

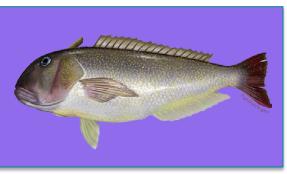
NOAA FISHERIES

Southeast Fisheries Science Center

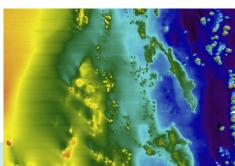
2017 Gulf of Mexico Climate Vulnerability Assessment

GMFMC Meeting October 17-21, 2016









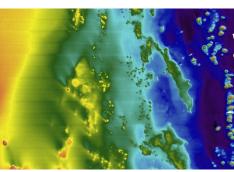
2017 Gulf of Mexico Climate Vulnerability Assessment

- Part of the National Climate Science Strategy and the Gulf of Mexico Climate Science Regional Action Plan.
- Determine which stocks/species will respond with a shift in abundance or productivity to a changing climate.











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:

Sea surface temperature, salinity, ocean acidification, etc.

Methodology

Stock

Vulnerability

Report

Vulnerability Assessment Framework

Uses existing information to create species profiles

Uses a combination of sensitivity attributes and climate factors to assess vulnerability

Species **Profiles**

A vulnerability report for each species will identify key attributes

Uses species profiles and expert opinion to score each stock

Multi-Stock Vulnerability Rankings

Produces multi-stock vulnerability score ranking for the region

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

GMFMC has a role to play...

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?
 Ecological Impact Assessments? BiOps? etc.
 - What is the best way to communicate assessment results?









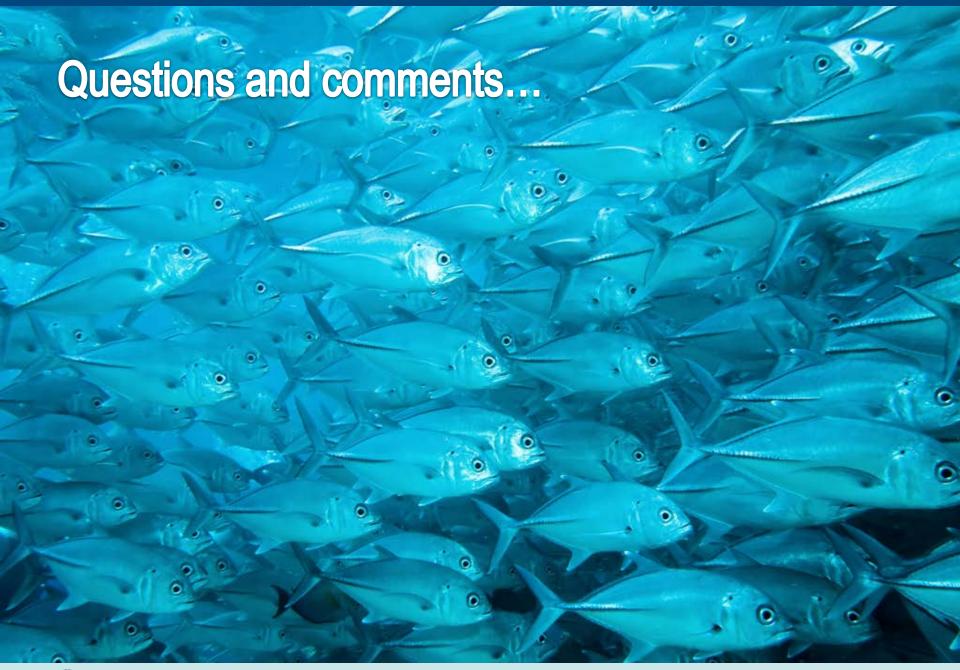




Why conduct CVA?

- Understand climate model projections for the region.
- Identify gaps in ecological knowledge to guide research agendas.
- 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.







EXPOSURE

Sea surface temperature
Air temperature
Salinity
Ocean acidification
Precipitation
Currents
Sea level rise

SENSITIVITY

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

Species Vulnerability



Example 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.



Example: Potential for distribution shift for Northeast stocks

Number of Species

30

20

0

Tilefish
Cusk
Atlantic Hagfish
Alewife
American Shad
Atlantic Sturgeon
Bay Scallop
Bloodworm
Channeled Whelk
Horseshoe Crab

Ocean Pout
Atlantic Sea Scallop
Atlantic Wolffish
Green Sea Urchin
Atlantic Salmon
Blue Mussel
Blueback Herring
Eastern Oyster
Hickory Shad
Northern Quahog
Rainbow Smelt
Red Drum
Sand Lances
Smooth Skate
Tautog

Acadian Redfish American Plaice **Atlantic Cod Atlantic Halibut Barndoor Skate** Bluefish Cancer Crabs Deep-sea Red Crab Longfin Inshore Squid Northern Shrimp **Offshore Hake Pollock** Silver Hake **Thorny Skate** White Hake 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 Atlantic Menhaden Black Sea Bass Blue Crab Conger Eel Northern Kingfish Softshell Clam Spanish Mackerel Spotted Seatrout Striped Bass Summer Flounder Weakfish

Dusky Shark
Northern Shortfin Squid
Porbeagle
Spiny Dogfish
Sand Tiger
Smooth Dogfish
Atlantic Saury
Butterfish

Low

Knobbed Whelk

Shortnose Sturgeon

Moderate

High

Winter Flounder

Very High

