



Diadromous Fish in Massachusetts – 2024 Updates

River Herring Network – Weymouth – November 12, 2024

Brad Chase – MA Division of Marine Fisheries

Bob Michelson

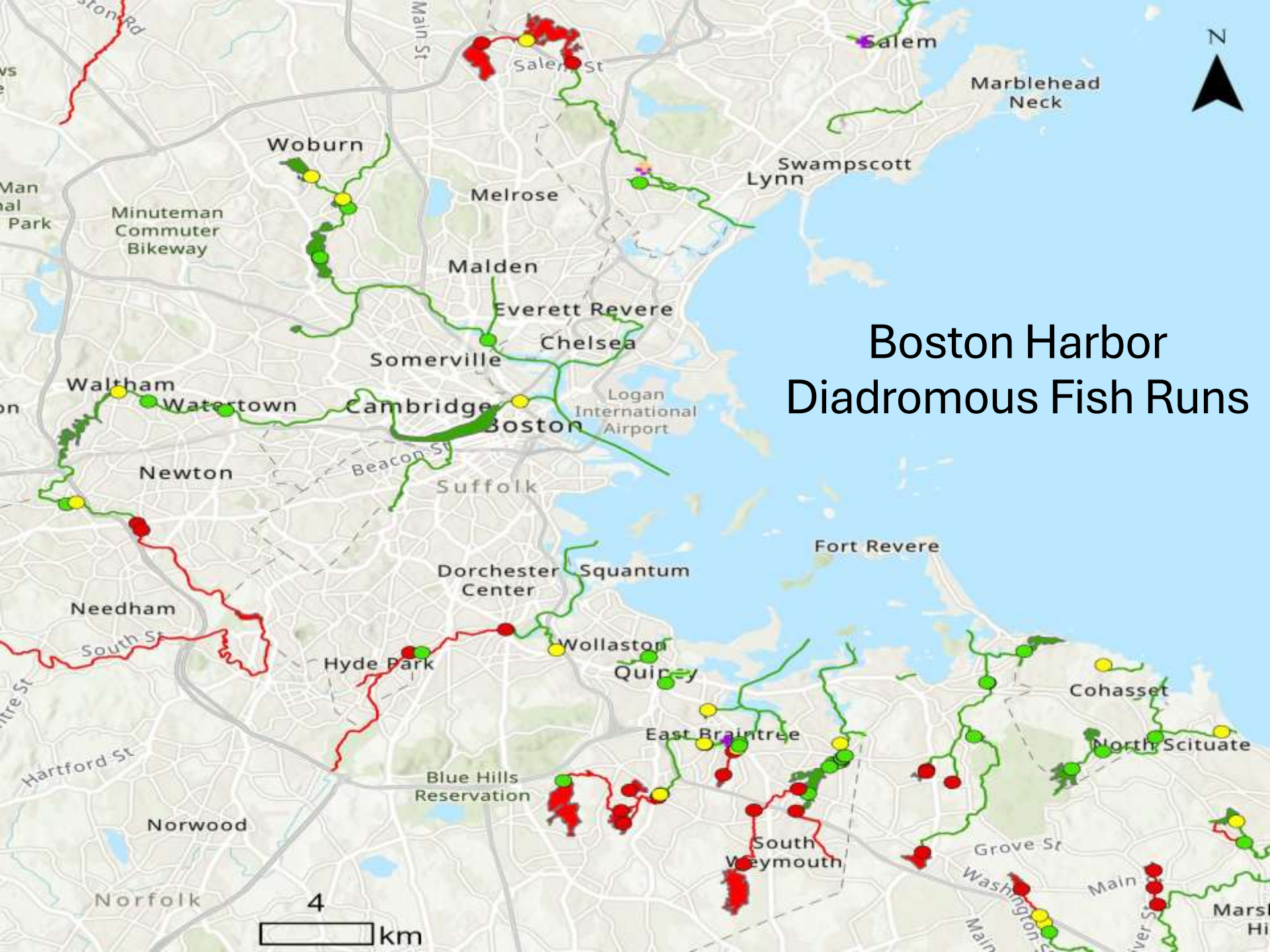
Diadromous Fish Monitoring and Restoration Updates

- **Boston Harbor Region**
- **ASMFC River Herring Stock Assessment**
- **River Herring spawning run counts**
- **Diadromous Fish Restoration Projects**





Boston Harbor region - 1819



Boston Harbor Diadromous Fish Runs

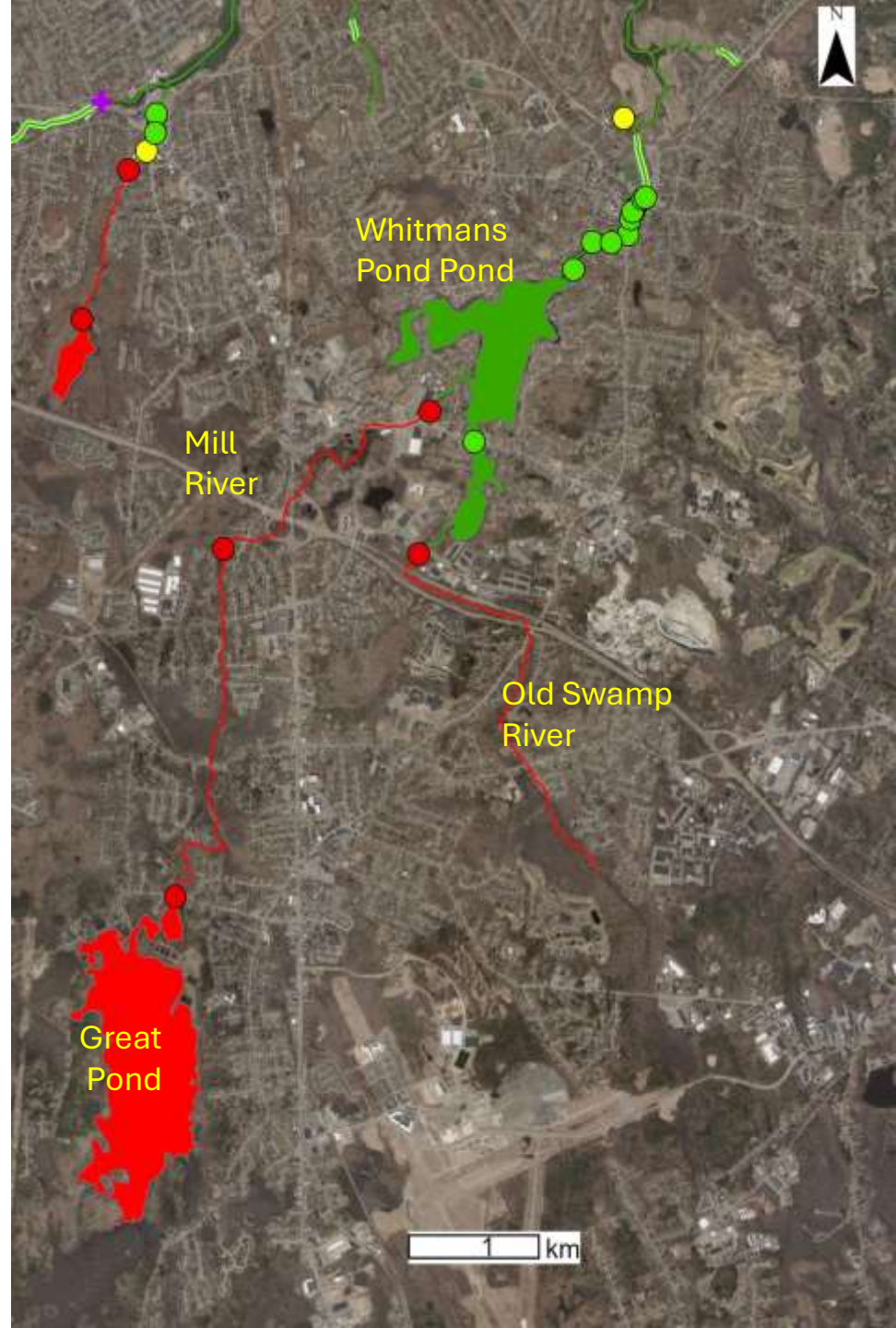
4 km

Back River Watershed

Whitman's Pond – 214 acres

- 7 structural fishways
- 15 locations on DMF Diadromous Fish Priority List
- 1500 fish/acre productivity

