Atlantic States Marine Fisheries Commission

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Ecological Reference Point Work Group
Assessment Workshop Summary

March 3 - 6, 2025
Arlington, VA

Members in Attendance: M. Cieri, M. Celestino, D. Chagaris, A. Buchheister, A. Schueller, A. Sharov, H. Townsend, M. Dean, J. Boucher
Staff: K. Drew, J. Patel, J. Boyle, S. Nehemiah
Public: W. Poston, P. Himchak, J. Kaelin, A. Binstock, R. Kane, J. Ault, B. Chiles, A. Kornbluth, A. Bianchi, C. Flora, R. Corbett, J. Higgins, M. Waine, K. Gamboa-Salazar, C. Read, R. Corbett, J. Millward, J. Spencer

Menhaden M WG Report

The data used for this analysis was the Coston dataset, a NOAA technical document which contained releases and recoveries of tagged menhaden. All the records between the Coston data and the other examined data sets (Liljestrand, Ault, and work group) matched for the releases. For recoveries, the difference was 2 between Liljestrand and others. This was used to ensure that the data matched the Coston dataset. There were no differences in the data for the Coston dataset. The other dataset that was examined was the NMFS re-digitized data (which includes the Coston dataset) that includes an expanded time series (an additional 1 year and 2 months). The release records for this dataset differed by 100 between Ault and working group. Recovery records differed by 1 between Ault and working group. The working group numbers were used for this data set. There was no real difference in the data. Differences were found in the releases and recoveries spatially and temporally and in the magnet of recovery. The percentages of the Coston data that were in the NMFS dataset varied by region (from 2% in Area 2 NJ-DE to 92% in Area MD-VA).

Outside of the release and recovery data, landings were also examined. These data are confidential, but the landings were matched across different groups. The landings were the same except for Liljestrand 1967 due to a copying error. Effort was also examined. These data did not match and they could not be recreated due to poor documentation. Effort data were determined using current methods, which were documented for consistency in the future. Plant test data were also examined to determine magnet efficiency. These data contain information on both primary and secondary magnets. The Coston data only had recoveries from the primary magnets. The NMFS data had recoveries from primary and secondary magnets. Plant test data were also examined at the regional level. Magnet efficiency was calculated using a regional average by month and year by taking an average of the efficiencies for the plants in that region, weighted by the landings from that plant for that month and year.

The runs that have been completed include the base run from Liljestrand used during the last assessment, (a) the Liljestrand base run with effort updated, (b) with magnet efficiency updated based on primary magnets (magnets 1 and 2 in the data files), (c) with Coston recovery matrix updated (the difference was 2 tags), and (d) the updated effort, magnet efficiency, and recovery matrix using Coston and primary magnets. (d) is the proposed new base run for the single species update from the M working group. The working group also ran (e) the (d) base run with updated effort, magnet efficiency, and the NMFS re-digitized data from 1966-69 using ALL magnets, and (f) the (d) base run with updated effort, magnet efficiency, and NMFS re-digitized data from 1966-1971 using ALL magnets. Both runs changed the number of theta parameters to match the data.

The working group also ran (d) with 4 more runs based on the work of the Ault group which uses the nonconfidential effort and landings data which may have contributed to the differences between these runs and the other runs.

Based on these runs, the new base run (d) gives an M of 0.925. The original estimate in Liljestrand was 1.16. Looking at annual estimates by region, with the lack of data in the northeastern area in the NMFS re-digitized data, the natural mortality is much lower using the NMFS re-digitized data. Looking at the data by season and region, in run (d) there is a higher migration of fish out of the northeast region from October to May, indicating that although some fish are staying in the region up to 2/3rds are moving south to the Chesapeake Bay or the Carolinas.

The group clarified that this is the M that the Lorenzen run scales to for menhaden aged 1.5. The group advised mentioning the old M in the peer-review report. The group also discussed some of the concerns about large time-at-large for recovered tags. This could be because certain tags were stored for a long period of time before being collected. The group requested a graph with time-at-large in the M working group report.

