



Post-fire Flooding and Recovery in the Upper Arkansas River Basin



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August 29, 2023



MISSION & OBJECTIVES

OUR MISSION IS TO PROVIDE ASSISTANCE TO ARKANSAS RIVER BASIN COMMUNITIES BY ADDRESSING LOCALLY-IDENTIFIED WATERSHED ISSUES FOR ECONOMIC, ECOLOGICAL & SOCIAL BENEFIT.

- Forest Health
- Post-Fire Recovery
- Water Quality and Quantity
- Collaborative Development



Dangers of Post-Fire Flooding

Fires strip trees & vegetation from hillsides.



Fire-scorched soils become hydrophobic soil (a temporarily impermeable soil layer), which cannot absorb rainwater.



Without vegetation or stable soil, debris such as burned trees, soil and ash flow downhill during rain events.



Communities downstream from these flows are at serious risk for flooding.



15 YEARS OF WILDFIRE IN THE ARKANSAS RIVER BASIN




3 MILLION ACRES
of Forested Land


230,303
Acres Burned


700,750 ACRES
Infected with
Insects & Disease

THE TRUE COST OF WILDFIRE



\$240,000,000
Fire Fighting
Suppression Costs



\$57,000,000
Flood Mitigation to Date
(EWP, CWCB, CDPHE)



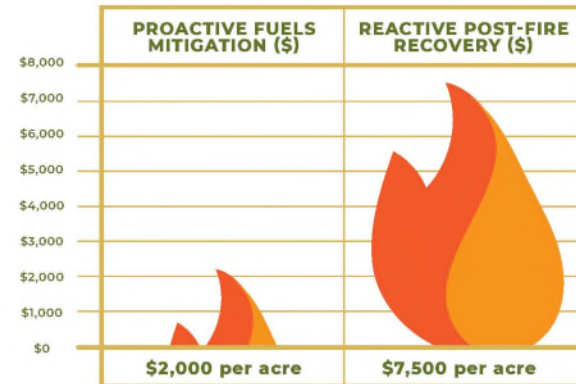
\$1,500,000,000
Insurance Claims Filed



\$16,000,000
Federal Emergency Response
to Wildfire (FEMA)



\$1.8 TRILLION
TOTAL CONSERVATIVE
COST OF
WILDFIRE
IN THE ARKANSAS BASIN
OVER 15 YEARS



**All numbers are estimates based on available data.*

Hayden Pass Fire Case Study: Fire, Flooding, & Early Response



Fire ignites July, 2016
Burns 17,000 acres



Severe Flooding in 2018 Initiates a Call to Action

- Hayco
- Gran





“...158 trout rescued by CPW from the Hayden Pass Fire in 2016, which threatened to wipe out the only known population still in existence.

...CPW surveys of Hayden Creek after the fire and subsequent ash flows didn't find a single survivor.”

Montrose Press



Colorado Parks and Wildlife / Bill Vogrin

Obstacles to Recovery Plan Implementation



Community-Wide Outreach

Obstacles:

- This process of engagement was not working
- This community was not interested in participating in a formal coalition.
- The community was confused by the different partners, projects and roles.
- In general, more information was needed.

Conclusion: The team listened, reorganized and approached the community again in the months to follow.



Individual Outreach

Obstacles:

- Trust-building within the community was not moving quickly enough to salvage the EWP program.
- Most landowners opted out of the program.

Conclusions:

- Understanding the population facilitated cooperation
- Redirected resources to those most impacted by post-fire flooding

