

CMAP

California Monitoring and Assessment Program for Perennial Streams



Sampling Target Sites

Approximately 50 sites/year
Minimum 150 meter reach,
11 transects

Indicators

Biological:
bugs, algae, fish

Physical:
thalweg profile,
channel, and riparian
cross-section characteristics,
flow, etc.



Chemical:
field - temperature, DO conductivity
lab - including chlorophyll a, ammonia, nitrogen,
phosphorus, etc.

The California Monitoring and Assessment Program (CMAP) for wadeable perennial streams was initiated in 2004. The program builds on the Environmental Monitoring and Assessment Program–Western Pilot (EMAP-West) for inland surface waters implemented in California from 1999 through 2003. The objective of the EMAP-West program was to demonstrate an integrated comprehensive monitoring program within the western states to

assess the condition of perennially flowing rivers and streams using a survey-based (probabilistic) monitoring approach. Approximately 50 probabilistic sites were sampled per year. The original design included a base statewide study and two special interest areas in southern coastal and northern coastal California.

The current state effort will be used to:

- Provide a framework for producing statistically valid assessments of condition for perennial streams in California, and
- Develop tools to facilitate these assessments, and
- Evaluate associations between observed effects and nonpoint source land use categories.

Management Questions

- What is the quality of water in California? Is water quality getting better or worse?
- What is the extent of impairments associated with nonpoint sources?
- What are the nonpoint sources that are impairing or threatening water quality?
- Are we investing nonpoint source resources in the right places?
- How effective are clean water projects and programs?

CMAP

Builds on EMAP-West 1999-2003
Samples ~50 stations per year
Designed as a 5-year study
Incorporates broad land-use classes (agricultural, urban, forested, other)

Trends in Stream Condition

- Based on health of benthic assemblage:
- Requires consistent monitoring over time.
 - Based on a rolling average.