Great Pond – 330 acres

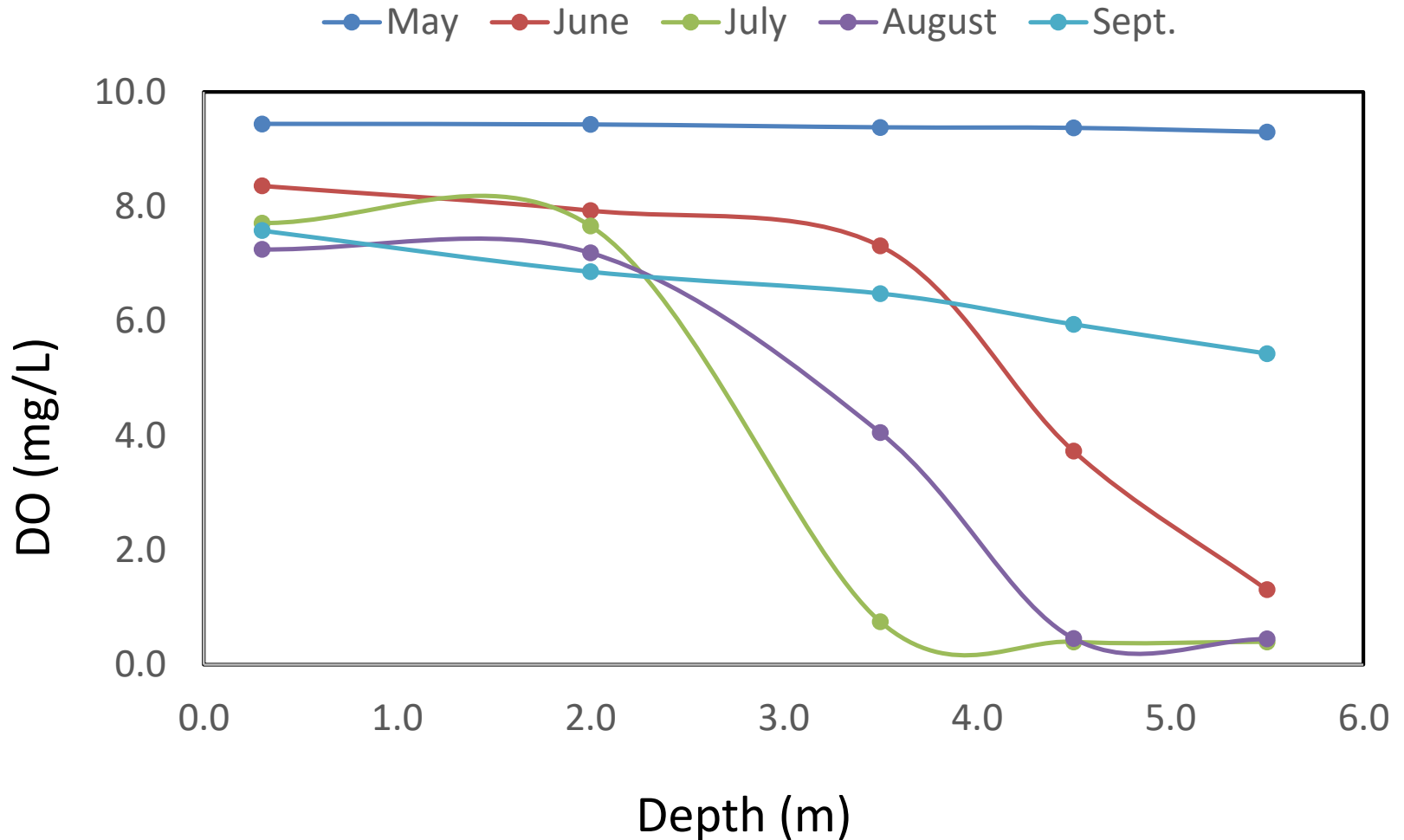




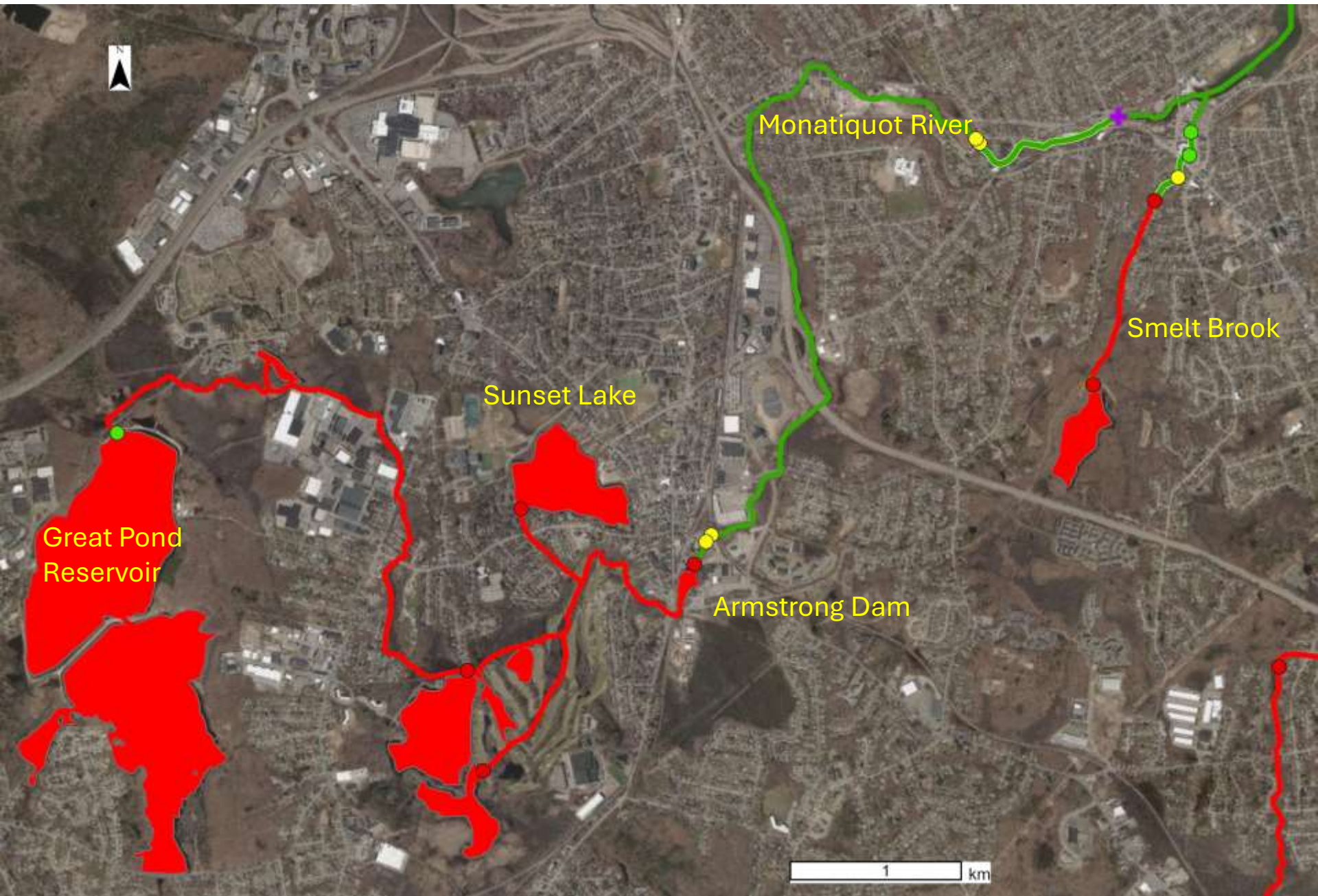
Back River, Weymouth

Whitman's Pond, Weymouth

Monthly DO at Depth



Fore River Watershed, Braintree - 2023

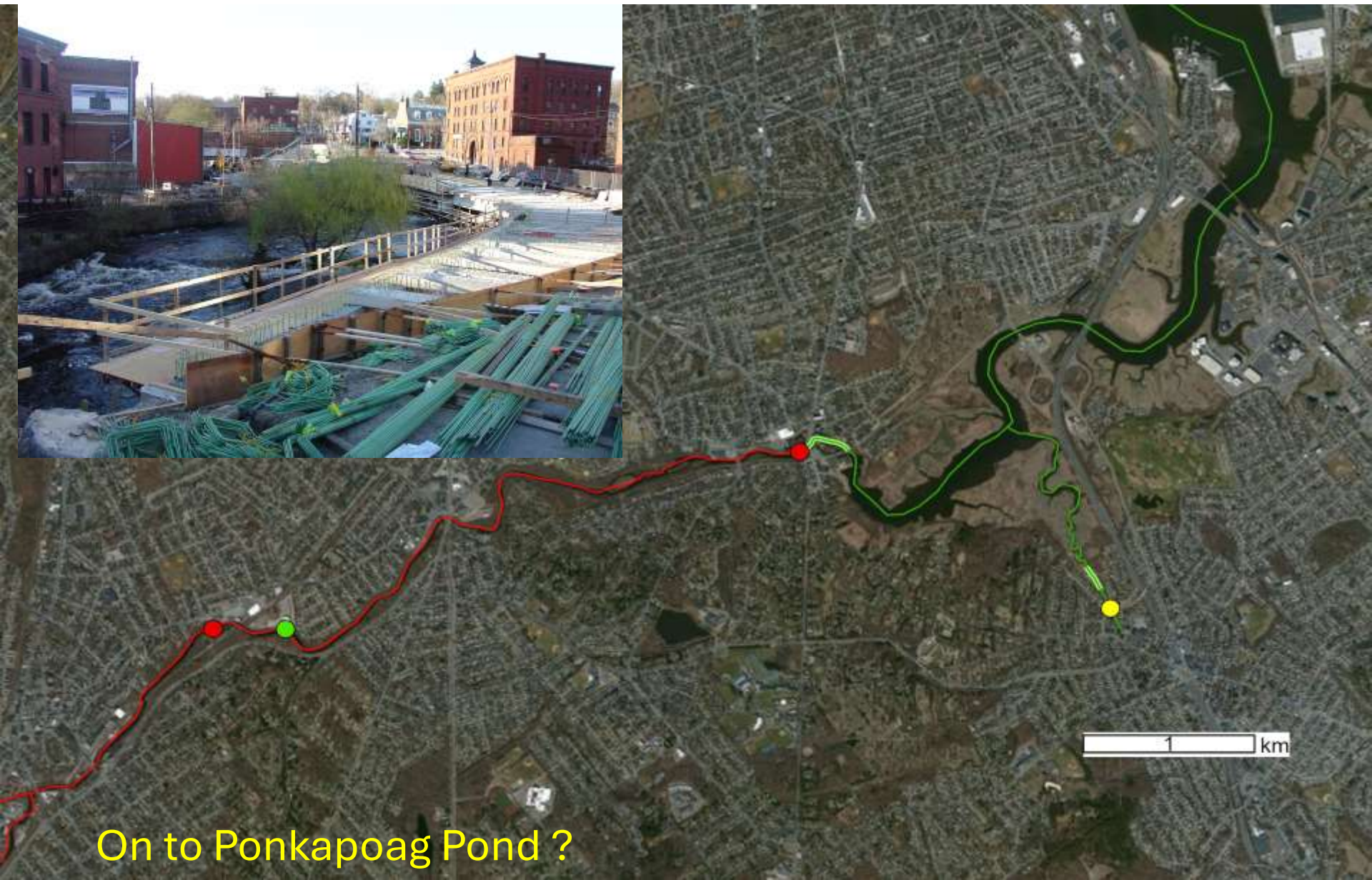


Fore River Watershed, Braintree - 2024





Neponset River



On to Ponkapoag Pond ?

Mystic River Watershed

- **2011:** no fish passage into Mystic Upper Lake and the Aberjona River
- Fishway concept boosted by “bucket brigade” during 2005-2008
- Mass. Dept. of Conservation and Recreational rebuilds the Mystic Lakes Dam in 2012
- Project includes new fishway, eel ramp and downstream migration channel