Recovery & Trust

- Building trust through action
- Development of a TRUE coalition



Key Takeaways & Lessons Learned



Expert Guidance



Adaptability



Resources

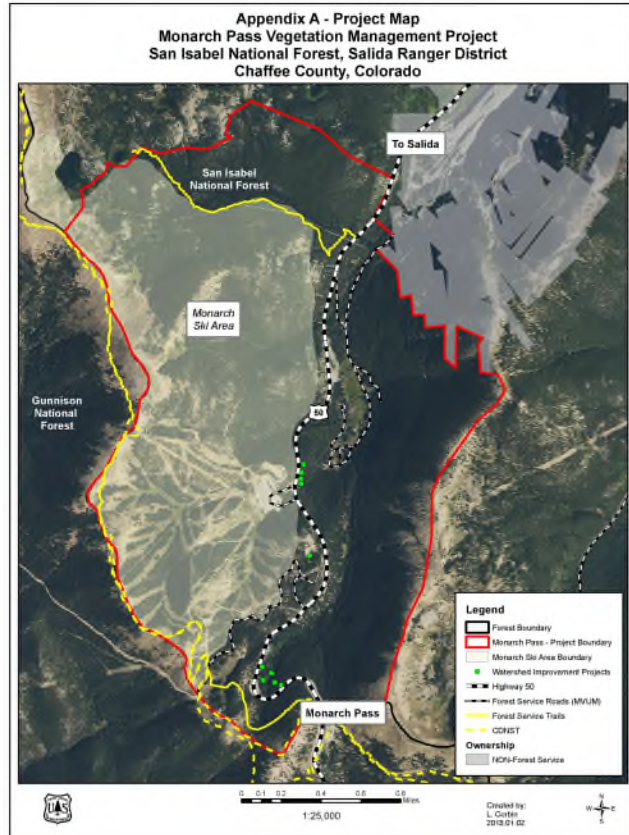


**Restructure Post-Fire
Programs**

Preventative Actions ... Before the Fire

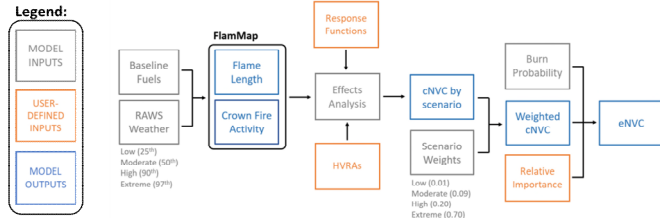


Monarch Pass Forest & Watershed Health Project

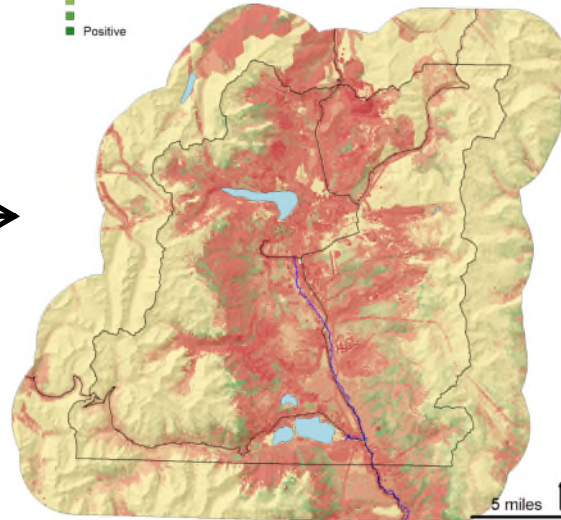




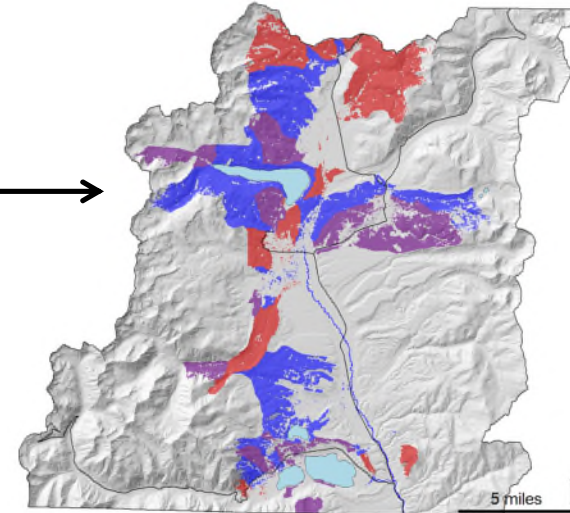
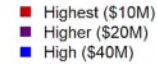
Lake County Community Wildfire Protection Plan Data Driven from Locally-Identified Priorities



Composite Wildfire Risk



Fuel Treatment Priorities



High Value Resources & Assets:

- Life Safety
- Infrastructure
- Water
- Wildlife
- Wildland-Urban Interface
- Recreation



MAJOR ELEMENTS OF THE LOCAL WRW ACTION PLAN



Stakeholders + Partners

Provide an overview of the partners and stakeholders that local planning and fire recovery teams will need to interact with both before and after a fire to address post-fire hazards and susceptibility.

