

Neponset River Restoration and Revitalization



Presented by:
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Riverways and DMF Goals

- Improve Aquatic and Riparian Habitat & WQ
- Restore Anadromous Fish Passage
- Secure PCB Contaminated Sediments
- Maintain or Improve Flood Control
- Improve Public Safety
- Complement Public Access and Recreation Initiatives by Community Partners
- Recognize and Protect Historic and Cultural Resources
- Develop Aesthetic and Cost Effective Solutions



Scope of Work – Preliminary Studies

- Site and Structure Assessment
- Water Elevation Analysis
- Sediment Type & Management
- Fish Passage Options
- Historic & Environmental Overview
- Conceptual Design Planning
- Preliminary Cost Estimates



Generic Fish Passage Alternatives

1. Trap and Haul
2. Fish Elevator/Lift
3. Fish Ladder
4. Bypass Channel
5. Rock Ramp Fishway
6. Full or Partial Dam Removal
7. Combination of Methods



Fish Ladders



Fish Ladder and Trap



SALMON RIVER



Rock Ramps



Ballou Dam Removal



Neponset River Fish Restoration Potential

- Annually, Massachusetts has a billion dollar recreational fishery for striped bass and river herring are an important prey species for striped bass.
- The lower Neponset River sustains one of the few remaining healthy populations of rainbow smelt in the state. This project has an opportunity to improve smelt spawning habitat and ensure this resource is protected for future generations.
- Due to the severe decline of river herring statewide, the Division of Marine Fisheries placed a ban on harvest and possession of river herring.
- Additionally, due to the limited population, there is no commercial harvest of American shad.
- The proposed restoration would restore access to at least 17 miles of spawning and nursery habitat.
- Under M.G.L. (Chapter 130, Section 19) dam owners can be required by DMF to provide fish passage for anadromous fish.



