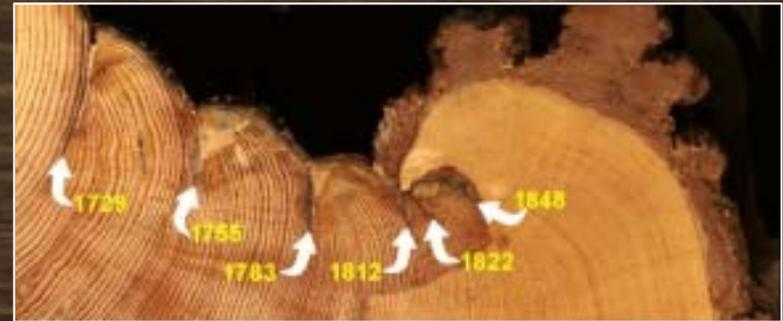


Reconstructing Attributes of Past Fire Regimes: Sequoia & Kings Canyon National Parks

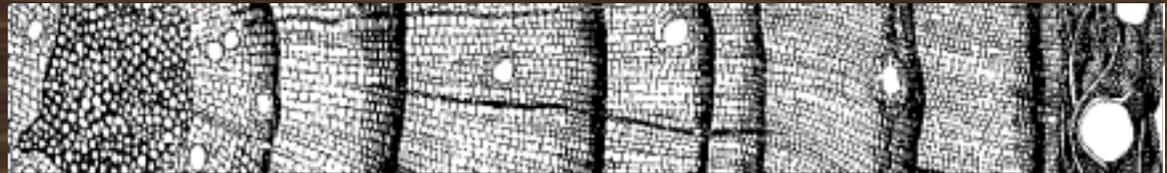


Photo by Eric Knapp



Anthony C. Caprio

Division of Natural Resources
Sequoia & Kings Canyon National Parks





Attributes of Pre-Euro- American Fire in the East Fork Watershed

Thematic mapper
(TM) scene and
study area.

Total Park Area
349,676 ha

East Fork
Watershed
(21,202 ha)

East Fork Drainage

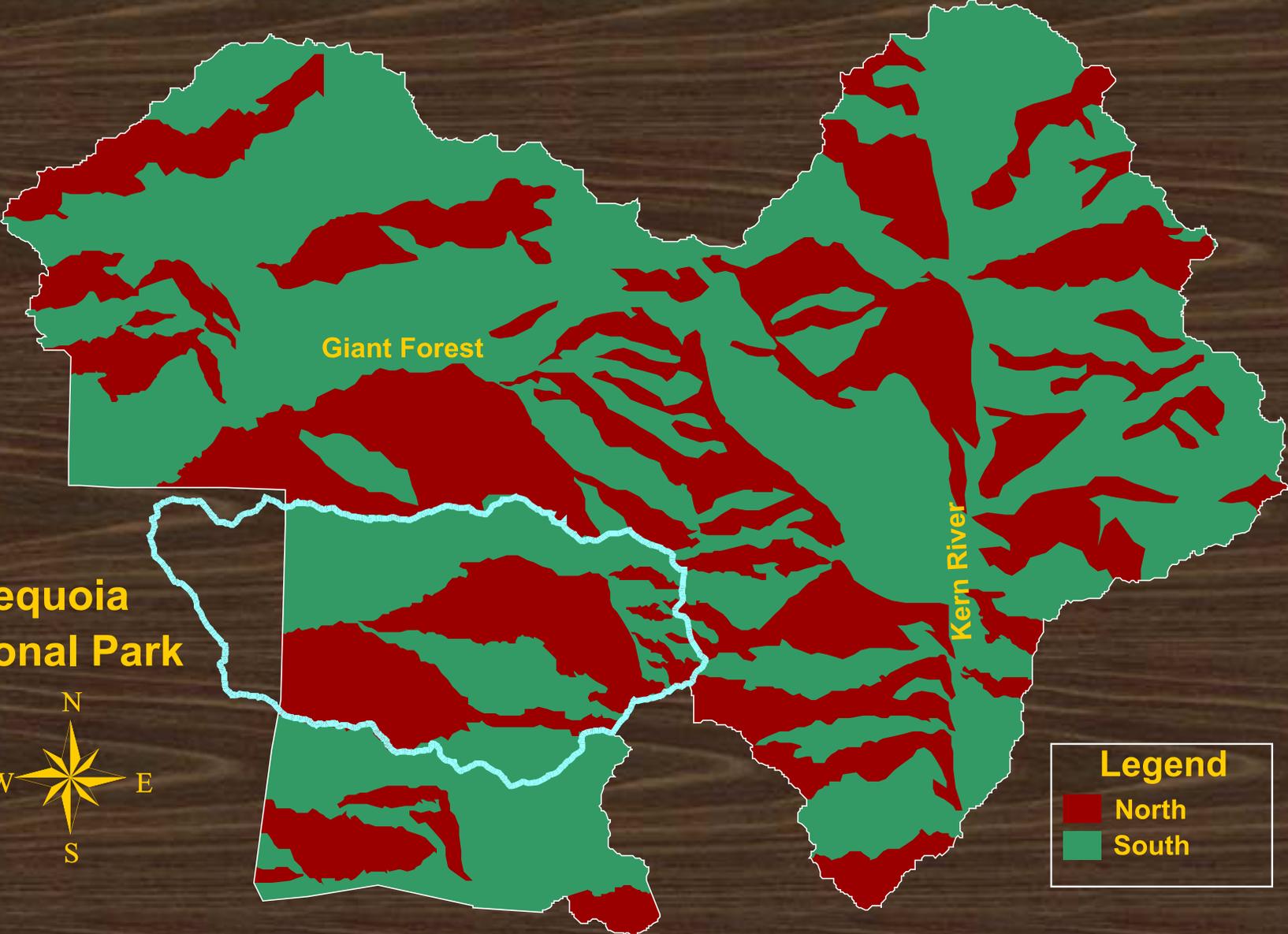
Diverse Vegetation and a Rugged Landscape



