

**NOAA
FISHERIES
SERVICE**



#1

SAW/SARC-54 Summary (NEFSC CRD#12-14; #12-18)

Presentation: Sept. 2012

SAW/SARC Process

1. **SAW Working Groups: Herring WG, 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 SAW54)
 - <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 54th Northeast Regional
Stock Assessment Review Committee (54th SARC)
Stephen H. Clark Conference Room – Northeast Fisheries Science Center
Woods Hole, Massachusetts
June 5-9, 2012**

SARC Chairman:

**Mr. Robert O'Boyle
(Beta Scientific, Bedford,
NS, Canada; NEFMC SSC)**

SARC Panelists:

**Dr. Chris Francis
(NIWA, New Zealand; CIE)**

**Dr. Norm Hall
(Subiaco, W. Australia; CIE)**

**Dr. Neil Klaer
(CSIRO, Hobart, Tasmania;
CIE)**

**A. Atlantic herring
B. SNE Mid-Atl
yellowtail
flounder**

(A.) Atlantic herring



Previous Assessment (TRAC in 2009)

- 1. Not overfished**
- 2. Not Overfishing**
- 3. Serious retrospective pattern**

Atl. herring

Assessment TORs for 2012 (1)

- 1. Estimate catch from all sources including landings and discards. Describe the spatial distribution of fishing effort. Characterize uncertainty in these sources of data.**
- 2. Present the survey data being used in the assessment (e.g., regional indices of abundance, recruitment, state surveys, larval surveys, age-length data, predator consumption rates, etc.). Investigate the utility of commercial LPUE as a measure of relative abundance, and characterize the uncertainty and any bias in these sources of data.**
- 3. Evaluate the utility of the NEFSC fall acoustic survey to the stock assessment of herring. Consider degree of spatial and temporal overlap between the survey and the stock. Compare acoustic survey results with measures derived from bottom trawl surveys.**
- 4. Evaluate the validity of the current stock definition, and determine whether it should be changed. Take into account what is known about migration among stock areas.**
- 5. Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) for the time series (integrating results from TOR-6), and estimate their uncertainty. Include a historical retrospective analysis to allow a comparison with previous assessment results and previous projections.**
- 6. Consider the implications of consumption of herring, at various life stages, for use in estimating herring natural mortality rate (M) and to inform the herring stock-recruitment relationship. Characterize the uncertainty of the consumption estimates. If possible integrate the results into the stock assessment.**
- 7. 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 scientific adequacy of existing BRPs and the “new” (i.e., updated, redefined, or alternative) BRPs.**

Atl. herring

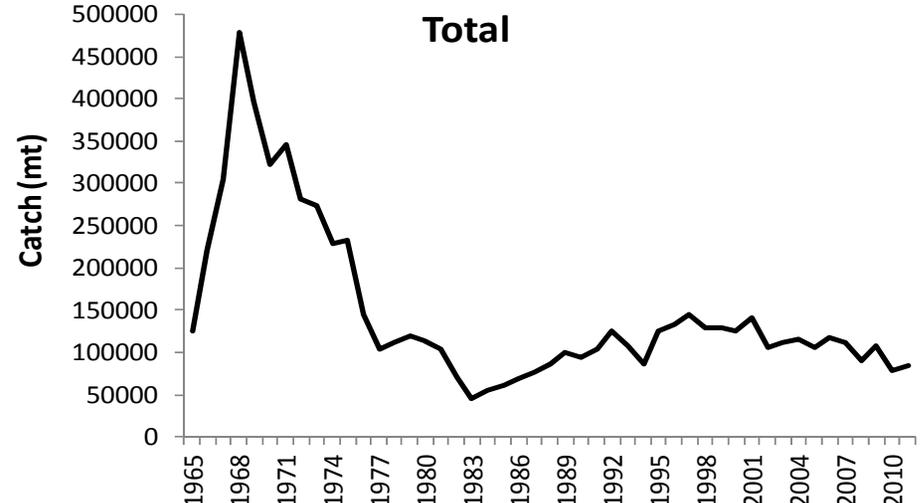
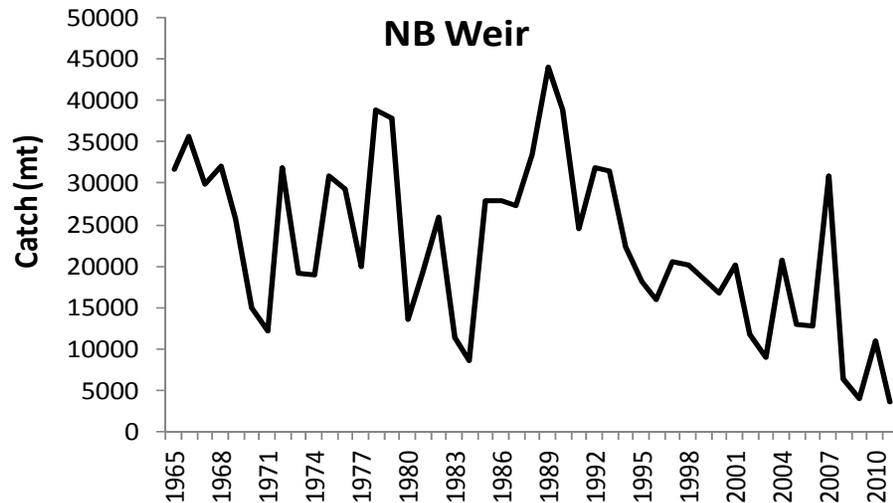
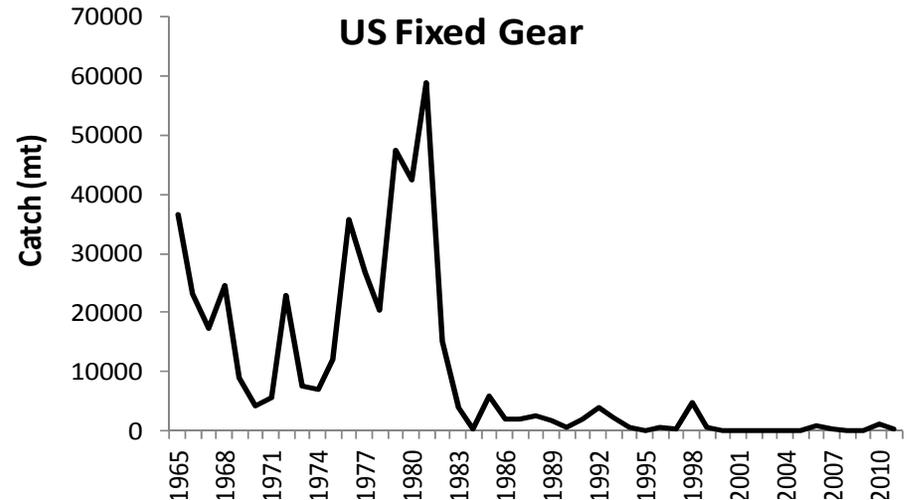
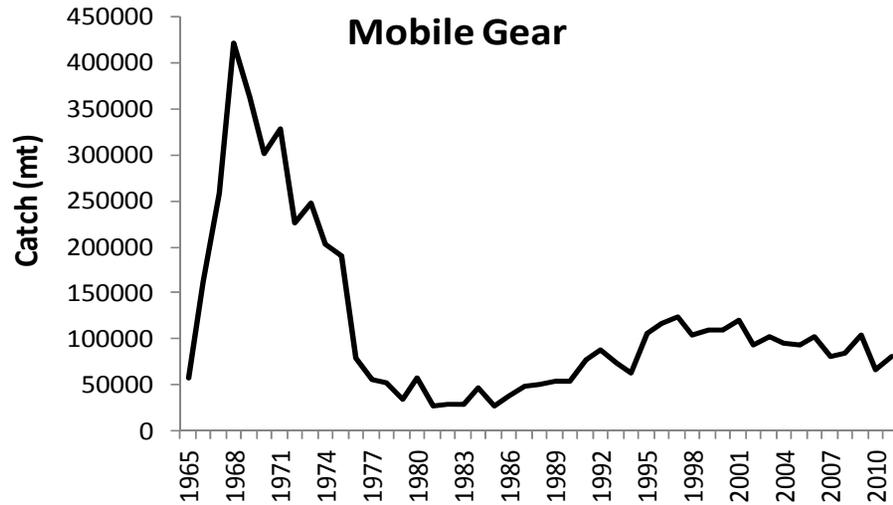
Assessment TORs (2)

