Feasibility Study

CONCORD RIVER

DIADROMOUS FISH RESTORATION

PUBLIC MEETING | FEBRUARY 23, 2016 | NORTH BILLERICA, MA

Project Lead

Project Partners

Project Consultants

GOMEZ AND SULLIVAN ENGINEERS

PAL Public Archaeology Laboratory

OVERVIEW

- PROJECT PURPOSE
- EXISTING ENVIRONMENT
- TECHNICAL ASSESSMENT
- RESTORATION ALTERNATIVES
- SUMMARY / NEXT STEPS
- QUESTIONS

PROJECT SUPPORT

- **Partners/technical assistance:**

Project Lead

Project Partners

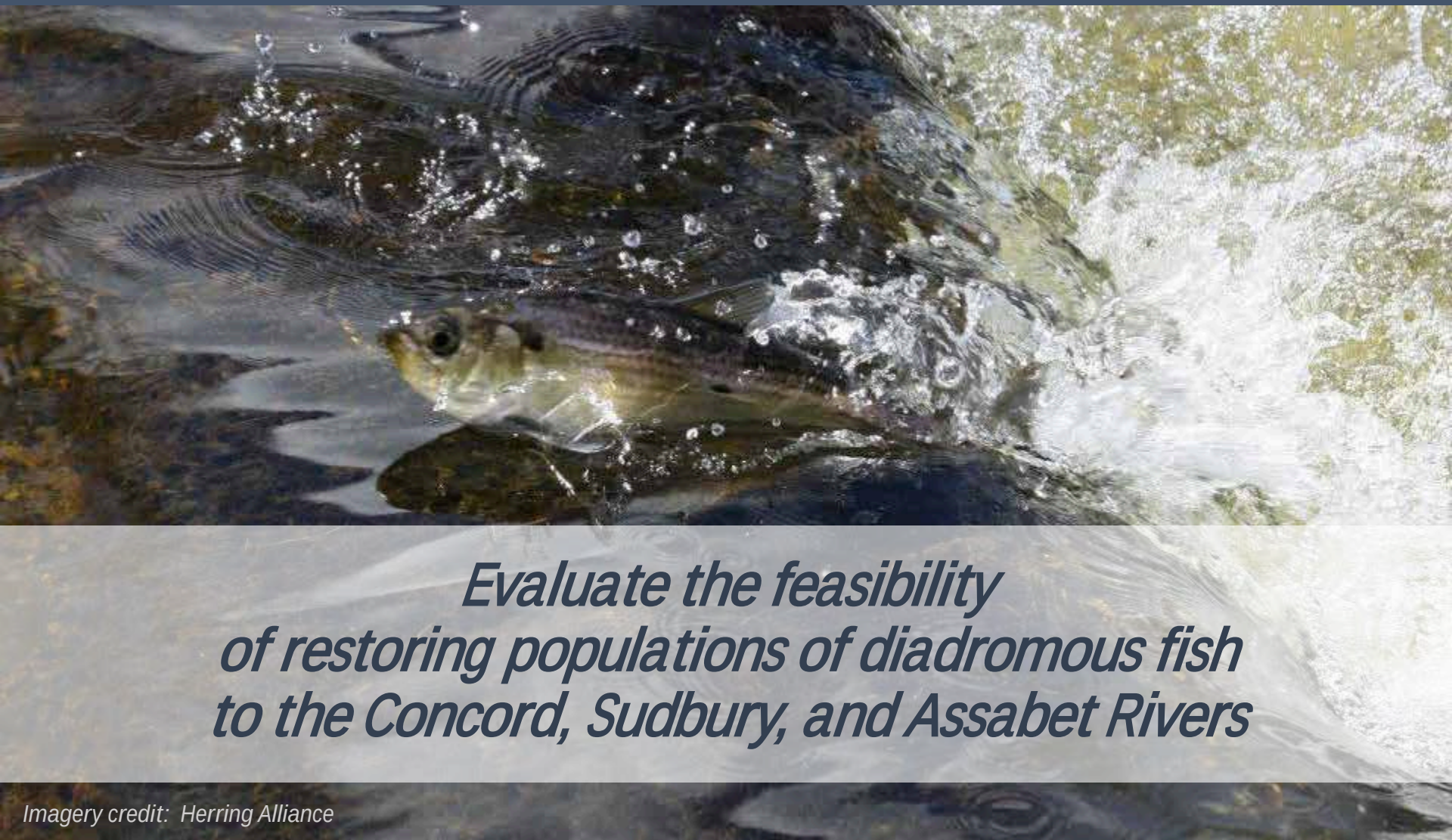
Project Consultants

- **Funding:**

  Nyanza Natural Resource Damages Settlement

PURPOSE

PROJECT GOAL



Evaluate the feasibility of restoring populations of diadromous fish to the Concord, Sudbury, and Assabet Rivers

Imagery credit: Herring Alliance

WHY? – Reasons to Restore Passage

- **Importance of target species –** ecosystem functions, commercial/recreational fisheries, cultural values, range, etc.
- **History** – historical presence of diadromous species in the Concord River is well documented
- **Habitat** – significant lacustrine and riverine spawning and rearing habitat exists upstream of Talbot Mills Dam
- **Connectivity** – the Concord River is low in the Merrimack River watershed and fish must only navigate past one dam before reaching the it
- **Support** – active and involved watershed associations, volunteer organizations, community members, and state/federal agencies support restoration
- **Public Input** – one of 12 projects identified in the Nyanza Restoration Plan, which resulted from public input process

EXISTING ENVIRONMENT

TARGET SPECIES

Blueback herring

Alewife

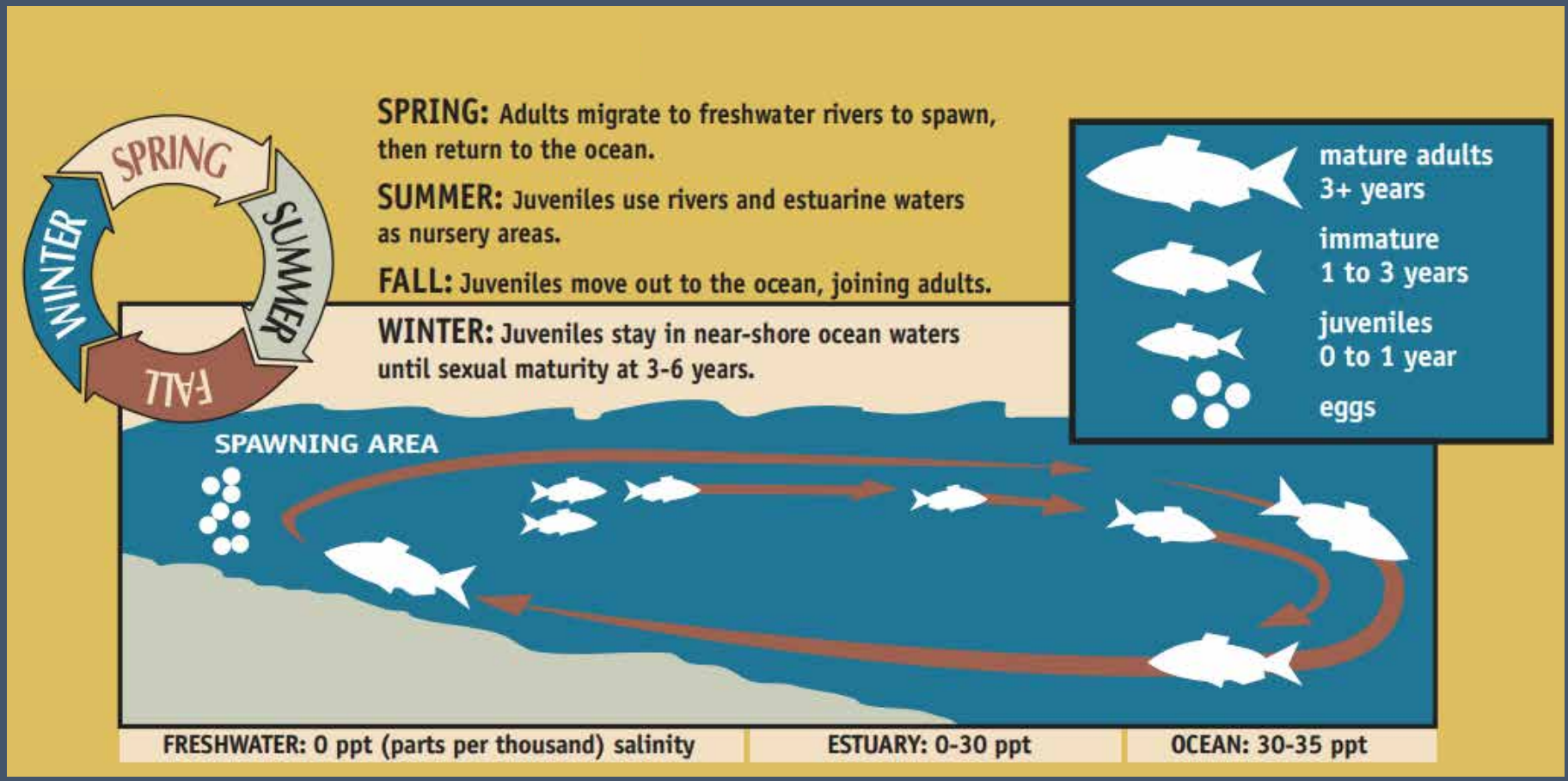
American shad

American eel

Sea lamprey

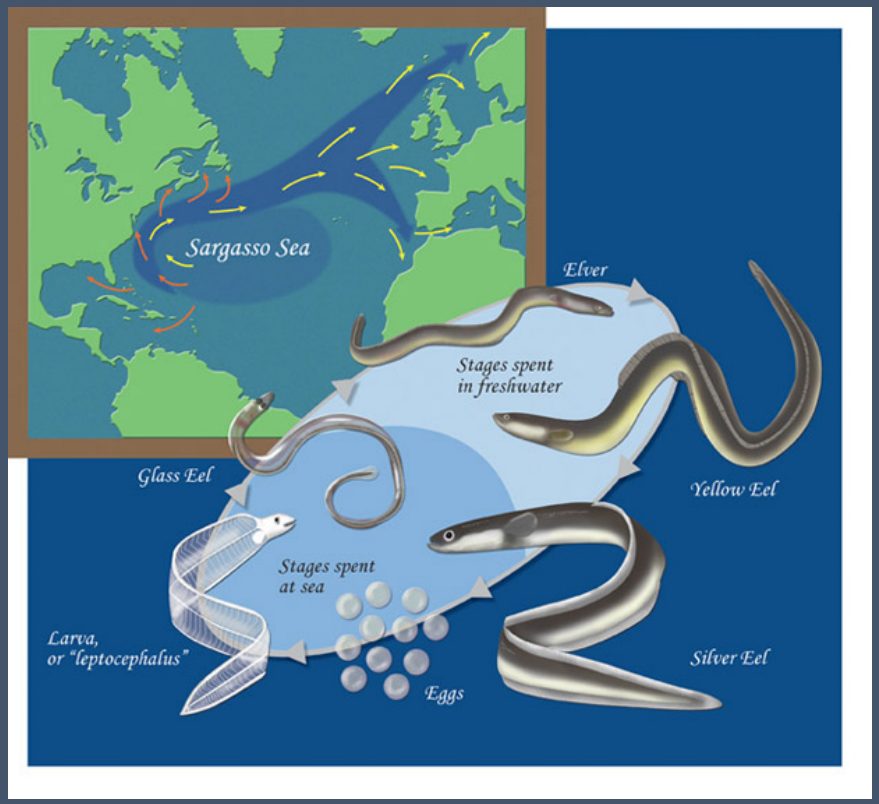
TARGET SPECIES – Life Cycles

River Herring & American Shad

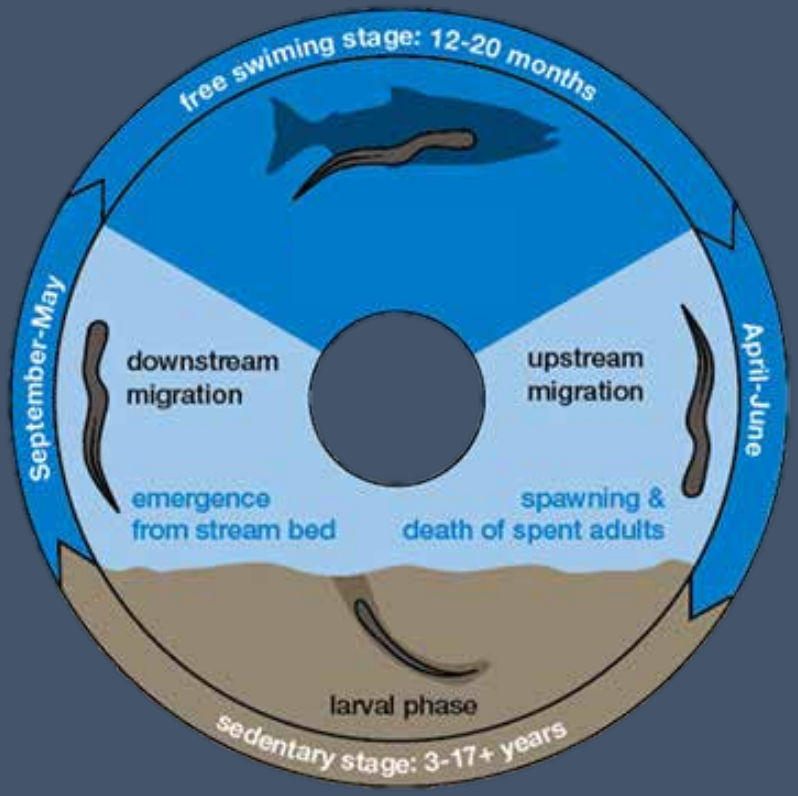


TARGET SPECIES – Life Cycles

American Eel



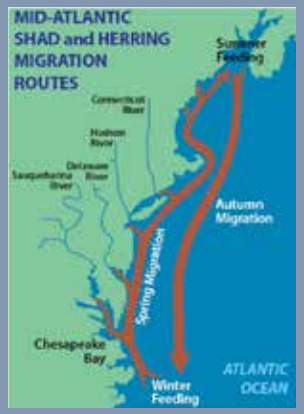
Sea Lamprey



TARGET SPECIES – Importance

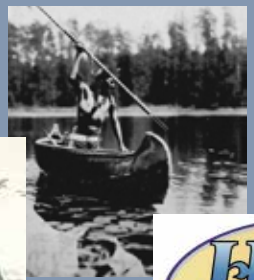
ECOSYSTEM FUNCTIONS

FISHERIES
(COMMERCIAL & RECREATIONAL)



