NC Nutrient Criteria Development Plan – Scientific Advisory Council (SAC)

7/19/2018

Attendees

SAC members in attendance:

Lauren Petter	Michael O'Driscoll
Bill Hall	Martin Lebo
Linda Ehrlich (online)	Hans Paerl (via phone)
James Bowen	Nathan Hall (via phone)
Clifton Bell	Deanna Osmond
Astrid Schnetzer	
Marcelo Ardon	

SAC meeting facilitator:

Andy Sachs

NCDEQ DWR staff in attendance:

Jim Hawhee	Mike Templeton
Tammy Hill	Raj Rajbhandari
Jeff Manning	Jing Lin
Connie Brower	David Huffman
Christopher Ventaloro	Qaise Banihani
Bongghi Hong	Pam Behm
Nora Deamer	
Brian Wrenn	

Criteria Implementation Committee (CIC) members in attendance:

In person:

Andy McDaniel

Anne Coan

Participating audience members:

Jay Sauber

Meeting materials can be found on the Division of Water Resources Nutrient Criteria Development Plan Scientific Advisory Council webpage. Click here for a direct link.

Meeting notes

All questions, comments and answers are paraphrased

1. **Convene** (Andy Sachs, Brian Wrenn)
   a. Desired outcomes for today's meeting:
      i. Shared understanding of the comments and questions from the CIC on the pH Proposal.
      ii. Shared understanding of fisheries data for HRL.
      iii. Shared understanding of the workflow proposal for Chlorophyll-*a* criteria for HRL.
      iv. Shared understanding of the continuing discussions on Chlorophyll-*a*.
   b. Administrative business
      i. Meeting notes from the May 2018 SAC meeting have been emailed today. Will request comments on notes at the September SAC meeting.
2. **Update on High Rock Lake fishery** (Marcelo Ardon)
   a. See [presentation slides](#)
   b. Throughout our discussions we've been hearing that HRL has an excellent largemouth bass fishery, but we have not seen data to support this.
   c. This is a summary of data from the Wildlife Resource Commission (WRC) and information from a graduate student project.
      i. WRC information includes:
         1. Surveys and electrofishing data
         2. Discussion with WRC Fisheries Biologist Laurence Dorsey
         3. Data shows a decline in catch per unit effort over the past ten years (See presentation slides for graphs)
         4. HRL catch per unit effort falls below other NC reservoirs in this district
      ii. Tried to compare the largemouth bass data to existing chlorophyll-a data:
         1. Only two years that have both fishery and chlorophyll-a data
      iii. Next, looked at the NC Trophic Status Index data
         1. Data came from the 2014 TetraTech report that ranked all NC lakes/reservoirs as a eutrophication index. Considers: total nitrogen, total phosphorous, chlorophyll-a and Secchi depth.
         2. Shows a declining trend in HRL.
         3. Used NC trophic status index vs. mean catch per unit effort/hour information:
            • HRL has had a history of being an excellent fishery, but is that still true? Looking at the TetraTech report other lakes that are less eutrophic appear to be more productive than HRL.
            • In HRL the largemouth bass catch is negatively correlated with the eutrophication index.

- HRL has the lowest catch per unit effort/hour of all the other NC reservoirs.
- Less eutrophic lakes showed greater production

d. Comments/questions:
1. James B.: What is catch per unit effort?
   - Marcelo A.: They have length data. They must catch a certain number of fish within a certain amount of time. For largemouth bass it is based on electroshocking methods. There is also data for crappie but focused on largemouth bass here.
2. Jay S.: The NC trophic status index is a relative index to rank lakes for productivity using total organic nitrogen, total phosphorous, chlorophyll-a and Secchi depth. Data is taken from mainstem location. Largemouth bass catch per unit effort data is based on availability of suitable habitat. The mainstem is not suitable habitat for largemouth bass. HRL is easily shockable, but this can vary by lake. Caution using the index for making this comparison. WRC could help with interpreting this.
3. Brian W.: We are hoping to get WRC staff and NC State University staff to provide updated information.
4. Jim H.: Any fishery metric is tough to get. It may be that HRL got its good reputation because it has good access which led to an influx of people. Be careful drawing conclusions as fisheries management is hard to measure.
5. Bill H.: There's not a lot of data here. It seems to be an outlier.
6. Astrid S.: We have argued that the HRL fishery is excellent based on little data. Why are we okay with heavily weighting what little fishery data we have yet question the limited data we have for other parameters?
7. Lauren P.: I like that this is being considered. There have been times where certain data sets have been considered not as important even though they had the same data density as the fishery information.
8. Marcelo A.: This is anecdotal information, but when I spoke with the graduate student he remarked that he was underwhelmed by the size of the largemouth bass being pulled from HRL and that there were a lot of catfish.

