Thousand Cankers Disease: New Insights and Future Directions

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Thousand Cankers Disease

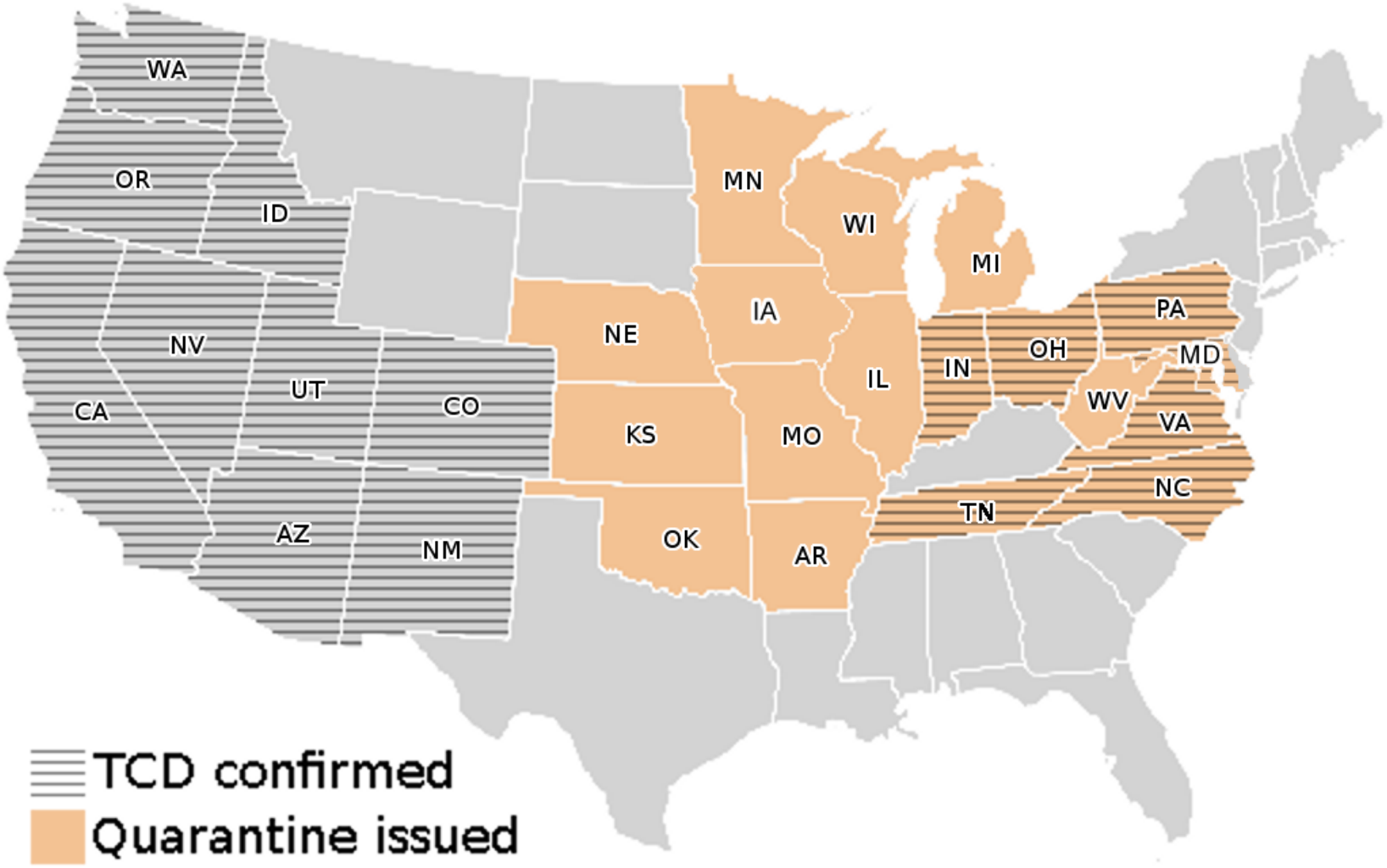
Walnut, Butternut, Wingnut
Juglans and *Pterocarya* spp.

