

ATLANTIC STRIPED BASS TECHNICAL COMMITTEE

January 10-11, 2007
Raleigh, North Carolina

Meeting Report

Committee Members

Charlton Godwin (NC DMF)

Doug Grout (NH, TC Chair)

Des Kahn (DE DFW)

Wilson Laney (USFWS SA)

Brandon Muffley (NJ F&G)

Gary Nelson (MA DMF, SASC Chair)

Rob O'Reilly (VMRC)

Alexei Sharov (MD DNR)

Gary Shepherd (NMFS NEFSC)

Vic Vecchio (NYS DEC, TC Vice Chair)

Beth Versak (MD DNR, TSC Chair)

Nichola Meserve (ASMFC, Staff)

Public Participants

Chad Thomas, NC WRC

Dick Brame, CCA

Tom O'Connell, MD DNR

Meeting Summary

The main agenda items for the Technical Committee (TC) meeting were: 1) reviewing Maryland's estimate of the 2006 spring trophy fishery harvest (p.2) and a proposal to eliminate the quota for the spring trophy fishery (p.3); 2) reviewing a proposal from North Carolina to increase the AS/RR TAC by 50,000 pounds (p.5); 3) receiving a progress update from the Tagging Subcommittee (p.7); 4) receiving a progress update from the Stock Assessment Subcommittee (p.11); 5) and approving the Terms of Reference and timeline for the 2007 benchmark stock assessment (p.13). The TC last met June 21, 2006.

Note: Other than subject headings, underlining denotes tasks, bolding denotes TC consensus.

Call To Order

Doug Grout, Chair of the TC, called the meeting to order at 9:00 a.m. on January 10, 2007.

Approval of Agenda

The agenda was approved with the following amendments:

1) Other Business: Wilson Laney added an update on the Cooperative Winter Tagging Cruise

2) Other Business: Nichola Meserve added a review of the Otolith Collection Program

3) Immediate Item: Rob O'Reilly added a discussion about the submission of meeting materials.

Some member states submitted materials for this meeting within a day of the meeting. Two weeks is an acceptable amount of time for TC members to analyze materials and is a recommended protocol in the ASMFC Technical Support Groups Guideline document.

Previously, the TC has debated whether to accept proposals if received late. The Board has not been enforcing this deadline and the TC cannot enforce it alone without risking the Board making decisions without technical advice. The TC agreed that Doug will make the Board aware of the issue and ask the Board to enforce the deadline. The chair of the TC will be able, on a case-by-case basis, to allow for some late submissions, such as revisions of previously submitted documents. From now on, the two-week deadline, and the repercussion of not meeting it, will also be clearly presented in the meeting announcements.

Review Maryland Spring Trophy Harvest Estimate

Document: Estimate of the 2006 Harvest of Spring Coastal Migrant Striped Bass in Chesapeake Bay

Maryland submits an annual report providing an estimate of the number of coastal migrant fish harvested during the spring trophy fishery in the Chesapeake Bay. The harvest estimate for 2006 is 67,771 fish. Maryland uses charter boat logbook reports and MRFSS private boat data (MD and VA) to calculate this estimate. The TC raised concerns about the estimation methodology, in particular the use of the charterboat logbooks due to a divergence in the charterboat harvest estimates between the logbooks and the MRFSS charterboat data.

Prior to 2005, Maryland used the MRFSS calculation of charterboat harvest. Originally, this was part of the telephone survey. In 2005 MRFSS changed its methodology, and since then the harvest estimate based on the MRFSS has been much larger than that based on the charterboat logbooks. In 2005, the TC approved the use of the logbooks estimate instead of the MRFSS estimate and Maryland used this method again for the 2006 harvest.

Maryland believes that there is a serious non-reporting bias in the MRFSS estimate based on two issues: 1) on average, 20% of the fleet doesn't report (and many are likely non-active vessels, yet the owners maintain their license because of the limited entry system), and 2) some vessels have not reported at the time that MRFSS requests data from MD. Thus, when MRFSS expands the catch of those vessels surveyed to the number of licenses, they ignore the non-reporters completely and harvest is overestimated.

The MRFSS personnel has agreed with Maryland that there is this bias, but the resolution requires a formal investigation into the numbers, which MRFSS is not able to do at this time. To reduce non-reporting, Maryland is starting a new practice: the state will not renew a license unless the charterboat captain has reported for the previous year even if the boat was not fishing. Alexei Sharov indicated that Maryland also does an independent creel survey and that the information from that compares well with the reports from a group of charterboat captains that voluntarily provide, on a weekly basis, the number of fish caught, harvested, and released.

In the harvest calculations, Maryland assumes that the non-reporters are inactive and have zero harvest (the opposite form the MRFSS which assumes they harvest like the rest surveyed). As a result of the MRFSS non-reporting bias and the assumptions in its own calculation, Maryland believes that the actual charterboat harvest is somewhere between the MD logbook estimate and the MRFSS estimate, but uses the charterboat logbook estimate for management.

The TC agreed that the true harvest is somewhere between the two estimates. However, without more information about the non-reporters (i.e., who is active, who is not), the TC cannot determine where in the middle the actual harvest is. While some TC members agreed that the non-reporters are probably harvesting little (meaning that the logbooks estimate harvest better), other TC members agreed that some captains likely underreport in the logbooks due to the ramifications of the quota being exceeded (meaning that the MRFSS estimates harvest better).

