

# Building a Design Team to Deliver Resilience

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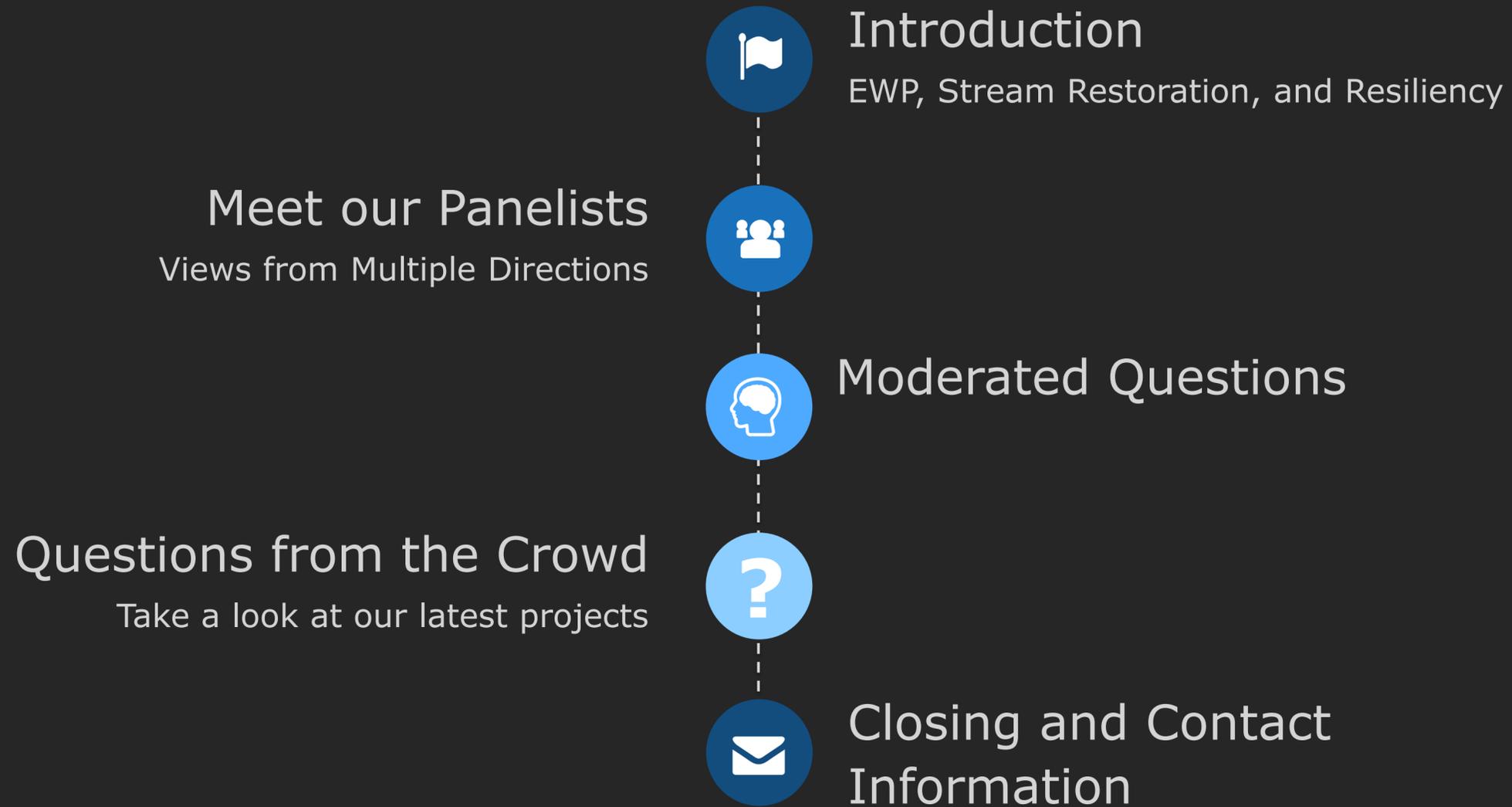
Moderated by: Jeffrey Sickles, PE, CFM



Colorado Emergency Watershed Protection (EWP) Program

Sponsored by the Colorado Water Conservation Board (CWCB)  
Administered by the Natural Resources Conservation Service (NRCS)

# Panel Discussion Overview



# Emergency Watershed Protection Program



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# 2013 Colorado Flood Recovery Phase II NRCS EWP Program Summary

- **Purpose:**

- Implement emergency recovery measures to protect life and property in watersheds impaired by a natural disaster

- **Funding:**

- \$63.2 mil. total/ \$47.4 mil. federal

- **State Sponsor:**

- Colorado Water Conservation Board

- **Local Sponsors:**

- Counties, cities/towns, watershed coalitions, others



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# Opportunities for Multiple Benefits

- Reduce hazards and improve flood conveyance
- Reconnect floodplains with streams
- Enhance stream function
- Manage sediment movements
- Improve ecological and biological function of the stream
- Improve recreational potential

# The Challenge of the 2013 Phase II EWP Program

- \$63.2 million for over 70 projects
- 6 flood affected Counties and Local Governments
- 9 Watershed Coalitions
- 26 months to identify projects, find and secure match funding, convince >500 landowners to participate, complete field work, designs, permitting, construction procurement, construction, and project closeout.

