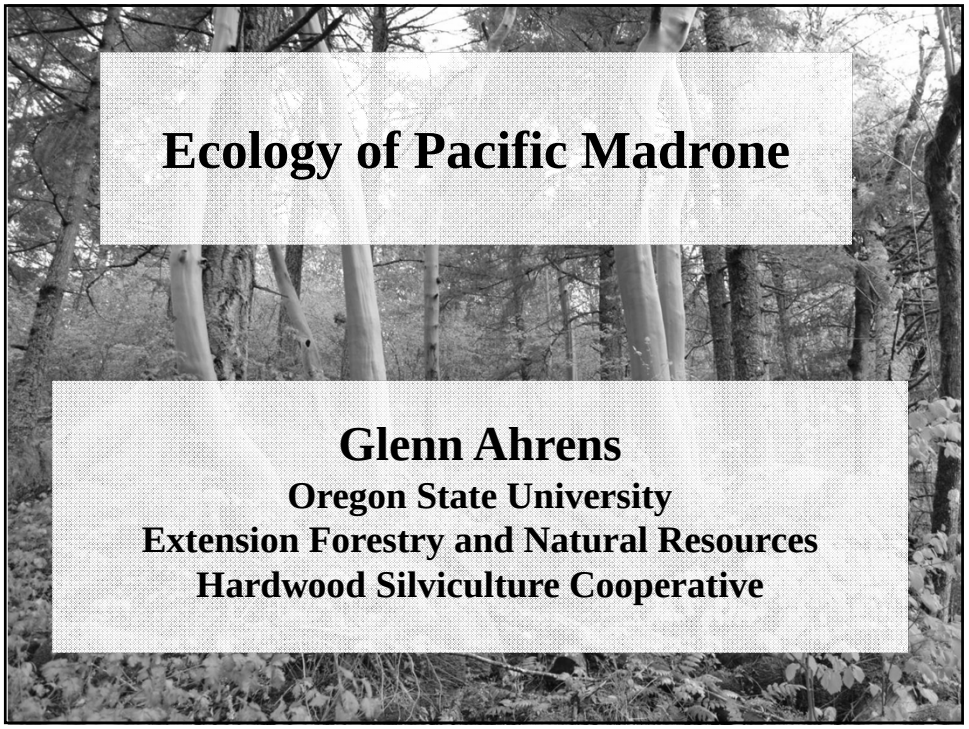



## Background

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

OSU Oregon State University Extension Service

Hardwood Silviculture Cooperative

# 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***

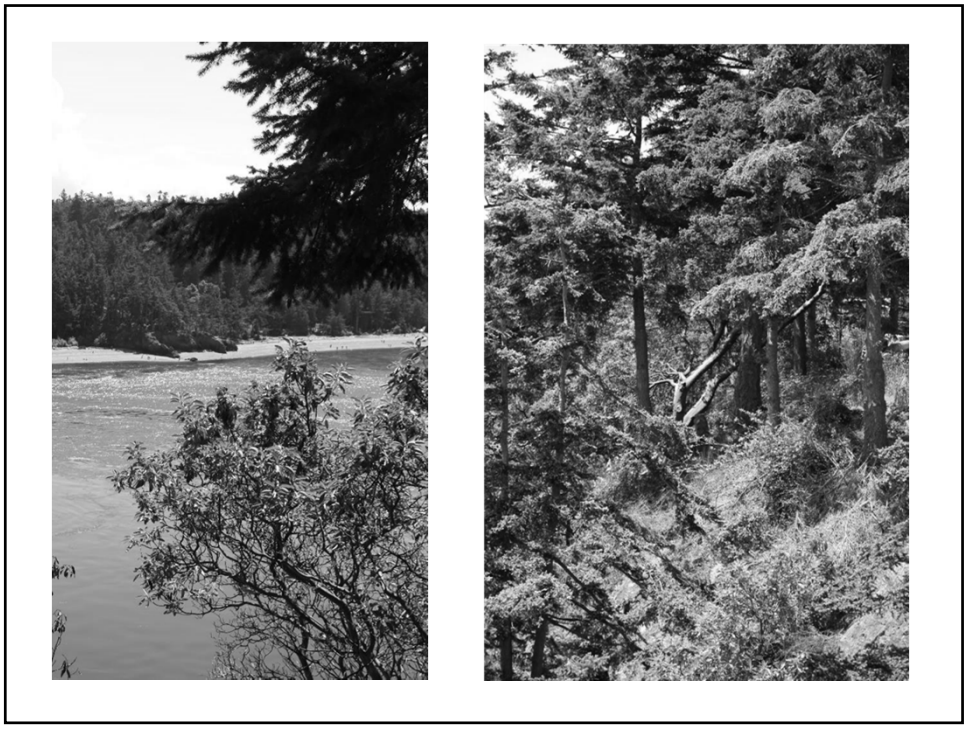
A Pacific coast species, limited to mild winter climate zones.

