SWAMP
Surface Water Ambient Monitoring Program

Monitoring Plan	2012-2013

Stream Bioassessment in the Santa Ana Region Sampling Events 2012-2013

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1. Introduction

The Santa Ana Region covers an area of approximately 2,800 square miles in Southern California and is the smallest of the nine water quality control regions in the state. Although small, the region's nearly 5 million residents make it one of the most densely populated regions in California. The climate of the region is classified as Mediterranean: generally dry in the summer with mild, wet winters. The average annual rainfall in the region is about fifteen inches, most of it occurring between November and March. The Santa Ana regional stream network consists of first order coastal streams that flow directly into the ocean as well as a network of first, second, third, and fourth order streams that are tributary to the two major rivers in the area, the Santa Ana and San Jacinto Rivers. The Santa Ana River cuts through the San Bernardino Mountains and the Santa Ana Mountains and flows down to the ocean and is effluent dominated during dry weather. The San Jacinto River has no flow during the dry season, flowing during large storm events. The terminus of the San Jacinto River is Canyon Lake during small storm events and Lake Elsinore during large storm events. These streams are designated to support several beneficial uses, including that for aquatic life, but at this point in time there is limited information on the water quality of this stream network. Most of the Region's ambient monitoring has been focused on a few waterbodies, such as those in which TMDLs have been developed and monitoring compliance points identified to measure effectiveness of BMP implementation, and those that require dischargers to monitor and report according to their NPDES permits. These efforts while important do not provide an unbiased view of the health of the Region's stream network since these efforts are focused on impaired and effluent dominated reaches. An integrated monitoring approach reveals pollution effects that go undetected with most conventional monitoring programs that rely on physical and chemical parameters alone.

Understanding the quality of the rivers, streams and other water sources is important for the development of management plans to protect California and Region 8's vital water resources. One approach that has been advocated for determining the overall health of a stream are direct measurements of biological assemblages occupying various trophic levels including plants, macroinvertebrates, vertebrates (fish) and periphyton (diatoms and algae). These evaluations are known as biological assessments and are the primary tool in evaluating the biological condition of a waterbody. Stressors such as low dissolved oxygen concentration and poor habitat quality adversely affect aquatic organisms. Biological communities integrate the cumulative effects of stressors and respond to stresses over time. Therefore, bioassessments can be used to track water quality trends, assess the effectiveness of TMDLs and NPDES permit controls, as well as determine the status of a water body. When a waterbody is healthy, it exhibits ecological integrity, a combination of chemical, physical and biological integrity. As defined by the 2006 EPA Wadeable Streams Assessment (WSA) document, *"biological integrity represents the capability of supporting and maintaining a balanced, integrated, adaptive community of organisms having a species composition, diversity and functional organization comparable to that of the natural habitat of the region".* Bioassessment is a proxy for determining stream water quality and habitat quality based on the types and numbers of organisms living there.

2. Background and Problem Statement

Beginning in 2006, the Santa Ana Regional Water Quality Control Board (SARWQCB) contracted the Stream Ecology and Assessment Lab (SEAL) to undertake a five-year project that focused on using benthic macroinvertebrates and physical habitat measures to assess the biotic integrity of the wadeable streams in Region 8. In addition, water quality field parameters (e.g., dissolved oxygen, pH, temperature, conductivity, and salinity) and water chemistry constituents (e.g., nutrient and total suspended solids) were obtained at each site. These were measured because 1) they are required as part of the Surface Water Ambient Monitoring Program (SWAMP) protocols for bioassessment (Ode 2007) and 2) they are important in interpreting bioassessment data such as identifying the specific stressors and physical that have the ability to degrade biotic integrity. These data can be used to perform a more in-depth stressor identification analysis to determine the specific stressors and the cause of those stressors. This causal analysis was not part of the original sampling plan; however, this type of analysis could be performed for developing TMDLs, NPDES permitting, and managing our watersheds. Sampling sites were selected to represent a random draw weighted by Strahler stream order prevalance within the region and by three elevation strata (i.e., 0-350 meters, 350-700 meters and 700+) (Mason et al. 2007). Under the original experimental design, SEAL sampled 181 random sites. The sampled sites are considered statistically representative of the 1302 linear stream kilometers covering the Santa Ana regional stream network. The data will be used to (1) estimate the percentage of stream kilometers in the region that are in one of five categories of health (very good, good, fair, poor, and very poor), (2) identify streams that may require

improvement of water quality, (3) assess the biotic integrity of streams in the region that might otherwise not have any monitoring data, and 4) identify and rank the relative importance of chemical and physical stressors affecting stream condition. Benthic macroinvertebrates were collected using the methods described in SWAMP protocols (Ode 2007) and the biotic condition of the streams was evaluated by seven metric types, including richness, composition, tolerance measures, and functional feeding groups that collectively make up the Southern California Index of Biotic Integrity (SoCal IBI) (Ode et al. 2005). Water chemistry, including conventional water quality parameters and nutrients, were collected according to current SWAMP guidelines.

