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Albert Weissfuss  
City Arborist  
Pacific Grove, CA

30 June 2014

**Re: Proposed management activities Monarch Grove Sanctuary and George Washington Park July-September 2014**

The following recommendations and assessments are based on a field tour with City Arborist Albert Weissfuss in May and June 2014. They are addressed in the context of the 2011 Management Plan and subsequent consultations with City staff and residents. The recommendations are based on previous scientific work, professional judgment, and detailed field assessments. They carefully balance monarch habitat needs, hazard reduction, and forest health, based on both short-term and long-term perspectives.

**Recent History and Current Conditions**

Monarch Grove Sanctuary continues to support one of the largest overwintering aggregations in Central California (Table 1). The ultimate size of the Monarch Grove aggregation is dependent on the breeding success the previous summer, and the ability of the site to attract butterflies in the fall, and provide suitable temperature, light, and wind conditions through the fall and winter.

From 2003 to 2008, the Sanctuary supported between 8,000 and 29,000 butterflies. The severe drop in 2009 reflected a sharp decline rangewide in the Western monarch population because of a three year drought across the Western United States. It has not been possible to attribute the low numbers in 2009-2010 to the hazard branch trimming along the southern boundary. Numbers recovered in 2010 with the end of the drought. In all these years, monarchs remained through the entire overwintering season through some severe storms, indicating that the Sanctuary provides sufficient wind shelter for now. Potted trees were placed along the southern edge in fall 2010 to fill in low wind gaps.

Thanksgiving counts of 10,790 in 2012 and 13,420 in 2013 indicate that the Sanctuary continues to attract large numbers of butterflies, and subsequent observations later in the season in those years show that they remained through the overwintering season. In 2012-2013, the butterflies largely moved onto pines and cypresses in the interior of the grove, a predicted result of blue gum plantings in 1999. These blue gum trees are now 40-60' tall and provide NW wind shelter. Strong storms in November and December 2012 drove the butterflies from the southern boundary trees, and the interior habitat provided suitable light and wind conditions through the remainder of the season. Viewing opportunities were provided from the hotel driveway.

In 2013-2014, butterflies remained at the southern boundary for much of the season, reflecting a lack of strong storms and southerly winds through most of the fall-winter.

Further details of the overwintering season can be obtained from the Pacific Grove Museum of Natural History monitoring program, but are beyond the scope of this report. In January 2014, Creekside staff mapped the location of trees that have been tagged by monitoring crews from the Museum. These are mapped in Figure 1. Note the two distinct areas for monarch clustering; the southern and far southeast boundary (and the Monterey Pine on the adjacent property), and the interior stretching from the hotel driveway to 30-40 m west into the grove. These maps will eventually be linked to the monitoring database collected by the Museum, and a dynamic picture of monarch distribution and abundance in the Sanctuary will be available.

## **Management Recommendations for 2014**

### *Monarch Grove Sanctuary*

Several issues in forest and habitat management at Monarch Grove Sanctuary were identified in the field, and are keyed to zones identified in Figure 2.

- 1) In Zone 1, along Grove Acre Avenue, several medium to large Monterey pines are heavily infested with pitch canker and will completely die soon (Photos 1 and 2). These trees are in advanced decline and a major source of infection for the rest of the grove. Standing dead trees will become a fire hazard, and some are within target distance of the path and Grove Acre if they were to fail. Following final determination by the City Arborist of exactly which trees, the trees should be removed this summer before the restrictions of tree trimming or removal come into effect. The effects of removing these trees on monarch habitat is minimal over the long-term, because the trees will not provide wind shelter for very much longer even if they are allowed to remain standing. In the short-term there is sufficient wind shelter deeper in the grove to ameliorate increased wind exposure from removal of these trees. Considering there is insufficient seed to produce a stand, locally collected seed could be introduced. It would be desirable to use seed from known resistant trees. The trees will be replaced with 15gallon Monterey pines obtained from the Pebble Beach Corporation with genetic resistance.
- 2) Also in Zone 1, the redwood trees need consistent watering, especially in this record drought year (Photo 3). Re-establishing the drip system to un-watered redwoods is a priority, and all irrigation scheduling should be done by the City Arborist. In the longer-term (10+ years) they will eventually provide 40-60' of dense windbreak along the western border, in conjunction with other pines (if they survive) and cypresses.
- 3) In Zone 2, many small planted understory pines have died. These trees should be removed, and the sites replanted where appropriate with 5gallon genetic resistance Monterey pines. Provision of drip irrigation until the trees are

established is critical for high survival of these trees. All irrigation scheduling should be done by the City Arborist.

