

Watershed-scale approach to restoration of AMD-impacted watersheds in WV

WRI Seminar Series
January 2, 2025

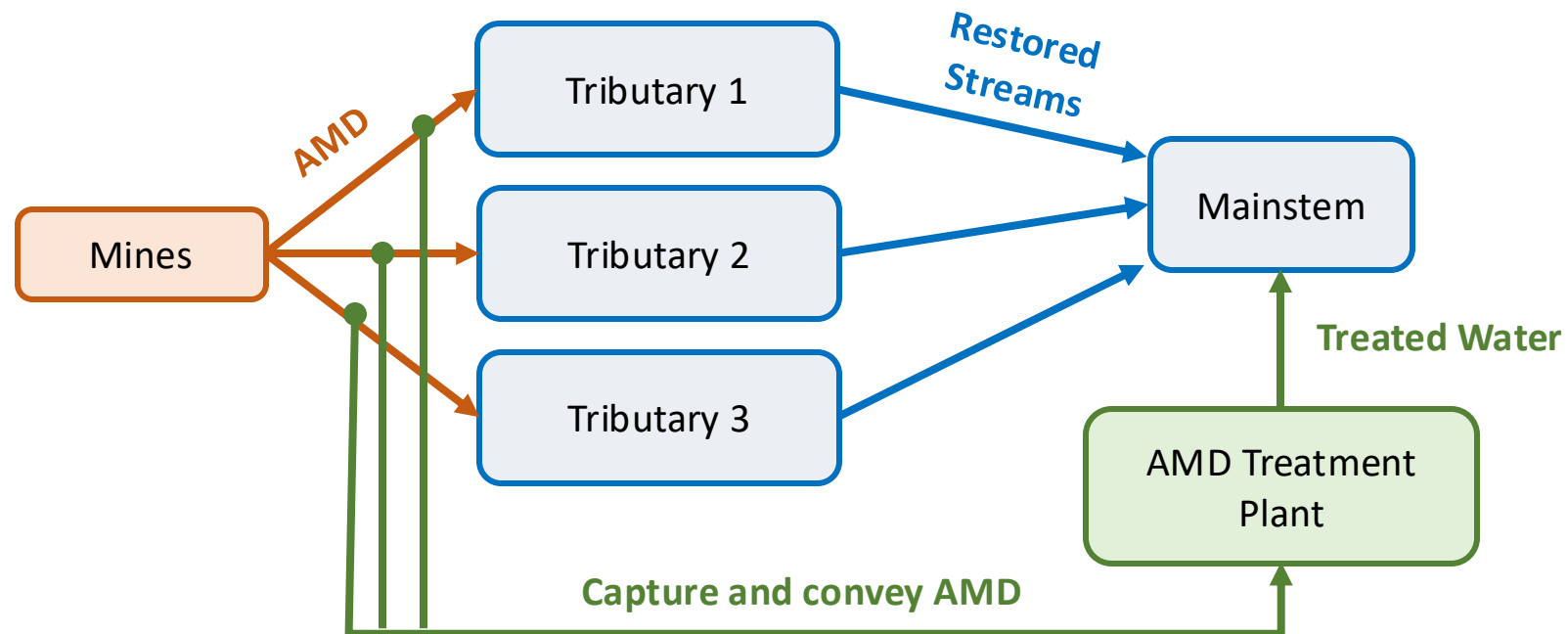
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Watershed-Scale Restoration

- Alternative to point-source approach (individual treatment systems)
- Centralized approach to AMD treatment
- Consolidates AMD sources to minimize treatment cost and maximize restoration



Watershed-Scale Restoration

Requirements

Identify and quantify ALL sources in watershed

Further restriction of point sources

Voluntary tools for addressing non-point sources

Document cost/benefit

Reduce load to meet TMDL/designated use

Challenges

Outside of existing permitting structure (NPDES)

Jurisdiction (AML vs OSR vs active)

Financing (AML vs OSR)

Higher initial capital cost

Benefits

Accounts for ALL pollutant sources in watershed

Restores more stream miles

Lower long-term treatment cost

Potential revenue benefit (REE)

Case Study – Muddy Creek Watershed

Point-Source Approach

- **Muddy Ck responsible for ~50% of acid load to Cheat River**
- **Multiple regulated (OSR) treatment sites**
- **Unregulated discharges (AML) responsible for >90% of pollutant load**
- **Expensive treatment without desired restoration**

