

## Appendix I

# Wildfire Threat Reduction Recommendations for Lake Tahoe Basin Homeowners



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# **Wildfire Threat Reduction Recommendations for Lake Tahoe Basin Homeowners**

## **Introduction**

*In 2002, the University of Nevada Cooperative Extension, in cooperation with the Lake Tahoe Regional Fire Chiefs' Association, initiated an effort to standardize wildfire threat reduction recommendations for Tahoe Basin homeowners used by federal, state, and local fire prevention organizations. The "Living With Fire Wildfire Threat Reduction Recommendations for Lake Tahoe Basin Homeowners" is the result of this process. It is important to note: these are **suggestions** for Tahoe Basin homeowners endorsed by the program's sponsors and are not requirements. Local fire jurisdictions should be consulted regarding requirements. These recommendations are not intended to be in conflict with local ordinances, codes, or laws.*

## **Recommendations**

**1.0 Purpose:** *These are wildfire threat reduction recommendations for Tahoe Basin homeowners to implement on their properties. The recommendations are presented in three categories: Built Zone; Defensible Space Zone; and Access Zone.*

### **2.0 Built Zone**

**2.1 Objective:** *Improve the ignition resistance of the house and associated structures.*

**2.2 Definition:** *The Built Zone consists of the house, deck, and other structures.*

### **2.3 Roof**

- a. Roof Covering:** *Wood shake or shingle roofs should be replaced with a non-combustible roof covering such as composition, non-glare metal, cement product, or tile.*
- b. Roof Assembly:** *The fire resistance of the roof assembly (includes the covering, underlayment, and support) should have at least a Class C rating. Contact the local fire department for detailed information concerning fire-resistant roofs.*

- c. **Roof Openings:** All roof openings, such as a space between the roof covering and the roof decking, should be plugged or screened with ¼-inch or smaller wire mesh to prevent entry of embers.
  - d. **Roof Debris:** The roof should be kept free of fallen needles, leaves, branches, and other debris.
- 2.4 Chimney:** Every chimney, flue, or roof vent should have an approved spark arrestor consisting of ½-inch or smaller wire mesh.
- 2.5 Eaves and Overhangs:** The undersides of eaves and other overhangs (e.g., cantilever balconies) should be covered with at least a ½-inch thick solid sheathing material.
- 2.6 Rain Gutters:** Rain gutters should be kept free of fallen leaves, needles, and other debris.
- 2.7 Exterior Wall Covering:** Exterior wall coverings consisting of wood shakes or shingles, boards, or panels and vinyl siding are poor choices. Stucco, brick, metal, cement board, stone, and log wall construction are usually more fire-resistant.
- 2.8 Windows:** Single-paned and large windows are poor choices. Windows that are at least double-paned or use tempered glass are preferred. Low “E” glass may provide some advantages. Windows with aluminum frames and sashes are better choices than those using vinyl or wood. Closable, solid exterior shutters can provide additional protection.
- 2.9 Vents:** All vent openings should be covered with ¼-inch or smaller non-corrosive mesh. Do not use fiberglass mesh.
- 2.10 Decks:** Preferably, the undersides of decks should be enclosed with fire-resistant materials, such as those described in **2.7 Exterior Wall Covering**. As an alternative, the undersides of decks can be screened with ¼-inch or smaller wire mesh. The area underneath decks should be kept free of all easily combustible materials.
- 2.11 Flammable Items:** Flammable items, such as paper, fallen leaves and needles, trash, firewood, and combustible decorations, should be removed from exposed locations, such as porches, steps, patios, and decks.
- 2.12 Wooden Fences:** If a wooden fence is attached to the house, create a barrier using fire-resistant materials, such as masonry or metal, between the house and the fence.

### 3.0 Defensible Space Zone

**3.1 Objective:** Reduce the flammability of vegetation near the house.

**3.2 Definition:** Defensible space is that area between a house and an oncoming wildfire where the vegetation has been managed (i.e., pruned, thinned, removed, replaced, etc.) to reduce the wildfire threat and allow firefighters to safely defend the house.

**3.3 Defensible Space Zone Distances:** The distance from the house in which defensible space practices should be implemented vary by fuel type and steepness of slope. The recommended minimum distances are presented in **Table 3.3a**.

