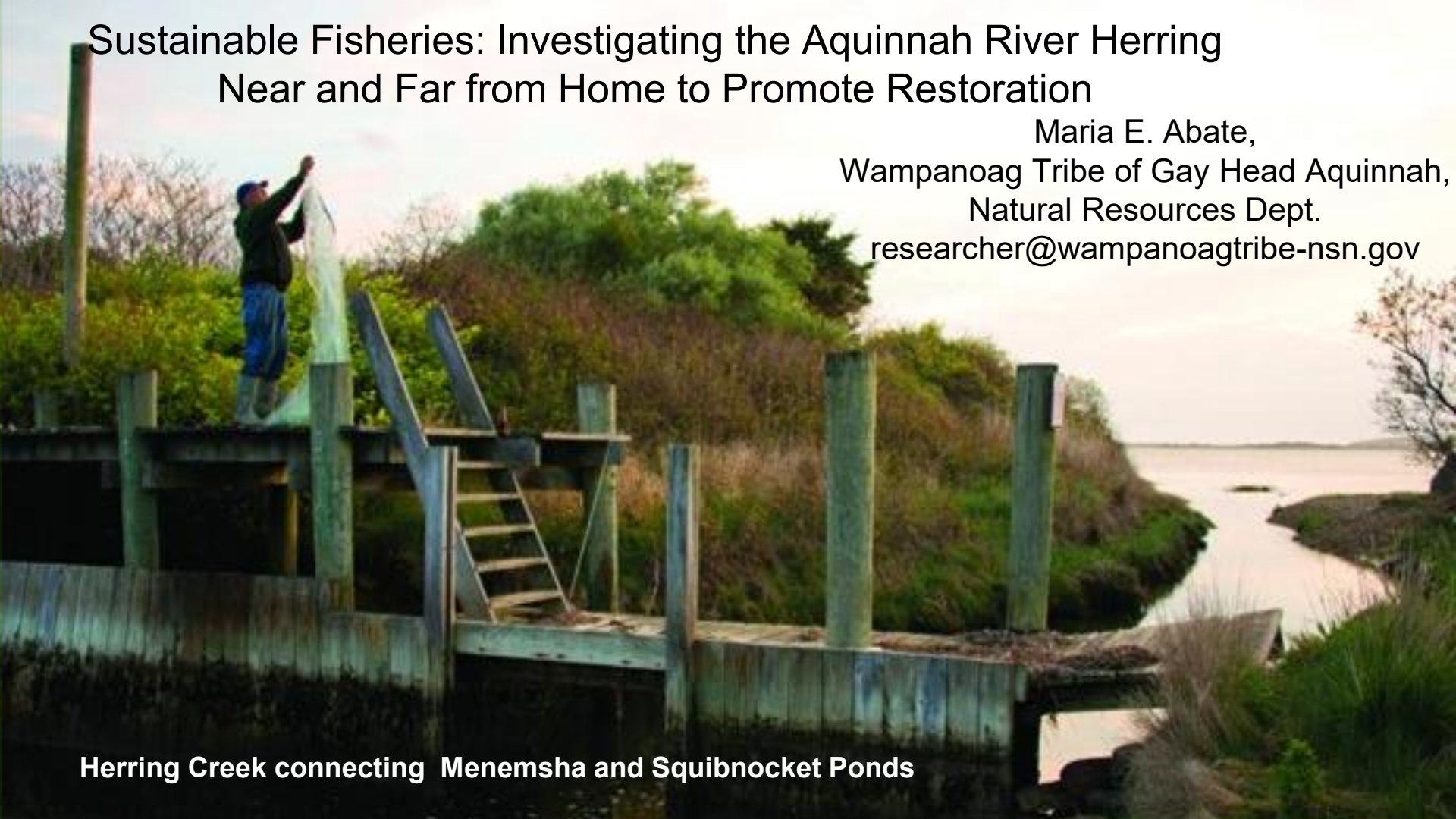


Sustainable Fisheries: Investigating the Aquinnah River Herring Near and Far from Home to Promote Restoration

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Herring Creek connecting Menemsha and Squibnocket Ponds

