



Charles River Dam Advisory Committee

Presentation of Recommendation and Final Report

September 21, 2022

Background

Dam is Constructed

Dam built for recreational use during Great Depression

Deficiencies Noted in Dam Safety Inspection

Dam found to be in fair condition, regular inspections begin. ODS issues new statewide dam safety regulations, including prohibition of trees

Town Monitors Deficiencies and Makes Plans to Repair

Town continues regular inspections; dam repair added to capital plan; dam noted on 2010 Hazard Mitigation Plan

Town Meeting Appropriates Funding for Repair & Begins Work

Appropriations occur in 2018 and 2019; GZA designs first phase of repair work and begins permitting process

Public Requests Consideration of Spillway Removal

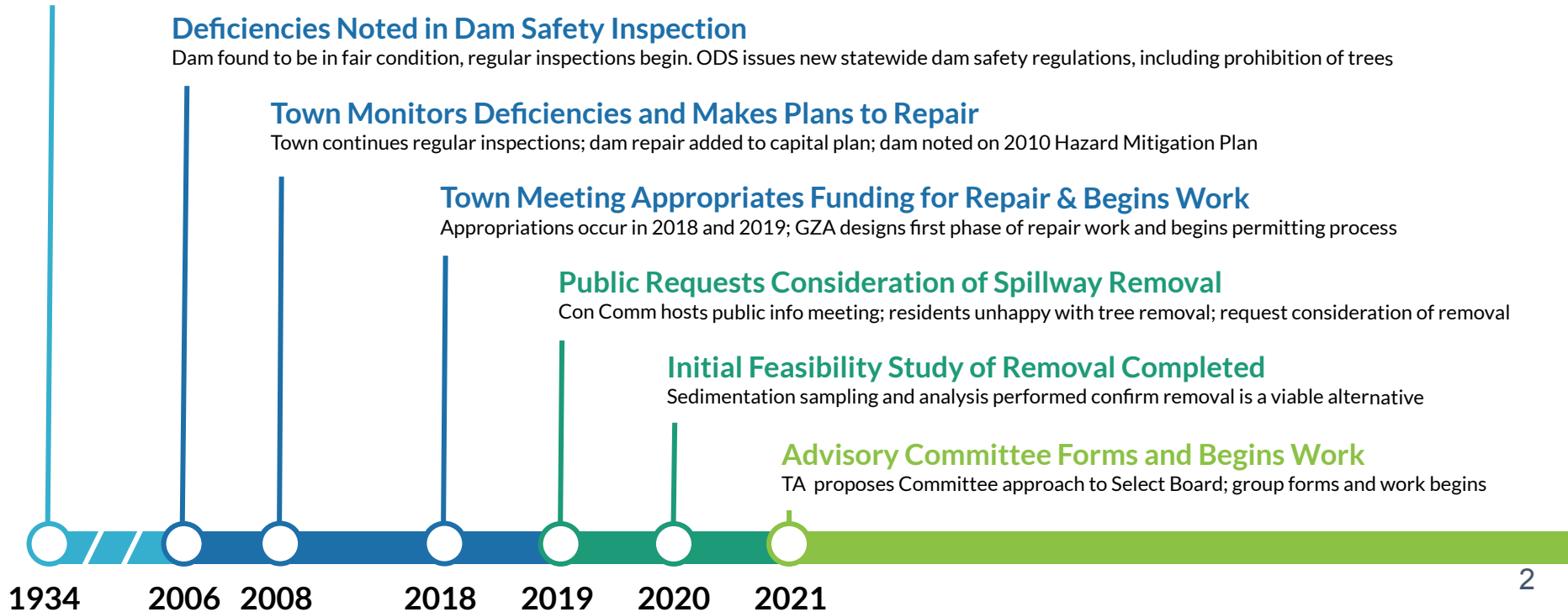
Con Comm hosts public info meeting; residents unhappy with tree removal; request consideration of removal

Initial Feasibility Study of Removal Completed

Sedimentation sampling and analysis performed confirm removal is a viable alternative

Advisory Committee Forms and Begins Work

TA proposes Committee approach to Select Board; group forms and work begins



An aerial photograph of an earthen dam. The dam is a long, low structure made of earth, with a concrete spillway on the right side. Water is flowing over the spillway, creating white rapids. The area upstream of the dam is a large, dark body of water. The area downstream is a river with a rocky bed and some rapids. The dam is surrounded by a dense forest of green and brown trees. A road runs along the right side of the dam, and a parking area is visible. The image is oriented vertically, with the dam running horizontally across the middle.

UPSTREAM

EARTHEN DAM

SPILLWAY

DOWNSTREAM

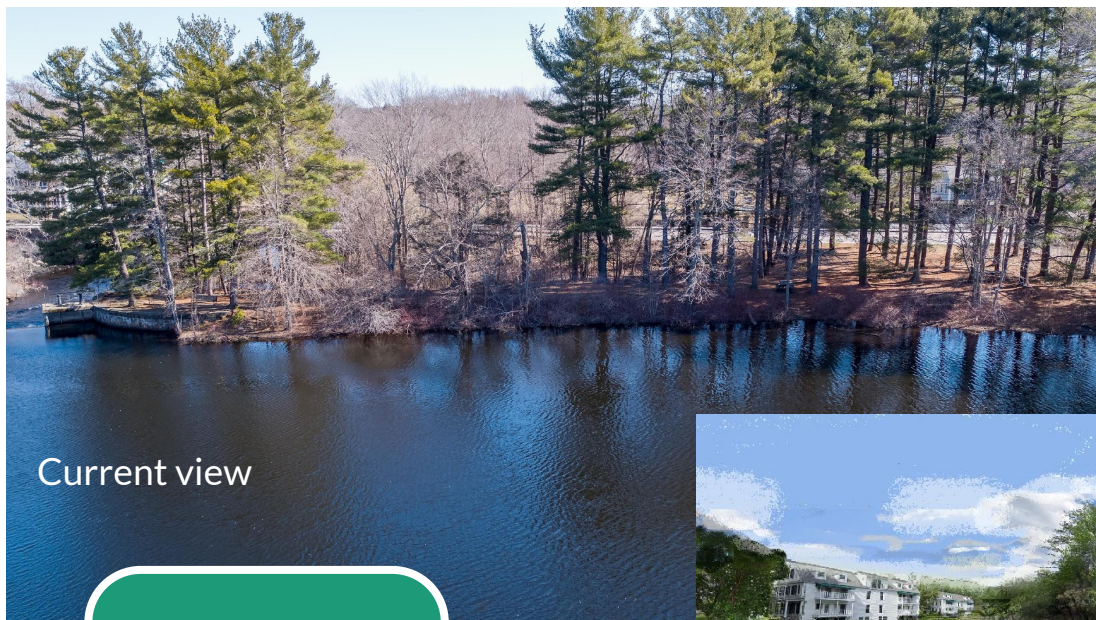


The dam impounds approximately 160M gallons of river water

Two Options

Repair
the Dam

Restore
the River



Current view

Option 1
Repair
the Dam



Rendering of post repair

Current view



Option 2
Restore the
River

Rendering post removal



Charles River Dam Advisory Committee

Advisory Committee

18 member body

150+ years of combined public service

Formed in March 2021

Appointed by the Town Administrator

*Tasked with **reviewing, discussing and evaluating the options** of what to do with the dam and **presenting a recommendation to the Select Board***

