Mamie Till-Mobley Forgiveness Garden, West Woodlawn; Photo courtesy of Delta Institute

delta institute

BIODIVERSITY ASSESSMENT, BASELINE ANALYSIS

WEST WOODLAWN BIOBLITZ EVENT SUMMARY, SUMMER 2023

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EXECUTIVE SUMMARY

Delta Institute (Delta) and our partners know that communities on the South Side of Chicago are disproportionally impacted by flooding and degraded stormwater infrastructure, which has a myriad of impacts on health, water quality, overall neighborhood wellbeing, and economic opportunity. Vacant lots are common in these neighborhoods, further degrading community outcomes.

Residents of Chicago's West Woodlawn neighborhood have identified a pressing neighborhood need to reduce stormwater flooding and the number of vacant parcels in their community. Green Infrastructure (GI) installed on vacant property improves urban stormwater management by capturing and filtering excess runoff from high-volume rainfall events. GI installations that mimic natural assemblages of plants provide habitat for insects, pollinators, and birds, thus improving local biodiversity. Enhanced biodiversity, in turn, may improve the functionality and resilience of GI installations. However, knowledge gaps exist in the GI sector as to whether GI installations demonstrably improve biodiversity in Chicago's neighborhoods and whether these improvements extend to the efficacy of GI.

Therefore, Delta Institute and our community partners performed a ***BioBlitz***, an on-the-ground assessment of existing flora and fauna on specific parcels of land, to create a baseline of biodiversity on four parcels within the West Woodlawn Sustainable Square Mile. This baseline data is the first step in accomplishing this project's primary objectives:

1. Create a database of critical data measuring the impact of nature-based GI on the following indicators: Biodiversity and Ecosystem Quality; Stormwater and Flooding Mitigation; and Community Health Outcomes.
2. Provide recommendations for the implementation, assessment, evaluation, and monitoring of nature-based GI in the Chicago region.

Participants of the W. Woodlawn Sustainable Square Mile BioBlitz on June 17th, 2023, at the Emmett and Mamie Till-Mobley House Museum, 6427 S. St. Lawrence Ave, Chicago IL. (Photo Credit: Blacks in Green)

About Delta Institute

Delta Institute collaborates with communities to solve complex environmental challenges throughout the Midwest. Delta exists because environmental, economic, and climate issues hit communities—urban and rural—through disinvestment, systemic inequity, and policy decisions. We collaborate at the community level to solve our home region's new and legacy issues, by focusing on the self-defined goals and needs of our partners.

Delta Institute improves the living conditions of more than five million Midwesterners by transitioning one million acres to more resilient, conservation-focused practices, and by improving water quality and reducing flooding by capturing 100 million stormwater gallons. By 2025 we will achieve these goals through our agriculture, climate, water, and community development projects.

This is what a more resilient, equitable, and innovative Midwest looks like. Visit us online at www.delta-institute.org.

Acknowledgements

This project was produced with generous support from Walder Foundation, the Gaylord & Dorothy Donnelley Foundation, the McDougal Family Foundation, and two anonymous donors.

We are grateful to partner with community-based and -focused organizations:

- Blacks in Green (BIG) is a national network pioneering "the sustainable-square-mile" in a "city of villages," where every household can walk-to-work, walk-to-shop, walk-to-learn, and walk-to-play – balancing environment, economics, and equity.
- Emerald South Economic Development Collaborative, Terra Firma is a 5-year, $25 million land care initiative launched in 2021 to beautify, maintain, and activate over 205 acres of vacant land on Chicago's mid-South Side. Terra Firma uses vacant land as an engine of opportunity to create jobs, grow small businesses, improve the local environment, and enhance neighbors' quality of life.
- South Merrill Community Gardens, which educates and promotes a sacred space for the health and wellbeing of the intergenerational members of our community through gardening, engagement and accessibility to nature's bounty.
- Metropolitan Planning Council (MPC) has been dedicated to shaping a more equitable, sustainable and prosperous greater Chicago region. As an independent, nonprofit, nonpartisan organization, MPC serves communities and residents by developing, promoting and implementing solutions for sound regional growth.

This document and the tools provided aim to be action oriented and to provide the most current, correct, and clear information possible, but some information may have changed since publication. We encourage practitioners to reach out to us at delta@delta-institute.org with questions, corrections, or to discuss implementation challenges.

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DOCUMENT GLOSSARY

A brief glossary of key terms related to the content in this overview:

- **Abundance**: the total number of organisms found in an area.
- **Biodiversity**: the variety of living things in an area. All living things interact with and influence one another as well as the environments in which they live.
- **Relative Abundance**: the evenness of distribution of individuals among species. An area may have a higher abundance of species, but less evenness of distribution of species.
- **Species Richness**: the number of different species found in an area.

Table 1: The difference between Abundance and Species Richness – "Park B" has greater Abundance of trees, but "Park A" has greater Species Richness.

Assessment Metric	Park A	Park B
Abundance	20 Trees	100 Trees
Species Richness	2 White Oaks, 5 Blue Spruces, 10 Elms, and 3 Sycamores	50 White Oaks and 50 Elms

INTRODUCTION

The City of Chicago owns approximately 10,000 vacant lots, the majority of which are located in low-income neighborhoods on the South and West sides (Bloomberg, 2022). These same neighborhoods are disproportionately affected by stormwater flooding, exacerbated by climate change and aging stormwater infrastructure (Chicago-Kent Journal of Environmental and Energy Law, 2022). Green Infrastructure (GI) can be installed on vacant lots to mitigate local flooding. Prior research suggests transferring vacant lots to private ownership for greening and reuse may also positively affect neighborhoods by reducing violence and crime (Branas et al., 2018), improving health outcomes (South et al., 2018; Sivak et al., 2021), increasing home values (Lin et al., 2022) and, if properly managed and monitored, enhance local biodiversity (Anderson & Minor, 2017). However, knowledge gaps exist as to whether these benefits extend to vacant lots in Chicago's South and West sides. Presently, Delta Institute is investigating all of the aforementioned benefits of installing GI on vacant lots in the South and West side neighborhoods of Chicago. However, here, we begin the process of investigating the effects, if any, of GI installation on vacant lot biodiversity and the effects, if any, of biodiversity on the efficacy of GI installations.

