

Challenges in Assessing Condition of Episodic Streams



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COASTAL WATER RESEARCH
PROJECT



The Challenge



Assessing a giant with the axe of a dwarf

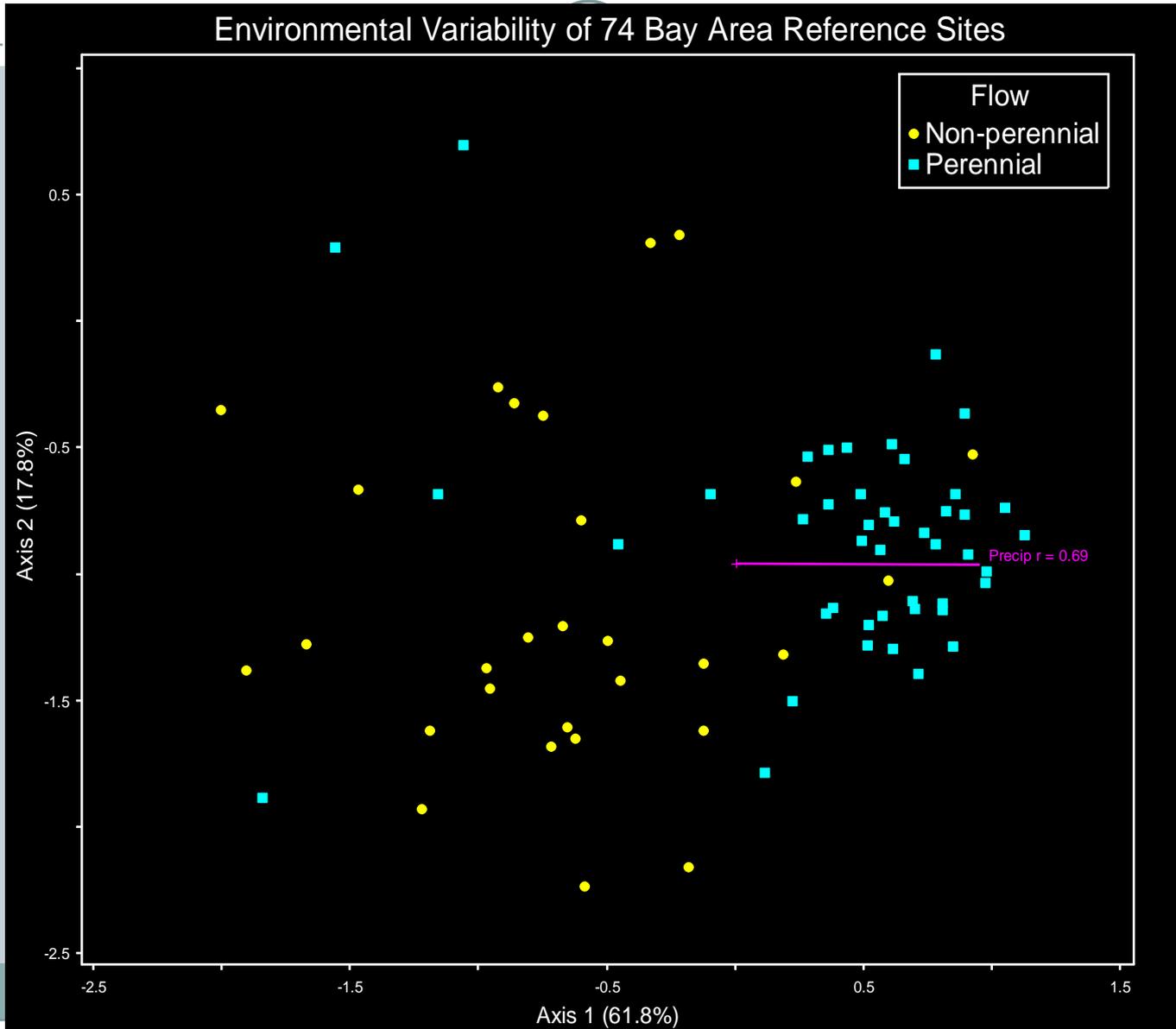


Considerations



- Highly variable systems over space and time
- Difficult to discern “impacts” from patterns of natural disturbance
- Subtle field indicators
- Traditional assessment tools & indicators may not be appropriate

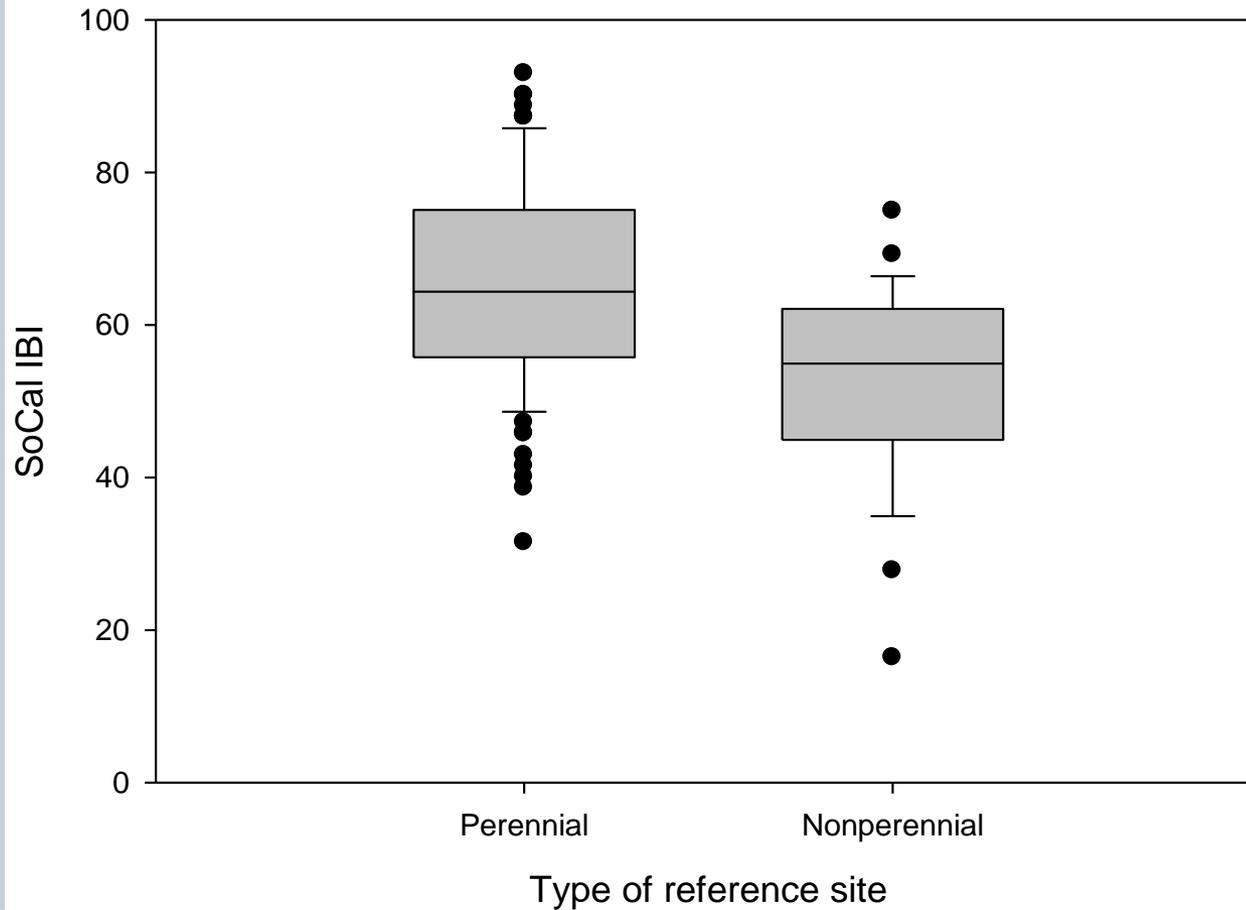
Need to Redefine “Reference”



Indices May Not Transfer Well



Southern California Reference Sites

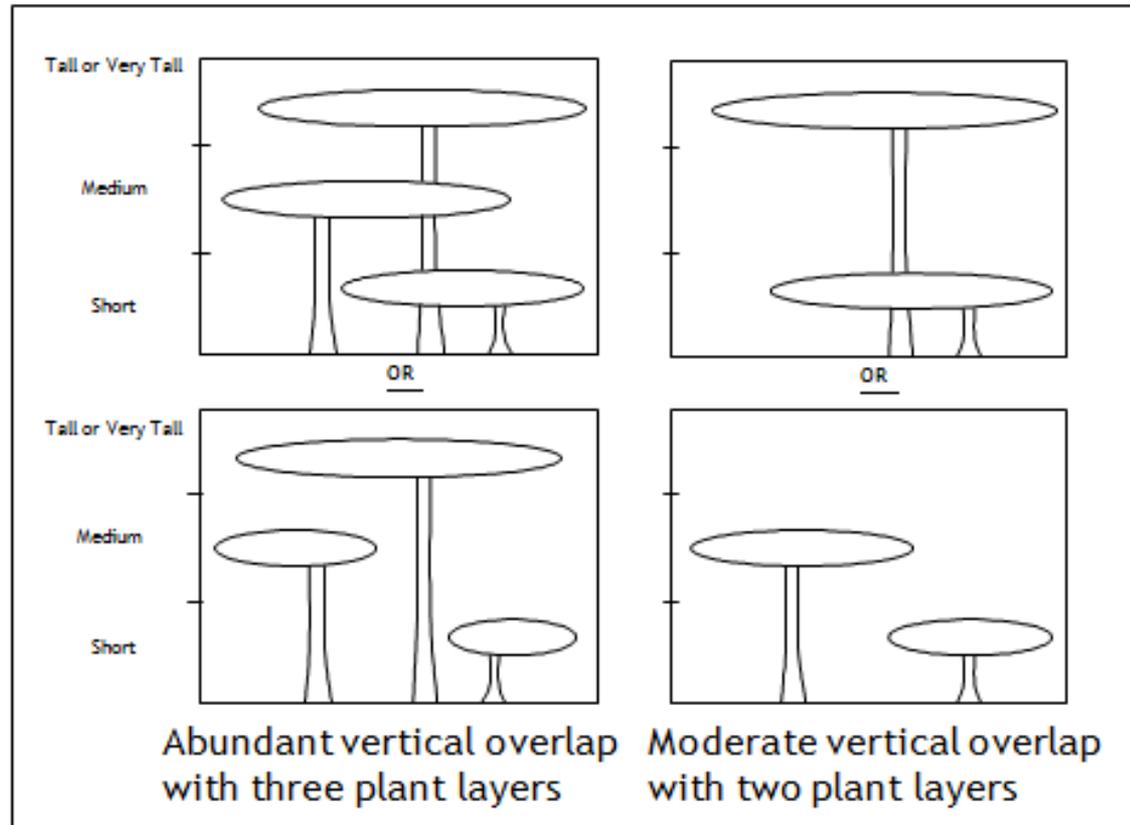


Physical Indicators May Differ

Minimum Patch Size	3 m ²	3 m ²
Secondary channels on floodplains or along shorelines	1	0
Swales on floodplain or along shoreline	1	0
Pannes or pools on floodplain	1	0
Vegetated islands (mostly above high-water)	1	0
Pools or depressions in channels (wet or dry channels)	1	1
Riffles or rapids (wet channel) or planar bed (dry channel)	1	1
Non-vegetated flats or bare ground (sandflats, mudflats, gravel flats, etc.)	0	0
Point bars and in-channel bars	1	1
Debris jams	1	1
Abundant wrackline or organic debris in channel, on floodplain, or across depressional wetland plain	1	1
Plant hummocks and/or sediment mounds	1	1
Bank slumps or undercut banks in channels or along shoreline	1	1
Variegated, convoluted, or crenulated foreshore (instead of broadly arcuate or mostly straight)	1	1
Animal mounds and burrows	0	0
Standing snags (at least 3 m tall)	1	1
Filamentous macroalgae or algal mats	1	1
Shellfish beds	0	0
Concentric or parallel high water marks	0	0
Soil cracks	0	0
Cobble and/or Boulders	1	1
Submerged vegetation	1	0
Total Possible	16	11



Indicators of Biological Structure May be Inappropriate



Considerations for Assessment of Episodic Streams



- Where am I?
- Spatial scale
- Physical indicators
- Biological indicators



Where am I?



Channel Type	Watershed Position		
	Supply	Transport	Deposition
Episodic Flow			
Arroyo			
Alluvial fan (fluvial)			
Alluvial fan (debris)			

- Expectation may vary based on:
 - Substrate type
 - Geologic setting
 - Inherent zones of stability or instability

Spatial Scale - Challenges



Traditional concepts of reach-scale analysis and “bankfull” may not apply



Spatial Scales - Considerations



- Current “active flow paths”
- Entire floodplain
- Portion of floodplain more regularly engaged



1029 ft

Image © 2009 DigitalGlobe

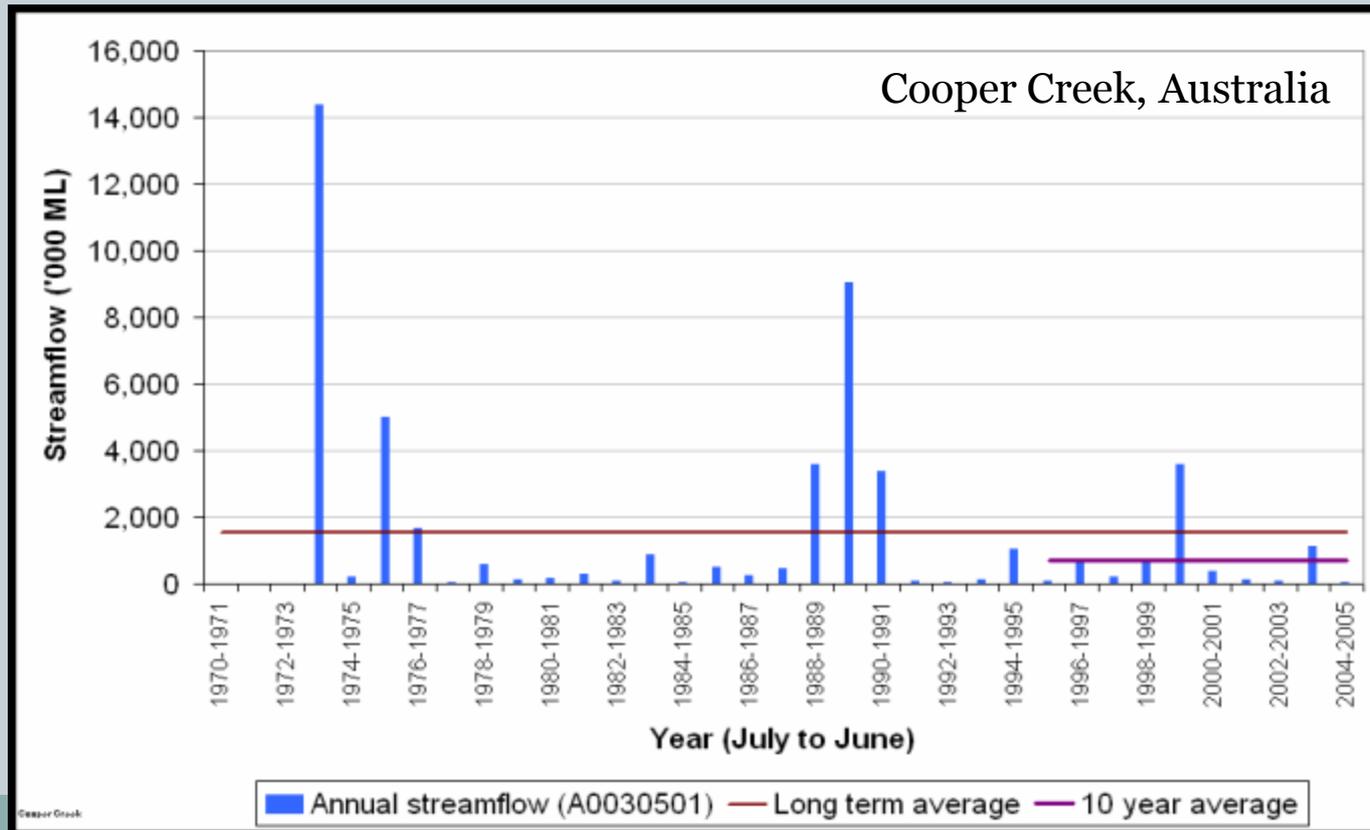
©2009 Google

33°58'22.30" N 117°25'20.38" W

Eye alt 3562 ft

Temporal Scale - Challenges

highly variable flow patterns may make it difficult to differentiate “condition” from natural variability

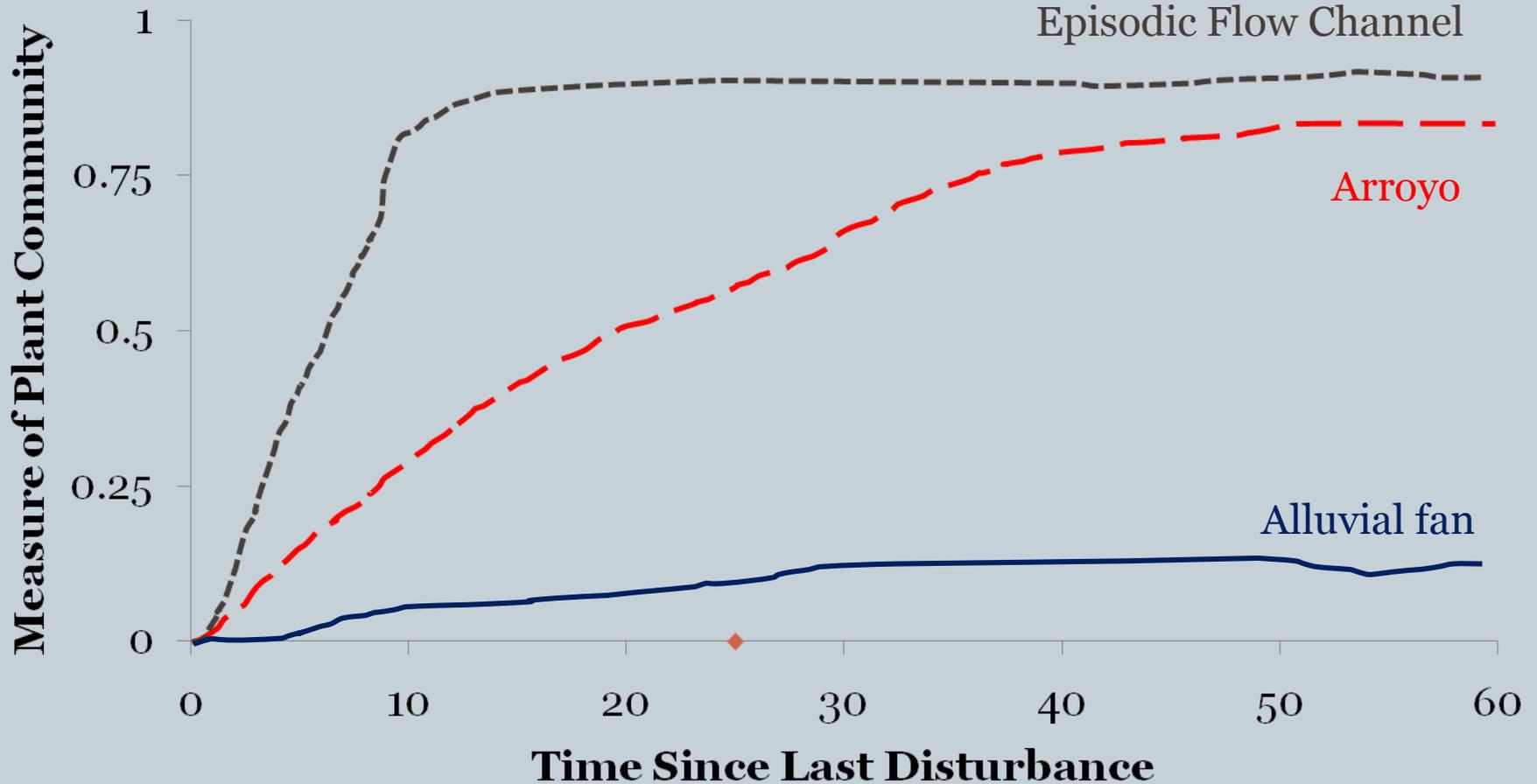


Temporal Scales - Considerations



- Identify semi-stable field indicators or macro-scale structures
- Base evaluation on ranges of values for key indicators
- Identify indicators of repeating patterns of flow or sediment movement
- Use gage data as a measure of system integrity (if available)
- Vary indicators as a function of time since last disturbance

Expectations Vary as a Function of Time



Physical Indicators - Challenges



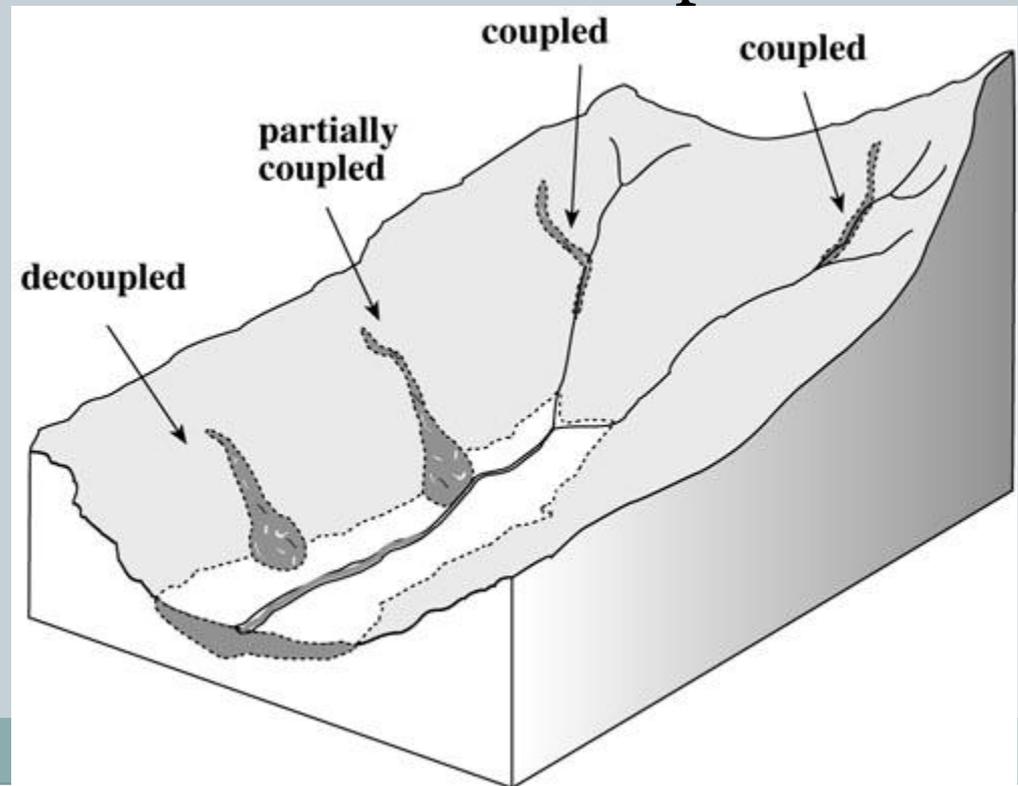
Dynamism may make indicators subtle or hard to measure



Physical Indicators - Considerations



- Planform structure vs. in-channel features
- Prevalence of indicators across active floodplain
- Hillslope coupling
- Landscape context



Prevalence of Indicators

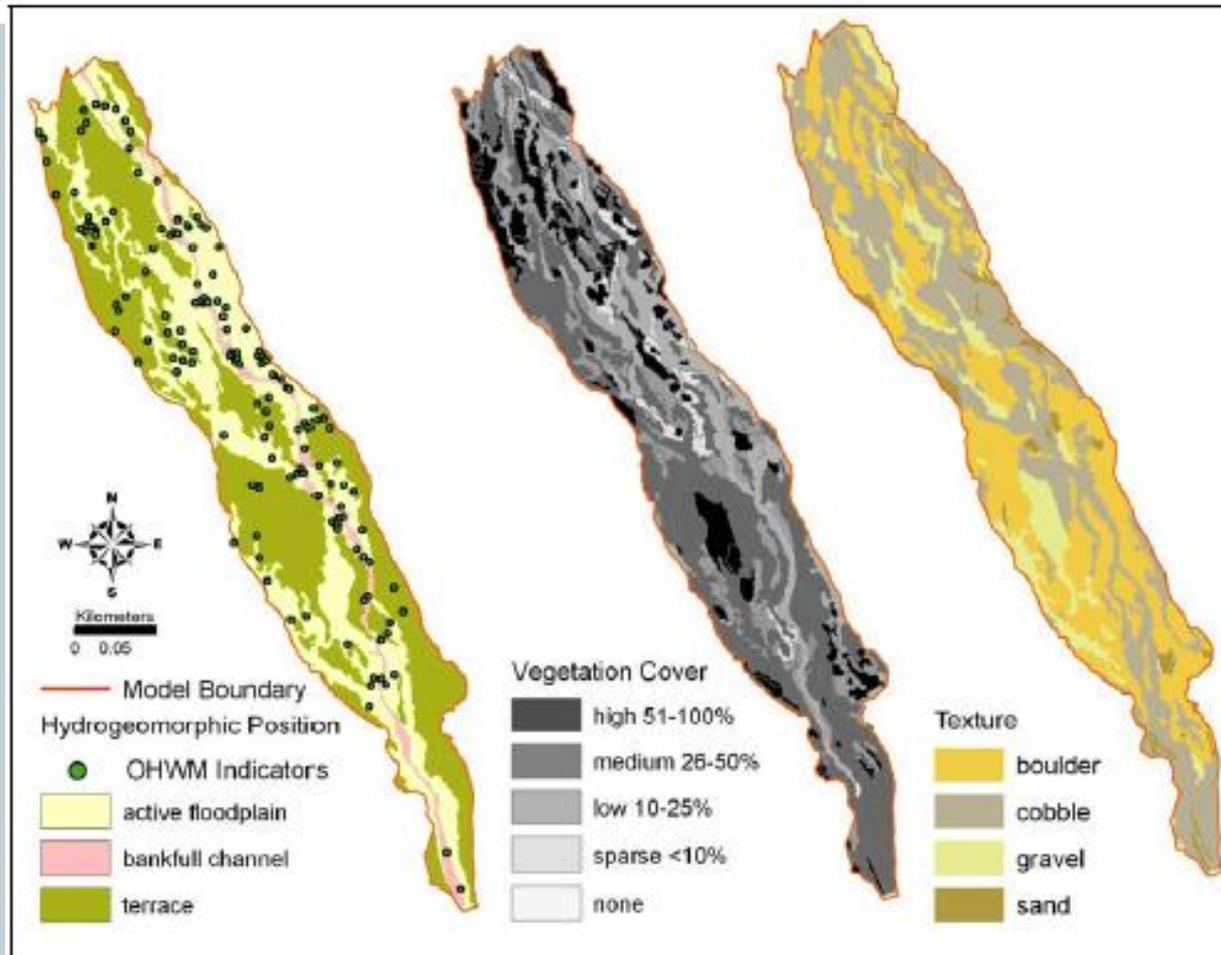


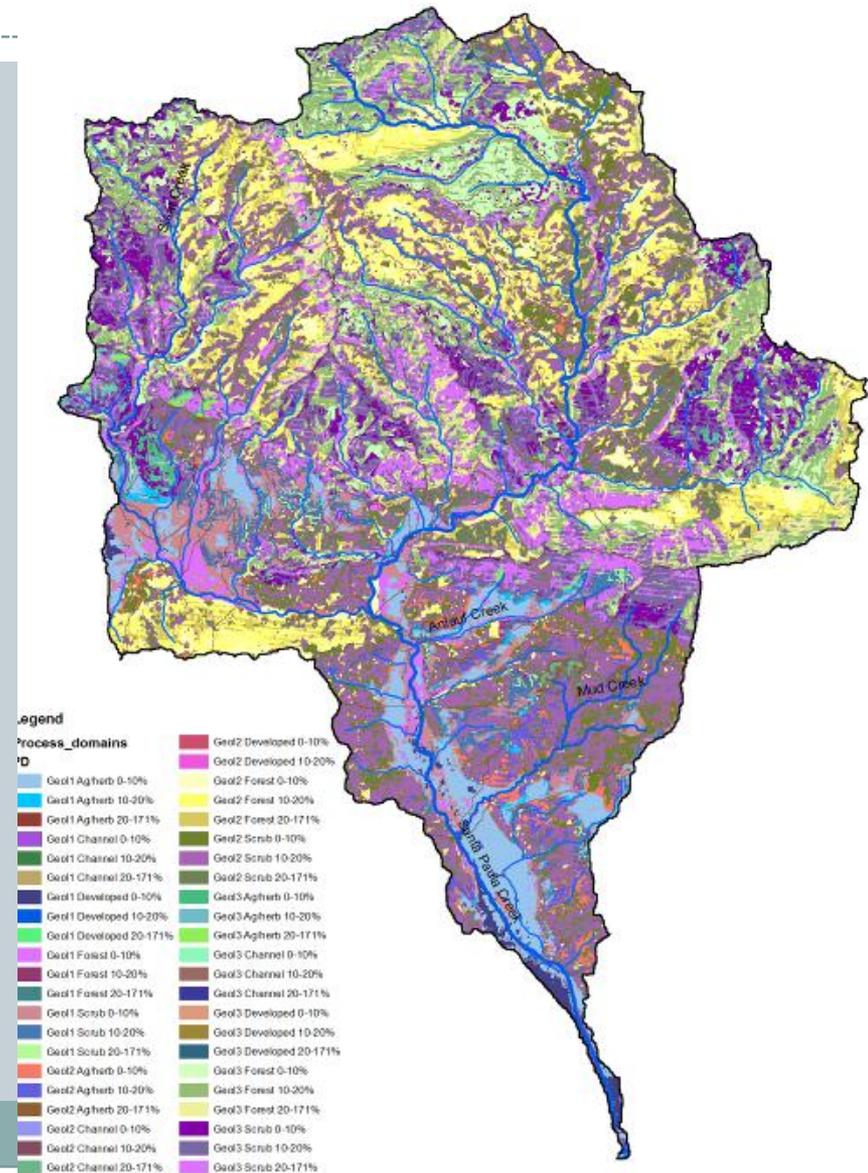
Figure 7. Field mapping results at Mission Creek for hydrogeomorphic positions and OHWM indicators (left), percent vegetation cover (middle), and composite geomorphic textures (right).

Lichvar et al. 2006

Landscape Context

- Sediment yield
 - Geology
 - Slope
 - Land cover
- Land use history/changes
- Existing structures

Applies to Physical and Biological Indicators



Biological Indicators - Challenges



Streams may lack distinctive riparian communities that have structure and composition features used by traditional assessment methods



Biological Indicators - Considerations



- Connections between upland and in-stream communities
- Floodplain plant composition
 - Plant densities and distribution/position across the floodplain
 - Structural complexity of floodplain plant communities
 - Diversity of non-invasive plants
- Linear corridor continuity
- Stand-age distribution
 - Seral stage relative to last disturbance
 - Position of mature vegetation relative to active channel
- “Requisite” faunal habitat



Habitat Assessment



- Position of communities on the floodplain
- Species habitat indicators



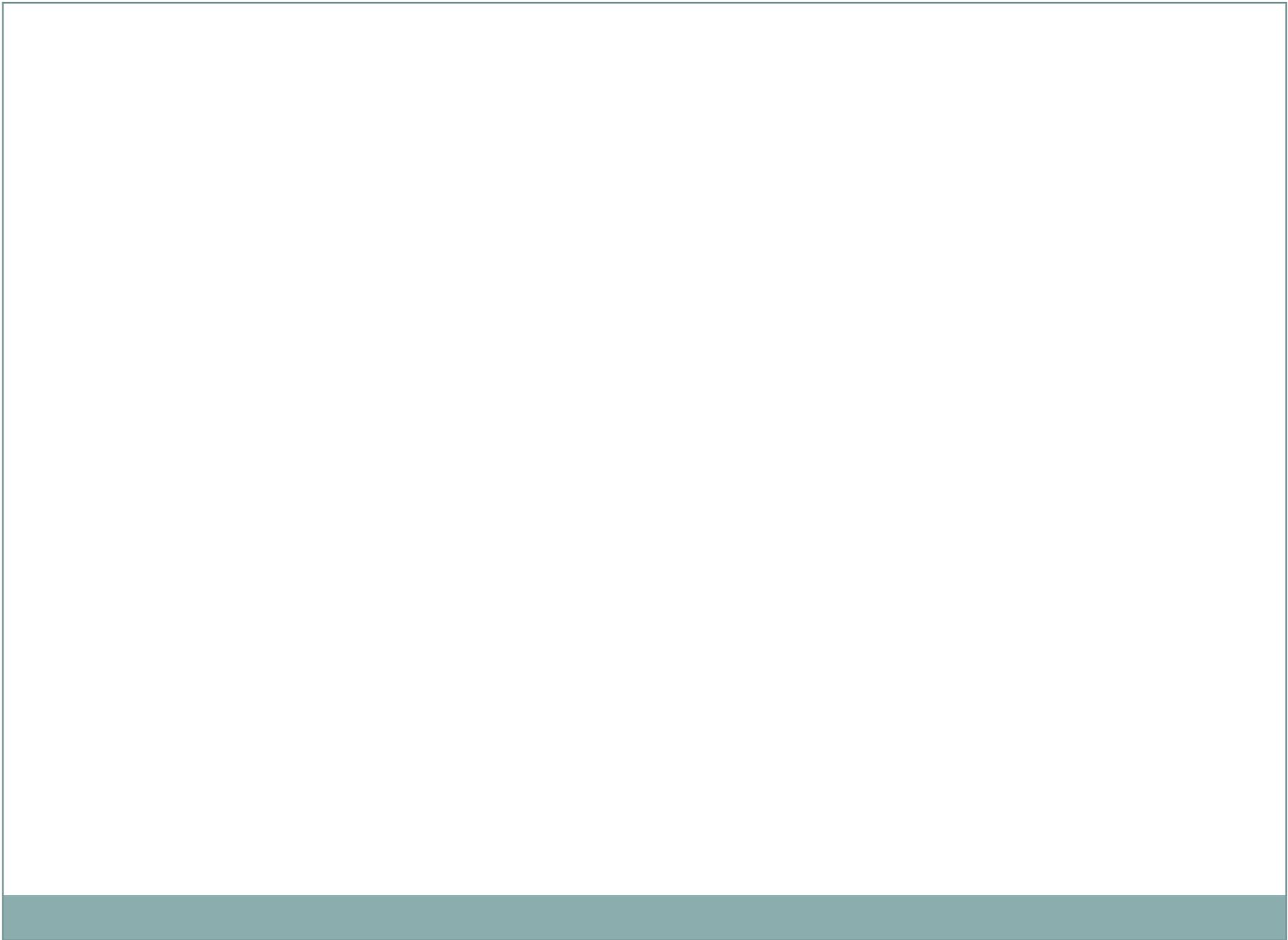
Additional Considerations

- What is reference?
 - Contemporary vs. relict features
 - Assess stressors vs. condition
 - Natural
 - Anthropogenic
 - Relationship to integrated regional monitoring
- Where am I?
 - Spatial scale
 - Physical indicators
 - Biological indicators

THANK YOU



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Break out Sessions



Goal = *develop recommendations for the types of research, resource management tools, and strategies that will be necessary to assess, conserve and effectively manage episodic stream ecosystems*

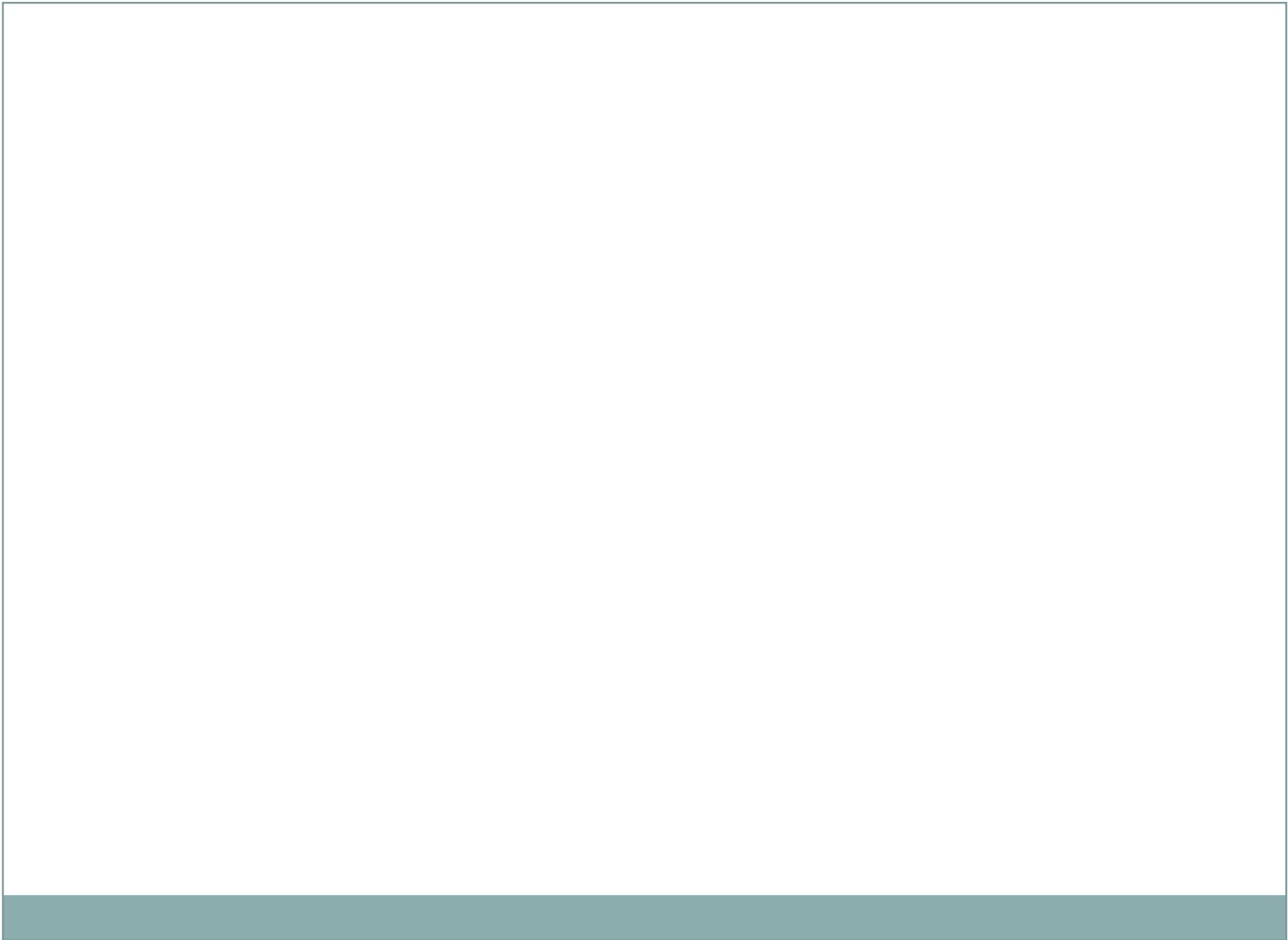
- Group Distribution
 - Biology
 - Physical
- Group Recorder
- Group Reporter

Products will be included in the workshop report

Break out Group Questions



- What key limitations of existing function or condition assessment tools must be addressed to make them appropriate for use in dryland environments?
- What key field indicators should be used to assess the biological or physical condition of dryland environments?
- What key field indicators can be used to delineate the boundaries of the functional ecosystem in episodic systems?
- What parameters should be included in regional or project-specific monitoring programs to promote improved understanding of the function of episodic systems over time?
- What priority research should be funded to address the limitations or knowledge gaps identified by the questions above?



Assessment Window

