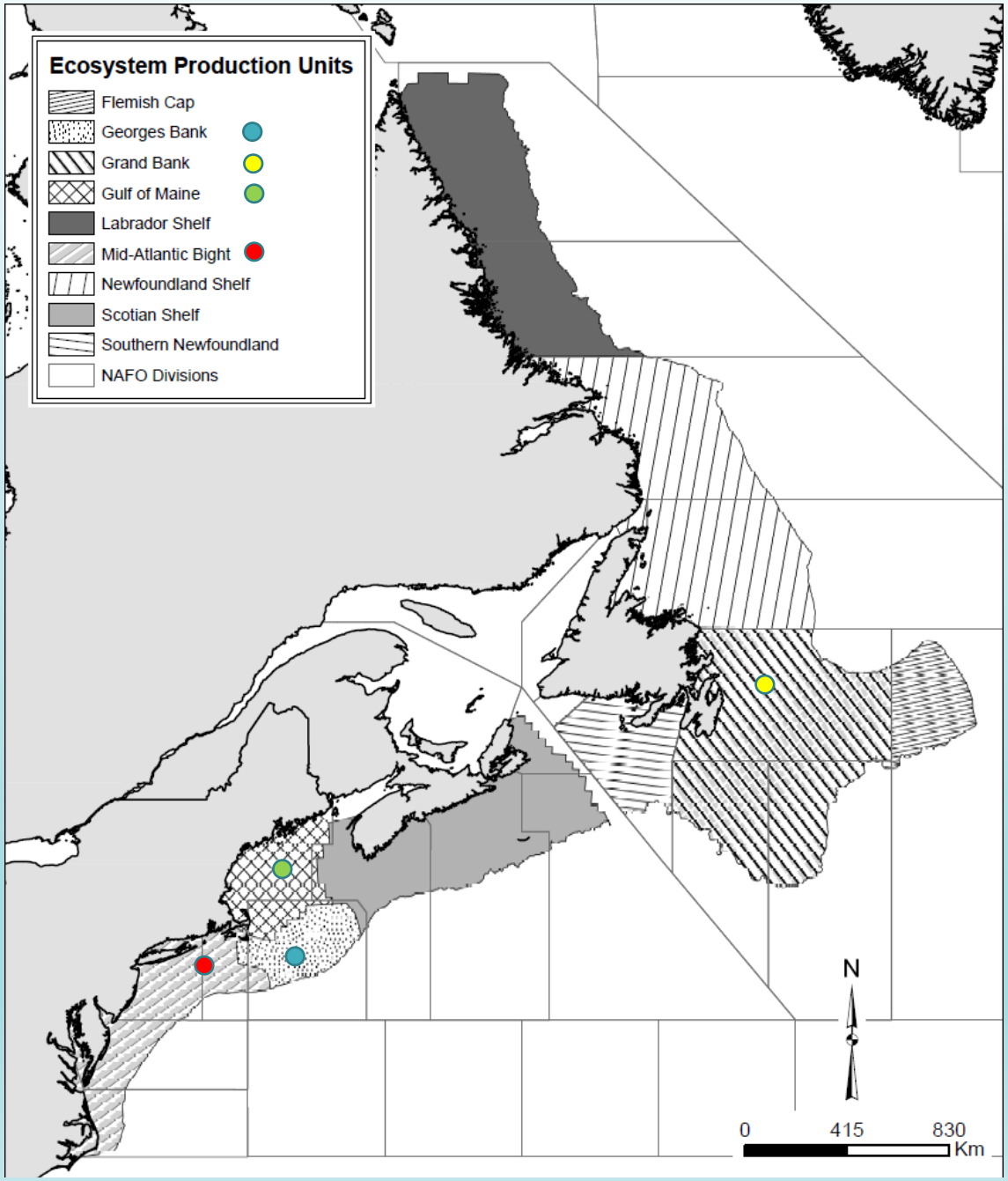


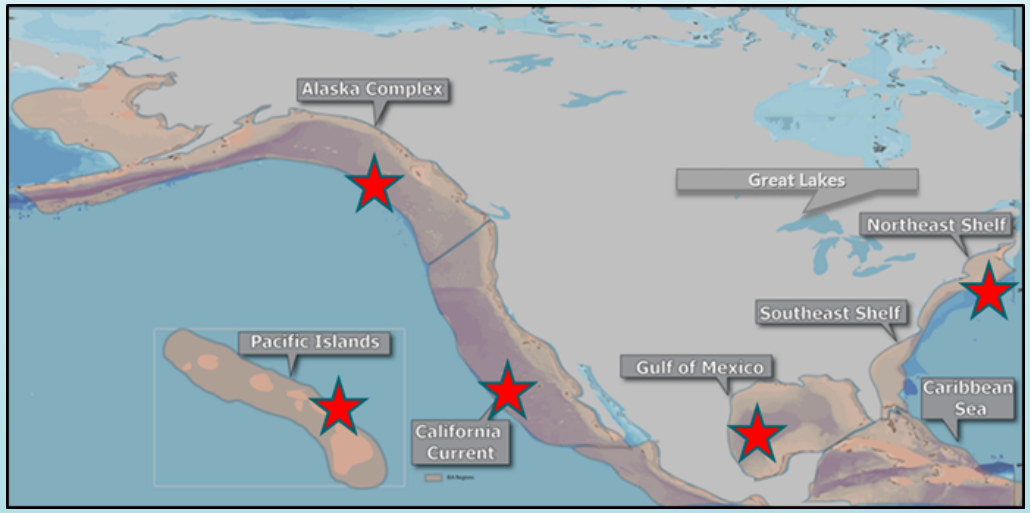
ICES WGNARS Overview

Working Group for the North Atlantic Regional Sea

6th PAME EA Workshop