Significance of river herring to the Aquinnah



Life Cycle of a Herring



Alewife



Blueback Herring

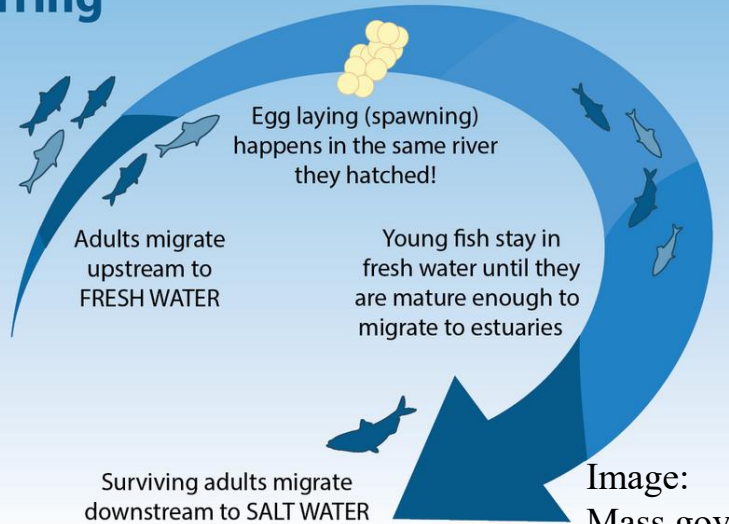


Image:
Mass.gov

- Tribal home for > 10,000 years
- Deep cultural / spiritual connections to the ecosystem
- River herring central to traditional sustenance

1. How has the Tribe's access to river herring diminished over time?

2. What is driving the river herring's decline?

--Poor local conditions?

Overview: Tribe's river herring and ecosystem monitoring/research

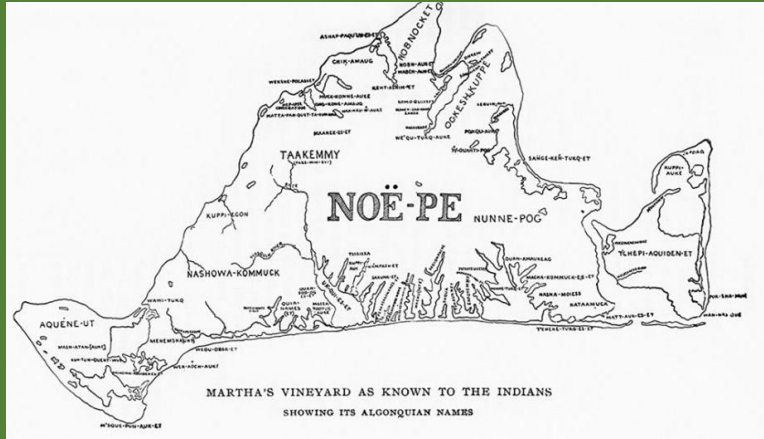
--Offshore problem?:

Caught as incidental catch (bycatch) by Atlantic herring and mackerel fisheries

Study partner: Drs. Eric Palkovacs, Kerry Reid, and John Carlos Garza

Sole proprietor of the Herring Creek run for 150 years

Martha's Vineyard as known to the Aquinnah

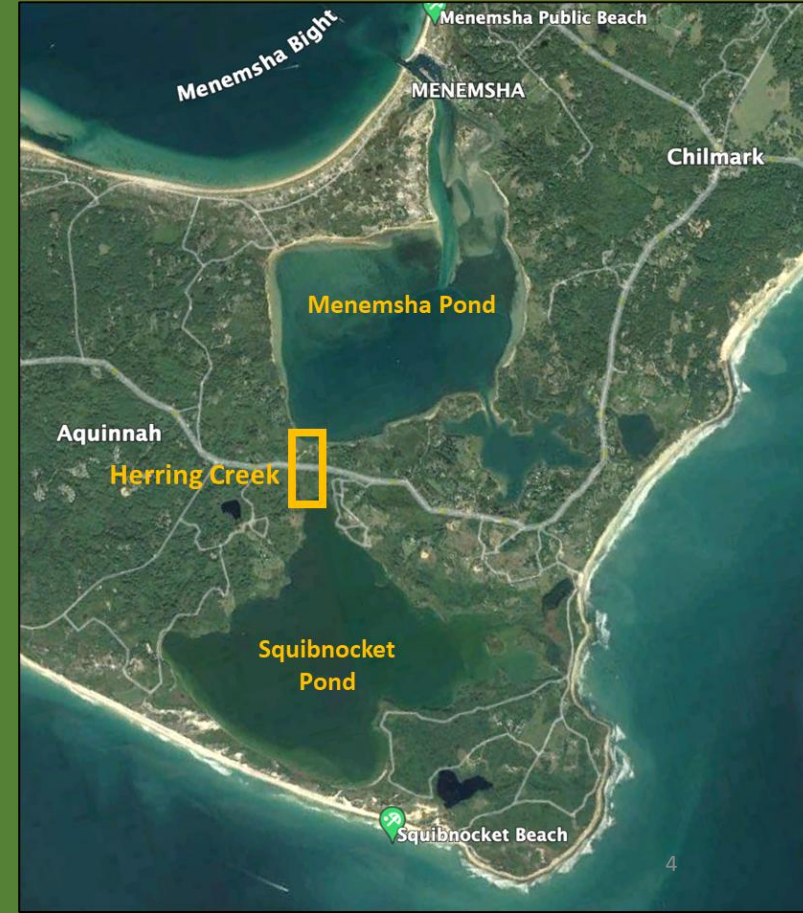


Forced relocation:

1775 Dukes County map identifying the "Indian Settlement" of Gay Head (Aquinnah).



Map showing Location of the Aquinnah Herring Creek



Historically, a thriving fishery and cultural mainstay until this century

Gay Head (Aquinnah) Herring Weir
1861



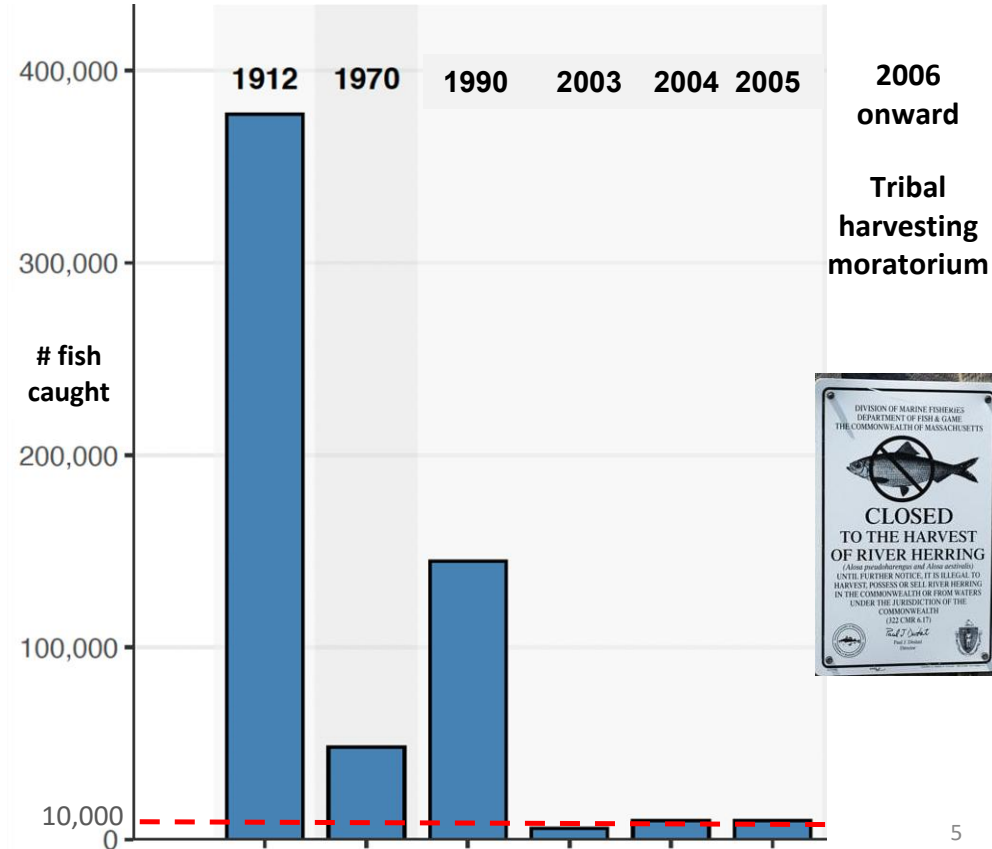
Aquinnah Herring Creek
1917



Harvesting from the Aquinnah herring run
1990's



Commercial harvest records



2. What is driving the river herring's decline?

--Poor local conditions?

Overview: Tribe's river herring and ecosystem monitoring/research

--Offshore problem?:

Caught as incidental catch by Atlantic herring and mackerel fisheries

Aquinnah Wampanoag Herring Run



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Natural Resources Department**
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Wampanoag Environmental Laboratory