**Table 3.3a**  
**Recommended Defensible Space Zone Distances<sup>1</sup>**

| <b>Fuel Type (Fuel Models)<sup>2</sup></b> | <b>Percent Slope</b> |                 |                 |
|--|----------------------|-----------------|-----------------|
|  | <b>0-20%</b>         | <b>21-40%</b>   | <b>&gt; 40%</b> |
| <b>Grass (1-3)</b>                         | <b>30 feet</b>       | <b>100 feet</b> | <b>100 feet</b> |
| <b>Shrub (4-7)</b>                         | <b>100 feet</b>      | <b>200 feet</b> | <b>200 feet</b> |
| <b>Timber<sup>3</sup> (8-13)</b>           | <b>100 feet</b>      | <b>100 feet</b> | <b>200 feet</b> |

<sup>1</sup> As measured from the footprint of the house.

<sup>2</sup> BEHAVE Fuel Models.

<sup>3</sup> Use shrub values if a substantial shrub understory is present.

**3.4 Defensible Space Zone Areas:** The Defensible Space Zone consists of three areas: the Noncombustible Zone; the Lean, Clean, and Green Zone; and the Wildland Fuel Reduction Zone. See **Figure 3.4**.

**3.5 Noncombustible Area:** This area lies immediately adjacent to the house and extends out from the footprint of the house for at least five feet. The objective of this area is to prevent the ignition of a smoldering or flaming fire that could in turn ignite the house. Of particular concern is the prevention of ignition from burning embers. Recommendations for the Noncombustible Area include:

- a. **Remove Dead Plant Material:** All dead plant material including dead shrubs and trees; fallen leaves and needles; bark and wood mulches; dried grass, flowers, and weeds; dead leaves, flowers and branches still attached to living plants; firewood; and construction materials, should be removed from this area.

- b. Remove Flammable Living Plants:** *Flammable native plants, such as big sagebrush, bitterbrush, rabbitbrush, greenleaf manzanita, huckleberry oak, snowbrush, and coniferous trees that are less than six inches in diameter at breast height (dbh), should be removed from this area. Flammable ornamental plants such juniper, mugo pine, Austrian black pine, other coniferous shrubs and trees, large exotic grasses, and Scotch broom, should be removed and should not be planted in this area. When removing shrubs and trees from this area, the root systems should be left in place to reduce the potential for erosion. Trees should be cut to ground level and the stumps treated with powdered borax.*
  - c. Use Noncombustible Materials:** *Consider the use of noncombustible materials, such as rock, gravel, brick, and concrete, in this area. Note: TRPA land coverage standards may apply and permits may be required.*
  - d. Use Low-growing, Irrigated, Herbaceous Plants:** *Consider the use of low-growing (less than 18 inches in height) herbaceous (non-woody) plants, such as lawn, conservation grasses, clover, forbs, and succulents, that are kept green during the fire season with irrigation.*
  - e. Use Deciduous Shrubs:** *The use of native and ornamental deciduous shrubs, except for those presented in **3.5b**, is acceptable, so long as they are kept healthy and vigorous, the lower branches do not touch the ground, and branches are not in contact with the house. Shorter shrubs (less than 18 inches in height) are preferred.*
  - f. TRPA Recommended Plant List:** *In situations other than borders, entryways, flower beds, and similar locations, vegetation to be planted in this area should be selected from the TRPA Recommended Plant List.*
  - g. Fire-resistant Trellises:** *Use noncombustible materials for trellises.*
  - h. Bare Soil:** *Implementation of defensible space practices in this area should not result in an increase in the amount of bare soil.*
- 3.6 Lean, Clean, and Green Area:** *This area often serves as the transition between wildland vegetation and the house and is usually where the irrigated, residential landscape is situated. It extends out for at least 30 feet from the footprint of the house. See **Figure 3.4**. The objectives for this area are to: 1) manage the vegetation so that the fuels present would be unable to generate enough heat for a long enough time to ignite the house, and 2) provide a safe and effective area for firefighters, if present, to defend the house. Recommendations for the Lean, Clean, and Green Area include:*

