



California oakmoth (*Phryganidia californica*) is the most serious defoliator of oaks in California. It feeds on all oaks, with damage very common on **coast live oak** (*Quercus agrifolia*). The moth also feeds on **tanoak** (*Notholithocarpus densiflorus*).

Distribution: Common in coastal areas along the entire California coast from San Diego to Del Norte County.

Biology: Young caterpillars skeletonize the leaf surface of native oaks, while older ones chew all the way through the leaf. Chewed leaves may turn brown and die.

Integrated Pest Management: Damage may vary from year to year. Trees can appear to be dead, or completely defoliated, but will recover; treatment is not needed. The easiest way to correctly identify damage is to look for droppings (frass), dark brown pellets that may be observed lodged in bark crevices, spider webs, and ground cover plants beneath infested oaks.

More information:

<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7422.html>
<http://ufe.calpoly.edu/forestry/detail.lasso?rid=51>



Photo Credits: The Regents of the University of California; Ted Swiecki (*top right*)
Produced by the Western Region Tribal Integrated Pest Management (IPM) Work Group
(<http://www.westernipm.org/index.cfm/center-projects/project-websites/tribal-work-group/>)
with funding from the Western IPM Center

Thistles include many species of composite plants in the subfamily *Cynareae*. Although some species are native and beneficial for wildlife, a number of introduced species are serious weeds.

Distribution: Varies by species, cosmopolitan.

Biology: In California, the most common species of concern are **Italian thistle** (*Carduus pycnocephalus*), **bull thistle** (*Cirsium vulgare*), **milk thistle** (*Silybum marianum*), and **yellow starthistle** (*Centaurea solstitialis*).

Integrated Pest Management: Thistles are pioneer species often found in areas where soil has been disturbed. For annual and biennial species, the first strategy is seed management, including checking shoes, socks, bags, and other items for stuck seeds that might spread as you travel. Longer-term, several techniques are necessary to manage established thistles stands, including cultural, biological, and chemical controls.

More information:

<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7422.html>
<http://ufe.calpoly.edu/forestry/detail.lasso?rid=51>



Photo Credits: The Regents of the University of California
Produced by the Western Region Tribal Integrated Pest Management (IPM) Work Group
(<http://www.westernipm.org/index.cfm/center-projects/project-websites/tribal-work-group/>)
with funding from the Western IPM Center

Mistletoes are parasitic plants that obtain water and nutrients by living on the aerial parts of other plants. They can reduce tree growth, disfigure branches and increase water-stress during droughts; they also can serve as habitat and food for birds and other wildlife.

Distribution: Statewide.

Biology: There are 2 types of mistletoes: **leafy mistletoes** (*Phoradendron* species) and **dwarf mistletoes** (*Arceuthobium* species). Leafy mistletoes are common in hardwoods, with sticky fruits and seeds often distributed by birds. Dwarf mistletoes are small and common on conifers, with swellings at the attachment point. The plants “shoot” sticky seeds and can release when touched.

Integrated Pest Management: The decision to take action to reduce mistletoe depends on the health of the trees and the desired environmental conditions.

More information:

<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7437.html>
<http://calfire.ca.gov/foreststeward/pdf/treenote11.pdf>



Photo Credits: The Regents of the University of California
Produced by the Western Region Tribal Integrated Pest Management (IPM) Work Group
(<http://www.westernipm.org/index.cfm/center-projects/project-websites/tribal-work-group/>)
with funding from the Western IPM Center

Brooms and gorse are European shrubs that grow rapidly, forming dense stands that crowd out other plants and animals.

Distribution: Varies by species, but as a group can be found statewide.

Biology: The four most common broom species are **French** (*Genista monspessulana*), **Scotch** (*Cytisus scoparius*), **Spanish** (*Spartium junceum*) and **Portuguese** (*Cytisus striatus*); **gorse** is *Ulex europaeus*. All species generally produce bright yellow, pea-shaped flowers in the spring and brownish-black pea pods in mid to late summer.

Integrated Pest Management: Seedlings grow quickly and can flower and produce seed their first year, making early removal an important control technique. Older stands can be managed with hand-pulling, burning, and chemical controls, with varying success. Management must continue since seeds can persist in the soil for years.

