3 SUMMARY OF ALTERNATIVES

Contents

The California Environmental Quality Act (CEQA) Guidelines (State CEQA Guidelines) Section 15126.6[a] requires an Environmental Impact Report (EIR) to "describe a range of reasonable alternatives to the project, ... [that] would feasibly attain most of the basic project objectives but would avoid or substantially lessen any of the significant effects, and evaluate the comparative merits of the alternatives." The purpose of the alternatives analysis is to determine whether or not an alternative to the proposed Program would feasibly reduce or eliminate significant project impacts, while still attaining the basic objectives of the project.

The range of alternatives studied in an EIR is governed by the "rule of reason," requiring evaluation of only those alternatives "necessary to permit a reasoned choice" (State CEQA Guidelines Section 15126.6[f]). Further, an agency "need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative" (State CEQA Guidelines Section 15126.6[f][3]). The analysis should focus on alternatives that are feasible (i.e., that may be accomplished in a successful manner within a reasonable period of time, taking economic, environmental, social, and technological factors into account). Alternatives that are remote or speculative or that do not feasibly meet most of the project objectives need not be discussed. Furthermore, the alternatives analyzed for a project should focus on reducing or avoiding significant environmental impacts associated with the project, as proposed. The CEQA Guidelines provide the following direction for analysis of the alternatives:

- Describe a range of reasonable and feasible alternatives to the project, or to the location of the project.
- Evaluate the comparative merits of the alternatives.

- If there is a specific proposed project, explain why other alternatives were rejected in favor of the proposal.
- Focus on alternatives capable of avoiding or substantially lessening significant adverse environmental effects or reducing them to a level of less than significant, even if these alternatives would impede to some degree the attainment of the project objectives or would be more costly.
- If an alternative would cause one or more significant effects in addition to those that would be caused by the project as proposed, the significant effects of the alternative shall be discussed, but in less detail than the significant effects of the project as proposed.

The objectives of the proposed Program are listed below. The evaluation of alternatives is conducted in the context of seeking to meet most of these objectives. They are:

- To modify wildland fire behavior to help reduce losses to life, property, and natural resources
- To increase the opportunities for altering or influencing the size, intensity, shape, and direction of wildfires within the wildland urban interface
- To reduce the potential size and associated suppression costs of individual wildland fires by altering the continuity of wildland fuels
- To reduce the potential for high severity fires by restoring and maintaining a range of native fire-adapted plant communities through periodic low intensity treatments within the appropriate vegetation types
- To provide a consistent, accountable, and transparent process for vegetation treatment that is responsive to the objectives, priorities, and concerns of landowners, local, state, and federal governments, and other stakeholders

3.1 ALTERNATIVES EVALUATED IN THIS PROGRAM EIR

As a result of the above requirements, the following alternatives have been developed. Each is listed below and described in more detail in following sub-sections. A more detailed analysis of the impacts of all alternative are discussed in Chapter 4 and 5.

No Project – This alternative represents the “No Project” alternative required by CEQA. If CAL FIRE took no further action, existing vegetation treatment programs, such as the Vegetation Management Program (VMP) and California Forest Improvement Program (CFIP), would continue to operate using previously approved EIRs and departmental procedures to satisfy CEQA requirements. The guidance documents for each of the CAL FIRE programs would apply to an existing landscape that is larger than the proposed Program or the Alternatives because both apply to the entire State Responsibility Area (SRA).

Proposed Program – The proposed Program would limit vegetation treatment efforts to areas within the SRA where assets, both urban and natural, are at greatest risk from wildland fire. Treatment activities would be limited to three general “project types” which

include vegetation treatments to protect the Wildland Urban Interface (WUI), fuel break installation and maintenance, and enhancing vegetative fire resiliency through Ecological Restoration. The available landscape to treat would be smaller than the “No Project” Alternative because the scope would be limited to areas that fall under one or more of the specified project and vegetation types.

Alternative A: WUI Only- The WUI Only Alternative would focus vegetation treatments specifically in areas that would protect assets within the WUI. Projects would primarily consist of community and infrastructure protection, establishing safe areas of refuge, and enhancing vegetation clearance proximate to structures. Vegetation management priorities and ecological restoration opportunities outside of the WUI would not be included under this proposed alternative. Wildland fire control success outside the WUI would rely primarily on initial attack and extended attack resources without the strategic benefit of pre-treated fuels or existing fuel breaks. The project evaluation process, analysis procedures, treatment options, and mitigations would be the same as the proposed Program. The available landscape to treat would be significantly smaller than the “Proposed Program” because only a portion of the SRA is comprised of the WUI.

Alternative B: WUI and Fuel Breaks- In addition to vegetation treatment efforts designed specifically to protect values within the WUI, fuel breaks would also be maintained or installed in favorable topographic locations to aid in wildland fire control efforts outside of the WUI. The project evaluation process, analysis procedures, treatment options, and mitigations would be the same as the proposed Program. The available landscape to treat would be significantly larger than the “WUI Only” due to the addition of fuel breaks, however, it would remain less than the “Proposed Program.”

Alternative C: Very High Fire Hazard Severity Zone- CAL FIRE is mandated by Public Resources Code 4201-4204 and Government Code 51175-51189 to identify fire hazard severity zones statewide. These zones reflect areas of significant fire hazard based on fuels, terrain, weather, and other relevant factors. To reduce the wildland fire threat in high hazard areas, fuel treatments under Alternative C would focus specifically on areas that are classified as a "Very High Fire Hazard Severity Zone.” The project evaluation process, analysis procedures, treatment options, and mitigations would be the same as the proposed Program. This alternative includes the least available acreage for treatment relative to the other alternatives.

Alternative D: Treatments that Minimize Potential Impacts to Air Quality- Minimize Potential Impacts to Air Quality has limitations on treatments, specifically the number of acres that could be treated with prescribed fire, and the landscape available for treatment is substantially less than the Proposed Program.

3.2 NO PROJECT

Under the No Project Alternative, CAL FIRE would continue to implement vegetation treatments through existing programs. Treatments would continue to emphasize changing vegetative structure to modify wildland fire behavior and improve non-industrial forestland quality on private forestlands within the State. Treatments would also meet a wide variety of other objectives, including protecting human life and property, reducing fire suppression costs, enhancing habitat, improving resource production (e.g. rangeland forage and water yield), and reducing the potential for long-term detrimental effects of wildland fire.

CAL FIRE would continue to rely on a broad range of environmental analysis tools to satisfy CEQA requirements as Lead Agency. Projects located in shrubland and grass vegetation types could rely on the 1981 Chaparral Management Program EIR for environmental compliance. Vegetation management projects in timber vegetation types, which are outside the scope of the Chaparral Management Program EIR, would rely on either the completion of a Negative Declaration or could fall under the California Forest Improvement Program EIR. Projects which are small in scope and would result in no impacts from the proposed activities could fall under a Categorical Exemption.

3.2.1 DETAILED DESCRIPTION OF TREATMENTS

Vegetation management activities include the disposal, rearrangement, or conversion of vegetation using various treatments. Treatment methods and actions include:

- Prescribed fire (underburn, jackpot burn, broadcast burn, pile burn, establishment of control lines)
- Mechanical (chaining, tilling, mowing, roller chopping, brush raking, skidding and removal, chipping, piling, pile burning)
- Manual (hand pull and grub, thin, prune, hand pile, pile burning, lop and scatter, hand plant)
- Prescribed herbivory (grazing by domestic animals, such as cattle, sheep, goats, horses)

Under the No Project Alternative, herbicide treatments are limited solely to applications funded or regulated under the CFIP program. Vegetation management treatment techniques may be applied singularly or in any combination for a particular vegetation type to meet specific objectives of resource management. Within existing physical, environmental, ecological, social, and legal constraints on the area to be treated, the method or methods used will be those that are most likely to achieve the desired objectives while protecting environmental quality. Historically, treatment acreage has averaged about 27,000 acres per year, with approximately 200,000 to 300,000 acres treated in any ten-year period. Based on recent trends, average project size is expected

to be around 260 acres. A detailed description of the vegetation treatments that would be applied under the No Project Alternative is described in Section 2.4.

3.2.2 LANDSCAPE AVAILABLE TO BE TREATED

Unlike the other alternatives, the No Project Alternative already takes place throughout SRA. Because a vegetation treatment project could theoretically take place at any location within the SRA, the landscape available to be treated occurs on a much larger landscape than what the proposed Program and other Alternatives would take place on. Table 3.2-1, visualized in Figure 3.2-1, provides a summary of the available landscape acreage, approximate distribution of treatment activities, approximate acreage treated per decade, approximate annual acreage treated, and percent of the available landscape treated per decade.

Table 3.2-1 No Project treatable landscape (SRA) and approximate acres treated per decade

Bioregion	SRA Acres	Distribution of Treatments	Approx. 10 Year Acreage Treated	Approx. Annual Acreage Treated	% of Modeled Acres (10 years)
Bay Area/Delta	2,990,699	7.39%	20,020	2,002	0.67%
Central Coast	4,953,917	14.26%	38,640	3,864	0.78%
Colorado Desert	509,668	3.25%	8,800	880	1.73%
Klamath/North Coast	7,335,482	17.74%	48,060	4,806	0.66%
Modoc	3,082,183	13.56%	36,730	3,673	1.19%
Mojave	729,740	4.12%	11,160	1,116	1.53%
Sacramento Valley	1,293,669	11.68%	31,650	3,165	2.45%
San Joaquin Valley	1,548,885	7.02%	19,030	1,903	1.23%
Sierra Nevada	6,436,569	14.72%	39,900	3,990	0.62%
South Coast	2,216,829	6.27%	16,980	1,698	0.77%
Total by Treatment	**31,097,639**	**100.00%**	**270,970**	**27,097**	**0.87%**

