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Standard Operating Procedures (SOP)

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Field Collection Procedures for Freshwater Streams and Rivers

Combined Benthic Macroinvertebrates and Algae

- [Collection of Field Data for Bioassessments of California Wadeable Streams: Benthic Macroinvertebrates, Algae, and Physical Habitat](#) (May 2016) - These documents are the combination of previous versions of the SOP's for both benthic macroinvertebrate and algae with the addition of the supplemental guidance document. These are the standard procedures designed to support general assessment of the ecological condition of wadeable streams and rivers based on the composition of the benthic macroinvertebrate and benthic algal assemblages. The procedures also produce standardized measurements of instream and riparian habitat and ambient water chemistry to support interpretation of the biological data.
 - **Supplemental Guidance:**
 - [Supplemental Guidance Document for the SWAMP Bioassessment Field Protocol](#) (May 2016)
 - **Field Data Sheets:**
 - **NEW!** Bioassessment Field Data Sheets with Algae for the SWAMP v2.5 database are available. (Updated April 2022)
 - To request a PDF of the updated Field Data Sheets: contact [Shuka Rastegarpour](#)

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sheets with algae are no longer included in the document. Please download the most recent version of the datasheets.

Field Collection for Freshwater Wetlands

- [Standard Operating Procedures \(SOP\) for Collection of Macroinvertebrates, Benthic Algae, and Associated Physical Habitat Data in California Depressional Wetlands](#) – February 2015
A PDF document that includes standard operating procedures (SOP) for sampling the biological, chemical, and physical condition of freshwater wetlands within California. The procedures include detailed instructions on how to sample macroinvertebrate and algae assemblages, water and sediment chemistry, and physical habitat within and adjacent to the wetland
- [Wetland Bioassessment Field Data Sheet](#) – February 2015
A PDF containing field data sheets associated with the Collection of Macroinvertebrates, Benthic Algae, and Associated Physical Habitat Data in California Depressional Wetlands.

Taxonomy Procedures

- [Standard Operating Procedures for Laboratory Processing and Identification of Benthic Macroinvertebrates in California](#) (October 2012) – A PDF document that describes the full procedures of SWAMP's BMI laboratory, the Department of Fish and Wildlife Aquatic Bioassessment Laboratory (DFW-ABL), including requirements and recommendations for all laboratories performing SWAMP-comparable BMI taxonomic identifications.
 - A presentation on the SWAMP SOP for Benthic Macroinvertebrate Laboratories, presented by Melinda Woodard of the QA Team at the California Aquatic Bioassessment Workgroup (CABW) 19th Annual Meeting (November 8, 2012; 9:00 am), is available for viewing: [Video Presentation](#).
- [Standard Operating Procedures \(SOP\) for External Quality Control of Benthic Macroinvertebrate Taxonomy Data Collected for Stream Bioassessment in California](#) (July 10, 2015)
A PDF document that outlines procedures for external quality control (QC) of benthic macroinvertebrate (BMI) taxonomy data generated for SWAMP and participating SWAMP-comparable bioassessment projects. The [BMI_QC_Template](#) is populated by the original and the QC Laboratories during the external QC process and used with the BMI QC tool to calculate Measurement Quality Objectives. For information on the tool, please contact SWAMP IQ Center. An SOP for use of the BMI QC tool will soon follow.

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This document describes steps in calculating three different ecological indices used to quantify stream conditions in California based on biological and physical data. The instructions herein are provided as support for analysts requiring scores for the California Stream Condition Index (CSCI), Algal Stream Condition Index (ASCI), and the Index of Physical Integrity (IPI). Additionally, these instructions will help analysts calculate landscape-scale measures of human activity, which are used to determine if streams meet criteria to quality as reference sites.

- [Instructions for Calculating Bioassessment Indices and other Tools for Evaluating Wadeable Streams in California: The California Stream Condition Index \(CSCI\), Algal Stream Condition Index \(ASCI\), and the Index of Physical Integrity \(IPI\) December 2020](#)

California Stream Condition Index (CSCI)

The California Stream Condition Index (CSCI) is a biological index used to score the condition of BMI communities in perennial wadeable rivers and streams. Developed in 2013 to include a broader reference data set and to ensure better statewide applicability than previous regional indices, the CSCI combines two unique types of index that have traditionally been used separately: an observed-to-expected (O/E) index and a multimetric index (MMI). The CSCI is the first index to provide a consistent statewide standard for interpreting bioassessment data and is the basis of the new statewide [Biological Integrity Assessment Implementation Plan](#).

- [Bioassessment Scores Map](#)
- [CSCI Fact Sheet](#) (December 2015)
- [CSCI Technical Memo](#) (October 2015)
 - [CSCI Scientific Paper](#) (2016)
 - [Reference Scientific Paper](#) (2016)
- [Technical basis for the bioassessment scoring tool, the California Stream Condition Index](#) - presentation by Pete Ode of the California Department of Fish and Wildlife to the State Board (Jan 2013)

Algal Stream Condition Index (ASCI)

The Algal Stream Condition Indices (ASCIs) are biological scoring tools that help aquatic resource managers translate complex data about stream benthic algae into an overall measure of stream health.

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- [Physical Habitat Index Technical Memo](#) (August 2018)

Indices of Biological Integrity (IBIs)- Archived

For most assessment applications, the CSCI should be used instead of these IBIs. The documents provided below are for informational purposes only.

Prior to the CSCI, several regional indices of biological integrity (IBIs) were developed for different portions of the state. An IBI uses multiple metrics to describe the biological condition of a stream or river. Included metrics vary by biogeographical region and benchmark values are based on reference sites considered to be relatively undisturbed by human activity.

To obtain a copy of archived IBIs, please contact shuka.rastegarpour@waterboards.ca.gov

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Water is a precious resource in California, and maintaining its quality is of utmost importance to safeguard the health of the public and the environment.

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EPA Water Sense

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the authority of the California Environmental Protection Agency

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