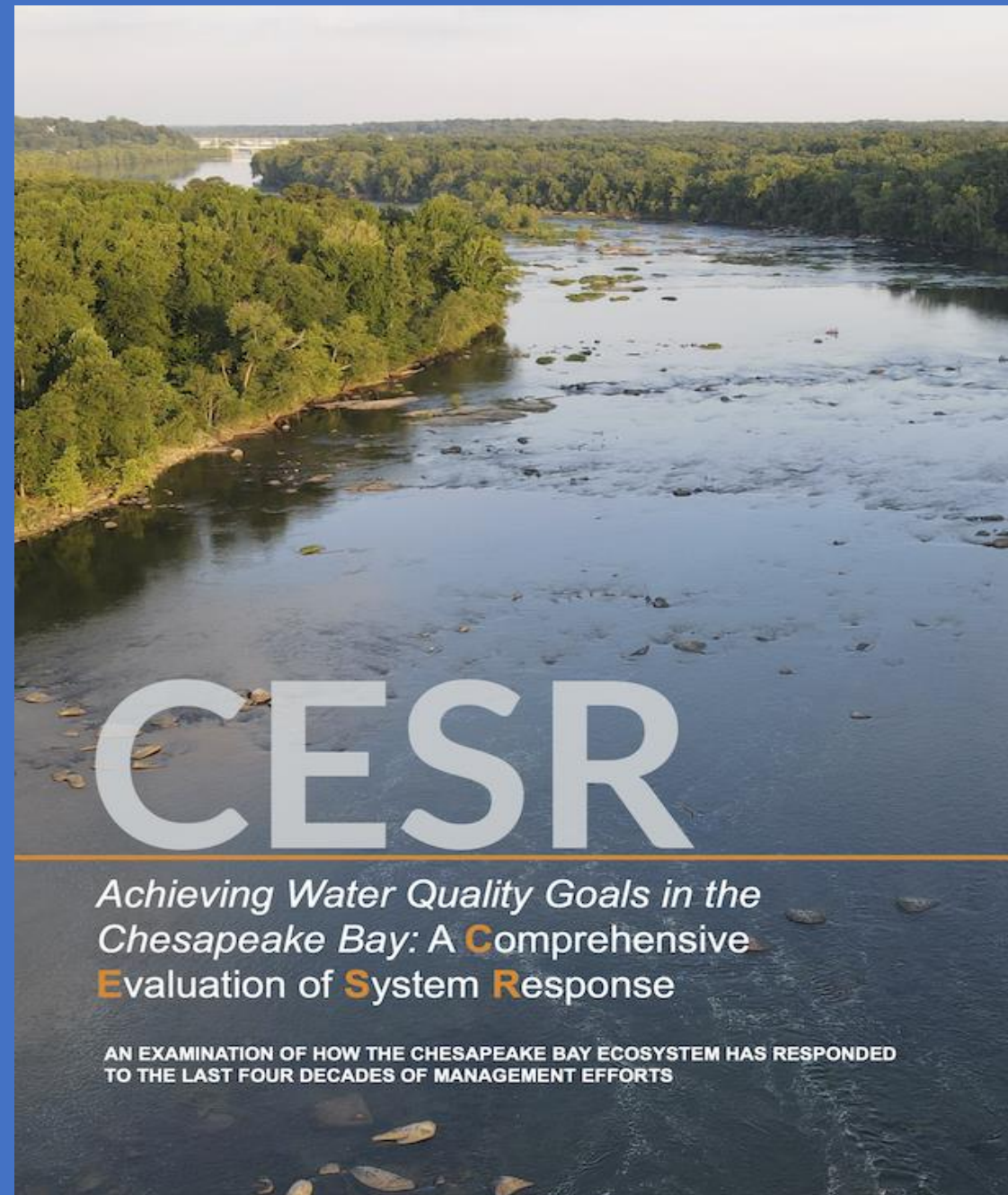CESR: Living Resources Initial Implementation Activities:

STAC Update December, 2024
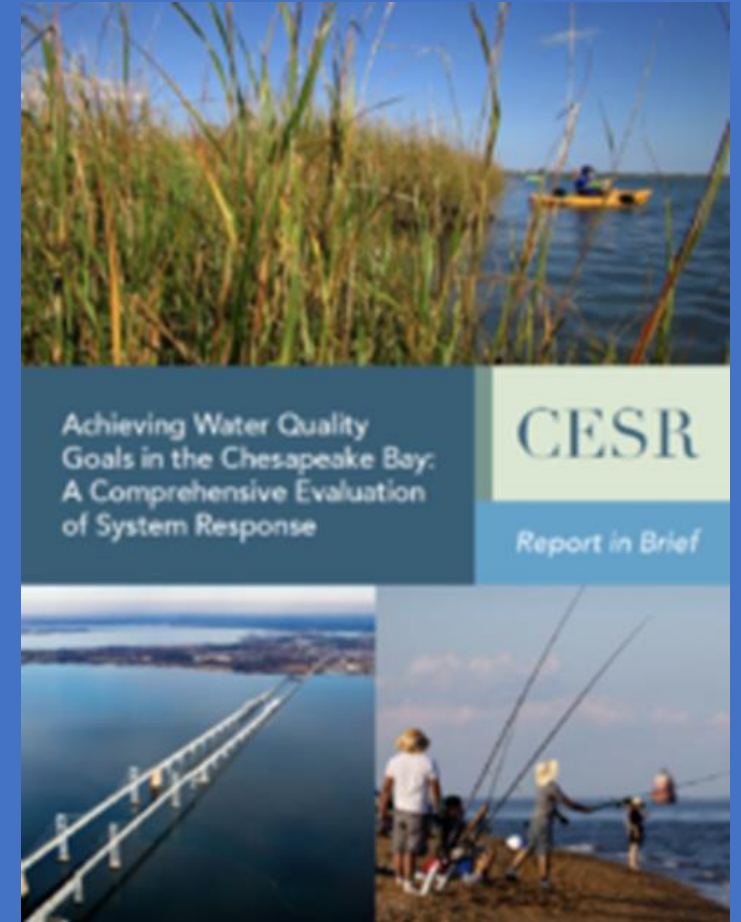
Research Article (In Review Nov 2024; JAWRA) (modified from CESR and CESR LR Resource Document)