3. **Update on the CIC** (Brian Wrenn)
   a. See [meeting materials](#)
   b. The CIC met in June.
   c. Discussion focused on the SAC pH proposals.
   d. CIC action items for the SAC & DWR
      i. If the SAC in going to include assessment units recommend referring to whatever guidance or reference explains how the assessment units are to be established. (SAC)

      ii. How would this site-specific pH criteria applied statewide? (SAC)

     iii. The pH proposal documented should be updated to include the Environmental Management Commission recent changes to the NC assessment methodology. (SAC/DWR)

     iv. Analyze overlay of photic zone vs. zone with DO greater than or equal to 4.0 mg/L. Where is the highest pH? (DWR – delivered)

     v. Provide a range of areas where the pH criteria would be applied to the regulated community?

        1. DWR working on this. Obvious areas would be NPDES permits, stormwater management plans & permits. Do not have a comprehensive list yet for which regulated entities might be impacted by a change in the pH standard.

e. CIC questions for SAC:

     i. Regarding pH proposal #1, referring to the one-hour median being more scientifically defensible but allowing an instantaneous reading. Should this proposal read instantaneous or median? If instantaneous is allowed why would you say one-hour median?

     ii. Regarding pH proposal #2, what is the standard when DO is less than 4.0 mg/L? Also, this seems like it could be implemented under the existing pH criteria as the current criteria can be done as an average of the water column.

     iii. What is the difference between the ammonia analysis conducted for the pH proposals and the minority report?

     iv. Why are different metrics for general tendency (median vs. arithmetic mean) used in each proposal?

     v. Should the proposals state that they assume the current assessment of impairment will be used for assessing compliance?

f. Comments/questions:

     i. Astrid S.: Can you give an example of what the CIC meant in their first action item (3.d.i)?

        1. Brian W.: DWR has established assessment units in place. If different assessment units are being recommended by the SAC how will these assessment units be determined? Using the example of the assessment units recommended by Clifton (riverine, transitional and lacustrine), what is the background for these and how were they developed?

     ii. Lauren P.: referring to the fifth CIC action item (3.d.V), was this referring to compliance?

        1. Brian W.: More along the lines of what regulatory programs would be impacted by a change to the pH standard? Permitting would be a major one for example.

2. Andy M.: For example, water quality effluent limits are not typically applied to stormwater permits. If DWR was going to go that direction it would change thigs. CIC needs to understand how this is intended to be implemented to determine costs.

3. Brian W.: And I don't think DWR is necessarily heading in that direction. This is just a site-specific standard that is being considered.

iii. Anne C.: For any proposals the intended assessment method should be clearly stated as opposed to just referencing the current assessment methods. Assessment methods may change over time. It is important to know exactly what was intended for the standard.

iv. Pam B.: Instead of making references to assessment it would be better to clearly state how the criteria is meant to be applied. The EMC determines the assessment methods.

v. Lauren P.: I like the way Pam said this. How are the criteria applied? The number of samples is what DWR considers after with the intention of having enough samples to be confident.

vi. Marcelo A.: The difference between the ammonia discussion in the proposals vs. the minority report was whether stations were combined vs. looking at individual stations.

vii. Clifton B.: Wasn't there a time scale difference as well? The SAC probably included data back to 2005 where the minority report might go back to the 1980s.

1. Marcelo A.: I will check that.

viii. Andy S.: SAC should get any action item products or comments back to Brian Wrenn by August 1.

