

# Ecosystem-Based Fishery Management

Jake Kritzer, Chair

NEFMC Scientific & Statistical  
Committee

# Timeline

- 2008: SSC requests time and resources to develop plan for transition to EBFM
- 2008: NEFMC approves request and conveys interest in developing and implementing plan over 3-5 years
- 2009: Two-day workshop held in Newport, RI
- 2010: SSC completes white paper and presents to Council
- 2011-2013: ... (no formal attention to EBFM, but lots of relevant issues raised)
- 2014: SSC presentation to EBFM Committee

**Wednesday, August 26, 2009**

*Convener: Jake Kritzer (SSC Member)*

- |               |   |
|---------------|---|
| 09:00 – 09:30 | Introduction and workshop background  |
| 09:30 – 10:30 | Progress towards EBFM in New England (Chad Demarest)                          |
| 10:30 – 10:45 | Break   |
| 10:45 – 12:15 | EBFM Examples (45 min each – 25 min presentation & 20 min discussion)         |
| 10:45 – 11:30 | California fisheries (Les Kaufman)  |
| 11:30 – 12:15 | Eastern Scotian Shelf integrated management (Tana Worcester)                  |
| 12:15 – 1:15  | Lunch   |
| 1:15 – 3:30   | Implementation Examples - cont'd  |
| 1:15 – 2:00   | Canadian Georges Bank fishery (Stratis Gavaris)                               |
| 2:00 – 2:45   | Australia (Steve Cadrin)  |
| 2:45 – 3:30   | Chesapeake Bay (Ed Houde)   |
| 3:30 – 3:45   | Break   |
| 3:45 – 4:30   | Discussion on best practices and lessons learned; issues for workshop day two |
| 4:30          | Day one adjournment   |

**Thursday, August 27, 2009**

*Convener: Mike Sissenwine (SSC Member)*

09:00 – 10:00 Synopsis of previous day's discussion

10:00 – 10:15 Break

10:15 – 10:45 Science in support of EBFM (Mike Fogarty)

10:45 – 12:00 Discussion on drafting EBFM Plan

The presentations and discussion on Wednesday are to inform discussion (either in plenary or breakout groups) on issues relevant to the drafting of an EBFM plan by the NEFMC. These issues, plus those that might emerge on Wednesday, include:

*Institutional arrangements for NEFMC EBFM Plan*

- One overarching plan or integration into existing species – specific plans?
- Process of plan development, review and approval (e.g. who to involve in plan drafting, how it is reviewed and how it is communicated to the NEFMC and more generally)
- Longer-term institutional requirements of EBFM plan

*Elements of NEFMC EBFM Plan*

- Identification of Issues (e.g. high level objectives, issues associated with objectives, ecosystem components associated with each issue)
- Ecosystem description (e.g. what is known about the Gulf of Maine ecosystem, what new knowledge is needed)
- Prioritization of issues (e.g. use of tools such PSA)
- Development of operational objectives (e.g. indicators and reference points, monitoring requirements)
- Development of management actions (e.g. areal management)

12:00 – 1:00 Lunch

1:00 – 3:00 Discussion on drafting an EBFM Plan - cont'd

3:00 Workshop adjournment

# EBFM Workshop: Case Studies

- North America + Australia
- Mix of focus on science, policy or both
- Mix of focus on primarily fisheries or other uses as well
- Variety of policy frameworks: National vs state/regional, single vs multiple instruments, binding vs advisory
- Different stages of implementation: Planning to operational

# California

## Policy As Successive Experiments

1. Designate experimental management regimes.
2. Establish replicate MPA's as reference sites.
3. Explore new diagnostic markers for system change.
4. Launch monitoring protocol.
5. Adapt markers as biological reference points.
6. Link management control rules to BRP values

# Eastern Scotian Shelf, Canada

## Management Actions

### Biodiversity

- Designation of critical habitat for species at risk.
- Disentanglement protocols for mammals & turtles.
- Ballast water exchange zones.
- Marine Protected Areas.

### Productivity

- Live release of non-target species (where possible).
- Fishing effort reductions.

### Environmental Quality / Habitat

- Coral conservation closures.
- Sponge avoidance protocols.
- Seismic noise “best practices”.

# Georges Bank, Canada

## What does EAM mean for fisheries

- In addition to concern about impacts of fishing on harvested resources
  - Impacts of fishing on components of ecosystem other than harvested resources
    - Manage by-catch & bottom contact; consider impacts on additional ecosystem attributes
  - Implications of environmental forces and prevailing ecosystem conditions on how fishing is conducted
    - Review references wrt changes in growth, mortality, species interactions, etc.