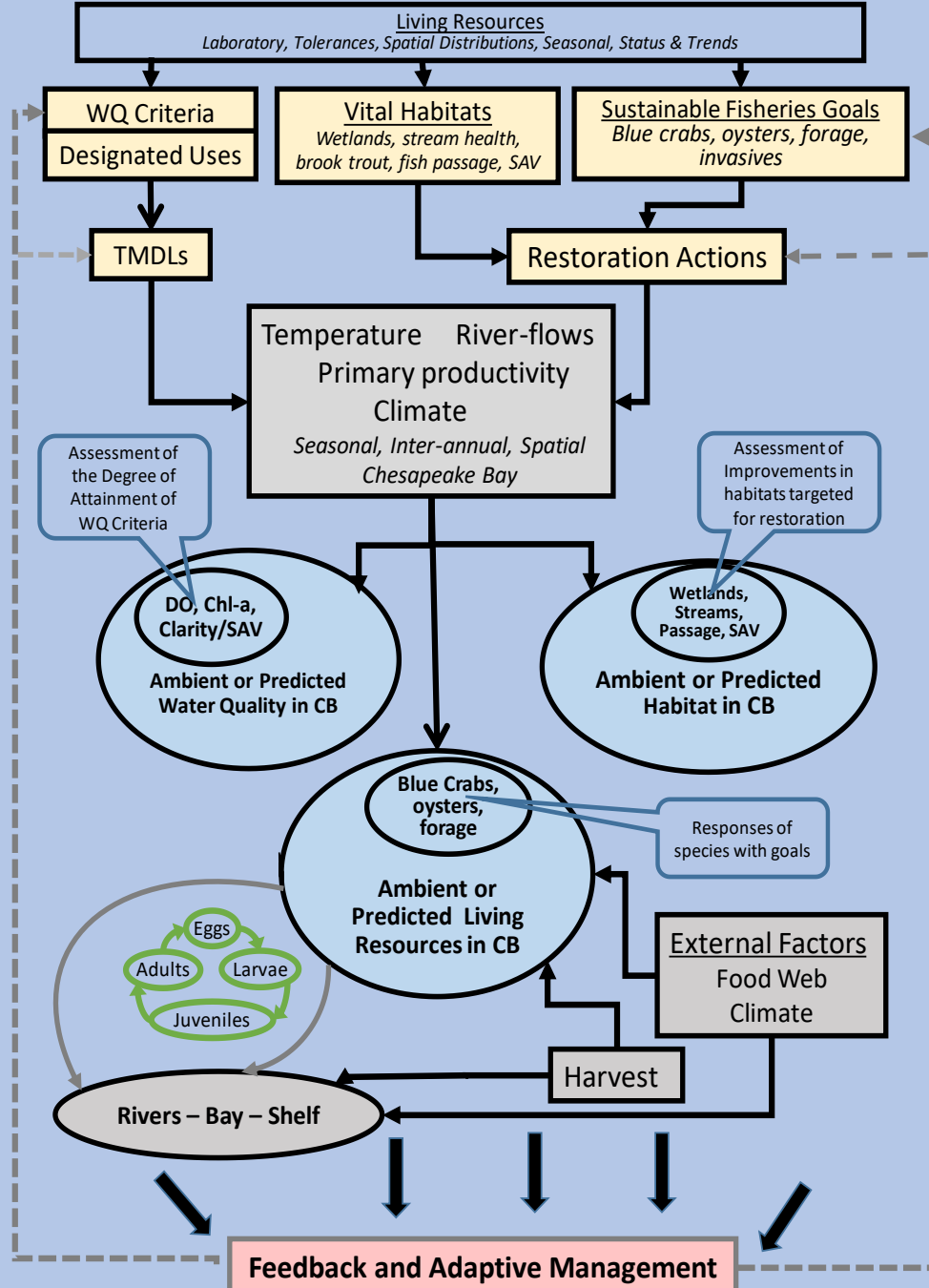
A Proposed Framework for Analyzing Ecosystem Restoration Actions on Living Resources: A Case Study Using the Chesapeake Bay