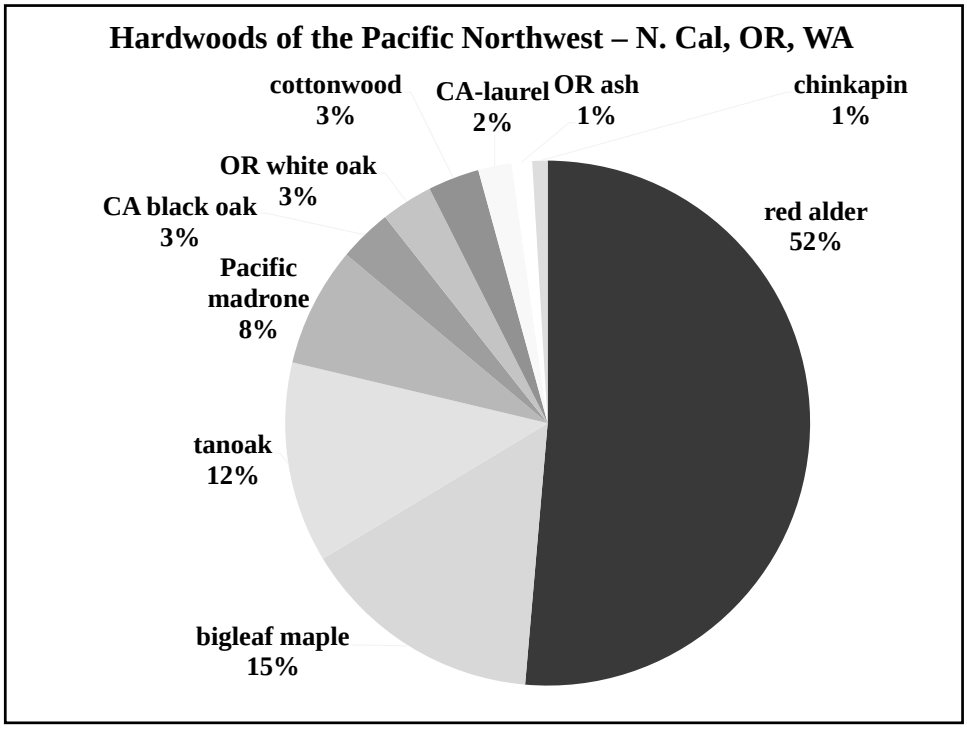
The largest of eight species of *Arbutus* in western U.S. and Mexico.

