

TREE HAZARDS AND RISK ASSESSMENT

Living in big tree country, like the California central coast, often brings special concerns from potential tree related risk for life and property. Homes and properties are situated in the densely forested areas of the coastal mountain range where trees get large and storms can be intense.

Many areas in the Santa Cruz Mountains have a dense population of large native trees; some, especially redwoods and firs, have a height in excess of 150 feet (50 meters), and a trunk diameter in excess of five feet (1.5 m), some of the largest trees reaching 200 feet (66 m) in height or more.

A serious concern for property owners living in a forest like this is the potential risk for life and property from falling trees and tree parts. The size of some trees and proximity to adjacent homes creates a potential for property damage and/or personal injury from:

- limb or top breakage, often associated with heavy winds during storm conditions
- an entire tree toppling due to decay and structural failure, high winds and wet soil
- heavy creek water flow and washing out of the soil around the root system
- water saturation of the soil and mud slides carrying the trees with it



can break or fall under extreme storm conditions. But from years of experience, knowledge of tree species, structure and environmental factors, an arborist can identify the possibilities and probabilities through technical inspection; the degree of risk is then estimated.

Rating of observed risk potential

When arborists inspect and evaluate trees for risk, we put the hazard potential into certain categories of urgency. Following determination of risk, recommendations for management of that risk are presented:

Most structural failures of trees can be predicted and prevented.

Much of tree risk assessment is common sense observation. Property owners and managers should do regular inspections of their trees and note irregularities and suspected problem situations. A non-professional can often spot a potential problem, and then call a tree expert for confirmation and management suggestions and, if needed, tree service contractor selection.

There is no way to 100% accurately predict or prevent limbs, tops or trees failures, or where they will land when they do come down; even healthy trees

LARGE GROWING TREES OF THE SANTA CRUZ MOUNTAINS

- Coast redwood (*Sequoia sempervirens*)
- Coast live oak (*Quercus agrifolia*)
- Tanbark oak (*Lithocarpus densiflora*),
- Douglas fir (*Pseudotsuga menziesii*)
- California bay laurel (*Umbellularia californica*)
- Big leaf maple (*Acer macrophyllum*).
- Pacific madrone (*Arbutus menziesii*)

Some coastal zone areas have stands of:

- Monterey pine (*Pinus radiata*)
- Monterey cypress (*Hesperocyparis macrocarpa*)
- Ponderosa pine (*Pinus ponderosa*)
- Blue gum (*Eucalyptus globulus*).

“Tree risk assessment is the systematic process of assessing the potential for a tree or one of its parts to fail and, in so doing, injure people or damage property. All trees have the potential to fail. The degree of risk will vary with the size of the tree, type and location of the defect, tree species, and the nature of the target. Tree risk assessment involves three components:

- 1. A tree with the potential to fail,*
- 2. An environment that may contribute to that failure, and*
- 3. A person or object that would be injured or damaged (i.e. the target)”*

Nelda Matheny and James R. Clark

The most immediate hazards to identify are trees in the process of uprooting, splitting apart, or with breakage of limbs or stem, representing imminent structural failure.

- 1. Imminent hazard.** (Extreme Risk) Tree structural failure in progress with a target within range:
 - uprooting with noticeable soil fissures, heaving of the root plate, structural root fractures
 - tree trunk or large limb breakage, often associated with overburdened weight distribution or leaning
 - advanced decay weakening the structural integrity of the tree
 - tree parts broken and hanging

Any of the above factors combined with near proximity to a high value target with frequent use, - a home or business structure, power lines, road or driveway, would indicate a dire emergency, get a tree crew out now for emergency removal, on overtime if necessary.

- 2. Urgent hazard.** (High Risk) Compromised structural integrity, but not as immediate as above, no observed failure in progress;
 - a tree leaning toward a house, overburdened limbs or top over a house, patio or driveway
 - big trees in a potential mudslide area above a house
 - construction activity or other damage of the trunk, large limbs or structural support roots

Schedule removal or safety pruning as soon as possible, before the next storm, but not on emergency overtime.



