External Independent Peer Review Report
Center for Independent Experts

SARC 49: Butterfish and Atlantic surfclam Benchmark Stock Assessments

November 30 to December 3 2009 NEFSC, Woods Hole, Massachusetts

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Executive Summary

- This report is an independent peer review of benchmark assessments for butterfish and Atlantic surfclam presented at the 49th SARC meeting.

- Terms of Reference (TOR) relating to the butterfish assessment were met in all important respects, except one, regarding Biological Reference Points (BRPs). Here the new proposed BRPs were rejected. In principle the old BRPs should then be kept, but in this special case these were obviously not applicable because the whole time series of biomass was a factor of three larger than in the last assessment. The assessed state of the stock and fishing mortality were accepted, but the estimated uncertainties were evaluated to probably be too large. Simple and very transparent exploratory assessment models were made during the meeting and these limited the possible lower and upper range of fishing mortality and stocks sizes. Large inconsistencies between natural mortality estimates (using different approaches) were identified. Obtained directly from predation studies, M is estimated to be around 0.1 (however recognising that this is an underestimate as several potential important predators were not accounted for, e.g. whales, seabirds, squids), based on previous assessment M is estimated to be around 0.8 and based on calculations made during the meeting on trawl survey data around 2.0. It was concluded 1) that the present fishing mortality is below any candidate value of Fmsy and that overfishing is not taken place, 2) that the stock biomass has been decreasing over time to a low level, and 3) that this is mainly due to other factors than fishing, although fishing, of course, has contributed to the decline. Whether the stock is overfished was not possible to determine because no BRP for biomass could be accepted.

- Terms of Reference (TOR) relating to the Atlantic surfclam assessment were met in all important respects. The assessment is generally evaluated to be good. The science is well done. Data are rich. There are some uncertainties in the catchability of the research vessel surveys, and the Bmsy proxy is quite "ad hoc" and should be considered in the future using more conventional approaches. The assessment was judged as providing a scientific credible basis for developing management advice in the current situation with low fishing mortality.

Background

The Northeast Regional Stock Assessment Review Committee (SARC) meeting is a formal meeting of stock assessment experts serving as a panel to peer-review tabled stock assessments and models. This report is an independent peer review of benchmark stock assessments for butterfish and Atlantic surfclam presented at the SARC 49 meeting. The SARC panel consisted of a chairman and three reviewers appointed by the Center for Independent Experts (CIE). This report constitutes my own personal review of the assessments. It is designed to be read as a stand-alone document, but there are strong overlaps with the Summary Report of the SARC panel, to which I contributed. The report also contains the Statement of Work for the review (Appendix 2), which includes Terms of Reference (TOR) for each assessment and a meeting agenda.

Description of the Individual Reviewer's Role in the Review Activities

Stock assessment reports and background working papers for SARC 49 (see Appendix 1) were made available to the SARC Review Panel on the NEFSC website 14 days before the meeting, except for two background documents which came 10 days and 3 days before the meeting, respectively. This allowed sufficient time for reviewers to become familiar with the overall context of the SARC process and with the material to be covered at the meeting. Terms of Reference and a draft agenda were also available before the meeting. The SARC 49 meeting was held at the Northeast Fisheries Science Center (NEFSC) at Woods Hole, Massachusetts, starting at 13.00 am on Monday 30 November and finishing at 3.00 pm on Thursday 3 December 2009. Stock assessment presentations for Atlantic surfclam were made by the lead assessment scientists on Monday. Questions and comments from the SARC panel were taken during the presentations. The morning of Tuesday was taken up with the main presentations on butterfish. Butterfish turned out to be a difficult case and further analysis of the butterfish assessment was needed and some of this was done on Tuesday and Wednesday. Tuesday afternoon was spent on follow-ups to the surfclam assessment. Wednesday was taken up with drafting of the Assessment Summary Report for surfclam and further elaboration on butterfish. Thursday was spent mainly drafting and discussing the review report (most time spent on butterfish) in a closed meeting of the 4 reviewers. In addition there was a one-hour open meeting discussion of butterfish issues with a focus on BRPs. The initial drafts were discussed, amended and agreed among the SARC panel before the close of the meeting. The butterfish summary report had to be redrafted because the new BRPs were not accepted and nor were the old ones. This was done by the assessment group and a new version circulated to the reviewers on Friday 11 December 2009. Some discussion on this took place by email until 15 December where a WEBEX conference was conducted. This took 2.5 hours and a final summary report was agreed. More advanced drafts were prepared by panel members during the two weeks following the meeting and edited into the overall SARC summary report by the SARC Chairman.

All parts of the meeting were open to other interested parties, except for a one-hour meeting between reviewers to internally hold discussion on the difficult butterfish assessment and the drafting on the review report for butterfish. Industry representatives, Management Council members and university scientists were present for almost all of the open sessions. No consensus among SARC panel members was required or sought, but there was a broad level of agreement about the extent to which the TORs for each assessment were met. Panel members made their views clear during the open sessions, such that the teams responsible for each assessment were aware of the likely conclusions with respect to each TOR.

Findings of whether to accept or reject the work reviewed, and an explanation of the decisions (strengths, weaknesses of the analyses, etc.) for each ToR.

Butterfish

1. *Characterize the commercial catch including landings, effort and discards by fishery (i.e., Loligo fishery vs other fisheries). Characterize recreational landings. Describe the uncertainty in these sources of data. Evaluate the precision of the bycatch data with respect to achieving temporal management objectives throughout the year.*

Most of this TOR was addressed in full. The only part which might be said to be missing is the temporal by-catch which aims at informing management on temporal management potentials. Information is given by fleet group on an annual basis and this probably contains some implicit information about temporal issues. However, no specific account was presented on how to sample and work up by-catches of butterfish in the squid fishery (the main part of the catch of butterfish is by-catch in the squid fishery), so that quota uptake can be made available in near real-time in order to be able to stop the fishery when the quota is fished up.

There is a very long time series of commercial catches going back more than 100 years. Catch by length data are available from 1989. Discards have been accounted for to a large extent based on observer data. As normal for observer data from relatively small vessels, the coverage (in terms of observers) of trips is limited and this gives large CVs on estimated catches.

In table B2-B9, the discards values given seem not to correspond to the values given in table B1, for instance for year 1999 the B2-9 value is about 5400 t, while the value from Table B1 is 8927 t. The reason for this discrepancy is not obvious. It was not clear from the material presented how the discard estimates were obtained although there were references that described the calculations.

The discards estimated from the Loligo catches Table B10 were not used due to very high CVs. However, these data in general gave higher discard estimates than the ones used and this might be looked at in future assessments.

The hindcast discards estimates formula on p. 8 was changed and new ones presented at the meeting. The new ones were accepted.

At the meeting some nice maps of observer data of butterfish catch by month were presented. These were very relevant for informing on the spatial distribution of the stock over seasons and would have been good to include in the report.

Effort was not dealt with numerically, but there was a detailed description of how the directed fisheries have changed over time. In the recent years, butterfish has only been caught as discards in the squid fishery.

