



ADVANCING THE LEGACY

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[WEBINAR Highlights – White River Basin Hydrologic Study](#)

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Presenters: Liz Chandler, White River Integrated Water Initiative Coordinator, and Professor Ryan Bailey, CSU Department of Civil and Environmental Engineering.

Study Purpose: To understand the impact of flood irrigation on stream recharge in the White River Basin in the area around Meeker, Colorado.

Study Features:

- The study quantified surface and groundwater water movement through the system.
- Surface water flow into and out of the White River (via diversions) was analyzed using data from USGS and Colorado Division of Water Resources (DWR) data.
- Groundwater levels were measured in wells to characterize aquifer filling and emptying.
- Soil moisture sensors across 12 sites were monitored from 2018 to 2022.
- Evapotranspiration and precipitation, including estimated runoff, was included in the water balance model.
- USGS flow modeling software (MODFLOW) was used to simulate surface water and groundwater movement. The USDA's Soil and Water Assessment Tool (SWAT) model was used to simulate hydrologic processes, integrating land use, soil types, irrigation schedules, and climatic data.



White River. Photo: Phil Brink

Findings:

- Flood irrigation significantly contributes to stream recharge, with up to 60% of applied irrigation water returning to the White River, enhancing late-season streamflow critical for aquatic ecosystems.
- Only 20% of the surface water diverted for irrigation is being utilized by forage through evapotranspiration (ET). The remaining 80% recharges the river via groundwater discharge. A portion of the amount lost (20%) is from ditch seepage and about 10% is from evaporation. The remaining 50% is lost from fields as it percolates past the root zones and recharges the aquifer.
- Strong surface-groundwater connectivity was observed, with irrigation-induced recharge elevating groundwater levels seasonally by 4.9 feet (1.5 meters) in key areas.
- During the months of July-September, approximately 75% of water in the White River is due to groundwater discharge.

Implications for Management

- **Irrigation Efficiency:** Optimizing flood irrigation timing and volume can reduce water loss while maintaining stream recharge benefits.
- **Environmental Benefits:** Sustained streamflow from irrigation recharge supports aquatic life and riparian ecosystems, particularly during dry seasons.