Photo by Linda Mutch

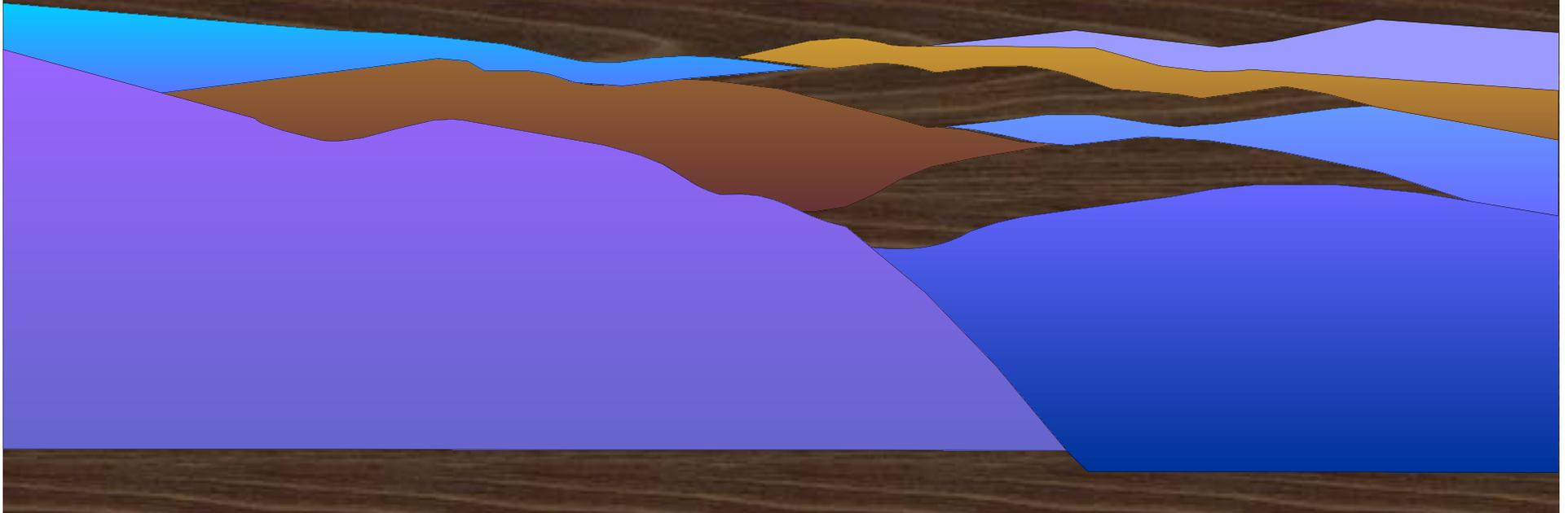
Strong North/South Aspect Contrasts in East Fork Watershed

(North 0-105° & 285-360°, South 105-285°)

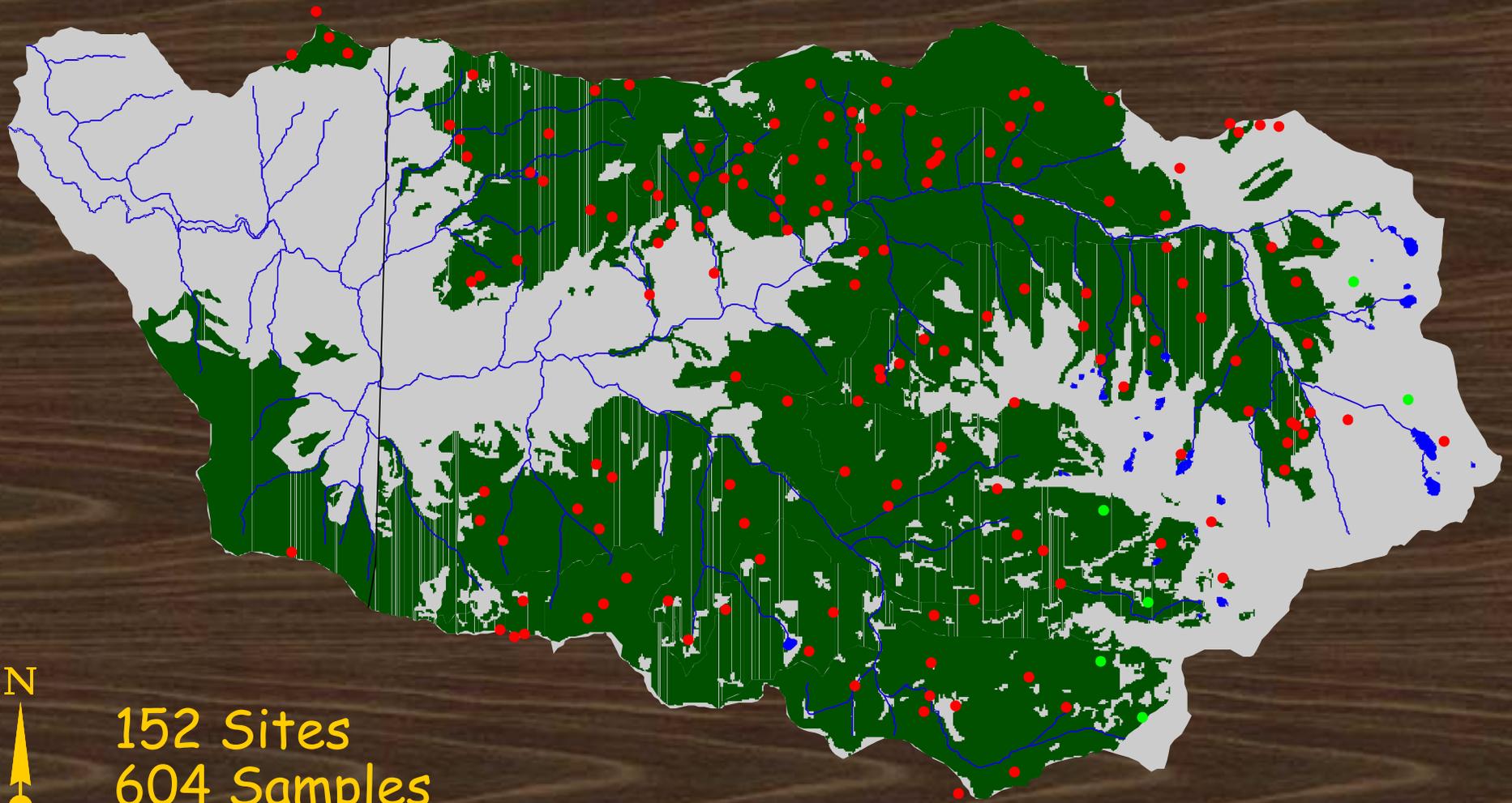


Objectives of East Fork Sampling

- 1) Sample a network of fire history sites throughout the forested area of the East Fork watershed.
- 2) Acquire reliable information about variation in past fire regimes over:
 - a) the range of vegetation types in the watershed
 - b) and across differing aspects and elevations.
- 3) Develop estimates of pre-Euroamerican settlement fire size within the watershed and examine differences / similarities across aspects and elevations.



