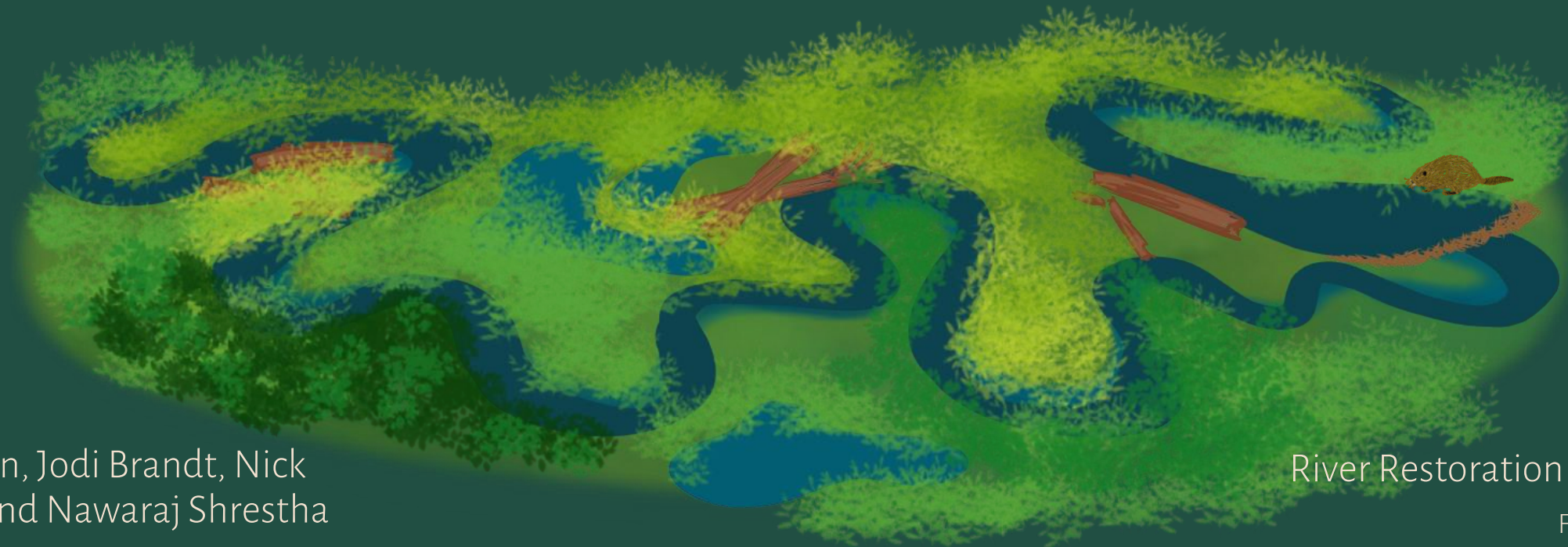


Rewilding the Riparian West:

Spatial and Temporal Responses of the Yankee Fork to
Process-Based Restoration



Emily Iskin, Jodi Brandt, Nick Kolarik, and Nawaraj Shrestha

River Restoration Northwest

February 4, 2025

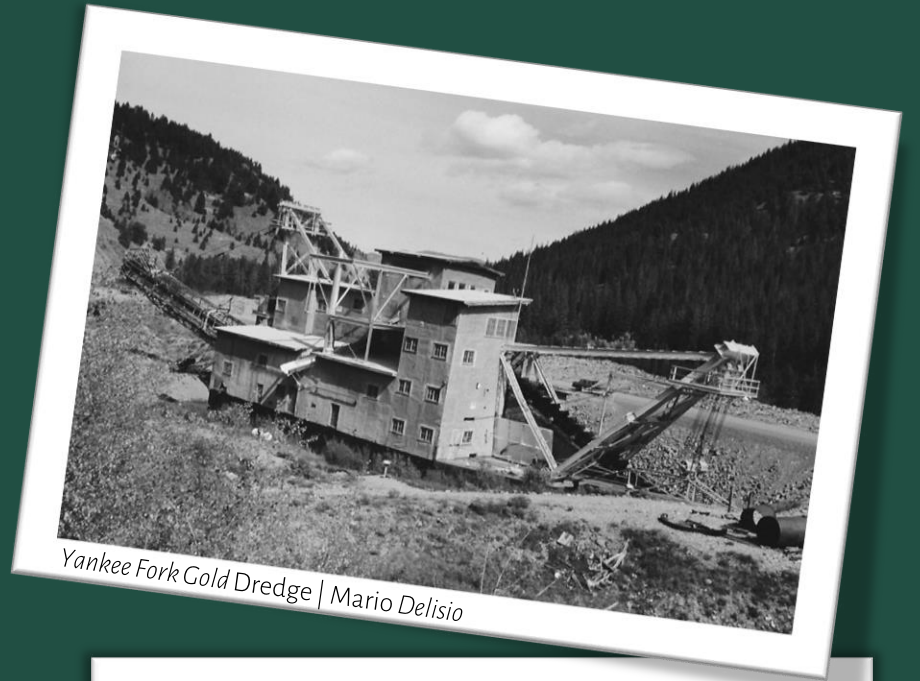
Idaho's Rivers



PBS



Idaho Fish & Game



Yankee Fork Gold Dredge | Mario Delisio



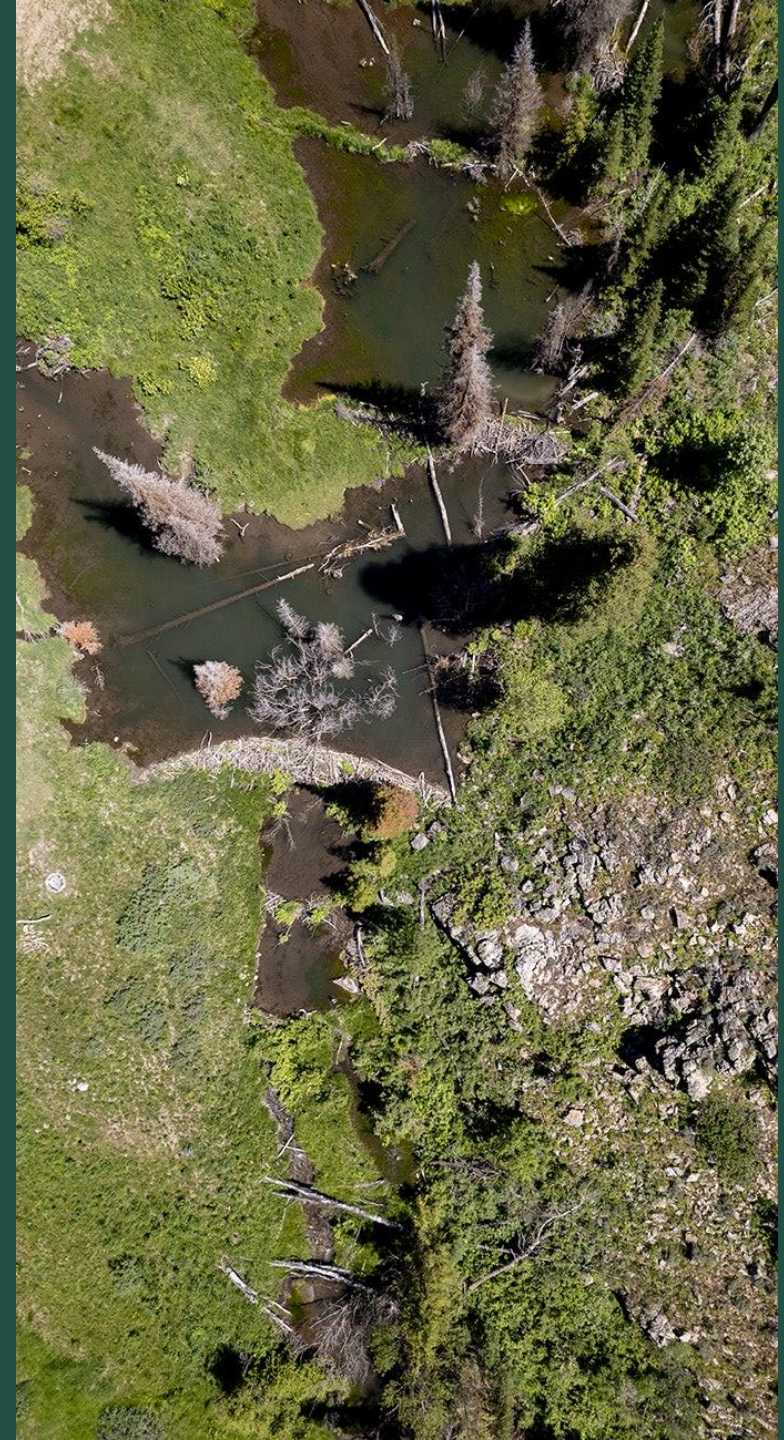
Frank Church | Boise State University



Potato News Today

Idaho's Rivers

- Legacy of wild places and human modifications on the landscape
- Recent increase in process-based restoration to address human impacts, including in Idaho
- This requires many partnerships and proponents
 - BLM, USFWS, USFS, TNC, TU, landowners, universities, consultants...



Is It "Working"?

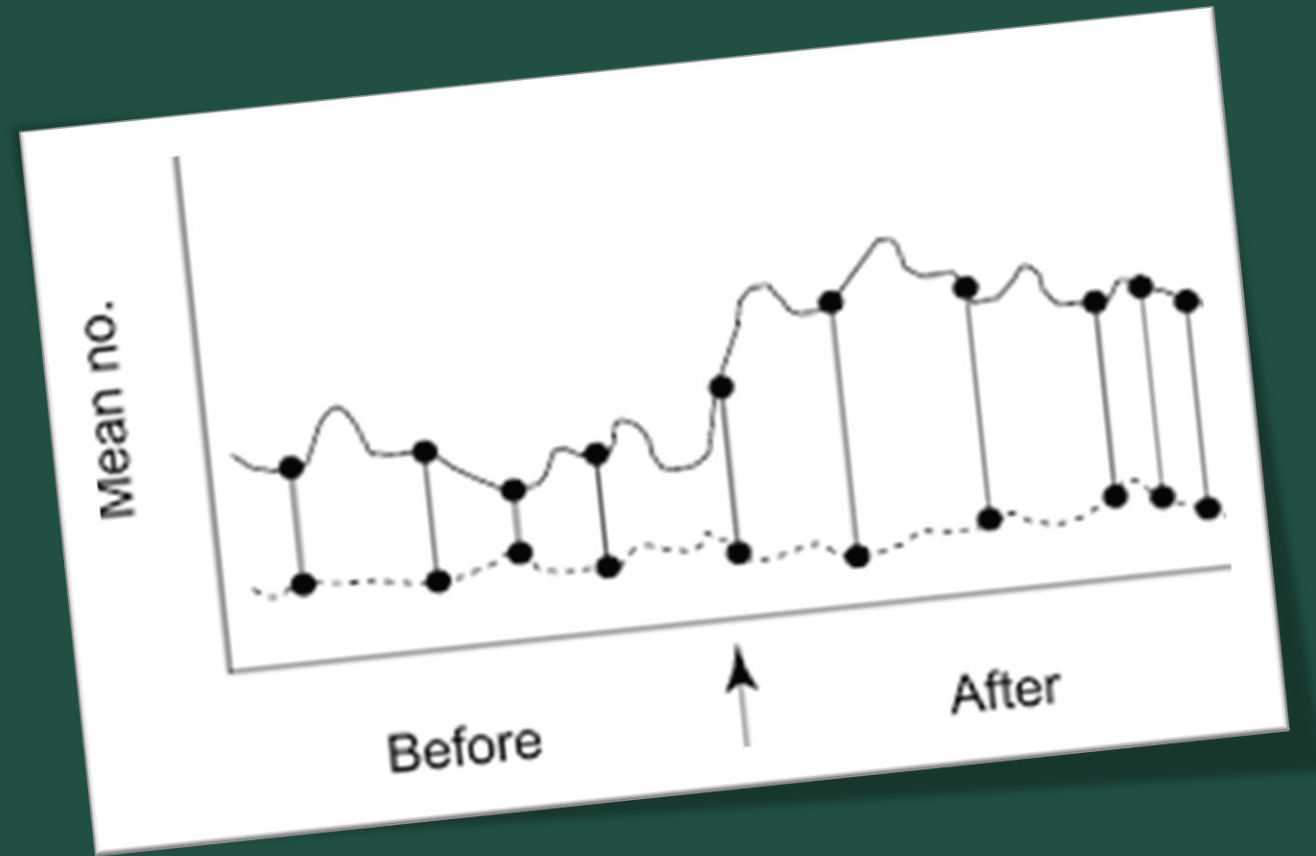
- As with any landscape change, we have to measure the impact of process-based restoration to understand if and how it is affecting:
 - Surface water availability
 - Vegetation vigor
 - River health
- Monitoring in the field can be time-consuming and costly, and benefits from 1+ years of pre-restoration data



→ *How can we leverage existing, free time series to measure change?*

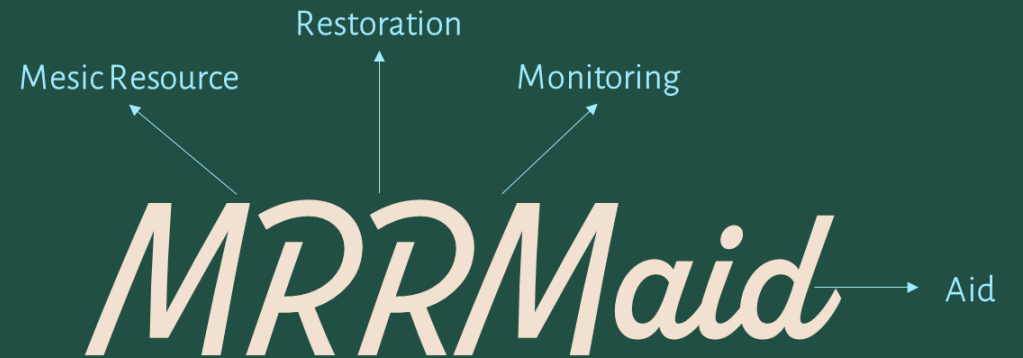
Before-After Control-Impact

- To measure landscape change, we need to compare to unaltered sites
 - For example, if you restore a river during prolonged drought, how can you tell if the project is having a positive effect?



