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Charles River Environmental Watch

Hell's Half-Acre 2025 Vegetation Monitoring Report

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Project Background

Hell's Half Acre (HHA) is a 7.5-acre tract of urban wilderness between Greenough Boulevard and the Charles River in Cambridge, MA. Across four distinct ecological habitats, the property supports many species of native plants and wildlife, including at least 80 species of birds. The site also provides important community value and recreational amenities including a walking and jogging path that connects the Charles River parklands south of the Eliot Bridge to the pedestrian pathways along Greenough Boulevard.

Decades of disturbance and neglect have left HHA's ecosystems vulnerable to the harmful impact of invasive plant species. The proliferation of these invasive species in HHA's four habitats was previously documented in botanical inventories from 2002 (by Carex Associates) and 2017 (by New England Wild Flower Society, now Native Plant Trust [NPT]). In 2019, the Charles River Conservancy (CRC) began working with the Massachusetts Department of Conservation and Recreation (DCR) to restore a more native plant community plant species that can support a healthy food web and robust ecosystem. The timeline below (Figure 1) highlights key milestones in the historical degradation and ongoing restoration of HHA.

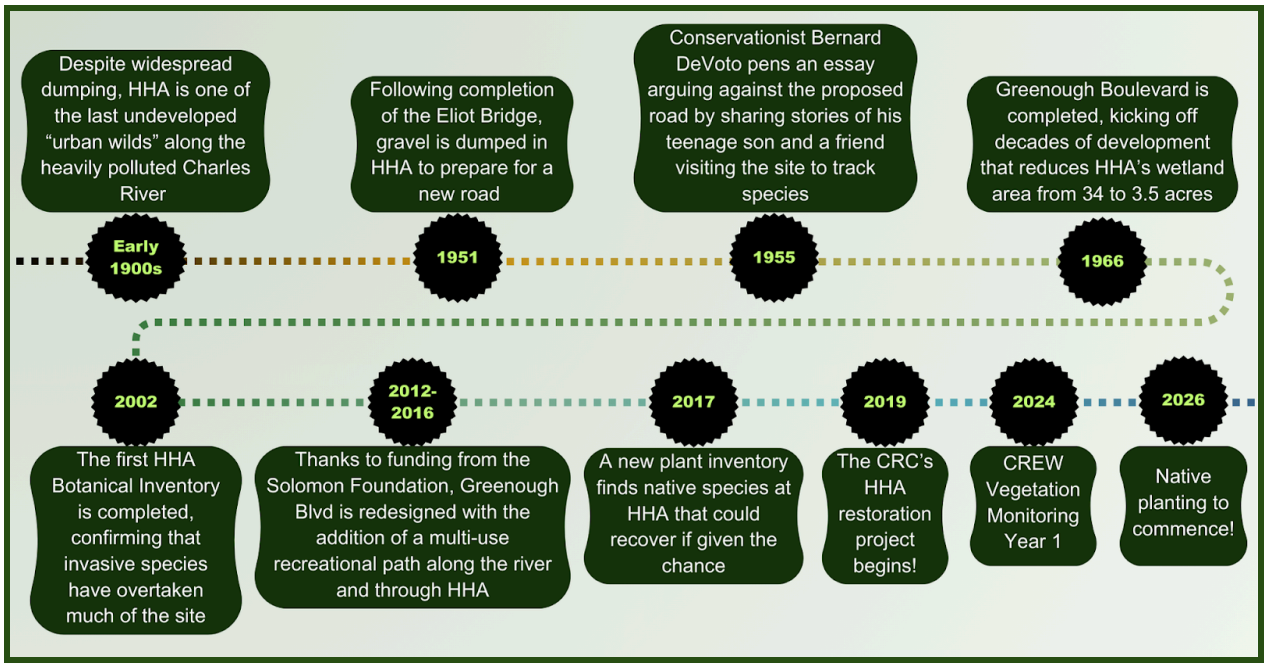

Figure 1. Timeline of key developments in the history of Hell's Half-Acre.

Since 2024, CRC volunteers have been monitoring plant species in 5' by 5' plots spread across the four habitat types found at Hell's Half-Acre: ***Riparian*** (River's Edge), ***Woodland*** (Successional Forest), ***Wetland***, and ***Road's Edge***. The locations of these plots within the habitats can be seen in Figure 2, with an example plot photograph in Figure 3.