4. **Alternatives and decisions to be made in writing numeric nutrient criteria for chlorophyll-a in High Rock Lake** (James Bowen)

   a. See the document titled "*Alternatives and decisions to be made in writing numeric nutrient criteria for chlorophyll-a for High Rock Lake, NC*" here

   b. This was developed based on the conversations surrounding the proposals by Lauren and Clifton during the last meeting. Feedback on the proposals was requested but both proposals assume that certain decisions have been made by the SAC. I'm not sure that these decisions have been made.

   c. Wanted to conceptually back up to ask what decisions need to be made on the way to deriving criteria? This workflow attempts to do this by outlining a set of alternatives that need to be considered to develop chlorophyll-a criteria for HRL.

      i. Set up as numbered alternatives which lead to questions that need to be answered. (like a dichotomous key).

      ii. Starts with question A-1: *Is the criteria evaluation based upon the number of samples exceeding the numeric criteria (exceedance based) or a growing season average of the samples (average based)?*

1. Feel that we need to know the evaluation method prior to developing criteria recommendations.
2. The current assessment method uses the exceedance-based method. The SAC has been going in the direction of a growing season, but we have not yet officially stated that.
3. Discussion:
   - Marcelo A.: When saying a growing season average, we still don't want to exceed some number, right?
     i. James B.: Yes, but we need to clearly acknowledge that question and address how we evaluate that. The criteria should have some sort of evaluation component with it. For example: If we go down the exceedance route, do we need some level of confidence?
   - Jay S.: The water quality standard is dimensionless. The EMC has the authority to determine when the standard is attained or not. The previous method was greater than 10% of samples exceeding with 90% confidence. New method is the same unless most recent two to three years have samples exceeding the standard.
   - Pam B.: When setting a number your setting it based on some assumptions. Those assumptions should then inform how the number is applied for assessment.
     i. James B.: As we've heard previously, criteria should include magnitude and frequency. We are tasked with going beyond just recommending a number.
     ii. Clifton B.: And averaging (duration).
     iii. Lauren P.: Is the current chlorophyll-a standard applied as an instantaneous value?
     iv. Pam B.: When the current 40 ug/L standard was developed it assumed averaging. That got lost at some point. We don't want that to happen again.
   iii. If we go with the average based approach (see A3 & A4), which is what the SAC seems to be leaning towards, we have another decision fork: how do we do the growing season averages? Arithmetic or geometric mean? What is the basis for this decision?
      1. If we go with the geometric mean, do we base it on distribution of data or not. If not, what is the justification for using a geometric average? distribution of the values.
   iv. Moving to A5, if we use a growing average, are we applying a statistical test to determine if it is less than a number? Will there be at least an XX% confidence that

the growing season, assessment unit (arithmetic/geometric) mean chlor-a concentration is less than some number (YY ug/L)?

v. If we don't go that way, we go to number A6 and the "Florida approach". There is a high number where use is not attained. Want a lower number where some percent of growing average will be less than that number. They chose 80% of the growing season average (geometric) will be less than the higher number that was determined by taking many measurements in multiple lakes over a period of time.

1. Lauren P.: Just to clarify, the "Florida approach" applied only for estuaries.
2. Bill H.: They used seven years of data?
3. James B.: Florida had four estuaries with seven years of data. They felt that was enough to evaluate the variability in the growing season average.
4. Jim H.: Could that be described as a reference approach?
5. James B.: Yes.
6. Lauren P.: But it is assessed as a 1-in-3.
7. James B.: It's been put out as an approach and appears here as a consideration. I'm not sure we have the data to support something like this but wanted to address all options.

vi. Looking at A7, some other issues concern how to evaluate data from multiple years. In most cases we have data from multiple years. What do you do with it? This gets to frequency. Do you evaluate frequency for which the growing season average can exceed the criteria? Florida did this as 1-in-3 geometric growing season averages can be less than a number. Clifton proposed something different for when there is not enough data.

1. Clifton B.: If you only have one year of data or weren't collecting data enough to do the 1-in-3, you can pool data from other assessment periods to get at least 10 data points. This may be more compatible with how DWR currently does lake monitoring due to resources (once every five years).

vii. If you don't pool data from multiple years, go to A8 to consider different growing season averages for different years. At what frequency may these averages exceed the criteria?

d. This was an attempt to capture everything that we have considered over the course of this discussion.

e. Discussion:

i. Astrid S.: Averaging based approach is good idea. The minimum required data plays a big role. If we can't nail down the number of samples needed figuring out the minimum data requirements will be difficult. We have not come to a consensus on this yet.

1. Mike O.: Sometimes there is more temporal variability than spatial variability. It may be good to consider decreasing the number of monitoring stations but increasing the amount of sampling at those

stations. How many data points do you need to detect a certain level of change and what level of change do we want we want to be able to detect.

2. James B.: This may be wrapped up in the "other questions that must be answered" section. We are limited to what sampling DWR can realistically perform, but it would be nice to be able to do it this way especially for HRL. Not sure where that leaves us?

