Date: July 21, 2021

To: Pyregence Technical Advisory Committee (TAC) and Stakeholders

From: Leroy Westerling, Workgroup #4 Lead, Pyregence Project

RE: Proposed Vegetation Management Scenarios for Long-term Wildfire Risk Projection Models

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The Pyregence Project Consortium, a collaborative group of forest and fire scientists and modelers, is in the process of developing the next generation of statistical and dynamical wildfire and landscape models to simulate potential future wildfire risks and vulnerabilities under projected climates and a range of vegetation management scenarios. The Consortium is undertaking this work through an EPIC grant (EPC-18-026) from the California Energy Commission and is tasked with producing these models for use in California's 5th Climate Change Assessment and other wildfire-related strategic planning efforts.

This memo is a follow-up to a previous request for information from March 2021 regarding the development of future vegetation management scenarios that are to be integrated into the long-term wildfire risk modeling framework. Below, we have characterized aspects of two scenarios ('high ambition' vs 'business-as-usual') and seek your acceptance and/or feedback in their refinement.

If you would like to **provide feedback** on the scenarios described below, we request it **by close of business on August 6, 2021.** Please submit your feedback and/or clarifying questions related to the scenarios to Charles Maxwell (cmaxwell@sig-gis.com), Leroy Westerling (lwesterling@ucmerced.edu), and/or Shane Romsos (sromsos@sig-gis.com).

Introduction

We developed two vegetation management scenarios to assess the potential effectiveness of a '***highly ambition***' forest health treatment regime (one million acres treated per year), consistent with 2021 California policy, versus management regime associated with '**business-as-usual'** forest health treatments (approximately 440,000 acres treated per year) consistent with 2010-2019 reported treatments within the State. This memo includes definitions, assumptions, and results as applied under both scenarios to different forest management zones in California.

Definitions

WUI Interface - housing is adjacent to wildland vegetation, mechanical and manual treatments are possible. WUI Interface zones are found throughout the state and are adjacent to state and federal managed lands.

WUI Intermix - housing and wildland vegetation intermix, with mechanical and manual treatments possible. WUI Intermix zones are found throughout the state and are adjacent to state and federal managed lands.

Mechanical treatments – are available on slopes less than 30%, and for the sake of modeling any area under the slope requirement considered accessible. This is inclusive of activities like mastication, tractor logging, chipping, crushing, and piling. Trees up to 24" dbh in size are removed using mechanical treatments.

Manual treatments – are available on all slopes, prioritized on slopes greater than 30 percent, generally inclusive of hand piling, lop and scattering. Trees up to 11" dbh are removed.

Ecological harvest methods – are available on slopes less than 30 percent, with no accessibility constraints. Limited to specific state and federal management areas. Trees up to 30" dbh are eligible for harvest.

State responsibility area (SRA) – are areas where California is responsible for fire suppression, inclusive of state-managed, non-industrial private, local, and federal lands.

State-managed lands - are lands owned and managed by California, also included fully within SRA.

Vegetation Management/Treatment Scenarios

High Ambition Treatment Scenario

This scenario models forest treatments to meet the one million acres treated per year goal found in the 2021 California Wildfire and Forest Resilience Action Plan and prioritizes reducing fuels (i.e., through treatments) in areas classified as 'high' and 'extremely high' fire hazard risk zones (Figure 1). The high rate of treatment in this scenario allows some, but not all, of the management areas to be completely treated within a 15-year timespan. Areas that are only able to be treated manually will not be fully treated within a 15-year time frame (except that state-owned lands will be completely treated). Federal lands eligible for mechanical treatments would be treated within that timeframe, while areas requiring manual treatment would not. At a treatment rate of 111,000 acres per year for WUI Interface lands in State Responsibility Areas, all acres would be treated within 18 years. For accessible WUI Intermix lands, mechanical treatments would allow all eligible areas to be treated within 20 years. However, for WUI Intermix lands that are only eligible for manual treatment, only 28 percent of the extremely high hazard areas would be treated in 15 years. Treatable areas exclude areas that are inaccessible due to special jurisdictional/administration designation (e.g., wilderness, national monuments, etc.) and natural features (e.g., high slope). Table 1 provides a summary of all forested acres and annual treatment acres by management zone under this scenario.

