**DRAFT**

# Decision Tree for Prioritizing Vegetation Treatments To Reduce Fire Risks to Structures In California Shrublands

This draft decision tree (Figure 1) is narrowly intended to help Calfire prioritize where vegetation treatments are most likely to reduce wildfire risks to human structures in southern California chaparral, sage scrub, or other shrubland types. It is NOT intended to cover all possible cases of vegetation treatments (e.g., to achieve ecological restoration goals) or all vegetation types (e.g., coniferous forests). Similar, but different, decision trees could be created for these other situations.

## Overview

The decision tree facilitates an objective, repeatable, and scientifically defensible decision-making process to categorize a proposed vegetation treatment project as High, Moderate, or Low Priority for implementation. It is based on extensive scientific information that shows where modifying vegetation is most likely to provide the "biggest bang for the buck" by reducing risks of structure damage from wildfires and improving firefighting tactical advantages during an incident, while minimizing adverse environmental impacts and economic costs. The goal is to maximize the benefit-cost ratio of vegetation treatment projects and to avoid wasting limited funds on projects that have a low probability of reducing risks or a high probability of adverse or unintended impacts (e.g., unnecessary environmental degradation, increases in flashy fuels, or high maintenance costs).

The decision tree starts with a coarse-filter (landscape level) evaluation of whether the proposed treatment is within a landscape zone mapped as having high risk of structure loss during a wildfire. Empirical analyses have shown structure loss is significantly more likely if a home is located in fire-prone areas (such as Santa Ana wind corridors) or in certain housing configurations (near the edge of a development or at low housing density) (Syphard et al. 2012,2013). Maps of high risk to structures can be developed as a function of where homes have historically been destroyed, but may also consider effects on fire risk of terrain, development patterns, vegetation characteristics, and wind patterns. A draft fire-risk map has been developed for San Diego County, and similar maps should be developed for other southern California counties.

If structures are in a high-risk area, the decision tree next evaluates the relative certainty that vegetation modification will reduce risks of structure loss by providing for defensible space or for additional firefighter safety and firefighting tactical advantages. Depending on distance of the proposed treatment from the structures at risk (roughly, <100 feet, 100-1,000 feet, or >1,000 feet away), it uses several field evaluation procedures to determine the likely benefits (i.e., risk reduction) and costs (e.g., environmental degradation) to assign treatments to High, Moderate, or Low Priority categories. (NOTE to reader: the field evaluation procedures are under preparation and are not yet included in this initial DRAFT. They should be developed in collaboration with firefighting experts and ecologists.)