Blacks in Green and Delta Institute have identified several vacant sites in the West Woodlawn community that can be converted to GI and become part of West Woodlawn's Sustainable Square Mile greenway. To create a baseline of biodiversity and investigate the effects of GI on local biodiversity, Blacks in Green, Metropolitan Planning Council and Delta Institute organized and hosted a BioBlitz – an event in which participants identify as many living things as possible in an area in a short period of time to produce a snapshot of an area's baseline biodiversity. Citizen scientists who participated in the BioBlitz not only collected valuable data about the species present in the study area prior to GI installation but also learned about GI and helped

Blacks in Green and Delta Institute envision what sustainable and inclusive development in Woodlawn should look like.

METHODOLOGY

Experimental Design

To assess the effects, if any, of GI installations of biodiversity, the following hypothesis was made: biodiversity indices will be greater among sites treated with GI in W. Woodlawn's Sustainable Square Mile than control sites.

To test this hypothesis, four parcels were selected for assessments of Biodiversity in W. Woodlawn's Sustainable Square Mile (Figure 2). As of Summer 2023, only one of the four parcels has been converted from vacant lot into GI – the Mamie and Emmett Till Memorial Garden (Figure 2, location "A"). As such, we consider this location to be the "experimental site", wherein the independent variable (GI installation) has been modified. Prior to the BioBlitz, the project team assessed the parcels and determined the three vacant lots were homogenously mowed turf grass with several similar species of trees on the perimeter. Due to the low apparent variability among these sites, the three vacant lots were considered to be "control sites". Measurements of Species Richness and Abundance taken at the control sites were aggregated for comparison against the experimental site. However, to investigate variability among the control sites, Relative Abundance of plant species was measured among all sites. Turfgrasses (e.g., Kentucky Bluegrass or perennial ryegrass) were not included in the analyses as turfgrass covered all four sites.

BioBlitz Sites

The BioBlitz took place on June 17th, 2023, within the West Woodlawn neighborhood's Sustainable Square Mile (Chicago IL). Participants first convened at 6427 S. St. Lawrence Ave for an educational level-setting discussion on GI and biodiversity. Participants then determined the goals of the BioBlitz and reviewed data collection methods. T

he BioBlitz took place from 10am – 12pm across four parcels (Figure 1). However, due to time constraints, only sites A and D were examined by all BioBlitz participants. Sites B and C were assessed by the Project Team during the afternoon.

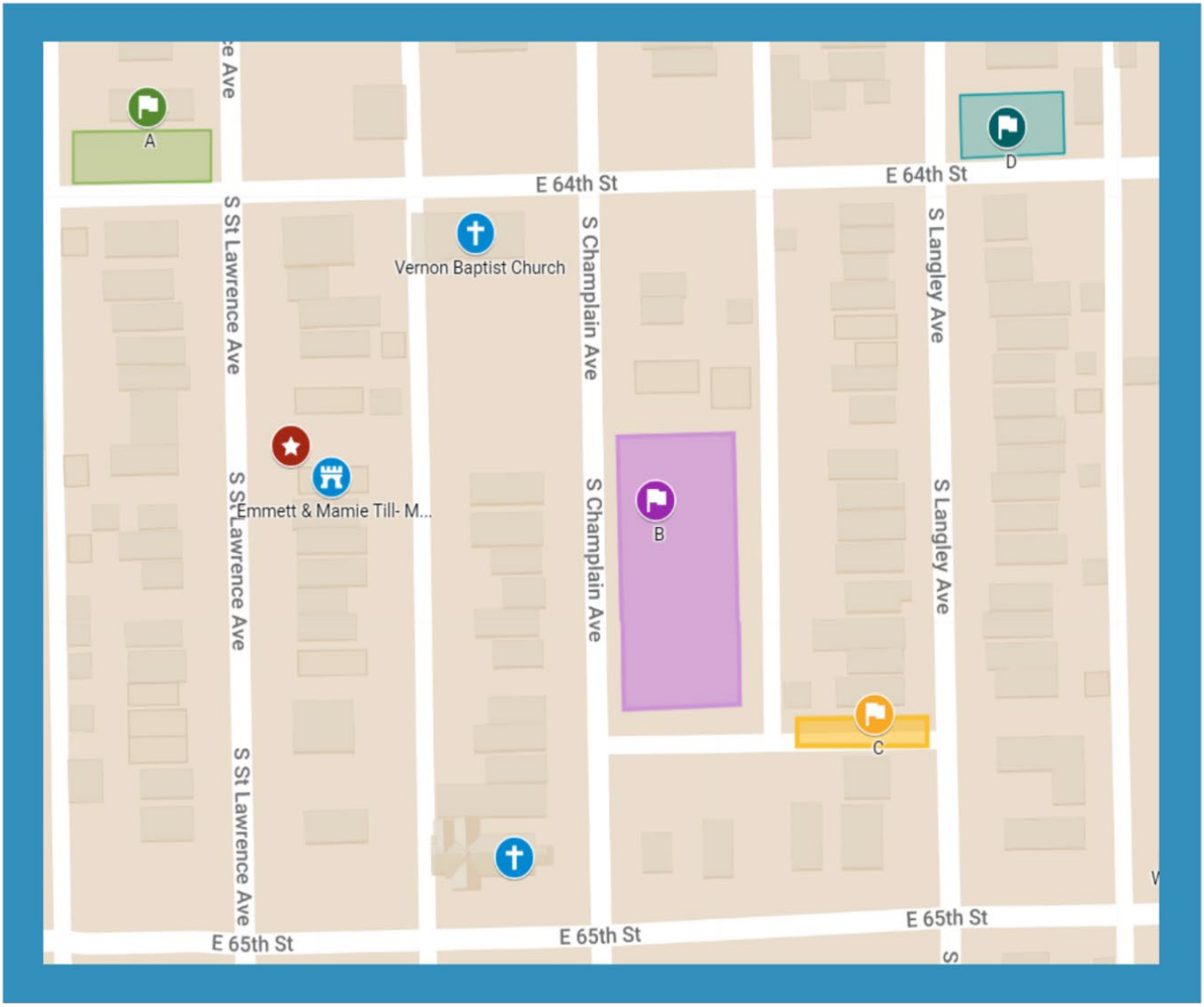


Figure 1: Map showing the four locations (A, B, C, D) of the W. Woodlawn BioBlitz on June 17th, 2023.

