Cheat River Biological Monitoring: Assessing Restoration Progress and Establishing a Baseline for future Recovery

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Appalachian Stewardship foundation

Overview

PROBLEM

RESEARCH GOALS

METHODS

PRELIMINARY RESULTS

WHAT'S NEXT

The Cheat River History

- 78 Miles long (125.5 km)
- Drains 1,422 square miles
- Parson, Kingwood, and Albright WV draw their drinking water from the River
- Has an extensive history of pollution

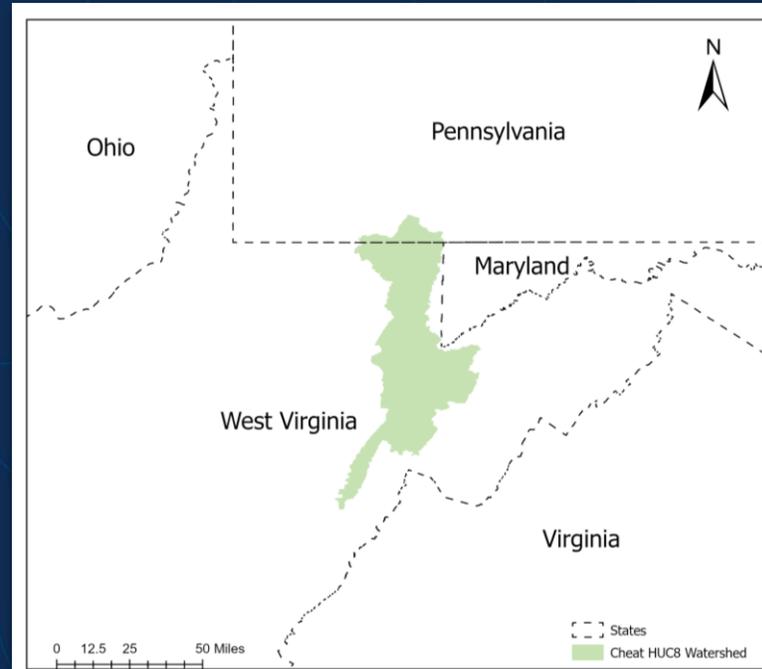Photo Courtesy Charlie Walbridge

Photo Courtesy Charlie Walbridge

Photo Courtesy Garrett Richardson

The knowledge gap

Rachel Spirnak[1], Melissa Shafer[2], Christine Risch[3], Melissa O'Neal[4], Paul Ziemkiewicz[5]

