Restoring Rivers Through Dam Removal

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NARRAGANSETT BAY ESTUARY PROGRAM

Who We Are:
Narragansett Bay Estuary Program

Mission:

To protect and restore Narragansett Bay and its watershed through sound science, collaborative action and community involvement

NBEP Particulars:

- **Located at URI Graduate School of Oceanography, Narragansett, R.I.**
- **Provide Technical Assistance in Ecosystem Restoration.**

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Wood Pawcatuck Watershed Association

Mission:

To Promote and Protect the Integrity of the Lands and Waters of the Wood Pawcatuck Watershed

WPWA Particulars:

- **Located on the Wood River at the Barberville Dam in Hope Valley, RI**
- **The Wood Pawcatuck Watershed encompasses a 320 square mile area of land in southern RI and southeastern CT**

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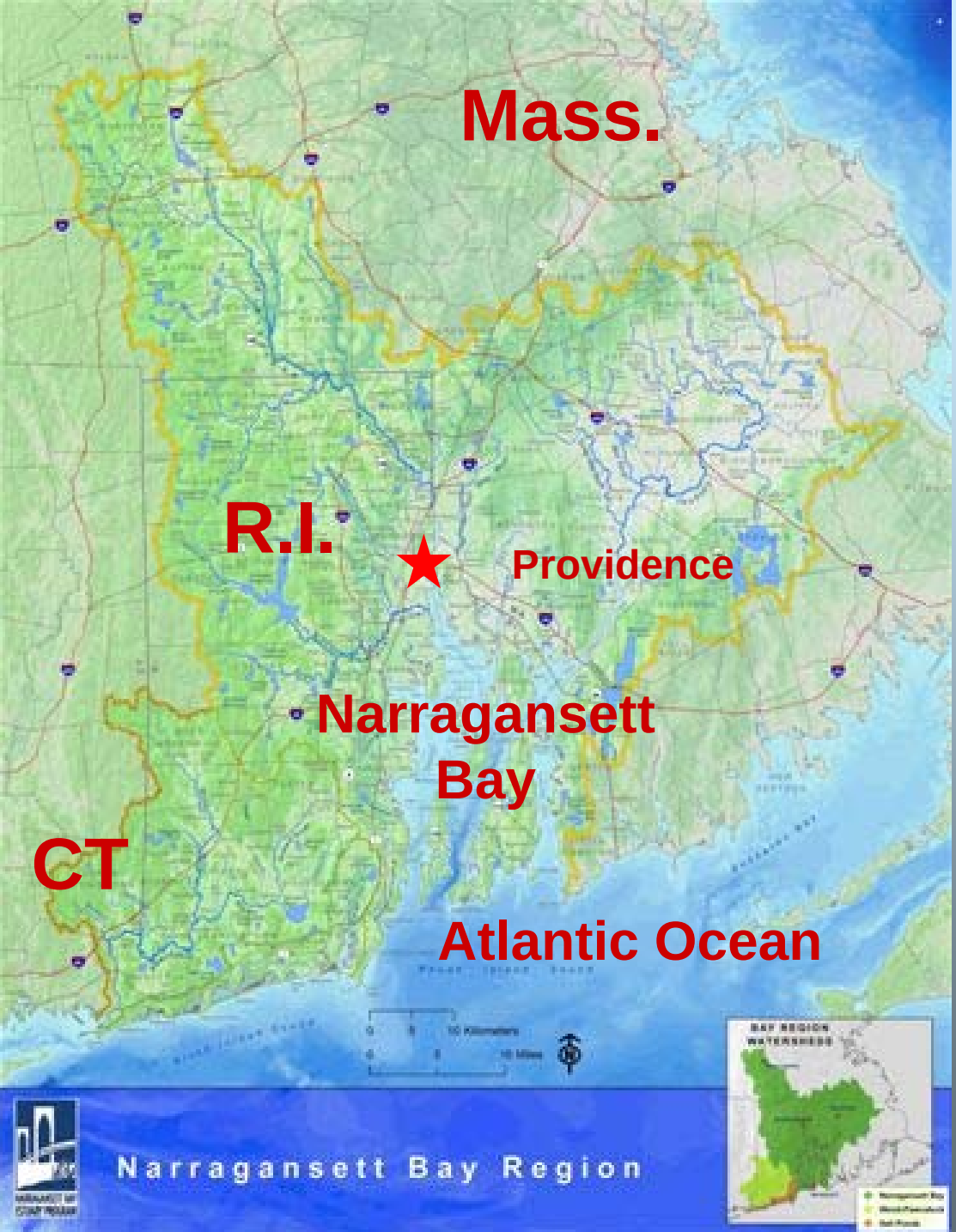

Where we are: Narragansett Bay Region

- Estuary = 130 square miles
- Watershed = 2000 square miles (15 times Bay)
- ~200 species of fish and shellfish
- Boundary between mid-Atlantic & North Atlantic marine ecosystems
- Watershed pop'n = ~2 million
- 100 cities & towns
- Watershed Mass./R.I./CT

