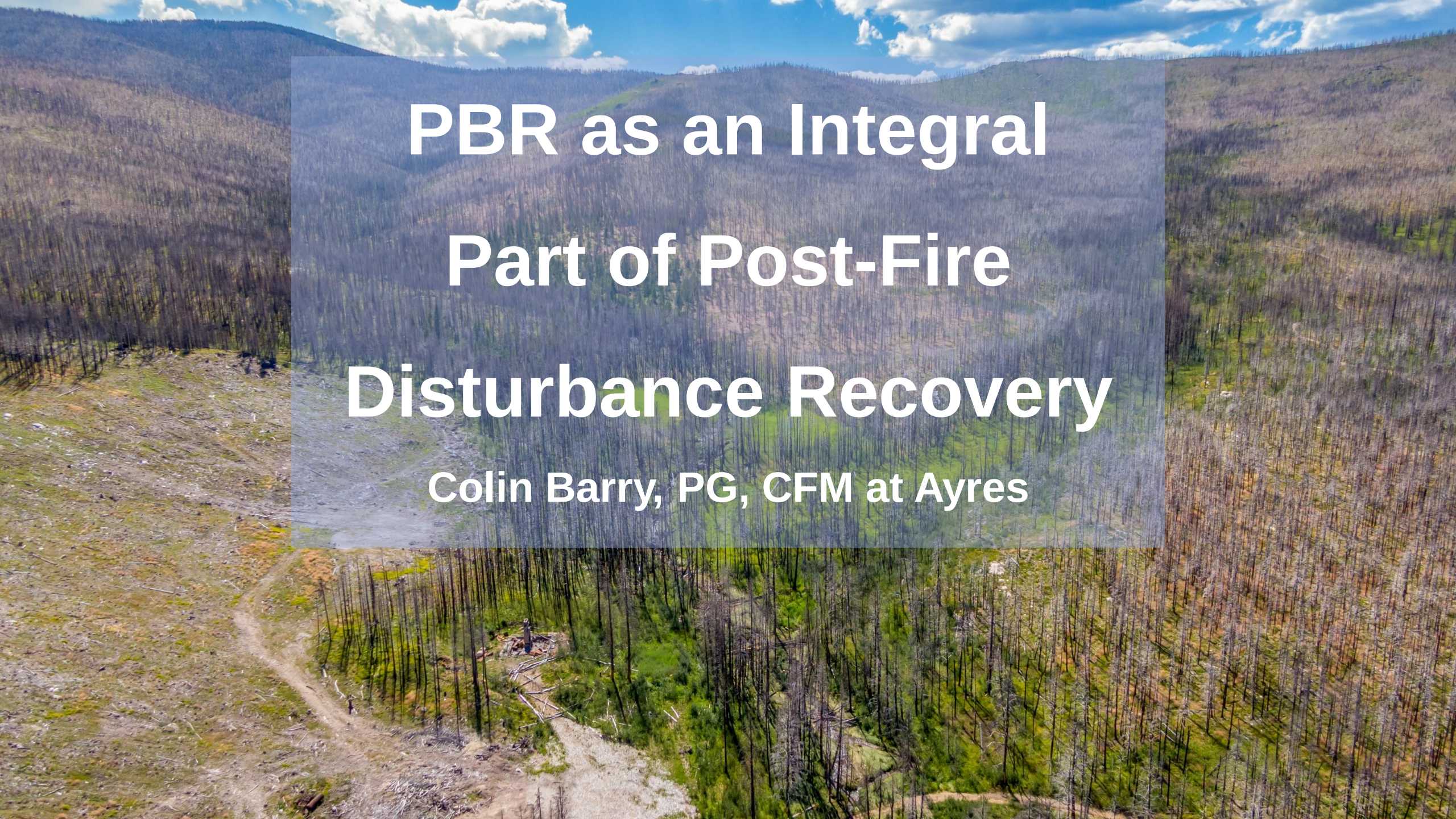


An aerial photograph of a mountainous landscape after a fire. The foreground shows a dirt road and a small clearing with a person. The middle ground is filled with dense stands of blackened, standing tree trunks. The background shows rolling hills under a blue sky with white clouds. A semi-transparent blue rectangle is overlaid in the center, containing the title text.