2. *Characterize the survey data that are being used in the assessment (e.g., indices of abundance including RV Bigelow data, NEAMAP and state surveys, age-length data, etc.). Describe the uncertainty in these sources of data.*

Most of this TOR was addressed in full. There are as many as three annual NEFSC surveys all with age data and long time series, with good spatial coverage for butterfish. The CVs are relatively small. This gives a good basis for the stock assessment. There was no mention of RV Bigelow data (except in the modelling) so this point in the ToR cannot be evaluated. However, comparison surveys and experiments between the old and the new vessel were presented at the meeting and these were very extensive. This will provide a good basis for the transition from the old vessel to the new one. State surveys are properly dealt with given the time available. However, further look into these might add valuable information to the assessment.

The NEFSC survey data (Tables B16 and B17) allows for calculation of total annual mortality, Z, and the table below gives these as calculated by me:

		age0/age1	age1/age2	age2/age3	age3/age4
Spring	Z		1.711228	1.725872	2.397748
Fall	Z	1.835341	1.395698	2.523966	2.513727

It can be seen from this that Z is very high and relatively similar across ages and across Spring and Fall surveys. These estimates implicitly assume that catchability is constant by age by Spring and Fall survey (but could be different by Spring and Fall survey), which is a fair assumption (based on experience in other ecosystems and similar ecotype fish species) given the small dynamic range of sizes and that commercial catch data are not indicating that the surveys are missing e.g. the old fish to any large extent. These Z values are important for the later judgement of the assessment. The Working Group scientists elaborated on this during the meeting and provided very useful analysis of changes over time, which seems not to have been large, and confirmed the potential usefulness of this approach.

Large or weak year classes are not easy to track through time in the survey data, which normally is an indication of uncertainties in either ageing or survey catch in

No/hr fishing. It would have been nice to see catch by length data from the surveys in order to be able to see whether it is one or the other situation. Of course age reading comparisons between age readers and over time would also have been nice to see if available, and so would validation of age readings. The Working Group scientists provided such length distributions during the meeting. These however were not as clear as expected and peaks in the distributions in one year were not easy to follow to the next year. The CVs of the survey CPUE for butterfish are as stated above relatively low, so it might be useful to look into other explanations of this lack of traceability of strong and weak year classes.

It was not clear from the report that the winter survey used another gear with lower net opening than the other two surveys. This was mentioned at the presentation.

State and NEFSC surveys seem not to be well coordinated. This is not only a butterfish issue but a general issue for all species on the northeast USA shelf area. The current system seems to be a result of state vs. federal lack of co-operation.

Figure B16 and B17 seem to be inconsistent, e.g. the 2008 data seems to differ although they should be the same. The presenters promised to look into this during the meeting and came back with corrected figures. These will be incorporated in a revised version of the Working Group report.

3. *Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) for the time series, and characterize the uncertainty of those estimates.*

Most of this TOR was addressed in full.

The KLAMZ model is used as in the previous assessment. The assessment is difficult because the catch is small and not of much help in estimating parameters so the assessment has to rely heavily on surveys. Luckily these are good, but as is normal for surveys it is not easy to relate survey indices to absolute biomass. This is reflected in the uncertainties in the stock population dynamics parameters estimated. These seem however to overestimate uncertainties (by nearly a factor of 2) as its 95% CI spans are much wider than the "envelope" boundaries (see below). The KLAMZ model seems too flexible and is very dependent on having a skilful modeler. The results were for instance very dependent on the settings of the priors for survey catchability and catches had to be assumed to be very precise for the model to converge. A simpler and more transparent approach in future assessment seems desirable.

Natural mortality – based on surveys alone Z is about 1.7 for age 0 to 2 and 2.5 for age 3 and 4 – M is assumed to be 0.8 in the KLAMZ modelling and F is about 0.1. This sums to only 0.9 so something is missing. This points towards M of about 1.6 - 2.4 instead of the used value of 0.8. It would have been interesting to see a model run with these M values, but other exploratory runs were prioritised at the meeting and I agreed with these priorities.

The catchability of the surveys cannot be larger than 1 which gives a lower limit to the biomass estimates, which are more or less similar to last assessment values (except that M might be quite different, it might be useful to apply catchabilities

directly to survey data and see what biomasses you get – this was actually done at the meeting by the Working Group scientists – see below).

Additional analyses were done during the meeting using survey data directly and high and low Qs to give upper and lower limits of stock biomass. Also similar upper and lower bounds were calculated based on catch data alone and assumed upper and lower F values. These gave "envelopes" or bands within which the stock estimates have to be.

Length frequency data from surveys were presented to see whether age determination could be verified and whether the large component of butterfish were lacking compared to the commercial catch, which would indicate that q for the larger fish is lower than for the shorter fish. There seem to be some indications of lack of large butterfish in the survey, so survey catchability of large butterfish is probably somewhat smaller than for small and medium sized butterfish. This implies that the increase in M seen for older butterfish (see above) might be an artifact.

The catchability estimation from the KLAMZ model seems somewhat opaque. It is not described what part of the survey data are collected by the Albatross IV and what part by the Henry B. Bigelow. The relative catchability between the two ships is probably well estimated, but the overall catchability (estimated to be 20% for the Albatross IV) is based on the KLAMZ model, the setting of the priors and a goodness of fit. I would expect the uncertainty to be large as there is not much information in the data for estimating catchability. The large sensitivity of the model to priors on survey catchability supports that expectation.

Several sensitivity analyses were performed and they gave useful indications of the precision of the assessment. As expected, this is low as the KLAMZ output of CV >0.5 also indicates.

The large increase in stock biomass throughout the time series in this year's assessment compared to last assessment made by NEAFC 2004 is due to the new catchability parameters for the survey. Last time they were implicitly larger than 100%, which is by definition impossible. Thus, the new assessment is preferable.

The assessment was accepted in terms of the low F, SSB at least at the lower "envelope" boundary and the decreasing trend in biomass over time to about ¼ of past values. The presented KLAMZ estimates were accepted except the CVs, which are evaluated to be too high. Given the current low fishing mortality, the assessment (but not the BRPs – see below), in spite of its large uncertainty, provides a credible background for scientific advice on management.

4. *Update or redefine biological reference points (BRPs; estimates or proxies for B_{MSY}, $B_{THRESHOLD}$, and F_{MSY}; and estimates of their uncertainty). Comment on the scientific adequacy of existing and redefined BRPs.*

With the large change in perception of the historical stock size the BRPs had to be updated. The new assessment uses a new approach, which is consistent with the assessment model, but I have reservations – see below.

I am critical of the new approach using a Y/R approach, ignoring a possible S-R relationship and getting an SSBmsy of only one third of the lowest ever observed. Considering the S-R plot I think that the hypothesis that there is a linear relationship between S and R has a higher likelihood than that there is no relationship. It would be

more appropriate to use a "breakpoint S-R" model and let the data determine where the breakpoint is. There is software around for such an analysis. If the KLAMZ cannot handle this S-R model, then a B&H model should be fitted to the breakpoint model (say for the SSB values experienced historically) and used. This should give a lower Fmsy (which is good because a value of 1.04 is far above the Fmsy for most if not all other comparable fish stocks) and higher SSBmsy. Using a Y/R approach when there is no Fmax is problematic. When there is no Fmax it is also very uncertain whether F0.1 is realistic as a BRP.

The new assessment is clearly evaluated to be better than the old assessment (see above) and can be used in getting BRPs.

As a matter of urgency I presume new BRPs should be developed. There are several conventional options. One is to use 30% or 40% of pristine SSB (here maybe the largest SSB could be used as a proxy for pristine SSB). Another is to use the hockey stick approach to get the S-R break point and define that as the Bthreshold and work out the related Btarget, Ftarget and Fthreshold from that value.

