

San Joaquin River Dissolved Oxygen Total Maximum Daily Load Technical Working Group (TWG) Meeting Notes

Addendum (October 11, 2010)

Thursday, June 24, 2010

9:30 a.m. – 12:00 p.m.

**ICF International
630 K Street, 2nd Floor
Sacramento, CA 95814**

Attendees

Name	Agency
Ameri, Khalid	CA Department of Water Resources
Brown, Russ	ICF International
Centerwall, Steve	ICF International
Domagalski, Joe	USGS
Fong, Stephanie	Central Valley Regional Water Board
Harringfeld, Karna	SEWD
Herr, Joel	Systech Water Resources
Hulkower, Bonnie	USACE-SPN-PL-ET
Joab, Christine	Central Valley Regional Water Board
Johnson, Mike	MLJ-LLC
Kamei, Gary	USACE
Lee, G. Fred	GFL & Associates
Lee, Gene	USBR
Lee, Petra	CA Department of Water Resources
Litton, Gary	University of the Pacific
Martin, Sara	ICF International (Notes)
McLaughlin, Bill	DWR Bay-Delta Office
Parlin, Larry	City of Stockton
Reeves, Ryan	CA Department of Water Resources
Turner, Melissa	MLJ-LLC
Westcot, Dennis	SJRG
Wilson, Danielle	ICF International (Facilitation)
Wingfield, Jeff	Port of Stockton
Wu, Frank	USACE-SPN

Introductions and Agenda Review

Danielle opened the meeting with a round of introductions and an agenda review. No one had any proposed changes to the agenda.

Updates and Announcements

CVRWQCB update from April Roundtable Discussion (Christine Joab)

Danielle reminded the group that the April meeting of the Technical Working Group (TWG) was designed as an open-ended roundtable, and produced a lively discussion (the notes from April's meeting are available on the TWG website: <http://www.sjrdotmdl.org/>). The roundtable participants left the meeting with a lot of questions for the Regional Board. Danielle introduced Christine Joab, who was prepared to provide an update on the action items and questions identified for the Regional Board in the April roundtable discussion meeting notes.

Action Item 1: Does starting the downstream studies constitute compliance with the TMDL program?

The official answer from the Regional Board's legal counsel is that the downstream studies need to be completed prior to Dec. 31 2011, or the conditional discharge prohibition will go into effect.

Action Item 2: Is there a possibility of postponing the conditional discharge prohibition in light of unforeseen economic roadblocks?

Christine informed the TWG that the Regional Board is looking at a variety of options for the conditional discharge prohibition. One thing that could be beneficial is a compliance time schedule—the Board is looking at instituting a cease and desist order with a compliance time schedule. They are also considering reviewing the Basin Plan amendment. The Board won't postpone the conditional discharge prohibition, but they are trying to work within the parameters of the TMDL.

Action Item 3: What is the Regional Board's perception of the aeration facility, including what role they feel the facility should play in the final implementation of the TMDL program?

Christine said that the public probably has more access to the Board than staff, such as herself, do. It is difficult to answer the question of whether or not the Board sees the aeration device as a long-term solution. If stakeholders support aeration, Christine recommended that it would be in the stakeholders' best interests to bring the topic up to the Board through Board meetings, phone calls, or letters to show them what the facility is capable of and why stakeholders are supporting it. She reminded the TWG to keep in mind that the terms of 2 of the Board members expire in the fall of 2010, and an additional Board member's term will expire in September of 2011 (full details of Board member terms are available to the public at the Regional Board's website:

http://www.waterboards.ca.gov/centralvalley/about_us/board_members/). There is a possibility that when those Board members' terms are up, they may not be reappointed, and the Board may feature a new set of Board members.

Action Item 4: Would long-term operation of the aeration facility to meet DO objectives be enough to satisfy the Regional Board's TMDL criteria?

Christine said she isn't able to speak for the Board, but she could relay, based on prior statements from a Board member that was on the Board when the TMDL went through, that they want to see some other actions done in the watershed aside from aeration. For example, actions to reduce loading and to increase flow. Based on what the Board has said in the past, Christine doesn't believe they will go strictly for aeration as a means to meet the TMDL criteria.

Additional Topic: Who is the new downstream studies grant manager at DFG?

The contract manager position at DFG has not yet been filled; no one is currently acting in that capacity at DFG.

Additional Topic: What was in the scope/proposal of the original downstream studies grant?