Fire History Sampling Site Locations within Forest Vegetation



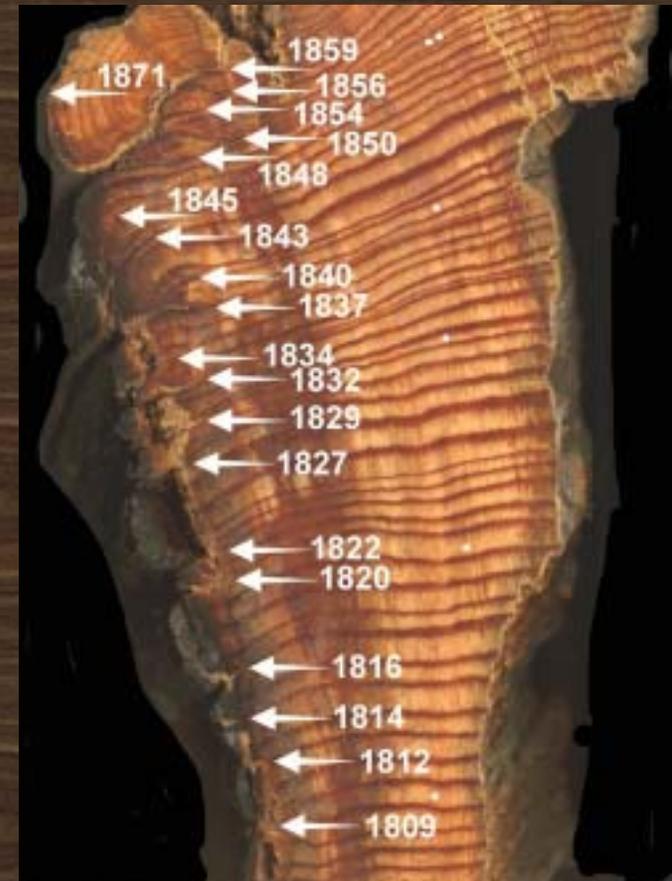
N



152 Sites
604 Samples
2829 fire scar dates
(~60% of collections dated)

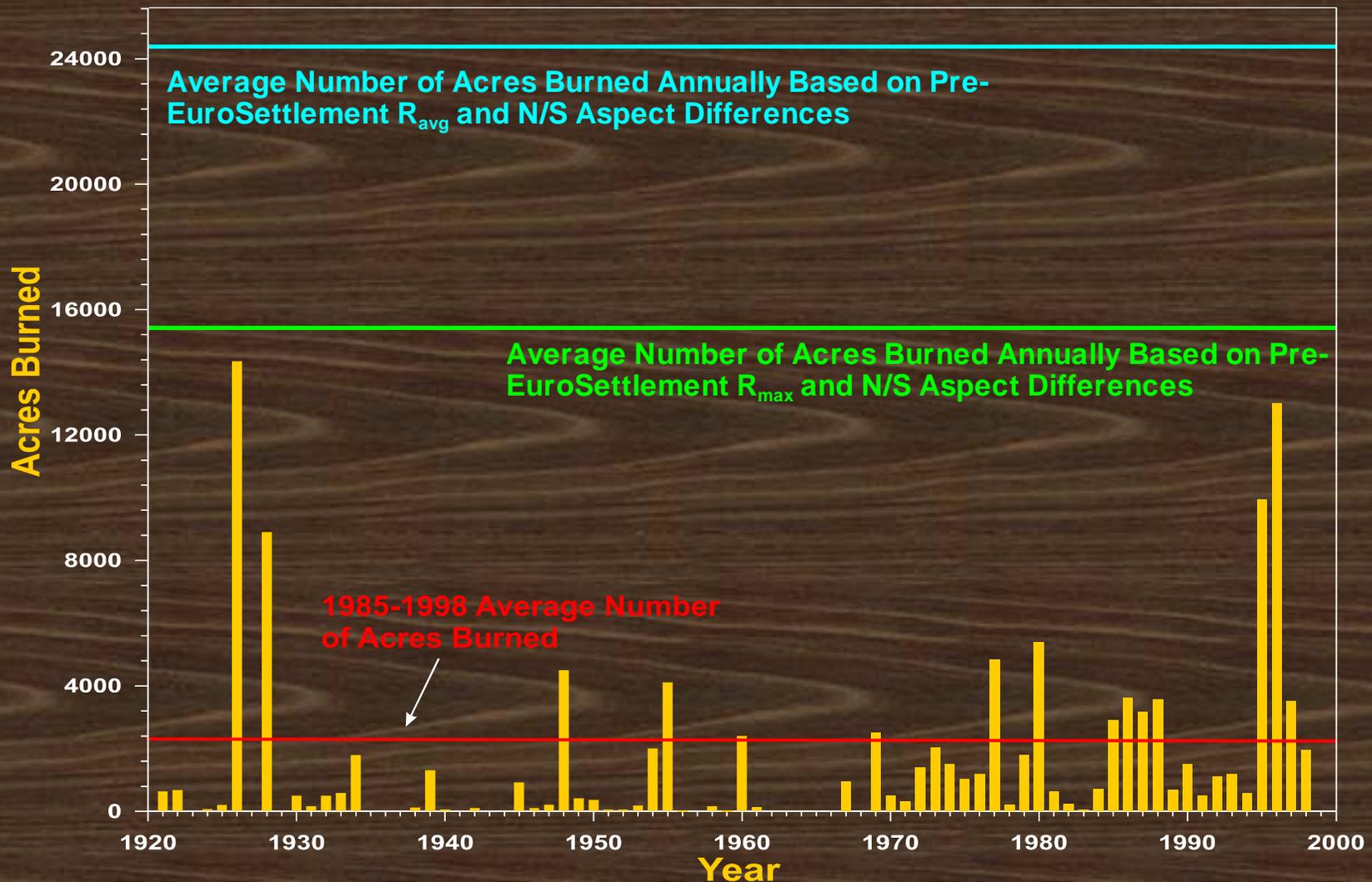
Management Application of FRI Data - Mean Maximum Fire Return Interval by Vegetation Class (green values are estimates)

Vegetation Classification	MFRI
1 - Ponderosa Pine-Mixed Conifer	6
2 - White Fir-Mixed Conifer	16
3 - Red Fir Forest	50
4 - Lodgepole Pine Forest	163
5 - Xeric Pine Forest	50
6 - Subalpine Conifer	508
7 - Foothills Hardwood/Grass	17
8 - Foothills Chaparral	60
9 - Mid-Elevation Hardwood	23
10 - Montane Chaparral	75
11 - Meadow	65

