Watching the demise of a coastal forest type – Bishop Pine

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Introduction

Bishop pine (*Pinus muricata)* is a North American pine of limited distribution found naturally along a narrow north-south axis from Humboldt County (a highly localized population near Trinidad Head) to Santa Barbara County, the Channel Islands and an occurrence near San Vicente in Baja California (Fig. 1).

Figure 1. Distribution of P. muricata in California (source Griffin and Critchfield).

Two distinct variants occur along its distribution with *P. muricata* var. *borealis*, ranging from Sonoma northward, while *P. muricata* var. *muricata* comprises populations in the south. Both a "green" and "blue" race have been described to further confuse the taxonomic status of this species. The cones are serotinous (requiring fire to open) and can be extremely variable in shape. Often the cones are egg-shaped and can measure up to four inches in length with strongly prickled scales. Cone color can vary depending on age from reddish brown to a washed-out gray. (Fig. 2).

Fig. 2.. Cones of P. muricata showing their "tight" scales. The serotinous species are mostly dependent on fire to open and disperse its seeds.

In the northern part of its range Bishop pine serves as the thin line of forest structure between the Pacific Ocean and the more dominant and expansive redwood type. It can be found as an associate in the marine terraces of Mendocino County often referred to as the "transition forest" near the pygmy forest and in pure stands of even-aged cohorts.

The challenge

Being a serotinous species bishop pines normally, but not always, regenerate following a fire. A number of large fires occurred along the coast of Sonoma and Mendocino counties following WW II. As a result many stands of even-aged bishop pine cohorts are common. A relatively short-lived tree (≈80-100 years) many of these stands are simultaneously nearing the end of their life cycle.

Compounding the stresses on these aging communities are the influences of disease (dwarf mistletoe and western gall rust), bark beetles (*Ips* and *Dendroctonus* sp.), and the lack of fire resulting in excessively thick understory vegetation and duff layers inhibiting seed germination and recruitment. The pressures from insects and disease may be further exasperated by the presence of Monterey pine (*P. radiata*) that has been widely planted as an ornamental and is widely believed to serve as a surrogate host for all of the aforementioned pathogens. The prevalence of each of these diseases and insects in *P. radiata* is cause for concern as the sheer number of these ornamental plants is serving as a huge pathogen reservoir (Fig. 3).

Figure 3. Western gall rust (Peridermium harknessii) on Monterey pine (P. radiata)

Further complicating the biological challenges facing coastal *P. muricata* stands is the reality that they often grow on coastal bluffs and terraces that are highly desirable development sites. People who pay exorbitant prices for these home sites are not keen on keeping old, decadent pines that negatively affect their sense of aesthetic quality. Many of these sites, due to decades of fire suppression are often over-grown with understory vegetation, some with juvenile bishop pine recruits. In the name of

viewshed, aesthetics or fire prevention these sites are often cleared and repeatedly mowed to prevent vegetation from reclaiming the site.

Consequences

Starting around the year 2000, Mendocino County planners, state resource agency personnel and academics began noticing and documenting the causes of the decline. In some cases individual trees obvious to members of the public were dying in large numbers resulting in calls from concerned citizens, while in other cases, entire stands collapsed almost simultaneously (Fig. 4).

Figure 4.. Bishop pine stand collapse north of Fort Bragg, Mendocino Coast.

It is apparent that many (if not most) of the stands along the coasts of Mendocino and Sonoma counties are nearing the end of their life cycles and a number of factors are hastening their demise and inhibiting recruitment to replace lost individuals and stands (Fig. 5).

Fig. 5. Extent of P. muricata die-off surrounding Lake Cleone, MacKerricher State Park, Mendocino County. (8/2013 google earth image).

A Way Forward

Fortunately the crisis facing northern coastal bishop pine stands is not irreversible like other north coast forest threats (i.e. *P. ramorum,* Sudden Oak Death disease*)* and steps can be taken to slow and even limit the extent of the collapse. Activities to increase public awareness and action have been effective in identifying key "talking points" that resonate with landowners, planners and other resource professionals.

- Key point #1 - Though fire has been identified as a key missing component inhibiting natural recruitment it must be widely recognized and accepted that re-introducing controlled fire in most locations is not within the realm of reality. Some limited applications may still be plausible (state park lands) but the risk from liability most likely will fuel the bureaucratic process to a standstill;
- Key point #2 - Introduced horticultural plantings of Monterey pine are most likely serving as a huge reservoir for both pathogens and insects further placing older individuals and stands of bishop pines at risk of infection;
- Key point #3 – Coastal development often accelerates the loss of aging and decadent individual pines; vegetation removal and/or management often results in the removal or inhibition of new cohorts to be recruited to a site;
- Key point #4 – *P. muricata* trees and stands are collapsing across all ownerships and are the result of independent factors i.e age, insects, disease, and fire suppression;
- Key point #5 – Given that fire serves a catalyst for seed dispersal and seed bed preparation in serotinous species efforts to recruit new individuals and stands may be reliant on recruiting those individuals who have not been released by fire thereby affecting genetic selection over time for "non-serototiny".

By concisely identifying the variables affecting bishop pine communities and which of those variables lend themselves to reasonable management options has led to a basis from which to assist the discussion in a positive message.

- Far and away the approach that has resonated most positively with landowners is helping them recognize what they can do to promote natural bishop pine recruitment. In most cases it simply means having them identify established seedlings, marking them and avoiding them when

mowing. Both the Mendocino County Planning Department and local California Fish and Wildlife personnel have accepted this approach suitable for mitigating the loss of older, decant trees.

- A far more difficult challenge is addressing the planting of *P. radiata* as an ornamental outside of its natural range. The species is well established in the horticultural trades, widely available through retail nurseries, is relatively inexpensive to purchase, and is a relatively fast grower. The nexus between *P. radiata* and the pathogens affecting *P. muricata* is obvious and groups like local chapters of CNPS can play a critical role in helping spread the word about planting exotic pines within the range of *P. muricata*.

I have personally led "neighborhood walk-abouts" pointing out the causes of pine collapse thereby assisting homeowners in understanding what is causing the decline and providing them with the talking points that they can share with others. This approach empowers local landowners to share the information with their neighbors thereby magnifying the distribution of the information.

Continued outreach will be important and necessary to achieve the type and level of attention necessary to begin the recovery of this unique pine community. This paper is intended for wide distribution to local chapters of the California Native Plant Society, Land Trusts, Homeowner Associations, other conservation organizations and professionals engaged in coastal forest management.

Unfortunately this has become an all too common sight within the northern portion of the range of *Pinus muricata.* Continued effort is needed to assist landowners and resource managers understand their options for insuring the recruitment of new cohorts to sustain this unique coast forest community.