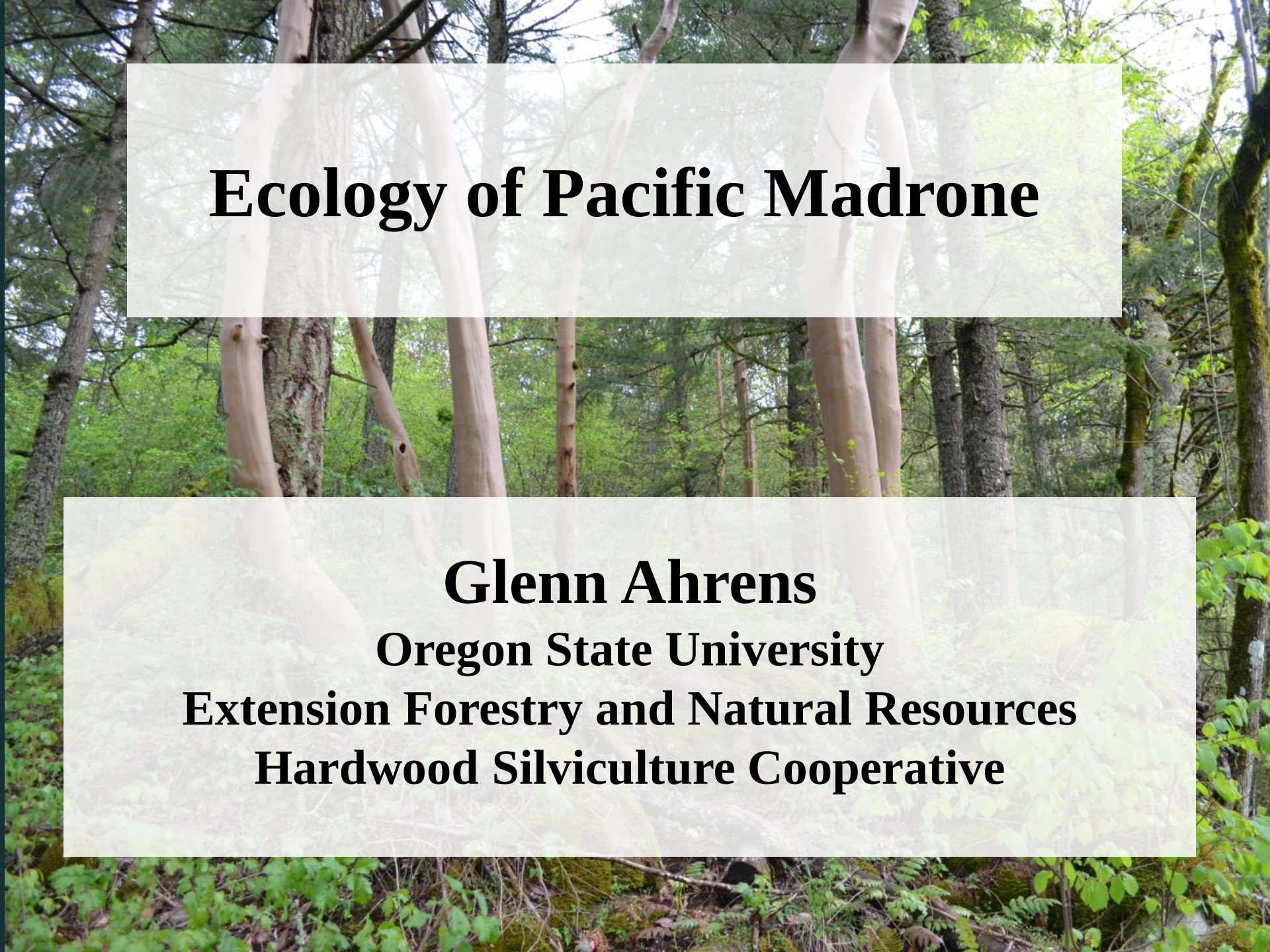


Ecology of Pacific Madrone

Glenn Ahrens

Oregon State University

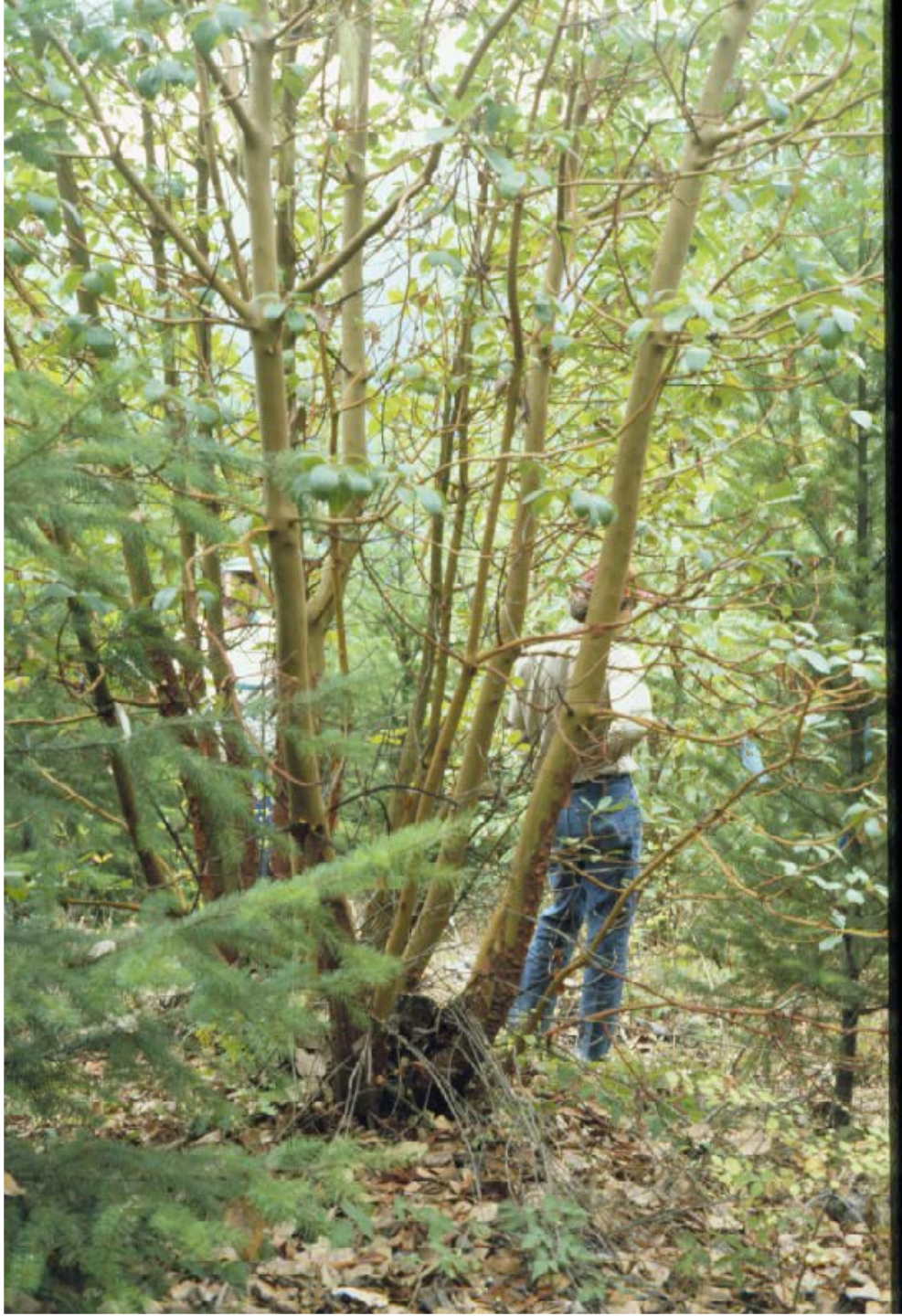
Extension Forestry and Natural Resources

Hardwood Silviculture Cooperative

Background

- **30 years of Research and Extension at Oregon State University**
- **Forest Ecology and Management**
- **Hardwood Forestry**

OSU
Oregon State
UNIVERSITY
Extension Service



Ecology of Pacific Madrone Outline

- Range, abundance, & basic attributes.
- Competition, succession, & stand dynamics, relationship with Douglas-fir & major associates.
- Role of fire and other disturbance drivers.
- Soils & belowground ecology.
- Management implications.