The TC agreed that the Board should be advised of both estimates, the caveats of each, and that without more information the TC can not determine which is closer to the actual harvest. It should be noted that the 2006 quota for the fishery might have been surpassed

more than estimated, due to the possibility of the harvest being underestimated by the MD charter boat logbook method.

The TC agreed that Maryland needs to improve the annual estimation of the harvest. If the quota for the Maryland spring trophy fishery is eliminated, accurate reporting becomes even more critical. The TC made several suggestions:

1. Maryland needs to remove inactive vessels from the harvest calculation. Perhaps a system where boats are flagged and contacted if they don't report could work. A permit specific to the spring trophy fishery may increase compliance with reporting.
2. Maryland should have a deadline for reporting after the close of the trophy fishery (fifteen days being suggested) rather than the end of the year. Reports will be more accurate if done more immediately after fishing.
3. Maryland should follow up with those 20% not reporting to find out why they aren't.
4. Maryland should request data from MRFSS and compare the CPUE of logbooks with that of the MRFSS. The B2 estimate could also be compared, although with the caution that self-reporting of releases is often poor. Maryland could also compare the MRFSS length-frequencies with those from the independent creel survey.

Additionally, the TC should update the Dorazio migration rate estimates. It was noted that this might be possible after the peer review, especially if the Board decided the TC doesn't need to produce an annual update assessment. The TC should also analyze if 28" is still a valid threshold for what is migrant.

Review Maryland Spring Trophy Fishery Proposal

Document: Proposal to Eliminate the Chesapeake Bay Spring Trophy Fishery Quota
Presentation by Alexei Sharov

Maryland presented a proposal to eliminate the quota for the Chesapeake Bay spring trophy fishery. Maryland expects there to be no effect on the stock from eliminating the quota. Maryland finds that accurate harvest prediction is very difficult, that the quota estimation mechanism is incompatible with the population size of the migrant striped bass and current regulations, that quota management is inappropriate for a recreational fishery, that the MRFSS estimates of private boat harvest are highly uncertain, and that the current regulations (size, creel and season) will adequately control the fishery while allowing the opportunity for anglers to fish. Maryland would continue to monitor the harvest if the quota is eliminated.

Alexei discussed Maryland's difficulty in predicting the harvest or what effect changing regulations (e.g. size limit) will have on harvest. Maryland used a three-year average to estimate what the harvest might be in 2006. The overage in 2006 resulted from MD underestimating the spawning run, which resulted in more fish being available to the fishermen than expected. Additionally, the strong 1996 year class had recruited to the fishery. Even with the 33" size limit, the quota was surpassed.

The TC discussed how eliminating the quota might affect fisher behavior. While charterboat licenses are currently capped, charterboat captains could increase their number of trips, and private boat effort could increase because it is not restricted in any way. Alexei responded that Maryland does not expect an increase in effort for several reasons: the number of charterboat trips has exhibited no trend over the past six years (based on logbooks); the number of

recreational fishing licenses has declined in recent years; and Maryland anglers have expressed opposite opinion to the MRFSS report of increasing effort by private boats in Wave 2. Later on, Alexei stated that the increase in the harvest in recent years and the quota overage was being driven by the private boat effort and the resulting removals. Des wanted to see more information about this private boat effort and CPUE.

The TC asked about Tables 2 and 3 in the proposal (Bay fishing harvest as a percent of the total annual coastwide catch, and fishing mortality generated by the Bay spring fishery). Gary Shepherd noted that it was inappropriate to compare the MD harvest and its associated fishing mortality to that of the total coastal harvest and the discard mortality associated with it. Des and Gary agreed that the composition of the MD harvest is not certain, and the MD harvest F does not include discard mortality. Several TC members stated how fishing on the MD resident stock does not affect the Delaware, Hudson, and Roanoke stocks (and their F), but that fishing on the MD migrants does effect the coastal stock and its F. Alexei stated that the table was meant to show that the trophy season harvest has a minute effect on the coastal stock. The TC determined that the tables could be presented to the Board after modification so that discard mortality is removed from coastal fishing mortality or added to Bay fishing mortality. (These tables were corrected accordingly and sent to both Nichola and Doug prior to the Board meeting.)

Alexei voiced a coastwide benefit of quota elimination: with the quota in place, if the coastal F were exceeded, Maryland could argue that it shouldn't be held responsible, whereas, if there were no quota and Maryland was part of the coastal management system, the state would have to be responsible with all the coastal states for exceeding the coastal F. This found some support among the TC members, but it was also noted that Maryland's ability to avoid responsibility in the first case might require Maryland to have stayed within the quota. Several members also stated that if Maryland wanted to be part of the coastal management system, it should have to raise the minimum size limit to 28". Gary S. noted that there is also the possibility for all the coastal states to bear the burden if Maryland becomes part of coastal management system and then is the cause of a fishing mortality that exceeds the reference point.

Alexei noted how this is the only component of the striped bass recreational fishery managed by a quota, a management system that is ineffective for a recreational fishery. He questioned whether any other states would want that for their recreational fisheries. The overwhelming response was no, but that the Chesapeake was in a unique situation. The Bay states were first permitted to harvest 18" fish due to the size availability of the fish. When the Management Board decided that Maryland could have a fishery on larger fish too, a different control mechanism was required (thus the quota system).

To come to consensus, the TC worked off of its response to a similar proposal presented by Maryland last year. In response to that proposal, the TC had said: 1) this is an allocation issue for the Board to decide, 2) implementation of the proposal could result in a slight increase in coastwide fishing mortality; 3) there ought to be a mechanism to determine the effect of increasing catch on the Maryland portion of the Bay stock, and 4) the regulations appear to be driving the harvest, not the quota.