- 4) The overall irrigation system in the Sanctuary should be reviewed, reinstalled where appropriate, carefully managed, and maintained as necessary for establishing and maintaining plantings.
- 5) At the western edge of Zone 2, several pines are infested with pitch canker, will eventually succumb, and should be considered for removal to slow the progression of the disease deeper into the grove. The determination should be made by the City Arborist. Small pitch canker infestations were noted in several trees much farther in the interior and should be monitored.
- 6) Also in Zone 2, there are opportunities to plant 5 gallon genetic resistance pines alongside the many wildlife snags in the open area, to re-establish forest cover. These trees were dead or hazardous Monterey pines that were removed and left to act as a habitat / granary snags. The natural occurrence of re-forestation is non-existent in Zone 2. Again, provision of drip irrigation for the initial plantings increases chances for success.
- 7) In Zone 3, the unauthorized blue gums (formerly potted) are planted much too densely (Figure 3 and Photos 4 and 5). A minimum of 10-15 feet (3-4.5 m) between trees is necessary for tree health and rapid growth. We recommend that the blue gums in this area be thinned back to the originally planned configuration, and a drip system be reinstalled and appropriately operated under the supervision of the City Arborist until the originally planted trees are established. The original City-authorized plantings in this zone were carefully planned to fill in gaps in wind protection, be appropriately spaced, and their rapid growth and health is essential to the long-term habitat suitability of the Sanctuary. Crowding these trees with the additional unauthorized plantings will serve to slow growth and create unhealthy individual trees. A close-up of the SE corner shows the numerous trees planted in this area (Figure 3). Selection of individual trees for retention and removal will be conducted in the field by the City Arborist and others prior to any actions.
- 8) In Zone 4, there are several dead hazard branches over the main trail that should be trimmed. This is a major priority for public safety and will have no effect on monarch habitat.
- 9) Because of the ongoing drought since 2011-2012 we anticipate that many established trees in the Sanctuary will be highly stressed over this dry season, leading to loss of leaves, needles, and branches, and even whole tree mortality, especially if the next rainy season provides below average precipitation. As noted through the document, maintaining and operating the irrigation system for establishing trees, and avoiding over-watering and under-watering is a critical management action.
- 10) We note a long history of governance issues regarding City control over activities in Monarch Grove Sanctuary, and ongoing controversies. In order to create a deliberate and open decision-making process, we propose the following progression of meetings to discuss the rationale and implementation of these recommendations, adjust them if appropriate. This sequence is outlined in the

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Adaptive Management section of the 2011 report. Public input should be sought at appropriate times and through official channels.

- a. A field-tour presentation to the BNRC and Monarch Committee in July 2014
  - b. Further presentations and field tours to interested parties, including the Museum and City Council
  - c. A final recommended course of action by early-August so that implementation can be scheduled and done at a deliberate pace. All work should be planned for mid-August to mid-September 2014 to avoid the October 1 restriction on activities in the grove, and allow for contingencies. All work should be supervised closely by the City Arborist.
  - d. A debriefing in October to review the activities.
- 11) The cypress above the hotel driveway, which has been a major cluster tree in recent years, has a broken branch that poses a hazard to people watching the butterflies from below. The City and the Hotel need to coordinate actions in this sensitive area. Removal of the dead branch should not affect use of the other branches on the tree because the wind shelter in this area is provided by surrounding trees and the hotel itself. Removing this branch may avoid death and injury to monarchs should the branch fall while butterflies are clustered.