PBR as an Integral Part of Post-Fire Disturbance Recovery

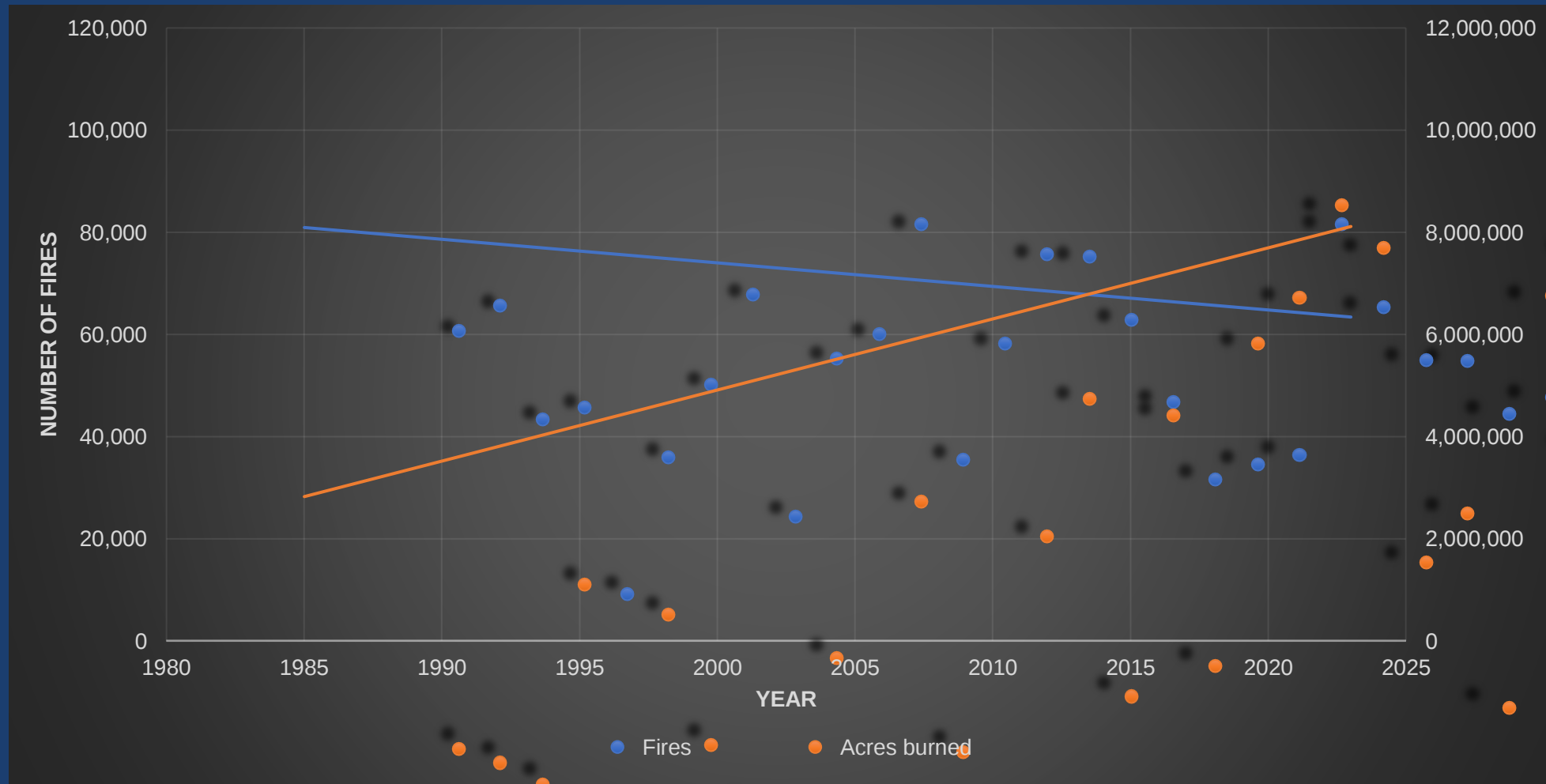
Colin Barry, PG, CFM at Ayres

What *are* we talking about?

- Wildfire Trends
- Post-Fire Impacts
- Holistic Approach To Disturbance
- Process-Based Restoration
- Specific Features & Project Examples
- Application to Reclamation
- Questions?

