

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

3/28/2018

## *Attendees*

### **SAC members in attendance:**

Lauren Petter  
Bill Hall  
Linda Ehrlich  
James Bowen  
Clifton Bell  
Astrid Schnetzer

Marcelo Ardon  
Deanna Osmond  
Michael O’Driscoll  
Martin Lebo  
Nathan Hall

### **SAC meeting facilitator:**

Andy Sachs

### **NCDEQ DWR staff in attendance:**

Jim Hawhee  
Tammy Hill  
Jeff Manning  
Connie Brower  
Christopher Ventaloro  
Bongghi Hong  
Nora Deamer

Brian Wrenn  
Mike Templeton  
Raj Rajbhandari  
Bridget Flaherty  
Jing Lin

### **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. Meeting goals:

- i. Finalize pH criteria proposal to distribute to CIC
- ii. Come to a shared view on chlorophyll-a criterion.

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- iii. Reminder that a super majority is required to resolve votes by SAC members. This requires that 70% of members agree.
  - b. Administrative business
    - i. Request comments on meeting notes from previous meetings.
      - 1. Lauren P. will submit comments to DWR staff.
    - ii. Potential conflicts of interest:
      - 1. Brian thanks SAC members for providing conflict of interest statements.
2. **Central Cape Fear River Monitoring Update** (Pam Behm)
- a. Brief update on modeling efforts for the middle Cape Fear River
    - i. Staff continuing to develop model for the Deep River & Rocky River as well as the Middle Cape Fear River.
    - ii. The model will be a permit tool for supporting nutrient permitting especially for streams and flowing waters.
  - b. Staff reviewed existing data for area from the Randleman Dam to Lock & Dam #1
    - i. Relevant findings
      - 1. Variability in nitrate-nitrite concentration throughout the middle Cape Fear.
      - 2. Regular occurrence of algal blooms.
      - 3. Correlation between low flow and increased chlorophyll-a concentrations.
    - ii. Upcoming monitoring plan will
      - 1. Reinforce model certainty.
      - 2. Address data gaps for calibration of headwaters and sub-watersheds.
      - 3. Address data gaps to obtain more information on tributary inputs.
    - iii. New monitoring plan set to begin in 2019 and will include:
      - 1. 9 new monitoring stations.
      - 2. Increased sampling frequency.
      - 3. Plan to sample storm events.
      - 4. Characterization of algae populations.
  - c. Model selection considerations
    - i. Ability to represent impoundments.
    - ii. Model must be supported by EPA.
    - iii. Model must be publicly available (not proprietary).
  - d. Parameters of concern
    - i. Dissolved oxygen important for NPDES permitting.
    - ii. Algal blooms
      - 1. Can be modeled indirectly.
      - 2. Model can provide frequency and risk analysis.
  - e. Supporting studies:
    - i. Rocky River study → looked at DO
    - ii. EPA sediment oxygen demand/nutrient flux behind locks & dams.
    - iii. Student study on periphyton.

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1. Mike O.: student will have report finished in the next month.
- f. Draft timeline
  - i. We have had a lot of modelling support from EPA Region IV staff.
  - ii. The framework has been established for the Deep River and Rocky River models.
- g. Questions/comments
  - i. Linda E.: Can the model use algal biovolume?
    1. Pam B.: No.
  - ii. Nathan H.: For how long have the permitted nutrient loads been frozen in the Cape Fear?
    1. Mike T.: They have been frozen for about two years. Several facilities have asked for expanded capacity. It will be very helpful for us to have this model. Example: Siler City had chicken plants that severely impacted the receiving stream. They want to install a new chicken facility, but there is no model with which to establish nutrient loads.
3. **High Rock Lake - Long-term trends in DO and pH** (Marcelo Ardon)
  - a. DO patterns
    - i. Looked at data from 1982-2016.
    - ii. Considered only photic zone measurements.
    - iii. Analyzed by station and by year.
    - iv. Linear regression used to identify trends.
      1. Minimum DO vs. Date.
      2. Significant declines observed over data time frame.
      3. Minimum DO has decreased over time, but mean DO has not.
  - b. pH patterns
    - i. Looked at data from 1982-2016.
    - ii. Considered only photic zone measurements.
    - iii. Analyzed by station and by year.
    - iv. Minimum pH has decreased over the data timeframe.
    - v. Maximum pH has increased over the data timeframe.
    - vi. Mean pH decreased at site YAD169A.
  - c. Summary
    - i. HRL is a eutrophic reservoir.
    - ii. Long-term patterns continuing eutrophic trend.
    - iii. TetraTech eutrophication index characterizes HRL as eutrophic.
    - iv. There have been instances of fish kills not related to drought (event in 2009).
    - v. Literature suggests that once a waterbody is eutrophic it is difficult to go back to not being eutrophic.
  - d. Questions/comments
    - i. Martin L.: How would sampling density change these profiles?
      1. Clifton B.: With more data, more extremes will appear.
      2. Marcelo A.: Wouldn't expect to see this trend at all sites.