### *George Washington Park*

There are several issues in forest and habitat management at George Washington Park

- 1) This is a unique site for California monarchs; it is one of the few remaining Monterey pine/live oak habitats.
- 2) The site has been used intermittently by monarchs, a few individuals can be found there every year at some point, but major clusters are found in only a few years (Table 1). In 2006, for example, there were more than 10,000 monarchs at GWP and very few at Monarch Grove Sanctuary. Since then, there has been only one year (2011) with more than 1 or 2 monarchs at Thanksgiving. Individual monarchs have been observed here during other times of the overwintering season.
- 3) The historic cluster sites in GWP still appear to have sufficient wind shelter, but changes in the forest as mature trees senesce threaten this important component of habitat suitability. In particular, the largest pine at the historical overwintering site has died, but there are several mid-story pines that are in positions to replace this tree over coming decades.
- 4) Removal of dead standing trees is recommended where they have stationary targets. Dead trees that may fall across trails should be evaluated on a case-by-case basis. Trees can be left as safe wildlife snags where appropriate, but a more naturalistic topping should be considered.
- 5) Reduction of accumulated deadfall is recommended, especially since CALFIRE has indicated that they can provide the resources, and the City has received a grant. Operations are expected to begin in late-July and August. Several large piles of downed tree debris were noted. Extra care should be taken to not injure small trees. But, some understory disturbance will be incurred in skid trails, but that should recover rapidly. If done properly, there should be no impact on monarch habitat, but site supervision by the City Arborist is recommended during the operation itself and follow-up weed surveys and management anticipated..
- 6) Operations on the perimeter of the park are the priority, to maintain safety from falling dead trees on adjacent roads, and to create a fire buffer.
- 7) The ongoing drought is likely to drive increased loss of leaves, needles, and branches, and mortality of entire trees (if not this year, then next year. The consequences of drought will eventually have to be managed. As mentioned above, CALFIRE is expected to begin work this summer, concentrating around the perimeter of GWP.
- 8) The establishment of a designated trail system and decommissioning of meandering paths impacting the root system of the trees should be considered for long term support of the forest health.
- 9) The long-term suitability of George Washington Park for monarchs should be assessed, with methods similar to those employed at Monarch Grove Sanctuary.
- 10) Once the assessment is done, a long-term planting scheme (pines, oaks, and native understory shrubs) should be developed and implemented. The key elements of such a planting scheme should be to provide eventual replacements for canopy

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trees, create and maintain a mid-story of oaks and pines, and maintain wind shelter from all directions around defined canopy gaps.

In summary, forest management at George Washington Park is needed, and the first steps of removal of some dead standing trees, clean-up of some forest floor debris, and re-routing some informal trails can be done with no harm to the monarch habitat, and will set the stage for plantings and restoration of the forest in GWP.