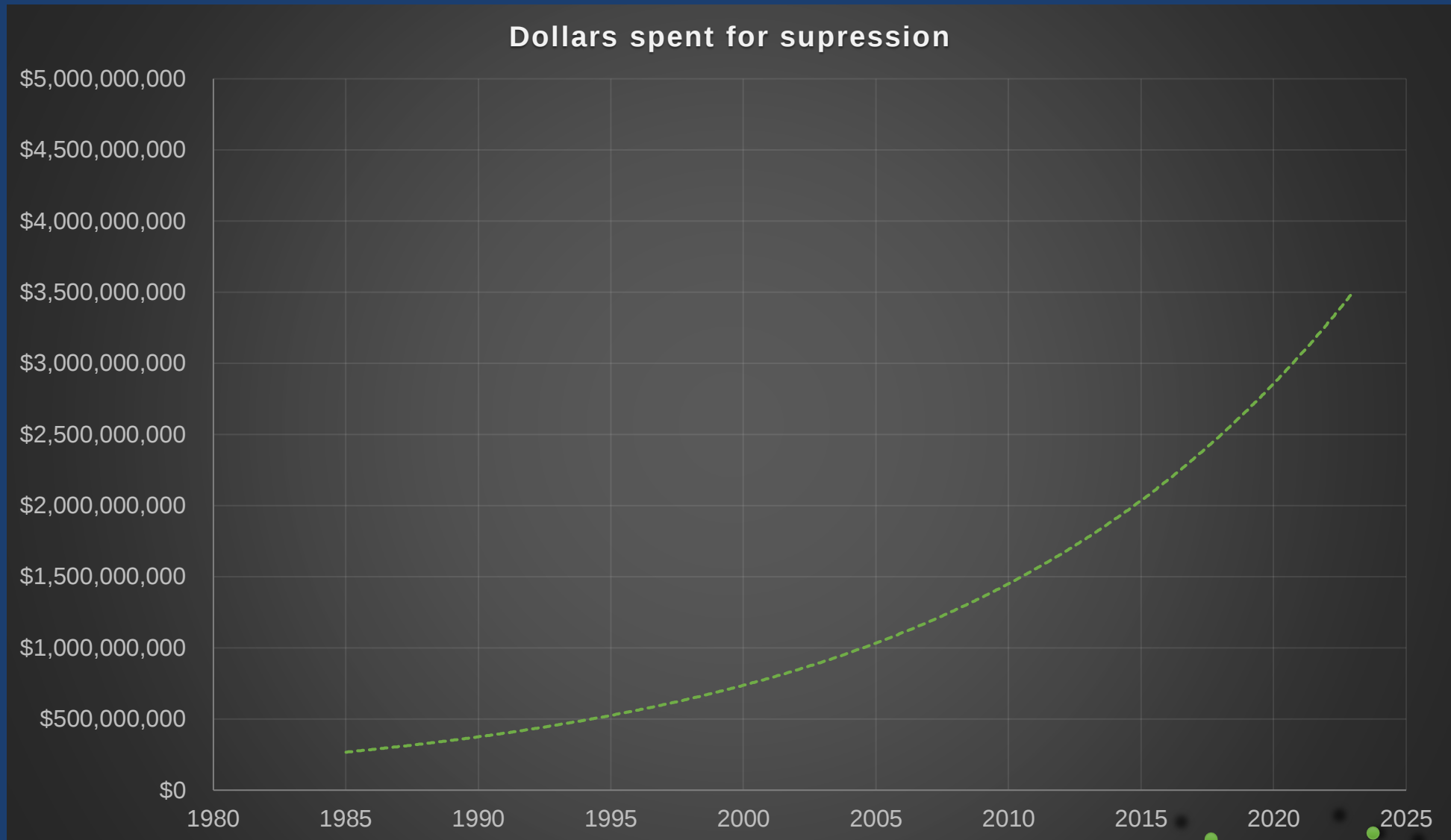


Wildfire Trends: Larger



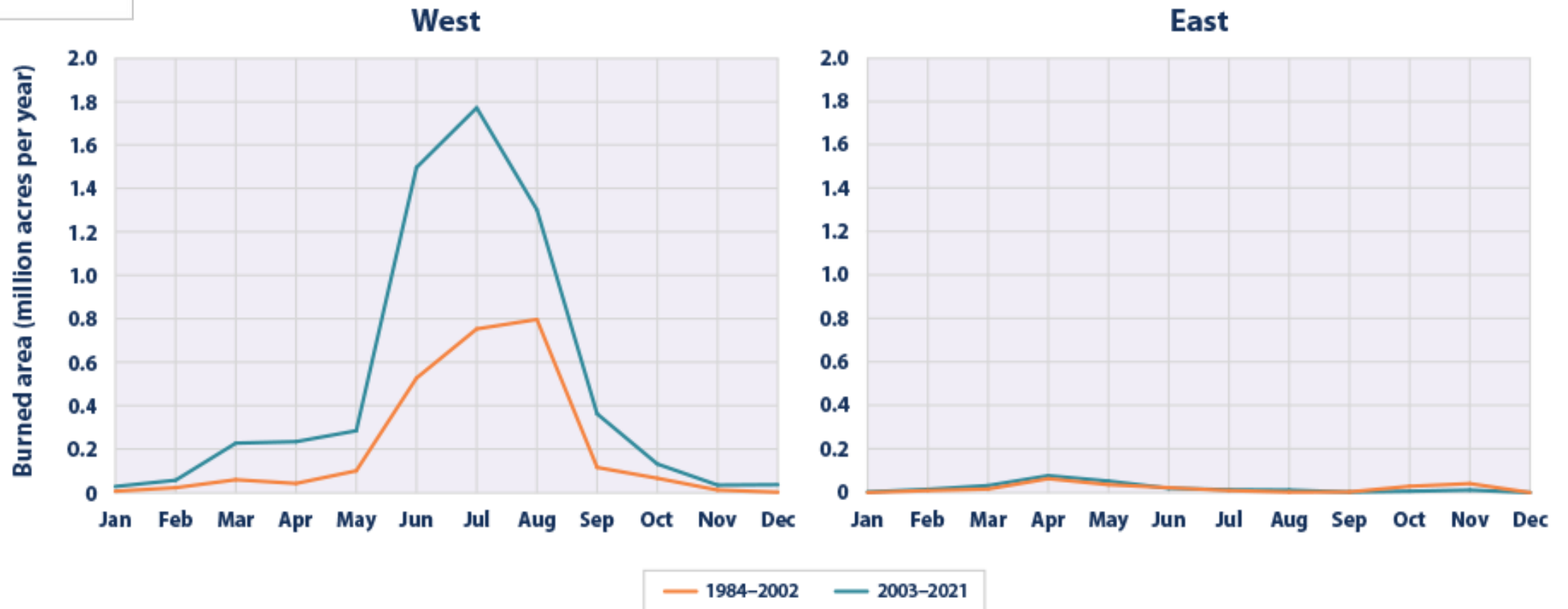
Source: National Interagency Fire Center at <https://www.nifc.gov/fire-information/statistics/suppression-costs>

Wildfire Trends: More Expensive



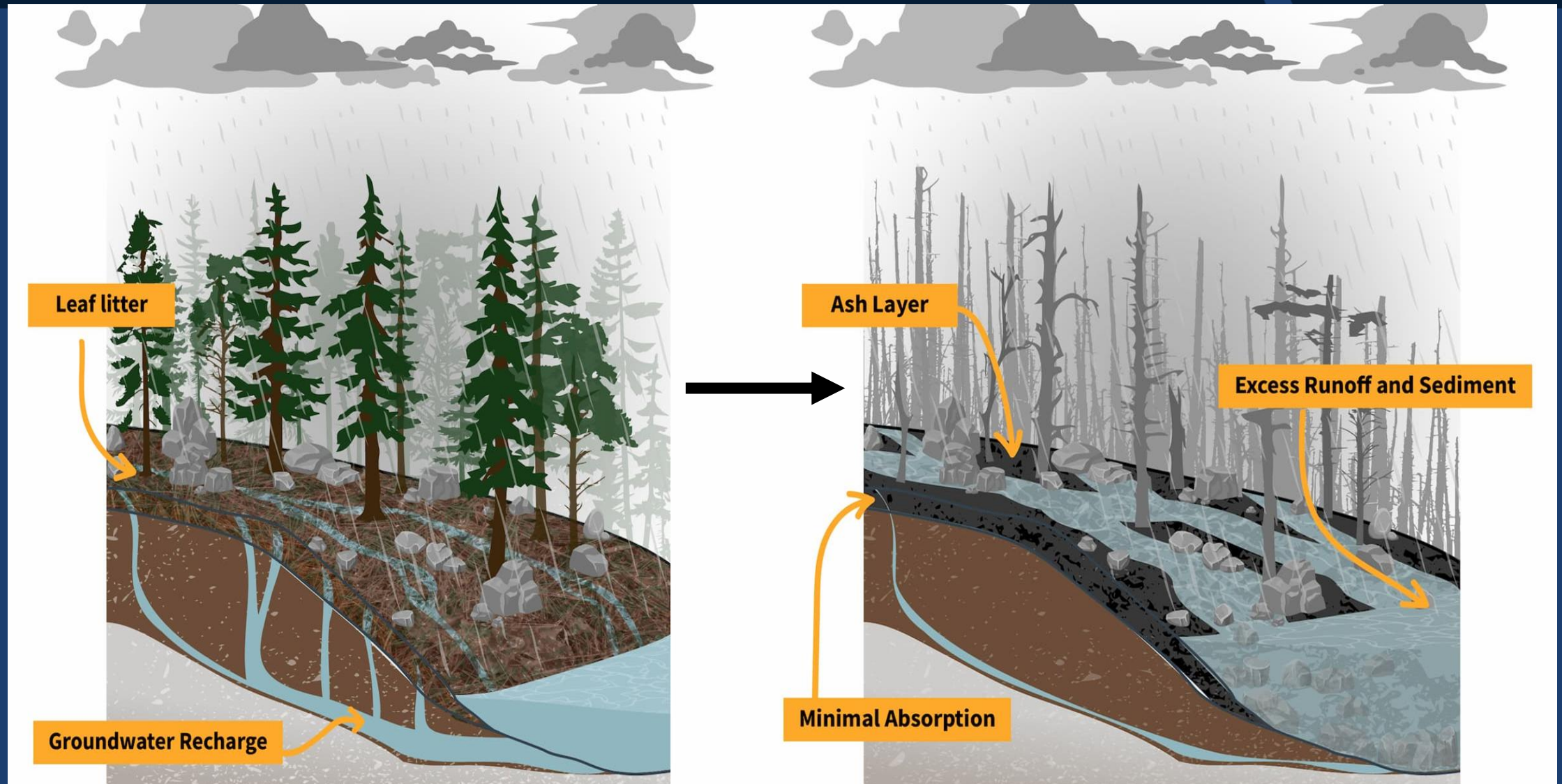
Source: National Interagency Fire Center at <https://www.nifc.gov/fire-information/statistics/suppression-costs>

