

USING HABITAT PREFERENCE MODELS, OCEAN FORECASTS, AND COOPERATIVE RESEARCH TO REDUCE RIVER HERRING INCIDENTAL CATCH

By: Sara Turner^{1*}, Jonathan Hare¹, John Hoey¹, John Manderson²,
and David Richardson¹

¹NOAA Northeast Fisheries Science Center, Narragansett, RI 02882;

²NOAA Northeast Fisheries Science Center, Highlands, NJ 07732;

*current: MA Division of Marine Fisheries, New Bedford, MA 02740

HABITAT ASSOCIATION MODELING

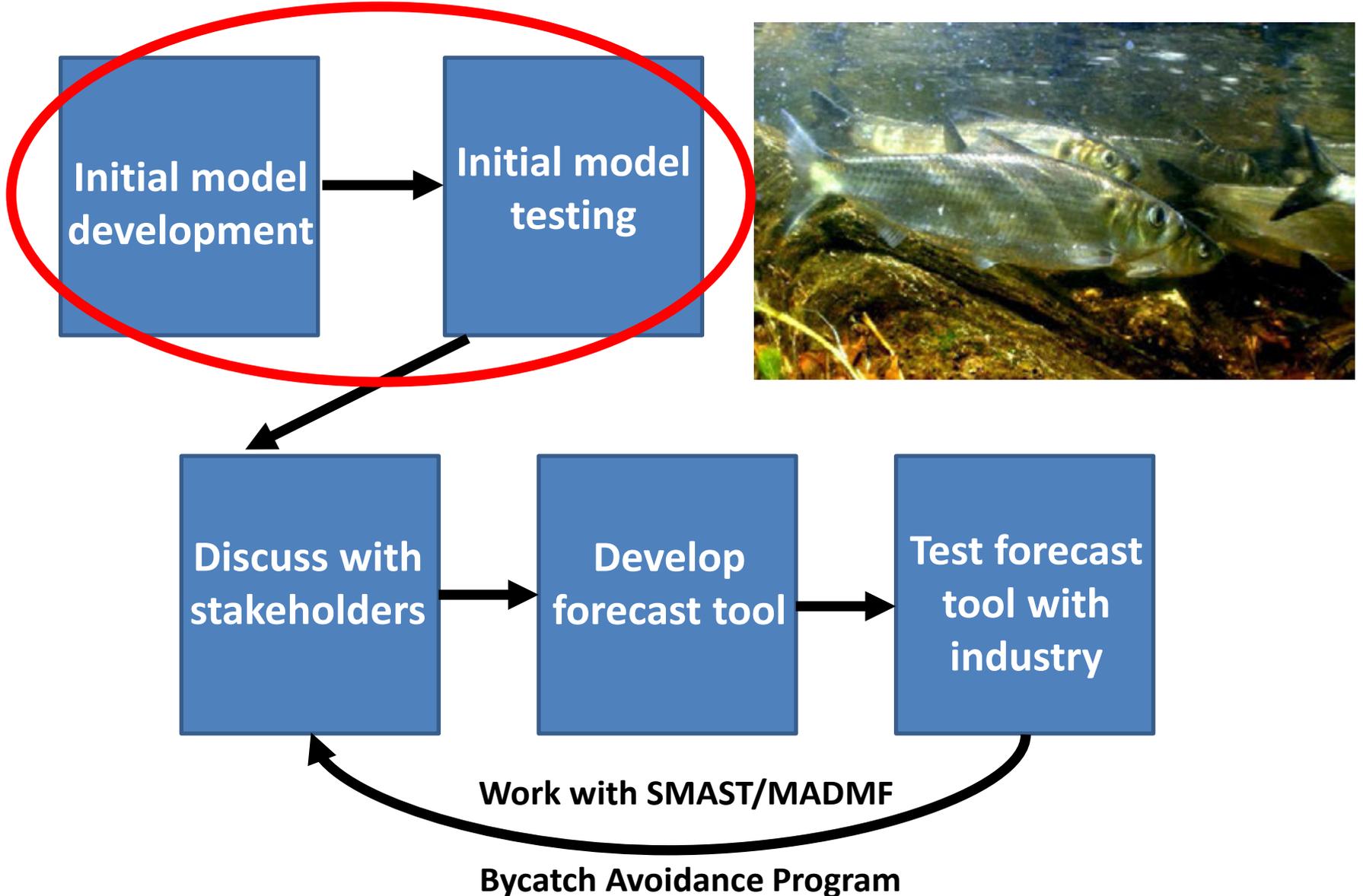
Species' habitat distribution driven by:

- Physiological requirements
- Food availability

Use environmental data
to develop spatial
and/or temporal habitat
association models



PROJECT OVERVIEW



METHODS

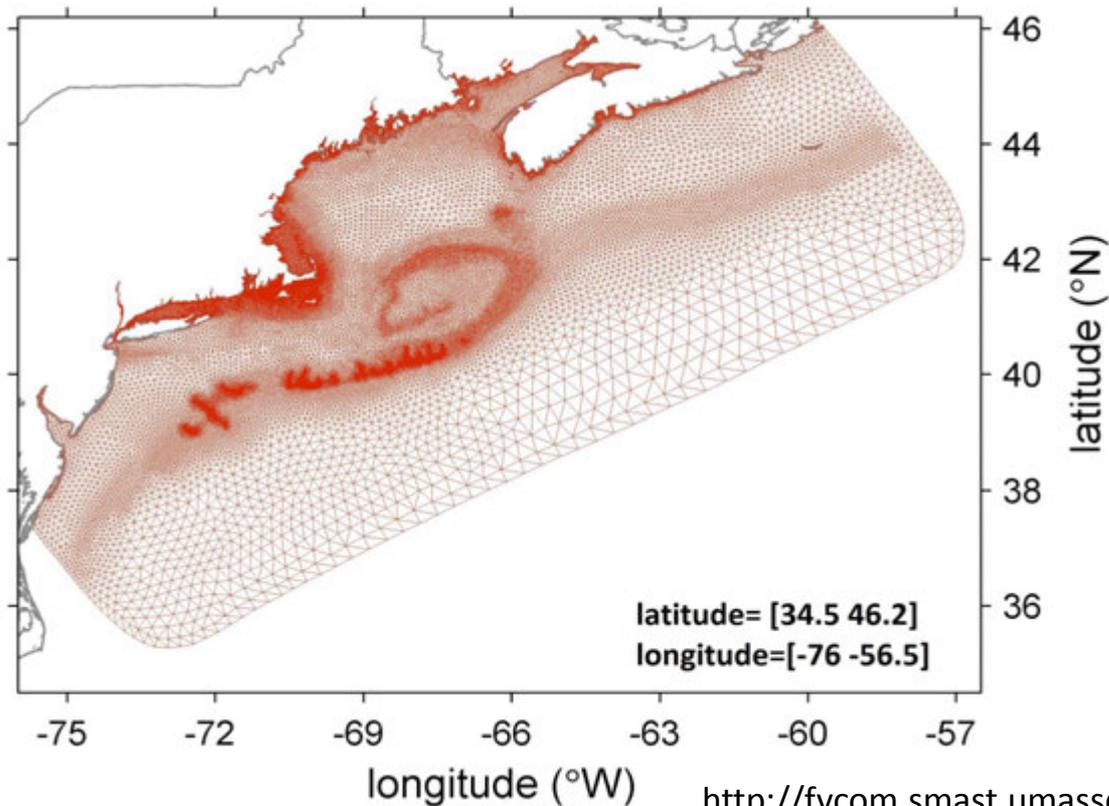
HABITAT MODEL DEVELOPMENT:

- Use NEFSC winter/spring survey data for models
 - Generalized additive modeling (GAM)
 - Predict presence/absence (binomial model)
 - Individual species models/overlap
 - Test models – predict Spring 2015
- Evaluate predictions using ocean forecast model



DATA - FVCOM-NECOFS FORECAST

- Finite-volume, primitive equation community ocean model
- Unstructured grid
- Forecasts – Current day, +24h, +48h
- Bottom temperature; bottom salinity



MODEL SUMMARIES

- Independent variables
 - Temperature/salinity/depth
 - Location & time
 - Region
- Models explain 17-25% of observed deviance
- Species models - summary
 - Temperature – substantial overlap
 - Salinity – river herring ↓
 - Depth – alewife = deep, blueback herring = shallow (< 50 m), Atlantic herring & Atlantic mackerel = middle
- Forecasts
 - Slightly higher predictions vs. observed conditions
 - Different forecasts – extremely similar

