RMP Sources Pathways and Loading Workgroup Meeting Summary
May 17th, 2017, 9:30am - 5:00pm

In attendance:

WG Member	Affiliation	Representing
Peter Mangarella	Geosyntec	Science Advisor
Mike Stenstrom	UCLA	Science Advisor
Kelly Moran	TDC Environmental	Science Advisor
Dan Cain	USGS	Science Advisor
Lori Sprague	USGS	Science Advisor
Bob Hirsch	USGS	Science Advisor
Barbara Mahler	USGS	Science Advisor
Dave Schoellhammer	USGS	
Chris Sommers	EOA	SCVURPPP
Arleen Feng	ACCWP	ACCWP, BASMAA
Lisa Sabin	EOA	
Bonne DeBerry	EOA	SMCCWP
Luisa Valiela	US EPA	
Richard Looker	SFB Regional Water Quality Control Board	
Jan O'Hara	SFB Regional Water Quality Control Board	
Carrie Austin	SFB Regional Water Quality Control Board	
Luisa Valiela	EPA Region 9	
Lisa Sabin Austin	Geosyntec	Contra Costa County
Aroon Melwani	AMS	SFEI
Paul Salop	AMS	
Hardeep Takhar	State Water Resources Control Board	
Bridgette DeShields		SFEI TRC

SFEI/ RMP Staff:

Lester McKee, Phil Trowbridge, Alicia Gilbreath, Don Yee, Jen Hunt, Jay Davis, Jing Wu, Becky Sutton

1 Introduction

Introductions were made. The primary goal of the meeting was to solicit advice on special studies for RMP 2018 which will be presented to the RMP technical review committee (TRC) for review on June 8th and for a funding decision at the RMP Steering Committee meeting on July 19th.

2a Information: Overview of SPL activities and objectives and recent high level outcomes

Alicia Gilbreath provided a summary of the primary stormwater management questions that are now part of the Small Tributary Loading Strategy (STLS). In question is the general shift away from loading studies and reconnaissance characterisation studies towards trends monitoring starting with the 2018 budget. As illustrated in the proposed special studies set, there remains a mix and some contention as to if it will be possible to cost effectively see a trend in stormwater. Alicia Gilbreath also reviewed the deliverables completed in the last year and provided a preview near complete deliverables in the context of the meeting.

2b Information: Review of management questions – how are they evolving?

Richard Looker presented a review of the MRP management questions. He noted that the RMP has its origins in permit requirements for stormwater and wastewater. The STLS is a subgroup of the RMP that works at the detailed level on loading studies and meets with greater frequency (monthly) than other RMP groups.

Kelly Moran asked if the SPL is responsive to the management of the Bay or just to the MRP. Richard Looker replied that it is both. Recently, the work under SPL has been more related to the MRP. Prior to 2010, work was more focused on better understanding Bay processes..

The primary focus of the permit is PCB load reduction. The goals are to implement PCBs control measures, assess PCBs load reductions, prepare Reasonable Assurance Analysis (RAA) for Green Infrastructure (GI), and to prepare implementation plans to achieve TMDL allocations. The numeric goal for GI implementation is to reduce PCBs by 3 kg/year by 2040. The RMP works close in coordination with stormwater permittees to collect needed information. There is sharing of information between the RMP and permittees and this will continue to be an important component of the joint stormwater programs. Per the permit, there needs to be some method for determining load reduction credits from control measures (aka accounting). There's also a RAA requirement for green infrastructure. There needs to be a demonstration on how green infrastructure will be implemented to reduce PCB loads. This can be done at the municipal or regional level. Demonstration will be completed via modeling and accounting. It would be beneficial to harness the information flow between the RMP and the permittees for RAA. The preparation of implementation plans will go beyond the current MRP. Part of the process will be to look at what control measures will be implemented and what is the timeframe for implementation beyond MRP 2.0 to achieve TMDL allocations. The RMP can also play a role in this.

2c Information: Overview of related stormwater program activities and objectives

Chris Sommers provided an overview of the stormwater programs efforts. Chris Sommers noted that a lot of work goes into the STLS process from the Water Board, other RMP stakeholders, and the county clean water programs. The primary driver for this work is the PCB TMDL mandated load reductions. The programs are now implementing MRP 2.0 which will ID watershed management areas (WMAs) for

control measures, account for required load reductions, prepare RAA, and prepare PCB/Hg load reduction plans for achieving TMDL load reductions. There's going to be city plans developed for removing PCBs from demolished buildings. Also looking at PCBs in structural controls. A lot of work completed in the last 8 years to ID where PCBs are in the landscape including ID of old industrial areas before 1980, then classifying these areas into high/mod/low expected PCB concentrations. There has also been street dirt/stormwater monitoring to classify/validate the classifications, with ID of high priority catchments as an outcome.