Wildfire Trends: Western States Problem



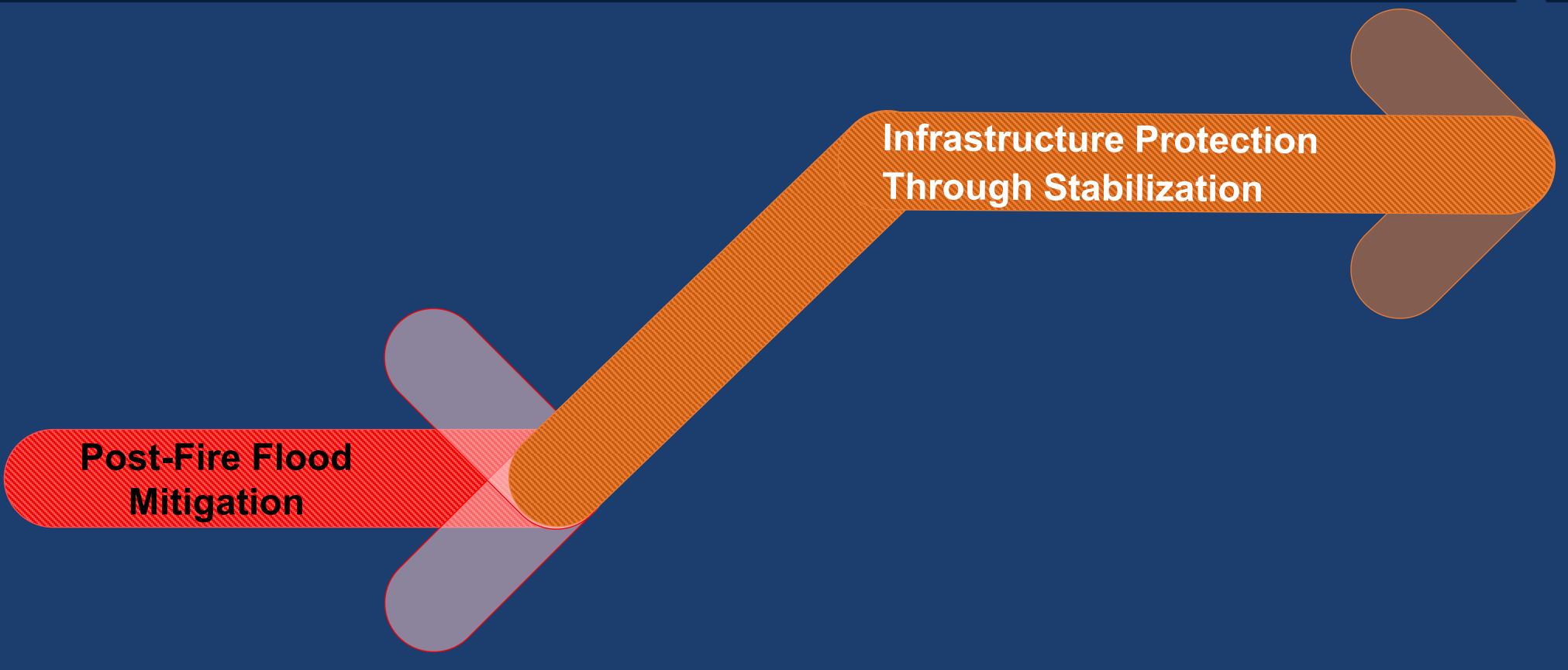
Source: Monitoring Trends in Burn Severity. 2023. www.mtbs.gov/direct-download

Post-fire Impacts



Source: <https://labs.waterdata.usgs.gov/visualizations/fire-hydro/index.html#/>

Holistic Approach To Disturbance



Infrastructure Protection
Through Stabilization

Post-Fire Flood
Mitigation

Holistic Approach To Disturbance



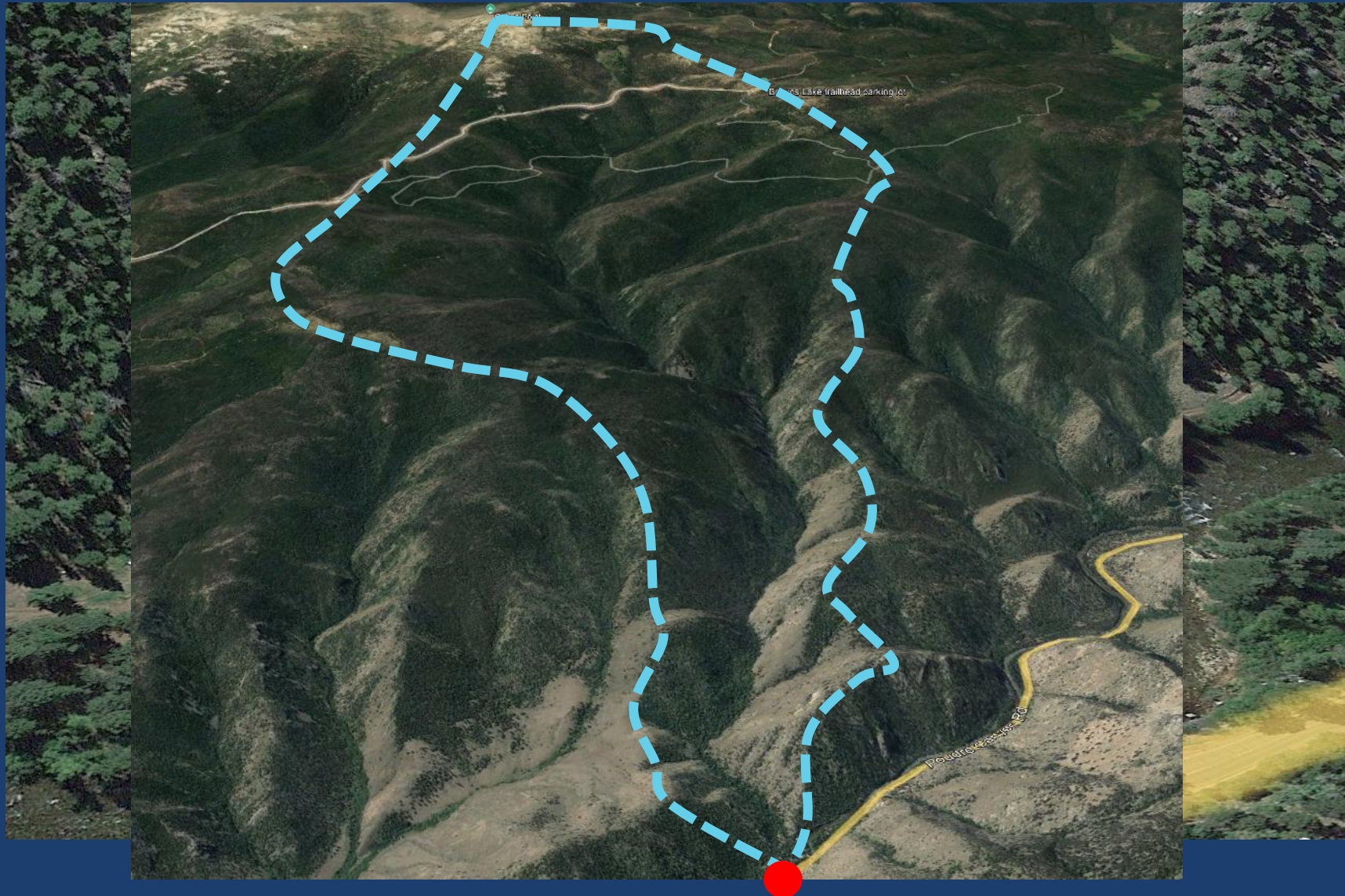
Holistic Approach To Disturbance



Holistic Approach To Disturbance



Holistic Approach To Disturbance



Holistic Approach To Disturbance

The diagram illustrates a holistic approach to disturbance management through three interconnected paths. The paths are represented by thick, rounded lines that cross each other. The top path is orange and labeled 'Infrastructure Protection Through Stabilization'. The bottom path is grey and labeled 'Hillslope Treatments'. The left path is red and labeled 'Post-Fire Flood Mitigation'. The paths intersect in a central area, suggesting a holistic integration of these three approaches. The background is a solid dark blue color.

