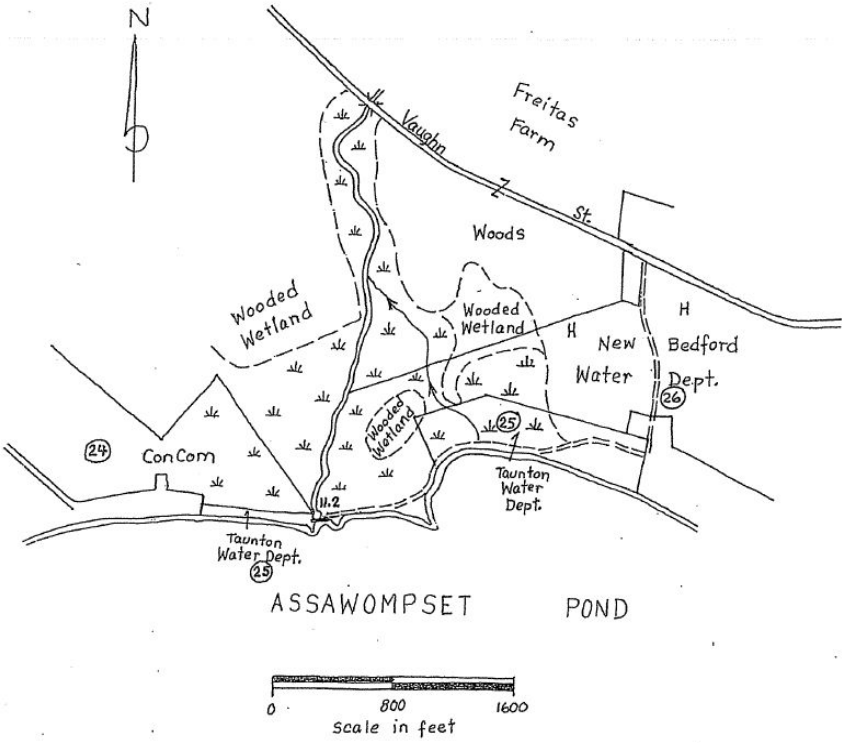
Assawompset Pond Complex Floodwater Management Program 2020

NEMASKET SAND TRAP & SEDIMENT REMOVAL

Priority Action Next Steps Summary

Where: The Nemasket River, downstream of the Assawompset Pond Dam.

What's the problem: The present course of the Nemasket River, for at least 2000 feet downstream of its outlet from Assawompset Pond, was excavated through a peat bog. The original channel of the Nemasket was located approximately 1000 feet east of the present dam.



Due to wave action, sand is routinely eroded from the northwest shore of Assawompset Pond. The sand is carried east to the outlet of the Assawompset Pond dam, where it accumulates at the headwaters of the Nemasket River. This results in the formation of sandbars along the first few hundred feet of the Nemasket. The sandbars partially fill the channel of the Nemasket. According to local sources, the sandbars lead to flooding and reduce the annual alewife run. The accumulation of sandbars has also allowed vegetation (including invasive species) to encroach farther into the excavated Nemasket River channel.

Note that the excavated Nemasket River channel immediately below the dam is likely wider than the natural geomorphology of the system would support. One possibility is that the observed sediment transport and accumulation below the dam is simply a natural process as the system seeks to return to an appropriate hydraulic and sediment transport equilibrium.

Sandbars frequently build up at several points further downstream of the Assawompset Pond Dam - notably, at the junction of the Nemasket River and Fall Brook. Sediment buildup has also been observed on the Nemasket upstream from Wareham Street. Buildup at this location is due to runoff from an earthen boat ramp on the east side of the Nemasket River.

What's the solution: Use results from H&H modeling (see other APC project summary) to evaluate channel hydraulics and sediment transport mechanics. Evaluate channel conditions based on the H&H modeling to determine appropriate geomorphology for the system that supports fish passage and other ecological needs.

If supported by results of H&H modelling, remove accumulated sediment from the first 500 feet of the Nemasket River. Remove the existing spoil pile, which has accumulated from previous sediment clearings.

If supported by results of H&H modeling, construct a sediment trap 200 feet downstream from the Assawompset Pond Dam. The sediment trap will involve enlarging the channel downstream of the dam to create a basin and installing an outlet control structure.

