

APPENDIX N

Monitoring and Assessment Program Fact Sheets

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Table of Contents

	Page
N.1 Receiving Water Monitoring	N-1
N.1.1 Long-Term Dry Weather Receiving Water Monitoring (Permit Prov. D.1.c).....	N-1
N.1.2 Long-Term Wet Weather Receiving Water Monitoring (Permit Prov. D.1.d).....	N-7
N.1.3 Southern California Bight Regional Monitoring (Permit Prov. D.1.e.(1)).....	N-11
N.1.4 Storm Water Monitoring Coalition Regional Monitoring (Permit Prov. D.1.e.(1))	N-16
N.1.5 Hydromodification Management Plan Monitoring	N-19
N.1.6 Sediment Quality Monitoring (Permit Prov. D.1.e.(2))	N-20
N.1.7 Bacteria TMDL Monitoring (Permit Attachment E).....	N-22
N.2 MS4 Outfall Discharge Monitoring.....	N-23
N.2.1 Dry Weather MS4 Outfall Discharge Monitoring (Permit Prov. D.2.b.(1)).....	N-23
N.2.2 Non-Storm Water Persistent Flow MS4 Outfall Discharge Monitoring (Permit Prov. D.2.b.(2)).....	N-26
N.2.3 Wet Weather MS4 Outfall Discharge Monitoring (Permit Prov. D.2.c)	N-30
N.3 Special Studies	N-34
N.3.1 San Diego Regional Reference Stream Study (Permit Prov. D.3).....	N-34
N.3.2 San Diego Regional Reference Beach Study (Permit Prov. D.3)	N-37
N.3.3 San Dieguito River WMA Bacteria Source Identification and Prioritization Process Special Study (Permit Prov. D.3)	N-39
N.3.4 Proposed Nutrient Load Characterization Study for Lake Hodges (Permit Prov. D.3).....	N-40
N.3.5 Stream Gauge Study (Permit Prov. D.3)	N-41

Table of Contents (continued)

	Page
List of Tables	
Table N-1	Dry Weather Receiving Water Monitoring Station..... N-1
Table N-2	Wet Weather Receiving Water Monitoring Stations N-7
Table N-3	San Dieguito River WMA Bight '13 Monitoring Stations N-11
Table N-4	2013-2014 Storm Water Monitoring Coalition Bioassessment Monitoring Locations N-16
Table N-5	Bacteria TMDL Monitoring Location N-22
Table N-6	MS4 Outfalls for Field Screening N-23
Table N-7	MS4 Outfalls for Dry Weather Monitoring..... N-26
Table N-8	MS4 Outfalls for Wet Weather Monitoring..... N-30

List of Figures

Figure N-1	Dry Weather Receiving Water Field Observations..... N-3
Figure N-2	Dry Weather Receiving Water Monitoring Composite Samples N-4
Figure N-3	Dry Weather Receiving Water Monitoring Grab Samples N-5
Figure N-4	Dry Weather Receiving Water Bioassessment Monitoring..... N-5
Figure N-5	Dry Weather Receiving Water Hydromodification Monitoring N-6
Figure N-6	Wet Weather Receiving Water Field Observations N-8
Figure N-7	Wet Weather Receiving Water Monitoring Composite Samples N-9
Figure N-8	Wet Weather Receiving Water Monitoring Grab Samples N-10
Figure N-9	Bight '13 Sediment Subpopulation Sampling Locations N-13
Figure N-10	Bight '13 Sediment Indicators of Contaminant Exposure N-14
Figure N-11	Bight '13 Sediment Indicators of Biological Response N-15
Figure N-12	Bight '13 Sediment Indicators of Habitat Condition N-15
Figure N-13	Bight '13 Bioaccumulation Monitoring Target Organisms..... N-16
Figure N-14	2013-2014 Storm Water Monitoring Coalition Bioassessment Monitoring N-17
Figure N-15	Storm Water Monitoring Coalition Regional Monitoring Projects (Proposed Implementation 2014-2019)..... N-18
Figure N-16	Sediment Quality Indicators N-21
Figure N-17	Field Screening Visual Observations for MS4 Outfall Discharge Monitoring Stations N-25
Figure N-18	Non-Storm Water Persistent Flow MS4 Outfall Field Parameters (Grab Samples)..... N-27
Figure N-19	Non-Storm Water Persistent Flow MS4 Outfall Discharge Monitoring Constituents (Grab Samples) N-28

Table of Contents (continued)

	Page
Figure N-20	Non-Storm Water Persistent Flow MS4 Outfall Discharge Monitoring Receiving Water Analysis (Grab Samples)..... N-29
Figure N-21	Wet Weather MS4 Outfall Grab Sample Constituents..... N-31
Figure N-22	Wet Weather MS4 Outfall Discharge Monitoring Constituents..... N-32
Figure N-23	Wet Weather MS4 Outfall Discharge Monitoring Receiving Water Analysis..... N-33
Figure N-24	San Diego Reference Stream Study Monitoring Constituents..... N-36

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N.1 Receiving Water Monitoring

N.1.1 Long-Term Dry Weather Receiving Water Monitoring (Permit Prov. D.1.c)

Overview

Objectives

- ❖ Determine whether the conditions in the receiving water during dry weather are protective or likely protective of beneficial uses
- ❖ Determine the extent and magnitude of the current or potential dry weather receiving water problems
- ❖ Evaluate whether conditions in the receiving water during dry weather are improving or declining.

Sampling Locations

**Table N-1
 Dry Weather Receiving Water Monitoring Station**

Station Name	Waterbody	Subwatershed	Latitude	Longitude
SDC-MLS	San Dieguito River	San Dieguito River Below Lake Hodges	32.99908	-117.20560

Frequency of Events

- ❖ Water Quality Sampling Events—Three During Permit Term
 - Event 1—During dry season (May 1—Sep. 30)
 - Event 2—During wet season (Oct. 1—Apr. 30)¹
 - Event 3—At-large dry weather event
- ❖ Bioassessment Event – One During Permit Term
- ❖ Hydromodification Event – One During Permit Term

¹ Dry weather sample must be preceded by ≥72 hrs antecedent dry period following rainfall event of >0.1" and occur after the first wet event of the season

Monitoring Methods Reference

- ❖ Transitional Receiving Water Monitoring Plan (2013-2015)
(www.projectcleanwater.org)
- ❖ Receiving Water Monitoring Plan (2015-2018) (www.projectcleanwater.org)

Sample Collection (Shown in Figures N-1 through N-5)

- ❖ Field Observations
- ❖ Flow-Weighted Composites
- ❖ Water Grab Samples
- ❖ Bioassessment Monitoring
- ❖ Hydromodification Monitoring