Menemsha Pond



Squibnocket Pond

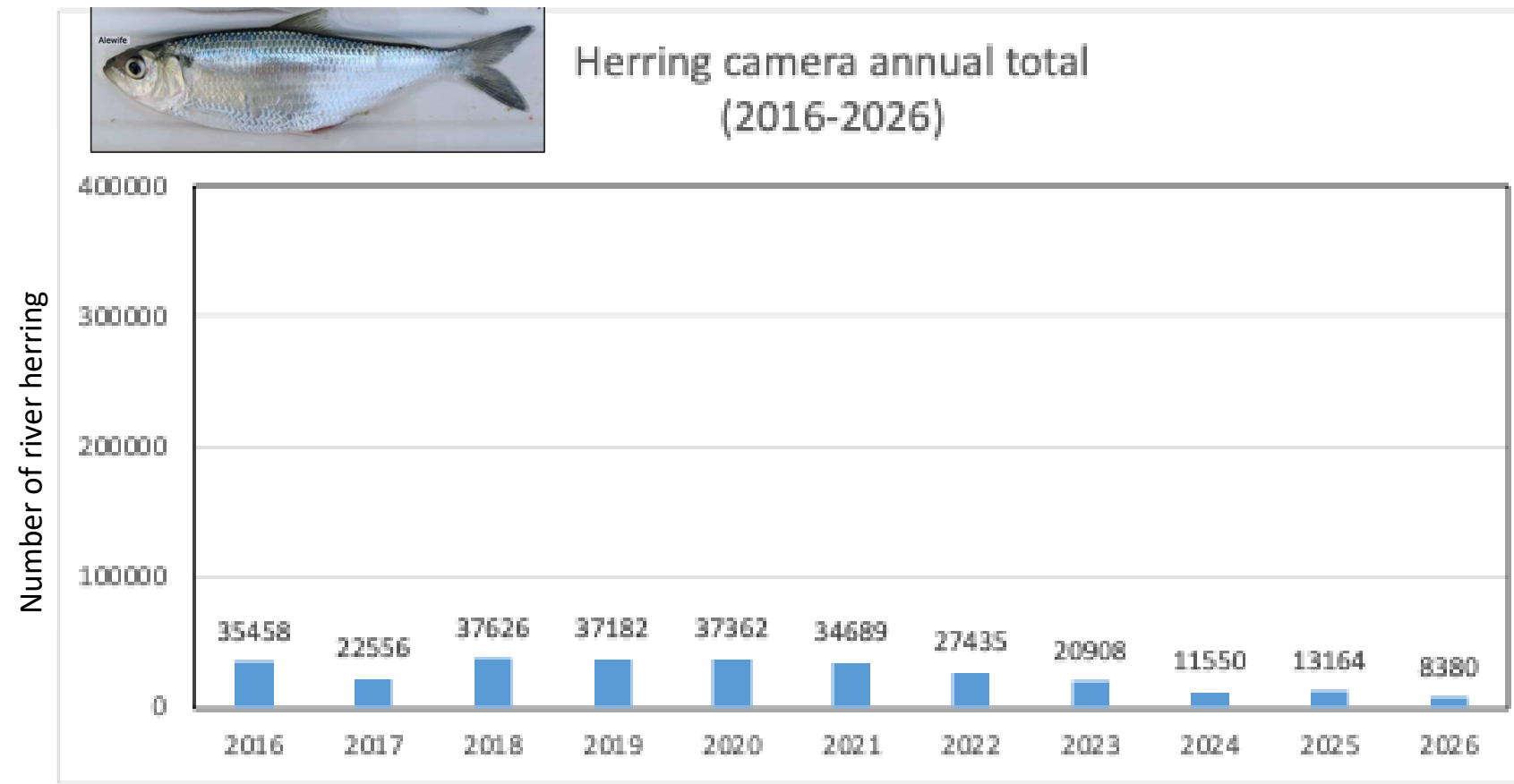


Squibnocket

Herring Creek



Despite 2006 moratorium & no physical barriers, decline persists.



Studying river herring population characteristics and behavior of individuals

Herring camera video:
Since 2016 daily run size and
environmental relationships



Sampling population characteristics:
E.g., Size/sex structure, genetics



PIT tagging study within the Creek:
Migration and individual movements



- Vast majority of Aquinnah herring pass through the run at night.
- Mostly alewife species.
- Run activity with respect to other environmental cues more variable.
- Repeat spawners found.
- Creek exit after spawn: hesitant, risk averse individual behavior.

