

The Ecological Diversity of Pines: A Research Travelogue

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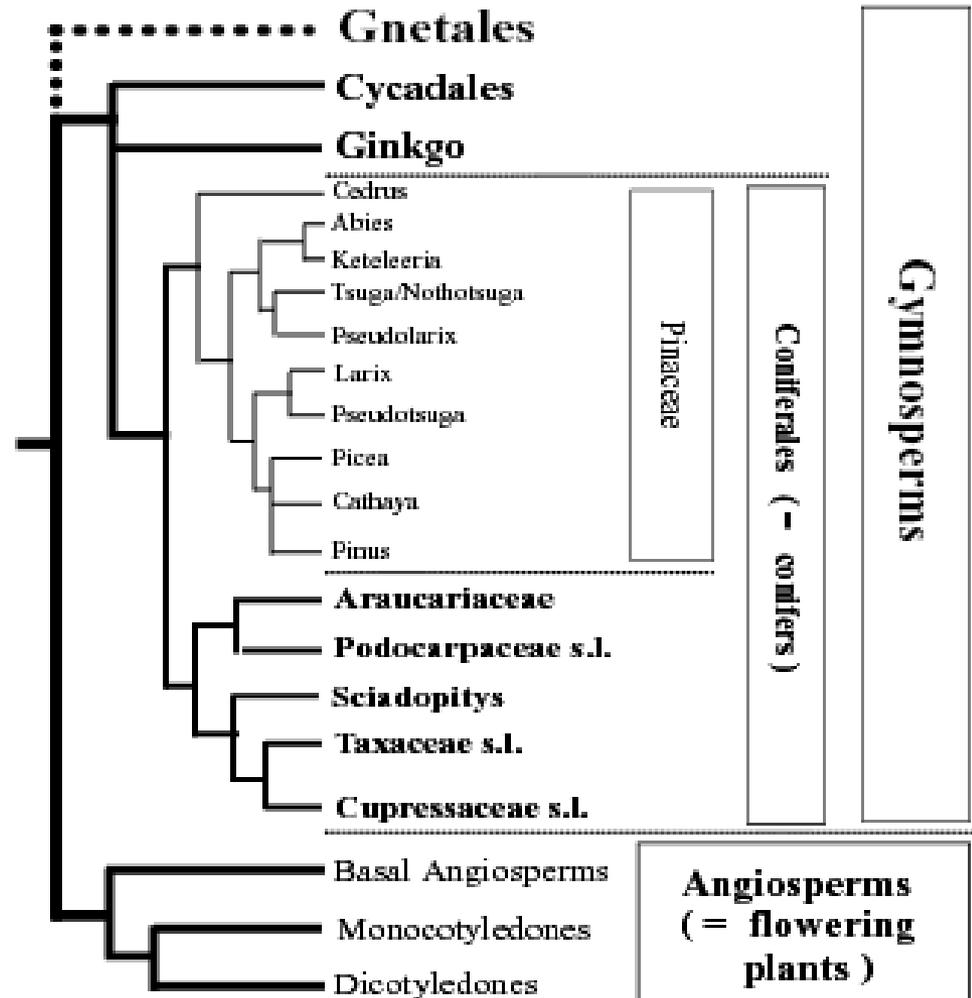
University of Northern BC

Terrace Campus

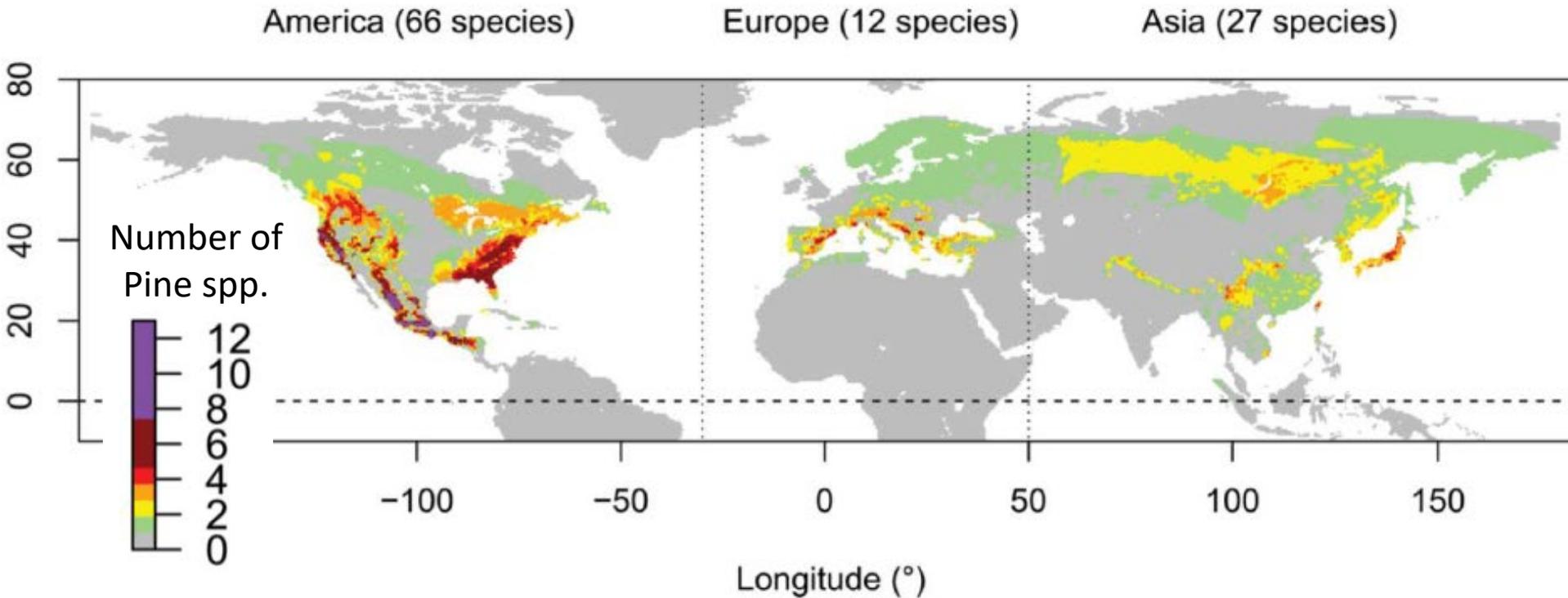
Welcome to the family tree of pine trees!