# Australia

## Management Strategy Evaluation Cycle

ATLANTIS MODEL

### MSE DESIGN AND ANALYSIS

DEFINE OBJECTIVES

PERFORMANCE MEASURES

JUDGING OUTCOMES

### BIOPHYSICAL

- environment (currents, bathymetry & climate)
- resources (flora & fauna)
- impacts

### IMPLEMENTATION

- economic pressures (costs, markets, trading)
- effort allocation & gear choice
- investment
- social pressures
- public perception
- ports

**INDUSTRY**  
- development  
- exploitation  
- multiple fleets (behaviour & gears)

**MANAGEMENT**  
- decision rules (harvest strategy)  
- all levers (input & output)  
- management costs

### SIMULATION CYCLE

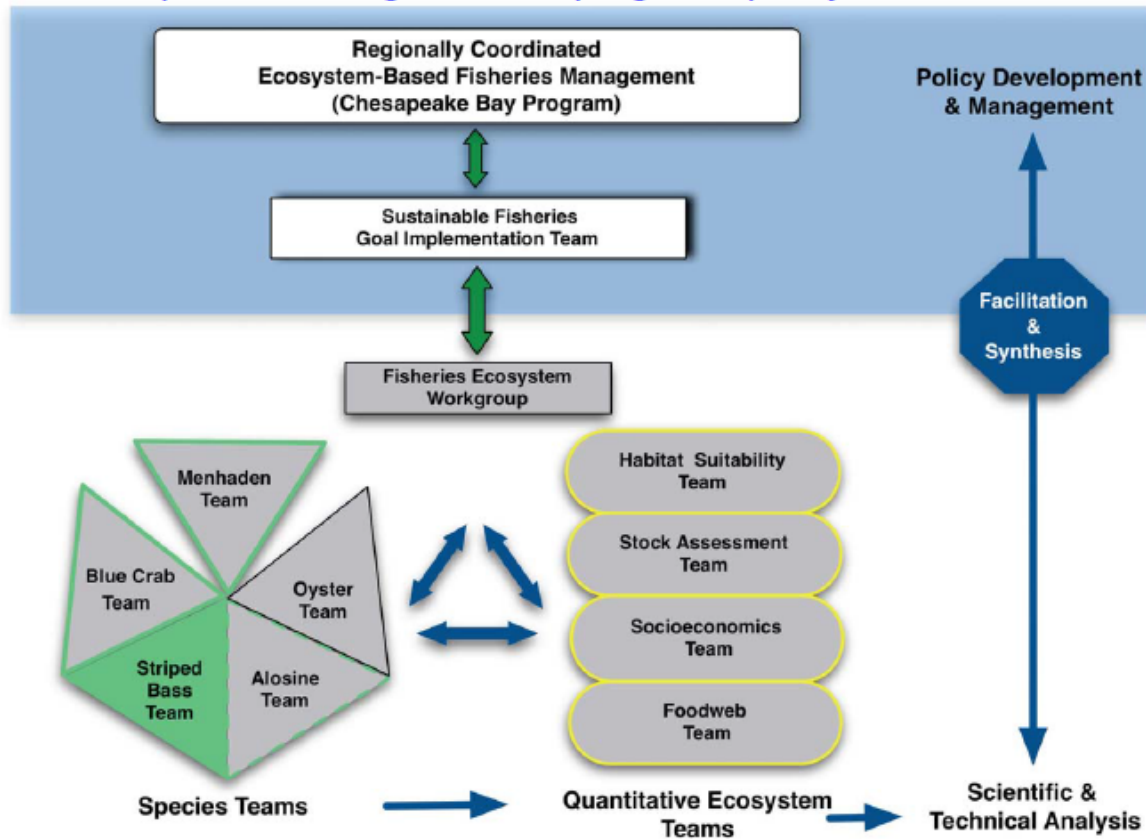
**MONITORING**  
- observers  
- surveys  
- reporting

**ASSESSMENT**  
- estimation  
- classification  
- RBC

# Chesapeake Bay

## Maryland Sea Grant Ecosystem-Based Fisheries Management Planning

<http://www.mdsg.umd.edu/programs/policy/ebfm/>



# EBFM Workshop Outcomes

White Paper  
On  
Ecosystem – Based Fishery Management  
For  
New England Fishery  
Management Council

Prepared by  
Scientific and Statistical Committee  
NEFMC

October 2010

O'Boyle, R., S. Cadrin, D. Georgianna, J. Kritzer, M. Sissenwine, M. Fogarty, C. Kellogg, and P. Florelli. 2012. Ecosystem Based Fishery Management for the New England Fishery Management Council. In: C.H. Kruse, H.J. Browman, K.L. Cochrane, D. Evans, G.S. Jamieson, J.A. Livingston, D. Woodby, and C.J. Zhang (eds.), Global Progress in Ecosystem-Based Fisheries Management. Alaska Sea Grant, University of Alaska Fairbanks. doi:10.4027/gpebfm.2012.05

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## Ecosystem-Based Fishery Management for the New England Fishery Management Council

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*Beta Scientific Consulting, Bedford, Nova Scotia, Canada*

**S. Cadrin and D. Georgianna**

*University of Massachusetts, School for Marine Science  
and Technology, Fairhaven, Massachusetts, USA*