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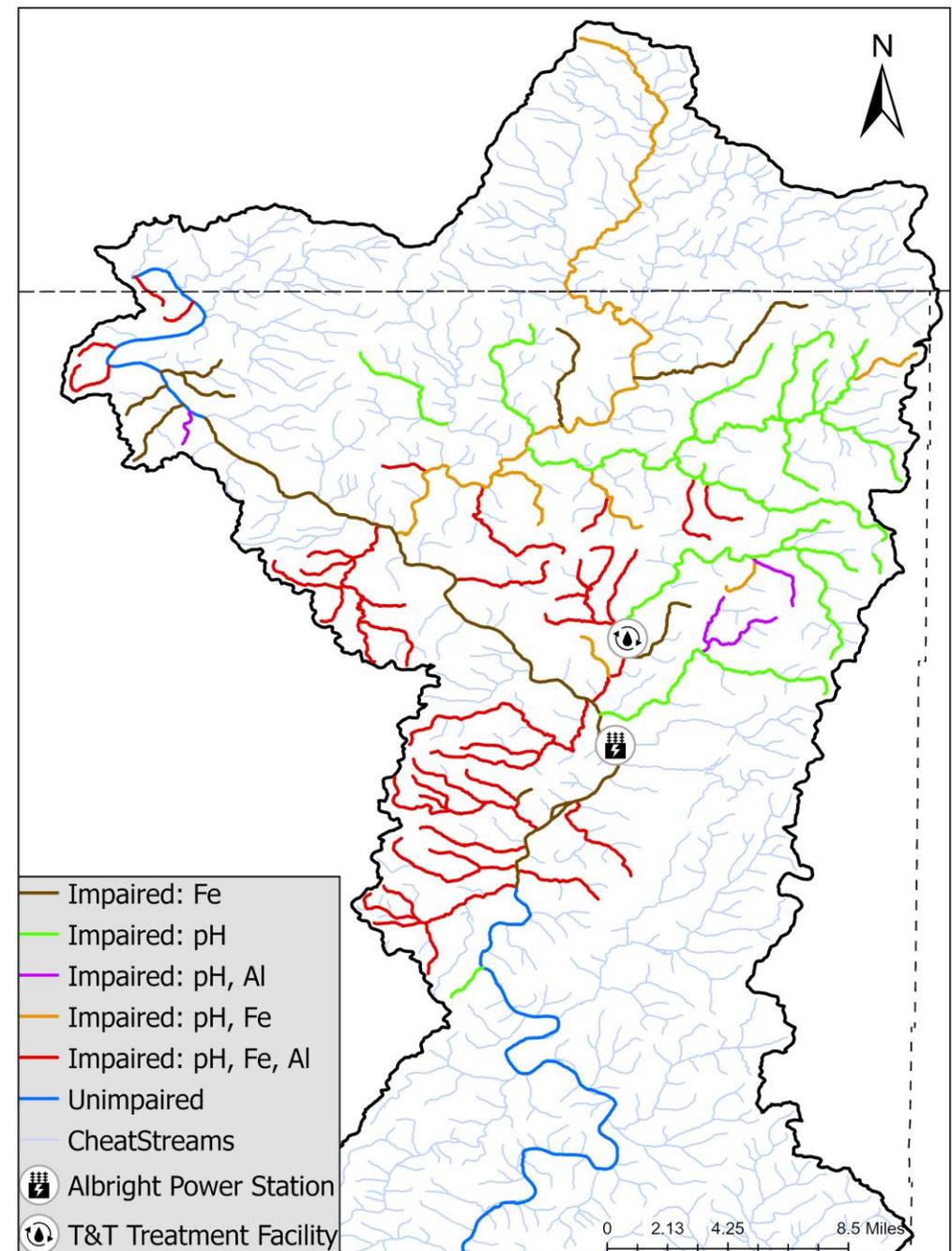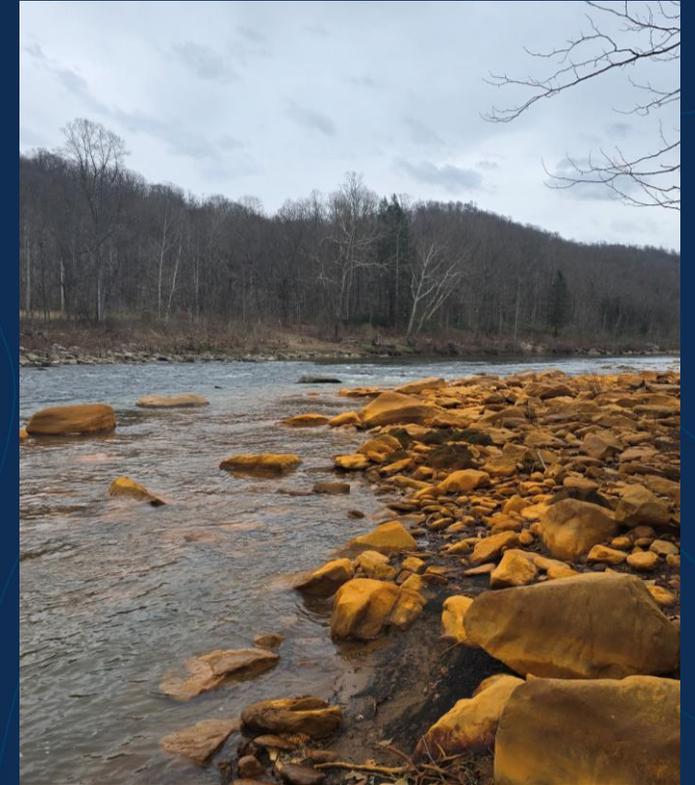