CALIFORNIA CHAPARRAL INSTITUTE

...the voice of the chaparral

May 24, 2016

California Board of Forestry and Fire Protection
Attn: Edith Hannigan, Board Analyst
Email: VegetationTreatment@bof.ca.gov

Dear Ms. Hannigan and Members of the Board,

It is with a deep sense of disappointment to find that the current Draft Programmatic Environmental Impact Report (DPEIR) for the state's proposed Vegetation Treatment Program contains many of the same errors (some with the exact wording), contradictions, and failures to identify environmental impacts that were pointed out in previous versions.

Many of the productive suggestions provided to the Board of Forestry on how they could improve the draft DPEIR were ignored, including those from the California Legislature's required review by the California Fire Science Consortium, the Department of Fish and Wildlife, fire scientists, and environmental groups.

Potential impacts are dismissed by the DPEIR without support, mitigations of impacts are unenforceable and unmeasurable, the treatment of northern chaparral is justified by non sequitur reasoning, and the research of several scientists continues to be misrepresented (despite corrections being submitted). The lack of transparency remains a significant issue – using a local newspaper to inform the public about projects is no longer adequate.

One of the most egregious examples of the DPEIR's failure is the continued use of outdated and inadequate spatial data that provides the foundation for the entire Program. Although updated data is available from Cal Fire itself, **the DPEIR ignores this rich resource** and depends instead on questionable information from decades ago.

As a consequence, the current DPEIR fails to meet the requirements of the California Environmental Quality Act (CEQA).

The DPEIR also reveals **a significant number of inconsistencies** as the document initially references current science to only qualify or ignore it later in order to support the Program's objectives. By using contradictory statements, undefined terms, and legally inadequate mitigation processes, the document is a testament in ambiguity. It appears to be a program in search of confirming data rather than one developed from examining the actual problem.

The most concerning issue, however, relates to the failure of the document to provide a key component of a programmatic EIR - providing a more exhaustive consideration of effects and cumulative impacts than could be accomplished at the project level (14 CCR § 15168).

Instead, volumes of repetitive text are punctuated with the unsupported claim that determining impacts is impossible, pushing it off to project managers to determine with a checklist and standard project requirements that depend on subjective judgments.

How does the DPEIR justify ignoring a thorough examination of impacts as required by CEQA? The document vacillates between claiming the Program is too large and complex to analyze, or the treatment areas are too small to have an impact.

As a consequence, the current DPEIR

- fails to provide adequate support for concluding that the proposed program will not have a significant effect on the environment
- fails to provide adequate guidance to prevent significant environmental harm
- fails to adequately support Cal Fire's mission to protect life, property, and natural resources

Briefly, the reasons for these failures include:

1. Circumventing CEQA

- impacts determined to be less than significant by the "Fallacy of Authority" (our conclusions are true because we say so – no evidence provided)
- lack of detail as required within a programmatic EIR
- passing on responsibility to project managers to determine potential impacts
- inadequate mitigation measures
- Significance Criteria to determine impact to biological resources dismissed without support

2. Substandard Research

- misrepresenting cited scientific literature
- dependence on anecdotal evidence
- contradictory statements
- ignoring information in the record
- cited references missing, non sequiturs

3. Inadequate Data

- outdated fire hazard analysis model/data unsuitable for project level planning
- utilizing coarse-scale maps that cannot provide sufficient detail for competent analysis
- WUI assessments based on 26-year-old information
- dependence on maps that no longer reflect current conditions

The DPEIR also fails to properly address the impacts the Program may have on **carbon emissions and the loss of carbon sequestration** by the clearance of native habitats.

A list of **Suggested Improvements** will follow the evaluation below.

Our Hope

Having worked on the Vegetation Treatment Program since 2005, our experience with this process allows us to offer a uniquely informed evaluation of the DPEIR.

Despite addressing the same problems over and over again, after all the well-informed feedback, all the legal battles, and all the delays caused by failures to meet requirements of environmental compliance, we remain hopeful that a quality Vegetation Treatment Program will emerge in a collaborative manner.

For a quality Program to develop, however, the process must focus on **"How do we protect lives and property from wildfire?"** rather than the current priority, "How do we manage fuel?" These are different questions with very different solutions.

1. Circumventing CEQA

Failure to Determine Impacts

The lack of detail in the DPEIR is a clear violation of the California Environmental Quality Act's requirements for a programmatic EIR.

Throughout the document, the DPEIR completely ignores the necessary detail needed to determine if the Program will have significant impacts. Instead, it defers to managers at the individual project level because the Program is either too "large and complex" to consider the true environmental impacts within the DPEIR (4-116 among others), or too small because the projects average 260 acres (5-44 among others). By using the "Fallacy of Authority," the DPEIR claims without providing supporting evidence,

> *Because of the amount of acreage eligible but not receiving treatment under the VTP, the proposed Program would likely result in a less than significant cumulative effect on biological resources at the bioregional scale.* (5-27)

The DPEIR frequently follows up these claims, again without supporting evidence, with the suggestion that the Program may actually provide a net environmental gain because it may "decrease the frequency, extent, or severity of wildfire." (5-32)

Such rationales have no merit. There is a rich source of literature describing the potential impacts, both local and cumulative, of “fuel treatments” as well as the ecological benefits of high-severity fires in crown fire ecosystems. The DPEIR should adhere to the requirements of CEQA and determine the overall environmental impact of the Program, not pass the responsibility on to individual project managers via a checklist based on subjective opinions.

This failure to account for environmental impacts is troubling because it gives the impression that the DPEIR was not produced to comply with CEQA, but rather to accomplish its stated goal of streamlining the regulatory process (1-7). In fact, this is in line with the Board of Forestry’s 2010 Strategic Fire Plan which endorses efforts to "remove regulatory barriers that limit hazardous fuel reduction activities” (Fire Plan Goal #5, objective “b”).

While it may be within the rights of the Board of Forestry to lobby the legislature to change laws, CEQA is quite clear about what programmatic EIRs need to address. An EIR’s purpose is to examine environmental impacts. The Board should produce a document that does so.

As we wrote in our comment letter on the draft 2010 Fire Plan,

> “Rather than seeking ways to circumvent proper scientific oversight and efforts to insure that scarce fire management resources are used wisely and in the most effective way, the Plan should recommend inclusive community processes that embrace environmental review and invite all stakeholders. While democracy can be inconvenient and collecting information that may question a proposed project frustrating, it is the best way to create a successful fire risk reduction strategy.”

Inadequate Standard Project Requirements (SPRs)

Even if the law allowed the lead agency to pass along all the environmental impact determinations/responsibilities to local project managers, the DPEIR’s project checklist and undefined “Standard Project Requirements” (SPRs) make such a task impossible.

SPRs are essentially mitigation measures. Such measures as per CEQA must be legally adequate. The DPEIR must demonstrate with solid evidence that mitigation measures are feasible, effective, and enforceable.

- Many of the Program’s SPRs fail to provide enforceable procedures (via legally binding agreements) that will produce measurable effectiveness.
- Important terms are not defined, allowing for inconsistent implementation and unknown impacts of projects.
- Some SPRs are so vague and allow for so much subjectivity that they are meaningless.

For example, despite the fact that BIO-5 appears to provide a mechanism to reduce the impact of "fuel treatments" in old-growth chaparral (2-57), it essentially requires nothing of the project manager for the following reasons:

Only southern chaparral. Without justification, the DPEIR excludes all chaparral from BIO-5 except that which occurs in nine southern and central counties.

Old-growth chaparral undefined. The term "old-growth" is not defined, an issue that was pointed out to the Board after the previous draft. Is old-growth chaparral just outside the average fire return interval? Is it more than a century old? Is the presence of 135-year-old *Arctostaphylos glauca* individuals required? Is it different in San Diego County in comparison to Fresno County?

Median fire return interval undefined. Although the DPEIR discusses fire return intervals, there is no guidance in the SPR to assist the local manager in determining what this value happens to be. Given the fact that there is tremendous misunderstanding and resistance to accepting the latest science about this topic (Halsey and Syphard 2015), it is critical that the DPEIR addresses this issue.

Critical infrastructure/forest health undefined. The project manager may dismiss BIO-5 if a proposed project is not deemed necessary to protect "critical infrastructure" or "forest health." Neither term is defined, therefore a project can be approved that destroys valuable, old-growth chaparral because again, the DPEIR does not provide the necessary guidelines.

Projects causing significant environmental harm are not speculative. One such project occurred July 4, 2013 when Cal Fire conducted a prescribed burn in the San Felipe Valley Wildlife Area, San Diego County. The approximately 100-acre fire escaped and burned 2,781 acres, causing significant damage to an old-growth stand of rare desert chaparral in addition to other plant communities.

Cal Fire's partial justification for the project was that it would provide "indirect community protection to Julian and Shelter Valley." This justification was erroneous. Julian is 4.5 miles distant to the project location and 2,000 feet higher in elevation. Shelter Valley is 6 miles distant with extremely light, arid vegetation between it and the project. The project also violated the land management plan for the site and was out of prescription when ignited (CCI 2013).

Clear, unambiguous definitions are required to prevent this type of incident from occurring again. In addition, it would be helpful if the San Felipe escaped burn could be highlighted in a case study to help managers avoid similar situations.

Preventing type-conversion unspecified. There are no guidelines on how to prevent the type conversion of native shrublands. In fact, the concept appears to be misunderstood in the document. It is not the instant conversion of shrublands ("brush fields") to non-native grasslands ("range") as the DPEIR discusses, but is typically a

gradual process. It begins with the loss of biodiversity by the elimination of obligate seeding shrubs leading to a combination of resprouting shrubs and native sage scrub species or resprouters and alien grasses (Halsey and Syphard 2015). While still appearing to be "chaparral" to the casual observer, it is in fact a seriously compromised habitat.

Vague consultations. The purpose and outcomes of consultations with the California Department of Fish and Wildlife (CDFW) and the California Native Plant Society (CNPS) are not specified. What will happen if CNPS indicates the project will cause significant environmental harm or if it rejects the project on grounds that several 135-year-old manzanita specimens will be destroyed? Will Cal Fire cancel the project? Reduce the size? Again, since old-growth chaparral is not defined, the consultation becomes fraught with subjective opinions and uncertain impacts.