**J. Kritzer**

*Environmental Defense Fund, Boston, Massachusetts, USA*

**M. Sissenwine**

*Teaticket, Massachusetts, USA*

**M. Fogarty**

*NOAA Fisheries, Woods Hole, Massachusetts, USA*

**C. Kellogg and P. Florelli**

*New England Fishery Management Council,  
Newburyport, Massachusetts, USA*

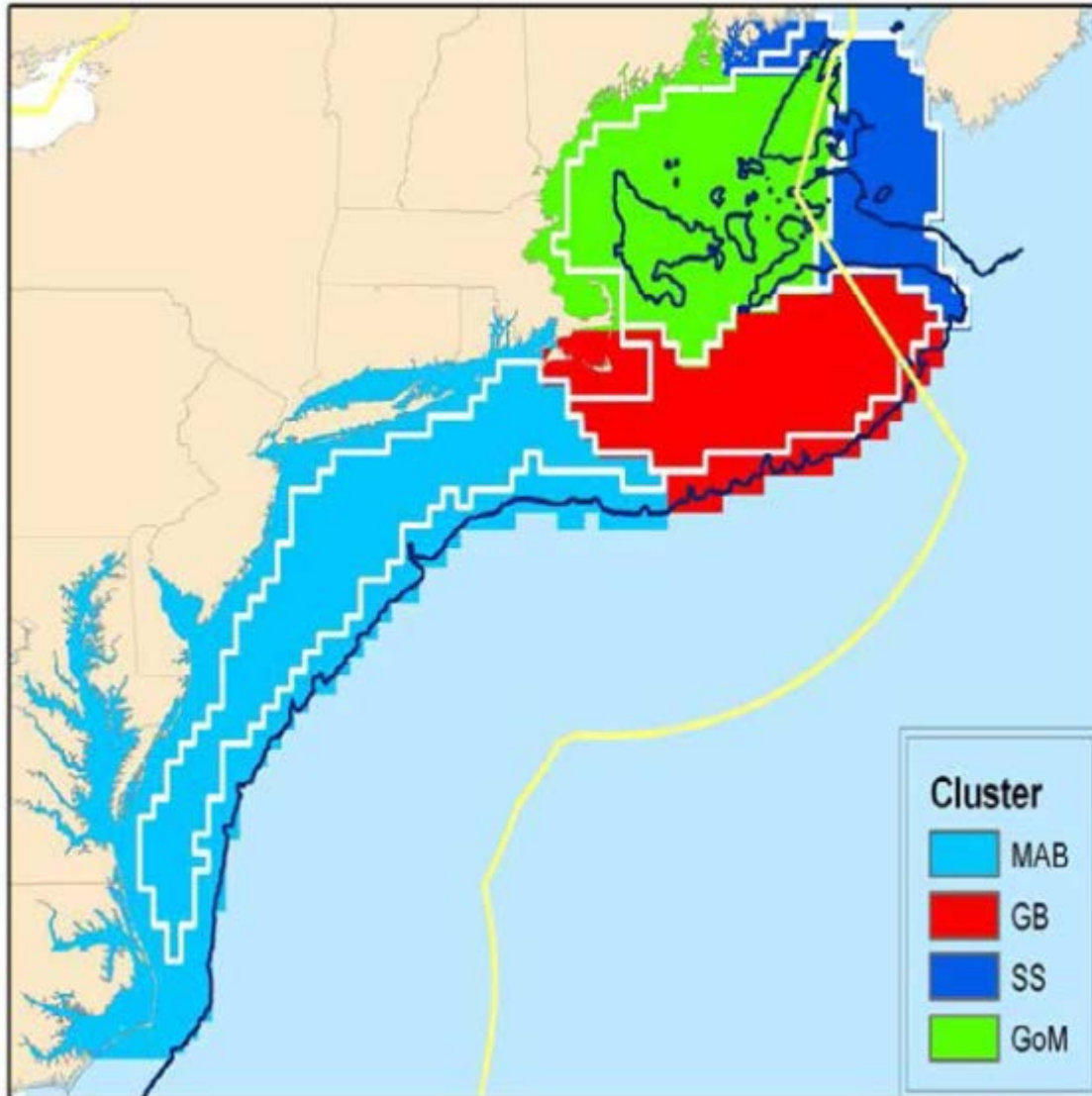
### Abstract

National and international legislation provide impetus for implementation of ecosystem-based fisheries management (EBFM) in the northeast region of the United States. EBFM provides a coherent means to reconcile conflicts among fisheries as well as ultimately simplifying the management system. The Scientific and Statistical Committee of the New England Fishery Management Council has proposed an implementation strategy in the council's mandate area, which is focused on the operational aspects of EBFM. Three approaches are considered. The

# SSC: Focus during transition period

- Defining Ecosystem Production Units (EPU) which will serve as the basis of EBFM management units
- Identifying issues associated with the ecosystem components of each EPU that require attention under EBFM,
- Defining the EBFM objectives to be achieved for each EPU and the risks of not achieving these
- Designing management strategies to achieve the EBFM objectives and the processes to facilitate consensus
- Developing assessment tools required to monitor progress towards EBFM objectives