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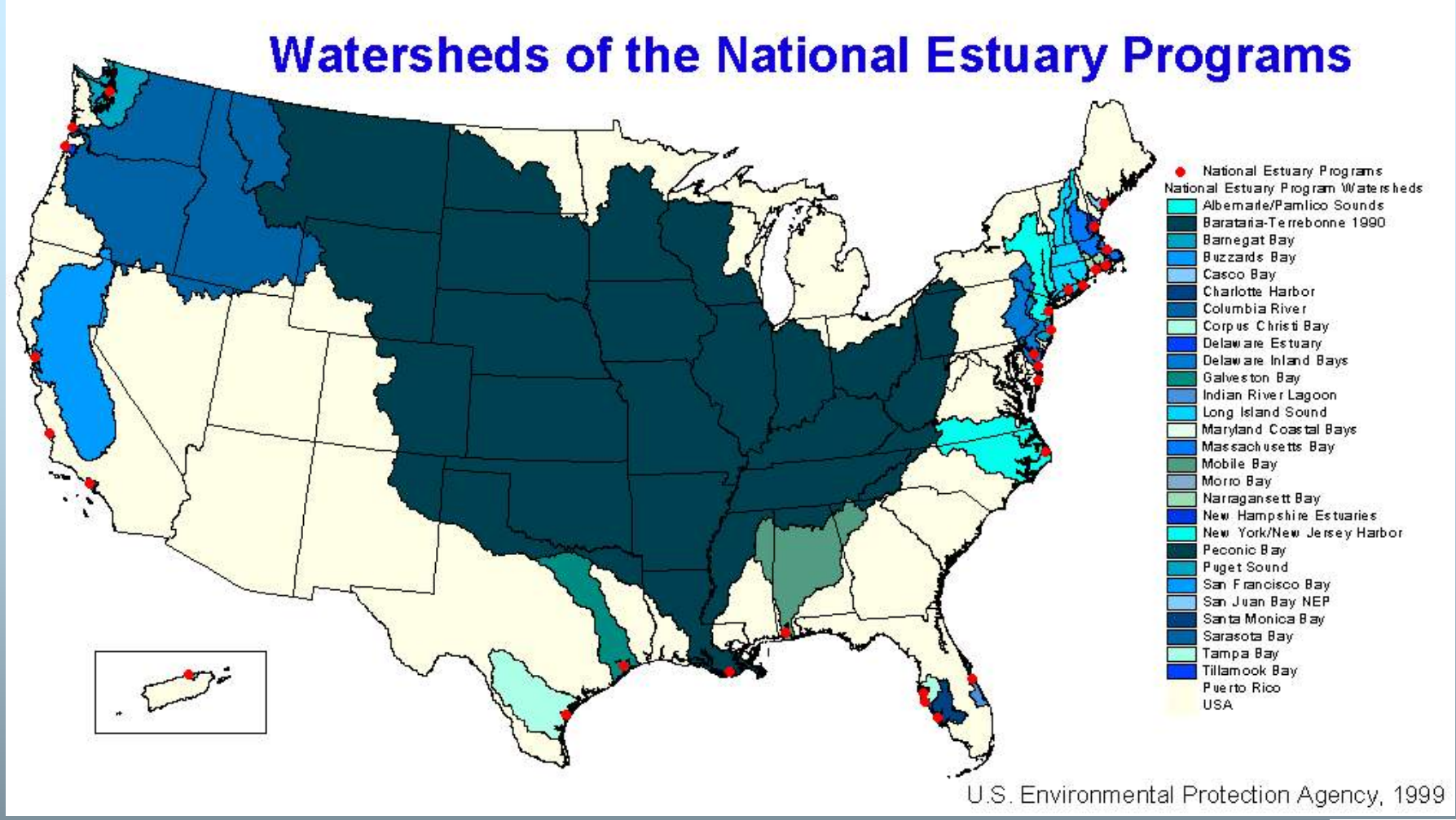

Comparative Basin Size

- **Mississippi Basin: 2,980,000 km2 (1,151,000 mi2)**
- **Columbia Basin: 673,000 (260,000 mi2)**
- **Chesapeake: 163,000 km2 (63,000 mi2)**
- **Long Island Sound: 41,000 km2 (16,000 mi2)**
- **Narragansett Bay: 4700 km2 (1800 mi2) (1/600 Miss.)**

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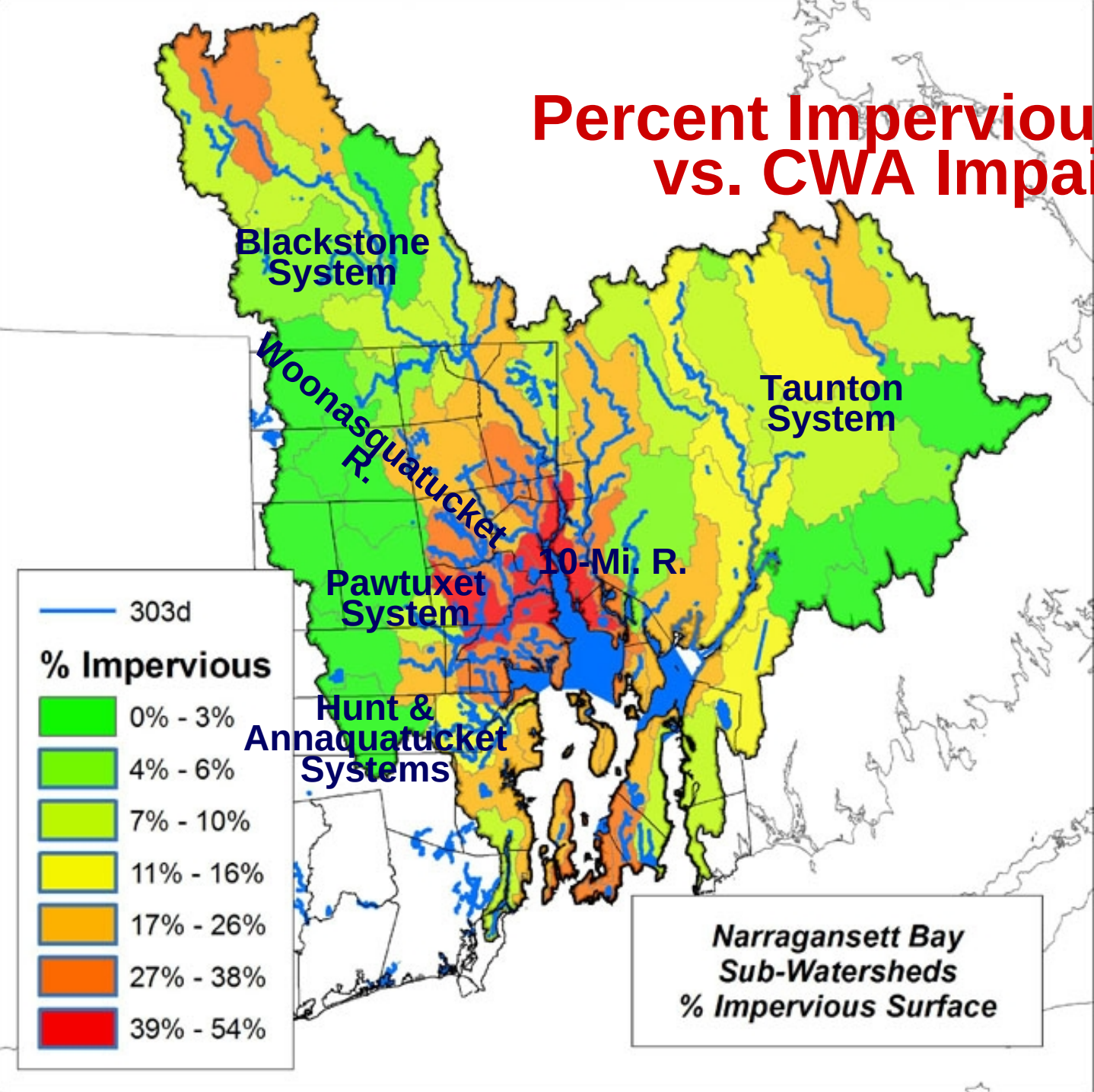
Percent Impervious Surface vs. CWA Impairment



