

# After the Fire and Flood:

Tracking wood recruitment in the Strawberry River watershed  
after the Dollar Ridge Fire

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Watershed Sciences

# Background – Dollar Ridge Fire

- Dollar Ridge Fire burned 300 km<sup>2</sup> summer of 2019
- Weeks after peak of fire, 50 year flood and debris flows
  - Roads and >300 structures destroyed
- Large increase in woody debris
- Dollar Ridge Fire Emergency Watershed Protection Project



Trent Nelson, Salt Lake Tribune, July 3, 2019



Kristin Forbes, Basin Now, July 2020



Morgan Reid, July 2020

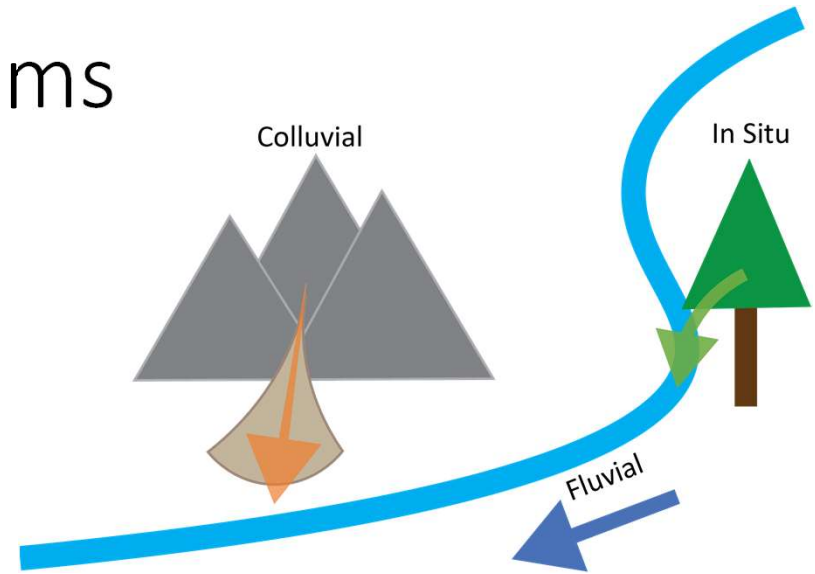
# Background – Wood in streams

## Wood Recruitment:

- In situ, Fluvial, or Colluvial

## Wood Impacts:

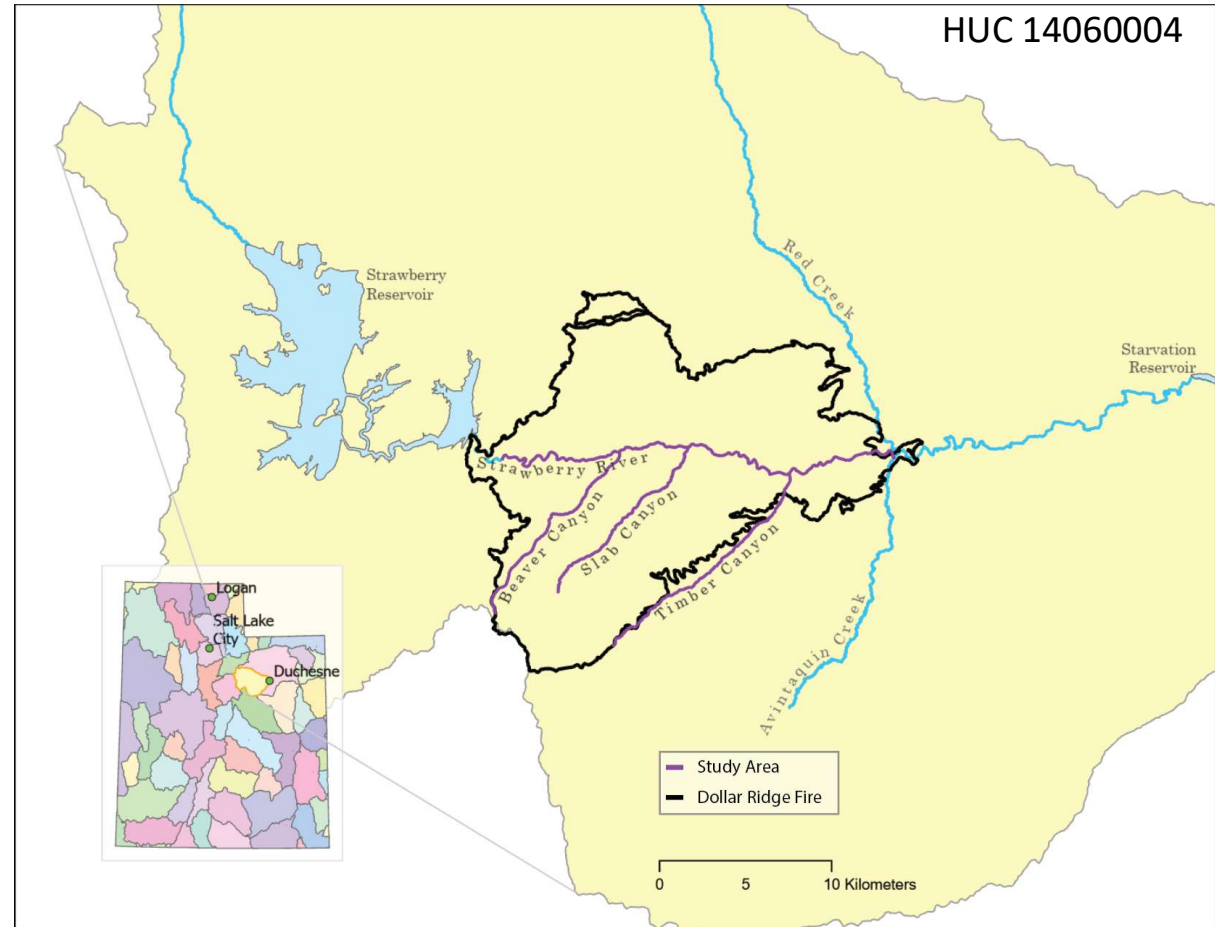
- Geomorphology
  - Structural forcing
  - Sediment dynamics
- Ecology
  - Habitat diversity and area
  - Nutrient cycling
- Hazards
  - management