The TC still agreed that eliminating the quota is changing the allocation, and as a result, this is not really a technical issue, but a policy decision. On the issue of F, the TC still thought that removal of the quota could result in a slight increase. Alexei asked to get a clear statement on

the meaning of “slight”. The TC members agreed that they couldn’t be more specific than saying that there is a potential for a slight increase, implying that there is potential to have no increase as well. Maryland has yet to look into a mechanism to determine the trophy season’s effect on the MD portion of the Bay stock. Des Kahn suggested that Maryland look at tag recoveries in the Bay. Doug will recommend to the Board that MD undertake this. The TC still agreed that the regulations appear to be driving the harvest not the quota.

The TC agreed that its statement for the Board would contain the following:

- 1. There is a potential for a slight increase in F if the quota is eliminated.**
- 2. Certain conditions would be required to see that increase, either an increase in total exploitation rate or total mortality rate. More exploitation could result from increased catchability or increased effort.**
- 3. Historically, the trophy season’s F has been a small contribution to the total coastwide F.**
- 4. Should the quota be eliminated, Maryland (with the TC) will monitor the population to see if F increases.**
- 5. Tagging data should be used to investigate the effect on Maryland migrant fish.**
- 6. Currently, regulations and stock size (and also weather conditions during the fishing season) are driving the harvest, not the quota.**
- 7. Quota elimination is a policy decision about allocation for the Board to decide.**

Review North Carolina AS/RR TAC Increase Proposal

Document: Potential for Increased harvest of Albemarle/Roanoke Striped Bass Fishery
Presentation by Charlton Godwin

North Carolina presented a proposal to increase the 2007 Albemarle/Roanoke TAC by 50,000 pounds. In October 2006, the TC looked at a similar proposal except it was for a 100,000 pound increase. North Carolina had used an index based assessment to justify the proposal, using such findings as an increase in CPUE on the spawning ground survey, expanding age structure in spawning ground survey and in catch-at-age, and high juvenile abundance indices in 2000 and 2005. The TC consensus then was to not support the quota increase because there was no measure of current or historical F, and the TC recommended NC to explore using tags, catch curves or, revising the VPA.

Charlton presented the proposal, focusing on additions since the last TC review. This included:

1. Roanoke River electrofishing CPUE has been increasing from 1991 to 2006.
2. Roanoke River male age 2-4 electrofishing CPUE has been increasing from 1991 to 2006.
3. Roanoke River age 8+ electrofishing CPUE has been increasing since 1991, and although a decrease occurred from 2002-2005, the 2006 value is high again. The slot limit protects these older fish. The fluctuations were driven, in part, by temperature or flow issues.
4. Roanoke River length-frequency has expanded.
5. CPUE of age 8+ females on the spawning grounds has been increasing.
6. Catch curve generation of F (based on CPUE of electrofishing survey in Roanoke River) has been relatively stable since 1997 (although above the ASMFC target of 0.27).
7. Albemarle Sound recreational hook and line catch composition is consistently mostly ages 3, 4, and 5. This is not expected to change with the TAC increase.
8. Roanoke River recreational hook and line catch composition is consistently ages 4, 5, and 6, and approximately 75% of the harvest is males.

9. Albemarle Sound commercial fishery (gill net and small mesh bycatch only) harvest composition is mostly ages 4, 5, and 6. There has been a slight increase in the age structure of the fish.
10. Effort has dropped in the Albemarle Sound.
11. TAC increases in the Albemarle Sound in 2000 and 2003 (both 100,000 lbs) did not lead to increased gillnet effort. There has been a decline in the bycatch discard estimates in the last two years because of better observer coverage to estimate discards and gillnet effort. Striped bass is limited to 50% by weight of combined daily harvest of all species, not to exceed daily landing limit (5 or 10 fish depending on the season).
12. Gill net effort (trips per year according to the trip ticket program) has declined slightly over the years is not anticipated to increase due to a TAC increase
13. Only 3 tagged fish from other producer areas have been recaptured in NC spawning grounds since 1987, providing evidence that the increasing abundance of age 8+ fish in the A/R spawning survey are likely not from the coastal stock, but are truly A/R stock fish.

North Carolina concludes that increasing the TAC by 50,000 pounds is unlikely to result in increased gill net effort and will not increase the overall removals. It will allow NCDMF to better utilize commercial discards. The additional 50,000 pounds would be split with 25,000 pounds allocated to the commercial fishery (Albemarle Sound) and 25,000 allocated to the recreational fishery (12,500 pounds each to Albemarle Sound and Roanoke River).

The TC agreed that it could not accept the catch-curve generated F estimates, for two reasons:

1) Concern about the electrofishing survey CPUE.

Environmental factors are likely introducing variability into the electrofishing survey and influencing the CPUE. The TC suggested a generalized linear model (GLM), which can account for environmental factors and indicate trend better. The GML could also be used to find out which factors are critical to the survey results and then the survey could be designed correspondingly. Truncating the data around the maximal CPUE was also suggested. Several TC members were also concerned that the large juvenile abundance indices don't show up in the electrofishing survey and that change in catchability could be causing some of the trends in the CPUE. The TC also mentioned that caution should be used in comparing these F values to the VPA F values, because the catch-curve is based on age 3+ fish from the electrofishing survey, while the VPA is based on age 4-6 fish.

2) The F estimates contradict other stock signals.