More information:

<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74147.html>
<http://www.fs.fed.us/database/feis/plants/shrub/genon/all.html>



Photo Credits: The Regents of the University of California
Produced by the Western Region Tribal Integrated Pest Management (IPM) Work Group
(<http://www.westernipm.org/index.cfm/center-projects/project-websites/tribal-work-group/>)
with funding from the Western IPM Center

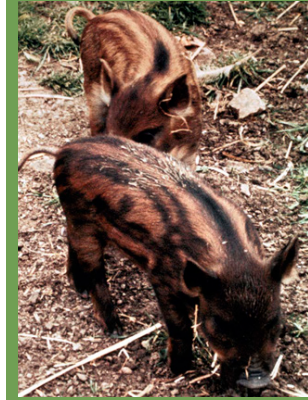
Sudden Oak Death



Goldspotted Oak Borer



Feral Pigs



Pampas & Jubata Grasses

Wild pigs are not native to North America. They impact forests and wildlands through rooting, wallowing, foraging, and hunting, creating a major nuisance.

Distribution: Statewide.

Biology: Domestic pigs were first introduced to California by Spanish missionaries in the 1700s, and wild **Russian boar** were brought in for sport hunting. Today's feral pigs are descendants of interbreeding wild boar and escaped domestic pigs. They are often found foraging for acorns in the fall.

Integrated Pest Management: Feral pigs can be managed through small-scale exclusion, trapping, or shooting. They are classified as a game animal and require a license and tag for hunting. Wild pigs live in groups led by a dominant female. They are voracious eaters, consuming about 3% of their body weight per day. Females can have up to 2 litters per year, with each litter having 3-18 young.

More information:

<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74170.html>
<http://www.dfg.ca.gov/wildlife/hunting/pig/>



Photo Credits: The Regents of the University of California
Produced by the Western Region Tribal Integrated Pest Management (IPM) Work Group
(<http://www.westernipm.org/index.cfm/center-projects/project-websites/tribal-work-group/>)
with funding from the Western IPM Center

Pampas (*Cortadria selloana*) and **Jubata** (*Cortaderia jubata*) grasses are large perennial grasses native to South America that were originally introduced as ornamental garden plants and used for erosion control.

Distribution: Coastal California and Coast Ranges (both species) and into the Central Valley and Mojave Desert (pampas grass only).

Biology: **Jubata grass** can flower in the first year of growth, and flower twice in the same season; it can also reproduce vegetatively. **Pampas grass** escaped from gardens tends toward showier female flowers without viable seed.

Integrated Pest Management: Both species produce thousands of seeds which quickly colonize bare ground; mulching may prevent infestations. Plants quickly resprout after cutting, burning, or grazing, making long-term management difficult. Prevention and early control is critical.

More information:

<http://bit.ly/29urxXS>
<http://bit.ly/29urKdW>
<http://bit.ly/29C8B5G>



Photo Credits: The Regents of the University of California
Produced by the Western Region Tribal Integrated Pest Management (IPM) Work Group
(<http://www.westernipm.org/index.cfm/center-projects/project-websites/tribal-work-group/>)
with funding from the Western IPM Center

The tree disease **sudden oak death** is caused by the introduced water mold *Phytophthora ramorum*. The disease can kill **tanoaks** (*Notholithocarpus densiflorus*) and some **oaks** (*Quercus* species); the pathogen can also cause non-fatal symptoms on many other tree, shrub, and herbaceous species of plants.

Distribution: Fifteen coastal counties in northern and central California, from Humboldt to Monterey; parts of coastal southwest Oregon.

Biology: *Phytophthora ramorum* requires water to reproduce and thrives in cool, wet weather. The organism is microscopic and can spread in tiny droplets of water via windblown rain. Tanoak trees are especially vulnerable because they get both leaf infections and fatal trunk cankers.

Integrated Pest Management: There is no cure for sudden oak death but certain actions may help protect susceptible trees from getting infected, such as removing nearby foliar hosts. Which preventative measures you choose depends on your overall forest management objectives.

More information:

<http://www.suddenoakdeath.org>
<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74151.html>



Photo Credits: The Regents of the University of California
Produced by the Western Region Tribal Integrated Pest Management (IPM) Work Group
(<http://www.westernipm.org/index.cfm/center-projects/project-websites/tribal-work-group/>)
with funding from the Western IPM Center

The **goldspotted oak borer (GSOB)** (*Agrilus auroguttatus*) can kill large, mature coast live oak, canyon live oak, and California black oak. It is not native to California and is thought to have been brought into the state on infested firewood.

Distribution: Southeastern and eastern San Diego County; sections of Riverside and Orange Counties.

Biology: Female beetles lay eggs on the bark surface; when they hatch, the larvae chew through the outer bark of trees. Young larvae live inside the tree until they emerge as adults from D-shaped exit holes one year later. As trees are attacked repeatedly, leaves thin, overall health suffers, and trees eventually die.

