Surfclam 2020 Management Track Assessment Proposal

Current Assessment (Benchmarked in 2016)

- Current model: 2016 SAW 61 accepted SS model
- Separate models for North (Georges Bank) and South (everything else)
- Catch data from 1965 in South and 1982 in North
- Survey time series split (change in platform): 1982-2011 and 2012 to present
    - includes absolute abundance index (1997-present)
    - relative abundance index 1982-2011
- Composition data include age/length in survey and length in commercial data
- Models use conditional age at length instead of age-length-key
- Models include informative prior distributions on survey catchability
- Selectivity is estimated but constant in time
- Reference points are relative to trend rather than scale (scale is uncertain).

Current Biological Reference Points from 2016 SAW 61

- $F_{MSY} = F_{Threshold} = F^{*}(F_{MSY}/F^{*}_{Max})$
- $B_{MSY} = SSB_{MSY} = SSB_{0}/2$

Status in 2017

F_{2015} / FThreshold= 0.295 (30% of F_{MSY})

SSB_{2016} / $SSB_{Threshold}$ = 2.54 (254% of SSB_{MSY})

Proposal for 2020 Management Track Assessment

- Update Survey and Commercial data through 2019
- *This includes a re-stratification of the survey*
- *Upgrade to latest version of SS (3.30)*
- *Alter model structure:*
    - *Instead of 2 models with 1 area each, make one model with 2 areas*

Alternative Assessment Plan (Plan B)

- Swept area biomass estimate based on survey and median q from depletion studies.

Level of Review Recommendation

Probably level 2 due to structure change in the model. The change should help somewhat with challenges related to scale and bring the surfclam assessment in line with the ocean quahog assessment.

Ocean quahog 2020 Management Track Assessment Proposal

Current Assessment (Benchmarked in 2017)

- Current model: 2017 SAW 63 accepted SS model
- One model with 2 areas North (Georges Bank) and South (everything else)
- Catch data from 1965 in South and 1982 in North
- Survey time series split (change in platform): 1982-2011 and 2012 to present
    - includes absolute abundance index (1997-present)
    - relative abundance index 1982-2011
- Composition data include length in survey and commercial data
- Models include informative prior distributions on survey catchability
- Selectivity is estimated but constant in time

Current Biological Reference Points from 2016 SAW 63

- $F_{MSY} = F_{Threshold} = 0.019$
- $B_{MSY} = SSB_{MSY} = SSB_0/2$

Status in 2017

F_{2015} / FThreshold= 0.246 (25% of F_{MSY})

SSB_{2016} / $SSB_{Threshold}$ = 2.04 (204% of SSB_{MSY})

Proposal for 2020 Management Track Assessment

- Update Commercial data through 2019 (no new survey data available)
- *This includes a re-stratification of the survey*
- *Upgrade to latest version of SS (3.30)*

Alternative Assessment Plan (Plan B)

- Swept area biomass estimate based on survey and median q from depletion studies.

Level of Review Recommendation

Level 1 – no changes beyond the addition of new commercial data.

Butterfish 2020 Management Track Assessment Proposal

Current Assessment (Updated in 2017)

- Current model: 2014 SAW 58 accepted ASAP 4 model as updated in 2017:
  - https://www.nefsc.noaa.gov/publications/crd/crd1805/
- Time series 1989–2016, with survey ages
- Natural mortality is *estimated* in ASAP 4 as $M = 1.25$
- Catchability is *fixed* as the product of availability and efficiency in ASAP 4
  - Revised thermal habitat availability index $A = 0.62$
  - Assumed maximum efficiency of the Albatross relative to the Bigelow = 0.2
- One fishery fleet (commercial landings + discards = total catch)
- One fishery selectivity time block
  - NEFSC fall offshore strata (1989–2016) calibrated to Albatross equivalents
  - NEFSC fall inshore strata (1989–2008)
  - VIMS NEAMAP fall (2007–2016)

Current Biological Reference Points from 2017 model update

- 2014 SAW 58 BRPs were recalculated as per MAFMC SSC advice to enable internal consistency with the ASAP 4 estimate of M
- F_{MSY} proxy = $2M/3 = 0.82$
- SSB_{MSY} = SSB_{MSY} proxy = 48,681 mt (107 mlb)

Status in 2016

- $F_{2016} = 0.05$ (6% of F_{MSY}) *overfishing is not occurring*
- SSB_{2016} = 59,041 mt (130 mlb) (1.2 times SSB_{MSY}) *stock is not overfished*

