

Terrestrial eDNA surveys for forest and plant pest detection: a trial with spotted lanternfly

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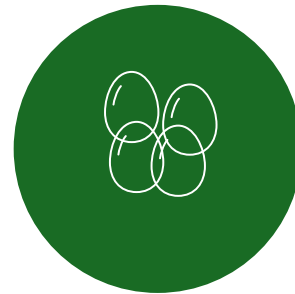
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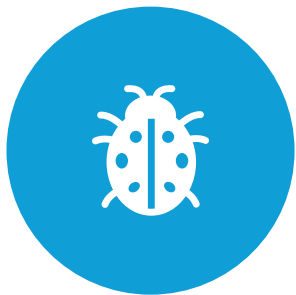
Environmental DNA (eDNA)



Any genetic material an organism leaves in the environment



Honeydew, molts, frass, eggs



Can be used in detection and monitoring of emerging pest and/or cryptic species



eDNA surveys for specific organisms involve field collection, sample processing, and qPCR assays for DNA detection

Studies have demonstrated eDNA outperforming conventional detection methods (Bass et al. 2015, 2023; Allen et al. 2021)

qPCR vs. metabarcoding assays in eDNA surveillance

Quantitative PCR

Highly sensitive

Species-specific

Quantitative

Specific primers

Metabarcoding

Broad range

Community-level
biodiversity assessments

Universal primers

Discover unknown species
without pre-existing target

RI spotted lanternfly eDNA survey

Objectives:

1. Assist RI Division of Agriculture with SLF detection
2. Use SLF as a test species to advance program and partner skills for future eDNA surveys of forest health threats.

Methods developed by:



Field sampling by:

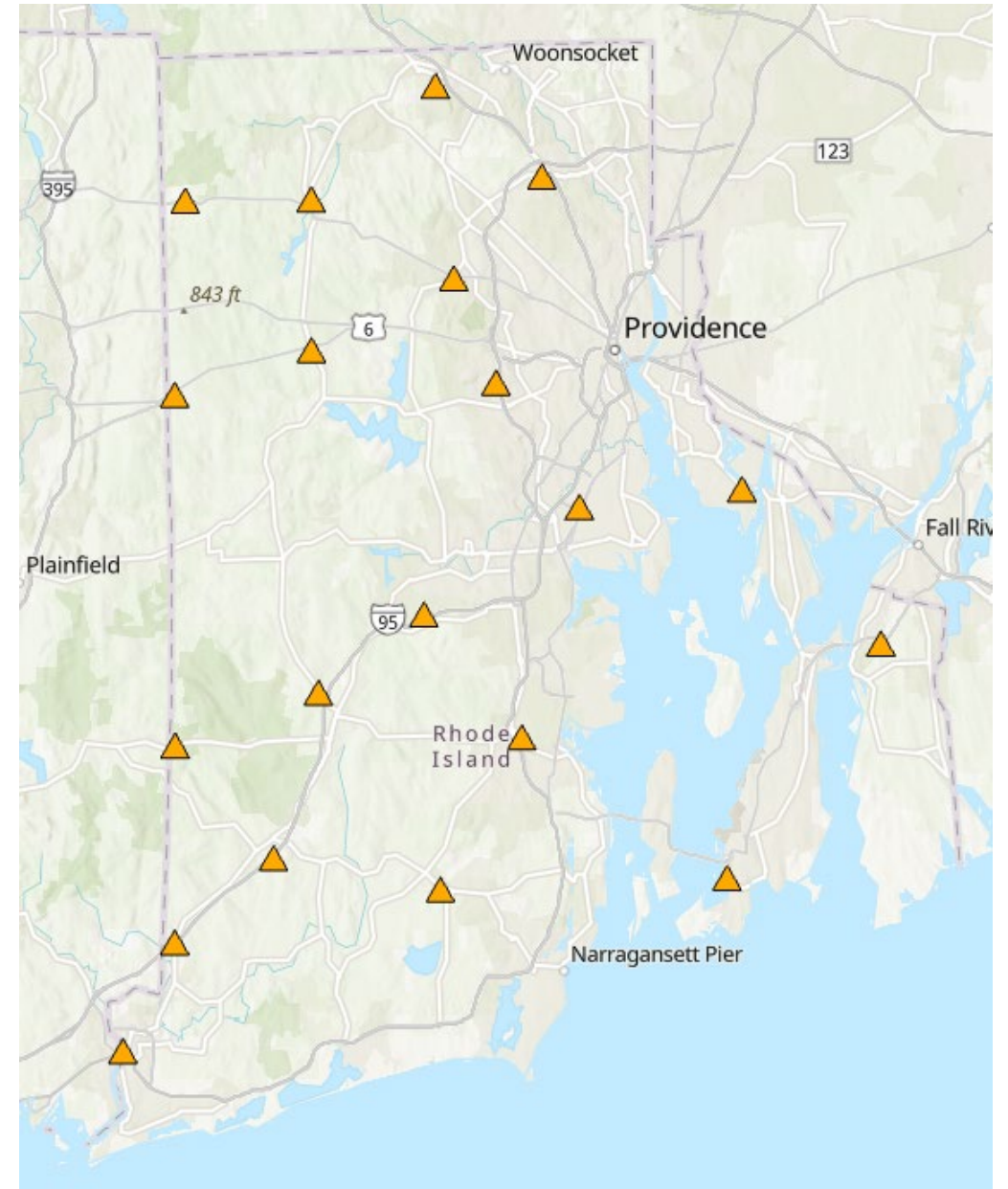


Lab assays by:

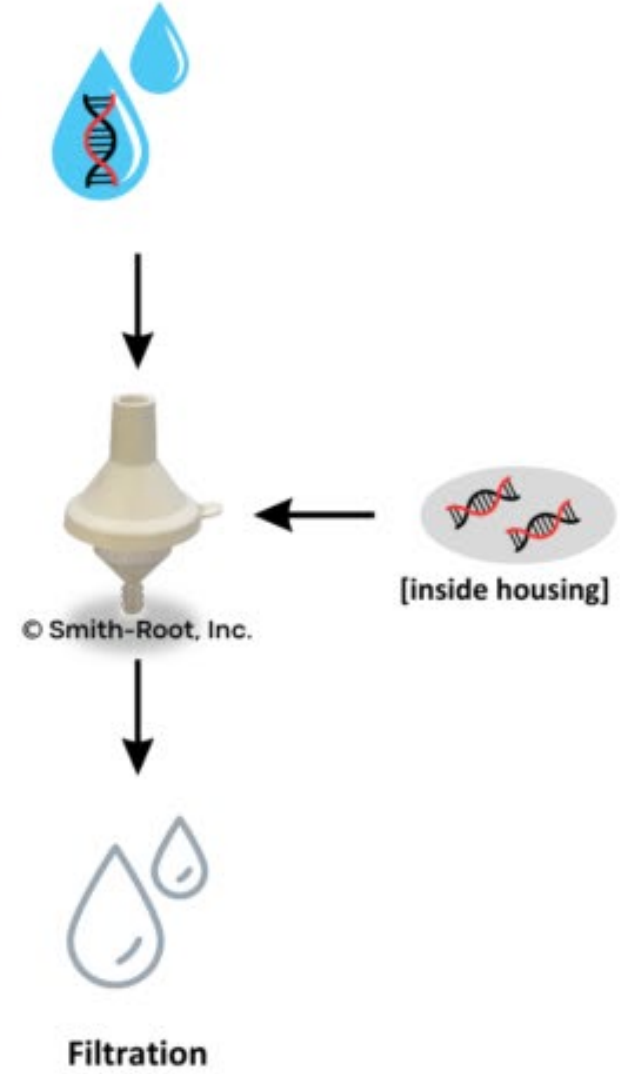
