SAW/SARC-53 Summary

(NEFSC CRD#12-03)

Presentation: Feb. 2012

SAW/SARC Process

1. SAW Working Groups (WG): NDWG (3 meetings), SDWG

2. External Peer Review Panel: Center of Independent Experts (CIE) + SSC.

- Emphasis on reviewing just the science/assessment.

3. Products: (Reviewer's Reports) + (2 Science Reports)
http://www.nefsc.noaa.gov/nefsc/saw/ (see SAW53)
http://www.nefsc.noaa.gov/publications/ (see Ref. Docs.)

4. Management advice:

- **Some in the SAW/SARC reports to support SSC in making ABC recommendation.**
- **Developed by Tech. Committees, PDTs, SSC.**

The 53rd Northeast Regional Stock Assessment Review Committee (53rd SARC)

Stephen H. Clark Conference Room – Northeast Fisheries Science Center
Woods Hole, Massachusetts
Nov. 29 – Dec. 2, 2011

SARC Chairman:
Dr. Thomas Miller
(U. Md. Univ., CBL; MAFMC SSC)

SARC Panelists:
Dr. Ewen Bell
(CEFAS, UK; CIE)

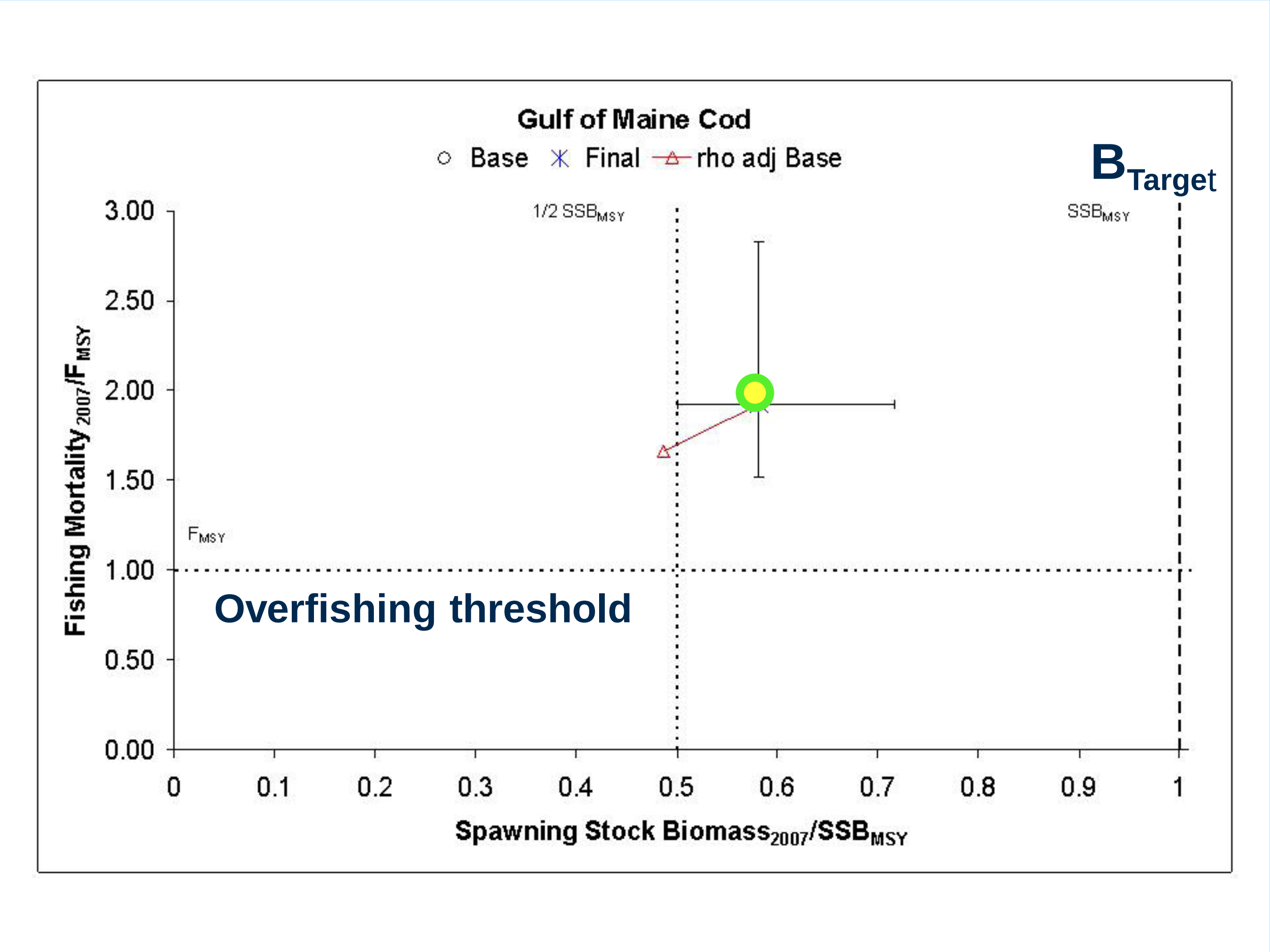
Dr. Kenneth Patterson
(Eur. Comm., Brussels, Belgium; CIE)

Dr. Kurtis Trzcinski
(Fisheries & Oceans Canada; CIE)

A. GOM cod
B. Black sea bass

(A.) Gulf of Maine cod

Results from __Previous__ Assessment (GARM-III in 2008)



1. Overfishing occurring

2. Stock in a rebuilding plan; at 58% of B target

3. Indications of a large recruitment coming in. If realized, projected to rebuild the stock.

GOM cod

Assessment TORs for 2011 (1)

1. Estimate catch from all sources including landings and discards. Characterize the uncertainty in these sources of data. Evaluate available information on discard mortality and, if appropriate, update mortality rates applied to discard components of the catch.