The fact that the stock has decreased over the entire time period of the assessment, i.e. since 1973 and that F has been low especially in recent years implies that fishing is not the main cause. Some unexplained reasons for low recruitment are responsible. It can be questioned whether BRPs are relevant in those cases. However, as the conditions for recruitment might return to previous good levels, I would advise that BRPs be set.

Butterfish is a short lived species and the fishery is strongly related to recruitment. Thus, F BRPs might not be of much relevance. Approaches in other parts of the world (e.g. capelin in the Barents Sea, capelin around Iceland) use only Biomass BRPs and set these so that there are enough spawners to secure good recruitment given average environmental conditions.

> 5. *Evaluate stock status with respect to the existing BRPs, as well as with respect to updated or redefined BRPs (from TOR 4).*

If the revision from above is accepted, then this needs to be reevaluated.

> 6. *Evaluate the magnitude, trends and uncertainty of predator consumptive removals on butterfish and associated predation mortality estimates and, if feasible, incorporate said mortality predation estimates into models of population dynamics.*

The Working Group has made good progress on this issue. They are fortunate to have a large database with stomach data available as well as good estimates of predator abundance over time. For these data they have calculated that the top six predators consume an amount of 4-6000 t per year of butterfish. They however lack the rest of the piscivorous fish, the cetaceans and seabirds as predators, as well as a good account of what is going on in the coastal areas. However, 6000t per year only represents about 0.1 in annual mortality with the current stock estimates. If M is 0.8 then there is a lack of explanation for the rest of the M (0.7). If the survey Z values are used as

guidance then the gap is even more. I would thus rather focus effort on finding out where the rest of the natural mortality is happening than try at this stage to include predation in the assessment model, as suggested by the Working Group.

Thus, this ToR is met to a reasonable extent.

> 7. *Develop and apply analytical approaches and data that can be used for conducting single and multi-year stock projections and for computing candidate ABCs (Acceptable Biological Catch; see Appendix to the TORs).*
>   a. *Provide numerical short-term projections (1-5years). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and probabilities of falling below threshold BRPs for biomass. In carrying out projections, consider a range of assumptions about the most important uncertainties in the assessment.*
>   b. *Comment on which projections seem most realistic, taking into consideration uncertainties in the assessment.*
>   c. *For a range of candidate ABC scenarios, compute the probabilities of rebuilding the stock by January 1, 2015.*
>   d. *Describe this stock's vulnerability to having overfished status (consider mean generation time), and how this could affect the choice of ABC.*

This ToR was fulfilled to the extent possible.

Projections could not be made in relation to BRP as these were not accepted. As stated above future population status is dependent on future recruitment. Models for forecasting recruitment were not developed in this assessment. If it is assumed that future recruitment is equal to the average of recruitments over the last 10 years, M is constant at 0.8, and current fishing mortality rate will continue to be low (F=0.02), based on the KLAMZ model the population is expected to increase. However, these quantitative projections of population size are very uncertain because recruitment is very uncertain, and because the assumed value of M is highly uncertain and could be higher than the assumed rate.

> 8. *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.*

This ToR is fulfilled. Especially the important issue of discards has been well analysed and well incorporated into the assessment, although the documentation could be improved (see above) and the inconsistency with the Table B10 as described above could be look at.

Further assessments should explore higher levels of M like those emerging from the surveys.

The KLAMZ model seems too flexible and is very dependent on a skilful modeller running it, i.e. there were too many settings that had to be based on subjective judgements. A simpler and more transparent approach in future assessment seems desirable.

As a matter of urgency, it seems to me, new BRPs should be defined.

It is suggested by the Working Group to make new model runs that account specifically for the natural mortality due to the predators analysed (and which gave an annual mortality of about 0.1). I would rather focus effort on finding out where the rest of the natural mortality is happening (sea mammals, sea birds, coastal predation and spawning mortality) than try at this stage to include predation in the model.

Conclusions

The overall conclusion is that the Working Group has fulfilled most of the ToRs to a degree that has resulted in a useful assessment, but the lack of BRPs makes scientific advice to management of the butterfish stock difficult. However, fishing mortality is low and even a zero fishing mortality will not result in a rebuilding of the stock, if recruitment conditions are not improved.

Atlantic surfclam

The assessment is only dealing with EEZ areas and the clams found and fished here. However, the coastal state clams are probably part of the same stock (or stock complexes). It seems to be an artificial split with very little scientific justification. From discussions at the meeting it seems that the reason is to be found in history, politics and legal restrictions.

It seems a better approach from a scientific point of view to assess the entire stock (state water and EEZ fish) and afterwards split it into management units (state water and EEZ water) when forming the scientific advice. This includes harmonizing of data collection and research vessel monitoring surveys.

However, due to the relative constant proportion of clams in the State water compared to EEZ recently, currently it does not significantly impact the current assessment.

1. *Characterize the commercial catch including landings, effort, LPUE and discards. Describe the uncertainty in these sources of data.*

This TOR was addressed in full.

There was a very good account of effort and CPUE, its amounts, its spatial and time-wise distribution, and its uncertainties.

Technological creeping (change in catchability) in relation to LPUE data was not mentioned in the reports. It was informed at the meeting that GLM analyses have been performed but that technological creeping specifically had not been included.

The biological sample size seems to be on the low side compared to normal standards, but stability in parameters from year to year indicate good precision anyhow.

The apparent lack of large clams since 2005 (Figures A14-A17) in the three main regions could have been noted and commented upon in the report. This was clarified at the meeting as an error in the plotting and thus the lack is not real.

I strongly support the future plans of ageing commercially caught surfclam as the aging seems to be very reliable, and this can add important information for the assessment and therefore improve the scientific basis for management.

The growth changes in southern areas – could that have any link to changes in eutrophication? Was eutrophication greater in the past than today? This was discussed, and there was no clear evidence of this except maybe in coastal areas.

Quahogs in the surfclams fishery? This was stated to be insignificant because of market and regulation conditions – the fishers avoided that. It would have been nice to see some kind of documentation of this claim.

2. *Characterize the survey data that are being used in the assessment (e.g., regional indices of abundance, recruitment, state surveys, age-length data, etc.). Describe the uncertainty in these sources of data.*

This assessment is fortunate to have very well done and relevant surveys. Very interesting and useful depletion experiments have been done as well. These give good indications (although with some uncertainties around the parameters) for the real density and thus catchability of the survey gear. All important aspects were analysed properly in these depletion experiments. Catchability parameters are as expected uncertain, but that has been accounted for well in the assessment. The reduced selectivity of the survey for large clams is surprising, but several special analyses of data showed that this probably is real.

The shell length to meat weight is now using survey catches. It was suggested to do this by season, area and size of surfclam.

Growth data could be area and depth stratified.

3. *Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) for the time series, and characterize the uncertainty of those estimates.*

This TOR was addressed in full.

The KLAMZ model used does not make full use of all the available shell length or age data from surveys or shell length data from the fishery, which contain useful information about recruitment. KLAMZ assumes knife edge selection (fish of the same age or size recruit to the fishery and the model at the beginning of the year). In reality, surfclams begin to recruit to the commercial fishery at roughly 10 cm and are almost fully recruited at about 15 cm, with variability among regions and over time. KLAMZ assumes that all individuals are the same size at each age even though growth data show considerable variability in size among surfclams of the same age. KLAMZ is divided up into two "age" groups (new and old recruits) with the latter representing survivors from previous years. In KLAMZ all of the old recruits have the same survey selectivity, even though the actual survey selectivity pattern is dome shaped for surfclams. KLAMZ is mathematically identical to an age structured model

with knife edge recruitment and von Bertalanffy growth. It seems to have been difficult to get the KLAMZ to converge, and it needs a skilful modeller to get sensible results out of it.

