

WAQUOIT BAY STREAM RESTORATION MASTER PLAN

Falmouth and Mashpee, Massachusetts



Waquoit Bay National Estuarine Research Reserve

Project Partners:

US Fish and Wildlife Service

Massachusetts Fish and Game

Massachusetts Division of Marine Fisheries

Mashpee Wampanoag Tribe

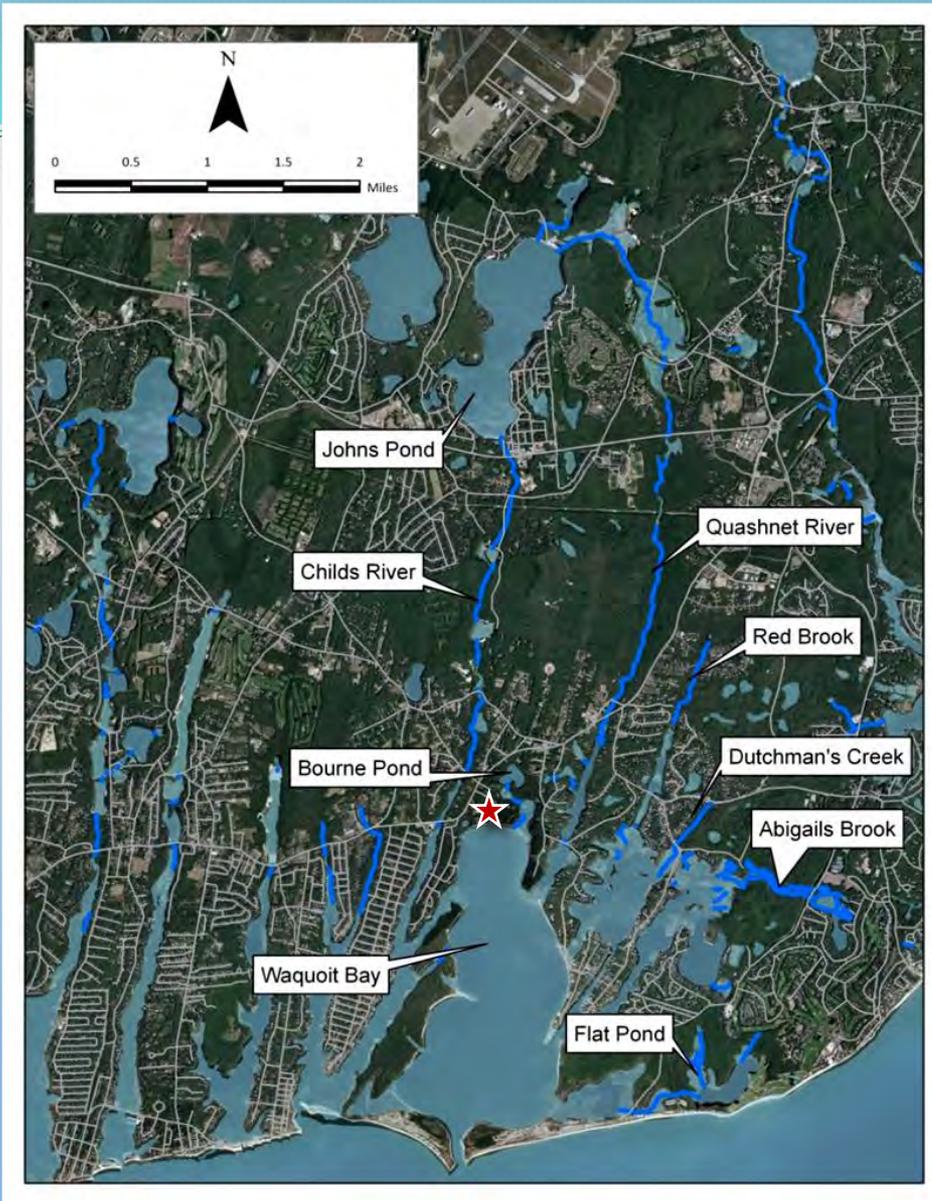
Mashpee and Falmouth natural resource agencies

Trout Unlimited

December 16, 2010



Project Overview



Stream Systems:

- Childs River
- Bourne Pond
- Quashnet River
- Red Brook
- Dutchman's Creek
- Abigails Brook
- Flat Pond