- a. **Dead Plant Material:** Remove standing dead trees and shrubs; recently fallen trees; dead branches that have fallen or that are still attached to living plants to height of 15 feet aboveground; dried grass, flowers, and weeds; fallen needles and leaves covering areas other than bare soil (such as lawn, roof, plants, deck, etc.), dead leaves and needles that are still attached to living plants to a height of 15 feet; firewood (should be located at least 30 feet uphill from the house); and wood scraps or debris. Fallen dead trees that are embedded into the soil can be left in place so long as all exposed branches are removed. Wood and bark mulches can be used. Fallen leaves and pine needles covering bare soil should be maintained at a depth of 1 inch to 2 inches.
- b. **Flammable Living Shrubs:** For the most part, the presence of flammable living plants as listed in **3.5b** should be substantially reduced in this area and replaced with less flammable species. Individual specimens or small group plantings of these species may be retained so long as they are kept healthy and vigorous; are pruned to reduce height and fuel load; and cannot convey a fire burning in adjacent wildlands to the house. Sufficient quantities of residual vegetation should remain in this area to stabilize the soil and prevent erosion. When removing shrubs from this area, the root systems should be left in place to reduce the potential for erosion.
- c. **Native Live Trees:** Native live trees should be thinned to provide an average separation of ten feet between crowns. Cutting of live trees greater than six inches dbh requires a permit and the trees must be marked prior to removal. Healthy trees greater than 24 inches dbh should be retained. Trees to be removed that are greater than six inches dbh should be cut to within six inches of the ground. Trees less than six inches dbh should cut at ground level. All stumps should be treated with powdered borax. If feasible, tree species of limited occurrence, such as incense cedar, sugar pine, western white pine, mountain hemlock, whitebark pine, and western juniper, should be retained; and more common tree species, such as white fir, should be removed.
- d. **Retain Low-growing Native Plants:** Low-growing (less than 18 inches in height) native plants, such as squaw carpet, pinemat manzanita, phlox, and sulfur flower buckwheat, can be retained so long as they are kept healthy and vigorous.
- e. **Use Noncombustible Materials:** See **3.5c**.
- f. **Use Low-growing, Irrigated, Herbaceous Plants:** See **3.5d**.

- g. Use Deciduous Trees and Shrubs:** *Deciduous trees and shrubs can be used if they are kept healthy and vigorous; are kept free of dead leaves and wood; and are arranged so that a fire burning in the adjacent wildland vegetation cannot be conveyed through them to the house. Shorter shrubs (less than 18 inches tall) are preferred.*
  - h. TRPA Recommended Plant List:** *In situations other than borders, entryways, flower beds, and similar locations, vegetation to be planted in this area should be selected from the TRPA Recommended Plant List.*
  - i. Ladder Fuels:** *A vertical separation between tree or tall shrub canopies and understory vegetation should be created that is at least three times the height of the understory plants. See **Figure 3.6g**. Removal of lower branches should not exceed one-third of the tree or tall shrub height. When no understory vegetation is present, the lower branches of trees and tall shrubs should be removed to a height of at least five feet aboveground. Branches of shorter shrubs that are in contact with the ground should be removed.*
  - j. Problem Tree Branches:** *Tree branches within 10 feet of a chimney, encroaching on power lines, overhanging the roof, or in contact with the house should be removed.*
  - k. Bare Soil:** *Implementation of defensible space practices in this area should not result in an increase in the amount of bare soil.*
- 3.7 Wildland Fuel Reduction Area Nonsensitive Lands:** *This area extends out from the Lean, Clean, and Green Zone to the appropriate Defensible Space Zone Distance presented in **Table 3.3a**. This area consists of wildland vegetation, such as manzanita brushfields and mixed-conifer forest. The objective for this area is to reduce the intensity and duration of a wildfire burning more than 30 feet from the house. Recommendations for the Wildland Fuel Reduction Area when situated in **nonsensitive areas** include:*
- a. Dead Plant Material:** *Remove standing dead trees and shrubs; recently fallen trees; dead branches that have fallen or that are still attached to living plants to height of 15 feet aboveground; dried grass, flowers, and weeds; and dead leaves and needles that are still attached to living plants to a height of 15 feet. Fallen dead trees that are embedded into the soil can be left in place so long as all exposed branches are removed.*