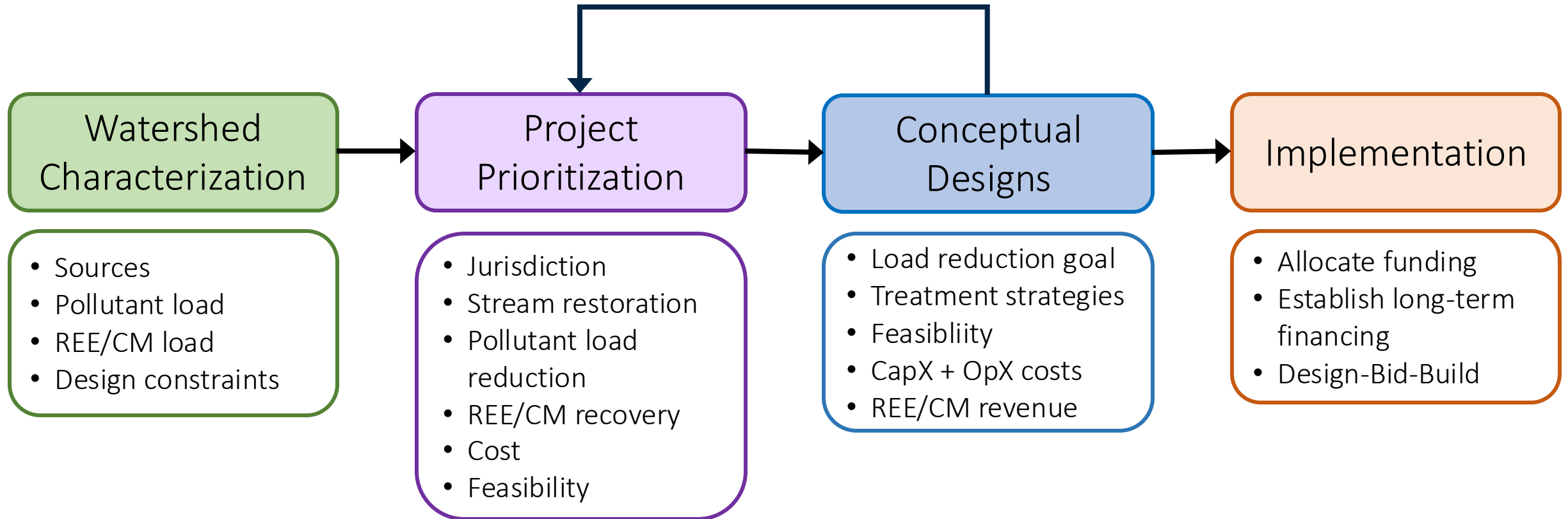
Watershed Approach

- **T&T AMD Treatment Plant**
- **Consolidated deep mine AMD into centralized treatment**
- **EPA granted in-stream variance**
- **Lower long-term treatment cost**
- **Improved restoration**

Evaluating Watershed-Scale Restoration in WV

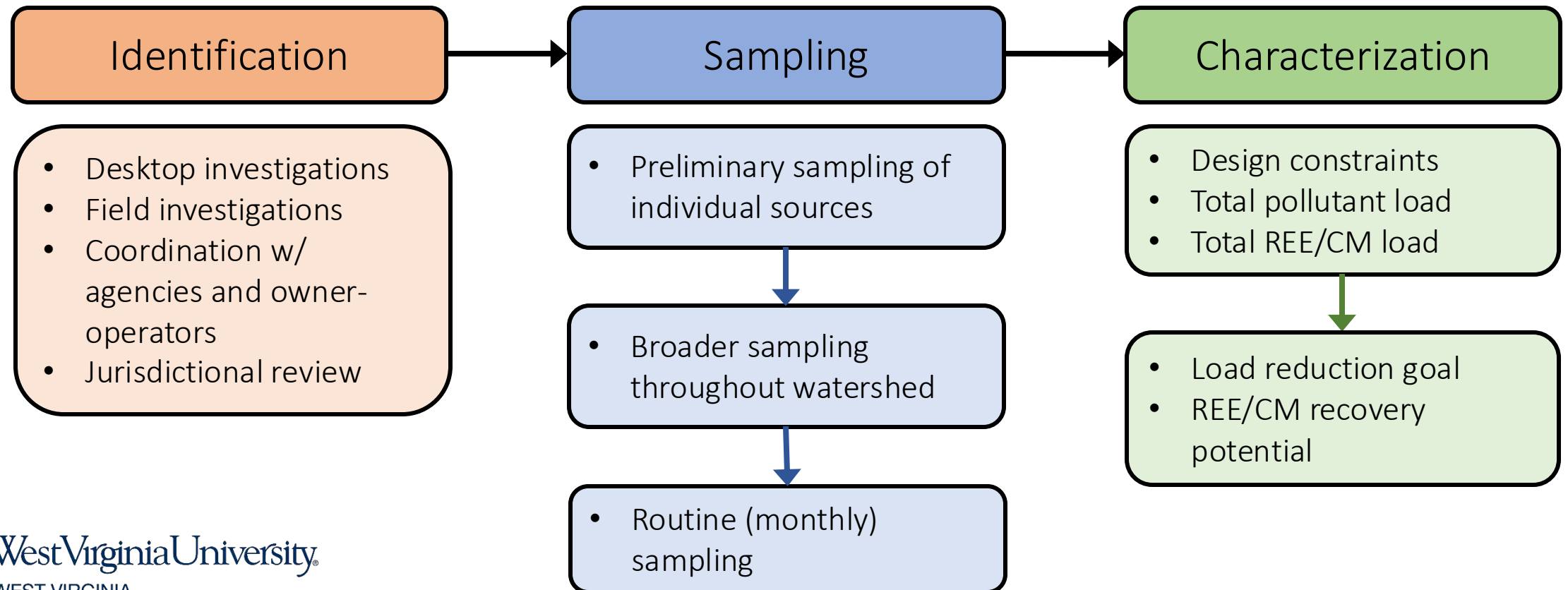
- **Project**: ETD-119 Watershed-Scale Restoration
- **Agency**: WVDEP AMLR
- **Funding**: Bipartisan Infrastructure Law (BIL)
- **Timeline**: Nov 2023 – Nov 2025
- **Objective**: Evaluate projects for watershed-scale AMD treatment
 - Characterize and prioritize watersheds
 - Develop conceptual plans for treatment
 - Collaborate with WVDEP, OSM, WVGES, WV watershed groups
 - Focus on AMD impacts from abandoned mine lands (AML)