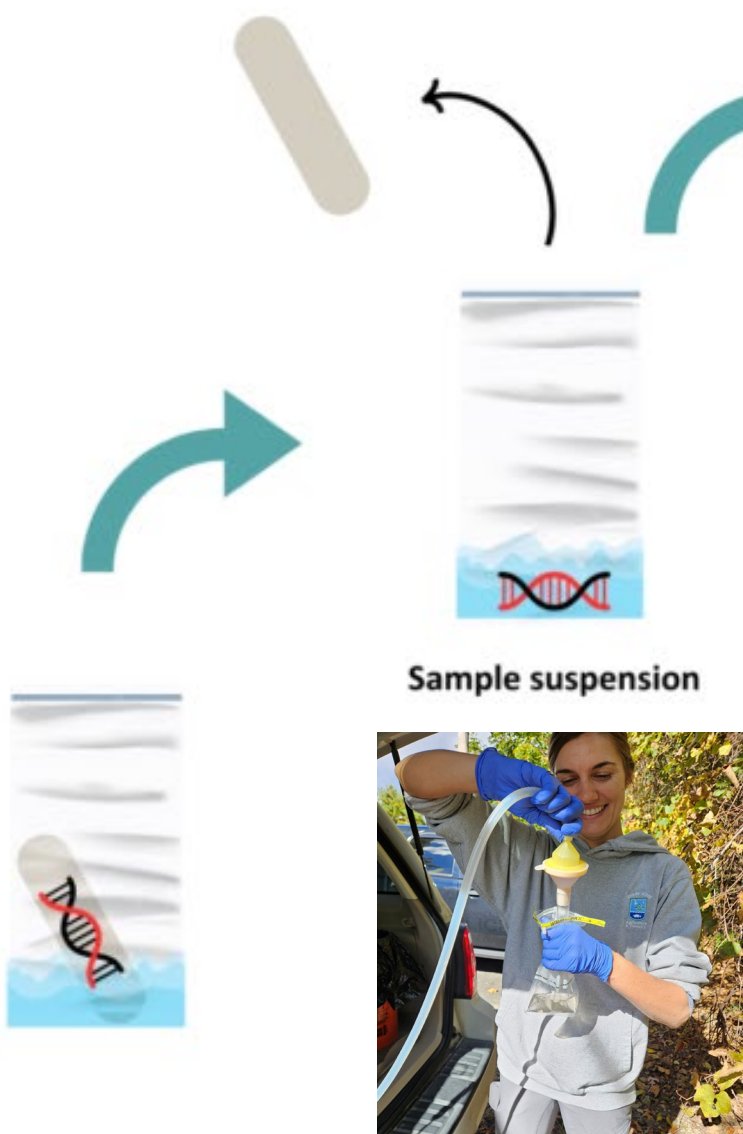
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RI spotted lanternfly eDNA survey

