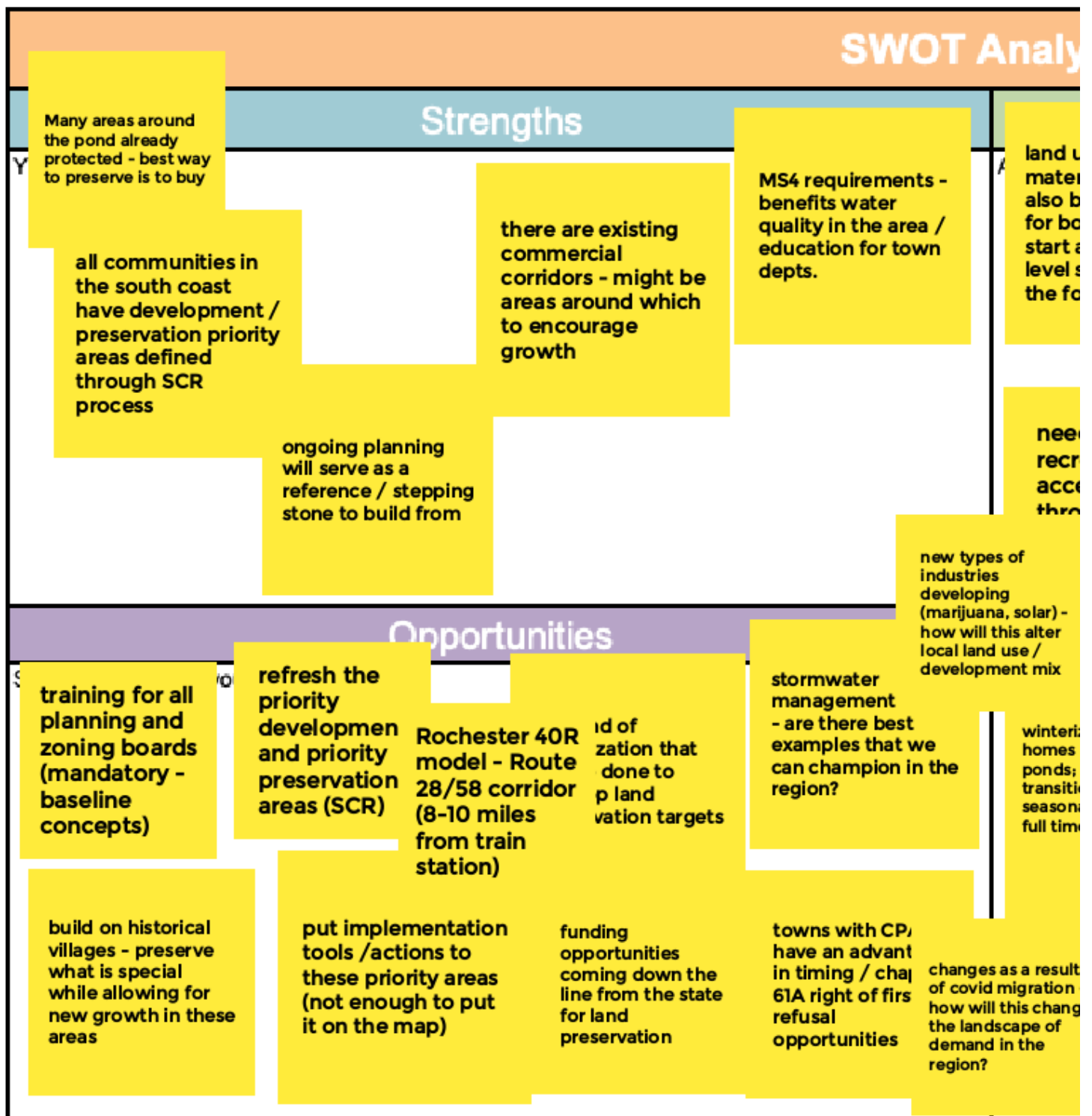
	Freetown	Lakeville	Middleborough	Rochester
Lot dimensions (residential)	Min 70,000 sqft	Min 70,000 sqft	Min 20k-80k sqft	Min 43,560 sq ft
Impervious cover maximums	30% (residential) to 80% (business & industrial) maximums	25% (residential) to 50% (business & industrial) maximums	No maximum for residential; 60-65% for general use & business	20% max (residential) and 70% elsewhere
Parking	<ul style="list-style-type: none"> - Mins by use - Shared options for commercial 	<ul style="list-style-type: none"> - Mins by use - Max in Smart Growth Overlay District - Shared parking by SP 	<ul style="list-style-type: none"> - No requirements for residential development - Commercial min by use - Shared parking by SP 	<ul style="list-style-type: none"> - Min driveway size for residential lots - Common driveways allowed for 2-4 lots by SP
Roads	24-40ft min widths	24-30ft min widths	24-26ft min widths (residential)	18-30ft min widths
Sidewalks	Required along all streets, both sides for primary and one side for secondary streets	Required along all streets, on one side only	Required along all streets serving 25+ homes, both sides in Res A/B and one side in Res-Rural	Required along all streets serving 3+ homes, on one side only
Permeable pavement	Concrete pavement standards No mention of permeable options			

APC Communities Regulatory Review: Site Plan Review

*Measures reviewed: Site Plan
Review bylaws/regulations,
Zoning bylaws*

	Freetown	Lakeville	Middleborough	Rochester
Site Plan Review	Standalone rules & regulations	Outlined in zoning; no separate rules and regs	Not addressed in zoning, except for Business District	Outlined in zoning; no separate rules and regs
Triggers	2500sqft gross floor area (single family exempt)	Business/industrial: 1500sq ft aggregate floor area Residential: 43,560 sqft	Business district and subdivision permits	675sqft total gross floor area (residential and agricultural uses exempt)
Reviewers	Planning Board, Board of Health, Building Inspector, Highway Surveyor, Police/Fire Chief, Conservation Commission	Planning Board, Police/Fire Chief, Board of Health, Conservation Commission, Highway Surveyor, Building Dept, Open Space Committee, Board of Selectmen	Business district: Zoning board of appeals reviews site plans for business district Subdivision: Planning Board	Planning Board, Conservation Commission, Board of Health, Building Commissioner, Highway surveyor, Police/Fire Chief
LID & resilience considerations	LID favored in design guidelines	SW management plan required; LID not specified	No design guidelines provided	Design guidelines require minimal environmental impacts; LID not specified

Strengths-Weaknesses-Opportunities-Threats Boards, Online Session



SWOT Analysis

Weaknesses

nts -
rea /
own

land use training materials should also be enhanced for board members - start at that 101 intro level so people have the foundation

low impact development - all bylaw changes have to go through town meeting - difficult to get things passed (home rule)

TDR - interesting idea, but difficult to implement.

lack of communication between people who share the same resource but don't normally talk on these issues

need equal recreational access throughout rshed

working with 4-6 different communities; potential inconsistency in bylaws and enforcement approaches

differences in bylaw implementation

overcoming historical lacks of communication

new types of industries developing (marijuana, solar) - how will this alter local land use / development mix

how can land use enforcement be bolstered / give resources to local officials that are the ones faced with implementation

staffing capacity, especially in the realm of town planning, is lacking

Threats

at
we
in the

winterization of homes around the ponds; homes transitioning from seasonal cottages to full time/larger

solar development is a large impact these days

how much water do we actually have? how many people are actually using it? there is just not enough data.

hydrological connectivity between assawompset ponds complex and neighboring watersheds

changes as a result of covid migration - how will this change the landscape of demand in the region?

tain areas
out of
pable land?
ou consider
ds, etc

land that is preserved comes out of the local tax base

in towns without infrastructure, the MBTA rule is not implementable

household-level land management habits are difficult to change

APC Public Meeting: Land Development

4/27/2022, 5-7pm

In-person meeting: Freetown Council on Aging

NOTE: The meeting format was meant to be a SWOT analysis identical to that which took place online, but outdoor conditions were extremely windy that day, precluding the use of the large SWOT boards. Attendance was also minimal. In recognition of these conditions, the meeting facilitator team held a guided discussion instead of a formal SWOT discussion.

Notes/public feedback:

- Public needs central information source to learn about what is going on in watershed
 - Want to see status of all ongoing projects (i.e. priorities identified from DER grant – what is the implementation status of each) – regularly updated webpage / spread sheet?
 - There hasn't been any communication with public regarding implementation post DER grant & public meeting years ago – people want to see progress made
 - APC newsletter – send out more regular updates?
- Forest management – question about APC management team's authority/intent to control what happens on private land, and difference between plan and committee
 - This plan is a standalone plan for watershed (independent of APC Management Team)
 - We will make recommendations in plan for how to manage plan, but no authority or intent to tell land owners how to manage their lands/forest
- APC Management Team – intent is to go back to less active role they had before this project, meeting quarterly only
- Lakeville Country Club – land protection opportunity (chapter land – town has right of first refusal)
 - Town will need to match offer from developer of \$12M (even though appraisal value is much lower - ~\$1.7M?)
 - Nancy thinks this property shouldn't be a priority because of how expensive it is, and relatively low value of golf course vs other natural land
- Need more education for public to understand why LID is important → get community to support LID regs
- Lakeville – Open Space Bylaw up for vote in next town meeting May 2022)

MEET YOUR PLAN PUBLIC MEETING MATERIALS

Date:	July 14, 2022
Location:	Ted Williams Camp, Lakeville, MA (in-person only)
Time:	Open House from 5:00 - 8:00 PM, with remarks and presentation from 6:30-7:30

The APC and Nemasket Watershed Management
and Climate Action Plan Sign-in Sheet



SRPEDD
Southeastern Regional Planning
& Economic Development District


If you would like to receive project updates, please
provide your email (extra care to write clearly - we
don't want to misread and miss you!)

Name	Community of Residence
John Worley	Lakeville
Tom Kenney	Lakeville
Pamela Maksy	Lakeville
Lia Faber	Lakeville
Donna Sue Sena	Lakeville
WENDY CHADBOURNE	Lakeville
Hannah Clayton	Lakeville
Susan Sena	Lakeville
Irudy Sena	Lakeville
Timothy O'Leary	Middleboro
Tom Gough	Middleboro
Nancy Dufur	Rochester
Janice McGonigle	Middleborough
Joan Pierce	man Wildlife (Fish & Game)
Jan O'Leary	Taunton/Lakeville born
Sally Spooner	Lakeville
Donna Delost	Lakeville
Rick MATHEWS	Lakeville
Nancy Yeatts	Lakeville

emails withheld for
privacy

www.srpedd.org

Name	Residence	don't want to misread and miss you!
Martha Worley	Lakeville	absolutely

An aerial photograph of a large, calm pond with a deep blue surface. In the foreground, a river flows through a dense forest with trees showing autumn colors of green, yellow, and orange. The background shows a distant shoreline with more trees under a clear sky.

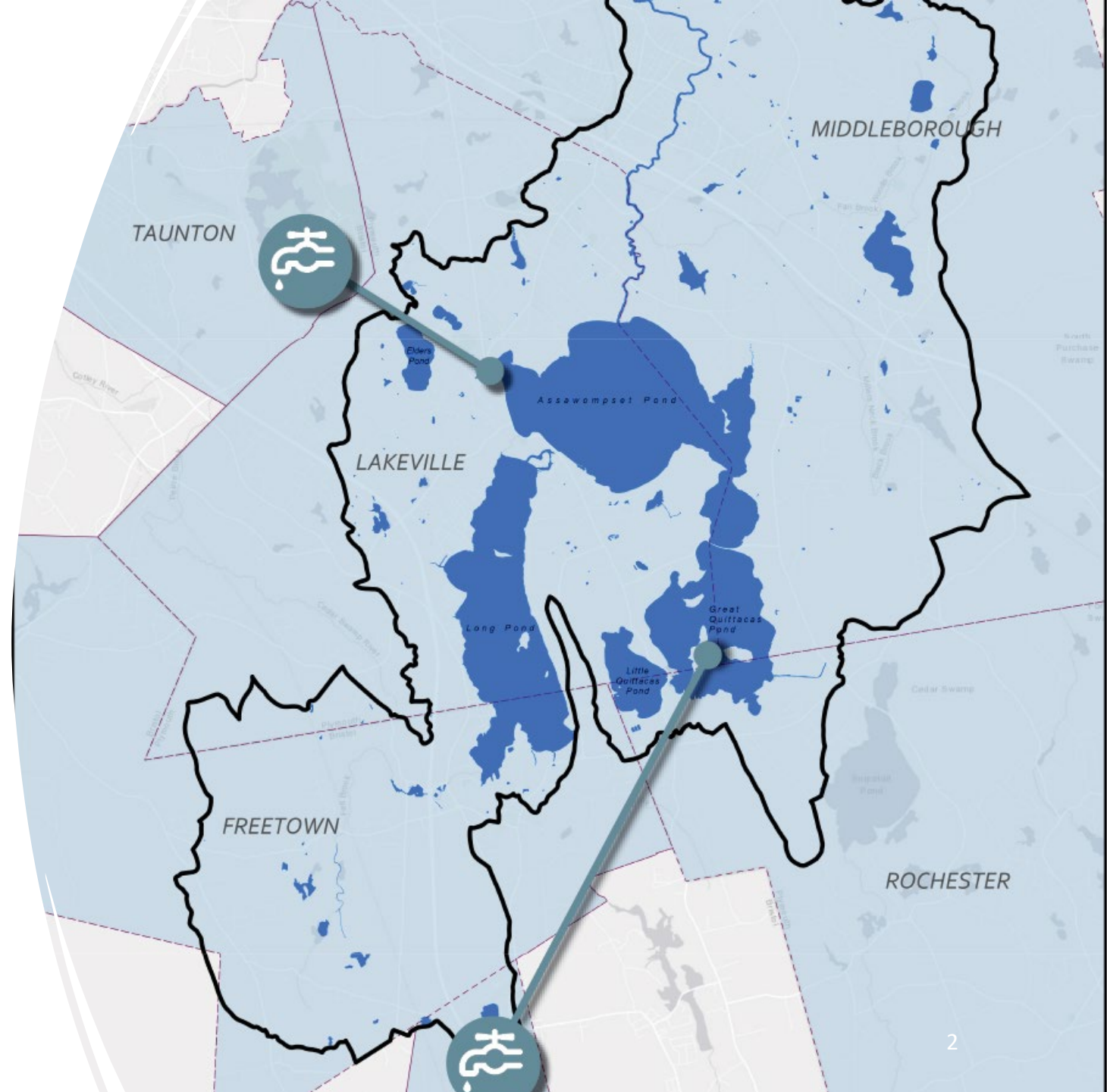
The Assawompset Pond Complex and Nemasket River Watershed Management and Climate Action Plan

Meeting your Plan Public Workshop

7/14/22

Outline

1. Project Background
2. Planning Process
3. Plan Structure
 1. Watershed Vision
 2. Regional Climate Future
 3. Issue Area Investigation
 4. Key Management Tensions
 5. Recommendations
4. Plan Outcomes





1: Project Background



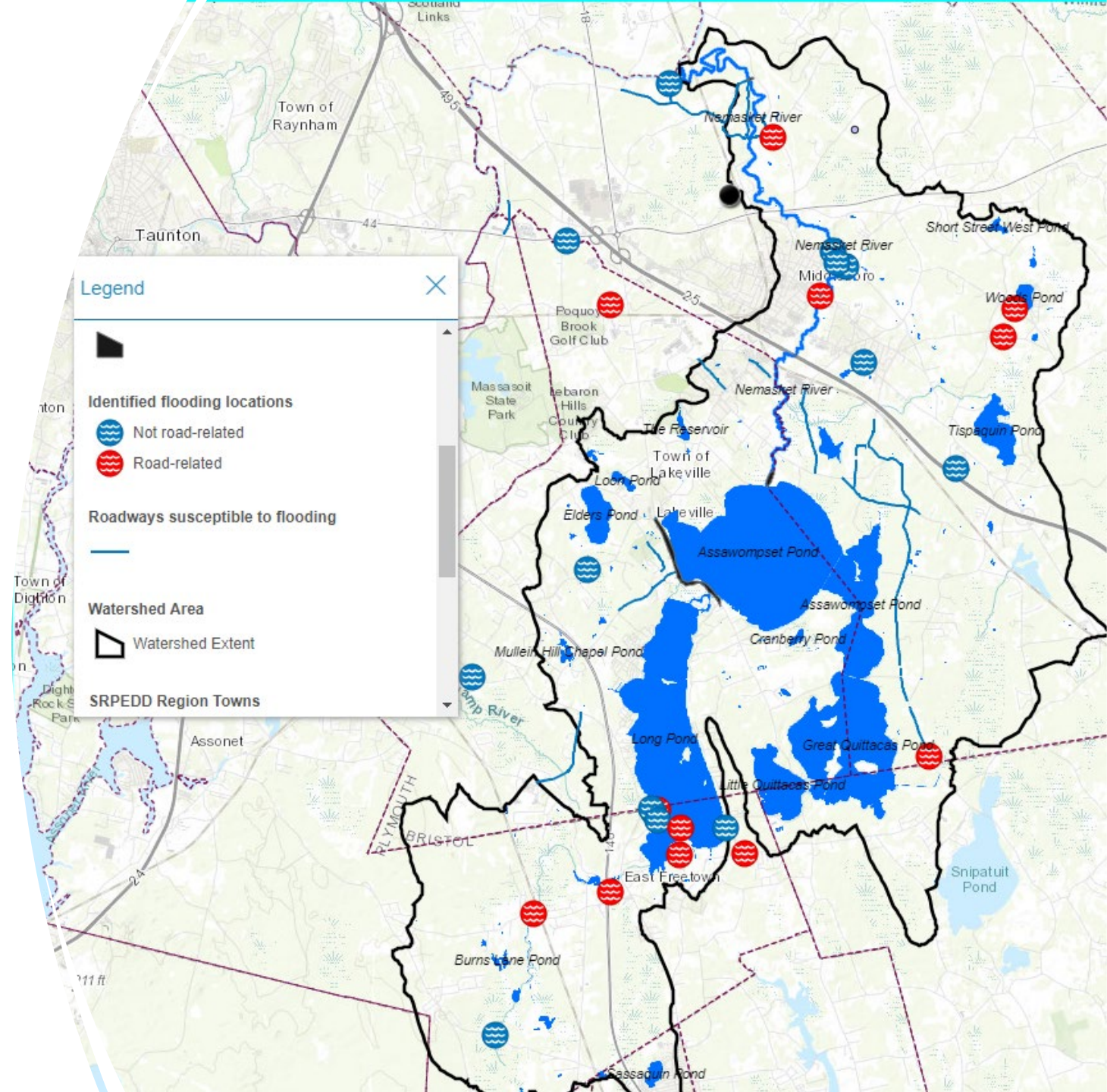
2010 Flooding

Stakeholder: Pondside Communities

**Median HH Incomes ranging
from \$83,227 - \$106,775**

**2010 Flood Impact Areas and Road
Closures were significant**

**Total Value of APC-Nemasket
Residences within the 100-year
floodplain - \$172,610,170**



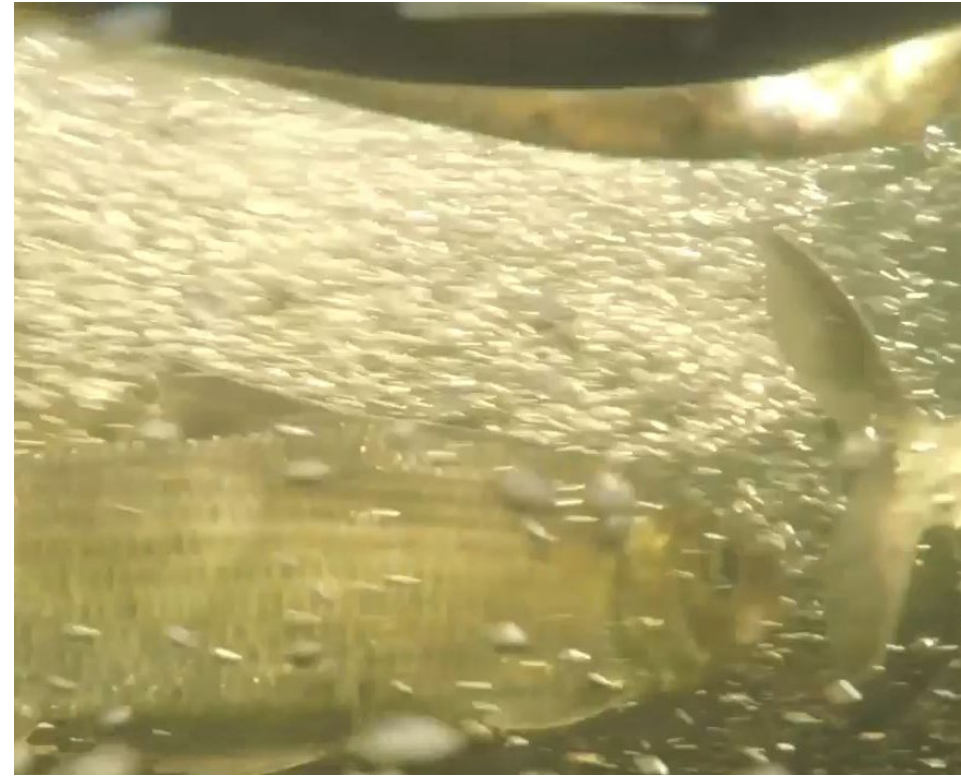
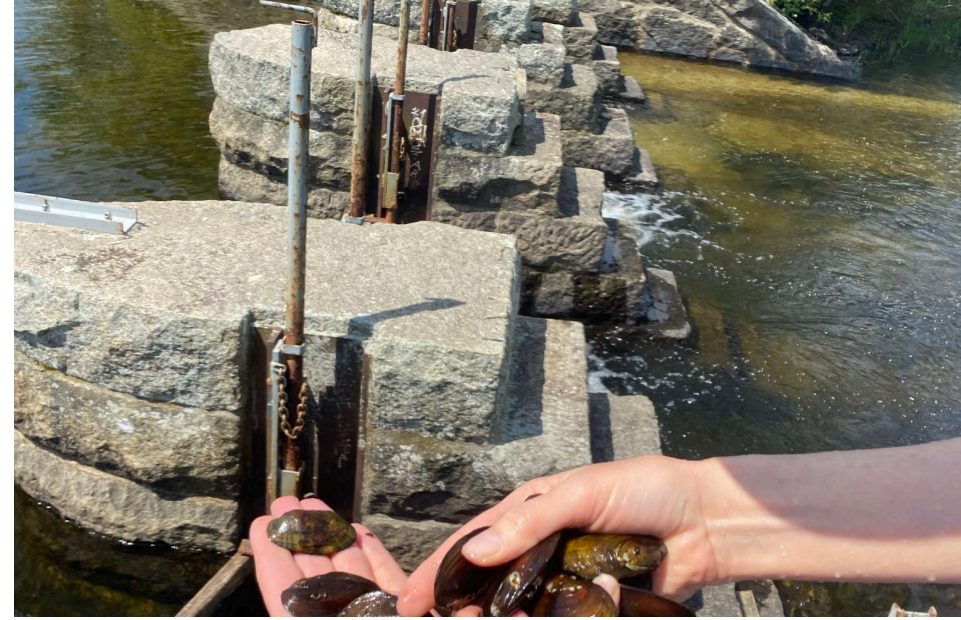
Stakeholder: Water Suppliers