Project Approach



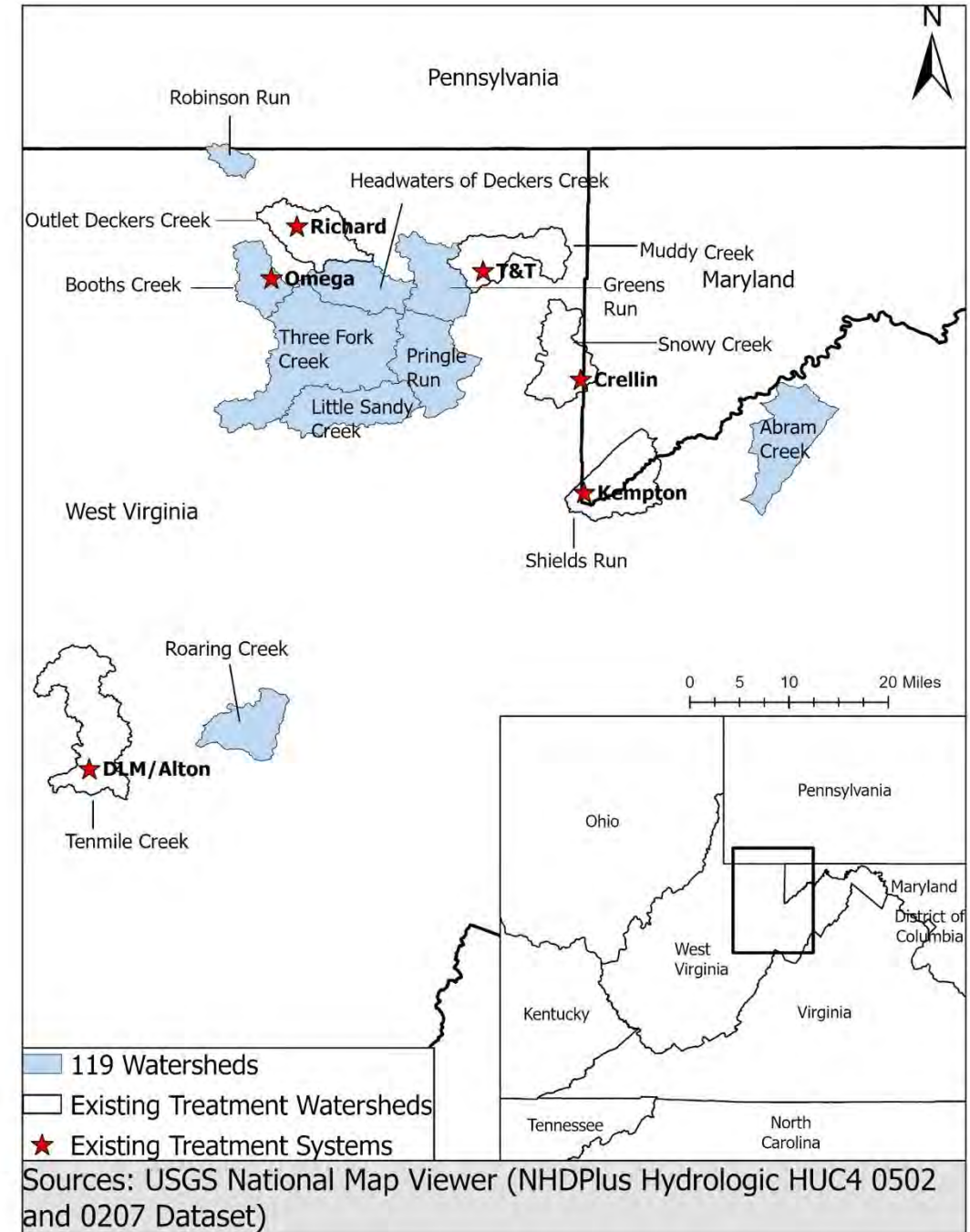
Watershed Characterization

Objective: Characterize pollutant and REE/CM loads throughout entire watersheds; gather information necessary for prioritization and conceptual design



