Regional stream monitoring in Southern California:

First-year results from the SMC monitoring program

Presentation to CABW
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San Gabriel River headwaters

Bio-objectives are coming

Biological thresholds for streams will be implemented within 3 years

Why does the State need them?

- Integrate mutliple impacts
- Directly related to beneficial uses
- Improve consistency 303d listings across state

Biological data provide a consistent, rational, and meaningful basis for watershed management

Regionalized Watershed Monitoring Makes Sense

- Place your site(s) in context
- Regional reference condition
- Help to develop regional tools
- Improves your agency's capabilities, broadens skill base
- Cost-leveraging
- Data sharing
- Drive statewide programs (e.g., bio-objectives)

Regional Monitoring Partners

Stormwater Monitoring Coalition members

Stormwater agencies:

Ventura Co WPD
Los Angeles Co FCD
Los Angeles Co Sanitation
OC Public Works
Riverside County FCD
San Bernardino FCD
San Diego Co-Permittees
City of Los Angeles FCD

Regulatory agencies:

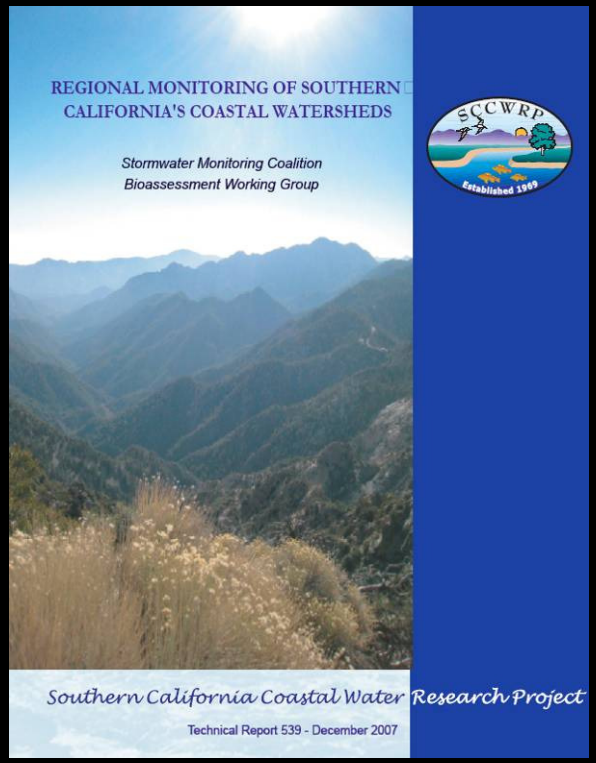
State Water Resources Control Board
LA Regional Water Quality Control Board
Santa Ana Regional Water Quality Control Board
San Diego Regional Water Quality Control Board
Environmental Protection Agency Region IX
California Department of Fish and Game

Goals for Program

Three questions:

1. What is the condition of streams in our region?
   - Land use?
   - Watershed?
2. What are the stressors that affect stream condition?
3. Are conditions getting better or worse?

Design of Program



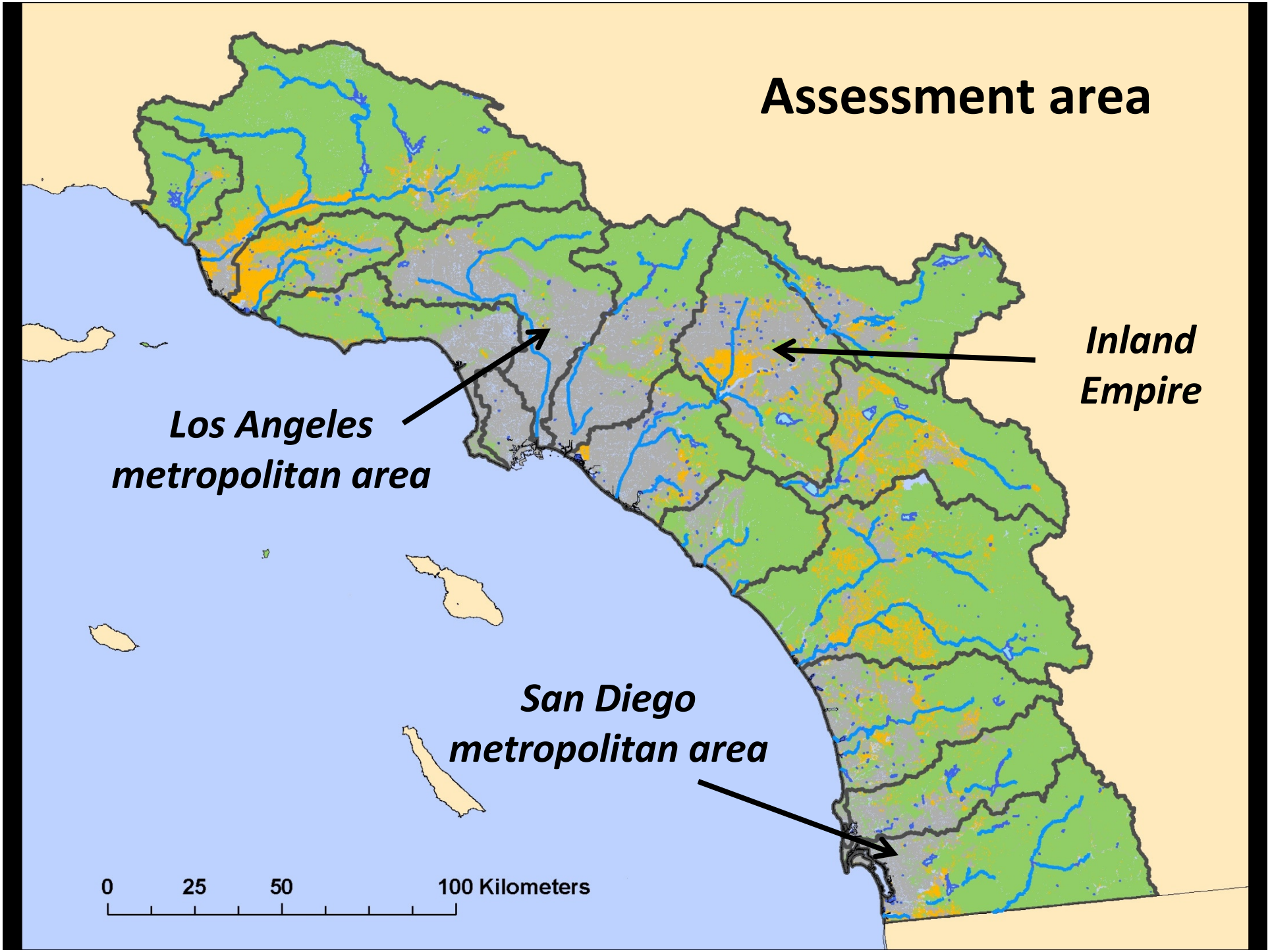
Workplan available at www.SCCWRP.org

Indicators:

- benthic macroinvertebrates
- benthic algae (soft and diatoms)
- riparian wetlands (CRAM)
- water chemistry
- water toxicity (*Ceriodaphnia*)
- physical habitat

15 watersheds stratified across land use (urban, agricultural, and open) and stream order.

450 sites over 5 years (90/year).


Assessment area
Inland Empire
Los Angeles metropolitan area
San Diego metropolitan area
0
25
50
100 Kilometers

Sampling summary

Land use	Intended #	Sampled #
Agricultural	24	23
Open	37	48
Urban	29	50
TOTAL	*90*	*121*

Agricultural

San Pasqual Valley

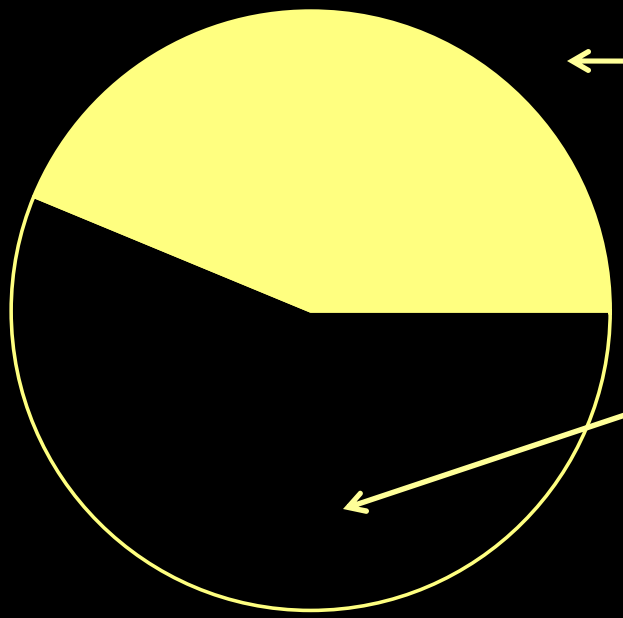
Open

Pine Valley Creek

Urban

Fullerton Creek

Extent of Survey

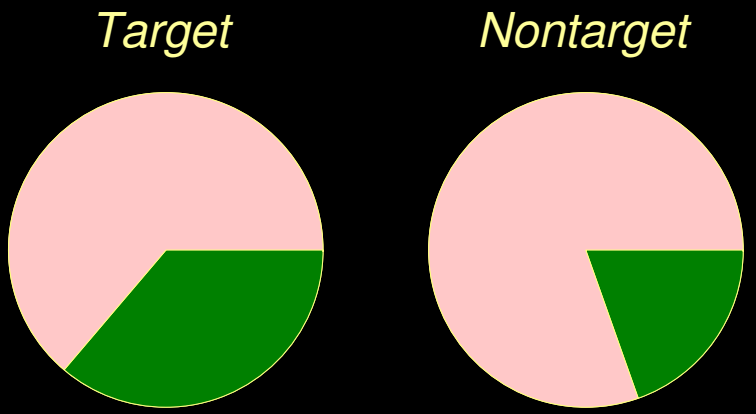


Perennial, wadeable streams (3200 km)

Nontarget streams (4100 km)

>90% nonperennial

*The majority of the region is **excluded** from the survey!*



First Results

We confirmed some expectations

- Physical habitat

Other results surprised us

- Contaminants (copper, zinc)