RANGE

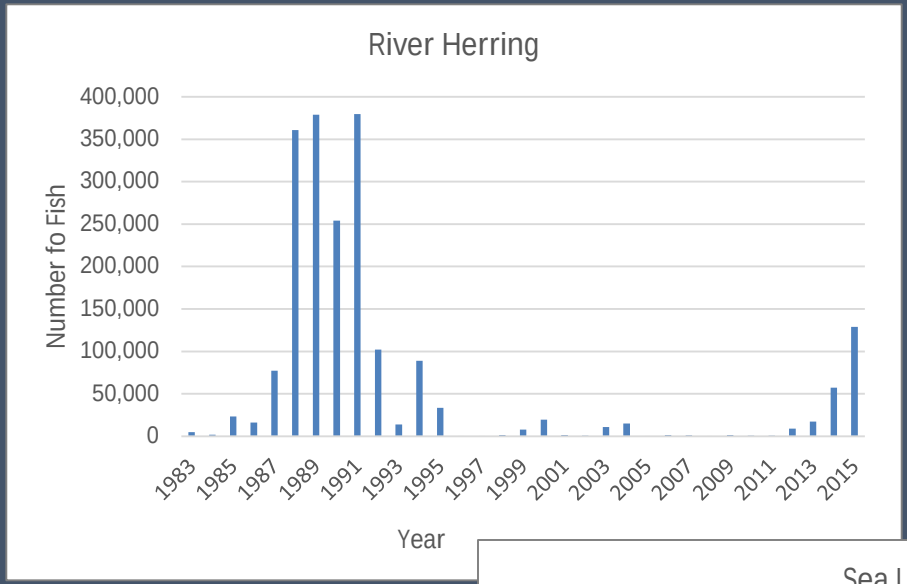
CULTURAL VALUES

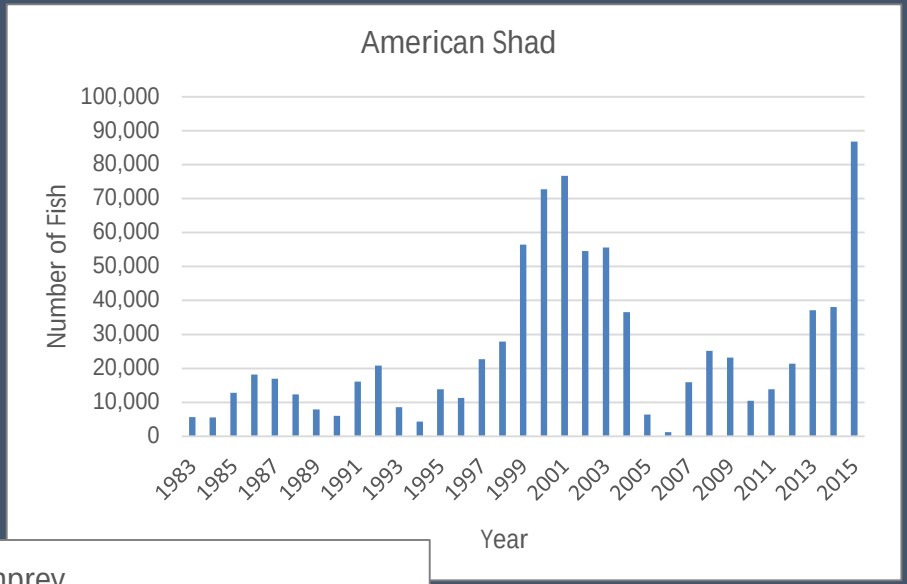


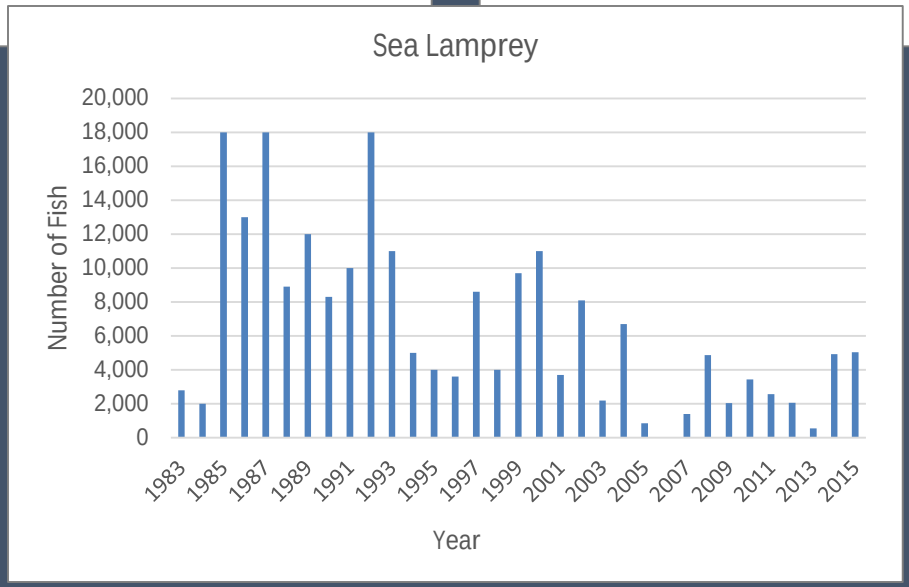
Herring Run

RUN WHERE THE HERRING RUN

TARGET SPECIES – Population Trends





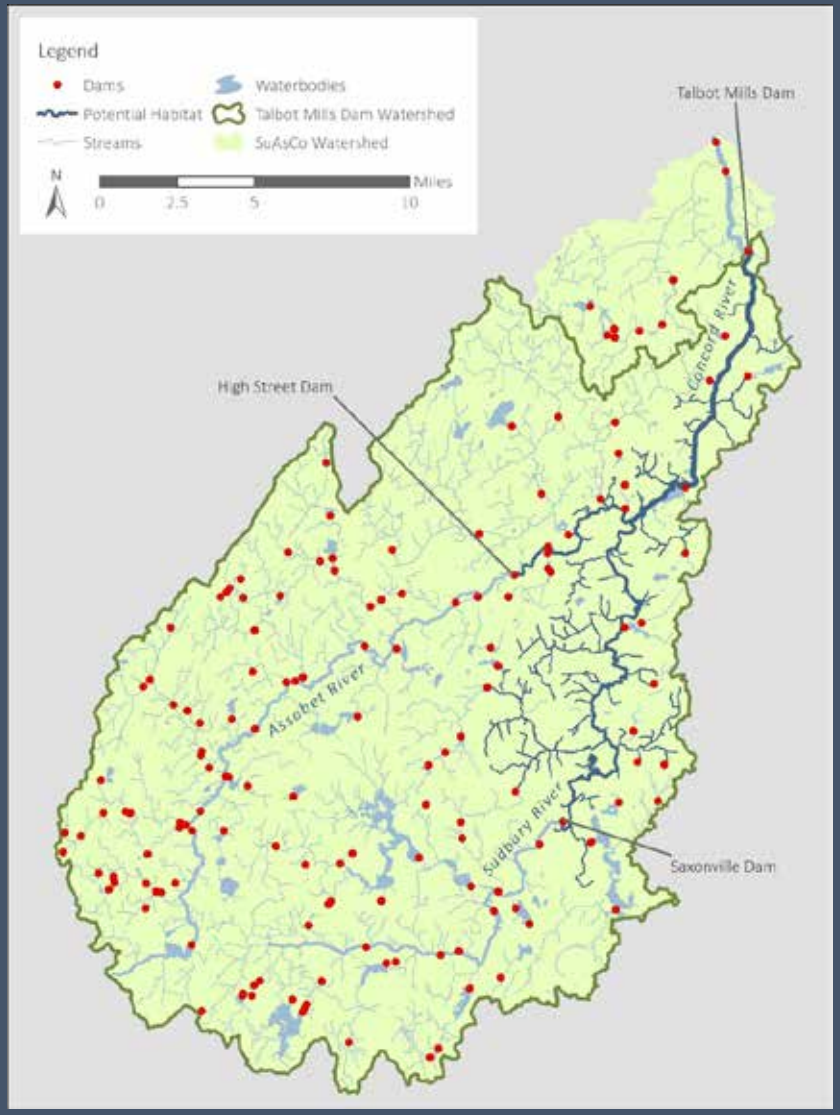


Fish returns for Merrimack River at Essex Dam in Lawrence, MA

WATERSHED

SuAsCo Watershed

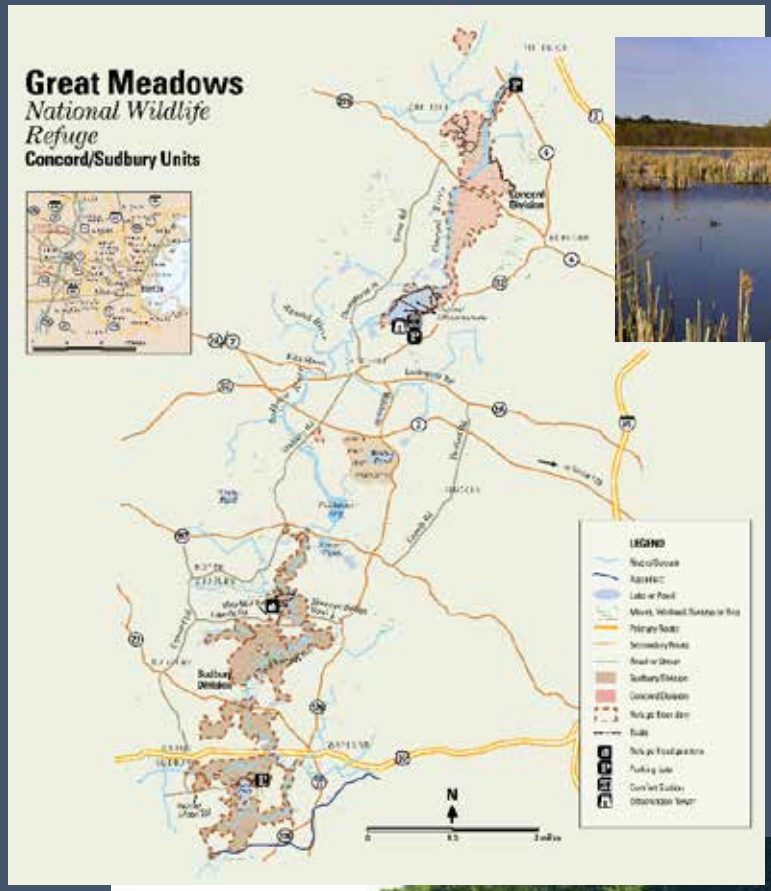
WATERSHED – Potential Habitat

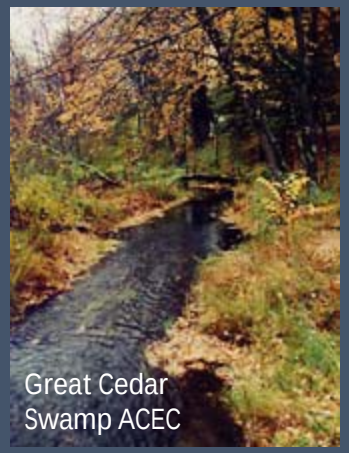


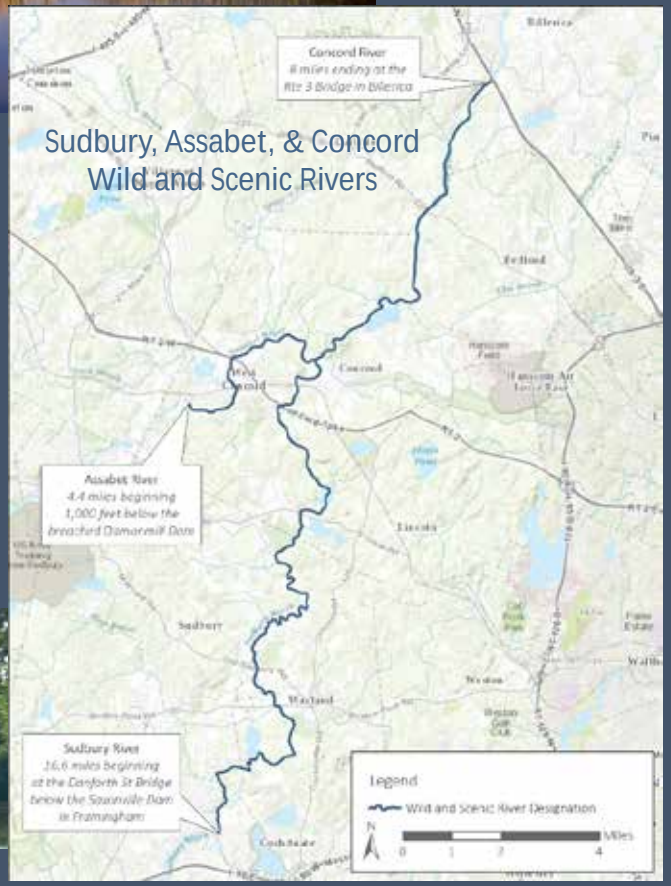
- Fish passage at Talbot Mills Dam would open access to:
  - **35 miles** (740 acres) of mainstem rivers
  - **100 miles** of tributaries
  - **260 acres** of lakes and ponds

