

NC Nutrient Criteria Development Plan – Scientific Advisory Council (meeting #14)
7/12/2017

Attendees

SAC members in attendance:

Lauren Petter	James Bowen
Bill Hall	Martin Lebo
Linda Ehrlich	Astrid Schnetzer
Clifton Bell	Nathan Hall
Deanna Osmond	Marcelo Ardon
Michael O’Driscoll	

SAC meeting facilitator:

Andy Sachs

NCDEQ DWR staff in attendance:

Jim Hawhee	Jeff Manning
Tammy Hill	Jucilene Hoffman
Mike Templeton	Bonghi Hong
Connie Brower	Nora Deamer
Pam Behm	Brian Wrenn
Jing Lin	Elizabeth Fensin
Christopher Ventaloro	Christofer Vande Zande (DWR intern)
Mark Vander Borgh	

CIC members in attendance:

In person:

Andy McDaniel
Anne Coan
Doug Durbin

Participating audience members:

Will Scott (Yadkin River Keeper)

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.

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Meeting notes

All questions, comments and answers are paraphrased

1. **Convene** (Andy S. Sachs)
 - a. SAC members, DWR staff and audience attendees provide names and affiliations.
 - b. Facilitator asks for approval on meeting notes from March 22, 2017 SAC meeting (meeting #12)
 - i. No comments.
 - c. High Rock Lake field trip
 - i. Best day for trip appears to be August 30, 2017 with a rain date of August 31, 2017
 - ii. 10 people have signed up so far
 - iii. We plan to have two boats available
 - iv. Trip will include a tour of the upper, middle, and lower portions of the lake
 - v. DWR staff will take samples
 - d. SharePoint update
 - i. Still working out some issues with SAC members not being able to access the site via invitation sent to work email
 - e. Desired outcomes for today's meeting
 - i. Revisit designated uses and assessment process
 - ii. Resolve pH
 1. Many of the SAC member did not have time to work on the literature review sparked by Clifton's pH proposal during the previous meeting. Consensus was reached that the pH discussion should be postponed until the next meeting.
 - iii. Begin chlorophyll-a discussion
 - iv. Resolve chlorophyll-a
 1. Brian W.: No reason to force closure. We can touch on what we have received so far.
 2. Deanna: Does voting for consensus on criteria proposals need to take place in person? Can we do this via email?
 - James B.: I believe that voting does not need to be in person.
 - Brian W.: We can do the strawman vote via email and then have the formal vote when we reconvene.
2. **Presentation: NC Integrated Report Assessment Process** (Pam Behm)
 - a. Overview:
 - i. Integrated report review
 1. Required under Sections 303(d) and 305(b) of the Clean Water Act
 2. Summarizes water quality status of water bodies
 3. Compares water quality data to existing standards

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4. Requirement to report each even-numbered year
- ii. Assessment process
 1. Water quality standards approved by NC and EPA
 2. Assessment methods for 303(d) purposes approved by Environmental Management Commission (EMC)
 3. EPA uses guidance and NC standards to review 303(d) list
 4. EPA has ultimate approval of 303(d) list
- iii. Application
 1. 303(d) list is a public information document with regulatory implications
 2. Identifies potential “hotspots” to guide future planning/research activities
 3. Acknowledges where water bodies are meeting standards
 4. Provides a spatial component to the water quality standards
 - Water bodies split into assessment segments
 - Avoids impairment of larger areas than necessary
- b. Comments/questions:
 - i. Bill H.: We have seen issues in other states water where discharging to impaired waters forces activities such as controls for stormwater discharges. In one state, if you are discharging to downstream waters that are listed as impaired, you are automatically required to have a management plan to reduce sediment and phosphorous by specific percentages. This is without any kind of assessment of the discharger. Is there anything like that going on in North Carolina?
 1. Pam B.: We are very removed from stormwater these days so I am not quite sure. I will check and mention it in the notes.
 - *** Pam follow-up: no, there are not similar requirements in NC, stormwater requirements kick in after being named as a source in a TMDL ***
 2. Jim H.: I will track that down.
 - Staff note: Pam B. found that there are no requirements of this kind in NC
 3. Andy M.: The answer to that is yes. There is something happening in North Carolina regarding MS-4s and TMDLs. Most MS-4s have TMDL related language. Our DOT permit has very strict TMDL language in it. Nobody that I am aware of faces the situation that you described. Most TMDL language is not structured like that in North Carolina.
 - ii. Bill H.: Do assessment methods get public notice?
 1. Pam B.: The EMC owns the assessment methodology. They decide if they want to receive comment. Any comments are usually in response to whether changes are being made to the method
 - iii. Deanna: Does USGS play a role in this? Is their data used for assessment?
 1. Pam B.: We do accept data from third parties, but I’m not sure if we’ve ever used USGS data for assessment purposes.

