

Small Tributaries Loading Strategy

Lester McKee

Sources Pathways and Loadings Workgroup

Presentation to TRC

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Priority Questions and the MRP

1) Impairment

- *Which are the “high-leverage” small tributaries that contribute or potentially contribute most to Bay impairment by pollutants of concern?*
 - Directly link watershed loads to foodweb uptake and impairments in biota
 - Increase the cost effectiveness of strategies to reduce impairment
 - Focus on watersheds that have high loads and/or are adjacent to areas of greater significance on the Bay margin (Will require ranking watersheds)
 - MRP linkage: Provision C.8.f calls for loads monitoring in single watersheds



Priority Questions

2) Loads

- *What are the loads or concentrations of pollutants of concern from small tributaries to the Bay?*
 - Need to know loads from individual high priority watersheds
 - Need to estimate aggregate loads
 - MRP linkage: Provision C.8.f calls for loads monitoring in single watersheds



Priority Questions

3) Trends

- *How are loads or concentrations of pollutants of concern from small tributaries changing on a decadal scale?*
 - Track progress toward TMDL wasteload allocations
 - Need systematic data in fixed locations
 - MRP linkage: Provision C.8.d and C.8.f of the MRP describe the intent to track trends through water quality sampling in urban stormwater.



Priority Questions

4) Support for Management Questions

- *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?*
 - Modeling
 - Input data
 - Source or land use categories
 - Management measure efficiency data
 - Bottom of the watershed calibration and verification data
 - MRP linkage: MRP permit provision c.8.e.ii call for pilot studies to test BMPs.



To scale by watershed area.

Ongoing River Loading Studies

Sacramento R. at Mallard Is.

Z4LA at Cabot Blvd.

Guadalupe R. at Hwy 101



150

Kilometers

6

2009 / 2010 Large Rivers (Mallard Island)

- Status and Trends funding (\$100k) + dioxins

Chemical	Number of Samples
HgT	40
PCBs	40
HgD, MeHgT, MeHgD, Hg(II)	20
Sediment	40



2009 / 2010 Guadalupe River

- Two funding sources:
 - SCVWD funding (Hg, SSC) \$175 k
 - Status and Trends “piggyback” funding (\$34k)
 - + Dioxins

- Two locations:
 - Guadalupe River at Hwy 101 (lower watershed)
 - Guadalupe River at Almaden Expressway (middle/upper watershed)