3. Astrid S.: Residence time is also important to consider as it may change how things might need to be assessed. Different residence times would lead to different sampling requirements and would be different for different systems.

4. James B.: I was thinking of this more as how to start at the beginning and then get to a criterion for HRL specifically.

ii. James B.: We might get to a different place with each system we look at. Want to make sure we are considering all options in any decisions we ultimately make. Does the SAC feel that this workflow is helpful?

1. Marcelo A.: I like this, but at what point do we determine if the number we choose is protective of the uses?

2. James B.: That's the other part of this. This workflow is mute on the procedure for doing that.

3. Andy S.: Is the answer to Marcelo's questions that once you get to the end of the workflow you then consider whether the value is protective.

4. James B.: Yes, but I think to some extent you are considering that all along.

5. Marcelo A.: In following this exercise of explicitly stating what all our choices have been to get to a number, maybe this [the protectiveness of the number] should be explicitly stated as well. Our decisions as to the protectiveness of the number need to be documented as well.

6. Clifton B.: I like this a lot. It helps us crystalize what we need to consider prior to getting to the numeric criteria (magnitude). We need to make these decisions first so that we can interpret the magnitude. The numeric criteria question will have a host of considerations related to multiple indicators and uses. If we can come to consensus on these other elements we know what we're dealing with and we can then tie the numeric number to the indicators. We should use this framework going forward.

7. Lauren P.: Is this saying that we are going to use the data from HRL to determine the magnitude? If so we need to address our decision making surrounding what data we consider appropriate and why. This brings up questions about how we are going to use the existing data. For example: Are we going to average all the chlorophyll-a data in HRL? Some people might feel that the existing data is too high. Do we need to cull out data first? How do we record these decisions?

8. James B.: One of the assumptions made is that we are using the data from HRL. Samples used for assessment are taken from a designated portion of the water column. I didn't consider any methodology beyond that. For example: throwing out outliers, non-detects, etc.

9. Clifton B.: Another way to think about this is that we are defining the framework for those things that we don't expect to change and how we address criteria between reservoirs. The magnitude will most likely change between reservoirs, but this provides a framework to decide how we approach the components of criteria for all lakes in general. Then we can look at what that means for HRL.

10. Remaining SAC members agree that this is a useful tool.
    - Andy M.: This framework will help the CIC understand the criteria more fully and will help in our discussions and improve the interaction of the SAC and the CIC.

11. SAC member commitments:
    - James B.: Will add references to HRL to the framework.
    - Deanna O.: Familiar with decision trees and will do a quality control check of the final framework.
    - Remaining SAC members: Provide James with any other decisions that you feel need to be considered in the framework.

iii. <u>Afternoon discussion</u>:

iv. James B.: There is an updated version of this framework. There was some concern about the original leading towards certain conclusions. The version shown here implies that there will be aggregation of sampling stations though the SAC may not have consensus on that. We also need to discuss combing of near stations and data requirements.

v. Concerning growing season:
1. Andy S.: What about the imbedded assumptions at the beginning of the framework document? Do we need to test the validity of these before moving on?

2. James B.: That would be a good place to start to see if we are in consensus.

3. Linda E.: Regarding the first assumption, samples being taken in the photic zone (defined as twice the Secchi depth) has been in place for a very long time. Is that up for reconsideration?

4. James B.: I didn't think so but wanted to be explicit in what we are deciding.

5. Lauren P.: It is worthwhile to indicate that.

6. Linda E.: Highest chlorophyll-a concentrations usually occur just before the start of what we have as the growing season. Often in February and March due to diatoms and flagellates.

7. Nathan H.: I'm not sure there is true growing season for reservoirs in NC. Jordan Lake has high chlorophyll-a counts in December. Can we just leave out the term "growing"? Do we really want to not consider other months?

8. James B.: Potential concern with diluting the data with low values if we look at it year-round. Summer blooms would be evened out by data from darker, cooler months.

9. Linda E.: The highest chlorophyll-a levels often occur in February and March due to diatoms and flagellates. There was also a cyanobacteria bloom at White Lake in January.

10. Hans P.: Agrees with Linda. Also, in the riverine portion of estuaries we see higher chlorophyll-a concentrations outside of summer.