# Methods

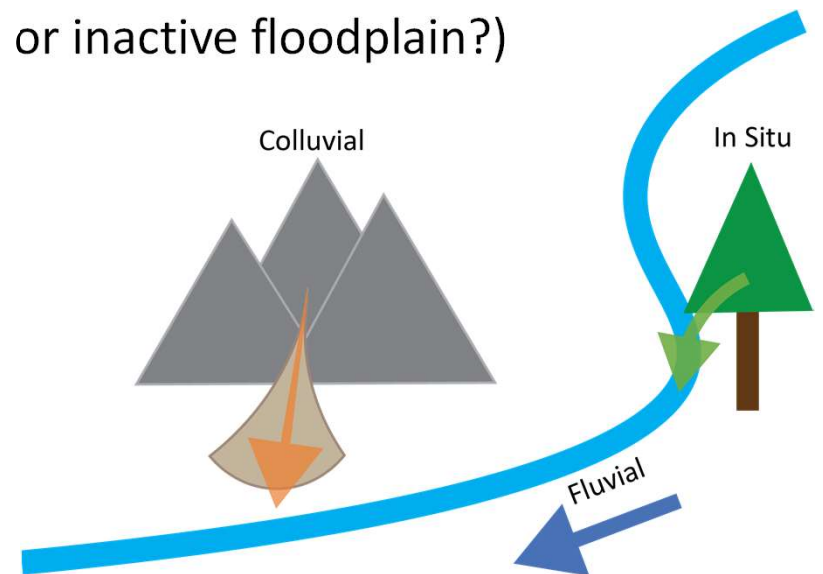
## Wood Quantification

- Aerial Imagery
- Field Measurements

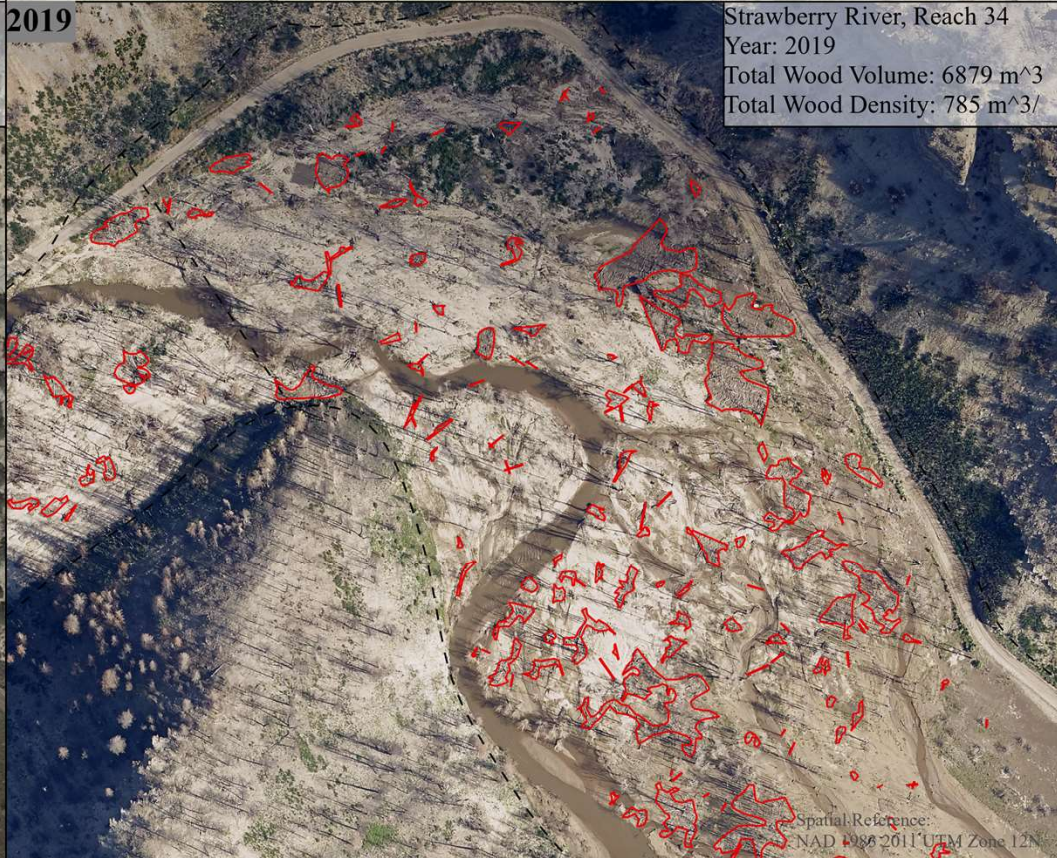
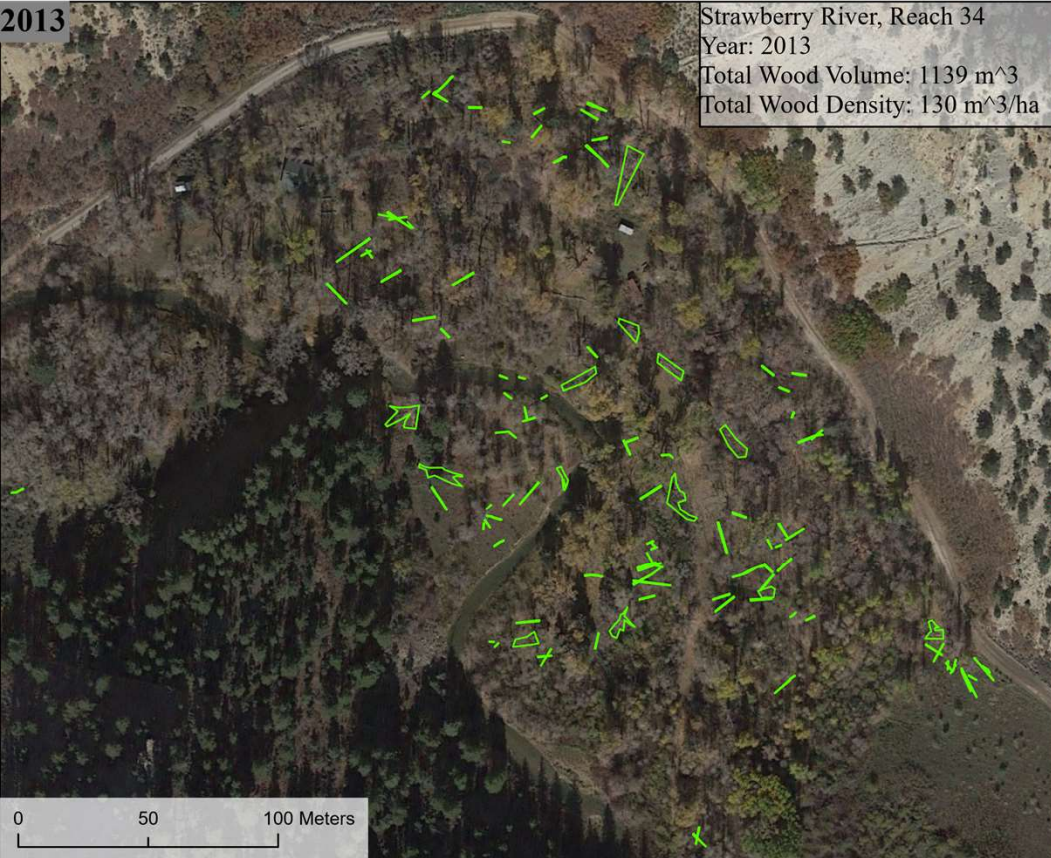


# Remote Data Collection

- Imagery from 2013 (15 cm) and 2019 (10 cm)
  - Digitize wood from both years
  - Recruitment mechanism: (Fluvial, In Situ or Colluvial?)
  - Valley bottom location: (Channel, Floodplain or inactive floodplain?)
- Volume:
  - Dispersed wood:  $V = \pi r^2 l$
  - Wood jams:  $V = (1-p)ah$