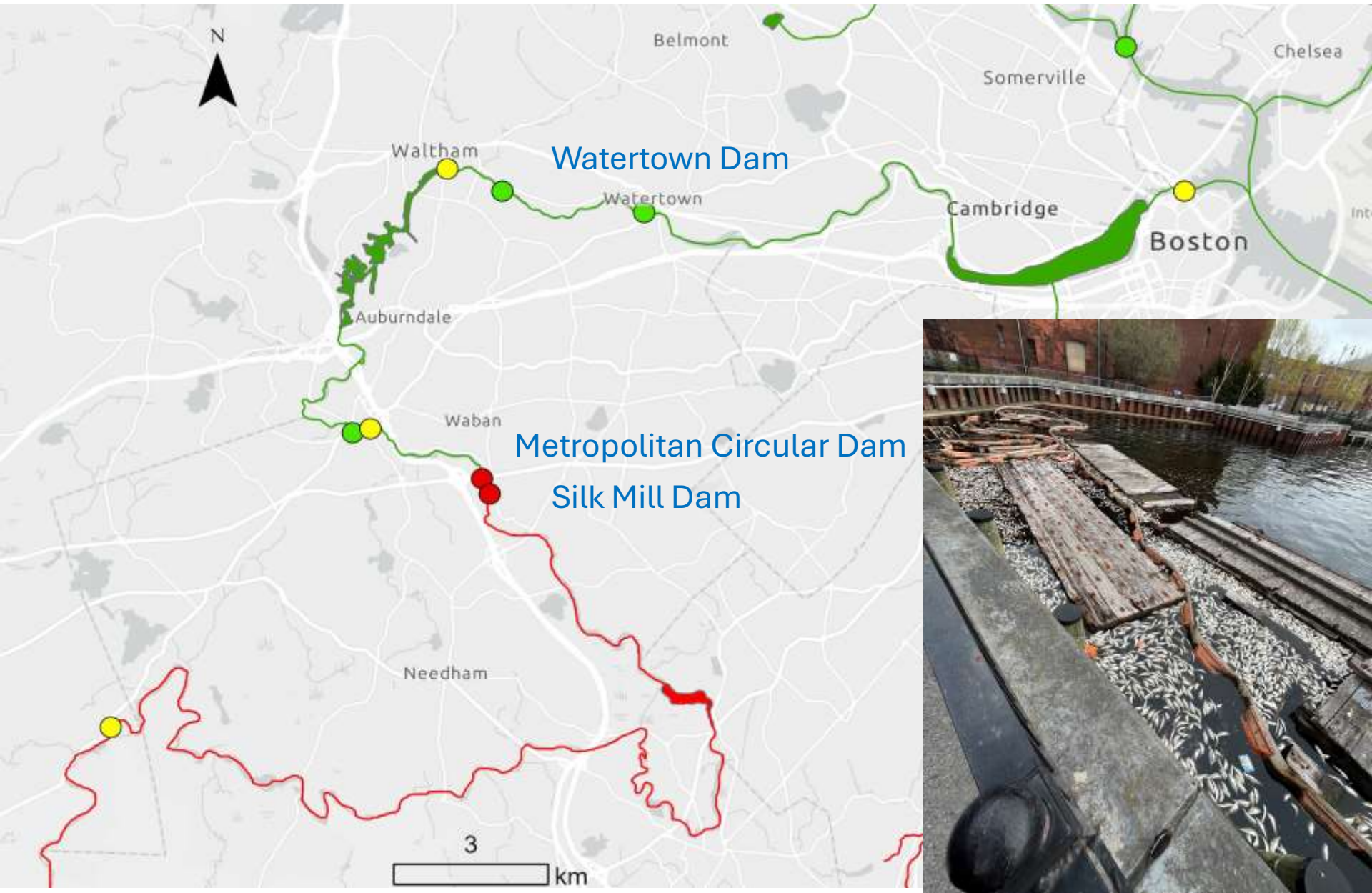


Mystic River Watershed

- Fishway installed at the Center Falls Dam in Winchester in 2016 funded largely by EPA Superfund
- DMF makes modifications to Scalley Dam bypass at Horn Pond in 2018: herring pass into Horn Pond
- Allows passage to 287 acres of spawning and nursery habitat
- *Top herring spawning run count in MA in 2017, 2022 and 2024*



Charles River



Weir River Hingham

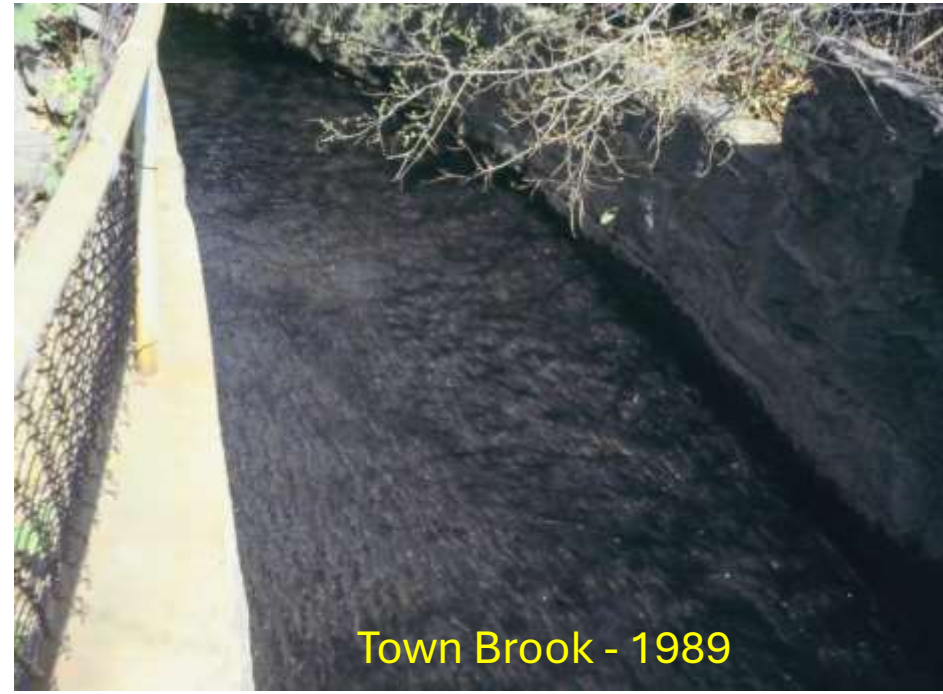
- Fishways at Foundry Pond and Triphammer provide access to 20 acres of spawning habitat
- Surface flows are severely limited in watershed
- 1998 Foundry Pond Dam reconstruction led to smelt egg kills during 1999-2001
- Major effort with stream maintenance during 2018-2022



DMF constructed the Triphammer Pond fishway in 1985, and repaired the Foundry Pond Fishway in 2010 and the Triphammer fishway in 2018

Rainbow Smelt

- Boston Harbor is the center of abundance in MA
- High cultural importance as shore caught food fish
- Two mitigation projects in the region restored smelt spawning habitat with stream daylighting projects



Town Brook, Quincy

- Large egg kills occurred in 1997 and 1998
- Flood control tunnel construction cut off >90% of April 1997 flow
- Age-2 smelt losses estimated at 14,000 to 21,000
- Penalty funds of \$75K required for restoration
- Daylighting construction in 2013 and culvert modification in 2014 to restore flows lost to flood tunnel



Smelt Brook, Weymouth

Smelt Spawning Habitat Daylighting Project

- Originated from MBTA Greenbush Train Station mitigation in 1994
- Not constructed until 2018
- Engineered channel to provide depth, velocity and substrate to suit smelt spawning habitat



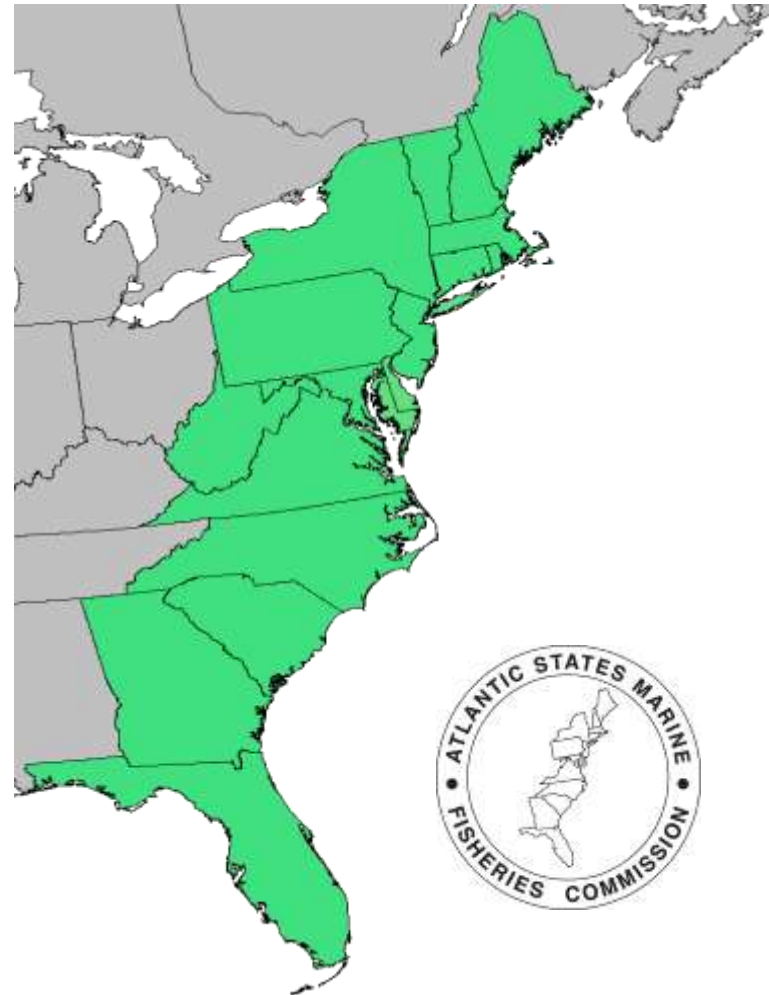
DMF Diadromous Fish Restoration Priority List – North Shore/Boston Harbor Region

Fore River –	Armstrong Dam / Rock Falls	1 st
Charles River –	Watertown Dam	2 nd
Mystic River –	Mystic Lakes Dam	3 rd
Neponset River –	Baker Dam	4 th
Aberjona River –	Scalley Dam	5 th
Back River -	SNUP Dam	8 th

Atlantic States Marine Fisheries Commission ASMFC

1. Interstate Fishery Mgt Plans
2. Sustainable Fishery Mgt Plans
3. Stock Assessments

- **American Shad** – Benchmark stock assessment in 2024
- **American Eel** – Benchmark stock assessment issued in 2023
- **River Herring** – New benchmark assessment in 2024



River Herring Stock Assessment

- The 2024 assessment is the second benchmark assessment for river herring. Following an update in 2018 and the first benchmark assessment in 2012
- Large effort to refine existing abundance trend series and mortality estimates
- River herring remains a data poor species. Few true biological reference points. Few data series go back to 1970s when landings collapsed



Stock Structure

- Individual rivers were the primary stock unit
- However, used genetic data to pool data by large East Coast regions in many cases based on Reid et al. (2018)
- Attempted to separate alewife and blueback herring but had to combined species in many cases



Fishery-Independent Data

- Net surveys and spawning run counts
- Trend analyses were conducted on run counts, survey CPUE rivers with Mann-Kendall and ARIMA models
- Use biological data to assess length, age and mortality demographics
- **Statistical Catch-at-Age model.** Developed in 2011 for the Monument River. Estimates age-3 abundance and natural mortality rates during 1980-2022 from total in-river catches, escapement counts, and escapement age composition

Abundance Trends

- The assessment reviewed abundance trends and/or mortality estimates for 105 stocks in 84 rivers
- Selected 52 datasets for alewife and 42 datasets for blueback herring
- Very few significant trends. Flat trends in most places
- No clear coast-wide trend since 2009 (Reference year from Amendment 2)

Results

Unlike the last update, very few significant trends:

“No clear coast-wide trends since 2009”

“Depleted relative to historic levels”

Alewife – N = 52 - no significant negative trends
only 4 significant positive trends (Northern)

Overall – large majority of abundance trend indices for both alewife and blueback herring >50% probability of being higher than 2009

Mortality – more than half the indices >50% probability of being higher than $Z_{40\%SPR}$ reference point

Peer R

- Stock assessment was based on
- River herring stock remains
- Much attention on ocean m
- Big pitch for more “sentinel populations” with abundance indices combined with biological data and standardized methods. Many sites now have just one river index
- Need more Statistical catch-at-age models (only 3)
- Interesting discussion on predation and trophic impacts



Ocean Bycatch

- Encouraging attention given to this complex and controversial topic
- Decline in removals recently presumably due to lower effort in Atlantic herring and mackerel fisheries
- 2005-2019: 343 mt annually
- 2020-2022: 91 mt annually



Massachusetts Run Counts

29 spawning run counts were considered from MA

Both Species	Counts	Length	Age	Mortality
Parker River	NA	↔	↔	↓
Mystic River	↑	↔	↔	↓
Back River	↔	↔	NA	↔
Town Brook	↔	↔	↔	↓
Monument River	↔	↔	↔	↔
Nemasket River	↑	↔	↔	↑

Massachusetts Run Counts

- 5 spawning run counts were accepted as indices of abundance for 2024 assessment. Through 2021.
- Herring Brook (Pembroke) and Herring River (Harwich) were not accepted but on the margin

Both Species	Counts
Stony Brook	↑
Herring River (Wellfleet)	↔
Agawam River	↔
Wankinco River	↑
Mattapoissett River	↓