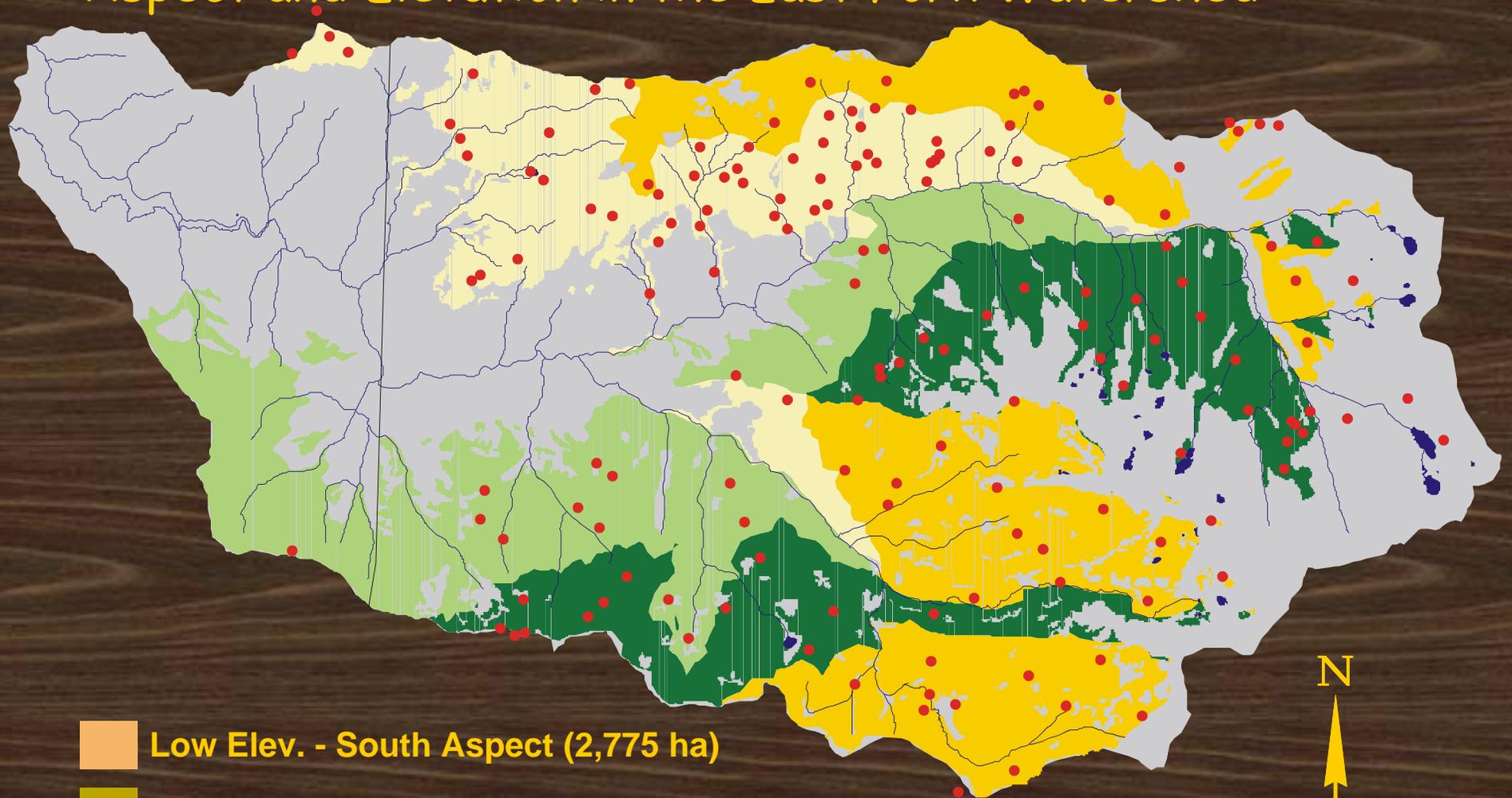


Use of fire return interval (FRI) values to estimate annual area burned prior to Euro-American settlement (**upper** estimate based on average FRI and **lower** on more conservative "maximum average").

Acres Burned in Sequoia & Kings Canyon National Parks Due to All Causes, 1921 - 1998



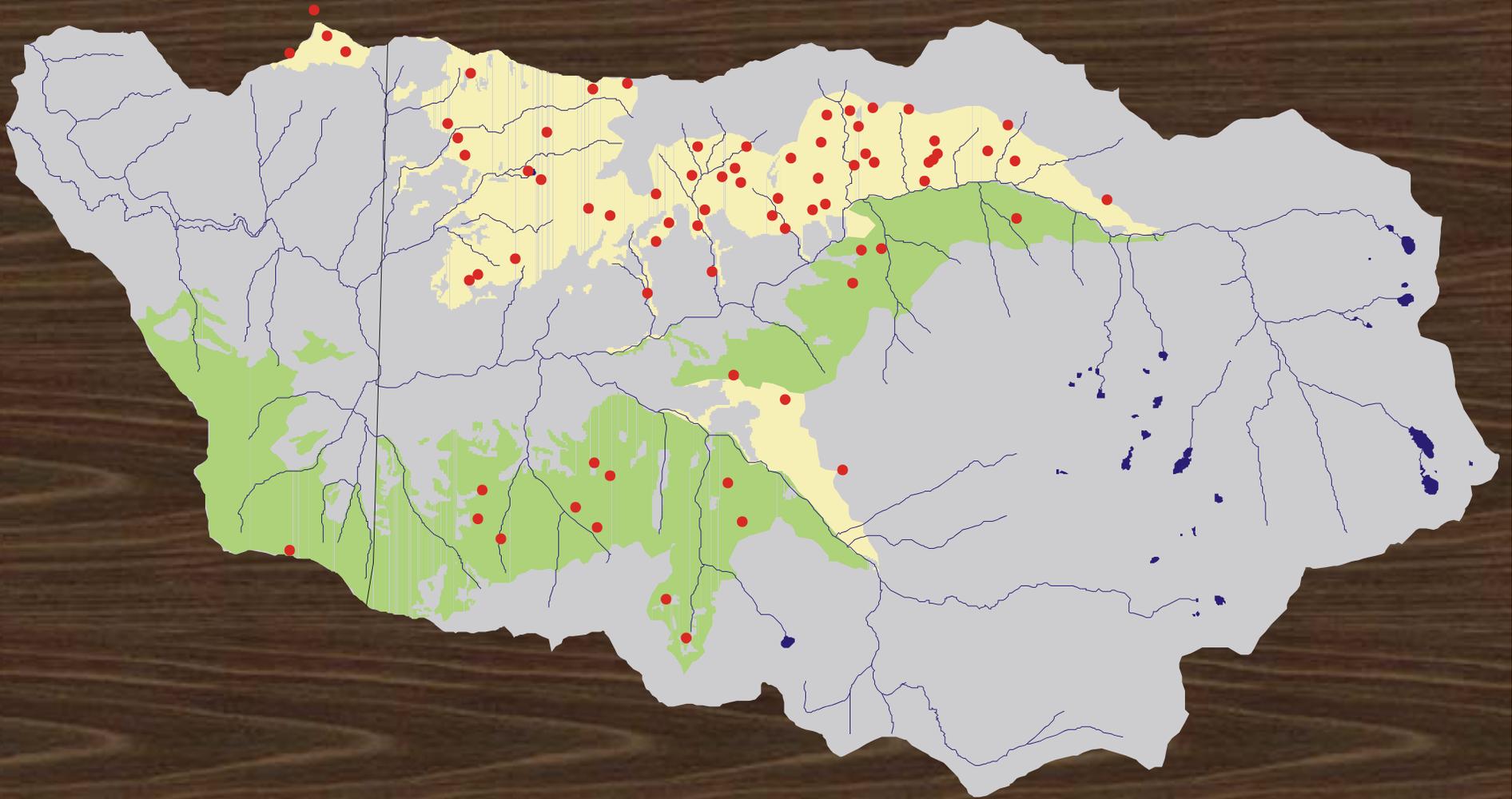
Forest Vegetation & Fire History Sites (red dots) by Aspect and Elevation in the East Fork Watershed



