Lessons Learned from Program Effectiveness Assessment Development and Implementation

CASQA Webinar
December 2, 2015

Hosted by:
Karen Ashby - Larry Walker Associates
Scott Taylor – Michael Baker International

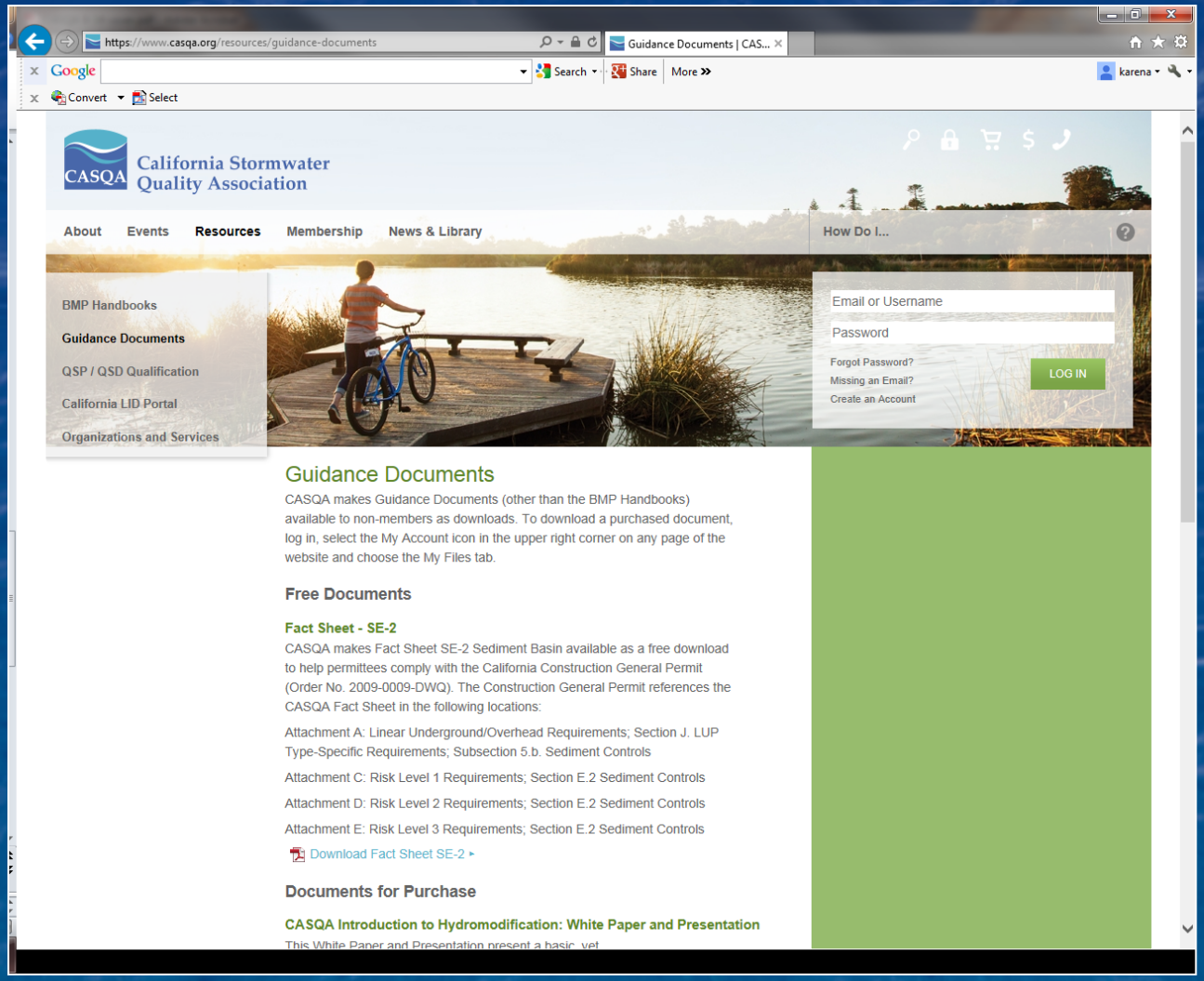
Instructions for Today

- Participants will be muted
- Pause for questions after each speaker
- Ask questions via “chat” function
  - Send to Karen Ashby

Agenda

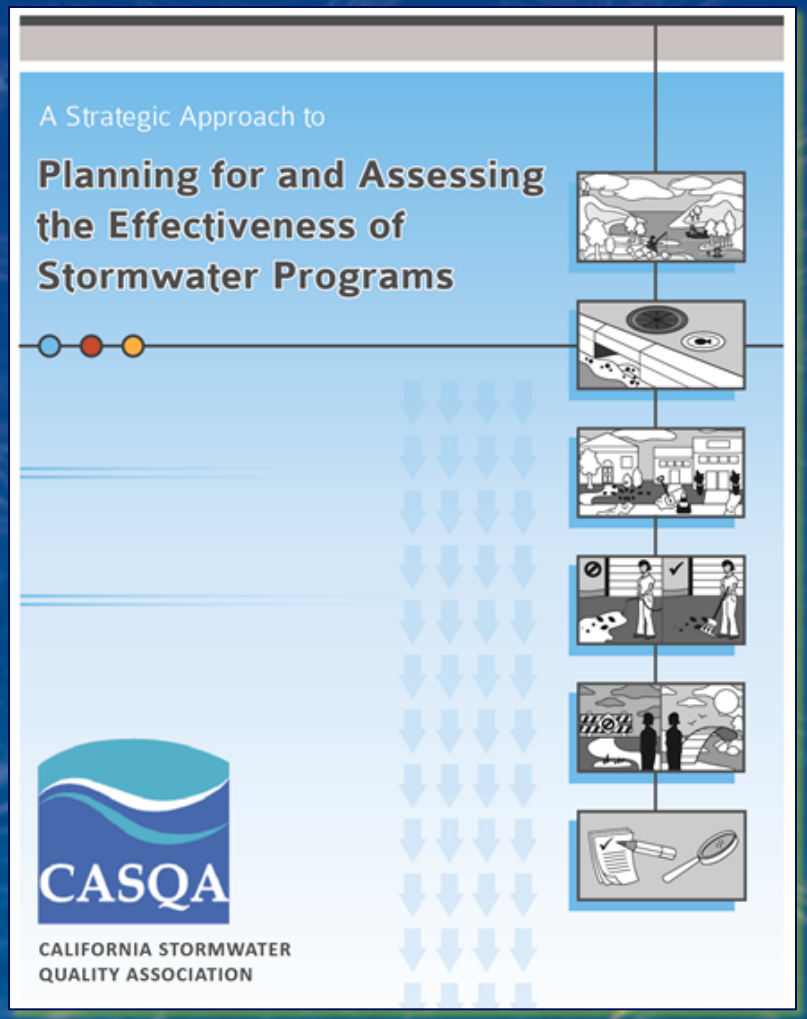
- Central Coast Program Effectiveness Assessment and Improvement Plans
  - Dominic Roques
- Lessons Learned in Assessing Existing Development Sources
  - Jon Van Rhyn
- Sacramento Stormwater Quality Program Long Term Effectiveness Assessment
  - Sherill Huun
- PEA from a Non-Traditional Phase II Perspective
  - Lisa Moretti

https://www.casqa.org/effectiveness_assessment

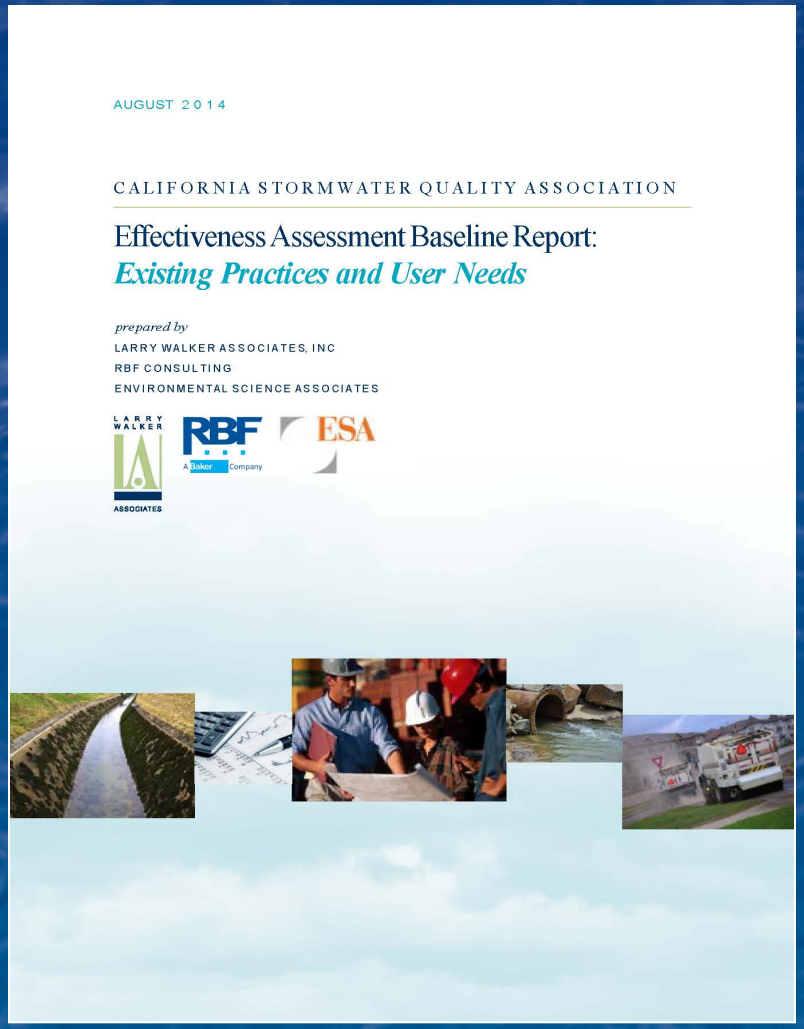


CASQA Guidance Document

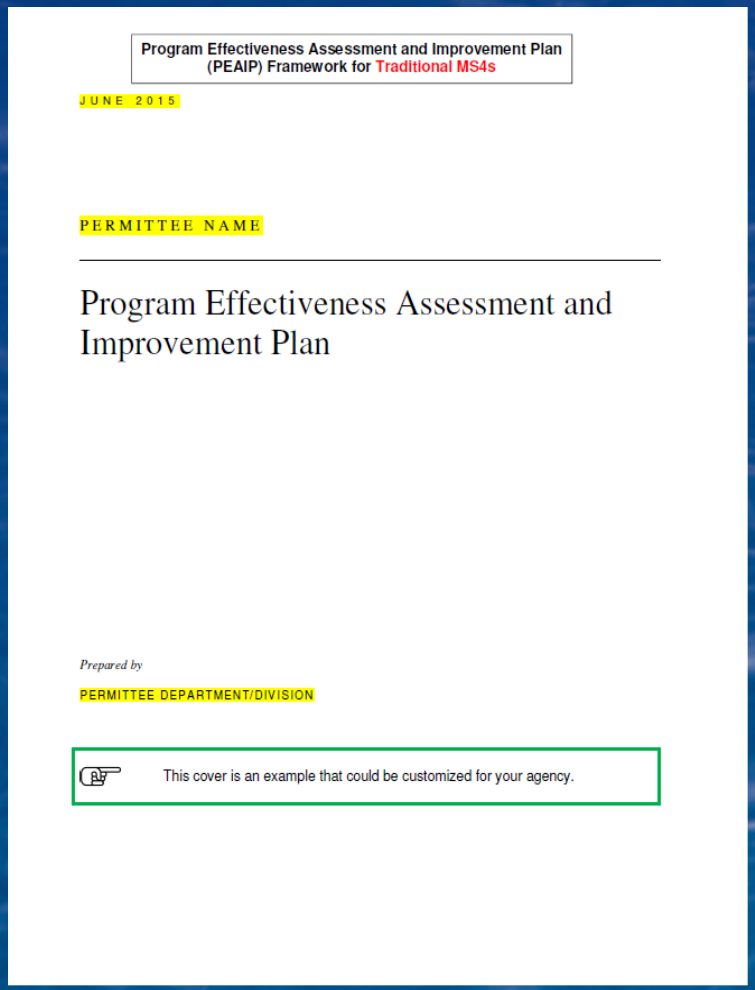
- One approach
- Terms and key concepts
- Assessment strategy
- Assessment methods
- Identifies applicability to program elements/ minimum control measures
- Provides examples