In 2009 Region 8 joined the Stormwater Montioring Coalition (SMC), an interagency group including the Regional Water Quality Control Boards (i.e., RWQCB Regions 4, 8, and 9) and the stormwater agencies within the counties of Los Angeles, Riverside, San Bernardino, Orange, Ventura, and San Diego. The SMC, coordinated by the Southern California Coastal Water Research Project (SCCWRP), initiated a regional bioassessment program to characterize the health of the Southern Californian freshwater streams. The SMC study collects six indicators, including water chemistry (conventional water chemistry, nutrients, trace metals, and pyrethroid pesticides), aquatic toxicity, physical habitat according to the methods in Ode (2007), benthic macroinvertebrates using the methods described in the SWAMP protocol (Ode 2007), riparian wetland condition using the California Rapid Assessment Method (CRAM) (Collins et al. 2008), and periphyton including biomass and taxonomic identification according to the SWAMP protocol (Fetscher et al. 2009 - updated May 2010). SEAL has sampled 26 sites within San Bernardino County under the SMC program. Other sites within the Santa Ana Region, including Orange and Riverside counties, have also been sampled by different agencies. At project completion, the total number of SMC sampled sites within the Santa Ana Region is expected to be 120 (SMC 2007).

Region 8 now has a data set from which to initiate a targeted study based on a multimetric index and physical and chemical data generated for sites over the past five years (2006-2010). We have assessed the ecological health of streams within the Santa Ana Region at over 200 different sites using multiple indicators, including benthic macroinvertebrate community structure, water chemistry and physical habitat. Macroinvertebrate communities have been evaluated by calculating the Southern California Index of Biotic Integrity (SoCal IBI) (Ode et al. 2005). Region 8 wants to utilize the collected data to identify distinct biological communities within subregions. Specifically, we can identify biologically relevant subregions to create representative biological conditions against which outliers can be targeted and resampled to determine the variance within a site, or in other words, the "signal to noise". These subregions will be used for determining the location of trend monitoring sites, determining if cumulative effects from pollution sources have adequate controls for support of aquatic life, identifying appropriate "reference" thresholds for developing and then measuring progress in implementing TMDLs, determining the effectiveness of discharger control permits, establishing and monitoring BMPs and for identifying previously unsampled reaches of particular interest (e.g., 303(d) listed, discharger permits).

3. Summary of Project Objectives

Below is an overview of the objectives of this two-year plan. Each objective is described in detail within the sections below. This project will have the following objectives:

Objective 1. Continued participation in the SMC project, which is scheduled to end after the sampling events in 2013.

Objective 2. Conduct targeted sampling at 37 sites in 2012 and 27 sites in 2013. During the first year (sampling events in 2012), riparian wetland condition using the CRAM and aquatic toxicity will be included in addition to the standard bioassessment activities. Beginning in 2013, total and dissolved metals (Al, Cr, Mn, Ni, Cu, Zn, Ag, Cd, Pb, As, and Se) will be included in the analyses, in addition to chlorophyll *a* and ash-free dry mass for periphyton. Detailed methods are described below. This targeted sampling will have three purposes:

a. *Outlier detection/confirmation:* IBI scores generated over the years 2006-2010 will be assessed to determine biologically relevant subregions utilizing both watershed and ecoregion GIS layers and non-parametric mulitvariate statistical methods (see *Site Selection* below for more detail). Outliers will be statistically identified and then resampled in 2012 and 2013 to determine the variance within a site and whether the range of IBI scores needs to be expanded based on the "signal to noise" exhibited in specific sites. We will also utilize the outcome of these analyses to locate sites suitable for trend monitoring. The sites then picked for trend analysis would be sampled at a regular interval to determine if conditions are improving or declining in the watershed. Trend analysis would be dependent on future funding and would take into consideration the location of monitoring sites related to the State Board's monitoring efforts (e.g., SPoT).