11. Bill H.: We just need to define the growing season for HRL.

12. Nora D.: Our lake sampling staff only sample these reservoirs in the summer.

13. Hans P.: What about March through November?

14. James B.: If we are clear about how we are doing it I would be ok with using all data.

15. Clifton B.: We need to be consistent. The growing season is not to reduce protection. It's more there to help define the relationships with the indicators.

16. Brian W.: SAC may want to consider warm vs. cold seasons. Would there be no chlorophyll-a standard during the cooler months?

17. Lauren P.: At least four people seem to feel that full-year coverage is important.

18. Astrid S.: How much data can DWR get? The most troublesome blooms occur between May and October. I would also move away from using a geomean if using less dense data.

19. Pam B.: Some of these questions could be answered by going back to the management goals the SAC established for HRL. Don't remember the exact wording, but those goals may help guide these decisions related to growing season.

20. Andy S.: It seems from this discussion that the assumption for using a growing season is not holding up.

21. James B.: Yes, and it seems that we have started down the road to considering this as an alternative.

22. Andy S.: It sounds like we would delete this assumption because it's not shared by all SAC members?

23. James B.: Maybe ask as a yes or no: "*Should you consider all data collected from the water body to be included in the assessment?*" If you say no, then

"What portion of the year should be considered for the evaluation?" Would this capture this issue?

24. Clifton B.: It is problematic to not have a seasonal definition for deriving the criteria. It makes it harder to make linkages with indicators. This should be voted on. Could possibly have warm and cool season criteria, but cool season criteria would be difficult to get to. We should at least have a number specifically for the warm season.

25. Hans P.: It depends on the criteria we are going to be using. Cyanobacteria certainly a problem, but there are other things to consider such as early year blooms leading to hypoxic conditions later.

26. James B.: It might be worth having as part of the decision tree. We can look at this system by system. For HRL, given what we know and that we want to tie chlorophyll-a to uses, we should probably have a seasonal component.

27. Brian W.: Need to remember that uses need to apply year-round. Growing season is important, but still need to figure out what that would be.

28. Lauren P.: This might work better as the new A1. Are you going to look at data from the whole year? If not, you shift to looking at a season. Then do we do exceedance based or averaging?

29. Deanna O.: For reservoirs, DWR usually has data from five months within April-October. If constrained by the sampling period, should we use that sampling period across systems to be consistent?

30. Brian W.: Events may occur outside of the regularly scheduled sampling period. White lake is an example. We increased monitoring efforts due to received complaints of blooms. If the chlorophyll-a standard only applied during a set growing season, how would we address blooms that occurred outside of that season?

31. Clifton B.: You can handle that by way of the narrative considerations. Chlorophyll-a will be useful during this time in this season. If blooms occur outside of this period, we will provide guidance for how you consider that. White Lake is a good example of how you don't need a year-round numeric criterion. You can impair White lake based on a narrative assessment.

32. Lauren P.: The trade-off with the framework is that we are blending site-specific and statewide standards. If we are going to use this for other systems, we need to make sure that many scenarios are captured by the framework. We may go with a growing season for HRL, but we may not for a different reservoir. This option needs to be in the framework as an alternative.

vi. Astrid S.: Regarding "Considering Data from Multiple Years", does the discussion of rolling years fall into this?

1. James B.: Assumption is that all available data will be used. The question is how?

vii. Regarding the "Other questions that must be answered in all cases" section:

1. Andy S.: Is the intent that these must be answered prior to going forward with the framework?

2. James B.: No. These are questions that need to be answered but didn't necessarily fit within the framework.

3. Anne C.: Question #2 (What portion of the water column will be included in the sample?) is the same as the first assumption (Samples used for assessment are taken from a designated portion of the water column at a given sampling station).

4. Andy S.: Tell me about question #2 "*What portion of the water column will be included in the sample?*".

   - Clifton B.: It is a photic zone composite sample.
   - Martin L.: What if the data is not from the photic zone? Would that need to be used?
   - Nora D.: In practice, some of the DWR sampling is done as grabs from bridge overpasses. No Secchi depth is taken in these cases. Also, what is the best way to sample a bloom?
   - Jay S.: Keep in mind that researchers sample differently than the state. DWR has standard operating procedures for sampling that must be followed. Any data needs to be considered carefully prior to being used.

5. Andy S.: Calls for an official vote on whether to establish the photic zone as a component of the recommended criteria for chlorophyll-a.

