UNIVERSITY OF MARYLAND CENTER FOR ENVIRONMENTAL SCIENCE
CHESAPEAKE BIOLOGICAL LABORATORY

Dave Secor

Good Fish in Bad Habitats
Improving Habitats for Migratory Fishes

The most essential things are invisible to the eye.
HC Anderson

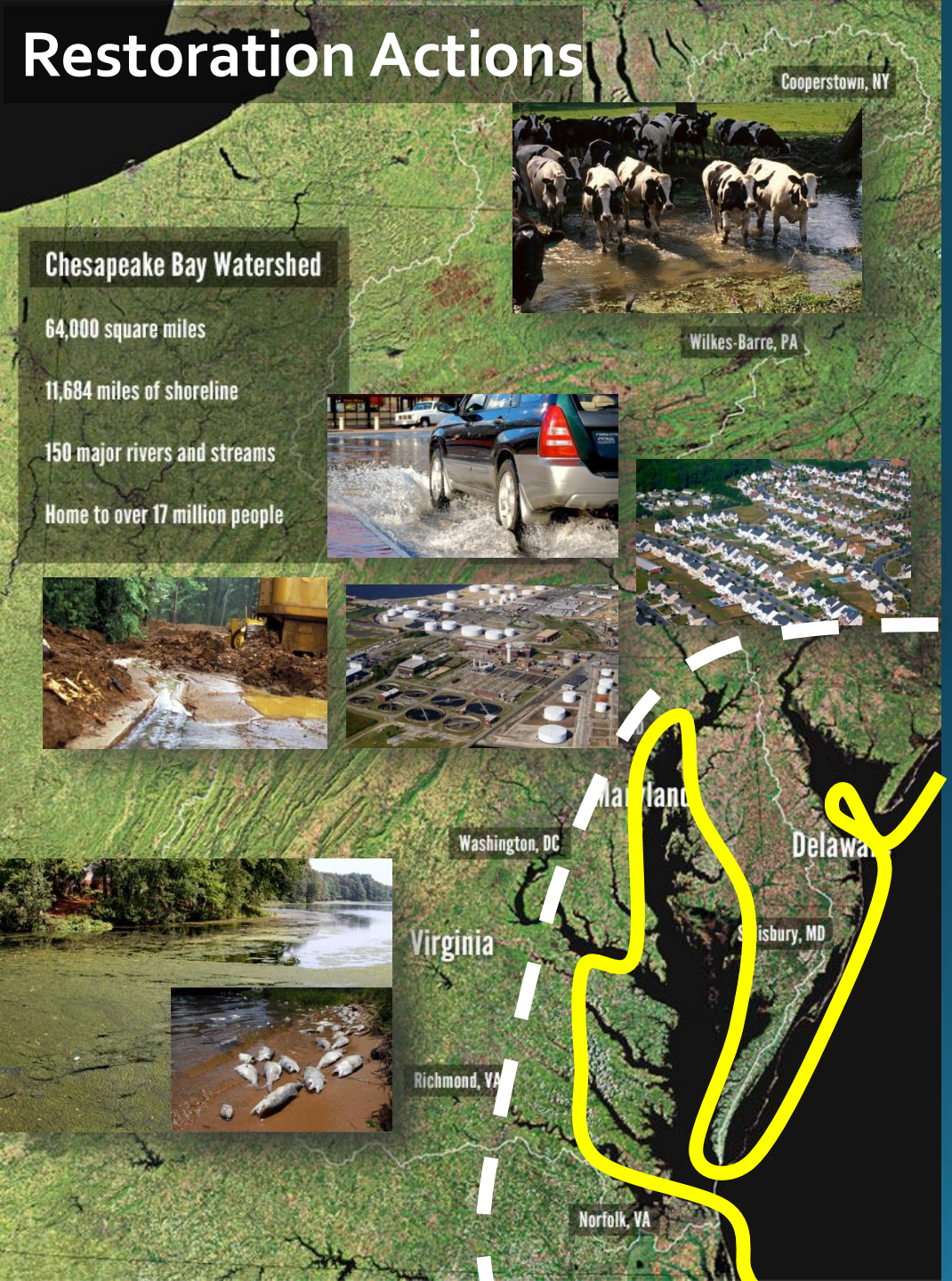
Public believe that coastal restoration programs will have direct benefits to fisheries but linkages are difficult to prove.

Restoration actions are often local, distant, and indirect in their influence on fisheries.

Restoration actions are confounded by large scale stressors.

Fish and fishers are adaptive, meaning that good fish and good fishing can occur in bad habitats.

Restoration Actions



Chesapeake Bay Watershed

64,000 square miles

11,684 miles of shoreline

150 major rivers and streams

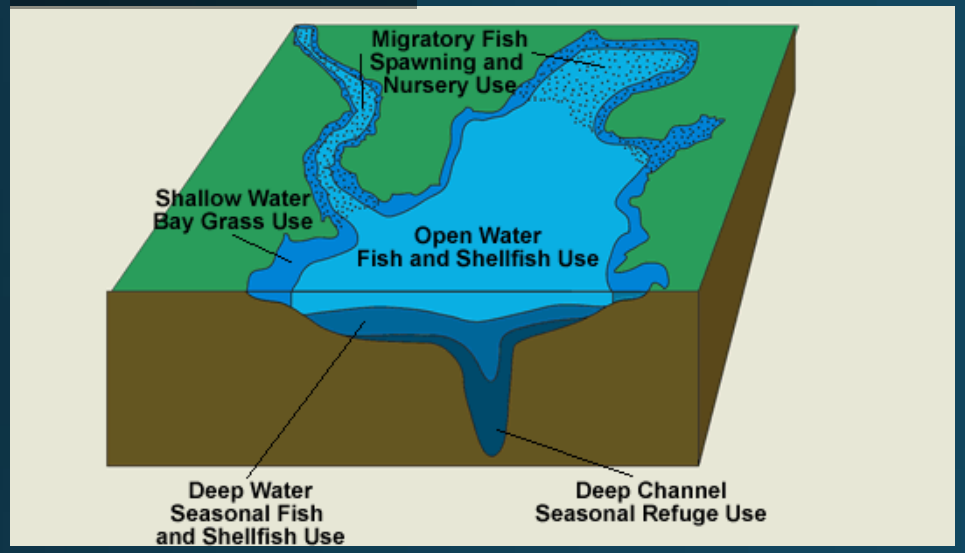
Home to over 17 million people

Chesapeake Bay Program
A Watershed Partnership

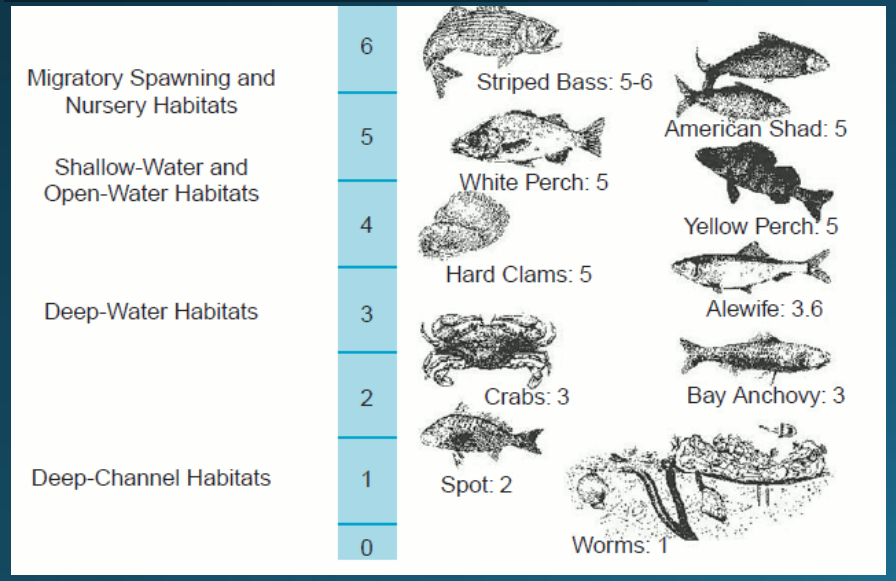
Consequences to Fisheries?