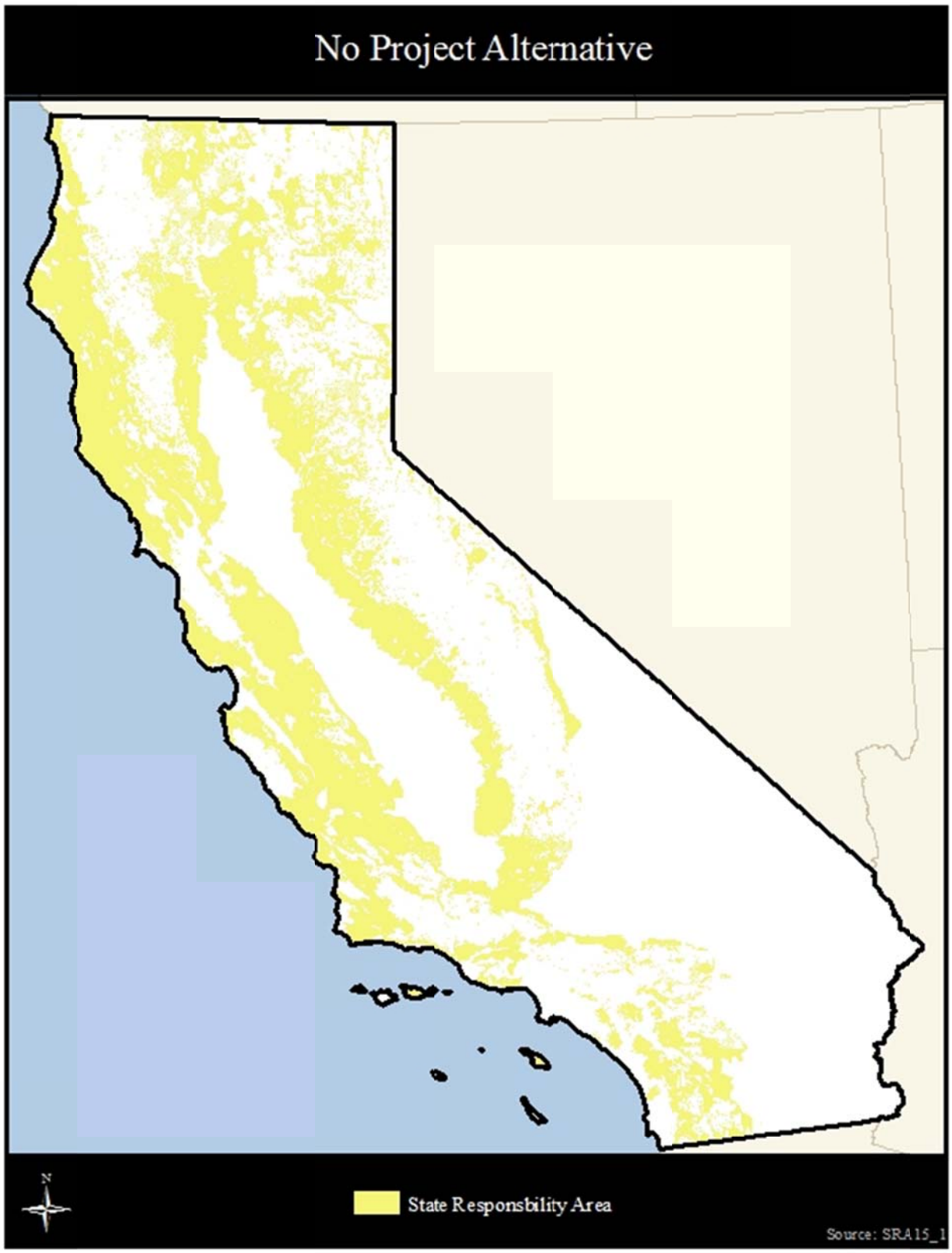

Figure 3.2-1 No Project Alternative

3.2.3 ACHIEVMENT OF BASIC PROJECT OBJECTIVES

The No Project Alternative would not achieve many of the basic objectives of the proposed Program. While wildland fire behavior could be modified to reduce impacts to life, property, and natural resources, the existing VMP scope is limited to only shrubland and grass fuel types and leaves out timber fuel types. Projects initiated in timber fuel types would rely on other programmatic vehicles such as the CFIP EIR or the preparation of a Mitigated Negative Declaration. The CFIP process, however, is largely developed between the landowner and a consulting RPF outside of the Department and generally excludes CAL FIRE from project planning. Preparation of a Mitigated Negative Declaration is costly, time consuming, repetitive, and unsustainable from a personnel standpoint. Because the No Project Alternative does not apply equally to all vegetative fuel types throughout the SRA, opportunities for altering wildfire size, intensity, shape, and ultimately reducing suppression costs within the WUI is largely limited to areas located in shrubland and grass fuel types. Although projects could be initiated under alternative CEQA means, the time consuming nature of preparing projects in this manner would result in fewer projects initiated and fewer acres treated.

Projects under the No Treatment Alternative would continue to be evaluated and approved on a project by project basis through multiple CEQA processes. This alternative does not adequately focus projects to strategic locations within the SRA to achieve the objectives of the proposed Program. Also, because of the multiple CEQA processes involved, the No Treatment Alternative lacks a large-scale coordinated analysis of a series of closely related and reasonably predictable vegetation treatment projects being undertaken throughout the State. Vegetation treatment projects would still be carried out in a manner consistent with CAL FIRE policy, relevant EIRs and CEQA processes, handbooks, and legal requirements which include many features intended to reduce or eliminate potential significant environmental impacts. Adherence to a comprehensive and consistent set of Standard Project Requirements (SPRs) to mitigate potentially significant impacts from vegetation treatment projects would not occur. Adaptive management techniques could be employed, but their application would likely vary from one CAL FIRE Unit to another.

Recognizing that each project would receive its case-by-case review without the opportunity for consistent application of SPRs and mitigation measures from a comprehensive Program EIR, the CEQA documentation would likely be repetitive from one project to the next and the potential for variability in mitigation approaches to offset impacts from one CAL FIRE Unit to the other would exist. The openness and transparency of the case-by-case project evaluation process, while complying with all legal requirements, could also be variable, depending on the nature of the proposal and the approaches of each administrative Unit.

3.3 PROPOSED PROGRAM

The Program stratifies treatments into three basic types: (1) wildland-urban interface (WUI), (2) fuel breaks, and (3) ecological restoration. These three types of treatments will be selected based on the values at risk, surrounding fuel conditions, strategic necessity for fire suppression activities, and departure from natural fire regime. The actual prioritization of such projects will be made at the local CAL FIRE Unit level.

Projects implemented under the WUI treatment type would take place outside of the 100 foot defensible space requirements under PRC 4291, and within the outer edge of the defined WUI area as described later in this section. These projects would focus on directly protecting communities and assets at risk from potential damage from wildfires originating in the adjacent wildlands as well as protecting the wildlands from fires transitioning to the wildlands from human infrastructure by modifying the fuels. Projects conducted in the designated WUI would utilize any of the treatment activities (prescribed herbivory, mechanical, etc) to reduce risk in the WUI.

Projects implemented under the Ecological Restoration treatment type would attempt to restore the fire resiliency associated with many of the fire-adapted plant communities by renewing degraded, damaged, or destroyed ecosystems and habitats in the environment through active intervention. The conceptual basis is that for fire-adapted ecosystems, much of their ecological structure and processes are driven by fire, and the disruption of fire regimes leads to changes in plant composition and structure, uncharacteristic fire behavior and other disturbance agents (pests), altered hydrologic processes, and increased smoke production. This treatment may also be used on working landscapes such as rangeland to facilitate terrestrial and aquatic ecosystem sustainability. Ecological Restoration projects would predominantly occur outside of the WUI in areas that have departed from the natural fire regime; however, these practices may have value in the WUI.

Projects implemented under the Fuel Break treatment type would consist of converting the vegetation along strategically located areas for fire control. The wildland fuels of California occur mainly on mountainous terrain, which adds greatly to the problem of controlling wildfires. Typical fuel break locations include ridgelines, along roads, or in other favorable topographic locations. Fuel breaks can provide safe access for quick manning of fire control lines. Low-volume fuels, especially flammable grass, can be fired out quickly to widen a fire line under conditions where backfiring would be impossible in heavy fuels that have a high heat output. Aerial attack can also be used effectively in conjunction with fuel breaks to contain the lateral spread of an advancing wildfire.

3.3.1 DETAILED DESCRIPTION OF TREATMENTS

Vegetation management activities include the disposal, rearrangement, or conversion of vegetation using various treatments. Treatment methods and actions include:

- Prescribed fire (underburn, jackpot burn, broadcast burn, pile burn, establishment of control lines)
- Mechanical (chaining, tilling, mowing, roller chopping, masticating, brushraking, skidding and removal, chipping, piling, pile burning)
- Manual (hand pull and grub, thin, prune, hand pile, pile burning, lop and scatter, hand plant)
- Prescribed herbivory (grazing by domestic animals, such as cattle, sheep, goats, horses)
- Herbicides (ground applications only, such as backpack spray, hypohatchet, pellet dispersal)

Vegetation management treatment techniques would be applied singularly or in any combination for a particular vegetation type to moderate the fire behavior of the targeted area. Within existing physical, environmental, ecological, social, and legal constraints on the area to be treated, the method or methods used would be those that are most likely to achieve the desired objectives while protecting environmental quality. A detailed description of the vegetation treatment activities that could be applied under the Proposed Program is described in Section 4.1.5.

3.3.2 LANDSCAPE AVAILABLE TO BE TREATED

SRA accounts for over 31 million acres in California, but not all of the area is appropriate for the three basic treatment types outlined in Section 2.3. The total land area capable of undergoing a WUI, fuel break, or ecological restoration treatment is approximately 21 million acres, or 70 percent of the SRA. Just under 50 percent of the acreage is within the proposed WUI treatment type, with the majority of the WUI acreage occurring in the Sierra Nevada and Klamath/North Coast bioregions, respectively. Ecological restoration accounts for approximately 33 percent of the available acreage; most of the ecological restoration acreage occurs in the Klamath/North Coast, Modoc, and Sierra Nevada bioregions, respectively. Fuel breaks make up the smallest proportion of the treatments, accounting for only 17 percent of the area available for treatment. Table 3.3-1 provides a summary of the available landscape acreage, approximate distribution of treatment activities, approximate acreage treated per decade, approximate annual acreage treated, and percent of the available landscape treated per decade under the proposed VTP. Figure 3.3-2 provides a map of the available WUI and ecological restoration treatment areas in the state. An example of a fuel break is pictured in Figure 3.3-1.

Table 3.3-1 Proposed Program treatable landscape and approximate acres treated per decade

Bioregion	Acres Modeled as the VTP	Distribution of Treatments	Approx. 10 Year Acreage Treated	Approx. Annual Acreage Treated	% of Modeled Acres (10 years)
Bay Area/Delta	2,146,135	9.76%	58,550	5,855	0.27%
Central Coast	3,263,733	14.84%	89,040	8,904	0.40%
Colorado Desert	362,077	1.65%	9,878	988	0.04%
Klamath/North Coast	4,270,334	19.42%	116,501	11,650	0.53%
Modoc	2,629,835	11.96%	71,746	7,175	0.33%
Mojave	942,962	4.29%	25,725	2,573	0.12%
Sacramento Valley	866,478	3.94%	23,639	2,364	0.11%
San Joaquin Valley	688,137	3.13%	18,773	1,877	0.09%
Sierra Nevada	4,915,658	22.35%	134,107	13,411	0.61%
South Coast	1,907,557	8.67%	52,041	5,204	0.24%
Total by Treatment	**21,992,906**	**100.00%**	**600,000**	**60,000**	**2.73%**

Figure 3.3-1 Example of a maintained landscape fuel break (arrow). Calf Canyon fuel break, San Luis Obispo County