January 9, 2018

NOAA's Integrated Ecosystem Assessment (IEA) Program

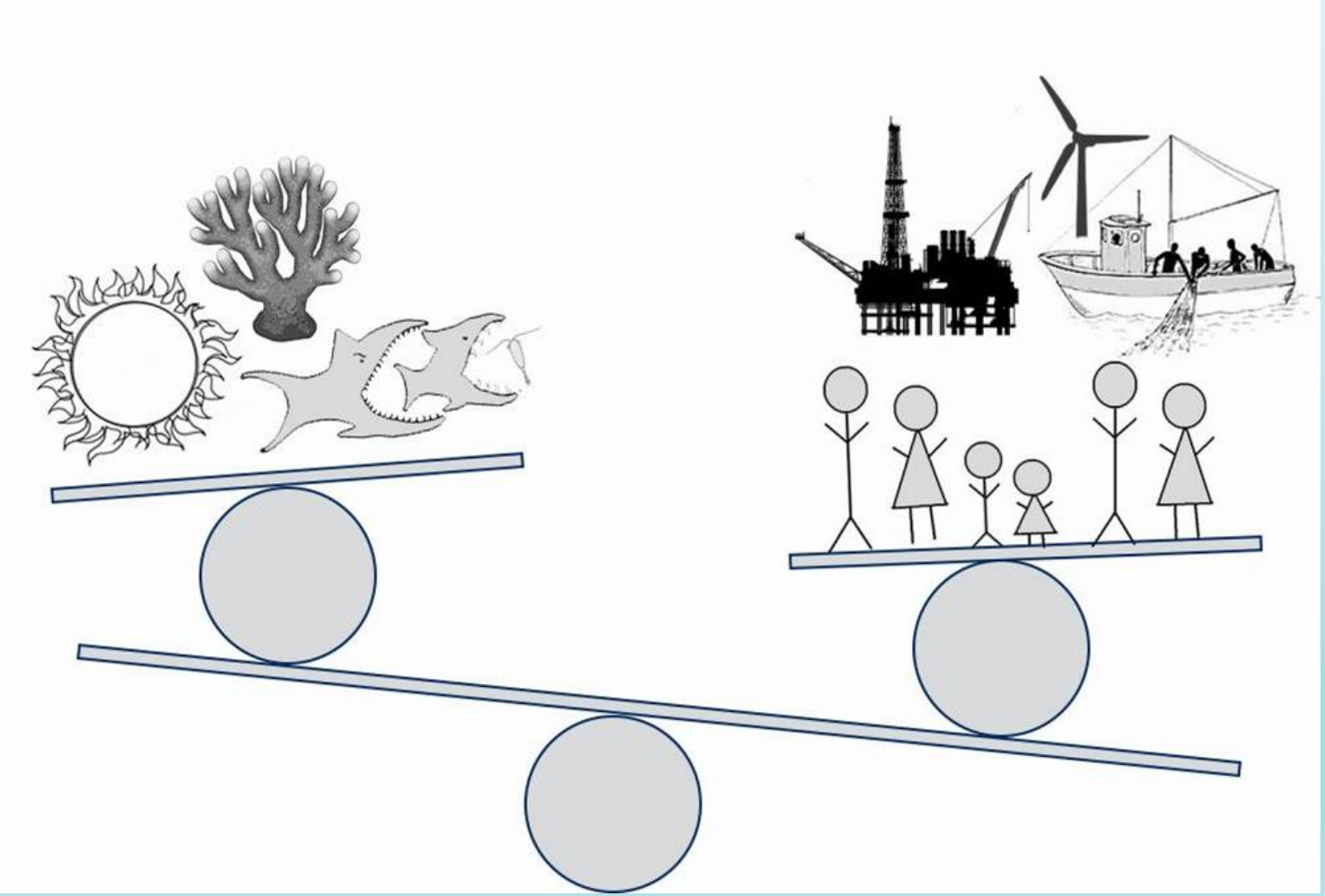
IEAs Provide an Analytical Framework to Implement EBM