- 6354 South St. Lawrence Ave (Figure 2, location "A")
    - Also known as the "Mamie and Emmett Till Memorial Garden", this parcel has been actively managed and monitored by community members. Therefore, the project team considered this parcel to represent GI in comparison to vacant lots (Figure 3).
- 6425 South Champlain Ave (Figure 3, location "B")
    - The largest of the vacant lots, a "control site" (Figure 4).
- 6450 South Langley Ave (Figure 5, location "C")
    - The smallest of the vacant lots, a "control site" (Figure 5).
- 6357 South Langley Ave (Figure 6, location "D")
    - This vacant lot is slated to be transitioned into GI in Spring 2024. A "control site" (Figure 6).

Figure 2: 6354 South St. Lawrence Ave – Mamie and Emmett Till Memorial Garden. (Photo Credit: Delta Institute)

Figure 3: 6425 South Champlain Ave – vacant lot. (Photo Credit: Delta Institute)

Figure 5: 6450 South Langley Ave – vacant lot. (Photo Credit: Delta Institute)

Figure 6: 6357 South Langley Ave – vacant lot. (Photo Credit: Delta Institute)

Data Collection

BioBlitz participants (e.g., community members, civic scientists, the project team) used various tools and techniques to identify and document as many species as possible present across the four parcels. First, participants performed walking surveys of each site and used the free mobile phone app, iNaturalist, to identify and inventory as many organisms at the species level as possible. Species Richness of each site was estimated by the number of unique species identified by iNaturalist. Abundance was estimated by visual survey with large organisms readily counted. However, smaller and more abundant organisms – such as Red Clover or Common Dandelions – were estimated by counting the number observed in a $1m^2$ quadrat and multiplying that number by 10 for the whole site. For example, five Red Clovers observed in one quadrat were recorded as n = 50 for the entire site. It should be noted, while this method was useful to standardize estimations of Abundance across all sites for comparison, the resulting counts of species may be misleading.

Second, the project team deployed insect traps along a random 10m line transect at each site 24 hours prior to the BioBlitz. On the day of the Bioblitz, participants collected, identified and inventoried the trapped insects using iNaturalist. Insect counts were included in Species Richness and Abundance.

Finally, BioBlitz participants measured the percent cover – a measure of the Relative Abundance – of vegetation at each site using $1m^2$ quadrats positioned along a random 10m line transect (Figure 7). Percent cover provided the project team with an idea of how much space a certain species occupies in a site.

Figure 7: Example of a $1m^2$ quadrat used to estimate floristic abundance via "percent cover". Quadrats were deployed across a 10m transect. Source: Sampling Vegetation Attributes, Bureau of Land Management (1999).

Data Analysis

The project team employed the two following indices to calculate and compare biodiversity:

First, **Simpson's Diversity Index** (SDI) was used to quantify and compare the biodiversity of the experimental site and the control sites. SDI provides a value between 0 and 1, where high scores (close to 1) indicate high biodiversity and low scores (close to 0) indicate low biodiversity (Simpson, 1949). To calculate SDI, both *Species Richness* and *Abundance* of a site must be measured. The formula to calculate SDI is as follows where n is the number of individuals of one species and N = the total number of all individuals:

$$\frac{D = 1 - \Sigma n(n-1)}{N(N-1)}$$

Worked example:

Species	Site 1			Site 2		
	n **(number of individuals)**	***n*** **- 1**	***n*** **(*n* - 1)**	***n*** **(number of individuals)**	***n*** **- 1**	***n*** **(*n* - 1)**
American Crow	12	11	132	6	5	30
Blue Jay	3	2	6	5	4	20
Northern Cardinal	4	3	12	2	1	2
American Goldfinch	10	9	90	15	14	210
House Sparrow	15	14	210	11	10	110

***N* (total number of individuals)**	44			39		
		Σ	450		Σ	372

For "Site 1": $D = 1 - \frac{450}{44*43}$ → $D = 1 - \frac{450}{1892}$ → $D = 1 - 0.237$ → **$D = 0.763$**

For "Site 2": $D = 1 - \frac{372}{39*38}$ → $D = 1 - \frac{372}{1482}$ → $D = 1 - 0.251$ → **$D = 0.749$**

One value of *D* does not tell us much about the biodiversity at a site. However, when compared among sites, two *D* values help tell a larger story. Here, we see that "Site 1" has a higher *D* value than "Site 2". Therefore, we can infer that "Site 1" is more biodiverse than "Site 2".

