NC Nutrient Criteria Development Plan – Scientific Advisory Council
11/15/2017

Attendees

SAC members in attendance:

Lauren Petter
Bill Hall
Linda Ehrlich
Clifton Bell
Deanna Osmond
Michael O'Driscoll
James Bowen
Martin Lebo
Dr. Katie Martin (alternate for Marcelo Ardon)

SAC meeting facilitator:

Andy Sachs

NCDEQ DWR staff in attendance:

Linda Culpepper (DWR Interim Director)
Jim Hawhee
Tammy Hill
Mike Templeton
Connie Brower
Pam Behm
Jing Lin
Christopher Ventaloro
Jucilene Hoffman
Cyndi Karoly
Bongghi Hong
Nora Deamer
Brian Wrenn
Rich Gannon
Raj Rajbhandari
Elizabeth Fensin
Leigh Stevenson
Mark Vander Borgh

CIC members in attendance:

In person:

Andy McDaniel
Anne Coan
Doug Durbin
Bill Kreutzberger

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. SAC members, DWR staff and audience attendees provide names and affiliations.
    b. Meeting goals:
        i. Resolve pH criteria
        ii. Resolve chlorophyll-a criteria
    c. Administrative business:
        i. Meeting notes for September SAC meeting were just finished. Please review and submit any comments.
        ii. Potential conflicts of interest:
            1. New DEQ administration is asking all members of committees and councils to provide written statements of conflicts of interest for the sake of increasing transparency.
            2. SAC members are requested to submit statements of conflicts of interest to Brian Wrenn
            3. SAC members also required to sign form acknowledging they received conflict of interest guidance (due December 1, 2017)
            4. Linda C.: The state would like to acknowledge the work that the SAC is doing and thank SAC members for their time and efforts. The reporting of conflicts of interest is being done consistently for all committees and councils for increased transparency.
2. **Resolution of pH criterion** (Brian Wrenn, SAC members)
    a. Two alternatives were proposed during the September SAC meetings:
        i. Option #1 = pH 6.0 – 9.5 as instantaneous value, with 10% exceedance/90% confidence
        ii. Option #2 = pH 6.0 – 9.0 with vertical averaging, with 10% exceedance/90% confidence
    b. Strawman vote (discussion follows):
        i. Those on favor of option #1
            1. Linda Ehrlich
            2. Clifton Bell
        ii. Those in favor of option #2
            - Mike O 'Driscoll
            - James Bowen
            - Lauren Petter
        iii. Those that are undecided
            1. Martin Lebo (leans toward Option #2)
            2. Deanna Osmond (leans toward Option #1)
            3. Katie Martin
            4. Bill Hall (abstains)

iv. Not present:
    1. Hans Paerl/Nathan Hall
    2. Astrid Schnetzer
    3. Marcelo Ardon

c. Discussion of vote:
    i. Martin L.: There are merits to both options. We don't need to decide as either/or. Combining both would be better. That would result in a maximum instantaneous, not to exceed value plus vertical averaging.
    ii. Deanna O.: Either option is good, but would pick the option that is more practical from a cost and implementation perspective. That would appear to be Option #1.
    iii. Katie M.: I will speak with Marcelo to get his thoughts on this.
    iv. Bill H.: Abstaining from vote.
    v. Mike O.: Option #1 is supported by existing HRL data. Including an averaging period would require more sampling. Would also want to consider spatial averaging.
    vi. Brian W.: During the September meeting we agreed to come back and vote on the pH criteria. What I'm hearing now is that there needs to be more discussion. To try and move this process along, we will submit these options to the CIC for their consideration. The CIC's comments will then return to the SAC for further discussion.
        1. Clifton B.: We can provide a write-up summarizing the two options.
            - Clifton will summarize Option #1
            - Martin will summarize Option #2