Inadequate transparency/public notification. Publishing a notice about a project workshop in "a newspaper that is circulated locally" may have been adequate public notice twenty-five-years ago, but no longer.

The need for greater transparency and communication was emphasized as important in the DPEIR. The subject was raised previously by CNPS and us in both written and oral testimony. It was also a key recommendation in the California Fire Science Consortium's Panel Review Report of the previous VTP draft (CFSC 2014) whereby,

Projects should include a general description of what is expected to be done. This should be announced at least six weeks before the project takes place. A more detailed description of the project, including project goals ***and scientifically-grounded rationale*** *as to why and how these goals will be met, should be released prior to the project implementation. The monitoring plan and its results should be made publically available when completed.*

At minimum, the above information should be posted on a website database **(emphasis ours).** *Additional outreach via newsletters, TV, radio, or events may be included.*

There are additional suggestions from the Panel Review Report concerning transparency that the DPEIR ignored that need to be incorporated into the Program.

Outcome of public workshops unknown. If people show up to such a workshop, how will the information gathered on the "potential for significant impacts" be incorporated in the project planning phase? If a group or organization provides evidence that a project has serious environmental impacts, what recourse will the public have if the evidence is ignored and the project proceeds? Considering the current DPEIR process and the time that has been required to include current science, we are not optimistic that the public's input will be seriously considered.

BIO-5 is a prime example of how the DPEIR allows the project manager to make subjective decisions that may cause significant impacts without a reasonable opportunity for mitigation or independent oversight to assist in preventing such environmental harm.

Inadequate Analysis of Significance Criteria

The entirety of Chapter 5 regarding the dismissal of cumulative impacts can be summed up with the following (parentheses/bold added) (5-41):

> *Landscape constraints, Standard Project Requirements, and Project Specific Requirements developed as a result of the Project Scale Analysis will, in the aggregate, reduce cumulative impacts to* --- **(fill in the biological resource in question)** --- *to a less than significant level as assessed at the scale of the bioregion. Reduction in the occurrence of high severity wildfire as a result of vegetation treatment technique application is expected to provide additional benefits to aquatic resources although to a degree not presently determinable.*

Without supporting evidence, Chapter 5 goes through all the possible biological resources and dismisses the possibility of significant impacts by again employing the Fallacy of Authority. The repeated claim that the Program will reduce high-severity wildfire is added here too, and again the DPEIR defers supporting evidence because it is "not presently determinable."

In summary, the DPEIR is stating that there is not enough research to determine the environmental impact of the Program. This is contrary to available information in the record.

2. Substandard Research

Another key recommendation of California Fire Science Consortium's Panel Review Report (CFSC 2014) was to, "Include additional scientific findings throughout," and that,

> *… **a sound scientific foundation** should be reflected with each vegetation management plan providing a clear rationale for the selected action. This should be done by providing additional references to support claims in the VTDPEIR and including additional scientific concepts that are relevant to the planned actions.*

The DPEIR has improved its review of the chaparral's fire regime. However, as to developing a sound scientific foundation for the plan, the DPEIR fails to do so.

Research misrepresented

There are numerous examples of scientific research being misrepresented in order to support the goals of the Program.

Northern chaparral fires are increasing (Safford and Van de Water 2014). The DPEIR claims northern chaparral is not threatened by increased fire frequencies like southern chaparral (4-113). It cites Safford and Van de Water 2014 as support. This is a fallacy of incomplete evidence ("cherry picking"). While Safford and Van de Water do indeed note this condition, they also warn that,

> ...recent trends in fire activity, burned area, and fire severity suggest that the situation is rapidly changing as climate warms and fuels continue to accumulate.

The Safford and Van de Water paper also notes that increasing fire frequencies appear to be spreading into the northern Santa Lucia Range. It is likely this trend will continue to spread northward as climate change and population growth increase the potential for ignitions in the northern part of the state.

While dismissing increasing fire threats to northern chaparral in Chapter 4, the document's Introduction presents a contradiction by emphasizing the fact that fires in northern California are indeed increasing.

> *These types of anthropogenic alterations are some of the reasons why wildfire frequency in Northern California has increased 18 percent in the period from 1970 to 2003...* (1-2)

If the Board desires the DPEIR to be a plan for the future, as the DPEIR explicitly states it is doing, it should plan for that future rather than depend on conditions of the past. It would also be helpful for the DPEIR to be internally consistent. In descriptions of the fire hazard severity zone analysis Cal Fire repeatedly states that the goal is to model fire hazard based on potential future (NOT current) conditions.

Non Sequitur. The DPEIR follows its misrepresentation of the Safford and Van de Water paper by leaping to the conclusion that fuel treatments in northern chaparral can be used for ecological purposes. This is a non sequitur. There is no scientific evidence to support such action.

The failure to correct this section is perplexing since CNPS and we offered testimony specifically discussing these errors. We wrote in our letter of October 27, 2015 (Appendix C),

> "There is NO research that supports this claim (treating northern chaparral for ecological purposes). In fact, a study just released by the Joint Fire Science

> Program indicates that there are indeed ecological trade-offs in reducing chaparral fire hazard in northern California (Wilkin, et al. 2015). Clearance of chaparral has also been recently suspected of increasing the spread of Lyme disease in vertebrates (Newman et al. 2015).
>
> The Draft EIR also appears to be assuming that climate change will not modify northern California in a way that will replicate increased fire patterns found in southern California chaparral. This is in opposition to USFS research. Safford and Van de Water (2014) suggest chaparral type conversion is spreading northward into the northern Santa Lucia Range and may likely continue to spread as climate change and population growth increase the potential for ignitions."

It is gratifying that this version of the DPEIR recognizes that every ecosystem has its own special relationship to fire. However, **the artificial truncation of northern and southern California chaparral is not based on research or ecological realities.** The DPEIR needs to correct this error and recognize that chaparral, California's most extensive plant community, can be threatened by increasing fire frequencies throughout the state. In addition, the DPEIR needs to recognize that any treatment of chaparral should be viewed as a **resource sacrifice** unless proven otherwise.

Ironically, the issue of "cumulative impacts to chaparral communities from program treatments and wildfires" is cited as an Area of Controversy in the DPEIR. As such, the topic should have been addressed in a thorough, scientific manner.

Claiming that chaparral in northern California can be treated for ecological benefit is one of the most significant errors in the DPEIR

Infrequent, large fires are the pattern (Lombardo et al. 2009). After recognizing the problems with short fire return intervals in chaparral, the DPEIR appears to hopefully suggest that science may yet find that short fire returns are not a problem by misrepresenting Lombardo et al. (2009).

> *"... chaparral does not need more fire, it needs less (Safford and Van de Water, 2014). However, new scientific information could modify that conclusion in the future as it becomes available. For example tree-ring data collected by Lombardo et al. (2009) in bigcone Douglas-fir stands surrounded by chaparral indicate that both extensive and smaller fires were present in historical time."*(4-111)

This is the exact wording used in the last version of the DPEIR. The Board consequently ignored testimony and a letter from the lead author of this paper that the DPEIR was misrepresenting the cited research (Appendix D).

The Board is ignoring information in the record in violation of CEQA.

Prescribed fire and seeds (Keeley and Fotheringham 1998). (3-18) The DPEIR incorrectly uses this paper to support the positive benefits of prescribed fire for restoration. This paper actually deals with seed germination of chaparral plant species in southern California, the very same region that the DPEIR acknowledges as being threatened by too much fire, stating correctly that, *"burning in chaparral may lead to adverse ecological results."* (4-112)

This citation is another example of the DPEIR's internal inconsistency and failure to provide a proper interpretation of literature being cited.

References inadequate for a science-based document

A significant number of references used to support statements in the DPEIR are from testimony or reports to Congress. While such references can provide overviews, many are too broad or political in nature to be of any use in developing a scientific foundation. And because such references are not peer-reviewed, there is no mechanism for determining how factual, evidence-based, or scientifically accurate they are.

McKelvey et al. 1996, a report to Congress on the forest of the Sierra Nevada, is cited out of context to support the notion that, "prescribed fire is believed to benefit the overall health of fire adapted ecosystems" (4-151). While true for some Sierra Nevada forests, this is not true for chaparral. This represents a chronic problem in the DPEIR – citing papers that are not applicable to the statement being made, but are used to support the general objectives of the Program.

Bonnickson 2003 (2-11) was testimony provided during a politically charged Congressional hearing after the 2003 fires. Much of the contents are opinion, not scientific fact.

Although used to support a statement in the DPEIR, the Bonnickson paper does not appear in the reference list. In fact, there are other papers cited but not listed in the references, or in the reference list and not cited in the text (e.g. Countryman 1972 – a speculative narrative, not scientific research). A simple editing program could resolve this problem.

Incorrect citations

The Sugihara et al. 2006 citation, an introductory chapter in a book about fire in California is used 12 times within Chapter 4. We searched for the specific DPEIR point the citation was supposed to be supporting within the Sugihara et al. work, but were unable do so in most instances. In other words, the statement the DPEIR is using the citation to support does not exist within the Sugihara et al. reference.

Using an introductory book chapter multiple times to establish a scientific foundation for the DPEIR is inappropriate. Original peer-reviewed research needs to be used and the research needs to be double checked to verify that cited references are in fact relevant to the point in question.

Anecdotal evidence

Unsupportable WUI definition. In several instances, the DPEIR depends on anecdotal, rather than scientific evidence to support its conclusions.

For example, the DPEIR claims a 1.5 mile wide WUI is necessary because this is assumed to be the approximate distance embers can be carried from the fire front (4-36). The DPEIR dismisses concerns that its definition of the Wildland Urban Interface is too large an area because Cal Fire staff overheard USFS representatives from the Cleveland National Forest talk about a 6 mile wide WUI buffer. (4-36) Casual conversations are not legitimate scientific references.

The only citation the DPEIR uses for support is the Sierra Nevada Forest Plan Amendment. (3-39) This is a serious misrepresentation. The Amendment does not provide any evidence for a 1.5 mile WUI, but rather is a management document that established an arbitrary distance to determine the number of homes/communities affected by the Plan.

Ironically, the DPEIR discounts a smaller WUI, such as the 1,000 foot version in one of the alternatives (3-39), because, "A review of the literature found no scientific basis to limiting WUI treatments to 1,000 feet."

