



Town of West Newbury Invasive Plant Internship

June - August 2023

Emily Cuellar

Stacey Dolan, MSc

Introduction to Interns

Emily Cuellar: rising fourth-year at Rensselaer Polytechnic Institute; studying environmental science and sustainability studies

Stacey Dolan: Master of Science in Wildlife and Fisheries Biology from Clemson University (2021); conservation biology career path, focusing on research of at-risk species



Objectives of Internship

- **Continuation of mapping** project from 2022 internship
 - Mapping of invasive plant species on town-owned parcels to inform ongoing management of focal species
- **Validation/expansion** of 2022 data
 - Many plants (esp. seedlings) were not initially logged last year because they were not visible until management was underway
 - Update status of last year's data to "treated" where relevant
- **Commence management** of invasive plant species
 - Cherry Hill Reservoir
 - Quaker Cemetery



Focal Species



Interns had two weeks of field training with several biologists and community members to learn plant ID for our focal invasive plants:

- Bush honeysuckle - *Lonicera* spp.
- Japanese honeysuckle - *Lonicera japonica*
- Black swallowwort - *Vincetoxicum nigrum*
- Pale swallowwort - *Vincetoxicum rossicum**
- Burning bush/ Winged Euonymus - *Euonymus alatus*
- Japanese barberry - *Berberis thunbergii*
- Common barberry - *Berberis vulgaris**
- Oriental bittersweet - *Celastrus orbiculatus*
- Glossy buckthorn - *Frangula alnus*
- Common buckthorn - *Rhamnus cathartica*
- Japanese knotweed - *Reynoutria japonica*
- Giant knotweed - *Reynoutria sachalinensis**
- Bohemian knotweed - *Fallopia x bohemica**
- Garlic mustard - *Alliaria petiolata*
- Multiflora rose - *Rosa multiflora*
- Privet - *Ligustrum* spp.
- Autumn olive - *Elaeagnus umbellata*
- Tree of Heaven - *Ailanthus altissima*

* species not observed during 2023 intern season surveys

Shared Common Invasive Traits

- Bud break extremely early and retain foliage extremely late into fall
- Prolific seed production
- Rapid growth rate
- High germination
- Shade tolerance
- Tolerant of wide range of soil conditions (moisture, pH, nutrient levels)
- Multiple modes of reproduction (sexual and vegetative)
- Create dense monoculture stands
 - Loss of plant biodiversity



Highlights of Some Common Invasives



Oriental Bittersweet:

- Can climb up to 60ft
- Can uproot trees from its weight and constrict nutrient flows through girdling
- Insect and wind pollinated
- High germination in low light
- Reproduce sexually and vegetatively
 - Layering and root suckering
 - Even small root fragments can resprout
- Prolific berries, each with 3 seeds

Multiflora Rose:

- Can climb up to 15 ft
- Creates impenetrable thickets
- Mature plant can produce 500,000 - 1,000,000 seeds per year
- Seeds remain in seed bank for 20 yrs
- Hips are dispersed by birds
- Can reproduce sexually and vegetatively
 - Layering is common due to its arched growth habit



Autumn Olive:

- Woody shrub, can grow up to 20 ft
- Fleshy berry readily consumed and spread by birds and mammals (similar to bush honeysuckle)
- Cutting plants results in sucker sprouting
- Can produce seed as early as 3 years (4-8 ft height)
- Mature plants can produce 30 lb of berries, ~66,000 seeds

Impacts of Invasive Plant Species

Plants provide habitat and are the foundation of most animal trophic systems (aka food webs)

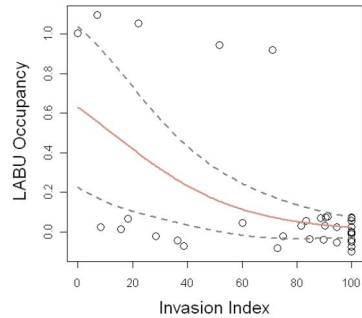


Figure 17. Lazuli Bunting Occupancy and the Invasive Index

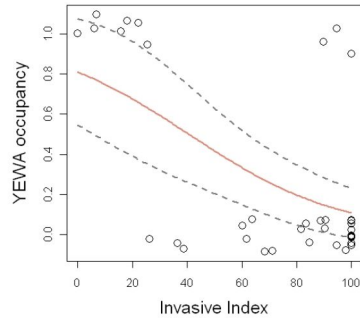


Figure 18. Yellow Warbler Occupancy and the Invasive Index

Impacts to birds & pollinators:

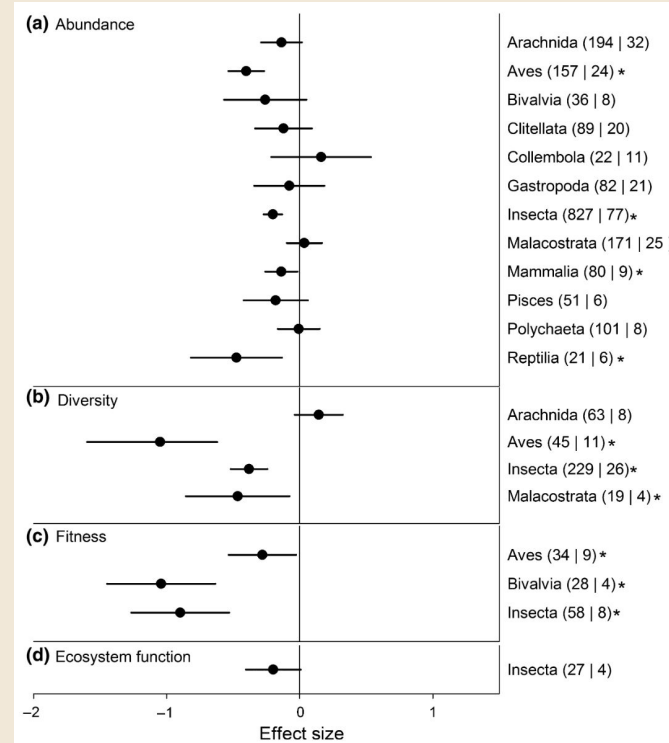
- Birds and insects are most strongly affected taxa
- Caterpillars are highly specialized to their host plants - can't eat invasives
- Birds feed chicks soft invertebrates
- Berries of invasives are often high in sugar and low in fat and won't provide them the energy reserves they need to survive migration
- Some bird species are lost from the guild at certain invasive thresholds

