SUGARBERRY (*CELTIS LAEVIGATA*) DIEBACK AND MORTALITY: FINDINGS AND FUTURE WORK

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SUGARBERRY

THE PROBLEM

2009: Many dead and dying sugarberry reported in Columbia, SC

High numbers of a buprestid and woolly aphid are found on stressed sugarberry trees and little is known about the insects agent(s)

Causal agent(s) and geographical extent of symptomatic trees are unknown

SYMPTOMS

- Small leaves
- Thin crowns
- Yellowing foliage
- Branch dieback
- Early leaf senescence


CAUSE FOR CONCERN: *AGRILUS MACER*

- Large number of egg masses
- Weeping fluid on bark around egg masses
- Staining and galleries with unknown buprestid larvae (later identified)

AGRILUS MACER FLATHEADED HACKBERRY BORER

- Historically present in low numbers in southern US- opportunistic
- Some dying trees are not attacked by the flatheaded hackberry borer, and others overcome attack
- Beetle attacks may hasten the death of the trees, and prevent recovery
- *A. macer* is not the primary cause of mortality

Photos: M. D. Ulyshen

NON-NATIVE APHIDS: *SHIVAPHIS CELTI* IN THE NEWS

What are those snowflakes falling out of the sky?

September Snow? Woolly aphids here until end of summer

It's not snowing: those white things are woolly aphids!

An aphid snowstorm covers area again

Early 'snow' proves to be woolly aphids




CAUSE FOR CONCERN: *SHIVAPHIS CELTI*

- Chlorosis following feeding
- Honeydew & sooty mold
- Premature leaf drop
- Repeated yearly damage