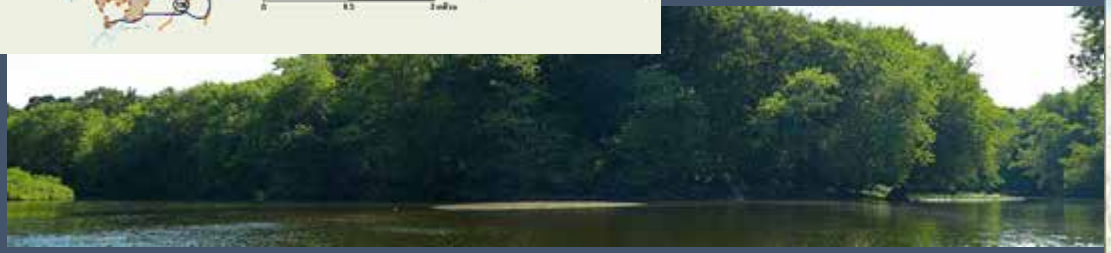
(Not including areas that could be accessed with fish passage at upstream dams)

WATERSHED – State & Federal Recognition

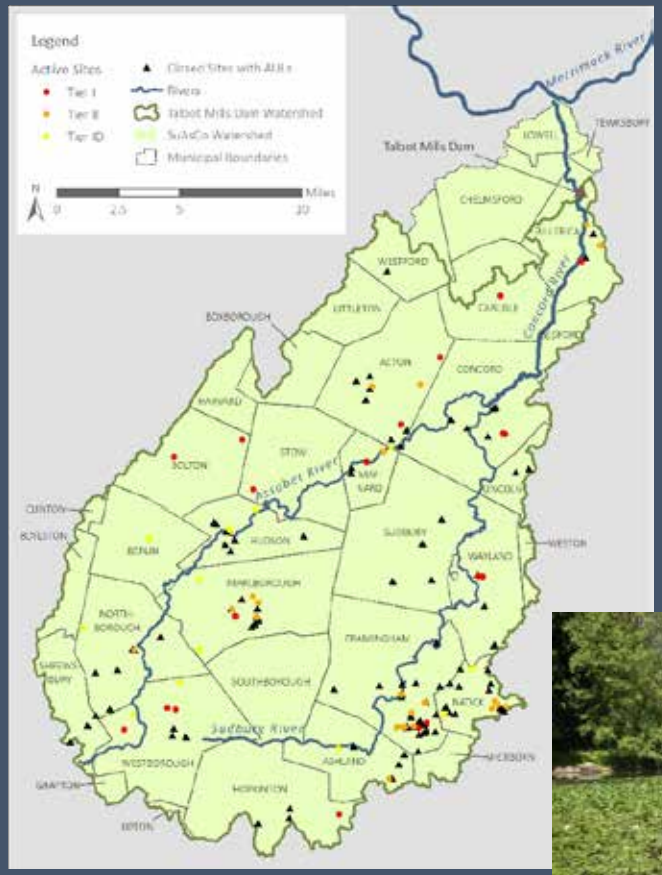


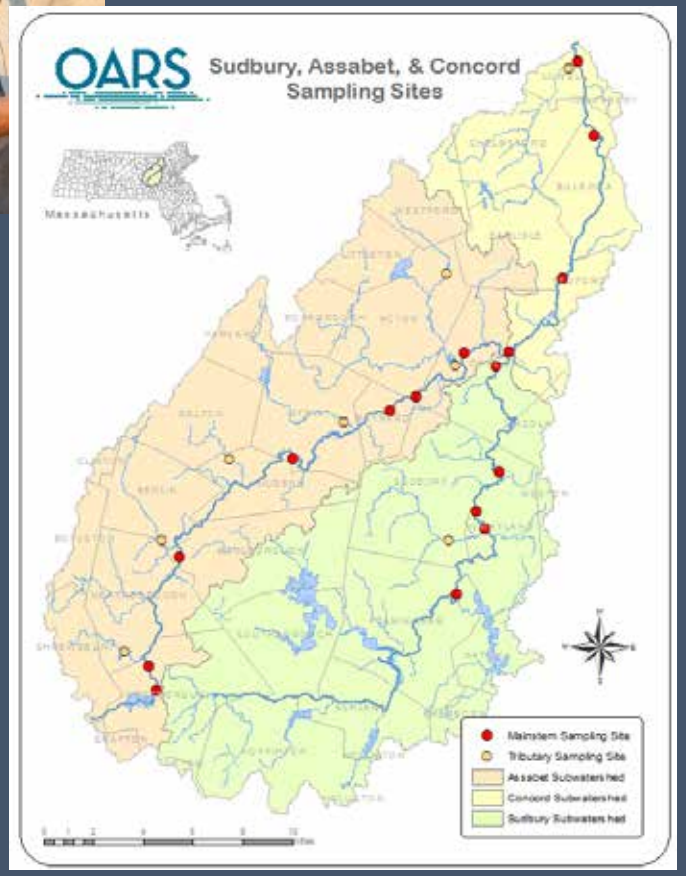






WATERSHED – Water Quality

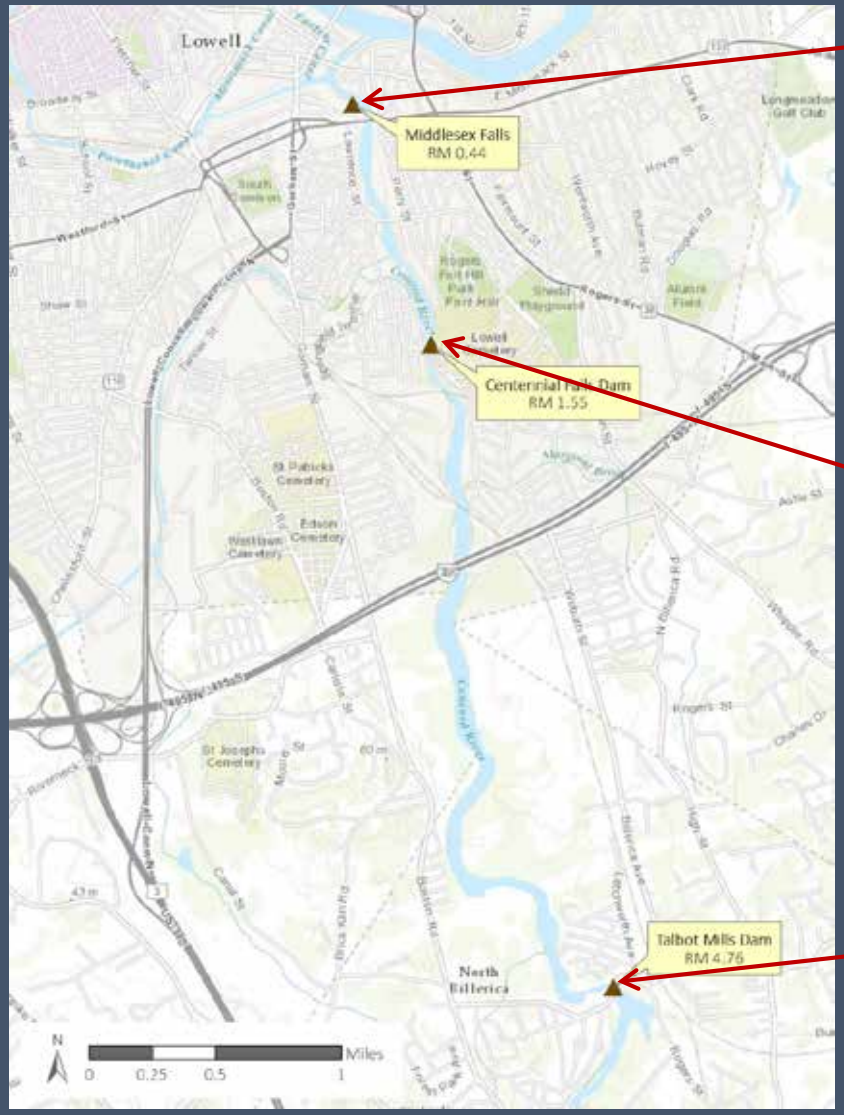




WATERSHED – Flooding

March 2010 Flood in Billerica

FISH PASSAGE OBSTACLES



OBSTACLES – Middlesex Falls

OBSTACLES – Middlesex Falls

- Former Middlesex Dam (breached in 1980s)
- 2000 NRCS/USFWS survey
- Possible fish passage impedance at some flows
- Minor channel modifications may improve passage
- Potential use of former raceway channel

OBSTACLES – Centennial Falls Dam

OBSTACLES – Centennial Falls Dam

- 8-foot-high dam with hydropower (22-foot hydraulic head)
- Fish ladder & downstream bypass sluice added in 1990
- History of deficiencies
- More recent active management and coordination
- River herring observed in fish ladder in 2015

OBSTACLES – Talbot Mills Dam

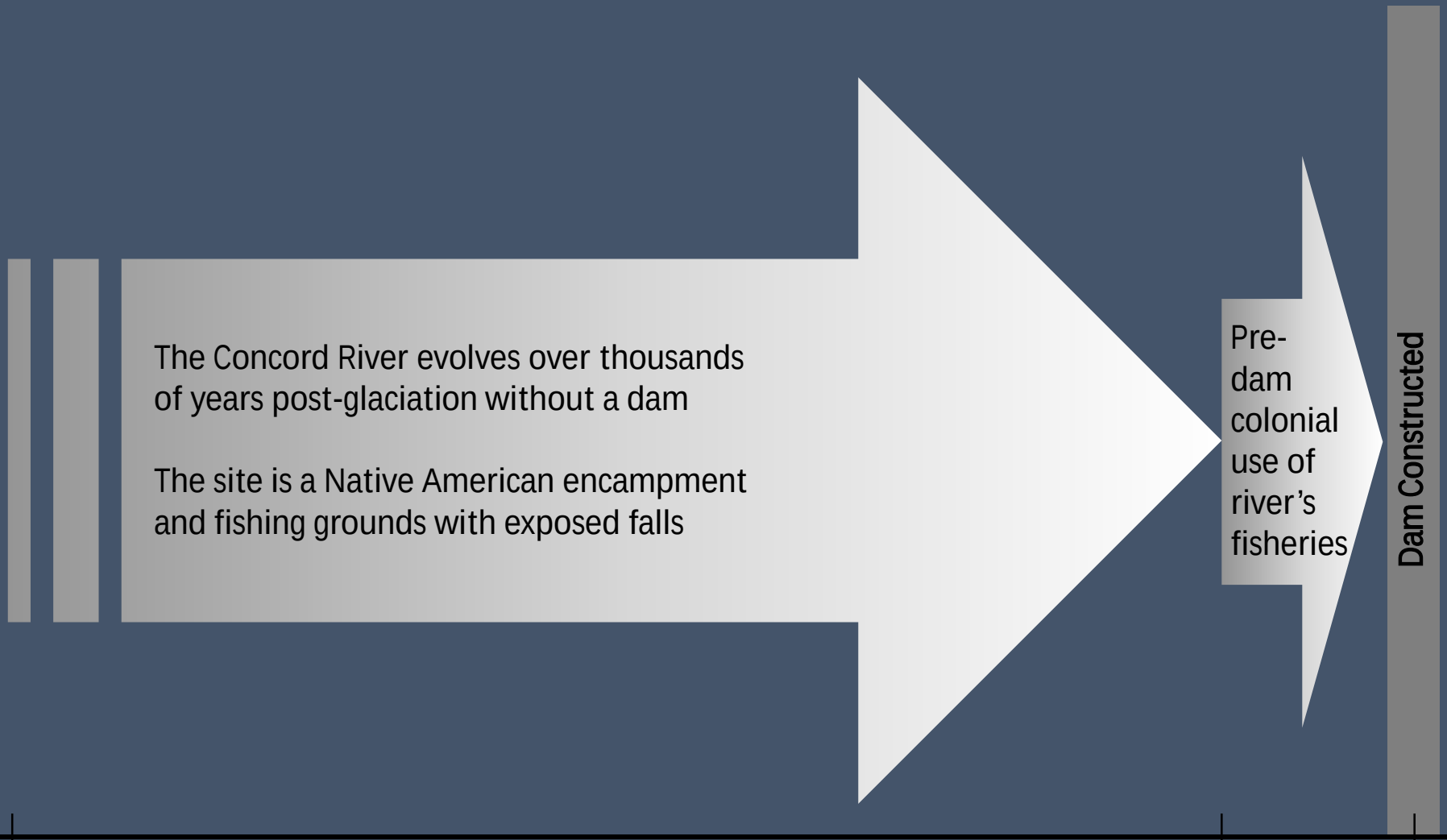
OBSTACLES – Talbot Mills Dam

- 10-foot-high former mill dam
  - Primary spillway (127 ft)
  - Abutments
  - Non-overflow section
  - Former intake structure
  - Sluiceway
- Privately owned (CRT Development Realty, LLC)
- No current fish passage facilities

