

Thank you for signing in early

The webinar will begin promptly at
12:00 pm ET, 9:00 am PT



SERDP and ESTCP Webinar Series

- The webinar will begin promptly at 12:00 pm ET, 9:00 am PT
- Two options for accessing the webinar audio
 - Listen to the broadcast audio if your computer is equipped with speakers
 - Call into the conference line
 - (646) 876-9923 or (408) 638-0986
 - Required conference ID: 645-616-109
- For questions or technical issues, please email serdpwebmaster@gmail.com or call 571-372-6565

Stormwater Impacts on Sediment Recontamination

November 15, 2018



Welcome and Introductions

Rula A. Deeb, Ph.D.
Webinar Coordinator



Webinar Agenda

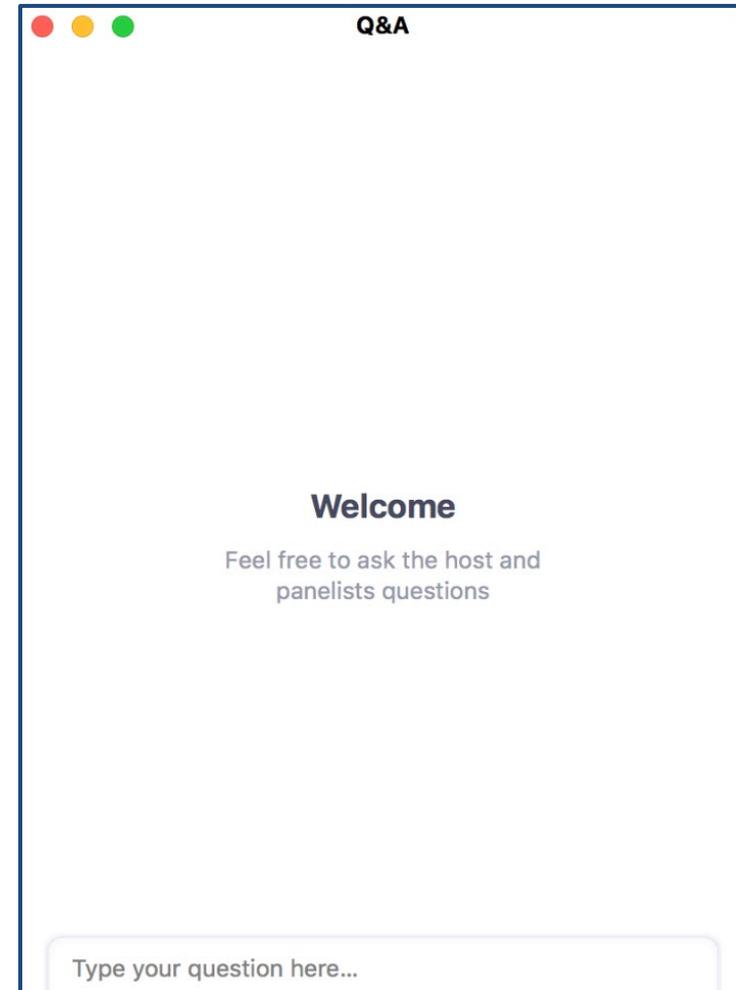
- **Webinar Logistics** (5 minutes)
Dr. Rula Deeb, Geosyntec Consultants
- **Overview of SERDP and ESTCP** (5 minutes)
Dr. Andrea Leeson, SERDP and ESTCP
- **Stormwater Impacts to Sediments at Naval Bases: A DoD Perspective** (15 minutes + Q&A)
Amy Hawkins, Naval Facilities Engineering and Expeditionary Warfare Center
- **Assessment and Management of Stormwater Impacts on Sediment Recontamination** (30 minutes + Q&A)
Dr. Danny Reible, Texas Tech University
- **Final Q&A session**

In Case of Technical Difficulties

- Use a compatible browser (Firefox, IE or Edge)
- If material is not showing on your screen or if screen freezes
 - Key in Ctrl + F5 to do a hard refresh of your browser
- If connecting to computer audio
 - Click the arrow next to the “*Join Audio*” button
 - Select test “*Speaker and Microphone*”
 - Follow prompts
- If you continue to experience difficulties, call into the conference line
 - (646) 876-9923 or (408) 638-0986
 - Required conference ID: 645-616-109

How to Ask Questions

- Find the Q&A button on your control bar and type in your question(s)
- Make sure to add your organization name at the end of your question so that we can identify you during the Q&A sessions



SERDP and ESTCP Overview

Andrea Leeson, Ph.D.
SERDP & ESTCP



DoD's Environmental Technology Programs



Science and Technology

- Statutory program established 1991
- DoD, DOE, EPA partnership
 - Advanced technology development to address near-term needs
 - Fundamental research to impact real world environmental management

Demonstration and Validation

- Demonstrate innovative cost-effective environmental and energy technologies
 - Transition technology out of the lab
 - Establish cost and performance
 - Partner with end user and regulator
 - Technology transfer
 - Accelerate commercialization or broader adoption
 - Direct technology insertion

Environmental Drivers

Sustaining Ranges, Facilities and Operations



Maritime Sustainability
Threatened and Endangered Species



Toxic Air Emissions and Dust



UXO and Munitions
Constituents

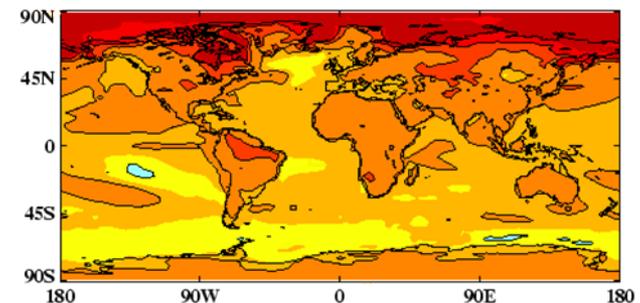


Noise



Sustainable FOB

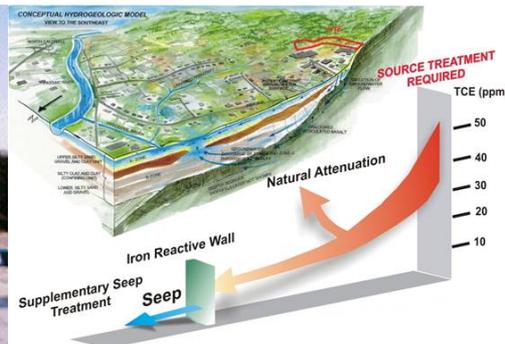
Change in Temperature (°C)
for (2040-2070) minus (1960-1990)



Environmental Drivers

Reducing Current and Future Liability

Contamination from Past Practices

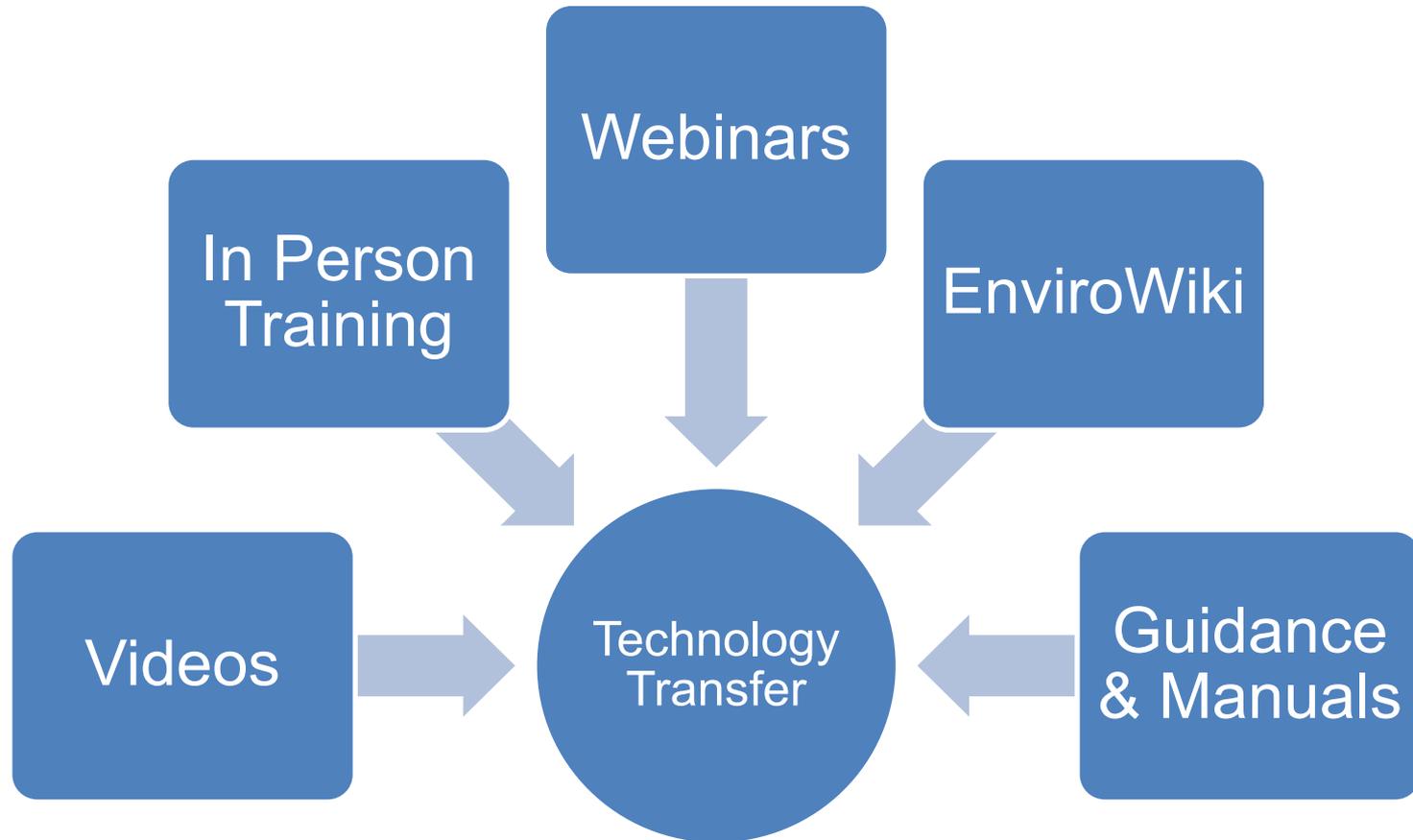


Pollution Prevention to Control Life Cycle Costs



- Groundwater, soils and sediments
- Large UXO liability
- Emerging contaminants

- Elimination of pollutants and hazardous materials in manufacturing, maintenance, and operations
- Achieve compliance through pollution prevention



www.serdp-estcp.org





SERDP & ESTCP Webinar Series

For upcoming webinars, please visit
<http://serdp-estcp.org/Tools-and-Training/Webinar-Series>