INITIAL MODEL TESTING: SUMMARY

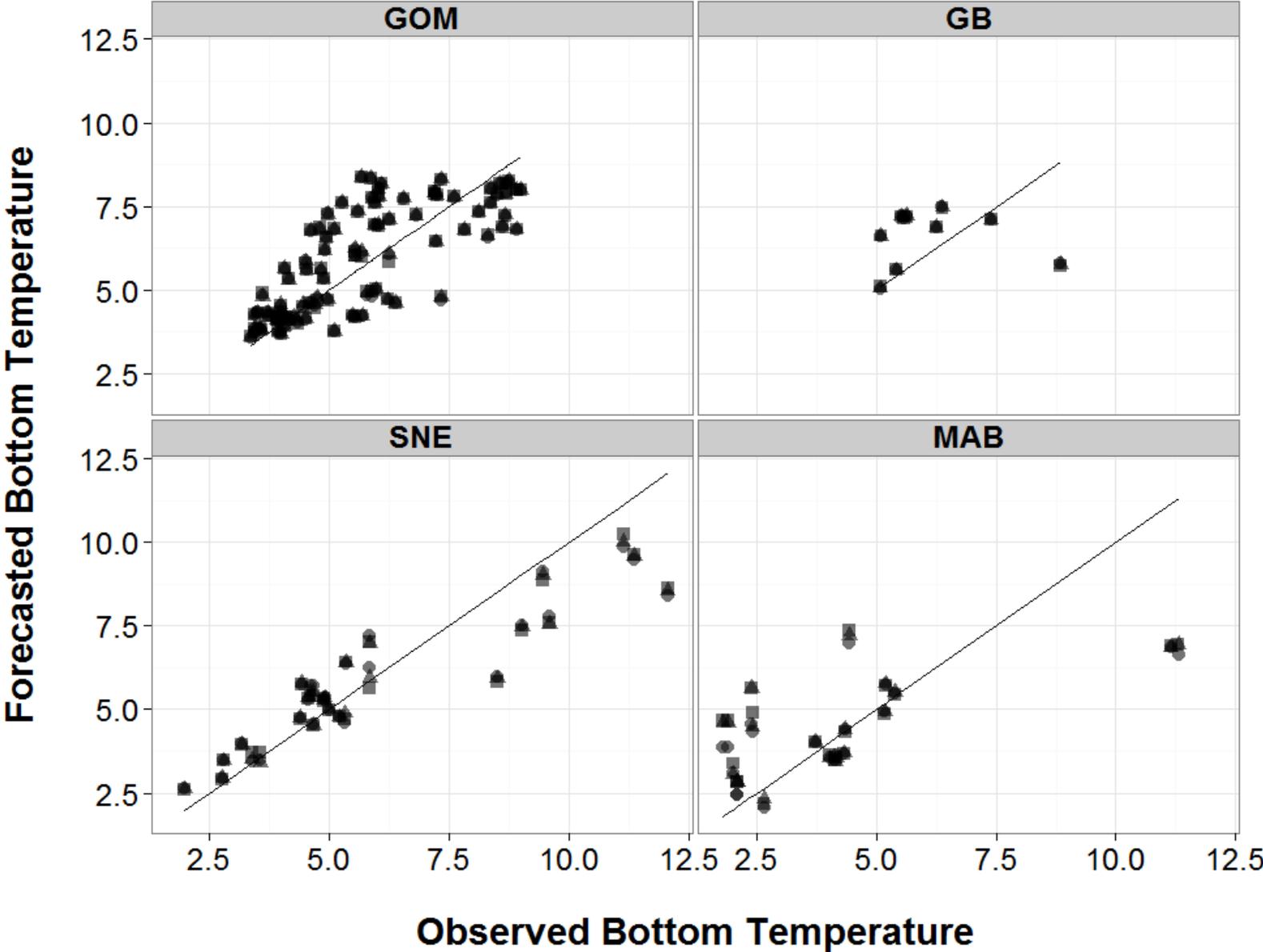
% Correct Classifications

	Alewife	Blueback herring	Atlantic herring	Atlantic mackerel
Alewife	73			
Blueback herring		76		
Atlantic herring	73	71	74	
Atlantic mackerel	69	67		69