   - SAC members vote with all members approving. The use of the photic zone will be moved to the "Assumptions" section.

viii. Regarding question #1 "*How will stations be aggregated regionally within a water body for purposes of assessment?*"

1. Andy S.: There is concern that this question is leading. How can we alter this to make it neutral?

2. Deanna O.: To DWR staff, what are staff concerns about aggregating samples?

   - Pam B.: Assessment units represent uniform bodies of water. If units do not share similar conditions they are deemed to be separate assessment units. How the SAC wants your criteria to be applied is up to you. How we currently do things should not prevent you from recommending something different if that is how you develop the criteria. Ultimately it is up to the SAC to determine how your criteria are to be applied.

- Brian W.: These monitoring stations are not set up just for chlorophyll-a. They are used for other parameters as well. The assessment units have been created with this in mind. There is concern that we would be watering down the standard.
- Deanna O.: If we aggregate samples based on these spatial characteristics there will be less data to work with. Does that introduce more noise?
- Clifton B.: It should be the opposite. We should end up with more data focused on specific spatial areas. For HRL we want to manage each individual area (riverine, area near dam) as an average condition. We can address these concerns as part of the magnitude.
- Brian W.: Also concerned that we will forget to do this as this process goes on.
- Clifton B.: By using the framework and recording our decisions it will help us to not forget.
- Lauren P.: Is it possible to increase the number of samples taken but keep the existing assessment units?
- Bill H.: There are trade-offs. For example: We can use a geomean with confidence intervals if we aggregate the stations. The only way to do that with the existing stations would be to get more data points.
- Nora D.: How are you aggregating and how will the data be used? How similar to each other do the stations need to be? The standard needs to be achieved at all stations whether they are lumped or not.
- Andy S.: Is there consensus at this point to aggregate stations?
- Clifton B.: Can we do a poll for whether, as part of the general framework (not HRL specific), we give the option to aggregate data from multiple stations based on lake management units (geomorphological based)?
- Andy S.: Thoughts?
- Astrid S.: What's a logical framework to come up with for lake management categories? Lake conditions change over time. If you group data, what exactly do you base that on? What if you don't have similar data across stations? How do you decide how to group stations then?
- Clifton B.: If we keep this as an option we can determine whether it fits reservoir by reservoir. Decisions can be based on

morphometry, water quality and hydraulics. We can make that judgement for HRL.

- Deanna O.: If we provide for this option does that change our ability to compare lakes/reservoirs?
- Clifton B.: It would be based on whether it makes sense to lump stations.
- Lauren P.: The question is: how much data do we want to use? For each lake there should be the ability to demonstrate this. We're looking for statistical power.

3. Pam B.: Do you plan to go through the frameworks first and then go to the data to calculate the criteria?
   - Clifton B.: Yes. When we relate chlorophyll-a to the indicators we need to compare apples to apples.
   - Lauren P.: This goes back to what I've said before. Do you completely discount the literature, then?
   - Clifton B.: I'm confused. Do we want to keep the option to aggregate?
   - Pam B.: Are you using this after the standard is set or are you using this to calculate the criteria?
   - Astrid S.: What is the benefit to aggregating the stations?
   - Bill H.: If using the average for a year there will be one data point. How do you apply statistic to one data point?
   - Astrid S.: Sounds like this is part of methodology and should come further down in the framework.
   - Clifton B.: If we keep this as an option it allows us to address natural management units.
   - Martin L.: Are we really increasing statistical power? The stations are already established for similar conditions.
   - Bill H.: DWR typically collects five samples per year. That makes it hard to do statistics. We either need more samples to get more data, or we need to aggregate sampling stations.
   - Nathan H.: Sample size can be small if the samples have similar values.

4. ==Andy S.: Calls for a vote. Should we keep aggregation as an option? If so, what considerations would need to be accounted for and how will this be implemented?==
   - SAC members agree to table this to learn more about it.
   - Pam B.: What does the "learn more about it" mean?

- Clifton B. agrees to make a case for including aggregation of samples as an option in the framework.
- Clifton B. will provide material at least two weeks prior to the next SAC meeting so that SAC members can review and comment.

ix. Regarding the starting and ending points for the growing season as part of question #3 (What other bases will be used to decide how the growing season is calculated?)

