



Science and Statistical Committee Report

Steve Cadrin, SSC Chair

November 2009

SSC Report

- Background
 - Council motion
 - Magnuson-Stevens Act and National Standard 1 guidelines on Acceptable Biological Catch
 - Recent herring stock assessments
 - Initial ABC recommendation (Sep '09)
- Reconsideration of ABC recommendation



Council Motion

- At its September 2009 Council meeting, NEFMC members approved a motion to request that “*the SSC revisit the size of the 40% buffer between OFL and ABC to consider whether application of recent years retrospective difference of about 17% is sufficient to account for scientific uncertainty caused by retrospective patterns.*”
- The motion **carried** on a show of hands (8/7/1).

Acceptable Biological Catch

- Magnuson-Stevens Act:
 - “Each scientific and statistical committee shall provide its Council ongoing scientific advice for fishery management decisions, including recommendations for acceptable biological catch...”
 - “Each Council shall... develop annual catch limits for each of its managed fisheries that may not exceed the fishing level recommendations of its scientific and statistical committee...”

Acceptable Biological Catch

- National Standard 1 Guidelines
 - “These guidelines describe how to address uncertainty such that there is a low risk that limits are exceeded.”
 - “Acceptable biological catch (ABC) is a level of a stock or stock complex’s annual catch that accounts for the scientific uncertainty in the estimate of OFL and any other scientific uncertainty, and should be specified based on the ABC control rule.”

Acceptable Biological Catch

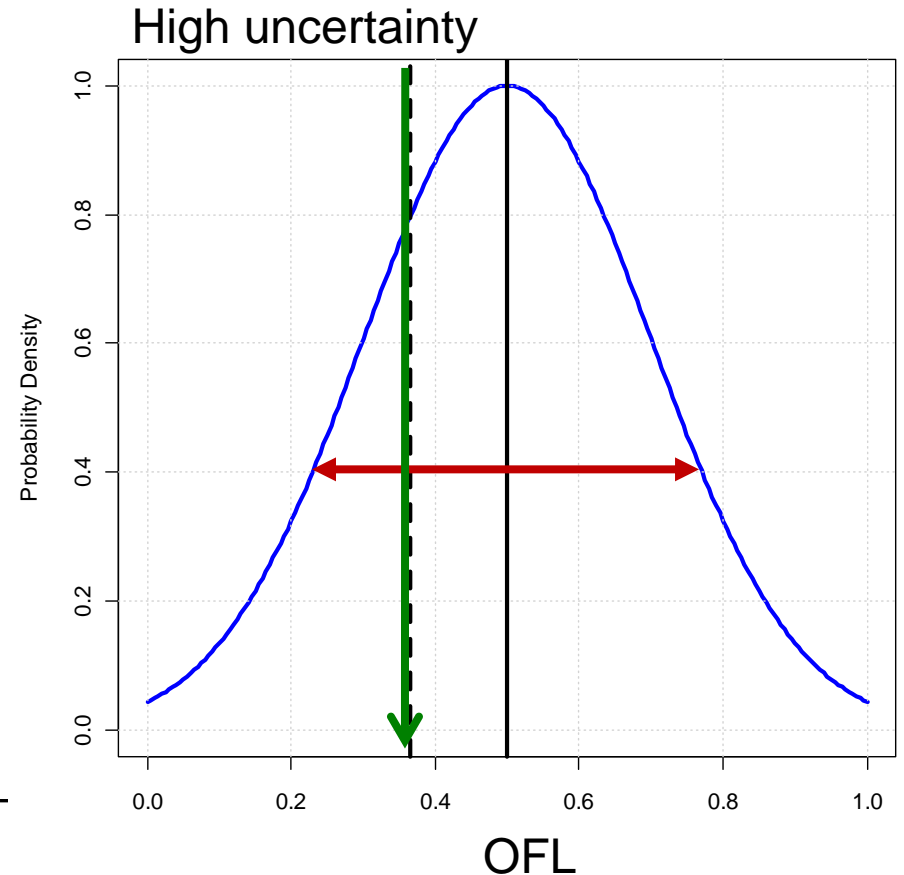
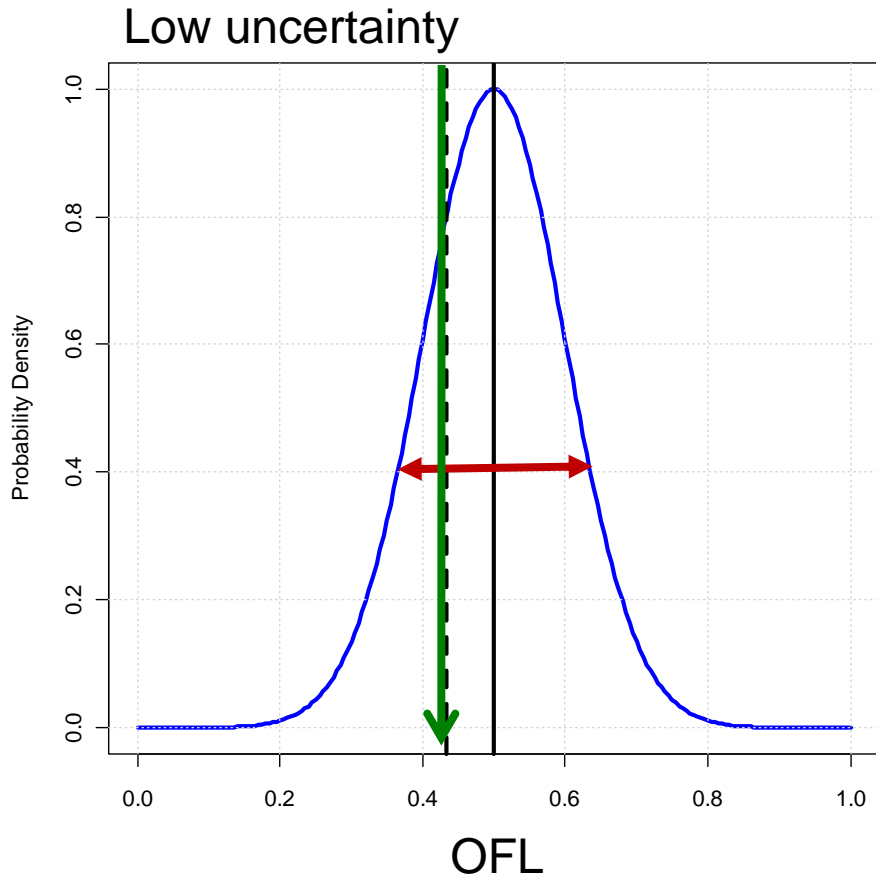
- National Standard 1 Guidelines
 - “ABC control rule means a specified approach to setting the ABC for a stock or stock complex as a function of the scientific uncertainty in the estimate of OFL and any other scientific uncertainty.”
 - “Councils must build into the reference points and control rules appropriate consideration of risk, taking into account uncertainties in estimating harvest, stock conditions, life history parameters, or the effects of environmental factors.”