<u>Menhaden Single-Species Update</u>

A. Schueller presented the new base run of the single-species model with the new M. For F, trends and trajectories have not changed, but scale has increased. The biomass and fecundity scales have decreased. Recruitment shows similar results with trends remaining the same while scale decreases with the new M. Fits for the North Atlantic (NAD), Mid-Atlantic (MAD), and South Atlantic (SAD) index have close to the same fit. Landings also show good fits. Time-varying selectivities look similar and the correlations also fit well. Selectivity at age for the northern region for the updated base run was compared with the continuity run and showed a fairly similar pattern with some flexing of the points. Selectivity at age for the southern region was slightly more different. Selectivity at age for the bait fleet was still similar between the updated and continuity runs. Relative abundance (CPUE) indices had similar fits and log residuals were explored. Looking at the differences between observed and predicted values, the fits look very similar to past runs. SAD and recruitment index (JAI) were also explored. SAD showed a similar fit to past runs, but JAI seemed to shift after 1986, likely because of the catchability blocks being estimated. In general, the new base run looked similar to what was seen in the past assessment.

A retrospective analysis was conducted to remove the terminal year of data and a sequence looking back to 2018. A series of runs was conducted with terminal years from 2022 to 2018. For most parameters, the trends look the same regardless of the year with the exception of the very last year. The NAD index shows some differences in the trend lines for each terminal year based on changes in the estimates of catchability.

The single-species reference points include fishing mortality rate (geometric mean for age-2 to age-4 from 1960-2012 with a maximum threshold and a median target for the time period) and fecundity (SSB). The most recent decades for the geometric F mean have been below the target and fecundity shows that the trend has been above the target recently but below the target for the last few years.

The group concluded that the model behaves similar to the previous version with the exception of scaling the population. The group also recommended rounding M when presenting to avoid a false sense of confidence when it comes to the certainty of M. The group also discussed the approval procedure for the new base run and decided that the ultimate decision was up to the SAS. However, the ERP WG agreed that it was important to use the same M as the single-species model for all of the ERP models. Current EwE calibrations have been run with the M from base run (d), so the model will have to be recalibrated if the SAS lands on a different run as a base run. Mechanically, the VADER model is a bit easier to adjust than the EwE models.

Data Updates
The WG members had no additional input for model species that had not been previously presented.

J. McNamee had certain species-specific questions for the VADER model which were explored more in-depth during the VADER update.

The final species for the NWACS-MICE model include menhaden, Atlantic herring, bluefish, spiny dogfish, striped bass, weakfish, and to a certain degree, anchovies (coastwide time series). The major changes to the NWACS-full model include adding bluefin tuna and osprey. Moving forward, for other iterations of these models and to account for regional considerations, other prey items may become more important; however, it is important to remember that the current models are coast-wide models.

NWACS-MICE Updates
After the last workshop, the output files from stock assessments have been extracted the inputs for all of the species and time series for the MICE model. The code for this has been uploaded to the NWACS Github. Since the last meeting, anchovies have also been revised. M. Dean ran 8 surveys through the sdmTMB model, which output an estimated biomass of 0.635 mt/km^2 and a time series which was not too different from the previous estimate. Benthic invertebrate data were queried through the NOAA National Benthic Inventory database to obtain weight by taxa by genus. The new biomass is 51.91 mt/km^2 for this group across the entire model domain. There was no data north of Massachusetts and there was a slight bias toward inshore sites. The zooplankton biomass estimates were derived from the NEFSC survey. M. Celestino found length-weight equations for different taxonomic groups to derive biomass to obtain 24.47 mt/km^2 across the model domain. Ecosim-MICE time series uses biovolume (rather than individual zooplankton groups). The zooplankton data are mostly offshore and the benthic invertebrate data was obtained from inshore.

The diet matrix was a modified approach of Masi et al. 2014 that bootstraps diet data and fits to a Dirichlet multinomial. This process was 6 steps: 1) combine datasets (ChesMMAP, NEAMAP, NEFSC, NJOT, RI, MSVPA), 2) Get prey taxonomy (R ‘taxize’ package), 3) Predator and prey assignments to model groups, 4) MLE diet estimates, 5) Assign unidentified prey, and 6) Assign to prey stanzas.

For the MLE diet estimates (4), there were 10,000 bootstraps of 30% of the data. The data were weighted and resampled based on stomachs. A Dirichlet distribution was fit to the bootstrapped data (R ‘compositions’ packages). The MLE was based on beta posterior distribution function. The averages (weighted) were also computed. This process helped identify how specific records fit into the distribution. For example, the NEFSC data were being diluted since they provided aggregated data, resulting in herring not appearing in striped bass data in initial runs. This was traced back and fixed by re-weighting the data.

