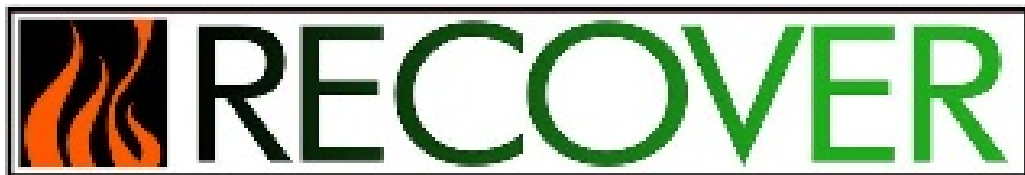# INVESTIGATING WILDFIRE FREQUENCY ACROSS THE WESTERN UNITED STATES USING GIS

Rituraj Yadav, Keith T. Weber, and Kindra Blair

Idaho State University's GIS TReC
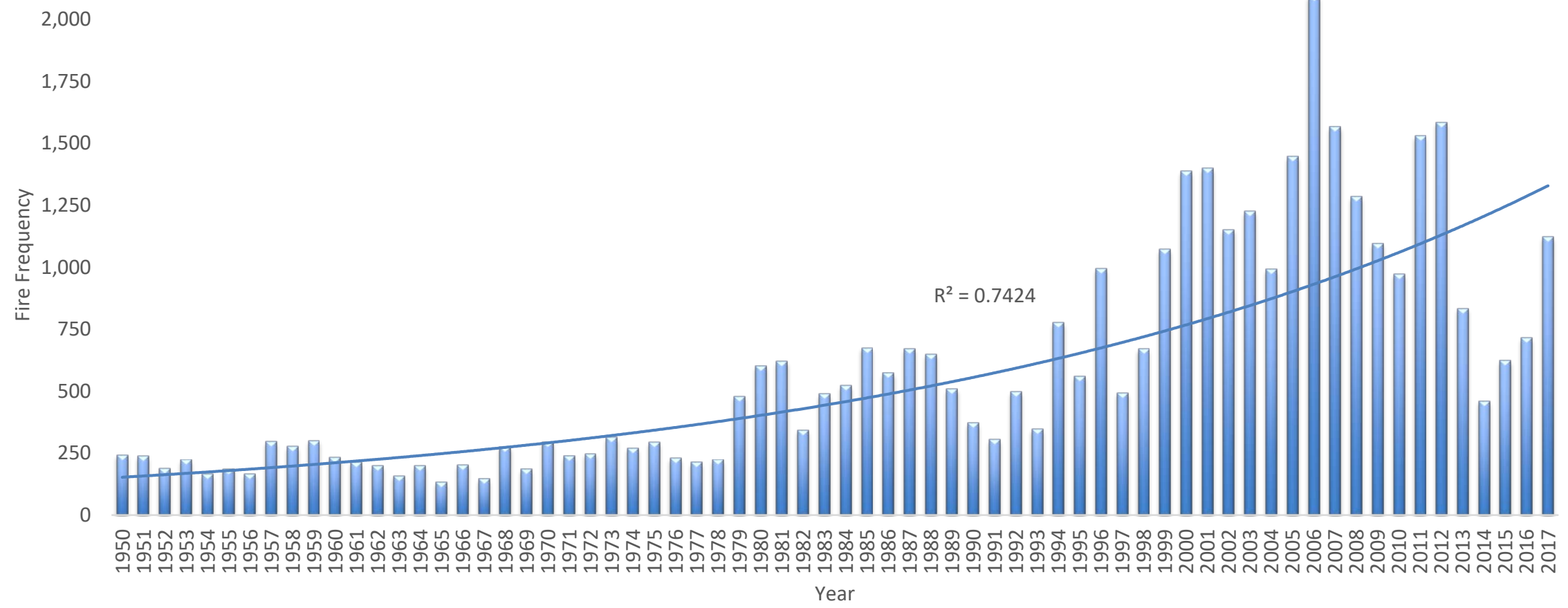
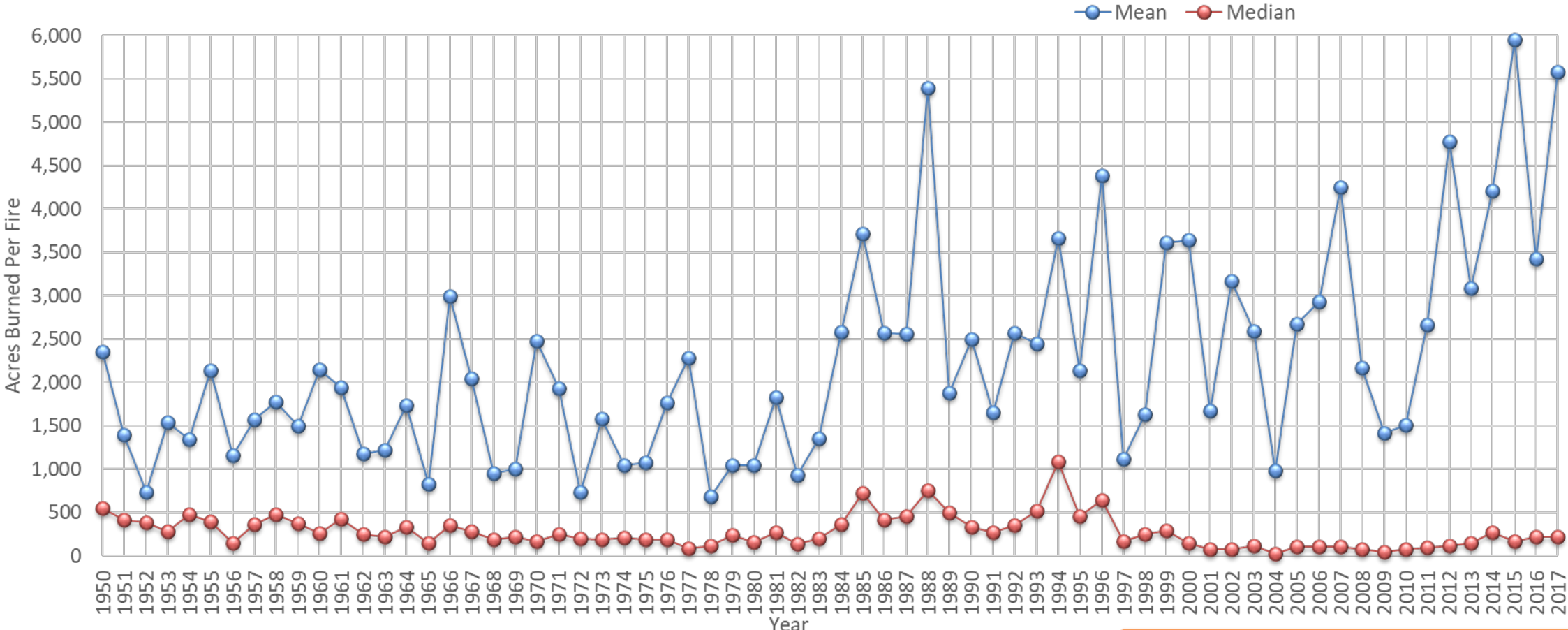Pocatello | Idaho Falls | Meridian | Twin Falls

