SWAMP
Surface Water
Ambient Monitoring
Program

ALGAE AS A SECOND INDICATOR FOR ECOLOGICAL HEALTH: INFRASTRUCTURE AND TOOL DEVELOPMENT

What is it?

The SWAMP strategy seeks to follow USEPA recommendations to develop multiple indicators of biological condition. In the past, SWAMP has focused most of its effort and resources on the development of indicators based on benthic macroinvertebrates (BMI). Now SWAMP is also working to develop the capacity to assess ecological condition with algae, habitat, and riverine wetland indicators. As primary producers, algae directly respond to nutrients, one of the major stressors in California's ecosystems. Also, algae assemblages can be used not only to assess overall impairment but also to diagnose certain stressors (e.g. nutrient, organic enrichment). In addition, algae assemblages usually respond faster to environmental stress than BMIs. For these reasons, the SWAMP program has been funding development of algal indicators since 2008.
In 2008, SWAMP funded the development of a guidance document (the "Algae Plan") that established a detailed road map for achieving robust and consistent algae bioassessment in California. The Algae Plan recommends a structured and standardized approach to algal bioassessment. The SWAMP algae program was designed to take advantage of the infrastructure that had already been developed for the BMI bioassessment (including physical habitat) program. SWAMP is currently focusing its efforts on the development of tools and infrastructure of the SWAMP's algae program. Tools and infrastructure will be developed for field sampling, and lab and data analysis.

For field sampling, the algae field sampling, standard operating procedures were finalized in 2009 and training for field sampling was conducted 2010. The method calibration study for field sampling is currently being finalized. For the lab analysis, SWAMP partnered with the State Water Board's Training Academy to sponsor a training session on laboratory processing and

quantification of soft algae and diatoms. In addition, taxonomic infrastructure for diatoms and soft algae was developed: (1) Algae Taxonomy Group and its website, and (2) Taxonomic master lists. For the development of the data analysis tools (e.g. indices and metrics), SWAMP collected over 200 diatom and soft algae samples under statewide and regional monitoring programs. An update on the tools and infrastructure of SWAMP's algae program was presented at the 2011 California Aquatic Bioassessment Workshop. In 2012, SWAMP is focusing on standard operating procedures for quality assurance and data management tools for SWAMP's algae program.

Why is it important?

Algae are known to be very powerful indicators of ecological health, and the inclusion of algae into SWAMP's bioassessment program will help California to protect and restore biological health based on multiple lines of evidence. Algal indicators are one of the most promising of the new indicators because they provide different and complementary information to BMI assemblages. Standardized infrastructure and tools will ensure consistency among users. The incorporation of algae as a second indicator of ecological health will improve the understanding of the condition of the waterbodies in California, and will help to develop stewardship of California's water resources.

How will this information be used?

The tools and infrastructure will be used by SWAMP as well as other regulatory and non-regulatory programs at the State Water Board (e.g. stormwater program, and 401 water quality certification). It will be also used by other state agencies, as well as by the regulated community and non-profit organizations. Access to the tools and infrastructure will be available through SWAMP's statewide website.