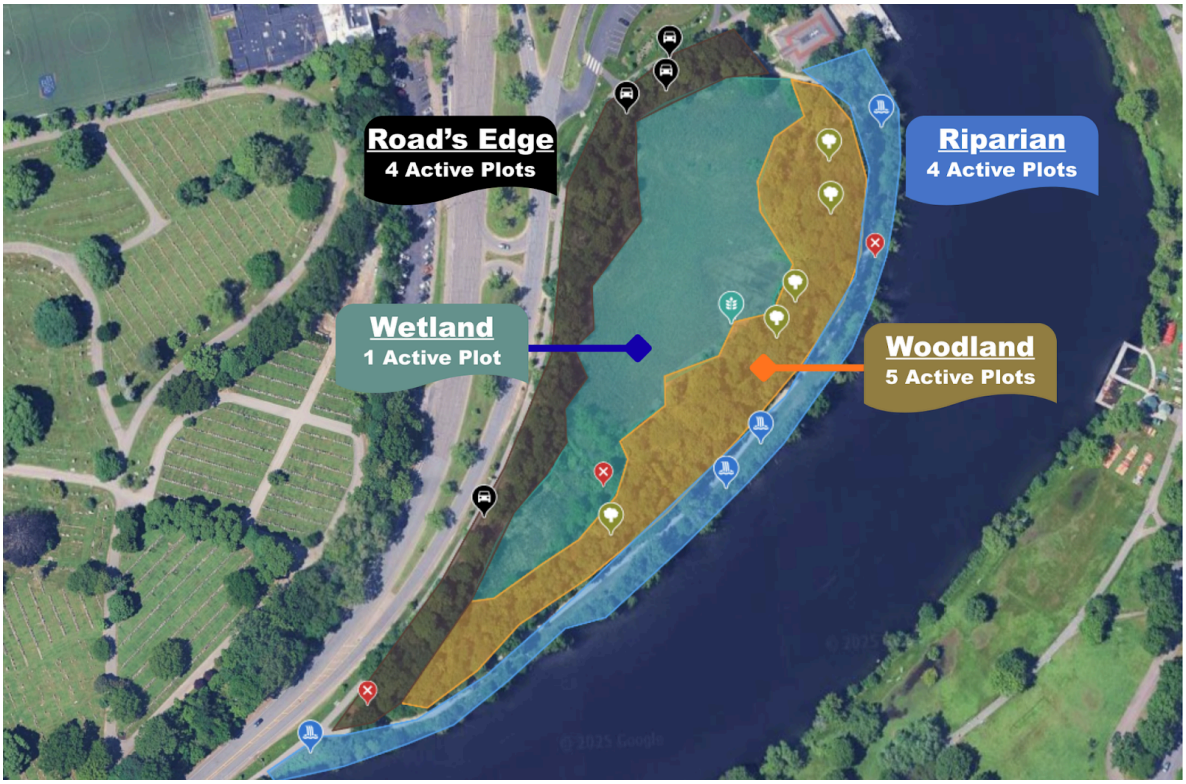

Figure 2. Habitat type boundaries and 2025 plot locations at Hell's Half-Acre

Figure 3. Example of a 5-by-5 foot monitoring plot in the woodland at HHA

The goal of this monitoring is to evaluate the success of invasive species treatment by assessing the post-treatment plant community in treated and untreated areas. Year 1 Results showed positive signs of native recovery despite the continued presence of persistent invasive species, a finding that underlines the importance of ongoing restoration and monitoring.

Building on this encouraging outcome, some plot locations for Year 2 were adjusted to capture more areas of previous invasive management, and the monitoring protocol was refined to generate clearer data on three main vegetation parameters:

- ***Diversity***: how many unique plant species were observed in a given plot or habitat
- ***Density***: the proportion of a test plot covered by a particular plant species or category
- ***Distribution***: how many different plots or habitat types a species was observed in

Given the relatively small sample size, these metrics are particularly useful for comparing the relative prominence of ***native*** species, ***invasive*** species (as listed by the Massachusetts Invasive Plant Advisory Group), and ***non-native*** species (introduced rather than native, but not officially listed as invasive).