There's a question about how to best interpret sample data, in particular how should the data be interpreted to answer management questions. The stormwater programs have developed a PCB threshold concentration that can be used to ID an upstream source. The threshold is somewhat arbitrary but important. There's still a question on how to classify catchments so that we cost effectively target the right catchments for further investigation. More information on determining the threshold and a data analysis method for the data will be helpful. Arleen Feng noted that source ID is a particularly vexing problem for stormwater managers.

There is and will continue to be a large effort by BASMAA to develop RAAs. BASMAA is developing an RAA guidance document that will be released in its final form in June 2017. RAAs will most likely be completed on a county wide basis using raw RMP and BASMAA data and synthesized information such the outputs from the regional watershed spreadsheet model (RWSM). RAAs will model or estimate PCB & Hg reduction from GI and source control demonstrating PCB load reduction effectiveness. Each municipality will also develop a GI plan for PCB/Hg reduction. There is a lot of planning happening under this permit term at the city and county level as well as connecting the planning efforts across different scales. Communication between RMP & BASMAA will be very important in developing RAAs. The RAAs needs to be approved by Regional Board staff as well as go through peer review.

Kelly Moran asked who will be the peer reviewers? Chris responded that this is undetermined at this point. There have been technical reviewers involved on the development of the RAA guidance document that have connections to the STLS. He also responded that it would be beneficial if the peer reviewers are consistent across the county programs.

Phil Trowbridge noted the primary question is to ask how can RMP data be best utilized for these different efforts?

3 Overview of proposed Special Studies

Don Yee summarized the work of the RMP STLS staff to lay out a roadmap of projects and timelines and linkages between the proposals and the broader program stormwater program. The primary goal for all STLS work is provide data to support management decisions on reducing the impacts of pollution and to help stakeholders measure regional changes in loads and concentrations compared to targets over time. For trends, how do we assess progress towards load reduction goals? The general elements & linkages for the roadmap include pilot studies, field programs, modeling tool application, and actual outputs from these efforts.

Arleen Feng asked if the framework is general or specific to particular contaminants. She also

commented that we still need to determine what the archetypes are and how they get applied - the word archetype may mean different things to different people.

Don Yee also outlined the questions for the advisers to consider throughout the day. Richard Looker expressed concern that if the synthesis component of the road map is pushed out to a much later date then we might get there and not have the right information to assess progress. He suggested spending time earlier to develop the synthesis tools since that is the most important output. Don Yee suggested that we have to start with something and then learn iteratively and adaptively. Need to build in flexibility to the road map.

Chris Sommers noted that the challenge is investing resources into developing the archetypes and learning adaptively. Resources are limited so we need to think about the archetype development on the front end. Jing Wu noted that a regional model will be a good tool to synthesize all of the information. Monitoring and modeling will proceed in parallel using the models to guide further monitoring. Richard Looker is looking for the mechanisms for feedback in the process to ensure it is iterative and adaptive. Arleen Feng noted that the difficulty is how to fit this process into the real world timing constraints of the MRP as well as the resource constraints. How will the permittees use incomplete information in the timeframe needed. We need a longer term planning effort to think through the issue. Peter Mangarella asked what proportion of resources will be utilized for trends? He noted that so far roughly 90% of resources has been spent on pilot study design and field program. Kelly Moran asked if there could be some time on the agenda to discuss the gaps in the proposals to which Phil responded that we have a large portion of the meeting time dedicated to getting feedback on the proposals and the program more generally for the last 2 hours of the day.

3a Proposal: Reconnaissance characterization monitoring

Alicia Gilbreath provided an overview of the reconnaissance monitoring to date. The reconnaissance method is a rapid and adaptable field technique to gather limited information from more locations across the region as a whole. The method is to sample one composite during one storm event at a site. The method was designed and first implemented during WY 2011 and then modified and implemented in WY 2015-2017. The main goal of using the method is to ID high leverage PCB source areas using a simple ranking technique that allows for simplistic comparisons between sites based on either stormwater concentrations or particle ratios. The simple rankings practice currently ignores variations in antecedent rainfall conditions, storm characteristics during sampling, and likely differences in source-release processes that are conceptually possible given watershed specific land use and source areas configurations . Despite these weaknesses, false positives are unlikely and so the method has helped to find about 15 locations of interest out of the 70+ sampled to-date by the RMP of the 4 years of monitoring using this technique, classifying high to low concentrations. It’s a flexible, relatively low cost method that also allows for sampling in tidally influenced channel systems as long at the storm times right relative to low or outgoing tides.