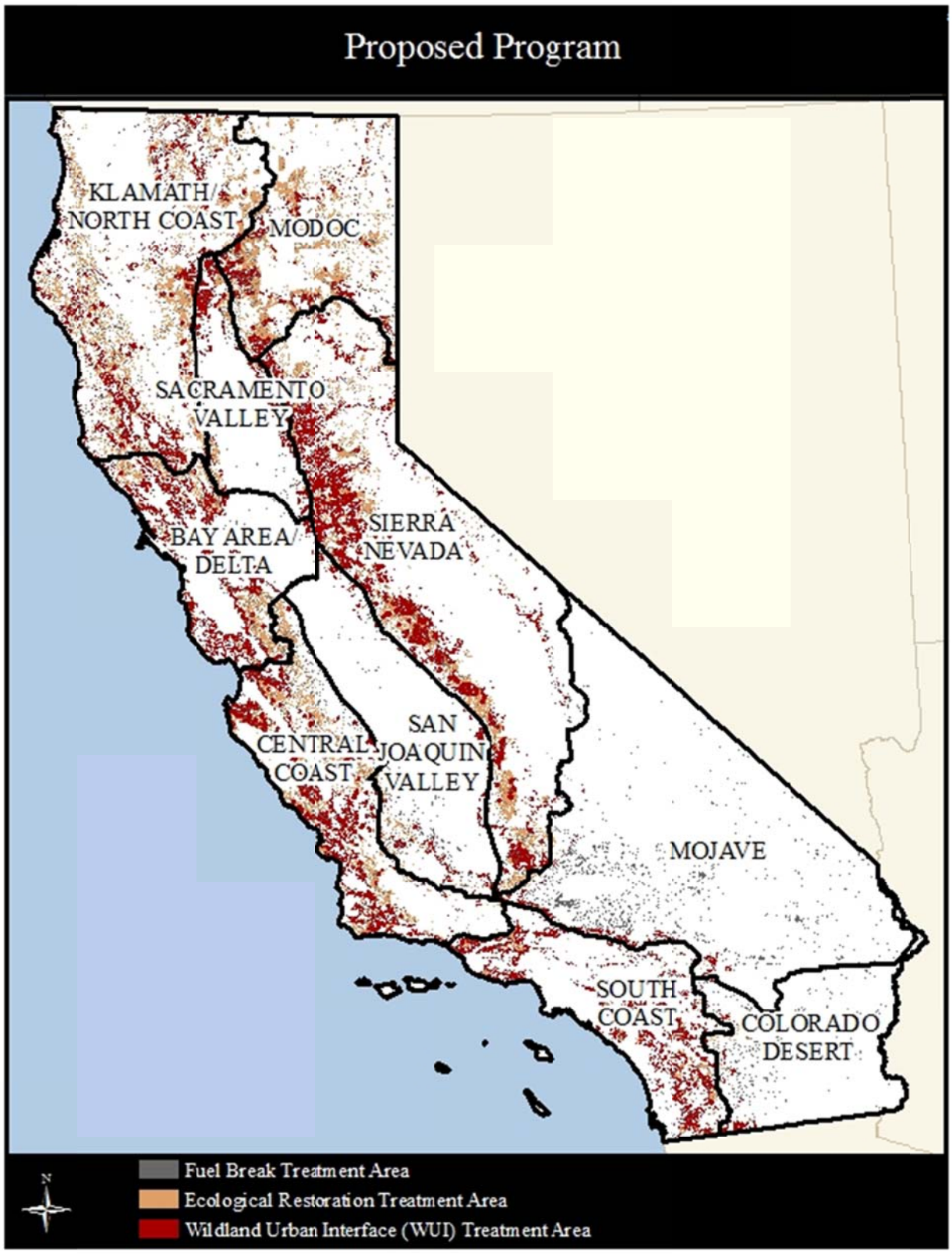

Figure 3.3-2 Proposed Program

3.3.3 ACHIEVEMENT OF BASIC PROJECT OBJECTIVES

The proposed Program would address all of the Program objectives. Wildland fire behavior would be modified, through the use of strategic fuel treatments, to help reduce losses to life, property, and natural resources. This is the governing objective of the program, and is consistent with Goals 1, 5, and 6 of the *2010 Strategic Fire Plan* (Board, 2010). Fire behavior is the manner in which fire reacts to weather, topography, and fuels (NWCG, 2001). Of the three variables, only fuels can be feasibly altered by humans. The primary assumption of the VTP is that appropriate vegetation treatments can affect wildland fire behavior through the manipulation of wildland fuels. With all other factors held constant, reducing the continuity of wildland fuels will result in lower fuel hazard and more favorable fire behavior. In turn, this will theoretically allow for more effective fire suppression and therefore reduce the likelihood of wildfire adversely affecting values at risk.

Opportunities for altering the intensity, shape, and direction of wildfires within the wildland urban interface would occur under the proposed Program. This objective places emphasis on increasing the strategic and tactical effectiveness of fire suppression within the WUI through the use of appropriate vegetation treatments. The WUI is the geographical overlap of two diverse systems, wildland and structures. At this interface, the buildings and vegetation are sufficiently close that a wildland fire could spread to a structure or a structure fire could ignite wildland vegetation. Focusing vegetation treatments in the WUI is critical, as losses in the WUI are on the rise (Stephens et al., 2009a) and are expected to get worse (Mann et al., 2014). The WUI component of the proposed Program is a tool to combat these predictions and engage in fuel reduction projects within the WUI.

The proposed Program would reduce the potential size and associated suppression costs of wildland fires by altering the continuity of wildland fuels. Wildfire suppression costs borne by California taxpayers have risen significantly in the past 35 years (Figure 2.2-3). Figure 1.1-1 and Figure 2.2-4 suggest a concomitant increase in both acres burned and suppression costs around the year 2000. The assumption is that decreasing fire size will have a resulting decrease on fire suppression costs (Figure 2.2-4). While wildfire acreage is not the only variable that drives suppression costs (Gude et al., 2013), increasing the likelihood that fires will be contained to relatively small areas through the use of fuel breaks and ecological restoration should also relate to lower cumulative fire suppression costs.

The potential for high-severity fires would be reduced by restoring a range of native fire-adapted plant communities through periodic low intensity treatments within appropriate vegetation types. The restoration of lower fuel amounts is a critical need across portions of the western United States (Agee and Skinner, 2005). In California, fuel treatments

have been shown to reduce fire severity (Skinner et al., 2004; Stephens et al., 2009a). It is also recognized that fuel reduction projects within forested settings appear to be more effective in reducing burn severity, as compared to some southern California chaparral ecosystems. Appropriately designed ecological restoration treatments can mimic the disturbance processes that historically controlled plant community composition and structure. In addition, reduced fuel loading in appropriate vegetation types can increase ecosystem resiliency to wildfire.

Adopting a programmatic approach to vegetation treatment can assure that a consistent process is applied to the prioritization, evaluation, and implementation of vegetation treatment projects. There is also recognition that projects can be improved through the consideration of stakeholder commentary. Also, there is a need to demonstrate whether the desired program and/or project outcomes are being achieved, and whether elements of the program should be iteratively changed in response to emerging data (i.e., adaptive management). The proposed Program recognizes that the chosen alternative will foster consistency, accountability, and transparency for the VTP in a way that satisfies the needs of vested stakeholders.

3.4 ALTERNATIVE A: WUI ONLY

Although wildfire behavior is driven by fuels, weather, and topography, human influences on wildfire are largely restricted to intentional or unintentional effects on fuels. Human geography, as it relates to the increased settlement of wildland landscapes, further complicates fire control efforts. The density of houses and other private structures in formerly wildland landscapes of the West is increasing rapidly (Field and Jensen, 2005). The extent of California's WUI, the area where homes are located in or near undeveloped wildland vegetation, grew almost 9 percent from 1990 to 2000 while the number of houses in new WUI grew by almost 700 percent over the same period (Hammer et al., 2007). Development in the WUI is leading both to increasing fire ignition and to increasing losses of property and life and as such, California is the focus of much of the nation's WUI issues (Radeloff et al., 2005).

Fires occurring in the WUI inherently pose multiple challenges. The mix of threats to life, homes, infrastructure, critical watersheds, and other high-value resources all contribute to the complexity of engaging WUI wildfires. Yet, response and management options available to fire managers are limited in areas of such multiple threats and complexity. Because WUI fires typically represent an immediate threat to life and property, fires of this type require immediate and aggressive action with a full complement of crews, equipment, and aircraft. The multiple resources needed to quickly and effectively suppress WUI fires drive costs upward relative to similar sized fires burning in non-WUI areas. Strategically focusing on wildland fuel reduction within the WUI would increase public safety while reducing potential damage to assets within the WUI.

Under Alternative A, projects would limit fuel reduction projects to the WUI only. State resources and funding would focus on protecting or enhancing strategic fire control features within or adjacent to communities primarily through fuel reduction. Vegetation management treatment techniques would be applied singularly or in any combination for a particular vegetation type to meet specific objectives of WUI protection. Within existing physical, environmental, ecological, social, and legal constraints on the area to be treated, the method or methods used would be those that are most likely to achieve the desired objectives while protecting environmental quality.

3.4.1 DETAILED DESCRIPTION OF TREATMENTS

Vegetation management activities include the disposal, rearrangement, or conversion of vegetation using various treatments. Treatment methods and actions include:

- Prescribed fire (underburn, jackpot burn, broadcast burn, pile burn, establishment of control lines)
- Mechanical (chaining, tilling, mowing, roller chopping, masticating, brushraking, skidding and removal, chipping, piling, pile burning)
- Manual (hand pull and grub, thin, prune, hand pile, pile burning, lop and scatter, hand plant)
- Prescribed herbivory (grazing by domestic animals, such as cattle, sheep, goats, horses)
- Herbicides (ground applications only, such as backpack spray, hypohatchet, pellet dispersal)

Vegetation management treatment techniques would be applied singularly or in any combination for a particular vegetation type to moderate the fire behavior within and adjacent to the WUI. Within existing physical, environmental, ecological, social, and legal constraints on the area to be treated, the method or methods used would be those that are most likely to achieve the desired objectives while protecting environmental quality. A detailed description of the vegetation treatments that could be applied under the WUI Alternative is described in Section 4.1.5.

3.4.2 LANDSCAPE AVAILABLE TO BE TREATED

Vegetation treatment projects under this Alternative would occur only in areas within the defined WUI landscape. To summarize Chapter 2, the WUI landscape was developed using a cost distance function in which urban areas and areas of “little” or “no threat” have higher costs while all other areas have lower cost. A maximum 1.5 mile buffer around areas where all costs are low was developed in accordance with the 2001 California Fire Alliance definition of “vicinity,” which is an approximate distance that embers and flaming material (firebrands) can be carried from a wildland fire to the roof of a structure. For areas where the buffer takes on higher cost values, the maximal

buffer distance is approximately 0.5 miles. Areas with mixed costs have buffer distances within this range. This concept reflects the greater resistance that urban areas and areas of little or no threat (such as agriculture lands) offer to the spread of wildland fire. Thus, areas of greater threat class take precedence over areas with lesser or no threat class. Refer to Chapter 2.3.2 for greater detail regarding WUI landscape development.

Vegetation management projects outside the defined WUI would be considered beyond the scope of the VTP Program EIR and would need to satisfy CEQA requirements through external processes. It is assumed that work capacity would be the same as that of the proposed Program. Table 3.4-1 provides a summary of the available landscape acreage, approximate distribution of treatment activities, approximate acreage treated per decade, approximate annual acreage treated, and percent of the available landscape treated per decade. Figure 3.4-1 shows the spatial distribution of treatable WUI land under this Alternative. A closer look at an example WUI area is presented in Figure 3.4-2.

Table 3.4-1 Alternative A treatable landscape (WUI) and approximate acres treated per decade

Bioregion	Acres Modeled as WUI	Distribution of Treatments	Approx. 10 Year Acreage Treated	Approx. Annual Acreage Treated	% of Modeled Acres (10 years)
Bay Area/Delta	1,291,941	12.11%	72,669	7,267	0.68%
Central Coast	1,626,890	15.25%	91,509	9,151	0.86%
Colorado Desert	113,664	1.07%	6,393	639	0.06%
Klamath/North Coast	1,604,748	15.04%	90,263	9,026	0.85%
Modoc	733,671	6.88%	41,267	4,127	0.39%
Mojave	226,257	2.12%	12,726	1,273	0.12%
Sacramento Valley	512,804	4.81%	28,844	2,884	0.27%
San Joaquin Valley	328,136	3.08%	18,457	1,846	0.17%
Sierra Nevada	2,884,660	27.04%	162,256	16,226	1.52%
South Coast	1,344,332	12.60%	75,616	7,562	0.71%
Total by Treatment	**10,667,101**	**100.00%**	**600,000**	**60,000**	**5.62%**

Figure 3.4-1 Alternative A

3.4.3 ACHIEVMENT OF BASIC PROJECT OBJECTIVES

Alternative A would achieve some of the basic objectives of the proposed Program. Fire behavior modification would occur to help reduce loss to life, property, and natural resources. Beyond the WUI however, the results would be limited. SRA lands provide a broad array of ecological benefits including critical habitat for protected species, drinking water, wood products, carbon storage, and scenic and recreational opportunities to name a few. Large, destructive wildfires are a growing threat to these values, and it's clear that landscape scale changes in vegetative structure and fuel loadings must be accomplished to significantly alter wildfire behavior, reduce wildfire losses, and achieve longer term fire resiliency in the wildlands (Agee et al., 2000; Finney, 2001; Peterson et al., 2003; Graham et al., 2004). Limiting fuel treatments to only the WUI would ignore larger opportunities to restore or maintain fire-adapted ecosystems beyond the WUI.

It should be noted that there are several key differences between fuel treatment priorities and outcomes in the WUI versus in wildlands. WUI fuel treatments are intended primarily to protect lives and private property, and to create safe zones for direct attack tactics based on mechanized support. Wildland treatments are typically designed to slow fire spread so as to provide time for indirect efforts to succeed in creating favorable conditions ahead of the fire that are more likely to result in its control. As such, WUI fuel treatments ultimately serve as the last line of defense for asset protection and are subject to more intense levels of fuel removal (Safford et al., 2009).