Impacts to Mammals:

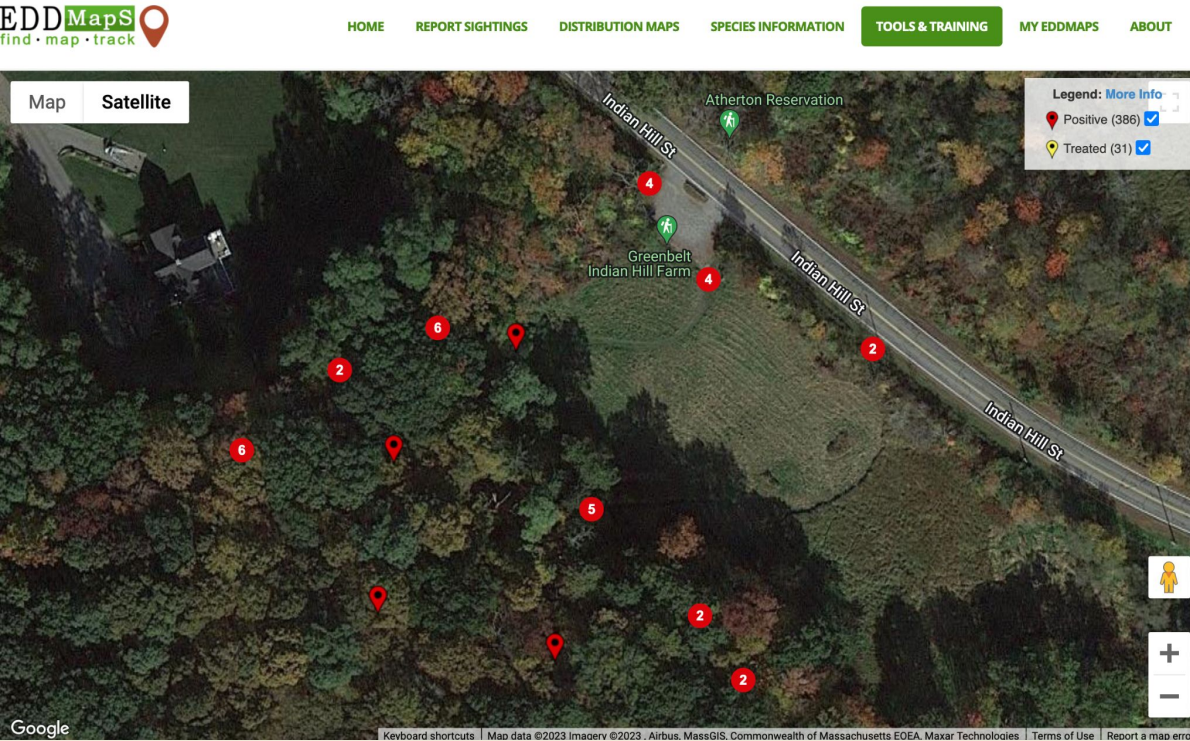
- Effects on herbivores are high due to direct consumption
- Invasives significantly reduce abundance of herbivores and carnivores (but not omnivores or detritivores)
- Mammals perceive many invasives as low quality forage (barberry, privet)

Impacts to Reptiles:

- Abundance is more significantly impacted by invasive plants than mammals
 - Blanding's turtles



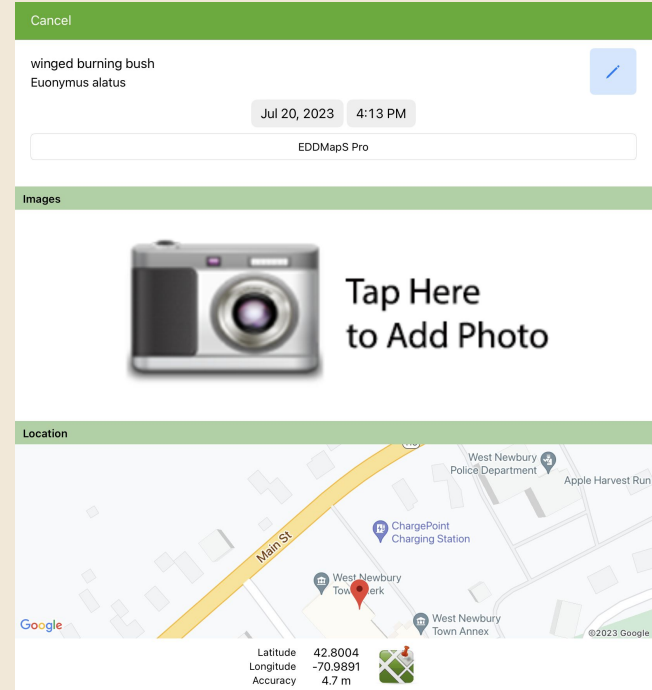
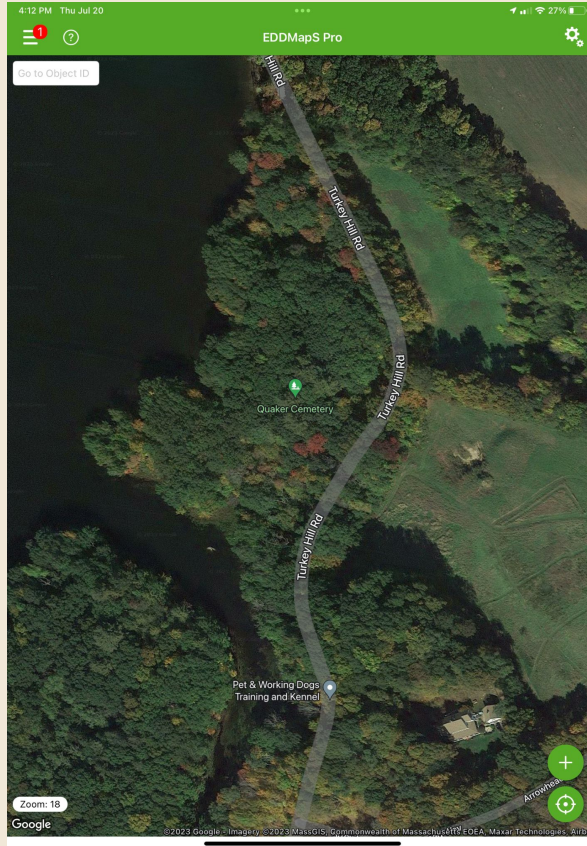
Mapping



