

**The Sixth Meeting of the DEQ Science Advisory Panel for the CHLa Study
November 22, 2013**

VCU Rice Center.

SAP Members Attending: Clifton Bell, Claire Buchanan, Paul Bukaveckas, Todd Egerton (for Harold Marshall), Greg Garman, Will Hunley, Margie Mulholland, Kim Reece, Jian Shen (for Harry Wang), Peter Tango

Other Participants: Iris Anderson (VIMS), Alex Barron (DEQ), David Bernard (Sierra Club), Jaimie Brunkow (JRA), Arthur Butt (DEQ), David Elliott (VCU), Jason Ericson (Dominion), Dave Jasinski (CEC), Chris Moore (CBF), David Parrish (VIMS), Gabe Retana (BC), Jennifer Stanhope (VIMS), Brendan Trache (VCU), David Whitehurst (DEQ), Joe Wood (VCU)

Meeting Notes Prepared by Joe Wood and Paul Bukaveckas

Meeting Agenda Items and Panel Discussion

1. Opening Remarks by Paul Bukaveckas
2. Presentation by Paul Bukaveckas, Will Hundley, Margie Mulholland and Todd Egerton reviewing monitoring results from 2013.
 - a. Will these presentations be available online? Paul: Yes on the DEQ web page.
 - b. Todd: Is the *Microcystis* genetic marker *aeruginosa* specific? Kim Reece states it depends on the design. Paul needs to check with Rima Franklin.
 - c. Paul: are there point sources or CSOs influencing the Lafayette River continuous monitoring sites? Margie response: minimal point source influences in the LAF. Will Hundley: The HRSD plant discharges into the Elizabeth, but with tides, could potentially influence Lafayette River.
 - d. Peter Tango: Regarding the observed vertical distribution patterns in CHLa, is there going to be additional work to determine what is the type of sampling that best represents water column conditions? How will that translate into supporting criteria requirements? Will Hundley suggests vertical integrations will be possible but daily temporal variation is more difficult. Margie suggests it will be a modeling approach, and in the lower James we need to be able to explain these dynamics because we won't be able to monitor all the time. Margie: we have done a few diel studies but they are limited. Will: VIMS has a profile of *Cochlodinium* that could potentially be used to develop "bloom probability" situations. Claire: we have done diel studies on zooplankton in the Potomac. In the tidal fresh all the zooplankton are light driven but when you have a tide coming in they lose their ability to hold their depth (except *Eurytemora*). In the lower Potomac it is more complicated and sometimes zooplankton depth levels relate to pycnocline or oxygen concentrations. Margie: In some of our previous work the effect of

precipitation upon bloom initiation is dependent upon a certain point of the tide, which Claire agrees is true of some of her observations as well. Will: We looked at these profiles in a variety of conditions and they were not stratified under ambient setting but usually only under bloom conditions. As a result, stratification may need to be characterized under bloom conditions.

3. Presentation by Iris Anderson on Sediment Flux Study

- a. Peter Tango: Does the benthos matter and should we be looking at pelagic and benthic CHLa? Iris: The benthic algae influence fluxes. Jian Shen: we don't have enough measurements of benthic biomass communities. Iris: Yes, there are very few measurements of benthic CHLa. Todd mentions that a PhD student at ODU has recently completed a project on benthic algae community composition. Todd: The composition in these communities is almost different from the water column (benthic diatoms dominated by pennates). Peter: When considering the New England model, they consider macroalgae, SAV, and phytoplankton, but not benthic CHLa. Perhaps we need to consider this. Jian Shen: This (benthic algae) which occurs at less than 1 m depths is representative of a huge area. Rusty: That was what Carl had problems with on the first model. The 0-1 meter regions were modeled very poorly, and someone came in and suggested benthic algae were missing. So if we are going to get the James right we need to have an understanding of what is going on with the sediments. Like all the other reports, we will review them and they will be housed and put on the web page. Paul: one of the things we have looked at is distribution of Chla between the water column and the sediments and there is more CHLa on the bottom than on the sediments. However, pelagic and total ecosystem production are nearly identical which suggests that overall production is dominated by the water column (i.e, the benthos does not contribute to NPP – this is likely due to very low light conditions at the sediment-water interface).
- b. Paul: when looking at the nitrogen fluxes, it looked like there was more nitrate coming out than ammonia going in, if so, what is the net effect? Iris: Ammonium is the main effect. Paul: so the sediments are a net source of inorganic nitrogen to the water column, not a sink? Iris: yes. Margie, we can shut off external nutrient inputs but fluxes from sediments will continue. Iris; I agree.
- c. Jian Shen: There was a large drop in oxygen during the core incubations but we do not see these low oxygen levels in the James. How does that influence the results (e.g., denitrification dynamics)? Iris: The benthic production can oxygenate the sediments during the day, and not at night. Jian Shen, you mentioned the benthic algae have a delayed response, is this due to pelagic cycling? Iris: I think that was actually due to production, we see deposited pelagic CHLa in the middle, and we see regenerated at the bottom.

