Best Management Practices for Disease in Oak Woodlands
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Tree Removal

Consult a specialist to evaluate trees with decay for structural failure potential; remove those that are near people and property.

Pruning Infected Material

1. Inspect branch for symptoms of branch canker.
2. If the canker has not reached the branch collar, cut the entire branch back using the techniques described herein, and move pruned material to a designated area (see below).
3. If the canker has extended into the branch canker, the infection has already reached the trunk. At this point, remove the dead limb 1/8-1/4 inch from the branch collar to reduce inoculum. Do not cut into the branch collar, or any other living tissue (Fig. C) , and move pruned material to a designated area (see below).

Pruned and Cut Plant Debris

1. Do not move plant material for use of firewood outside of local areas. This is especially important because the assemblage of canker pathogens differs between locations (Fig.D). Please refer to www.dontmovefirewood.org for more information.
2. Create a designated area for plant material and soil debris that is removed from managed areas. Ensure debris piles are not in areas that drain towards native stands.
3. Do not move plant material and soil debris between locations.
4. Chip plant debris, starting with any infested material first. This will assist with cleaning out potentially contaminated material from the chipper (Fig. E).
5. Cover woodpiles with a plastic tarp (Fig. F). This is not only good practice for insect management, but also prevents splash dispersal of pathogenic fungal propagules.
6. After plant material is chipped and solarized, it may be safe for use in other locations.
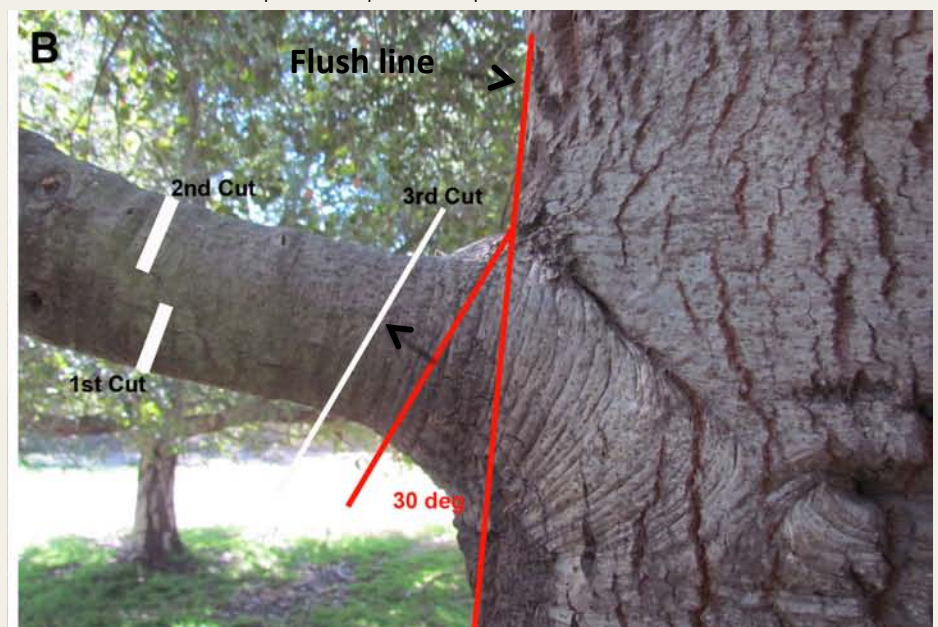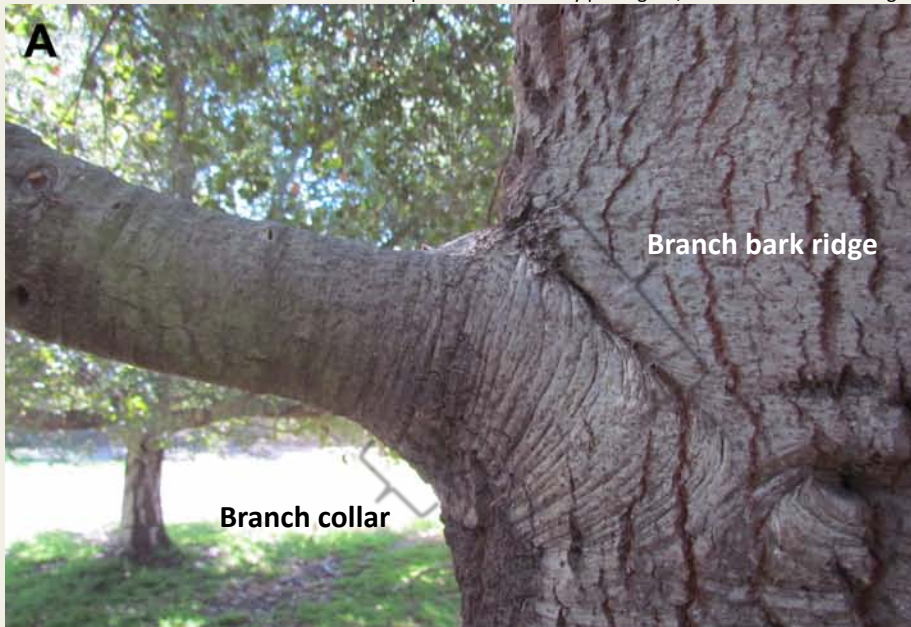
Education and Outreach

Annual public meetings are essential for managing pathogens so land managers and public officers are up to date on BMP's and disease identification.