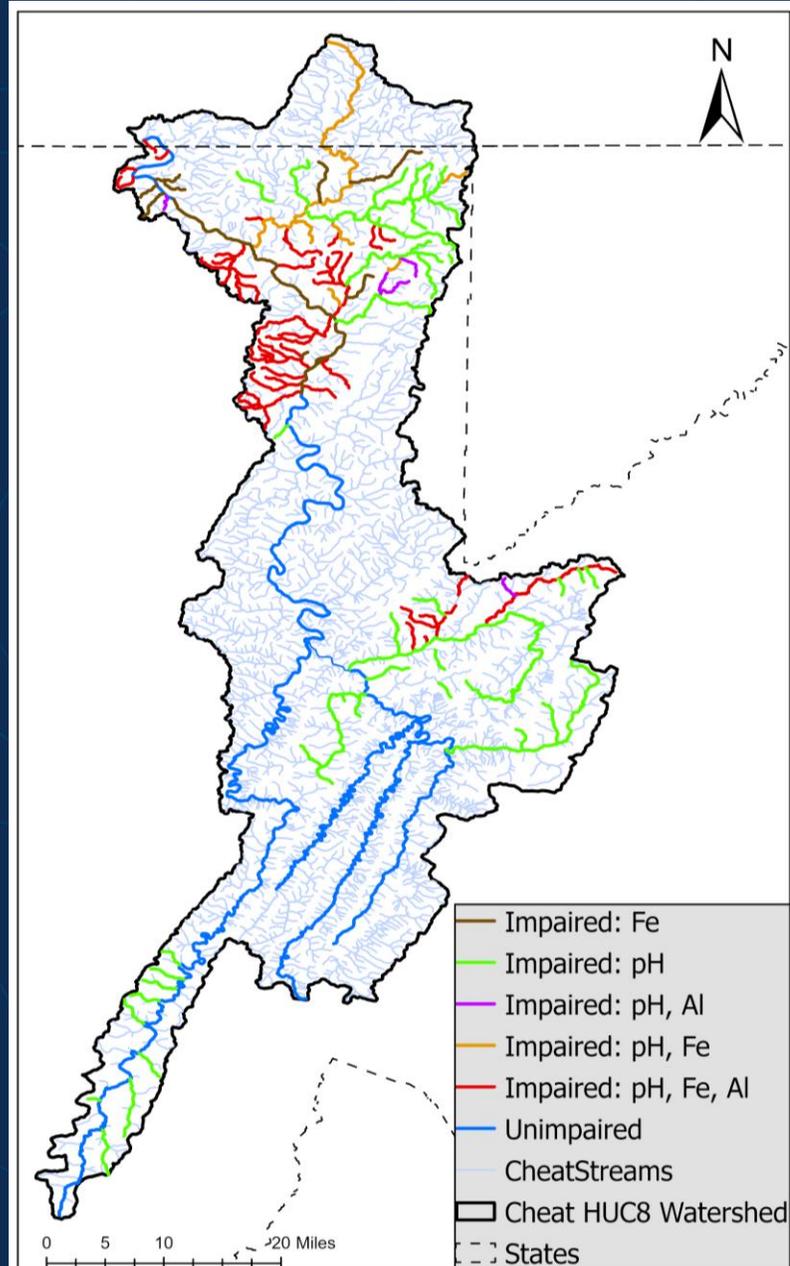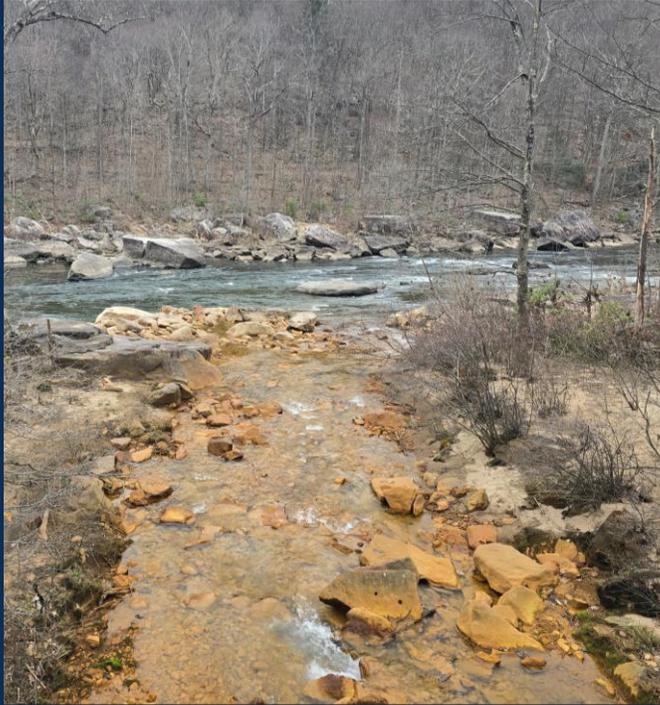
PRIMARY RESEARCH PAPER

