

Item #0

Sources Pathways and Loading Workgroup Meeting

May 15th, 2006 10 am – 3 pm
SFEI Downstairs Conference Room
7770 Pardee Lane 1st Floor (See attached map)
Oakland CA 94621

Draft Minutes

Attendees (n=24): John Oram, SFEI; Jon Konnan, BASMAA; Lester McKee, SFEI (Chair); Richard Looker, RWQCB; Fred Hetzel, RWQCB; Trish Mulvey, Clean South Bay; Jim Kuwabara, USGS; Paul Salop, AMS; David Drury, SCVWD; Roger Narsim, SCVWD; Andy Gunther, AMS; Mike Connor, SFEI; Meg Sedlak, SFEI; Nicole David, SFEI; Sarah Pearce, SFEI; Ken Schiff, SCCWRP; Barbara Mahler USGS, Austin; James Downing, CSJ; Jim McGrath, SFEI Board; Neil Ganju USGS, Sacramento; Khalil Abu-Saba, Free Agent; Paul Amato, RWQCB; Luisa Valiela, EPA; Peter Mangarella, GeoSyntec; Roger James, Water Resources Management; Jay Davis, SFEI.

10:15 am

Item #1

Welcome

Lester opened the meeting 15 minutes late (note we start at 10 pm sharp from now on) and began with introductions and an apology received from Russ Flegal who was planning to attend but could not due to unforeseen circumstances. Lester introduced Barbara Mahler from USGS, Austin Texas who has been invited onto the WG as an external expert. Barbara has extensive experience in the fields of environmental hydrology and contaminant hydrology (hydrophobic contaminants, legacy pollutants, pesticides, metals, and PCBs) (see her CV in the agenda package for details). Lester welcomed Ken Schiff, Deputy Director of SCCWRP, who was attending his second meeting with us as an invited expert. Ken has extensive experience in So. Cal. where he has developed a comprehensive research program that includes development and implementation of monitoring designs for wet and dry weather runoff and using the data to inform management and TMDL development. Their work includes the development of models to determine BMP design and understand watershed source and transport. Their modeling work in the watersheds has also been coupled with receiving water models thus increasing the utility and providing better information on the relationship between management and receiving water (Please see his CV in the agenda package for details of his recent publications).

10:25 am

Item #2a

Mallard Island Large Rivers Loading Study – Main Study

The RMP has approved funding for continuation of the Mallard Island study at various levels through to 2009. In December 2005, routine wet season sampling was completed during the first flush of WY 2006. In January 2006, following TRC approval, contingency funds were expended using our sampling plan for catching important flood events. Samples were captured during a ~1:7 year storm event – a flood discharge regime well beyond anything the RMP has ever sampled before. Nicole gave a great presentation highlighting the river network and its relationship to Sacramento and the Cache Creek mining area. She showed out the flood progressed through the system peaking at about 370,000 cfs. A total of 25 samples including 2 duplicates were captured this year evenly spaced over the entire discharge regime. She described the return frequency of the storm and of the other storms measured over the 5 years of study, she discussed the previous Hg data and made a prediction based on salinity on what we might see this year, she showed a satellite image of the sediment plume from this year's flood and finished with a photo exposé of the field team and a big thank you to the TRC for funding and the field team for dedication.

Open discussion and questions from the workgroup both during and after the presentation was very lively. Trish M asked for a clarification on calendar versus water year. Nicole replied that all of the analyses we do are for WY including the return frequency analysis. Jon K asked about monitor v flood stage. Nicole answered that it was defined by either USGS or DWR and that it provides a warning to residents to get property and livestock away from the river. Ken S asked for a clarification on the cause of the small first flush hydrograph. Nicole replied it was just a smaller early season event when soil moisture was not at saturation. She also commented that storms that fall as snow produce smaller floods than do warm storms that fall as rain. Lester agreed but did not know if the January storm was a true pineapple