Sample Analysis

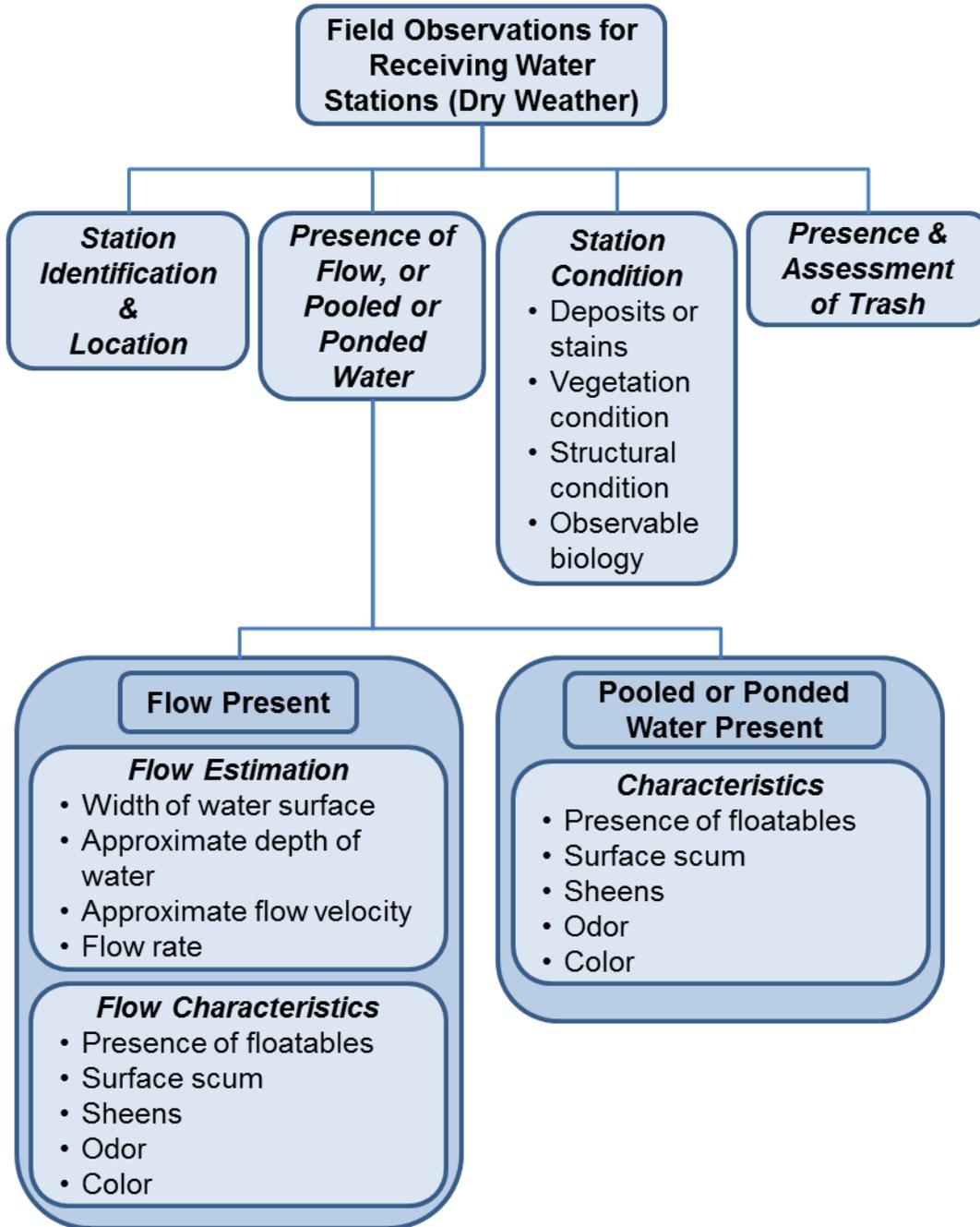


Figure N-1
Dry Weather Receiving Water Field Observations

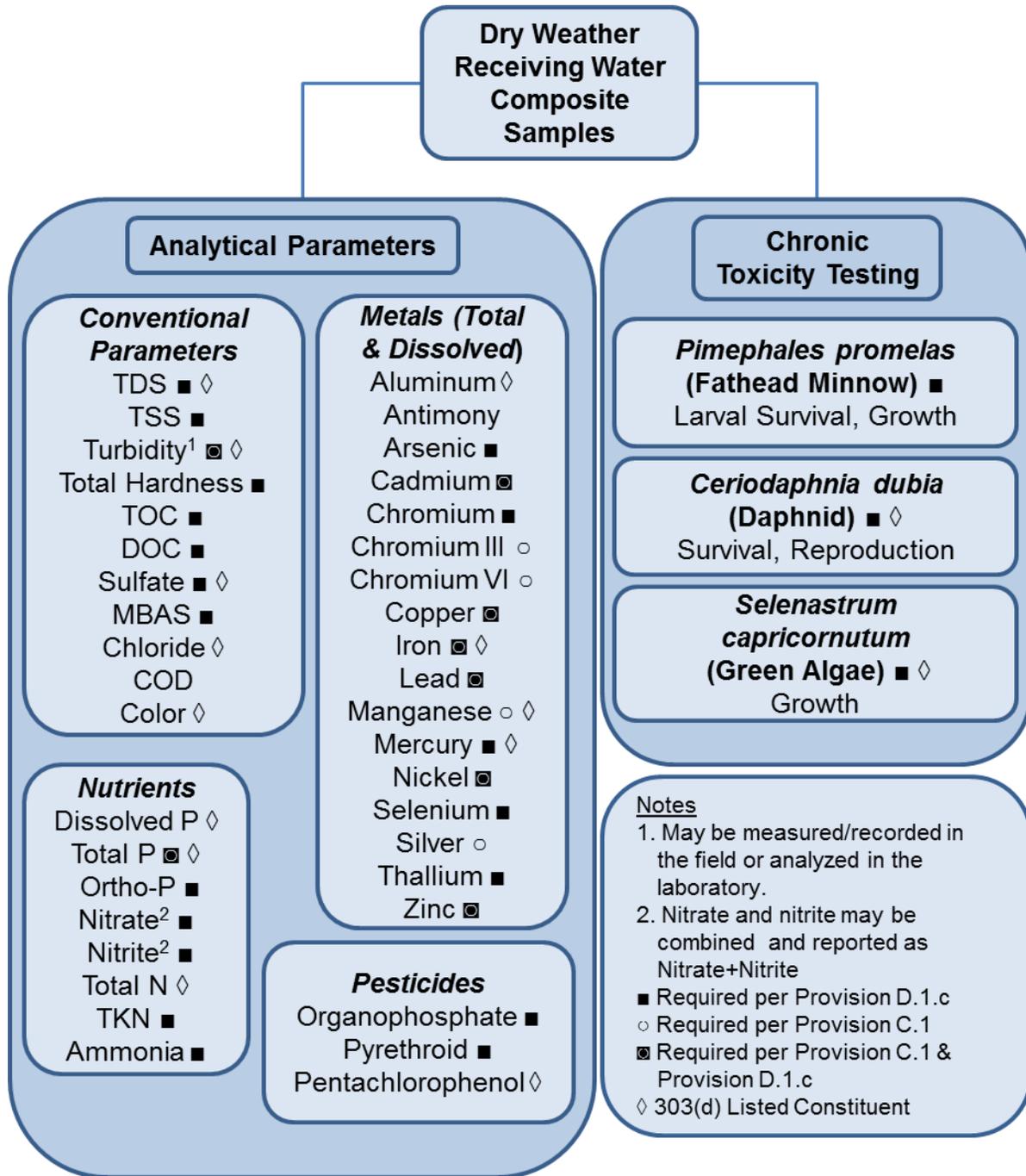


Figure N-2
Dry Weather Receiving Water Monitoring Composite Samples

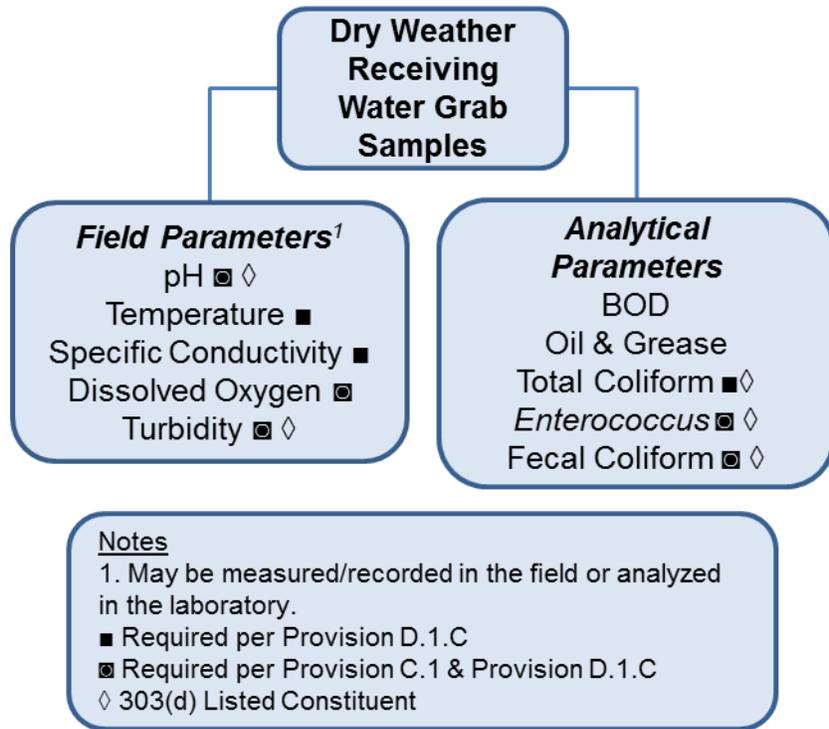


Figure N-3
Dry Weather Receiving Water Monitoring Grab Samples

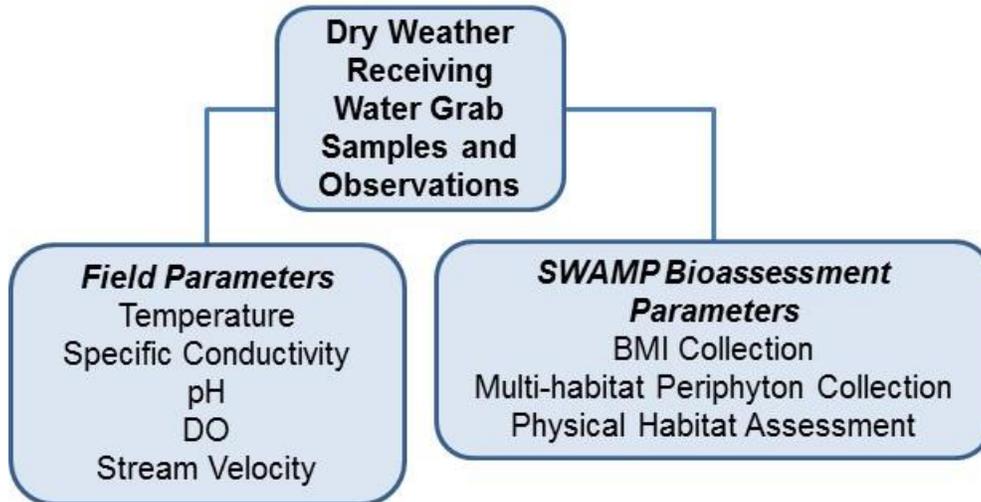


Figure N-4
Dry Weather Receiving Water Bioassessment Monitoring

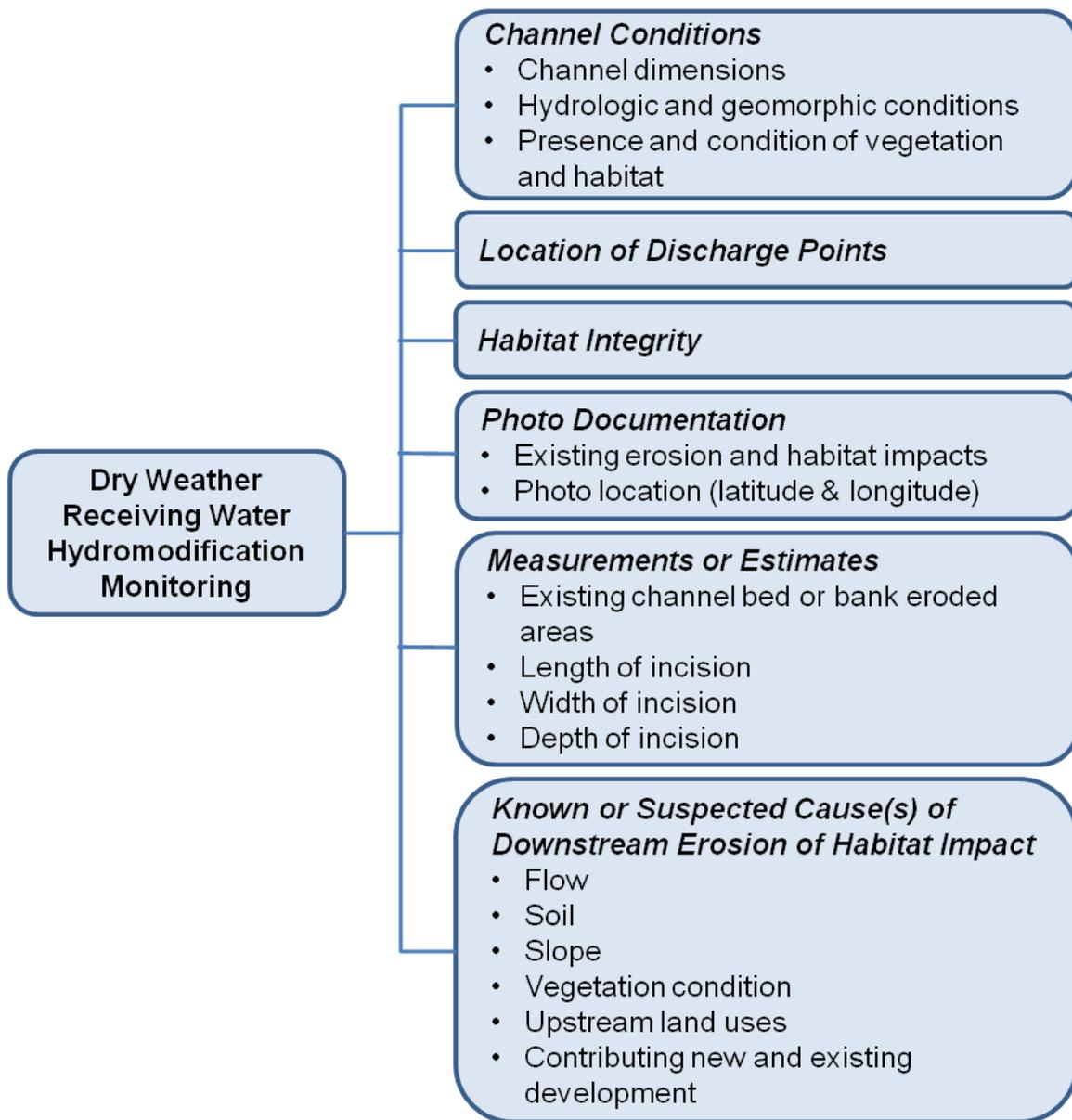


Figure N-5
Dry Weather Receiving Water Hydromodification Monitoring

N.1.2 Long-Term Wet Weather Receiving Water Monitoring (Permit Prov. D.1.d)

Overview

Objectives

- ❖ Determine whether the conditions in the receiving water during wet weather are protective or likely protective of beneficial uses
- ❖ Determine the extent and magnitude of the current or potential wet weather receiving water problems
- ❖ Evaluate whether conditions in the receiving water during wet weather are improving or declining.