This report summarizes the findings after Year 2 of monitoring by assessing the three plant groups along the three metrics. For each habitat type, overall highlights (including notable species) and trends are presented along with notable changes relative to Year 1. The report concludes with a breakdown of overall site-wide trends and takeaways and a discussion of next steps for the broader restoration project.

Riparian (River's Edge)

Figure 4: A river's edge test plot covered by low vegetation including common burdock

Habitat Overview

The riparian (or river's edge) habitat is a highly disturbed ecosystem that stretches along approximately 1300 feet of the Charles River. The vegetated area is widest (about 75 feet) at the north end near the boathouse, and it narrows to about 25 feet moving south along the path. NPT's 2017 assessment described a variable vegetation structure including small trees, thickets of shrubs, open herbaceous and weedy patches, and areas of dry-moist meadow. The riparian community had the most species diversity when inventoried in 2017, largely consisting of persistent invasive species and disturbance-tolerant natives. This characterization is supported in the data collected by the CRC's volunteers.

2025 Highlights

35 unique species were observed across four active plots in the riparian habitat this year. 14 of these were native species, 10 were listed invasives, and 11 were non-native species. No plant was observed in all four plots, but common burdock and goldenrod were observed in three of the four plots.

Common burdock (*Arctium minus*) is a non-native species that often behaves like an invasive species at HHA by spreading rapidly across the site. This was reflected in its average density of 42.7% within the riparian area.

Goldenrod (*Solidago* spp.) includes several native species (e.g. *Solidago rugosa*) that proliferate in and around wetlands and disturbed areas, and these collectively had an average density of 35.4% on the river edge.

Other species with high average density distributed across multiple plots included honeysuckle (*Lonicera* spp., invasive), blackberry (*Rubus* spp., native), Oriental bittersweet (*Celastrus orbiculatus*, invasive), buckthorn (*Rhamnus or Frangula spp.,* invasive), and Japanese knotweed (*Fallopia japonica*, invasive).

Comparison To Year 1

The riparian area saw a substantial increase in the diversity of both invasive and native species, further enhancing the complexity of its habitat structure. Notably, there were more unique native than invasive species observed here in 2025 (14 versus 10). This is an improvement from 2024, when the river's edge had the highest proportion of diversity coming from invasive plants (8/15 observed species), but invasive species are clearly still a significant presence.

This dynamic is further reflected in the evolution of a plot that contained a monoculture of invasive Japanese knotweed (*Fallopia japonica)* in 2024 despite two seasons of professional treatment. In Year 2, knotweed was among the most dominant species in the plot with an average density of 91.25%, but native species including fleabane (*Erigeron*), touch-me-not (*Impatiens capensis)*, and goldenrod (*Solidago*) were consistently present as well.

Woodland (Successional Forest)

Figure 5: The woodland habitat is a mix of mature canopy trees and weedy undergrowth.

Habitat Overview

The successional forest (or woodland) habitat sits between the river's edge and wetland zones. This area has seen severe disturbance from ditching, filling, and waste-dumping, leading to a plant community dominated by species that readily colonize open or disturbed areas. This does include large patches of invasive species, but the canopy is largely made up of native tree species and the understory is primarily weedy natives. This composition allows for targeted treatments that help prevent further establishment of invasive species and encourage the formation of a more native successional woodland.

2025 Highlights

Volunteers reported 23 unique species across five active plots in the woodland. 15 of these were native species, six were listed invasives, and two were non-native species. Two native plants (Black cherry and blackberries) were observed in all five plots, while goldenrod and invasive honeysuckle were present in four of the five.

Black cherry (*Prunus serotina*) is a native tree that is frequently found in forest ecosystems across New England. It produces large quantities of seeds, allowing it to establish rapidly as a dominant component of the canopy in previously disturbed areas like HHA. This tree supports over 450 varieties of butterflies and moths, including many that are important food for birds, making the black cherry a keystone species in the overall forest food web. It is therefore very

encouraging that black cherry had an average density of 78.5%, much higher than any other species in the forest, and it also had the highest individual density in all five plots.