“And you want to achieve resiliency too?”  
• May 2015 – April 2018

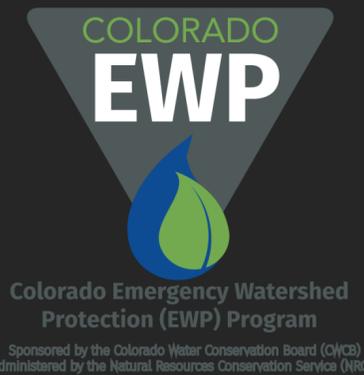


If it were easy my Nana would be sitting here right now instead of me.



**Chris Sturm,  
CWCB**

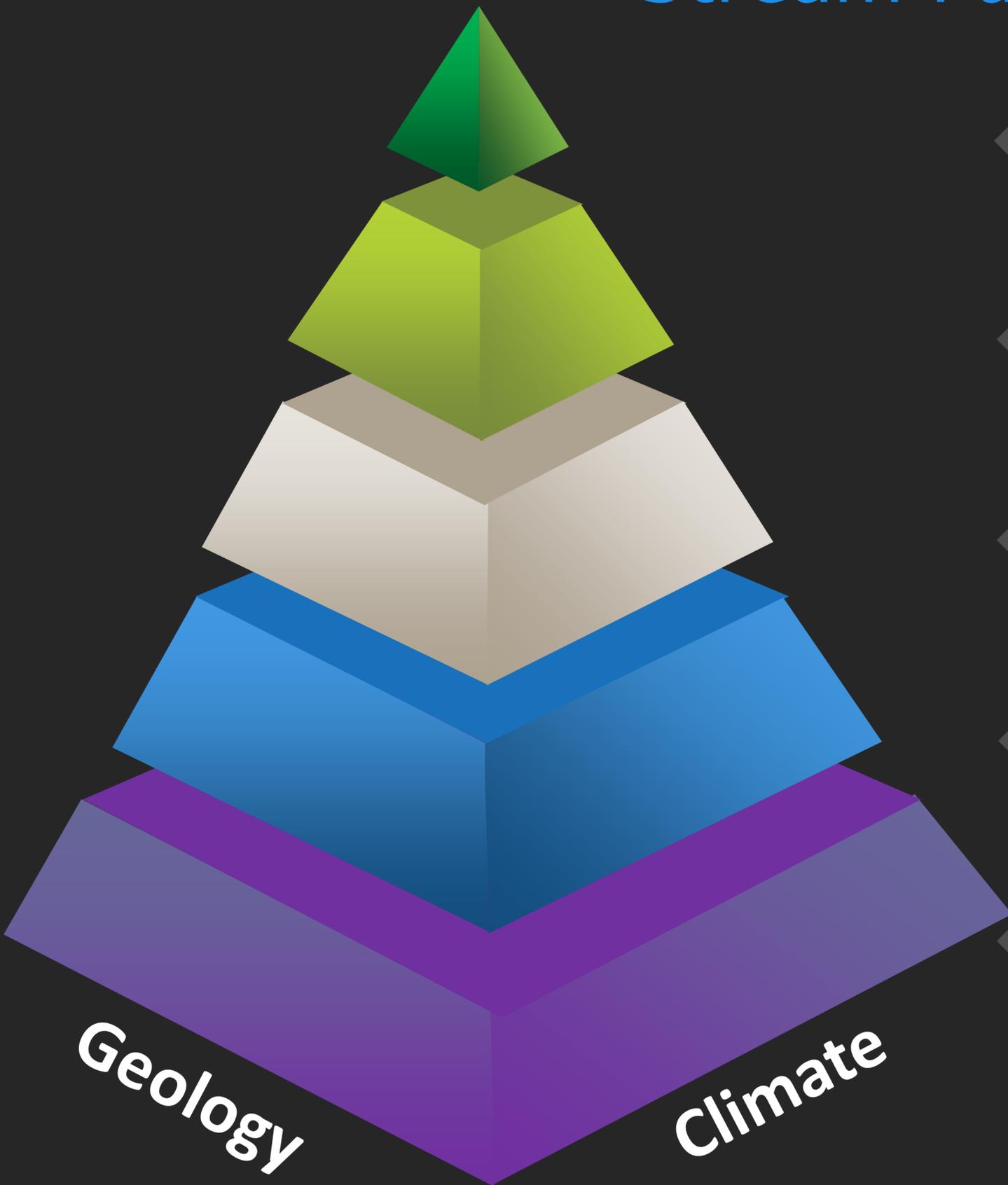
# Building a Team to Deliver Resiliency





Enhancing the ecological, biological, and geomorphic functions of the river is a foundational principle of resiliency in flood recovery

