

**Sources, Pathways, and Loadings Work Group  
Bay Area Stream Reconnaissance  
Technical Memo**

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## Introduction

Recent TMDL reports on PCBs and Hg emphasize the influence of local small tributaries on water quality in the Bay and call for reduced loadings from urban areas. Yet there is still much uncertainty associated with quantifying contaminant loads from the storm water pathway and little information on how best to achieve load reductions. Better certainty on the magnitude of the stormwater source relative to other sources and the ability to measure success through changes in concentrations on suspended particles or in loads resulting from upstream management initiatives necessitates further baseline data collection and loadings studies. Measurement of loads near the Bay margin in watersheds where other measurements of BMP efficiency are being done and where data exists for sub-watersheds upstream would allow modeling of the influence of scale on contaminant transport and of the linkage between action and success. Conducting further loadings studies in “observation” watersheds is a long standing recommendation of the Sources Pathways and Loadings Work Group (SPLWG) of the Regional Monitoring Program for Trace Substances (RMP) (see Davis et al., 1999) and has most recently been recommended in the SPLWG 5-year work plan (McKee, 2005).

## Objectives and Goals

The Objective of this technical memo is to provide information to help the SPLWG make a decision regarding the most appropriate watershed for a future loadings study similar to the current study at the Guadalupe River. Based upon current knowledge, hypotheses, and past SPL discussions an ideal watershed would have the following characteristics: a location within the Bay Area that will help our understanding of spatial variability of loading, a medium to large size, a significant proportion of urban and industrial land use, and a low ratio of upland “clean” sediment to lowland “dirty” sediment supply. In addition, there are a variety of logistical constraints that influence decisions on where to sample. These include creek access, lighting, access to the entire cross section during flood sampling, water flow measurement, bed stability, vandalism potential, and personal safety. The aim of this simple reconnaissance study is to inspect potential sample sites in selected contaminated drainages and rank each location based upon its characteristics.

The Goals are:

- To compile a list of potential watersheds for sampling
- To perform GIS analyses to provide statistics on watershed size, land use, and contaminants for each selected watershed
- To conduct a reconnaissance of each potential sample location to gather site-specific information
- To facilitate discussion at Workgroup meetings and a decision on the best location(s) for future studies through the provision of a matrix for rapid comparison of each watershed and a technical memo to describe each location in more detail

## Investigated Watersheds

Although this memo only references 7 watersheds, initially we selected 17 watersheds that are considered utilizing the following sources of information:

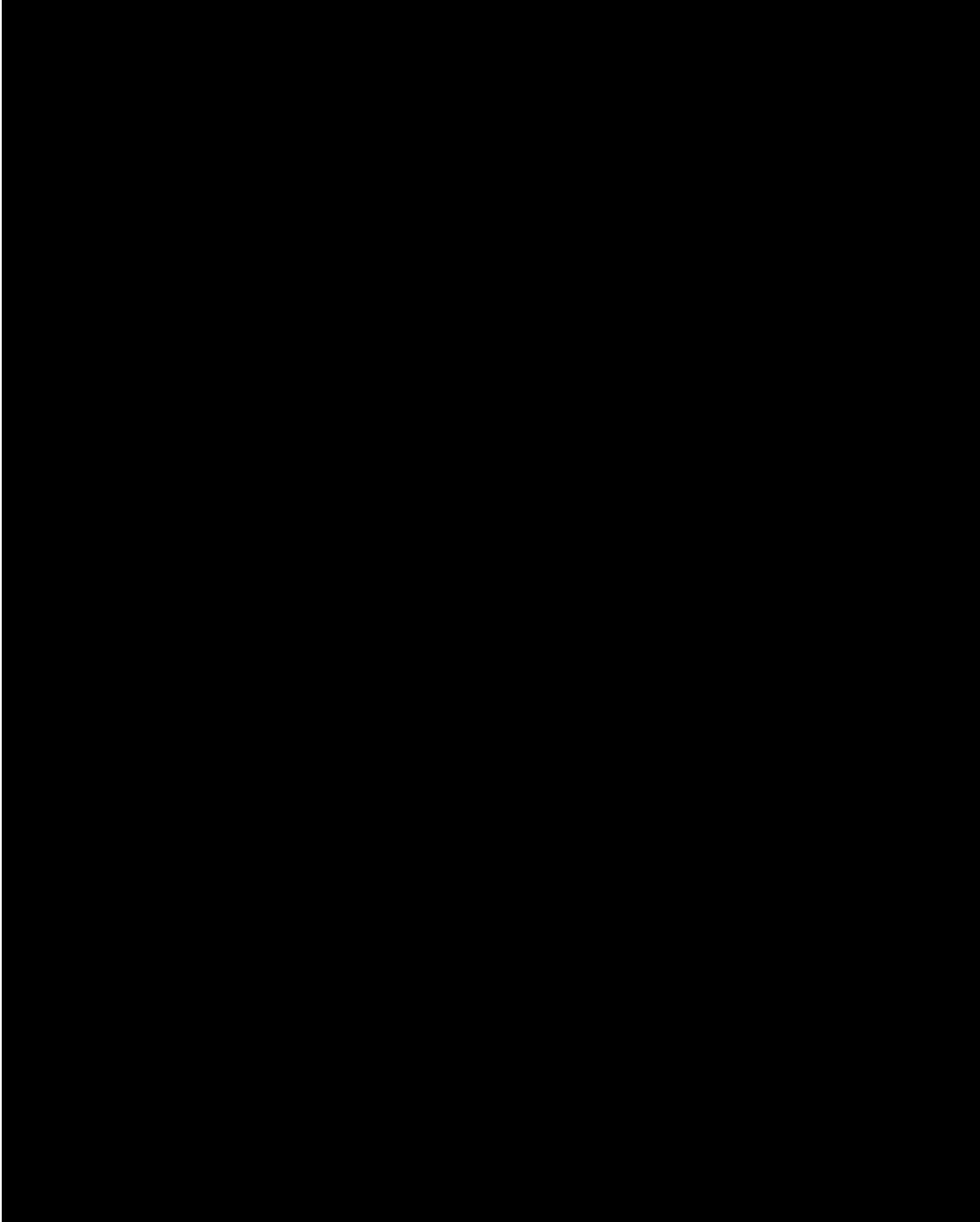
- A list of current and historic USGS gauge station locations
- Advice from local flood-control and stormwater managers
- GIS analysis of land use patterns around the Bay Area
- Professional judgment and watershed sampling experience