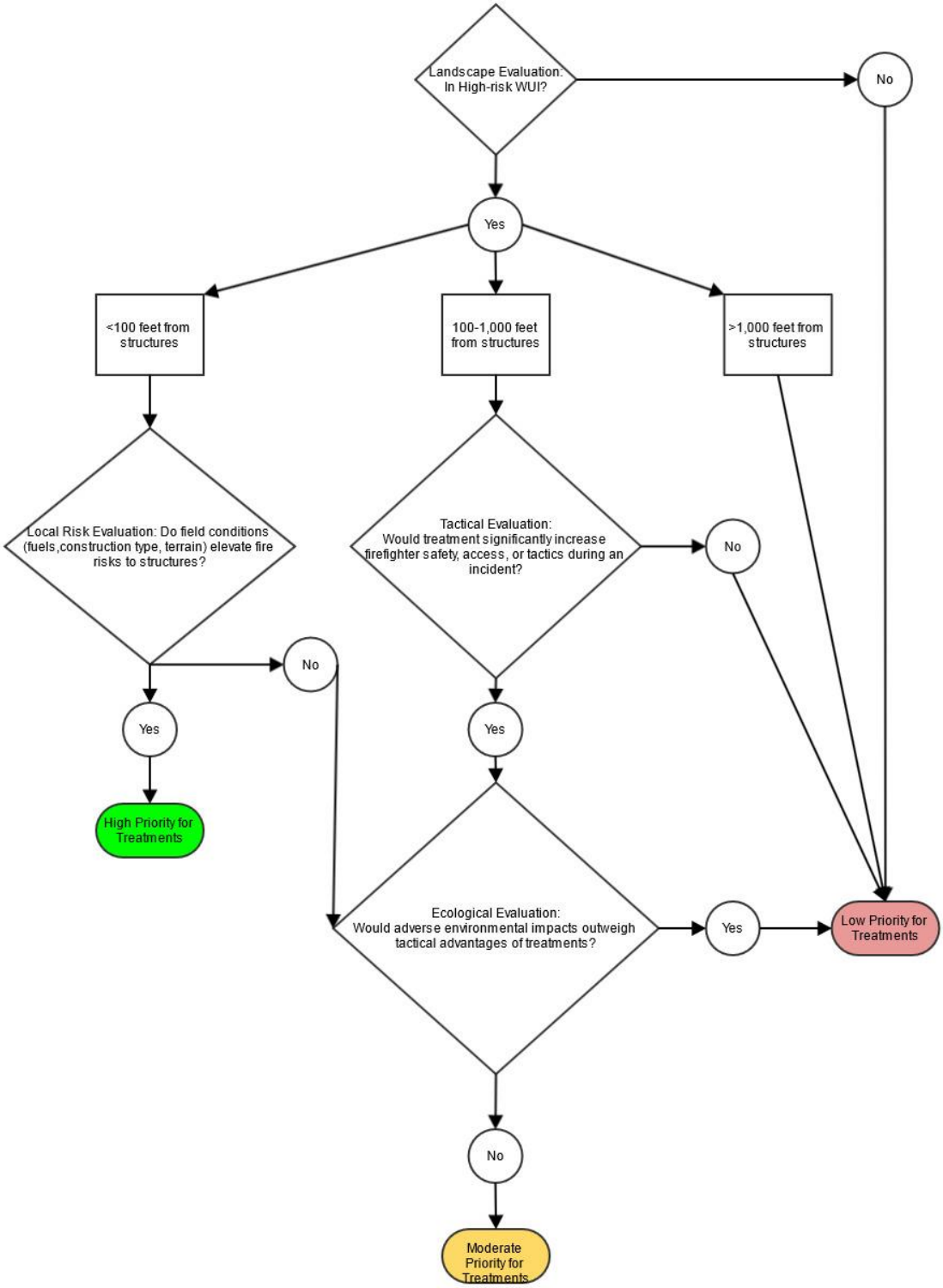


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**Figure 1. Vegetation Treatment Decision Tree**

**Funds should always be allocated first to High Priority Treatment projects.** Moderate Priority projects should only be implemented once all High Priority projects are implemented. Low Priority projects should rarely if ever be implemented, and only if the project is carefully designed and analyzed to demonstrate that it will have a positive benefit–cost ratio to risk reduction and will not increase other fire risk factors, such as by increasing flashy fuels.

**Foundational Assumptions and Logic**

- Most structure ignitions during wildfires occur from fire brands (blowing embers) rather than radiant or convective heating from flames.
- Most structure loss to wildfires occurs during wind-driven (e.g., "Santa Ana" and "Sundowner") fires. Fuel breaks alone do not stop fires under such severe weather conditions.
- Fuel breaks can provide access and anchor points for tactical firefighting operations and can be used to control fire perimeters under normal weather conditions or during the later stages of wind-driven fires, once the winds subside. The challenge is to identify strategic locations where fuel breaks are most likely to be effective.
- The certainty that vegetation treatments reduce structure losses decreases with distance from the structures:
    - Treatments immediately adjacent to (<100 feet from) homes or other structures minimize the potential for structure ignition from flame impingement or radiant heat and increase the amount of defensible space from which firefighters can safely protect those structures under either wind-driven or fuel-driven fires (e.g., by dousing ember ignitions in the built environment).
    - Empirical studies demonstrate that treatments more than 100 feet from structures do not directly influence the probability of structure losses. However, treatments that create or improve access routes, escape routes, safety zones, anchor points, or firelines for backfires, MAY help firefighters safely protect communities during incidents. To be useful to firefighters protecting communities, such fuel modifications should be near (generally, within about 1,000 feet of) the structures at risk and must be safely accessible from existing roads.
    - Due to great uncertainty that treatments more than about 1,000 feet from structures will help firefighters protect communities, they should rarely, if ever, be implemented, and only if in-depth analysis demonstrates that there are substantial tactical benefits to be gained due to special circumstances, along with minimal potential for adverse or unwanted impacts, such as degradation of ecological resources or increases in weedy (flashy) fuels.

**Safety Considerations**

Regardless of distance from structures at risk, only sites where firefighters can be safely deployed according to the National Wildfire Coordinating Group's (NWCG's) risk management process should be considered for vegetation treatments. Fuel breaks should be confined to areas where a firefighter's mandatory hazard control analysis based on firefighting rules of engagement (e.g., from Standard Fire Orders and the LCES checklist) determine that suppression operations could proceed safely and

effectively under expected fire conditions. Lack of anchor points, viable escape routes and safety zones, or presence of multiple "watch out" situations or tactical hazards should disqualify any potential treatment area. Fuel breaks should never be located in places too remote or dangerous for firefighters to reach given expected fire behavior or historic fire scenarios.

**Next Steps**

- Develop objective evaluation procedures (e.g., scoring matrices or other objective, repeatable methods) for how to perform the three field evaluation processes in the decision tree (the three large diamonds):
    - **Local Risk Evaluation**. This should entail a "house-out" field evaluation of structure risks based on characteristics of the built environment, vegetation, terrain, weather patterns, fire history, and other relevant factors. The evaluation process should be developed based on best available fire science and expertise and should include a cost-benefit analysis.
    - **Tactical Evaluation** of improvements to firefighter safety, access, and tactics. This field evaluation process should be developed collaboratively with fire-fighting experts having thorough knowledge of fire behavior and fire-fighting tactics and operations.
    - **Ecological Evaluation** of impacts to the environment. This field evaluation should be developed by experts in ecology and resource management in California shrubland ecosystems. It should consider the potential risks of vegetation type conversion, increases in weedy species and flashy fuels, runoff and soil erosion, and impacts to sensitive species and vegetation communities.
- Establish an expert oversight group and process to provide input and review for application of the decision tree and guidelines.
- Establish a process (such as another decision tree and associated guidelines) for planning and implementing ecological rehabilitation and restoration of unneeded fuel breaks (e.g., existing breaks that rate as Low Priority under these guidelines).
- Develop guidelines for maintaining higher-priority fuel breaks to ensure their continued effectiveness.
- Develop guidelines for what structures qualify for consideration under these guidelines (e.g., should treatments near isolated rural homes receive the same priority as treatments near suburban developments or clusters of homes?).