- Used EDDMapS software to map focal invasive species at several sites: Town Offices parcel incl. trail, Quaker Cemetery, Indian Hill, Cherry Hill
- Software bundles spatial data (location, coverage area) with qualitative data (density, habitat type, plant description (mature/seedling/in flower/in fruit/etc), abundance (single plant/scattered plants/dense monoculture/etc), positive/negative/treated, a photo, and additional notes
- All data points are validated by approved verifiers using included photos of observations
- Can be exported as shapefile and imported into other GIS software such as MiMAPS and ArcGIS for further analysis

Mapping Case Study: Quaker Cemetery

- Quaker Cemetery is a historic cemetery on a wooded lot adjacent to the Artichoke Reservoir
- Initial visit on 7/11/23 to map and flag all invasives with flagging tape
- Initial mechanical removal by Elisa Grammer on 7/19/23
- Interns revisited on 07/27/23 to cut glossy buckthorn stumps and remove remaining invasives



glossy buckthorn *Frangula alnus* Mill.

[Edit Record](#) [Revisit Record](#) [Delete Record](#)

Record ID 11446820

Location Information

Habitat Forest
Location Essex, Massachusetts, United States
Coordinates 42.79600, -70.92607
Coordinate Uncertainty 5 Meters

Infestation Information

Density 25-50%
Infested Area 1 Sq Feet
Infestation Status Positive

Reporter Information

Reporter [Stacey Dolan](#)
Observation Date July 11, 2023
Date Entered July 11, 2023
Source Type iPhone

Species Information

Common Name glossy buckthorn
Scientific Name *Frangula alnus*

Verification and Review

Reviewed Not Verified

Survey Information

Datum WGS84

Other

Other Geographic Locations

Location Quaker Cemetery
Location US Congressional District MA-6



[View full size image](#)

Mapping Case Study: Quaker Cemetery

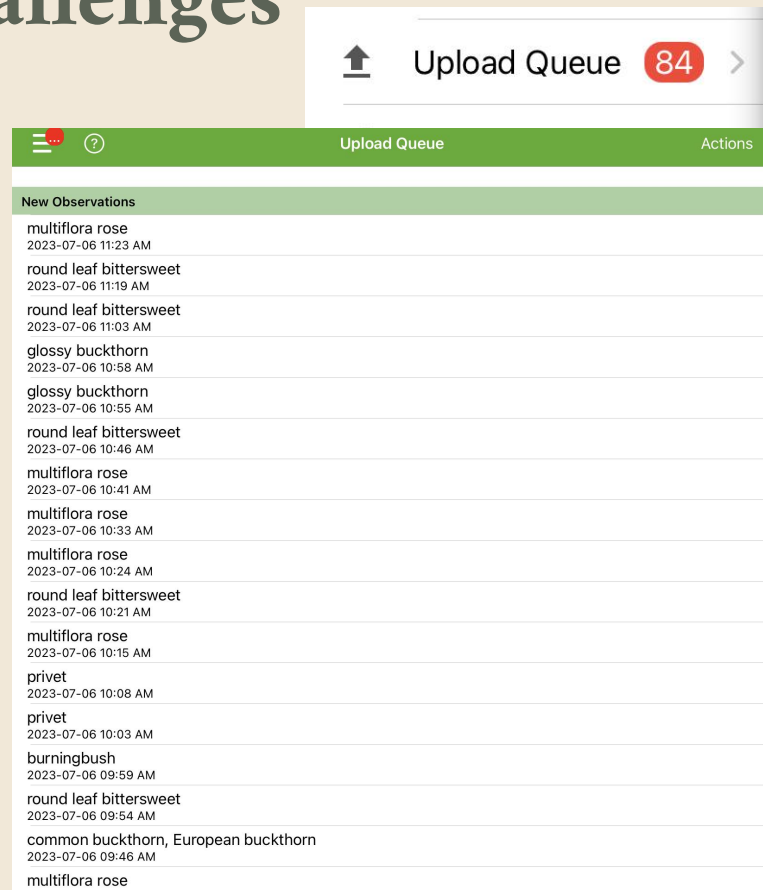
Revisit 7/27/23:

- Removed remaining invasives (~dozen small plants in photo)
- Monitored for any new growth
- Denoted EDDMapS observations at this site as “treated”



Mapping Challenges

- One of the interns' iPads had issues uploading observations of invasive species from EDDMapS app onto server
 - Attempting to upload data from EDDMapS app queue caused app to crash and upload to fail
- West Newbury IT department reached out to EDDMapS (UGA) to resolve issue
 - Issue was unable to be resolved
 - Interns manually transcribed data to other iPad, successfully uploaded, and only used that iPad for rest of season



The screenshot shows the 'Upload Queue' interface of the EDDMapS app. At the top, there is a navigation bar with an upward arrow icon, the text 'Upload Queue', a red circle containing the number '84', and a right-pointing chevron. Below this is a green header bar with a menu icon, a question mark icon, the text 'Upload Queue', and an 'Actions' button. The main content area is titled 'New Observations' and contains a list of 16 entries, each consisting of a species name and a timestamp.