Stock Assessment Run Count Criteria

- Consistent data collection methods over the time series
- 10 consecutive years of data
- 10% of tows/hauls/sampling events were positive for alewife or blueback herring

- Emphasis from Peer Review panel for more “Sentinel” stations with biological data, multiple indices and standardized methods

Electronic and Video Counter Stations in Massachusetts

Smith Root Electronic

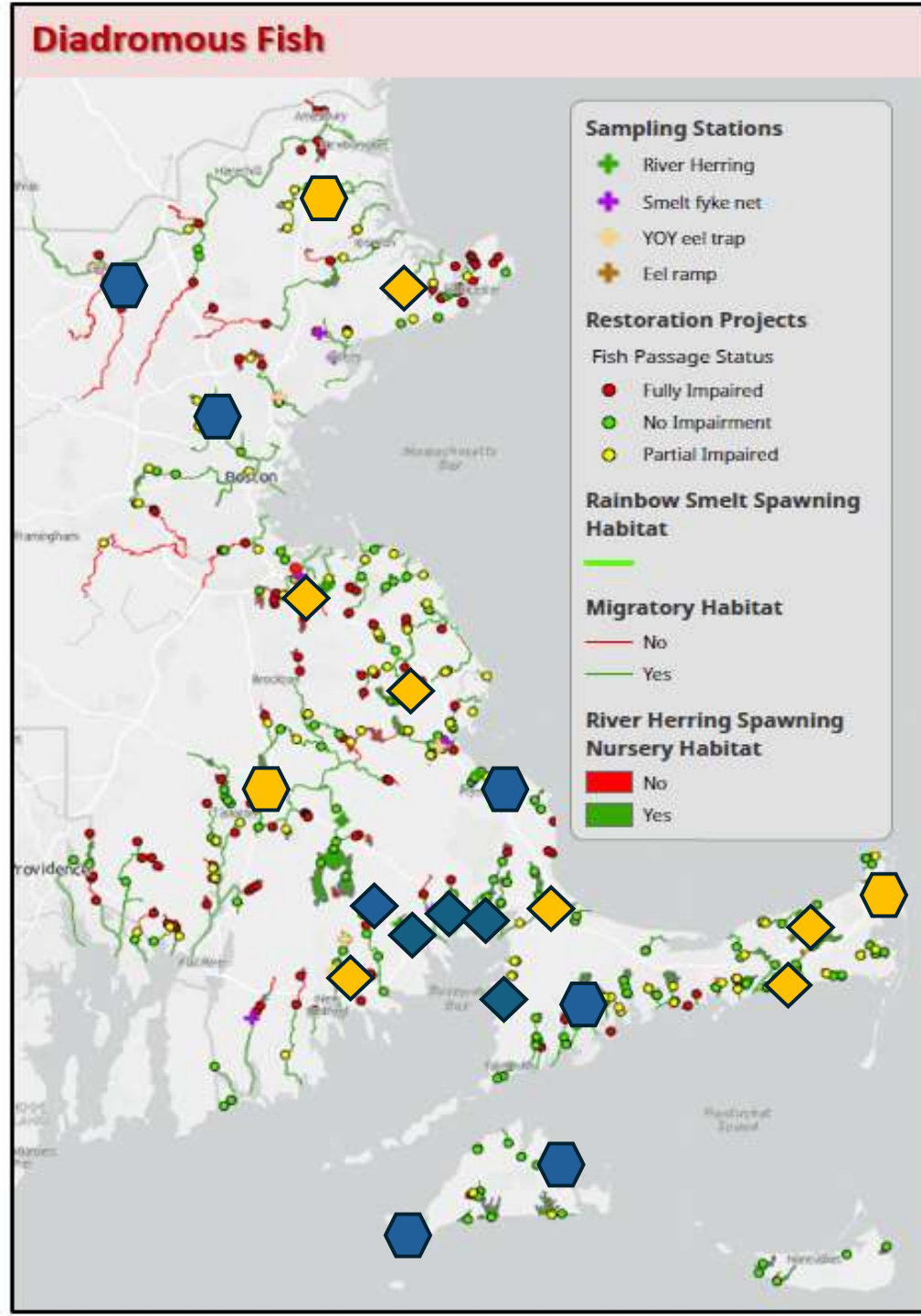
DMF  7 multi-tube counters

Buzzards Bay  5 single tube counters

Video

DMF  3 video stations