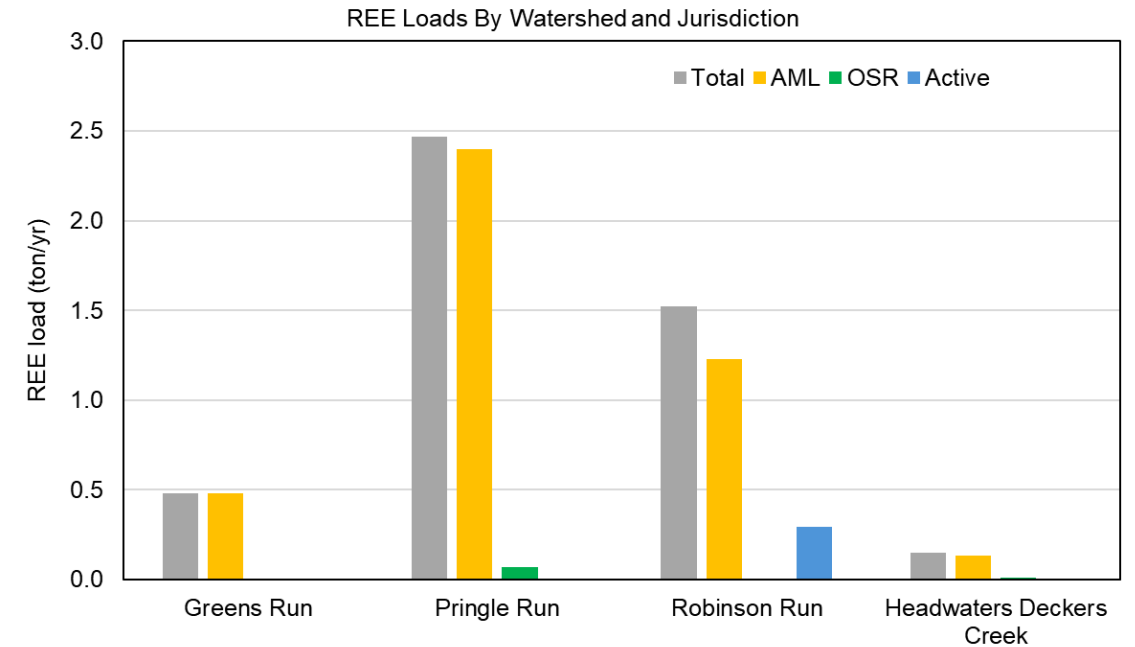
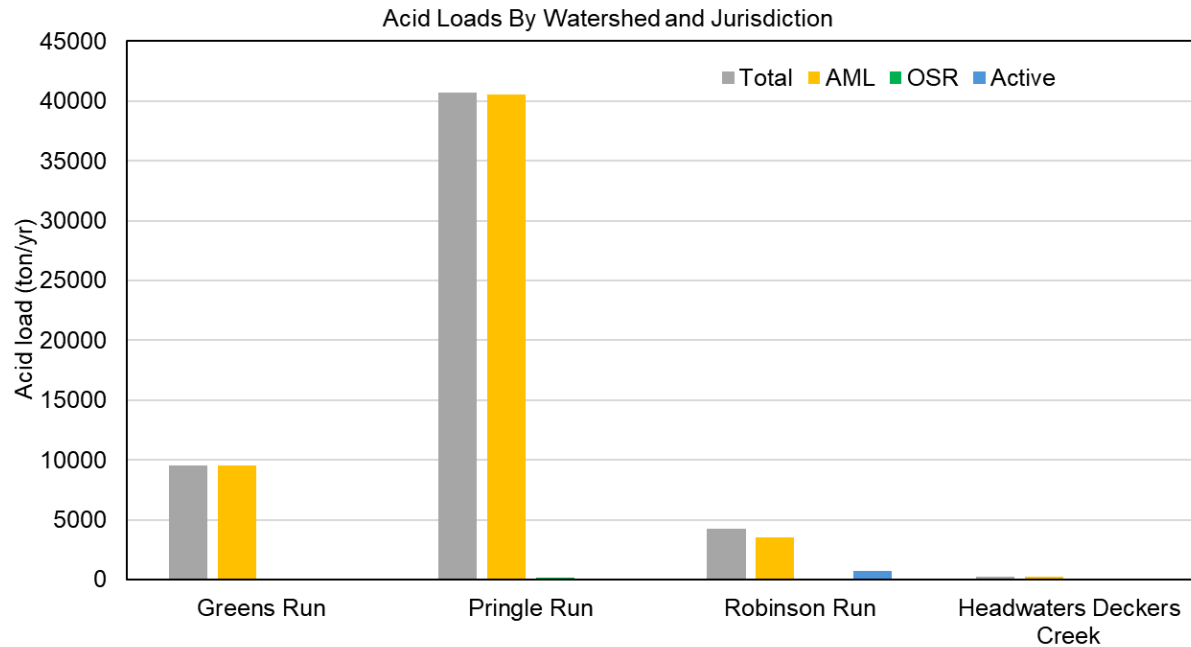
Watershed Characterization