The **Shannon-Weiner Species Diversity Index** (SWSDI) was also employed to calculate and compare biodiversity between the experimental site and the control sites. The SWSDI calculates biodiversity by taking the total number of each species in the area, the proportion of each species to the total number of individuals, and sums the proportion multiplied by the natural log of the proportion for each species. The higher the number, the higher the species diversity. In the ideal situation, one should compare populations that are the same size in numbers of individuals (Nolan & Callahan, 2006). The formula to calculate SWSDI is as follows where (i) represents species, Σ is to "sum", ln is the 'natural log', and p_i is the proportion of the entire community made up of species (i).

$$H = -\Sigma p_i * ln(p_i)$$

Worked Example:

	Site 1				**Site 2**			
Species	Number (*i*)	p_i	$\ln(p_i)$	$p_i * \ln(p_i)$	Number (*i*)	p_i	$\ln(p_i)$	$p_i * \ln(p_i)$
American Crow	3	0.14286	-1.94591	-0.278	8	0.28571	-1.2528	-0.3579
Blue Jay	6	0.28571	-1.25276	-0.3579	4	0.14286	-1.9459	-0.278
Northern Cardinal	7	0.33333	-1.09861	-0.3662	5	0.17857	-1.7228	-0.3076
American Goldfinch	3	0.14286	-1.94591	-0.278	2	0.07143	-2.6391	-0.1885
House Sparrow	2	0.09524	-2.35138	-0.2239	9	0.32143	-1.135	-0.3648
Total	21			-1.5041	28			-1.4969
			H	1.5041			***H***	1.4969

Percent cover – or Relative Abundance – of plant cover at all sites was determined by first visually estimating the percentage of space that each plant species occupied within a $1m^2$ quadrat across all four sites. The estimated percentage was then converted to cm (1% = 1cm). Next, the sum of each plant species' coverage per transect was combined to provide each plant species' total coverage (cm) across the 10m transect. The total coverage (cm) was then divided by 10m and multiplied by 100 to provide a percentage. Plant species were then categorized into functional groups – trees, shrubs, forbs and grasses. The percentage cover of each functional group per site was then calculated.

RESULTS

Overall, BioBlitz participants made 182 observations and identified 99 unique species across the four study sites within the West Woodlawn Sustainable Square Mile (see, Appendix 1 for full inventory).

Among the 99 species observed across all four sites, the majority (80.9%) were plants. Insects accounted for approximately 17.3% of species and birds represented the remaining 2.7% (Figure 8).

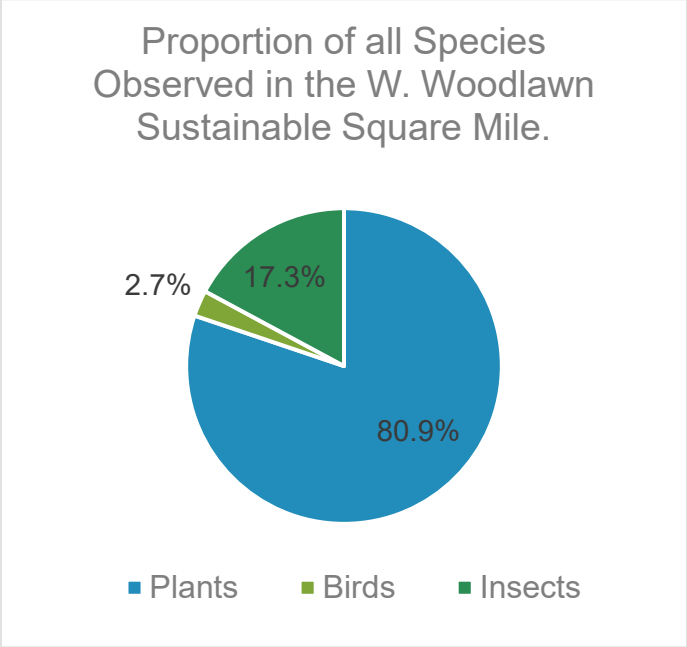


Figure 8: Proportion of all species observed across all four sites in the W. Woodlawn Sustainable Square Mile on June 17th, 2023.

When plant species were categorized into 'functional groups' (e.g., trees, shrubs, grasses and forbs – herbaceous broadleaf plants) across the four sites, the majority of plants were shown to be forbs (61.8%) (Figure 9). Trees were the second most commonly observed functional group, representing 19.1% of plants. Shrubs and grasses were nearly equally represented across sites, 8.9% and 6.7% respectively. Finally, succulents were rarely observed across the four sites (3.3%).

Among all four sites, the Memorial Garden had the greatest diversity of floristic cover (Table 1). The Memorial Garden was notable for having the greatest diversity of plant groups, including trees and shrubs. The Vacant Lot at 6357 S. Langley Ave was notable for its abundance of forbs. The other two vacant lots were dominated by turfgrass.

When compared using both the Simpson's Diversity Index and Shannon's Diversity Index, the

Memorial Garden was shown to have greater biodiversity than the Vacant Lots (Table 2).

Indeed, the number of plant species observed in the Memorial Garden (79) was over twice the number of plants species observed in the Vacant Lots (37).

Additionally, the number of insects species observed in the Memorial Garden (15) was over twice the number of insect species observed in the Vacant Lots (6). However, only one species of bird was observed at the Memorial Garden and the Vacant Lots (Figure 10).

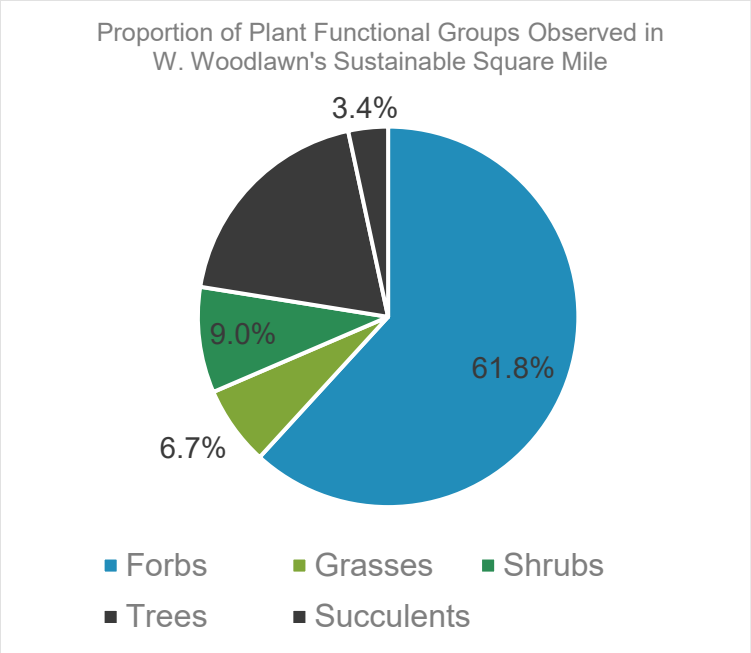


Figure 9: Proportion of plant functional groups observed across all four sites in the W. Woodlawn Sustainable Square Mile on June 17th, 2023.