Vision:

To provide the sound interdisciplinary, ecosystem-based science, tradeoff evaluation, and management advice required to ensure the sustainable delivery of a broad spectrum of benefits and services from our Nation's marine, coastal, estuarine, and Great Lakes ecosystems; thus, enhancing the well-being of current and future generations.

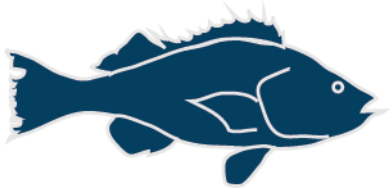
Why NOAA IEA: Balancing Human Activities and Environmental Stewardship/ Ecological Integrity



From ICES Workshop (Jan. 2016):
Operationalizing the Ecosystem Approach

Why NOAA IEA: The EBM Continuum/ Spectrum

No EBM or Low EBM

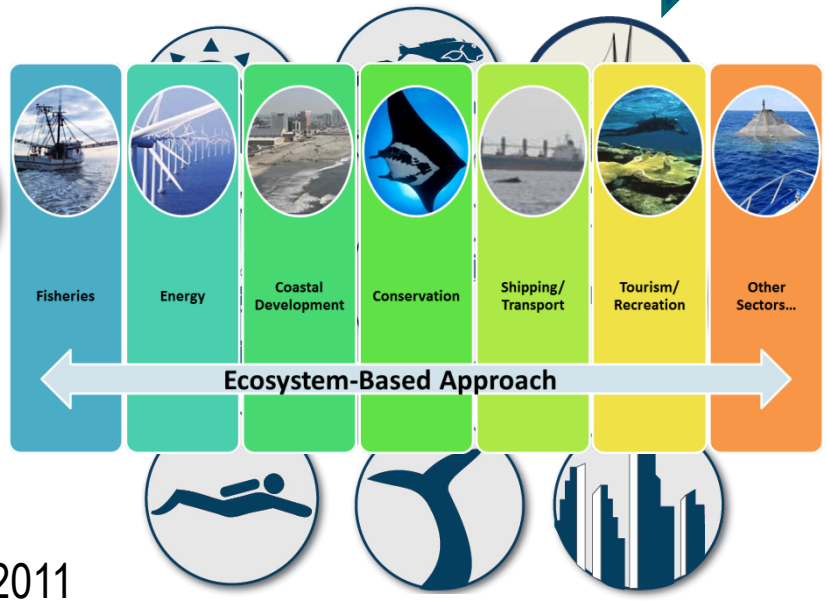


Or

Incremental EBM

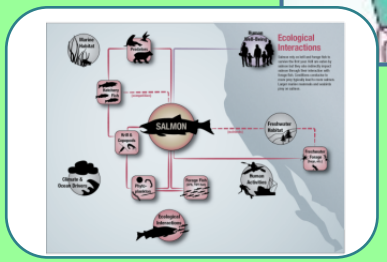
Or

Comprehensive EBM



Adapted from UNEP, 2011

NOAA IEA in action



CONCEPTUAL MODELS and SCOPING EFFORTS help frame the issues

Is the ecosystem "healthy"?