Sought 75% agreement on recommendation

Achieved 89% agreement

Perspectives Included

Recreation & Parks Commission

Commission on Disability

Planning Board

Historic District Commission

Open Space Advisory Committee

Finance Committee

Conservation Commission

Downstream Abutters

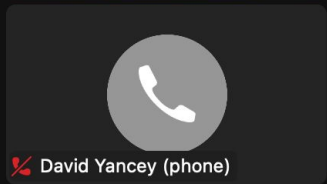
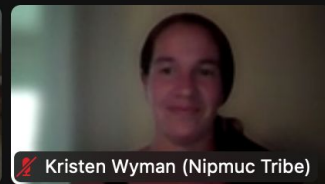
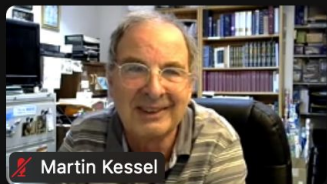
Upstream Abutters

Precinct 10 - Town Meeting Member

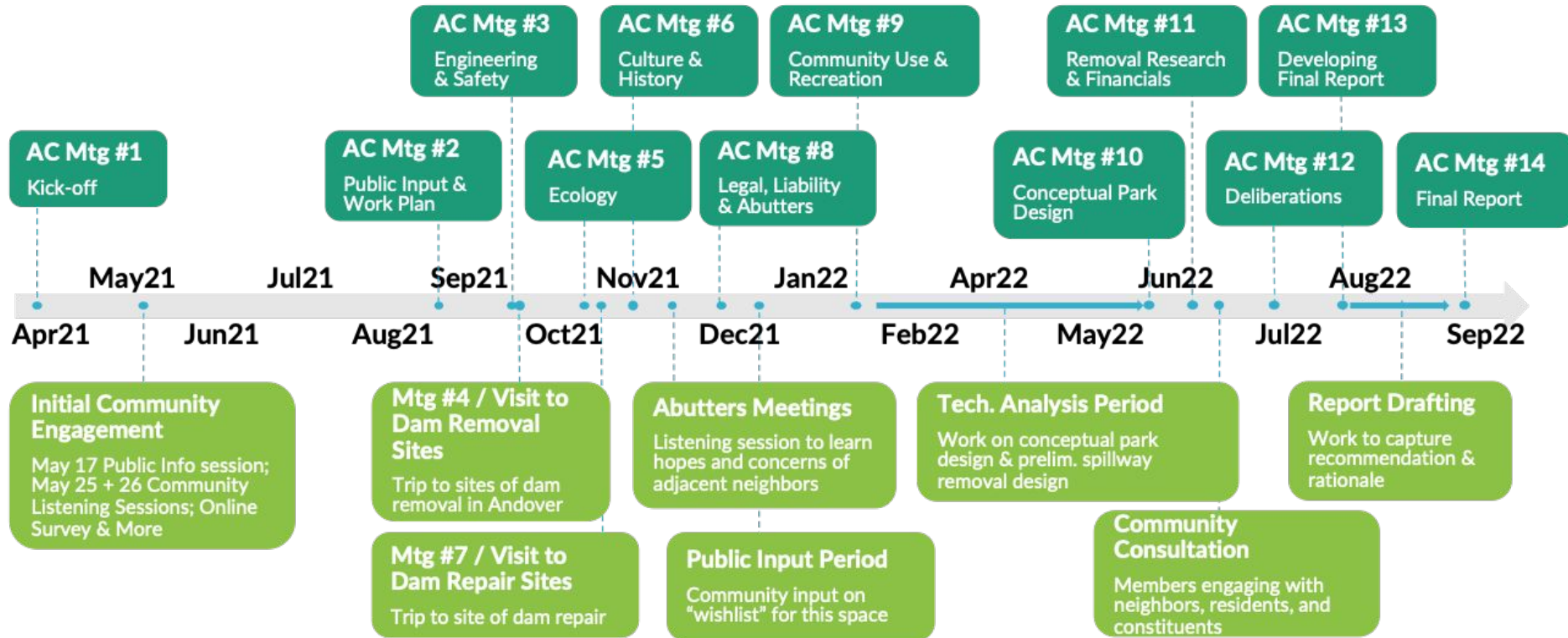
Environmental

Indigenous

Town Staff



18 Month Process



Organizations and Experts Engaged

Dams - Removal and Repair

GZA

Derek Schipper, P.E., Jim Guarente, P.E., and
Marc Chmura, E.I.T

Stantec

Gordon Clark, and Michael Chelminski, P.E.

Culture and History

Charlotte Diamont, **Wellesley College**

Suzanne Cherau, RPA, Senior Archaeologist,
The Public Archaeology Laboratory

Kristen Wyman, Indigenous rep,
Natick Nipmuc Indian Council

David Yancey, Indigenous rep,
Natick Nipmuc Tribal Council

Ecology

Nick Wildman, C.E.R.P, **MA Division of
Ecological Restoration (DER)**

Dr. Allison Roy, **U.S. Geological Survey
(USGS)**, MA Cooperative Fish and Wildlife
Research Unit, **UMass Amherst**

Rebecca Quiñones, Stream Biologist Project
Leader, **MassWildlife**

Charles River Watershed Association
Emily Norton, Executive Director, Robert
Kearns, Climate Resilience Specialist, and
Lisa Kumpf, River Science Project Manager

Mass Audubon

Elissa Landre, Community Advocacy and
Engagement Manager, and Heidi Ricci,
Director of Policy and Advocacy

Community Use & Recreation

Mark Jacobson, CEO, **Paddle Boston**

Other

Towns of Dover, Sherborn and Wellesley

Tighe & Bond

Christopher D. Haker, P.E., and
Bryan Gammons, Senior Environmental
Scientist

Town of Andover

Shawsheen River Watershed Association

Natick Town Counsel

Our Recommendation and Rationale

Our Recommendation

The Charles River Dam Advisory Committee recommends that the Town of Natick remove the spillway and restore the river, and invest in creating a beautiful and welcoming waterfront park.