*The list of 2019 webinar dates and topics
will be available soon*



The next webinar is on
December 13, 2018

*Utilization of Advanced Conservation Voltage
Reduction (CVR) for Energy Reduction on
DoD Installations*



SERDP • ESTCP
SYMPOSIUM
2018 | Enhancing DoD's Mission Effectiveness

A three-day symposium showcasing the latest technologies that enhance DoD's mission through improved environmental and energy performance

November 27 - 29, 2018
Washington Hilton Hotel

Registration is still open

Stormwater Impacts to Sediments at Naval Bases: A DoD Perspective

Amy Hawkins
Naval Facilities Engineering and
Expeditionary Warfare Center



Agenda

- Navy sediment remediation program and policy
- Navy stormwater program
- Stormwater challenges for restoration
- Pearl Harbor example

Navy Sediment Remediation Policy

- Enacted in 2002
- Identify all sources
- Link all investigations to specific Navy CERCLA/RCRA site
- No clean-up before source containment

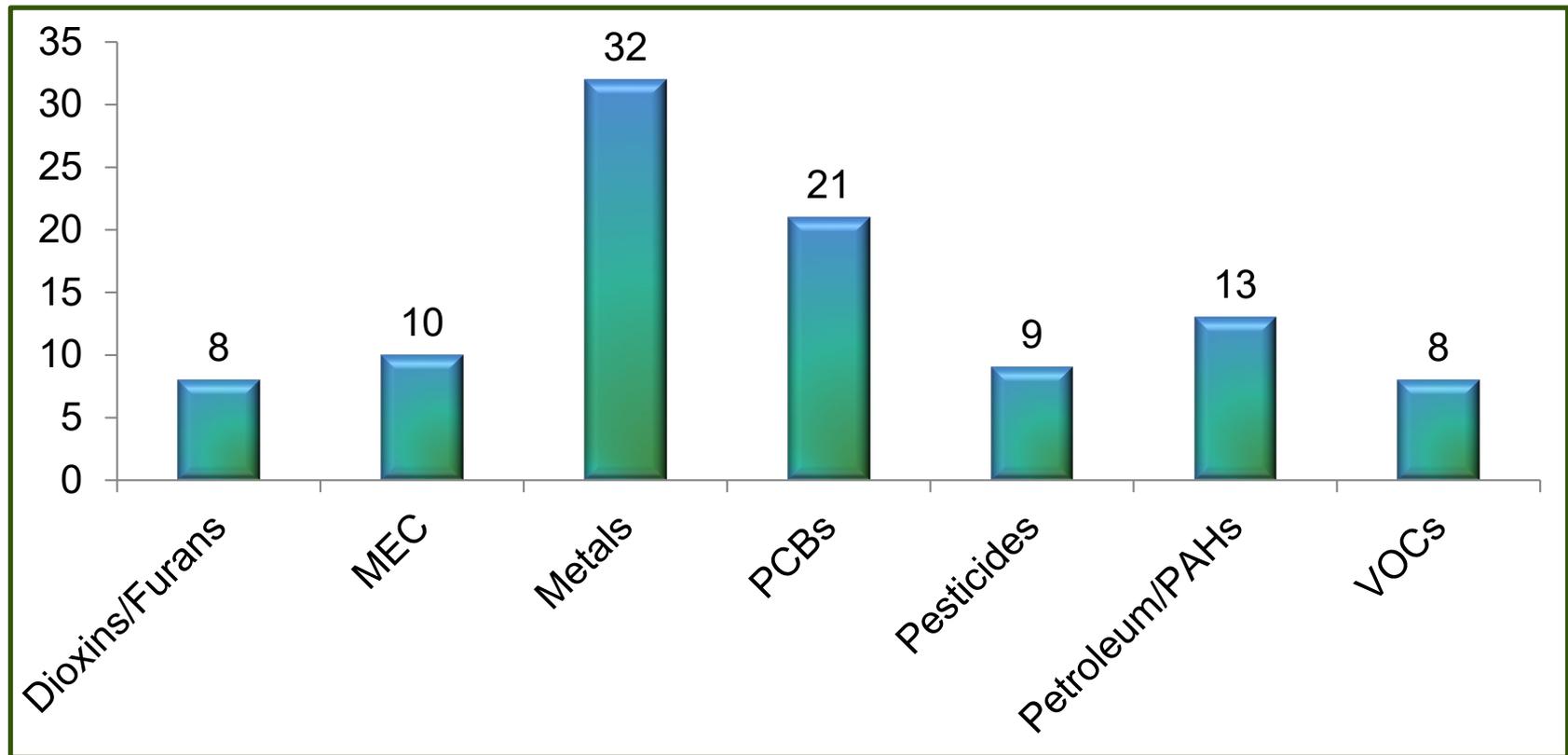


Image Source: U.S. Navy

Navy Stormwater Management

- Installations responsible for Clean Water Act compliance and permitting
- Compliance tracked centrally
- Coordination with Environmental Restoration is site-specific

Navy Sediment COPCs



Notes:

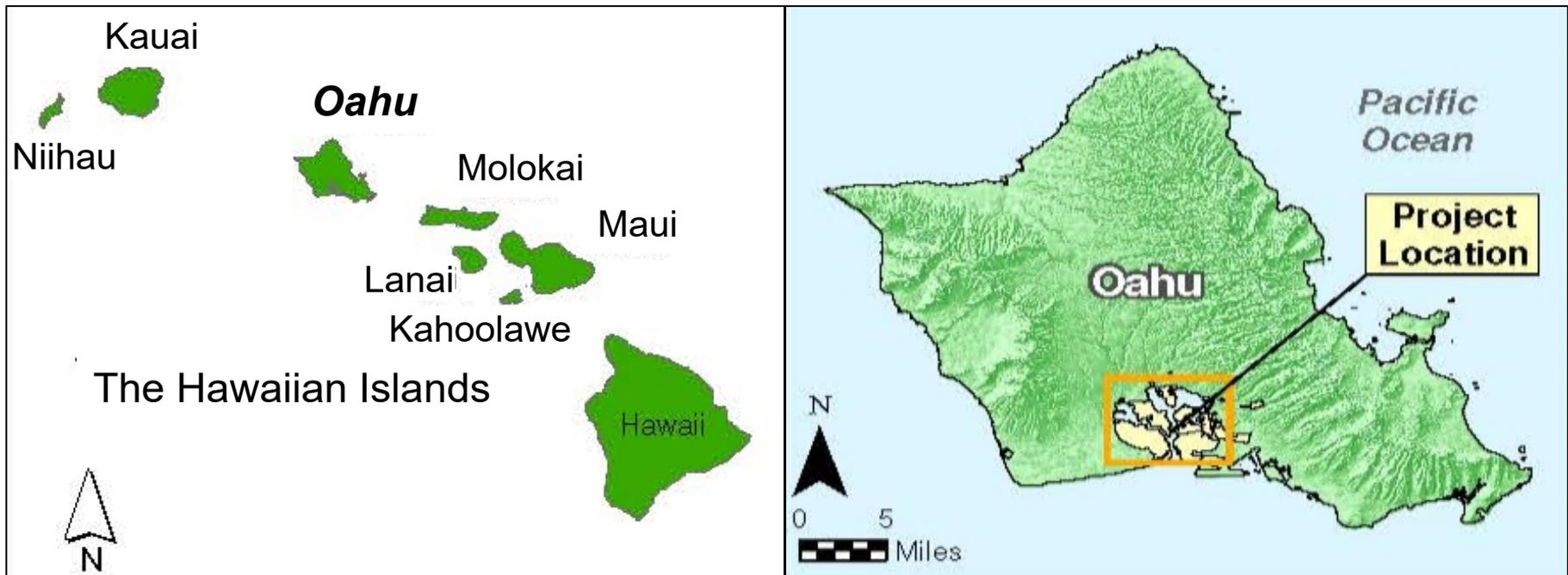
MEC = munitions and explosives of concern; PAHs = polyaromatic hydrocarbons; PCBs = polychlorinated biphenyls; VOCs = volatile organic compounds

Stormwater Challenges for Restoration

- Stormwater discharge and sediment recontamination
 - Critical challenge for protecting DoD investments in sediment cleanup
- Sediments are contamination sinks
 - Both DoD and non-DoD areas
- Disconnect between NPDES and CERCLA
- Allowable discharges could be an ongoing source

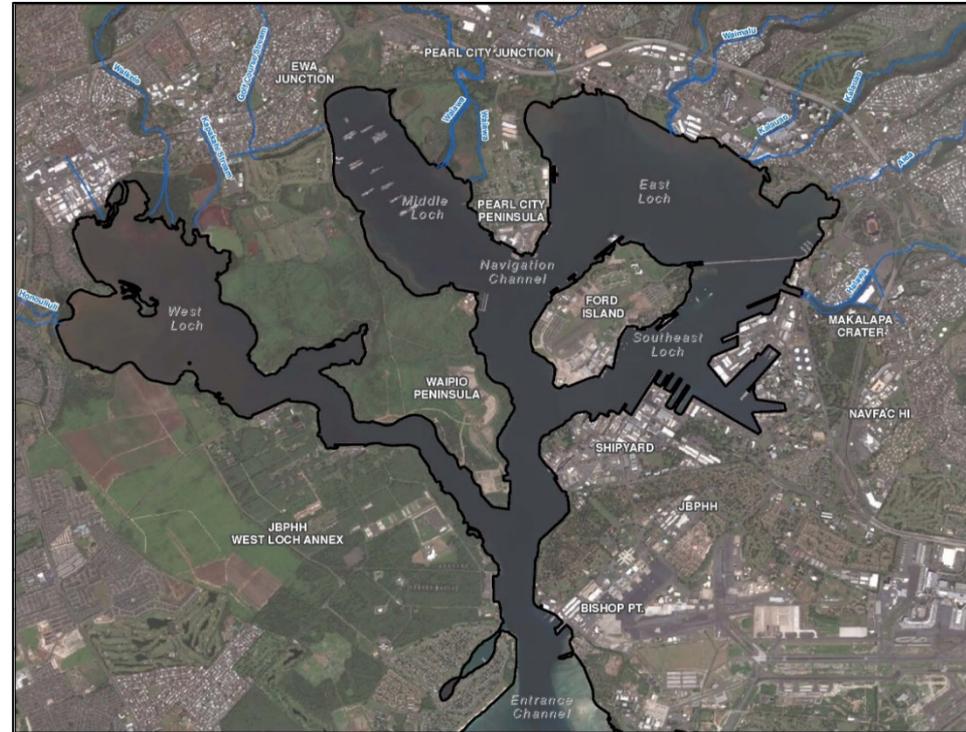
Pearl Harbor Example

Project Location



Pearl Harbor Example

- 5 major streams
- Drainage canals/ditches
- Numerous Navy/non-Navy storm drain conveyance outfalls
- Quantifying non-point source loading is a challenge



