

An underwater photograph showing several fish swimming in a dark, murky environment. The fish are illuminated by a bright, warm light source, possibly a flashlight, creating a strong glow around them. The fish appear to be of various species, including what looks like a larger fish in the center and several smaller ones. The background is dark and indistinct.

Diadromous Fish Habitat Restoration Prioritization

MassDEP's Watershed Planning Workshop - March 8, 2017

Brad Chase – Mass. Division of Marine Fisheries

Bob Michelson

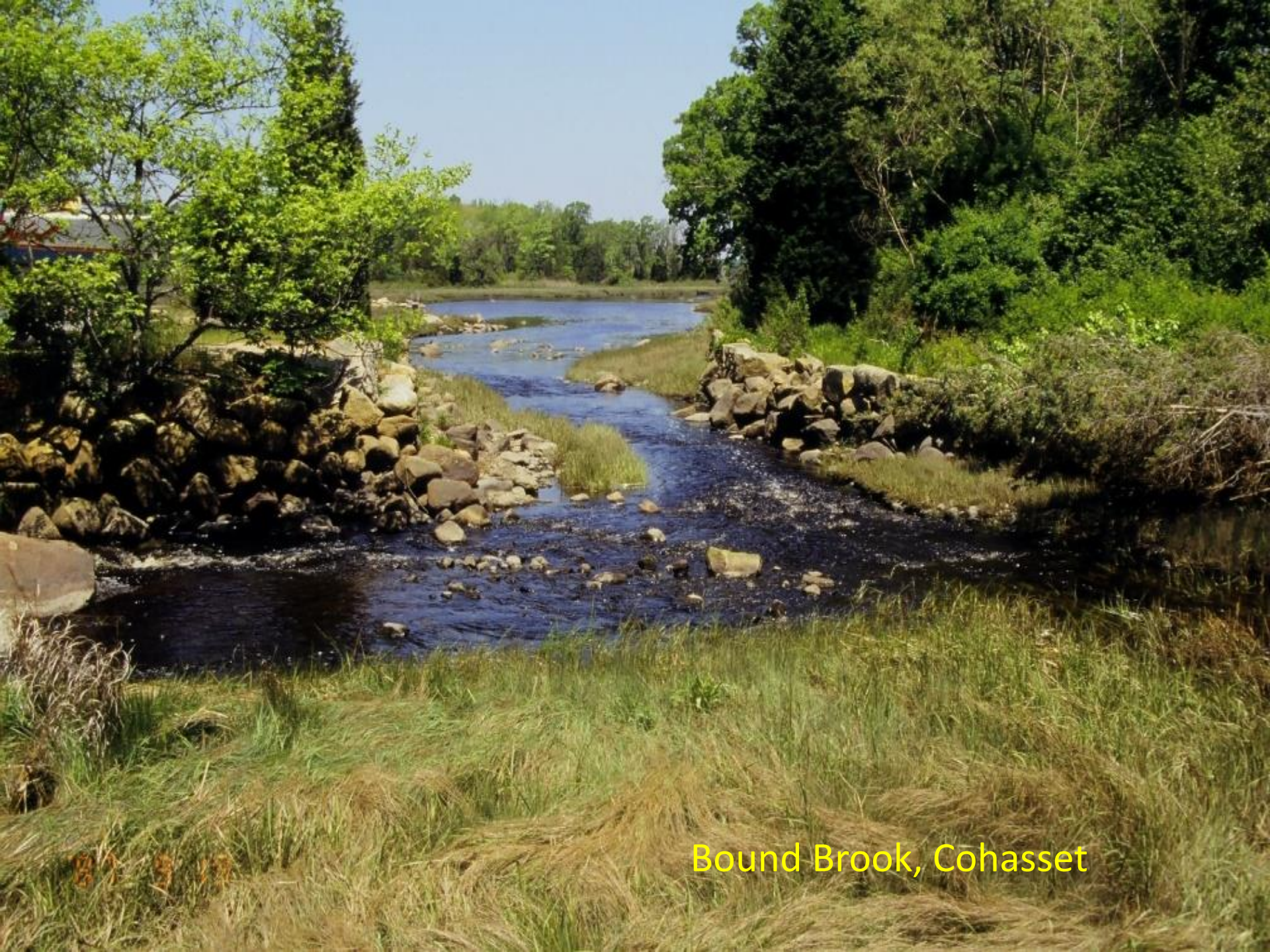
Diadromous Fish

- rainbow smelt
- American eel
- alewife
- blueback herring
- American shad
- white perch
- sea lamprey
- Atlantic tomcod
- sea-run trout
- striped bass