Alicia Gilbreath summarized the findings over the monitoring period. Mercury results show that most sites are above the TMDL waste load allocation of 0.2 ug/g. In 2016, a very high Hg concentrations was detected at Gilman Street in Berkeley. Similarly, for PCBs, most sites are above a conceptual PCB waste load allocation based on the regional stormwater waste load allocation of 2 kg PCBs compared

to either an estimate of regional flow or regional suspended sediment load.

Mike Stenstrom asked why do some old industrial areas not have PCBs? Alicia responded that the challenge is that old industrial areas cover a broad area of land use and source area types. In addition, the current reconnaissance method that measured concentrations in runoff from just one storm could result in false negatives (sampling storms that don't show the true loading character of a particular watershed).

To decrease the costs even further, we have also been piloting remote, unmanned sediment samplers. The data suggest that the samplers could be good for characterizing PCBs but not as good at characterizing Hg. One hypothesis is that Hg tends to be on finer grained particles that aren't entrained in the samplers as readily.

Questions for the advisers:
How can we improve the method?
Are we ready to shift to remote samplers? Could we also deploy samplers for longer time periods?
How can we adapt/refine the recon methods for broader uses?

Discussion
Mike Stenstrom noted that we could create our own land use categories to help with analysis. Old industrial is very important but not all old industrial areas are the same. Having data on land use is a very important part of a program. Mike Stenstrom recommended that we utilize the updated old industrial data layers that the counties have developed.

Kelly Moran noted that the current reconnaissance design isn't working as well as it could be - she noted that there is not a strong relationship between PCBs and old industrial area. She suggested that we need to look at the data in much more detail. We need to open up how to look at the data set - the field method has its limitations that may not be easily resolved without spending a lot more money but the data can be mined using more detailed interpretative techniques . She asked what are the other correlations in the data e.g. storm size etc. More analysis of the data are needed. If there is interest in using the data for wider purposes, moving to a probabilistic site selection process may be important. She also asked about collecting depositional sediments to which Arleen Feng responded that that stormwater programs are already doing a lot of that at the scales of individual properties but that that method is also prone to false negatives.

Dan Cain asked if we are seeing any surprises in the data? Alicia reiterated that we see low concentrations in area that were targeted because of high percentages of old industrial areas upstream. We also see very high concentrations occasionally but that these do not always correspond to the storm size sampled or to the percentage of old industrial upstream but do generally occur where there has been little redevelopment. But even when we find a high concentration, the larger question is where within the old industrial upstream should we be spending our efforts.

Barbara Mahler asked if we have looked at the bedded sediment data with the stormwater data? We have in the past but RMP staff haven't recently. BASMAA has looked at bedded sediment data to

inform where to monitor stormwater. Kelly Moran recommended doing more of these types of analyses. There's more questions about the middle part of the data set. If anything, the budget and oversight for this work may need to be increased.

Jay Davis noted that the false negatives are an issue so we could increase the frequency of sampling to try and reduce this. Lester commented that the field and interpretive methods as currently applied to not do a good job of predicting sources and processes within watersheds - congener profiles may help, as would a better understanding of the spatial distributions of possible sources properties and sampling more than one storm so that time and space can be reconciled.

Lisa Sabin suggested that we could look at imperviousness and concentration correlations using satellite data. Also look at antecedent rainfall and rainfall intensity relationships to the data. Can also look at transport processes to the analysis.

Mike Stenstrom noted that some watersheds wouldn't calibrate in the RWSM. This suggests that there's something different in those data and it needs to be investigated.

Barbara Mahler noted the congener profiles might provide more indication on why PCB levels are different amongst old industrial sites. Jay Davis responded that there are some interesting patterns in the congeners that we have looked at including storm differences and congener differences. Barbara Mahler noted that including the bedded sediment data in this analysis would be important. She suggested that Kerry Hornbuckle has been making progress on congener profiles so it would be good to look at some of her recent work.

Richard Looker commented on the importance of multiple uses of the data. The reconnaissance single storm data can tell us something about differences between sites but have not been very useful so far for supporting the RWSM. This could be improved by collecting data during multiple storms or better interpretative techniques, but he worries about the suggestion of doing super-composites that span longer term seasonal or multi storm samples that may yield data that may not be useful for other applications. He asked what do you lose by temporally integrating data via a long term method? This needs to be considered when making a decision to move to a long term composite design. It would be difficult to tease apart storm related data.