Geographic Range *of* Pacific madrone ***Arbutus menziesii***

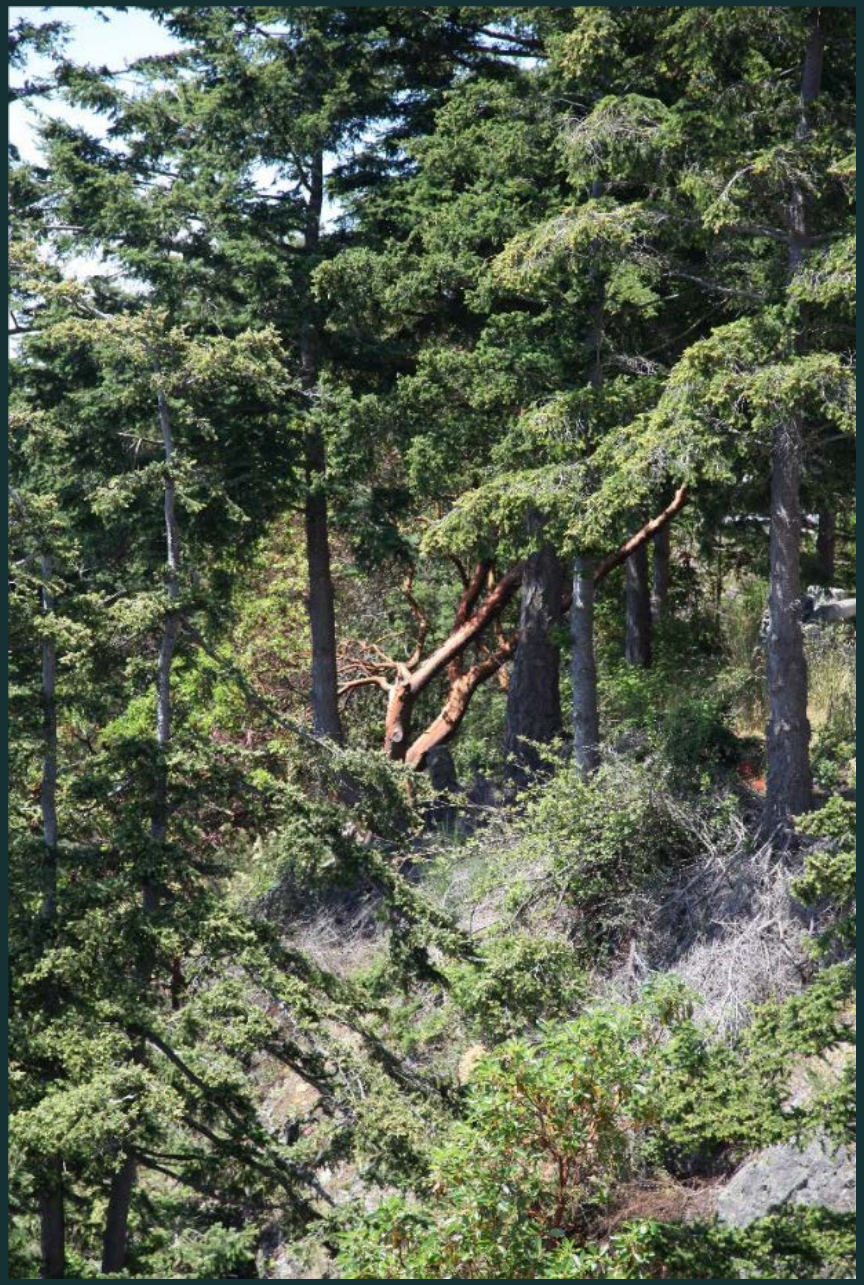
A Pacific coast species, limited to mild winter climate zones.