Pearl Harbor Example

- Clean-up levels consider non-point source contributions
- Existing NPDES permit limits above project action levels
- Implementing source control on non-Navy property



Image Source: U.S. Navy

Conclusions

- Navy policy requires sources to be quantified and contained before clean-up
- Stormwater is managed according to existing laws and regulations
- There are cross-program impacts, but no mechanism for cross-program coordination

SERDP & ESTCP Webinar Series

For additional information, please visit
<https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Sediments/Stormwater>

Speaker Contact Information

amy.hawkins@navy.mil; 805-982-4890



Q&A Session 1



Assessment and Management of Stormwater Impacts on Sediment Recontamination

Danny Reible, Ph.D., PE, BCEE, NAE
Texas Tech University



Agenda

- Research goals
- Benefits to DoD
- Application at Paleta Creek, Naval Base San Diego
- Characterize stormwater inputs
- Characterize receiving water sediment recontamination
- Conclusions and lessons learned

Research Goals

Stormwater Sediment Recontamination

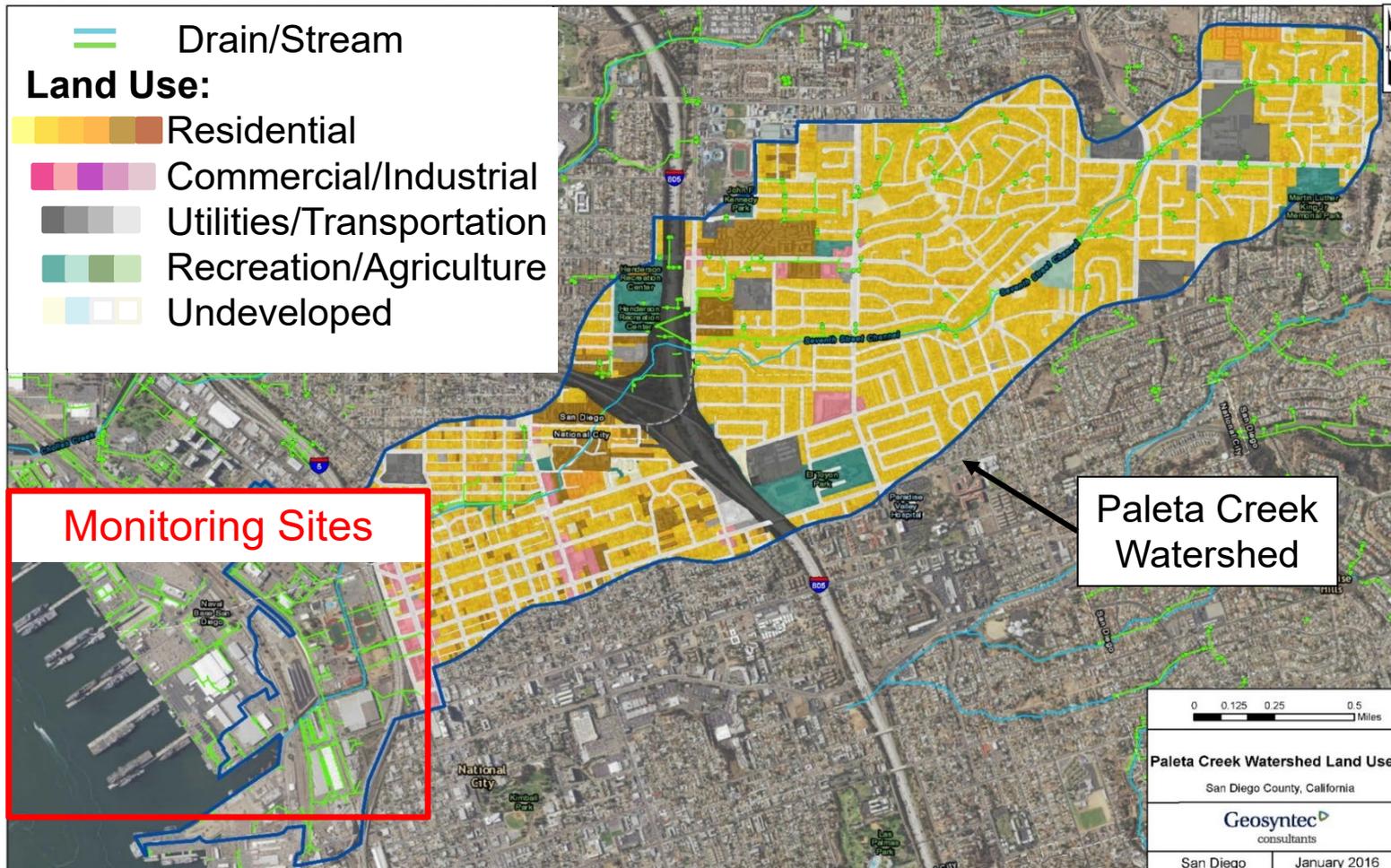
- Control of sources
- Stormwater can limit or reverse sediment cleanup
- Characterizing stormwater for sediment recontamination potential
 - Contaminant strength (concentration) and loads (mass release) in stormwater discharge
 - Post-discharge transport and distribution
 - Post-discharge contaminant availability, mobility and fate
- ER-2428: Evaluate and demonstrate methods for this characterization
 - Texas Tech, SPAWAR, Geosyntec, University of Michigan

Benefits to DoD

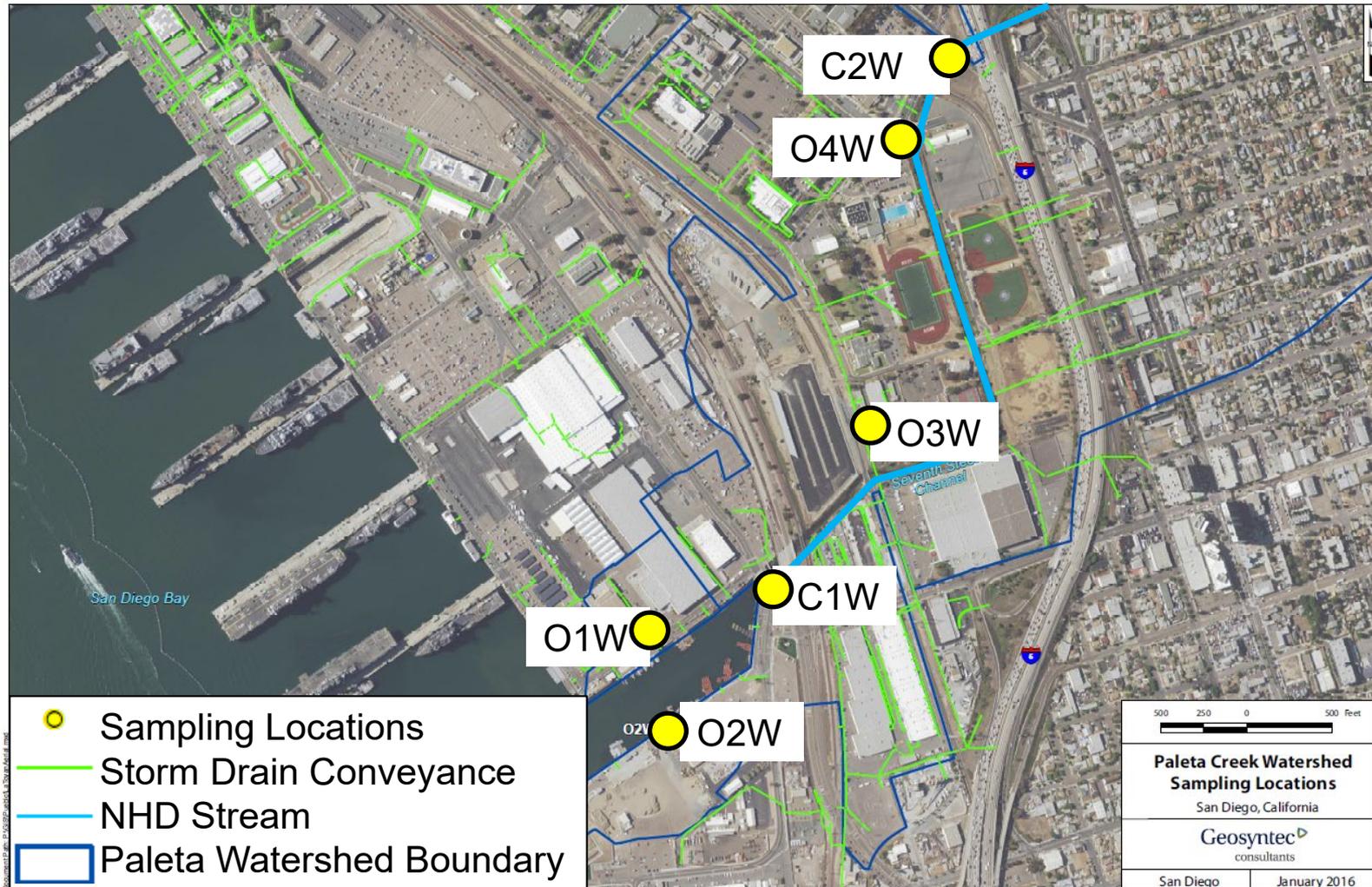
- Provides tools to assess sediment recontamination *and its significance* for DoD facilities
- Helps DoD facilities determine whether source control or sediment remediation is most effective path forward
- Identifies key contaminants and their characteristics that might be problematic in stormwater from DoD facilities