Alternative A, because it is WUI-centric, would likely out-perform other Alternatives with regard to increasing opportunities for altering or influencing the size, intensity, shape and direction of wildfires within the WUI. With few exceptions, fuel treatments substantially moderate fire severity and reduce tree mortality under typical weather conditions. Focusing fuel treatment efforts to the WUI will increase opportunities to reduce fire behavior and provide firefighters with safer options to protect homes and infrastructure.

Alternative A would marginally reduce the potential for high severity fires by restoring a range of native, fire-adapted plant communities through periodic low intensity treatments within appropriate vegetation types. Prescribed burning elicits a host of ecological interactions potentially important to restoration, including release from plant competition, greater access to light and water, nutrient enrichment, destruction of germination retardants, and the beneficial effects of smoke on plant germination (Keeley and Fotheringham, 1998).

The risk of potential fire escape and the generation of nuisance smoke often outweigh the benefits of applying fire for fuel reduction proximate to communities. Because of social, operational, and ecological constraints, mechanical treatments are often easier

to implement than prescribed fire, and are often used in its place. However, mechanized and hand treatment effects on ecological function are usually subtle, short-lived, and do not serve as a surrogate for fire. Fire has unique effects on ecosystems and most favorable effects cannot be successfully emulated with any other treatment (McIver et al., 2013). Restoring native, fire-adapted plant communities would be less likely under this Alternative because prescribed fire would be available in fewer applications than alternative treatments.

Limiting projects only to the WUI is not in total alignment with the Department's overall mission to protect natural resources. In addition to providing fire protection, the Department also engages in projects to protect watershed values and restore fire-adapted ecosystems to preserve biological integrity. Engaging in ecological restoration projects to protect watersheds and address chronic departures from natural fire regimes outside the WUI would not occur, leading to increased fire behavior and hazard risk.

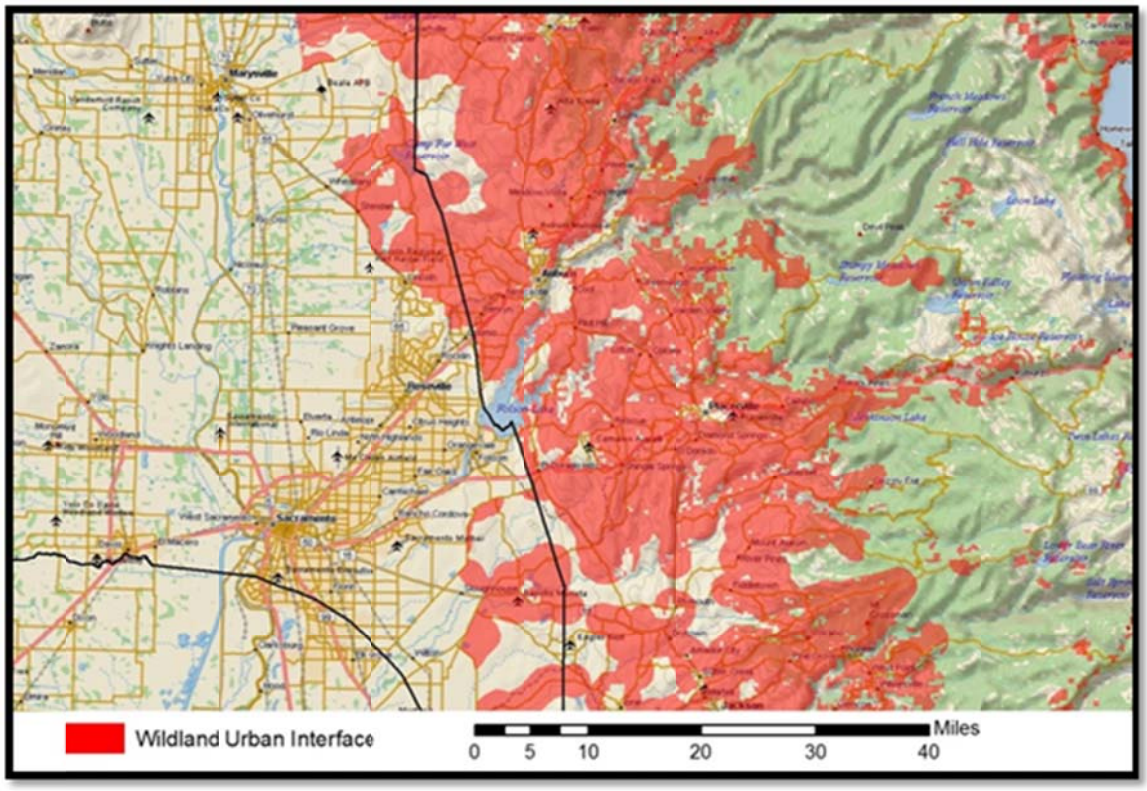

Figure 3.4-2 Example of designated WUI within SRA in the central Sierra Nevada Mountains

Similar in structure to the proposed Program, projects conducted under Alternative A would benefit from a consistent statewide evaluation process. Proposed projects would be evaluated for implementation using a standardized system and subject to a single CEQA process. Adherence to a comprehensive set of statewide mitigations would occur. CAL FIRE would still require compliance with CEQA for all project proposals

equally, regardless of whether it is conducted in a systematic and comprehensive manner or on a case-by-case basis. Projects conducted outside of the designated WUI, however, would require additional CEQA analysis on a case-by-case basis without the benefit of consistently applied Standard Project Requirements (SPRs). It is reasonable to conclude that the risk of environmental impacts may be greater as a practical matter for case-by-case proposals outside of the WUI.

3.5 ALTERNATIVE B: WUI AND FUEL BREAKS

Alternative B would combine Alternative A (WUI only) with the option to implement fuel breaks outside the WUI. Fuel breaks are an area in which flammable vegetation has been modified to create a defensible space in an attempt to reduce fire spread to structures and/or natural resources, and to provide a safer location to fight fire. These treatments can be a part of a series of fuel modifications strategically located along a landscape.

Projects implemented under the fuel break designation would consist of converting the vegetation along strategically located areas for fire control. The wildland fuels of California occur mainly on mountainous terrain, which adds greatly to the problem of controlling wildfires. Typical fuel break locations include ridgelines, along roads, or in other favorable topographic situations. Fuel breaks can provide safe access for quick manning of fire control lines. As stated previously, protective firefighter clothing and equipment has limitations on how much convection and conduction heat energy they can take. These types of vegetation treatments can provide necessary firefighter safety zones or immediate access to escape wildfire burn injuries. Low-volume fuels, especially flammable grass, can be cleared quickly to widen a fire line under conditions where backfiring would be impossible in heavy fuels having high heat output. Aerial attack can also be used effectively in conjunction with fuel breaks to contain the lateral spread of an advancing wildfire.

3.5.1 DETAILED DESCRIPTION OF TREATMENTS

Vegetation management activities include the disposal, rearrangement, or conversion of vegetation using various treatments. Treatment methods and actions include:

- Prescribed fire (underburn, jackpot burn, broadcast burn, pile burn, establishment of control lines)
- Mechanical (chaining, tilling, mowing, roller chopping, masticating, brushraking, skidding and removal, chipping, piling, pile burning)
- Manual (hand pull and grub, thin, prune, hand pile, pile burning, lop and scatter, hand plant)
- Prescribed herbivory (grazing by domestic animals, such as cattle, sheep, goats, horses)

- Herbicides (ground applications only, such as backpack spray, hypohatchet, pellet dispersal)

Vegetation management treatment techniques would be applied singularly or in any combination for a particular vegetation type to moderate the fire behavior associated within the WUI as well as fuel break maintenance or installation. Within existing physical, environmental, ecological, social, and legal constraints on the area to be treated, the method or methods used would be those that are most likely to achieve the desired objectives while protecting environmental quality. A detailed description of the vegetation treatments that would be applied under the Alternative B is described in Section 4.1.5.

3.5.2 LANDSCAPE AVAILABLE TO BE TREATED

Vegetation treatment projects under this EIR would occur only in areas designated within the WUI or as a fuel break outside of the WUI. Fuel break acreage estimates were compiled using a modelling exercise which combines key topographic features with roadside fuel clearance along designated roads. See Chapter 4.1 for model description and parameters. Vegetation management projects which are outside the WUI and not associated with a fuel break would be considered outside the scope of the VTP Program EIR and would need to rely on alternative means to address CEQA requirements. Table 3.5-1 provides a summary of the available landscape acreage, approximate distribution of treatment activities, approximate acreage treated per decade, approximate annual acreage treated, and percent of the available landscape treated per decade. WUI and fuel break treatable areas are modeled spatially in Figure 3.5-1.

Table 3.5-1 Alternative B treatable landscape (WUI and Fuel Breaks) and approximate acres treated per decade

Bioregion	Acres Modeled as WUI & Fuel Breaks	Distribution of Treatments	Approx. 10 Year Acreage Treated	Approx. Annual Acreage Treated	% of Modeled Acres (10 years)
Bay Area/Delta	1,614,957	11.06%	66,342	6,634	0.45%
Central Coast	2,126,524	14.56%	87,358	8,736	0.60%
Colorado Desert	315,536	2.16%	12,962	1,296	0.09%
Klamath/North Coast	2,222,188	15.21%	91,287	9,129	0.63%
Modoc	1,139,222	7.80%	46,799	4,680	0.32%
Mojave	863,107	5.91%	35,456	3,546	0.24%
Sacramento Valley	686,352	4.70%	28,195	2,820	0.19%
San Joaquin Valley	556,486	3.81%	22,860	2,286	0.16%
Sierra Nevada	3,389,936	23.21%	139,258	13,926	0.95%
South Coast	1,691,355	11.58%	69,481	6,948	0.48%
Total by Treatment	**14,605,664**	**100.00%**	**600,000**	**60,000**	**4.11%**

Figure 3.5-1 Alternative B

3.5.3 ACHIEVMENT OF BASIC PROJECT OBJECTIVES

Alternative B would achieve most of the objectives of the proposed Program. Similar to the other Alternatives, wildland fire behavior would be modified to help reduce losses to life, property, and natural resources. Because the WUI is a major component of this Alternative, there exists opportunities to alter the size, intensity, shape, and direction of fires specific to the WUI. Also within the WUI, and beyond, to a lesser degree, the reduction of potential size and associated suppression costs is achievable due to the fuel break component of this Alternative. Fuel breaks are designed to reduce the potential for fire spread and allow for the safety of suppression personnel to engage a fire.

An obvious limitation of fuel break system effectiveness is the heavy, flammable vegetation which normally remains on much of the adjacent untreated lands. Fires that occur on adjacent, untreated lands with heavy fuels are extremely difficult to control. Even with improvements in firefighting equipment and techniques which provide quicker, larger suppression responses during windy weather, smoky conditions, and during darkness, control of fires in heavy fuels will continue to be difficult and perhaps impossible under severe conditions.

Reducing the potential for high severity fires by restoring a range of native, fire-adapted plant communities through periodic low intensity treatments is unlikely to occur outside of the WUI under this alternative. Prior to human-influenced changes to the characteristic fire regime, the composition, structure, and spatial pattern in frequent-fire ecosystems (FRI of less than 35 years) were maintained by frequent, low-severity fire through a functional relationship between pattern and process; that is, frequent low-severity fires resulted in ecosystem structures that facilitated continued low-severity fire.

Fuel breaks serve as a defensive feature and are typically implemented through mechanical means. Ecosystem resiliency is the ability of an ecosystem to absorb and recover from disturbances without altering its inherent function (Reynolds et al., 2013). Fire has unique effects on ecosystems and most favorable effects cannot be successfully emulated with any other treatment (McIver et al., 2013). Restoring native, fire-adapted plant communities beyond the WUI would be less likely under this Alternative because the option to engage in landscape scale restoration efforts would be beyond its scope.