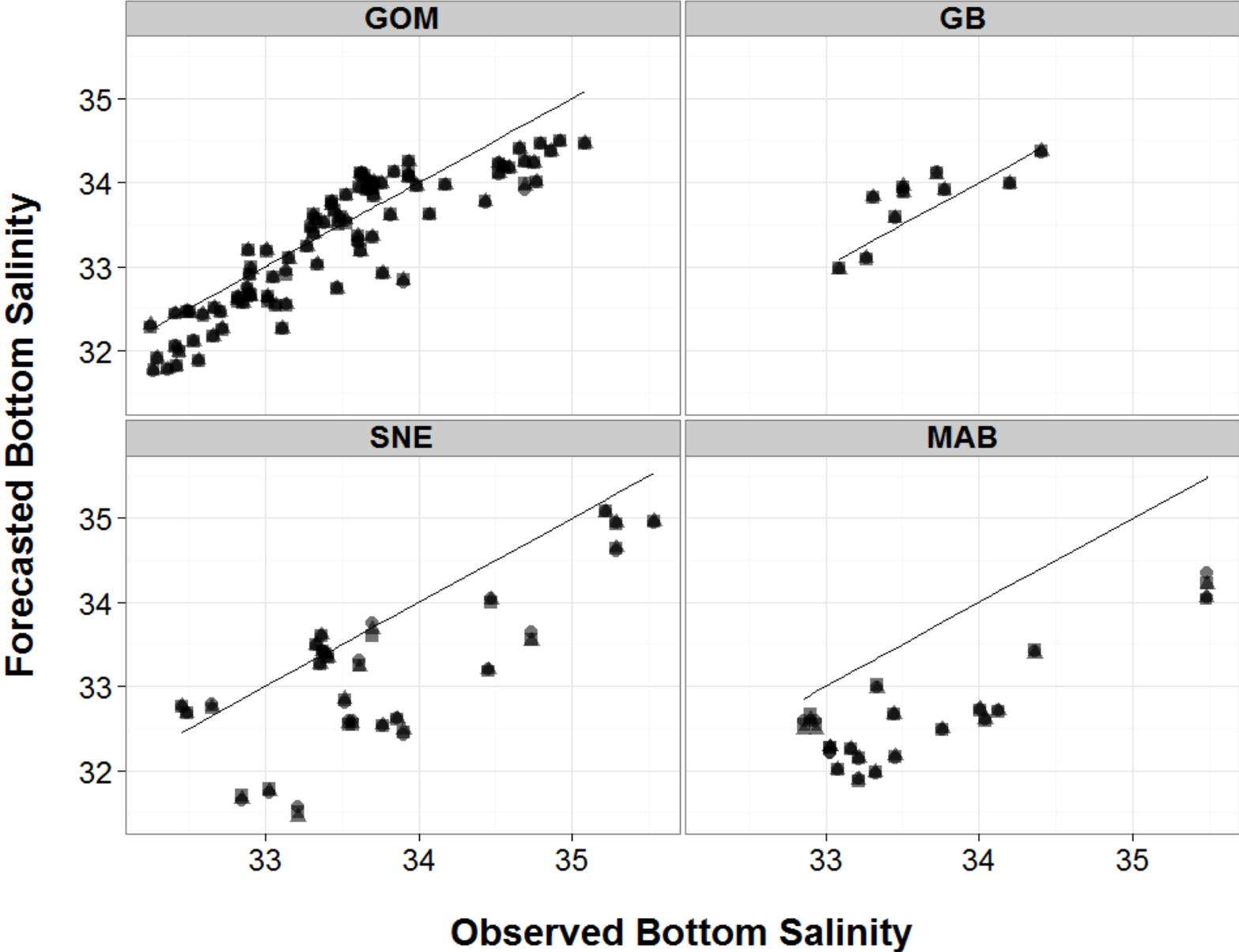
% Stations Observed

	Alewife	Blueback herring	Atlantic herring	Atlantic mackerel
Alewife	35.1			
Blueback herring		18.0		
Atlantic herring	29.2	17.1	53.9	
Atlantic mackerel	13.2	10.0		25.8