# Wood Volume Via Imagery



# Wood Jams

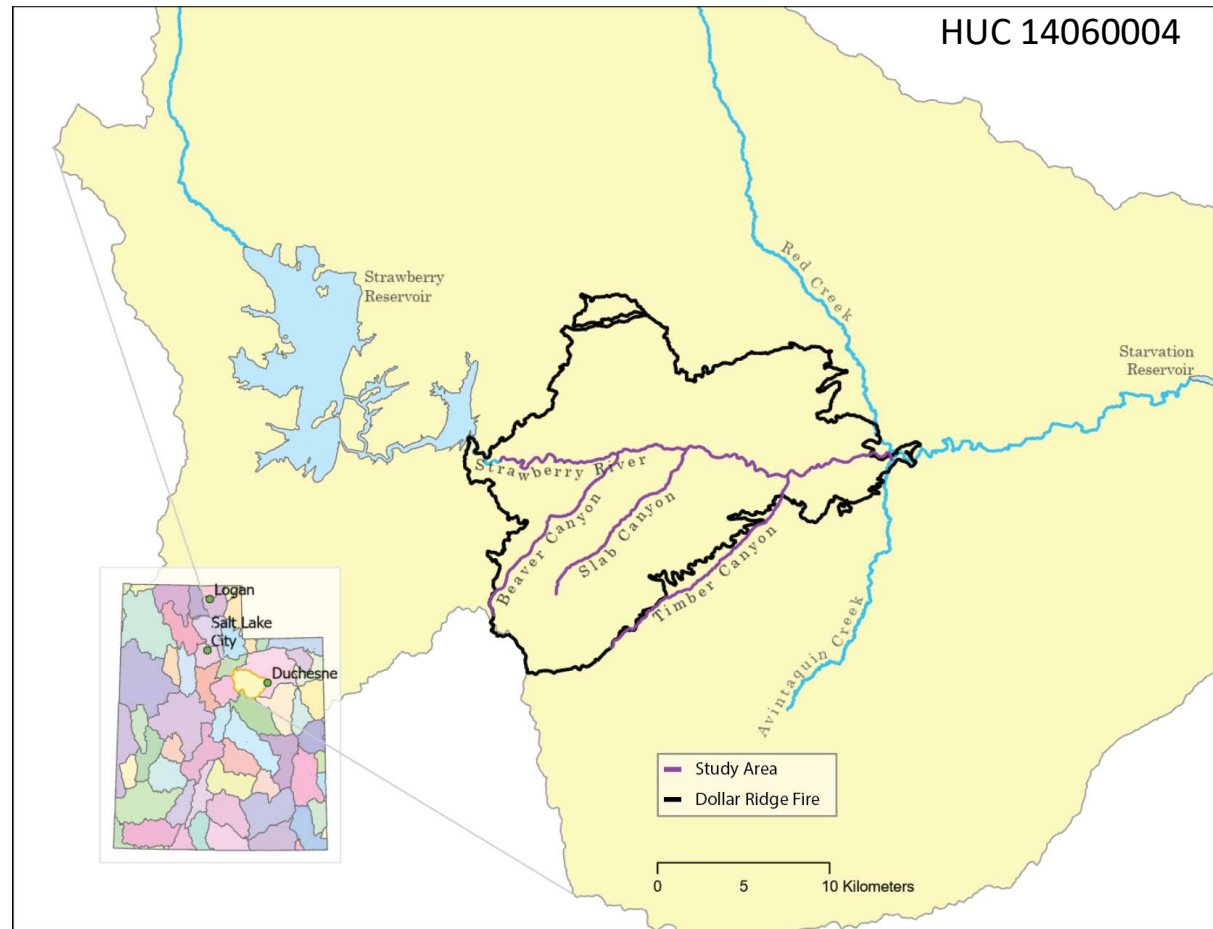


0 2.5 5 Meters



# Analysis

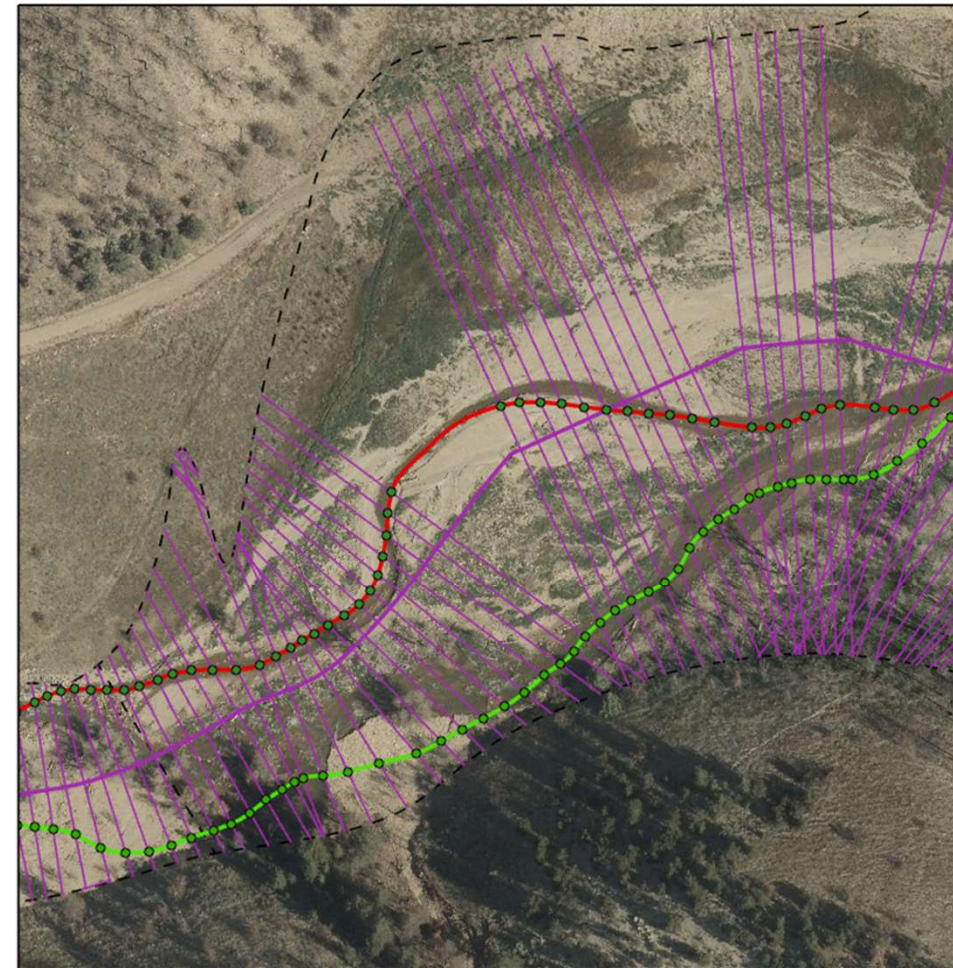
- Wood Data
- Burn Severity
- Reach and Network Extraction