Assumptions

The major assumptions to prioritize treatments include:

1. Treatment of the WUI Interface takes precedence over WUI Intermix at a 60%/40% split.

2. This Interface to Intermix precedence would result in a 70%/30% split between mechanical treatment over manual treatment[1].
3. Timber harvesting on private lands will count towards the acreage target of treatments on private lands.
4. Prescribed fires can occur on any slope class and harvestable areas occur only where mechanical treatment is possible (areas with slopes less than 30%).
5. For State and federally-managed lands, harvesting will be based on ecological harvest methods which would leave a high residual of remaining basal area and standing snags.
6. For Private lands, harvesting will be consistent with current practices.
7. Any areas with a protected status—such as roadless areas, PACs, wilderness, national monuments, etc. (totaling 40 percent of acres considered)—would not be treated by mechanical or manual means.
8. High fire suppression effort would be emphasized everywhere except in roadless and wilderness areas where fire would serve as a restoration action.
9. Corporations would be responsible for reducing the fire risk on their lands; corporately-held lands would harvest at business-as-usual rates of a 36-year return interval.
10. For family-owned forests, the continuation of present harvest rates would indicate a 200+ year return interval.
11. For transmission infrastructure, investor-owned utilities would perform significant additional vegetation control around their respective transmission infrastructure up to 175 ft from transmission lines (totaling a 350 ft buffer, centered on transmission poles), following Liberty CalPeco and the California Tahoe Conservatory's Powerline Resilience Corridor Strategy.

Treatment Schedule

The vegetation treatments would follow CalFire's fire hazard ranking order where areas mapped as 'extremely high' hazard would be treated first, descending through 'high,' 'moderate,' and eventually any 'low'-risk areas if time and resources permit.

Retreatment would occur on a 15-year rotation for WUI areas (both Interface and Intermix) and State managed areas.

After 15 years, for federally managed lands, prescribed fire would supplant mechanical and manual treatments at a rate of 50% to maintain the "treated" status, such that annual treatments would be 335,000 acres of prescribed fire, 190,000 acres of mechanical treatments, and 72,500 acres of manual treatments.

Results

Using the described schema:

- At a rate of 111,000 acres treated per year for the WUI Interface zone, all areas in State Responsibility Areas would be treated within 18 years, regardless of fire risk level.
- At a rate of 51,800 acres treated per year for the WUI Intermix areas that allowed for mechanical treatment, all eligible areas would be treated within 20 years.

[1] This assumption would mean that of the total acres allotted to WUI treatments, there would be 300,000 * 40% * 70% = 84,000 of mechanical treatments in the WUI Intermix (where slopes are less than 30%).

- At a rate of 22,200 acres treated per year for the WUI Intermix areas only eligible for manual treatment, only 28% of the extremely high hazard area would be treated after 15 years, leaving a potential shortfall of over 840,000 acres.

At the proposed rate of treatment of 50,000 acres per year, all State Park lands, excluding protected areas, could be treated within 15 years, potentially allowing for treatment of 500,000 acres of lands under local or tribal management in the same timeframe.

For federally managed lands, while all of the eligible mechanically treatable areas could be treated within 15 years at a rate of 380,000 acres per year, lands receiving manual treatment at a rate of 145,000 acres per year for 15 years would leave close to four million acres untreated. Because most of the funding is coming from the State of California, it is assumed that treatments on federal land would follow SRA risk prioritization. Using this approach, the rate of treatment would be sufficient to treat all the lands in the elevated hazard risk areas and could feasibly be distributed differently depending on annual priorities.

For corporate and family-owned forest lands treated at a rate of 115,000 acres per year (95,000 corporate, 20,000 family), a substantial deficit of nearly four million acres would remain after 15 years. Based on a treatment rate of 10,000 acres per year around transmission lines, it would take almost 30 years for all the areas in the elevated fire risk classes to be treated, or 16 years for the high and very high-risk areas to be treated. Increasing the treatment rate to 30,000 acres per year allows for a retreatment interval of 10 years.