2. Present the survey data being used in the assessment (e.g., indices of abundance, recruitment, state surveys, age-length data, etc.). Investigate the utility of commercial or recreational LPUE as a measure of relative abundance. Characterize the uncertainty and any bias in these sources of data.

3. Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) for the time series, and estimate their uncertainty. Include a historical retrospective analysis to allow a comparison with previous assessment results. Review the performance of historical projections with respect to stock size, catch recruitment and fishing mortality.

4. Perform a sensitivity analysis which examines the impact of allocation of catch to stock areas on model performance (TOR-3).

5. If time permits, consider the small-scale distribution of cod (e.g., spawning sites, resource distribution, fishing effort) in the Gulf of Maine and advise on its management implications.

6. State the existing stock status definitions for “overfished” and “overfishing”. Then update or redefine biological reference points (BRPs; point estimates or proxies for B_{MSY}, $B_{THRESHOLD}$, F_{MSY}, and MSY) and provide estimates of their uncertainty. If analytic model-based estimates are unavailable, consider recommending alternative measurable proxies for BRPs. Comment on the appropriateness of existing BRPs and the “new” (i.e., updated, redefined, or alternative) BRPs.

GOM cod — Assessment TORs (2)

7. Evaluate stock status with respect to the existing model (from the most recent accepted peer reviewed assessment) and with respect to a new model developed for this peer review. In both cases, evaluate whether the stock is rebuilt.

a. When working with the existing model, update it with new data and evaluate stock status (overfished and overfishing) with respect to the existing BRP estimates.

b. Then use the newly proposed model and evaluate stock status with respect to "new" BRPs (from Cod TOR-6).

8. Develop and apply analytical approaches to conduct single and multi-year stock projections to compute the pdf (probability density function) of the OFL (overfishing level) and candidate ABCs (Acceptable Biological Catch; see Appendix to the SAW TORs).

a. Provide numerical annual projections (3-5 years). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and probabilities of falling below threshold BRPs for biomass. Use a sensitivity analysis approach in which a range of assumptions about the most important uncertainties in the assessment are considered (e.g., terminal year abundance, variability in recruitment).

b. Comment on which projections seem most realistic. Consider the major uncertainties in the assessment as well as sensitivity of the projections to various assumptions.

c. Describe this stock's vulnerability (see "Appendix to the SAW TORs") to becoming overfished, and how this could affect the choice of ABC.

9. Review, evaluate and report on the status of the SARC and Working Group research recommendations listed in recent SARC reviewed assessments and review panel reports. Identify new research recommendations.

GOM cod	SARC53 2011 Panel Findings (1)

- **Panel unanimously recommends that the results of the Gulf of Maine cod assessment be used for management of this stock.**
- **All assessment Terms of Reference were fully met.**
- **Both catch and survey data have been fully and adequately summarized.**
- **The assessment model (ASAP) was appropriately applied. Model outputs represent the best scientific estimates available.**
- **The 2005 cod year class in the Gulf of Maine was less strong than suggested by analyses conducted in 2008.**
- **The Panel recommended the continued use of $F_{40\%}$ as the basis for biological reference point proxies. (Status not changed by this.)**
- **Gulf of Maine cod stock is overfished and experiencing overfishing.**

GOM cod | SARC53 2011 Panel Findings (2)