Don Yee asked how would you use temporally integrated samples in a model? Jing Wu noted that you wouldn't be able to use this type of sample in a dynamic model calibration. Richard Looker noted that you might ask a different question for a temporally integrated sample e.g. what is the impact of the five storm composite. Jing Wu noted that both grabs and longer term composites are useful for answering that question. Mike Stenstrom said in relation to calibrating the RWSM, that you can look at the residuals of an analysis and weight those residuals based on confidence and the impact on the calibration. There are formal techniques for weighting the data in the Box method of autocalibration.

Peter Mangarella noted that PCBs are mostly a "large storm" problem therefore the long term integrated samples are less informative. Better to focus efforts on large storm events.

- Lunchtime presentation (Guadalupe Hg loads during large storms)

3b Proposal: RWSM support

Jing Wu presented a summary of the RWSM proposal. The last phase of the RWSM provided a good model calibration. The results of this calibration indicate that old industrial areas produce the highest PCB concentrations and yields (mass per unit area). Well sampled watersheds were used for the calibration - the reconnaissance data from 40+ sites were experimented with extensively but were eventually dropped due to the unpredictability of false negatives within that data set. However, even with the use of the well sampled watershed data only, watersheds with high PCB concentrations tended to be under simulated in the model. For mercury, the model calibration suggested that agricultural and open space land uses should have the highest concentrations, followed by old urban, and then old industrial. Given the high sediment loads in rural areas, even with low particle ratios, this result seems generally logical. However, this results in a relatively low variation in simulated concentrations across the calibration watersheds that do not fully reflect the variability that has been observed leading us to the conclusion that the Hg model isn't very sensitive to the data and is not as well calibrated as the PCB model.

Mike Stenstrom suggested that the high point in the concentration data might be driving the poor calibration - drop the point out and see if it improves the calibration - something is going on in that watershed. Regional load estimates for both models are in the right order of magnitude despite calibration challenges for each model. The primary use of the model is to estimate annual regional contaminant loads. It also provides regionally averaged estimates of land use concentrations coefficients and yields as part of its output. It could be used in the future for generation of 1st order estimate for loads of other contaminants. However, given the average annual time step and the regionally calibrated nature, use of the model at scales more akin to management (sub-watersheds and source areas) is not recommended. In addition, the model is limited and shouldn't be used to measure spatial or temporal trends over time. The model also can't simulate landscape related BMP performance at the scales of individual storms when management practices must be tested for performance.

Barbara Mahler asked if the current work timeline is reasonable. Arleen Feng commented that the public use of the model is still under discussion - that in this case "public" more likely means BASMAA and its consultants. Chris Sommers noted that the RWSM will be beneficial to BASMAA's RAA modeling efforts where it is planned to use the regional coefficients as a starting point for the RAA model inputs or calibrations. We need to ensure that communication about the structure and performance and data needs of the County RAA models comes back to the RMP and SPL to help inform future directions.

3c Proposal: Alternative flame retardants

Arleen Feng presented the alternative flame retardant (AFR) proposal. There is a MRP permit requirement to address "relevant management information needs" for certain Emerging Contaminants (ECs) which is best conducted via a RMP special study. There is an existing RMP synthesis and strategy document that outlines the scope of the EC efforts under the Emerging Contaminant Workgroup (ECWG). Within the strategy document there's a task to develop a conceptual model of

AFRs with a 2019 placeholder of $80k which doesn't fit within the permit timeframe. This project will help coordinate between the EC & SPL workgroups with respect to AFRs.
Kelly Moran asked if this proposal fulfills a gap in the ECWG? Becky Sutton noted that the strategy does call for an AFR conceptual model and it will information the 2019 work. Kelly Moran also asked if the conceptual model will summarize how AFRs are used outdoors.Arleen Feng responded that it is still uncertain how the two groups will collaborate and how to integrate the varying needs of each workgroup. Kelly Moran asked if any research will be required to ID which consumer products have AFRs and in particular those that are outdoors? Becky Sutton did note that yes this is something we need to look at. We need to look at the various pathways of AFRs to the Bay and get good information for the next phase that will occur within ECWG. Kelly Moran noted the distinction between pathways and sources. Becky Sutton noted that these are important components to consider in this proposed project. Jan O'Hara noted that the outdoor use would be most important. Arleen Feng noted that the proposal would mostly summarize existing data on stormwater and deliver back the conceptual model to the ECWG. Mike Stenstrom recommended we could develop a mass emissions model and look at atmospheric drop out to see what are the most significant pathways. Arleen Feng responded that atmospheric pathways haven't been explored in great detail and there are no local data but that the project team could include an exercise to list the possible pathways and evaluate each conceptually. Mike Stenstrom agreed and suggested not just a conceptual evaluation but trying to put some rough numbers on the pathways to get an idea of the most important pathways during this first phase of the AFR project.