Who: Towns of Lakeville and Middleborough, SRPEDD, Mass DEP, Mass DER, the Middleboro-Lakeville Herring Fisheries Commission, local environmental groups, and environmental/water resource engineers would be involved.

Steps to complete work:

1. Conduct sediment testing above and below the Assawompset Pond dam, and at crucial points in the river in order to develop a Sediment Management Plan (this would be necessary for dredging as well as for both a dam repair and the placement of a silt trap in the river)
2. Conduct a hydrological study of the Nemasket River/Assawompset Pond to determine existing/previous conditions of the Nemasket, and where silt trap and sediment removal would be appropriate (see H&H Model Project Summary)
3. Stakeholder Engagement
4. Determine data needs
5. Collect field data
6. Conceptual engineering silt trap and dredging design
7. 75% design and permitting of silt trap and dredging
8. Final design and bidding
9. Construction
10. Monitoring and O&M

Permits required: Environmental permitting and coordination may include: NOI (Mass DEP, Lakeville, Middleborough), MESA Coordination, Mass DMF review (comment under MEPA and NOI), Mass DEP Ch. 91, ACOE Ch. 404, Water Quality Certification from DEP Ch. 401, Sect. 106 Massachusetts Historical Commission Coordination, Massachusetts Environmental Policy Act

Assets and barriers: Assets include willing partners, support of the Herring Fisheries Commission, legislative awareness. Barriers include uncertainty about the necessity of this project, likely prohibition due to environmental regulation (specific to the sediment basin),

difficulty obtaining environmental grants for dredging operations, and the likelihood the location of the Nemasket River headwaters and Assawompset Pond Dam are ill-suited for preventing sediment accumulation, potential limitations of dredged material disposal if contamination is present.

When would we see results: If the project is suitable, 1-3 year following H&H study

How much (ballpark costs): $50,000-$100,000 design and $250,000-$1,000,000 construction (depending on contamination)

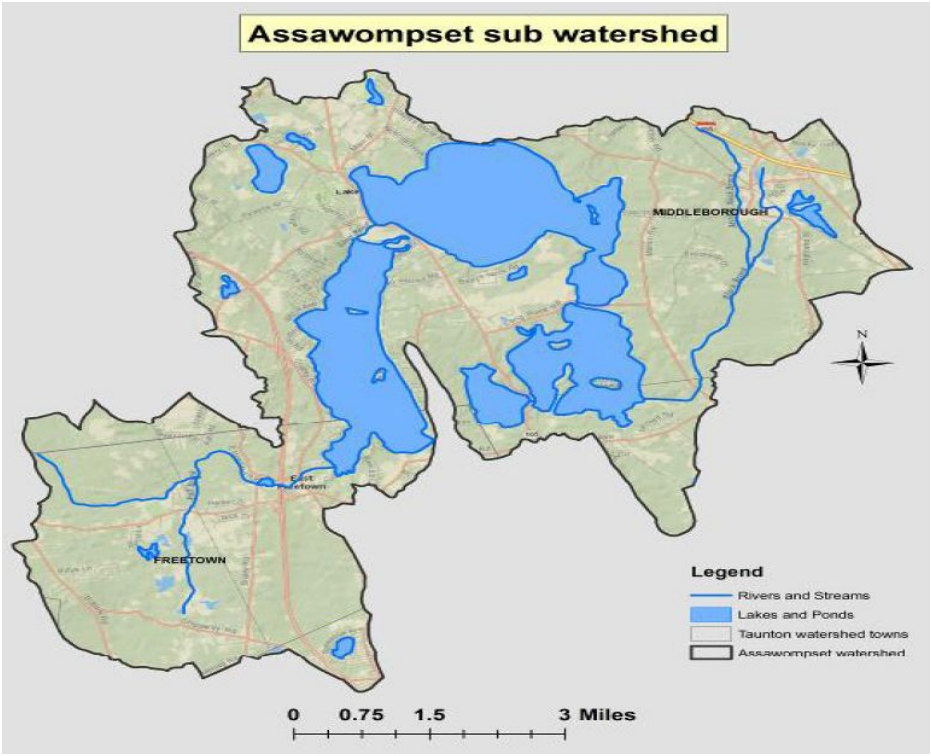
Funding sources: Towns of Lakeville & Middleborough

