

**Hydrologic Flowpaths in Oak Woodland  
Landscapes: Implications for Dissolved Organic  
Carbon and Nutrient Transport**

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**Urban-Wildland-Agricultural Interface**



**80% of Reservoirs**



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**Objective 1.**

**Test the effects of rangeland management practices  
on stream water quality in three paired watersheds.**

- High grazing, 500 lb/ac residual dry matter
- Moderate grazing, 1000 lb/ac residual dry matter
- Moderate grazing and prescribed fire
- No grazing (experimental watershed)

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## UC Rangeland Watersheds

- UC rangeland research
  - SFREC- Sierra Foothill Research & Extension Center
  - Continuous streamflow and weather data
  - Intensive sample collection
  - Control of land use
  - Paired watersheds



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## Paired Watershed design: size ~100 hectares



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### Water quality parameters to be measured

Temperature	Dissolved organic carbon
pH	Particulate organic carbon
Turbidity	Electrical conductivity
Total N	Ammonium
Nitrate	Total P
Soluble-reactive phosphate	Major cations (Ca, Mg, K, Na)
Major anions (Cl, SO <sub>4</sub> , HCO <sub>3</sub> )	Flow
lignin- a potential aromatic precursor to DBPs	

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### Stream Flow Monitoring



Flume for high flows



V-notch weir for low flow conditions

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### Objective 2.

Monitor hydrologic flowpaths in the experimental watershed and assess their degree of connectivity with streams.

- Surface runoff
- Lateral flow of perched water
- Soil pore water
- Ground water

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10 Surface Runoff Collectors



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Perched Water Collection System



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Perched Water Collection System; Soil Horizons



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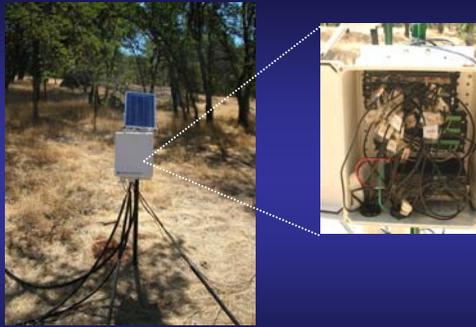
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### Continuous Soil Water Content Measurements



250 volumetric water content sensors placed in 50 soil profiles at 4 depths.

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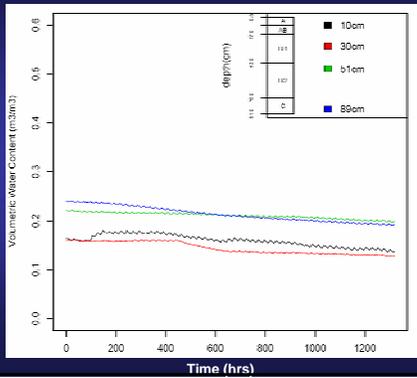
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### Patterns in volumetric water content




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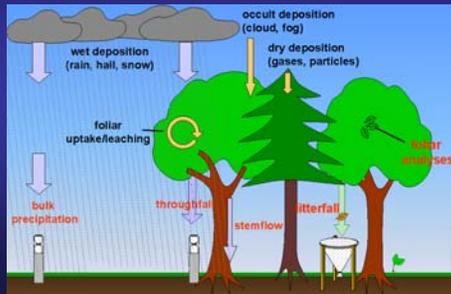
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### Objective 3.

Trace the DOC signature through the watershed (rainfall to river) through molecular-level analysis of lignin.




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**Objective 4.**  
Identify soil properties and associated landscape variables that control the fate of DOC and nutrients.



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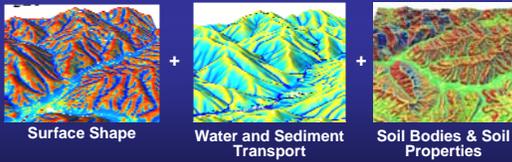
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**Objective 5.**  
Extrapolate transport governing variables with digital soil survey data coupled with hydrologic models to scale and predict the fate of DOC and nutrients in the foothill region.



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**Education & Extension**

Graduate & Undergraduate Education



Ranch WQ Planning Short Courses



Continuing Education, Professional Development



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