

Low Tech Process Based Restoration - Cameron Peak Fire Case Study

Presented By:

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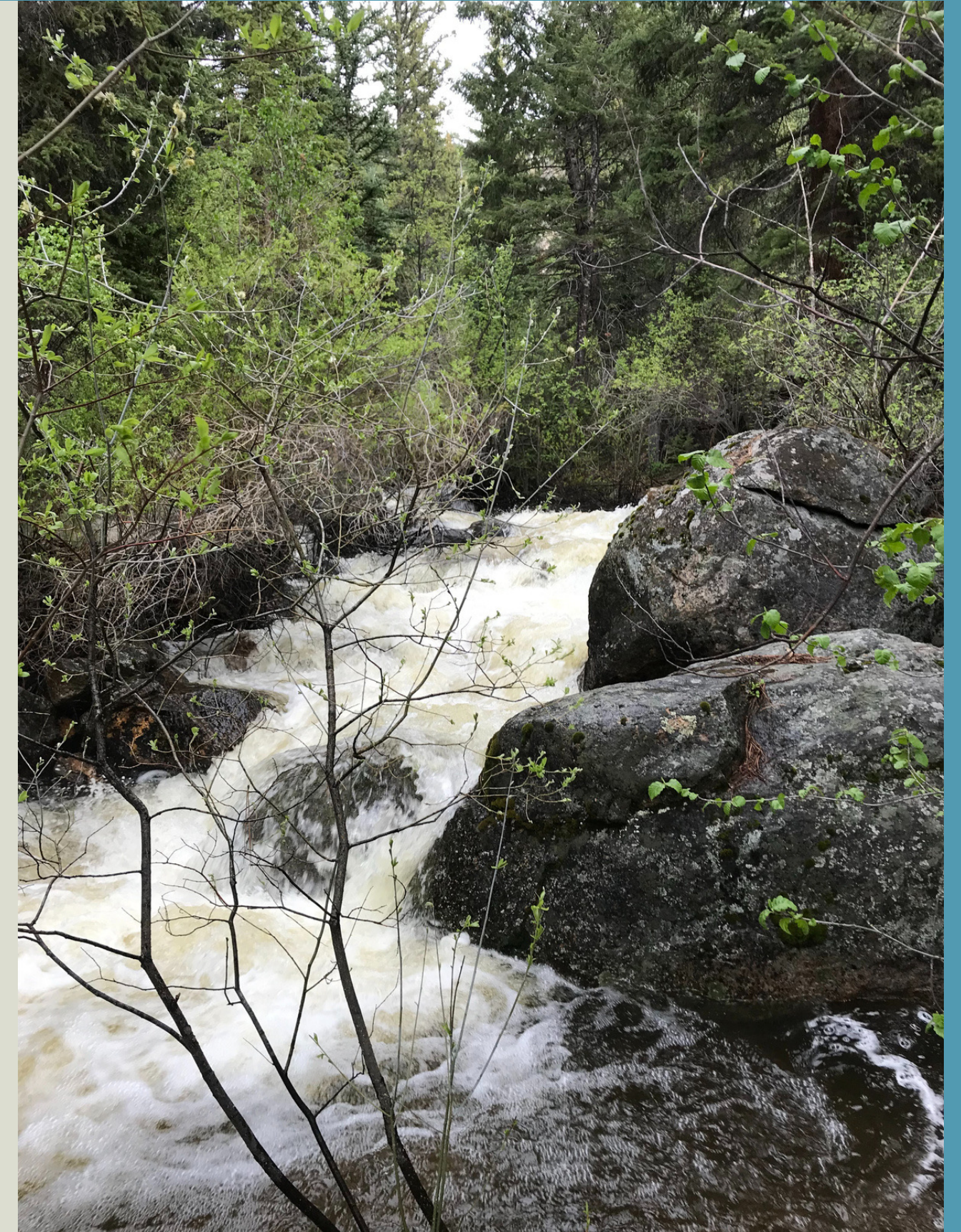
CPRW



- Informal coalition following the High Park Fire of 2012 and subsequent flood events
- Official 501(c)(3) nonprofit in 2013
- Mission: To improve and maintain the ecological health of the Poudre River Watershed through community collaboration