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- iv. Marcelo: You mention a 5-year data window. Is this assessment only done every 5-years?
 - 1. Pam B.: Assessment is done every 2 years. This is a rolling window.
- v. Martin L.: Are all locations assessed every two years or is it only if the basin information has rolled through it?
 - 1. Pam B.: If there has been data collected, and we have been given that data, it will be assessed. It used to be tied with the basinwide plan development, but that hasn't been the case for some time.
- vi. Marcelo A.: Confused about the 10% exceedance with 90% confidence. How do you calculate that?
 - 1. Pam B.: It's a statistical calculation. 10% exceedance is straight forward calculation. Then a binomial non-parametric approach is employed to see if there is 90% confidence. We have only been doing this since 2014. We are getting push back from EPA on the 2016 listing as we are only considering 90% for listing waters as impaired and not for de-listing waters. They feel that we should be doing both. This is still unresolved.
- vii. Astrid: The number of data points being >9, is that for each station? Each assessment period? How does that work?
 - 1. Pam B.: It's throughout the five years. Typically, reservoirs are being monitored during the growing season. For some we get less than 10 samples in the 5-year period.
 - 2. Astrid S.: So, those data points can be from multiple stations throughout the year? Or they could be from one station during one summer? There is no specific requirement?
 - 3. Pam B.: The locations are always the same. Stations are assessed independently. Data from different stations are not merged for assessment.
- viii. Bill H.: The procedures are defined in the assessment methods?
 - 1. Pam B.: Yes.
- ix. Bill H.: Most lakes are sampled on a five-year rolling schedule. So, you might be looking at one year of data for two or three assessment cycles?
 - 1. Pam B.: Yes.
- x. Clifton B.: There is an argument for letting the assessment segmentation define the monitoring. Many states do this. For this group, we are not being tasked to modify the assessment methods. You said a lot of standards do not have a spatial requirement. We are considering spatial requirements for some of these parameters so we would need to specifically build that into any criteria that we propose.
 - 1. Pam B.: Yes, but I'm not sure how that might play out as far as whether it appears as a modification to the assessment methodology or in the standards.

