

**San Joaquin River Dissolved Oxygen Total Maximum Daily Load  
Technical Working Group Meeting  
February 21, 2008  
9:00 a.m. – 12:30 p.m.**

**Jones & Stokes  
2600 V Street  
Sacramento, California**

***Agenda***

**Attendees**

**Name**

Beaulaurier, Diane  
Borglin, Sharon  
Brewster, Frances  
Brown, Russ  
Buck, Byron  
Chen, Carl  
Clamurro, Lori  
Dibole, Chad  
Edmunds, Jody  
Frantzich, Jared  
Grimes, Russ  
Gowdy, Mark  
Herr, Joel  
Hsu, Claire  
Kendall, Carol  
Kratzer, Charlie  
Lee, G. Fred  
Lee, Gene  
Mao, Lee  
McLaughlin, Bill  
Mueller-Solger, Anke  
O'Laughlin, Tim  
O'Neill, Jenna  
Ploss, Lowell  
Quinn, Nigel  
Taylor, Ernie  
Trouchon, Mike  
Van Nieuwemhuyse, Erwin  
Vargas, Al  
Vogel, Dave  
Wilson, Danielle  
Wingfield, Mike

**Agency**

Central Valley Regional Water Quality Control Board  
University of the Pacific  
Santa Clara Valley Water District  
Jones & Stokes  
Byron Buck Associates  
Systech Water Resources  
Department of Fish and Game  
Department of Fish and Game  
URS  
Department of Water Resources  
Jones & Stokes  
Water Resources Control Board  
Systech Water Resources  
US Bureau of Reclamation  
US Geological Survey  
US Geological Survey  
G. Fred Lee & Associates  
US Bureau of Reclamation  
US Bureau of Reclamation  
Department of Water Resources  
Department of Water Resources  
San Joaquin River Water Quality Management Group  
Jones & Stokes  
San Joaquin River Groundwater Authority  
Lawrence Berkeley National Laboratory/US Bureau of Reclamation  
Department of Water Resources  
Larry Walker Associates  
US Bureau of Reclamation  
Department of Food and Agriculture  
Natural Resource Scientists, Inc.  
Jones & Stokes  
Jones & Stokes

## Introductions and Agenda Review

### *Welcome and Introductions*

## Updates

### ***San Joaquin River Water Quality Management Group plan***

Byron Buck gave an update on the status of the San Joaquin Water Quality Management Group plan. The Westside Drainage plan, managed by the San Joaquin River Water Quality Management Group, addresses drainage in grassland and subsurface drainage areas in the lower San Joaquin River area in order to control selenium and salt. The program is well underway and has produced about a 65% load reduction (the goal is a 100% load reduction). SJRWQMG acquired \$26 million in grant money and is applying for more. The group just closed escrow on 2,000 acres that will be used for drainage, and is looking to purchase an additional 2,000 acres, which would bring the current total to 8,000 acres. They are also seeking a use agreement extension from the San Luis drain in order to implement the final pieces of the plan. In the long run, the drainage needs to be accessible to flood flows to sequester selenium from the refuge areas and then be released back into the river during high flows. The aim is to use the drain through 2019.

### ***Stockton Deep Water Ship Channel Aeration Device***

Bill McLaughlin gave an update on the status of the aeration device. It was recently discovered that the probe in the DO system will not meet specifications for reading high DO levels, which is a very important part of the system. The system can provisionally operate in a limited capacity, so DWR will be looking at a temporary plan to continue testing until a permanent fix is found. Hopefully, as river and turbidity levels go down, they will be able to run more tests. DWR expects the aeration device to be fully operational by spring or summer.

### ***Upcoming Water Quality Nutrient Load Modeling Workshop***

Fred Lee reported that the Water Quality Nutrient Load Modeling Workshop will be held on March 25 in Downtown Sacramento. Seventeen speakers will present some aspect of this issue, including such topics as nutrient-related water quality problems in the Delta; how nutrients can be modeled; and other problems such as taste and odor, water hyacinth, egeria, and low DO in the DWSC. Future workshops will address agricultural and municipal sources. For more information or to register, visit the California Water and Environmental Modeling Forum website at <http://cwemf.org/>. Members are free; non-member cost is \$50.