New Observations	
multiflora rose	2023-07-06 11:23 AM
round leaf bittersweet	2023-07-06 11:19 AM
round leaf bittersweet	2023-07-06 11:03 AM
glossy buckthorn	2023-07-06 10:58 AM
glossy buckthorn	2023-07-06 10:55 AM
round leaf bittersweet	2023-07-06 10:46 AM
multiflora rose	2023-07-06 10:41 AM
multiflora rose	2023-07-06 10:33 AM
multiflora rose	2023-07-06 10:24 AM
round leaf bittersweet	2023-07-06 10:21 AM
multiflora rose	2023-07-06 10:15 AM
privet	2023-07-06 10:08 AM
privet	2023-07-06 10:03 AM
burningbush	2023-07-06 09:59 AM
round leaf bittersweet	2023-07-06 09:54 AM
common buckthorn, European buckthorn	2023-07-06 09:46 AM
multiflora rose	

Management

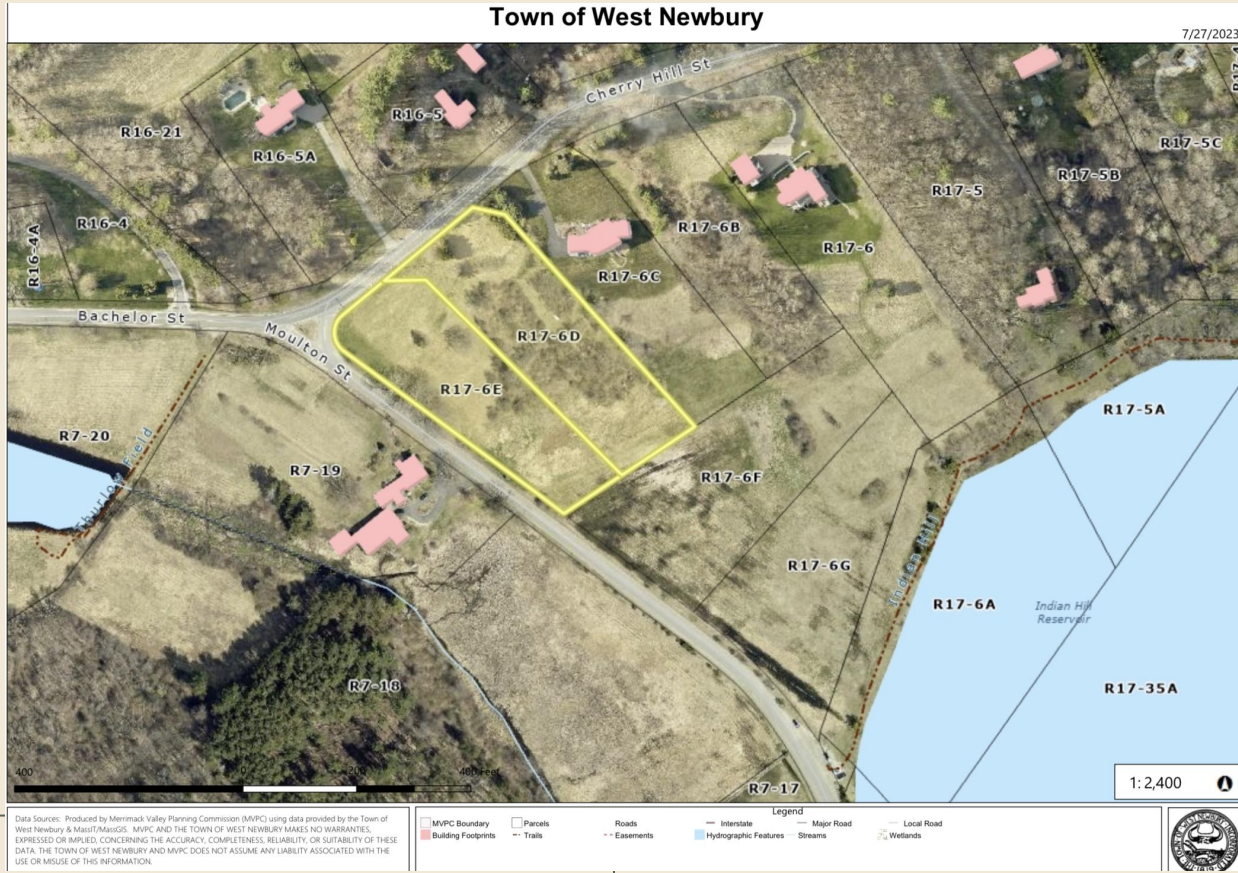
- Invasive plant management was performed by interns in order to control invasives at Cherry Hill Reservoir and Quaker Cemetery
- Mechanical removal methods:
 - Cutting, sawing, uprooting, hand pulling
 - Equipment: Large loppers, hand pruners, handsaws, Extractigator, Buckthorn bags
 - Removed plant material collected into brush piles for spring burning by fire department
- Updated observations to “Treated” in EDDMapS





- **Extractigator works well on most small woody shrubs** (e.g., bush honeysuckle, privet, winged burning bush, and sometimes buckthorn)
- **Does not work well on vines** (i.e., bittersweet, multiflora rose, Japanese honeysuckle)

Management Case Study: Cherry Hill Reservoir



Management Case Study : Cherry Hill Reservoir



There is a sugar maple buried under that bittersweet

Management Case Study : Cherry Hill Reservoir



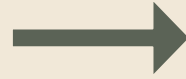
Sugar maple halfway through treatment

Management Case Study : Cherry Hill Reservoir



Sugar maple
after treatment

Management Case Study : Cherry Hill Reservoir



Ash tree before and after

Management Case Study : Cherry Hill Reservoir

Mowing Observations Related to Invasives



Multiflora rose (left) and Autumn Olive (right) seedlings evade mowing by laying over.