We choose a suite of watersheds that are spatially distributed throughout the Bay Area, without preference for one particular sub-region. The selected watersheds vary in size between 4 and 826 km<sup>2</sup>. Sites with current or historic USGS gauging were considered because the previously developed stage-discharge relationships can be utilized during the future sampling. However, consideration of watersheds was not limited to those that have had gauging, partly because gauging can be implemented, and partly because such a stipulation would cause the rejection of a number of sites that may be important for a management or policy standpoint. Local managers were consulted to get their preliminary suggestions for watersheds / storm-sewersheds to study.

The distribution of 17 selected watersheds is shown in the figure below, with each watershed outline shown over top of the current land use (ABAG, 2000).

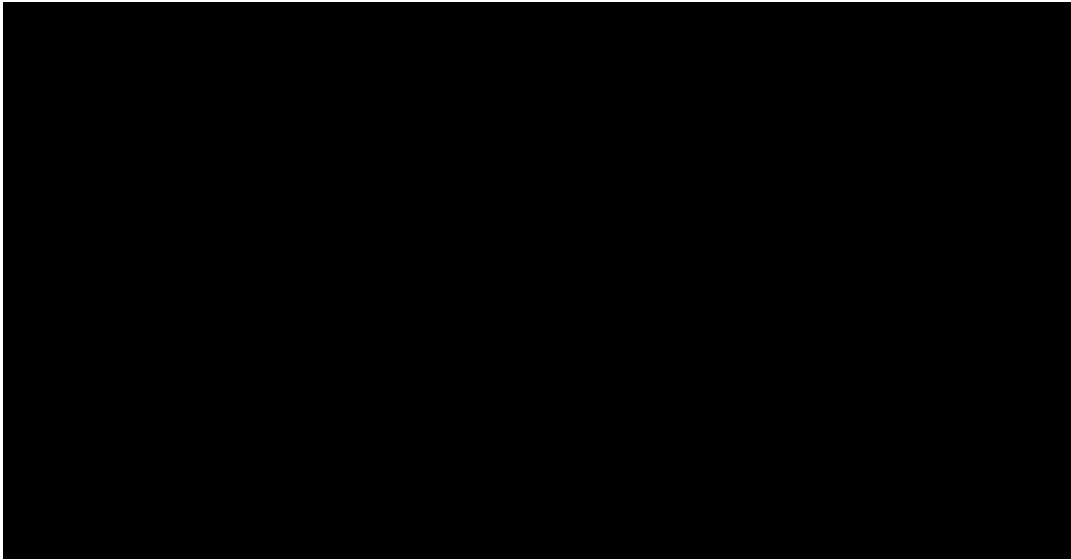
Following the figure is a 1-page overview of the 7 potential sampling locations that we decided upon after the workgroup did a first cut. The last page of this memo contains the field data summarized from field notes and measurements that was provided to the WG to help with decision making. The final decision will be a product of the 2006 workgroup meetings and will appear in future meeting presentations and minutes of both the RMP TRC and SPLWG.