3. **Presentation: *Assessment Units and Chlorophyll-a Growing Season Averages*** (Pam Behm)
    a. Pam provides a compilation of information that was requested by the SAC during the September meeting
    b. Topics:
        i. Combining assessment units in HRL - visual display of different options, pointed out that the lower lake station by the dam is in an assessment unit with a different classification index (Critical Area), not sure if it CAN or should be combined into a larger assessment unit
        ii. Different averaging options for chlorophyll-a by station
        iii. Seasonal averaging April – October, May – October (not much difference)
        iv. Using Students T-test to see if there is a statistical difference in the data from stations SAC is considering combining, results show there is a difference between the station closest to the dam and the next upstream station.
        v. Major sub-watersheds used in the HRL model
        vi. Downstream of HRL
            1. HRL starts a chain of five reservoirs
        vii. Average unit density for chlorophyll-a
            1. At >30 ug/L chlorophyll-a, cyanobacteria (blue greens) dominate
        viii. Distribution of chlorophyll-a data by station (2008-2010, plus summer 2011)

1. Highest chlorophyll-a was 95 ug/L in summer of 2008

ix. Algal unit density for one station compared to chlorophyll-a at a mainstem station, shows close relationship between density and chlorophyll-a concentrations

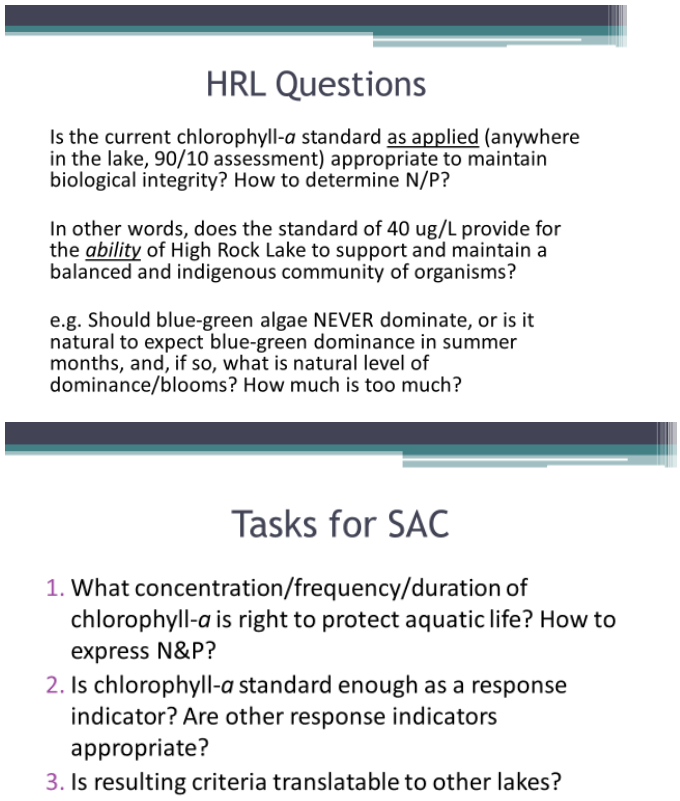
x. Same information for the Abbott's Creek arm.

c. Discussion:

i. James B.: How does the critical area affect the combining of the assessment units? Does the critical area have other water quality standards?

1. Connie: The critical area indicates that there is a drinking water intake in place. Our classifications staff would need to evaluate this.
2. Jay Sauber: I believe that the critical area does not have additional numeric water quality standards so it should be possible to combine it with another assessment unit.

ii. Pam B.: Review of the tasks assigned to the SAC (from first SAC meeting)



iii. Clifton B.: Re: Student's T-test. The more data available the more of a difference that can be detected. There's also environmentally significant differences as opposed to just statistical differences. Any thoughts on this?

iv. Pam B.: More concerned with the difference between impaired vs. non-impaired, we don't want to give the wrong impression as to the spatial area of impairment. Not surprised by this result, we see lower chlorophyll-a in stations closest to dams in most big reservoirs in this state due to a number of reasons.