Sampling Location

**Table N-2
Wet Weather Receiving Water Monitoring Stations**

Station Name	Waterbody	Subwatershed	Latitude	Longitude
SDC-MLS	San Dieguito River	San Dieguito River Below Lake Hodges	32.99908	-117.20560

Water Quality Sampling Events—Three During Permit Term

- ❖ Event 1—First wet weather event of wet season (Oct. 1—Apr. 30)
- ❖ Event 2—Event occurring after February 1
- ❖ Event 3—At-large wet weather event

Monitoring Methods Reference

- ❖ Interim Receiving Water Monitoring Plan (2013-2015) (www.projectcleanwater.org)
- ❖ Receiving Water Monitoring Plan (2015-2018) (www.projectcleanwater.org)

Sample Collection (Shown in Figures N-6 through N-8)

- ❖ Field Observations
- ❖ Flow-Weighted Composites
- ❖ Grab Samples

Sample Analysis

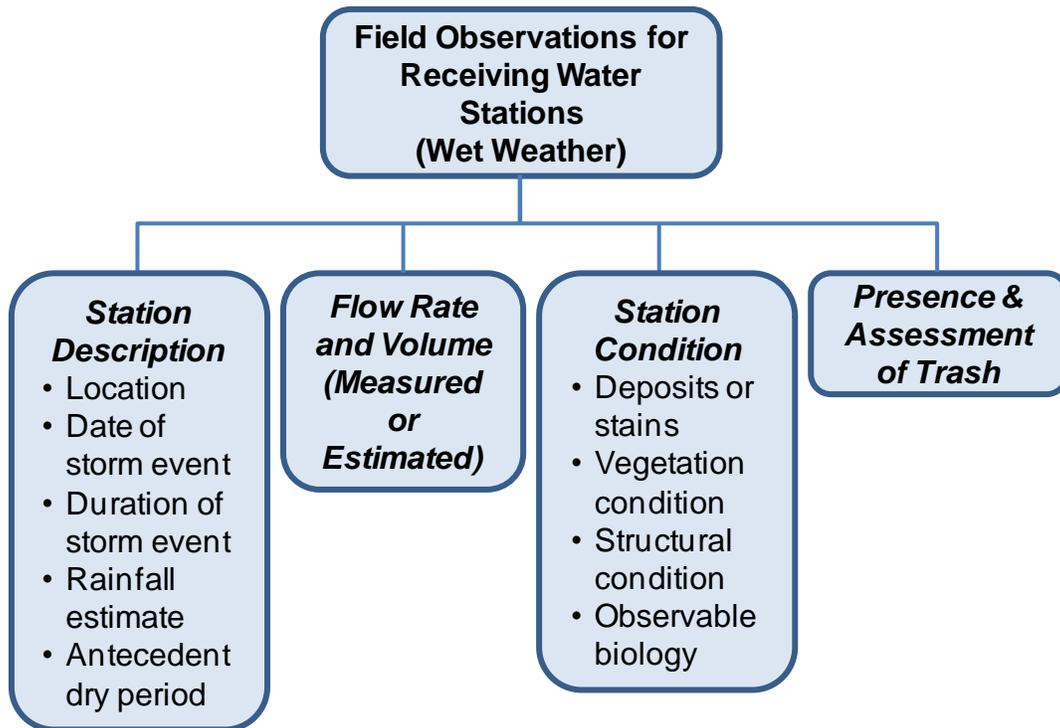
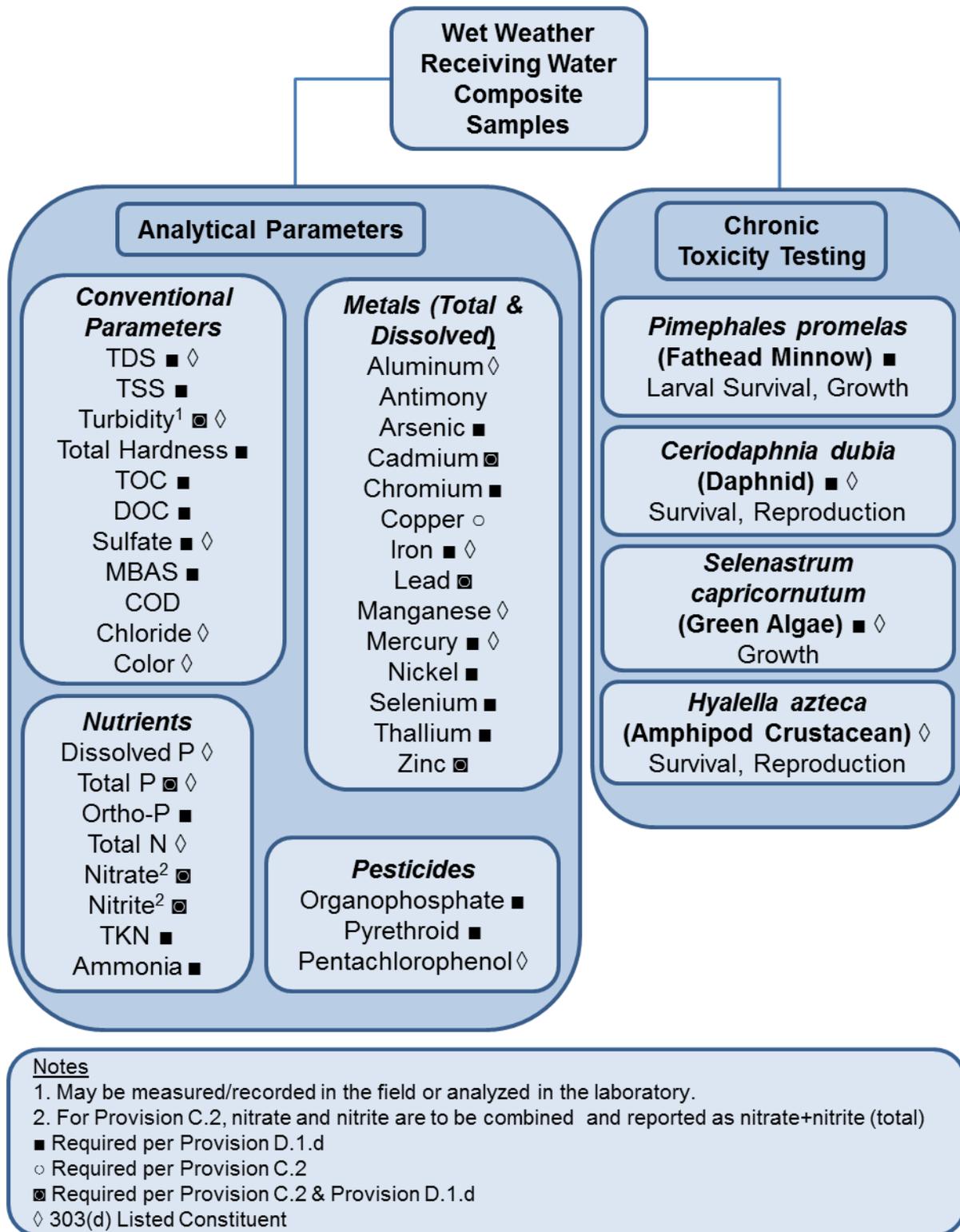


Figure N-6
Wet Weather Receiving Water Field Observations



**Figure N-7
 Wet Weather Receiving Water Monitoring Composite Samples**

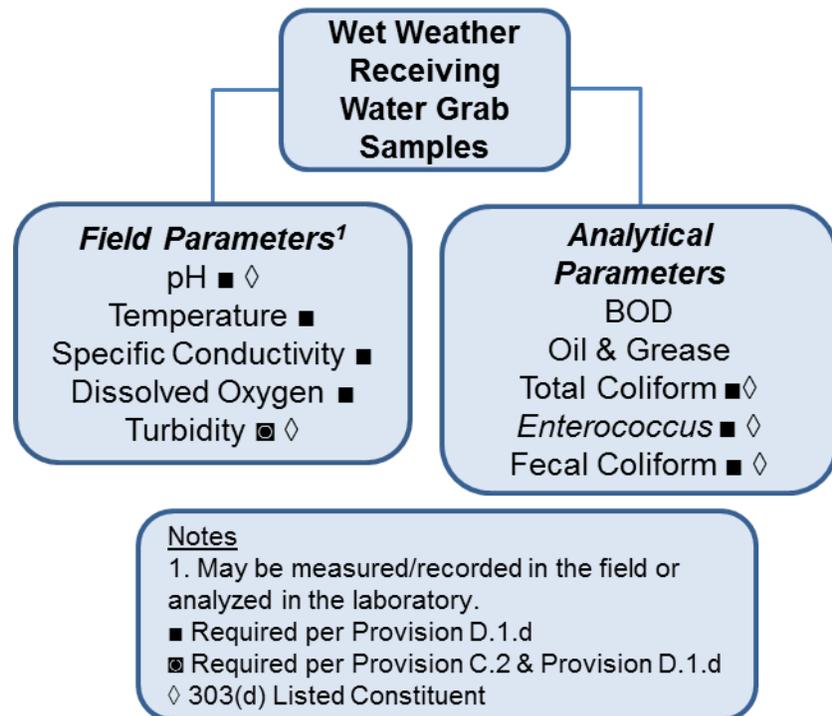


Figure N-8
Wet Weather Receiving Water Monitoring Grab Samples

N.1.3 Southern California Bight Regional Monitoring (Permit Prov. D.1.e.(1))

Overview

Objectives

- ❖ Evaluate the extent and magnitude of direct impact from sediment contaminants
- ❖ Determine how the extent and magnitude of environmental impact varies by habitat
- ❖ Evaluate the trend, in terms of extent and magnitude, of direct impacts from sediment contaminants

Sampling Location

**Table N-3
San Dieguito River WMA Bight '13 Monitoring Stations**

Waterbody	Site ID	Latitude	Longitude	Sample Depth
San Dieguito Lagoon	8179	32.9661	-117.2525	1.0
	8180	32.9664	-117.2579	1.0
	8187	32.9708	-117.2582	1.0

Sampling Program

- ❖ Sampling of 397 sites in the Southern California Bight
- ❖ Stratified random site selection from 11 sediment subpopulations as shown in Figure N-9
- ❖ Each site sampled once between July 1 and September 30, 2013

Monitoring Methods Reference

- ❖ Bight '13 Contaminant Impact Assessment Work Plan (www.projectcleanwater.org)

Sample Collection (Shown in Figures N-10 through N-13)

- ❖ Sediment sampling indicator types
- ❖ Contaminant exposure in sediments and from marine debris
- ❖ Biological response
- ❖ Sediment habitat condition
- ❖ Bioaccumulation monitoring

Planned Bight '13 Special Studies

- ❖ Analysis of Contaminants of Emerging Concern in Sediment
- ❖ Bioanalytical Screening of Sediment Extracts
- ❖ Sediment Toxicity Identification Evaluation in Embayments
- ❖ Gene Microarray Analysis of Sediment Toxicity Samples
- ❖ Alternative Toxicity Test Species Comparison
- ❖ In situ Toxicity Testing Using the SEA Ring
- ❖ Effects of Macrobenthic Preservation Techniques on Efficacy of Molecular and Morphological Taxonomy
- ❖ Adaptation to Hypoxic, High CO₂ Environments—Phenotypic Plasticity in Echinoderms