Similar in structure to the proposed Program, projects conducted under Alternative B would benefit from a consistent statewide evaluation process. Proposed projects would be evaluated for implementation using a standardized system and be subject to a single CEQA process. Adherence to a comprehensive set of statewide Standard Project Requirements (SPRs) would occur. CAL FIRE would still require compliance with CEQA

for all project proposals equally, regardless of whether it is conducted in a systematic and comprehensive manner or on a case-by-case basis. Projects conducted outside of the designated WUI and not associated with a fuel break, however, would require additional CEQA analysis on a case-by-case basis without the benefit of consistently applied SPRs. It is reasonable to conclude that the risk of environmental impacts may be greater as a practical matter for case-by-case proposals outside of the scope of Alternative B.

3.6 ALTERNATIVE C: PROJECTS LIMITED TO VERY HIGH FIRE HAZARD SEVERITY ZONES

The Bates Bill, which became law January 1, 1993, added Sections 51175 et seq. to the Government Code and amended Health and Safety Code Section 13108.5. The bill requires CAL FIRE to identify and classify fire hazards as they relate to communities. The classification resulted in the identification of moderate, high, and very high fire hazard severity zones (VHFHSZ) and is based on a number of factors including fuels, weather, topography, and ember production. The program is administered by CAL FIRE's Fire and Resource Assessment Program (FRAP). The zones are illustrated on maps and distributed to cities and counties by CAL FIRE, and available to the public on the FRAP website.

Fire hazard, in this case, is a method to measure the physical fire behavior to predict the damage a fire is likely to cause. Fire hazard measurement includes the speed at which a wildfire moves, the amount of heat the fire produces, and the burning fire brands that the fire sends ahead of the flaming front.

Fire hazard is evaluated using five key elements. Vegetation serves as fuel for a wildfire and it changes over time. Fire hazard considers the potential vegetation over a 50 year planning horizon. Topography influences fire hazard by providing opportunities for convective heating. Fires typically burn faster as they progress up steep slopes because the convective heating allows pre-drying and heating prior to the passage of the flaming front. Weather is a critical fire hazard element because fires burn faster and with more intensity when the ambient air temperature is high, relative humidity is low, and winds are strong. Crown fire potential measures the risk of a fire transitioning from a surface fire to the crowns of trees and tall shrubs. The last fire hazard element includes ember production and movement. Fire brands generated from the flaming front are blown ahead of the main fire resulting in increased fire spread as well as opportunities for embers to penetrate openings in structures and ignite the interior.

Under Alternative C, CAL FIRE would focus vegetation treatment to areas representing the highest hazard, classified as VHFHSZ. The purpose would be to moderate the potential fire hazard of these very high hazard areas by modifying the fuels to reduce

the potential for extreme fire behavior and ultimately reducing the fire risk to communities adjacent to the VHFHSZ area if an ignition occurs. Because the treatment areas are clearly defined and represent the highest hazard, CAL FIRE could specifically focus efforts to these high priority areas.

3.6.1 DETAILED DESCRIPTION OF TREATMENTS

Vegetation management activities include the disposal, rearrangement, or conversion of vegetation using various treatments. Treatment methods and actions include:

- Prescribed fire (underburn, jackpot burn, broadcast burn, pile burn, establishment of control lines)
- Mechanical (chaining, tilling, mowing, roller chopping, masticating, brushraking, skidding and removal, chipping, piling, pile burning)
- Manual (hand pull and grub, thin, prune, hand pile, pile burning, lop and scatter, hand plant)
- Prescribed herbivory (grazing by domestic animals, such as cattle, sheep, goats, horses)
- Herbicides (ground applications only, such as backpack spray, hypohatchet, pellet dispersal)

Vegetation management treatment techniques would be applied singularly or in any combination for a particular vegetation type to moderate the fire behavior associated with VHFHSZs. Within existing physical, environmental, ecological, social, and legal constraints on the area to be treated, the method or methods used would be those that are most likely to achieve the desired objectives while protecting environmental quality. A detailed description of the vegetation treatments that would be applied under the VHFHSZ Alternative is described in Section 4.1.5. There would be less total acres available for treatment under this Alternative.

3.6.2 LANDSCAPE AVAILABLE TO BE TREATED

Vegetation treatment projects under this Program EIR would occur only in areas designated as VHFHSZ. Vegetation management projects which are beyond VHFHSZs would be considered outside the scope of the VTP Program EIR and would need to rely on either the completion of a Negative Declaration or could fall under the CFIP EIR. Projects which are small in scope and would result in no impacts from the proposed activities could fall under a Categorical Exemption. It should be noted that the presence of a significant WUI hazard or the designation of communities-at-risk does not influence fire hazard severity zone classification. As stated earlier, fire hazard severity zones are evaluated based on the impacts they could produce without regard to the physical vulnerability of structures proximate to the zone. Table 3.6-1 provides a summary of the available landscape acreage, approximate distribution of treatment activities,

approximate acreage treated per decade, approximate annual acreage treated, and percent of the available landscape treated per decade. VHFHSZ are mapped in Figure 3.6-1.

Table 3.6-1 Alternative C treatable landscape (VHFHSZ) and approximate acres treated per decade

Bioregion	Acres Modeled as VHFHSZ	Distribution of Treatments	Approx. 10 Year Acreage Treated	Approx. Annual Acreage Treated	% of Modeled Acres (10 years)
Bay Area/Delta	567,799	4.82%	28,903	2,890	0.25%
Central Coast	1,350,997	11.46%	68,770	6,877	0.58%
Colorado Desert	255,248	2.17%	12,993	1,299	0.11%
Klamath/North Coast	3,689,075	31.30%	187,787	18,779	1.59%
Modoc	1,663,045	14.11%	84,655	8,465	0.72%
Mojave	152,109	1.29%	7,743	774	0.07%
Sacramento Valley	287,841	2.44%	14,652	1,465	0.12%
San Joaquin Valley	46,117	0.39%	2,348	235	0.02%
Sierra Nevada	2,338,827	19.84%	119,054	11,905	1.01%
South Coast	1,435,957	12.18%	73,095	7,310	0.62%
Total by Treatment	**11,787,015**	**100.00%**	**600,000**	**60,000**	**5.09%**

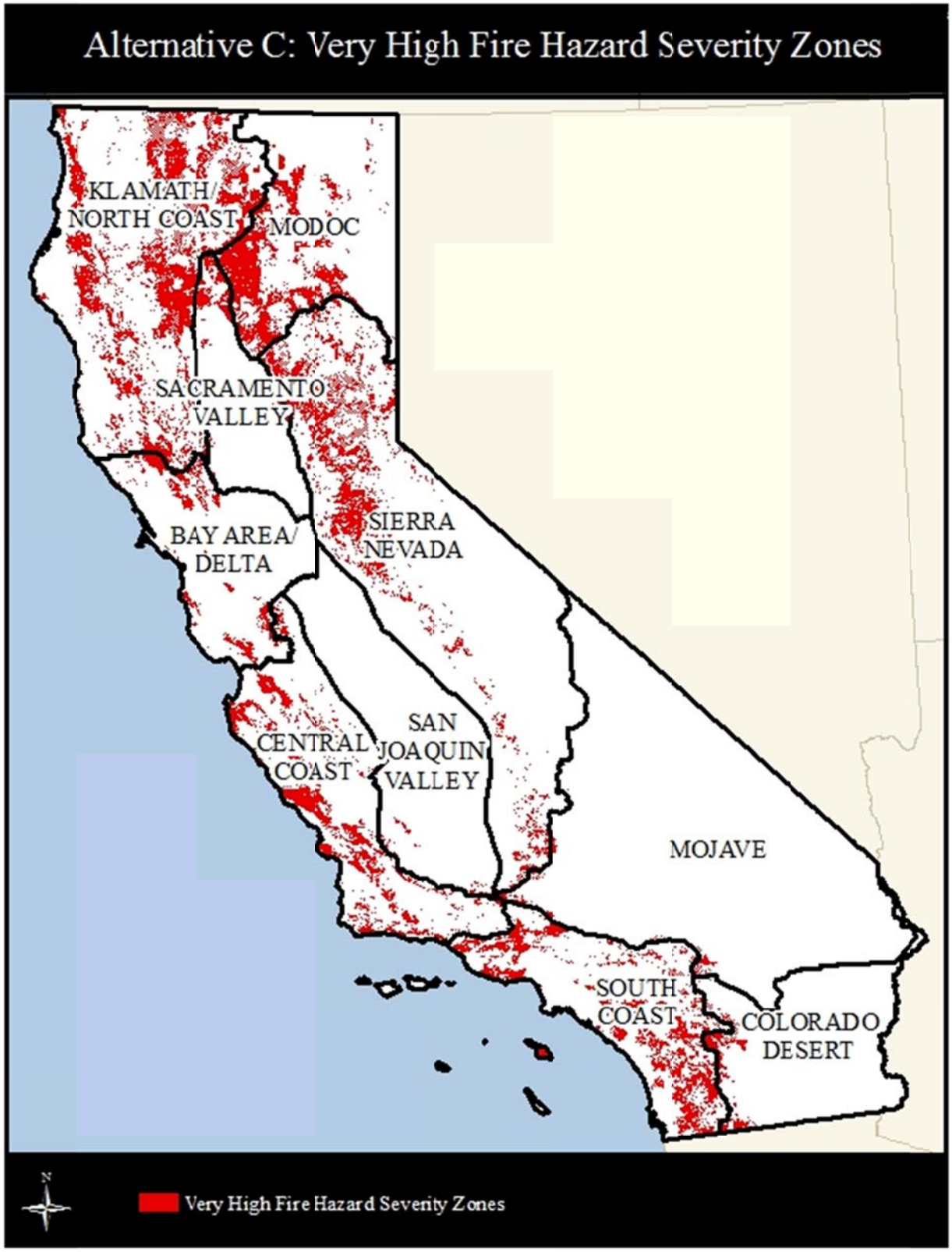

Figure 3.6-1 Alternative C

3.6.3 ACHIEVMENT OF BASIC PROJECT OBJECTIVES

The VHFHSZ Alternative would achieve some of the basic objectives of the proposed Program. While it's true that wildland fire behavior could be modified, in part, to help reduce losses to life, property, and natural resources, destructive wildfires can be supported by high and moderate fire hazard severity zones as well. Although the most hazardous fuel systems would be targeted under this Alternative, local opportunities to protect specific assets that may be located outside the VHFHSZ would be excluded, resulting in reduced treatment location flexibility and a decreased program utility.

To help protect people and their property from potential catastrophic wildfire, the National Fire Plan directs funding to be provided for projects designed to reduce the fire risks to communities. A fundamental step in achieving this goal was the identification of communities that are at high risk of damage from wildfire. These high risk communities identified within the wildland-urban interface, the area where homes and wildlands intermix, were published in the Federal Register in 2001. At the request of Congress, the Federal Register notice only listed those communities neighboring federal lands. The list represents the collaborative work of the 50 states and five federal agencies using a standardized process, whereby states were asked to submit all communities within their borders that met the criteria of a structure at high risk from wildfire. With California's extensive WUI situation, the list of communities extends beyond just those adjacent to Federal lands. A significant inadequacy under Alternative C is the inability to engage in fuel reduction projects in areas that are outside of the VHFHSZ but within other identified high-risk areas. Many high risk communities exist within areas designated under more moderate hazard severity zones (see Figure 3.6-2). Beneficial projects that may directly protect WUI assets or communities in need of fuel reduction efforts which occur outside a VHFHSZ would not be eligible for treatment.

