Bioassessment in non-perennial streams in Southern California

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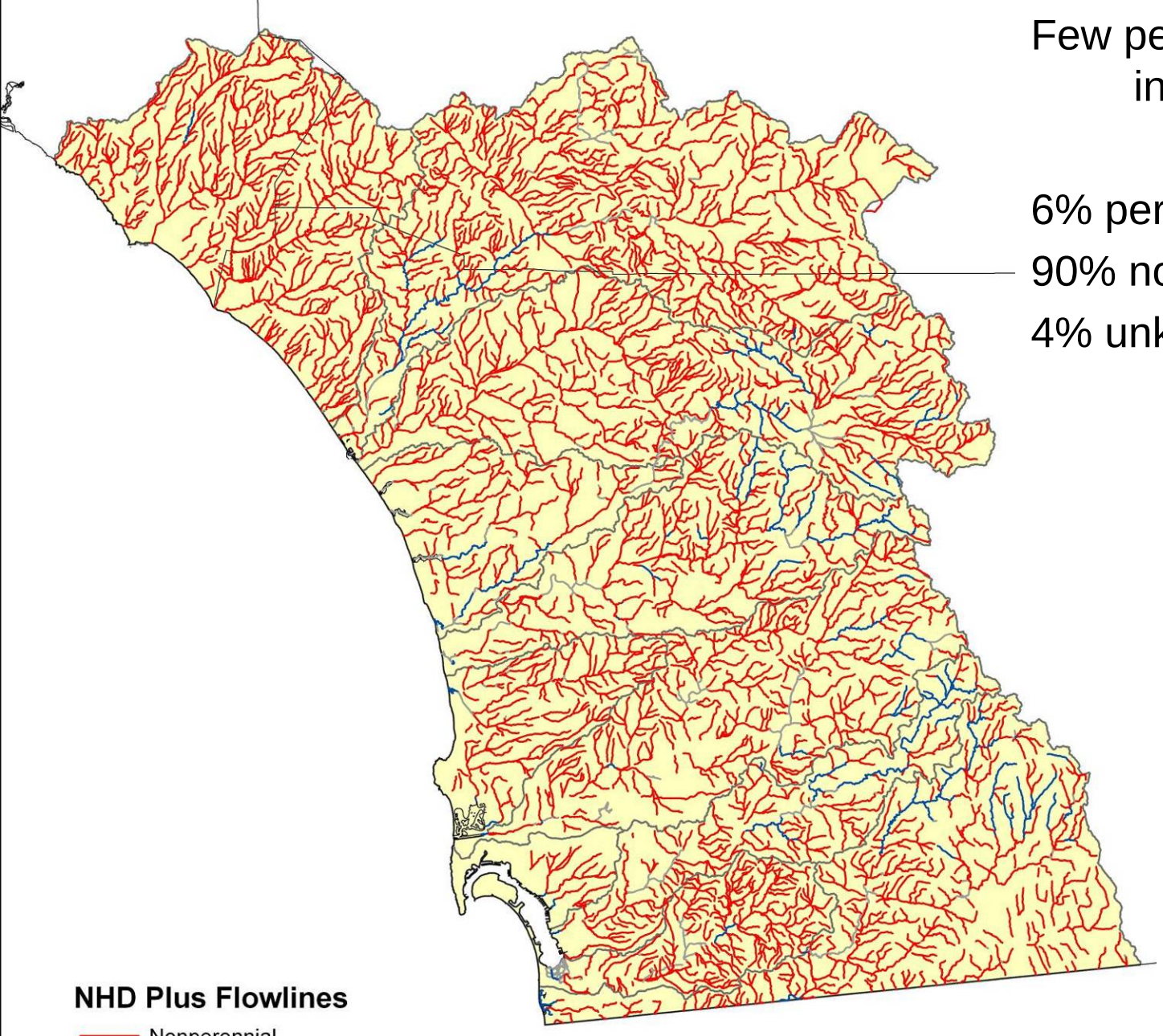
Nonperennial streams (NPS)

- NPS are common in California (esp. Southern California)
- Definition: Dry for at least one month in most years.
- Applicability of assessment tools (e.g., IBI) unclear.
- Porter-Cologne Act mandates regulation of NPS in California

Nonperennial streams (NPS)

Study goals

- Update accuracy of NHD+ maps using additional data from San Diego Region
- Evaluate the applicability of assessment tools (IBI), and identify thresholds



Few perennial streams in NHD+ dataset:

6% perennial

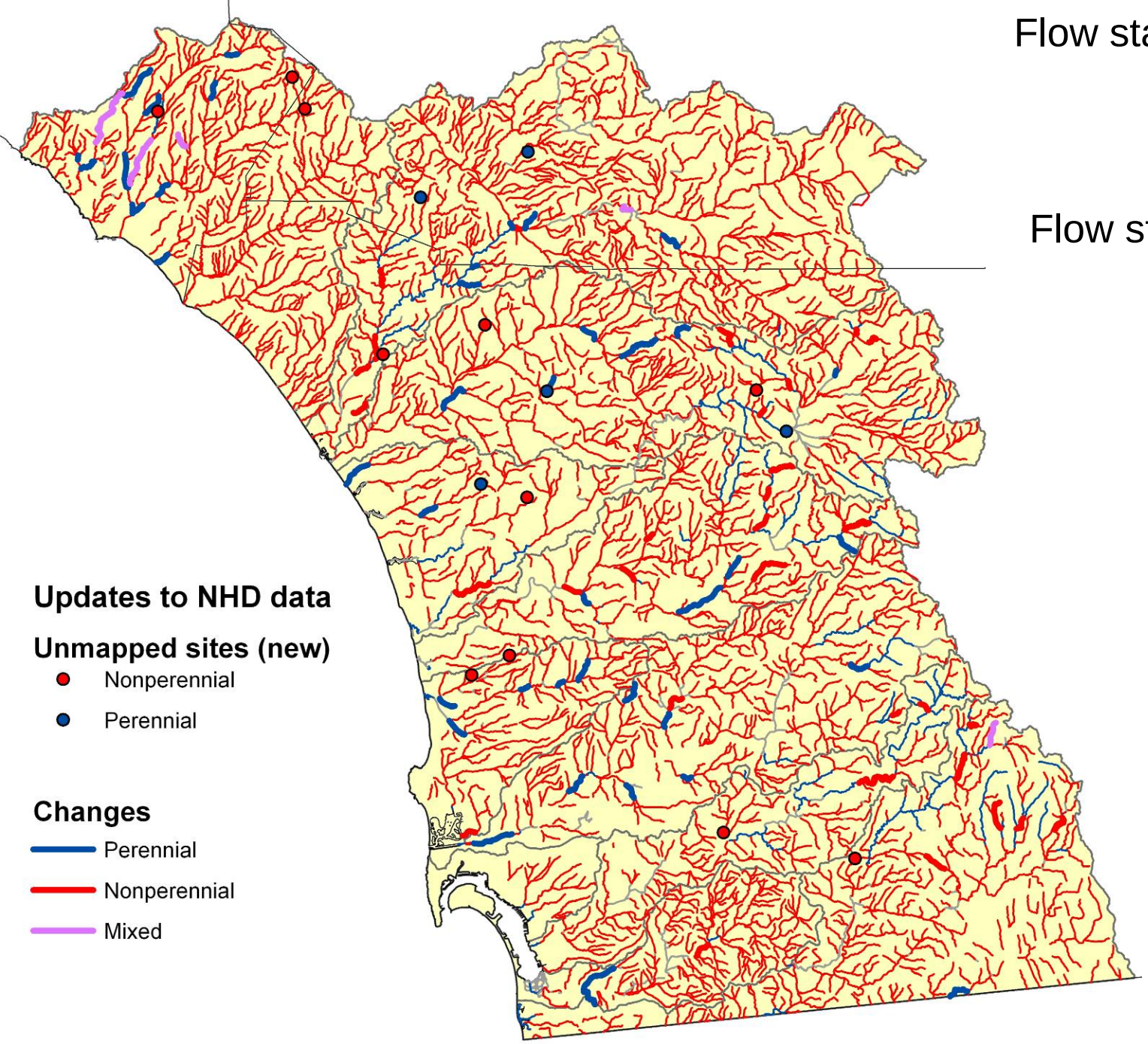
90% nonperennial

4% unknown

Updating maps

Sources of new data: 494 km of streams

- Recon from regional assessments, special studies
- USGS gauges
- Local expertise



Flow status confirmed:

56%

Flow status updated:

44%

Causes of inaccuracies

Hollenbeck Canyon
(upwelling)

Springs, upwellings

Noble Canyon (spring)