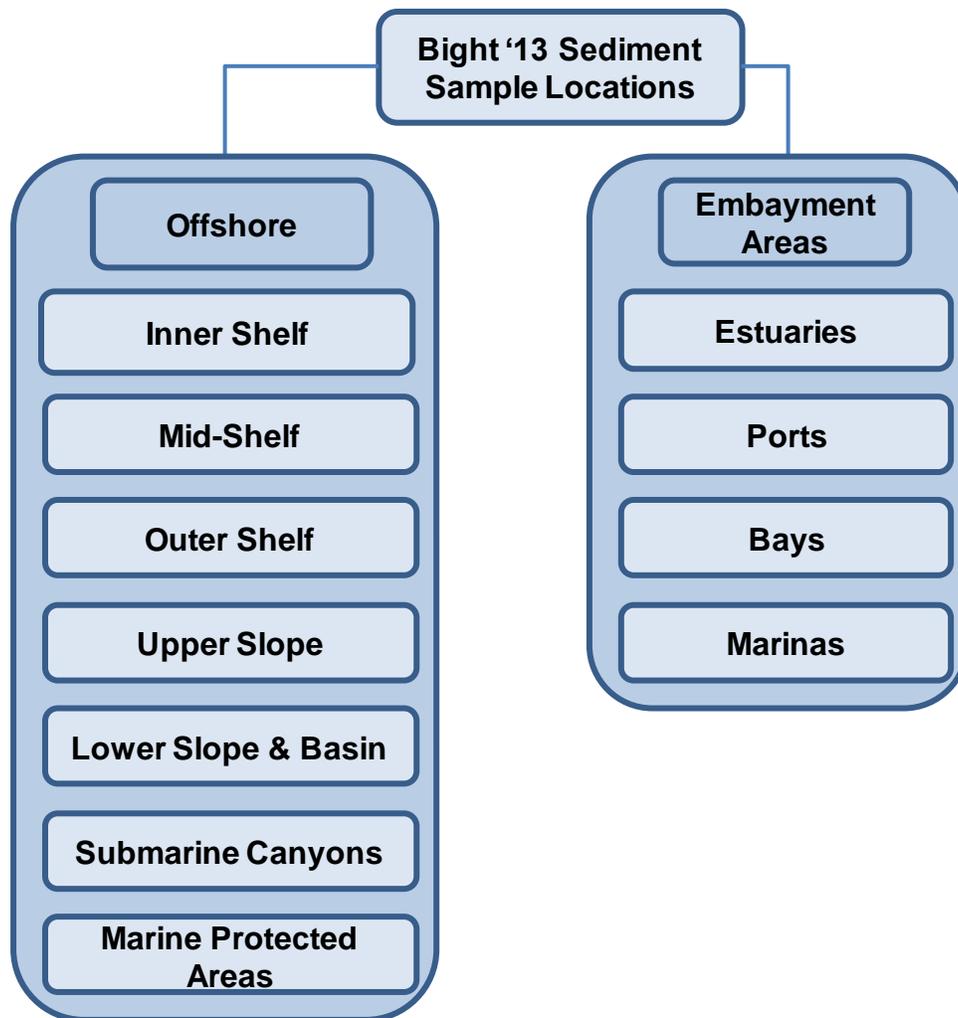


Figure N-9
Bight '13 Sediment Subpopulation Sampling Locations

Sample Analysis

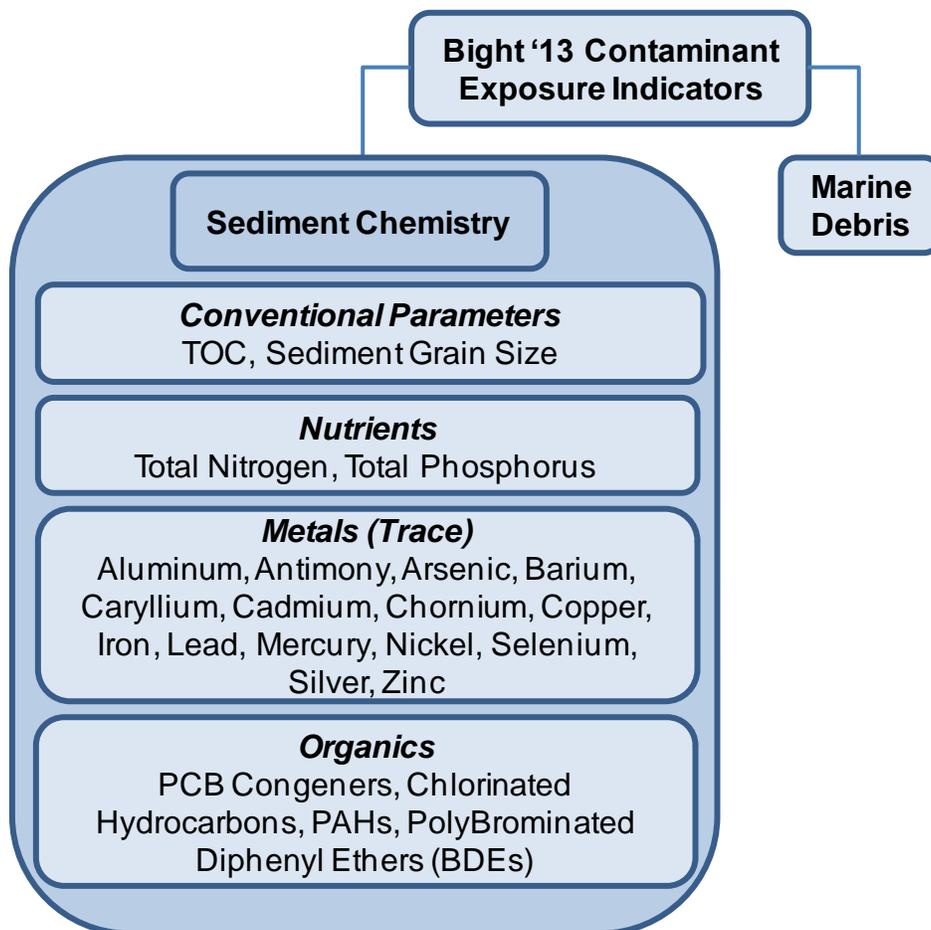


Figure N-10
Bight '13 Sediment Indicators of Contaminant Exposure

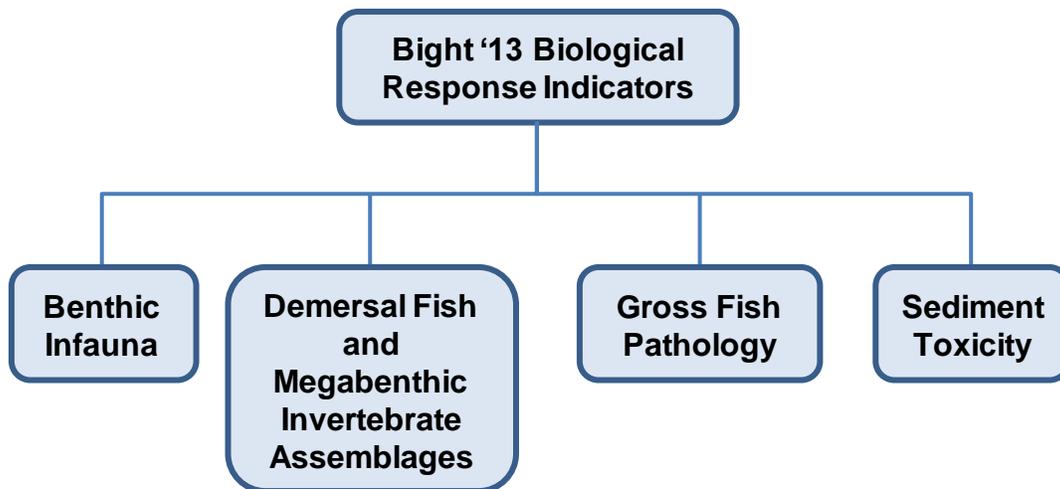


Figure N-11
Bight '13 Sediment Indicators of Biological Response

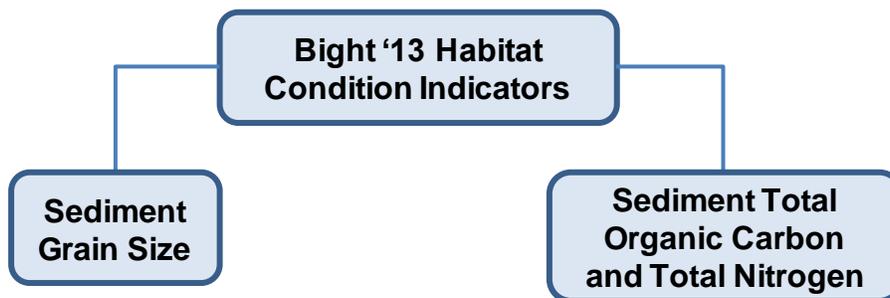


Figure N-12
Bight '13 Sediment Indicators of Habitat Condition

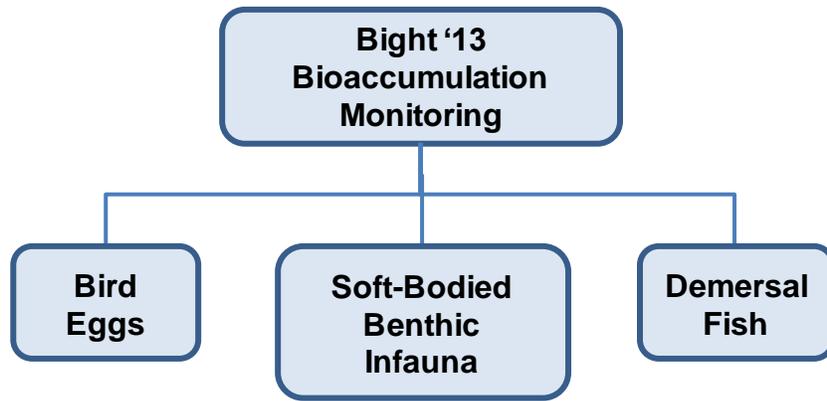


Figure N-13
Bight '13 Bioaccumulation Monitoring Target Organisms

**N.1.4 Storm Water Monitoring Coalition Regional Monitoring
 (Permit Prov. D.1.e.(1))**

Overview

Objectives

- ❖ Determine whether the conditions in the receiving water are protective or likely protective of beneficial uses on a regional scale
- ❖ Determine the extent and magnitude of the current or potential receiving water problems

Sampling Location

Table N-4
2013-2014 Storm Water Monitoring Coalition Bioassessment Monitoring Locations

SMC Region	Stream	Station Identifier	Latitude	Longitude
Central San Diego	Black Canyon Creek	905BCC	33.13086	-116.79575

- ❖ Sites presented are from 2013-2014 monitoring year. Additional locations may be selected in future monitoring years.