Baseline Report – August 2014



Education and Outreach



Program Effectiveness Assessment and Improvement Plan (PEAIP) Framework for Traditional MS4s

JUNE 2015

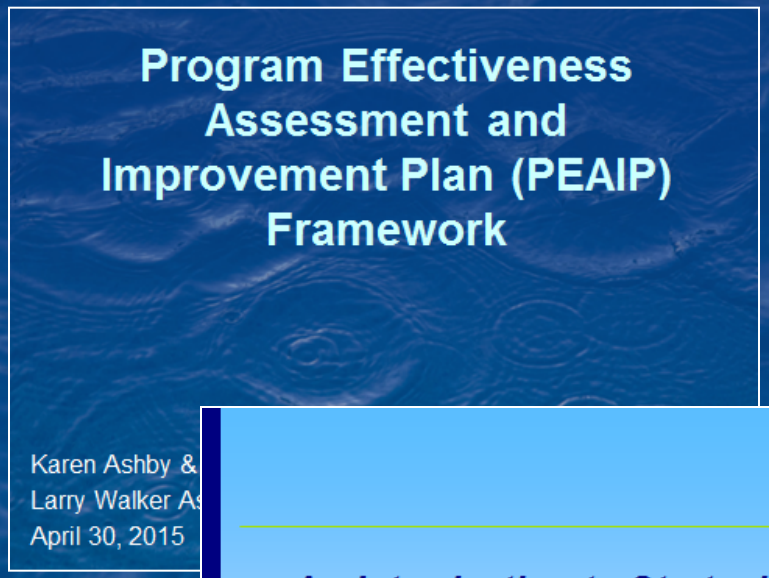
PERMITTEE NAME

Program Effectiveness Assessment and Improvement Plan

Prepared by

PERMITTEE DEPARTMENT/DIVISION

This cover is an example that could be customized for your agency.



Program Effectiveness Assessment and Improvement Plan (PEAIP) Framework

Karen Ashby &
Larry Walker As
April 30, 2015

An Introduction to Strategically Planning and Assessing Stormwater Programs

CASQA Webinar
June 22, 2015

Jon Van Rhyn – County of San Diego
David Pohl – ESA, San Diego, CA
Karen Ashby - Larry Walker Associates, Davis, CA

1

Central Coast Program Effectiveness Assessment and Improvement Plans

Dominic Roques
Storm Water Program Manager
Central Coast Water Board

Presentation

- Introduction
- Regional Board's Expectations for EA
- Assisting Permittees
- Results
- Continuing Challenges
- Conclusion

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

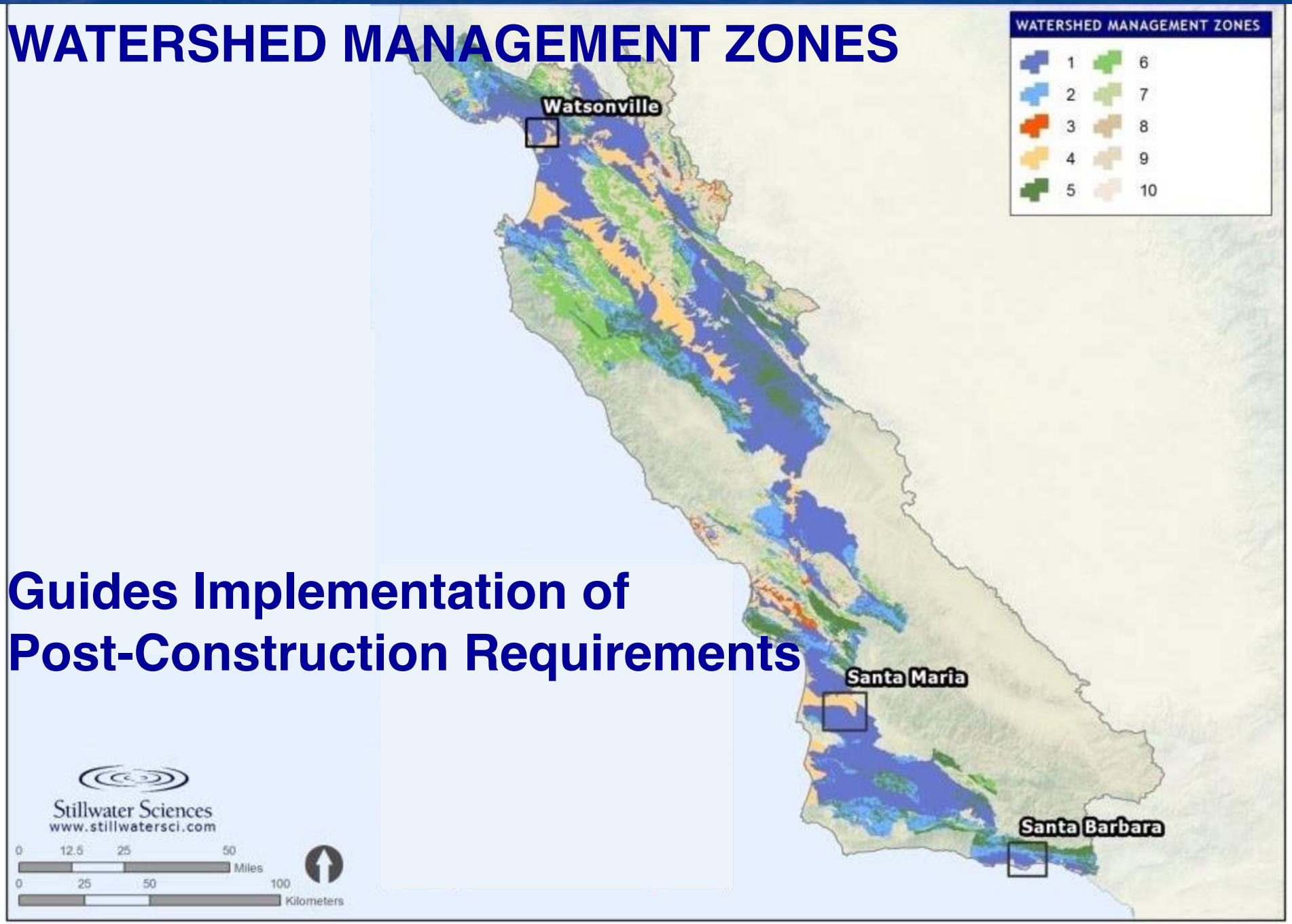
California's Central Coast

38 Phase II

1 Phase I

22 MS4 w/TMDLs

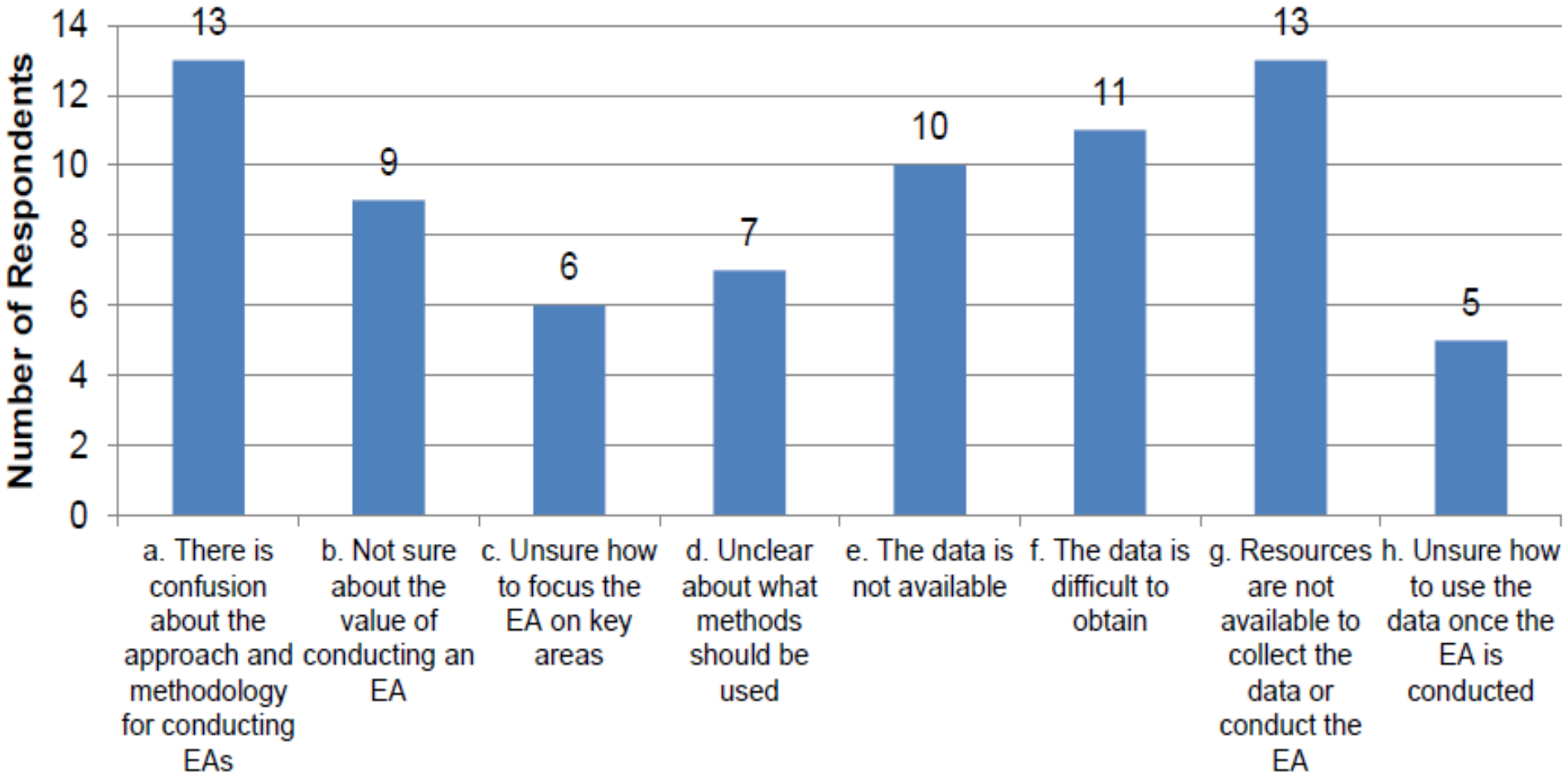
WATERSHED MANAGEMENT ZONES



Guides Implementation of Post-Construction Requirements

Methods and Data Limitations

Figure 17. Limitations to Effectiveness Assessment, MS4 Program Manager Perspective



Regional Board's Expectations

- Map Stormdrain System to Support EA
- Design BMP Inventory
- Design BMP Effectiveness Assessment
- Identify Steps to Quantify Pollutant Loads and Load Reductions Achieved by the Program as a Whole