Our Approach

- Compile restoration history for projects with at least 7 years of post data
 - Goals of the work, footprints, timelines from partners and publications
- Pair the restoration reach with natural and degraded control reaches in the same watershed
 - Historical and Current BRAT dataset filters, VBET dataset to limit to beads
- Map mesic vegetation through time at the grouped sites
 - MRRMaid Mesic Vegetation Persistence dataset for 1984-2022
- Use timeseries analysis tools to measure change on the ground



MRRMaid Toolbox

Landing Page



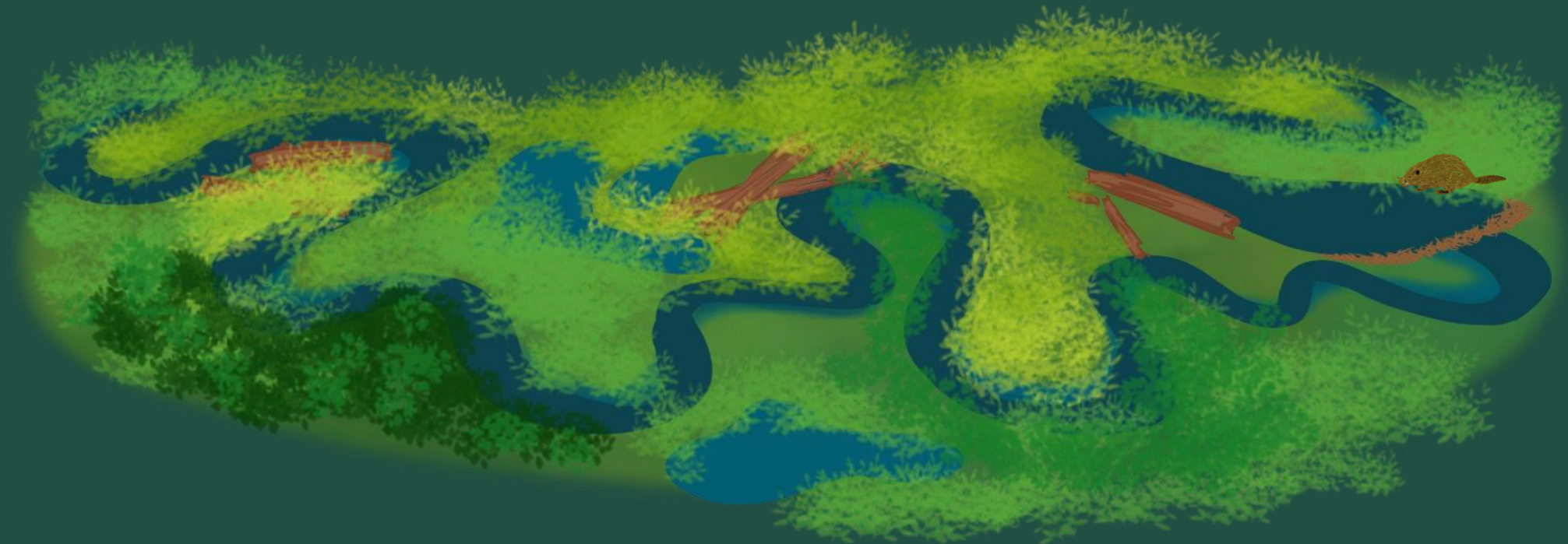
MRRMaid Monthly



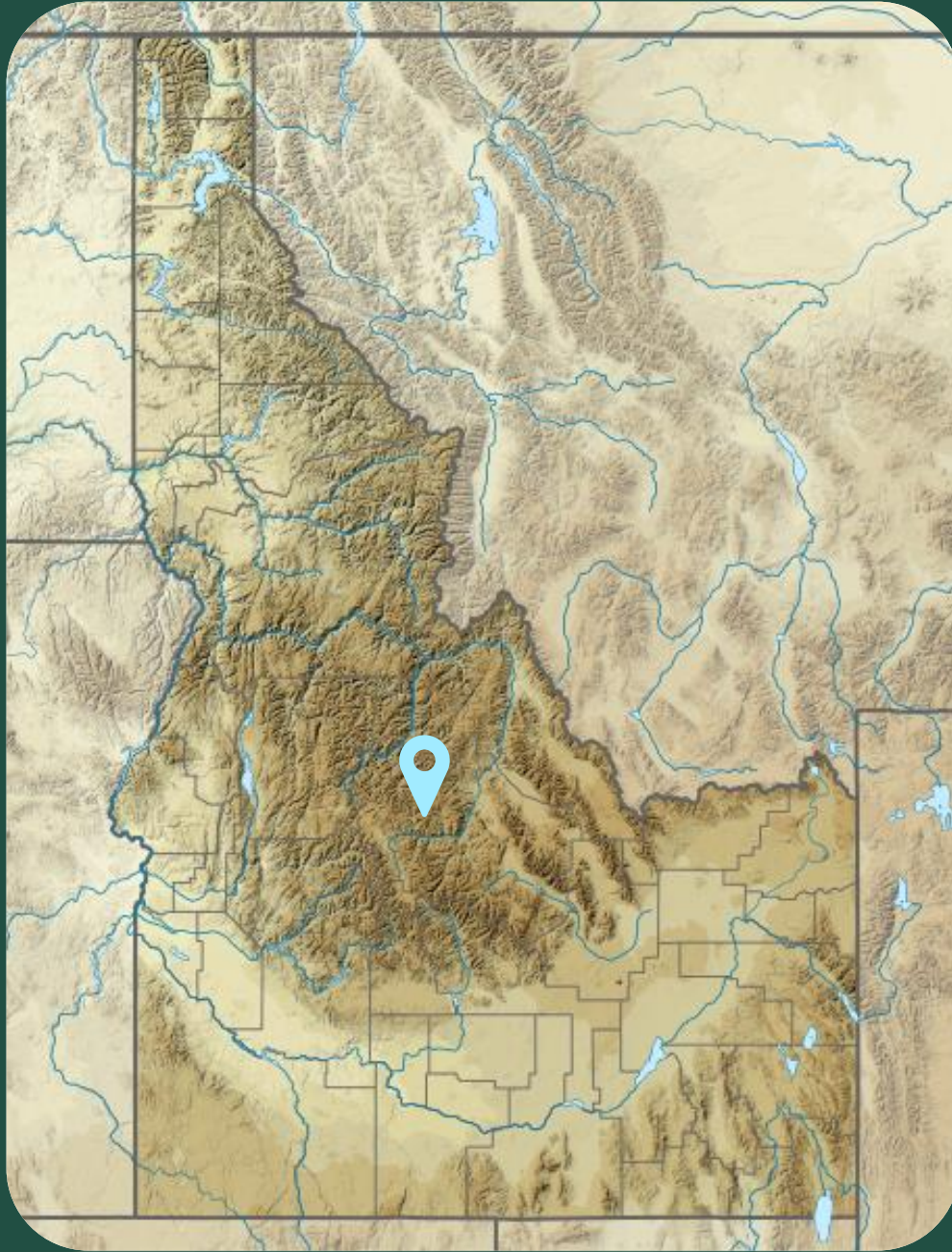
MRRMaid MVP Restore



Yankee Fork of the Salmon River, Idaho



Yankee Fork



Yankee Fork

- Deforested and dredged for gold from 1940 to 1952
- Reduced connectivity and complexity by burying the floodplain under dredge tailings



