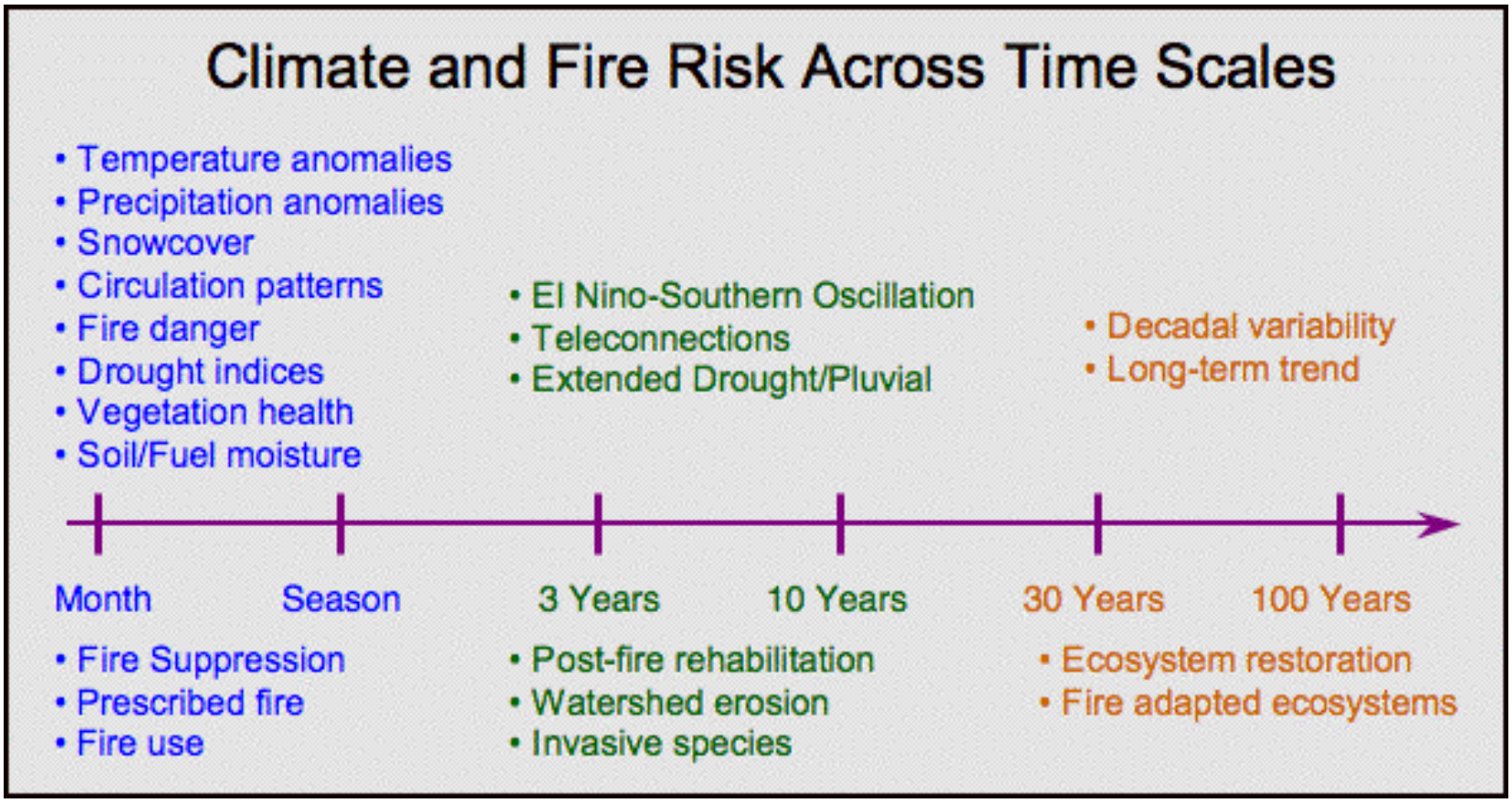
The Current Climate in Fire and Land Management