Overview

- Since 1950

  11% of Western US lands have experienced a wildfire

  89% has no documented record of wildfire

Idaho State
UNIVERSITY
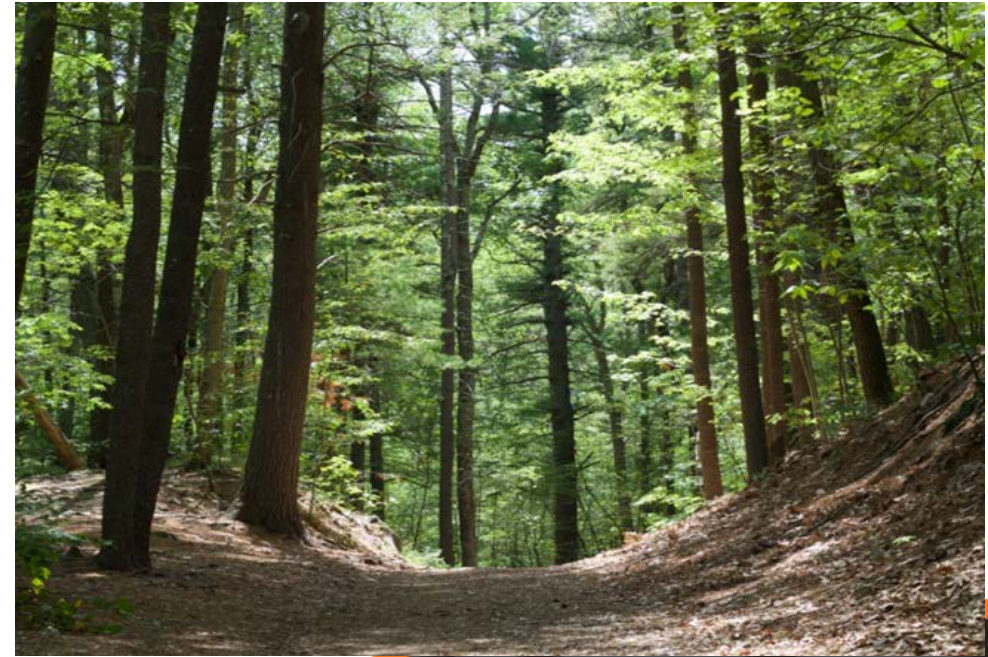
Fire Frequency

Acres Burned

What else is changing?

- Any specific vegetation burning?

  Or, what vegetation is burning more?

Idaho State
UNIVERSITY

Spatial Analysis across the West

Workflow

- Overlay fire polygons on the USGS LANDFIRE *Biophysical setting* raster layer

- Run zonal Statistics as Table

- Analyze results

All Fires 1950-2017	
Majority	**PCT**
Conifer	38%
Shrubland	44%
Grassland	12%
Riparian	0%
Hardwood	6%
Hardwood-Conifer	1%
Sparse	0%
	100%

Fires after 2000	
Majority	**PCT**
Conifer	42%
Shrubland	39%
Grassland	13%
Riparian	0%
Hardwoord	5%
Hardwood-Conifer	1%
Sparse	0%
	100%

Notice the recent increase in coniferous forest fires

Idaho State
UNIVERSITY

What's Happening in Idaho?

All Fires 1950-2017	
Veg Group	**PCT**
Conifer	38%
Shrubland	61%
Grassland	1%
Riparian	0%
Hardwood	0%
Sparse	0%
Hardwood-Conifer	0%
	100%

Fires after 2000	
Veg Group	**PCT**
Conifer	46%
Shrubland	52%
Grassland	2%
Riparian	0%
Hardwood	0%
Sparse	0%
Hardwood-Conifer	0%
	100%

Idaho State UNIVERSITY

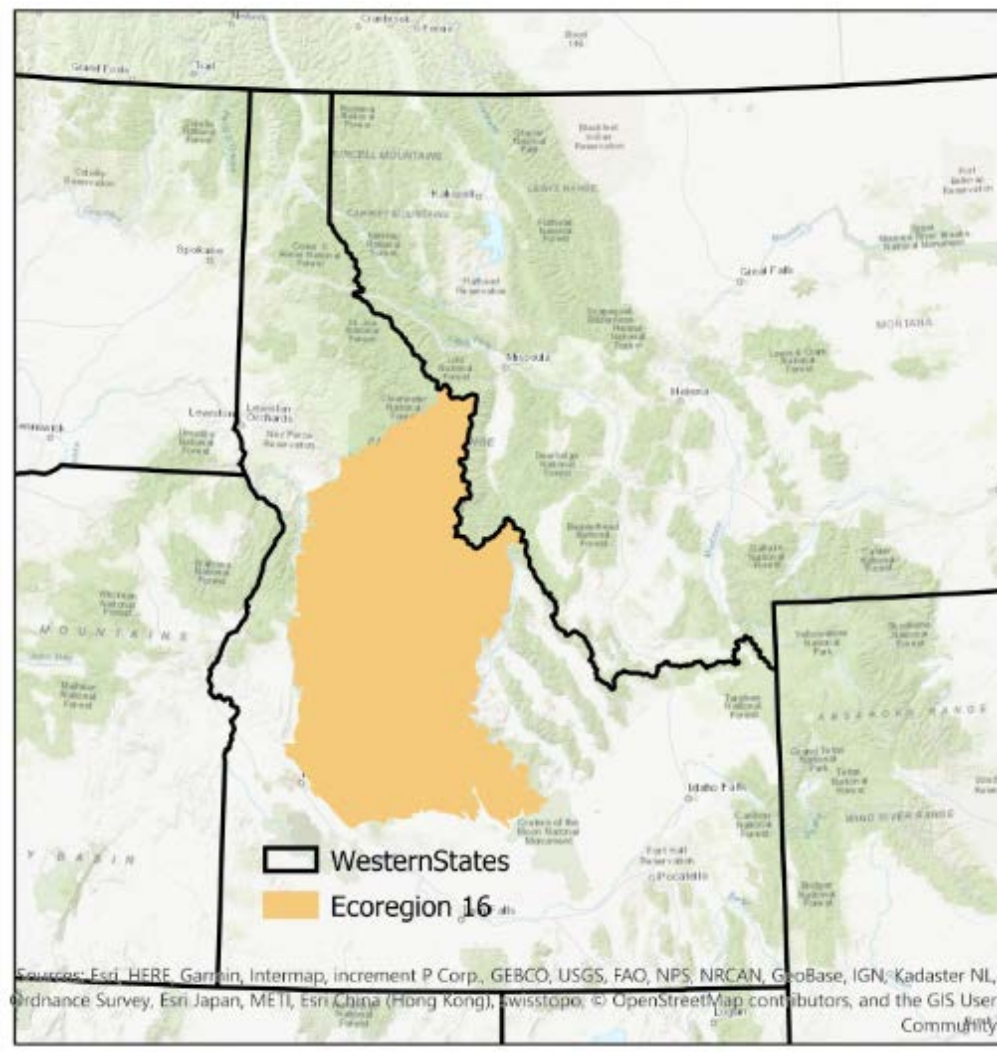Pocatello | Idaho Falls | Meridian | Twin Falls

The Fire Regime is Changing

- Why?

