

**Integrating dynamic soil and vegetation properties into ecosystem service-based STMs to guide rangeland management**



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**California Oak Woodland**

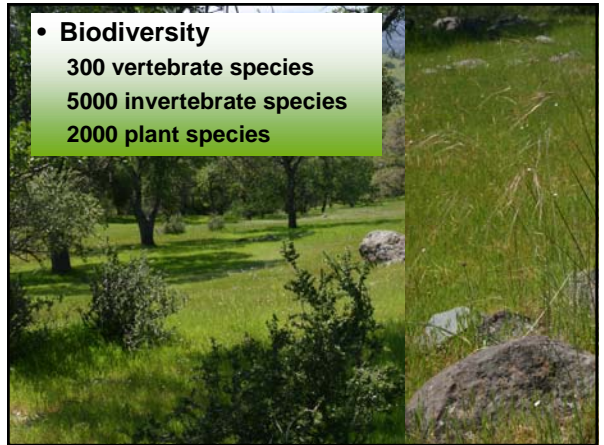
- 70% state's annual forage base
- \$3 B annual beef cattle industry



**Rangeland watersheds supply 85% of California's drinking water**



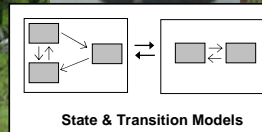
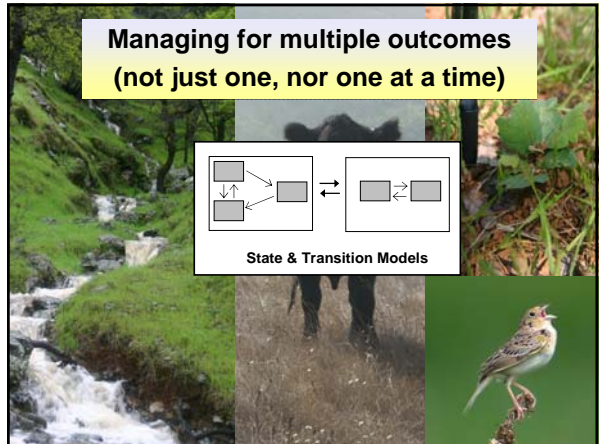
- Biodiversity
  - 300 vertebrate species
  - 5000 invertebrate species
  - 2000 plant species



**Managing for multiple outcomes (not just one, nor one at a time)**




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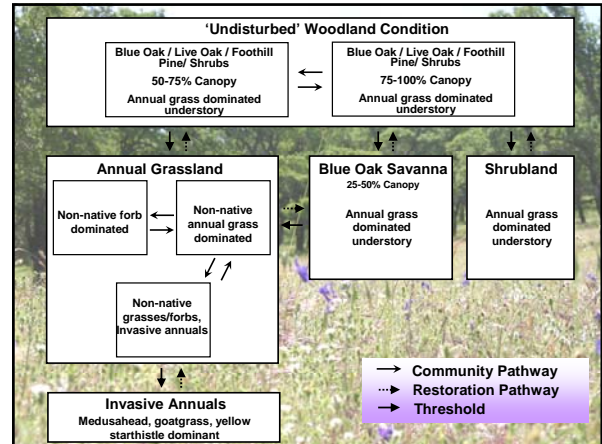

## California Oak Woodland

### Sierra Nevada Foothill Rangeland

- Elevation: 400-580m
- Mediterranean Climate
  - Mean annual temp: 15.7 C
  - Annual rainfall: 22-110 cm
- Soils
  - Haploxeralfs
  - Basic metavolcanic bedrock
  - Very gravelly loam surface texture
  - Well-drained