Timothy Brown

Desert Research Institute

CLIMATE ECOSYSTEM FIRE APPLICATIONS

Fire-climate interactions in the context of land management



Applications of climate information for land management (1998 version)

Weather Forecasts	*Vegetation Manipulation*	*Fire Regimes*	*Management Planning*	*Resource Management*
Spot Forecasts	Fuels Management	Histories	Trend Analysis NFDRS	Fire Ecology
Historical Patterns	Noxious Weeds	Fire Rehabilitation (Emergency/ Normal)	Resource Allocation Priorities	Rangeland Health
Fire Suppression	Prescribed Fire	Desired Future Condition	Hazardous Materials	Riparian Restoration
	Fire Effects	Fire Ecology		
	Mechanical Methods			

Fire Climate Impacts and Associations

Event	Impact
El Niño	Enhances fuel growth in SW and Florida Increases fire potential in NW Inhibits fuel treatments
La Niña	Increases fire potential in SW and Florida Enhances fuel growth in NW Inhibits fuel treatments
Drought	Increases fire potential Enhances vegetation stress and mortality
Pluvial	Decreases fire potential Enhances fuel growth Inhibits fuel treatments
Multi-decadal variability	Fuel accumulation Desired future condition
Warming trend	Increase in number of days of fire severity Increase in length of fire season Increase in frequency of extreme events Enhances bug kill

Three shaping factors of fire management today

- Past management practices
- Land use activities and expectations
- Climate

Fire-climate information needs for land management

Current broad areas of interest:

1) Climate change
2) Drought
3) Seasonal to multi-year forecasts

Climate is viewed as an impact on agency business

Current “hot” topics

1) Observation networks
2) Fuel targets
3) Resource planning (suppression costs)
4) Wildland-Urban Interface
5) “Megafires”