We learned many new things

- Biology, nutrients, pyrethroids

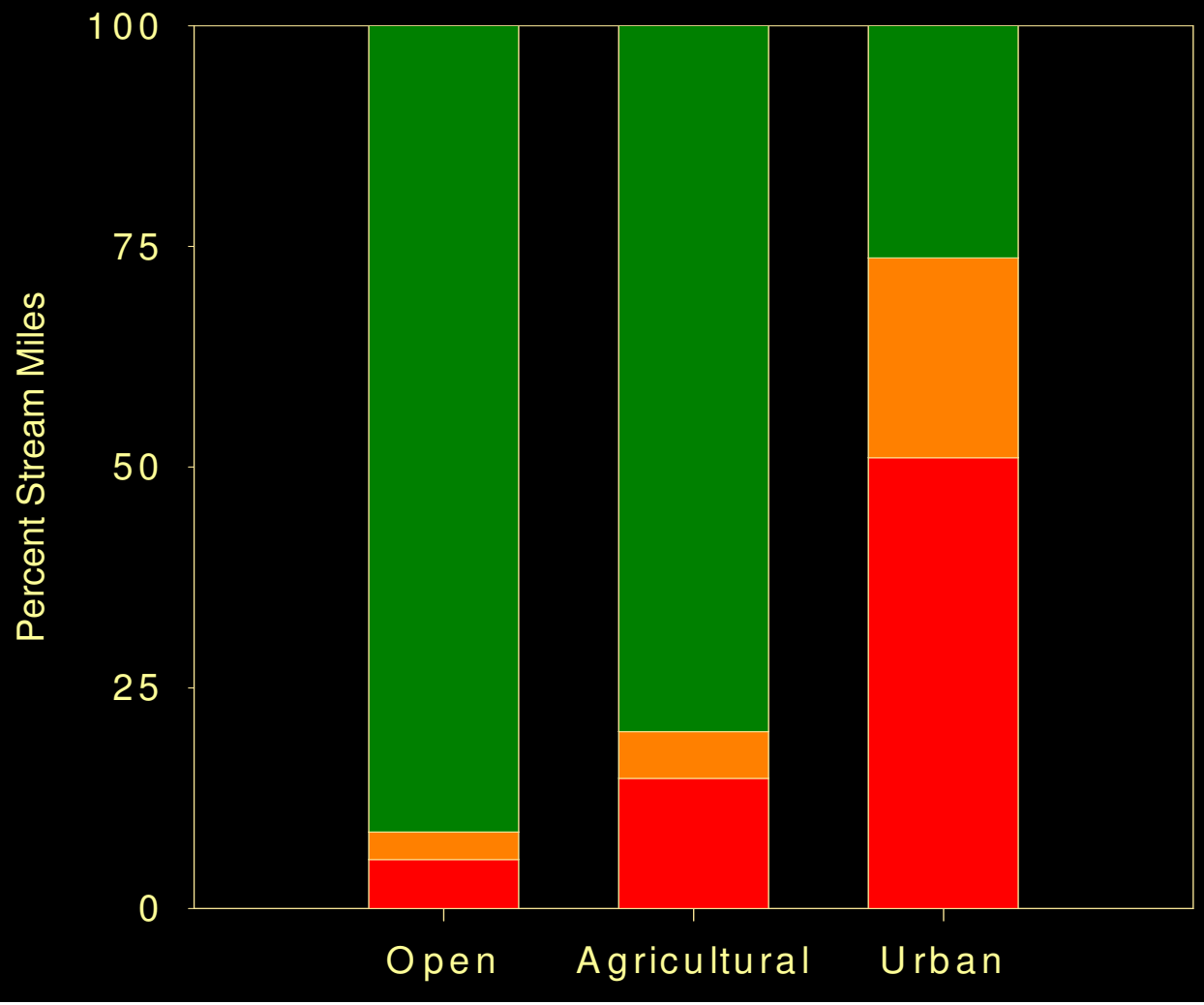
Q1: Stream Condition
Physical habitat: channel alteration

Minimal alteration

Cooper Canyon

Severe alteration

Fullerton Creek



First Results

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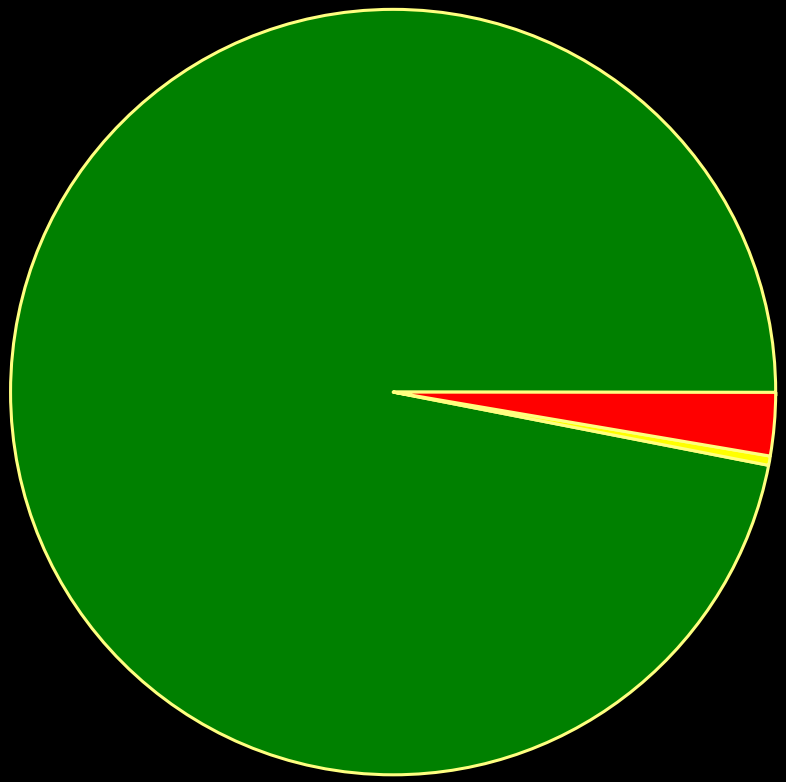
Q1: Stream condition
Dissolved Copper



California Toxics Rule

Below thresholds

Above chronic threshold (9 ug/L)

Above acute threshold (13 ug/L)

First Results

We confirmed some expectations

- Physical habitat

Other results surprised us

- Contaminants (copper, zinc)