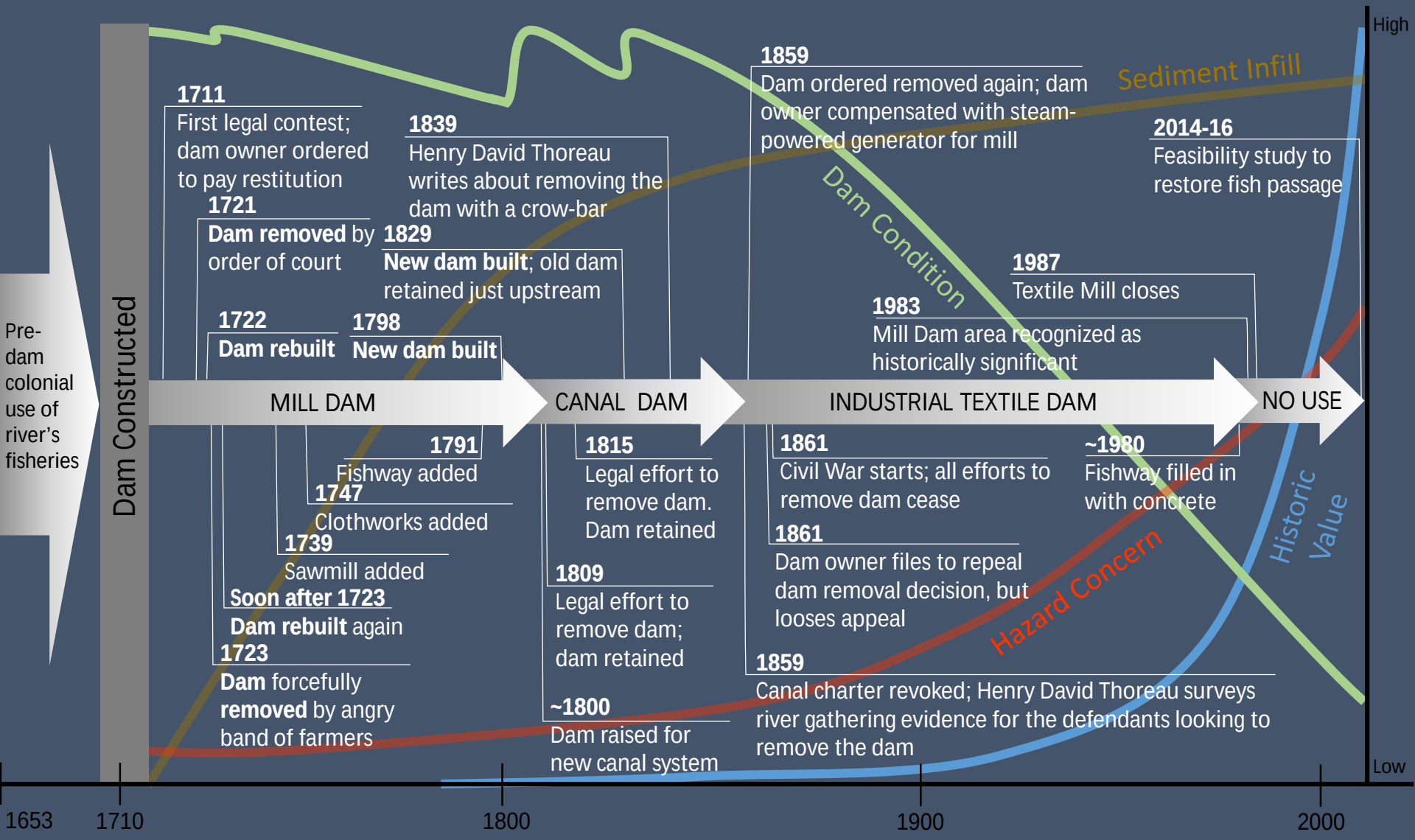
TALBOT MILLS DAM – Dam Safety

- 2015 inspection
  - Intermediate size, significant hazard, fair condition
  - Deficiencies:
    - Lack of operation & maintenance plan, routine oversight
    - Lack of working controls, low level outlet, emergency bypass
    - Seepage in the abutments
    - Trees below spillway and on embankment
  - Estimated repair cost: $105,000+
- Feasibility study findings
  - Does not meet regulations to pass spillway design flood
  - NOT a flood control dam

TALBOT MILLS DAM – History

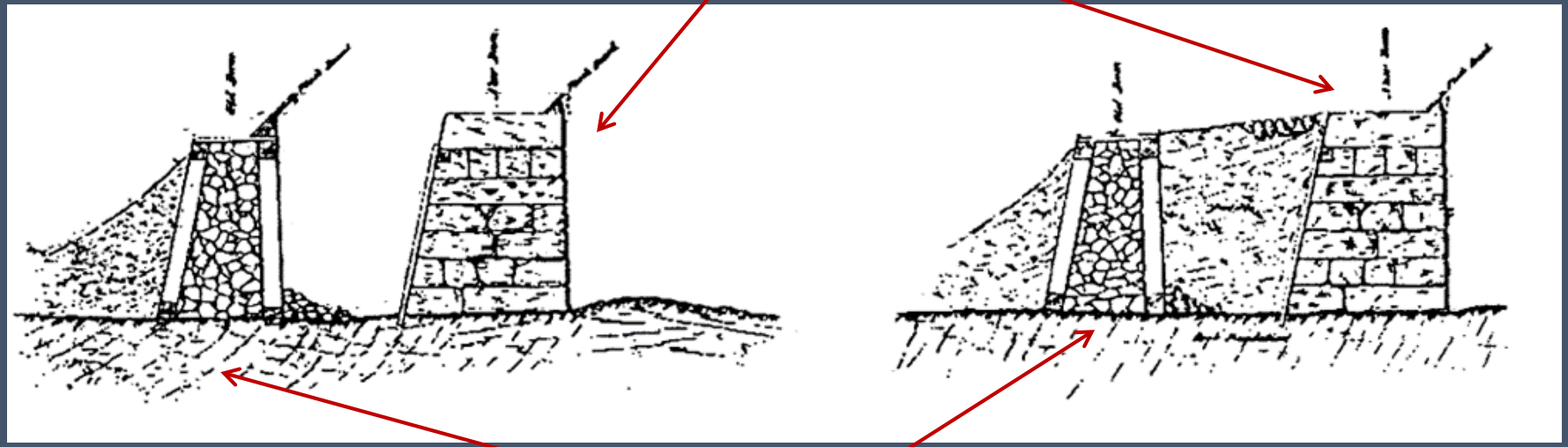


TALBOT MILLS DAM – History



TALBOT MILLS DAM – History

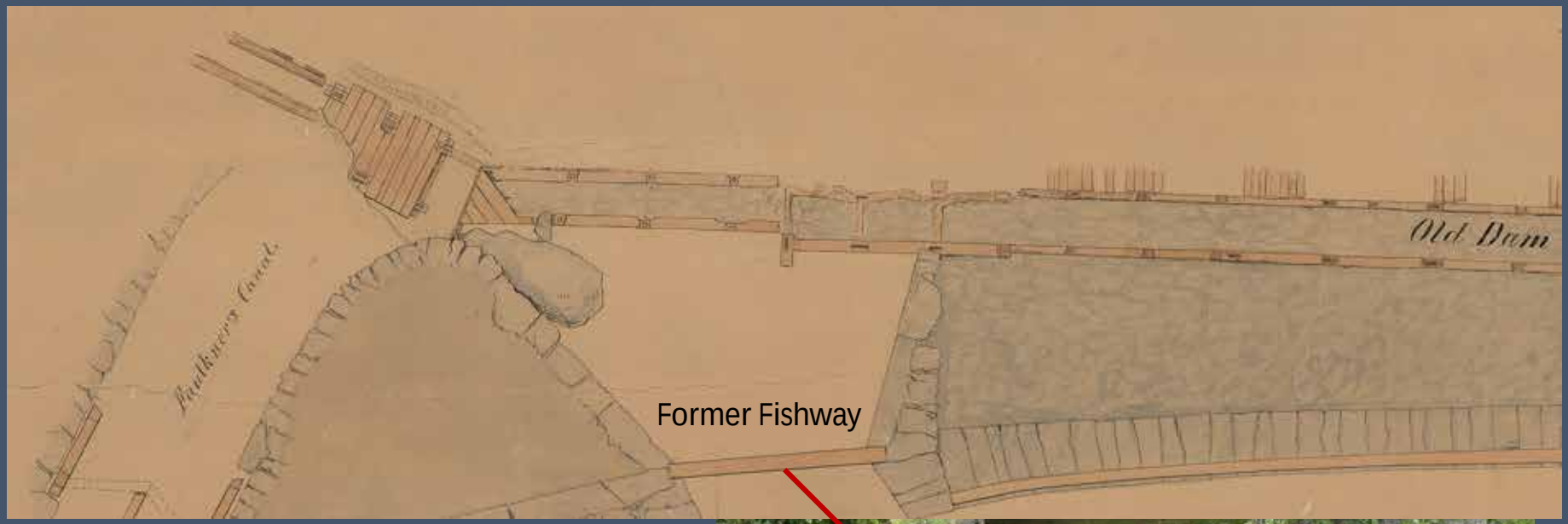
Current (1828) dam



Ingraham, 2009

1798 “legacy dam”
submerged upstream

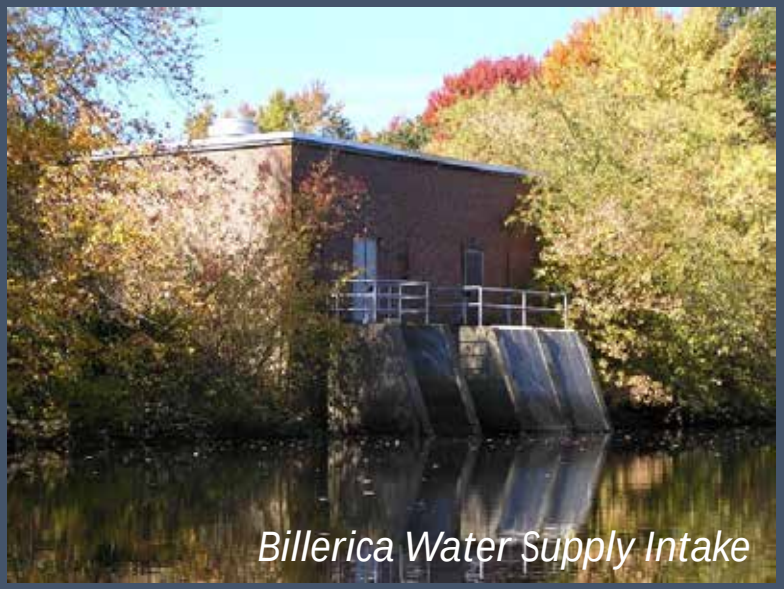
TALBOT MILLS DAM – History

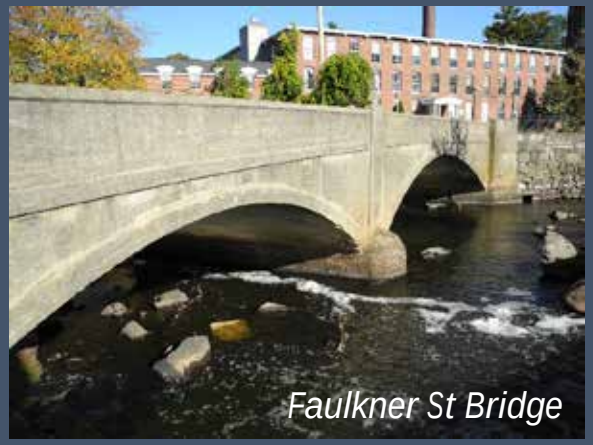


"...so long as there shall be kept and upheld, a dam across Concord River, in the Town of Billerica...there shall be kept open at the usual place in said dam, ***a sluice or passage way for fish*** *to pass up and down the river through said dam, from the first day of April to the twentieth day of May in each year..." (1820 Chap. 0070)*

