



Forest Health Protection

Pacific Southwest Region



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To: Santa Ysabel Tribal Council
Subject: Forest Health Survey (SC-12-04)

Summary

Tom W. Coleman, Entomologist, Forest Health Protection, and Adrian Ackley, Forester, Bureau of Indian Affairs, conducted forest stand surveys on the Santa Ysabel Reservation on January 18, 2012. Surveys assessed current insect and disease issues impacting Tracts 2 and 3 of the Reservation. Surveys were also conducted for the new invasive pest, the goldspotted oak borer, *Agrilus auroguttatus*, which is currently found in San Diego Co. Leafy mistletoe was found infecting California black oak, *Quercus kelloggii*, and canyon live oak, *Quercus chrysolepis*, along Tracts 2 and 3. Higher elevation mixed conifer stands along Tract 3 should be thinned to help prevent elevated levels of bark beetle mortality to Coulter pine, *Pinus coulteri*.

The goldspotted oak borer was found infesting coast live oak, *Q. agrifolia*, and California black oak on the reservation. Infestation levels are currently low on the Reservation, but tree mortality was observed with goldspotted oak borer injury on both tracts. Elevated levels of tree mortality may take several years to become evident, but action should be taken to limit mortality of high-value trees on the Reservation. A management plan should be developed for the Reservation to assist in managing this new invasive insect. Additional education should be provided to tribal members about this new pest and the threats of moving firewood.

Introduction

Forest Health surveys were conducted on the Santa Ysabel Reservation to look for the presence of the goldspotted oak borer and current insect and disease issues. These surveys were used to provide support for prevention and suppression management options that can enhance forest health.

The goldspotted oak borer is a new invasive insect to San Diego Co. See the attached Field Identification Guide for additional information about this insect. The goldspotted oak borer is causing elevated levels of tree mortality further south in the county, but evidence of infestation has been found around the Santa Ysabel Reservation. The goldspotted oak borer prefers larger diameter coast live oak and California black oak, but will also attack and kill canyon live oak. This insect represents the most significant insect threat to red oaks in



Figure 1. California black oak infected with leafy mistletoe on Tract 3 of the Santa Ysabel Reservation.

California.

Forest stand surveys

Forest stand surveys were conducted along Tracts 2 and 3. BIA road 47 was primarily surveyed for insect and disease issues on Tract 2. Tenth-acre plots were established in the higher elevation mixed conifer forest stands on Tract 3 to assess tree density, species composition, and current insect and disease issues. A mean measurement was calculated for total density of trees per acre, basal area (sq ft/acre), and density of dead trees from these plots.

Lower elevation oak woodlands were randomly surveyed for insect and disease issues. Oak mortality was observed for evidence of the goldspotted oak borer. Living coast live oaks, California black oaks, and canyon live oaks, were also observed for injury symptoms from the goldspotted oak borer. The lower bole was examined for D-shaped exit holes, bark staining, and woodpecker foraging. Bark was peeled from dead oaks to search for meandering goldspotted oak borer larvae galleries on the surface of the sapwood or any life stages. If an infested oak tree was suspected, a portion of the bark was removed from the main bole to examine for larval galleries.

Observations

Engelmann oak, *Q. engelmanni*, coast live oak, and California black oak were dominant canopy species surveyed within the oak woodlands on Tract 3. Coulter pine, *Pinus coulteri*, Incense cedar, *Calocedrus decurrens*, bigcone Douglas-fir, *Pseudotsuga macrocarpa*, canyon live oak, and California black oak were common dominant canopy species in the higher elevation mixed-conifer stands. White fir, *Abies concolor*, was observed infrequently in these areas. The mean stand density of the higher elevation stands was 110 trees per acre. Big Cone Douglas-fir was the dominant canopy tree species in these plots followed by Coulter pine and California black oak. Mean basal area in the mixed conifer stands was 291 sq ft/acre. Conifer basal area in these areas was 261 sq ft/acre, representing 90% of the stand basal area.

Goldspotted oak borer infestation was observed on coast live oak and California black oak on both tracts. D-shaped exit holes were used to identify infested trees. Dark-colored larval galleries were also observed on the sapwood surface. Woodpeckers foraging for goldspotted oak borer were observed on a recently killed tree along Tract 2 (Figure 2). A single coast live oak and California black were observed with goldspotted oak borer injury on Tract 2. Bark staining was also present on each tree, which can be a result of canker fungi, *Botryosphaeria* spp., necrotic tissue, or bacterial infection following the feeding activity from goldspotted oak borer larvae. Four dead coast live were surveyed on tract 2 and associated with goldspotted oak borer



Figure 2. Woodpeckers foraging for goldspotted oak borer larvae on coast live oak. This is a common injury symptom associated with goldspotted oak borer infestation.

injury. A goldspotted oak borer larvae was also sampled from a dying coast live oak (Figure 3).

Leafy mistletoe, *Phoradendron villosum*, was found infecting several dominant California black oaks along Tract 3 (Figure 4). See the link below for additional information about leafy mistletoe biology and management. Canyon live oak was observed with minor infection from leafy mistletoe. Infection rates were low to severe on California black oak. No dwarf mistletoe, *Arceuthobium campylopodum*, was observed on Coulter pine on tracts 2 and 3.