8. Evaluate stock status with respect to the existing model (from previous peer reviewed accepted assessment) and with respect to a new model, should one be developed for this peer review. In both cases, evaluate whether the stock is rebuilt (if in a rebuilding plan).
 - 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 and their estimates (from TOR-7).
9. Using simulation/estimation methods, evaluate consequences of alternative harvest policies in light of uncertainties in model formulation, presence of retrospective patterns, and incomplete information on magnitude and variability in M.
10. Develop approaches and apply them to conduct stock projections and 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 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.
11. For any research recommendations listed in recent peer reviewed assessment and review panel reports, review, evaluate and report on the status of those research recommendations. Identify new research recommendations.

- **New ASAP assessment model was accepted. Herring is not overfished and overfishing is not occurring.**
- **Key feature of model: a 50% increase in natural mortality since 1996. This is appropriate because it is consistent with estimate of predation on herring and it largely resolves the retrospective pattern.**
- **High consumption of herring likely to continue in immediate future.**
- **New biomass threshold and MSY are considerably less than existing values of these reference points. New values were derived assuming the higher M and a more detailed model.**

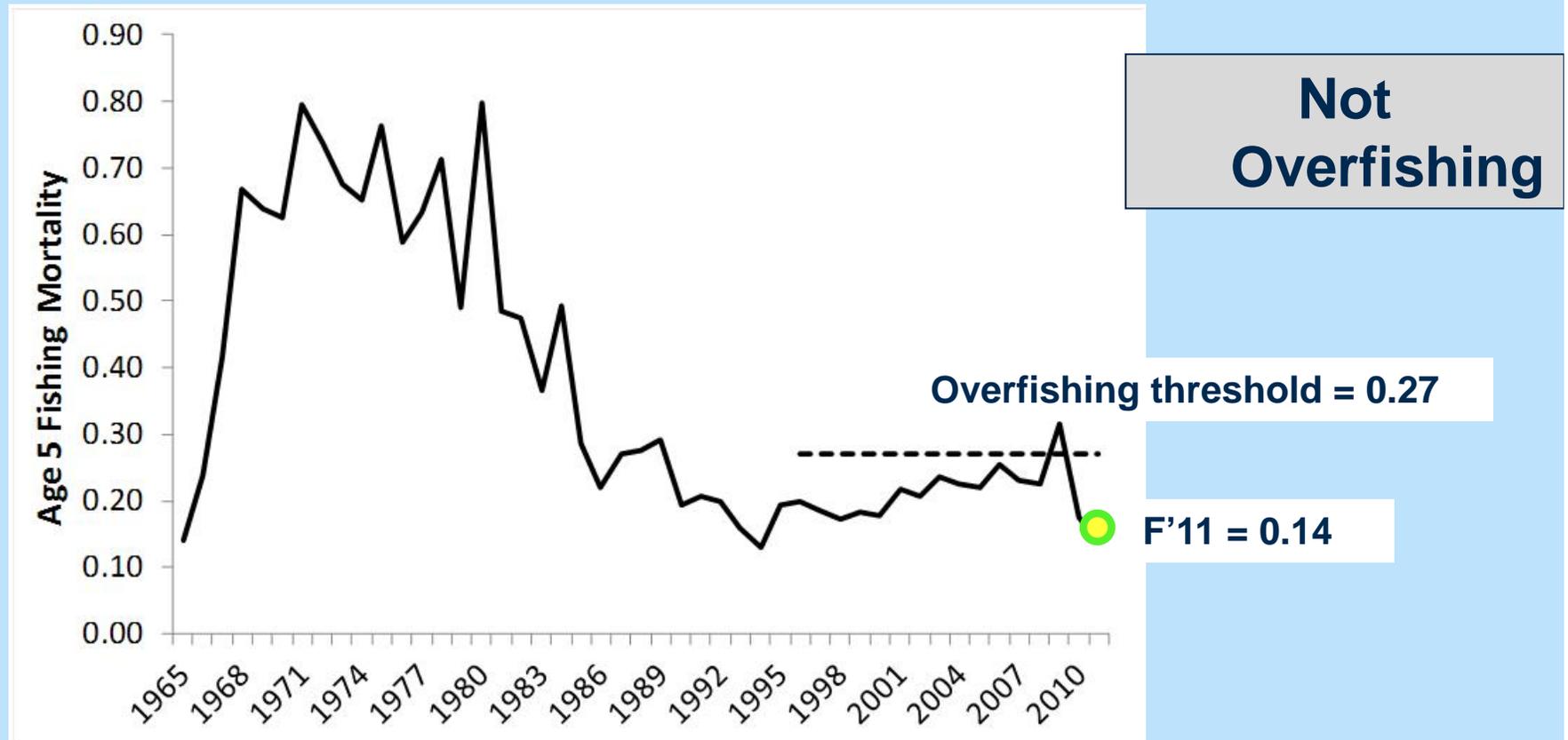
- **Source of uncertainty in stock projections: large size of 2008 year-class. This year-class is prominent in recent stock biomass increase, and will be a significant component of projected yield over the immediate future.**
- **Survey indices included in the model were adequate. Acoustic survey data did not serve as index of abundance in the model, was inconsistent with other indices, covered a limited area, was not representative of entire stock.**
- **The Panel questioned the level of uncertainty in the model associated with changes in trawl doors in 1985 and survey vessels in 2009.**

Catch of Atl. Herring (1965-2011)