- 3. Potential hazard. (Moderate Risk)** Condition unclear from initial inspection. Root collar exam or other further advanced inspection needed to determine degree of risk.
- Tree leaning toward house, could become dangerous if allowed to continue growth in that direction.
 - Thin layer of topsoil on rock base creating shallow rooting and vulnerability to toppling.
 - Structural defects. Co-dominant stems, or suspected decay conditions that could weaken tree structure if allowed to advance.
 - Dead or declining foliar top or other tree health issues that should be addressed or tree may weaken or die and become dangerous.

Schedule further inspection, pest/disease control or tree pruning sometime in the near future.

- 4. Preventive maintenance.** Known risk factors are identified that could become an issue if allowed to develop.
- Schedule crown cleaning and thinning and/or crown reduction pruning.
 - Remove selected overcrowded trees to allow light and space for remaining trees to grow with balanced weight distribution.
 - Initiate pest and disease management program.

[To learn evaluation and rating of risk according to professional standards, ISA certified arborists attend a Tree Risk Assessment Qualification program, and use protocol and terminology created for that program. My 50 years of tree risk assessment experience occurred mostly before that program was developed, so my process of assessments and terminology may differ slightly. Before and after TRAQ, a primary reference publication is "*A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas*" by Matheny and Clark]

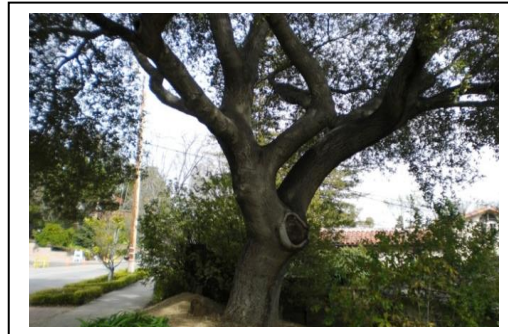
Topping (major crown reduction) is usually not recommended, but can be a short term, cost effective alternative to removal, when immediate safety, and not tree care, is the priority. Topping can be ugly and create future problems and risk due to possible rapid re-growth and the nature of the weak structural attachments that form as a result. **If a tree is topped, it necessitates follow-up with an annual inspection and maintenance program or a plan for progressive removal of the tree.**

Pest and disease factors: Wood-rot and root-rot fungal and water-mold (*Phytophthora spp*) infections are the primary disease issue in relation to tree structural failure. Infection and advance of decay exists in varying stages in many trees and is to be expected in a forest or woodland environment. Advanced stages of decay in roots, stems or branches can contribute to structural failure. Pest infestations can create or hasten decline in health and structural defects.

Many of the existing trees in previously logged or developed areas are re-sprouts from old cut stumps from trees that were removed. This presents a potential problem in that advanced decay of the parent stump and roots, which may be below ground and not visible in a superficial inspection, could create a compromise to the structural integrity of the standing tree.

Initial visual inspections with sounding and probing, can be useful to determine obvious hazards and potential problems and to identify need for further inspection. **Advanced inspections can include:**

- excavating around the base of a tree to expose the root collar and major structural roots where decay is often present but unobservable without exposure
- climbing of the tree to examine potential structural defects of limbs, stem and top.
- technical examination with modern instruments of decay detection and stress assessment
- determining property lines and responsibility of ownership and liability
- measuring heights and distances and calculating possible worst-case scenarios



Some examples of structural defects - clockwise from top left: 1. Imbalanced weight distribution, leaning. 2. Co-dominant stems splitting apart. 3. Large wound at critical location. 4. Large deadwood

Forest fires are another major concern with need for recommendations to include clearing of trees and brush within a 30 - 100-foot distance of the structures to create a “defensible space”. Obviously, the more distance the better, and some trees and shrubs are more flammable and therefore more important to clear than others. Even beyond this defensible range, clearing of deadwood and lower limbs can prevent the “ladder effect” of fire transferring from grasses and shrubbery to the tree canopies and roofs of structures.



Manual root crown exam to determine extent of decay.

If you have trees near your home it is better to be safe than sorry. Invite your local fire marshal, qualified arborist or forester to inspect the trees, discuss findings with you and make recommendations, or write a report with detailed observations and specifications for management of risk.

The cost of prevention is usually much less than the cost of loss and inconvenience of damage.



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