



Fungal Frontiers: **Non-native and Invasive Mushrooms in** **California**

Christian Schwarz — California Invasive Plant Council 2025

Invasive Plants vs. Invasive Fungi

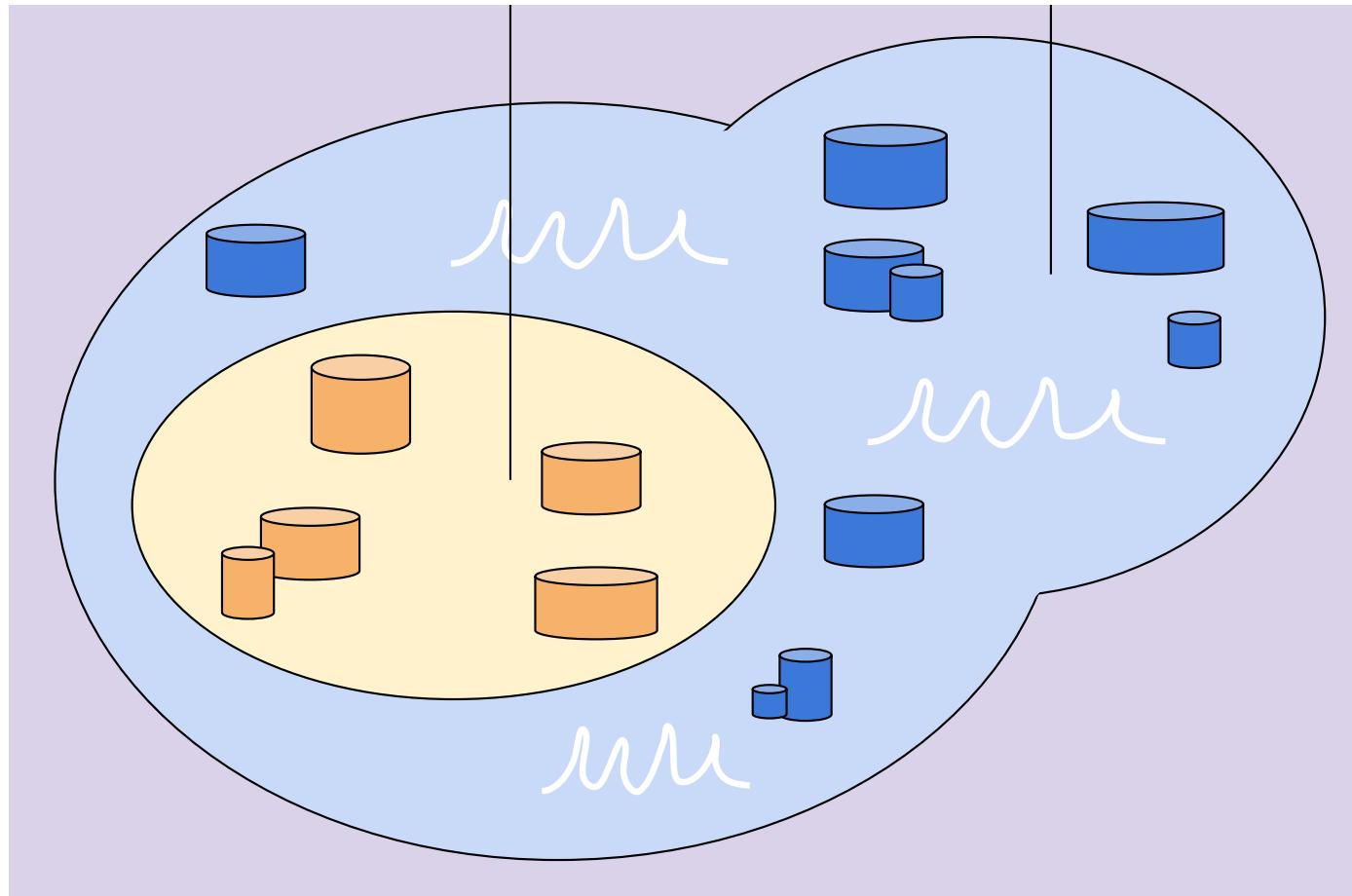


IN CALIFORNIA:

- Around 2,000 non-native plants
 - >200 invasive/noxious
- 1-2 hundred non-native fungi
 - Low double-digit invasive/noxious



Evidence of Invasiveness



- **Theoretical:**
 - Niche theory
- **Empirical:**
 - Almost no data

Hort- & Agr- icultural Pathogens

Sudden Oak Death Syndrome
(*Phytophthora ramorum*)

Pistacio Canker
Leptosilla pistaciae

***Phytophthora* species repeatedly introduced in Northern California through restoration projects can spread into adjacent sites**