If the catch-curve F estimates were correct, the age structure would not have been expanding, but rather the stock would have been collapsing. Alexei was also hesitant about the expanding age structure because it is showing mostly in the female population whereas the fishery is more directed at the male population, which doesn't seem to show the expansion to the same extent. Due to the gill net mesh size regulations, the commercial fishery doesn't catch the larger fish and its length frequency cannot be compared. The TC further noted that if the F estimates were correct, North Carolina should be focused on decreasing discards and discard mortality, rather than utilizing discards.

One member of the TC was uncomfortable using the low tag recapture number in the NC spawning areas to show that the increase in stock was from more A/R fish. Des stated that the analysis was more complicated than what NC had provided (for example, a reporting rate needed to be included in the calculation). On the other hand, he said that the number of recaptures was very low and sporadic.

The TC noted that the recreational fisheries are often under their quota. It was suggested that NCDMF give unused TAC from the recreational fisheries to the commercial fishery to utilize. While it might be a better way to utilize unused quota, the FMP would not allow for this because it requires a 50% split of quota to the recreational and commercial sectors. To better use the TAC, North Carolina has the ability to change regulations by proclamation and this can be expected to happen if the quota increase is approved. This concerned some TC members because it could result in an increase in the harvest and the F. The commercial gill net fishery is not subject to limited entry, but the number of gill net trips has been declining. North Carolina has estimated an increase of 7,500 fish harvested if the discards in the commercial fishery were utilized and both the recreational and commercial fisheries caught their TAC.

The TC discussed F in regard to biological reference points (BRP). Alexei thought that if the F estimate is wrong, North Carolina needs another plan to monitor this stock in the future. Without a good F estimate, North Carolina has considered using the independent surveys to monitor the stock for changes. Towards this, Des suggested that NC might want to explore spawning potential ratio. He also suggested the use of tagging data in MARK to get F estimates. This has been done in the past, resulting in values similar to that from ADAPT; however, the lack of a reporting rate estimate is problematic. If North Carolina switched to an index based assessment, Alexei pointed out that there were no BRP control rules to manage the stock to tell when F is too high. Gary S. noted that if NC switched to the indices, they would need to be validated.

The TC agreed upon the following consensus statement.

The TC cannot endorse the TAC increase because of uncertainty with the information provided (the F estimate) and what affect the proposed TAC increase could have. The TC recommends two paths for NC:

- 1. Keep the current control rules (F and SSB) and improve F estimates. Improvement is necessary because of the disconnect between the expanding age structure and the F estimates. Suggested methods to improve the F estimates include: use the GLM to improve the CPUE estimates and do catch curve analysis again; conduct cohort catch curves to determine an annual F estimate across all cohorts or age groups; develop a tag reporting rate and use tagging data to get exploitation rates; improve the VPA.**
- 2. Make an official move to index based assessments, validating the indices, and developing control rules around the indices.**

Tagging Subcommittee (TSC) Update

Documents: Striped Bass Tagging Subcommittee Update to the Technical Committee; Estimation of fishing and natural mortality when a tagging study is combined with a creel survey or port sampling (Pollock *et al.* 1991.), Instant Rate Catch-Release

Presentations by Beth Versak, Chair of the TSC, and Gary Nelson, TSC member

The TSC has been using the MARK program since 1997. It is based on assumptions in Brownie, models are chosen a priori and weighted, and it gives unadjusted S, which is adjusted for live releases to get a bias-corrected S estimate, which is then converted to Z. From there, two methods are currently used. In the constant-M method, a M equal to 0.15 is assumed and subtracted from Z to get F. Variance estimates are ad hoc estimates of 95% CIs for S and F. With the catch equation method, first reported last year, M is not assumed, but rather the method of Pollock is used to separate Z into F and M ($F = (u*Z)/A$ then you subtract to get M). Variance

estimates were not provided in the first reporting of this method. Beth showed some graphs comparing Fs from the constant-M method and the catch equation method per state. Some points she made were: 1) For $\geq 18''$ fish, the catch equation flattens out variability seen in the constant-M Fs; 2) For $\geq 28''$ fish, the catch equation has lower F values in the last few years than the constant-M method.

The TSC was last charged with developing a method to calculate estimates of variance around catch equation outputs in the short term, and with developing one model to estimate instantaneous F and M rates in the long term. Beth Versak provided an update as to where the TSC was with these two tasks.

The TSC has been working with formulas from Pollock et al (1991) to calculate variance estimates for four variables: reporting rate (λ), u, F, and M. Beth indicated that the equations have a covariance term that the TSC couldn't estimate and, thus, left out. Beth presented some results. Variance estimate for λ (0.43 reporting rate from a 2000 DE study) was 0.0127 with a CV equal to 26%. Beth indicated that there is some problem with using the DE study λ , but noted that a high-reward tagging study is starting this spring, so the TC should have a new value by 2008.

u, F, and M variance estimates and CVs are program-specific. CVs for u of $\geq 28''$ fish ranged from 30-50%; for F, they were about the same; and for M, they were much more variable with some higher values. CVs for u of $\geq 18''$ fish ranged from 30-40%, for F, they were about the same, and for M, they were more variable but not as much as for $\geq 28''$ fish. Some TC members expressed concern about the observed variability, but it was pointed out that these were preliminary results to be reviewed in detail still. When presented, the TC will be focusing on $\geq 28''$ fish, but will keep $\geq 18''$ fish tables in the report because $\geq 18''$ can provide a lot of information for producer areas.