Ambient Water Quality Criteria: Linkage Variable Dissolved Oxygen

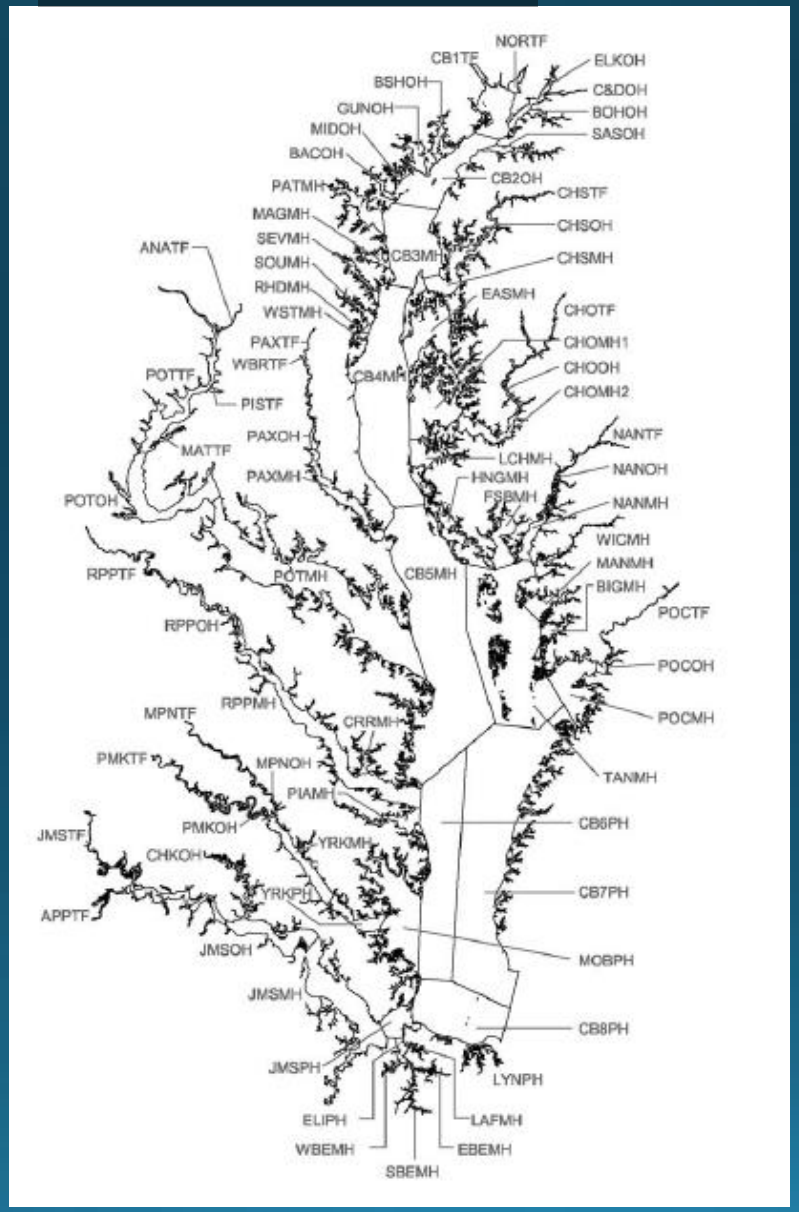
Designated Uses

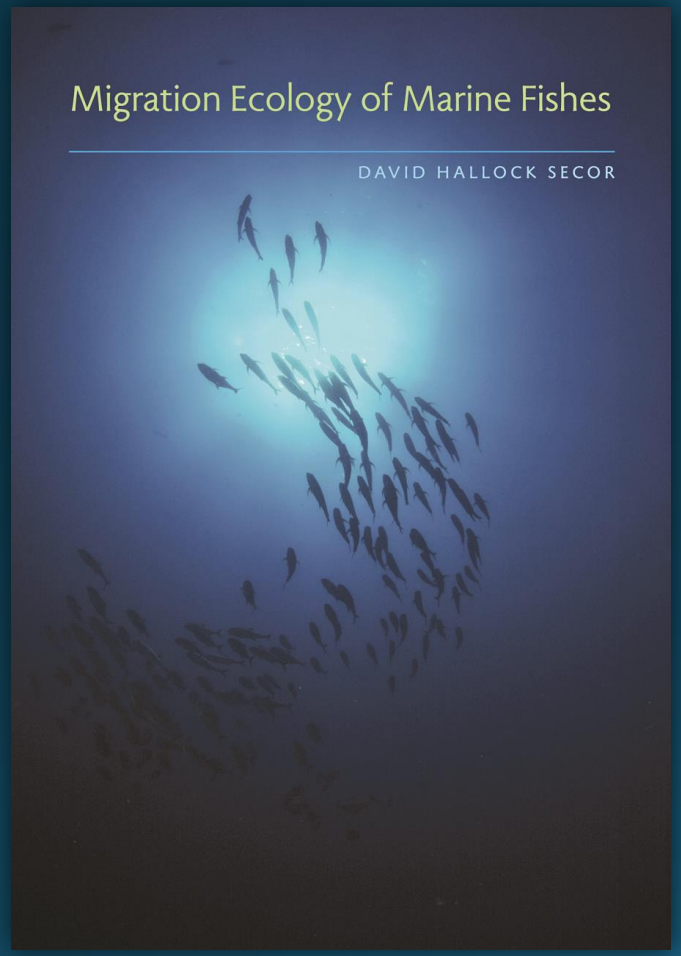


Biological Criteria (EPA 2003)



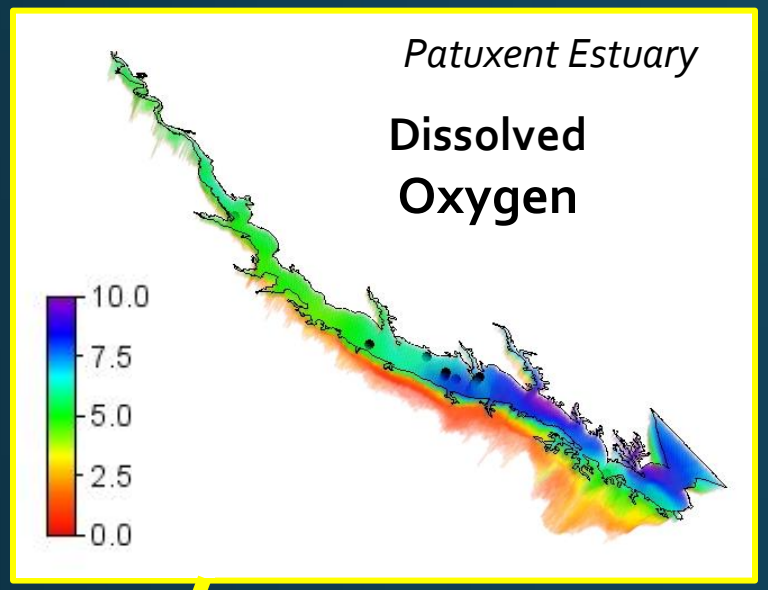
Segment Monitoring



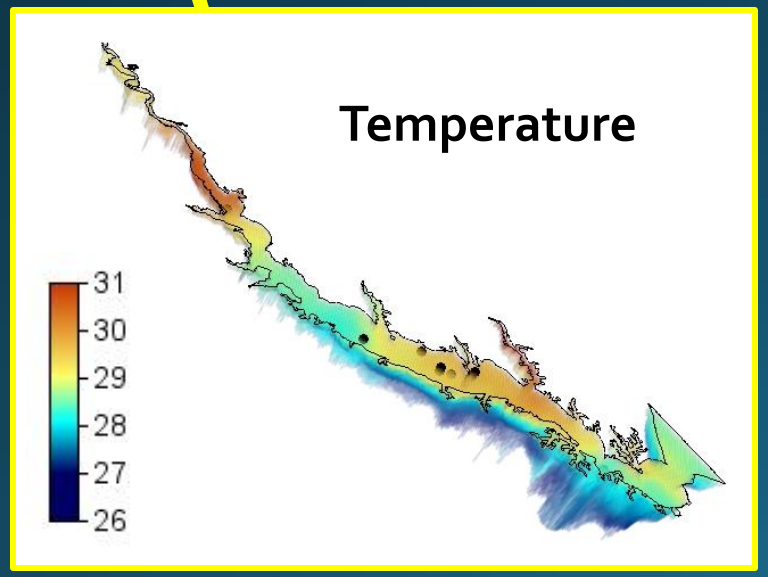


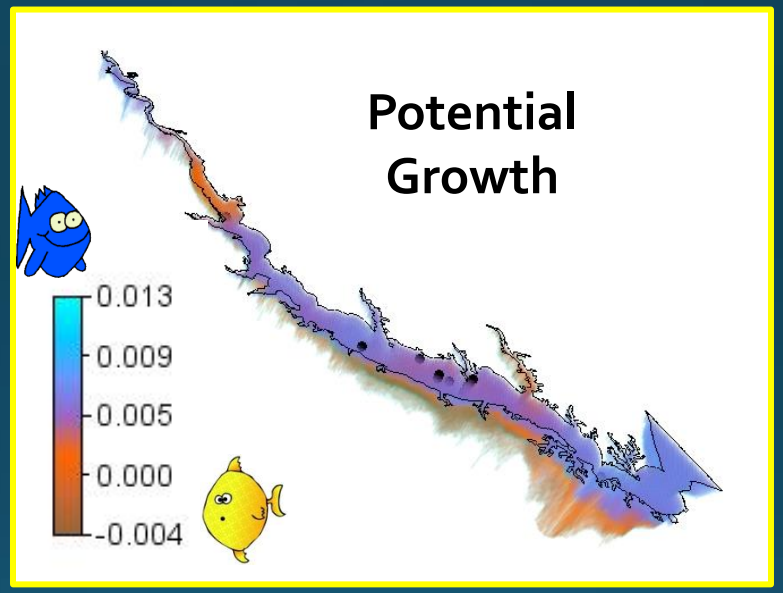
We are now in the happy dilemma of being deluged in discovery.

3D Interpolations and Spatial Growth Rate Potential Model Kraus et al. In Press. Environ. Biol. Fishes