# Reaches and Stream Network

- 2018 and 2019 DEMs
- Fluvial Corridor Toolbox
  - Valley bottom, Centerline, Stream Network, Reaches
- Elevation profile
  - Based on centerline transects

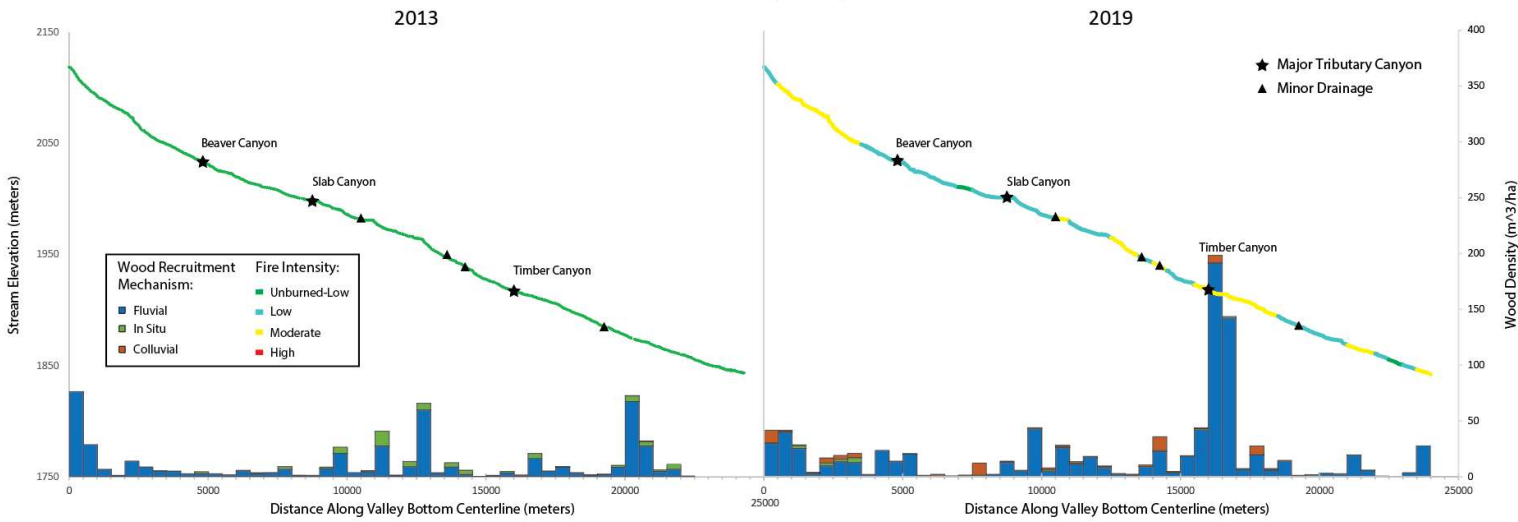


0 25 50 Meters

- Valley Bottom Centerline
- Centerline Transects
- 2019 Stream
- 2018 Stream
- Intersect Points

# Findings

## Strawberry Canyon

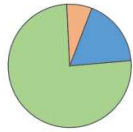


Recruitment Mechanism



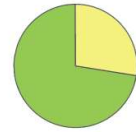
■ Fluvial ■ In Situ  
■ Colluvial

Recruitment Location



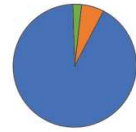
■ Floodplain ■ Channel  
■ Inactive Floodplain