1. Bill H.: It will depend on how the sampling is done.
2. Astrid S.: Will our selection of a start and end to the growing season change how sampling is done?
3. Clifton B.: Propose an April to October growing season. No requirement for having data from all months within period, but you can use the data if you have it.
4. Hans P.: Seconds Clifton's proposal. Concerned with climate related changes. Things are starting earlier and lasting longer into the fall.
5. Astrid S.: That should also say that data should be dispersed throughout the sampling period so that it doesn't all come from just a single month or something like that.
6. Clifton B.: I had language that required sampling from at least five months in the period.
7. Andy S.: So, I am hearing a start to the growing season is April 1st and the end is October 31st.
8. Astrid S.: I have an issue with the term "growing". Maybe we can call this a "sampling" season?
9. Deanna O.: Change the language from the second assumption to something like "*Samples taken from April to October will be used for assessment*".
10. Connie B.: We don't want to put assessment into rule, we just want to define the timeframe (averaging period).
11. Martin L.: "*Only samples collected through the months of April to October would be averaged*"?
12. Connie B.: It will be preceded by the maximum limit and will be written as one sentence. It doesn't have to mention a growing season. It will just provide a timeframe.
13. Lauren P.: Suggested language: "*The criteria will be applied based on samples from April 1st to October 31st.*" Also, do we intend for this time-period to apply whether we look at the data as "exceedance-based" or "average-based"? Might this be different for different lakes?
14. Astrid S.: My understanding was that the growing season would apply either way and that a narrative would be used for those times outside of the sampling period.

15. Linda E.: That was my understanding too.
16. James B: It is preferable to set a time period.
17. <mark>Andy call for an official vote on "*The criteria will be applied based on samples from April 1st to October 31st*" being the language for the second bullet in the assumption section.</mark>
    - SAC members agree to this language.
    - Pam B. and Connie B.: We need to also capture the narrative component for the remainder of the year.
    - Clifton B.: Language addition recommendation: "*This does not preclude assessment based on other considerations outside of this period including the use of narrative and numeric information.*"
    - Connie B.: This is good as an assumption, but if you plan to recommend this language for establishing the standard in rule we need to remove any references to assessment. Assessment needs to be separate from the standard. Rule-making example: "*The geomean of samples collected April 1 through October 31 shall not exceed XX. Samples collected November 1 through March 31 shall be examined on a case-by-case basis using numeric and/or narrative criteria.*" Not sure exactly how to word this, but it would avoid the use of the word assessment.
    - Andy S.: Group seems to have consensus on the April 1 through October 31 time period. Now trying to determine wording for the remainder of the year. Avoid use of assessment.
    - James B.: "*This does not preclude the use of other types of data outside these months for evaluation.*"

x. Regarding assumption #4 "*One or more samples are used for assessment within the growing season?*" (What is the minimum data requirements for assessment?)
    1. Astrid S.: What is the current requirement?
    2. Connie B.: There is no minimum requirement in standards.
    3. Clifton B.: No one recommends calculating a seasonal geomean or statistical confidence based on a single sample.
    4. Lauren P.: Could be five or more temporally independent samples?
    5. Linda E.: Is this something DWR statisticians have looked at?
    6. Pam B.: This isn't really something to be used for establishing criteria. It's more on the back end of what to do with the standard once it is established.
    7. SAC members agree to table this discussion for later.

5. **Recommend Framework for Deriving Site-Specific Criteria for Warm Water Lakes and Reservoirs in NC** (Clifton Bell)
    a. See presentation material [here](#).

b. This framework is intended to help the SAC make more efficient progress toward developing site-specific criteria for chlorophyll-a in HRL.

c. This framework tries to address some of the concerns/issues that have come up during our discussions with the idea of getting away from some things and moving towards other things:

    i. Want to get away from:

        1. Focusing on individual proposals from a minority of the group and voting those up or down.

- SAC members may like different parts of the proposals.
- Not sure if it's good that one person's proposal gets voted on as the official SAC proposal. It shouldn't be any one person's proposal really. It should be a collaborative effort by the SAC.

        2. Procedural issues.

- For example: Lauren works for the EPA which is the agency that will ultimately approve of criteria. There may be a procedural issue if her proposal came out as the official SAC proposal.

    ii. Want to move toward:

        1. Making sure this is more of a collaborative effort.

        2. Coming to a consensus on an outline for group proposals.

        3. Appointing someone who has not been an advocate of one of the previous proposal as an editor to take content from the various proposals to piece them together as a consensus.

