

## **Trailside Trespassers: Mapping Invasive Plant Species in Lyme Land Trust Preserves**

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Controlling the growth of invasive plants in the woods of Lyme, Connecticut is just one aspect of managing nature preserves that Lyme Land Trust (LLT) is both responsible for and concerned about. Humans are a contributor to the spread and propagation of invasive plants. The community trails in the preserves of LLT are well-maintained and accessible and, therefore, are frequented by many. People may be spreading or introducing invasive species as they walk the trails. The null hypothesis I worked with for this project was that presence and intensity of infestation of invasive plants would decrease as the distance from the trailhead increased. My goal for the summer was to gain more experience working in the field, collecting data, and designing a study while also generating a product that would be useful in LLT's management strategy against invasive plants. It was a fantastic opportunity to work with a nonprofit organization (both staff and volunteers) that makes the area where I grew up so special. Land trusts are complex environmental bodies as well, and I learned a lot about the details that go into decision-making and all the moving parts behind the scenes that keep land protected.

I worked with LLT's Environmental Director, Jim Arrigoni, to design a procedure to collect data on the presence and infestation level of 9 of the common invasive plants in CT's woods: *Berberis thunbergii* (Japanese barberry), *Euonymus alatus* (winged euonymus), *Rosa multiflora* (multiflora rose), *Celastrus orbiculatus* (oriental bittersweet), *Elaeagnus umbellata* (autumn olive), *Microstegium vimineum* (Japanese stiltgrass), *Rubus phoenicolasius* (wineberry), *Allaria petiolate* (garlic mustard), and *Artemisia vulgaris* (mugwort). Data was collected from the trails of 4 LLT preserves in Lyme, CT (Banningwood, Beebe, Brockway-Hawthorne, and Thach) from June 19-July 31, 2023. The entire length of each trail was split into 100-ft segments. The area surveyed for each segment was 10 yds off both the left and right sides of the trail. GPS data of the start and finish of each segment was collected using the app GPS Tracks. Invasive plant intensity was recorded using a semi-quantitative scale (that I created) that ranged from 0-3 based on how infested each segment was with each species. For example, the score 0 indicated that the species was not observed, and the score 3 indicated that the species dominated the segment with little to no other species present. Invasive plant intensity data was collected using the platform Epicollect5 and analyzed using the R programming language. The GPS and plant intensity data were combined into maps using QGIS.

Most of the preserves showed a general decrease in invasive plant infestation as the distance from the trailhead increased. Thach showed a distinct decrease in both presence and infestation intensity of invasive plants as the distance from the trailhead increased, which may be the result of an access road that leads to the forested part of the preserve. Brockway-Hawthorne also exhibited a decrease in invasive plants as distance from the trailhead increased, though not as pronounced as Thach. Banningwood showed consistent infestation throughout its trail system, but there was a lot of variability between segments and species. Beebe's trail is just one loop, and it showed an increase of invasive plants as the distance from the trailhead increased. There are obviously a lot more factors than just the distance from the trailhead that contribute to the distribution of invasive plants, including past land use, bodies of water and water flow, soil makeup, and the geographic features of the land. Knowing exactly where certain invasive plants are alongside trails and how badly the area is infested can help inform plans for work parties, herbicide use, and other ways of invasive plant management. For example, it is difficult to significantly reduce Japanese barberry in areas that are heavily infested by just cutting or uprooting plants, but in a minorly infested area, barberry could be eradicated. On the other hand, in terms of vines like oriental bittersweet, heavily infested areas are the ones to target because they pose the most risk to native trees and can be effectively dealt with by cutting and painting with herbicide.

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