- City of Taunton and City of New Bedford water supply source (granted water rights in 1870s; drawing since late 1890s)
- Provides water to 250,000 people
- Median HH Income Taunton - \$61,185
- Median HH Income New Bedford - \$43,989 (MASS = \$81,215)
- UNIQUE SITUATION: two separate water utilities drawing from same surface water reservoir
- Concerns: Drought, Water Quality, Limiting Human Contact with Water Supply



Stakeholder: Unique Ecological Communities

- Longest Herring Run in Massachusetts
- Home to threatened and endangered species of mussels and turtles
- Site of active wildlife conservation and reintroduction projects



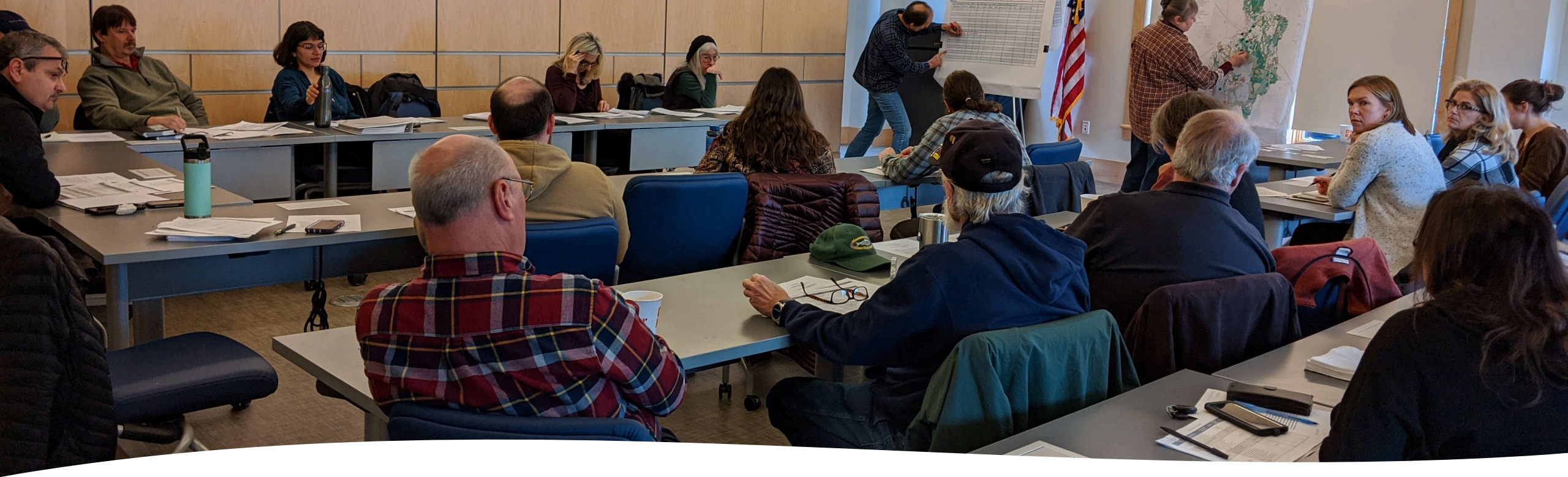
SNEP Network / Taunton River Stewardship Council grants funding a hydrological and hydraulic study of the Upper Nemasket River

[illegible][illegible]



Floodwater Management Project Outcome: 6 Priority Projects

1. Remove Sediment Deposition in the first 500 ft of the Nemasket River and install Silt Trap
2. Develop a long-term, scientifically-based hydro model for the APC and Nemasket to support water supply operations, determine firm yield, and support fish passage
3. **Develop a Management Plan for the APC with best practices for handling the dam, sediment, fisheries, Nemasket flow, aquatic invasives management, floodplain, water quality and supply, etc.**
4. Replace undersized culverts at the snake River and Route 105
5. Assawompset Dam Replacement
6. Wetland restoration at Bridget Street, Wood Street, Wareham Street, Vaughn Street



Steering Committee: APC Management Team **PLUS**

APC Management Team

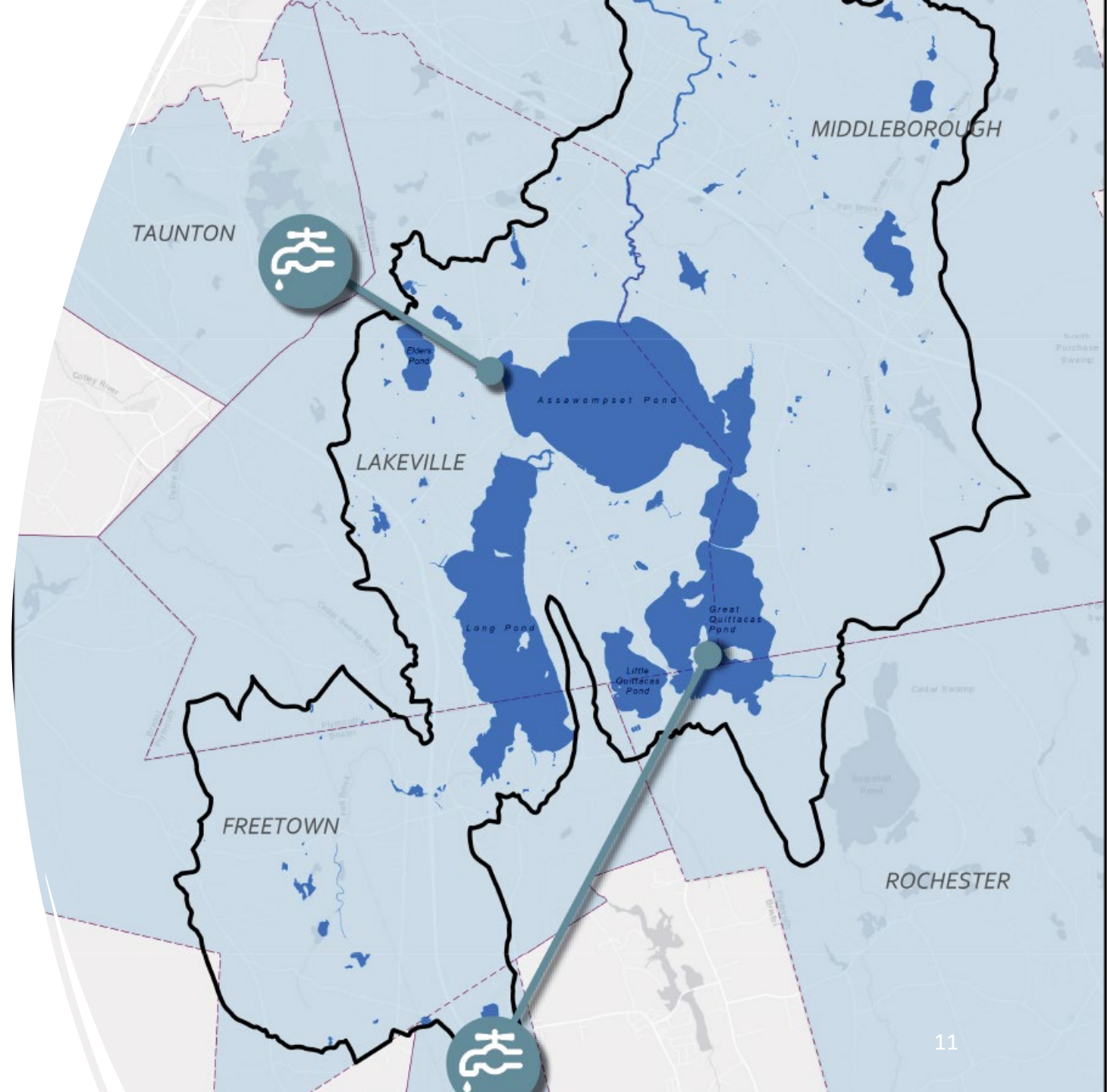
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- Mass Division of Fisheries and Wildlife
- Select Board Members
- Legislators
- Local Board and Commission Members / Appointees

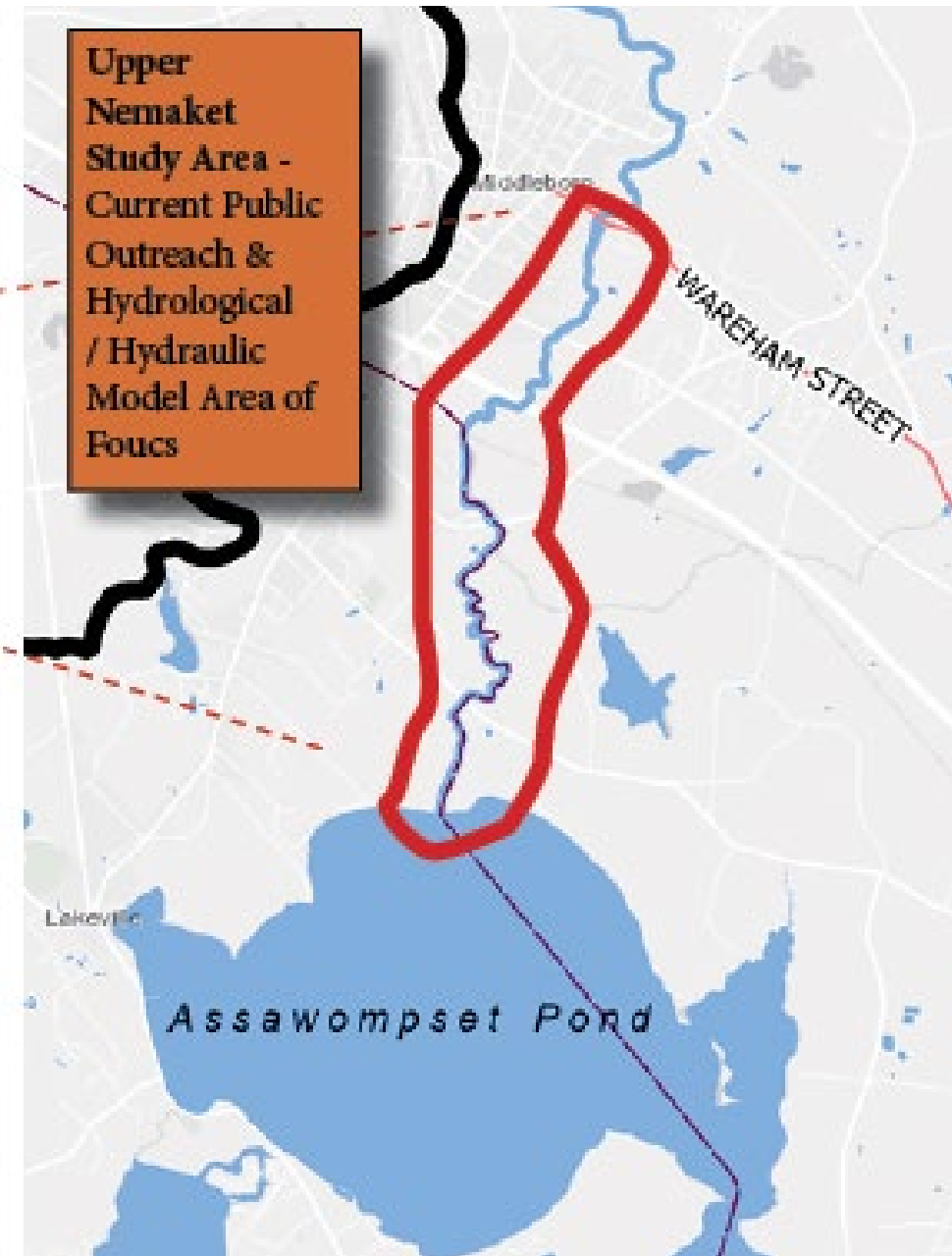
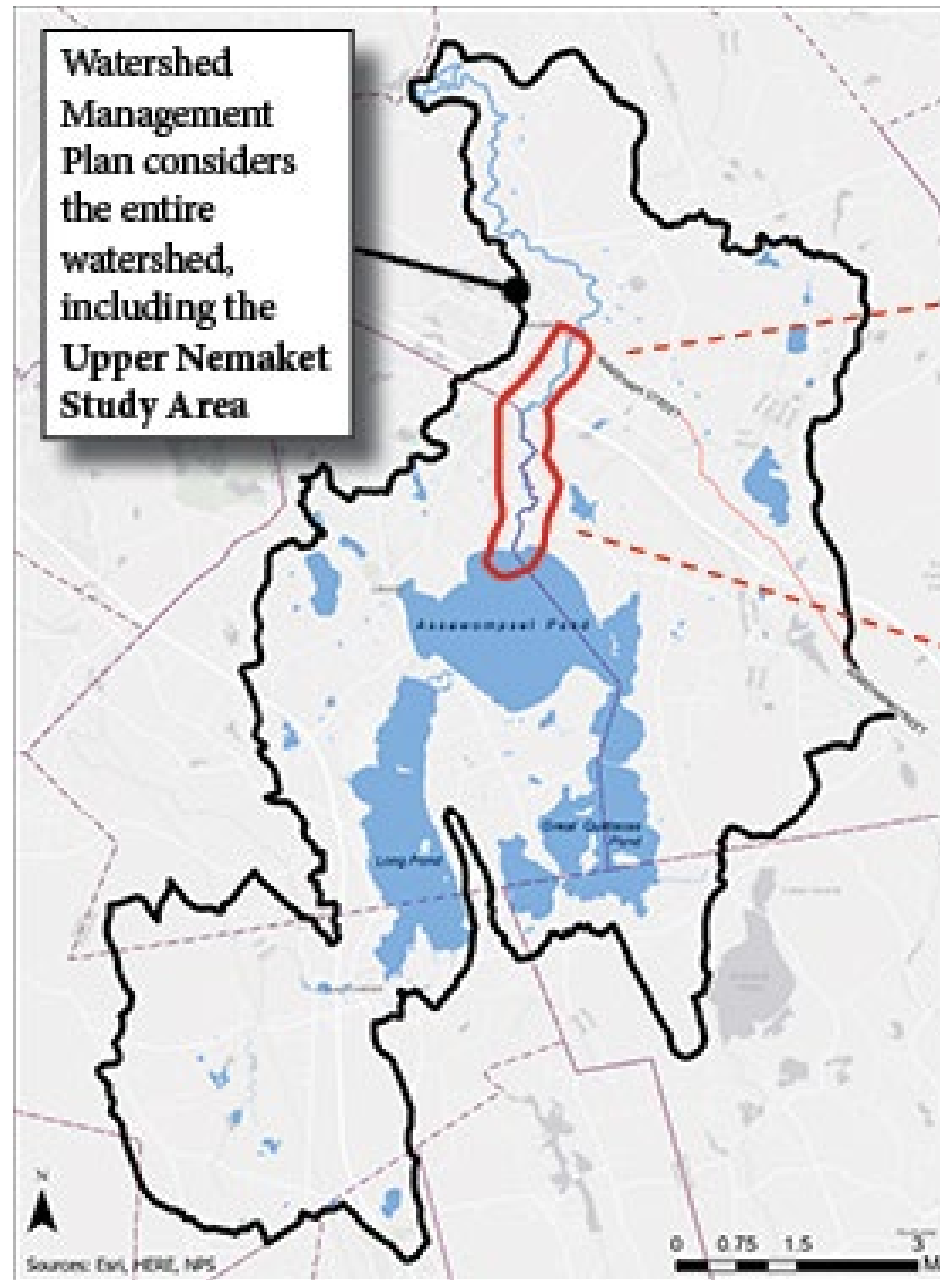
Plus

- Additional city and town staff
- Additional city and town local representatives

Basic Geography

- Total Plan Area: 44,900 ac = 70 sq. Mi.
- Low gradient river – drops approx. 20 ft over 11 miles
- Spans the towns of:
 - Freetown
 - Lakeville
 - Middleborough
 - Rochester
 - Small portion of New Bedford







1: Planning Process

Stakeholder Engagement and Events

11 Steering Committee Meetings

Dec 2000

Feb 2021

Mar 2021

May 2021

June 2021

Sept 2021

Nov 2021

Jan 2022

Feb 2022

Mar 2022

May 2022

6 Public Meetings

Date	Place	Topic
9/29/2021	Lakeville	Floodwater
10/13/2021	Taunton	Water Quality
3/23/2022	Middleborough	Ecology
4/13/2022	Rochester	Recreation
4/27/2022	Freetown	Land Development
7/14/2022	Lakeville	Meet your Plan

Digital Watershed Tour Videos

Scan the QR code for a fun informational video on a related topic!



FLOODWATER MANAGEMENT



ECOLOGY, UNIQUE HABITATS & NATURAL RESOURCES



DRINKING WATER SUPPLY



RECREATION & STEWARDSHIP



INTER-AGENCY COOPERATION



WATER QUALITY



LAND DEVELOPMENT





2: Plan Structure



Watershed Vision

Overall, in 2050, the APC and Nemasket River are healthy, sustaining life and natural communities, including our own through clean, safe, and reliable water supply. The inhabitants of the watersheds have greater protections from climate hazards, and have developed an environmental ethic based upon choice, not chance, that drives sound local and regional decision-making.

Regional Climate Future

Climate Change – 2050 / High Scenario / Taunton Basin



15.2-33.5 additional days over
90 Degrees F



2.56" additional annual
precipitation (spring and
winter)



2 additional days of extreme
weather per year



1.25 additional consecutive
dry days (summer/fall)

Issue Area Investigation



Water Supply



Recreation



Flood Management



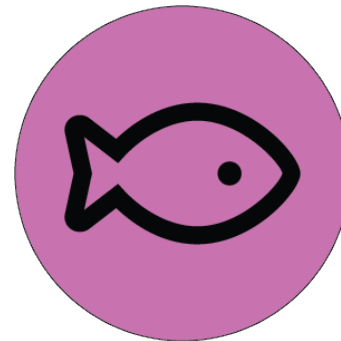
Interagency Cooperation



Water Quality



Land Development



Ecology



Stewardship



Key Management Tensions

- 1. Water Supply Management and Flood Mitigation**
- 2. Land Development and Flood Hazard Mitigation**
- 3. Land Development and Water Quality / Ecology**
- 4. Water Supply Management and Ecology**
- 5. Recreation and Ecology**



Action Item Recommendations

- **Goal 1: Reduce flood risks to people and property**
- **Goal 2: Safeguard public drinking water supplies**
- **Goal 3: Improve water quality**
- **Goal 4: Preserve wildlife and habitat**
- **Goal 5: Encourage sustainable development that retains natural functions**
- **Goal 6: Enable ecologically appropriate recreation**
- **Goal 7: Foster a widespread culture of stewardship**
- **Goal 8: Expand Opportunities to improve cooperative management**



Action Item Recommendations

- **Goal 1: Reduce flood risks to people and property**
- **Goal 2: Safeguard public drinking water supplies**
- **Goal 3: Improve water quality**
- **Goal 4: Preserve wildlife and habitat**
- **Goal 5: Encourage sustainable development that retains natural functions**
- **Goal 6: Enable ecologically appropriate recreation**
- **Goal 7: Foster a widespread culture of stewardship**
- **Goal 8: Expand Opportunities to improve cooperative management**



3: Plan Outcomes

12-POINT PLAN FOR PRIORITY APC-NEMASKET PROJECT PHASING

PHASE 1: WORK THAT IS HIGH PRIORITY AND ACTIONABLE (in priority order)

1. Address sedimentation build-up with a 5-year emergency permit

- Building off model emergency permit from several years ago

Initiated; currently pursuing local and state permits; funded by state ARPA allocation.

