Management Emphasis: Monitoring/Modeling Needs

Lester McKee, Jennifer Hunt, Alicia Gilbreath, David Gluchowski, Jing Wu
SFEI

Sources Pathways and Loadings Workgroup Meeting
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Questions for the workgroup

- What combination of monitoring and modeling are most appropriate to address current permit provisions and the management focus proposed for MRP 2.0?
  - Emphasis on characterizing pollutants in tidal areas?
  - Pollutant specific program designs that could be considered?
- What are the pros and cons for the monitoring/modeling alternatives?
- Are there tools other than monitoring and modeling that should be considered?
- What is a cost effective design going forward?

Lessons learned:
POC loads monitoring

Pro's

- High quality information
- Informs pollutant source/transport conceptual models
- Baseline data for temporal trends
- Elucidates complex source-release, transport processes
- Developed flow monitoring methodology for pump stations

Challenge's

- Subject to climate
- Can't monitor watersheds within tidal prism
- Prone to resampling climatically similar conditions
- Fixed locations; Inability to respond to local weather conditions
- Expensive

Lessons learned:

Composite sampling

Pro's

- Useful for characterization of lower priority pollutants
- Provides an "EMC"
- Lower lab costs
- Useful for pollutant/toxicity relationships

Challenge's

- Full storm capture and generation of EMC difficult
- Expensive equipment
- Expensive pre-storm setup
- More false starts

Alternative design options:
POC loads monitoring

Status quo	• Until some future milestone then change?
Modified design	• Rotate site between years to fill data gaps • Respond to climate conditions to fill data gaps • Add/substitute stations e.g. pump stations/ industrial drainage areas
Reallocate $ to other program areas	• Drop sites when sufficient data reached

Lessons learned:

Reconnaissance monitoring

Pro's

- Identify relative watershed pollution levels
- Supports conceptual model development
- Relatively inexpensive
- Monitoring in tidal reaches
- Model calibration

Challenge's

- High variability in site particle ratios
- Less accurate loads computations

Alternative design options:

Reconnaissance monitoring

Focus on sites near Bay margin	• Pump stations downstream from industrial land use (73 identified) • 10-15 sites per year for 5 years
Sample source areas	• Rotate in “single land use/ source area” sites
Add flow at select stations	• Stage • Spot velocity

Lessons Learned:
Regional Watershed Spreadsheet Model (RWSM)

Pro's

- POC loads data useful for model development (flow, sediment and pollutant data available)
- Large calibration set for sediment (n=46)
- Sufficient particle ratio data for calibration (n = 24)
- Initial model runs encouraging

Challenge's

- Trends in concentrations confound model calibration
- Model uncertainty propagates from hydrology/sediment models to pollutant models
- POC loads data limited in use for model verification (n = 9)
- Difficult to calibrate sediment model – risk of diverting resources
- Some pollutant sources in the model not represented in the monitoring data
- Sediment data insufficient to separate urban land uses

Alternative design:
Regional Watershed Spreadsheet Model (RWSM)

Continue regional loads estimate design	• Add micro climate parameterization to improve sediment model calibration • Accept sediment model limitations based on success criteria
New management focus	• Model only urban watersheds? • Water and sediment production more homogeneous and land use is an OK predictor • Pollutant source-release processes are relatively more complex • Monitoring design needs to support model and represent the region
Develop small scale detailed/mechanistic models?	• RWSM (SWMM? HSPF?) • Would require nested sampling design

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RWSM

- Are there any impediments to completing modeling?
  - Can we calibrate the model with reasonable confidence? What level of uncertainty can we live with?
  - No – good chance we will complete with appropriate confidence level
  - Modeling Hg in urban areas is driven by deposition (driven by impervious area) – not highly associated with sediment transport
- What are the appropriate uses?
  - Can we model parcel hot spots (small scale areas). Can we break out the old industrial PCB sediment concentrations to have lower bounds? Yes but need empirical data at the same scale.
  - Model could be used to estimate other POCs e.g. nutrients
  - Need trained end users who use the model and then assess how it worked/didn't work to answer the particular questions
  - Direct on where to collect more data
  - Caution in using model to prioritize watersheds
  - Use model to ID polluted watersheds, then verify through field monitoring, then management controls if neccessary

RWSM

- What do we continue to invest in RWSM and do we need to consider other models to answer existing questions?
  - Small scale is important to consider for next modeling tool
  - HSPF models have been used at the watershed scale and measuring management effectiveness (Los Angeles)
  - Apply different models for different questions/scales. Keep iterating these models to then answer management effectiveness questions.
  - How do we enhance RWSM to answer our questions?

Monitoring
(Notes taken during the meeting)

- Trends are lower priority; higher priority for identifying high leverage source areas.
- Need to set up a sound baseline for long term loads monitoring
- How do we establish a baseline for source areas so we can measure effectiveness of mgmt actions. Need to normalize to weather, need a control site to measure change
- Need to collect additional information during field activities e.g. transport, reconnaissance, site dirtyness
- Value in monitoring sediments in creeks? Not for PCBs.
- Passive samplers?
- How do we sufficiently mine RMP data to help identify high leverage watersheds (sed and fish)?
- Consider design of reconnaissance based source area monitoring (may need pollutant specific designs)
- Might see response sooner in small sites once control measures are implemented

POC Load Station Summary

Location	Years of Data*	Amount of information	Remaining Need
Lower Marsh Creek	3		High intensity, upper watershed storm events (Hg)
Richmond Pump Station	3		Capture of early season storm events
San Leandro Creek	4		Reservoir release contaminant data; rating curve, better understanding of source transport response
Guadalupe River	8		High antecedent, upper watershed intense rainfall events
East Sunnyvale Channel	4		Storm events
Pulgas Pump Station	3		Storm events
* Includes water year 2014			

Cost analysis

Project Type	#of Station Years	Years of Effort	Cost/Year/Site	Total Cost
Literature Review/Desktop Analysis	4*	2001-2003	$30,000	$120,000
Loads Monitoring (Mass Emissions)	14	2002-2010	$125,000	$1,750,000
Reconnaissance Monitoring	17	WY 2011	$18,000	$300,000
Soil and Sediment Sampling	300	2007-2008	$2,000	$600,000
RWSM	5	2010-Present	$55,000	$275,000
MRP POC Monitoring-6 Stations (RMP & BASMAA)	16	2012-2014	$170,000	$2,700,000

* Number of reports

Alternative Monitoring Scenarios

Option	Outcome	Cost
1. Status quo		No change
2. Targeted Monitoring at POC loads stations	Site-specific monitoring plan	Reduced cost/effort
3. Change frequency of loads station monitoring	Rotating monitoring approach	Reduced cost/effort
4. Change frequency of sample collection for lower priority pollutants	Focus on priority pollutants	Reduced cost/effort
5. Reconnaissance monitoring – watershed characterization	Identify high leverage watersheds	Reduced cost/effort
6. Reconnaissance monitoring – source area monitoring	Identification of pollutant source areas	Unknown
7. Sediment/soil monitoring	Identification of pollutant source areas	Unknown
8. Other		