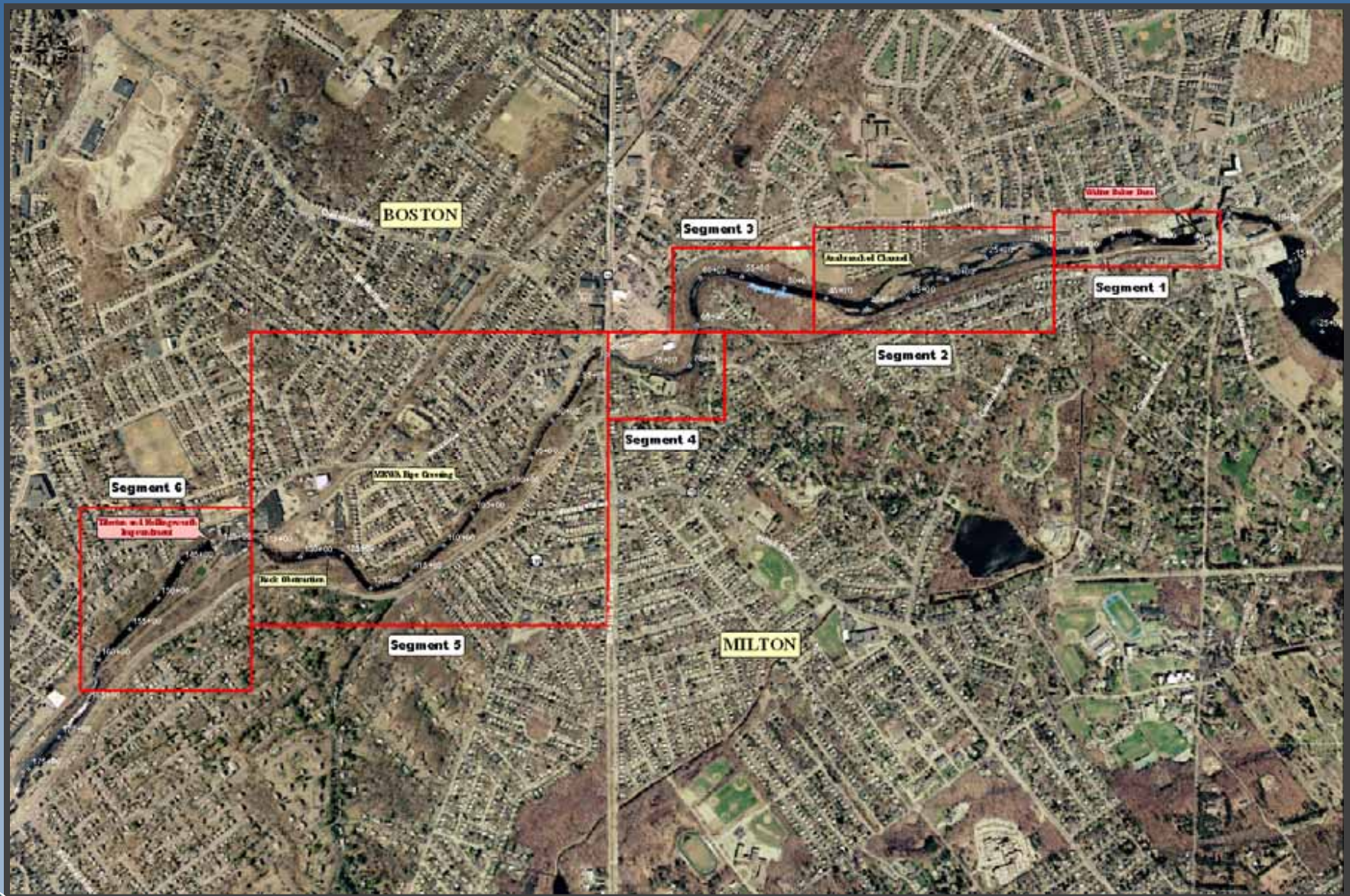
American Shad



Alewife



Neponset River Study Area Corridor



Specific Issues Related to Neponset River Restoration

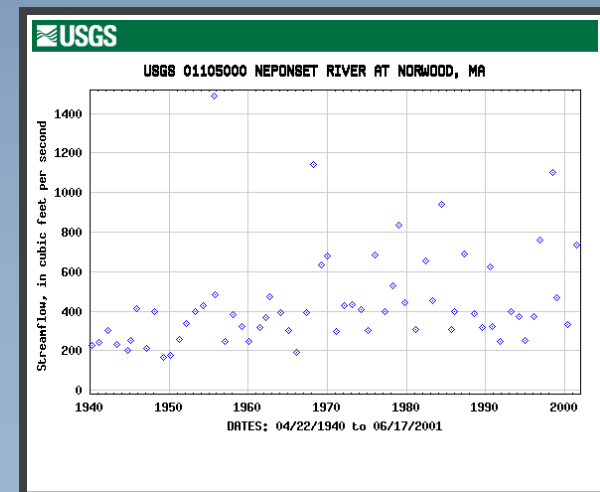
Watershed Scale

- Hydrology
- Sediment