Field and remote data provide

STATUS AND TRENDS

How vulnerable is the ecosystem to human uses and natural perturbations?

Exposure

RIS
qu

Now what do we do?

vs vs vs ...

Year

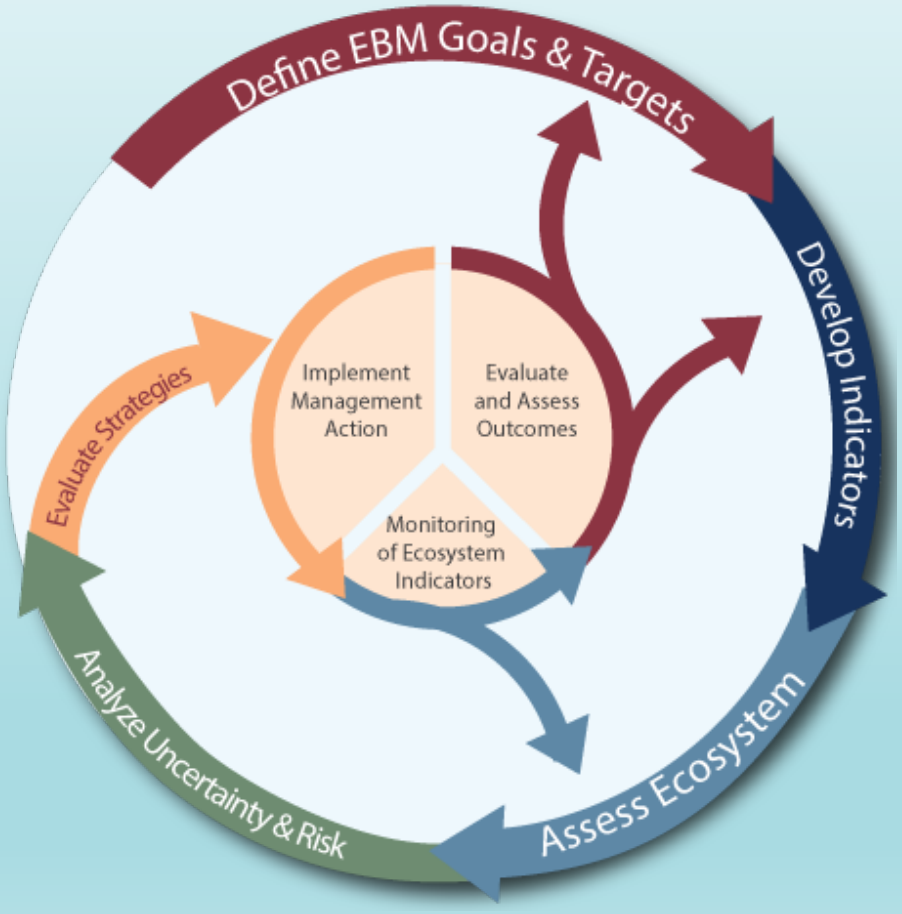
SCENARIOS generate estimates of alternative futures and tradeoffs

...and then, the next iteration of the IEA loop begins

IEA PRODUCTS

ICES WGNARS Goal: Build Regional IEA Capacity

Ultimately attempting to develop management advice



WG Co-Chairs:

- Geret DePiper – US NOAA NEFSC
- Robert Gregory – DFO Canada
  Ecological Science Section

ICES WGNARS History

2009 - 2012	2013-2016	2017 -present
• Information Inventory • Indicator & threshold development • Physical & Biological focus broadened to Social Sciences	• Definition of objectives • Risk Analysis • Qualitative models used in "desk MSE" • Results informed discussion with fishery managers	• Definition of objectives • Indicator development • Risk assessment • MSE for risk mitigation • Report on best practices