- Methods
  - Examine the effect of weather and climate at various scales
    - Western US
    - Idaho's Ecoregion 16
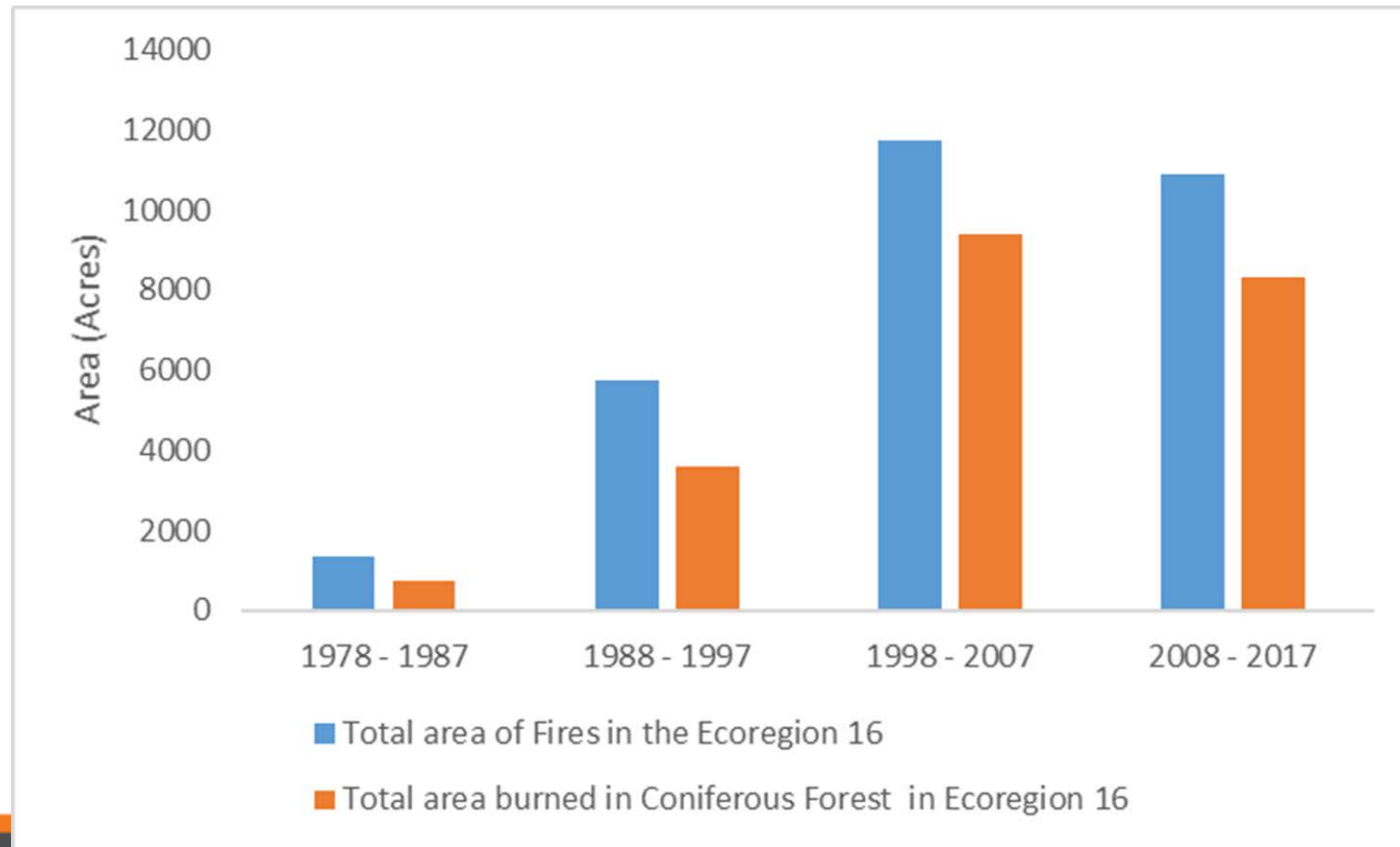   - Watershed basin scale
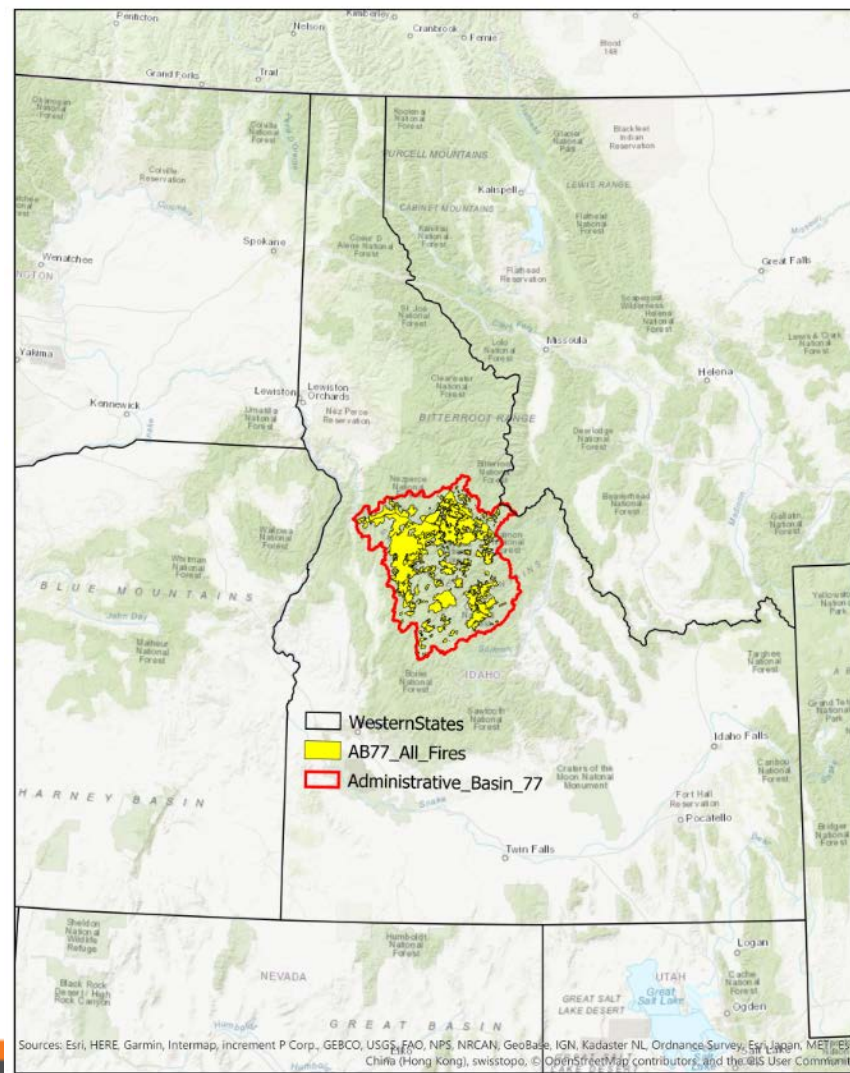
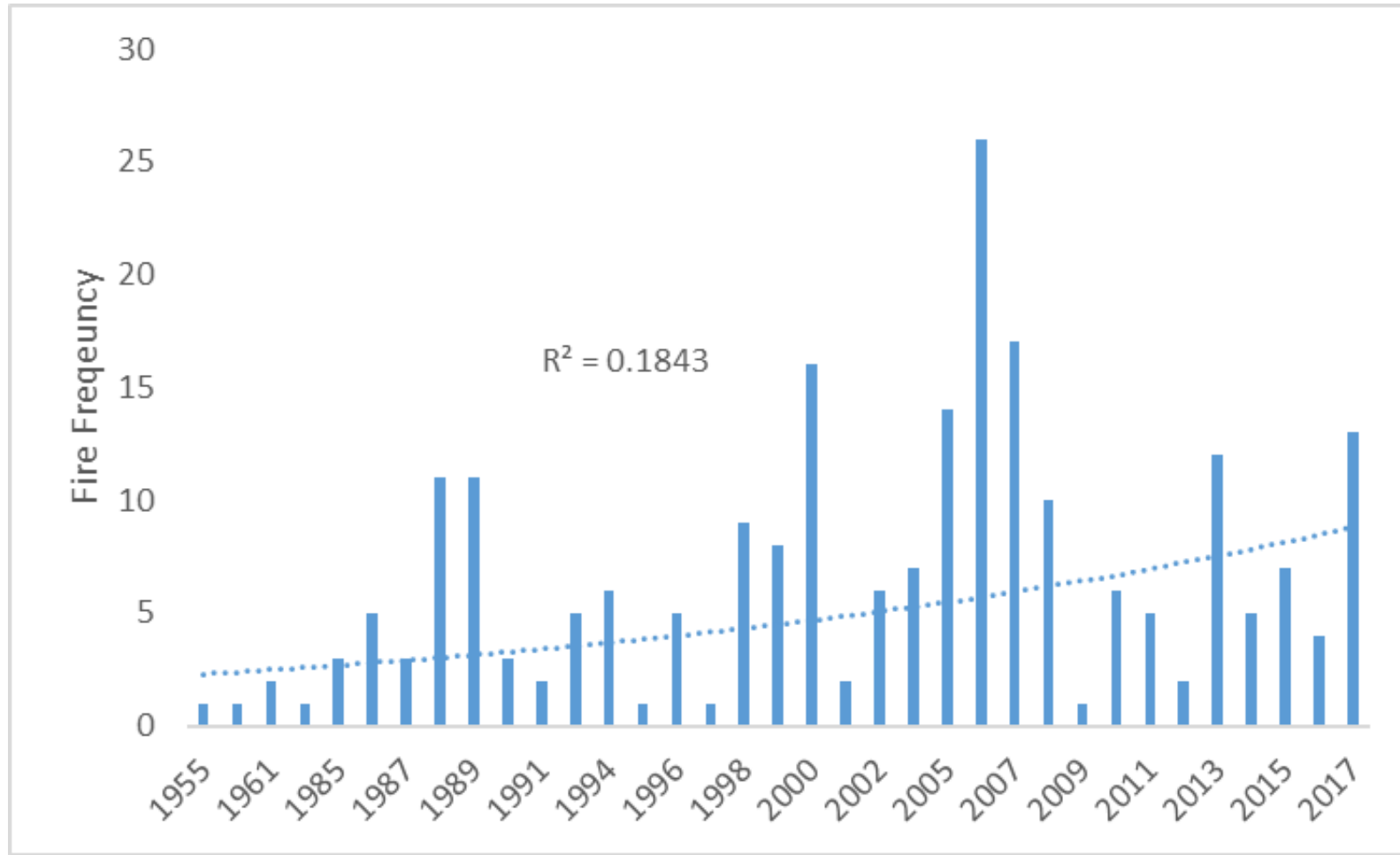# Pacific Decadal Oscillation and Fire Frequency