Yankee Fork

- Stream and floodplain restoration projects along three stream reaches led by Trout Unlimited
 - Removed tailings
 - Reconstructed channels
 - Reconnected floodplain
 - Planted native vegetation
 - Added large wood
 - Re-established sediment grain size distribution
- West Fork Confluence Restoration Project
 - 2015: Historic channel restoration
 - 2016: Side channel restoration
 - 2017: Large flood event, log structures added



Trout Unlimited

2013

Before Restoration



2015

During Restoration



2017

Large Flood



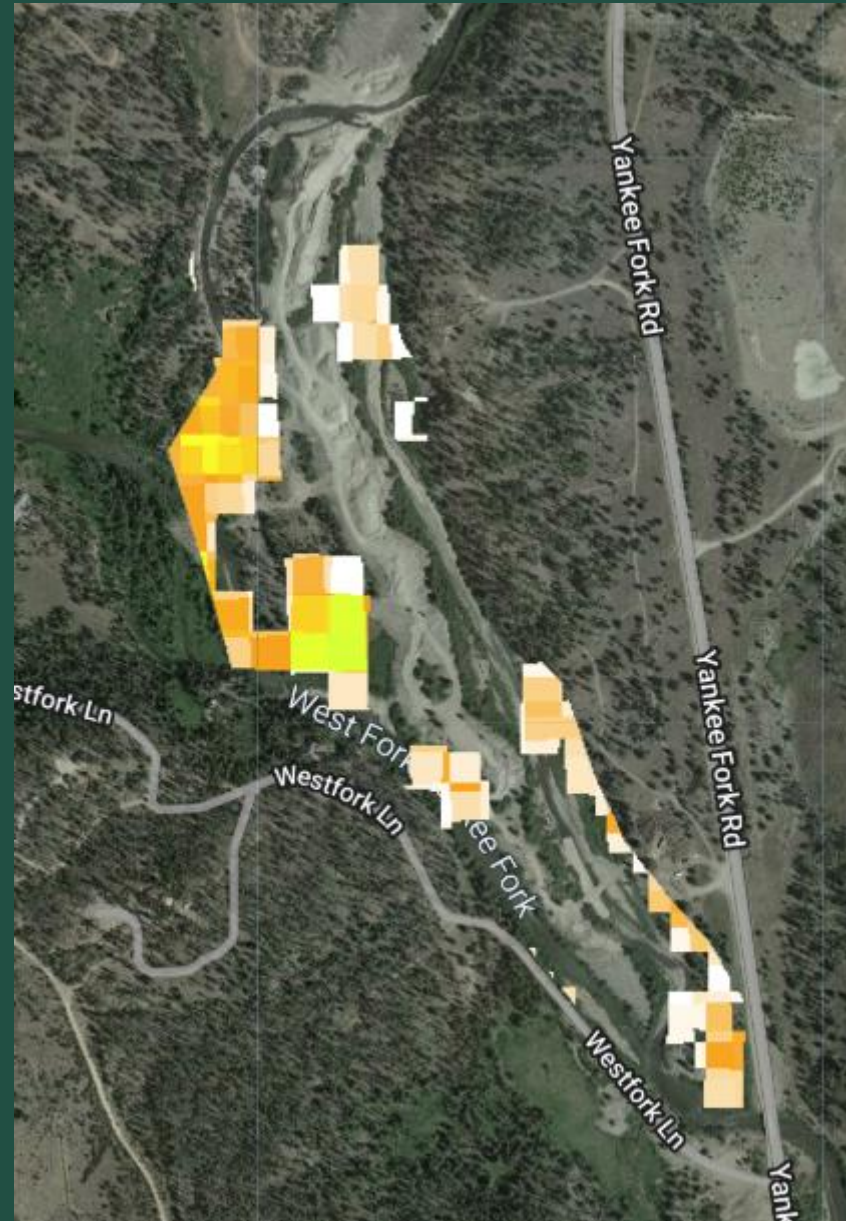
2023

After Restoration



MRRMAid Timeseries

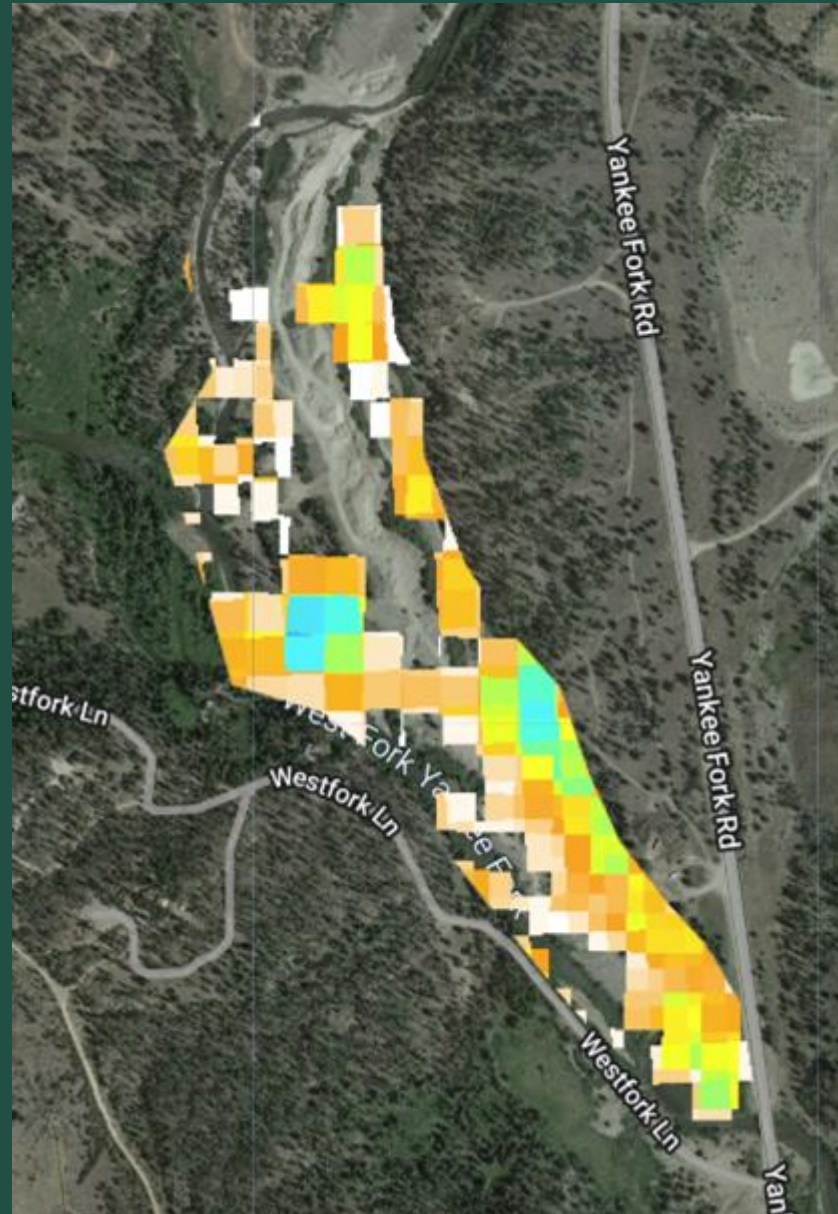
Before: 1984-2014



MRRMAid Timeseries

Before: 1984-2014

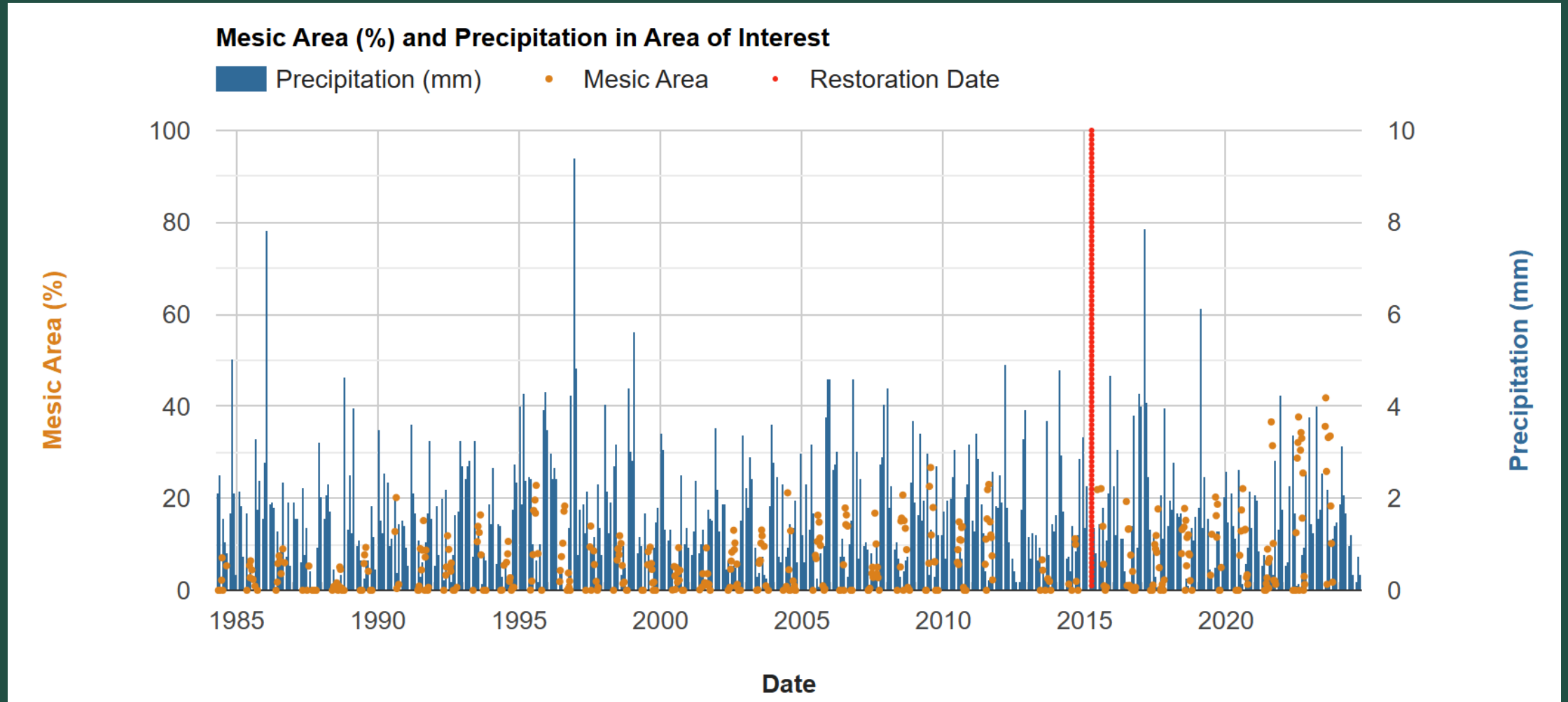
During and After: 2015-2024



MRRMAid Timeseries

Before: 1984-2014

During and After: 2015-2024



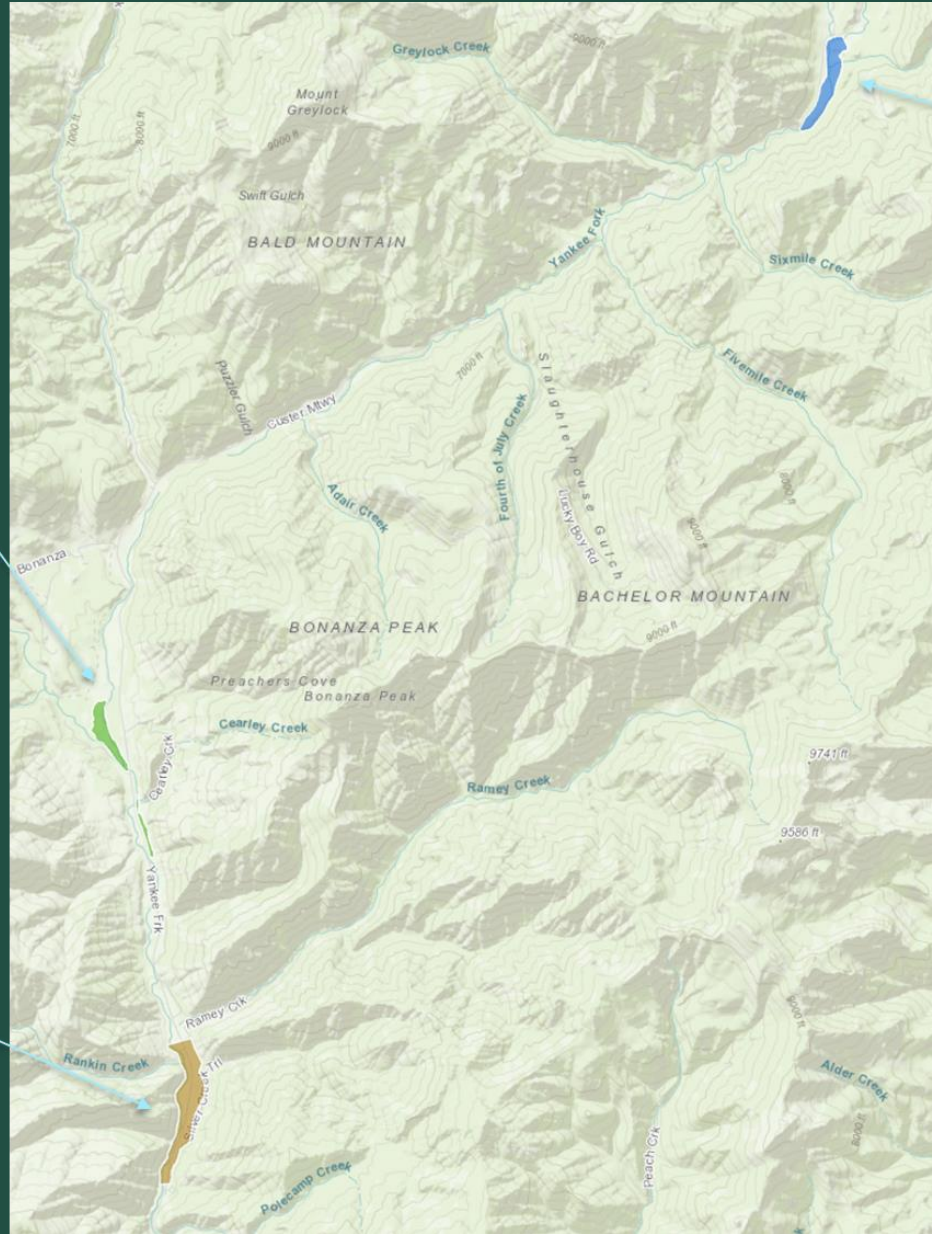