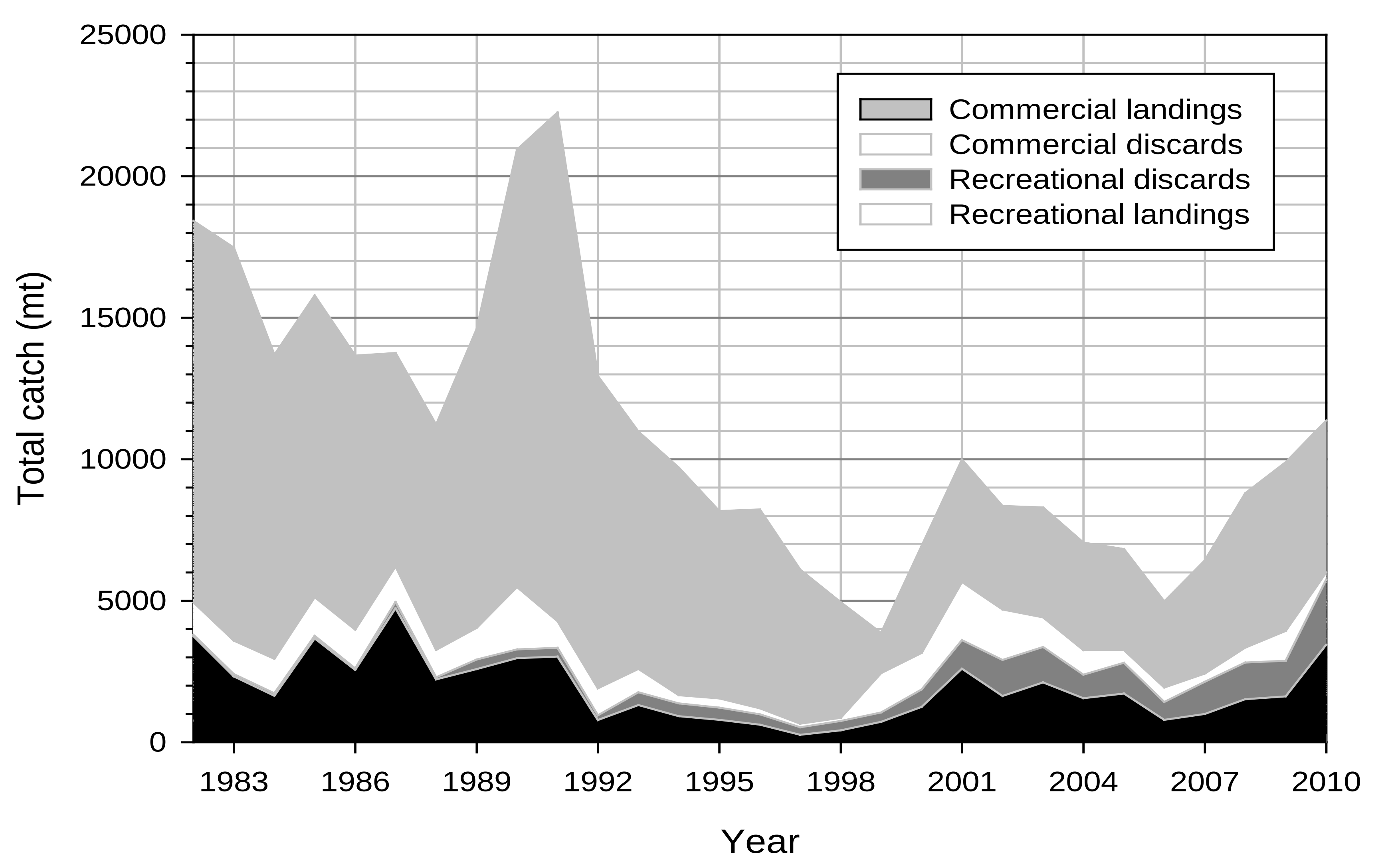
- **Projections indicate the stock will not be rebuilt by 2014.**

- **Perception of stock biomass has changed markedly. Lower biomass estimate now. A result of changes in weights at age (resulting from inclusion of complete discard data) and reductions in estimated 2005 year class strength (resulting from observations of this year class recruiting to surveys and the fishery). These changes are well documented and appropriate.**

- **Retrospective pattern in model fit is source of uncertainty in stock size and projection estimates.**

- **Stock appears more aggregated in the western part of the Gulf of Maine in recent years. In this situation, commercial catches per unit effort could be maintained even with declining overall stock size.**

Total Catch of GOM cod (1982-2010)



Fall Surveys

Spring Surveys

Over time, stock has become more spatially concentrated.