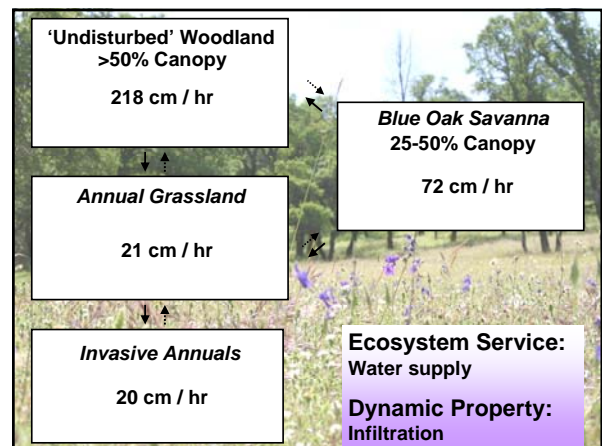
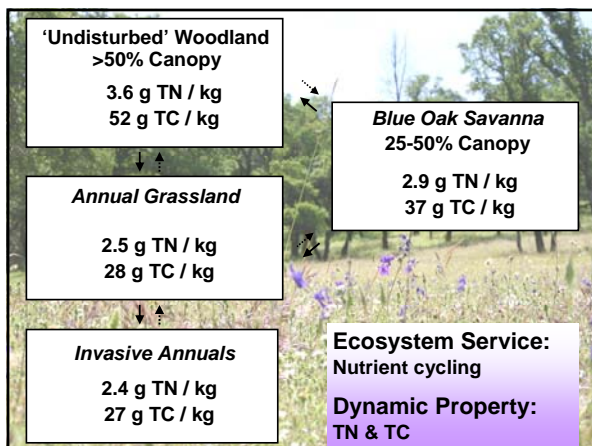
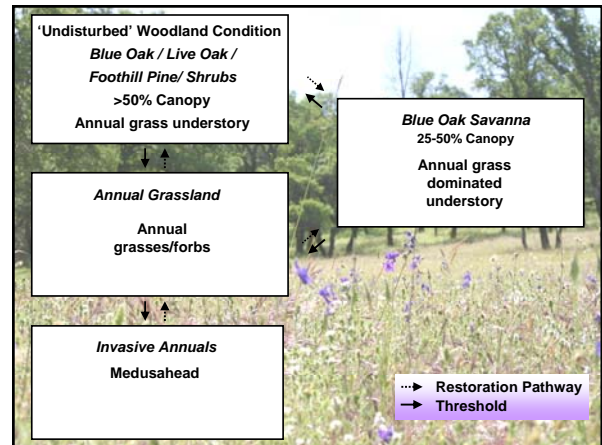