Similar Example:

Assawompset Pond Complex Floodwater Management Program 2020

HYDROLOGICAL AND HYDRAULIC STUDIES

Priority Action Next Steps Summary



Where: The Assawompset Pond Complex and Nemasket River

What's the problem: No hydrological and hydraulic (H&H) models of the Assawompset Pond Complex (APC) or the Nemasket River currently exist. In 2010, Professor Neil M. Fennessey of UMass Dartmouth produced an analysis of the historic water level range of the Assawompset Pond, and recommended that a long-term hydrological study would be key to the planning and decision-making process.

Several other projects recommended by the APC Management Team require the use of H&H models to properly evaluate project objectives and design parameters. This study is a necessary first step to inform those other projects.

Projects requiring a H&H model include Assawompset Pond Dam removal or replacement, dredging and installing a silt trap at the headwater of the Nemasket River, repairing or replacing the Wareham Street Dam, and replacing undersized culverts throughout the Taunton River Watershed. H&H modelling is also a necessary step in water supply management planning.

What's the solution: Develop one or more long-term H&H model(s) of the APC, Nemasket River, and contributing watersheds. These models may include groundwater, surface water, and/or linked modeling approaches. Possible modeling tools may include MODFLOW, HEC-RAS, HSPF, and others. Use the model(s) to establish firm yield and reservoir management operating rules for the APC, and to model the dams along the Nemasket to

evaluate dam design and operating rules. Design the model to be applicable to scenario-based questions for possible interventions along the Nemasket River.

Who: Towns of Lakeville, Middleborough, Freetown, Rochester, Taunton, and New Bedford; APC Management Team; SRPEDD; USGS; local environmental non-profits; civil/environmental/water resource engineers.

Steps to complete work:

1. Review existing data
2. Collect new field data from APC, Nemasket River, and contributing watersheds as needed
3. Develop H&H model(s)
4. Identify scenarios of interest
5. Run model(s) and evaluate outcomes of different scenarios

Permits required: None

Assets and barriers: Assets include existing data collected by Dr. Fennessey and existing data about water surface levels and withdrawals from ponds . Barriers include the complexity of the APC system and anticipated expense of this study.

When would we see results: 2-4 years

How much (ballpark costs): $200,000-$400,000

Funding sources: MVP Action Grant, SRF Loans, SNEP, FEMA HMP Grant?, surrounding municipalities

Similar Example: Silver Lake Watershed, Monponsett Ponds.

Assawompset Pond Complex Floodwater Management Program 2020

ASSAWOMPSET POND DAM REPAIR AND REPLACEMENT

Priority Action Next Steps Summary

Where: Assawompset Pond Dam in Lakeville

What's the problem: The dam was built in 1904 and is in somewhat poor condition. It allows for fish passage via a Denil fish ladder, which has a low but constant capacity for herring runs when pond levels are low. The dam structure itself allows migrating herring passage when pond levels are high. It is owned by the Cities of New Bedford and Taunton. The dam is a granite structure with wooden boards, and it has a 43'x 4' spillway. Due to the dam's age and design, it is dangerous to add or remove the wooden boards, making operation of the dam a liability

The dam was constructed primarily for water supply purposes (currently serving all or portions of 13 cities and towns) and not as a flood control or fish passage structure. Sand has flowed from the pond, over the dam as a result of natural circulation processes, which become exacerbated during heavy storm events, causing siltation, channel clogging, resulting in an adverse impact to the herring fishery. Sedimentation has also caused problems maintaining pond levels adequate for water supply and stream flow, as well as retaining enough storage capacity for heavy storm impacts.

Assawompset Pond Dam

What's the solution: Pending results of feasibility study and evaluation of water supply and ecological needs, repair and replace the dam in a manner that balances these competing interests and simplifies pond water level management. A reconstructed dam should allow for improved herring passage under variable water level conditions.

Who: The Division of Ecological Restoration (DER), DEP, City of New Bedford, City of Taunton, the Middleboro-Lakeville Herring Fisheries Commission, the APC Management Team, environmental non-profits, and civil engineers.