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2. Chris V.: Just want to note that during the last triennial review, EPA disapproved implementation components that we had written into the standards. If you recommend modifications to how a standard is assessed, it may not appear in standards.
- xi. James B.: I think of the monitoring program as a once per quarter. It sounds like it is more a period of time for a particular area. Can you discuss that?
 1. Pam B.: Rivers and streams that receive ambient monitoring get sampled, typically, each month. This is done at road crossings and easily accessible areas using grab samples and is done year-round by regional office staff. For lakes and reservoirs, they are monitored by the intensive survey group here in Raleigh. We try to negotiate with them to focus on areas that appear to need more data. Jordan and Falls lakes do get year-round monitoring.
- xii. Nathan H.: How do you ever get 10 samples at a single station in a reservoir if you are only sampling seven months out the year every five years or so?
 1. Pam B.: They would have to make extra trips. A lot of reservoirs are just meeting the standards. If all five samples come back and there are no exceedances, then it's going to show as being ok. We try to target those reservoirs that have problems.
 2. Nathan H.: So, you can have really poor confidence that it is meeting the criteria and not impair, but you need really good confidence that it is not meeting the criteria in order to impair.
- xiii. Lauren P.: Why was a five-year window picked as opposed to a ten-year window?
 1. Pam B.: I don't know the answer to that. I think that might be due to the assessment having been so closely tied to the basinwide schedules in the past.
- xiv. Linda E.: How many reservoirs are category 5?
 1. Pam B.: We can find out and add it to the notes.
 - ***Pam follow-up: From the 2014 Integrated Report: there are 18 reservoirs impaired for chlorophyll-a in NC. 7 of those are impaired for chl-a, but already have TMDLs or an equivalent strategy (these are not on the 303(d) list). The remaining 11 are on the 303(d) list for chlorophyll-a and need TMDL or equivalent.

Number of reservoirs impaired and on 303(d) list for other parameters: 1 for copper, 1 for fecal coliform, 8 for PCB fish tissue advisory, 2 for high pH, 5 for turbidity, and 1 for high water temperature.
- xv. Marcelo A.: Looking at the HRL data, from 1981 to 2016, there's only been four years in which there have been more than five samples taken in a given year. Most years it's like one or two samples.

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3. **Presentation: HRL Uses & Goals** (Christopher Ventaloro)

a. Overview:

- i. Review of designated uses associated with High Rock lake
 1. Class C (aquatic life, secondary recreation, wildlife, fishing, agriculture)
 2. Class B (primary recreation)
 3. Class WS (water supply IV & V)
 4. Protection of downstream uses
- ii. Management goals
 1. Review of HRL management goal as established by the SAC
 2. Elaborating on the HRL management goal and tying it more directly to the designated uses
 3. Designated use management goal & criteria development approach tracking tool

b. Comments/questions:

- i. James B.: You are making us remember what we did two years ago. I'm trying to think about this work that we did and I'm wondering, have we filled in the management goals for some of these? I'm asking the group, and specifically Lauren since the materials she provided for her talk today address this also. I think we were thinking similarly in trying to put narratives to what we want or don't want to see in the water body.
 1. Lauren P.: The chart in my presentation is mostly from the notes. It looks like there has been some refining of these goals so far. Part of this is what I have tried to do in my paper.
 - Chris. V: I had also looked at Lauren's paper and this worksheet was really meant to serve to bring this topic back to the forefront to help you organize your thoughts and to make sure that nothing was unintentionally dropping off the radar.
- ii. Pam B.: We had also talked about adding protection of downstream uses to this table.
 1. Chris V.: Yes, I forgot to add that to this worksheet.
- iii. Bill H.: Just for clarification, the drinking water use is use as a water supply source not as dipping a cup into the water to take a drink.
 1. Chris V.: Yes. It protects the source.
- iv. James B.: There's this issue of what's reference? I've been thinking of it as what's there in this lake and what's indigenous not necessarily as comparing it to a reference site. Though, if something is not there, it may be because it cannot tolerate current conditions. We've only looked at fish carefully.
 1. Clifton B.: We have looked at mussels indirectly via ammonia. With regards to pH, it is the toxicity of ammonia that is the real stressor. We were using the ammonia concentrations provided by EPA that assume mussels are present.