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express. Barbara M asked how much work we had done on the valley hydrology, how many rain gages there are etc. Lester responded saying that to-date we had treated the sampling location as a outlet to the Bay and had done little to think through the watershed hydrology. Some members seem to be interested in us going in that direction and to the extent that budget allows we will. The reason why we have not to-date stems from the fact that until now we have not studied a storm that was of a magnitude where our sampling location was highly connected to its watershed – during smaller storms there is a lot of processing of the signal by the Delta (hence the description large resuspension events in the first report of the SPLWG in 1999) – only during large floods would we be likely to see some more dynamic signals from the watershed. James D asked about the influence of grainsize on the two Hg-SSC regressions that were based on salinity. Perhaps grainsize plays a role. Lester commented that we had not taken a detailed look but that data collected by the USGS (pers. Comm. D Schoellhamer) show that the grainsize at Mallard Is. is consistently fine (<20 microns). Neil G commented that sometime grainsize does spike for short periods of an hour or so and that floc size and density do not change much. He agreed with Lester, there is not data available to suggest that grainsize will play a major role in the Hg-SSC relations.

Actions:

1. Nicole to find out about reservoir storage in Cache Creek
2. If budget allows, project team to consider a more detailed analysis of watershed climate and hydrology and grainsize during the reporting phase

11:00 am

Item #2b

Mallard Island Large Rivers Loading Study – Cross Section Variation (USGS)

All of our estimates of sediment and contaminant loads to-date are made using point data collected at the DWR gauge house on the edge of the ship channel at Mallard Is. The WG is concerned that this might cause a low bias in the results. USGS have been investigating the issue of variation in the X-section at several stations in the Delta including Mallard Island using their own funding (requests to the RMP for funding were not forthcoming). This work has strong implications for estimation of the loads entering SF Bay from the Central Valley. Neil Ganju gave a great presentation on recent work in the X-section. He described the three sampling dates and times, talked about the types of data that were collected and how and compared the sampling times with the sediment record generated at the gage house. Neil concluded that although it appears from the graph that our MI sampling location on the edge of the channel is underestimating sediment load, there are good reasons what this bias might not be real including a resuspension plume on the north side of the channel that is present during non-flood times that is biasing the data and secondly that the methodology used by McKee et al. to estimate loads using the point data at the gage house used daily averaged data which do not show the same bias. He suggested that the major data gaps remains a lack of quasi-continuous velocity and SSC at points across the channel data over the duration of a multi-day flood event. He suggested two possible approaches, 1. Deploy multiple instrument packages in channel, 2. Perform a few cross-sectional surveys everyday for the duration of a 3-5 day flood pulse.

Very lively discussion and review by the WG included many questions and observations. Jim K asked if the variation from N to S might be caused by wind-wave resuspension. Neil answered – yes that David Schoellhamer had published several papers illustrating that is entirely possible for this part of the Delta. Andy G asked about how important the sediment and flow was on the North side of the channel and if it were ignored what the ramification would be. Neil reiterated that the signal over there is probably caused by resuspension in Honker Bay (he also showed a satellite image taken 17 days after peak flow showing a strong plume of sediment that probably moved upstream on the flood tide, deposits and is resuspended on the ebb tide). Ken Schiff remarked that there might be some benefit in analyzing signatures in the bed sediment or perhaps core data to help tease out the history of loading. He also suggested that a factor of two bias may not be too bad but that given the importance of knowing the load passing through this cross section into SF Bay, it might be very important to get this reassurance or improvement in loads estimate and use a permanently mounted sensor package. Lester asked if that is feasible in the ship channel (caused a laugh given it would not even scratch the bottom of an oil tanker). Neil thought it would be possible but he is not sure if resources could be allocated.

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Action: WG supports continuation of the evaluation of variability in the X-section but did not suggest funding. Chair suggests that a special study be again advanced for TRC consideration.

