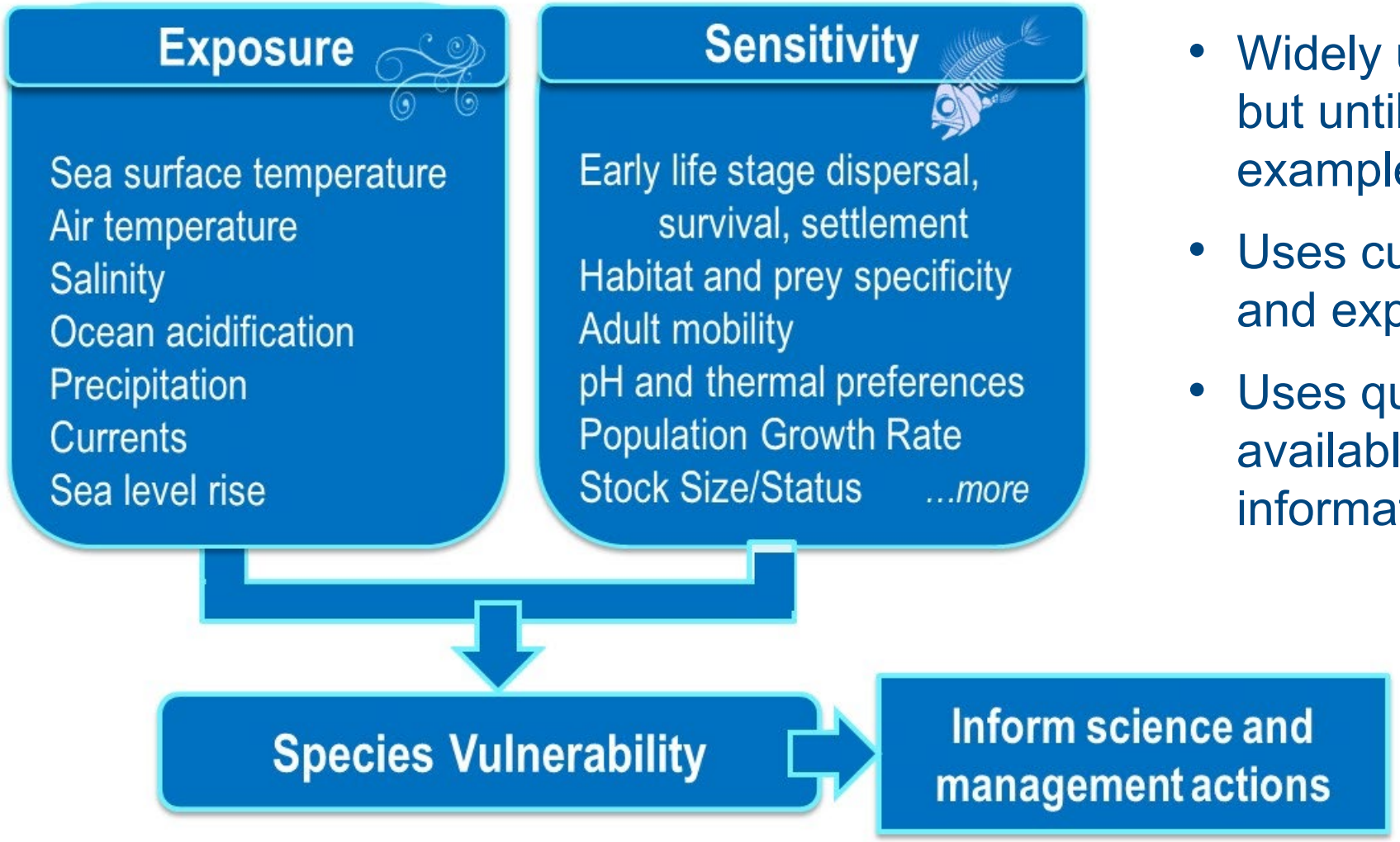
NOAA FISHERIES

Atlantic Highly Migratory Species Climate Vulnerability Assessment

HMS Advisory Panel Meeting

May 9, 2023

Climate Vulnerability Assessments (CVA)



