

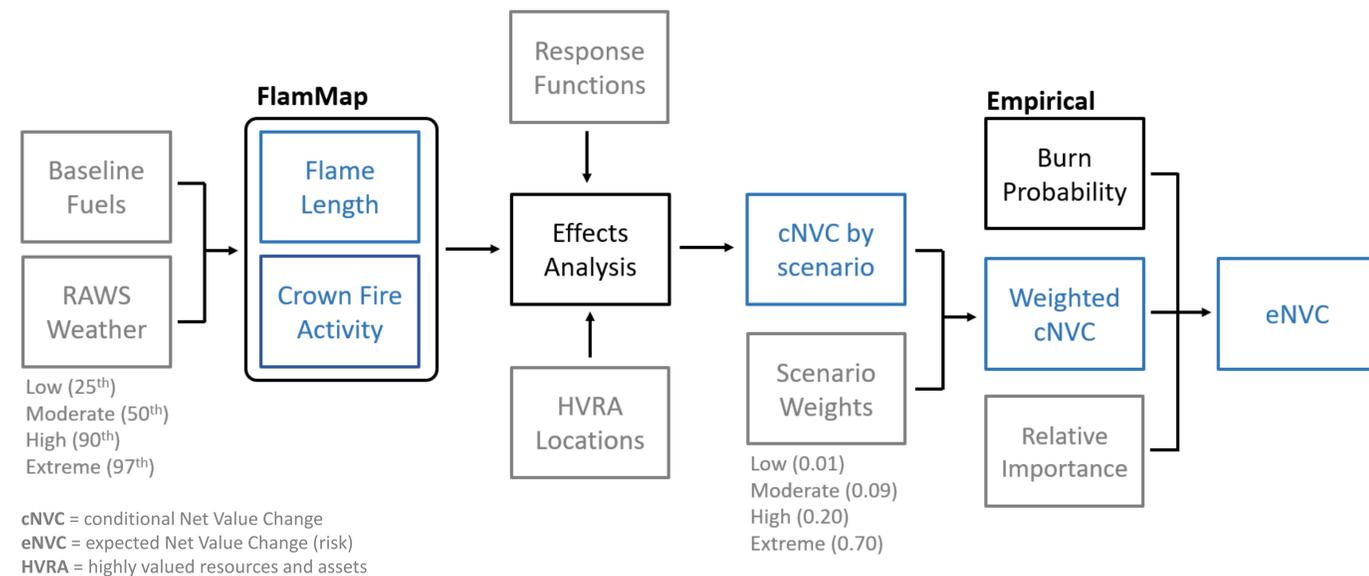
# Chaffee County Wildfire Risk Assessment

Benjamin Gannon  
Colorado Forest Restoration Institute  
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**Summary.** Wildfire risk was assessed using predictions of wildfire likelihood and behavior, spatial data on highly valued resources and assets (HVRAs), response functions to characterize HVRA vulnerability to fire, and relative importance weights to represent community values (Scott *et al.* 2013). Wildfire risk assessment requires a mix of technical and social tools. Fire simulation models are used to describe trends in wildfire occurrence and intensity across large landscapes due to variability in fuels, topography, and weather. Spatial data on the location of highly valued resources and assets are organized in a Geographic Information System (GIS) to evaluate their exposure to wildfire. Resource experts use their scientific knowledge and experience to describe how each HVRA will respond when exposed to fire of varying intensity. Which highly valued resources and assets to include in the assessment and how to weight their importance is a social process.