- Water Quality
- Aquatic Life

River Scale

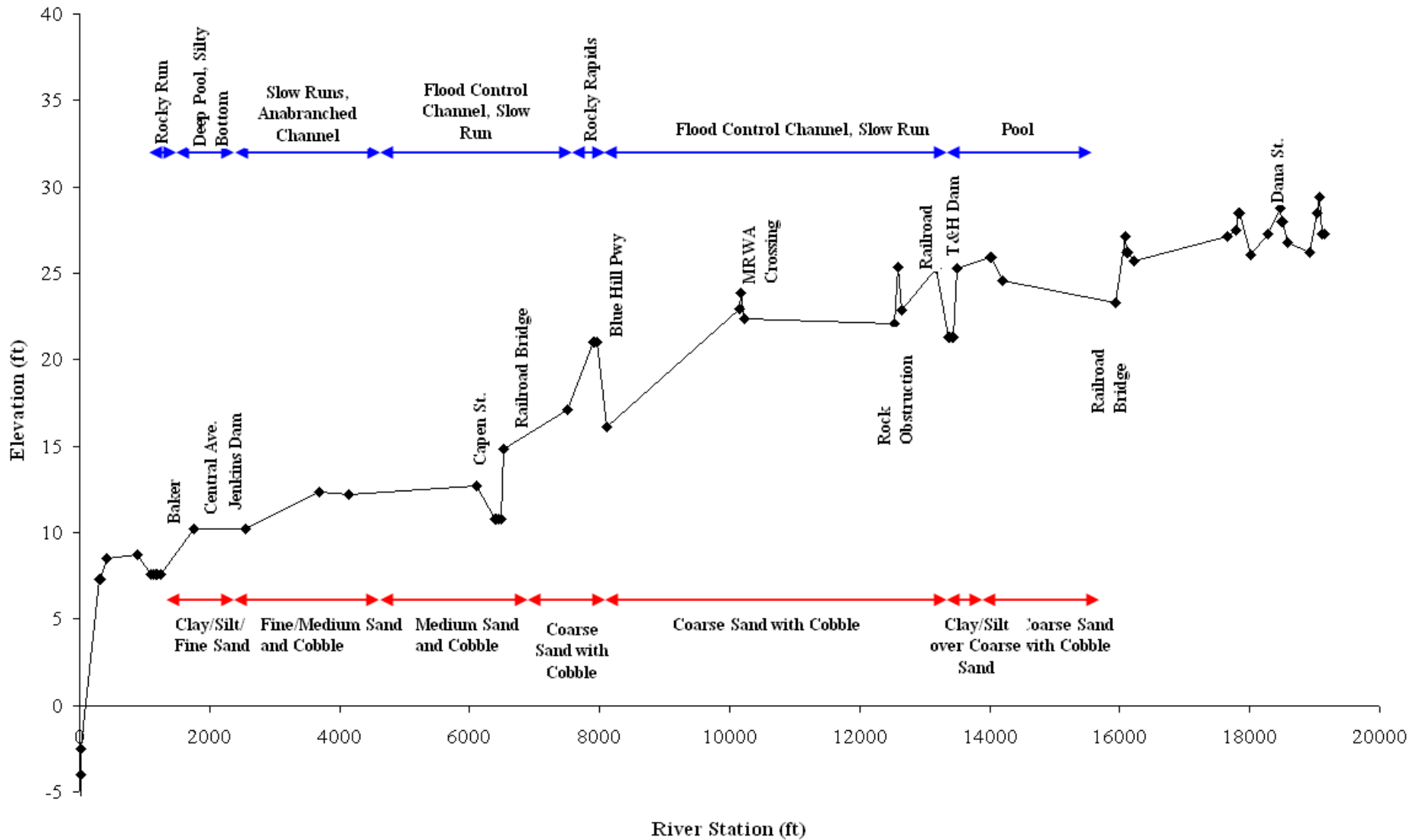
- Width, Depth, Slope, Roughness
- Velocity, Turbulence
- Structures, Barriers

Community Scale
Access, Recreation
Historic Setting
Aesthetics
Public Safety
Costs



