

Striped Bass in Massachusetts

Benjamin Gahagan

Massachusetts Division of Marine Fisheries

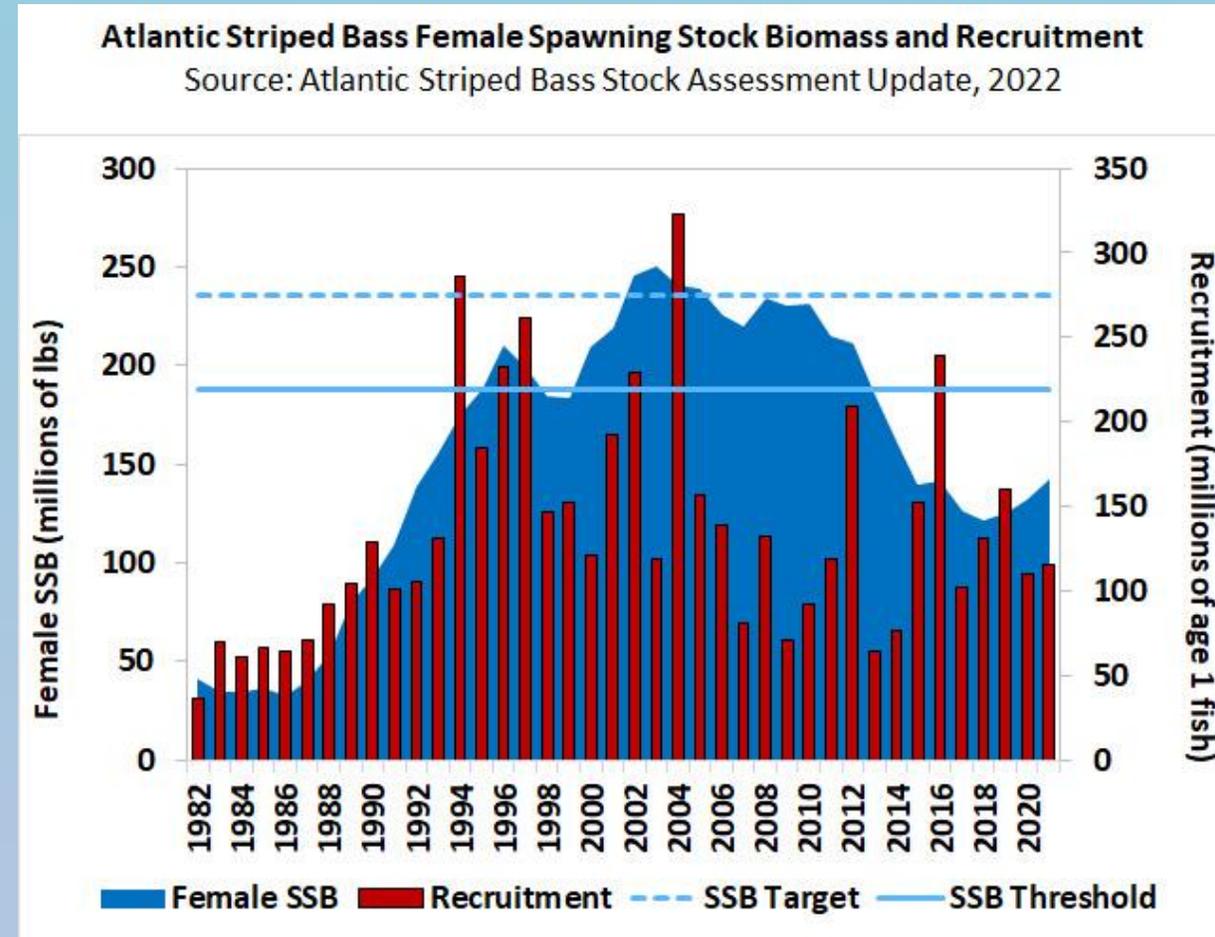
Falmouth Fisherman's Association

10/8/2024



Striped Bass Ecology and Management

- Striped bass (*Morone saxatilis*) is a moderately long-lived (>30 years) diadromous fish native to the Northwest Atlantic
- A long history of subsistence, commercial, and recreational use
- Currently the most pursued recreational fish on the Atlantic coast of the US
- Overfishing and poor recruitment led to a large-scale crash in the early 1980s
- Regulatory actions and favorable environmental conditions led to a successful recovery of remaining populations from 1990 – 2010
- Since 2010, high levels of effort and poor conditions for recruitment have led to a steady decline in SSB with 5 consecutive years of very low production since 2018



Tonight's presentation!

1. Striped bass in Massachusetts: Where to and where from

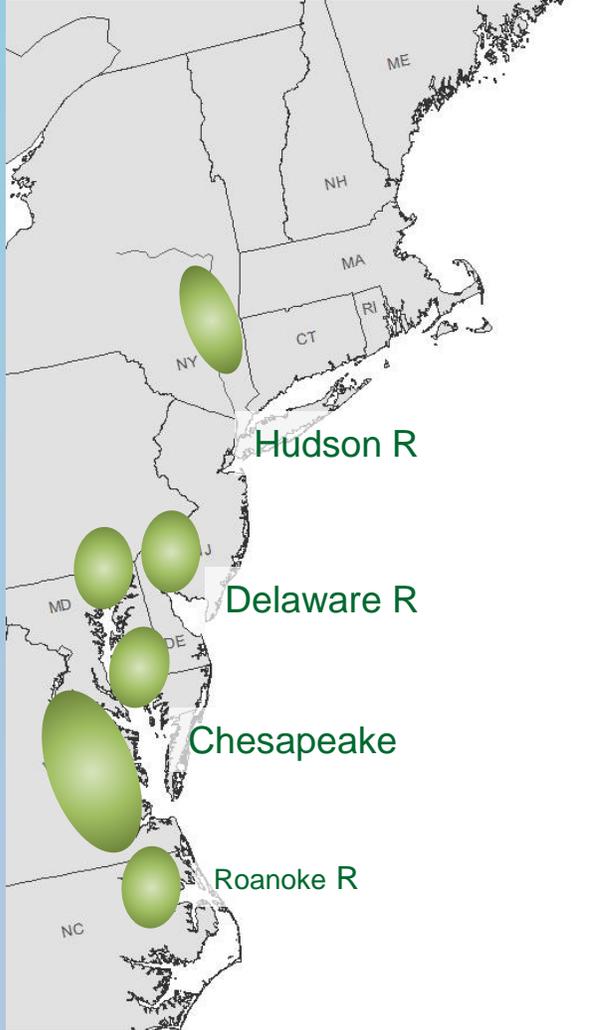
- Acoustic telemetry recap
- Genetics and what they can tell us about bass in Massachusetts

2. Post Release Mortality

- Why is this important
- The power of citizen science
- What we know so far



Striped Bass Early Life History

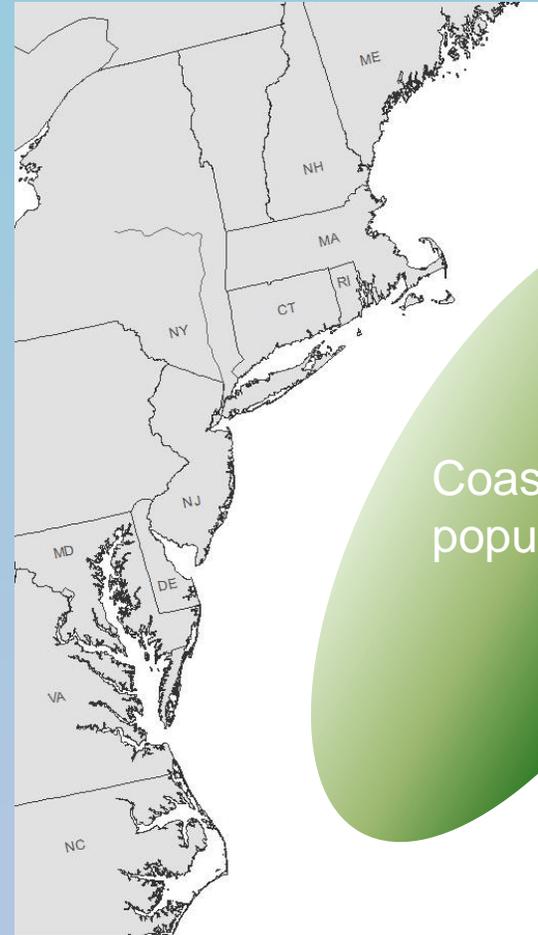
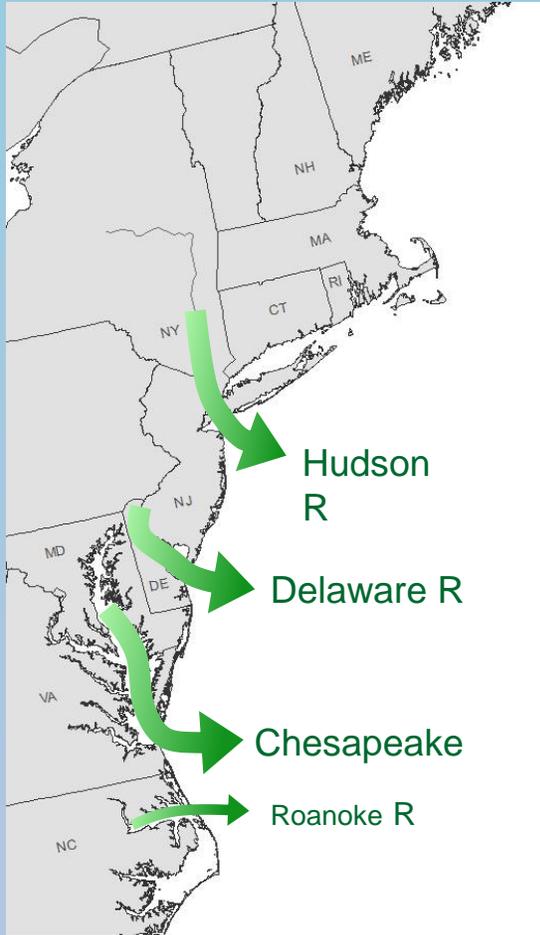


Spring spawners

- Currently found in largest rivers and estuaries
- Young thrive in estuaries, growing rapidly
- Display partial migration
 - Contingent structure
- Coastal “stock” is a mixture of fish from all the spawning populations



Management model



Massachusetts Fishery

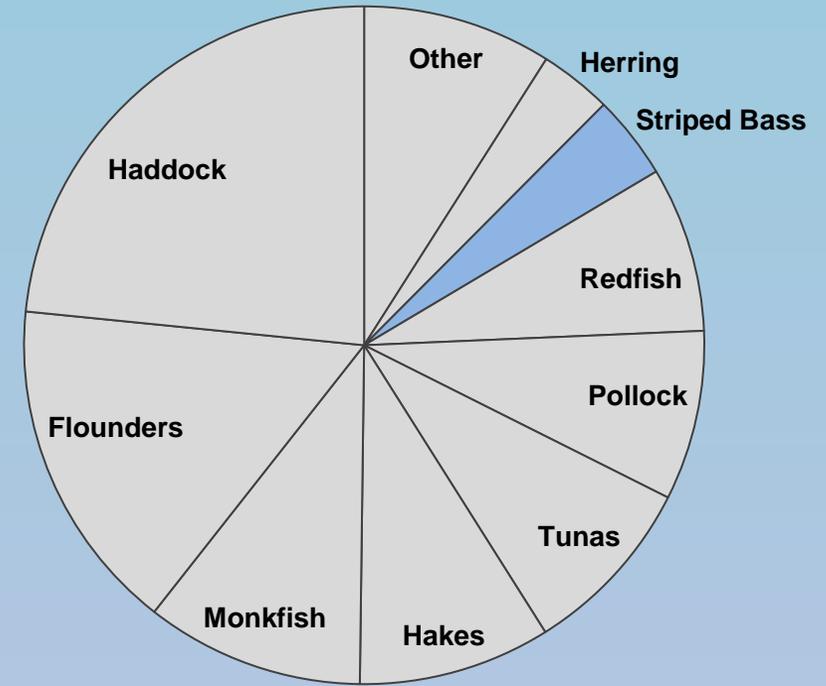


Importance of Striped Bass to MA

Typical Finfish Landings



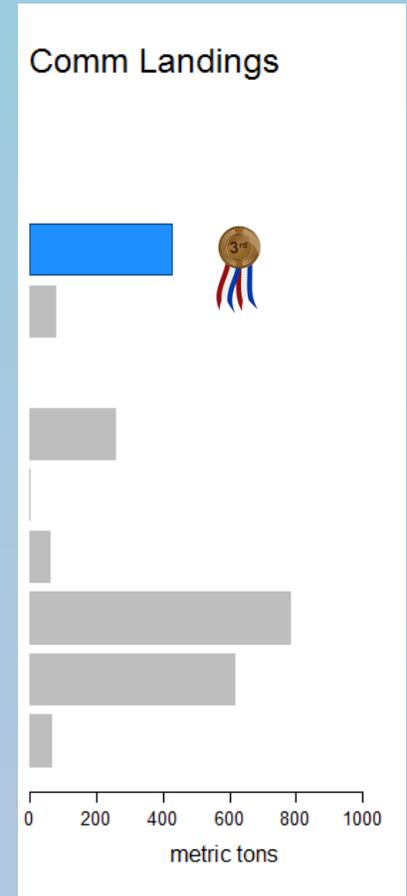
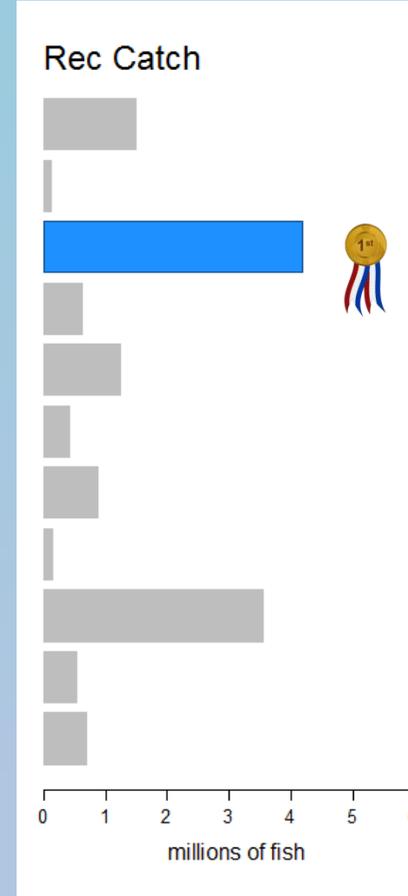
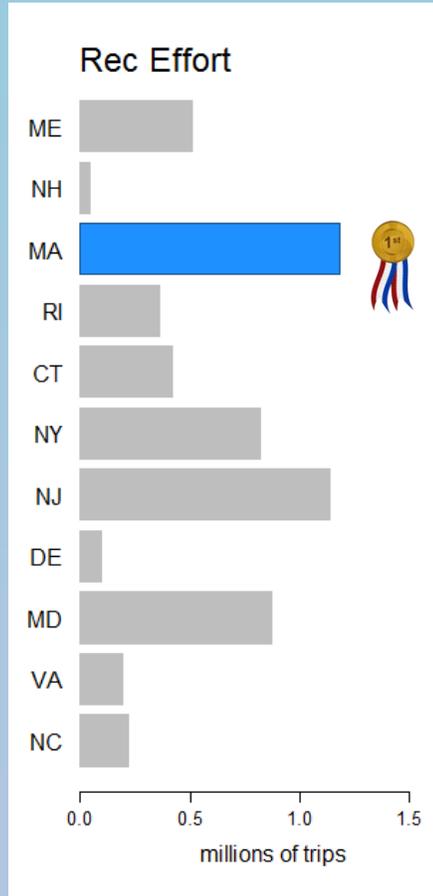
Recreational
% contribution by weight



Commercial
% contribution by value



Importance of MA Fishery to the Stock

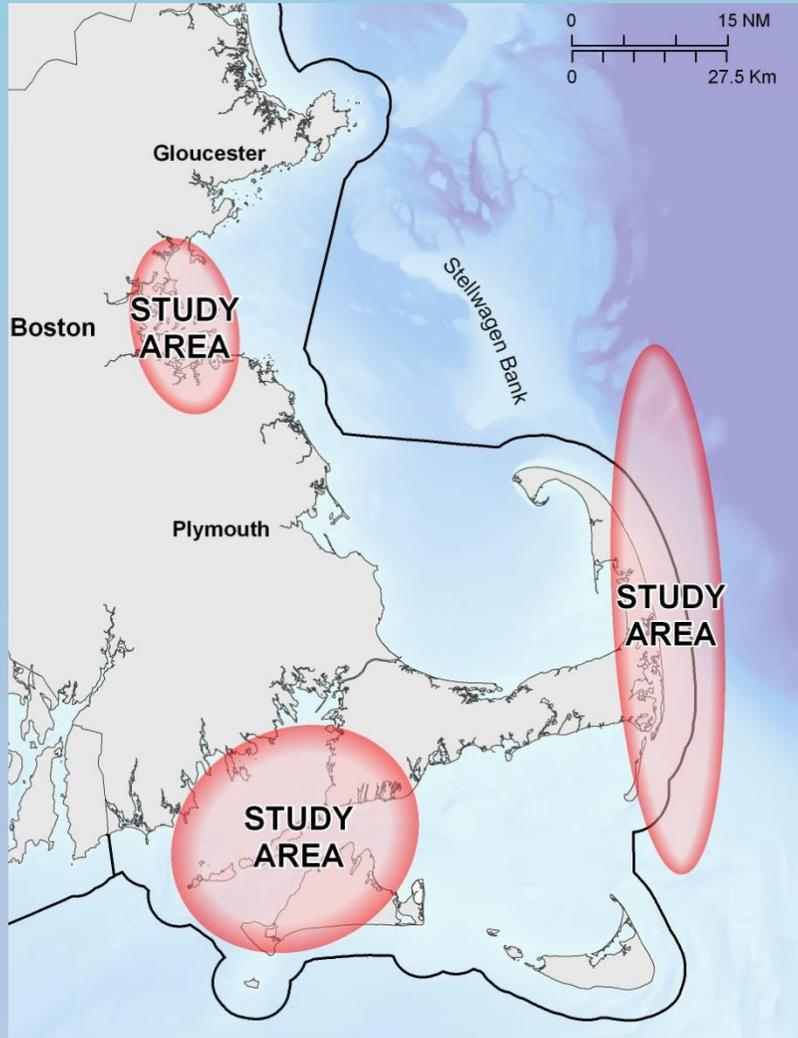


Research Goals

- Provide information on stock composition of aggregations
- Examine year-to-year stability of MA striped bass aggregations
- Determine potential differences in mortality of aggregations
 - Natal origin, migration route, aggregation area...