- Low Elev. - South Aspect (2,775 ha)
- High Elev. - South Aspect (4,360 ha)
- Low Elev. - North Aspect (2,664 ha)
- High Elev. - North Aspect (3,088 ha)



Sites Sampled in Lower Elevation Conifer Forest on North and South Aspects (<2286m)



Differences in Fire Frequency by Aspect

Low to Mid-Elevation Sites

North Aspect Sites - 1821 to 2165 m Elevation *Mean FRI 31.8 (1700-1850)*
SD 11.4



South Aspect Sites - 1776 to 2102 m Elevation *Mean FRI 9.1*
SD 4.7



Composite Site Fire Chronologies

1700

1800

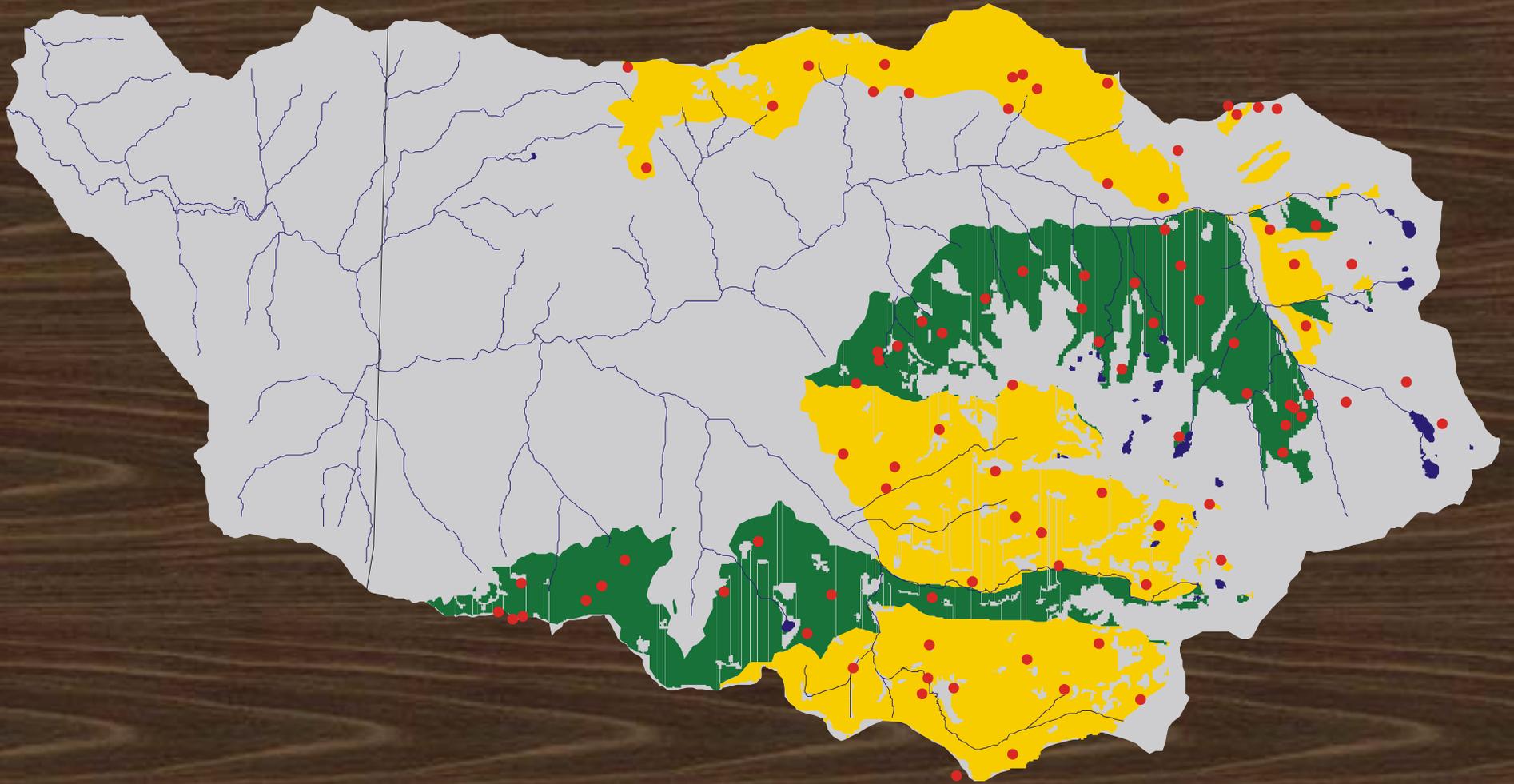
1900

2000

Year

(From Caprio 1999)

Upper Elevation Conifer Forest Vegetation (>2286 m) & Fire History Sites (red dots) by Aspect and Elevation in the East Fork Watershed



Differences in Fire Frequency by Aspect

Upper-Elevation Sites (>2286 m)