3 Largest Bay tributaries are all in urbanized areas; others largely suburban

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Narragansett Bay Sub-Basins

Avg. Flows, m3/s

- All Rivers = 93
- Taunton = 30
- Blackstone = 21
- Pawtuxet = 10
- (collectively 2/3 of flow)
- Others < 10
- Larger systems flow into northern (upper) reaches of estuary

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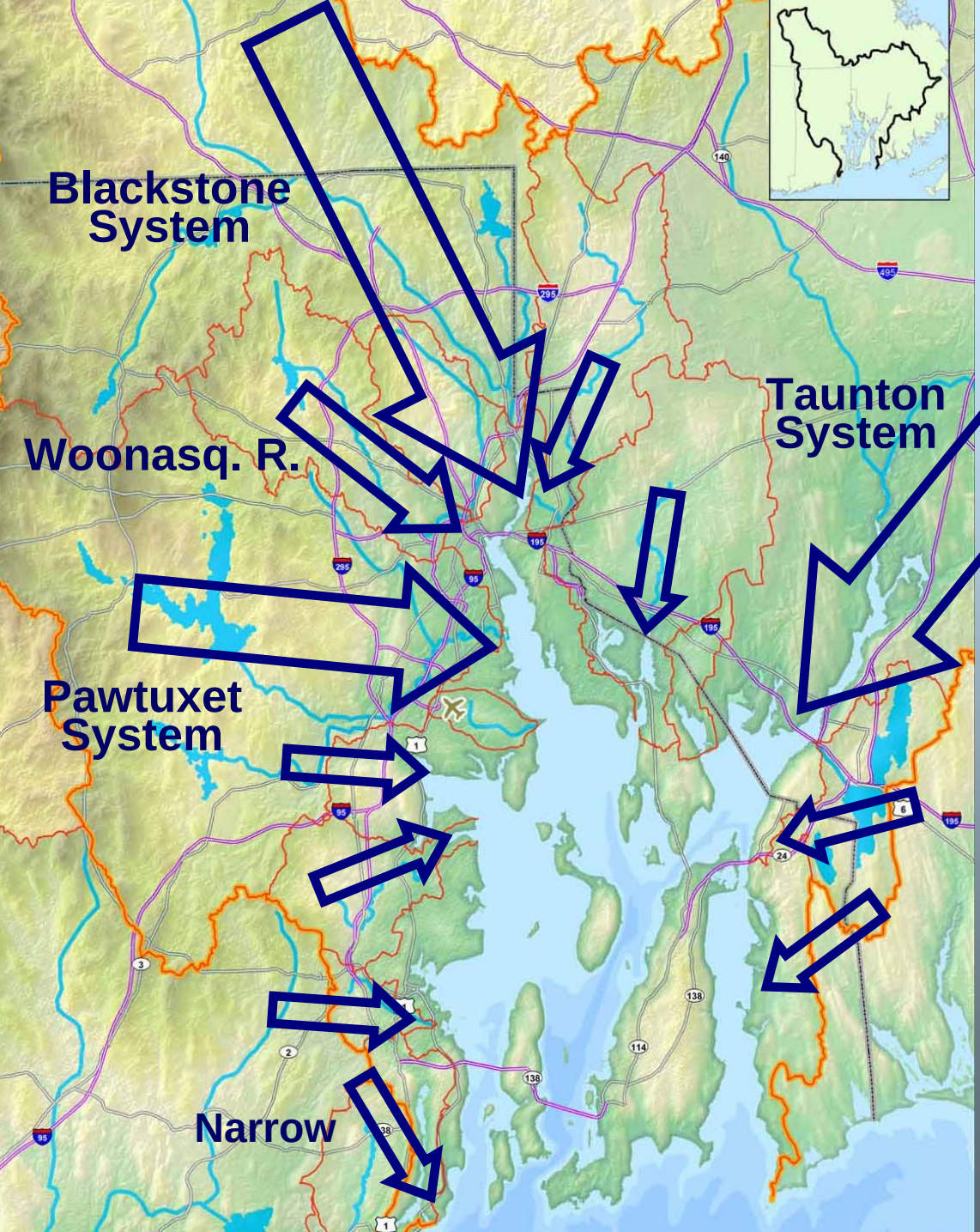