*16 of the 18 Committee members (89%) voted to recommend removing the spillway and restoring the river.
2 members (11%) voted to recommend repairing the dam, but said they could live with removing the spillway.*

What Guided Us

*Members were driven by a deep responsibility to protect this place
and the Charles River for future generations.*

Environmental
Considerations

Social and Cultural
Considerations

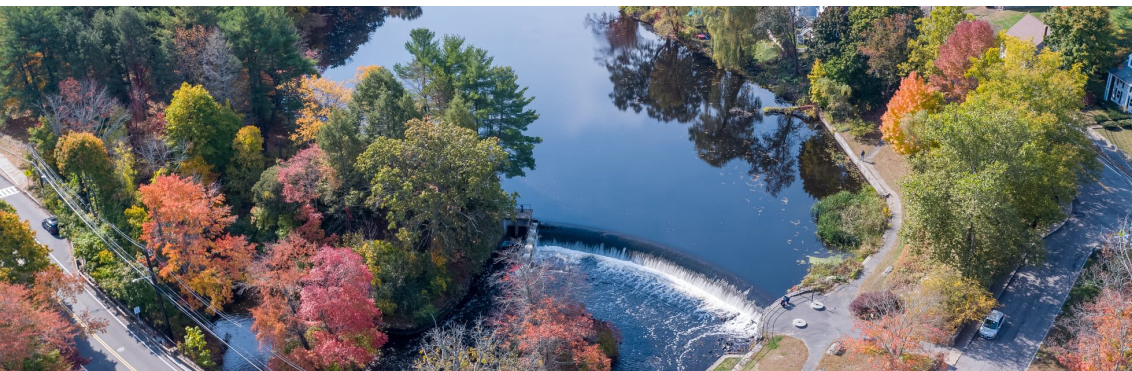
Economic
Considerations



Tyler Keefe, Love Birds

Tykedigitalmedia.

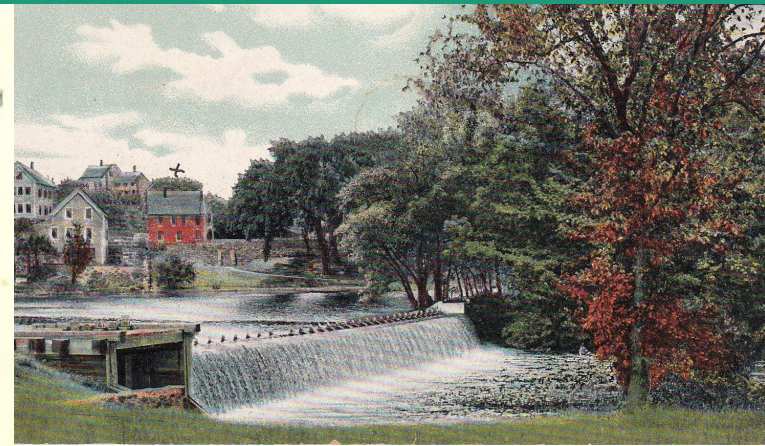
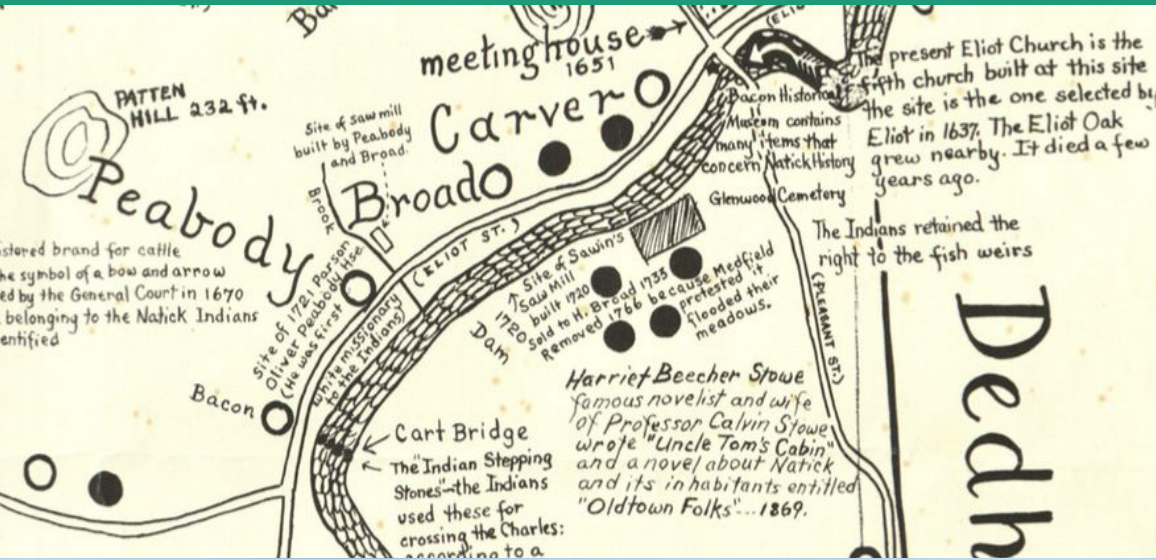
This place will change,
but the water will still be here.



The Oldtown Calendar



The history of this place and the people who lived here is long and winding.



Historic and Cultural Considerations of the Quinobequin

Damming Fish and Indians: Starvation and Dispossession in Colonial Massachusetts

Today's post in the Roundtable on Food and Hunger in Vast Early America is by Zachary M. Bennett, who is Visiting Assistant Professor of History at Connecticut College this autumn. He is a Ph.D. candidate at Rutgers University-New Brunswick. His dissertation, "Flowing Power: Rivers, Energy, and the Making of New England," examines the political ecology of waterpower before the industrial revolution.

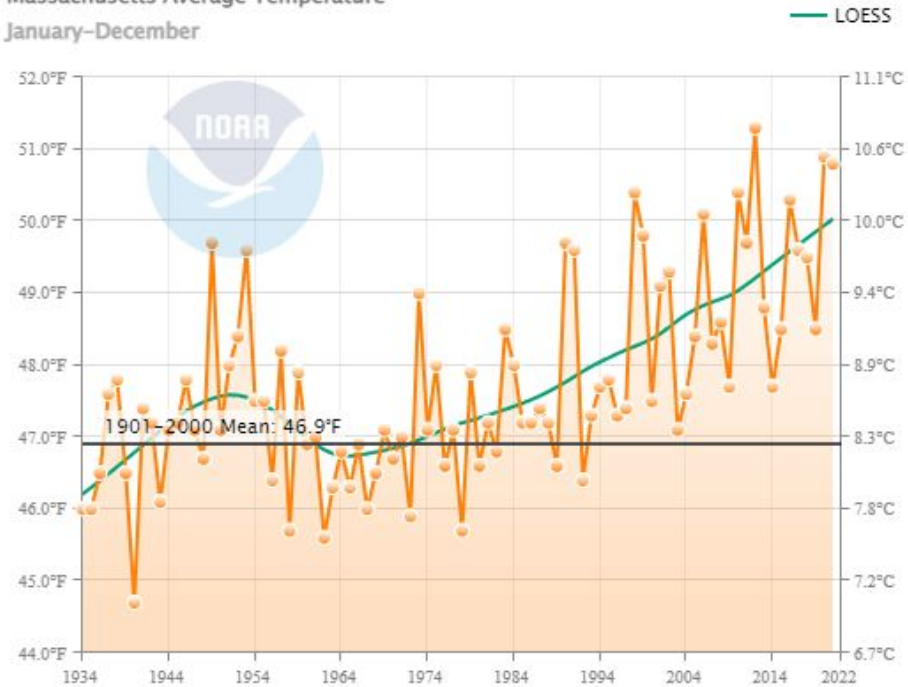
Compared to other Native Americans in southern New England, the Ninnimissinuok community of Natick, Massachusetts seemed to have secure footing going into the eighteenth century. Located only fifteen miles outside of Boston on the Charles River, Natick was the largest community of Native American converts to Christianity—or "Praying Indians"—in mainland New England with a population exceeding two hundred persons. These Praying Indians owned their land in corporation to safeguard their enclave against land hungry colonists. To passersby, Natick

Dams have a negative impact
on the health of rivers.