Approach



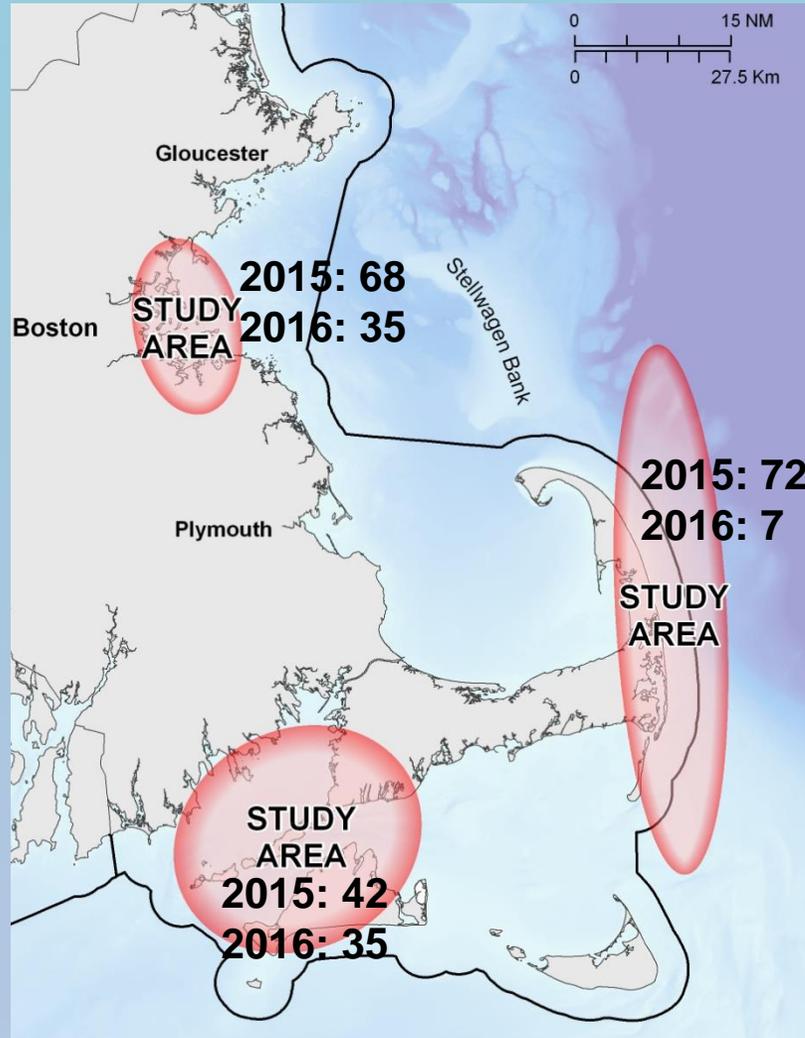
Acoustic Telemetry



Genetic Stock ID



Acoustic Transmitters



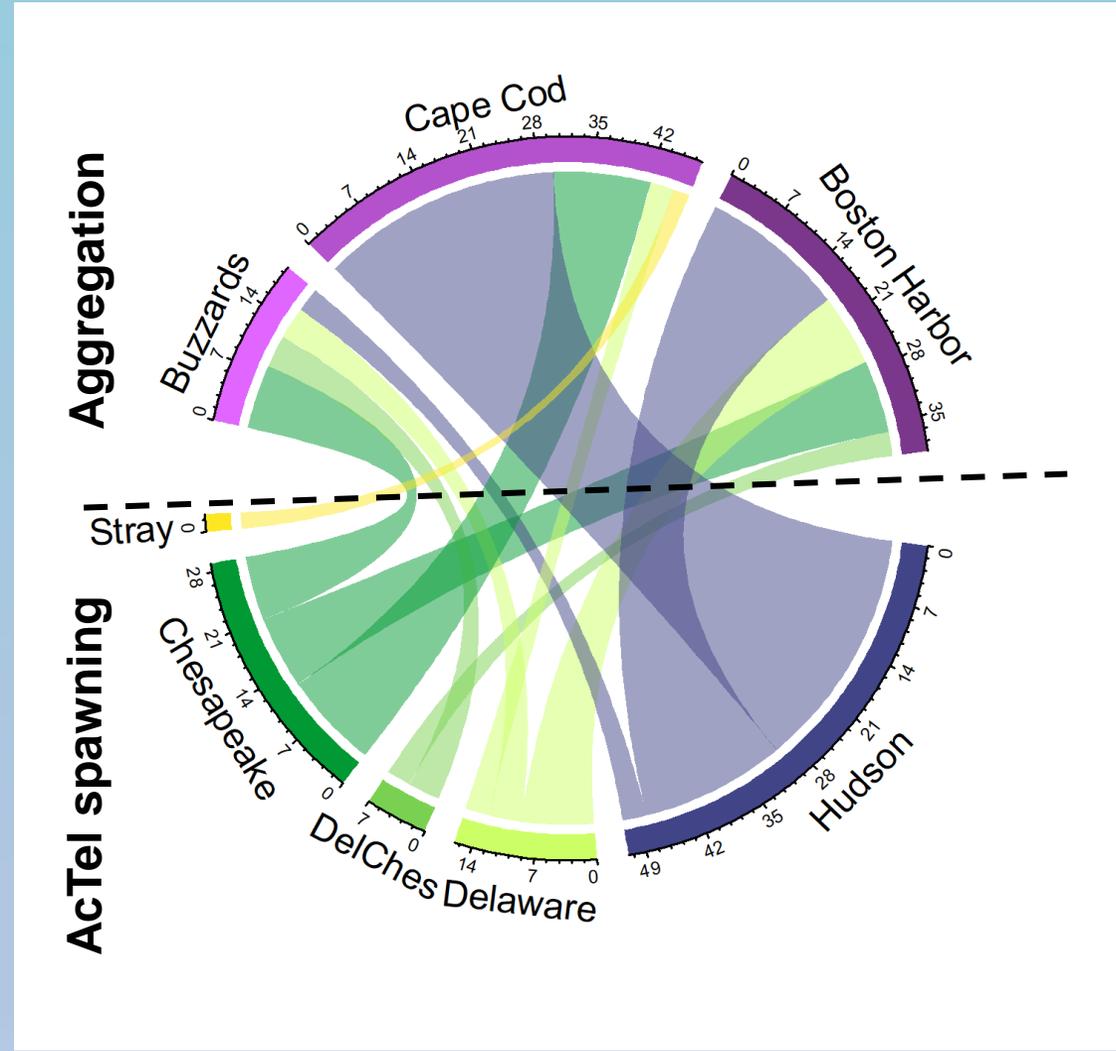
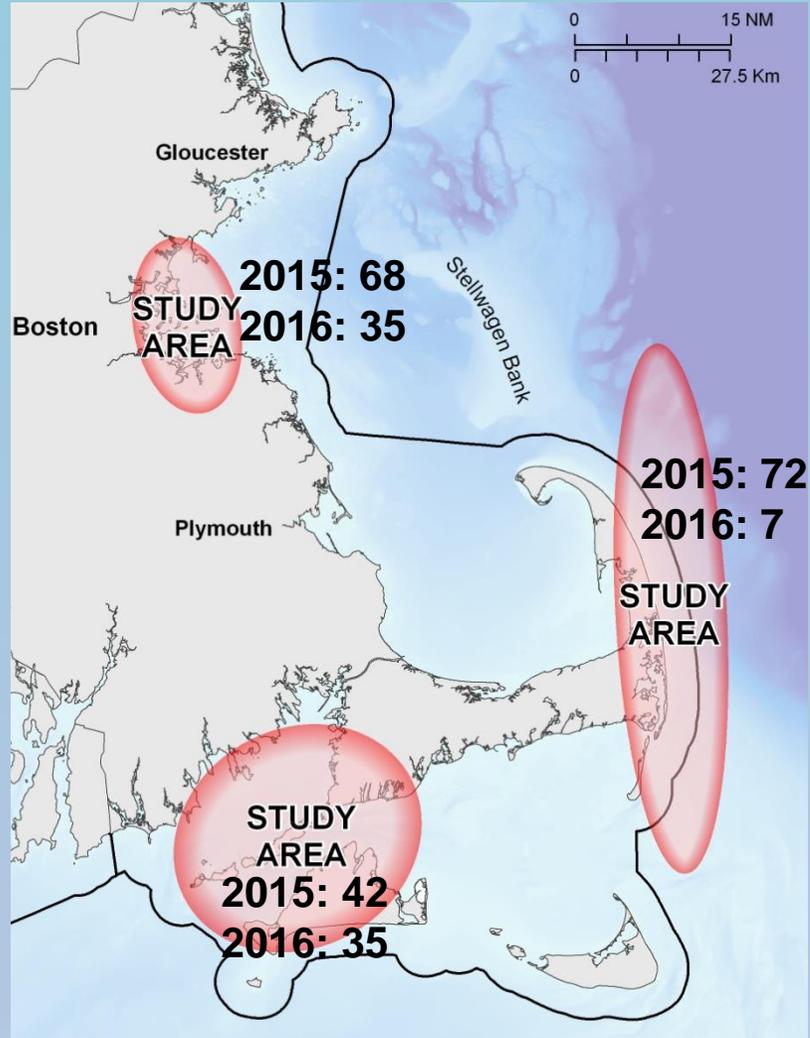
Tagged 259 bass in 3 areas
Split into 3 size categories

- Sub-legal (55-71 cm)
- Recreational (72-85 cm)
- Commercial (>86 cm)

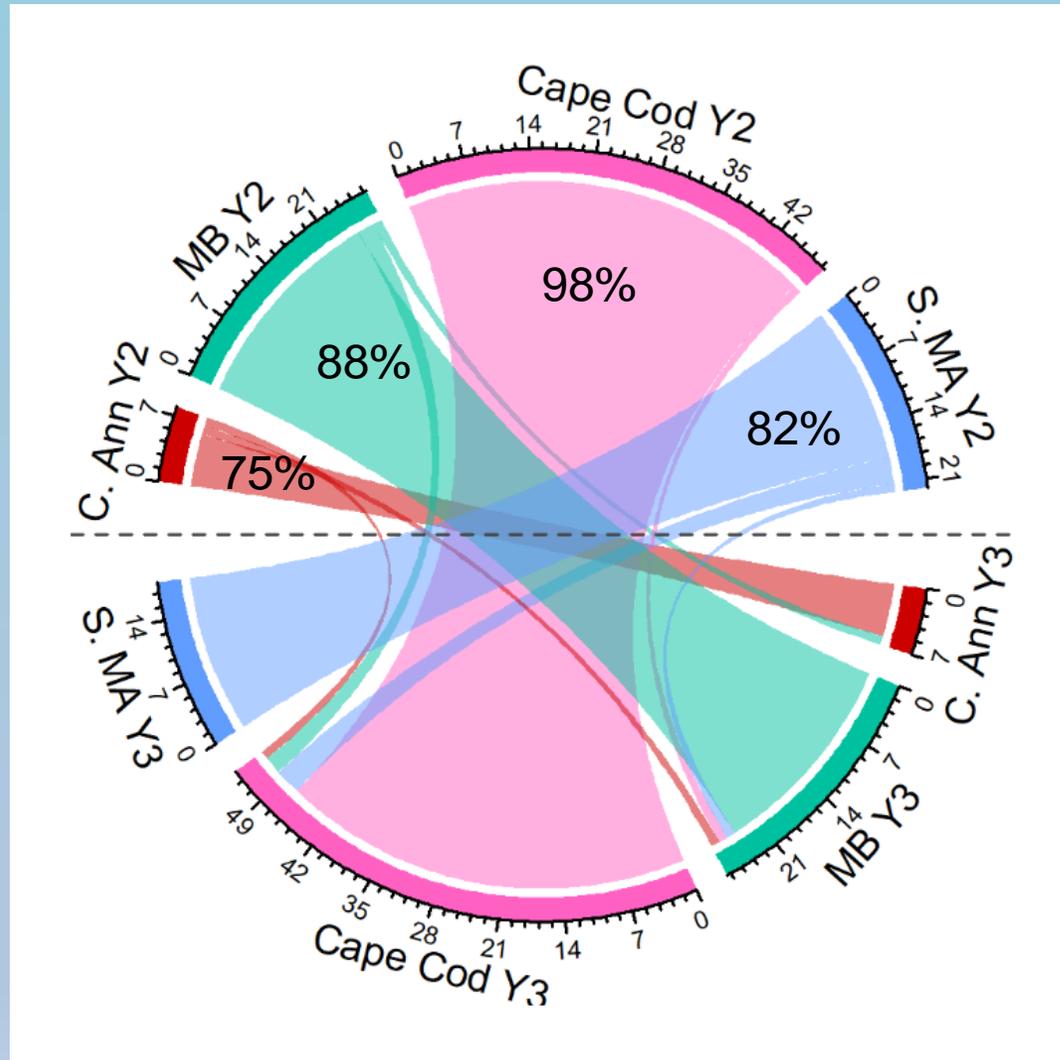
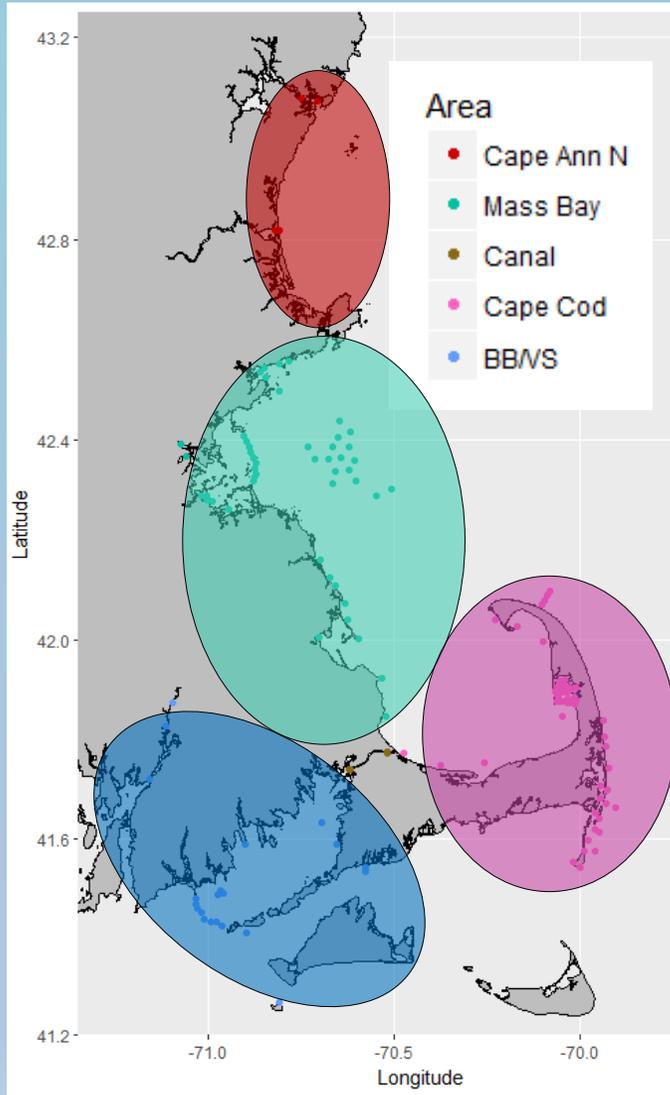
Surgically implanted
Vemco V16 4H
7+ yr battery life