b. *Relationships between 303(d) listed sites and IBI scores:* Some targeted sites will be located along current 303(d) listed water bodies to explore possible relationships between the specific pollutants at these sites and the biological health of these water systems. Since funding is not adequate to focus on all possible stressors, specific stressors include nutrients, specific metals, degraded physical habitat, and increased toxicity. These targeted sites will be chosen so as to augment the dataset of IBI scores already in existence (see *Site Selection* below for details). Conducting biological assessments at TMDL compliance points represents a complete evaluation for determining water quality condition by integrating physical, chemical, and biological evaluations.

c. *Obtain data from reaches not included in the database:* To obtain bioassessment data along streams for which we have no data on biological health. The previous probabilistic design (see Mason et al. 2007) did not include some prominent reaches

of some streams and we will target these during both the 2012 and 2013 sampling events. These are new sites and their specific locations will be determined by the results of the outlier detection/confirmation described in a above and considering Region 8's priorities, historic monitoring data, and location of current regional monitoring sites.

Objective 3. Participation in "Assessment of Extent and Condition of Depressional Wetlands in southern California", a project administered by the Southern California Coastal Water Research Project (SCCWRP). This project was initiated in 2011 and our participation will begin with 2012 training and sampling events. Final protocols are currently being developed at SCCWRP and will be available early in 2012.

Objective 4. Coordination of monitoring efforts to use ambient water quality data to determine overall conditions of waterbodies in the region for inclusion in the 305(b) report and 303(d) list. The integration of multiple types of environmental information from a site (e.g., physical, chemical, and biological) directly evaluates conditions of those elements stated in the Clean Water Act (1972) and represents a thorough ecological assessment.

4. Description of Methods to Achieve the Project's Objectives

i. Objective 1 – Participation in the SMC Program

a. The SMC program is an interagency group including State Water Board Regions 4, 8, and 9 and the counties of Los Angeles, Riverside, San Bernardino, Orange, Ventura and San Diego. Under Region 8's agreement, SEAL will provide field and laboratory work at 13 probablisitic sites during sampling events in 2012 and 2013. Dr. Mazor of SCCWRP will provide the GPS coordinates of sites within four watersheds, the San Jacinto, Upper Santa Ana, Middle Santa Ana, and Lower Santa Ana. Water chemistry, physical habitat data and benthic macroinvertebrates will be collected as described in Objective 2 below; these protocols also follow those of the SMC QAPP (June 2009). Additionally, water toxicity, conventional water chemistry (Table 1), pyrethroids/pyrethrin concentrations, and total and dissolved metals analyses will be provided by Babcock Labs as per an agreement between Region 8 and San Bernardino County Flood Control District.

ii. Objective 2 – Targeted Sampling

There are three types of targeted sampling proposed, 1) *Outlier detection/confirmation*, 2) *Relationships between 303(d) listed sites and IBI scores*, and 3) *Obtain data from reaches not included in the database*. Each of these will have their own methods for the unique selection process for a site type (see *Site*

Selection below). Assessment methods measuring physical habitat condition, water quality, and biological condition will be the same at all sites (targeted). Physical habitat descriptions, analyses of water chemistry, benthic macroinvertebrate collection and processing, periphyton analyses and toxicity analyses will be applied uniformly at all targeted sites and are further described in sections ii.b, ii.c, ii.d, ii.e, and ii.f, respectively. All sampling will occur within the SWAMP Index Period (May 15 – July 15). Sampling effort among the site selection strategies will be determined after examination of 2010 multi-metric index scores and prior to the 2012 sampling season.

a. Site Selection

Outlier detection/confirmation – In order to identify sites that are significantly divergent (biologically) from surrounding sites, distinct biological communities within subregions will be identified for Region 8.

Initially, watershed layers using the watershed boundary dataset (WBD) will be used to delineate Region 8's area into HUC 10 or HUC 12 watersheds. In addition, we will also use ecoregion (Level III) and sub-ecoregions (Level IV) layers as described in USEPA (2011). We will test for significant groupings of the IBI scores. The new Watershed Boundary Dataset (WBD) consists of digital geographic data that includes six levels of detailed nested hydrologic unit boundaries. It defines the perimeters of drainage areas (hydrologic units), formed by the terrain and other landscape characteristics, at a 1:24,000 scale in the United States. It is also consistent with the national criteria for delineation and resolution. The 5th and 6th levels are known as the 10-digit (watershed) and 12-digit (sub-watershed) HUCs. Average size of each HUC is 227 square miles and 40 square miles for the 10 and 12-digit HUCs, respectively (USGS and NRCS, 2011).