- b. Reduce Horizontal Continuity of Native Shrubs:** For Individual or small groups of native shrubs growing on flat to gently sloping terrain (less than 20% slope), create a horizontal separation between their canopies that is at least twice their height. See **Figure 3.7b**. On steeper terrain (greater than 20% slope), this separation distance should be greater than twice their height. The recommended separation distance can be created through shrub removal and/or pruning to reduce height and/or diameter of the shrub. When removing shrubs from this area, the root systems should be left in place to reduce the potential for erosion.
- c. Native Live Trees:** The recommended average separation distance between the canopies of live trees growing slopes less than 20% is ten feet. For trees growing on steeper slopes, the separation distance should be greater. Cutting of live trees greater than six inches dbh requires a permit, and the trees must be marked prior to removal. Healthy trees greater than 24 inches dbh should be retained. Trees to be removed that are greater than six inches dbh should be cut to within six inches of the ground. Trees to be removed that are less than six inches dbh should be cut at ground level. All stumps should be treated with powered borax. If feasible, tree species of limited occurrence, such as incense cedar, sugar pine, western white pine, mountain hemlock, whitebark pine, and western juniper, should be retained, and more common tree species, such as white fir, should be removed.
- d. Remove Ladder Fuels:** A vertical separation between trees or tall shrub canopies and understory vegetation should be created that is at least three times the height of the understory plants. Removal of lower branches should not exceed one-third of the tree height. When no understory vegetation is present, the lower branches of trees and tall shrubs should be removed to a height of at least 5 feet aboveground.
- e. TRPA Recommended Plant List:** In situations other than borders, entryways, flower beds, and similar locations, vegetation to be planted in this area should be selected from the TRPA Recommended Plant List.
- f. Bare Soil:** Implementation of defensible space practices in this area should not result in an increase in the amount of bare soil.

**3.8 Wildland Fuel Reduction Area Sensitive Lands:** When the Wildland Fuel Reduction Area is situated on **sensitive lands**, additional considerations apply. Sensitive lands include Stream Environment Zones (SEZ), Shoreline Zones, Scenic Areas, and Conservation/Recreation Areas.



- a. **SEZ:** TRPA shall evaluate defensible space practices proposed for SEZs prior to implementation. No healthy SEZ indicator plants shall be removed from this area. Slash and other materials shall not be placed, piled, spread, or burned within SEZs.*
- b. **Shoreline Zones:** TRPA shall evaluate defensible space practices proposed for Shoreline Zones prior to implementation.*
- c. **Scenic Areas:** TRPA shall evaluate defensible space practices proposed for scenic areas, such as scenic corridors, state parks, and public beaches, prior to implementation.*
- d. **Conservation/Recreation Areas:** Within these areas, snags and coarse woody debris that have high wildlife value will be managed as specified in 78.2D of the TRPA Code of Ordinances.*

#### **4.0 Access Zone**

- 4.1 **Objective:** Improve the ability of firefighters to locate and arrive at a house threatened by wildfire in a timely manner.*
- 4.2 **Definition:** The Access Zone consists of driveways and signage associated with house location.*
- 4.3 **Address:** The home address sign should be readily visible from the street, use characters that are at least four inches high, and be constructed of fire-resistant material.*
- 4.4 **Street Signs:** Street signs should be at every intersection leading to a house, use characters that are at least four inches high, and be made of reflective, noncombustible material.*
- 4.5 **Driveways and Clearance:** Flammable vegetation should be cleared for at least 10 feet on both sides of the driveway. Overhead obstructions, such as overhanging branches, should be cleared for at least a 15 foot vertical clearance.*
- 4.6 **Driveway Characteristics:** Houses located at the end of long driveways (greater than 300 feet) should have turnaround areas suitable for large fire equipment.*

## **Literature Review**

*California Department of Forestry and Fire Protection. 1993. Fire safe guides for residential development in California. 97p.*

*International Fire Code Institute. 1997. Urban-Wildland Code. 49p.*

*Moore, H.E. 1991. Protecting residences from wildfires: a guide for homeowners, law makers, and planners. USDA Forest Service. GTR: PSW-50. 43p.*

*National Fire Protection Association. 1991. NFPA 299 Protection of life and property from wildfire. 19p.*

*Slack, P. Undated. Firewise construction design and materials. Colorado State Forest Service and Federal Emergency Management Agency. 38p.*

*Smith, E.G. and J.A. Skelly. 1999. Living with fire – a guide for the homeowner (2<sup>nd</sup> edition). University of Nevada Cooperative Extension and Sierra Front Wildfire Cooperators. UNCE Special Publication: SP-99-01.*