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Assisting Permittees

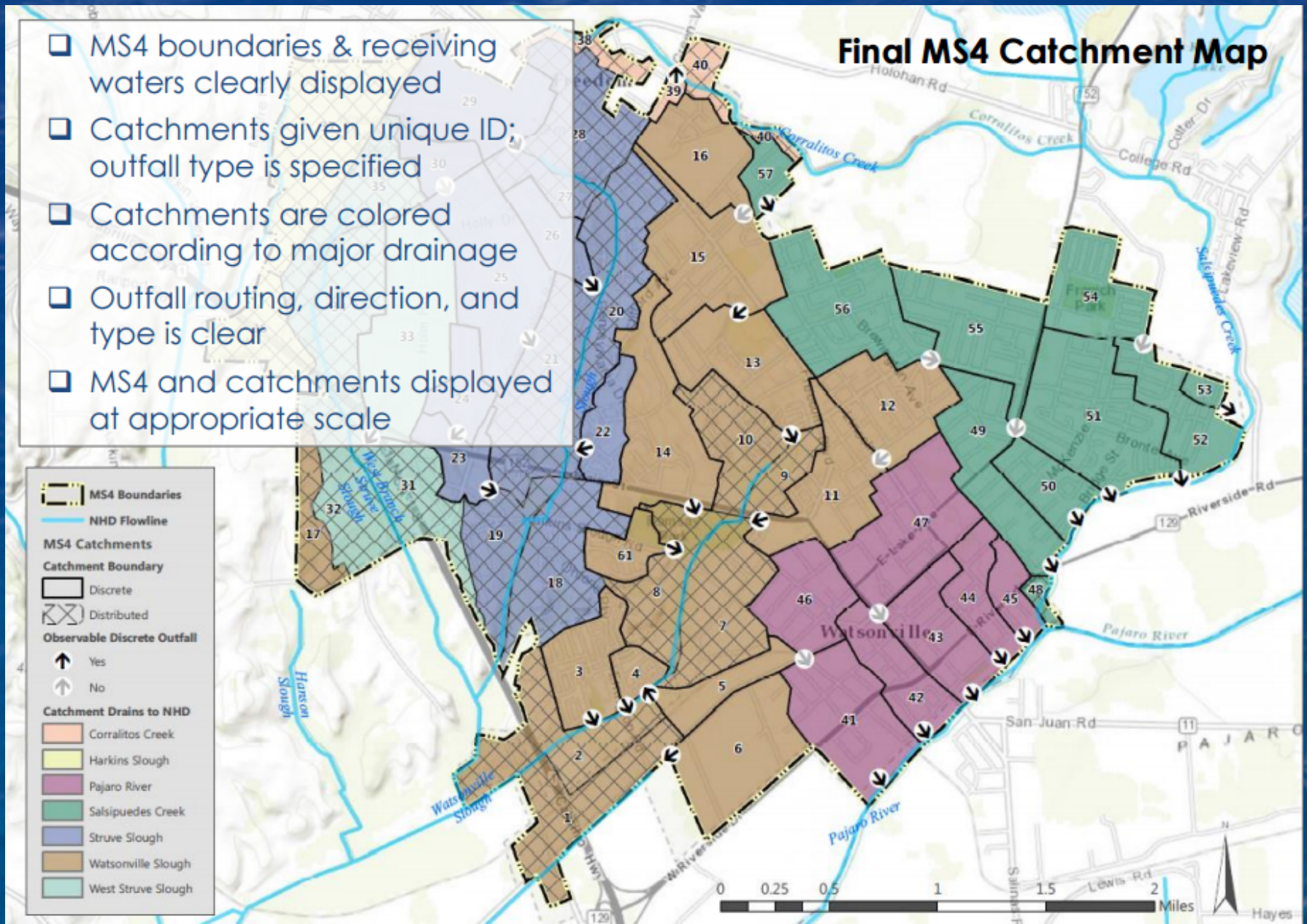
Map Stormdrain System to Support EA

- Map requirements found in IDDE Section of Phase II Permit
- Delineate *Urban Catchment*
- Land Uses
- Priority Areas
- Hydrologic Routing - *Know the Flow*
- Webinar to Assist Permittees

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Urban Catchments

- MS4 boundaries & receiving waters clearly displayed
- Catchments given unique ID; outfall type is specified
- Catchments are colored according to major drainage
- Outfall routing, direction, and type is clear
- MS4 and catchments displayed at appropriate scale



Assisting Permittees

Design BMP Inventory and BMP Effectiveness Assessment

- BMP Rapid Assessment Method (RAM)
- On-line inventory and performance tracking
- Structural BMP focus

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Assisting Permittees

Identify Steps to Quantify Pollutant Loads and Load Reductions

- Tool to Evaluate Load Reduction (TELR)
- Land Use Condition estimated at parcel scale
- User Guidance and Webinars to assist Permittees

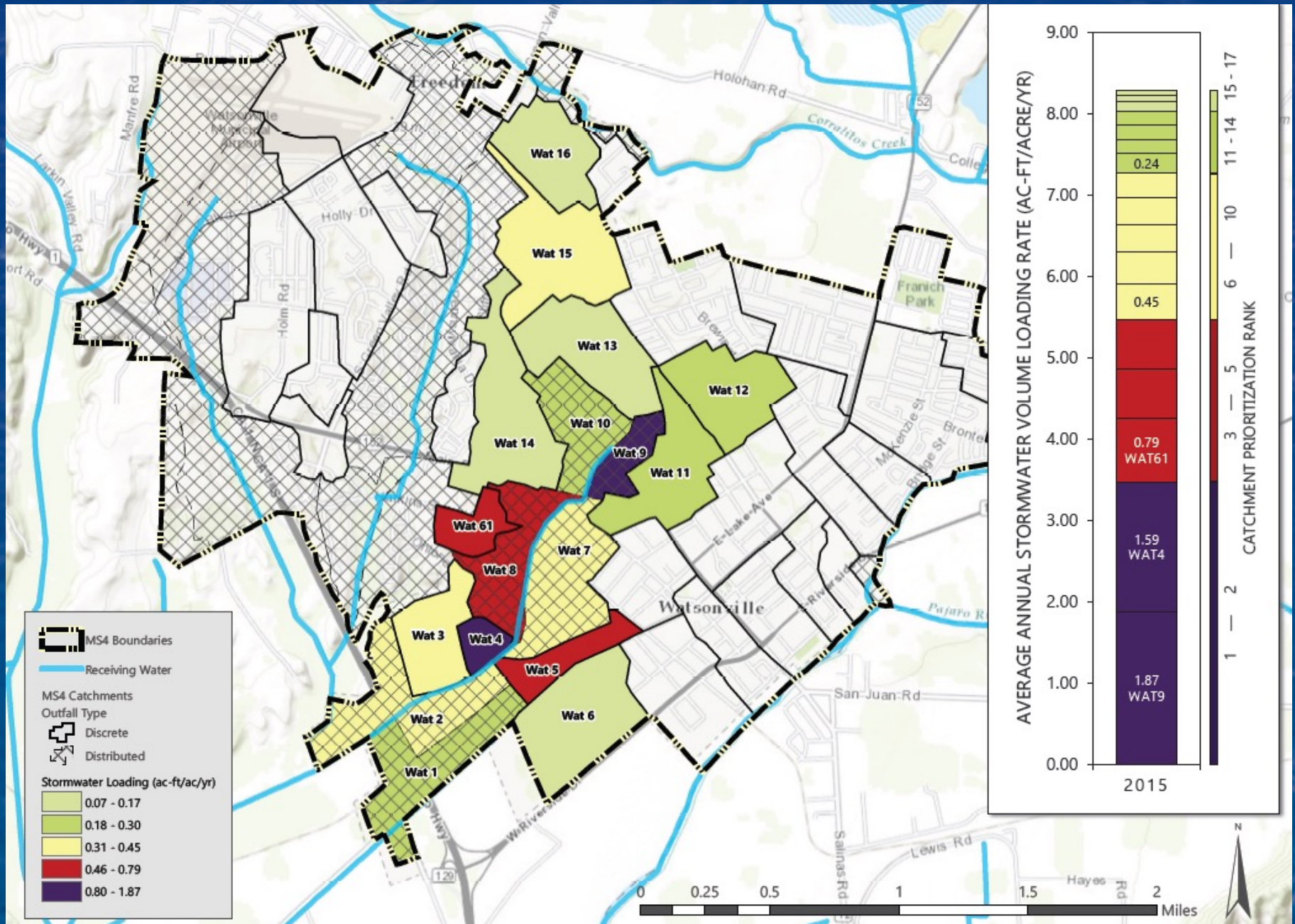
CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Assisting Permittees

MS4 Support Project: Develop a Process and Supporting Tools

1. Detailed mapping
2. Inventory BMPs Assess performance — BMP RAM
3. Quantify pollutant load reductions — TELR
4. Prioritize what BMP's next

Results


Wat 16
Wat 15
Wat 13
Wat 12
Wat 14
Wat 10
Wat 9
Wat 11
Wat 61
Wat 7
Wat 8
Wat 3
Wat 4
Wat 5
Wat 2
Wat 6
Wat 1
Holohan Rd
Manfre Rd
Holly Dr
Holm Rd
Larkin Valley Rd
Corralitos Creek
Franich Park
Mckenzie St
Bridge St
E Lake Ave
Watsonville
San Juan Rd
Lewis Rd
Hayes Rd
Pajaro R
Salinas Rd
MS4 Boundaries
Receiving Water
MS4 Catchments
Outfall Type
Discrete
Distributed
Stormwater Loading (ac-ft/ac/yr)
0.07 - 0.17
0.18 - 0.30
0.31 - 0.45
0.46 - 0.79
0.80 - 1.87
AVERAGE ANNUAL STORMWATER VOLUME LOADING RATE (AC-FT/ACRE/YR)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.24
0.45
0.79
WAT61
1.59
WAT4
1.87
WAT9
2015
CATCHMENT PRIORITIZATION RANK
1 — 2
3 — 5
6 — 10
11 - 14
15 - 17
0
0.25
0.5
1
1.5
2
Miles
N

Results in PEAIPs

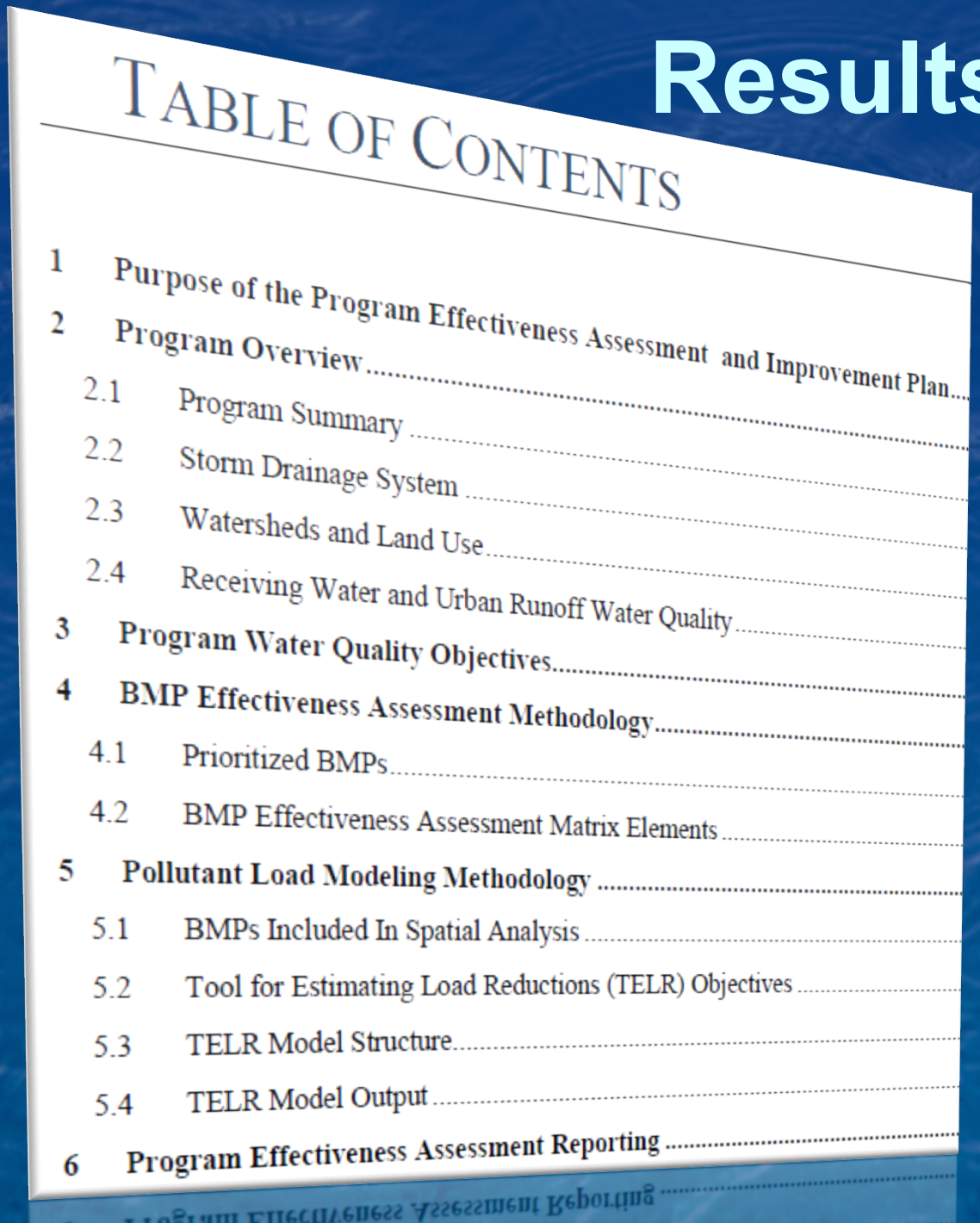


TABLE OF CONTENTS

- Some commit to Spatial objectives
- Some commit to load quantification
- Some missed the boat entirely

Continuing Challenges

- Greater consistency among Permittees
- Increase capacity for smaller MS4s
- Completing BMP Inventories
- Making a lasting change beyond Year 5
  - *"Identify BMPs or program modifications in priority program areas that will be made in the next permit term"*
- Assessing load reductions from non-structural BMPs

Conclusion

Urban Catchment-Based EA

- Foundation for:

✓ Better understanding of BMP effectiveness

✓ Better monitoring design

✓ Better compliance demonstration

Conclusion

Central Coast Approach to EA

- Spatially Explicit: *Urban Catchment*
- Quantifiable: *Pollutant Loading is Focus*
- Tools Assist Permittees: *BMP RAM / TELR*
- Inform future Permits revisions: *Salinas in 2017; Phase II Permit in 2018*
- Create a future where: *Permittees are managing urban runoff on a catchment scale to protect and restore watershed processes, accrue benefits of climate resilience, and water supply security*

Please send in your questions using the ‘chat’ feature to Karen Ashby.