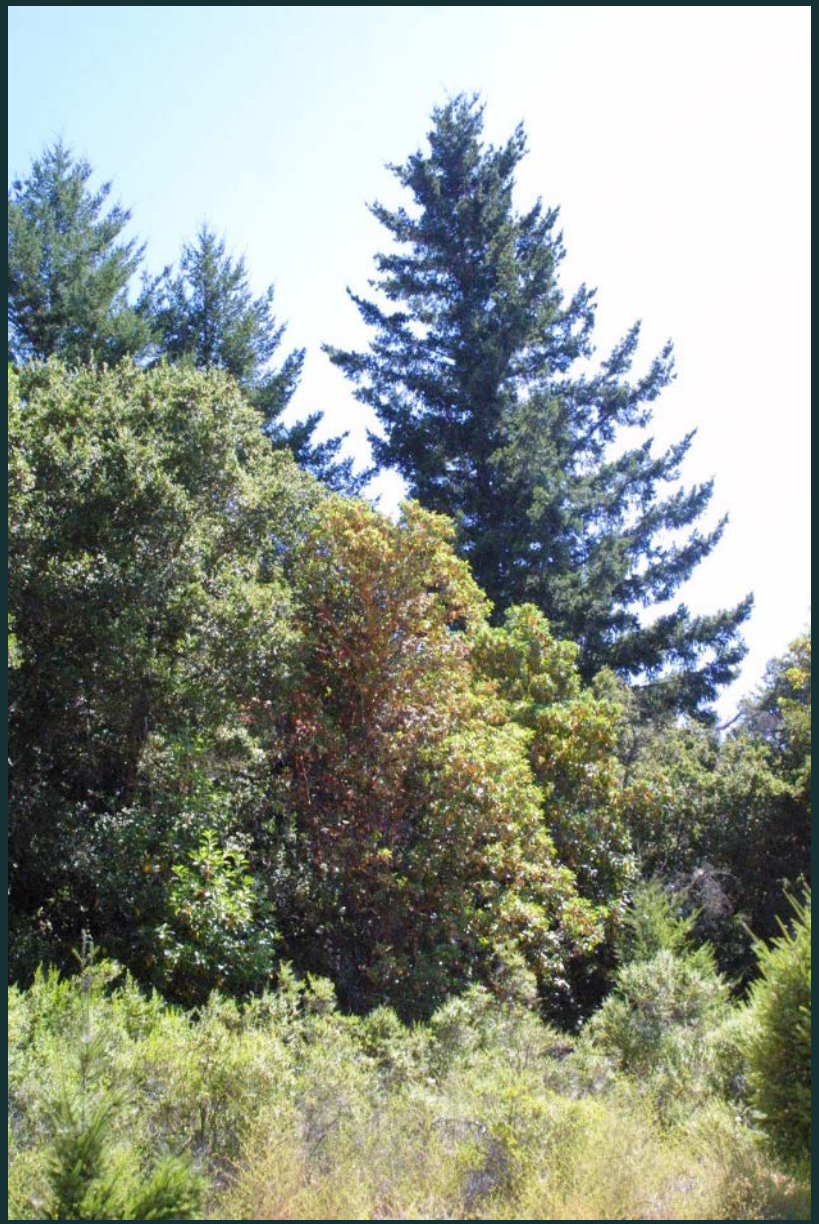
The largest of eight species of *Arbutus* in western U.S. and Mexico.