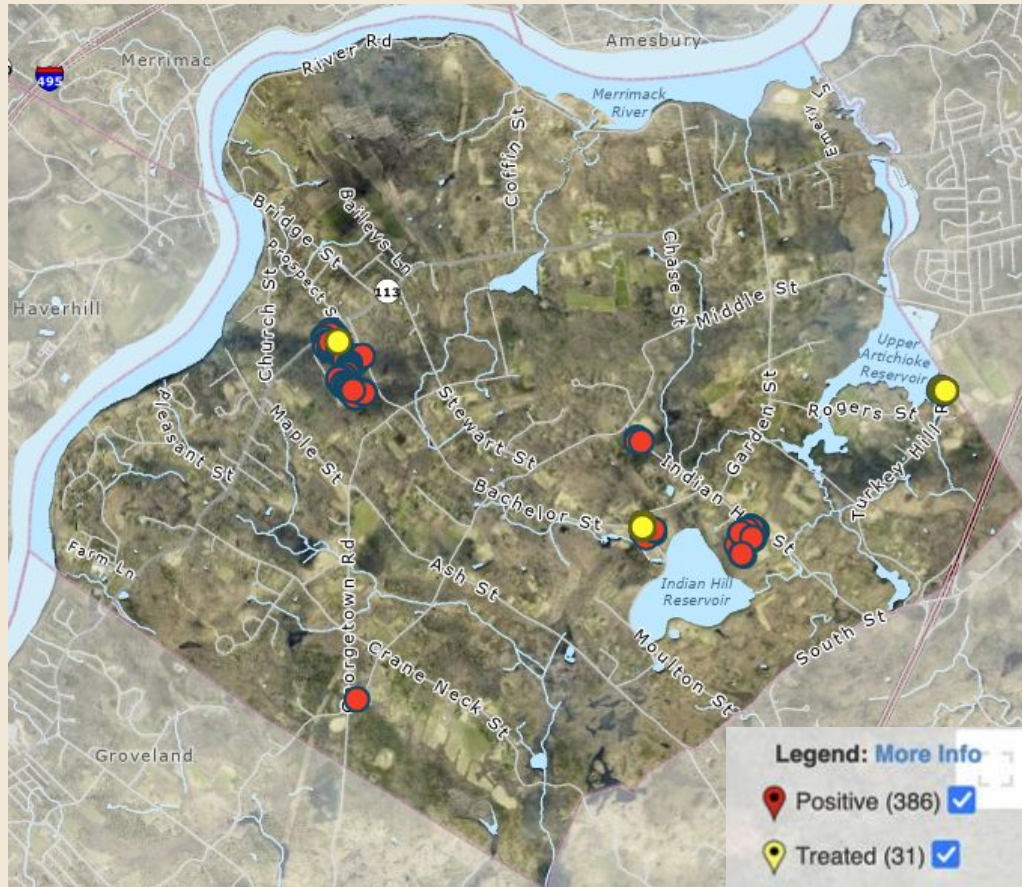
Only invasive species were observed to do this.

Countless seedlings throughout the field remained after mowing, upwards of 3 ft tall.