Beth next presented some concerns that the TSC had about the catch equation. These include: 1) the difference in scale of inputs (u and S); 2) the reliance on a concurrent and accurate reporting rate; 3) that the covariance term is ignored; 4) that the SE from uncorrected-S is used for corrected-S variance formulas; 5) that there are some non-sensical negative values in the results; and 6) that M may have increased in the Bay, but that it is not consistent with other signals from the stock (for example, there has been no truncation of age in the Bay).

Beth noted that Gary N. has now programmed the instantaneous catch rates into AD model builder such that the TSC doesn't need to wait for Hoenig's AVACADO model. This approach could solve a bunch of these problems if the TC and TSC have time to finalize it.

Instantaneous Rates Model

Gary Nelson provided a presentation on the instantaneous rates model he programmed in AD model builder using a paper by Jiang *et al.* (in review). The model incorporates catch and release rates by modeling the fate of tagged fish and the tags themselves (for those that are clipped from fish before the fish is re-released). The model can estimate M. The model requires two matrices: a recovery matrix of harvested fish, and a recovery matrix of released fish (tag cut off). It estimates M, F and F' (fate of tags), and can also produce S, df, \hat{c} , AIC values, and more. Values of F can be partitioned. Model averaging can be done by hand by saving each output file from different state runs and then averaging the results.

Gary N. presented some analyses in which M was different for two periods (simulating a pre- and post-mycobacteriosis invasion). He showed that he got very different M estimates for the second period (when mycobacteriosis had moved into the Bay) depending on what year the second period was started. He indicated that more analyses were needed for this issue. Gary S. had another concern about M estimation; the M value includes tags that fall off, and factors such as tagger skill, manufacturer quality, and tag legibility can mean that some fish are included in the M estimate that shouldn't be. The TC thought that this was a good thing to be aware of and to make clear in any report. It was determined that this is the best that can be done until there is better information to improve upon the knowledge of tag fate and that sensitivity analyses should be conducted to evaluate the significance of the problem.

Gary N. reported his next steps for model development. These were: 1) picking periods for each program; 2) working out the right calculation for degrees of freedom; 3) developing a data spreadsheet to be filled in by everyone; 4) averaging the eight programs; 5) addressing the influence of tagger skill, tag loss, and changing size-at-recruitment (the current setup uses all tags for $\geq 28''$ fish).

Given the three model options, the TC needed to decide which model(s) to have the TSC move forward with. The TC had a lengthy discussion on this point. Below is a summary of some of the pros, cons, and other comments stated by TC members for each method. Pros and cons for moving forward with all three are listed separately. (Note: Pros for a particular method could be listed as cons for another method, but this wasn't done so as to reduce redundancy.)

Constant-M

- Con: Using a single M for the whole stock means inaccuracies for certain components.
- Con: A constant M for Chesapeake Bay will result in incorrect high F values for VA and MD.
- Other: We could try to validate the use of the constant-M by running the IRM to solve for M and use the constant M value in the IRM to compare the results, doing some sensitivity analysis particularly if they come up with different results. This would provide some desired redundancy to justify that what the TC is using for M is appropriate.

Catch Equation

- Pro: The covariance term can be estimated, and when it is, good estimates of uncertainty can be made. Using the catch equation to partition Z isn't that controversial. The geographically limited reporting rate is the biggest weakness, but it is acceptable because it is low which makes underestimating F less likely. There is only a problem with a couple of erratic programs.
- Pro: A variable M can be used to help inform management decisions.
- Pro: The reporting rate estimation should be better, but it shouldn't be the limiting factor. The peer review provides the opportunity to get feedback on the approach, and if the panel said the reporting rate estimation was not good enough, the TC would be able to update it in 2008 (when results are in from the coastwide high reward tagging program) and the approach will already have been reviewed.
- Con: Each of the problems mentioned by Beth in the TSC report (on page 8 in this report)
- Con: The reviewers might be very critical of using variable M for calculating BRPs.
- Con: A better reporting rate is needed before using this method.
- Con: Can't agree with using the catch equation because the IRM has a better track record for getting F.

Instantaneous Rates Model

- Pro: Gets away from the problem of having different data sets (R/M one year versus MARK model multi-year) to calculate different inputs to the catch equation (although the method has been peer-reviewed and, thus, its use is defensible).
- Pro: It can have weighted contributions of stocks. CIE reviewers might have a problem with the use of one model for three stocks and applying indices.
- Pro: Might provide a better fit to the striped bass data.
- Pro: This is the most appropriate time to have the model reviewed. The TC will have to wait 3-5 years if don't do it now.
- Pro: Support switching from MARK to IRM and is personally willing to commit the time required to do this.
- Pro: Although it is less familiar, it is possible. We have seven months to get the model running and do the analyses for each program before the assessment workshop in July.
- Pro: The model can address the problem of constant M in the Bay by having a M1 (baseline) and a M2 (disease).
- Pro: It uses all the data that we don't use in other methods; the catch equation has a lot of problems and the IRM is the next logical step after MARK.
- Con: Requires the most work and model vetting.
- Con: A lot of work will likely fall into the hands of a few.
- Con: It will be subject to the most scrutiny because it is newer.

All Three Models

- Pro: The TC should use the peer review to get the most insight about what assessment method is best for striped bass rather than bring forward only what the TC anticipates to be accepted. In continuing to be conventional, opportunities are lost to move toward multispecies.
- Pro: If start with the constant-M, we will have it as a fallback and can then work on catch-equation and IRM. This way a decision would not be required immediately when the TC doesn't have all the information but before the assessment workshops when we will know more about the capability of each model.
- Con: Support narrowing down the models to be taken to the review. Need to remember that the objective is to produce an F estimate to compare to the target/threshold F.
- Con: Don't want to use time on moving forward with the catch equation that could be used for working on the IRM.