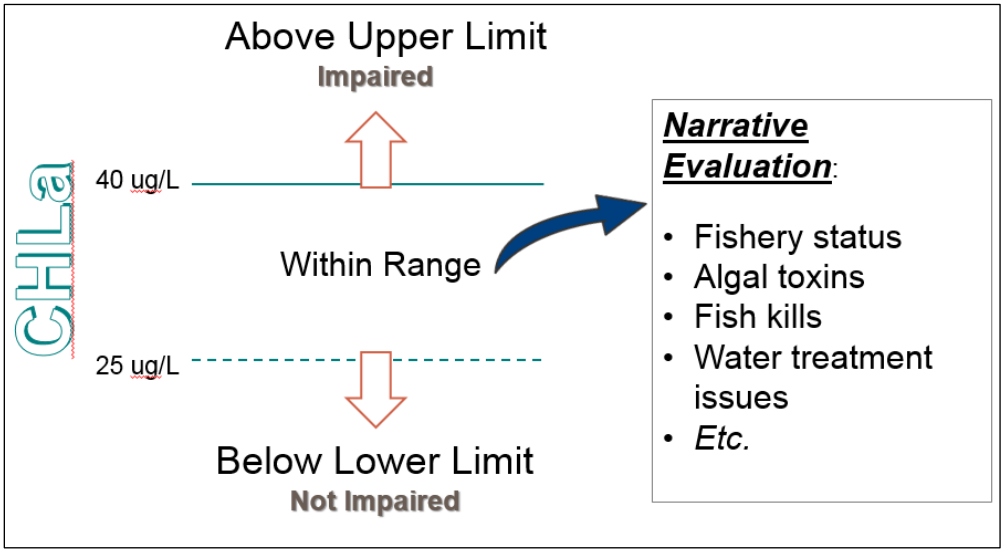
v. Martin L.: Using biovolume vs. biomass can also impact how waters are assessed

vi. Pam B.: Can still see a jump in blue-greens when chlorophyll-a is > 30 ug/L, even though blue greens typically are very small – takes a lot for them to overwhelm others with regards to biovolume

Criteria resolution: Chlorophyll-a (SAC members)

d. Discussion continued from Pam's presentation:
   i. Clifton B.: Comments that it is important for the group to agree on spatial concerns before moving on to discuss magnitude and frequency
   ii. Bill H.: We need to step back. What is biological integrity? How do we interpret this to decide if use is impaired?
   iii. Lauren P.: We need to look at examples of how other states have handled this for biological integrity. Also include the site-specific information that Pam just showed in her presentation.
   iv. Andy S.: Do we need staff to expand on biological integrity? Who would that person be?
   v. Brian W.: That's a complicated question. It wouldn't be just one person
   vi. Lauren P.: It's better to start discussing some numbers for chlorophyll a
e. Clifton B.: Magnitude alone is not sufficient. Need to consider frequency and duration. This is very subjective.
f. Martin L.: Once we decide on seasonal and spatial averaging we can look at the data to determine magnitude
g. Lauren P.: We may not touch on everything with that approach. We should put down some examples to help guide us through this process
h. Andy S.: Why don't we have a brainstorming session for chlorophyll-a criteria. (SAC members split into groups to discuss)
   i. Results:
   ii. Group #1 (Martin L. speaking)
      1. We came up with three options:
         - Continue with existing chlorophyll-a standard (40 ug/L), no seasonal averaging, 10% exceedance/90% confidence
         - Incorporate seasonal averaging by location, use geomean, not to exceed more than once in three years
         - Build on second option by incorporating spatial zonation, group similar stations together
      2. Group #2 (Clifton B. speaking)
         - Reiterate proposal already given for warm water fishery
         - This ties together with the third option from group #1
         - Uses seasonal geomean
         - Chlorophyll-a range of 25 ug/L to 40 ug/L
            i. 25 ug/L low end of chlorophyll-a to support fishery

ii. 40 ug/L upper end where begin to see impacts to other uses



- Lake is currently above 40 ug/L (even as a geomean for most stations)
- Might consider a long-term (multi-year) average if there is not enough short-term data

3. Group #3 (Lauren speaking)
   - Look to the literature and examples from what other states in the southeast have done
   - Growing season average of 20-25 ug/L is protective of multiple uses
   - Instantaneous value

i. Andy S.: During the September meeting we were discussing what a growing season is. Any additional thoughts on this?
   i. Clifton B.: Normally it is from May – October, but for HRL it would be April – October.
   ii. Linda E.: April is very often a high productivity period in Piedmont lakes
   iii. Lauren P.: I though sampling started in May, but including April would be good.
   iv. Andy S.: Does anyone object to a growing season of April – October?
      1. SAC: No objections

j. Andy S.: Let's discuss spatial averaging.
   i. Clifton's proposal:
      1. Riverine
      2. Transitional
      3. Lacustrine
      4. Critical area