Work Flow for current 3-year TORs

Define Objectives

- Identify
  - Benefits
  - Drivers
  - Pressures

Select Indicators

- Identify
- Link to Objectives
- Rank
  - Cull
  - Assess Confidence
- Identify Thresholds

Assess Risk

- Rank Threats to Objectives
  - Likelihood
  - Impact
- Explore Uncertainty

Test Strategies

- Select
  - Strategies
  - Scenarios
- Model (Multi?)
  - Complexity
  - Structural Difference
  - Process Difference
  - Scale

Report Best Practices

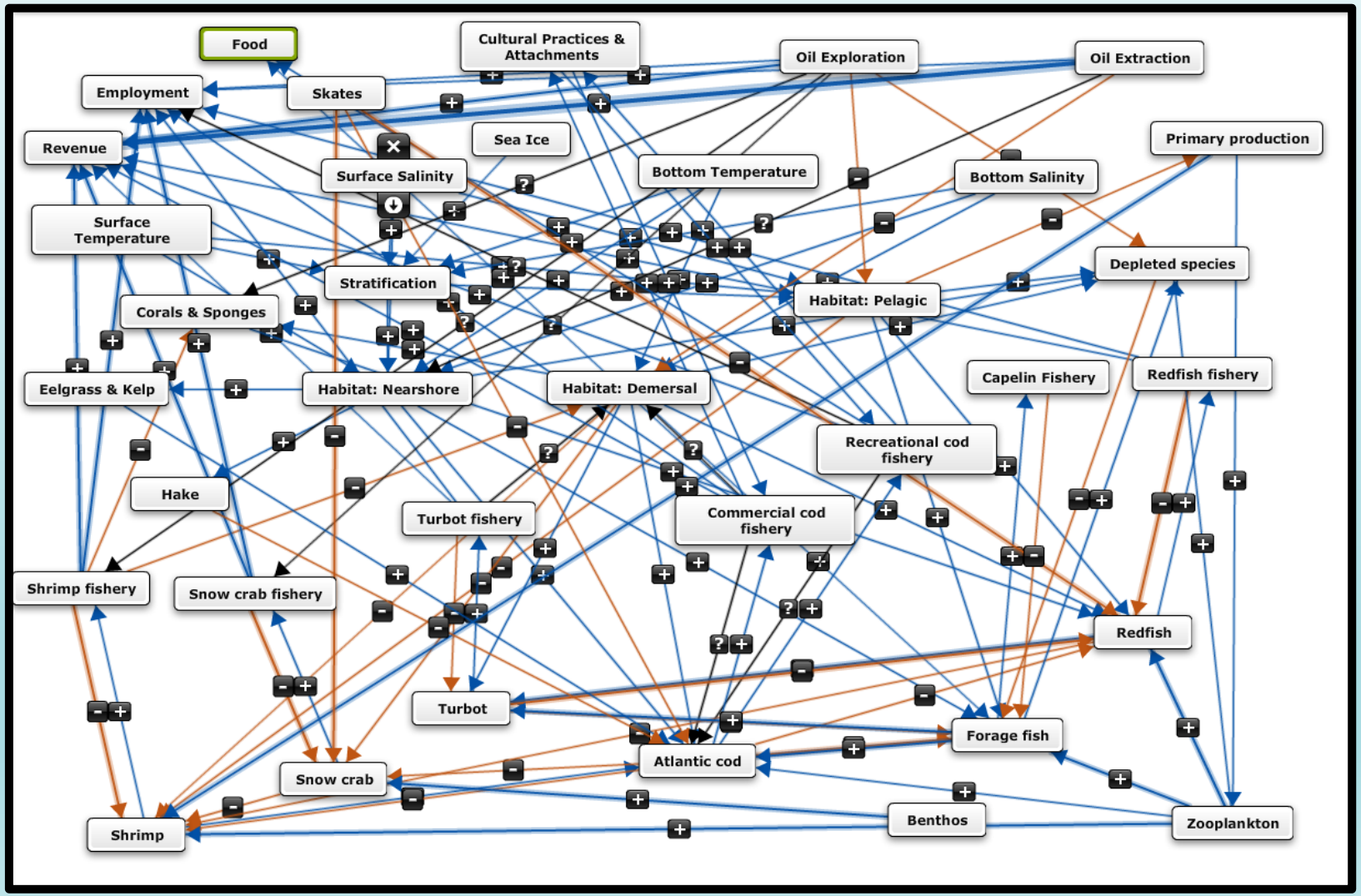
- Communication
- Process

Establishing a Strawman is Key: Define Objectives

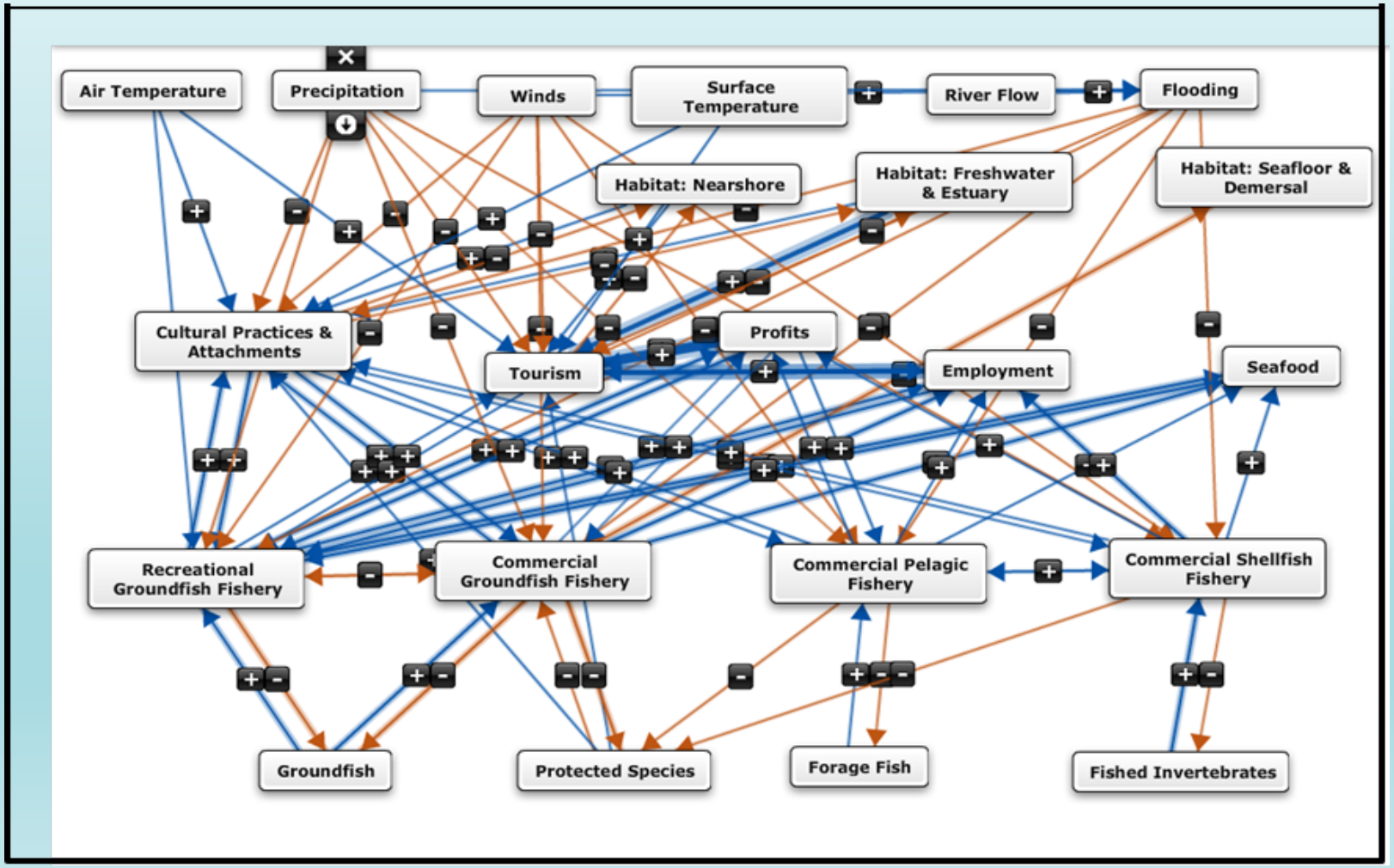
Country	Strategic Objective
US	Maintain fishing mortality within target reference points
US, Canada	Protect and/or facilitate recovery of at-risk or depleted species
US	Individual species mortality below threshold
US	Maintain total harvested species biomass above a dynamic biomass threshold
US	Maintain fish population size structure within acceptable limits
US	Maintain trophic structure within acceptable limits
US	Maintain functional group/guild structure within acceptable limits
US	Maintain habitat productivity
US	Maintain habitat diversity
US, Canada	Maintain habitat structure and function
US	Minimize risk of permanent (>20 years) impacts