- Widely used in terrestrial systems, but until recently only a few examples from marine systems
- Uses currently existing knowledge and expert opinion
- Uses quantitative data when available, and qualitative information when data are lacking

NOAA FISHERIES

Existing Climate Vulnerability Assessments

Protected Species CVAs

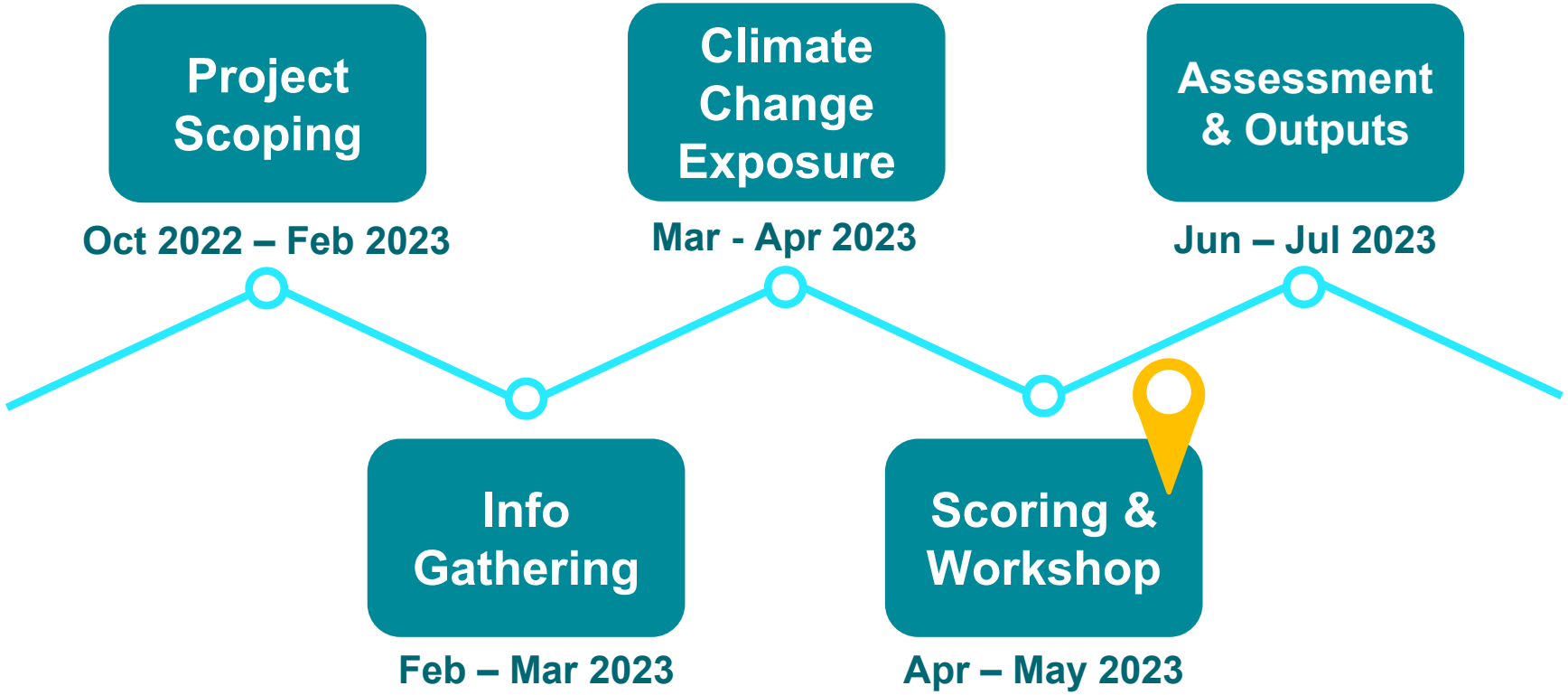
- Sea Turtles – in progress
- **Pacific Marine Mammals – in progress**
- **Atlantic Marine Mammals – in progress**