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3. Martin L.: It would also depend on whether the lake responds similarly throughout the spatial extent. Should explore this further.
  4. James B.: Did you look at normality in the pH and DO data? If data is normally distributed?, should use arithmetic mean.
4. **Discussion of pH Proposal for CIC** (Andy Sachs, SAB members)
- a. Summary of Comments on Proposal to CIC (Clifton Bell)
    - i. Comments that don't require further discussion
      1. Request to consider the influence of phytoplankton on pH.
      2. Request to look at correlation of pH trends with chlorophyll-a concentrations.
      3. Request to clarify acute and chronic test durations.
      4. Request to add pH relevant language from the Georgia example.
      5. Request to clarify whether the proposed pH criteria would necessitate increased sampling.
    - ii. Comments for discussion
      1. Implications of pH trends to criteria proposals
        - The criteria being proposed are based more on literature than observed trends in the HRL.
        - These proposals are on the conservative side.
        - No long-term average is being proposed, proposing a 1-hour average
          - i. Nathan H.: Why the 1-hour average?
          - ii. Clifton B.: Instantaneous values are not good to use as they don't represent the potential overall impacts to the lake well. This is also the standard duration used by EPA to represent acute exposure periods for criteria.
      2. Concern over freshwater mussels and ammonia
        - Should the protection of endangered mussels be a priority in HRL? Mussels in general are not prolific in the lake?
        - There is a lack of literature to address effects of pH on mussels.
        - We did look at the EPA 2013 ammonia criteria to help address this.
          - i. Marcelo A.: The tables from the EPA document end at a pH of 9.0 and a temperature of 30° C. Your chart shows a temperature of 30.5° C and a pH of 10. How did you determine the ammonia criteria at that pH and temperature?
          - ii. Clifton B.: The ammonia document provides equations to calculate at different pH and temperature.
          - iii. Bill H.: The tests used to derive the ammonia criteria chart in the 2013 EPA criteria document only went as high as a pH of 9.0. Anything above pH of 9.0 is an extrapolation. A pH of

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9.0 is also well below what we see in HRL when we look at instantaneous pH values.

- The question has come up as to whether we need to talk about ammonia in this document?
  - i. Ammonia is the dominant mechanisms of toxicity to many organisms and toxicity is tied to pH. Mussels are extremely sensitive.
  - ii. Literature does not have a lot of information on pH sensitivity of various fish species. Considering ammonia toxicity would allow to fill that gap.
  - iii. The EPA “Gold Book” provides the basis for the current pH standard. It is based on fish data (primarily salmonids) as well as the impact of pH on the toxicity of other substances. If we see a lot of ammonia toxicity in HRL that might influence what we consider an appropriate magnitude for pH.
    1. Lauren P.: Inclined to not have it in the pH proposal document. Ammonia toxicity is impacted by pH, but chlorophyll-a impacts pH levels in the lake. Would be good to have a separate discussion of chlorophyll-a and ammonia. See the Georgia reference for some examples.
    2. Clifton B.: We are trying to establish a direct link between toxicity and aquatic life. We can do that with ammonia, but we do not have the information to do that for chlorophyll-a.
    3. Bill H.: It would be unusual to include chlorophyll-a in a discussion of pH criteria. The criteria should be limited to the direct effects of pH on the designated uses. Maybe move the ammonia discussion to an appendix?
    4. Clifton B. agrees with moving this discussion to an appendix.
    5. Marcelo A.: Ok with moving to an appendix. Would also like to see a statement acknowledging that the graphs you’ve shown were extended beyond the pH and temperature ranges of the studies that EPA considered.
    6. James B.: If this is considered important to the criteria it should remain in the proposal.
    7. Linda E.: Agrees.