SPRING 2015 OCEAN FORECAST EVALUATION



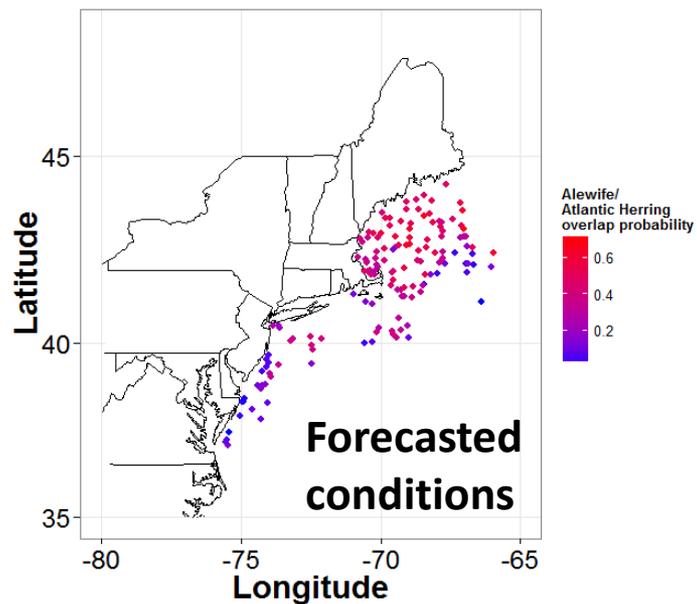
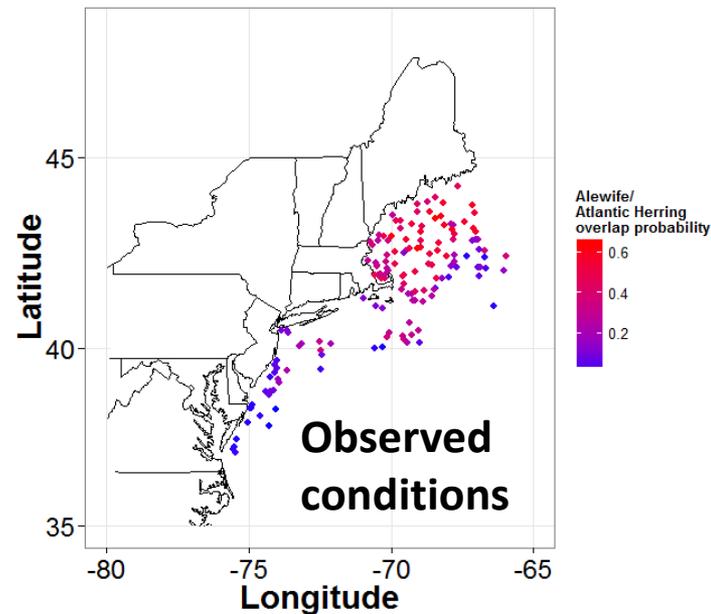
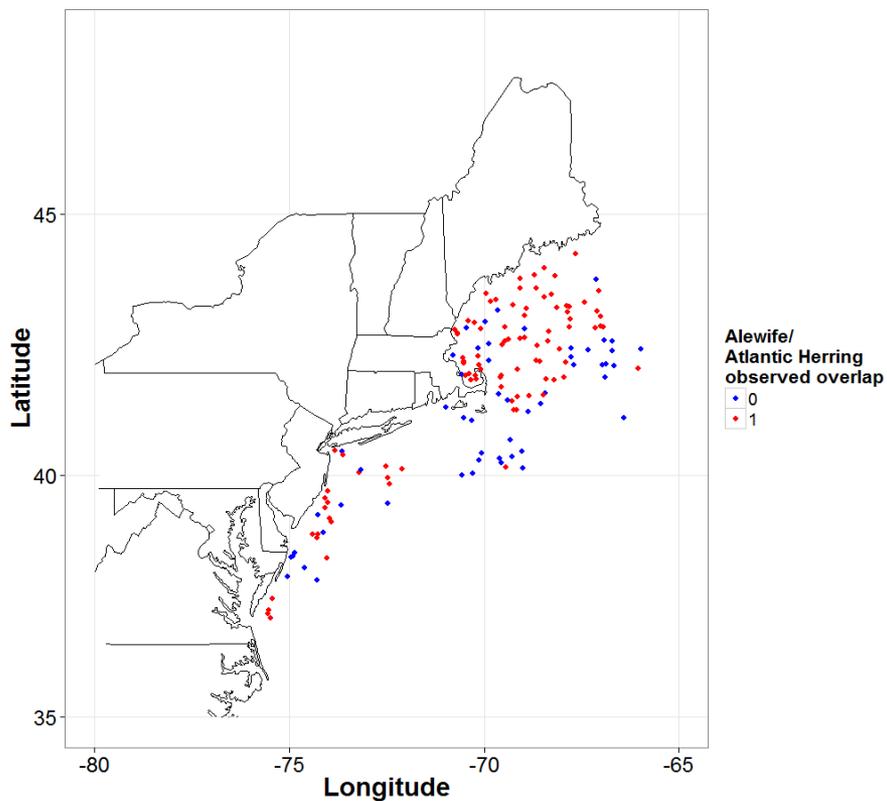
SPRING 2015 OCEAN FORECAST EVALUATION