Project Overview

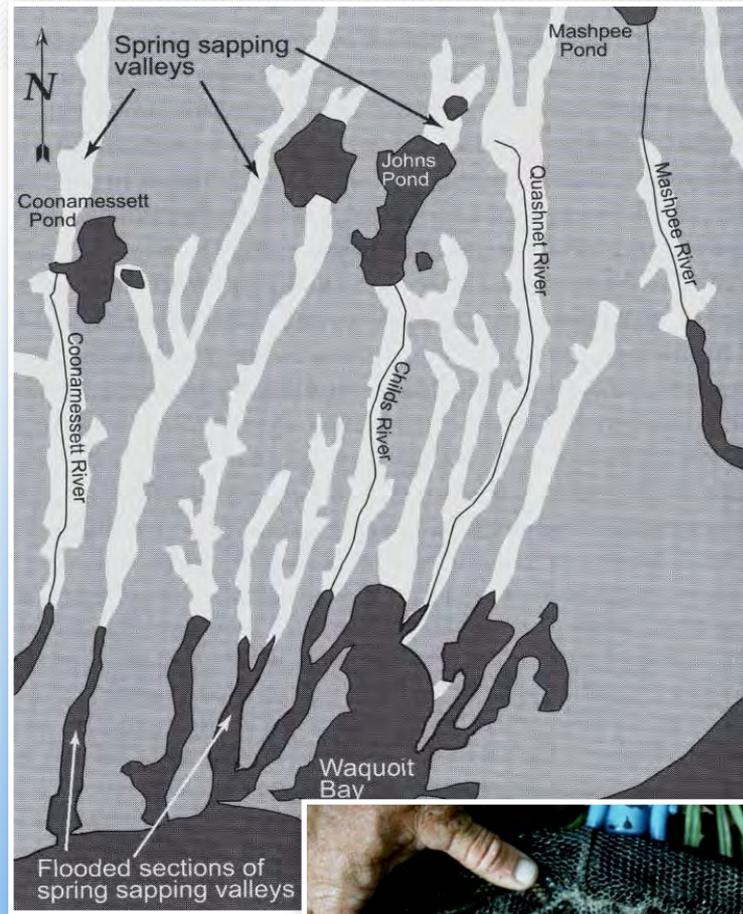
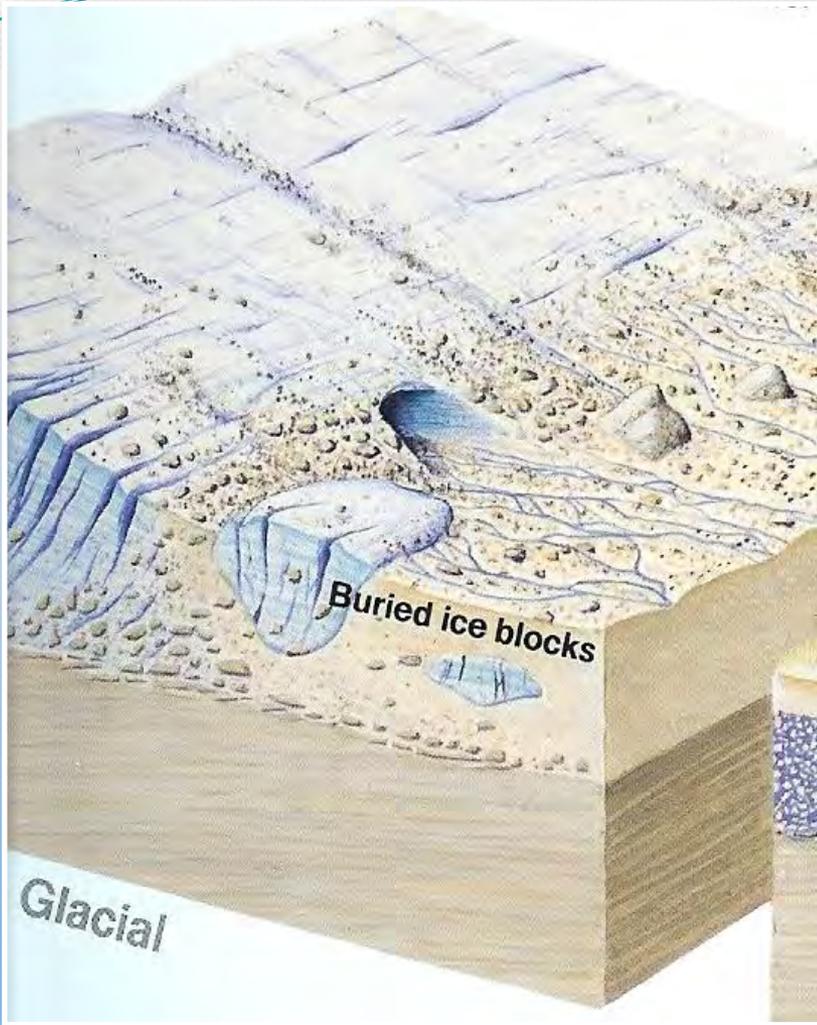


Restoration Opportunities:

- Diadromous Fish Habitat
- Cold Water Fish Habitat
- Freshwater Wetland
- Tidal Wetland
- Watershed Approach



Watershed Approach to Restoration

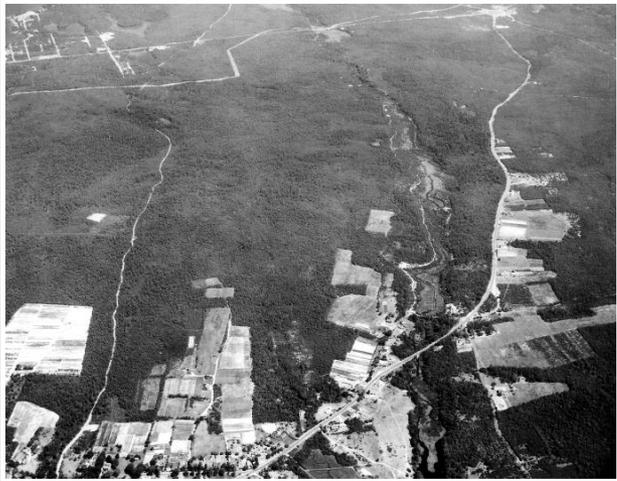
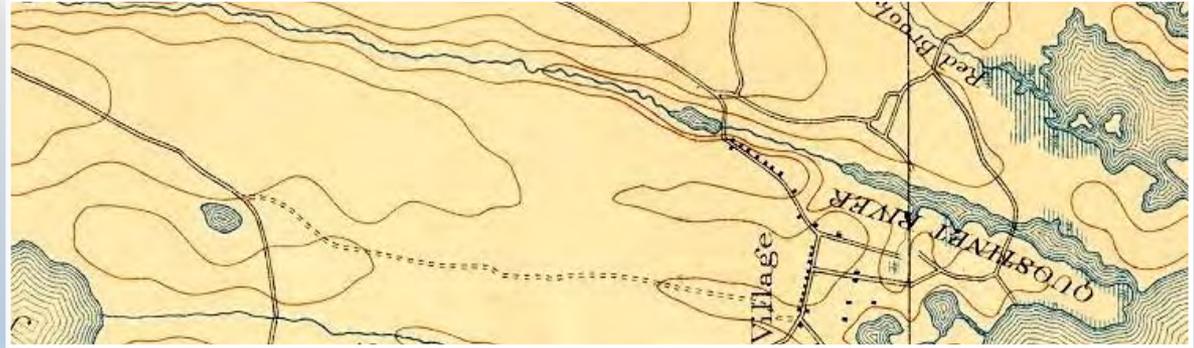