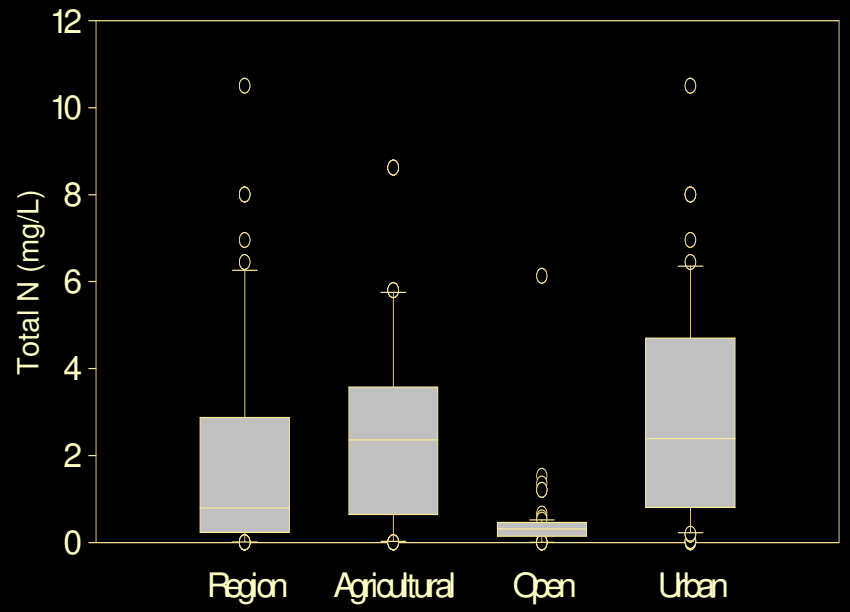
We learned many new things

- Nutrients, bugs, pyrethroids

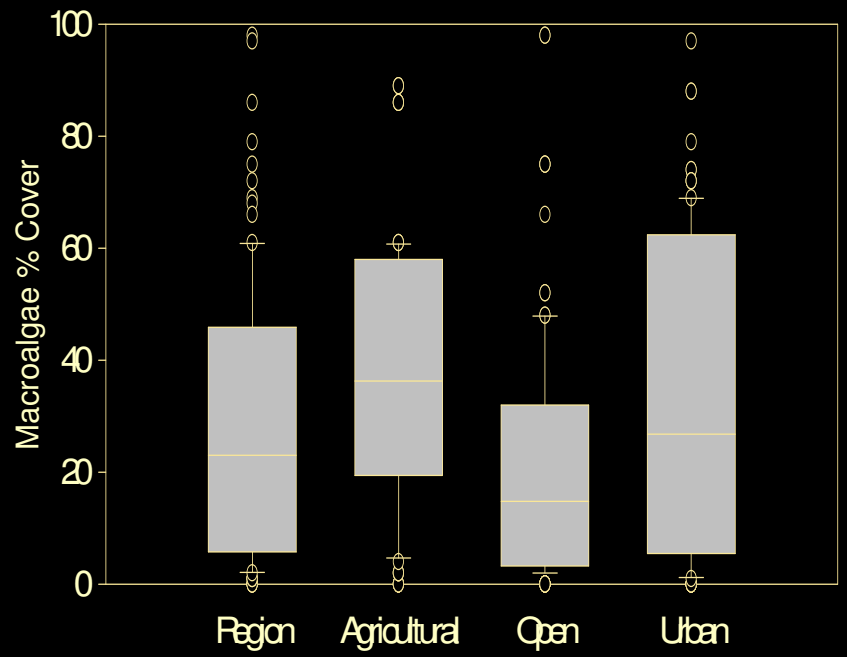
Assessment of other indicators

Nutrients

Total Nitrogen



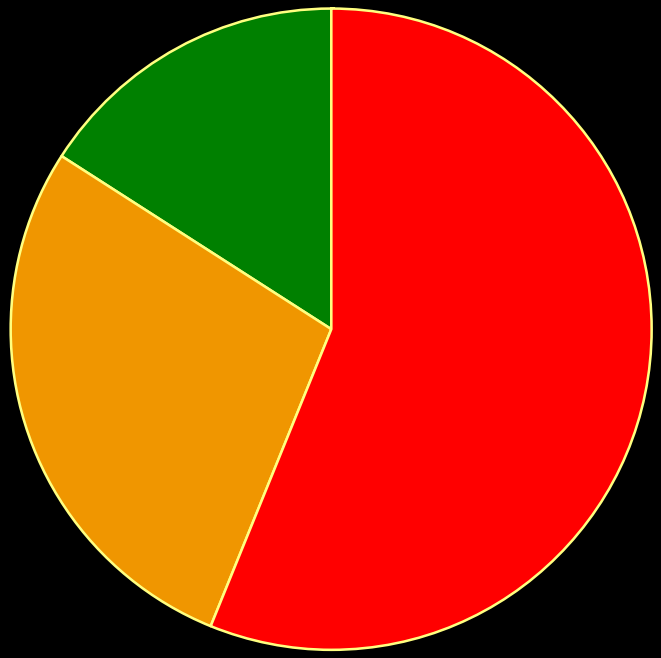
Macroalgae Percent Cover



Assessment of biological integrity

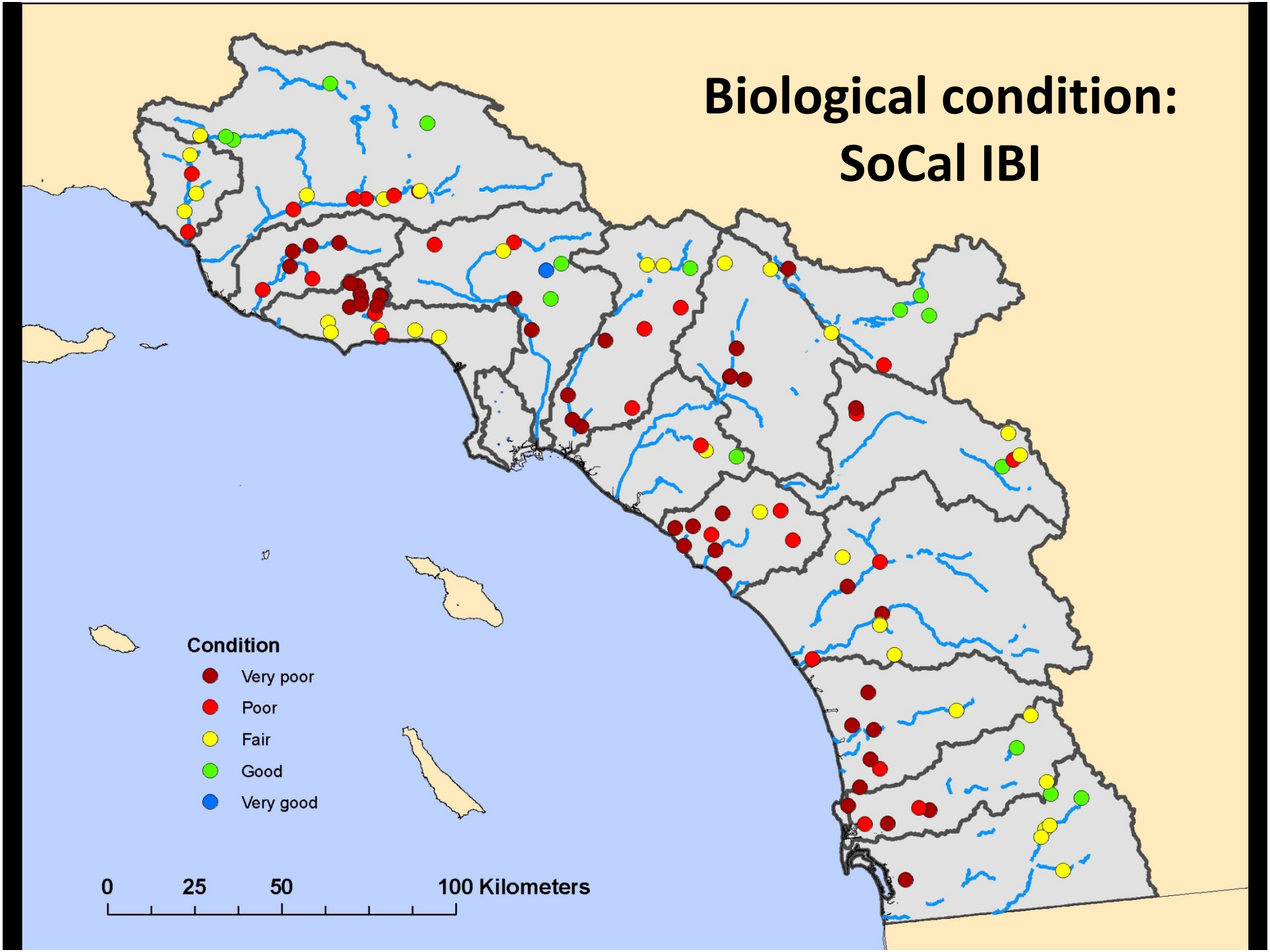
Calculate Southern California Index of Biotic Integrity (IBI)

- Coleoptera richness
- EPT richness
- Predator richness
- % Collector individuals
- % Intolerant individuals
- % Non-insect taxa
- % Tolerant taxa