From this discussion, the TC agreed that the TSC should start with the MARK approaches as phase one, and then build upon the IRM as phase two. Due to time constraints, Doug will ask the Board at its next meeting to provide staff the time necessary for these analyses. The Terms of Reference will be written in general terms to be applicable to whichever method is chosen during the summer.

Gary N. believes that he can get the IRM done as long as he receives the necessary data from everyone as soon as possible. He will develop a spreadsheet to collect the data. The tagging season is not over until the spring, so Gary won't be able to produce the final cut with 2006 data until summer. Before then, Gary will get everything set up so that adding another year of data just before the workshop will require minimal work. Through email, Gary will instruct the subcommittee members on the use of IRM.

****Doug stressed the importance of members getting going early on this and following Beth's instructions and deadlines. He also stressed the need for getting all the data with the compliance reports, due June 15th. This will be very important to the assessment getting done in time. Diligence in reporting is also required to make sure that each state is reporting the proper information in the datasheets (e.g., no double reporting). Even if MRFSS is still preliminary, it will have to be used. If any problems arise with getting the data, call Doug in advance.****

Before moving on to the SASC report, the TC discussed some aspects of the SARC review process and the Center for Independent Experts (CIE). Des noted the current issue of Fisheries has an article on the CIE. Gary S. has experience with multiple reviews of this type and shared how the process had changed recently and how only what is presented in the final document to the panel will be considered. The CIE protocol requires the reviewers (two to three people) to have very high standards for an assessment. The CIE is required to find reviewers that have expertise in the models being used. Part of the panel's response is a decision on whether the assessment will be useful for fisheries management. If an assessment is not endorsed, the reviewers' contract requires them, if at all possible, to provide recommendations for improvement to make the assessment acceptable. Currently, only two reviewers have been funded for the striped bass assessment, and the TC decided that it would be wise to ask ASMFC to fund another reviewer, thus avoiding split decisions and putting so much weight on the opinions of just two people. Nichola will ask Megan Caldwell, ASMFC Science Director, about this. Des suggested that TC members read some of the SARC reports on the NMFS/SARC website to get an idea of what is presented, what responses are, etc.

Stock Assessment Subcommittee (SASC) Update

Documents: Review of Striped Bass Hooking Mortality Rates, STSCAM: A Forward Projecting Statistical Catch-At-Age Model for Striped Bass, SCAMTAG: A Merger of Statistical Catch-At-Age and Instantaneous Rates Tag Return Models, Tag Return Models allowing for Harvest and Catch and Release (Jiang *et al.*)
Presentation: Gary Nelson, Chair of the SASC

Gary Nelson provided a brief overview of the SASC's last meeting. At that meeting, the Subcommittee developed the idea for an ultimate assessment model. The model that the Subcommittee has tasked itself with developing is a 4-box model (akin to Clay Porsh's 2-box model) that would include migration between four areas (three producer areas, one coastal). This design uses the data currently used but would require the catch to be partitioned among the four areas, and would ideally partition by sex as well. Again, this is a long-term goal not for the 2007 assessment. The greatest benefit would be the ability to use the indices in a regional way and not have to combine them as is currently done for the whole coast. It would be a VPA approach. Gary N. noted that Stock Synthesis is set up to do this now and that Laura Lee is looking into this approach.

The SASC had next talked about ways to improve the current data. Several methods were identified at the meeting or had been previously assigned. Gary N. conducted a literature review aimed at improving discard mortality estimates. For trawl mortality, Gary N. referenced a FAO document that the SASC could use if they wanted to re-evaluate the current 35% mortality rate. He presented a table of hook and line discard mortality rates that included the sample size, time held, temperature, salinity, fish size, and hook type. He is building a predictive model for striped bass (and then all species) using a SAS logistic model that generates discard mortality estimates based on these factors. Preliminary analysis has indicated relationships between mortality and

warmer water, smaller fish, lower salinity, and J hooks. (Salinity was not significant after a RMC study in the Bay was removed and Gary S. noted that the use of this study might be inappropriate due to the height of the catwalk from where the released fish were dropped.) Gary will keep working on this model and ask the SASC for suggestions at its next meeting. He will also incorporate suggestions from Gary S. including some analysis of the data in blocks so that it can be applied to MRFSS data.

The SASC had also talked about incorporating ageing error information. Hank Liao had presented a model to adjust scale ages to otolith ages with a correction factor. Hank's corrected ages lead to higher abundance (total and SSB) than the base model run (unadjusted 2005 run of VPA), a lower F in the terminal year (less retrospective bias), and shows better year class strength (ex. picks up strong 1993 and 1996 year classes). The TC discussed whether or not the SASC should use this correction for the peer review or wait for additional analysis. For example, the correction could be based on a wider geographic scale, because currently it assumes that the adjustment factor of VA caught fish applies to all fish, which was a clear drawback for the TC using it. (New York has another scale-otolith age comparison, while MD has limited unprocessed samples, and VA has enough coastal samples to do a dry run to see if applying this to coastal areas is okay.) **The TC agreed that the method has potential to improve the data and will show the peer review panel that the TC knows of the ageing error and is trying to account for it, although recognizing that the work is incomplete because it needs more states' conversions.** Gary S. will email Hank (via Gary N.) about applying the workshop data from each state to see if the Virginia-based correction factor is applicable to the whole coast. Then the TC can decide on the use of the correction factor.