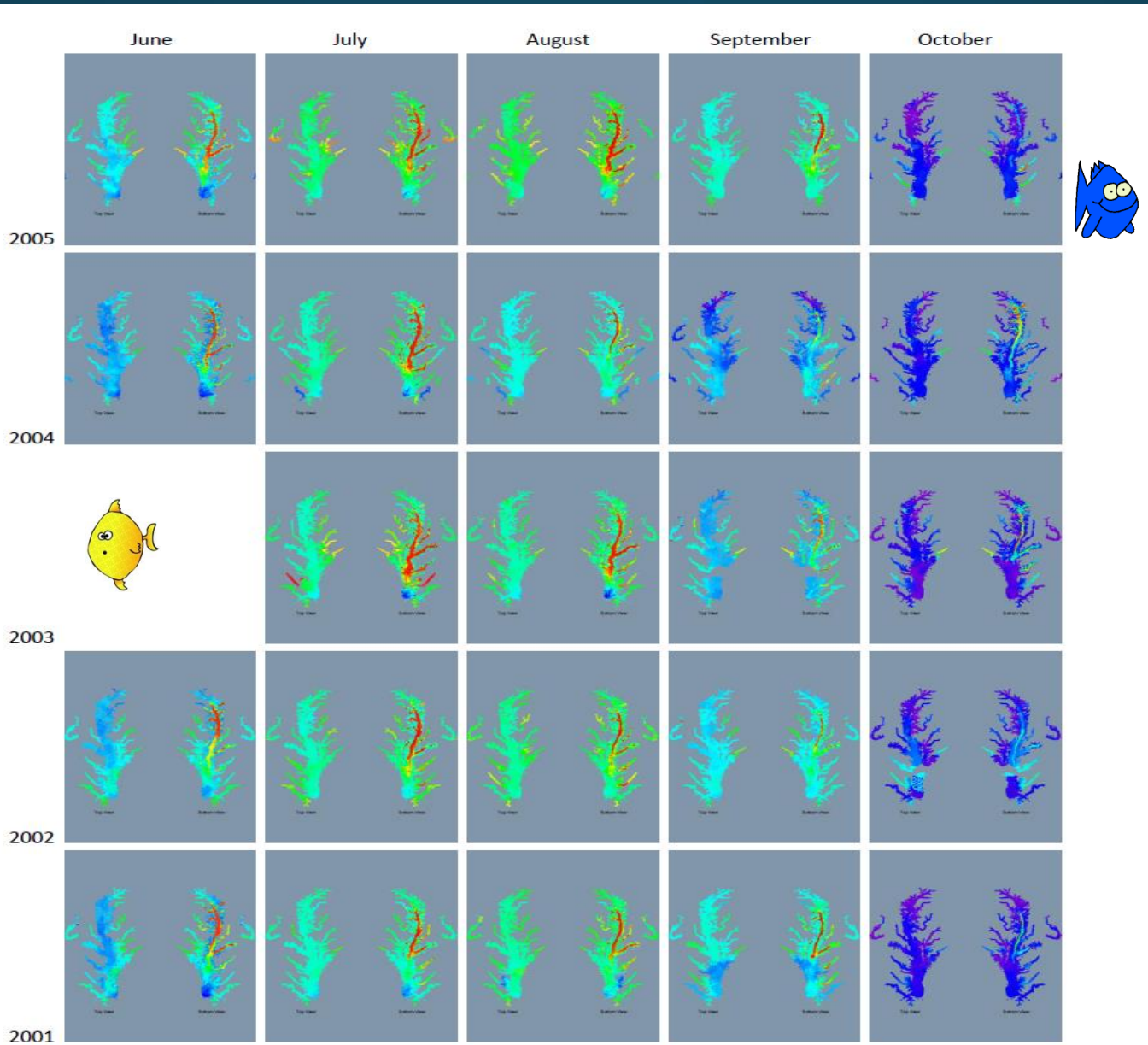


Bioenergetics Model

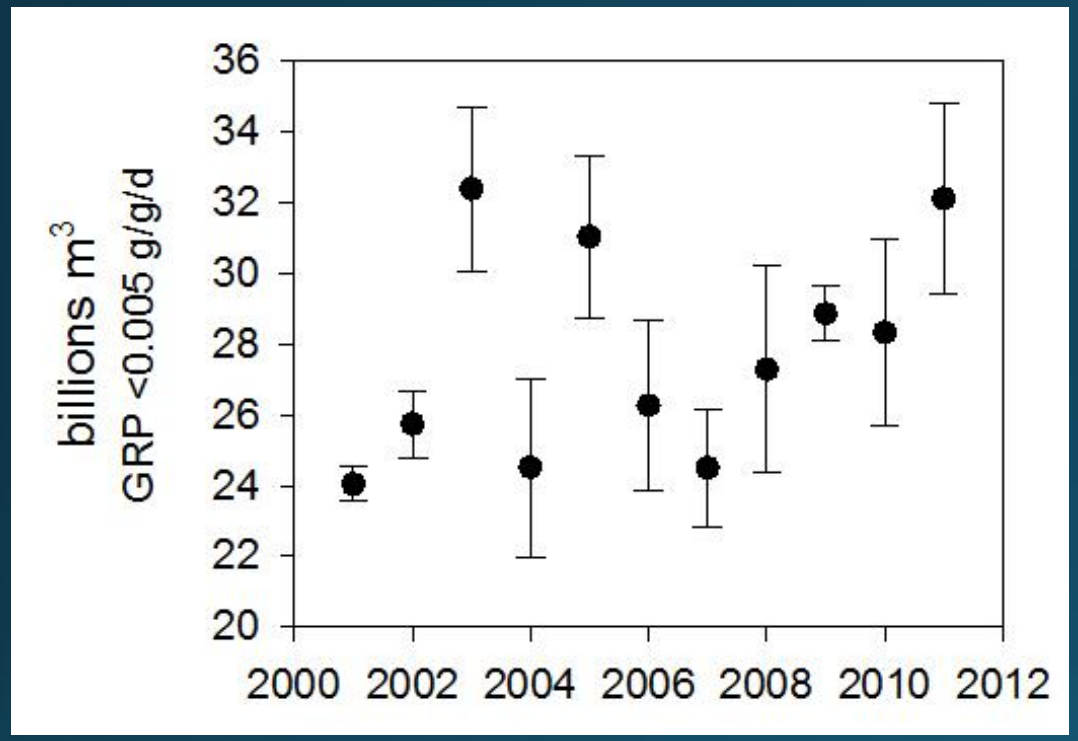




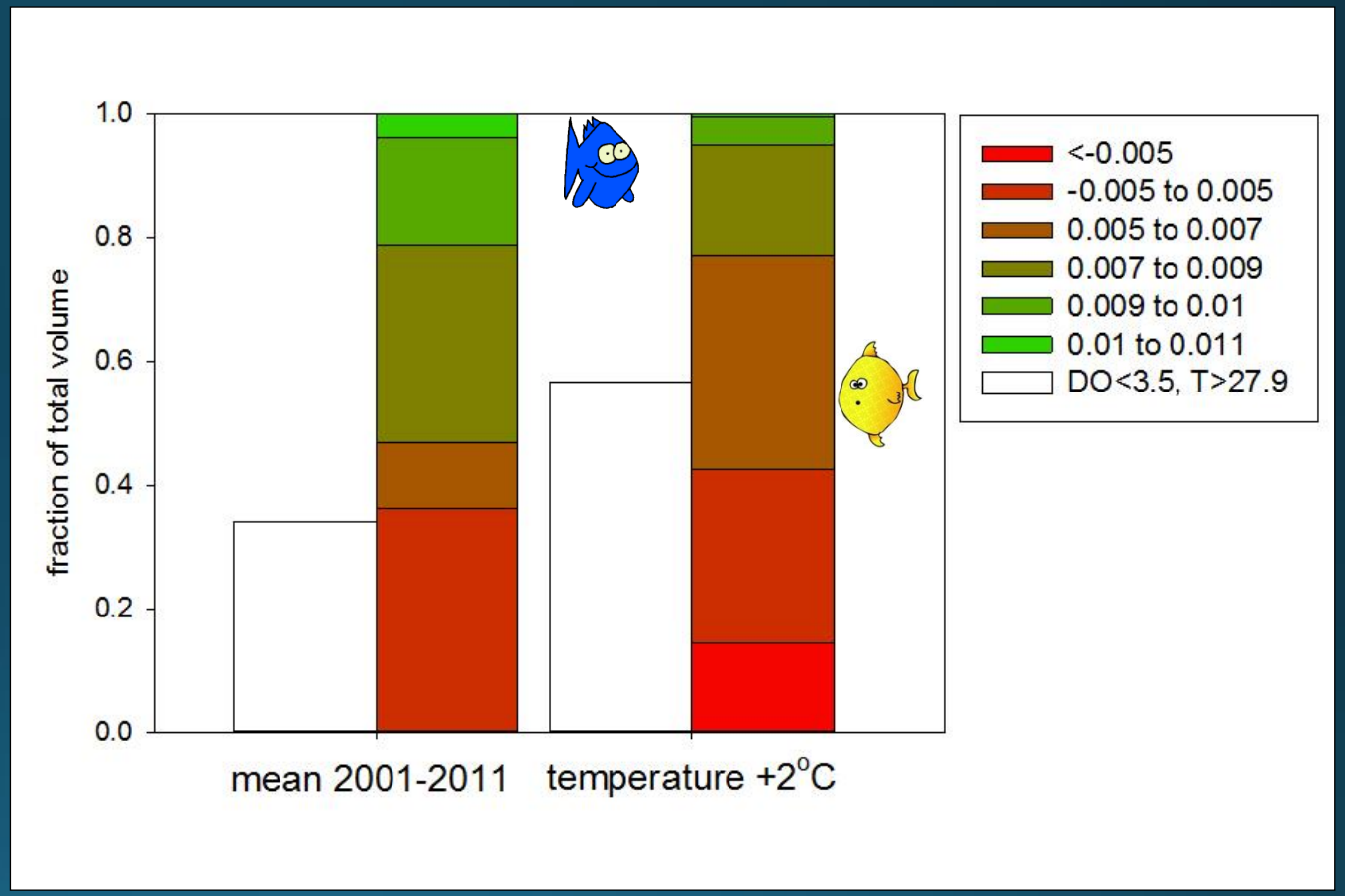
Striped Bass Morone saxatilis


June
July
August
September
October
2005
2004
2003
2002
2001

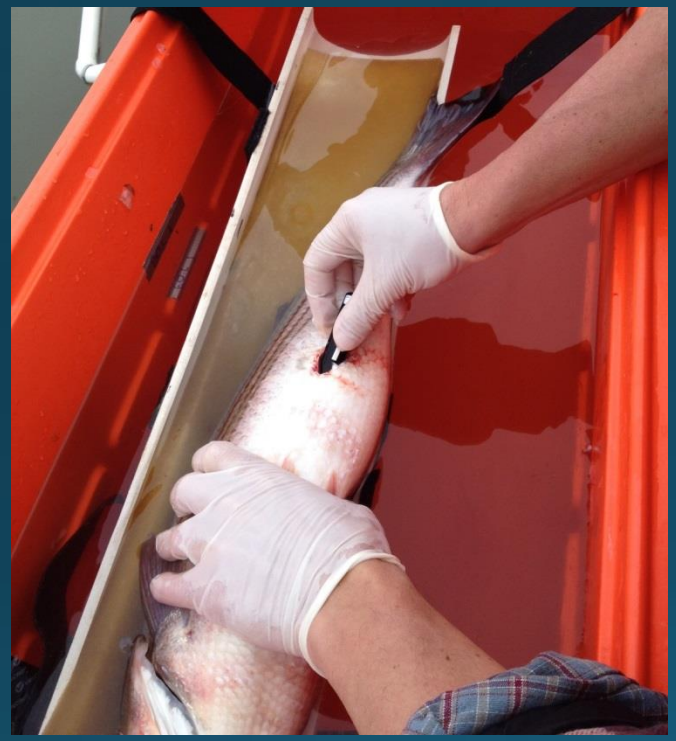
Virtual Carrying Capacity



Climate Warming Scenario



VEMCO ©; model V16P-4H-S256; 65 mm, 10 g, 3.0-year expected battery life



Have you seen this tag?

RESEARCH 410-326-7421 RELEASE

If so, please release. These fish have been fitted with an electronic tag to allow University of Maryland scientists to track striped bass migrations.

