

Sources Pathways and Loading Workgroup Meeting

December 15th, 2005 10:10 am – 3:05 pm

SFEI Conference Room
7770 Pardee Lane 2nd Floor
Oakland CA 94621

Minutes

Attendees (n=23): Jon Leatherbarrow, SFEI; John Oram, SFEI; Jon Konnan, BASMAA; Terry Cooke, URS; Carrie Austin, RWQCB; Lester McKee, SFEI (Chair); Richard Looker, RWQCB; Fred Hetzel, RWQCB; Trish Mulvey, Clean South Bay; Jim Kuwabara, USGS; Paul Salop, AMS/CEP; David Drury, SCVWD; Andy Gunther, AMS; Mike Connor, SFEI; Meg Sedlak, SFEI; Nicole David, SFEI; Sarah Pearce, SFEI; Ken Schiff, SCCWRP; Janet Sowers, WLA; Setenay Bozkurt; Shin-Roei Lee, RWQCB; James Downing, CSJ; Jamison Crosby, CCCCWP.

10:10 am

Item #1 Welcome

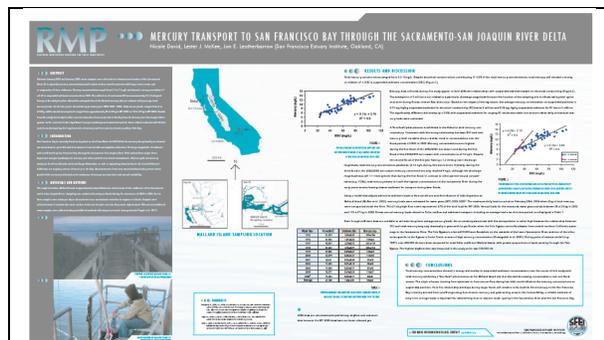
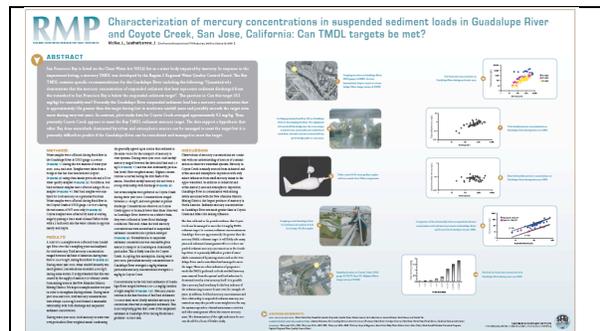
Welcome and introductions (Lester McKee, SFEI)

Meeting Objectives:

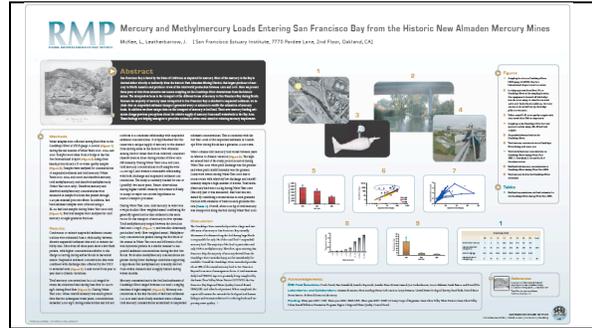
- Make informative presentations on products completed this year that are either overseen by the WG or relevant. Select a date for completion of review of products.
- Make decisions or at least decide on how to make decisions on choosing a new small tributary to study – select a date for email ranking completion
- Discuss proposal concepts for special and pilot studies – select a date for email ranking completion

Lester made the following announcements:

1. SPLWG 5-year work plan is available at:
http://www.sfei.org/rmp/reports/splwg/No406_RMP_SPLWG_5YrWorkPlan.pdf
2. SOE poster “Characterization of mercury concentrations in suspended sediment loads in Guadalupe River and Coyote Creek, San Jose, California: Can TMDL targets be met?” is available at:
http://www.sfei.org/presentations_posters/05SOE_Poster_McKee_MedRes.pdf
3. National SETAC poster by Nicole David “Mercury transport to San Francisco Bay through the Sacramento-San Joaquin River Delta” can be obtained by emailing Nicole@sfei.org



4. National SETAC poster by Lester McKee “Mercury and methyl mercury loads entering San Francisco Bay from the New Almaden historic mercury mines” can be obtained by emailing lester@sfei.org



5. Our Mallard Island sediment loads work is finally in press after rather uneventful positive review process that just took for ever.