Spring Sapping Valleys

(from: Schwarzman 2002 and Finch-Cape Cod)



Watershed Approach to Restoration



Cranberry Production



Watershed Approach to Restoration



Cranberry Production

Watershed Impacts

- Channel straightening
- Disconnected floodplains
- Loss of woody material/riparian forest
- Elevated water temperatures
- Impounded conditions
- Lack of flow regime diversity
- Obstructions/loss of connectivity



Project Overview



Components

Data Gathering/Site Visits

- Historical mapping/photos
- Previous studies
- On-going research
- Personal communications
- Field reconnaissance

Restoration Master Plan

- Data inventory/compilation
- Prioritization
- Recommendations

Public Meeting

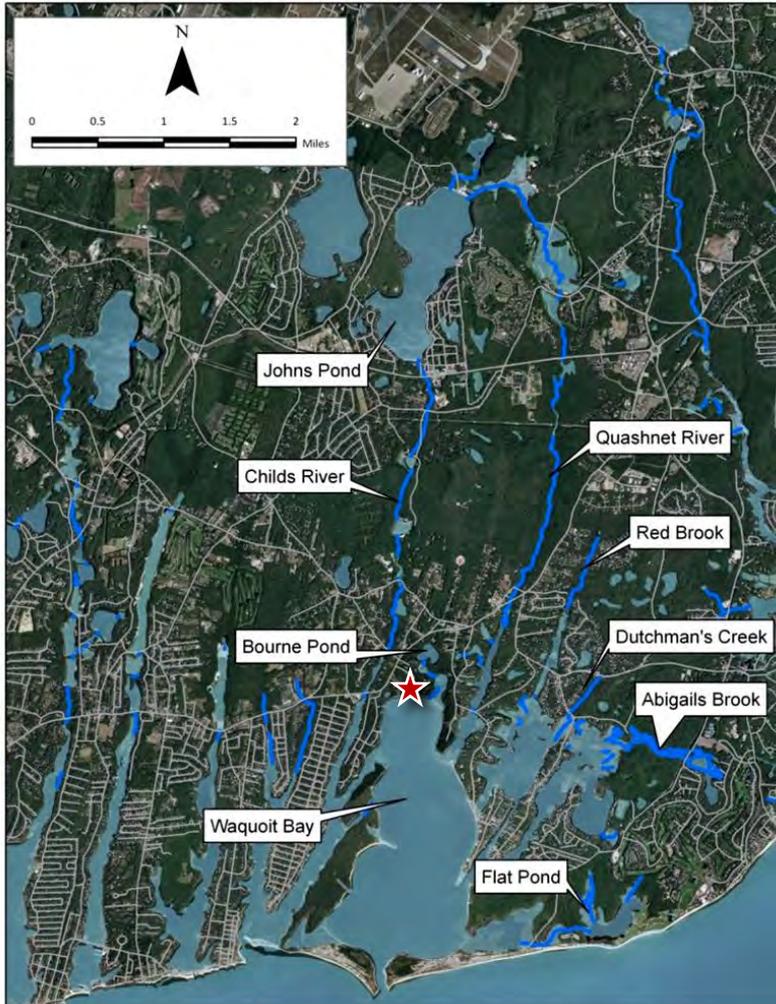
Conceptual Design of Priority Sites



Habitat Restoration Inventory

Inventory of Potential Sites

Childs River	12
Bourne Pond	2
Quashnet River	16
Red Brook	5
Dutchman's Creek	2
Abigails Brook	4
Flat Pond	1



Restoration Master Plan

Restoration Priority Criterion

Ecological

Obstructions/loss of connectivity

Restoration area (fish/wildlife)

Existing populations

Stream flow/hydrology

Water quality

Multiple environmental benefits



Feasibility

Local support

Ownership

Complexity (construction/regs)