3d Proposal: Trend Strategy

Aroon Melwani reviewed the work completed to date for developing a trends strategy. We have been working to design a statistical trends model. There's a challenge in designing a sampling program with highly variable PCB data. The model showed that too many samples would be needed to show change over time.

Richard Looker asked what is driving the quality of the model in terms of Guadalupe River (GR) vs Z4LA? Aroon Melwani noted that Z4 concentrations are low and have apparently no spatial signal. For GR there is a signal and there are two different parts of that watershed.

The model development followed this procedure: Develop a multiple linear regression (MLR) model to predict PCB concentrations from grab samples accounting for climatic, seasonal, inter-annual factors [the concentration model]; Apply a regression relationship to continuous records of model variables (turbidity, precipitation) to estimate PCB load per event; Develop MLR model to test for significant changes in event loads over time accounting for climatic, seasonal, inter-annual factors [the trends model] assessing statistical power of MLR for trend scenarios.

A host of predictor variables were investigated in the model and the best models for both Z4LA & GR were evaluated. Residuals were also explored to make sure there weren't other patterns remaining in the data including temporal or seasonal patterns or relationships with other covariates. The residuals were also explored for autocorrelation. The GR findings included turbidity and rainfall parameters that account for significant variation in Guadalupe River PCB concentrations, PCBs predicted as function of turbidity, San Jose rainfall, Loma Prieta rainfall, and season, and the Guadalupe model residuals

indicate normality and homoscedasticity.

The next step was to apply a concentration model to the continuous data to estimate loads and propagate errors. Also, staff needed to determine discrete storm events from the continuous hydrologic record. One-third of the events did not meet the criteria for storm identification. In total 68 storms were selected for inclusion. The model estimated event loads. Events with estimated loads > 100g had higher error bars (~20%).

A trends model was also developed by investigating how various model parameters explain event loads. Residuals were explored which showed no statistical relationship between PCBs and year or season. Residuals of peak flow, SSC and PCB loads over time suggest the model will under predict PCBs at higher SSC. The conclusion of the model is that there have been no trends in PCBs over time of monitoring period.

Mike Stenstrom asked what is the relationship between PCBs and rainfall? Aroon Melwani responded that there's a lot of noise and variability between rainfall and PCB loads and that only a weak relationship exists. Peter Mangarella asked why we didn't do the same analysis with Z4 data? Aroon Melwani responded that initial results looked more promising for GR and with limited funds, we decided to push along with GR to complete a demonstration of concept rather than risking not complete the model for either watershed to a satisfactory level.

Aroon continued his presentation by discussing a power analysis to see what type of pollutant load trends we can detect with different monitoring designs. He superimpose the the empirical data with linear and geometric declines at various rates of change. The data were propagated through trend models procedure to develop new coefficients for the concentration model, estimate PCB event loads and errors (N = 68 storms), and simulate loads and test for trend (using 1000 model runs to generate reliable statistics). The power analysis for PCBs showed no significant annual trends detected in 5% or 10% linear decline and no significant annual trends detected in 4% or 6% geometric decline. For PCBs and Turbidity there was an 80% Power for linear decline of 5% (60% over 12 years) and an 80% Power for geometric decline of 6% (50% over 12 years).

Chris Sommers asked why we would use a geometric vs a linear decline.? Arleen Feng asked what would be the 2nd watershed for the analysis since Z4LA did not show good initial results and didn't have enough data? Bob Hirsch noted that the work has really matured and was very pleased at how the models have developed. He recommended using the geometric trend since it is more realistic e.g. we will never reach zero. Lori Sprague asked if there is an assumption that the decline in PCBs will be based on a reduction in turbidity. Richard Looker said not necessarily but it's uncertain which will be the primary driver (PCBs or turbidity) of a decline. Chris Sommers noted that, if anything, the emphasis should focus on the source control side of the management reduction effort rather than turbidity side which would be more reflective of treatment control. Lori Sprague asked if we are trying to see an overall reduction (induced by uncontrollable variables such as increased stream flow due to climate change) vs a controllable reduction (induced by management action). Richard Looker noted that this is a good point but the TMDL isn't that sophisticated, is prescriptive to a load reduction, but doesn't take into effect other variables that affect loads. Richard Looker hopes that these uncontrollable variables

aren't as important as source reduction. Lester McKee noted that we could explore how the model outputs change if we ramp up rainfall by reasonable amounts as predicted by our published local climate change downscaling simulations. Bob Hirsch noted that it is also important to discuss what types of declines would be seen if there were no changes to rainfall patterns. Lester McKee asked if we need to add some flow normalization. Don Yee noted that the modeled 2017 max is higher than past empirical data - is this an artifact? It was agreed that this would be further explored in the next iterations of the technical work after the meeting.