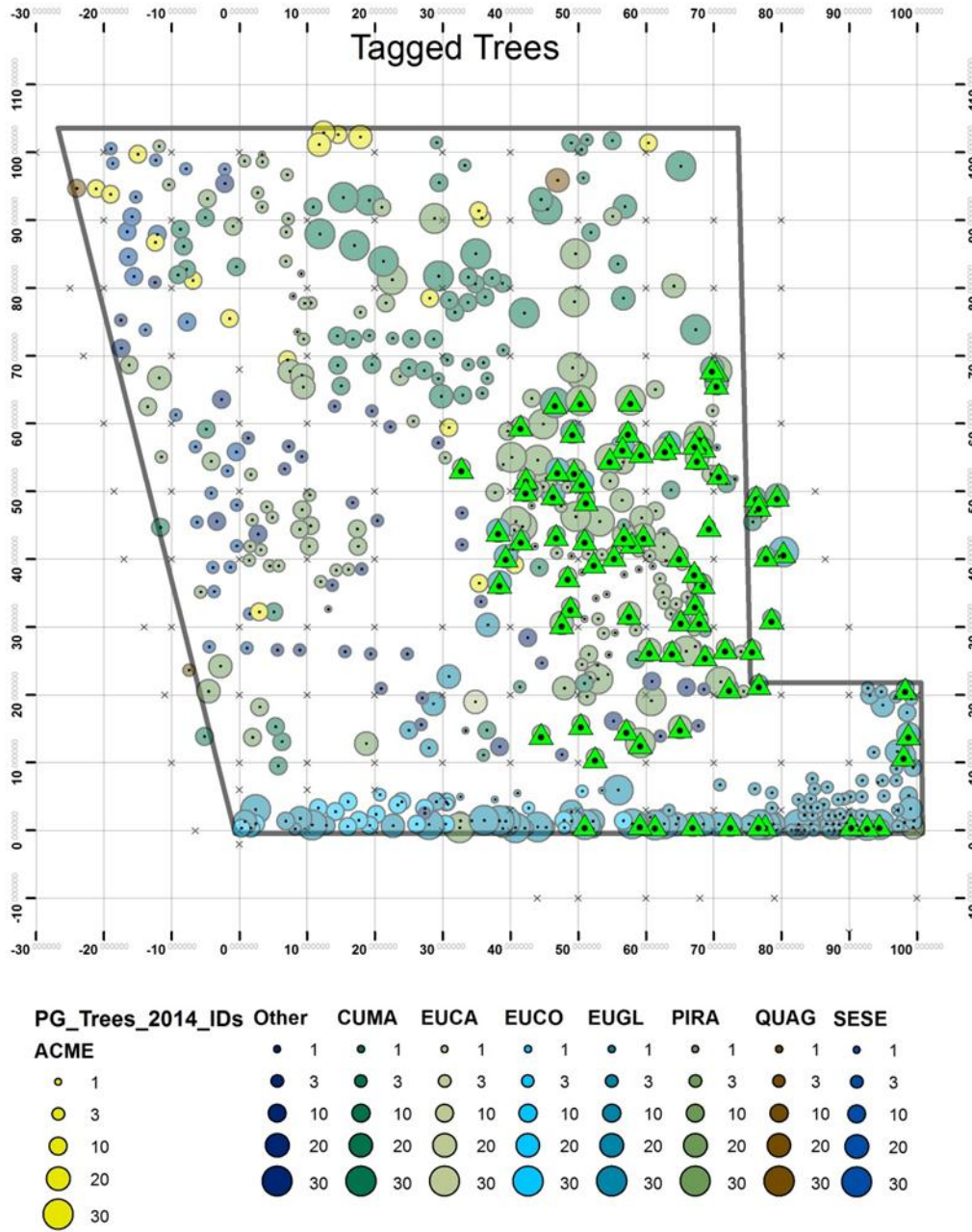
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**Table 1. Monarch Butterfly Thanksgiving Counts Xerces Society  
Monarch Grove Sanctuary (MGS) George Washington Park (GWP), Pacific Grove**

Year	MGS	GWP
2003	22,802	2,750
2004	10,867	4,325
2005	12,199	2
2006	28,746	11,795
2007	8,181	2
2008	17,866	0
2009	793	0
2010	4,968	0
2011	12,265	61
2012	10,790	0
2013	13,420	1

