SWAMP
Surface Water
Ambient Monitoring
Program

PERENNIAL STREAMS ASSESSMENT (PSA) EIGHT-YEAR REPORT

What is it?

The Surface Water Ambient Monitoring Program (SWAMP) has completed 12 years of statewide probability surveys to assess the biological, physical and chemical condition of perennial streams (streams that flow year-round) in California. In October 2011, SWAMP released a report that synthesized results from the first 8 years of these surveys. Titled "Ecological Condition Assessments of California's Perennial Wadeable Streams: Highlights from the Surface Water Ambient Monitoring Program's Perennial Streams Assessment (PSA) (2000-2007)", the report is based on data compiled from several state and federal programs and represents a coordinated effort between SWAMP, the State Water Board's Non-Point Source (NPS) Pollution Control Program, the U.S. EPA's Environmental Monitoring and Assessment Program (EMAP) and California Department of Fish and Game.

Monitoring all of California's estimated 42,000 stream miles is impossible, so the PSA program utilizes a probabilistic sampling design in which a set of randomly selected sites represents the entire perennial stream length in California. Once sampled, randomly selected sites are scored against reference sites that have minimal human disturbance and thereby set the benchmark for expected biological condition. This scientific monitoring approach, similar to "Gallup" polls that estimate the opinion of a large population of people by questioning relatively few individuals. It provides a statistically robust and unbiased estimate of the condition of all perennial streams throughout California.

One of the primary tools utilized by PSA is bioassessment, a water quality monitoring method that uses resident aquatic organisms (such as fish, insects or algae) as indicators of biological health. The PSA program uses benthic macroinvertebrates (BMIs), bottom-dwelling animals with no backbone (often insect larvae) large enough to be seen by the naked eye. BMIs have well-known

responses to human-caused alterations in stream chemistry and physical habitat condition and provide a direct measure of how well a stream supports aquatic life. The PSA program also conducts assessments of physical habitat and water chemistry conditions at sites, for example by using measures of riparian vegetation and in-stream habitat diversity, and by taking water samples for laboratory analysis of selected nutrients, metals, salinity, suspended solids, etc..

Four major NPS program management questions were the focus of the PSA Eight-Year Report:

1. What is the overall condition of California's streams?
2. Are stream conditions changing over time?
3. What is the relative condition of streams draining agricultural, urban and forested regions?
4. Which non-point stressors (e.g., urban land use or road density in a watershed) have the strongest associations with biological condition?

The results of the study showed:

- Fifty percent of California's total stream length appears to be in "good" biological condition.
- There was no detectable change in the biological condition of California's perennial streams during the eight-year survey.
- All streams that drain agricultural and urban landscapes had "degraded" or "very degraded" biological condition. About 30% of streams draining forested landscapes had "degraded" biological condition.
- Poor in-stream habitat, such as excess siltation; and poor water quality such as excess nutrients, was strongly associated with degraded biological conditions in agricultural and urban streams, but were also present at a large percentage of forested streams statewide.

Why is it important?

The PSA Eight-Year Report provides an integrative, ecology-based assessment of the overall health of streams in California. The scientific analyses that underpin the report are key to understanding whether streams in California support intact ecosystems with fully functioning and diverse communities of native plants and animals. Streams in good ecological condition also support beneficial uses that are important for human health and recreation including clean drinking water

supply, healthy fish stocks and clean places where people can swim. When beneficial aquatic life uses are not met, results from PSA help identify which stressors are most strongly associated with poor biological condition and which stressors have the greatest extent (are most common) at both statewide and regional scales. The increased risk of biological impairment associated with the presence of a particular stressor, known as relative risk, can be used to rank the importance of different chemical and physical disturbances affecting stream condition. Stressors that are most common in the landscape and whose effects on stream biota are potentially severe should be a primary focus for remediation when BMI assemblages are found in poor condition.

How will the information be used?

Results described in the PSA Eight-Year Report provide an unbiased perspective on which types of land use pose the biggest threats to aquatic life condition at both statewide and regional levels. This information is vital for setting priorities for protection of streams and watersheds against diffuse sources of pollution such as urbanization and agricultural development as California's population continues to grow. PSA data were used in development of SWAMP's 2010 305(b)/303(d) Integrated Report and will continue to support other Water Board programs including development of statewide biological objectives, the Reference Condition Monitoring Program (RCMP), NPDES permitting, NPS Pollution Control and Total Maximum Daily Loads (TMDLs). These programs rely on monitoring and assessment to provide accurate and complete identification of waterbody impairments and their associated causes. In addition, the range of values observed at randomly sampled sites for in-stream and reach-scale stressor variables, such as nutrient concentrations or riparian disturbance, can be used together with data from reference sites to put results from local restoration projects and NPDES monitoring into regional context. Together, data distributions from randomly sampled sites and minimally disturbed reference sites can be used to guide the establishment of meaningful and objective restoration targets for NPS projects and to evaluate the success of restoration efforts. BMI responses to in-stream stressors, such as increased nutrient loads or increased fine sediment, can also be used to guide the establishment of biology-based thresholds that may be more protective of stream condition than current water quality criteria based on other factors. Now in its 13th year, data from PSA continues to provide critical trend monitoring of stream conditions in California over time and

provides a solid baseline for future trend monitoring. All PSA data will be incorporated into the California Environmental Data Exchange Network (CEDEN) for use by the other agencies and the public.

To read the report, click here.

Four short management memos were developed from the report to provide management and the public with condensed versions of key results and findings.

To view the memos, click here.