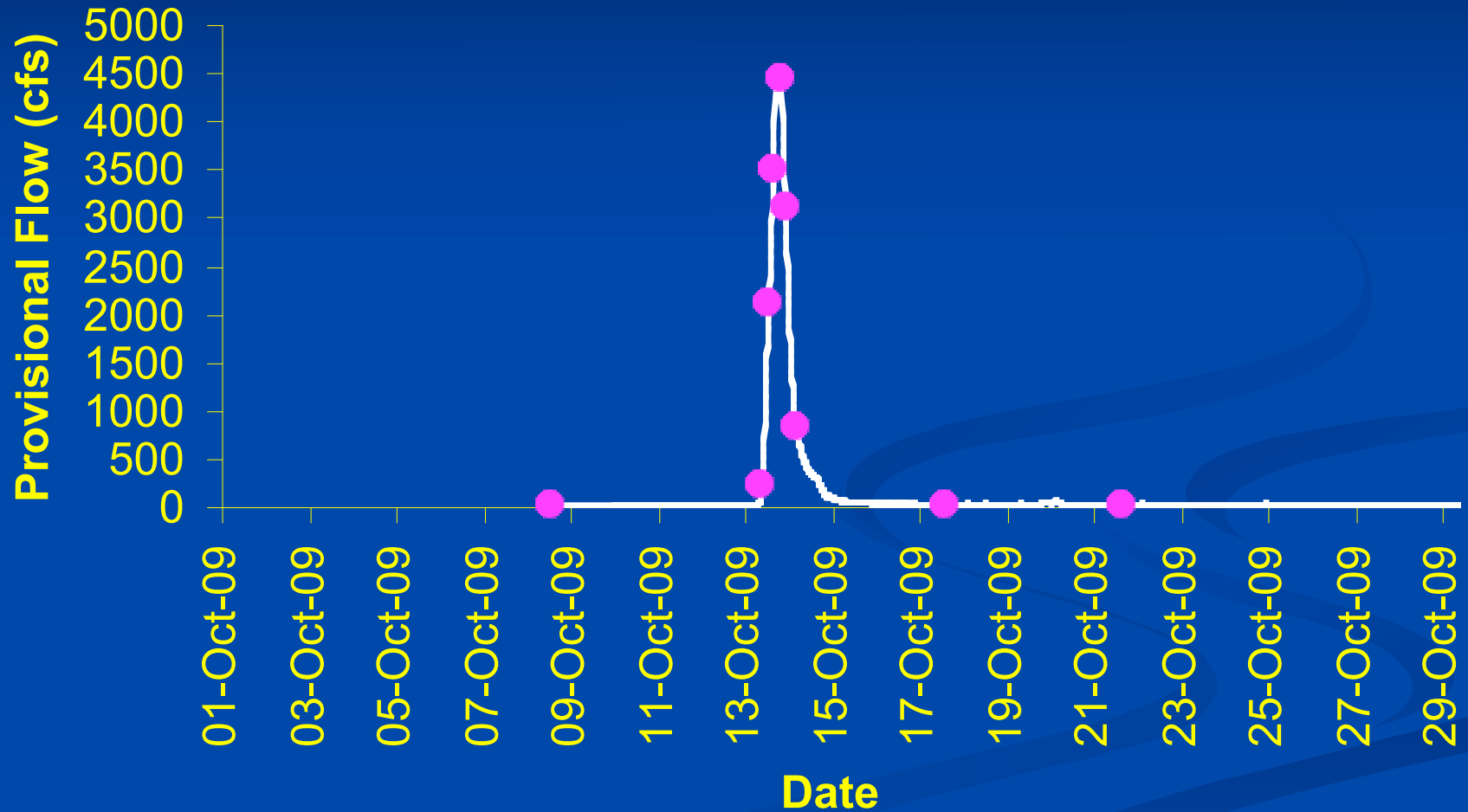


2009 / 2010 Guadalupe River

Analyte	Number of Samples per Location
HgT	50
SSC	50
HgD, MeHgT, MeHgD	25
DOC/POC	25
PCBs	20

