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Using Ecorevelatory Design and Landscape Biography to Promote Ecological Literacy in Menomonee Valley, Milwaukee, WI, USA

Menomonee Valley in Milwaukee, Wisconsin, USA, has undergone a remarkable transformation from a defunct brownfield site into a vibrant landscape of community parks within a revitalized industrial corridor. This change was driven by ecological restoration, stormwater management, and renewed connections to the Menomonee River. Central to this transformation was the use of ecorevelatory design, which draws on historical narratives and site-specific stories to highlight the presence and importance of more-than-human elements such as water, vegetation, and wildlife. To assess how contemporary users engage with these ecological features, the study employed stakeholder interviews, intercept surveys, and site observations. These methods explored whether visitors recognize and connect with the ecological systems embedded in the landscape. Survey data were used to evaluate ecological literacy, offering insights into how design and storytelling can foster meaningful relationships between human and more-than-human communities. The Urban Ecology Center, located adjacent to the site, plays a pivotal role in bridging these relationships through education and stewardship. This study demonstrates that ecorevelatory design can be a powerful tool in cultivating ecological awareness and care, helping communities move toward a more holistic understanding of landscape. Menomonee Valley is emerging as a model for integrated urban ecology and sustainability; where people care for one another and the broader environment as part of a shared system.

Keywords

Post-Industrial Landscape, Systems-based thinking, Urban Ecology, System Relationships, Sustainable Systems, More-than-human

Acknowledgements

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1.0 INTRODUCTION

Within the dogma of contemporary Western culture, humans continue to impact and change the flow of ecosystems with a dominant or controlling perspective that often puts humans as separate or distinct from the ecosystem. Humans have a dominant role on the land, as compared to more-than-human[1] elements – fish, plants, water, and wildlife. They are often seen with a sense of human hierarchical superiority over more-than-human elements. The more that more-than-humans are a part of the design process and realm of care, the better the relationship and health of both human and more-than-human systems.

This study suggests a methodology that considers the intersection of landscape biography (Kolen et al. 2017), ecorevelatory design (Helphand and Melnick 1998), and user evaluation (Gehl and Svarre 2013) to examine a post-industrial site with a holistic approach. Through this novel approach when all three methods are used together, site history, design goals and implementation, and current site users all see this site as a large, continuous system instead of the current moment in time. It is also critical that each component consider both human and more-than-human elements. As humans, it is essential that we find ways to help more-than-human elements within a system; we can help repair the damage we have done in the past and build a more holistic relationship for all elements. This methodology allows us to consider human and more-than-human elements of a landscape and better understand relationships between elements of the space.

1.1 Landscape biography

A biography is conventionally defined as the telling of story about a person (Oxford University Press 2025). Research about that person is compiled and then relayed through another person's perspectives. Typically, it starts at one point in time and reflects on the change that has occurred in their life up to another point in time. However, Jan Kolen (1995) describes how if one expands the subject beyond a specific person, one can start to create a "cultural biography." Kolen defines a "cultural biography" as the history of goods within society that change meaning and form to fit people's attitudes (Kolen 1995). Marwyn Samuels first transferred the biography language to a landscape to explain that humans cannot separate themselves from the land in understanding histories today (Samuels 1979). Kolen, Hans Renes, and Koos Bosma have furthered the conversation, defining how landscape biography has become a method of landscape research (Kolen et al. 2017).

A landscape biography explores the change in a landscape from past to present to future (Kolen et al. 2017). This entails focusing on two points in time or a specific period and how the system's functions change from one point to another, articulating how human action or inaction has altered interactions and modified the functions of the system. Kolen and colleagues incorporate the complexity of culture, social, and economic factors that have caused changes in the interactions and resulted in new landscape functions (Kolen et al. 2017). This approach

[1] More-than-human references non-human entities (Castree et al. 2013) and is a way to acknowledge the influence and responsiveness of these ecological elements. It seeks to challenge anthropocentric perspectives by reintegrating humans within broader ecological systems (Tran et al. 2024).

grounds human perception of the landscape and explains why there were changes to the physical landscape and system interactions.