Local Partners  6 video stations



Electronic and Video Counter Stations in Massachusetts

Smith Root Electronic

DMF  7 multi-tube counters

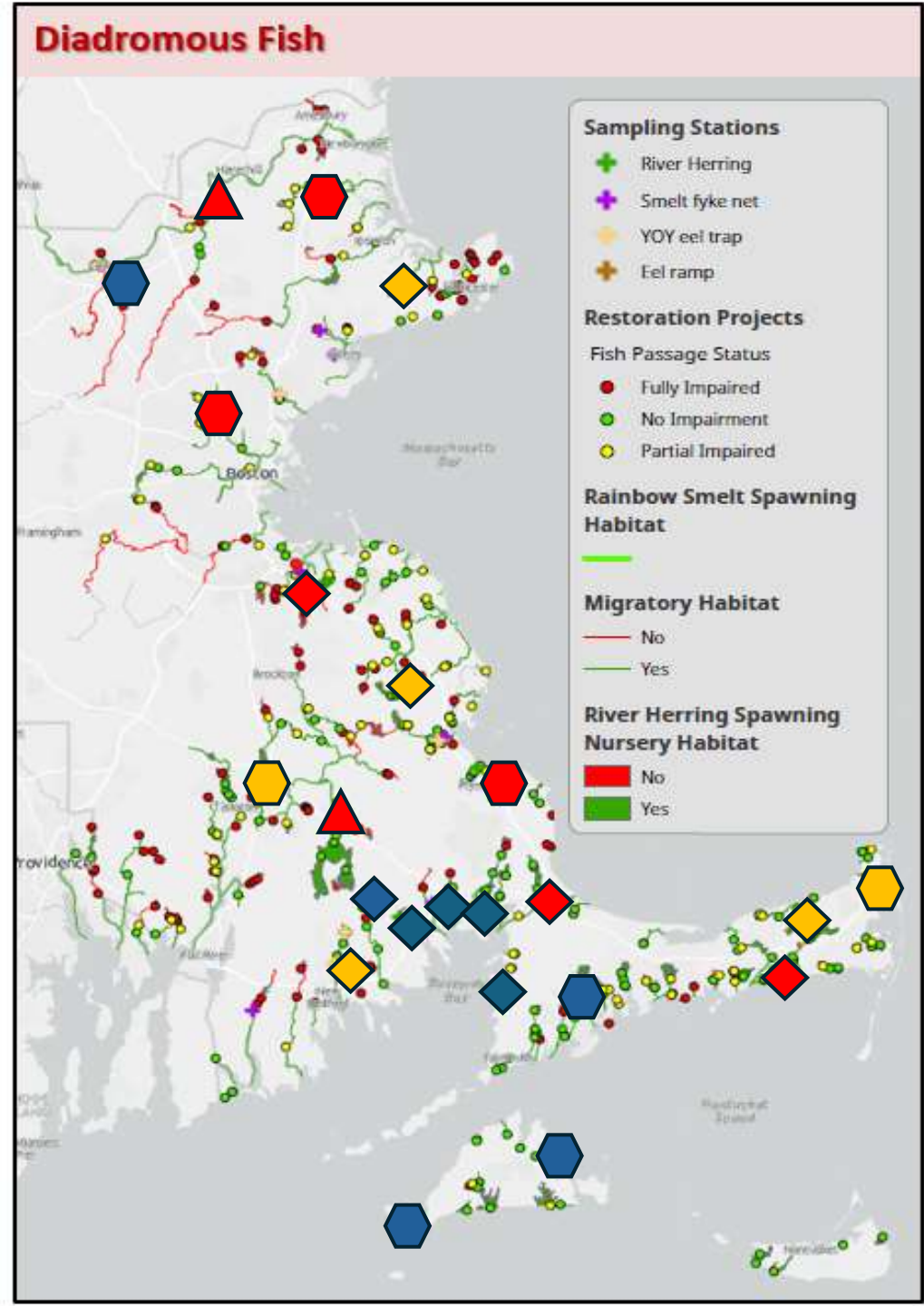
Buzzards Bay  5 single tube counters

Video

DMF  3 video stations

Local Partners  6 video stations

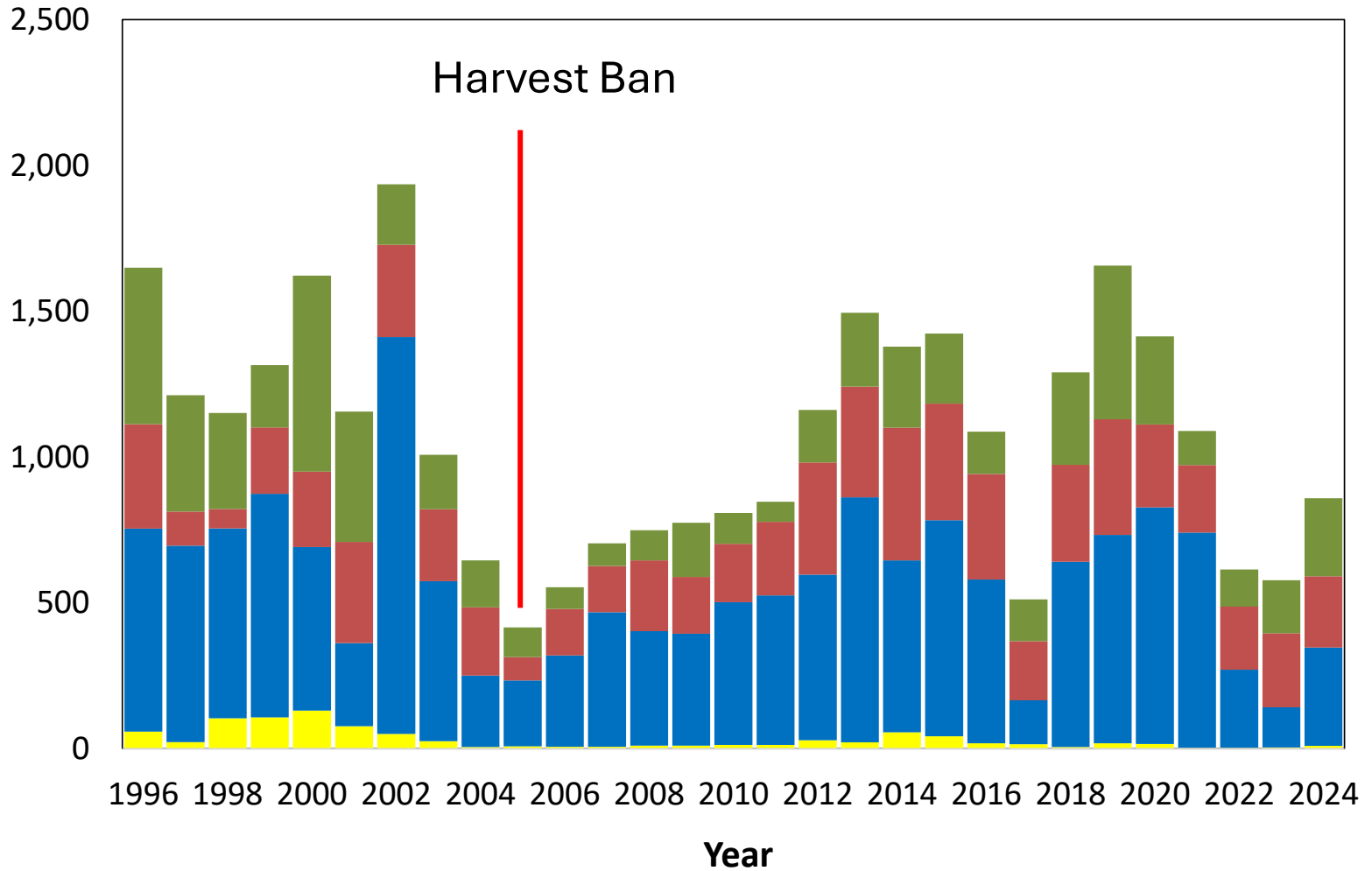
Sentinel Stations   



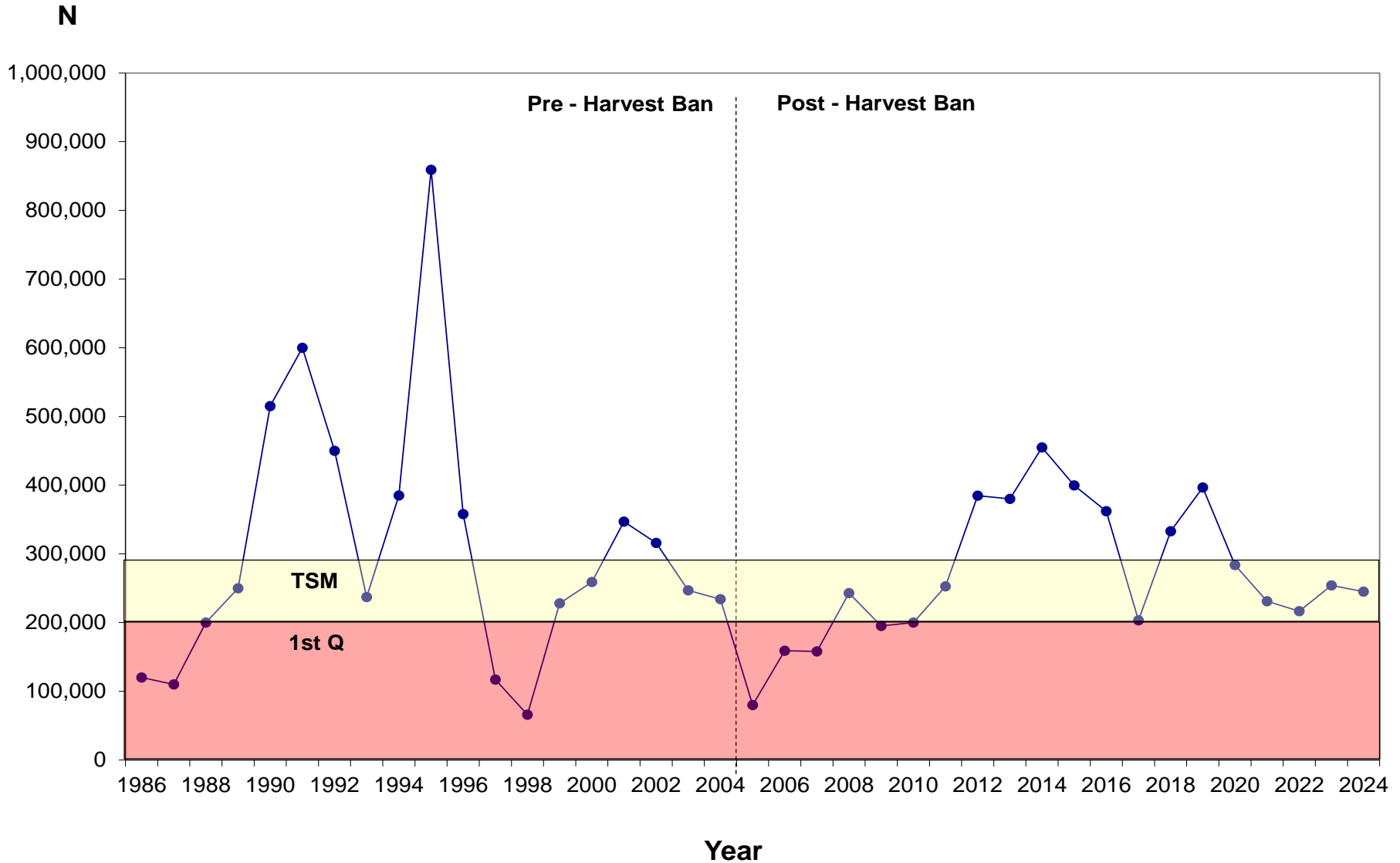
River Herring Spawning Run Counts +20-year combined

Counts (1,000s)

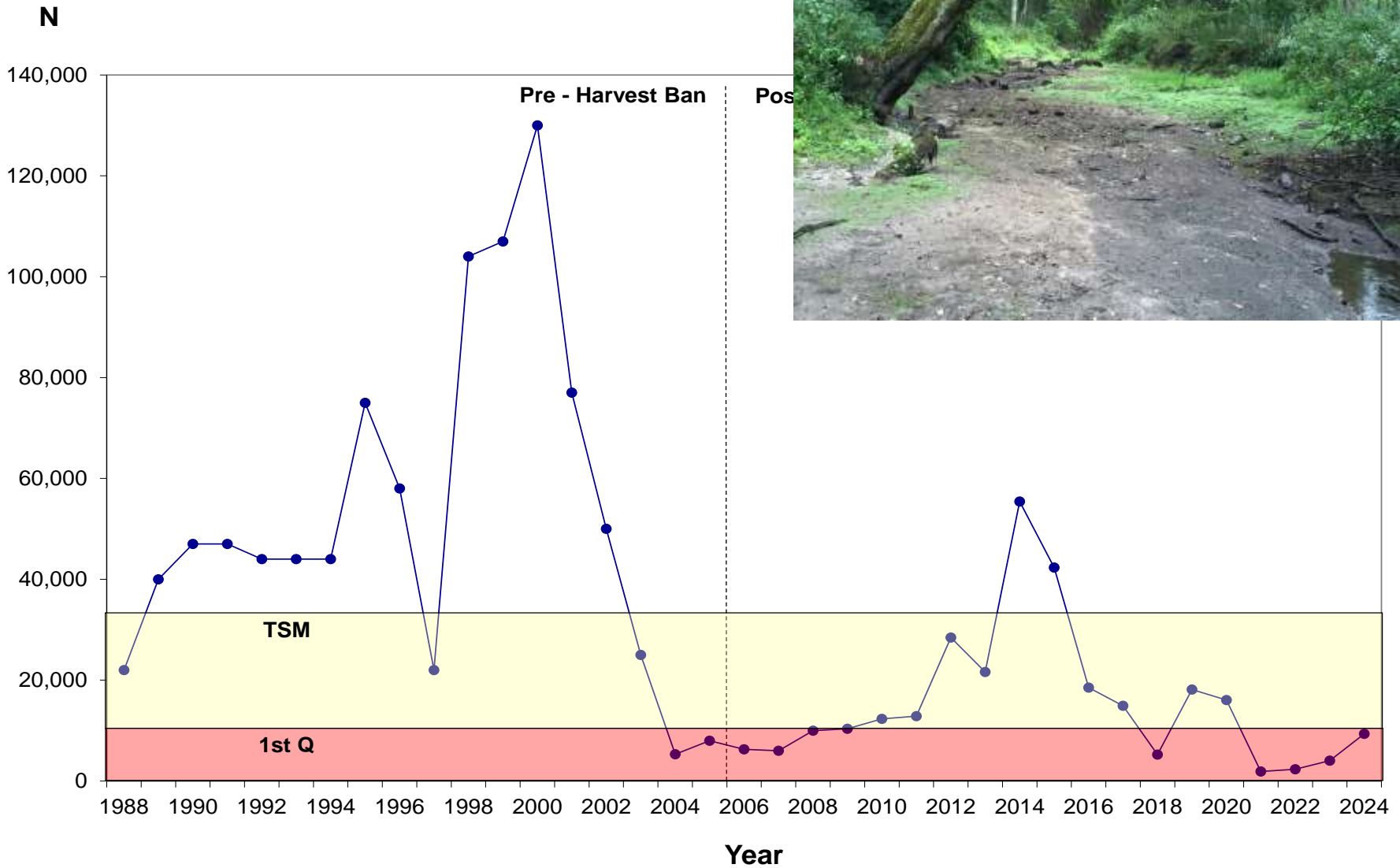
■ Mattapoisett ■ Nemasket ■ Back ■ Monument