North Aspect Sites

Mean FRI 71.4 yr (1700-1850)
SD 26.1 yr



South Aspect Sites

Mean FRI 44.0 yr
SD 46.7 yr



Composite Site Fire Chronologies

1700

1800

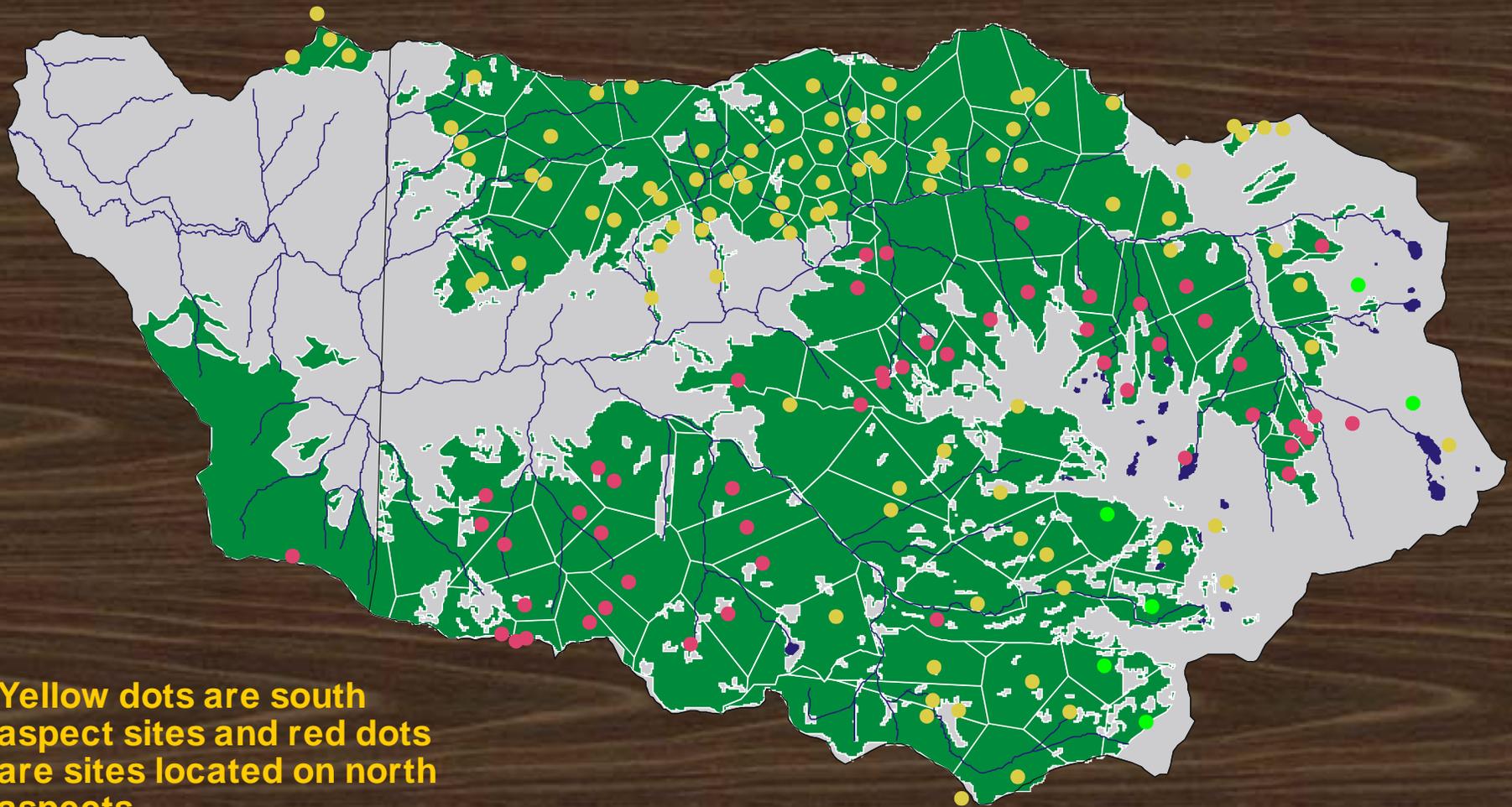
Year

1900

2000

Reconstructing Area Burned

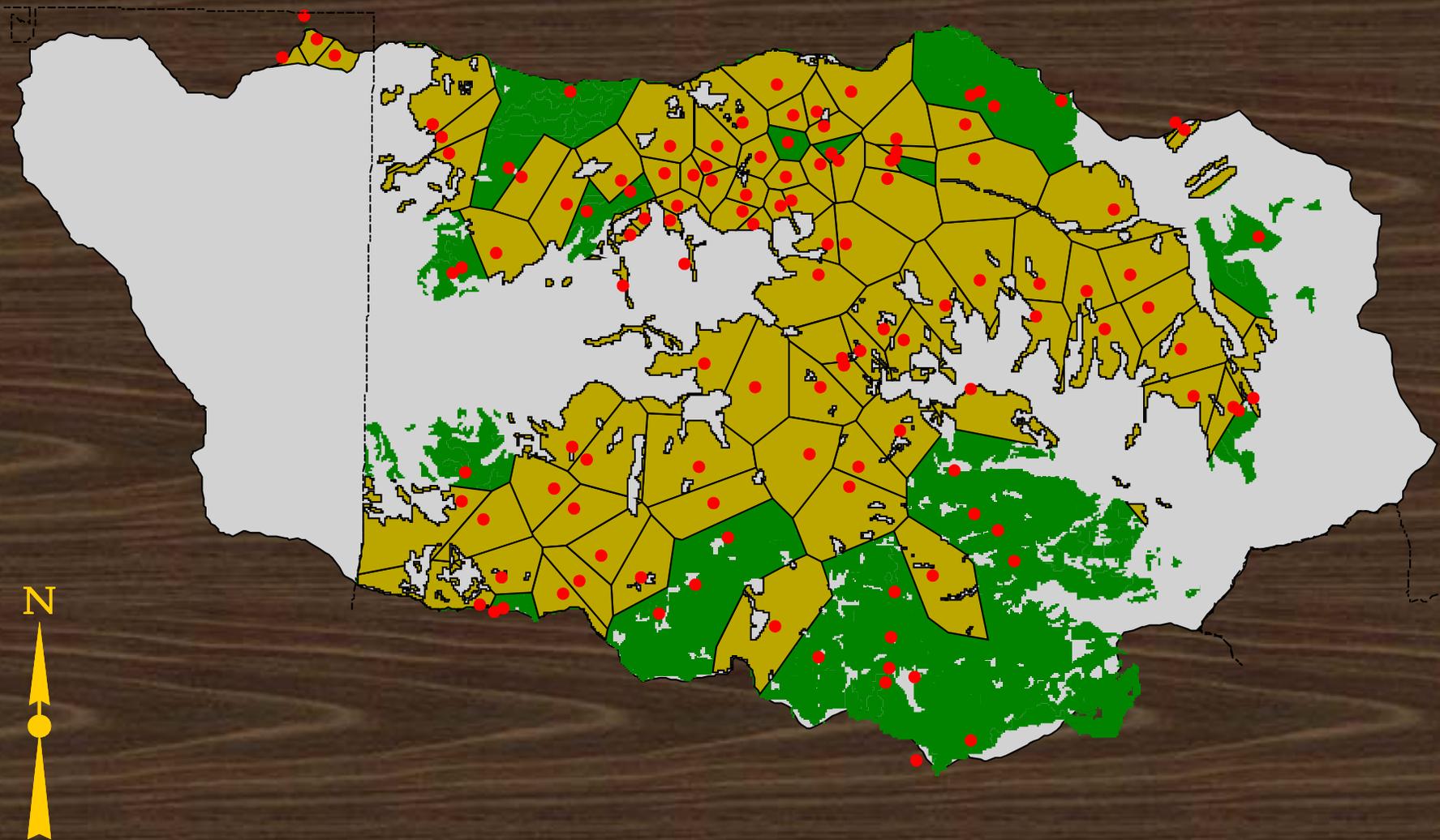
Area of Influence Polygons



Yellow dots are south aspect sites and red dots are sites located on north aspects