This perspective is more appropriate for the DPEIR's 1.5 mile WUI as there is significant evidence indicating fuel treatments even beyond 300 feet (the length of a football field) are excessive for the purpose of reducing fire risk to communities (see Cohen's extensive research).

The DPEIR appendix, "Characterizing the Fire Threat to Wildland-Urban Interface Areas in California" is equally unscientific and does not provide the necessary information to properly assess the characteristics of the WUI.

For example, Figure 1 does not distinguish fuel types, slope conditions, how heat per unit area and rate of spread is estimated/modeled/calculated. The axes are not mentioned in the descriptions. Another important point omitted from this section is that flame length as an indicator of fire risk varies by vegetation type – 12 foot flame lengths in conifer forests are routine, but not in grasslands.

As a tool, Figure 1 is not useful.

Considering the expense and extensive environmental damage that can occur with fuel treatments, the Board should base the size of the WUI on available science, not arbitrary numbers (see Appendix A: Ember Behavior: Why the 1.5 mile WUI is Excessive).

3. Outdated/Inadequate Data

Ignoring Cal Fire Data

Inexplicably, **the DPEIR is based on decades old data** even though Cal Fire's GIS analysts have completed two updated fire hazard analyses since, and are now working on a third. The current document is based on products from a fire hazard analysis done in 2001-2003 which is used a wildland urban interface WUI model based on the 1990 U. S. Census. (2-17)

The U. S. Census is conducted every ten years. GIS analysts at the University of Wisconsin-Madison have produced block housing density maps and derived WUI maps serially using the 1990, 2000, and 2010 Census data. They are free to the public. Cal Fire uses these datasets as input for their new fire hazard analyses.

The DPEIR does not mention that Cal Fire has produced an updated, revised version of the 2003 fire hazard analysis in 2007 using the 2000 U. S. Census data. They issued revised fire hazard analysis maps that were reviewed and in some cases amended by local firefighting agencies in every county:
http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_zones

The DPEIR does not mention that Cal Fire updated fire hazard maps again in 2010, apparently adding some new fire history data inputs:
http://frap.cdf.ca.gov/data/assessment2010/pdfs/2.1wildfire_threat.pdf

The DPEIR does not mention that a Cal Fire webpage dated April 2016 says the agency is currently gathering updated data to do another wildfire hazard analysis:
http://cdfdata.fire.ca.gov/fire_er/fpp_planning_severehazard

There is a significant amount of information about the fire hazard analyses and planning based on them on the Cal Fire webpage. It's been there for years (most of it dates to the 2007 update). The current DPEIR ignores much of this.

Legal origins of the program:
http://cdfdata.fire.ca.gov/fire_er/fpp_planning_severehazard

Non-technical overview of the program and analysis:
http://osfm.fire.ca.gov/codedevelopment/pdf/Wildfire%20Protection/FHSZ%202007%20fact%20sheet.pdf

Discussion of methods including a flowchart of the GIS analysis:
http://osfm.fire.ca.gov/codedevelopment/pdf/Wildfire%20Protection/FHSZ%20model%20primer%20Fact%20Sheet%202007.pdf

Discussion of applying the analysis to natural resources on wildlands:
http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_zones_development

Minimal fire hazard predictability. The input data and analysis the DPEIR is based on remain woefully inadequate for project level planning.

Syphard et al. (2012) proved this point by comparing Cal Fire's 2003 final fire hazard analysis products (Fire Threat, Fire Threat People, and Communities at Risk) to actual structure loss data from 2003 and 2007 wildfires. They found that the Cal Fire fire hazard analysis had **no value in predicting the likelihood of structure loss.**

As per the California Fire Science Consortium Panel Report, the DPEIR should be informed by findings of modern fire science. But the DPEIR still proposes to base the entire Program on an old and flawed fire hazard analysis that has been proven in peer-reviewed fire science publications to have no predictive value. It is our understanding that this finding supports the professional opinion of the Cal Fire GIS staff that performed the analysis back in 2003.

Cal Fire acknowledges the limitations of the data on their Wildfire Hazard Real Estate Disclosure web page (http://frap.cdf.ca.gov/projects/hazard/hazard#VHFHSZdatalim).

> "… the map data showing VHFHSZ is out-of-date, incomplete, and reflects an inconsistent application of decision rules reflecting physical conditions contributing to hazard."

The DPEIR should not be allowed to cite an outdated analysis as a valid or credible tool for decision-making.

Cal Fire's GIS staff is very competent and should be utilized. They can provide a useful, statistically valid spatial analysis fire hazard model with good data, especially when following the best probability-based methodology as outlined in Scott (2006).

Inadequate maps. The maps provided in the DPEIR cannot provide enough information to properly assess the Program. They do not reflect data-rich research nor Cal Fire's expertise.

As in previous drafts, the DPEIR presents fuzzy, indistinct graphics reduced far beyond the point of legibility. The effective scale of these maps onscreen or printed is about 1:16

million. At 72dpi screen resolution each fuzzy indistinct pixel represents about 3.5 miles (approximately 8,000 acres) on the ground.

However, despite the extremely pixilated quality of the maps, significant contradictions can still be seen. For example, the three maps of the state in the Executive Summary and elsewhere, comparing State Responsibility Areas (SRA), Treatable Vegetation Formations, and Treatable Acres in the VTP. (E-7) The graphic appears to convey the treatable areas within SRAs, excluding some vegetation types as inappropriate to treat. And yet it is clear that the treatable areas in the third map include some areas that fall outside the SRA footprint shown in the first map.

This is not just about illegible maps, but one example of a much larger, systemic problem. The Program must be based on a solid, statistically valid technical analysis, undertaken in good faith, based on appropriately solid, modern data, and peer-reviewed fire science. CEQA requires it. The current DPEIR does not follow this standard.

Suggested Improvements to the Draft DPEIR

- Detail impacts. Examine possible direct and cumulative impacts and develop legally adequate mitigations for those impacts as required by CEQA.

- Recognize all chaparral as potentially threatened. Chaparral in the northern part of the state will likely be threatened by higher fire frequencies as the climate continues to change. There is no ecological rationale for fuel treatments in shrub dominated ecosystems in northern or southern California.

- Define terms. Define all terms utilized in the text needed to ensure consistency in use such as old growth chaparral, critical infrastructure, forest health, etc.

- Redefine WUI. Establish a reasonable distance for the WUI by using science rather than anecdotal information (see Appendix A and B).

- Use most current Cal Fire Fire hazard data. It is inadequate to utilize a fire hazard analysis done in 2000-2003 that uses a wildland urban interface (WUI) model based on the 1990 U.S. Census. The DPEIR needs to base the Program on current, scientifically verified information available from Cal Fire.

- Research support for conclusions. Conclusions in a DPEIR need to be supported by research, not by employing the Fallacy of Authority. Sweeping generalizations like the one below should not be in a science-based document.

> "*Landscape constraints, Standard Project Requirements, and Project Specific Requirements developed as a result of the Project Scale Analysis will, in the aggregate, reduce cumulative impacts to less than significant.*"

- Maintain consistency and research quality. Eliminate contradictions, errors in citations, and inconsistencies throughout the document.

- Consultation on chaparral treatments. All projects involving chaparral should be developed in consultation and in agreement with the California Native Plant Society.

- Real alternatives. Create at least one new alternative that focuses on a program that emphasizes the reduction of fire risk by using "from the house out" approach – reducing home flammability, properly maintained defensible space, community fire safe retrofits, then strategic fuel treatments within 1,000 feet if needed.

- Account for biodiversity in chaparral. Incorporate into the cumulative impact analysis how biodiversity may be impacted by the Program. See Halsey and Keeley (2016).

- Increase transparency. Develop a web-based public notification process for projects similar to the US Forest Service SOPA website. For example: http://www.fs.fed.us/sopa/forest-level.php?110502

- Plan for the future. Base project need, selection, and treatment approach, on projected climate change scenarios, not past, anecdotal experiences (Please see Appendix E: Global Warming and Future Fire Regimes).

- Proper account of carbon sequestration. Recalculate the loss of carbon to account for the loss of below ground carbon sequestration in healthy chaparral communities.

With the impacts of human-caused climate change accumulating much faster than even the most severe predictions, it is imperative that every policy we implement from here on out must honestly and exhaustively examine how such policy can facilitate the reduction of carbon in the atmosphere and the protection of what natural environment remains.

The current DPEIR fails to do so.

Regarding carbon emissions, the DPEIR uses the same response it does throughout to dodge examining significant impacts – it merely states there won't be any impacts because of unsupported assumptions.

> *While there is not a direct correlation between implementation of a vegetation treatment project and a proportionate reduction in numbers of fires or acres burned, it is reasonable to acknowledge that while the VTP program would result in emissions of GHGs as a result of prescribed fire, it would likely result in some reduction in the numbers of fires and/or burned acres from wildfires and, therefore, would avoid some emissions associated with those fires. The VTPs contribution to cumulative GHG emissions would not result in a considerable contribution to GHGs and would result in a less than significant impact.*

The DPEIR assumes all the projects will work out properly, and treated plant communities will not type convert to low carbon sequestering grasslands because of the Program's project requirements. These requirements are legally inadequate and unenforceable.

The DPEIR fails to account for the loss of underground carbon storage with the concomitant loss of above ground shrub cover in shrublands, an important carbon sink (Jenerette and Chatterjee 2012, Luo 2007). The DPEIR also fails to address the research that has shown vegetation treatments often release more carbon than wildfires (Mitchell 2015, Law et al. 2013, Meigs et al. 2009).

By using assumptions based on anecdotal evidence and focusing on the short term (such as how to reduce flame lengths, remove dead trees, or increase the number of clearance projects), the DPEIR will likely exacerbate climate impacts, increase the loss of habitat, and fail to adequately accomplish its primary goal – protecting life and property from wildfire loss.

- Reduce fire risk from the house out. As we have written many times over the past decade, the most effective way to prevent the loss of life and property from wildland fires is to work from the house out, rather than from the wildland in. In other words, focus on reducing home flammability first (ember-resistant vents, replacing flammable features, cleaning roof gutters, etc.). Properly maintained defensible space is the other important half of the fire risk reduction equation. Wildland fuel treatments (beyond the defensible space zone) offer the least effective strategy to protect communities from wildfire.