Walnut Twig Beetle (WTB)
Pityophthorus juglandis

Geosmithia morbida

Tisserat et al 2009; Pictures compliments of Ned Tisserat and Jim LaBonte

Distribution of Thousand Cankers Disease as of April 20, 2015



Source: www.thousandcankers.com

Two new studies on genetic diversity and spread of WTB and *Geosmithia*

PLOS ONE

Phylogeography of the Walnut Twig Beetle, *Pityophthorus juglandis*, the Vector of Thousand Cankers Disease in North American Walnut Trees

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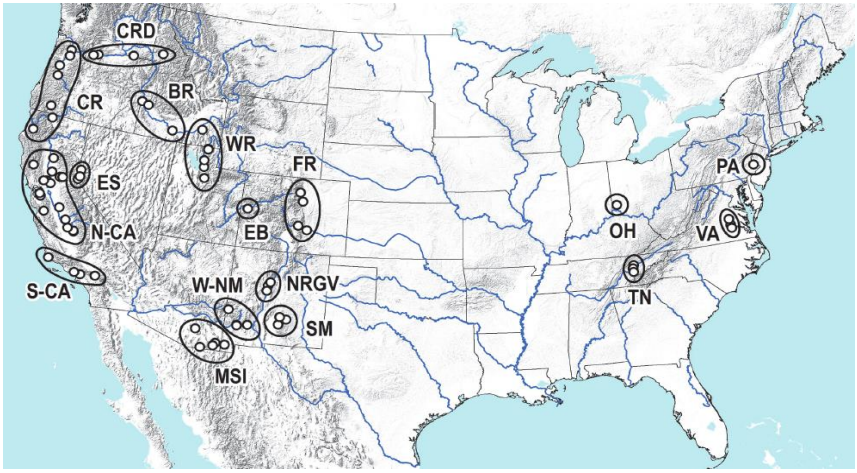

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PLOS ONE

Population Structure of *Geosmithia morbida*, the Causal Agent of Thousand Cankers Disease of Walnut Trees in the United States

Marcelo M. Zerillo[1]*, Jorge Ibarra Caballero[1], Keith Woeste[2], Andrew D. Graves[3], Colleen Hartel[4], Jay W. Pscheidt[5], Jadelys Tonos[4], Kirk Broders[6], Whitney Cranshaw[1], Steven J. Seybold[7], Ned Tisserat[1]