Ecoregion 16

Idaho State
UNIVERSITY
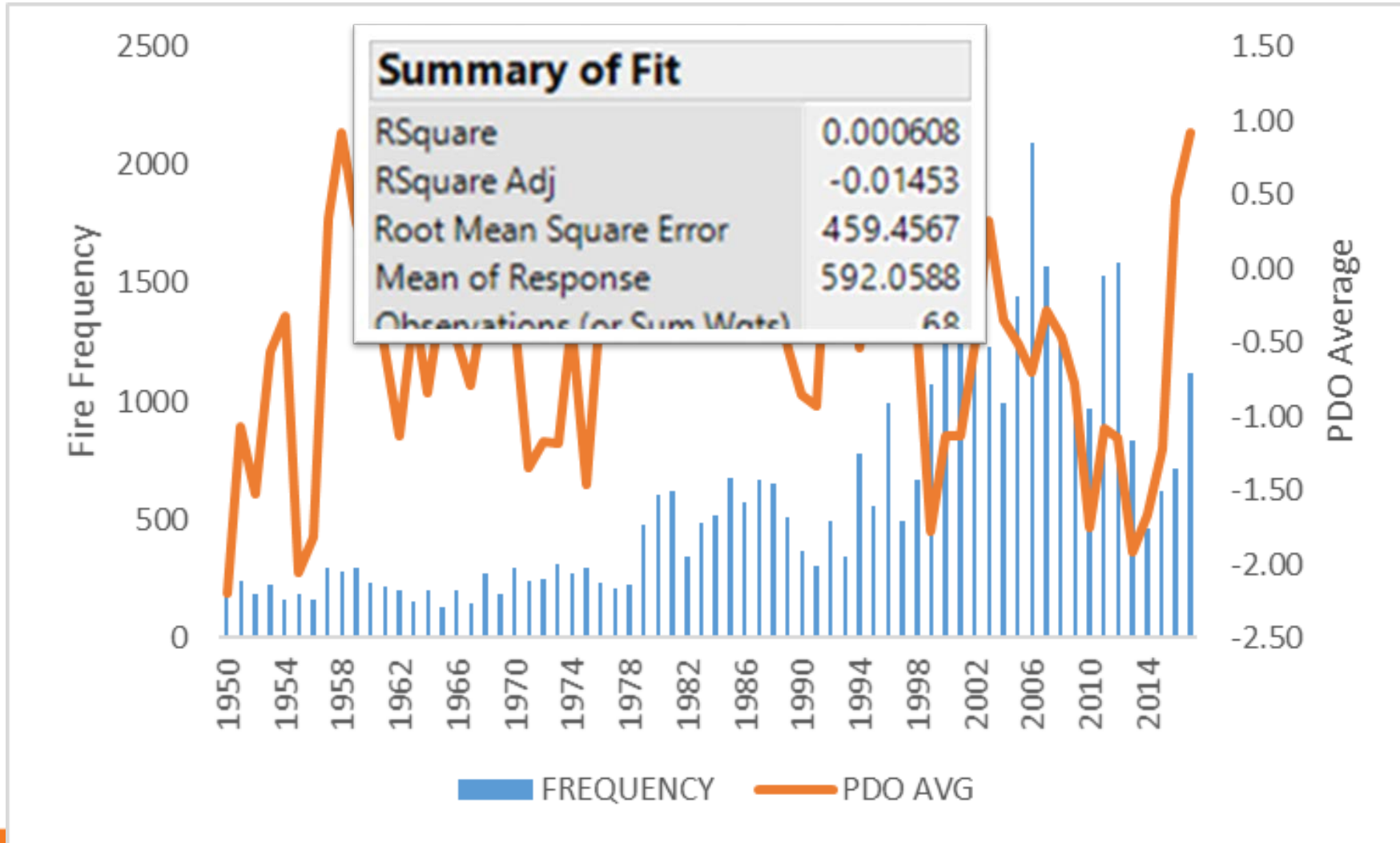
Total Area Burned in Ecoregion 16 vs Total Coniferous Forest Area Burned in Ecoregion 16
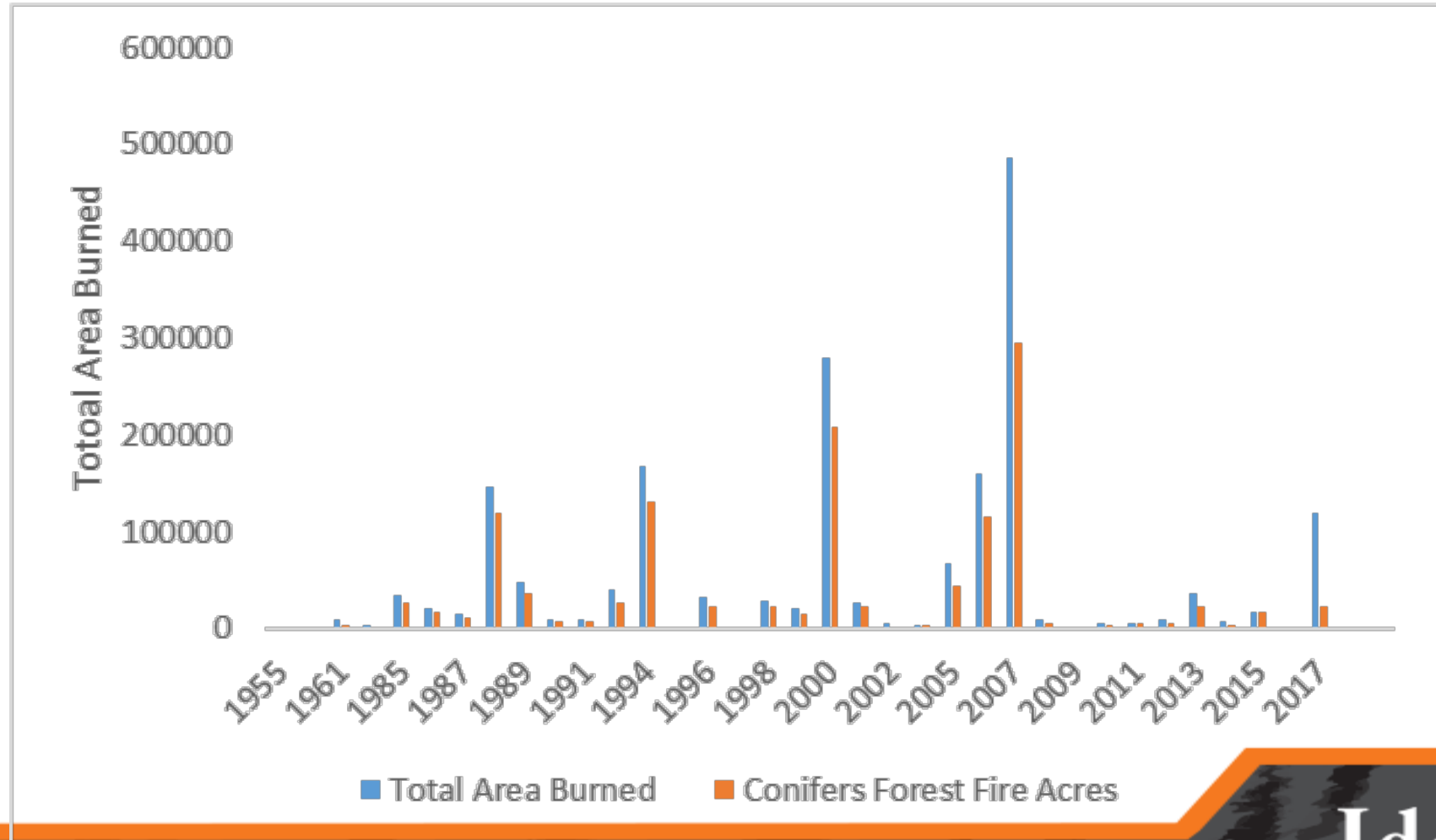
Watershed Basin 77