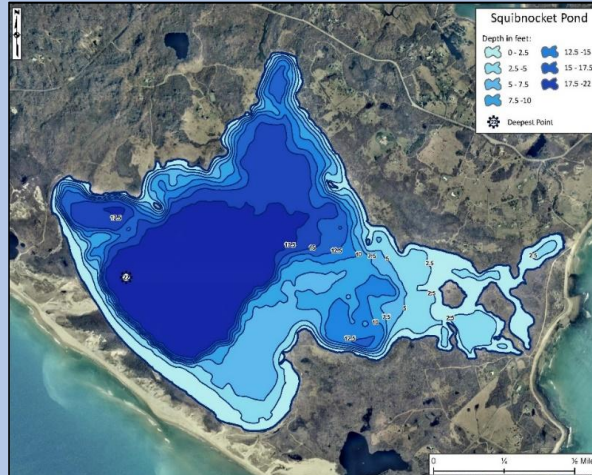
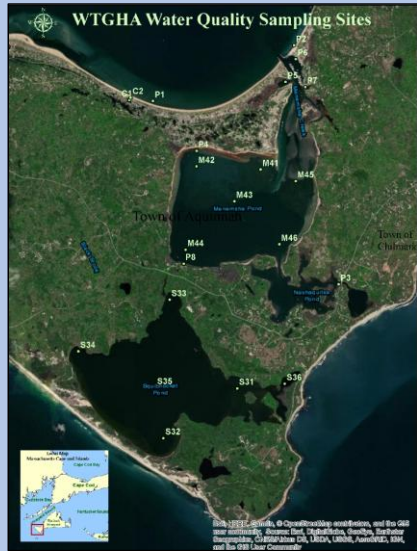
Passive Integrated
Transponder tag



Ecosystem Health Monitoring Program

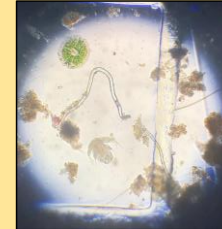
Water and Habitat Surveys

- Water Quality
- Water Elevation and Flow
- Hydrodynamic Modeling
- Salinity Profile
- Bathymetry
- Benthic Habitats & vegetation
- Sediment Surveys



Biodiversity

- Plankton Tows
- Herring Cam: other species
- eDNA
- Seining surveys
- Striped Bass Acoustic Tagging
- Tribal Ecological Knowledge



Looking beyond our shores:



- We have conducted a broad and intensive research program on the characteristics of Aquinnah herring and their local ecosystem.
- A black box existed beyond Menemsha Pond Complex regarding impacts during migration.
- Reid et al. 2023 revealed to us a means to test for Herring Creek fish in the bycatch
- Fin clips were collected from 70 fish in 2025 and sent to UCSC for genetic analysis and bycatch determination.



Aim 1: To identify herring creek stock individuals in the bycatch

Step 1:

Determining if alewife from Herring Creek are genetically different from other alewife runs

Examined single building block differences (SNP) in DNA.

In alewife, 93 specific short areas of DNA are examined to determine the fish's genotype based on the SNPs.

If the genotypes of one run are distinct enough from others, the run can be utilized as a source ('reporting group').

Unknown individuals can be compared to sources and then identified back to their source.

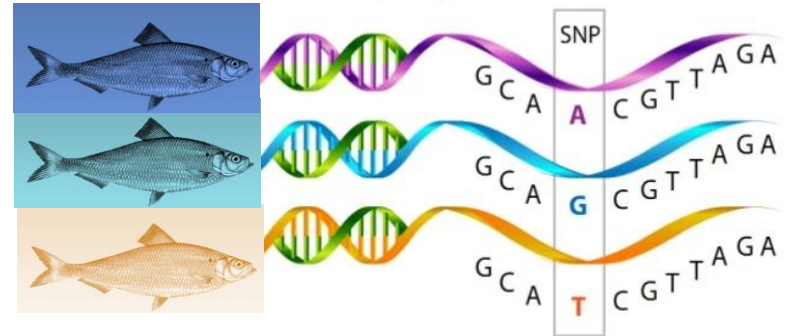
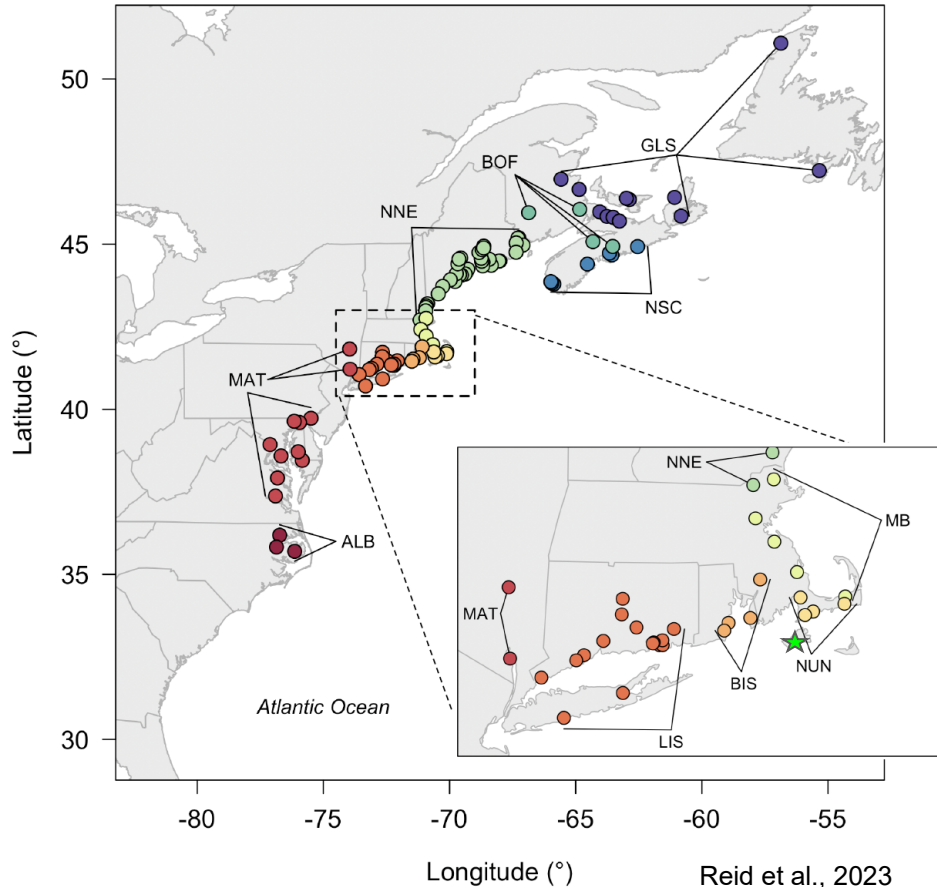