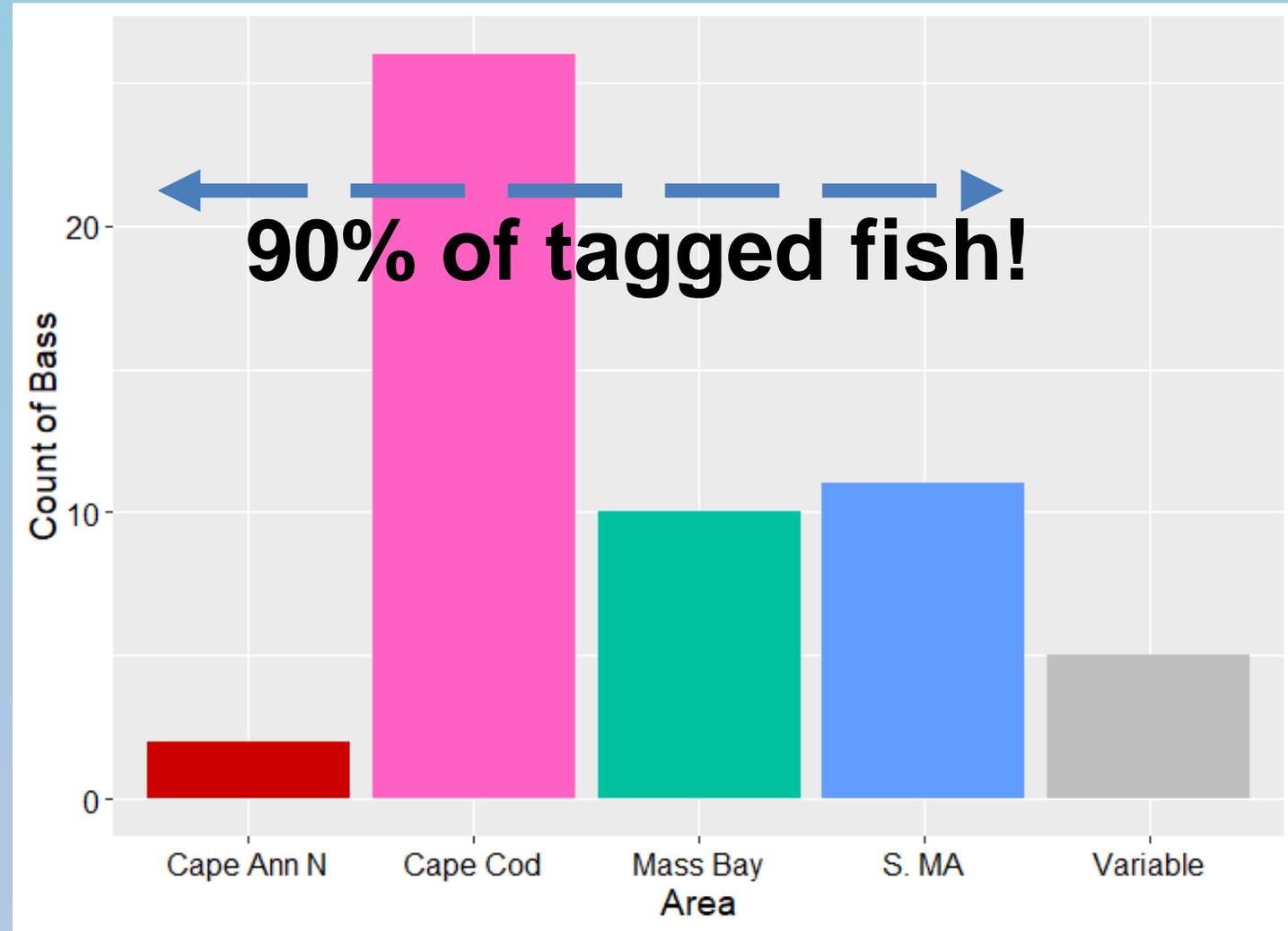
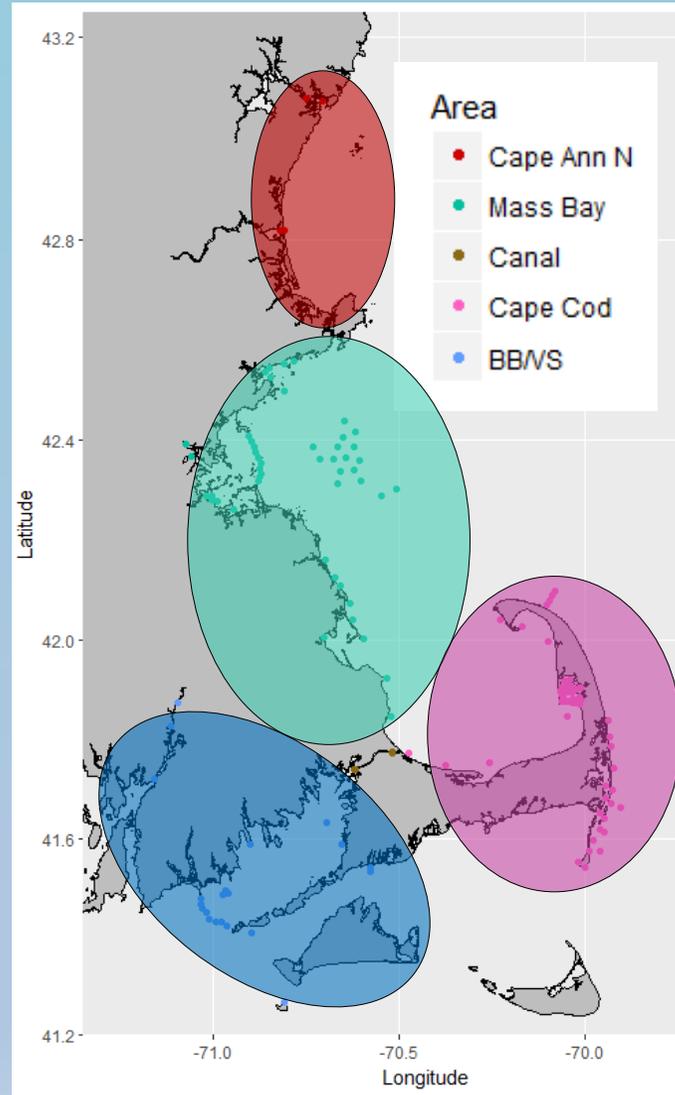
Tag location to spawning areas



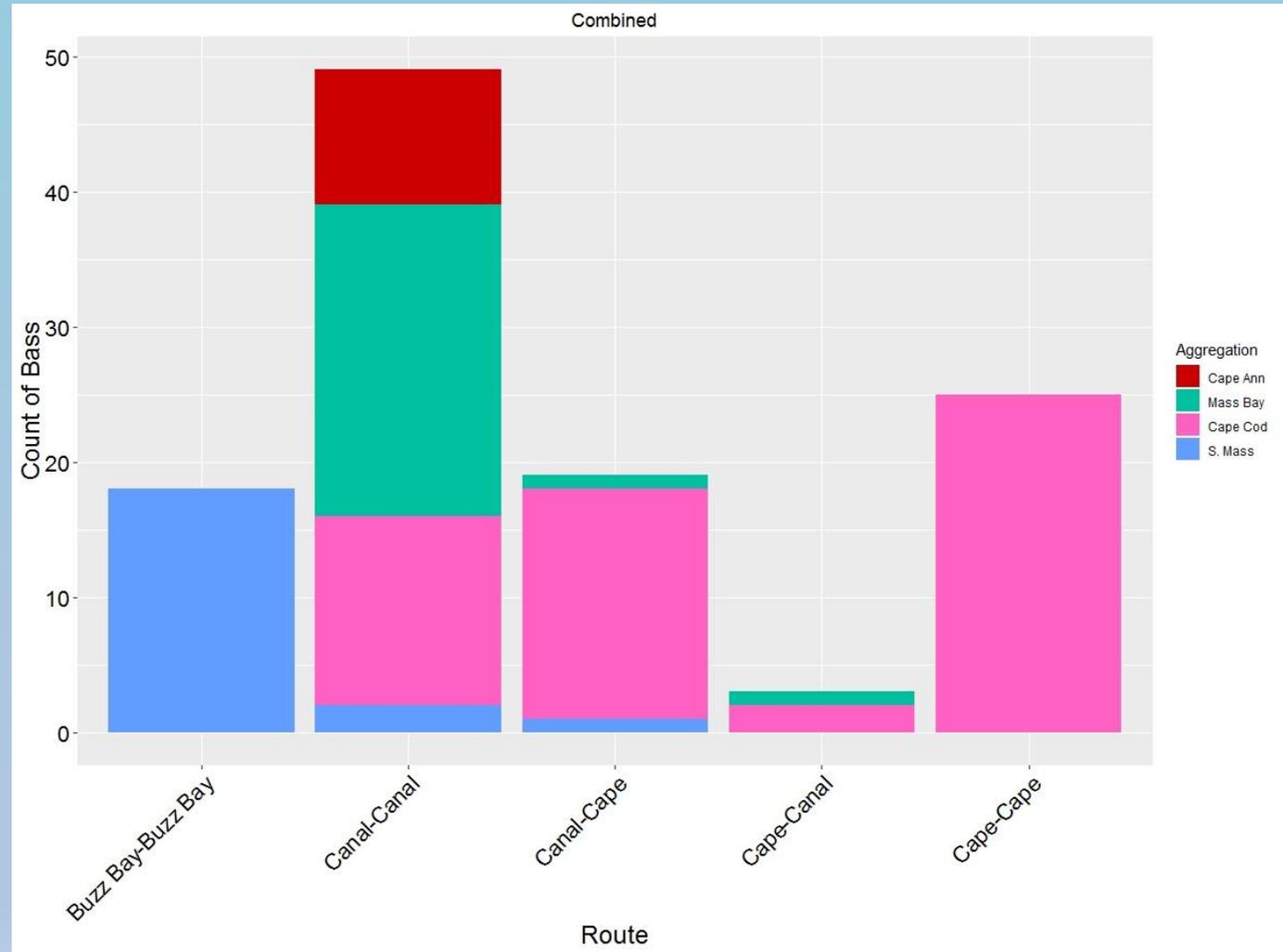
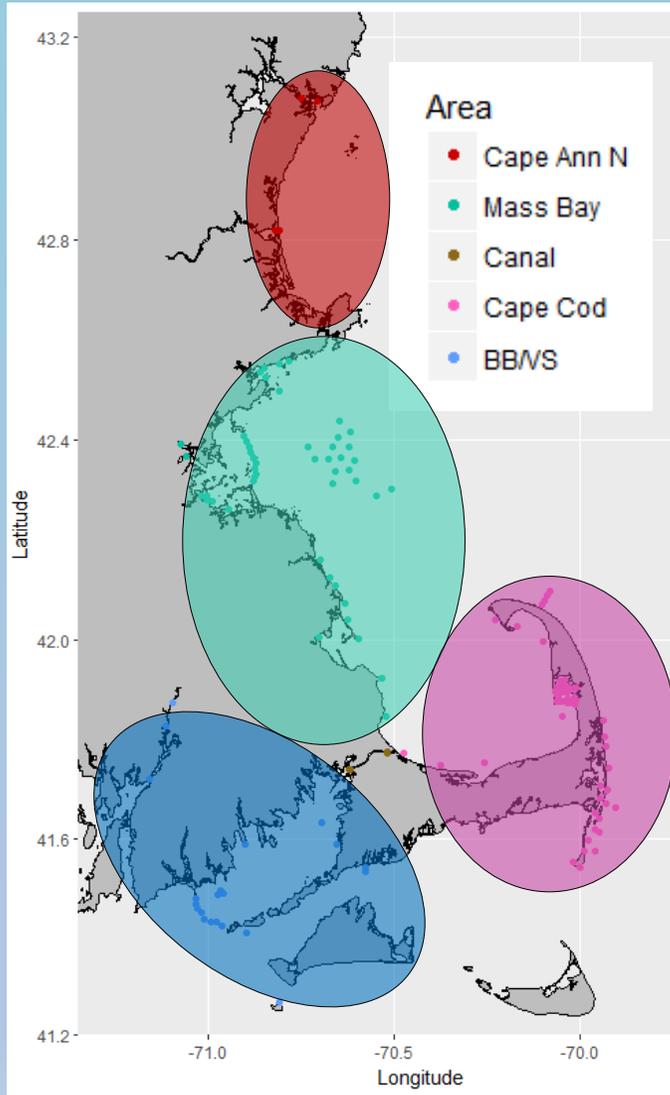
Aggregation fidelity: fidelity based on preferred area



Aggregation fidelity: bass tagged in 2015 with 4 years of history



Migration Corridors

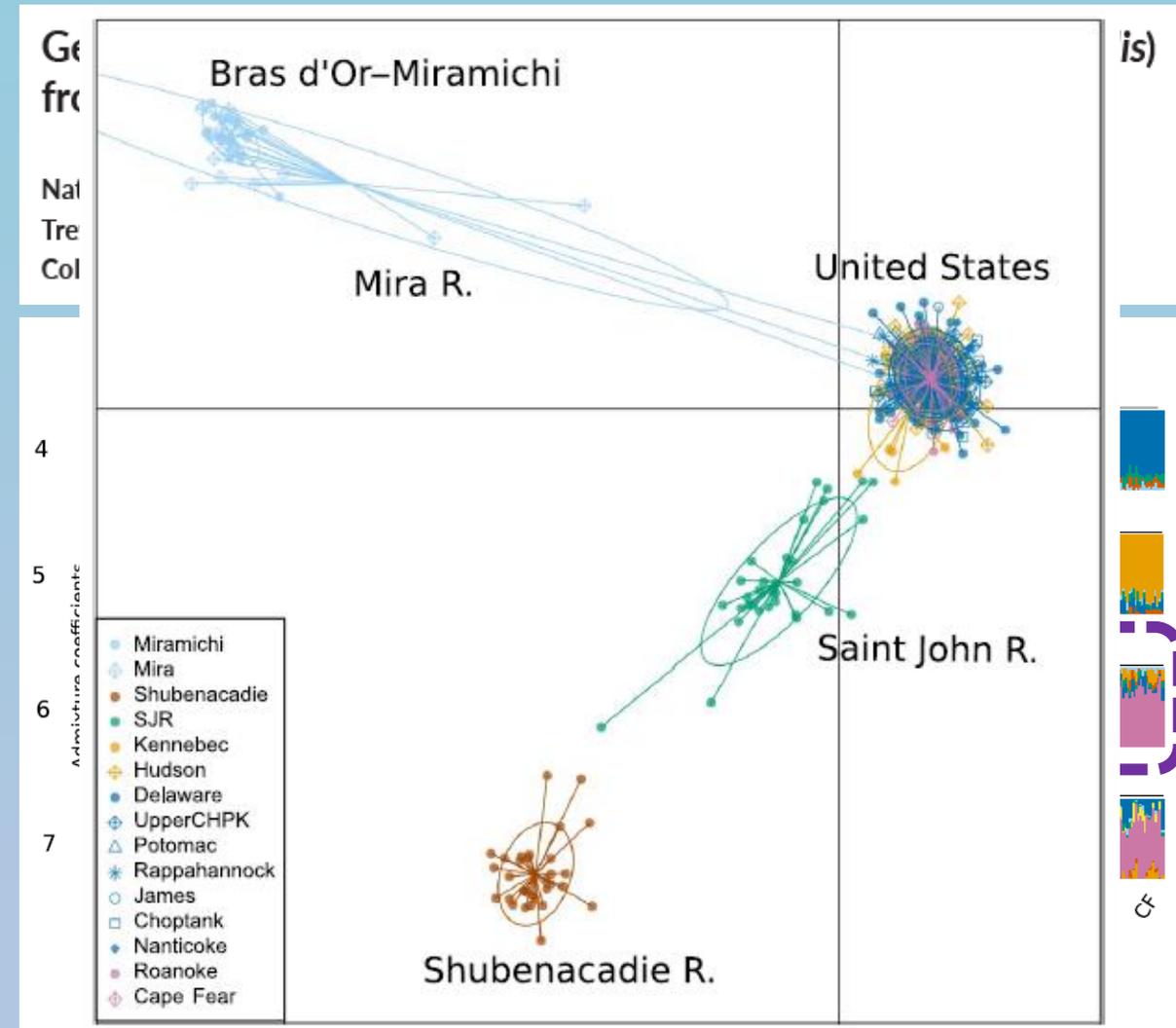


Genetics background

GOAL: Develop an accurate, precise, standardizable between labs, and cost-effective method to determine mixture estimates and potentially individual assignments of striped bass

GT-Seq panel derived from 1296 SNP ddRAD panel described in LeBlanc et al. 2020 (*LeBlanc et al., in prep*)

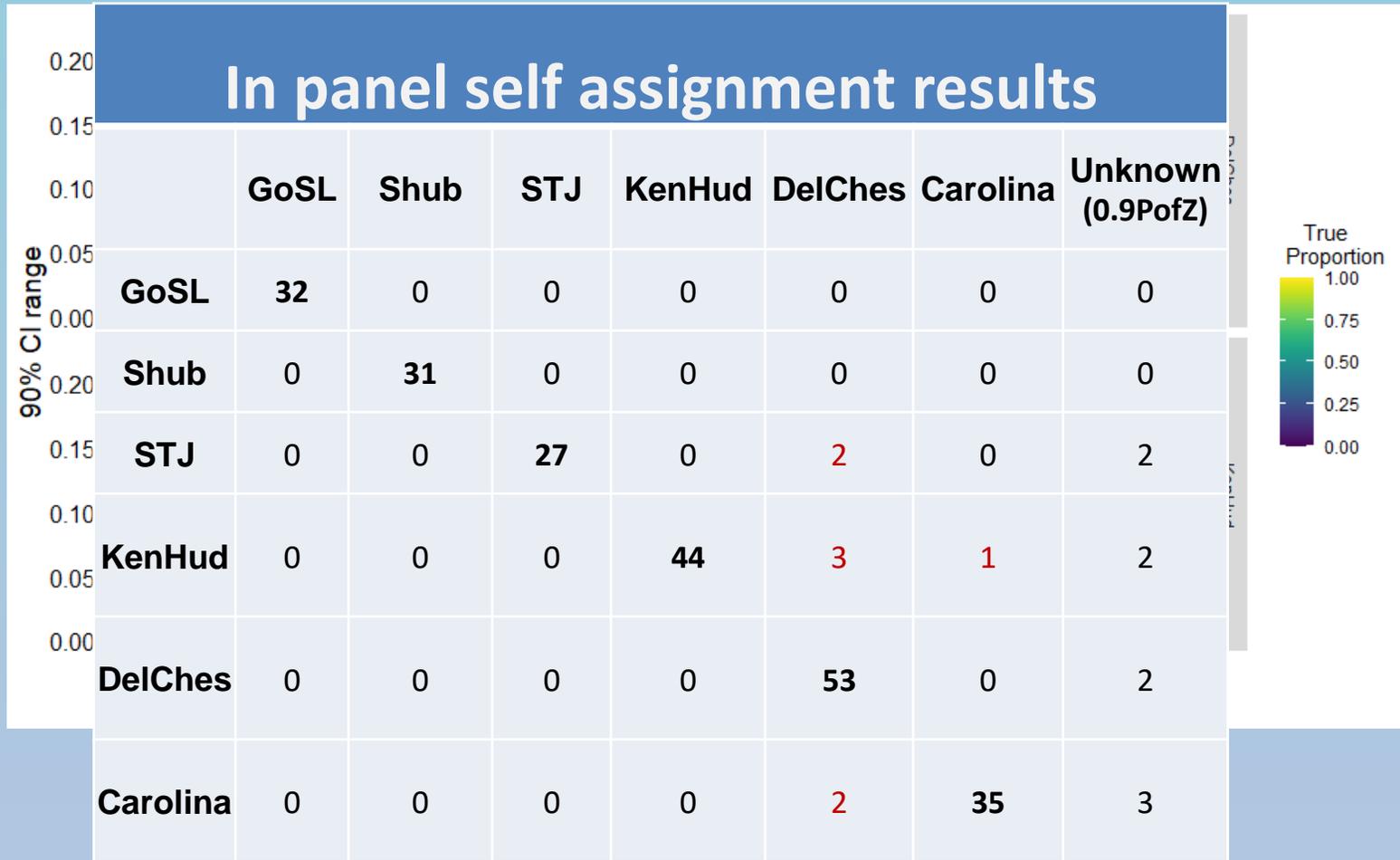
- 3 US reporting groups: Kennebec-Hudson (KenHud), Delaware-Chesapeake (DelChes), North Carolina (Carolina)
- Using models we reduced this to 233 SNPs, cost to extract DNA and sequence a sample was less than \$5/sample!