Kenneth Rose, Mark E Monaco, Thomas F. Ihde, Eric Smith, Jay Stauffer, Jr., Kirk J. Havens, Lee McDonnell, Lewis C. Linker, and Kaylyn S. Gootman

We present a framework for how to perform statistical and ecological modeling analyses to examine the in-situ responses of living resources to restoration actions. The framework uses 12 ecological concepts and principles as the foundation, and then includes the steps involved in developing a strategic plan for statistical and modeling analyses.

Achieving Water Quality Goals in the Chesapeake Bay: A Comprehensive Evaluation of System Response

CESR

Report in Brief

Schematic of how information on living resources is presently incorporated into water quality and habitat within the CBP (top box) and how their effects can be traced through to the in-situ responses of the living resources.
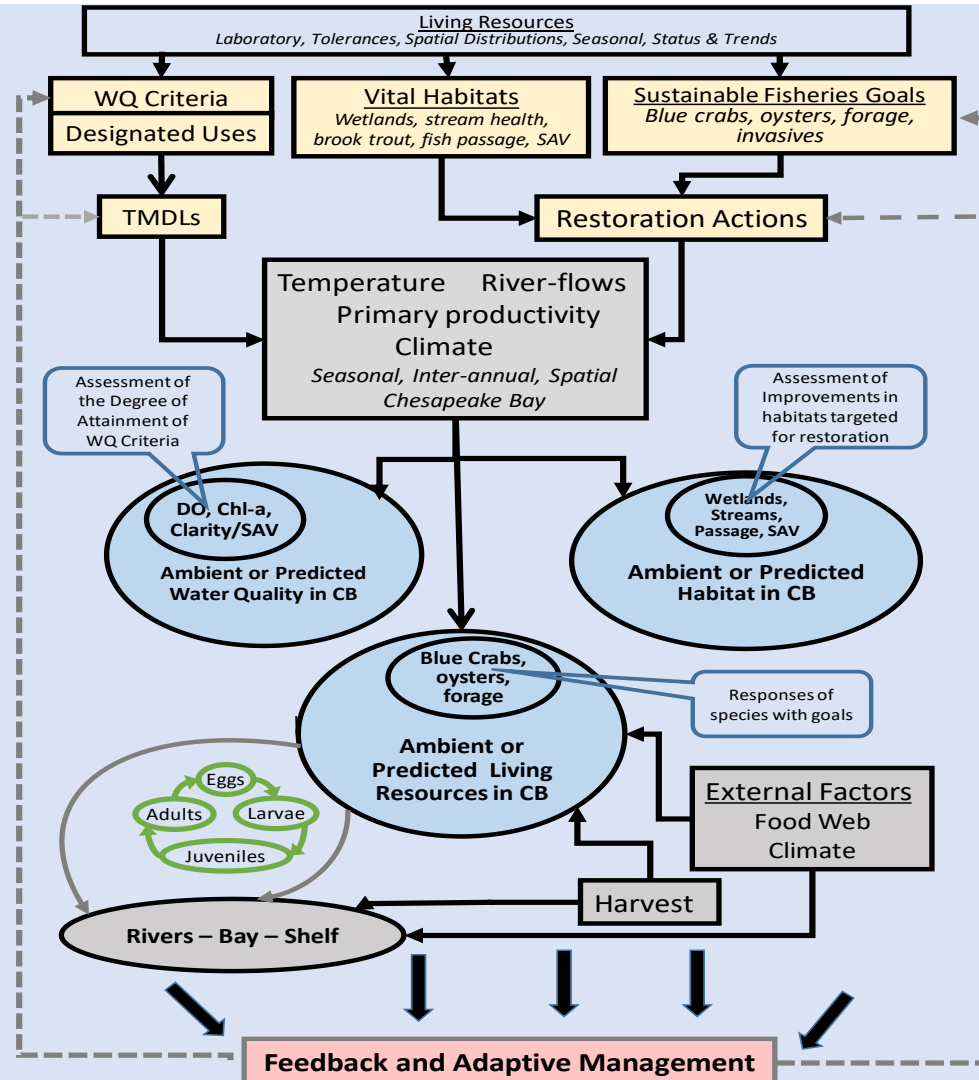
Living Resources
Laboratory, Tolerances, Spatial Distributions, Seasonal, Status & Trends

WQ Criteria
Designated Uses

Vital Habitats
Wetlands, stream health, brook trout, fish passage, SAV

Sustainable Fisheries Goals
Blue crabs, oysters, forage, invasives

TMDLs

Restoration Actions

Temperature   River-flows
Primary productivity
Climate
*Seasonal, Inter-annual, Spatial
Chesapeake Bay*

Assessment of the Degree of Attainment of WQ Criteria

Assessment of Improvements in habitats targeted for restoration

DO, Chl-a, Clarity/SAV
Ambient or Predicted Water Quality in CB

Wetlands, Streams, Passage, SAV
Ambient or Predicted Habitat in CB

Blue Crabs, oysters, forage
Ambient or Predicted Living Resources in CB

Responses of species with goals

Eggs
Adults   Larvae
Juveniles

External Factors
Food Web
Climate

Harvest

Rivers – Bay – Shelf

Feedback and Adaptive Management

Lee McDonnell - CBP
Kaylyn Gootman - CBP
Kenny Rose – U MD

Lewis Linker - CBP
Richard Tian – CBP
Emily Young – CBP
Angie Wei – CBP
Mark Monaco - NOAA
Bruce Vogt – NOAA (Fish GIT)
A.K. Light - NOAA
Gary Shenk – USGS
Peter Tango - USGS
Alex Gunnerson -USGS
John Wolf - USGS
Denise Wardrop - CRC
Tom Parham – MD DNR
Brooke Landry – MD DNR