6. Lester gave an invited presentation in S. Korea at the APEC symposium on the protection of the marine environment from land-based sources of pollution.



10:20 am

Item #2

Mapping stormwater drainage and drainage areas in the Bay Area (WLA/OMC)

William Lettis and Associates and Oakland Museum of California have been developing maps of 24 in storm drains, creeks, and watershed boundaries for more than a decade. These maps are the best resource we have for understanding sources, pathways, and loadings of water, sediment, and contaminants in the small tributaries and storm sewersheds around the Bay margin. These maps will likely become a primary GIS resource for tracking contaminants and modeling stormwater flows and loads.

Janet Sowers of WLA gave a presentation on progress to-date based upon a previous presentation she had done at the GSA meeting. Her presentation opened with a map of maps so far produced or in progress. Fred asked if the Oakland maps was in GIS form – Janet said yes and to contact her after the meeting. Also Fred asked if the maps show pump stations – Janet said no. Shin Roei said that the Water Board was planning to ask BASMAA to provide this information. The presentation focus then shifted to describing various aspects of the production of historical and modern south Bay maps. Ken asked about recycled water. Janet said that

Historical Geomorphology of the Santa Clara basin, California

Janet M. Sowers and Justin T. Pearce
William Lettis & Associates, Inc.

Research supported by:
Santa Clara Valley Water District
Oakland Museum of California
CALFED



recycled sewage water is piped upstream to water golf courses. Janet presented a conceptual model of stream processes in relation to 4 landscape types (A: Bedrock uplands, B: incised older alluvial fans, C: active alluvial fans, and D: basin). Trish asked - can streams meander in both B and C. Janet replied that streams will meander anywhere where there is soft bank material and where valley width is sufficient so that supply of sediment is not greater than erosive force provided by the stream. Janet discussed the position of distributaries relative to faults on the east Bay hills. Lester asked Janet to explain in more detail why the “crow’s foot” occurs on the west side of faults. Janet replied that it occurs because as the west side drops it reduced confinement and causes the water to spread out, dispersing power across a larger area and causing sediment to drop out and deposit. During periods of no fault activity might see pro-gradation of the crow’s foot. Janet discussed the modern storm drains in the Cunningham lake area of Central San Jose. Ken asked why did Silver Ck. not pass through the lake. Janet was not sure but guessed it was a planning decision of the time due to water quality concerns. Janet discussed the San Francisquito Ck. watershed and its large fan. Fred asked where Stanford’s linear accelerator discharge point is on the map and if there are depositional zone in the creek downstream. Janet was not able to respond specifically. Trish thought that all the abatement had been completed. Fred remarked that there is still an ongoing issue for PCBs.

General discussion continued after the end of the formal presentation. Trish recounted her conversation with Lester the day before on the remaining gaps. These include urban areas of Marin, Vallejo, Benicia, and Fairfield / Suisun. Jamison – remarked that she would discuss these mapping needed with Don Freitas. Fred asked - if we are to do more maps, when is the money needed? Janet said 2007 would be ideal. Fred said he thought the maps are great and wanted to use them to better understand where the sediment is coming from. Lester suggested that the maps will be a primary resource for developing models to answer Fred’s sediment question, however in the mean time the maps can be used to provide hypotheses about clean and dirty sediment supply if they are compared to the distribution of land uses. Jon K also felt that the maps are a great resource and suggested that they will be important for BASMAA’s attempts to identify sources of pollutants. – He supported completion of the maps throughout the Bay Area and asked when they will be available digitally as a GIS via the Internet.