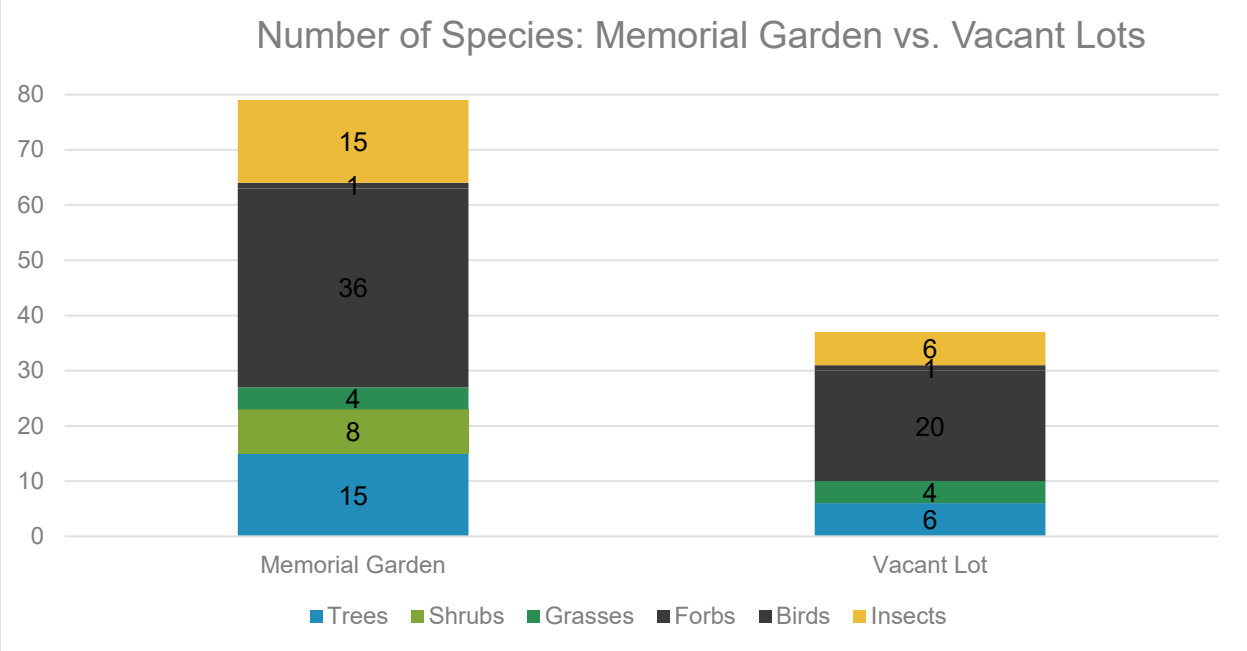


Figure 10: Comparison of the number of unique species observed among the Memorial Garden and the Vacant Lots on June 17th, 2023.

Table 2: Comparison of percent cover of plant functional groups among four sites in W. Woodlawn's Sustainable Square Mile.

Site	Functional Group	Cover
6354 S. St. Lawrence (Memorial Garden)	Shrub	20.30%
6354 S. St. Lawrence (Memorial Garden)	Forb	10.70%
6354 S. St. Lawrence (Memorial Garden)	Grass	37.00%
6354 S. St. Lawrence (Memorial Garden)	Tree	1.20%
6354 S. St. Lawrence (Memorial Garden)	No Plants/Mulch	30.80%
6425 S. Champlain (Vacant Lot)	Forb	22.90%
6425 S. Champlain (Vacant Lot)	Grass	77.10%
6450 S. Langley (Vacant Lot)	Forb	15.50%
6450 S. Langley (Vacant Lot)	Grass	84.50%
6357 S. Langley (Vacant Lot)	Forb	69.20%
6357 S. Langley (Vacant Lot)	Grass	30.80%

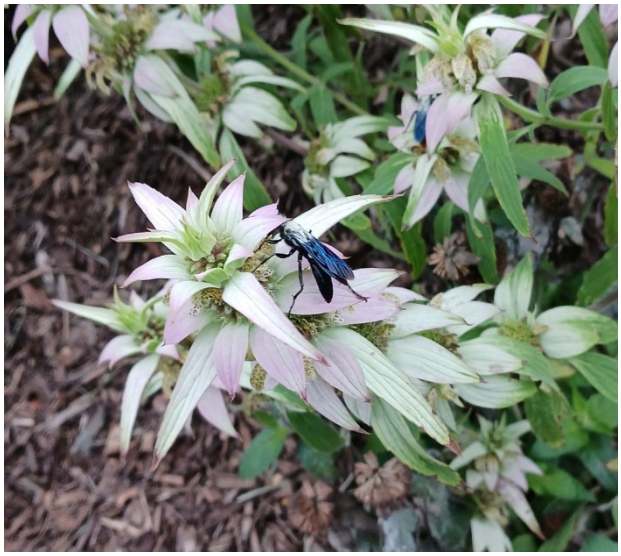
Table 3: Comparison of biodiversity among sites in W. Woodlawn's Sustainable Square Milet using two biodiversity indices.

	Mamie and Emmett Till Memorial Garden, 6354 S St Lawrence Ave	Vacant Lots
Simpson's Diversity Index	**0.97**	0.88
Shannon-Weiner Species Diversity Index	**3.81**	2.64

DISCUSSION

The Memorial Garden likely had greater biodiversity than the Vacant Lots due to the difference in management. The Memorial Garden is the result of intentional planning, planting and maintenance. On the other hand, regular mowing may be the extent of management that occurs on the Vacant Lots. To be sure, many of the plant species observed in the Memorial Garden were non-native, which may or may not have an effect on the efficacy of GI. However, at present, the project team is not assessing the effects of native vs non-native plants on GI.

