SAW/SARC-58 Summary
(NEFSC CRD#14-03)

Public Presentation: April 2014
**SAW/SARC Process**

1. SAW Working Groups

2. External Peer Review Panel: Center of Independent Experts (CIE) + SSC.
   - Emphasis on reviewing the science/assessment.

3. Products: (Reviewer’s Reports) + (2 Science Reports)
   - [http://www.nefsc.noaa.gov/nefsc/saw/](http://www.nefsc.noaa.gov/nefsc/saw/) (see SAW58)

4. Management advice:
   - SAW/SARC reports support SSC in making ABC recommendation.
   - Primarily developed by Tech. Committees, PDTs, SSC.
The 58th Northeast Regional Stock Assessment Review Committee (58th SARC)
Stephen H. Clark Conference Room – Northeast Fisheries Science Center
Woods Hole, Massachusetts
January 27-31, 2014

SARC Chairman:
Dr. Rob Latour
(VIMS; MAFMC SSC)

SARC Panelists:
Dr. Catherine Dichmont
(CSIRO Australia; CIE)

Dr. Stewart Frusher
(IMAS, Tasmania; CIE)

Dr. Ian Jonsen
(Dalhousie U., Halifax; CIE)

A. Butterfish
B. Golden tilefish
C. Northern shrimp
(A.)  Butterfish
1. Characterize the catch including landings, effort and discards by gear type.

2. Characterize survey data used in the assessment.

3. Characterize oceanographic/habitat data wrt butterfish distribution/availability.

4. Evaluate consumptive removals of butterfish by its predators.

5. Use assessment models to estimate F, recruitment, stock biomass.

6. State the stock status definitions. Update or redefine BRPs.

7. Evaluate stock status wrt newly proposed model and BRPs. Evaluate whether stock is rebuilt.

8. Conduct stock projections, statistical distribution of OFL, and candidate ABCs.
   a. Annual projections (2 years). Report probabilities wrt BRPs.
   b. Describe this stock’s vulnerability.

• Previous stock assessment (SARC49, 2010) was not accepted, and peer-reviewed BRPs were not available.

• The SARC58 Panel (2014) accepted a new assessment and BRPs. Stock is not overfished, and is rebuilt. Overfishing is not occurring in 2012.

• External estimation of survey catchability coefficient (q) contributed to success of the assessment. Scaling of population size within the assessment model hinges on accurate estimation of q.

• Although habitat preference study was impressive, a temporally varying habitat index was not included in the assessment model on basis of parsimony.
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<th>Butterfish</th>
<th>SARC58 Panel Findings (2)</th>
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<td>• Good recruitment and the propagation of strong year classes appear vital to the success of butterfish.</td>
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<td>• Survey data represent best available information. Six survey data sets included: NEFSC spring &amp; fall offshore, NEFSC spring &amp; fall inshore, and NEAMAP spring &amp; fall.</td>
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<td>• Other impressive advancements: new BRPs and enhanced observer coverage to improve discard estimation.</td>
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Catches have been lower since 2002 due to lack of directed fishery and management restrictions.
Butterfish: Plot of Survey Catch per Tow.
Butterfish: Stock Biomass (line) and Recruitment (vert. bars)

Biomass has averaged ~80kmt. Recruitment: variable. No clear S/R relationship. $R_{2012}$ is lowest on record.
Butterfish

Not Overfishing in 2012

Catch and Fishing mortality over time, and associated overfishing level, $F_{\text{Threshold}}$. New BRP proxy from Patterson (1992).

$F_{\text{Threshold}} = \frac{2M}{3} = 0.81$

$F_{12} = 0.02$
Butterfish: Stock Biomass and Fishing Mortality Rate

SSB_{Target} \sim 46 \text{kmt} \quad \text{SSB}_{12} \sim 79 \text{kmt}

Not Overfished in 2012; Rebuilt.

New SSB_{Target} is associated with new F_{Threshold}.
A Sample Projection of catch.

Assumptions: preliminary 2013 catch (2,489 mt), 2014 ABC (9,100 mt), and $F_{MSY}$ proxy = 0.81 in 2015-2017, sampling recruitment from entire time series.
• Consider state survey data more fully. Try to integrate them.

• Habitat preference analysis: Improve documentation. Explore why temperature did not explain more. Consider this analysis for other assessments.

• Consider ecosystem and multispecies modeling approaches (e.g., Atlantis, EwE, MSVPA, MS SCAA)

• Models within the NOAA Fisheries Toolbox have been peer-reviewed and are acceptable for use.

• Consider extending sensitivity model runs through to stock status determinations.
(B.) Golden tilefish
1. Estimate catch, including landings and discards. Describe the spatial and temporal distribution.

