Wildfire Ready Watersheds Project
Meeting Minutes

The Watershed Center and the Boulder Watershed Collective

Process Overview Meeting: Technical Advisory Council

Date: July 2, 2024

10am -12pm

Attendees:

Katie Jagt – Watershed Science and Design
Derek Rapp – Peak Stormwater
Natalie Collar – Wright Water Engineers
Preston Brown – Boulder Watershed Collective
Maya MacHamer – Boulder Watershed Collective
Kirin Riddell – Boulder Watershed Collective
Jeff Sickles – CWCB WRW Technical Team
Deb Hummel – The Watershed Center
Lauren – Boulder Ranger District
Kate Dunlap- City of Boulder
Michael Lawlor – City of Boulder
Tracy Weddle – USFS
Andrew Breibart- USFS
Andrea Harbin Monahan – CWCB
Jenn Keyes – Boulder County
Sarah Heerhartz – Boulder County
Allie Rhea – CFRI
Scott Ritter – CFRI

Key Takeaways:

- For all models, team leveraged a lot of holistic data that covers and "communicates" across the County.
    - Team leveraged a lot of existing data and made adjustments to fire scenarios and post-fire impacts
- All analyses/models and memos for methods will be available to us to use in the future when we have a fire to understand what we should expect.
    - For now, reach out to Deb or Preston/Maya if we have a fire in the near term. In the future, these models could be housed with the County.
- Additional modeling to be completed: understanding how these driving hazards (debris flows, hydrology, erosion) impact stream responses (hydraulic modeling and FHZ mapping) to round out the hazards analysis.
- Next Steps:
    - Coming months: finalize and conduct all modelling discussed today
    - Late fall – early Winter 2024/2025: overlap hazards with values
    - Beginning of April 2025: preliminary list of projects
        - Expect the next technical advisory meeting in early 2025.

Process introduction from Watershed Science and Design: types of hazards (driving hazards: debris flows, hillslope erosions) and scenarios

- Katie gave an overview of Wildfire Ready Watersheds program context and goals for integrative management of both forests and rivers to prepare for wildfire impacts. Though there are also management implications for disturbances more broadly (e.g., floods)
- There's a difference between Community Wildfire Protection Plans and Wildfire Ready Watersheds. CWPPs focused on managing wildfire events and communities, WRW focused on what happens are a wildfire (e.g., downstream impacts).
- Overview of approach including leveraging existing data and creation of new data to best understand post-fire hazards on values at risk. Goal is to reduce susceptibility.
- Types of hazards: increased flows, debris flows, hillslope erosion, inundation flooding, erosion and deposition flooding.

Wildfire severity and behavior modeling by Wright Water Engineers: CFRI data and how it was incorporated

- FlamMap- fire behavior model, conditions on the ground should wildfire occur. Inputs include weather characteristics, landscape conditions (e.g., aspect, slope) and fuels landscape. Outputs characterize fire behavior such as crown fire or flame length.
- For this study, they determined burn severity class based on FlamMap with 2020 fuels conditions (completed for the Northern Colorado Fireshed).
    - Note that these data do not include post-2020 wildfire activity such as Marshall Fire.

Discussion:

- Andrew B (USFS) asked if model considers burn severity predictors if burn scars were to re-burn given regrown and changes to fuels conditions.
    - Scott R (CFRI)- yes, re-growth and changes in fuels conditions are incorporated.
    - Natalie C (WWE)- there are a lot of conditions incorporated rather than just vegetative cover. We also modeled in the 97th percentile- assuming worst case scenarios.