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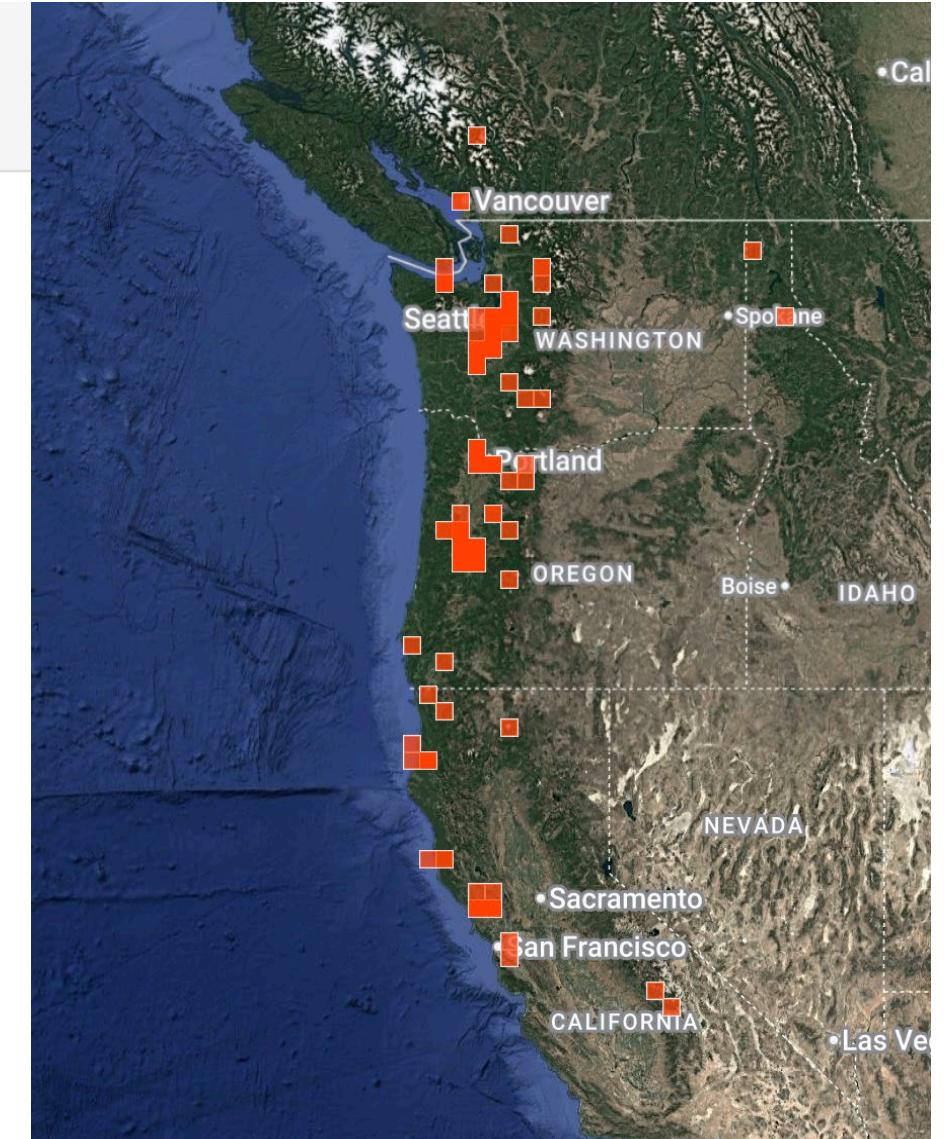
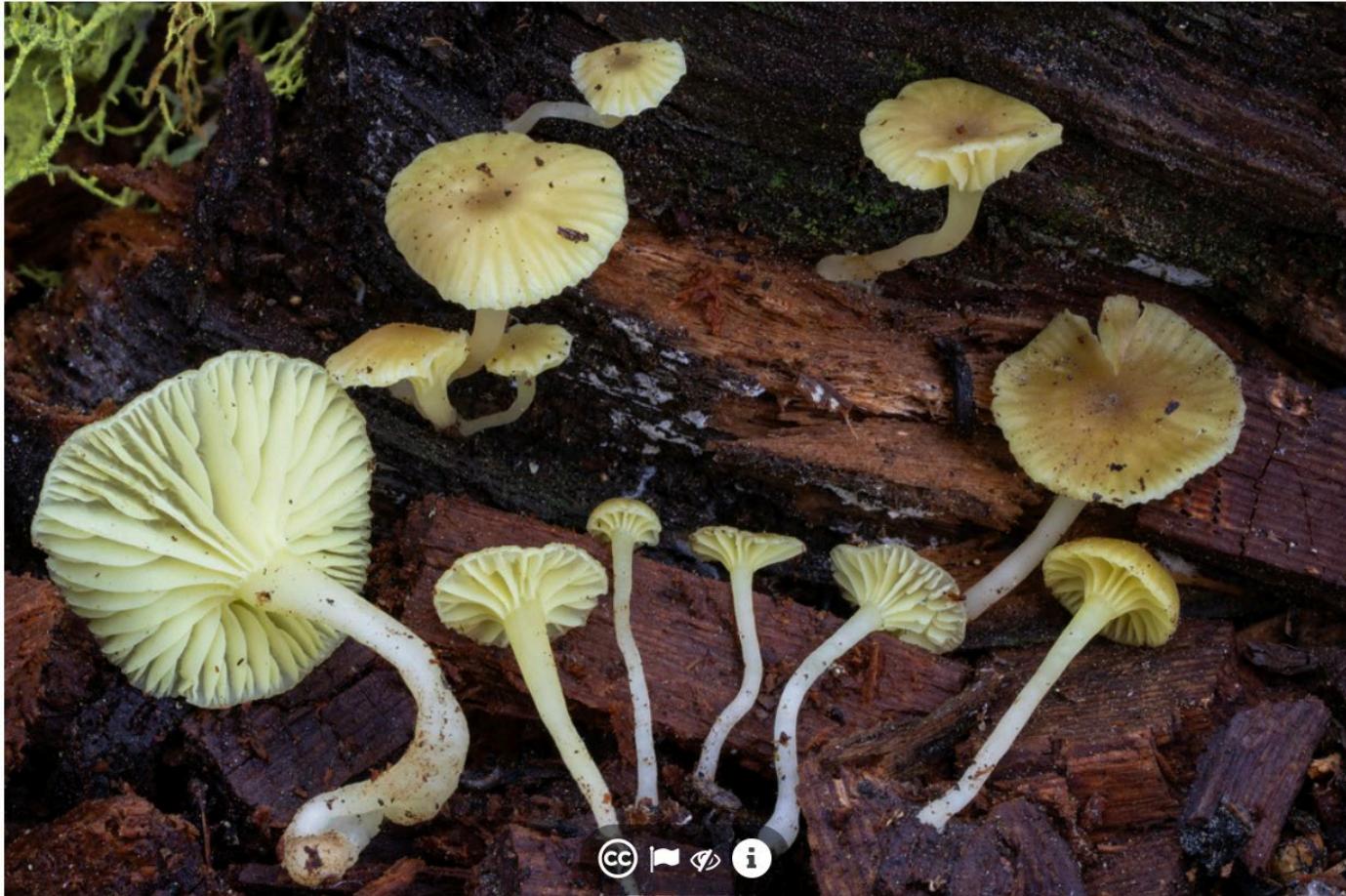
Urban Incubators: Fungal Junk Food