All participants are muted throughout the webinar.

QUESTIONS

CASQA Program Effectiveness Assessment Webinar

December 2, 2015

Lessons Learned in Assessing Existing Development Sources

Jon Van Rhyn
County of San Diego Watershed Protection Program
858-495-5133 / Jon.vanrhyn@sdcounty.ca.gov

Overview of Major Source Categories

Table 4.15: Major Source Categories and Examples of Specific Source Types

Existing Development			New and Redevelopment	
Municipal Sources	**Residential Sources**	**Industrial/ Commercial Sources**	**Construction Sources**	**Development & Redevelopment Sources**
• Solid waste facilities • Wastewater operations • Streets and roads • MS4s • Parks • Office buildings	• Single family housing • Multiple family housing • Apartments • Mobile homes • Rural residential areas • Inner city neighborhoods	• Restaurants • Automotive maintenance • Nurseries • Horse stables • Mobile operations (landscaping, pool care, pest control, etc.)	• Commercial and industrial development • Single family homes • Major subdivisions • Capital improvement projects • Redevelopment sites	• Commercial and industrial development • Single family homes • Major subdivisions • Capital improvement projects • Redevelopment sites

Today's Focus is on Behavior (Outcome Level 3)

Target Audiences are Diverse and Complex

Residential Sources

- Do-it-yourselfers (e.g., gardening and yard care; home improvement; power washing; vehicle washing, maintenance, and repair)
- Service providers (commercial operations corresponding to same activities as above)
- Pet owners
- Livestock owners
- Smokers
- Recreational water users (swimmers, surfers, etc.)
- Schoolchildren
- Hotline callers

Municipal Sources

- Garbage collectors
- Street maintenance staff
- Park and grounds maintenance staff
- Building maintenance staff
- Grading plan or permit reviewers
- Grading or construction inspectors
- Industrial and commercial business inspectors
- Waste water collection and water distribution maintenance staff
- Animal control staff
- Law enforcement staff
- Flood control or reclamation district maintenance staff
- Hazardous materials inspectors

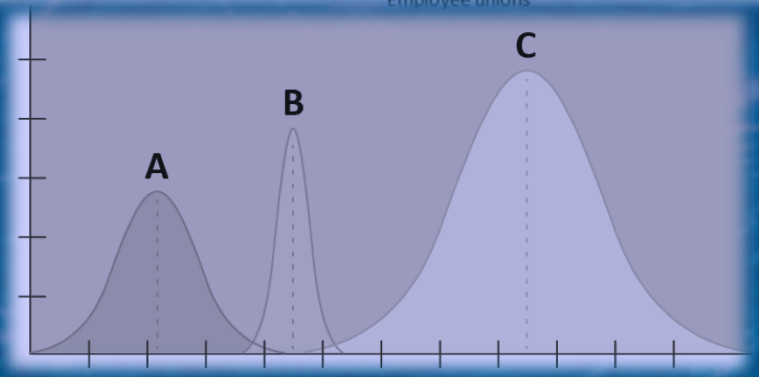
Industrial and Commercial Sources

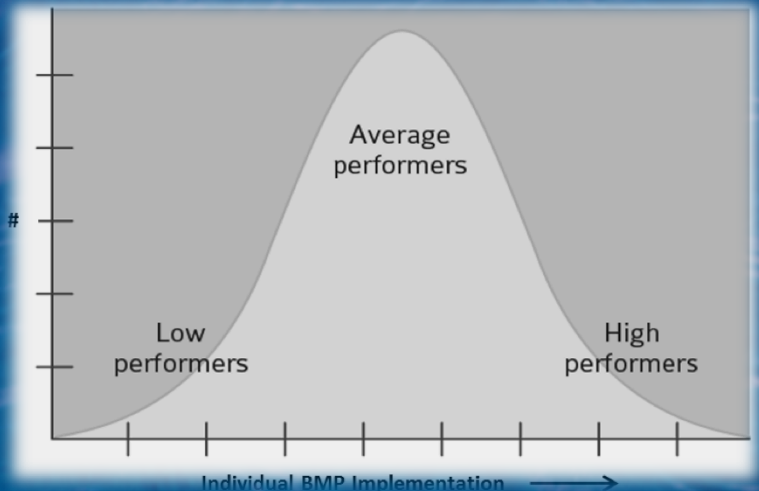
- Owners
- Managers and supervisors
- Employees (skilled workers and laborers)
- Mobile operators
- Contractors (landscaping, parking lot sweeping, etc.)
- Industry associations
- Employee unions

Pollutant-generating activities (PGAs) are behaviors that contribute pollutants or increase flows to runoff. In this illustration, a woman is using a hose to clean up an outdoor area. If other precautions are not taken to prevent flows and pollutants from leaving the site, this action is likely to be a PGA.

Best management practices (BMPs) are practices designed to prevent, reduce, or eliminate discharges of pollutants and flow. Here the woman has instead chosen to use a broom for cleaning up. Dry sweeping methods are an excellent example of choosing a BMP over a PGA.

Supporting behaviors are actions that encourage or facilitate BMP implementation. Supporting behaviors can be initiated by virtually anyone; in some cases, by dischargers (facility self-inspections, staff training, etc.) and in others by interested parties (pollution reporting, joining an environmental advocacy group, etc.).





Commercial and Industrial Sources

Potential Assessment Tools

- Regulatory compliance inspections
- Facility audits
- Complaint investigations
- Surveys and special investigations

County of San Diego Commercial and Industrial Sources (FY 2011-12)

Industrial Sources (10 subcategories)	181
Stationary Commercial Sources (18 subcategories)	1,921
Mobile Commercial Sources	147
Total Sources (Commercial + Industrial)	2,309

Regulatory Inspection Targets for Industrial Sources

Targeted Behaviors	Targeted Percentage
A. Administrative and Procedural Behaviors	
1. Documentation of a monitoring program satisfying the requirements of the General Industrial Permit	100%
2. Current, complete, site-specific SWPPP available for review	100%
3. Site-specific spill response plan	100%
4. Completed annual review of operations and procedures	100%
5. Provided annual training to all operators, employees, and workers	100%
B. Illicit Discharge Control	
1. No illicit discharges	100%
C. BMP Implementation	
1. No BMP violations	50%
2. Less than 3 BMP violations	75%
3. Implement at least one pollution prevention practice	90%
D. Overall Regulatory Compliance	
1. No violations	50%

Multi-year Industrial Source Inspection Results

Targeted Behaviors	Sites Without Violations								
	Targeted Percentage	FY 2004-05	FY 2005-06	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	FY 2010-11	FY 2011-12
A. Administrative and Procedural Behaviors									
1. Documentation of a monitoring program satisfying the requirements of the General Industrial Permit	**100%**	NA	25%	14%	74%	81%	89.1%	88.9%	96.5 %
2. Current, complete, site-specific SWPPP available for review	**100%**	45%	27%	22%	71%	95%	84.3%	94.4%	94.2%
3. Site-specific spill response plan	**100%**	NA	NA	NA	NA	92%	97.6%	100%	100%
4. Completed annual review of operations and procedures	**100%**	NA	NA	NA	79%	79%	90.0%	90.0%	89.6%
5. Provided annual training to all operators, employees, and workers	**100%**	NA	35%	25%	66%	51%	78.0%	82.2%	89.6%
B. Illicit Discharge Control									
1. No illicit discharges	**100%**	NA	NA	NA	98%	100%	100%	100%	100%
C. BMP Implementation									
1. No BMP violations	**50%**	NA	NA	NA	58%	75%	100%	100%	100%
2. Less than 3 BMP violations	**75%**	NA	NA	NA	97%	100%	100%	100%	100%
3. Implement at least one pollution prevention practice	**90%**	NA	NA	NA	92%	100%	100%	100%	100%
D. Overall Regulatory Compliance									
1. No violations	**50%**	14%	40%	38%	42%	46%	92.8%	100%	100%

Commercial & Industrial Facilities
Summary of Lessons Learned

Achievements

- Regulatory compliance levels well understood
- Improvements in compliance demonstrated over time
- Some behavioral baselines and trends generally understood

Potential Improvements

- Pollutant loads and reductions
- Frequency and impacts of specific practices (BMPs rather than violations)
- Impacts on MS4s and receiving waters
- Specific impacts of different facility/source and target audience types

Residential Sources (~503,000 in 2010)

Potential Assessment Tools

- Surveys and tests
- Website hits and hotline calls
- Complaint investigations
- Residential inspections / audits
- Recycling and waste collection
- Incentive program participation
- Event participation
- Special investigations

Surveys and Tests

Appendix A: Test Items

County of San Diego Water Quality Program – Splash Lab PRE-Survey

SECTION 1: Please fill in the blanks below

Date: _____ School: _____ Teacher: _____

What is the first letter of your FIRST name? _____

What is the first letter of your LAST name? _____

What grade are you in? _____

SECTION 2: For each of the following questions, please circle the best answer.

1) Which of the following types of water is carried by the storm drain system?
   a. Waste water from showers and sinks
   b. Household toilet water
   c. Rainwater
   d. All of the above

2) What happens to the water that goes into storm drains?
   a. It gets sent to the sewer system where it is cleaned
   b. It goes directly to creeks, lakes, or the ocean without cleaning
   c. It goes to the ocean after trash is filtered out
   d. It gets stored in case we need it

3) Which of these things can be harmful to plants and animals if it enters a storm drain?
   a. Fertilizer
   b. Dirt and gravel
   c. Grass clippings and leaves
   d. All of the above

4) Fertilizers made with nitrogen are considered what type of pollutant?
   a. Bacteria
   b. Nutrients
   c. Sediment
   d. Chemicals

5) We all live in _____.
   a. A reservoir
   b. An estuary
   c. A watershed
   d. An aqueduct

6) Bacteria pollution in the water comes from:
   a. Animal waste
   b. Nutrients
   c. Sediment
   d. All of the above

7) What is one thing that people can do to prevent stormwater pollution?
   a. Use a hose to clean litter and trash off the sidewalk

County of San Diego Water Quality Program – Splash Lab POST-Survey

SECTION 1: Please fill in the blanks below

Date: _____ School: _____ Teacher: _____

What is the first letter of your FIRST name? _____

What is the first letter of your LAST name? _____

What grade are you in? _____

SECTION 2: For each of the following questions, please circle the best answer.