ii. Mike O.: The riverine section of HRL tends to be turbid. It would be more protective to look further down stream
iii. James B.: Where do the side arms fit in that proposal?
    1. Brian W.: The side arms get more frequent monitoring and have more data than the mainstem.
    2. Martin L.: Are the side arms monitored for nutrients regularly?
    3. Brian W.: I'm not sure what each station in the arms monitors for, but we can check
    4. Brian W.: For Clifton's proposal, were those sections based on lake assessment segments or on lake sampling stations?
    5. Clifton B.: It is an aggregation of stations by similar geomorphology
    6. Brian W.: This would be a break from what is normally done. We would prefer not to change our current assessment methodology. We work out the assessment methodology with the North Carolina Environmental Management Commission (EMC)
    7. Clifton B.: Segment geomorphology should dictate how we sample not the other way around.
    8. Jing L.: However, these segments (transitional, lacustrine, riverine) are defined based on observations from existing stations. Also, algal blooms tend to be patchy, what is the typical spatial extension of algal blooms in High Rock Lake?
    9. Elizabeth F.: Algal blooms don't occur by lake section. They are often lake-wide. This will cause problems if there is a bloom in only part of the lake
    10. Clifton B.: If we look at stations with similar chlorophyll-a numbers there is equal probability of bloom occurrence
    11. Elizabeth F.: In terms of phytoplankton in HRL there is no segmentation. The lake blooms, it doesn't just bloom in sections.
    12. Pam B.: We need to consider how we merge these things. The lake is currently split based on all of the parameters we assess for impairment (i.e. pH, DO, chlorophyll-a). So are we going to have one set of assessment units for one parameter and different for others? This is one reason why we use a simple station by station approach (for impairment determination, NOT for strategy development or implementation), to provide a simple snapshot every 2 years.
    13. Deanna O.: I want to make sure I understand this from DWR's perspective. If we adopt geomorphological segmentation, would you need to go to the EMC for approval?
    14. Brian W.: If we change the assessment methodology, then yes.
    15. Deanna O.: I'm not sure of the value of changing the current methods. Will it really make a difference?

16. Lauren P.: Concerned about how these zones would be used. Would one magnitude be used to assess over each of the segments or would each segment have its own magnitude?
17. Bill H.: The whole lake should be averaged
18. Katie M.: That would assume that nutrients are homogenous throughout the lake.
19. Martin L.: Spatial distribution is typical in reservoirs. This pattern is consistent for 100's of reservoirs. The hinge point would be where transition of sediment falls out and nutrients are highest.

iv. Mike O.: also need to consider flow data. When flow is low (<20%), chlorophyll-a increases. If sampling is only done at high flow that would indicate less of a problem.

v. Brian W.: Regarding graph of biovolume and unit density, we see a marked difference in blue-green abundance. If talking about conditions where blue-greens are dominant, DWR has a real concern about potential risk for toxin production. Thoughts?
    1. Lauren P.: 0-30 ug/L chlorophyll-a is associated with about 9% dominance of blue-greens while >30 ug/L chlorophyll-a is associated with about 40% dominance
    2. Linda E.: Goes back to the question of whether blue-green blooms are natural? I would say yes. References Touchette et. al. *Eutrophication and cyanobacterial blooms in run-of-river impoundments in North Carolina, U.S.A.* (2009)
    3. Mark V.: In HRL blue-greens come down to two species. They overwhelm the assemblage. Also, when considering biovolume remember that the size of the organism will impact the biovolume. Euglenoids are very large, blue-greens are very small.
    4. Linda E.: We need to define what we mean by dominance.

vi. Jim H.: We also need to consider risk. When we begin to talk about averaging (spatial or seasonal) we start to increase the risk of type II errors.
    1. Elizabeth F.: We have seen this in the Cape Fear River. Better to not average out the details.

vii. Andy S.: Final thoughts on averaging:
    1. Mike O.: I like a "by station" approach and thinking more about temporal averaging
    2. Martin L.: In concept temporal makes sense, but in a practical sense it does not add much in this case. I would say averaging by station is a better approach.
    3. Deanna O.: Ditto
    4. Bill H.: Stations should be averaged
    5. Katie M.: Continue with the individual stations

6. Lauren P.: By station.
7. James B.: Agree with Martin. Temporal averaging would not add much in this case. I would go with the average of the stations.
8. Clifton B.: The segmentation of the lake should be informed by the geomorphology. If there are multiple stations within those segments, they should be averaged.
9. Linda E.: I agree with the concept of the geomorphological segments. I could even go with averaging all of the stations as they are now. I'm still on the fence.