- Needle-leaved
- Northern hemisphere
- Trees or shrubby
- Soft wood
 - uniform tracheid cells
- Wind pollinated
- Wind dispersed
 - (mostly...)

Phylogeny of Coniferales

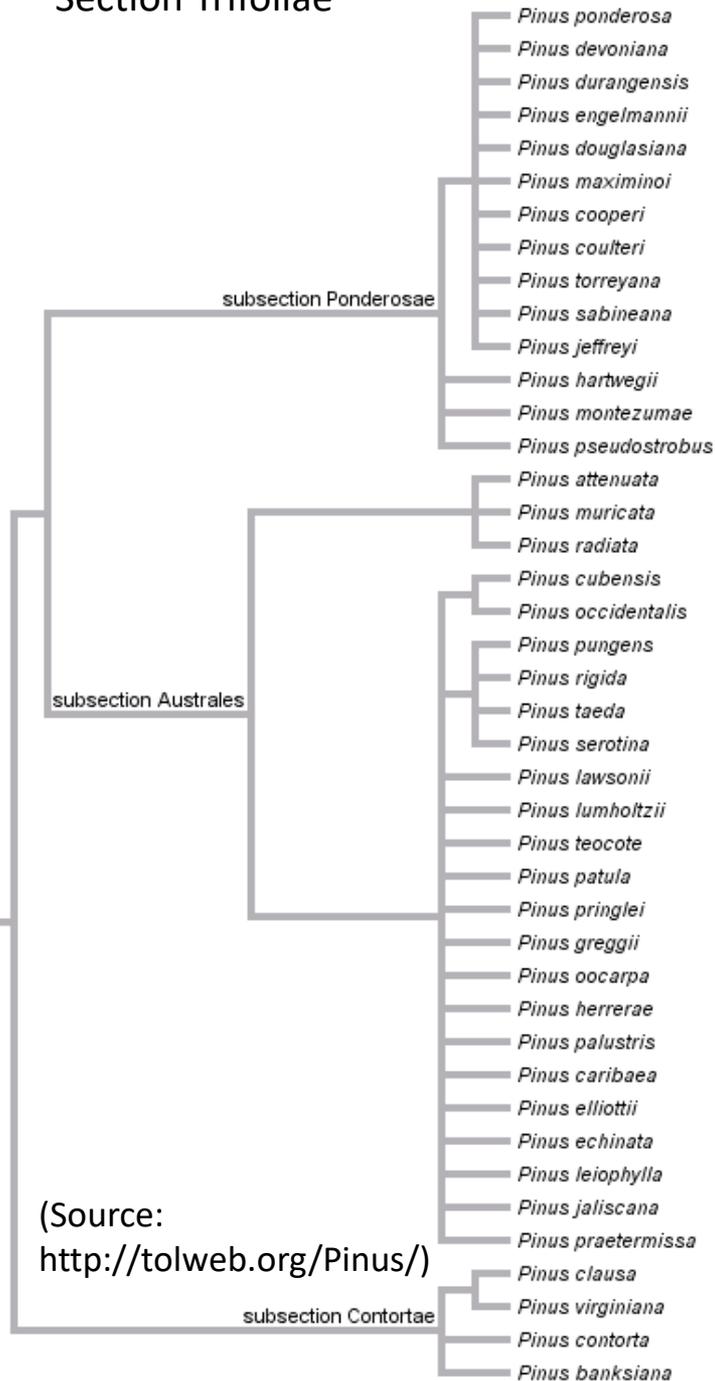


A Northern Hemisphere Genus, Widely Distributed

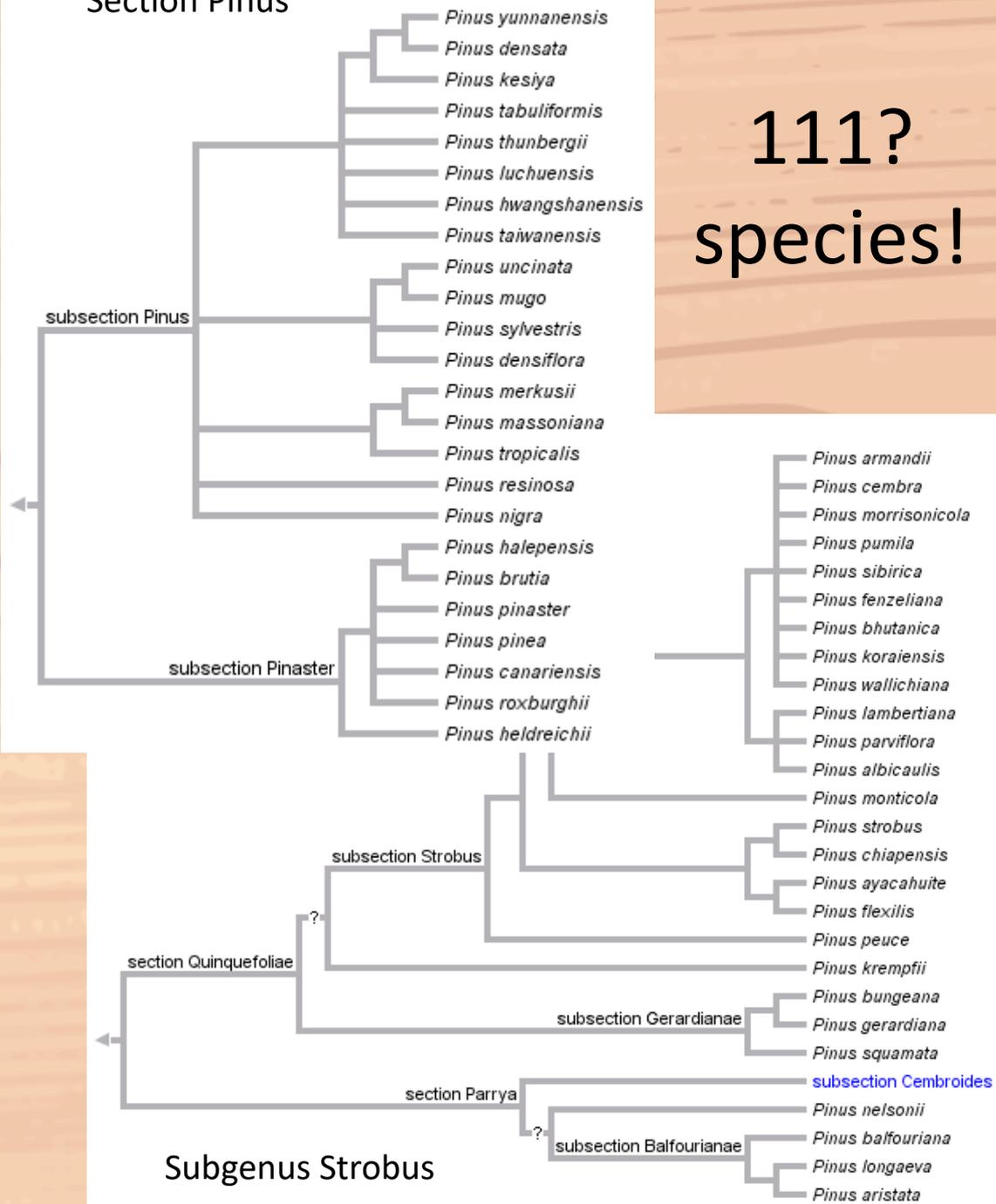


(Source: Nobis et al., 2012, Latitudinal variation in morphological traits of the genus *Pinus* and its relation to environmental and phylogenetic signals. *Plant Ecology & Diversity*, 5(1), pp.1-11)

Section Trifoliae



Section Pinus



111?
species!

© W.P. Armstrong 2006



(Source: <https://www.pinterest.ca/pin/66357794487093941/>)

2-needle pines

3-needle pines

5-needle pines



“hard pines”

e.g., lodgepole pine
(*Pinus contorta*)

e.g., ponderosa pine
(*Pinus ponderosa*)

“soft pines”

e.g.,
the “white pines,”
eastern (*Pinus strobus*); western
(*Pinus monticola*)

“stone pines”



“tropical pines”



e.g., Caribbean pine
(*Pinus caribaea*),
loblolly pine
(*Pinus taeda*)

The Many Faces of Lodgepole Pine

1. near-pure even-aged post-fire stands
2. even- or uneven-aged stands on very dry (sandy, gravelly, rocky) sites
3. uneven-aged stands in cold dry habitats supporting few other tree species (i.e., the Chilcotin, the Sub-Boreal Pine-Spruce zone, SBPS)
4. mixed stands, mostly post-fire, mostly even-aged





MPB at Outbreak Levels



Elevated Fire Risk, 2 Phases



Post-Fire Recovery

➔ More Even-Aged Lodgepole Pine



What if Widespread Beetle Attack, but No Fire?



- Some pine-leading stands have spruce and fir in the understory, are essentially reforested already after MPB ... other stands do not

Understory Release is Certain,

though stocking and volumes may take longer to meet site potential than after fire



Natural Recovery (decades later)



(stand attacked by MPB in 1970s, Wateron Lakes National Park; photo by
Rene Alfaro)

Other Major Pine Species in B.C.



Western White Pine, *Pinus monticola*
(photo from <http://www.kalesnikoff.com/>)