Programs

- Rivers
 - River restoration, fish passage, ditch and diversion restoration
- Forests
 - Forest restoration, wildfire mitigation, landscape-scale planning
- Post-fire Restoration
 - Water quality, river health, infrastructure protection, reforestation
- Science and Monitoring
 - Prioritization, post-project monitoring, water quality monitoring
- Community Outreach
 - Public engagement and education

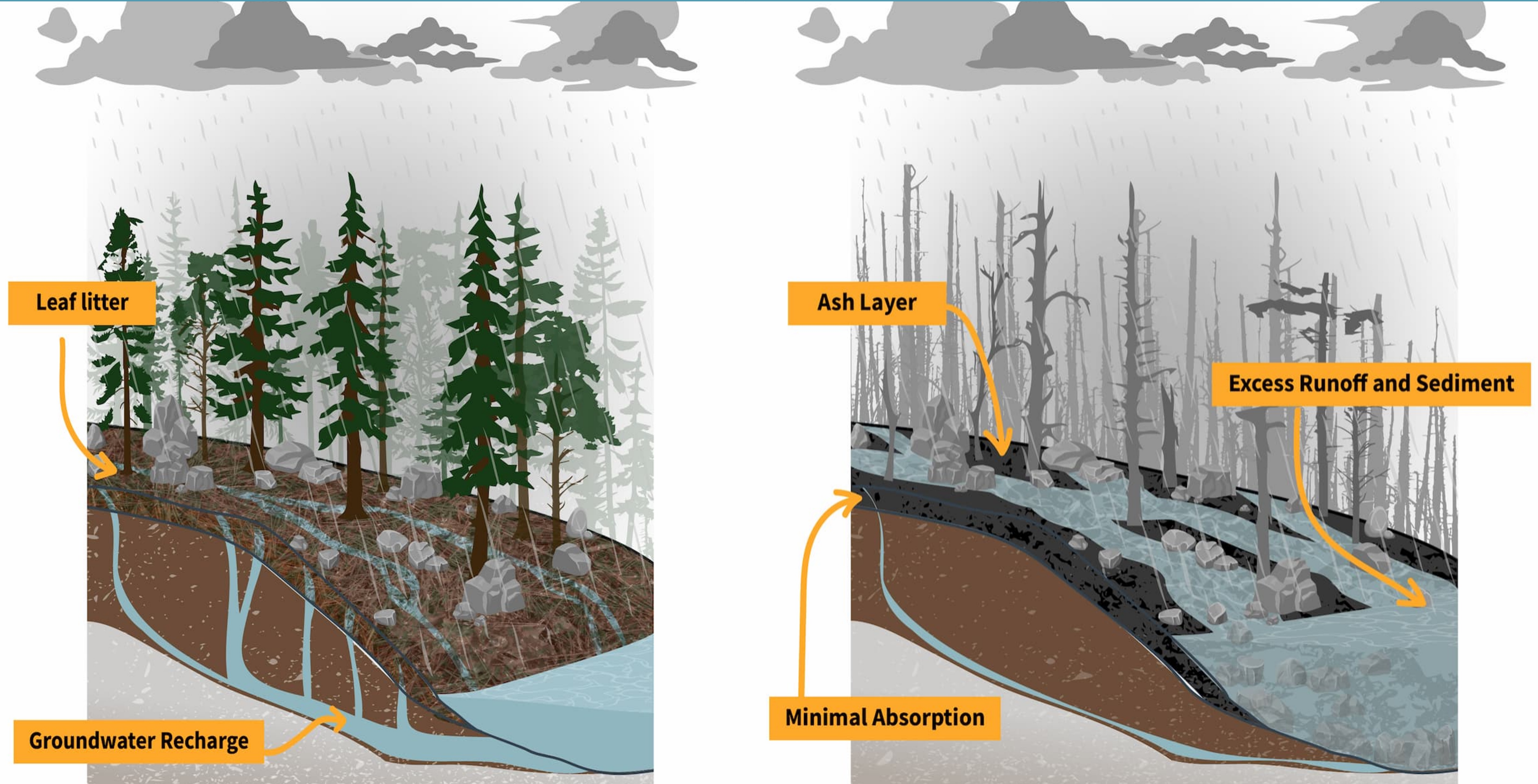




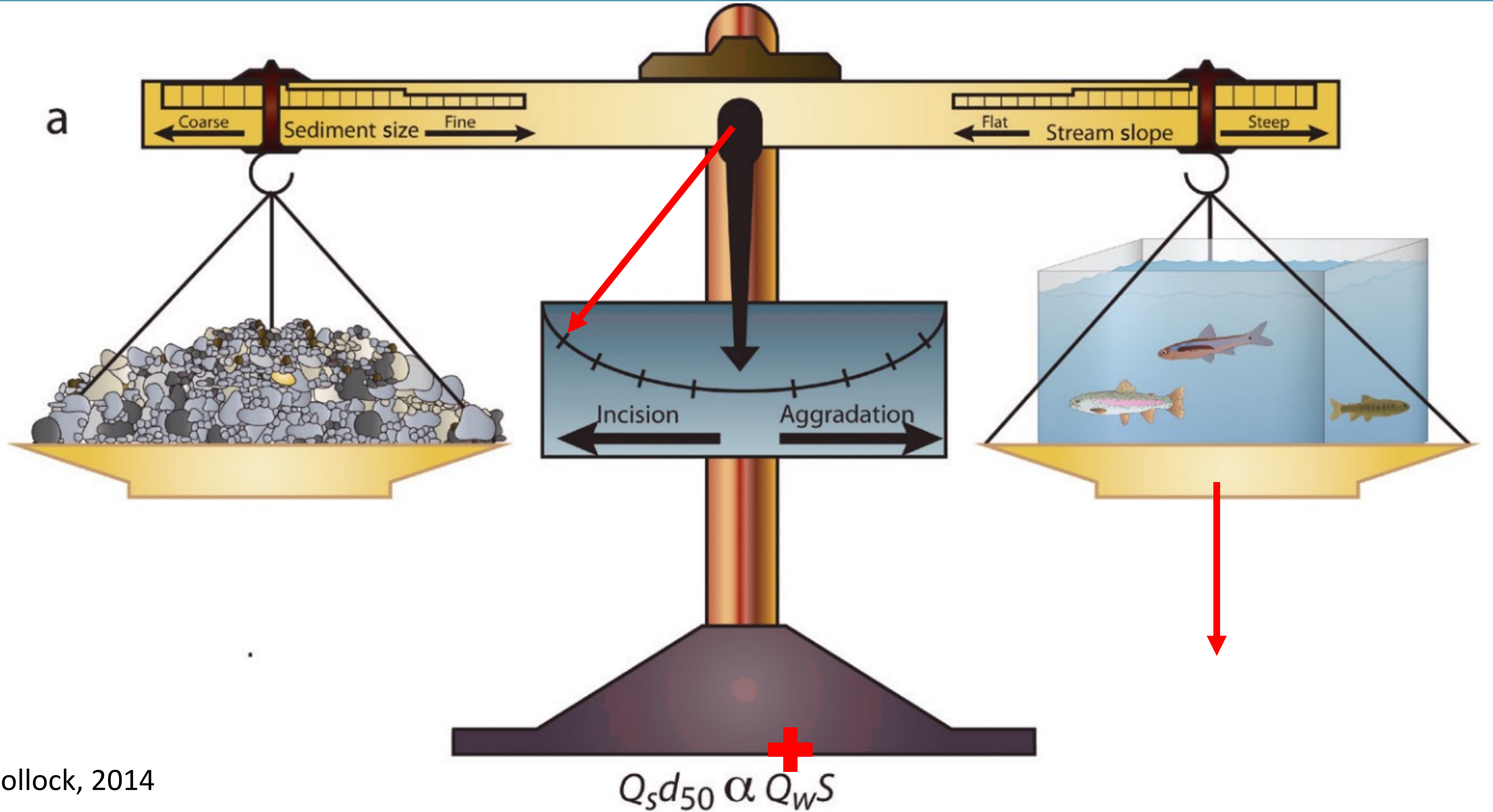
CPRW Post-Fire Mitigation

- Compliment other mitigation efforts
 - EWP, Aerial Mulching, US Forest Service
- Several Funding Sources
 - CWCB
 - CDPHE 319 Grant
 - NoCo Fire Fund
 - USFS Participating Aggrement
- Reforestation
- Multi-Year Implementation & Monitoring
- Adaptive Management