Fish Stock CVAs

- **Northeast – completed 2016**
- Pacific salmon – completed July 2019
- Bering Sea – completed September 2019
- Pacific Islands – completed 2022
- **South Atlantic – in progress**
- **Gulf of Mexico – in progress**
- West Coast – in progress

NOAA FISHERIES

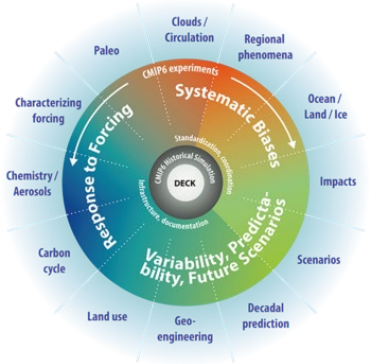
Project Timeline



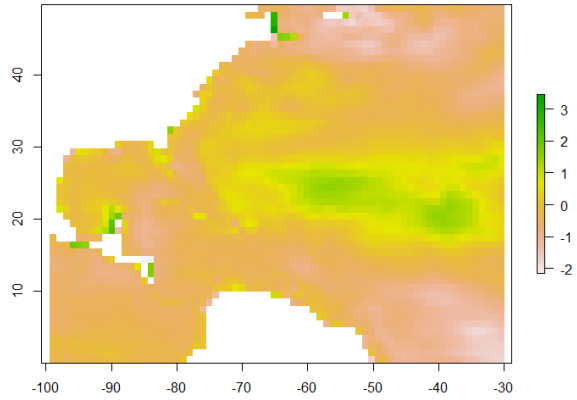
NOAA FISHERIES

Exposure Factor Analysis

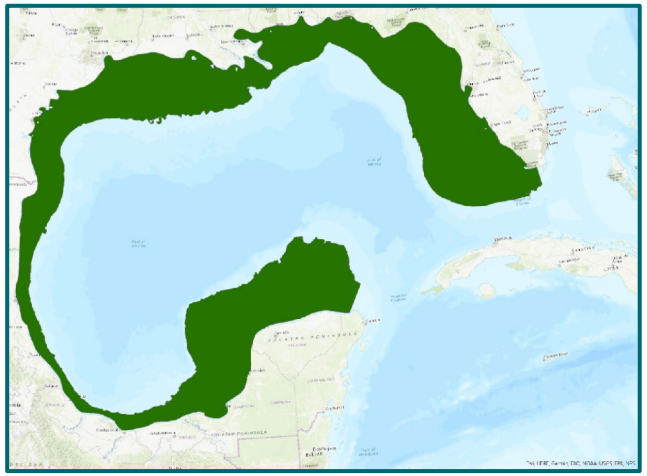
CMIP6 Model



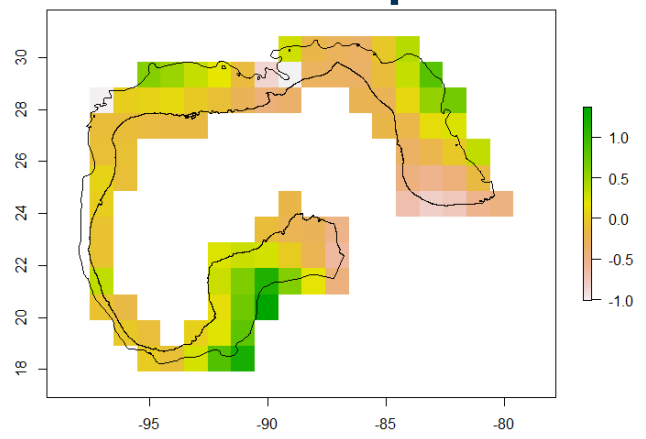
Exposure Factor



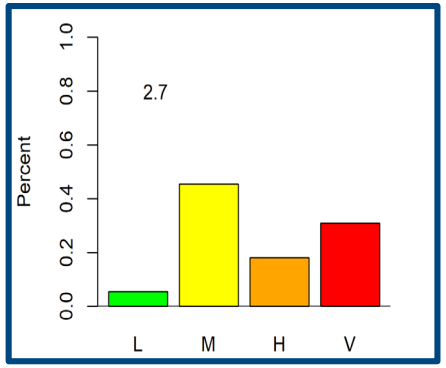
Species Distribution



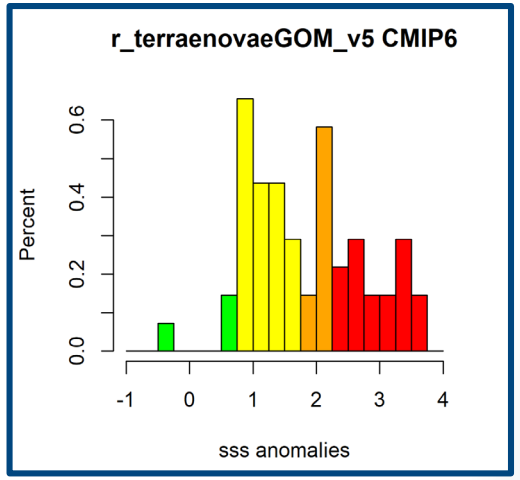
Overlap



Summarized Histogram & Exposure Factor Score



Histogram of Overlap



NOAA FISHERIES

Sensitivity Scoring:

- Multi-step process involving experts
- Training/orientation webinar
- Experts rank vulnerability individually
- Workshop to discuss scores
- Opportunity to re-rank

NOAA FISHERIES

Info Gathering

Information Gathering

Species-specific profiles

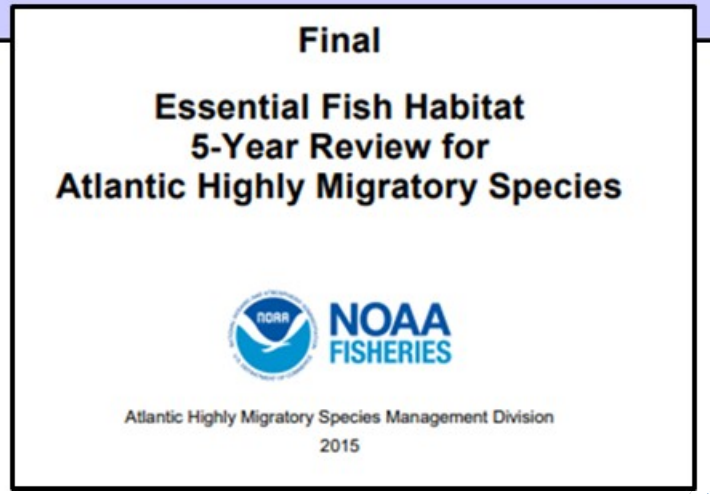
- Summary of 13 life history characteristics
- Inform expert scoring of vulnerability attributes
- Tailored to HMS characteristics

Species Profile for Vulnerability Assessment to Climate Change

Species Name:

Stock Name:

ATTRIBUTE	DATA	SOURCE	DATA QUALITY SCORE
Habitat specificity - To determine on a relative scale if the stock is a habitat generalist or a habitat specialist while incorporating information on the type and abundance of key habitats			
What are the habitat requirements for juveniles? (e.g. What types of habitat does the stock utilize? Is the habitat abundant? Is it a physical or biological habitat? Is the habitat rare or abundant? Is there documented evidence that the habitat will be impacted by climate change?)			
What are the habitat requirements for adults? (e.g. What types of habitat does the stock utilize? Is the habitat abundant? Is it a physical or biological habitat? Is the habitat rare or abundant? Is there documented evidence that the habitat will be impacted by climate change?)			
Prey specificity - To determine on a relative scale if the stock is a prey generalist or a prey specialist while incorporating information on the type and abundance of key prey types.			