- >560 samples collected to date
- 14 watersheds (and counting!) throughout WV
- 7 existing AMD treatment systems in WV and MD



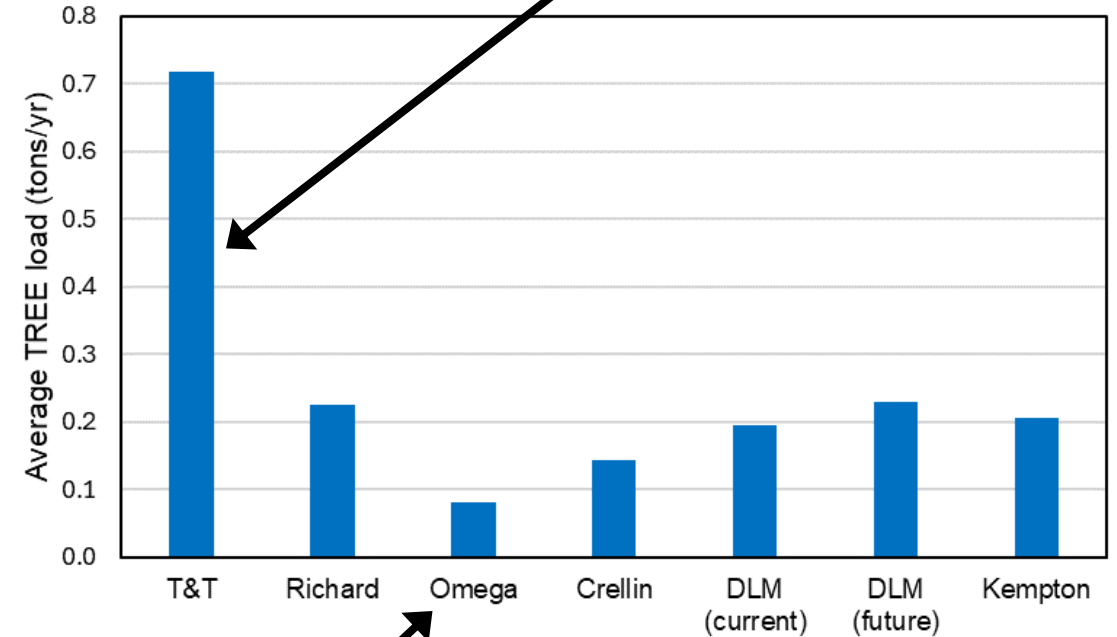
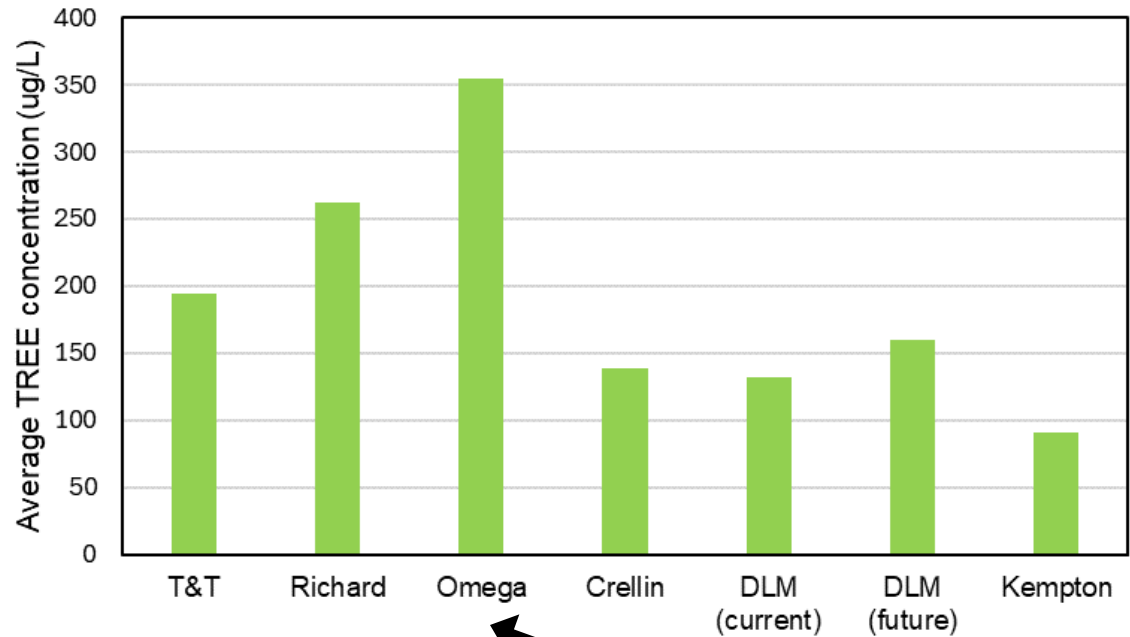
Watershed Characterization