- 20 sites
- High-risk: transportation and commerce corridors
- Host plants: **Ailanthus**, maples, black walnut
- Conducted in fall 2023 and 2024



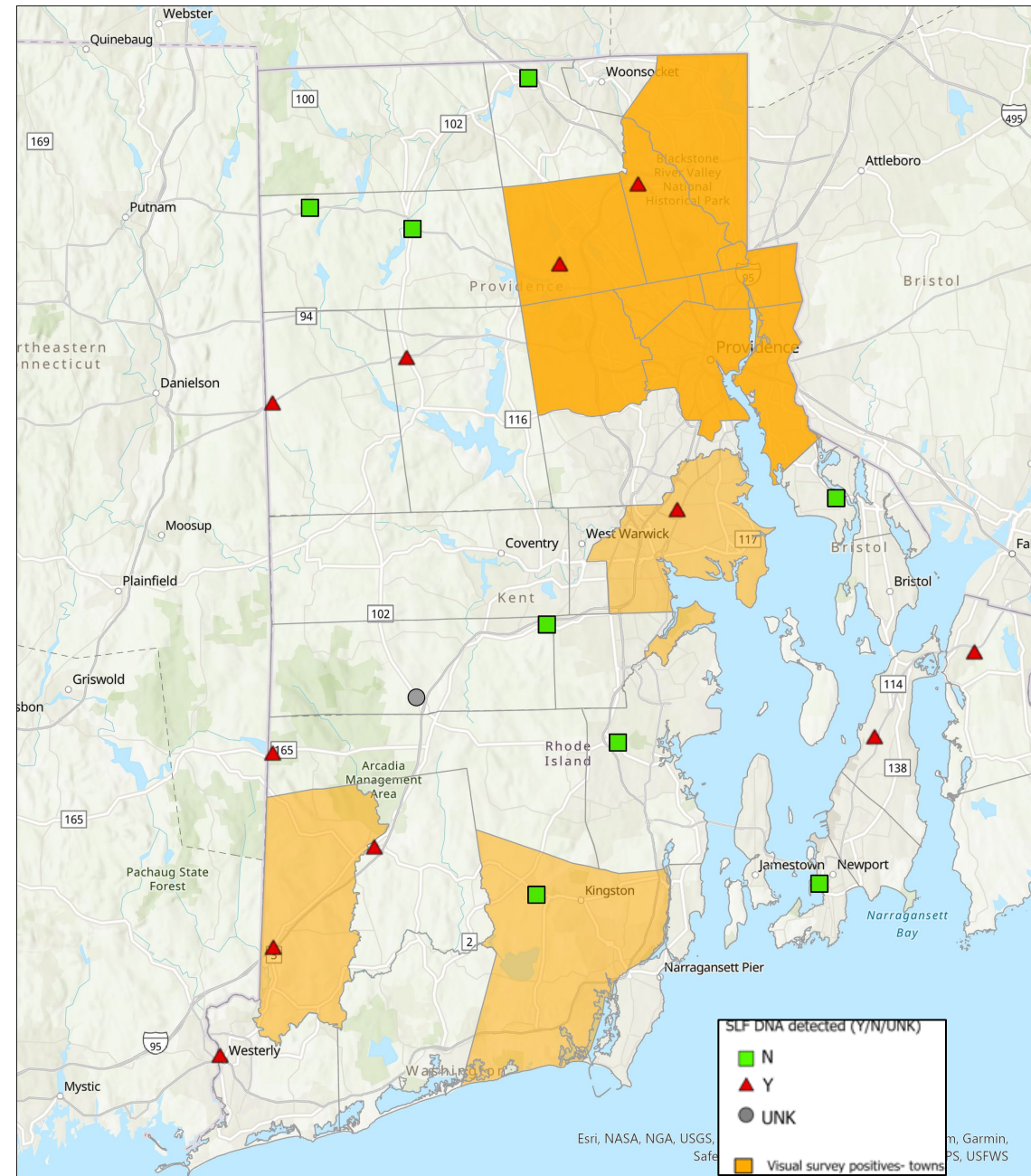
Methods



Results: 2023

- 11 positives
- 1 unknown
- 8 negative

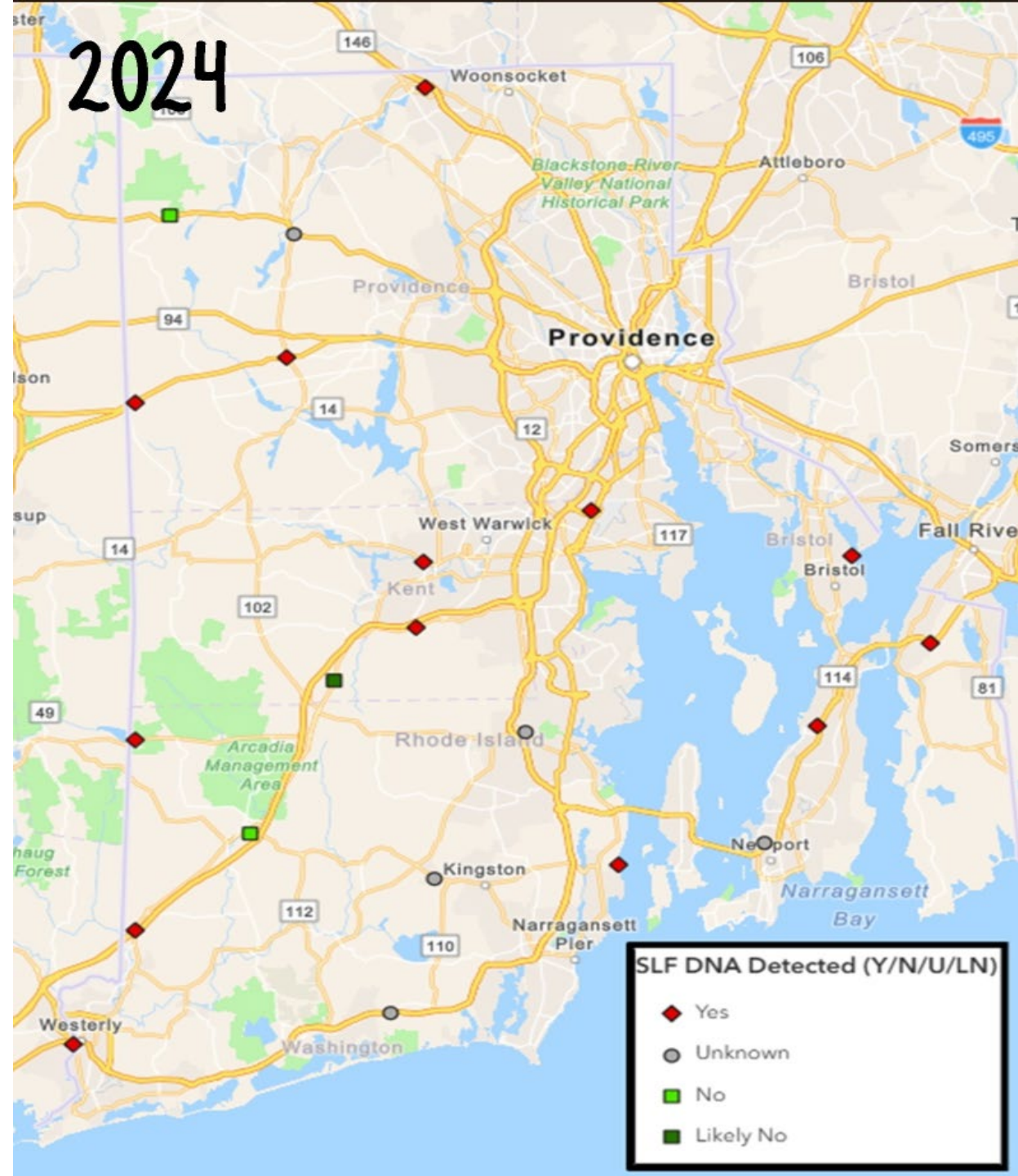
- Four counties positive



Results: 2024

- 13 positives
- 5 unknowns (contamination)
- 3 negative

- All five counties positive
 - eDNA survey contributed to two new positive counties

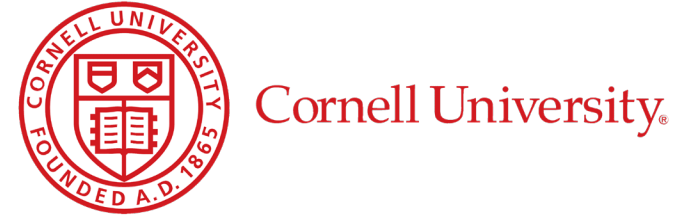


Lessons learned

- Effective for early detection, when population densities are low
- Issues with field contamination when populations are widely distributed