Ponderosa Pine,
Pinus ponderosa

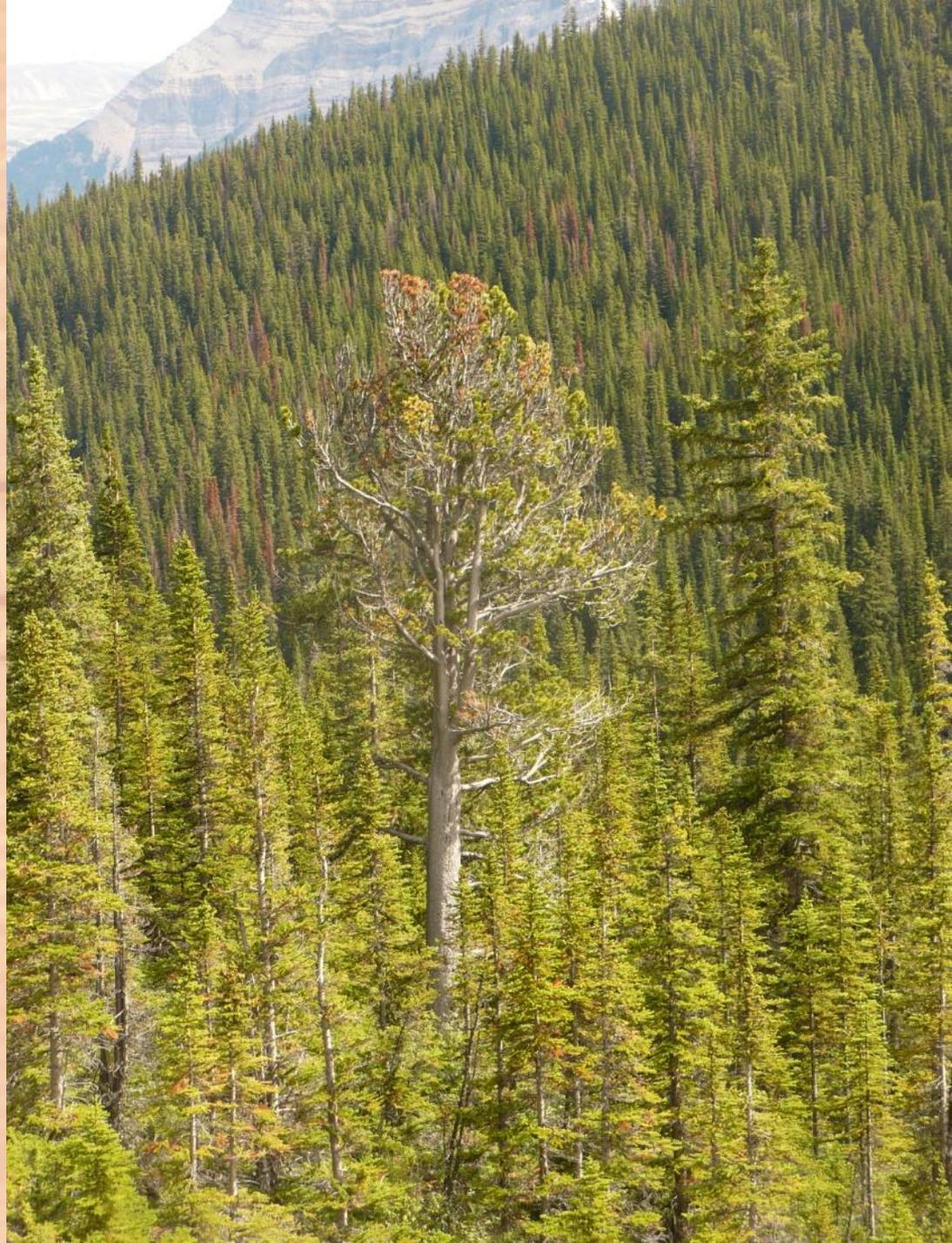
All 5-Needle Pines are Susceptible to “White Pine Blister Rust”



Whitebark Pine at high elevations



Whitebark Pine,
Pinus albicaulis



(Photos courtesy of Alana Clason)

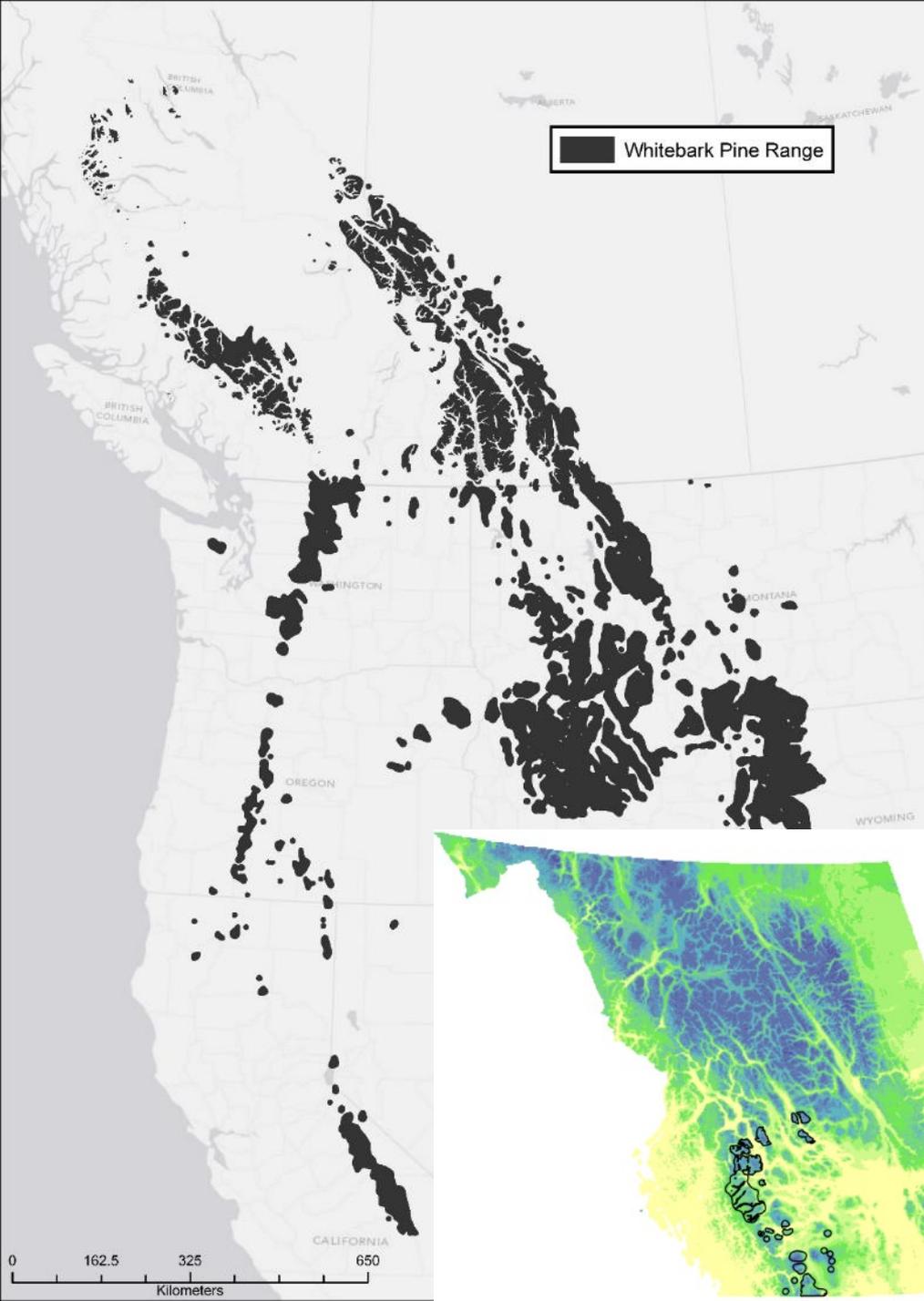
Clark's Nutcracker – important seed disperser