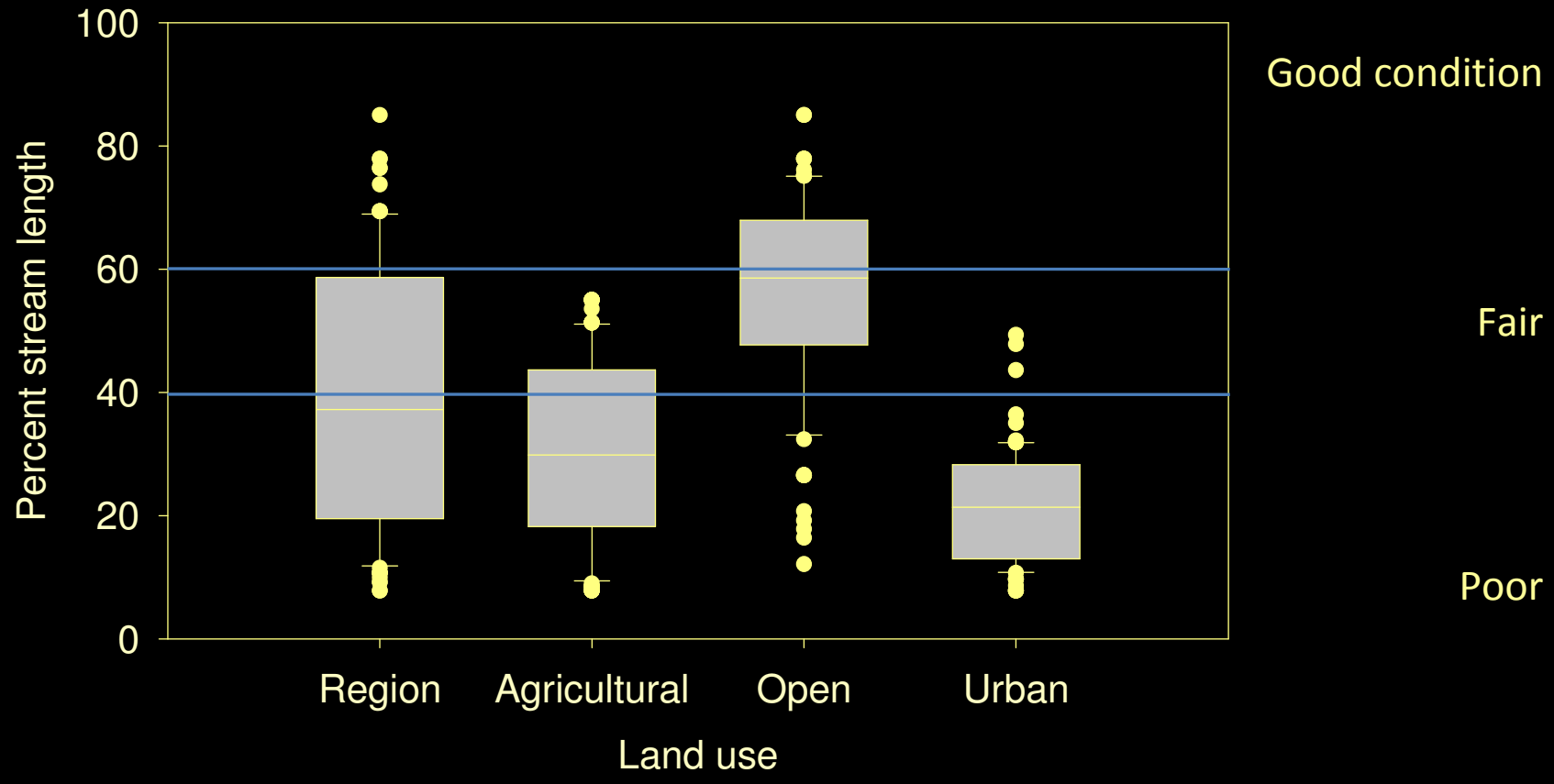


Scored from 0 to 100

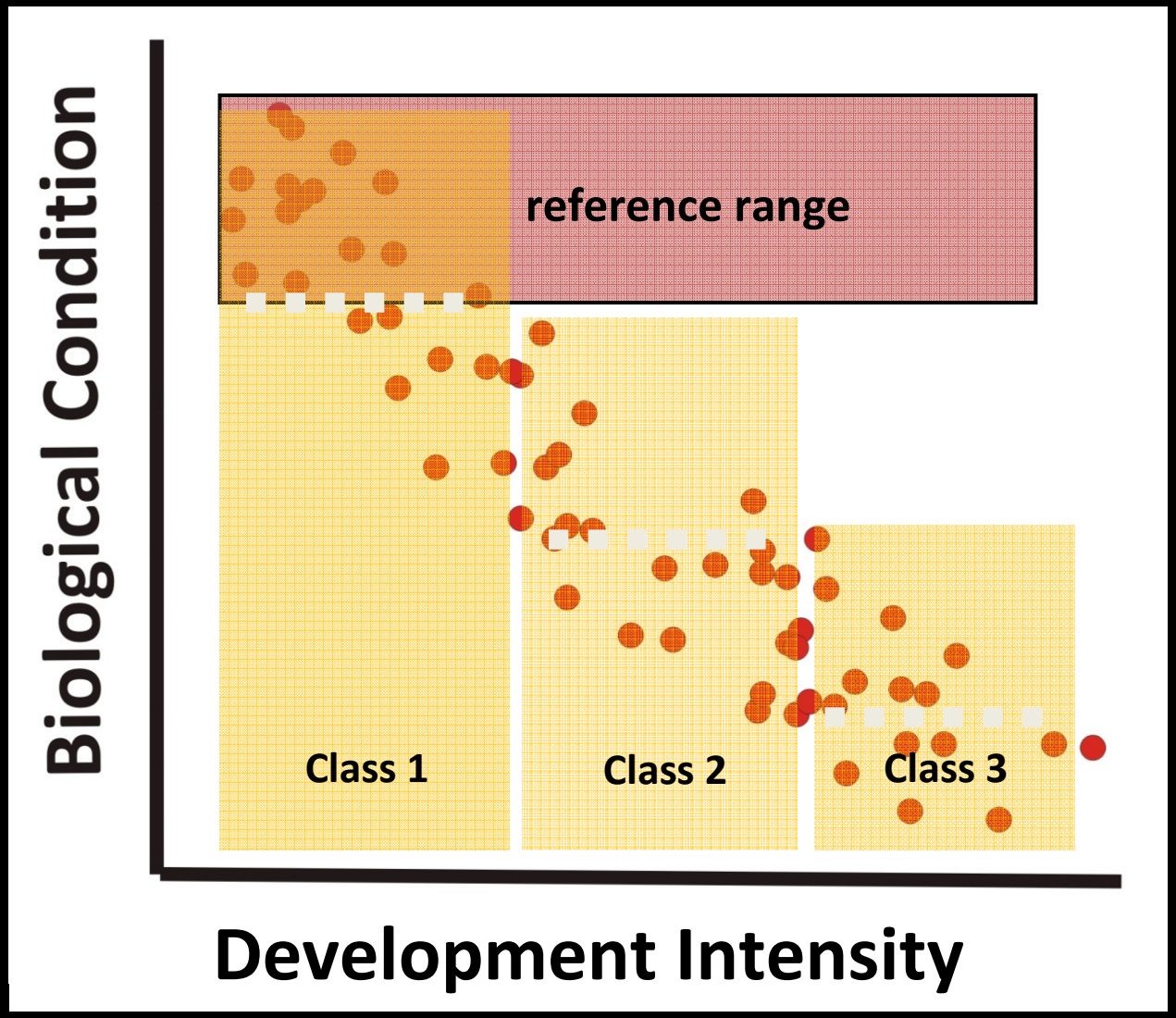
- Good: 60-100
- Fair: 40-60
- Poor: 0-40

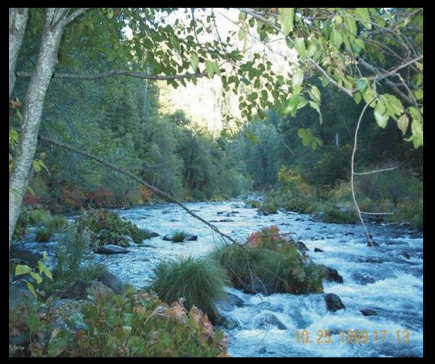

Biological condition:
SoCal IBI
Condition
Very poor
Poor
Fair
Good
Very good
0
25
50
100 Kilometers

Assessment of biological integrity



Using the Stressor Response Model for Tiered Biocriteria





Question 2: Stressors affecting stream condition

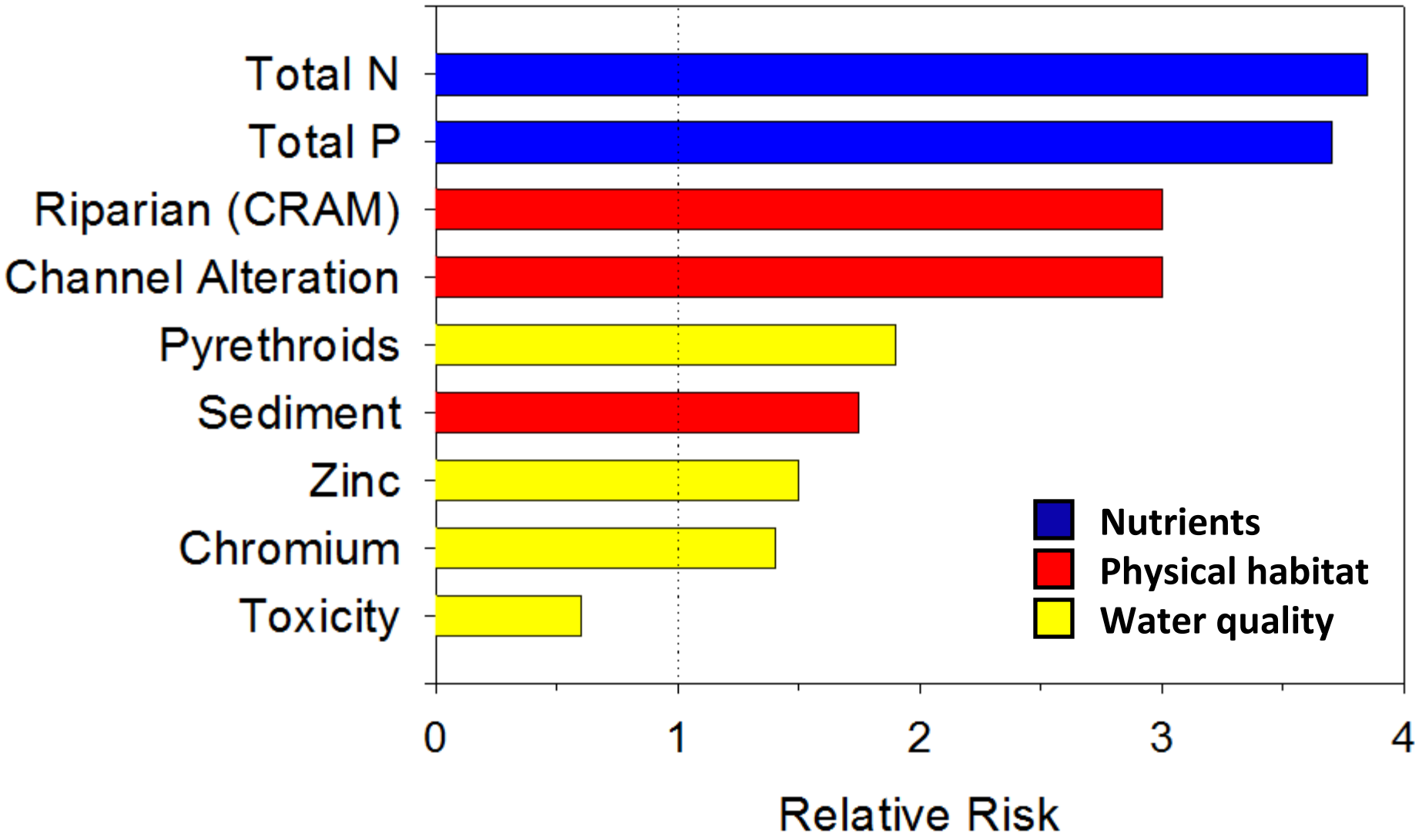
- Relative risk assessments
  - How likely you are to observe impairment (i.e., low IBI scores) when a stressor is present, relative to when the stressor is absent.

Example from public health:

Relative risk of smoking

$$\frac{\text{Prevalence of lung cancer among smokers}}{\text{Prevalence of lung cancer among non-smokers}}$$

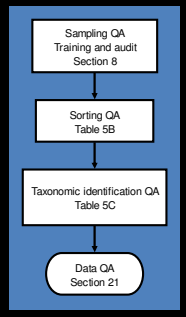
Relative Risk Ranking



“Intangible” benefits

- Training and auditing of field crews

- Developed QA protocols
  - model for all bioassessment in CA (and NV)
- Mapping of local resources



- Data sharing protocols (CEDEN)
- Framework for research partnerships
  - ability to test new issues

SoCal influences statewide projects

- Almost *one-third* of bio-objective development data comes from so-cal.
- Contributes to statewide reference network
- Model and partner for similar programs elsewhere

Objectives based on this:

Griffith Park

Not this:

Inyo National Forest

Status

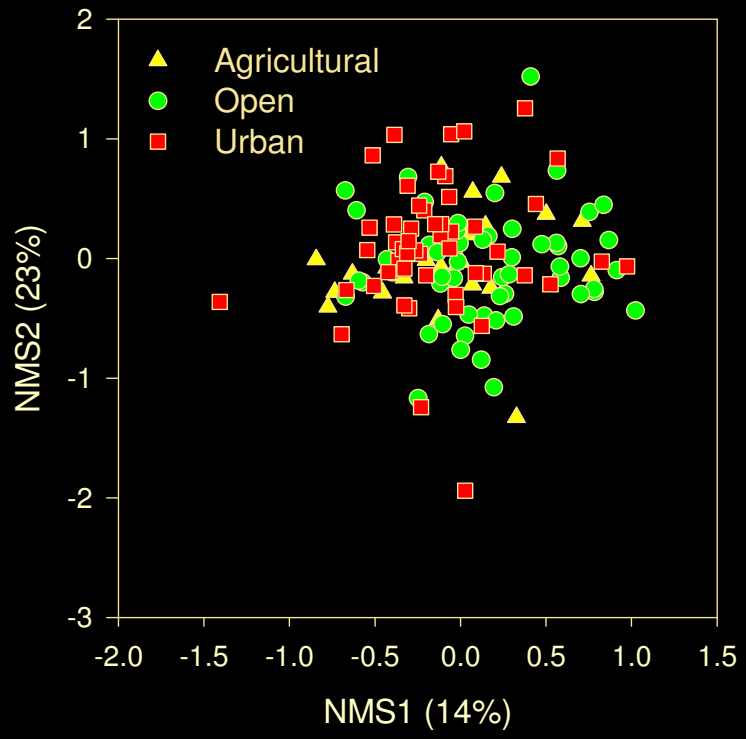
- Publishing first-year report.
  - Explore relationships between biology and physical habitat, land use.
- Year 2 sampling complete. Year 3 sample draw underway.
- Prepping data for bio-objectives development team.
- Looking for additional opportunities in 2011:
  - Additional collaborators
  - Specific watershed enhancements
  - Expanding to nonperennial streams