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- v. Lauren P.: Regarding water supply sources, it is important to consider all of these parameters when we discuss protecting drinking water sources.
 - 1. James B.: I know of one reservoir in North Carolina where the taste and odor issues come from low pH. It has to do with iron and manganese content.
 - 2. Astrid S.: I was wondering about protecting the downstream use since there is a water treatment plant downstream. Are there other concerns that we have associated with downstream uses?
 - 3. Chris V.: You should certainly consider what impact any recommendations that you make would have to the downstream uses. I don't think we ever specifically looked at what the classifications are directly downstream of HRL, but you would have to be protective of class C uses at a minimum.
 - 4. Will S.: The DO in the tailwater of the HRL dam is consistently in violation of the state standards pretty much every summer (June-September). They are below 4 mg/L. There was a fish kill in 2008 or 2009 in the tailwater due to low DO. They are working on technology to improve that. I don't not know the pH numbers off hand.
 - Astrid S.: Do they know how that relates to conditions in the lake?
 - i. Will S.: That would be a great question for the operator of the dam. There is a new owner working on this.
 - ii. Linda E.: That's probably because what they discharge is hypolimnetic.

4. **Options for pH** (Brian Wrenn)

- a. Since we are postponing the continuation of the pH criteria discussion until the next SAC meeting, I want to quickly touch on what has been proposed so far:
 - i. Clifton's proposal of 6.5-9.5
 - 1. Two SAC members support this option
 - ii. Existing criteria
 - 1. Two SAC members have said they support this option
 - iii. Existing pH range + 30-day average and diurnal with assessment/monitoring for early morning and afternoon to account for diurnal fluctuations
 - 1. Staff note: Not sure yet how many SAC members support this option.
- b. Comments/questions:
 - i. Clifton B.: Regarding the summary table which can be found on the NCDP Literature Library (SharePoint):
 - 1. Much of the literature is old and consists of summary statements without details as to health effects, duration, etc.
 - 2. Most articles are in this table. Some papers have yet to be added, could not be found, or are in a foreign language.
 - 3. Suggest that the table is a good place to start when doing your literature review

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4. In general,
 - Non-salmonids are less sensitive than salmonids
 - There are some exceptions such as an experiment looking at pH shock to bluegill.
 - Going back to the original article to understand the context is very important!
 - Also, important for us to think about magnitude, frequency, and duration.
5. Our proposal (Clifton & Bill H.) was based on 9.5 as an instantaneous value.
- ii. Lauren P.: Have you considered co-stressors? Some papers suggest high pH is mediated by high DO levels.
 1. Clifton B.: Co-stressors are something that we should consider. The algal conditions drive the pH up, but also increase DO and consume ammonia. The duration really needs to be considered and how likely they are to co-occur.
 2. Jing L.: Do we also need to consider temperature as a co-stressor? For HRL, in the summer, the median temperature is about 30°C. Most of these studies have temperatures below 20°C.
 - Martin L.: For non-salmonids, we probably do need to consider that.
- iii. James B.: As I look through the table, ~10% information refers to non-salmonids. Is it appropriate to not consider salmonids when so much of the information is based on them?
 1. Clifton B.: They are useful for reference. We know they are much more sensitive to ammonia which is probably why they are more sensitive to pH. They are helpful for understanding where the 9.0 maximum pH came from.
 2. James B.: I was also trying to consider what species are native to HRL. There are some perch references. There are also some references to Roaches. Are these applicable?
 3. Unidentified speaker: A roach is a type of carp. There are carp in HRL.
- iv. Bill H.: Does the lake support bluegills? One of the studies suggests that bluegill died at a pH of 9.6. The data we have from the 2016 HRL intensive study showed numerous measurement of pH above 9.6. So, if HRL is currently supporting a large bluegill population, and we are seeing pH values frequently above 9.6, how do you reconcile that with the literature?
 1. Brian W.: This goes back to the designated uses and what the management goals for HRL are. We're again talking about sportfish species, but I want to make sure everyone thinks about this when we come back to discuss pH at the next meeting. Are sportfish the most sensitive aquatic life and is that the management goal for HRL (to maintain it as a sport fishery)?