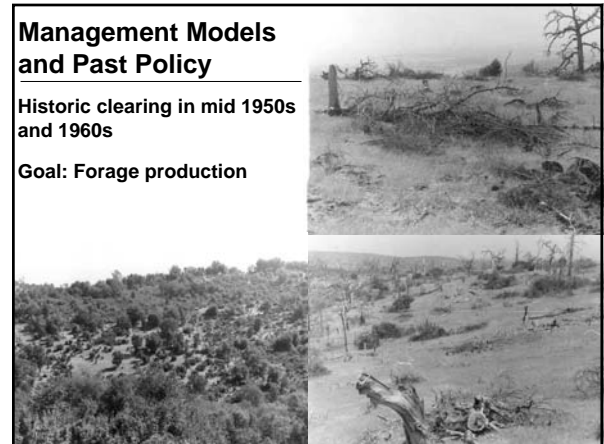
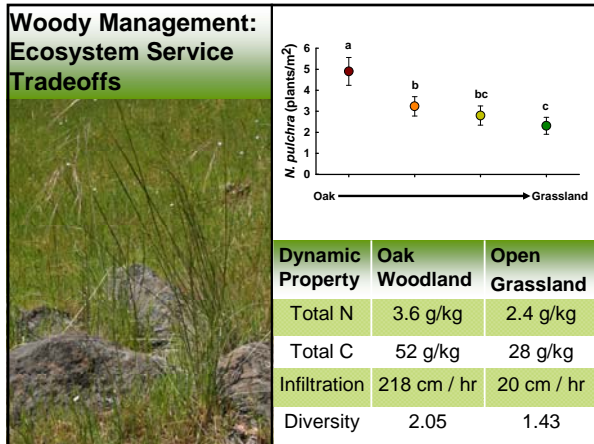
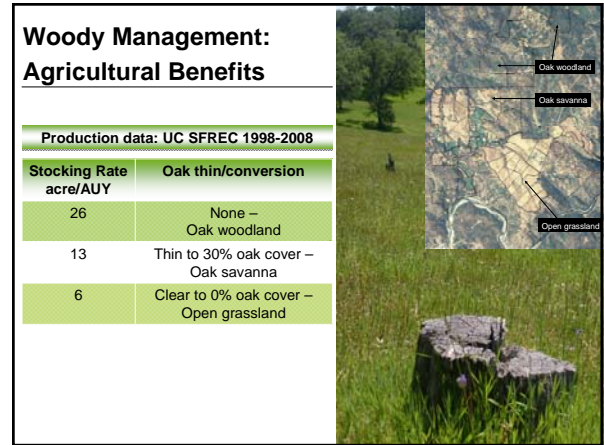
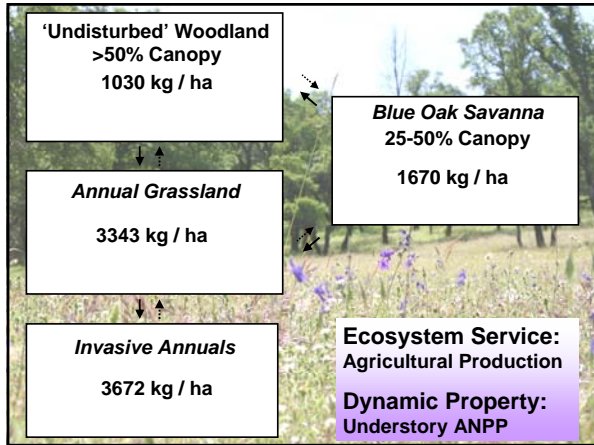
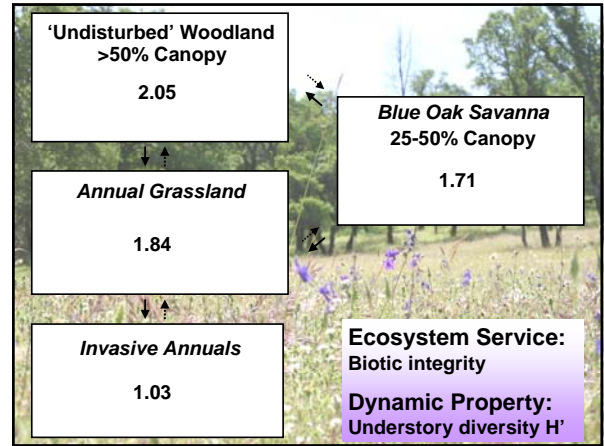
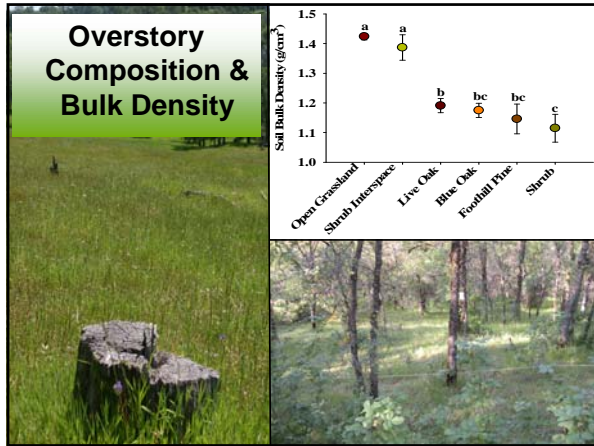
Huntsinger et al. 2010

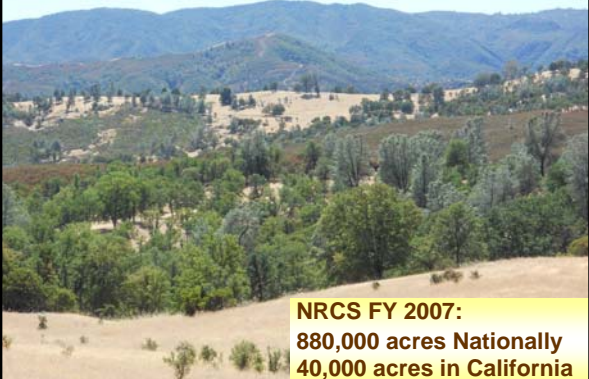
### Integrating Ecosystem Services into Management Models

- Management impacts across multiple *spatial* and *temporal* scales.
  - Ecologically important scales relative to management.
- Identify dynamic soil and vegetation properties serving as sentinels of soil change.
  - Easily measured proxies
  - Relevant to system function






**Management Models and Current Policy**  
**Goals: Multiple (private and public)**



**NRCS FY 2007:**  
**880,000 acres Nationally**  
**40,000 acres in California**

**Goals, Management, & Policy**

- Changing landowner goals (Huntsinger et al. 2010)
- Programs supporting tradeoffs for public benefit
- Integrative projects foundational for multi-use management models



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