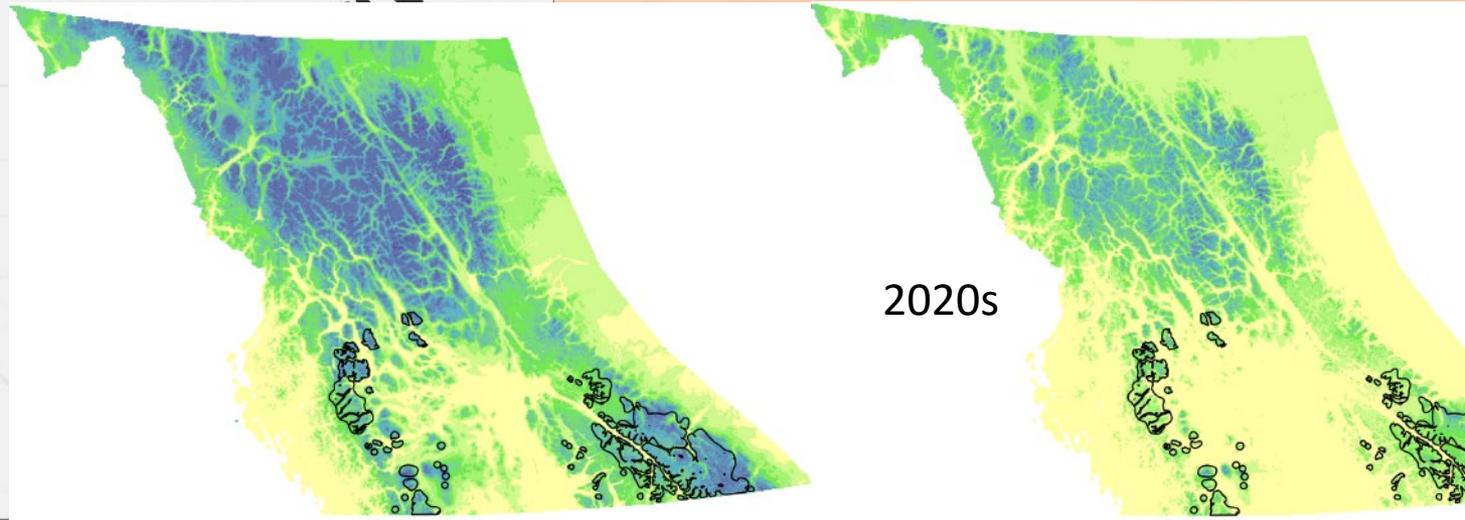
(Photo from <https://www.audubon.org/news/better-know-bird-clarks-nutcracker-and-its-obsessive-seed-hoarding>)



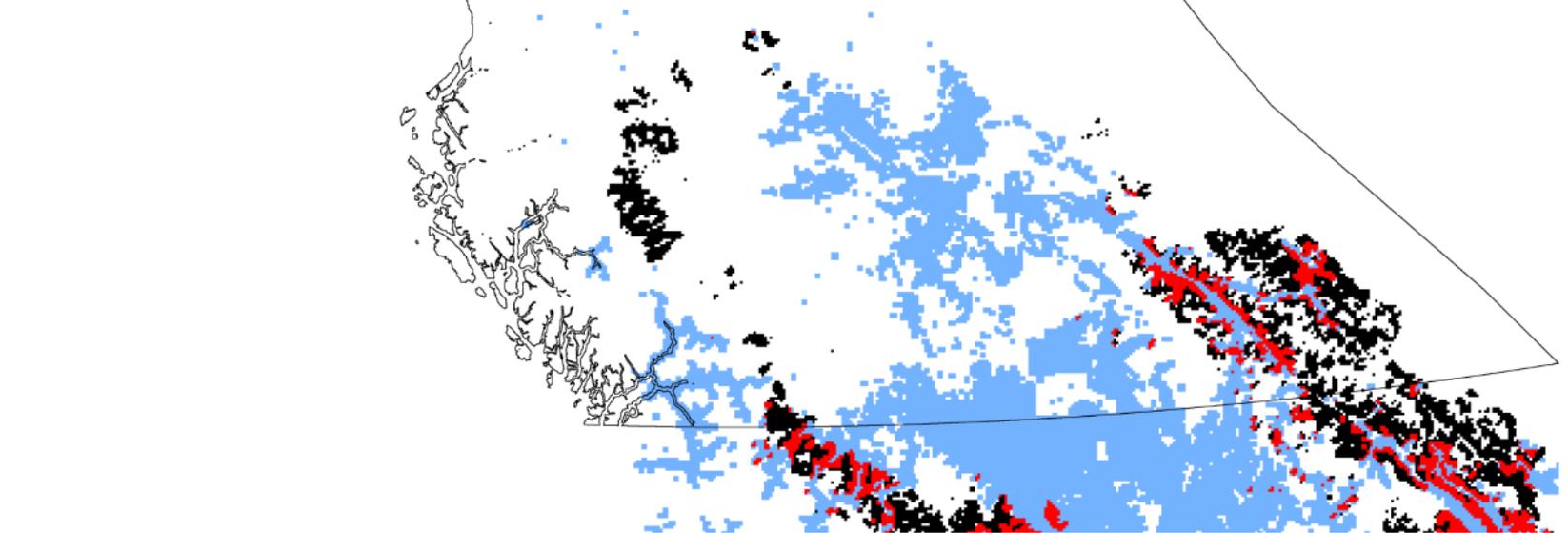




Why Isn't
Whitebark Pine
Moving North into
Suitable Habitat?