A

B

C

1963-70

1971-80

1981-90

D

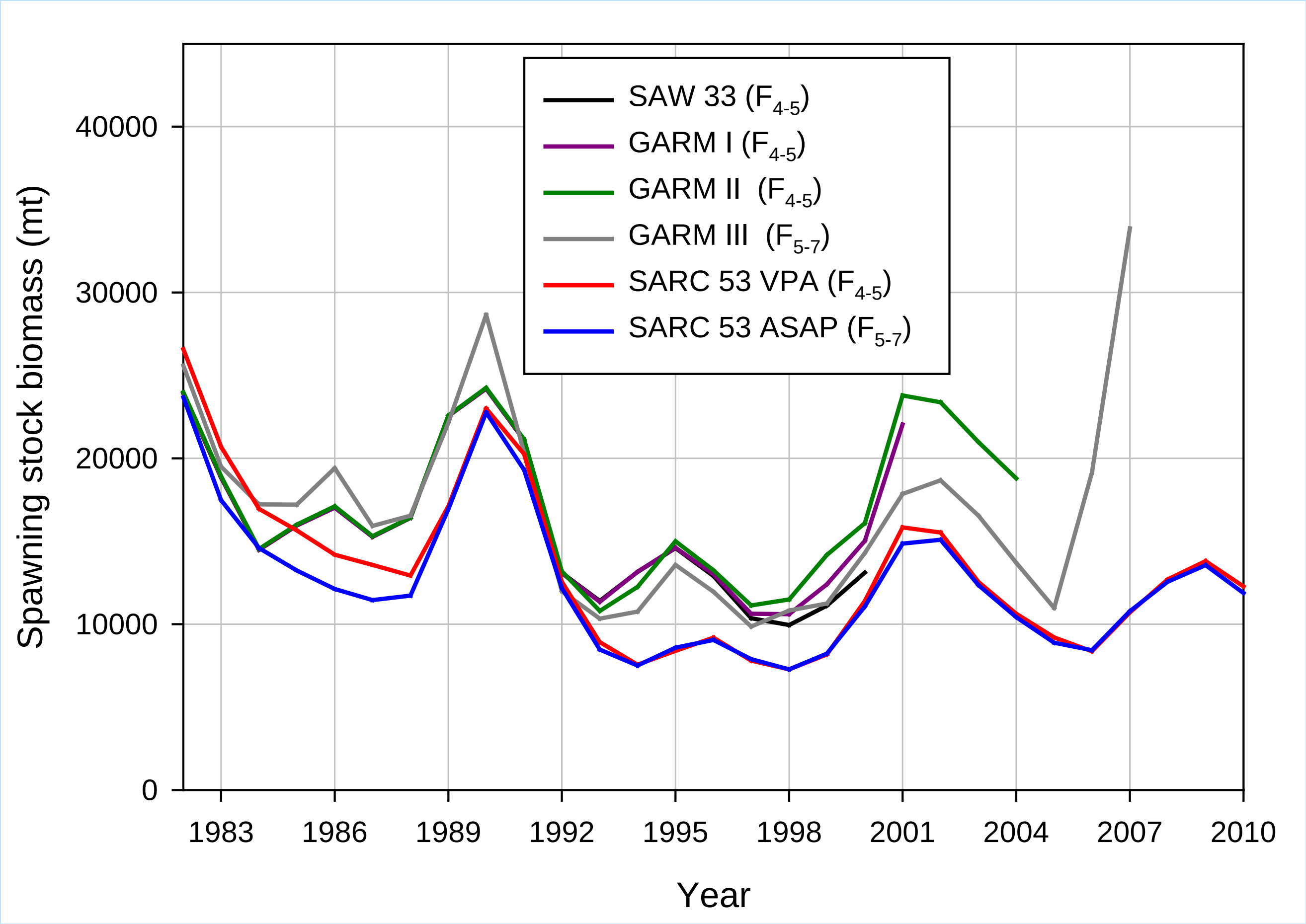
E

1991-2000

2001-2010

NEFSC Fall Survey (#/tow). Spatial distribution.

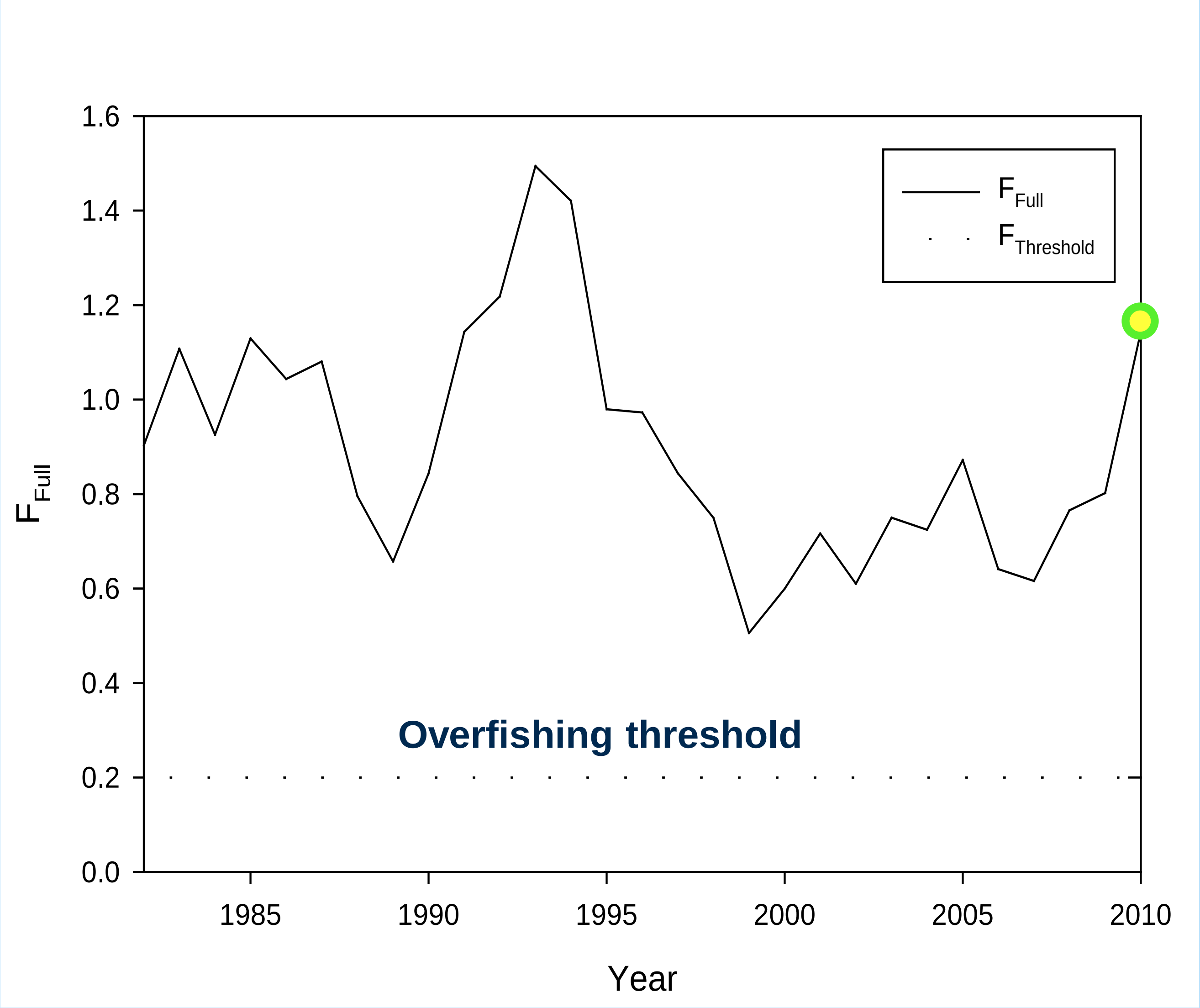
Comparison w/ Previous GOM cod Assessments



1. **Previous assessments overestimated SSB (relative to most recent assessment).**