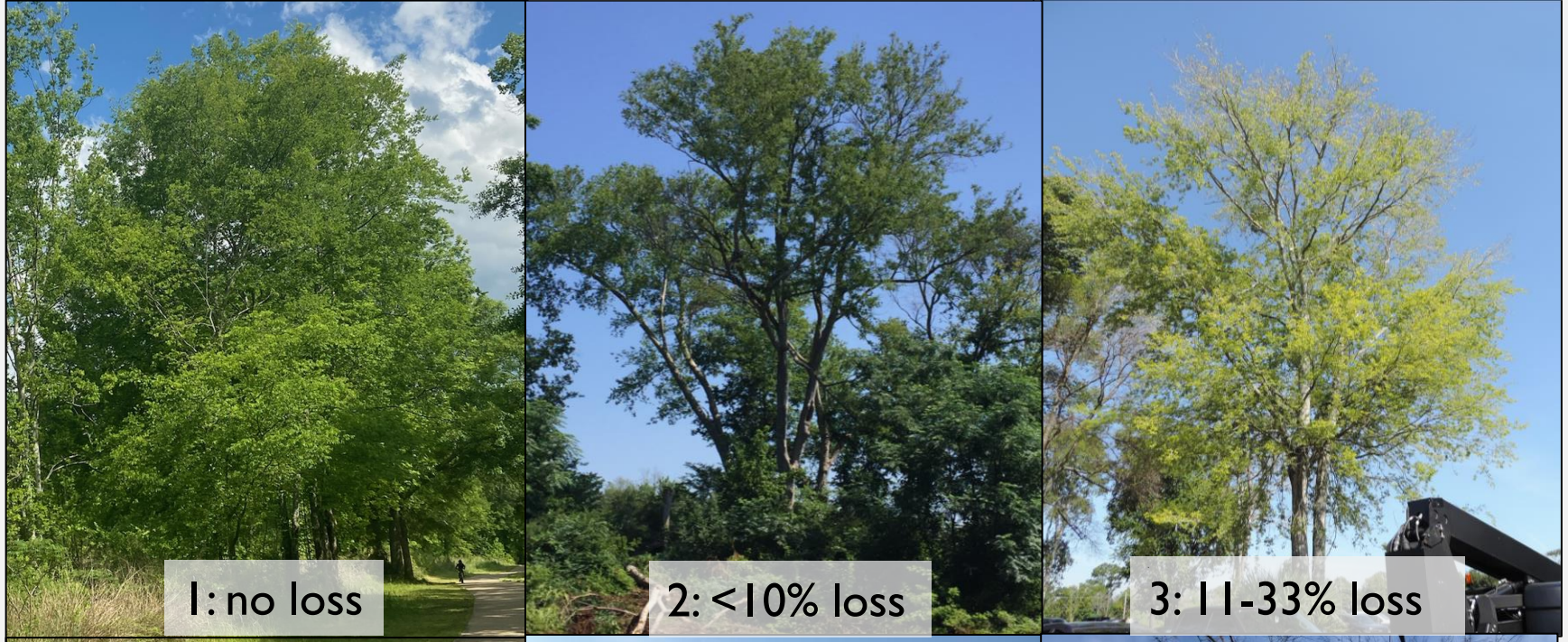
SHIVAPHIS CELTI: HACKBERRY WOOLLY APHID

- Imidacloprid consistently provides protection against hackberry woolly aphids throughout the growing season for sugarberry
- In the US, most hackberry woolly aphid reports are in the southeast. Aphid is likely present in areas with *Celtis*
- Impact of hackberry woolly aphid is still poorly understood

MORTALITY CONTINUES TO EXPAND IN THE SOUTHEASTERN US

OBJECTIVES

- Document patterns of dieback and mortality over five years of observation
- Determine the efficacy of systemic insecticide treatments in effort to improve survivorship
- Report known locations with high mortality