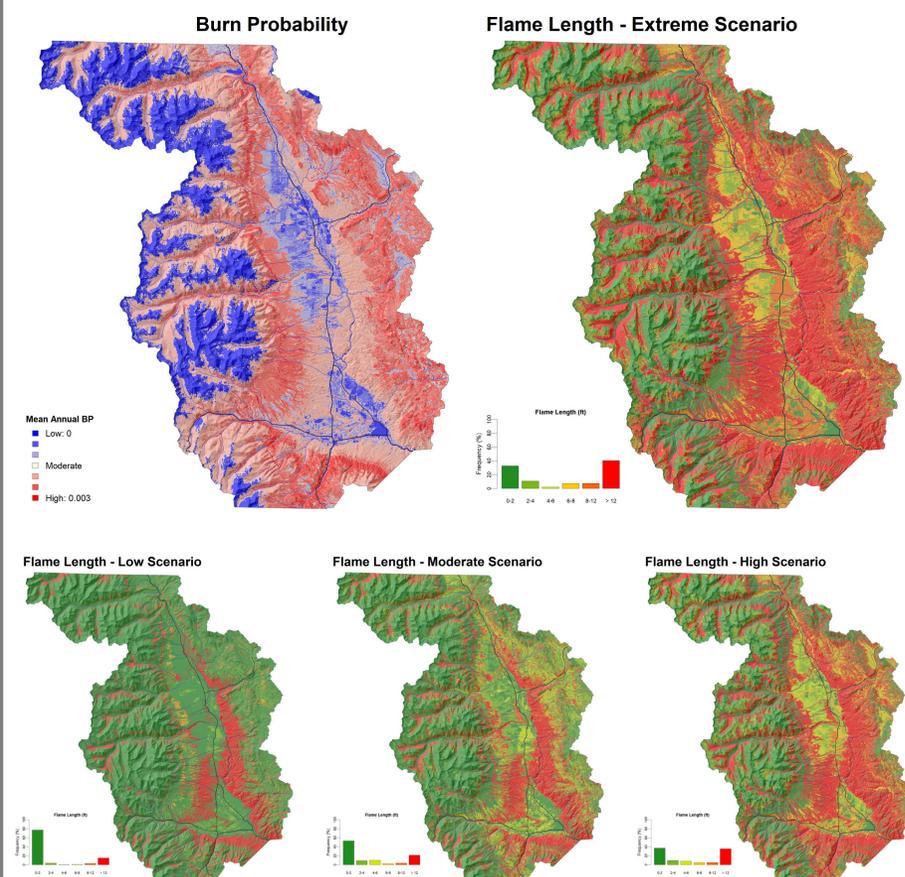
The technical portions of the Chaffee County Wildfire Risk Assessment closely follow the methods used in the Colorado Wildfire Risk Assessment (Technosylva 2018). This County assessment extends the State assessment to consider highly valued resources and assets related to emergency evacuation, wildlife, and recreation that are important to the well-being of County residents and the local economy. The assessment also incorporates the highest quality local data and local knowledge on how resources respond to wildfire. Local representatives from the County, land management agencies, fire management organizations, and non-profits guided this effort. Highly valued resources and assets were weighted in the assessment based on the results of a local survey on County residents' wildfire concerns.



## Fire simulation

**Burn probability** describes the annual likelihood of encountering wildfire for each pixel on the landscape. Burn probability was defined using historical fire records within a 20-mile radius around Chaffee County to characterize wildfire likelihood by vegetation type. High burn probability increases risk.

**Flame length** is a measure of fire intensity modeled with FlamMap 5.0 using fuels data from LANDFIRE (2014). Fire intensity is sensitive to weather, so the risk assessment incorporates flame length predictions for low, moderate, high, and extreme fire weather scenarios. Fire effects are modeled separately for each scenario and combined by weighting by their probability of occurrence (low – 0.01, moderate – 0.09, high – 0.20, extreme – 0.70). High flame lengths increase wildfire risk to fire sensitive resources and assets.