Principal Hydrologic Flows from Watershed to Estuary

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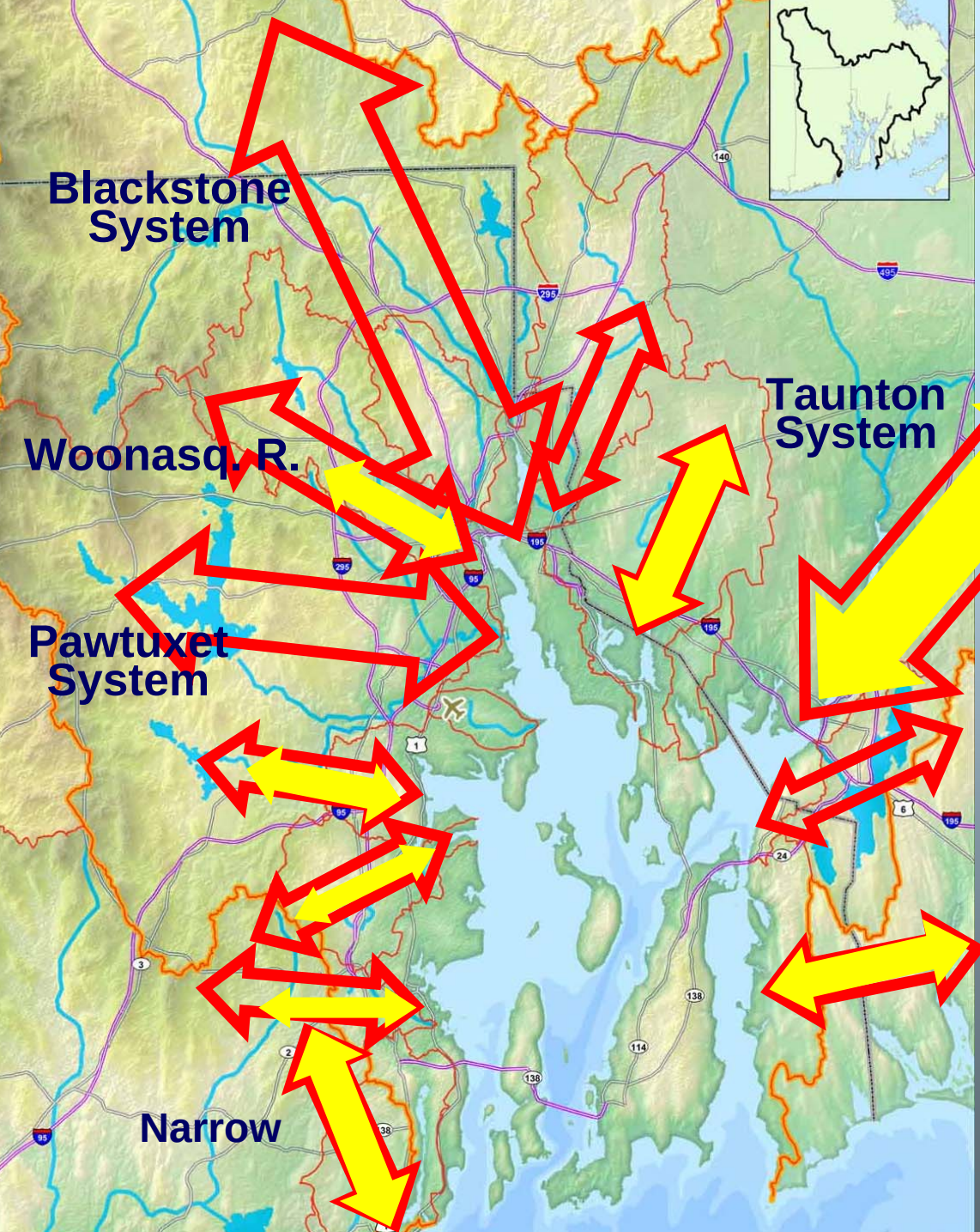

Historic & Present Fish Migration— Biological Flows between Estuary & Watershed

Historic

Today

Diadromous fish historically present but now largely absent from 2 of NB's 3 largest systems

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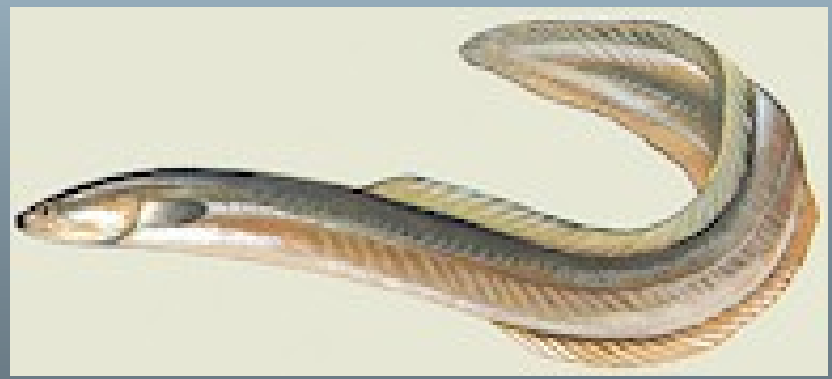
“Diadromous” Fish:
Native Sea-Run Migratory Fish
(Anadromous + Catadromous = Diadromous)

Alewife *Alosa pseudoharengus*

River Herring or “Buckies”

Blueback *Alosa aestavalis*

American shad *Alosa sapidissima*



American eel *Anguilla rostrata*

(Atlantic Salmon extirpated; Atlantic sturgeon status unknown)