Several native species of ***blackberries*** (genus *Rubus*) are present throughout HHA, especially in the woodland. Also known as brambles, these plants often form large, intertangled colonies and are easily recognizable by their berries and spines. Perhaps for this reason, *Rubus* had the highest quantity of observations in the woodland even though its average density of 28.3% was substantially lower than black cherry.

The presence of ***goldenrod*** (*Solidago*) in the woodland reflected its adaptability to disturbed conditions across different habitat types. It was less ubiquitous here than in the riparian habitat, with an average density of 15.3%.

The vine-forming ***Japanese honeysuckle*** (*Lonicera japonica*) is the more common form of invasive honeysuckle (*Lonicera* spp.) at HHA, but the shrubbier ***Tatarian honeysuckle*** (*Lonicera tatarica*) is also present. These two honeysuckles were collectively the most prevalent invasive plant type in the woodland, with an average density of 21.8%.

Comparison To Year 1

Neither the overall diversity nor the invasive-native breakdown in the woodland plots changed significantly, with the number of unique native species increasing from 13 to 15 and the number of invasives holding at six. Invasive species were observed in all five plots in Year 2, up from 4/5 in Year 1 of monitoring. As before, none of the five plots exhibited a monoculture or invasive-dominated structure.

Wetland

Figure 6: Degradation and hydrological alterations created the conditions for a *Phragmites australis* monoculture in much of the HHA wetland.

Habitat Overview

The 2-acre wetland at HHA has been severely degraded over time, with overall plant diversity decreasing and invasives consistently out-competing natives. In particular, the notorious invasive species *Phragmites australis* (common reed) has become dominant in a large portion of the wetland. This tall, fast-growing plant readily invades wetlands and forms dense stands at the expense of native species diversity. *Phragmites* is an especially problematic invader because there are few proven cost-effective treatment options. Some targeted treatment has been completed in the HHA wetland, but permitting and resource limitations are obstacles to long-term control of *Phragmites* at the site. The smaller area of marsh to the southwest does contain more native species such as cat-tails, so monitoring will be an important step in assessing the potential for a more widespread native recovery.

2025 Highlights

The one active wetland plot had nine unique species observed: seven natives and two invasives.

Native species of note in this plot included ***red maple*** (*Acer rubrum*), ***goldenrod*** (*Solidago*), and ***burnweed*** (*Erechtites hieraciifolius*). Burnweed is a species of particular interest as it can proliferate rapidly and suppress overall diversity despite being a native species.

Invasive species included the aforementioned ***Phragmites*** reeds and ***buckthorn*** (*Rhamnus or Frangula spp.),* which had the highest average density at 38.3%.

Comparison To Year 1

2025's active wetland plot was not a direct replicate of the *Phragmites*-affected plot surveyed in Year 1, but both plots reflect the plant community in and around this area of the wetland following *Phragmites* treatment. As in Year 1, *Phragmites* had less than 25% density, with the Year 2 average dropping under 10%. Another continued trend was that native species including burnweed and goldenrod had denser coverage in the plot than *Phragmites.*

Road's Edge

Figure 7: Proximity to Greenough Boulevard means vegetation in the Road's Edge habitat must contend with various chemical and physical stressors.

Habitat Overview

The road's edge habitat is the vegetated strip along the Greenough Boulevard sidewalk on the west side of HHA, an area approximately 1000 feet long by 25 feet wide. Soils here have been extremely disturbed by road construction and runoff of water and salt, so the habitat is made up almost exclusively of successional and disturbance-tolerant species. This previously encouraged dominance of invasive species, which have been targeted by treatment.

2025 Highlights

24 unique species were observed in the four active Road's Edge plots. Eight of these were native species, nine were listed invasives, and seven were non-native species. Black cherry was present in all four plots, Japanese knotweed was present in three, and three species were present in two of the four.

While ***black cherry*** trees were not as dominant here as in the woodland, their resilience and prolific seeding allowed them to establish in this highly disturbed habitat, with an average density of 28.6%.

The invasive species ***Japanese knotweed*** (*Fallopica japonica*) had by far the highest quantity of observations in the road's edge habitat despite being absent from one plot. This abundance was also reflected in its average density of 29.2%.

The plants present in two of four plots were the invasive-behaving common burdock and a similar non-native species in ***curly dock*** (*Rumex crispus*), as well as invasive honeysuckle *(Lonicera* spp.)