Landscape biography offers a framework for understanding how systems evolve over time through the interplay of cultural history and ecological processes. It integrates historical cultural activities with ecological health and cycles, emphasizing that landscapes are not static but dynamic entities shaped by both human and more-than-human forces. This perspective examines how system cycles – such as hydrological patterns, vegetation succession, and social practices – shift in response to cultural, social, and economic events. These changes illustrate the profound influence of human actions on ecological systems and the reciprocal transformations that occur within the environment (see Figure 1). However, these interactions are highly complex and often difficult to fully interpret within the context of place and time. The dynamic nature of these cycles means that interventions can have uneven effects: one system may experience ecological benefits, while another may suffer significant decline. By tracing these patterns across temporal and spatial scales, landscape biography provides a lens for evaluating the resilience and vulnerability of coupled human-natural systems, revealing how historical decisions continue to shape present and future ecological conditions.

Tying together the methodology of landscape biography, the addition of cultural, social, and economic factors explains why changes in the system occur. They can include the reintroduction of elements into the ecosystem, representing positive interventions. Ultimately, the impact of these perceptions will differ based on the authorship of the narrative.

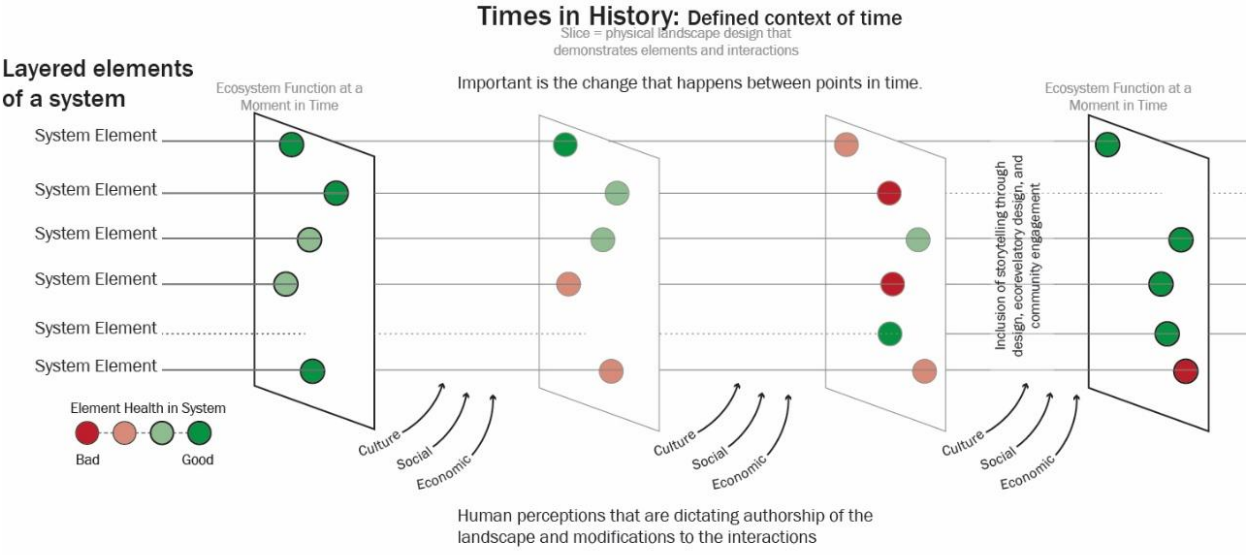

Figure 1 – **Systems-based design**: Using Reason's (1990) understanding of system error, it was applied to the landscape to show the change over time to help visualize how the landscape system changes.

1.2 Ecorevelatory Design

When applied to the latest design intervention of present-day Menomonee Valley Community Park, ecorevelatory design focuses on how designs can "make the invisible visible" and bring more-than-human elements to the forefront of the design (Helphand and Melnick 1998). It is a form of design practice emphasizing the restoration and repair of more-than-human elements of a system. By bringing ecological systems to the forefront of the design, the physical connection between humans and more-than-humans becomes increasingly more evident. This creates a knowledge and visible relationship for humans about more-than-humans that was not noticeable when the ecological system was buried.