Business-As-Usual (Low Ambition) Treatment Scenario

This scenario represents an attempt to perpetuate the vegetation management/treatment approach from the previous decade (2010-2019). As such, the total average annual treatment rate across the state is approximately 440,000 acres per year, or 55% less activity than the high ambition scenario. Treatment levels are based on completed activities reported by departments and agencies and averaged across the decade. Rather than specifically targeting areas of the landscape, treatments are opportunistic and scattered across the landscape. High fire suppression efforts will be applied across the entire landscape. All the assumptions from the high ambition scenario apply to this scenario as well. Table 1 provides a summary of all forested acres and annual treatment acres by management zone under this scenario and is compared to the high ambition scenario.

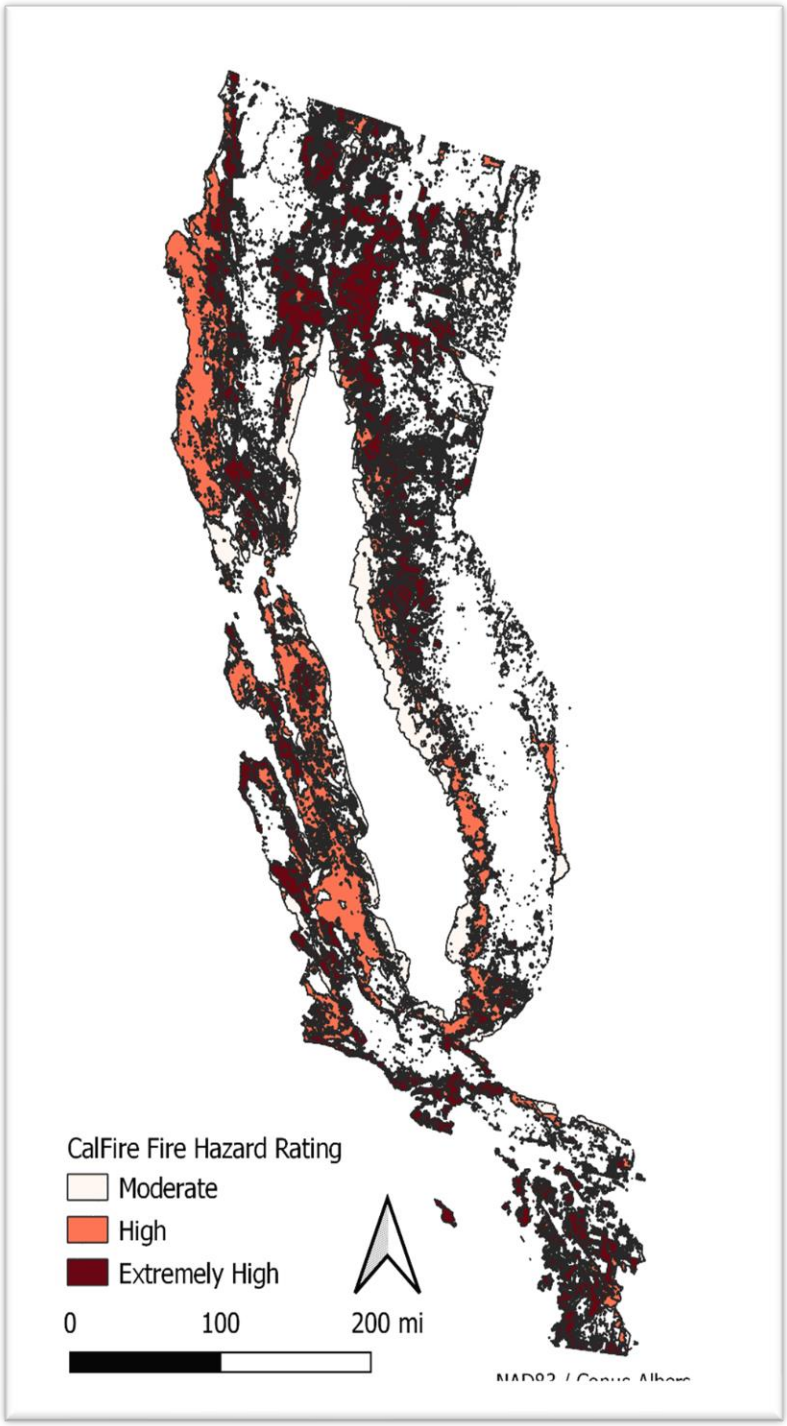


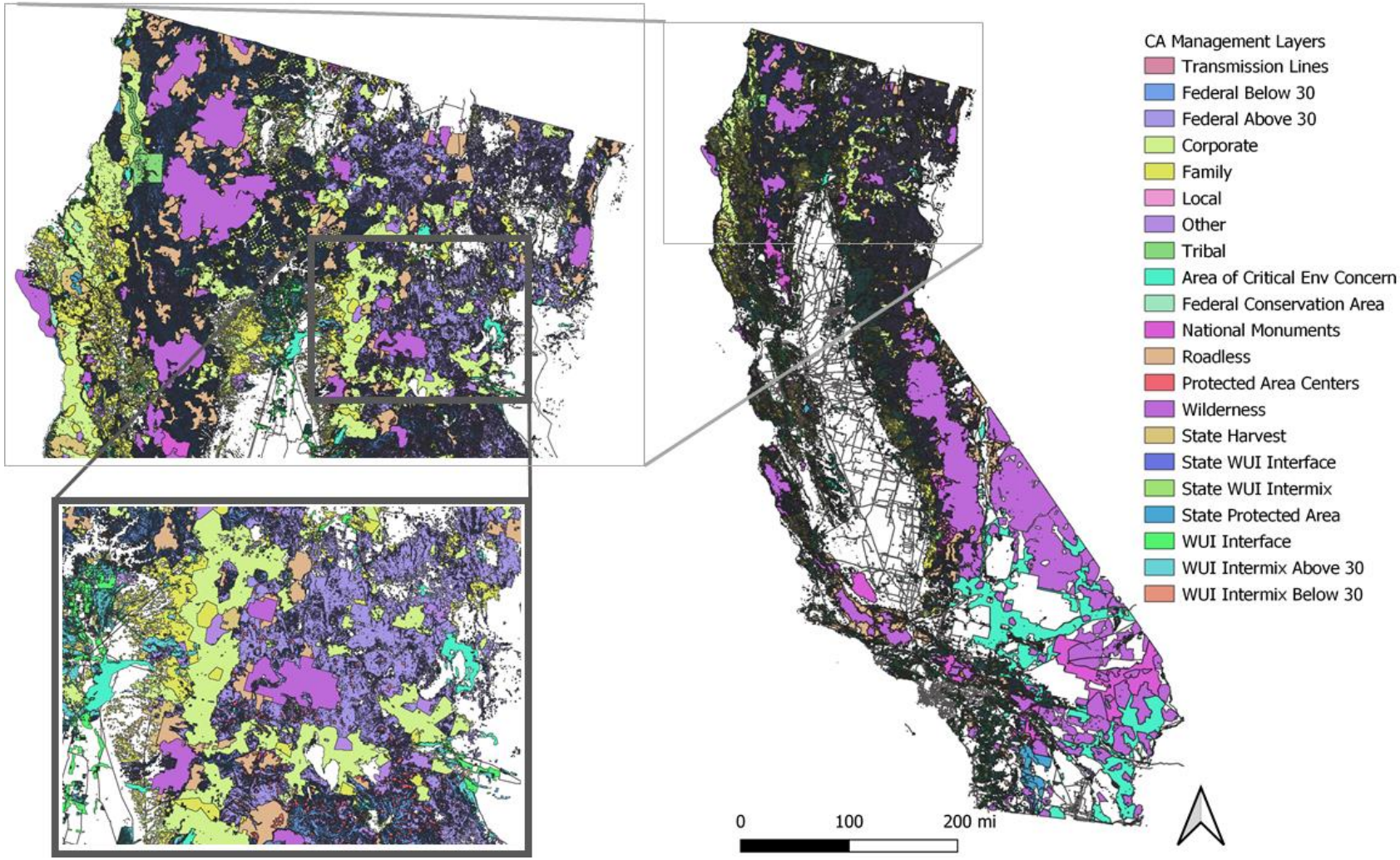
Figure 1. Map of CalFIRE's Fire Hazard Severity Rating. This map is inclusive of all acres delineated in Table 1.

