

TO: San Diego Fire Recovery Network
FROM: CJ Fotheringham, Research Scientist
RE: Mitigation Strategies for Reducing Wildland Fire Risks report
DATE: 19 January, 2004

I am a doctoral candidate at University of California, Los Angeles and have been actively involved in research of fire in southern California shrublands as well as in other mediterranean climate regions of the world for the past 10 years. I have published papers in peer-reviewed scientific journals and have detailed knowledge of fire ecology and fire regimes in southern California. A number of the papers I've published specifically address issues the Board of Supervisors is currently grappling with in order to improve public safety and decrease the loss of human life and property during large fire events.

I have reviewed the "Mitigation Strategies for Reducing Wildland Fire Risks" report and find it lacking, if not outright misleading, in a number of key areas. The report is poorly researched and on the face appears heavily biased toward influencing the San Diego Board of Supervisors and Planning Department toward a decision of managing large fires in San Diego County by control burning of remote wildland areas. I have attached a more detailed review.

It is my belief, based on my own and other's extensive research, that Santa Ana driven fires are infrequent but not unnatural events. As such, I believe that a productive way of viewing the issue in regards to public safety would be addressing this in a similar context as 100 year flood events. Like 100 year floods, the probability of a Santa Ana driven fire is low at any given time but highly probable to occur at some point. A management and planning policy that focused on strategic fuel manipulations at the urban/wildland interface coupled with planning ordinances that mandated buffer zones around new communities would have the greatest success of decreasing loss of property and life during even extreme fire events.

If I can be of further assistance, please do not hesitate to contact me.

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This critique pertains to “Mitigation Strategies for Reducing Wildland Fire Risks” report submitted to The San Diego Board of Supervisors on 13 August 2003

Page 4; The Natural Fire Regime

While the historical fire regime is of academic interest, it is a debatable whether it is relevant to the issue at hand, specifically how to minimize impacts of wildland fires to human property and lives. That said, this section brings up an issue that is apparent throughout the report -the lumping of chaparral and coniferous fire regimes as one phenomena. While these two systems occur in juxtaposition to one another in San Diego County and fires spread from one to another, fire regimes and fire behavior is very different in the two systems. To adequately address the problem of protecting human life and property, management of these systems needs based on the unique characteristics of each.

For further discussion of southern California historic fire regimes :

Keeley, J.E., and C.J. Fotheringham. 2001a. *Historic fire regime in Southern California shrublands. Conservation Biology 15:1536-1548.*

Keeley, J.E., and C.J. Fotheringham. 2001b. *History and Management of crown-fire ecosystems: a summary and response. Conservation Biology 15:1561-1567.*

Conard, S. G., and D. R. Weise. 1998. *Management of fire regime, fuels, and fire effects in southern California chaparral: lessons from the past and thoughts for the future. Tall Timbers Fire Ecology Conference Proceedings 20:342-350.*

Moritz, M. A. 1997. *Analyzing extreme disturbance events: fire in the Los Padres National Forest. Ecological Applications 7:1252-1262.*

Moritz, M. A. 1999. *Controls on disturbance regime dynamics: fire in Los Padres National Forest. Ph.D. dissertation. University of California, Santa Barbara.*

Page 4; Fire Exclusion Practices

While it appears that fire suppression has been effective at eliminating fires from many western coniferous systems, there is evidence that this is not the case in chaparral. Additionally, many studies indicate that infrequent large fires were the norm long before arrival of Europeans.

In addition to the above cited literature see also:

Mensing SA, Michaelsen J, Byrne R 1999. *A 560-year record of Santa Ana fires reconstructed from charcoal deposited in the Santa Barbara Basin, California. Quaternary Research 51 (3): 295-305*

Keeley J. E. 2002. *Native American impacts on fire regimes of the California coastal ranges Journal Of Biogeography 29:303-320*

Page 5; Fire Exclusion Practices Figure 1

The graph presented contradicts earlier statements by the authors that fire suppression has been effective in San Diego County. Additionally, other reputable publications are widely available that support fire suppression has not led to fire exclusion. These studies also indicate that average fire size in San Diego County shows a significantly decreasing trend since the beginning of the century. The authors of these studies concluded that fire suppression not led to fire exclusion but also that fire suppression is absolutely necessary to minimize the impact of increased anthropogenic ignition.

Keeley, J. E., C. J. Fotheringham, M. Morais. 1999. *Reexamining fire suppression impacts on brushland fire regimes. Science 284:1829-1832.*

Page 5; Fire Exclusion Practices Figure 2

These data, while minimal, bring up some important points that should be pursued further; specifically structure loss per unit area burned is an order of magnitude greater under Santa Ana driven fires. This is an important observation for policy makers as it indicates that these extreme fire conditions are the ones that need to be addressed in order to affect the greatest decrease in loss to human life and property.