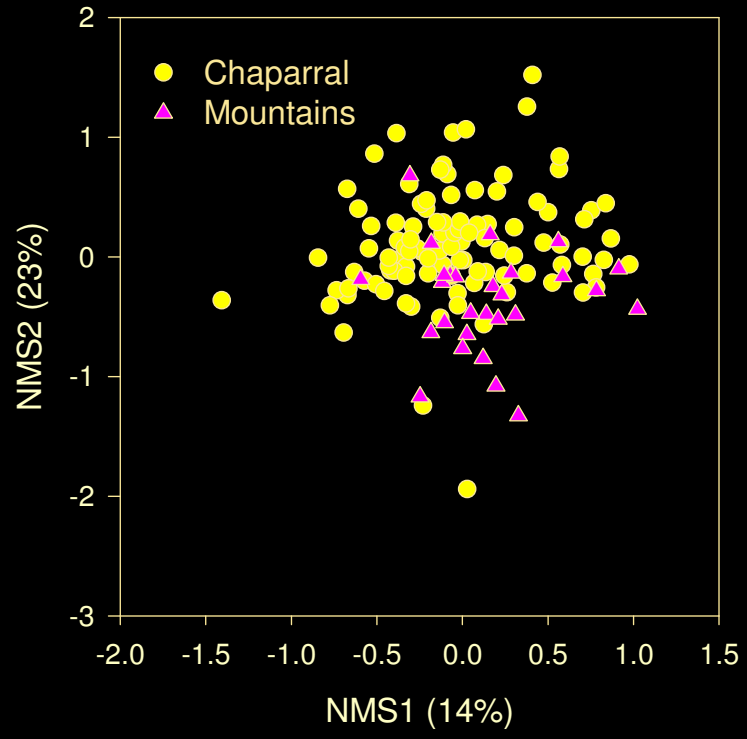
Thank you!

Devil's Canyon, San Gabriel River

Ordination of benthic macroinvertebates

3-axis solution represents 58% of variabiliy
Weak segregation by land use (axis 1)
Good segregation by ecoregion (axis 2)



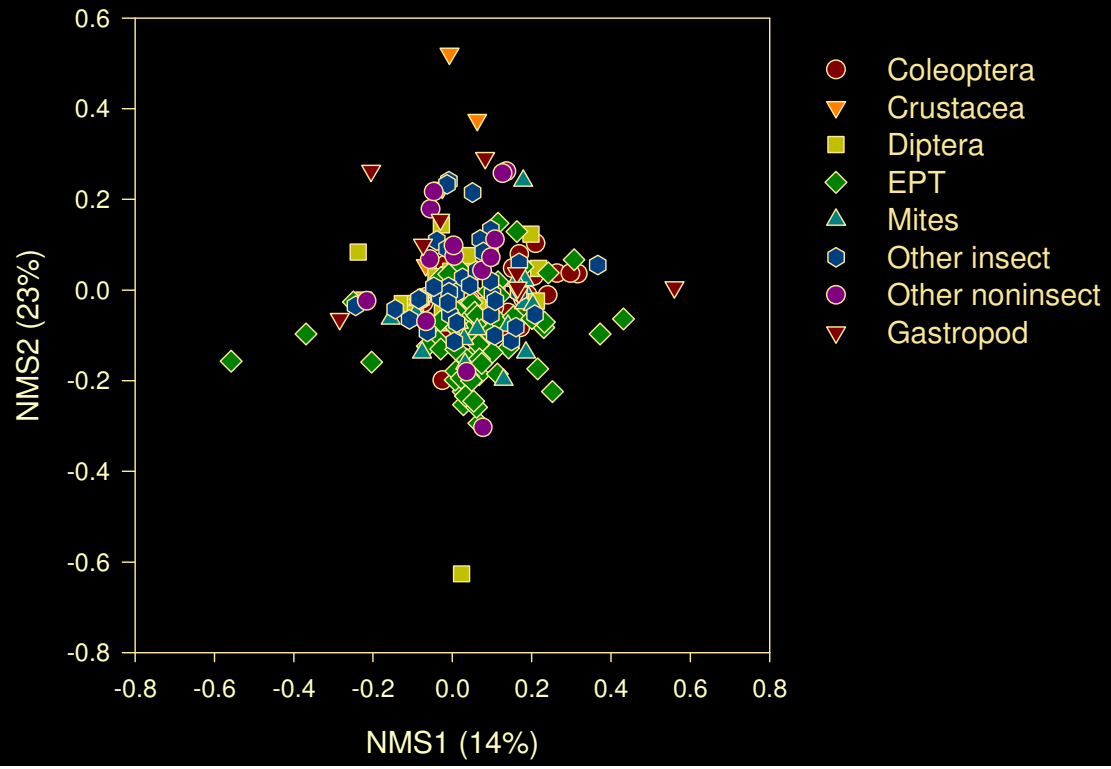


Ordination of benthic macroinvertebates

Baetids, worms, nonnative snails.

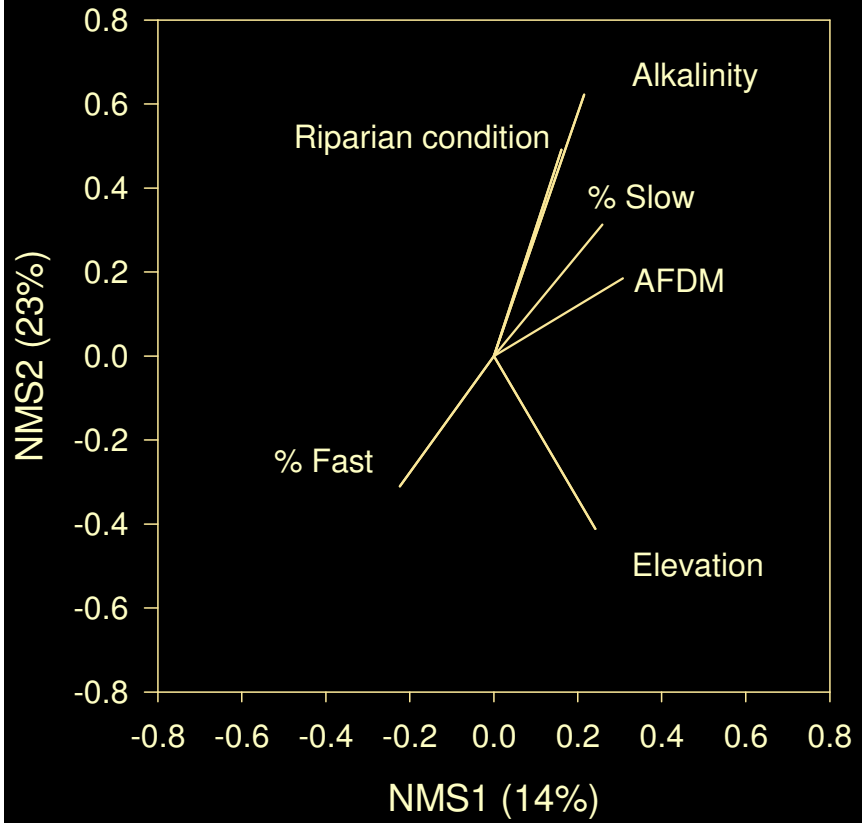
Axis 1

Sensitive EPT, Coleoptera , mites, native snails



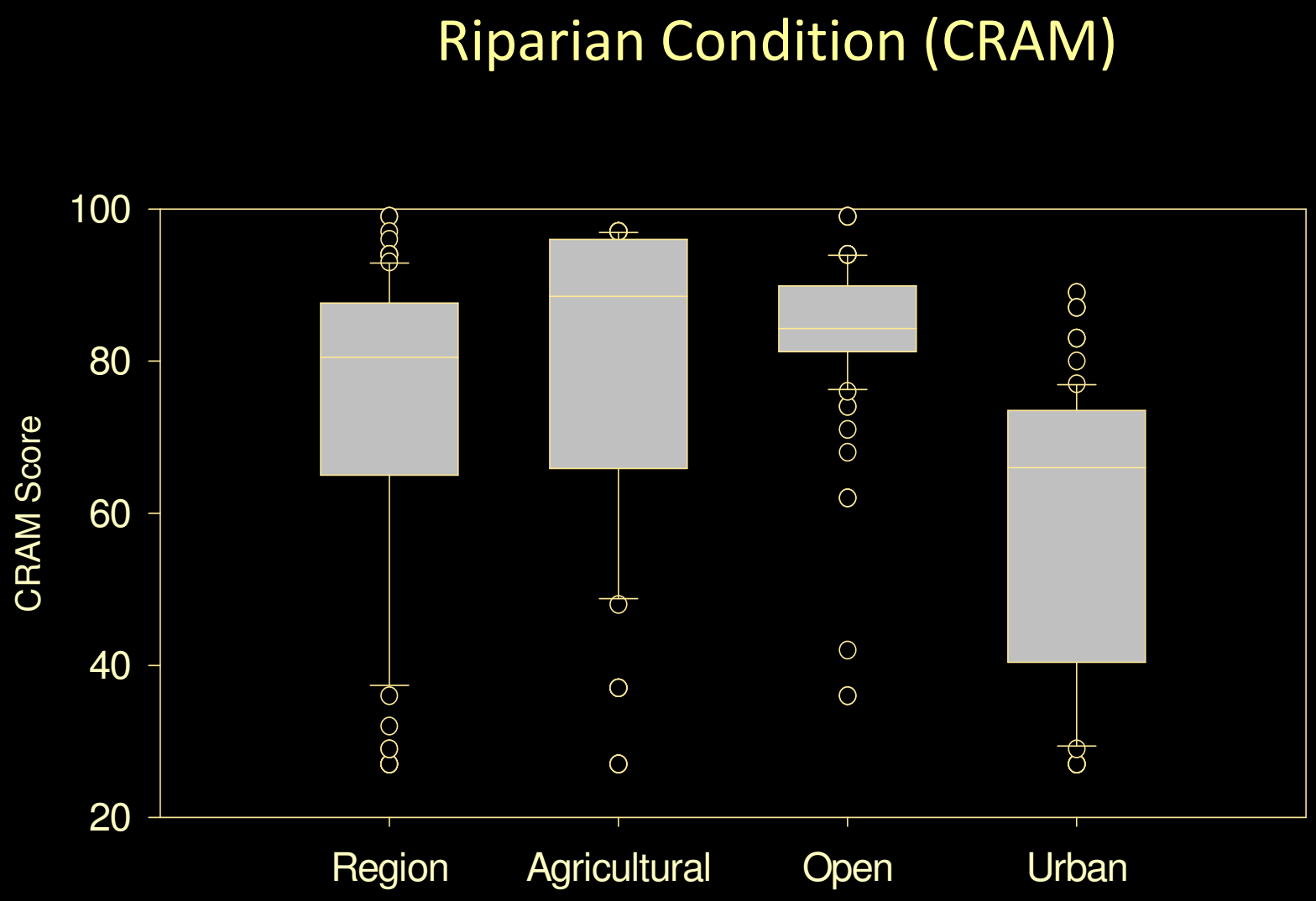
Ordination of benthic macroinvertebates

Moderate-to-strong correlations with alkalinity, riparian condition, elevation, flow habitats, and benthic biomass.