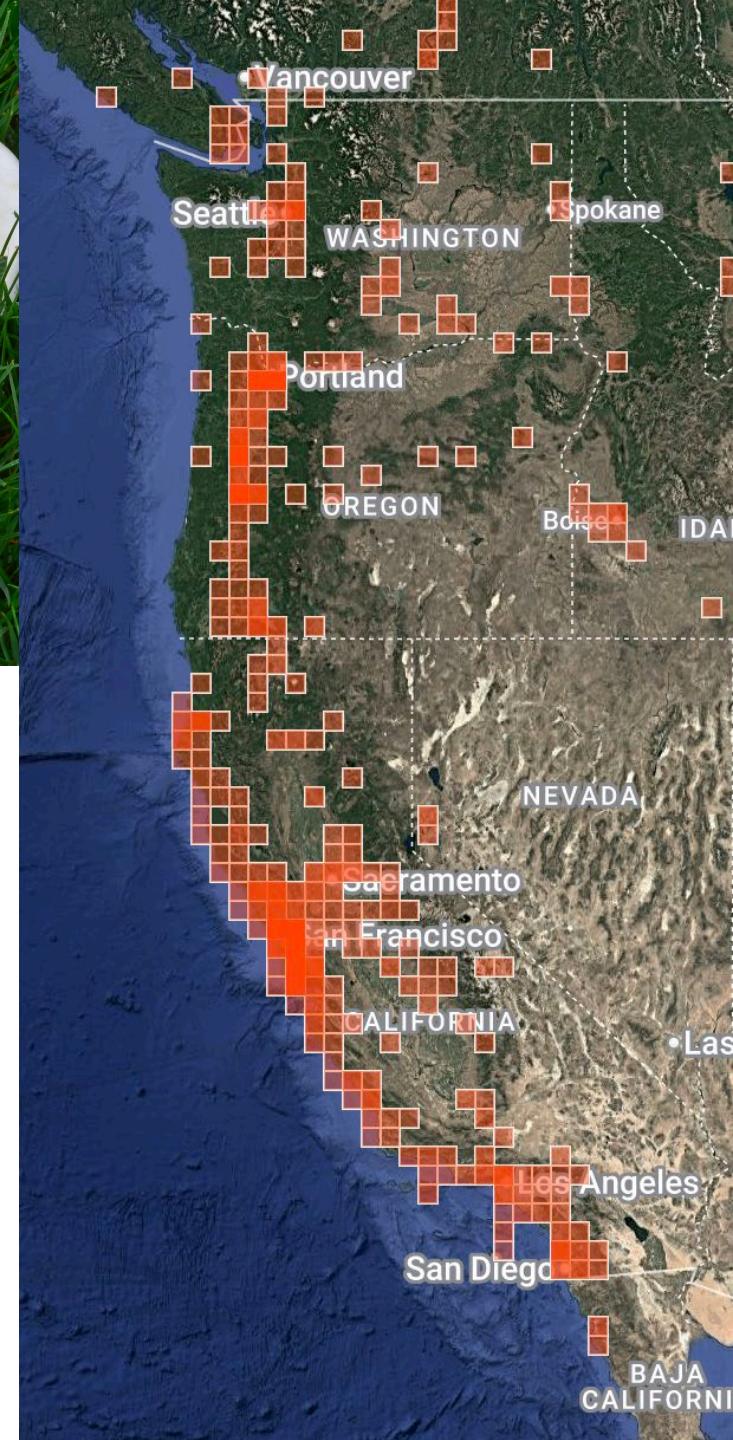


- Woodchips / mulch
- Horticultural plantings
 - Irrigation

Urban Incubators: Fungal Junk Food

Chrysomphalina grossula (Green Navel) vu Research Grade

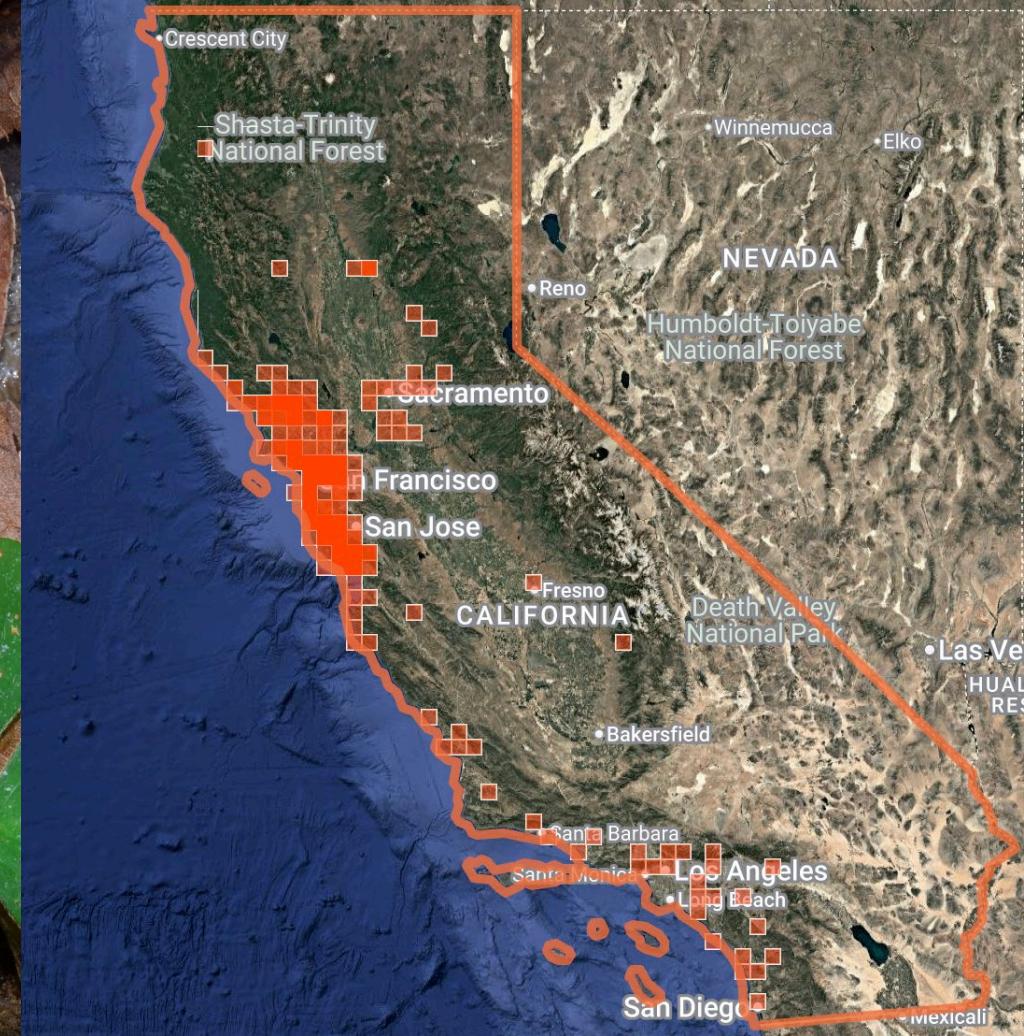