Proposal for 2020 Management Track Assessment

- Model update through 2019
- Update all fishery and survey data through 2019
  - Note commercial landings and discards require AA tables
  - If 2019 AA tables not available will use CFDERS2019 for landings and mean discards for 2016–2018
- Update to thermal habitat index for 2016–2019 is not available
  - Will use the time series mean ($A = 0.62$) for 1989–2015 from the 2017 update
- Use current ASAP 4 model configuration with no changes
- Update BRPs using 2014 SAW 58 projection approach
  - BRPs will be recalculated as per MAFMC SSC advice to enable internal consistency with the ASAP 4 estimate of M
- Perform projections of OFL and SSB for 2020–2022
  - Assume landings in 2020 equal the Domestic Annual Harvest quota (23,752 mt)
  - Assume stock fished at updated F_{MSY} proxy (TBD when model run) in 2021–2022

Alternative Assessment Plan (Plan B)

- LOESS smoothing of NEFSC fall survey indices to infer future catch increase
- (note that NEFSC spring indices were not used in the SAW 58 accepted ASAP 4 model due to conflicting trends between spring & fall)

Level of Review Recommendation

- Level 2: Expedited Review
- In the Stock Assessment Process document, it says "Changes permitted in level 2 assessments include…Calculate new values for the existing BRPs." Given the MAFMC SSC advice to recalculate BRPs for internal consistency with the estimate of *M* when the ASAP 4 model is run, it is assumed that the assessment will be a Level 2.
- The Stock Assessment Process document also says "Changes permitted in level 2 assessments include…Updated discard mortality estimates, when based on peer-reviewed experimental evidence." The entire time series of discards will be revised with either ADIOS estimates (if available) or the 2014 SAW 58 SBRM SAS code, with several incorrect settings restored to defaults. Thus it is assumed that this will also require the assessment to be a Level 2.
- The NEAMAP indices at age are currently calculated with a composite ALK based on NEFSC inshore strata, 1989–2012. The time series will be revised by using the NEAMAP ALK to calculate the indices at age. (Note the swept area abundance estimates and associated CV will remain unchanged.) This change will have no impact on the suggested level of review recommendation because the Stock Assessment Process document says "Model that has been updated with revised data, with minor changes…" is permissible for a Level 1.

Doryteuthis (*Amerigo*) *pealeii*
2020 Management Track Assessment Proposal

Current Assessment (Updated and accepted by SSC in 2017)

Note: This species has a sub-annual lifespan, is semelparous and spawns year-round resulting in two dominant intra-annual cohorts with different growth and maturation rates (around the globe, each intra-annual squid cohort is assessed and managed separately, but here they are not)

- Swept-area biomass (catchability-adjusted survey catch rates for daytime tows)
  Spring and fall survey biomass estimates for each of the two intra-annual cohorts
  - NEFSC spring survey biomass (1976-2016)
  - NEFSC fall survey biomass (1976-2016) plus NEAMAP fall survey biomass (2007-2016)
- Landings, discards and catches (1963-2016)
  - Bottom trawl discards for small, medium and large mesh sizes, midwater trawls and scallop trawls
- Relative exploitation indices for each of the two intra-annual cohorts (1987-2016)
  - Jan-June catch / spring survey biomass
  - July-Dec catch / fall survey biomass
- **Current Biological Reference Points (from 2017 update)**
  - F_{MSY} or an F_{MSY} proxy could not be estimated with the available data
  - B_{MSY} proxy = 42,405 mt
    (computed as the median of the average B for the two intra-annual cohorts combined, which does not account for their different growth and maturation rates)
- **Stock Status (from 2017 update)**
  - F_{2016} could not be estimated with the available data
  - B_{2016} = 73,762 mt (2015-2016 avg of spring and fall survey biomass)

Proposal for 2020 Management Track Assessment

- Update catches, relative exploitation rates and survey swept-area biomass, separately for each of the two intra-annual cohorts, through 2019
- Compute separate B_{MSY} proxies for each of the two intra-annual cohorts using the current methodology but without averaging spring and fall survey biomass
- Determine 2019 overfished status of each of the two intra-annual cohorts

Level of Review Recommendation

- Level 3 – Enhanced Review

Alternative Assessment Plan

- This assessment currently involves Plan B

Atlantic herring (*clupea harengus*) 2020 Management Track Assessment Proposal

Current Assessment (Benchmark was in 2018)

- Current model: 2018 SAW 65 accepted ASAP model
- 1965-2017
- Constant natural mortality assumption: M = 0.35
- Two fishery fleets (mobile and fixed gear types) each with time invariant selectivity
- Four surveys (spring, fall, and summer NMFS BTS; acoustics collected during fall BTS)

Current Biological Reference Points (BRP) from 2018 SAW 65

- F_{MSY} proxy of $F_{40\%} = 0.51$
- SSB_{MSY} proxy of $SSB_{40\%} = 189{,}000$mt

Status in 2017

- $F_{2017} = 0.45$ (88% of $F_{MSYproxy}$; overfishing not occurring; Probability of overfishing = 24%)
- $SSB_{2017} = 141{,}473$mt (75% of $SSB_{MSYproxy}$; not overfished; Probability of overfished = 2%)
- Status changed to "approaching overfished" in 2019 based on short-term projections conducted during specifications

