Southern California Fire Regime Departure Mapping
Angeles, Cleveland, Los Padres and San Bernardino National Forests
2007

Project Description: Southern California is the site of North America's most extreme wildfire conditions, but it is also home to over 20 million people, and their numbers are growing. As a result, the region is the nation's leader in wildfire-related spending, home loss, and human fatalities. The Forest Service Region 5 Ecology Program used the interagency California fire perimeter database, which contains GIS perimeters for almost all large and medium fires which have occurred in California since about 1910, to determine contemporary frequencies of burning in different vegetation types in the four Southern California National Forests. A literature review and peer-review process was used to assign consensus mean, minimum and maximum fire frequencies for the pre-Euroamerican settlement period to each of these vegetation types, and a departure index was calculated, which categorizes the difference between current fire frequencies and the presettlement estimates. The resulting maps allow us to, for example, quickly identify locations with exceedingly high fire frequencies, or to locate those places on the landscape where fire is burning more or less often than ecologically desirable. This information has multiple applications, from community and forest planning, to fire management decision support (maps like this are key parts of the fire suppression decision-making process in other Mediterranean-climate areas like South Africa), to rare species management.

Implementation Plan and Accomplishment to Date: This project was begun in 2005 and mapping and preliminary analysis completed in December, 2007. We hope to have data analysis complete and a manuscript submitted to a scientific journal by April, 2008. Our work involved GIS analysis, extensive literature review, and statistical analysis of the data, and completion of a report and manuscript summarizing our results. Our results show that lowland and highland vegetation in S. California have very different fire-related issues. In many places, lowland habitats are burning much more often than they did before Euroamerican settlement. For example, 50% of the chaparral vegetation on the S. California National Forests is currently burning >1.5 times more often per century than under our presettlement estimates of mean fire frequency, and 6% is burning >3 times more often (Figure 1). Under the latter conditions, chaparral is almost invariably replaced by weedy grassland. Big cone Douglas-fir, a conifer species of major management concern in S. California, is also subject to fire that is frequent enough to make long-term survival of the species doubtful in many places (Fig. 1). Highland habitats, where fire suppression has been successfully enforced, are often burning much *less* often than under presettlement conditions, which is leading to high levels of forest fuels accumulations, expansion of density dependent mortality among trees (due to, e.g., insects and disease), and loss of habitat for many species of plant and animal; this is the classic "western fire problem". An example is white fir-mixed conifer in Fig. 1. Fig. 2

shows the southern body of the Cleveland National Forest, and a map of current departures from presettlement mean fire frequencies. Many lowland habitats abutting housing developments are burning distressingly often; Jeffrey pine forests at higher elevations are burning at much lower frequencies than is ecologically desirable.

Work was carried out by Hugh Safford, Regional Ecologist, Pacific Southwest Region; David Schmidt, Fire Ecologist, The Nature and Conservancy and Forest Service (cost share position); Mark Borchert, Southern California Province Ecologist; Lloyd Simpson, Forest Botanist, Los Padres NF.

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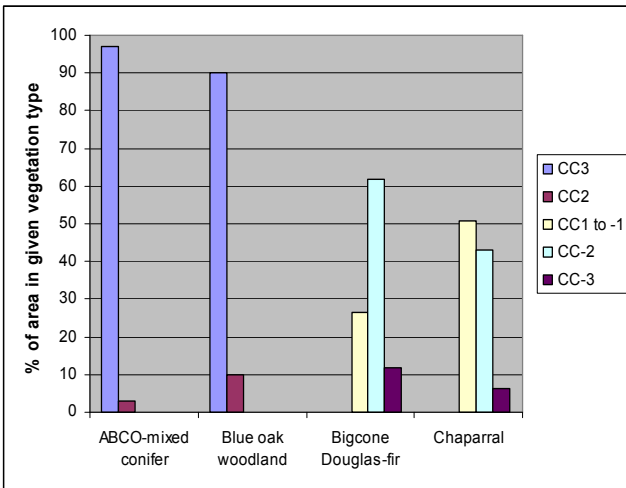

Fig. 1. Current departures from presettlement mean fire frequencies for 4 major vegetation types in S. California (National Forest lands only). "CC" = condition class. In this case, CC measures the % departure: CC3 = >67% less fire, CC2 = 33-67% less fire, CC1 to -1 = 33% less fire to 33% more fire, CC-2 = 33-67% more fire, CC-3 = >67% more fire. "ABCO" = white fir.
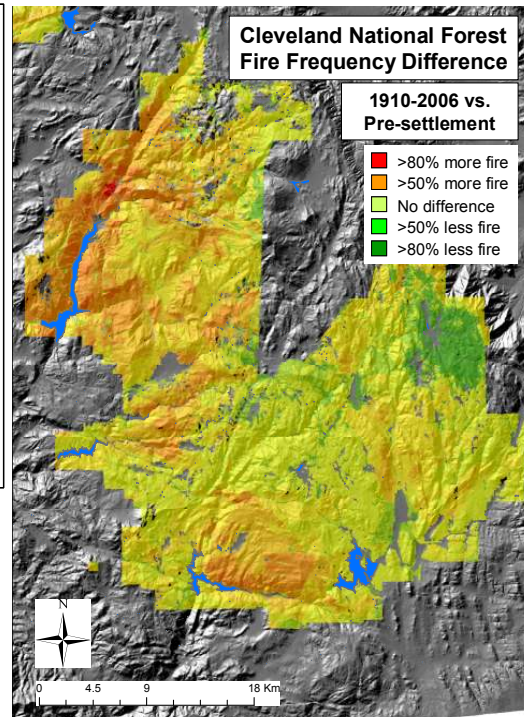

Fig 2. Cleveland National Forest, southern management unit (Descanso and Palomar Ranger Districts) and differences between current and presettlement fire frequencies. Ecologically speaking, fire is too common in lowland habitats (chaparral) in the west, and too rare in highland habitats (conifer) in the east.