3. Comment regarding specific regulatory language and establishing criteria vs. implementation of criteria
  - pH criterion should have three components: magnitude, frequency and duration.
    - i. Martin L.: Vertical averaging doesn't need to be established as part of the criterion. It can be part of the assessment.
    - ii. Clifton B.: I propose that Martin and I reword our proposals to be clearer about what the standard language would be.
    - iii. Bill H.: The way Clifton's proposal is crafted is based on unusual sampling methods. This may not be reconcilable with how criteria are assessed by the state. Also, we haven't discussed frequency. Are we assuming the EPA's default "not to exceed more than once in three years" (1-in-3) method?
    - iv. Clifton B.: We did not include a frequency in the proposal document. DWR's existing assessment methodology (>10% exceedance with 90% confidence) addresses the frequency. This wouldn't go into the standard.
    - v. Bill H.: This needs to be made clear in the proposal.
    - vi. Pam B.: Agrees that this should be made clear. The intent behind the proposed criteria is very important and needs to be something that can be referenced in the future.
  - Median pH vs. mean pH
    - i. Proposal #1 uses median.
    - ii. Proposal #2 uses arithmetic mean.
      1. Discussion
        - a. Clifton B.: Median is like geometric mean for non-normal data and like arithmetic mean for normal data.
        - b. James B.: Let's look at the HRL data to see if it has a normal distribution.
        - c. Marcelo A.: The pH data for HRL does not have a normal distribution.
        - d. Martin L.: If the median is used half of the habitat will be below the threshold. If the mean is used the proportion of the habitat that is protected will vary based on the conditions in the lake.
        - e. Bill H.: How was the pH reported in the literature? It is important to match that.
        - f. Martin L.: In laboratory testing, pH would have been held constant.

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- g. Marcelo A.: It would be good to review the example from Georgia. They suggest an average. Would be interesting to see how they addressed this.
- h. Clifton B.: This is probably more relevant to proposal #2. Proposal #1 does not have spatial averaging, only temporal (1-hour) averaging. Martin, do you have thoughts on this?
- i. Martin L.: Average is simple to use and familiar. Provides some fraction of habitat that would be protected (lower pH). How does the median come into proposal #1?
- j. Clifton B.: If we do a 1-hour average it would just be the median. Do both proposals need to treat this the same way?
- k. Martin L.: I don't see a need to force them to be the same.
- l. Connie B.: I think I would need to see how it is worded. You said that the wording of the proposal would not allow a pH of 10.5 to occur, but I think that using an average would allow for that to happen.
- m. Clifton B.: Proposal #1 has no temporal (aside from the 1-hour) or vertical averaging.
- n. Connie B.: 1-hour not to exceed? Or 1-hour average?
- o. Clifton B.: As a max not to exceed with an assessment method using a 90<sup>th</sup> percentile. The tables in the proposal document show what the maximum pH would be if you attain a specific value at the 90<sup>th</sup> percentile. That was for informational purposes to illustrate that higher pH would not occur.
- p. Martin L.: Connie, are you asking if either method precludes for getting above say a pH of 10? Neither method would prevent that. They could both be assessed as meeting the standard, but have pH values over 10 in the lake. The actual data from HRL would

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suggest that we would not see a pH over 10. The proposals do not prevent that.