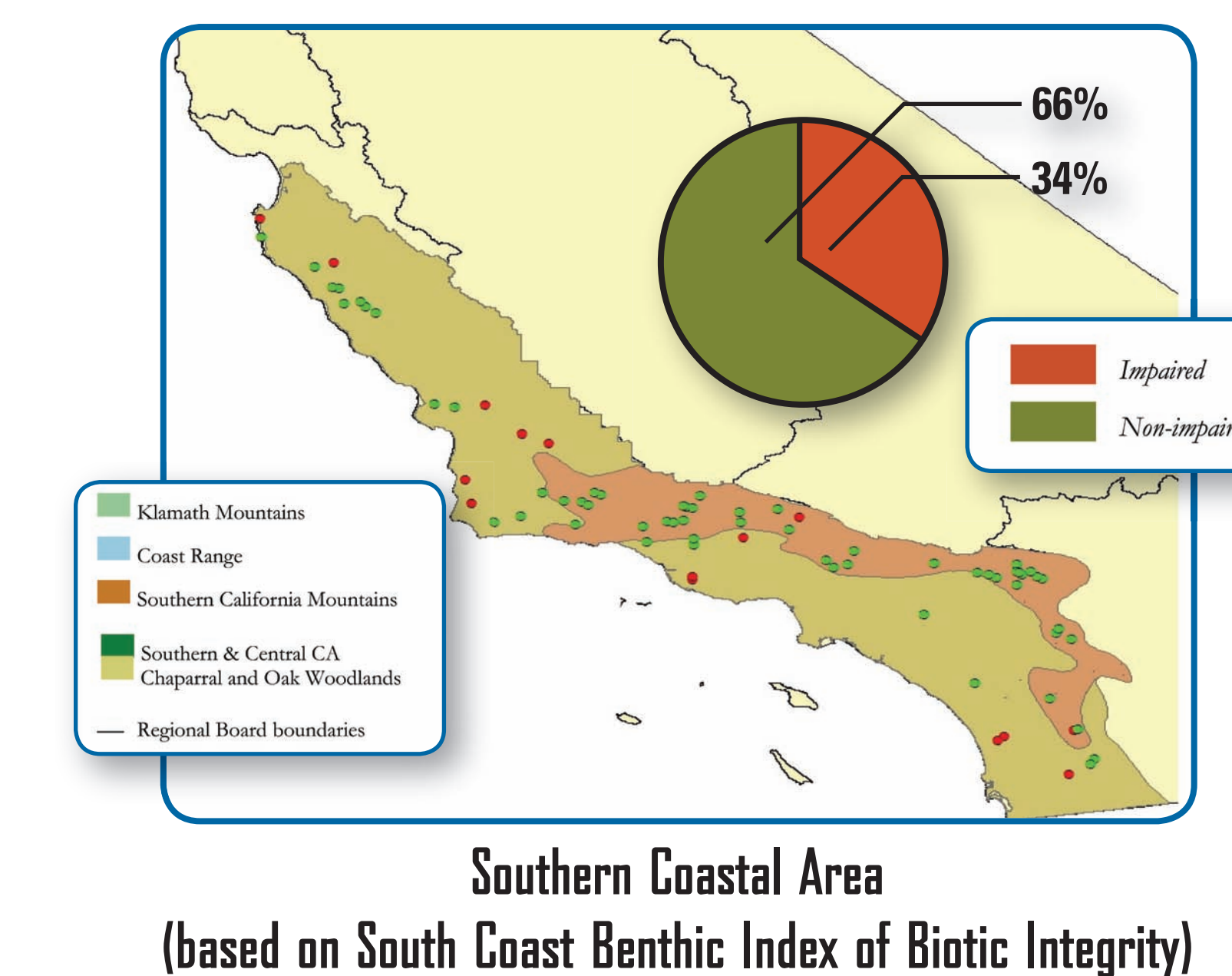
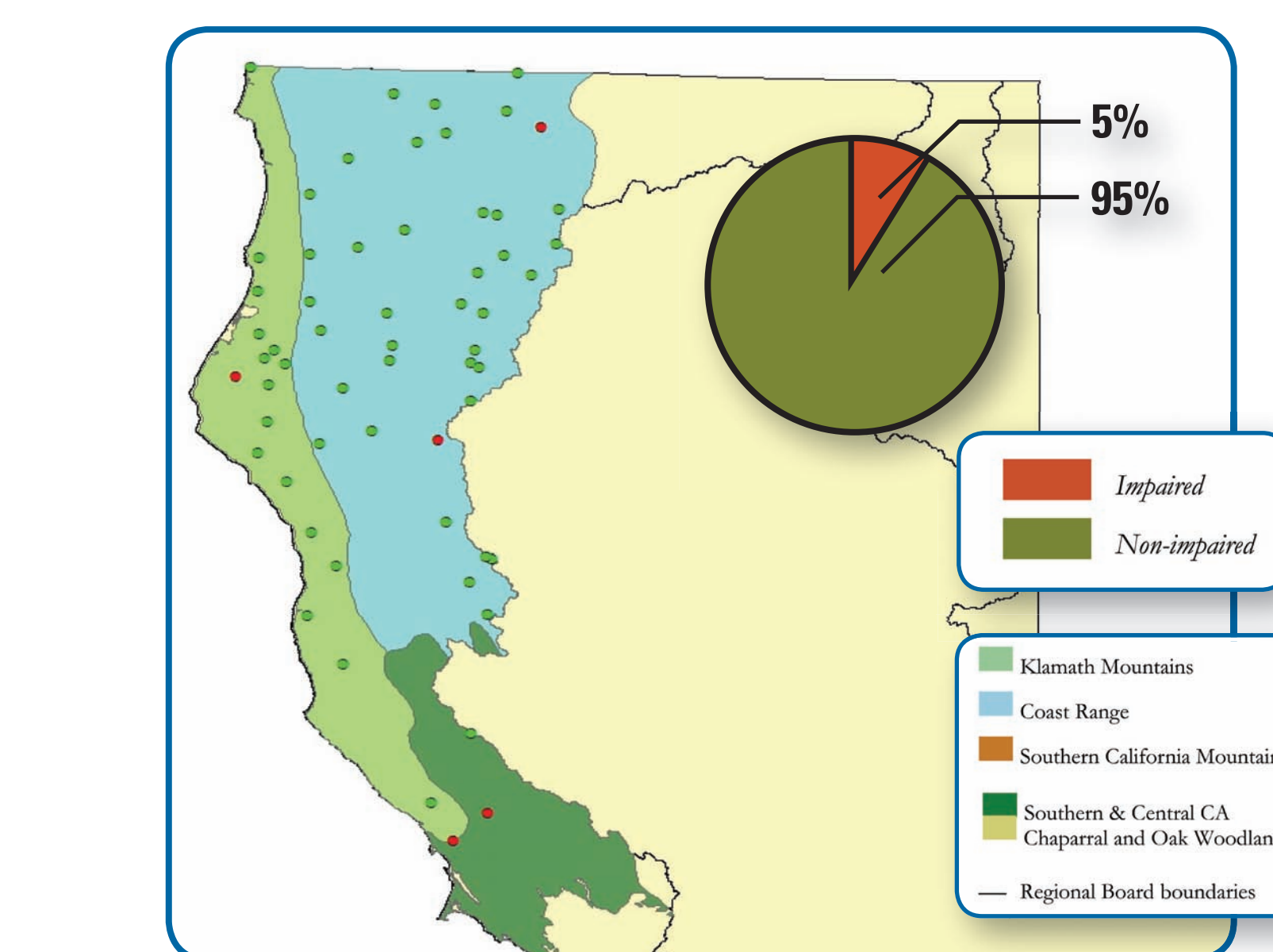