Steps to complete work:

1. Scope the boundaries of types of data that are currently available, from all sources, that may impact the project feasibility and next steps.
2. Conduct a Feasibility Study for the dam repair and replacement
3. Evaluate dam repair and replacement design options based upon ecological and water supply needs
4. Conduct assessment and field work to determine design specifications
5. Preliminary/conceptual engineering and design
6. 75% design and permitting
7. Final design. Bid package, and bidding
8. Dam construction
9. Monitoring and O&M Plan

Permits required: Environmental permitting and coordination may include: NOI (Mass DEP, Lakeville, Middleborough), MESA Coordination, Mass DMF review (comment under MEPA and NOI), Mass DEP Ch. 91, ACOE Ch. 404, Water Quality Certification from DEP Ch. 401, Sect. 106 Massachusetts Historical Commission Coordination, Massachusetts Environmental Policy Act

Assets and barriers: Assets include willing participants, the APC Management Team Committee, and consistency with local planning, legislative awareness. Barriers include lack of available funding.

When would we see results: approximately three-five years following hydrological study

How much (ballpark costs):

- Initial Phase (field data collection and analysis, engineering, permitting) **- $300,000**
- Construction Phase - **$1,000,000-3,000,000**

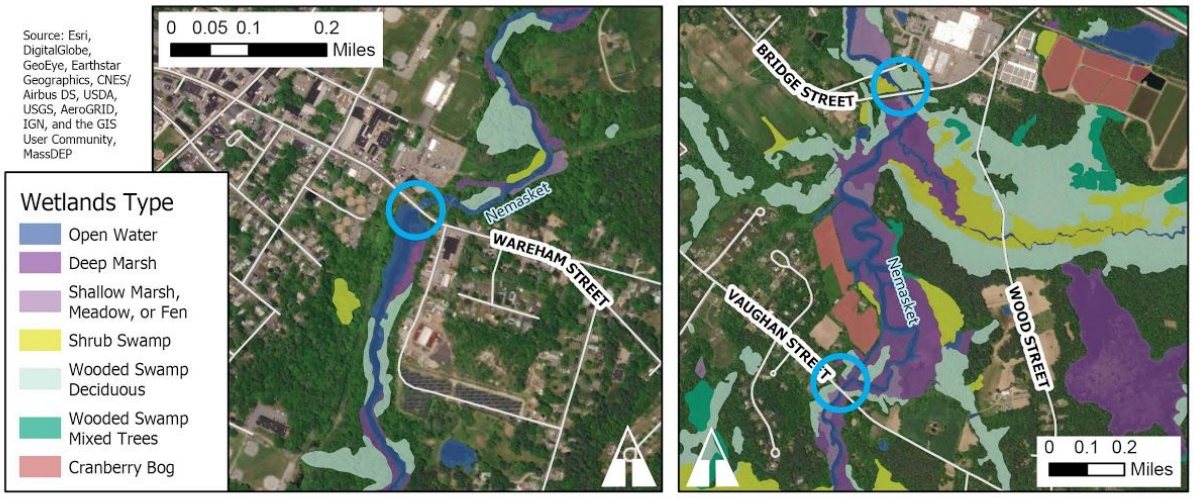
Funding sources: USFWS, NOAA, DER, EEA Dam and Seawall Repair or Removal Program, MVP Action Grant, NFWF

Similar Example: Lake Sabbatia, on Bay Street in Taunton; Reservoir Dam, Scituate, MA

Assawompset Pond Complex Floodwater Management Program 2020

WETLANDS RESTORATION

Priority Action Next Steps Summary



Where: The Assawompset Ponds watershed and the upper Nemasket River.

What's the problem: Urbanization, changing land use patterns, and associated loss of wetlands have resulted in diminishment of flood storage capacity, water quality impacts and habitat destruction. These alterations result in people living and working in low-lying wet areas and have diminished the capacity of wetlands to buffer flooding.

What's the solution: Targeted wetland restoration could provide multiple benefits including flood mitigation, water quality improvement, improve water access and recreational opportunities, and enhanced support of biodiversity. A regional analysis and prioritization of restoration opportunities is a needed first step. Once the analysis is complete it will be possible to determine linkage to other aspects of APC project planning, develop more detailed implementation plans, and seek funding.