Cost/Funding sources

Education/Recreation

Public access

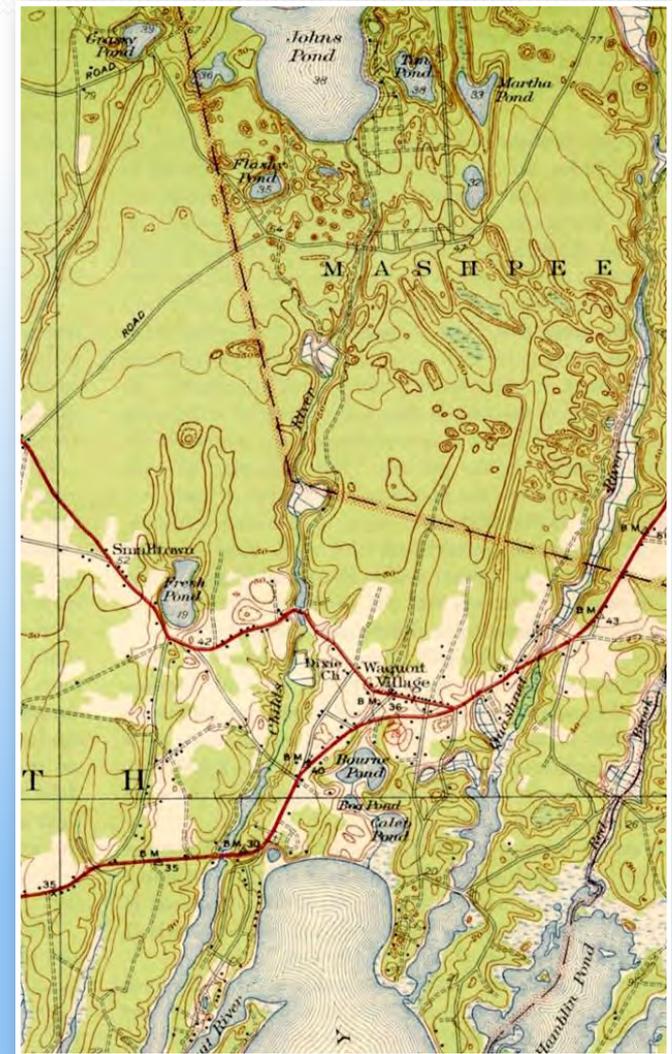
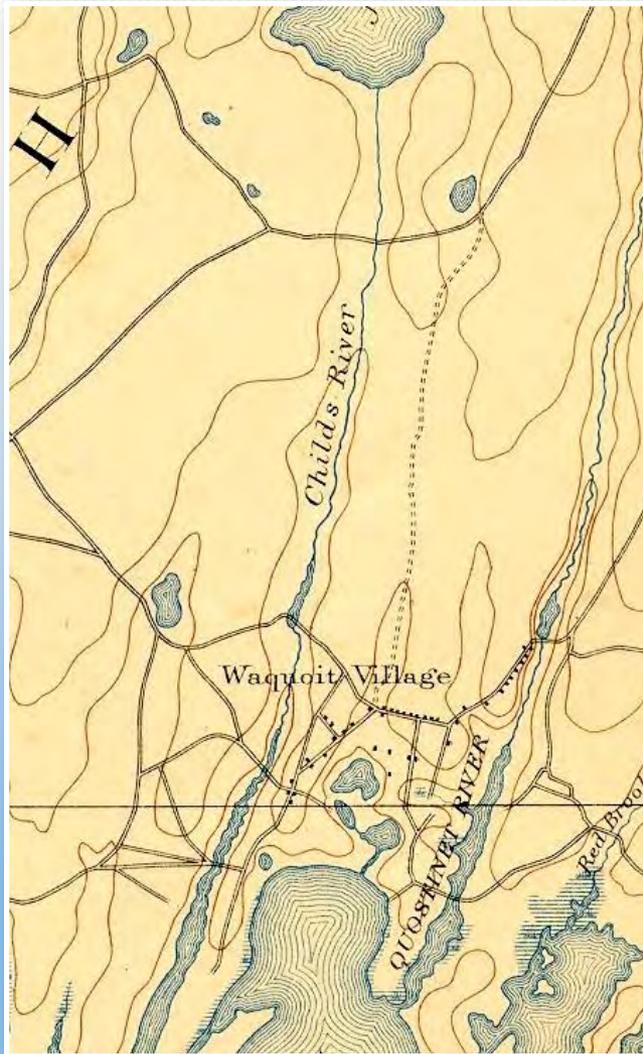
Proximity to schools

On-going research



Priority Restoration Opportunities

- Lower Childs River-Carriage Shop Dam
- Middle Quashnet River-Abandoned Bogs
- Upper Quashnet River-Bog Complex
- Abigails Brook



Childs River – Carriage Shop Dam

Current issues:

- Existing fishway in poor condition
- Falmouth Rod & Gun Club ponds very shallow with extensive aquatic vegetation growth and sediment accumulation
- Impoundment acts to increase water temperatures in brook trout stream with most trout occurring below dam

Riverways study (Milone & MacBroom 2008) recommended full dam removal at cost of up to \$575,000