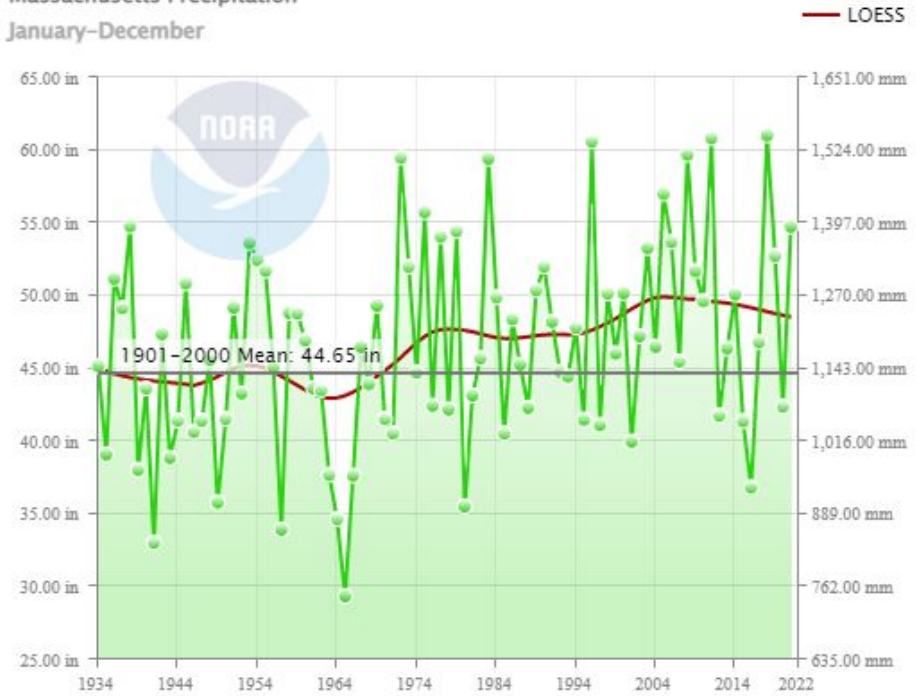


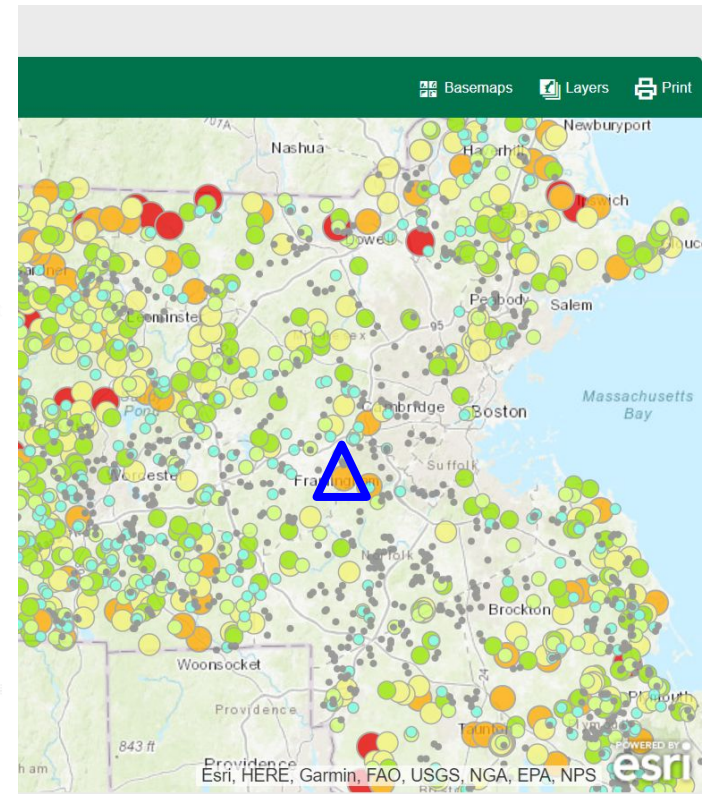
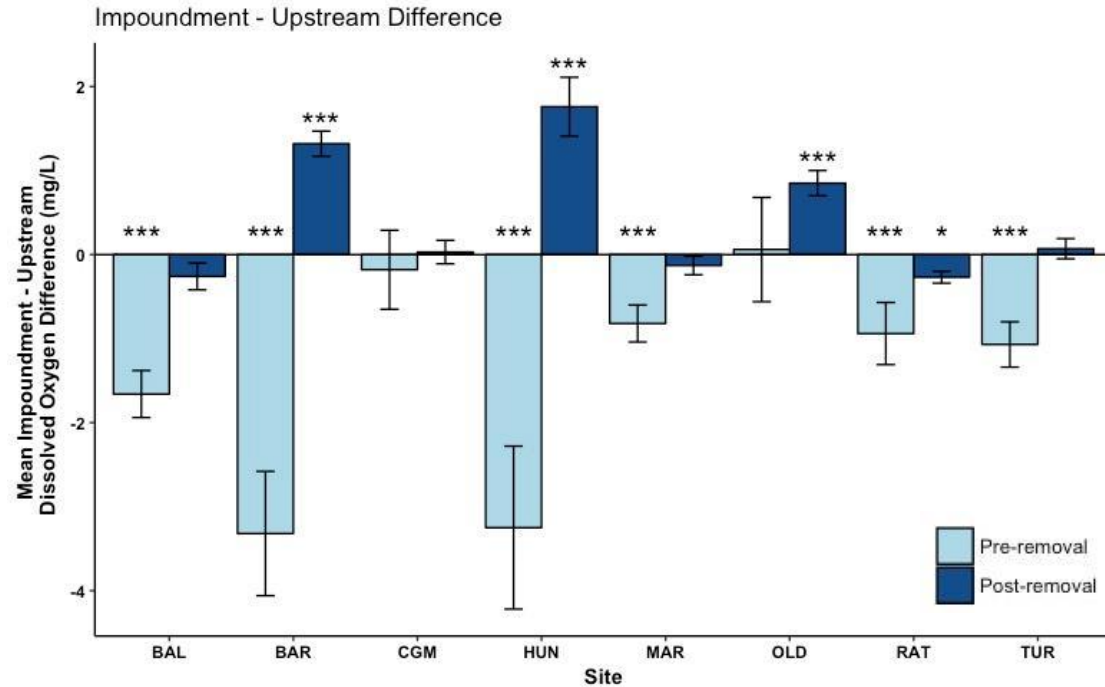
Climate change is exacerbating the risk and impacts of dams.

Massachusetts Average Temperature
January–December



Massachusetts Precipitation
January–December





Dam removal is a proven approach to restoring rivers – in their entirety or in sections.