Final

Essential Fish Habitat
5-Year Review for
Atlantic Highly Migratory Species

NOAA FISHERIES

Atlantic Highly Migratory Species Management Division

2015

NOAA FISHERIES

Project Scoping & Core Team

The Core Plan team includes managers and participants from past CVAs and aids in the decision making of the HMS CVA design.

Defining our CVA – Scoping Document

- **Definition:** Concisely defines project elements.
- **Options:** Describes options considered by the Core Plan Team.
- **Related Items:** Highlights connectivity between project elements.
- **Decision:** Describes and provides connections to the final decision.

NOAA FISHERIES

Scoping Document

Project Element	Decision
Species or Stock	58 species and stocks based on ICCAT and SEDAR assessments, with flexibility to determine inclusion on a species-by-species basis
Species Distribution	Begin with IUCN distributions and refine based on EFH and further information
Spatial Boundaries	Begin with the full range of the species and use a refinement process to determine final extent
Model Selection	CMIP6 – reflects newer climate information
Temporal Scale	1985-2014 Historical Period; 2020-2049 Future Period
Exposure Factors	Species-by-species Basis, dependent on life history
Sensitivity Attributes	HMS-Specific Attributes
Prey	Prey is sufficiently discussed in the sensitivity attributes

NOAA FISHERIES

Sensitivity Attribute Pilot Project

Purpose: To evaluate the effects of sensitivity attribute definition modifications that better reflect HMS life history.

Four Experts scored **10 Species** twice.

Northeast CVA Attribute Definitions

HMS CVA Attribute Definitions

Rankings

Rankings

Final Sensitivity Attributes

Decisions: HMS Attributes & 2020-2049

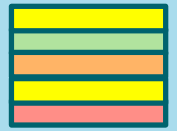
Temporal Scale Pilot Project

Purpose: To evaluate future periods for differences in exposure scores.

IUCN Distribution Refinement
EFH
Literature & Tagging Studies
Expert Opinion

Exposure Factor Analysis for **Two Future Periods**

2030-2059



2020-2049

Final Temporal Scale

NOAA FISHERIES

Sensitivity Attribute Pilot Results*

Species	Original Attributes	HMS Attributes
West Atlantic skipjack tuna	Moderate	Low
White marlin	Moderate	Moderate
West Atlantic sailfish	High	High
Yellowfin tuna	High	Moderate
Lemon shark	Moderate	Very High
Oceanic whitetip shark	High	High
Sand tiger shark	High	High
Atlantic sharpnose shark	Low	Low
Caribbean sharpnose shark	Low	Low
White shark	High	High

Influencing Attributes:

- Habitat Specificity
- Sensitivity to Temperature
- Other Stressors
- Reproductive Strategy Sensitivity

Decision:

- HMS-Specific Attributes

*Pilot results are for testing purposes only and should not be interpreted as preliminary or final results for the HMS CVA.

NOAA FISHERIES

Temporal Scale Pilot Results*

Species	2020-2049	2030-2059
West Atlantic skipjack tuna	High	Very High
White marlin	Very High	Very High
West Atlantic sailfish	Very High	Very High
Yellowfin tuna	Very High	Very High
Lemon shark	Very High	Very High
Oceanic whitetip shark	Very High	Very High
Sand tiger shark	Very High	Very High
Atlantic sharpnose shark	Very High	Very High
Caribbean sharpnose shark	--	--
White shark	High	Very High

Influencing Factors:

- pH
- Surface Oxygen
- Sea Surface Temperature

Decision:

- 2020-2049 Future Period

*Pilot results are for testing purposes only and should not be interpreted as preliminary or final results for the HMS CVA.