Acceptable Biological Catch

- The ABC recommendation is derived from an ABC control rule, which has an appropriate consideration of risk, as determined by the Council.
- The SSC should base its ABC recommendation from the ABC control rule.
- The SSC reconsidered its September ABC recommendation, recognizing that there is no accepted ABC control rule for herring, and the Council determines the desired risk tolerance.

Acceptable Biological Catch

- The buffer between OFL and ABC should be based on both **scientific uncertainty** and the Council's desired **risk tolerance**.



Herring Stock Assessments

- Transboundary Resources Assessment Committee
 - TRAC 2003 – (Overholtz et al. 2004)
 - TRAC 2006 – (TRAC 2006 proceedings)
 - TRAC 2009 – (Shepherd et al. 2009)

2003 TRAC

- Two assessments were presented:
 - Virtual Population Analysis (ADAPT)
 - Delay-difference model (KLAMZ)
- The review committee did not reject either assessment.

Northeast Fisheries Science Center Reference Document 04-06

**Stock Assessment of the
Gulf of Maine - Georges Bank
Atlantic Herring Complex, 2003**

by

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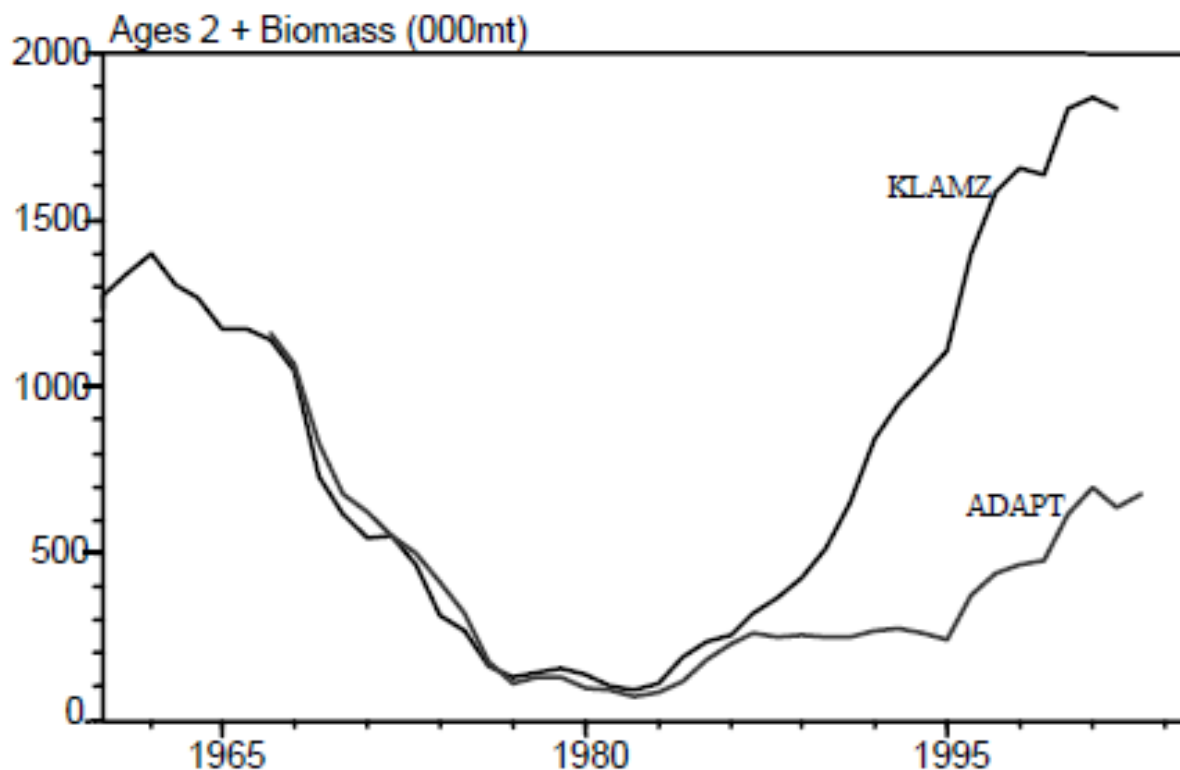
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**U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, Massachusetts**

February 2004

2003 TRAC

- Results from the two models suggest a threefold difference in 2002 biomass and F (0.06 vs. 0.18).
- These differences were not reconciled by the TRAC working group, and future work was suggested.