# Ecosystem Production Units



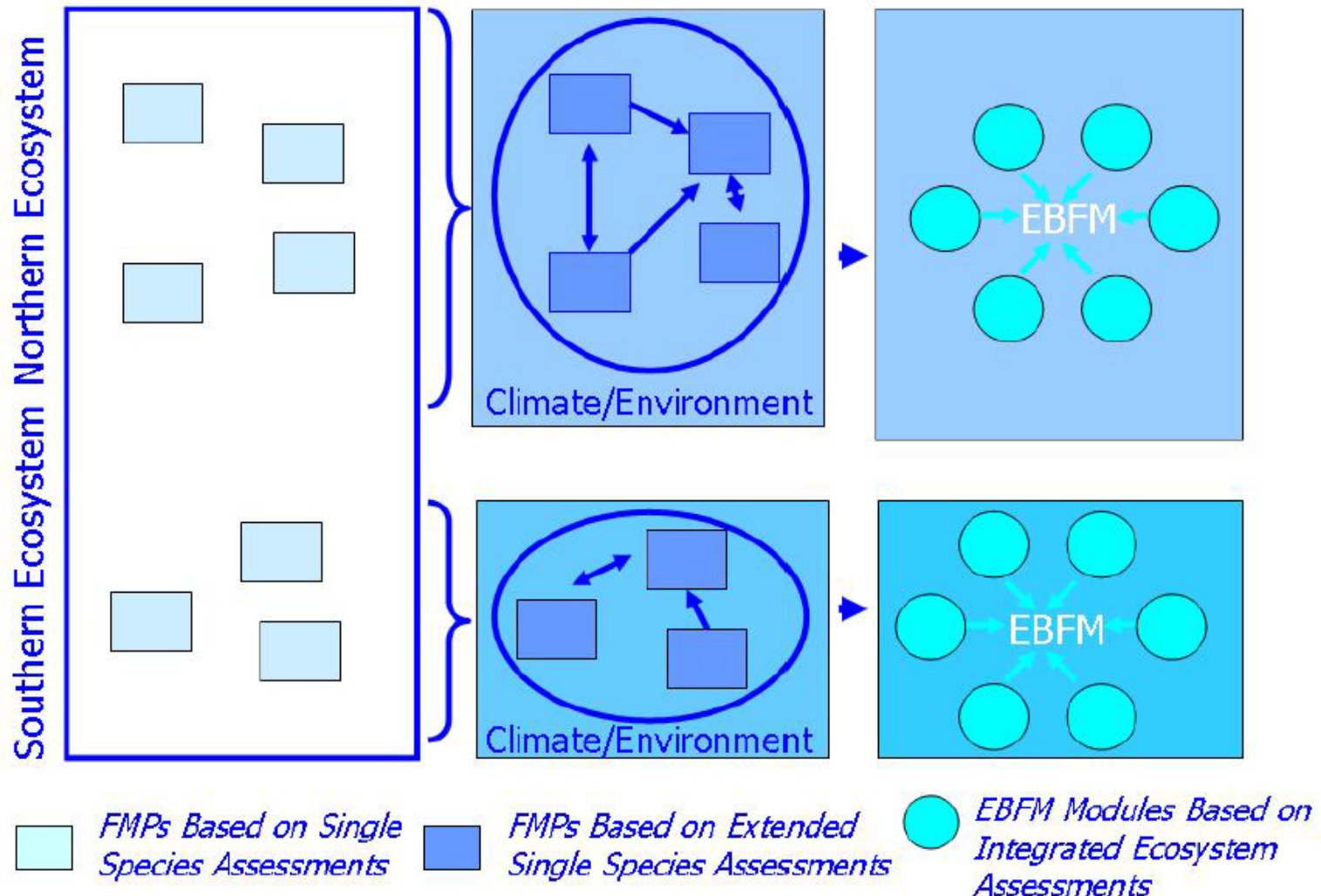
- NEFMC: GB + GOM
- MAFMC: MAB
- ????: EGOM/SS

# Approaches to EBFM

1. Incremental or “evolutionary” → EAM
  - Works within existing FMP structure
  - Adds linkages among FMPs and effects of environmental components on each
  - In progress.
2. Holistic or “revolutionary” → true EBFM
  - Fully integrated FEPs for EPU
  - Adopts integrated analytical framework based on new tools, etc. Integrated ecosystem assessments
3. Blended:
  - Planning approach of #1, but uses analytical tools of #2 to set ecosystem-level goals and constraints