The diet data from the NWACS-MICE v2.1 showed a much lower menhaden consumption (23%) for striped bass age-6 than the new version of the model (35%). There is also a high discrepancy in estimated consumed herring (previously 5% and now 17%). It was advised that this may be based on the back of Cape Cod in the fall, there are mass aggregates of Atlantic herring for spawning, but the bottom trawl there catch very few striped bass; however, the model does not have any downweighing to account for this and the diet matrix is not seasonally weighted. The group also noted that the NEFSC estimates the striped bass consumption of herring to be much higher.

For spiny dogfish, there was a high number of zooplankton, but this may be because it’s a generalist predator that eats a lot of gelatinous zooplankton. Despite the small percentage of menhaden in their diet, they are large predators that have high consumption rates, which could still lead to high removals of menhaden.

For bluefish, both juveniles and adults ate the most amount of anchovy. Their menhaden consumption increased from 1% as juveniles to 6% as adults.

For weakfish, are still eating menhaden as adults, but little to no herring due to lack of spatial overlap.

For Atlantic herring, the large portion of benthic invertebrates that were seen in the first runs of the matrix was resolved. Now, the matrix has a much higher portion of zooplankton, as expected. This species' diet also has a broader distribution due to either diurnal patterns, their wide range, or more diet information.

There are some species where this method didn't work, including juvenile and adult menhaden and anchovy. These were not estimable with the MLE approach, so their diets remain unchanged from the v2.1 model.

After step 4, step 5 dealt with distributing UI prey in order from lowest to highest taxonomic resolution and step 6, which assigned prey to age stanzas. The Rhode Island predator-prey size data were used to calculate cumulative distribution function of data by prey length for fish prey by predator. This represents generalized finfish prey size preferences for each predator. The ECDF was applied to size breaks of multi-stanza prey species. The group mentioned that the federal food database has prey and predator length and weight for future iterations of this model. M. Dean has access to this database.

Looking at the outputs of the unbalanced model, there are the usual issues of the juvenile stanzas being unbalanced due to high levels of predation mortality. The weakfish output is also problematic since the ecotrophic efficiency was very high and very low juvenile mortality rates. The current iteration of the model has different juvenile morality input for weakfish (derived from a Lorenzen calculation) than in the stock assessment to help balance it. The juvenile M was also averaged over the time series, but that did not balance very well with the diet.

The group also discussed whether it was worth including weakfish in the model for future iterations. As a predator and a prey item, weakfish gives a good contrast between the prey and predator trends, but moving forward, it may be worth removing weakfish because of the issues caused by weakfish inputs, the lack of sensitivity, and the potential lack of impact on menhaden M. However, there is also stakeholder interest in this species so if some of these issues can be resolved, it may be worth keeping in.

The balanced NWACS-MICE has adjusted values for ecotrophic efficiency, production/consumption, and bioaccumulation rate.

There are 7 Ecosim models – the updated model, the annual primary production forcing model, the monthly primary production prey forcing model, the monthly egg production forcing model, the monthly predator-prey k_{ij} forcing model, the monthly fishing mortality model (needs monthly catch), and all the monthly dynamics included. There were 27 relative biomass, and 12 catch time series used in the calibration of these models. The relative catch was used for non-leading stanzas. The biomass from the stock assessments was included but with weight 0. All the time series for the model calibration were obtained from stock assessments except for anchovy and zooplankton.

Alternative starting values were used for vulnerability multipliers (k_{ij}). The default is 2. It can also be scaled to B0/B1985 (carrying capacity assumption). k_j can also be scaled to trophic level (range 1.10-100) or the F_{max} constraint. k_{ij} could also start randomly (n=5). The values that worked the best were the default and the carrying capacity assumption.

Ecosim can also be calibrated in about 6 different ways, which are explored in-depth in Bentley et al. This paper also carries these methods through to whether this would be useful for management advice. Some of these methods include estimating by k_j predator column for groups with time series data, estimating k_{ij} with repeated searches (what was done last time), or stepwise k_{ij} estimate which involves adding k_{ij} parameters one at a time. So far, 60 different Ecosim models have been calibrated. The model was fit at 0, 1, and 2 with 1 having the lowest sums of squares. The foraging time adjustments parameters were evaluated as well with the base setting having the lowest sums of squares. In scenarios with primary production, the maximum relative production rate was constrained to 2 (default).