Yellow Stainer

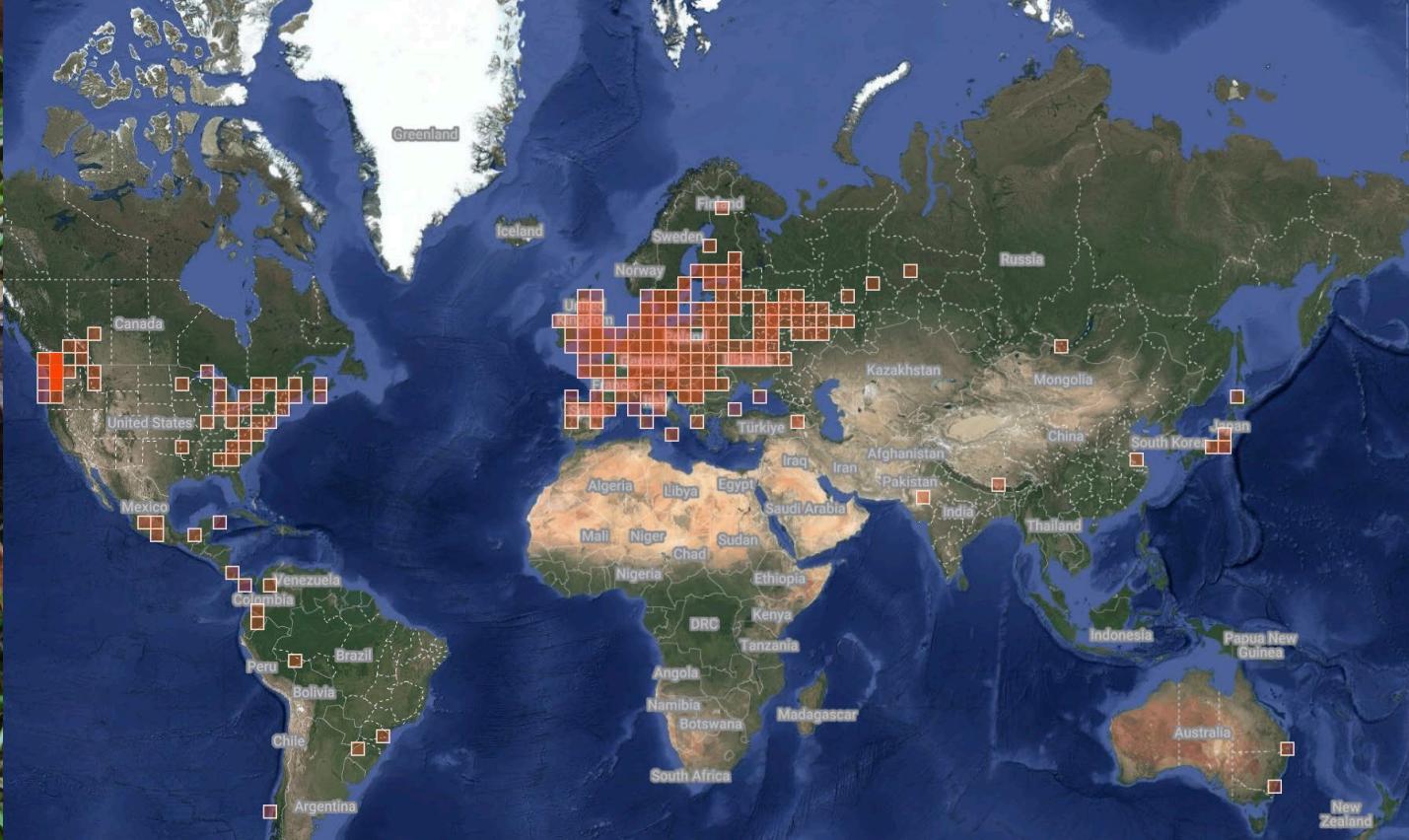
(*Agaricus xanthodermus*)

- Native to Europe
- Expanding north on irrigated lawns
- Jumping into native habitats



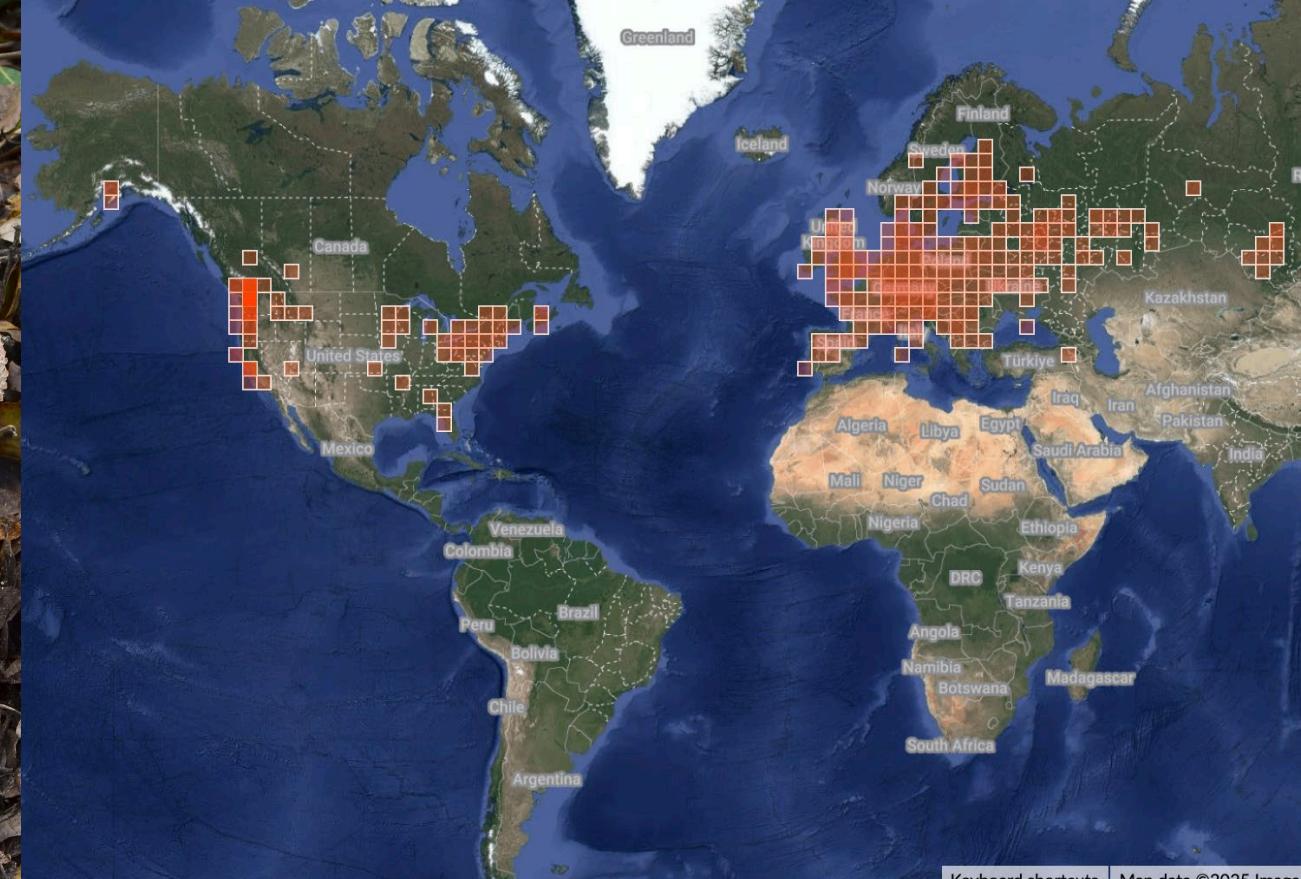
Cabbage Parachute (Gymnopus brassicola)