The WBD differs from the CalWater version 2.2.1 watershed dataset used to determine hydrologic codes and watershed boundaries identified in Region 8's Basin Plan, primarily because CalWater also took into consideration political boundaries which the WBD does not. In addition, delineation methods for the watersheds differ, so that a waterbody might fall within two different WBD watersheds or subwatersheds compared to one Calwater watershed.

Watershed and ecoregion or sub-ecoregion groupings will then be verified by an analysis of biologically relevant subregions. An analysis of the BMI species and environmental parameters might show that watershed groupings and ecoregions/sub-ecoregions are not adequate to describe the differences in observed community types and therefore, require an alternate approach to

group similar community types. Physical habitat and chemistry data from sampling events 2006-2010 will be organized as an “analyte x site matrix” and imported into Primer v6©, a non-parametric multivariate statistical program. Similarly, all of the laboratory results from BMI sample analysis will be stored as “taxon x site” matrix and uploaded to Primer©. Biologically relevant sub-regions will be identified by using Analyses of Similarity (ANOSIM) with both matrices. Once subregions are identified, summarization of conditions through generation of means and standard deviations for multi-metric scores within each subregion will be determined. Outlying scores that fall more than two standard deviations from the mean will be flagged as outliers and will be targeted for resampling during both years of this work plan. Two standard deviations from the mean multi-metric index score is a threshold usually used to distinguish between two distinct biological populations incorporating sources for natural variation and error as part of the process in characterizing biological condition.

Relationships between 303(d) listed sites and multi-metric index scores – Region 8 has numerous water bodies in freshwater ecosystems that have been identified as having 303(d) listings. The pollutants that serve as a focus for this two-year plan include nutrients and select metals. This work plan proposes to test for relationships between specific attributes of Region 8’s 303(d) listed sites and bioassessment data. Existing bioassessment data are available from years 2006-2010 and this information will be initially analyzed with respect to their proximity to 303(d) listed reaches. For 303(d) listed reaches absent of bioassessment data, an additional three sites will be targeted (upstream, midstream, and downstream) during at least one of the years covered by this work plan. Furthermore, if some sites have been identified as outliers based on the methods described above (*Outlier detection/confirmation*) these will be given priority for resampling if funds are insufficient to accomplish all desired bioassessement activities. Outliers are important in determining the "noise" of the biotic signal to determine the range of site conditions at those sites that require resampling.

Obtain data from reaches not included in the database – Because bioassessment in Region 8 has been strictly probablistic, some freshwater stream reaches have never been sampled and are not represented in our database. Targeted sampling of specific reaches is important for future TMDL development, criteria revision and assessing effectiveness of management actions and discharger permit controls. Prior to the 2012 sampling season, we will identify these specific reaches and prioritize their sampling based on Region 8’s priorities, historic monitoring data, and location of regional monitoring sites.

b. Physical Habitat Description - The field methods use those described by the Surface Water Ambient Monitoring Program (SWAMP) Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California (Ode 2007). Additionally, algae collection and preservation methods follow SWAMP's Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in California (Fetscher et al. 2009, updated May 2010). The most current physical habitat data sheets will be used and information integrated from both protocols to increase efficiency of field effort.

c. Water Chemistry - For all sampling sites water *in* situ chemistry measurements will be taken using a YSI (or equivalent) environmental monitoring unit for pH, dissolved oxygen (mg/l), conductivity (mS/cm), water temperature (°C), turbidity (NTU), and salinity at the location specified in the SWAMP protocol (Ode 2007). In addition to these on site measurements, a 500ml water sample will also be collected at each site for laboratory analysis to test for parameters that will be used to describe the general chemical status of the streams. These measurements will be performed by IIRMES housed at CSULB and will include those listed in Table 1. Sample collection and subsequent processing and testing will be performed according to the SWAMP Quality Assurance Project Plan (QAPrP), SEAL Laboratory SOPs and SEAL QAPP (2010).

