

Appendix E

Bioassessment Summary and Resources

Bioassessment is a method of evaluating the structure of a biological community (e.g., invertebrates, fish, and algae) in a **receiving water** body to determine its ecological condition, compared to an applicable reference condition. Bioassessments have been conducted for decades in many states, and more recently have gained popularity in California as indicators of ecological condition in **wadeable streams**. Specifically, **benthic macroinvertebrate** bioassessments are currently conducted in California by the State Water Resources Control Board's (SWRCB) Surface Water Ambient Monitoring Program (SWAMP) and many Phase I municipal **stormwater** programs.

The **General Permit** requires that projects meeting all of the following requirements must conduct or participate in a benthic macroinvertebrate bioassessment of the receiving waters:

- Risk Level 3 or **Linear Underground/Overhead Projects** (LUP) Type 3 project; and
- Project disturbs more than 30 acres; and
- Project **directly discharges** runoff to a freshwater wadeable stream (or streams) that has all of the following three existing **beneficial uses**: **SPWN and COLD and MIGR**; and/or is either (a) listed by the **SWRCB** or US Environmental Protection Agency (EPA) as impaired due to **sediment** or (b) is tributary to any downstream water body that is so listed.

Projects required to conduct bioassessment monitoring must select sites upstream and downstream of the point where runoff from the construction site enters the wadeable stream. Sampling events must occur **before the start** of ground disturbing activities and **must be repeated after the completion of construction** (at least one winter season that generates runoff after project related ground disturbance has ceased).

The bioassessment includes the collection of in-stream biological data and in-stream physical habitat data.

Macroinvertebrate samples must be taken during the during the appropriate **index period**, that is the time of year most appropriate for bioassessment sampling. The index period depends upon the ecoregion. In general, the index period is in the late spring to early fall. The SWRCB maintains an index period map at:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml

Projects that begin outside of the appropriate index period for their area may qualify for a sampling exception and pay into the **SWAMP** program. The Regional Water Quality Control Board (RWQCB) must approve the sampling exception. To qualify for an exception projects must:

1. Receive **RWQCB** approval for the sampling exception.

2. Make a check payable to: Cal State Chico Foundation (SWAMP Bank Account) or San Jose State Foundation (SWAMP Bank Account) and include the Waste discharger Identification (WDID) number on the check for the amount calculated for the exempted project.
3. Send a copy of the check to the RWQCB office for the site's region.
4. Invest **\$7,500 times the number of samples required** into the SWAMP program as compensation.

Bioassessment sampling must be performed in according to the protocols identified in Appendix 5 of the General Permit covering field collection and laboratory methods, quality assurance, data reporting, and invasive species control.

Field data collection methods for macroinvertebrates

Bioassessment field data collection methods are identified in the *Reachwide Benthos (Multi-habitat) Procedure*, specified in *Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California* (Ode, 2007). Available at:

http://swamp.mpsl.mlml.calstate.edu/wp-content/uploads/2009/04/swamp_sop_bioassessment_collection_020107.pdf.

Anyone who collects fish, amphibians, or invertebrates from the waters of the state must have a California Department of Fish and Game (DFG) Scientific Collecting Permit (SCP) in their possession. The SCP can be obtained from the DFG License and Revenue Branch in Sacramento (916) 928-5849. Additional information and the SCP application can be obtained from: http://www.dfg.ca.gov/wildlife/nongame/research_permit/. For additional information on bioassessment contractors, please contact the RWQCB or a Phase I municipal stormwater program representative in your project area.

Habitat assessment methods

Concurrent with the collection of macroinvertebrates the full suite of physical habitat characteristics must be measured according to *Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California* (Ode, 2007). These requirements are summarized in the *Surface Water Ambient Monitoring Program's Stream Habitat Characterization Form – Full Version*. The most recent update, March 2009, is available at:

http://swamp.mpsl.mlml.calstate.edu/wp-content/uploads/2009/03/swamp_ba_field_data_sheets_v25_033009.pdf.

Laboratory methods

Macroinvertebrates should be identified and classified using a fixed-count of 600 organisms per sample according to the Standard Taxonomic Effort (STE) Level I of the Southwestern Association of Freshwater Invertebrate Taxonomists (SAFIT), which is available at:

http://www.safit.org/Docs/ste_list.pdf.

Only trained and professional entomologists should conduct the identification and classification of macroinvertebrates. For a list of trained professional entomologists familiar with the California STE, see <http://www.safit.org>.

Quality assurance

The bioassessment monitoring plan must include a bioassessment quality assurance (QA) plan that includes an external [QA](#) check performed by the DFG Aquatic Bioassessment Laboratory (<http://www.dfg.ca.gov/abl/>) on one sample per calendar year or 10% of the samples, whichever is greater. An alternative laboratory with equivalent of better expertise and performance may be used if approved in writing by the SWRCB staff.

The SWAMP recently released a Quality Assurance Project Plan for bioassessment monitoring, available at http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/smcqappfinal.pdf.

Sample preservation and archiving

Original samples must be archived pending the completion of QA sampling, including the external QA checks. The remaining sample after completing the recommended reanalysis must be archived and preserved for three years and must be relinquished to the SWRCB upon request. See Appendix 5 of the General Permit for additional information on archiving requirements.

Data reporting and submittal

Data must be submitted in an electronic form to the SWRCB. Standardized formats for reporting bioassessment data to the SWAMP are currently in development. All bioassessment data collected after those formats become available must be submitted using the SWAMP formats. Until those formats are available, the biological data should be submitted in Microsoft Excel ® (2000 or later) format.

Physical/habitat data must be reported using the standard format titled *SWAMP Stream Habitat Characterization Form – Full Version*, http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/fieldforms_fullversion052908.pdf.

Invasive species prevention

Special care must be taken when conducting bioassessment monitoring to prevent the introduction and spread of [aquatic](#) invasive species. In particular, to prevent the spread of the New Zealand Mudsnail, samplers conducting bioassessments must follow DFG's recommendations to prevent the spread of this invasive species. Available at: <http://www.dfg.ca.gov/invasives/mudsnail>.

Other information on aquatic invasive species is available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/ais/.

Most of the above noted references are maintained at the SWRCB's SWAMP website. These references and additional information on bioassessment are available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/.

Much of the bioassessment work and development of sampling protocols are developed and maintained by [SAFIT](#). SAFIT is a nonprofit organization of scientists and citizen volunteers collaboratively working to standardize the taxonomy of inland freshwater invertebrates in the southwest United States. SAFIT maintains the documents and tools it develops on its website: <http://www.safit.org/>.