All fire science points to this. Many county fire programs support "from the house out" concept. Cal Fire promotes this strategy too, and has since at least 2007. http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_faqs#gen01

Unfortunately, DPEIR ignores these facts and focuses exclusively on vegetation management. This bias is reflected in Cal Fire's and the Board's public messages as well.

During Wildfire Awareness Week (May 1- 8, 2016), Cal Fire made 8 posts on their official Facebook page about protecting your home from fire. None mentioned the importance of home flammability. All focused on vegetation clearance.

On April 21, 2016, Cal Fire began a #ShareYourDefensibleSpace photo challenge on their Facebook page. We are submitted a photo of an ember-resistant attic vent to the contest with the suggestion to begin a companion #ShareYourFireSafeHome photo challenge to emphasize the main reasons homes actually ignite and burn down - unsafe structure design and flammable, non-vegetative materials around the home. Our photo was deleted shortly thereafter.

We resubmitted the photo and it remained online for several weeks. The Cal Fire Facebook moderator (Heather) thanked us for pointing out the importance of home

flammability. Unfortunately, it appears the original contest post and the photo entries have now been deleted.

We urge the Board to reconfigure the DPEIR so that it incorporates the entire fire risk reduction equation, not just vegetation management. Suggestions on how to do so, and examples of programs that have worked, can be found in Appendix B: An Appeal to California's Fire Agencies.

- Reassess the efficacy of remote fuel modifications. Current research makes it clear that strategic fuel modification has only helped stop fires in fire weather if fire suppression forces can quickly and safely access them. Remote, back country fuel modifications are generally not effective in stopping fires and, as a consequence, haven't generated any significant reductions in total annual area burned in southern California (Keeley et al. 2009, Syphard et al. 2011).

Global surveys concerning fuel modifications have also demonstrated that even very large amounts of strategic fuel modification are not very effective in reducing total areas burned. This research makes a compelling case that constructing and maintaining large fuel treatments is not the most effective use of fire risk reduction resources (Price et al. 2015, Price et al. 2015b).

Conclusion

As we have in the past, we urge the Board of Forestry and Cal Fire to produce a document that starts by responding to the following question, **"How do we protect lives and property from wildfire?"** instead of "How do we manage fuel?" These are two different questions resulting in two different answers.

Such a powerful approach will challenge everyone to leverage their own experiences, be willing to consider new paradigms, and honestly collaborate with others, especially with those who have different perspectives. Otherwise, we will continue practices that have brought us to this point – increased loss of homes, increased loss of habitat, and increasing levels of carbon in our atmosphere.

It was suggested to us after our testimony to the Board on August 26, 2015, that, "scientists used to believe a lot of things that we've learned were wrong. So we can't just wait around for science to find the correct answer. We need to move forward."

We do need to move forward, but we need to do so by utilizing *all the information available to us today,* not depend on outdated models, poor research, and incorrect assumptions.

Therefore, we urge the Board to prepare a revised DPEIR by addressing and incorporating the suggested improvements above.

We owe it to ourselves and future generations to get it right this time, especially because the changing climate will not be forgiving if we squander the opportunity.

Sincerely,

Richard W. Halsey
Director
The California Chaparral Institute

Attachments:
Appendix A. Ember Behavior: Why the 1.5 mile WUI is Excessive
Appendix B. An Appeal to California Fire Agencies
Appendix C. Resubmission of our letter of October 30, 2015
Appendix D. Understanding the Relationship between Fire/Chaparral - K.J. Lombardo
Appendix E. Global Warming and Future Fire Regimes

Citations

CCI. 2013. Escaped Cal Fire Prescribed Burn, San Felipe Valley Wildlife Area. The California Chaparral Institute, July 4, 2013.

CFSC. 2014. Panel Review Report of Vegetation Treatment Program Environmental Impact Report Draft. California Fire Science Consortium. 69 p.

Halsey, R.W. and J.E. Keeley. 2016. Conservation issues: California chaparral. Reference Module in Earth Systems and Environmental Sciences. Elsevier Publications, Inc.

Halsey, R.W. and A.D. Syphard. 2015. High-severity fire in chaparral: cognitive dissonance in the shrublands. In D.A. DellaSalla and C.T. Hansen (eds), The Ecological Importance of Mixed-Severity Fires, Nature's Phoenix. Elsevier Press. Pgs. 177-209

Jenerette, G.D. and A. Chatterjee. 2012. Soil metabolic pulses: water, substrate, and biological regulation. Ecology 93 (5): 959-966.

Keeley, J. E. and C. J. Fotheringham. 1998. Smoke-Induced Seed Germination in California Chaparral. *Ecology* 79.7: 2320-2336.

Keeley, J.E, H. Safford, C.J. Fotheringham, J. Franklin, and M. Moritz 2009. The 2007 Southern California wildfires: lessons in complexity. Journal of Forestry, September: 287-296.

Law, B.E., T.W. Hudiburg, and S. Luyssaert. 2013. Thinning effects on forest productivity: consequences of preserving old forests and mitigating impacts of fire and drought. Plant Ecology & Diversity 6(1): 73-85.

Lombardo, K.J., T.W. Swetnam, C.H. Baisan, and M.I. Borchert. 2009. Using bigcone Douglas-fir fire scars and tree rings to reconstruct interior chaparral fire history. Fire Ecology 5: 32-53.

Luo, H. 2007. Mature semiarid chaparral ecosystems can be a significant sink for atmospheric carbon dioxide. Global Change Biology 13: 386-396.

Meigs, G.W., D.C. Donato, J.L. Campbell, J.G. Martin, and B.E. Law. 2009. Forest fire impacts on carbon uptake, storage, and emission: the role of burn severity in the Eastern Cascades, Oregon. Ecosystems 12: 1246-1267.

Mitchell, S. 2015. Carbon dynamics of mixed- and high-severity wildfires: pyrogenic CO_2 emissions, postfire carbon balance, and succession. In D.A. DellaSalla and C.T. Hansen (eds), The Ecological Importance of Mixed-Severity Fires, Nature's Phoenix. Elsevier Press. Pgs. 290-309.

Newman, E.A., L.Eisen, R.J. Eisen, N. Fedorova, J.M. Hasty, C. Vaughn, and R.S. Lane. *Borrelia burgdorfei* sensu lato spirochetes in wild birds in northwestern California: associations with ecological factors, bird behavior and tick infestation. PLoS ONE 10 (2): e0118146. Doi:10.1371/journal.pone.0118146.

Price, O.F., J.G. Pausas, N. Govender, M.D. Flannigan, P.M. Fernandes, M.L. Brooks, and R.B. Bird G. 2015. Global patterns in fire leverage: the response of annual area burnt to previous fire. International Journal of Wildland Fire 24(3): 297-306.

Price, O.F., T.D. Penman, R.A. Bradstock, M. M. Boerand, and H. Clarke. 2015b. Biogeographical variation in the potential effectiveness of prescribed fire in south-eastern Australia. Journal of Biogeography, Vol 42 #11: 2234–2245.

Safford, H.D. and K.M. Van der Water. 2014. Using Fire Return Interval Departure (FRID) Analysis to Map Spatial and Temporal Changes in Fire Frequency on National Forest Lands in California. USDA, Forest Service. PSW-RP-266.

Scott, J.H. 2006. An analytical framework for quantifying wildland fire risk and fuel treatment benefit. USDA Forest Service Proceedings. RMRS-P-41: 169-184.

Syphard, A.D., J.E. Keeley, A. Bar Massada, T.J. Brennan, and V.C. Radeloff. 2012. Housing arragement and location determine the likelihood of housing loss due to wildfire. PLoS ONE 7(3): e33954. doi: 10.1371/journal.pone.0033954

Syphard, A.D., J.E. Keeley, and T.J. Brennan. 2011. Comparing fuel breaks across southern California national forests. Forest Ecology and Management 261: 2038-2048.

Wilkin, K.M, L.C. Ponisio, D.L. Fry, C. Tubbesing, J. Potts, S.L. Stephens. Trade-offs of Reducing Chaparral Fire Hazard. Final Report JFSP Project Number 11-1-2-12.

Appendix A

Ember Behavior: Why the 1.5 mile WUI is Excessive

The likelihood of an ember travelling 1.5 miles from a flaming front and igniting any single given house (or any other given small, discretely located type of potential receptive fuel) downwind is likely quite small. However, ignition by a single ember is usually not how most houses burn down.

If a structure lies downwind of a weather-driven wildfire, chances are excellent that a large number of shorter range embers will ignite everything that can burn between here and there, creating more embers all along the way, and allowing the head fire to blow hopscotch over, across, and through just about anything to reach that house. The collective fire spreading effect of all the embers makes the head fire's downwind progress all but unstoppable while the fire weather lasts.

Tracked in real time, the instantaneous rates of ember production and subsequent transport by turbulent, gusty winds must be very transient and highly dynamic. In general, averaged over time, it is likely most embers fall near the flaming front in a decay curve as you move further and further downwind of the instantaneous location of any flaming front. At 1.5 miles, the tail of the decay curve is likely quite small. Chances are a structure will burn when the flaming front is close and the site is under the “thicker” part of that ember distribution curve.

The rationale for fuel treatments in areas a long way upwind of a community is that they will produce some additional fire safety even if they can't stop the fire because they will reduce the density of embers falling on a structure or community. **Such a claim is conjectural at best.**

Since fires produce embers by the millions, and ignition probabilities likely approach 100% in very dry fire weather, it is not at all clear what value reducing ember density might actually have in protecting structures or helping firefighters reduce fire spread.

We are unaware of any recorded quantitative data on ember density-by-distance.

Firefighter experience and the research have shown that weather-driven wildfires tend to spread across landscapes with very little regard to fuel type, or age (Mortiz et al. 2004). This spread is mostly through a large number of separate spotting events that start a large number of new fires running out ahead of any fire's flaming front. If structures are in the way, then fire will spread up to them, go over, and around them, and then move on downwind.

Like the onset of a coming rainstorm, at a given location one might experience a single ember, then another, then two, then more and more, until the main flaming front comes through and the ember density gets heavy. Ember density will decline as the fire passes by and continues downwind.