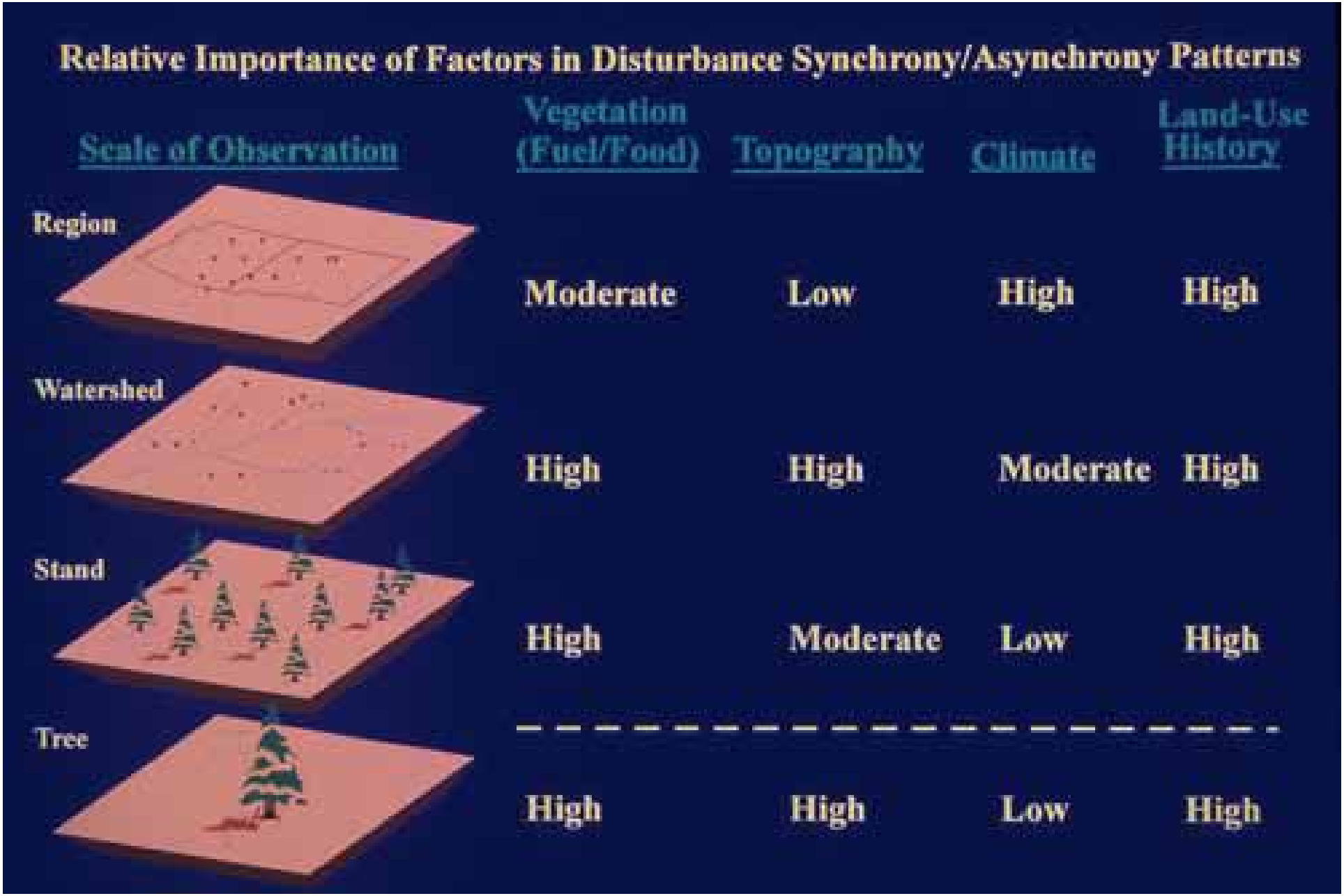
Information issues

1) Minimal capacity to work with grids and high volumes of information

2) Transition of development to operations

3) Understanding uncertainty (e.g., verification, low-skill forecasts)

4) Conflict of spatial scale - fine-scale versus climate scale space

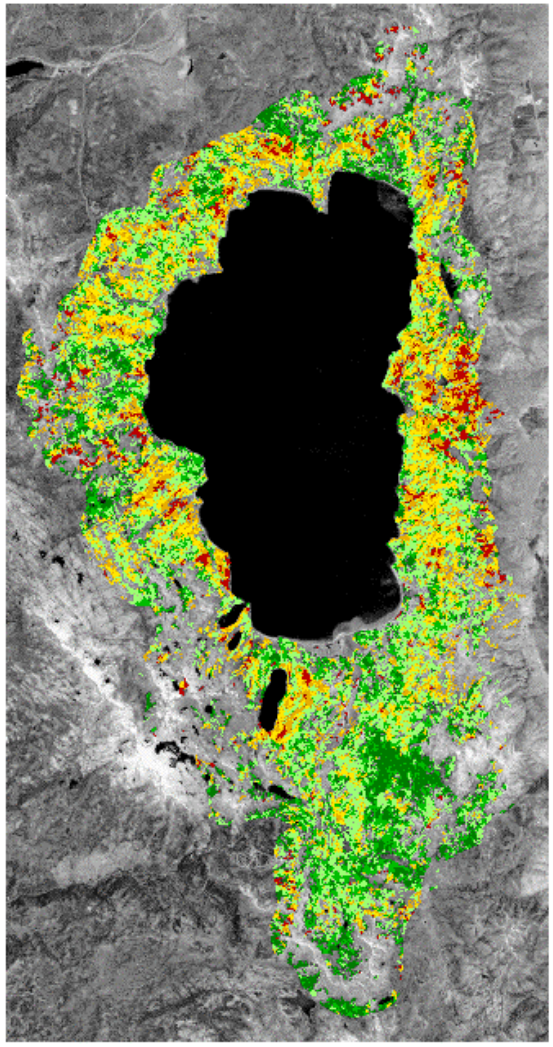


Source: Tom Swetnam, Univ. Arizona

What are the current major climate impacts?