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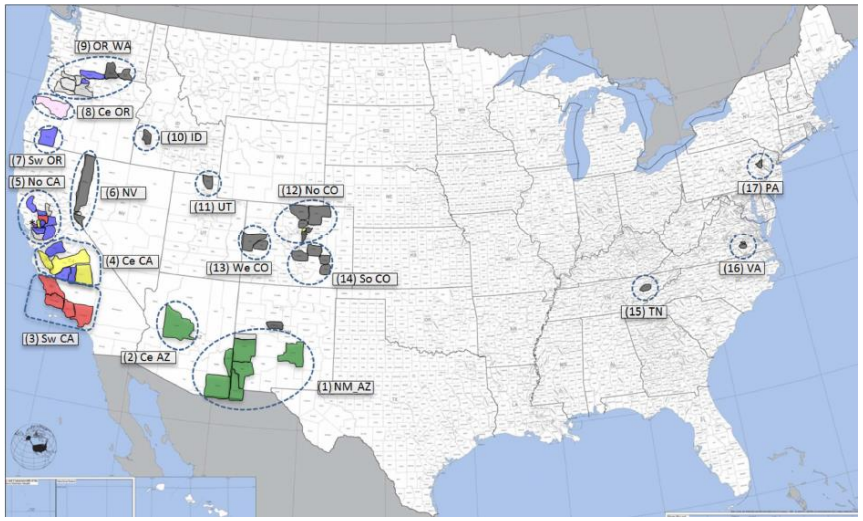
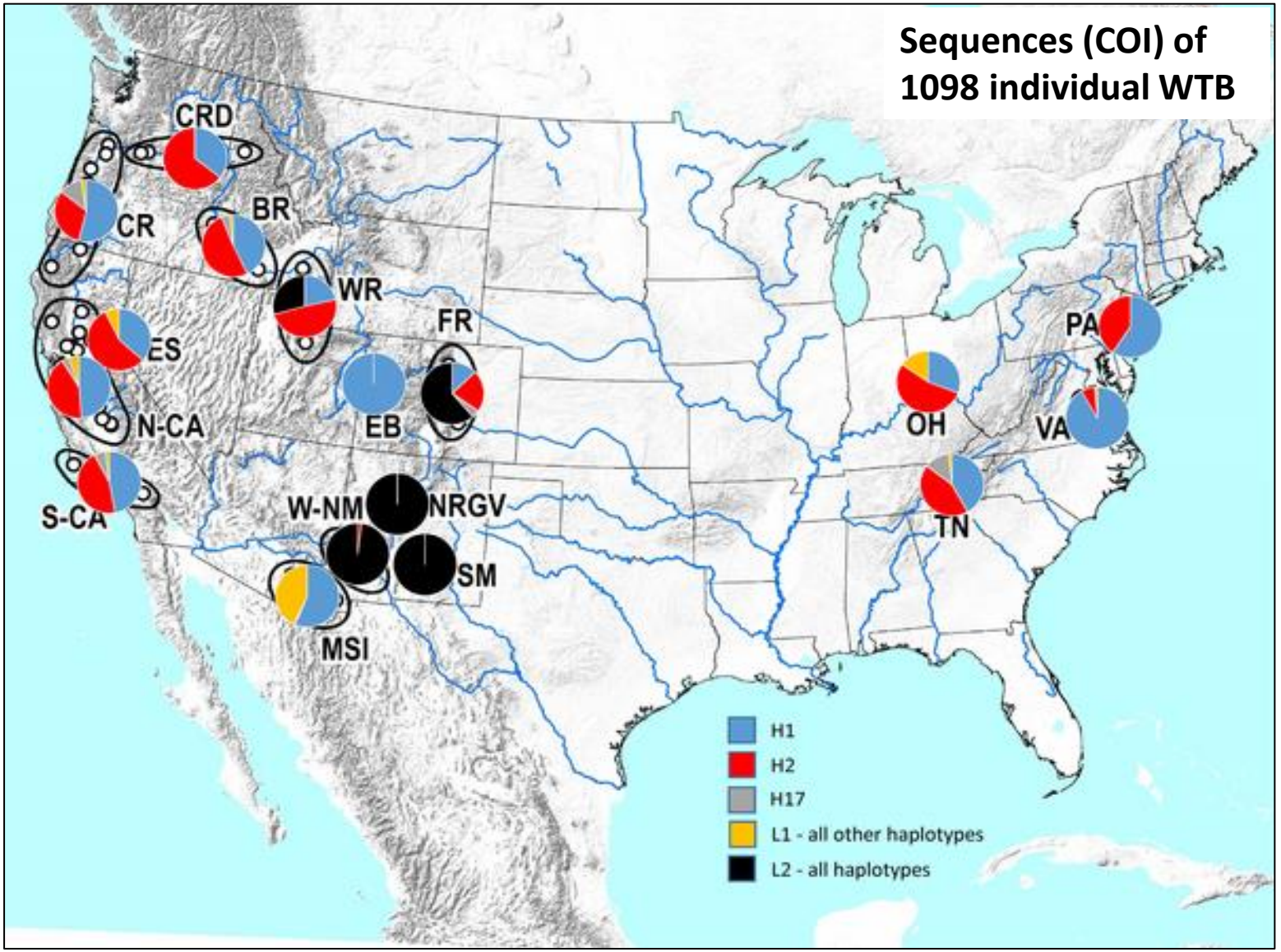