Wood Jams vs. Dispersed



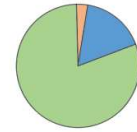
■ Wood Jam ■ Dispersed  
■ In Situ

Recruitment Mechanism



■ Fluvial ■ In Situ  
■ Colluvial

Recruitment Location



■ Floodplain ■ Channel  
■ Inactive Floodplain

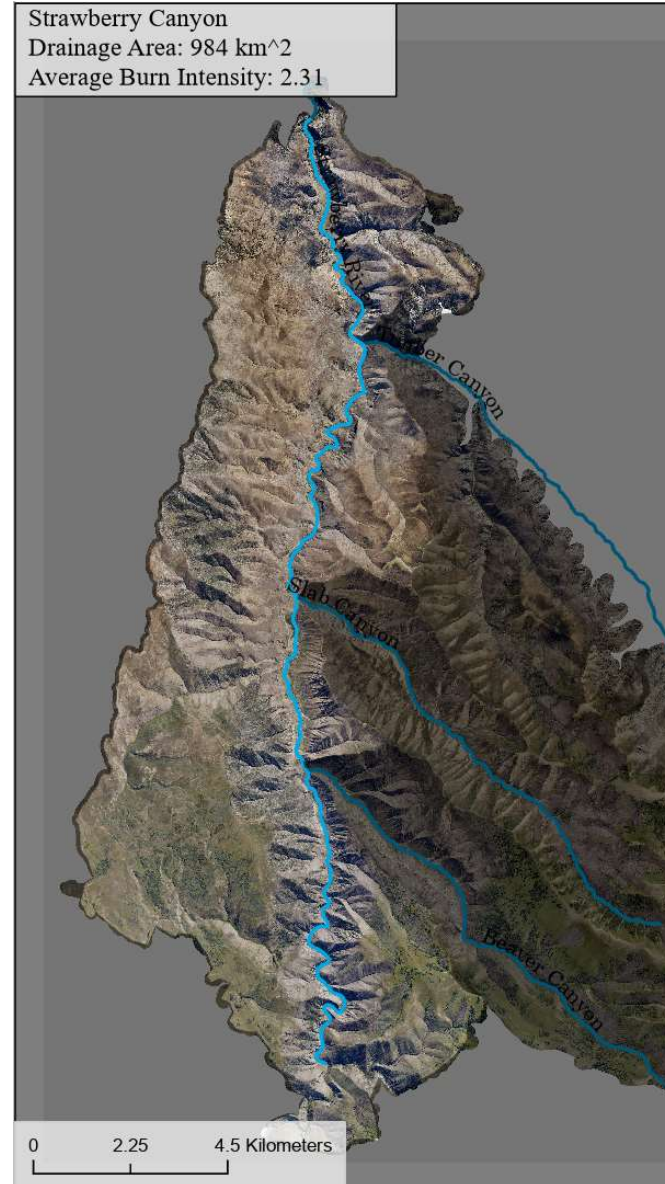
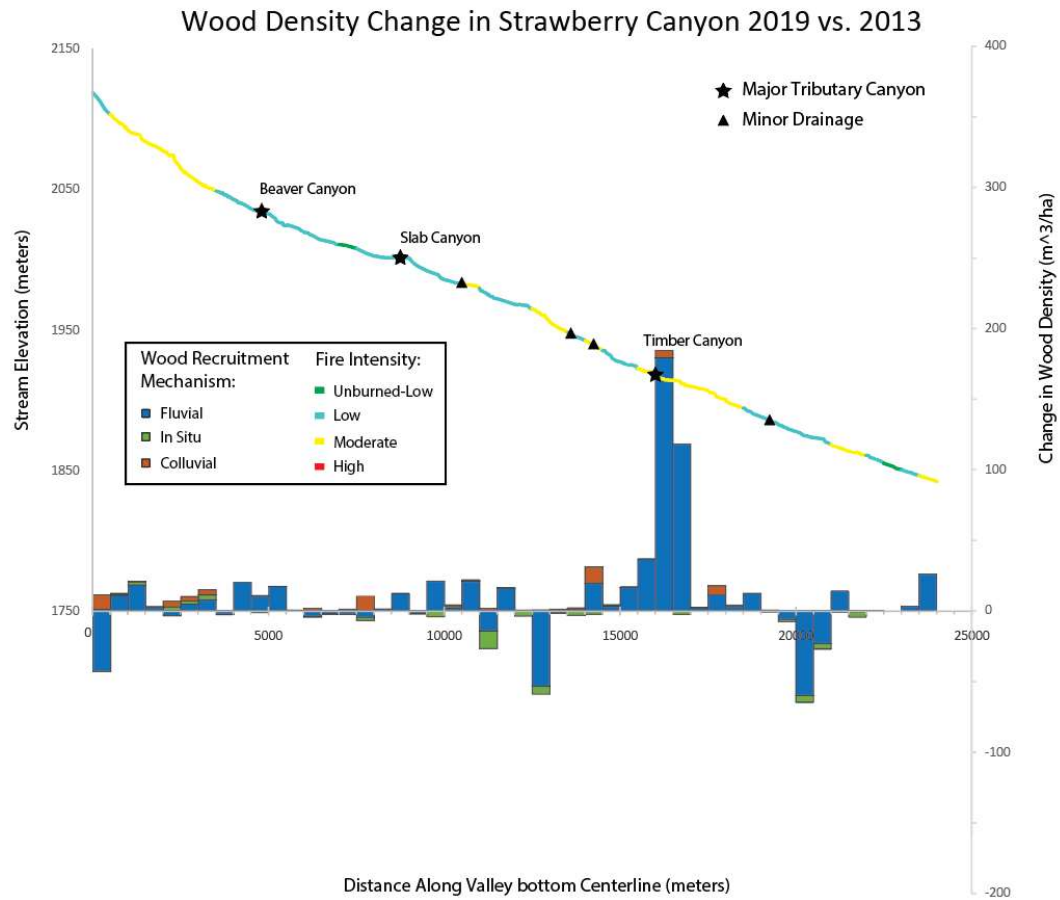
Wood Jams vs. Dispersed