11:30 am

Item #3a

Guadalupe River Small Tributaries Loadings Study – WY 2006

The Guadalupe River is known to be contaminated with Hg from mining activities and urbanization, with PCBs associated with historic urban use, with OC pesticides associated with historic urban and agricultural applications, and with PBDEs associated with current use. SFEI has led the first long-term contaminant loading study in a small urban tributary of the Bay Area beginning October 2002. We now have preliminary data for WY 2006, the 4th year of the study. Lester gave a brief introduction, reminding the WG of the funding sources, the monitoring location, methodologies and celebrating how hard the field team works (12 people involved this year). Lester displayed the data collection times in relation to water and turbidity record, showing how we focused on high flow. He also described how in the later part of the wet season, the largest flood had occurred causing a long recession limb and the controlled release of the Guadalupe and Almaden reservoirs. These releases show up as benches in the discharge record and are also associated with spikes in the turbidity record. Lester remarked that the size and strength of the signal was similar between the two reservoir releases suggesting that Lake Almaden had little attenuating effect or perhaps that the spikes are associated with the main channel further downstream. Lester showed preliminary Hg data that arrived the Friday before the meeting (not yet QAQC) and showed how it compared with estimated SSC (based on last years Turb-SSC relationship). He then compared it to previous years showing that it was similar but generally lower in concentration. In contrast, the MeHg data was a little more elevated but not remarkably so.

Open discussion and questions were very inspiring. Khalil commented that it is great to come back to the WG after several years away and see how great the data collection has worked out. Several WG members commented on the variation between years and asked why the data from the first year is so elevated. Lester said that there was no reason to believe that data quality is an issue. Jon K asked about the trace metals. Lester said that they had been reported in the 2nd year report and that they had helped to support a hypothesis on the Hg-release transport processes. As a reminder, the data acquisition for each year was as follows:

WYs 2003, 2004:	PCBs, OC Pests, HgT, total trace metals
WY 2005:	PCBs, PBDEs, HgT, HgD, MeHgT, MeHgD, total trace metals, HgT in bed sediments
WY 2006:	PCBs, PBDEs, HgT, HgD, MeHgT, MeHgD

Lester said that there was no indication in the data that suggested a visible Hg signal associated with the Guad downtown project. All observations support the hypothesis that the majority of total Hg transported in the system is derived from out of channel sources in the Historic New Almaden Mining District (could include floodplain and terrace deposits in first and second order tributaries). We do not see elevated Hg concentrations in response to high tributary flows under lower rainfall intensity conditions, or in response to reservoir releases. Other mercury sources such as runoff and channel erosion in the urban areas, erosion from Lake Almaden, atmospheric deposition, and channel erosion in Alamitos Creek and Guadalupe Creek mainstems appear to be subordinate given the observation of high Hg concentrations on the falling stages only when channel deposition not channel erosion would be the dominant process. Urban metals such as Cu and Pb and the organics (PCB and PBDEs) show elevated concentrations relative to SSC on the rising stages when flood waters are derived wholly from urban runoff and lower particle concentrations on the falling stages when water is derived from the upper watershed or a mixture of urban and upper water. Trish asked about releases from Lexington Reservoir and how that might influence interpretations – she urged us to take a look at the data. It was clear that the WG is interested in further analysis of the latest data to tease out and refine our hypotheses. It was suggested that all the data together (not just Hg) will form a very strong story. Lester agrees that this is a strength of the study.

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Guadalupe River Small Tributaries Loadings Study – Continuation?

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With WY 2006 data we now have 4 years of SSC, Hg, other trace metals, and trace organics data collected on Guadalupe River at Hwy 101 (USGS gauge 11169025). Given the variability in the system and the call for a substantial load reduction in the system, is this enough data for setting the current baseline for the system against which to make future comparisons? If so, at what period should future loads monitoring occur? Does the WG support further use of RMP funds for this effort? Lester gave a brief presentation on the variability of the system further remarking on the suggest causes on that variation. He showed the bubble plot for rainfall intensity versus Hg particulate concentration and showed the loads for the last 3 years and suggested that WY 2006 load will be intermediate not because of concentrations but rather because of runoff. He then showed a plot of estimated long term average loads based on averaging data for 1 to 15 years as an illustration of how variable Hg loading in the system is likely to be (note this is based on a regression between monthly runoff and monthly load). He then presented 3 options for continuation (in a separate word document (see meeting materials). The options are:

- Option 1: Discontinue
 - \$0k
- Option 2: Continue Status Quo
 - \$80k per year (local sponsor) + \$50k per year (RMP) = \$130k/y
- Option 3: Large Floods Only – Falling Stage
 - \$35k per year (USGS) (every year ongoing)
 - \$15k (SFEI labor) + \$10k (Hg lab analysis) only when a large flood occurs = \$25k
 - \$140k full study every 5 years (next time would be in water year 2011)

There were lots of questions and discussion. Roger N commented on the estimate of loads variability and suggested that this kind of analysis might have some utility in other projects. Mike C asked what it might look like for other contaminants. Lester said that he thinks the Hg in the Guadalupe River would be more variable than sediment but he cannot say for other metals or the organics. Mike suggests that Lester do the analysis for the others. It was also asked why the upper estimate of long-term average loads did not vary as much as the lower estimate. Lester said that is because of the way annual loads data is skewed towards larger events that have a very strong influence on the average. Barbara M also pointed out that it is partly an artifact of the log scale on the graph. Barbara asked if antecedent condition might have made a difference (if Hg loads in WY 2003 were elevated because of extra storage in the system). Lester said that is possible but that it is surprising that there is no signal in the 1st floods of WY 2004. Also there was no signal in the first or second peak of the first year – increased concentrations only occurred when rainfall intensity exceeded a threshold and only on the falling stages of the hydrographs – all of these things tending to negate the hypothesis of antecedent dry conditions causing the elevated signal. Khalil A suggested it is time for a power analysis to determine how much data might be needed to see a trend. Jon K reminded the WG that BASMAA had supported this special study proposal but that over all the WG had not given it a high vote. Richard L responded explaining that the RB did not see the value given the size of the data set we have now. The answer is obvious – we will need a lot of data. While it would be good to do – it is not a priority use of money at this time – other studies seem more important. There was no consensus on this issue. Trish M asked the SCVWD folks if they thought doing a detailed study again in 5 years might be a benefit to them. Dave D responded saying yes, there is plenty of new projects planned that might help to reduce the loads – every 5 years might be reasonable for study to see trends. Dave D also pointed out that the District has been doing plenty and that the decreasing trend in the median concentrations for Hg shown by 4 years of data might be a result of the channel modifications. The downtown project has been built and a further 18,000 cubic yards of material has been removed from channel reaches upstream from the 101 gage. This caused a ruckus as people all commented it would be better if we were collecting base line data in a static system. (Note Lester, from a scientific standpoint, does not see this as a major issue, it adds complexity to data interpretation but that can be overcome). Fred Hetzel commented that this data set is still short compared to climatic variability in the Bay Area. He thinks the study should be continued, a sentiment generally shared amongst WG members. Andy G commented that we have a great data set but that we need to do a better job of marketing it to the managers who need to use this kind of data. Trish M asked the question: Once there is a TMDL – how will it be stated in the implementation plan who has what obligation for the monitoring? Richard L responded that it could be written into permits but it really depends on what criteria to measure against (loads, sediment concentrations, or mass removed for example). The TMDL will not express an obligation by the RMP but it is possible that the RMP will be able to assist. Other members commented that it is difficult to decide over what number of years the data should be averaged for some permit requirement. Dave D commented that it that the District as a member

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of the WG supports further monitoring of the Guadalupe River at Hwy 101 but that it may not always be able to provide local sponsorship. The District is essentially managing other peoples Hg in its waterways – perhaps those other people such as County Parks, Guadalupe Rubbish, or Mid Peninsular Open Space District should also assist with funding. Overall, the WG agreed that the Guadalupe study should continue although recognizes that the RMP might not have the funds to do that.