| Map Name | GIS available? | From Who |
|-------------------------|--------------------------------|-----------|
| Oakland / Berkeley | Yes | WLA/ SFEI |
| Hayward / San Leandro | Yes | WLA/ SFEI |
| Dublin / Pleasanton | Yes | WLA/ SFEI |
| Fremont | Yes | WLA/ SFEI |
| Milpitas | Yes | WLA/ SFEI |
| Central San Jose | ? | |
| South San Jose | ? | |
| West Santa Clara Valley | ? | |
| Palo Alto | Yes | WLA/ SFEI |
| San Mateo | Not yet – but planned Dec 2006 | WLA/ SFEI |
| South San Francisco | Not yet – but planned Dec 2006 | WLA/ SFEI |
| San Francisco | Not yet – but planned Dec 2006 | WLA/ SFEI |

Outcome: Overall the completion of the Oakland museum of California / WLA 24 inch storm drain and boundary Map Series and GIS products was completely endorsed by the work group as necessary resource for BASMAA and Water Board decisions and for hydrological based models for analysis of prediction of sediment and contaminant sources, processes of release and transport and loadings to the Bay.

11:00 am

Item #3

Estimating sediment loads in ungauged watersheds using statistical models (PWA)

Gaining a better understanding of total suspended sediment load from the local tributaries is important for a range of reasons including: 1. “Clean” sediment derived from the upper parts of watersheds help to dilute contaminated sediments derived from urban areas and already in the Bay, 2. Sediment from local tributaries can be a valuable resource for wetlands restoration particularly in the south Bay, 3. Sediment is the main vector for transporting Hg and PCBs (and other emerging contaminants) – understanding sediment sources helps us to understand contaminant sources and might assist us to extrapolate limited data from one watershed to another.

Setenay Bozkurt, PWA gave a presentation on a draft report that has been prepared for WG review with funding from a Prop 13 grant issued to SFEI. Setenay provided an opening series of slides that set up a series of conceptual models governing water and sediment release processes in Bay Area watersheds. Trish asked the question: Are you [Setenay] talking about sediment yield both from the watershed and the creek itself? Setenay said yes – qualitatively. Jon K asked if the response of the watersheds of the urbanized Bay Area to urbanization and development is an overall increase or decrease? Setenay suggested that for some it might be an increase and for other a decrease.



Lester believes there has been an overall increase over the natural conditions. There is local data to support a conclusion of net increase in agricultural and open space areas which make up 50% of the area of the nine counties that drain to the Bay. It seems that sediment yield might have increased by 4x where as reservoirs have only taken away 16% of the functional drainage area. In the case of urban areas Lester’s hypothesis is that there has been a net increase in sediment supply to the Bay for the following reasons:

1. Urban creeks have been connected, are incising, and are designed to pass sediment
2. Wetland areas near the Bay margin have been filled and drainage networks built that now supply sediment to the Bay from areas that were by definition net depositional
3. Creeks have been cut off from their floodplains and the floodplains themselves which were once by definition depositional areas are now plumbed with efficient drainage networks that supply sediment to the Bay via creeks and stormwater conveyance channels
4. Humans are constantly bringing in “sediment” in the form of road maintenance materials, traffic wear debris
5. Wind, tire tracking, ground squirrels are redistributing dust and soils from soil surfaces and gardens onto impervious surfaces where transport into storm drains is efficient

Setenay went on to show a range of correlative relationships between sediment yield and relief, mean annual runoff, and drainage area. Jim K asked: What is the increase in predictive power if multiple regression is done. Setenay said none due to correlation between causative variables. Mike C suggested that the variables could be normalized and the residuals used to look for spatial relationships to other parameters. Setenay said she would check to see if they already tried that and do it if not. Setenay then

showed the results of the temporal analysis. The found decreasing sediment yields in, Alameda Creek at Niles, Colma Creek at South San Francisco, and Cull Creek above the Reservoir. Ken S asked : is this an expected result? Some mentioned that there has been significant effort to stabilize slopes in the Cull Creek watershed.