Proposal for 2020 Management Track Assessment

- Update all assessment data through 2019
- Use current ASAP model configuration with no changes
- Update BRPs using 2018 SAW 65 projection approach, maintaining MSY level proxies of $F_{40\%}$ and $SSB_{40\%}$
- Perform projections of OFL and ABC for 2021-2023
  - Assume Catch in 2020 = 2020 ABC
  - Apply ABC harvest control rule as approved in Amendment 8

Alternative Assessment Plan (Plan B)

- LOESS smoothing fit to mean of all survey indices; log linear regression on the last three years of the smooth; back-transformed slope to estimate "multiplier" for application to recent catch
- Why?
  - Little basis to consider alternatives
  - Most "DLM" tools (e.g., DCAC) require some reasonable guess as to current depletion or some other quantity that I am not comfortable with
  - Data driven, and although noisy, the indices are consistent for herring
  - Familiarity in the region

Level of Review Recommendation

- Level 1 – direct delivery
  - No changes to data or model structure
  - I expect a worsening retrospective pattern, but not enough to require adjustment

Atlantic mackerel 2020 Management Track Assessment Proposal

Current Assessment (Benchmark was in 2017)

- Current model: 2017 SAW 64 accepted ASAP model
- 1968-2016; ages 1-10^{+}
- Constant natural mortality assumption: M = 0.2
- One fishery fleet with time-invariant, flat-topped selectivity
- Three surveys
    - Spring NMFS bottom trawl survey, Albatross years 1968-2008 (number/tow for ages 3^{+})
    - Spring NMFS bottom trawl survey, Bigelow years 2009-2016 (number/tow for ages 3^{+})
    - Range-wide SSB index, 1977-2016 (though several missing years)
        - Developed from DFOs dedicated egg survey, and NEFSC MARMAP and ECOMON surveys

Current Biological Reference Points (BRP) from 2017 SAW 64

- F_{MSY} proxy of $F_{40\%}$ = 0.26
- SSB_{MSY} proxy of $SSB_{40\%}$ = 196,894 mt

Status in 2016

- F_{2016} = 0.47 (180% of $F_{MSYproxy}$; overfishing occurring)
- SSB_{2016} = 43,519 mt (22% of $SSB_{MSYproxy}$; overfished)

Proposal for 2020 Management Track Assessment

- Update all assessment data through 2019, provided that Canada is able to provide 2019 data in time
- Use current ASAP model configuration with no changes; Do not plan to operate the secondary models (SAM and CCAM) as they were developed to support trends in the primary model
- Update BRPs using 2017 SAW 64 projection approach, maintaining MSY level proxies of $F_{40\%}$ and $SSB_{40\%}$
- Perform projections of OFL for 2021-2023
    - Assume catch in 2020 = 2020 ABC

Alternative Assessment Plan (Plan B)

- LOESS smoothing fit to range wide egg index; log linear regression on the last three years of the smooth; back-transformed slope to estimate "multiplier" for application to recent catch
- Why?
    - Method proposed during 2017 benchmark and used in the region
    - Little basis to consider alternatives
    - Does not require assumption of current depletion level or unfished biomass, like many data-limited approaches
    - Data driven (driven by recent index trends)
    - Egg index thought to be most representative of trends in the stock

Level of Review Recommendation

- Level 1 – direct delivery
    - No changes to data or model structure

- Sensitivity analyses for SSC consideration (per SSC request in May 2019):
    - To consider evidence of alternative recruitment regimes in the most recent decades, the time series of recruitment estimates used to develop the empirical cdf for projections will be modified from 1975 onward to 1) 1999 onward, and 2) 2009 onward.

      A 2017 benchmark working paper on industry perspectives indicated that fishermen have observed marked changes in mackerel distribution and seasonal movement patterns, which they attributed to environmental changes, and that after 1998, large fish have generally not been available to the mid-Atlantic bight winter fishery in the coastal zone.

    - To consider evidence of variable rates of natural mortality, a likelihood profile for natural mortality will be completed. No new information on natural mortality is available.

      During the 2017 benchmark, the WG acknowledged that natural mortality likely varied over time, but concluded that the percent occurrence of mackerel in the diets of those predators well sampled by the NEFSC's bottom trawl surveys was not sufficient to inform time-varying natural mortality rates. In addition, estimates of predation mortality were not available for the months the northern contingent was outside of the NEFSC trawl survey area. The working group also discussed the possibility of modeling natural mortality as age-varying, though time-invariant. However, recent work on the performance of assessment models across varying assumed natural mortality rates indicated that an assumed age-invariant natural mortality that approximates the average natural mortality across ages performed similarly to age-varying natural mortality values (Deroba and Schueller 2013). Accordingly, the working group moved forward with the assumption that natural mortality was constant across all ages and years.