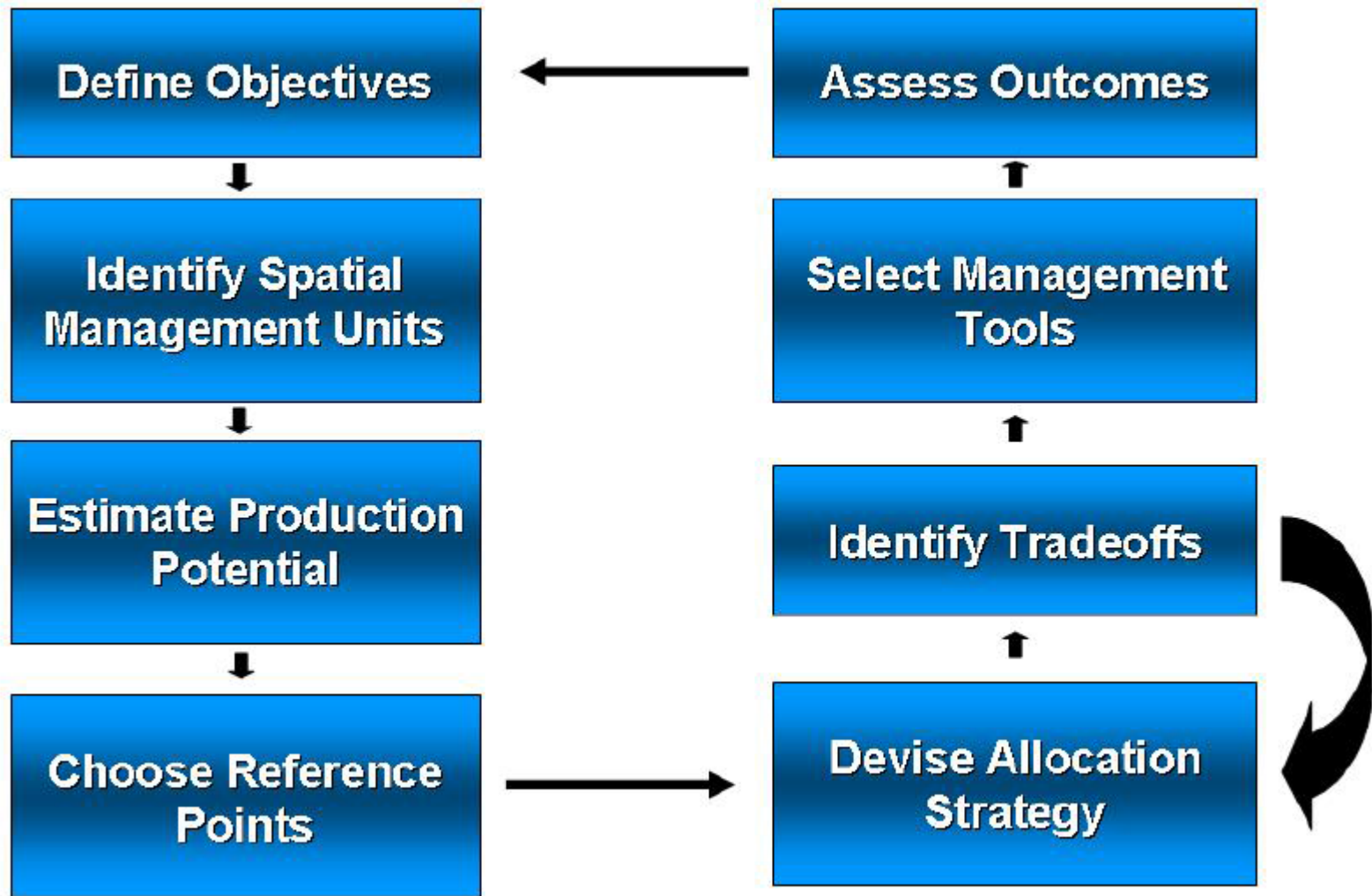
# Approaches to EBFM

Current FMP Structure    Transition FMP Structure    Ecosystem-Based FMP





# EBFM Process





Incremental approach is in progress...

# EBFM-ish Issues

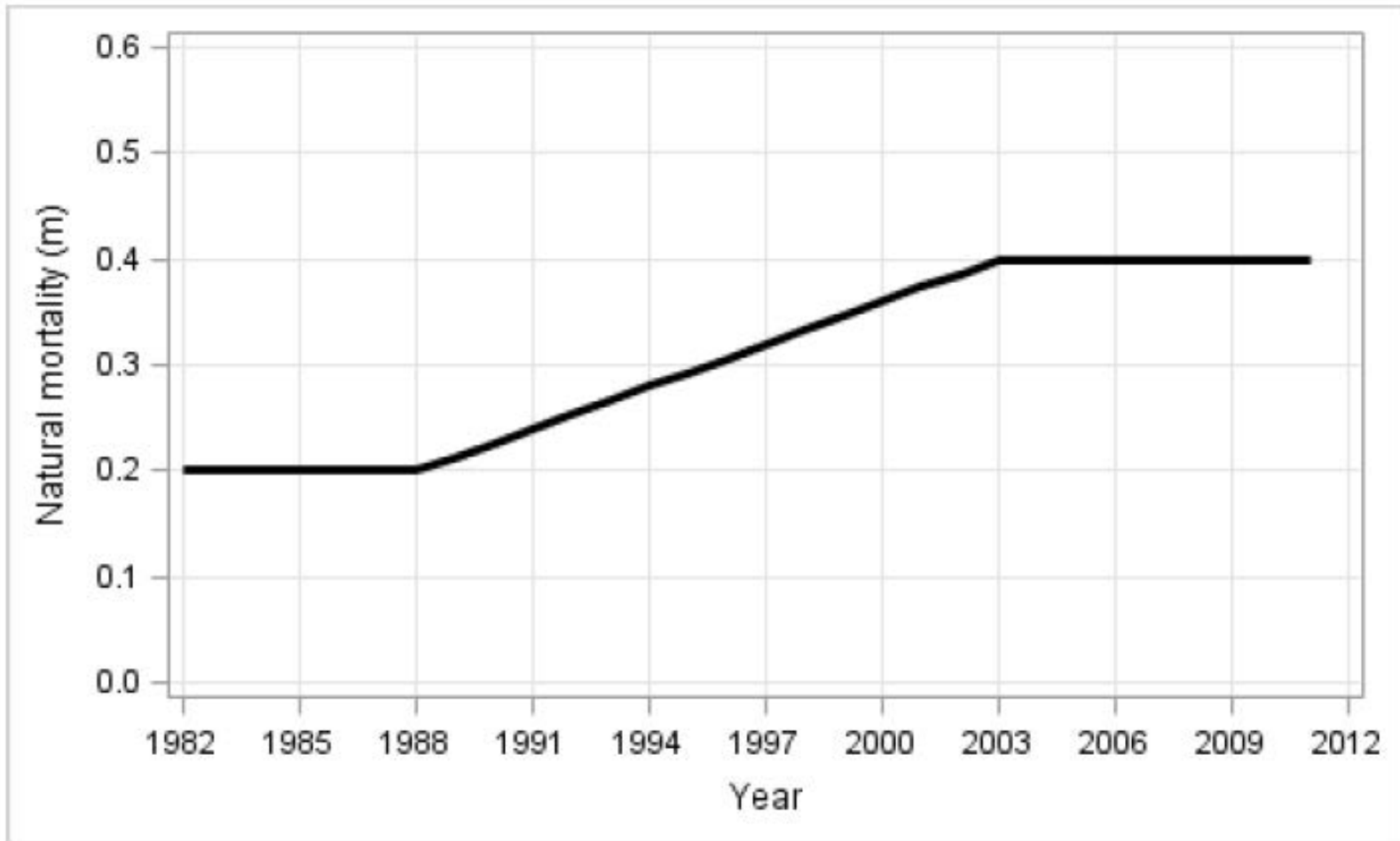
- GARM3: Reduced size-at-age → drivers?