# Stream Functions Pyramid



## Biology

Biodiversity and the life histories of aquatic and riparian life.

5

## Physiochemical

Temperature and oxygen regulation; processing of organic matter and nutrients.

4

## Geomorphology

Transport of wood and sediment to create diverse bed forms and dynamic equilibrium.

3

## Hydraulic

Transport of water in the channel, on the floodplain, and through sediments.

2

## Hydrology

Transport of water from the watershed to the channel.

1

Geology

Climate

Post-Flood Recovery Assessment and Stream Restoration Guidelines for the Colorado Front Range

(Colorado Parks and Wildlife, 2015)

# The Team Needed to Deliver Resilient Stream Design

- **H&H Engineer**
- **Geomorphologist**
- **Ecologist**
- **Biologist**



Can we get these individuals to work together and respect their unique knowledge and abilities to design and construct resilient flood recovery projects?



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# Meet our Panelists

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Gerald Blackler, PE,  
The **PhD** Engineer

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Michael Blazewicz  
The Geomorph

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William Miller, PhD  
The Biologist

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Randy  
**Mandel**  
The Ecologist

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## Regarding Resilience

Define resilience, and

As a \_\_\_\_\_ what does it mean to achieve resilience on these EWP flood recovery projects?



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## Regarding Risk

Are ecological function and the elimination of flood (inundation and erosion) risk mutually exclusive?

Provide specific examples on recent flood recovery or mitigation work.



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## Regarding Changed Perspectives

Have your designs on any of the EWP projects changed as a result of working with the professional expertise on this team? If so, how?

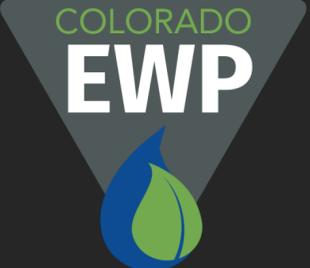


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# Regarding Geomorphology

What drives the design process more: geomorphic/watershed context or local geomorphic conditions (slope, bedform, etc)?



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# Regarding revegetation

What are your thoughts on using revegetation only on a flood recovery project such as the Deutschteig project on Left Hand Creek and on Fish Creek in



For Randy:

What is the best way to achieve project objectives when landowners mandate “no willows” or “no trees that block my view”?