2. Removal of weeds from Long Pond and the Nemasket River

- Plan for eco-harvester weed removal based on areas of weed concentration shown in solutions study
- Present to permitting agencies (local Con Comms, US Fish and Wildlife, Natural Heritage)
- Contract with eco-harvesting company
- Repeat seasonally as necessary

Initiated; currently pursuing local and state permits; funded by state ARPA allocation. Will require successive years of activity.

3. Install automatic pond level loggers

- Direct transmission of level data to a publicly-facing website / database

Not yet initiated

4. Signage Plan and Installed Signage / Monitoring around the ponds

- Aimed at curbing inappropriate recreation

Not yet initiated

Nemasket Sedimentation



Invasive Weeds



PHASE 2: WORK THAT IS HIGH PRIORITY BUT REQUIRES SOME FURTHER STUDY OR ANTECEDENT ACTIONS (in priority order)

5. Wareham Street dam removal

- Several phases (feasibility, design, engineering, construction)

6. Permeable Reactive Barrier / Buffer Strip Long Pond Pilot Program

- We've removed immediate issue in item 2 above, now let's keep the weeds from coming back; goal of PRB technology

7. Installation of boat washing station at the Freetown Boat Ramp

8. Replacing the Snake River Culvert

- Note that it is after items 1 and 6, which helps to address transmissible weeds

9. Buy high priority preservation land

10. Amend local bylaws with low-impact development principals on the ponds

Initiated; on-going project is exploring removal feasibility.

Grant application submitted 6/30/22.

Initial site work (electrification, gate installation) being pursued

Funding not identified. BRIC potential in future.



Projects 9-12

PHASE 3: WORK THAT WOULD BE MOST DISRUPTIVE TO STATUS QUO - NEEDS ONGOING STUDY AND CONSIDERATION (in priority order)

11. APC Dam upgrade / reconfiguration

12. Initiating a property buy-out program

Project specifics not yet fully developed; funding pathway not yet developed.

[Lakeville Select Board endorsed 3/21/22; Middleborough Select Board endorsed 3/14/22]



Wareham
Street Dam



Snake River Culvert

State Boat Ramp





Assawompset Pond Dam



GATES

**FISH
LADDER**

Thank you!

For more information, visit:
www.srpedd.org/apc-nemasket, or
contact hzincavage@srpedd.org

LakCAM also has a series of videos





Goal 2: Safeguard public drinking water supplies

SUMMARY: More than 250,000 people rely on the Assabetz River for their drinking water supply, and many more wells throughout the watershed similarly provide for the watershed community's water needs. Ensuring the Watershed is able to continue to meet growing water demands is essential. This means protecting the watershed's capacity to recharge ground and surface waters, protecting drinking water supplies from pollutants, and considering water use impacts (as well as the Watershed's capacity to accommodate increased demand when considering future development and land use proposals). Additional steps will also need to be taken to safeguard the resilience of the water supply to future droughts.

Action Item	Nature Based Solution	Climate Resilience Priority	Responsible Party	Timeline	Funding	Co-Benefits
Objective A: Anticipate and guard against drought, especially as climate change causes more frequent and extended drought periods in summer and fall.	✓	✓	Conservation Commission, Planning Board, Water Suppliers	3-5 years	Local staff and board member time, Technical Assistance from WARD or other consultants, grants (LEA, MDP, etc.)	• Drinking Water Supply
Update and increase transparency about thresholds and implementation measures for enforcing water use restrictions during drought.	✓	✓	APC Management Team, Water Suppliers, Planning Board, Board of Health, Conservation Commission	2-3 years	Local staff and board member time	• Drinking Water Supply
Use a multi-platform approach to notify the public of restricted water use periods and conservation measures, including webpage, social media, and roadway signage boards.	✓	✓	APC Management Team, Water Suppliers, Planning Board, Board of Health, Conservation Commission	1-3 years, and ongoing	Local staff and board member time	• Drinking Water Supply
Regularly evaluate and update drought protocols and back-up supply plans.	✓	✓	Water Suppliers	1-3 years, and ongoing	Local staff time	• Drinking Water Supply
Objective B: Take steps to improve knowledge and management capabilities to enhance water supply management.			APC Management Team	3-5 years	Grant funding secured (DER)	• Drinking Water Supply
B-1 Complete a full groundwater study and model of the ponds system.	✓	✓	Water Suppliers	7-10 years	Local staff time, explore grant opportunities	• Drinking Water Supply
B-2 Determine an updated safe yield of the ponds.	✓	✓	Water Suppliers, APC Management Team	10-15 years	Grants (NOAA, DER, NADP, MDP, etc.)	• Drinking Water Supply
B-3 Reconfigure the APC dam spillway for greater control over water levels in the ponds.			Water Suppliers, APC Management Team, local volunteer organizations	1-5 years, then ongoing	Grants or partnership with groups like the TRM and local wastewater treatment plant.	• Drinking Water Supply
Objective C: Keep contaminants out of the water supply.			Water Suppliers, APC Management Team, local environmental groups	Ongoing	Local staff and volunteer time	• Drinking Water Supply
C-1 Support additional drinking source water testing and monitoring for regulated and emerging contaminants, especially those that would require treatment by water suppliers.			APC Mgmt Plan Implementation Committee, Long Pond Association, Conservation Commission	Ongoing	Local staff and volunteer time	• Drinking Water Supply
C-2 Continue to monitor compliance with WMA registration / permit water withdrawal limits and other special conditions.	✓	✓				• Drinking Water Supply
C-3 Eliminate the use of herbicides in the ponds, which pose an unacceptable risk to public drinking water supplies, by encouraging integrated pest management and mechanical/sovereign intercepting invasive weed control options.						• Drinking Water Supply

Reference Terms:
Safe yield, sometimes also referred to as firm yield, is the maximum amount of water that can be removed from a system, usually calculated per day, without harming either the water supply or the environment from which the water is being withdrawn.
Through the Massachusetts Water Management Act (WMA), MassDEP regulates withdrawals from ground and surface waters by requiring permits from major withdrawals (i.e. over 100,000 gallons per day, which typically applies to public water suppliers, golf courses, and agricultural and industrial users).
Integrated Pest Management is taking a holistic approach to managing pests (i.e. invasive plant species, rodents, mosquitoes, ticks) that first addresses the causes of the infestation (in the case of aquatic weeds, nutrient pollution) and utilizes the most targeted mechanical treatments (pulling out the target species, either by hand or with a machine such as an Echorvester), and only uses more general herbicide application as a last resort, to avoid negative impacts to non-target species and water quality.

Icon Legend:
 Flood Management
 Drinking Water Supply
 Water Quality
 Ecology
 Land Development
 Recreation
 Stewardship
 Interagency Cooperation

APC & Nemasket River Watershed Management & Climate Action Plan

WATER SUPPLY focus area

THE ISSUE

Pond water levels need to be maintained for drinking water.
 • Assabetz Pond Dam boards provide limited control.
 • High water is a flood threat (from dam spillway, large beams).
 • Drought is a threat.

Water supply needs to be protected from contamination.
 • Can be conflicts with inappropriate recreational use.
 • Concern that invasives issue in Long Pond may spill over.

Climate change brings extremes
 • Will exacerbate need for flood management.
 • Will increase the intensity of drought.
 • High temps promote nutrient pollution, upping treatment costs.

POTENTIAL MANAGEMENT SOLUTIONS

Decide on Target Pond Levels and Monitor

- Complete a full groundwater study of the system to find pond levels and water withdrawals can be better coordinated.
- Monitor and report levels for knowledge of pondage constraints.

Reconfigure the Assabetz Pond Dam

- Upgrade the spillway technology to drop the gate system is safer for dam operation.
- Allow for a larger spillway and a lower beam to prevent overtopping during high water and adjacent wetlands.

Water Conservation Measures

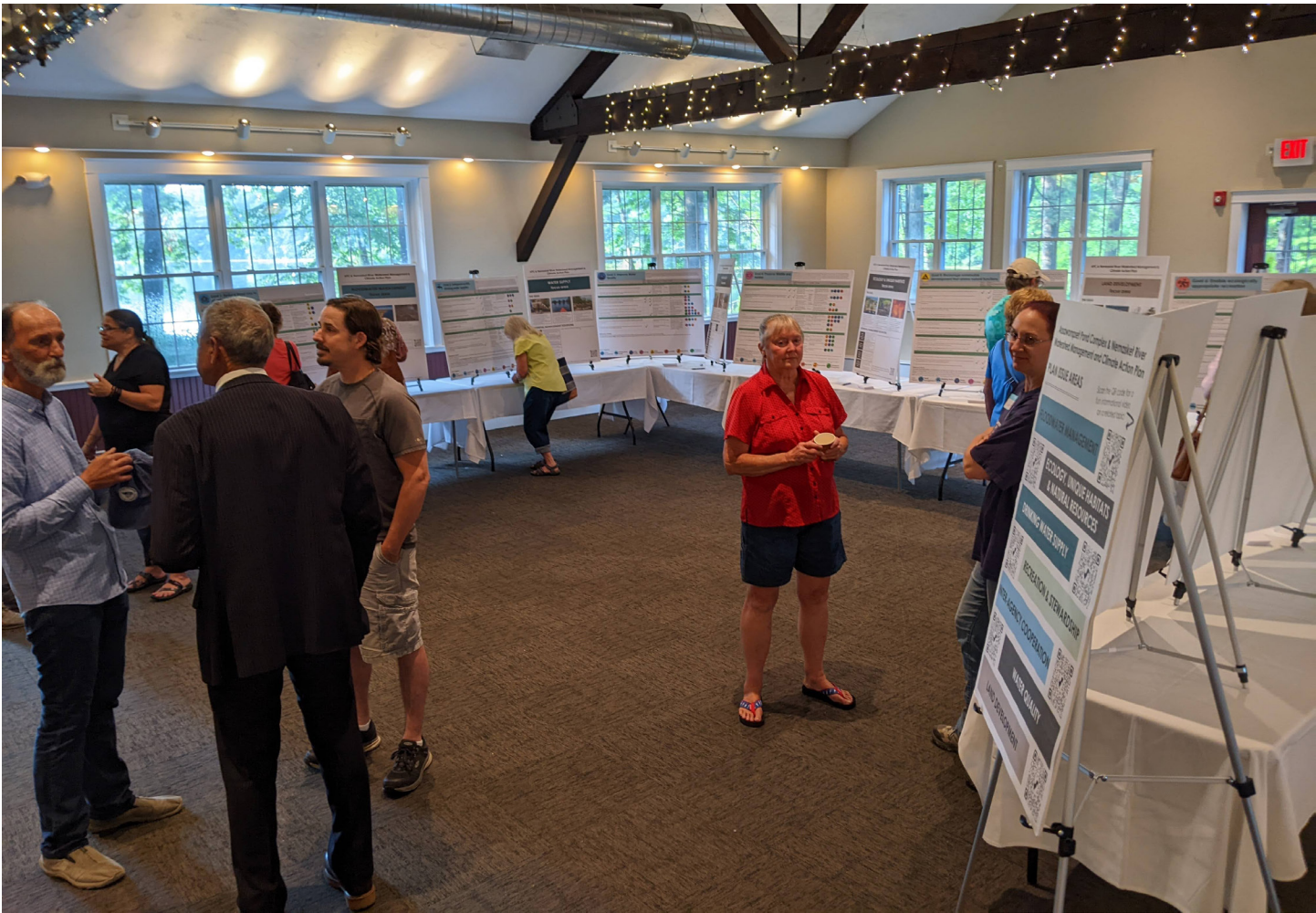
- Additional vegetation and green infrastructure to improve and diffuse runoff.
- Lower the frequency for installing a watering basin or similar measures.

Reliable Mitigation and Enforcement

- Provide a larger budget for additional staff for the APC to manage water withdrawals to reduce and enforce compliance more effectively.
- Provide information about alternative water uses and local ponds.

Comments also accepted on a rolling basis here: (<https://bit.ly/comment-apc-nemasket>)

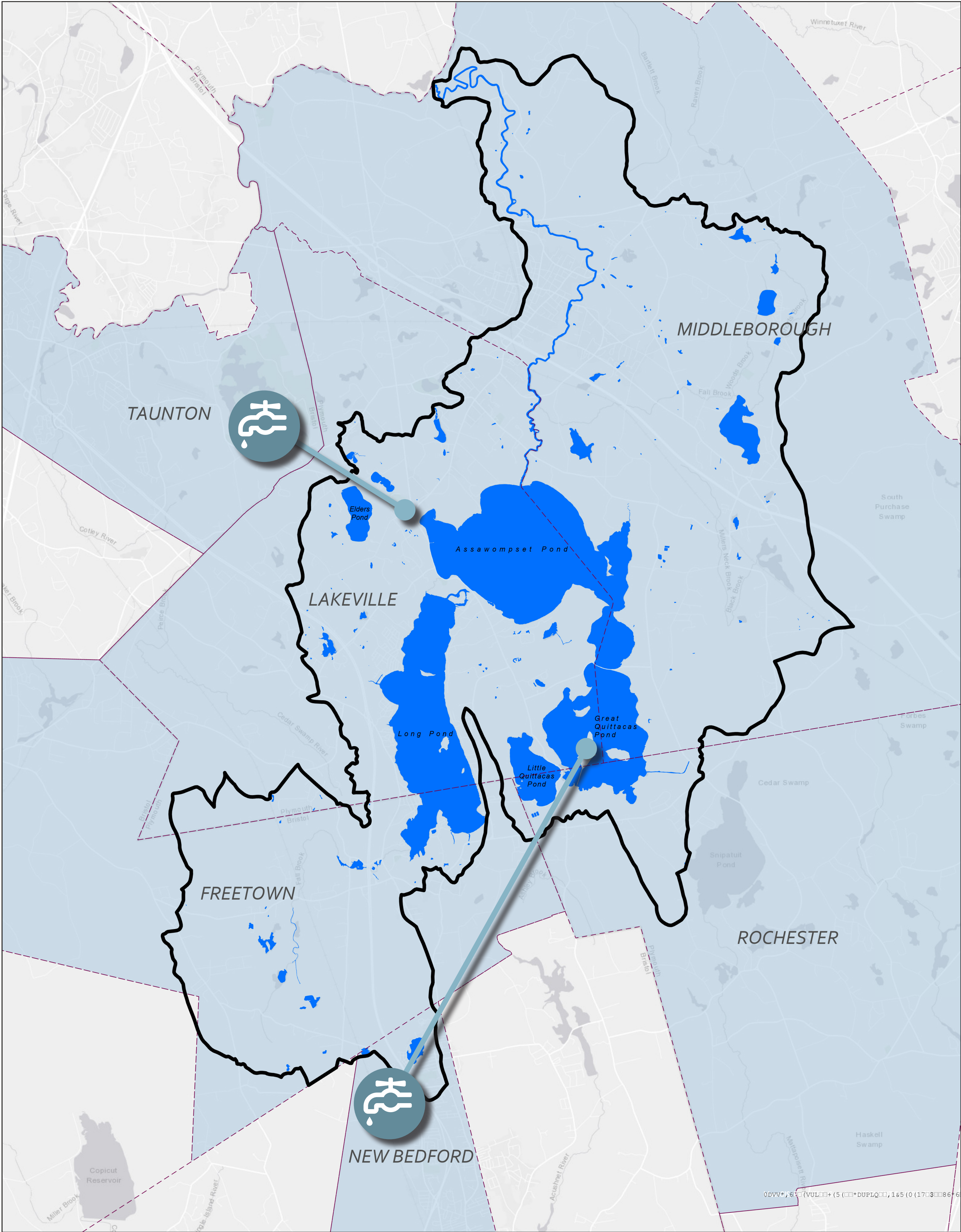






Assawompset Pond Complex & Nemasket River Watershed Management and Climate Action Plan

WATERSHED AREA = AREA COVERED IN THE PLAN



- PARTICIPATING CITIES & TOWNS**
- Pondside Communities**
- Freetown
 - Lakeville
 - Middleborough
 - Rochester
- Communities Drawing Water Supply**
- New Bedford
 - Taunton

GET INVOLVED!

PROJECT WEBSITE

www.srpedd.org/apc-nemasket-plan

Visit the website to review the full Draft Plan! Send any comment to hzincavage@srpedd.org thru July 31, 2022.

APC & Nemasket River Watershed Management & Climate Action Plan

FLOODWATER MANAGEMENT focus area

THE ISSUE



Barriers to Water Passage

- Culvert between Long Pond and Assawomspet Pond
- Siltation in the Nemasket
- Assawompset Pond Dam
- Bascule Dam



Proximity between Floodplains and Development

- Existing and new residences, community facilities, roads and utilities in the special flood hazard area are more at risk



Climate Change

- The Northeast USA is predicted to have the same or more annual rainfall amounts
- These amounts will occur in fewer, more intense storms

POTENTIAL MANAGEMENT SOLUTIONS

Store the Floodwater

- Wetland / Floodplain / Bog Conservation and Restoration
- Wetland / Floodplain Replication and Expansion in uplands

Avoid the Floodwater

- Create a regional property buy-out program



Help the Floodwater Flow

- Replace culvert/bridge pinch points
- New APC Dam with greater connection to wetlands
- Remove sediment / vegetation / Wareham St Dam as part of channel restoration

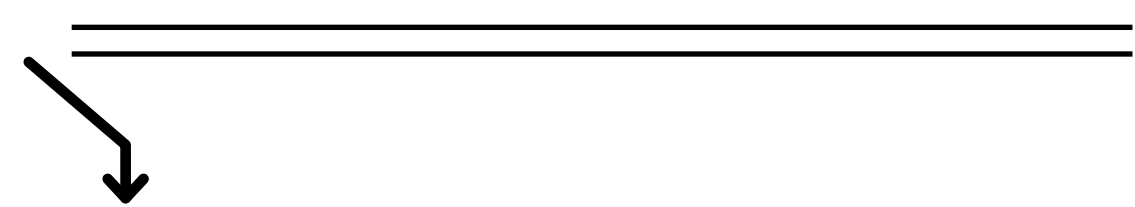
Make Rules that Limit Danger from Floodwater


















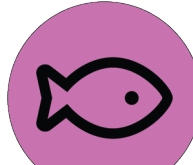


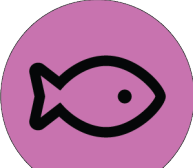

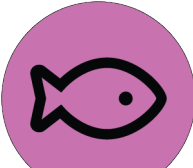

- Review MOUs and maintenance schedule with MassDOT / MBTA
- Put restrictions on development in the floodplain (zoning overlays)
- Adopt a local stormwater bylaw that is above minimum infiltration rules

Build Infrastructure that Limits Dangers from Floodwater

- Elevate or fix culvert issues below Bedford Street
- Install green infrastructure (swales) to control on-site flooding and flooding along roadways

add other comments here!