# EBFMish Issues

- GARM3: Reduced size-at-age → drivers?
- GOM Cod & GB YTF: Increases in M and drivers?

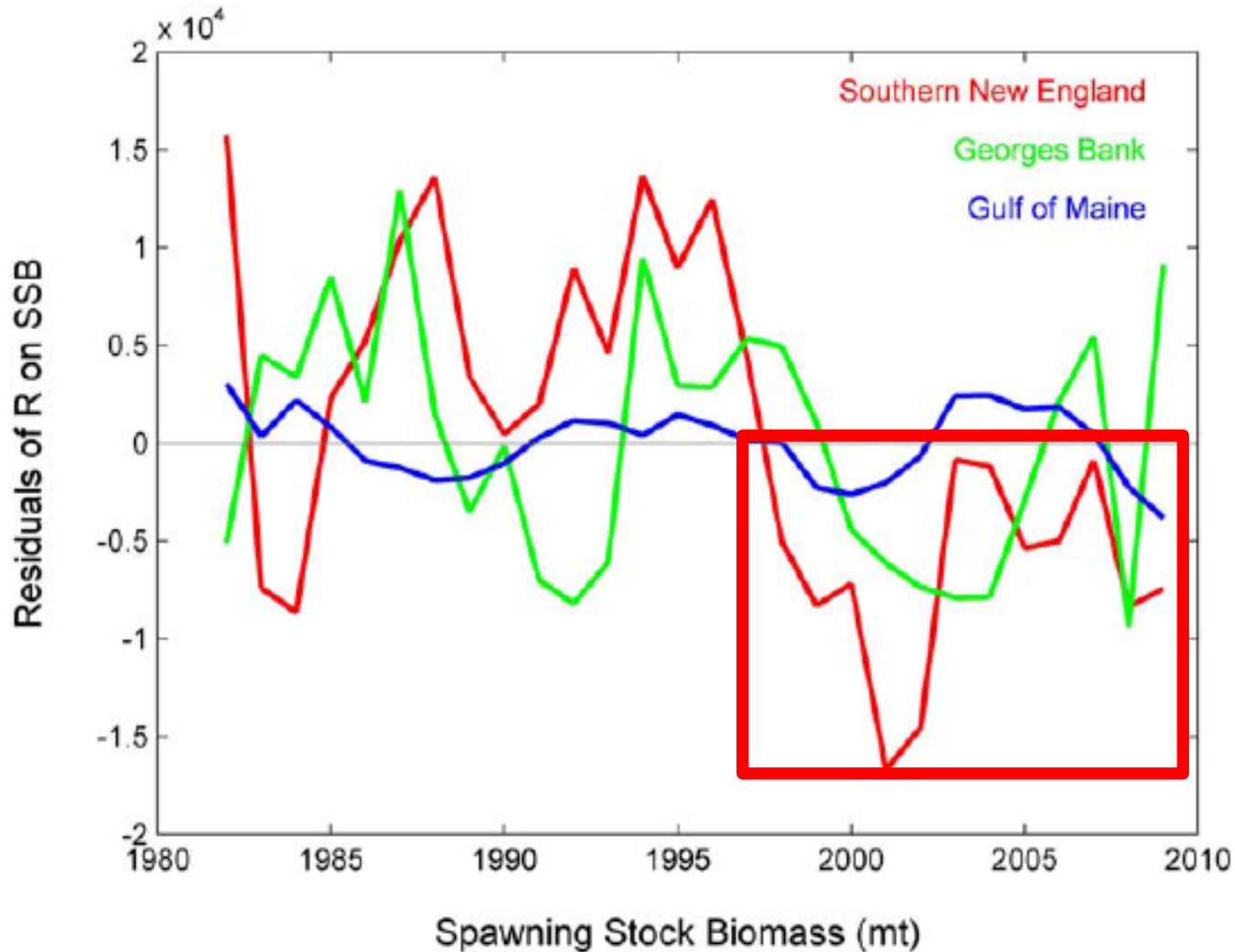
# GOM Cod “ramped” M



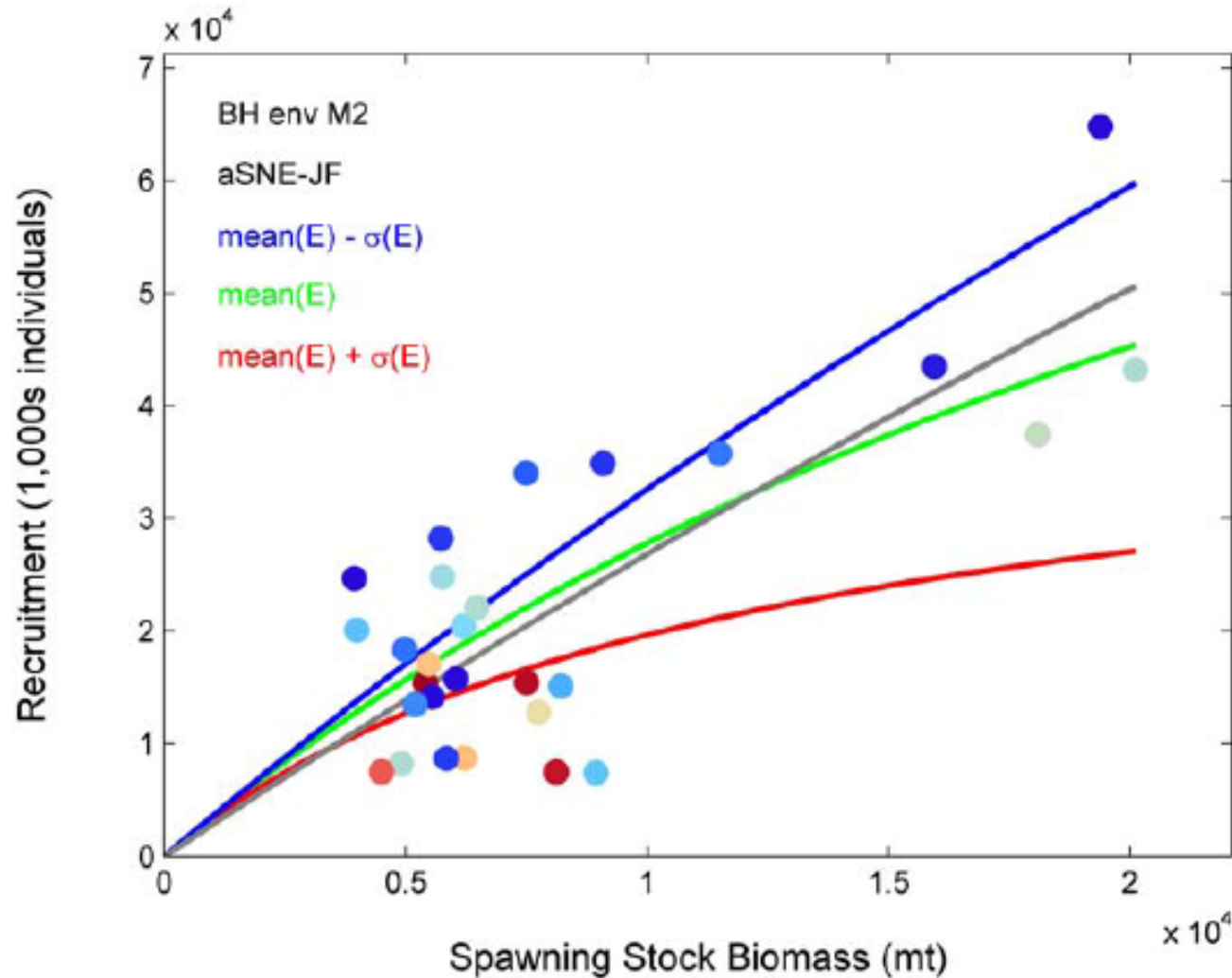
# EBFMish Issues

- GARM3: Reduced size-at-age → drivers?
- GOM Cod & GB YTF: Increases in M and drivers?
- SNE WF: Pattern in recent S-R residuals → temperature effects?