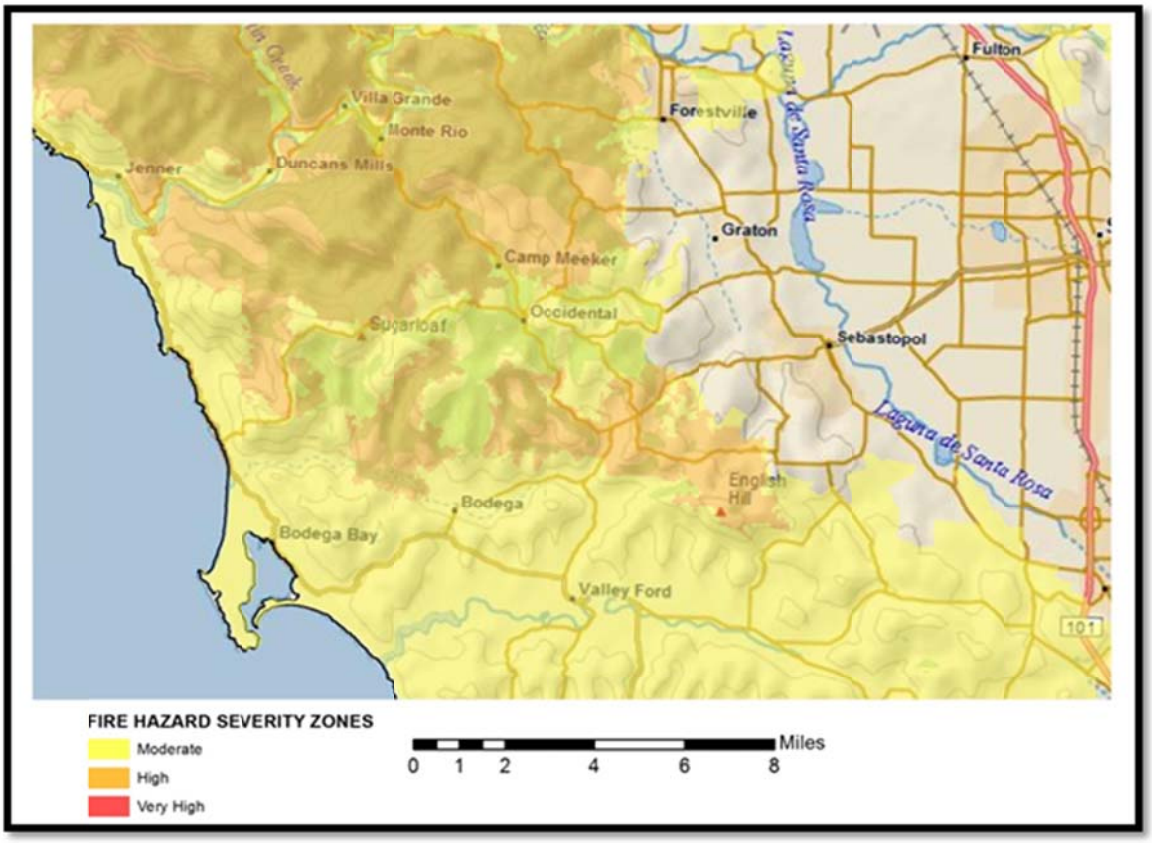

Figure 3.6-2 Western portion of Sonoma County. Monte Rio, Duncan Mills, Jenner, Camp Meeker, Occidental, Bodega Bay, Bodega, and Valley Ford are all registered as "communities-at-risk" from the threat of wildfire (source: ofsm.fire.ca.gov). The absence of a VHFHSZ classification proximate to the communities would exclude them from future wildfire hazard mitigation efforts.

While restoring fire-adapted plant communities may be an indirect outcome for some of the fuel reduction projects implemented under this alternative, ecological restoration would not be an emphasis like that of the proposed Program. Hazard mitigation would serve as the primary purpose for the VHFHSZ Alternative and as such, would utilize all available resources to reduce the wildland fire threat specific to those very high hazard areas. Opportunities to adjust the potential fire behavior in hazard zones represented as "high" or "moderate," and where landowners are willing to participate, would not exist. Operating primarily in VHFHSZ would reduce the Unit's overall flexibility and could result in the forfeiture of key fire control features (i.e. truck trails, fuel breaks).

Limiting projects only to VHFHSZ is not in total alignment with the Department's overall mission to protect natural resources. In addition to providing fire protection, the Department also engages in projects to protect watershed values and restore fire-adapted ecosystems to preserve biological integrity. VHFHSZ designations do not take into account ecological aspects related to fire control, resulting in missed opportunities

to restore ecological function, protect watersheds, and address chronic departures from natural fire regimes (see Figure 3.6-3).

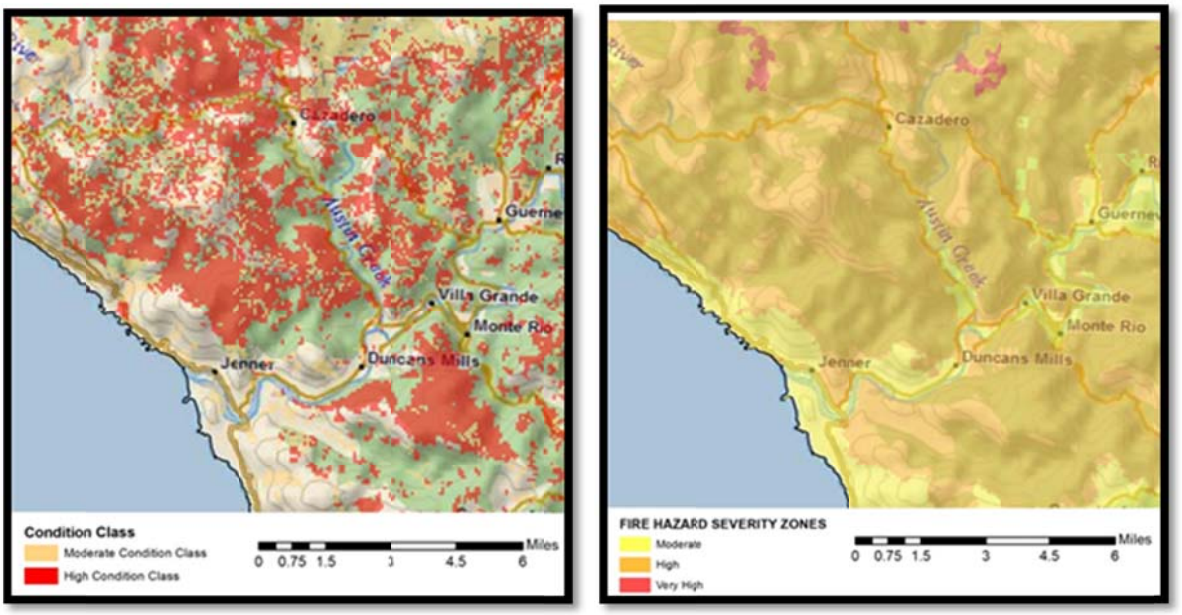

Figure 3.6-3 While most of western Sonoma County is classified as a Moderate and High FHSZ, the majority of the same area is also classified as a High Condition Class (Condition Class 3). High Condition Classes have departed from the natural fire regime and typically results in significantly different vegetation composition, structure and fuels, highly uncharacteristic fire behavior and severity, high smoke production. Opportunities to moderate the High Condition Class would not be available under the VHFHSZ Alternative.

Similar in structure to the proposed Program, projects conducted under this alternative would benefit from a consistent statewide evaluation process. Proposed projects would be evaluated for implementation using a standardized system and subject to a single CEQA process. Adherence to a comprehensive set of statewide Standard Project Requirements would occur. CAL FIRE would still require compliance with CEQA for all project proposals equally, regardless of whether it is conducted in a systematic and comprehensive manner or on a case-by-case basis. Projects conducted outside of VHFHSZs however, would require additional CEQA on a case-by-case basis without the benefit of consistently applied SPRs. It is reasonable to conclude that the risk of environmental impacts may be greater as a practical matter for case-by-case proposals outside of VHFHSZs.

3.7 ALTERNATIVE D: REDUCTION OF PRESCRIBED FIRE TREATMENTS TO REDUCE AIR QUALITY IMPACTS

Burning wildland vegetation causes emissions of many different chemical compounds such as small particles, nitrogen oxide (NO_x), carbon monoxide (CO), and organic

compounds. The components and quantity of emissions depends in part on the types of fuel burned, its moisture content, and the temperature of combustion. Complex organic materials may be absorbed into or onto condensed smoke particles. Tests indicate that, on average, 90 percent of smoke particles from wildland and prescribed fires are PM_{10}, and 70 percent are $PM_{2.5}$.

The primary air pollutants that are detrimental to public health or ecosystems or that impair visual quality include particulates, oxides of sulfur and nitrogen, elemental carbon and carbon oxides, ozone, and toxic air pollutants. Air pollution affects human health and welfare, including damage to vegetation, injury to animals, effects on soil and water, and visibility impairment. Health effects include respiratory problems and decreased lung function, heart disease, and premature death. Chronic injury to plants often results from intermittent or long-term exposure to relatively low pollutant concentrations with chlorophyll destruction or chlorosis as the principal symptom of injury (Neary, 2005). Nitrates and sulfates contribute to acid rain and dry deposition of acid compounds. Lower elevation aquatic systems tend to be less sensitive to acid rain than higher elevation systems. Current levels of acidity are not high enough to cause mortality of amphibians or to fish but may have other subtle effects, particularly during the spring snowmelt period (Neary, 2005).

Atmospheric conditions that create temperature inversions and permit air masses to remain stagnant for long periods allow the airborne concentrations of smoke and other pollutants to increase. These conditions aggravate air pollution over urban, industrial, and agricultural areas. Air pollution is occasionally aggravated by daily and seasonal wind patterns. Sea-to-land breezes remove pollution from coastal areas during the day as cold, dense air moves onshore, but push it back during the night as the land breeze gently flows offshore.

The potential to ignite prescribed fire is dependent on whether the particular day is a permissive burn day and whether the project area is available to burn. An analysis of the number of permissive burn days by the California Air Resources Board, Planning and Technical Support Division, Meteorology Section of burn day information in 2005 showed that on average, the number of permissive burn days varies from a low of only 15 days per month in July to a high of 28 days per month in February. On the other hand, the average number of permissive burn days varies by AQMD location; the South Central Coast AQMD, for instance only averages about 21 permissive burn days per month. The Lake Tahoe AQMD has the lowest number of permissive burn days, at 19 days per month. Permissive burn days during the critical prescribed burn months of February through June average about 28 days per month statewide.

Mechanical treatments can serve as a reasonable replacement to prescribed fire when management objectives are to reduce fuel density to reduce a wildfire hazard. However,

mechanical treatments are normally limited to accessible areas, terrain that is not excessively rough, slopes of 40 percent or less, sites that are not wet, areas not designated as national parks or wilderness, areas not protected for threatened and endangered species, and areas without cultural or paleontological resources.

An alternative that specifically addressed air quality is considered in this Program EIR because most of the state's counties are in a non-attainment status for PM_{10}, $PM_{2.5}$, and ozone (Table 4.12-3). Treatments would be modified so that prescribed fire in non-attainment basins would only take place on burn days, with no variances allowed. Eliminating the use of variances would ensure that air quality would not be degraded beyond that allowed under the State Implementation Plan (SIP). A SIP is a plan prepared by states and submitted to the U.S. EPA describing how each area will attain and maintain National Ambient Air Quality Standards (AAQS). AAQS serve as health and welfare-based standards for outdoor air which identify the maximum acceptable average concentrations of air pollutant during a specified period of time.

Under Alternative D, live-fire vegetation treatment techniques (broadcast burning, pile burning) would be reduced by 55 percent statewide when compared to the No Project Alternative to meet air quality thresholds. Under the No Project Alternative, annual live-fire projects account for approximately 13,500 acres annually; under Alternative D the annual acreage figure would be reduced to 6,000 acres. Other vegetation treatment options would remain unaffected. Total output of PM_{10} and CO would be limited to the statewide total allowed in the SIP. This restriction would drastically limit the amount of acreage that could be burned and ultimately treated. Other available vegetation treatments are assumed to slightly increase due to the reduction in prescribed fire projects, but because of the significantly higher costs and significantly lower production rates associated with the other available treatment techniques, the acreage increase would be largely insignificant.