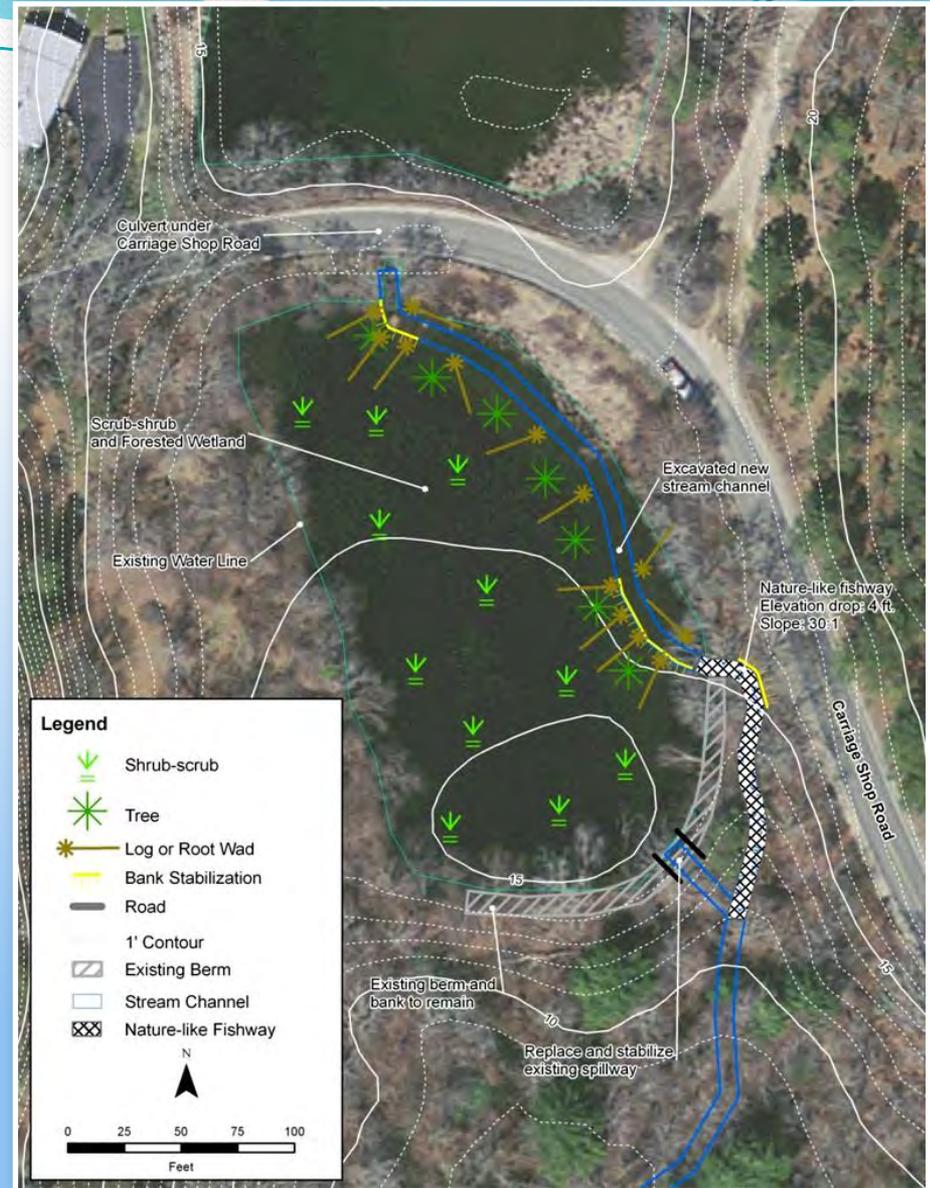
Other options include:

- Replacement of existing fishway with new “technical” fishway (such as Denil, but upstream herring passage not a major objective for river)
- Partial dam removal with conversion of existing fishway channel to nature-like fishway, lower pond level, create new stream channel, wetland restoration (preferred)



Childs River – Carriage Shop Dam

- **Creates stream habitat in new stream channel in former pond, and in nature-like fishway**
- **Provides for fish passage at the site for river herring, trout, and other species**
- **Allows for restoration of scrub-shrub and forested wetland in former pond**
- **Lower cost than full dam removal**



Childs River – Carriage Shop Dam

Nature-like fishway:

- Estimated head – 4 feet
- Slope – 20:1 to 30:1 depending on topography and head
- Length – 80 to 120 feet, drop per pool approx. 6 inches
- Width – 15 to 20 feet
- Rock/boulder weirs with interspersed instream boulders and cobble/gravel substrate in pools
- Design flow – 15 to 20 cfs -based on average monthly flows on the Quashnet River – max. annual flows on Quashnet typically 30 to 40 cfs. (Design flows to be prorating by drainage area)
- Current outlet from pond to be replaced and stabilized



Middle Quashnet River

Current issues:

- Several water control structures remain from past cranberry operations
- Open for fish passage
- Potential for structural failures
- Impediments to river connectivity and wildlife passage in river corridor
- Potential for flow restriction/impounding of flows
- Channel location/spring seeps



Lower Quashnet River bogs abandoned and purchased by Division of Fisheries and Game – 1956 (picture of David Leonowicz near Martin Rd., 1953)