- 9 watersheds identified for further characterization
- 4 priority watersheds identified for conceptual designs



Watershed Characterization

- **Sampled 7 existing AMD treatment systems**
- **Evaluated for potential retrofit to REE recovery**

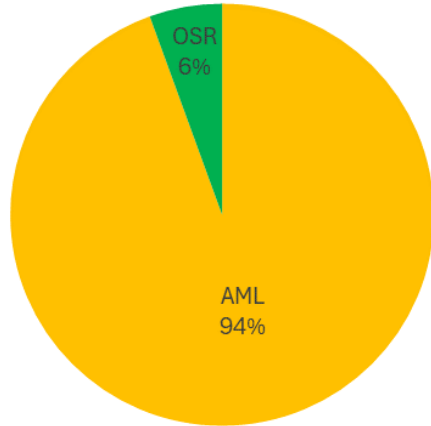


Jurisdictional considerations

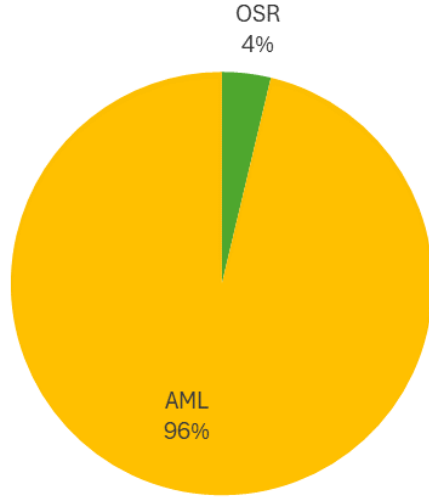
High concentration does not necessarily equal high load