Actions:

1. Per option C (above), Lester to prepare a formal request to the TRC for using contingency funds for sample large floods (>12 feet that occur in response to >2 inches of rain in the mining district over a 6 hour period) until further funding is found. This recommendation implied that Lester also needs discuss study continuation with RB2 staff and SCVWD staff and if there is interest he should prepare a request to the SCVWD or another local sponsor (he'll need support for a request to another sponsor) for continuation of the sediment monitoring but he failed to remind the WG of that need at the end of the discussion.
2. A special study for power analysis of the data should be kept alive for TRC consideration next year.
3. Further reporting on the existing data should include documentation of actions already taken by SCVWD and partners to reduce loadings and a more detailed analysis of the SSC signals associated with Lexington and the other reservoirs.

1:10 pm

Item #4

SJ/SC WPCP Mercury Fate and Transport Study

The City of San Jose/Santa Clara has been conducting an analysis of Hg in their Waste Water Treatment plant. These data and interpretations provide good context for other Hg studies occurring in the watershed, wetlands, and Bay. James Downing gave a presentation of their most recent results. There was several things that came out of the presentation. Firstly, that HgT and MeHg concentrations in the plant track suspended sediment closely – that is when sediment is removed so is mercury. Secondly, that the plant has a net loss overall of MeHg (good news!). Over all there is a 99% removal of HgT and a 97% removal of MeHg with 50% of the HgD being removed.

Lester commented at the end on the concentrations and suggested that compared to the Guadalupe River, the sewage treatment plant is providing a load to the South Bay that is 2 -3 orders of magnitude lower. James confirmed that the plant discharges a flow equivalent to about the volume of the Guadalupe River and Coyote Creek combined but at much lower Hg concentrations. Andy G asked about the difference between the concentrations on different days. James D replied that the difference is associated with wet weather, mid season, and dry season. Jim M asked about the water loss in the sludge total Hg – James said yes that is part of the reason why concentrations decrease. Mike C asked about the nitrogen and sulfur budgets – Are you denitrifying? James said yes but he was not sure about the sulfur budget. Mike C said it seems likely you will have net demethylation. Khalil commented that Sac Regional has done a similar study – they has 70% removal of Hg but were not as good for MeHg. WG members might be interested in taking a look at that study and other done in the Central Valley.

1:40 pm

Item#5

Modeling to determine effectiveness of Urban BMPs for Trapping Sediment and Trace Metals at the Watershed Scale – A Southern California Example

The PCB and Hg TMDLs call for greater than 50% load reductions in urban areas adjacent to SF Bay. SFEI and GeoSyntec are presently conducting a study using proposition 13 funds to determine how this might feasibly be achieved at the regional scale of the Bay Area (progress will be presented at the next SPLWG meeting). Colleagues at Southern California Coastal Water Research Project (SCCWRP) have been testing the use of a number of different urban BMPs for reducing concentrations and toxicity (enhanced stream wetland in Laguna Niguel (Wet CAT), constructed sub-surface flow wetland cells at the Orange County Water Department field station in Anaheim (OCWD SSF), a screening/settlement sump in Los Angeles (L.A. metal recycling yard), three sites with hydrodynamic devices using Continuous Deflection Separation (CDS) units (Pico-Kenter in Santa Monica, BC120 in Culver City, and a site in South Pasadena), and a site

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that used a combination of screening, microfiltration, and UV treatment [Santa Monica Urban Runoff Recycling Facility (SMURRF)]. In addition, they have been using a HSPF model (supported with extensive data collected in a single watershed) to estimate load reductions at the watershed scale. Given all the data we have in the Guadalupe River Watershed, a similar type of model could be developed for the Bay Area. Ken Schiff gave a great presentation on the use of HSPF for modeling urban watersheds in S. Cal. He covered topics including the advantages of modeling, the fact that there are few models developed for California's arid climate, showed the model inputs and the model calibration. The he discussed that BMPs that stakeholder had suggested they try to model to see the potential load reductions at the watershed scale. These included Cisterns, Detention basins, Load reduction, Impervious reduction, Wetland treatment, and Instream impoundment and diversion. He then presented the decadal simulations for effectiveness. He showed the watershed scale load reduction results for impoundment and diversion (3% SS and 6% Cu) and for Cisterns (8% SS and 14% Cu) and explained the reasons for only small load reductions.