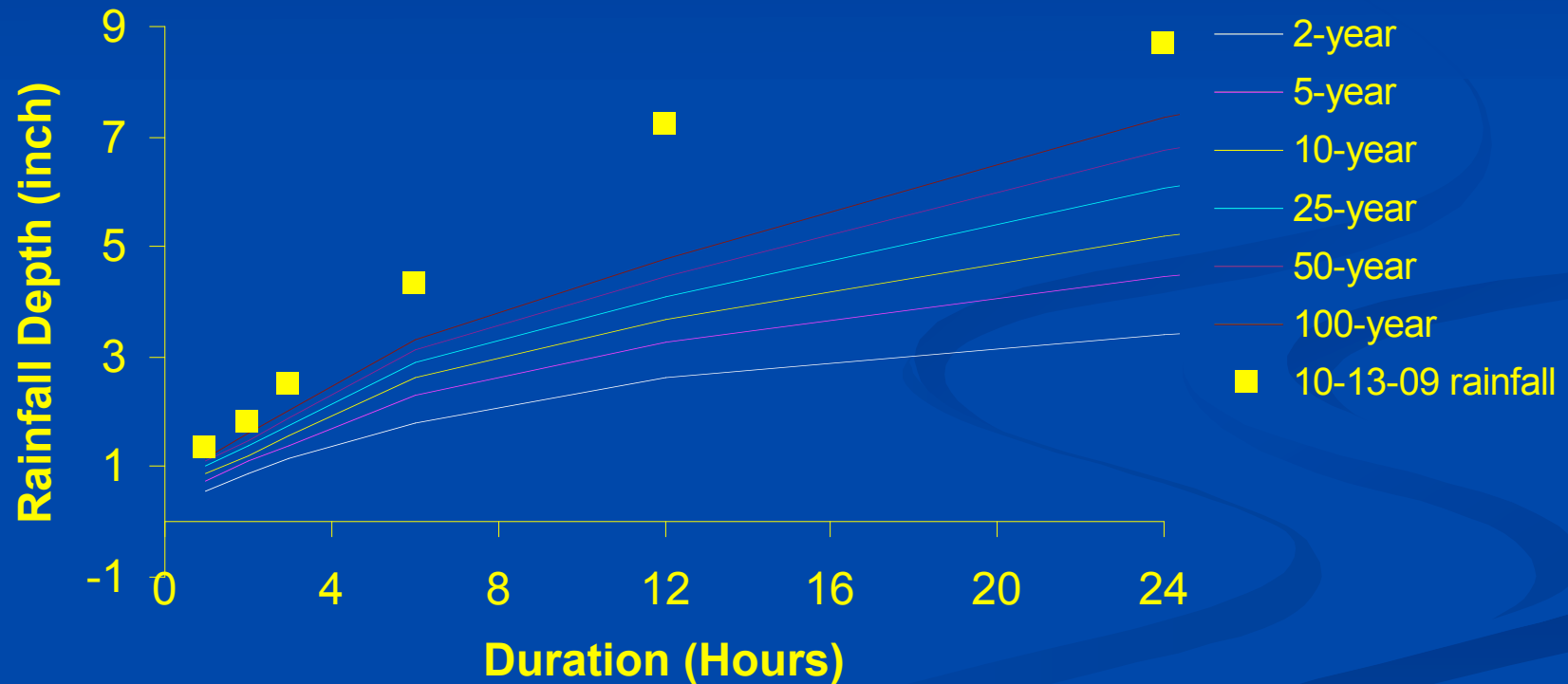


2009 / 2010 Guadalupe River



2009 / 2010 Guadalupe River

Almaden RF4 Storm 1: 10-13-09