Once there is a modest amount of defensible space around a structure to make the surface fire stop short of direct flame impingement (varies with terrain, often no more than 30ft) and to

prevent ignition by radiant heating (100ft max), and to be safe in case of potential turbulent convective heating so firefighters can feel safe enough to stay and defend (up to 150ft?), then it's all about ember ignition. Whether any given structure burns or not has everything to do with **how receptive it is to ignition by windborne embers** when that unstoppable fire comes through.

That NIST report on structure loss during the 2007 Witch Creek Fire, and much of their subsequent work, documents very clearly that lots of structures with good defensible space of up to 100 or more feet can and do get ignited by embers. Firefighters or civilians onsite defending a structure do so primarily by extinguishing spot fires on and in the structure before they can get big.

http://www.nist.gov/el/fire_research/wildland/project_wui_data.cfm

http://nvlpubs.nist.gov/nistpubs/TechnicalNotes/NIST.TN.1796.pdf

This is exactly why risk reduction must work from the “house out.” All fire science points to this. Many county fire programs support this concept as well. Cal Fire promotes the "house out" strategy too, and has since at least 2007.

http://www.fire.ca.gov/fire_prevention/fire_prevention_wildland_faqs#gen01

Unfortunately, vegetation management gets the primary focus (please see Appendix B: An Appeal to California’s Fire Agencies).

Fire agencies, firefighters, fire scientists, and environmental groups are on the same page about this. What we've been fighting about all these years are questions about the efficacy of doing anything to “fuels” beyond the home ignition zone and beyond the largest plausible defensible space buffer.

The WUI as a concept should be determined by fire operation concerns of fighting fire at the edge of town. So WUI as a concept is all about defensible space and how much of that do we need.

USFS fire scientist Jack Cohen has clearly demonstrated that about 100ft is all any structure needs to avoid ignition by radiant heating from even the hottest wildfire on flat ground with little wind. Add those factors drive heat and convection horizontally and more space will be needed.

Let’s assume for discussion that a 300 ft defensible space would be desirable for doing point protection versus long, completely sideways flames that might be expected in the very most hazardous fire terrain imaginable. Three hundred feet of defensible space would be very excessive in all but the most pathological cases of structures built in terrain where no one should be living and no firefighters should be asked to make a stand against fire.

Three hundred feet is only 5% of the way to the 8,000ft (=1.5miles) that the DPEIR currently proposes everywhere.

So the 1.5 mile definition of WUI everywhere is excessive.

Ember travel distance

As far as we know, the longest distance spotting event documented in fire literature occurred on Feb 7, 2009 ("Black Saturday") during the 2009 Victoria, Australia firestorms. Spot fire ignitions from Bunyip Park were documented at 20km (approx 12 miles).

Below are two annotated references concerning that event and another from the recent Fort McMurray Fire in Alberta, Canada.

Campbell, Peter. 2010. 2009 Victorian bushfires.
Greenlivingpedia.org
http://www.greenlivingpedia.org/2009_Victorian_bushfires

Local weather stations on "Black Saturday" 2/7/2009 recorded sustained winds of approximately 30mph blowing nonstop from the N and NW for about 12 hours during the worst of the fires. The winds reversed direction during the course of the incident, blowing from the SE. This would be quite typical for a major Santa Ana wind event in southern California. In fact, Santa Ana winds often blow even stronger than this. The duration and the reversal are also typical of Santa Ana winds.

Daily high temperature was a record-setting 46.4degC (114degF). Relative humidity was as low as 5%. This is a higher temperature than we are ever likely to see in southern California, but our relative humidity often goes lower than this (to near zero) during our worst fire weather.

The area of Victoria State, Australia, had gone for a record-setting 38 days without any rain. Southern California's seasonal drought is commonly 5-6 months.

Widespread and very long distance spotting was observed. Fire spread rates of up to 100km/hr (62 miles/hr) were observed. Fire spread through all types of land cover, including farmland, and forests where extensive fuel modification by Rx burning had been performed for fire safety. Fire officials emphasized that this fire was driven primarily by weather, not fuels.

The main fire at Bunyip Park was started by lightning. Several other fires in the area were confirmed or suspected to be arson.

Egan, Carmel and Steve Holland. 2009. Inferno terrorizes communities as it rages out of control. The Age, Feb 8, 2009.
http://www.theage.com.au/national/inferno-terrorises-communities-as-it-rages-out-of-control-20090207-80fw.html

> *The Bunyip Ridge inferno lived up to its menacing threat yesterday, bearing down on one tiny Gippsland community after another and forcing firefighters to retreat ahead of its towering fire head.*
>
> *More than 300 firefighters battled the three-kilometre-wide fire front before being forced to pull back as it made its run out of the state forest around 4pm towards the*

villages and towns of Labertouche, Tonimbuk, Longwarry, Drouin and Jindivick.

By 6pm, fanned by gale-force north-westerly winds, it had burnt 2400 hectares of forest and farmland and unknown numbers of homes and outbuildings.

Flaming embers started spot fires up to 20 kilometres to the south and threatened homes as far away as Warragul.

Ha, Tu Thanh. 2016. The perfect storm of conditions: here's how the blaze reached Fort McMurray, and why it spread so fast. The Globe and Mail. http://www.theglobeandmail.com/news/alberta/albertas-highway-of-fire/article29863650/

The fire that jumped over the Athabasca River was a spot fire, Mr. Schmitte said.

Mr. Burnett said he had seen situations where spotting enabled a forest fire to leap eight to 10 kilometres ahead of its main line.

Spot fires are also troublesome when they are near urban areas, he said, because embers ignite rooftops or rain gutters clogged with dead leaves and pine needles.

Cited Reference

Moritz, M.A., J.E. Keeley, E.A. Johnson, and A.A. Schaffner. 2004. Testing a basic assumption of shrubland fire management: Does the hazard of burning increase with the age of fuels? Frontiers in Ecology and the Environment. 2:67-72.

Appendix B

An Appeal to California's Fire Agencies

Emphasizing home flammability, as well as vegetation management, can save more homes during wildfires.

Local, state, and federal fire agencies are urged to expand their fire education efforts. Currently, the primary, and sometimes the only message citizens hear is to clear native vegetation ("brush") from around their homes. While creating defensible space is a critical component of fire risk reduction, it fails to address the main reason homes burn - embers landing on flammable materials in, on, or around the home, igniting the most dangerous concentration of fuel available, the house itself.

Fire risk reduction education must emphasize BOTH how to reduce home flammability and how to create defensible space. As seen in the photo on the next page, **many homeowners have complied with defensible space regulations only to see their homes burn in a wildfire.**

Educational materials and public announcements must make clear that without addressing the entire fire risk reduction equation, your home has a greater chance of burning in a wildfire. This includes creating defensible space AND retrofitting flammable portions of homes such as,
- the replacement of wood shake roofing and siding
- installation of ember resistant attic vents
- removal of flammable landscaping plants such as Mexican fan palms and low-growing acacia
- removal of leaf litter from gutters and roofing
- removal of flammable materials near the home such as firewood, trash cans, wood fences, etc.
- roof/under eave low-flow exterior sprinklers

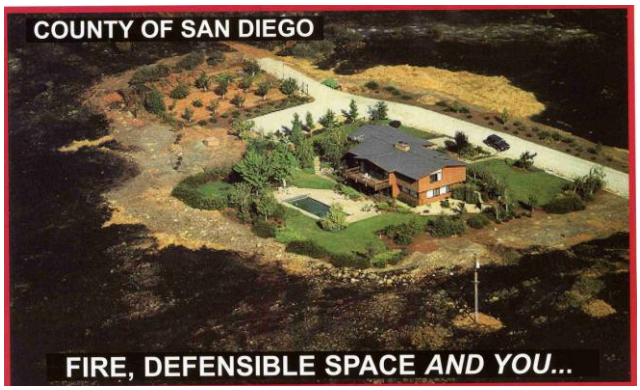
It also must be made clear to homeowners that by having well maintained and lightly irrigated vegetation within the outer 70 foot portion of the defensible space zone can play an important role in protecting the home from flying embers and radiant heat. Bare earth clearance creates a bowling alley for embers and can actually increase fire risk if invaded by flammable, non-native weeds.

We urge Cal Fire to address the full fire risk reduction equation when revising the draft of their proposed Vegetation Treatment Program.

A comprehensive approach to home protection can be found here:
http://www.californiachaparral.org/bprotectingyourhome.html

The New Message. The photo above shows a home with extensive defensible space and proper vegetation management that burned during the May 14, 2014, Poinsettia Fire in Carlsbad, California. Addressing the entire fire risk reduction equation is essential.

The Old Message. The photo to the right, distributed widely after the 2003 California firestorm, creates a false sense of security by implying that defensible space is adequate to protect a home from wildfire.



Mountain communities learning to use federal grants to eliminate wood roofs, a lead cause of home loss in wildfire

David Yegge, a fire official with the Big Bear Fire Department, is about to submit his fourth grant proposal to the FEMA pre-disaster mitigation grant program to pay up to 70% of the cost of re-roofing homes with fire-safe materials in the Big Bear area of San Bernardino County. Yegge has also assisted the towns of Idyllwild and Lake Tahoe to do the same. The grant includes the installation of non-ember intrusion attic vents.

Yegge's first grant was for $1.3 million in 2008. He identified 525 wooden-roofed homes in need of retrofits in the community of Big Bear Lake. Only 67 remain. Helping to push homeowners to take advantage of the program is a forward-thinking, "no-shake-roof" ordinance passed by the Big Bear City Council in 2008 requiring roofing retrofits of all homes by this year. San Bernardino County passed a similar ordinance in 2009 for all mountain communities. Homeowners have until next year to comply. Such "future effect clause" ordinances can be models for other local governments that have jurisdiction over high fire hazard areas. "The California Legislature should adopt such an approach and Cal Fire should incorporate such retrofit programs into its new Vegetation Treatment Program," Halsey said.

In order to qualify for the FEMA grant, a cost/benefit analysis must be completed. "Our analysis indicated that $9.68 million would be saved in property loss for every $1 million awarded in grant funds," Yegge said. "FEMA couldn't believe the numbers until they saw the research conducted by then Cal Fire Assistant Chief Ethan Foote in the 1990s. There's a 51% reduction in risk by removing wooden roofs."

"The FEMA application process is challenging, but well worth it," said Edwina Scott, Executive Director of the Idyllwild Mountain Communities Fire Safe Council. "More than 120 Idyllwild homes are now safer because of the re-roofing program."