- Woodchips
- Delayed jump-off into native habitats



Woollyfoot (*Collybiopsis peronata*)

- Litter decomposing generalist
- Rapid jump-off into native habitats
- Southward range expansion



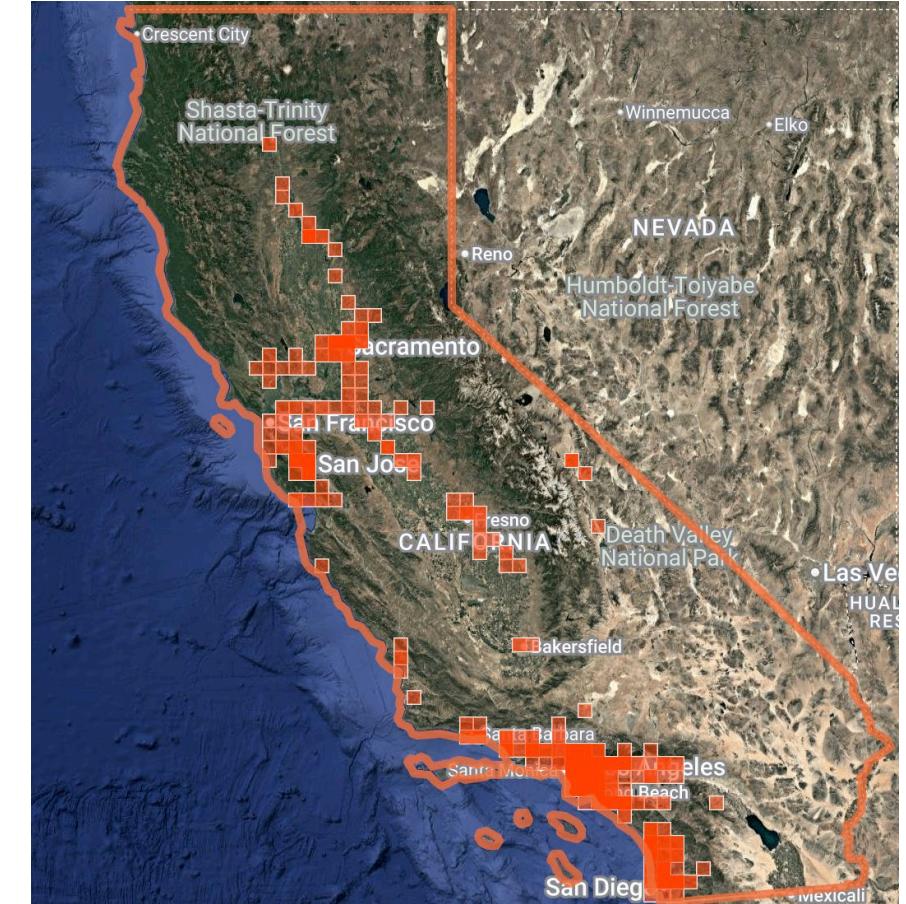
Olive Parasol (*Chlorophyllum olivieri*)

- Nutrient enriched substrates
- Immediate jump-off into native habitats
- Possibly hybridization



Thomas Shahan

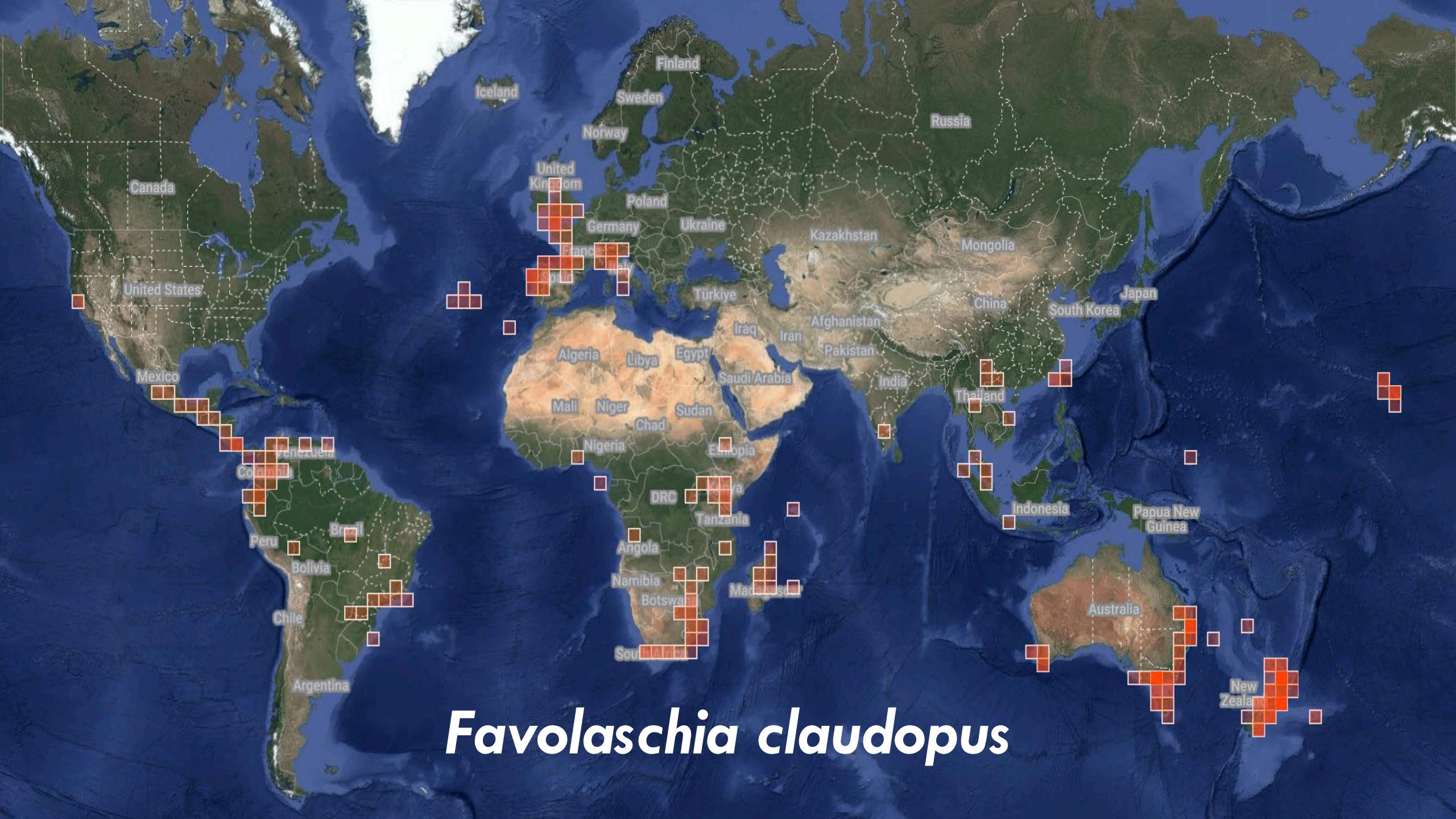
Lantern Stinkhorn (*Lysurus mokusin*)