**Infrastructure Protection
Through Stabilization**

**Post-Fire Flood
Mitigation**

Hillslope Treatments

Holistic Approach To Fire Planning & Impacts



Source: Coalition for the Poudre River Watershed

Holistic Approach To Fire Planning & Impacts

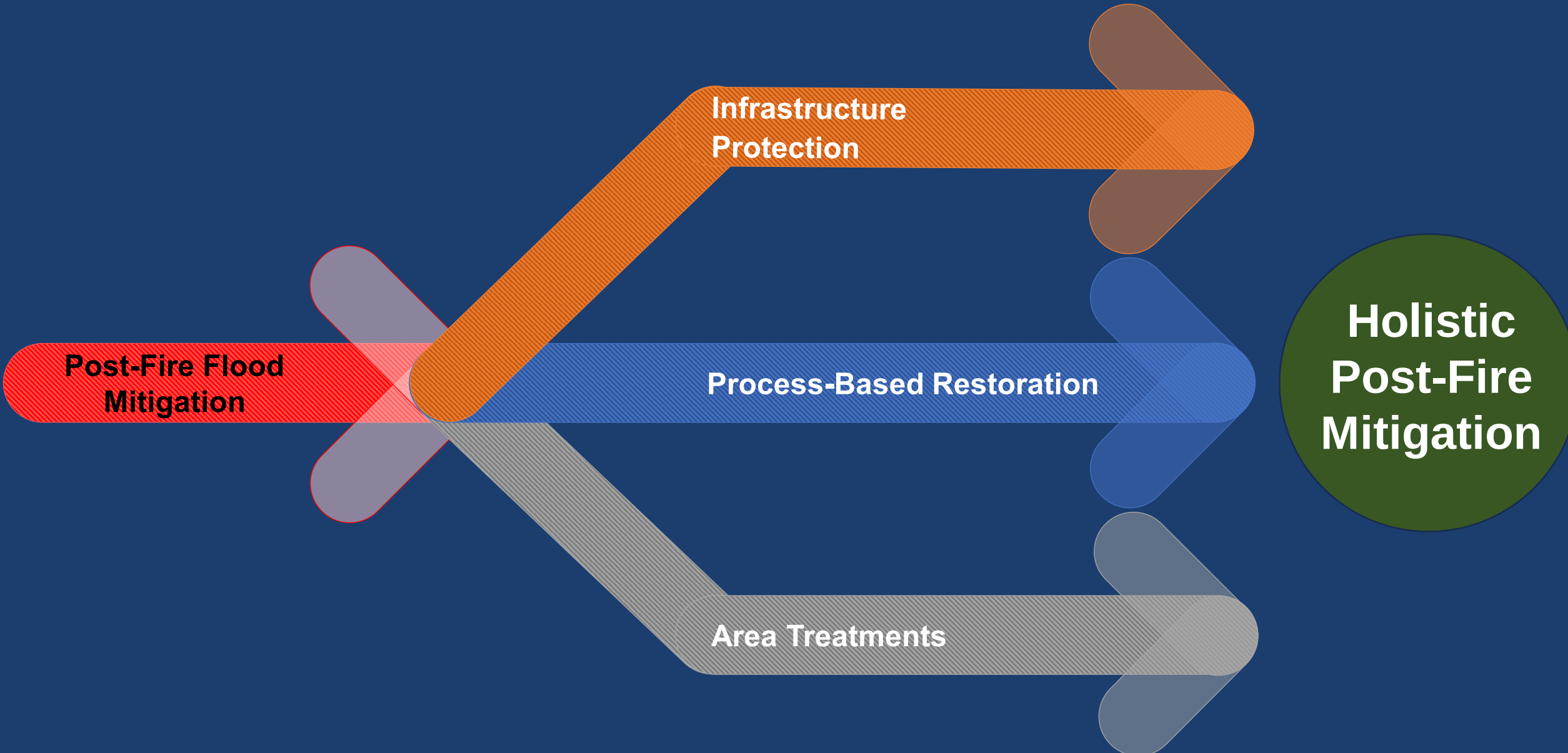
**Post-Fire Flood
Mitigation**

**Infrastructure
Protection**

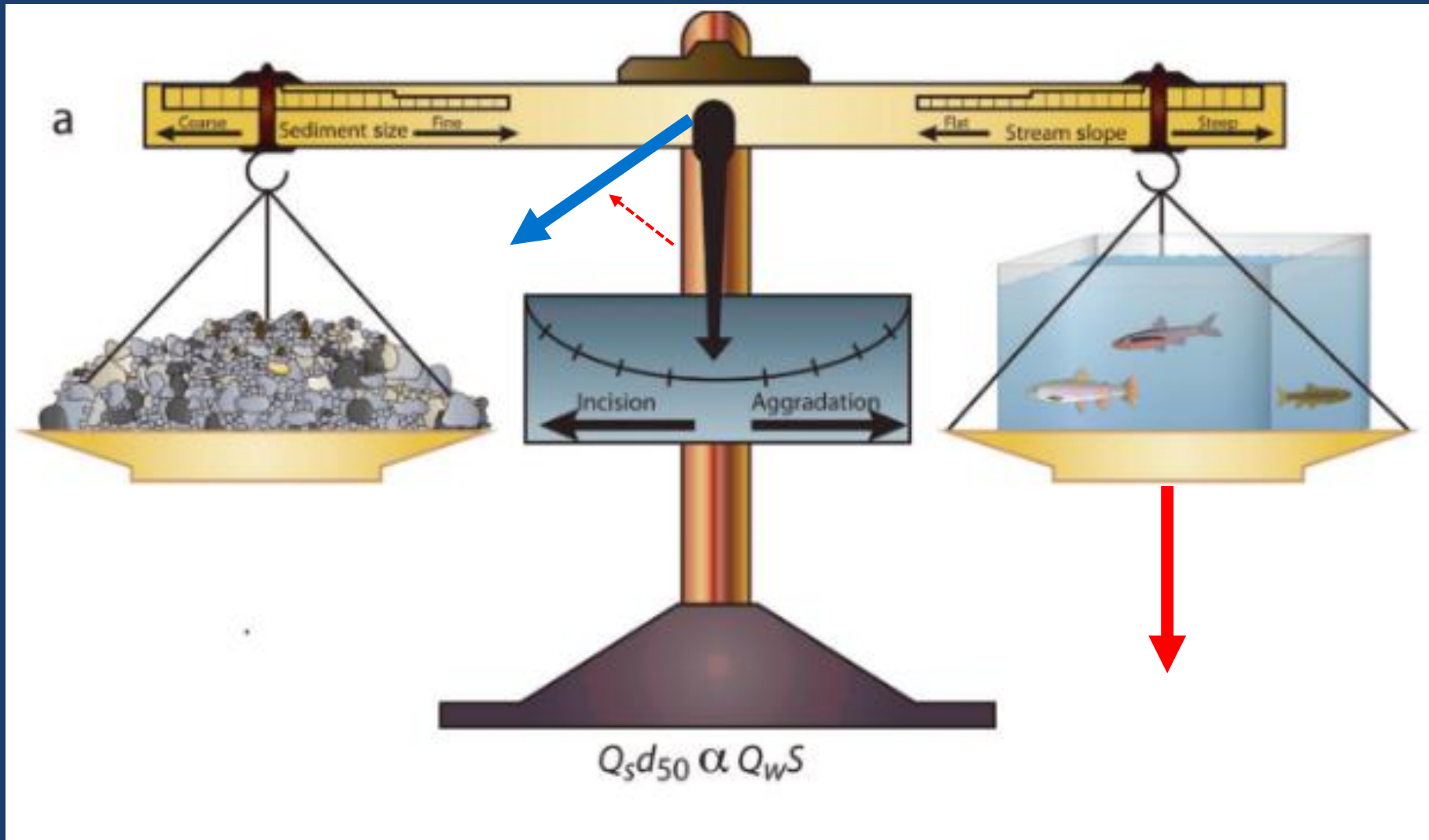
Process-Based Restoration

Area Treatments

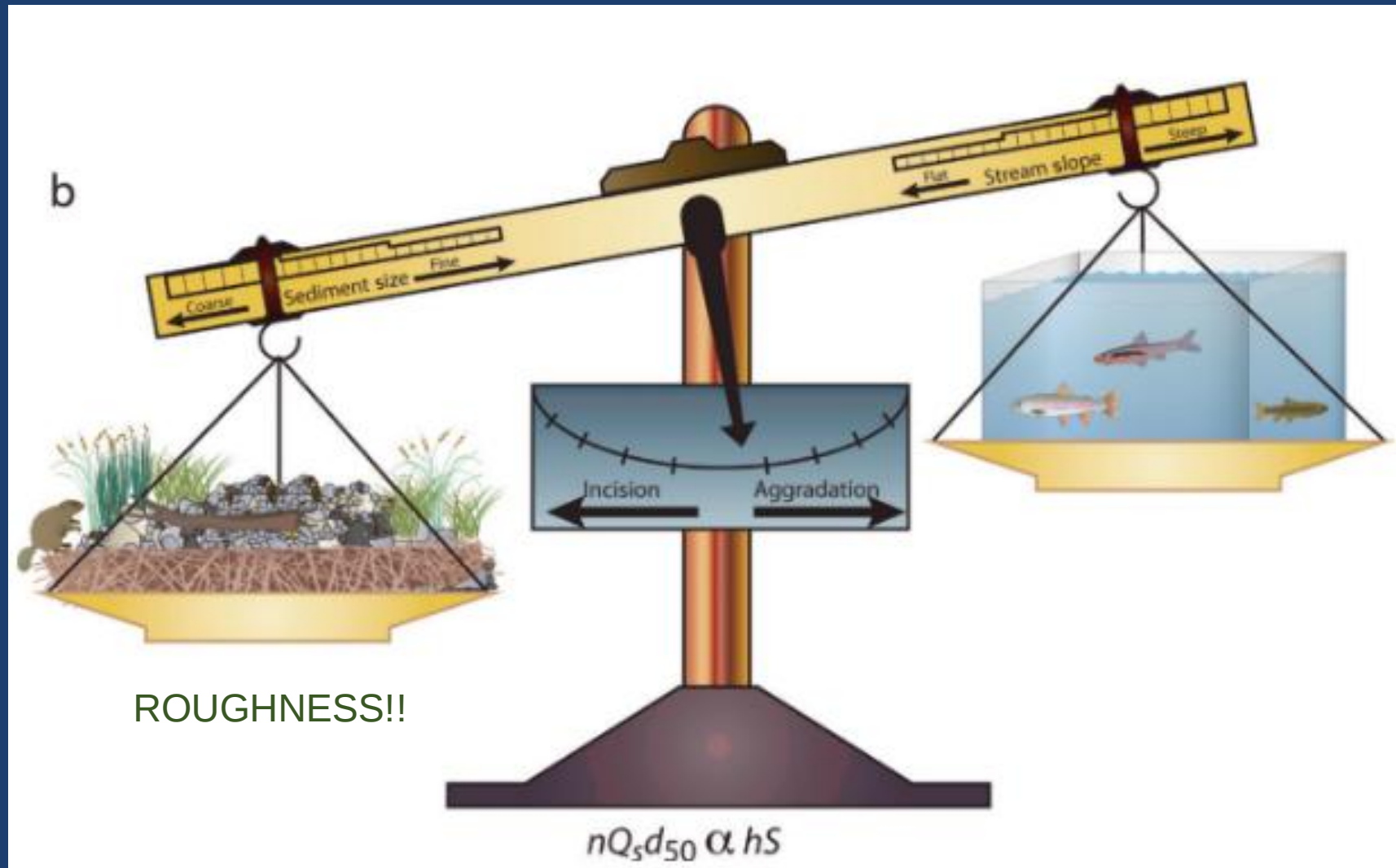
**Holistic
Post-Fire
Mitigation**



What processes are we leveraging?



What processes are we leveraging?