It is therefore a good plan, stated by the Working Group, to try to make an age based model next time this stock is assessed. I recommend that the new model becomes more transparent than the old model, and that the settings are made more fixed so that future updates came be made easily and in a strictly consistent way.

The lack of fit between LPUE and stock trend from the assessment is adequately justified by the distribution of fishing (quite constant) and in comparison to the change in the distribution of the stock ("moving" towards north).

A very good and illustrative analysis was presented of the contribution to the retrospective pattern in model output from the various factors (Table A32). This helps make the assessment more transparent. The decreasing LPUE in DMV and NJ is a strong support for the survey data indication of a shift in spatial distribution of surfclam.

An error was discovered in Figure A8 for the Summary. This was corrected during the meeting.

4. *Update or redefine biological reference points (BRPs; estimates or proxies for B_{MSY}, $B_{THRESHOLD}$, and F_{MSY}; and estimates of their uncertainty). Comment on the scientific adequacy of existing and redefined BRPs.*

This ToR is adequately addressed.

The BRP is appropriately updated due to a new assessment that has revised the entire time series in terms of biomass and fishing mortality.

Using the 1999 biomass as a basis for the BRP calculations was regarded as sensible but somewhat arbitrary. In the future, and maybe in connection with a future age based assessment modelling, more conventional calculations of BRP should be pursued.

5. *Evaluate stock status with respect to the existing BRPs, as well as with respect to updated or redefined BRPs (from TOR 4).*

This is adequately addressed and the stock status conclusions are not sensitive to the uncertainties in the assessment due to the large margin of the present stock parameters to the BRPs.

6. *Identify potential environmental, ecological, and fishing-related factors that could be responsible for low recruitment.*

This TOR was addressed in full.

The Working Group made several good analyses and explored various possible reasons. There might be some indications, although weak, that the juveniles in some areas die before they reach fishable sizes. The reason for this is however not certain.

Predation by crabs or predators (maybe some flatfish) on juveniles was mentioned at the meeting as a potential possibility.

During the meeting data on crab and a few other potential predators on surfclam abundance over time from surveys were provided to throw light on the possible predatory impact on newly settled surfclam. They showed that there were no obvious candidates for reasons for the increased mortality of juvenile surfclams.

A die-off in 1976 was maybe due to pollution and anoxia from organic load dumped by the city of New York. In 2000 the die-off was probably due to temperature. This was observed in area 9 but it was not clear how widespread it was. It remains uncertain whether temperature can be shown to be responsible for the trend in stock by area.

> 7. *Develop and apply analytical approaches and data that can be used for conducting single and multi-year stock projections and for computing candidate ABCs (Acceptable Biological Catch; see Appendix to the TORs).*
>   a. *Provide numerical short-term projections (1-5 years; through 2015). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and probabilities of falling below threshold BRPs for biomass. In carrying out projections, consider a range of assumptions about the most important uncertainties in the assessment.*
>   b. *Comment on which projections seem most realistic, taking into consideration uncertainties in the assessment.*
>   c. *Describe this stock's vulnerability to becoming overfished, and how this could affect the choice of ABC.*

This TOR was addressed in full.

Figure A76. It was not very clear why the Fmsy scenario in the forecast to 2015 in some years went higher than 0.15 (which is the Fmsy). At the meeting this was explained to be due to slight model deficiencies, that it was impossible to exactly match the wanted F level and to various ways of interpreting what a 0.15 future F is in terms of a forecast calculation, like how much implementation error should it include, how much uncertainty in the biology etc. These were accepted as reasonable explanations.

> 8. *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.*

This TOR was addressed in full.

The WORKING GROUP has dealt with the most important research recommendations and further improved the assessment accordingly. The list of research recommendation in recent SARC reviewed assessments and review panel reports is very long and the balance between funding and research issues to be dealt with is difficult for me to evaluate but my evaluation is that the WORKING GROUP has made good priorities in the selected items they have dealt with.

New research recommendations:

1. M might be estimated from the model using the survey data – there are good absolute estimates from the survey.

2. I strongly support the future plans of ageing commercially caught surfclam as the aging seems to be very reliable, and this can add important information for the assessment and therefore improve the scientific basis for management.

3. Continue the Stock Synthesis modeling – age data seem to be reliable. This could also give some clues to why recruitment declines because it can link individual year's recruitment to environmental conditions and maybe then offer an explanation on the generally decreasing trend in R.

4. Bmsy should be calculated based on the planned new age based model. An S-R model will have to be developed for this. Other more conventional ways of getting Bmsy proxies should also be pursued at the next benchmark assessment.

5. The plan to use commercial vessels to do the monitoring survey compared to the current R/V system seems important although it has some implicit "dangers" for the consistencies over time due to catchability instability and technological creeping. However, as the commercial dredging has a near 100% catchability this is probably not a major problem as it can be measured in terms of e.g. dredge width or other parameters properly reflecting the gear performance.

6. Technological creeping in relation to LPUE could be useful and helpful for the assessment to look into more closely. A fishery as technical as clam dredging with pumps and water streams in the bottom to flush out clams might be especially relevant for technological creeping, although as stated above this might be well reflected in measurable gear and fishing parameters.

NMFS Review Process

The Statement of Work for CIE reviewers (Appendix 2) asks for a critique of the NMFS review process, with suggestions for improvements of both process and products. From a reviewer's point-of-view the process worked very well during SARC 49. Strengths that should be emphasized include:

- Meeting logistics well arranged, which allowed for a strong focus on issues raised at the meeting;

- Availability of documentation well in advance of the review meeting;

- Effective chairmanship of the review meeting, ensuring that discussions remained on-topic and included the views of all interested parties;

- Effective guidance by the SAW chairman, ensuring that the required outcomes of the review were kept in mind;

- Early availability during the meeting of presentation material and effective rapporteur reports;

- Willingness of assessment scientists to undertake additional analyses when required;

- An atmosphere of scientific rigor coupled with a pragmatic, "real world" approach to producing required outputs;

- Precise terms of reference for the meeting and precisely defined requirements for reviewer outputs. A number of these strengths are primarily indicative of a constructive attitude among meeting participants, but the existence of well-defined requirements and review structure created the necessary conditions for this to happen.

I cannot identify any real weaknesses to the process. There are only maybe two small issues I can point out. One is a more precise statement in the "Statement of Work for Review" that the Summary Report is a product of the review process based on a draft from the Working Group, including more precise guidelines on the form of advice and format of the document. The other is more precise guidelines on when to accept and when to reject the work in relation to a given ToRs, including the overall conclusion of having or not having a credible scientific basis. I have the opinion that scientists should always be able to give their best estimate of the stock status (including biomass and fishing mortality) and forecast, because logically if there is a better assessment around than the current one, then this new assessment should be the one recommended. However, the best estimate should be clearly linked to the uncertainties around it. Scientists should always, with the same logic as above, be able to give their best estimate of uncertainties. Given that these are well done scientifically, one has a credible scientific basis for management, even if the confidence intervals are very wide. If the confidence intervals are very wide management must act accordingly, taking into account the legal framework under which the management works, i.e. the precautionary approach. Thus, the present evaluation is on whether the science is "well done" and whether the estimates have been presented. The issue of whether the assessment is precise enough is mainly a matter of basic research and data collection. That is to a large extent a matter of political priorities and that is not up to this review to decide upon; however, an evaluation of whether this follows normal practises or not, might be part of the review, like whether the assessment is unusually imprecise compared to the importance of the stock for the fisheries or ecosystem. These rough principles are the ones I have used in my review.