Watershed Characterization

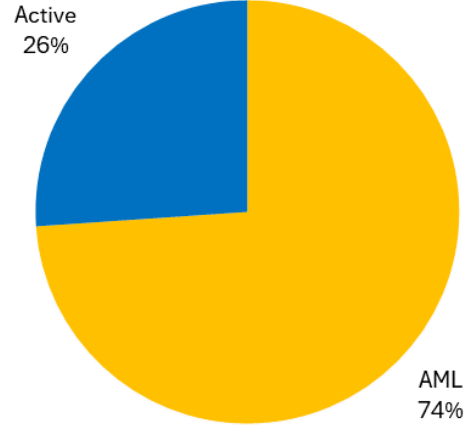
Greens Run
AMD Sources by Type



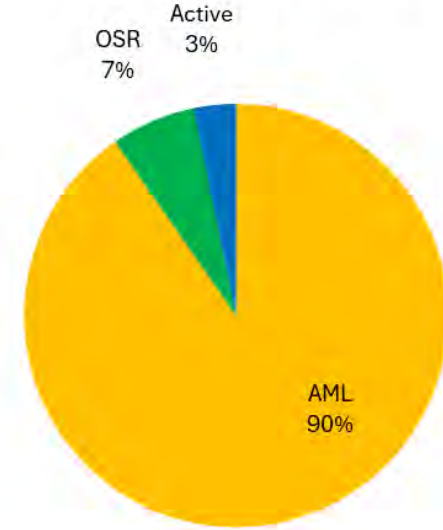
Pringle Run
AMD Sources by Type



Robinson Run
AMD Sources by Type



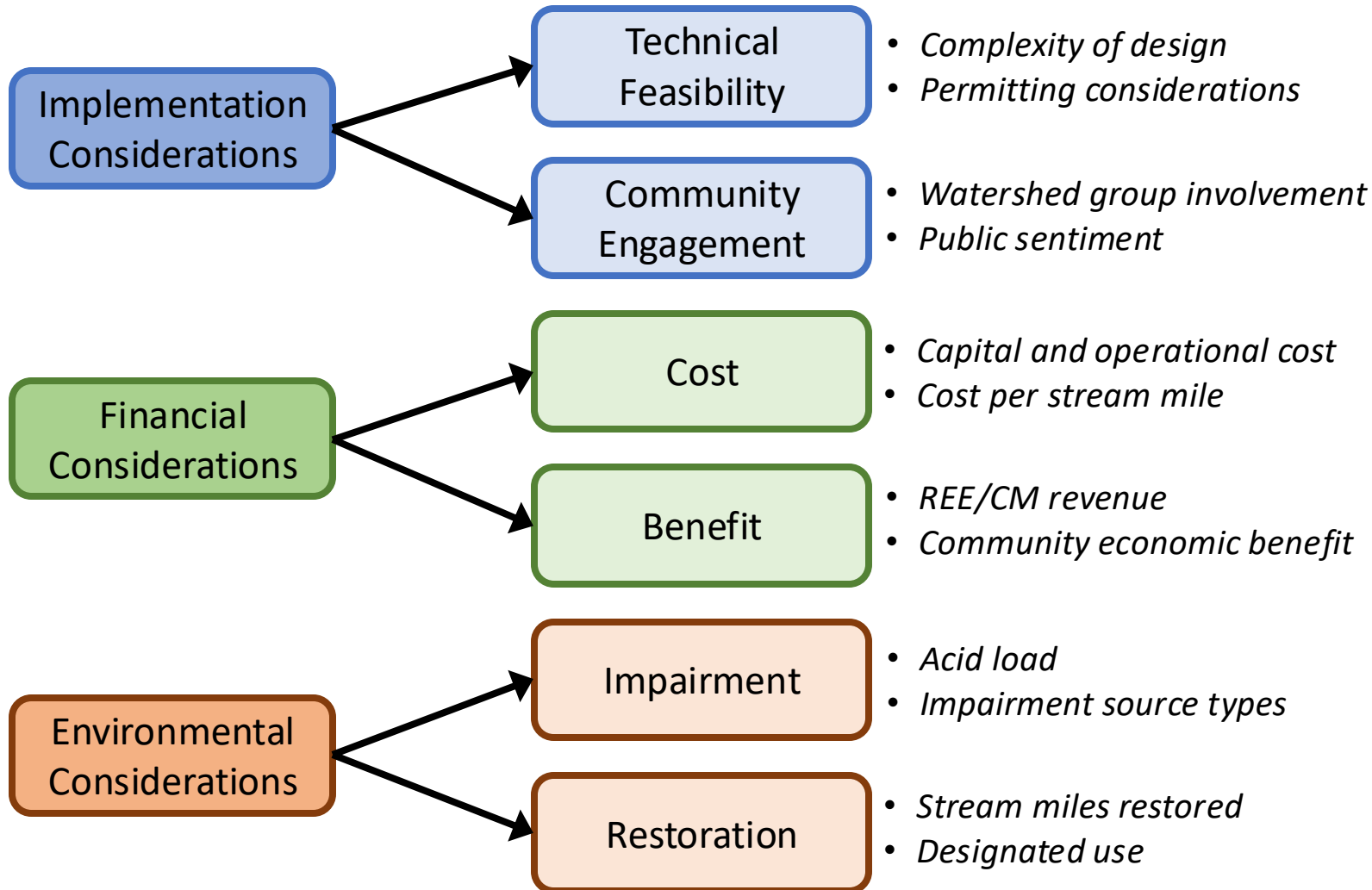
Headwaters Deckers Creek
AMD Sources by Type



- **Jurisdictional considerations (AML vs OSR vs Active)**
- **Compare jurisdictional feasibility to restoration impact**

Watershed	Estimated REE load (t/yr)	Estimated Acid load (t/yr)	Impaired stream miles (mi)
Headwaters Deckers Creek	0.5	227	21.0
Pringle Run	2.1	3220	36.9
Robinson Run	1.7	4584	4.4
Greens Run	0.3	7353	15.2
Total	4.6	15385	78

Project Prioritization



Objective: Rank/prioritize watershed-scale projects

- Develop objective evaluation tool using weighted criteria
- Solicit input from stakeholders and decision-makers
 - State/federal agencies
 - Watershed groups
 - Owner-Operators
- Grade Projects

Conceptual Designs

- **Objective**: Develop conceptual designs for treatment and provide to WVDEP for implementation.
- **Conceptual designs for priority watersheds in development.**
- **Strategy**:
 - **Monthly sampling to characterize flows and concentrations.**
 - **Piezometers to identify and monitor mine pools.**
 - **Grouting to eliminate ancillary sources.**
 - **Use of mine pools as conveyance and source consolidation.**
 - **Capture of primary sources and conveyance to centralized treatment location.**
 - **Limit hydraulic conveyance lines as much as possible.**