The SASC had also discussed looking into the effect of different hooking mortality estimates (based on regional differences in temperature) on F estimates in ADAPT. This task needs to be assigned to someone still. Also, some catch-at-age sensitivity analyses had been assigned to Gary Shepherd. The status of this assignment was not clarified.

The SASC had talked about different models to use including ADAPT, ICA, ASAP, and ASPIC. The SASC had tentatively decided to stick with ADAPT for the model unless any promising news came out of work to be done by Laura Lee and Gary Nelson. Gary will call Laura to find out her progress with ASPIC and check with Gary S. about ASAP.

Statistical Catch-At-Age Model (SCAM)

As assigned, Gary N. had run a statistical catch-at-age model (SCAM) and had it reviewed by Erik Williams. Erik made some recommendations for Gary to improve the model, getting away from VPA thinking. Gary is to make some changes to SCAM and meet with Chris Legault and/or Erik Williams to further refine the model. (Since the TC meeting, the date of February 12 was set for this.)

SCAMTAG: A Merger of Statistical Catch-At-Age and Instantaneous Rates Return Models

Gary N. had also developed a model he called SCAMTAG, which merges the SCAM and IRM, by linking the fully recruited Fs from Jiang's IRM into SCAM. The link between the two models is that the 28" fish that are tagged are assumed to experience the same harvesting rates as the fully-recruited untagged coastal population. Gary is still working out an issue about changing size at recruitment due to variability in regulations. Gary noted that he would like to have help from someone reading the code to check for mistake. It is essentially C++, so if anyone knows

this well, Gary would appreciate your help. He may ask Chris Legault or Erik Williams for help too. Gary noted that SCAMTAG doesn't solve for M (it can't be estimated reliably because M is highly correlated with a number of other parameters); however, the IRM can solve for M.

The TC voiced support for the SCAMTAG model. It was determined that if the TSC works on IRM and the SASC works on SCAM, it may be possible to link the models into SCAMTAG with little difficulty. The TC also decided that ADAPT will also have to be updated with 2006 data because it has been used in the past for management and the Board will want to know the results.

The TC agreed upon the following plan: to have the TSC produce constant-M, catch-equation, and if possible IRM results, and have the SASC produce ADAPT and ASPIC, and if possible, SCAM results. By the summer assessment workshops, the subcommittees must have decided which method they will be using and have written some parts of the report. If IRM and SCAM are available, the TC will try SCAMTAG. Under this method, the TC has MARK and ADAPT to fall back on, which are two methods that passed peer review.

Gary Nelson will resend a spreadsheet about MRFSS information for the states to fill out.

Review and Approve Terms of Reference

The TC reviewed the Terms of Reference (ToR) that the TC chair and the subcommittee chairs had drafted. The following ToR were agreed upon by the TC for approval by the Board. Note that the modeling language is general to provide room for use of IRM and SCAM should they be ready for the assessment.

1. Characterize the commercial and recreational catch including landings and discards
2. Characterize the fisheries independent and dependent indices of abundance
3. Review the catch-at-age based model used in the stock assessment to provide estimates of F, spawning stock biomass, and total abundance and characterize the uncertainty of those estimates.
4. Review the tag based model used in the stock assessment to provide estimates of F and total abundance and characterize the uncertainty of those estimates
5. Evaluate the biological reference points for striped bass and determine stock status based on those reference points

Timeline and Stock Assessment Outline

The TC reviewed and revised the assessment timeline and outline for the assessment. See Appendices 1 and 2. The outline includes several assignments.

Other Business

Otolith Collection Program

Nichola asked the TC if it had additional comments about the statement prepared for ASMFC regarding the proposed otolith collection program. See Appendix 3 for the revised statement.

Cooperative Winter Tagging Cruise

Wilson provided an update on the cooperative winter tagging cruise including dates, plan of attack, and research projects.

Other Notes and Tasks:

- Research recommendations from the last SARC report should be included to show what the TC has accomplished since receiving the recommendations.
- Vic Vecchio, vice chair of the TC, would like to come to future SASC meeting(s)
- The TSC should be gathering the tagging data in winter.
- MRFSS should be done end of May.
- Compliance reports and Excel sheets due June 15th. The importance of states getting data in on time this year for the assessment cannot be stressed enough!
- Gary will compile a list of what each state needs to fill-in in the spreadsheet.
- Wilson is to get graphics of tag recaptures.
- Nichola is to post to the website or email the TC the source document for Amendment 4.