Process-Based Restoration (PBR)

- Pre-fire resiliency
- Post-fire mitigation approach
- Labor- or Machine-Based
- Adaptive Management & Monitoring



Labor-Based in Remote Areas



Machine-Based in Accessible Systems



Responses to Disturbance w/o Roughness



Stream Incision



Floodplain Disconnection



Habitat Simplification

Roughness Features for Every Setting

Relative Scale of Issue & Desired Impact	Stream and Riparian Related Issues		
	Stream Incision	Floodplain Disconnection	Habitat Simplification
1	• Log Structure • Wood Apron	• Strategic Tree Felling • Lateral Willow Wattle • Stream Debris Fence	• Willow Staking • Fencing & Enclosures • Native Seeding
2	• Post-assisted Log Structure • Beaver Dam Analog	• Wood Straw Bale Check • Beaver Dam Analog	• Longitudinal Willow Wattle • Riparian Revegetation • Log Structure
3	• Native Rock Stabilization • Wood Apron	• Post-Assisted Log Structure	• Native Rock Cascade
4	• Engineered Log Jam (ELJ) • Hardened Riffle/Step Pool/Boulder Cascade	• Engineered Log Jam (ELJ) • Wood Apron	• Native Rock Cascade

Demonstrated Success – Log Structures

Sheep Creek 2023

- 1.5 miles of stream
- ~\$20,000
- 2-wks
- Roughness threshold
- 30 Log Structures