For more information, visit fishconnectivity.cbl.umces.edu/PAST or call 410-326-7421. This research is sponsored by the Atlantic States Marine Fisheries Commission to improve the management of striped bass.

@SecorLab

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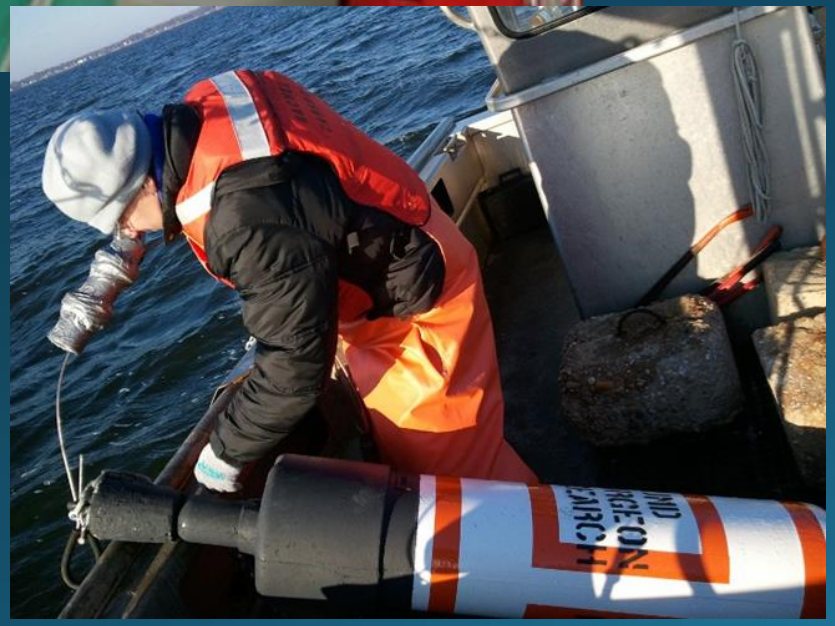
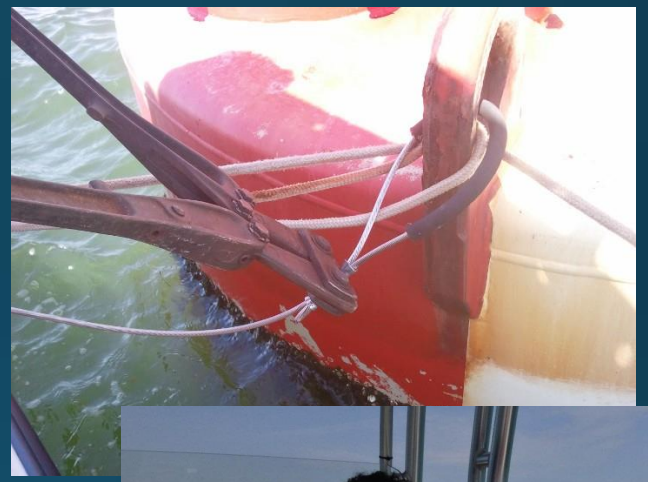
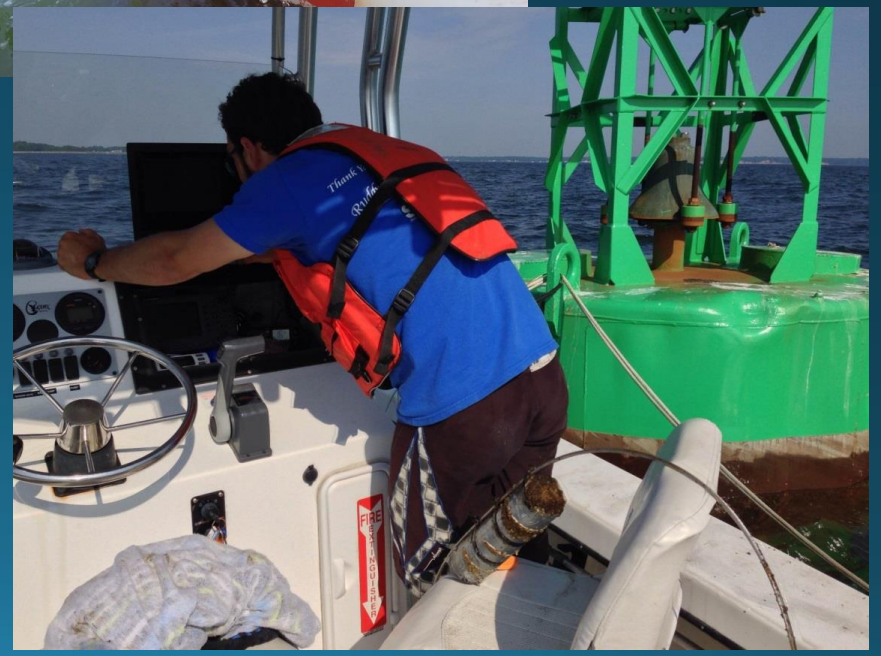
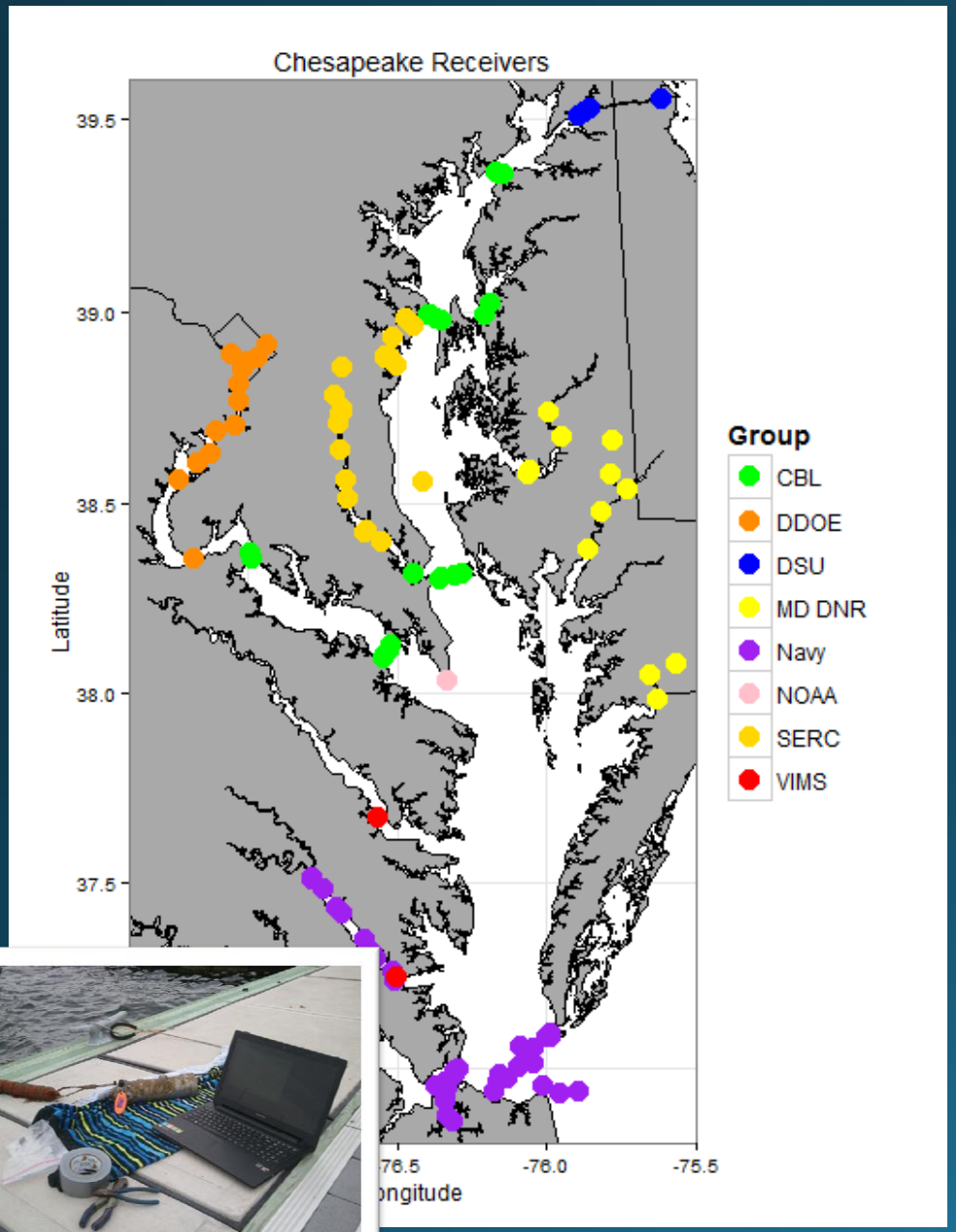
Deploying receiver gates in the Potomac River and Middle Bay.