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** |





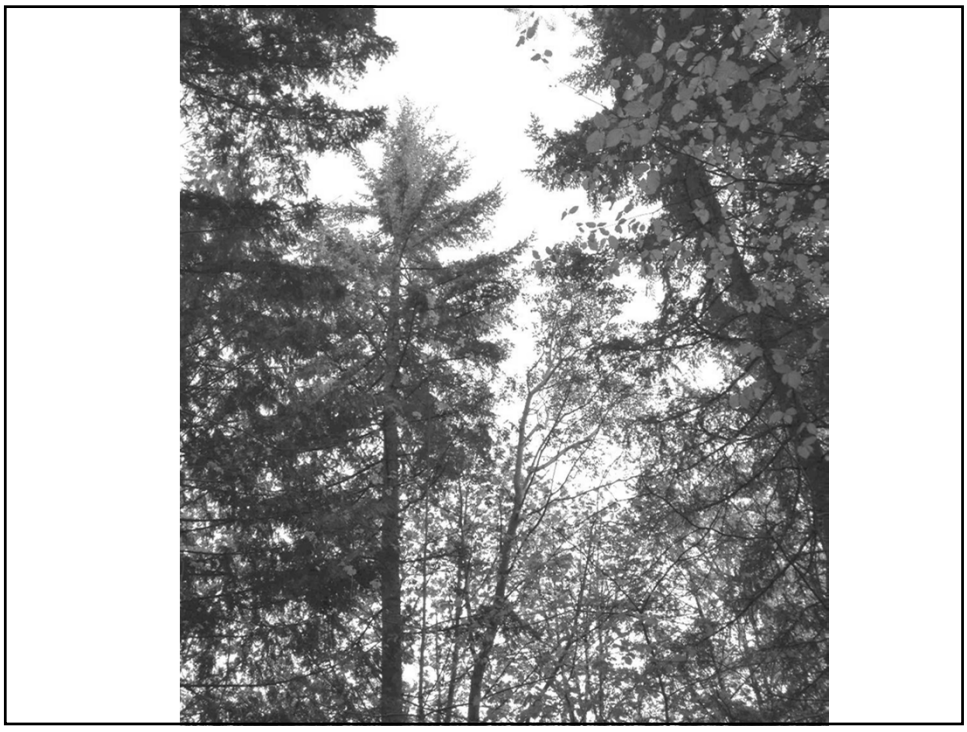

## Madrone – basic ecological characteristics.

- 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.

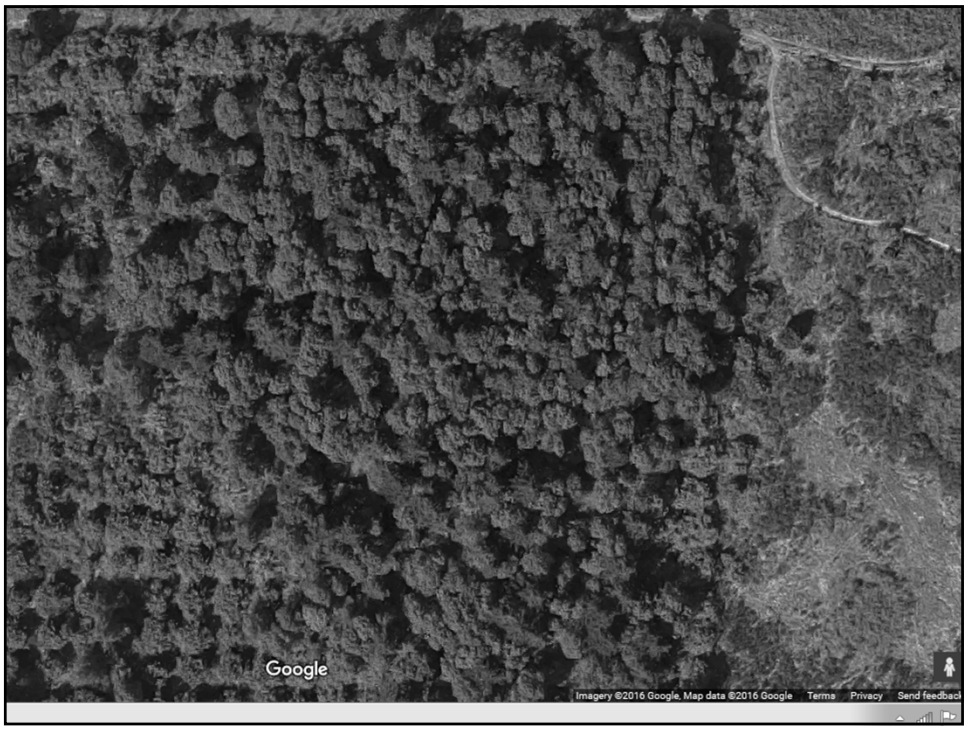
## Madrone: fire-adapted, fire-driven, sometimes fire-dependent.

- 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
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.



## 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