CESR Living Resource Implementation flowchart (Rose et al. In Review JAWRA)
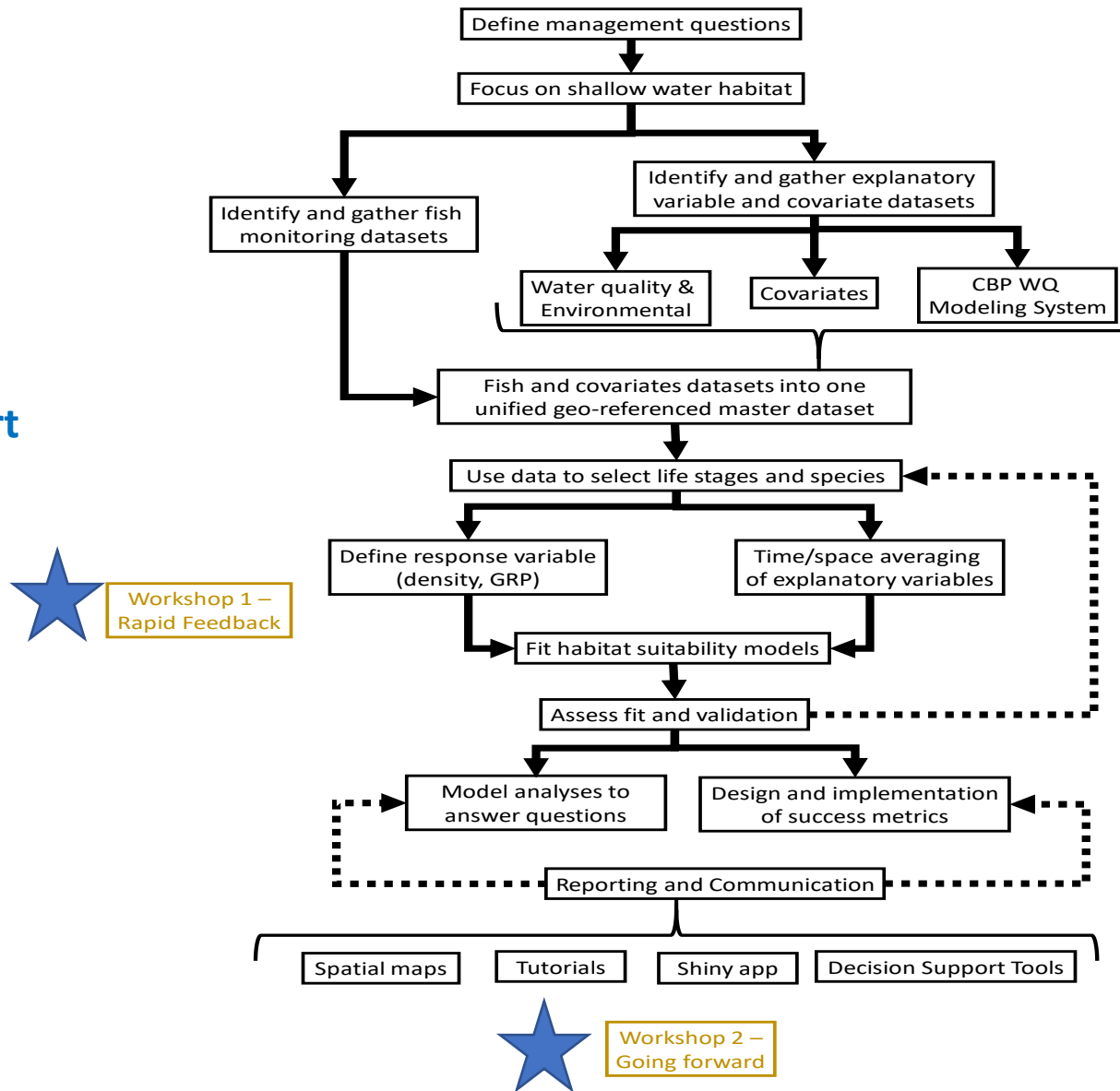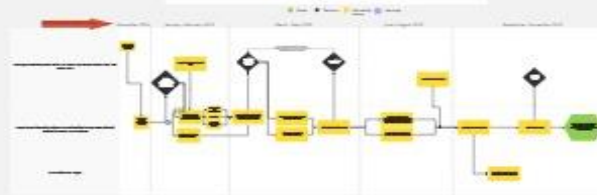
Define management questions