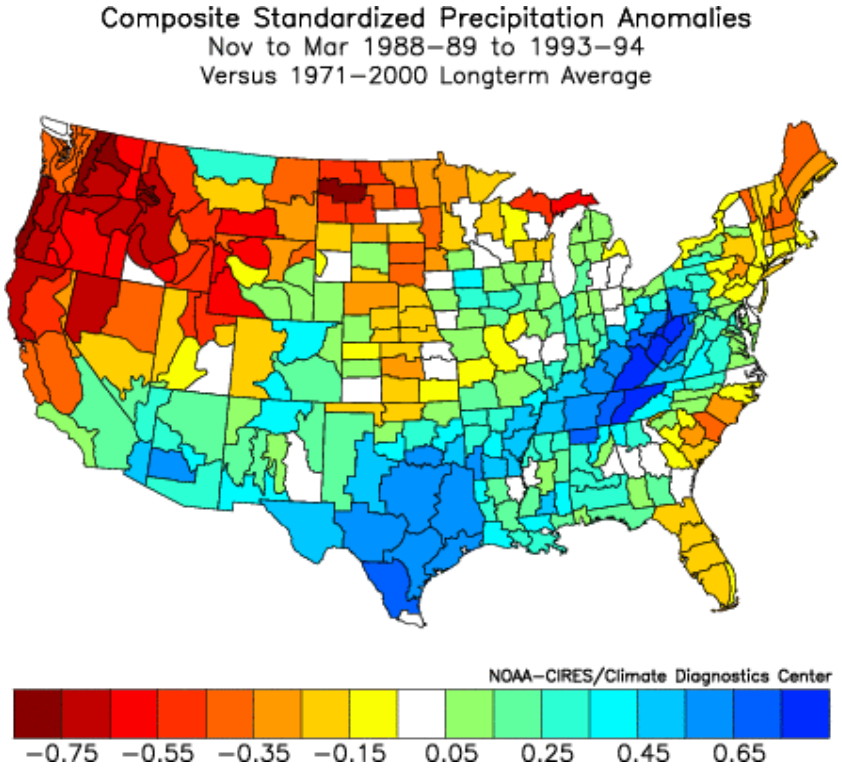
1) Increased vegetation stress (reduced warm season soil moisture)
2) More “extreme” events
3) Changing fire severity
4) Changing fire effects
5) Changing windows of opportunity for fuels treatment (i.e., burn windows)