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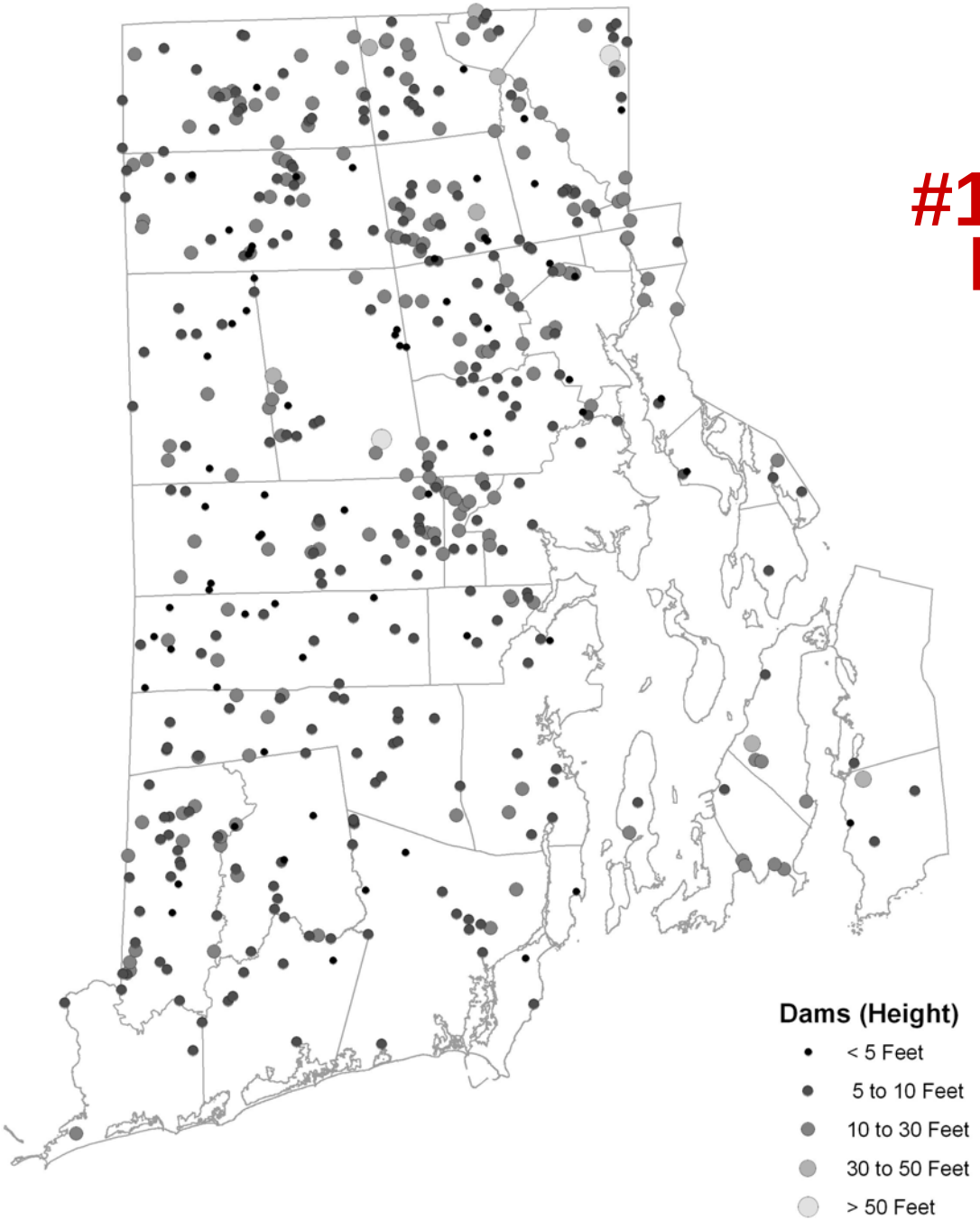

#1 Obstacle to Fish Passage: Dams

- 500 dams in R.I. alone
- R.I. the "Birthplace of the American Industrial Revolution"

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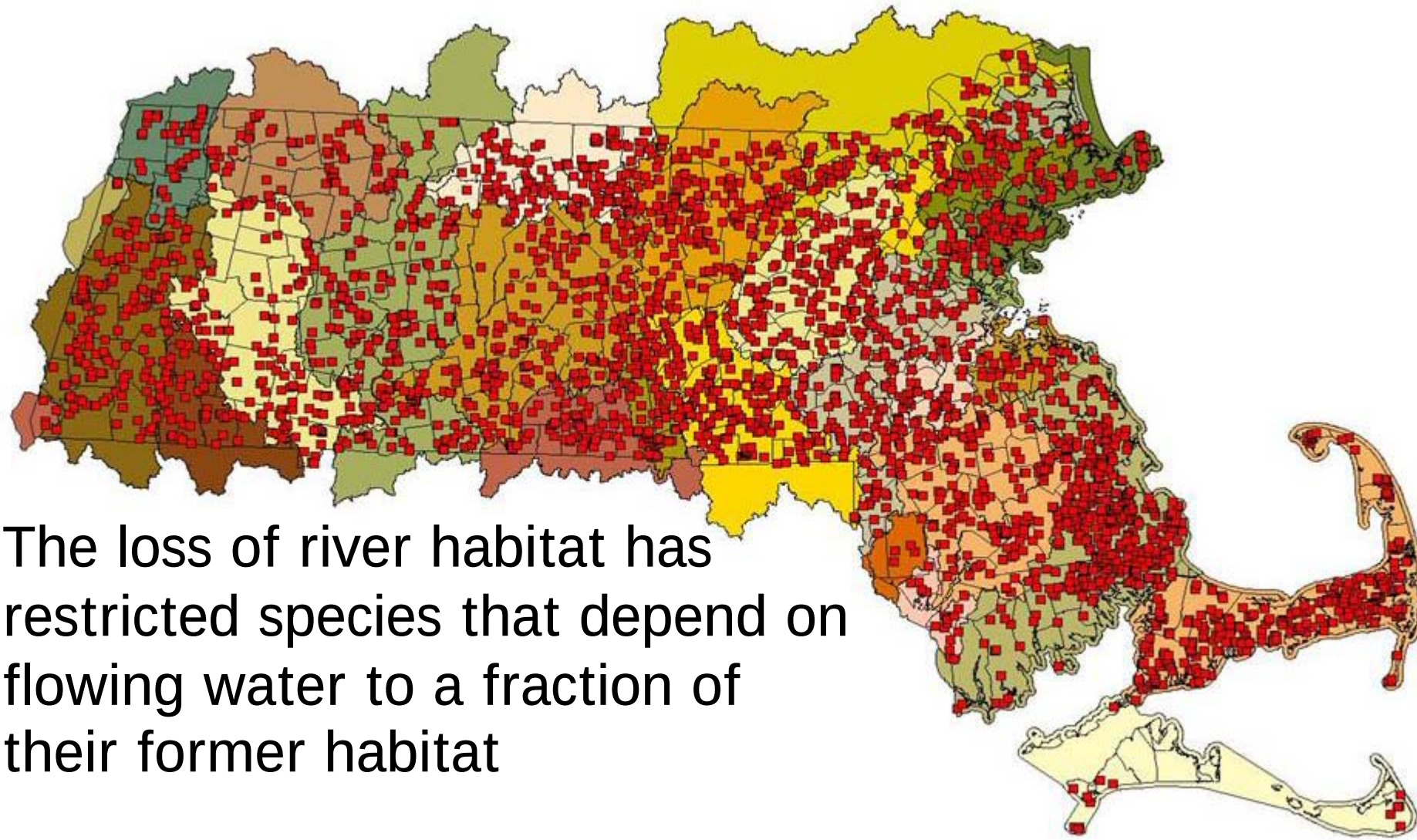
More than 3,000 Dams