The Memorial Garden's plant biodiversity may help explain the notable difference in insect biodiversity of the sites (e.g., bees,



Great Black Digger Wasp (Sphex pensylvanicus) observed in the Memorial Garden, June 17th, 2023.

macroinvertebrates, and spiders). For example, the project team observed mostly ants and spiders in the insect traps deployed at the Vacant Lots. In fact, no flying pollinators were observed by BioBlitz participants at the Vacant Lots. However, insect traps and visual surveys revealed a greater diversity of insect species at the Memorial Garden, such as Great Black Digger Wasps (Figure 11), Bumble Bees, Clubbed Mydas Flies and Carolina Mantises (Figure 12).

Carolina Mantis (Stagmomantis Carolina) observed in the Memorial Garden, June 17th, 2023.

Beyond an enhanced diversity of plant species, BioBlitz participants observed the Memorial Garden to have a wider range of plant heights and biomass than the Vacant Lot. It should be noted that plant heights and biomass were not empirically measured. These observations may be in line with prior research of urban biodiversity, which suggest that insect abundance may be driven by greater habitat availability, floristic abundance, height and biomass (Parker et al., 2020).

Despite having lower biodiversity overall, the project team was surprised by the diversity of plant species – including native species – observed in the vacant lots. For example, horseweed, blue violets, and soapworts (Figure 12) were commonly observed in the vacant lots. The presence of these native plant species suggests spontaneous succession has taken place during the lots' history. The fact that somewhat diverse vegetation can develop naturally in vacant lots suggests that lots can also be valuable habitat in urban settings.

Soapwort (Saponaria officinalis) observed in a vacant lot within the W. Woodlawn Sustainable Square Mile, June 17th, 2023.

At this time, it is not possible for the project team to compare the provisioning of ecosystem services between the Memorial Garden and the Vacant Lots. However, given the vegetative cover of both sites, it follows that both types of land use produce oxygen, provide habitat for organisms, sequester atmospheric carbon, capture stormwater runoff, and reduce urban heat island effects to some degree. Therefore, it is essential that even vacant lots be managed similarly to community gardens, parks and natural spaces.

LESSONS LEARNED

Site Access and Acquisition

At this stage in the project, site access and acquisition have proven to be major barriers preventing the collection of baseline and post-intervention data on the effects of GI on local biodiversity, hydrologic and community co-benefits. Bureaucratic processes and political reshuffling have slowed progress. However, the project team has taken advantage of this time to develop strong relationships with crucial community groups and develop monitoring and evaluation standards.

Convening with other nonprofits and community organizations performing similar research has led the project team to prioritize standardization of assessment tools. This will ensure that data collection will be technically sound, easily replicable, and inclusive of community priorities.

Additional Outreach

While turnout was relatively good (approximately 30 participants), it is imperative to reach as many community members as possible, especially young people, for civic-science events. Prior to the BioBlitz, the project team engaged with the following groups to ensure a variety of expertise and priorities were represented:

- Neighborhood schools: Burke Elementary, Carter School of Excellence, and UChicago Charter School – Woodlawn Campus.
- Community organizations: Eden Place Nature Center, South Merrill Community Garden, Garden Resources of Woodlawn (GROW), Central South Shore Area Council, Chicago Wilderness, Blacks in Green, Faith in Place, South Shore Works, the Community Benefits Agreement for the area around the Obama Center, Alliance for the South East, Neighbors for Environmental Justice (N4EJ), Washington Park Camera Club, Chicago Public Library Coleman and South Shore branches, Family Focus South Shore, Chicago Youth Center - South Shore (Rebecca K. Crown Youth Center), Gary Comer Youth Center, Project Exploration, Chicago Youth Program and Space to Grow.
- Relevant research institutions: Cook County Master Naturalists, Openlands, Chicago Botanic Garden's Negaunee Institute for Plant Conservation Science and Action, the Field Museum's Keller Science Action Center, the Illinois Natural History Survey's Urban Biotic Assessment Program, the Forest Preserve District of Cook County, Northwestern University's Plant Biology and Conservation Department, the University of Chicago's Environmental Community, the US Environmental Protection Agency, US Fish & Wildlife, Chicago Audubon Society, Chicago Ornithological Society, Peggy Notebaert Nature Museum's Community Science program, Chicago State University's Calumet Environmental Resource Center, Chicago Herpetological Society, Lincoln Park Zoo, Chicago Zoological Society and the Shedd Aquarium.

Of these 41 groups, 9 were successfully engaged in further discussions and information sharing: Burke Elementary, Carter School of Excellence, UChicago Charter School – Woodlawn Campus, Chicago Botanic Garden, Chicago Audubon Society, Chicago Ornithological Society, Garden Resources of Woodlawn (GROW), Chicago Wilderness, South Shore Works, Cook

County Master Naturalists, and the Chicago Zoological Society.

Data Collection

While iNaturalist is a free and easy-to-use smartphone application, it may require substantial time for participants to download and install on their smartphones. Therefore, the project team suggests ensuring an additional 30-minutes are reserved before the BioBlitz kickoff to address these technological realities. When planning future BioBlitz events, teams would also do well to have several volunteers on hand that are familiar with iNaturalist to assist new users.

Additionally, iNaturalist provides recommendations of species identification based on crowdsourced data and user input. For this reason, and that many BioBlitz participants are not trained ecologists, identification of species during the BioBlitz may not be completely accurate. To remedy this, the project team recommends securing several local experts to assist with species identification during future BioBlitz events. The project team also recommends double-checking and amending, if need be, species identifications that were made during the BioBlitz after the event using the iNaturalist web platform.

Data collection itself is time intensive and requires careful coordination among BioBlitz participants. Volunteer participants of the W. Woodlawn Sustainable Square Mile BioBlitz were only able to perform visual surveys on two out of the four lots before a community lunch was scheduled. The project team then performed the remaining surveys throughout the day. Therefore, the project team has identified a need to extend the timeframe of future BioBlitz events from 2 hours to 4 hours, with regularly scheduled breaks.