Lake Tahoe tree mortality 1991-94



Loss in basal area,
square meters per hectare

- < 2
- > 2, < 5
- > 5, < 10
- > 10, < 15
- > 15, < 20
- > 20

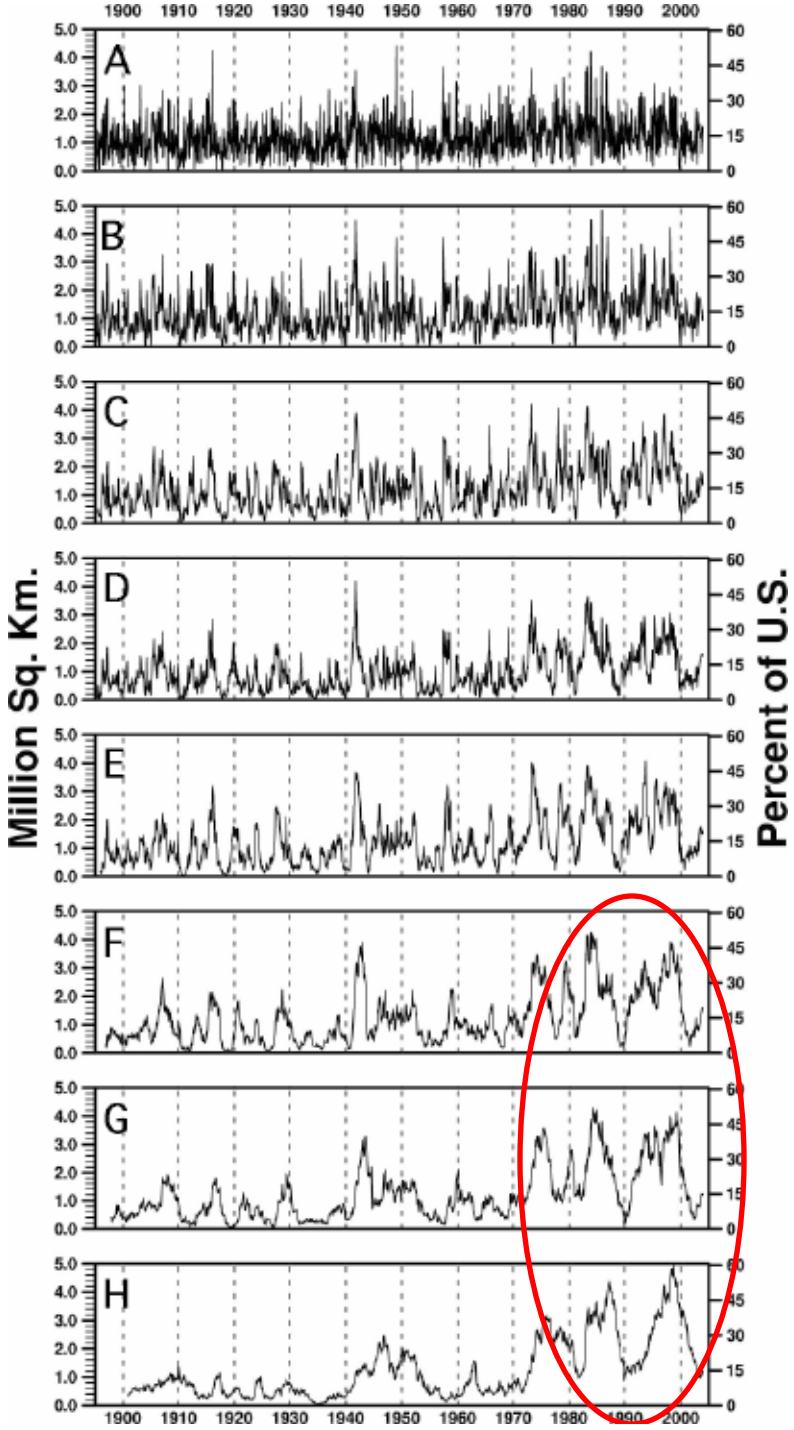


Canadian Outbreak ~24,000,000 ac (and counting) as of summer 2005

Source: Jesse Logan, USFS

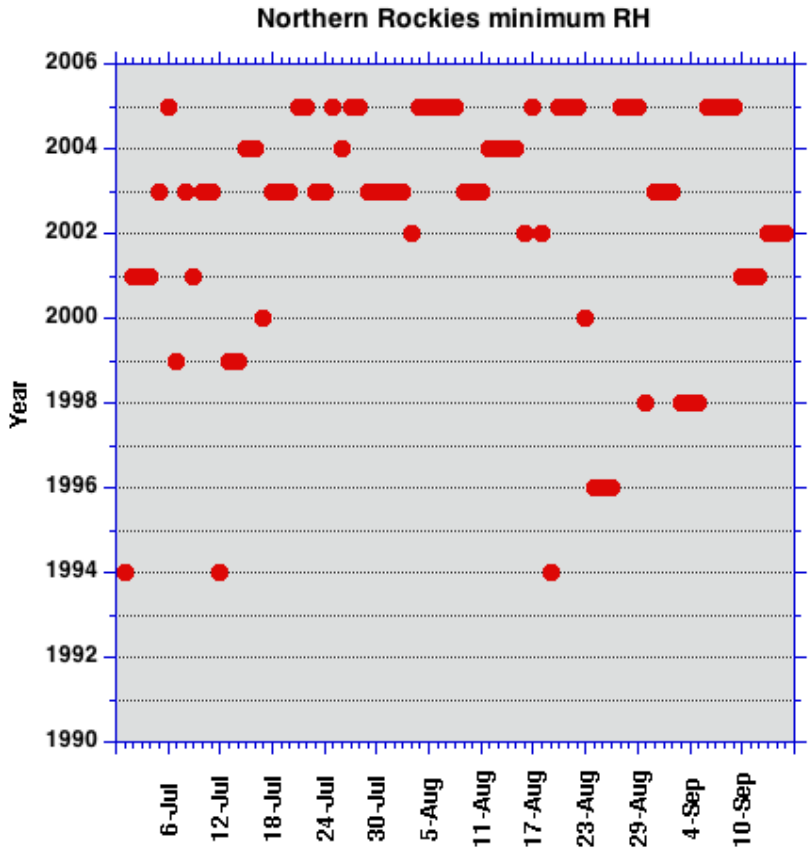
Source: California Department of Forestry