[READ MORE](#)

GIS Preparedness

Provide a checklist of data needed to perform a comprehensive watershed-scale susceptibility assessment and/or post-fire risk assessment.

[READ MORE](#)

Hazard Evaluations - Types + Methodologies

Provide recommended hazard evaluations and guidance for their use in determining post-fire hazard susceptibility.

[READ MORE](#)

Susceptibility Analysis

Provide guidance regarding how to use hazard evaluations to identify values at risk and categorize impacts.

[READ MORE](#)

Mapping + Data Sharing

Provide examples and guidance for the development of cartographic work products that support pre-fire decision-making, fire response, and post-fire protection and recovery.

[READ MORE](#)

Pre- + Post-Fire Actions

Identify and implement actions that communities can take to address susceptibility to post-wildfire hazards.

[READ MORE](#)

Hooray! Nothing Happened!
(this doesn't make the news)

“So, is all fire bad?”



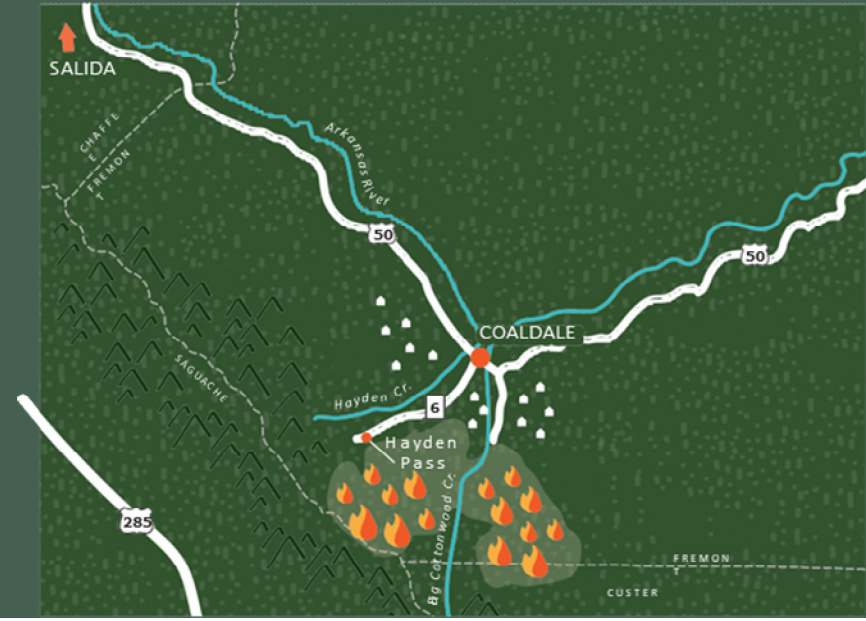


**Big Cottonwood Creek:
Post Fire and Flooding Work and Long-Term Recovery**

Luke Javernick, Ph.D.

OVERVIEW

- 2018 Flood Event
- Prioritization of post-fire and post-flood projects
- ARWC's action
- Current issues and opportunities





DINKLE DITCH

UNDERSTANDING THIS FLOOD



- Hydrology performed by Lotic
- Stage data from Coaldale
2,050 cfs
- Estimated that 3,500 cfs at the confluence of Big Cottonwood and Arkansas