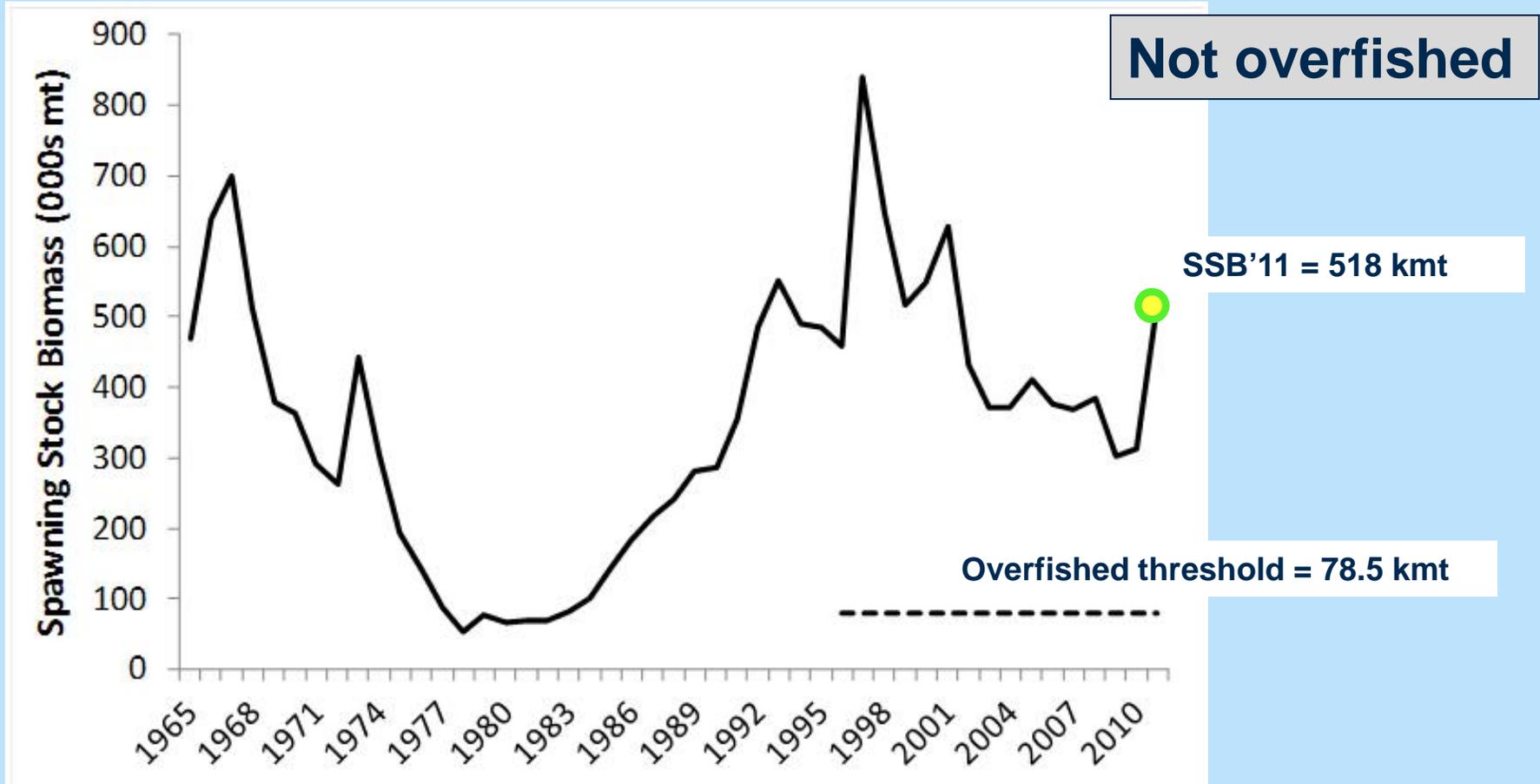
In the past 5-yr, total catch ranged from 79 kmt – 112 kmt.

Atl. Herring (2012 Assessment Results, SARC54)



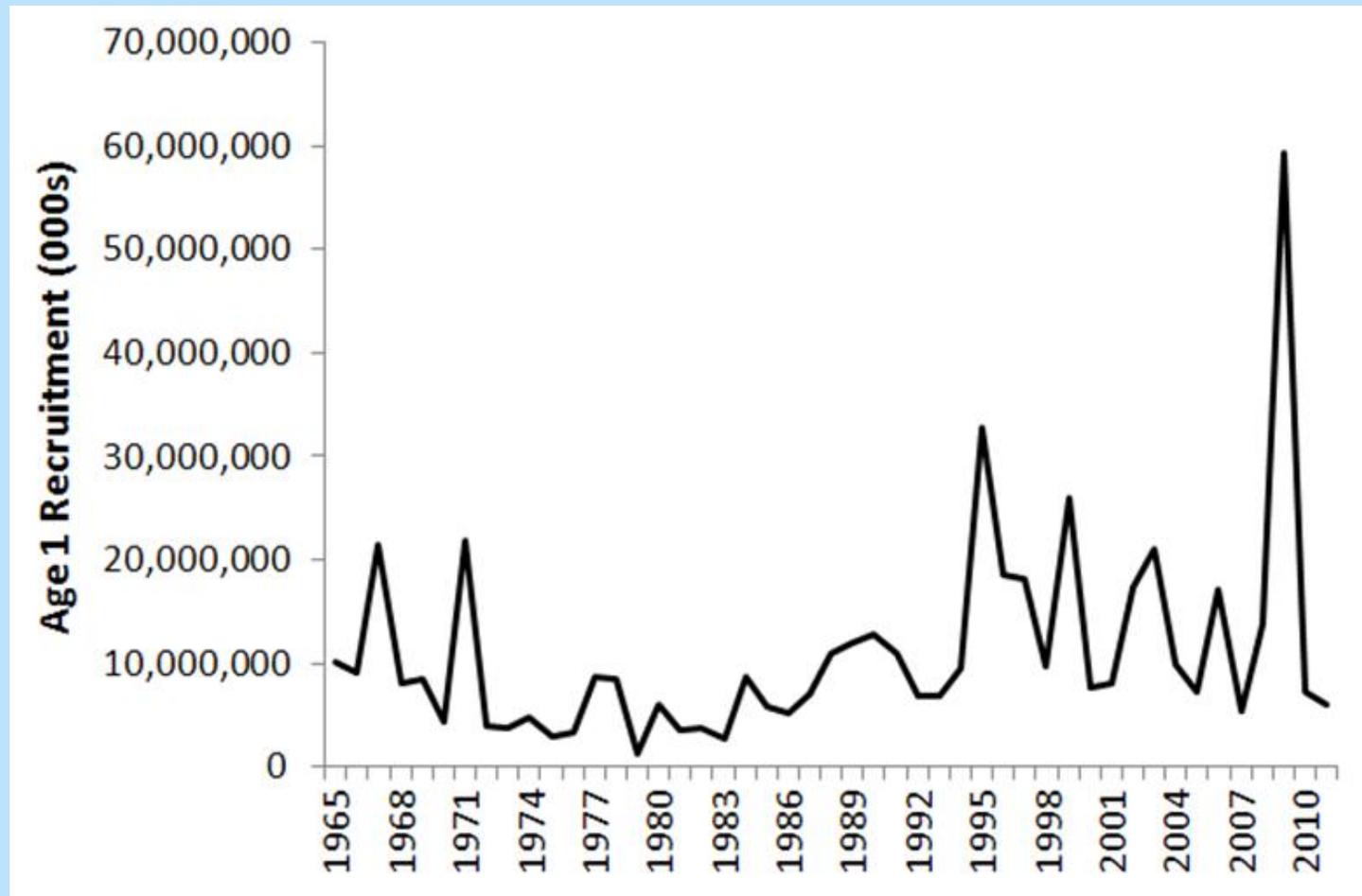
Fishing mortality over time, and associated overfishing level, $F_{\text{Threshold}}$ *