GT-Seq Panel Performance

Despite lack of differentiation in US reporting units relative to Canadian ones, the 233 SNP GT-Seq panel has proven powerful:

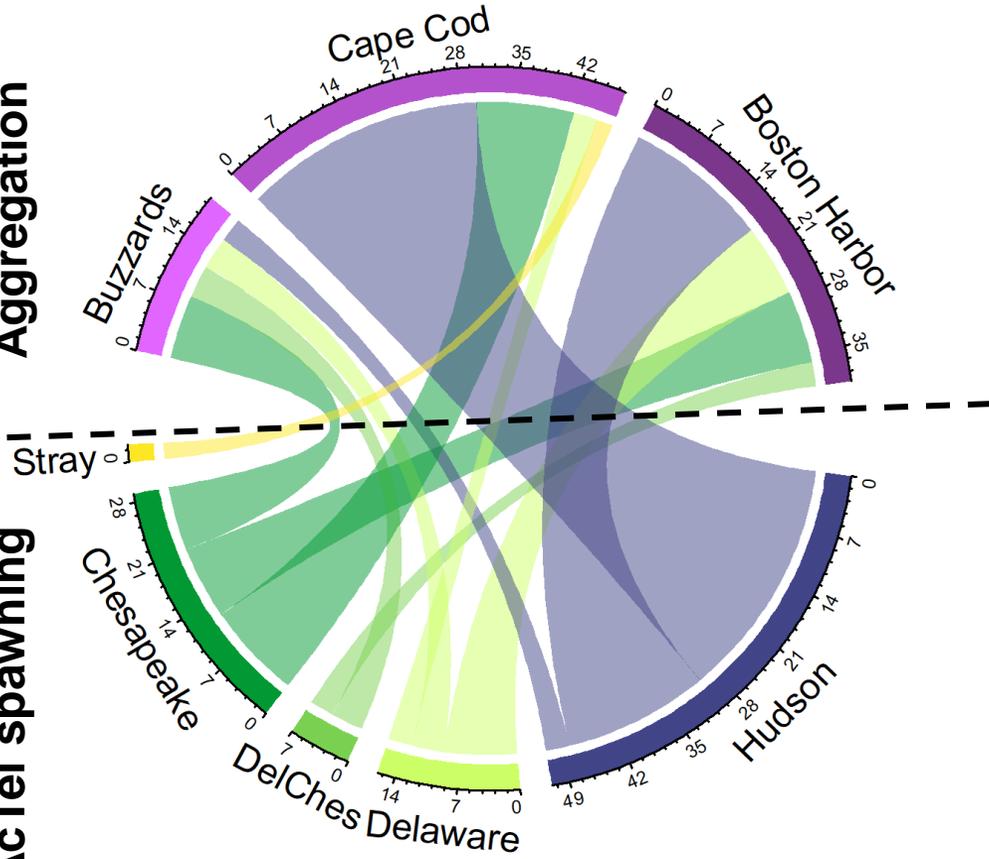
- Can provide precise and accurate mixture estimates at relatively low sample sizes (e.g. 200-300)
- High degree of individual assignment at 0.9 probability level



Genetics inform telemetry results

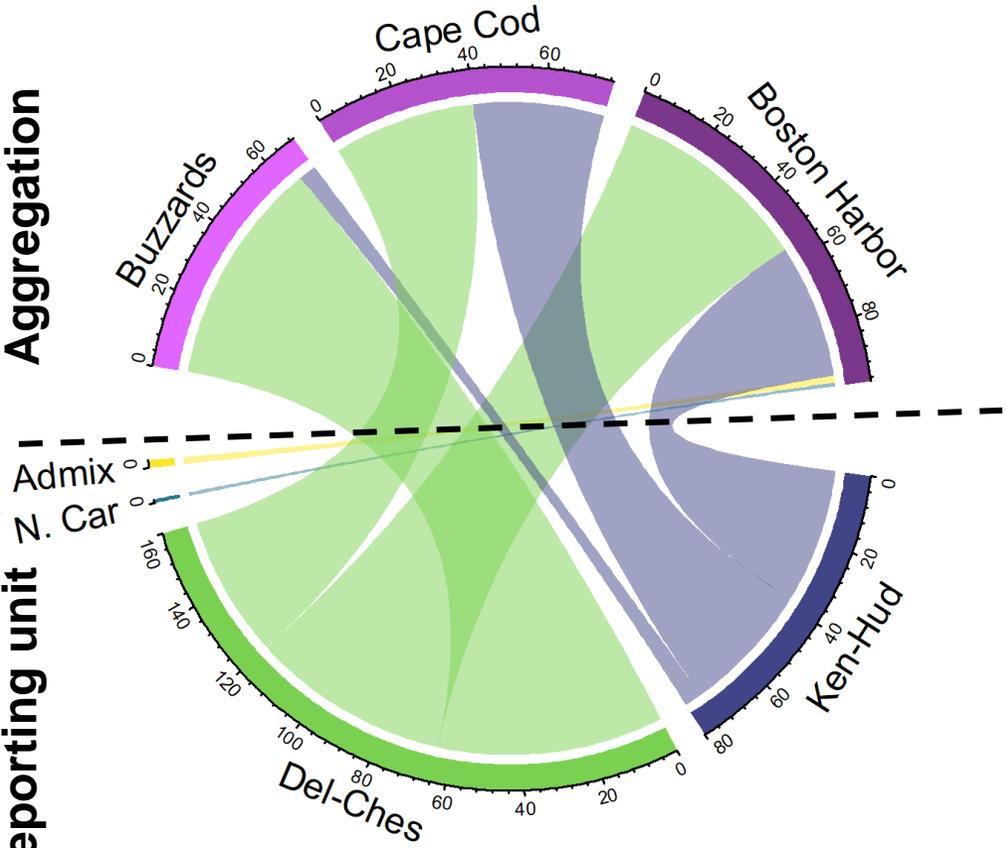
Aggregation

AcTel spawning



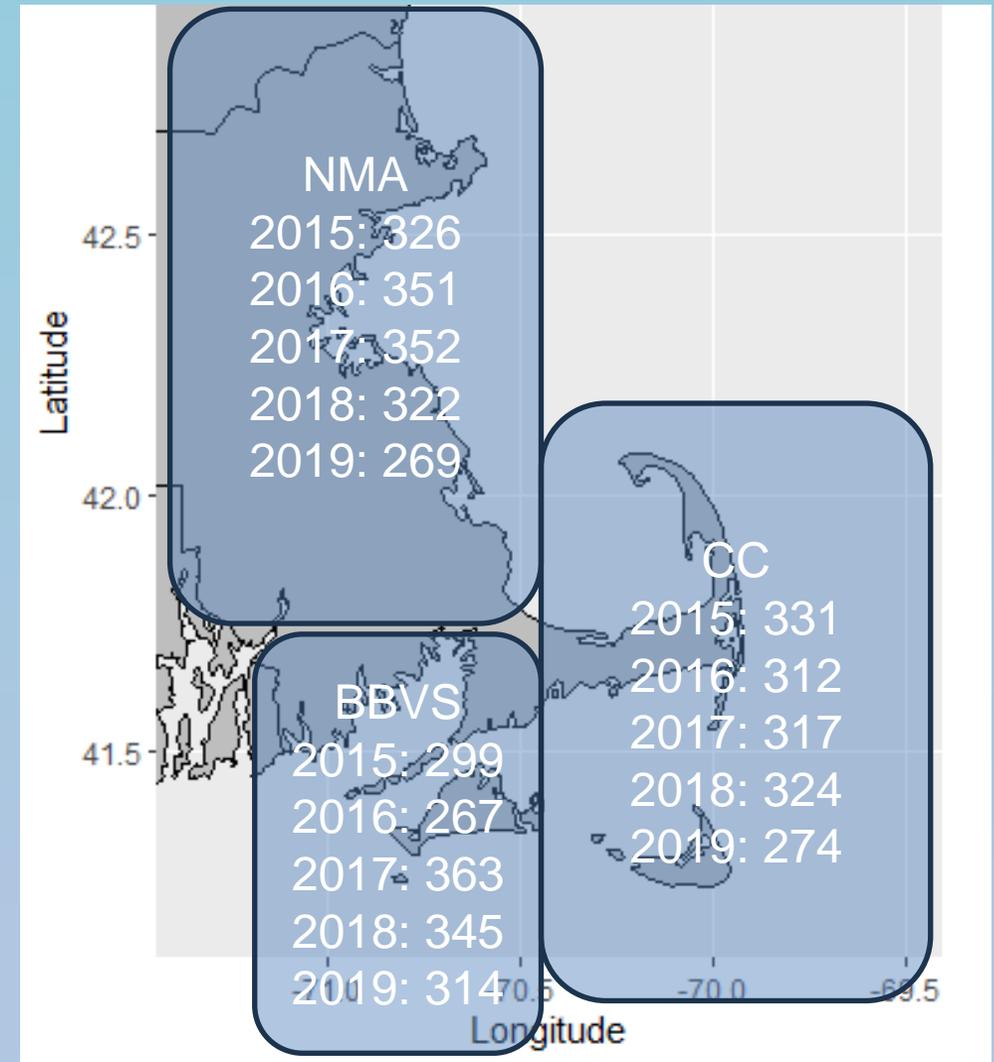
Aggregation

Reporting unit

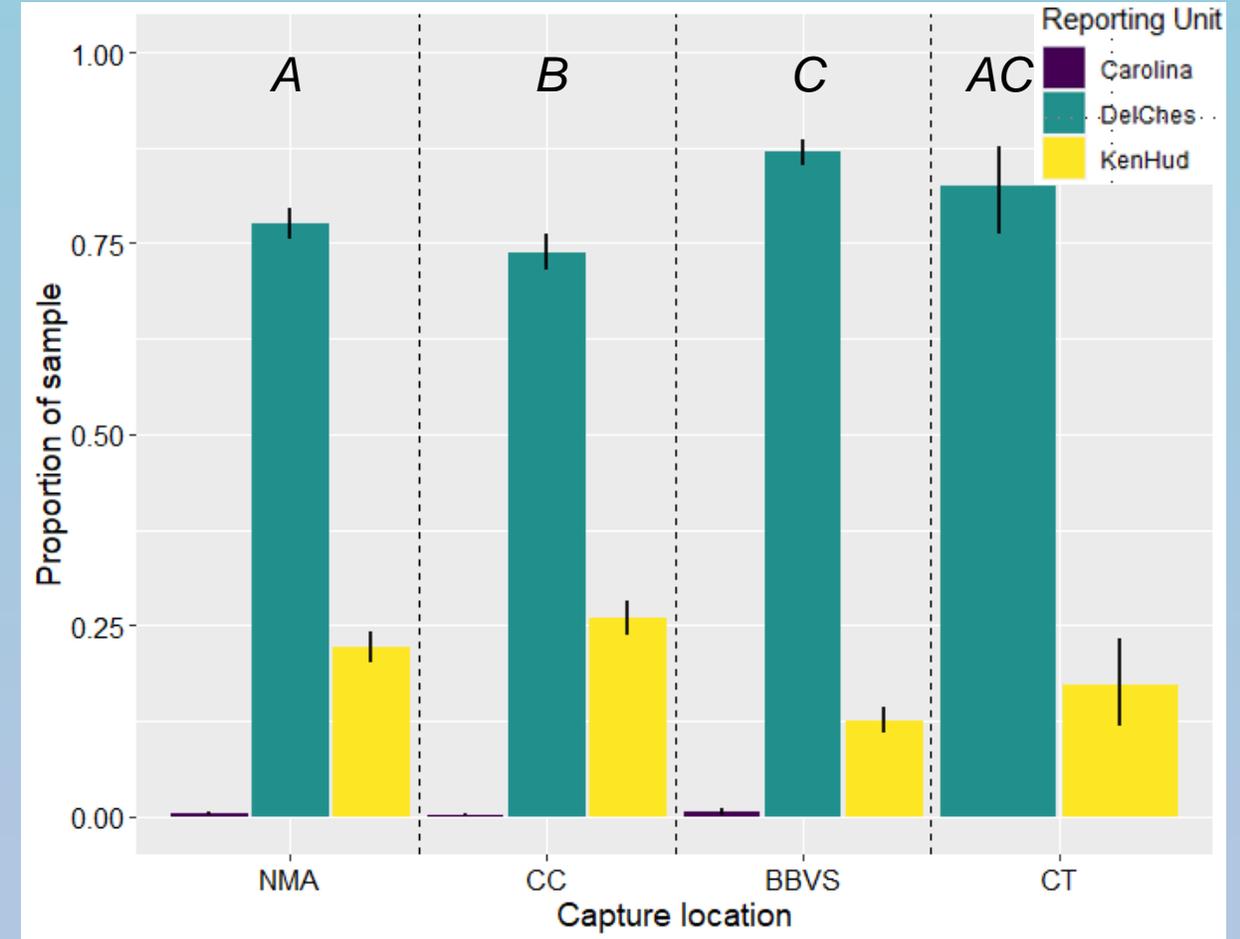
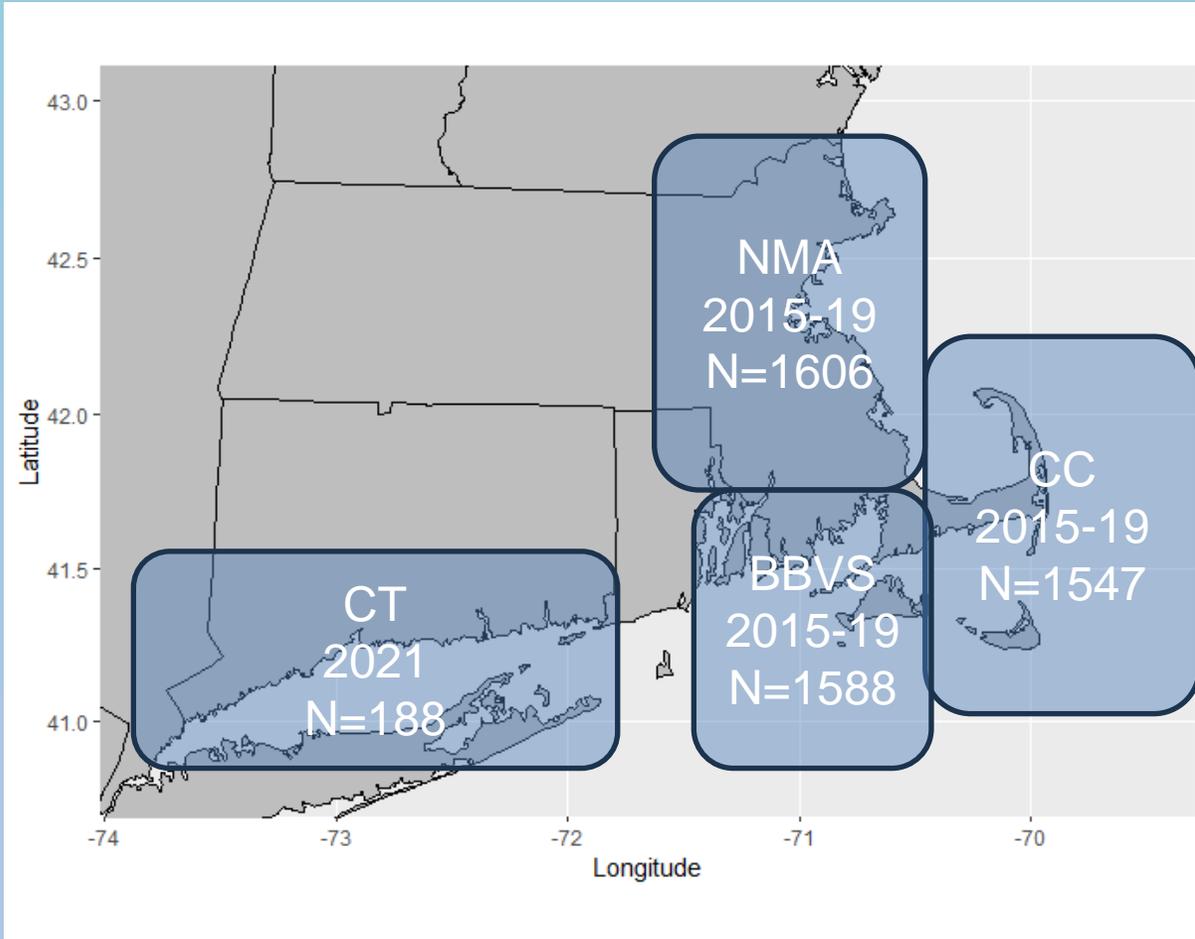