Additional Information

The state agency that manages the grants is the California Governor's Office of Emergency Services (Cal OES), Hazard Mitigation Grants Division. Cal OES is the go between agency and they decide what grants get funded based upon priority established by the State Hazard Mitigation Plan. Without the help and assistance of Cal OES, it is not likely the FEMA grants would have be funded.

David Yegge given fire leadership award:
http://kbhr933.com/current-news/david-yegge-awarded-firewise-leadership-award/

The Mountain Area Safety Taskforce re-roofing program:
http://www.thinisin.org/shake/

The Big Bear re-roofing ordinance:
http://www.thinisin.org/home/images/stories/downloads/Ord_2008-383.pdf

The San Bernardino County re-roofing ordinance:
http://www.thinisin.org/shake/images/DOWNLOADS/ORDINANCES/ord_4059.pdf

FEMA grant program:
http://www.fema.gov/pre-disaster-mitigation-grant-program

Appendix C

Resubmission of our letter of October 30, 2015

Dear Ms. Hannigan and Board Members,

We have been contributing to the development of a new Vegetation Management Program since 2005.

While we believe the current draft being developed is a vast improvement over previous attempts, it still contains significant contradictions and scientifically unsupportable statements that compromise the achievement of our common goal: protecting life, property, and the natural environment from wildland fire.

Thank you for the opportunity to provide the following comments and recommendations.

1. Ecological Restoration/resource goals
There are very few ecological communities or resource values that can be improved with the sorts of treatments the current Draft EIR proposes, with the exception of some mid-elevation (under 7,000 feet), mixed coniferous and pine forests where fire suppression has had an impact and altered ecological conditions outside the natural range of variability. Solid scientific justification, by experts in ecology and restoration, must be required for any project purporting to further natural resource goals.

2. Acres Treated rather than need
Project justification still appears to be based more on acreage quotas rather than actual need. The Draft EIR should ensure a project justification process that starts with a clear need to reduce risks, rather than the attainment of a certain number of treated acres. The 2013 San Felipe Valley prescribed burn provides an example of why this issue needs to be clearly addressed. Not only were the justifications for the project invalid, but the ecological damage caused by the burn's escape was significant. Details on this escaped burn can be found on our website here:
http://www.californiachaparral.org/threatstochaparral/dprescribedfire.html

3. Citizen Oversight lacking within the WUI
Although the Draft EIR attempts to cover this issue with Objective #5 and indicating that the "Unit/Contract County CEQA Coordinators would seek public input and engage with stakeholders," such engagement is not spelled out other than saying the Unit will be doing it. What will the exact role be for interested stakeholders? Will they be able to see how their influence will be reflected in the final plan? After the plan is finalized, is there a mechanism that will allow stakeholders to provide additional input or object?

The Draft EIR also states that, "Each vegetation treatment project proposed would

require the preparation of a Project Scale Analysis (PSA) that would document the project's consistency with the requirements and findings of this Program EIR."

However, we could not find any opportunity for the public at large to review these PSAs unless the project falls outside the 1.5 mile wide WUI. The Draft EIR dismisses concerns that this is too large an area because Cal Fire staff heard USFS representatives on the Cleveland National Forest suggested a 6 mile wide WUI buffer (4-30). We consider this inadequate support for one of the fundamental principles that is apparently guiding the document.

The explanation as to why the 1.5 mile wide WUI is necessary is based on the approximate distance embers can be carried from the fire front (4-29). We suggest the Board refer to USFS scientist Jack Cohen's work. His conclusions do not support such a rationale.

4. Public Meetings for projects outside the WUI?
The Draft PEIR says the "project proponent" will provide a public meeting for projects outside the WUI. What role will Cal Fire play in making sure a meeting will occur, how it will be organized, and how comments made during the public meeting will be (or not) considered. The document also does not make clear how much State Responsibility Area is actually outside the 1.5 mile wide WUI that would require a public meeting. (2-46)

5. High-severity fire - all forests are not the same
One of the Draft EIR's key program objectives is to reduce the potential for high-severity fire within "appropriate vegetation types" (2-8). The document appears to mean "many forests in California" and only cites Bonnicksen's political Congressional testimony in 2003 to support this objective.

The document states,

"Coniferous forests in California have long been subject to frequent low-intensity fires, which played an important role in reducing hazardous fuels and maintaining ecosystem processes." (2-9)

The Draft EIR makes no distinctions for forest types. Presumably projects could thin lodgepole pine forests that do not have unnaturally high vegetation build-ups due to fire suppression because they have a 100 year plus natural fire return interval.

6. Contradictions concerning the chaparral fire regime
Although the Draft EIR recognizes the chaparral's natural fire regime as being characterized by infrequent, high-intensity fires, it later contradicts itself.

For example, the document first indicates that chaparral species are lost at short fire return intervals (immaturity risk), then reverses itself by stating that chaparral is resilient to short fire return intervals.

"*Over time, instances of the loss or significant reduction of species that were victims of immaturity risk began to accumulate. In addition, the study of chaparral ecosystems began to reveal that chaparral,* ***in addition to being resilient to fire at shorter intervals****, was also resilient to fire at long intervals (Sampson, 1944; Horton and Kraebel, 1955)."* (4-12)

Later in the document, after again recognizing the problems with short fire return intervals in chaparral, the document suggests that science may yet find that short fire returns are not a problem by misrepresenting Keith Lombardo's research (2009).

"... chaparral does not need more fire, it needs less (Safford and Van de Water, 2014). However, new scientific information could modify that conclusion in the future as it becomes available. For example tree-ring data collected by Lombardo et al. (2009) in bigcone Douglas-fir stands surrounded by chaparral indicate that both extensive and ***smaller fires were present in historical time****."*(4-14)

We are attaching the statement from Dr. Lombardo that we also submitted during the August, 2015 Board of Forestry meeting that makes clear his research was being misrepresented. His research does NOT suggest that short fire return intervals in chaparral were typical in historical time.

7. Erroneous Ecological Restoration treatments for northern chaparral

The Draft EIR falsely claims that chaparral in northern California is different enough from the south that the *"**ecological rationale** for fuel treatments"* can be used. (4-15)

There is NO research that supports this claim. In fact, a study just released by the Joint Fire Science Program indicates that there are indeed ecological trade-offs in reducing chaparral fire hazard in northern California (Wilkin, et al. 2015). Clearance of chaparral has also been recently suspected of increasing the spread of Lyme disease in vertebrates (Newman et al. 2015).

The Draft EIR also appears to be assuming that climate change will not modify northern California in a way that will replicate increased fire patterns found in southern California chaparral. This is in opposition to USFS research. Safford and Van de Water (2014) suggest chaparral type conversion is spreading northward into the northern Santa Lucia Range and may likely continue to spread as climate change and population growth increase the potential for ignitions.

8. Biased Case Studies/Faulty Generalization
It is critical that the Draft EIR does not ignore contrary data. The current draft does so by selecting only affirming case studies, rather than objective research, to prove a particular point.

For example, using the one-year-old prescribed burn conducted at Poppet Flats to demonstrate control of the 2006 Esperanza Fire (2-55) illustrates a failure to recognize that it is not practical to establish and maintain black ground around every vulnerable community.

The Esperanza Fire was able to be controlled at the referenced location. However, vegetation grows back, and it did in the Esperanza area, leading to the 2013 Silver Fire that re-burned a huge portion of the Esperanza scar (destroying 24 homes in the process).

Additional details concerning the 2013 reburn can be found here:
http://californiachaparral.org/wordpress1/2013/08/12/silver-fire-defies-popular-beliefs-about-wildfire/

The Draft EIR must use research that examines the entire picture and how *all the fuel treatments* impact fire spread. Anecdotal stories can lead to misleading conclusions. The following research offers a more comprehensive approach.

Home Loss
Syphard, AD, JE Keeley, A Bar Massada, TJ Brennan, VC Radeloff. 2012. Housing arragement and location determine the likelihood of housing loss due to wildfire. PLoS ONE 7(3): e33954. doi: 10.1371/journal.pone.0033954

Rather than examining a narrow set of case studies, Syphard and her coauthors gathered data on 700,000 addresses in the Santa Monica Mountains and part of San Diego County. They then mapped the structures that had burned in those areas between 2001 and 2010, a time of devastating wildfires in the region.
The authors found:
- Nearby vegetation was not a big factor in home destruction.
- Grasses that often sprout in areas cleared of native habitat like chaparral could be more of a fire hazard than the shrubs.
-Geography is most important—where is the house located and where are houses placed on the landscape.

Defensible Space
Syphard, A.D., T.J. Brennan, and J.E. Keeley. 2014. The role of defensible space for residential structure protection during wildfires. International Journal of Wildland Fire 23:1165-1175.

The authors found:
- The most effective measures to reduce structure losses are to "reduce the percentage of woody cover up to 40% immediately adjacent to the structure and to ensure that vegetation does not overhang or touch the structure."
- There is no additional structure protection provided by clearing beyond 100 feet, even on steep slopes, and the most important treatment zone is from 16-58 feet.
- The amount of cover reduced is as important as the fuel modification distance; however complete removal of cover is not necessary. The term "clearance" should be replaced with "fuel modification" to emphasize this fact.

Fuel Breaks
Syphard, A.D., J.E. Keeley, T.J. Brennan. 2011. Comparing fuel breaks across southern California national forests. Forest Ecology and Management 261: 2038-2048.

The authors found:
- A substantial number of fuel breaks are never intersected by fires.
- Firefighter access — to fuel breaks for backfires and other control measures — was the most important determinant of their effectiveness.
- Among the forests studied, only 22% to 47% of fires stopped at fuel breaks, even when firefighters could access them.

9. Green House Gases
The Draft EIR fails to establish a reasonable/accurate way to measure greenhouse gas (GHG) emissions for treatment projects. The assumption that treated sites would create less GHG emissions than if burned in a wildfire, and thus sequestering carbon (meaning projects have no impact), is questionable.

Instead, the VTP needs to use a 100 year timeline for greenhouse gas (GHG) emissions. An example in how a 100 year timeline is used follows.

- On the project impact side, the total GHG emissions are calculated from projects over a 100 year time span. To determine the impact on a site that is repeatedly treated every 10 years, the sum of the total GHG emissions for 100 years of treatments is calculated.