Table 1. Conventional water chemistry analytes

CONSTITUENT	UNITS
Alkalinity	mg/L
Hardness as CaCO3	mg/L
Ammonia as N (NH3)	mg/L
Conductivity	µS/cm
Nitrate as N (NO3)	mg/L
Nitrite as N (NO2)	mg/L
Total Nitrogen (measured directly)	mg/L
Orthophosphate as P (dissolved OPO4)	mg/L

Total P	mg/L
Total Suspended Solids	mg/L
Turbidity	NTU
Cloride	mg/L
pH	

Correlations between physical parameters, physical habitat, nutrient results, and bioassessment results will be done to determine possible relationships between IBI scores and the water column indicators. Beginning in 2013, total and dissolved metals (Al, Cr, Mn, Ni, Cu, Zn, Ag, Cd, Pb, As, and Se) will be included in the analyses. Replicates will be collected at 5% of the sites.

d. Benthic Macroinvertebrate Collection and Processing – Benthic macroinvertebrates (BMIs) will be collected following the current SWAMP SOP for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California (Ode 2007) and includes eleven samples taken at each of eleven transects per reach that are composited into one sample. These composite samples will be subsampled in the lab following the SWAMP-approved SEAL QAPP (v3.4.5, October 2010) to samples containing 600 BMIs. BMIs will be identified to SAFIT Level II following the most recent Standard Taxonomic Effort (STE) document. Taxonomy and enumeration will be checked for accuracy at a rate of 10% and performed by the Aquatic Bioassessment Laboratory (ABL) at CSU Chico. Field replicates will be taken at 10% of the sites.

e. Periphyton analyses - Beginning in 2013, periphyton biomass (i.e., chlorophyll *a* and ash-free dry mass (AFDM) will be collected and analyzed by SEAL. The analysis and collection will follow the SWAMP Standard Operating Procedures for Collecting Stream Algae Samples and Associated Physical Habitat and Chemical Data for Ambient Bioassessments in California (Fetscher et al. 2009 - updated May 2010). These two parameters are key indicators in the Nutrient Numeric Endpoints framework (Tetra Tech 2006) and are measurements of stream productivity. These analyses will also aid Regional Board staff in assessing some 303(d) listed streams for nutrient impairment. Additional evidence using biological information will refine the degree of impairment and influence from non-target stressors (e.g., those peripherally associated with nutrient enrichment affecting community response).

f. Toxicity analyses - Beginning in 2012, targeted sites will also be analyzed for aquatic toxicity to the water flea, *Ceriodaphnia dubia*. Chronic toxicity will be measured as a 7-day exposure according to USEPA (2002). Sampling and analysis will follow the SMC methodology (SMC 2009) and (SMC 2007).

iii. Objective 3 – Participation in SCCWRP's Depressional Wetlands Study

The study is being conducted by the Southern California Coastal Water Research Project (SCCWRP), in coordination with several state and federal agencies, to assess the condition and stressors associated with depressional wetlands throughout southern California. Freshwater depressional wetlands comprise approximately 45% of the State's 3.6 million acres of wetlands (Sutula et al. 2008). One of Region 8's basin planning priorities has been to revise our Basin Plan narrative section on wetlands, as well as to develop criteria for wetlands mitigation. Similarly, one of the State Board's priorities has been to develop a wetlands protection policy. This study will provide the indicators that will help assess the condition and stressors associated with beneficial uses in depressional wetlands, and potentially could be adopted or modified for other regions of the State.

During the first year of the study (spring/summer 2011) indicators are being evaluated and refined using a small set of wetlands along a disturbance gradient. The indicators include macroinvertebrates, algae, and a visual assessment of habitat condition called the California Rapid Assessment Method (CRAM). During the second year of the study (spring/summer 2012) SCCWRP will use the refined indicators (plus sediment toxicity and chemistry) on a larger scale in order to evaluate depressional wetlands throughout the region.

Region 8, in coordination with other southern California regions (i.e., Region 4 and 9), is contributing funds to this study beginning in FY11/12. CSULB staff will also receive training on the final protocol during spring 2012. Depending on SWAMP funding levels, Region 8 will provide funding in future years to assess the condition and stressors associated with depressional wetlands within our region.

iv. Objective 4 – Coordination of Monitoring Efforts

One of the main objectives of the 2010 SWAMP Strategy (SWAMP 2010) is to improve coordination of monitoring among Water Board programs as well as to improve coordination among other state agencies, local agencies and districts, and non-governmental organizations that monitor surface water throughout the state. To this end, Region 8 participates in the Stormwater Monitoring Coalition's (SMC) regional

monitoring program that characterizes the health of the Southern Californian freshwater streams. Region 8 also participates in the depressional wetlands technical advisory committee and will fund work in our region in summer 2012 and future years, depending on funding.