 <h1>Goal 1: Reduce flood risks to people and property</h1>		<p>SUMMARY: Perhaps one of the critical driving forces that initially sparked this planning process, though one of several stakeholder interests, is reducing flood risks to those residing within the watershed. The aim of this goal is to leverage nature’s inherent ability to absorb rainfall. This includes enhancing the watershed’s current capacity to soak up stormwater runoff by restoring the floodplain and improving natural areas management. We also need to be more thoughtful of where and how we develop, to ensure new development is not placed in potential hazard areas, where flooding is currently likely, or may be possible in the future. Lastly, we need to assess how our built infrastructure creates barriers to the flow of water throughout the watershed. Culverts, bridges and dams all allow us to coexist with our water resources, but ensuring these structures are sized appropriately and not preventing the flow of water is essential to reduce flood risks.</p>					
	Action Item	Nature Based Solution	Climate Resilience Priority	Responsible Party	Timeline	Funding	Co-Benefits
Objective A: Limit Development in the Floodplain and enhance protection for existing development							
A-1	Pursue regional participation in FEMA’s CRS program, on a local and regional basis.		✓	Conservation Commission, Planning Board	3-5 years	Local staff time; investigate grant options	
A-2	Create a regional buy-out program and/or prepare to participate in a potential state-run program (currently under consideration) to acquire properties for flood storage.	✓	✓	Planning Board, Conservation Commissions, APC Management Team	10-15 years	FEMA/ MEMA	 
A-3	Adopt shared wetland regulations across all communities that expand the Conservation Commission’s authority to uniformly protect floodwater storage areas and their buffers across the watershed from development.	✓	✓	Conservation Commission, Planning Board	3-5 years	Local staff and board member time; grants; technical assistance from SRPEDD or another consultant	 
A-4	Expand the floodplain overlay district to the 500-year FEMA flood zones , and take a climate change - aware stance in accounting for floodplain shifts.		✓	Conservation Commission, Planning Board	3-5 years	Local staff and board member time; grants; technical assistance from SRPEDD or another consultant	
A-5	Restrict development encroachment into the floodplain by requiring special permit review in the flood overlay district, subject to review by Conservation Commission, Planning Board, Board of Health, Dept of Public Works, and/or building department.		✓	Conservation Commission, Planning Board	3-5 years	Local staff and board member time; grants; technical assistance from SRPEDD or another consultant	 
Objective B: Leverage natural functions that protect communities from flooding, extreme heat, and intense storms							
B-1	All local jurisdictions should adopt a current Hazard Mitigation Plan that prepares the community for future climate impacts, incorporating the latest information and projections.		✓	All municipal departments	3-5 years	Grants (MEMA, MVP)	   
B-2	Identify and prioritize areas where nature-based stormwater management (i.e. green infrastructure, swales, etc.) may have the greatest impact on mitigating stormwater and flooding.	✓	✓	Conservation Commission, Board of Health, Planning Board	3-5 years	Grants (MEMA, MVP)	 
B-3	Restore natural wetland habitat and function so that these lands can act like a sponge to hold and slowly infiltrate and filter water.	✓	✓	Conservation Commission, Board of Health, Agricultural Commissions	5-7 years	Grants (DER, SNEP)	  
Objective C: Improve the flexibility of the APC – Nemasket System to move water between its constituent parts							
C-1	Replace the Snake River Culvert (but not before addressing invasive weeds in Long Pond to minimize transfer between waterbodies).	✓	✓	Lakeville & Freetown Conservation Commission, Planning Board	10-15 years	FEMA BRIC (but requires Lakeville to have an approved HMP), DER	
C-2	Restore the Nemasket River channel (especially in the first 600-1,200 ft), including limited and targeted sediment removal or dredging on a regular basis as required, and vegetation removal.	✓	✓	Lakeville & Middleborough Conservation Commission, Planning Board; APC Management Team	Ongoing, as needed	SRPEDD ARPA APC funds	 
C-3	Remove the Wareham Street Dam to gain topography, increase flows, and reduce impoundment.	✓	✓	Middleborough Conservation Commission, Planning Board; APC Management Team	5-7 years	State Dam and Seawall Grant, NOAA, NWF, TNC, other non-profit partners	  

Reference Terms:

The Federal Emergency Management Agency (FEMA) compiles flood risk data for communities for use in both insurance rating and floodplain management, which includes flood hazard maps that predict the area of inundation during storms. Regulatory flood hazard areas typically reflect the 100-year storm, or a rainfall event expected to occur about once every 100 years. Climate change is increasing the fequency of these types of storms, however. **FEMA's Community Rating System (CRS)** encourages municipal leaders to increase the flood resilience of their community so that local homeowners may collectively receive a discount on their flood insurance premiums. Enrolling in the CRS not only reduces costs, but also helps reduce flooding risks to homes, businesses, ecosystems, and people. **Buy-out programs** can provide a mechanism for vulnerable homeowners to receive compensation for their homes if they chose to relocate, without placing someone else in harm’s way.

Icon Legend:



Flood Management



Drinking Water Supply



Water Quality



Ecology



Land Development



Recreation



Stewardship



Interagency Cooperation

APC & Nemasket River Watershed Management & Climate Action Plan

WATER SUPPLY focus area

THE ISSUE



Pond water levels need to be maintained for drinking water.

- Assawompset Pond Dam boards provide limited control
- High water is a flood threat (narrow dam spillway; large berm)
- Drought is a threat



Water supply needs to be protected from contamination.

- Can be conflicts with inappropriate recreational use
- Concern that invasives issue in Long Pond may spill over



Climate change brings extremes


- Will exacerbate need for flood management
- Will increase the intensity of drought
- High temps promote nutrient pollution, upping treatment costs

POTENTIAL MANAGEMENT SOLUTIONS

Decide on Target Pond Levels and Monitor	<ul style="list-style-type: none">• Complete a full groundwater study of the system so that pond levels and water withdrawals can be better coordinated• Monitor and report levels for knowledge of pondside communities
Reconfigure the Assawompset Pond Dam	<ul style="list-style-type: none">• Upgrade the spillway technology so that the gate system is safer for dam operators• Allow for a larger spillway and a lower berm to permit overflow during high water into adjacent wetlands
Water Conservation Measures	<ul style="list-style-type: none">• Additional vegetation and green infrastructure to capture and infiltrate runoff• Lower the threshold for instituting a watering ban or similar measures
Redouble Education and Enforcement	<ul style="list-style-type: none">• Provide a larger budget for additional staff for the APC Rangers• Install additional signage to deter misplace recreational activity• Provide information about alternative recreation areas and access points


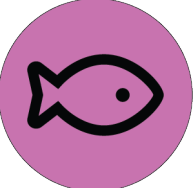

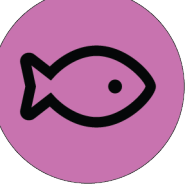

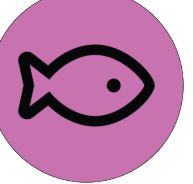



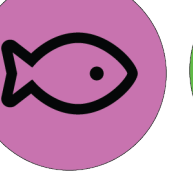


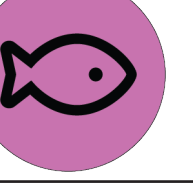



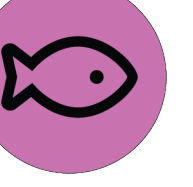

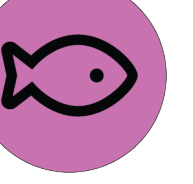

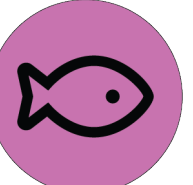
add other comments here!





Goal 2: Safeguard public drinking water supplies

SUMMARY: More than 250,000 people rely on the Assawompset Ponds for their drinking water supply, and many more wells throughout the watershed similarly provide for the watershed communities’ water needs. Ensuring the Watershed is able to continue to meet growing water demands is essential. This means protecting the watershed’s capacity to recharge ground and surface waters, protecting drinking water supplies from pollutants, and considering water use impacts (as well as the Watershed’s capacity to accommodate increased demands) when considering future development and land use proposals. Additional steps will also need to be taken to safeguard the resilience of the water supply to future droughts.

	Action Item	Nature Based Solution	Climate Resilience Priority	Responsible Party	Timeline	Funding	Co-Benefits
Objective A: Anticipate and guard against drought, especially as climate change causes more frequent and extended drought periods in summer and fall							
A-1	Adopt uniform Water Resource Protection Overlay Districts and Regulations that protect groundwater recharge areas to the ponds, as well as local water supply wells elsewhere in the watershed.	✓	✓	Conservation Commission, Planning Board, Water Suppliers	3-5 years	Local staff and board member time; Technical Assistance from SRPEDD or other consultant; grants (EEA, MVP, etc.)	  
A-2	Update and increase transparency about thresholds and implementation measures for enforcing water use restrictions during drought.		✓	APC Management Team; Water Suppliers; Planning Board, Board of Health, Conservation Commission	1-3 years	Local staff and board member time	 
A-3	Use a multi-platform approach to notify the public of restricted water use periods and conservation measures, including webpage, social media, and roadway signage boards.		✓	APC Management Team; Water Suppliers; Planning Board, Board of Health, Conservation Commission	1-3 years, and ongoing	Local staff and board member time	 
A-4	Regularly evaluate and update drought protocols and back-up supply plans.		✓	Water Suppliers	1-3 years, and ongoing	Local staff time	
Objective B: Take steps to improve knowledge and management capabilities to enhance water supply management							
B-1	Complete a full groundwater study and model of the ponds system.		✓	APC Management Team	1-3 years	Grant funding secured (DER)	  
B-2	Determine an updated safe yield of the ponds.		✓	Water Suppliers	7-10 Years	Local staff time; explore grant opportunities	 
B-3	Reconfigure the APC dam spillway for greater control over water levels in the ponds.		✓	Water Suppliers, APC Management Team	10-15 Years	Grants (NOAA, DER, SNEP, MVP etc.)	 
Objective C: Keep contaminants out of the water supply							
C-1	Support additional drinking source water testing and monitoring for regulated and emerging contaminants, especially those that would require treatment by water suppliers.			Water suppliers, APC Management Team, local volunteer organizations	3-5 Years, then ongoing	Grants or partnership with groups like the TRWA and local wastewater treatment plant	 
C-2	Continue to monitor compliance with WMA registration / permit water withdrawal limits and other special conditions.			Water suppliers, APC Management Team, local environmental groups	Ongoing, but especially at permit renewals	Local staff and volunteer time	 
C-3	Eliminate the use of herbicides in the ponds, which pose an unacceptable risk to public drinking water supplies, by encouraging integrated pest management and mechanical/source intercepting invasive weed control options.	✓		APC Mgmt Plan Implementation Committee; Long Pond Association; Conservation Commission	Ongoing	Local staff and volunteer time	 

Reference Terms:

Safe yield, sometimes also referred to as firm yield, is the maximum amount of water that can be removed from a system, usually calculated per day, without harming either the water supply or the environment from which the water is being withdrawn.

Through the Massachusetts **Water Management Act (WMA)**, MassDEP regulates withdrawals from ground and surface waters by requiring permits from major withdrawers (i.e. over 100,000 gallons per day, which typically applies to public water suppliers, golf courses, and agricultural and industrial users).

Integrated Pest Management is taking a holistic approach to managing pests (i.e. invasive plant species, rodents, mosquitoes, ticks) that first addresses the causes of the infestation (in the case of aquatic weeds, nutrient pollution) and utilizes the most targeted mechanical treatments (pulling out the target species, either by hand or with a machine such as an Ecoharvester), and only uses more general herbicide application as a last resort, to avoid negative impacts to non-target species and water quality.

Icon Legend:

 Flood Management

 Drinking Water Supply

 Water Quality

 Ecology

 Land Development

 Recreation

 Stewardship

 Interagency Cooperation

APC & Nemasket River Watershed Management & Climate Action Plan

WATER QUALITY focus area

THE ISSUE



Credit: SRPEDD Staff

Contamination of water from a variety of sources

- Nitrogen, Phosphorous, and Fecal Coliform are all present.
- Distribution from various sources (septics, stormwater, etc.) makes management difficult.



Credit: SRPEDD Staff

Requirement for more effective stormwater management infrastructure.

- Current stormwater infrastructure including culverts and storm drains are not performing at their peak.



Credit: Shutterstock

Climate Change

- Increases surface water temperatures, leading to eutrophic conditions.
- More storms = more contaminated stormwater.

POTENTIAL MANAGEMENT SOLUTIONS

Reduce Nitrogen and Phosphorus

- Upgrade septic systems around APC.
- Identify candidate sites for Riparian restoration.
- Work with golf course owners, bog operators, farmers, and private residences to limit pesticide/fertilizers.

Enhance Water Quantity and Flow

- Monitor compliance with WMA registration.
- Remove impediments to flow on the Nemasket and APC including sediment/vegetation below the APC dam.
- Reconnect Assawompset Pond to surrounding wetlands beyond the berm.



Manage Stormwater Run-Off/ Sedimentation

- Use Nature-based solutions (ie. bioswales) to capture stormwater.
- Improve coordination with MassDOT to address stormwater infrastructure issues & opportunities.
- Apply climate resilience into MS4.


Identify and mitigate potentially hazardous material contamination, including expanded water quality monitoring.

- Increase water quality sampling sites.
- Conduct a vulnerability assessment of harmful pollutants migrating from contaminated sites during flood events.
- Ensure proper removal of biosolids.

Manage Invasive Plants/Algae Blooms








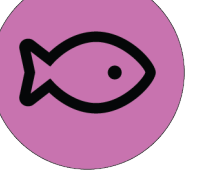



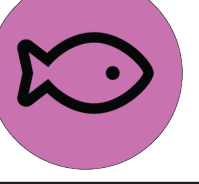


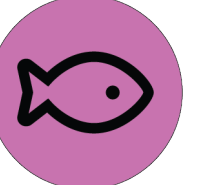


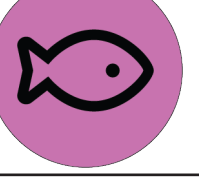



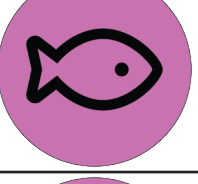




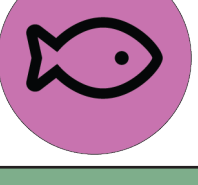



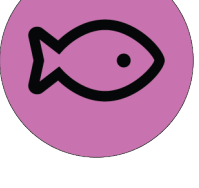




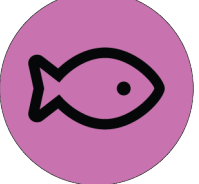


- Remove vegetative mass from Wareham St Pond.
- Install a boat washing station for Long Pond and educate users about recreational uses and invasive species spread.

add other comments here!



Goal 3: Improve Water Quality

SUMMARY: Water quality throughout the watershed impacts wildlife, drinking water supplies, environmental health, and people’s ability to recreate in, on and around the Watershed’s water resources. Development and associated increases in stormwater runoff are contributing to water quality impairments throughout the watershed, but steps can be taken to remove and/or manage these threats and improve the health of our waterways.

	Action Item	Nature Based Solution	Climate Resilience Priority	Responsible Party	Timeline	Funding	Co-Benefits
Objective A: Eliminate potential contaminants at the source using physical treatment and regulation							
A-1	Explore grant and loan funding for septic system upgrades from conventional to denitrifying systems.			Dept of Public Works, Board of Health, Conservation Commission, Planning Board	Ongoing	Local staff and board member time; technical assistance through SRPEDD or another consultant	 
A-2	Adopt uniform local septic bylaws that go beyond minimum Title V regulations to reduce nutrient releases from septic systems contaminating groundwater.			Planning Board, Board of Health, Conservation Commission	3-5 years	Local staff and board member time; grants (MVP, EEA, etc.); technical assistance through SRPEDD or another consultant	 
Objective B: Prevent and monitor the spread of contaminants into waterbodies							
B-1	Restore buffers on lands adjacent to wetlands and waterways for increased water filtration and purification. Where these buffers are currently in place, retain and enhance them.			Conservation Commission, Dept of Public Works	3-5 years	Local staff time; grants (SNEP, MVP, etc.)	 
B-2	Alter mowing practices that compromise the integrity of buffer areas, and establish “no-mow zones” on municipal lands surrounding water bodies and wetlands.			Conservation Commission, Dept of Public Works	2-4 years	N/A (routine staff operations)	 
B-3	Adopt local wetland bylaws that protect wetlands and their buffers for stormwater filtration.			Conservation Commission, Planning Board	1-3 years	Local staff and board member time; grants (i.e. MVP), technical assistance from SRPEDD or other consultant	  
B-4	Install permeable reactive barriers to filter nutrients from groundwater, as appropriate.			APC Management Team; homeowners	1-3 years	SNEP, explore other grant opportunities	  
B-5	Install more water-quality monitoring stations and develop a volunteer network dedicated to routine water quality sampling.			Local environmental groups, Conservation Commission	3-5 years	Local staff and volunteer time, explore grant opportunities	   
B-6	Reduce excessive sediment transport by removing sandbars near water crossing infrastructure and improving drainage outlets where feasible.			Local Dept of Public Works, MassDOT	3-5 years	Staff time; explore grant opportunities	    
Objective C: Educate stakeholders on methods they can take to reduce contaminant inputs							
C-1	Educate landowners about MA Dept of Agricultural Resources’ fertilizer use regulations and encourage Farm Conservation Plans that implement best practices. Coordinate with retailers to provide consumer information.			Agricultural & Conservation Commissions	2-5 years	Local staff and board member time; technical support from practitioners, such as SRPEDD, TNC, UMass Amherst	   
C-2	Develop and spread water quality protection best practices (particularly as it relates to nitrogen and fertilizer runoff). Lead by example on public lands.			Agricultural & Conservation Commissions	2-5 years	Local staff and board member time; technical support from practitioners, such as SRPEDD, TNC, UMass Amherst; grant funding for implementing best practices (i.e. NRCS)	  

Reference Terms:

The State’s **Title V** rules control how home septic systems should be installed, used and maintained, in order to protect public health and safety.

Permeable Reactive Barriers (PRBs), installed underground in strategic locations adjacent to water water bodies, filter nutrients out of groundwater as it passes through the barrier and into the water body.

Icon Legend:

Flood Management

Drinking Water Supply

Water Quality

Ecology

Land Development

Recreation

Stewardship

Interagency Cooperation

APC & Nemasket River Watershed Management & Climate Action Plan

ECOLOGY & UNIQUE HABITATS

focus area

THE ISSUE



Development negatively impacting key habitats

- Septic leach and runoff from pavement and buildings
- Road & highway construction leads to runoff and negative impacts.



Changing water levels/quality challenges and invasives

- Anadromous fish and Mussels impacted by low water levels/quality.
- Spread of invasive plants and animals as a result.



Climate Change

- Warmer water, lower water levels, increased bacteria, changing seasonality.
- Lower dissolved oxygen in aquatic environments.
- Forest fires and drought.

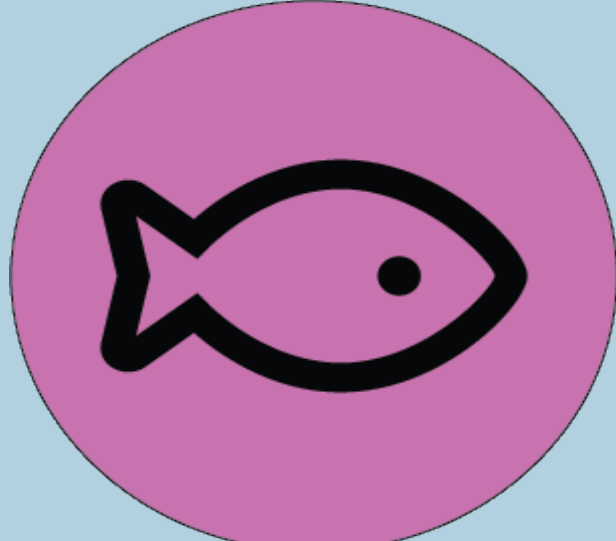
POTENTIAL MANAGEMENT SOLUTIONS

Improve Aquatic Habitat and Passage	<ul style="list-style-type: none">• Reconfigure the APC and bascule dam passages to enhance water flow and fish passage in both spawning and return seasons.• Remove sediment and vegetation in the Nemasket River.
Control the Presence of Invasives	<ul style="list-style-type: none">• Investigate options for invasive species removal including of fanwort, variable millfoil, Asian Clams, Buckthorn and others• Continue the ecoharvester program• Design regular maintenance permits
Prepare Forests for Climatic Change	<ul style="list-style-type: none">• Prepare forests for increased fire risk through the introduction of fire and drought resistant tree species.• Remove invasives and pests such as Gypsy Moth to protect native forests.
Protect Critical and Endangered Species	<ul style="list-style-type: none">• Support clams and mussels during their spawning season through removal of competitors and other supports.• Coordinate with MA NHESP for all active management of plants.

add other comments here!


















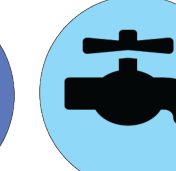



















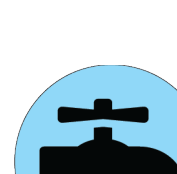
Learn more about Flora & Fauna in the APC-Nemasket through this child-friendly educational video!





Goal 4: Preserve Wildlife and Habitat

SUMMARY: Wildlife and the natural landscapes that they make up provide a wealth of resources to people, and living sustainably alongside nature is as critical for the resilience of people as it is for the Watershed. Protecting these resources includes both preserving the Watershed’s existing natural areas through active management that supports health and function, and also strategically expanding the existing open space network to protect priority natural areas from development. All of nature is worth protecting, but those unique and/or culturally significant species and natural communities that are special to the APC, such as river herring, northern red-bellied cooter, breeding bobolinks, and coastal plain pondshore habitats, should be prioritized for protection in particular.