### ***Upstream Update***

Lowell Ploss provided that the current schedule calls for completion of these efforts at the end of March, when all individual task reports will be completed. In April, the task reports will be rolled up into a final draft report. Look for draft reports for review to be released in March and April. The target completion date of the report is the end of June. At that time, it will be sent to Calfed for final approval. Next steps will be determined after that.

## Presentations

***Analysis of D.O. Sinks in the Deep Water Ship Channel with the Link-Node Model — Joel Herr, Systech Engineering [Get Joel's PPT; check with Russ re: new modeling page for him]***

## Status

Systech's Link-Node Model work has mostly focused on upstream studies, but they have recently started using the model in the tidal portions of the San Joaquin River and the DWSC. Systech received funding to update the Link-Node model so it reflects the state of the science, since a lot has happened since the model was last calibrated. They have been collecting data into the model from such sources as Data Atlas, CDEC, DWR, BDAT, USGS, and STORET. It is also linked to the WARMF model in the San Joaquin River Model Interface. This new data has been linked to individual segments of the Link-Node model domain.

The Link-Node model's interface is interactive with point-and-click capability, showing where water quality data has been collected. Some locations have limited parameters (such as flow and temperature), and others have much more data available (such as ammonia, nitrate, phytoplankton, etc). The model is run on an hourly time step to capture both tidal and algae ranges.

## **Conclusion**

New data since 2000 provides an opportunity to upgrade DWSC modeling. The current model shows differences between the model and real-time data, indicating that the model needs to be recalibrated. Important phytoplankton decay/grazing from Old River to Channel Point is not currently captured by the model; there are higher DO levels at Rough & Ready Island; and the model is not simulating enough nitrification in the DWSC. Scenarios show improvement in DO in winter with Stockton RWCF nitrification, and in summer with phytoplankton reduction. Joel will be modifying the model based on this recalibration and any feedback he receives from the workgroup.

For Joel's complete presentation, visit [\[link here\]](#).

## ***Stockton RWCF Implementation of Nitrification and Title 22 Process Upgrades — Stephen Gittings, City of Stockton***

This presentation was postponed until a future DOTMDL TWG meeting.

## **Continued presentations**

### ***Study on 2007 VAMP High Fish Mortality Rate in the San Joaquin River Near the City of Stockton — Dave Vogel, Natural Resource Scientists [Dave will make PDF of his presentation for us]***

In the past, with traditional code-wire tagged salmon studies, large numbers of fish were released and then collected downstream, and the fish had to be killed in order to recover the embedded binary code tag. Although large numbers of tags were released, extremely low numbers were actually recovered. In 2007, due to a low number of hatchery fish, acoustic telemetry transmitters (Hydroacoustic Technology, Inc.) were looked into as an alternative approach. This technology is radically different. Acoustic telemetry transmitters are very small and very light. They are also very expensive (\$275 – \$300 each). Each is individually identifiable based on a programmed pulse width and repetition rate (a 3-4 millisecond difference), and lasts about two weeks. These tags are surgically implanted in juvenile salmon at the hatchery. Readings are picked up by acoustic receivers embedded in the shoreline, or by towing a receiver behind a boat. A fish is picked up if it enters a receiver's zone of detection (200-300 yards from a receiver). These receivers have a better than 99% detection rate; if fish are not detected, it can either be attributed to human error, technological error (like a receiver shutting down), or predation. Unlike other types of radio and acoustic technologies, which only capture proximity, acoustic telemetry technology captures telemetry, tracks fish movements, tracks voltage, and displays a Doppler-type effect—all with extremely precise rates.

Using acoustic telemetry technology, Dave had a major breakthrough in the Sacramento River when data showed identical arrival times for three fish released at different times and from different

locations. Through post-processing techniques, Dave determined that five fish in the experiment had actually been eaten by a predator (likely a striped bass).

During VAMP 2007, Dave conducted a study with 10-12 receivers and five different fish release locations. 100 fish were released at each location over a two week period (1,000 fish total). He then used mobile telemetry to find missing transmitters by towing a receiver behind a boat. On May 17, Dave found a high fish mortality rate (116 fish) in and around the proximity of the railroad bridge in Stockton. This included fish released from all locations upstream of Stockton. Dave also a sonar camera in this area and found two pipes extending from the Stockton Wastewater Treatment Plant to the middle of the river, with discharge moving in an upstream direction. He could not determine where the fish had died, or whether the transmissions were coming from a dead fish on the river bottom, or from predator that ate a tagged fish and defecated it onto the river bottom.