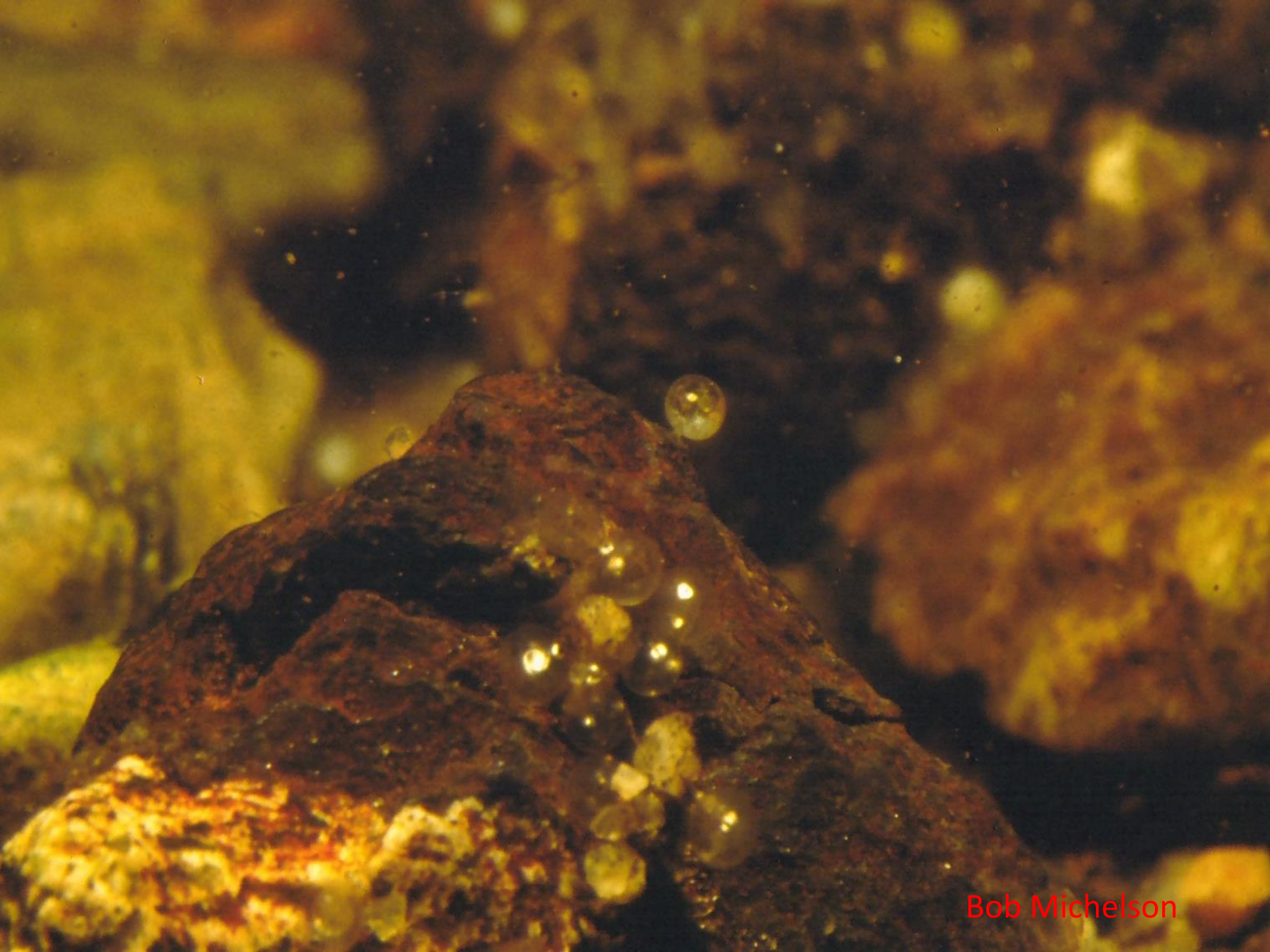


Bob Michelson





Bound Brook, Cohasset



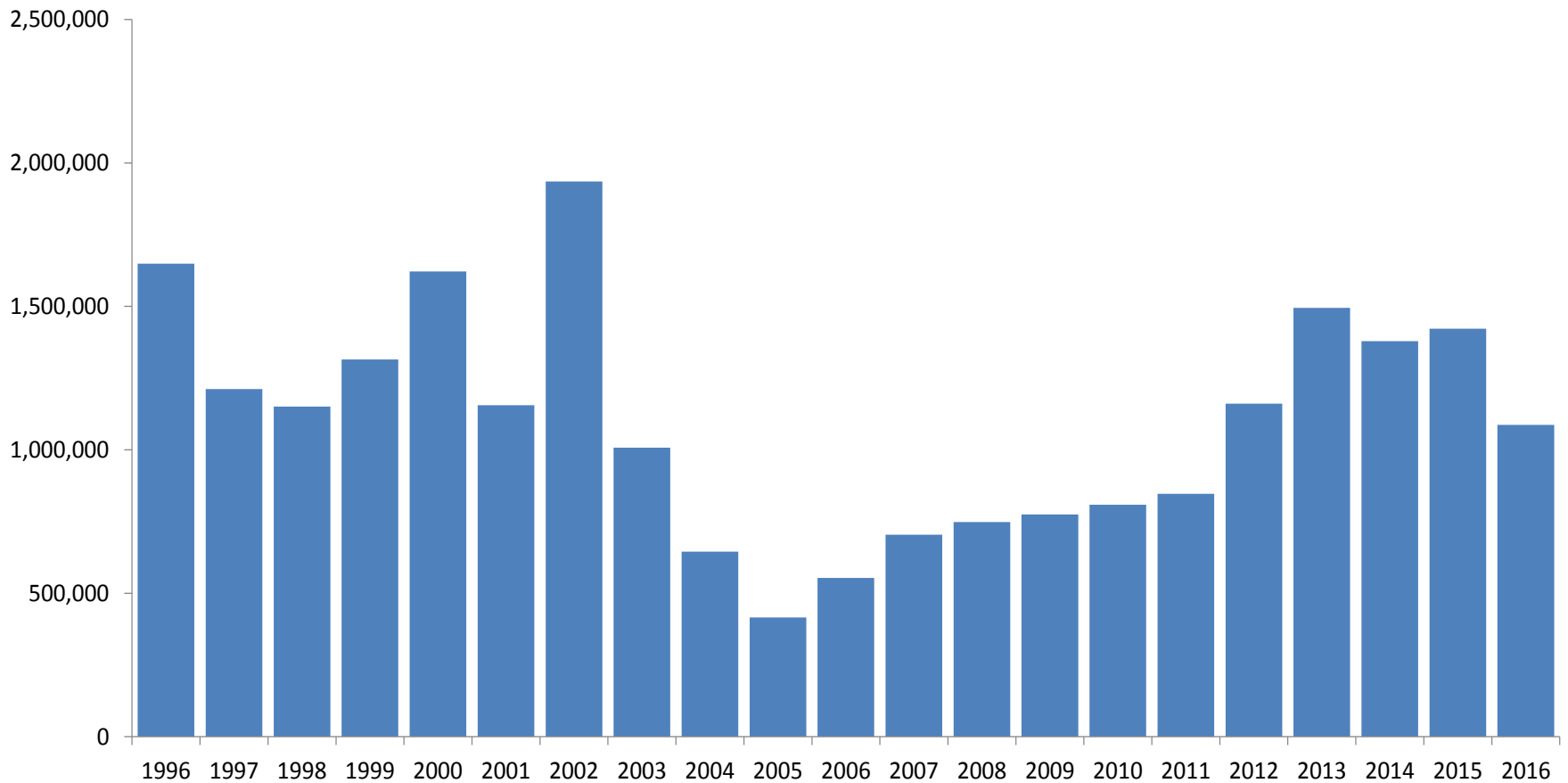
Bob Michelson

Declining Populations

- Fishing mortality
- Natural mortality
- Habitat alteration
- Climate change



Massachusetts River Herring 21-year count index



Habitat Alterations

- Passage barriers
- Watershed development
- Water management
- Eutrophication



Recreational and Diadromous Fisheries Program

- Diadromous Fish Passage and Habitat Restoration
- Diadromous Fish Biology and Management
 - 48 Towns with river herrings runs
 - 80 river herring runs
 - 140 fishways