General discussion continued after the formal presentation. Andy G made several comments. Data is limited. He asked how to get to a point when we are confident that sediment loads are decreasing. Setenay replied that statistical analysis was limited by the data rich periods available. Andy commented about the construction of Dams, periods of urbanization, and restoration effects. Richard L suggested that there should be a corroboration between a change in sediment yield and creek function downstream. Fred commented that it is the job of SFEIs prop 13 grant to determine how to reduce find sediment and pollutant loads entering the Bay from urban areas of small tributaries. Janet commented that it is great to see what can be done with existing data. Suggested that the work that Laurel is doing in Alameda Creek might provide some support for the conclusions of downward trends in loads. Ken S commented great to see the connection between TMDLs and dredging in the Bay Area. He said that in S. California there is a struggle to make the connection between hydro-modification and sediment and pollutant loads. He said that nobody thinks about where the sediment is going as a useful resource – in the Bay Area that seems important. Setenay agreed – sediment is important for restoration projects in the S. Bay.

Action: WG to provide review comments by January 31st.

11:10 am

Item #4
Choosing a location for a 2nd small tributaries loading study

We have completed a draft memo product of a small RMP funded review and reconnaissance field project (\$7.5k) to help make decisions on where to sample next. Sarah Pearce gave a presentation of the matrix of information about each potential sampling location (17 in total). The workgroup had two main frustrations:

1. The asked us to reduce the number to just those that Sarah and Lester know are logistically possible, and
2. That we decide upon some criteria for picking a new areas to study. Trish commented we need a list of criteria. Lester commented that we had tried to do this at the last work group meeting and had not come to a consensus. Lester did not feel that it is appropriate for him and SFEI staff to decide on the criteria. Ken S remarked that an overall need should be articulated. For example, the selection of a new watershed to study will be influenced by the need. The need might be for collection of data for modeling or for measuring trends, or for improving understanding of loads entering the Bay. For trends might pick a watershed where there is going to be a large amount of effort expended to introduce new BMPs to reduce loads. For modeling might choose a watershed that contrasts completely to Guadalupe. For loads to the Bay might choose another very large watershed. Lester reminded the WG that the 5-year work plan has outlined all three of these needs but that the over-arching need is to develop a series of observation watersheds in a number (six) watershed in the Bay Area. Fred asked the question: do we want a reference watershed or a contaminated one? If we are interested in loads – need one that is representative of loads. Richard asked: what is a reference watershed? Andy G also suggested we need to decide which of the second tier goals in most important now and use that to decide on a watershed to study next. Lester was asked for his opinion - He suggested that a small to medium sized watershed with low upland sediment yield would offer great contrast with Guadalupe, would be logistically possible to sample, would provide baseline data for trend analysis in response to BMPs, and would represent a group of watersheds in the Bay margin that have likely high loads of PCBs and Hg thus with a use of a numerical model (that could be developed in the future), the data collected could be extrapolated top estimate loads from the industrialized Bay margin. Lester's suggestion is consistent with comments by Andy G and Jim K made at the May 05 WG meeting and written in the SPL 5-year work plan. Jon K said OK we have multiple objectives – lets list them:

1. Reference watershed
2. Industrial small watershed
3. Medium urban watershed
4. Large urban watershed

Andy asked: Can we improve our current estimates of loads? Or through time have we improved? Can we improve loads estimates with 6 watersheds? Lester commented that this could be best achieved with a regional watershed loading model. If modeling is the eventual outcome then should aim to get as much contrast in the data inputs so that the model can be developed and verified for a range of watershed types with a higher degree of confidence. Andy asked the question: Will that help decision making? Lester reminded the WG that the SPL 5-year work plan and our last 5 years of discussions reflect the agreement for another loading study. Assuming our work plan (finalized only 4 months ago) still reflects the groups priorities then it is not if we should do another loading study – its where that is the right question. Andy G: Responded with Yes but its another 1 of 6. Lester – OK lets decide which one. Jon K suggested we narrow the choices and move on to a ranking through email. Trish commented that it needs to be gauged, safe and industrial. Lester said – gauging is less important – we can do that ourselves if necessary or get USGS to install and operate one. Again Lester was asked what he would recommend. Lester answered; we have two main choices that will contrast with Guadalupe: 1. a medium urban watershed or 2. a small industrial watershed. Ken S commented on the need to understand future land use change (build-out). Terry C suggested that voting should give 1st, 2nd, and 3rd choices. Jon K asked: Should we pick all 6 now? Fred said no – just pick 2 or 3. Our needs will change through time as understanding improves. Terry – we need to list objectives. Richard L: What about a reference watershed? Is there one in our list of potential watersheds? What does reference mean? Lester: A reference would be a watershed that has a mixed urban and open space/ ag land use pattern. We have Corte Madera ck at Ross as an example. Richard L: What use will a reference watershed be? Will it provide any information for the understanding of other watersheds? Fred responded: It bounds variation and the effects of climate. Mike C: Provides a baseline for Hg and atmospheric deposition.

WG asked that Sarah compile comments and send out V2 of the matrix for WG ranking.

Ranking – Previous monitoring lower criterion than ability to partner. WG urged Lester to send out goals from 5-year work plan.

Lester asked Ken S how the choice of where to monitor would be done in S. Cal. Ken answered: We start with the objectives, then we choose a watershed. If loadings – then go to big watershed, if trends through time go to one that is expected to change, if model go to one that has historical data and is well mapped.

Action: Lester to send out refined matrix and objectives. WG to provide ranking and any comments by January 31st.

12:30 pm

Lunch

Lunch provided as long as you arrive at the meeting before 11 am to put in your lunch request.

1:10 pm

Item #5

Review of proposals for SPL special and pilot studies

Lester briefly discussed two new concept proposals:

#7 Stormwater storm-sewershed outfall sampling

#8 Guadalupe River Watershed Model Development

There was much WG discussion on this point. Jim K asked: How complex? John O said complexity yet to be determined depending on needs. Basic need is a calibrated hydrological model, then build sediment component, then contaminants. Jim asked about channel x-section data. Carrie A said there is no maps of x-section data but SCVWD might have some – has SFEI talked with them? Lester – yes they (at least some) are in support – Roger Narsim says there is a strong need. Dave D – models have been developed for the mainstem USACE standard HECRAS model etc. Some body asked what the total cost will be – can't do Hg w/o sediment. John O said at this stage it is a concept proposal – those details would be worked out if people agree it is the right next step. Jon K – please send the proposals out electronically. How much money is there in the TRC budget. Lester – about \$200k i.e. ranking is very important. Richard L if we put

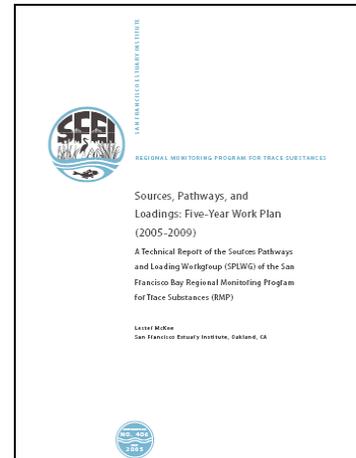
forward a small tributaries loading study that will leave about \$50k. Lester – yes – perhaps one additional study can be done. Jon K remarked about the previous ranking decision made at an earlier WG meeting and noted that on some studies BASMAA and RB2 voted completely opposite. Richard L – yes. Lester – part of this was perhaps because there were caveats in the ranking pending changes and additions/edits to the concept proposal language.

Action: Lester to email out the ranking methodology. Ranking should be completed by January 31st 2006.