Fire	Condition	Structures lost/1000 ac burned
Laguna	Santa Ana	2
Harmony	Santa Ana	14
Viejas	Santa Ana	2
Gavilan	Santa Ana	7
La Jolla	Heat wave	0.2
Pines	Heat wave	0.7

Page 6; Weather, paragraph 1

This is a mis-statement of the findings. Brushland fire *regimes* in southern California are largely driven by the occurrence of wind driven fires. The difference is more than just a matter of semantics. What drives an individual fire is dependent on the conditions prevalent at the time—*ie* under moderate weather and terrain conditions, fuel is probably the most important factor but under high wind conditions such as Santa Anas then the impact of wind can override the importance of fuels and similarly in rugged terrain, topography may be the limiting factor to fire spread. However, the fire *regime* in southern California is dominated, in terms of both acreage burned and structure/life loss, by wind-driven (primarily Santa Ana) fires.

Page 6; Weather, paragraph 2

While fires under drought conditions can and do get large, they account for less area over all and cause less structure loss. Again, it is important to separate what plant community these fires are occurring in (See discussion above).

Page 6; Figure 3

Why was the Harmony fire not included in this table? A skeptic would think it was to balance the ratio of Santa Ana : Non-Santa Ana fires.

Page 7; Topography

Agreed topography is an important factor in determining structure loss. In addition, planning should include the direction from which a wind driven fire is likely to occur and additional precautions taken along this margin.

Page 7; Fuel, paragraph 1

See above discussion for clarification of fire vs. fire regime.

Page 7; Fuel, paragraph 2

The authors of the report are again confusing individual fires with fire regimes. Dr. Keeley has conducted research and commented on fire *regimes* not individual fires *per se*.

While Minnich and Bonnicksen speculate about the historic fire regime, neither author has offered anything that would qualify as “proof” to support their contentions of the historic fire regimes. Indeed, a number of papers have cast serious doubt both on the methodology and the conclusions of studies conducted on southern California shrubland fire regimes by above authors. In regards to studies comparing southern California to Baja California, the methodology has been criticized as there are a number of large fires recorded in Baja California that appear to be lacking from the data set used by Minnich. Also, there were no blind tests conducted to test the accuracy of fire boundary delineation. In regards to conclusions, the study attributes all purported differences in fire regimes to one

factor (fire suppression) without addressing other differences such as climate, topography, land use, etc. that also influence fire regimes.

In addition the authors of the report fail to distinguish between shrubland or coniferous fire regimes. While fuels are likely the dominant factor in fires of coniferous forests (where fire suppression policy has been effective and led to fire exclusion) there is strong evidence this is not the case in southern California shrublands and there is no indication that there is an abnormal accumulation of fuels in shrublands-see figure 1.

For further discussion see:

Keeley, J.E., and C.J. Fotheringham. 2001a. *Historic fire regime in Southern California shrublands. Conservation Biology 15:1536-1548.*

Keeley, J.E., and C.J. Fotheringham. 2001b. *History and Management of crown-fire ecosystems: a summary and response. Conservation Biology 15:1561-1567.*

Conard, S. G., and D. R. Weise. 1998. *Management of fire regime, fuels, and fire effects in southern California chaparral: lessons from the past and thoughts for the future. Tall Timbers Fire Ecology Conference Proceedings 20:342-350.*

Keeley, J.E. and C.J. Fotheringham. 2003. *Historical fire regime in southern California. Fire Management Today 631:8-9*

Keeley, J.E. and C.J. Fotheringham. 2002. *Impact of past, present, and future fire regimes on North American Mediterranean shrublands, pp. 214-258. In T.T. Veblen, W.L. Baker, G. Montenegro, and T.W. Swetnam (eds), Fire Regimes and Climatic Change in Temperate and Boreal Ecosystems of the Western Americas. Springer-Verlag, New York.*

Page 8; Fuel (cont.), paragraph 3

Again the authors of the report fail to separate coniferous forest from shrublands. While there is evidence of coniferous forests having longer fire free intervals than historically was the case there is no reliable evidence for this being the case in shrublands. In addition, increasing age of wildland fuels is contradicted by the authors own figure 1 (see comments above).

Page 8; Fuel (cont.), paragraph 4

The recent Cedar fire burned through the 10,000 Ac Viejas fire from Jan 2002. Not only was the fire able to propagate in this 1 ½ year old stand, it was able to jump 8-lanes of the freeway at Viejas grade. Clearly, under appropriate conditions chaparral of any age can burn and young age classes cannot be a reliable prevention of fire spread.

