

INTRODUCTION

- The watershed's water resources are believed to be at considerable risk from high severity wildfires.
- This hydrologic modeling project intends to develop a Municipal Watershed that will be useful for predicting wildfire risk scenarios.

• The Santa Fe Municipal Watershed is an important source A variety of watershed data will be used to parameterize and calibrate modeling. of drinking water and water storage for the City of Santa Fe. Existing watershed instrumentation: Two USGS stream gauges Two USGS reservoir gauges Two SNOTEL snowpack/weather station coupled snowpack-surface water model for the Santa Fe • One RAWS (weather station) Santa Fe Municipal Watershed SANTA FE MUNICIPAL WATERSHED Ster I ATTACK JAPANA AND IN THE TOP • The watershed is located to the east of the City of Santa Fe SANTA FE I 5 km

- in the Sangre de Cristo mountain range.
- Headwaters of the Santa Fe River.
- Mountainous, snowmelt dominated watershed.
- Upper section is Pecos Wilderness.
- Lower forest dominated by Ponderosa Pine, higher elevation forest is mixed-conifer.
- Prominent source of water for the City of Santa Fe.
- Nichols Reservoir and McClure Reservoir provide water storage for the city.



WILDFIRE RISK

- A long history of fire suppression elevates the risk of a high-intensity wildfire in the watershed.
- A wildfire would severely impact the ability of the watershed to provide water resources to the city.
- Surface runoff patterns, water quality, and reservoir water storage could become compromised.
- Hydrologic modeling of wildfire scenarios would help guide watershed management decisions (e.g., magnitude, timing, spacing of forest thinning and prescribed burns).

Surface Water and Snowpack Modeling with Emphasis on Post-Wildfire Hydrologic Impacts in the Santa Fe Watershed, NM Joseph Kuljis, Daniel Cadol

INSTRUMENTATION



SAP FLOW DATA

- Sap flow measurements from prominent tree species can be used to estimate watershed evapotranspiration (ET) rates.
- Instrument sensor induces a temperature tracer at a point in the tree's xylem.
- This temperature is then measured at a higher point to determine sap velocity/sap discharge.
- Will be installed at three locations at different elevations around the watershed in combination with soil moisture sensors.

- Project-specific instrumentation:
- Three sap flow sensors
- Three soil moisture profiles



- The goal of this research project is to improve surface water modeling in the Santa Fe Municipal Watershed.
- Surface water model: Army Corps of Engineer's HEC-HMS.
 - Semi-distributed rainfall-runoff model.
- Snowpack evolution model: SnowModel.
 - Suite of submodels that will simulate snow accumulation and meltwater model inputs.
- Wildfire scenarios will be developed for predicting how different forms of wildfire management affect water yield. These will vary in vegetation density, hydrologic properties of the soil, and more.



- Installation of sap flow/soil moisture sensors.
- Preliminary surface water modeling in HEC-HMS.
- Coupling of SnowModel with HEC-HMS.
- Parameterization of combined surface water-snowpack model.
- Creation and testing of various wildfire scenarios.

ACKNOWLEDGMENTS

This research was funded by NSF grant #2115169, "Transforming Rural-Urban Systems: Trajectories for Sustainability in the Intermountain West"



NTERMOUNTAIN WES

MODELING

UPCOMING WORK