The best fit based on sums of squares and AIC was the model with the monthly egg production. For the continuity update run (3rd best fit), the best run showed an uptick in the population of age-6 striped bass, which may be due to aging error. The outputs of this run also show the difficulties caused by the Z of weakfish. The plots for all MICE species were examined. Run 29, which includes primary production forcing functions, was also examined.

After a few days of work on the model, the diet matrix was adjusted for both EwE models by removing redundant data and fixing the prey stanza discrepancies between the two models. The diet plots for both EwE models looked more similar than in the original plots. The original discrepancy between herring's percentages were also explained by these differences in the first diet matrices. Most of the diet proportions match between predator-prey matches for the two EwE models after these changes. The group did ask about potentially creating a working paper that explores the diagnotstics of the Dirichlet fit for each of the predator-prey pairings. In addition to this, the weakfish M was updated in the MICE model.

<u>NWACS-Full Updates</u>

For the Full model landings and effort data, the goal was to get gear-specific landings and effort data at a finer resolution and develop an effort time series. This is especially important for species that do not have mortality represented by a specific assessment. The previous pull was from the NOAA landings database, but this pull was directly from ACCSP and had some additional MRIP data. Some of the species had substantial differences in magnitude of landings. For example, the Hake stock assessment report had lower landings than the other data sources. Herring, spiny dogfish, Atlantic mackerel, and haddock also had some differences. Some of these differences could be because of the addition of Canadian landings. The group recommends using the stock assessment report data for most of the species excluding Hake. For the non-assessed species, the gear-specific data were examined against the non-gear-specific data from ACCSP and MRIP. The macrobenthic polychaetes were excluded as well as other primary producers. The key different groups include the macrobenthic mollusks and megabenthic filterers. For the mollusks, the reported weights changed from "mean weight" to live weight in 1994. Conversion factors were developed and applied for these two groups.

Fishing effort by gear was also examined. The best effort metric would vary by gear, so number of trips was used as the "effort" metric. Despite confidentiality issues, most of the data were available. The number of trips were scaled to total landings based on the proportion of total landings counted on trips. There was a large increase in the proportion of landings with trip data in 2010 (without an increase in trips). This leads to a big dip in adjusted effort. The are two possible metrics for effort (relative to 1985): adjusted number of trips (some odd patterns with long lines and dredge) or total landings (was used in the original model and assumes constant catchability through time). The group instead recommended calculating total landings by gear only for the species that don't have an assessment.

A similar diet methodology was used as the MICE model. 25 different data sources from literature to surveys (NEFSC, NEAMAP, ChesMMAP, NJOT, and RI) were used. The plots for the Full model had many more functional groups, but age-0 striped bass consumed anchovies at the greatest rate (32%). Age-2-5 and age-6 striped bass consumed the menhaden at a high rate (19% and 26% respectively). However, the group did notice a discrepancy between the proportions of Atlantic herring consumed in the MICE model vs. the Full model with the Full model reporting 5% for age-2-5 striped bass and 2% for age-6 striped bass as compared to the MICE's 17% for age-6 striped bass. The same type of discrepancy is not found in spiny dogfish or bluefish.

To allocate diet among prey stanzas, the same ecdf as the MICE was used and the same allocations as the previous model was used. Diets for 30 model groups were updated. For the otherwise the diets were kept the same. Anchovy, menhaden, osprey, marine mammal, and tuna diet values were taken from the literature.

For the osprey data in this model, a biomass time series was developed using the Breeding Bird Survey and the Partners in Flight database. Biomasses for both regions (14, 30) were summed. Osprey biomass for the model area was 0.00007 mt/km^2 which is 100x less than the previous bird value from the EMAX (0.007 mt/km^2).

There were slight changes to the groups to make the stanzas match the MICE model. Overall, the group number was reduced from 61 to 59. The Ecopath model has been parameterized. It is currently in the process of being balanced to get ecotrophic efficiencies <1 for all groups.

Additionally, in the 2019 model, B was 7.9 mt/km^2 with ecotrophic efficiencies between 0.15 and 0.56 and in the current iteration (terminal year 2023) B is 2.8 mt/km^2 with ecotrophic efficiencies between 0.45 and 0.73. Part of this increase in precision is because the model area was matched to the MICE model area (441,000 km^2).