- q. Clifton B.: The existing pH standard would not prevent this either.
  - r. Clifton B.: Table 3-4 (from the pH proposal document) shows that these higher pHs would be unlikely.
  - s. Marcelo A.: From reading the pH proposal document it may be that pH is not currently a problem. Why are we looking to raise the pH standard for HRL? Do we know that it things will continue to be ok?
  - t. Clifton B.: The proposals are less stringent standards, but they are more based on the literature regarding what is acceptable for warm water fisheries. We also would not be raising pH in HRL.
  - u. Jing L.: (to Mike T.) HRL is currently impaired for pH. How would the proposed changes impact NPDES permitting?
  - v. Mike T.: NPDES permitting uses a 6.0 – 9.0 pH range which is both technology-based and in line with current NC water quality standards. If the upper limit of pH for HRL went to 9.5, the permitting would still be technology-based.
4. Comment related to vertical averaging in proposal #2
- Discussion
    - i. Martin L.: The pH ranges being discussed are not based on acute toxicity. Aquatic life does not need to avoid waters with a pH of 9.5. Proposal is trying to provide habitat above and below pH of 9.5. I can add a phrase to the proposal that clarifies this.
    - ii. Marcelo A.: Figure 3.5 in martin’s handout that provides estimates of habitat vs. pH. Can you walk us through this figure? There are no units on the x-axis. I just am not clear on this.
    - iii. Martin L.: Each line is an individual profile of HRL for the years 1981-2016. The red line on top shows the fraction of habitat that has DO > 4.0 mg/L and pH < 9.0. The line on the bottom is the average pH corresponding to each profile. The



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x-axis is not time it is per profile. I can reformat that to make it clearer. It is not intended to provide a connection between the profiles.

- iv. Lauren P.: Regarding cold water vs. warm water. Make sure that all documents are available on the SharePoint site. Some of these studies may not have been appropriate to keep in.
- v. Bill H.: may need to revisit the background behind Clifton's approach. I heard that the current assessment methodology (>10% exceedance with 90% confidence) is going away.
- vi. Pam B.: The current assessment methodology is not changing. Some changes are being made to how waters on the 303(d) impaired waters list are going to be de-listed. Other options are also being considered for water bodies with small data sets.
- vii. Bill H.: Are reservoirs typically small data sets?
- viii. Pam B.: HRL is not.
- ix. Bill H.: Proposal #1 should acknowledge that it is based on the 10%/90% assessment methodology in case that changes in the future.
- x. Clifton B.: I suggest we update the comment log and proposals and send them to the CIC.
- xi. Brian W.: We can set a date for comments and then send to the CIC.

5. **Chlorophyll-a proposal presentations** (Andy Sachs, SAB members)

a. Potential Elements of a Chlorophyll-a Criterion Proposal for HRL (Clifton Bell)

- i. Background
  - 1. Consider HRL
  - 2. Establish framework for site-specific criteria for all NC reservoirs
- ii. Method #1 – Maintain existing uses in HRL
  - 1. Fishery is good
  - 2. Few algal blooms occur
  - 3. Recreation is good
  - 4. Existing chlorophyll-a in HRL is ~50 ug/L
- iii. Method #2 – Balanced uses
  - 1. Literature-based
  - 2. Risk concerns
    - Cyanotoxin risk
    - Aesthetic concerns
    - Water supply concerns
  - 3. Criteria range 25-40 ug/L

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4. More conservative
- iv. Some truth in both methods
- v. Potential framework for Piedmont reservoirs
  1. Chlorophyll range of 25 ug/L → 40 ug/L
  2. Desired range falls in-between the lower and upper bounds.
  3. Establish a narrative evaluation method to consider water body impairment.
- vi. Summary
  1. Season geomean of 40 ug/L
  2. Assessment should be either not to exceed more than once in three years (1-in-3) or a rolling 3-year average.
- vii. Discussion
  1. Brian W.: To clarify, what is the proposed chlorophyll-a criterion?
  2. Clifton B.: The 40 ug/L geometric mean. A rolling average might affect the magnitude. Included this because of the lack of data for NC reservoirs.
  3. James B.: Some states have a rolling average. How would that be different? What would be the argument for or against that?
  4. Clifton B.: A rolling average would make us reconsider the magnitude. We would need to figure out where in this range that should be. When looking at the data available for the formulation of the 303(d) list it looked like so many of the lakes/reservoirs only had one year of data.
  5. Pam B.: Lakes are typically monitored as one round of growing season monitoring once every five years. How would we apply the 1-in-3 given this monitoring protocol?
  6. Clifton B.: For the 1-in-3 you would use what data you have. The criteria should drive the sampling rather than the other way around, but either one would work.
  7. Nathan H.: Is there a reason why we couldn't apply a statistical test (T-test)? Right now, using the 1-in-3 does not include weight of evidence based on sample numbers. That statistical confidence is important.
  8. Clifton B.: Maybe those are some things we can think about?
  9. Linda E.: Do you define the growing season in your proposal?
  10. Clifton B.: I think it was April through October.
- b. Updated Chlorophyll-a Criteria Considerations for High Rock Lake (Lauren Petter)
  - i. Seasonal average not to exceed 30 ug/L more than once in three years
  - ii. Try to balance uses quantitatively
  - iii. Looked at literature for chlorophyll-a, but also incorporated HRL modelling information
    1. Natural conditions are between 25-40 ug/L.
  - iv. Looked at toxics literature and values for HRL
    1. Categorized by risk