2006 TRAC 'Benchmark'

- Several alternative models were evaluated.
- A statistical catch-at-age model (ASAP) was accepted as the basis for management.



CERT

Comité d'évaluation des
ressources transfrontalières

Comptes rendus 2006/01

TRAC

Transboundary Resource
Assessment Committee

Proceedings 2006/01

Proceedings of the
Transboundary Resources Assessment Committee (TRAC)

Benchmark Review of Stock Assessment Models for
Gulf of Maine and Georges Bank Herring

2 – 5 May 2006
Woods Hole, Massachusetts

R. O'Boyle¹, and W. Overholtz²
TRAC Co-Chairs

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November 2006

Ce document est disponible sur l'Internet à :
<http://www.mar.dfo-mpo.gc.ca/science/TRAC/trac.html>

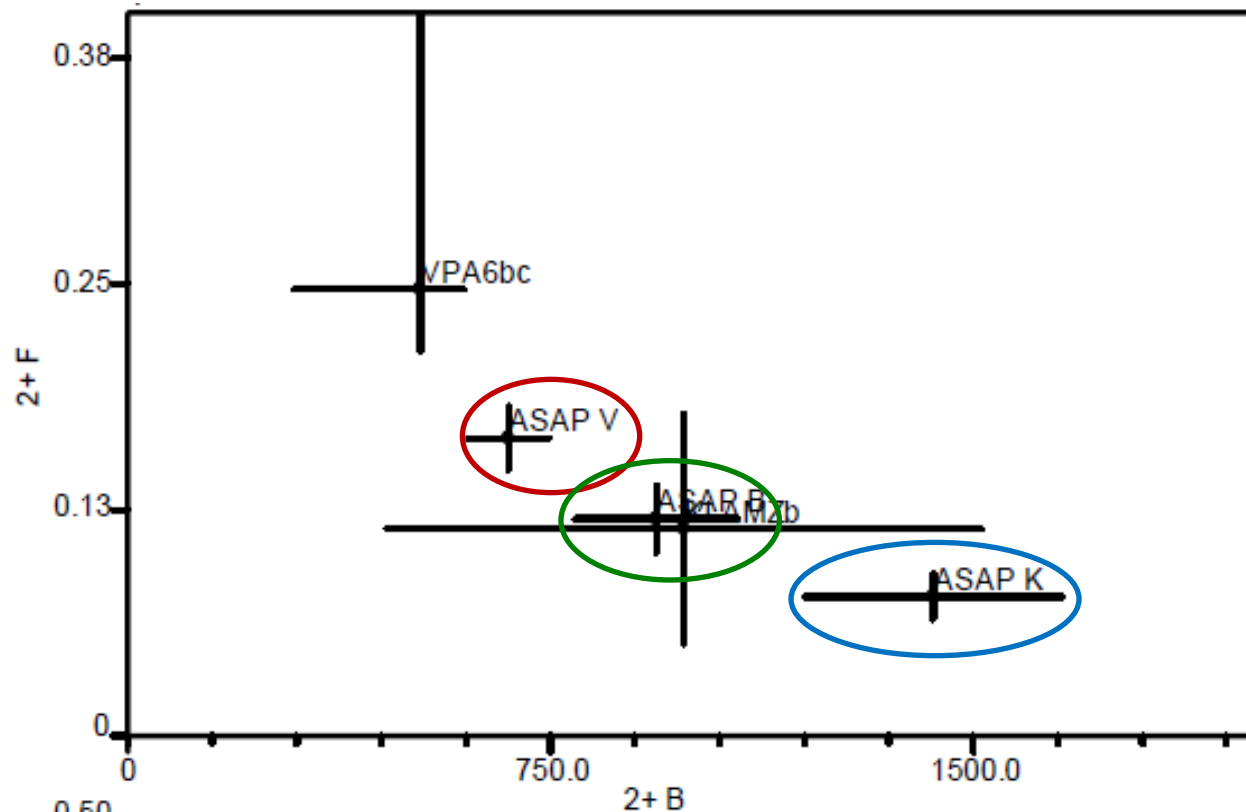
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Canada