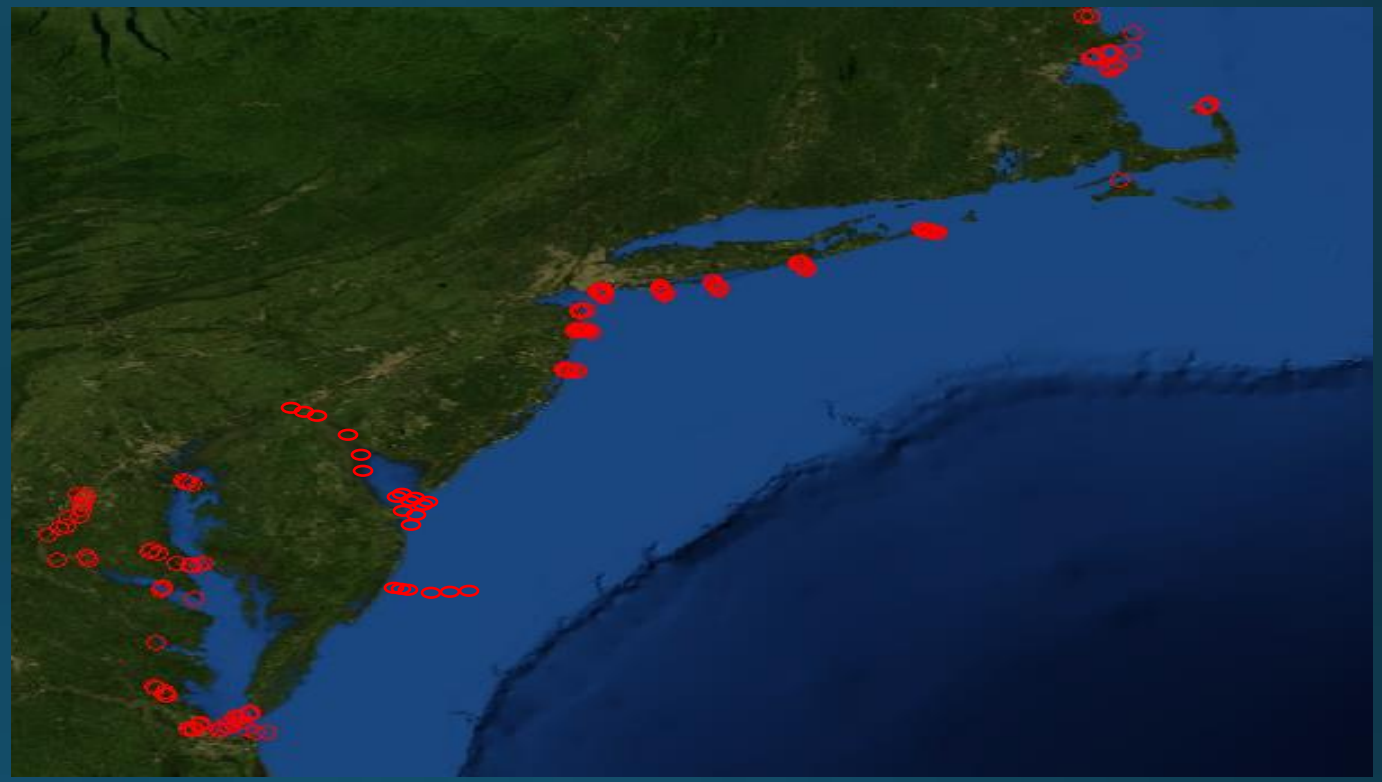


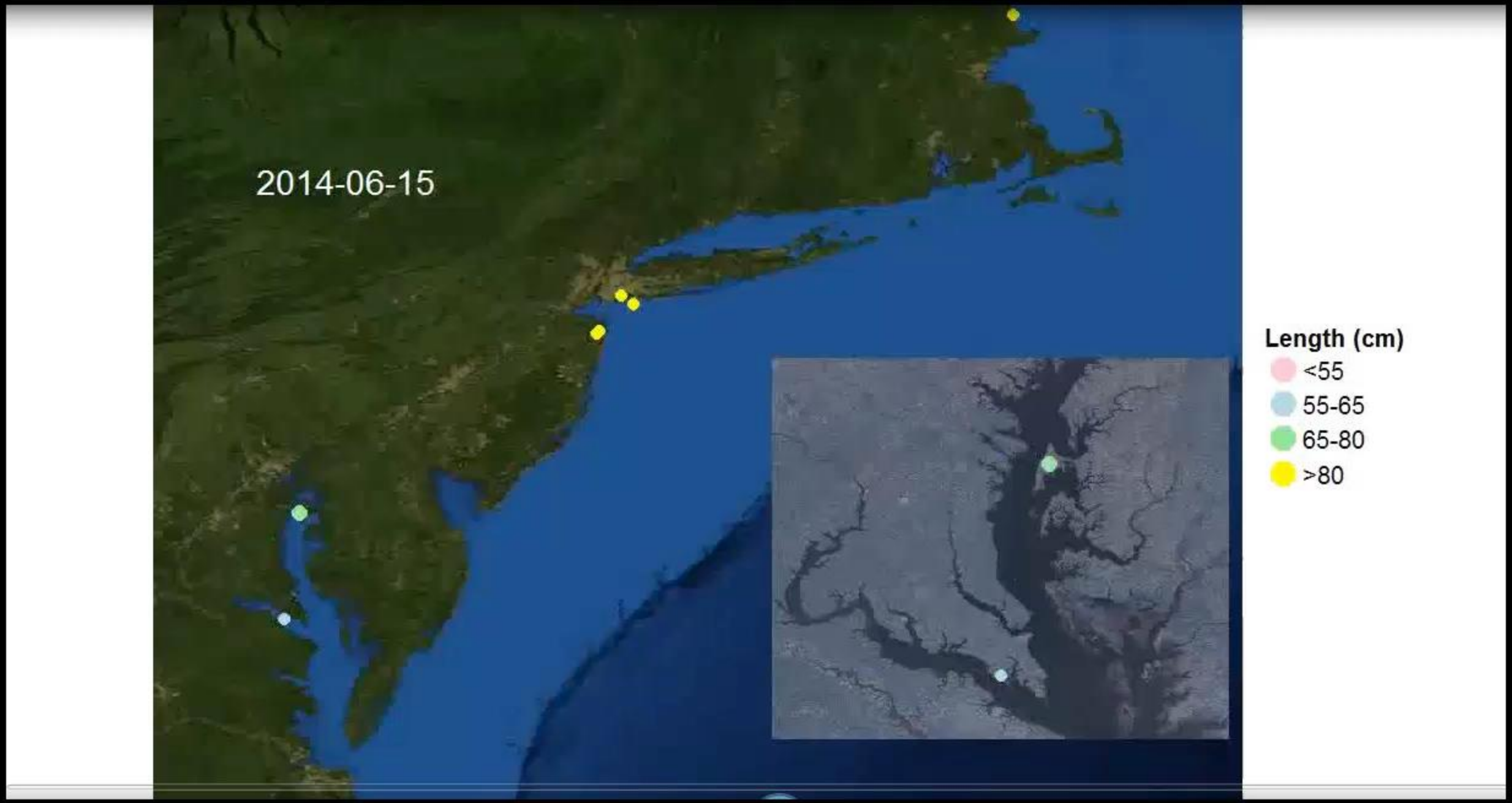


~100 receivers in Chesapeake Bay

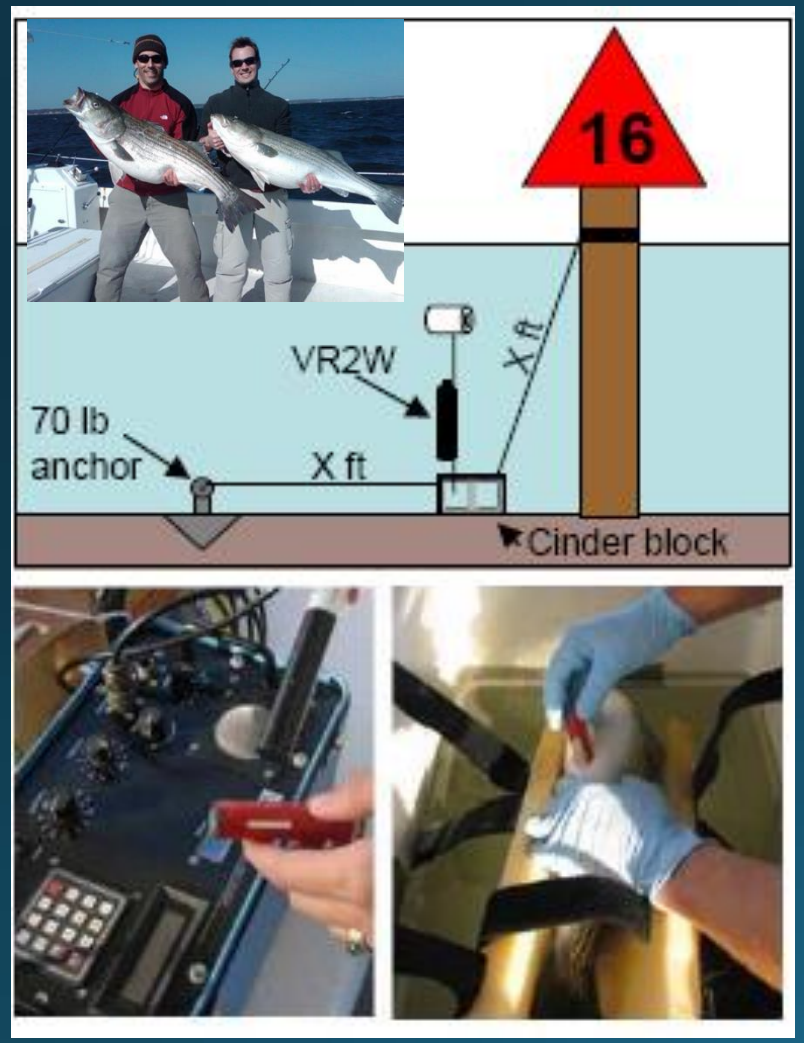


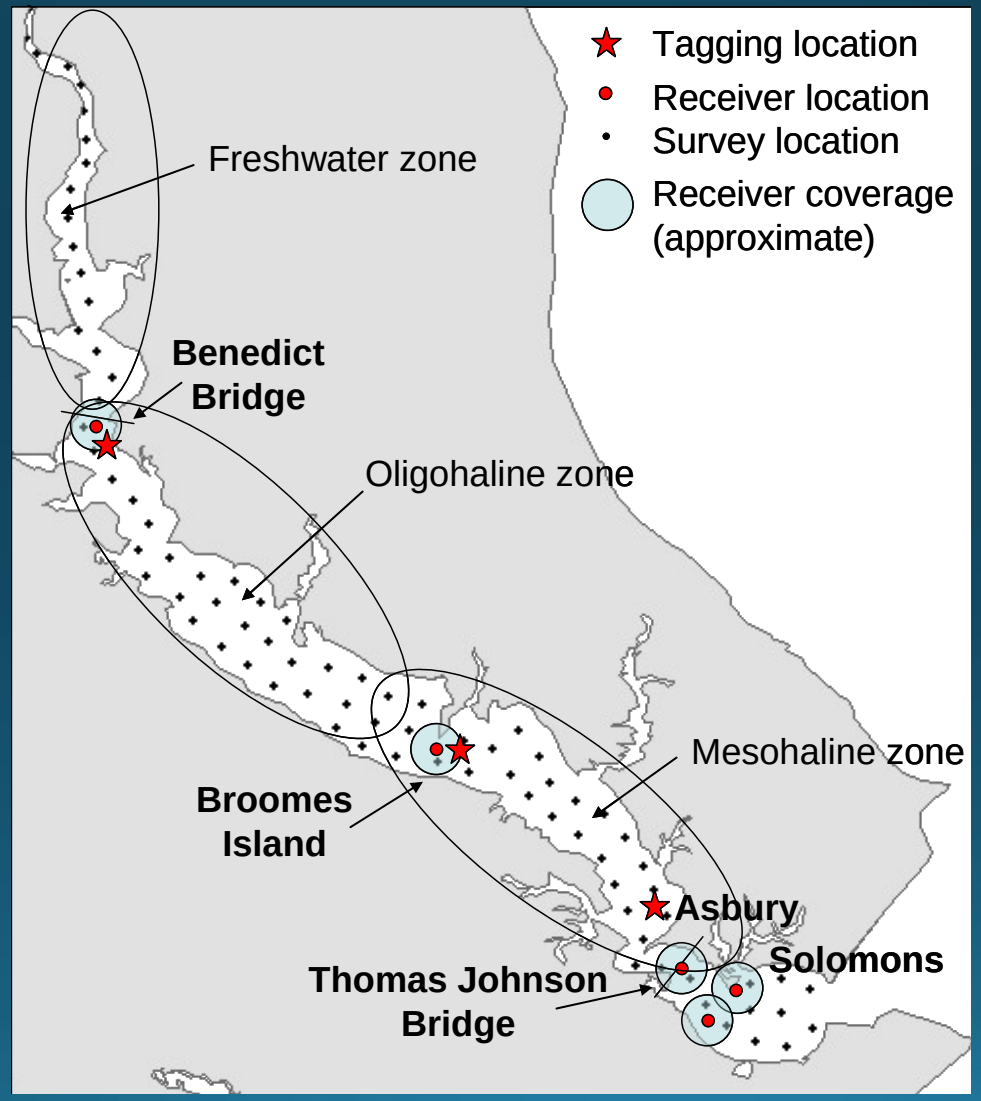
More still over the entire NE Atlantic



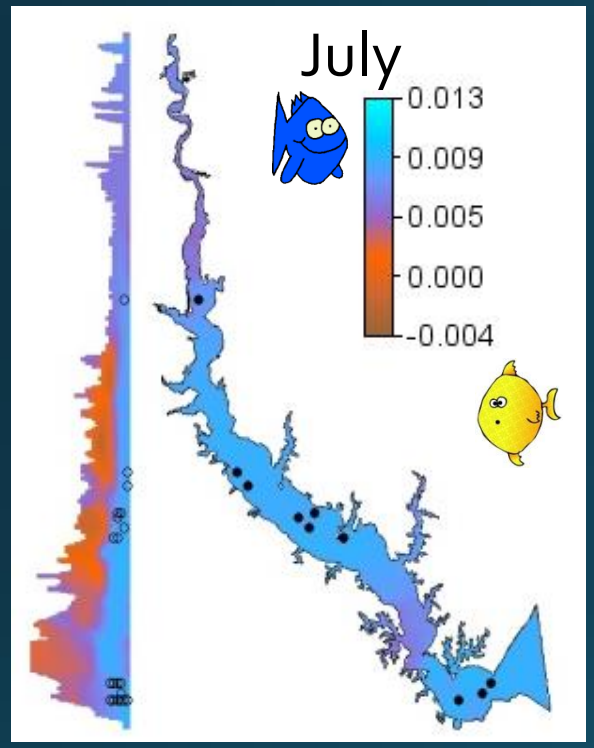

2014-06-15
Length (cm)
<55
55-65
65-80
>80

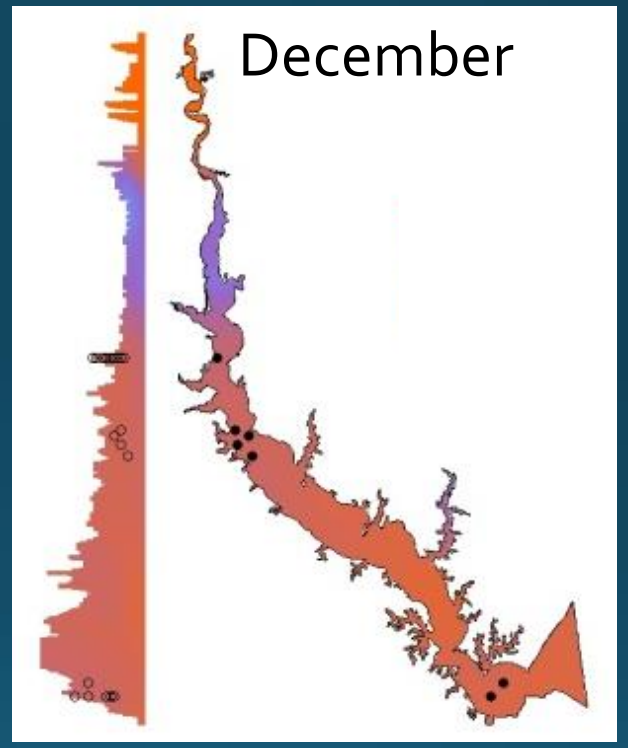
Dynamic Habitat Suitability Modeling