# WF S-R residuals



# Temperature effects on WF S-R?

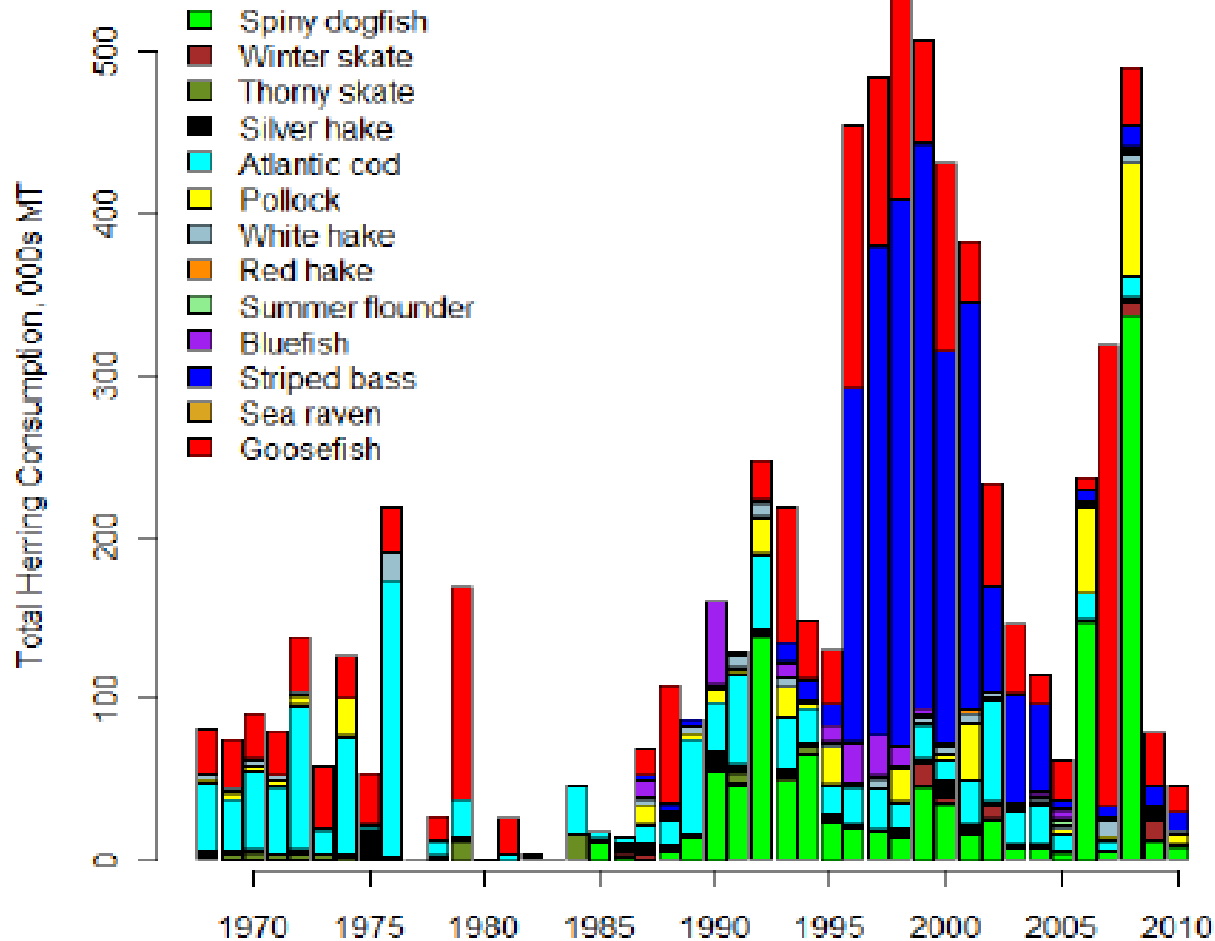




# EBFMish Issues

- GARM3: Reduced size-at-age → drivers?
- GOM Cod & GB YTF: Increases in M and drivers?
- SNE WF: Pattern in recent S-R residuals → temperature effects?
- Herring: Specification of M based on consumption.

# Consumption of herring



# EBFMish Issues

- GARM3: Reduced size-at-age → drivers?
- GOM Cod & GB YTF: Increases in M and drivers?
- SNE WF: Pattern in recent S-R residuals → temperature effects?
- Herring: Specification of M based on consumption.
- Whiting: Socio-ecological implications of large increase in ACL?

# Changes in whiting ACL

<b>Silver Hake NORTH</b>			<b>ABC - Percentage of Current Catch</b>			
Percentile OFL	ABC (000 mt)	Risk F > FMSY	2010	3yr Avg Catch	5 yr Avg Catch	10 yr Avg. Catch
1	3.18	0%	128%	212%	221%	175%
5	5.36	0%	216%	358%	372%	295%
10	7.43	0%	300%	496%	516%	408%
25 (M2)	13.18	0%	532%	878%	915%	724%
OFL	24.88	50%	1004%	1659%	1728%	1367%
<b>Silver Hake SOUTH</b>			<b>ABC - Percentage of Current Catch</b>			
Percentile OFL	ABC (000 mt)	Risk F > FMSY	2010	3yr Avg Catch	5 yr Avg Catch	10 yr Avg. Catch
1	7.57	0%	106%	107%	122%	111%
5	13.07	0%	184%	185%	210%	191%
10	18.29	0%	257%	259%	294%	267%
25 (M2)	32.64	0%	459%	463%	525%	476%
OFL	62.30	50%	876%	884%	1002%	910%

# Summary

- SSC is ready (and eager) to assist Council in transition to EBFM.
- Considered wide variety of case studies and stakeholder input (workshop) to develop recommendations.
- Define EPU's for EBFM planning purposes.
- Transition to incremental (in progress), then blended, then holistic approach.
- Incremental already underway to some extent.
- Caveat: Five years since workshop and four years since white paper, with some membership turnover and many more lessons learned → SSC discussion of recommendations probably warranted.

**THANKS! QUESTIONS?**