Christine supplied the original downstream studies scope of work to Danielle, and Danielle will post it on the TWG website, <http://www.sjrdotmdl.org/>. She also provided a spreadsheet showing all the tasks and estimated costs, which she handed out to the TWG and also provided to Danielle for posting on the website.

Stockton DWSC Demonstration Dissolved Oxygen Aeration Facility (Bill McLaughlin)

Bill McLaughlin informed the TWG that he and others were at the aeration facility the day before, getting it ready for 2010 operations. They are beginning the process of final testing; focusing on increasing efficiency. On June 23, they had a good day of testing, discovering that they do have the ability to increase the quantity of oxygen that is being put into the channel. However, there is still a long way to go, especially in regards to monetary efficiency. The results will all be summarized in the final report, in addition to previous testing summarized in the 2008 operations report (on DWR and TMDL website).

Question: Has any testing been done under low-flow conditions?

Answer: Yes, in 2008, the aerator was tested in June through September, during low flow conditions. And last year (2009), it was tested under very low flow conditions. Dr. Russell Brown pointed out that in field experiments, all the variables cannot be controlled. In 2008, the flow was approximately 200 cfs through the Deep Water Ship Channel (DWSC) with a fairly long travel time from Mossdale. He understands that the worst DO conditions may occur at around 500 cfs, because with flows lower than that (basically no flow), there is no loading. Russ hopes those conditions occur this year, but in general, to make up for lack of control over variables in field studies, the studies need to be supplemented by models. He assured the group that he would be discussing models at length later in the meeting.

San Joaquin River Water Quality Management Group

No one was present to provide an update.

Presentations/Discussions

Modeling, Upstream Loading, and Dissolved Oxygen in the Deep Water Ship Channel 2008-2009 – Joel Herr, Systech Water Resources, Inc.

Joel Herr explained that Systeq was heavily involved in the upstream San Joaquin River studies via the WARMF model, as well as in linking WARMF and the Link-Node model together. He provided a summary of the model status two years ago. At that point, the linked models were calibrated for 2000-2007 to predict nutrient loading (and its effect) in the Delta. WARMF was used to predict the impact of shutting off the San Luis Drain in July of 2007, and it successfully predicted a reduction of phytoplankton load where the San Joaquin River meets Old River. Unfortunately, there was little net flow past Old River at the time, so no benefit was seen in the DWSC.

WARMF is now being updated to assist in two current projects, the Central Valley SALTS project (on the east side of the San Joaquin Valley) and the Bureau of Reclamation Westside project. Being added to WARMF are increased resolution; detailed land use including crop types and dairies; catchments realigned to follow districts and drainage patterns; and a significant increase in modeled area.

Question: Are you considering sediment loads out of the west side?

Answer: Yes, WARMF has always considered sediment, since sediment affects light penetration. In the original WARMF studies, we looked at how differing levels of sediment affected phytoplankton growth.

Joel then presented a table showing detailed mass balances (see presentation on TWG website: <http://www.sjrdotmdl.org/>).

Right now, WARMF is only set up to run through the 2007 water year, so it does not currently have the ability to model the 2008 or 2009 water years.

Joel next presented graphs showing DO conditions over the last 10 years, noting the recent substantial decrease in DO violations. He found it particularly interesting that there were so few violations in 2008 and 2009, even though those were not wet years. He would like to find out what caused the DO levels to improve in those years; whether it was the aerator, changes in the City of Stockton's discharge, or something else.

He then explained how flow has a significant effect on DO levels, and how the risk of DO violations decreases with high and very low flows, and pointed out that 2008 and 2009 featured flows mostly in the "danger zone" that are most likely to contribute to low DO levels in the DWSC. He presented a table showing phytoplankton input. According to the table, it appears that phytoplankton input was reduced starting in 2007. However, as Petra Lee pointed out, the source of phytoplankton data changed in 2007 and needs to be QA/QC'd. It's not clear that the sampling or calculation methods used were the same, and therefore it would be dangerous to make assumptions from this data.

Joel's main conclusion is that if the WARMF model is updated with 2008 and 2009 data, and the City of Stockton's wastewater discharge data is analyzed, it could provide a rigorous scientific basis for figuring out why DO levels were so much better in 2008 and 2009.

Question: Have you looked at the number of violations so far in 2010?

Answer: Joel said that Systech has not looked at that data yet. Dennis Westcot said that he is familiar with the data, and there have not been any DO violations yet in 2010. In contrast, there were over 40 violations by this point in time in 2006.