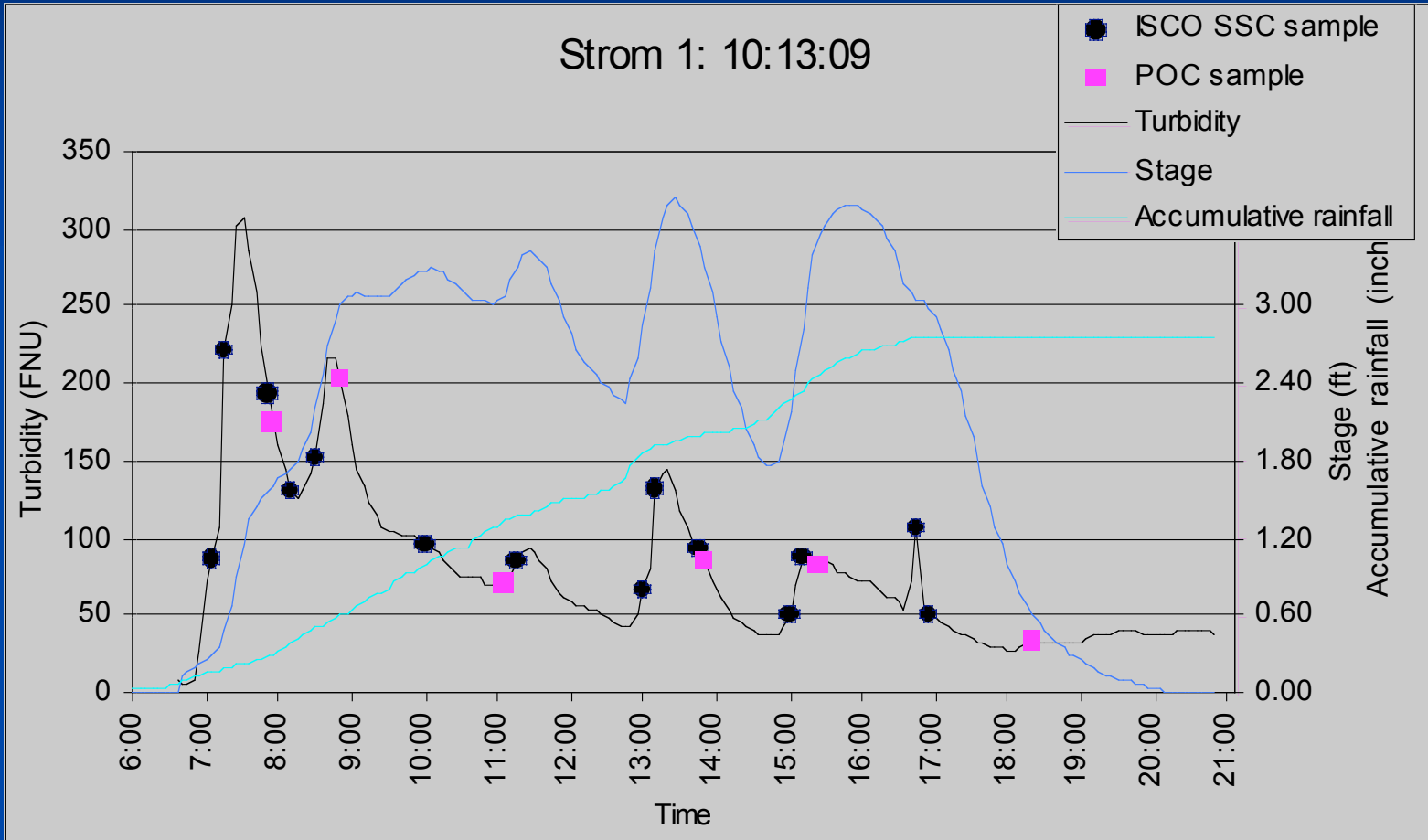


2009/2010 Zone 4 Line A

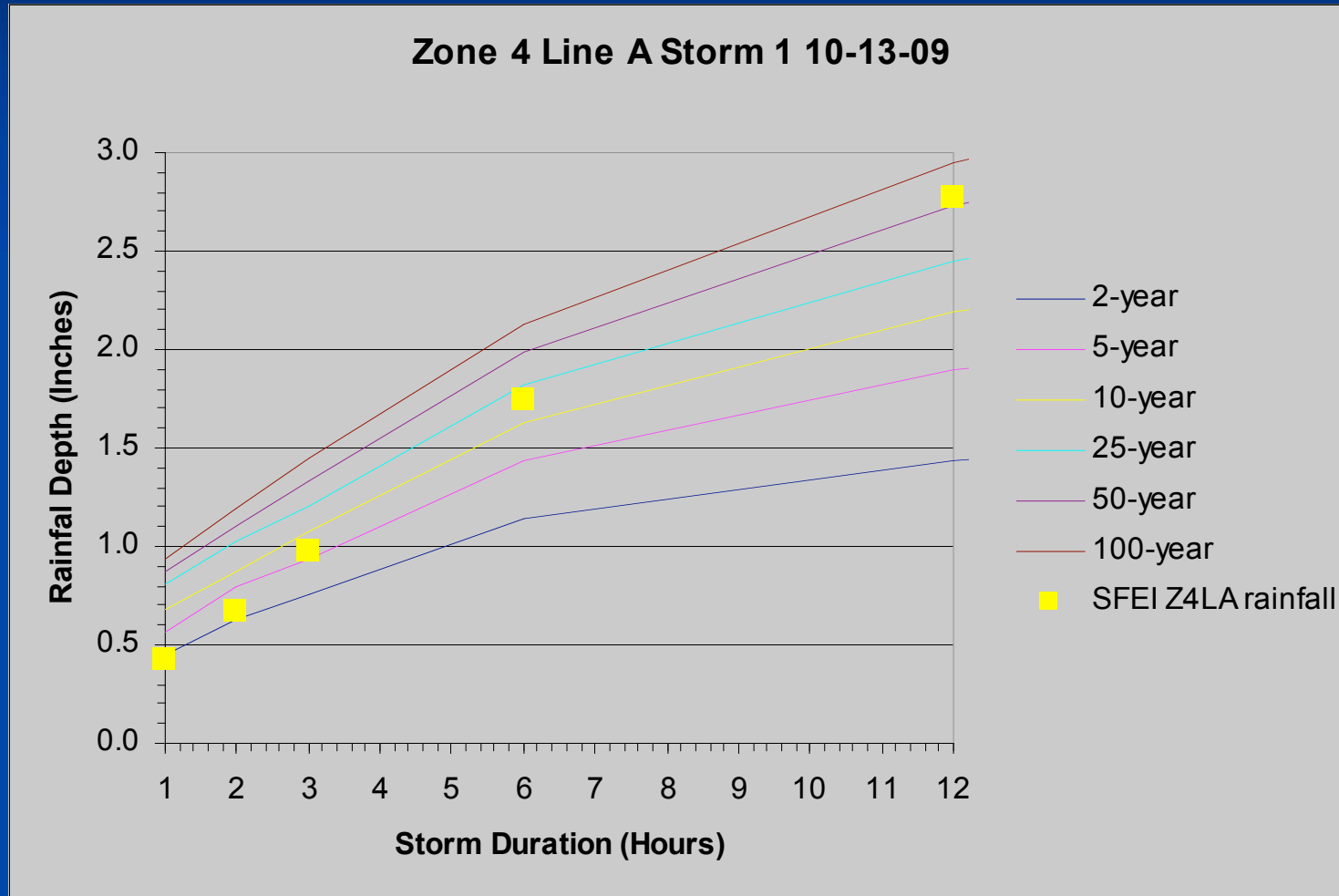
- Status and Trends funding (\$150k) + dioxins