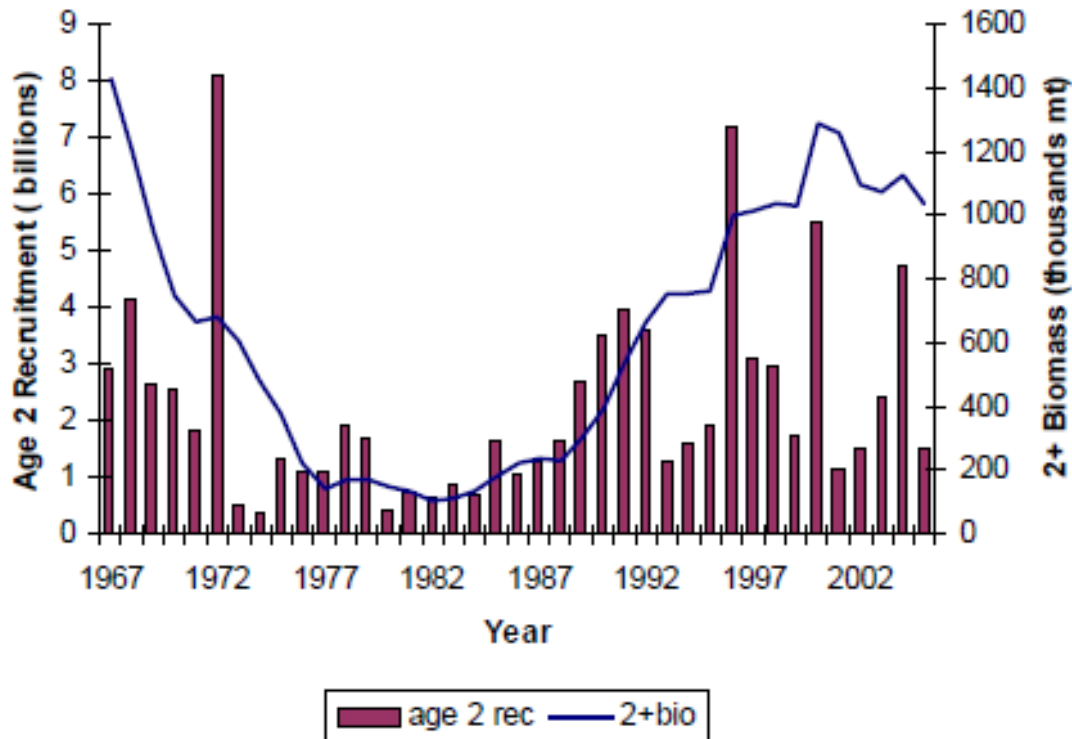
2006 TRAC 'Benchmark'

- The flexible model **reflected ADAPT** if age structure **was emphasized**, or **reflected KLAMZ** if age structure was de-emphasized.



2006 TRAC 'Benchmark'

- The ASAP Base model was chosen as the benchmark formulation, because it showed the least retrospective pattern and was considered to be a compromise among all formulations.

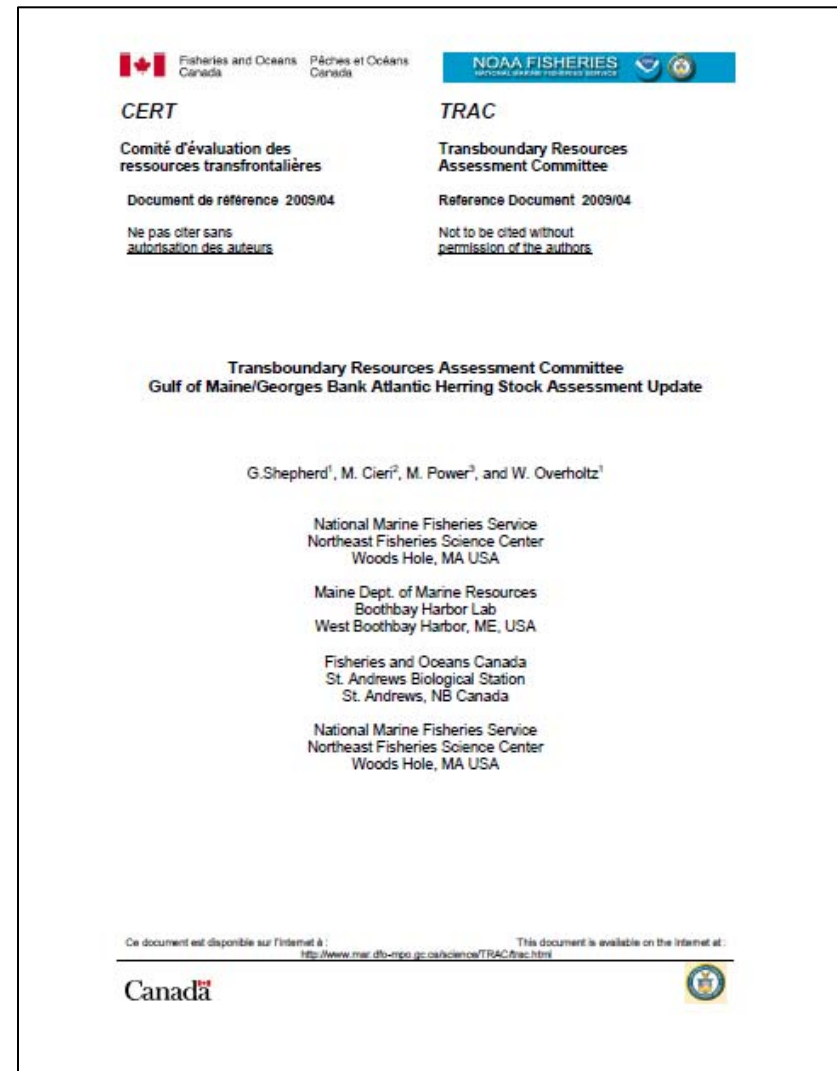


2006 TRAC 'Benchmark'

- *“In drafting harvest advice, it will be important to emphasize that model selection was difficult and that there are considerable uncertainties in the determination of stock status.”*
- *“The Committee discussed three diagnostics that would indicate the need for a formal reevaluation of the current assessment:*
 - *Poor standard model diagnostics*
 - *Sudden change in survey estimates*
 - *Industry not able to catch quota”*