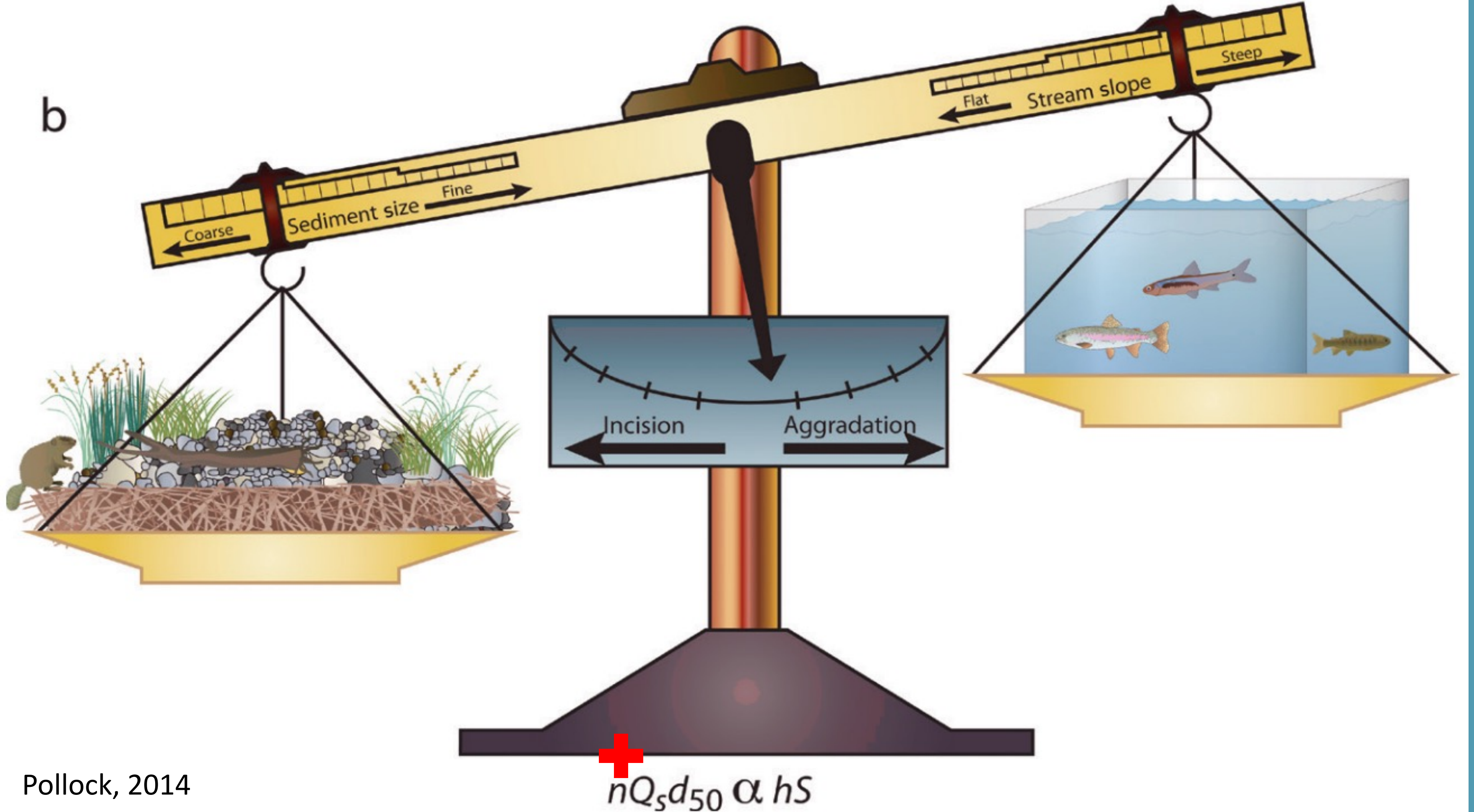
Post-Fire Impacts & Mitigation Approach



Post-Fire Impacts & Mitigation Approach



Post-Fire Impacts & Mitigation Approach



Process Based Restoration Umbrella

CONSIDERATIONS WHEN SELECTING RESTORATION APPROACHES AND TREATMENTS

When selecting a restoration approach and treatment, water managers and restoration practitioners weigh the following factors. Passive recovery and low-tech active recovery projects fall toward the left and middle of these spectrums, while high-tech active recovery work is on the right side.