Trends proposal
Why do we need a regional model?
Lester McKee and Jing Wu presented the proposed work on the trends strategy development. It's very expensive to monitor everywhere so we need a tool that can scale up from individual watersheds to a regional model. The model can also be used to guide future monitoring efforts. The model can also be used to assess management actions. A model is cheap to run once it is developed unlike data collection which has a relatively low information yield that requires a lot of patience to observe all climatic variability - models on the other hand can be used to explore and predict landscape processes outside of observations. Models thus provide continuous management support and a lot of flexibility.

The proposal as it was presented at the meeting would include:
a - Complete Guadalupe trend analysis and design and cost out a field program ($15-20k)
b - Develop a similar statistical model in a second watershed ($50-60k)
c - "Trends level" monitoring ($30k + $70k carryover)
d- Develop a modeling framework for estimating regional scale loads ($75-95k)

Arleen Feng noted that the stormwater program has a Bay Area Hydrology Model - she requested changing the name to distinguish between the models. Chris Sommers asked if we could approve some of the elements and if there is a timing structure and a dependency of the elements? Lester McKee noted that optimally we want to complete 4a before starting 4b, and that 4c would start after 4a and 4b are completed. Phil Trowbridge added that the modeling task is important to figure out where to monitor for trends. Richard Looker asked about synthesizing the trends work in specific watersheds and how to scale that to regional loads to the Bay. It was not clear to him or many others in the room as to why we would spend a significant amount of money on watershed monitoring to plug into developing a regional model. This is a resource allocation question. Lester McKee responded that trends designed for a specific watershed would be used to design a trends monitoring method. Once enacted, the data from applying that method in selected watershed could be used for many purposes including calibration of a model to assist in regional scale loading trend evaluations. Richard Looker asked if the monitoring data could be used for both trends modeling for the regional scale and monitoring trends at the single watershed scale to which Lester and Jing answered yes. Mike Stenstrom said he is skeptical of using a HSPF model as a regional scale model for estimating PCBs loads and asked what mechanisms do we need to better understand before we could calibrate such a model? Arleen Feng noted that the decisions to date about this aspect of the proposal are missing a larger stakeholder input process beyond the STLS monthly meetings and that in this case, the discussion had not been fully completed prior to the SPLWG meeting. If this were to be funded now, the RMP would need to allocate more STLS coordination budget to coordinate more meetings around the development of such a model and

that most permittees are already overloaded. There are a lot of good ideas in this proposal but it's not unrealistic to get this all agreed to by the TRC meeting on June 8th 2017. Chris Sommers added that implementing the model in a parallel fashion with other RAA models might not be the best use of resources and not allow a feedback of information from the RAA model development. Lester McKee summarized the conversation so far by suggesting that there appears to be a consensus emerging to add sub-task 4dii (Refine rationale for watershed archetypes and select watersheds) before 4b (Develop statistical model in 2nd watershed) or at least before 4c to help inform 4c ("Trends level" monitoring).

4 Discussion: Recommended Studies for 2018

Summary of proposals and budgets as presented before discussion.

Proposal #	Proposal Name	Management questions addressed		
			Low End	High End
1a	Advanced reconnaissance data analysis	MQ#3. Management Support	40	60
1b	Reconnaissance characterisation monitoring	MQ #1: Source ID	55	150
2	RWSM support	MQ#4. Loads/ Status/ Presence	5	7
3	AFR conceptual model development	MQ#4. Loads/ Status/ Presence	13	16
4a	Trends strategy: Complete Guadalupe trend analysis	MQ#2. Impairment / MQ#5 Trends	15	20
4b	Trends: Develop a statistical trends model for a 2nd watershed	MQ#2. Impairment / MQ#5 Trends	50	60
4c	Trends: "Trends level" monitoring in a select watershed	MQ#2. Impairment / MQ#5 Trends	30	30
4d	Trends: Develop a regional modeling framework	MQ#2. Impairment / MQ#5 Trends	75	95
5	STLS management support	Coordination and Management	32	32
		Total	**315**	**470**