Country	Strategic Objective
US	Optimize food provision
US	Optimize economic profitability
US	Optimize employment
US	Optimize recreation
US	Optimize stability
Canada	Maintain healthy biomass and productivity of harvested and other species
Canada	Support conservation of biodiversity at local, regional, and national scales
Canada	Optimize ocean sector revenues
Canada	Optimize ocean sector employment

Conceptual Models as Organizing and Communicating Tools: Generate System Model



Conceptual Models as Organizing and Communicating Tools: Gulf of Maine Human Dimensions



Performance relative to objectives

Ecosystem status: Executive summary

We have organized this report using a proposed set of **ecosystem-scale objectives** derived from US legislation and current management practices. We also report single-species status relative to established objectives and reference points.

Objective Category	Indicators reported here
Seafood production	Landings by functional group, mariculture
Profits	Revenue by functional group
Recreation	Numbers of anglers and trips
Employment	Indicator under development (see p. 4)
Stability	Diversity indices (fishery and species)
Social-Cultural	Community vulnerability, fishery engagement and reliance
Biomass	Biomass or abundance from surveys, biomass relative to reference
Productivity	Condition and recruitment, fishing mortality relative to reference
Trophic structure	Relative biomass of trophic groups
Habitat	Thermal habitat volume, physical properites

Mid-Atlantic Fishery Management Council

- Committed to Risk Assessment as part of EAFM
  - Strategic planning tool
- Finalized with unanimous adoption by Council on December 11
- Impossible without previous investment in automation
- Expected uses include:
  - Informing strategic plan
  - Develop MSE to mitigate major risks

Types of Risk Elements

Ecological

e.g. Ecosystem Productivity – risk of not achieving OY due to changing system productivity

