

# A REGIONAL APPROACH TO EVALUATING THE BIOLOGICAL CONDITION OF SOUTHERN CALIFORNIA'S WADEABLE STREAMS



2009-2013: THE FIRST FIVE YEARS OF THE STORMWATER MONITORING COALITION'S REGIONAL MONITORING PROGRAM

## OVERVIEW

In 2009, the Southern California Stormwater Monitoring Coalition embarked on an ambitious effort to evaluate the biological condition of 4,300 miles of wadeable streams in the region's coastal watersheds. Over the ensuing five years, the coalition's participating agencies conducted extensive survey and sampling work at more than 500 randomly selected sites encompassing 15 major watersheds in California's South Coast region. Monitoring efforts that had historically been done with minimal coordination were unified around a cohesive, shared vision for the first time, generating high-quality data sets that have painted a powerful picture of regional stream condition. The SMC survey is a regional enhancement of the statewide Perennial Stream Assessment.



The mature riparian plants and biological complexity observed in upper portions of Trabuco Creek in the Santa Ana Mountains reflect a stream that is in good biological condition. 25% of wadeable stream-miles in Southern California were found to be in good condition in the five-year survey.

Caballero Creek, a channelized, algae-filled tributary to the Los Angeles River, reflects severe habitat degradation and impacts of elevated nutrient concentrations. The survey found that both types of stressors were widespread in Southern California streams.



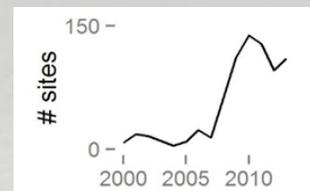
## PROGRAM BENEFITS AND IMPACTS

- **Relevant to managers:** Comprehensive data sets inform decisions about priorities and resource allocation, and identify opportunities for causal assessment follow-up studies.
- **Cost-effective:** Each participant realizes approximately 10 times the data value relative to costs.
- **More influential:** Regional collaborations provide more data to inform statewide policymaking, and highlight local concerns.
- **Conversation-altering:** Provides a starting point for developing innovative management strategies that consider and go beyond water chemistry.

## KEY FINDINGS

25% of the region's wadeable stream-miles are in good biological condition, including:

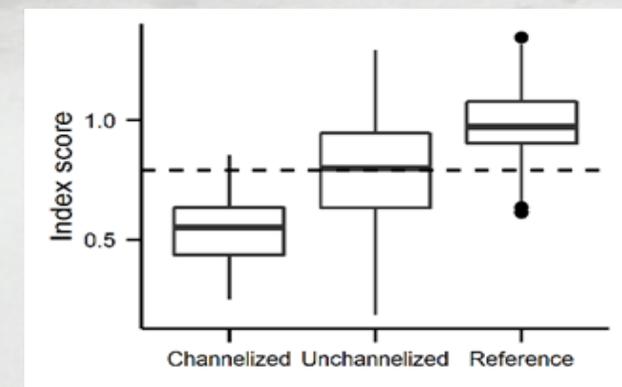
- 60% of stream-miles in open-space
- 9% in agricultural areas
- 2% in urban areas



The Regional Monitoring Program stream survey, which began in 2009, significantly increased the number of stream sites sampled in the region.

## HIGH-PRIORITY STRESSORS ON WADEABLE STREAMS

Stressors affecting more than 25% of stream-miles	Stressors affecting 10% to 25% of stream-miles
<ul style="list-style-type: none"> <li>• Nutrients (Nitrogen and Phosphorus)</li> <li>• Physical habitat degradation</li> <li>• Sulfates</li> <li>• Total dissolved solids</li> </ul>	<ul style="list-style-type: none"> <li>• Chloride</li> <li>• Total suspended solids</li> <li>• pH</li> </ul>



Index scores based on benthic macroinvertebrates were lower in channelized streams than non-channelized and reference streams; however, high scores for algal indices were observed in channelized streams where water quality was good. These findings provide a basis for regulators and stormwater agencies to discuss management strategies for channelized streams.

## FOUR ECOLOGICAL CONDITION INDICATORS

The biological condition of streams was assessed by collecting data for four biological indicators. Each indicator is sensitive to a unique combination of stream stressors, allowing it to provide different types of information about a stream's overall health. Collectively, the four indicators provide comprehensive, direct evidence of a stream's capacity to support aquatic life, a more revealing approach than measuring the chemical concentrations of pollutants.

**1 Benthic macro-invertebrates**, such as aquatic insects, snails, and worms, respond to changes in habitat or water quality over their lifespans.



