SWAMP
Surface Water Ambient Monitoring Program

Fact Sheet

Assessing the Health of Southern California Streams

The Stormwater Monitoring Coalition has brought together federal, state, and local agencies to assess the health of streams throughout Southern California.

Overview

There are over 4,200 miles of perennial streams in the coastal watersheds of Southern California. Effective protection and management of these resources require an understanding of their overall health (or condition) and the major stressors that affect their condition. In 2009, major municipalities and counties and their state/federal regulatory counterparts got together to conduct the first comprehensive assessment of the health of streams in Southern California. The first year of a five-year program was a great success: Over 120 sites were sampled and analyzed for biological community characteristics, chemical parameters, aquatic toxicity, and physical habitat condition.

Regional cooperation

Southern California's burgeoning population stresses coastal watersheds because of habitat alteration, flood control, water diversion, discharge of treated and industrial wastewaters, and urban or agricultural runoff. Prior to 2009, more than $4.5 million was spent each year for stream monitoring, but efforts were isolated, site-specific, and largely focused on streams with known problems. The result was a patchwork of disconnected programs that left managers unable to answer basic questions about overall stream health throughout the region. In order to address these challenges, Southern California's major stormwater

Southern California Stormwater Monitoring Coalition

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agencies and their state and federal regulatory counterparts formed the Stormwater Monitoring Coalition (SMC). Working cooperatively, the SMC created an integrated and scientifically rigorous regional monitoring program to answer three key questions:

1. **What is the condition of Southern California streams?**
2. **What stressors affect stream condition?**
3. **Is stream condition changing over time?**

Early answers

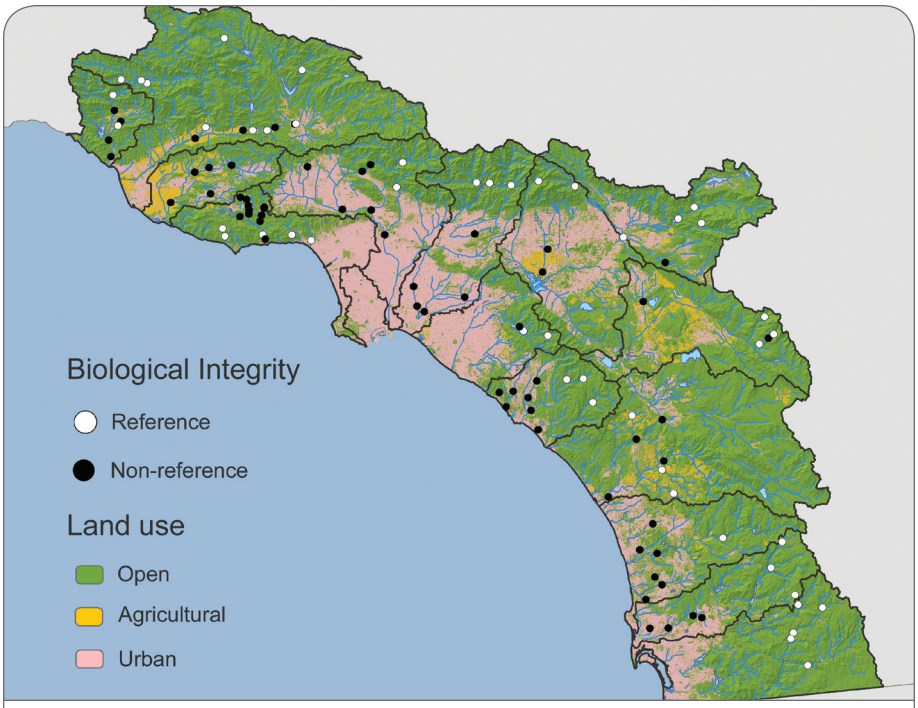
In 2009, over 120 sites were sampled by more than a dozen agencies across 15 watersheds and analyzed for biological community characteristics, chemical parameters, aquatic toxicity, and physical habitat condition. Sampling will continue for each of the next four years to obtain at least 450 total samples. This first-year summary provides preliminary answers to the first two questions.