Hydrologic modeling and preliminary results by Peak Stormwater Engineering

- Initially broke larger basin into HUC 12 subwatersheds, but special scale is so large, so we broke it up into smaller units within each HUC 12 called Sub-Basins averaging 2,500 ac.
- Hydrologic model data include peak flow raters, runoff volumes (including sediment), hydrographs (e.g., timing of peak flows), estimated sediment concentrations.
- Did not need to build models from scratch- leveraged studies after the 2013 floods.
    - Important to note that there are other models out there for different drainages for regulatory purposes. We are working with 5 larger scale models developed for CDOT (using HEC-HMS) after the floods that communicate well with each other rather than merging the many discrete models.
- Model components include
    - storm frequency, storm duration, point precipitation depths,
    - temporal distribution (when most rain occurs),
    - depth-area reduction analysis (if we have a huge storm covering a large area, we adjust/ "dilute" precipitation estimates- likely a large storm will not have heavy precipitation everywhere),
    - loss method (how much becomes runoff?),

    - transform method (create hydrograph for a storm scenario to be mapped downstream, how long is the lag time to be felt downstream?),
    - Hydrologic Routing Method (how to the hydrographs stack up- do they build on each other or miss each other?)
- Model re-runs at each junction in the SubBasins
- Model also considered Fire Scenarios
    - 12 scenarios around 30K acres in size to get worst case scenarios within the County.
- Running the model
    - Apply burn severities for each Sub-Basin and then apply the hydrology model components.
- Outputs are ratios for change between existing conditions to post-fire conditions

Discussion:

- Maya asked if this model will be available to use for the future?
    - Derek: yes, though it is important to note that this model does not include regulatory models.
    - Katie: our intent was to develop a model that could be used in the future when a fire does occur to run and understand
    - Kate: how does this model compare to the WESTT tool developed for the City of Boulder?
        - Katie (WSD): we did not evaluate sediment to the same detail.
        - Scott R/ Alli R (CFRI): hydrologic modeling for that was not as intensive as this one.
    - Kate: how would we use this model if we were to have a fire this summer/ in the future? Who would we contact?
        - Contact Maya/Preston (BWC) and/or Deb (TWC). We will likely be 95% there by this summer.
        - Eventually this model could live with the County.
- Lauren (USFS) asked if the scenarios correlate with PODs?
    - Katie (WSD) said not for the scenarios, but the mitigation strategies will support POD boundaries.

Debris flow modeling and preliminary results by Wright Water Engineers

- Debris flows are saturated body of sediment spanning varying sizes that includes other organic and inorganic materials.
- Used USGS Landslide Hazards Program and model as base. M1 intermountain west.
- Inputs: elevation change, proportion of upslope area burned at high or moderate severity, difference normalized burn ration, soil KF Factor (erosion potential)
    - Used all open source data incase any edits need to be made in the future.
- Smaller basins are more likely to issue a debris flows. Developed over 2000 dub-basins for evaluations (as opposed to the 250ish for the hydrology model).
    - Debris flows were modeled for stream orders less than 3. Larger streams were considered mainstem streams and not as relevant for debris flow risk.

- Debris flows outputs: each Sub-Basin will have:
    - For different intensity storms, Increase in post-fire debris flow probability relative to pre-fire.
    - For each intensity storm, Post-fire debris flow probability likelihood
    - Important to note that results are normalized to acreage of drainage area to compare across different scales and see priorities more clearly.
- In addition to debris flows, we also estimated hillslope erosion
    - Used CFRI RULSE modeling
    - Soil KF factor and vegetation cover type adjusted in post-fire scenario.
    - Predicts annual soil loss per acre.

Active stream corridor mapping and hydraulic modeling and next steps by Watershed Science and Design

- Understanding how these driving hazards (debris flows, hydrology, erosion) impact stream responses (hydraulic modeling and FHZ mapping) to round out the hazards analysis.
- Looking at inundation flooding and erosion/deposition hazards.
- Will leverage post-2013 flood hydraulic modeling and compare how post-fire models differ.
- Next Steps:
    - Coming months: finalize the modelling discussed today
    - Late Fall-early Winter: overlap hazards with values
    - Beginning of April 2025: preliminary list of projects
- Team will provide documentation of methodologies so they are replicable

Discussion:

- Alli (CFRI) provided more resources and clarification on modeling completed by CFRI.
- Maya (BWC) emphasized importance of warning systems and how we can leverage this effort to refine existing systems.