Process Based Restoration Umbrella

DETAILS & APPLICABILITY FOR PBR APPROACHES:

| Approach: | Developed for or applicable to: | Limitations: | Common level of design analysis required: |
|--|--|--|--|
| <p>Passive Recovery (P)</p> | <ul style="list-style-type: none"> Any system | <ul style="list-style-type: none"> Not helpful when causative stressor (cause of degradation) cannot be removed (e.g., a dam or diversion structure) | <ul style="list-style-type: none"> No design required for system recovery Design for safe removal of the causative stressor may be required |
| <p>LTPBR & other beaver mimicry (LT), including Beaver Dam Analogs (BDAs), Post-Assisted Log Structures (PALs), Simulated Beaver Structures (SBS)</p> | <ul style="list-style-type: none"> Remote Areas with Limited Access Permit Limitations Implementation Speed | <ul style="list-style-type: none"> Not intended for non-wadeable, higher order systems where causative stressor is other than loss of wood and beaver dams If beaver can't be expected to move in to the restored area, beaver mimicry structures may be built Frame Expectations Appropriately | <ul style="list-style-type: none"> Engineering design analysis not required LTPBR Manual 2019 provides "guidelines for implementing a subset of low-tech tools (i.e., BDAs and PALs in riverscapes lacking wood and beaver dams" Interdisciplinary Design Team! |
| <p>Stage Zero Design (LT or HT)</p> <p>Stage Zero falls between LT & HT in required analysis and construction cost.</p> <p>Smaller Stage Zero efforts may have LT characteristics, but a larger project such as work covering a full valley, is closer to HT.</p> | <ul style="list-style-type: none"> Most successful in depositional areas with wide valleys and mild slopes to promote deposition Often in small, incised streams in wet meadows headwaters, but can be up-scaled to larger rivers Promote processes that will nudge the system back toward a Stage Zero condition May need sediment supply from upstream to fill incised channels over time Works best with adaptive management, but not required | <ul style="list-style-type: none"> Typically low risk areas with low or no infrastructure adjacency to accommodate floods covering full width of the valley bottom Access to full floodplain may currently be impractical due to anthropogenic constraints—Stage Eight might work well instead with restoration to an extent rather than the full floodplain width | <ul style="list-style-type: none"> Engineering design analysis varies, typically falling between LTPBR and HTPBR Analysis required to determine target slopes at minimum Full valley reset approach requires significant analysis |
| <p>HTPBR (HT)</p> | <ul style="list-style-type: none"> Detailed analysis allows PBR application on a case-by-case basis to any system Works best with adaptive management | <ul style="list-style-type: none"> Applies to most systems and causative stressors because customized detailed analysis addresses site-specific constraints Higher cost of analysis and often construction as well | <ul style="list-style-type: none"> Heavier engineering design analysis required compared to other approaches, but varies greatly across specific projects |

Process Based Restoration Umbrella

EXAMPLES OF TREATMENTS (NOTING OVERLAP ACROSS RESTORATION APPROACH):

PASSIVE RECOVERY (P)

Eliminate grazing (P)

Fence out grazing (P)

Remove invasive weed species (P)

Gravel augmentation (P, LT)

ACTIVE RECOVERY

LOW-TECH (LT)

Leaky beaver dam features (LT)

Wood structures—e.g., BDAs, PALs (LT)

Wood placement without anchoring (LT)

Floodplain reconnection (LT, HT)

HIGH-TECH (HT)

