

Date: Thu, 25 Apr 2002 10:23:26 -0700
From: "Chris Foe" <FoeC@rb5s.swrcb.ca.gov>
To: <Gfredlee@aol.com>, <JmcGahan@summerseng.com>
Cc: <TullochEng@aol.com>, <nwquinn@lbl.gov>,
"Mark Gowdy" <GowdyM@rb5s.swrcb.ca.gov>, <dileanis@usgs.gov>
Subject: Re: Increase in Algae and BOD Loads Between Mud Slough and SJR
at Patterson

In the earlier version of the strawman i calculated loads from Los Banos creek as I had chlorophyll data from UC davis and flow data but left it out of the writeup as I mistakenly thought that the Mud slough values included Los Banos Creek. I did not realize that Los Banos discharged below the Mud slough monitoring site. I will dig up the numbers and report them early next week. chris

>>> <Gfredlee@aol.com> 04/24/02 04:37PM >>>
Joe,

In response to your questioning whether there was some other source of algae/BOD between where Mud and Salt Sloughs discharge to the SJR and the SJR at Patterson which would account for the significant increase in BOD measured at Patterson compared to those discharged by Mud and Salt Sloughs and the SJR at Lander, I have enlisted the assistance of several others (Chris Foe, Nigel Quinn, Peter Dileanis, Alice Tulloch). Attached in Word format is additional discussion of this issue. As discussed, there is additional input of BOD and algae between Mud Slough's discharge and the SJR at Patterson. Further, there is an approximate doubling of the algal population between the two points. The net result is that Mud and Salt Sloughs, as well as the SJR at Lander are the primary origin of the elevated BODu at SJR-Patterson.

If you have questions about these conclusions, please contact me. If any of those whose data I have used to address your concern have comments, please contact me.

Fred

Date: Tue, 30 Apr 2002 12:17:51 -0700
From: "Chris Foe" <FoeC@rb5s.swrcb.ca.gov>
To: <gfredlee@aol.com>
Cc: "Mark Gowdy" <GowdyM.RB5SPost.Region5S@rb5s.swrcb.ca.gov>
Subject: Comments on Synthesis report.

Fred, Attached are comments on last weeks version of the synthesis report. Sorry I was unable to get them to you earlier. Please call if you wish to discuss any of them. chris

Comments on Synthesis Report

I have several major and some minor comments. Mark Gowdy has send you additional comments on the Streeter-Phelps model and the water quality target.

Major comments.

1. Overall, I think you have done a good job in synthesizing the large amount of information collected on the DWSC dissolved oxygen problem in a relatively unbiased fashion. Thanks for your hard work.
2. Unfortunately I think there is a tendency for your report to get a little repetitive by the end. It would benefit from a good editing.
3. I hear that the questions being submitted to the External Science Review team are in the process of changing again. This will mean an editing of that section. Also, I very much favor your idea of trying to put together short answers to the questions to help the team collect their thoughts. You said that you had already started that process but it may now need to be edited somewhat depending on how the questions change. Sorry.
4. I think a key question for us and the external science review team is whether we are ready for the next step. You have discussed the phase I TMDL implementation plan in several sections but I believe we should have a very short section at the end laying out exactly what we are proposing doing. I would be willing to help you craft that section.

Minor comments

Page iv DO depletion in the DWSC. I am not sure that the bottom DO are "often" 1 to 2 mg/l lower than the surface. I would use the word "occasionally" after looking at table 6 in the strawman and your tracings of the Hayes cruises. Also, I know of no data that conclusively links surface bottom DO differences to thermal stratification. We actually did an analysis of that in the strawman and, surprising to me, saw nothing conclusive.

End of next paragraph. Not sure that chlorophyll differences of 20-30 micrograms per liter are associated with several mg/l diel DO differences. You cite nothing in your more indepth write-up on this. Might leave out.