The current review process has the right balance between defining the structure and requirements of the assessment and review and allowing space for creative science, effective outcomes and constructive discussion.

Appendix 1: Bibliography of materials provided for review

Butterfish:

Working Paper B1; Assessment Report, November 18, 2009. Stock Assessment of Butterfish (*Peprilus triacanthus*) in the Northwest Atlantic. SAW/SARC 49, November 30- December 3, 2009, Woods Hole, MA. Coastal/Pelagic Working Group, Northeast Fisheries Science Center, National Marine Fisheries Service, Woods Hole Laboratory, Woods Hole, MA 02543.

Working Paper B2; Assessment Summary Report. November 18, 2009. Atlantic Butterfish. Assessment Summary Report. SAW/SARC 49, November 30 – December 3, 2009, Woods Hole, MA.

Timothy J. Miller, Chhandita Das, Phil Politis, Alicia Long, Sean Lucey, Christopher Legault, Russell Brown, and Paul Rago. 2009. Estimation of Henry B. Bigelow calibration factors. Northeast Fisheries Science Center, National Marine Fisheries Service,166 Water Street, Woods Hole, MA 02543. Working Paper for Vessel Calibration Analysis Review, August 10, 2009.

Amendment 9 to the Atlantic mackerel, squid, and butterfish fishery management plan. Volume 1 + 2, February 12, 2008. Mid Atlantic Fishery Management Council in cooperation with the National Marine Fisheries Service. Draft adopted by MAFMC: March 2006, February 2007, Final adopted by MAFMC: August 2007. A Publication of the Mid-Atlantic Fishery Management Council pursuant to National Oceanic and Atmospheric Administration Award No. NA57FC0002.

2004. 38 SAW Butterfish background report.

1994. 17 SAW Butterfish background report.

Atlantic surfclam:

Working Paper A1; Assessment Report, November 13, 2009. Stock assessment for Atlantic Surfclams in the US EEZ. Invertebrate Subcommittee. SAW/SARC 49, November 30-December 3, 2009, Woods Hole, MA.

Working Paper A1a; Appendixes. November 13, 2009. SURFCLAM APPENDIXES. Invertebrate Subcommittee. SAW/SARC 49, November 30- December 3, 2009, Woods Hole, MA.

Working Paper A2; Assessment Summary Report. November 13, 2009. ATLANTIC SURFCLAM ASSESSMENT SUMMARY FOR 2009. SAW/SARC 49, November 30-December 3, 2009, Woods Hole, MA.

Surfclam Background Paper (WP A3). C. ATLANTIC SURFCLAM ASSESSMENT SUMMARY FOR 2006.

Surfclam Background Paper (WP A4). C. ASSESSMENT OF ATLANTIC SURFCLAM.

Weinberg, J. R. 2005. Bathymetric shift in the distribution of Atlantic surfclams: response to warmer ocean temperature. ICES Journal of Marine Science, 62: 1444-1453.

NOAA Technical Memorandum NMFS-NE-142. Essential Fish Habitat Source Document: Atlantic Surfclam, *Spisula solidissima*, Life History and Habitat Characteristics. U. S. DEPARTMENT OF COMMERCE, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Region Northeast Fisheries Science Center, Woods Hole, Massachusetts, September 1999.

Appendix 2. Statement of Work

Attachment A: Statement of Work for Dr. Henrik Sparholt

External Independent Peer Review by the Center for Independent Experts

49th Stock Assessment Workshop/ Stock Assessment Review Committee (SAW/SARC)
Atlantic Surfclam and Butterfish

Statement of Work (SOW) for CIE Panelists
(including a description of SARC Chairman's duties)

Scope of Work and CIE Process: The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from www.ciereviews.com.

Project Description: The purpose of this SARC49 meeting will be to provide an external peer review of benchmark stock assessments for Atlantic surfclam (*Spisula solidissima)* and butterfish *(Peprilus triacanthus)*. Surfclams are sedentary infaunal bivalves. Butterfish are a schooling pelagic fish. This review determines whether the scientific assessments are adequate to serve as a basis for developing fishery management advice. Results form the scientific basis for fishery management in the northeast region. This meeting satisfies Prioritization criteria 1-3. The Terms of Reference (ToRs) of the peer review are attached in **Annex 2**. The tentative agenda of the panel review meeting is attached in **Annex 3**. The SARC Summary Report format is attached as **Annex 4.**

The SARC49 review panel will be composed of three appointed reviewers from the Center of Independent Experts (CIE), and an independent chair from the Science and Statistics Committee (SSC) of the New England or Mid-Atlantic Fishery Management Council. The SARC panel will write the SARC Summary Report and each CIE reviewer will write an individual independent review report.

Requirements for CIE Reviewers: Three CIE reviewers shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. CIE reviewers shall have working knowledge and recent experience in the application of modern fishery stock assessment models. Familiarity with statistical models for estimating gear efficiency is desirable, as the surfclam assessment will apply methods for experimentally estimating survey dredge capture efficiency. For butterfish, reviewers should be familiar with schooling pelagic species whose catchability in research trawl surveys is highly variable and influenced by environmental conditions; expertise in discard estimation for pelagic species and in the analysis and interpretation of trawl surveys is desirable.

Reviewer expertise should include statistical catch-at-age, catch-at-length, delay-difference, and traditional VPA approaches. Reviewers should also have experience in evaluating measures of model fit, identification, uncertainty, and forecasting. Reviewers should have experience in development of Biological Reference Points that includes an appreciation for the varying quality and quantity of data available to support their estimation. Reviewers should have familiarity with the development and interpretation of rebuilding strategies. Experience with the biology and population dynamics of species on the agenda would be useful.

Each CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review described herein.

Not covered by the CIE, the SARC chair's duties should not exceed a maximum of 14 days (i.e., several days prior to the meeting for document review; the SARC meeting in Woods Hole; several days following the open meeting for SARC Summary Report preparation).

Location and Date of Peer Review: Each CIE reviewer shall conduct an independent peer review during the panel review meeting scheduled at the Woods Hole Laboratory of the Northeast Fisheries Science Center (NEFSC) in Woods Hole, Massachusetts during 30 November through 3 December 2009.

Charge to SARC panel: The panel is to determine and write down whether each Term of Reference of the SAW (see Annex 2) was or was not completed successfully during the SARC meeting. To make this determination, panelists should consider whether the work provides a scientifically credible basis for developing fishery management advice. Criteria to consider include: whether the data were adequate and used properly, the analyses and models were carried out correctly, and the conclusions are correct/reasonable. Where possible, the chair shall identify or facilitate agreement among the reviewers for each Term of Reference of the SAW.

If the panel rejects any of the current Biological Reference Point (BRP) proxies for B_{MSY} and F_{MSY}, the panel should explain why those particular proxies are not suitable and the panel should recommend suitable alternatives. If such alternatives cannot be identified, then the panel should indicate that the existing BRPs are the best available at this time.