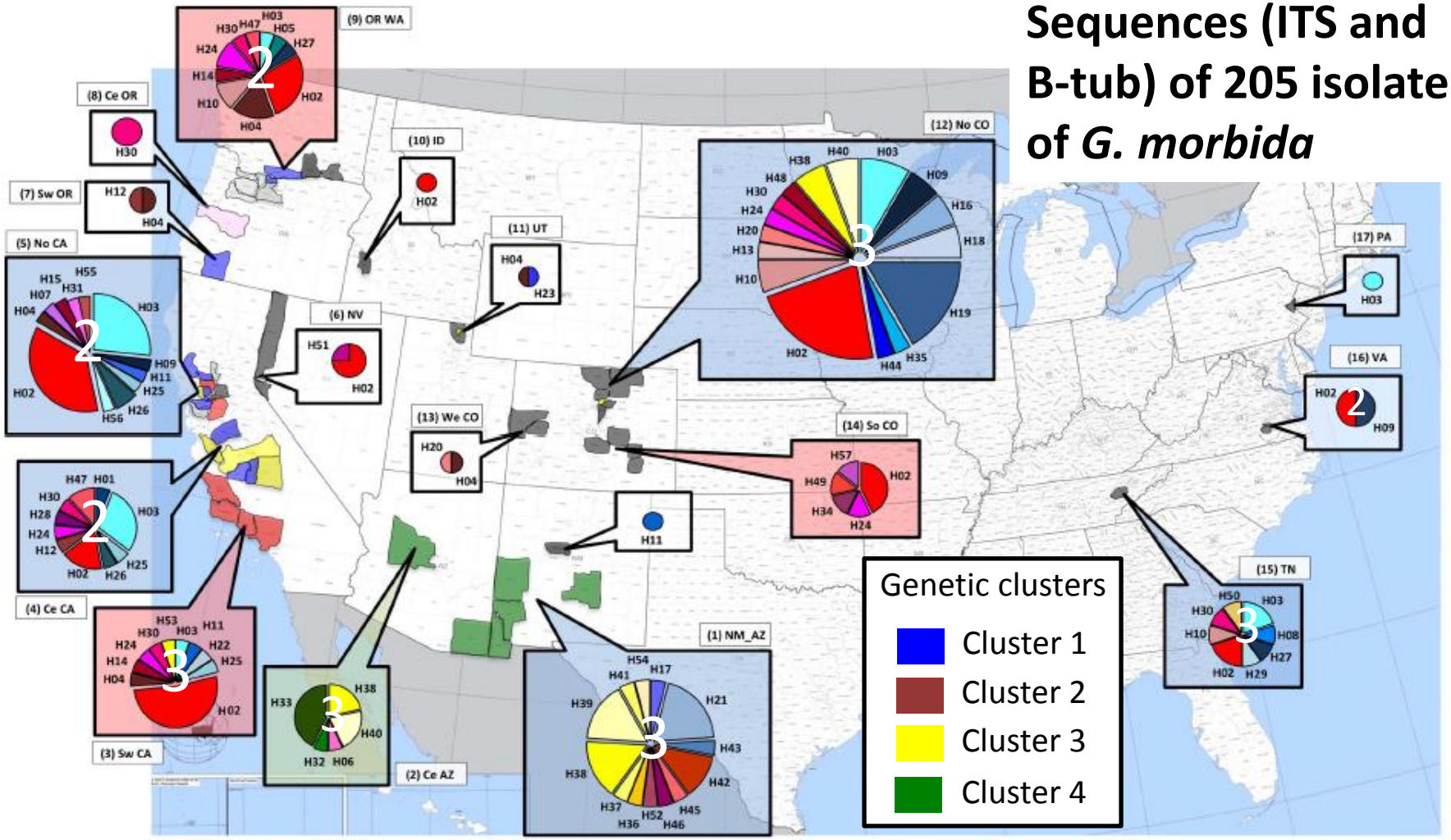
Distribution of 2 lineages of WTB



Rugman-Jones et al. 2015. PLoS ONE 10(2): e0118264.