Characterizing natal origins of catch in Massachusetts

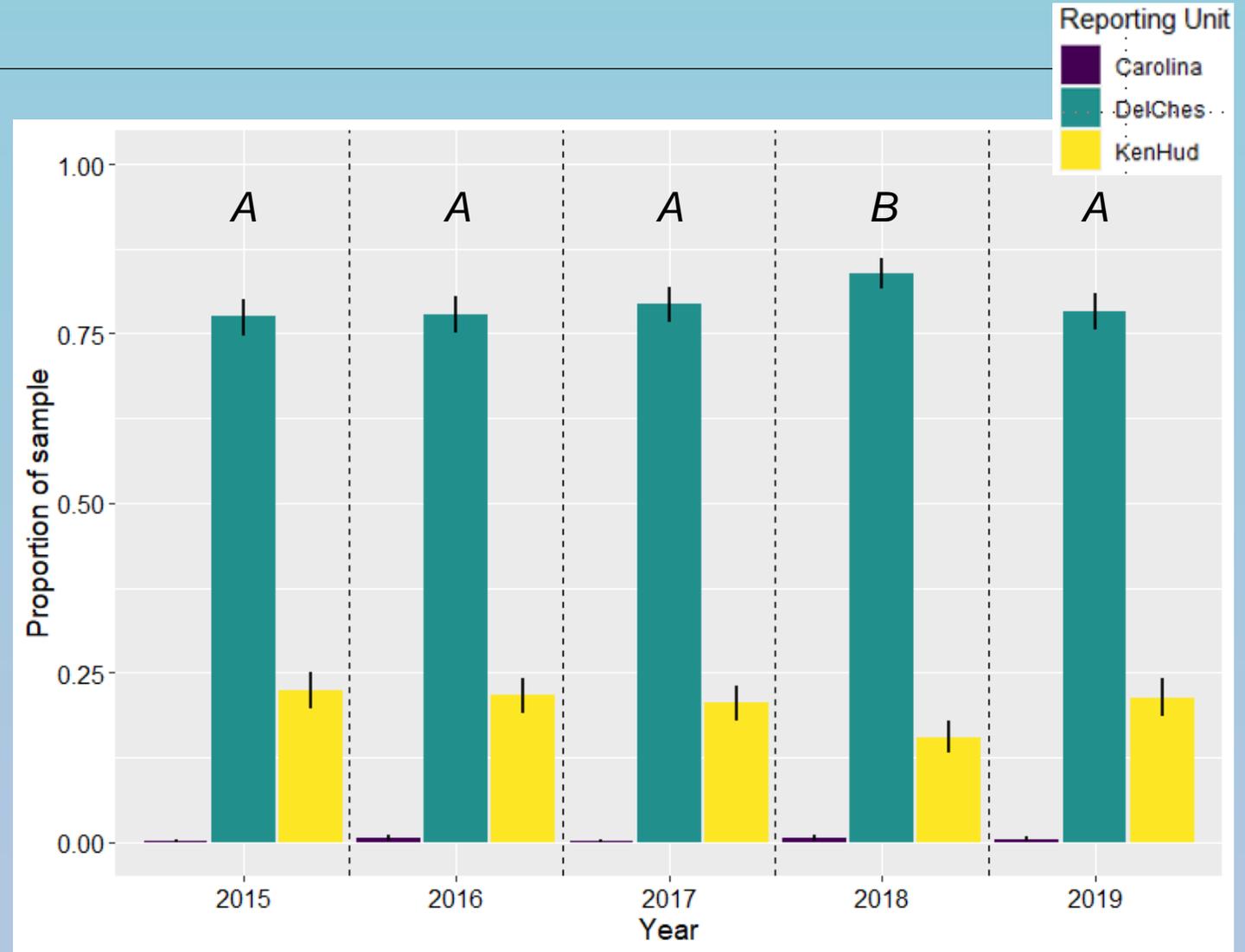
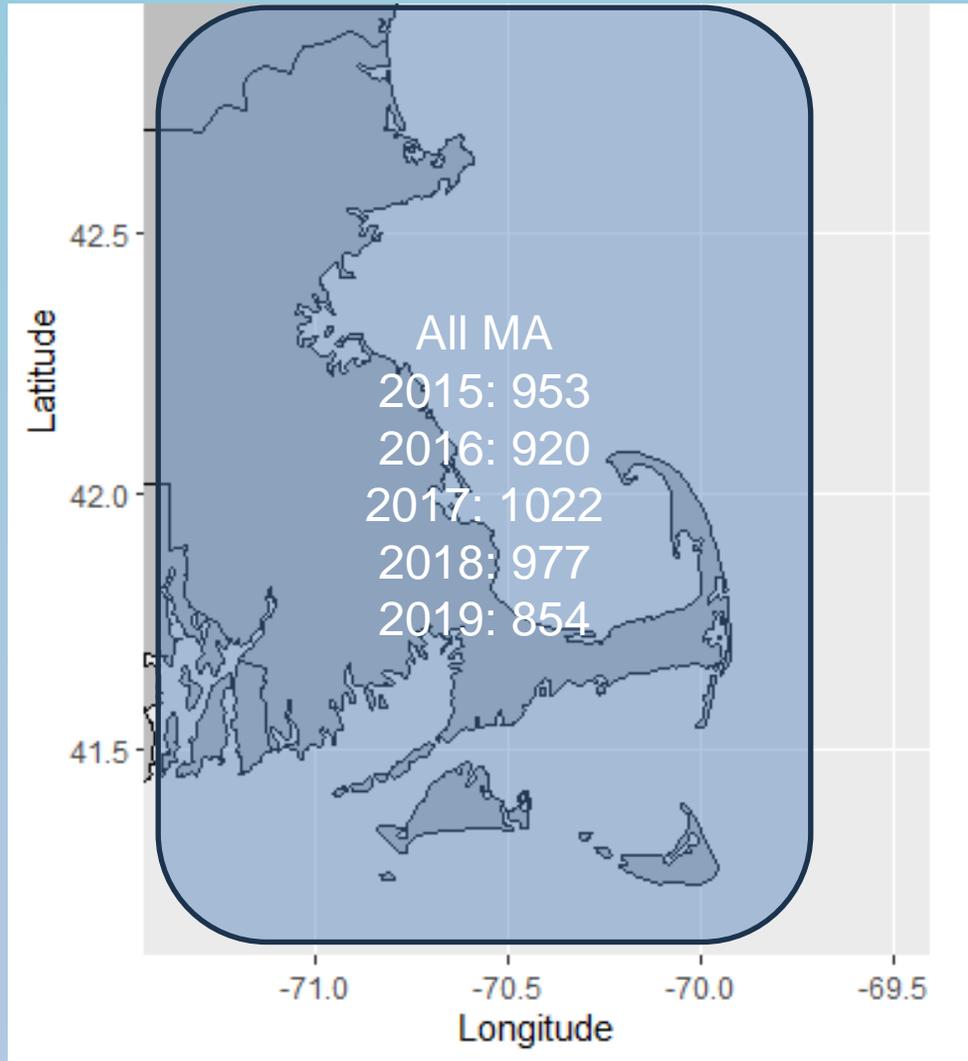
- Recreational and commercial samples were collected 2015 – 2019 by MA DMF, capitalizing on commercial sampling, recreational sampling, and the Sportfish Angler Data Collection Team (SADCT).
- Annual collections were based on a nested design considering geographic areas:
 - Northern Massachusetts (NMA)
 - Cape Cod (CC)
 - Buzzards Bay and Vineyard Sound (BBVS)and regulations:
 - No harvest (School) < 28"
 - Recreational harvest (Recreational) 28-35"
 - Commercial and recreational harvest (Commercial) > 35"
- *A smaller set of samples (n = 198) was collected from Long Island Sound and the Connecticut River by CT DEEP and USFWS in 2021*



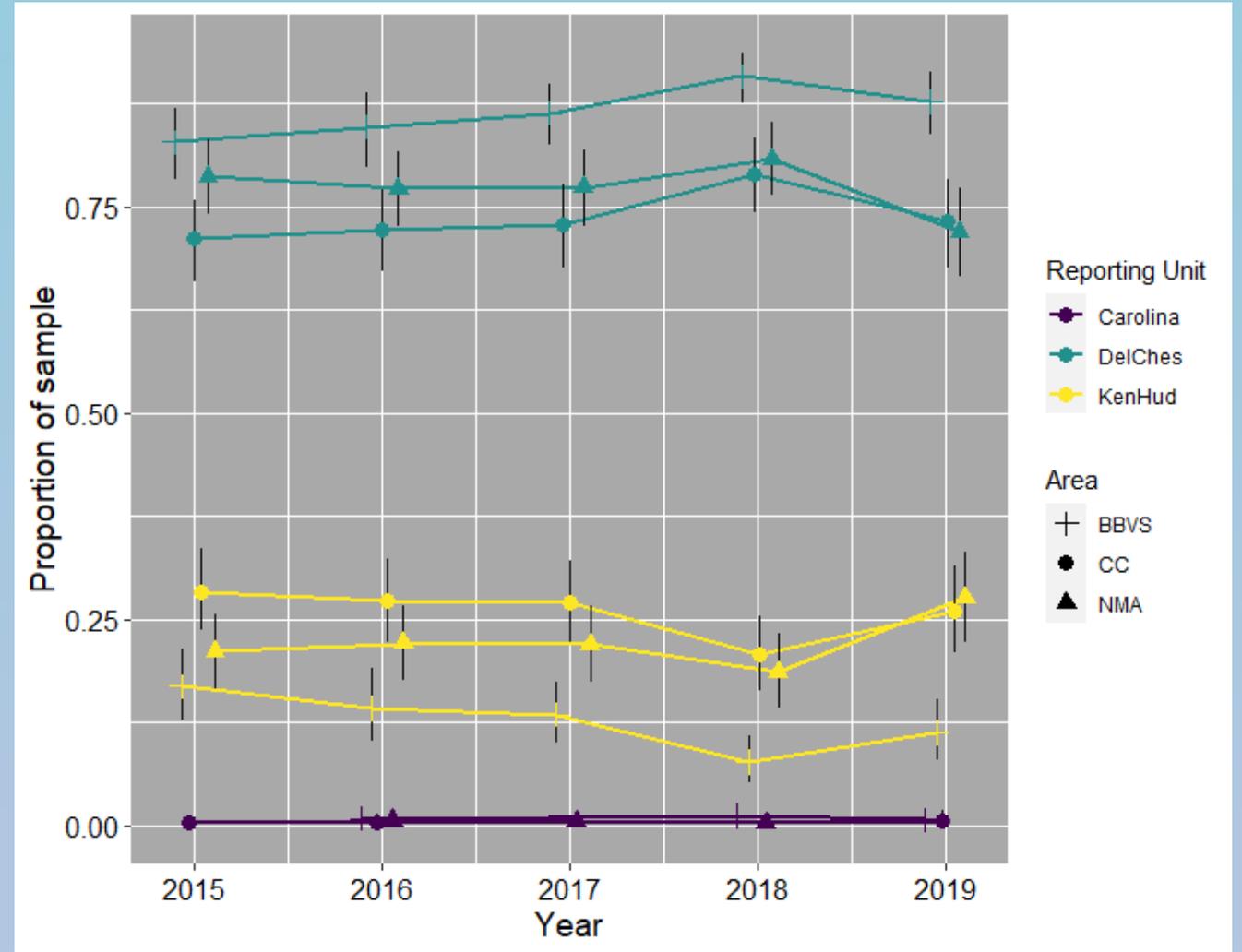
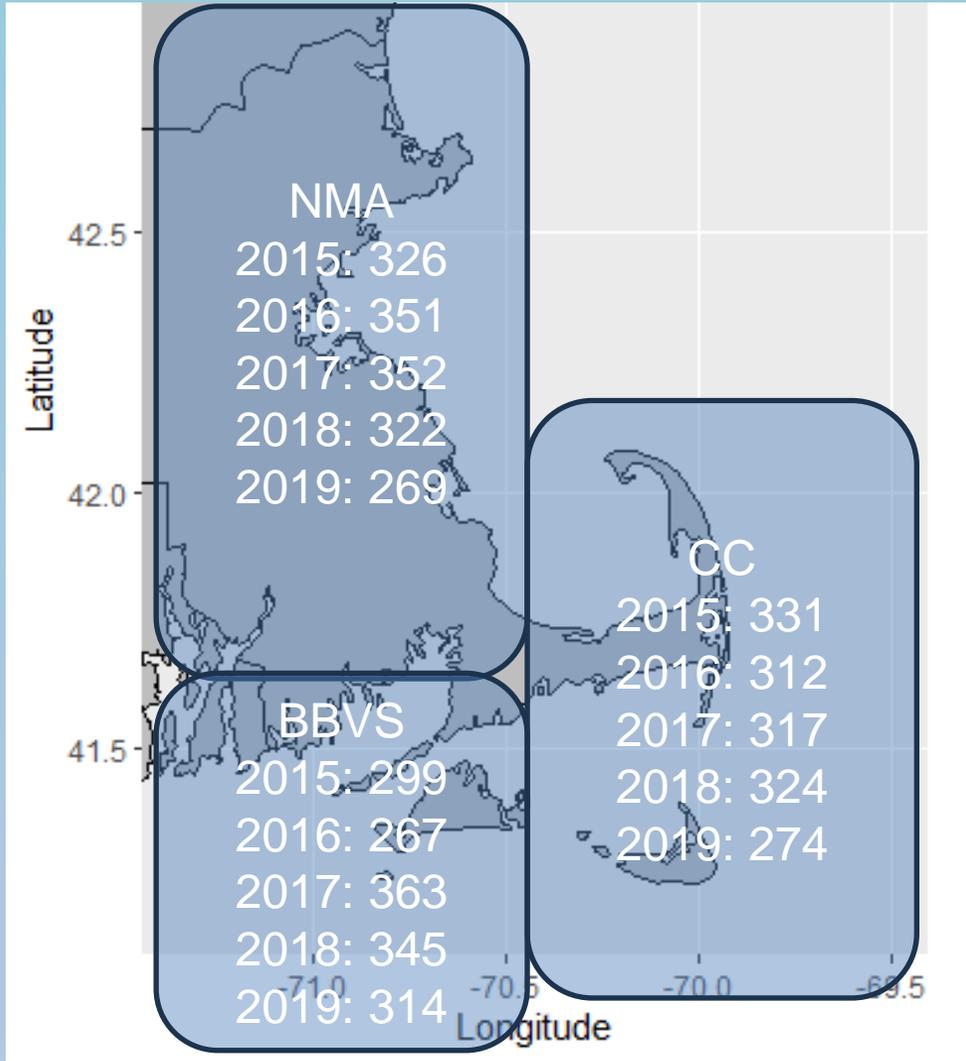
Results – Collection area composition



Results – Annual composition



Results – Collection area by year



Results – Size class by year

School (<71)



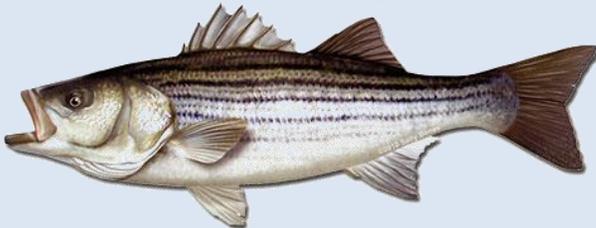
2015: 383
2016: 418
2017: 463
2018: 435
2019: 470

Recreational (71-85)