Fire Frequency in Basin 77
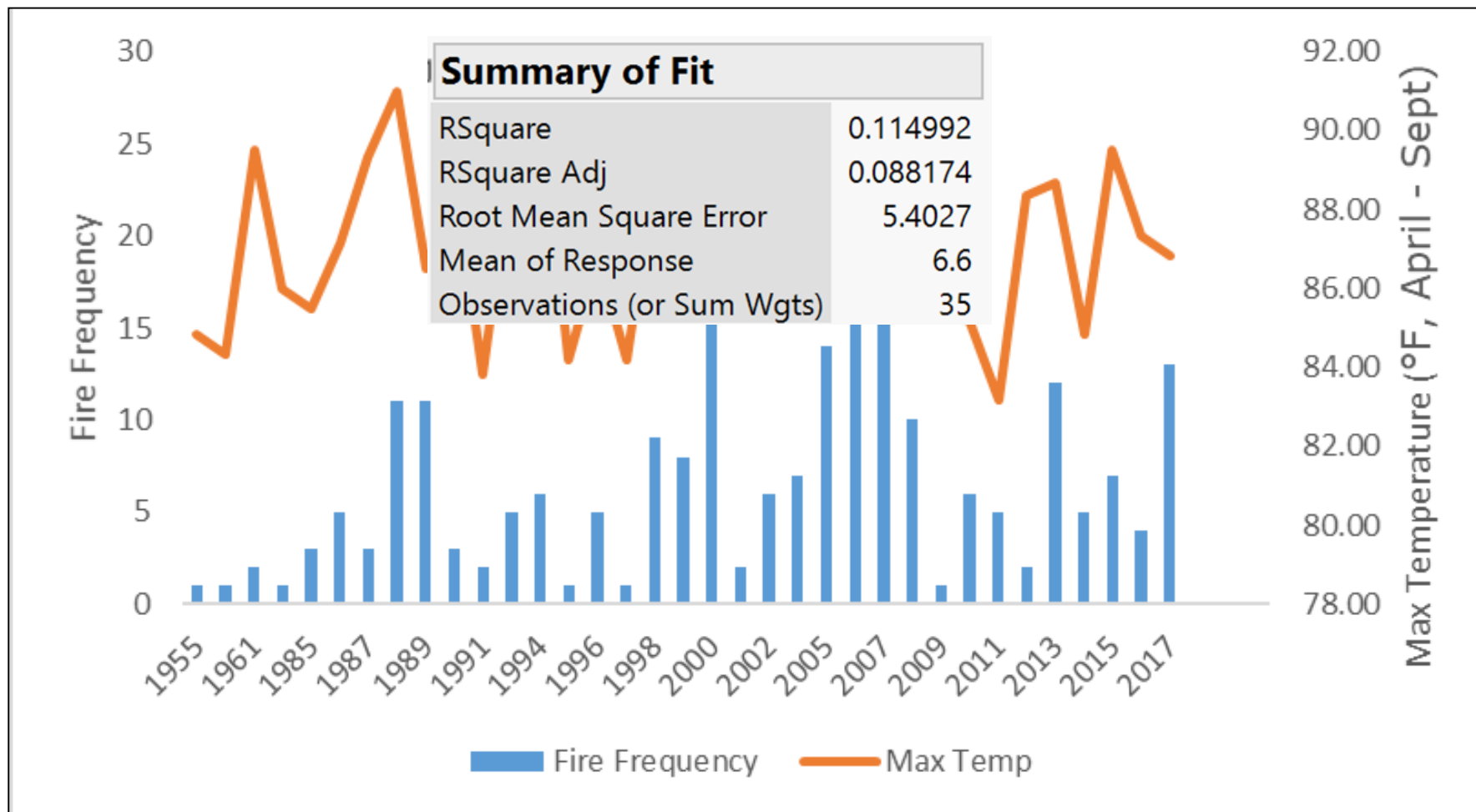
Comparing Coniferous Forest Fires and Total Area Burned

Idaho State
UNIVERSITY

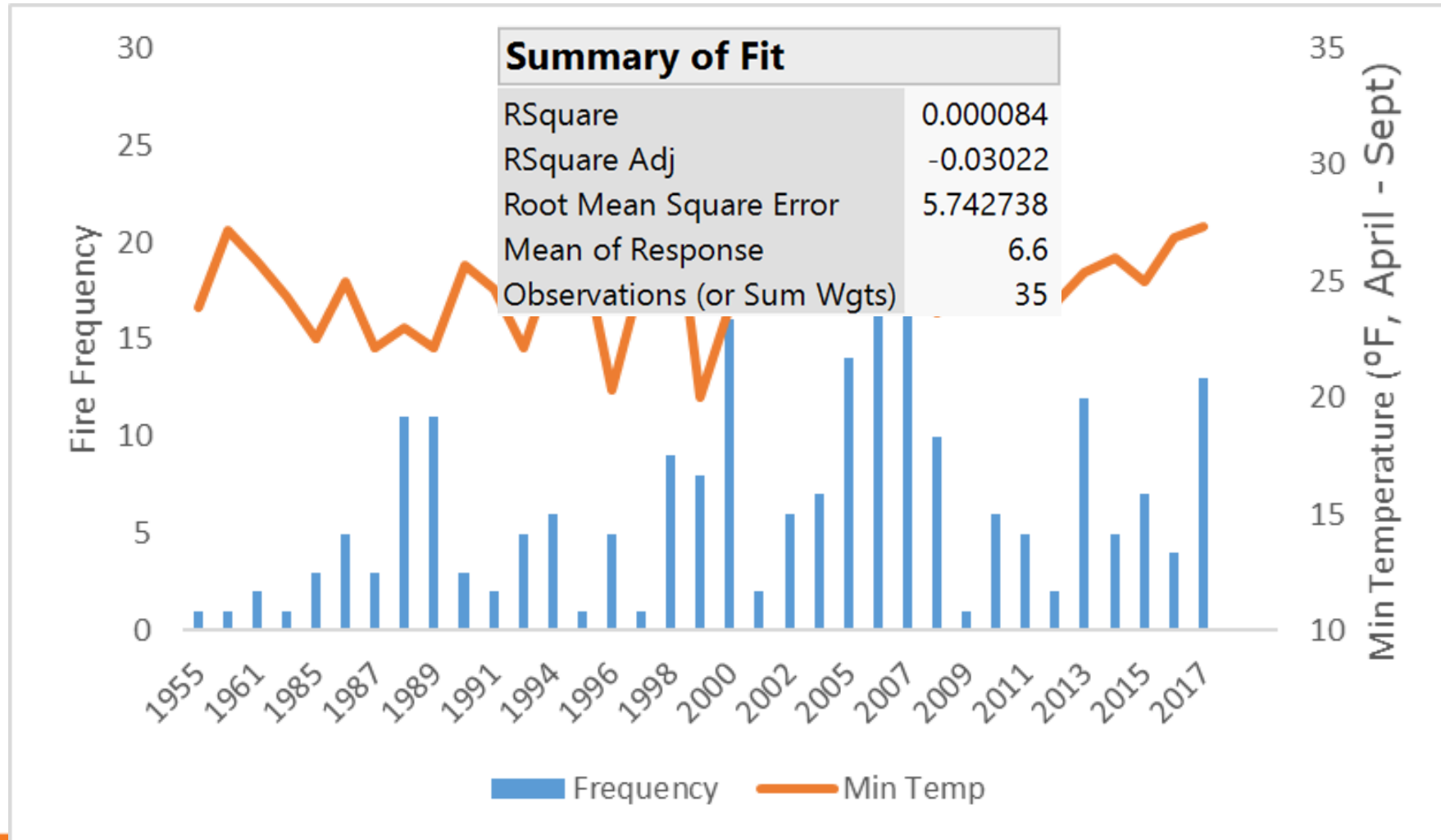Pocatello | Idaho Falls | Meridian | Twin Falls