Danielle thanked Joel and announced that his presentation would be made available on the TWG website (<http://www.sjrdotmdl.org/>).

U.S. Army Corps of Engineers Update on Dissolved Oxygen Modeling Efforts – Bonnie Hulkower and Frank Wu, U.S. Army Corp of Engineers

Bonnie Hulkower, the environmental planner for the deepening of the DWSC and Port of Stockton, explained that the Corps' report on the dissolved oxygen (DO) effects of deepening the DWSC and Port is not publicly available yet. She provided a summary handout, but the bulk of the information from the study will be in the final report, which should be available in September 2010. DO is just one of the elements the Corps is studying; the summary handout (available on the TWG website) provides an idea of the scope of the study.

In the Corps' study, the UnTRIM model was used for hydrodynamics, and the ECOMSED model was used for water quality. They looked at two main conditions: Year-0 (2007-2008 flow conditions) and Year-50

(sea level rise of 60 cm, 1994-1995 flow conditions, plus operational conditions, which include the deepening of both the Stockton and Sacramento DWSCs.

The hydrodynamic flow and salinity modeling domain included the entire San Francisco Bay/Suisun Bay/Delta system, as well as a portion of the Pacific Ocean. The DO/water quality modeling domain reached from Jersey Point to Vernalis.

Preliminary data show that if any impacts were to occur because of deepening, they would occur between study reaches 3 and 7 (see map in handout). The study still needs to undergo a rigorous review process at the national level before the results are officially released; however, local Corps staff have reviewed the study and feel comfortable with the preliminary results. These preliminary results are showing no significant change in DO due to dredging under Year-0 and Year-50 conditions.

The Corps will return to provide the Regional Board with a formal presentation on the study results after the final report is released in September 2010. The final report will be posted on Delta Dredging Long-Term Management Strategy website (<http://www.deltatms.com/>), and Bonnie will send the report directly to Danielle for posting on the TWG website. When the final report is released, it will be for informational purposes only. Comments will be accepted only through the environmental permitting process, which has not begun yet. Bonnie then opened up the presentation to questions and discussion.

Question: How much does the Corps plan to deepen the DWSC, and why? How far down will the Corps need to dredge to get the DWSC to the desired depth?

Answer: The DWSC is currently 35 feet deep. The Corps is looking at deepening it to 40 feet. With Corps projects, there is occasionally a foot or two of overdepth dredging, so the model looked at overdepth as well.

Question: Geographically, how far do you have to dredge?

Answer: The dredging will start from Richmond Harbor, and will continue past Jersey point.

Question: Did you develop your own bathymetry data?

Answer: Yes; the Corps used the most updated bathymetry data based on dredging records.

Question: Are those dredging records publicly available?

Answer: Yes, the dredging records are publicly available upon request. However, those requests are handled by a different Corps Section than was present at the meeting.

Question: The map in the handout shows that the Head of Old River barrier (HORB) is in. Does the model assume the HORB is in or out?

Answer: Frank Wu was not sure about the HORB. He encouraged anyone with knowledge of the most updated conditions and information to contact him. It is not too late to incorporate updated information into the models and update the results. Please contact Bonnie with any information at bonnie.hulkower@usace.army.mil or (415) 503-6906.

Question: If the DWSC and Port are deepened to 40 feet, does it change who can get into the Port?

Answer: Yes, it would result in a significant change on what type of ships could access the Port. Even though the DWSC and Port are currently considered to be 35 feet deep, there really isn't that much depth because of dredging timeframes; as soon as dredging is completed, flows

begin to bring sediment in again. Ships are 'light loading' right now because of the reduced depth, which burns more fuel and gets less goods in. The bottom line is that it is inefficient. It generally costs about \$200,000 in lost cargo capacity per ship for each lost foot of depth.

Question: Didn't the Federal government provide money to the Port to implement a barge system?

Answer: Yes; it is called the "short sea shipping program". It would allow cargo to be offloaded in the bay and transferred to barges, which would be pushed by tug into Stockton. It would save fuel and air quality because it would put less trucks on the road. The Port is going through the environmental permitting process now on the project. The Port plans to get all the equipment in place and all the infrastructure set up as soon as possible; however, the economy will need to turn around before the Port will be able to really get goods onto the barges. The program only allows for containers to be transported by barge, so it would not take away from the bulk shipping services that are coming into the Port now (like fertilizer) and going out of the Port (like rice). The channel will still need to be deepened in order to get ships in with cargo that can't be barged. The Port does not anticipate increased ship traffic after deepening, as the deepening will simply allow larger loads in the current ship traffic. The Port actually anticipates fewer vessels based on the ability to carry more in each load. A CEQA document has been prepared that looks at the maximum number of ships at current build out. They are not anticipating building any more docks. Deepening would just make the current operation more efficient.