Application at Paleta Creek

Naval Base San Diego



Sampling Locations

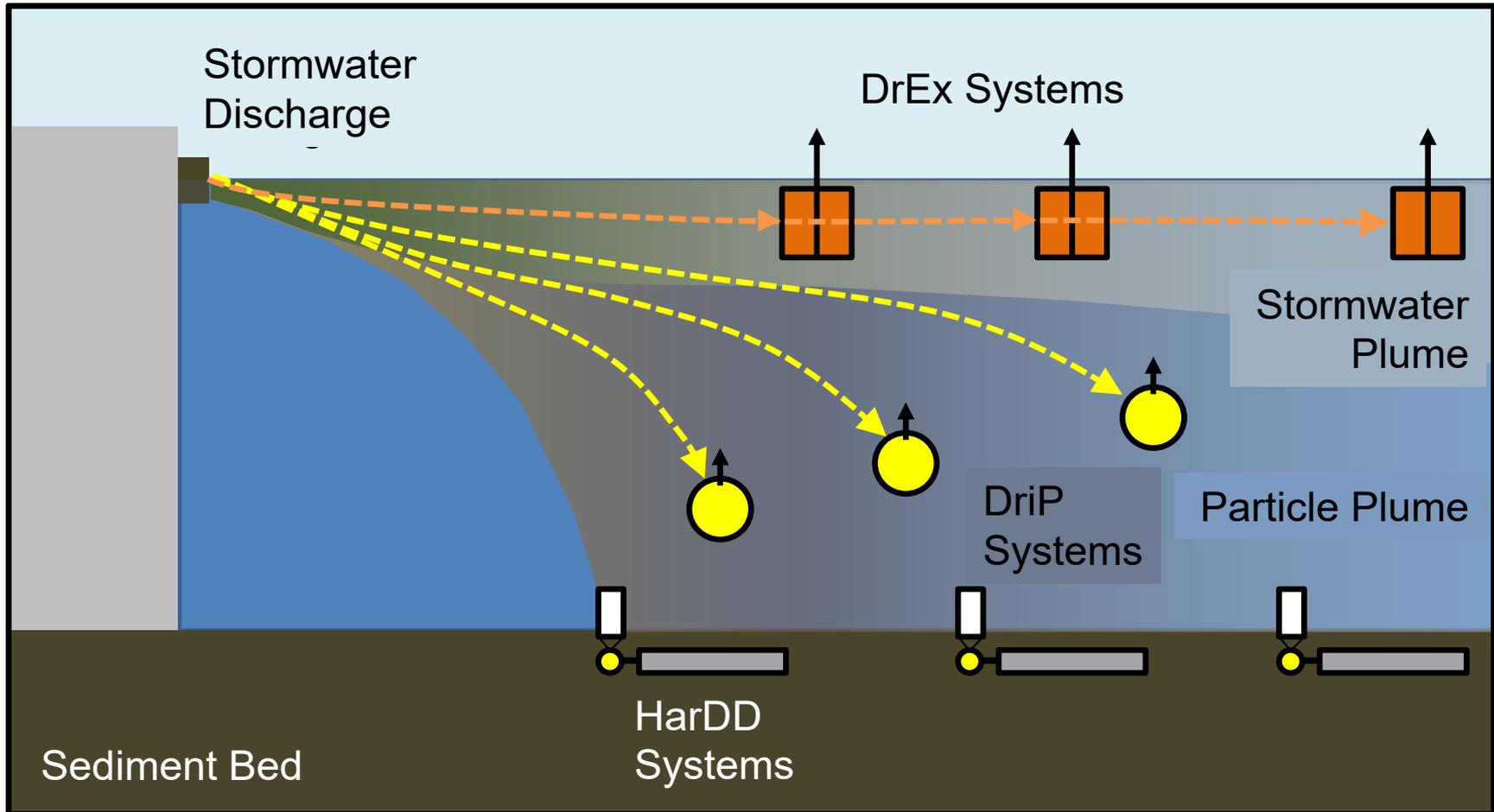


Sampling Methods

- Automated stormwater sampling
- Sediment cores/settling traps
- Bioassays
 - Dual Tracer
 - Drifting GPS



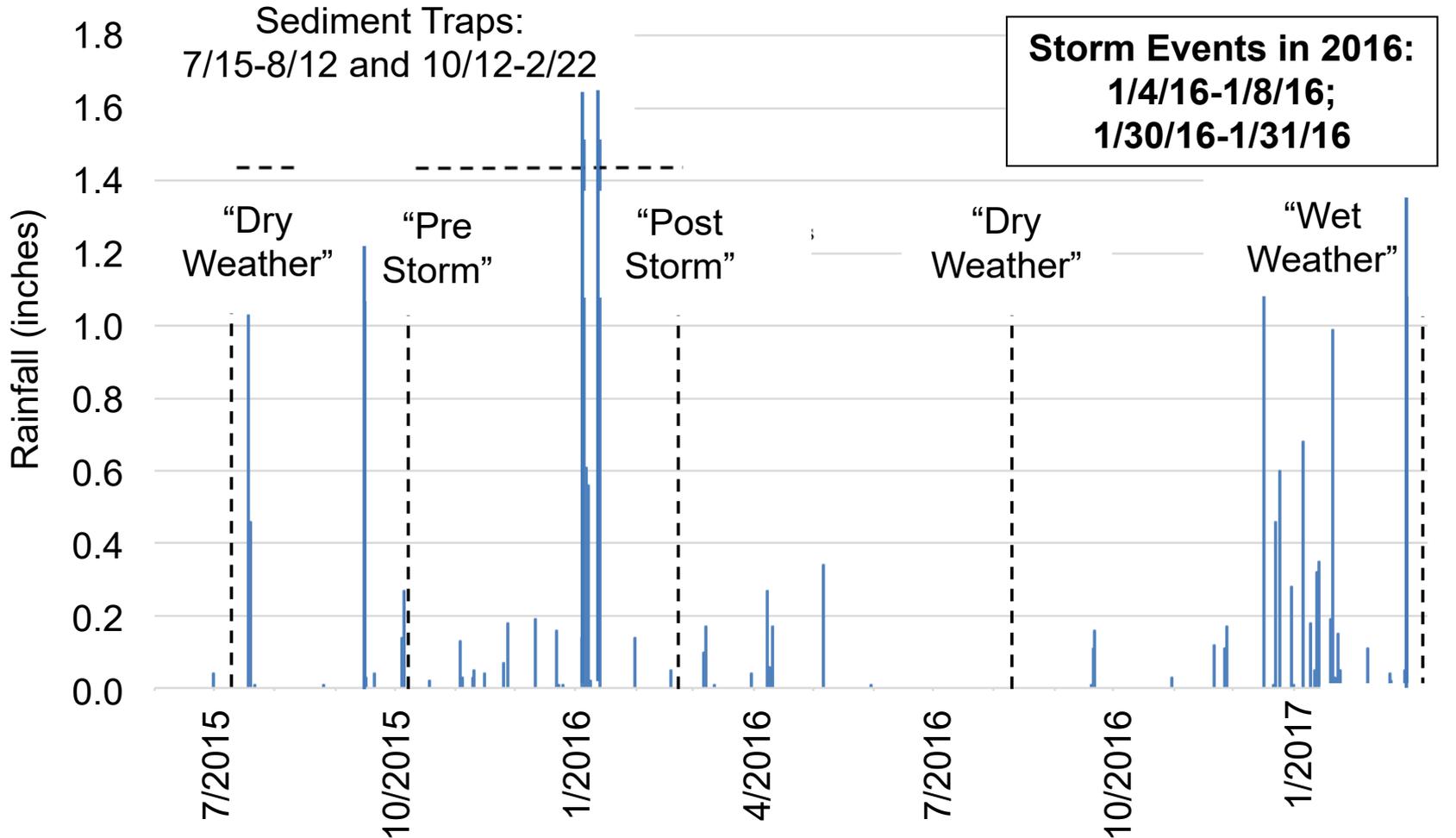
Sampling Methods



Source: Chadwick (14E-ER1-014)

Notes: DriP = Drifting Particle, DrEx = Drifting Exposure System, HarDD = Harbor Deposition Detector