The loss of river habitat has restricted species that depend on flowing water to a fraction of their former habitat

Small Dams

- Built for Water Power & Water Supply, 17th – 20th C.
- Barriers to fish passage
- Modify river habitat
- Modify physical characteristics (temp, DO)
- Trap sediments

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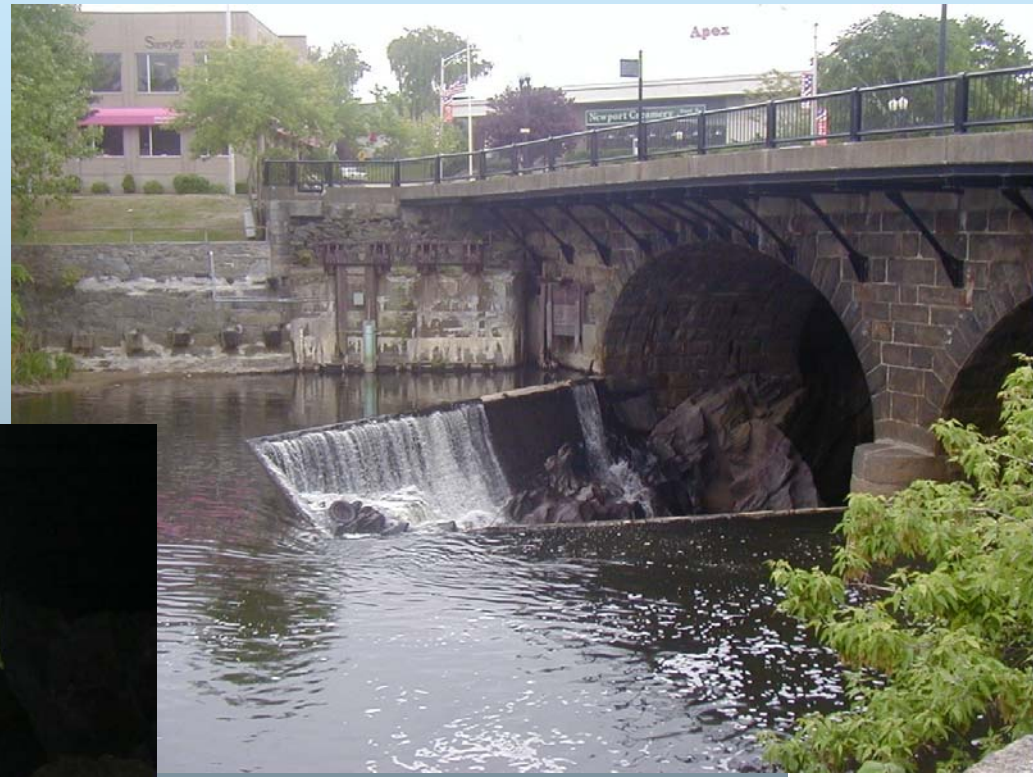
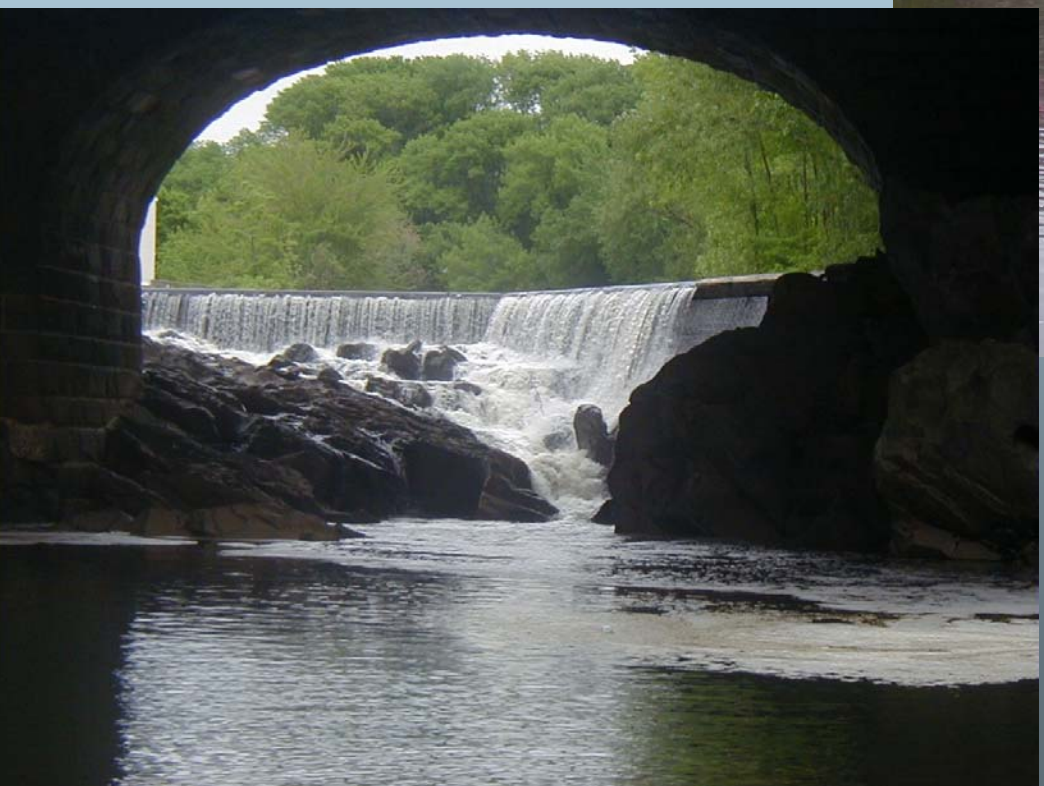
Pawtucket Falls, Blackstone River

Main Street Dam (Pawtucket, R.I.)