Statement of Tasks:

1. Prior to the meeting
      (SARC chair and CIE reviewers)
      Review the reports produced by the Working Groups and read background
      reports.

Each CIE reviewer shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein:

Upon completion of the CIE reviewer selection by the CIE Steering Committee, the CIE shall provide the CIE reviewer information (full name, title, affiliation, country, address, email) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewers. The NMFS Project Contact is responsible for providing the CIE reviewers with the background documents, reports, foreign national security clearance, and other information concerning pertinent meeting arrangements. The NMFS Project Contact is also responsible for providing the Chair a copy of the SoW in advance of the panel review meeting. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Foreign National Security Clearance: When CIE reviewers participate during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for CIE reviewers who are non-US citizens. For this reason, the CIE reviewers shall provide requested information (e.g., first and last name, contact information, gender, birth date, passport number, country of passport, travel dates, country of citizenship, country of current residence, and home country) to the NMFS Project Contact for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations available at the Deemed Exports NAO website: http://deemedexports.noaa.gov/sponsor.html).

Pre-review Background Documents: Two weeks before the peer review, the NMFS Project Contact will send (by electronic mail or make available at an FTP site) to the CIE reviewers the necessary background information and reports for the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE Lead Coordinator on where to send documents. CIE reviewers are responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein. The CIE reviewers shall read all documents in preparation for the peer review.

2. During the Open meeting

Panel Review Meeting: Each CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs, and shall not serve in any other role unless

specified herein. **Modifications to the SoW and ToRs can not be made during the peer review, and any SoW or ToRs modifications prior to the peer review shall be approved by the COTR and CIE Lead Coordinator.** Each CIE reviewer shall actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks shall be focused on the ToRs as specified herein. The NMFS Project Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements). The NMFS Project Contact is responsible for ensuring that the Chair understands the contractual role of the CIE reviewers as specified herein. The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

(SARC chair)
Act as chairperson, where duties include control of the meeting, coordination of presentations and discussion, making sure all Terms of Reference of the SAW are reviewed, control of document flow, and facilitation of discussion. For the assessment, review both the Assessment Report and the draft Assessment Summary Report.

During the question and answer periods, provide appropriate feedback to the assessment scientists on the sufficiency of their analyses. It is permissible to discuss the stock assessment and to request additional information if it is needed to clarify or correct an existing analysis and if the information can be produced rather quickly.

(SARC CIE reviewers)
For each stock assessment, participate as a peer reviewer in panel discussions on assessment validity, results, recommendations, and conclusions. From a reviewer's point of view, determine whether each Term of Reference of the SAW was completed successfully. Terms of Reference that are completed successfully are likely to serve as a basis for providing scientific advice to management. If a reviewer considers any existing Biological Reference Point proxy to be inappropriate, the reviewer should try to recommend an alternative, should one exist.

During the question and answer periods, provide appropriate feedback to the assessment scientists on the sufficiency of their analyses. It is permissible to request additional information if it is needed to clarify or correct an existing analysis and if the information can be produced rather quickly.

3. After the Open meeting

(SARC CIE reviewers)
Each CIE reviewer shall prepare an Independent CIE Report (see Annex 1). This report should explain whether each Term of Reference of the SAW was or was not completed successfully during the SARC meeting, using the criteria specified above in the "Charge to SARC panel" statement.

If any existing Biological Reference Point (BRP) proxies are considered inappropriate, the Independent CIE Report should include recommendations and justification for suitable alternatives. If such alternatives cannot be

identified, then the report should indicate that the existing BRPs are the best available at this time.

During the meeting, additional questions that were not in the Terms of Reference but that are directly related to the assessments may be raised. Comments on these questions should be included in a separate section at the end of the Independent CIE Report produced by each reviewer.

The Independent CIE Report can also be used to provide greater detail than the SARC Summary Report on specific Terms of Reference or on additional questions raised during the meeting.

(SARC chair)
The SARC chair shall prepare a document summarizing the background of the work to be conducted as part of the SARC process and summarizing whether the process was adequate to complete the Terms of Reference of the SAW. If appropriate, the chair will include suggestions on how to improve the process. This document will constitute the introduction to the SARC Summary Report.

(SARC chair and CIE reviewers)
The SARC Chair and CIE reviewers will prepare the SARC Summary Report. Each CIE reviewer and the chair will discuss whether they hold similar views on each Term of Reference and whether their opinions can be summarized into a single conclusion for all or only for some of the Terms of Reference of the SAW. For terms where a similar or a consensual view can be reached, the SARC Summary Report will contain a summary of such opinions. In cases where multiple and/or differing views exist on a given Term of Reference, the SARC Summary Report will note that there is no agreement and will specify - in a summary manner – what the different opinions are and the reason(s) for the difference in opinions.

The chair's objective during this Summary Report development process will be to identify or facilitate the finding of an agreement rather than forcing the panel to reach an agreement. The chair will take the lead in editing and completing this report. The chair may express the chair's opinion on each Term of Reference of the SAW, either as part of the group opinion, or as a separate minority opinion.

The SARC Summary Report (please see Annex 4 for information on contents) should address whether each Term of Reference of the SAW was completed successfully. For each Term of Reference, this report should state why that Term of Reference was or was not completed successfully. The Report should also include recommendations that might improve future assessments.

If any existing Biological Reference Point (BRP) proxies are considered inappropriate, the SARC Summary Report should include recommendations and justification for suitable alternatives. If such alternatives cannot be

identified, then the report should indicate that the existing BRP proxies are the best available at this time.

The contents of the draft SARC Summary Report will be approved by the CIE reviewers by the end of the SARC Summary Report development process. The SARC chair will complete all final editorial and formatting changes prior to approval of the contents of the draft SARC Summary Report by the CIE reviewers. The SARC chair will then submit the approved SARC Summary Report to the NEFSC contact (i.e., SAW Chairman).

Contract Deliverables - Independent CIE Peer Review Reports: Each CIE reviewer shall complete an independent peer review report in accordance with the SoW. Each CIE reviewer shall complete the independent peer review according to required format and content as described in Annex 1. Each CIE reviewer shall complete the independent peer review addressing each ToR as described in Annex 2.

Other Tasks – Contribution to SARC Summary Report: Each CIE reviewer will assist the Chair of the panel review meeting with contributions to the Summary Report, based on the terms of reference of the review. CIE reviewers are not required to reach a consensus, and should provide a brief summary of the reviewer's views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

Specific Tasks for CIE Reviewers: The following chronological list of tasks shall be completed by each CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review.
2) Participate during the panel review meeting in Woods Hole, Massachusetts during 30 November through 3 December 2009, and conduct an independent peer review in accordance with the ToRs (**Annex 2**).
3) No later than 17 December 2009, each CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Mr. Manoj Shivlani, CIE Lead Coordinator, via email to shivlanim@bellsouth.net, and Dr. David Sampson, CIE Regional Coordinator, via email to david.sampson@oregonstate.edu. Each CIE report shall be written using the format and content requirements specified in **Annex 1**, and address each ToR in **Annex 2**.