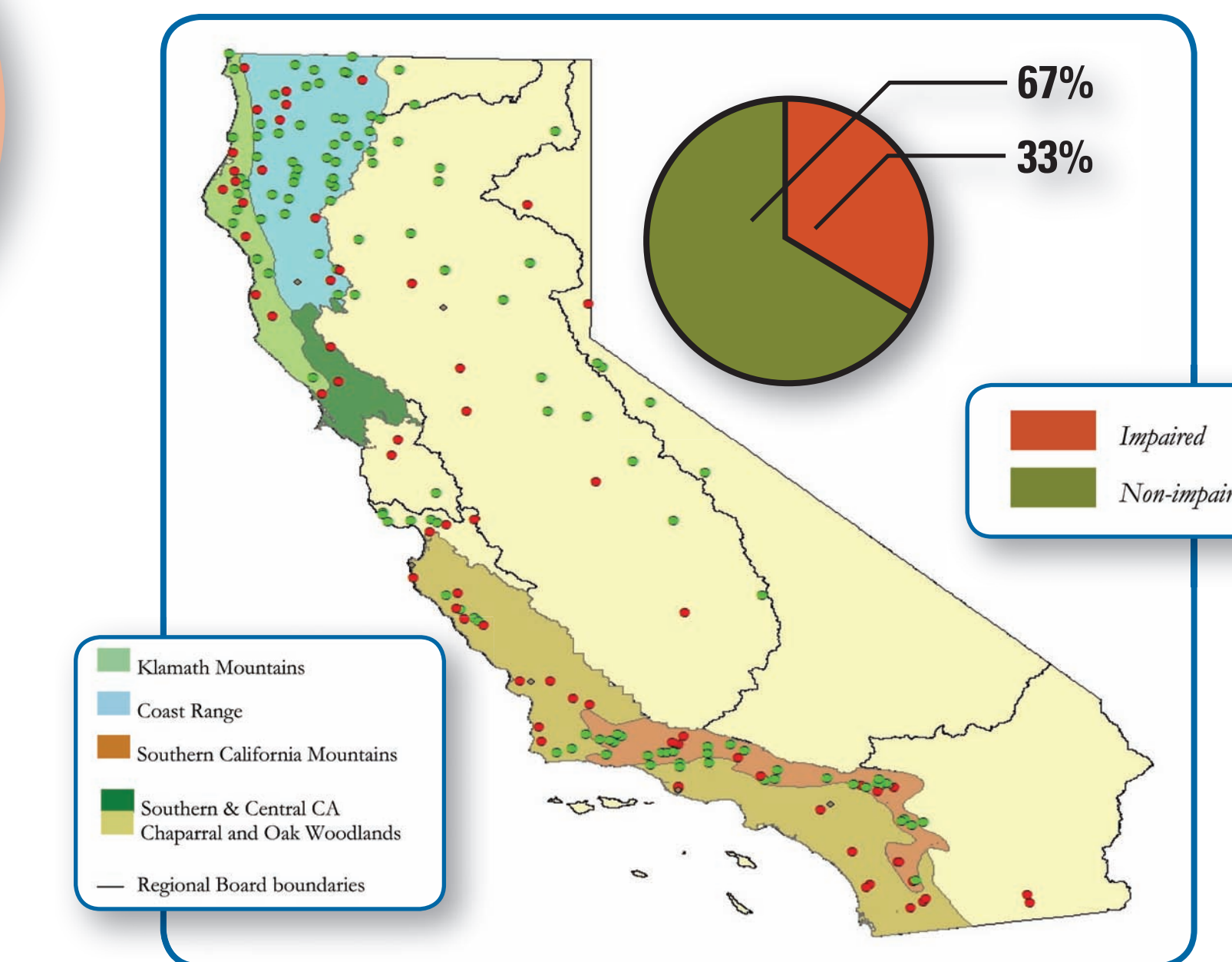
Environmental Protection Indicators for California (EPIC)