Causes of inaccuracies

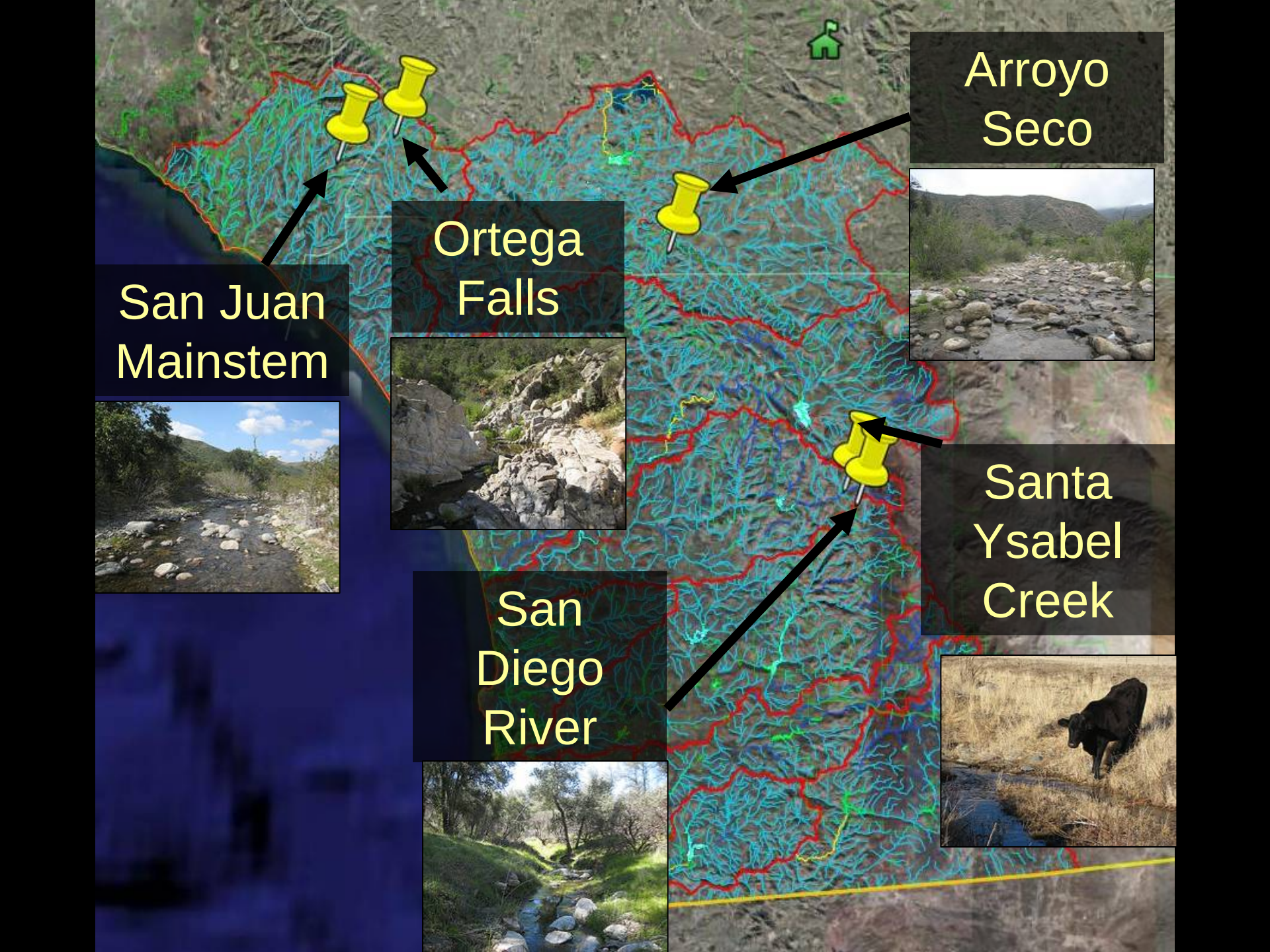
Jeronimo Creek, Mission Viejo

Frequent “perennialization” of urban streams.

Evaluation of assessment tools

15 nonperennial streams in the San Diego Region.

- 5 sites in 2008, 10 in 2009
- Sample every 1-4 weeks, from April until drying
- Collect bugs, PHAB and water chemistry (at 7 sites). Continuous water-level loggers.
- Target best available sites
- Represent natural gradients (slope, substrate, elevation, watershed area)