Kelly Moran was struck by lacking clarity on how the SPL work fits in with the larger issues in the Bay. She recognized that a task/proposal related to connections between SPL and the larger bay issues would not be possible to add this year, it should be considered for next year. She also noted that the SPL is not moving closer to finding true sources - this needs to be a greater focus? She suggested that the proposals are disconnected from where PCBs come from and need an improved connection to source areas. The program keeps trying to connect PCBs to land use without exploring other connections. She suggests we need to look at the conceptual model for PCBs again and think this through some more. There are other linkages such as PCBs in caulk, gas lines etc that need to be

considered in our advanced data analysis proposal. These other sources need to be explored as part of the upstream component in the conceptual model. For the modeling approach to be more effective, it probably needs to be more source specific. Kelly Moran is noting that a source focus could result in better chances of identifying site of management interes. Lester McKee noted that a 2006 report summarized true PCB sources and quantified the source contributions by percentage. We could take another look at that work as a starting point but that source inventory hasn't been revisited since then but BASMAA has been doing some work on this and there are recent published PCB mass inventories that could be used to develop an improved mass balance at the regional scale. Kelly Moran clarified that the work would not need to be done numerically but just needs to be at the conceptual model level (but improved over the 2006 work) summarizing how PCBs in these products would be released in under rainfall-runoff conditions - not quantifying the sources.

Chris Sommers responded that the focus of the STLS is a good point to clarify. There are efforts outside the SPL that aren't often communicated in this venue and that RMP staff are not always aware of the latest information that BASMAA has developed. There's a large effort looking at PCBs in building materials that will be implemented by cities. There's also some effort looking at PCBs in electrical transformers and distribution systems - a white paper. Many of these efforts are data poor. BASMAA could do a better job in communicating these efforts to the RMP staff. Arleen Feng noted that the work BASMAA is doing is beyond monitoring and modeling and is at cross purposes of data needs to some extent. Kelly Moran clarified that her request on the conceptual model is about what needs to be monitored. Phil Trowbridge noted that some of Kelly Moran's request could be incorporated into proposal 1a (advanced reconnaissance data analysis) and that 1a might not be resourced enough to answer some of the questions on data analysis to inform monitoring. Jan O'Hara added some support to Kelly Moran's point. There's a recent lack of documenting the refinements of a conceptual model since we've focused on management. There are one off sources that we don't understand.

Barbara Mahler suggested that the SPL group did discuss looking at true sources at the last meeting (May 2016) but that we all felt it wasn't a fruitful effort due to the lacking information to ID sources.

Peter Mangarella suggested that the trends question is the biggest question and hardest question. Proposal 4a (Guadalupe trends statistical model) and 4b (trends statistical model for a 2nd watershed) relate to evaluating trends based on empirical data in single watershed locations. He then suggested that 4d (Develop a regional modeling framework) says use deterministic modeling to do trends based on presumptions of management actions. He suggested we probably don't want to do both [but his assumption about what 4d is was not correct - 4d is not about estimating trends based on presumptive management actions - this is what RAA modeling will do - instead task 4d is about modeling trends for the region based on input data for single watersheds (let's guess at a half dozen or so) and on real management actions recorded in the accounting system through time that have been completed for the region]. This misconception was near ubiquitous in the room and likely caused by a combination of trying to bring the concept forward to fast and lack of preparation of a full conceptual model prior to the meeting.

Richard Looker noted that the model in 4d could be used for other contaminants. With 4a and 4b you are only getting trend information in the place you are monitoring - not scaling this to regional trends.

Lester McKee noted that Z4LA was dropped in the first trends model development due to resources but we could revisit it if funds were available which might be desirable given its halfway done and what we have learned from Guadalupe and that it represents a nice contrast to Guadalupe - the results of which would provide some idea of the universe of variation for the region as a whole.

Arleen Feng noted that the stormwater manager's question whether funds should be spent on monitoring/modeling or on implementing. Dan Cain asked how much data would be needed to calibrate the proposed 4d model? Jing Wu replied that we have some data to start but it is unclear how much data is needed to support this kind of model. If the “archetype watersheds” are well selected then they can be very representative in the model and thus fewer of them might be needed.

Richard Looker observed that we could look at the proposals on a regrets vs no regrets basis. 1a is no regrets and maybe we increase that budget, 1b, 2, 3, 4a are no regret, 4b is a potential regret, 4c is no regret, 4d is a no regret but many decisions to make before moving forward, 5 is no regret.

Chris Sommers asked if we need to start on a new modeling platform to make a first cut for developing archetypal watersheds for monitoring. He suggested that 4dii (Refine rationale for watershed archetypes and select watersheds) could be done for other reasons outside of preparing for a modeling platform.