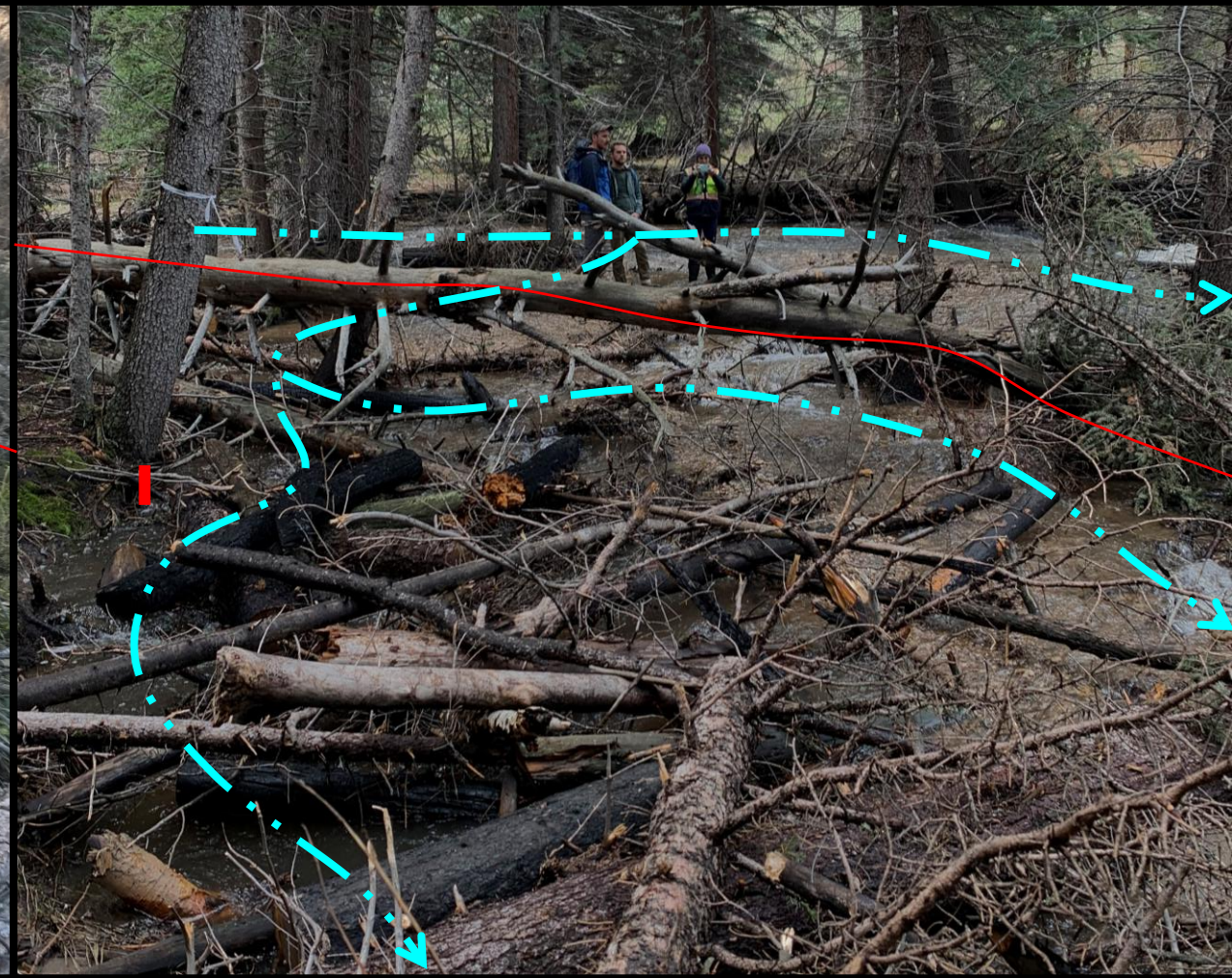


Demonstrated Success – Log Structures

As-Built



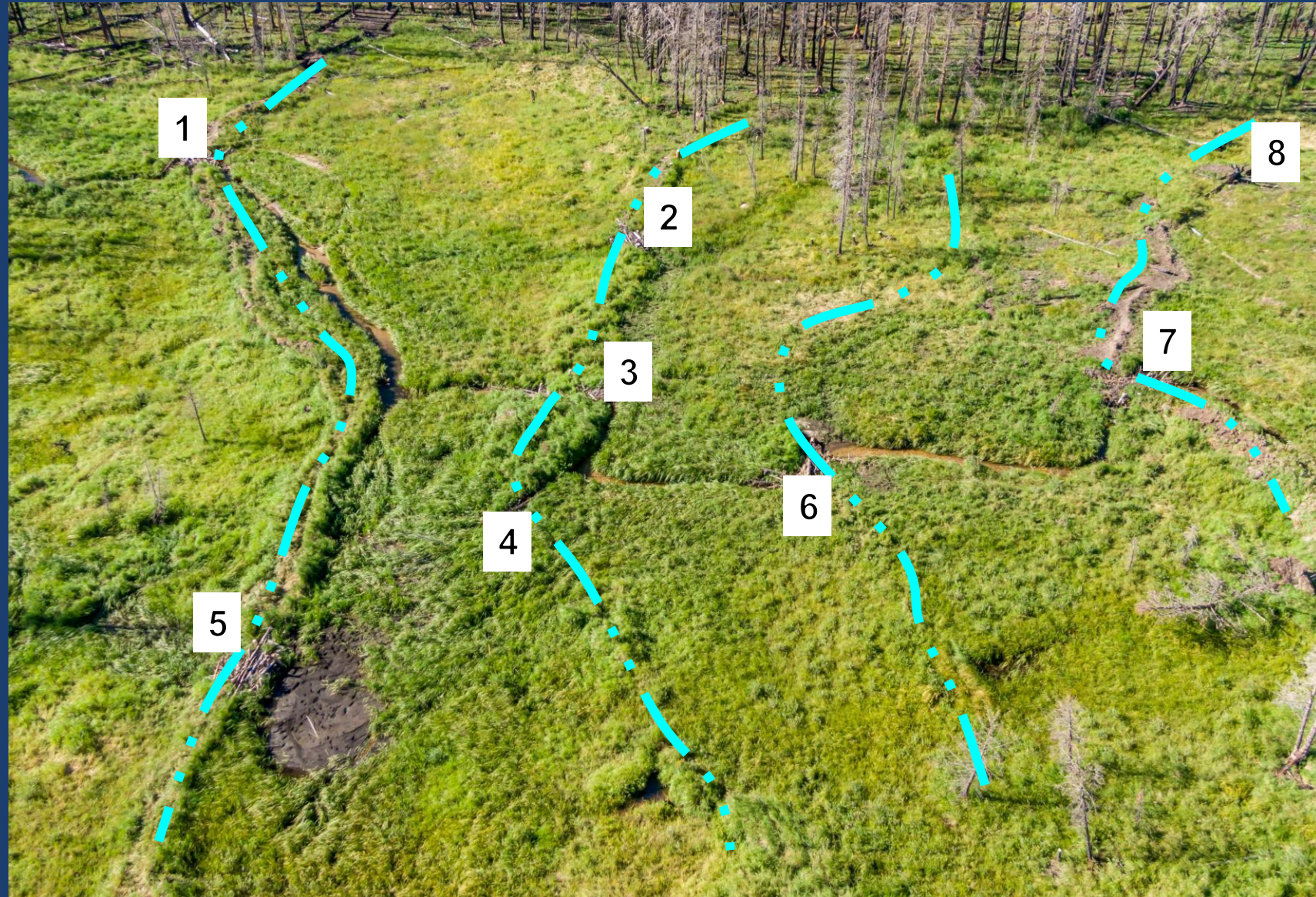
1-yr Post



Demonstrated Success – PALS

Upper Elkhorn Creek- 2022

- 2000 LF of stream
- ~\$25,000
- 2-wks
- Relic Beaver Meadow
- 12 PALS



Post-Assisted Log Structures (PALS)

As-Built



1-yr Post



Demonstrated Success – Engineered Log Jams

South Fork CLP - 2024

- 2000 LF of stream
- ~\$200,000
- 6-wks
- Depositional
Meadow Complex
- 12 ELJS / 10 LS



Demonstrated Success – Engineered Log Jams



Demonstrated Success – Beaver Dam Analogs

Little Beaver Creek - 2024

- 1000 LF of stream
- ~\$30,000
- 3-wks
- Depositional Meadow Complex
- 12 PALS / 10 BDAs