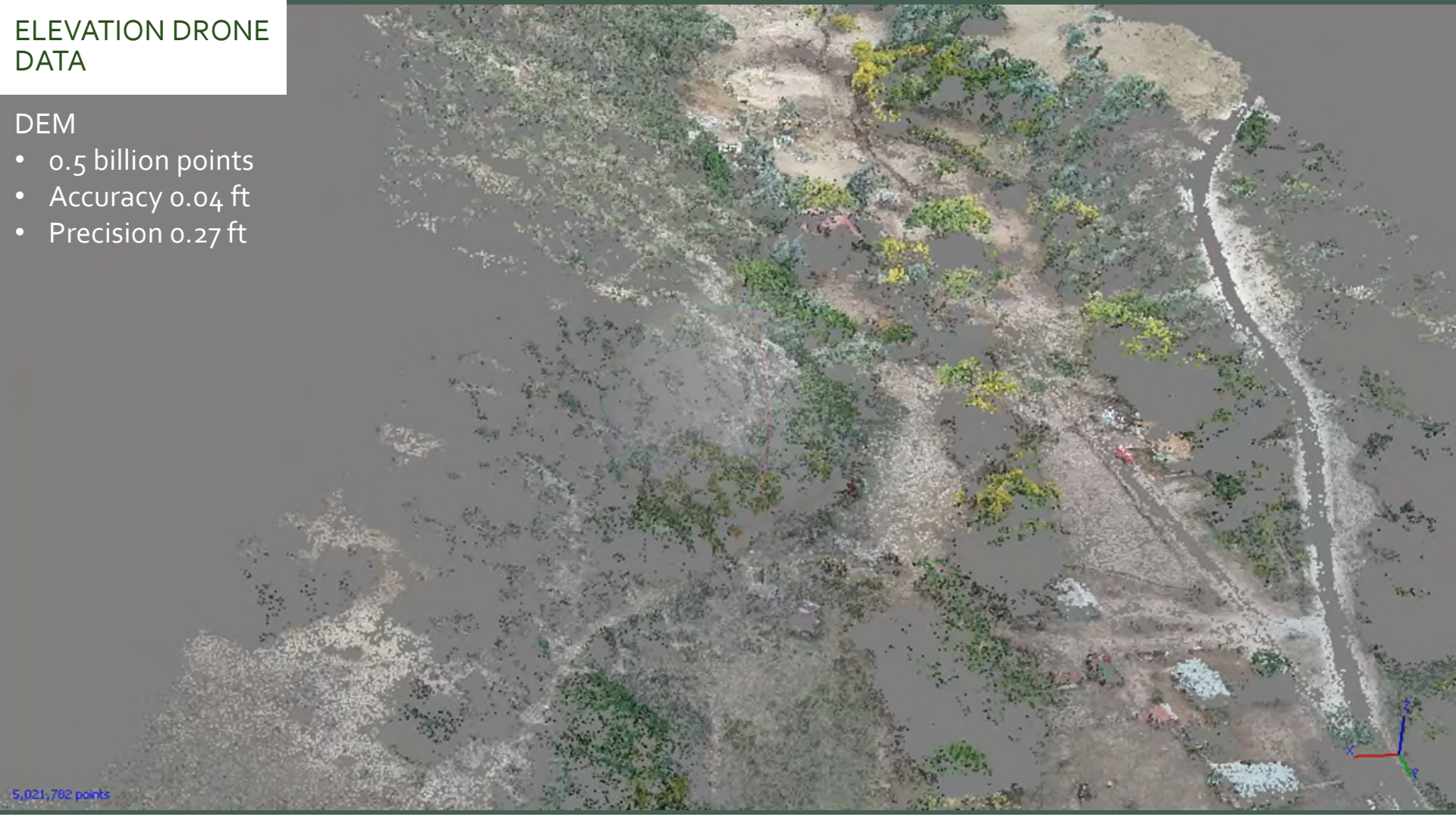
- Land Survey
- Full elevation model
- Flood debris lines from July event