Source: http://esp.cr.usgs.gov/data/little/

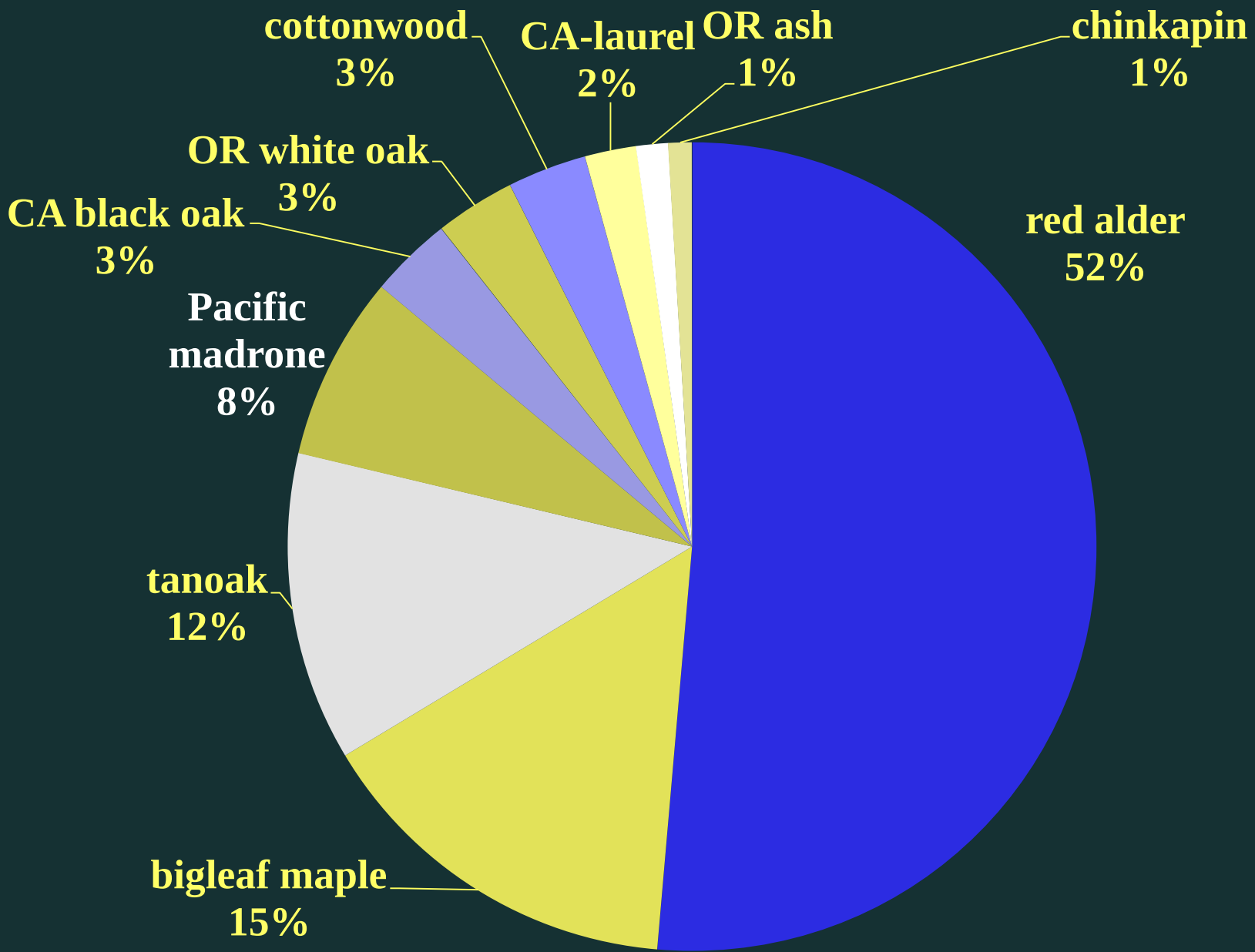
Madrone - important component of many vegetation types