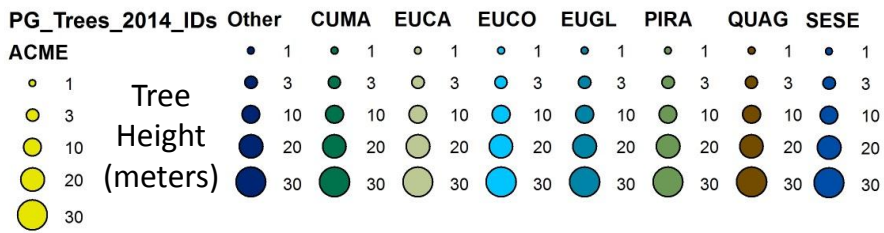
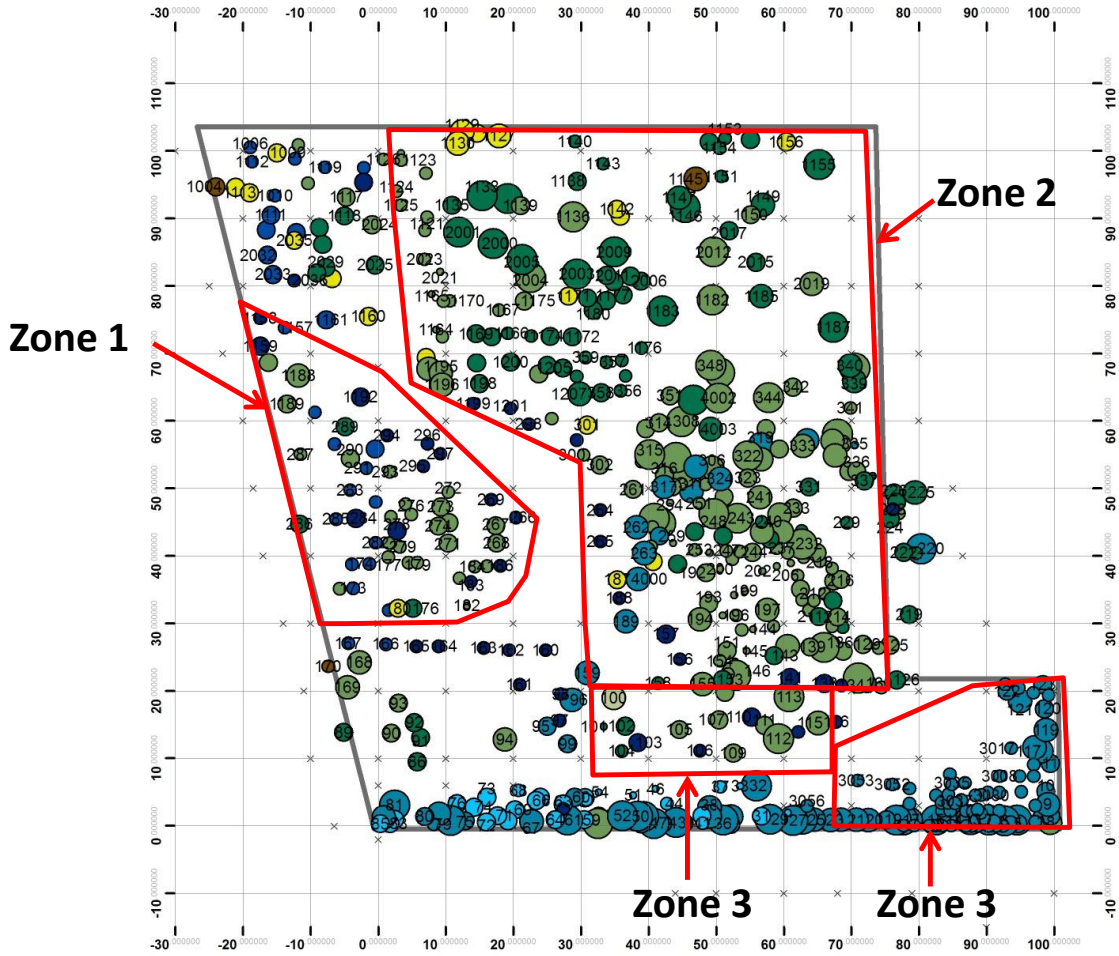
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**Figure 1. Monarch Occupied Trees (Green Triangles) 2012-2014, Grid in meters**





**Figure 2. Management Zones Grid in Meters**



**Figure 3. SE corner of Sanctuary, highlighting the closely spaced small trees. The grid is 10 m (33'), some of the trees are less than 1m apart.**