Simultaneous models of habitat and behavior

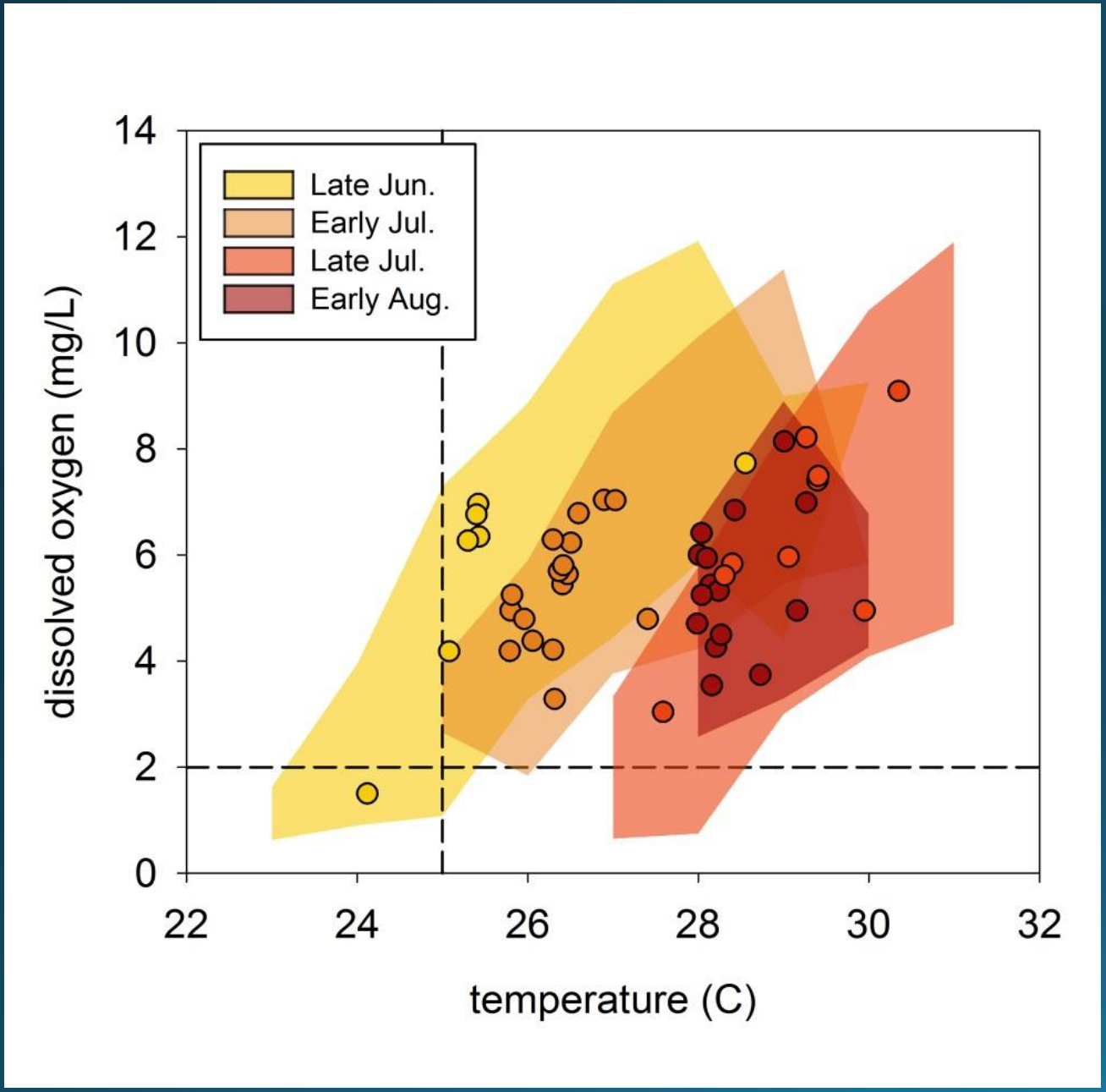




Seasonal Changes in Growth Rate Potential and Striped Bass locations

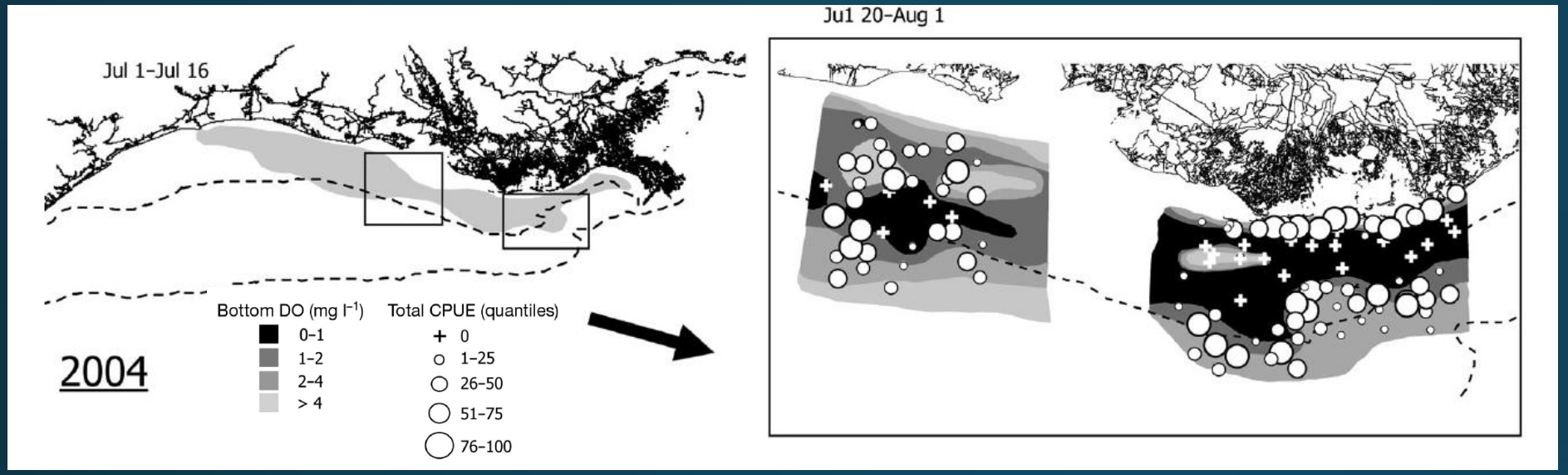






Kraus, R.T., D.H. Secor, and R. L. Wingate. *In Press*. Testing the Thermal-Niche Oxygen-Squeeze Hypothesis for Estuarine Striped Bass. Environmental Biology of Fishes.