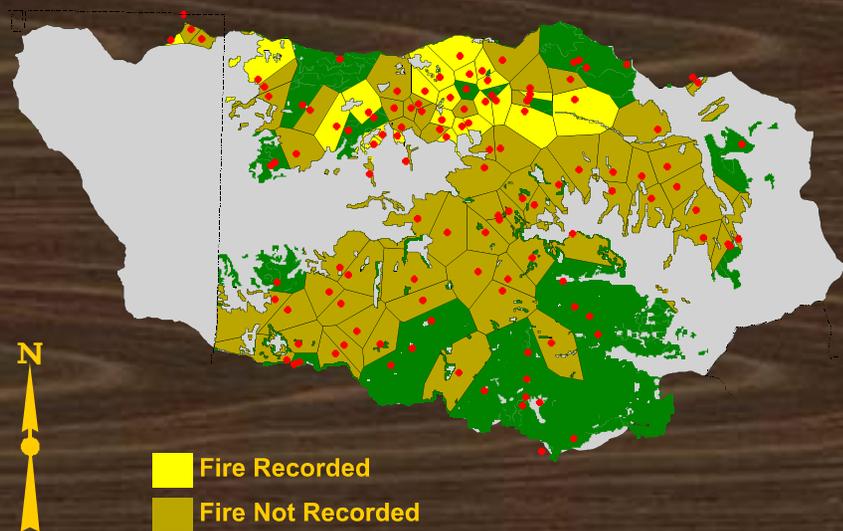
Reconstructing Area Burned

Polygons Having Dated Samples



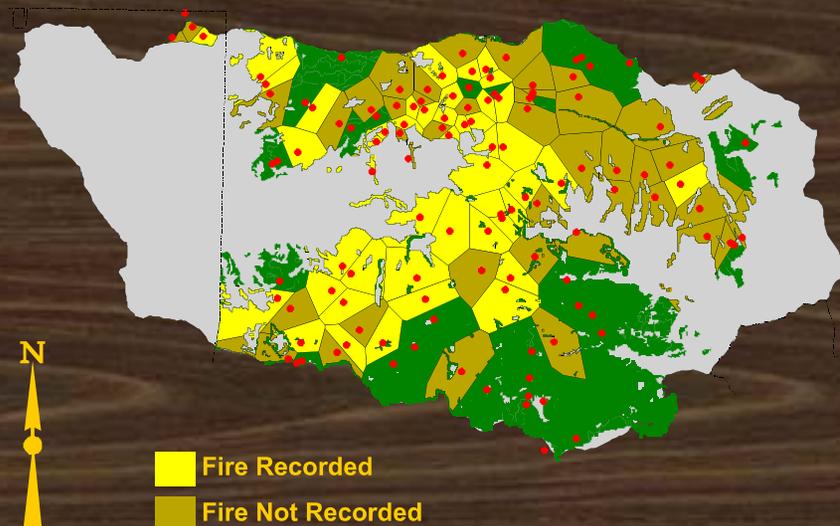
Reconstructing Patterns of Area Burned

1800



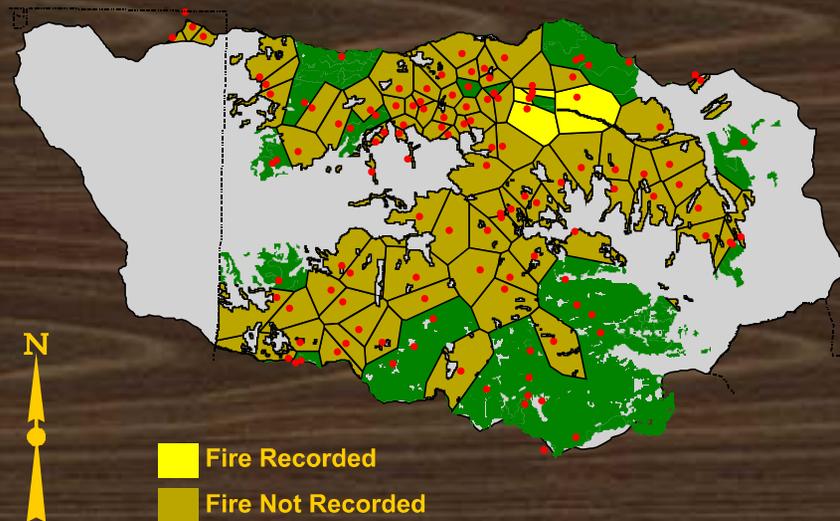
1506 ha

1829



4176 ha

1844

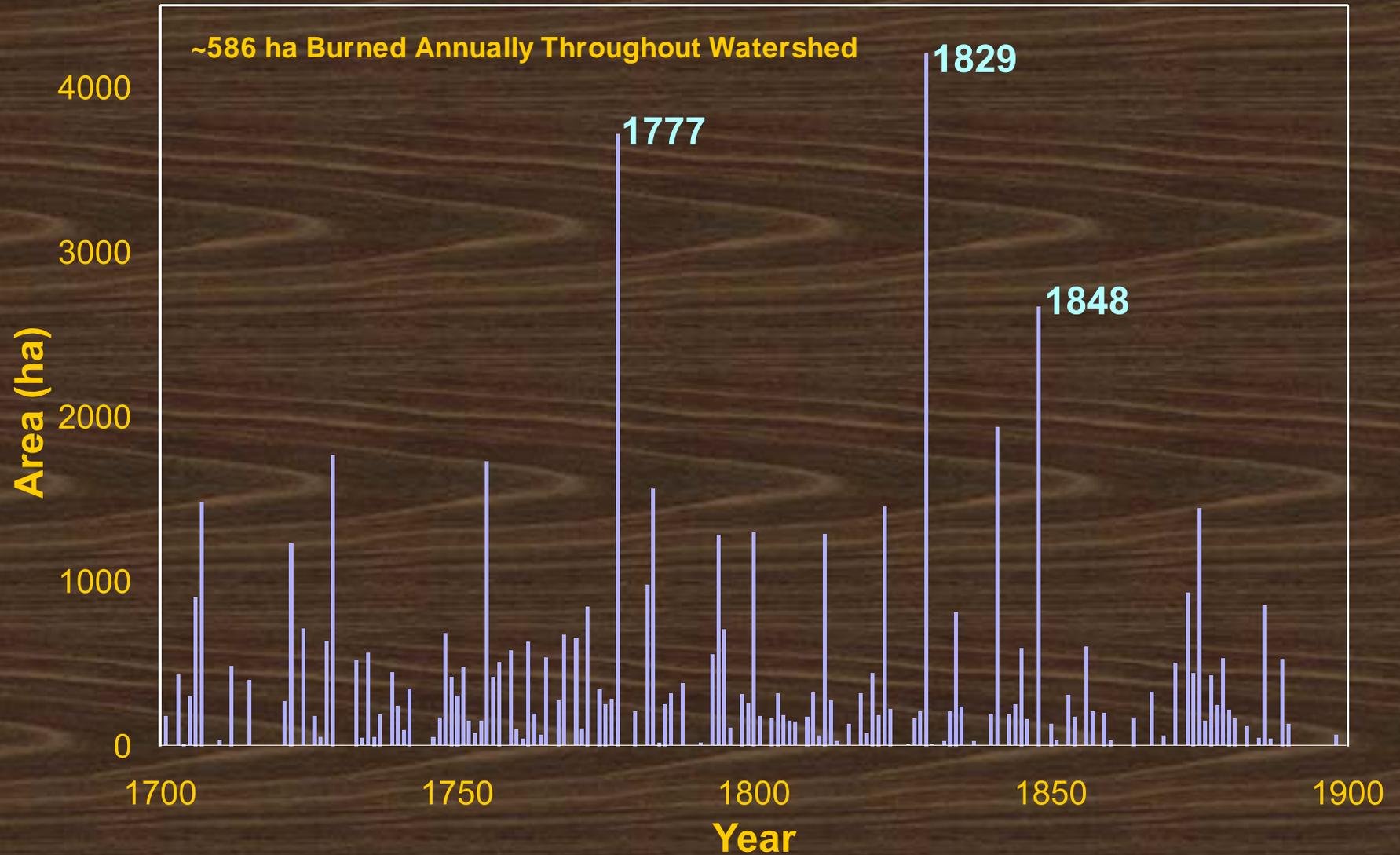


459 ha

Examples from three years, 1800=fire primarily on south aspect, 1829=fire throughout much of watershed, 1844=fire only recorded in limited area.