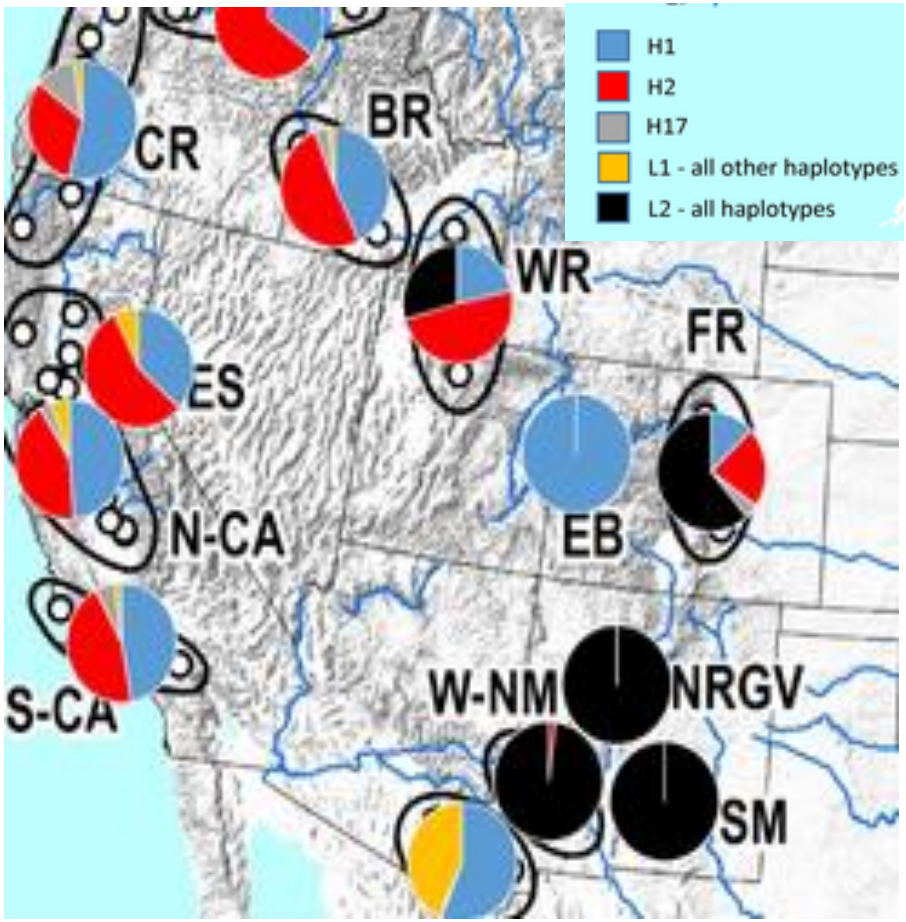
Distribution of 4 lineages of *Geosmithia morbida* across the United States

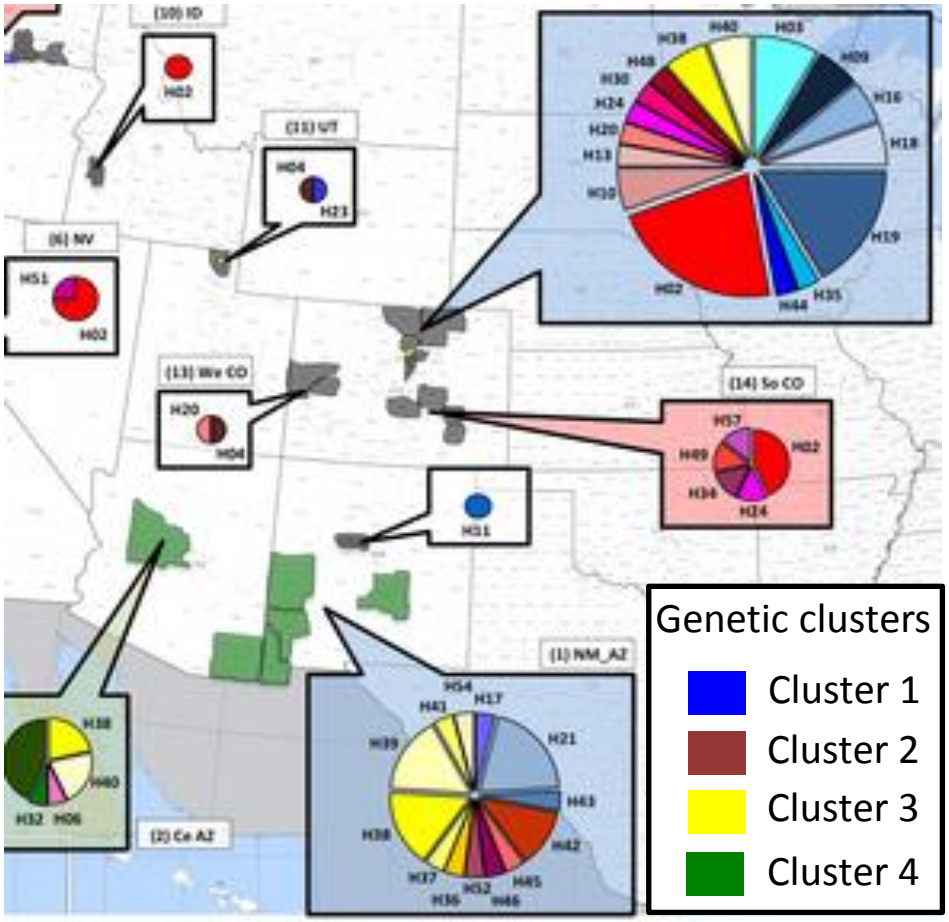
Sequences (ITS and B-tub) of 205 isolates of *G. morbida*