        4. Casting a vision for establishing a high bar for what we provide as a final product. Want this to be a useful project and for it to looked on as being a valuable effort.

d. The major headings of the framework are:

    i. Introduction

        1. Provides background from NCDP plan

    ii. Literature review

        1. Shows literature available by designated use to show we considered more information than just that from HRL.

    iii. Site-specific concerns

        1. Focuses more on HRL. Identifies spatial & temporal patterns and linkages with indicators to get toward use attainment.

        2. This would be the bulk of the work.

        3. Would tie to the framework that James provided.

    iv. Narrative use attainment

        1. Look at the narrative components related to use attainment

    v. Recommended framework for site-specific criteria

1. Address specific framework to develop site-specific standards for other lakes/reservoirs.
2. This could be reorganized based on the consensus of the SAC. Currently shows part of my proposal with the range of chlorophyll-a values as an example, but if the group does not agree that can be removed.
3. A missing section here might be: how do we make decisions on magnitude based on the data and the literature?

vi. Proposals for site-specific criteria
1. This would be the recommended magnitude and how it would work for HRL.

vii. Clifton asks for written feedback on his proposed outline for a chlorophyll-a criterion proposal for HRL.
1. Do SAC members agree with this more collaborative proposal?
2. Does this address the major outline elements we want to include?

e. Comments/questions:
i. Bill H.: Really like this idea. Everyone contributes.
ii. Lauren P.: This is good. The workflow that James created fits well in part 5.
iii. Connie B.: You mentioned looking at HRL specific patterns to get to use attainment and then mentioned a narrative use attainment. Can you explain that?
iv. Clifton B.: That gets more into the details of how we establish a magnitude with all the different types of information available. Need to discuss this more. Meant to ask: how do you use narrative statements to makes decisions on site-specific criteria?
v. Marcel A.: Like this as well.
vi. Lind E.: We would still ultimately need to vote certain individual parameters up or down. This may be more difficult to reach consensus.
vii. Clifton B.: We'll have to vote regardless. This is meant to capture the decision making behind the results of any votes.
viii. Martin L.: Like this as well especially combined with the framework James provided.
ix. James B.: We talked about assigning specific people to contribute to specific parts of this. This will help facilitate the collaborative effort. One version of the framework has people assigned to writing certain section based on skill sets. Does anyone have recommendations?
1. Clifton B.: Recommends James B. to edit the framework.
2. Astrid S.: Lauren should do section 1.2.
3. Deanna O.: Should that be the job of DWR?
4. Brian W.: We can check with management, but we see this as a SAC document.

5. Connie B.: Also remember that although Lauren is with EPA, she does not speak for all of EPA.

x. Hans P. and Nathan H. (via phone): Agree that this is a good effort. Nathan suggests that this will be good for statistics as well.

xi. Marcelo A.: We've discussed a lot of this information already and interpretation of this information may be different amongst SAC members. How do we handle this?

xii. James B.: Since this is a collaborative effort there will be opportunity for discussion.

xiii. Mike O.: For sections one and five, it would be helpful to describe what other southeastern states are doing.

6. **Working Table: Using High Rock Lake-Specific Information to Inform Chla Criterion Magnitude** (Clifton Bell)

   a. See presentation material [here](#)
   b. The goal is to help key in on specific metrics.
   c. This is meant to use the outline that we just discussed to help us to think through the available information and to focus on where we need more information.
   d. Clifton reviews the various table columns as well as the intention of the color coding.
      i. Green = indicator supports finding of use attainment
      ii. Yellow = indicator does not clearly show use not met, but raises concerns
      iii. Red = indicator shows use clearly not met
   e. Regarding color coding: To make this determination we look at the existing HRL water quality data.
      1. Example: Water clarity is tied to chlorophyll-a, but what is the relationship?
         - There is a relationship, but it is not tied to a particular Secchi depth. The relationship does, however, provide context for decision making.
   f. Comments/questions:
      i. Clifton B.: Does the SAC find this to be a useful tool?
      ii. Bill H.: This is exactly what we need to do. Question, would we apply a water supply standard at the mid-point of the lake or at the dam?
      iii. Mike O.: It might help to add turbidity as an indicator since there is an existing water quality standard.
      iv. Astrid S.: James B. had a conceptual diagram from earlier. That would be a good compliment to this.
      v. Andy S.: How does the framework proposed by James B. fit with this?
      vi. Clifton B.: This falls under the "What is the magnitude" section

7. **Wrap-up**
   a. Next SAC meeting is on September 24, 2018.