Table 1. *Summary of management zone by fire hazard severity class (Figure 1), and targets for acres of vegetation treatment achieved under both scenarios. Note that the "State Prescribed Fire" zone is inclusive of State Harvest Eligible, State WUI Interface and State WUI Intermix.*

		CalFire Fire Risk Severity Classes			Scenario assumed percent allocation for WUI zones		Scenarios - Acres Treated per Year	
Management Zone	Total	Moderate	High	Very High	Allocation	Sub-allocation	High Ambition	BAU
WILD/URBAN AREAS								
WUI Interface	1,949,231	152,102	85,962	128,551	60%		111,000	57,000
WUI Intermix Slope Above 30%	3,416,728	749,110	758,526	1,173,885	40%	30%	22,000	11,400
WUI Intermix Slope Below 30%	1,042,384	103,391	249,976	453,450		70%	51,800	26,000
STATE MANAGED								
State Harvest Eligible	778,196	40,631	399,658	241,427			2,000	2,000
State WUI Interface	13,119	293	220	37	25%		13,119	6,250
State WUI Intermix	85,415	2,047	4,627	1,149	75%		36,881	18,750
State Prescribed Fire Assumes that Rx can be applied on any of the other State owned zones	876,729	42,971	404,504	242,613			50,000	20,000
OTHER OWNERSHIPS								
Corporate	3,466,899	137,679	1,051,836	2,138,617			95,000	95,000
Family	4,068,454	541,333	1,709,092	1,646,432			20,000	20,000
Local	210,431	29,385	100,223	65,506				
Other	383,006	21,858	118,188	223,570				
Tribal	227,151	6,637	19,002	41,866				
FEDERAL MANAGED								
Fed Below 30	5,548,680	162,291	304,133	1,074,333	70%		380,000	87,070
Fed Harvest Eligible Assumes harvest can only occur on slopes below 30%	5,548,680						40,000	29,000
Fed Prescribed Fire	5,548,680	162,291	304,133	1,074,333			75,000	24,100

		CalFire Fire Risk Severity Classes			Scenario assumed percent allocation for WUI zones		Scenarios - Acres Treated per Year	
Management Zone	Total	Moderate	High	Very High	Allocation	Sub-allocation	High Ambition	BAU
Assumes that Rx fires can be applied on any slope								
Fed Above 30	5,710,213	36,762	188,122	894,358	30%		145,000	37,316
UTILITIES								
Transmission Lines	939,983	139,330	83,095	73,700			30,000	10,000
PROTECTED AREAS								
State Protected Area	587,204	55,549	174,640	197,700			NA	NA
Areas of Critical Environmental Concern	2,139,361	61,820	60,968	52,915			NA	NA
Fed Conservation Areas	131,404	520	2,269	296			NA	NA
National Monuments	1,866,727	44,063	43,287	96,318			NA	NA
Protected Area Centers	422,107	0	1	719			NA	NA
Roadless	4,414,251	516	536	3,685			NA	NA
Wilderness	6,947,567	12,229	23,468	98,870			NA	NA
Total Acres	39,512,152	7,939,884	10,633,345	12,532,681			1,072,000	443,486

Figure 2. *Map of derived management areas in California inclusive of all landscape types except for urban areas, agricultural lands and deserts in private ownership. Zoomed areas indicate the variability of forested landscapes throughout the state in terms of jurisdictional management, accessibility and ecosystem type.*



Sources:

CalFIRE Fire Hazard Severity Zones Maps <https://osfm.fire.ca.gov/divisions/wildfire-planning-engineering/wildland-hazards-building-codes/fire-hazard-severity-zones-maps/>

Electric Transmission Lines – California Energy Commission <https://apps.wildlife.ca.gov/bios/?al=ds1198>

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