Meeting Adjourned

Appendix 1

STOCK ASSESSMENT TIMELINE

- Amendment 6 triggers peer reviewed benchmark stock assessment
- Tagging and Stock Assessment Subcommittees meet to determine data needs, discuss methodology, and start preliminary analyses to be continued remotely. Chairs of Subcommittee designated as lead data compilers. (Early Subcommittee meetings held in lieu of later Data Workshops as decided by the TC.) – **August 2006**
- Subcommittees prepare working papers and brief presentations to provide information on proposed modeling methods and data/modeling issues to TC – **October-December 2006**
- Chairs of TC, SASC, and TSC develop Terms of Reference and Timeline for the Stock Assessment Report (SAR) – **November 2006**
- Technical Committee receives progress update from subcommittees chairs, determines modeling methods, approves Terms of Reference and Timeline, and assigns products that would have resulted from a data workshop (below) – **January 2007**
 - Data Report: Introductory Sections 1-5 of the SAR (See Appendix 2)
 - Research Recommendations: Section 9.2 of 9.0 Recommendations and Findings
 - Consensus database containing the data sets and data descriptions to be used in the stock assessment models, organized in such a way that the assessment can be performed based on the information assembled in the database
- Management Board approves Terms of Reference – **January 2007**
- ASMFC staff sends reminding of annual compliance report and standardized excel sheet deadline: **March 15, 2007**
- Lead modeler(s) begin document describing reasoning and methodology of proposed assessment technique(s) for the Assessment Workshop(s) – **April 2007**
- Announcement of Assessment Workshops (separate events for the Subcommittees; announcement to include those products that must be completed beforehand) – **April 2007**
- 2006 Data Submission Deadline (timed with deadline for 2006 compliance reports, after which ASMFC staff sends data to all committee members): – **June 15, 2007**
- Finalization of assigned products that would have resulted from a data workshop – **July 2007**
- Convene two Assessment Workshops (2-4 days) to complete SAR. Note: one workshop for each subcommittee; because of overlap in membership, these will be held in different weeks – **Week of July 16 & Week of July 30, 2007**
- SAR submitted to ACMFC staff – **Sept. 4, 2007**
- TC approves/disapproves SAR and submits it to the SARC peer review process (if SAR not approved, it is returned to Subcommittees with comments, Subcommittees address comments and resubmits to TC for approval) – **September 2007 (TC Meeting Week 9/17-21?)**
- Peer Review of SAR – **November/December 2007**
- Management Board approves/disapproves peer reviewed SAR – **January 2008**

Appendix 2

STOCK ASSESSMENT OUTLINE

(with responsibilities)

- 1.0 Introduction – Doug Grout
 - 1.1 Management Unit Definition
 - 1.2 Regulatory History
 - 1.3 Assessment History

- 2.0 Life History – Rob O’Reilly
 - 2.1 Age
 - 2.2 Growth
 - 2.3 Reproduction
 - 2.4 Stock Definitions
 - 2.5 Genetic Information
 - 2.6 Natural Mortality

- 3.0 Fishery Description – Rob O’Reilly
 - 3.1 Brief Overview of Fisheries
 - 3.2 Current Status

- 4.0 Habitat Description (If relevant to assessment results) – Wilson Laney
 - 4.1 Brief Overview of Habitat Requirements

- 5.0 Catch at Age-based Model (VPA, ICA, Statistical CCA, etc.) – Stock Assessment SC
 - 5.1 Data Sources
 - 5.1.1 Fisheries Dependent Data
 - a. Commercial
 - b. Recreational (For-hire included)
 - 5.1.2 Fisheries Independent Data
 - 5.2 Methods
 - 5.3 Output Results
 - 5.4 Sources of Uncertainty

- 6.0 Tag-based Model
 - 6.1 Coast-wide Program (Brownie, R/M, Baranov’s Catch Equation, Instantaneous Rates Model) – Tagging SC
 - 6.1.1 Data Sources (by Tag Program)
 - 6.1.2 Methods
 - 6.1.3 Output/Results
 - 6.1.4 Sources of Uncertainty
 - 6.2 Chesapeake Bay Program (Bay-wide F from Spring Tagging Program) – Alexei Sharov
 - 6.2.1 Data Sources
 - 6.2.2 Methods
 - 6.2.3 Output/Results
 - 6.2.4 Sources of Uncertainty

- 7.0 Biological Reference Points – Gary Shepherd
- 8.0 Recommendations and Findings – Doug Gout
 - 8.1 Evaluation of Current Status
 - 8.2 Research Recommendations – TC compiled by Nichola Meserve
- 9.0 Literature Sited
- 10.0 Tables
- 11.0 Figures

Appendix I - Fisheries Dependent Sampling Review – Gary Nelson

Appendix II - VPA Tuning Index Review – Nichola Meserve (from files)

Appendix III – Estimation of Wave 1 Harvest in NC and Virginia

Appendix 3**Otolith Collection Program**

The Atlantic Striped Bass Technical Committee (TC) supports the Commission's 2007 Action Plan item to develop an otolith collection program. In 2004, the TC formed an Age Sampling Subcommittee to develop recommendations for such a program. The resulting program included the following elements:

- Goal: develop seven (7) regional age-length keys for striped bass ≥ 800 mm TL (because scales can not be used to reliably age these large fish)
 - Coastal
 - ME, NH, North MA
 - South MA, RI, CT, NY
 - NJ, DE, MD
 - VA, NC
 - Bays
 - MD/VA
 - DE
 - Hudson
- Otolith requirement: $>2,000$ otoliths should be collected to achieve a CV of 0.2 based on a two-stage random sampling estimation (Quinn & Deriso 1999)
- Sampling: 225 otoliths per region
 - Otoliths could be attained from some current programs, carcass collections, volunteers (anglers), commercial sampling (must purchase fish)
- Potential processing centers:
 - New York and Virginia (ODU): have the capacity to process otoliths, but can't handle more without \$6,500 for initial costs, \$600 yearly for supplies, \$8,000/yr/person for additional staff
 - ODU indicated it could process all the otoliths in 2004 at a processing fee of \$6 each
 - New Jersey recently spent \$50,000 on equipment and is getting training from ODU; could process with money for additional staff
 - Massachusetts also has the ability (facility/equipment) to do some processing but not the staff. Would require money for seasonal employees.
- Other
 - Staff requirement: some difference in opinion between adequacy of seasonal staff (MA) and permanent staff (NY)
 - Reminder that this is a labor intensive process (processing time~ 8 heads/hour)
 - This is a long-term project; money is required every year