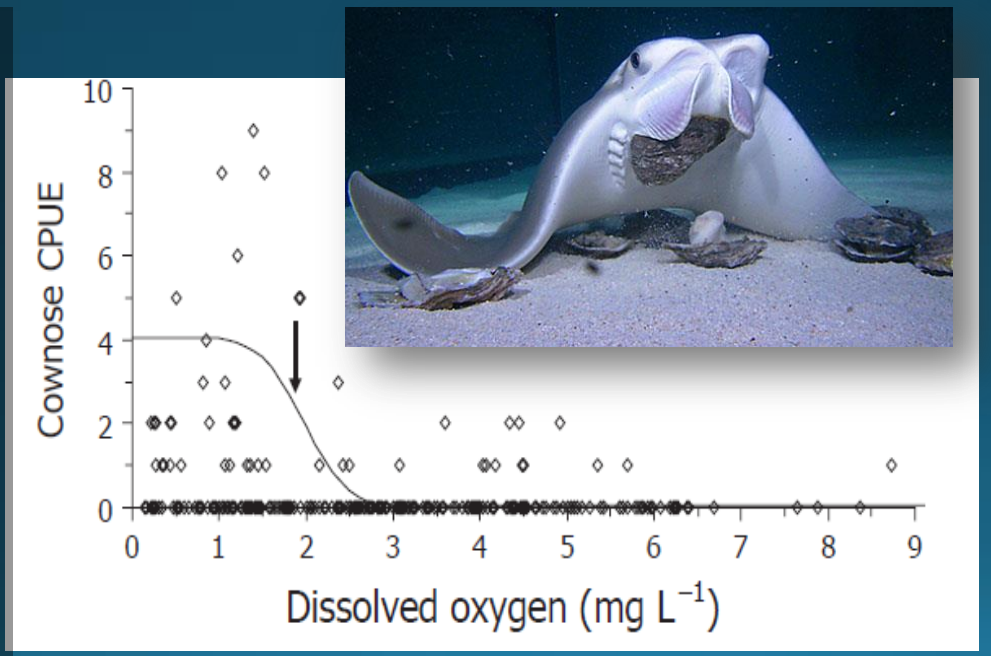
Fish and fisheries gaming the ecosystem: Gulf of Mexico brown shrimp



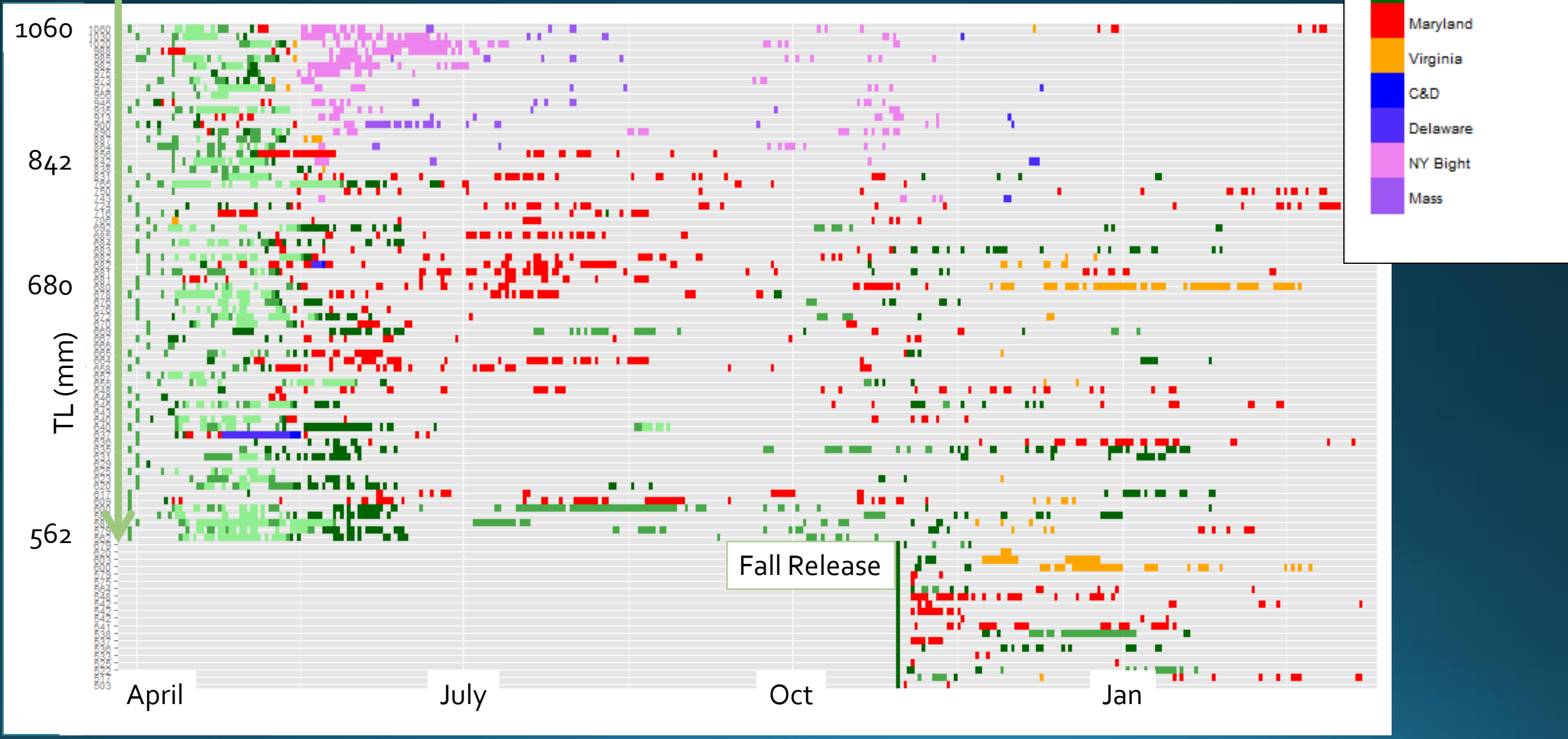
…spatial overlap between brown shrimp and finfishes was highest in years when hypoxia was most severe

…potential for enhanced harvest and bycatch interactions along margins of the hypoxic zone…

J. K. Craig. 2012. Aggregation on the edge .. MEPS 445: 75-95.
J.K. Craig et al. 2010. Fish. Ocean. 19:301-317

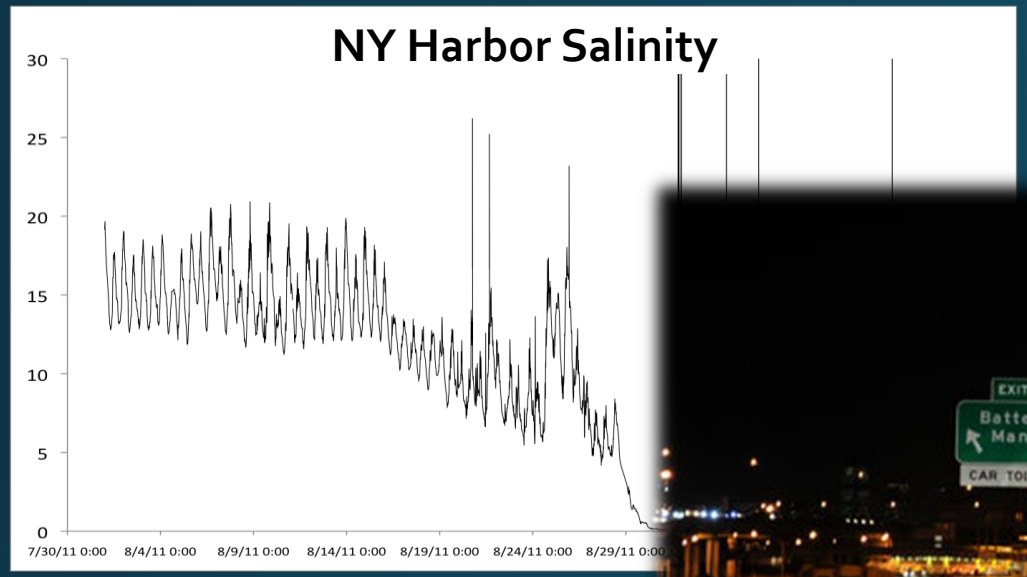


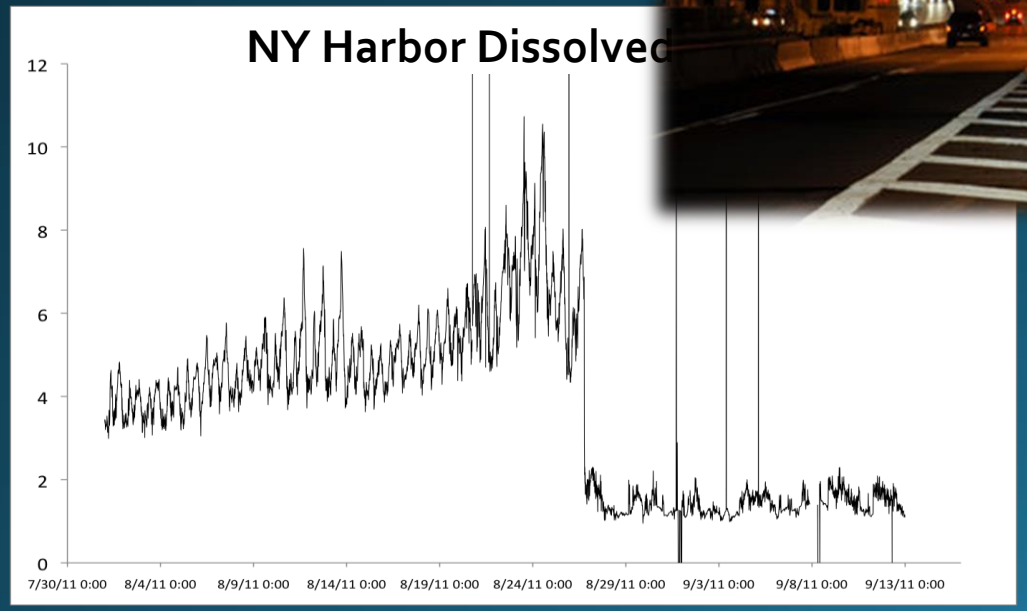
Migration Sheet Music
Do Striped Bass Evade Bad Water?