NOTES:

- 1) THE INUNDATED AREAS SHOWN ON THIS MAP REFLECT EVENTS OF AN EXTREMELY REMOTE NATURE, THESE RESULTS ARE NOT IN ANY WAY INTENDED TO REFLECT UPON THE INTEGRITY OF CHARLES RIVER DAM AT SOUTH NATICK.
- 2) NUMBERS INSIDE CROSS SECTION SYMBOLS INDICATE DISTANCE DOWNSTREAM OF CHARLES RIVER DAM AT SOUTH NATICK IN MILES.
- 3) PEAK WATER ELEVATIONS SHOWN ARE APPROXIMATE AND SHOULD BE USED AS A GUIDELINE FOR ESTABLISHING EVACUATION ZONES.
- 4) ACTUAL PEAK WATER SURFACE ELEVATIONS WILL DEPEND ON ACTUAL FAILURE CONDITIONS AND MAY DIFFER FROM ELEVATIONS SHOWN ON THESE MAPS.
- 5) INUNDATION AREA SHOWN REFLECTS HYPOTHETICAL DAM FAILURE WITH STARTING WATER SURFACE ELEVATION COINCIDENT WITH THE SPILLWAY CREST (100.0 FT), A BASE FLOW IN THE CHARLES RIVER OF 250 CFS.
- 6) CROSS-SECTION INFORMATION INCLUDING LOCATION, LEADING EDGE ARRIVAL TIME, PEAK FLOOD ARRIVAL TIME, MAXIMUM WATER SURFACE ELEVATION, AND PEAK DISCHARGE ARE GIVEN FOR THE FAIR WEATHER CONDITION.
- 7) AERIAL PHOTO FROM MASS GIS DATE 2005.

WET WEATHER DAMBREAK
FLOOD LIMITS CORRESPOND
TO FEMA 100-YEAR FLOOD
PLAIN BEYOND THIS POINT.

LEGEND

- AREA FLOODED BY CHARLES RIVER DAM AT SOUTH NATICK WET WEATHER FAILURE
- AREA FLOODED BY CHARLES RIVER DAM AT SOUTH NATICK FAIR WEATHER FAILURE
- CROSS-SECTION MILEAGE FROM CHARLES RIVER DAM AT SOUTH NATICK



PROJ. MGR: DML
DESIGNED BY: BBF
REVIEWED BY: PHB
OPERATOR: BBF
DATE: 10/26/2006

SCALE : 1 INCH=1,000 FEET

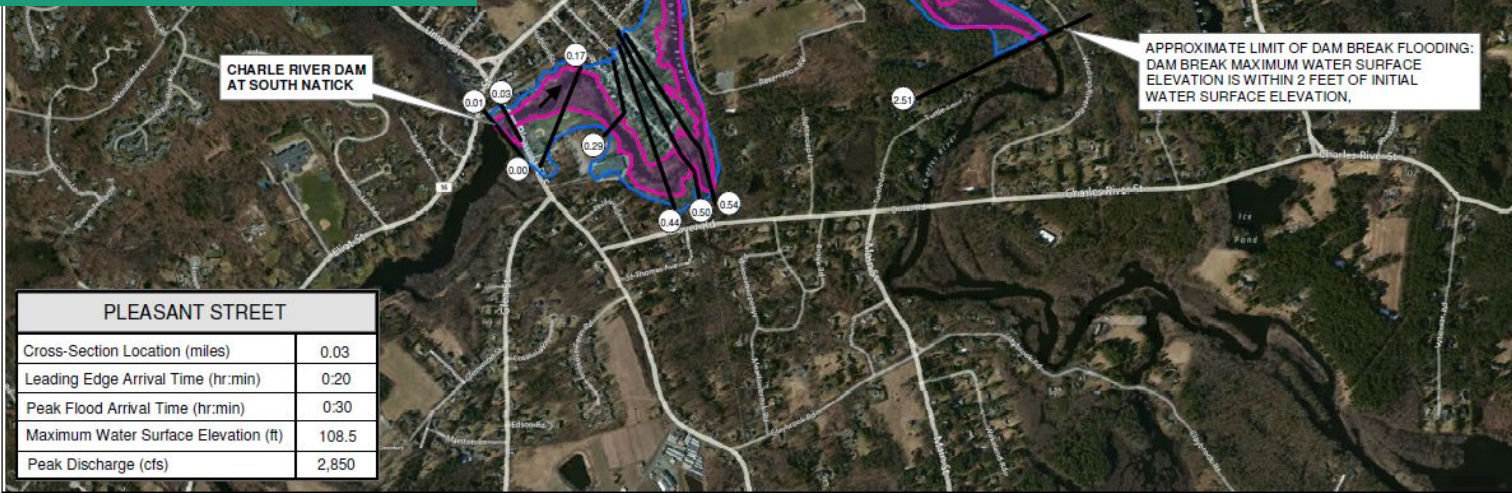
0 500 1,000 2,000 Feet

CHARLES RIVER DAM EAP
TOWN OF NATICK
NATICK, MASSACHUSETTS
ORTHOPHOTO
INUNDATION MAP

GZA NO.
19114

FIGURE
G-2

Dam failure could be disastrous – to people and the Town's finances.



PLEASANT STREET

Cross-Section Location (miles)	0.03
Leading Edge Arrival Time (hr:min)	0:20
Peak Flood Arrival Time (hr:min)	0:30
Maximum Water Surface Elevation (ft)	108.5
Peak Discharge (cfs)	2,850

Category	Dam Repair	River Restoration
Engineering and Construction Costs	\$2,640,000	\$1,511,000