Comparison Site Selection



Restored



Degraded

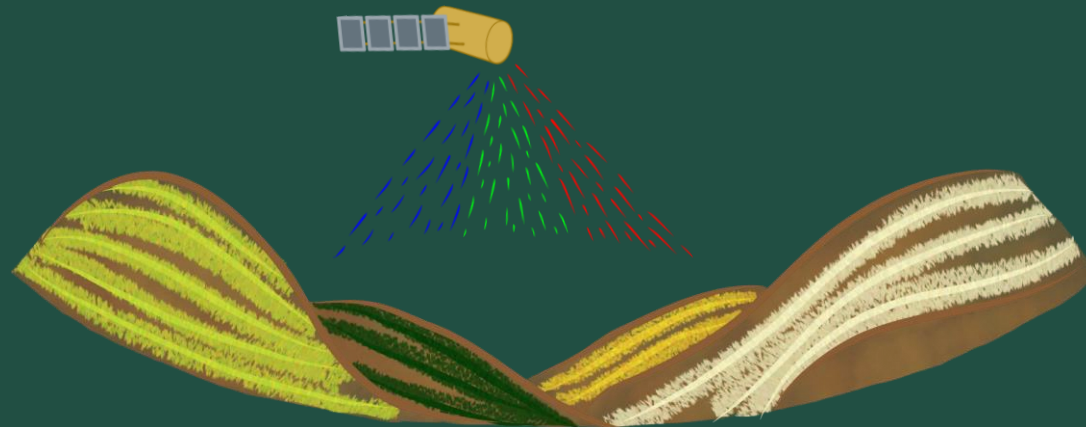


Natural

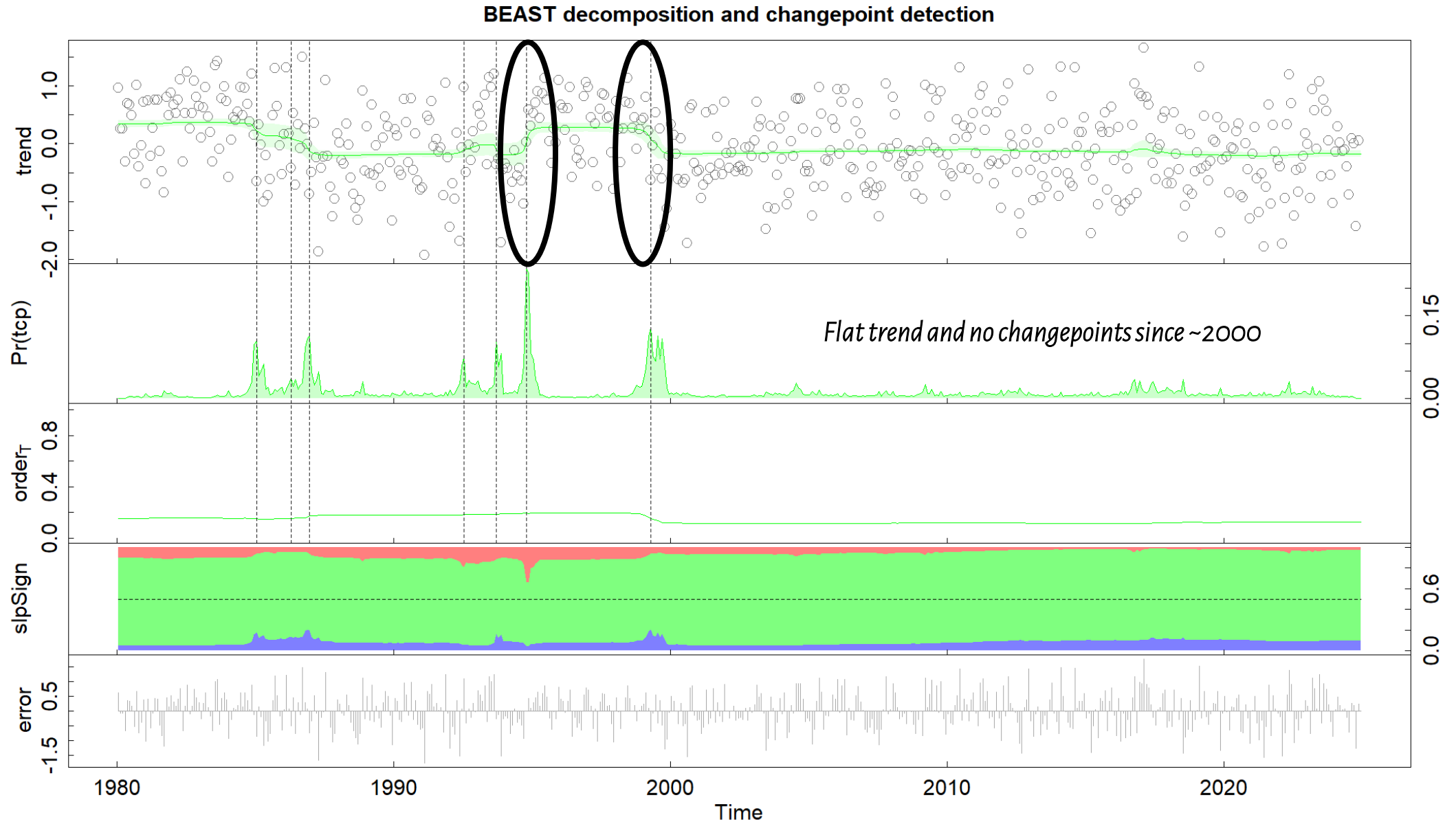


Timeseries Analysis

- Landsat archive goes back to 1984
- Leverage this data to have a long period of data before restoration at all three sites
- Use a ready-baked R package to look for changepoints in the seasonality and trend
 - *Bayesian Estimator of Abrupt change, Seasonal change, and Trend (BEAST)*