(From Caprio 1999)

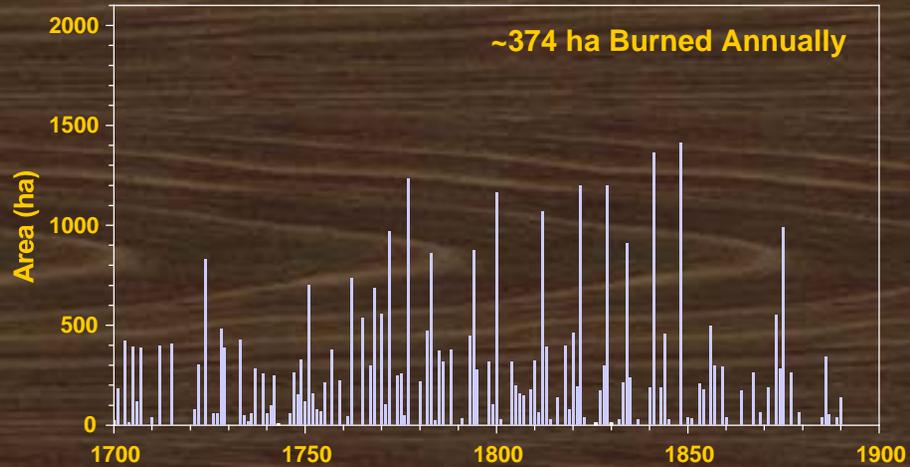
Reconstructed Estimate of Area Burned Annually Full Watershed



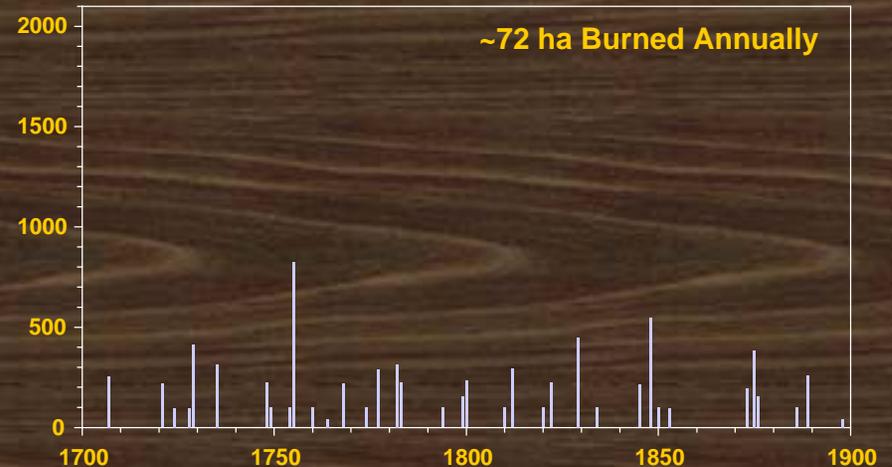
(From Caprio 1999)

Reconstructed Estimate of Area Burned by Elevation and Aspect

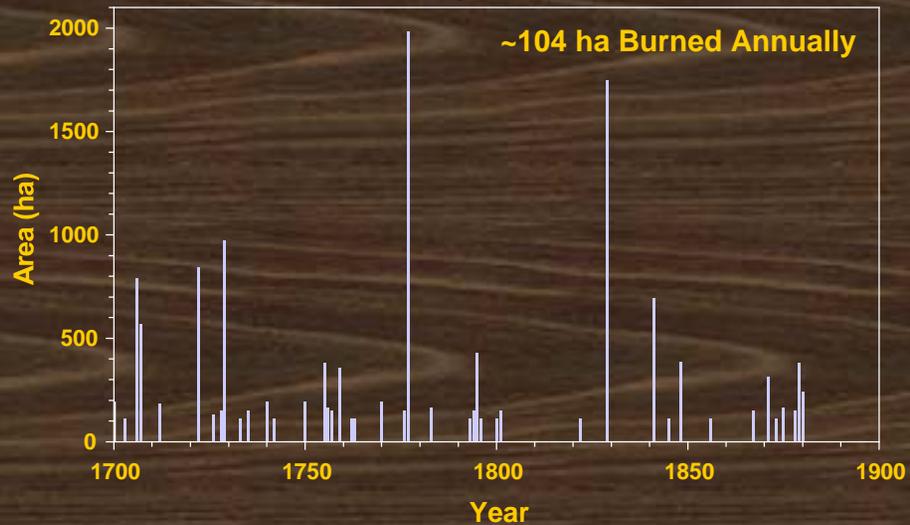
South Aspect - Low Elev.



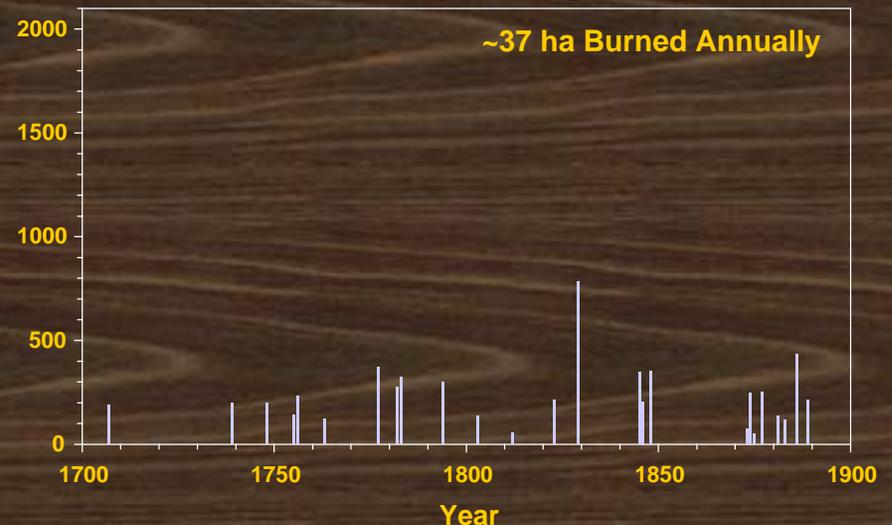
South Aspect - High Elev.



North Aspect - Low Elev.



North Aspect - High Elev.



(From Caprio 1999)

High/Low Elev. Division at 2286 m (7500 ft.)

Additional Site Locations Within Sequoia & Kings Canyon

Blue dots are sites from
Caprio & Swetnam (1995)