Symptomatic:
3 or higher

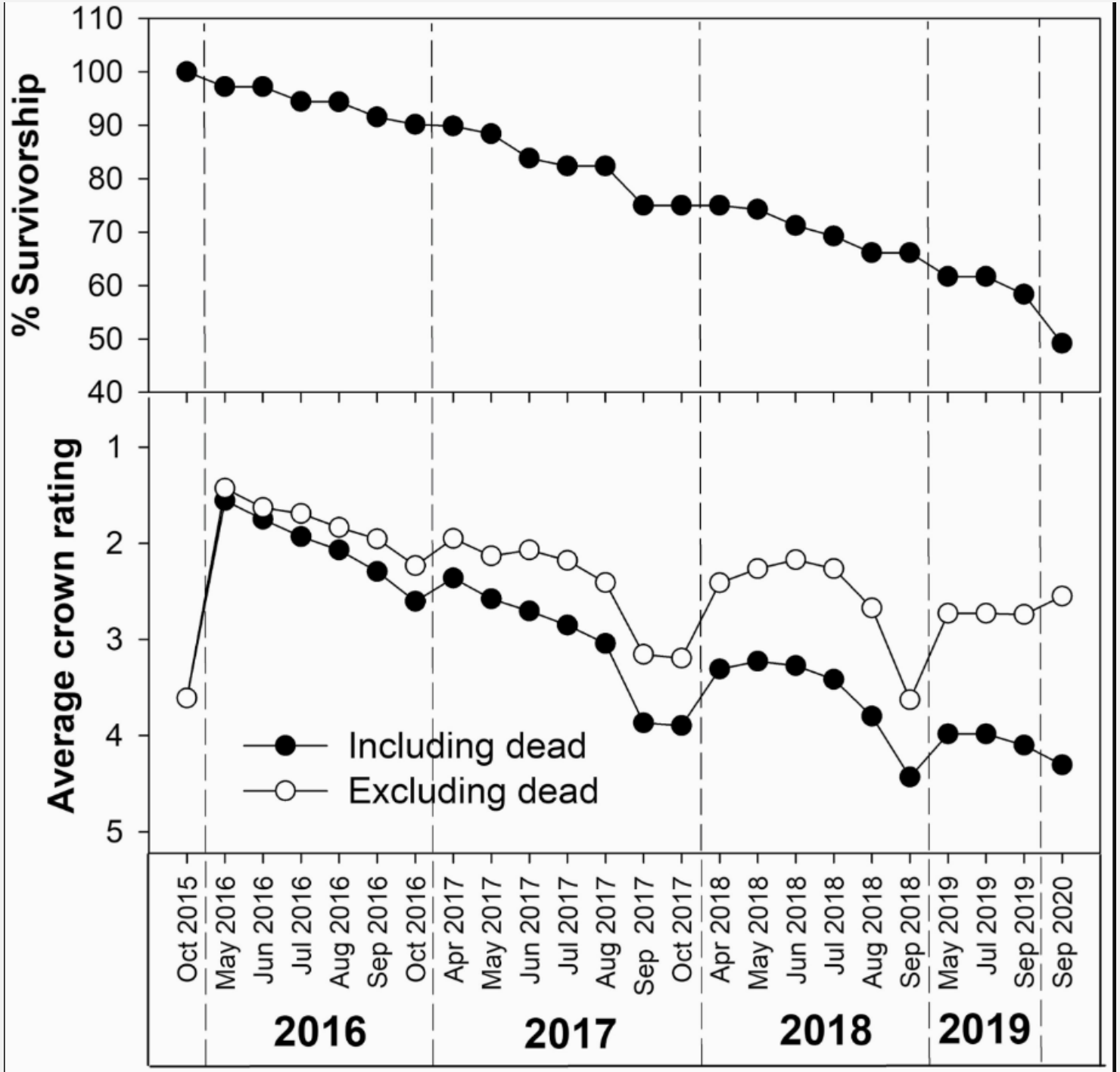
A LONG-TERM SITE AND INSECTICIDE TRIAL IN NORTH AUGUSTA, SC

- Stem injection of emamectin benzoate on October 22, 2015 caused bark damage.
- Imidacloprid soil injections applied:

  October 22, 2015, April 3, 2017, and April 22, 2020
- Mortality did not differ among the insecticide treatment groups(X^2[3, n = 59] = 1.02, p = 0.80) based on logistic regression