Comparison To Year 1

The Road's Edge habitat displayed the lowest diversity of native plants in Year 1, with only four unique species across three plots. The addition of a fourth active plot in 2025 was accompanied by an increase in native diversity to eight species. This habitat has been historically dominated by invasive species, with an estimated 76-95% density in 2017. However, native and invasive species have each been present in nearly equal densities for the past two years of monitoring (in 2025: 27% native and 25% invasive), showing that targeted treatment of invasive species has allowed native plants to recover well.

As noted in the Year 1 report, consistent observations of certain native species is a positive indication of an existing native seed bank in this habitat, which is essential for continued recovery. In Year 2, these species included blackberries, ash trees (*Fraxinus*), and burnweed in addition to the previously reported pokeweed (*Phytolacca americana*) and black cherry.

Overall Data and Takeaways

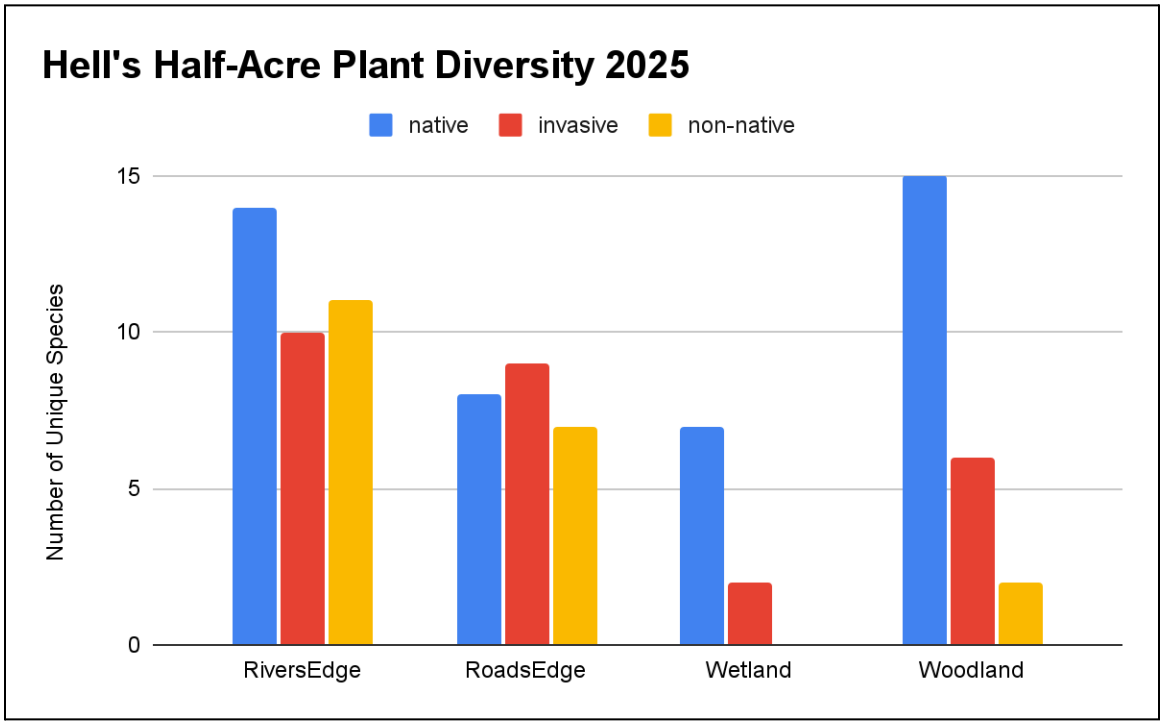

Figure 8: The diversity and distribution of plant species differed across the four habitat types.