Interactive effects of multiple stressors and restoration priorities in a mined Appalachian watershed

George T. Merovich Jr. · J. Todd Petty

Legend:
- Impaired: Fe
- Impaired: pH
- Impaired: pH, Al
- Impaired: pH, Fe
- Impaired: pH, Fe, Al
- Unimpaired
- CheatStreams
- Albright Power Station
- T&T Treatment Facility

Remaining AMD Challenges:

Pictures taken 3/30/2025

Legend:
- Impaired: Fe
- Impaired: pH
- Impaired: pH, Al
- Impaired: pH, Fe
- Impaired: pH, Fe, Al
- Unimpaired
- CheatStreams
- Cheat HUC8 Watershed
- States

0   5   10   20 Miles

Research Goals

1. **Post Restoration assessment:** By collecting macroinvertebrate and water quality data, we'll evaluate the effectiveness of the T&T Treatment Plant on the receiving stream.

2. **Pre-restoration baseline data:** The data will act as pre data for the proposed restoration projects in the remaining watersheds contributing significant amounts of AMD.

3. **Thermal Pollution Assessment:** We'll assess changes in water temperature using HOBO loggers to understand the long-term impact of the Albright Power Station's closure.

Methods
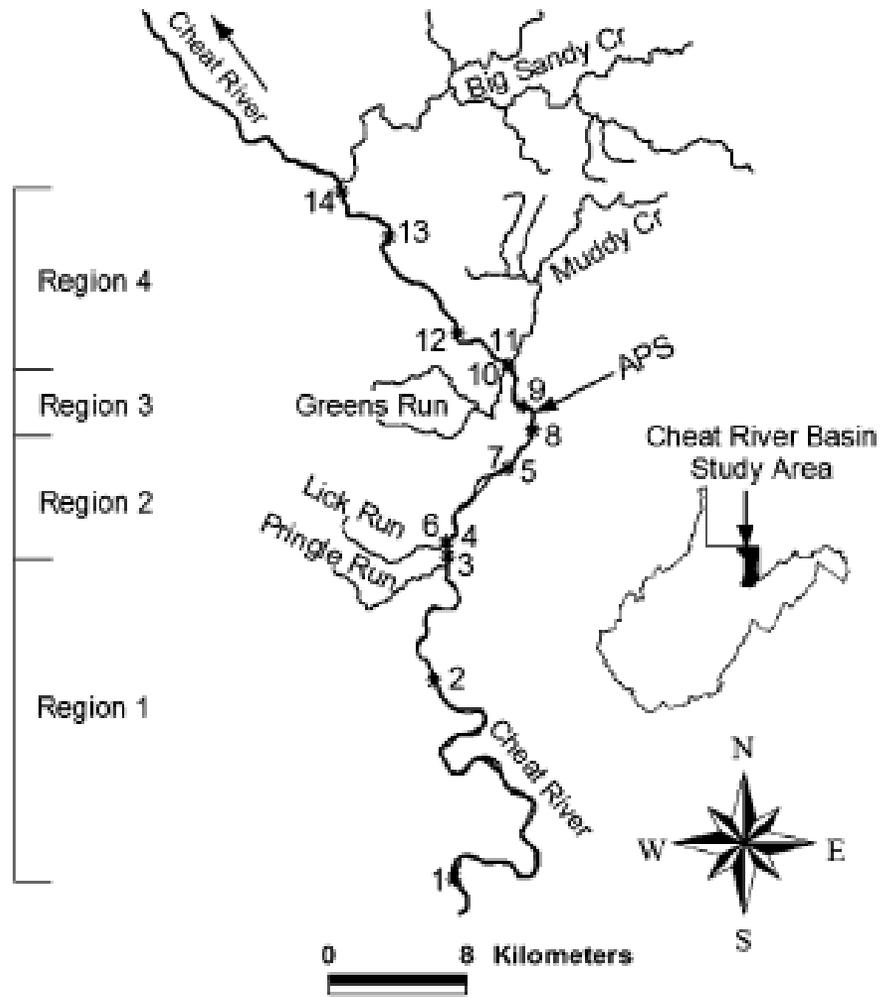
| Analytical Package	Description
AMD Package	Alkalinity
	acidity
	pH
	conductivity
	sulfate
	total Fe
	total Mn
	total Al
	total Mg
	total Ca
AMD Metals	dissolved Fe
	dissolved Mn
	dissolved Al
	dissolved Mg
	dissolved Ca