Middle Quashnet River

1950's Aerials



Middle Quashnet River

Restoration Opportunities



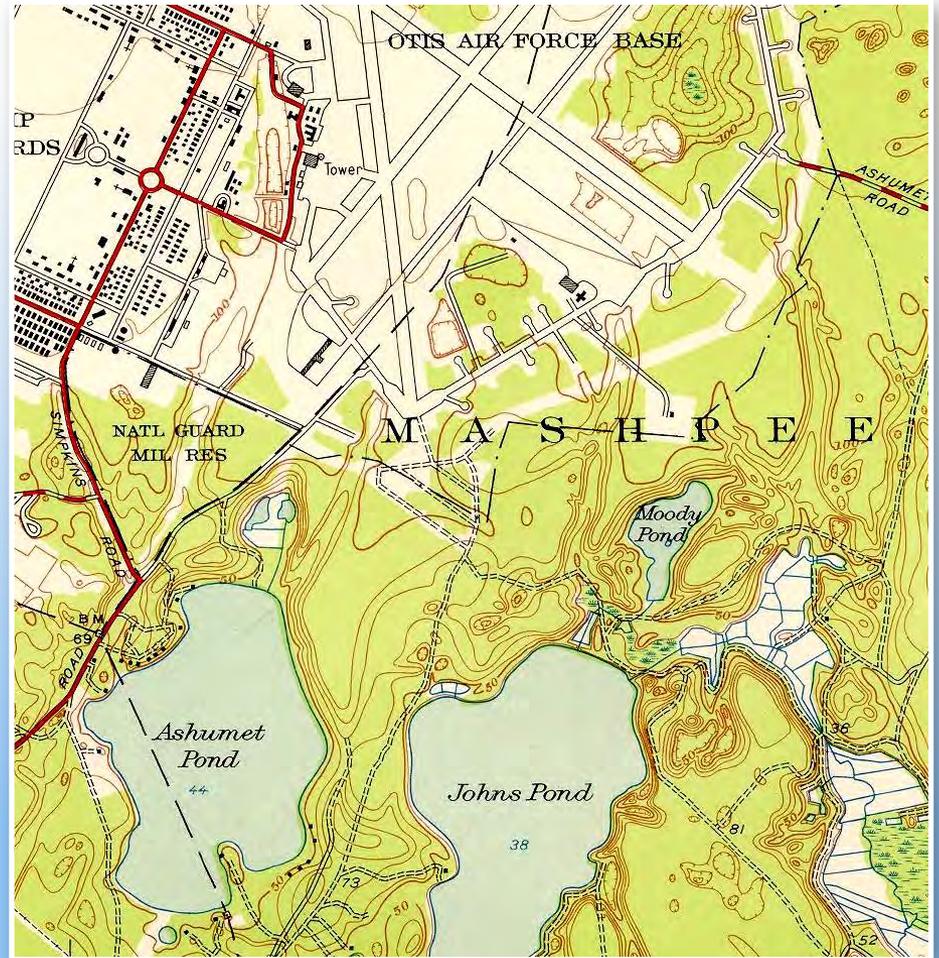
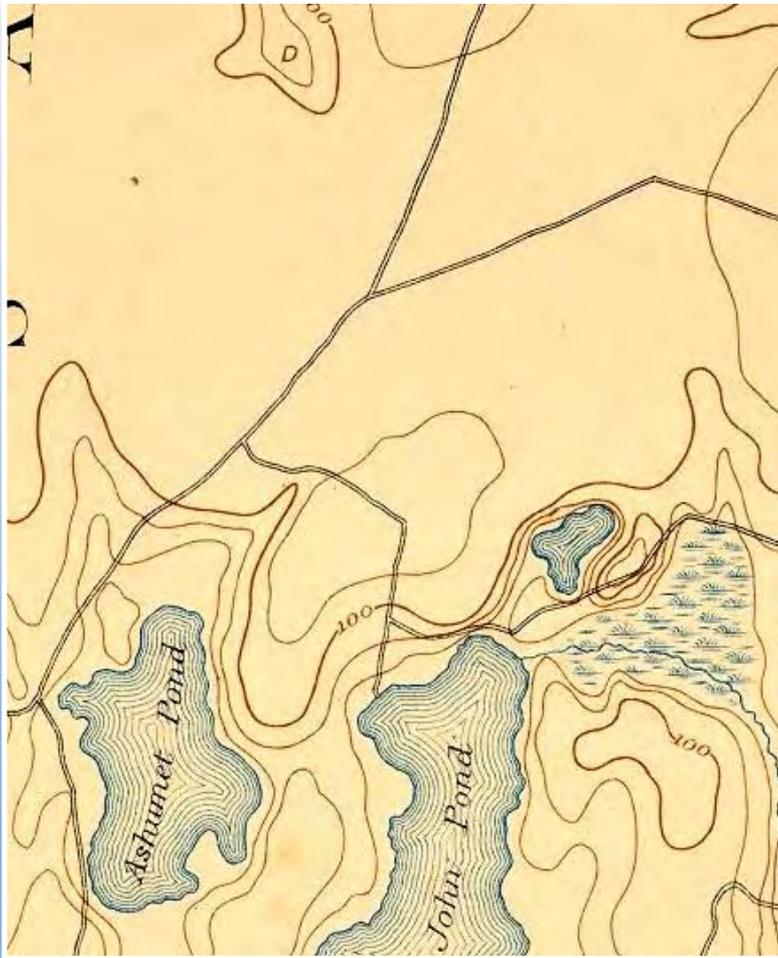
Middle Quashnet River

Potential Restoration Measures:

- Regular inspection & maintenance program to ensure structures are open
- Removal of failing concrete structures, leave associated berms in place
- Removal of concrete structures and berms, river corridor restoration
- Those to remain subject to regular inspections
- In-stream habitat enhancement
- Restore natural stream process, function and values (self-sustaining)



Upper Quashnet River



Upper Quashnet River



Impairments:

- Cutting of white cedars, shingle mill dam, cranberry cultivation (mid-1900's)
- Ethylene Di-bromide (EDB) Treatment
- Channel straightening
- Disconnected floodplains
- Loss of woody material/riparian forest
- Elevated water temperatures
- Loss of wetland habitat
- Lack of flow regime diversity
- Obstructions/loss of connectivity