Diadromous Fish Restoration Priority List

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graph TD; A[Diadromous Fish Restoration Priority List] --- B[Fish Passage Surveys]; A --- C[Population Monitoring]; A --- D[Regulatory Process]; A --- E[Habitat Assessments];
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Fish Passage Surveys

Population Monitoring

Regulatory Process

Habitat Assessments

Diadromous Fish Restoration Priority List

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graph TD; A[Diadromous Fish Restoration Priority List] --- B[Fish Passage Surveys]; A --- C[Population Monitoring]; A --- D[Regulatory Process]; A --- E[Habitat Assessments]; A --- F[Institutional Knowledge]; A --> G[MassDOT/ DMF GIS Data layer];
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Fish Passage Surveys

Population Monitoring

Regulatory Process

Habitat Assessments

Institutional Knowledge

MassDOT/
DMF GIS
Data layer

MASSACHUSETTS DIVISION OF MARINE FISHERIES

Diadromous Fish Habitat Restoration Priority List: **Parameter Table**

Parameter	Description	Value
Obstruction Number	Number of obstructions in river system of the proposed project.	per unit
Acreage	Of potential spawning/nursery habitat available.	0 - 15
Existing Population	Ranking of status of existing fish run.	0 - 10
Passage	Rank project by existing passage.	0 - 10
Stream Flow	Rank the status of stream flow to support life history stages	-10 - 0
Public Access	Rank the status of public access	0 - 5
Water Quality	Tiered approach depending on available data	-7 - 0
Water Conflict Use	Rank competing water uses.	-5 - 0
Project Feasibility	Rank factors that influence construction or implementation feasibility.	-5 - 0
Environmental Benefits	Rank factors that relate to improvements other than river herring	0 - 5
Existing Funding	Rank the availability of committed funds for project.	0 - 5
Local Support	Rank the interest and support of municipality and local NGOs.	0 - 5
Cost	Rank project by cost.	-5 - 0

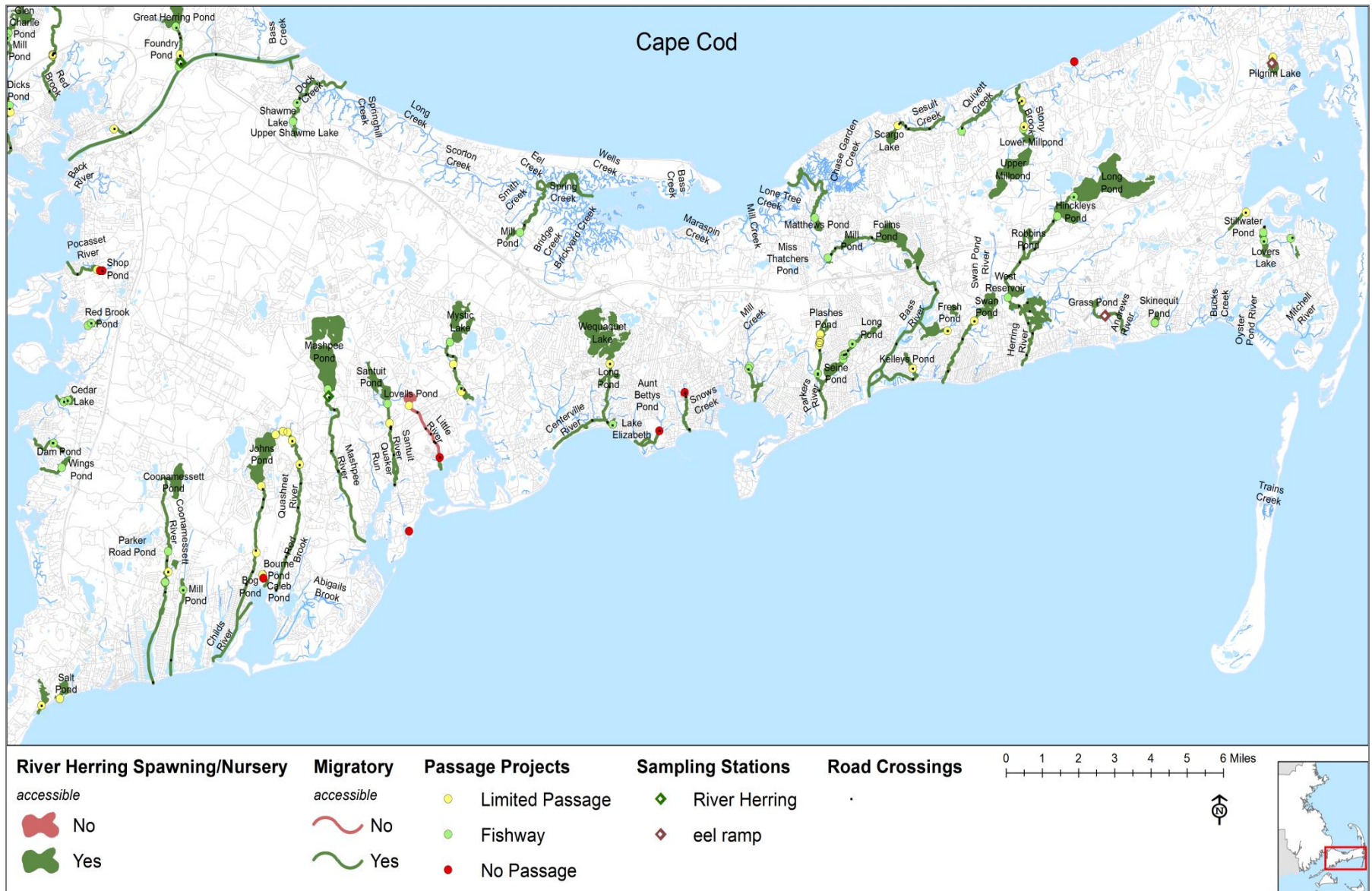
MASSACHUSETTS DIVISION OF MARINE FISHERIES