Table 1 Sample sites and locations within major regions defined by stressor type in the Cheat River, WV. Region 2 was the AMD region. Sites in Region 2 containing no dominant stressor were on the side of the river opposite the tributary source of AMD. Upstream distance to the source of the dominant stressor is also listed

Site No.	Site description	River kilometer	Region	Dominant stressor	Distance to AMD source (km)	Distance to heat source (km)
1	Seven Islands	93.7	1	None	–	–
2	Manheim	69.6	1	None	–	–
3	DS Pringle Run	59.9	2	None	–	–
4	DS Lick Run	59.8 (RR)	2	None	–	–
5	Rt. 7 Bridge	53.9 (RR)	2	None	–	–
6	DS Lick Run	59.8 (RL)	2	A	0	–
7	Rt. 7 Bridge	53.9 (RL)	2	A	6	–
8	DS Elsey Run	51.4	2	A	8	–
9	DS APS	49.8	3	H	–	0.5
10	Decision Rapids	46.8 (RL)	3	H	–	3
11	Decision Rapids	46.8 (RR)	4	A + H	0	3
12	Big Nasty Rapids	43.0	4	A + H	3	6
13	Coliseum Rapids	39.8	4	A + H	7	10
14	Jenkinsburg	31.0	4	A + H	16	19