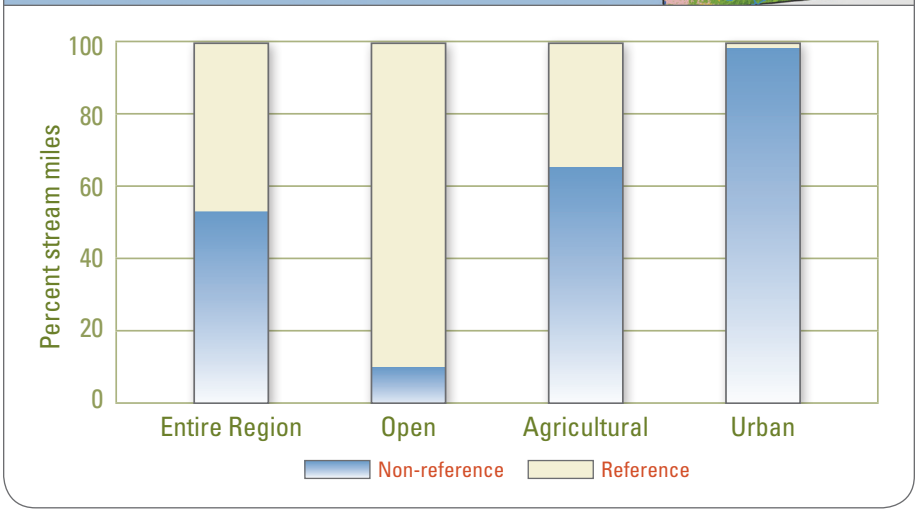
Question 1:

What is the condition of Southern California streams?

Biological indicators are a great tool for assessing stream condition because living organisms respond to many different types of stressors, such as water pollution, habitat degradation, and stream flow alteration. This first-year report focuses on stream benthic macroinvertebrates (e.g., aquatic insects, snails, and worms) as key biological indicators of stream health. In future years, algae and other aquatic organisms will also be used as indicators.

Abundance and diversity of benthic macroinvertebrates were evaluated using the Southern California Index of Biotic Integrity (IBI). The IBI is calculated from the relative abundance of different pollution-tolerant and intolerant species, and sites are scored from 0 to 100; more sensitive species results in higher IBI scores. Sites that score 40 or higher are biologically similar to those found at minimally disturbed "reference" sites.





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Across Southern California, 47% of all stream-miles were similar to reference sites. However, when broken down by land use, only 2% urban stream-miles, and 35% of agricultural stream-miles were similar to reference; in contrast, nearly all (90%) of open space stream-miles were similar to reference. Most of the sites in the best biological condition were found in the mountainous, undeveloped areas of Southern California.

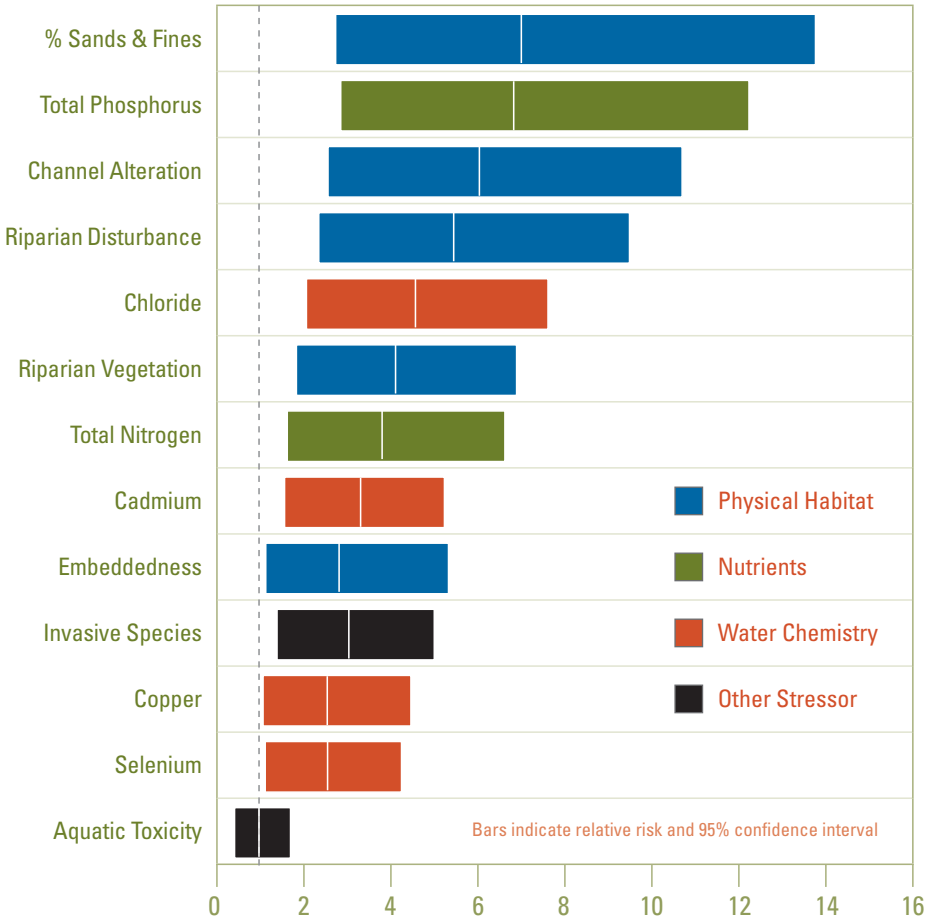
Question 2:
What stressors affect stream condition?