viii. Andy S.: There seems to be some disagreement here. One way for groups to get past this is to meet between meetings to discuss further

ix. James B.: Didn't they use to aggregate stations in the Neuse River?
1. Pam B.: Yes, but there was a lot of best professional judgement that went into that back then. It would be difficult to reproduce how they came to that conclusion. We need to have more transparent methods now.

x. Jay S.: Regarding the role of the EMC, we are talking about two separate processes:
1. Establishing water quality standards
- DWR staff propose standards
- EMC adopts/modifies
2. Assessment of water quality standards
- EMC has approved the current assessment methodology
- Does not believe that EMC discussed where sampling stations occur
- Aggregation of samples is for frequency of exceedance, not for individual exceedance

xi. Martin L.: For HRL there is limited benefit of creating assessment units that lump some of the current monitoring stations. When we write a recommendation, we should recognize that there may be cases where there is more benefit to lumping and that our proposal should be more focused on assessment units where multiple monitoring stations fit within the same hydrologic and physiologic characteristics.

xii. Jing L.: Transitional areas also shift over time. This would make it difficult to establish set segments.
1. Nora D.: We have seen this in the Tar-Pamlico river basin. Transitional areas can shift greatly.

k. Andy S.: How would you like to proceed?

i. Clifton B.: Are we in agreement on the growing season component? Can we vote?

ii. Mike O.: Would want to know how many samples are taken during that period.
1. Brian W.: DWR normally samples lakes monthly once every five years. There may also be other studies that provide data and monitoring coalitions may also provide additional data.

l. Bill H.: Want to again bring up that we have not linked these indicators to any impairments
    i. Brian W.: When we see big blooms that is an impairment, especially when considering the increased risk of toxin production
m. Andy S.: Let's shift gears and talk about a magnitude for chlorophyll-a
    i. Clifton B.: We should speak to frequency first. It makes a big difference when considering magnitude. (Clifton shows slides)
        1. Deanna O.: Due to data limitations will this help account for climate change?
        2. Clifton B.: Would use five year increments
        3. Lauren P.: How would these tables support a protective criterion proposal, related to sensitive use?
        4. Clifton B.: This just helps to inform us of what level of risk we would see with these options
        5. Bill H.: We need to consider the basis of the current EPA guidelines (referring to the not to exceed more than once in three years). You need to link the frequency to an impairment that would occur.
        6. Lauren P.: If we have site-specific data can we model risk assessment for seasonal averages?
        7. Katie M.: It would be challenging to set…(I did not catch what Katie was saying here and the audio is missing this segment. Katie may wish to add to this)
        8. James B.: The time horizon would be different if we are only sampling once every five years
        9. Jim H.: Do we monitor once per year? If monitoring once in five years how does that work if we only have one sample?
        10. Clifton B.: once in some number of years or a long-term average would be the best options for frequency
        11. Pam B.: We are working on ways to get more than five samples per sampling session
        12. Clifton B.: a five-year monitoring window also does not fit with EPA's one-in-three frequency
        13. Mike O.: Might be a good opportunity to use continuous sensors. The continuous data could be used to trigger sampling events
        14. Martin L.: We don't want triggered sampling. Water quality standards are meant to account for highs and lows
        15. Brian W.: Clifton, why are you opposed to the one-year frequency?
        16. Clifton B.: It essentially eliminates the frequency component because currently lake sampling only occurs once every five years.
        17. Connie B.: Important to remember also that EPA's one-in-three was based on toxics

18. Clifton B.: Florida based a one-in-three frequency on chlorophyll-a exceedances using statistical analysis
19. James B.: I can see a standard that considers multiple years of data, but also addresses unusual circumstances
20. Lauren P.: (to Clifton) You mentioned a narrative off-ramp to account for unusual years, can you elaborate?
21. Clifton B.: it would be a fuzzy tool to use. Would be better to do a 1-in-3, 1-in-5, or multiple year frequency instead
22. Lauren P.: Trying to think of how Florida determined the 1-in-3 based on chlorophyll-a exceedances. How do you show that it is protective?
23. Clifton B.: Florida looked at error rates. They started with where they would like the lake to be.
24. Doug D.: Florida was concerned with implementation at the same time. They came up with 20 ug/L. People were concerned that that was too low. Addressed this by adding a frequency of not to exceed more than once in three years
25. Martin L.: Would a frequency be needed if we adopted the Minnesota approach which uses all available data in the assessment period?
26. Clifton B.: I'm leaning that way due to the data limitations we have in HRL
27. Martin L.: That would help account for long-term
28. Katie M.: Long-term averaging may not pick up changing conditions and tends to dilute exceedances. A 1-in-3 approach could still incorporate a not to exceed instantaneous value.
29. Elizabeth F.: Concerned about comparing NC methodology to Midwest methodology. Minnesota has different types of blooms than we have here.

