



Research Brief for Resource Managers

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Fire Regimes in the “Two Californias”

Safford, H. D., and K. M. Van de Water. 2014. Using fire return interval departure (FRID) analysis to map spatial and temporal changes in fire frequency on national forest lands in California. Res. Pap. PSW-RP-266. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 59pp.

According to a recent statewide **FRID (fire return interval departure)** analysis for USFS and some NPS lands, there are two distinct California fire regimes. Over the past century there has been a fire deficit in northern California forests while southern California has experienced a fire excess (Figure 6). FRID analysis examines the extent to which 20th and 21st century fire regimes have departed from pre-Euro-American era fire regimes. It is a widely used metric for understanding the extent to which anthropogenic interference has disrupted fire regimes, altered vegetation structure and reduced biodiversity. While it has been widely appreciated that many western forests deviate in a positive direction, this analysis makes it clear that negative deviations are a major issue in some regions such as southern and central coastal California.

Although the contrasting modern regimes can be coarsely separated into northern and southern regions, the finer ecological

Management Implications:

- In one California, dominated by forests, fire return intervals (the time between two successive fires) are longer than normal and fire needs to be restored.
- In the other California, dominated by shrublands, fire occurs at high frequencies that need to be reduced.
- In both Californias, wise fire management is needed to conserve biodiversity.
- Vegetation, precipitation, elevation, temperature and management history add nuance to the general geographic patterns and managers should be cautious when using FRID analysis tools.

gradients of vegetation, elevation, precipitation, temperature and management history are also important as indicators of a location's historic fire return interval departure direction and degree.

Dr. Safford and his colleagues compared historical average fire return intervals (200-300 years before 1850) to modern ones (1908-present) across three broad regions of California (Northwest; Sierra Nevada ; and South) and found significant positive (fewer fires) and negative (more fires) departures in fire return intervals. While the forests of the

northwest and Sierra Nevada regions have missed fire cycles as a result of fire suppression, southern California has been burning more frequently, in large part because of the increase in fire starts associated with the increasing human population. Complicating the large scale pattern is the more nuanced ecological observation that increased fire frequencies for southern California are in the low elevation shrublands and areas with precipitation below 50cm per year. Southern California’s high elevation “islands” are actually similar to some of the northwest and Sierra regions in that they trend toward missed fire cycles

which contemporary fires [i.e. since 1908] are burning at frequencies similar to those that occurred prior to Euro-American settlement.” These negative and positive PFRID values were then used to assess human use and environmental gradients (geographic, climatic and vegetation) via Principle Components Analysis. Six environmental variables, along with human population densities, were then used to compare locations with negative departures to locations with positive departures via Mann-Whitney U tests. Zonal statistics were also used to compare the negative and positive departure trends along elevation, precipitation, and temperature gradients.

Figure 6 shows us the 8.1 million ha of USFS and 1.6 million ha of NPS land that received percent fire return interval departure (PFRID) values from -100 to 100. Specifically, PFRID “quantifies the extent in percentage to

While FRID analysis is quite useful for planning, the authors caution us with a good discussion of the tool’s limitations, including scalar issues, data quality issues and interpretation issues.

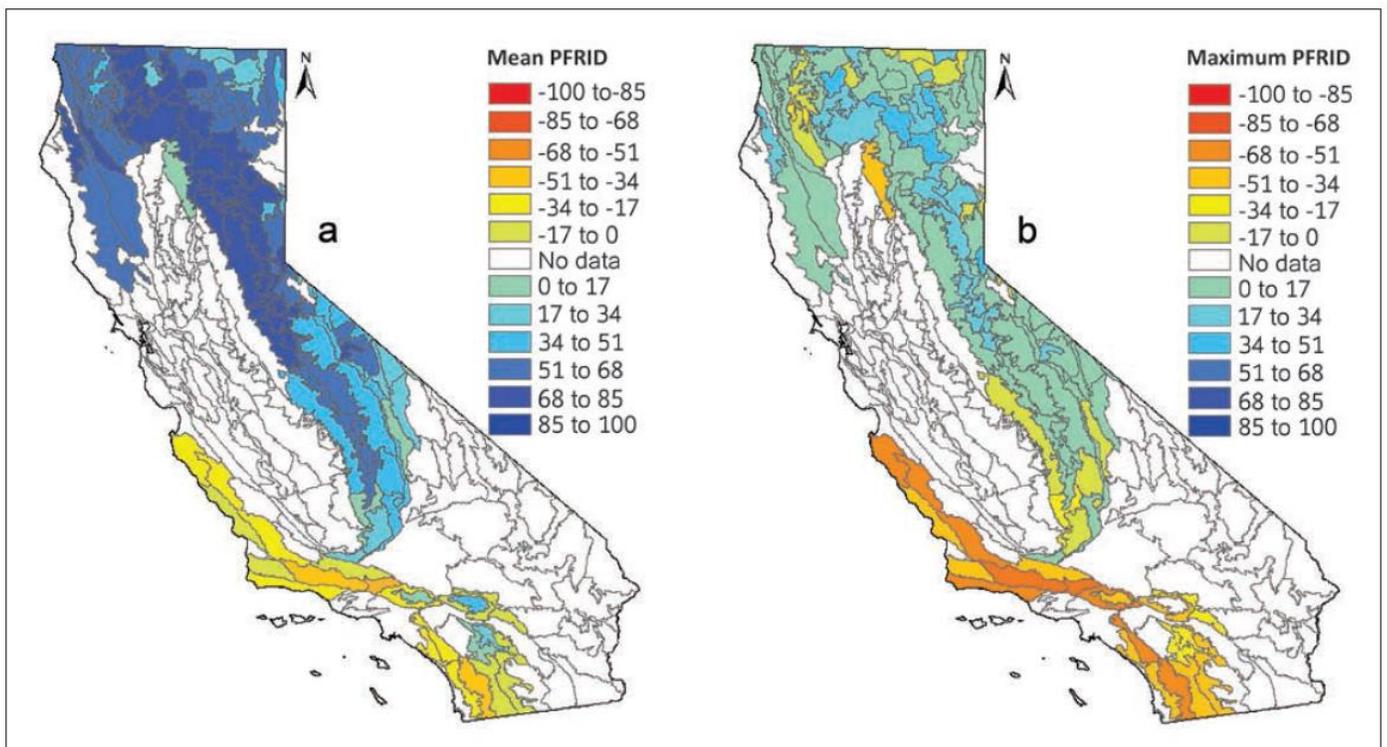


Figure 6—Mean and max percent fire return interval departure (PFRID), with the results of figure 4 extrapolated to the ecological subsection boundaries (Miles and Goudey 1997). See figure 3 for percentages of subsections analyzed; in this figure, subsections with < 5 percent analyzed land have been removed.