Figure 3. Goldspotted oak borer larva sampled from coast live oak on Tract 2 on Mesa Grande.

Discussion

Leafy mistletoe infection on California black oak was the most significant disease issue surveyed on the Santa Ysabel Reservation. High-value sites and clumps of oaks should be pruned to improve tree and forest health. Mistletoe infection can also increase the susceptibility of trees to secondary insects and disease, leading to tree death. Presence of the goldspotted oak borer represents the most significant insect issue surveyed. This new pest can potentially be a long-term problem for the Reservation and should be managed at high-value sites.

Management options for mistletoe

Prevention/Suppression

Pruning leafy mistletoe from the oaks is suggested to prevent the infections from intensifying and spreading to additional trees. Pruning infected branches will also improve tree and forest health. Birds can actively spread leafy mistletoe to adjacent trees. Pruning of leafy mistletoe should follow the best management practices listed in the Leafy Mistletoe on Hardwoods in the link provided below.



Figure 4. Leafy mistletoe infecting California black oak on the Santa Ysabel Reservation.

No management

Mistletoe infection will slowly spread to other host species in the stand or high-value sites and increase in severity on the Reservation. Tree mortality may occur solely from mistletoe infection, but take years to manifest. Enhanced stress from mistletoe infection can increase the susceptibility of trees to other insect and disease issues, which can enhance their rate of mortality.

Management options for bark beetles

Prevention

Mixed conifer stands along Tract 3 are at moderate risk to bark beetle-caused mortality due to the current tree densities. Thinning is the only long-term management option available to reduce or prevent bark beetle-caused tree mortality. When tree density is not managed, high levels of tree mortality may occur, particularly during severe or protracted droughts. Coulter pine has the biggest threat from bark beetle injury in these stands.

Reducing the overall basal area will increase growth and vigor of the residual trees and lower susceptibility to successful bark beetle attacks. A mixed species composition of drought-tolerant trees with diversity in age classes should be retained. In addition, selecting against pines with extensive mistletoe, poor needle retention, and/or low live crown ratios will reduce the number of focal trees for western pine beetles, *Dendroctonus brevicomis*.

Thinning a site to 50% of the basal area needed for full site utilization can provide adequate prevention against bark beetles and lower the likelihood of tree mortality for about 20 years. Thinning will also reduce fuels thereby reducing the threats to life and property during high fire danger years. Regardless of tree density, moderate to high levels of tree mortality may occur during extreme and/or protracted drought periods. All cut conifer stumps should be treated with a borax solution (Sporax or Cellutreat) to prevent the spread of Heterobasidion (Annosus) root disease. See the link below for additional information about managing Heterobasidion root disease.

Suppression

No bark beetle suppression activities are suggested at this time. Active bark beetle populations or recent conifer mortality was not observed during this survey.

Management options for the goldspotted oak borer

Prevention

Additional surveys should be conducted at high-value sites and around the community for presence of the goldspotted oak borer. Surveys should examine any recent oak mortality and larger diameter red oaks (>20" DBH) for injury symptoms from the goldspotted oak borer. See the Goldspotted Oak Borer Field Identification Guide for the injury symptoms associated with this new pest. Forest Health Protection can provide training to assist with field surveys and supply traps to assist with monitoring efforts. Forest Health Protection can also return to the Reservation and assess any new tree mortality if desired.

A goldspotted oak borer management plan should be developed for the Reservation to assist in mitigating this new threat. See the attached document "Goldspotted Oak Borer Management Plan" to assist the development of management activities for limiting tree mortality



Figure 5. A dense Coulter pine stand surveyed on Tract 3.

from this new pest. Additional education should be passed to the tribal members about this new pest and the threats of moving oak firewood. Additional information about moving firewood can be found at the California Firewood Task Force website listed below.

Suppression

No suppression activities are recommended for the goldspotted oak borer at this time. Additional surveys and a management plan should be developed for high-value sites prior to any suppression activities.

Conclusion

Leafy mistletoe infection found on both tracts should be pruned to improve forest stand health. Funding can be submitted to Forest Health Protection for this suppression work through the Bureau of Indian Affairs. Surveys for the goldspotted oak borer should continue yearly as the infestation intensifies on the Reservation. Forest Health Protection will gladly assist in the surveys or provide training to diagnose the injury symptoms associated with this new pest. Dense forest stands on Hot Springs Mountain should be thinned to prevent elevated levels of tree mortality from bark beetles during an outbreak or drought.

If there are any questions please contact:

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Additional information referenced in the text:

Leafy Mistletoe on Hardwoods:

<http://www.fs.fed.us/r6/nr/fid/fidls/fidl-147.pdf>

Bark Beetles and Vegetation Management in California:

http://www.fs.fed.us/r5/spf/fhp/wbbi/CABarkBeetlesVegMgt_2007.pdf

Heterobasidion root disease:

<http://www.fs.fed.us/r5/spf/fhp/heterobasidion.shtml>

Goldspotted Oak Borer Field Identification Guide:

http://www.ipm.ucdavis.edu/PDF/MISC/GSOB_field-identification-guide.pdf

California Firewood Task Force:

<http://firewood.ca.gov/>