Why Isn't Whitebark Pine Moving North into Suitable Habitat?



 Douglas-fir

 Whitebark pine

 Whitebark pine
– Douglas-fir

Sierra Nevadas Host Some Awesome Pine Species!



Sugar Pine, *Pinus lambertiana*
(photo from

www.pinterest.ca/pin/6896205650766499/)

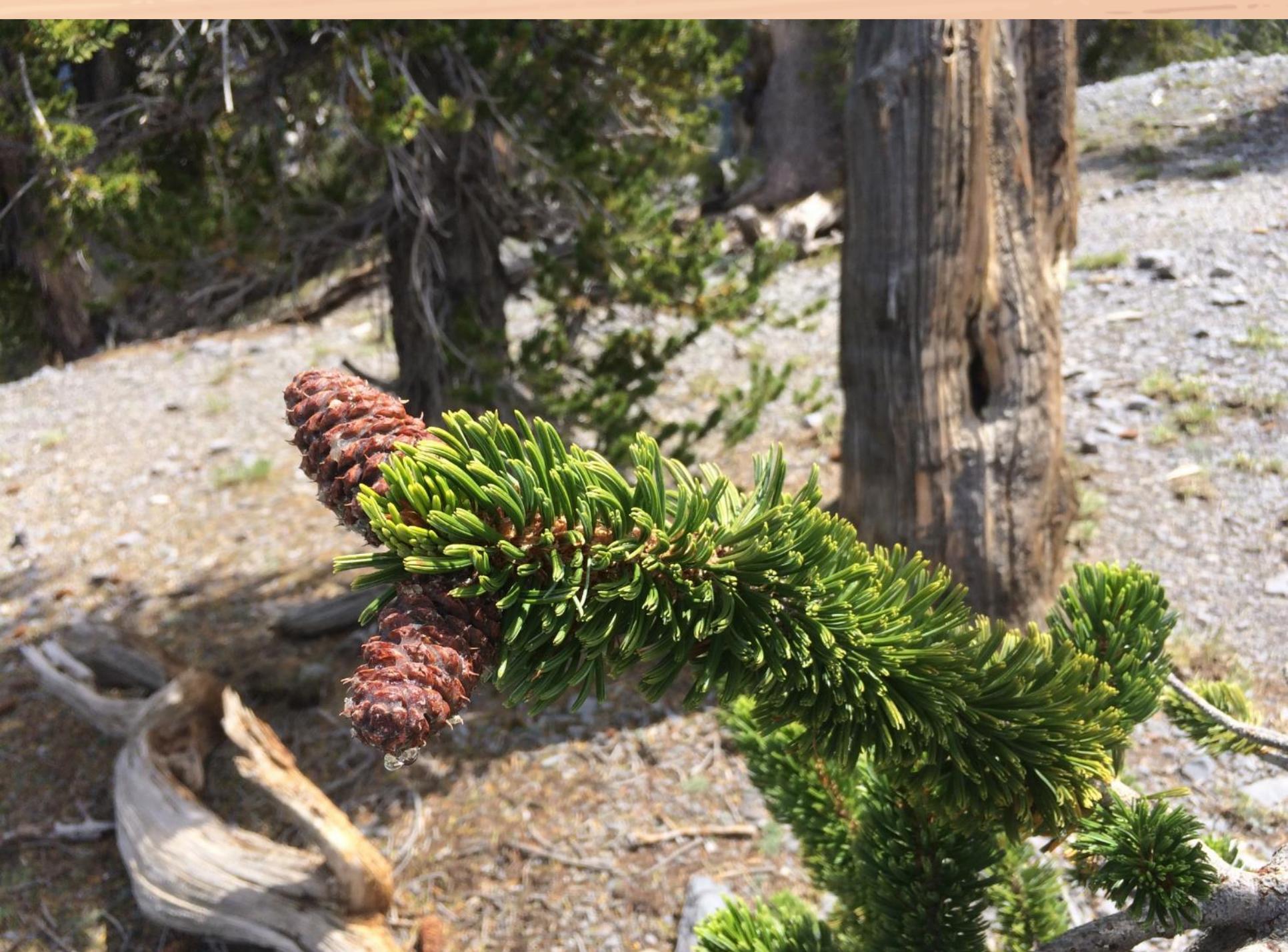
Jeffrey Pine,
Pinus jeffreyi

Great Basin
Bristlecone Pine,
Pinus longaeva













A 5-needle pine ...
but no confirmation
of white pine blister
rust in this species
yet