1) Which of the following types of water is carried by the storm drain system?
   a. Waste water from showers and sinks
   b. Household toilet water
   c. Rainwater
   d. All of the above

2) What happens to the water that goes into storm drains?
   a. It gets sent to the sewer system where it is cleaned
   b. It goes directly to creeks, lakes, or the ocean without cleaning
   c. It goes to the ocean after trash is filtered out
   d. It gets stored in case we need it

3) Which of these things can be harmful to plants and animals if it enters a storm drain?
   a. Fertilizer
   b. Dirt and gravel
   c. Grass clippings and leaves
   d. All of the above

4) Fertilizers made with nitrogen are considered what type of pollutant?
   a. Bacteria
   b. Nutrients
   c. Sediment
   d. Chemicals

5) We all live in _____.
   a. A reservoir
   b. An estuary
   c. A watershed
   d. An aqueduct

6) Bacteria pollution in the water comes from:
   a. Animal waste
   b. Nutrients
   c. Sediment
   d. All of the above

7) What is one thing that people can do to prevent stormwater pollution?
   a. Use a hose to clean litter and trash off the sidewalk

Recycling and Waste Collection

Waste Stream	FY 2006-07 (3,672 residents)		FY 2007-08 (7,674 residents)		FY 2008-09 (4,896 residents)		FY 2009-10 (4,896 residents)		FY 2010-11 (3,561 residents)		FY 2011-12 (3,546 residents)	
	Pounds	% of Total	Pounds	% of Total	Pounds	% of Total	Pounds	% of Total	Pounds	% of Total	Pounds	% of Total
Auto Fluids	27,490	5.7	60,112	8.1	28,575	5.6	15,496	4.9	21,101	4.9	19,744	5.4
Asbestos	525	0.1	207	0.1	598	0.1	52	0.0	600	0.1	1,452	0.4
Household Cleaners	22,144	4.6	33,119	4.5	24,536	4.8	15,662	5.0	19,035	4.4	20,612	5.6
Latex Paints	112,376	23.3	129,487	17.4	126,577	24.7	67,416	21.4	127,957	29.7	89,909	24.4
Yard and Garden Products	24,553	5.1	26,182	3.5	19,164	3.7	9,137	2.9	24,470	5.7	23,734	6.4
Auto Batteries	19,177	4.0	34,135	4.6	12,998	2.5	3,930	1.3	3,346	0.8	2,671	0.7
Oil Based Paints & Materials	119,018	24.7	169,867	22.8	101,200	19.7	52,214	16.6	112,406	26.1	103,850	28.2
Oil Filters	681	0.1	1,838	0.3	1,025	0.2	497	0.2	1,004	0.2	876	0.2
Other	25,883	5.4	239,836	32.2	147,508	28.7	15,197	37.1	27,827	6.6	20,453	5.6
Electronic Waste	80,764	16.8	12,205	1.6	23,137	4.5	116,535	5.8	82,933	19.2	71,856	19.5
U –Electronic Waste	49,476	10.3	37,364	5.0	27,802	5.4	18,213	4.8	10,074	2.3	13,143	3.6
Totals	**482,087**	**100**	**744,353**	**100**	**513,120**	**100**	**314,349**	**100**	**430,753**	**100**	**368,300**	**100**

Residential Sources
Summary of Lessons Learned

Achievements

- Recycling and waste collection well documented
- Limited improvements demonstrated over time
- Knowledge, behavioral intention, and behavioral baselines are increasing
- Some behavioral trends are generally understood

Potential Improvements

- Pollutant loads and reductions
- Impacts on MS4s and receiving waters
- Specific impacts of different target audiences
- Frequency and impacts of specific practices
- Behavioral baselines sometimes lack context
- Knowledge often focuses on training/educational interactions (pre- and post-tests)
- Assessment is often piecemeal

Municipal Sources

Potential Assessment Tools

- Compliance inspections / audits
- Surveys and tests
- Complaint investigations
- Recycling and waste collection
- Special investigations

County of San Diego Municipal Sources (FY 2011-12)

Source Type	Number as of June 30, 2012
Streets, Roads, and Highways (Miles)	1,929
Municipal Separate Storm Sewer System (MS4) Inlets and Basins	18,975
Municipal Separate Storm Sewer System (MS4) Linear Channels (Miles)	2,067
Solid Waste Facilities	22
Wastewater Collection System (Sewer Pipeline in Miles)	450
Wastewater Facilities	18
Road Stations	21
Fleet Maintenance Facilities	27
Municipal Airfields	4
Parks and Recreational Facilities	91
Office Buildings and Other Municipal Facilities (including Household Hazardous Waste)	74
Pesticide, Herbicide, and Fertilizer Management (Applications)	2,276
Non-emergency Fire Fighting and Related Activities (Districts)	28
Special Events (Permits Issued)	361

Overall Lessons Learned for Existing Development Sources

Achievements

- Regulatory compliance, knowledge, behavioral intention, and behavioral baselines are well understood or increasing
- Some behavioral trends generally understood
- Recycling and waste collection well documented (low hanging fruti)
- Limited improvements demonstrated over time (but not always meaningful)

Potential Improvements

- Pollutant loads and reductions remain elusive
- Regulatory compliance, knowledge, and behavioral intention are less meaningful than detailed behavioral assessment
- Frequency and impacts of specific practices is key to projecting loads and reductions
- Specific impacts of sources, target audiences, and behaviors on MS4s and receiving waters is needed
- Assessment remains piecemeal; strategies are needed for integrating diverse and focused metrics
- Continued experimentation and critical review are paramount

Please send in your questions using the ‘chat’ feature to Karen Ashby.

All participants are muted throughout the webinar.

QUESTIONS

Sacramento Stormwater Quality Program
Long Term Effectiveness Assessment

Sherill Huun
Supervising Engineer
December 2015

Background

- Permittees: County of Sacramento and cities of Sacramento, Citrus Heights, Elk Grove, Folsom, Galt, and Rancho Cordova

- 1st Permit issued in 1990
  - 1995 Effectiveness Evaluation

- 5th Permit–Limited Term (18 months) issued in 2015
  - Stormwater Quality Improvement Plan (SQIP) – 2009
  - Report of Waste Discharge (ROWD) / Long Term Effectiveness Assessment (LTEA) – March 2013

- Next Permit: Region-wide MS4 Permit – Late 2016

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

2009 Approach

- 2009 SQIP – Program Effectiveness
  - Based on CASQA's 2007 Municipal Stormwater Program Effectiveness Assessment Manual
  - Annual effectiveness assessments of activities
  - Long-term effectiveness assessments of overall program
    - ➢2013 Long Term Effectiveness Assessment

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

2009 Approach

- Programmatic Outcomes
  - Program implementation
  - Raising awareness
  - Changing behaviors
  - Program/Activity improvement
  - Overall Program Effectiveness
- Environmental Outcomes
  - Overall Program Effectiveness
  - Reducing pollutant discharges
  - Improving environmental conditions

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Programmatic Evaluation

- Each Program Element Evaluated
- 2-3 Key Indicators selected per Element
  - Used to assess and document progress toward meeting Program Element Goal

    The goal of the Construction Element is to reduce the discharge of stormwater pollutants at construction sites to the maximum extent practicable (MEP) by requiring erosion, sediment and pollution controls.
- Performance Standard/Target set
  - Specific, measurable and achievable metrics
- Schedule for assessments established

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Construction Element

City of Sacramento Construction Element Activities Work Plan (2008-2013)

Element Goal: The goal of the Construction Element is to reduce the discharge of stormwater pollutants at construction sites to the maximum extent practicable (MEP) by requiring erosion, sediment and pollution controls .

Activity/Task	Key Indicator?	Performance Standard / Target	Schedule/Target Outcome Level					
			FY08/09	FY 09/10	FY 10/11	FY 11/12	FY 12/13	FY 13/14
Legal Authority								
Permitting, Inspection and Enforcement								
Monthly assess the quality of the ESC plans for 30% of permits issued for regulated private development projects	✓	All regulated projects include adequate ESC plans	N/A	⇔3	⇔3	⇔3	⇔3	⇔3
Require development projects to submit the mandated SWPPP and WDID number for all projects that disturb one or more acres of land in accordance with the State Construction General Permit	✓	Prior to the issuance of a building or grading permit a SWPPP and WDID are provided for all projects that disturb one or more acres of land	⇔	⇔3	⇔3	⇔3	⇔3	⇔3
Ensure that all municipal construction projects that disturb one or more acres of land comply with the State Construction General Permit requirements and, for those projects disturbing less than one acre, at a minimum submit ESC plans	✓	By the fifth year of the permit term, show that 100% of municipal construction projects disturbing greater than or equal to one acre file for a NOI	⇔1	⇔1	⇔1	⇔3	⇔3	⇔3
Inspect private construction projects that disturb one or more acres of land to ensure the required BMPs are implemented and maintained	✓	All regulated construction sites implement and maintain the required BMPs	⇔1	⇔1	⇔3	⇔1	⇔3	⇔1
Inspect municipal construction projects to ensure the required BMPs are implemented and maintained	✓	All regulated construction sites implement and maintain the required BMPs	⇔1	⇔1	⇔1	⇔3	⇔1	⇔3
Training and Outreach								

Legend: C-Confirmation, T-Tabulation, S-Survey, I-Inspection, Q-Quantification, M-Monitoring; ⇔ Ongoing task; ♦ Permit Deliverable; # Outcome level

Stormwater Quality Improvement Plan — November 2009
Sacramento County, cities of Sacramento, Citrus Heights, Elk Grove, Folsom, Galt, and Rancho Cordova

Construction Element

- Goal: The goal of the Construction Element is to reduce the discharge of stormwater pollutants at construction sites to the maximum extent practicable (MEP) by requiring erosion, sediment and pollution controls.

- Key Indicator/Task: Monthly assess the quality of the ESC plans for 30% of permits issued for regulated private development projects
  - Performance Standard/Target: All regulated projects include adequate ESC plan (Outcome level 3: Change in behavior)

Fiscal Year	Permits Issued	Approved Plans Assessed	Percent of Assessed Plans	Percent of Plans that Met Minimum Requirements
2009/2010	**35**	**12**	**34 %**	**83% (10 of 12)**
2010/2011	**23**	**12**	**52 %**	**100% (12 of 12)**
2011/2012	**16**	**10**	**63 %**	**100% (16 of 16)**
2012/2013	23	14	61%	Less than 100%
2013/2014	25	14	56%	100% (14 of 14)
2014/2015	22	15	68%	100% (15 of 15)

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Construction Element

- Key Indicator/Task: Inspect private construction projects that disturb one or more acres of land to ensure that the required ESC plan measures are implemented and maintained
  - Performance Standard/Target: All regulated construction sites implement and maintain the required ESC plan measures (Outcome level 3: Change in behavior)

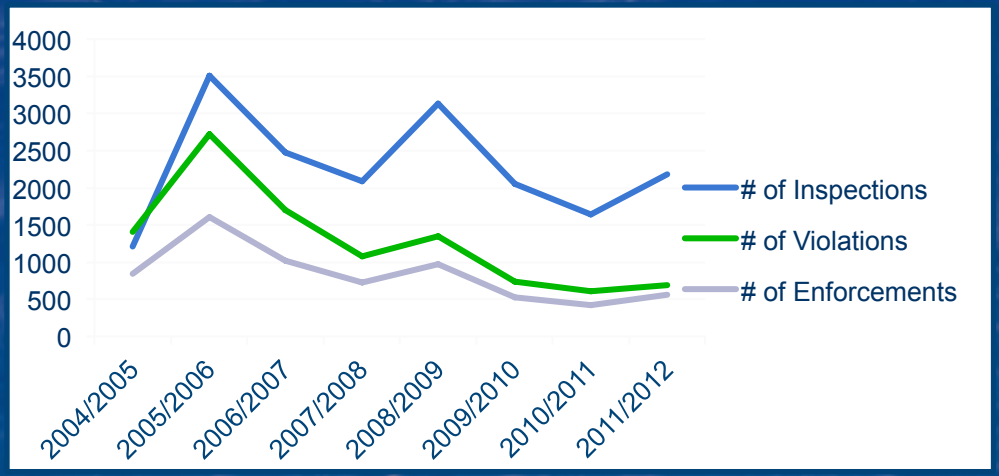
Fiscal Year	Permits Issued	Approved Plans Assessed	Percent of Assessed Plans	Percent of Sites that Met Minimum Requirements
2010/2011	23	12	52 %	83% (10 of 12)
2012/2013	23	14	61%	*
2013/2014	10	7	70%	*
2014/2015	9	9	100%	*

- Qualitative assessments
  - ✓Most sites implemented all the necessary BMP measures
  - ✓Areas of concern included inadequate stockpile protection, unmaintained construction entrances, and inadequate stabilization of landscaped areas
  - ✓Contractors not as diligent during summer months

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Example Key Indicators

- Commercial/Industrial Element Performance Standard – Decrease in violations observed from one cycle to the next



- Municipal Operations Element Performance Standard – Show an increase in the effectiveness ranking for all sites by the end of the Permit term
  - Target - Maintain minimum 80% compliance with the facility pollution prevention plan

- New Development Element Performance Standard - Annual maintenance verification
  - Target – 70% minimum response rate

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Lessons Learned

- Focus assessments to key activities and indicators
  - Don't assess every program area (e.g., training)
  - Eliminate "counting" exercises
- Consider level of effort needed for assessments
- Choose metrics or performance standards that provide useful information/inform your program & regulators
  - Avoid Increase/Decrease
    - *Illicit: Decrease in number of responses, containment and cleanup of Illicit discharges*
    - *Training assessment: Increase in staff awareness as a result of training*
  - Doing the task does not mean that you did it well
  - Focus on quantitative measurements

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Environmental Outcomes

- Robust monitoring program
  - River, Creek and Urban discharge monitoring and special studies
- Established management questions
- Analyze data
  - Trend analysis
  - Up-stream-Downstream comparisons
  - Urban Runoff Discharge Load Modeling
  - Comparison of New Development vs Pre-1990 Development
- Program focus on Target Pollutants

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Management Questions

- What is the existing condition of receiving water quality and is it protective of beneficial uses?
- What is the quality of urban discharge in new developed areas?
- What is the trend of urban discharge quality?
- What is the relative urban runoff contribution to receiving water quality?
- What are the sources to urban runoff that affect receiving water quality?
- Are conditions in receiving waters getting better or worse?
- How can changes in urban water quality affect receiving water quality?