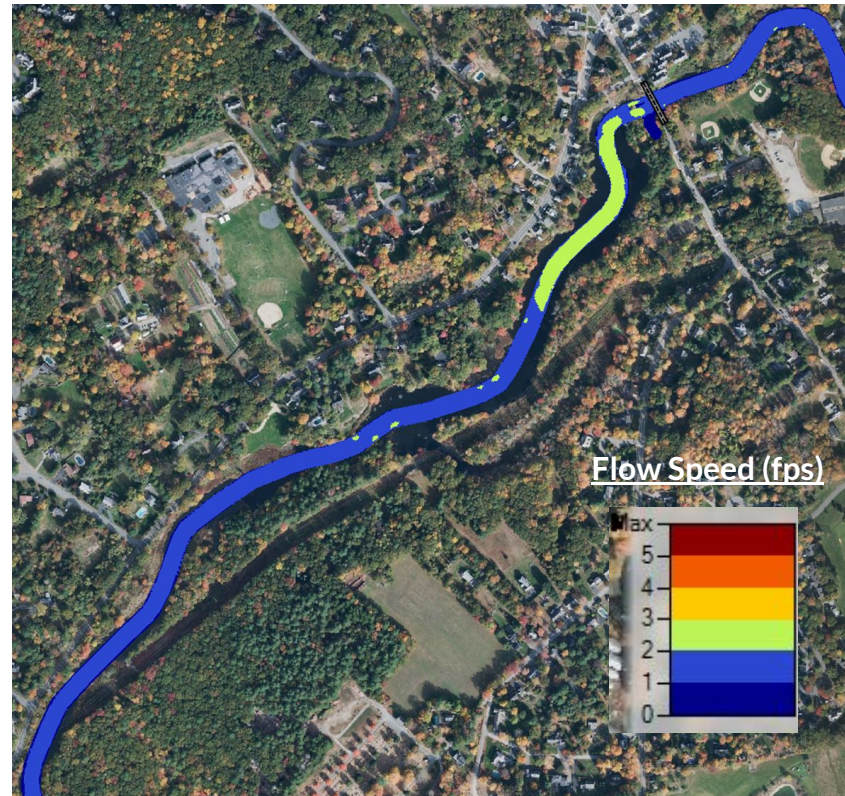
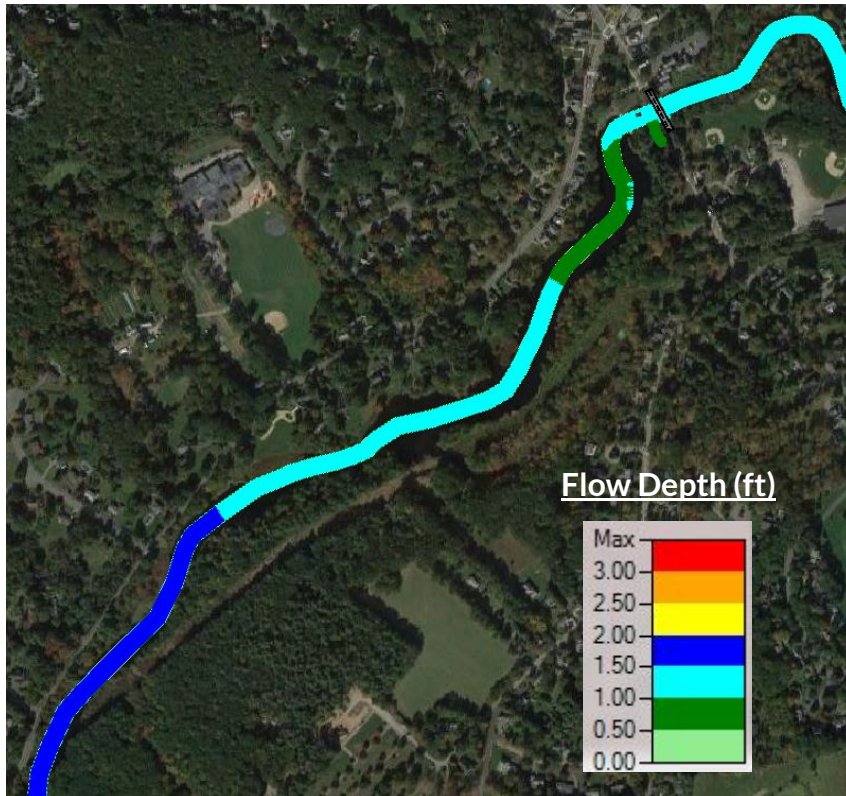
When comparing probable costs of Dam Repair v. River Restoration, one-time costs are estimated at over \$1,000,000 more for Dam Repair



In addition....operational and maintenance costs over a 30 year span could total \$830,000 for maintenance of the Dam and Spillway

Park updates are needed for either option. These costs are unknown.

Removal is less expensive than repair. It also avoids future maintenance and replacement costs.



Depths and flow will change if the dam is removed and will be most noticeable in an 860 ft stretch of river. The system will behave more like a river and less like a pond.

Healthy rivers are better for people and wildlife.



What do we want Natick's legacy to be?



Our Legacy



The Committee received a significant amount of public input through various community surveys.

What We Cherish

A Place Close to the Charles River
A Place for Reflection
Sound of Rippling Water
Mature Tree Groves
Outdoor Recreation
Picturesque Setting
Historical Context

What's Missing

Accessibility
Safety
Physical Access to the River
Opportunities for New Programs
Limited Usable Open Spaces
Celebrating the Rich and Extensive History
Healthy Ecological Resources and Habitat

Making a Place for All of Natick

- Accessibility, including for the disabled community
- Natural, quiet recreation opportunities, room for sitting and picnicking
- Trees and shade
- Historical markers to recognize the long and varied history of this place including information, photos and signage
- Access to the water's edge, including, but not limited to a boat launch(es) here or in nearby parks to ensure safe “on water” access to this section of the river
- Safe pedestrian connections between area amenities and parks
- Long-term maintenance and upkeep, including of trees and other plantings to ensure their optimum health, the safety of park users, and control of invasive plant species

Rehabilitation of Park Areas

We believe park rehabilitations are necessary for both options.

The cost of rehabilitations is unknown at this time.

We recommend a concurrent design and permitting process.

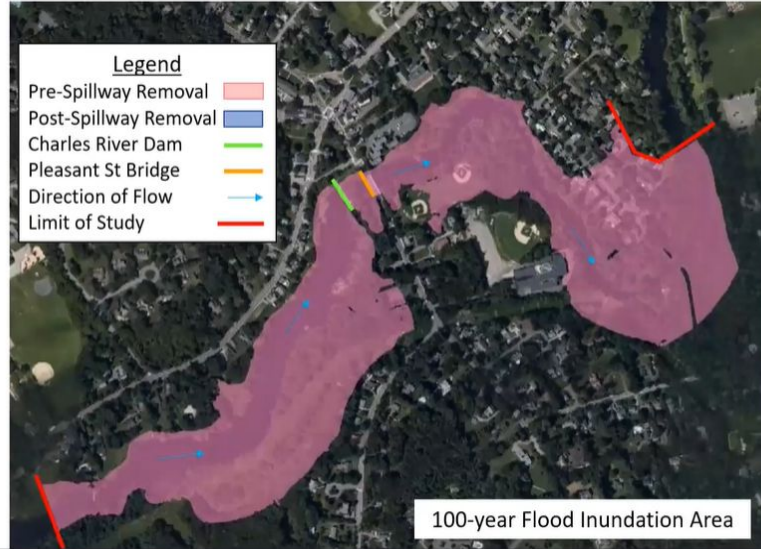


Questions & Thank You

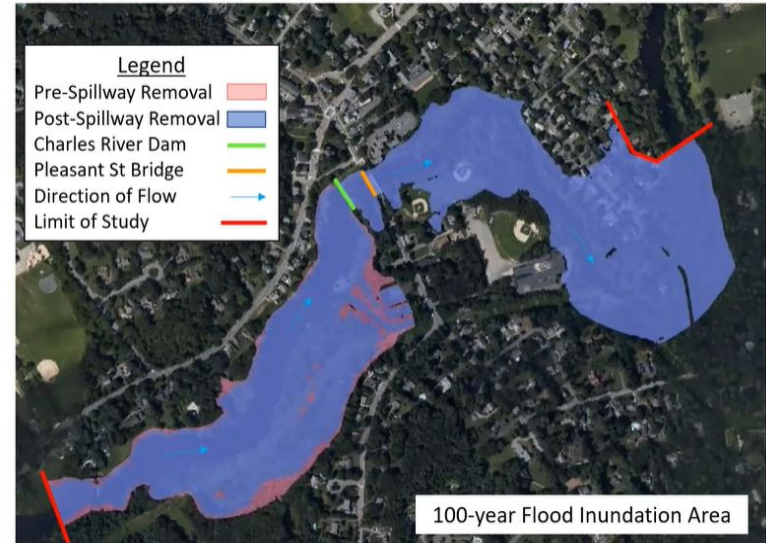
Appendix

As a 'run of river' dam, neither option will impact seasonal flooding

Floodplain if Dam is Repaired



Floodplain if Spillway is Removed



Flood limits shown in the images show seasonal flooding within the 100-year floodplain of the Charles River, which is determined by weather conditions.