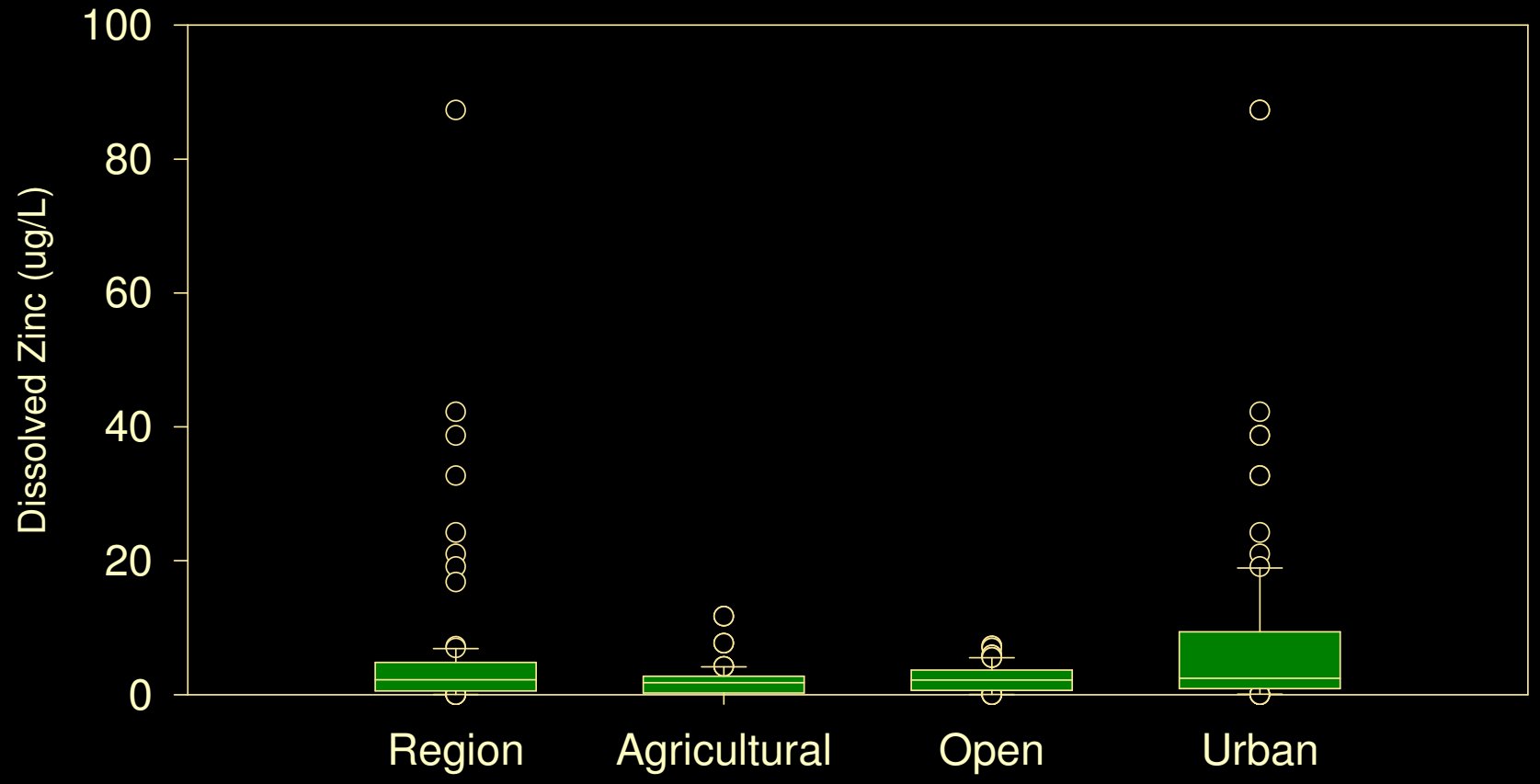
No strong relationships with many water chemistry, toxicity, and physical habitat-related variable.

Assessment of other indicators

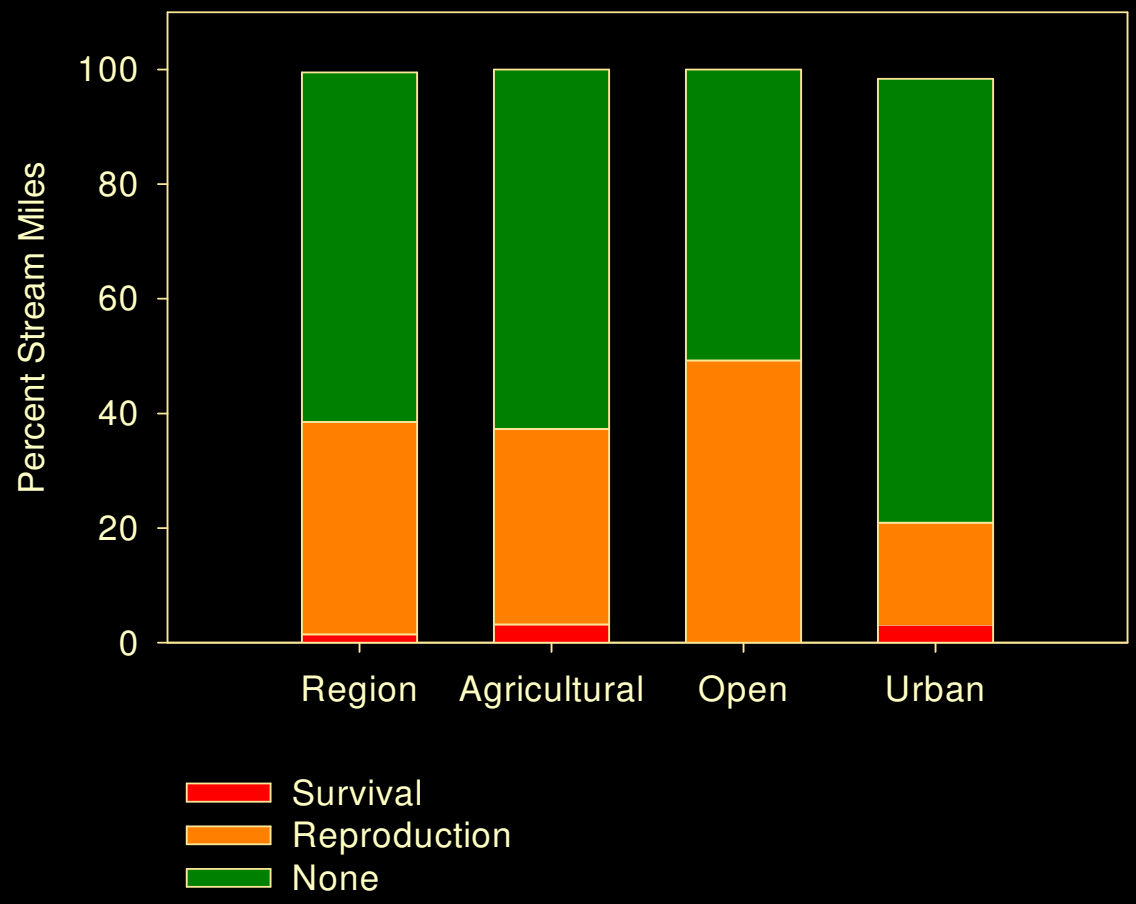


Q1: Stream condition
Dissolved zinc

Always below CTR threshold (120 ug/L)