Dave sees opportunities in 2008 to look further into these types of hot spots.

More information is available on the San Joaquin River Group Authority's "2007 Annual Technical Report", provided on CD at this meeting, available at [\[link to website\]](#).

### ***"Dead fish talking?" – Anke Mueller-Solger, Department of Water Resources***

It is still not known what caused the 2007 VAMP fish kill near the Stockton Railroad bridge. Anke presented several potential culprits, including toxic ammonia, predators, low DO, and other toxicants.

Anke also raised additional questions, including:

- Does the ammonia really come from the WWTP? Since mid-90s, the WWTP appears to be the most important ammonia source.
- Why are unionized ammonia levels higher upstream and closest to the WWTP than farther downstream? Starting in April, upstream pH levels are much higher because of more algae/primary production. At and below the WWTP and in the DWSC, river algae die (more pheophytin/chlorophyll) and/or produce less. This lowers the pH.
- What about DO? More algae/primary production. Low DO likely did not kill the salmon in May 2007, but may have killed fish starting in June (but the salmon were then gone).

### **Conclusions**

Toxic ammonia originating from the WWTP could have killed the VAMP salmon in May, by itself or with other toxicants/stressors. However, this is not conclusive because a lack of data from the immediate vicinity of the salmon kill site. More water quality monitoring and fish testing should take place within a one-mile radius of the discharge site.

For VAMP 2008 monitoring, Anke suggests:

- Collect more water quality data close to the discharge;
- Conduct salmonid toxicity assays with water from the discharge area;
- Work toward site-specific toxicant criteria;
- Closely work/coordinate with EMP, the WWTP, and UCD/POD water quality and fish toxicity work.

For Anke's complete presentation, visit [\[link here\]](#).

***Field Observations of Ammonia and pH Variability in the San Joaquin River Near the City of Stockton — Gary Litton and Mark Brunell, University of Pacific***

UOP has been collecting additional data near the [WWTP?] outfall. They have determined that, as temperature changes, toxicity shifts. There is a great variability in pH at this site, which has a dramatic effect on toxicity. A lot of variability at this site is associated with the tidal behavior of flows coming up and down the San Joaquin River. Chlorophyll is also impacted by tidal flows, and has an impact on pH. Gary explained that both the deepening of DWSC channel and zooplankton play dominant roles in depleting the algae population. This year in particular, the zooplankton tended to “hang out” in certain locations in the river (mainly based on flow), apparently waiting for algae to come through. Once the algae plume crossed the zooplankton, there would be a decline in algae. Gary expected to see a great decline in DO in the DWSC this year after [HOOB] was removed, but did not see it; Gary speculates that this is because of low ammonia load.

For Gary’s complete presentation, visit [\[link here\]](#).

### ***VAMP Water Quality Sampling Plan – Lowell Ploss, San Joaquin River Group Authority***

The San Joaquin River Group Authority has been researching possible causes of the 2007 VAMP fish kill in order to determine what needs to be researched for the 2008 VAMP period. They came up with a list of what they would test for, including temperature, pH, DO, ammonia, and EC. They also thought about how often to sample, where to sample, and over what duration of time to sample. They determined that they will sample during the first two weeks of May (they are planning on releasing fish on May 1 and May 8, and sampling around May 15). SJRG also advises taking more samples within a one-mile radius of the railroad bridge, collecting samples more frequently during the VAMP period, and using discharge plume/mixing data.

For Lowell’s complete presentation, visit [\[link here\]](#).

## **Identify Next Steps**

### ***Schedule Next Meeting—March 20, 2008 proposed***

The next meeting will likely occur at DWR because Jones & Stokes is moving. The topic will be modeling. Danielle Wilson will send updates about the meeting location and agenda. If you have questions, feel free to contact Danielle at [dwillson@jsanet.com](mailto:dwillson@jsanet.com) or 916.737.3000.