OTHER INFRASTRUCTURE


Middlesex Canal


Billerica Water Supply Intake


Faulkner St Bridge


Pollard St Bridge

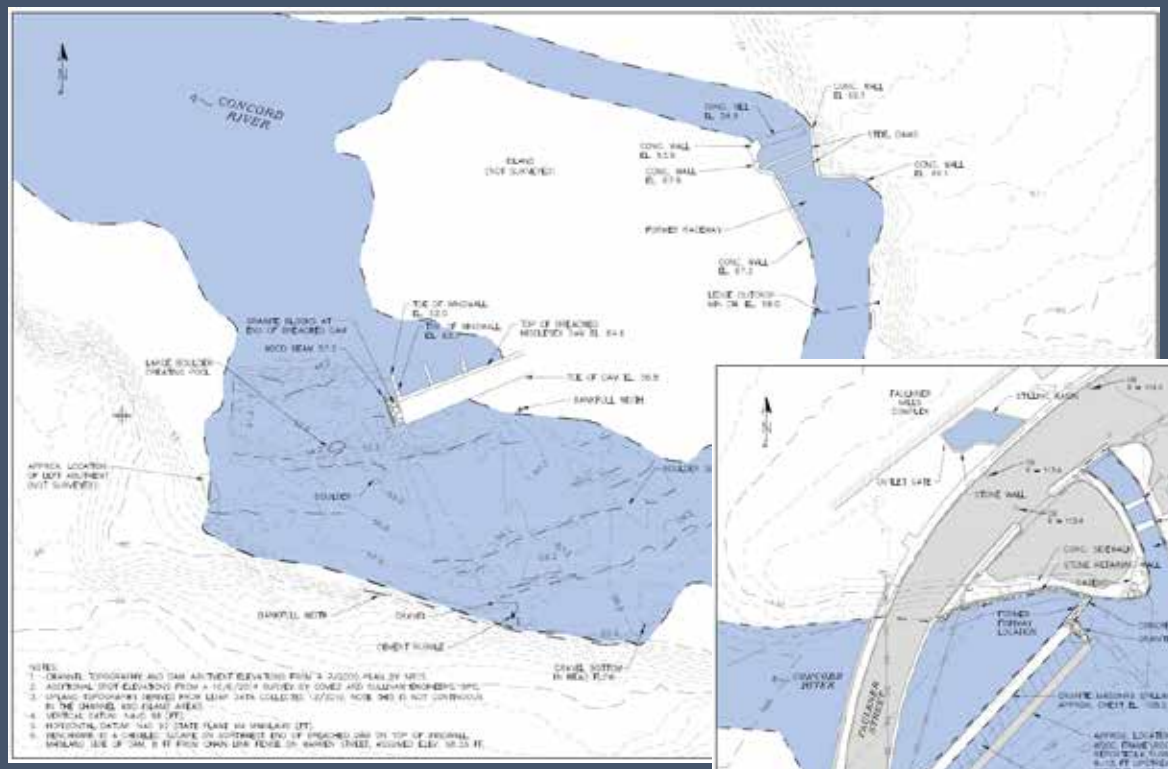

Boston Rd/Rte 3A Bridge

TECHNICAL ASSESSMENT

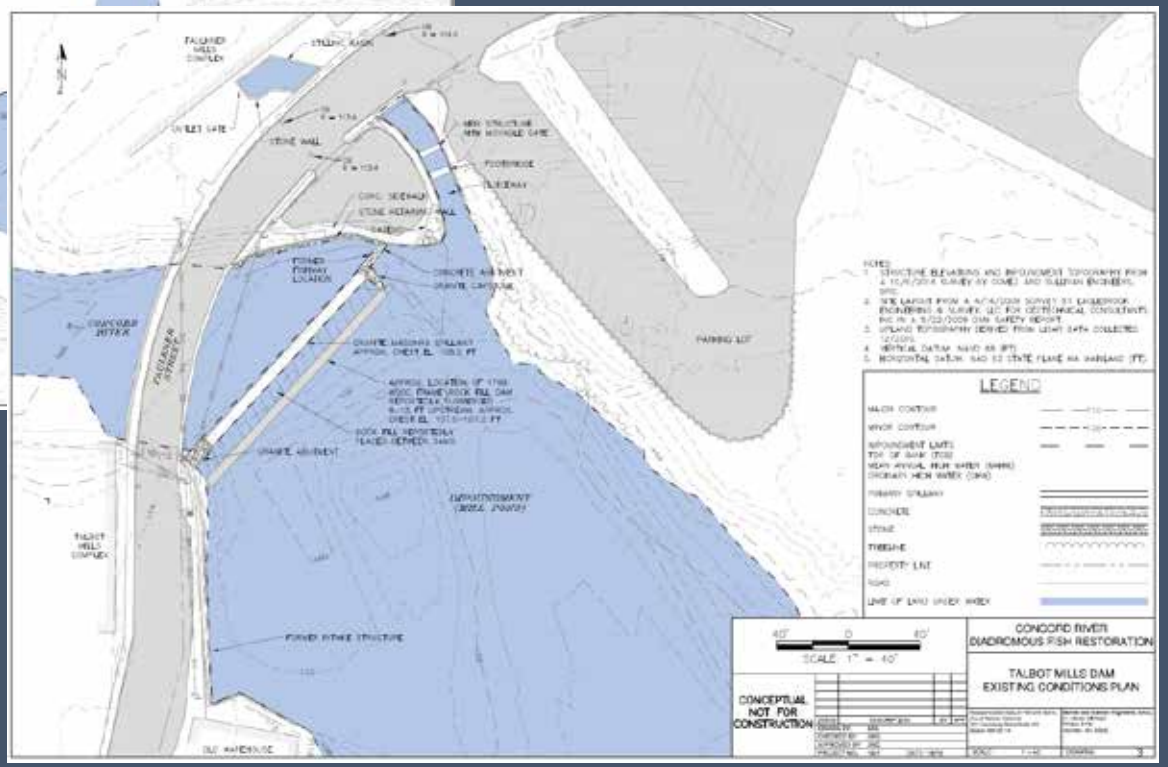
PROJECT SCOPE

- TOPOGRAPHIC SURVEY
- SEDIMENT ANALYSIS
- HYDROLOGIC ANALYSIS
- HYDRAULIC ANALYSIS
- CULTURAL RESOURCES ANALYSIS

FIELD DATA – Topographic Survey

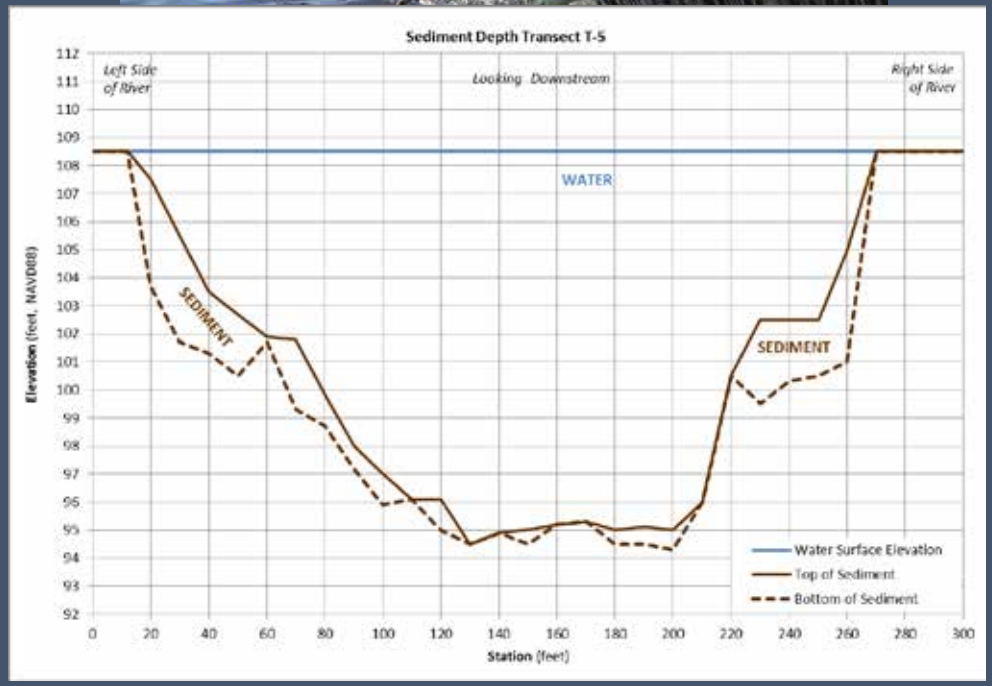


Middlesex Falls

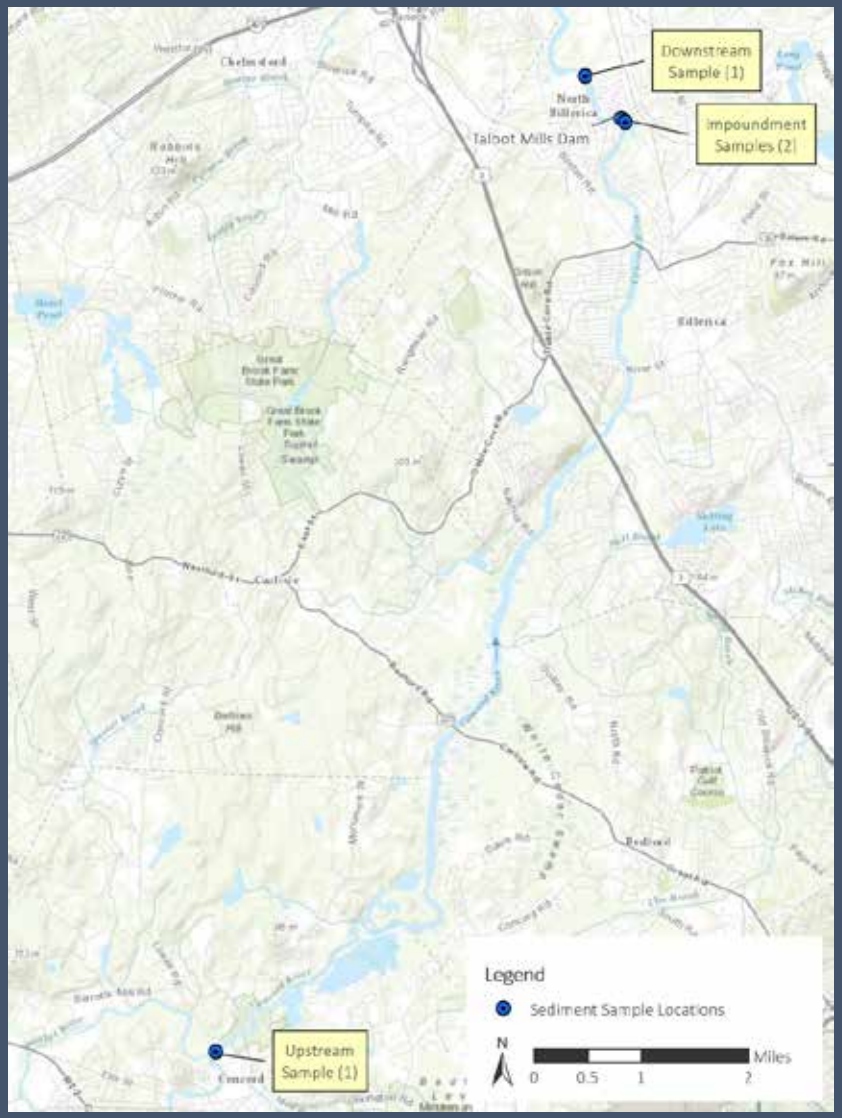


Talbot Mills Dam

FIELD DATA – Sediment Quantity

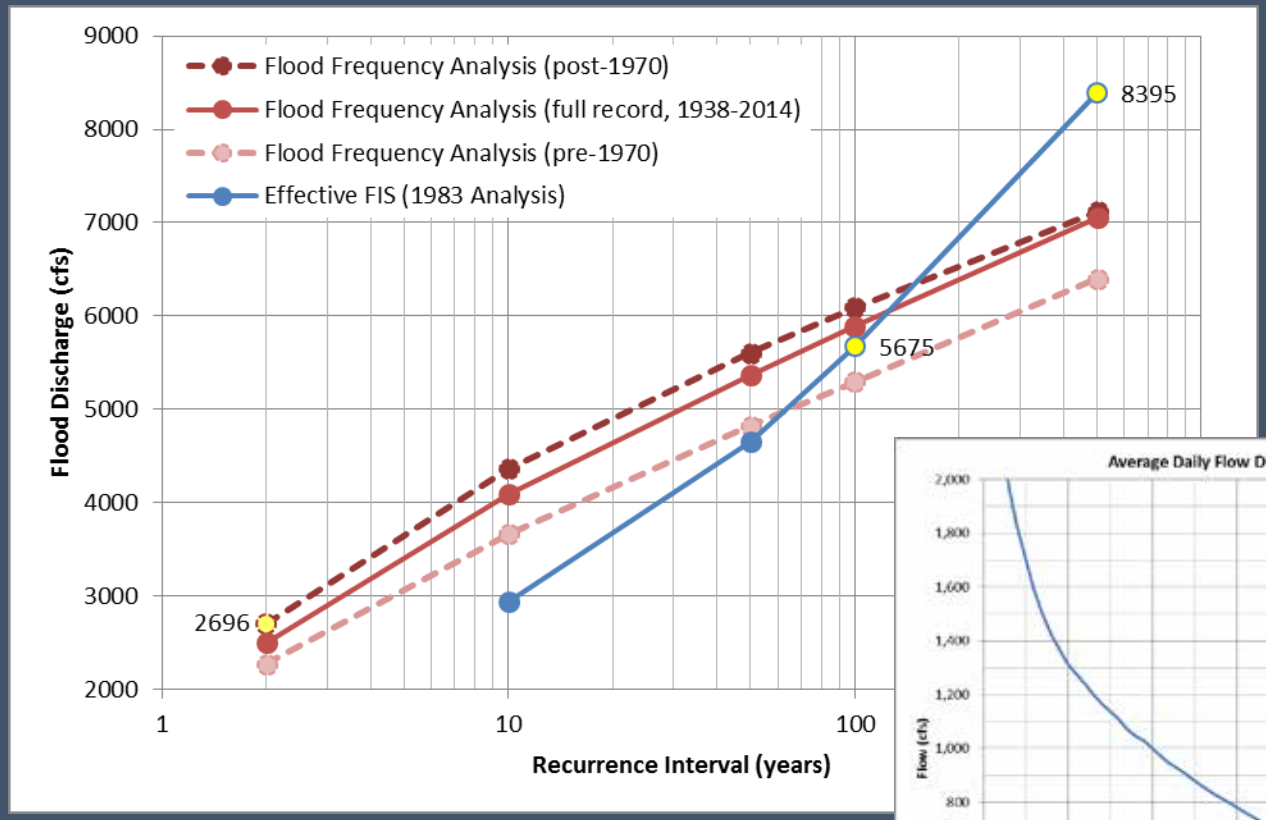


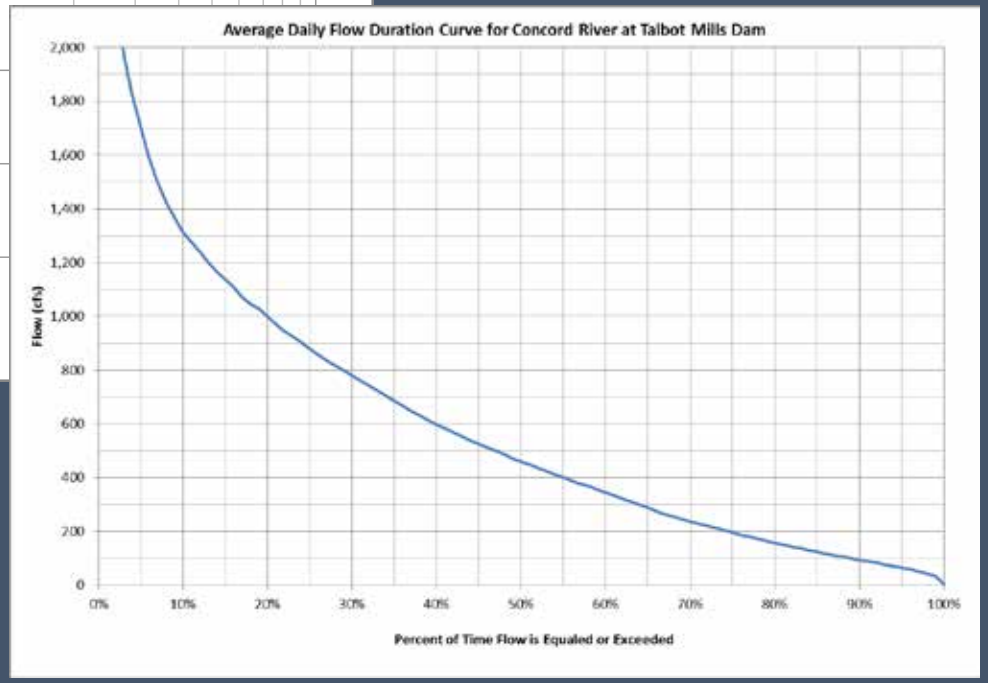
FIELD DATA – Sediment Quality



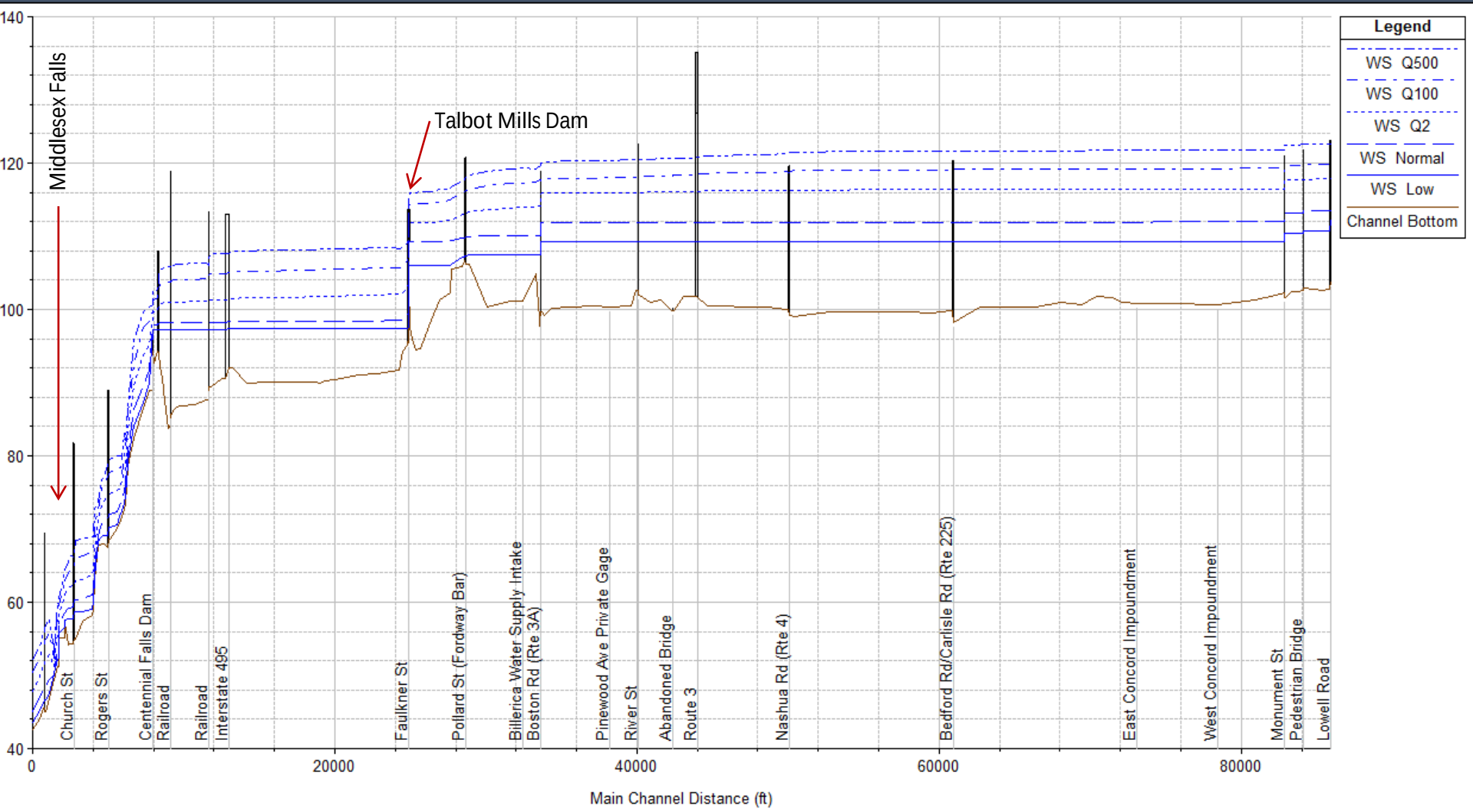
- Sediment quantity:
  - ~18,200 CY total sediment
  - ~9,500 CY mobile sediment
- Sediment quality:
  - Overall low pollutant concentrations

ANALYSIS – Hydrology





ANALYSIS – Hydraulics



CULTURAL RESOURCES

SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT (NHPA):

"….take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register".

106 PROCESS (CONSULTATIVE):

1. Determine where the project may result in effects to historic properties (the APE)
2. Identify historic properties
3. Assess the potential impacts of the project to those properties