2009 TRAC 'Update'

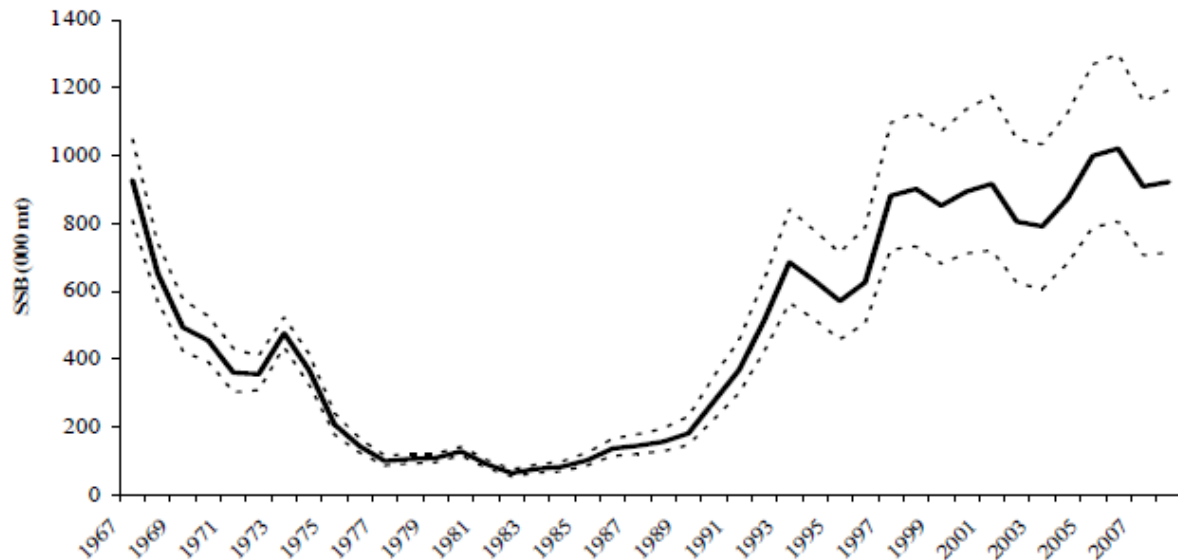
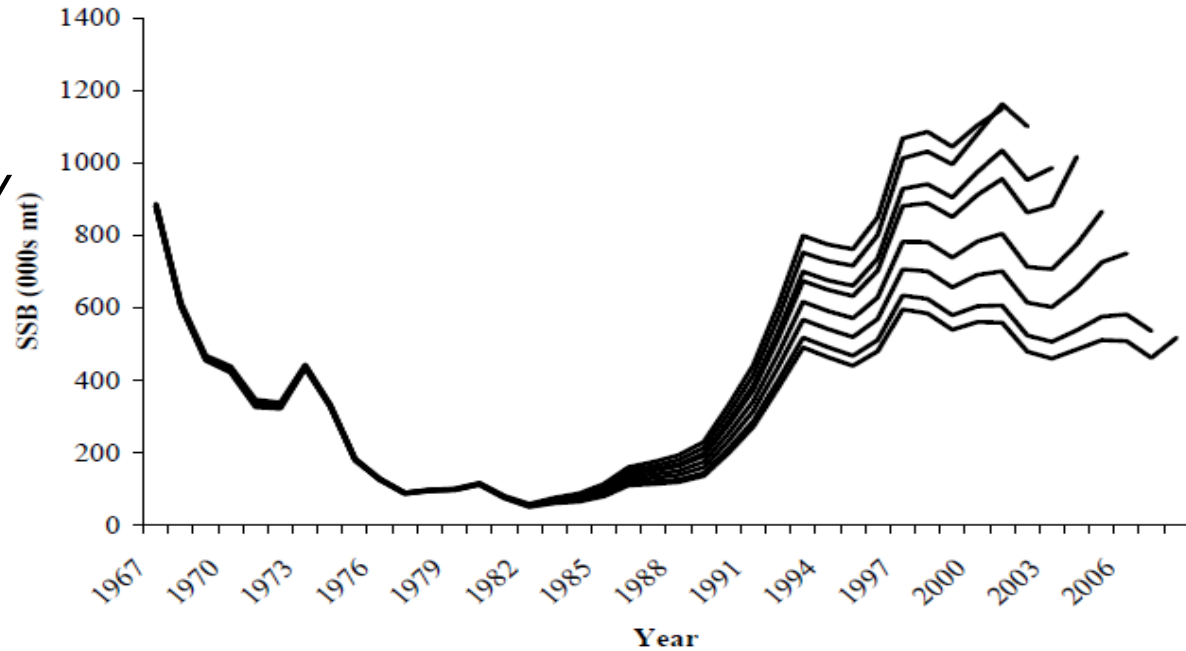
- 2006 benchmark method was updated through 2008.
 - The catch series was revised.
 - The acoustic survey index declined further.
 - The retrospective pattern was worse.
 - The acoustic and winter survey indices were removed, because the model didn't fit them well.