Findings: Longitudinal Profile

Figure 2-2: NEPONSET RIVER SUBSTRATE PROFILE



Sanitary Sewer Crossing



Rock Obstruction – Old Dam



Anabranching Channel



Flood Storage



No Flood Storage Potential:
has full impoundment and
constant flow over spillway

Flood Storage Potential:
has storage volume and
no regular flow over
spillway

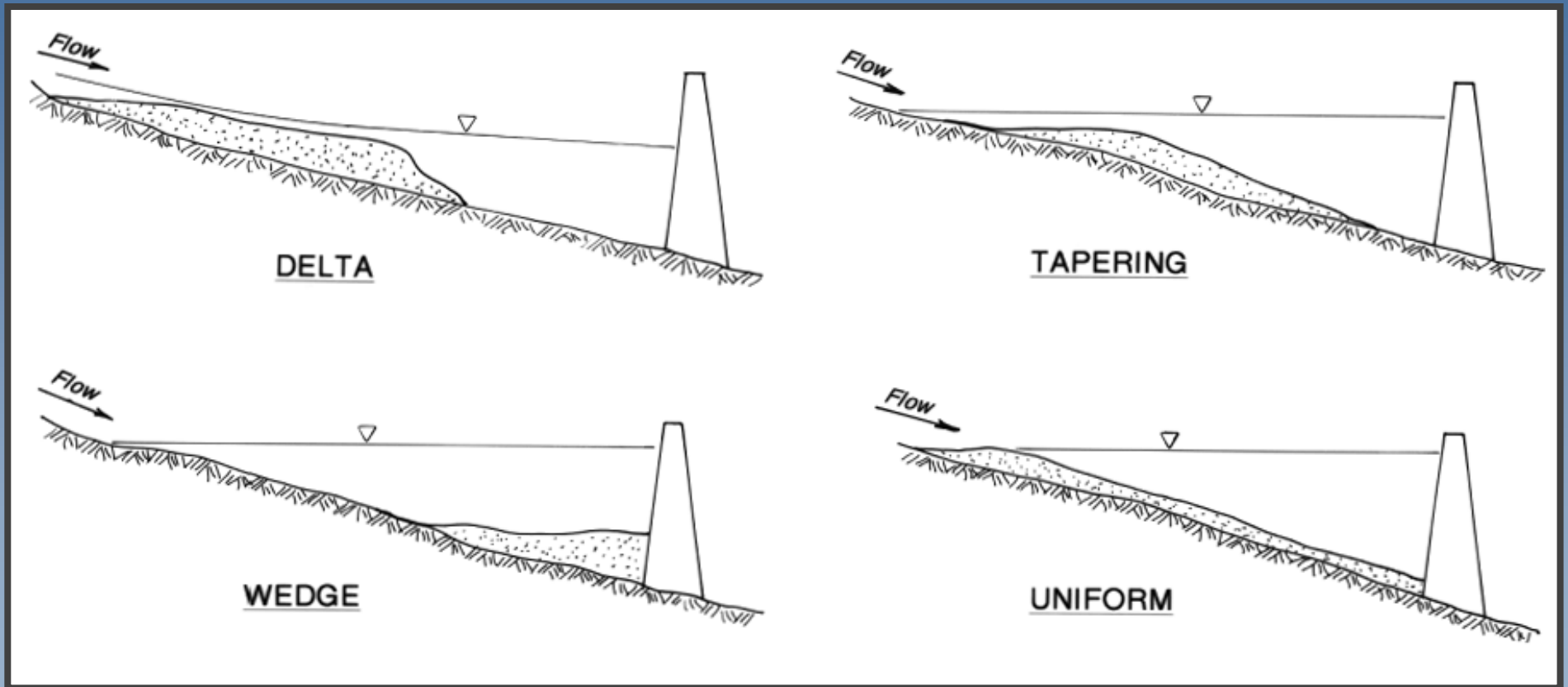


Flood Control and Neponset River

- Based on hydraulic modeling, neither the T&H nor Baker Dams provide flood control and appear to cause rather than lessen flooding (Milone & MacBroom, Supplemental Report, 2007)
- According to the Army Corps in response to a request about the flood control effects at the T&H Dam, the Corps responded that the T&H Dam does not provide flood control and dam removal would reduce water surface elevation (Dec. 21, 2007 correspondence)