Floodplain is the same downstream in both scenarios. It is slightly reduced upstream if spillway is removed.

What condition is the dam in?



“Significant operational and maintenance deficiencies, no structural deficiencies. Potential deficiencies exist under unusual loading conditions that may realistically occur.”

Source: [Phase 1 Formal Inspection Report Template and Instructions](#)

Requirements per [302 CMR 10.07](#):

- Must be inspected/reported at least every two years

“Significant structural, operation and maintenance deficiencies are clearly recognized for normal loading conditions”

Source: [Phase 1 Formal Inspection Report Template and Instructions](#)

Requirements per [302 CMR 10.03](#) and ODS letter:

- Must be inspected/reported at least every six months
- May be required to be monitored during anticipated rain/runoff events

The sediment is not a barrier to removal.

“Based on the laboratory results of the sediment samples collected at the Site and comparison to the standards and guidance values developed by the DER, it does not appear that contaminant levels of the sediment would be an impediment to dam removal. “

-GZA 1/10/2020 Report

Stantec took two additional deep sediment samples in 2022 that mirrored GZA's results.

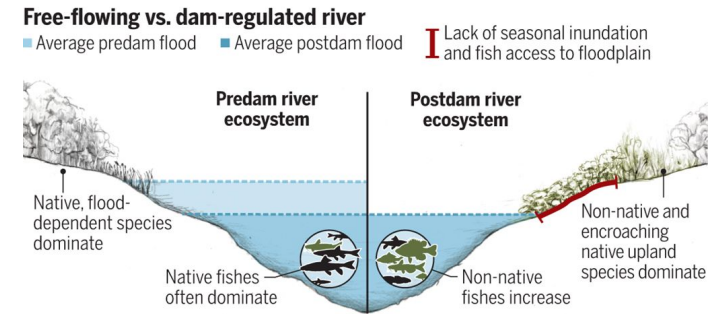
Additional tests would occur as part of the permitting process



Ecosystem changes

“Restoration of an unregulated flow regime has resulted in increased biotic diversity ... By returning riverine conditions and sediment transport to formerly impounded areas, riffle/pool sequences, gravel, and cobble have reappeared, along with increases in biotic diversity.”

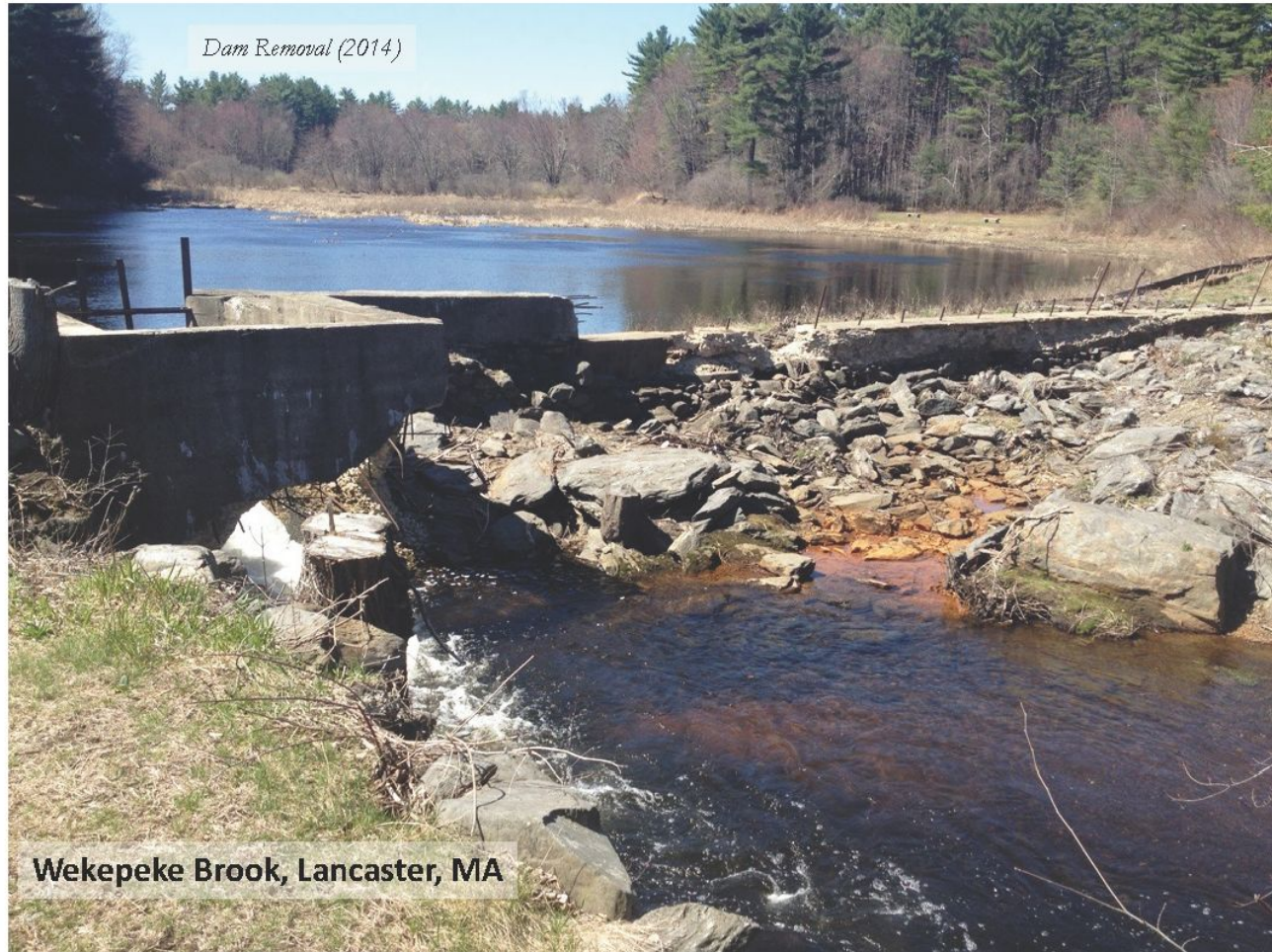
- Several published, peer-reviewed studies affirm that dam removal poses an overall benefit for habitat and migration
- Species that may benefit from dam removal: turtles, amphibians, racoons, skunks, and micro/macro aquatic invertebrates
- Species that may be impacted by dam removal: ducks and muskrat



Dam Removal Response

TIMEFRAME	RESPONSE
HOURS	Fish & wildlife passage Sediment movement
DAYS	Channel formation (riffles, etc.)
WEEKS	Vegetation sprouting Channel formation
MONTHS	Vegetation establishment Channel widening
YEARS (2+)	Channel widening and evolving

Dam Removal (2014)