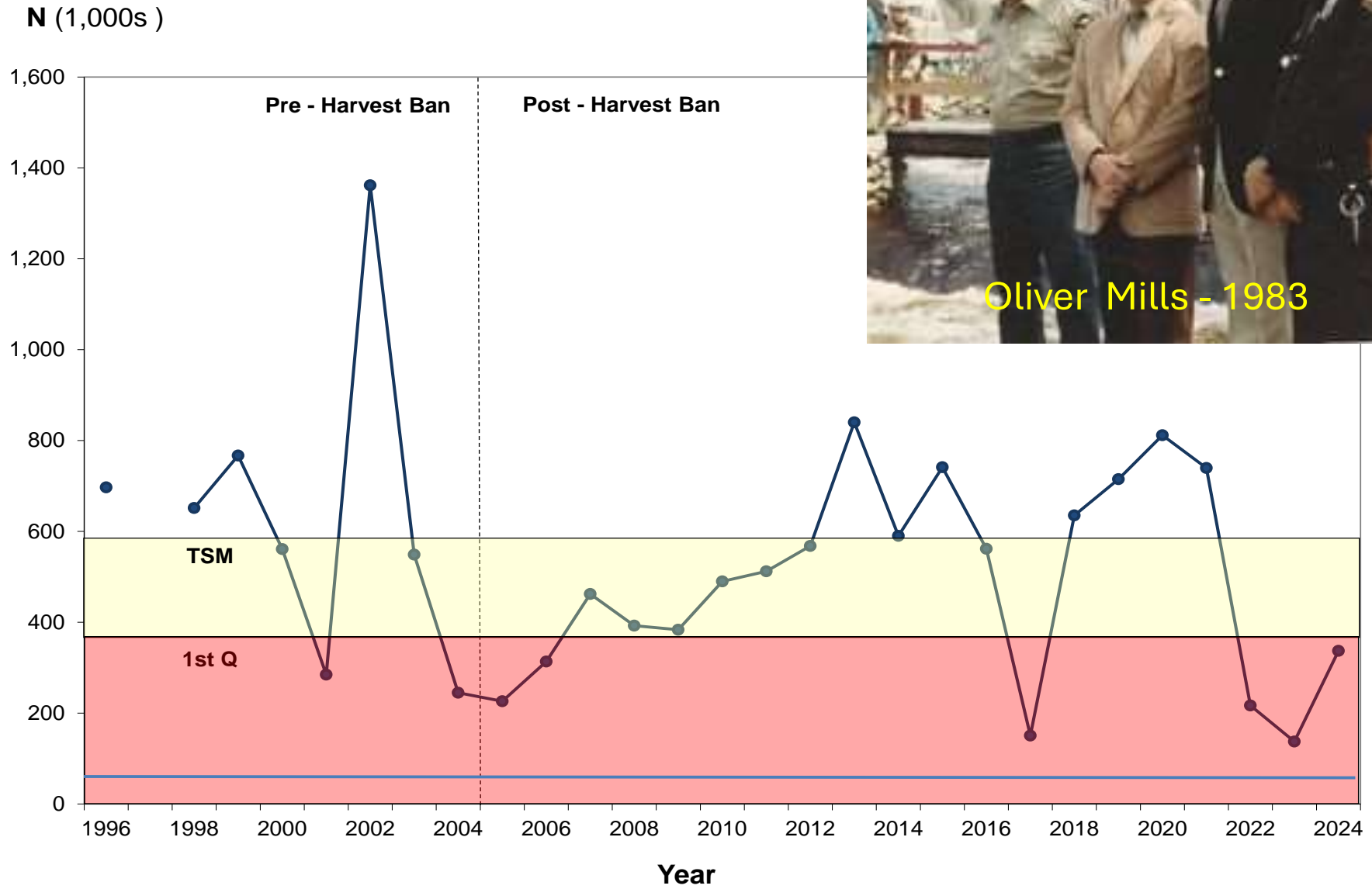
Weymouth-Back River



Mattapoissett



Nemasket Riv

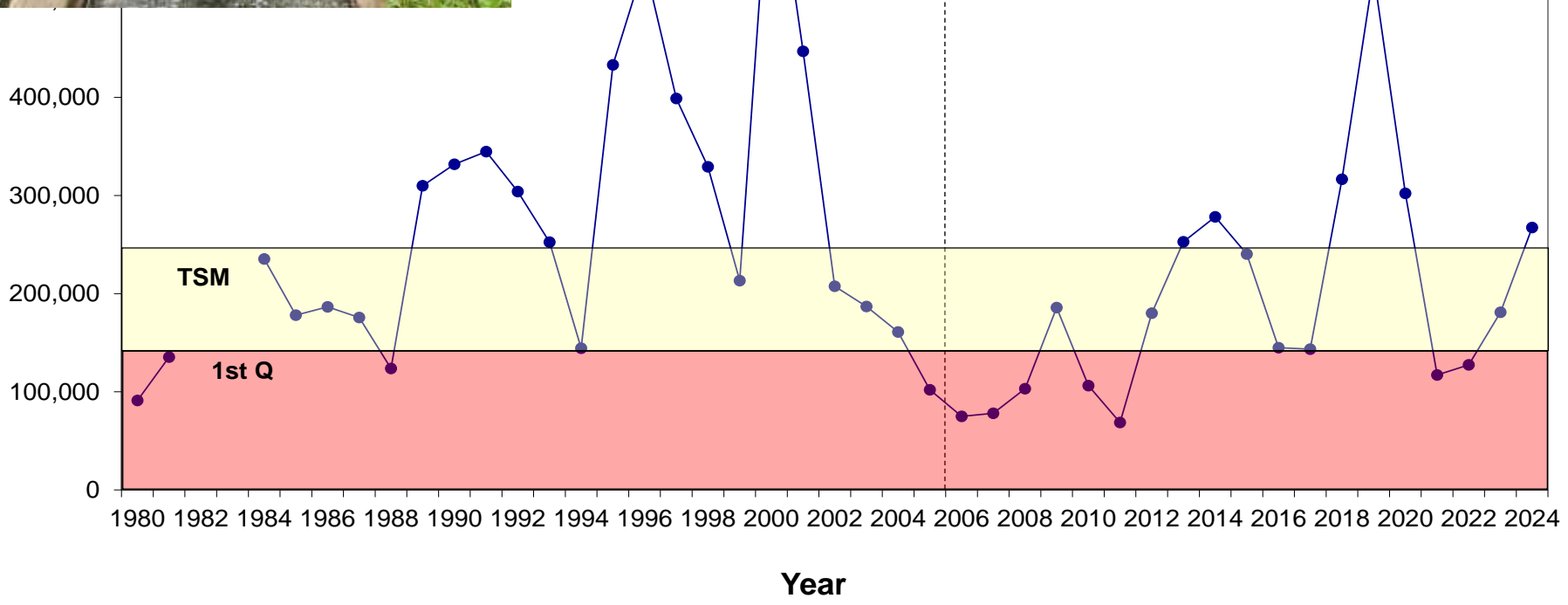




Monument



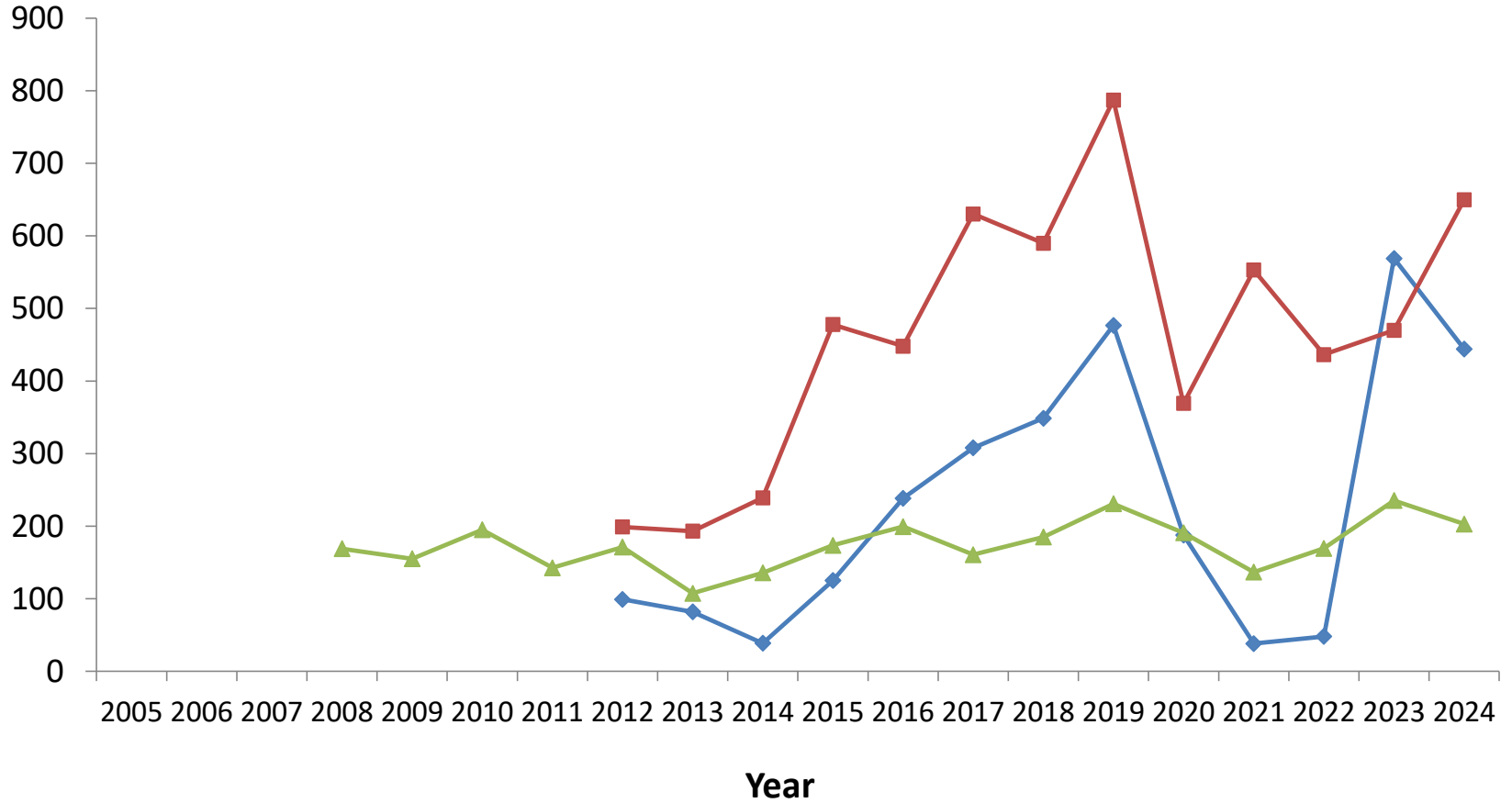
Pre - Harvest B



Restoration Response Runs

Counts (1,000)