2. **2011 Assessment: VPA and ASAP models, similar results.**

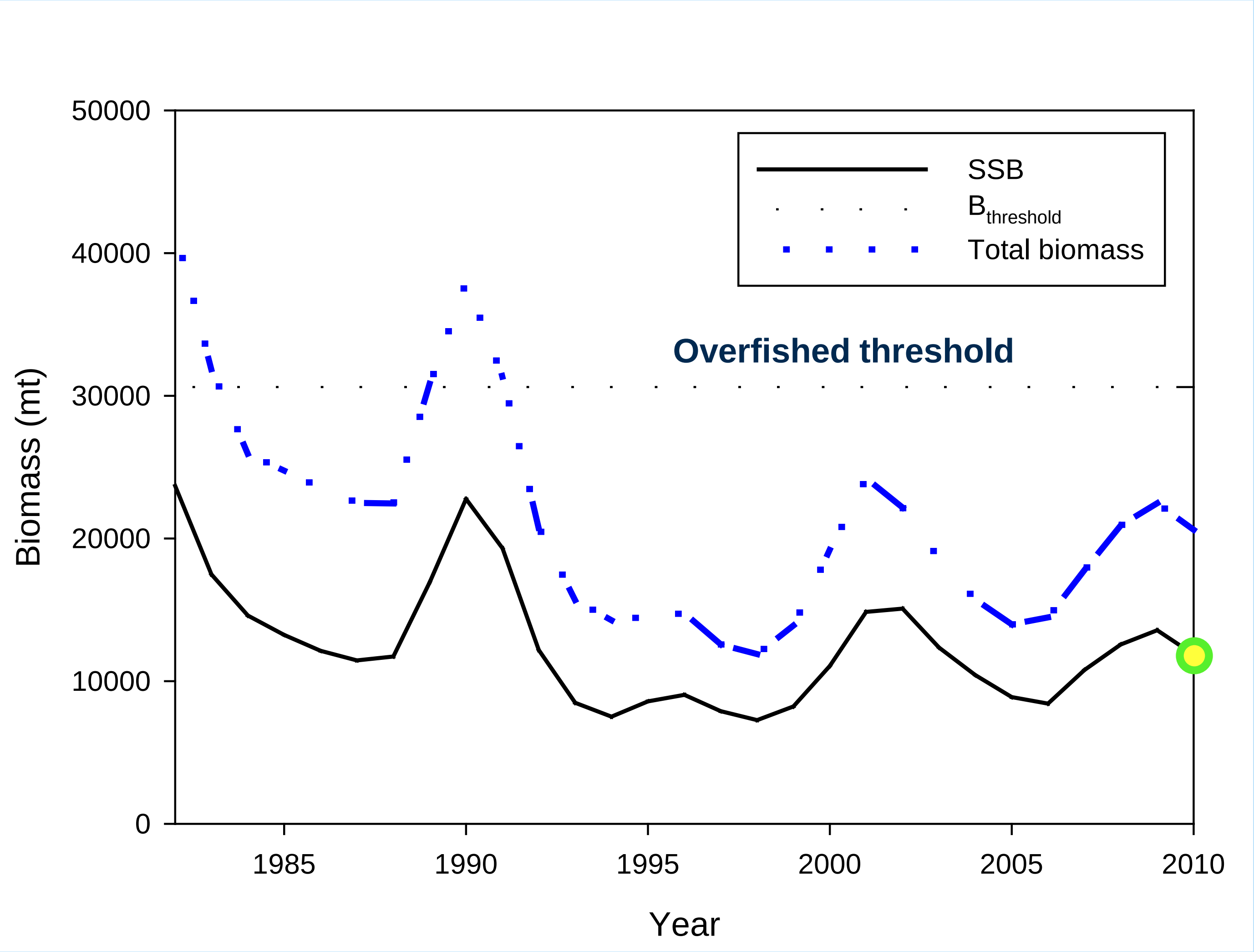
GOM cod (2011 Assessment Results, SARC53)



Overfishing since 1982.

Fishing mortality over time, and associated overfishing level, $F_{Threshold}$.