T$_{avg}$ and Fire Frequency
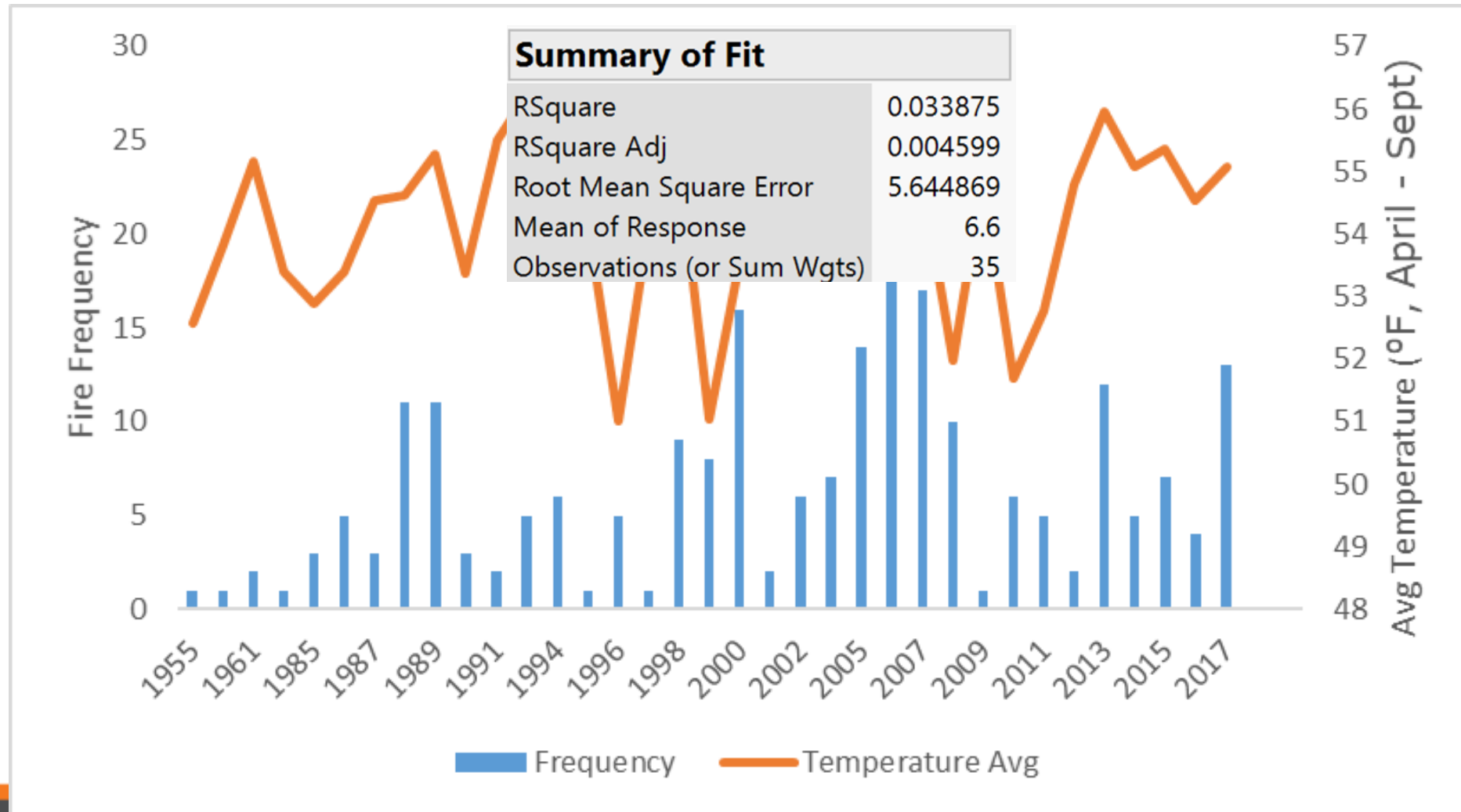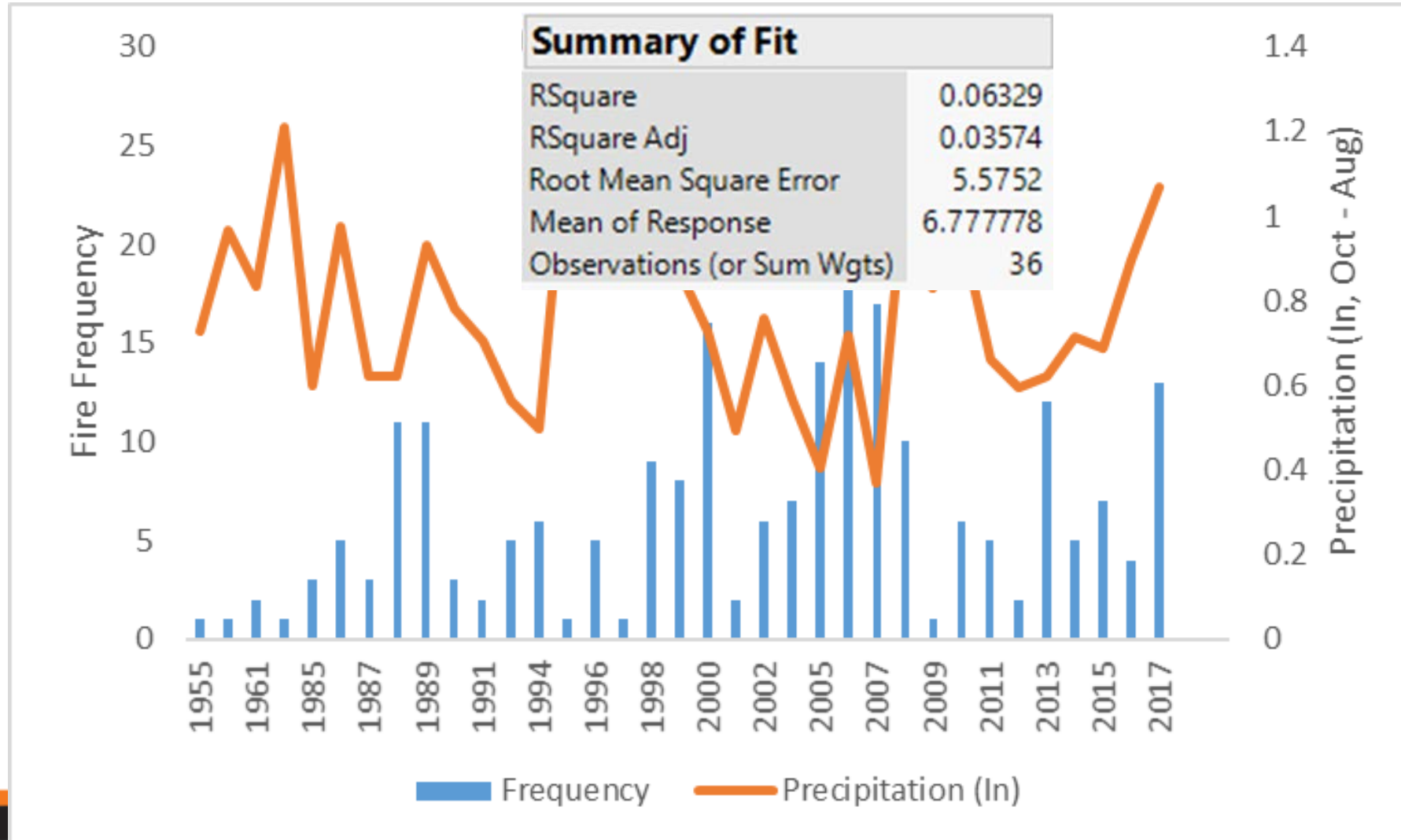
T$_{max}$ and Fire Frequency