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- Low risk → 16.5 ug/L
  - Medium risk → 30.6 ug/L \*\*aim for this in lake\*\*
- v. Looked at resiliency
    1. Still a lot to be learned about causes of algal blooms and the development of cyanotoxins.
  - vi. Discussion
    1. Bill H.: The information that was specified in Item #2 was not my information.
    2. Nathan H.: What were the health problems related to? Drinking water while recreating?
    3. Lauren P.: The tables given in the 2016 presentation captured qualitative phrases with numbers. They didn't get into the specific health related issues. Would need to look back at the source.
- c. Chlorophyll-a Criteria Considerations for High Rock Lake (Bill Hall)
- i. Prepared after reviewing Clifton's and Lauren's proposals
  - ii. Per national guidelines criteria are to be established at a level necessary to protect uses
    1. Ex: pH established at a level to protect aquatic life.
  - iii. Refers to the conceptual model established by the SAC which describes the relationships between HRL indicators and uses
    1. Chlorophyll-a does not directly impact any of the uses set for HRL
    2. Chlorophyll-a relates to water clarity, pH and aesthetics, but we must first establish how.
    3. Then we can go on to consider what level of chlorophyll-a would be appropriate in HRL.
    4. No links have been made between algae density or biovolume and use impairment.
  - iv. Regarding Clifton's and Lauren's proposals
    1. If there was a problem below the lower bound of 25 ug/L in Clifton's framework we would need to be able to define how a use was impacted.
    2. Regarding cyanotoxin risk, % blue-green algae is irrelevant to use impairment until the state shows how a use is being impaired.
  - v. What we don't know
    1. There are high chlorophyll-a concentrations in certain areas of HRL.
    2. However, we don't know of any use impairments.
    3. Cyanotoxins have not been observed.
  - vi. Conclusion
    1. Not enough data to say that any level of chlorophyll-a is having an impact on the uses in HRL.
  - vii. What to do
    1. Maintain the current chlorophyll-a standard.

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2. Decide on a growing season and an averaging period.
  3. Provide an off-ramp for lakes that experience chlorophyll-a concentration higher than the existing water quality standard (40 ug/L), but show no signs of uses being impacted.
  4. Use anti-degradation requirements to prevent deteriorating conditions.
- viii. Other thoughts
1. Figure out what is meant by “biological integrity”.
  2. For recreation, develop a water clarity criterion that can then be related to chlorophyll-a.
  3. For non-stratified lakes relate primary production and DO (this will be lake specific).
  4. Establish water quality standards for cyanotoxins.
- ix. Discussion
1. Astrid S.: EPA is currently developing regulation for cyanotoxins for recreation waters.
  2. Bill H.: EPA recently developed cyanotoxin draft criteria. If going to use this it needs to be adopted by the state.
  3. Lauren P.: I would argue that we are trying to use state specific information as well as aquatic guidelines for toxins. The regulations only require that scientific information is defensible.

#### 6. Group discussion of Chlorophyll-a proposals

- a. Nathan H.: Just because we can't prove impairment in the lake doesn't mean we can't make scientifically defensible decisions. The literature suggests risks tied to chlorophyll-a.
- b. Bill H.: No disagreement. However, the presence of cyanobacteria does not cause impairment, the presence of toxins does.
- c. Bill H.: We need to be able to make direct associations between indicators and impairments. Establishing a chlorophyll-a criterion to protect for cyanotoxins in highly conservative.
- d. Linda E.: There is a problem when you try to equate chlorophyll-a concentration to toxin production. They don't equate.
- e. Marcelo A.: Even if we can't directly equate the two, the literature shows that more cyanobacteria create a greater risk of toxins being present. To Bill H.: how do you define impairment?
- f. Bill H.: Currently HRL is impaired for pH. If we adopt one of these pH proposals that impairment disappears.
- g. Marcelo A.: What would that impairment look like?
- h. Bill H.: Not sure. Maybe something like more than 10% of days being not suitable for recreational use?
- i. Lauren P.: What's the difference between modifying the pH standard based on literature and doing the same thin for chlorophyll-a?
- j. Bill H.: The literature has never addressed the designated uses.