*Tahoe Regional Planning Agency. 2003 (as revised). Code of ordinances.*

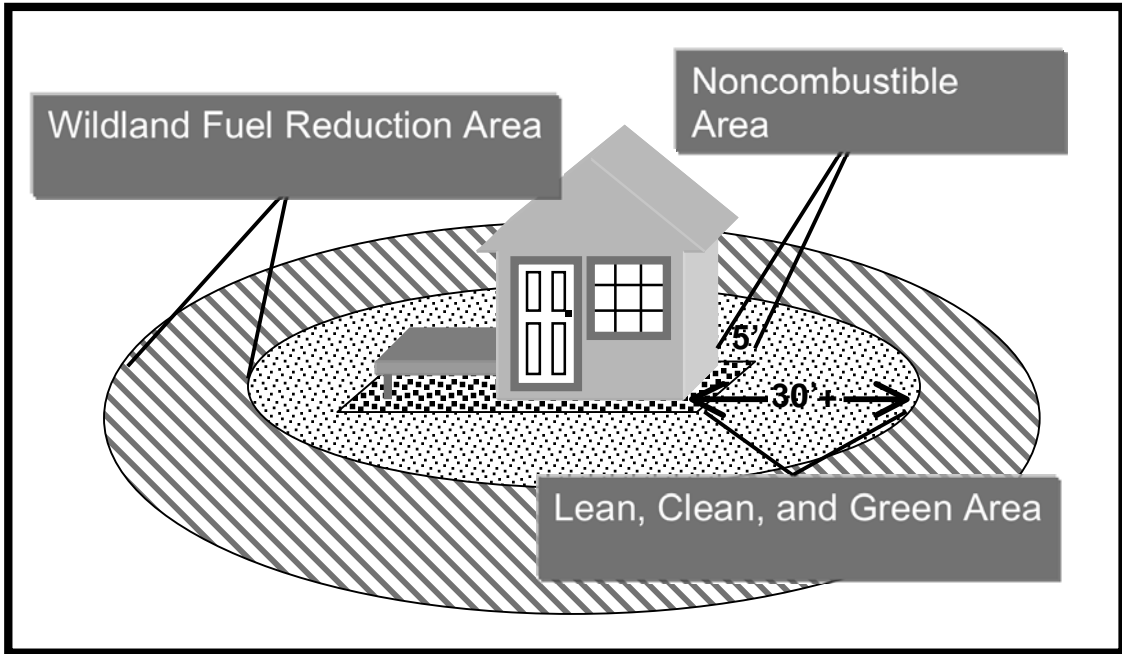


Figure 3.4: Defensible Space Zone Areas.

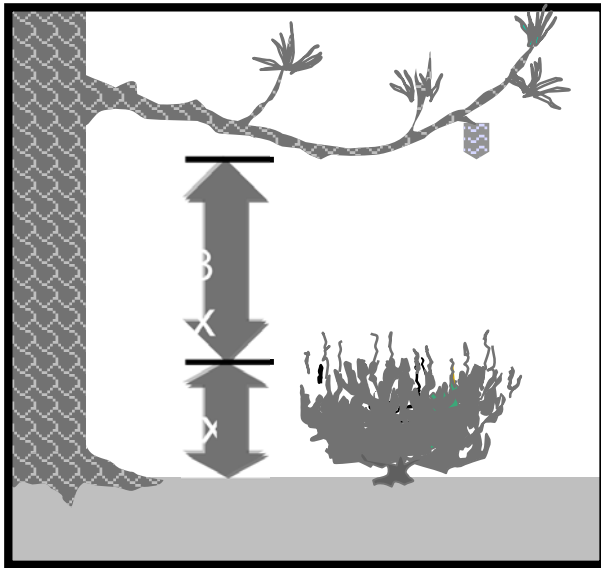


Figure 3.6g: Recommended separation distance for ladder fuels.

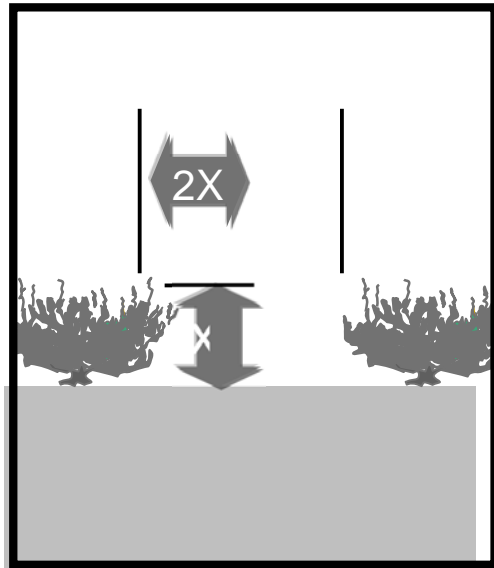


Figure 3.7b: Recommended separation distance between shrubs, pinion, and Utah juniper located on 0-20% slopes.