Item #4



Map of the drainage basin area of the 17 investigated watersheds. Land use is from ABAG, 2000. The watershed outlines for the Petaluma River, Laurel Creek, and Lower San Leandro Creek are approximate. Watershed outlines for the Napa River, Corte Madera Creek, Colma Creek, Zone 6 Line B, Castro Valley Creek, Walnut Creek, and Wildcat Creek are only shown upstream of the USGS gauge location. A zoom-in of the Hayward Area is shown only for clarity.

## Wildcat Creek



A) View looking downstream at the Vale Road bridge.

Wildcat Creek is located in San Pablo, with the potential sample location on Vale Road just west of San Pablo Avenue. The creek is primarily natural, with only a 1 ft high concrete sill on the downstream side of Vale Road, and concrete jacks armoring the downstream left bank. The creek flows underneath Vale road in a concrete single barrel culvert, with a significant sediment deposit on the left bank side inside the culvert. A turbidity probe could be mounted to the wall of the culvert, and would likely sample in the pool on the upstream side. Vale road is a primary two lane residential road with a sidewalk on both sides and adjacent lighting. The surrounding area is lower-income residential, with a high school, hospital, and some commercial space. There is a slight possibility of crime potential and vandalism from high school kids during the day and homeless during nighttime hours. This location appears to be suitable for this sampling effort.

- Safety rating- Medium (daytime only)
- Overall feasibility- Medium
- Drawback- Nighttime safety

## Estudillo Canal



A) View looking downstream at the Wicks Blvd Bridge. B) View looking upstream from the sampling site on the upstream side of the bridge.

Estudillo Canal is located on the San Leandro/San Lorenzo border. The potential sample location is located on Wicks Blvd, a two-lane road with sidewalks on both sides. The channel is a stable engineered flood-control channel with a low-flow channel, wide floodplain, 2:1 slopes on the outer banks, and maintenance roads on both sides. The bridge is supported by 66 (6 across the channel width, 11 along the channel length) concrete pillars, which appear to have minimal effect during floods. A turbidity probe could be mounted to one of the concrete pillars and would likely sample on the downstream side of the bridge. Arleen Feng notes that tidal influence very occasionally reaches Wicks Blvd. This is evidenced by the brackish plant community observed on the low floodplain (species such as tule, bulrush, atriplex, distichlis, sedge, and rush). The water surface reaches the low floodplain surface even on the lowest flow events. With permission and a key from the ACFCWCD, access to the maintenance roads and underneath the bridge would be possible. However, sampling could occur from the bridge without access. The surrounding neighborhood is residential, with a school, park, and parking immediately adjacent to the channel. Off-street parking is immediately adjacent to the sidewalk. The sidewalk, lighting, railing, parking and neighborhood make this bridge ideal for this sampling effort.

- Safety rating- Good
- Overall feasibility- Good
- Drawback- Some tidal influence

## San Lorenzo Creek at San Lorenzo (Zone 2 Line B)



A) View looking upstream at the Washington Street Bridge. B) View looking upstream from the potential sample location on the upstream side of Washington Street.

San Lorenzo Creek flows through the City of San Lorenzo, with the potential sample location on Washington Street just south of Highway 880. At this location the channel is a concrete lined flood control channel with 4 m tall vertical walls and a flat bed with a 1.5 m wide inset low-flow channel. The turbidity probe would likely be suspended from the bridge and would sample on the downstream side. The USGS gauge house is approximately 50 m downstream of Washington Street, however the upstream sidewalk appears to be the best sampling location. Although Washington Street is a major road (4 lanes of traffic), a sidewalk and lighting allow for safe sampling. The field team would park in the adjacent Walgreens parking lot and carry the equipment approximately 50 m to the bridge. The surrounding area is commercial on Washington Street, but residential on either side. Graffiti underneath the bridge suggests that teens regularly hangout, and might potentially vandalize a turbidity probe. This location appears to be suitable for this sampling effort.