Wekepeke Brook, Lancaster, MA



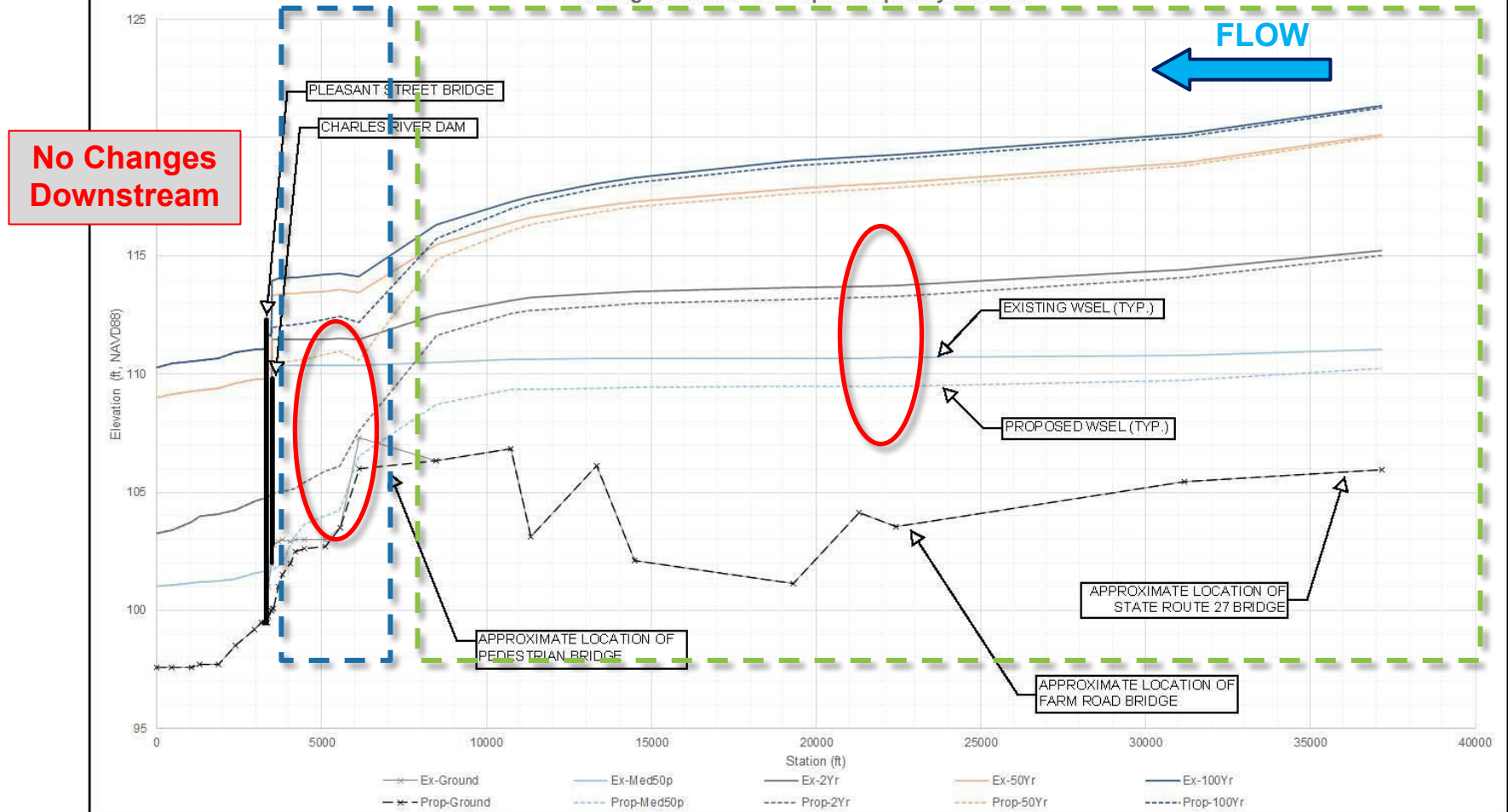
3 months later...



3 years later...



Hydraulic Model Results Existing Conditions vs. Proposed Spillway Removal



(Figure 2 in Stantec Recon Study Report)

Dam Repair Costs: Anticipated Costs

One Time Costs

Repair Earthen Berm

Repair Entrainment Wall

Replace Fish Ladder

Operations & Maintenance Costs

Dam Maintenance

Annual Fish Ladder Maintenance/Oversight

DCR Compliance (every 2 yrs)

Preventative Maintenance (every 15 yrs)

Park improvements are not included in the cost analysis.

Spillway Removal: What's Included

One Time Costs

Dewatering Impoundment

Spillway Removal

Operations & Maintenance Costs

None

Park improvements are not included in the cost analysis.

Outside Funding Sources

Grants for Dam Repair

Federal Emergency Management Agency (FEMA), Rehabilitation Of High Hazard Potential Dam Grant Program

MA Executive Office of Energy and Environmental Affairs (EEA), Dam and Seawall Repair Program

United States Department of Agriculture - Natural Resource and Conservation Service (USDA - NRCS), Watershed and Flood Prevention Operations (WFPO) Program

Grants for Spillway Removal

National Oceanic and Atmospheric Administration (NOAA), Restoring Fish Passage through Barrier Removal

FEMA, Hazard Mitigation Grant Program

FEMA, Rehabilitation Of High Hazard Potential Dam Grant Program

MA Executive Office of Energy and Environmental Affairs (EEA), Municipal Vulnerability Preparedness (MVP)

MA Division of Ecological Restoration (DER), Priority Projects

U.S. Fish and Wildlife Service, National Fish Passage Program

Trout Unlimited, Embrace a Stream

EEA, Dam and Seawall Repair Program (extra points for removal)

MA Environmental Trust

Additional potential funding sources identified from US Army Corps of Engineers, MassDCR, and MassDEP





DAM REPAIR - CONCEPTUAL PLAN

[illegible]

Appropriations & Grants To-Date

Funding Source	Original Amount	Remaining Balance	Use
2018 TM Appropriation	\$625,000	\$488,682	Repair design and initial permitting; community engagement; landscape design
2019 TM Appropriation	\$1,250,000	\$1,250,000	TBD pending outcome of process
2020 ODS Grant	\$29,750	\$0	Sediment testing, feasibility study
2021 DER Grant	\$25,000	\$0	Technical assistance for preliminary design

Potential Permits for River Restoration

**Source: Massachusetts Executive Office of Energy and Environmental Affairs
Division of Ecological Restoration, [Dam Removal Guide](#)**

1. Notice Of Intent (NOI) – One of the key permits at the local level is with the local Conservation Commission. A filing of a NOI with the Conservation Commission also alerts the MassDEP to the project. MassDEP then responds outlining which specific MassDEP permits will be required.
2. MEPA - Environmental Impact Report (if applicable)
3. Massachusetts Endangered Species Act (MESA) (if applicable)
4. 401 Water Quality Certificate (WQC)
5. United States Army Corps of Engineers (USACE) 404
6. Chapter 91 (if a full license is required all permits must be received before the issuance of this license)
7. Federal Consistency Review
8. National Pollutant Discharge Elimination System (NPDES)
9. Local Building or other Permits
10. Beneficial Use of Solid Waste Permit