Upper Quashnet River

Reference Wetlands



Atlantic White Cedar Swamp

Red Maple Swamp



Upper Quashnet River

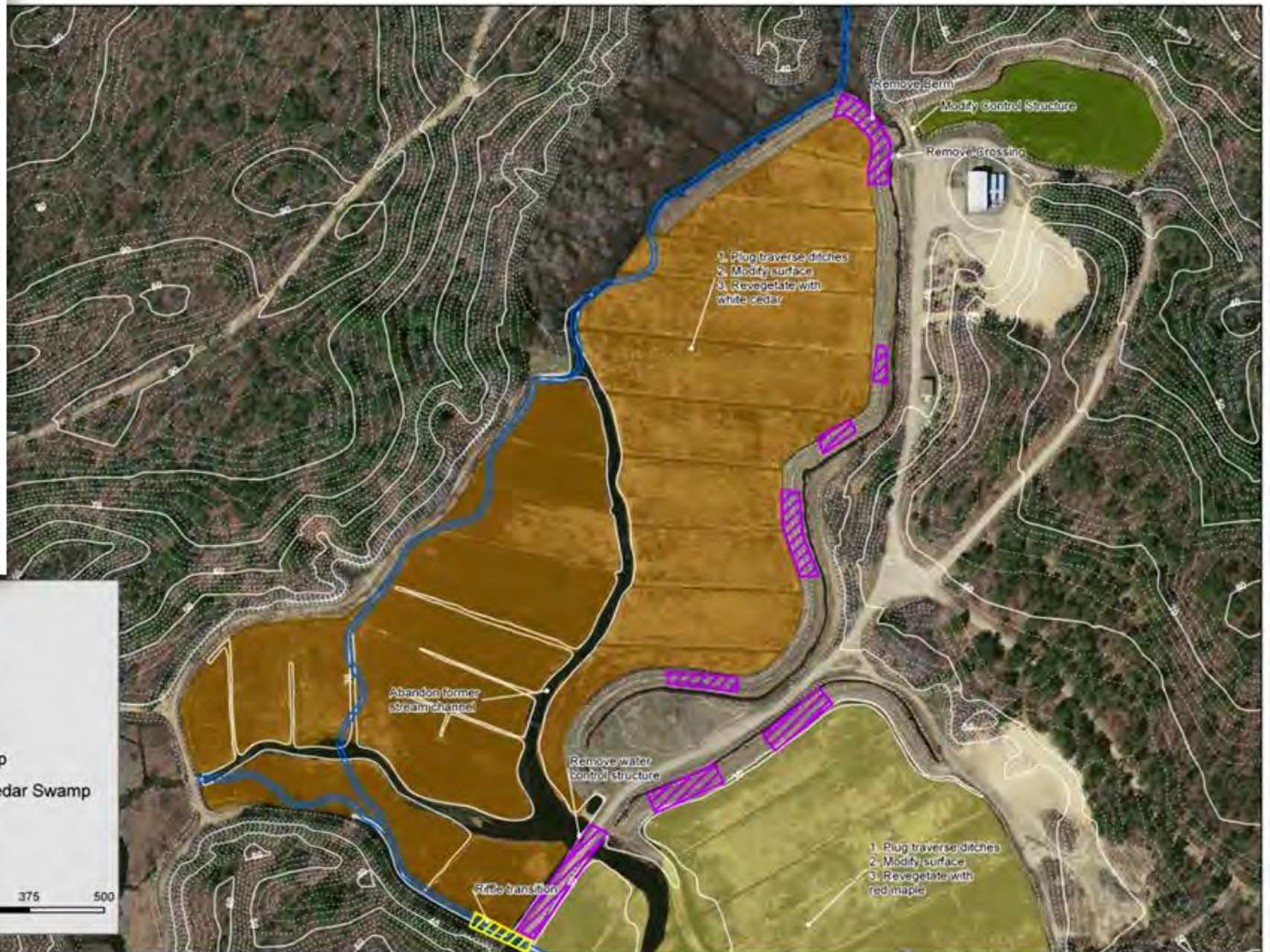
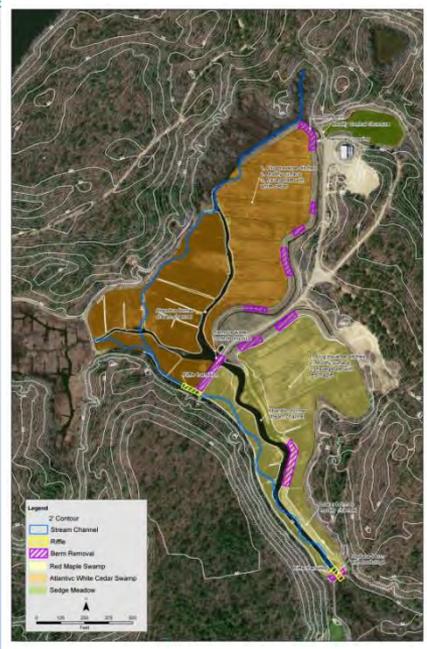
Restoration components