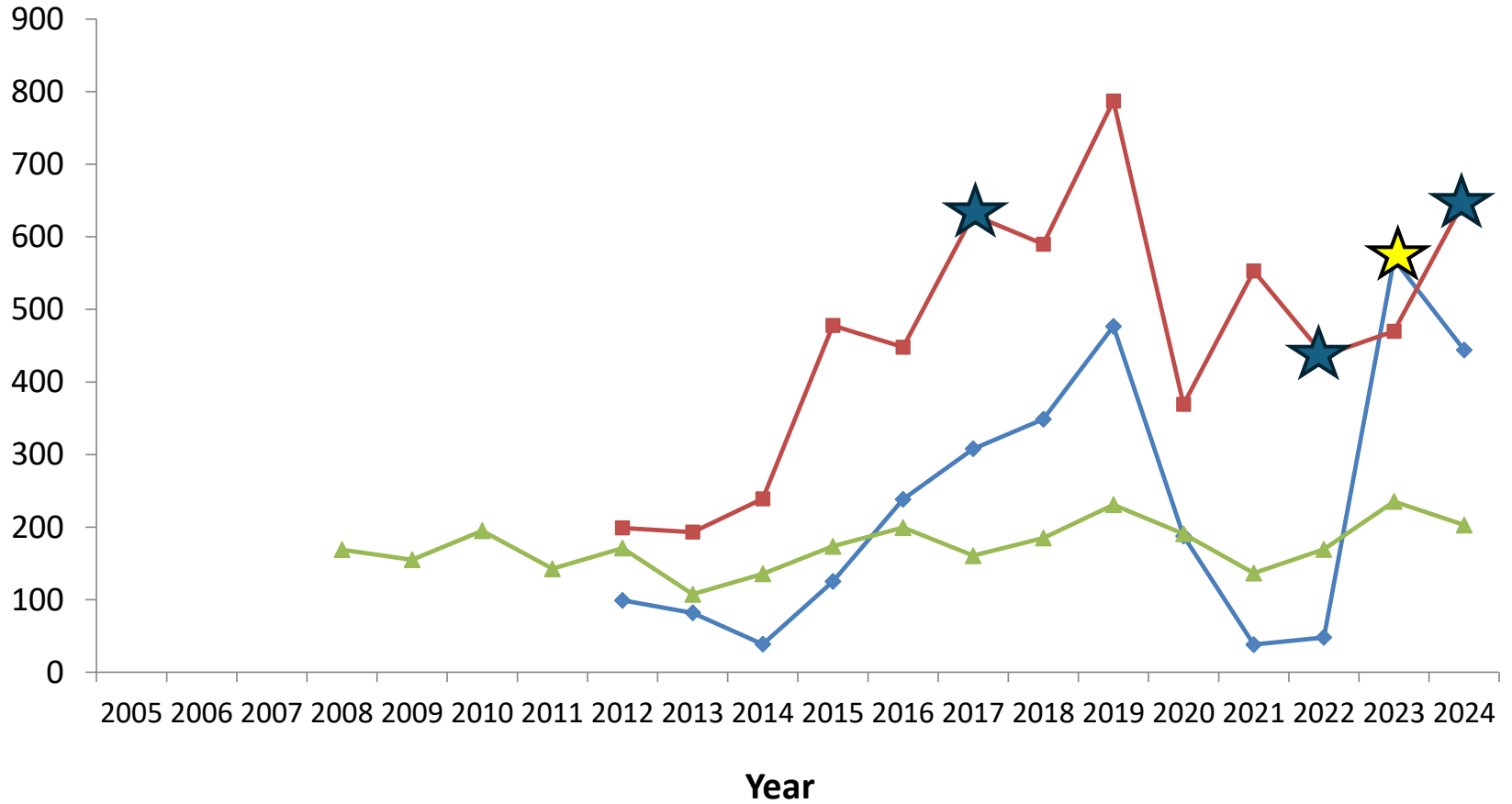
◆ Pembroke ■ Mystic ▲ Town Brook



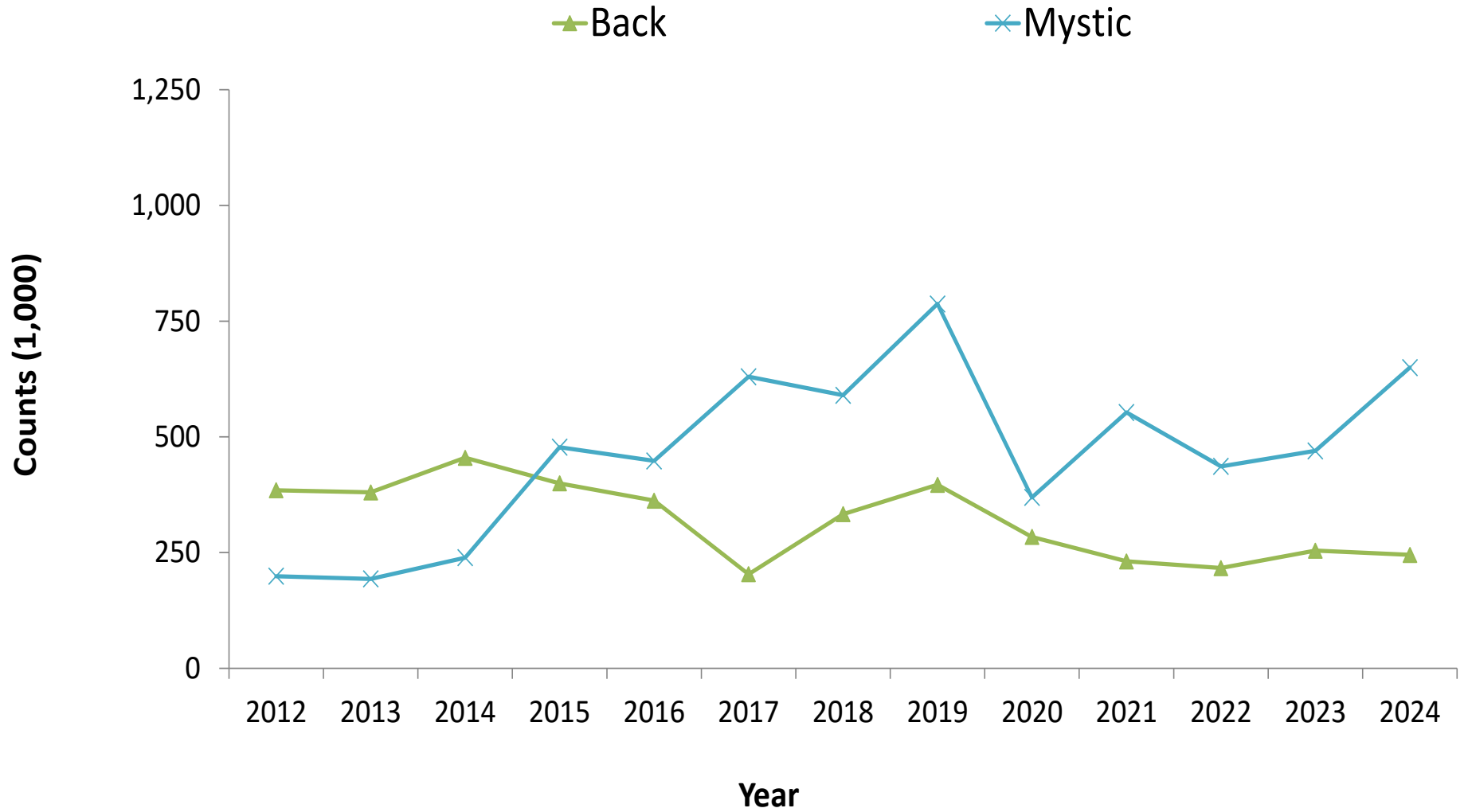
Restoration Response Runs

Counts (1,000)