- Woodchips and gardens
- No significant jump-off into native habitats



Favolaschia



Favolaschia claudopus

Co-invasion

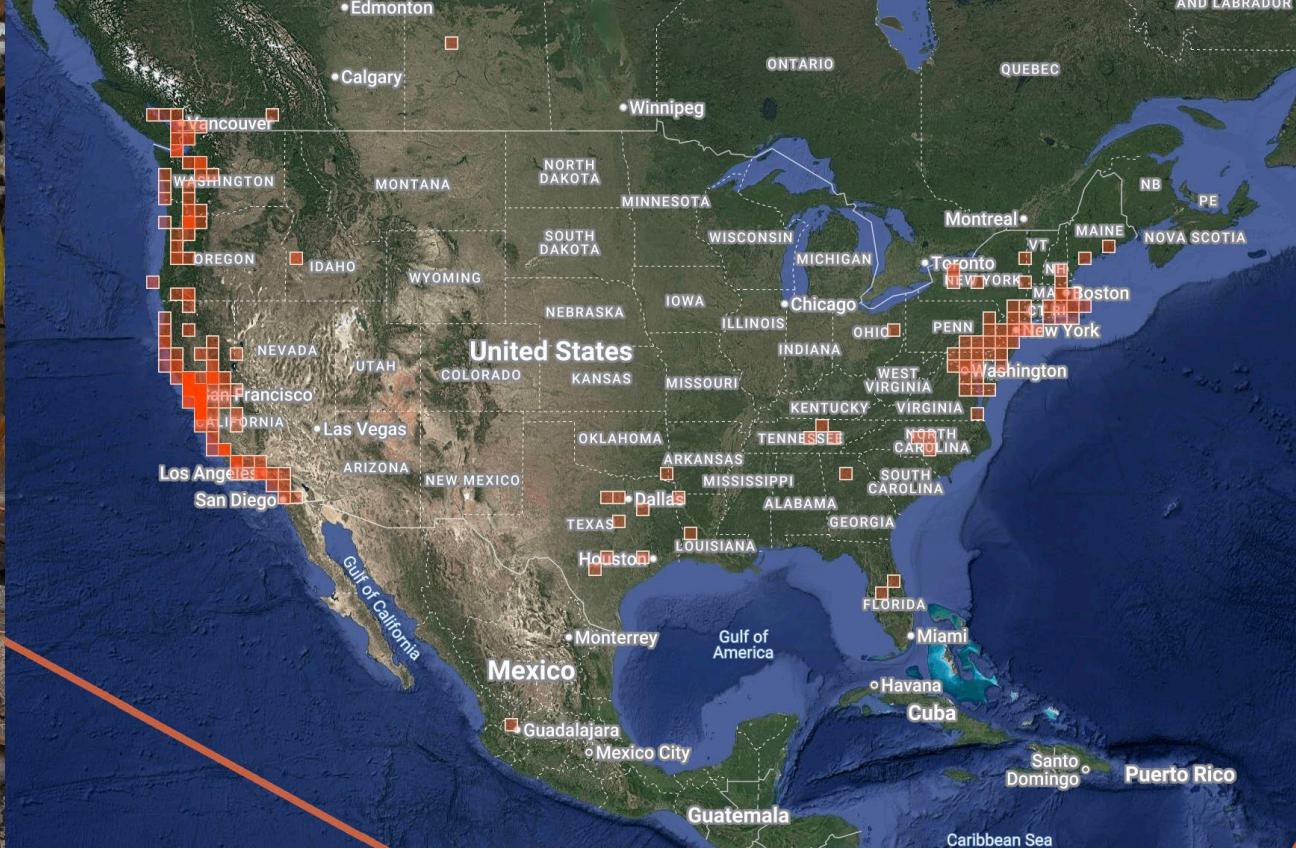


Californian Fungi overseas



PLANTATION TREES:

- **Lumber, pulp, windbreaks**
- **Monterey Pine, Douglas-fir, Monterey Cypress**



Death Cap (*Amanita phalloides*)

- Introduced from Europe to CA with cork oaks, ~1930s
 - Rapid expansion and host-jumping
 - Deadly toxic



White Button Mushroom

(Agaricus bisporus)