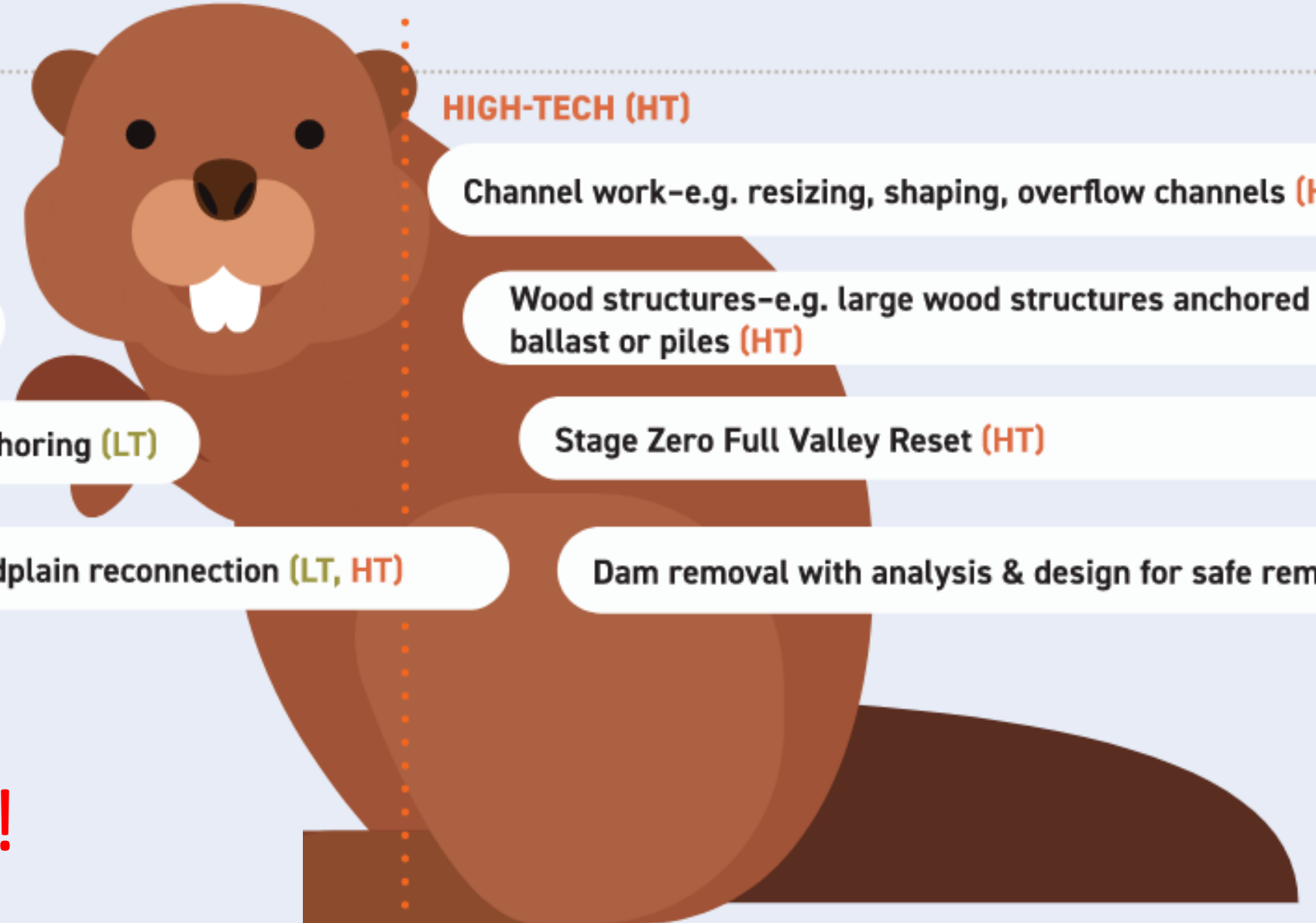
Channel work—e.g. resizing, shaping, overflow channels (HT)

Wood structures—e.g. large wood structures anchored by ballast or piles (HT)

Stage Zero Full Valley Reset (HT)

Dam removal with analysis & design for safe removal (HT)

Scale & Distribute!!



Two Project Examples:

Upper Elkhorn (2021)

- **Template Project for future work with USFS**
- **Relic Beaver Meadow Restoration**
- **Focused on Floodplain Connectivity, Water Quality Improvements, & Structural Diversity**

Sheep Creek (2022)

- **Reach-wide Roughness Threshold**
- **Relic Beaver Meadow Restoration**
- **Focused on Mitigate Incision, Water Quality Improvements, & Structural Diversity**

Upper Elkhorn 2021

Template Project!



**Upper
Elkhorn
2021**

**Relic Beaver
Meadow**



**Upper
Elkhorn
2021**

**Relic Beaver
Meadow**



Upper Elkhorn 2021

PALS



**Upper
Elkhorn
2021
PALS**



Sheep Creek 2022

Reach-wide Roughness Threshold



Sheep Creek 2022

Log Structures



Sheep Creek 2022

Log Structures

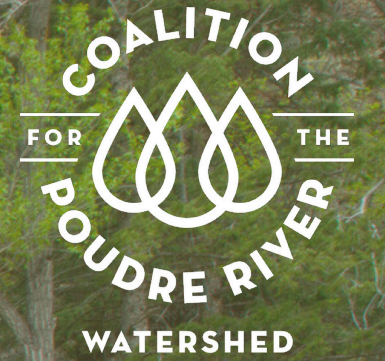


As-Built



1-yr Post





Questions?

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