2013-2014 Sampling Program

- ❖ Bioassessment monitoring of non-perennial streams and trend sites in Southern California

2015-2019 Sampling Program

- ❖ Responsible Agencies will continue to participate in bioassessments. Sites we will be determined

Other Proposed Projects:

- ❖ Twenty-one (21) proposed projects over five years (2014-2019) within four study categories
- ❖ Responsible Agencies have not committed to participate in any of these projects at this time

Monitoring Methods Reference

- ❖ SCCWRP Regional Watershed Monitoring Program – Proposal for 2014 Sampling (www.projectcleanwater.org)
- ❖ Southern California Regional Watershed Monitoring Program, Bioassessment Quality Assurance Project Plan (www.projectcleanwater.org)
- ❖ Southern California Stormwater Monitoring Coalition 2014 Research Agenda (www.projectcleanwater.org)
- ❖ *Other methods to be determined* as projects are implemented. Project implementation based on collective need and availability of funding

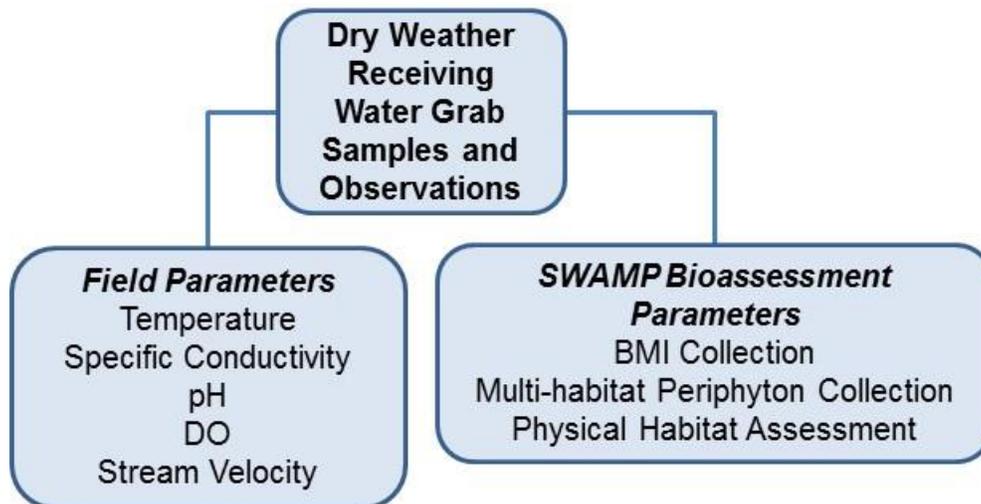
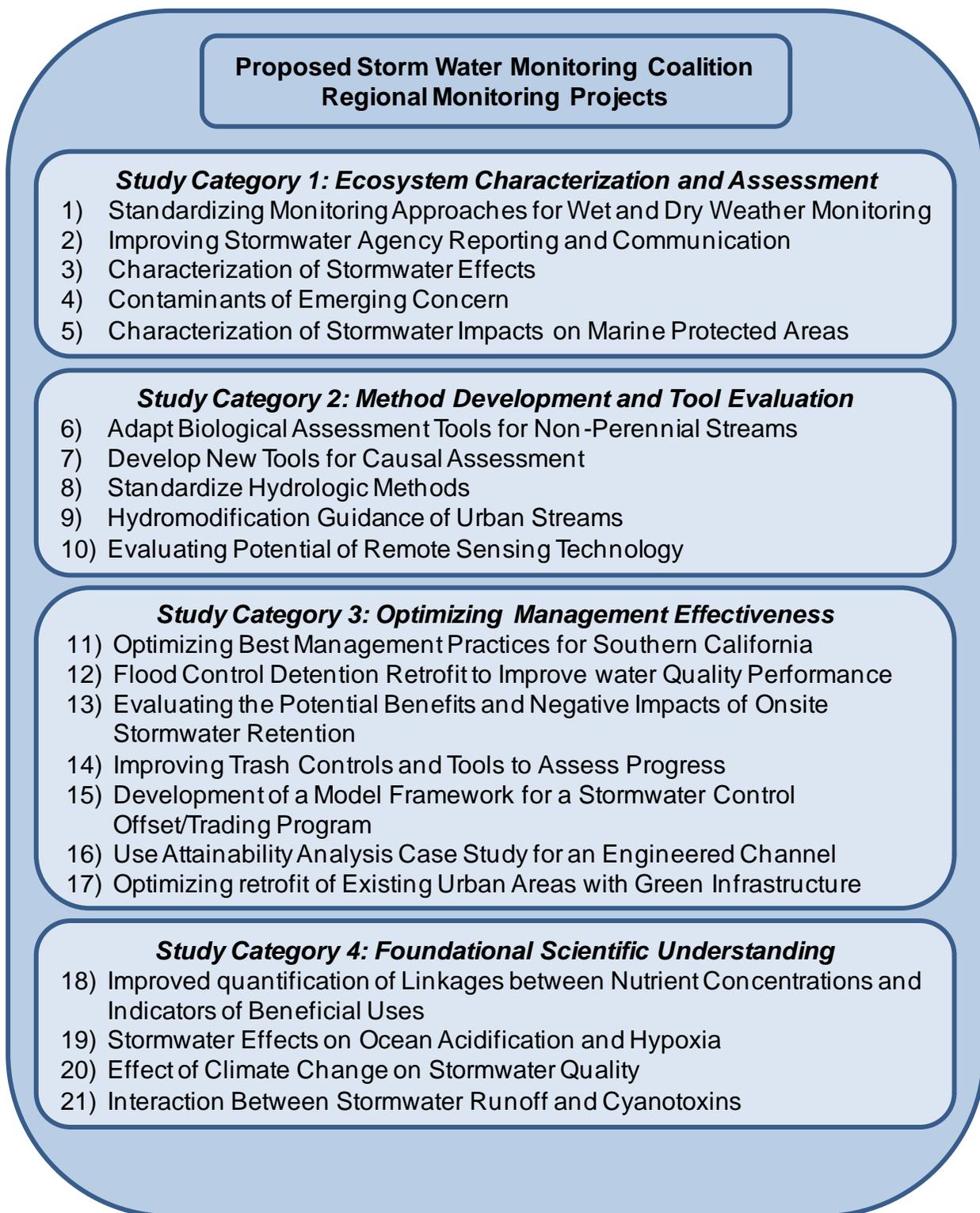


Figure N-14
2013-2014 Storm Water Monitoring Coalition Bioassessment Monitoring



**Figure N-15
Storm Water Monitoring Coalition Regional Monitoring Projects
(Proposed Implementation 2014-2019)**

N.1.5 Hydromodification Management Plan Monitoring

Overview

Objectives

- ❖ Assess the effectiveness of the Hydromodification Management Plan (HMP) in managing increases in runoff discharge rates and duration from all Priority Development Projects, where such increased rates and durations are likely to cause increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive forces.

Monitoring Location

- ❖ Nine (9) monitoring locations in San Diego County, including
 - Three (3) HIGH susceptibility Development sites
 - Two (2) HIGH susceptibility Reference sites
 - Two (2) MEDIUM susceptibility Reference sites
 - One (1) HIGH susceptibility Urban site
 - One (1) MEDIUM susceptibility Urban site

Monitoring Methods Reference

- ❖ San Diego HMP Revised Monitoring Plan (www.projectcleanwater.org)

Monitoring Activities

- ❖ Rain gauge analysis
- ❖ Stream gauge analysis
- ❖ Channel assessments
- ❖ Sediment transport analysis
- ❖ Flow duration analysis

N.1.6 Sediment Quality Monitoring (Permit Prov. D.1.e.(2))

Overview

Objectives

- ❖ Evaluate the condition of sediments in enclosed bays or estuaries with respect to the statewide sediment quality objectives

Sampling Locations

- ❖ Conducted as part of Bight '13. See Section N.1.3 for sampling location details.

Sampling Program

- ❖ Sediment monitoring in enclosed bays and estuaries per State Sediment Control Plan (www.projectcleanwater.org)
- ❖ Each site sampled at least twice between June and September during the Permit cycle².

Monitoring Methods Reference

- ❖ State Sediment Control Plan Section VII.D (Receiving Water Limits Monitoring Frequency (www.projectcleanwater.org))
- ❖ State Sediment Control Plan Section VII.E (Sediment Monitoring) (www.projectcleanwater.org)
- ❖ Sediment Quality Monitoring Plan (www.projectcleanwater.org)

Sample Collection

Sediment Quality Objectives, Multiple Lines of Evidence Approach

- ❖ Chemistry
- ❖ Toxicity
- ❖ Benthic Community Condition

² Monitoring may be reduced to a frequency of once per Permit cycle if station has been classified as unimpacted or likely unimpacted using a Multiple Line of Evidence approach

Sample Analysis

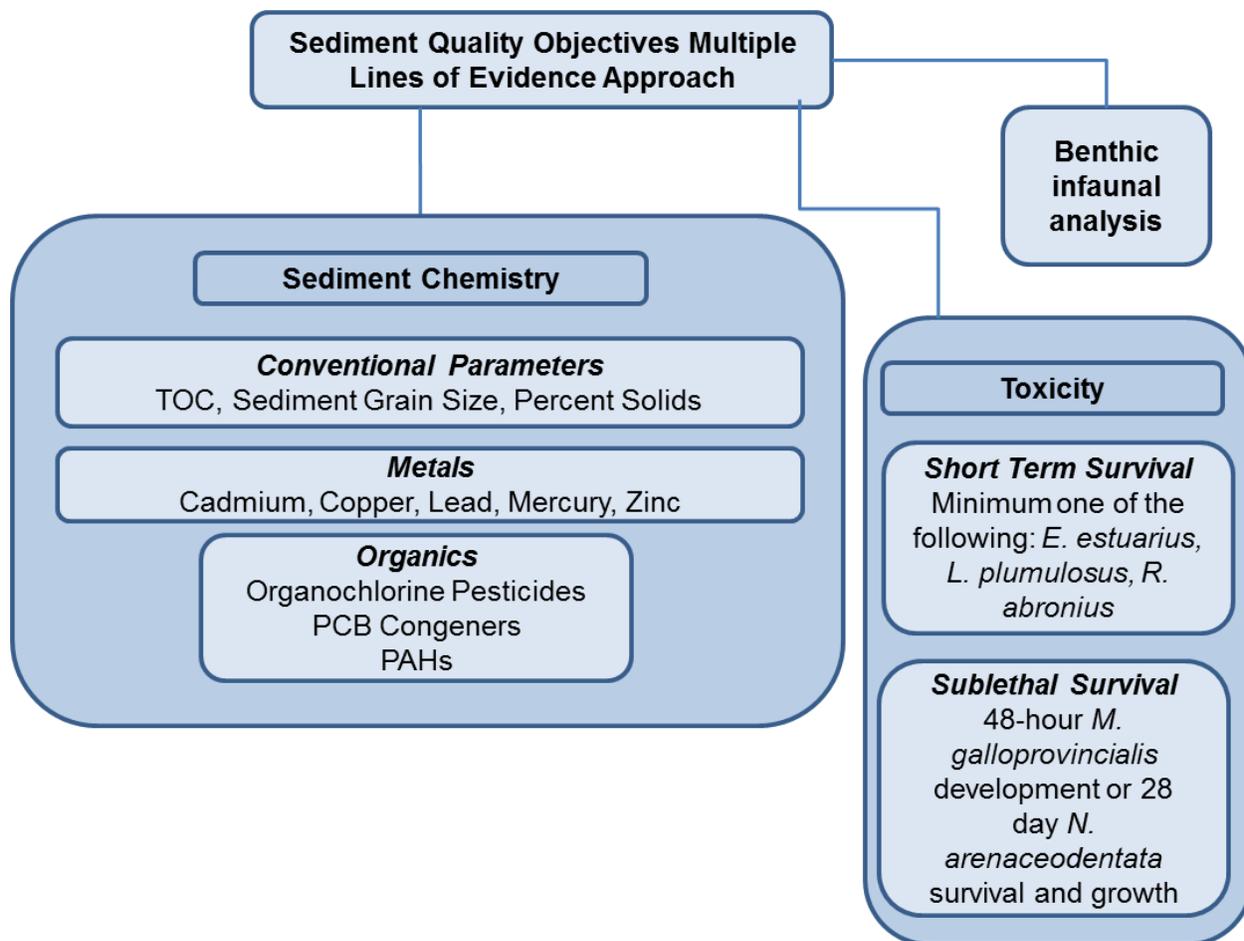


Figure N-16
Sediment Quality Indicators

N.1.7 Bacteria TMDL Monitoring (Permit Attachment E)