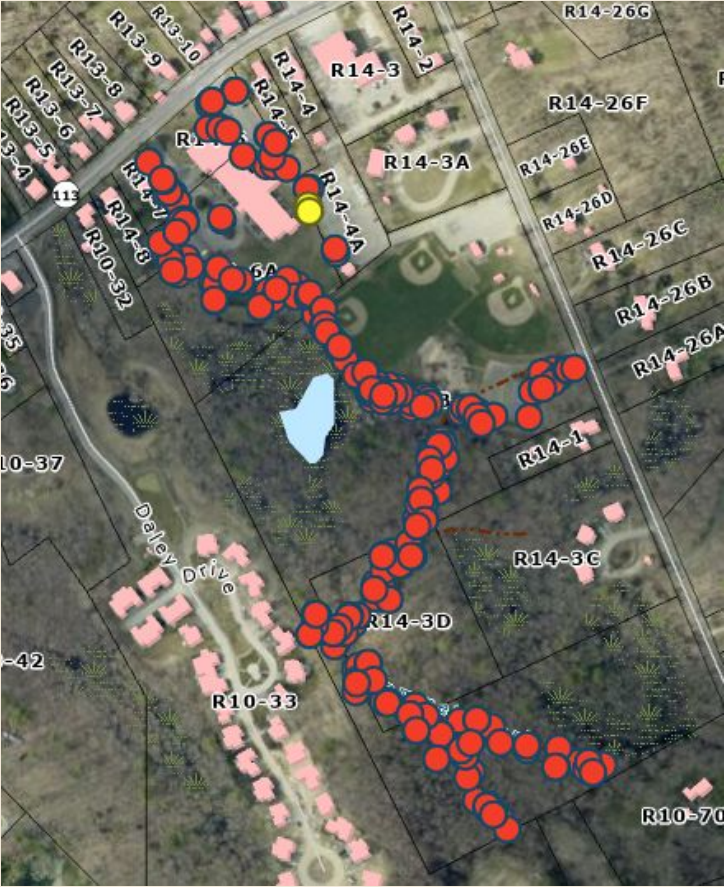
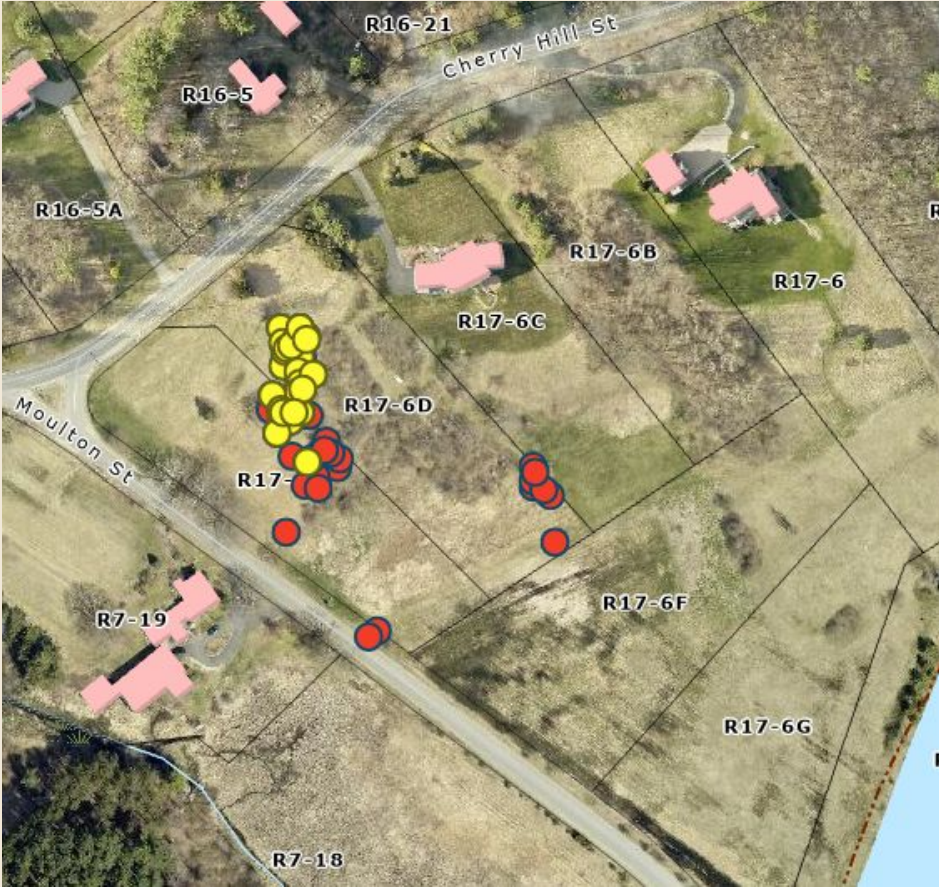
Does mowing facilitate some invasives (e.g., *Rosa multiflora* and *Elaeagnus umbellata*) by knocking back natives and thereby providing them a competitive advantage (more sunlight) and potentially encouraging layering?

Mapping Results



- Total of 470 observations over 2 weeks of mapping effort in 2023
- 2022 interns mapped 1609 observations
- Project now totals 2079 observations on town property

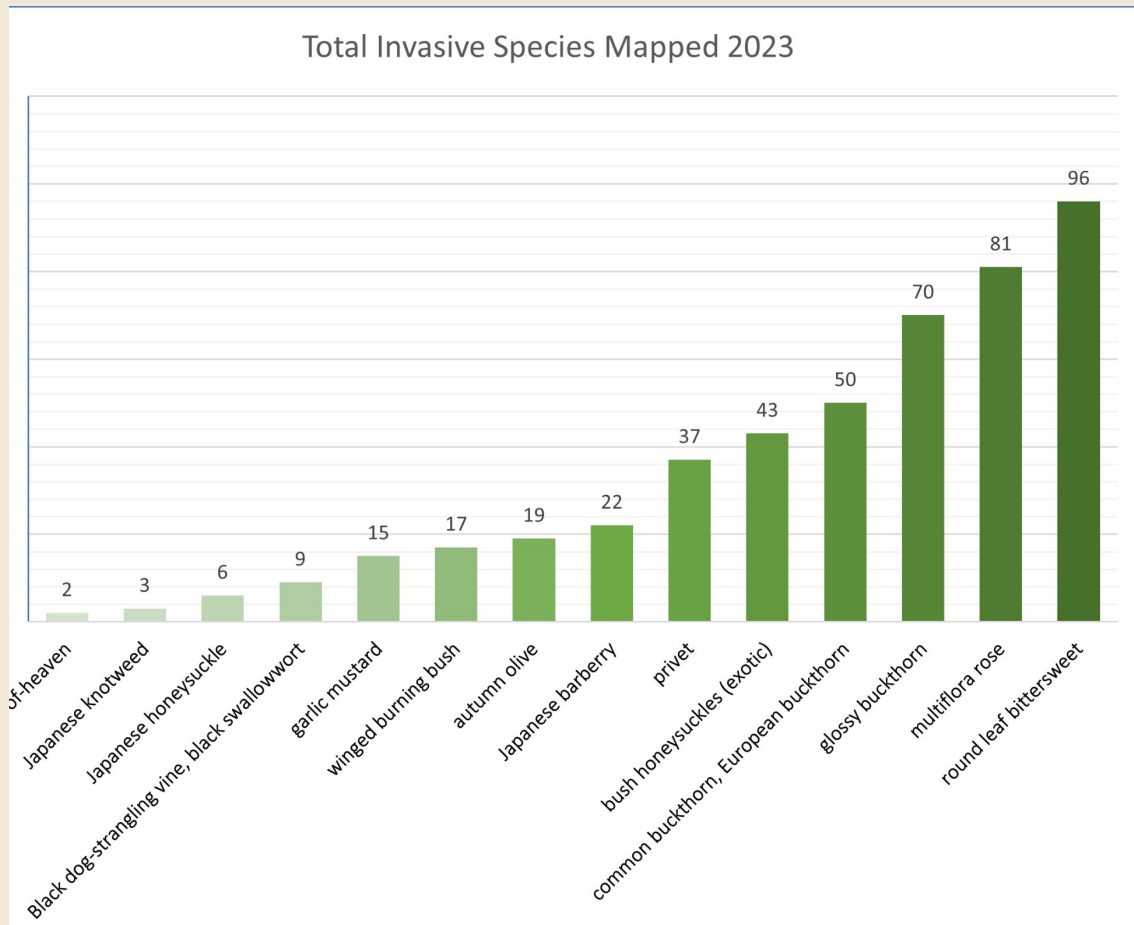
Mapping Results: Cherry Hill and Town Offices