Sediment Deposits in Impoundments



Modified from Morris, 1998



Findings: Sediment Quality

Baker Dam

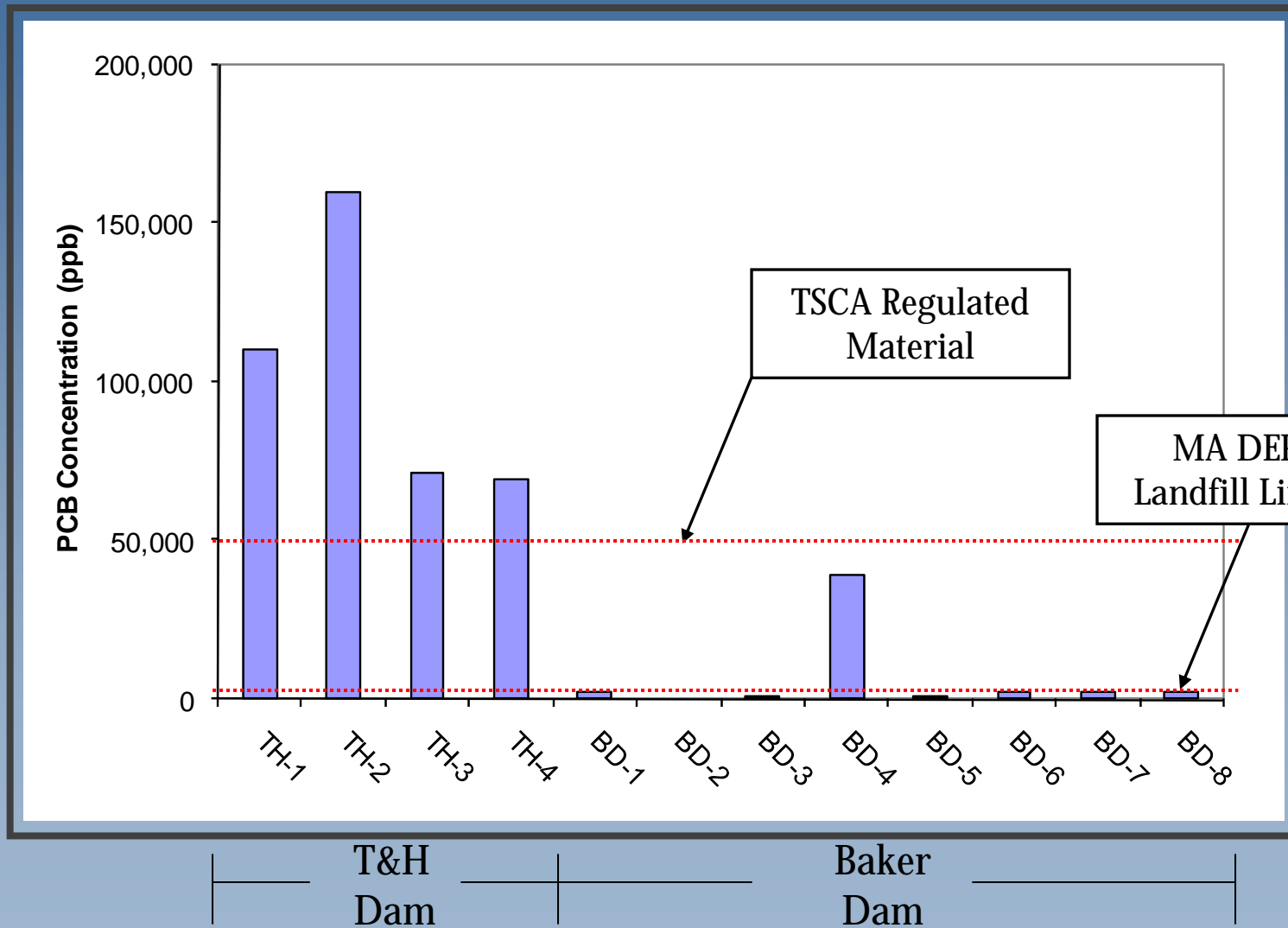
- Fine to coarse grained sands intermixed with silt and clay
- Chemical analysis: heavy metals, PCBs, petroleum hydrocarbons
- PCB levels are below TSCA thresholds

T&H Dam

- Greater percentage of fine grained material than at Baker
- Clays to coarse silts
- Chemical analysis: heavy metals, PCBs, petroleum hydrocarbons
- PCB levels are above TSCA thresholds



Findings: Sediment Quality

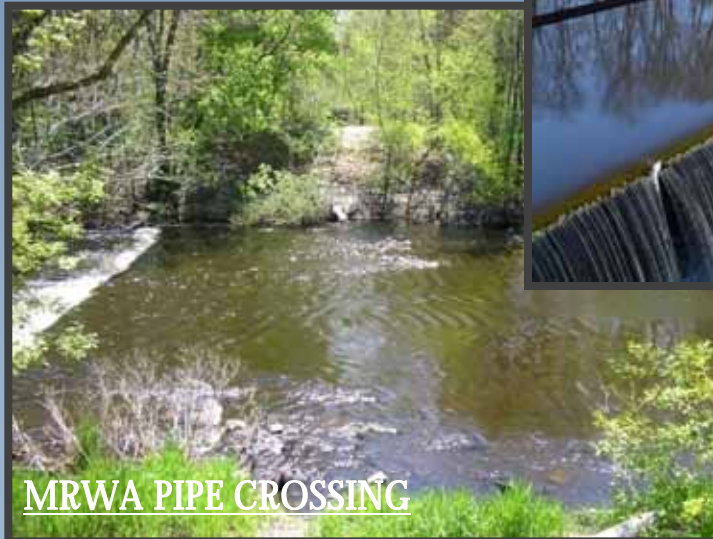
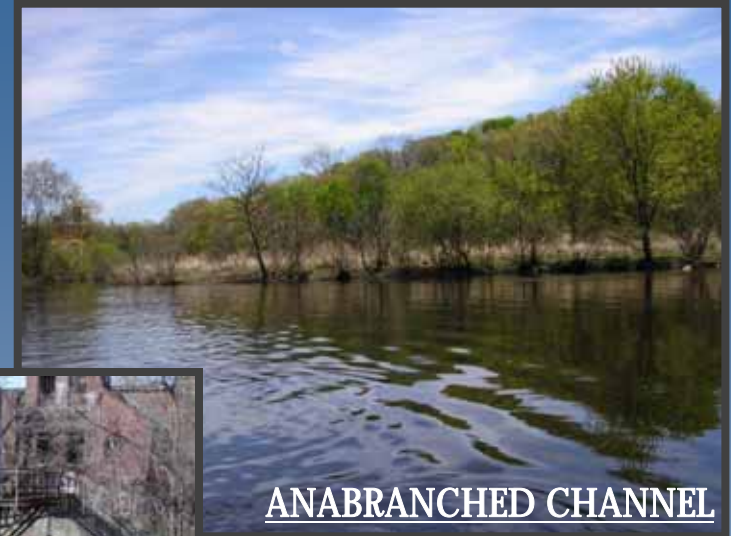
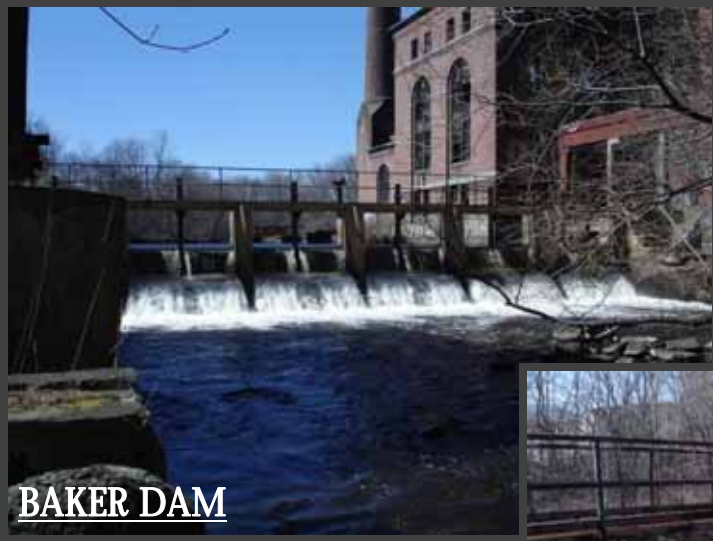