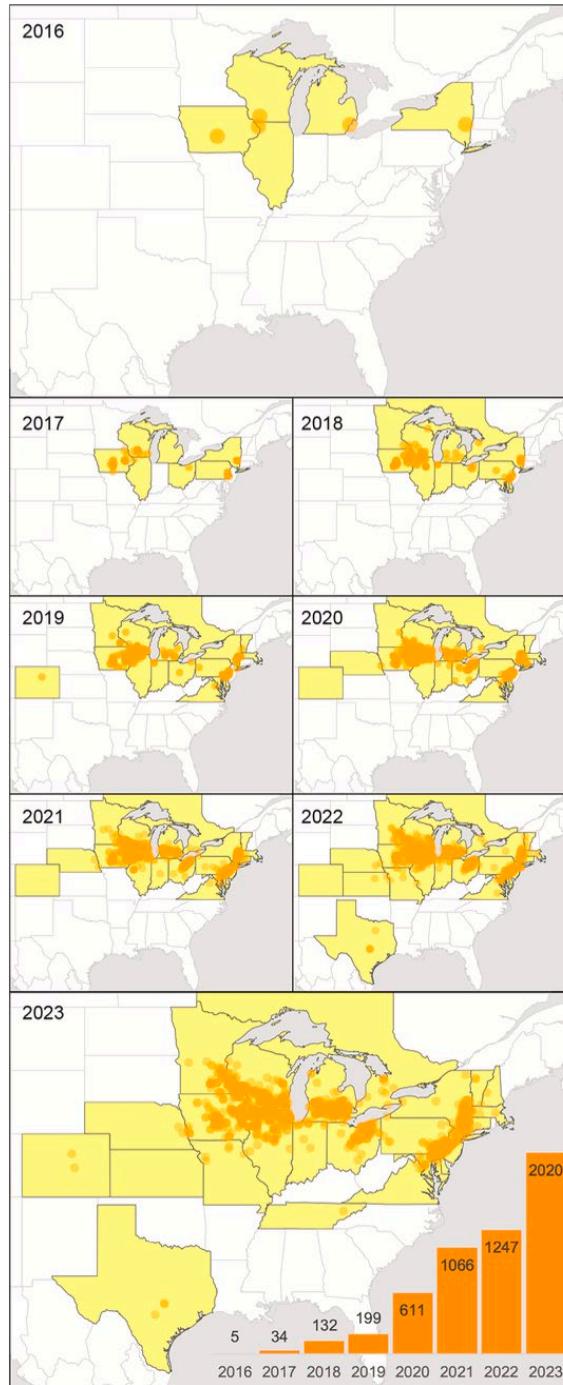
Golden Oyster Mushrooms (GOM)



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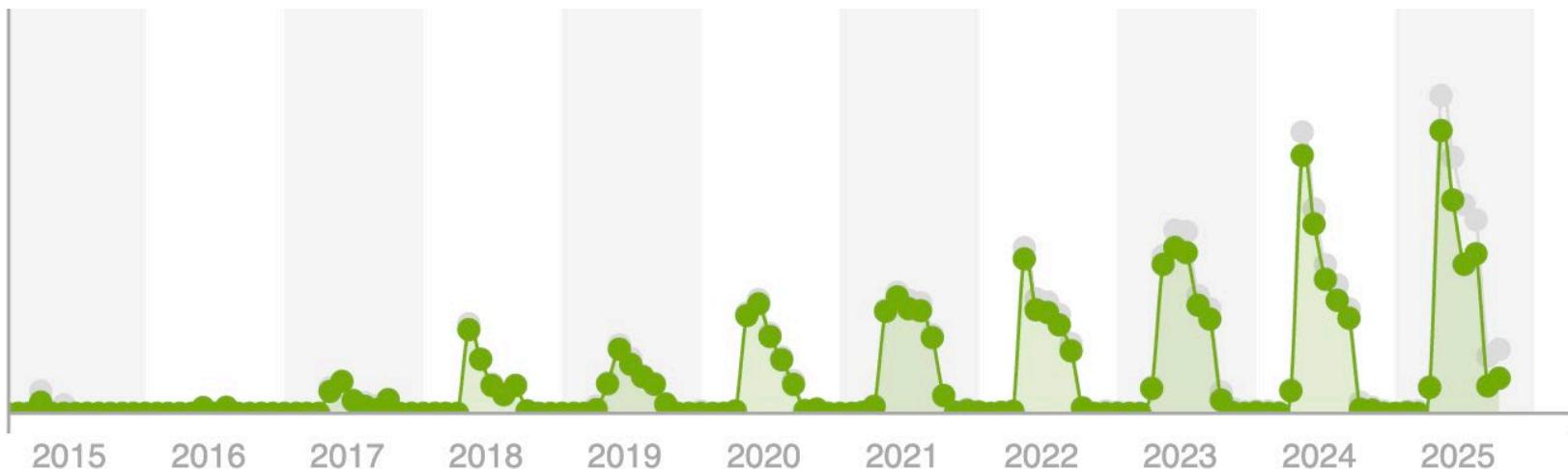