	Action Item	Nature Based Solution	Climate Resilience Priority	Responsible Party	Timeline	Funding	Co-Benefits
Objective A: Strategically expand the watershed’s open space network							
A-1	Preserve the regional Green Infrastructure Network , through both land acquisition and by minimizing land disturbance during development.	✓	✓	Planning Boards, Open Space Committees, Conservation Commissions, Select Boards; APC Management Team	Ongoing	Local staff and volunteer time; grants (i.e. MVP, State Planning Grants, DCR Grants); Local CPA Fund	   
A-2	Keep Open Space & Recreation Plans current, prioritizing high value and connected natural areas, such as the Green Infrastructure Network , for protection. Consider the development of a Regional Open Space and Recreation Plan.	✓	✓	Planning Boards, Open Space Committees, Conservation Commissions	Ongoing, every 7 years as OSRPs expire	Keep Open Space & Recreation Plans current, prioritizing high value and connected natural areas, such as the Green Infrastructure Network, for protection.	   
A-3	Launch public education campaign to garner support for land acquisitions.			Open Space Committees, Local Environmental Groups, APC Management Team	1-3 years, and ongoing	Local staff and volunteer time, utilizing resources from MassLand and Mass Audubon	 
A-4	Adopt the Community Preservation Act to fund open space protection.		✓	Freetown & Rochester Open Space Committees, Planning Board	1-3 years	Local staff and volunteer time, utilizing resources from the Community Preservation Coalition	  
Objective B: Improve habitat through natural resource management							
B-1	Adopt and/or update forestry management plans that improve forest health and resilience to climate change.	✓	✓	Forest owners & managers; Conservation Commissions	3-5 years, and ongoing	Local staff & volunteer time; technical & financial assistance from NRCS	    
B-2	Address barriers to fish passage in the Nemasket River at dams, fish ladders, and stream crossings (i.e. dam removal, bridge replacement).	✓		APC Management Team; Lakeville Middleborough Herring Fishery Commission	5-10 years, and ongoing	Partnership with MA DOT; grants (i.e. NOAA, MVP, DER)	   
B-3	Protect headwater stream flow and shading for cold-water fish.	✓	✓	APC Management Team; Conservation Commissions; local environmental groups	3-5 years, and ongoing	Grants (i.e. MVP, DER)	 
B-4	Install wildlife corridors & road crossing structures.	✓	✓	APC Management Team; Conservation Commissions, Dept of Public Works, MassDOT	5-7 years, and ongoing	Explore grant opportunities	 
Objective C: Manage and prevent the spread of invasive species							
C-1	Implement public education campaign to increase awareness and knowledge of invasive species, and help with containment and early detection.			Conservation Commission; Long Pond Association; APC Management Team	1-3 years, and ongoing	Local staff and volunteer time	  
C-2	Institute volunteer monitoring programs for rapid detection and management of invasive plants.			Conservation Commission; Long Pond Association; APC Management Team	1-3 years, and ongoing	Local staff and volunteer time; explore grant opportunities	  
C-3	Implement a holistic integrated pest management approach for controlling invasive plant species.	✓		Conservation Commissions, Long Pond Association, APC Management Team; public	Ongoing	Local staff and board/ commission member time	  
C-4	Monitor and minimize the spread of aquatic invasive plants from Long Pond to Assawompset Pond.			Conservation Commissions, Long Pond Association, APC Management Team	Ongoing, before action taken at Snake River Culvert	Local staff and board/ commission member time	  

Reference Terms:

The regional **Green Infrastructure Network** identifies connected, cohesive areas of land that are performing critical landscape functions and ecosystem services that sustain communities and help them mitigate and adapt to climate change (i.e. removing carbon from the atmosphere, purifying our air and water, cooling neighborhoods during heat waves, and protecting our built infrastructure from flooding).

The **Community Preservation Act (CPA)** gives communities the option to adopt a local property tax surcharge that goes into a local Community Preservation Fund, with state matching funds, that can be used for open space protection, historic site preservation, recreational facilities and affordable housing.

Integrated Pest Management is taking a holistic approach to managing pests (i.e. invasive plant species, rodents, mosquitoes, ticks) that first addresses the causes of the infestation (in the case of aquatic weeds, nutrient pollution) and utilizes the most targeted mechanical treatments (pulling out the target species, either by hand or with a machine such as an Ecoharvester), and only uses more general herbicide application as a last resort, to avoid negative impacts to non-target species and water quality.

Icon Legend:

 Flood Management

 Drinking Water Supply

 Water Quality

 Ecology

 Land Development

 Recreation

 Stewardship

 Interagency Cooperation

APC & Nemasket River Watershed Management & Climate Action Plan

LAND DEVELOPMENT focus area

THE ISSUE



Development exacerbates stormwater issues

- Conversion of natural areas increases runoff (stormwater)
- Urban runoff pollutes water ways and can cause flooding



Loss of Natural Area

- Increasing demand for land threatens open space
- Natural area conversion removes our first line of defense against extreme weather



Climate Change

- More intense storms are overwhelming aging water systems & utilities
- Increasing chances of flooding damage infrastructure

POTENTIAL MANAGEMENT SOLUTIONS

Improve Stormwater Management in All New Development

- Limit conversion of natural areas to impervious cover that contributes to stormwater runoff
- Prioritize on-site treatment and infiltration in drainage designs

Work with Nature

- Leverage natural functions that protect communities from flooding, extreme heat, and intense storms
- Enable flexible site plan design that conforms to, rather than alters, nature



Proactive Land Use Planning

- Prioritize areas for development vs. protection in Master Plans
- Prioritize valuable natural areas for protection in Open Space Plans

Smart Housing & Development Design

- Allow more flexible multi-family housing options in zoning
- Encourage cluster developments and open space designs that minimize environmental footprint

Build for the Future

- Consider climate change projections in construction design & planning
- Build all new infrastructure to withstand larger storm events

add other comments here!



Goal 5: Encourage sustainable development that retains natural functions

SUMMARY: Ongoing development to support the watershed’s growing population does not need to come at the expense of nature. Thoughtful and proactive planning can help to guide development towards the most appropriate areas across the watershed, and protect priority natural areas that provide important resilience functions. An extensive toolbox of sustainable development techniques is also available to reduce the footprint and environmental impacts of new development. Resilient growth requires the Watershed communities to take important regulatory approaches that encourage sustainable development built with both natural resources and future climate in mind.

	Action Item	Nature Based Solution	Climate Resilience Priority	Responsible Party	Timeline	Funding	Co-Benefits
Objective A: Plan for and manage expected growth, and its impacts to the watershed							
A-1	Prioritize areas for development vs. protection in long-range planning efforts (including Master Plans).	✓	✓	Planning Boards, Open Space Committees	Ongoing	Local staff and board member time, grants (i.e. technical assistance funds through SRPEDD)	 
A-2	Address the impacts of expansion and winterization of homes around the Ponds transitioning from seasonal to full-time.		✓	Planning Boards, Conservation Commissions, Boards of Health; APC Management Team	Ongoing	N/A (routine staff operations)	  
A-3	Consider increasing capacity at the Middleborough Waste Water Treatment Plant to accommodate future development.			Middleborough Public Works Dept.	10-15 years	Local staff time; explore grant opportunities	 
A-4	Engage the state in updating new MBTA multi-family housing zoning requirements; and protect watershed resources while meeting the new regulations locally.	✓	✓	Planning Boards, Conservation Commissions; APC Management Team; SRPEDD	1-3 years	Local staff and volunteer time; grants (i.e. state planning grants, technical assistance grants through SRPEDD)	    
A-5	Consider the effects that new land development will have on the watershed’s water table and ability to maintain drinking water to public and private well sources.		✓	Planning Boards, Conservation Commissions, Board of Health, developers	Ongoing	N/A (routine staff operations)	
Objective B: Encourage low impact development practices in local bylaws and regulations							
B-1	Allow flexible lot designs in zoning and subdivision regulations, and require development that conforms to, rather than alters, natural features.	✓	✓	Planning & Zoning Boards	1-3 years	Local staff and board member time; grants (i.e. state planning, technical assistance via SRPEDD)	  
B-2	Allow Cluster and Open Space Design development by-right that protects priority natural land.	✓	✓	Planning & Zoning Boards	1-3 years	Local staff and board member time; grants (i.e. state planning, technical assistance via SRPEDD)	  
B-3	Consider mixed-use developments with a commercial component that can add to the tax base as other lands are put into permanent preservation (i.e., removed from the tax base).		✓	Planning Boards	Ongoing	Local staff and board member time; grants (i.e. state planning, technical assistance via SRPEDD)	  
Objective C: Ensure new development is built with the future climate in mind, and doesn’t contribute to stormwater runoff							
C-1	Establish impervious cover controls in zoning and site design to limit conversion of natural areas that contributes to stormwater runoff.	✓	✓	Planning & Zoning Boards	1-3 years	Local staff and board member time; grants (i.e. state planning, technical assistance via SRPEDD)	   
C-2	Require the inclusion of 100- and 500-yr floodplains and the most up-to-date rainfall rates in site planning, to ensure all new infrastructure is built for the future.		✓	Planning & Zoning Boards	1-3 years	Local staff and board member time; grants (i.e. state planning, technical assistance via SRPEDD)	 
C-3	Strengthen local regulations to meet MS4 requirements and further protect water quality and groundwater supply through low impact development techniques.	✓	✓	Planning & Zoning Boards	1-3 years	Local staff and board member time; grants (i.e. state planning, technical assistance via SRPEDD)	  
Objective D: Increase local capacity and education around sustainable land use							
D-1	Increase local staffing capacity, including resources and training, for land use planning and enforcement.			Community managers, Select Boards	3-5 years, and as needed	Municipal budgets, utility fees	     
D-2	Work with and create easy-to-understand materials for developers to clearly define priority development vs. preservation areas, and preferred development practices.	✓	✓	Planning Boards	3-5 years	Local staff and board member time; grants; technical assistance	   
D-3	Increase public education about ecologically responsible land management practices.		✓	Planning Boards, Conservation Commissions, APC Management Team	1-3 years, and ongoing	Local staff and board member time; technical assistance	    

Reference Terms:

Low Impact Development (LID) is a land development strategy that incorporates nature based solutions into site design by preserving natural features as much as possible and minimizing the negative impacts of development on habitats and waterways.

Open Space Design (OSD) is a clustered development type that allows smaller lot sizes concentrated within a smaller footprint, so that the remaining lot area may be protected as open space.

By-right is a zoning term that means a certain use or development type is allowed, assuming it meets all other requirements of that zoning district, without needing to apply for a special permit. This option is the easiest way to get a project approved, and allowing perfered development techniques by-right incentivizes developers to adopt those practices.

MS4 means Municipal Separate Storm Sewer System. Municipalities are subject to the MA General MS4 permit, which regulates how stormwater is managed and treated, to prevent negative impacts to water quality, flooding, and public health.

Icon Legend:

Flood Management

Drinking Water Supply

Water Quality

Ecology

Land Development

Recreation

Stewardship

Interagency Cooperation

APC & Nemasket River Watershed Management & Climate Action Plan

RECREATION & STEWARDSHIP focus area

THE ISSUE



Site Conditions

- Nuisance aquatic vegetation impacts water recreation
- Lower summer flows, bridges, and culverts inhibit paddling access in the Nemasket River



Inappropriate Use & Lack of Information

- Recreational access must be balanced with drinking water protection in the Ponds
- Rule violations threaten resources and recreation
- More platforms advertising rules and appropriate use are needed



Climate Change

- Flooding may impact historic and cultural resources and recreational amenities
- Temperature changes may shift recreational use patterns

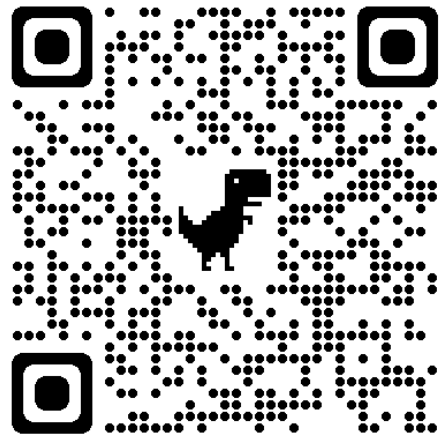
POTENTIAL MANAGEMENT SOLUTIONS

Public Information & Signage

- Universal informational signage explaining allowed uses, rules, and public access boundaries
- Public education to increase awareness of responsible recreation and environmental stewardship

Enforcement of recreational use rules

- Formalize funding stream for APC Rangers program and enforcement
- Advertise rules and regulations for public recreation on town websites and with clear signage at public sites



Invasive Plant Management

- Coordinate with local stewardship groups on volunteer invasive plant management efforts
- Prevent spread through public education and boat washing stations


Open Space Protection & Management

- Strategically expand the watershed's open space network
- Enhance land and water trails through regular maintenance
- Cooperative regional stewardship

Recreational Programming

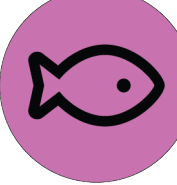


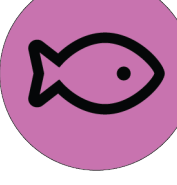



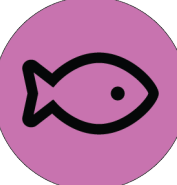


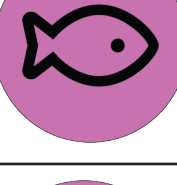


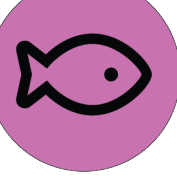




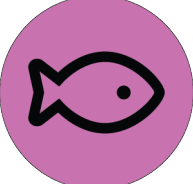


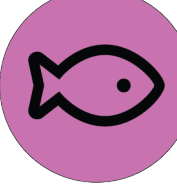


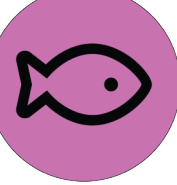


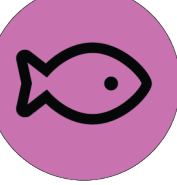


- Expand spiritual, cultural, and historic education opportunities
- Convert old Middleborough DPW site to public park

add other comments here!



Goal 6: Enable ecologically appropriate recreation

SUMMARY: For the purpose of watershed and climate resilience planning, a balanced recreation program is one which provides a quality outdoor recreation experience for people within a range of recreational activities that have a low impact on ecology and water quality in the Watershed. Community leaders and recreational users alike share the responsibilities of recreating appropriately in the watershed. Clearly communicated guidelines for how and where community members can enjoy various activities throughout the watershed can empower recreational users to be more mindful and reduce their impact on natural resources. This in turn can enable local capacity to expand the Watershed’s open space network and available programming.

	Action Item	Nature Based Solution	Climate Resilience Priority	Responsible Party	Timeline	Funding	Co-Benefits
Objective A: Improve signage and communication regarding permitted uses, access locations, and proper standards for recreating in the Watershed							
A-1	Encourage responsible and appropriate recreation in the region by improving signage in and around the area about public access and use limitations.			Conservation Commissions, Parks Commissions, APC Rangers	Ongoing	Local staff and board member time; CPA funds; explore grant opportunities	  
A-2	Increase public access to online information about where and how to recreate across the Watershed.			Conservation Commissions, APC Rangers, Town Managers	Ongoing	Local staff and board member time; CPA funds; explore grant opportunities	  
Objective B: Increase local municipal capacity for oversight and enforcement of recreational activities across the Watershed							
B-1	Provide a larger annual budget for the APC Rangers program to increase their presence around the ponds during peak months, for public education, enforcement and safety.			APC Management Team, Town Managers & Select Boards	Ongoing	Municipal Budgets, water utility & boat permit fees	 
B-2	Increase municipal funding for local Parks Commissions and/or departmental staff to improve maintenance of open space.			Town Managers & Select Boards, Parks & Conservation Commissions	Ongoing	Municipal Budgets; explore potential grant opportunities	  
B-3	Create a formal system for logging reports submitted by the APC Rangers to keep track of repeat rule breakers.			APC Rangers, APC Management Team	1-2 years	Local staff & volunteer time; explore potential grant opportunities	  
B-4	Invite and advocate for more oversight from MA Environmental Police throughout the region, and at the boat launch for Long Pond, especially if a boat washing station is installed.			APC Rangers, Local Police, State Environmental Police	Ongoing	Local staff & volunteer time	  
B-5	Highlight the importance of the APC Rangers in town communications.			Conservation Commissions, APC Rangers, APC Management Team, Town Managers	Ongoing	N/A (routine staff operations)	  
Objective C: Maintain and center ecological integrity in recreational offerings							
C-1	Install a boat washing station at the Long Pond Boat Ramp in Freetown to reduce the spread of water-quality degrading invasive plants.			MA DCR, State and Local Police, Freetown Conservation Commission	1-2 years	State budget	  
C-2	Manage over-use of recreational areas that threatens ecology and natural resources by directing users to more appropriate locations.			Conservation Commission, Parks and Rec Departments, APC Rangers	Ongoing	Local staff and commission time	 
C-3	Establish Downtown Middleborough River Walk with educational and stewardship signage about the Nemasket River.			Middleborough Conservation Commission, Parks and Rec Dept; APC Management Team	3-5 years	Grants (state & federal trails grants); CPA funds	

Reference Terms:

The **APC Rangers** are the first line of defense for protecting the watershed and water supply from inappropriate use. They patrol the Watershed, enforce recreational use regulations, and provide education and outreach to recreational users.

Boat Washing Stations help reduce the spread of contaminants, like invasive aquatic plant and animal species, from one water body to another. Boats (particularly motor boats, but smaller row boats and canoes and kayaks as well) may carry hitch-hiking species on them, and should always be cleaned and disinfected thoroughly in between uses to reduce the spread of invasive and nuisance species.

There is a conceptual Downtown Middleborough **River Walk** in development on public properties from Route 28 to Route 105/East Main Street near the Nemasket River. There are some private properties interrupting the proposed pathway at present, but many properties are already public that could be used for a walkway and/or bike path. Educational signage placed along the walk could increase awareness about the River’s history and natural resources, and encourage more ecologically-mindful recreation.

Icon Legend:

 Flood Management

 Drinking Water Supply

 Water Quality


 Ecology

 Land Development

 Recreation

 Stewardship

 Interagency Cooperation



Goal 7: Foster a widespread culture of stewardship

SUMMARY: Similar to recreation, stewardship requires a balance between the right to enjoy local natural resources and the responsibility to do so mindfully. It is important to note that everyone plays a role in stewardship, and there are opportunities for municipal managers, residents, recreational users and other stakeholders, through the ways they interact with the Watershed and its resources on a daily basis, to act as environmental stewards. Community leaders and land managers can help foster a widespread culture of stewardship among those who live, work and play in the watershed through education and leading by example, to help the public recognize and adopt best practices.

	Action Item	Nature Based Solution	Climate Resilience Priority	Responsible Party	Timeline	Funding	Co-Benefits
Objective A: Expand outreach to increase education and awareness of the impact of stewardship							
A-1	Engage local schools and provide educational opportunities for youth.			Conservation Commissions, School Departments, environmental groups	1-3 years, and ongoing	Local staff time; in-kind services from environmental groups and consultants; explore grant opportunities	 
A-2	Reach out to property owners who live on the water and share recommendations on how they can be effective stewards.			Conservation Commissions, Planning Boards, Long Pond Association	1-3 years, and ongoing	Local staff time; in-kind services from environmental groups and consultants; explore grant opportunities	  
A-3	Increase public awareness of the scenic and ecological value of the Nemasket River, and support efforts to nominate this corridor for potential designation programs.			APC Management Team, APC Rangers	3-5 years, and ongoing	Local staff & volunteer time; explore grant opportunities	  
A-4	Expand spiritual, cultural, and historical education and recreation offerings to encourage better relationships with, and understanding of, the Watershed.			Local arts and culture organizations, Conservation Commissions, Historical Commissions, Parks Depts & Commissions	1-3 years, and ongoing	Local staff & volunteer time; in-kind services from local orgs; CPA; explore grant opportunities	
Objective B: Enable residents to apply their knowledge of stewardship to active stewardship projects							
B-1	Engage archeological and historical groups in stewardship efforts on a more regular basis.			Town Boards & Commissions, local community groups, Historical Commissions	Ongoing	N/A (routine staff operations)	
B-2	Encourage public review and comment on new water withdrawal permits from the Watershed to assure healthy ground and surface water flow levels.			Town Boards & Commissions; APC Management Team, local & regional environmental groups	Ongoing	N/A (routine staff operations)	   
B-3	Organize and mobilize local volunteers and environmental groups to help steward open space and outdoor recreation facilities.			Conservation Commissions, local environmental groups, APC Management Team	Ongoing	Local staff & volunteer time; in-kind services from environmental groups; explore grant opportunities	 
B-4	Enlist high school and college student-run clubs and/or programs to help monitor local ecological conditions and track changes.			Local environmental groups & schools	Ongoing	Local staff & volunteer time; in-kind services from environmental groups; explore grant opportunities	 
Objective C: Take municipal actions to improve stewardship							
C-1	Install public art in community and civic spaces throughout the region to foster a connection and celebration of the Watershed’s special natural resources.			Planning Boards, Dept of Public Works, Arts and cultural groups	Ongoing	Local staff and volunteer time; CPA Funds; explore grant opportunities	 
C-2	Manage growth in historical villages to enhance and preserve what is special.			Historical Commissions, Planning Boards, developers	Ongoing	N/A (routine staff operations)	
C-3	Encourage good stewardship of cranberry bogs and their preservation and/or restoration as wetlands.			Conservation Commissions, Planning Boards, Cranberry Bog owners	Ongoing	Local staff and bog owner time; utilize resources and grant funding from DCR, MDAR and NRCS	 

Icon Legend:

 Flood Management

 Drinking Water Supply

 Water Quality


 Ecology

 Land Development

 Recreation

 Stewardship

 Interagency Cooperation



Goal 8: Expand opportunities to improve cooperative management

SUMMARY: For many of the management actions proposed in this Plan, cooperation among various local, regional state and federal entities is essential, particularly where interests and jurisdictions overlap. For example, several Nemasket River bridge crossings managed by the State Department of Transportation are of interest to entities focused on habitat and water quality restoration, as well as to recreational entities interested in river access locations. At a more holistic level, the overall management of the watershed requires continued and strengthened interagency cooperation and communication among local public water supply agencies in New Bedford and Taunton, watershed municipalities, homeowner associations, conservation agencies and organizations and many others. Collaboration across jurisdictions can increase efficiency and likelihood of success in achieving these management goals. Expanding upon the partnerships already existing across the watershed, and establishing platforms for more regular and streamlined communication with each other as well as with the public, will help achieve the 2050 Vision for the Watershed.