Wet and Dry Season Sampling Events

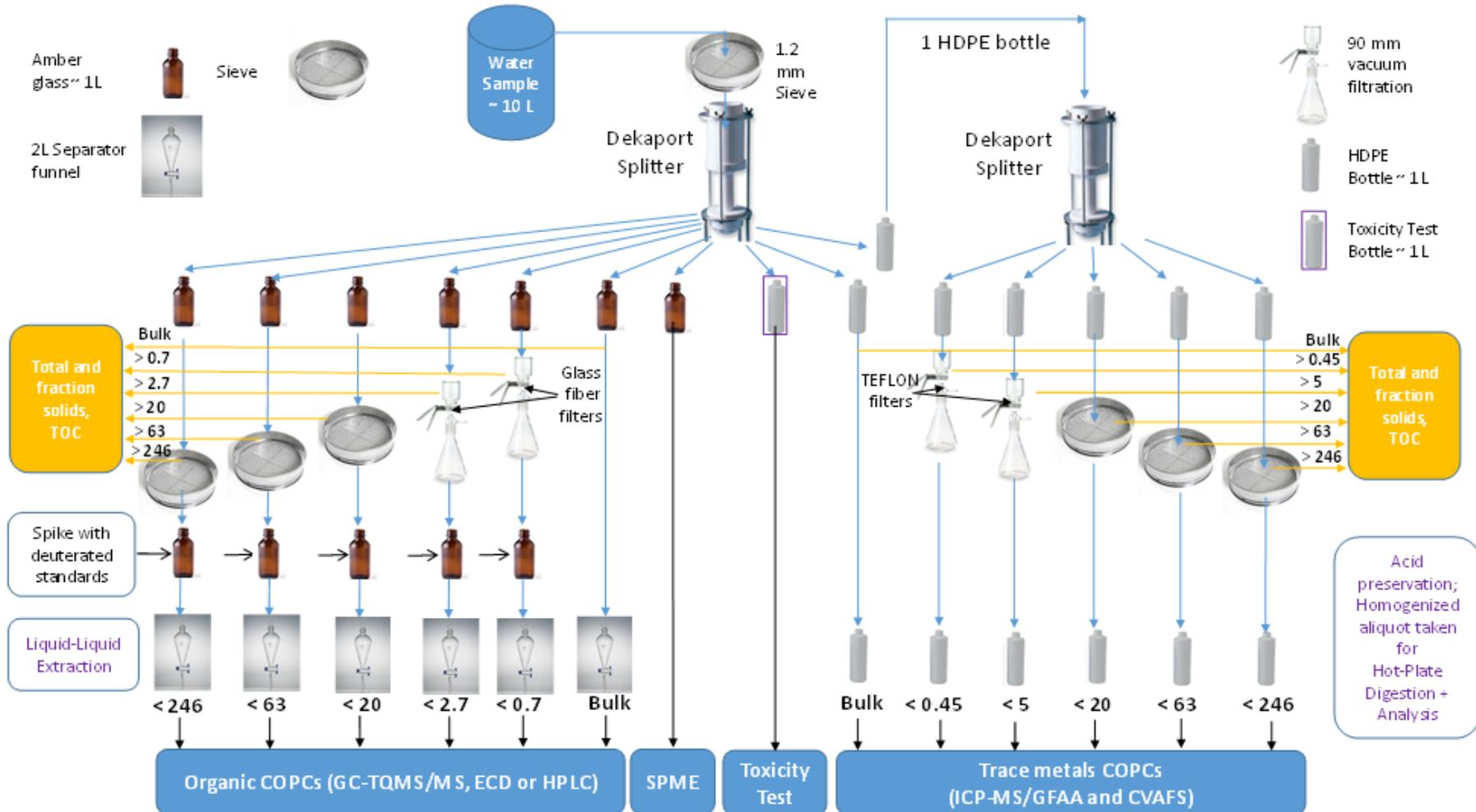


Stormwater Sample Processing

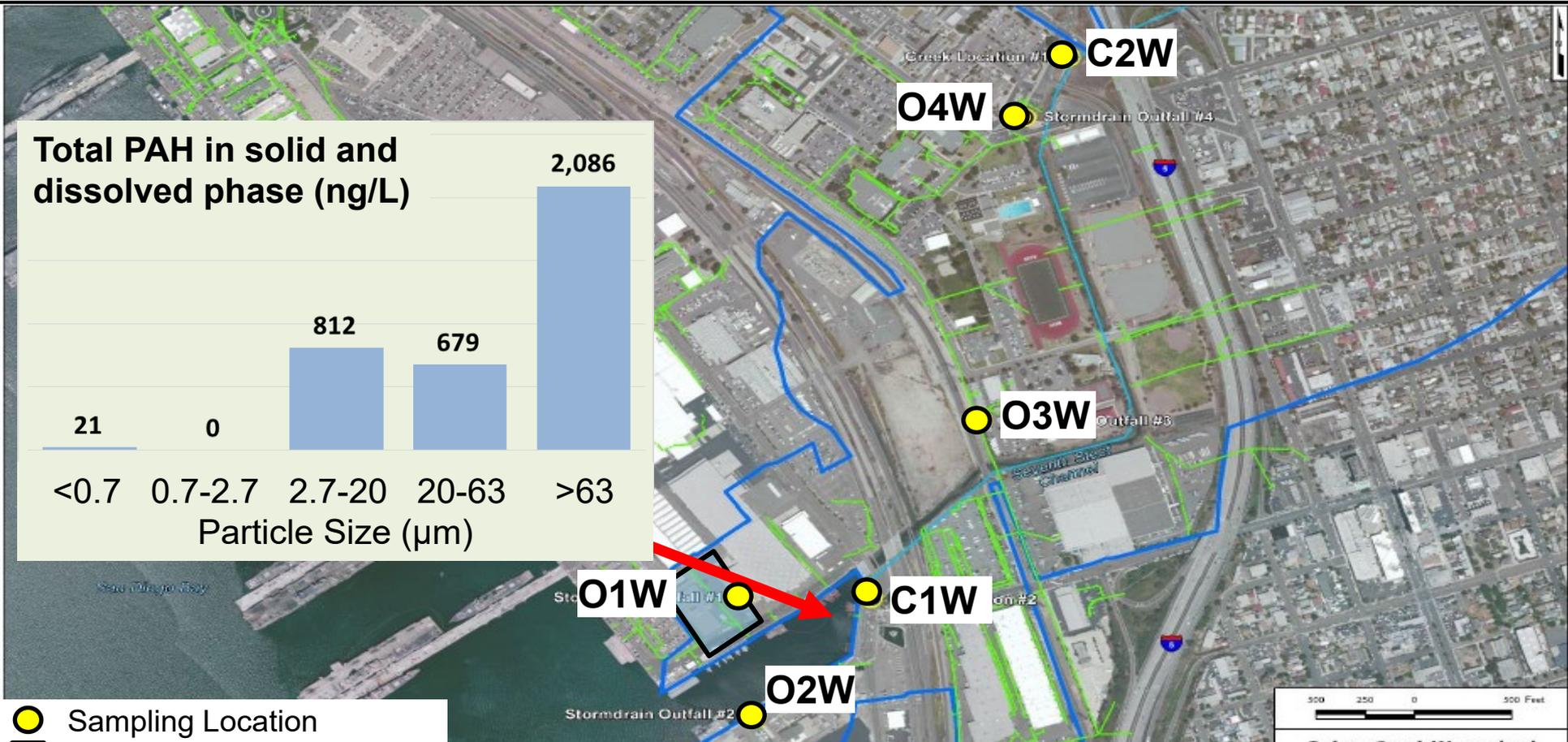
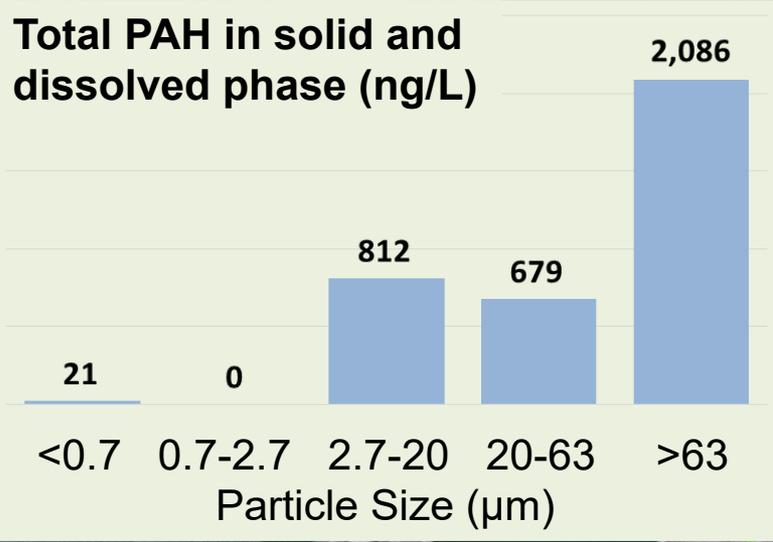
- 10-L water sample processed into:
 - Split of bulk samples into 15 separate replicates for different analyses
 - Metals, organics processed separately
 - Filtration, sieving to segregate by particle size
 - Size segregated chemical analysis
 - Complimented by:
 - Bioassays
 - Porewater analysis (SPME, DGT)

Notes: L = liter, COPC = contaminants of potential concern, SPME = solid-phase microextraction
DGT – Diffusion gradient in thin films

Sample Processing Schematic



Initial Stormwater Load



- Sampling Location
- Drainage area
- Paleta Creek Stream
- Storm drain conveyance

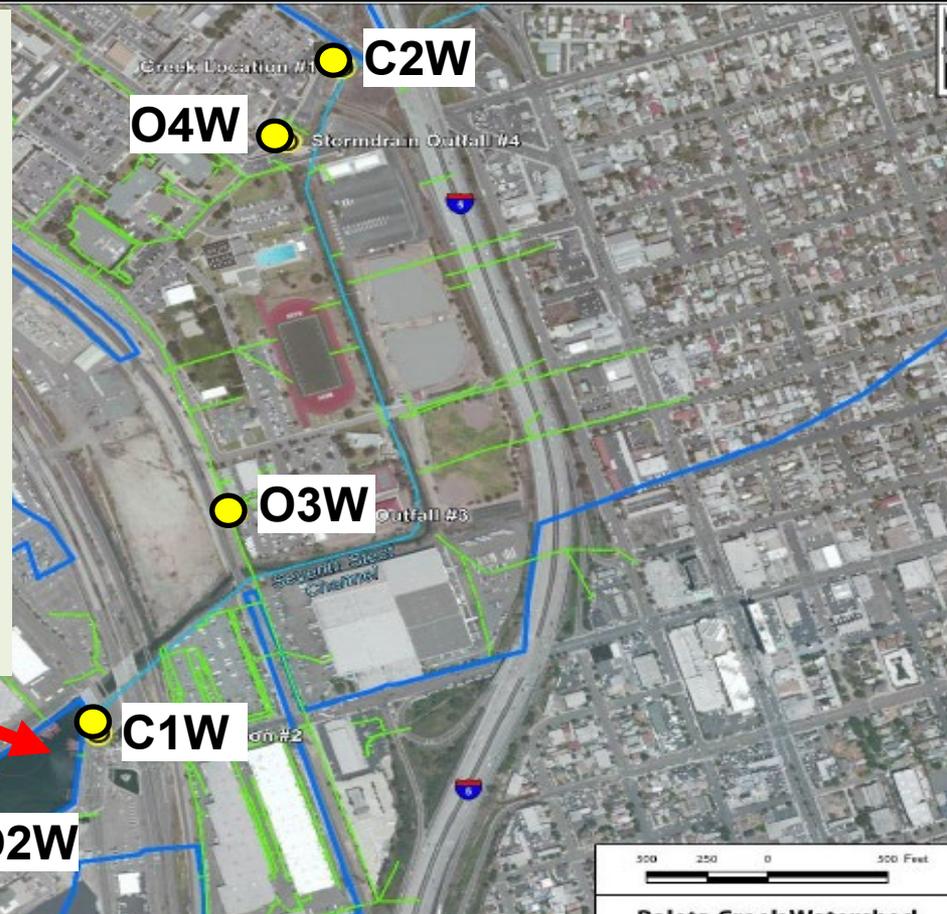
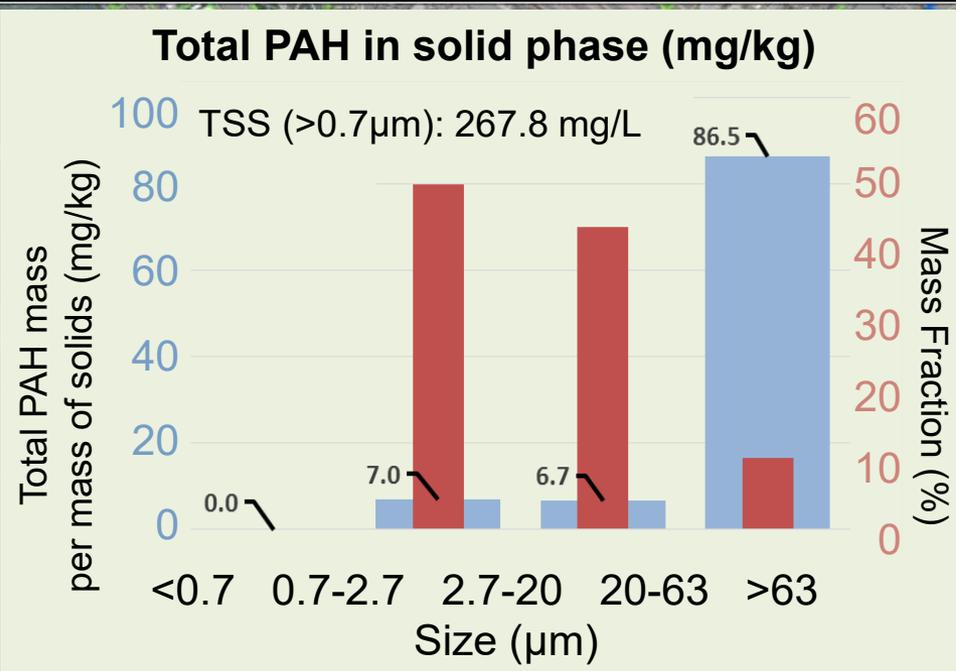
Notes:
PAH = polyaromatic hydrocarbons, ng = nanograms, µm = micrometer