Focus on shallow water habitat

Identify and gather fish monitoring datasets

Identify and gather explanatory variable and covariate datasets

Water quality & Environmental

Covariates

CBP WQ Modeling System

Fish and covariates datasets into one unified geo-referenced master dataset

Use data to select life stages and species

Define response variable (density, GRP)

Time/space averaging of explanatory variables

Workshop 1 – Rapid Feedback

Fit habitat suitability models

Assess fit and validation

Model analyses to answer questions

Design and implementation of success metrics

Reporting and Communication

Spatial maps

Tutorials

Shiny app

Decision Support Tools

Workshop 2 – Going forward

Figure 8. Example of an implementation plan for the Chesapeake Bay. This illustrates how the flowchart and principles and concepts can be combined to result in a step-by-step plan for performing the analyses to answer the management questions. GRP is Growth Rate Potential and is a bioenergetics-based measure of habitat suitability (Almeida et al. 2022). GRP uses temperature and food availability to predict daily growth rate.

Tactical Steps for Potential Implementation of CESR Living Resource Assessment Framework
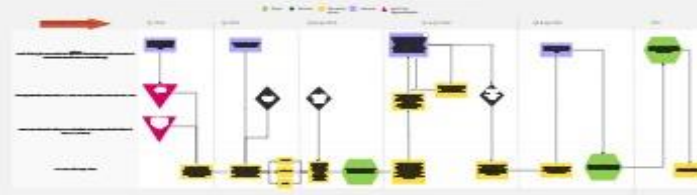## Best opportunity for success based on habitat suitability modeling

Analytical planning across multiple spatial scales to define targeted areas of assessment using the Rose et al. CESR LR Framework

List of segments to prioritize for improvement of key habitat parameters for selected species at specific life stages. Provided by Regional/Targeted Analyses.

Complementary STAC Workshop:
Workshop Topic: Striped Bass Survey Assessment and Habitat Connections
Workshop Type: State of the Science Workshop
Workshop Format: In-person, with potential hybrid capabilities

The Sustainable Fisheries Goal Implementation Team (Fish GIT) successfully proposed a STAC science workshop to investigate possible environmental and ecological factors of low recruitment in Striped bass, review current survey approaches, and identify priority science needs.

Initial Steps:
Tou Matthews & Meg Cole providing SC support

-Bi- Weekly Steering Committee Meetings

-Survey went to Bay community on Nov 22 that asked questions about various Striped bass monitoring programs that focus on recruitment. The survey addressed knowledge of monitoring programs, likes and needs approvement, current perceptions, etc.

-Feb 13-14, 2025 STAC Striped bass workshop

Carrie Kennedy	MD DNR
Bruce Vogt	NOAA
Mark Monaco	NOAA/STAC
Pat Geer	VMRC
Troy Tuckey	VIMS
Lynn Fegley	MD DNR
Kenny Rose	UMCES/STAC
Danny Ryan	DC
Ingrid Braun-Rick	PRFC
Bob Beal	ASMFC

Summary/Next Steps:

- **Publish: A Proposed Framework for Analyzing Ecosystem Restoration Actions on Living Resources: A Case Study Using the Chesapeake Bay**

- **CESR Living Resource Initial Implementation Planning Team: Tactical Implementation Actions**

- **Synthesize & Integrate Habitat & Living Resource Data into Georeferenced Database**

- **Utilize past and planned (e.g., Striped bass) STAC Workshops Information to Advance Framework**

- **Develop Draft Assessment Products via Framework for Expert Review/Consultation Workshop(s)**

- **Revise, Adapt, & Advance Implementation**

CESR

Achieving Water Quality Goals in the Chesapeake Bay: A Comprehensive Evaluation of System Response

AN EXAMINATION OF HOW THE CHESAPEAKE BAY ECOSYSTEM HAS RESPONDED TO THE LAST FOUR DECADES OF MANAGEMENT EFFORTS