Overview

Objectives

- ❖ Determine whether the TMDL numeric targets for bacteria indicators are being met at the compliance monitoring locations
- ❖ Evaluate whether bacteria levels are improving at the compliance monitoring locations

Sampling Locations

Table N-5
Bacteria TMDL Monitoring Location

Site ID	Site Name	Site Type	Latitude	Longitude
EH-380	San Dieguito Lagoon Mouth	Pacific Ocean Shoreline	32.975	-117.271

Monitoring Methods Reference

- ❖ AB411 Monitoring Plan (www.projectcleanwater.org)
- ❖ San Dieguito River Bacteria TMDL Monitoring Plan (www.projectcleanwater.org)

Sample Collection

Monitoring Program

- ❖ Dry weather monitoring to overlap with the AB411 Monitoring Program during AB411 season, when feasible
 - Weekly samples from April 1 through October 31
 - Monthly samples from November 1 through March 30
- ❖ Wet weather monitoring during three (3) storm events per wet season, spread throughout the wet season as follows, to the maximum extent practicable:
 - Storm Event 1 (October to November)
 - Storm Event 2 (December to January)
 - Storm Event 3 (February to April)

N.2 MS4 Outfall Discharge Monitoring

N.2.1 Dry Weather MS4 Outfall Discharge Monitoring (Permit Prov. D.2.b.(1))

Overview

Objectives

- ❖ Identify non-storm water and illicit discharges within jurisdiction per Provision E.2.c
- ❖ Determine which discharges are transient vs. persistent flows
- ❖ Prioritize persistent dry weather MS4 discharges to investigate/eliminate per Provision E.2.d

Sampling Locations

- ❖ The outfalls below will be field screened following an antecedent dry period of ≥72 hours following a rainfall event >0.1"

**Table N-6
MS4 Outfalls for Field Screening**

Jurisdiction	Number of MS4 Outfalls for Field Screening ^{(a)(b)}
City of Del Mar	5 (6) ^(c)
City of Escondido	3 (3) ^(c)
City of Poway	12 (15) ^(c)
City of San Diego	42 (42) ^(d)
City of Solana Beach	3 (3) ^(c)
County of San Diego	16 (20) ^(c)

Notes:

- (a) Antecedent dry period of > 72 hours following rainfall event >0.1" required prior to field screening
- (b) The total number of outfalls in each Jurisdiction is provided in parentheses.
- (c) For Copermittees with fewer than 125 major outfalls in the WMA, 80% of major outfalls must be screened twice per year. The total number of outfalls in each Jurisdiction is provided in parentheses.
- (d) For Copermittees with more than 500 outfalls in multiple WMAs, at least 500 must be screened at least once annually. The City of San Diego has identified 501 outfalls. It is assumed they will screen all of them once annually.

Sample Analysis

- ❖ Field Screening Observations (Shown in Figure N-17)
- ❖ Based on Results of Visual Screening
 - Identify persistent non-storm water discharges
 - Prioritize persistent non-storm water discharges to investigate/eliminate per provision E.2.d

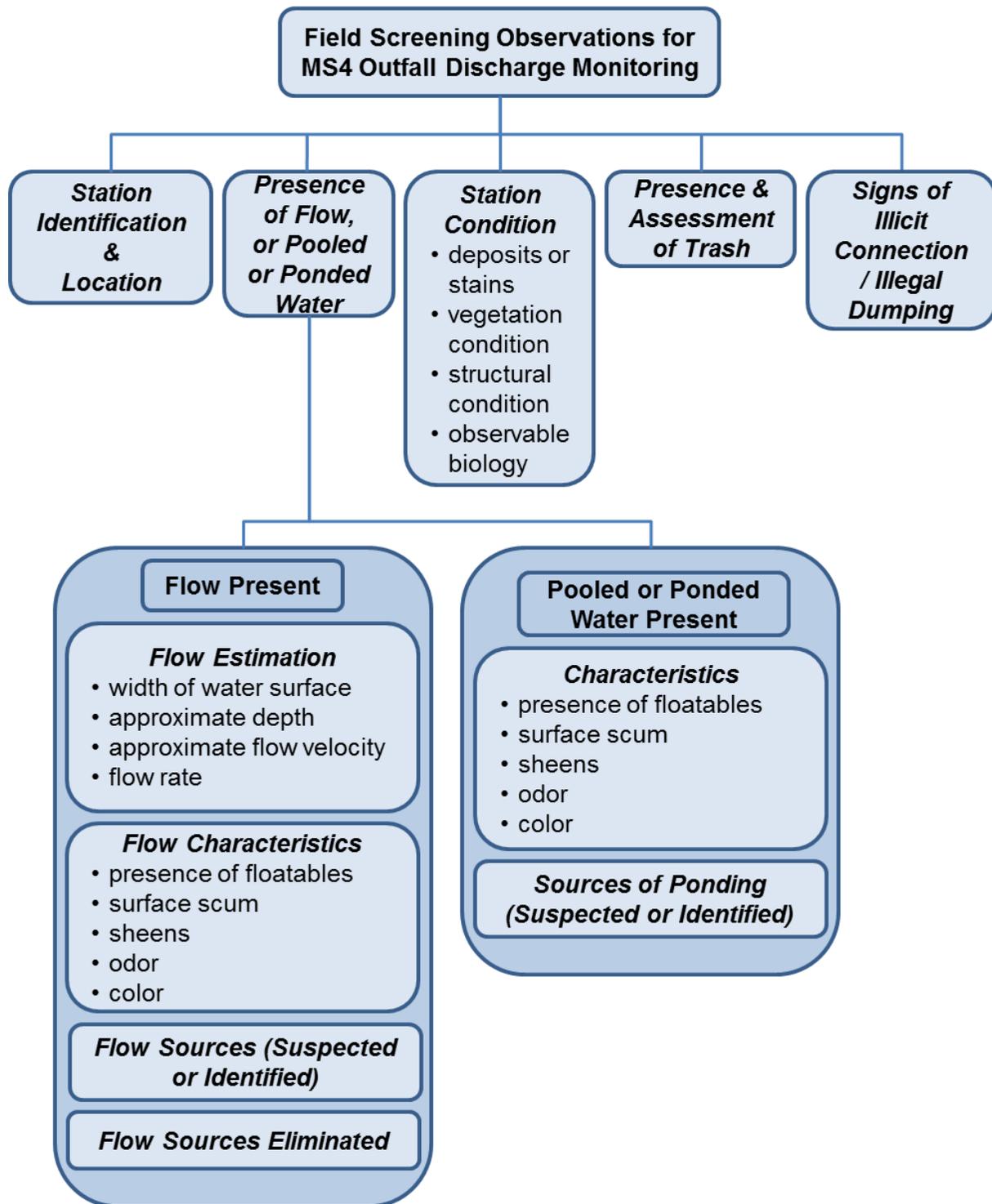


Figure N-17
Field Screening Visual Observations for MS4 Outfall Discharge Monitoring Stations

N.2.2 Non-Storm Water Persistent Flow MS4 Outfall Discharge Monitoring (Permit Prov. D.2.b.(2))

Overview

Objectives

- ❖ Determine which persistent non-storm water discharges contain concentrations of pollutants below non-storm water action levels (NALs) (Permit Provision C.1)
- ❖ Determine the relative contribution of MS4 outfalls to priority water quality conditions during dry weather
- ❖ Investigate the sources of persistent non-storm water flows

Sampling Locations

- ❖ The persistently flowing outfalls below will be monitored following an antecedent dry period of ≥72 hours following a rainfall event >0.1"

**Table N-7
 MS4 Outfalls for Dry Weather Monitoring**

Jurisdiction	MS4 Outfalls for Dry Weather Monitoring
City of Del Mar	2 (S-06, S-07)
City of Escondido	1 (HDG_102)
City of Poway	2 (140, 54)
City of San Diego	5 (DW0284, DW0317, DW0333, DW0033, DW0636)
City of Solana Beach	0 ^(a)
County of San Diego	3 (SDG-074, SDG-080, SDG-115)

Notes:

- (a) All persistently flowing outfalls have been diverted to the sanitary sewer.

Number of Sampling Events

- ❖ Two events/year during dry weather conditions

Monitoring Methods Reference

- ❖ San Dieguito River WMA MS4 Outfall Monitoring Plan (www.projectcleanwater.org)

Prepare Map

- ❖ Identify locations of highest priority non-storm water persistent flow MS4 outfall monitoring stations on map per Provision E.2.b
- ❖ Map to specify which MS4 outfalls are being monitored for compliance with a TMDL

Sample Collection (Shown in Figures N-18 through N-20)

- ❖ Field Parameter Grab Samples
- ❖ Analytical Parameter Grab Samples
- ❖ Receiving Water Grab Samples