4. Seek ways to avoid, minimize, or mitigate adverse effects (MOA)

HISTORIC / ARCHAEOLOGICAL RESOURCES RECONNAISSANCE SURVEY (2015)

- Identified properties and sensitive archaeological areas
- Assessed potential effects for the project alternatives

CULTURAL RESOURCES – Architectural / Industrial

Talbot Mills Dam (aka Middlesex Canal Dam and Locks—MHC No. BIL.900/BIL-HA-09) within 2 historic districts listed in the National Register:

- Middlesex Canal Historic and Archaeological District (MHC Nos. BIL.T, BIL.K, BIL.P)
- A potential contributing resource to the Billerica Mills Historic District (MHC Nos. BIL.O, BIL.E)

Project APE contains multiple resources relating to the 2 districts

CULTURAL RESOURCES – Archaeological

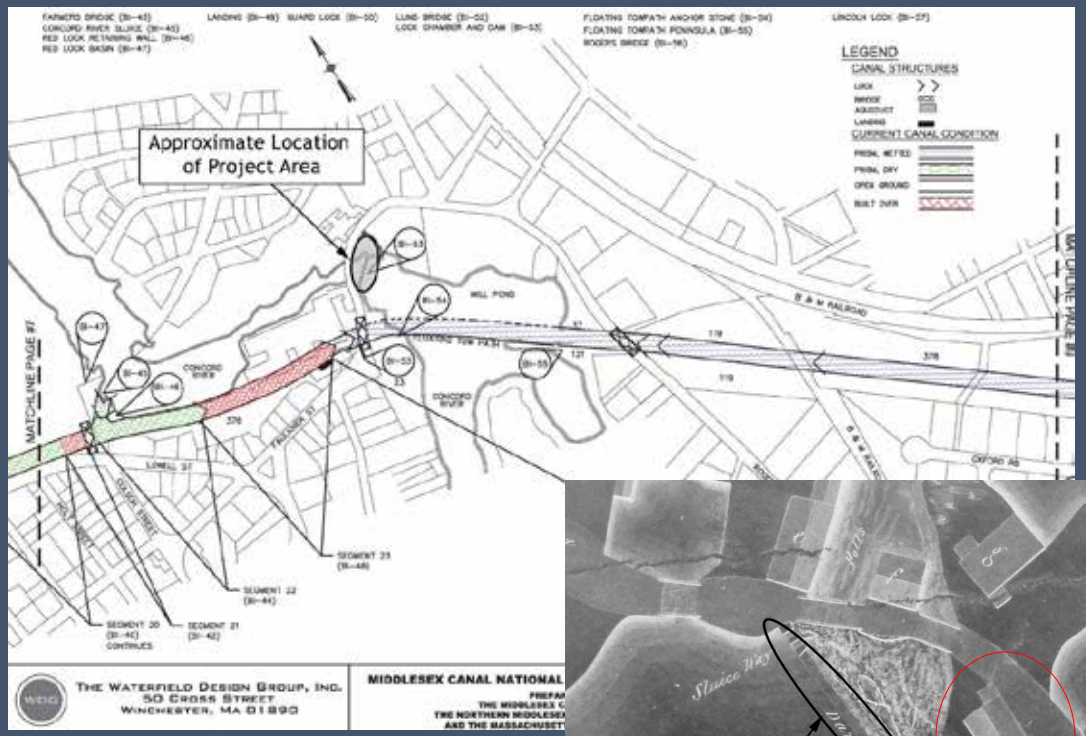
Four recorded pre-contact Native American "village" sites upstream and downstream of the Talbot Mills Dam

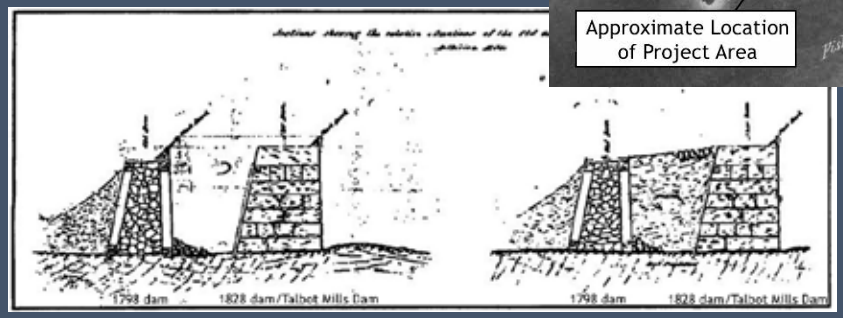
Four contributing archaeological resources to the Middlesex Canal Historic and Archaeological District:

- Middlesex Canal Lock and Dam Site;
- Middlesex Canal Prism;
- Floating Towpath Peninsula;
- Anchor Stone

Potential for 1798 wood dam remains (underwater) a few feet upstream of the current dam site