ELEVATION DRONE DATA

DEM

- 0.5 billion points
- Accuracy 0.04 ft
- Precision 0.27 ft

5,021,782 points

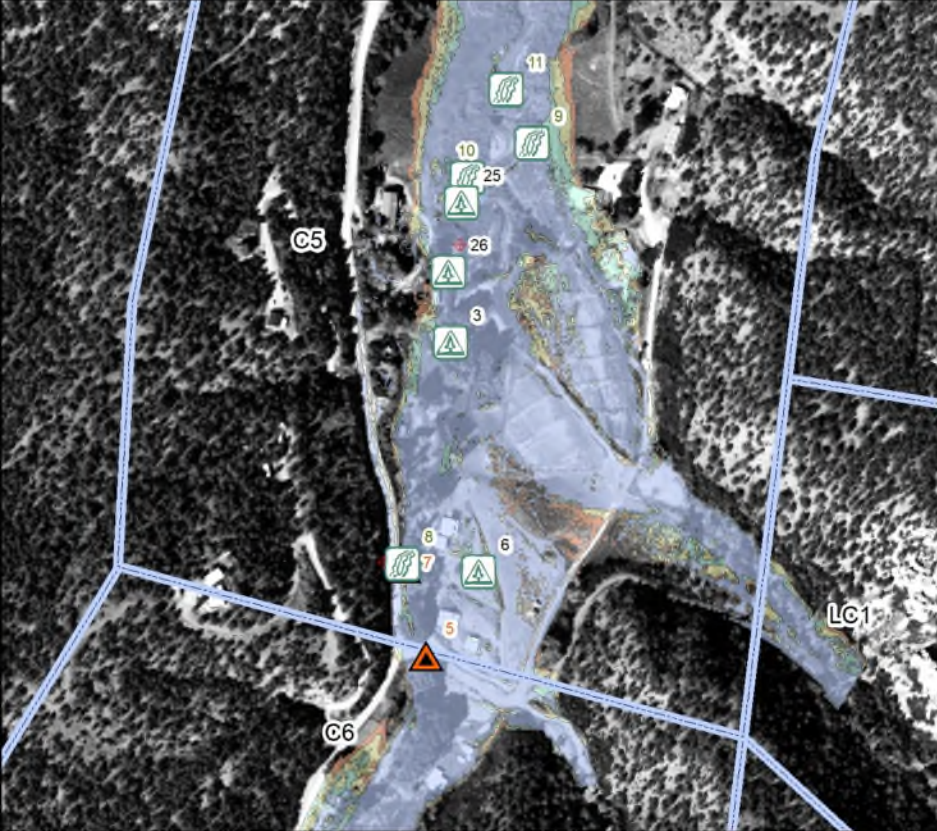


HYDRAULIC MODELING

Selected: 'depth'

30NOV2018 00:00:00





Legend

- | | | | | | |
|--|----------------|--|-----------------|--|---------------------------|
| | Debris | | Channel Grading | | 10 year flood inundation |
| | Channel Issues | | Reaches | | 25 year flood inundation |
| | Dangers | | Photo Points | | 50 year flood inundation |
| | | | | | 100 year flood inundation |



REMAINING ISSUES

- Significant bank erosion
- Fine sediment overload
- Depleting water table
- Fast and narrow flow
- Disconnected floodplain
- Disconnected Diversions
- Lack of viable habitat



REMAINING ISSUES

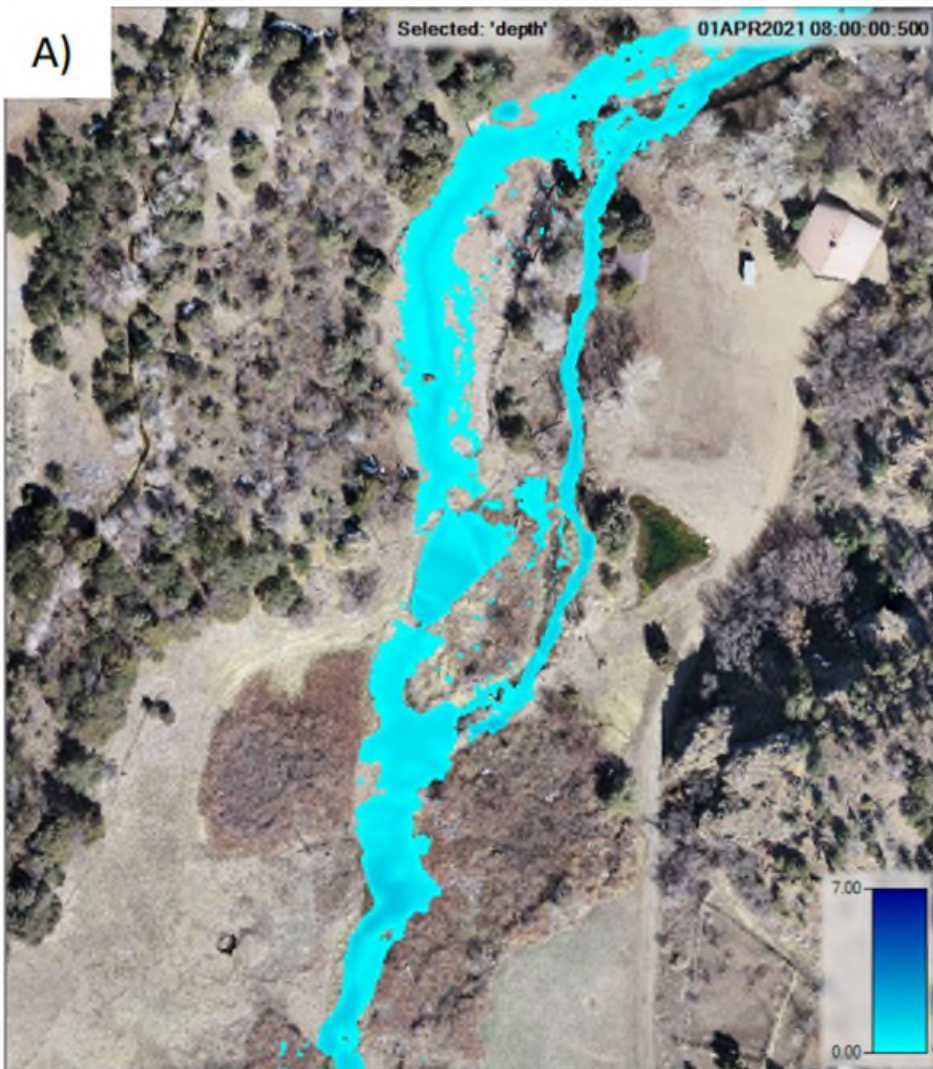
- Frequent bank failures
- Fine sediment overload
- Depleting water table
- Fast and narrow flow
- Disconnected floodplain
- Disconnected Diversions
- Lack of viable habitat