Who: Towns of Lakeville, Middleborough, Freetown, Rochester, Taunton, and New Bedford; APC Management Team; SRPEDD; USGS; local environmental non-profits; civil/environmental/water resource engineers.

Steps to complete work:

- Expansion of existing wetlands restoration analysis from the Nemasket River watershed to the APC watershed.
- Prioritization of potential restoration sites with the project steering committee.
- Integration of priority restoration projects with other aspects of the APC effort.

- On-site assessment of soil, vegetation, and current wetlands. Survey data will be needed for design.
- Engineering and permitting
- Construction, and hopefully some monitoring.

Permits required:

- Conservation commission NOI FOR WPA relevant work
- Depending on size, potential MEPA
- Need to check for endangered species
- If altering River, potential for ACOE

Assets and barriers:

- Climate resilience
- Biodiversity services
- Water quality
- Flood relief
- Enhancing fisheries
- Potential recreation co-benefit

When would we see results: We could request funds for engineering, permitting, and construction to Wildlife Conservation Society (WCS). Application due 4/18, construction completion deadline Nov 2022.

How much (ballpark costs): $175,000

Funding sources:

- WCS
- NFWF
- MVP
- DER Cranberry Priority Projects

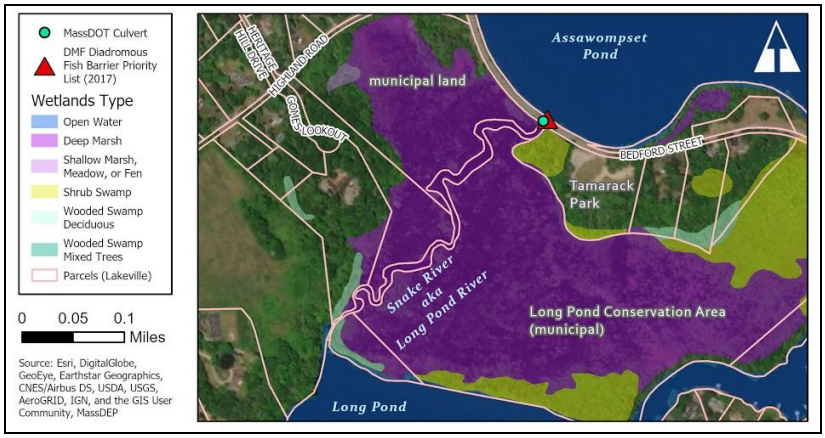
Similar Example: The Town of Easton just received MVP action grant funding to restore a wetland identified by TNC through one of the analyses used in the Nemasket watershed.

Assawompset Pond Complex Floodwater Management Program 2020

SNAKE RIVER CULVERT REPLACEMENT

Priority Action Next Steps Summary

Where: MassDOT owns the culvert where the Snake River (also known as Long Pond River) crosses under Bedford Street (Route 105/18) in Lakeville. The culvert location is shown with the green dot/red triangle in the map, adjacent to Tamarack Park.



What's the problem:

The Snake River culvert is a 4' x 8' concrete box culvert that facilitates the flow of water between Long Pond and Assawompset Pond under Bedford Street. The culvert was constructed in 1993 as part of a road safety improvement measure by Mass Highway District 7 (now MassDOT District 5 jurisdiction). The invert of this culvert was determined to be too high for the downstream migration of juvenile herring. To remedy this, Mass Highway added a 2' diameter culvert, approximately 30'' to the north of the larger culvert, in 1994. State dive teams have periodically inspected the larger structure, most recently in September of 2016.

Flooding in this area suggests that the culvert is undersized, creating backwatering that overflows Bedford Street during high rains, and with a design that hinders fish passage. The latter problem has led the Division of Marine Fisheries to designate this stream crossing as a Priority Barrier that inhibits the passage of diadromous River Herring and American Eel species. According to NAACC culvert surveying methodology and bankfull estimates (22.8 ft to 44.1 ft) from USGS StreamStats, the culvert width of 8' represents a severe constriction to stream flow. Increased development around the pond shore, shallow stream profile, continued presence of aquatic invasives, and lack of stormwater improvements and flood control measures all contribute to the problem. Because the culvert runs the width of the public right of way, a failure could cause Bedford Street to become impassable in this location, flood pond-front communities on Long Pond, make Town Hall inaccessible, and force emergency response personnel (fire and rescue) to use other routes leading to longer emergency response times.

