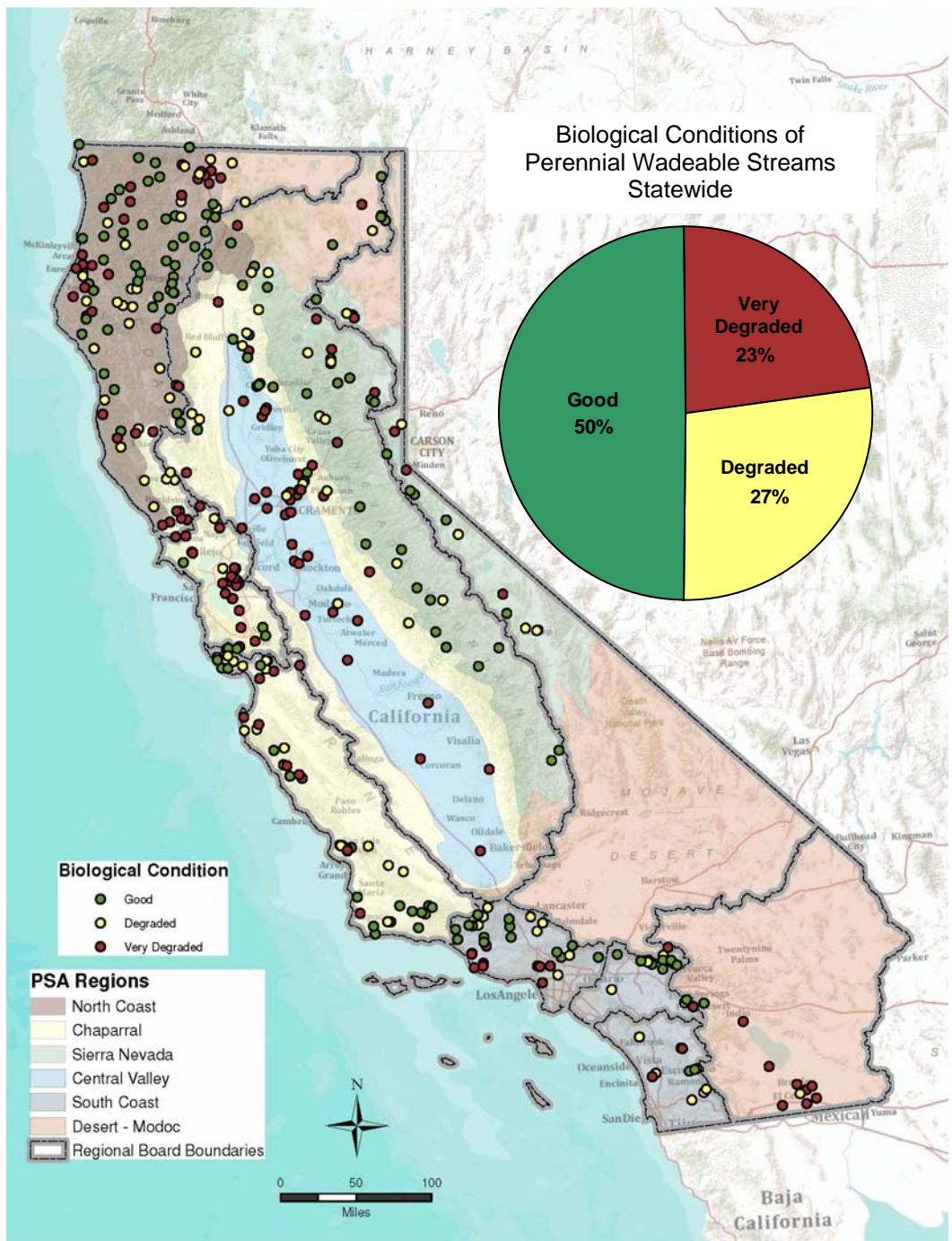


# The California Water Boards' Annual Performance Report – Fiscal Year 2010-11

## ENVIRONMENTAL INDICATOR: AQUATIC LIFE

<b>WATERBODY TYPE:</b> WADEABLE PERENNIAL STREAMS	<b>MEASURE:</b> BIOLOGICAL CONDITION OF STREAMS								
<b>MESSAGE:</b>  50% of California's wadeable perennial stream length is in "Good" condition and should be protected. 50% is in degraded condition and should be prioritized for restoration.	<table border="1"> <thead> <tr> <th colspan="2">KEY STATISTICS</th> </tr> </thead> <tbody> <tr> <td>Number of sites sampled:</td> <td>393</td> </tr> <tr> <td>Total Perennial Stream length (km)</td> <td>74,000</td> </tr> <tr> <td>Wadeable Perennial Stream Length Assessed (km)</td> <td>67,000</td> </tr> </tbody> </table>	KEY STATISTICS		Number of sites sampled:	393	Total Perennial Stream length (km)	74,000	Wadeable Perennial Stream Length Assessed (km)	67,000
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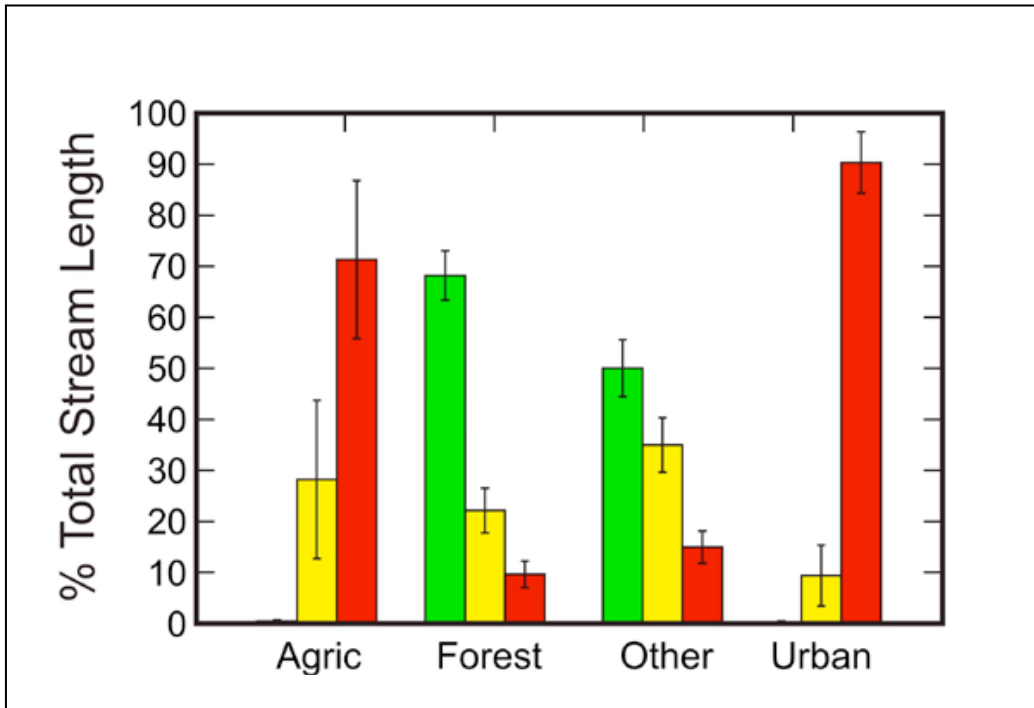


**Figure 1. The Biological Condition of Wadeable Perennial Streams in California.**

Data was collected from 2000-2007. Colored dots identify randomly sampled survey locations. Biological condition is represented as Green = good, Yellow = degraded, and Red = very degraded.

## WHAT IS THE MEASURE SHOWING?

This measure utilizes aquatic bug communities that live in wadeable perennial streams throughout California to tell us about the health of our streams. Some of these organisms are sensitive to water pollution while others are relatively tolerant. Their presence, absence and abundance in a stream can tell us about water quality, potential toxicity, and habitat condition. This measure reports on the health of wadeable perennial streams in California and their ability to support aquatic life. It estimates the percent of stream kilometers that are in good (green), degraded (yellow) and very degraded (red) condition, and correlates stream condition with land use activities. Supporting studies show that half of California's stream length is in relatively good biological condition (50%), while half is either degraded (27%) or very degraded (23%) compared to the reference, or least disturbed, sites in California. Figure 1 displays the biological condition of randomly sampled wadeable perennial stream sites across California. Figure 2 shows the effects of land use on biological condition at these same sites. Land use analysis of current data show that stream health is impaired in areas that drain agricultural and urban landscapes (Figure 2).