Washington	**Puget Trough**	**Pacific madrone-lodgepole pine**
		Douglas-fir-Pacific madrone
	Coast Range	**western hemlock-Douglas-fir-Pacific madrone**
		Douglas-Fir
	Southern Cascades	**Douglas-fir-tanoak-Pacific madrone**
		Pacific madrone-tanoak
Oregon	**Coast Range**	**Pacific madrone-Oregon white oak**
		Ponderosa Pine-Douglas-Fir
	Willamette Valley	**California black oak -Pacific madrone-coast live oak**
	Klamath Mountains	**redwood - mixed evergreen**
		Sierra Nevada mixed conifer
		canyon live oak
California	**Sierra Nevada**	**Oregon white oak**
		California black oak
	Coast Range	**coast live oak-Pacific madrone**
		interior live oak-Pacific madrone





Hardwoods of the Pacific Northwest – N. Cal, OR, WA



Madrone – basic ecological characteristics.

- Moderate to low tolerance to shade.
- Long-lived - 400 years, plus persistent re-sprouts.
- Typical max. height 80 to 125 ft, dia. 24 to 48 in.
- Adapted to mild winter climate, warm, dry sites – very drought tolerant.
- Important component of mixed evergreen, mixed conifer.
- Imparts high wildlife habitat value – food source and nesting/roosting habitat.

Photo: The Heritage Madrone, WakawakaWineReviews.com

Madrone - competition, succession, & stand dynamics

- Early successional, fire-regenerated – may die out in prolonged absence of fire.
- Fire sub-climax – dominance maintained by periodic fire.
- Climax with Douglas-fir on warm dry, rocky slopes, ridgetops & bluffs.
- Needs open sunlight on top – shaded out by Douglas-fir et al. on more moist sites.

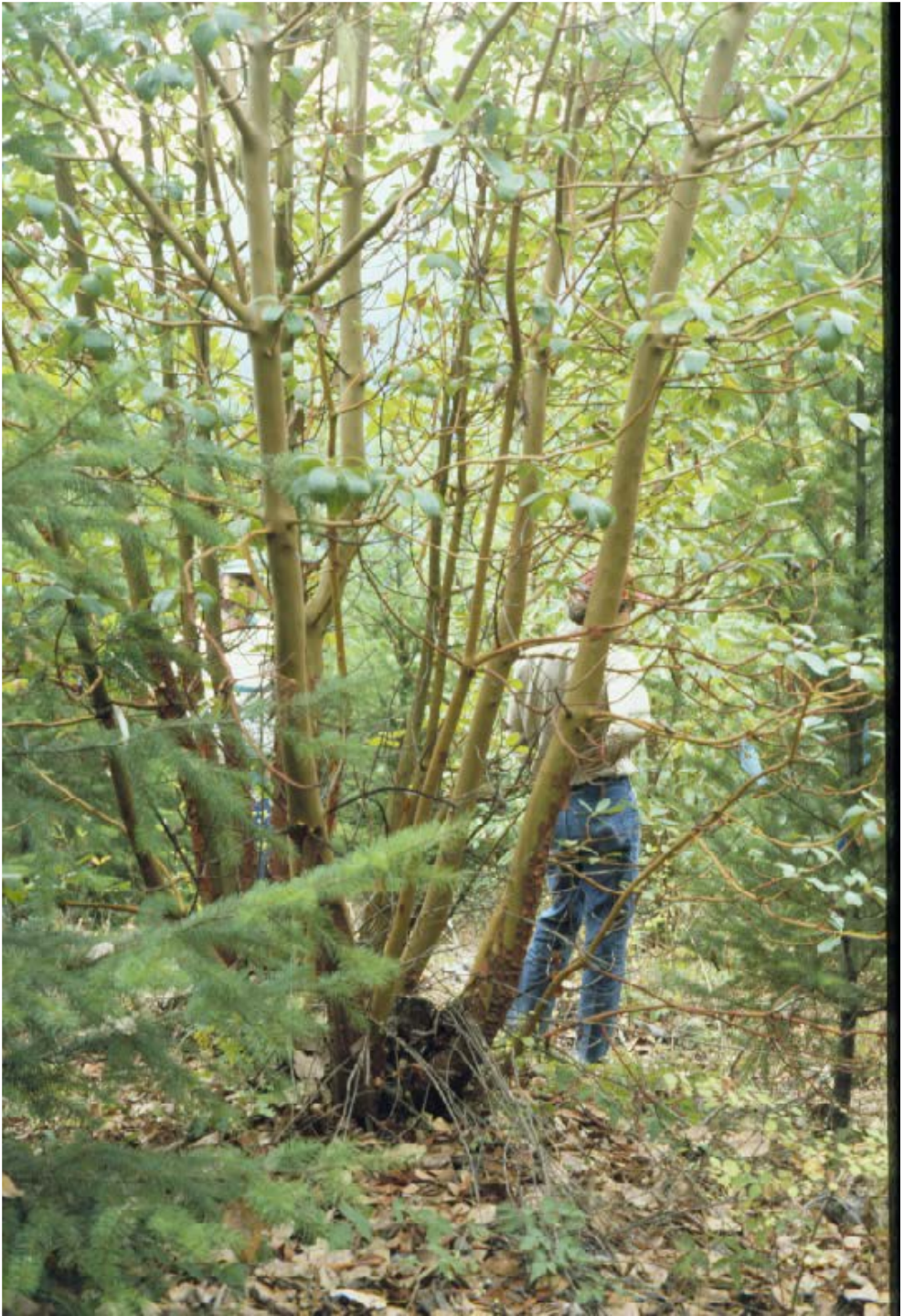
Madrone – special attributes and adaptations