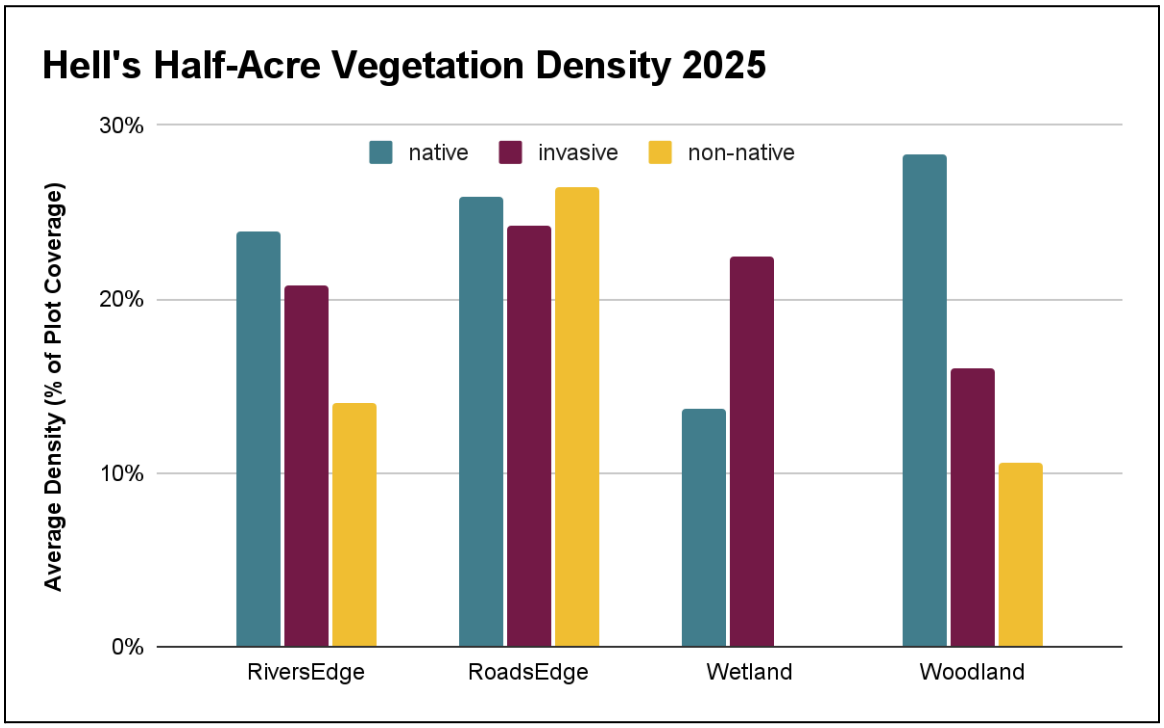

Figure 9: The collective average plot coverage for each type of plant largely followed the patterns of species diversity, other than in the wetland.