Conceptual Designs



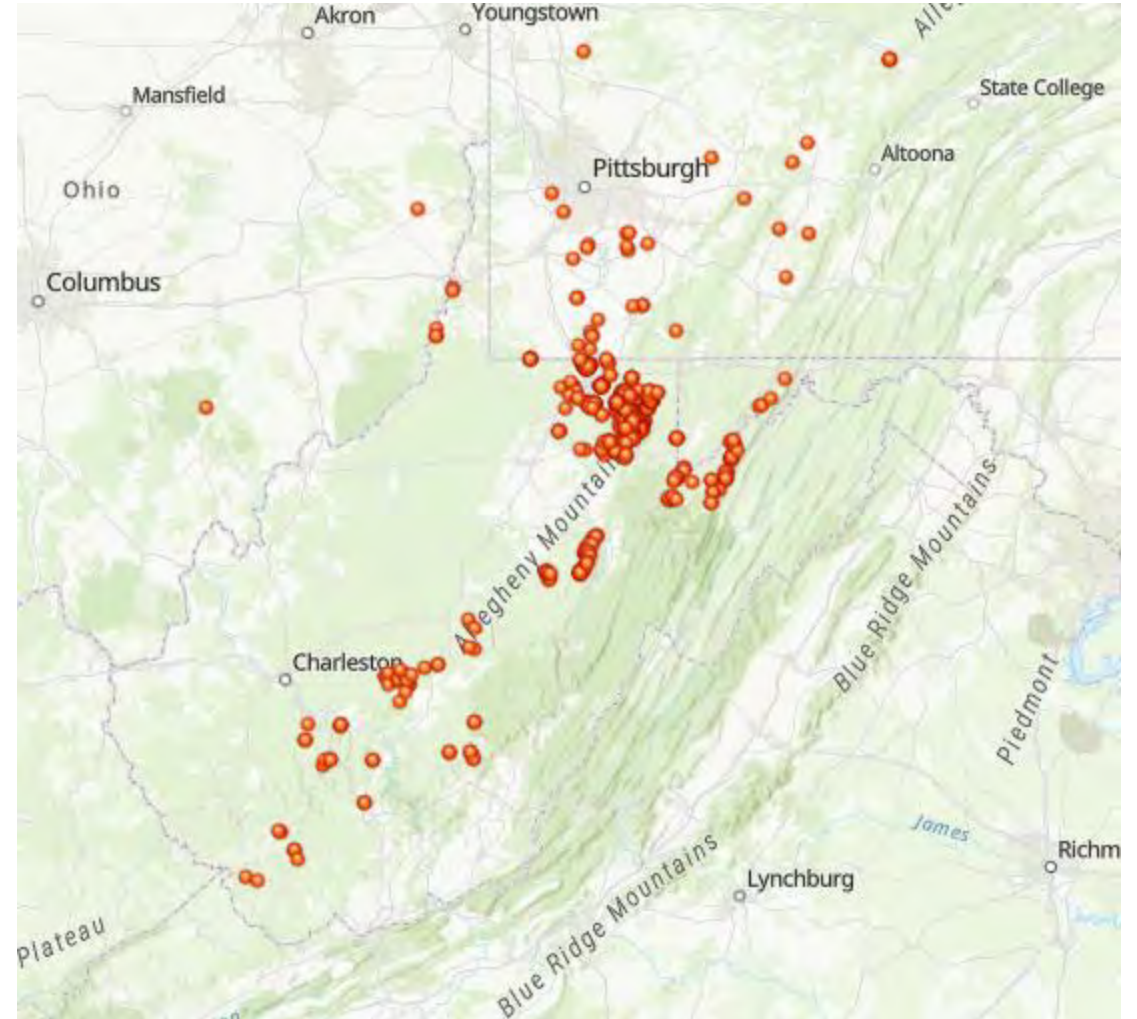
Characterizing REE/CM in AMD

- **Project**: ETD-85 Mid-Appalachian Carbon Ore, Rare Earth and Critical Minerals (MAPP-CORE) Initiative
- **Agency**: US DOE
- **Funding**: CORE-CM Program
- **Timeline**: Oct 2021 – Feb 2025
- **Objective**: Identify and characterize REE occurrence in coal-based resources

<https://netl.doe.gov/resource-sustainability/critical-minerals-and-materials/core-cm>

Characterizing REE/CM in AMD

- Focus on coal AMD discharges in WV
- Other AMD types: hard rock (copper, gold)
- Other AMD source locations: PA, KY, OH, TN, SC, MT
- Regulated and unregulated discharges
- With and without treatment
- Supports preliminary sampling at unique AMD sites
- >400 unique AMD sources collected to date
- Phase II under proposal review; expand to regional analysis



AMD-REE sampling locations (multiple WRI projects)

Questions?

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