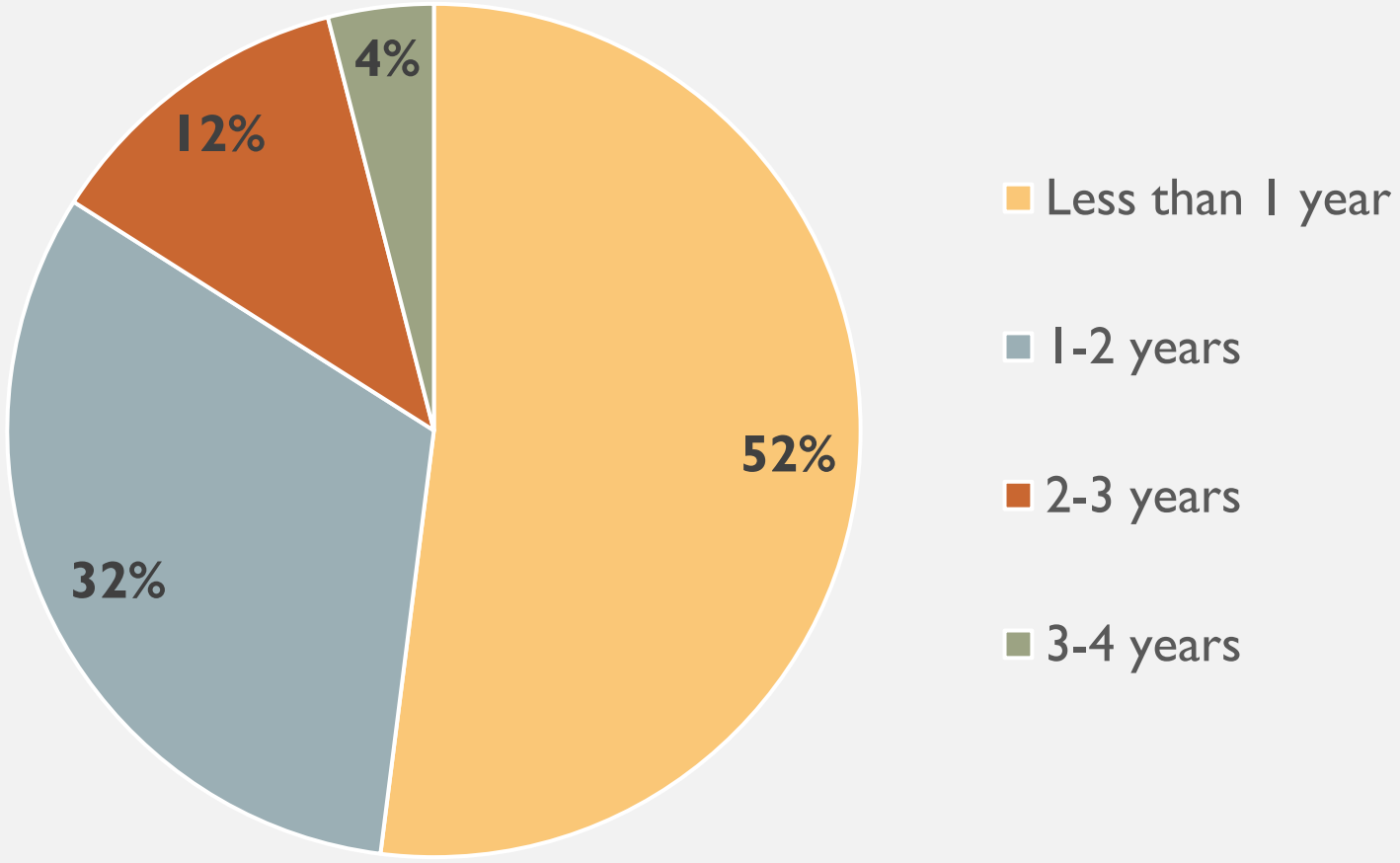
RESULTS AFTER 5 YEARS OF MONITORING

~52% of monitored trees died in 5 years



Trees removed by city not included

SURVIVAL TIME AFTER BECOMING SYMPTOMATIC



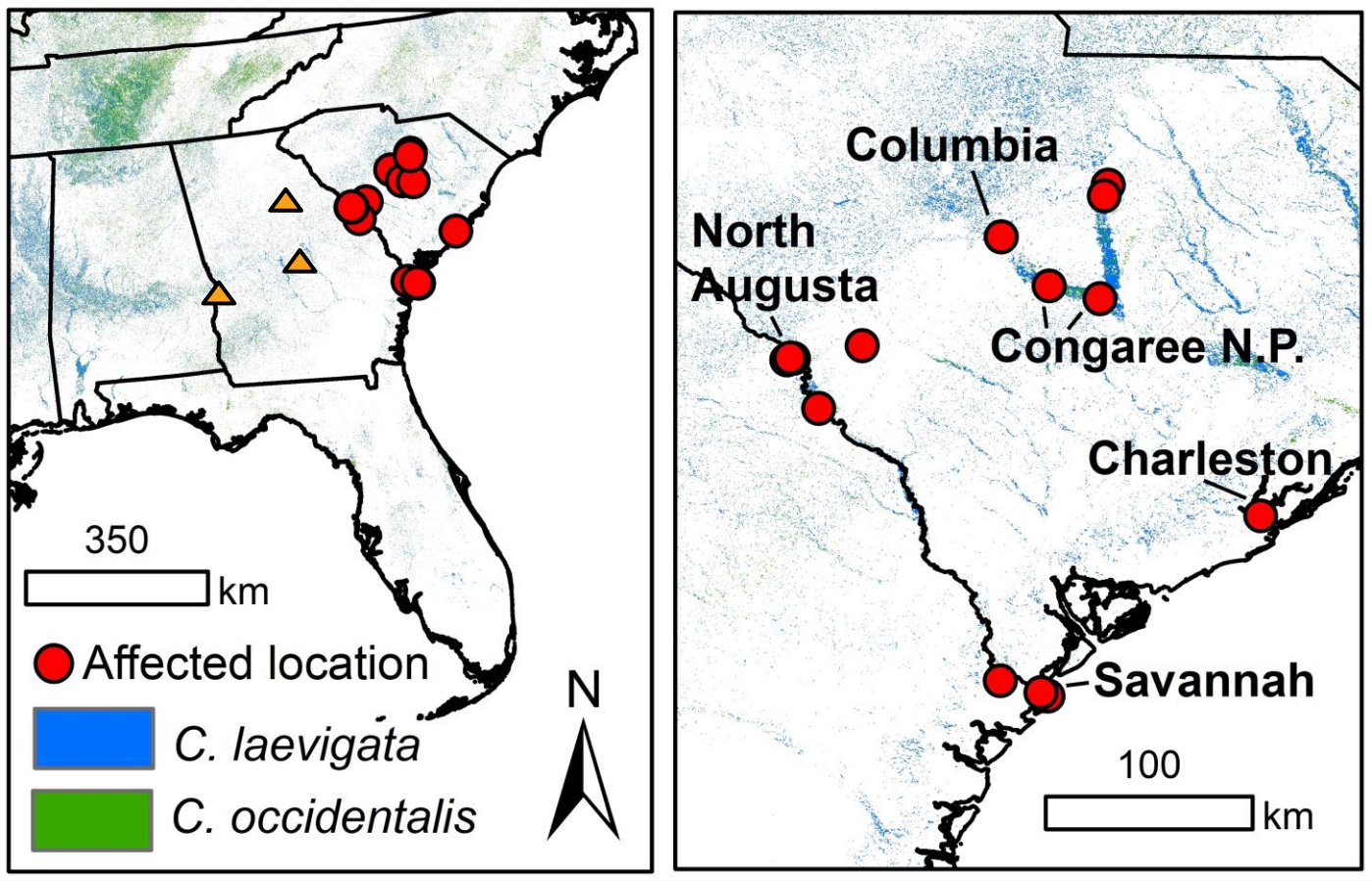
North Augusta, SC monitoring

- 131 trees assessed
- 36 cut by city
- Of remaining 95 trees **~52% died in 5 years**
- **~65% mortality** if cut trees were dead before removal

City of North Augusta, SC Tree Removals

- 813+ sugarberry removed from 2015-2020
- 45–86% of all trees removed yearly
- $500 per tree
- Cost **over $400,000** to remove hazardous sugarberry on city property

CITIES WITH HIGH MORTALITY



FINAL CONCLUSIONS

- Compared to other decline/dieback events this is one of the most long-lasting and expansive *Celtis* mortality events
- No signs of the dieback and decline showing; primary cause still unknown

- Canopy sampling
- *Celtis* determination
- Phenolic data analysis
- Reassess monitoring sites
- Native/invasive understory recruitment
- Local climate role