Potential for belowground mid-19th c. dye/store house used by the Faulkner Manufacturing Company



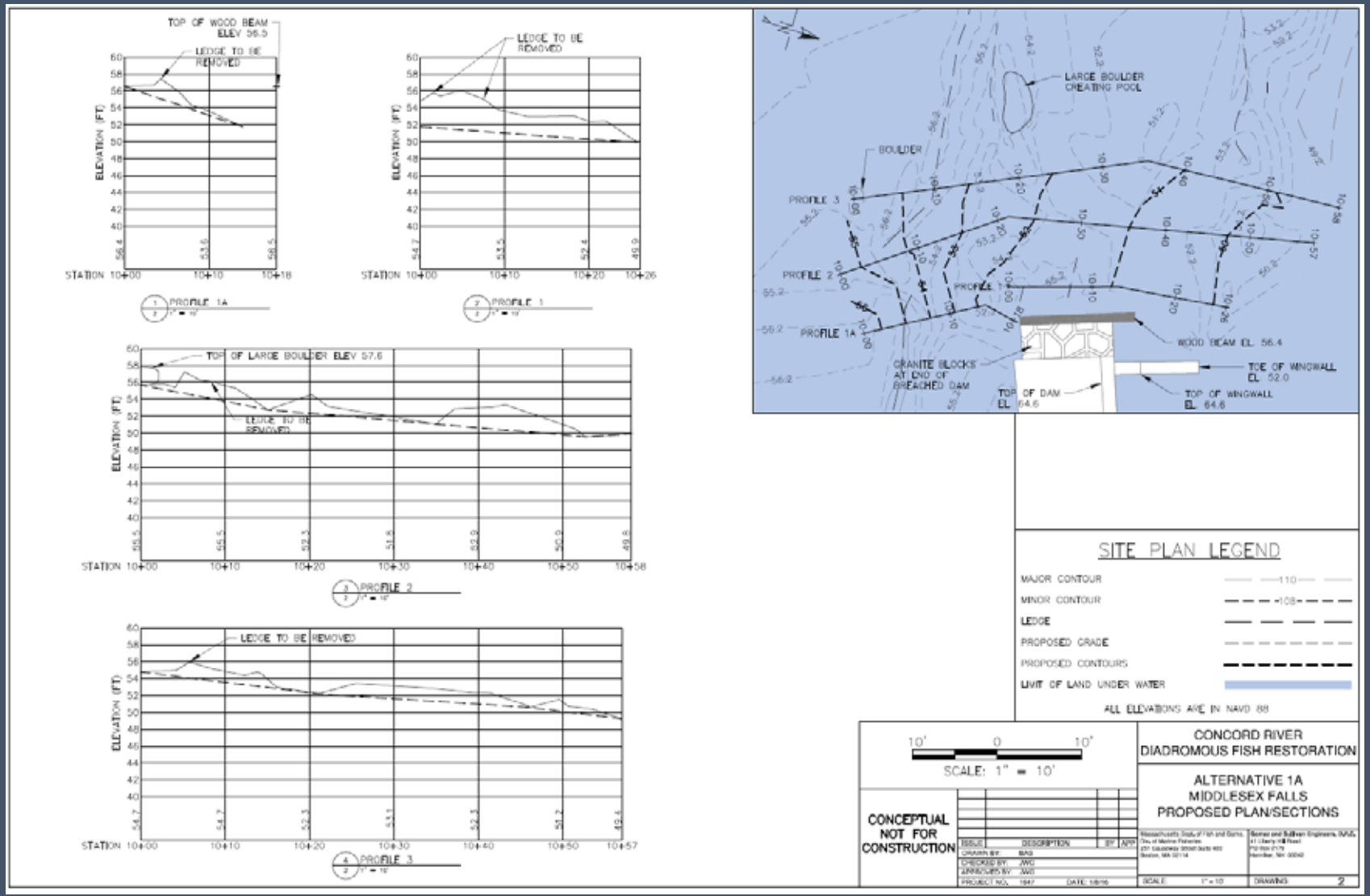


RESTORATION ALTERNATIVES

MIDDLESEX FALLS

- No Action
- Channel Improvements (1A)
- Other concepts considered:
  - Former raceway channel
  - Fishway
  - Abutment removal

MIDDLESEX FALLS



CENTENNIAL FALLS DAM

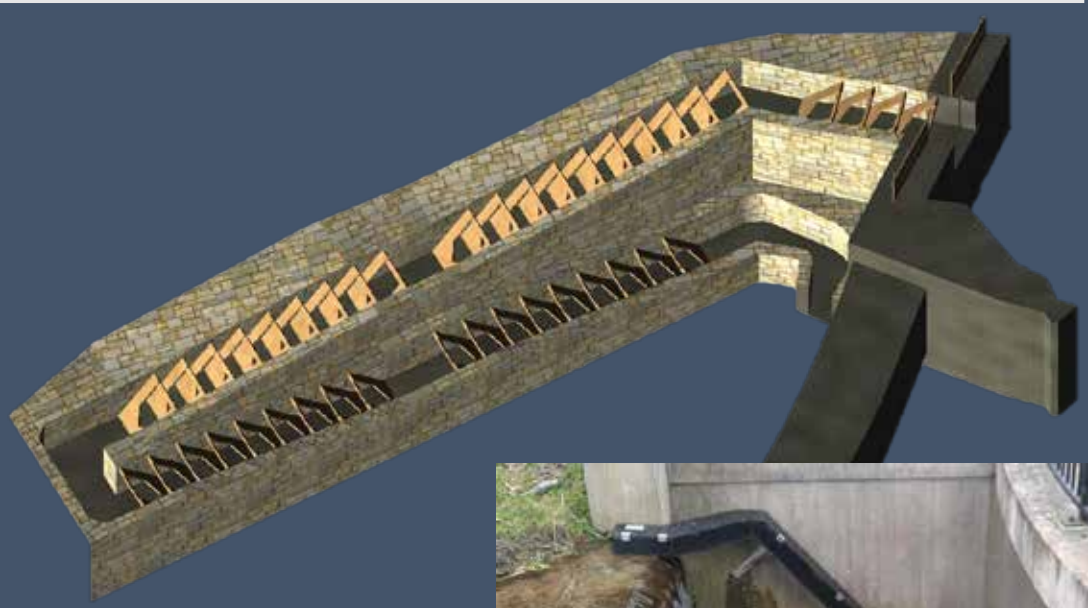
- No Action
- Fishway Improvements (2A)
  - Fish ladder entrance
  - Tailwater staff gage
  - Trash rack
- Volunteer Coordination (2B)
  - Part-time coordinator
  - Training & observation (video monitoring system)
  - Education & outreach

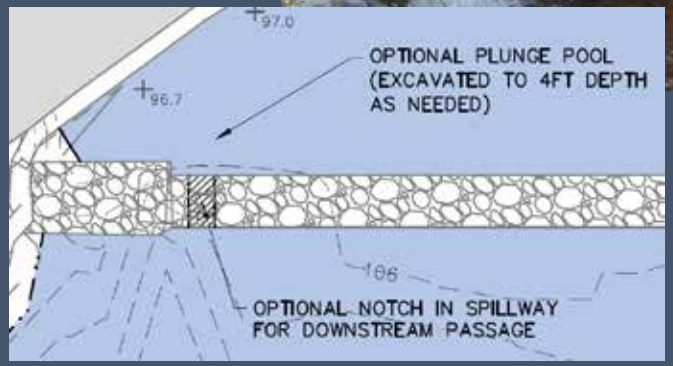
TALBOT MILLS DAM

- No Action
- Technical Fishway (3A)
- Partial Dam Removal (3B)
- Other concepts considered:
  - Nature-like fishway
    - Rock ramp
    - Bypass channel
  - Sluiceway bypass channel

TALBOT MILLS DAM – Technical Fishway

- Denil fish ladder
- Eel ramp
- Downstream passage notch & plunge pool
- Water controls (stoplogs, flashboards)