- On the natural impact side, GHG emissions are calculated from fires, using the calculated "natural" fire return interval, and again summed over 100 years. If there is a 50 year fire return interval for a project site, emissions are calculated as if the site burned twice in the 100 year period. The sum of the GHG emissions from the two fires is calculated.

- The two sets of emissions are compared, and the difference between them is their cumulative GHG impact.

Why sum over 100 years? Groups like the Climate Action Reserve are using 100 year contracts for carbon sequestration, so looking at carbon emissions over 100 years allows

landowners to calculate the relative effects of carbon sequestration projects and vegetation treatments on the same time scale they use for sequestration contracts. This also allows the Board to help meet the state's carbon sequestration goals.

This method provides a fairly simple standard for quantitative calculations that fits in with what the Board is starting to do with reforestation for carbon sequestration. In this way, the Board can calculate the real impacts of the VTP.

Other Points Needing Clarification

- Condition Class 3 (4-39) needs to clearly indicate it can meant either not enough fire or too much. Additionally, the fuel rank of 3 needs to be detailed out to include "too much fire."
- Climate change/carbon sequestration is only related project to emissions. It needs to reference carbon sequestration balances.
- There is no definition for old-growth chaparral. (4-16) Fifty-year-old stands and above qualify.
- There needs to be a CEQA/Federal SOPA type website that lists the proposed projects in each unit, date of any stakeholder meeting, including projects on state parks/CA Fish and Wildlife lands. (2-46)
- The WUI definition needs to be based on science, not agency opinions.
- The structure of the public meetings needs to be clarified.
- "Critical infrastructure" needs to be defined.
- Different forest types need to be recognized.
- The Draft EIR fire modeling shows fuel breaks on every ridgeline without incorporating the science that clearly shows this is not an effective strategy and causes unnecessary damage to plant communities.

What we wrote in our 2005 comment letter on the draft VTP then being considered still applies to the current draft.

> If a thorough analysis of the true costs of various fuel modification treatments is performed (one has never been done), we believe concentrating efforts directly where loss of life and property can occur will produce the greatest and most effective benefit.

We are hopeful such an analysis will also be imbedded in the current effort.

Sincerely,

Richard W. Halsey
Director

Appendix D

Understanding the Relationship between Fire and Chaparral

From Lombardo, K.J., T.W. Swetnam, C.H. Baisan, M.I. Borchert. 2009. Using bigcone Douglas-fir fire scars and tree rings to reconstruct interior chaparral fire history. Fire Ecology 5: 32-53.

Main Points

1. The southern California landscape was rich with fire from the early 1600s (and likely much earlier) to the mid 1800s. During this time we saw both localized fire events and landscape-sized events occurring. Large fires are a natural phenomenon of the southern California chaparral dominated landscape (1-3 per century).

2. By the early 1900s, many of the small fire events were absent from the record. Most of these small fires were likely the product of Native American activity. While small fires were frequent in the past, they did not effectively control or contain large events from occurring.

3. In limited cases, fire return intervals of less than 10-15 years were recorded by the same individual tree. Such short intervals, however, do not reflect what was happening on the broad landscape. The ecologic impact following those localized events is unknown. It is unlikely, however, that many of the chaparral species in those areas survived such frequent fire return intervals based on life history traits and modern day observations.

4. The presence of non-native species, such as grasses, has dramatically altered modern post-fire landscapes by quickly colonizing frequently burned areas.

Reconstructing Past Fire Regimes

Understanding the interactions between wildfire and native vegetation is critical to understanding how to manage the landscape for resource benefit. This is particularly true in our landscapes that are, or in some cases were, dominated by chaparral and coastal sage scrub species.

Fire plays a critical role in shaping these landscapes, however, while they are often referred to as “fire-dependent”, these suites of species are actually quite sensitive to fire at particular intervals. Using modern era records to understand what has occurred on our landscapes is certainly informative; however, prior to drawing any conclusions we must first acknowledge that the ecological events and processes in the modern era are heavily influenced by anthropogenic activities (e.g. grazing, logging, settlement, climate change, etc.). To eliminate some of these influences and elucidate past ecologies that may have functioned in a more natural state, we must look into the deep past.

Historical reconstruction of ecological processes and events is one of the best tools available to land managers who are interested in understanding how our systems operated

prior to advent modern day influences that have dramatically altered landscapes, species compositions and ecological processes. Present day managers can use the findings of these studies to establish natural baselines and guide restoration efforts whose aim is to re-create, as best as possible, fully functioning ecologies.

In the western United States, historic reconstructions that pre-date the 1800s, have been used extensively to establish the parameters for what is believed to be the natural operating state of the landscape. Native Americans have certainly had a degree of influence upon the American landscape for 1000s of years. We can't ignore the impact their land use and practices may have had on ecological processes and these impacts are embedded within the signals we detect in our modern day studies of the past. However, we do understand that their impacts were substantially lighter and spatially far less extensive than anything that has occurred in the past 200 years. So while we must always account for the potential impacts that these past anthropogenic practices may have played, we can examine historical records gleaned from natural data and begin to see how these landscapes may have operated with minimal human influence.

The Southern California National Forest Study

As a graduate student at the University of Arizona, I worked with Drs. Tom Swetnam and Don Falk on a reconstruction of fire histories in the southern California National Forests (Mark Borchert, a long standing USFS ecologist, was also a significant contributor to this study). The aim of our study was to document, examine and interpret the historical fire regime of the chaparral vegetation in these forest using Bigcone Douglas fir (BCDF) as a proxy species given that it is long-lived, able to withstand multiple fire events and relatively accessible in places. We only sampled stands that were completely surrounded by chaparral vegetation so that we could eliminate any influence on the BCDF fire record from fire that may have been more reflective of those originating and burning in mixed conifer stands.

In general, our results showed that fires, both big and small, were commonplace in the southern California forests from the 1600s to the mid 1800s. By the early 1900s, many of the smaller fire events were observed in the tree-ring record had ceased to exist. However, the large fire events that are familiar to many of us today, continued to occur. This was a common signal seen in Los Padres, Angeles and San Bernardino National Forests. While these results seem relatively cut and dry, detailed analysis and a clear understanding of the sampling techniques used to create tree-ring records, reveal a slightly more complicated story.

Below I have listed several distinct thoughts and interpretations that we believe are the main points to be taken from this work.

- The landscape was rich with fire from the early 1600s (and likely much earlier) to the mid 1800s. During this time we saw both localized fire events and landscape-sized events occurring. By the early 1900s, many of the small fire events were absent from the record. We believe that the absence of these types of events is due to the advent of fire suppression and the removal of Native Americans from the

landscape. Furthermore, this result signifies to us that large fires are a natural phenomenon of the southern California chaparral dominated landscape.

- While, small fires were frequent in the past, they did not effectively control or contain large events from occurring. Even in present day landscapes, wind-driven fire events (i.e. Santa Ana fires) can burn over, through and around recently burned landscapes that would be a deterrent to fires in normal weather conditions.

- We believe that the frequent fires of the past are a reflection of Native American burning practices meant as a means of landscape management and manipulation. Preliminary analysis suggests that fire frequencies reconstructed near known Native American settlements are higher than those reconstructed in areas not known to have been frequented by these peoples. However, further work needs to be done to provide a more robust understanding of the spatial and temporal patterns of Native American use of fire in this region.

- We generated mean fire return intervals (MFI) for both large and small sized fire events across all three forests. While these MFIs are often the most cited result from dendrochronology studies, they are often not used in the current context. For example, when a study cites a MFI of 10 years, in nearly all dendrochronology work, that refers to a fire of a certain size which has occurred somewhere within the sampled landscape once every ten years (on average). It does not mean that a fire occurs at the same point in a forest every ten years (on average). The ecological reality of those two situations is extremely different, especially in the case of chaparral.

- There were instances that we observed, in the tree-ring record, fires occurring at intervals of less than 10-15 years and were recorded by the same individual tree. In these limited cases, we do find that fires in southern California chaparral can occur at high frequencies. We don't know what the ecologic impact was following those events. Given what well-respected research has shown us, it is unlikely that many of the chaparral species in those areas survived the event based on life history traits and modern day observations. However, like the influence of Native Americans on fire regimes, we need to acknowledge the substantial impact the introduction of non-native species has had upon our landscapes. Prior to the mid 1800s, we lacked many of the now invasive non-native species that are abundant today. And those that were present were far more limited in their extent than in the present day. Unlike we see on the modern day landscape, when fire frequencies exceeded the ability of chaparral species to withstand closely repeated events, what followed was likely a barren landscape and not a field of aggressive, non-native species. These barren patches would slowly be colonized by native vegetation from surrounding areas or native species within the seedbank that survived the event. The ecological consequence was low, and would remain low to this day, if the suite of quick moving and ubiquitous non-native species were not present. That is certainly not the case

now and any benefits gained by short fire frequencies would quickly be negated by the advance of non-native species at the expense of native.

- Dr. Keith J. Lombardo

Global Warming and Future Fire Regimes

Jon E. Keeley, Ph.D.
U.S. Geological Survey, Western Ecological Research Center, Sequoia–Kings Canyon Field Station, 47050 Generals Highway, Three Rivers, California
and Department of Ecology and Evolutionary Biology, University of California, Los Angeles, Los Angeles, California, United States

Summary
Climate and weather have long been noted as playing key roles in promoting wildfires. Global warming is generally expected to exacerbate fire problems. After reviewing the scientific studies of fire-climate relationships, the following conclusions can be drawn. 1) Annual temperature is a crude predictor of ecosystem responses since many processes respond to specific seasonal temperature signals. For example, on landscapes where past climate signals are correlated with fire activity, winter and autumn temperatures are generally irrelevant, but spring and summer temperatures play an important role. 2) Annual fire activity in California has been strongly influenced by climate only in the mid- to higher-elevation forests. However, in lower elevations throughout the state, but most particularly in southern California, fires in shrublands and grasslands have not been strongly correlated with annual variations in temperature during any season. 3) Past fire activity has been strongly influenced by land use activities (e.g., suppression of natural fires or human ignitions) and the impacts have been radically different in the northern and southern parts of the state. These two very different landscapes need to be viewed separately when planning future fire management practices. Global warming is occurring along with a number of other global changes that may have greater influences on future fire regimes, including population growth, changes in land management policy, shifts in vegetation types, and patterns of fire ignitions. All of these factors interact in complicated ways, making future forecasts a challenge.