Beyond species richness, abundance and percent cover, measurements of biomass, plant heights and floristic abundance should be included in measurements during future BioBlitz events. These measurements may help explain differences in insect, mammal and bird communities among sites.

Finally, the project team has identified the need to collect information on each site's history to better infer observations from the BioBlitz. For example, without knowledge of a site's soil substrate (e.g., texture, water holding capacity) or management history (e.g., mowing, watering), it is difficult to suggest reasons for differences of plant community succession among the sites. While the plant communities observed in the Vacant Lots here were largely similar, there may be nuanced differences among sites below the surface, with possible ramifications to GI implementation.

NEXT STEPS

The project team will perform outreach and distribute this BioBlitz summary, as well as any raw data, with community members in W. Woodlawn and project partners. The project team also seeks to organize and host an additional BioBlitz event in the South Shore neighborhood in accordance with Delta's community partners and future scopes of work. In future assessments of the effect of GI installations on biodiversity, more data may be collected on sites such as soil characteristics, management history, vegetation heights and biomass. Additionally, it may prove valuable to assess the presence/absence of native vegetation in vacant lots.

Standardization of methodology is crucial for measurements of biodiversity to be replicable and for data to be useful across sites. The project team will seek the expertise of local ecologists to create more standardized data collection and analysis methodology to be used in future BioBlitz events.

In partnership with Emerald South Economic Development Collaborative, Blacks in Green and South Merrill Community Garden, Delta is preparing for GI installation on two sites identified in the Woodlawn (6400 S Champlain) and South Shore (7038 S Paxton) communities. Delta is currently working with partners to develop a community-led site visioning and design process for both locations. Additionally, Delta and other Resilient by Nature grantees have been developing standard metrics and tools to align evaluation of environmental, economic, health and biodiversity impacts from GI. This has resulted in a white paper published by Northwestern University researchers that investigates the efficacy of standardizing stormwater monitoring instrumentation on urban-scale GI projects, as well as the formation and facilitation of an Aligning Community Evaluation Working Group.

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APPENDIX

Table 3: Inventory of all species identified during the BioBlitz on June 17th, 2023, among four sites in the W. Woodlawn Sustainable Square Mile: the Mamie and Emmett Till Memorial Garden and the three Vacant Lots

Site	Scientific Name	Common Name	Functional Group
Vacant Lot	*Trifolium pratense*	Red Clover	Forb
Vacant Lot	*Hibiscus moscheutos*	Swamp Rose Mallow	Forb
Vacant Lot	*Ambrosia trifida*	Ragweed	Forb
Vacant Lot	*Carex blanda*	Eastern Woodland Sedge	Grass
Memorial Garden	*Carex blanda*	Eastern Woodland Sedge	Grass
Memorial Garden	*Trifolium pratense*	Red Clover	Forb
Memorial Garden	*Melissa officinalis*	lemon balm	Forb
Memorial Garden	*Solidago canadensis*	Canada Goldenrod	Forb
Memorial Garden	*Poa pratensis*	Kentucky Bluegrass	Grass
Memorial Garden	*Linum perenne*	Blue Flax	Forb
Memorial Garden	*Salvia nemorosa*	Purple Wood Sage	Shrub
Memorial Garden	*Amorpha fruticosa*	false indigo bush	Shrub
Memorial Garden	*Acer palmatum*	Japanese maple	Tree
Vacant Lot	*Ulmus pumila*	Siberian elm	Tree
Vacant Lot	*Taraxacum officinale*	common dandelion	Forb
Memorial Garden	*Taraxacum officinale*	common dandelion	Forb
Memorial Garden	*Trifolium repens*	white clover	Forb
Memorial Garden	*Hydrangea macrophylla*	mophead hydrangea	Shrub
Vacant Lot	*Brachymyrmex depilis*	Hairless Rover Ant	Insect
Vacant Lot	*Gymnocladus dioicus*	Kentucky coffeetree	Tree
Vacant Lot	*Jikradia olitoria*	Coppery Leafhopper	Insect
Vacant Lot	*Plantago lanceolata*	ribwort plantain	Forb
Vacant Lot	*Erigeron canadensis*	horseweed	Forb
Vacant Lot	*Viola sororia*	common blue violet	Forb
Vacant Lot	*Lasius neoniger*	Turfgrass Ant	Insect
Vacant Lot	*Malva neglecta*	dwarf mallow	Forb
Vacant Lot	*Chaetura pelagica*	Chimney Swift	Bird
Vacant Lot	*Medicago lupulina*	Black Medick	Forb
Vacant Lot	*Bromus hordeaceus*	common soft brome	Grass
Vacant Lot	*Tragopogon dubius*	Yellow Salsify	Forb
Vacant Lot	*Sonchus asper*	prickly sowthistle	Forb