Page vi 14th paragraph under factors influencing DO depletion in the DWSC. I understand your unease about using such a simple model as the Streeter-Phelps to begin to tease apart DO patterns in the DWSC. You don't have to accept any of it. However, the actual data collected by the City and Hayes demonstrate that the oxygen deficit at the inflection point decreases with all increases in flow between 0 and about 2000 cfs. This is because both incoming BOD decreases slightly and the oxygen content of the water increases. More flow less deficit. I think this is very important and begins to answer my question about whether and, if so, why flow is important. Unfortunately, I agree with your statement later on in the synthesis where you say that higher flows will require more aeration at a constant deficit. So increased flows are unlikely to be an attractive solution unless we can get them consistently up somewhere near 2000 cfs while keeping incoming BOD low

SJR Diversions. 2nd paragraph. Surface return flows are about 20 % of metered flow at Vernalis (Tables 3 and 4 of Strawman) but only appear to contribute about 2 percent of chlorophyll load at Mossdale.

South Delta Barriers A comment for here and elsewhere. It is true that Alex Hildebrand has pushed for an evaluation of whether reverse flows could be achieved in the South Delta thereby increasing the flow down the DWSC. Your write-up has done a good job of describing this. However, a second and perhaps more likely scenario is that barriers would/could be operated to give a constant flow through the DWSC, sometimes shunting all the water into the DWSC and on other occasions allowing some to go down the Old River. This might be the most cost effective way to set up fixed location(s) for aerators. I doubt that we will ever get a consistent 2,000 cfs through the channel.

DO WQO See Gowdy comments. Also more unbiased to say just say that the 6 mg/l WQO was adopted to protect fall run Chinook salmon spawning migration.

Implications of Technical Studies for Managing the low DO problem

Port of Stockton. I think you need to change first sentence to say ...it seems fair that the future budget for the maintenance dredging...

Supplemental aeration. Writeup might be more powerful if give credit to box model, brown aeration report, strawman that all suggest an average 2-3,000 lbs/day oxygen needed with higher range (unsure what final numbers are here) during critical oxygen demand periods.

Nutrient/Algal Control. A comment for here and elsewhere in the text. I think we need two sets of upstream studies. First, we need to determine whether any decreased loads of algae exported from the upper basin would survive and make it down to the DWSC as a true decrease if upstream algal controls could be implemented. Second, if the results of the first experiment are positive, then we need to evaluate what could be done in upper basin to control algae. All forms of upstream algal control, not just those that include nutrient limitation, should be evaluated.

City of Stockton Wastewater. A comment for here and elsewhere in the text. Your writeup makes it sound like ammonia removal from the Stockton plant is a done deal. I think you need to say something to the effect that the CVRWQCB recently adopted a revised permit that sought to limit the ammonia to 2 mg/l for aquatic toxicity reasons. The permit may be appealed (call Deltakeeper or the City to confirm) to the State Board. If the permit is upheld, then the load reduction would result in up to a 20,000 lb/day BODu reduction in fall.

Development of a TMDL and its technical Allocation

We need to work together to carefully spell out all the primary elements of the phase I TMDL.

Figure 1. Put a box around the area of interest to help guide the reader's eyes.

Figures 6 and 7. Omit legend at top of each figure. They are redundant and confusing. DO Depletions in the DWSC. Omit last sentence of first paragraph.

Last sentence of 2nd paragraph unclear. What does it mean that is "applicable to the time and location of monitoring"

4th Paragraph. I think it is speculation to conclude that near surface DO concentrations would be higher if meter were placed higher in water column. Likewise, what a meter might report in the early morning. The ship channel has a history of working different than anyone predicted.

5th Paragraph. The DO violation table is now in the Strawman not Gowdy and Foe. Also did not include the graph comparing DO at inflection point versus Rough and Ready Island meter but could ship to you for inclusion in your report if interested. There is nothing wrong with the information only that we now show with real data how the inflection point moves downstream with increased flow.

Conceptual model of the SJR DWSC oxygen demand processes

4th paragraph, second to last sentence. I think it is speculation to say that there are periods of time from a few hours to days when mixing is not sufficient to prevent transitory thermal stratification. Have I missed some citations?