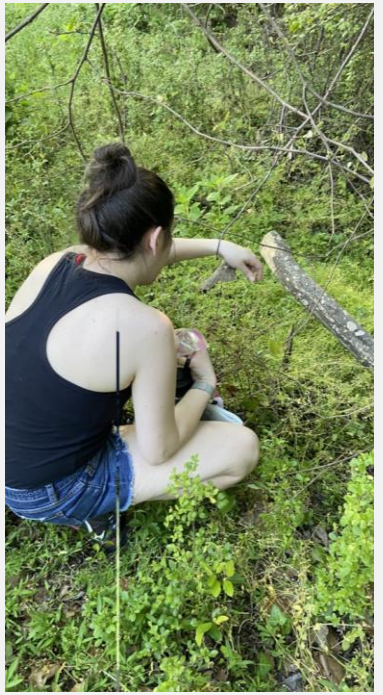
NEW OPPORTUNITIES AND FUTURE WORK

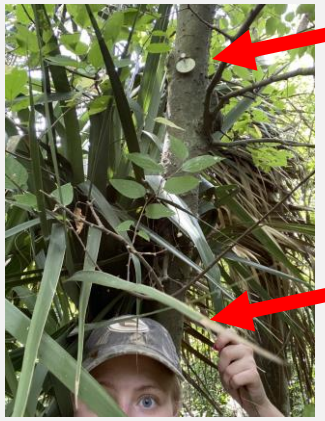
SUGARBERRY SQUAD IN ACTION









Ulyshen tag height

Emilee

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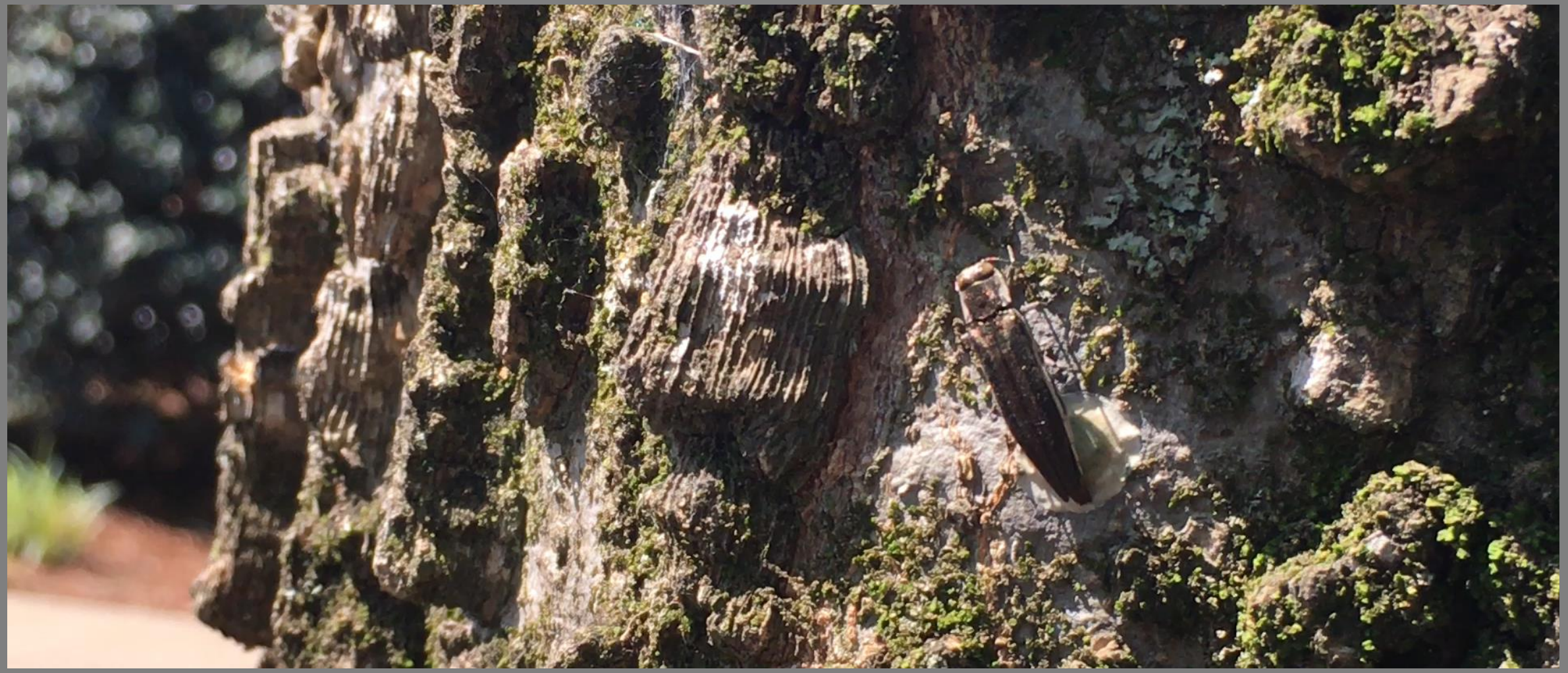

Filmed by M. D. Ulyshen

Thank you

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