Integrated Pest Management: Management is focused on limiting spread into new areas - especially by not moving wood - and protecting healthy trees. Signs of GSOB infestation may not be obvious right away so repeated monitoring, especially of larger trees, is useful. If an infested tree is cut down, the wood should be treated to insure that larvae are killed before they can mature and fly to new trees.

More information:

<http://www.gsob.org>
<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74163.html>



Photo Credits: Mike Lewis (top left); The Regents of the University of California
Produced by the Western Region Tribal Integrated Pest Management (IPM) Work Group
(<http://www.westernipm.org/index.cfm/center-projects/project-websites/tribal-work-group/>)
with funding from the Western IPM Center



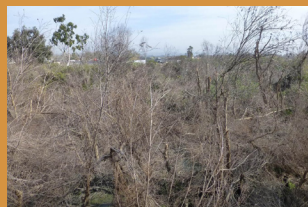
Tamarisk & Arundo



Tree of Heaven



Shot Hole Borers & Fusarium Dieback



The **tree of heaven** (*Ailanthus altissima*) is native to China and was planted widely in the U.S. in the early 20th century. It produces abundant root sprouts which displace native vegetation, especially in riparian zones.

Distribution: Statewide, especially in riparian areas along the coast and Sierra foothills.

Biology: Trees become reproductive at 10-20 years of age. A single tree can produce up to a million seeds per year.

Integrated Pest Management: Plants may be removed by hand-pulling, digging out roots, cutting and girdling. Burning is not effective as it produces resprouts. Treated sites should be monitored to remove new sprouts for at least a year. Most new shoots are produced by root sprouts rather than seeds, despite prolific seed production.

More information:

http://www.cal-ipc.org/ip/management/plant_profiles/Ailanthus_altissima.php
<http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74142.html>

Photo Credits: The Regents of the University of California; Annemarie Smith (*bottom center*)
Produced by the Western Region Tribal Integrated Pest Management (IPM) Work Group
(<http://www.westernipm.org/index.cfm/center-projects/project-websites/tribal-work-group/>)
with funding from the Western IPM Center



Tamarisk (*Tamarix ramosissima*) and **Arundo** (*Arundo donax*) are highly invasive plants common in riparian areas of the western United States. They can cause dramatic changes in hydrology as well as crowd out native vegetation that harbor insects which serve as food for fish and birds.

Distribution: Locally abundant in rivers and streams throughout the West.

Biology: **Arundo** populations in North America do not appear to spread via seed, they reproduce vegetatively from rhizomes. **Tamarisk** can reproduce from seed or vegetatively (from cuttings).

Integrated Pest Management: Early detection is critical for both species as they can grow and spread quickly once established. Hand-pulling of very small infestations can be helpful initially but larger infestations require stronger measures, including grazing, fire, and chemical controls.

More information:

http://www.cal-ipc.org/ip/management/plant_profiles/Tamarix_amosissima.php
http://www.cal-ipc.org/ip/management/plant_profiles/Arundo_donax.php

Produced by the Western Region Tribal Integrated Pest Management (IPM) Work Group
(<http://www.westernipm.org/index.cfm/center-projects/project-websites/tribal-work-group/>)
with funding from the Western IPM Center



Polyphagous and **Kuroshio shot hole borers** (Euwallacea species) appear identical, but are genetically distinct beetles that attack dozens of common native and landscape trees. They carry fungi (multiple species) which causes **Fusarium dieback disease** in over 100 tree species.

Distribution: Coastal California from Ventura to San Diego Counties.

Biology: Adult beetles carry fungal spores into the tree and deposit them into galleries next to their eggs. Once inside, the fungi grow and serve as food for the newly hatched larvae.

Integrated Pest Management: Identifying the beetles directly can be difficult as they are tiny and spend most of their lives inside a tree; many other beetles and pathogens cause similar symptoms on host trees. Proper identification is the first step in deciding the proper management, which may include removing the tree and solarizing the wood to kill larvae. Beetles can spread in wood, and fungi can spread on pruning tools. Prevent further spread by keeping wood local and sanitizing tools.

More information:

<http://www.pshb.org>

Photo Credits: The Regents of the University of California
Produced by the Western Region Tribal Integrated Pest Management (IPM) Work Group
(<http://www.westernipm.org/index.cfm/center-projects/project-websites/tribal-work-group/>)
with funding from the Western IPM Center