Regeneration Surveys in an 11,000 ha Burn







Pinyon – Juniper Woodlands



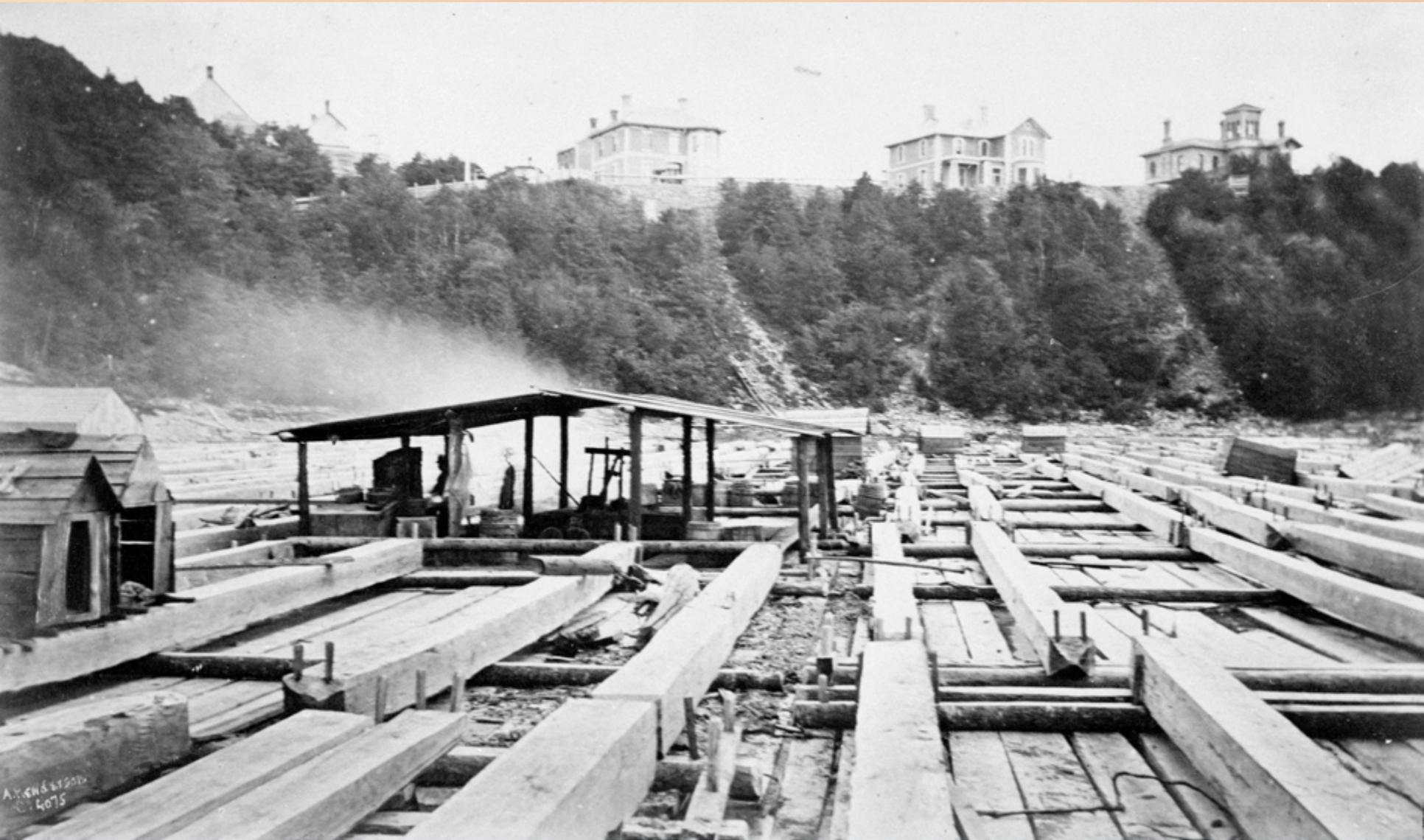
Single-Leaf Pine,
Pinus monophylla





Eastern White Pine, *Pinus strobus*

Timber Raft on the Ottawa River, mid-1800s



(Source: <http://passageshistoriques-heritagepassages.ca/ang-eng/ouvriers-labour/la-vie-apres-le-canal-life-after-the-canal/train-de-bois-sur-la-riviere-des-outaouais-timber-raft-on-the-ottawa-river>)

History of Land Use in New England: The Harvard Forest Dioramas

ca. 1700



History of Land Use in New England: The Harvard Forest Dioramas

ca. 1740



History of Land Use in New England: The Harvard Forest Dioramas

ca. 1830



History of Land Use in New England: The Harvard Forest Dioramas

ca. 1850



History of Land Use in New England: The Harvard Forest Dioramas

ca. 1910



History of Land Use in New England: The Harvard Forest Dioramas

ca. 1930





Some Southeastern Pines



Loblolly Pine, *Pinus taeda* (photo from <https://plants.ces.ncsu.edu/plants/pinus-taeda/>)



Longleaf Pine, *Pinus palustris*
(photo from <https://bladenonline.com/>)

Shortleaf Pine (*Pinus echinata*) in Alabama, managed by different frequencies of under-burning



Burned 1 year before



Burned 3 years before



Burned 7 years before



Not burned for 14 years

Monterey Pine (*Pinus radiata*) on the California Coast



(Photo from <https://davesgarden.com/guides/articles/view/3537>)



(photo from https://www.conifers.org/pi/Pinus_radiata.php)



(photo from <https://pfaf.org/user/Plant.aspx?LatinName=Pinus+radiata>)













Kauri “Pine”
(*Agathis
australis*)