Diadromous Fish Habitat Restoration Priority List

Attribute Categories

Region	Watershed	Species	Condition	Project Type	Project Status	Project Scope
1 = TR-18	Merrimack River	alewife	channel limitation	fish ladder	conceptual	cooperative
2 = TR-17	Parker River	blueback herring	culvert limitation	channel improvement	planning	DMF
3 = TR-16	Ipswich River	American shad	existing fishway	fishway improvement	construction	private
4 = TR-17	North Coastal	rainbow smelt	fish lift	passage improvement	complete	
	Boston Harbor	American eel	degraded habitat	culvert improvement	dormant	
	South Coastal	white perch	no present passage	fishway maintenance	maintenance	
	Cape Cod	lamprey	passage limitation	stream maintenance		
	Islands		water diversion	dam breach		
	Buzzards Bay		sedimentation	dam removal		
				water management		
				operational		
				eel pass		
				smelt spawning riffle		
				tidegate		
				limited potential		
				channel daylighting		

Diadromous Fish – GIS Transportation Datalayer





Technical Report

**Massachusetts Division of Marine Fisheries
Technical Report TR-42**

**Quality Assurance Program Plan (QAPP)
for Water Quality Measurements
Conducted for Diadromous Fish
Habitat Monitoring
Version 1.0, 2008-2012**

B. C. Chase

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Department of Fish and Game
Massachusetts Division of Marine Fisheries

May 2010

Habitat Criteria and Classification

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graph TD; A[Habitat Criteria and Classification] --- B[Life History]; A --- C[MassDEP SWQS]; A --- D[US EPA Nutrient Criteria]
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Life History

MassDEP SWQS

US EPA Nutrient Criteria

Summary of river herring habitat assessment criteria for Great Pond Reservoir, Braintree, 2008/2010.

Parameter	Units	Sample Size (No.)	Acceptable Criteria	Exceedance (%)	Classification
Temp. (nursery)	°C	31	≤28.3	0	<i>Suitable</i>
Temp. (spawning)	°C	41	≤26.0	0	<i>Suitable</i>
DO	mg/L	64	≥5.0	2	<i>Suitable</i>
pH	SU	74	6.5 to ≤8.3	1	<i>Suitable</i>
Secchi	m	18	≥2.0	0	<i>Suitable</i>
TN	mg/L	5	≤0.32	40	<i>Impaired</i>
TP	ug/L	5	≤8.0	20	<i>Impaired</i>
Eutrophication	NA	10	BPJ	0	<i>Suitable</i>
Fish Passage	NA	10	BPJ	100	<i>Impaired</i>
Stream Flow	NA	10	BPJ	100	<i>Impaired</i>