2009 TRAC 'Update'

- *"The uncertainty due to model configuration is dwarfed by the uncertainty associated with retrospective bias."*
- Retrospective inconsistency is greater than the estimated confidence limits.
- TRAC Status Report: *"Ignoring the retrospective pattern in biomass could increase the risk of not meeting conservation objectives."*

Steve Cadrin



SSC Recommendation (Sep '09)

- The SSC endorsed the 2009 TRAC assessment as a basis for projection, derivation of overfishing limit (OFL) and Acceptable Biological Catch (ABC) but recognizes considerable uncertainty in the assessment.
 - The assessment has a strong ‘retrospective pattern’ in which estimates of stock size are sequentially revised downward as new data are added to the assessment; and
 - Maximum sustainable yield reference points estimated from the biomass dynamics model are inconsistent with the age-based, stochastic projection

SSC Recommendation (Sep '09)

- Given the magnitude of uncertainty in the herring assessment and reference points, an ABC control rule cannot be derived at this time, and the SSC recommends a new benchmark assessment of herring as soon as possible.
- The SSC based its ABC recommendation on two general approaches that produce consistent catch advice:
 1. uncertainty in the projected OFL and
 2. a magnitude of removals that appears to sustain a relatively abundant stock.

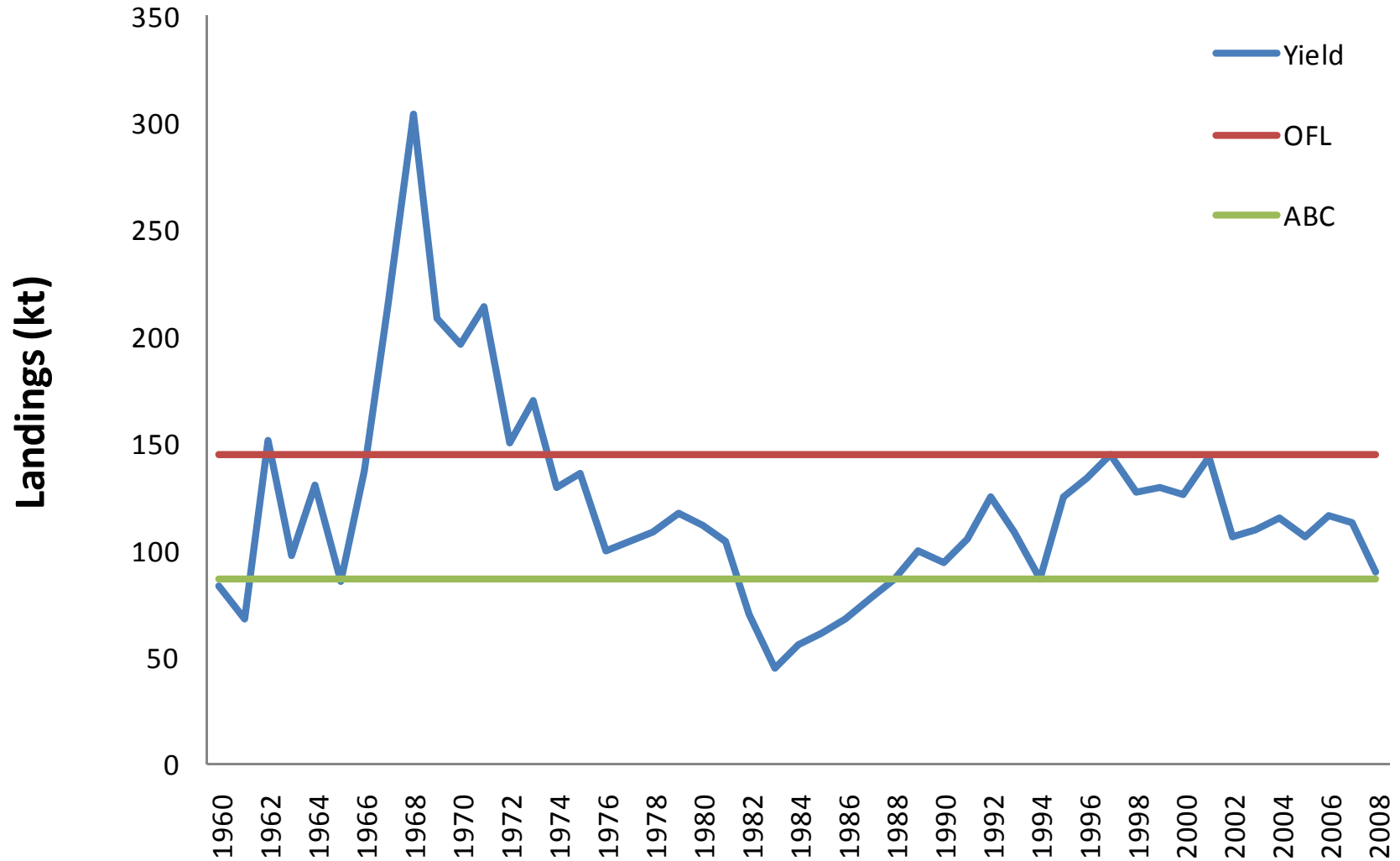
SSC Recommendation (Sep '09)

- National Standard 1 Guidelines suggest that ABC should be less than OFL, and that the 'buffer' between OFL and ABC should account for scientific uncertainty.
- The average retrospective inconsistency in the estimate of exploitable biomass is approximately 40%.
- Therefore, the SSC considers that the magnitude of retrospective inconsistency accounts for the major sources of uncertainty in the assessment, and the buffer between OFL and ABC should be 40% (approximately 90,000 mt in 2010).