Proposed Uses of Deep Water Ship Channel Water Quality Models During Implementation of the San Joaquin River Dissolved Oxygen TMDL – Russ Brown, ICF International

Russ reminded the group that, back in 2006, the TWG held a "day of modeling". Presentations were made by the folks working on the different models to report on their progress and their accomplishments. Russ wrote a paper summarizing what the TWG had heard, and where the TWG should go from there. Unfortunately, after that report, some of the CALFED funding started to dissipate. The TWG has recently decided to revive that effort. Russ will present on that paper, which will lead the TWG into the next discussion: "How do we know if and when we are in compliance with the TMDL?" including:

- Is it possible to measure or model upstream contributions to a DO solution?
- Can both the width and the depth of the DWSC be measured correctly?
- Are we distributing oxygen adequately?
- Have we addressed the demands in the TMDL and if so, what next?

In the late 1980's, the Corps was planning to deepen the DWSC from 30 to 35 feet. The Corps determined that the DO would go down by 0.2 milligrams per liter because the increased depth would reduce the algae growth and slightly increase respiration. The Corps decided to mitigate that effect by building the Corps aerator device, a water jet with air bubbles to create aeration at the side of the channel. They assumed it would only need to operate during the fall fish migration. It was built in 1993, and still operates to this day during September, October, and November.

Russ told the TWG that he is interested in hearing where the group would like to go with modeling now. As evidenced by the presentations earlier in the meeting, models are still being used to figure out the DO situation in the Delta. It's clear that a combination of modeling and on the ground studies are necessary. Do we need to do more modeling to complete the TMDL?

Question: How good are the existing models? How well are they predicting what we're seeing in the field right now? If the models are no good, then we don't want to use them.

Answer: Joel Herr said he thinks that Link-Node is great, but he brought up the famous quote, "all models are wrong, but some are useful." A good judge of whether or not a model works is whether it can predict something changing (a sensitivity study).

The DO TMDL does not currently define what "compliance" actually is. Russ prefers basing TMDL compliance on a minimum value, since it's the worst condition a fish will encounter. He asked the TWG if they thought a minimum value approach was too conservative, and whether using an average would be better for compliance. Whatever threshold is decided upon, a big test of the model would be: what are the chances that the model can predict periods of compliance and non-compliance? If the numbers generated by the model are not reliable, then the model cannot be used for compliance.

G. Fred Lee said he doesn't think models can be used for compliance; they are for predicting sampling. For actual compliance determinations, field sampling must be used.

Gary Litton suggested that a model be used to manage the system as efficiently as possible. It could provide guidance for when to turn on the aerator or install the HORB. Russ agreed. Real measurements should be used for compliance, but a model could be used to anticipate conditions under which non-compliance might occur. If DO levels were low in the DWSC, it would be valuable to know what the upstream BOD conditions were. However, it takes 30 days to perform a "5-day BOD test", but only five or so days for the water to flow from Mossdale to the DWSC. The field test is therefore worthless for guiding compliance. A model would be useful in that situation. We definitely want to use real measurements, but how do we go from the real measurements to being prepared to act and make sure we're compliant?

Russ posed another question to the TWG: How could we apply models now? He suggested that the TWG should be shifting out of research mode. December 31, 2011 (the date for implementation of the conditional discharge prohibition) is not so far away. There is a defined period between now and then to make the TMDL work with what we have and what we know.

Russ attempted to further ignite the imaginations of the TWG members by posing the following scenario for consideration: What if you were Christine (a regulator at the Regional Board)? What if you had her job? As the representative of the Regional Board, her job is to implement this DO TMDL. Her goal is to get the oxygen levels above the threshold, all the time, everywhere. How is she going to make that happen? As the stakeholder group, how do we make life easier for Christine? We need to give her a plan that she can follow. What are all the elements necessary to satisfy this job?