The California Water Boards are part of the California Environmental Protection Agency (Cal/EPA). Cal/EPA has adopted environmental protection indicators for California (EPIC) as one means for judging the effectiveness of the state's environmental protection programs through measurable environmental results.

Aquatic life use assessment is one of the EPIC indicators for water quality. Current assessments cannot be used for valid trend analysis at the statewide level because results are more likely to reflect changes in approach to completing the assessment and the availability of monitoring data than actual improvements or degradation of water quality. Assessments from CMAP may provide an alternative EPIC indicator for year-to-year comparisons.

Condition Assessments

The probability-based design, in conjunction with the indices, can be used to provide estimates of condition. Historical EMAP-West data were analyzed to produce the following baseline condition assessments of wadeable perennial streams in California based on benthic macroinvertebrate indices.



Next Steps

- Integrating supplemental sample of modified channels into original design.
- Improving links to nonpoint source classes.
 - Developing tolerance values.
 - Associating biotic condition with timber harvest activities.
 - Associating biotic condition with urban and agricultural stressors in Central Valley streams.
- Exploring multiple indicators.
- Linking state and regional questions.
- Improving site access.

Resource Reports

The following reports are available at [<http://www.waterboards.ca.gov/swamp/reports.html>].

CDFG-ABL. 2004. *Condition Assessment of Coastal Streams in Southern and Central California*. Draft technical report.

Ode, P.R. and Rehn, A.C. 2005. *Probabilistic Assessment of the Biotic Condition of Perennial Streams and Rivers in California*. Draft technical report.

Rehn, A.C. and Ode, P.R. 2005. *Development of a Benthic Index of Biotic Integrity (B-IBI) for Wadeable Streams in Northern Coastal California and Its Application to Regional 305(b) Assessment*. Draft technical report.

Definitions

Probability-based survey design: a statistical approach wherein a subset of all waters are sampled, and the results are used to make estimates about the population with a known level of uncertainty.

Index of biotic integrity (IBI): a multi-metric index where the total score is the sum of scores for a variety of individual measures, or metrics, that make up the key characteristics of biotic integrity.

Observed/expected index (O/E): a measure of the proportion of taxa observed that should have been collected. "O" refers to the number of taxa predicted to occur that are actually present, and "E" is the number of native taxa expected to occur at a site in the absence of human caused stress. The California O/E index was developed by Hawkins (unpublished).

PARTICIPATING AGENCIES:

