



# Floodplain Heterogeneity

## *Measurements & Metrics*

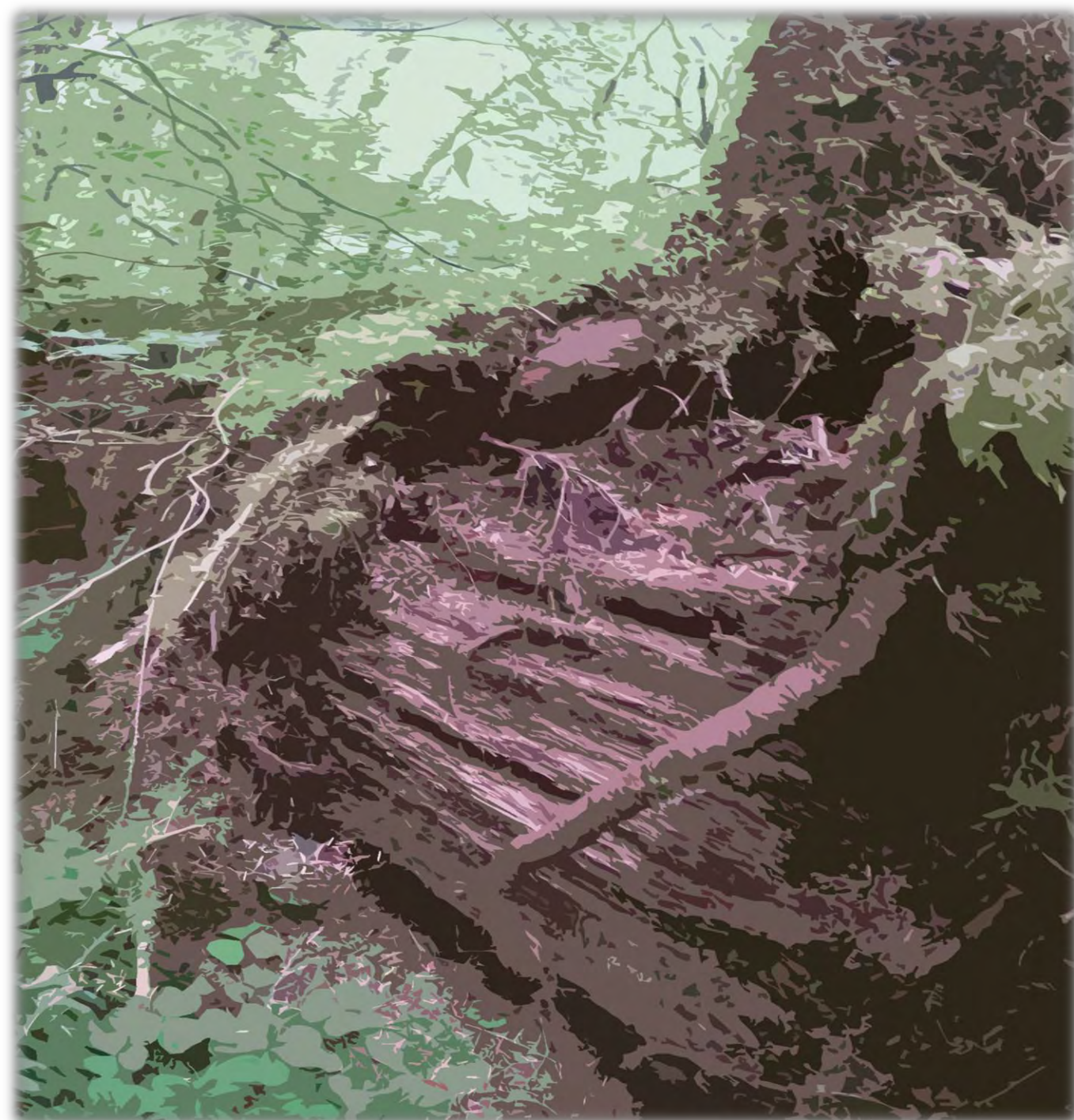
October 5, 2021  
Sustaining Colorado Watersheds Conference  
Emily Iskin, MS, PE

# Floodplain Heterogeneity is...

Spatial differences in topography, vegetation, grain size and texture, soil moisture, and ponded or flowing water

- Is driven by active channel movement across the valley bottom
- Is important because it impacts storage of water, sediment, solutes, and organic matter
- Is largely unquantified!





# How Can We Measure It?

**Our research is based on field data collection and remote sensing...**

# Field Work

We define and delineate “patches” at each field site as we walk across the floodplain

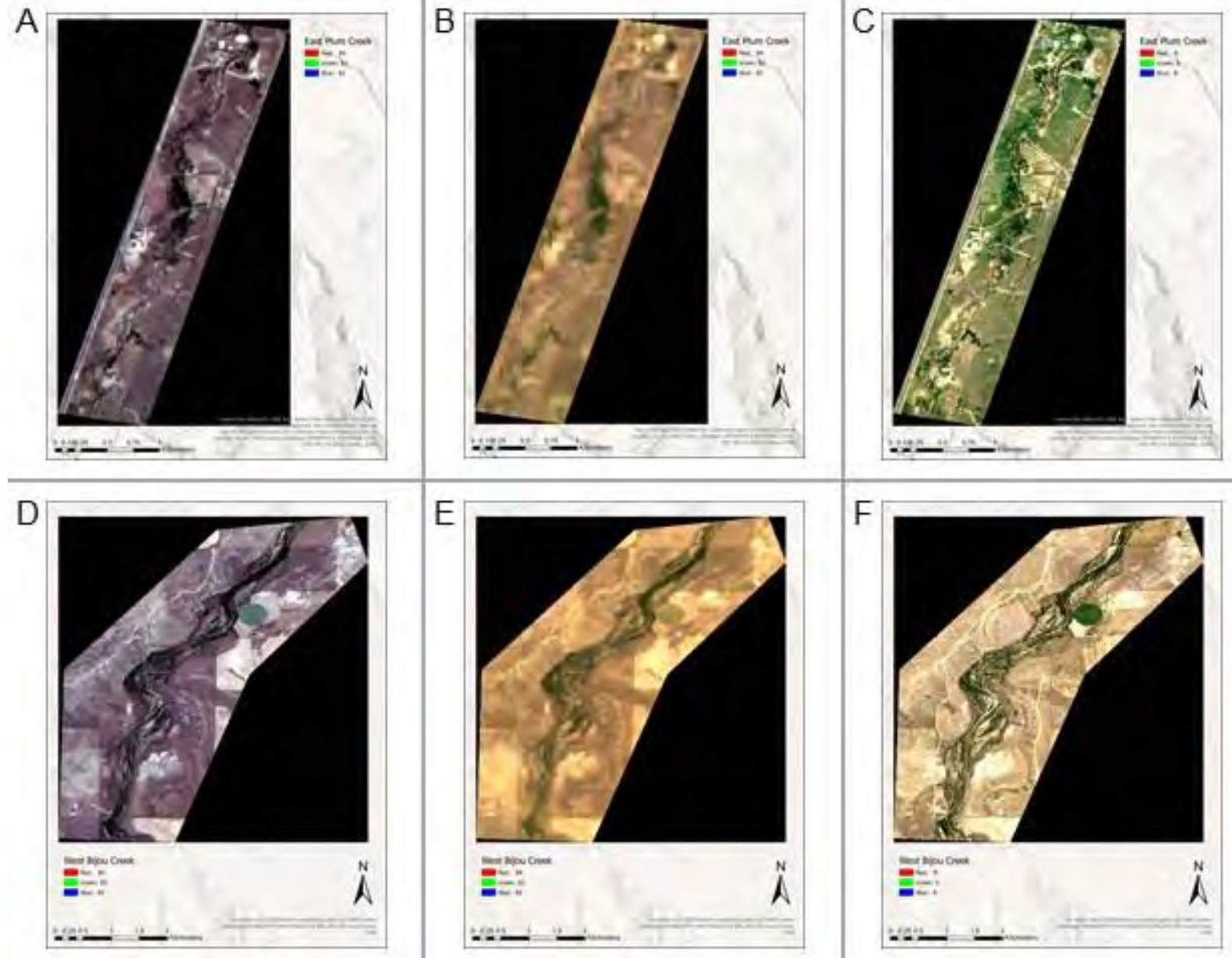
- 5-10 transects per river reach, perpendicular to valley trend
- Travel along the transects identifying different patches, GPS the boundaries, and describe what they look like
  - Type and relative age/DBH of vegetation
  - Geomorphic characteristics: sediment size, channels, terraces, planform, gradient, log jams
  - Water: wetland, flowing side channel, seep