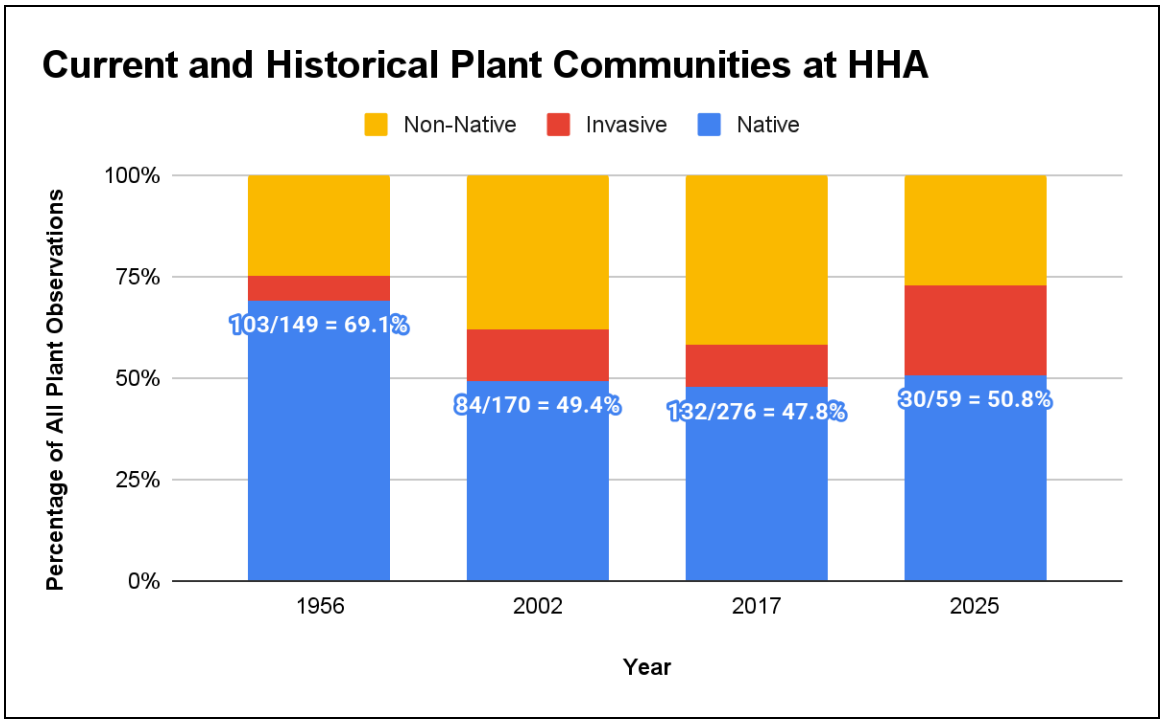

Figure 10. Though it is a small and non-random sample, 2025's data shows signs of recovery in terms of native plants' proportion within the overall plant community.

With two years of quantitative data and volunteer feedback now available, the vegetation monitoring program is becoming established as a key component of the broader HHA restoration project. Among the biggest takeaways at the end of Year 2:

Native Species Are Recovering Well, But Invasives Remain

- Volunteers observed more native than invasive diversity in three of four habitat types (*Fig. 8)*, and over half (30/59) of unique species site-wide were native
- Native species also had a higher average plot cover in three of the four habitats (*Figure 9*), and their sitewide average also exceeded that of invasives (25% to 20%)
- The native proportion of overall plant diversity was higher in the 2025 data than in the 2002 and 2017 site assessments, though it still falls short of 1956 conditions (*Fig. 10*).

Exact Conditions Vary Across Habitat Types

- Likely due to disturbance and stress, the Road's Edge has more diversity among invasives than natives, as well as the highest average plot cover by invasives.
- The wetland has less diversity of invasive species but a higher invasive density, possibly reflecting the past *Phragmites* monoculture
- Certain native species (e.g. Black cherry, goldenrod) have wide distribution, showing their ability to establish across the different habitat types, while others are most prominent in only one habitat (e.g. *Rubus* in the woodland, burnweed in the wetland)
- Differences in data quantity and plant identification success make it difficult to thoroughly compare different plots/habitats

Next Steps

These findings inform key aspects of the CRC's plans to continue improving the project ahead of the 2026 season: further methodological revisions will allow monitors to continue providing valuable and consistent data, while a new volunteer planting and watering initiative aims to add momentum to the ongoing recovery of native species.

Revamped Monitoring

Through data analysis and conversations with volunteers, we have identified several potential aspects of the monitoring program that we can tweak to streamline logistics and improve the experience for everyone involved. These may include:

- Fewer, but larger plots intentionally located in areas of interest to ensure continued robust data on the impact of ongoing management
- Multiple volunteers assigned to each plot to encourage peer-to-peer learning, consistent data collection, and increased engagement
- More streamlined and intuitive field methodology and datasheet to give volunteers more confidence and deliver consistent, easy-to-interpret data
- Additional training and easily accessible online resources for plant identification and estimation of quantitative metrics

Planting and Watering

Given the continued presence of various invasive species, including some that are difficult to treat or remove, the CRC plans to introduce a planting component to the overall restoration project in Spring 2026. Data from monitoring, especially on the native species that thrive in each habitat, is a valuable resource for planning this initiative.

Replanting efforts will begin with 3 test plots in the road's edge, wetland, and woodland habitats. Volunteers will assist by watering plants as needed to help them establish on-site. Eventually, there may be crossover between volunteer watering and monitoring so that the CRC can assess the success of planted species relative to existing natives in similar areas.

Conclusion

The tireless efforts of our volunteers continues to generate incredibly valuable data and information about the Hell's Half-Acre plant community and how it has responded to invasive species management. We are very grateful for all the CREW members who helped with monitoring and data management and for every volunteer who has taken part in an event at HHA over the last few years. We are incredibly excited about the future of this project, including the introduction of planting and watering in the coming spring. Keep an eye on our newsletter and social media for opportunities to visit HHA and get involved with this amazing restoration initiative next spring!