	Action Item	Nature Based Solution	Climate Resilience Priority	Responsible Party	Timeline	Funding	Co-Benefits
Objective A: Continue the efforts of the APC Management Team to enhance regional coordination and transparency of pond level management and water supply-related protections							
A-1	Provide ongoing transparency and clarity into Assawompset Pond water level management, particularly around target water thresholds.			APC Management Team, Water Suppliers	Ongoing	N/A (routine staff operations)	 
A-2	Consistently monitor and report water levels to a centralized online location where residents (and water suppliers) can access pond level information and the status of the dam (boards in or open) on demand.			APC Management Team, Water Suppliers	Ongoing	N/A (routine staff operations)	 
A-3	Install automated pond water level gauges that can streamline water level monitoring and reporting.			APC Management Team, Water Suppliers	3-5 years	Explore grant opportunities	 
A-4	Formalize fisheries and wildlife considerations in APC dam management through continued coordination between water suppliers and the Lakeville-Middleborough Herring Fisheries Commission.			APC Management Team	1-3 years	Local staff and board member time	  
Objective B: Improve regional collaboration and coordinate on environmental monitoring and management efforts							
B-1	Increase coordination with state agencies for improved regulation, education, management, and monitoring of invasive plant removal strategies.			Conservation Commissions; MA DCR, NHESP; APC Management Team	Ongoing	N/A (routine staff operations)	   
B-2	Coordinate efforts between towns and local stewardship groups to remove and monitor the spread of invasives plants.			Conservation Commissions, Long Pond Association, local environmental groups	Ongoing	Local staff and volunteer time	   
B-3	Increase collaborative efforts to preserve land in the Watershed through an inter-municipal committee dedicated to prioritizing acquisition targets and generating funding.			APC Management Team, Conservation Commissions, Open Space Committees, local & regional environmental groups	1-3 years	Local staff and volunteer time; in-kind time of environmental groups	  
Objective C: Educate stakeholders on methods they can take to reduce contaminant inputs							
C-1	Review MOUs , OOCs and operating procedures with entities like MassDOT and DEP that have a role in scheduled maintenance that affects drainage, sedimentation and water flow.			APC Management Team, Dept of Public Works	Ongoing	Local staff and board member time	   
C-2	Work with MassDOT to explore new road surface quality and road bed design and maintenance standards that will reduce runoff.			APC Management Team, Dept of Public Works, Conservation Commission	Ongoing	Local staff and board member time	   
Objective D: Improve communication and public awareness of environmental regulations and ongoing efforts across the Watershed							
D-1	Establish a public communications platform to share information about the watershed and communicate the status of various ongoing projects across the Watershed.			APC Management Team	Ongoing	Local staff and volunteer time; explore grant opportunities	 
D-2	Identify and address inconsistencies in bylaws and enforcement approaches between communities			Planning Boards, Conservation Commissions, APC Management Team	1-3 years, and ongoing	Local staff and board member time; explore grant opportunities	  
D-3	Work with state representatives and other communities to lobby for additional resources for MA Environmental Police.			APC Management Team, local and regional environmental/ advocacy groups	Ongoing	Local staff and volunteer time	  

Reference Terms:

Memorandums of Understanding (MOUs) and **Orders of Conditions (OOCs)**, in this context, are agreements between two or more entities on how to operate and maintain infrastructure (including roadways, culverts and bridges) that exists across overlapping jurisdictions.

Icon Legend:

 Flood Management

 Drinking Water Supply

 Water Quality

 Ecology

 Land Development

 Recreation

 Stewardship

 Interagency Cooperation

12-POINT PLAN FOR
PRIORITY APC-NEMASKET PROJECT PHASING

PHASE 1: WORK THAT IS HIGH PRIORITY AND ACTIONABLE
(in priority order)

1. Address sedimentation build-up with a 5-year emergency permit

- Building off model emergency permit from several years ago

2. Removal of weeds from Long Pond and the Nemasket River

- Plan for eco-harvester weed removal based on areas of weed concentration shown in solutions study
- Present to permitting agencies (local Con Comms, US Fish and Wildlife, Natural Heritage)
- Contract with eco-harvesting company
- Repeat seasonally as necessary

3. Install automatic pond level loggers

- Direct transmission of level data to a publicly-facing website / database

4. Signage Plan and Installed Signage / Monitoring around the ponds

- Aimed at curbing inappropriate recreation

Initiated; currently pursuing local and state permits; funded by state ARPA allocation.

Initiated; currently pursuing local and state permits; funded by state ARPA allocation. Will require successive years of activity.

Not yet initiated

Not yet initiated

PHASE 2: WORK THAT IS HIGH PRIORITY BUT REQUIRES SOME FURTHER STUDY OR ANTECEDENT ACTIONS (in priority order)

5. Wareham Street dam removal

- Several phases (feasibility, design, engineering, construction)

6. Permeable Reactive Barrier / Buffer Strip Long Pond Pilot Program

- We've removed immediate issue in item 2 above, now let's keep the weeds from coming back; goal of PRB technology

7. Installation of boat washing station at the Freetown Boat Ramp

8. Replacing the Snake River Culvert

- Note that it is after items 1 and 6, which helps to address transmissible weeds

9. Buy high priority preservation land

10. Amend local bylaws with low-impact development principals on the ponds

Initiated; on-going project is exploring removal feasibility.

Grant application submitted 6/30/22.

Initial site work (electrification, gate installation) being pursued

Funding not identified. BRIC potential in future.

PHASE 3: WORK THAT WOULD BE MOST DISRUPTIVE TO STATUS QUO - NEEDS ONGOING STUDY AND CONSIDERATION (in priority order)

11. APC Dam upgrade / reconfiguration

12. Initiating a property buy-out program

Project specifics not yet fully developed; funding pathway not yet developed.

[Lakeville Select Board endorsed 3/21/22; Middleborough Select Board endorsed 3/14/22]

GOAL TIMELINE FOR ALLEVIATING

SEDIMENTATION

IN THE UPPER NEMASKET RIVER



SRPEDD
Southeastern Regional Planning
& Economic Development District

Prepared on 6/17/22

OUTCOME:

Excavate ~1,200 cubic yards of built-up sediment from the first 600 - 1,200 feet of the Nemasket River downstream of the APC Dam

THIS WILL ACCOMPLISH:

better water flows | **flood mitigation** | **less hospitable conditions for invasive aquatic plants** | **easier passage for river herring**

BUT FIRST WE NEED:

 Permits! Many, many permits!

Lakeville and Middleborough Conservation Commission NOI's, 401 Water Quality Certification and Chapter 91 permit (state), Self-Verification Notification and/or Pre-Construction Notification (Army Corps of Engineers)

AND WE NEED TO CONSIDER: The timing of herring migration out of the ponds. Out-migration ends around Nov. 15 - work in the river must wait until this time.

THE GROUP IS WORKING ON IT: Inter-agency Sedimentation Committee

INTENDED DATE OF COMPLETION: December 15, 2022

MORE INFO ON THE STEPS IN BETWEEN:

**JUNE/JULY
2022**

Sedimentation Committee working with contractor to finalize local Conservation Commission application materials

**AUGUST
2022**

Aug. 18th: Joint town Conservation Commission meeting to review application

With local approvals (hopefully!) in hand, submit for state and federal permits

**SEPT / OCT
2022**

Towns go through the bid process to select a contractor to conduct sediment removal and bank restoration work (funded by SRPEDD ARPA \$\$)

**NOV / DEC
2022**

Work completed. Renew permits to repeat as needed in future years.

Comment Cards from Board Stations - Floodwater

1
NO BUY
OUT 😞

1 So I'm a homeowner + Naturally
Buy outs Don't make sense to me -
because A.) even if you buy out on
Assawamsett - Longpond Drains to
Assawamsett and Do you then buy out
all those homes? And Do you shut down
the public beach ramp - Would it
even make a difference?

BUT yeah - I really don't like that option
~~Buy out~~

Don't buy
Shut down
beach ramp
-
Fletcher resident

1 FLOOD CONTROL

LIMIT DEVELOPMENT

Jim Kenney

1 Are there any short-term strategies
to mitigate flooding impact similar
to the Spring 2010 occurrence

1 Flood Control

Jim Kenney

Would like to see some kind of coordinated
dam management plan to utilize the
Upper Nemasket Watershed as a
Strategic Flood Plain:

- must be pro-active (ie beginning in
the fall and extending through the spring)
- allows reasonable volumes in
Assawamsett
- requires early action to lower
bascule dam for the UNW flood plain

1 Must take care of the weeds.

Comment Cards from Board Stations - Water Supply

2✓✓ C-3
≡

✓ C-1

2

If They tear down The old
Assaw. Dam + build a new one -

Can They Repurpose The old
Granite Balusters as a monument
over in The Lakeville Library
Grounds? It would make
a beautiful outdoor space

Institute Stephen Shore Landscape
Architecture

Comment Cards from Board Stations - Water Quality

3

Is expectation for property owner to have to exceed Title V requirements reasonable??

3

Boat wash station. Where, how?
Need to have water to wash.
Need to clean old water

3

What is cost / impact to homeowners to have to exceed Title V requirements?

3

✓ B-1

✓ B-2

✓ C-1 ✓ B-5:

✓ C-2

TRWA has volunteer

supported routine

H₂O testing (enterococci, nitrate, phosphorus...)

Comment Cards from Board Stations - Ecology

4 ✓ B-1

✓ B-2

✓ C-1

✓ C-2

✓ C-3

C-4

4

Amazing job! The
hardwork is evident.
Don't forget to reflect on
what you've accomplished!
Onward! - Courtney, MVP

Comment Cards from Board Stations - Land Development

5

Goal 5

Support A-4

6

I would think The Boat
washing station would be
A #1 priority

Along w/ education on Invasives

6

I am confused on The
creation of APC Rangers -

Is This a State park?
What authority Do They have?

Yes - definitely need education

APC Public Meeting – Meet your plan open house

7/14/2022, 5-8 PM

Verbal Comments:

- (Nancy Durfee) FEMA offers raising grants (in addition to buy outs) – potential interim/more immediate option for homeowners
 - Post boards somewhere in public to allow public more time to review and provide feedback (Rochester COA, Lakeville Library...)
 - Help public understand importance of watershed, learn what it means to them
 - Need to better understand relationship between neighboring watersheds in Rochester (Snipatuit Brook) – don't want to compromise Rochester's water supply
 - Ecoharvester – can be used elsewhere when not being used for Ponds? (Rochester can use in ponds there)
- (Jim) – vision statement does not offer recreation
 - Written comment cards – not a good way to get feedback, need assurance those comments will be addressed – how to find out respond (if and why/why not included)
 - Comments will be included in public feedback appendix to plan
 - (one-on-one / not public comment: better management of Wareham St dam – lower more frequently so not holding back water)
- 12 point plan
 - Many diff players involved – will all approve so steps actually happen? Lakeville & Middleborough have already reviewed and selectboards approved plan – no challenges there
 - Other communities participate in APC Management Team (incl water suppliers) and have contributed to plan as well
- Tom: Upper Nemasket River is drainage/flooding problem (sedimentation, weeds)
 - Jim disagrees – bascule dam is issue

Comment Cards:

- Goal 1 (Reduce flood risks):
 - “NO BUY OUT 😞”
 - “So I'm a homeowner and naturally buy outs don't make sense to me, because A.) even if you buy out on Assawompsett – Long Pond drains to Assawompsett and do you then buy out all those homes? And do you shut down the public boat ramp – would it even make a difference? But yeah – I really don't like that option.” (Jen O'Keefe, Staples Shore ;and owners, Taunton resident)
 - “Are there any short-term strategies to mitigate flooding impact similar to the spring 2010 occurrence” (Jim Kenney)
 - “Would like to see some kind of coordinated dam management plan to utilize the Upper Nemasket Watershed as a strategic flood plain:
 - Must be pro-active (i.e. beginning in the fall and extending through the spring)
 - Allows reasonable volumes in Assawompsett

- Requires early action to lower bascule dam for the UNW flood plain” (Jim Kenney)
 - “Must take care of the weeds.”
- Goal 2 (water supply):
 - C-3 (Eliminate the use of herbicides vis IPM) ✓ ✓ C-1 (support additional drinking source water testing and monitoring) ✓
 - “If they tear down the old Assawompset Dam and build a new one – can they repurpose the old granite bolsters as a monument over in the Lakeville Library Grounds? It would make a beautiful outdoor space” (Jen O’Keefe, Staples Shore land owner, Taunton resident)
- Goal 3 (water quality):
 - “Is expecting for property owners to have to exceed Title V requirements reasonable??”
 - “Boat wash station: where, how? Need to have water to wash. Need to clean old water.”
 - “What is cost/impact to homeowners to have to exceed Title V requirements?”
 - B-1 (restore buffers) ✓ B-2 (alter mowing practices) ✓ C-1 (educate landowners about fertilizer regs) ✓ C-2 (Develop and spread WQ BMPs) ✓ B-5 (more WQ monitoring stations & volunteer network) ✓: “TRWA has volunteer supported routine H2O testing (enterococci, nitrates, phosphorus...)”
- Goal 4 (ecology):
 - B-1 (forestry management plans) ✓ B-2 (address barriers to fish passage) ✓ C-1 (public education about invasives) ✓ C-2 (volunteer monitoring for invasives) ✓ C-3 (IPM) ✓ C-4 (prevent spread of invasives from Long to assawompset Pond) ✓
 - “Amazing job! The hard work is evident. Don’t forget to reflect on what you’ve accomplished. Onward!” (Courtney, MVP)
- Goal 5 (development):
 - “Support A-4” (engage state in new MBTA multi-fam housing)
- Goal 6 (recreation):
 - “I would think the boat washing station would be a #1 priority along with education on invasives”
 - “I am confused on the creation of APC Rangers – is this a state park? What authority do they have? Yes – definitely need education”
- Goals 7 (stewardship) & 8 (interagency): no comments

WRITTEN COMMENTS RECEIVED ON DRAFT PLAN (JULY 2022):

APC/NR Plan

Thomas Quigley <tquigley49@gmail.com>

Mon 7/18/2022 3:16 PM

To: Danica Belknap <dbelknap@srpedd.org>

Danica:

Overall, a great job by your colleagues and yourself. It was interesting to note the youngest people at the 7/14 meeting were the presenters. This is why I have tried over the decades to get young children to young adults very interested in Environmental Education. My generation, your generation, and my grandchildren's generation, could be the very last hope that we will ever have in trying to save our planet.

Listed below are my random thoughts about some of the items that were noted within the displays at that 7/14/22 meeting:

- (1) There needs to be many more Environmental Police law enforcement officers to curtail inappropriate recreation. The APC Rangers are doing the very best possible, as I have seen them in action on a number of occasions. Unfortunately, they do not have the power of law enforcement.
- (2) Commercial and light manufacturing businesses need to be steered toward urban and suburban Brownfield sites. They have all of the necessary infrastructure already in-place, yet they will not be dumping hazardous waste into the former "Waste Ways" on the waterways.
- (3) Monitoring wells need to be installed upgradient of municipal water supply wells, as the last line of defense before impacting drinking water.
- (4) Deactivate the Assawompset dam, while simultaneously activating a new dam, with automated devices to gauge water level for possible adjustment, to gauge water temperature, to gauge water speed, and to gauge the amount of sediment. A new fish ladder is also a must have.
- (5) Match youth educational programs with outdoor education opportunities that teach ecologically appropriate recreational activities.

Based on the plan, and comments at the meeting, these are short-term, mid-range, and long-term recommendations:

- (1) The SRPEDD display at that meeting was awesome, as it was very informative, definitive, challenging, and hopeful. Unless you can ideally produce separate displays for each of the affected communities, then rotate the display through each of the four communities.
- (2) Set-up several educational sessions at each of the affected four school districts. You need to get student, parent, and staff buy-in.
- (3) Eventually, there will need to be a sewer treatment plant in Lakeville, Rochester, and/or Freetown. As has been done in many other communities, first start where there are a lot of homes, like Clark Shores in Lakeville, then branch outward to other developments.

On 7/15/22, I took another tour around Long Pond. These are the observations of two, 40-year owners on Long Pond, and my own:

- (1) They felt the five point plan (boat wash station, eco-harvester, Route 105 culvert, and sediment and dam removals) was a good start.
- (2) They have noticed so much grass growth, they felt you would have to harvest every year, for an extended period of time each year.

- (3) The husband actually recommended shutting down the entire pond to recreational use for one year. (I do not see that happening.)
- (4) Just over the last few years, there are now much bigger homes, more bathrooms, more occupants, bigger boats with larger motors, and much bigger docks. Local and state officials need to get this under control soon, or Long Pond will be lost to eutrophication (owner comment).
- (5) Local and state officials also need to address zoning, septic system, and stormwater run-off issues. Yes, this is also another hard part.
- (6) There should be fliers handed to all pond users on the "Dos and Don'ts" of using/living on a pond discharging to a back-up water supply.

Tom

P.S. If your colleagues, and yourself, would like a present day tour of Long Pond, just let me know. It can be a real eye opener.

To: SRPEDD
From: Neil Fennessey, PhD
HYSR
South Dartmouth, MA 02748
Professor Emeritus, Civil Engineering
University of Massachusetts

Thank you for the opportunity to review this DRAFT report. I have a few comments, recommendations and corrections to offer.

Review of APC and Nemasket Watershed Management and Climate Action Plan DRAFT 7-27-22 Main Report

pp. 29, para 1, change from: 'Culverts, bridges and dams all allow... ' to "Culverts, bridges, dams **and invasive vegetation species in the Nemasket River channel** all allow..."

pp. 29, para 1, change from: "... these structures are sized appropriately and not preventing..." to "... these structures and sized appropriately **and invasive vegetation removed from the river channel on an annual basis** and are not preventing..."

pp. 37, para. 5, change from: "... we are moving with additional GHG emissions..." to "... we are moving with additional GHG **(Green House Gas)** emissions..."

pp. 38, para. 3, change from: "... depth to groundwater, soils and natural climatic..." to "... depth to groundwater, soils, **invasive aquatic vegetation** and natural climatic..."

pp. 46, para. 3, change from: "One such study during recent..." to "**Two such studies** during recent..."

pp. 46, para. 3, change and add citation: "... APC water levels (Assawompset Pond Level and Dam Committee, 2011)." to "... APC water levels (Assawompset Pond Level and Dam Committee, 2011) **and Fennessey (2013).**"

pp. 47, para. 2, insert new topical sentence: "Under climate change, the respective Taunton and New Bedford estimated firm yields from the APC will likely be diminished."

pp. 47, para. 2, change from: "... needs to store more surplus water, potentially..." to "... needs to store more surplus water, **and/or require the implementation of more frequent and longer duration water use restrictions in Taunton and New Bedford,** potentially..."

pp. 47, para. 2, delete sentence: "The APC is, therefore, called upon for additional withdrawals during times of regional scarcity, compounding water supply management challenges."

pp. 73, Action C-1 change from: "Replace the Snake River Culvert (but not before addressing..." to "Replace the Snake River **Box** Culvert **between Long Pond and Assawompset Pond** (but not before addressing..."

pp. 73, Action C-1 Co-benefits: add **ecology and flood mitigation symbols**.

pp. 73, Insert new C-2 below C-1 co-benefits: "**Conduct sonar side-scan survey of the entire length of the Nemasket above the Wareham St. dam/fish passageway.**"

pp. 73, add a new paragraph: "**The planned MA DCR DER objective is to replace the existing undersized Snake River box culvert connecting Long Pond and Assawompset Pond with a structure that uses a "natural" bottom located at the approximate original elevation of the bottom of the Snake River. The new structure will cause some "tension." For example, when the other four lakes of the APC are drawn down during the summer due to water supply withdrawals, enhanced surface evaporation and releases/dam leakage to the Nemasket, recreation levels in Long Pond will also fall**

with a structure designed to provide anadromous fishery spawning access without the use of a fish ladder/passageway. On the plus side, Long Pond shoreline residents will likely be flooded less often because the replacement Rt. 18/105 structure will presumably no longer be undersized. Perhaps it was intentionally undersized and with the invert elevation where it presently is, serves to better maintain the desired summer time recreation pool.” This writer recommends that a mass balance model be developed to assess the trade-offs and consequences of replacing the present culvert with an alternative “fish friendly” design.

pp. 73, para. 1 comment: “Hydrologic modelling has revealed that removing the Wareham Street Dam in particular would greatly improve flow conditions...”

This isn't necessarily true. Thanks to data recorded by the town Middleborough which operates the bascule gate at the Wareham Street dam, at the special request of Rep. Paul Schmid, Fennessey (2013) studied the problem and showed that the gate did not control the flood water levels in the APC during the 2009/2010 flood.

pp. 75, modify Objective B table: Items B-1 and B-2 should be done simultaneously. Typical (USGS MODFLOW) groundwater models don't handle dynamic (time varying) head or flux boundary conditions, or infiltration and exfiltration (evapotranspiration) well. Given the hydrogeology of the APC, the firm yield model development needs to incorporate dynamic “bank” storage into the model's active storage component. NOTE: due to the location and elevation of Taunton and New Bedford's intake structures, the firm yield will be different for each system. To consider the potential impacts due to climate change, the firm yield model input time series also need to be re-scaled for mid-century and late-century General Circulation Model (GCM) climate change modeling temperature and precipitation RCP 4.5 and 8.5 emission output scenarios.

pp. 75, modify Objective B table: following the combining of Objective B-1 and B-2, add a new B-2. Conduct a sonar side-scan bathymetry study of the five APC ponds. A sonar side-scan bathymetric study was conducted in 2008/09 by Ocean Server Technologies, a UMass Dartmouth spin-off company, located in Fall River. Although a written report and sets of maps were prepared, unfortunately, when the company was sold the digital data files were not retained. This data is necessary to create stage-storage tables for each of the five ponds as needed for the firm yield study and presumably the groundwater study.

pp. 75, modify Objective B table: following the combining of Objective B-1 and B-2 and the addition of a new B-2, add a new B-3. ”Determine the leakage/seepage rate of the APC earthen dam and gatehouse as a function water surface elevation. Create a discharge-stage/elevation rating curve of the APC dam and gatehouse as will needed by the firm yield model.”

pp. 76, para. 1 and footnote 3 comment: firm yield is the maximum average daily withdrawal from active storage that could be sustained during a “significant,” usually the period-of-record drought. Safe yield is no longer used because it implies some sort of guarantee. Since the system will fail to provide this withdrawal rate regardless, those who think think about this sort of thing use instead “reliable yield” or “firm yield.” MA DEP uses firm yield per Fennessey (1996).