Zerillo et al. 2014. PLoS ONE 9(11): e112847.

WTB and *G. morbida* most diverse in the SW





Rugman-Jones et al. 2015. PLoS ONE 10(2): e0118264.

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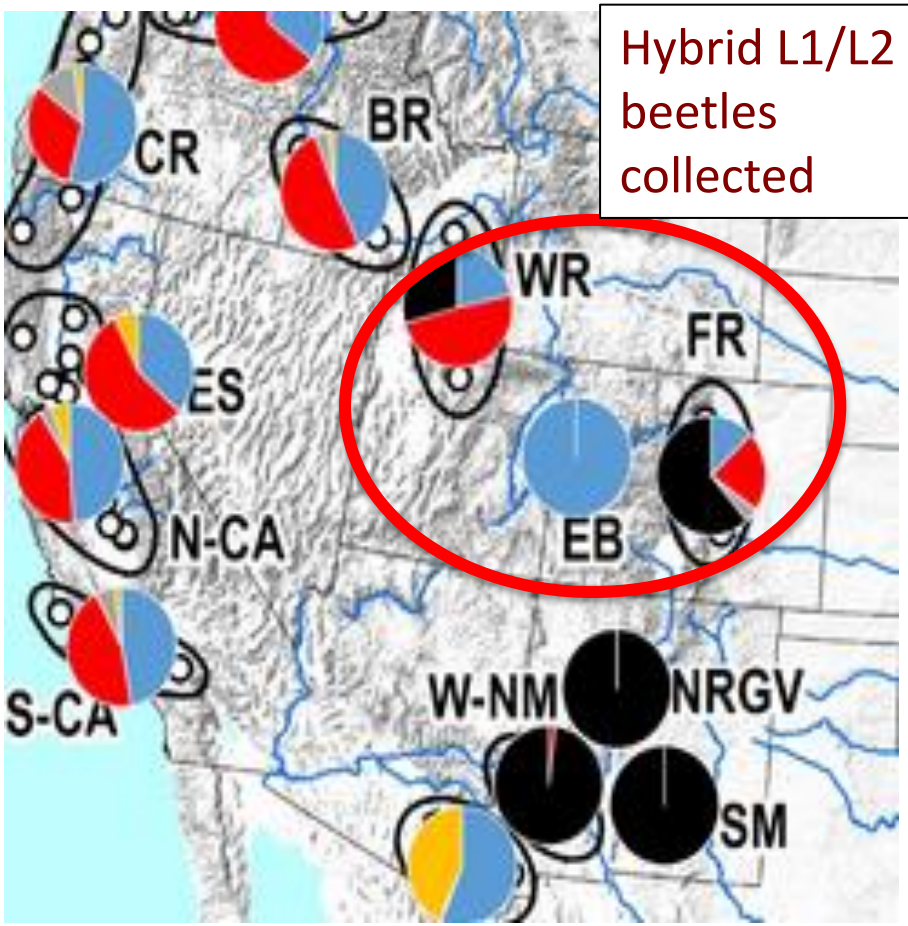
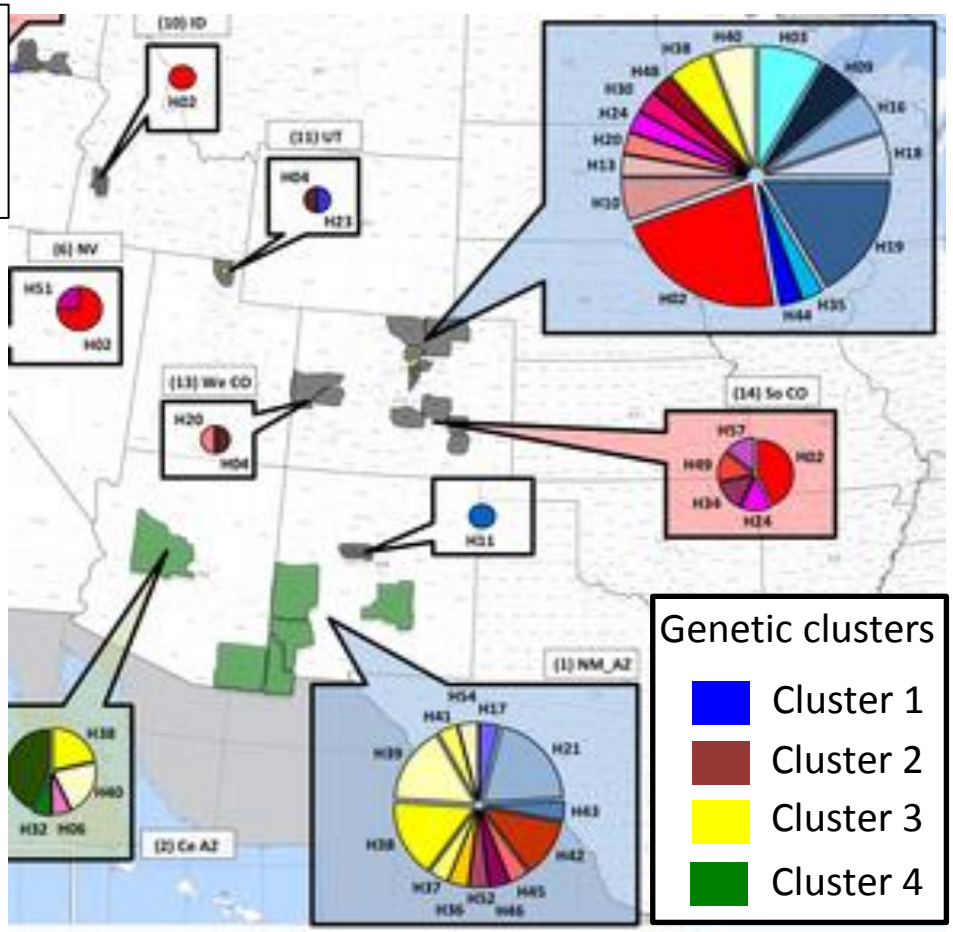
Evidence for hybridization of WTB lineages may have spread more aggressive beetle/pathogen complex