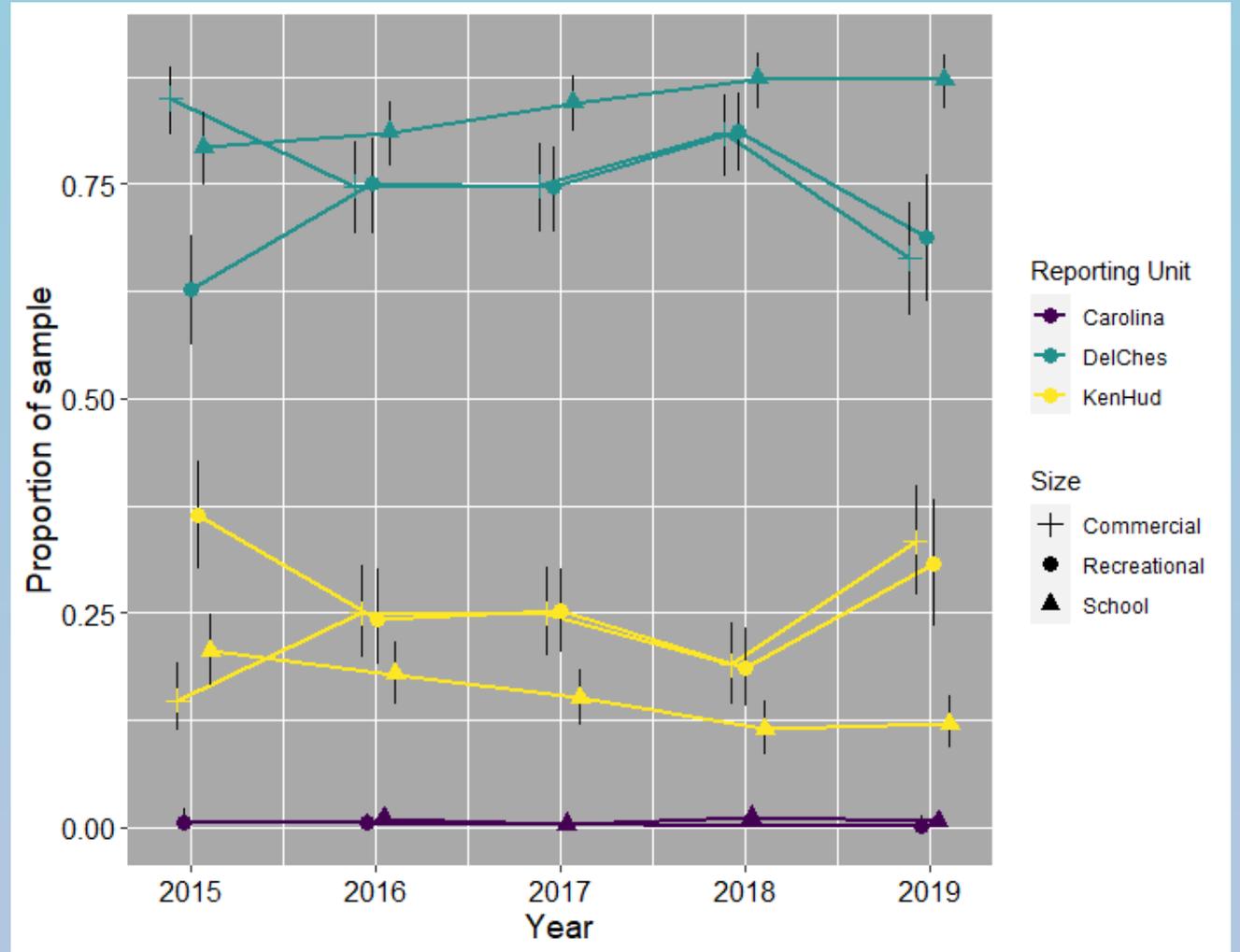


2015: 231
2016: 232
2017: 303
2018: 263
2019: 160

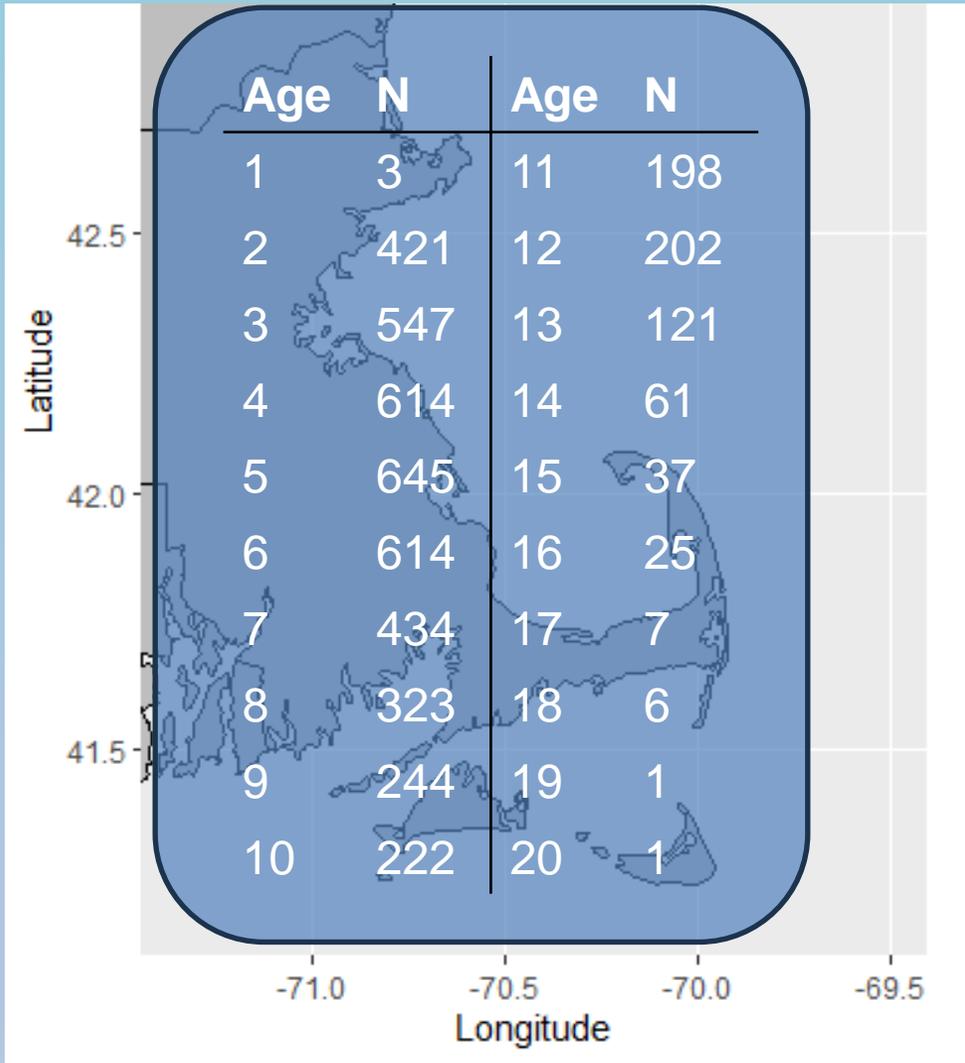
Commercial (>85)



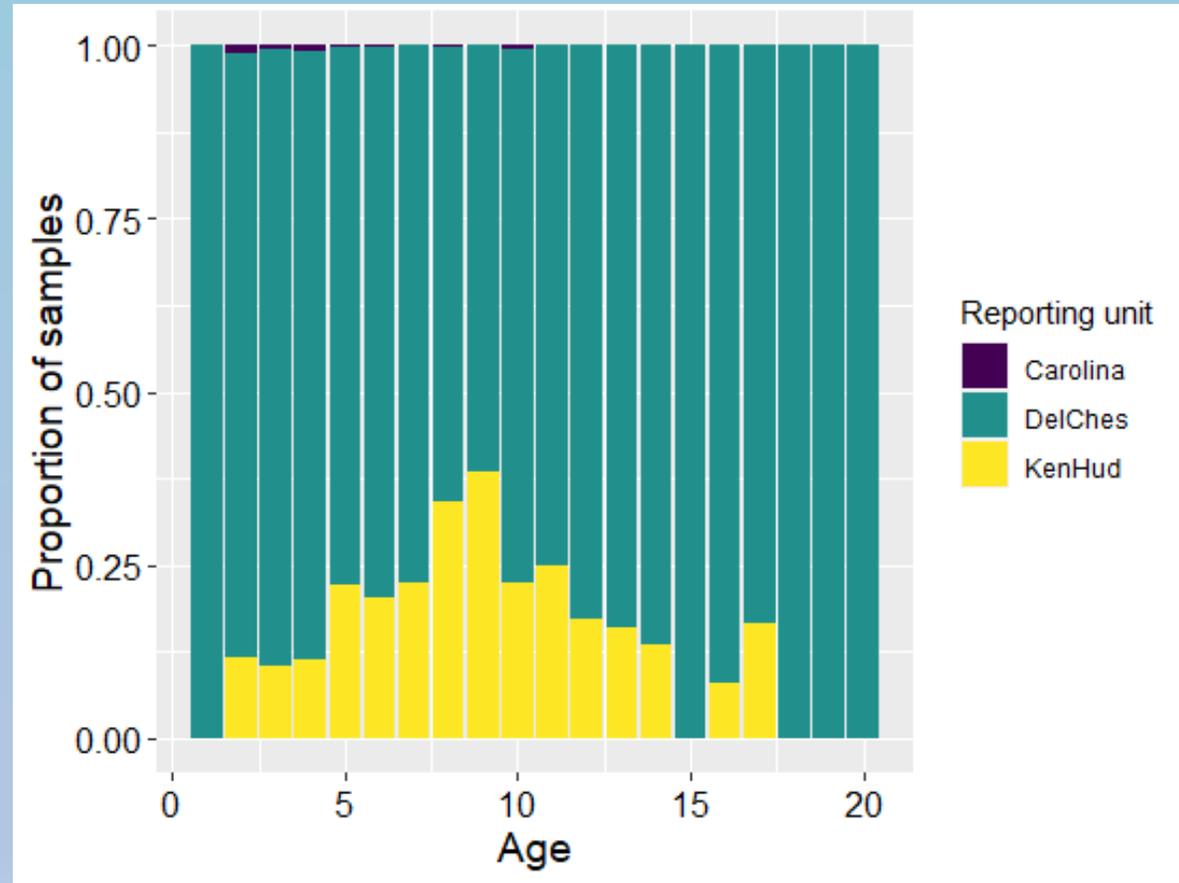
2015: 339
2016: 270
2017: 256
2018: 279
2019: 224



Individual Assignments increase our capabilities



- More than 97% of sampled fish were assigned back to a reporting unit at a probability of 90% or greater
- 4,592 available samples over entirety of study



Post-Release Mortality



- **Striped Bass** - most-released US saltwater sportfish
 - 11 fish released for every fish harvested
 - Most mortality comes from recreational releases

- Recreational **release mortality rate** = 9%
 - From a prior MADMF study – Diodati and Richards, 1995
 - Currently applies to all recreational releases
 - We have better methods now!

Transactions of the American Fisheries Society 125:300-307, 1996
© Copyright by the American Fisheries Society 1996

Mortality of Striped Bass Hooked and Released in Salt Water

PAUL J. DIODATI

Massachusetts Division of Marine Fisheries
Cat Cove Marine Laboratory, Salem, Massachusetts 01970, USA

R. ANNE RICHARDS

Fisheries Science Center, National Marine Fisheries Service
Woods Hole, Massachusetts 02543, USA

recreational fishery for striped bass *Morone saxatilis*
is known about the survival rates of caught and
hooking mortality of striped bass after catch
Experimental fishing was conducted on
Massachusetts. Depth of hook penetration
or single hooks), and angler
from hooking. The
as predic
% for

Release Mortality Methods

Acoustic Telemetry Study - Complete
349 bass tagged in 2020-2021. Monitored mortality over 2 months

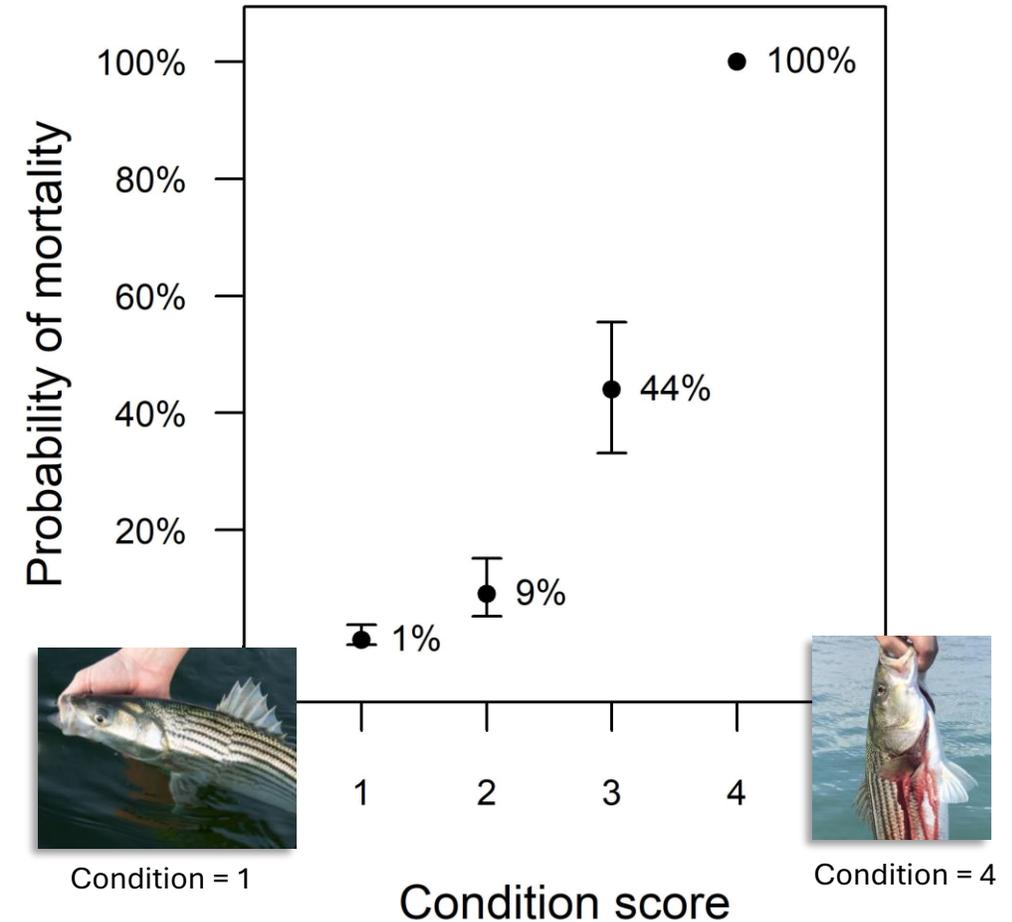
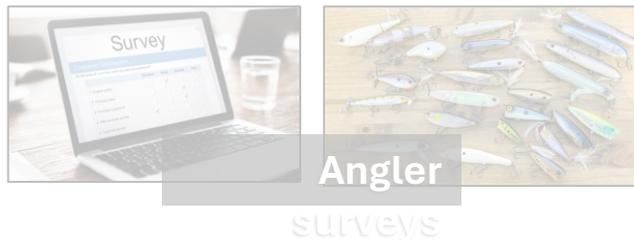
A. Mortality Rate ~ Release Condition