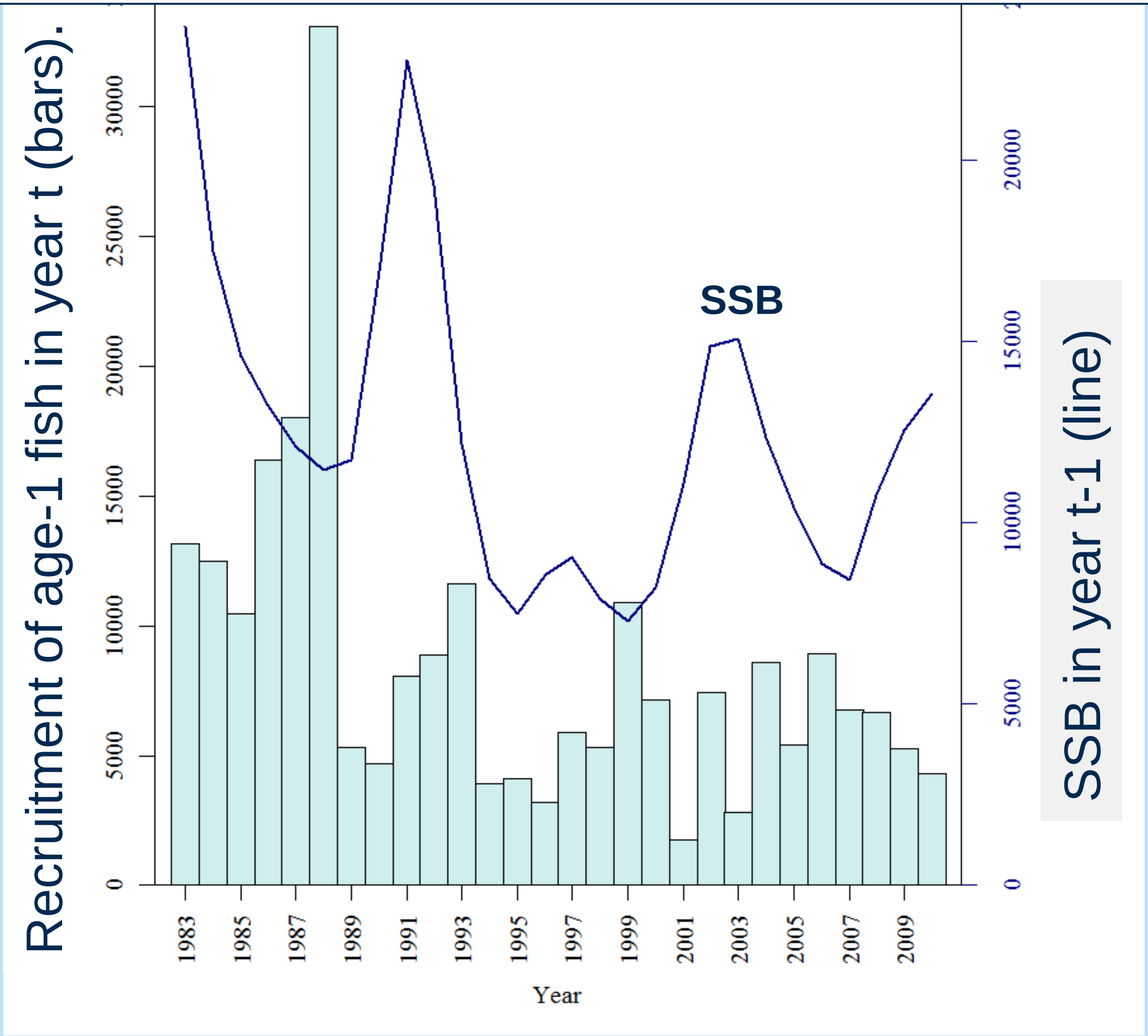
GOM cod (2011 Assessment Results, SARC53)



Overfished since 1982.

Total biomass and spawning stock biomass (SSB) over time and $SSB_{threshold}$.

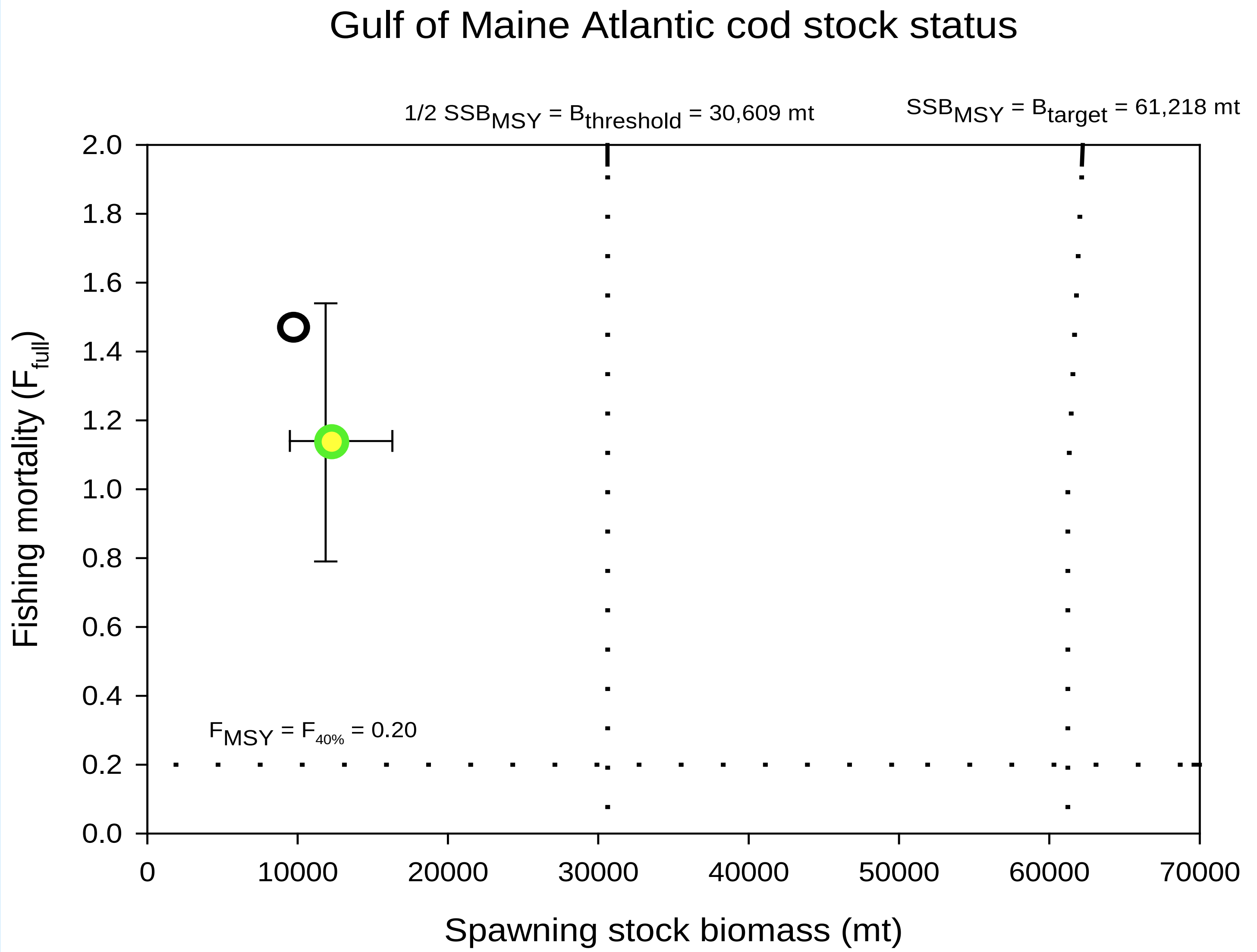
GOM cod (2011 Assessment Results, SARC53)



