



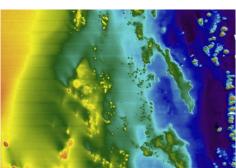
South Atlantic Climate Vulnerability Assessment

- National Climate Science Strategy and South Atlantic Climate Science Regional Action Plan
- Determine which stocks/species will respond with a shift in abundance or productivity to a changing climate.











Why conduct CVA?

- 1. Understand climate models projections for the region.
- 2. Identify gaps in ecological knowledge to guide research agendas.
- 3. Establish which stocks might decline or expand to guide management, monitoring, and research decisions.
- Identify communities dependent on vulnerable stocks to build greater economic resilience.



How?

Exposure

Sea surface
temperature*
Air temperature*
Salinity*
Ocean acidification*
Precipitation*
Currents
Sea level rise
* Analyzed mean and variance

Sensitivity

- •Complexity in Reproduction
- Dispersal of Early Life Stages
- •Early Life History Survival and Settlement Requirements
- Habitat Specificity
- Prey Specificity
- Adult Mobility
- pH preferences
- Thermal preferences
- Population Growth Rate
- Stock Size/Status



Species Vulnerability



Methodology

Stock Vulnerability Report

A vulnerability report for each species will identify key attributes

Multi-Stock Vulnerability Rankings Vulnerability Assessment Framework

Uses a combination of sensitivity attributes and climate factors to assess vulnerability Uses *existing information* to create species profiles

Species Profiles

Uses species profiles and *expert opinion* to score each stock

Stock Scores [low, moderate, high, very high].

Produces multi-stock vulnerability score ranking for the region



Example Sensitivity Attributes:

Complexity in Reproduction, Habitat Specificity, Etc.

Example Climate Factors:

SST, Air temperature, Salinity, Ocean acidification, Etc.



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How?

Rubric to aid scoring for sensitivities

Goal: To determine if the stock is a prey generalist or a prey specialist.

Relationship to climate change: Understanding how reliant a stock is on specific prey species could predict its ability to persist as the climate changes.

Background: Impacts extend beyond the stock in question to include species within its food web.

<u>How to use expert opinion</u>: Please account for ontogenetic shifts in diet; however, limit your response to the juvenile and adult life stages as larvae are considered elsewhere.

Prey Specificity Bins:

Low: The stock eats a large variety of prey.

Moderate: The stock eats a limited number (~3) of prey types (copepods, krill, forage fish, etc).

High: The stock is partial to a single prey type. It is able to switch to a different prey type, but this may negatively impact fitness.

Very High: The stock is a specialist, and is unable to switch to alternative prey.



Products?

Example: Potential for distribution shift for Northeast stocks

Number of Species

20

30

10

0

Tilefish Cusk Atlantic Hagfish Alewife American Shad Atlantic Sturgeon Bay Scallop

Channeled Whelk Horseshoe Crab Knobbed Whelk Shortnose Sturgeon

Low

Smooth Skate Tautoa

Red Drum

Ocean Pout

Blue Mussel

Hickory Shad

Atlantic Wolffish

Atlantic Salmon

Blueback Herring Eastern Oyster

Northern Quahog

Rainbow Smelt

Sand Lances

Green Sea Urchin

Atlantic Sea Scallop

Black Sea Bass Blue Crab Conger Eel Scup Softshell Clam Spot Spotted Seatrout Striped Bass Summer Flounder

Acadian Redfish

American Plaice Atlantic Cod Atlantic Halibut Barndoor Skate

Deep-sea Red Crab **Longfin Inshore Squid**

Northern Shrimp Offshore Hake Pollock

Witch Flounder Yellowtail Flounder

American Lobster Atlantic Herring

Clearnose Skate

Red Hake Windowpane Anchovies **Atlantic Mackerel Atlantic Surfclam** Haddock Little Skate

Monkfish Ocean Quahog Rosette Skate Winter Skate American Eel

Atlantic Croaker

Silver Hake **Thorny Skate** White Hake

Bluefish **Cancer Crabs**

> **Dusky Shark** Northern Shortfin Squid Porbeagle Spiny Dogfish Smooth Dogfish Atlantic Saury Butterfish

Moderate Very High High

Species Distribution Change Potential



Planning for the South Atlantic...

Council input can help us to:

- Prioritize species/stocks to assess
- Identify important regional climate processes
- Identify life history data
- Suggest tangible products that could aid end users such as Council and other stakeholders.
 - What materials would best support management? EIAs?
 BiOps? etc..
 - What is the best way to communicate assessment results?











Planning for the South Atlantic...

Currently assessing:

- Funding and Staffing needed to support the SA-CVA
- Management structure to recruit and retain participants from the region (please contact us if interested in helping)
- Repositioing some software tools to streamline climate data assessment for the South Atlantic.
- Updating the NMFS Office of Science and Technology on needs.