Mapping Results

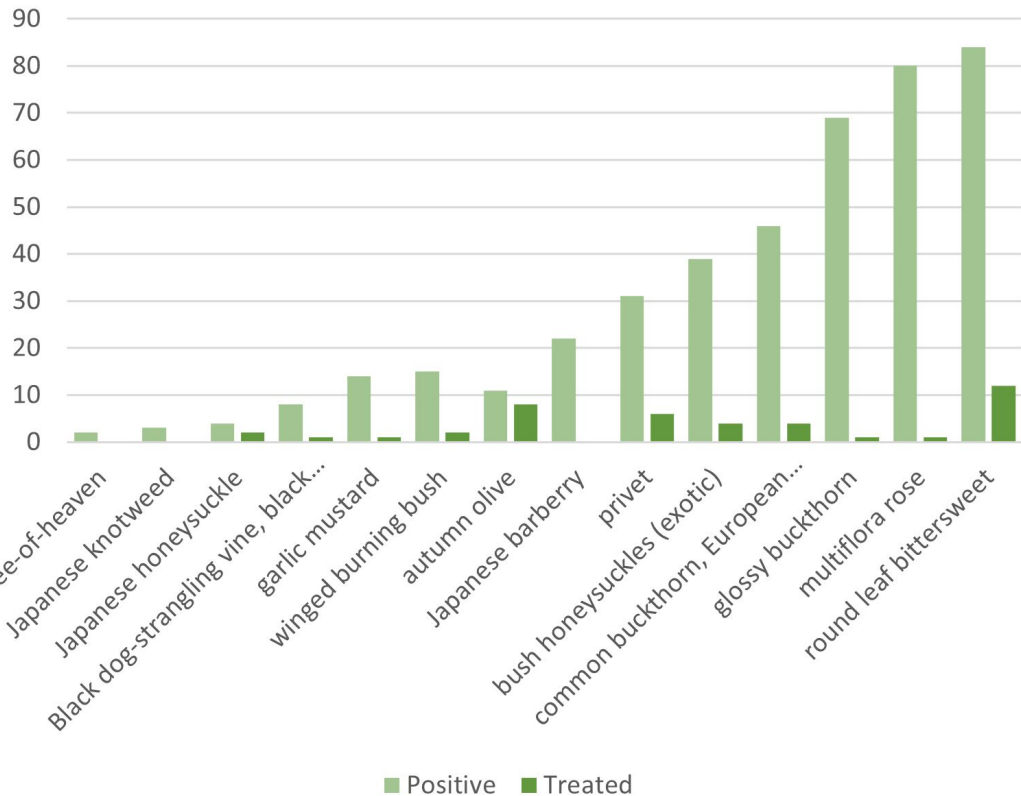
Note: Observation counts do not directly correlate to abundance

- Some observations are polygons (>5 plants) and some are points (individual plants)
- Observations don't reflect size of plant (some are large shrubs (e.g. Autumn olive) while some are seedlings)



Management Results- Total

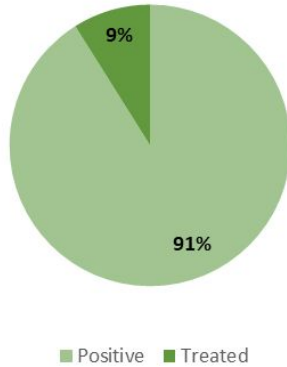
Treated Invasives 2023



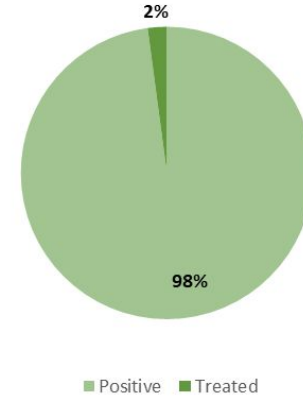
- 39 total treated invasives observations (points + polygons)
 - Management began July 12th at Cherry Hill
 - This encompasses ~3 weeks of work
- 0.75 acres of land treated over course of internship
- Total treated will continue increasing until the end of internship