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2. Pam B.: The point of the standard is to set a protective level that, even if exceeded, would not result in impact. There needs to be a margin of safety built into the standard.
3. Clifton B.: The resolution to Bill's question is that, when we look at the literature for the bluegill, it was based on pH shock and not ecological conditions. There would be no contradiction in this case.
4. Bill H.: My point is that you can't look at an instantaneous number if it is not an instantaneous effect. I suggested it should be a 30-day average. That is one of the things that the SAC needs to focus on.
- v. Martin L.: In HRL, we want to maintain a level of eutrophication that supports the sport fishery, but we need to balance that with the limits of the other uses. Meeting a pH of 9.0 may start to threaten how much productivity will occur in the lake.
- vi. Clifton B.: I think we will be stuck with the literature we have and we will need to carefully consider this. Ammonia will be the most important co-stressor. My recommendation is that when we ask people about pH, we explicitly ask about magnitude, frequency, and duration.
- vii. Andy S.: Can one of your results be that you don't know. Is that possible?
 1. Deanna O.: I can see that being a possibility, but don't we still have to come to a number for the water quality standard?
 2. Chris V.: If you decide that you cannot come to a recommendation, the existing pH standard would stand.
- viii. Chris V. Going back to the topic of native fish species, we have lists of indigenous and non-indigenous species by river basin on our website. *These tables have been uploaded to the NCDP Literature Library.*
- ix. Lauren P.: It may be useful to have some type of tally to trace which of the literature match the conditions in HRL. This will be helpful for documentation.
- x. Pam B.: When talking about duration and frequency, include how many samples would be appropriate.
- xi. Anne C.: One of those studies was from 1931. Was pH measurement as accurate then as it is now? That may be something that you want to consider when deciding how to weigh the literature.
- xii. Pam B.: Also, need consider how would you then take this pH criterion and relate that to nitrogen and phosphorous as we don't have a model that does that.
 1. Bill H.: In your presentation, it said that the compliance points are based on modeling. How does that work?
 - Pam B.: When we have a model for a parameter we look at different scenarios (where the concentrations are the highest, different reductions) to determine what stations should be monitored long-term to identify where management needs to be

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focused. Without a model for pH we cannot say where those compliance points should be.

xiii. Astrid S.: What was the variability that was found in the lake from the summer study?

1. Jing L.: The diurnal range was up to 2.7 for pH. The 90th percentile at the critical station (middle of the lake) was 9.5 and the max was 10.0.
2. Astrid S.: Can you send out that summary again.
 - Staff note: This summary should be in the NCDP document library.
3. Martin L.: The average variability for that station was about 1.0 pH unit within a day. The distribution sheet that was provided earlier gave the deviation by hour against the 24-hour average.

5. **Presentation of findings, evaluation, and resolution: Chlorophyll a** (Clifton Bell, Lauren Petter)

a. Brian W.: Clifton and Lauren will present to the SAC considerations for possible chlorophyll-a criteria. These are not proposals for how the SAC should proceed.

b. Presentation: *Potential Elements of a Chlorophyll-a Criteria* Proposal for High Rock Lake (Clifton Bell)

i. Overview:

1. Compare/contrast two approaches to CHLa criteria derivation
2. Identify range of potential CHLa criteria
3. Describe a framework for using this range to identify reservoir-specific criteria

ii. Comments/questions:

1. Marcelo A.: Didn't we see a video of nuisance blooms?
 - Clifton B.: That was a good example of algae in the water column, not of surface scum.
2. Jim H.: What you are saying is generally true, but from my time on the lake there were definitely high levels of algae. Our field trip may help put this into perspective.
3. James B.: Are the numbers that you are proposing meant to be calculated for a growing season?
 - Clifton B.: Yes.
4. Nathan H.: Regarding statistical confidence, how do we account for this in relation to the number of samples that are routinely collected?
 - Clifton B.: Could calculate a geometric mean using 8 samples per year. The issue would be having enough years of data within the assessment period.
 - Nathan H.: None of this takes into account uncertainty related to small sample sizes. We could suggest a student's t-test to account for this uncertainty.