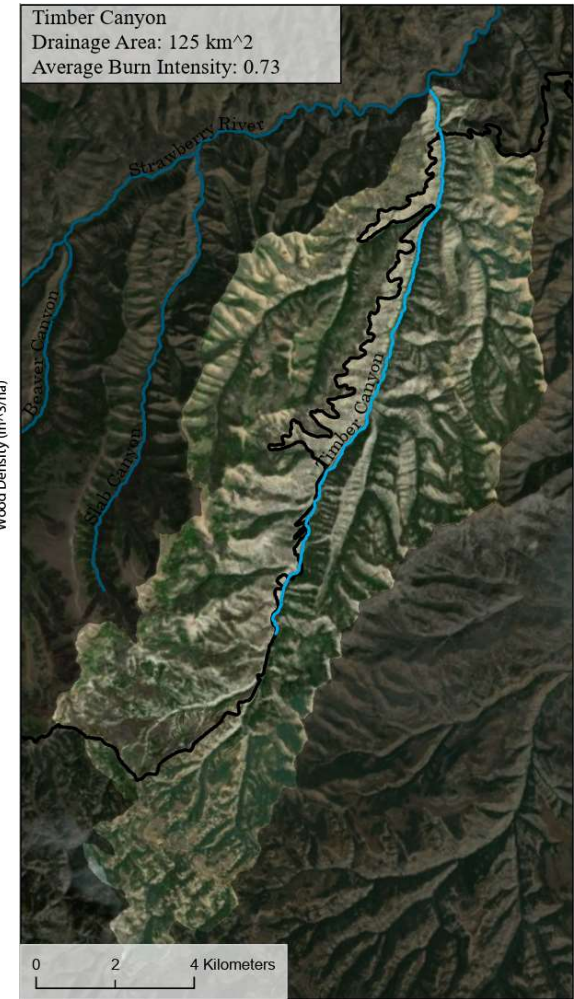
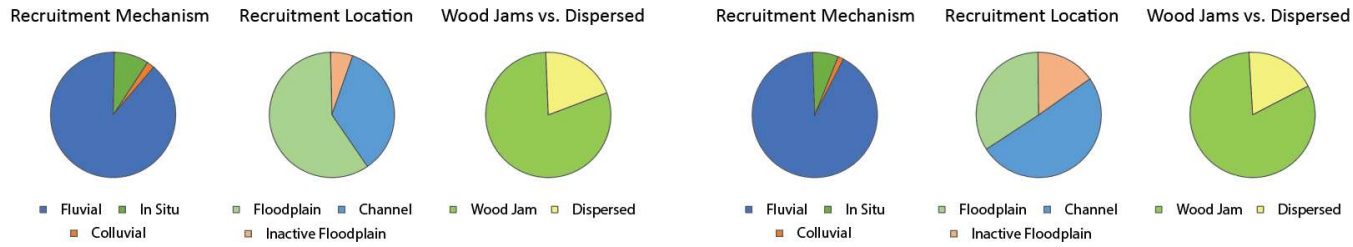
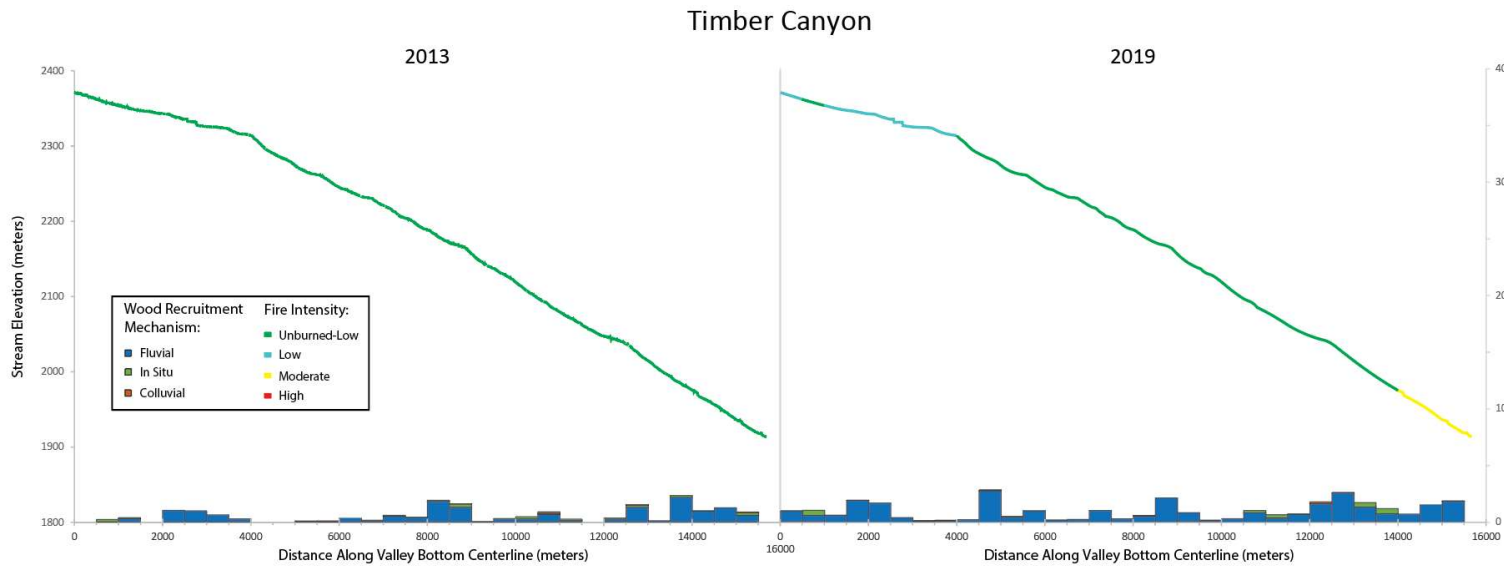
■ Wood Jam ■ Dispersed  
■ In Situ