Sample Analysis

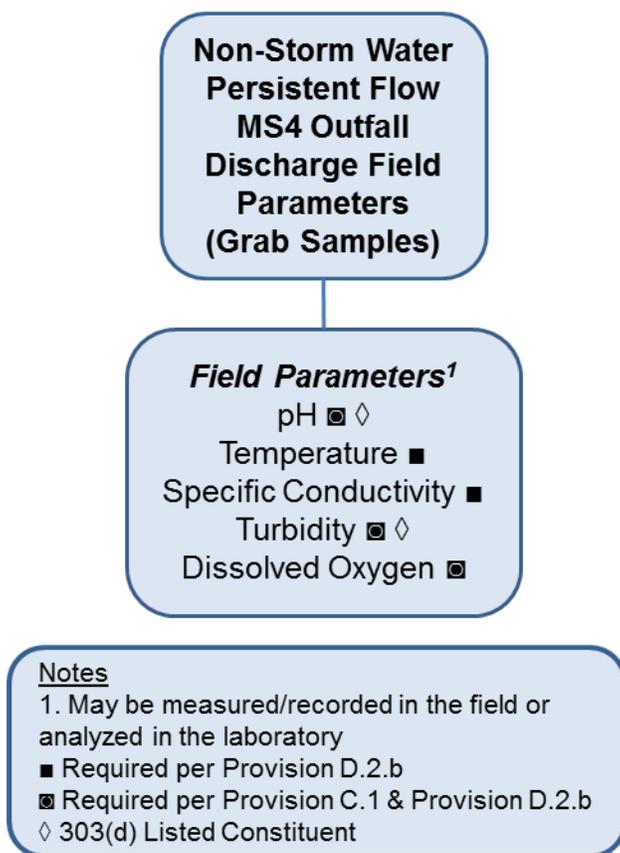
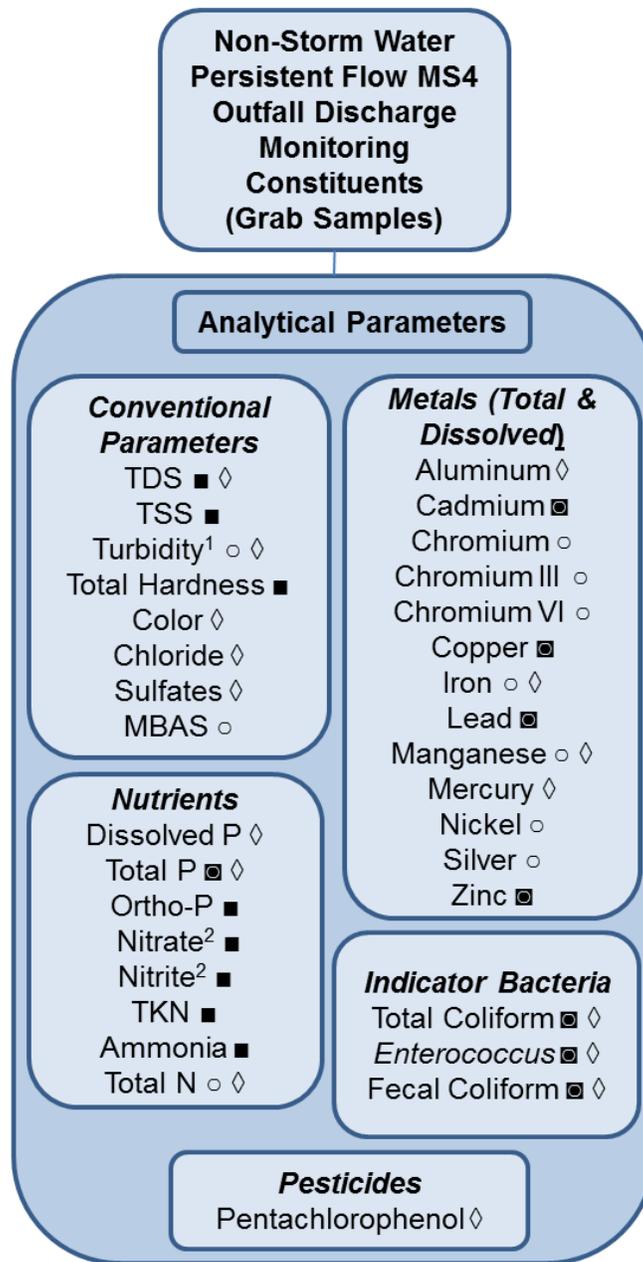


Figure N-18
Non-Storm Water Persistent Flow MS4 Outfall Field Parameters (Grab Samples)



Notes
 1. May be measured/recorded in the field or analyzed in the laboratory
 2. Nitrate and nitrite may be combined and reported as Nitrate+Nitrite
 ■ Required per Provision D.2.b
 ○ Required per Provision C.1
 ■◇ Required per Provision C.1 & Provision D.2.b
 ◇ 303(d) Listed Constituent

**Figure N-19
 Non-Storm Water Persistent Flow MS4 Outfall Discharge Monitoring Constituents
 (Grab Samples)**

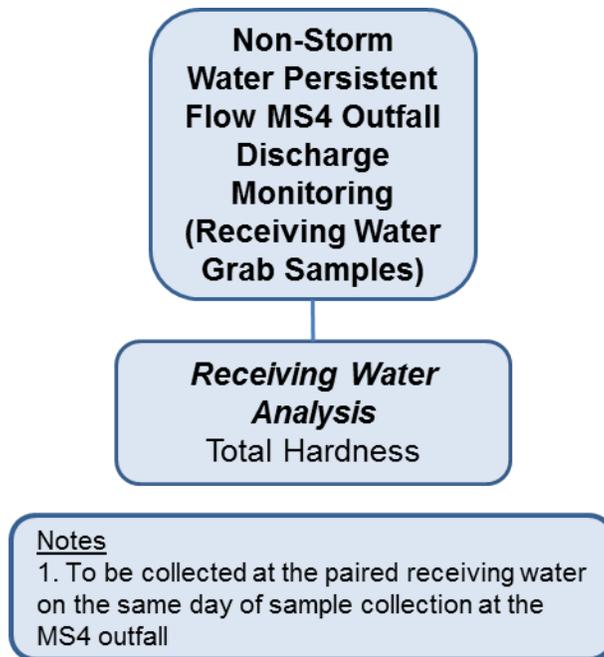


Figure N-20
Non-Storm Water Persistent Flow MS4 Outfall Discharge Monitoring
Receiving Water Analysis (Grab Samples)

N.2.3 Wet Weather MS4 Outfall Discharge Monitoring (Permit Prov. D.2.c)

Overview

Objectives

- ❖ Determine which storm water discharges contain concentrations of pollutants below storm water action levels (SALs) (Permit Provision C.2)
- ❖ Determine the relative contribution of MS4 outfalls to priority water quality conditions during wet weather
- ❖ Investigate how discharge concentrations, loads, and flows change over time at representative MS4 outfalls

Sampling Locations

- ❖ The outfalls below will be monitored annually by each Jurisdiction during the wet season (October 1 – April 30)

Table N-8
MS4 Outfalls for Wet Weather Monitoring

Jurisdiction	MS4 Outfalls for Wet Weather Monitoring
City of Del Mar	1 (MS4-SDC-1)
City of Escondido	1 (MS4-SDC-2)
City of Poway	1 (MS4-SDC-3)
City of San Diego	1 (MS4-SDC-4)
City of Solana Beach	1 (MS4-SDC-5)
County of San Diego	1 (MS4-SDC-6)

Frequency of Events

- ❖ One wet weather event per monitoring year

Monitoring Methods Reference

- ❖ 2015-2016 San Dieguito River WMA MS4 Outfall Monitoring Plan (www.projectcleanwater.org)

Sample Collection (shown in Figures N-21 through N-23)

- ❖ Time Weighted Composites
- ❖ Grab Samples

❖ Receiving Water Grab Samples

Sample Analysis

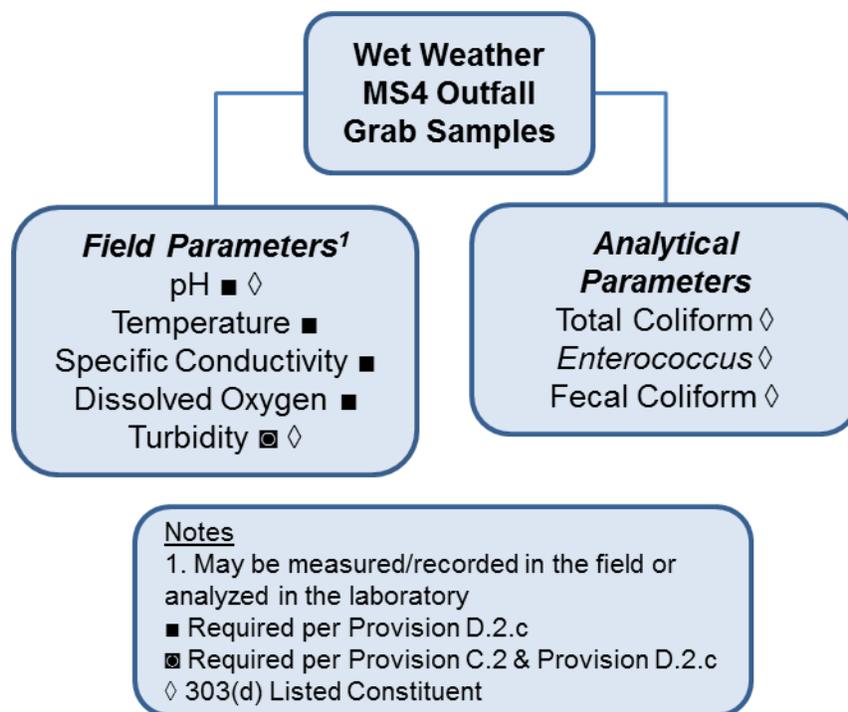
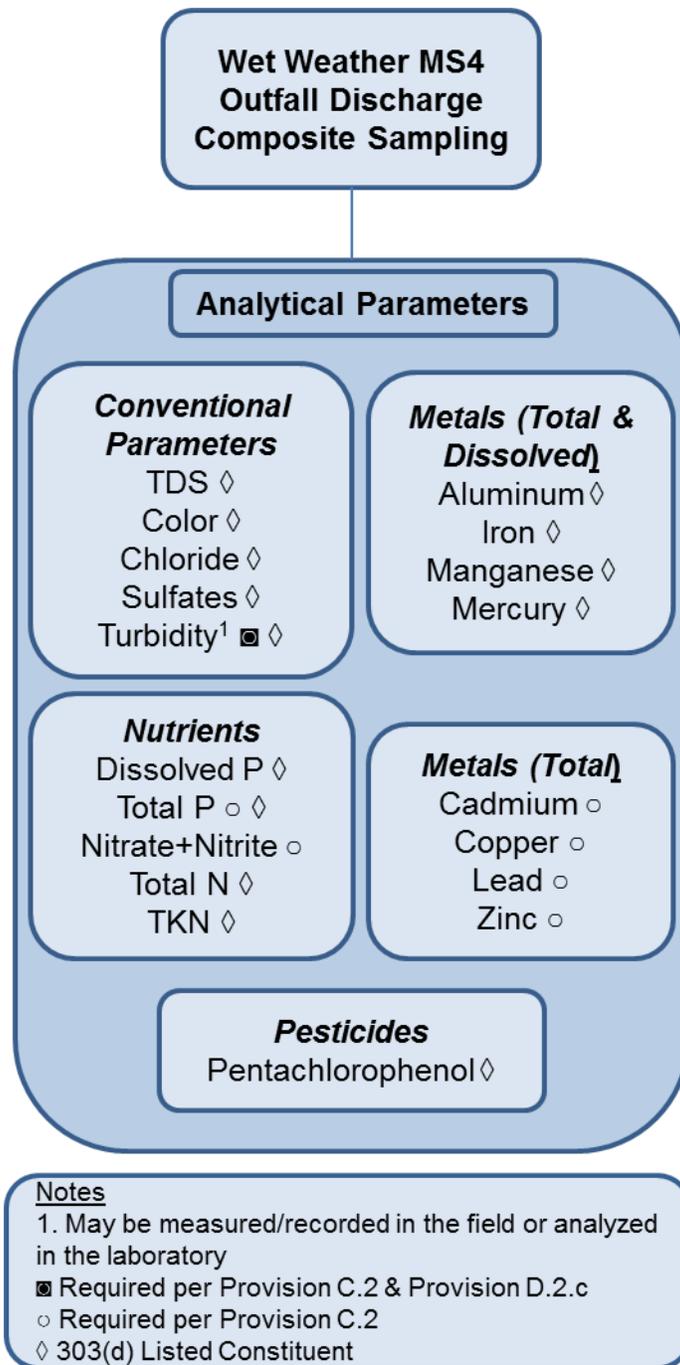