Atl. herring (2012 Assessment Results, SARC54)



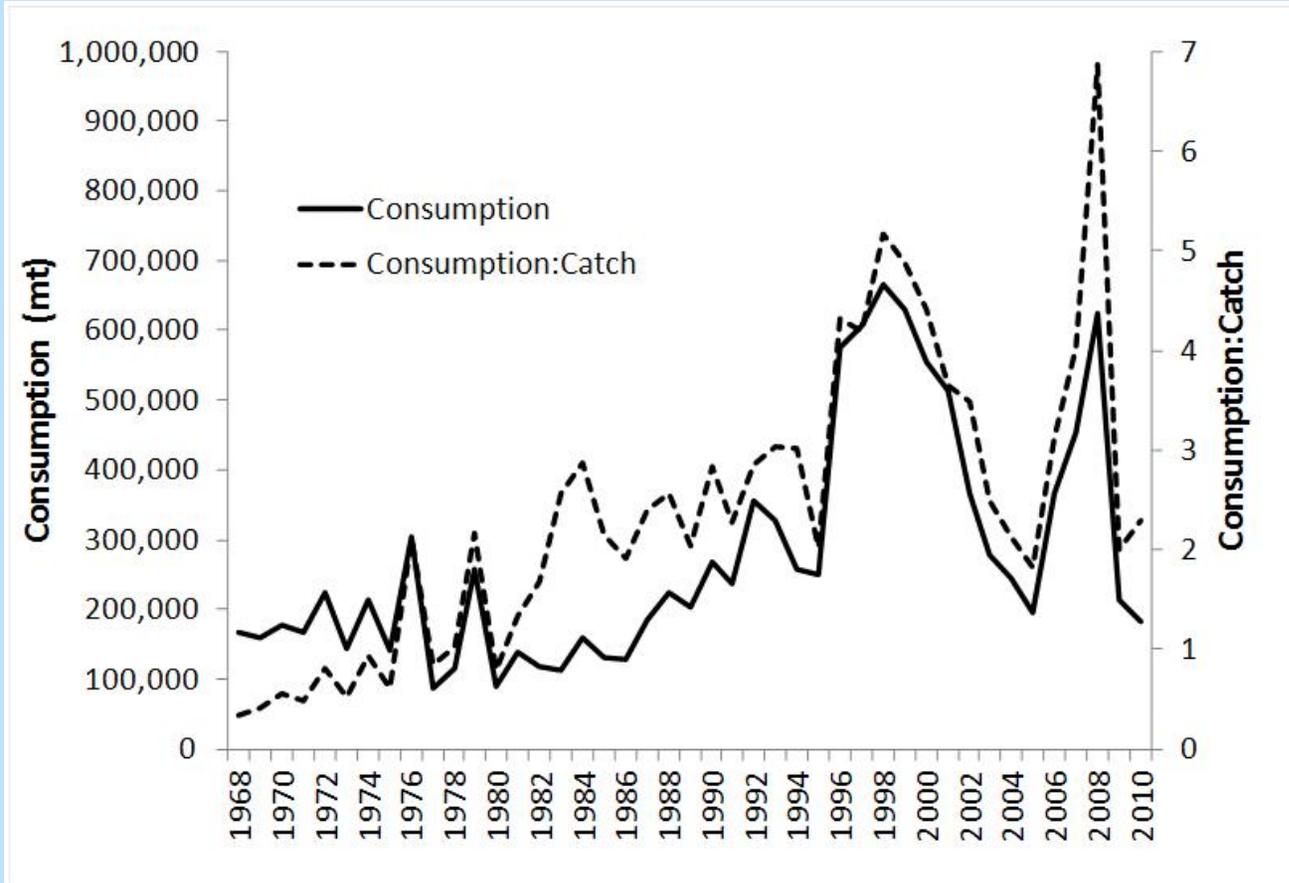
Spawning stock biomass (SSB) over time and $SSB_{\text{threshold}}$

Atl . Herring (2012 Assessment Results, SARC54)



The age-1 cohort in 2009 is estimated to be largest on record. Strength of large cohorts often overestimated, and should be interpreted w/ caution.

Consumption of Atl. herring by predators



Since 1996, about 4x > the fishery catch.

Incorporating consumption into the new model supported raising M.

Atl. Herring: Biological Reference Points (BRP)

	TRAC (2009)	SARC54 (2012)
F_{MSY}	0.27	0.27
SSB_{MSY} (MT)	670,600	157,000
$1/2 SSB_{MSY}$ (MT)	335,300	78,500
MSY (MT)	178,000	53,000

What caused the changes?

- 1. Fox model to ASAP model, and**
- 2. M was increased**

Herring projections: Catch and Spawning Stock Biomass

		Year:		
		2013	2014	2015
If Fish at:				
		Catch		
F_{MSY}		168,775	126,589	104,430
Status quo F		93,159	76,823	67,912
Status quo catch		87,683	87,683	87,683
MSY		53,000	53,000	53,000
		SSB		
F_{MSY}		496,064	368,501	308,949
Status quo F		548,788	450,496	402,551
Status quo catch		551,686	446,496	385,995
MSY		576,092	492,162	448,725

- **Biological reference points were derived assuming that the 50% increase in M due to herring consumption will continue in the future. Monitoring is required to determine whether or not this increase will continue over the longer term. Could affect future BRPs.**
- **Panel encourages further work on Management Strategy Evaluation. However, this is more than can be accomplished within the timeframe of a stock assessment.**
- **Consider additional work on stock boundaries and how they could impact the catch series, by sub-stock. Consider feasibility of a multi-sub-stock assessment.**
- **Consider the effect of NMFS survey trawl door-changes between spring and fall.**