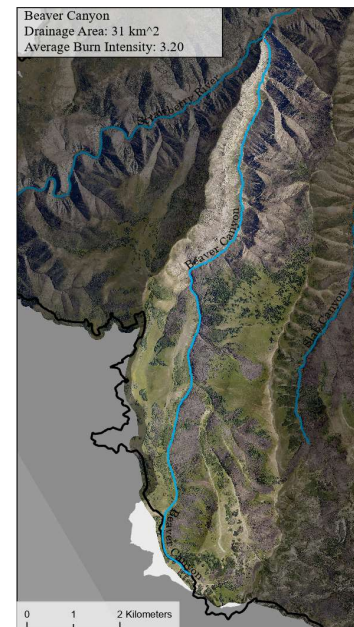


# Findings



# Findings



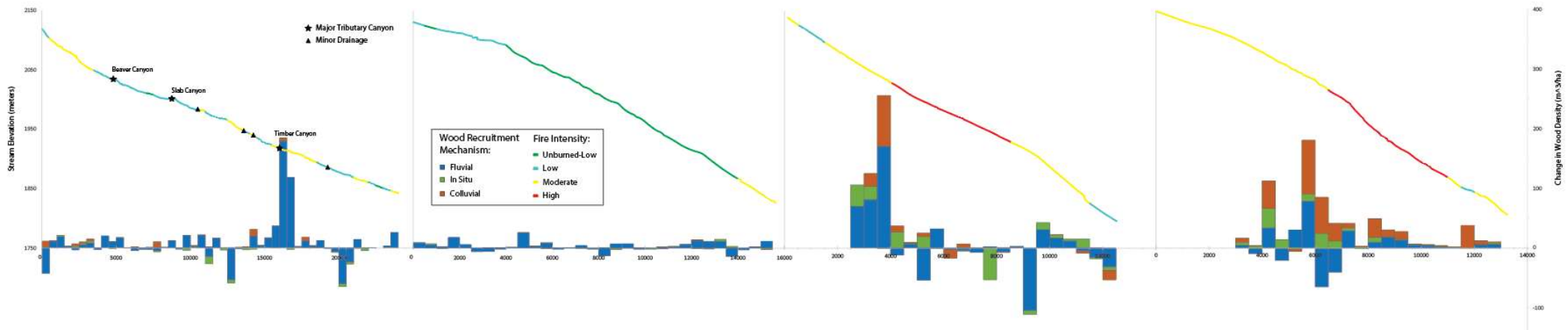


Wood Density Change in Strawberry Canyon 2019 vs. 2013

Wood Density Change in Timber Canyon 2019 vs. 2013

Wood Density Change in Slab Canyon 2019 vs. 2013

Wood Density Change in Beaver Canyon 2019 vs. 2013



# Conclusion

Research Question: What effect did the 2018 Dollar Ridge Fire have on wood recruitment to valley bottoms in the Strawberry River watershed?

- Overall – Wood density increased by 95%
  - Largest increase in burned watersheds
- Wood transport mechanism changes depend on valley setting
  - Proximity to tributary canyons correlate to wood density
  - Fluvial transport dependent on stream power (deposition vs transportation)

# Future Direction

- Findings shared with Dollar Ridge Fire Emergency Watershed Protection Project managers
- Work will support/inform Alec Arditti's PhD thesis

# Acknowledgments

Support from:

- USU Office of Research URCO program
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- Dr. Patrick Belmont
- PhD candidate Alec Arditti