Preliminary Guidance from DEP & EPA on Sediment Management

- Environmental Restoration Projects such as the Neponset River Restoration are not to be treated as typical remediation sites as defined under the Massachusetts Contingency Plan.
- Sediments from sources of PCBs >50 ppm will be regulated under TSCA and cannot be disposed of on-site. This eliminates alternatives involving containment walls.
- Newly exposed bank sediments can be removed and disposed of off-site. Alternately, they may remain with proper stabilization, cover, and long-term monitoring and maintenance, subject to regulatory approval.



Areas of Focus



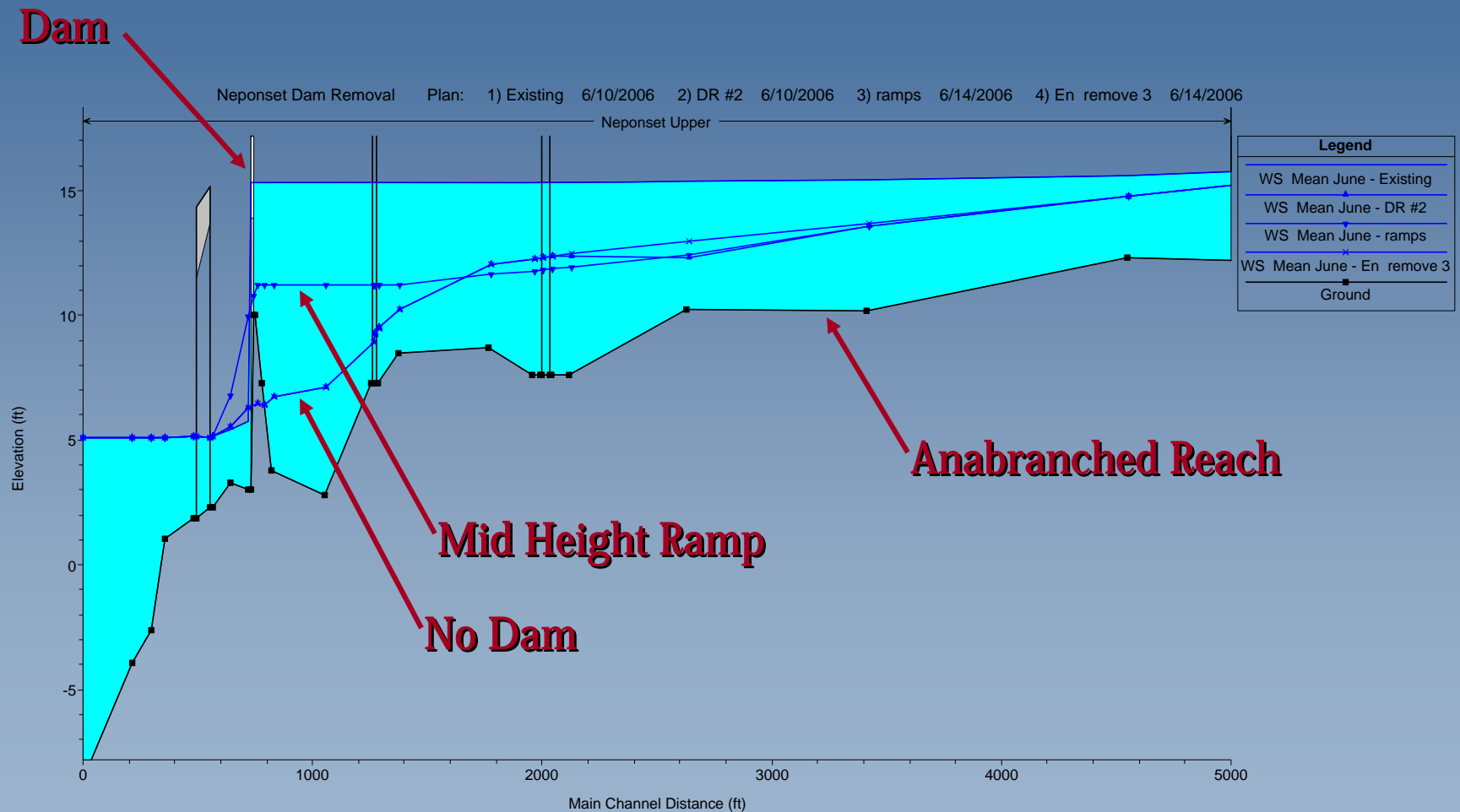
Neponset River Baker Dam Data



Use	Former Mill
Type	Run-of-River
Material	Gravity Concrete
Foundation	Bedrock
Length	150 Feet, 80 Foot Spillway
Gate Crest el.	14, Wood Flashboards
Spillway Crest el.	10± Feet
Toe el.	3.5 Feet
Sediment el.	5-9 Feet
Vertical Transition, ft.	7± Feet
Horizontal Transition, ft.	500 Feet
Pool Depth	5-8 Feet
Sediment Type	Silt & Sand
Dam Condition	Fair
Hazard Classification	Recommended "Significant"



River Restoration Alternatives on the Neponset River



Baker Dam Preliminary Alternatives

- Alternative 1 – No Action
- Alternative 2 – Fish Ladder
- Alternative 3 – Rock Ramp
- Alternative 4 – Dam Removal

Baker Dam



Baker Dam

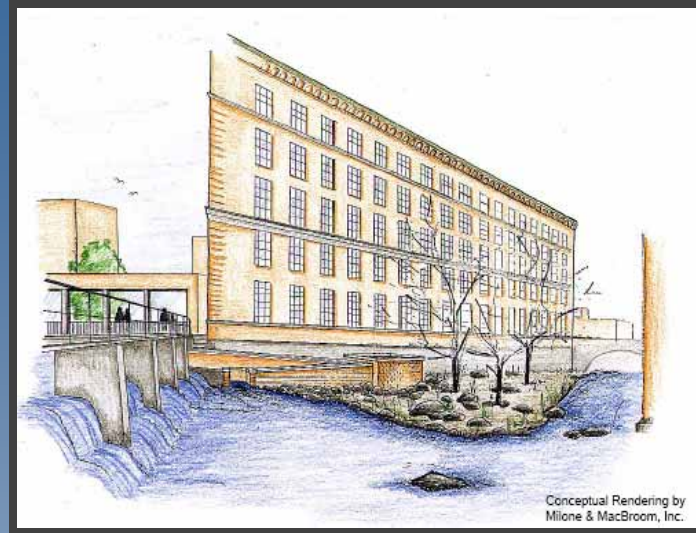
Maintain Dam Indefinitely



Option	Ecological Pro	Ecological Con	Estimate of Probable Cost
Maintain Dam Indefinitely	<ul style="list-style-type: none"> Maintains existing smelt habitat 	<ul style="list-style-type: none"> Maintains status quo Requires continual dam repair, maintenance and operation (30 year estimate) Maintains current hydrology Prevents fish passage Does not fulfill legal obligations for fish passage under Chapter 130, Section 19 Fails to restore river health Fails to restore wetlands Maintains canoe portage 	\$3.6 - \$5.6 million



Baker Dam, Fish Ladder



Option	Ecological Pro	Ecological Con	Estimate of Probable Cost
Fish Ladder Sediment Management	<ul style="list-style-type: none"> • Provides some fish passage 	<p><u>Infeasible</u> due to increased flooding</p> <ul style="list-style-type: none"> • Maintains status quo • Fails to restore river health • Requires continual fish ladder maintenance and operation • Requires continual dam maintenance and operation • Limited aquatic species passage • Fails to restore wetlands • Maintains canoe portage • Reduces spillway capacity 	\$4.1 – \$6.1 million



Baker Dam, Rock Ramp



Option	Ecological Pro	Ecological Con	Estimate of Probable Cost
Rock Ramp with Sediment Management	<ul style="list-style-type: none"> • Provides some fish passage 	<ul style="list-style-type: none"> • Poses concern regarding technical effectiveness • Requires extensive fill of resource areas • Requires walls along river to stabilize rock ramp • Requires continual rock ramp repair, maintenance and operation • Fails to fully restore river health • Negatively impacts smelt habitat 	\$4.5 - \$6.6 million