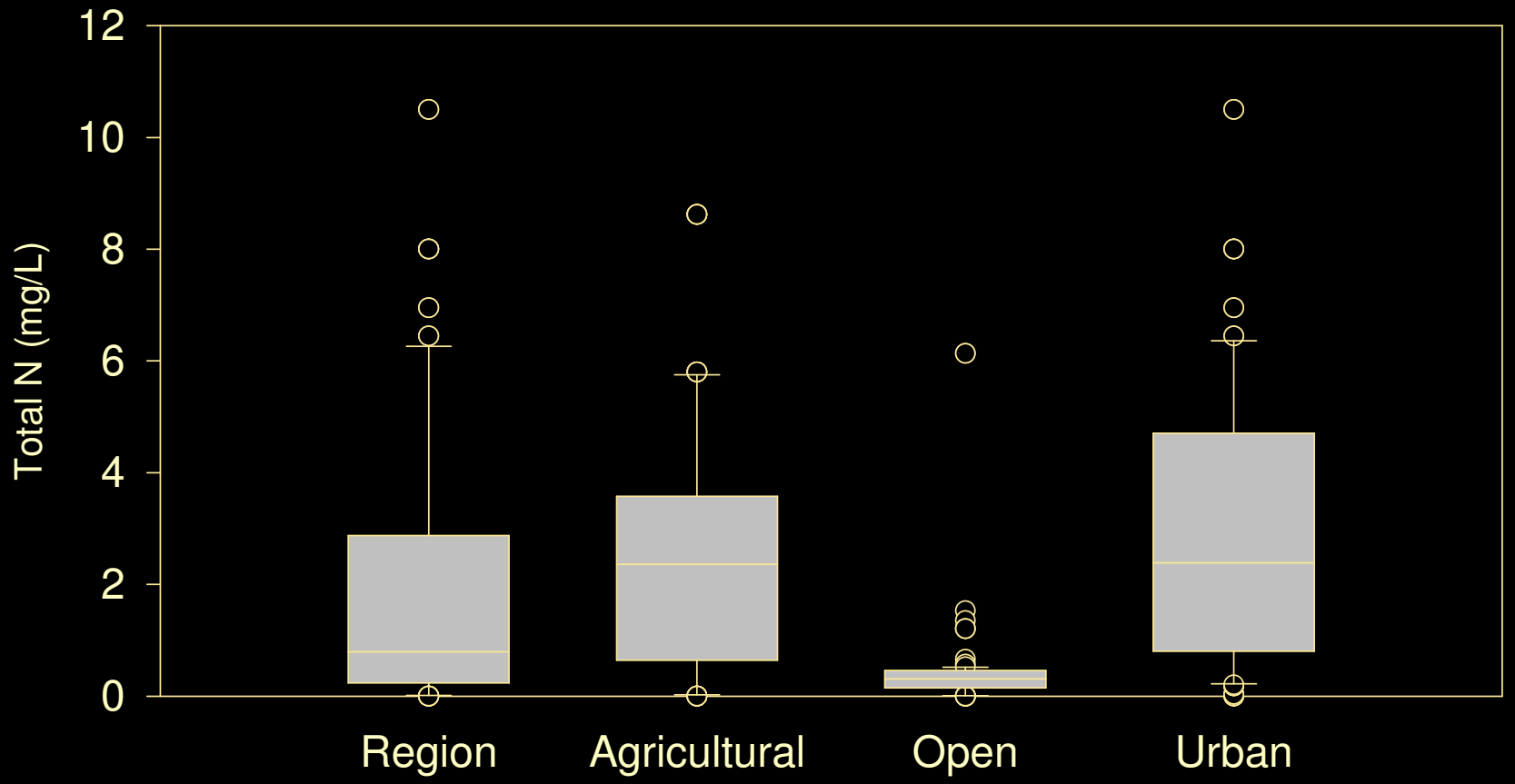


Q1: Stream condition
Water column toxicity

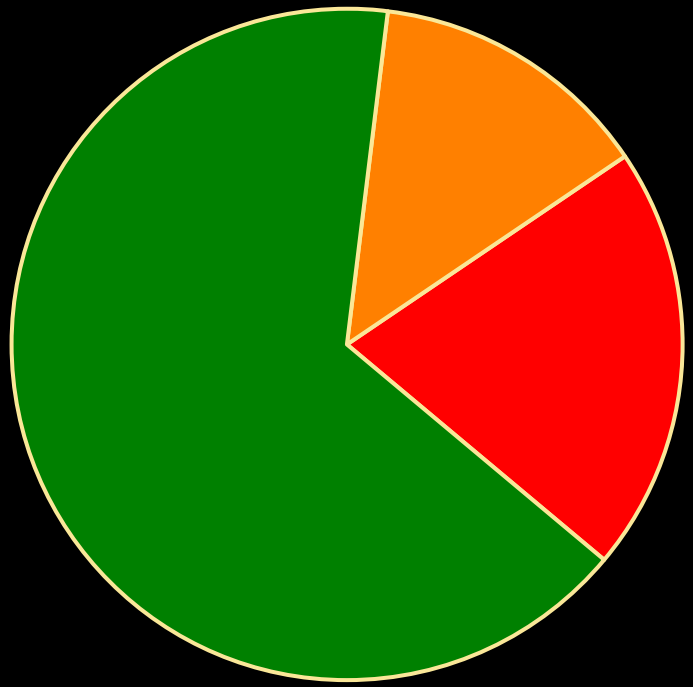


Q1: Stream Condition
Nutrient impacts: Water chemistry

No applicable thresholds (yet)



Q1: Stream Condition
Nutrient impacts: Macroalgae Cover



Moderate (30-50% cover)

Heavy (50-100% cover)