DS = Downstream; RR = River Right; RL = River Left; A = AMD; H = heat; APS = Albright Power Station
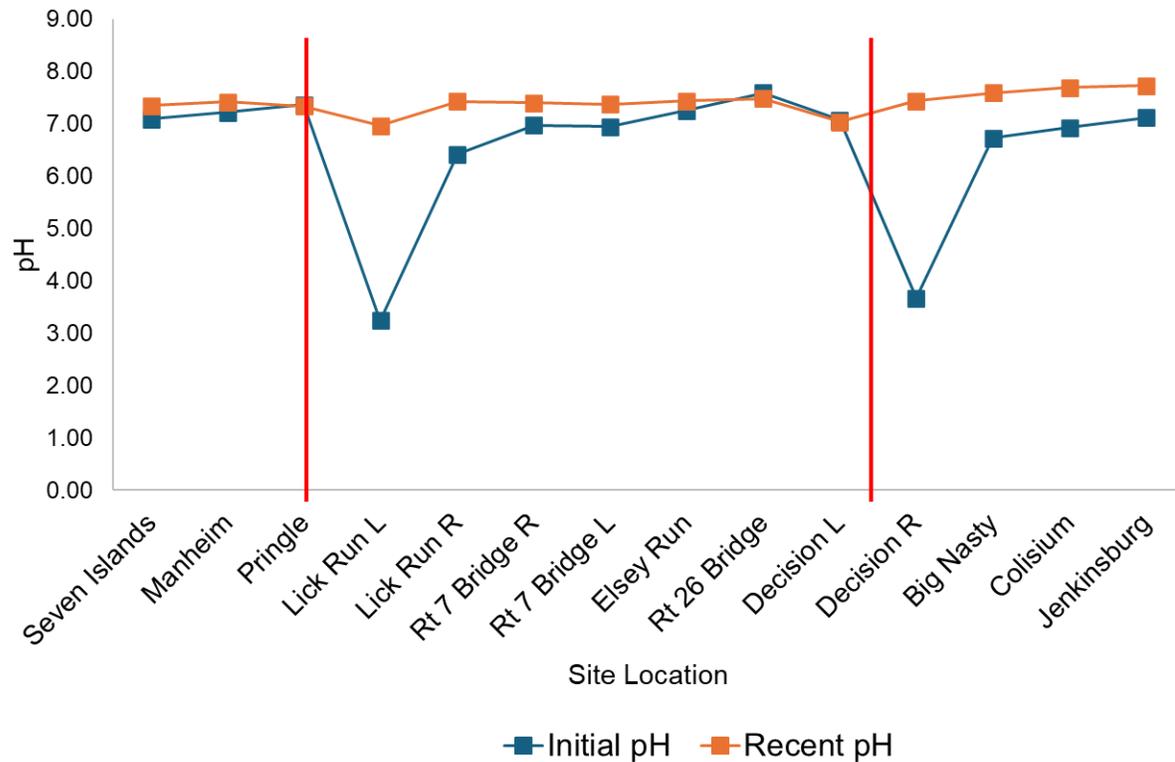
Data Collection
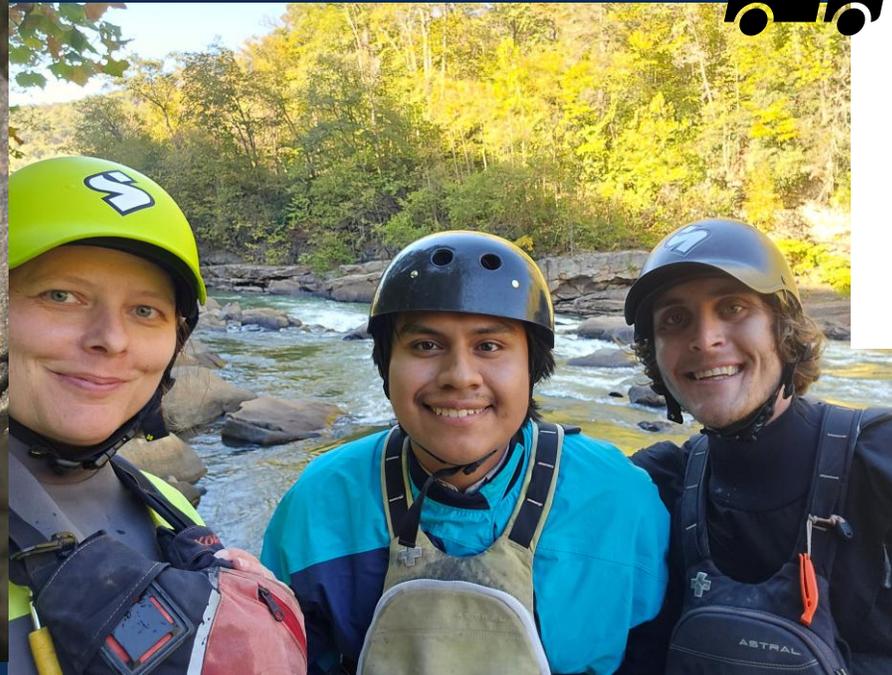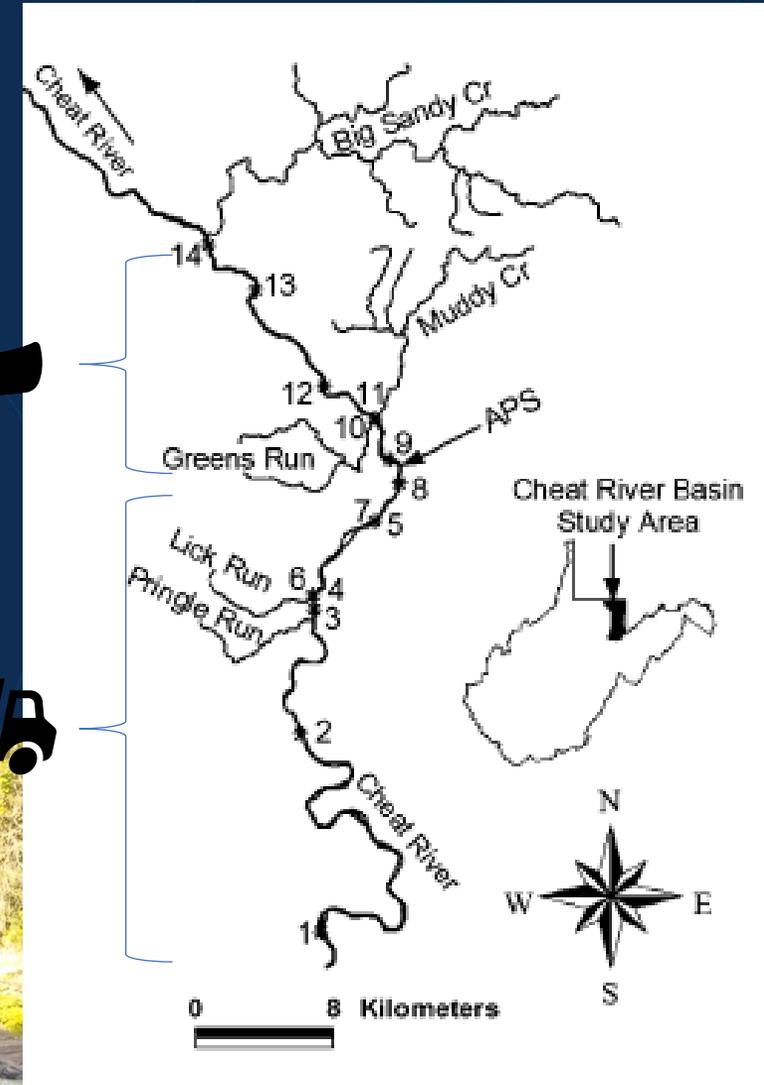
Preliminary Results: Chemistry