As for internal coordination among Region 8's various programs, Region 8's focus over the next two years will be to review historical monitoring data and current TMDL and stormwater annual reports, as well as NPDES discharger reports to determine the location of monitored sites, constituents monitored, and the frequency of monitoring. Region 8 staff will compile the information for each waterbody and will use the State's Listing Policy (2004) to assess water bodies. This policy establishes a standardized approach for developing California's section 303(d) list.

5. Quality Assurance

Data collection and subsequent processing and testing under this 2-year workplan will be performed according to the most recent version of the SWAMP Quality Assurance Program Plan (QAPrP), SWAMP Bioassessment SOPs, SMC QAPP (SMC 2009), SEAL Laboratory SOPs and SEAL's QAPP (2010). SEAL's 2010 QAPP will be revised to include additional parameters such as metals and toxicity and incorporate the change in monitoring design from probabilistic to targeted.

Summary of QAQC activities performed by SEAL, details can be found in the QAPP (2010).

Field Protocols

Internal Training and QC: All field personnel participate in training sessions the first week of May before a given field season. This training includes completing the field forms, using the equipment, and an inter-team calibration where several teams collect data on the same transects and their results are compared and adjusted in the field. At the completion of a site, a designed field form QC person checks the field forms for completeness.

External QC: Each year the senior field personnel participate in the interlab calibration excercies hosted by SCCWRP for the SMC project. This includes collecting data along replicate transects with field crews from other labs and comparing the data.

Laboratory Protocols

All lab personnel must undergo training and pass internal QC in order to be qualified to pick and identify specimens. All sites are QC'd for 95% picking completeness; any site that fails this QC is repicked until it passes. All taxonomy undergoes internal QC at a rate of 95%. Ten percent of all sites are sent to Aquatic Bioassessment Laboratories (Chico State) for external taxonomy QC.

6. Reports

All data, including applicable QA/QC data, will be electronically submitted to the SWAMP database using the standard formats for the 2.5 SWAMP database as specified by the SWAMP Information Management Plan. CRAM data will be submitted to the CRAM database (eCRAM).

The data collected during this program will be used to compose watershed assessment reports, the 305 (b) Report and ultimately the 303 (d) List, as well as preparing results (manuscripts) for submittal to peer-reviewed scientific journals. Data are expected to be available for the 2014 and 2016 integrated 305(b)/303(d) report cycle.

CSULB will prepare a summary report for both years 2012 and 2013, summarizing the IBI scores and other water quality data. These data will be used to determine the quality of water and surrounding riparian habitat of these waterbodies.

All reports will be available on the SWAMP website under Region 8 reports.

7. Project Schedule

The project schedule for 2012 work conducted by SEAL at CSULB for the bioassessment work of Region 8's wadeable streams and rivers is as follows:

Deliverable	Deadline
Summary of sites sampled	August 1, 2012
Chemistry data submitted to the SWAMP database	October 1, 2012
SMC-related chemistry/toxics data submitted to the SWAMP database	November 1, 2012
BMI samples Level II identifications completed	December 1, 2012
BMI samples sent to ABL for taxonomy QC	January 1, 2013
Draft report submitted to Region 8	March 1, 2013
Final report submitted to Region 8	March 31, 2013

The project schedule for 2013 work conducted by SEAL at CSULB for the bioassessment work of Region 8's wadeable streams and rivers is as follows:

Deliverable	Deadline
Summary of sites sampled	August 1, 2013
Chemistry data submitted to the SWAMP database	October 1, 2013
SMC-related chemistry/toxics data submitted to the SWAMP database	November 1, 2013
BMI samples Level II identifications completed	December 1, 2013
BMI samples sent to ABL for taxonomy QC	January 1, 2014
Draft report submitted to Region 8	March 1, 2014
Final report submitted to Region 8	March 31, 2014

The project schedule for the depressional wetlands work is dependent on a partner agency (SCCWRP) and is anticipated to proceed on the following schedule:

Deliverable	Deadline
Draft protocols and sampling design for 2012	May 2012
Training of CSULB staff on sampling protocol for 2012 sampling	June 2012
2012 sampling of Region 8 sites	October 2012
Submission of data to database (TBD)	October 2013

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