The 5 highest recruitments (bars)occurred before 1990.

SSB target

Gulf of Maine cod: SSB Projection at F=0.



1. **Overfishing in 2010 (F = 1.14)**
2. **Overfished in 2010 (at 19% of SSB target)**
3. **Chance of rebuilding by 2014 is <1% (even with F=0)**

GOM cod	SARC Panel Recommendations

- **Increase inspection and analysis of survey data prior to inclusion of these data in the model.**
- **Implement methods that do not rely on the survey vessel conversion factors as soon as the length of the Bigelow time series permits.**
- **Model diagnostics reviewed at the meeting were adequate. The Panel recommended that these diagnostics be included routinely in assessments.**
- **Assess potential causes and consequences of the observed aggregation.**
- **There is no compelling reason to abandon $F_{40\%}$ as the overfishing BRP proxy.**
- **Stock projections should be re-calculated to reduce recruitments at low stock sizes (completed).**
- **The Panel recommends that efforts be undertaken to re-assess the stock definition for Gulf of Maine cod.**

(B.) Black sea bass

Black sea bass — Assessment TORs (1)

1. Estimate catch from all sources including landings and discards. Characterize the uncertainty in these sources of data. Evaluate available information on discard mortality and, if appropriate, update mortality rates applied to discard components of the catch. Describe the spatial and temporal distribution of fishing effort.

2. Present the survey data being used in the assessment (e.g., indices of abundance, recruitment, state surveys, age-length data, etc.). Investigate the utility of commercial or recreational LPUE as a measure of relative abundance. Characterize the uncertainty and any bias in these sources of data.

3. Consider known aspects of seasonal migration and availability of black sea bass, and investigate ways to incorporate these into the stock assessment. Based on the known aspects, evaluate whether more than one management unit should be used for black sea bass from Cape Hatteras north and, if so, propose unit delineations that could be considered by the Mid-Atlantic Fishery Management Council and for use in future stock assessments.

4. Investigate estimates of natural mortality rate, M, and if possible incorporate the results into TOR-5. Consider including sex- and age-specific rate estimates, if they can be supported by the data.

5. Estimate annual fishing mortality, recruitment and appropriate measures of stock biomass (both total and spawning stock) for the time series (integrating results from TOR-4), and estimate their uncertainty. Include a historical retrospective analysis to allow a comparison with most recent assessment results.

6. State the existing stock status definitions for "overfished" and "overfishing". Then update or redefine biological reference points (BRPs; point estimates or proxies for B_{MSY}, $B_{THRESHOLD}$, F_{MSY}, and MSY) and provide estimates of their uncertainty. If analytic model-based estimates are unavailable, consider recommending alternative measurable proxies for BRPs. Comment on the appropriateness of existing BRPs and the "new" (i.e., updated, redefined, or alternative) BRPs.

Black sea bass — Assessment TORs (2)

6. State the existing stock status definitions for "overfished" and "overfishing". Then update or redefine biological reference points (BRPs; point estimates or proxies for B_{MSY}, $B_{THRESHOLD}$, F_{MSY}, and MSY) and provide estimates of their uncertainty. If analytic model-based estimates are unavailable, consider recommending alternative measurable proxies for BRPs. Comment on the appropriateness of existing BRPs and the "new" (i.e., updated, redefined, or alternative) BRPs.

7. Evaluate stock status with respect to the existing model (from the most recent accepted peer reviewed assessment) and with respect to a new model developed for this peer review.

a. When working with the existing model, update it with new data and evaluate stock status (overfished and overfishing) with respect to the existing BRP estimates.

b. Then use the newly proposed model and evaluate stock status with respect to "new" BRPs (from black sea bass TOR 6).

8. Develop and apply analytical approaches to conduct single and multi-year stock projections to compute the pdf (probability density function) of the OFL (overfishing level) and candidate ABCs (Acceptable Biological Catch; see Appendix to the SAW TORs).

a. Provide numerical annual projections (3-5 years). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and probabilities of falling below threshold BRPs for biomass. Use a sensitivity analysis approach in which a range of assumptions about the most important uncertainties in the assessment are considered (e.g., terminal year abundance, variability in recruitment, and definition of BRPs for black sea bass).

b. Comment on which projections seem most realistic. Consider major uncertainties in the assessment as well as the sensitivity of the projections to various assumptions.