- **18’ Spill @ Low Tide**
- **FERC hydro**
- **First dammed: 1716!**





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Slater Mill, Blackstone River, 1793

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Hunts Mill, Ten Mile River

Historic Site, “Horseshoe” dam

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Turner Reservoir, Ten Mile River

“Large” water supply dam

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Historic Industrial Uses

- Dams
- Wetland filling
- Floodwalls
- Chemical contamination

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Physical modification

Legacy of historic & current land uses

- **Channelization**
- **Floodwalling**
- **Culverts**
- **Dredging**
- **Wetland fill**
- **Road crossings, etc.**

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Weird Water Control Structures

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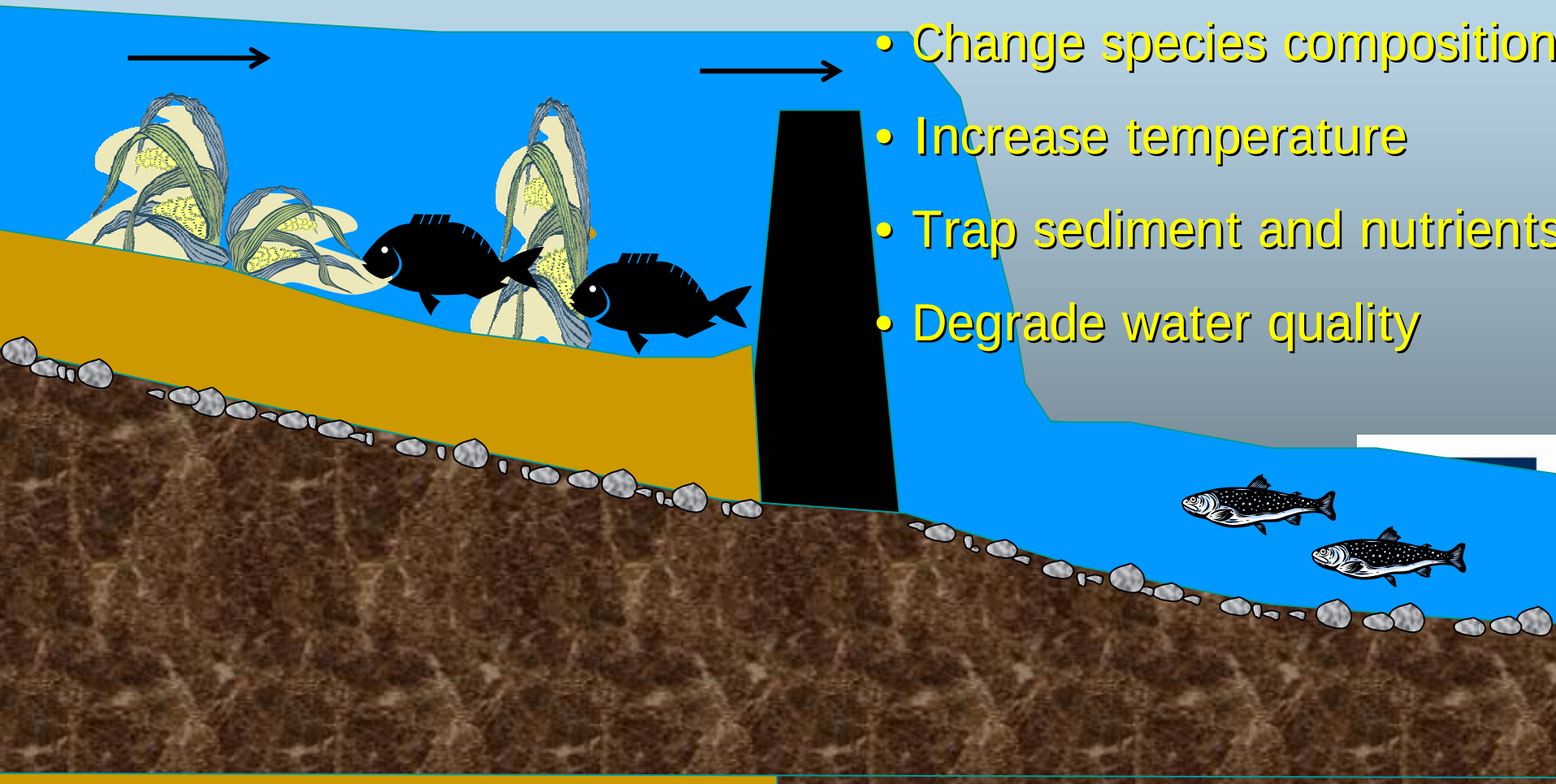
Ecological Impacts of Dams



- Block migratory fish
- Change species composition
- Increase temperature
- Trap sediment and nutrients
- Degrade water quality

Dams Transform Rivers into Millponds

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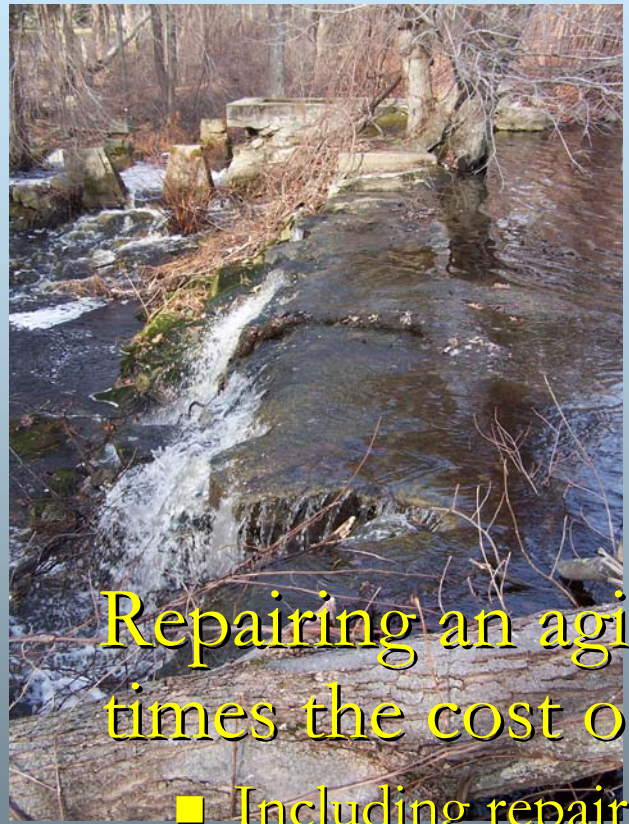
Harm Native Watershed Wildlife