Image adapted from (https://en.wikipedia.org/wiki/Single-nucleotide_polymorphism)

Reporting groups for alewife from Reid et al 2023



Southern New England

Mass Bay (MB, 5 alewife runs)

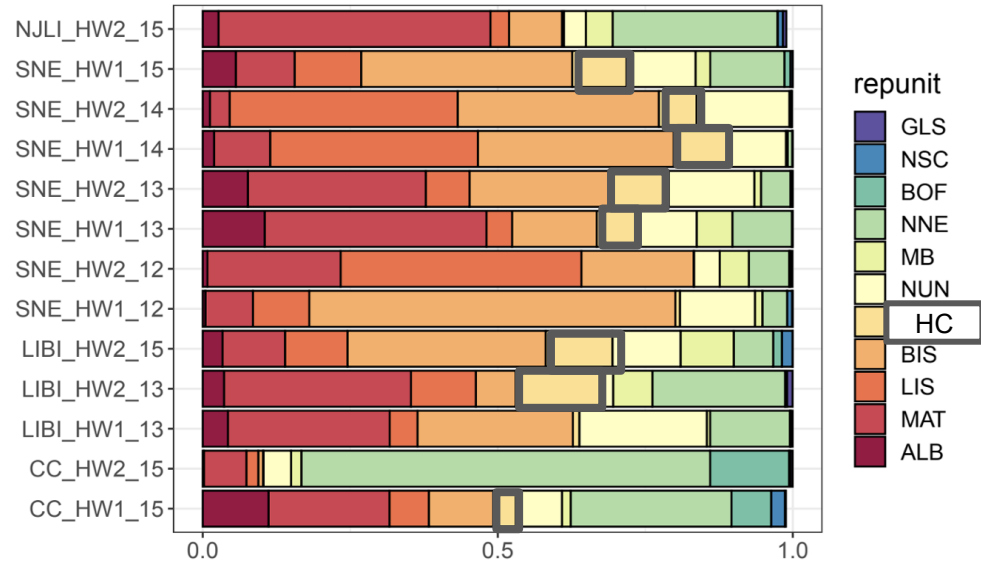
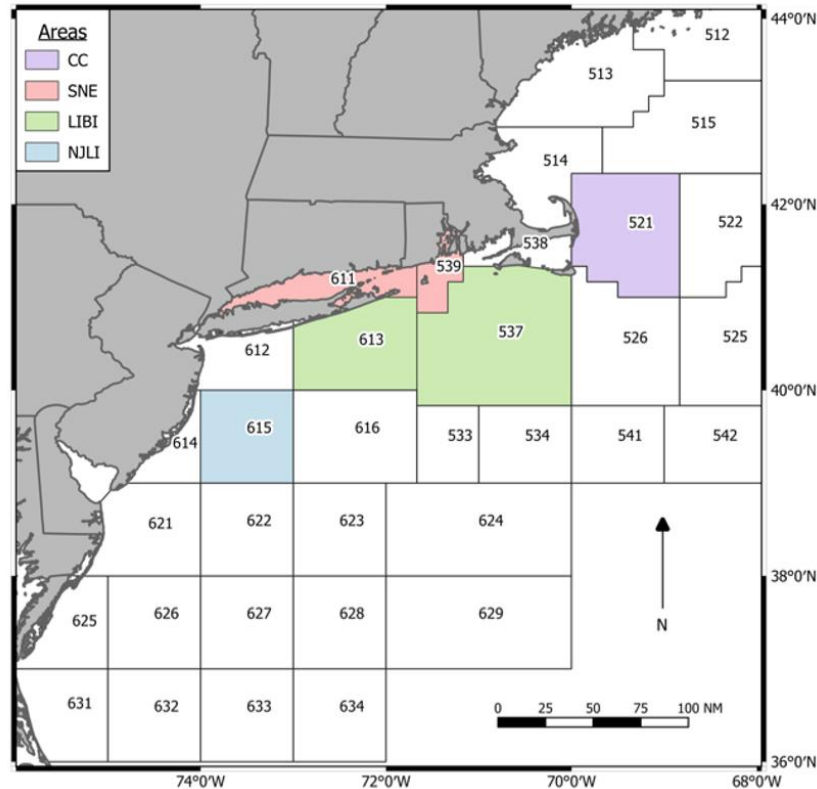
Nantucket (NUN, 4 alewife runs)