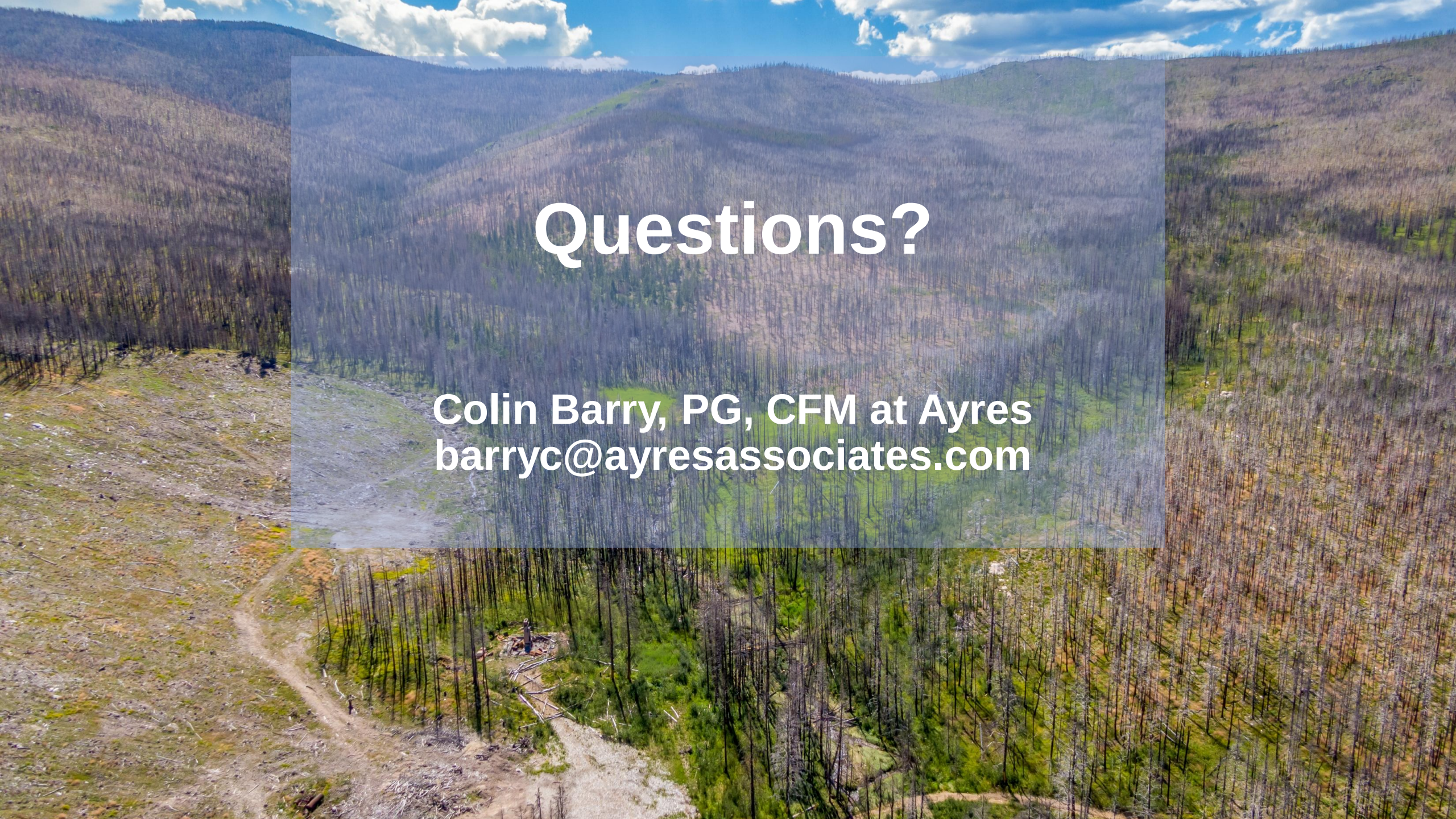
Beaver Dam Analogs



Application in Reclamation?

- Additional Tool
 - Watershed Approach
 - Valuable in Remote Habitats
- Permitting Metrics Drive Need for Stabilization
- Adaptive Management Considerations



An aerial photograph showing a vast landscape affected by a forest fire. The foreground and middle ground are filled with numerous black, charred tree trunks standing like sentinels in a field of green regrowth. A dirt road or path winds through the lower left. In the background, rolling hills are covered in a mix of green and brown vegetation under a blue sky with scattered white clouds.

Questions?

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