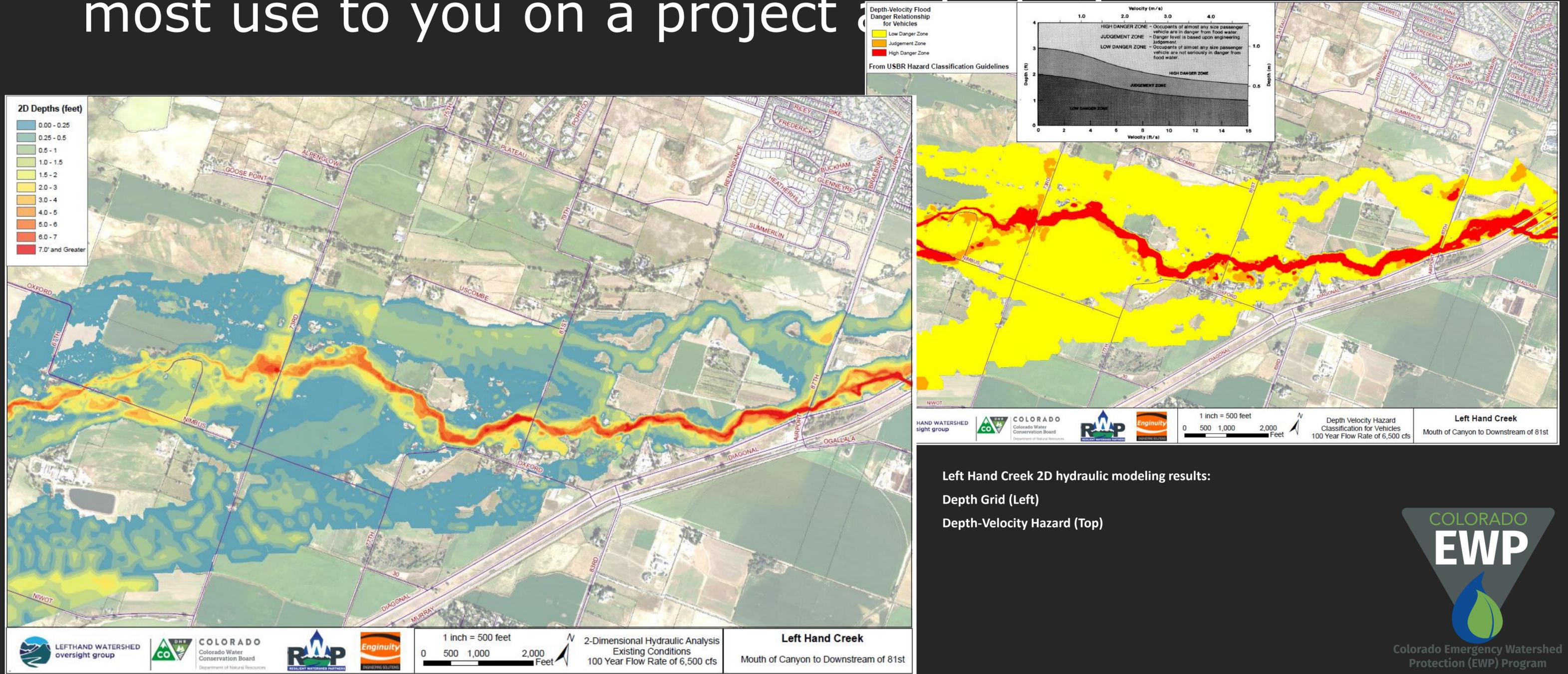


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# Regarding hydraulic modeling

## What components of the hydraulic modeling are of most use to you on a project



## Regarding project success

What metrics do you feel should be included in monitoring these projects after implementation?



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## Regarding working with a multi-disciplined team

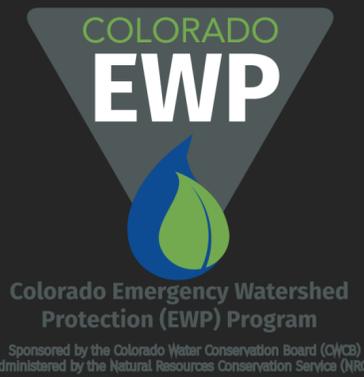
Having worked now with this multi-discipline team of professionals...

What have you learned that you didn't already know?

How will what you have learned change the way you think about stream restoration and flood recovery projects?

Is there any expertise not sitting up here that you'd like to see more regularly included on stream restoration projects?

# Questions from the Crowd





# Get in touch

## We want to hear from you

Gerald Blackler, PE,

The **PhD** Engineer

[Gblackler@Enginuity-es.com](mailto:Gblackler@Enginuity-es.com)

Michael Blazewicz

The Geomorph

[michael@roundriverdesign.com](mailto:michael@roundriverdesign.com)

William Miller, PhD

The Biologist

[wjmiller@millereco.com](mailto:wjmiller@millereco.com)

Randy

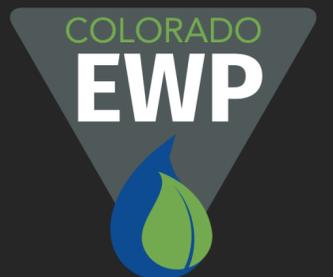
**Mandel**  
The Ecologist

[rmandel@greatecology.com](mailto:rmandel@greatecology.com)

## Regarding biology

For Bill:

Aquatic considerations go far beyond just fish passage. What other considerations and design recommendations have you developed through out this process?



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# Regarding channel evolution

## How does channel evolution inform design concepts?



Left: Lower Fish Creek  
Above: Big Thompson near Canyon Mouth  
Right: Big Thompson at Moodie



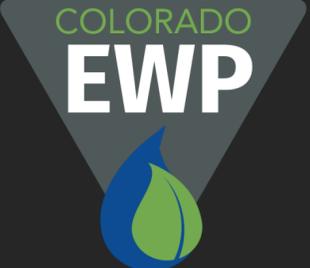
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# Regarding channel evolution and hydraulic modeling

How do geomorphic considerations enhance or compete with design considerations tied to recurrence interval flows? What is the compromise?



Left: Big Thompson River  
Above: Four Mile Canyon Creek  
Right: Gold Run



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# Project Discussion

## EWP Project Examples



Plains Reach  
Left Hand Creek



N. 83<sup>rd</sup> Street  
Little Thompson River



North Fork  
North Fork of the Big  
Thompson