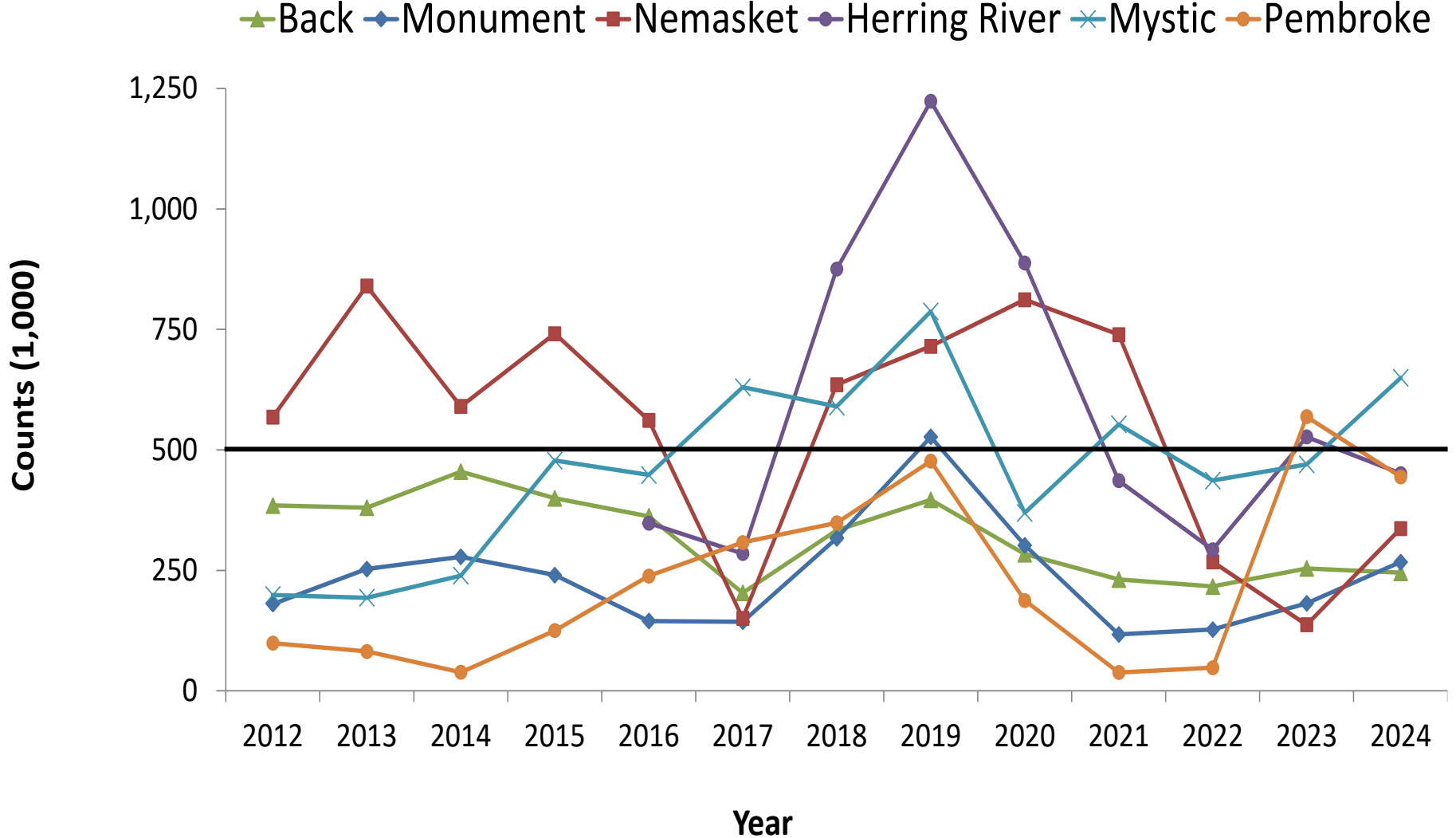
◆ Pembroke ■ Mystic ▲ Town Brook



Half-Million Club



Half-Million Club



Recent Spawning Run Counts > **200,000 fish**

Merrimack River

Charles River

Mystic River, Medford

Back River, Weymouth

Herring Brook, Pembroke

Herring River, Harwich

Nemasket River

Monument River, Bourne

Town River, West Bridgewater

Santuit River, Mashpee

Mashpee River, Mashpee

Stony Brook, Brewster

Town Brook, Plymouth

Recent Spawning Run Counts > 200,000 fish

Merrimack River

Charles River

Mystic River, Medford

Back River, Weymouth

Herring Brook, Pembroke

Herring River, Harwich

Nemasket River

Monument River, Bourne

Town River, West Bridgewater

Santuit River, Mashpee

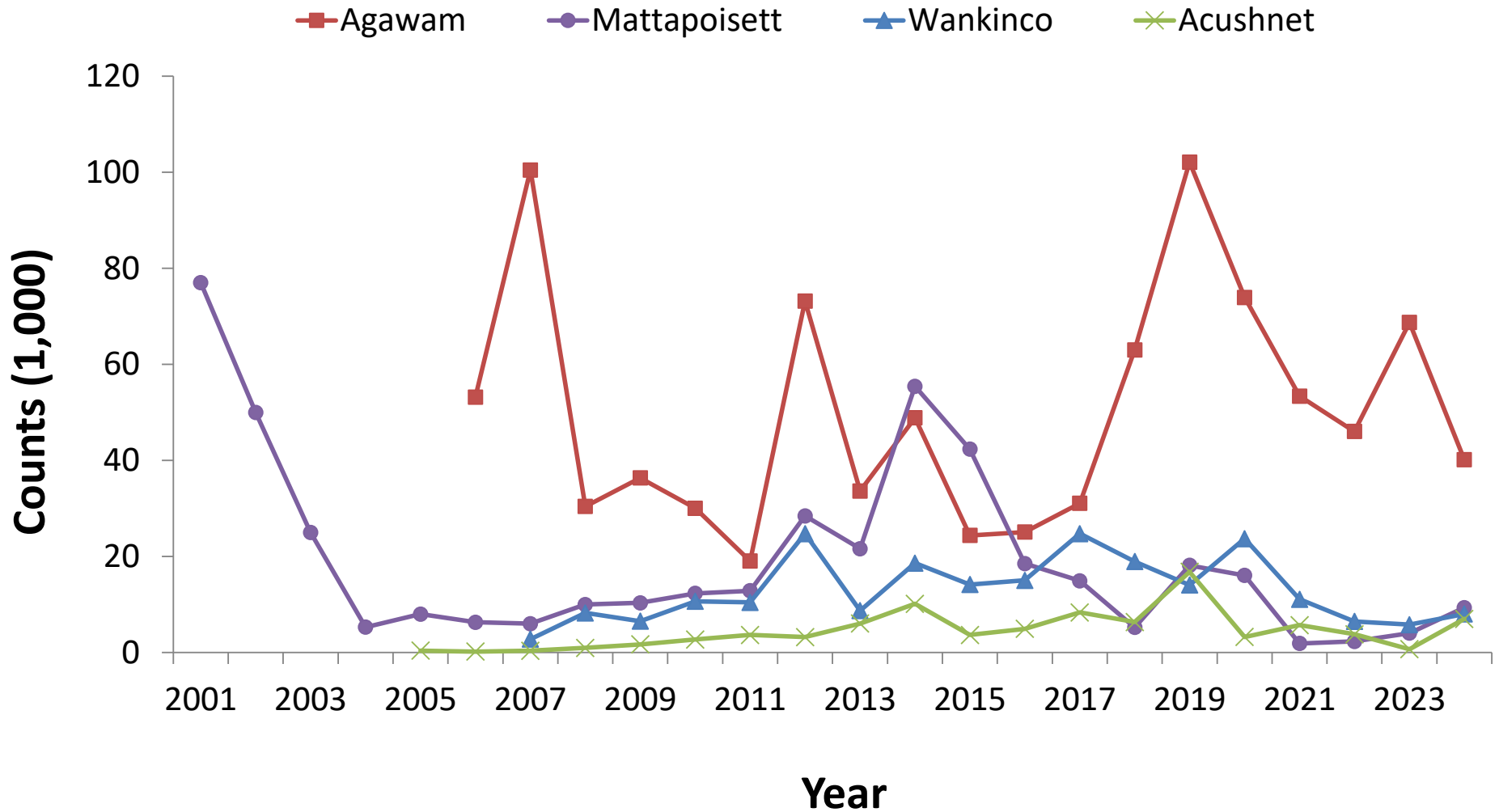
Mashpee River, Mashpee

Stony Brook, Brewster

Town Brook, Plymouth

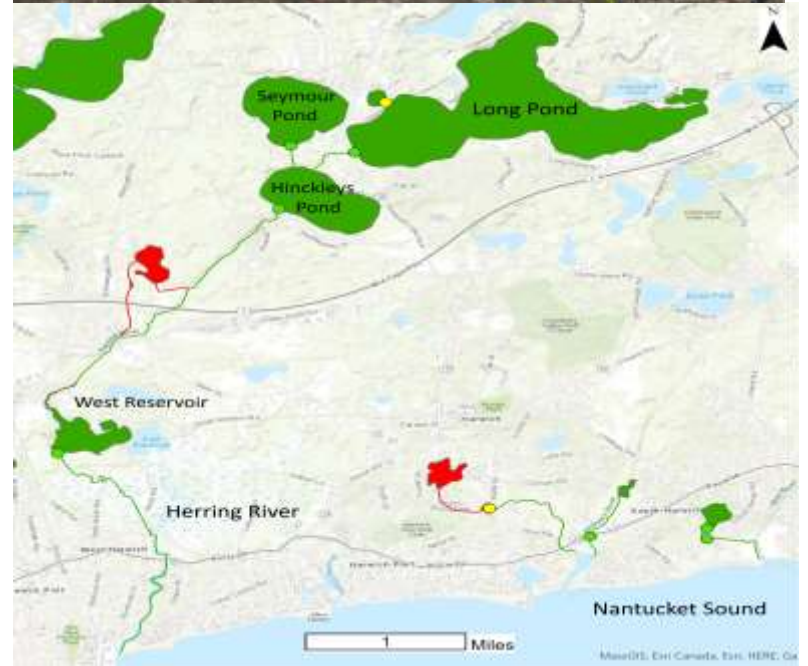
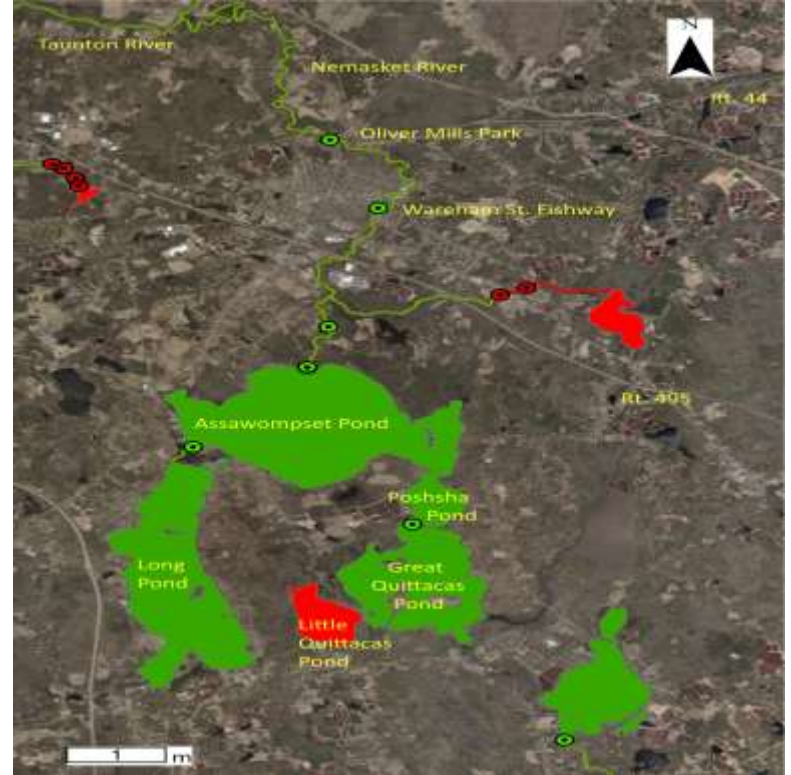
500,000 count club

Buzzard Bay Run Counts

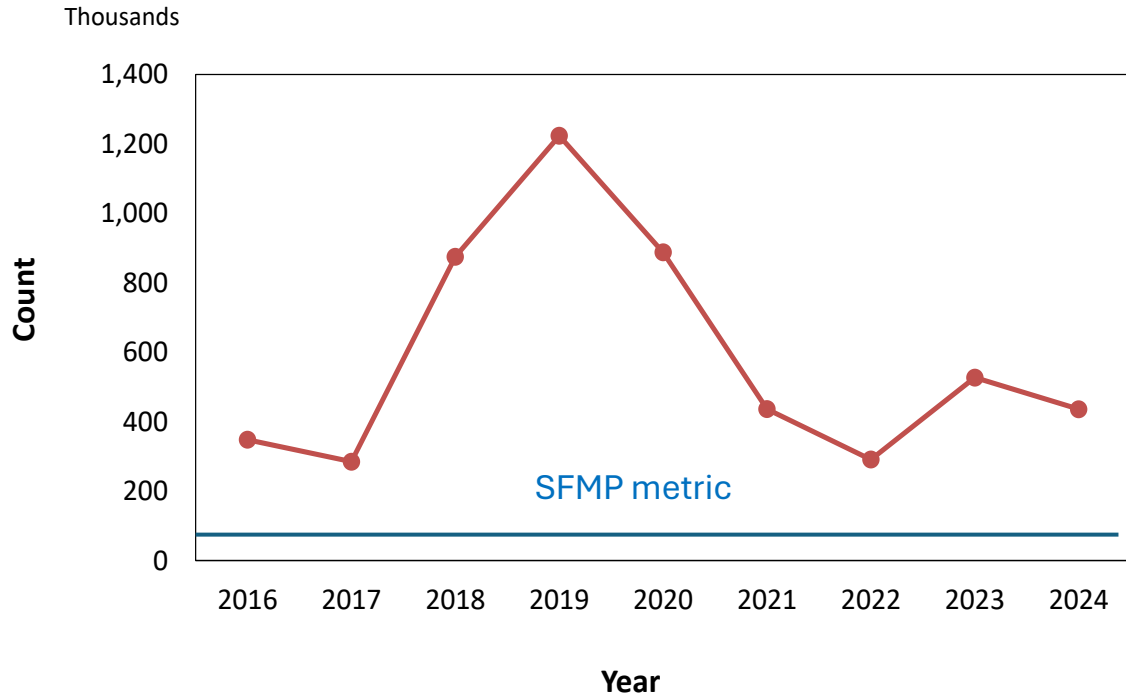


River Herring Harvest ASMFC Sustainable Fishery Mgt Plans

- Four Towns have requested DMF for harvest plans in the last 6 years
- Nemasket River plan renewed and Harwich approved in 2022
- Town of Pembroke has renewed request for SFMP in 2024



Herring River, Harwich Electronic Count 2016 - 2024



Sustainable Fishery Mgt Plan - Allows 10%
of time series mean (570,000 fish)

Taunton River Shad Stocking

- USFWS / DMF agreement for 5-years of shad stocking in the Taunton River
- Over 5 million shad larvae stocked 2022-2024
- DMF / DFW cooperative monitoring



MASSWILDLIFE

South River, Marshfield

Veterans Park Nature-Like Fishway

- Dam removal with weir-pool fishway integrated to water wheel and lagoon pond at park
- At least 6 diadromous fish species present
- Town project with construction start any day



Stony Brook, Brewster



- Iconic park with grist mill
- DMF Fishway Crew rebuild upstream weirs in 2011
- Cooperative project to fully reconstruct downstream fishway in 2025
- Town of Brewster, NRCS, CCCD project under the Cape Cod Water Resources Restoration Project
- Spawning and nursery habitat assessment underway

Sesuit Creek Culvert Replacement, Dennis



Mass DOT project contracted now to Robert Our Co. to replace two problematic culverts on Route 6A. Reoccurring passage blockages have caused significant impingement and predation mortality

Westport River, Westport

- Two impassible dams on the Westport River
- 165 acre spawning and nursery habitat at Noquochoke Lake
- Fyke net monitoring found strong diadromous fish presence
- 3rd and 6th ranked projects on DMF Restoration Priority List for region
- 2013-2015 Habitat Assessment and USFWS survey followed by signing MOU with Forge Pond Dam owner



Westport River, Westport



- USFWS surveys and DMF funds feasibility/design study by GZA in 2021
- DMF funds design/permitting project by GZA, October 2023
- USFWS conceptual design in 2024 on upstream Noquochoke Lake Dam. Seeking MOU for fishway with the City of Fall River

WESTPORT GRANGE #181

A presentation and public meeting on

Fish Passage Restoration in the Westport River

by the Massachusetts Division of Marine Fisheries



November 19, 2024 5-6 pm (free)
931 Main Rd, Westport MA 02790



Questions:

westportgrange181@gmail.com;

Brad Chase, Mass. DMF brad.chase@mass.gov

DMF Fishway Crew - 2024



Snuff Mill Dam,
Parker River, Newbury



Acushnet River



Herring Creek,
Aquinnah

Monument River, Cape Cod Canal, Bourne



Cooperative project with U.S. Army Corps of Engineers

Depot Pond, Eastham



River herring impeded from reaching 29-acre Depot Pond in Herring Brook Watershed. Removed large root ball from culvert, added a staff gauge and stop-log board slots, and grubbed out downstream channel

Herring Brook – Wings Pond, Falmouth



Extensive erosion disrupted the 10-weir in-stream channel fishway build by the DMF Fishway Crew in 1975. Cooperative project with the Town of Falmouth and cranberry bog owner to repair fishway.

Herring Brook – Wings Pond, Falmouth



Two week labor-intensive project that depended on DMF excavator and 5 DMF and 2 Falmouth staff.

Herring Brook – Wings Pond, Falmouth



Thank you! Questions?

Fore River, Braintree - 1989