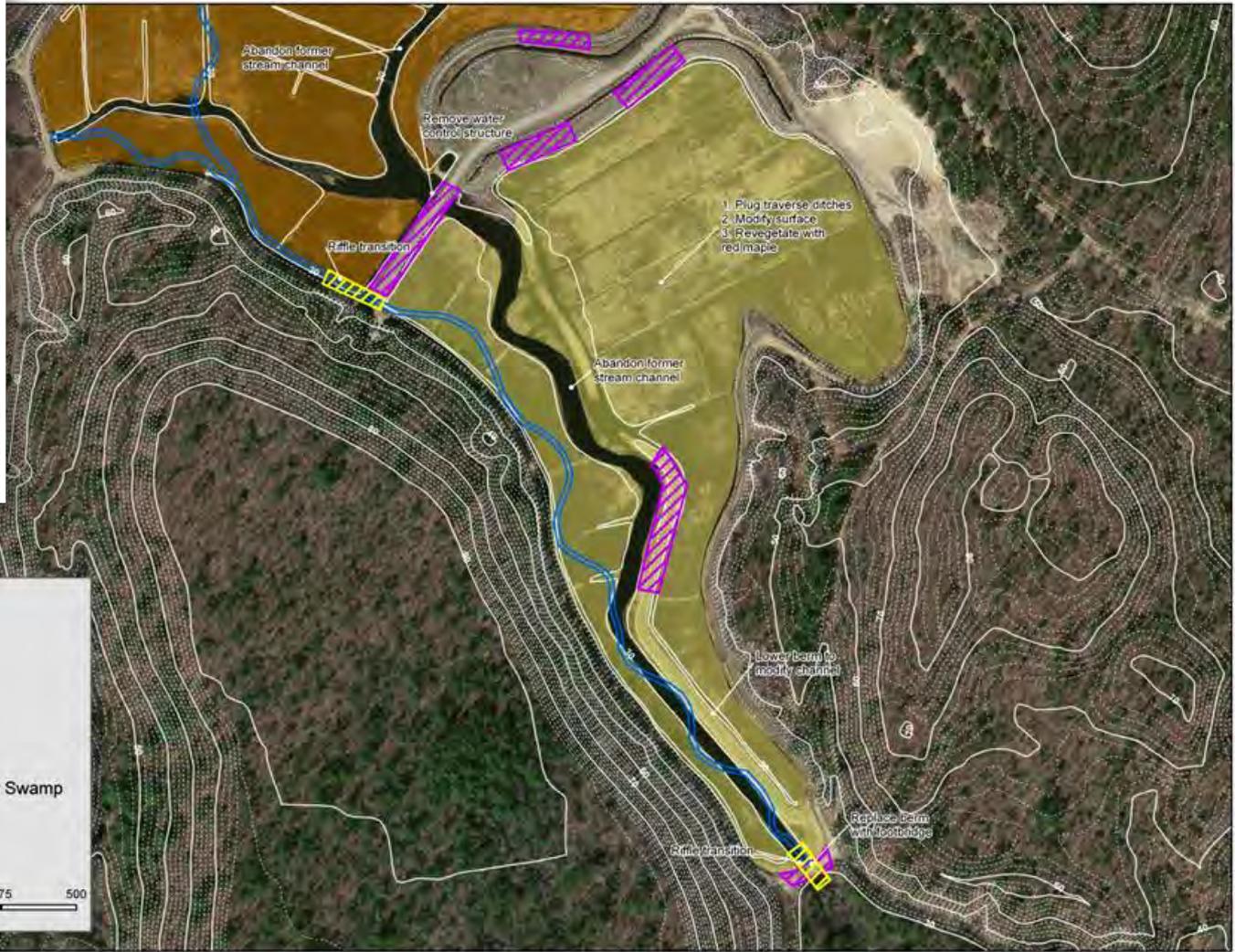
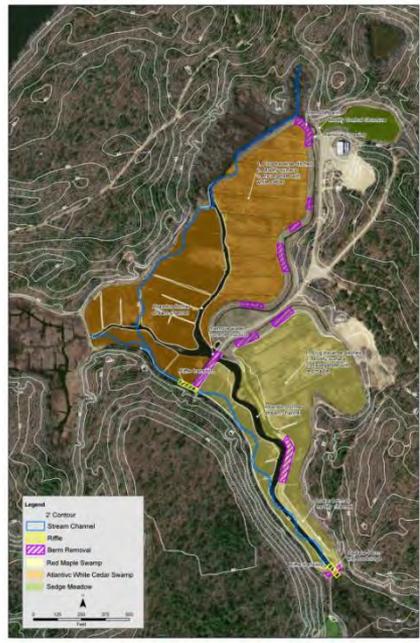
- Restore natural stream alignment, width, depth, slope, and substrate (sand/gravel with upwelling cool water)
- Stream flow regime/diversity
- Bank stability
- Establish forested wetland/riparian forest/shading
- Logs and root wads
- Restore wetland hydrology (elevate groundwater-grade controls/plug ditches)
- Modify bog surface
- Atlantic white cedar/red maple plantings
- Planting/Deer exclusion fencing



Upper Quashnet River



Upper Quashnet River



Eel River - Plymouth



Photos Courtesy of Alex Hackman, MA DER



Eel River - Plymouth



Photos Courtesy of Alex Hackman, MA DER



Abigails Brook



Abigails Brook

Impairments:

- Tidal Restriction
- Obstructions/loss of connectivity
- Invasive species
- Channel straightening
- Disconnected floodplains
- Fish run potential (Fells Pond)



WAQUOIT BAY STREAM RESTORATION MASTER PLAN

Falmouth and Mashpee, Massachusetts



Next Steps:

- Finalize Master Plan
- Complete Conceptual Design of Priority Projects
- Public outreach-build support
- Seek funding opportunities to advance design and implementation