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5. Linda E.: Do we have evidence to show that chlorophyll of 25 ug/L is protective of the fishery?
 - Clifton B.: The original chlorophyll-a literature review showed this.
 - Pam B.: We also have a letter from the Wildlife Resources Commission (WRC) that supports 25 ug/L (as an instantaneous value) for Jordan Lake.
 - Marcelo A.: I believe some literature stated that 10-15 ug/L could support a similar fishery in Georgia and Alabama.
 6. Astrid S.: It is also important to consider the source of the chlorophyll-a numbers. High chlorophyll concentration dominated by cyanobacteria would have different consequences than a high chlorophyll concentration composed of other species.
- c. Presentation: *Chlorophyll A Considerations* (Lauren Petter)
- i. Outline
 1. Water quality goals, approaches, and documentation refresher
 2. Magnitude
 3. Duration
 4. Frequency
 - ii. Comments/questions:
 1. Clifton B.: Why do you consider the fertilization of a lake a negative?
 - Lauren P.: Because fertilization was based on specific management strategies for specific species.
 2. Pam B.: We spoke with Tim Wool (USEPA) regarding the HRL model. We did look at forested watershed so we can use that to look at low end bound.
 3. Bill K.: We used the same HRL model as developed by DWR. We did a sensitivity analysis looking at a range of chlorophyll-a concentrations vs total phosphorous. We did not run a watershed model. We reduced inputs to get an idea of how some of these different scenarios would impact N & P levels.
 4. James B.: Lauren provides a very comprehensive model that we can use going forward. I like that it started with the uses and proceeded to a goal. Do the green values correspond to Clifton's low bound (definitely meets criteria) and the red values to the upper bound (definitely exceeds criteria)?
 - Lauren P.: The values don't match exactly, but could possibly be used that way. I would think that a single value is more appropriate since we are looking at a site-specific standard for HRL. The range may be more appropriate state-wide.

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- Bill H.: This could apply to all lakes, but how does it specifically relate to HRL? For example: for the slide on recreations: These are generally applicable, but aesthetics/recreation is very specific.
 - Lauren P.: This can help guide us toward what things we want to avoid and help narrow down what info we are considering.
 - Bill H.: Regarding % blue-greens, can't you have high blue-green density when chlorophyll-a is low?
 - i. Linda E.: Yes, that can occur.
 - ii. Lauren: These are to give us places to start
 - iii. James B.: We can use data specific to HRL.
5. Andy S.: So where do you want to go from here?
- Brian: I wanted to bring this back to the designated uses. Use the reference sheet to frame these questions.
 - Martin L.: regarding most sensitive use. With regards to nutrients, we are actually looking at optimizing uses. That goes to the ranges that both Clifton & Lauren have talked about.
 - i. Jim H.: We do have a legal obligation to protect all uses, but it seems that the numbers being looked at would cover this.
 - ii. Clifton B.: I would use the word "balance".
 - iii. Jim H.: I would hope that at the end of this we can say with authority that each use is being protected.
 - iv. Marcelo A.: I like the word protect rather than optimize. Protecting all the uses is our goal.
 - v. Clifton B.: We have gradational responses for these uses. There's not necessarily a bright line to indicate whether uses are being met or not. It is important to realize that there are certain trade-offs between uses. There is a conceptual approach between picking the most sensitive use and maybe establishing unrealistic goals vs. acknowledging that these gradations exist. Can we agree to acknowledge these trade-offs while being protective of all uses? And can we also agree that we need to consider an averaging period?
 - vi. Martin L.: We need to be careful with the terms. We have agreed on protecting all uses. We need to look at multiple uses.
 - vii. Marcelo A.: I don't agree that protecting the most sensitive use will impact the other uses.