2. Characterize commercial LPUE as a measure of relative abundance. Consider the utility of recreational data.

3. Examine relationship between temperature, tilefish distribution and thermal tolerance.

4. Estimate fishing mortality and stock size.

5. State the existing stock status definitions for “overfished” and “overfishing”. Update or redefine BRPs.

6. Evaluate stock status with respect to the existing and new model. Evaluate whether the stock is rebuilt.

7. Conduct stock projections and compute the statistical distribution of the OFL and candidate ABCs.
   b. Describe this stock’s vulnerability.

8. Review, status of existing and new research recommendations.
• New assessment and BRPs were accepted. Stock is not overfished, and is rebuilt. Overfishing is not occurring in 2012.

• The assessment model was appropriately based on commercial landings-per-unit-effort (LPUE). Research survey not available.

• Spatial limits of the fishery compared to the larger range of tilefish is a concern. LPUE trends seems to reflect strong year classes in the population, which lends support for using LPUE.

• Model assumes a dome-shaped selectivity pattern. This assumption had reasonable support. The “dome” can cause an overly optimistic view of stock status.
• New BRPs are related to stock performance under constant quota since 2002. This corresponds ~ to F25%, the new overfishing proxy threshold. During this period, the stock increased gradually and supported a stable fishery.

• Multiple assessment models were presented which allowed the SARC to explore the assessment well.

• Recruitment was likely underestimated for 2010-2012. Therefore, in stock projections average recruitment was considered more realistic for those years.
Tilefish: Landings (1915-2012)

--Red line represents the TAC since Nov. 2001.
--Assessment model starts with 1971.
Fluctuations in CPUE seem to correspond to big year classes (‘98-’99, ‘05).
Tilefish: Commercial Catch Len. Freq. Distributions

Data suggest strong 1998-1999 and 2005 year classes can be tracked through time.
Tilefish: BRPs and Stock Status

In 2012, $F_{2012}$ is below $F_{\text{threshold}}$. Stock is above $SSB_{\text{target}}$. Rebuilt. BRPs are new.

$F_{\text{Threshold}} = F_{25\%} = 0.37$

$F_{2012} = 0.275$

$SSB_{2012} = 5,229$ mt

$SSB_{\text{Target}} = SSB_{25\%} = 5,153$ mt
Tilefish: Model Estimates of F, SSB with PDFs

**Annual Total F-Mult**

2012

![Annual Total F-Mult graph]

**Annual Total SSB**

2012

![Annual Total SSB graph]

\[ F_{2012} = 0.275 \]

\[ SSB_{2012} = 5,229 \text{ mt} \]

Confidence intervals can be taken from the cumulative frequency.
Recruitment for years 2010-2012 not shown – estimates highly uncertain.
Two scenarios shown:

1. From 2015+, $F_{\text{threshold}}$ (black).

and

2. Constant catch (red)
• Attempt to improve characterization of catch: more refined trip-level information, market category designations across dealers.

• Refine trip level data: effort definition used in developing the LPUE indices; trip length vs number of hooks, longline length, or hours fished.

• A GLM standardized LPUE index that included year and permit (vessel) effects, and possibly environmental covariates.

• Aging data from the commercial catch facilitated successful application of assessment model. Should continue in the future.

• Consider an industry-based tilefish survey.
(C.) Northern shrimp
1. Present landings, discards, effort, and fishery-independent data.


3. Update or redefine BRPs. Evaluate stock status.


5. Review methods used to calculate the annual target catch.

6. Develop prioritized lists of recommendations.

7. Comment on appropriate timing of future assessments.
All 3 assessment models presented had serious problems.

The population recently experienced the highest and lowest recruitment on record, which contributed to difficulties in the models.

Stock assessment was **not accepted**. Stock status could not be determined.

In lieu of an accepted assessment model, the SARC focused on observed patterns in survey, catch, and commercial CPUE indices.

The indices (above) suggest that the stock is very low, and there is considerable uncertainty about when it might increase.

SARC 58 recommendations and comments apply solely to the models and updated data presented in this most recent assessment.
N. shrimp

Plot shows commercial landings in Gulf of Maine.
*: 2012 and 2013 data are preliminary.
N. shrimp

Top: Commercial CPUE (blue) and Maine trawl CPUE (pink) over time.

Bottom: Maine trawl CPUE and summer survey index (green) for the summer prior to the fishing season.
Recruitment index from the ASMFC summer shrimp survey.
**N. shrimp**

**Summer Survey Indices**

Top: Biomass /tow

Bottom: Number of individuals/tow
• Conduct annual index-based assessments while refining the models.

• Potential inclusion in the CSA model of effort and commercial CPUE time-series standardized for environmental effects.

• Consider benchmark assessment when improvements can be made to the models.

• In lieu of an accepted assessment model, the SARC recommended basing management on observed patterns in the survey, catch, and possibly commercial CPUE indices.

• Evaluate adequacy of the current BRPs, perhaps through management strategy simulations.