Figure N-21
Wet Weather MS4 Outfall Grab Sample Constituents



**Figure N-22
Wet Weather MS4 Outfall Discharge Monitoring Constituents**

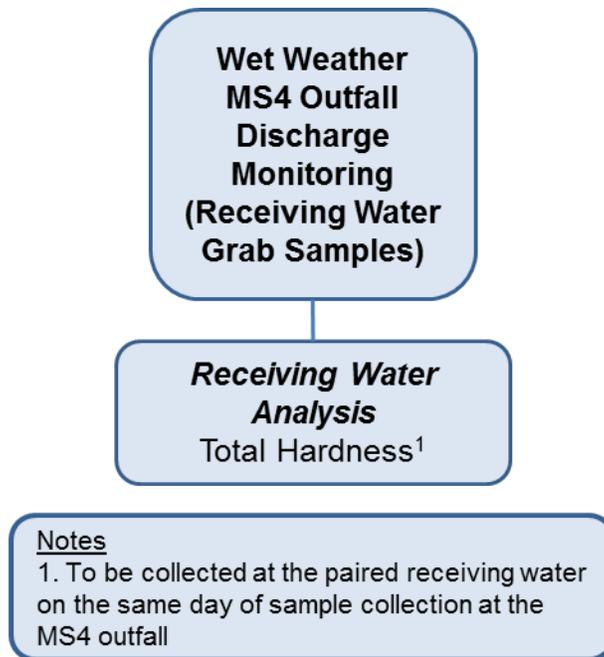


Figure N-23
Wet Weather MS4 Outfall Discharge Monitoring Receiving Water Analysis

N.3 Special Studies

N.3.1 San Diego Regional Reference Stream Study (Permit Prov. D.3)

Overview

Objectives

- ❖ Evaluate variation in Water Quality Objective (WQO) exceedance frequencies between summer dry weather, winter dry weather, and wet weather?
- ❖ Evaluate variation in WQO exceedance frequencies with respect to hydrologic factors, such as:
 - Storm size (wet weather only)
 - Beginning versus end of storm season (wet weather only)
 - Discharge flow rate and volume
- ❖ Evaluate variation in WQO exceedance frequencies with respect to impact factors such as the size and geology of catchments
- ❖ Evaluate variation in WQO exceedance frequencies with respect to biotic and abiotic factors, such as:
 - Algal cover and/or biofilms
 - Water quality (temperature, conductivity, pH, dissolved oxygen, total suspended solids concentrations)

Sampling Locations

- ❖ Three (3) wet weather events at six (6) sites throughout the San Diego Region (two sites are located in San Diego County)
- ❖ Up to 40 weeks of dry weather at up to ten (10) dry weather sites

Monitoring Methods Reference

- ❖ San Diego Reference Stream QAPP available upon request from the Regional Water Quality Control Board

Monitoring Approach

Wet Weather Monitoring

- ❖ Time course pollutograph sampling (sampling of concentrations at multiple periods over the course of the storm) over the duration of the storm event and once per day on the following three days

- ❖ *In-situ* field measurements will be recorded at each site to coincide with each pollutograph grab sample
- ❖ Flow and precipitation will be measured throughout the duration of the storm event at each reference site, when feasible
- ❖ During one wet event per site, toxicity composite sample taken over a whole day

Dry Weather Monitoring

- ❖ Up to 40 weeks
- ❖ Water grab-sampling:
 - Weekly bacteria samples will be collected such that 5 samples will occur within each 30-day period
 - Biweekly nutrient, metals, and conventionals sampling
 - Flow calculated weekly at each site using a hand-held March-McBirney flow meter. The meter measures instantaneous velocity, which will be used with cross-sectional area measurements to calculate flow
 - *In-situ* field measurements to coincide with each grab sample
- ❖ Modified algal bioassessment sampling one to two times per Reference Stream site, when feasible
 - Modified SWAMP guidelines for algae collection and stream condition parameters, including physical habitat, benthic algae and chlorophyll a

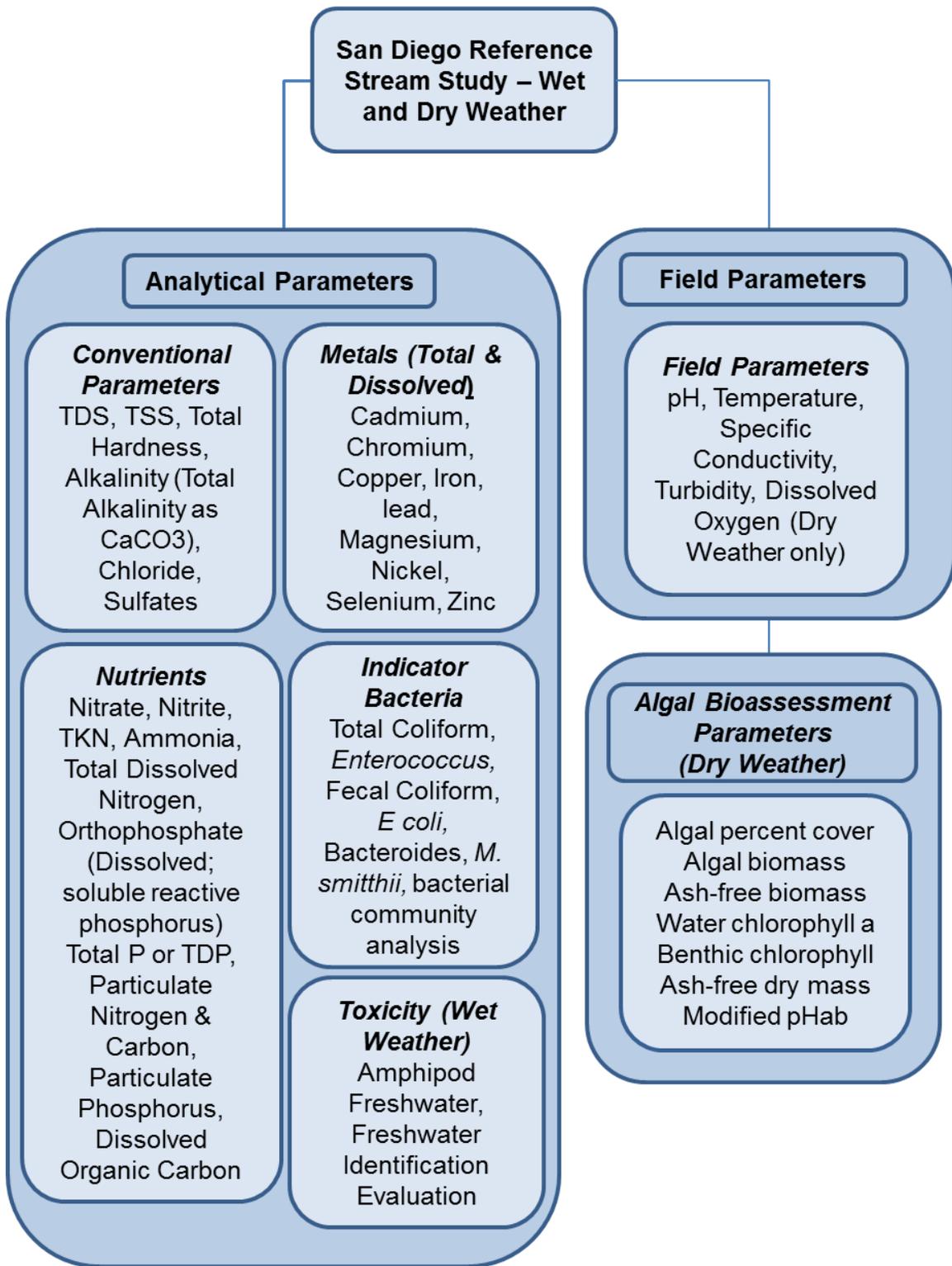


Figure N-24
San Diego Reference Stream Study Monitoring Constituents

N.3.2 San Diego Regional Reference Beach Study (Permit Prov. D.3)

Overview

Objectives

- ❖ Evaluate variation in Water Quality Objective (WQO) exceedance frequencies between summer dry weather, winter dry weather, and wet weather.
- ❖ Evaluate variation in WQO exceedance frequencies with respect to hydrologic factors, such as:
 - Discharge flow rate (wet and dry weather)
 - Status of estuary mouth, if applicable (open or closed, dry weather only)
- ❖ Evaluate wet and dry weather WQO exceedance frequencies in creeks and estuaries (if applicable).

Sampling Locations

- ❖ Three (3) wet weather events at three monitoring (3) points at one (1) site: freshwater creek, estuary, and ocean (site located in San Diego County)
- ❖ Up to 60 weeks of dry weather at two (2) to three (3) monitoring points at two (2) dry weather sites: freshwater creek, estuary (if applicable), and ocean (one in the San Diego Region; one in the Malibu Region)

Monitoring Methods Reference

- ❖ San Diego Reference Beach QAPP available upon request from the Regional Water Quality Control Board

Monitoring Approach

Wet Weather Monitoring

- ❖ Monitoring conducted only during storms that produce enough runoff to result in the creek actively discharging to the ocean
- ❖ One grab sample at each monitoring point on the day of the storm event and once per day on the following three days
- ❖ *In-situ* field measurements will be recorded at each monitoring point to coincide with each grab sample
- ❖ Discharge from the creek will be estimated during sampling each day throughout the duration of the monitoring event, when feasible

Dry Weather Monitoring

- ❖ Up to 60 weeks
- ❖ Water grab-sampling:
 - Weekly bacteria samples at each monitoring point will be collected such that 5 samples will occur within each 30-day period
 - Flow estimated weekly at each creek site and the flow across the beach to the ocean, if flowing.
 - *In-situ* field measurements to coincide with each grab sample
- ❖ Estuary Special Study
 - Dry weather only at San Onofre Creek (Deer Creek does not have an estuary)
 - Includes two (2) additional sample points within the estuary, for a total of three (3) sample points within the estuary (spatial variability)
 - Samples are collected once per sampling day, or twice per sampling day when open to tidal fluctuation (temporal variability)

N.3.3 San Dieguito River WMA Bacteria Source Identification and Prioritization Process Special Study (Permit Prov. D.3)

Overview

Objectives

- ❖ Implement source characterization via desktop analysis and Responsible Agency interviews in order to determine the specific sources of bacteria impacting the San Dieguito River at the Pacific Ocean Shoreline

Monitoring Methods Reference

- ❖ San Dieguito River WMA Bacteria Source Identification Special Study Plan (www.projectcleanwater.org)

Source Identification

Source Identification to include:

- ❖ Data Collection and Analysis
 - Literature review
 - Compilation of monitoring data and other relevant information
 - Analysis of data gaps
- ❖ Identification and prioritization of bacteria sources

N.3.4 Proposed Nutrient Load Characterization Study for Lake Hodges (Permit Prov. D.3)

Overview

Objectives

- ❖ City of San Diego Public Utilities Department program to characterize the nutrient budget to Lake Hodges and identify the sources of those loads. Program is currently under development and details are not available.

Monitoring Methods Reference

- ❖ NA; program is under development

N.3.5 Stream Gauge Study (Permit Prov. D.3)

Overview

Objectives

- ❖ Evaluate the level of flow in local streams
- ❖ Determine which streams are perennial and which streams are ephemeral

Sampling Locations

- ❖ Three (3) locations in the San Dieguito River

Monitoring Methods Reference

- ❖ Stream Gauge Study Monitoring Plan (www.projectcleanwater.org)

Data Collection

Data Collection to Include:

- ❖ Dataloggers with five minute logging interval for:
 - Water level
 - Temperature
 - Barometric pressure
 - Conductivity (location-dependent)
- ❖ Stream cross section measurements

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