**(B.) SNE MidAtl
Yellowtail flounder**



- 1. Estimate landings and discards by gear type and where possible by fleet, from all sources. Describe the spatial distribution of fishing effort. Characterize uncertainty in these sources of data.**
- 2. Present the survey data being used in the assessment (e.g., regional indices of abundance, recruitment, state surveys, age-length data, etc.). Investigate the utility of commercial or recreational LPUE as a measure of relative abundance, and characterize the uncertainty and any bias in these sources of data.**
- 3. Evaluate the validity of the current stock definition, and determine whether it should be changed. Take into account what is known about migration among stock areas.**
- 4. Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) for the time series (integrating results from TOR-5), and estimate their uncertainty. Include a historical retrospective analysis to allow a comparison with previous assessment results and previous projections.**
- 5. Investigate causes of annual recruitment variability, particularly the effect of temperature. If possible, integrate the results into the stock assessment (TOR-4).**
- 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 scientific adequacy of existing BRPs and the “new” (i.e., updated, redefined, or alternative) BRPs.**

- 7. Evaluate stock status with respect to the existing model (from previous peer reviewed accepted assessment) and with respect to a new model, should one be developed for this peer review. In both cases, evaluate whether the stock is rebuilt (if in a rebuilding plan).**
 - 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 and their estimates (from TOR-6).**

- 8. Develop approaches and apply them to conduct stock projections and 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 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 recruitment as a function of stock size).**
 - 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.**

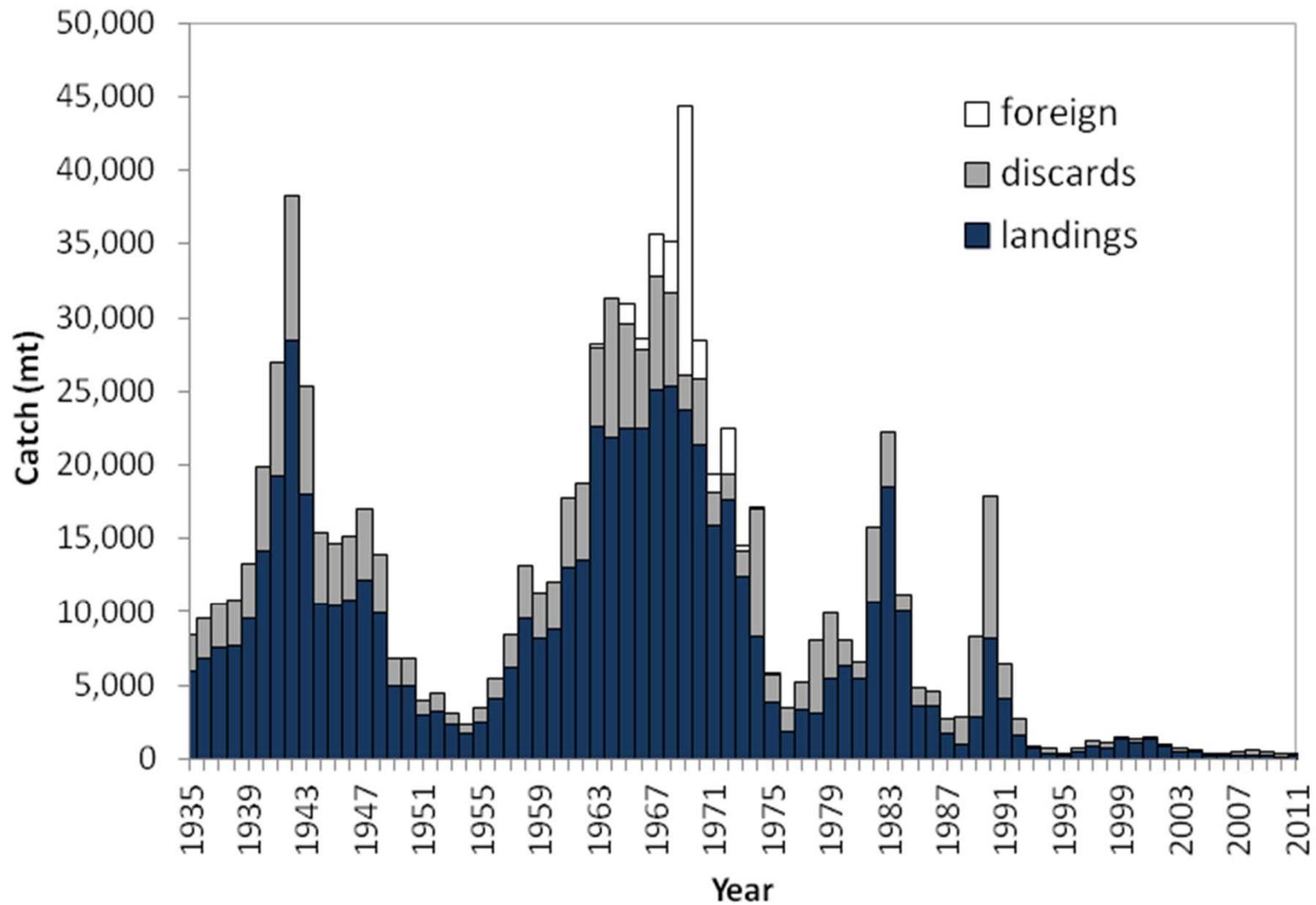
- 9. Review, evaluate and report on the status of research recommendations listed in most recent peer reviewed assessment and review panel reports. Identify new research recommendations.**

- **New ASAP assessment model was accepted. Bridging analyses with the VPA (2008) was well done. Trends in SSB and F are comparable with previous assessments.**
- **A key finding of new assessment: a marked decline in recruitment since 1990. Two stock recruitment scenarios were developed to account for this. Neither scenario could be ruled out (slightly favored the change in stock productivity hypothesis).**
- **Analyses were attempted to explain the reduction in stock productivity in terms of oceanographic processes. A definitive environmental explanation for the drop in recruitment since 1990 has not been found.**
- **Source of assessment uncertainty: factors affecting recruitment**

- **Fishing mortality (F_{MSY}) reference point is relatively certain. Overfishing is likely not occurring.**
- **Uncertain whether or not the stock is overfished and what the biomass reference points should be. Depends on which recruitment scenario is adopted. Source of uncertainty for management decisions. Under the recent recruitment scenario, the stock has already rebuilt; under the other scenario, stock cannot rebuild by 2014.**
- **SNE-MidAtl stock can be treated as a single unit for the purposes of management and assessment.**

SNE Yellowtail:

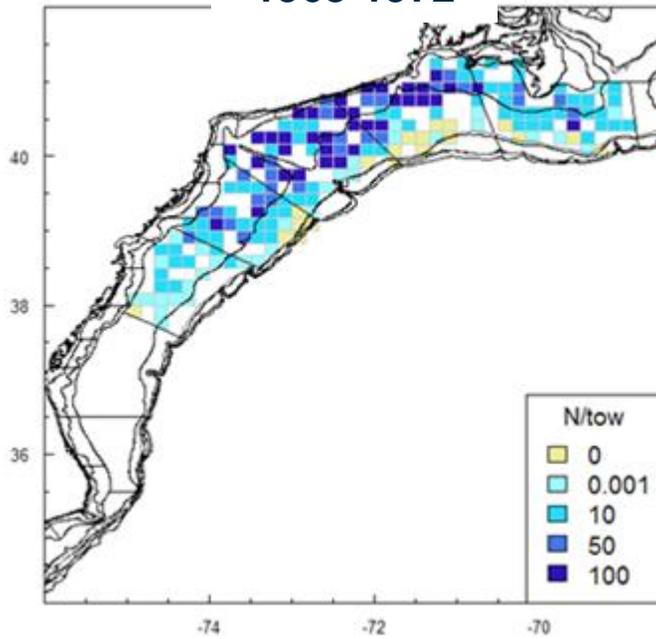
Catch (1935-2011)