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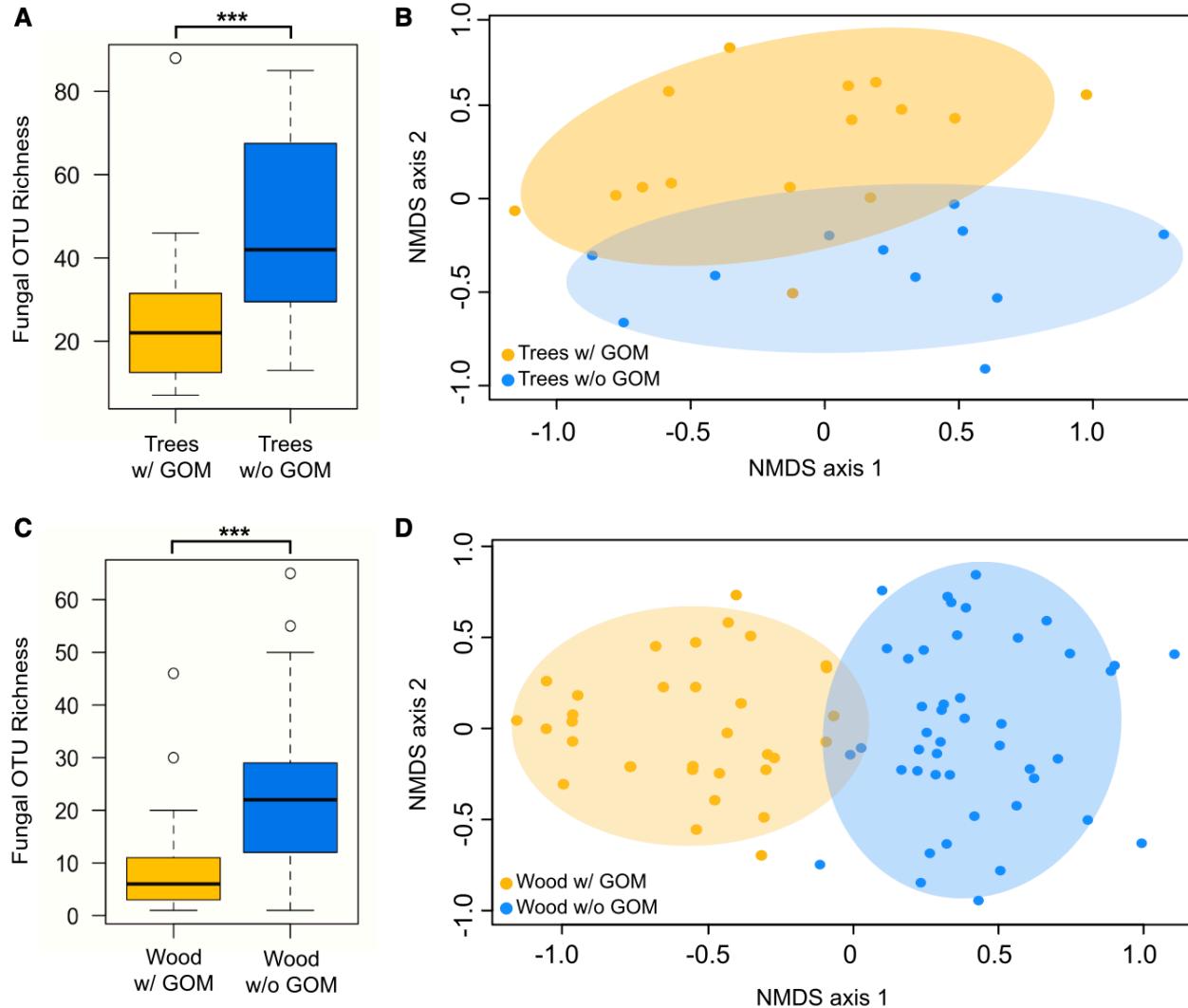


Golden Oyster Mushrooms (GOM)

- *Pleurotus citrinopileatus*
- Native to east Asia
- Cultivation in North America began in ~2000s
- Escaped in 2010
- Extremely rapid spread — now in 25 states and 1 province

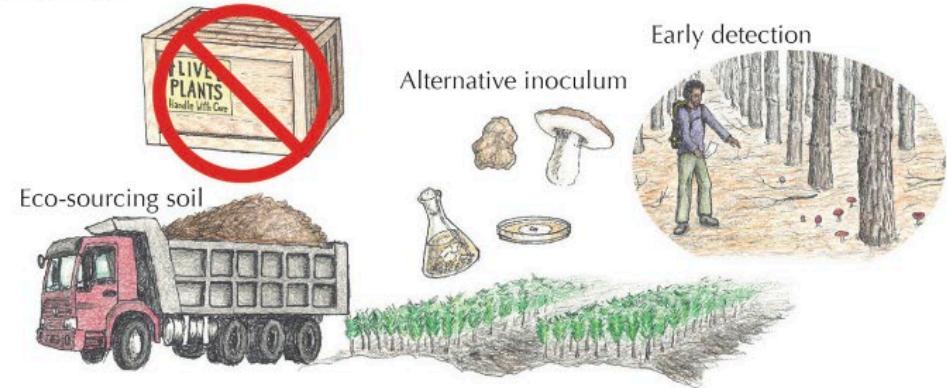


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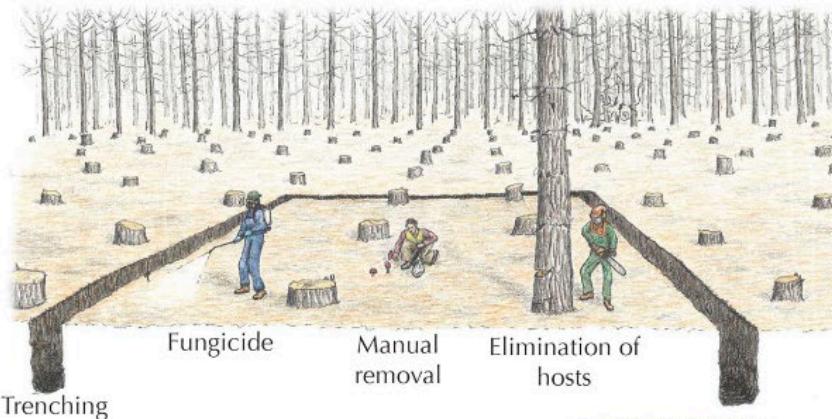


- Lower overall diversity of fungi on both standing trees and fallen wood infected with GOM
- Different suite of species tolerate co-inhabitation of trees/wood with GOM
- Most directly-threatened species?

Prevention

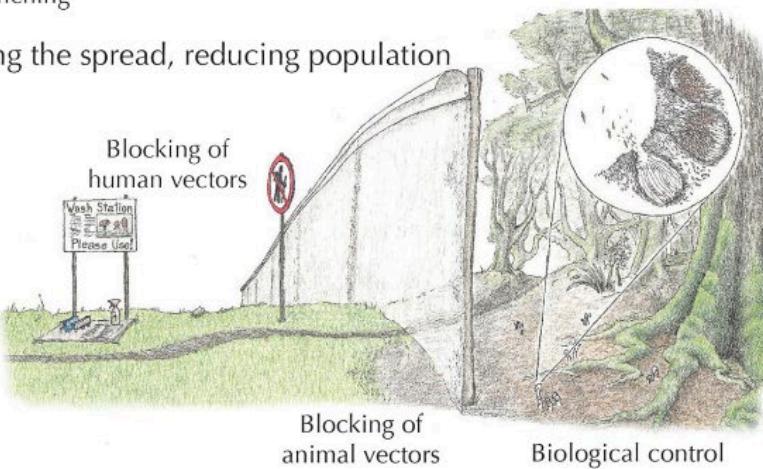


Control and eradication



Increasing extent / stage of invasion

Slowing the spread, reducing population



Management

- Virtually no hope for post-hoc management
- Prevention of plant movement
- Regulation of cultivated species (complicated by amateur / non-commercial efforts)
- Year-to-year control of poor soil competitors?