Arroyo Seco
Ortega Falls
San Juan Mainstem
Santa Ysabel Creek
San Diego River

Arroyo Seco, April 8

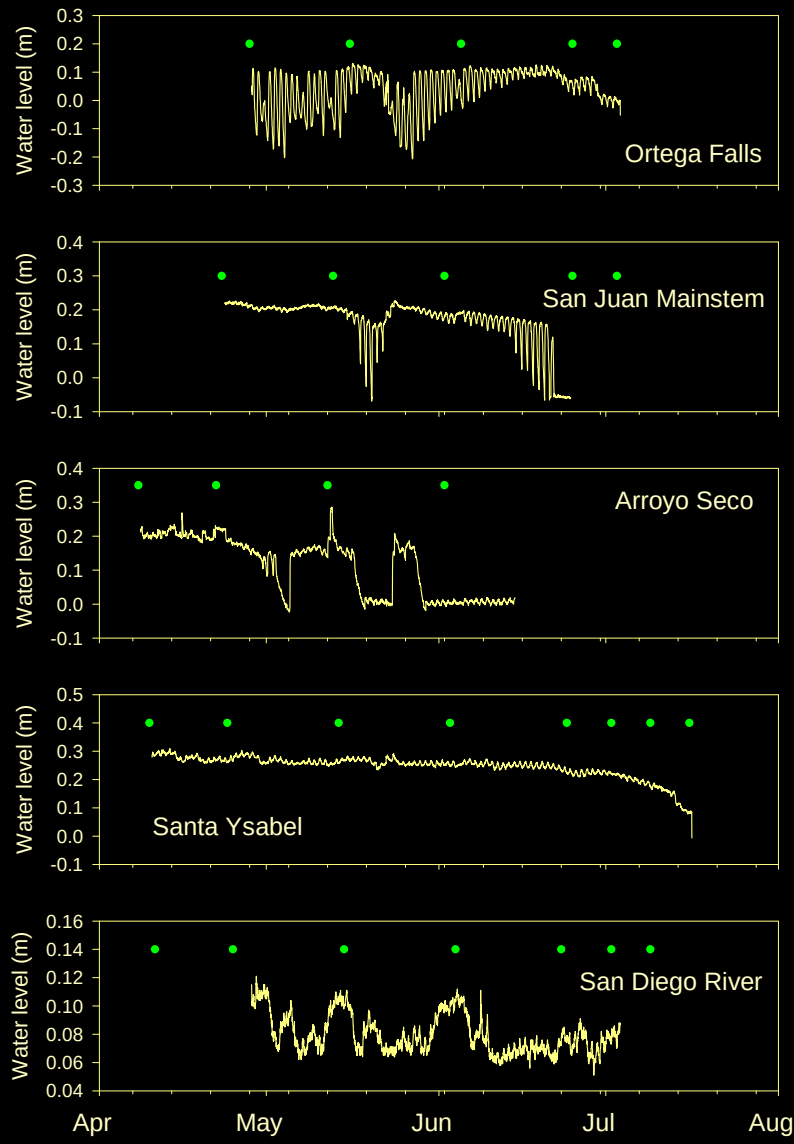
Arroyo Seco, April 22

Arroyo Seco, May 12

Arroyo Seco, June 2

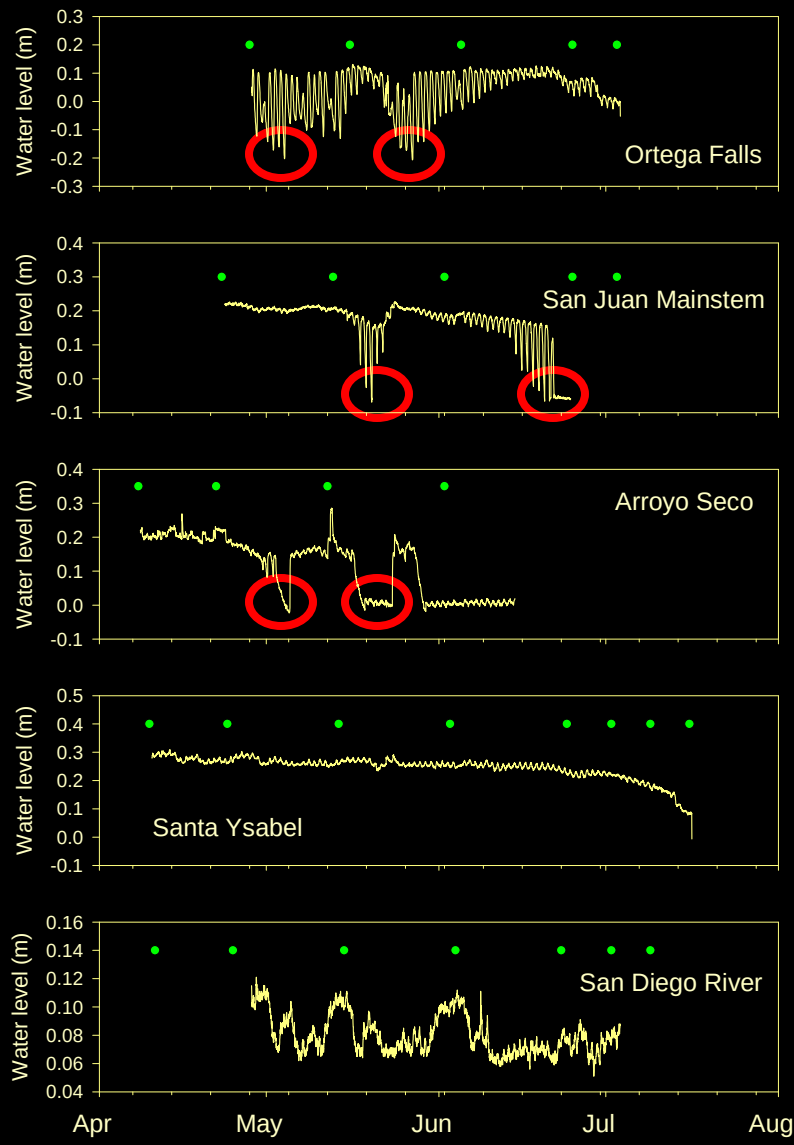
Water level loggers

- Flow regimes varied among sites



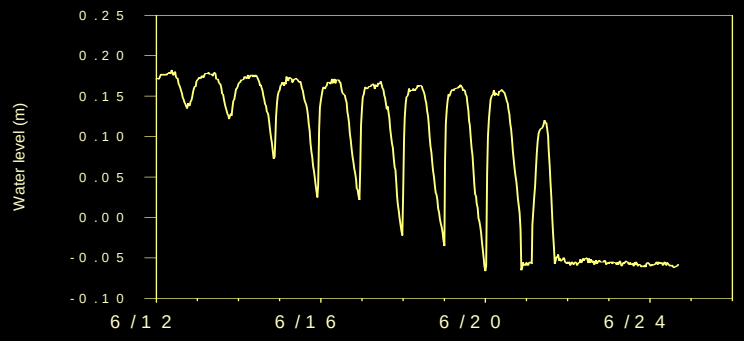
Water level loggers

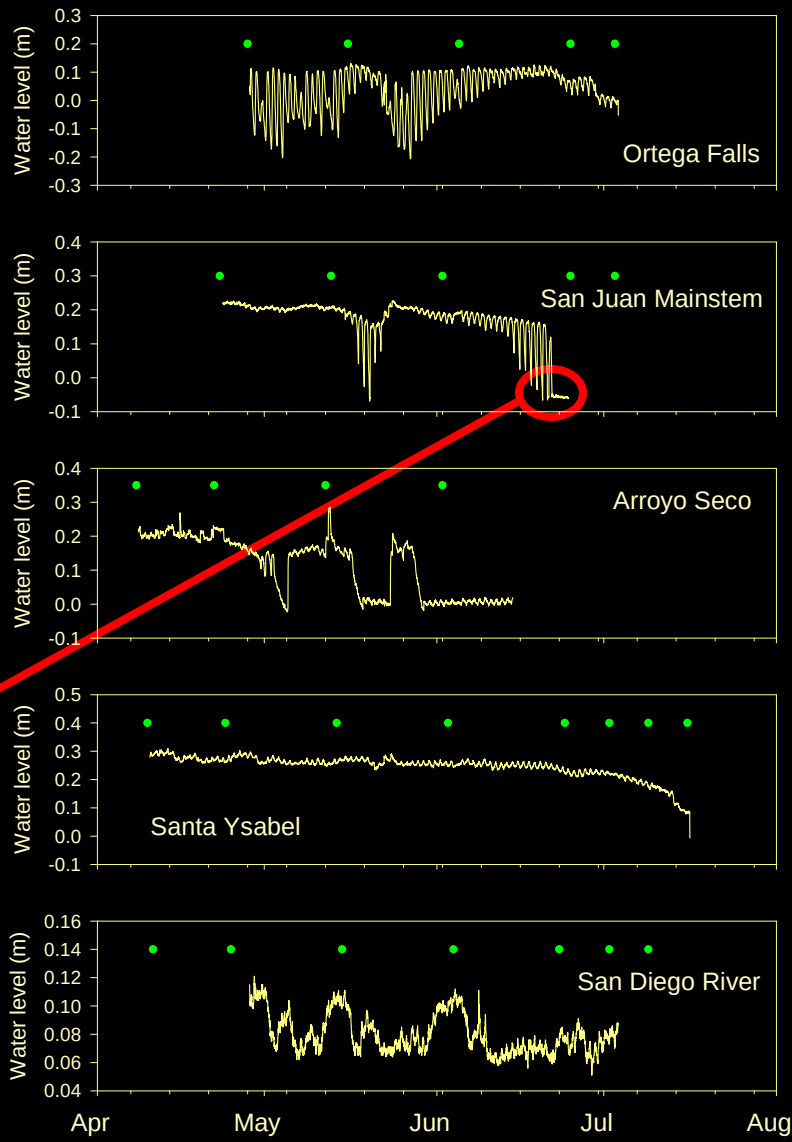
- Flow regimes varied among sites
- Dry periods undetected by field visits at many sites



Water level loggers

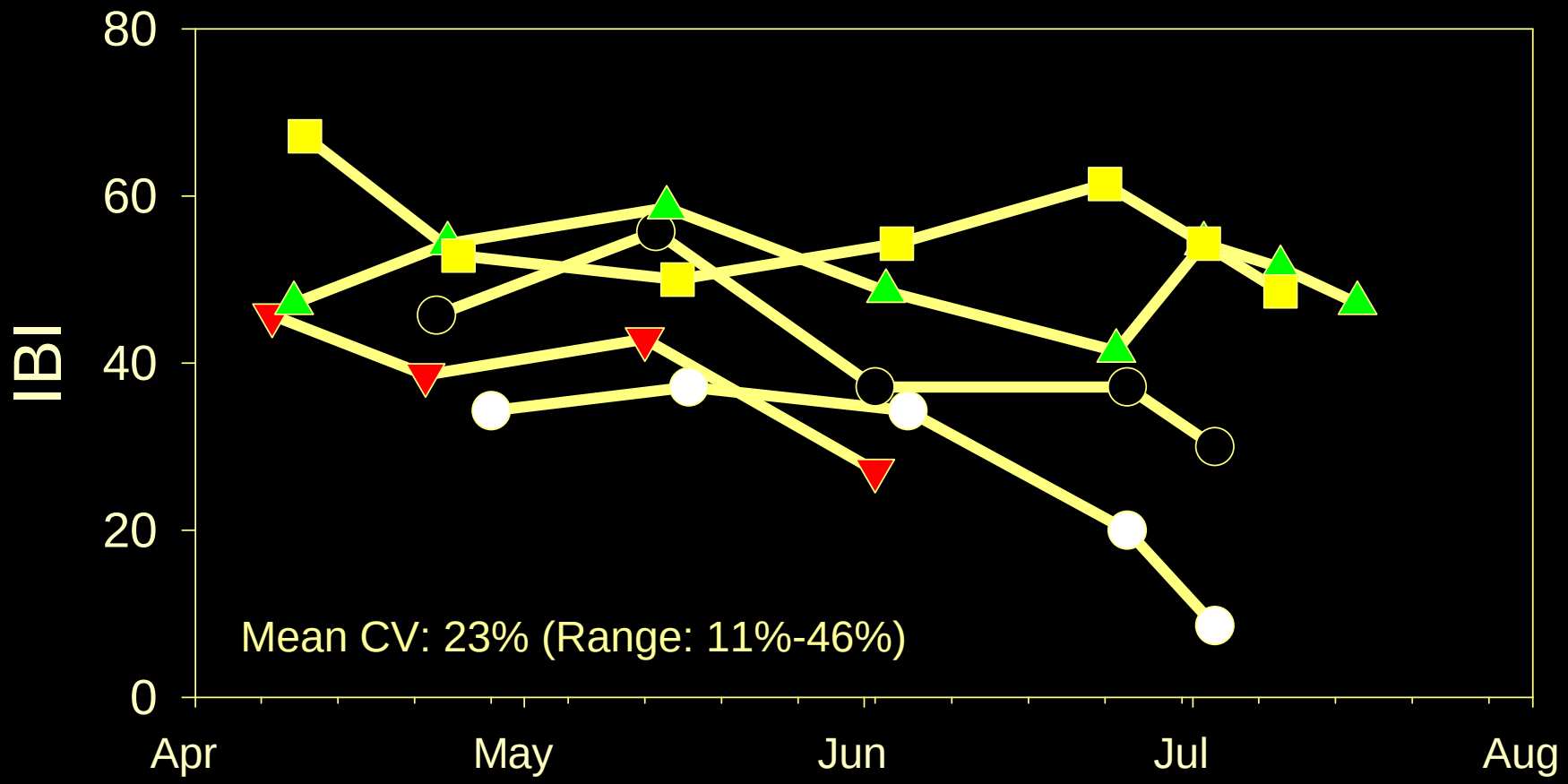
- Flow regimes varied among sites
- Dry periods undetected by field visits at many sites
- Strong daily fluctuations—evapotranspiration!





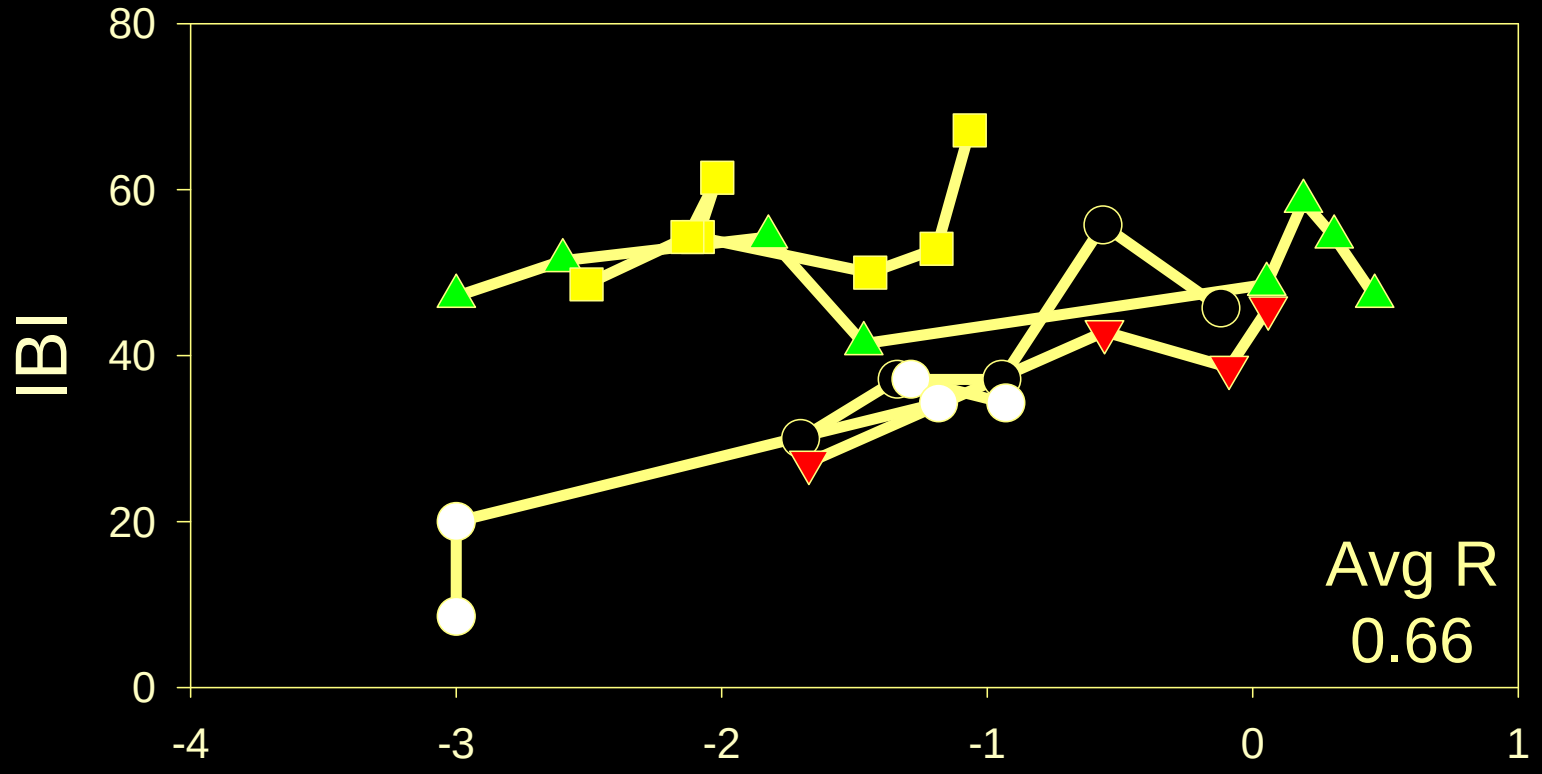
IBI Scores

Gradual decline at most sites



IBI Scores

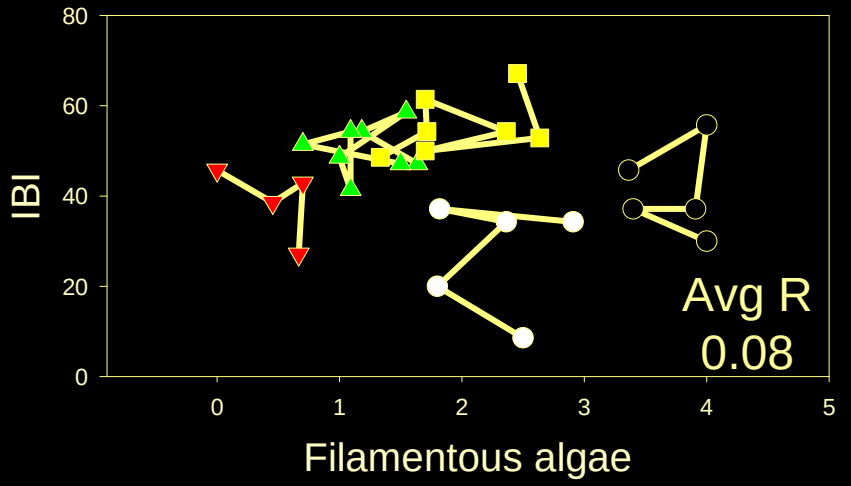
Gradual decline with flow

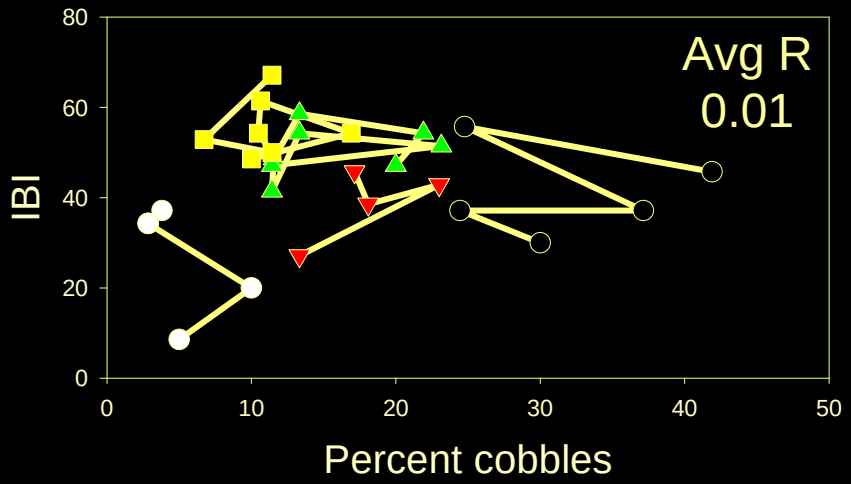


No obvious threshold

IBI Scores

No relationship with many PHAB variables



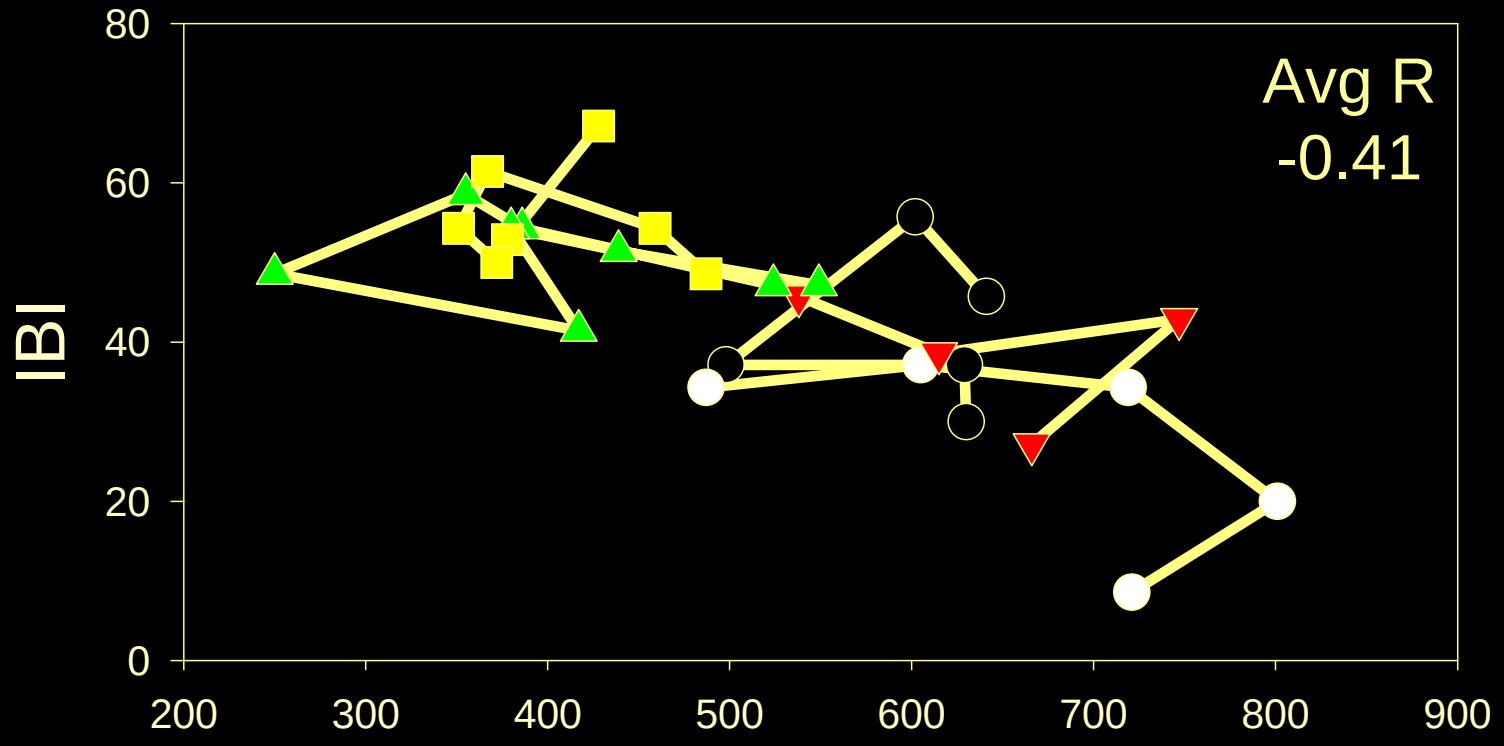


Large differences among sites.

No clear trends within sites.

IBI Scores

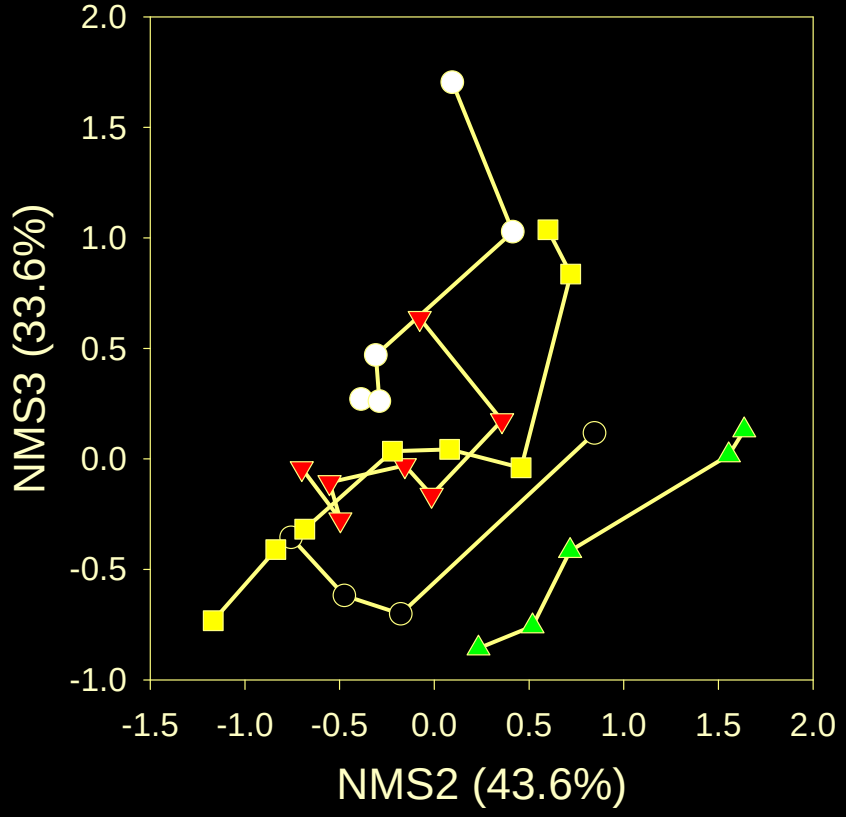
Weak relationship with specific conductivity