WG discussion again was very lively. Barbara M asked did you divide out the parking lots? Barbara also suggested that another reason for doing modeling is to organize the data to tell you what you don't understand about a system. Peter M commented that another reason why the dam was less effective is because it remains partly full between floods. Trish M commented on how the presentation pointed to the importance of hydro-modification (or reducing flows) as a solution for reducing loads. Somebody else asked could HSPF be used in the Bay Area – Ken S replied yes, the model was originally designed for less urban systems than LA for example, so yes it could be applied to the mixed land use watersheds of the Bay Area although it will depend on what you need it to do, how you would develop it. Richard L said we would need to review other models to determine which is right. Roger J asked why so much of the land use was not regulated (modeled)? Ken S said because it is difficult to ask homeowners to foot the bill. Roger J commented that in the Bay Area Cisterns wont work in the Adobe soils without the risk of slope stability issues. Lester finished off by commenting about the data richness of Guadalupe River system and that it is an ideal location for us to begin developing a model to test, at a watershed scale, different kinds of BMP options. However there was no formal recommendation by the WG at this time.

2:30 pm

Item #6

SPLWG Special and Pilot Studies – Small Tributaries Loading Study #2 – TRC votes

Each year about \$500k is spent by the RMP participants on furthering knowledge about the Bay through special and pilot studies that focus on a single aspect of Bay ecology. At both the May and December 2005 SPLWG meetings we compiled and discussed eight potential special and pilot studies relevant to SPL. These were ranked by the SPLWG and the 4 studies receiving the highest rank were forwarded to the TRC for their review and ranking however the "Design of a Watershed RMP" was dropped given MRP development and Karen T's hope to continue to develop ideas through SWAMP. Given the preparation time needed to develop a new small tributaries loading study, we need to make a final decision on the location should the TRC rank it highly. Lester gave a short presentation opening with the TRC ranks in so far. Starting a new small tributary loading study has gained 15 points so far whereas Guadalupe modeling and SW sewershed outfall sampling gained only 9 points so it appears Small tribis is likely but there still needs to be a final decision by TRC and approval by RMP Steering Committee. Lester then introduced Sarah P to discuss the top 4 raked locations for a new small trib loads study (for details see meeting materials). The 4 candidates that had received highest WG rank from the last meeting were San Lorenzo, Estudillo Canal, Zone 4, Line A, and Colma Creek.

The WG asked us to lay out the pro's and cons of each option on the white board. Estudillo was knocked off because of the uncertainty of tidal influence. It was decided that San Lorenzo did not contrast with Guadalupe sufficiently to investigate at this time. Colma was kept on as a second choice for its contrast with Guadalupe and the fact that it has a historic USGS water and sediment gage record. So the WG ranked Zone 4 Line A highest because it was the largest contrast with Guadalupe, small and industrial, logistically safe. Given its small size, the WG recommended we explore the use of automatic sampling equipment. Several disadvantages need to be overcome including either modifying the fence to provide sampling access or building a small foot bridge further upstream to sample from. The will need to be discussed with the appropriate city and county jurisdictions. According to Arleen Feng, ACFCWCD requires a flood encroachment permit for access to channels that are fenced (and anywhere for installation of equipment in flow zone). To obtain application, SFEI needs to contact Gary Moore (510) 670-5402 or garym@acpwa.org.

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Actions:

1. Lester needs to discuss Zone 4 line A with Arleen F and then with Gary M.
2. If permission is gained for Zone 4 Line A, SFEI to complete 2nd reconnaissance with field team to gather data specific to the design of equipment. If no permission likely, then reconnaissance will be done on Colma Creek with the same objectives
3. Lester to present WG meeting outcomes to TRC for discussion and ratification

3:30 pm

Adjourn