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

What is the existing condition of receiving water quality and is it protective of beneficial uses?

- River Receiving Waters are of High Quality – supports beneficial uses
  - Infrequent exceedances of water quality
  - Both rivers are sought after drinking water sources
  - Significant toxicity is infrequent in all receiving waters
- Pyrethroid Insecticides Pose Risk to Aquatic Life in Urban Tributaries

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Percent Water Quality Exceedance in Rivers

	American River at Nimbus Dam		American River at Discovery Park		Sacramento River at Veterans Bridge		Sacramento River at Freeport				
Constituent	1998-2012	2008-2012	2002-2012	2008-2012	2002-2012	2008-2012	2002-2012	2008-2012	Objective	Units	Objective Source
Total Mercury	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		µg/L	
Methylmercury	NA	NA	NA	NA	NA	NA	NA	NA	[1]	ng/L	NA
TSS	NA	NA	NA	NA	NA	NA	NA	NA	[1]	mg/L	NA
Turbidity	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	8.82%	4.00%	<= 20% increase	NTU	Basin Plan
TDS	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		mg/L	Basin Plan
Dissolved Copper	0.00%	0.00%	0.54%	4.17%	0.00%	0.00%	0.55%	4.00%	[2]	µg/L	
Total Recoverable Copper	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1000	µg/L	Title 22 2° MCL
Dissolved Zinc	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	[2]	µg/L	
Total Recoverable Zinc	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5000	µg/L	Title 22 2° MCL
Dissolved Lead	0.00%	0.00%	1.20%	4.17%	0.00%	0.00%	0.00%	0.00%	[2]	µg/L	
Total Recoverable Lead	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%		µg/L	Basin Plan
Nitrate + Nitrite	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	10	µg/L	Title 22 1° MCL for NO3N+NO2N
Diazinon	7.58%	0.00%	5.30%	0.00%	7.30%	0.00%	7.30%	0.00%	0.08	µg/L	Basin Plan
Chlorpyrifos	59.05%	0.00%	56.60%	0.00%	57.27%	0.00%	56.76%	0.00%	0.015	µg/L	
Bifenthrin	NA	NA	NA	NA	NA	NA	NA	NA	[1]	µg/L	NA
Permethrin	NA	NA	NA	NA	NA	NA	NA	NA	[1]	µg/L	NA
Total Organic Carbon	NA	NA	NA	NA	NA	NA	NA	NA	[1]	mg/L	NA
Dissolved Organic Carbon	NA	NA	NA	NA	NA	NA	NA	NA	[1]	mg/L	NA
E Coli	6.5%	12.50%	18.95%	32.00%	6.32%	8.00%	11.58%	15.38%	235	MPN/100mL	Basin Plan
DDT	74%	62%	71%	75.00%	64.29%	50.00%	62.07%	50.00%		µg/L	
Chrysene	29%	0.0%	32%	12.50%	26.87%	0.00%	28.99%	4.00%		µg/L	

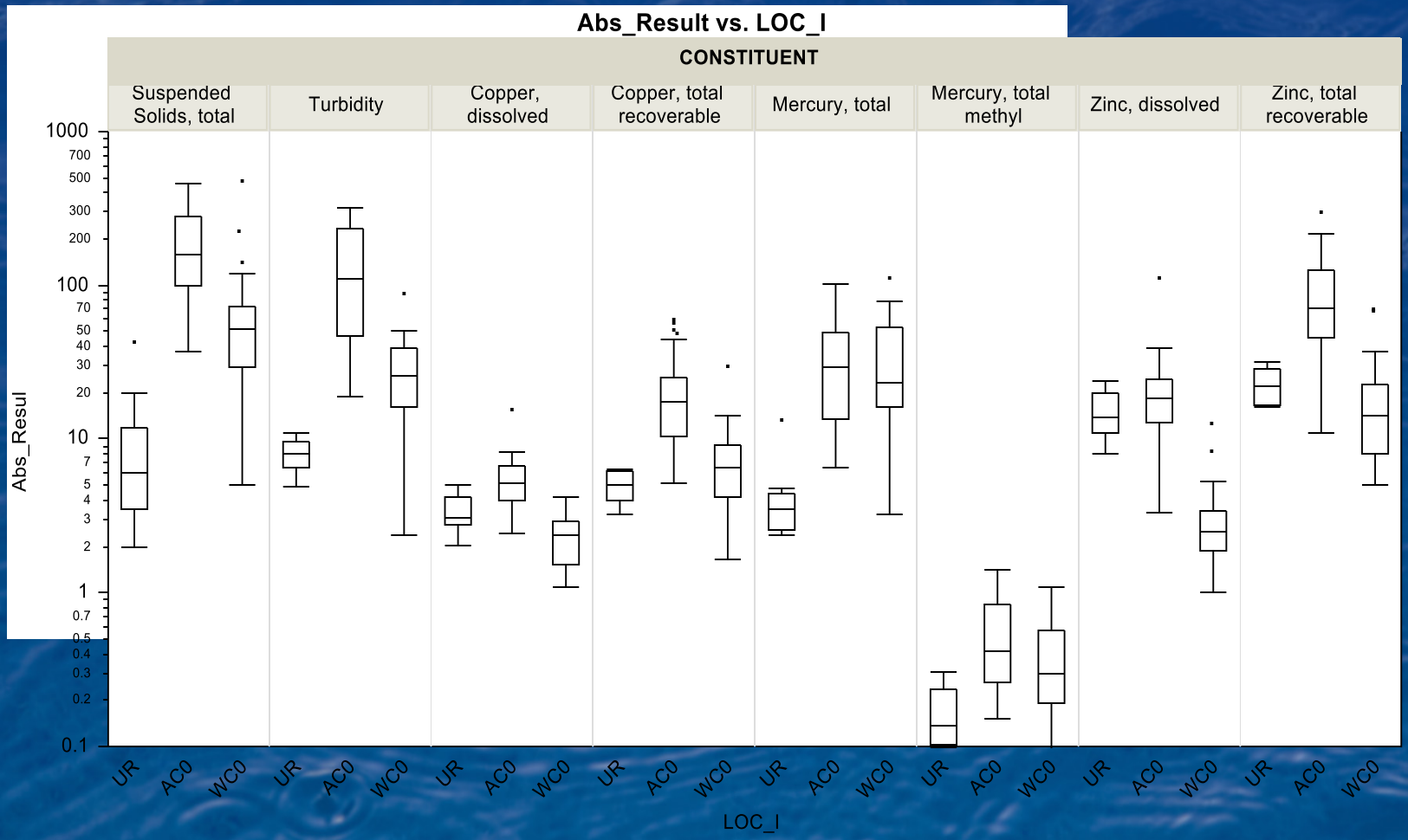
What is the quality of urban discharge in new developed areas?

- New Development Land Use and Structural Controls have Improved Overall Urban Runoff
  - Comparison of older development areas vs. new development areas
    - Creek sites
    - Urban runoff sites (old vs. new)

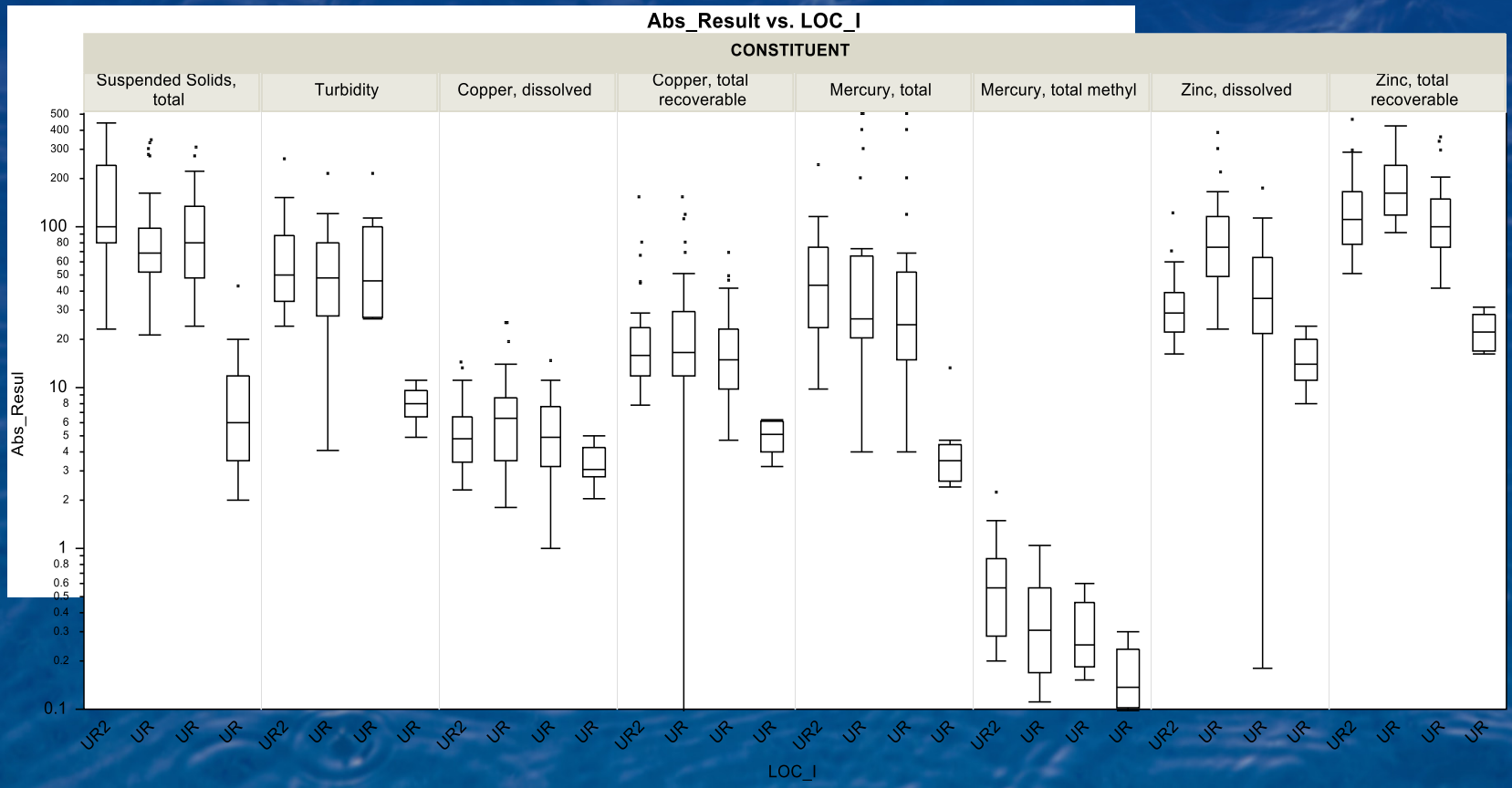
CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Comparison of Willow Creek (WC01) to Older Development Drainage (AC03)

and New Development Urban Runoff (UR5)



Comparison of Older (UR2S, UR3, and UR4) and Newer (UR5) Development Urban Runoff



Lessons Learned

- Traditional monitoring adequately characterized conditions, but only successfully identified large changes related to product replacement
  - Frequency of urban discharge and urban tributary monitoring can be decreased
- COCs in urban runoff are similar to other California communities or are driven by specific receiving water or downstream issues
- Trend monitoring under the current approach will identify only significant changes
- Monitoring Program focused on receiving waters has limited ability to link individual program activities to changes in water quality, or to identify changes occurring on a year-to-year basis
- Implementation of new development standards significantly improves quality of urban runoff

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Contact Information

Sherill Huun
City of Sacramento
(916) 808-1455
shuun@cityofsacramento.org

Please send in your questions using the ‘chat’ feature to Karen Ashby.