Block Island Sound (BIS, 4 alewife runs)

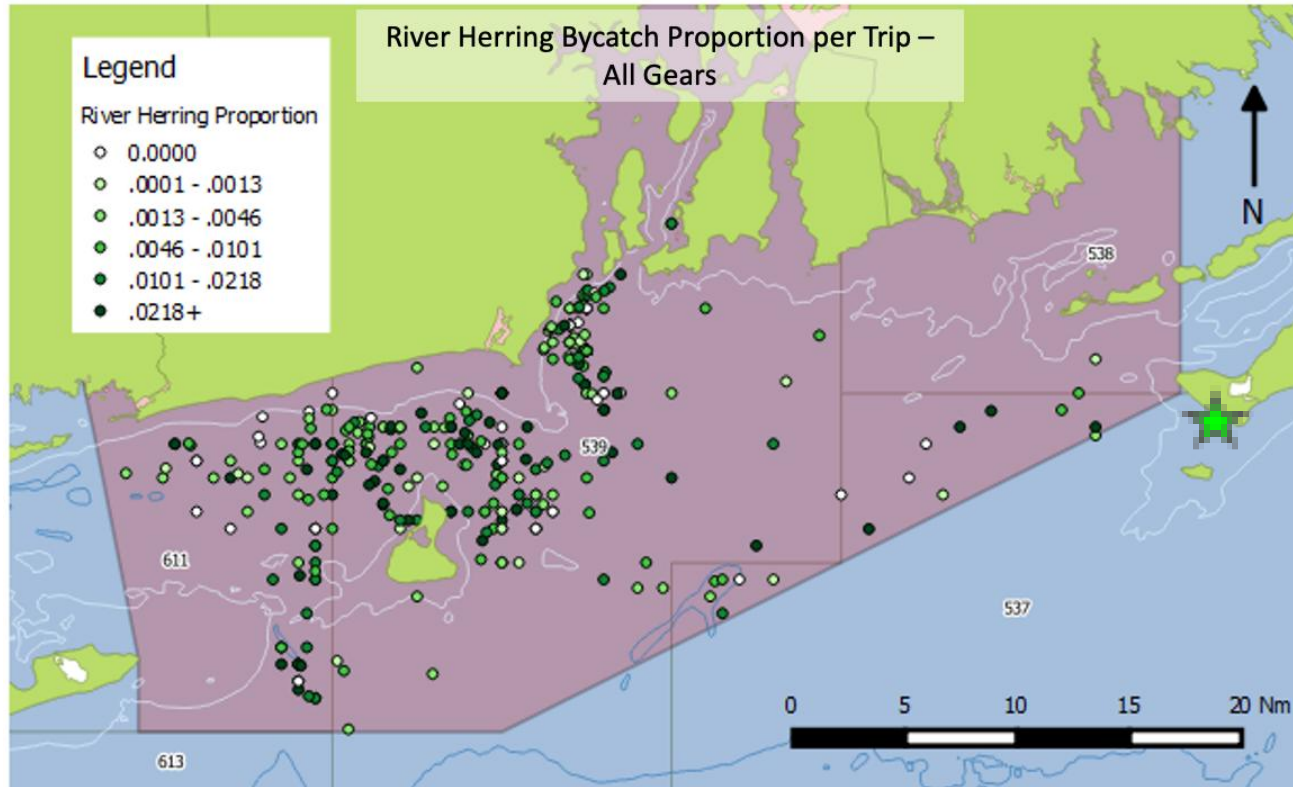
Long Island Sound (LIS, 15 alewife runs)