Long term hydrological impacts

Impacts to ag, water quality, recreation & environment, property value, etc.



A)



B)



OPPORTUNITY

- Work with the creek and restore the processes missing. PBR
- Low-cost restoration
- Low-disturbance
- Trap sediment and raise the channel bed, which can:
 - Improve water table
 - Improve habitat by slowing flow and creating features
 - Improve water quality
- Demonstrate the need for long-term post-fire recovery
- Demonstrate this restoration in context of CO water rights.





Channel-Spanning



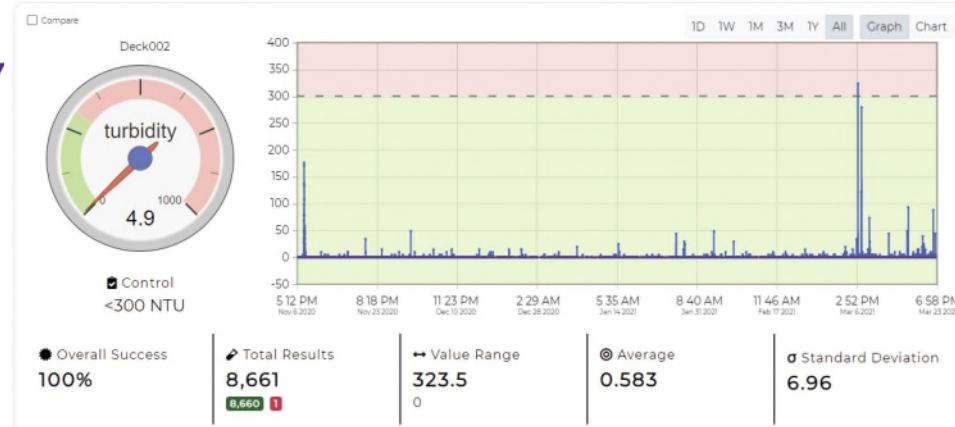
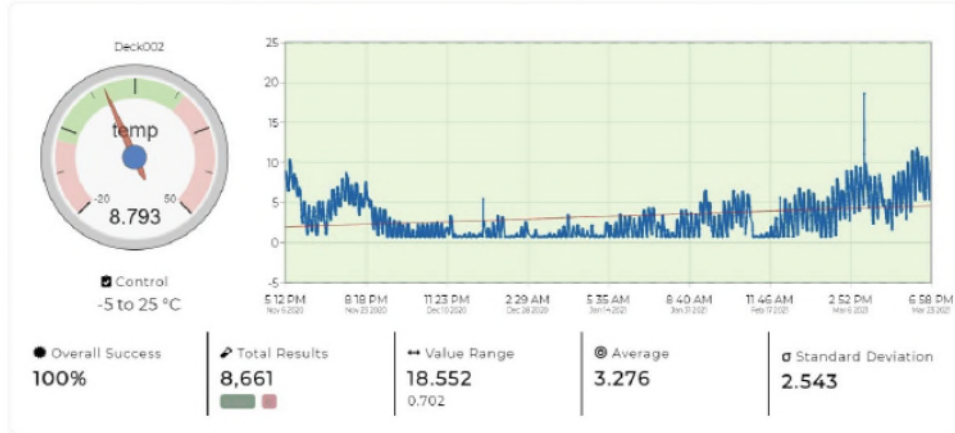
- PALS are
 - Leaky
 - Don't pond
 - Lift the channel vertically
 - Temporary grade controls