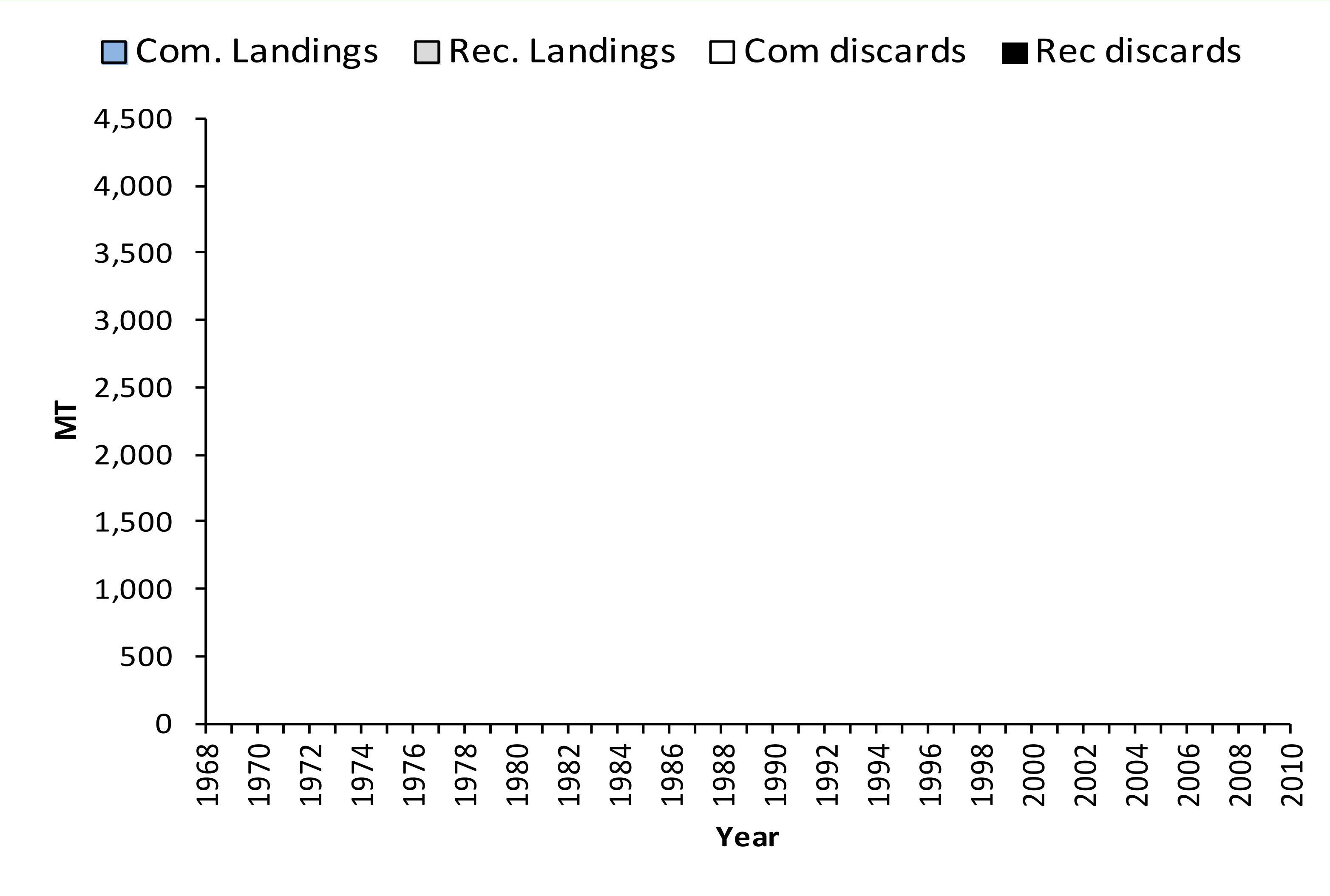
c. Describe this stock's vulnerability (see "Appendix to the SAW TORs") to becoming overfished, and how this could affect the choice of ABC.

9. Review, evaluate and report on the status of the SARC and Working Group research recommendations listed in recent SARC reviewed assessments and review panel reports. Identify new research recommendations.

Black sea bass	SARC53 Panel Findings

- **The effort to complete a revised and age-structured assessment was both important and constructive.**
- **Panel unanimously rejected the assessment for black sea bass as a basis for management of this species.**
- **substantial concerns over the potential for spatial structure and incomplete mixing within the stock area that compromised the ability of the forward projecting catch at age model to index abundance and fishing mortality reliably based on the data available.**
- **Based on the biological reference points and assessment as approved at the Data Poor Species Workshop in 2007, black sea bass is not overfished and overfishing is not occurring in 2010 (based on results in 2011 assessment updates).**
- **Consider alternative methods for assessing black sea bass stock status, perhaps continuing with age-based methods, although achieving a new framework should not be expected in the short term.**

Black sea bass: Catch (1968-present)



Black sea bass

SARC53 Panel Recommendations

- **multiple age-structured models be evaluated for use in a future model (e.g., simple vs complex spatial models including tag returns)**
- **the three models suggested above are a major research task and may require additional data. We do not anticipate that such models could be produced within an operational assessment framework.**
- **a species specific survey, such as a pot survey to provide increased information on abundances and biological characteristics**
- **Continue and expand the tagging program (for aging and resolution of populations)**
- **Continue and expand genetic studies**
- **research on rate, timing and occurrence of sex-change in this species**
- **scale- otolith intercalibration exercise might be of utility**