4. Effects on Living Resources: Presentation by Paul Bukaveckas and Kim Reece

- a. Claire: (Regarding seasonal MC concentrations in water and crabs) the last point (Sept) has high water concentrations but low tissue concentrations in crabs. Paul: Crab sampling is not as frequent (monthly) as water sampling (weekly). The water concentrations shown in the plot are monthly averages but we could look at the crab values in relation to weekly MC to see if the drop in crab tissue concentrations precedes that observed in the water column.
 - b. Greg (regarding high MC concentrations in sentinel fish) - the sentinels are suspended in the water column which means that the gizzard shad are restricted to a planktivorous diet and this may contribute to higher tissue MC concentrations relative to wild fish (which may feed in a variety of locations). Alex: Was the comparison between wild and sentinel fish based on individuals of similar size/age? Paul: Yes they are both young-of-the-year.
 - c. Arthur (regarding MC effects on *Rangia* filtration) Can you relate that Microcystin concentration back to a CHLa level? Paul: yes we could use the environmental data to relate CHLa and MC and possibly Todd's data to relate MC to *Microcystis* cell densities. Claire: food levels affect *Rangia* clearance rates and these are unlikely to be the same when MC concentrations differ. Paul: the dose-response experiments consider only the effects of dissolved Microcystin, not dietary ingestion – food levels are the same in all treatments. We have done separate experiments to consider dietary effects by comparing grazing rates of James clams in water from the James vs. Pamunkey Rivers. Claire: someone could still make the argument that this is a food effect. Kim Reece: did you try an artificial diet? Paul: yes, they didn't feed on this. Arthur: if you can't say it's a Microcystin response than what can we say? Paul: we can conclude three things: (1) clearance rates in the environment are negatively correlated with MC concentrations in the James, (2) the addition of dissolved Microcystin causes clearance rates to decline in the laboratory, and (3) clearance rates of James River water clams feeding on suspended matter from the James and Pamunkey Rivers is similar in the absence of Microcystin, but clearance rates are lower when Microcystin is present in the James. Clifton Bell: The dissolved MC experiments were controlled for food effects, correct? Paul: yes. Clifton: so you can argue that *Rangia* exposed to dissolved Microcystin causes a decline in clearance rates? Paul: yes.
5. Review of Current CHLa Criteria for the James (C. Bell and C. Buchanan)
 - a. Peter Tango (and others) – there was some discussion of the potential role of algae in influencing TSS and light attenuation in the James.
 6. Status of Modeling Project and Model Scenario Development (Arthur Butt)
 - a. Paul: Does the 1985 baseline scenario model use climate and hydrology data from that year? Arthur: No, the model is run using a 1991-2000 index period – what is varied is the watershed loading scenarios which include 1985 (baseline),

Tributary Strategy implementation, 2017 WIP target loads and 2025 TMDL target loads.

- b. Todd: once that model scenario is chosen is there a plan for how to assess the water quality in the river? Arthur: as far as our integrative report, we will use monitoring data. Unfortunately after this project we will not have dataflow and will move back to fixed stations. Some aspects of the assessment will be reviewed as for example the number of years to be used for the assessment window.
 - c. Margie: you might consider (in terms of modeling) a review by the CB Science and Technical Advisory Committee. Arthur: we have had discussions with EPA about this. The DEQ feels that the Science Advisory Panel constitutes an expert review, if EPA wants a further review, they will take it to STAC.
 - d. Paul: What is the next modeling outcome that will be brought to the Science Advisory Panel? Arthur: the watershed component of the model is progressing but the water quality component is a little behind. For the Spring meeting, there may be additional information on model validation.
7. Wrap-Up & Adjourn Meeting
- a. Paul: upcoming events include a Project Meeting for PIs involved in the data collection and modeling efforts. This will allow the PIs more time to present their findings than can be provided at the SAP meetings. Also, there will be more attention to technical issues and collaboration between the data collection and modeling efforts. This meeting will be organized by DEQ, possibly in January to precede the February 15 deadline for PI Data Reports. The next SAP meeting will be held in the Spring (March or April) possibly at Maymont (a Doodle poll will go out to all panel members)..
 - b. Peter: How soon will we expect to have all data available for review? Paul: In theory reports from 2012-2013 will be available in March and an Executive Summary should follow within a month or two afterwards. Some additional data collection will occur in 2014 though the bulk of the data will have been collected in 2012-2013.