All participants are muted throughout the webinar.

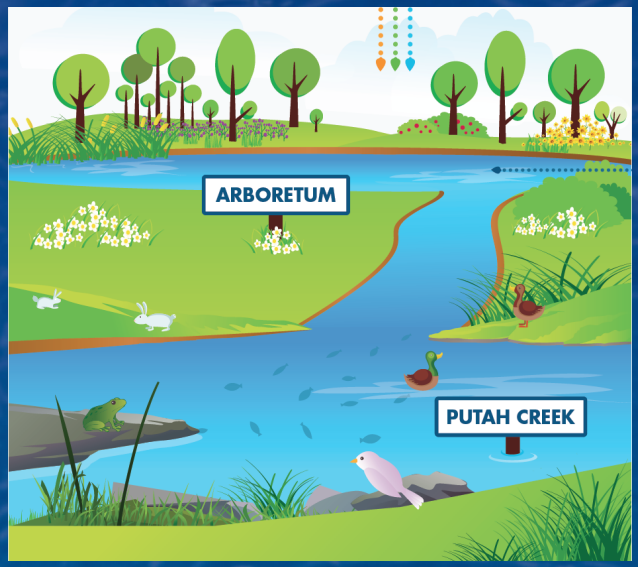
QUESTIONS

Program Effectiveness Assessment from a Non-Traditional Phase II Permittee Perspective

Lisa Moretti, P.E., QSD, QISP TOR
University of California, Davis
Environmental Health & Safety

Overview

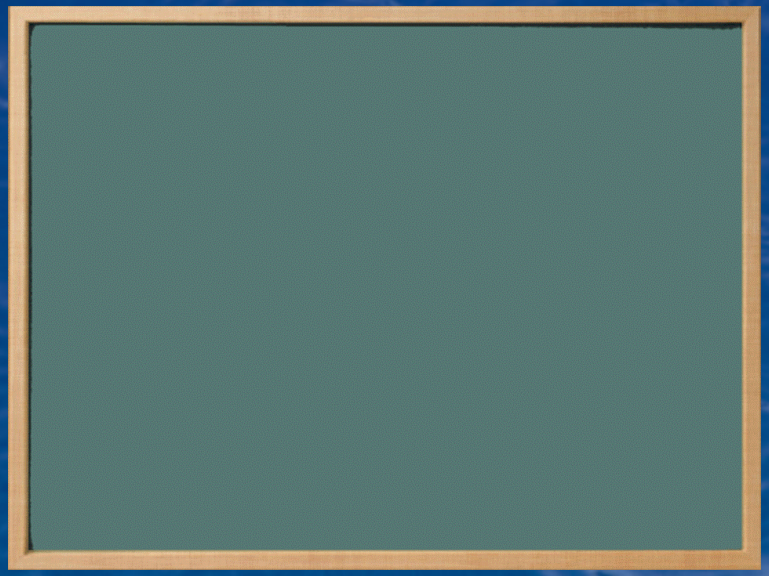
- Program Effectiveness Assessment and Improvement Plan (PEAIP)
- Management Questions
- Determining Data Needs
- Assessment Matrix



UC DAVIS
UNIVERSITY OF CALIFORNIA

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Program Effectiveness Assessment and Improvement Plan



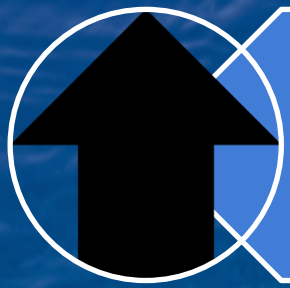
- Water Quality Data
- Operational Knowledge
- Land Use

Priority Pollutants
Pollutant Sources
Data Gaps

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Scaling Down and Scaling Up

What are our BMPs aiming to address, and do we have data available to prove the BMPs are addressing the problem?



Increase focus on Priority BMPs

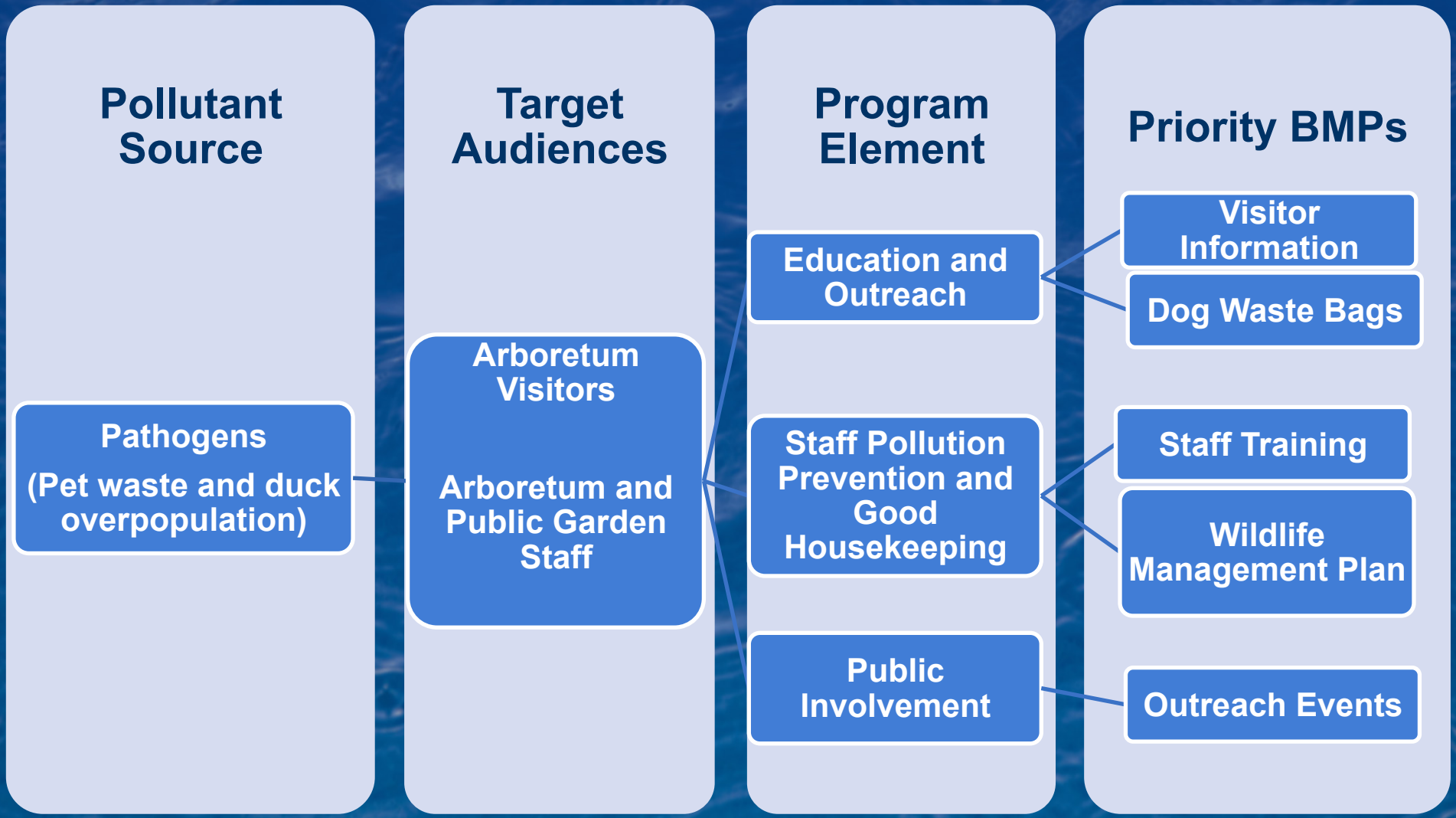
Stop collecting data that doesn't show effectiveness

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

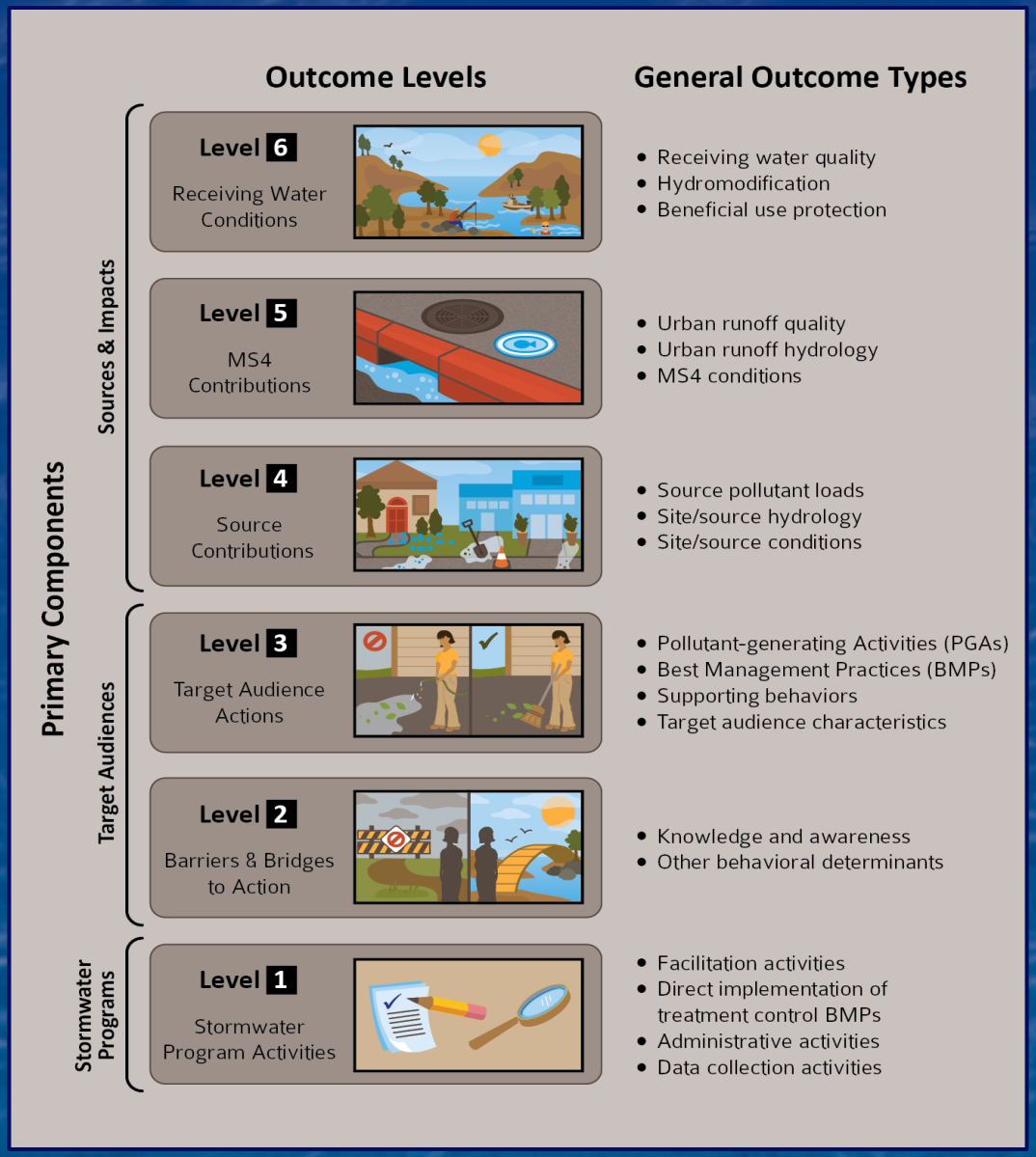
Program Effectiveness Assessment Framework

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Source Assessment: Pathogens



Outcome Levels



Outcome Level	Management Questions
1	Are program elements being fully implemented?
2	Are BMPs increasing knowledge and awareness?
2	Have barriers and bridges to action been addressed to effectively change behavior that contributes to storm water pollution?
3	Are BMPs resulting in a reduction of pollutant generating activities?
4	Are pollutant sources being reduced due to implementation of the BMP?