If there are water levels above an empty reservoir condition that are needed to ensure/sustain ecological/habitat requirements, those need to be defined by those sorts of specialists and used in the firm yield model.

The firm yield estimates for both New Bedford and Taunton were likely based on one of four storage-yield curves published in the J. of the New England Water Works in 1969 (see NEWWA, 1969). Those curves were constructed following the end of the 1960s multi-year drought of record. Fennessey (1996) developed the method that is required to estimate the firm yield when a municipality with a surface water supply system applies for a Water Management Act permit. Like the NEWWA method, Fennessey's method depends on historic USGS index stream gauge records but it incorporates better, up-to-date science. As such, the firm yield isn't regularly assessed or updated unless the region experiences a drought that's worse than that of the 1960s. Eventually a worse drought will occur in which case modeling won't be necessary as the APC-Nemasket River system and the cities of New Bedford and Taunton will be experiencing it in real time.

pp. 76, modify Objective B table: add B-4. Determine a calendar schedule of target minimum flows to be sustained in the Nemasket River for ecological/habitat requirements. These flows would be sustained by the combination of APC governed releases and leakage through the dam as they are now.

pp. 76, modify Objective B table, add Objective B-5. As described in an above comment, the Fennessey (1996) firm yield estimation method require the use of a proxy/Index streamgauge to drive the QPPQ Transform and provide a long history of daily inflows to the reservoir system being modeled. For future planning purposes this writer recommends that funding for a streamgauge to be established and maintained by the US Geological Survey be found. The author has conducted a preliminary site assessment and recommends that a DCP (real-time) streamgauge be established on Fall Brook using the dam located on the corner of County Street and Washburn Rd (Lawrence Park) in East Freetown as the gauge's hydraulic control structure.

pp. 76, modify Objective B table, rename present Objective B-3 as Objective B-6 comment and comment. "Reconfigure the APC dam spillway for greater control over the water levels in the ponds." The APC dam's emergency spillway isn't used to control water levels per se, rather, its function is to prevent the APC's earth dam from failing/washing out during an extreme event. It is possible that when it was designed, the present stone structure had vertical slide gates instead of flash boards. Even if it didn't it would be better served to refer to the structure as a "Gatehouse" versus a spillway.

pp. 76, para. 2: comment. This writer doesn't believe that the "current APC Dam spillway" can be improved. Rather, the stone pier "gatehouse" and emergency spillway need to be replaced. The structure has lasted as long as it has despite extreme flooding because the hydrostatic pressure, wind fetch and ice forces are/have been small enough to prevent failure from overturning. One of the piers is slightly out of alignment due to sliding. While the stone structure itself clearly has stood the test of time, operating the system of flash boards to govern water levels and releases to the Nemasket River is dangerous for the Taunton operators. It is this writers opinion that the safety of the operators is sufficient justification to replace the structure but adding better control using slide gates or pneumatic control to control releases and impounding is an added benefit to all stakeholders.

pp. 82, add to Objective B table, B-2. "Address barriers to fish passage in the Nemasket River at dams, fish ladders and stream crossings (i.e. dam removal, the culvert between Long Pond and Assawompset Pond and bridge replacement.)

pp. 83, para 2: change "Stream crossings along the Nemasket River, including multiple dams and bridges that restrict..." to "Stream crossings along the Nemasket River, including multiple dams, the culvert between Long Pond and Assawompset Pond and bridges that restrict..."

References

Fennessey, N.M., 2013. *Nemasket River Middleborough Dam Gate Analysis*. Prepared for Rep. Paul Schmid, Westport, MA. UMass-Dartmouth Department of Civil and Environmental Engineering, March.

Fennessey, N.M., 1996. *Estimating the Firm Yield of a Surface Water Reservoir Supply System in Massachusetts: a Guidance Manual*, Prepared for the Massachusetts Department of Environmental Protection, UMass-Dartmouth Department of Civil and Environmental Engineering, Hydrology and Water Resources Group Publication January.

NEWWA, 1969. *Proceedings: Progress Report of Committee on Rainfall and Yield of Drainage Basins*, Sept. 23, 1968. J. New England Water Works Assoc., Vol. 83, No. 2, pp. 166-189, June.

REVIEW OF APPENDIX A. TOPICAL WHITE PAPERS

Flooding and Flood Management

pp. 14, References: change citation from "Fennessey, N. (2013). Subject: Nemasket River Middleborough Dam Gate Analysis [Letter]." to "Fennessey, N.M. (2013). *Nemasket River Middleborough Dam Gate Analysis*. Prepared for Rep. Paul Schmid, Westport, MA. UMass-Dartmouth Department of Civil and Environmental Engineering, March."

Drinking Water Supply

pp. 30, para. 3, add citation: "Currently, under the Water Management Act, firm yield "is the basis for permitting maximum annual withdrawals from reservoirs" and defined as "a simulated estimate of the water volume available in a reservoir or reservoir system, as approved by the Department" (MassDEP, 2021b, Fennessey, 1996) "

pp. 30, para. 4, comment:"Based on a 1988 study from the engineering firm Camp, Dresser, and McKee (CDM), the permit also noted that the firm yield of the five APC ponds is 27.5, with 6.71 MGD allocated to Taunton and the remaining 20.79 MGD allocated to New Bedford (MassDEP, 2003). " Neither the City of New Bedford nor CDM Smith have been able to find their safe yield report, which according to MA DEP was prepared in 1971 According to MA DEP, the Taunton safe yield study by CDM was performed in 1988.

pp. 33, para. 4, add citation:"Two such study during recent floods found that removing the bascule gate at the Wareham Street Dam also did not affect APC levels, indicating that these two dams are not the primary drivers of APC water levels (SRPEDD, 2011 and Fennessey, 2013).

pp. 34, para. 6, add "Despite having historic legislative rights to Long Pond, Fall River no longer has access to the resource as a water supply source. Because Fall River had no withdrawals from there during the five-year Water Management Act registration period ending in 1987, those water right ceased to exist."

pp. 36, para. 3, add to bullet item:"The combination of hotter and drier periods will increase the likelihood of drought episodes, consequently the estimated Taunton and New Bedford APC firm yields will probably fall in conflict with both rising municipal demand and the instream/ecological flow water requirements of the Nemasket River. It is likely that CDM did not include ecological flow releases and leakage/seepage from the APC earthen dam in those original safe yield studies.

pp. 37, para 3 comment: "In relation to water withdrawal permits, the terminology "safe yield" and "firm yield" can introduce confusion, especially with differing and evolving definitions over time (see Current Water Withdrawals section above)." DEP WMP staff refer to Firm Yield as that average daily withdrawal rate which can be sustained from active storage during a period of extensive drought as used by modern Water Supply systems analysis (Fennessey, 1996) and Safe Yield when referring to the SWMI defined watershed, no reservoir, safe yield. Unfortunately, when the WPA was written in 1985, textbooks at that time discussed the safe yield of watersheds. Unfortunately, from a hydrological point of view, there is no such thing and so MA DEP had to make one up. The regulatory definition developed by MA DEP (in fact, this writer) and approved by the Mass. Water Resources Commission (WRC) in 1992 became obsolete when DCR refused to provide any more river basin "minimum streamflow" recommendations to the WRC. Because that number was required by the MA DEP WMP regulations basin safe yield formula, issuing permits ground to a halt by 1994. This author devised that formula. Following a 20-year hiatus, the SWMI developed a new regulatory definition of river basin safe yield which allowed the issuing of WMP withdrawal permits once again. This was critical because all existing WMP registrations once approved had to be reviewed after 20 years to be renewed.

pp. 40, References, change citation from "Fennessey, N. (2013). Subject: Nemasket River Middleborough Dam Gate Analysis [Letter]." to "Fennessey, N.M. (2013). *Nemasket River Middleborough Dam Gate Analysis*. Prepared for Rep. Paul Schmid, Westport, MA. UMass-Dartmouth Department of Civil and Environmental Engineering, March."

REVIEW OF APPENDIX F. REFERENCES

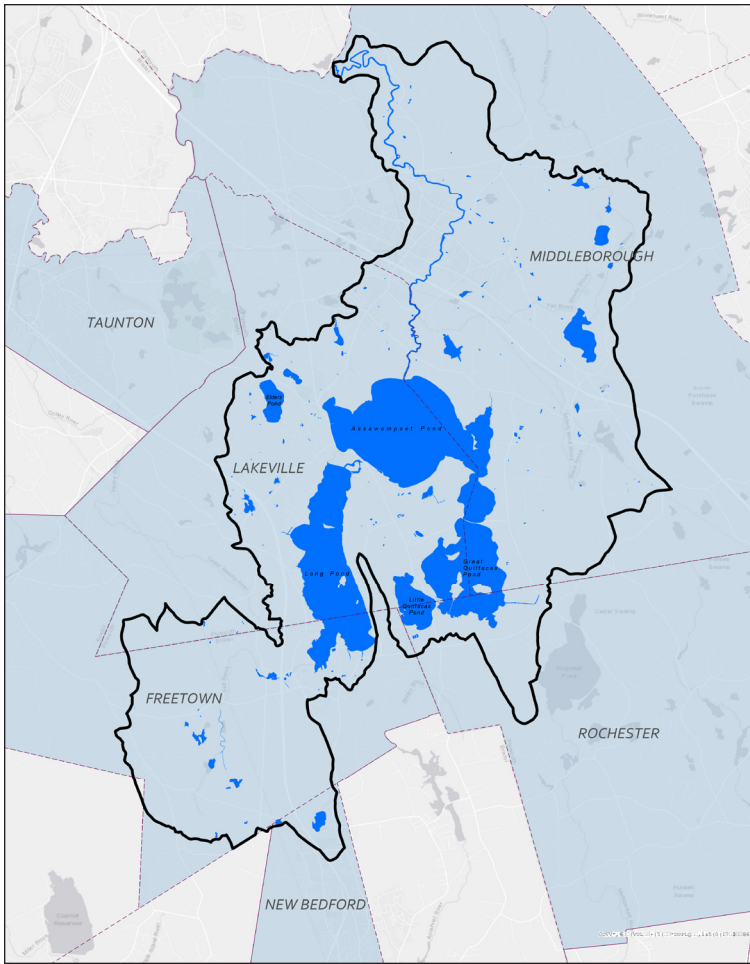
add citations:

Fennessey, N.M., 2013. *Nemasket River Middleborough Dam Gate Analysis*. Prepared for Rep. Paul Schmid, Westport, MA. UMass-Dartmouth Department of Civil and Environmental Engineering, March.

Fennessey, N.M., 1996. *Estimating the Firm Yield of a Surface Water Reservoir Supply System in Massachusetts: a Guidance Manual*, Prepared for the Massachusetts Department of Environmental Protection, UMass-Dartmouth Department of Civil and Environmental Engineering, Hydrology and Water Resources Group Publication January.

OTHER PUBLIC ENGAGEMENT MATERIALS, INCLUDING:

- Advertisements
- Press Releases
- Photos of pop-up tables at community events (x4)



GET INVOLVED!

in the

**Assawompset Pond
Complex and
Nemasket River**

**Watershed
Management
& Climate Action Plan**

Join us for public meetings and share your perspective on a number of topics about the region where you live, play, and work.

The Watershed Management and Climate Action Plan will establish a program of activities to pursue across the APC-Nemasket communities that will improve watershed health and human quality of life, spanning land conservation, restoration, regulation, public education, and beyond.

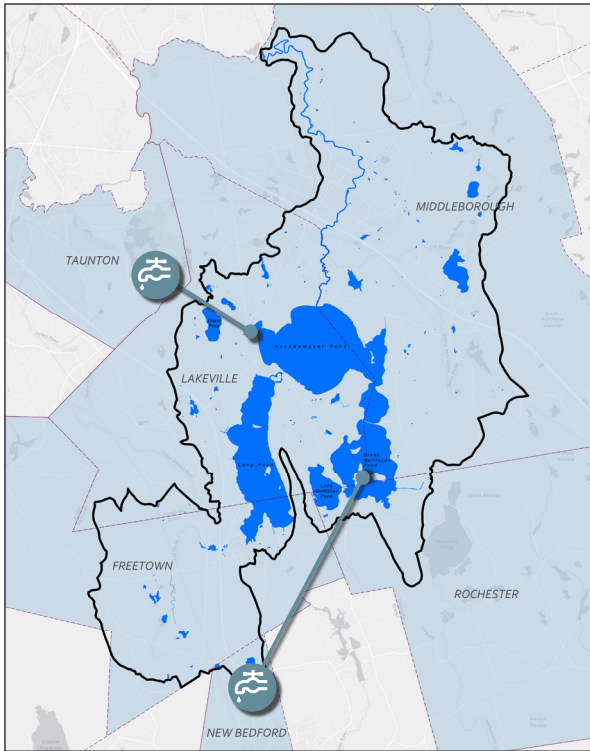
Participate in the planning process so that your ideas and reactions to proposed management solutions are part of the Plan!

Meetings will be held in person and online.

TOPIC	DATE	LOCATION
Flooding	9.29.21 5-7 PM	Lakeville
Water Quality	10.13.21 5-7 PM	Taunton
Water Supply	11.10.21 4:30 - 6:30 PM	New Bedford
Unique Habitats	3.23.22 5-7 PM	Middleboro
Recreation	4.13.22 5-7 PM	Rochester
Land Development	4.27.22 5-7 PM	Freetown
Open House	6.1.22 6-8 PM	Lakeville

Visit the [project webpage](http://www.srpedd.org/apc-nemasket-plan) for full meeting details and registration:
www.srpedd.org/apc-nemasket-plan



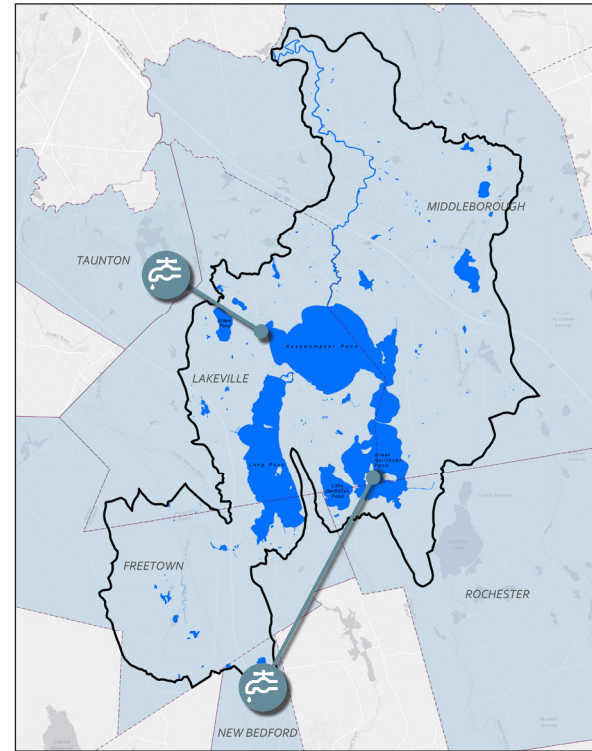


GET INVOLVED!

in the **Assawompset Pond Complex and Nemasket River Watershed Management & Climate Action Plan**

*We need your input in a
comprehensive evaluation
of water-related issues and
management solutions across the
plan region in the areas of:*

water supply	water quality
recreation & stewardship	land development
unique habitats	floodwater management

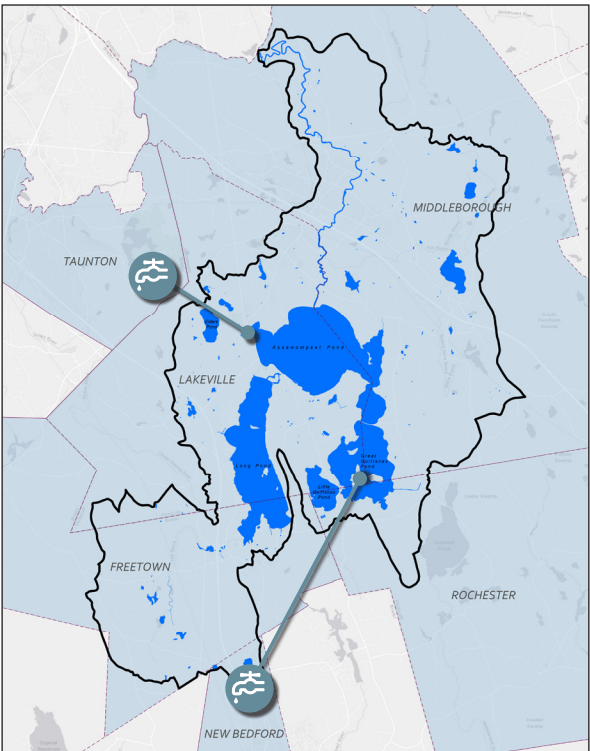


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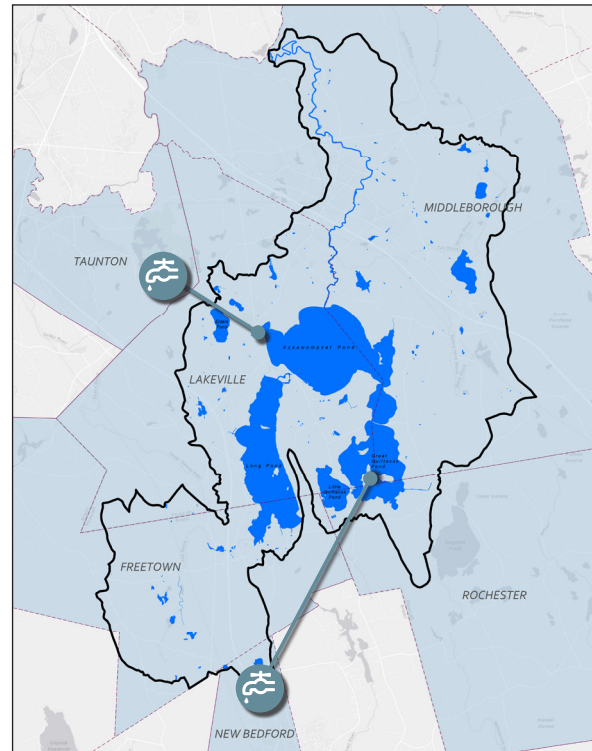


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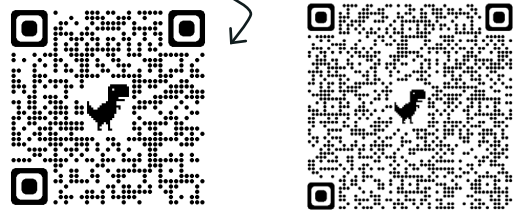
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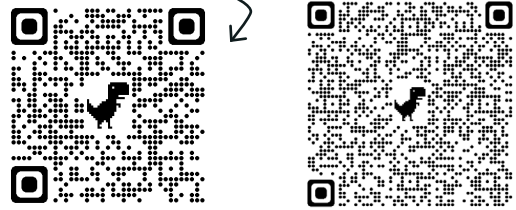
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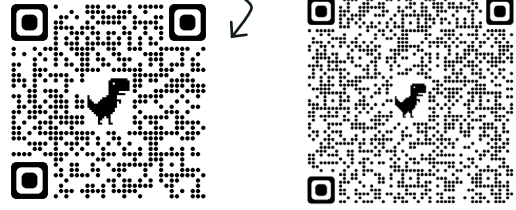
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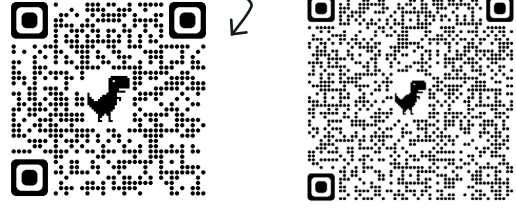
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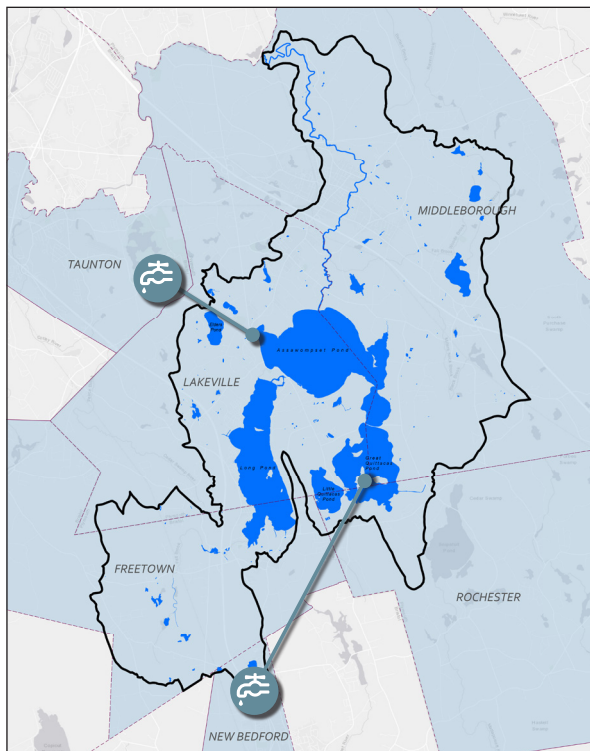


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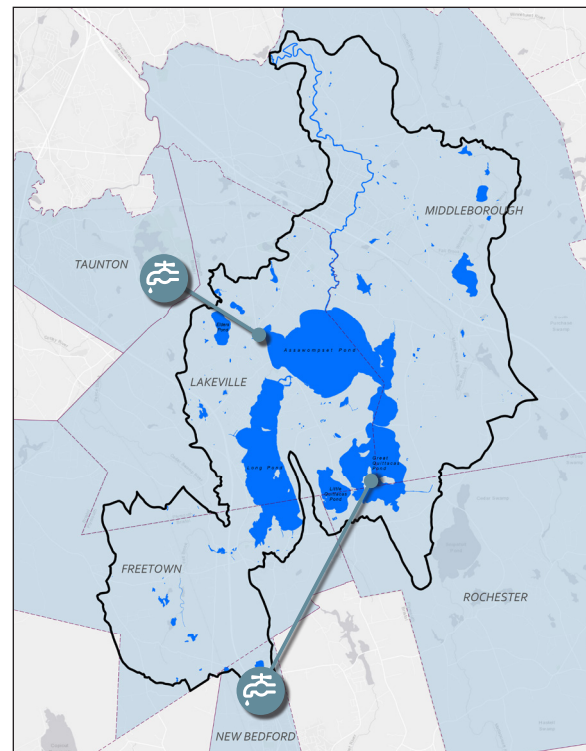
SE ENVOLVE!