B. Release Condition ~ Variables

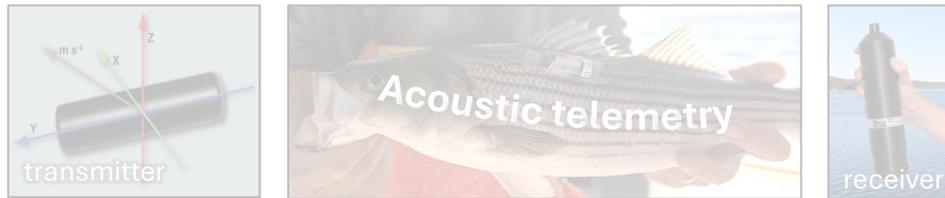


C. Describe Variables for Fishery



Release Mortality Methods

A. Mortality Rate ~ Release Condition



B. Release Condition ~ Variables



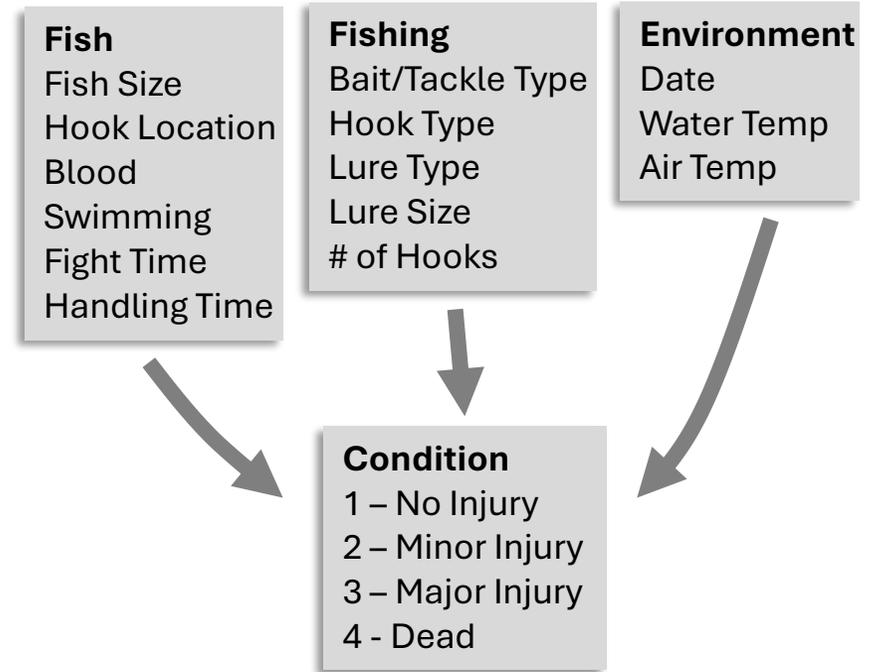
Citizen science / cooperative research

C. Describe Variables for Fishery



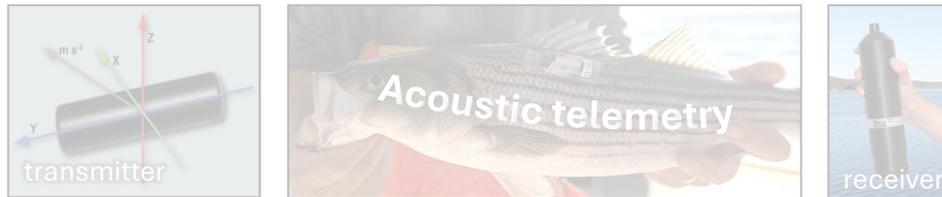
Angler surveys

Citizen Science Study - Ongoing 2023 - 2024



Release Mortality Methods

A. Mortality Rate ~ Release Condition



B. Release Condition ~ Variables



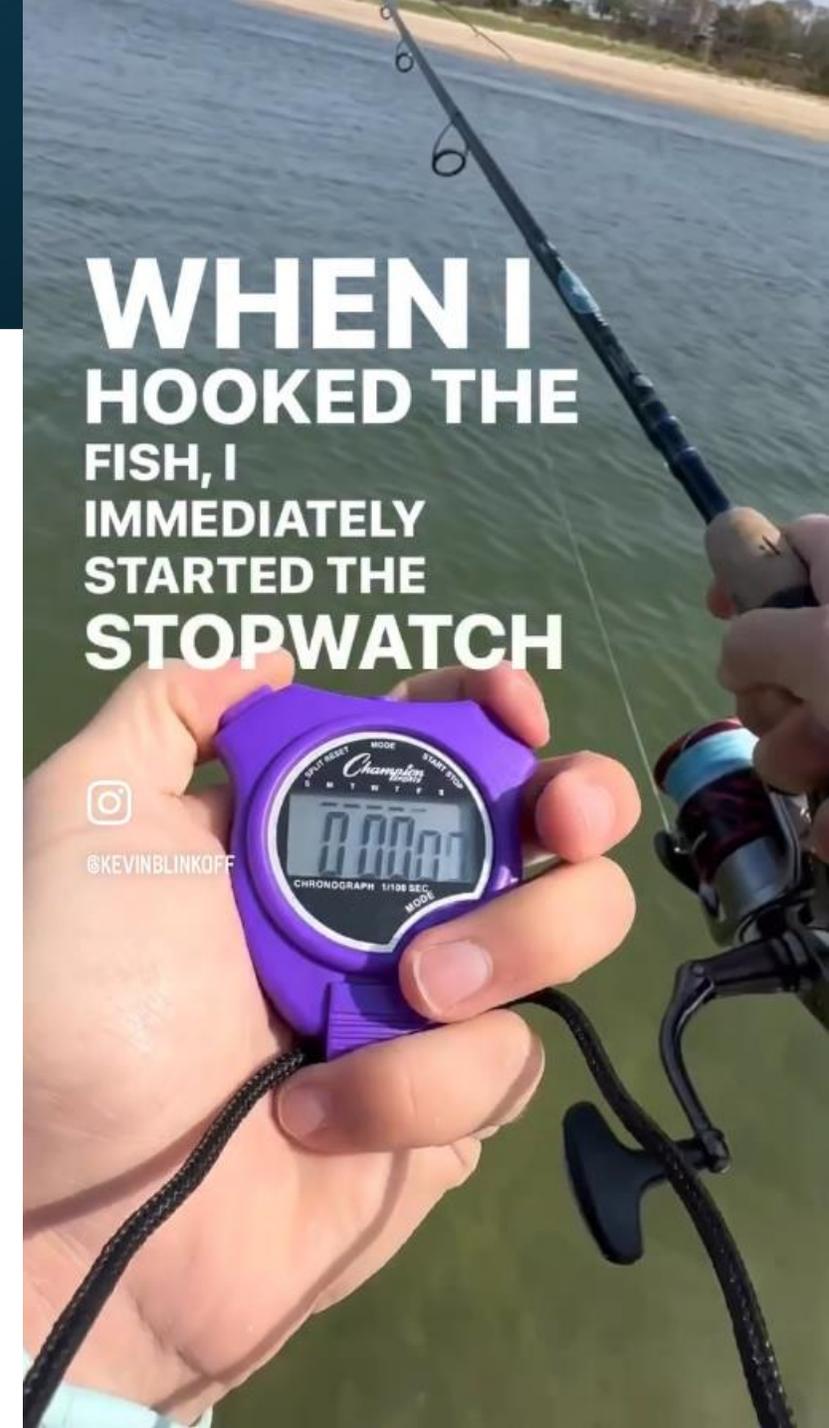
C. Describe Variables for Fishery



Angler Tackle Configuration Surveys
Coming in 2024-2025

Striped Bass Citizen Science

- Anglers sign up to record data while fishing
- First 500 participants received
 - Thermometer
 - Stopwatch
 - Tape measure
- Anglers get fishing pliers after 1st report
- Weekly raffles for active participants



Striped Bass Citizen Science

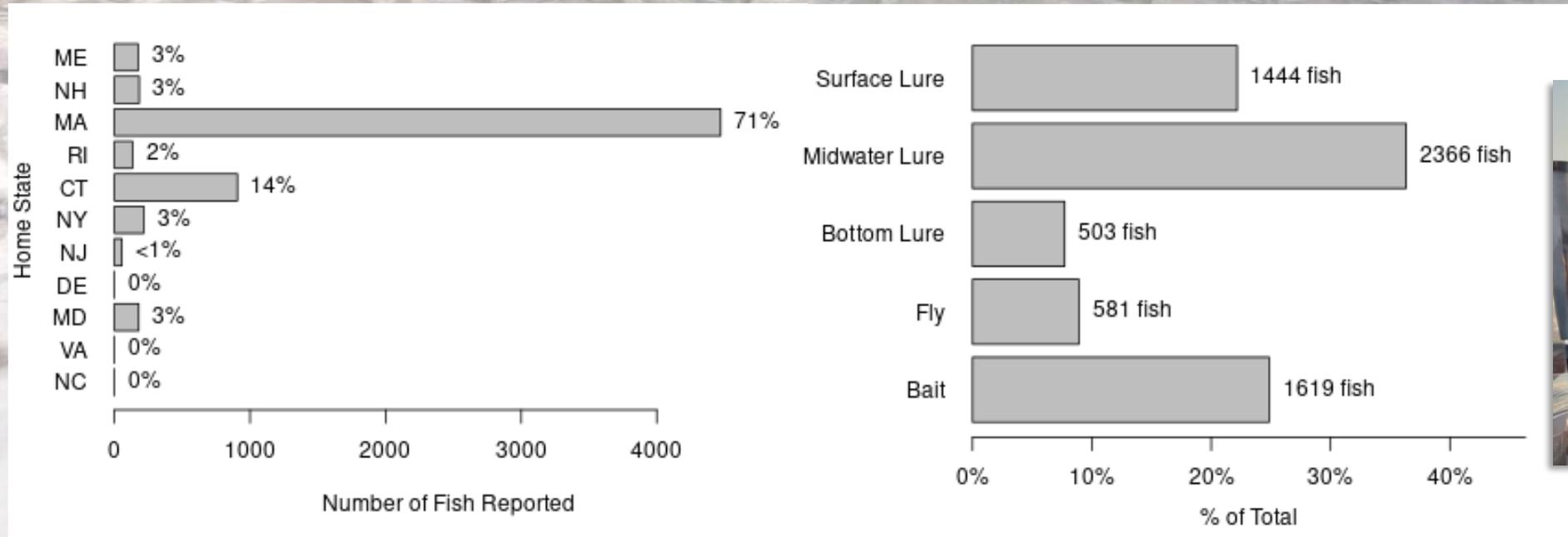
- Anglers sign up to record data while fishing
- First 500 participants received
 - Thermometer
 - Stopwatch
 - Tape measure
- Anglers get fishing pliers after 1st report
- Weekly raffles for active participants



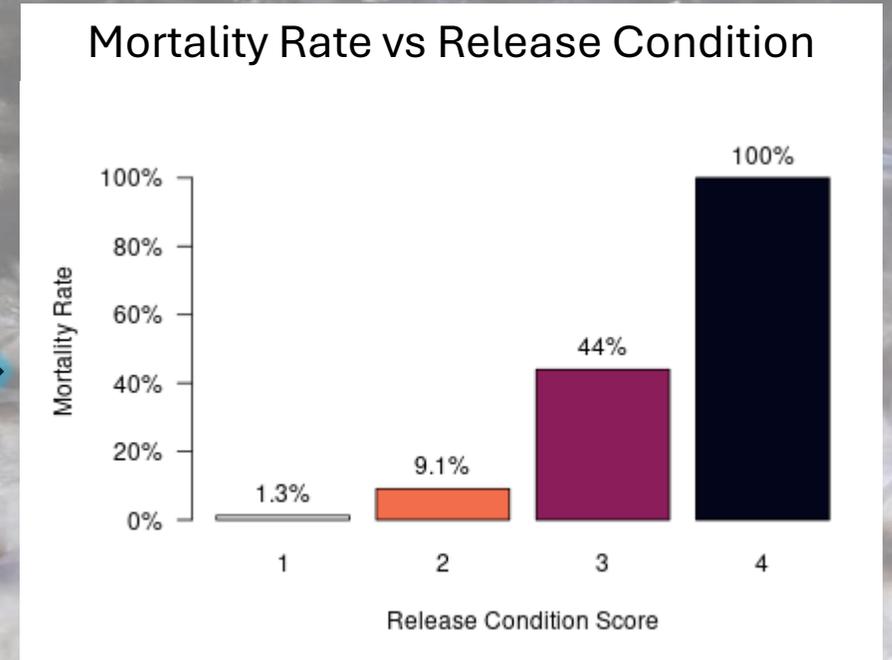
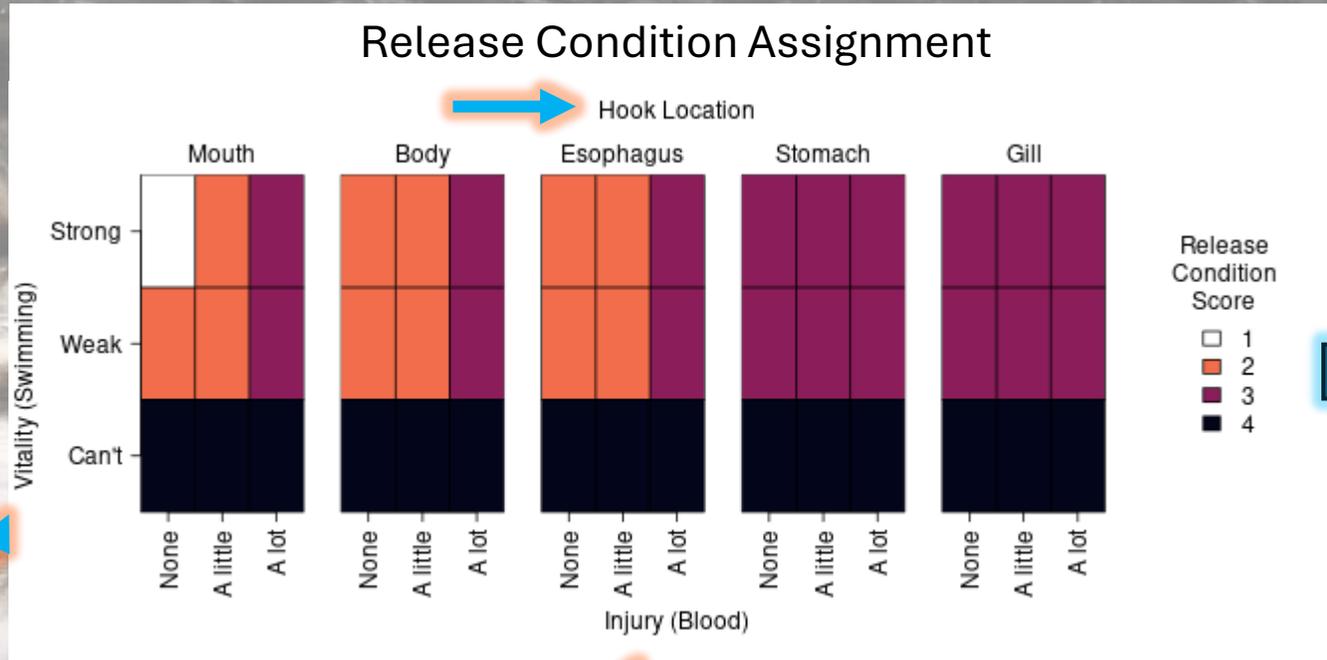
Weekly Raffle Winners – Thank you for participating!



Citizen Science Dataset

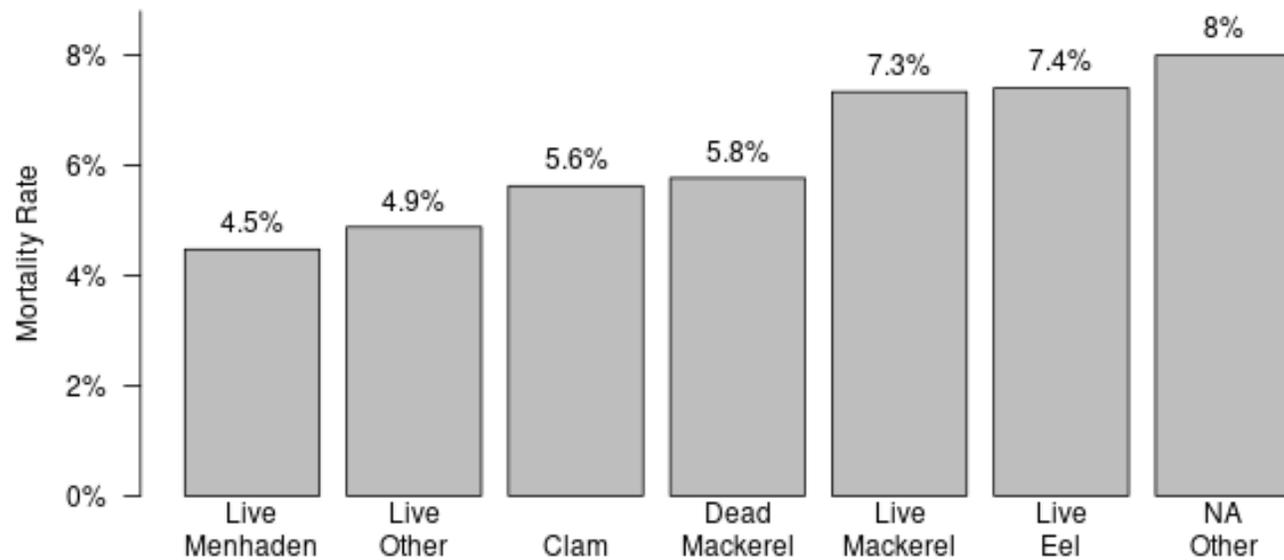


Release Condition Predicts Mortality Rate

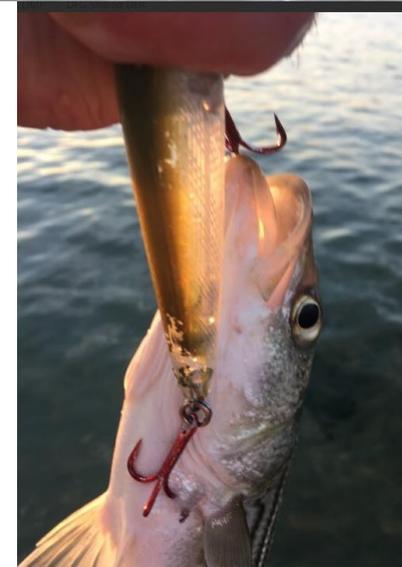
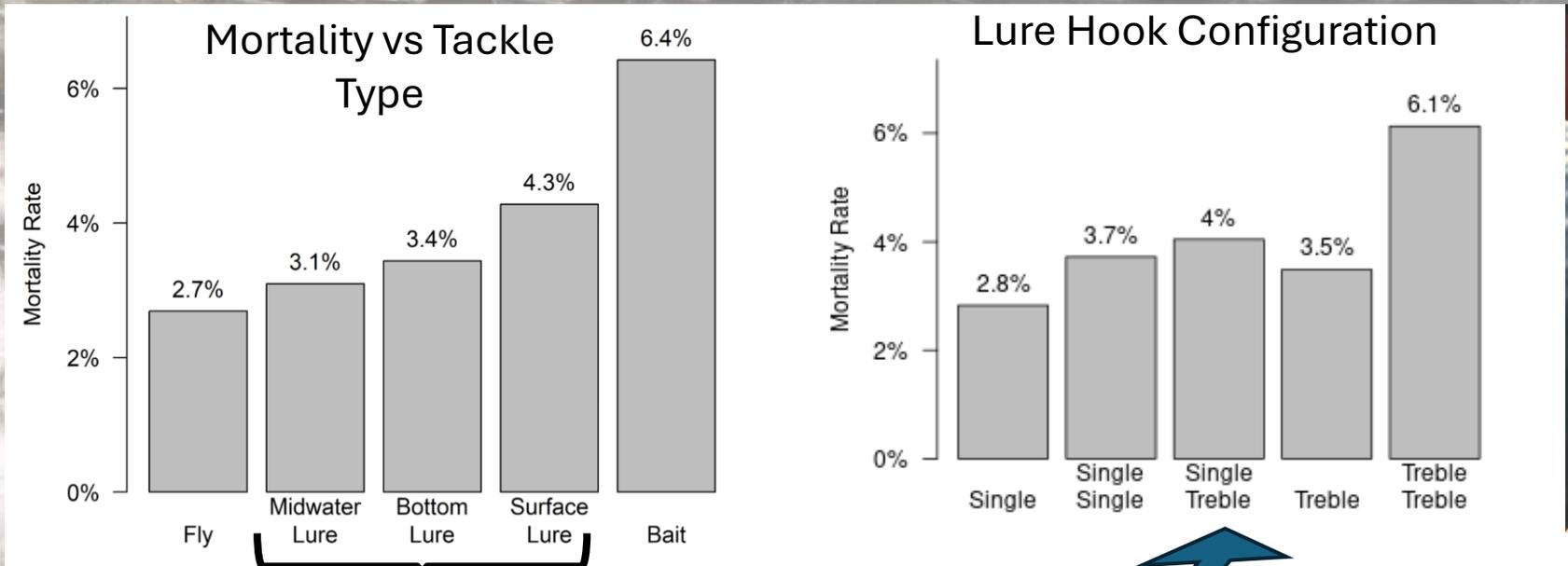