Analyte	Number of Samples
HgT	35
MeHgT	19
HgD, MeHgD	14
CuT and CuD	11
SSC	80
PCB analysis	25
PBDE analysis	8
PAH	8
OC pest	8
Pyrethroids	8
Se(I), SeD, Se(IV), Se(VI), SeMe	10
HgR	10
Nutrients	19
DOC/ POC	14

2009/2010 Zone 4 Line A



2009/2010 Zone 4 Line A





Multi-year Watershed Loading Sampling Plan (2009 funds)

- Supporting elements:
 - Develop criteria and rank watersheds (2009 funds)
 - Reconnoiter high ranking watersheds (2010 S&P funds)
 - Optimize sampling methods for loads and trends (2009 funds)
 - Scoping needs for land-use specific loads monitoring (2010 S&P funds)






Develop Criteria and Rank Watersheds

- Direct link to MRP provision c.8.f
-  Develop and document a rationale for initially classifying Bay Area small tributary watersheds into a small number (<10) of classes, relevant for loads monitoring and Bay margin impacts
-  Develop a list of representative watersheds in each class and rank these for focused study making a decision in the process of how many should be studied



Reconnoiter High Ranking Watersheds

- Direct link to MRP provision c.8.f
-  Take that list and go out and document the logistics of setting up monitoring at each site
-  Write a short memo for discussion purposes that include photo documentation and other data about each site
-  Make a final decision about which of the ranked watersheds could be monitored safely and successfully



Optimize Sampling Methods for Loads and Trends

- Provision C.8.d and C.8.f of the MRP describe the intent to measure loads in single watersheds and track trends
- Take the data we have collected at Mallard Island, Guadalupe River, and Zone 4 Line A and:
 - Objective 1: Loads
 - Sub sample it using a range of sampling strategies
 - Recalculate loads and compare these to the “real loads”
 - Objective 2: Trends
 - Sub sample it using a range of sampling strategies
 - Determine the power to observe trends such as a 50% reduction in particle concentration in 10 years



Scoping Needs for Land Use Specific Loads Monitoring

- Link to MRP permit provision c.8.e.ii that calls for pilot studies to test BMPs
- In order to test what kinds where and how many BMPs would be needed to achieved loads targets:
 - Need to develop and calibrate models
 - Where contamination is
 - What kinds of concentrations and loads emanate from contaminated sites of a given “land use”
 - The efficiency of BMPs to trap load



Multi-year Watershed Loading Sampling Plan (2009 funds)

- Blue print for monitoring activities
 - Where, how, and when to sample
- Time line for completion:
- May 2009
 - Working with Ben, Aroon, and Michelle presently
 - Interim deliverable for each sub-task
 - Check in phone conferences / face / face meetings with the Strategy Team (Sommers, Feng, Looker)



Modeling Elements

- General objectives to support MRP provision c.8.d and c.8.f:
 - Local and regional loads estimates
 - Refinement of multi-year watershed loading sampling plan
- Guadalupe River HSPF model (2008 and 2009 S&P funds)
- Develop spreadsheet model (2010 S&P funds)



Develop Spreadsheet Model

- The model will be based on the published work by Ha and Stenstrom (2008) as follows:
 - Compile local GIS layers (rainfall, land use type DEM, hydrologic soils groups)
 - Adjust runoff coefficients for soil group, slope and land use (Brown's relation)
 - Spatially interpolate precipitation data at desired time resolution
 - Calibrate hydrology using local runoff data for watersheds with differing land use, slope and soil characteristics
 - Apply landuse-specific EMCs to runoff to generate loads
 - Calibrate and improve model using optimization (limited memory Broyden–Fletcher–Goldfarb–Shanno Bound (L-BFGS-B) constrained nonlinear)



Summary

- Many elements of the Strategy are now in progress
- We plan to have interim and in some cases near final results by May
- We anticipate a SPLWG meeting in late April / early May where remaining unfunded elements for 2011 will be discussed and prioritized
 - Further development of the spreadsheet model and HSPF model
 - Loads monitoring locations
 - Possible land use monitoring locations

Questions?

Discussion...