Site differences may obscure trends

BMI communities

Shifts were paralleled at all sites

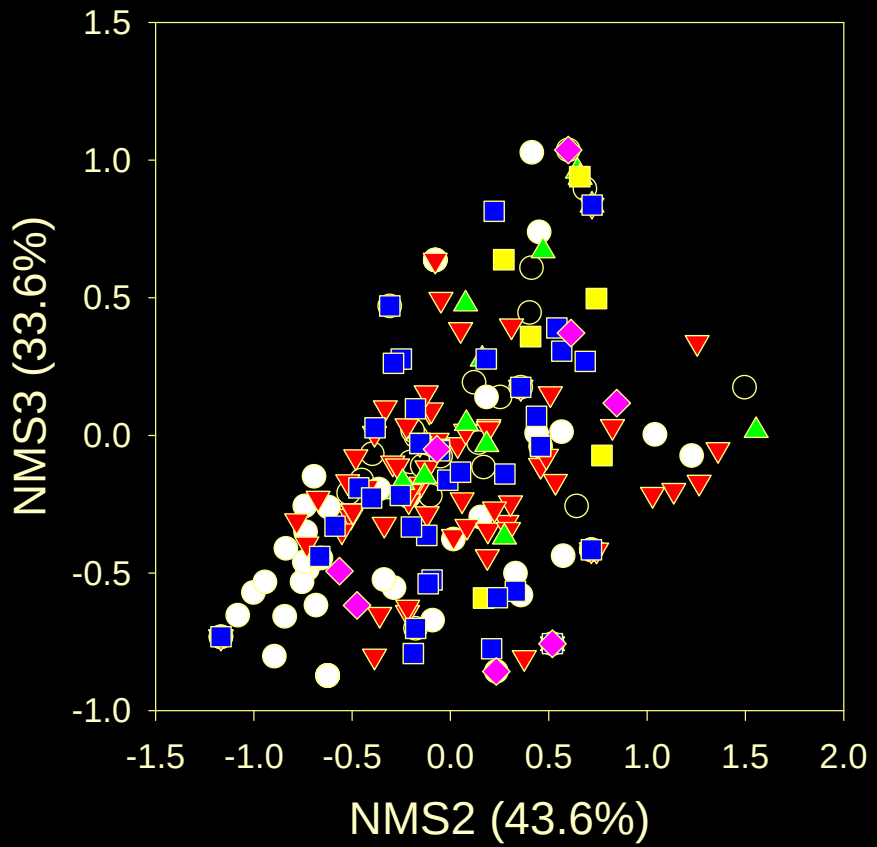


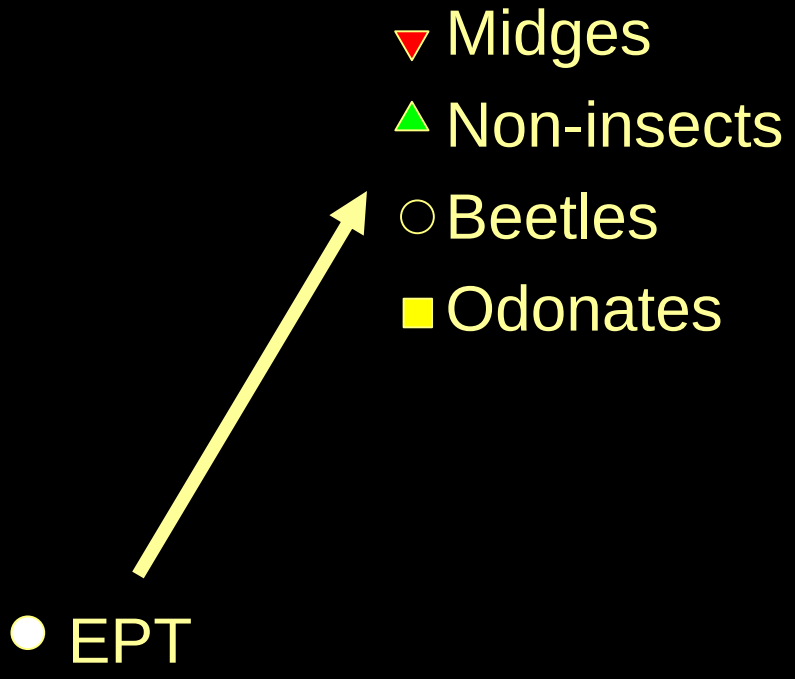
June samples

April samples

BMI communities

Shift from EPT to other types of BMI





Conclusions

- Nonperennial streams are a dominant feature of southern California, but perennial streams may be more common.
- Flow regimes varied, depending on watershed size and substrate.
- Preliminary data showed a negative relationship between IBIs and flow.
- This decline was driven by shift from EPT to more tolerant taxa.

Implications for bioassessment

- Narrow index periods may be necessary for NPS.
- NPS may require different thresholds, or different metrics for an IBI.
- Implications for perennial streams should be investigated.

Thank you!

Questions?