- **Initial Results are the average of multiple data sets**
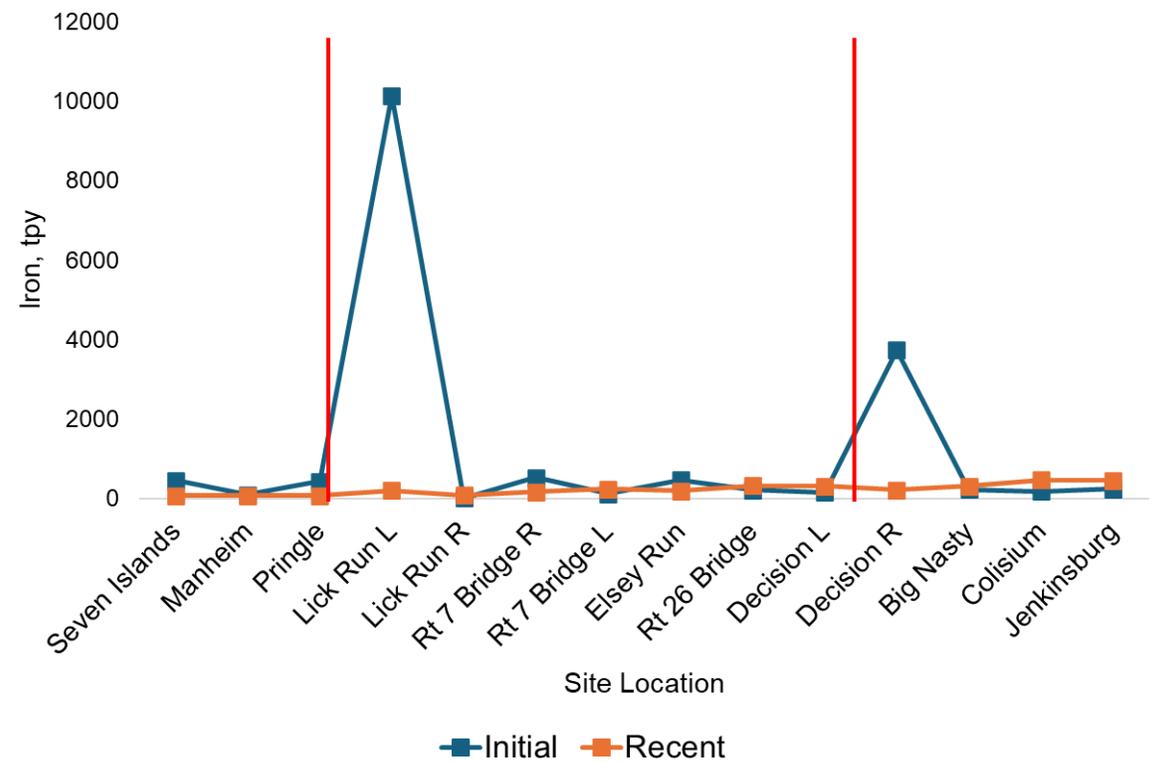
- **Recent is just one sample point**

- **Loadings were calculated using Drainage Area Ratios (DAR)**

$$Q_u = Q_g \left(\frac{A_u}{A_g} \right)^{\phi}$$

Initial vs Recent pH

Initial vs Recent Iron loadings, tons per year

Preliminary Results: Macroinvertebrates

- **WVSCI Score Scale**
  - **<55 Poor**
  - **55-69.9 Marginal**
  - **70-85 Good**
  - **>85 Excellent**