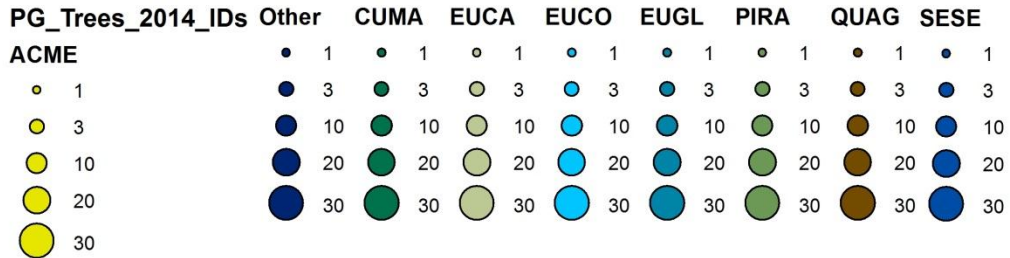
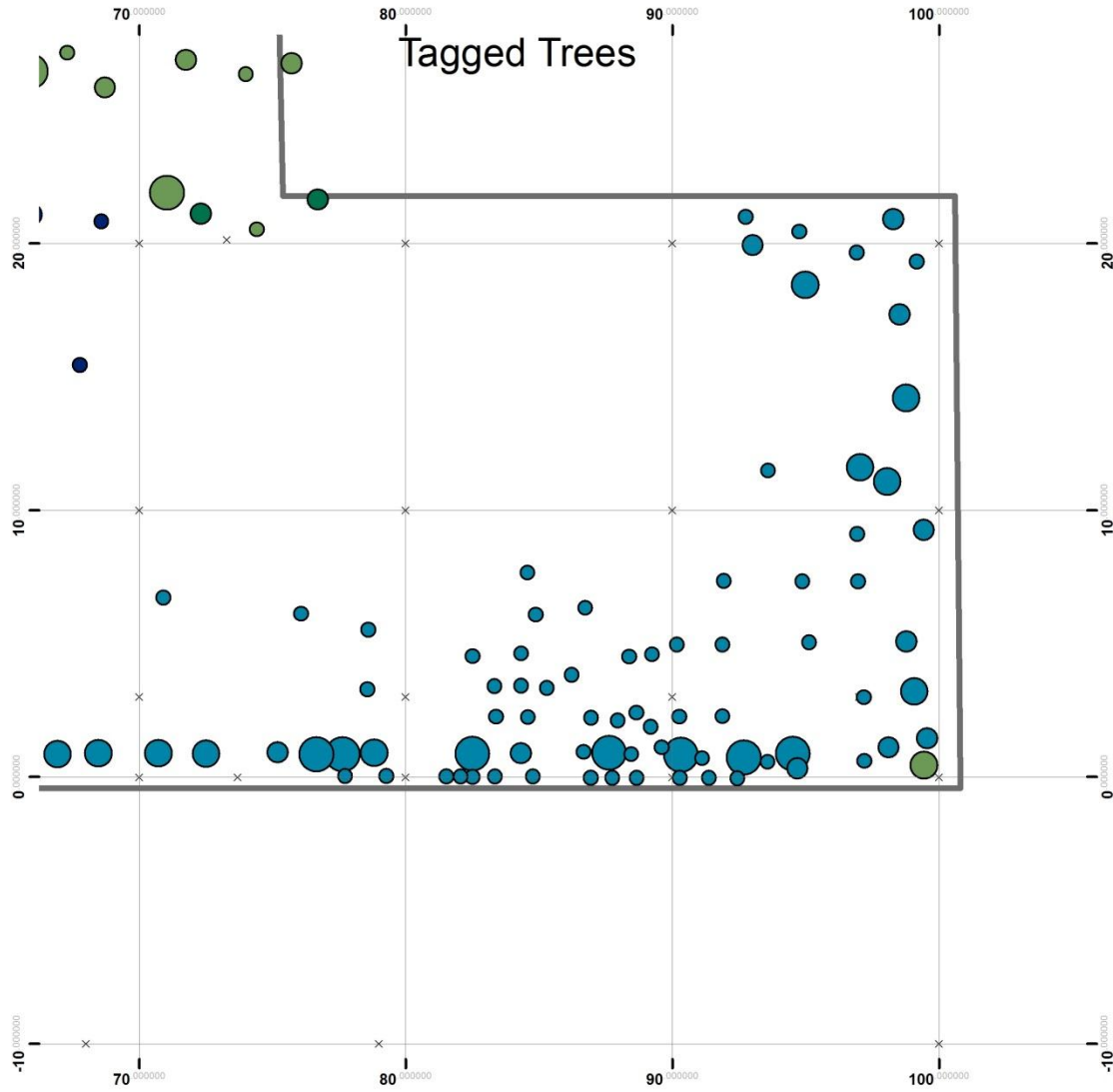


Photo 1. Pitch Canker Infected Tree, Zone 1



Photo 2. Pitch Canker die-off on newly infected branch



Photo 3. Redwood tree in need of irrigation, Zone 1



Photo 5. Blue gum trees planted too close together, May 2014



Photo 4. Newly planted blue-gums, too close together, June 2013