Interfere with River Recreation

Economic Realities
- Maintenance, Repair and Inspection



Repairing an aging dam has typically cost 3 - 5 times the cost of removal

- Including repair estimates to bring dam to modern safety standards or to provide effective fish passage
- Finite Design Life – Approx. 50 years
- Continual Repairs - $32 million needed to repair state-owned dams in Massachusetts (one-time)

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Benefits of Dam Removal

- Ecosystem-Based Management
- Restore Native Migratory Fish
- Restore Native Instream Fish
- Restore associated wildlife
- Eliminate DownstreamFlood Risk/Hazard
- Eliminate Maintenance Costs
- Restore Canoe Passage

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Yet Restoration Has Often Focused on Fish Ladders: Engineered solution

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Obstacles to Dam Removal

- Aesthetic Change
- Recreational Change
- Historical concerns
- “Stinking Mudflats”
- Perceived Flood Storage
- Permitting Issues—wetland change
- Sediment issues—exposure, mobility, contamination
- Engineering “certainty”
- Ownership issues
- Perceived Liability
- Perception of Static Landscape

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Considerations: Is Dam Removal Appropriate?

- Current uses of dam
- Ownership
- Size
- Extent of Impoundment
- Extent of Wetlands
- Flood hazard
- Condition
- Other infrastructure (roads, pipes, etc.)
- Licensed hydro?
- Anadromous fish potential?
- Recreational impacts
- Historic issues
- Upstream landuses

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Examples of successful projects

- **Silk Mill & Ballou Dam, Becket, Mass.**
- **Town Brook, Plymouth, Mass.**

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Silk Mill Dam Removal, Becket, Mass.

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Ballou Dam, Becket, Mass.

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Ballou Dam, Becket, Mass.

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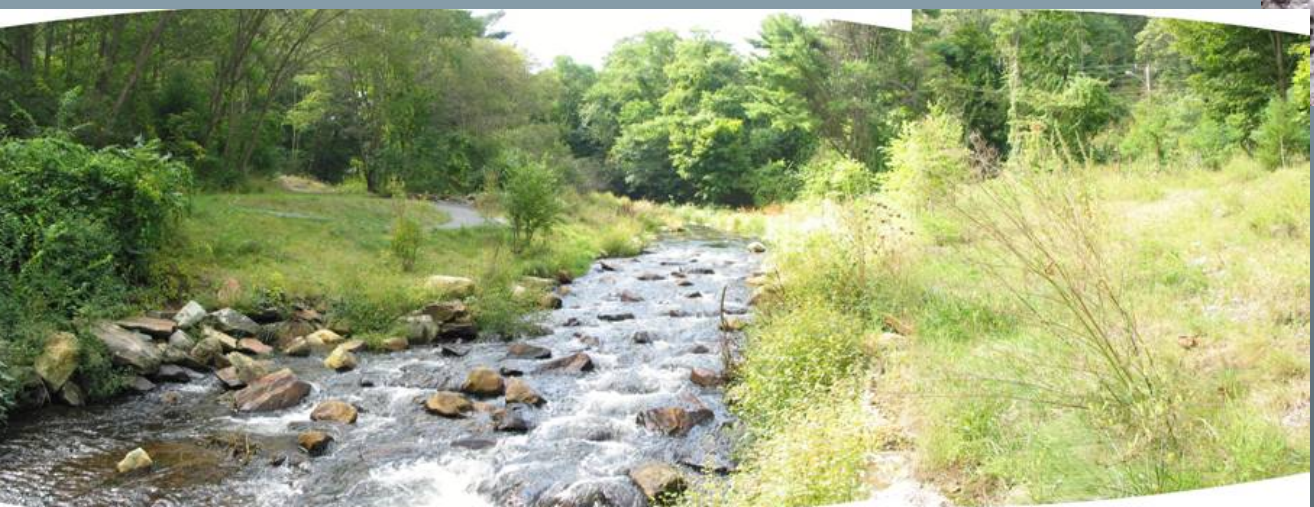
Billington Street Dam
Town Brook, Plymouth



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Planned Projects in R.I.

- **Pawtuxet River, Warwick & Cranston**
- **Upper Pawcatuck River, Richmond, Charlestown & South Kingstown, R.I.**

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Pawtuxet River

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Pawtuxet Falls Restoration

- Dam constructed for water supply & recreation
- Aesthetics / historic considerations key
- 7+ river miles of habitat
- ~3’ spillway
- Target spp.: river herring, American shad
- Project in planning phase
- Alternatives under evaluation: Denil ladder, dam removal, rock ramp fishway
- Partial breach alternative looking good…
- Construction 2008?
- NRCS probable lead federal partner & funder
- Other key partners: Pawtuxet River Authority, R.I. DEM, NBEP, R.I. CRMC, NOAA, US F&WS, Save the Bay

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Upper Pawcatuck River

- Richmond, Charlestown & South Kingstown
- Lower Shannock Falls
- Horse Shoe Falls
- Kenyon Mill Dam
- Habitat goal: Worden's Pond

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Lower Shannock Falls, Pawcatuck River

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Horseshoe Falls, Pawcatuck River

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Kenyon Mill Dam, Pawcatuck River

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You Can Help Us!

- **Identify dam removal opportunities—research potential projects**
- **Advocate for improvement of state regs**
- **Advocate for funding—state, federal and private**
- **Build community support—educate stakeholders regarding *natural* river ecosystems!**

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Visit Us!

www.nbep.org

www.wpwa.org

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