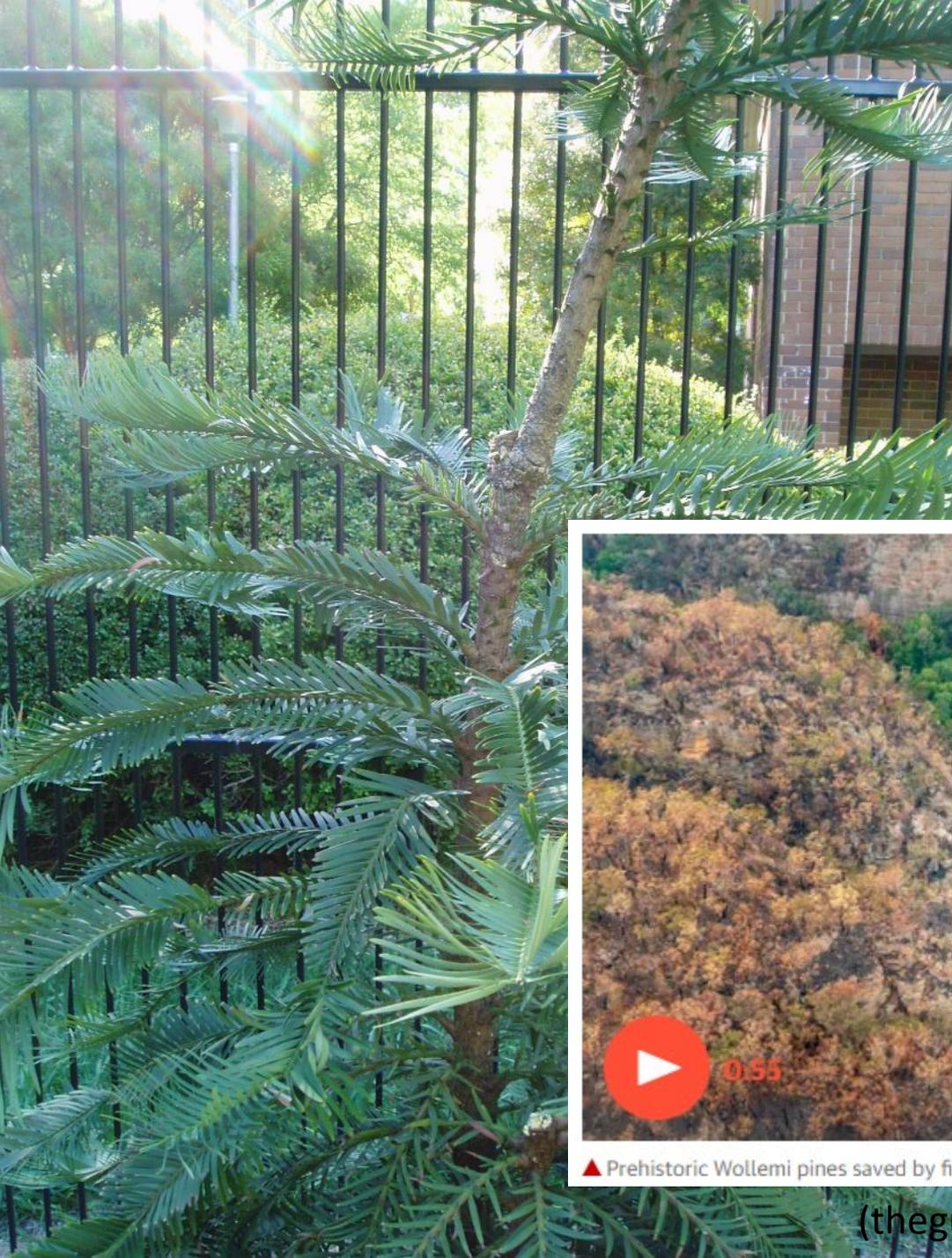


Kauri "Pine"
(*Agathis
australis*)

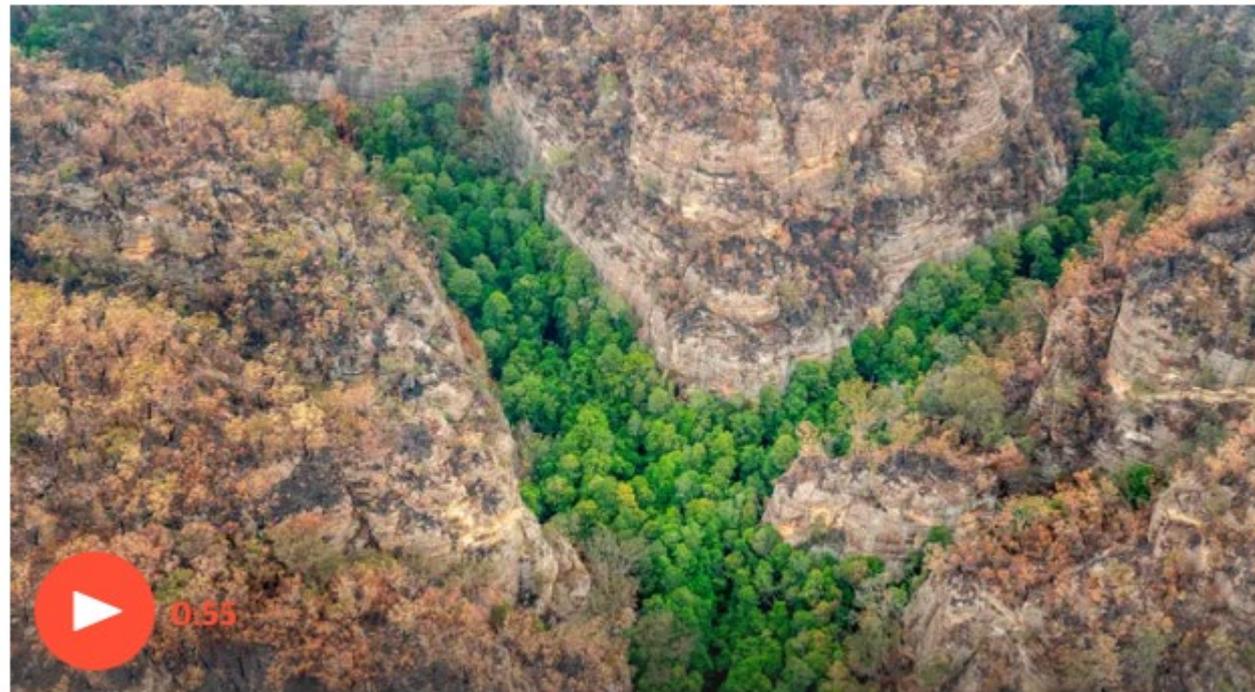


Rimu,
Dacrydium cupressinum

... and many other
members of the
Podocarp family, not
the Pine family



Wollemi “Pine”,
Wollemia nobilis,
Discovered 1994 in
New South Wales,
Australia



▲ Prehistoric Wollemi pines saved by firefighters from Australia's bushfires - video

(theguardian.com/australia-news/2020/jan/17/)



Parana “Pine” of
southern Brazil,
*Araucaria
angustifolia*



(photo from Koehnlein et al. 2012)





Canary Island Pine,
Pinus canariensis