Schedule of Milestones and Deliverables: CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

26 Oct 2009	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
16 Nov 2009	NMFS Project Contact will attempt to provides CIE Reviewers the pre-review documents by this date
30 Nov – 3 Dec 2009	Each reviewer participates and conducts an independent peer review during the panel review meeting in Woods Hole, MA
2-3 Dec 2009	SARC Chair and CIE reviewers work at drafting reports during meeting at Woods Hole, MA, USA
17 Dec 2009	CIE reviewers submit draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
21 Dec 2009	Draft of SARC Summary Report, reviewed by all CIE reviewers, due to the SARC Chair *
29 Dec 2009	SARC Chair sends Final SARC Summary Report, approved by CIE reviewers, to NEFSC contact (i.e., SAW Chairman)
31 Dec 2009	CIE submits CIE independent peer review reports to the COTR
7 Jan 2010	The COTR distributes the final CIE reports to the NMFS Project Contact and regional Center Director

* The SARC Summary Report will not be submitted, reviewed, or approved by the CIE.

The SAW Chairman will assist the SARC chair prior to, during, and after the meeting in ensuring that documents are distributed in a timely fashion.

NEFSC staff and the SAW Chairman will make the final SARC Summary Report available to the public. Staff and the SAW Chairman will also be responsible for production and publication of the collective Working Group papers, which will serve as a SAW Assessment Report.

Modifications to the Statement of Work: Requests to modify this SoW must be approved by the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the COTR within 10 working days after receipt of all required information of the decision on substitutions. The COTR can approve changes to the milestone dates, list of pre-review documents, and ToRs within the SoW as long as the role and ability of the CIE reviewers to complete the deliverable in accordance with the SoW is not adversely impacted. The SoW and ToRs shall not be changed once the peer review has begun.

Acceptance of Deliverables: Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent to the COTR for final approval as contract deliverables based on compliance with the SoW and ToRs. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (CIE independent peer review reports) to the COTR (William Michaels, via William.Michaels@noaa.gov).

Applicable Performance Standards: The contract is successfully completed when the COTR provides final approval of the contract deliverables. The acceptance of the contract deliverables shall be based on three performance standards:
(1) each CIE report shall completed with the format and content in accordance with **Annex 1**,
(2) each CIE report shall address each ToR as specified in **Annex 2**,
(3) the CIE reports shall be delivered in a timely manner as specified in the schedule of milestones and deliverables.

Distribution of Approved Deliverables: Upon acceptance by the COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COTR. The COTR will distribute the CIE reports to the NMFS Project Contact and Center Director.

Support Personnel:

William Michaels, Contracting Officer's Technical Representative (COTR)
NMFS Office of Science and Technology
1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910
William.Michaels@noaa.gov   Phone: 301-713-2363 ext 136

Manoj Shivlani, CIE Lead Coordinator
Northern Taiga Ventures, Inc.
10600 SW 131st Court, Miami, FL 33186
shivlanim@bellsouth.net   Phone: 305-383-4229

Key Personnel:

Dr. James Weinberg, NEFSC Stock Assess. Workshop (SAW) Chair, (NMFS Project Contact)
National Marine Fisheries Service, NOAA
Northeast Fisheries Science Center
166 Water St., Woods Hole, MA 02543
james.weinberg@noaa.gov   Phone: 508-495-2352

Dr. Nancy Thompson, NEFSC Science Director
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Northeast Fisheries Science Center
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Annex 1: Format and Contents of CIE Independent Peer Review Report

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of whether they accept or reject the work that they reviewed, with an explanation of their decision (strengths, weaknesses of the analyses, etc.).

2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Findings of whether they accept or reject the work that they reviewed, and an explanation of their decisions (strengths, weaknesses of the analyses, etc.) for each ToR, and Conclusions and Recommendations in accordance with the ToRs. For each assessment reviewed, the report should address whether each Term of Reference of the SAW was completed successfully. For each Term of Reference, the Independent Review Report should state why that Term of Reference was or was not completed successfully. To make this determination, the SARC chair and CIE reviewers should consider whether the work provides a scientifically credible basis for developing fishery management advice.

   a. Reviewers should describe in their own words the review activities completed during the panel review meeting, including a concise summary of whether they accept or reject the work that they reviewed, and explain their decisions (strengths, weaknesses of the analyses, etc.), conclusions, and recommendations.

   b. Reviewers should discuss their independent views on each ToR even if these were consistent with those of other panelists, and especially where there were divergent views.

   c. Reviewers should elaborate on any points raised in the SARC Summary Report that they feel might require further clarification.

   d. Reviewers shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.

   e. The CIE independent report shall be a stand-alone document for others to understand the proceedings and findings of the meeting, regardless of whether or not others read the SARC Summary Report. The CIE independent report shall be an independent peer review of each ToRs, and shall not simply repeat the contents of the summary report.

3. The reviewer report shall include as separate appendices as follows:

   Appendix 1: Bibliography of materials provided for review
   Appendix 2: A copy of the CIE Statement of Work
   Appendix 3: Panel Membership or other pertinent information from the panel review meeting.

Assessment Terms of Reference for SAW/SARC49 (Nov-Dec 2009)
(file vers.: 8/12/09)

A. Atlantic surfclam

1. Characterize the commercial catch including landings, effort, LPUE and discards. Describe the uncertainty in these sources of data.

2. Characterize the survey data that are being used in the assessment (e.g., regional indices of abundance, recruitment, state surveys, age-length data, etc.). Describe the uncertainty in these sources of data.

3. Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) for the time series, and characterize the uncertainty of those estimates.

4. Update or redefine biological reference points (BRPs; estimates or proxies for B_{MSY}, $B_{THRESHOLD}$, and F_{MSY} and estimates of their uncertainty). Comment on the scientific adequacy of existing and redefined BRPs.

5. Evaluate stock status with respect to the existing BRPs, as well as with respect to updated or redefined BRPs (from TOR 4).

6. Identify potential environmental, ecological, and fishing-related factors that could be responsible for low recruitment.

7. Develop and apply analytical approaches and data that can be used for conducting single and multi-year stock projections and for computing candidate ABCs (Acceptable Biological Catch; see Appendix to the TORs).
    d. Provide numerical short-term projections (1-5 years; through 2015). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and probabilities of falling below threshold BRPs for biomass. In carrying out projections, consider a range of assumptions about the most important uncertainties in the assessment.
    e. Comment on which projections seem most realistic, taking into consideration uncertainties in the assessment.
    f. Describe this stock's vulnerability to becoming overfished, and how this could affect the choice of ABC.

8. 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.

B. Butterfish

1. Characterize the commercial catch including landings, effort and discards by fishery (i.e., *Loligo* fishery vs other fisheries). Characterize recreational landings. Describe the uncertainty in these sources of data. Evaluate the precision of the bycatch data with respect to achieving temporal management objectives throughout the year.

2. Characterize the survey data that are being used in the assessment (e.g., indices of abundance including RV Bigelow data, NEAMAP and state surveys, age-length data, etc.). Describe the uncertainty in these sources of data.

3. Estimate annual fishing mortality, recruitment and stock biomass (both total and spawning stock) for the time series, and characterize the uncertainty of those estimates.

4. Update or redefine biological reference points (BRPs; estimates or proxies for B_{MSY}, $B_{THRESHOLD}$, and F_{MSY}; and estimates of their uncertainty). Comment on the scientific adequacy of existing and redefined BRPs.

5. Evaluate stock status with respect to the existing BRPs, as well as with respect to updated or redefined BRPs (from TOR 4).