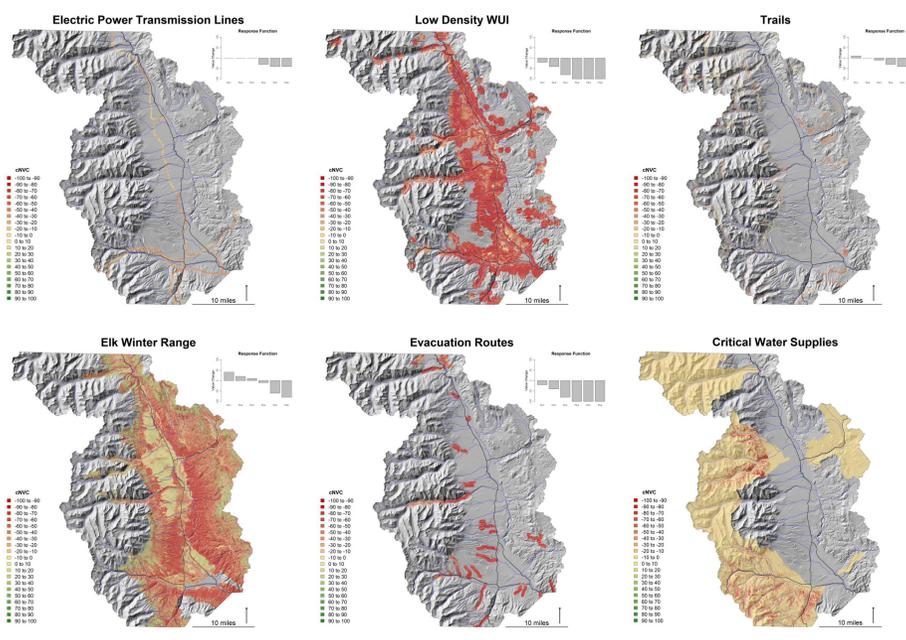
## Fire effects

**Conditional Net Value Change (cNVC)** represents the anticipated change in resource or asset value when exposed to wildfire. cNVC is quantified for each resource and asset by combining spatial data on its extent with flame length predictions and relative response functions that specify the direction and magnitude of change predicted for each level of fire intensity. This framework accommodates both negative and beneficial effects of wildfire. The risk assessment incorporates local data and resource knowledge on 28 separate resources and assets in six categories that touch on wildfire concerns in Chaffee County. cNVC maps are shown below for several resources and assets.

**Response functions** specify the direction and magnitude of fire effects on a scale from -100 to 100 for complete loss to radical gain. Most response functions were collaboratively defined by local land, resource, and fire managers.

Category	HVRA	FIL1	FIL2	FIL3	FIL4	FIL5	FIL6
Life safety	Evacuation Routes	82%	24%	44%	44%	82%	82%
	Aircraft Landing Facilities	0	0	-10	-50	-80	-90
	Communication Facilities	0	0	0	-30	-100	-100
	Electric Power Transmission Lines	0	0	0	-30	-40	-40
Infrastructure	Emergency Service Stations	-10	-30	-60	-80	-100	-100
	Schools	-10	-30	-60	-80	-100	-100
	Low density WUI	-20	-40	-80	-100	-100	-100
	High density WUI	-40	-80	-100	-100	-100	-100
Wildland Urban Interface	Critical Water Supplies	NA	NA	NA	NA	NA	NA
	Surface diversions	NA	NA	NA	NA	NA	NA
	Ground diversions	NA	NA	NA	NA	NA	NA
	CSU Pipelines	0	-20	-50	-80	-100	-100
Water	CSU Buildings	-10	-20	-40	-100	-100	-100
	Wildlife	40	20	10	-10	-60	-80
	Black Bear Fall Concentration	40	20	10	-10	-60	-80
	Elk Migration Corridors	40	20	10	-10	-60	-80
Wildlife	Elk Winter Range	40	20	10	-10	-60	-80
	Aquatic Habitat	NA	NA	NA	NA	NA	NA
	Mule Deer Migration Corridors	40	20	10	-10	-60	-80
	Mule Deer Winter Range	40	20	10	-10	-60	-80
Recreation	Trails	0	-10	-20	-40	-80	-100
	Tourism Businesses	-10	-20	-40	-80	-100	-100
	Monarch Ski Area	0	-10	-10	-20	-50	-70
	USFS Recreation Opportunities	10	-10	-10	-20	-50	-70
Recreation	Trails	10	-10	-10	-30	-40	-50
	Arkansas Headwaters Recreation Area	10	-10	-10	-30	-50	-70
	Brown's Canyon National Monument	40	20	10	-10	-10	-10
	Dispersed camping	10	0	-10	-30	-40	-50

Wildfire impacts to watershed-related resources were instead quantified with a linked wildfire-watershed model that relates predicted wildfire behavior to post-fire erosion and routes sediment to the resource of interest (Gannon *et al.* 2019). Critical water supplies were identified and assigned relative importance values by local watershed stakeholders.



## Community values

**Expected Net Value Change (eNVC)** is calculated as the product of cNVC and burn probability. eNVC maps are shown by category (below). The final composite wildfire risk map (right) combines the category eNVC maps using relative importance weights to represent Chaffee County community values as expressed in the Envision Community Wildfire Survey.

Results of the Chaffee County community wildfire survey were used to weight the relative importance of resource and asset categories in the composite wildfire risk map.