Vacant Lot	*Bromus tectorum*	Cheatgrass	Grass
Vacant Lot	*Arctium minus*	lesser burdock	Forb
Vacant Lot	*Diplotaxis muralis*	annual wall-rocket	Forb
Vacant Lot	*Arenaria serpyllifolia*	Thyme-leaved Sandwort	Forb
Vacant Lot	*Sporobolus heterolepis*	prairie dropseed	Forb
Vacant Lot	*Erigeron philadelphicus*	Philadelphia fleabane	Forb
Vacant Lot	*Morus rubra*	red mulberry	Tree
Vacant Lot	*Acer saccharinum*	silver maple	Tree
Memorial Garden	*Attulus fasciger*	Asiatic Wall Jumping Spider	Arachnid
Memorial Garden	*Dysdera crocata*	Woodlouse Spider	Arachnid
Memorial Garden	*Bombus bimaculatus*	Two-spotted Bumble Bee	Insect
Memorial Garden	*Armadillidium vulgare*	Common Pill Woodlouse	Insect
Memorial Garden	*Tutelina elegans*	Thin-spined Jumping Spider	Arachnid
Memorial Garden	*Larinioides cornutus*	Furrow Orbweaver	Arachnid
Memorial Garden	*Trochosa ruricola*	Rustic Wolf Spider	Arachnid
Memorial Garden	*Oxidus gracilis*	Greenhouse Millipede	Insect
Memorial Garden	*Leucojum aestivum*	Summer snowflake	Forb
Memorial Garden	*Ribes hirtellum*	Smooth Gooseberry	Shrub
Memorial Garden	*Tilia americana*	basswood	Tree
Memorial Garden	*Larinioides cornutus*	Furrow Orb-weaver	Arachnid
Vacant Lot	*Melilotus officinalis*	Yellow Sweetclover	Forb
Memorial Garden	*Monarda fistulosa*	wild bergamot	Forb
Memorial Garden	*Pieris rapae*	Cabbage White	Insect
Memorial Garden	*Lonicera tatarica*	Tatarian honeysuckle	Shrub
Memorial Garden	*Penstemon hirsutus*	hairy beardtongue	Forb
Memorial Garden	*Proserpinaca palustris*	marsh mermaidweed	Forb
Vacant Lot	*Hylotelephium telephium*	Orpine	Succulent
Memorial Garden	*Achillea filipendulina*	Fern-leaf Yarrow	Forb
Memorial Garden	*Coreopsis grandiflora*	Largeflower Tickseed	Forb
Memorial Garden	*Liatris pycnostachya*	Prairie Blazing Star	Forb
Memorial Garden	*Ailanthus altissima*	Tree of Heaven	Tree
Memorial Garden	*Cichorium intybus*	chicory	Forb
Vacant Lot	*Cichorium intybus*	chicory	Forb
Vacant Lot	*Elymus repens*	Quack Grass	Grass

Vacant Lot	*Proserpinaca palustris*	marsh mermaidweed	Forb
Vacant Lot	*Amphimallon majale*	European Chafer	Insect
Vacant Lot	*Trochosa ruricola*	Rustic Wolf Spider	Arachnid
Vacant Lot	*Araneus pegnia*	Butterfly Orbweaver	Arachnid
Memorial Garden	*Accipiter cooperii*	Cooper's Hawk	Bird
Memorial Garden	*Liquidambar styraciflua*	American sweetgum	Tree
Memorial Garden	*Lobelia siphilitica*	great blue lobelia	Forb
Memorial Garden	*Coreopsis verticillata*	Whorled Coreopsis	Forb
Memorial Garden	*Echinacea purpurea*	purple coneflower	Forb
Memorial Garden	*Bombus griseocollis*	Brown-belted Bumble Bee	Insect
Memorial Garden	*Liatris aspera*	rough blazing star	Forb
Memorial Garden	*Cornus racemosa*	gray dogwood	Tree
Memorial Garden	*Prunus serotina*	Black Cherry	Tree
Memorial Garden	*Stagmomantis carolina*	Carolina Mantis	Insect
Memorial Garden	*Lamium maculatum*	Spotted deadnettle	Forb
Memorial Garden	*Phedimus spurius*	Caucasian Stonecrop	Succulent
Memorial Garden	*Buxus sempervirens*	common box	Tree
Memorial Garden	*Nepeta cataria*	Catnip	Forb
Memorial Garden	*Hemerocallis fulva*	orange day-lily	Forb
Memorial Garden	*Thuja occidentalis*	northern whitecedar	Tree
Memorial Garden	*Hosta sieboldii*	Small-leaved Plantain Lily	Forb
Memorial Garden	*Geranium macrorrhizum*	Rock Crane's-bill	Forb
Memorial Garden	*Phlox paniculata*	fall phlox	Forb
Memorial Garden	*Coprosma linariifolia*	Yellow wood	Tree
Memorial Garden	*Panicum capillare*	witch grass	Grass
Memorial Garden	*Rudbeckia hirta*	black-eyed Susan	Forb
Memorial Garden	*Alnus glutinosa*	European alder	Tree
Memorial Garden	*Lobelia cardinalis*	cardinal flower	Forb
Memorial Garden	*Clethra alnifolia*	Sweet Pepperbush	Shrub
Memorial Garden	*Juniperus virginiana*	eastern redcedar	Tree
Memorial Garden	*Monarda punctata*	spotted horse mint	Forb
Memorial Garden	*Quercus bicolor*	swamp white oak	Tree
Memorial Garden	*Stachys byzantina*	woolly hedgenettle	Forb
Memorial Garden	*Begonia heracleifolia*	Star Begonia	Forb
Memorial Garden	*Agastache foeniculum*	anise hyssop	Forb
Memorial Garden	*Solanum nigrum*	black nightshade	Forb

Memorial Garden	*Diervilla lonicera*	northern bush honeysuckle	Shrub
Memorial Garden	*Rumex obtusifolius*	broad-leaved dock	Forb
Memorial Garden	*Mydas clavatus*	Clubbed Mydas Fly	Insect
Memorial Garden	*Amelanchier arborea*	common serviceberry	Shrub
Memorial Garden	*Phedimus kamtschaticus*	Kamchatka Stonecrop	Succulent
Memorial Garden	*Viola Ã— wittrockiana*	garden pansy	Forb
Memorial Garden	*Sphex pensylvanicus*	Great Black Digger Wasp	Insect
Memorial Garden	*Asclepias syriaca*	common milkweed	Forb
Memorial Garden	*Glechoma hederacea*	ground-ivy	Forb
Memorial Garden	*Miscanthus sinensis*	Chinese silver grass	Grass
Memorial Garden	*Quercus macrocarpa*	bur oak	Tree
Memorial Garden	*Ulmus americana*	American elm	Tree
Memorial Garden	*Penstemon digitalis*	foxglove beardtongue	Forb
Memorial Garden	*Acer saccharinum*	silver maple	Tree
Vacant Lot	*Ulmus americana*	American elm	Tree
Vacant Lot	*Saponaria officinalis*	common soapwort	Forb
Vacant Lot	*Fraxinus pennsylvanica*	green ash	Tree