SSC Recommendation (Sep '09)

- Alternatively, the stock assessment suggests that recent catches have maintained a relatively abundant stock size and low fishing mortality.
- Total catch of the Gulf of Maine / Georges Bank herring complex by U.S. and Canada in 2008 was 90,000 mt.
- Given the consistency in catch advice from these two approaches, the SSC's recommendation is that ABC should be 90,000 mt each year until the stock assessment is revised.

SSC Recommendation (Sep '09)



SSC Recommendation (Sep '09)

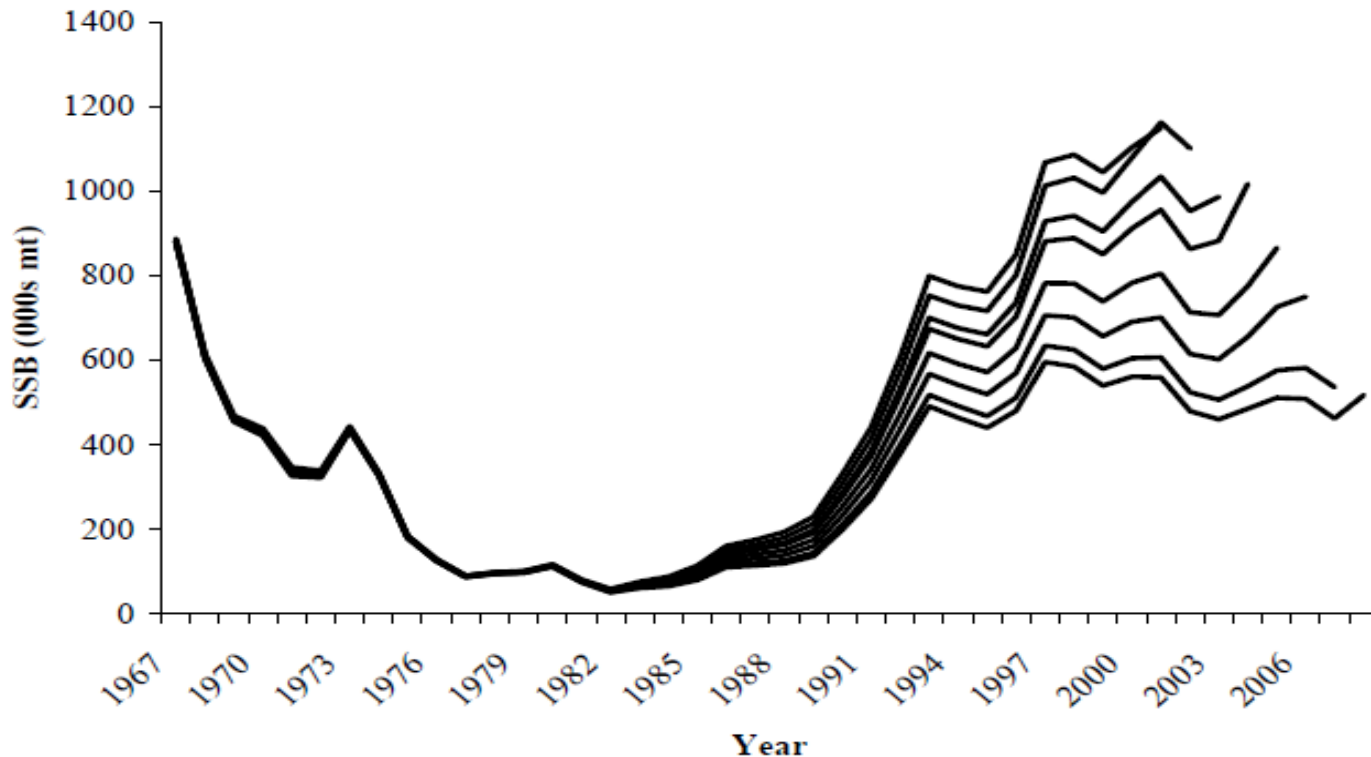
1. The Overfishing Limit (OFL) is 145,000 mt in 2010, 134,000 mt in 2011 and 127,000 mt in 2012 based on projections of fishing at the current estimate of F_{MSY} .
2. Acceptable Biological Catch (ABC) is 90,000 mt each year for 2010 to 2012.
3. Catch recommendations include combined U.S. and Canadian catch of the Gulf of Maine / Georges Bank Atlantic herring complex.
4. A new benchmark assessment should be scheduled as soon as possible to address sources of uncertainty, re-estimate MSY reference points and consider including estimates of consumption and spatial structure in the assessment.

SSC Process

- The next scheduled meeting of the SSC was December, and another meeting was not possible.
- SSC deliberation by correspondence
 - Email correspondence (12 of 15 SSC members)
 - Nov 12 Conference call
 - 14 of 15 SSC members participated
 - 8 Council staff, NMFS staff or PDT members
 - ~30 others
 - Final report by correspondence

SSC Response to Motion

- The SSC concluded that there is no scientific basis for a 17% buffer, and that a 17% buffer is insufficient to account for scientific uncertainty.