The group recommended running this model as a sensitivity run and comparing the results of the 2023 terminal year model to the output of the 2019 terminal year model. The group acknowledged the possibility that the Full model may show that certain species not in the MICE model are more sensitive to menhaden biomass than the species in the MICE model and that this would be addressed if that were the case after the models had been run.

<u>VADER Updates</u>
The VADER model was completely recoded into rTMB; however, rTMB has difficulty reading lists. ADMB uses ragged arrays to deal with non-orthogonal data. R handles these types of data as a list. rTMB still works with the old data and the new data (without weakfish). When adding weakfish into the model, the model didn't run due to error. J. McNamee was able to get the model running again; however, the model results were not feasible. A week or two will be needed to fix this problem.

The group recommended potentially condensing the current model to striped bass and menhaden as proof-of-concept to show that there may be another alternative to the EwE models. The other option is to start with this and then add more species and see what the output looks like or to review the necessary components of the input file and see if that is contributing to the error.

<u>Weakfish M</u>
The issue was that the weakfish model uses a Bayesian model to estimate an age-constant, time varying M. We input this time-varying M into an ASAP model set up to mimic the SSB trends from the Bayesian model to get age-0 biomass estimates and to make it easier to read in the other model inputs. M is converted from age-constant to age-varying using the Lorenzen curve, but the EwE models are having a very difficult time balancing this.

The Bayesian model put an upper bound on M at 1.0. Krause et al. 2020 used an integrated tagging model to estimate M and F for weakfish tagged in NC from 2013-17. An M of 2.33 was used for their study period. Their estimate of Z was very similar to the assessment for that time-period. One potential solution is to scale the time-varying M from the Byesian model to the Krause et al. M. The maximum M from the Byesian occurred during the Krause et al. study. Krause et al. tagged primarily age 2-3 weakfish. If their M represented age 2.5 weakfish and scale the Lorenzen curve to have M at age 2.5 equal to the scaled, time-varying M for that year.

The group was asked whether to run the weakfish ASAP model with a Krause M in place of a Bayesian M would help the EwE models balance a bit better. It is important to note that a Krause M has extremely high biomass and recruitment later in the time series, but the starting M is much more reasonable than the Bayesian model, so it may be a better starting point for this species in the EwE models. For the Full model, the time series used will still be what's in the original ASAP assessment, but the M will shift to the Krause M.

Model Comparison Updates, Reference Point Scenarios

In the previous assessment, the same models were reviewed in addition to the surplus production model and the single-species models. Three main criteria were developed to help compare the models: (1) the ability to address management objectives, (2) estimates of age-1+ biomass and exploitation rate form each model compared with BAM output, and (3) stock status from each model relative to internal reference points where available.

In the previous assessment, the first management objective looked at which models informed the population's ability to sustain menhaden to provide for fisheries by looking at the following performance metrics: abundance/biomass of menhaden, menhaden yield objectives, age composition, and the historical distribution. These metrics were examined across models and almost all of the models gave information to inform this objective. The second objective was to sustain menhaden to provide for predators by looking at the following performance metrics: abundance/biomass of predators, predator yield objectives, predator nutrition, and prey availability relative to predator distribution. For this criterion, the BAM, Steele-Henderson, and Time-varying r models did not give information to inform these metrics. The VADER and EwE models were able to inform all of the performance metrics with the exception of prey availability relative to predator distribution, which could be provided with future adjustments. The third management objective was to provide stability for all types of fisheries by looking at stability in yield for directed menhaden fisheries and stability in yield for non-menhaden fisheries. Again, the VADER and EwE models were able to inform both performance metrics. The final management objective was to minimize risk to sustainability due to changing environment based on uncertainty for future environments for menhaden and their predators. None of the models could inform these metrics in the last assessment, but the VADER and EwE models could be modified to address this objective.

The group discussed the model comparison criteria for each of these objectives and their corresponding metrics. For the VADER model, there are methods to incorporate indices into statistical models, but this probably will not happen within the current timeline. For the second and third management objective, it seems like the models seem to be in the same place as the previous assessment; however, the EwE models have made more adjustments via primary production forcing functions and Ecospace to tackle these objectives.