Current realities
Temperature has always been a key factor in wildfire danger indices, and global warming predictions are a major concern. Historical analyses have shown that the *sine qua non* of a severe fire season in California forests is dry spring weather. It is now widely recognized that this relationship between climate and fire activity has important implications for climate change impacts on fire regimes of the future. However, it is important to recognize that temperature effects are seasonally dependent. Based on historical analysis of the last 100 years of fire records, it is apparent that warmer winters or warmer autumns have had no discernible effect on fire activity, whereas spring and summer temperatures do play a pivotal role. It cannot be stressed enough that this fire-climate relationship is largely restricted to montane coniferous forest ecosystems. Lower elevations and most elevations in the lower part of the state are generally less responsive to yearly changes in temperature. These latter landscapes appear to be more strongly affected by direct anthropogenic impacts, including timing and location of ignitions.

California covers a greater latitudinal range than any other western state and, as such, comprises a huge range of climates and very diverse fire regimes. In terms of California fire issues, the recent United States Forest Service (USFS) analysis illustrates two distinct regions within the state (Figure 1). Due to the success of a century of fire-suppression policy, forests in the Sierra Nevada and the northern portion of the state have experienced far fewer fires than historically recorded. In contrast, the nonforested landscapes in the southern part of the state, although managed with the same fire suppression policy, have not experienced a deficit of burning. This is in part due the difficulty of suppressing fires in chaparral-dominated landscapes coupled with the greater numbers of human-caused ignitions in this southern region.

Scientific opportunities and challenges
Balancing fire hazard reduction and resource protection poses a major challenge in a state as diverse as California. This equation plays out very differently in northern versus southern ecosystems in the state. Most of California's forests have historically experienced frequent low-severity understory burning, and both understory herbaceous and shrubby species as well as overstory tree species are adapted to this fire regime. Managing these landscapes with frequent prescription burning has the potential for both reducing fire hazard and enhancing these resources

Research needs for forested landscapes include parsing out the effects of global warming in different seasons and developing models that equate temperature increases with expected fire activity. Because the effect of global warming may have multiple effects, including increases in the length of fire season as well as increasing fire frequency, this research can be complicated. A further complication is that as fire frequency increases, the current ecosystem may be set on a trajectory for a different vegetation type with different fire regime characteristics.

In the southern half of the state there is a need for a better understanding of other global change issues that will potentially have greater impacts than global warming. In particular, there is need for understanding how population growth and patterns of growth will impact future fire regimes, something that is particularly critical in light of the fact that human activity accounts for more than 95% of all fires. Issues in need of research are causes of ignitions and placement of prefire fuel treatments. On these southern California landscapes, humans dominate the ignitions and as ignitions have increased over the past century there has been a well-documented conversion from native shrublands to nonnative grasslands. These latter systems are much more flammable, increasing the length of the fire season and frequency of burning, which feeds back into even greater landscape conversion and resource degradation. Additional issues in need of research are ignition causes and placement of prefire fuel treatments.

Policy issues
The U.S. Geological Survey has been an active player in the development of wildland fire management policy. The Cohesive Strategy developed by federal agencies has focused on using sound scientific evidence when choosing among alternative management approaches.

On an annual basis, California wildfires are responsible for a small portion of the total acreage burned in the Western United States. However they consume the bulk of federal fire suppression dollars. This is largely due to the high population density of metropolitan areas juxtaposed with watersheds of dangerous chaparral fuels. Since the beginning of the 21st century California has averaged a loss of 1,000 homes a year from wildfires mostly in the southern half of the state.

- **Forested ecosystems.** These ecosystems have missed fires due to past fire-suppression policy (Figure 1) that has resulted in substantial increases in forest fuels threatening to change fire regimes to high-intensity crown fires. Forest restoration requires prescription burning or other fuel reduction tactics. One of the primary constraints on burning is air-quality, which applies to both allowing wildland fires to burn, as well as prescription burning. One solution to reducing surface fuels (e.g., leaves, small dead wood) and ladder fuels (e.g., young trees) could be mechanical treatments. Constraints on this approach are the greatly increased costs associated with mechanical treatments plus economic limitations to such tactics on National Park Service lands. Making these treatments pay for themselves through commercial contracts raises

serious issues about trees of value to be removed versus the impact on fire hazard. These are issues in need of serious discussion.

- **Nonforested ecosystems.** These landscapes comprise shrublands, which are the dominant plant community in southern California. Since the California State Legislature mandates a resource assessment of only timber and rangeland, these shrublands are perhaps not as well understood as is needed to assess their fire potential. On these landscapes the important global changes need to be viewed broadly to include more than climate change. Humans account for the vast majority of fires and human growth predictions are an order of magnitude greater than temperature warming in the coming decades.

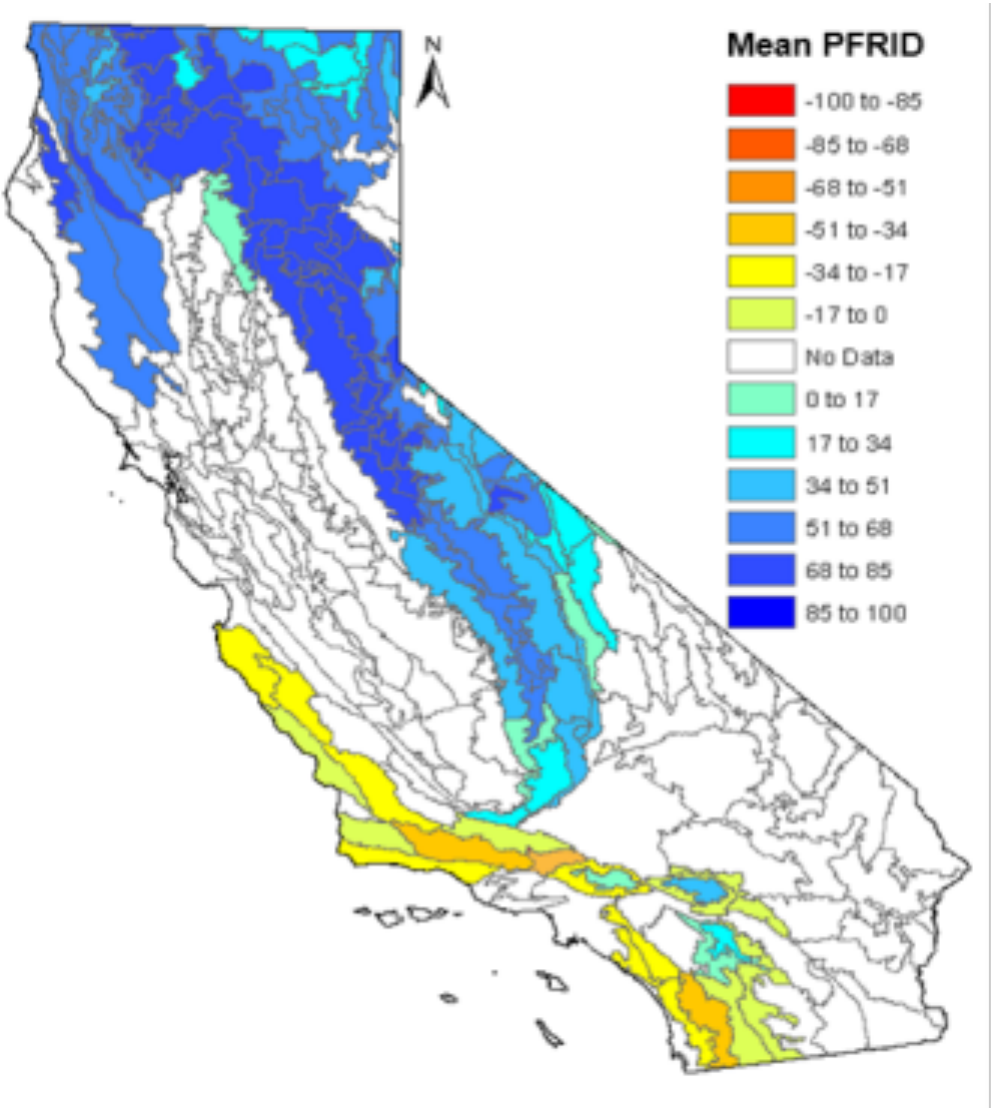
  Critical concerns do not only involve increased anthropogenic ignitions, but the spatial distribution of ignitions as well. In the south, the majority of fires that become catastrophic are ones that ignite in the interior and are driven by desert-to-ocean offshore winds known as Santa Ana winds. The more that development expands to the interior landscapes, the more likely such fires will increase in size. A closer relationship between fire management practices and land planning decisions could have positive effects.

  Throughout the western U.S. there has been an inordinate concern on landscape-level fuel treatments for handling wildfire issues. In southern California this issue is doubtful because catastrophic fires are driven more by factors such as weather than the state of the vegetation. We currently lack clear evidence that landscape-level fuel treatments change fire outcomes, particularly with respect to property losses. The model that seems to have the most support is that of fire management focused on "the house out," which describes a concern on focusing fire hazard reduction at the house and Wildland Urban Interface (WUI) zone, and decreasing emphasis as one moves out on the landscape. Particularly in these nonforested landscapes, additional research is needed to determine the appropriate strategic placement of vegetation treatments.

  Other issues that need further discussion include the state-mandated "clearance" requirements. Total clearance is not required for defensible space and thus a change in terminology may enhance communication. Recognition that embers are a major source of home ignition points to the need for more research on specific changes in maintenance required to produce fire safe conditions. The role of evergreen trees as ember catchers needs further research as well.

*** A position paper prepared for presentation at the conference on* Water and Fire: Impacts of Climate Change*, convened by the Institute on Science for Global Policy (ISGP), April 10–11, 2016, at California State University, Sacramento*

Figure 1



Fire departure map for USFS lands in California. Areas in blue indicate landscapes that, relative to historical fire regimes, have missed fires and are in need of prescription burning or other related vegetation treatments. Yellow and orange represent landscapes that, despite a century of fire suppression, have had more fire than historically was the case and 'restoring' fire is not needed (from Safford and van de waters 2014).