

Hughie Jones

**Bishop pine**  
*Pinus muricata*



*Bishop pine in the Heather Garden waiting for fire to release its seeds*

Bishop pine (*Pinus muricata*) was first identified near the Mission of San Luis Obispo. This tree has a number of other common names and prior scientific names due to many variant forms – Obispo pine, Santa Cruz pine, dwarf marine pine and prickleccone pine.

Bishop pine, along with Monterey (*Pinus radiata*) and knobcone (*Pinus attenuata*), belongs to an informal taxonomic category known as the ‘California closed-cone pines’. In most species of pine, a set of cones matures annually, opening and dropping their seeds in the fall. With the closed-cone pines, many of the cones remain sealed with resin and attached to the branches.

Botanists call this closed-cone trait serotiny. Most scientists believe that serotinous cones evolved as an adaptation to dry climates with occasional forest fires. The heat from fires sweeping through the crowns of the trees causes the resin seal to melt. In as little as a day after the fire, the cones open, at once releasing a seed supply saved up from multiple years. Although the burned mature trees usually die, many new trees soon sprout from the seeds, recolonizing the area more quickly than other tree species.

Studies of fossil cones and fossil pollen show that the closed-cone pine population has always been fragmented. The species expanded, shifted, or colonized new sites during

periods of favourable climate. Its range contracted and some forest stands dried out during periods of unfavourable climate.

Bishop pine has a very restricted range: mostly California, USA, including some offshore islands, and a few locations in Baja California, Mexico, and always on or near the coast. The mature tree grows to a height of 15-25 m with a trunk diameter of up to 1.2 m. It is often smaller, stunted and twisted in coastal exposure. Bishop pine is drought tolerant and grows on dry, rocky soil.

Bishop pine has cones that are strongly reflexed down the branch, 5-10 cm long. The scales are stiff, thin on the side of the cone facing the stem, but greatly thickened on the side facing away and with a stout 5-12 mm spine. This minimizes squirrel predation and fire damage to the cones. The cones remain unopened for many years until fire or strong heat causes them to open and release the seeds.

A study at Pt. Reyes showed that Bishop pine and Douglas-fir (*Pseudotsuga menziesii*) were connected by mycorrhizal networks. Two plants can be linked into what is called a 'common mycorrhizal network'. The networks can link individuals of the same species as well as create networks between individuals of different species. Common mycorrhizal networks are quite widespread. Both carbon from the tree and nutrients taken from the soil by fungi pass between plant individuals linked by this network.

Today IUCN lists Bishop pine as Vulnerable (VU). This means it is facing a high risk of extinction in the wild. The biggest threat to Bishop pine is pitch canker – a fungus characterized by a resinous flow on shoots, branches, boles, cones and above ground roots. Removal of bark from an infected area reveals slightly sunken, honey-colored wood that is soaked with resin. It kills pines and spreads to new species and regions.

Pitch canker is believed to have originated in Mexico and spread north into eastern USA in 1946. It was first discovered in California in 1986. World-wide the disease has been recorded in Japan (1980), South Africa (1990), Chile and Spain (mid 1990s), and Italy (2007). The fungus can survive in soil for 6 months and in wood pieces for over 12 months.

Now it affects many pine species and has made a transgeneric jump to Douglas-fir. A number of beetles are vectors of the fungus. There is no fungicide or pesticide that works. Long term management is dependent on developing a resistant tree variety. Most pine species (both native and exotic) are susceptible. Native stands of Bishop pine have been infected and only one mainland native stand of Monterey pine remains uninfected. This could result in depletion of genetic diversity at native sites.

Other threats to *Pinus muricata* are development and ozone depletion. Mycorrhizal networks are destroyed with development and ozone depletion affects Pinaceae more than

other families of conifers. But these are minor threats compared to the spreading and powerful fungus, pitch canker.

On a hopeful note, First Nations (the Pomo and Kashaya) have always known Bishop pine is a tree that disappears but somehow manages to come back. They have used every part of this tree long before it received a Latin name. The roots were used for making fish traps and baskets. The nuts were eaten fresh and dried for winter use. The pitch was used like glue and the wood for fuel.

Sources:

[https://www.conifers.org/pi/Pinus\\_muricata.php](https://www.conifers.org/pi/Pinus_muricata.php)

[https://www.nps.gov/pore/learn/nature/diseases\\_pitch\\_canker.htm](https://www.nps.gov/pore/learn/nature/diseases_pitch_canker.htm)

Conifers. Compiled by Aijos Farjon and Christopher N Page. IUCN/SSC Conifer Specialist