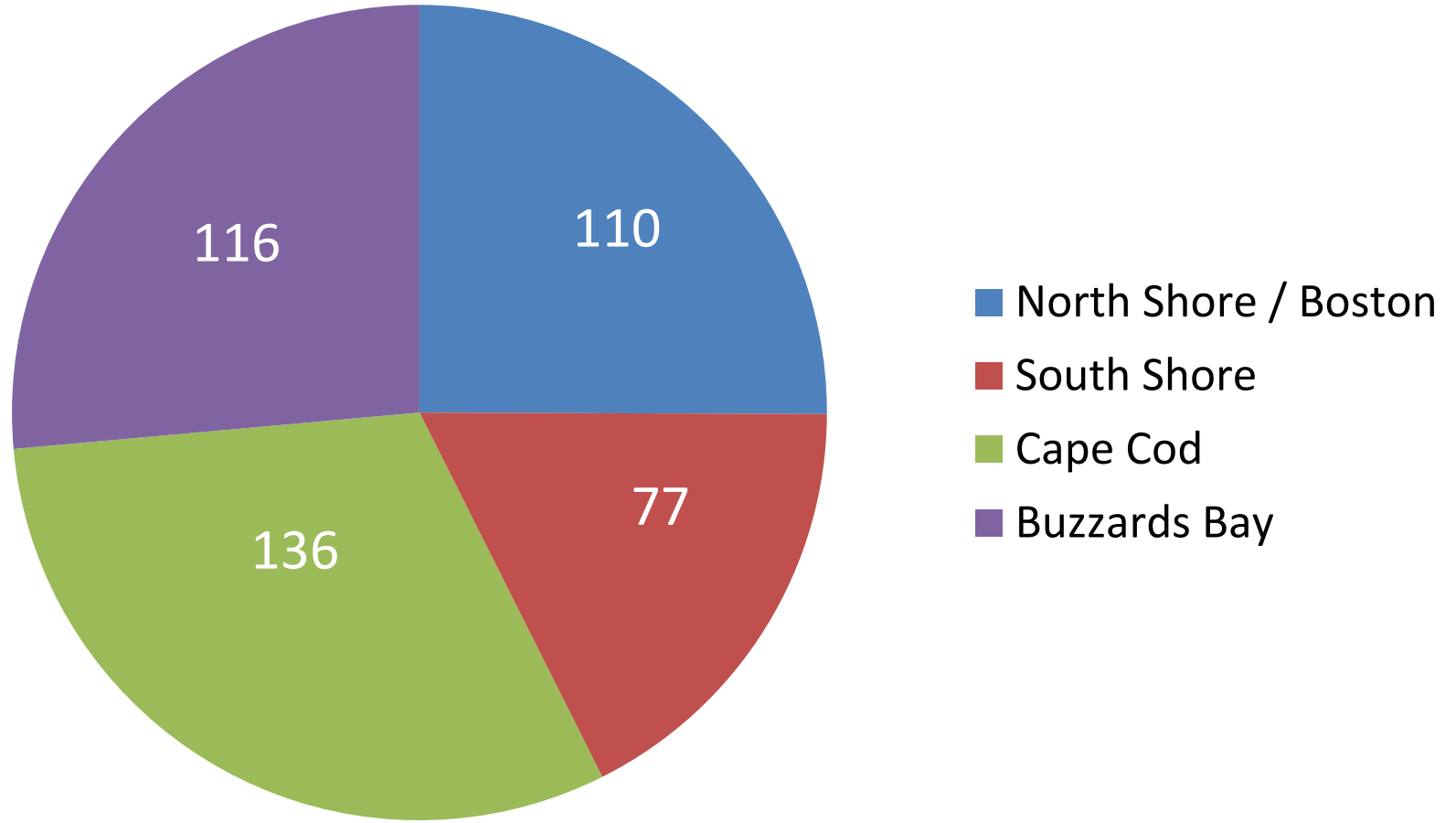
Notes:

Bottom DO measurements at deep stations in stratified lakes are excluded due to QAPP exemption.
Impaired classifications result from exceedancesf >10% for transect stations during two seasons.