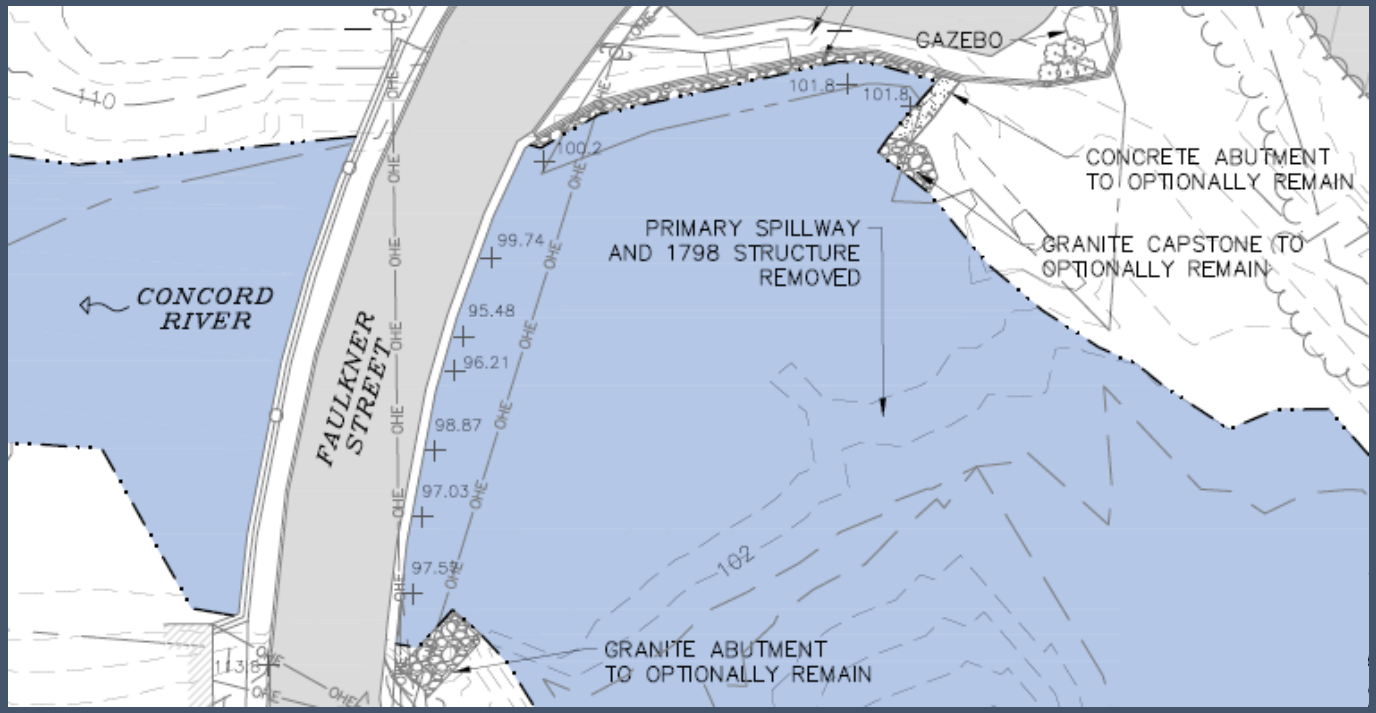




TALBOT MILLS DAM – Technical Fishway

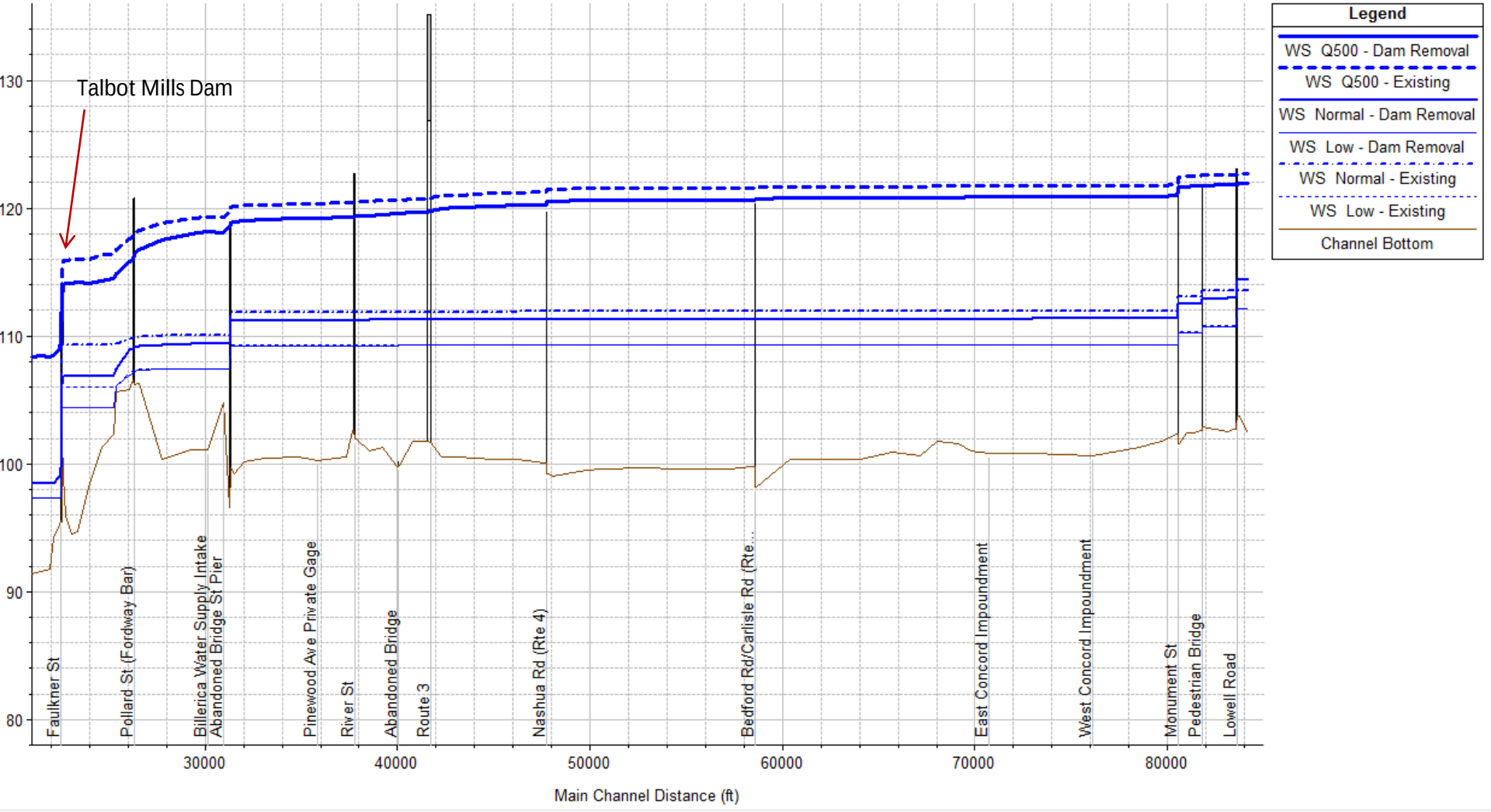
TALBOT MILLS DAM – Dam Removal

- Removal of primary spillway & legacy dam
- One or both abutments could optionally remain
- Preliminary recommendation for instream sediment mgmt.



TALBOT MILLS DAM – Dam Removal

TALBOT MILLS DAM – Dam Removal



FACTORS TO CONSIDER

- Dam safety/liability
- Public water supply
- Cultural resources *(historic structures, Native American artifacts, etc.)*
- Fisheries *(passage, assemblage, etc.)*
- Water quality *(sediment, temperature, etc.)*
- Water quantity *(upstream water levels, flooding, etc.)*
- Wetlands
- Abutter interests
- Public access/recreation
- Aesthetic resources
- Economic impact *(businesses, tourism, property taxes, etc.)*
- Cost *(additional studies, engineering, permitting, construction)*
- Ongoing operation and maintenance

TALBOT MILLS DAM – Decision Matrix

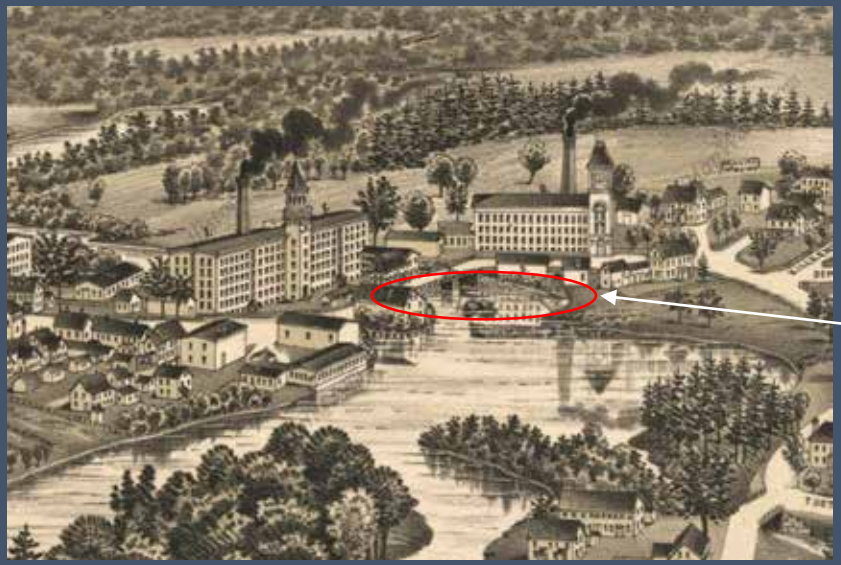
	ALTERNATIVE		
	No Action	Technical Fishway	Dam Removal
POTENTIAL BENEFITS			
Upstream passage of target fish species	Low	Moderate	High
Downstream passage of target species	Moderate	High	High
Passage of other species (connectivity)	Low	Moderate	High
Improved water quality & aquatic habitat	None	None	High
Reduction of invasive species	None	None	High
Restoration of natural wetland habitat	None	None	High
Restoration of ecological functions (e.g., sediment transport)	None	None	High
Reduced upstream flooding	None	None	High
Improved recreation	None	Subjective	Subjective
Improved aesthetics	None	Subjective	Subjective
Decommissioning of aging infrastructure	None	None	High
Environmental justice for Nyanza	None	Low	High
POTENTIAL IMPACTS			
Blockage of fish passage	High	Low	None
Impairment of water quality	High	High	None
Fragmentation of aquatic habitat	High	High	None
Rare/threatened/endangered species	None	Low	Low
Loss of upstream wetlands	None	None	Moderate
Impoundment of sediment	High	High	None
Sediment management impacts	None	Low	Moderate
Artificial upstream flooding	High	High	None
Reduction of spillway capacity	None	Low	N/A
Water supply impacts	None	None	None
Infrastructure impacts (e.g., bridges)	None	None	Low
Cultural resources impacts	None	Moderate	High
Recreation impacts	None	None	Subjective
Aesthetic impacts	None	Subjective	Subjective
OTHER FACTORS			
Permitting effort	Moderate	High	High
Operation & maintenance	High	High	None
Estimated cost (engineering, permitting, construction)	$105k+	$590k	$470k

CULTURAL RESOURCES – Architectural/Industrial

IMPACTS/EFFECTS AND RECOMMENDATIONS – Fish Ladder

Design of fish ladder should conform to the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (36 CFR Part 68) to minimize potential adverse effects to the districts

Notch in dam spillway would result in adverse effect—to the dam, also if the impoundment water level is so low that it changes relationship between canal components



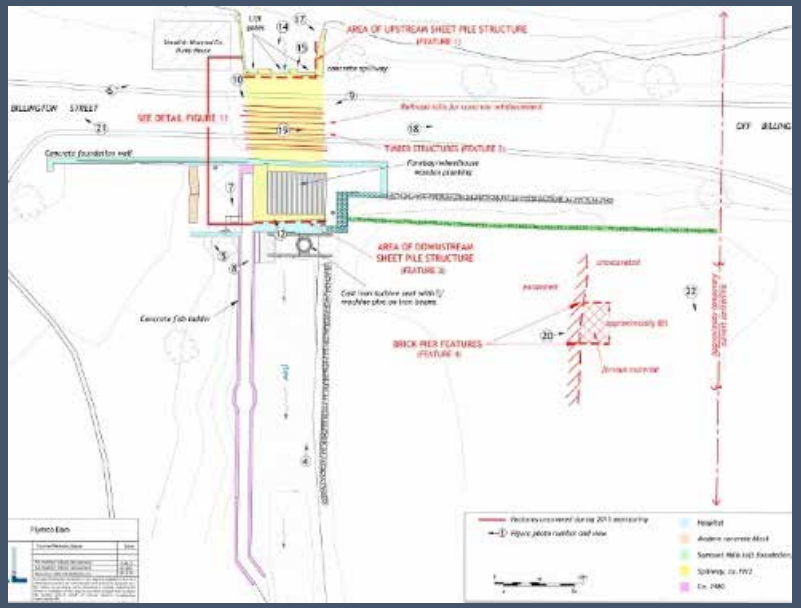
IMPACTS/EFFECTS – Partial Dam Removal

Adverse effect on the Middlesex Canal Historic and Archaeological District and the Billerica Mills Historic District.

CULTURAL RESOURCES – Archaeological

RECOMMENDATIONS – Technical Fishway

Archaeological monitoring and recordation in high sensitivity areas during construction, to identify and record any buried surviving components of the earlier dams and fishways.



RECOMMENDATIONS – Partial Dam Removal

Archaeological monitoring and recordation in high sensitivity dam area (same as above), plus archaeological walkover with close ground surface inspection of high sensitivity pond shoreline and exposed impoundment drawdown areas.

SUMMARY

- Feasibility study is not intended to identify a preferred alternative
- Found that fish passage restoration in the Concord River is technically feasible
- Possible to combine two or more alternatives together, implemented simultaneously or in phases
- Over 35 miles of diadromous fish habitat on the mainstem rivers, plus more than 100 miles of habitat on tributaries could be restored

NEXT STEPS

- Planning
- Feasibility
  - Public comments
  - Final report
  - Preferred alternative?
- Additional feasibility/ consultation
- Design
- Permitting

COMMENTS

- Written comments welcome & encouraged
- Feasibility report:
  - http://tinyurl.com/ConcordRiverFishStudy
  - Hard copies available at Billerica Public Library
- Send comments by April 6, 2016 to:

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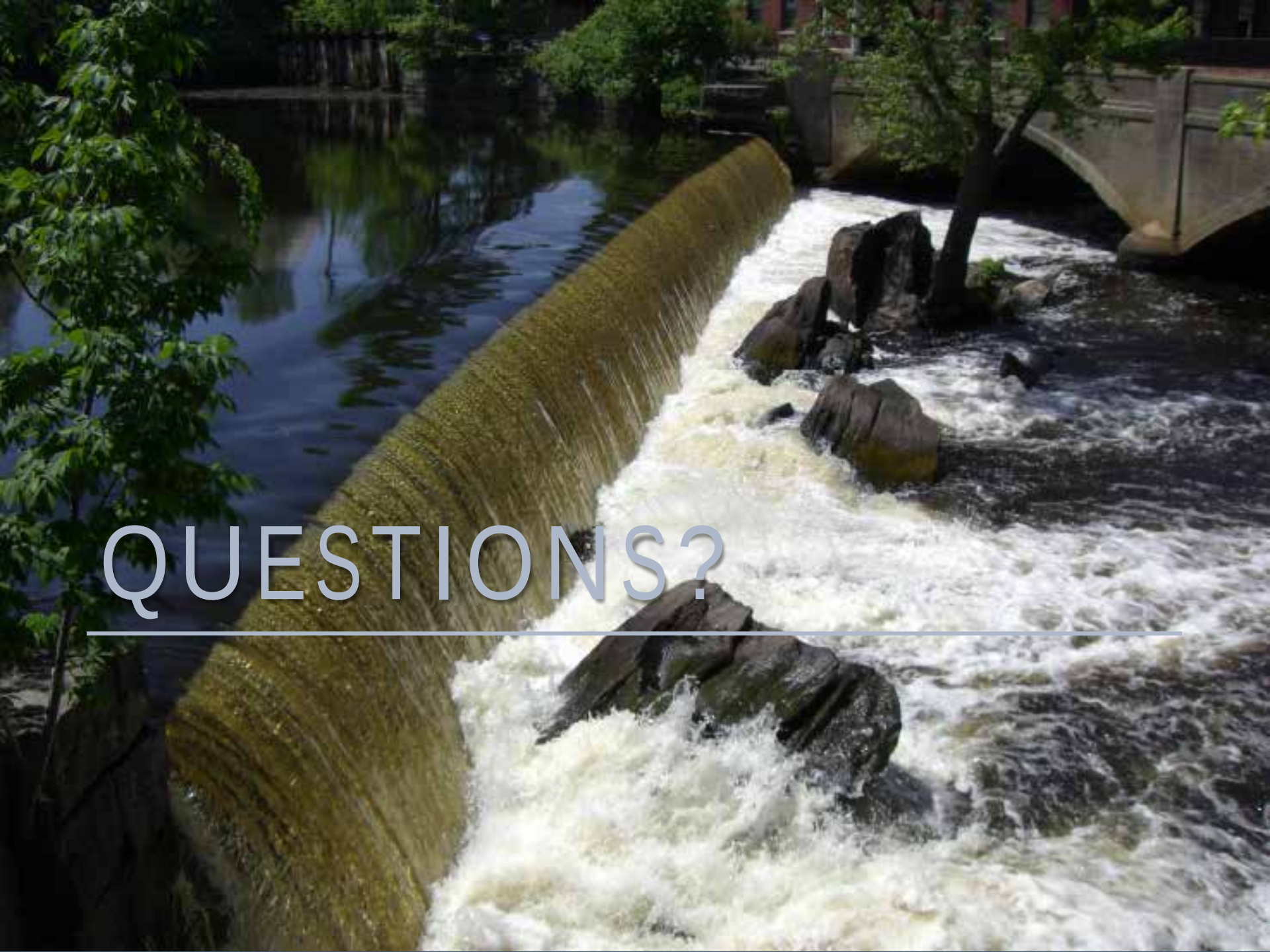
QUESTIONS?

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http://www.mass.gov/eea/agencies/massdep/cleanup/nrd/nyanza-chemical-waste-dump-superfund-site-nrd-settlement.html