

STORMWATER LOADS MONITORING IN REPRESENTATIVE WATERSHEDS

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ESTIMATED COST: \$352,000 per year (2014 special and pilot studies budget)

OVERSIGHT GROUP: Sources Pathways and Loading Work Group (SPLWG)

PROPOSED DELIVERABLES AND TIMELINE

Deliverable	Due Date
Task 1. Project Management (write and manage sub-contracts, track budgets)	Jul-Sep the following year
Task 2. Equipment purchase and prefabrication	Jul-Sep each year
Task 3. Fieldwork	Oct-Apr each year
Task 4. Laboratory analysis	Nov -May each year
Task 5. QAQC / data management	Jun-Sep each year (dependent on final sampling date)
Task 6. Preliminary data presentation, interpretation, and discussion	Summer/Fall each year

Background

The San Francisco Bay Hg and PCB TMDLs call for a reduction in loads by 50 and 90% respectively. In response, the Municipal Regional Permit for Stormwater (MRP) (SFRWQCB, 2009) (Provision C.8.e.) calls for better quantification of loads of sediments and trace contaminants on a watershed basis and regionally. This is consistent with a long standing recommendation from the SPLWG where six observation watersheds were recommended, selected on the basis of land use and climate (Davis et al. 2000; 2001). This recommendation was reiterated by the SPLWG during 5-year planning (McKee et al., 2008). As such, the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP), through its Sources, Pathways, and Loadings Workgroup (SPLWG), has been conducting tributary loading studies for 11 years beginning WY2003 in Guadalupe River. The focus has been to provide information on sediment and pollutant transport processes and loads in urban watersheds around the Bay (McKee et al., 2004; 2005; 2006a; 2006b; 2009; 2010; 2012; 2013; Davis et al. 2007; Oram et al. 2008; Gilbreath et al., 2012), and for loads coming into the Bay from the Central Valley via the Sacramento and San Joaquin River Delta (McKee et al., 2001; Leatherbarrow et al., 2005; McKee et al., 2006; David et al. 2009; 2012). Most of the sampling effort has been focused on three SPLWG identified priority locations using a turbidity surrogate methodology recommended by McKee et al. (2001) and McKee et al. (2003): Mallard Island on the Sacramento River; Guadalupe River in San Jose; and the Zone 4 Line A flood control channel in Hayward.

During 2010 the STLS carried out two tasks to support the development of a draft multi-year watershed loading sampling plan (MYP). The first of these tasks “develop criteria and rank watersheds” used GIS to support a statistical classification of watersheds in the Bay Area. Preliminary results provided evidence that there are at least four distinct classes (Greenfield et al., 2010). The second task “Optimize sampling for loads and trends” took advantage of existing temporally resolute (5-15min) data available in Guadalupe River and Z4LA. These data were statistically resampled using a range of sampling designs and loads estimators (mathematical

formula for loads calculations). The outcomes supported the logical notion that more samples covering a greater number of storms or the use of the turbidity surrogate method provide loads with the greatest accuracy and the least bias (Melwani et al., 2010). At the March 29, 2011 STLS meeting, draft monitoring methods were outlined that included selection of the first four watersheds for monitoring (Sunnyvale East Channel, Guadalupe River, Lower Marsh Creek, San Leandro Creek), turbidity surrogate methods, the use of manual or ISCO sampling design depending on site logistics, 16 samples over 4 storms for 4 years for MRP category 1 pollutants, annual data management, and a report at the end of 3 years). During water year 2012, two additional sites were selected as POC monitoring locations, bringing the total number of sites monitored to six. Richmond Pump Station and Pulgas Pump Station (sampling location upstream of pump station) went online during WY 2013. The final sampling design for WY2013 load monitoring at the six sites was:

1. Turbidity surrogate at all locations
2. Discrete manual sampling for PCBs, Hg, SSC, nutrients, total organic carbon at all six locations, 4 samples per storm for 4 storms plus quality assurance samples (field blanks, field duplicates) and methylmercury, PBDE and PAH at a lower sampling frequency.
3. Composite sampling for copper, selenium, carbaryl, fiprinil, pyrethroids, and toxicity at all four locations, 1 sample per storm for 4 storms aiming for 16 aliquots per sample based on a prediction of storm duration plus quality assurance samples (field blanks, field duplicates). For Guadalupe River, given site logistics, composite samples were taken by hand also based on a prediction of storm duration
4. Continuous stage and flow data were also collected from each location.
5. Rain gauges were installed at each sampling location.

WY2013 continued the dry weather pattern seen in recent water years, particularly during the period January-April 2013. San Francisco rainfall for the period January-April 2013 was the driest on record in 164 years. Given the previous year was dry also and thus some samples were carried over at some locations, here is a summary of storms completed for each location to-date over the two years:

Richmond Pump Station: 3 of 4

Lower Marsh Creek: 6 of 8

San Leandro Creek: 7 of 8

Pulgas Creek: 1 of 4

Guadalupe River: 6 of 8

Sunnyvale Channel: 4 of 8

It is proposed that additional storms will be carried into the WY2014 sampling plan so that over a 3 year period, representative samples are taken at each site for a total number of 12 storms sampled (8 storm events for the 2 locations added in WY 2013). A lessons-learned document, with suggested recommendations for future monitoring, will be developed during the summer 2013 and taken into account as we set up for monitoring in WY 2014.

Objective: This study will implement a small tributaries monitoring in 2 watersheds: Richmond Pump Station and Sunnyvale East Channel (the other four locations are being carried out through separate BASMAA funds and contracts).

Applicable RMP STLS / MRP Management Questions

- Level I RMP, Q3: What are the sources, pathways, loadings, and processes leading to contaminant-related impacts in the Estuary?
- Level II RMP, Q3C: What is the effect of management actions on loads from the most important sources, pathways, and processes?
- Level III SPL Q2: What is the watershed-specific and regional total water flow, load of sediment, and load contaminants entering the Bay from the urbanized small tributaries and non-urban areas draining to the Bay from the nine-county Bay Area and are there trends through time?
- Level IV STLS Q1: Impairment: Which are the “high-leverage” small tributaries that contribute or potentially contribute most to Bay impairment by pollutants of concern?
- Level IV STLS Q2: Loads: What are the loads or concentrations of pollutants of concern from small tributaries to the Bay?
- Level IV STLS Q3: Trends: How are loads or concentrations of pollutants of concern from small tributaries changing on a decadal scale?
- Level IV STLS Q4: Support management actions: What are the projected impacts of management actions on loads or concentrations of pollutants of concern from the high-leverage small tributaries and where should management actions be implemented in the region to have the greatest impact?

Approach

POC monitoring will continue at 2 bottom-of-the-watershed locations in coordination with BASMAA and other project partners according to the Field Manual developed for WY2013 POC monitoring. Essentially, we will follow the WY2013 sampling design with small modifications based on lessons-learned to-date.

Proposed Budget

Deliverable	Estimated cost (spread across 2 watersheds)
Task 1. Project Management (write and manage sub-contracts, track budgets)	\$30,000
Task 2. Equipment purchase and prefabrication	\$6,000
Task 3. Field preparation, field work, Site set-up, shipping	\$100,000
Task 4. Laboratory analysis	\$145,000
Task 5. QAQC / data management	\$40,000
Task 6. Draft and final report (per MRP requirements)	\$20,000
Shipping and Travel	\$11,000
Total	\$352,000

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