★ Herring Creek included as a distinct run

Herring Creek stock identified in the bycatch of Atlantic herring and Mackerel fisheries (2012-2015)

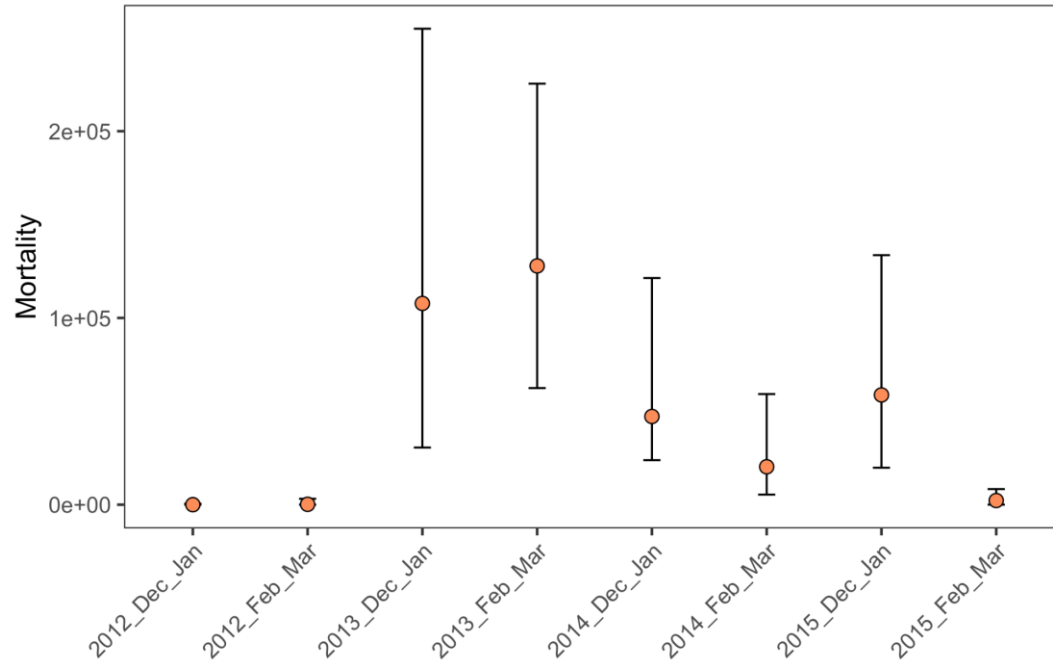


Aim 2: Determining Herring Creek alewife in bycatch events and mortality in 1300 sq mile region.
(purple area) in Southern New England where bycatch event records were available.



Reid et al., 2023

Mortality estimates of Herring Creek Origin alewife varied over years.
especially substantial in 2013.



	Mortality	Lower CI	Upper CI
2012_Dec_Jan	0	0	516.697
2012_Feb_Mar	189.316	0	3152.204
2013_Dec_Jan	107763.624	30578.121	254874.438
2013_Feb_Mar	127848.246	62441.424	225456.59
2014_Dec_Jan	47225.997	23827.264	121355.619
2014_Feb_Mar	20280.795	5385.44	59221.807
2015_Dec_Jan	58752.192	19791.936	133607.628
2015_Feb_Mar	2217.42	0	8352.282

Recall that Herring Creek run counts have consistently been below 40,000 fish since 2016.

Genetics study conclusions:

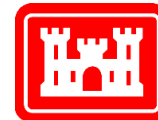
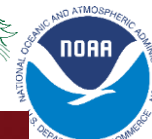
- The study found evidence that alewife from Herring Creek were being caught in Atlantic herring and mackerel fisheries in consequential amounts.
- The magnitude of bycatch events contributed to historical declines in the run.
- This study represents some of the best available science for the impact of non-Indigenous fishery policies on Tribal Trust fish resources in New England.
- Supports need and advocacy for changes in policies which will decrease encounters of the Herring Creek run during their migration for its restoration.

Identifying the potential drivers of the Herring Creek run decline

*Shout out -thank you-
to all our research
partners and
funding agencies!*



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A photograph of a body of water, possibly a pond or a slow-moving stream, surrounded by lush green vegetation. In the background, a wooden structure, possibly a bridge or a walkway, spans the water. A person is visible standing on this structure. The water reflects the sky and the surrounding greenery. The word "Questions?" is overlaid in the center of the image in a large, black, sans-serif font.

Questions?