Recent studies also indicate that age is not a reliable predictor of fuel load or dead to live ratio.

For further information see:

Conard, S. G. & J. C. Regelbrugge. 1994. *On estimating fuel characteristics in California chaparral. Pages 120-129 in Proceedings of the 12th conference on fire and forest meteorology. American Meteorology Society, Boston.*

Page 8; Fuel (cont.), paragraph 5

This is a complete mis-representation of studies involving these researchers and borders on outright dishonesty

1. They did not study fuel *per se* but age class (see comments above about age as a fuel predictor)
2. They found that age was a reliable predictor of probability of burning only up to ~28 years.
3. While aware of the debate of the relative role of wind vs. fuel in chaparral fire regimes they do not address the role of wind. Their studies only addressed the probability of stands of a certain age class burning.

However, the authors of the report do not list which of the studies Schoenberg and Peng have published that they are referring to (they are not listed in the bibliography) so it is hard to be more specific than the above comments.

For Schoenberg and Peng's recent work see:

Schoenberg, F.P., Peng, R., Huang, Z., and Rundel, P. (2003). *Detection of nonlinearities in the dependence of burn area on fuel age and climatic variables in Los Angeles County, California*. *Int. J. Wildland Fire* 12(1), 1--10

Schoenberg, F.P., Peng, R., and Woods, J. (2003). *On the distribution of wildfire sizes*. *Environmetrics*, in review. Available for download at <http://web.stat.ucla.edu/~frederic/papers/firesize.pdf>

Peng, R. D., Schoenberg, F. P., Woods, J. (2003). *Multi-dimensional point process models for evaluating a wildfire hazard index*. *JASA*, in review. Available for download at <http://web.stat.ucla.edu/~frederic/papers/fireinterval.pdf>

Statements in the second half of the paragraph borders on plagiarism. Peng and Schoenberg never studied Baja California and the figure presented (with modifications? Sub-title is unclear) has been published by Minnich and Chou, 1997. The figure itself has been questioned as misleading on a number of grounds and should be viewed skeptically.

Again, the studies of Baja California vs. southern California have been heavily criticized both on the basis of their methodology and conclusions.

Page 8; Fuel (cont.), paragraph 6

There is no data presented indicating how much of what burned in these fires was 1) older age classes, 2) chaparral or coniferous forest. The fact that Santa Ana conflagrations can and do occur begs the question as to whether maintaining an age mosaic on the landscape is even possible, *ie* when large areas burn the entire footprint of the fire is effectively set back to zero and any previous (expensively obtained) age mosaic is lost across the entire area.

Additionally, the authors do not indicate where these older classes are located. Are they in chaparral or coniferous forests? Near or far from developments? Where they occur is important to making policy and management decisions. Figure 7 would seem to indicate that these older stands are largely coniferous and/or remote from high density population centers.

Page 11; San Diego Wildland-Urban Interface Fire Issues

This section of the report again indicates wind was a dominant factor in structure loss during catastrophic fires. The authors fail to acknowledge this. As indicated earlier, it appears that the greatest losses to human life in property due to fire in southern California is during Santa Ana driven fires. Not all large fires are equal and the order magnitude greater loss under Santa Ana driven fires indicate that these are the fires on which planning should focus in order to maximize the effectiveness of management funds and efforts. Therefore, it would seem that planning for these, infrequent but highly destructive, fires would be a top priority for zoning and planning boards-much in the same way that ordinances are established to cope with the possibility of a 100 year flood.

Bibliography

I'm not sure what to say about this but 'appalling' comes to mind. There is at least one fictional citation when the authors have reputable publications. Most cited articles cannot be verified due to missing information such as year and/or journal/media. The number of op-ed pieces included, which are just peoples opinions and they do not generally provide support for their arguments, is inappropriate for a document that purports to be a review of the scientific literature. Particularly in light of what wasn't, and should have been, included.

Below is a list of some papers that may be considered relevant to Southern California fire regimes and planning issues.

- Amaya, S. 1991. Discussion. Page 21 in *Memorias de la Conferencia internacional sobre el potencial de la cordillera peninsular de las Californias como reserva de la biosfera*. Centro de Investigacion Cientifica y Educacion Superior, Ensenada, Mexico.
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- Countryman, C. M. 1974. Can southern California wildland conflagrations be stopped? General technical note 7. U.S. Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, California.

- D'Antonio, C.M. 2000. Fire, plant invasions, and global changes. Pages 65-93 in H. A. Mooney and R. J. Hobbs, editors. *Invasive species in a changing world*. Island Press, Covelo, California.
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