NOAA FISHERIES

Combined Pilot Vulnerability Rankings*

Sensitivity Attributes Scores

Species	HMS Attributes
West Atlantic skipjack tuna	Low
White marlin	Moderate
West Atlantic sailfish	High
Yellowfin tuna	Moderate
Lemon shark	Very High
Oceanic whitetip shark	High
Sand tiger shark	High
Atlantic sharpnose shark	Low
Caribbean sharpnose shark	Low
White shark	High

×

Exposure Factors Scores

Species	2020-2049
West Atlantic skipjack tuna	High
White marlin	Very High
West Atlantic sailfish	Very High
Yellowfin tuna	Very High
Lemon shark	Very High
Oceanic whitetip shark	Very High
Sand tiger shark	Very High
Atlantic sharpnose shark	Very High
Caribbean sharpnose shark	--
White shark	High

=

Species	Climate Vulnerability Ranking
West Atlantic skipjack tuna	Low
White marlin	High
West Atlantic sailfish	Very High
Yellowfin tuna	High
Lemon shark	Very High
Oceanic whitetip shark	Very High
Sand tiger shark	Very High
Atlantic sharpnose shark	Moderate
Caribbean sharpnose shark	--
White shark	High

*Pilot results are for testing purposes only and should not be interpreted as preliminary or final results for the HMS CVA.

NOAA FISHERIES

Expert Scoring Workshop

- 3-day workshop
- Presentations
  - Oceanography & Climate
  - Climate Change in Puerto Rico/Caribbean

- Agenda and observer registration link available:

https://www.fisheries.noaa.gov/event/atlantic-highly-migratory-species-climate-vulnerability-assessment-public-workshop-and

Next Steps / Timeline

By Spring AP:

- Species profiles complete
- Temporal scales finalized
- Expert training April 24 & 26
- Scoring period in progress

After Scoring & Workshop:

- Post-workshop species narratives
- Finalize results
- Manuscripts & StoryMap
- CVA Website
- Future AP presentation

NOAA FISHERIES

Questions?

Tyler Loughran, tyler.loughran@noaa.gov
Jennifer Cudney, jennifer.cudney@noaa.gov
Dan Crear, dan.crear@noaa.gov
Lisa Crawford, lisa.crawford@noaa.gov
Peter Cooper, peter.cooper@noaa.gov

Resources:
https://www.fisheries.noaa.gov/national/climate/climate-vulnerability-assessments

NOAA FISHERIES

Core Plan Team

- Wendy Morrison
- John Quinlan
- Roger Griffis
- Eric Hoffmayer
- Cami McCandless
- Eric Orbesen
- Nicholas Coleman

Supporting Staff:

- Tyler Loughran
- Jennifer Cudney
- Dan Crear
- Nicholas Coleman
- Delisse Oritz

Presenters:

- Michelle Scharer Umpierre*
- Vincent Saba
- René Esteves

Species Distribution

- Trey Driggers
- Dean Grubbs*
- Tobey Curtis
- Ryan Logan*
- Brad McHale
- John Graves*
- Greg Skomal*
- Ben Galuardi

Sensitivity Pilot Project

- Michelle Passerotti
- Ben Galuardi
- Guillermo Diaz
- Heather Marshall*

Workshop Experts

- John Carlson
- Dave Richardson
- Bryan Keller
- Lisa Kerr*
- Camrin Braun*
- Willy Goldsmith*
- Bryan Frazier*
- Jeff Kneebone*
- Aaron Carlisle*
- Derke Snodgrass
- Toby Daly-Engel*
- David Kerstetter*
- Eric Hoffmayer
- Cami McCandless
- Eric Orbesen

Species Profile Review

- Jay Rooker
- Ryan Logan
- Ben Galaurdi
- Walt Golet
- Tobey Curtis
- Diego Bernal
- Dean Grubbs
- Daniel Coffey
- Brad Wetherbee
- David Wells
- Greg Skomal
- Marcus Drymon
- Chuck Bangley
- James Sulikowski

Total Number of Experts: 42

NOAA FISHERIES