Economic

e.g. Commercial Revenue – risk of not maximizing fishery value

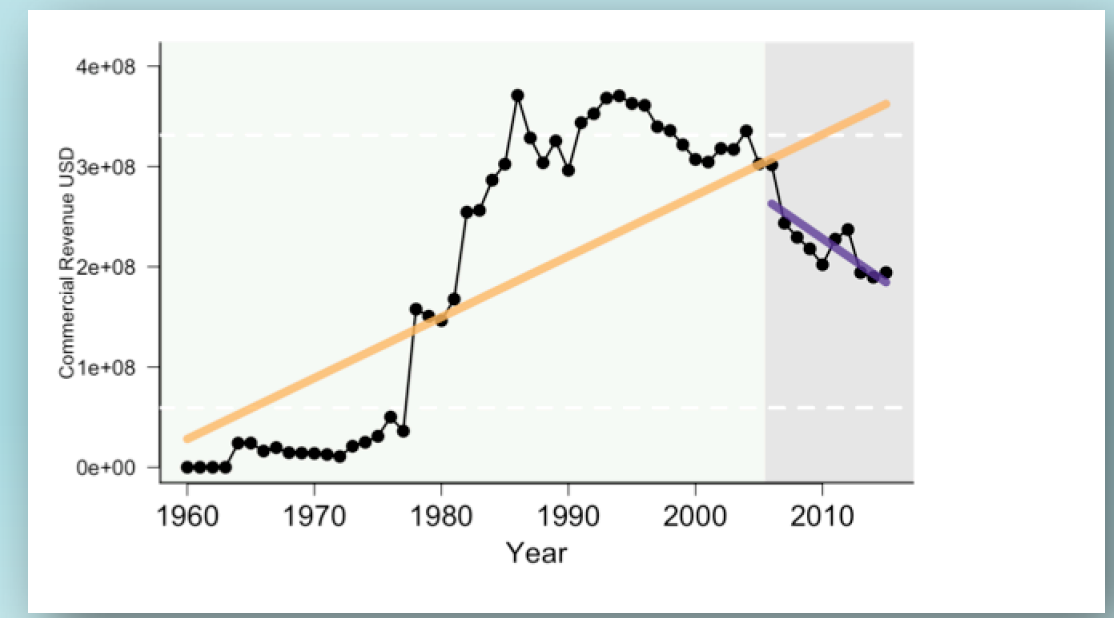
Social

e.g. Socio-Cultural – risk of reduced community resilience

Management

e.g. Interactions – risk of not achieving OY due to interactions with species managed by other entities

Risk Element	Definition: Risk to what?	Indicators used
Economic		
Commercial Revenue	Risk of not maximizing fishery value	Revenue in aggregate
Recreational Angler Days/Trips	Risk of not maximizing fishery value	Numbers of anglers and trips in aggregate
Commercial Fishery Resilience (Revenue Diversity)	Risk of reduced fishery business resilience	Species diversity of revenue
Commercial Fishery Resilience (Shoreside Support)	Risk of reduced fishery business resilience due to shoreside support infrastructure	Number of shoreside support businesses



Risk Assessment adopted by Mid-Atlantic Council

DRAFT Mid-Atlantic EAFM Risk Assessment Documentation and Results

S. Gaichas, G. DePiper, R. Seagraves, L. Colburn, A. Loftus, M. Sabo, B. Muffley

December 08, 2017

Introduction

The purpose of this report is to document the use of ecosystem indicators within the Mid-Atlantic Council's Ecosystem Approach to Fisheries Management (EAFM) initial risk assessment.

A **Risk Element** is an aspect that may threaten achieving the biological, economic, or social objectives that the Council desires from a fishery. By that definition, some risk elements or risk rankings may change as conditions change or new information becomes available. Thus, the EAFM Risk Assessment will be a dynamic and evolving process that will be revisited and updated in future years.

The Council selected a range of risk elements to be evaluated at either the managed species level, the species and sector level, or the ecosystem level. An overview of the risk elements with definitions and associated indicators as adopted by the MAFMC is presented in the table below.

In the following sections, we describe each risk element in more detail along with proposed definitions of low, low-moderate, moderate-high, and high risk. Indicators are then shown for each risk element and a preliminary risk categorization based on the indicator is presented. For trend-based risk definitions, a Mann-Kendall test for monotonic trends is used to test significance ($p<0.05$) of both long term and recent trends. Autocorrelation in the time series was addressed by prewhitening the data as suggested by (Yue et al. 2002).

At the end of the document, we summarize risk ranking results across elements in three tables.

This risk assessment is currently in draft form, pending Council review.

Risk Element	Definition: Risk to what?	Indicators used
Ecological		
Assessment performance	Risk of not achieving OY due to analytical limitations	Current assessment method/data quality
F status	Risk of not achieving OY due to overfishing	Current F relative to reference F from assessment
B status	Risk of not achieving OY due to depleted stock	Current B relative to reference B from assessment
Food web (MAFMC Predator)	Risk of not achieving OY due to MAFMC managed species interactions	Diet composition, management measures
Food web (MAFMC Prey)	Risk of not achieving OY due to MAFMC managed species interactions	Diet composition, management measures
Food web (Protected Species Prey)	Risk of not achieving protected species objectives due to species interactions	Diet composition, management measures

http://www.mafmc.org/s/SOE_MAB_RiskAssess-lzyt.pdf

Major takeaways

- Iterative process
  - Cannot wait for “Final” product
- Strawmen key to process
  - Existing legislation for objectives
- Conceptual model as organizing tool
  - Link goals to human activities, biological components, and large-scale drivers
- Investment in automation well worth upfront cost
  - Management timelines often tight

Questions?

Geret.DePiper@noaa.gov