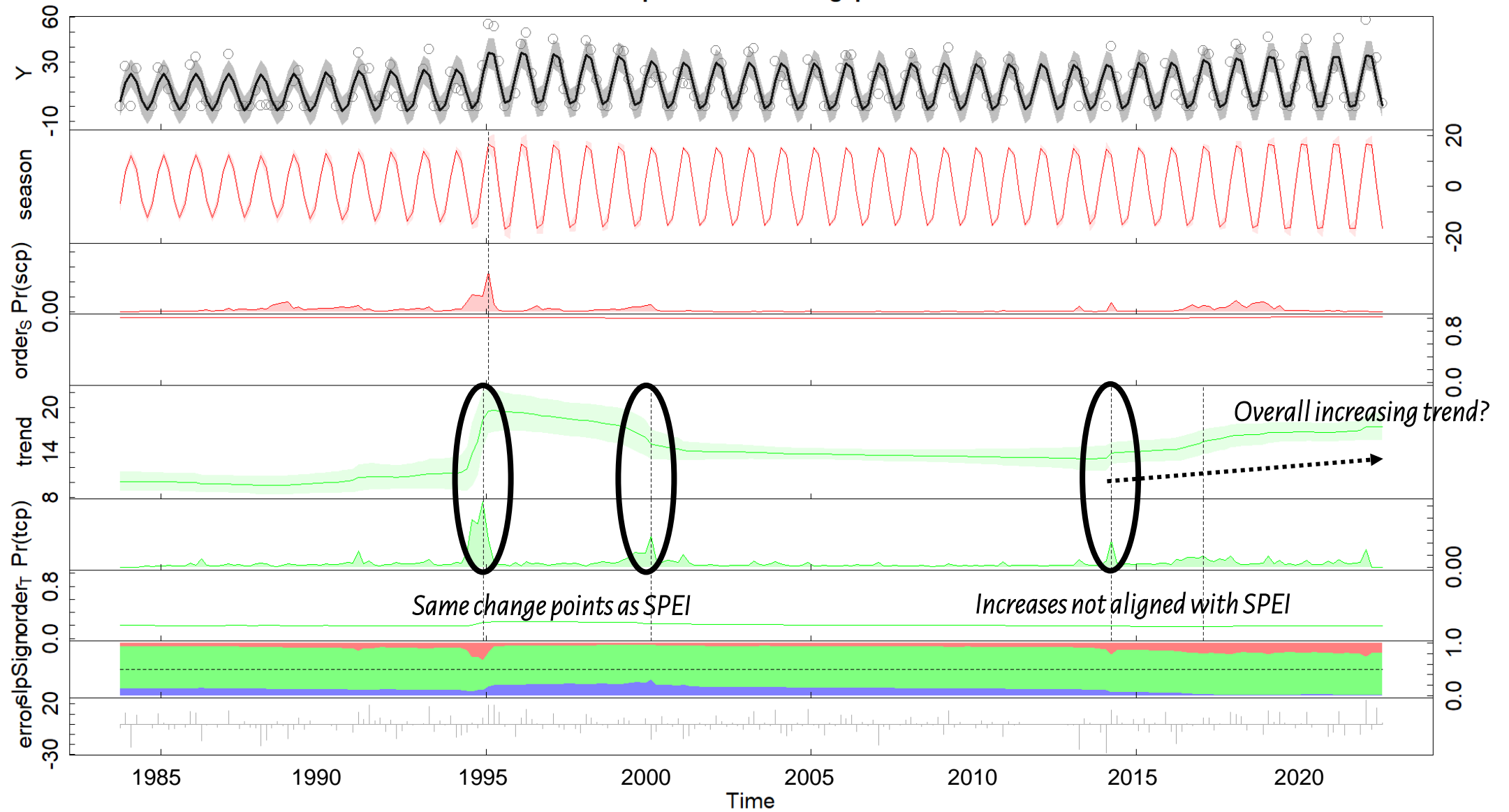


SPEI Trend



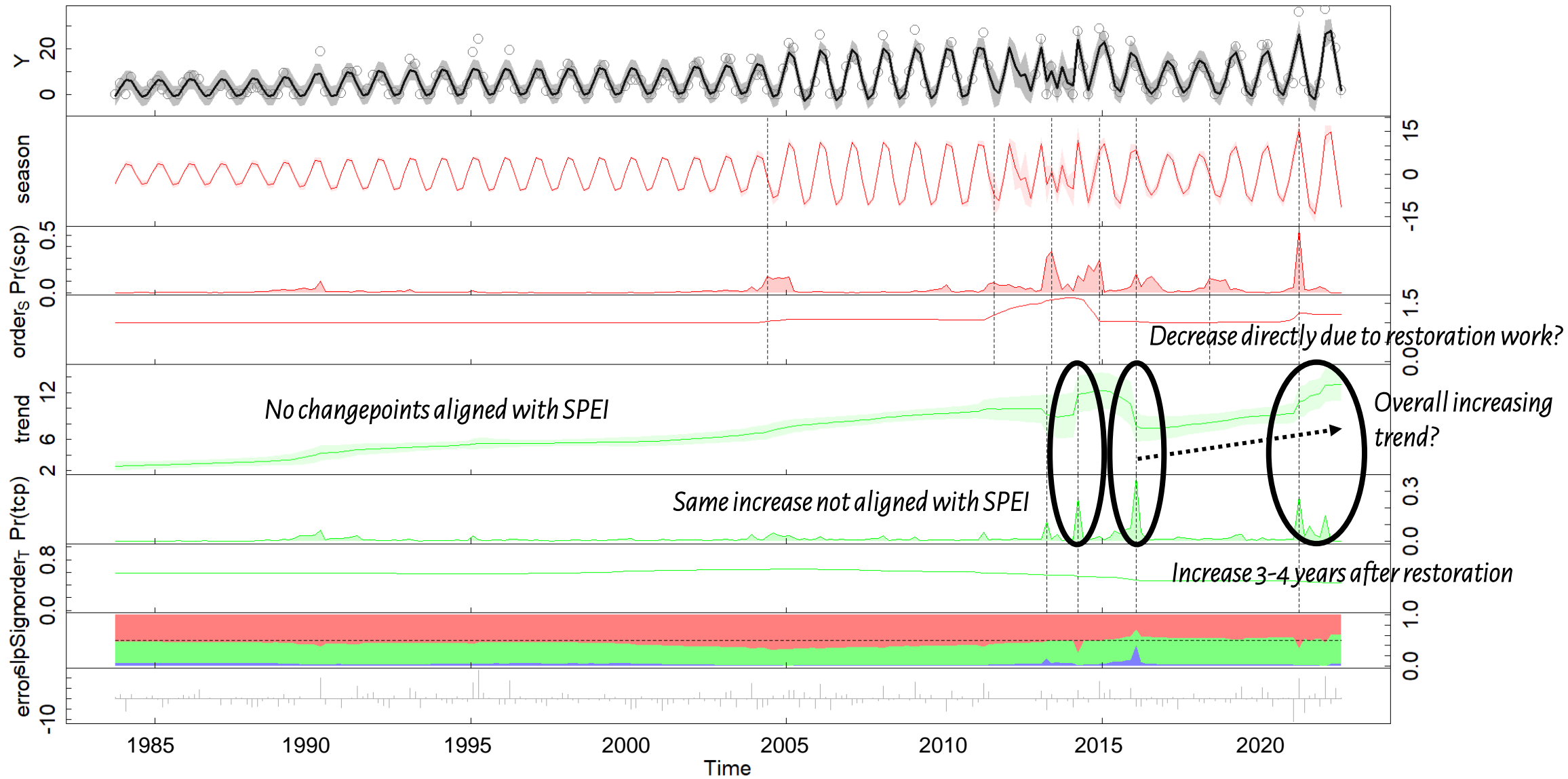
Yankee Fork Natural Site

BEAST decomposition and changepoint detection



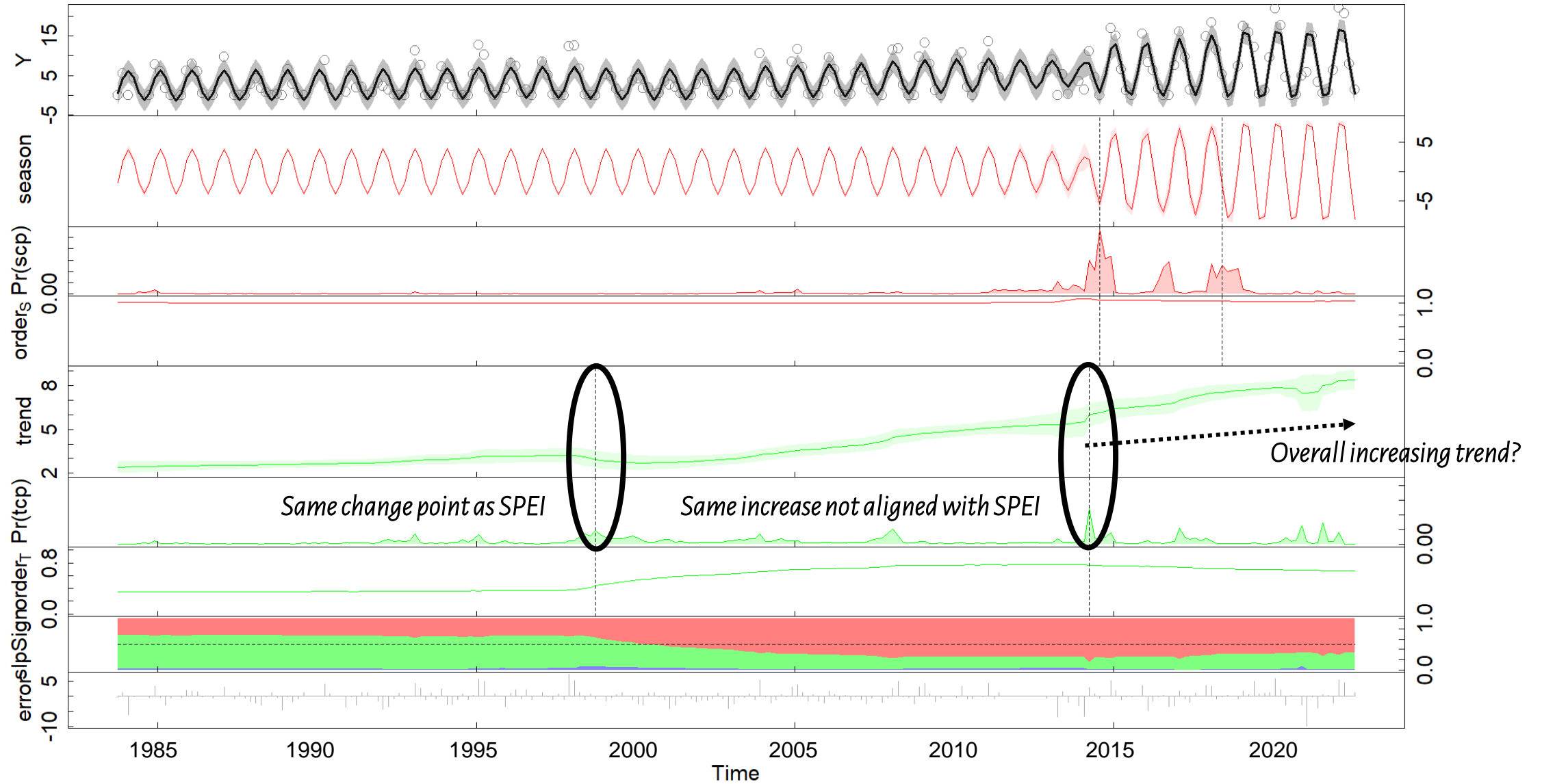
Yankee Fork Restored Site

BEAST decomposition and changepoint detection



Yankee Fork Degraded Site

BEAST decomposition and changepoint detection



Key Takeaways

- Drought probably has a similar signature at natural and degraded sites (1995 and 2000)
- While drought trend has not changed much since 2000, all sites show an increase in mesic vegetation before restoration in 2015
 - Is a slight easing of drought enough to allow for vegetation to expand?
 - Is there something else going on with water supply in the watershed?
- There is an increase in mesic vegetation at the restored site in 2021
 - Evidence of sleep, creep, leap cycle?



Next Steps

- Quasi-experimental Difference-in-Difference analysis for causal inference *in progress*
 - For example, we might be able to say the increase in vegetation at the restored site in 2021 is due to the restoration that started in 2015
- Expand the study to include other sites from Idaho and sites from Oregon, Utah, and Colorado *in progress*
 - Birch Creek, Baugh Creek, Tincup Creek, Cottonwood Creek, ID
 - Bridge Creek, Wychuss Creek, McKenzie River, OR
 - South Park, CO



Wychuss Creek, OR



McKenzie River, OR



Kenosha Creek, CO



Baugh Creek, ID



EmilyIskin@boisestate.edu



www.emilyiskin.myportfolio.com



Questions?