3.7.1 DETAILED DESCRIPTION OF TREATMENTS

Vegetation management activities include the disposal, rearrangement, or conversion of vegetation using various treatments. Treatment methods and actions include:

- Prescribed fire (underburn, jackpot burn, broadcast burn, pile burn, establishment of control lines)
- Mechanical (chaining, tilling, mowing, roller chopping, masticating, brushraking, skidding and removal, chipping, piling, pile burning)
- Manual (hand pull and grub, thin, prune, hand pile, pile burning, lop and scatter, hand plant)
- Prescribed herbivory (grazing by domestic animals, such as cattle, sheep, goats, horses)

- Herbicides (ground applications only, such as backpack spray, hypohatchet, pellet dispersal)

Vegetation management treatment techniques may be applied singularly or in any combination for a particular vegetation type to meet specific objectives of resource management. Within existing physical, environmental, ecological, social, and legal constraints on the area to be treated, the method or methods used will be those that are most likely to achieve the desired objectives while protecting environmental quality. A detailed description of the vegetation treatments that would be applied under Alternative D is described in Section 4.1.5. Historically, treatment acreage has averaged about 27,000 acres per year, with approximately 200,000 to 300,000 acres treated in any ten-year period. Based on recent trends, average project size is expected to be around 260 acres.

3.7.2 LANDSCAPE AVAILABLE TO BE TREATED

Alternative D would take place within the same footprint as the Proposed Program and utilize the same scope. However, in order to reduce air quality impacts under Alternative D, the annual live-fire acres would be reduced from approximately 13,500 prescribed fire acres under the No Project Alternative to 6,000 acres. Approximately 36,000 acres would be treated on an annual basis statewide by prescribed fire and the other available vegetation treatment options. With the significant decrease in the annual prescribed fire acreage, other vegetation treatment options would occupy a larger percentage of the total, but are not expected to compensate for the reduction in live-fire acres with any significance. Of the total 36,000 annual acres proposed to be treated under Alternative D, approximately 17 percent of all treatments are expected to be prescribed fire, 32 percent are expected to be hand treatments, 17 percent are expected to be mechanical treatments, 17 percent are expected to be chemical treatments and 17 percent are expected to be treatments using prescribed herbivory. Table 3.7-1 provides a summary of the available landscape acreage, approximate distribution of treatment activities, approximate acreage treated per decade, approximate annual acreage treated, and percent of the available landscape treated per decade.

Table 3.7-1 Treatable landscape and approximate acres treated per decade

Bioregion	Acres Modeled as the VTP	Distribution of Treatments	Approx. 10 Year Acreage Treated	Approx. Annual Acreage Treated	% of Modeled Acres (10 years)
Bay Area/Delta	2,146,135	9.76%	35,130	3,513	0.16%
Central Coast	3,263,733	14.84%	53,424	5,342	0.24%
Colorado Desert	362,077	1.65%	5,927	593	0.03%
Klamath/North Coast	4,270,334	19.42%	69,901	6,990	0.32%
Modoc	2,629,835	11.96%	43,048	4,305	0.20%
Mojave	942,962	4.29%	15,435	1,544	0.07%
Sacramento Valley	866,478	3.94%	14,183	1,418	0.06%
San Joaquin Valley	688,137	3.13%	11,264	1,126	0.05%
Sierra Nevada	4,915,658	22.35%	80,464	8,046	0.37%
South Coast	1,907,557	8.67%	31,225	3,122	0.14%
Total by Treatment	**21,992,906**	**100.00%**	**360,000**	**36,000**	**1.64%**

3.7.3 ACHIEVMENT OF BASIC PROJECT OBJECTIVES

Alternative D would address some of the Program objectives. Wildland fire behavior could be modified, through the use of strategic fuel treatments, to help reduce losses to life, property, and natural resources. This is the governing objective of the program, and is consistent with Goals 1, 5, and 6 of the *2010 Strategic Fire Plan* (Board, 2010). Larger landscape level treatments, where prescribed fire is the only reasonable option, would be limited. Burning out fuels between past wildfire scars, which is an effective technique to reduce opportunities for wind driven fires to breach areas with lower fuel loading, would be largely unavailable. Range improvement burning would also be limited.

Opportunities for altering the intensity, shape, and direction of wildfires within the wildland urban interface would occur under Alternative D. This objective places emphasis on increasing the strategic and tactical effectiveness of fire suppression within the WUI through the use of appropriate vegetation treatments. Although the use of prescribed fire would be limited, all of the other treatment options would still be available for use within the WUI environment. With the inherent risk of escape from prescribed fire, live-fire operations within the WUI would not be expected to change as a result of Alternative D.

With the limited use of prescribed fire, which can be used to treat landscape level hazardous fuel conditions, the reduction of fire size and associated suppression costs would be limited under Alternative D. Prescribed fire is a logical option to treat larger areas in need of fuel reduction. Other treatment options alone could not be expected to compensate for lack of prescribed fire acres due to the topographic and access limitations associated with mechanical treatment options and the slow production rates associated with hand treatments. Alternative D would also be impractical from an

ecological standpoint because mechanical and hand treatments alone do not serve as ecological substitutes for fire. Fire adapted vegetative systems, which occupy the majority of California, require the infrequent application of fire to stimulate growth, scarify seedbeds, reduce resource competition, and ultimately maintain a balanced and healthy ecosystem.

Alternative D would not reduce the potential for high severity fires by restoring a range of native, fire-adapted plant communities through periodic low intensity treatments within appropriate vegetation types. Prescribed burning elicits a host of ecological interactions potentially important to restoration, including release from plant competition, greater access to light and water, nutrient enrichment, destruction of germination retardants, and the beneficial effects of smoke on plant germination (Keeley and Fotheringham, 1998). The risk of potential fire escape and the generation of nuisance smoke often outweigh the benefits of applying fire for fuel reduction proximate to communities. Because of social, operational, and ecological constraints, mechanical treatments are often easier to implement than prescribed fire, and are often used in its place. However, mechanized and hand treatment effects on ecological function are usually subtle, short-lived, and may not serve as a surrogate for fire. Fire has unique effects on ecosystems and most favorable effects cannot be successfully emulated with any other treatment (McIver et al., 2013). Restoring native, fire-adapted plant communities would be less likely under this Alternative because prescribed fire would be available in fewer applications than alternative treatments.

Similar to the other Alternatives, adopting a programmatic approach to vegetation treatment can assure that a consistent process is applied to the prioritization, evaluation, and implementation of vegetation treatment projects. Also, there is a need to demonstrate whether the desired program and/or project outcomes are being achieved, and whether elements of the program should be iteratively changed in response to emerging data (i.e., adaptive management). The proposed Program recognizes that the chosen alternative will foster consistency, accountability, and transparency for the VTP in a way that satisfies the needs of vested stakeholders.

3.8 ACREAGE SUMMARY FOR PROPOSED PROGRAM AND ALTERNATIVES

Below is a summary of the available landscape where projects could occur relative to the geographic constraints associated with each Alternative. The proposed Program would take place within the WUI, fuel breaks outside of the WUI, and in the Condition Classes 2 and 3 outside the WUI (Ecological Restoration). Fuel treatments under the No Project Alternative can take place anywhere within SRA. Alternative A (WUI only) occurs only in the WUI. Projects initiated under Alternative B (WUI and fuel break) could occur anywhere within the designated WUI as well as fuel break features outside of the

WUI. Alternative C (VHFHSZ) would only address VHFHSZs regardless of whether WUI assets are present. Alternative D would significantly reduce the available acreage for prescribed fire while maintaining the acreage devoted to other treatment types. Tables are presented in acres by bioregion

Table 3.8-1 Treatable landscape under the Proposed Program, No Project, and Alternatives

Bioregion	VTP	No Project	Alt A: WUI Only	Alt B: WUI and Fuel Breaks	Alt C: VHFHSZ	Alt D: Air Quaility
Bay Area/Delta	2,146,135	2,991,166	1,291,941	1,614,957	567,799	2,146,135
Central Coast	3,263,733	4,954,495	1,626,890	2,126,524	1,350,997	3,263,733
Colorado Desert	362,077	509,424	113,664	315,536	255,248	362,077
Klamath/North Coast	4,270,334	7,335,781	1,604,748	2,222,188	3,689,075	4,270,334
Modoc	2,629,835	3,080,269	733,671	1,139,222	1,663,045	2,629,835
Mojave	942,962	731,382	226,257	863,107	152,109	942,962
Sacramento Valley	866,478	1,310,640	512,804	686,352	287,841	866,478
San Joaquin Valley	688,137	1,539,938	328,136	556,486	46,117	688,137
Sierra Nevada	4,915,658	6,439,257	2,884,660	3,389,936	2,338,827	4,915,658
South Coast	1,907,557	2,209,622	1,344,332	1,691,355	1,435,957	1,907,557
Total by Project	**21,992,906**	**31,101,975**	**10,667,101**	**14,605,664**	**11,787,015**	**21,992,906**

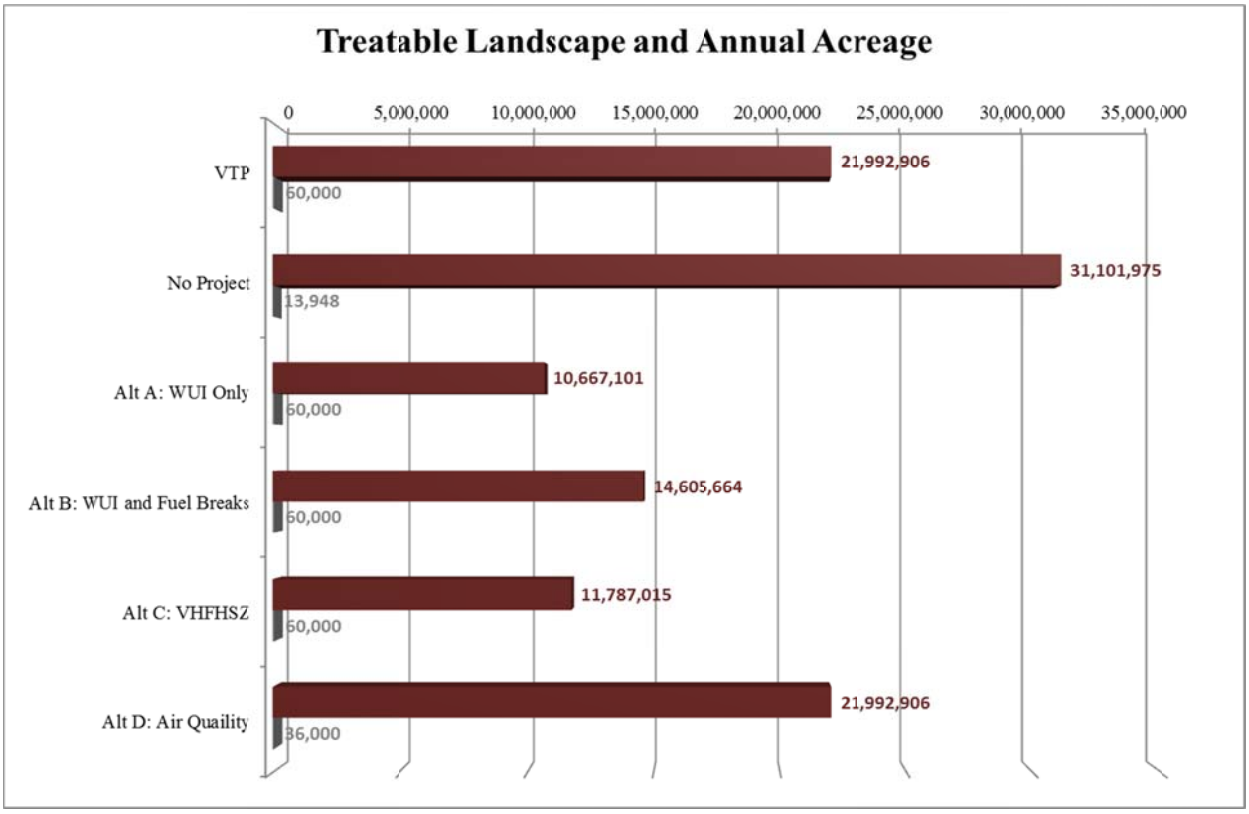

Figure 3.8-1 Treatable Landscape and Annual Acreage under the Proposed Program, No Project and Alternatives

3.9 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Alternatives considered but eliminated from detailed analysis are described below.