Management Results

Positive vs Treated Invasive Species 2023

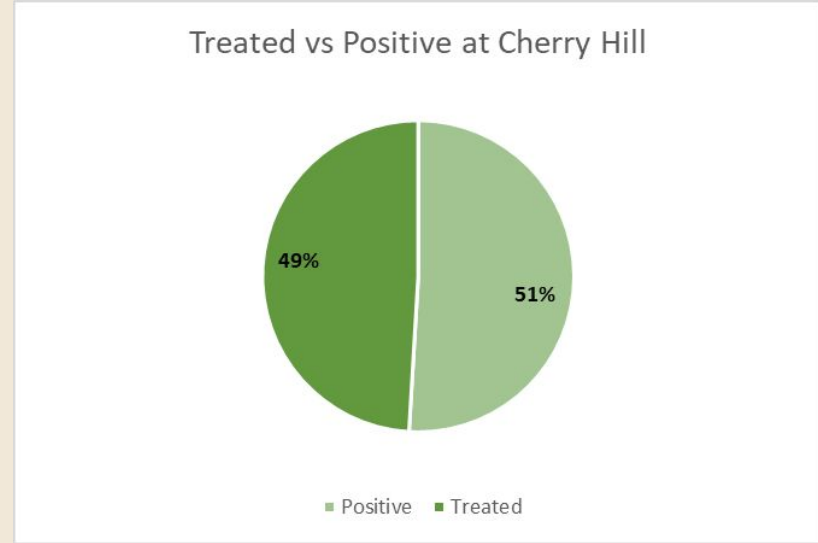
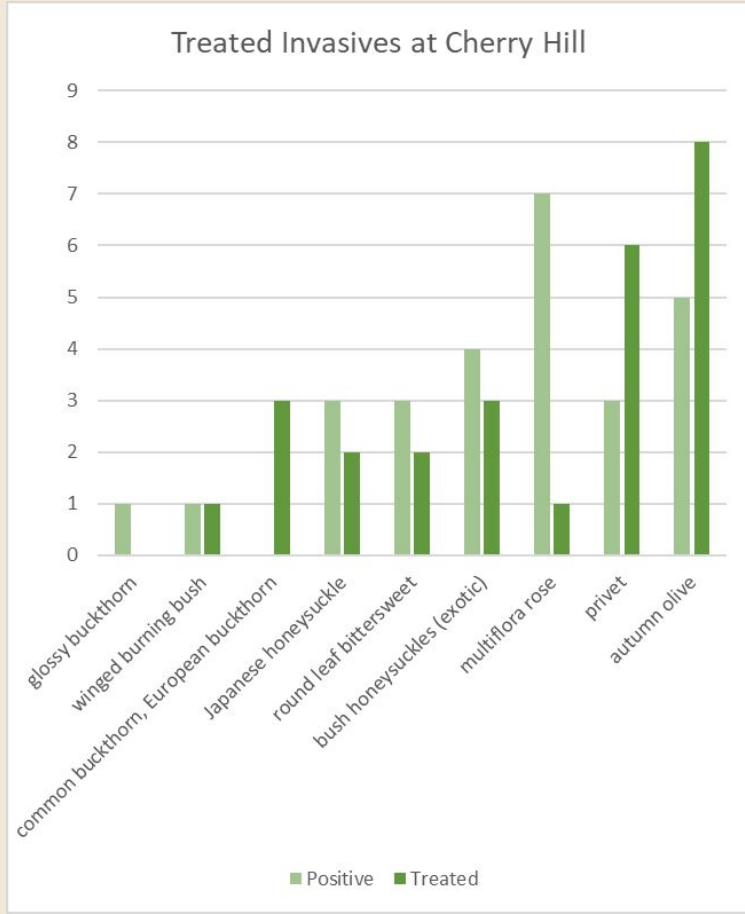


Total Positive vs Treated Invasive Species



Although only about 2% of invasives have been treated from the total mapped during 2022 and 2023, it should be noted that each treatment of an invasive varies in time and speed based on quantity and maturity of plant. For example, sawing down a mature autumn olive tree versus uprooting a single, small bittersweet vine.

Management Results



- Cherry Hill was the focus of management for 2023
- 0.27 acres of land treated out of 3.91 total acres of land owned by town at Cherry Hill
- 26 observations treated as of 8/03/23
- Autumn olive and round-leaf bittersweet have been the most time consuming in terms of management

Recommendations

- Multiple volunteer days to increase manpower
 - Quick plant ID lesson led by interns
 - Mechanical removal
 - Volunteers currently bring their own tools; additional town-owned tools may encourage greater participation
- Increase scope of internship
 - Incorporate plant, wildlife, or environmental quality metrics to provide measurable benefits of invasives removal
 - E.g.: native veg surveys, point count surveys, camera trap surveys, road surveys, water sampling (high ROI techniques)
 - Measure yearly to see how habitat quality and/or habitat use changes as invasives are removed and natives increase
- Continued monitoring of treated areas
 - Early detection saves management costs and prevents spread



INVASIVE PLANT REMOVAL WORKDAY

THURSDAY AUGUST 10, 2023
TWO TIME SLOTS: 9AM-11AM & 12PM-2PM

- Join the Town's 2023 Summer Interns to continue ongoing efforts to restore the Cherry Hill Conservation land at 1 Cherry Hill Street, West Newbury, MA
- Volunteers should dress appropriately for the weather, rough terrain, and possible exposure to poison ivy, thorns, and ticks
- Volunteers are asked to bring their own gloves, loppers, clippers, and other plant removal tools

Please RSVP by email to:
Michelle Greene, Conservation Agent
conservation@wnewbury.org

Join Us!

08/10/2023

@ 1 Cherry Hill
Street

References

- Bierker, S. R., Brubaker, F., Scheideman, K. E., Ciamacco, M., Harris, M. E., & Utz, R. M. (2023). Small Mammals Perceive Most Fruits of Invasive Plants as Low-Quality Forage in a Pennsylvanian Forest and Meadow. *Northeastern Naturalist*, 30(1), 24-40.
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- Wagner, S. K. (2010). *Trends in avian community structure across a gradient of native to invasive riparian vegetation in northwest New Mexico* (Doctoral dissertation, University of Colorado at Boulder).

Acknowledgements

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