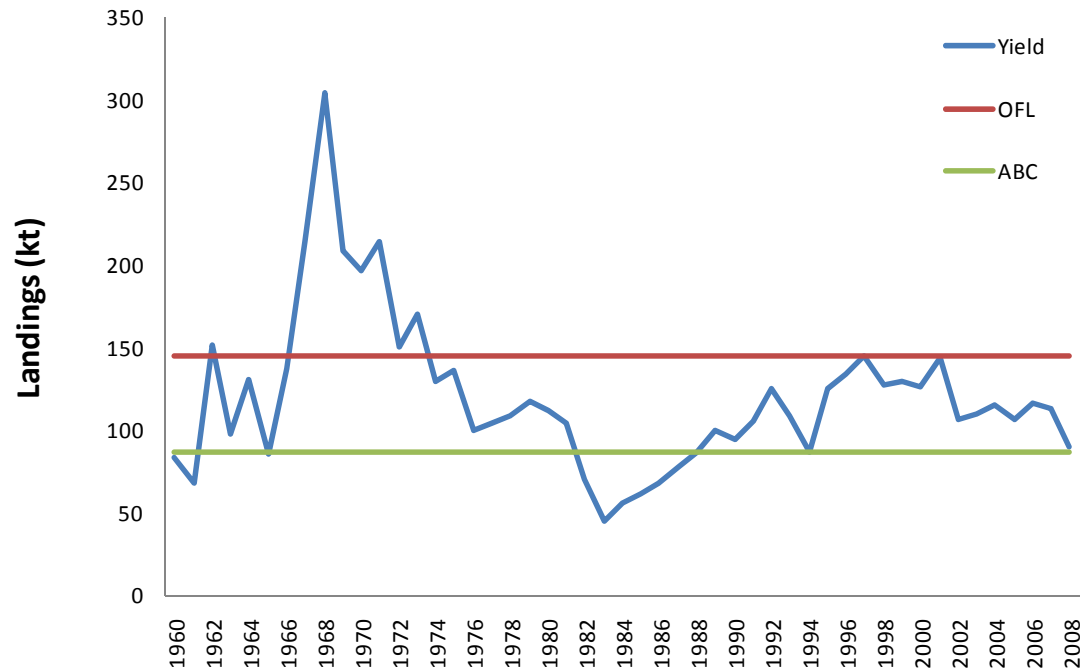


SSC Response to Motion

- Although there is substantial uncertainty in the stock assessment, the stock complex does not appear to be overfished and overfishing does not appear to be occurring.
- In the context of several sources of substantial uncertainty, it would not be appropriate to allow catches to increase.
- The SSC recommends that annual catches in 2010 to 2012 should be limited to recent catch, and recent catch should be used as an interim ABC.

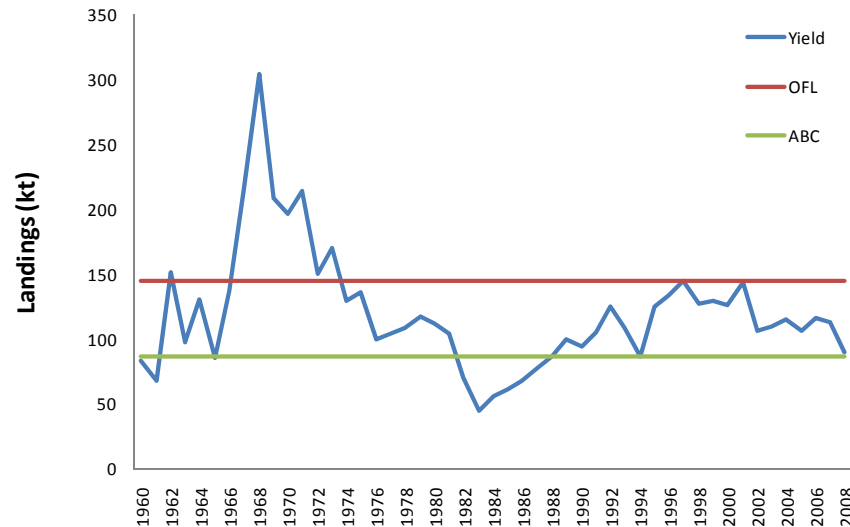
SSC Response to Motion

- Recent catches were:
 - 90,000mt in 2008;
 - the average for 2006 to 2008 is 106,000mt;
 - and the average for 2004 to 2008 is 108,000tmt.
- The choice of recent time period to use in the derivation of ABC depends on the Council's tolerance to risk.



SSC Response to Motion

- Exploitable biomass is projected to decline during 2010 – 2012 due to the recruitment of poorer than average year-classes.
- The risk of depleting spawning components and the role of herring in the ecosystem as a forage species needs to be considered.
- Given the substantial uncertainty in the assessment, the Council should consider a conservative catch limit (e.g., 90,000 mt as recommended by the SSC in September).



SSC Response to Motion

- The catch limit should be considered to be reviewable and revisable pending new information.
- Ideally, information from a revised stock assessment could be used to revise catch advice within this management cycle (2010 to 2012).
- The SSC recommends that the next benchmark assessment be scheduled well in advance of the management cycle for 2013 catch advice.

SSC Recommendations

- **Acceptable Biological Catch for the herring complex in 2010 to 2012 should be limited to recent catch.**
- **A new benchmark assessment should be scheduled as soon as possible.**



- This recommendation replaces the recommendation of September 2009.

SSC Schedule

- December 8-9 meeting, Boston MA
- Agenda
 - SSC Business
 - Elections for chair and vice-chair nominations to Council
 - Summary of national SSC workshop
 - Process recommendations to Council
 - Status of ecosystem-based fishery management policy paper
 - Research recommendations
 - 2010 preliminary agenda setting
 - National Standard 2 guidelines
 - Review habitat omnibus analyses