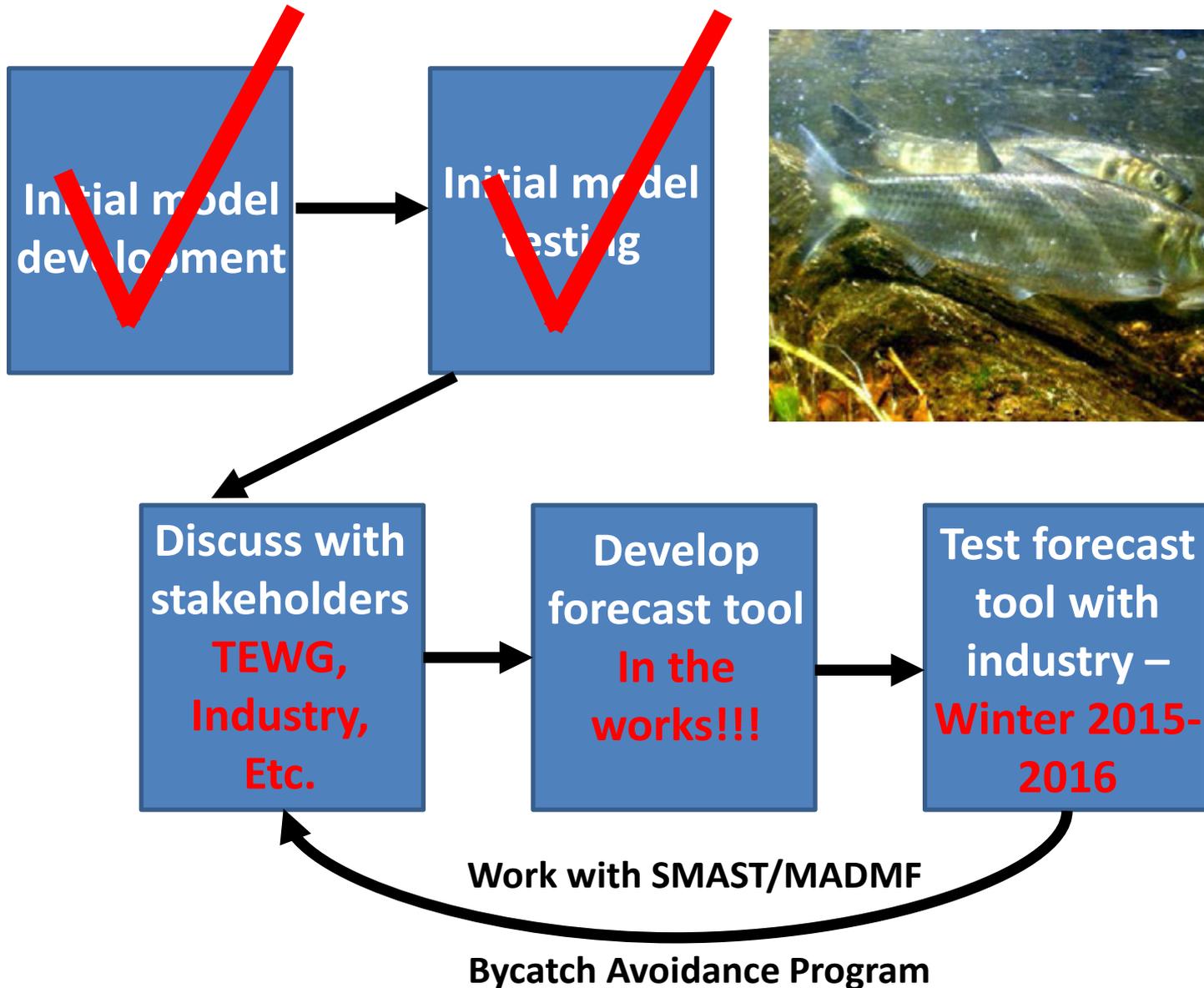
SPRING 2015

Modeled probabilities

Observed presence/absence



PROJECT OVERVIEW



NEXT STEPS

- Directed sampling with cooperative research fleet
- Refine/evaluate models with cooperative fleet/observer data
- Input from industry and other researchers
 - What's missing (variables)?
 - Improve usefulness?
 - Collaborate with SMAST Bycatch Avoidance Program/MWT fleet
- Functional “bycatch forecast” online!!



Credit: E. Marchetti

A large school of fish, likely Atlantic menhaden, is seen swimming in dark, rippling water. The fish are densely packed, creating a shimmering effect on the surface. In the bottom right corner, a small green plant with several leaves is visible, partially submerged in the water.

QUESTIONS?

Funding provided by:
NOAA Greater Atlantic Regional Fisheries Office