It is important to figure out how much each variable ("incremental contributions": discharges, flow, BOD input, etc.) contributes to DO levels in the DWSC, so that models can be used to predict DO conditions a few days ahead of time. If the DO levels can be predicted ahead of time, there are some things that can be done to change the system enough to maintain compliance ("actions": aerators, algae management/load reduction/ flow modifications, nitrifying biotowers, etc.).

Russ then posed another question: What if you had to translate incremental contributions into responsibility? Some contributions are man-made, and some are natural. How much does the flow

contribute to DO levels? Low flows due to drought would be a natural cause. But if someone had a giant pump sucking water out of the system, that would be a low-flow contribution that also has a responsibility attached to it. Christine doesn't have control of all the responsible parties, so she's not sure how to dole out responsibility. How could modeling help us in the process of "tracking" contributions, which is what Christine needs to determine who's responsible for a low-DO problem?

Joel Herr said it sounded like the type of modeling Russ is proposing would lead to short-term solutions. Long-term solutions are necessary too—like reductions of loads from San Luis drain ("algae management")—more of a long-term modification of practices.

Gary Litton pointed out that reservoir management could mitigate the DO problem, by providing higher flows to reduce algae. However, the group agreed that (1) it would be a sticky political situation to start demanding more flows from, for example, the Merced River, and (2) that the Regional Board does not have the power to regulate reservoir releases as a part of the TMDL.

Joel suggested that San Joaquin River settlement flows may change the dynamics of algae downstream; however, Dennis Westcot pointed out that the settlement agreement only stipulates rewatering from Friant to Merced. There is no guarantee of flows downstream of Merced. Russ added that the settlement flow releases are designed for spring-run fish, so the big releases will only occur in the spring months.

Russ brought the group back to the question at hand: we don't have to solve the problem for Christine, but we can help her by creating a model that helps her understand the system and helps her make decisions. For example, it would be helpful for Christine if we had a model that could figure out what flows she would need to prevent a DO violation in the DWSC. Russ suggested that the current models be modified for this purpose, because Christine only has about 550 days before the conditional discharge prohibition goes into effect. This means we need to be done with our research phase. We need to model DO from full saturation to determine who is responsible for DO reductions below saturation. Could we develop a model that would track not only DO levels, but who caused DO reductions? A model like that would lead Christine to be able to decide what actions could be taken to manage DO throughout the year. Russ acknowledged that developing such a model is not the same as actual compliance, but asked Christine: "what if we promised that by the end of 2011, we would have a TMDL compliance tracking model so you would know how to assign responsibility to any remaining violations?"

G. Fred Lee said that such a model could be developed. Necessary data would include Vernalis BOD loads, the City of Stockton's discharge data, the flow split, status of the HORB and Turner Cut. Once those variables are laid out, additional data collection necessities could be determined. The model could be fairly well laid out by the end of 2011, at which point you could show it to the Regional Board, explain where the model is headed, and ask if it is acceptable to meet the conditions of the TMDL. They would have to accept it if this group had a definite plan and funding. Mr. Lee also added that ultimately, he believes the EPA is going to start to lean on California to control phytoplankton to under 20 micrograms per liter.

Russ thanked the group for the discussion. He reviewed the goal of the discussion, which was to stimulate ideas on how to translate the research members of the TWG have already done into a model, or "tracker" to help translate the measurements into processes; to figure out how to create a model

that not only predicts the DO value at Rough & Ready Island, but also determines who caused DO reductions below saturation. A tool like this would allow Christine to apply a set of actions to get an increment of improvement in DO levels and hopefully head off any violations.

Update on Aeration Facility Testing – Russ Brown, ICF International

Russ announced that a new person is involved in the aeration facility testing this year, who pointed out that gas pressure could be increased to increase the amount of oxygen entering the water. The testing team tried increasing the pressure and it worked. It appears that the aeration facility is capable of putting out more than 12,500 pounds of oxygen per day. It was previously believed that it was only capable of putting out 7,500 pounds of oxygen per day, but the gas pressure had never before been adjusted. More testing will need to be done on the effects of increasing gas pressure, but it is a promising development.

Question: Is it safe to apply so much oxygen to the same location?

Answer: G. Fred Lee responded that too much oxygen could increase the risk of embolism in fish. Gary Litton suggested ensuring that oxygen is only released at levels safe for fish.

Identify Next Steps

Danielle reminded the group that the next TWG meeting was originally scheduled for July, but since the present meeting was postponed from May, she suggested postponing the July meeting to August. The group agreed.