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- k. Clifton B.: If there is no use impairment now then what does that look like? We are determining what is protective, not waiting to see what impairments occur. Agree with many of Bill's points. We know of linkages between literature and effects (impairments). My proposal considers this as the upper end of a range. Lauren's proposal would be at the lower end of the range.
- l. Astrid S.: References a USGS study that would indicate that HRL would be in a moderate risk category for microcystins based on observed chlorophyll-a values.
- m. James B.: Seems like we are in the middle of a risk assessment without much data.
- n. Bill H.: (To Astrid S.): For HRL, the geomean for chlorophyll-a is ~50 ug/L, yet we are not detecting cyanotoxins to a great degree. The data doesn't show a problem.
- o. Astrid S.: We don't have enough data to make that call.
- p. Linda E.: One reason we don't have toxin criteria is that we don't fully understand the mechanism involved in toxin production.
- q. Nathan H.: It sounds like we are arguing whether we need to consider chlorophyll-a as an indicator.
- r. Bill H.: I'm just saying that we need to demonstrate a relationship
- s. Brian W.: There are different levels to being protective of the uses. Would encourage folks to think about what is protective.
- t. Lauren P.: (Re: anti-degradation) For permitting would need to consider assimilative capacity. There is no capacity in HRL. EPA requires defensible information, lines of scientific evidence. Decisions are documented to show thinking. This can be changed later when more information becomes available.
- u. Andy S.: Vote to retain chlorophyll-a as an indicator for HRL?
  - i. Linda E.: Yes
  - ii. Astrid S.: Yes
  - iii. Martin L.: Yes
    - 1. Chlorophyll-a not a perfect indicator. Degree of plankton does impact ecosystem.
  - iv. James B.: Yes
    - 1. There are connections between chlorophyll-a and pH
  - v. Nathan H.: Yes
  - vi. Bill H.: Yes
    - 1. Need to be able to show a lack of impairment
  - vii. Marcelo A.: Yes
  - viii. Deanna O.: Yes
    - 1. Much more comfortable with Clifton's proposal for chlorophyll-a
  - ix. Lauren P.: Yes
  - x. Clifton B.: Yes
    - 1. Should keep in mind what Bill said regarding influencing the magnitude

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- v. Martin L.: I don't see a conceptual difference between what Clifton and Lauren have proposed. Clifton considers weight-of-evidence to provide a range. Now we need to consider where in that range we want to be.
- w. Clifton B.: (to Lauren P.) regarding the natural conditions, that was based on a model that considered only forested watersheds, correct? Point sources were turned off? That would be one argument against using the 30 ug/L
- x. Lauren P.: Yes. The natural conditions were a bit conservative.
- y. Bill H.: Can we get a copy of the report that had the information on the natural conditions model?
- z. Jing L.: Yes
- aa. Bill H.: Regarding the current assessment areas, wherever we see the highest chlorophyll-a concentration, that is determining the impairment status.
- bb. Clifton B.: I recommended using the limnological model to assess different portions of the lake. DWR stated that might cause problems with their assessment methods.
- cc. Lauren P.: Alabama only assesses on one sampling site.
- dd. Martin L.: Where we go with the magnitude is dependent on how we assess spatially. 30 ug/L would be okay in parts of HRL, but not everywhere in the lake.
- ee. Deanna O.: How far back does the HRL data go?
- ff. Jay Sauber: The data goes back to 1968. Current sampling methods only established in 1980.
- gg. Andy S.: How do you want to go forward with this? Straw vote on chlorophyll-a proposals?
  - i. Three options
    - 1. Clifton #1 – Framework for reservoirs.
    - 2. Clifton #2 – Seasonal geometric mean of 40 ug/L for HRL.
    - 3. Lauren - 30 ug/L average for HRL.
  - ii. Tammy H.: [creates table outlining the options]
    - 1. Lauren P.: Propose to straw vote on the 30 ug/L and the 40 ug/L. The narrative components can be discussed later.
    - 2. Clifton B.: The numbers would be easier to agree on now. I think that we can define the narrative assessment.
    - 3. Martin L.: What is the spatial consideration for each option?
      - Lauren P.: By station with the 1-in-3 for mine.
      - Clifton B.: Spatial average by major limnologic area as a rolling 3-year average.
    - 4. James B.: Are we turning our backs on the 10%/90% completely? Also, shouldn't we have an option to retain what is being done now?
    - 5. Deanna O.: Since we previously agreed on using a geometric mean and an April-October seasonal component would Lauren need to recall her proposal?
    - 6. Lauren P.: I would need to recalculate. The Magnitude would probably go lower, but the method would be the same.