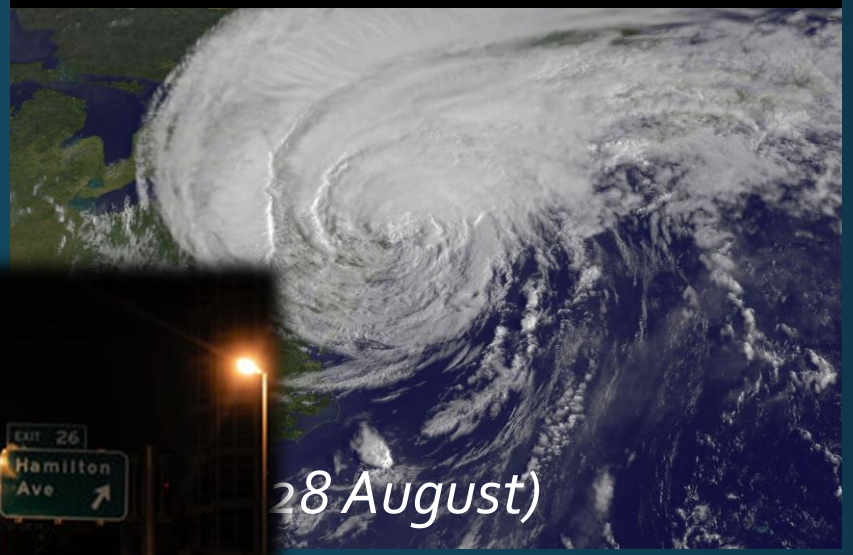


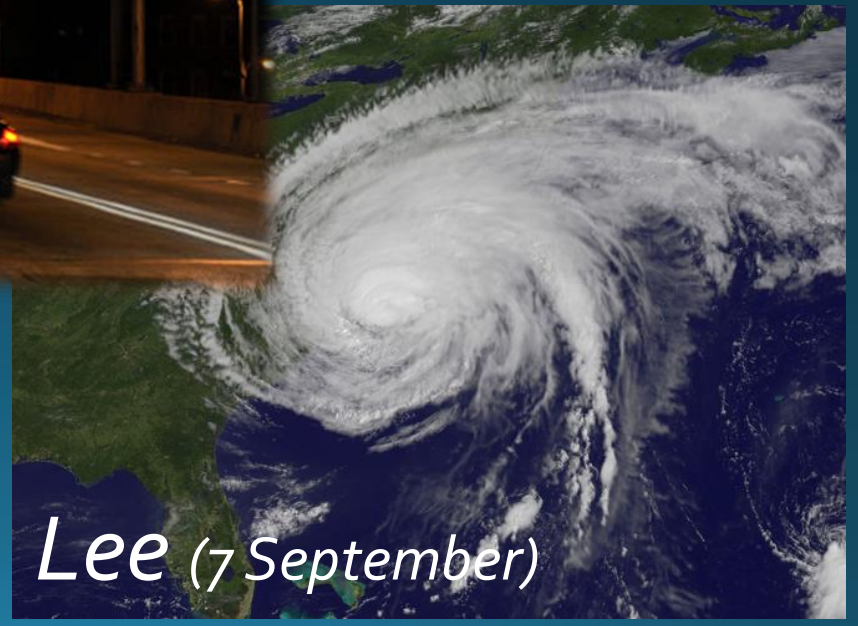
Event Driven Migrations of Hudson River Striped Bass

Helen Bailey and Dave Secor (HRF Study)



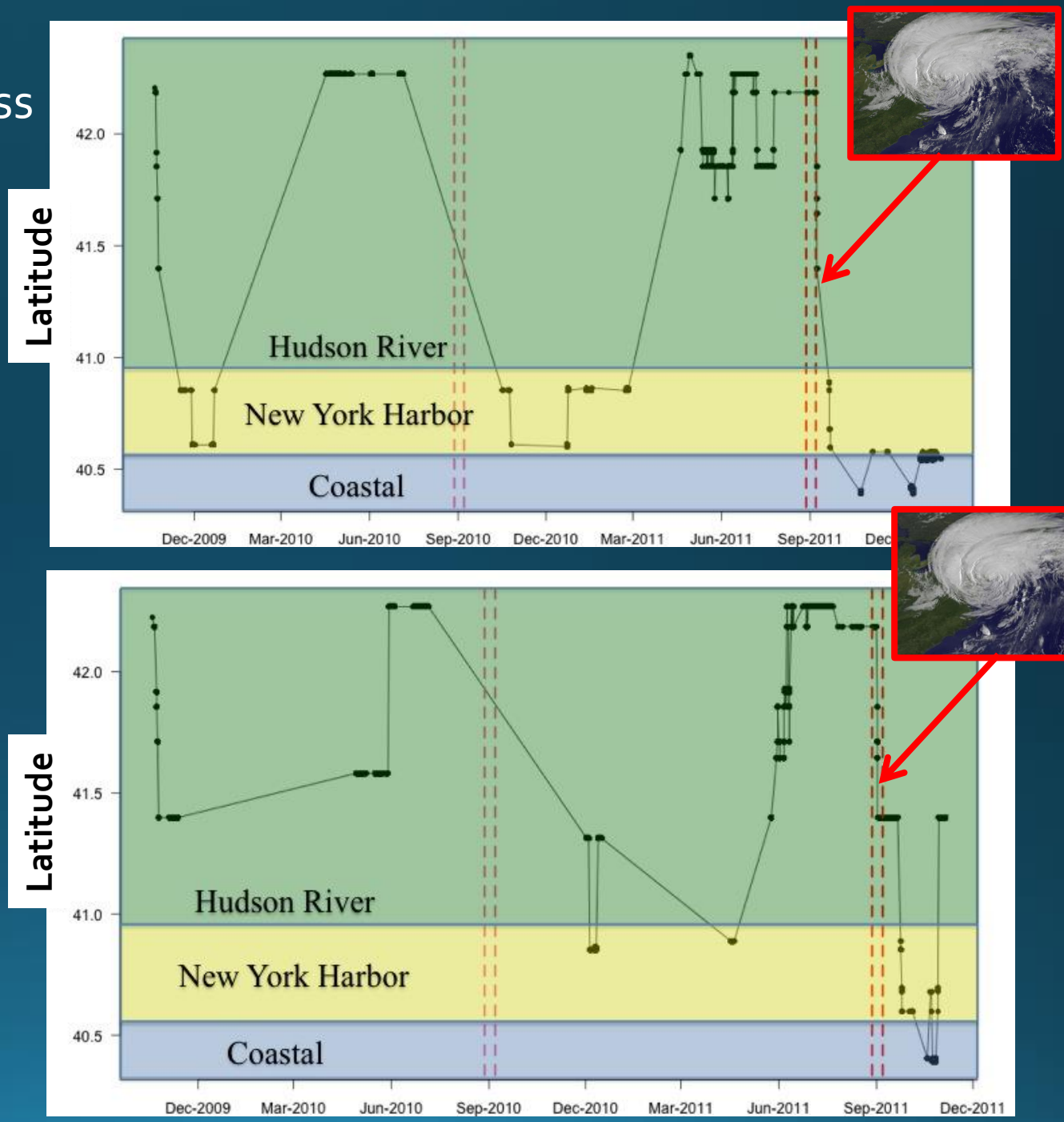




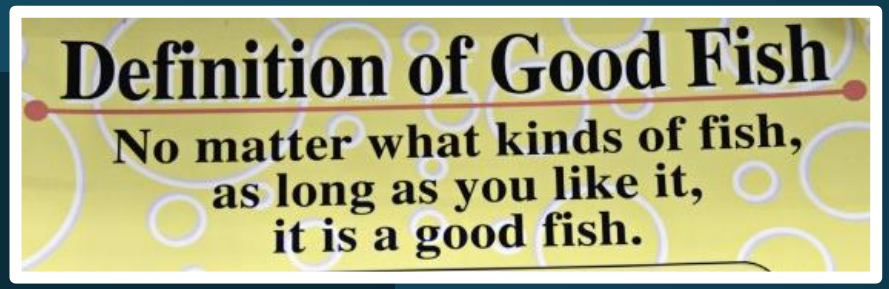


Event Driven Evacuations by HR Striped Bass

H. Bailey and D. Secor (HRF study)



Good Fish in Bad Habitats



Moving fish and fisheries within ecosystems represent complex adaptive systems, showing both resilience and vulnerabilities.

Linking watersheds to estuarine living resources requires

(1) Improved observing systems to monitor good fish and fishers in bad habitats

(2) Adaptive management:

- -Integrated Ecosystem Assessments
- -Concept → actions → monitor → assessment → repeat
- -Stakeholder engagement

(3) Recommendation: Patuxent Inventory: Inventory trends, inventory institutional knowledge (>1990)