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- viii. Jim H.: From a management perspective: To be clear, we are not looking to get below the current standard. I think that's obvious to everyone.
- ix. Nathan H.: We are going to have to decide between using a tiered approach vs. using a single numeric value.
 - 1. Clifton B.: For HRL it will probably come down to a single value.
- x. Martin L.: Do we consider spatial averaging? The more you consider spatial average, the lower the criterion goes.
- xi. Linda E.: Do we have an example of a reservoir with a management plan? How have they worked?
 - 1. Jim H.: We have seen some success with the Falls Lake management plan.
 - 2. Forest W.: There has been a good response from limiting impervious surfaces. Hoping to work on current built-upon area using best management practices.
 - 3. Linda E.: Has there been evidence of nutrients being reduced?
 - 4. Forest: DWR has shown that there have been reductions during the past two cycles.
 - 5. Anne C.: There have been agricultural reductions as well.
 - 6. Connie B.: I just want to restate the difference in the roles of the CIC and SAC. The CIC is here to discuss management strategies while the SAC is here to focus solely on criteria development.
 - 7. Linda E.: I don't think that those things can be separated.
- Lauren P.: Would it make sense to talk about chlorophyll-a as it relates to each use individually?
 - i. James B.: I think we've seen that with the proposals presented today.
- Marcelo A.: What if we took the numbers as proposed by Lauren and applied those as the minimum and maximum based on the concepts proposed by Clifton?
 - i. Clifton B.: There is a difference in saying that between 5 and 20 is good for protecting drinking water uses and that exceeding 20 will impair drinking water uses. There is a gradational effect.

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- ii. Marcelo A.: The use of spatial averaging kind of does this, no?
 - Astrid S.: It would be helpful to have an operator from the Denton Water Treatment Plant here to give us some sense of what constitutes a reasonable treatment cost. I also like the two-tiered approach.
 - Connie B.: Just to remind everyone: we have been down this road before with the “threshold rules”. Those were soundly defeated by stakeholders.
 - i. Martin L.: The two-tiered approach is different from what Clifton has proposed.
 - ii. Clifton B.: There’s a difference between my proposal and the threshold approach attempted in the past.
 - 1. My proposal is to use this process to develop a single criterion value to be used as a standard. First, we need to identify the range and then we can narrow it down to get an appropriate criterion.
 - iii. Nathan H.: So, if monitoring shows that chlorophyll is somewhere in the middle of the range, do you then take steps to address that?
 - 1. Clifton B.: You still need to set a number somewhere in that range to serve as the standard. Some of what I showed was to assess the water, but, there still needs to be a set number to serve as the criterion.
 - iv. Bill H.: Minnesota developed nutrient criteria for lakes by ecoregion. They set total phosphorous criteria and chlorophyll-a criteria. If the TP is exceeded, but the chlorophyll-a is not, the lake is considered to not be impaired. This approach can be used here as well.
6. **Preparation for the September SAC meeting** (Andy Sachs)
 - a. What topics of discussion should be addressed during the next meeting?
 - i. Pam B.: The next meeting will follow the field trip to HRL. It would be good to start with a review of that trip.
 - ii. Brian W.: Staff will consolidate the proposals provided by Lauren and Clifton. We will focus on ranges and overlap.
 - 1. Martin L.: Each of us can consider these ranges and overlap as homework.
 - 2. Clifton B.: The previous ranges [from the literature reviews] need to be reexamined. I think we need to identify where uses will be met or not met.
 - 3. Lauren P.: We shouldn’t be developing new ranges, but considering what we have seen.

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4. Martin L.: We also need to consider these ranges in the context of HRL. Ex: we don't see thick algal scums in the Piedmont.
- iii. Marcelo A.: It would be nice to see the math behind using a mean vs. a geometric mean and growing seasons vs. annual means. A geometric mean of 40 ug/L increases the standard from what it is now.
 1. Andy S.: Would it be helpful to see a presentation on the different averaging options on the table?
 2. Nathan H.: Will provide a presentation discussing this as well as how it ties in with assessment methodology.