- Very fine roots explore deep fractured rock, may access stored water not available to other species.
- Evergreen sclerophyllous leaves, tolerates very high plant moisture stress.
- Hosts a wide variety of mycorrhizal fungal species, many that are shared with associated tree species.

Madrone: fire-adapted, fire-driven, sometimes fire-dependent.

- Madrone is usually maintained by periodic fire - frequent low-intensity fire, variable mixed severity fire, or high-severity stand replacement fire
- Thin-barked stems easily killed by fire.
- Regenerates via prolific sprouts from burls & seedling establishment on exposed mineral soil.
- How will we maintain madrone in the absence of fire?


99
Pacific Hwy
5
Rogue River Hwy
99
45A
45B
Valley of
the Rogue
State Park
Foots Creek
Google
Imagery ©2016 Google, Map data ©2016 Google



Soils and belowground ecology

- Madrone need well-drained surface soils.
- Avoid poor drainage, soil compaction/alteration.
- Madrone is likely a “hub for mycorrhizal fungal diversity and connectivity”
- Need to ensure that compatible below-ground associations are established.


Google
Imagery ©2016 Google, Map data ©2016 Google
Terms
Privacy
Send feedback

Applied ecology –implications for management of madrone

- **Focus on sites with well-drained drained soils, rocky soils, south and west aspects.**
- **In the absence of fire – try thinning to reduce canopy competition + controlling invasive species.**
- **Choose sites with compatible woody vegetation & mycorrhizal associations.**
- **Avoid soil compaction/alteration, irrigation, fertilization, pollution, and physical damage.**

For more information on Hardwood Ecology & Management

Glenn Ahrens, OSU Extension Forestry & Hardwood Silviculture Cooperative
503-655-8631
glenn.ahrens@oregonstate.edu

Selected References

- USFS Plants Database - Fire effects reference http://www.fs.fed.us/database/feis/plants/tree/arbmen/all.html
- Silvics of Forest Trees of the United States http://www.na.fs.fed.us/spfo/pubs/silvics_manual/volume_2/arbutus/menziesii.htm
- Niemiec et al. 1995. Hardwoods of the Pacific Northwest. http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/7623/RC8.pdf?sequence=1
- Kennedy et al. 2012. *Arbutus menziesii* facilitates regeneration dynamics. Am. J. Bot. 99(10): 1–11. http://www.esf.edu/efb/horton/Kennedyetal2012_arbutus.pdf