What's the solution: Replace the existing problematic culvert with a new, larger open box or open bottom arched culvert that will allow greater conveyance of water, lessen overtopping during flood events, and allow for fish passage.

Who: The Town of Lakeville, MassDOT (especially District 5), SRPEDD, Mass DEP, the Division of Ecological Restoration, the Middleboro-Lakeville Herring Fisheries Commission, environmental non-profits, and civil engineers would have a role. The Town would like to work with MassDOT to replace the culvert, but MassDOT has no immediate or long-term plans to improve Bedford Street. MassDOT has worked with outside partners to facilitate similar repairs in tidally impacted areas.

Steps to complete work:

1. File a Notice of Intent (NOI) with the Lakeville Conservation Commission
2. Obtain a MassDOT Access Permit
3. Conduct assessment field work to determine design specifications
4. Engineer culvert design
5. Permitting
6. Culvert removal and construction

Permits required: Environmental permitting and coordination, from concept through construction may include: NOI, MassDOT Access Permit, MESA Coordination, Ch. 91, ACOE, WQC from DEP, Sect. 106 Coordination; MEPA

Assets and barriers: The data already known about this culvert is an asset. The state dive team inspection results, knowledge of fisheries impacts at the Herring Commission, and monitoring conducted by SRPEDD staff (2001-2003, as part of the Geographic Roadway Runoff Inventory Program and a DEP Source Water Protection Program Grant) will all contribute to expediting initial project design and investigation and have noted problems related to increased presence of aquatic invasive vegetation, channel clogging, and poor water exchange. Inadequate culvert infrastructure has become a priority issue across the state, with guides on the construction of better culvert systems now available. The barriers to culvert replacement projects are mainly associated with funding, phasing the project in sync with funding schedules, and coordinating all of the agencies that have a role in the project.

When would we see results: approximately two years

How much (ballpark costs):

- Initial Phase (field data collection and analysis, engineering, permitting) **- $75,000 - $100,00**
- Construction Phase - **$200,00 - $500,000**

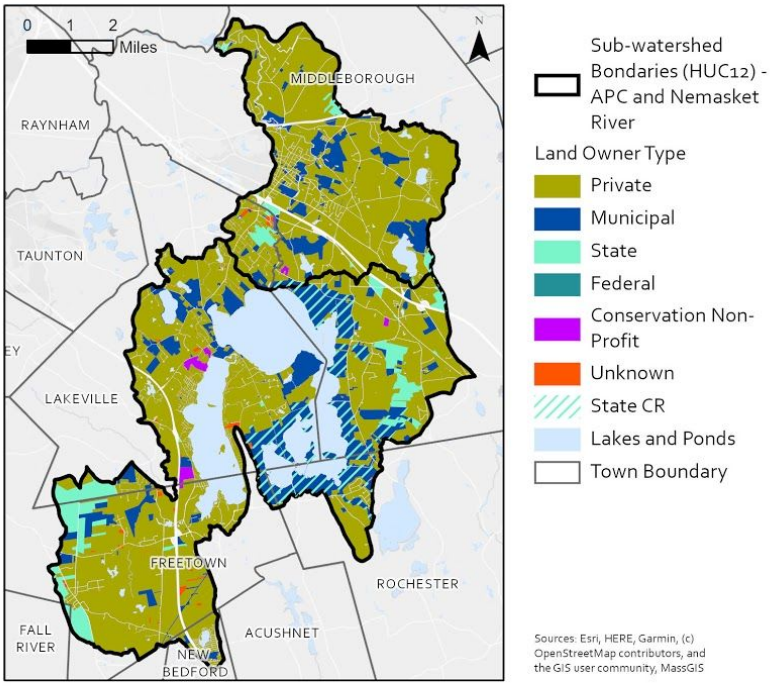
Funding sources: USFWS, NOAA, DEP 604(b), DEP Sect. 319,, Mass. Environmental Trust (MET), MVP Action Grant, NFWF

Similar Examples: Pearse Road, Swansea; Hill Street, Raynham

Assawompset Pond Complex Floodwater Management Program 2020

ASSAWOMPSET POND COMPLEX MANAGEMENT PLAN

Priority Action Next Steps Summary



Where: The entire Assawompset Pond Complex (APC) and its watershed, including Long, Assawompset, Pocksha, Great Quittacas, and Little Quittacas Ponds, and the Nemasket River.