GENERATE REPORTS

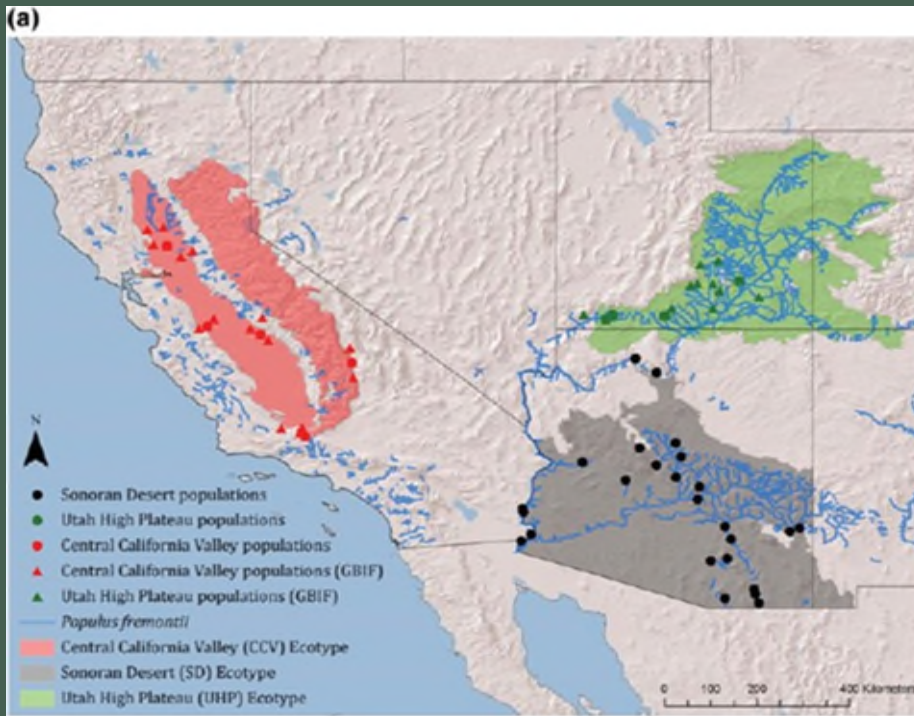
TRACK STATISTICS



ARKANSAS RIVER
CONSERVATION COOPERATIVE

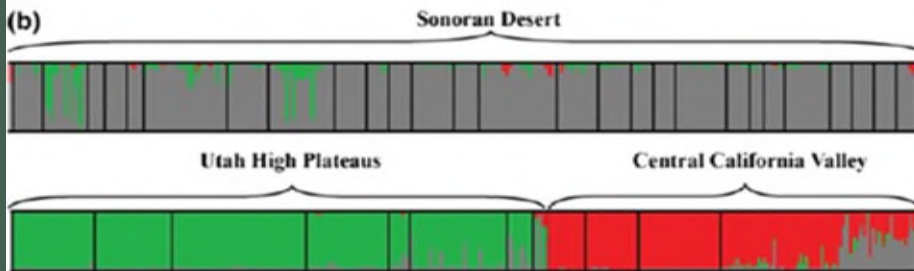


Climate Adaptation and Restoration Opportunity



...unify four conceptual areas of genes to ecosystems research related to *P. fremontii*'s capacity to survive or even thrive under current and future environmental conditions...

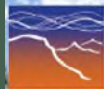
Hultine et al. 2020



The Role of Genetics and Genomics in Riparian Restoration and Management: Insights from Research in Foundation Cottonwood Trees

G. J. Allan

and the Cottonwood Ecology Group
Northern Arizona University



CANYONLANDS
RESEARCH CENTER

Fremont cottonwood "Ribbon of Green"
Boulder Creek, Utah
Photo by Tom Whitham



QUESTIONS?

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