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7. Clifton B.: We would need that number before we go any further. Would probably be around 25 ug/L.
8. Some SAC members state they would like to get Lauren's new number and have time to digest all this information.
9. James B.: There are two things going on here: (1) the methodology and (2) the numbers. We could standardize magnitude based on frequency of exceedance.
10. Astrid S.: If not using the 10%/90% would there be a minimum number of samples required?
11. Lauren P.: First we would have to look at the criteria. Implementation would be separate.
12. Clifton B.: I would expect monthly sampling.
13. Connie B.: I believe our sampling season was May through September at one point.
14. Clifton B.: My proposal has too many options. I will work to split this out more, especially regarding the spatial component.
15. Linda E.: I would like to understand the objections that DWR had against aggregating stations within a water body.
16. Jeff M.: This has been discussed a lot. An advantage to doing this by site is the that segments are smaller allowing us to better address localized impairments.
17. Nathan H.: Not sure about the 1-in-3. The current assessment method addressing assessment better than the 1-in-3.
18. Nora D.: Assessments are done over a 5-year period with greater than 10% exceedance and 90% confidence. There is also a requirement of a minimum of 10 samples.
19. Connie B.: The 1-in-3 was also written for toxicants. If using a geomean, how are we looking at not more than one exceedance in three years?
20. Clifton B.: This is set on the Florida precedent. They based 1-in-3 on a statistical assessment of type I and type II error. Other things can be done.
21. Nathan H.: A 3-year rolling average can be busted by one sampling event.
22. Bill H.: Frequency is supposed to be the allowable rate of exceedance. My proposal should have a 1-in-3 frequency.
23. Martin L.: The difference between the 1-in-3 and the 3-year rolling average is that the 3-year rolling average includes weight of evidence while the 1-in-3 treats each year separately. The 3-year rolling average is very dependent on frequency of sampling. Would have to clarify what the sampling frequency would be.
24. Lauren P.: Think we need to agree on the methods that we agree on.

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25. Brian W.: We will send out the proposal summary table. Folks with proposals can make their modifications and we can then do a straw poll by email.
26. SAC members agree to this.
27. Marcelo A.: I would like to propose another pH proposal which would be to maintain the existing standard and assessment method. Is that okay?
  - Linda E.: Ok with that.
  - Clifton B.: Too late. SAC voted on this already.
  - Lauren P.: I think the majority did vote to exclude option to do this already.
  - Marcelo A.: Can we check the notes?
  - Deanna O.: I think we have addressed this already.
  - Astrid S.: If one member is not clear on this we should double check.
  - Connie B.: It would be good for our records if we clear this up.
  - Andy S.: This would also be good as a minority report.

### 7. Final Thoughts

- a. Lauren P.: Good discussion, we found some common ground.
- b. Bill H.: Good meeting, like the idea of a minority report.
- c. Nathan H.: I like the 2-tier approach, need to address sampling frequency.
- d. James B.: I'm a new fan of the 10%/90% assessment method.
- e. Brian W.: DWR will provide:
  - i. HRL modeling report
  - ii. pH proposal tallies from notes
  - iii. Table of proposals
- f. SAC assignments:
  - i. Due date for chlorophyll-a proposal updates
    1. Comments to Clifton by April 4, 2018
    2. Proposal updates by April 11, 2018
- g. Connie B.: People have been commenting about wanting to finish HRL. We still need to discuss TN & TP in some way.
- h. Next meeting: May 31, 2018.