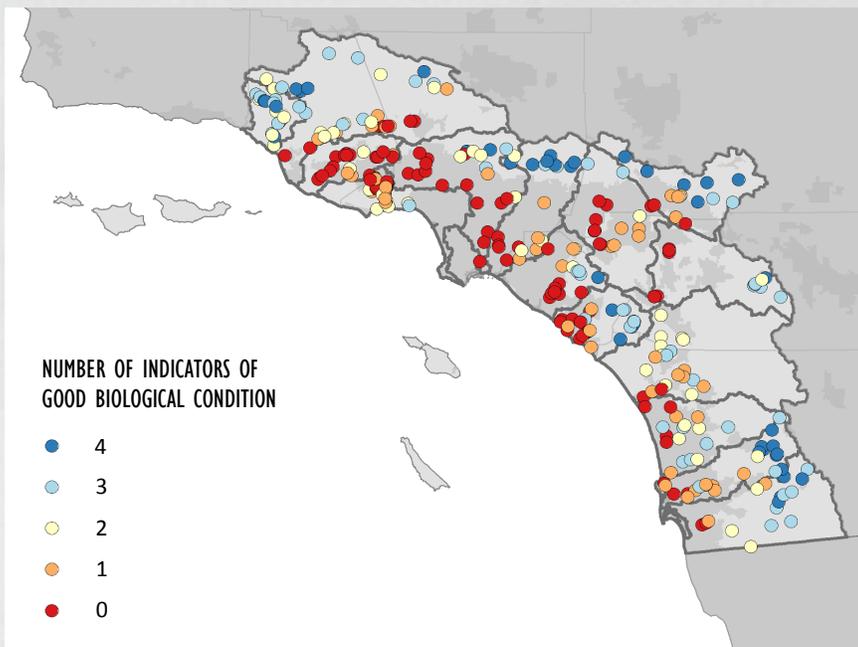
**2 Soft algae**, such as *Vaucheria*, may form clumps or filaments on submerged rocks. Some species proliferate when nutrients are elevated, while others thrive when nutrients are scarce.



**3 Diatoms**, such as *Navicula*, respond strongly to changes in water chemistry and sedimentation.



**4 Riparian habitats**, which support both terrestrial and in-stream wildlife, may be degraded by habitat alteration, upstream discharges, and hydrologic modification.



At the 500+ randomly selected sampling sites in the stream survey, anywhere from 0 to all 4 biological indicators indicated that a site was in good biological condition. The four indicators – benthic macroinvertebrates, diatoms, soft algae, and riparian habitat condition – collectively were used to assess a site's biological condition.

### WATERSHEDS WITH MANY STREAMS IN GOOD CONDITION

- Ventura River
- Upper Santa Ana River
- Tijuana + Sweetwater + Otay Rivers

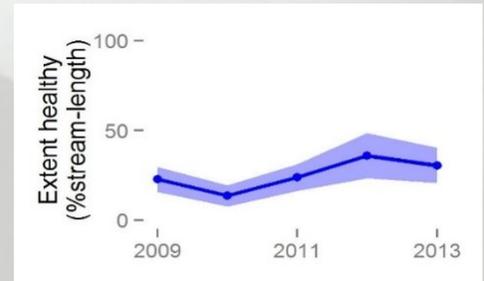
### WATERSHEDS WITH FEW STREAMS IN GOOD CONDITION

- Calleguas Creek
- Lower Santa Ana River
- San Dieguito River + Carlsbad Hydrologic Unit

## NO APPARENT TRENDS

Although there was some year-over-year variability, the survey did not find a change in the health of the streams over the five-year sampling period, from 2009 to 2013.

Urban streams tended to be in consistently poor biological condition, whereas open-space and agricultural streams tended to experience greater year-to-year variability.



The portion of healthy stream-miles fluctuated over the five-year sampling period, but overall showed no clear trends in either direction. The blue shading represents the 95% confidence interval.

## A NEW SURVEY UNDERWAY

The success of the SMC's Regional Monitoring Program has paved the way for a second round of the program, which began in spring 2015. The first five-year survey will serve as a baseline for detecting trends over time.

The second cycle includes nonperennial streams, a critical habitat that makes up more than half of the region's stream-miles, and will seek to clarify the linkage between stressors and biotic integrity.

### STORMWATER MONITORING COALITION MEMBERS

County of Los Angeles Department of Public Works, County of Orange Public Works, County of San Diego Department of Public Works, Riverside County Flood Control and Water Conservation District, San Bernardino County Flood Control District, Ventura County Watershed Protection District, City of Long Beach Public Works Department, City of Los Angeles Department of Public Works, California Regional Water Quality Control Board—Santa Ana Region, Los Angeles Region, and San Diego Region, State Water Resources Control Boards, California Department of Transportation, Southern California Coastal Water Research Project (SCCWRP). Collaborating organization: U.S. Environmental Protection Agency Office of Research and Development | [www.socalsmc.org](http://www.socalsmc.org)

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WITH THE SURFACE WATER  
AMBIENT MONITORING PROGRAM