No
Complexo do Lago de
Assawampset e o Rio de
Nemasket

**Gestão de Bacias
Hidrográficas e Plano de
Ação Climática**

*Precisamos da sua opinião numa
avaliação compreensiva
relacionado à água e soluções de
gerenciamento em toda a
região de plano nas áreas de:*

abastecimento da água	qualidade da água
recreação e mordomi	desenvolvimento de terreno
habitats únicos	gestão da água de inundação



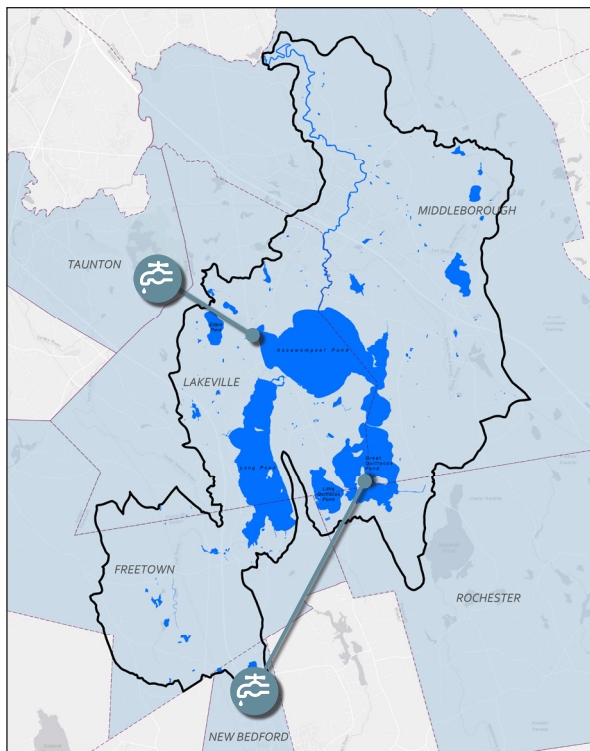
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habitats únicos	gestão da água de inundação



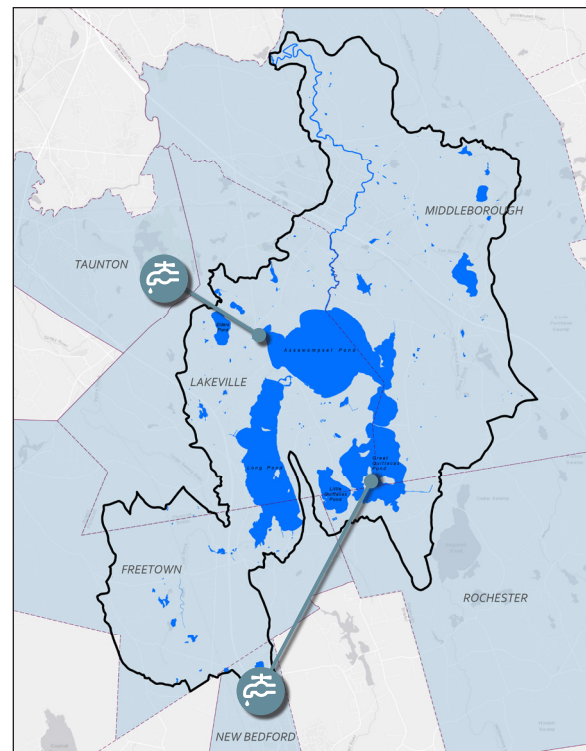
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Uma Aproximação de Gestão Regional

A Gestão de Bacias Hidrográficas e o Plano de Ação Climática irá estabelecer um programa de atividades para seguir nas comunidades APC Nemasket que irá melhorar a saúde da bacia hidrográfica e a qualidade de vida humana, conservação da terra, restauração, regulamentação, educação pública e muito mais.

Visite a página do projeto www.srpedd.org/apc-nemasket-plan para informação completa sobre a reunião e para registrar:

video da tour da bacias hidrográficas!



ou escaneie aqui para se registrar!

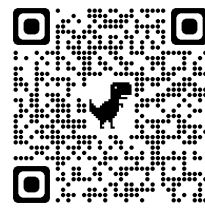


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Junte se conosco para um workshop público la fora! Venha a todos ou as reuniões dos temas que lhe interesse. **NOTA** que também existe uma opção de reunião online, na mesma data e hora pelo Zoom.

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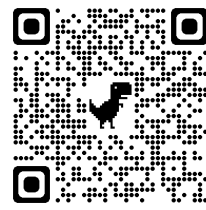


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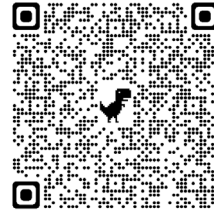
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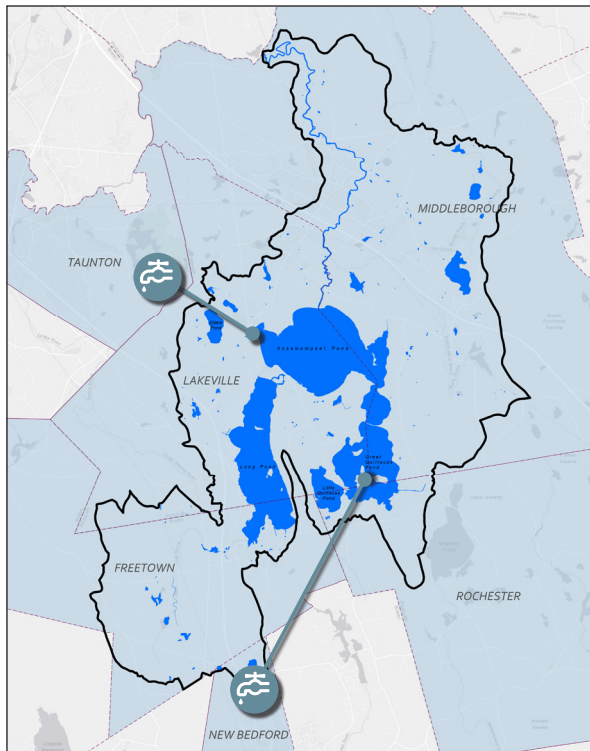


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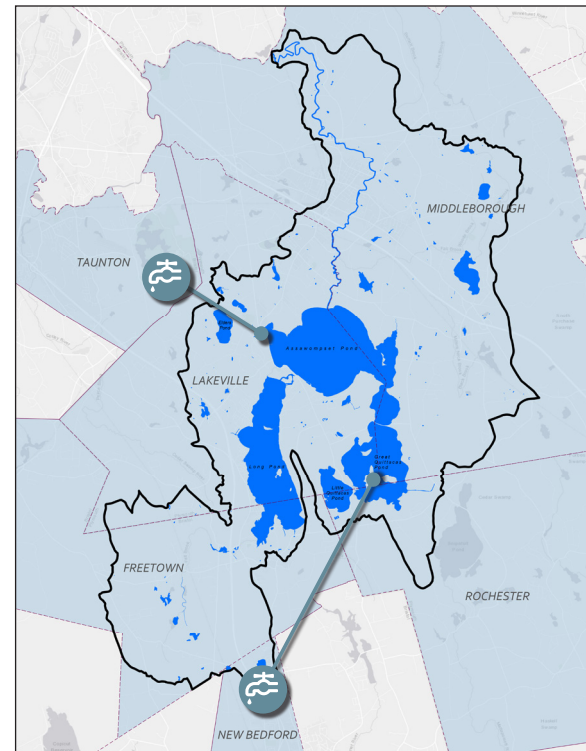
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en el Manejo de Cuenca y Plan de Acción Climática

Complejo Assawompset y el Río Nemasket

*Necesitamos su opinión en
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suministro de agua	calidad de agua
recreación y administración	desarrollo de la tierra
hábitats únicos	gestión de aguas de inundación



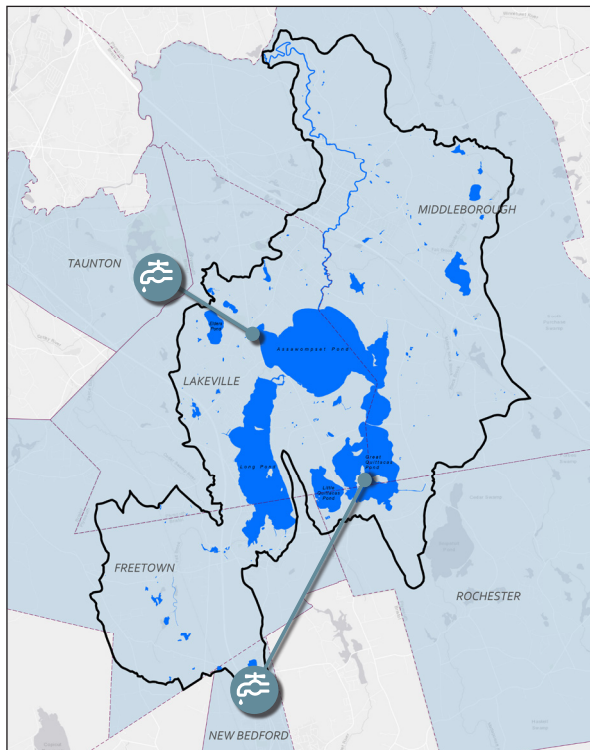
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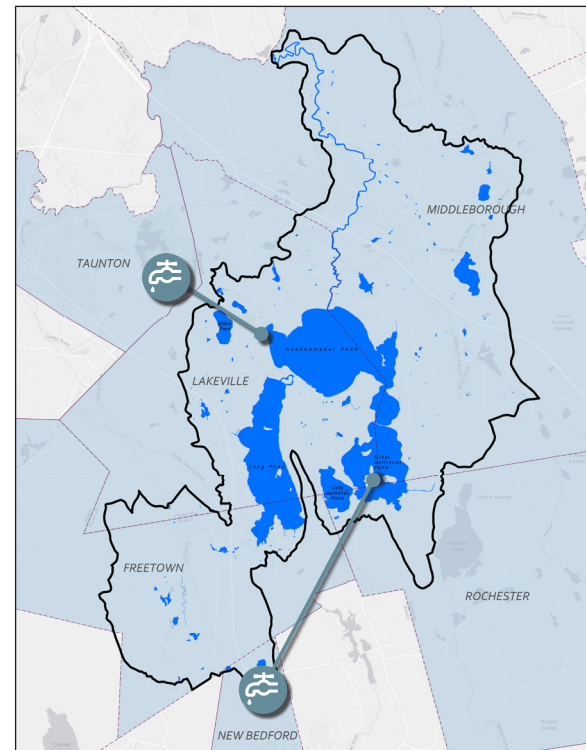
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Un enfoque de gestión regional

El Plan de Gestión de Cuencas y Acción Climática establecerá un programa de actividades a realizar en las comunidades de APC-Nemasket que mejorarán la salud de las cuencas hidrográficas y la calidad de vida humana, abarcando la conservación de la tierra, restauración, regulación, educación pública y más.

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visite nuestra pagina web
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Video de cuencas!



escanee para registrars!



¡Únase a nosotros para talleres públicos al aire libre en persona! Ven a todos ellos, oa tantas reuniones como temas te interesen. **TENGA EN CUENTA** que también hay una opción de reunión en línea, en la misma fecha y hora a través de Zoom.

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escanee para registrars!

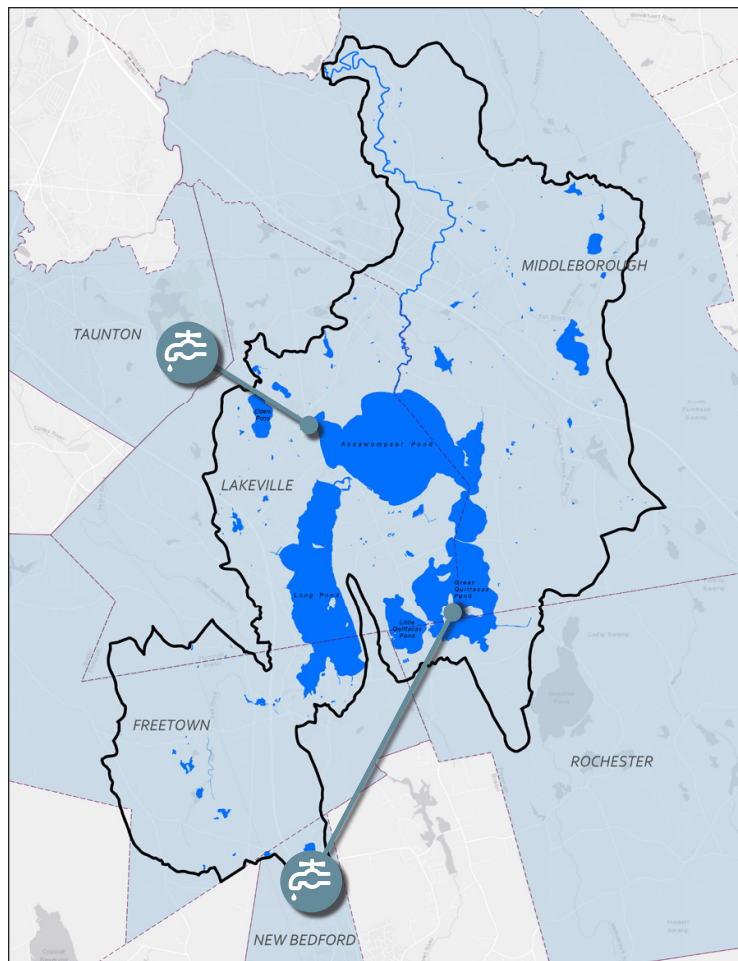


¡Únase a nosotros para talleres públicos al aire libre en persona! Ven a todos ellos, oa tantas reuniones como temas te interesen. **TENGA EN CUENTA** que también hay una opción de reunión en línea, en la misma fecha y hora a través de Zoom.

TEMA	FECHA	UBICACIÓN
inundación	9.29.21 5-7 PM	Lakeville
calidad de agua	10.13.21 5-7 PM	Taunton
suministro de agua	11.10.21 5-7 PM	Zoom
hábitats únicos	3.23.22 5-7 PM	Middleboro
recreación	4.13.22 5-7 PM	Rochester
desarrollo de la tierra	4.27.22 5-7 PM	Freetown
casa abierta	6.1.22 6-8 PM	Lakeville

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MEET YOUR PLAN!

Assawompset Pond Complex and Nemasket River

Watershed Management & Climate Action Plan

Public Open House July 14, 2022

Ted Williams Camp

28 Precinct St, Lakeville, MA

DROP-IN HOURS: 5-8PM

Legislator remarks and brief presentation at 6:30PM

A Regional Management Approach

The Watershed Management and Climate Action Plan will establish a program of activities to pursue across the APC-Nemasket communities that will improve watershed health and human quality of life, spanning land conservation, restoration, regulation, public education, and beyond.

Make sure your ideas and reactions to proposed management solutions are part of the final Plan!



Learn More



PRESS RELEASE - FOR IMMEDIATE RELEASE

Contact: Helen Zincavage (hzincavage@srpedd.org) for more information.

Planning for Resilience in the Assawompset Ponds and Nemasket River Watersheds

The Assawompset Ponds Complex (APC) and Nemasket River are unique among waterbodies in the diversity of uses that they support, which include recreation and scenic beauty, drinking water supply for 250,000 people in New Bedford, Taunton and beyond, and essential migratory habitat for river herring and endangered species.

The Assawompset Ponds Management Team - a group of representatives from local communities surrounding the APC, water supply entities, and state agencies – is seeking the insight and local expertise of the broader APC-Nemasket watershed community to enrich and support an ongoing project to develop a Watershed Management and Climate Action Plan that reduces flood hazards, protects drinking water supplies, improves stormwater management, and enhances habitat and recreational access.

Funded by an MVP Action Grant from the Executive Office of Energy and Environmental Affairs, a team of multi-disciplinary specialists has joined with the APC Management Team to serve as a project Steering Committee guiding the development of the Watershed Plan. The Steering Committee includes participants from each community connected to the APC and Nemasket: Freetown, Lakeville, Middleborough, New Bedford, Rochester, and Taunton. A team of consultants from the Southeastern Regional Planning and Economic Development District, Horsley Witten Group, The Nature Conservancy, and Eric Walberg Consulting are helping to facilitate the planning process.

The Plan builds off of a previous grant from the Division of Ecological Restoration, in which the APC Management Team synthesized recommendations from four decades' worth of previous

studies and prioritized the projects that, once completed, would have the most significant positive outcomes for flood mitigation. Developing a comprehensive plan that will lay out an actionable path forward for coping with floodwater issues throughout the APC while also equally addressing water supply and drought potential, water quality, preservation of critical habitat, and compatible recreational access was a top priority coming out of the previous study, and is exactly what this Watershed Plan aims to do.

Evaluating potential management strategies in the context of both current and future climate change impacts will result in a plan that is both a watershed management and climate action plan. The Plan will bolster regional climate resilience and improve social resilience through the commitment of a network of regional stakeholders operating from a set of coordinated best management practices.

All residents living in or relying on waters from the APC-Nemasket watersheds are a vital part of the stakeholder network whose actions can support watershed health and climate resilience. Your watershed stewardship efforts can begin or continue with participating in an inclusive community engagement process that begins on September 29, 2021. Through a series of seven public workshops, community members are invited to share their personal experience of existing conditions throughout the watershed, and insight into potential management actions that can be taken to address ongoing issues.

Each of the following public meetings will focus on a particular topic as it relates to the watershed. Each meeting provides two options for participation – an in-person workshop or a virtual meeting via Zoom. In-person events will be held outdoors, following recommended health and safety guidelines, and will be family friendly with activities for children and light refreshments available. The in-person and Zoom meetings, while separate, will occur on the same date and time. In the case of inclement weather, the meeting will be held solely on Zoom. Please use the registration form available at <https://bit.ly/register-apc> to receive additional in-person meeting details and Zoom link access.

- **Floodwater Management:** September 29, 2021, 5:00 – 7:00 PM at Ted Williams Camp in Lakeville.
- **Water Quality:** October 13, 2021, 5:00 – 7:00 PM at Hopewell Park in Taunton.
- **Water Supply:** November 10, 2021, 5:00 – 7:00 PM, location TBD in New Bedford.
- **Ecology and Unique Habitats:** March 23, 2022, 5:00 – 7:00 PM, location TBD in Middleborough.
- **Recreation and Stewardship:** April 13, 2022, 5:00 – 7:00 PM, location TBD in Rochester.
- **Land Development:** April 27, 2022, 5:00 – 7:00 PM, location TBD in Freetown.
- **Open House – Meet your Plan!** June 1, 2022, 6:00 – 8:00 PM, location TBD in Lakeville.

Visit the project webpage at www.SRPEDD.org/apc-nemasket-plan to take a virtual tour of the watershed, learn more about the plan, sign up for project updates and meeting announcements, register for upcoming events, review past presentations and meeting summaries, and provide

additional input via written comments. For those without access to a computer, please call our project hotline at 508-938-6031. Leave your name and number, and we will follow up with instructions for accessing meetings by phone.

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Taunton River Festival, Taunton, MA, 9/12/21



Lakeville Arts Festival, Lakeville, MA, 10/2/21



Middleborough Town Meeting, Middleborough, MA, 10/4/21



Herring Festival, Middleborough, MA 4/10/22