**Figure 2. Statewide Condition of California's Wadeable Perennial Stream Length (km), Draining Landscapes Representing Four Land Use/Cover Categories.**

Green = good condition, yellow = degraded, red = very degraded, biological condition. A high percentage of sites with very degraded biological condition and poor stream health are in areas that drain urban and agricultural landscapes.

## WHY IS THIS MEASURE IMPORTANT?

This measure utilizes bioassessment, an integrative ecology-based tool to evaluate the overall health of streams. The response of biological organisms to stream chemistry, water toxicity and physical habitat condition, gives a direct measure of how well is a stream supporting aquatic life. The probabilistic nature of the study design and the identification of "healthy" regional reference sites allow researchers to make broad estimates on the health of wadeable perennial streams statewide. In addition, the health of aquatic life, specifically bugs and algae that live in streams, are important because they are food sources for fish, frogs and other wildlife. The presence of healthy bug communities directly affects the health of animals higher up in the food chain.

The probabilistic surveys that make up the measure have produced a wealth of data that can and should be used to inform many decisions made by California's Water Resources Agencies. For example, assessments made in the 2006 California Water Quality Assessment Report (Clean Water Act Section 305(b)) were based in large part on the data from these surveys. Data from bioassessment surveys were also used in the development of the 2010 305(b)/303(d) Integrated Report.

## WHAT FACTORS INFLUENCE THE MEASURE?

The reason for the decline of aquatic life in some streams is not always apparent. Pollution, habitat degradation and other factors that stress stream systems can develop gradually over time, negatively impacting aquatic life. In many cases, multiple stressors act together. Higher water temperatures (lack of streamside vegetation and trees), lowers the amount of dissolved oxygen in water. Sediment and anthropogenic pollutants are other potential stressors that can negatively affect aquatic life. Associating the many sources of stress to stream life with land use activities is a way to understand the cause and effect of impairment. Bioassessment studies clearly show large impacts to water quality, stream biology and stream health associated with agricultural and urban land use.

Stressor	Potential Source(s) of Stressors
Land Use/ Pollution	Runoff from urban or agricultural areas; Wastewater treatment plant effluent; Storm water runoff.
Habitat degradation/ High water temperature	Low water flow; Lack of shade along stream banks; Shallow water due to sediment build-up.
Sediment (soil)	Erosion from stream banks; Runoff from urban or agricultural areas.
Low dissolved oxygen	High water temperature; Excess nutrients from erosion, runoff, or wastewater discharges.

## TECHNICAL INFORMATION

- » Data sources: Surface Water Ambient Monitoring Program (SWAMP), Perennial Streams Assessment (PSA) Period 2006-2007; California Monitoring and Assessment Program (CMAP) Period 2004-2005; US EPA Environmental Monitoring and Assessment Program (EMAP) Period 2000-2003.
- » Unit of Measure: Condition scores based on Index of Biological Integrity (IBI) scores and California Aquatic Macroinvertebrate Observed/Expected Index.
- » Poor stream condition scores likely indicate poor ecological condition. However, a stream can have a good condition score and still be in poor ecological condition.
- » More information is available in the soon to be released 8-Year PSA report and Managers Memos (Fall 2011).

## GLOSSARY

### **Wadeable Stream**

Streams, creeks and small rivers that are shallow enough to sample without boats.

### **Perennial Stream**

Streams that contain water year-round.

### **Aquatic Macroinvertebrates**

Aquatic bugs that are large enough to be seen with the naked eye.

### **Observed/Expected Index**

An observed to expected ratio is a measure of the loss of species expected under natural or reference conditions.

(Updated 9/26/2011)