What's the problem: The state's largest natural pond system, the APC provides drinking water for around 250,000 people in the cities of New Bedford and Taunton, and portions of nearby towns. It is a significant habitat area for fish, birds, wetlands, and mammal species. It is a scenic residential and recreation area for surrounding communities. Water quality and flow through the APC and Nemasket is affected by the land use in their combined 44,900-acre watersheds, where land is owned and maintained by many individual households and larger entities (75% of land in private ownership, 18% in municipal ownership, 5% in state ownership, 1% in non-profit land conservation ownership, and less than 1% in federal ownership or ownership unknown).

Recently, excessive flooding has caused significant issues for the APC and surrounding communities, particularly in 2010 when heavy and prolonged rainfall and resultant flooding caused evacuations, property damage, failures of septic systems, and interruption of critical utility and transportation infrastructure. Runoff with excess nutrients degrades water quality and encourages invasive plant overgrowth. The system has also experienced serious drought, most recently in 2016. Climate trends elevate the urgency for considering these issues.

What's the solution: Develop a comprehensive management plan that targets floodwater mitigation throughout the APC while also equally addressing water supply and quality, preserving critical habitat, maintaining recreational access that does not impede natural function of the land, and improving resilience of the Ponds and surrounding communities.

The plan would consider the APC and Nemasket systems as a whole, and identify known data, missing data points, and best practices for managing infrastructure, sedimentation, fisheries, aquatic invasives, floodplain areas, and water quality, supply, and flow. A coordinated and balanced set of goals and strategies will ensure all stakeholders work together to implement nature-based solutions that protect critical green infrastructure, encourage low impact development, enhance floodplain storage, reduce the amount of nutrients and sediments entering the ponds, and adopt consistent local regulations compatible with regional goals for protecting the APC.

Who: All property owners within the APC and its watershed; the Towns of Lakeville, Freetown, Middleborough, and Rochester; water suppliers; state and local regulatory agencies; the Assawompset Ponds Committee; local environmental groups; environmental engineers; and regional planning agencies. All have relevant knowledge for an effective management plan.

Steps to complete work:

- Design an inclusive stakeholder engagement process including identification of communications networks between stakeholder groups.
- Outline the contents of the management plan and determine data needs (ex: water levels and flows, vegetation, wildlife populations, water quality, pollutant levels, land use).
- Collect data by: (1) research existing sources and documents; (2) desktop data analysis (land cover, ownership, etc); and (3) field assessments.
- As a specific portion of data collection, determine best climate change predictions for the area and what impacts they will have on water levels, habitat types, and other conditions in the APC.
- As a specific portion of data collection, determine the additional information that will be necessary for completing a hydrological study.
- Review surrounding communities' bylaws for opportunities to standardize land use approaches across the region that support management plan goals.
- Draft management plan (including ongoing stakeholder engagement).
- Include a schedule of implementation and benchmarks for tracking success.
- Update plan periodically with new data and updated action recommendations.

Permits required: Perhaps Con Comm Notices of Intent or Access Permits for fieldwork.

Assets and barriers: Assets in plan development include existing data on the APC, the results of the planned hydrologic study, and the regular coordination of the Assawompset Ponds Committee as the nucleus of continued stakeholder cooperation. Barriers include securing funding and coordinating a diversity of stakeholder groups and interests.

When would we see results: Developing a management plan: one to two years. Implementing the plan and seeing improvements is a long-term (decades-long) process.

How much (ballpark costs): $125k

Potential funding sources: MVP Action Grant Funds

Similar Example: Taunton River Watershed Management Plan

Competing Interests: Identify integrated project timeline and prioritize next steps. The Management Plan might compete with the Hydrological Study for this round of MVP Action Grant funding, and it is unlikely both could be completed under one project. The Management Plan may be a necessary first step to lay the foundation for a path forward for completing future studies and taking action.