Algae as an Oxygen demand constituent. I agree with the conclusions in your last paragraph and believe your graphs of BOD versus chlorophyll tend to confirm it. But this is contrary to what Peggy Lehman would say. I think you need to be more straight forward here. I think the Cities data and Peggys say different things about what drives oxygen demand in the channel. This needs to be sorted out and explained or at least acknowledged. Now is the place and time to work this out.

Significance of the Port of Stockton. I took out almost all reference to the Systech model from my writeup because of Bill Johnson's comments. I cannot support what I do not understand. Instead of citing the Strawman, cite the Systech report for fact that no problem would exist if channel not present. However,

you can use the actual data for upstream and in the channel that I worked up in the Strawman that tends to agree with Carl Chen. I can ship you my graphs developed from Chen data for inclusion as your figure 14

Impact of SJR flow through the DWSC Sorry but revised Strawman removed use of Chen model from our analysis of flow. Instead we rely more on the Streeter-Phelps model to guide our analysis of field data. Please see Mark Gowdy's comments.

Light Penetration Third Paragraph. Could you please give the date. I was not aware that this was actually associated with an unusual DO response in the channel.

Box Model Calculations 15th paragraph. See figure 8 in the Strawman for analysis of actual data.

Significance of SJR upstream of Mossdale Oxygen Demand Loads. Second paragraph. The UC Davis data is every 2 weeks and the entire data set was used and times of high algal concentration selected for detailed analysis.

Strawman analysis Sorry but we removed this graph from the Strawman. The results are still valid but we believe that the actual data from channel demonstrating that the inflection point moves downstream with increasing flow while the deficit at the point decreases with higher discharges not only does a better job of illustrating the point but begins to provide an explanation of why the phenomena occurs. Our changes may necessitate some rewriting in the synthesis. Sorry

Upstream WasteWater/Urban stormwater sources. City of Tracy discharges to Old River. This discharge may become a problem depending on how the South Delta barriers get operated. Also, two proposed NPDES discharges, Lathrop and Mountain house, may have discharges in the future.

Last paragraph. Most animal feedlots do not have NPDES permits. They have been regulated up until now under the ag waiver that is due to sunset. I am not sure what will replace it. The industries contention is that they do not discharge so when a discharge is found they are penalized for discharging to surface water.

Deterministic Modeling of oxygen demand load-response relationships for the DWSC
Last sentence in last paragraph. Could we replace Regional Board staff with Steering Committee and TAC?

Estimating Algal Growth in the DWSC Sixth paragraph. I have watched zooplankton free themselves from Asiatic clam pseudofeces. Wim Kimmerer says that protomocorbula is able to control zoops density downstream in Suisun Bay. I remain skeptical that that is the mechanism. But regardless, there are no protomocorbula in the San Joaquin. Periodic blooms of zoops could radically decrease algal abundance. I bet this will be a very tough thing to predict when it is likely to occur in the field. This is likely to forever remain a possible source of variation.

South Delta Barrier Modelling Results. See comments above about using the barriers to control flow into the DWSC.

Supplemental aeration Last sentence in first paragraph. The mitigation letter says that the Corps will run the aerators when DO falls below 5.2 mg/l anywhere in the DWSC as measured by the City of Stockton weekly runs between 1 September and 30 November. I have no evidence that the Corps does not turn the aerators on and off as required. Whether they are doing any good is another question.

South Delta Barrier Reverse-Flow pumping. Second paragraph. Hopefully, Gowdy's writeup has clarified what we think about this. More flow lowers the deficit but may increase the amount of reaeration required depending on flow, incoming BOD and temperature.(see figure 12 in the strawman report) It is not a simple relationship.

Appendix A. Could we take out the section on Reasonable assurances. Seems like this is a political issue for the Steering Committee to handle and not relevant for the external science review team.

Appendix E Figures. I would switch x and y axis. Make BOD the dependent variable. That way your slope will be consistent with the rate coefficients discussed in the text. As mentioned previously, these results seem directly opposite to what Lehman and Litton have concluded. I think this needs to be worked out at the next TAC meeting. Otherwise we will be arguing about it before the external Science Review committee which would be unfortunate.