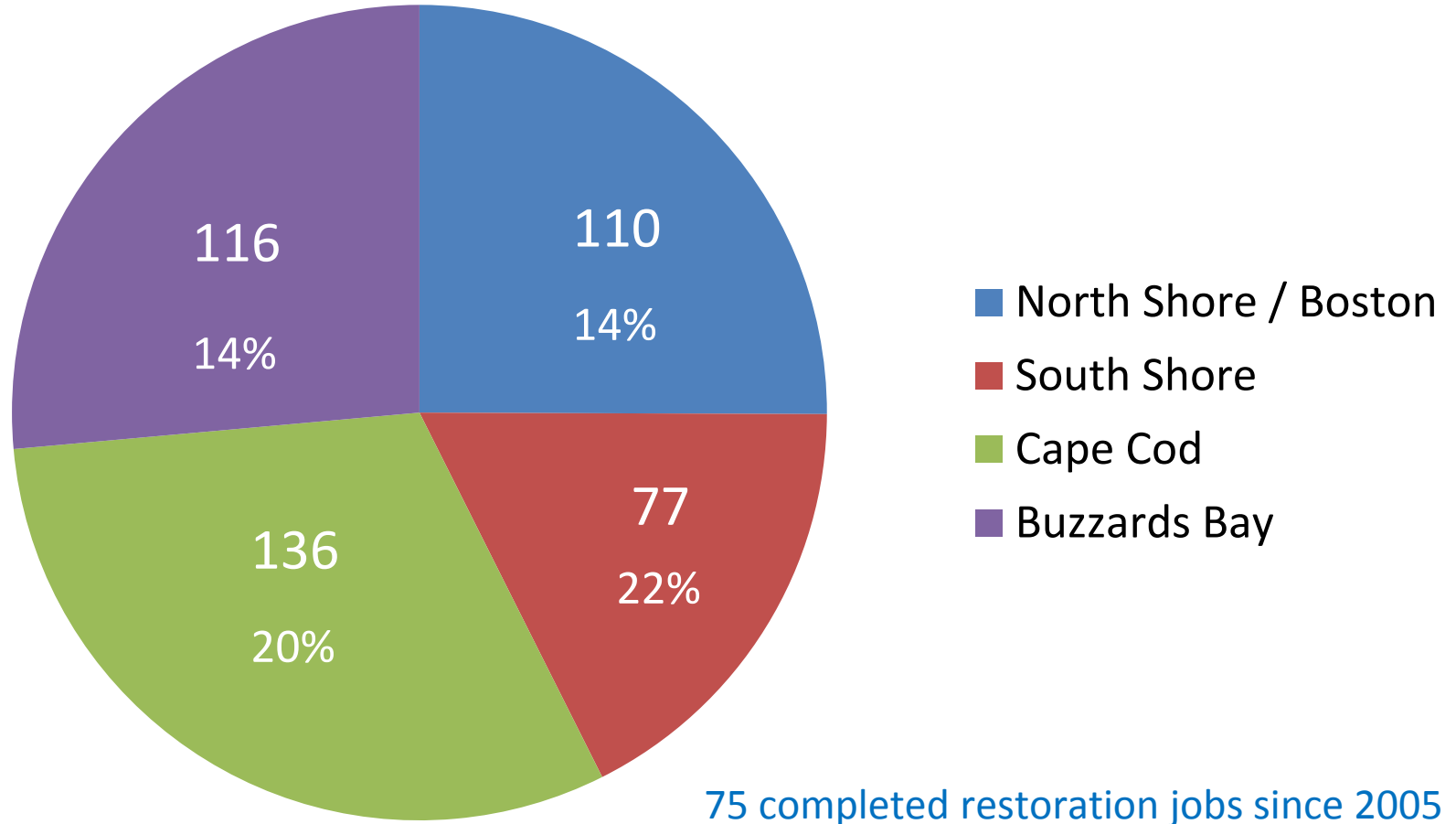
River Herring Habitat Assessment Summary

1. Few assessed ponds and lakes were considered unsuitable for river herring early life stages
2. Common impairment for DO, pH, TN and TP
3. Water flow limitations on fish passage

Diadromous Fish Restoration Sites



Diadromous Fish Restoration Sites



Next Steps

- Integrate Priority List and Habitat Assessments to DEP's CWA processes
- Update and improve these tools for wider use
- Contribute to improved process for selecting restoration priorities



What can we do?

- Reduce eutrophication
- Restore surface water and groundwater
- Include habitat restoration as part of infrastructure Improvements
- Improve restoration planning coordination