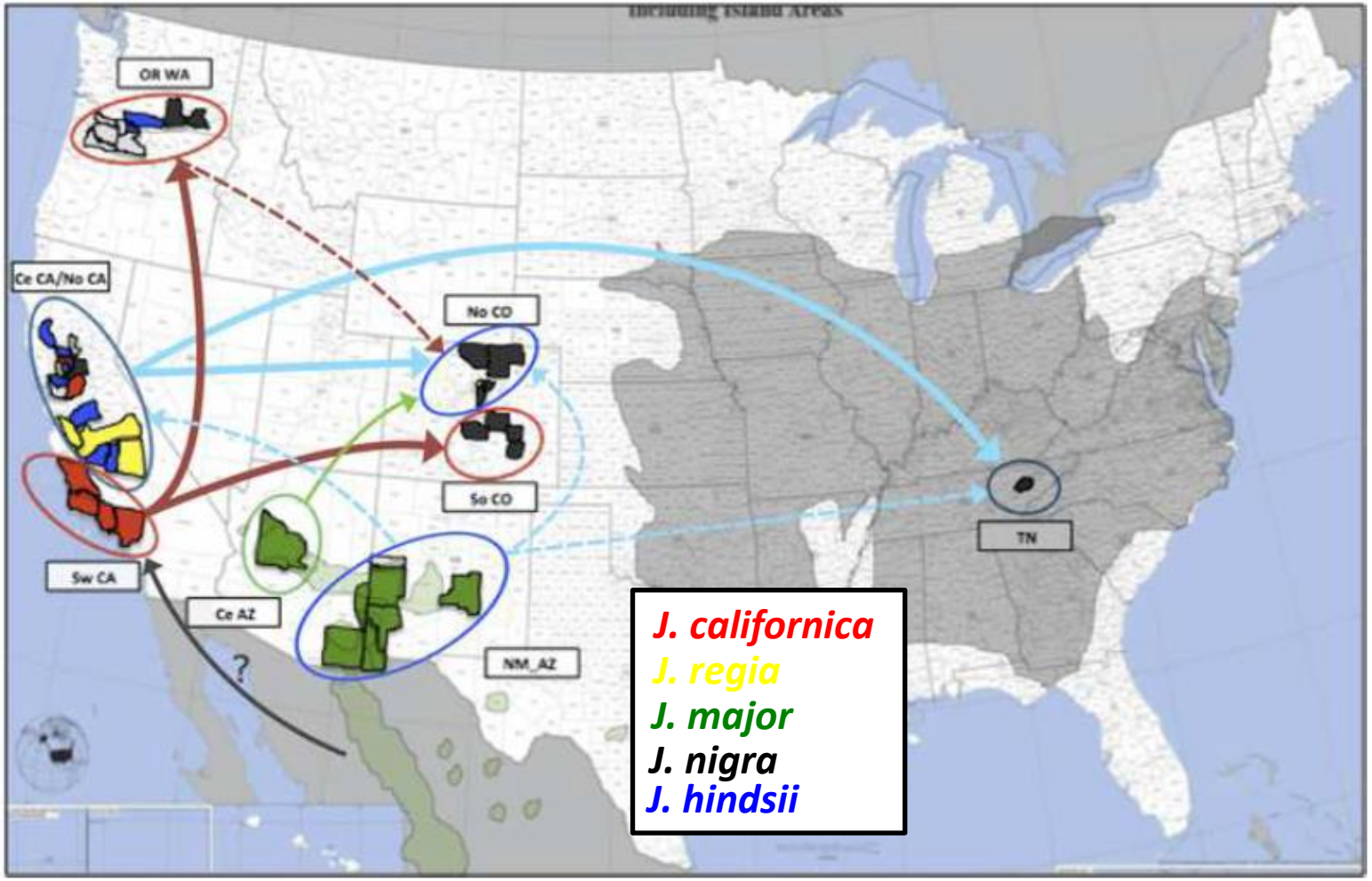




Rugman-Jones et al. 2015. PLoS ONE 10(2): e0118264.

Zerillo et al. 2014. PLoS ONE 9(11): e112847.

Movement and spread of *G. morbida*



Zerillo et al. 2014. PLoS ONE 9(11): e112847.

Ongoing research at CSU:

- Testing different cultivars of black walnut (different seed sources) for resistance to *G. morbida*
- Testing virulence of *G. morbida* genetic clusters
- Understanding mechanisms of walnut resistance and pathogen virulence by examining RNA expression level
  - *G. morbida* in culture vs. *in planta*
  - Walnut vs. walnut in response to *G. morbida*
- Possibility of hybrids and increased aggressiveness of *G. morbida*
  - Genomic comparisons between *G. morbida* and non-pathogens