Baker Dam, Removal



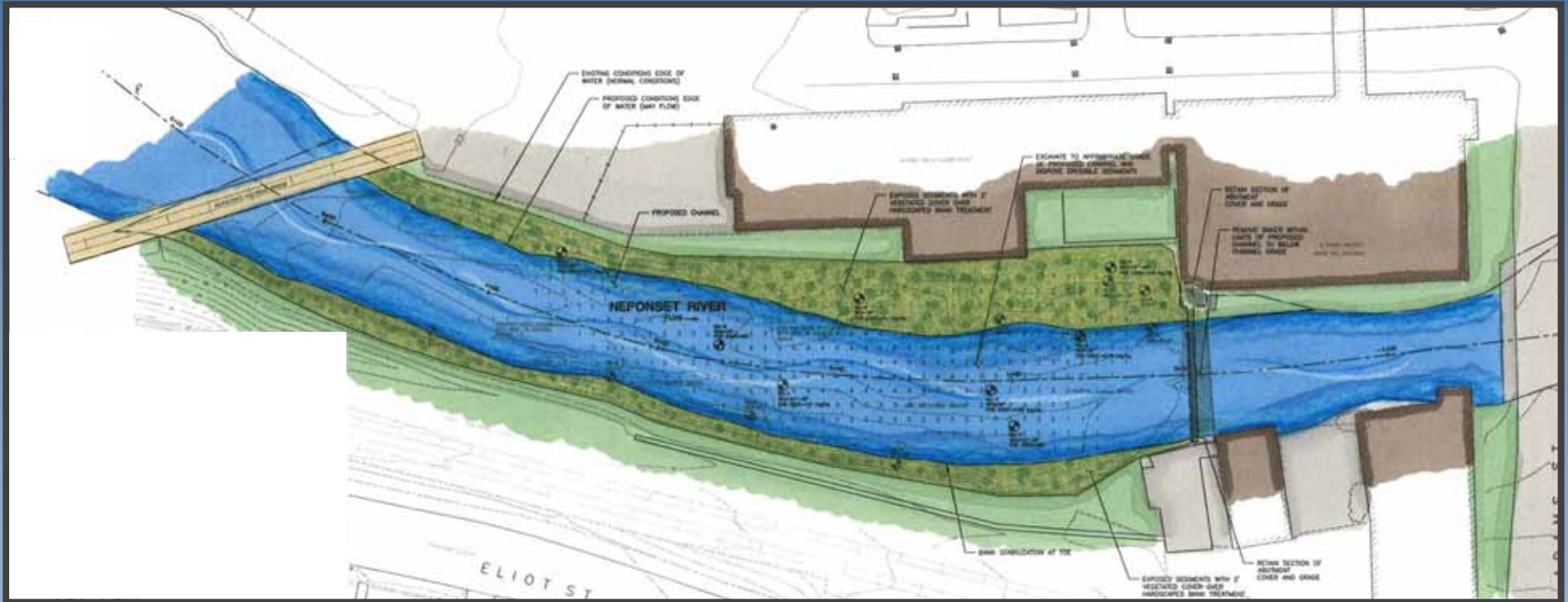
Existing Conditions



Option	Ecological Pro	Ecological Con	Estimate of Probable Cost
Full Dam Removal With Sediment Management	<ul style="list-style-type: none"> • Restores natural river processes (sediment transport, reduces eutrophication, eliminates thermal pollution source) • Ecologically restores river (establishes free flowing river aesthetics) • Eliminates dam maintenance and liability • Changes hydrology • Provides passage for all aquatic species • Improves and expands smelt spawning habitat • Restores wetlands • Creates kayak and canoe passage 	<ul style="list-style-type: none"> • Allows migration of contaminated sediment • Changes historical industrial landscape • Eliminates still water 	\$3.6 million



Baker Dam Removal



Neponset River T&H Dam Data



Use	Former Mill, Former 2 MGD Intake
Type	Run-of-River
Material	Gravity Concrete
Foundation	Bedrock
Length	200 Feet
Gate Crest el.	36', 4.3 feet High Bascule
Spillway Crest el.	31.7± Feet
Toe el.	24 Feet
Sediment el.	Varies
Vertical Transition, ft.	10 Feet
Pool Depth	6-8 Feet
Sediment Type	Silt & Sand
Dam Condition	Fair
Hazard Classification	Significant Hazard



T&H Dam Preliminary Alternatives

- **Alternative 1 – Maintain Status Quo**
- **Alternative 2 – Fish Ladder**
- **Alternative 3 – Dam Removal**
 - 3a - No Dredging
 - 3b - Full Dredging
 - 3c - Partial Dam Removal & In-Situ Stabilization
 - 3d - Partial Dam Removal & In-Situ Sediment Stabilization
 - 3e - Dam Removal with In-Channel Dredging
 - 3f - Dam Removal with Full Dredging
- **Alternative 4 – Rock Ramp**
 - To Top of Gates
 - To Top of Concrete Weir
 - Optimum 4% Slope
- **Alternative 5 – Bypass Channel**
- **Alternative 6 – Channel Relocation**
 - Full Length Relocation
 - Partial Length Relocation



T&H Dam

Maintain Dam Indefinitely



Option	Ecological Pro	Ecological Con	Estimate of Probable Cost
Maintain Dam Indefinitely		<ul style="list-style-type: none"> • Requires continual dam repair and operation (30 year estimate) • Prevents fish passage • Fails to restore wetlands • Fails to restore river health • Maintains canoe portage • Does not fulfill legal obligations for fish passage under Chapter 130, Section 19 • Maintains current hydrology 	\$3.6 - \$7.0 million



T&H Dam, Fish Ladder

Option	Ecological Pro	Ecological Con	Estimate of Probable Cost
Fish Ladder and Sediment Management	<ul style="list-style-type: none">• Partially preserves impoundment• Allows for limited fish passage	<ul style="list-style-type: none">• Fails to restore river health• Requires continual fish ladder maintenance and operation• Requires continual dam maintenance and operation• Allows limited aquatic life passage• Fails to restore wetlands• Maintains canoe portage• Limits spillway capacity• Difficult to regulate proper flows given current gate design	\$5.0 - \$7.5 million