ii. Andy S.: So where does everyone lean regarding frequency?

1. Lauren P.: I can't vote on this yet
2. Martin L.: Using all available data from an assessment period is like what's being done now (rolling data into a 5-year period and applying 10% exceedance rate with 90% confidence.)
3. Bill H.: This doesn't work for a lake that's sampled once every five years
4. Clifton B.: Agreed. Makes a big difference if it was being sampled every year
5. Deanna O.: From Martin's example, it could be rolled into the existing data set
6. Lauren P.: The problem with rolling the data is that you can miss that one event that did impact a use.
7. Martin L.: Two standards would apply:
    - Narrative standard to fall back on → even if the chlorophyll-a concentration is met in the lake, unwanted conditions may still warrant concern

- Numeric standard is separate → gives an idea of the long-term conditions

8. Lauren P.: That's different from my idea of a narrative standard. Still haven't heard what the basis of long-term averaging is.
9. Jim H.: I'm not sure if we ever declared a water body impaired not based on comparison to a standard. We're now averaging on big spatial scales (monthly). You're now talking about extending that to yearly.
10. James B.: I like the idea of an exceedance frequency as opposed to a long-term average.
11. Anne C.: Current assessment also includes data from non-DWR groups. How is that data used now?
    - Pam B.: Data have to meet DWR's QA/QC requirements and use a certified lab, so we use the data the same as our own.
12. Pam B: The 2016 assessment for High Rock was unusual because it had 5 winter data points (from 2010) included from the intensive monitoring study. Assessing based on growing season would have helped.
13. Doug D.: In Florida, there is a big part of the rule that guides what the state is going to do (x number of data points, sampling schedules, etc.)
14. Lauren P.: Just note that EPA did not add that language and that there are still some discrepancies between what their guidance says and what their criteria say
15. Pam B.: Regarding the 1-in-3, NC does not agree with this assessment methodology for toxics and has argued a case against it. Other states share this concern and EPA is going to convene a workgroup to look into it further.
    - Jay S.: Just to be clear this is not the same as the Florida 1-in-3 for nutrients. Also, when you suggest that the criteria should be based on growing season, are you also saying that there would be no assessment of non-growing season? Have you all decided on blue-greens as being the driver?
16. James B.: My concern for HRL is diluting the high chlorophyll-a concentrations through averaging.

n. Andy S.: Let's move on to discuss magnitude
   i. Bill H.: regarding Clifton's slide on proposed criteria (range from 20 to 40 ug/L), this is great for what we might do for lakes state-wide, but how does this work for HRL? We can't tie this to the narrative evaluations.
   ii. Clifton B.: A lot of what the lake is currently based on is nebulous information (literature review, perception of impairment). 40 ug/L is about the highest it would get. Spectrum of risk that would take us to 40 ug/L.
   iii. Bill H.: Still have no basis. If the state decided to say that a certain turbidity must be attained we could then tie that to a chlorophyll-a value.