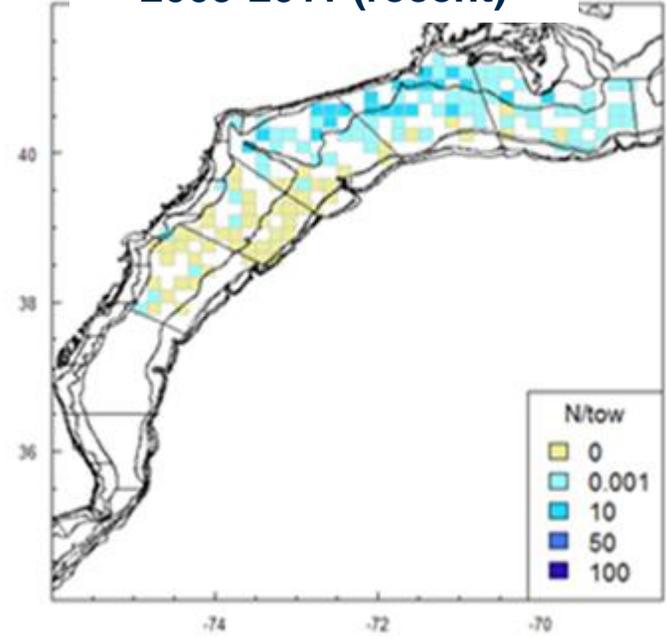
SNE Yellowtail: Survey Catch per tow in

Spring

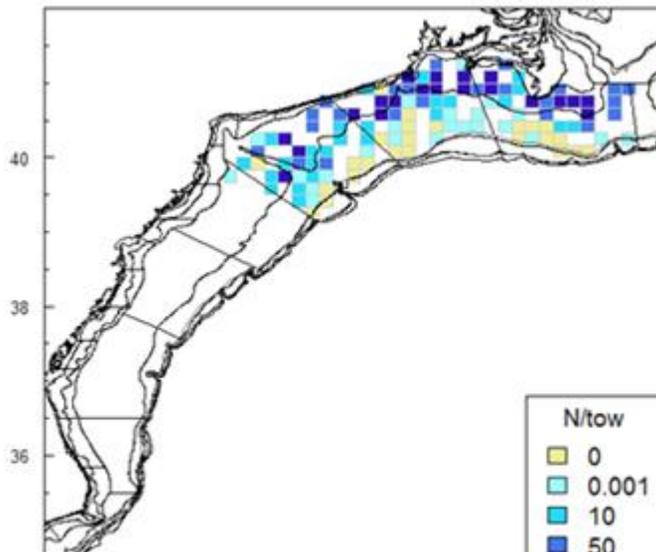
1968-1972



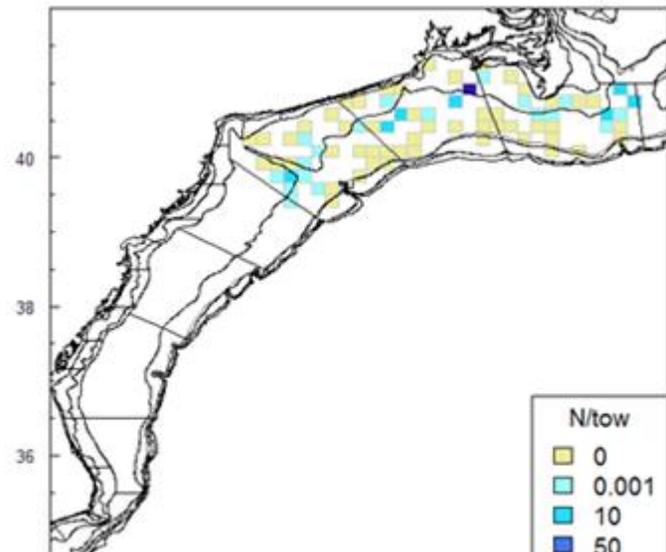
2009-2011 (recent)



1963-1967



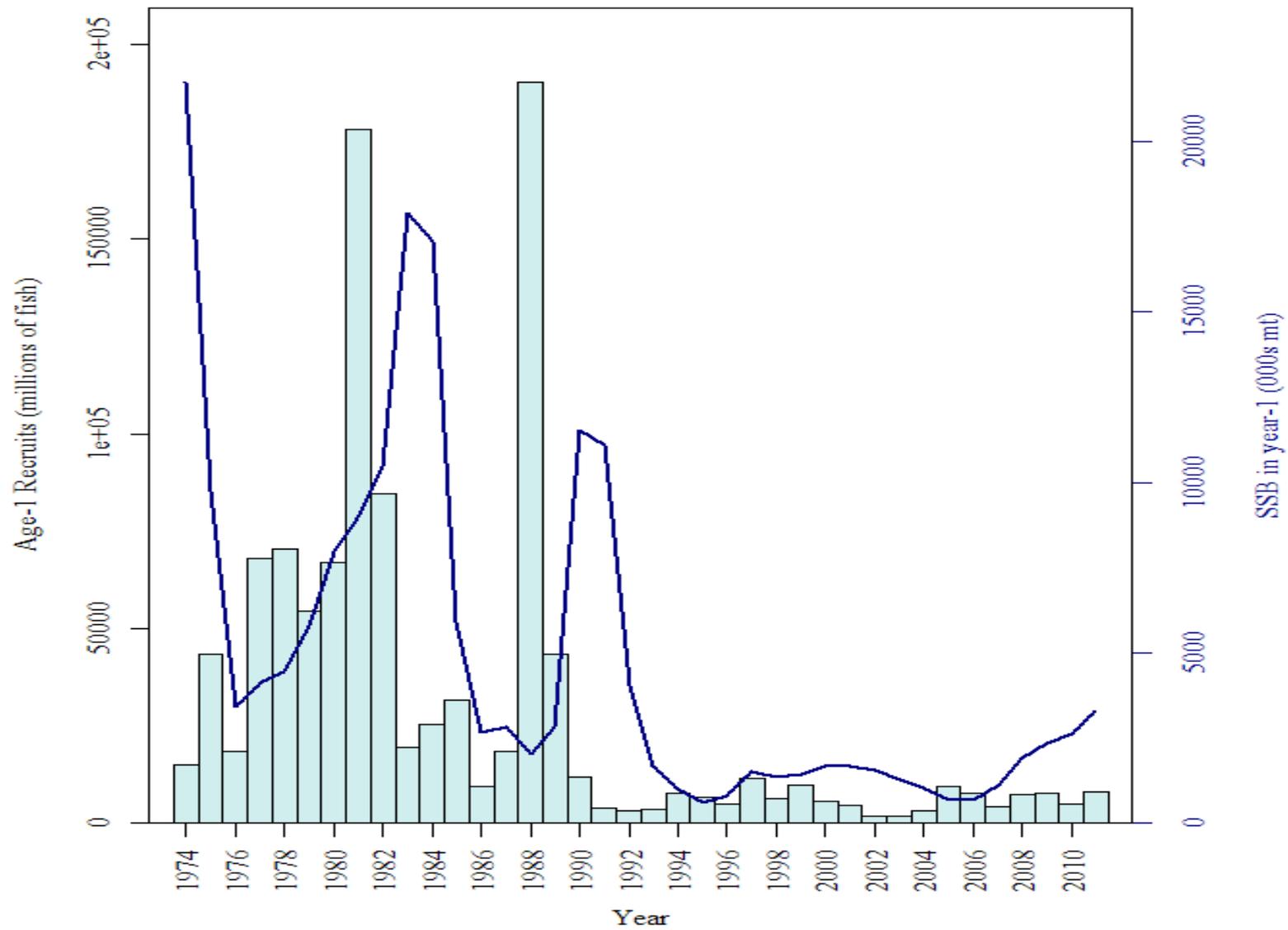
2009-2010 (recent)