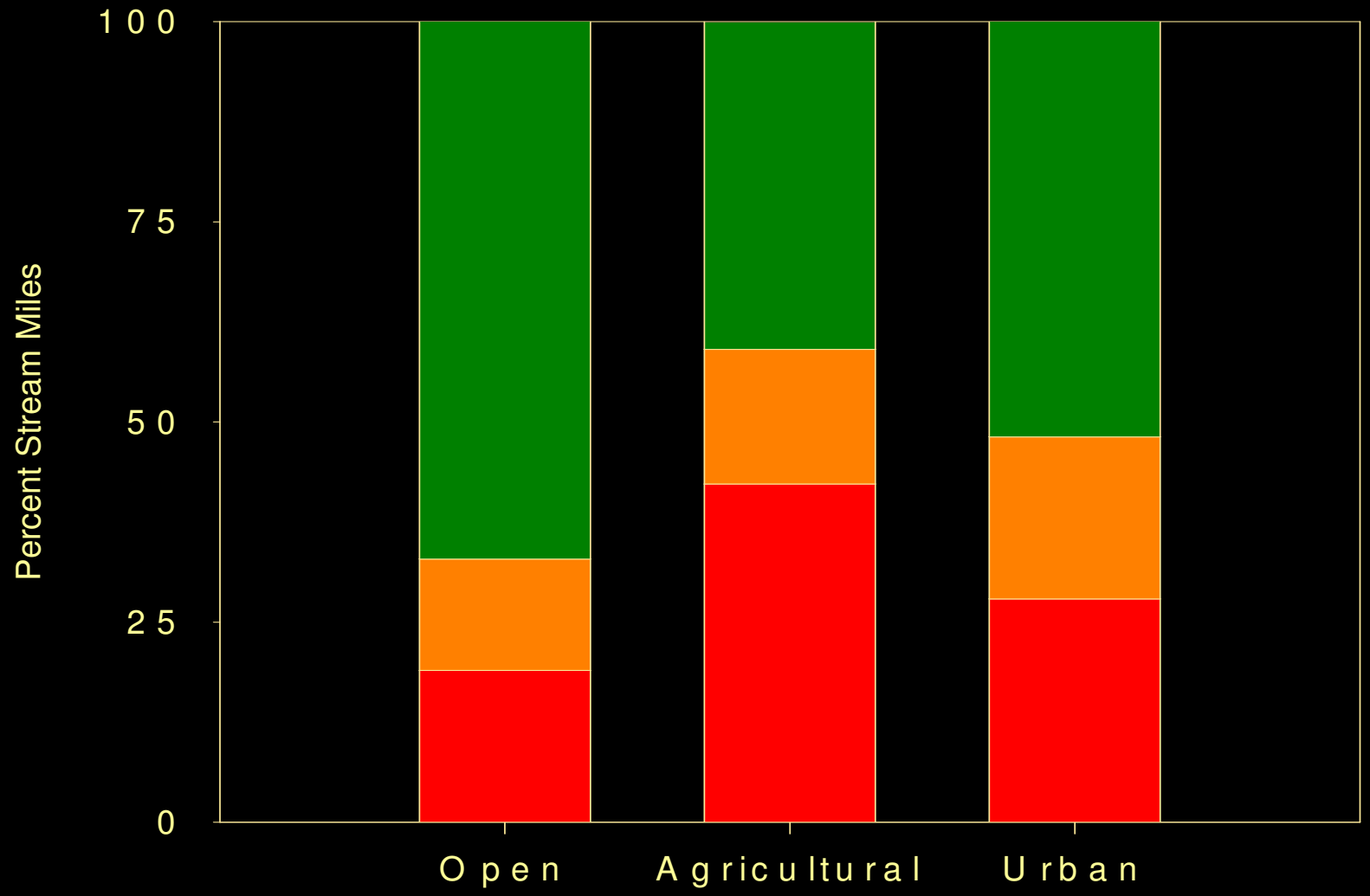
15% cover

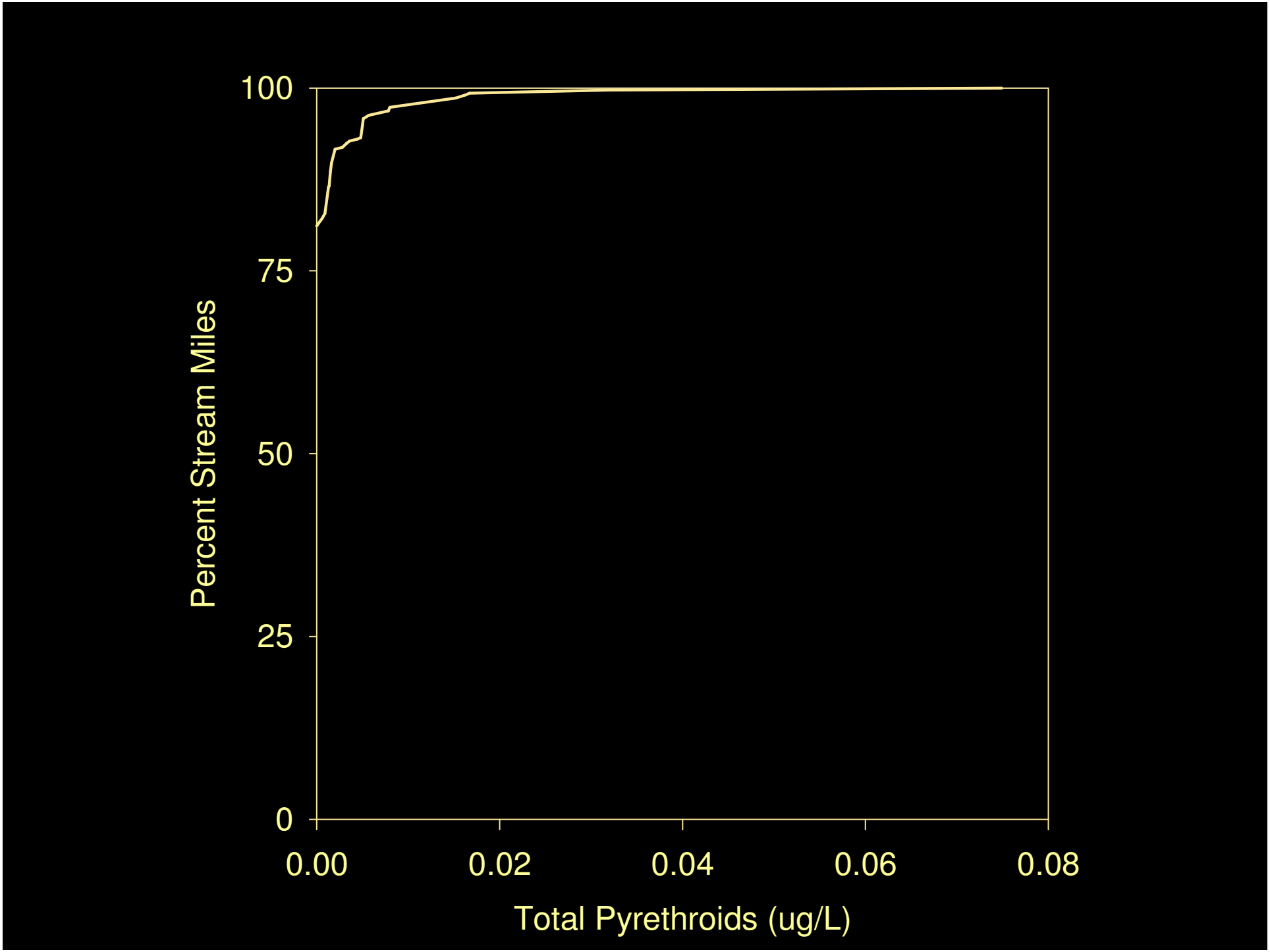
Mill Creek

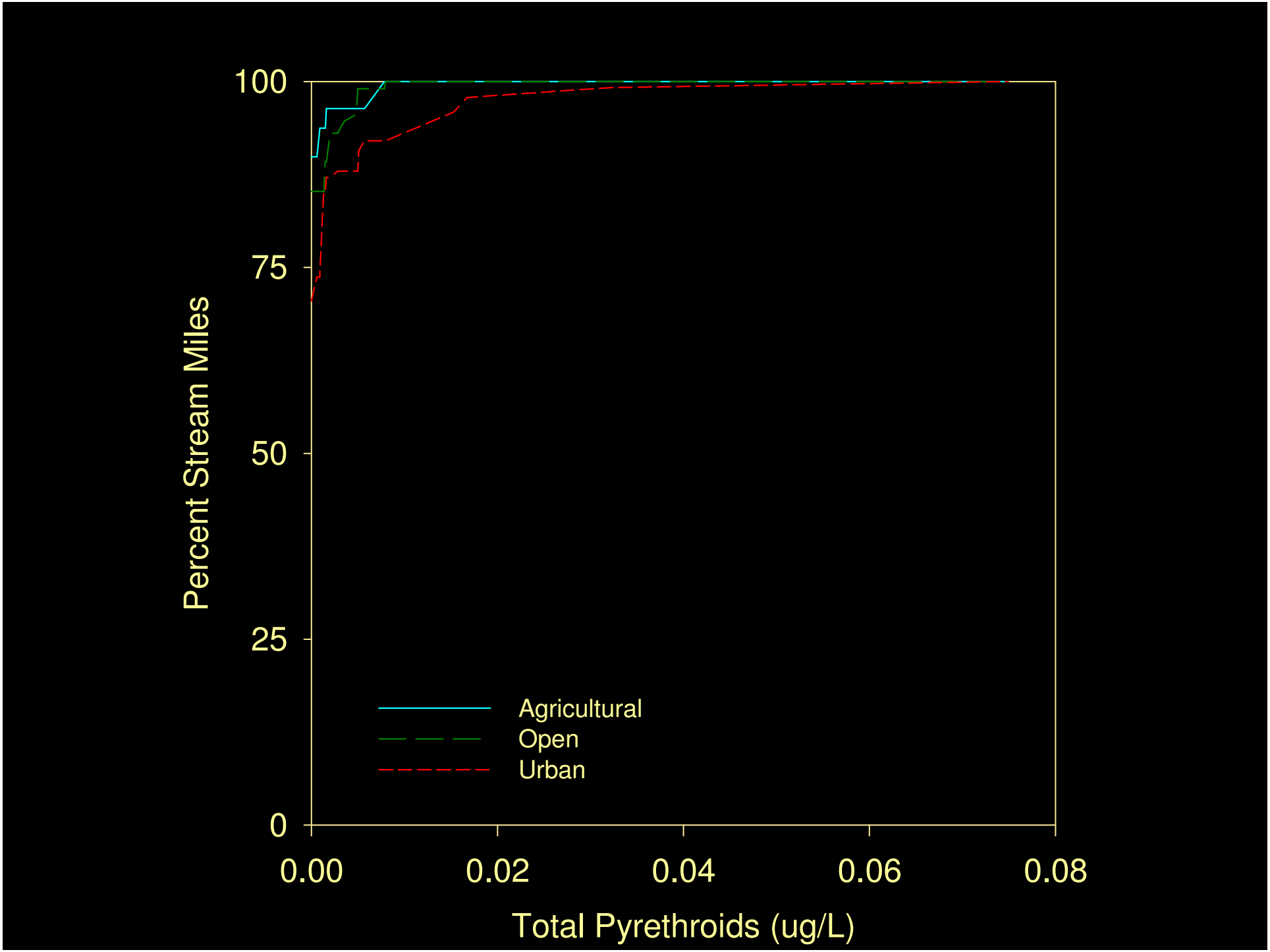
50% cover

Ventura River

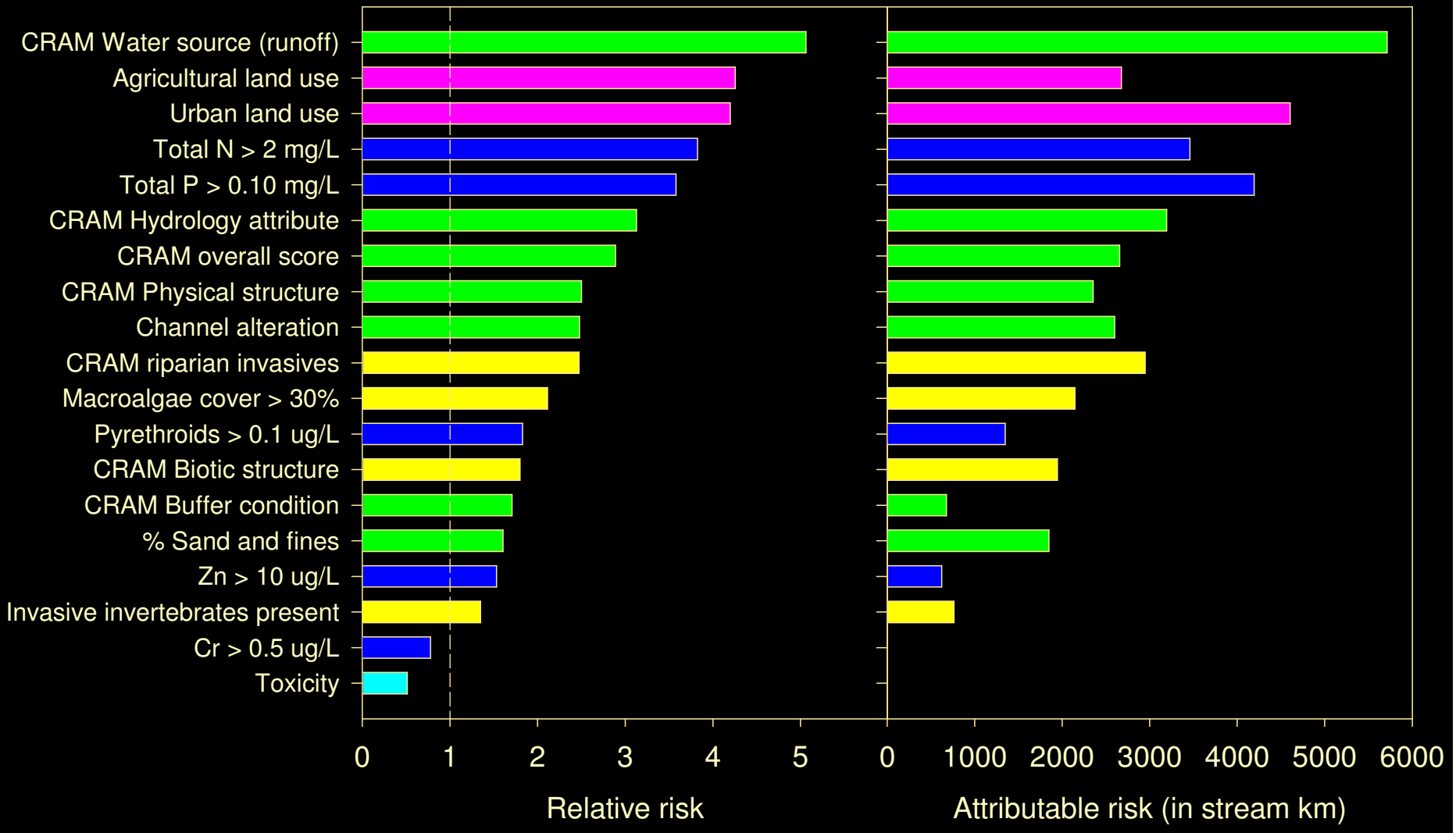
Q1: Stream condition
Nutrient impacts: Macroalgae Cover




100
75
50
25
0
Percent Stream Miles
0.00
0.02
0.04
0.06
0.08
Total Pyrethroids (ug/L)


100
75
50
25
0
Percent Stream Miles
0.00
0.02
0.04
0.06
0.08
Total Pyrethroids (ug/L)
Agricultural
Open
Urban

Relative & Attributable Risk



Prior to 2009, monitoring efforts were isolated and lacked coordination

Lots of effort, but:

-Inconsistent methods, indicators, QA

-Limited (site-specific) designs

-No data sharing

-Little biological monitoring

Problems

-Can't prioritize areas for restoration or protection

-Unfulfilled mandates

Upper San Dieguito River, San Diego County

Sampling summary

Land use	Intended #	Sampled #
Agricultural	24	23
Open	37	48
Urban	29	50
TOTAL	*90*	*121*

Agricultural

San Pasqual Valley

Open

Pine Valley Creek

Urban

Fullerton Creek