Identifying the specific stressors that affect a stream's biological condition is not easy or straightforward. Clearly, land use has an effect on stream condition in Southern California, but environmental managers need more information in order to prioritize mitigation and remediation efforts. The first year of this program begins to take on this challenge using a statistical method called relative risk analysis.

"Relative risk" is the likelihood of observing non-reference conditions when a stressor is present, compared to when it is absent (scores greater than 1 indicate increased risk to biological communities). Relative risk analyses show which stressors are associated with non-reference biological conditions and guides future studies to identify causes . Managers can use relative risk analyses to decide which stressors require attention, and what management actions might best protect or restore a stream.

Three of the four highest risk stressors were related to physical habitat. Complex in-stream substrate (e.g., a mixture of gravel, cobbles, and woody material), unconstrained stream beds, and a healthy riparian corridor around the stream are all associated with healthy streams. Reference biological conditions were rarely observed where the physical habitat of a stream was extensively altered from its natural state.

The chemical stressors with the highest relative risk were not the toxic substances (e.g., trace metals) traditionally regulated by state and federal agencies. In fact, more than 96% of stream-miles in Southern California met the State's regulatory standards for trace metals. Nutrients (such as phosphorus and nitrogen), which can lead to an overgrowth of algae, had higher relative risks than toxic trace metals such as copper. However, there are currently no statewide regulatory water quality objectives for phosphorus and nitrogen, and it is not known if local thresholds are broadly applicable.



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Question 3:
Is stream condition changing over time?

The third question will be answered after the fifth year of the program.

Successes and Challenges

The successes of the first year of the SMC stream monitoring program go beyond the collection of large quantities of high quality environmental data. Through the re-allocation of permit-required monitoring efforts, the SMC has developed a cooperative sampling program that is efficient and cost-effective, producing 10 times more data than each agency could afford on its own. The program provided unparalleled opportunities for collaboration with the State Water Board's Surface Water Ambient Monitoring Program, which not only reduced sampling costs, but enabled integration with key State programs. For example, conditions in Southern California streams can now be compared with those in other regions through the State Water Board's Perennial Stream Assessment. Even more importantly, the State will now use Southern California stream data to help develop biological objectives (a.k.a. biocriteria) for regulatory purposes.

Several challenges lie ahead for the regional stream monitoring program, such as developing new assessment tools for the stressors with the largest relative risks: habitat condition and nutrients. New tools will be able to connect these stressors to biological responses in invertebrate or algae communities; these tools need to work in streams with year-round or seasonal flow, in high-gradient mountain or low-gradient floodplain streams, and for soft-bottom or concrete-lined channels. The SMC program collects exactly the type of data needed to develop and refine these tools, and gives stakeholders the opportunity to understand the extent of important stressors and take part in developing appropriate management goals.

For further details on the first year of the SMC program, please refer to the Technical Report available on the SMC webpage (www.SoCalSMC.org) or email Ken Schiff at kens@sccwrp.org.

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The Stormwater Monitoring Coalition

The Southern California Stormwater Monitoring Coalition (www.SoCalSMC.org) is a consortium of 14 regulated, regulatory, and research agencies covering all of southern California. Formed in 2003, the SMC's mission is to better understand stormwater dynamics and effects at a technical level, and develop tools to support effective and efficient stormwater management decision-making. The SMC regularly funds and implements cooperative projects to improve knowledge of stormwater quality management.

Participating agencies include: Ventura County Watershed Protection District, Los Angeles County Flood Control District, Orange County Department of Public Works Watersheds Program, San Bernardino County Flood Control District, Riverside County Flood Control and Water Conservation District, San Diego County Department of Public Works, California Water Resources Control Board–Surface Water Ambient Monitoring Program, California Regional, Water Quality Control Boards–Los Angeles, Santa Ana, and San Diego Regions, Southern California Coastal Water Research Project, and Los Angeles and San Gabriel River Watersheds Council