T$_{min}$ and Fire Frequency

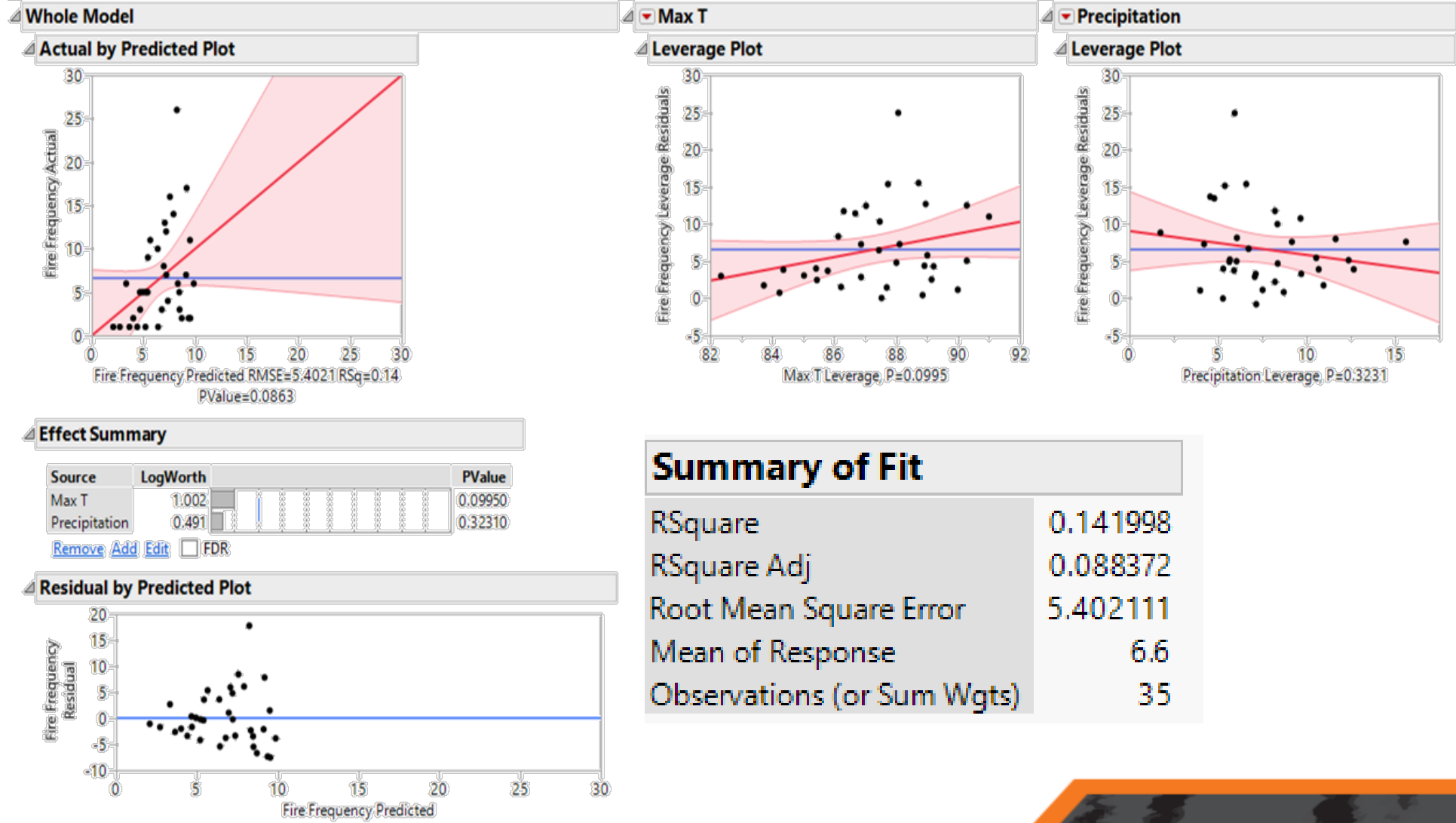# What other variables might play a role in increasing fire frequency?

- Precipitation
  - Snow Water Equivalent
  - Relative Humidity

Idaho State
UNIVERSITY

Precipitation and Fire Frequency

Multiple Regression Results

Required Conditions for a Wildfire to occur

SUSCEPTIBILITY

Fuel (load, continuity)
Soil moisture
Topography (aspect)
Other intrinsic factors
Past fire history

HAZARD

Winter snow pack/SWE
Precipitation
Temperature
RH (approx. thresholds
<15% day and <40% night)

IGNITION SOURCE

Lightning
Anthropic

Discussion

- In Idaho, 46% of the total forest fires after the year of 2000 were in coniferous forests

- Weather and climate were found to have minimal effect on fire frequency (R^2 = 0.14)

- Land management practices are a more likely cause of increasing wildfire.

Idaho State
UNIVERSITY

Questions?

Visit http://giscenter.isu.edu/research/Techpg/nasa_RECOVER/

yadaritu@isu.edu

Also, visit https://www.ted.com/talks/paul_hessburg_why_wildfires_have_gotten_worse_and_what_we_can_do_about_it?language=en

Across the West