Fall

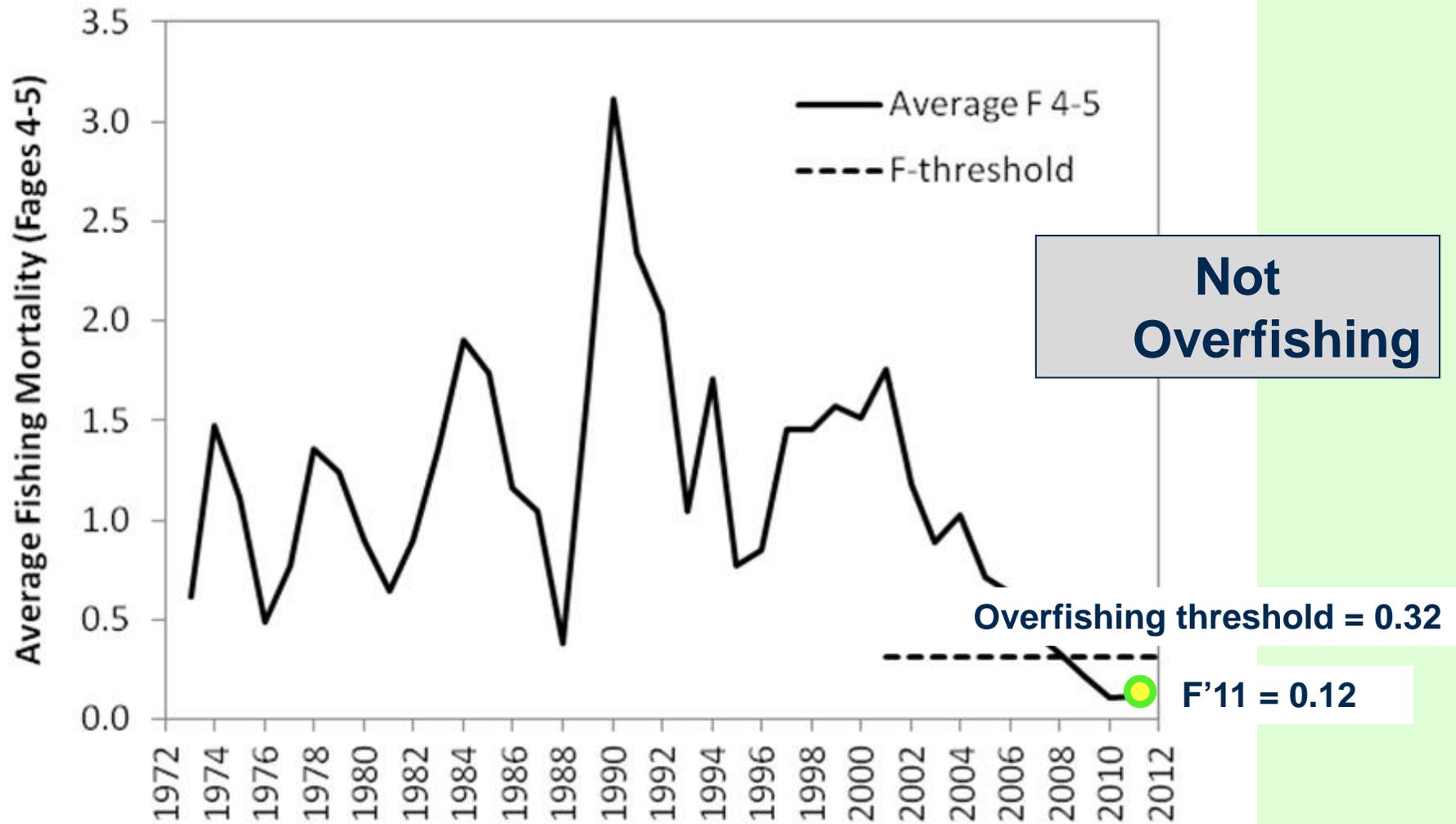
SNE Yellowtail:

Recruitment



SNE Yellowtail:

Fishing Mortality Rate



SNE Yellowtail:

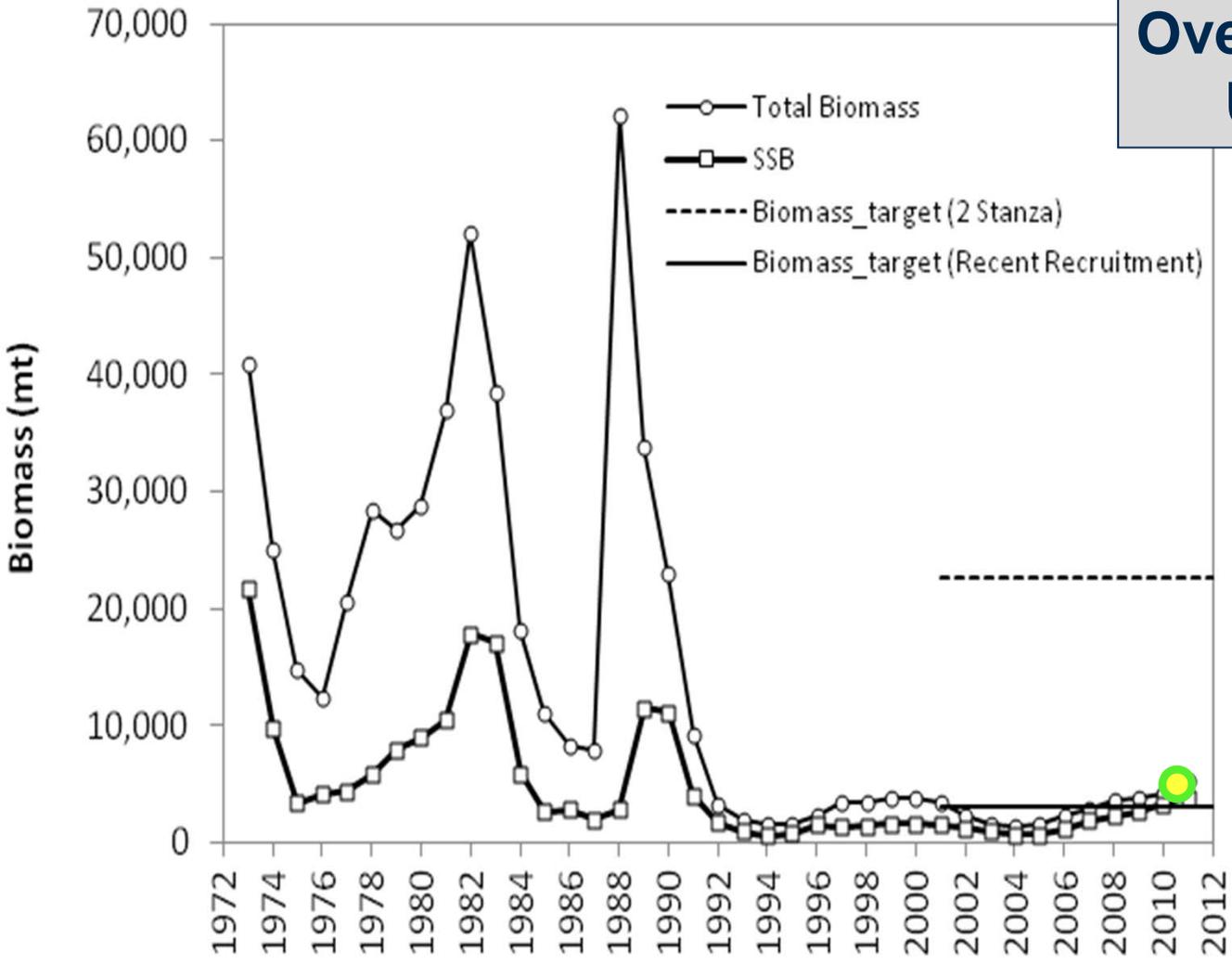
Two scenarios were considered:

- **“Recent” recruitment (change in productivity)**
- **“2-stanza” recruitment (depends on adult biomass)**

Neither scenario could be ruled out.

SNE Yellowtail:

Spawning Stock Biomass



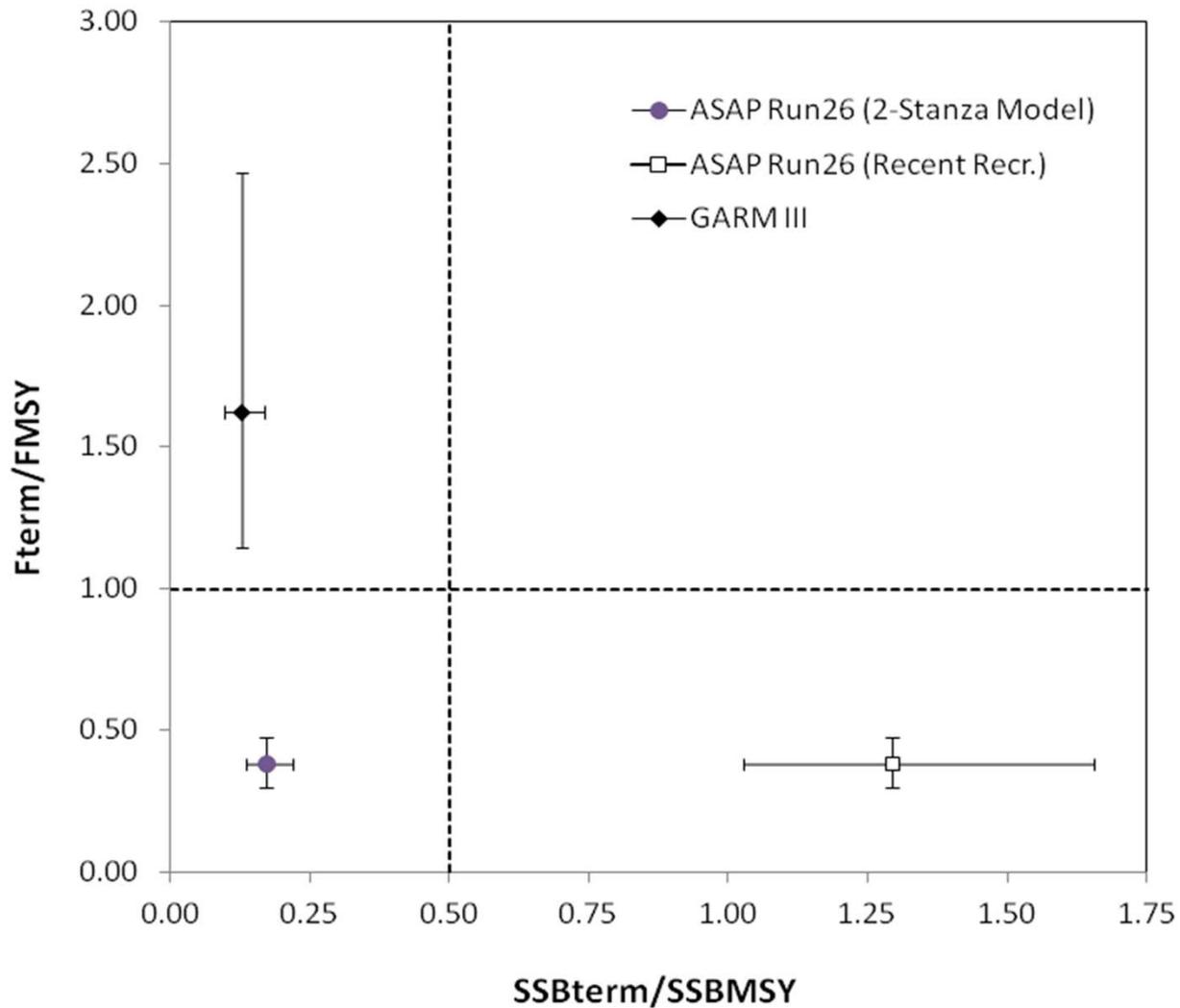
**Overfished status:
UNKNOWN**

Target ("2-stanza")

Target ("recent R")

SNE Yellowtail:

Stock Status Summary



Overfishing is no longer occurring.

Overfished status: UNKNOWN, depends on scenario

- **Examine whether there was shift in stock productivity. Research that helps to illuminate this question should be of the highest priority.**
- **Evaluate uncertainty in components of catch, and use in future stock assessments.**
- **Better tables needed for assessment documentation (# of ages, lengths, weight samples, by yr).**
- **Examine these sources of uncertainty: some of survey calibration issues (e.g. trawl door change in 1985), catch history (particularly discards), and assessment model outputs with respect to the choice of the M.**
- **Confidence intervals were calculated for annual SSB. Calculate the probabilities that these fell below the threshold BRP.**