T&H Dam Removal



Option	Ecological Pro	Ecological Con	Estimate of Probable Cost
Dam Removal with Sediment Management	<ul style="list-style-type: none">• Restores natural river processes (sediment transport, reduces eutrophication, eliminates thermal pollution source)• Ecologically restores river (establishes free flowing river aesthetics)• Eliminates dam maintenance and liability• Provides passage for all aquatic species• Restores wetlands• Creates recreational canoe and kayak passage	<ul style="list-style-type: none">• Changes industrial landscape• Eliminates still water	\$2.6 - \$5.8 million

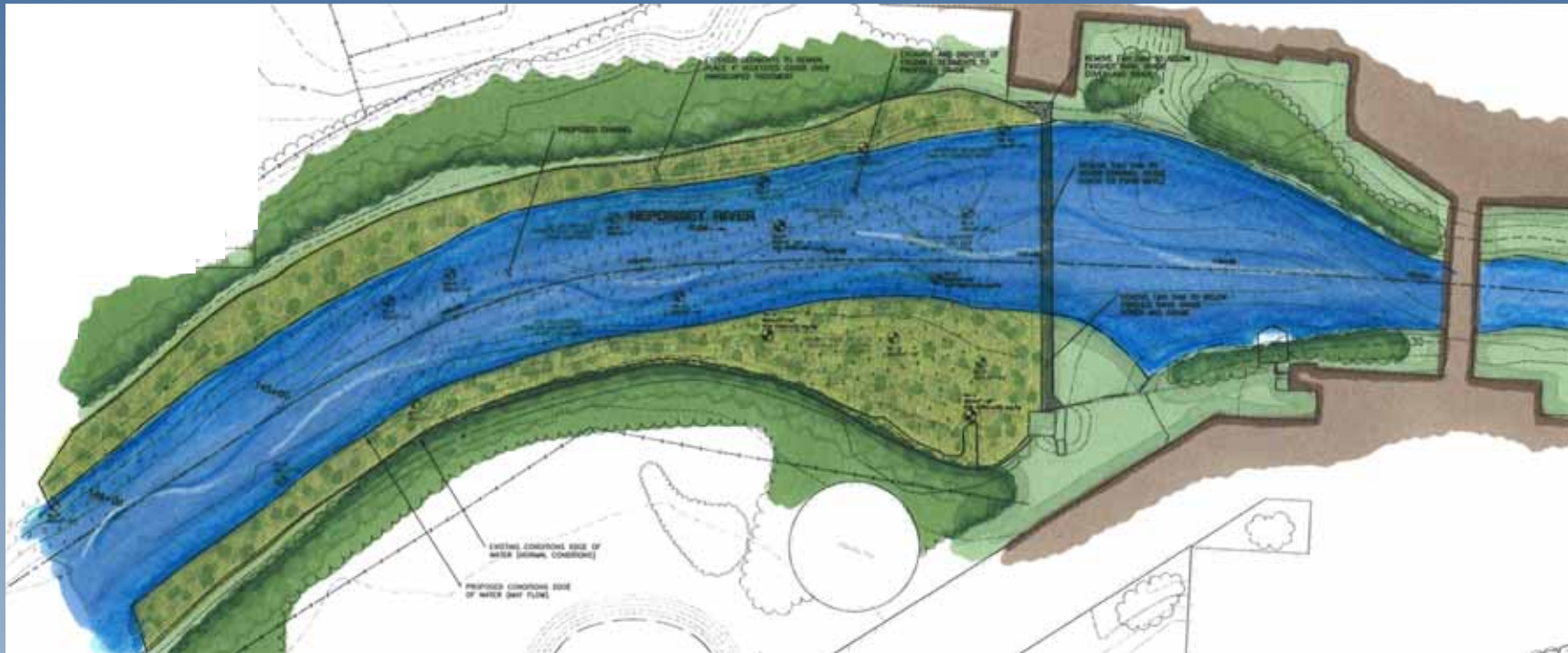


T&H Dam, Rock Ramp

Option	Ecological Pro	Ecological Con	Estimate of Probable Cost
Maintain Dam Indefinitely and Add Rock Ramp for Fish and Sediment Management	<ul style="list-style-type: none">• Partially preserves upstream pool• Provides some fish passage	<ul style="list-style-type: none">• Fails to restore river health• Requires continual dam repair, maintenance and operation• Requires continual rock ramp repair, maintenance and operation• Poses concern regarding technical effectiveness• Requires extensive fill of resource areas	\$8.4 million



T & H Dam, Dam Removal



Restoration & Remediation

What Does it Mean To The
Watershed and
Community?

Potential Benefits to the Commonwealth

- Habitat Restoration
- Fisheries Protection and Enhancement
- Long Term Cost Savings
- Human Health
- Recreational Fishing Improvements
- Recreational Benefits
- National, Holistic Model for River Restoration, PCB Remediation, Urban Revitalization, Fisheries Improvement
- Connecting a Healthy River to the DCR Greenway



Riverways Proposed Next Steps

- Stakeholder Consensus
- Inter Departmental Co-ordination
- File MEPA
- Regulatory Permitting, Design, Construction



Historical and Present Importance of Fisheries

- Anadromous (migratory) fish are considered a resource held in public trust- American shad, rainbow smelt, river herring, American eel, and sea lamprey were once abundant in the Neponset River.
- Anadromous species were important historically for commerce and recreation. The cultural heritage of this area is linked to the harvest of these species.
- Neponset River once provided a vital spawning habitat for a diversity of anadromous and freshwater fish.



Rainbow Smelt

©Lawrence Taylor 2002



American Eel



Questions and Comments