To reduce the spread and sporulation of fungal propagules, conduct management activities during dry periods, and avoid any activity shortly after periods of precipitation whenever possible. If management activities cannot be avoided during wet periods, stay on maintained roads and trails as much as possible.

Equipment Disinfecting

Because propagules of many pathogens may persist on dead wood for several years, it is important to ensure that equipment is properly cleaned of plant debris before travelling between locations. Wood cankers occur on twigs, branches or trunks and are caused by fungal pathogens that enter through wounds on the bark surface, caused primarily by pruning, frost damage and mechanical injury. Residual debris may be a source of inoculum and sanitation practices will reduce their potential introduction and spread.

1. Avoid unnecessary pruning. In general, coast live oak is adversely affected by pruning. Unless compromised by decay fungi, pruning depletes carbohydrate storage of the tree, slowing its growth. In addition, pruning wounds serve as entry points for many fungal pathogens.

2. Prior to cutting/pruning, remove organic debris off equipment (hand and power tools used for cutting (e.g. loppers, chainsaws), then spray or wipe with either Lysol or 70% ethanol (Figs. A & B). Clorox bleach diluted to 25% may be used, but may cause corrosion and thus pitting in the blades. Pitting can harbor microbes that are unaffected by quick sterilization. Dry blades with a clean towel, and spray blades with sterilizing solution in between trees.

3. Never use disinfections on pruning wounds, as they could be phytotoxic.

4. Remove any accumulated soil/mud or plant debris from heavy operating equipment with a hose (high pressure is best) prior to relocation of equipment. Equipment includes vehicle tires, shovels, stump grinders, trenchers, chipper trucks, mowing equipment, chippers, tractors, fertilization and soil aeration equipment, cranes, etc. Spray with Lysol.

5. Prior to leaving a site, remove any accumulated soil/mud or plant debris from shoes and tires and spray with Lysol. A five-gallon pump sprayer is useful for debris removal.

Use of Seedlings/Saplings for Restoration Projects

1. Know the source of plants, including where the soil came from. Ensure growing media is from an area free of pathogens.

2. Plants that are slated for use in restoration projects should be screened for presence of pathogens prior to deployment. If important pathogens are present, all plant material must be destroyed appropriately.

3. Minimize accumulation of standing surface water in plant beds to reduce the potential for sporulation and dissemination of soil borne pathogens.

4. Prior to deployment, place potted plants on a barrier between native soil and containers. A barrier may be raised benches, a gravel layer, etc. Do not place containers directly on native soil. This practice is used for management of SOD in nursery facilities so that lateral movement of pathogens through water or contacted with infested soil may be prevented from entering into plants.

Management of Rots and Decay Fungi

In general, rots aid in providing important habitat for wildlife and play an important role in ecosystem processes. Management strategies should be targeted towards trees within proximity to recreation activities to prevent hazards, and allow for natural ecosystem processes in areas unfrequented by visitors. Check trees near trails, roads, or other recreation sites periodically for signs and symptoms. Conks for most species indicate advanced decay and structural hazard. Removal of deadwood should be limited to these areas, so not to remove wildlife habitat. Minimize injury to plants during management activities as spores enter through wounded tissues.

Pruning Techniques

The following guidelines are recommended to minimize plant wounding and speed wound closure.
To prevent infection by pathogens, conduct activities during the summer so calluses form on the plant tissue prior to wet periods.

A Branch bark ridge
Branch collar

B Flush line
2nd Cut
3rd Cut
1st Cut
30 deg

1. Find the **branch collar** and **branch bark ridge** of the tree (Fig A). The branch collar is the swollen area of trunk tissue surrounding the base of a branch. The **branch bark ridge** is a line of rough bark running from the branch-trunk crotch into the trunk bark (Fig. A).

2. Draw a line flush along the trunk, outside the branch bark ridge (Fig B).

3. Cut the branch at least 30 degrees away from the flush line so the cut will close evenly (Fig. B).

4. For branches larger than 3 inches in diameter, utilize the three cut method to prevent unnecessary branch tearing under its own weight, below the collar (Fig. B)

Three Cut Method:
1st cut: About one foot away from branch union with the trunk (crotch). Cut from under the branch approximately one-third to halfway through the branch.

2nd cut: Cut from above, approximately two inches past the first cut.

3rd cut: Cut at the proper pruning point, just outside the branch collar. Make the cut 1/8 inch and ¼ inch beyond the branch collar for small branches and large branches respectively.

C

D

E

5. Make a clean cut of the remaining stub using sharp implements to ensure quick and even callus formation Fig.C).

6. **Never cut into the branch collar, or branch bark ridge (Fig. D)**. A cut too close, or flush to the trunk results in greater wound surface area and uneven callus formation (Fig. E). In addition, the branch collar serves as a protection zone that limits infection in the parent stem by forming pathogen-resistant compounds. Thus, flush cuts, or any cuts into the branch collar damage the tissue, and impair the trees natural ability to defend against pathogens (Fig. E).

7. Make smaller cuts rather than fewer large cuts when pruning to minimize decay forming columns.

8. Cuts on small branches should be square to the diameter of the stem (Fig F), not at a diagonal (Fig.G) to minimize wound surface area.

9. Non-diseased limbs that are cut may be left within the vicinity of the tree to promote natural ecosystem processes.

F

G