Mike Stenstrom noted that we have collected a lot of data that haven’t been adequately analyzed - only a simple ranking method has been used for comparison purposes and much more can be done with the data we have. He suggested that we need to identify collate all the data we have, go through a stakeholder process to define the questions, work with stakeholders to define the modeling needs and the platforms that could be used all before moving forward with developing a model. Modeling is 1% of the cost of data collection but the right model needs to be selected. Peter Mangarella asked why we couldn’t use the RWSM as a model. Jing Wu replied that the RWSM doesn’t have a temporal component and is calibrated at the regional scale not at the scale akin to management practices. Mike Stenstrom countered that we could consider using the RWSM for 4d (regional trends) as long as we are careful to recognize there’s a limit since it is average concentrations and average annual loads. Chris Sommers asked if the RMP staff are ready to make a decision about a modeling platform without the questions Mike Stenstrom raised being answered. Lester responded no - the objective of one of the subtasks to to explore those types of questions and document the rationale for the choice of a suitable modeling platform. Kelly Moran proposed that it would be great if all the counties could combine resources and develop one RAA model. Arleen Feng noted the key question is how to phase this proposed model development in relation to the RAA model developments and that the permittees don’t have the bandwidth to run a parallel modeling effort by permittees and RMP separately. Proposal 4b (Develop a regional modeling framework) needs to be pulled apart and budgeted for each separate subtask but, even then, proposal 5 would need to have more budget to facilitate the stakeholder process even if BASMAA had the bandwidth. Phil Trowbridge reiterated Mike Stenstrom’s idea of building a modeling roadmap as the appropriate task right now - rather than actually getting going on modeling. Chris Sommers reiterated pulling out 4dii (Refine rationale for watershed archetypes and select watersheds) as a first step and not to propose getting started on the modeling just yet until we see the outcomes of some of the county RAA models. Don Yee noted that “archetypal” development

will be an iterative process but that we can start on it and set up a plan for how to do it. He also noted that findings from 1a (Advanced reconnaissance data analysis) will provide further information to support 4dii (Refine rationale for watershed archetypes and select watersheds). Barbara Mahler noted she agrees with the discussion so far and has some discomfort with developing a regional model just yet given all the parallel tracks and projects.

Kelly Moran had a question on the budget in 1b and why it's so variable. Alicia responded that we have some carryover funds and that to some extent, this task just gets all the leftover budget based on the budget cap the TRC provided us - the other tasks need more rigid budgets but the field monitoring task can just be adjusted up or down to do more or less sites depending on available budget.

Peter Mangarella noted that the data resulting from reconnaissance characterization monitoring fieldwork has been useful but there is some concern about the methods both in the field and interpretative - he likes that we are continuing to resolve those and supports task 1a (Advanced reconnaissance data analysis) and 1b (further data collection perhaps with more repeated sites). In terms of trends, 4a is worth doing and maybe 4b but he was not supportive of 4c and 4d. In contrast, Dan Cain was a proponent of trends monitoring and analyses. One outcome of trends monitoring is how to optimize sampling. There's a question on how the data collected in the other tasks will inform a regional modeling effort - need to understand the variability in the data first and the RMP team need to layout the modeling framework more carefully.

Mike Stenstrom also supported the Proposal 1a and 1b (Advanced reconnaissance data analysis and further data collection) but recommended that Aroon Melwani take a look at the existing data to see how many samples you really need to identify watersheds of interest. He recommended that this be done as part of the 1a (advanced reconnaissance data analysis). He supported the continuation to completion of proposal 4a (Trends statistical model development for Guadalupe) but he suggested that we need to check again with the stakeholders on the detection level is for the trend you want to detect. He also supported doing 4b (statistical trends model development for another watershed) and supported the staff recommendation that to do it in Z4LA since we have a start on this one already and that Z4LA represents a different type of watershed and therefore that things will be learned from doing so. He did not support embarking on 4c or 4d at this time but agreed that using some budget to plan out those more carefully would be warranted. Peter Mangarella agreed with Mike that it would be good to get more statistical support for best sampling design for the reconnaissance characterization field methodology - EMC vs grabs and how many storms may be needed to get a reasonable picture of the a realistic EMC for each watershed.

5 Decision: Recommendations for 2018 Special Studies Funding

This is the proposal matrix that resulted after all the discussion at the meeting that was completed during the closed session without RMP staff present.

Proposal #	Proposal Name			
		Low	High	SPLWG

		End	End	Recommendations from 5/17/17
1a	Advanced reconnaissance data analysis	40	60	100
1b	Reconnaissance characterisation monitoring	55	150	150
2	RWSM support	5	7	7
3	AFR conceptual model development	13	16	16
4a	Trends strategy: Complete Guadalupe trend analysis	15	20	20
4b	Trends: Develop a statistical trends model for a 2nd watershed	50	60	30
4c	Trends: "Trends level" monitoring in a select watershed	30	30	0
4d	Trends: Develop a regional modeling framework	75	95	20
5	STLS management support	32	32	32
	Total	**315**	**470**	**375**