Bait fishing has the highest release mortality

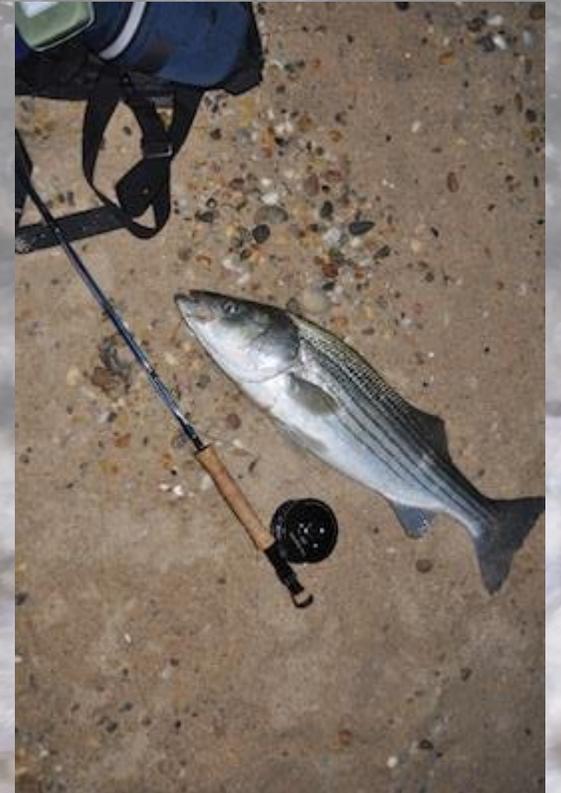
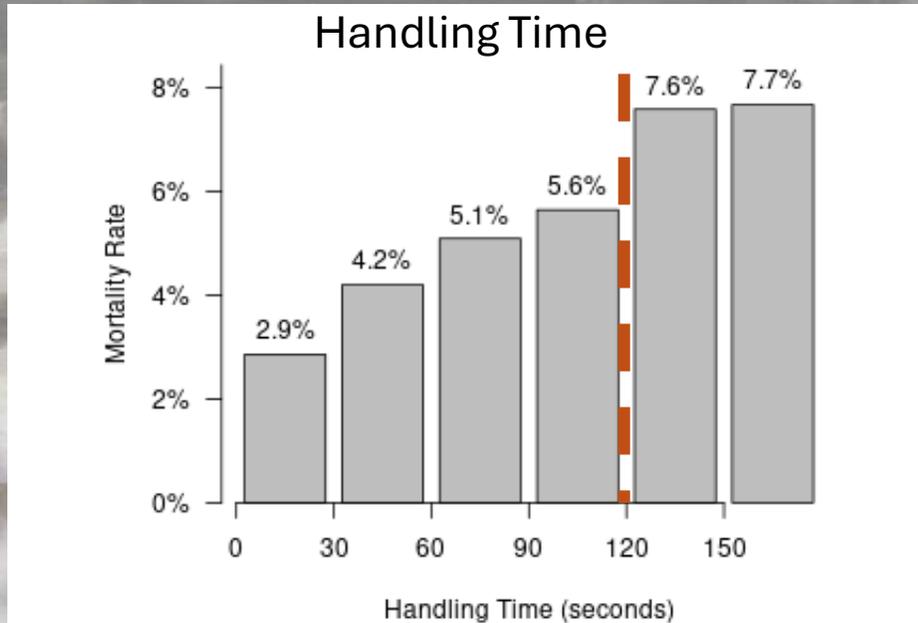
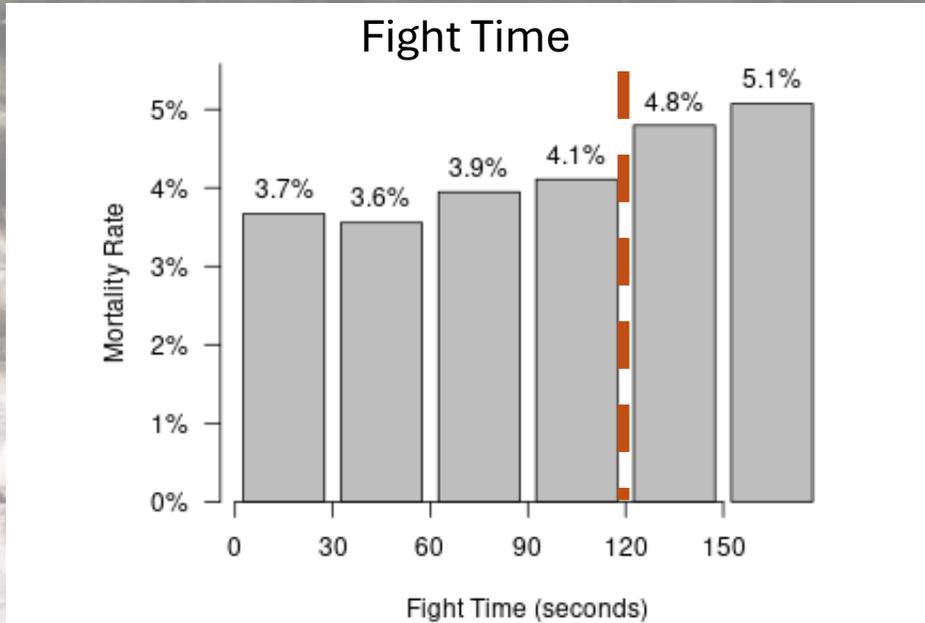
Mortality vs Bait Type



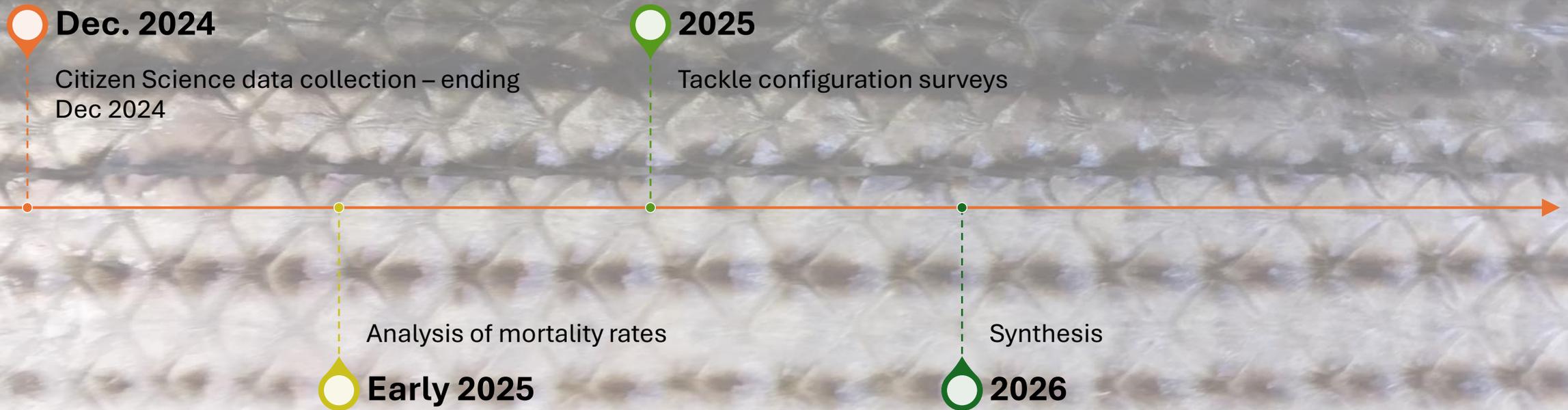
Tackle & Lure Choices Impacts PRM...



... As Does Fishing Stress



Timeline



Summary

Massachusetts has been a management leader

- Outsize impact and interest
- Invested in research and responsible use
- **Our work is enabled by our anglers**

Striped Bass are a part of our social fabric

- Long history of exploitation and conservation
- Modern abundance lower than past, trending down

What can I do to help Striped Bass?

- Reduce the number of hooks on lures
- Fight and handle fish quickly, avoid stressful fishing!
- Consider what makes a “good day”



MA DMF Striped Bass Research Team

Mike Armstrong



Ben Gahagan



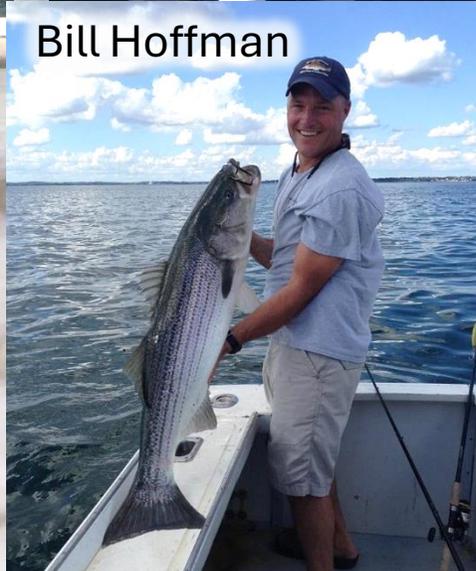
Michele Heller



Micah Dean



Bill Hoffman



Matt Ayer



Gary Nelson



Thank you!!!

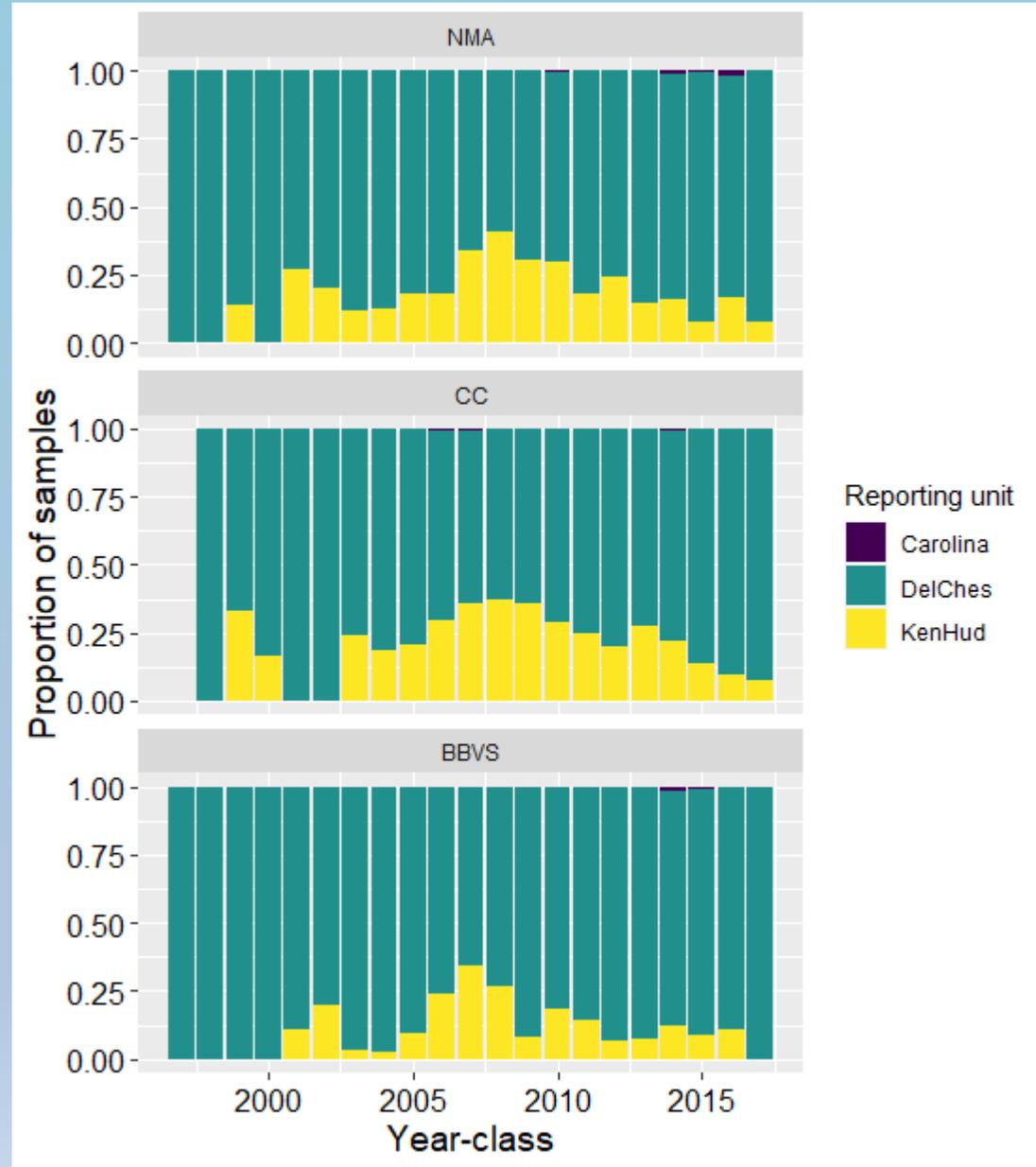
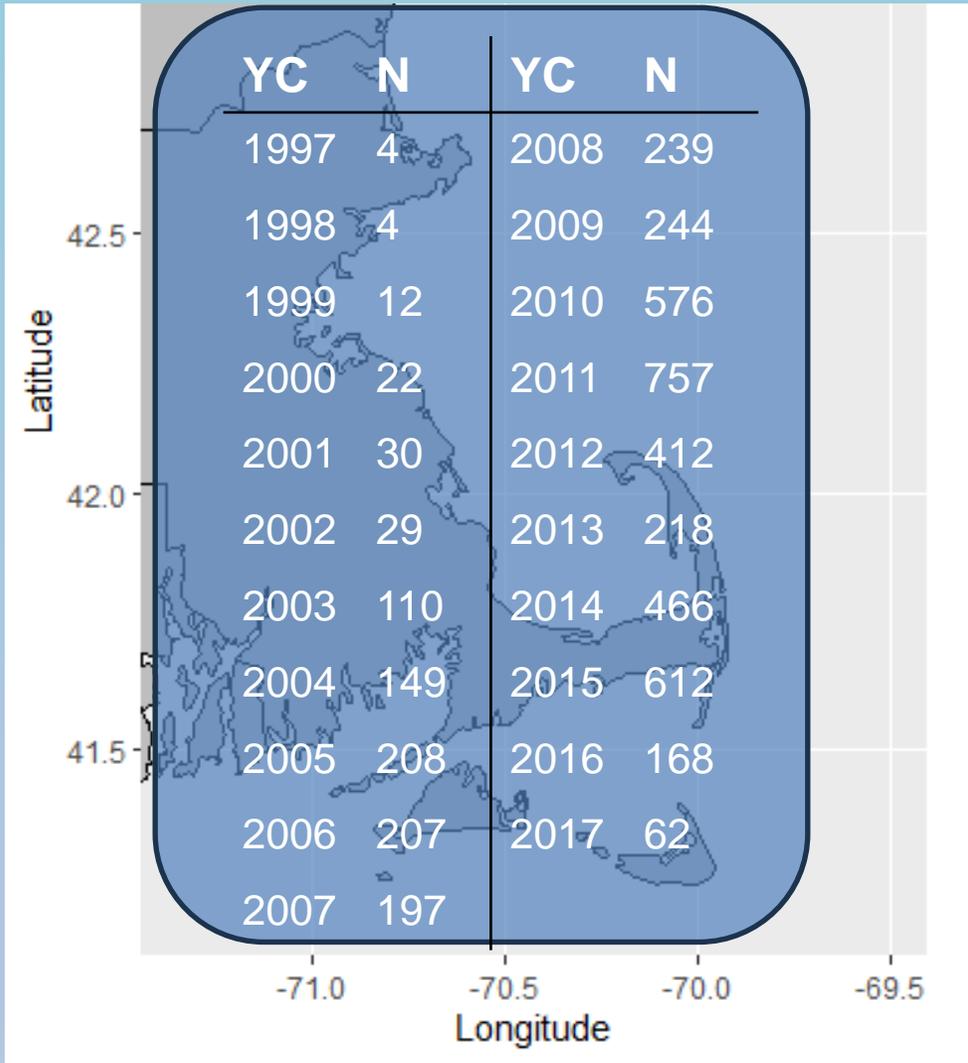
Citizen Science



Striped Bass
Conservation
Fund



Year-classes



Reporting unit specific cohort tracking