2:00 pm

Item#6
SPLWG 5-yr work plan published

Lester authored and circulated the draft 5-year Work Plan for SPLWG review in April. Oral comments were received at the May WG meeting and written comments were received from Jon Konan Fred Hetzel, Paul Salop, Richard Looker, Trish Mulvey, and Josh Collins. The work plan was then finalized and sent to the WG and TRC for a 15 day approval period. Lester needs to know what the WG want to do with it and how often it needs to be updated. Jon K suggested we simply ask the question each year – does it need a revision? Carrie A noted we need to spend time and money wisely – she seconded Jon K – ask the question but revise only if needed.

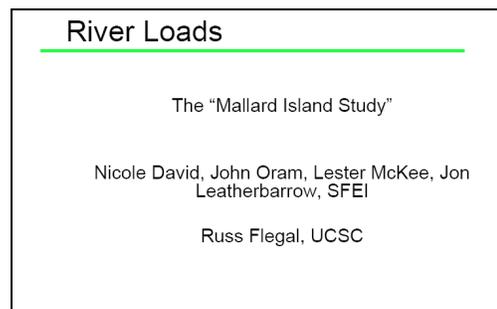


Outcome: Each year in the 1st meeting of the year, the chair will ask the question. Does the WP need to be updated. If the WG says yes, then WP will be revised that year if budget allows or the following year if budget is short.

2:10 pm

Item #7
Mallard Island Larger Rivers Loading Study

Our Mallard Island study of the large river loadings on the Sacramento River 8 km downstream from the confluence with the San Joaquin River has been running now for 5 years. Nicole presented the most recent findings about sediment and Hg. She began with several slides on the location and sampling program. She then went on to discuss the relationship between SSC and Hg and how that changes with salinity. Kerry asked for a clarification on the data. Nicole responded that it is 2002-05. James D asked: Could the changes in ratio between SSC and Hg be a function of grain size rather than salinity. Paul S suggested that we look at surface sediment upstream and downstream – resuspended sediment in Honker Bay might be finer than coming down the system. Nicole reminded everyone that we do not measure grain size. Lester reminded the WG that USGS has collected GS info and that grain size is very fine (<25 micron). Andy asked: Have you ever looked at sediment concentrations in Honker Bay and upstream to see if the Mallard Island observations make sense? Lester said we could do that in the next reporting phase. Nicole then went on to present sediment and Hg loads (now 10 years of sediment data). Richard asked about climatic variability and suggested that we contact Jan Null to get his opinion on what kind of climatic year we are get. After the meeting Lester called Jan – Jan said it is currently forecast to be slightly La Nino but that the Christmas New Year storms were looking quite strong.



John O then went on to talk about organic concentrations data and loading estimates. Andy G suggested we should go back to the Gunther et al., 1987 report to make comparisons. Andy and Paul S remarked that back then there was no turbidity data and very little contaminant data. Now look at the impressive body of information amassed now. Back then there was dissolved data on Hg on the Sacramento River at Freepport and the Mokelumne R at Woodbridge and dissolved and total Hg data at Vernalis on the San Joaquin. These data were used to estimate loads per day during “low flow” and high flow”. There were no estimates of loads of PCBs and no annual estimates for the large river inputs. Terry C asked do we have enough data yet to predict without any further collection. Nicole and Lester said we still have not sampled an event where there is substantial flow through the Yolo bypass – this is an important Hg source. Lester asked Ken S about how episodic systems are sampled in So. Cal. Do you sample only wet years? Ken S responded saying that they have money set aside to mobilize for “samplings of opportunity” as they call them. He added that they have much more problem with wildfires down there and that they do a lot of work to follow up on assessing the effluence of wildfires on sediment and contaminant hydrology. Carrie A asked: Is there a funding response from the agencies? Ken S said no unless flooding is the issue. Carrie A commented that in the case of Gambanini Hg mine the EPA did provide emergency \$\$ to get work done. Nicole finished with a summary of future effort. A report will be written in 2006, RMP contingency will be used as needed during subsequent winters to sample large floods or ever great magnitude (current trigger is 150,000 cfs). A full study is planned for 2009 that will include analysis of all data collected up to the end of the winter of WY 2009. Lester – commented that by then we will have 15 years of data – a great achievement by David Schoellhamer and his group.