3.9.1 REDUCED ACREAGE

An alternative was developed similar to the proposed Program but which only treated about 30,000 acres instead of the 60,000 acres proposed under the proposed Program. This alternative projected that treatment acreages would increase at a rate consistent with current program treatment accomplishments over the past 20 years. However, this alternative was eliminated from detailed analysis because it would fall short of the objectives of the proposed Program from a fuel treatment and fire behavior standpoint. Effectively this option deviates very little from Alternative D, although prescribed fire would not be specifically limited. The existing VMP treats on average 23,000 acres each year; with such a small increase in treated acres, this option would not provide sufficient additional acreage over existing programs to adequately address the objectives of the proposed Program.

3.9.2 HIGHLY CONSTRAINED – WUI AND VHFHSZ

Another “highly constrained” alternative was also considered but eliminated from detailed analysis. This alternative would have been similar to Alternative A: WUI, but would have further constrained treatments to VHFHSZs only. This alternative was rejected because it too would not have been able to meet the objectives of the program from a fuel treatment and fire behavior standpoint. Too many acres would have been constrained out of treatment to allow such a program to be successful in achieving the stated objectives. In addition, this alternative is not consistent with *2010 Strategic Fire Plan for California* or the *2012 Strategic Plan*.

3.9.3 LIMITING TREATMENT TO AREAS WITH HIGH INCIDENCE OF WILDFIRES

The third alternative considered but eliminated from detailed analysis would have placed most of the treatments in areas where there currently is a high incidence of wildfire (i.e. ignition sources). As a result, this alternative would have placed the majority of the annual acreage of treatments into the South Coast and Sierra Nevada bioregions. This alternative was eliminated from detailed analysis because the likely consequences of treating such a small proportion of the state were expected to outweigh the benefits in the two bioregions. In addition, treating only two bioregions would have resulted in no benefits to other bioregions from treatments to reduce wildland fire, improve forest and range conditions, etc. This alternative would also not allow the majority of California

residence in the SRA the opportunity to benefit from vegetation treatments in areas that may reside in Condition Class 2 or 3 but are considered infrequent areas for wildfires. In addition, this alternative is not consistent with *2010 Strategic Fire Plan for California* or the *2012 Strategic Plan*.

3.9.4 HIGH ACRES IN THE WUI ONLY

The fourth alternative eliminated from detailed analysis proposes treatment activity within the WUI only and would propose to treat 10 percent of the WUI landscape over a 10 year time frame. Projects would primarily consist of community and infrastructure protection, establishing safe areas of refuge, and enhancing vegetation clearance proximate to structures. Fuel breaks and ecological restoration opportunities outside of the WUI would not be included under this proposed alternative. Wildland fire control success outside the WUI would rely primarily on initial attack and extended attack resources without the strategic benefit of pre-treated fuels or existing fuel breaks. The project evaluation process, analysis procedures, treatment options, and SPRs would be the same as the proposed Program. The available landscape to treat would be significantly smaller than the proposed Program because only a portion of the SRA is comprised of the WUI, but to reach the threshold of treating 10 percent of the landscape over a decade, the total acres treated under this alternative would be greater than the proposed Program. Modeling this approach identifies 11.7 million acres of WUI within the SRA, which equates to 117,243 acres being treated each year. As discussed in Section 2.3.2, CAL FIRE does not have the capacity to treat this many acres.

Although this option focuses treatments on high value resources (life safety and property) and would be expected to make WUI communities more resilient to wildfire, there would be significant impacts to air quality, greenhouse gasses, and watershed resources as the treatments are concentrated on only 11.7 million acres. Furthermore, this Alternative excludes the option to implement hazardous fuel reduction treatments (fuel break or ecological restoration) on a landscape level. Consequently, this Alternative may lead to more fires entering and being fought in the WUI and is not consistent with *2010 Strategic Fire Plan for California* or the *2012 Strategic Plan*.

3.9.5 FOCUSING ON AREAS OF HISTORICAL USE OF TREATMENTS

A fifth alternative eliminated from detailed analysis would limit vegetation treatments to areas of the State that already practice these activities. Portions of California would not be eligible for fuel treatments based on historical treatment applications. The effects of California's drought continue to show in conifer mortality throughout the State, but communities that have not conducted fuel treatments previously would not be eligible to take advantage of this Vegetation Treatment Program. There is a current estimate that about 12.5 million trees have died in areas of extreme and exceptional drought stricken

areas of California (USFS, 2015). Drought impacts have also lead to a buildup of bark beetle infestations throughout the State (USDA, 2015). This Alternative does not allow CAL FIRE to respond to changing environmental conditions over time. Consequently, this Alternative would not meet the first four objectives including increasing the opportunities for altering or influencing the size, intensity, shape, and direction of wildfires within the wildland-urban interface. In addition, this alternative is not consistent with *2010 Strategic Fire Plan for California* or the *2012 Strategic Plan*.

3.9.6 1,000 FOOT WUI AND FUEL BREAKS ONLY

Another alternative considered but eliminated from detailed analysis focused vegetation treatments within a 1,000 foot WUI area and maintaining existing pretreated areas only. However, there are several road blocks to develop an analysis of this Alternative. A review of scientific literature found no scientific basis to support limiting WUI treatments to 1,000 feet. The most relevant research from the Sierra Nevada Forest Plan Amendment (Part 3.5) split the WUI into two components, a 0.25 and a 1.25 mile wide area, for a total of a 1.5 mile wide WUI zone, but a scientific basis for a smaller WUI zone could not be established.

Further literature review examined the potential for a tiered WUI alternative based on ember cast from timber, shrubs, and grass. Spotting and spotting ignition are a significant mechanism for fire spread. The hypothesis was that a timber ember would travel farther than a shrub or grass ember. There are three primary mechanisms for ember ignition potential: generation, transport, and ignition of recipient fuel. However, weather conditions (specifically wind and humidity) are the most critical factors in spotting (Koo et al., 2010). There are several models that predict the potential spotting distance from a fire. Factors such as height of the flame above a canopy, wind speed, plume height and ember size play individual roles that collectively specify the total distance of travel (Albini et al., 2012). Another study evaluated wind speed and firebrand distance and concluded that the distance a firebrand reaches is dependent on wind speed and not in relation to a fire's pyrolysis temperature and diameter of the ember (Kim et al., 2009). Comparisons of these factors have provided encouraging results but additional studies on ember casts have been recommended (Koo et al., 2010; Albini, et al. 2012; Linn et al., 2010). Consequently, there was no strong basis to support this approach with this Program EIR. See Chapter 2.3 and Chapter 4.1 for additional WUI evaluation under this Program EIR.

Maintaining existing fuel breaks does not allow a community to respond to changing environmental conditions, especially emergency environmental conditions such as drought. This alternative would not offer opportunities for altering or influencing the size, intensity, shape or directions of wildfires within the WUI as fuel loading changes occur

over time. Consequently, this alternative is not consistent with *2010 Strategic Fire Plan for California* or the *2012 Strategic Plan*.

3.9.7 FIRE RETURN INTERVAL DEPARTURE

Comprehensive fuels management programs traditionally depend on the characterization of a reference condition which can provide management targets and a means to measure management success. The most commonly used reference condition to reconstruct historical fire regimes is fire return interval (FRI), or the length of time between fire occurrences on a specific area of land (Agee, 1993; Brown, 1995). Drawing comparisons between past and current fire frequencies can assist resource managers in prioritizing fuel treatments by providing a template for assessing ecosystem conditions and evaluating landscapes for ecosystem need (Hann and Bunnell, 2001). Under this alternative, only landscapes that have met or exceeded their FRI would be available for vegetation treatment.

Using a landscape's FRI as a strategic planning guide has many benefits. Landscapes that have exceeded their FRI are more susceptible to fire, pests, disease, and water stress (Schmidt et al., 2002) and the FRI alternative could also address the ecological consequences of fire suppression such as altered species composition. Landscapes within their mean FRI will generally have less severe fire behavior should an ignition occur (Hardy et al., 2001).

However, committing to focus treatment efforts based on one metric has many shortcomings. Changes in the environmental baseline resulting from climate change, human land use, or invasive species make the uncritical use of historical data as a guide to the future less defensible. Most landscapes already exhibit substantial variability in fire occurrence (Schmidt et al., 2002). Modeled or inferred fire intervals over the next 50 to 100 years nearly unanimously project increasing potential for wildfire above pre-settlement levels (Safford and Van de Water, 2014) which makes relying on a historical FRI questionable.

Areas in the WUI already suffering from potentially damaging fires would also continue to be threatened from potentially damaging fires under this Alternative. Unless the FRI is met or exceeded, fuel treatments could not be initiated. This poses significant challenges as California's urban areas continue to stretch out into the wildlands. Delaying the opportunity to address critical fuel conditions until an arbitrary point in time has been reached ignores the immediate threat to life and property.

Considering most fire-dependent ecosystems in California never reach their FRI because of an abundance of human and natural ignition sources, this alternative would not meet any of the Program Goals. By utilizing a one-dimensional metric such as FRI

as a guide to focus fuel treatment efforts would likely result in future loss to life and property. Fewer opportunities to alter the size of potential fires would be available because treatments would not commence until the FRI was met or exceeded. Although the potential for high-severity fires could be reduced by restoring a range of native and fire-adapted plant communities through treatment efforts, these reductions would only be met in areas meeting the FRI requirement and would ignore landscapes of slightly younger fuels that are still capable of supporting high severity fires. Consequently, this alternative is not consistent with *2010 Strategic Fire Plan for California* or the *2012 Strategic Plan*.

3.10 PREFERRED ALTERNATIVE

After considering all of the environmental consequences of implementing the proposed Program and the Alternatives, the proposed Program is considered the Preferred Alternative relative to the Objectives.

Overall, the proposed Program is the environmentally superior alternative as it has a combination of the most benefits and least effects when considering all of resources. Alternative B is close to the proposed Program, but while it treats the same number of acres per decade as the proposed Program, it would not have nearly as large of a treatable land base open to prescribed fire in terms of ecological restoration. This reduced landscape would not initially be constraining, but over time the acreage that could be treated with prescribed fire would be limited. In addition, limitations on what could be treated at the project level could create a more complex mosaic of treated and untreated vegetation that might not reduce wildfire behavior to as great an extent as the proposed Program. A detailed description of the potential impacts to various resources, as well as any mitigation measures prescribed to reduce their impacts, is discussed in Chapter 4. Cumulative impacts are discussed in Chapter 5.

The proposed Program would meet the objectives established for the VTP in Section 2.2.1 to a greater degree than the Alternatives and No Project (Status Quo). Again, Alternative B would come almost as close to meeting the objectives for the VTP as the proposed Program. However, the opportunity to engage in vegetation treatment projects throughout the SRA that have been designated as Condition Classes 2 or 3 would not be available. As stated earlier, SRA lands provide a broad array of ecological benefits including critical habitat for protected species, drinking water, wood products, carbon storage, and scenic and recreational opportunities. Large, destructive wildfires are a growing threat to these values, and it’s clear that landscape scale changes in vegetative structure and fuel loadings must be accomplished to significantly alter wildfire behavior, reduce wildfire losses, and achieve longer term fire resiliency in the wildlands (Agee et al., 2000; Finney, 2001; Peterson et al., 2003; Graham et al., 2004). Limiting fuel

treatments as proposed in Alternative B would ultimately ignore broad-scale opportunities to restore or maintain landscape-level fire-adapted ecosystems.