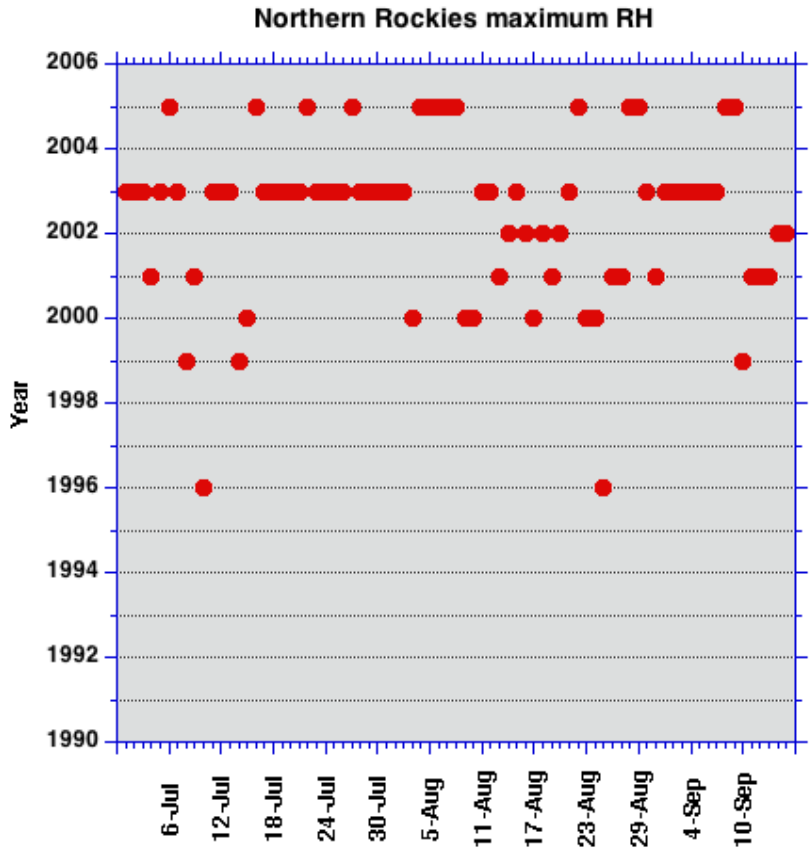
Fire exclusion + pluvial = overstocked forests/dense fuels



Climate - Extremes in Fire Danger

Lowest values of minimum and maximum relative humidity





Changing fire severity

Cooler (current)

More low and mixed severity fire

Warmer (projected)

More high-severity fire

Changing fire effects

Cooler (current)

More low and mixed severity fire

Mixed seral stages, less stand-replacing

Warmer (projected)

More high-severity fire

More stand-replacing, less middle and late seral stages

Climate and adaptive management

- Conflicts between local, regional and national assumptions and objectives
  - Dualities in wildfire hazard/benefit
  - Priorities and jurisdictional issues
- Planning and budgeting processes do not incorporate a climate timeline
  - No annual variation in budget or multi-year options to accommodate fluctuations in fire severity and fuels associated with climate
- Climate is not a priority in policy (e.g., NFP, Cost-containment, QFFR)
  - Climate primarily a reaction, not part of the planning process
- Climate is not a priority in fire management education

Integrating Climate and Fire Risk Assessment

- Effective utilization of climate information
  - Establish effective pathways from policy through operations
  - Must be incorporated at multi-levels: national, regional, state and local
  - Determine if assumptions that go into policy and operations are supported by what we know about the climate record
  - Incorporate knowledge of decadal and interannual variability, climate change, and extremes
  - Determine entry points for climate information across scales in policy, management and operational responses