iv. Brian W.: We set water quality standards to protect uses. When we see increases in chlorophyll-a concentrations we see an increased risk for development of toxic blooms. This is a potential impact of designated uses. If we lower the chlorophyll-a concentration, the fishery will be ok and we will decrease the risk of toxic blooms. Why risk impact of the uses by increasing the chlorophyll-a concentration?
v. Lauren P.: Remember that the lake is also impaired for pH.
vi. Jim H.: There is a burden to find the protective area. Also, don't discount the ick factor and personal perception.
vii. Deanna O.: I appreciate the need to be conservative. Regarding the ick factor, it is very individual.
viii. Pam B.: Regarding the data collected, monitoring is designed to evaluate the current standard. It seems a shame to conclude that all uses are being met when we don't know how to evaluate the condition of designated uses.
ix. Bill H.: We're not hearing of any type of impairment
x. Pam B.: staff identified use impairment based on the algal assemblage vs. chlorophyll-a concentration blue-green graph shown earlier. As chlorophyll-a increases above 30 ug/L, blue-greens dominate the assemblage. As blue-greens proliferate, risk of toxic blooms increases leading to potential use impairments. Seems to be a biological integrity issue. Again, we are asking the SAC to help us determine how much blue-greens is too much? Is it normal to expect this level of blue-green dominance in a southern piedmont reservoir.
xi. Bill H.: We haven't seen evidence of toxins in the lake.
xii. Katie M.: If the goal is to protect against toxins, the fact they have not been found is good.
xiii. Elizabeth F.: It's important to understand that the testing of toxins is still in the early stages. We just started testing HRL last summer. We can't say we haven't seen toxins year after year.
xiv. Bill H.: EPA guidance says that it is not sufficient to establish criteria based on limited data. Also, EPA has developed criteria for two toxins for finished drinking water. Every time HRL is sampled, toxins are below those values.
xv. Jim H.: from what we have seen in the Albemarle Sound the amount of blue-greens in HRL could certainly support high toxin levels. USGS will often get many negative samples in Albemarle and then, suddenly, see a big spike.
xvi. Jay S.: The challenge is in being able to explain to people what the new criteria are going to protect. The original criteria presented to the EMC in 1979 excluded certain things such as winter chlorophyll-a. Why are these things important? Why should the public support any recommended criteria?
xvii. Connie B.: noted that exclusions of winter data were not adopted into the standards proposed in 1979. Later modifications did not amend this either, so the standard was actually "not to exceed".

o. Andy S.: SAC members, thoughts so far?

i. Clifton B.: Bill's viewpoint is valid and so are concerns about risk. I see three options:
    1. Take an antidegradation approach given favorable conditions in HRL
    2. Push to get a value (draconian number)
    3. Use a geometric mean of 40 ug/L which considers both issues
ii. Linda E.: Concur with Clifton and Bill.
iii. James B.: Balance between protection and evidence for impairment. A seasonal geomean of 40 ug/L would be less protective than what is in place now. I'm wrestling with the number and how to assess it. Agree that there needs to be a balance.
iv. Lauren P.: If going with the geomean the chlorophyll-a number would be closer to 25 ug/L. Alabama had a limnologist investigate this and it was determined that bass were fine at lower chlorophyll-a levels.
v. Katie M.: I will pass this information to Marcelo for his consideration. Should consider the predominance of the blue-green algae at higher chlorophyll-a levels.
vi. Bill H.: To do this we need data to tie to the uses. There needs to be a balance, but we have no data. What level is causing an impairment? An increase in chlorophyll-a supports the fish and a decrease supports recreation. I've never seen a chlorophyll-a criterion in other states that was tied to a use.
vii. Deanna O.: I like Clifton's proposal with the growing season range of 20 – 40 ug/L. The upper level of 40 ug/L is good.
viii. Martin L.: Appreciate both Bill and Clifton's views. Actual number is still open for discussion, but it would be closer to 40 than 25 ug/L

p. Andy S.: Other topics to cover? How to move forward?
i. Deanna O.: We need to have a vote for each piece (magnitude, frequency, temporal averaging, spatial averaging) and need an explanation of how each of these pieces would interact with the others.
ii. James B. & Clifton B.: expressed that the SAC should approach this the same way that it did with pH. Specific proposals need to be brought up for a vote. So far Lauren and Clifton have submitted proposals.
iii. Brian W.: Deadline for any proposals will be January 1, 2018. Next SAC meeting is currently scheduled for January 18, 2018. I will send out a poll to set dates for the remaining SAC meetings for 2018.
iv. Connie B.: regarding Clifton's proposed range of 20-40 ug/L, were these values meant to be geomeans? Not to exceed?
    1. Deanna O.: Not sure what would be best. That's why I want to see how each option would work with the others.
    2. Brian W.: You just voted earlier today and agreed to a seasonal geomean
    3. James B.: Any proposals should make it clear how the different pieces fit in.
    4. Deanna O.: I want to see how the different proposals match up
    5. Lauren P.: We should explain all details not just refer to labels