



New Indices of Biotic Integrity for Southern California Streams Based on Algae

What is it?

SWAMP is following U.S. Environmental Protection Agency recommendations to develop multiple indicators of environmental condition. In the past, SWAMP has focused on the development of stream health indicators based on benthic macroinvertebrates (BMIs). Now SWAMP is also working to develop additional indicators based on algae, habitat, and riverine wetlands.



Picture by the Southern California Coastal Water Research Project

The algae-based indices of biotic integrity (IBIs) that were developed for southern California are based on single-assemblage metrics (either diatoms or soft-bodied algae [including cyanobacteria]) or a combination of metrics representing the two assemblages. Performance of the algae-based indices was assessed based on responsiveness to anthropogenic stress, signal-to-noise ratio, metric redundancy, and degree of indifference to natural gradients. IBIs with metrics from both diatoms and soft-bodied algae ("hybrid IBIs") performed best overall. Single-assemblage IBIs ranked lower than hybrid IBIs but may be considered sufficient for routine monitoring applications. Although the algae indices were developed for southern California, studies will be conducted to determine whether these indices are appropriate for use in other parts of the state.

The development of the algae-based IBIs was a collaborative effort between the Southern California Coastal Water Research Project, California State University San Marcos, University of Colorado, California Department of Fish and Wildlife, SWAMP, and the San Diego Water Board, with funding from the State Water Board.

Why is it important?

This expanded set of indicators will help California better protect the biological integrity of streams by providing multiple lines of evidence. Algal indicators are among the most promising of the new indicators because they provide information that is different from but complementary to BMI assemblages. Algae directly respond to nutrients, one of the major types of stressors in California's stream systems. Since algae assemblages usually respond to environmental stress faster than BMIs, algae are good indicators of short-term environmental stress.

How will this information be used?

The new algae-based IBIs can be used for assessing stream health in southern California. Together with BMIs, stream health can now be assessed using multiple lines of evidence. The new indices will help decision-makers make informed management decision to better protect and restore California's water resources.

For more information:

- The new algae-based indices have been published in a scientific journal:
 - *Fetscher, A.E., Stancheva, R., Kociolek, J.P., Sheath, R.G., Stein, E.D., Mazor, R.D., Ode, P.R., and Busse, L.B. 2013: Development and comparison of stream indices of biotic integrity using diatoms vs. non-diatom algae vs. a combination. J. Appl. Phycol., published online 11 August 2013.*
- Read the abstract on the [Springer](#) website.
- Contact Lilian Busse (Lilian.Busse@waterboards.ca.gov, or 858-736-7332).