- Effective and handy to target areas for further visual/conventional survey
 - help narrow down survey extent
- Usage of tools to reach parts of host environment inaccessible with conventional methods

Other forest health applications of eDNA survey



- EAB:
 - Tree coring and qPCR assay developed (Kyle et al. 2024)
- ALB:
 - qPCR assay developed
 - Testing field collection techniques
- HWA:
 - qPCR assays for HWA, and predators *Leucotaraxis* spp. and *Laricobius* spp. (Kirtane et al. 2022; Liu et al. 2024)



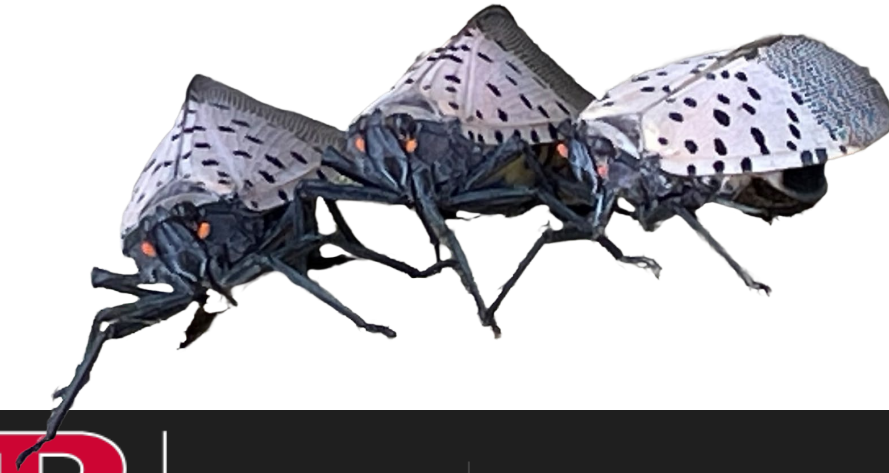
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Thanks! Questions?

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