6. Evaluate the magnitude, trends and uncertainty of predator consumptive removals on butterfish and associated predation mortality estimates and, if feasible, incorporate said mortality predation estimates into models of population dynamics.

7. Develop and apply analytical approaches and data that can be used for conducting single and multi-year stock projections and for computing candidate ABCs (Acceptable Biological Catch; see Appendix to the TORs).
    e. Provide numerical short-term projections (1-5years). Each projection should estimate and report annual probabilities of exceeding threshold BRPs for F, and probabilities of falling below threshold BRPs for biomass. In carrying out projections, consider a range of assumptions about the most important uncertainties in the assessment.
    f. Comment on which projections seem most realistic, taking into consideration uncertainties in the assessment.
    g. For a range of candidate ABC scenarios, compute the probabilities of rebuilding the stock by January 1, 2015.
    h. Describe this stock's vulnerability to having overfished status (consider mean generation time), and how this could affect the choice of ABC.

8. 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.

Appendix to the SAW Assessment TORs:

Clarification of Terms
used in the SAW/SARC Terms of Reference

(The text below is from DOC National Standard Guidelines, Federal Register, vol. 74, no. 11, January 16, 2009)

On "Acceptable Biological Catch":

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 [overfishing limit] OFL and any other scientific uncertainty…" *(p. 3208) [In other words, OFL ≥ ABC.]*

ABC for overfished stocks. For overfished stocks and stock complexes, a rebuilding ABC must be set to reflect the annual catch that is consistent with the schedule of fishing mortality rates in the rebuilding plan. *(p. 3209)*

NMFS expects that in most cases ABC will be reduced from OFL to reduce the probability that overfishing might occur in a year. (p. 3180)

ABC refers to a level of ''catch'' that is ''acceptable'' given the ''biological'' characteristics of the stock or stock complex. As such, [optimal yield] OY does not equate with ABC. The specification of OY is required to consider a variety of factors, including social and economic factors, and the protection of marine ecosystems, which are not part of the ABC concept. (p. 3189)

On "Vulnerability":

"Vulnerability. A stock's vulnerability is a combination of its productivity, which depends upon its life history characteristics, and its susceptibility to the fishery. Productivity refers to the capacity of the stock to produce MSY and to recover if the population is depleted, and susceptibility is the potential for the stock to be impacted by the fishery, which includes direct captures, as well as indirect impacts to the fishery (e.g., loss of habitat quality)." (p. 3205)

49th Northeast Regional Stock Assessment Workshop (SAW 49)
Stock Assessment Review Committee (SARC) Meeting

November 30 – December 3, 2009

Stephen H. Clark Conference Room – Northeast Fisheries Science Center
Woods Hole, Massachusetts

DRAFT AGENDA* (version: 9-11-09)

TOPIC	PRESENTER(S)	SARC LEADER
RAPPORTEUR		

Monday, 30 Nov
  1:00 – 1:30 PM
  Opening
  Welcome   **James Weinberg**, SAW Chairman
  Introduction   **TBD**, SARC Chairman
  Agenda
  Conduct of Meeting

  1:30 – 3:30   Assessment Presentation Surfclam (Sp. A)
                           Larry Jacobson   **TBD**   **TBD**

  3:30 – 3:45   Break

  3:45 – 5:30   SARC Discussion of Surfclam
                           Larry Jacobson, SARC Chairman

Tuesday, 1 Dec
  9:00 – 10:30 AM   Assessment Presentation Butterfish (Sp. B)
                           Tim Miller   **TBD**   **TBD**
  10:30 – 10:45   Break

  10:45 – Noon   SARC Discussion of Butterfish
                           Tim Miller, SARC Chairman
  Noon – 1:15   Lunch

  1:15 – 2:15   Continue SARC Discussion of Butterfish
                           TBD, SARC Chairman

  2:15 – 3:30   Revisit Surfclam Assessment with Presenters

  3:30 – 3:45   Break

3:45 – 5:30   Revisit Surfclam and/or Butterfish Assessments with Presenters

Wednesday, 2 Dec
9:00 – 10:00 AM   Revisit Butterfish Assessment with Presenters

10:00 – 10:15   Break

10:15 - Noon   Surfclam follow up + review Assessment Summary Report

Noon – 1:15 PM   Lunch

1:15 – 3:00   Butterfish follow up + review Assessment Summary Report

3:00 – 3:15   Break

3:15 – 5:15   SARC Report writing. (closed meeting)

Thursday, 3 Dec
9:00 – 2:00 PM   SARC Report writing. (closed meeting)

*Times are approximate, and may be changed at the discretion of the SARC chair.
The meeting is open to the public, except where noted.

ANNEX 4: Contents of SARC Summary Report

1.

The main body of the report shall consist of an introduction prepared by the SARC chair that will include the background, a review of activities and comments on the appropriateness of the process in reaching the goals of the SARC. Following the introduction, for each assessment reviewed, the report should address whether each Term of Reference of the SAW was completed successfully. For each Term of Reference, the SARC Summary Report should state why that Term of Reference was or was not completed successfully.

To make this determination, the SARC chair and CIE reviewers should consider whether the work provides a scientifically credible basis for developing fishery management advice. Scientific criteria to consider include: whether the data were adequate and used properly, the analyses and models were carried out correctly, and the conclusions are correct/reasonable. If the CIE reviewers and SARC chair do not reach an agreement on a Term of Reference, the report should explain why. It is permissible to express majority as well as minority opinions.

The report may include recommendations on how to improve future assessments.

2.

If any existing Biological Reference Point (BRP) proxies are considered inappropriate, include recommendations and justification for alternative proxies. If such alternatives cannot be identified, then indicate that the existing BRPs are the best available at this time.

3.

The report shall also include the bibliography of all materials provided during the SAW, and any papers cited in the SARC Summary Report, along with a copy of the CIE Statement of Work.

The report shall also include as a separate appendix the Terms of Reference used for the SAW, including any changes to the Terms of Reference or specific topics/issues directly related to the assessments and requiring Panel advice.

Appendix 3: Panel Membership

SARC Chair

Robert J. Latour, Moses D. Nunnally Distinguished Associate Professor, Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, VA 23062. USA.

CIE Reviewers

Michael T. Smith. Fish and shellfish population biologist, Cefas, Lowestoft Laboratory, Pakefield Road, Lowestoft, Suffolk. NR33 7NY. United Kingdom.

Dr. John Cotter, 57 The Avenue, Lowestoft, Suffolk NR33 7LH, United Kingdom.

Dr. Henrik Sparholt, ICES. H.C. Andersens Boulevard 44-46, 1553 Copenhagen V. Denmark.

Others

Dr. James Weinberg, NEFSC Stock Assess. Workshop (SAW) Chair, (NMFS Project Contact)
National Marine Fisheries Service, NOAA
Northeast Fisheries Science Center
166 Water St., Woods Hole, MA 02543, USA.

Assessment Presentation Surfclam (Sp. A)
Larry Jacobson and Toni Chute
National Marine Fisheries Service, NOAA
Northeast Fisheries Science Center
166 Water St., Woods Hole, MA 02543, USA.

Assessment Presentation Butterfish (Sp. B)
Tim Miller
National Marine Fisheries Service, NOAA
Northeast Fisheries Science Center
166 Water St., Woods Hole, MA 02543, USA.

Dr. Paul Rago
National Marine Fisheries Service, NOAA
Northeast Fisheries Science Center
166 Water St., Woods Hole, MA 02543, USA.