Paleta Creek Watershed
San Diego, California

Geosyntec[®]
consultants

San Diego | February 2015

Initial Stormwater Concentration



- Sampling Location
- Drainage area
- Paleta Creek Stream
- Storm drain conveyance

Notes:
 PAH = polyaromatic hydrocarbons, mg = milligram kg = kilogram, µm = micrometer, TSS = total suspended solids

500 250 0 500 Feet

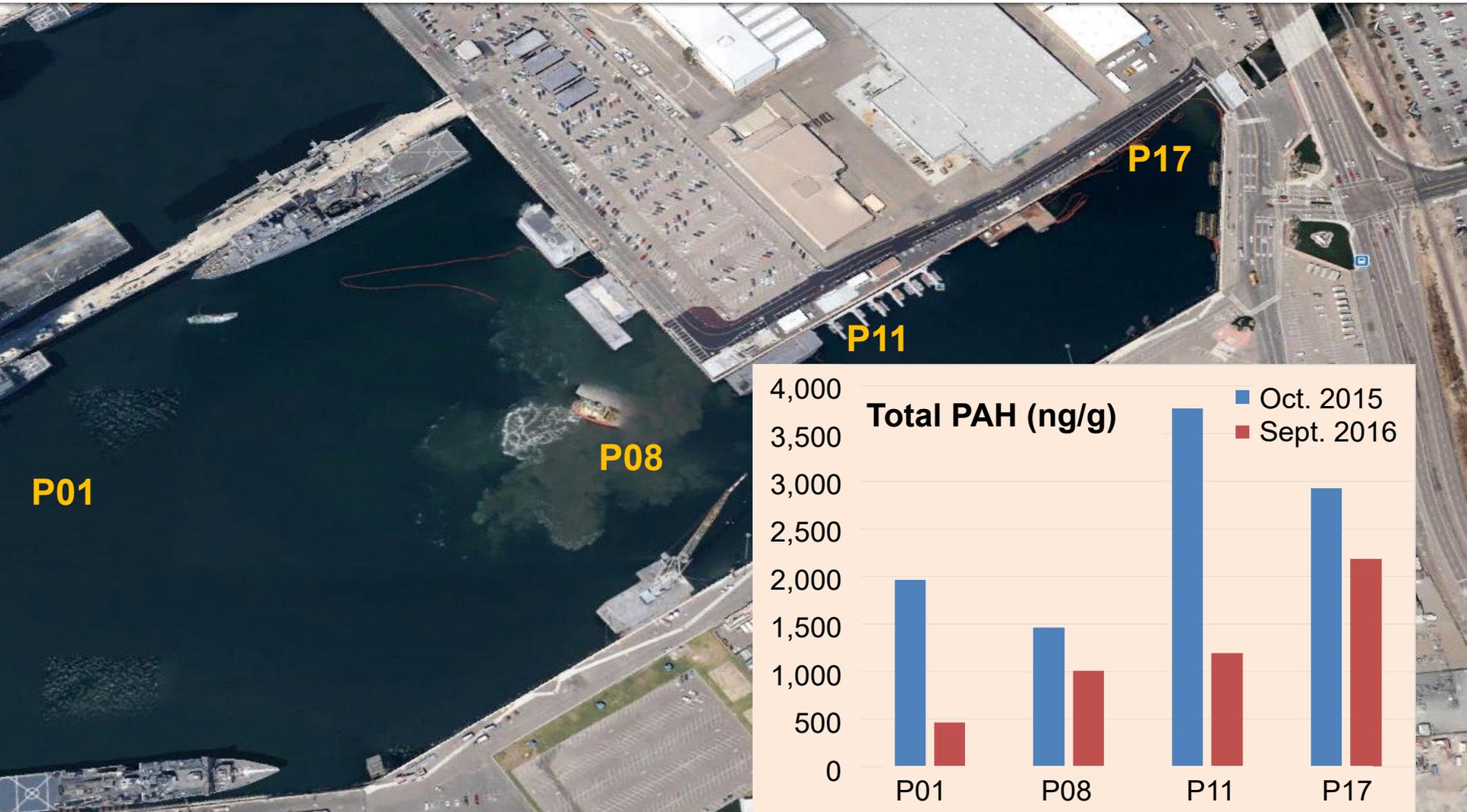
Paleta Creek Watershed

San Diego, California

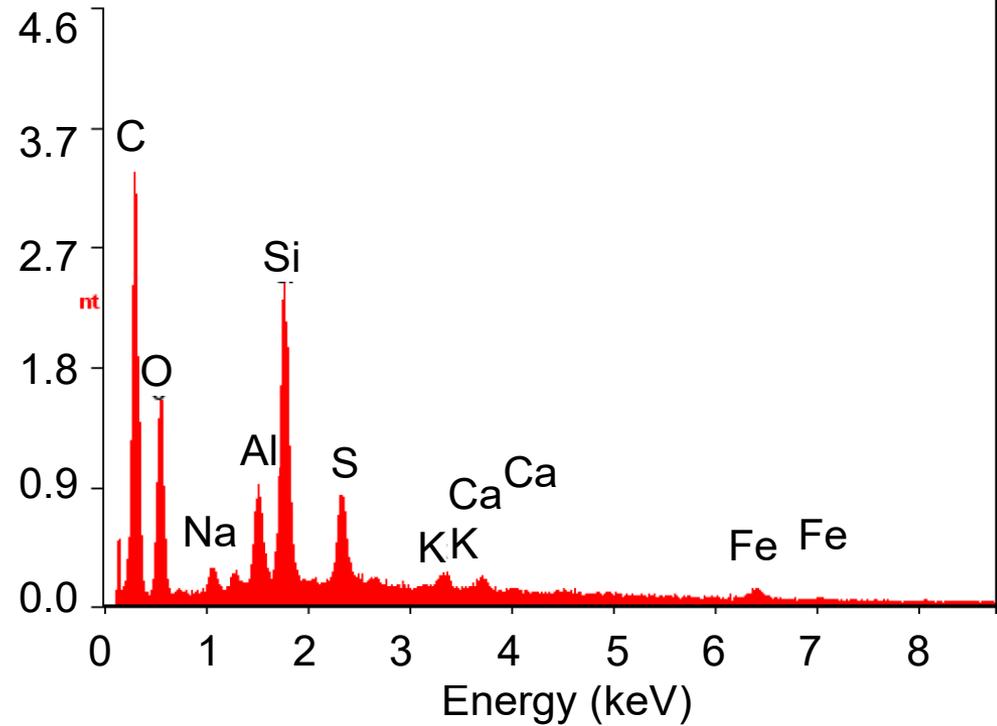
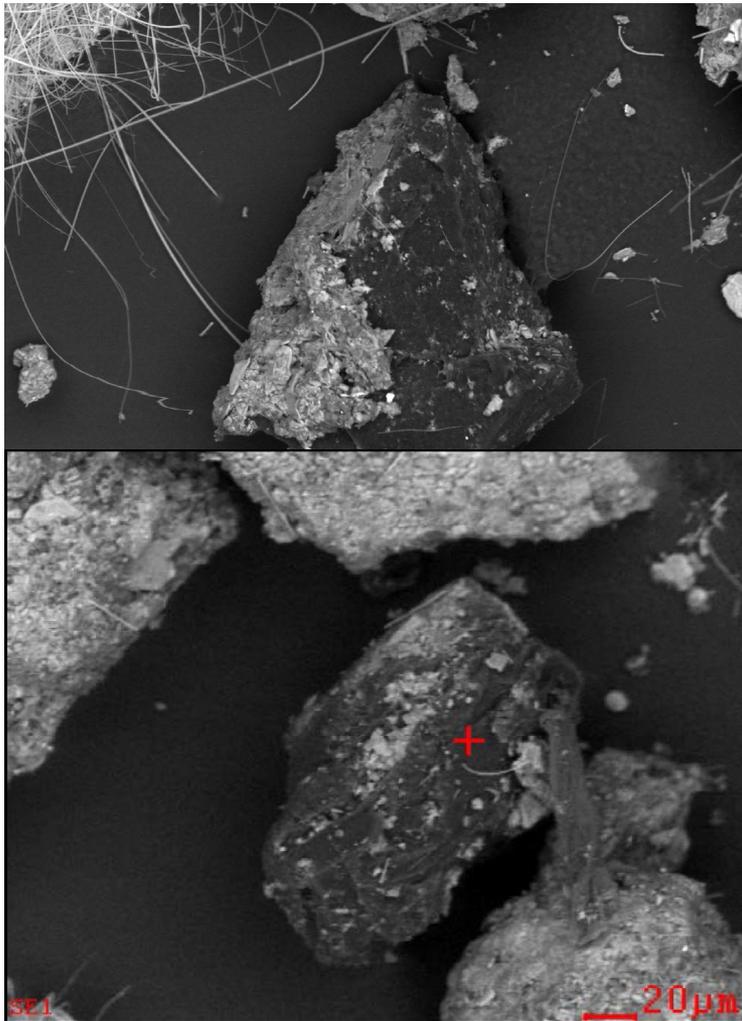
Geosyntec
consultants

San Diego | February 2015

Sediment Recontamination



Carbon Rich Large Particles

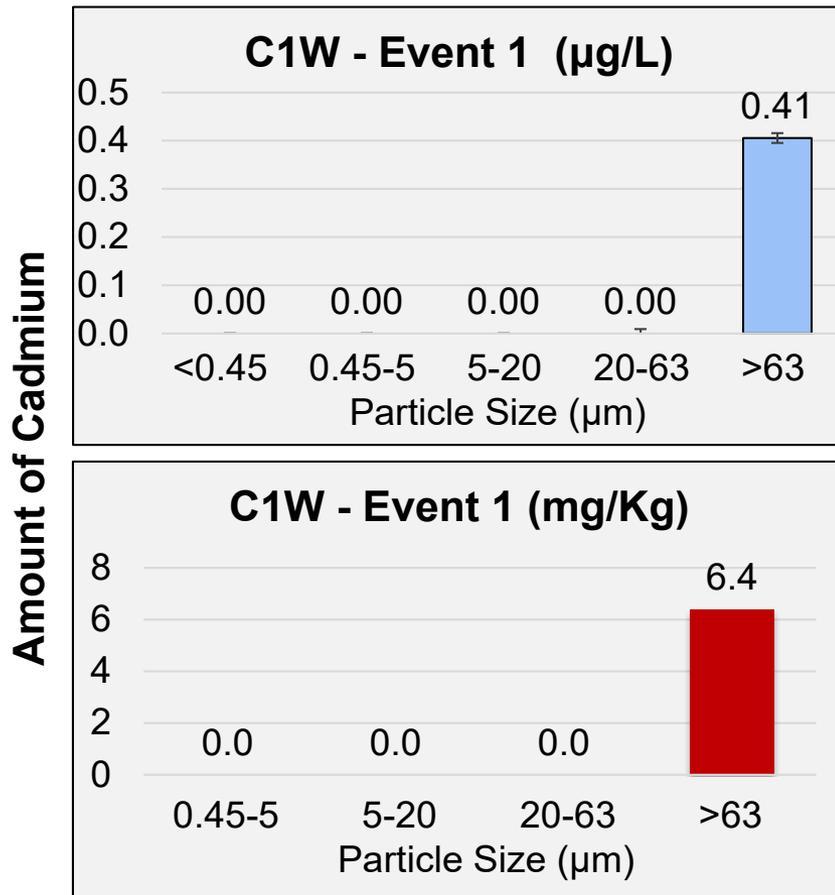


Notes:

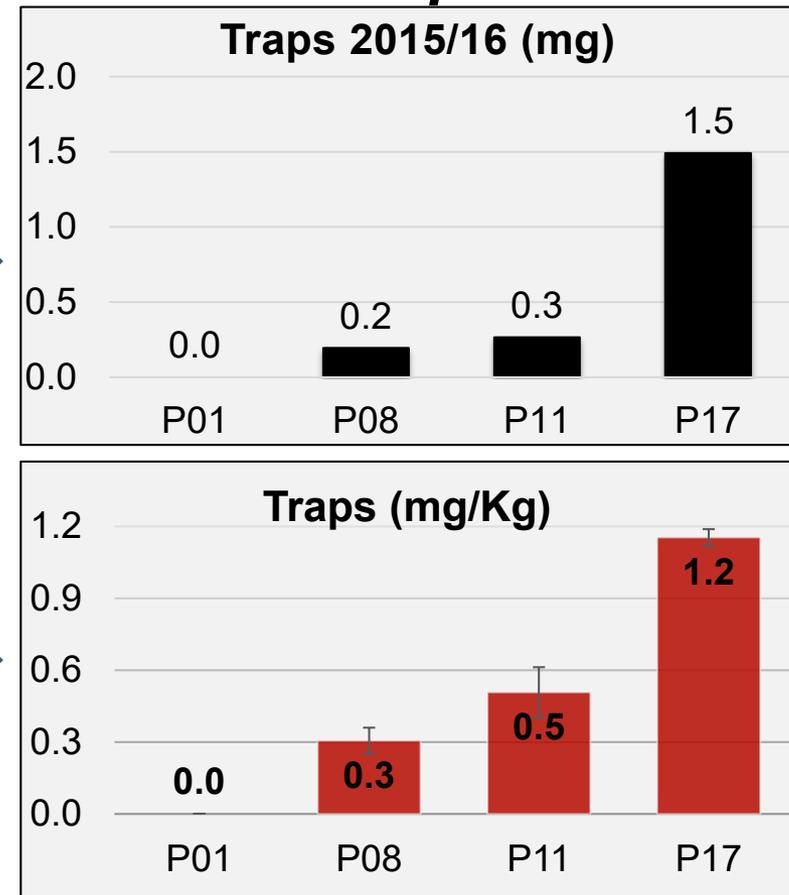
Al = aluminum, Ca = calcium, C = carbon, Fe = iron; K = potassium, Na = sodium, O = oxygen, keV = kiloelectronvolt

Cadmium Recontamination

Stormwater Releases

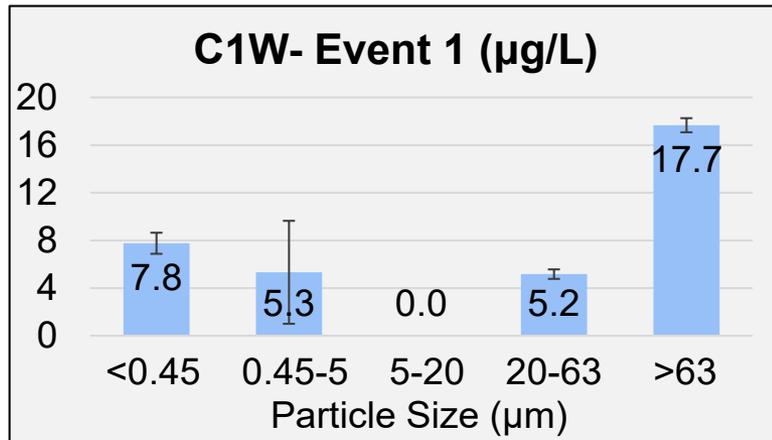


Sediment Traps

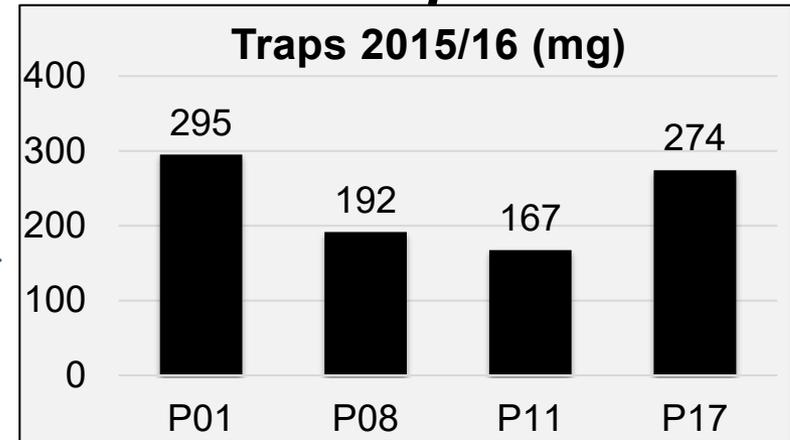


Copper Recontamination

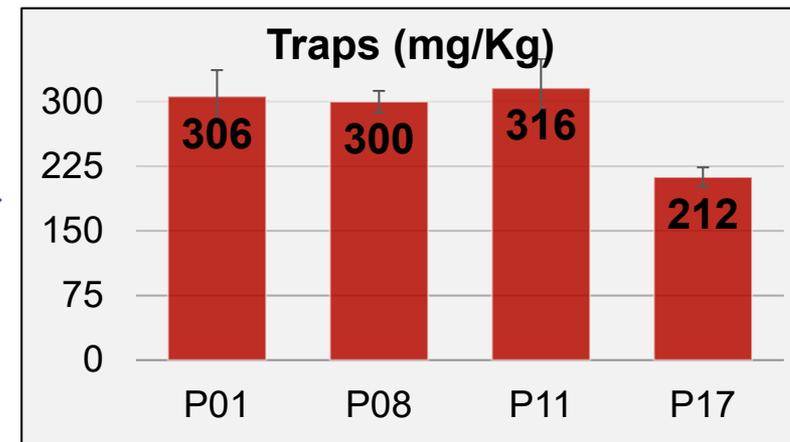
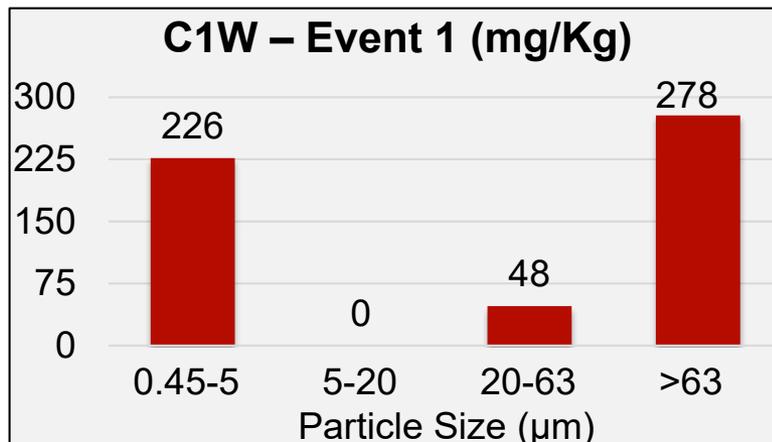
Stormwater Releases