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Management Questions

- Are visitors aware of their impacts? (OL2)
- Are visitors changing their behavior to eliminate pet waste and to stop feeding wild animals? (OL3)
- Is public outreach and education resulting in changed behavior? (OL3)
- Is the Wildlife Management Plan implementation resulting in a reduction in overpopulated species contributing to pathogens? (OL4)

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

Data Needs

Outcome Level 1 (Stormwater Program Activities)	Outcome Level 2 (Barriers and Bridges to Action)	Outcome Level 3 (Target Audience Actions)	Outcome Level 4 (Source Pollutant Loads)
• No. of Outreach Events • No. of Signs • No. of Staff Trained • No. of bags stations	• % Surveyed with awareness of impacts of pet water who have attended outreach events • % Surveyed with awareness of impact of ducks on water quality who have read outreach materials • Are staff implementing measures to limit duck overpopulation?	• Observation of visitor behavior • Use of pet waste bags	• Fecal Indicator Bacteria sample results from Arboretum Outfall • Duck population counts

Assessment Tools

- Staff and Visitor Surveys (OL1, 2, 3)
- Training Quizzes (OL 1, 2, 3)
- Site Inspections (OL 1, 2, 3)
  - Hotspots, Construction, Inspection
- Website Analytics (OL 1)
- Illicit Discharge Reports (OL 2, 3, 4)
- Outfall Sampling (OL 5)
- Receiving Water Quality Samples (OL 6)

Program Effectiveness Assessment

Priority BMP	Implementation Level None Partial Full	Effectiveness Level None – OL1 Low – OL 2 Medium – OL 3 High – OL 4	Proposed Modification
Distribute Visitor Outreach Materials on Feeding Wildlife	Full	Low	Conduct outreach events
Staff Training	Full	Medium	N/A
Pet Waste Bag Stations	Full	Medium	N/A

Effectiveness Level

Low	Medium	High
• Outcome Level 1 results only • Implemented, but no evidence that there was an impact	• Outcome Level 2 results • Results in a change of awareness	• Outcome Level 3-4 results • Results in a change in behaviors or reduction in pollutant load

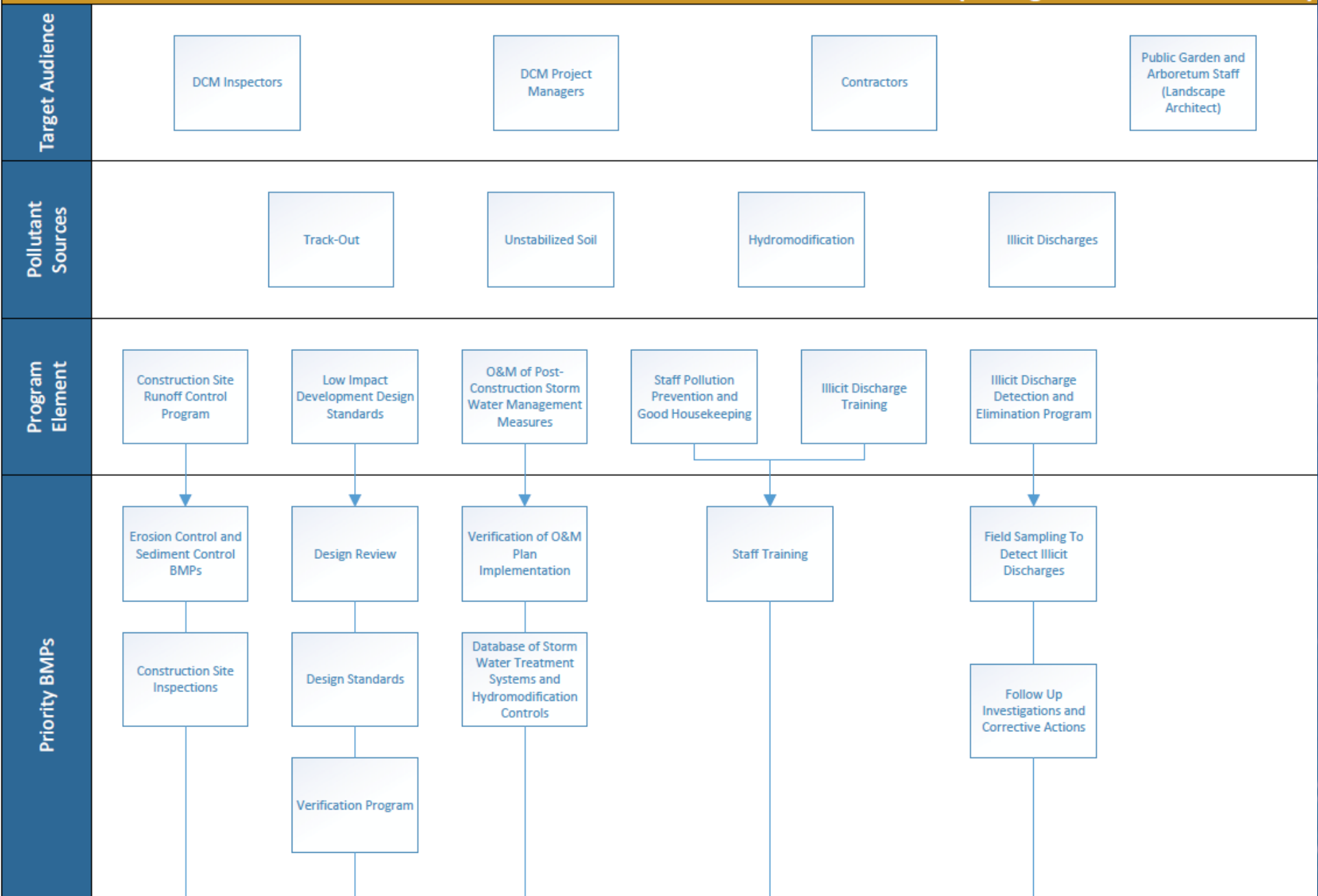
CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

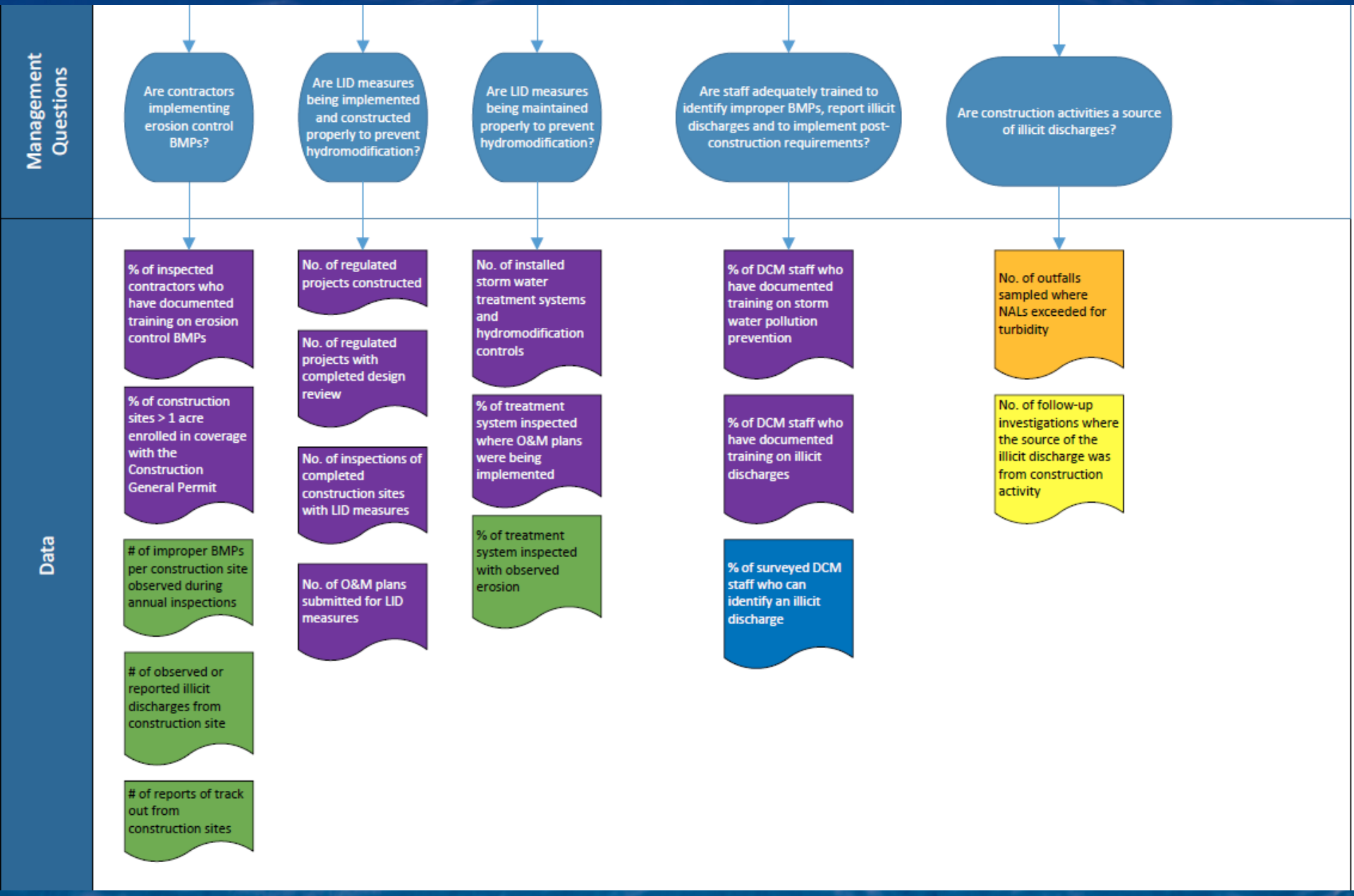
Templates

Program Effectiveness Assessment and Improvement (PEAIP) Matrix						
PERMIT SECTION AND ELEMENT			Policy/Procedure/BMP Description	Permit Compliance Year for Implementation	Target Audience	Pollutant of Concern
F.5.a		PROGRAM MANAGEMENT ELEMENT				
F.5.b.		EDUCATION AND OUTREACH PROGRAM				
F.5.b.2		Public Outreach and Education		2		
		Disseminate education materials to target audiences and translate as appropriate	Public Outreach and Education Plan		Staff, Faculty, Students, Contractors	All POCs
		Promote reporting of illicit discharges	Biennial training program, storm water awareness website, surveys		Staff, Faculty, Students, Contractors	All POCs
		Convey messages to reduce discharges from pressure washing operations and landscape irrigation	Biennial Training Program		Staff, Contractors	Sediment, Trash
		Conduct focused education on illicit discharge flow areas	IDDE Program		Staff	All POCs
F.5.b.3		**Staff and Site Operator Training and Education: Illicit Discharge Detection and Elimination Training**	Biennial Training Program	3	All staff with connection to IDDE activities	Trash, Sediment, Metals
F.5.b.4		**Staff Pollution Prevention and Good Housekeeping**	Biennial Training Program	2	All staff with pollutant generating activities	Trash, Sediment, Metals

Pollutant of Concern: Sediment

Construction Activities (During and Post-Construction)




Management Questions
Are contractors implementing erosion control BMPs?
Are LID measures being implemented and constructed properly to prevent hydromodification?
Are LID measures being maintained properly to prevent hydromodification?
Are staff adequately trained to identify improper BMPs, report illicit discharges and to implement post-construction requirements?
Are construction activities a source of illicit discharges?
Data
% of inspected contractors who have documented training on erosion control BMPs
% of construction sites > 1 acre enrolled in coverage with the Construction General Permit
# of improper BMPs per construction site observed during annual inspections
# of observed or reported illicit discharges from construction site
# of reports of track out from construction sites
No. of regulated projects constructed
No. of regulated projects with completed design review
No. of inspections of completed construction sites with LID measures
No. of O&M plans submitted for LID measures
No. of installed storm water treatment systems and hydromodification controls
% of treatment system inspected where O&M plans were being implemented
% of treatment system inspected with observed erosion
% of DCM staff who have documented training on storm water pollution prevention
% of DCM staff who have documented training on illicit discharges
% of surveyed DCM staff who can identify an illicit discharge
No. of outfalls sampled where NALs exceeded for turbidity
No. of follow-up investigations where the source of the illicit discharge was from construction activity

Contact Information

Lisa Moretti
lmoretti@ucdavis.edu
530-752-0177

Please send in your questions using the ‘chat’ feature. All participants are muted throughout the webinar.

QUESTIONS

Program Effectiveness Assessment

Thank you for Attending!

CASQA WEBINAR