- Safety rating- Medium
- Overall feasibility- Medium (Higher? if we can work out a solution for vandalism)
- Drawback- On a major road



## Castro Valley Creek at Hayward



- A) View looking downstream at the footbridge taken from the Senior Center parking lot.  
B) View looking upstream at the old abutment from underneath the bridge.

Castro Creek is located in Hayward, with the potential sampling location at the Hayward Senior Center, just a few blocks upstream from the confluence with San Lorenzo Creek. The potential sampling location is a footbridge that fully spans the creek, with a 1 m tall wooden railing. The USGS gauge house is located on a platform underneath the bridge, but still 5 m above the channel bed. The creek appears very stable in planform and grade, with bedrock exposed in the bed and banks. An old stone and concrete abutment partially sticks into the channel just upstream of the bridge, potentially affecting high flows. A turbidity probe could be mounted to the concrete abutment, and would sample in a pool on the downstream side of the bridge. It is possible that large woody debris would be abundant during high flows, and might affect sampling. Parking is available immediately adjacent to the bridge in the Senior Center parking lot. The surrounding area is residential with the Senior Center and an apartment complex on either sides of the footbridge. This location appears to be suitable for this sampling effort.

- Safety rating- Good
- Overall feasibility- Good
- Drawback- A narrow bedrock channel with fair amounts of woody debris

## Zone 4 Line A



A) Downstream side of the concrete single barrel culvert. B) Downstream side sidewalk and fence. C) Looking downstream. D) Looking upstream.

Zone 4 Line A is located in the City of Hayward, with the potential sampling location on Cabot Blvd, south of Winton Avenue. The channel is a straight engineered channel, flowing through a single barrel concrete box culvert under Cabot Blvd. The concrete culvert bed and wingwalls extend 3 m from the culvert, but elsewhere the bed is natural. Downstream the bank slopes are approximately 3:1 with concrete slabs armoring the base of the banks. The turbidity probe would be mounted to the culvert wingwall, and would sample on the downstream side. A sidewalk exists on both the upstream and downstream sides, but the upstream side is preferable. However, a 2 m chain link fence would require modification to allow for sampling. With permission and a key from ACFCWCD, access to the maintenance road and channel is possible. The surrounding area is an industrial office park, with a fair amount of semi-truck traffic. This location has low crime potential during the day, but may not be ideal during nighttime hours. This location appears to be slightly less than ideal for this sampling effort.

- Safety rating- Medium (nighttime safety is questionable)
- Overall feasibility- Poor
- Drawback- Fence

## Laurel Creek



A) View looking upstream at the Curtiss Street bridge. B) Looking downstream at the concrete single barrel box culvert.

Laurel Creek is located in Hillsdale, with the potential sampling location just south of Hillsdale Blvd near Highway 101. The creek flows underneath Curtiss Street in a concrete single barrel box culvert, with a flat-bottomed concrete bed. The upstream side has nearly vertical banks without any revetment. The downstream side has a concrete sill drop structure controlling the grade, wire gabions on the left bank and concrete slabs stacked on the right bank. The turbidity probe could be attached to the concrete sill and would measure in the scour pool on the downstream side of the culvert. Curtiss Street is a two-lane residential road with sidewalks on both sides. The surrounding neighborhood is residential. Although the bridge does not have a railing, the bridge sill and chain-link fence are low enough to allow for sampling. Because of the neighborhood and steepness of the banks, there is a low potential for vandalism. This location appears to be suitable for this sampling effort.

- Safety rating- Good
- Overall feasibility- Good
- Drawback- Watershed land use

## Colma Creek at South San Francisco



A) View looking upstream across West Orange Drive into Orange Memorial Park. B) Looking at the upstream side of the concrete double barrel culvert.

Colma Creek is located in South San Francisco, with the potential sample location on West Orange Drive, just east of the El Camino Real. The creek flows in a concrete lined flood-control channel. Upstream of the bridge, the walls are at a 2:1 slope, with a flat-bottomed concrete bed. The channel flows underneath Orange Drive in a concrete double barrel culvert. The turbidity probe would be attached to the concrete and could be sampled either on the upstream or downstream side. Orange Drive is a two-lane main residential street with sidewalks and lighting on both sides. The surrounding neighborhood is primarily residential with some commercial space. Because the neighborhood is good, there is a low potential for vandalism or crime. Parking is available on the street immediately adjacent to the bridge. This location appears to be suitable for this sampling effort.

- Safety rating- Good
- Overall feasibility- Good
- Drawback- A stormdrain inputs 10 m upstream, potentially causing an unmixed sample