Sediment Traps

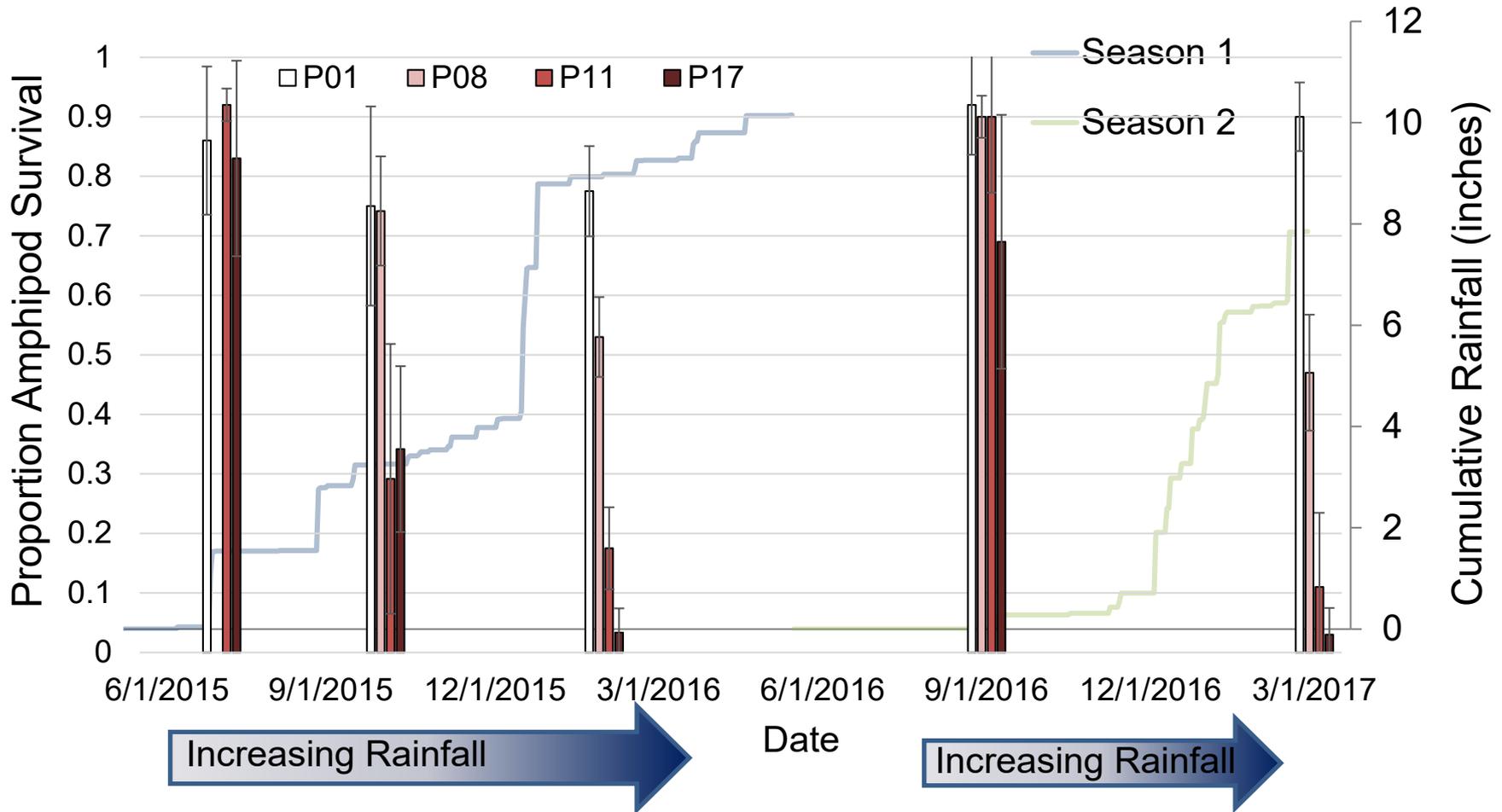


Amount of Copper

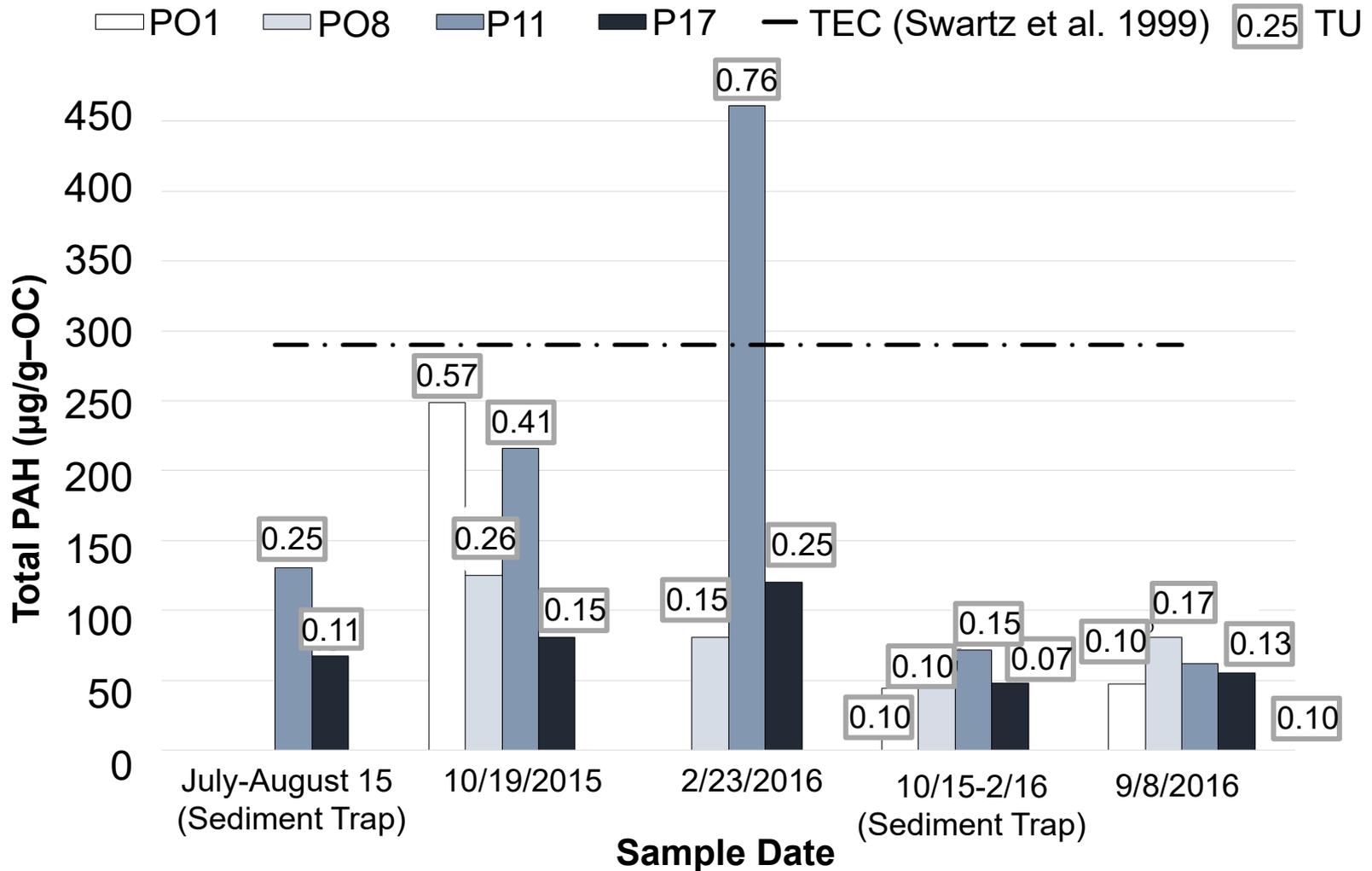




What About Biological Response?

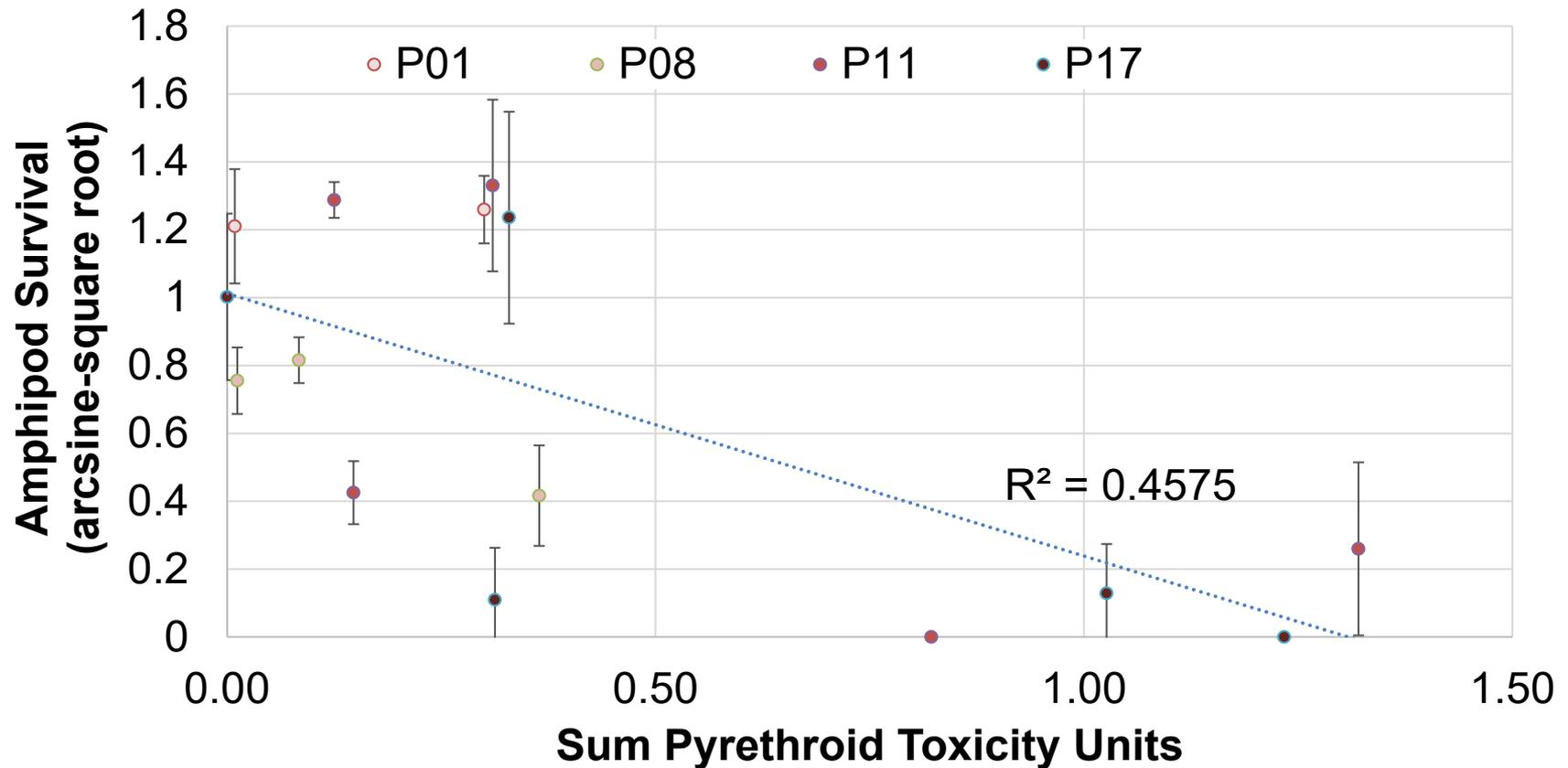


Can PAHs Explain Increased Toxicity?



Notes: TEC = toxicity equivalence concentration, TU = toxicity units; µg/g-OC = micrograms per gram organic carbon

Can Pyrethroids Explain Increased Toxicity?



Summary

- Assessing stormwater for sediment recontamination
 - Measure indicative characteristics
 - Particle size/settling velocity based loads
 - Total contaminant load and strength (concentration)
 - Measure sediment recontamination directly
 - Settling traps or surficial sediments
 - Measure contaminant biological effects, availability, mobility
 - Bioassays
 - Interstitial Water

Lessons Learned

- Additional information from:
 - Models of deposition and flow/deposition paths
 - In-situ bioassays preserve sediment stratification and conditions
 - Calibration of stormwater flow models
- Needs
 - Effectiveness of BMPs relative to sediment recontamination indices?

SERDP & ESTCP Webinar Series

For additional information, please visit
<https://www.serdp-estcp.org/Program-Areas/Environmental-Restoration/Contaminated-Sediments/Stormwater/ER-2428>

Speaker Contact Information

danny.reible@ttu.edu; 806-834-8050



Q&A Session 2



The next webinar is on
December 13, 2018

*Utilization of Advanced Conservation Voltage
Reduction (CVR) for Energy Reduction on
DoD Installations*



Survey Reminder

Please take a moment to complete the survey that will pop up on your screen when the webinar ends