The group examined the previous output of the model comparison criteria for biomass, age1+ biomass, M1, M2, F, and Z. The previous conclusions stated that estimates of biomass and exploitation rate from the ERP models were very similar to the simulated values from BAM in both scale and trend; however, this is expected as the models have the same inputs. All the models produced MSY and MSY-proxy reference points. All of the ERP models agreed with the BAM model that in 2017, overfishing was not occurring, and the stock was not overfished. The final conclusions stated that VADER and NWACS were the only models that provided information on predator biomass and fishing mortality and only the NWACS models include "bottom-up" feedback.

For the current models, the group agreed that it's worth keeping the management objective tables and criteria since there has not been much change since the last assessment. They also agreed that for comparisons between the VADER and the EwE models, it would be worth exploring age-1+ biomass and exploitation rate form each model compared with the BAM output. This would include absolute estimates, relative scaled to each model's time series mean, M2, and consumption of menhaden by MICE predators across all models. The group also discussed removing stock status relative to each model as a comparison criterion.

The group also weighed the pros and cons of showing projection scenarios that include showing what the impact on menhaden would be if predators were fished to various levels and bringing these scenarios to the peer-review.

The group then discussed the current ERP scenarios. The first scenario is the current ERP definition, which includes striped bass at target F and all of the other species at their 2023 status quo F. The second scenario includes all other MICE species predators at their F (or biomass) target while keeping herring at status quo biomass (high F, above the threshold) and all other non-MICE species kept at 2023 status quo.

<u>Report Writing and Peer Review Framing</u>
The group discussed potentially changing the outline of the report to first address the indices of each individual species, but the group ultimately settled on keeping the report structured the same way as the 2019 assessment. The report will also likely end up a bit shorter due to the removal of 2 of the 2019 assessment models. The group also agreed to create a working paper explaining why certain predators were excluded and chosen and how. Additionally, it was recommended that the original 3 pages about predator section be reduced and direct readers to refer to the previous assessment report.

The M section should be highlighted in the TOR summary and should be explained in depth in the TOR report. The group also agreed to keep the BAM section the same length along with an appendix to explain the BAM update in-depth.

The diet matrix process for the models should also have a working paper to give details about the process, but the main report will just have a summary of the process and the main changes with the VADER diet section being slightly different due to the age-structured nature of the model.

The group agreed to add a table and shorter written summary of the single-species assessments and stock status.

Writing Assignments:

- Executive summary and TOR summary report – M. Cieri, K. Drew, J. Patel
- Introduction (parts 1-8) – S. Madsen (with help for data sources)
- Single species assessments and stock status – K. Drew, S. Madsen
- Assessment history – K. Drew, S. Madsen
- BAM update – A. Schueller
- Model sections (don't have to follow exact outline from last time) - D. Chagaris, A. Buchheister, J. McNamee
    - If WASPP can be run, then a working paper – G. Nesslage
- Model comparisons – K. Drew
- Discussion/synthesis of findings – M. Cieri
- How research and modeling recommendations from 2019 have been addressed – M. Celestino
- Reference points (TBD after next meeting) – M. Cieri, A. Schueller, K. Drew, J. Patel
- Internal reviewer – A. Sharov

Once writing assignments are complete, please send to K. Drew and J. Patel and upload to the ShareFile.

<u>Timeline and Assignments</u>
Modelers:

- Finish your model
- Write up your results

K. Drew:

- Work with A. Schueller to create time-at-large figures and model comparison figures
- ERP species target and threshold scaling document
- Send 2023 projections to modelers for bluefish and spiny dogfish
- Double check inputs in the model file vs the VADER files for J. McNamee

Timeline:

- March 12th – SAS call to finalize runs
- March 15th – M WG draft sections to staff
- April 3rd (10:00 AM – 2:00 PM) – ERP WG Check in call (goal: establish a base run and pick a preferred model type)
- April 15th – M WG report edits due
- April 28th (10:00 AM – 2:00 PM) – ERP WG Check in call
- May 16th – Menhaden and ERP report sections due to staff
- Week of June 16th – SAS and ERP WG meetings to approve reports
    - July 17th (1:00 PM – 5:00 PM) – ERP WG report approval meeting
- July 9th (1:00 PM – 5:00 PM) – ERG WG Check in call
- Week of July 14th – TC call to approve report
- July 25th – report goes to peer review panel
- Week of August 12th – Peer review workshop