- **Big Nasty and Colisium did not have historical data collected in the Fall**
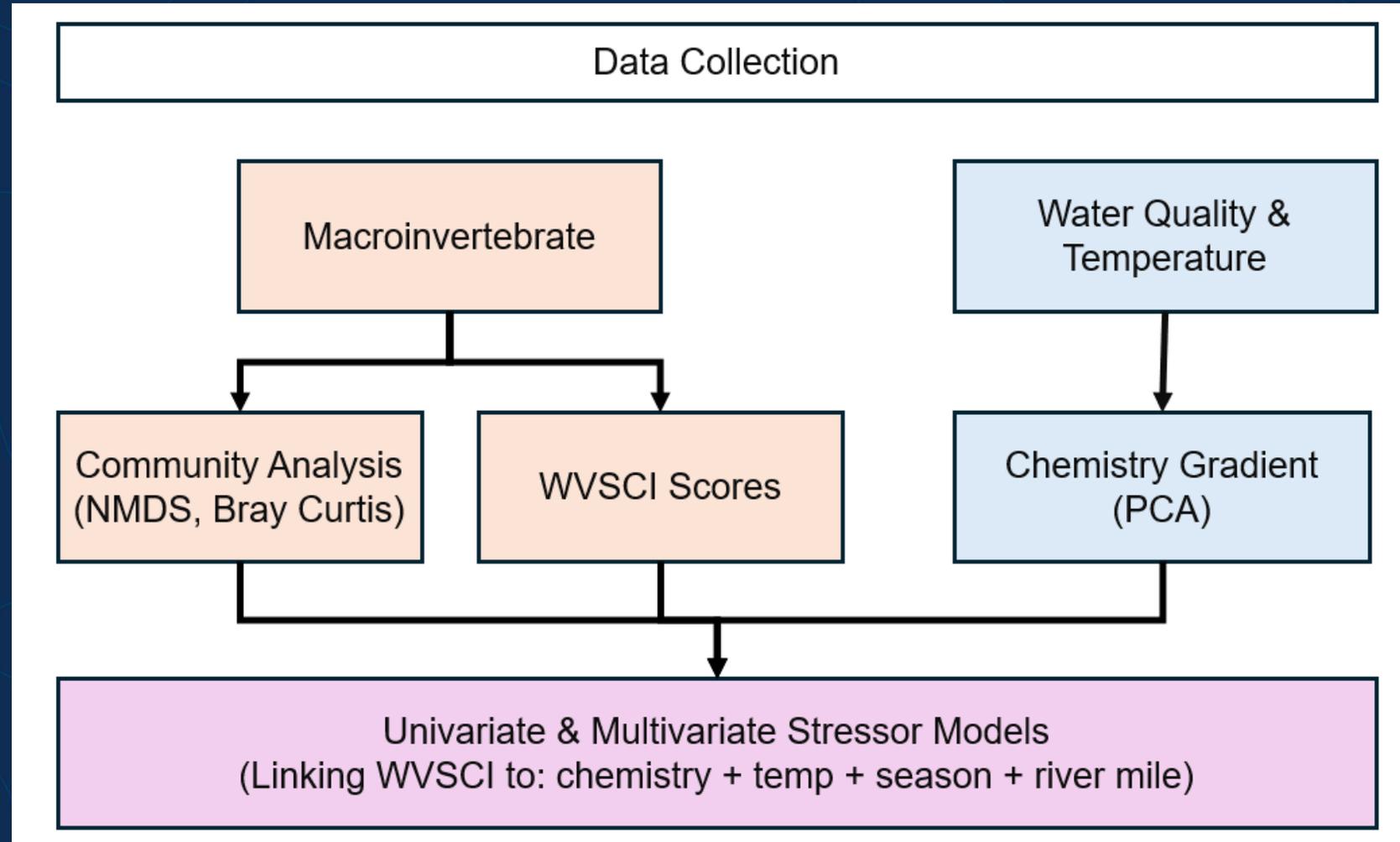

Initial vs Recent: WVSCI (Fall)

Initial vs Recent: %EPT (Fall)

What's to come:

- **No temperature data available yet**

- **Start building models – can add data as it become available**
  - PCA
  - NMDS
  - Bray Curtis

Expected Impacts

- Builds on a legacy of Recovery
    - Supports long-term AMD remediation in the Cheat
- Addresses emerging threats
- Informs future restoration
    - Data-driven priorities for treatment and monitoring
    - Supports aquatic life recovery and coldwater fisheries
- Strengthens community & recreation
    - Safeguards the Cheat as a resource for anglers, paddlers, and local economies

Thank you!

Appalachian Stewardship foundation

Friends of the Cheat

Questions?

June 2-3rd, 2013

West Virginia University