# Remote Sensing

Satellite images allow for global assessment and analysis

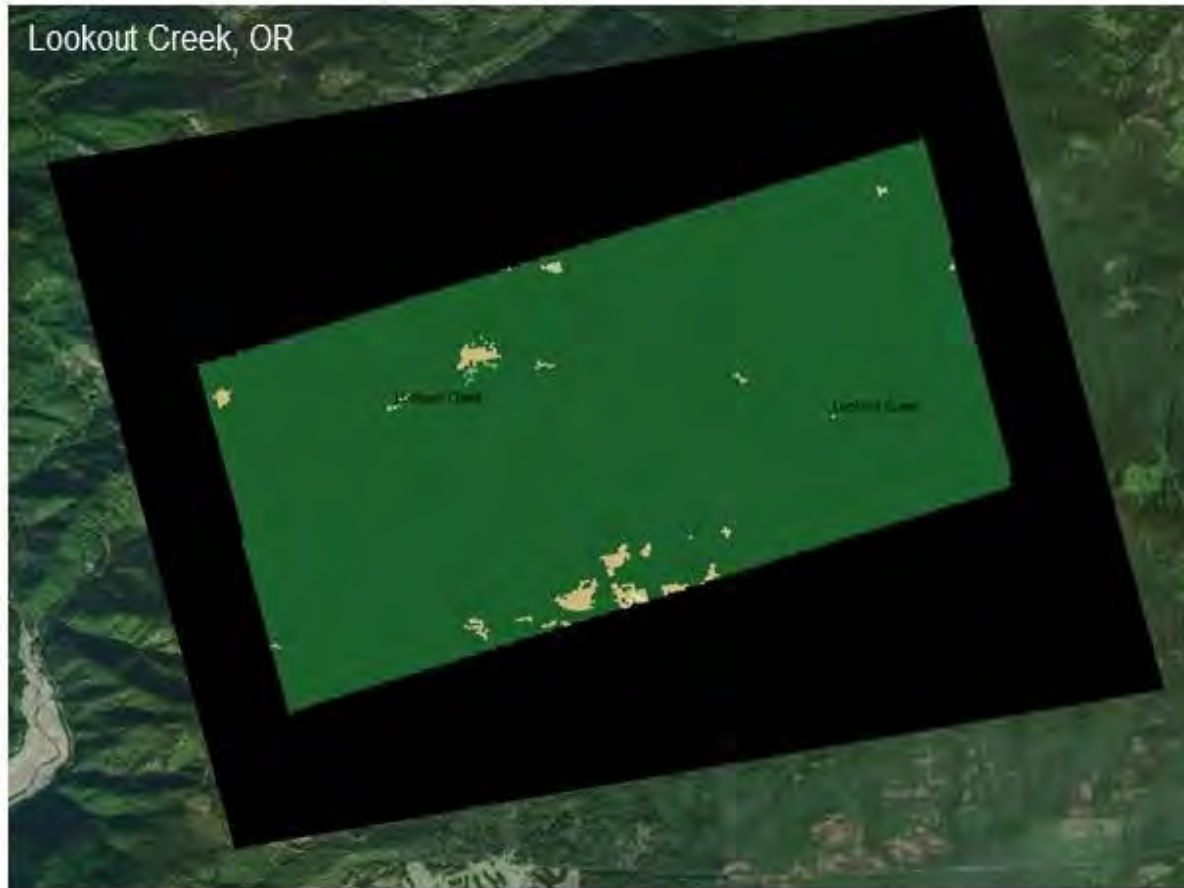
- Compare field delineation to spectral/object-based classification
- Perform sensitivity analyses
- Use classified images to calculate floodplain heterogeneity



# How Can We Quantify It?

We use metrics from the field of Landscape Ecology: *patch, class, landscape*

- 11
- 21
- 22
- 23
- 24
- 31
- 41
- 42
- 43
- 52
- 71
- 81
- 82
- 90
- 95



# Example Metrics: normalized, bounded, scalable, and/or comparable

Metric Name	Metric Type	Limits (units)
Aggregation index	Aggregation	[0, 100]
Division index	Aggregation	[0, 1)
Interspersion and juxtaposition index	Aggregation	(0, 100]
Patch density	Aggregation	(0, 1x10 <sup>6</sup> ], (number/100 hectares)
Percentage of like adjacencies	Aggregation	[0, 100]
Largest patch index	Area and Edge	(0, 100]
Disjunct core area density	Core Area	>0, (number/100 hectares)
Modified Simpson's evenness index	Diversity	[0, 1)
Patch richness density	Diversity	>0, (number/100 hectares)
Relative patch richness	Diversity	(0, 100], Max # patches = 20 for NLCD
Shannon's evenness index	Diversity	[0, 1)
Simpson's diversity index	Diversity	[0, 1)
Simpson's evenness index	Diversity	(0, 1]
Perimeter-area fractal dimension	Shape	[1, 2]

# Ideas & Questions?



<https://www.eea.europa.eu/highlights/restoring-floodplains-would-improve-state>



# References

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