2:40 pm

Item #8

Guadalupe River Small Tributaries Loadings Study

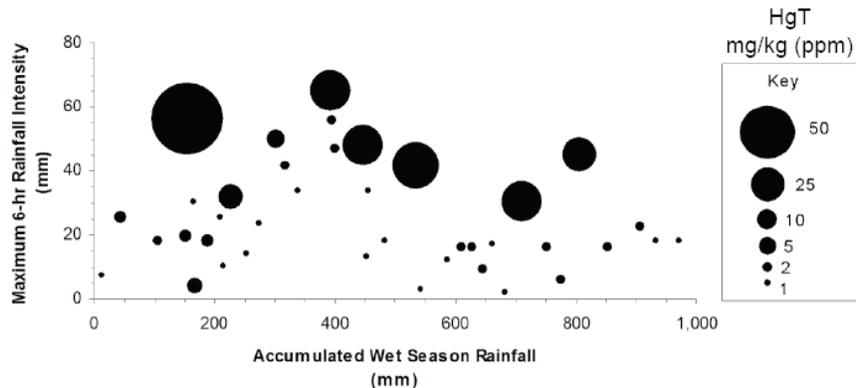
The Guadalupe River is known to be contaminated with Hg from mining activities and urbanization, with PCBs associated with historic urban use, with OC pesticides associated with historic urban and agricultural applications, and with PBDEs associated with current use. SFEI has led the first long-term loading study in the Bay Area beginning October 2002. There is support for continuation in WY 2007 but funding is not yet secured. Lester and John O gave a quick presentation of some of the highlights in the year 3 report. Lester discussed the sediment loads for WY 2003, 2004, 2005 and the fact that they had each year decreased from 10,800 t to 8,500 t, 4,500 t. He said this was not a trend but rather a response to climatic variation. Ken S asked about the turbidity probe specifications. Lester said this reads up to 1500 NTU. We do routine maintenance on it about every 2-4 weeks when algae begins to obscure the optics – for this system it seems to always be worse from January onward. Hg show a similar response with highest loads in the first year and least loads in the last year. Lester showed a 3D plot of Hg sediment concentrations versus accumulated rainfall and storm intensity. The plot shows that storm intensity is strongly related to Hg sediment concentrations.

Small Tributary Loads

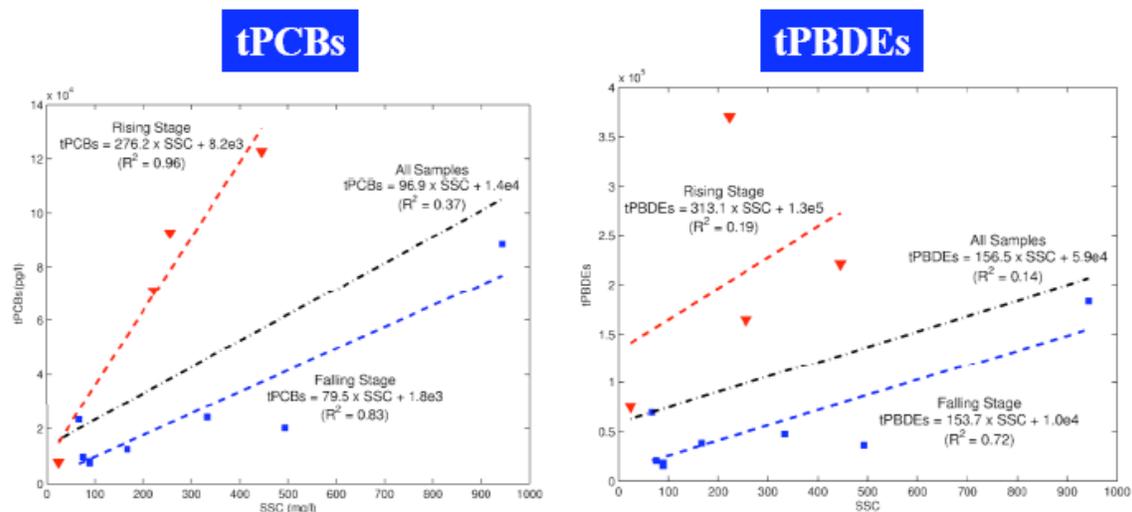
The “Guadalupe River Study”

Lester McKee, John Oram, Jon Leatherbarrow SFEI

Autumn Bonnoma, Mark Stephenson, Wes Heim
MLML



Lester also remarked that it is still a qualitative model given it is difficult to tell the exact source of water during each sampling event – He commented that we need a calibrated and verified hydrological model to take the interpretation of the data to its fullest level. Ken S asked why we chose 6-hour window. Lester responded by reminding the WG that the 6-hour window was based upon work done by Wilson of Menlo Park USGS who found that he could predict landslide activity based on a rainy-day normalized index. Lester felt that this model should also predict Hg mobilizations because the processes the mobilize sediment in the Mining District likely also mobilize Hg. Ken S remarked that he also see this pattern in So. Cal. but they get an influence from storm duration as well. Lester went on to present MeHg data and showed how the first two storms had differed from the rest of the season – they had the highest concentrations and showed a loop response – much higher concentrations on the rising stage relative to the falling stage. James D asked about the timing of the storms or patterns with regard to sources of MeHg. Lester said that the first two storms we mainly urban runoff events but that the MeHg might still be sources from the mainstem – this study cannot answer those types of complex questions with just one year of MeHg data – will collect a second year in 2006. Lester went on to say that MeHg load was only 0.5% of the total load. He then discussed the sediment Hg data. There is a general trend in the data with small grain sizes showing higher concentrations. Carrie A asked is this the average of? Lester – yes of eight samples. However there are some outliers that show Hg concentrations up around 13 mg/kg. This might reflect source heterogeneity. Lester said bed load makes up about 1% of the total load for WY 2005. Richard L asked – so why did Roger James push so hard for it? John O then went on to discuss the trace organics data. He commented about the fact that we had observed the highest concentrations of PCBs this year (123 ng/L). Fred said statistically there is no difference between 90 and 123 given we are summing 40 congeners. Lester commented that the first storm when the 90 had been measured was sampling after the peak in flow and turbidity – that in fact concentrations might have been higher then. PBDE concentrations were around 2-3x greater – a great concern given similar biological effects. John commented that our data for both PCBs and PBDEs was conforming to our original conceptual understanding of sources in the watershed. Concentrations relative to particles on the rising stage when water is dominantly from the urban source areas are greater than on the falling stage when water is of mixed origin from urban and upper watershed sources.



The opposite occurs for Hg and is consistent with the notion that the dominant source of Hg in the watershed is the mines. Jim K asked about Hg speciation. Lester said yes we had done that this year and will gain in WY 2006. HgT is 97% particulate and MeHgT is about 93% particulate. Again Lester and John O supported the development of a model to better understand the sources and transport of trace contaminants in the Guadalupe. Terry C suggested that we start from the work done by TetraTech – Carrie said that there was little modeling done by TetraTech. Terry said perhaps start from the original loading work done by BASMAA in 1995. Lester finished off with comments on the planned future of the Guadalupe River small tributary loads study. Presently there is tentative funding for continuation in 2007 provided by the SCVWD and USACE. The appears to be support for modeling the watershed but presently there is no funding source guaranteed.

Overall the WG enjoyed the last two presentations and is looking forward to reading the new (brief) Guadalupe River Year – 3 report.

Action: Workgroup agreed to review the Guadalupe year – 3 report and provide comments to John and Lester by January 31st.

3:05 pm
Adjourn