Making environmental systems such as stormwater flows and plant systems visible within the landscape serves multiple purposes, including enhancing ecological function and fostering awareness of more-than-human elements. Ecorevelatory design emphasizes the dynamic movement of these systems by showcasing processes and change rather than presenting a static moment in time. Through this approach, the design reveals how stormwater moves across a site and how plant communities interact and evolve, gradually reshaping the landscape. These changes are not immediately apparent; they require time and observation for people to notice patterns and recognize the underlying causes. By making these processes legible, ecorevelatory design transforms the landscape into an educational and experiential space, encouraging site users to engage with ecological cycles and recognize their role within a broader system of interdependent relationships.

It is theorized that this design strategy can lead to ecological literacy or human understanding of more-than-human elements in the system and their crucial roles in the landscape (Orr 1992). Landscapes can act as a communication device; describing what people see influences what they believe belongs in the landscape (Nassauer 2012). Through this approach, it is imperative to examine how people live with the land where human ideals are not the center of the design (Higgs 2003). Ecological literacy results from people wondering, connecting, engaging, contextualizing, and recognizing the existence of more-than-human elements in the system and more-than-human interactions within the larger ecosystem in which we participate (Boehnert 2012). Design can intentionally reveal those ecological systems while still aligning them with cultural norms of the community (Nassauer 2012).

In August of 1997, University of Illinois faculty launched the *Eco-Love* lecture series and an exhibit of invited work from interdisciplinary professionals that considered the importance of revealing the "ecological" elements of the landscape (Brown et al. 1998). This is a practice that is interdisciplinary and meant to be seen by the public; it is done with the intention of science, art, design, and community participation being at the forefront of the design and meant to be understood by people. Ecorevelatory design has been criticized for being too theoretical and not practical, with cues to sustainable landscapes or ways to connect with ecological education (Arisoy 2013; Eisenstein 2001). However, Joan Nassauer provided a "cues to care" predecessor that attempted to bring ecological education into design (Nassauer 1995). This argument considered how people infer ecological quality from what landscapes look like instead of how the systems function (Nassauer 1992). If the ecological function is invisible or aesthetically confusing, public support for the space is lessened. This connects with Beth Meyer's manifesto

(2008) that says we cannot ignore the aesthetics of design. The aesthetics are what connect people to a space. Therefore, it is critical to have both aesthetics and function in the design. Nassauer later reflected that "cues to care" was not enough and that ecological literacy was necessary at the forefront of the design to create a paradigm shift (Nassauer 2020). Ecorevelatory design focuses on the land's more-than-human elements but also on how human elements interact and understand more-than-human elements; it brings together the aesthetics and function to create education and change.

1.3 User evaluation

User evaluation in this study is a form of post-occupancy evaluation that focuses on human interaction within a landscape and with more-than-human elements. The user evaluation recognizes the attempts designers have made to understand a holistic story and narrative of the landscape. By seeing the goals and intentions of the designers and measuring the impact and understanding of those features by the site users, we could understand if the holistic message reached the intended audience.

User evaluation has been used throughout time in different formats. William Whyte, Clare Cooper Marcus, Jan Gehl, and the Landscape Architecture Foundation Landscape Performance Series serves as a starting point in understanding how people move within a landscape (Whyte 1980; Marcus and Francis 1998; Gehl and Svarre 2013). This project included intercept surveys and site observation to evaluate human experience. By focusing the questions on the holistic landscape, we can better understand how people are relating to and understand more-than-human elements of the landscape. Ecorevelatory design and landscape biography are strategies for helping us understand how human and more-than-human elements relate, but there needs to be strategies visible to the general public, not just understood by engaged community members. User evaluation helps us understand how the general public perceive the landscape and if these strategies are successful in educating people about the landscape. The survey questions aimed to assess whether ecorevelatory design effectively fostered ecological literacy among site users. Additionally, questions explored place attachment, seeking to understand how individuals emotionally and cognitively connect to the landscape. This dual focus highlights the interplay between human and more-than-human elements, offering insight into whether design interventions actively shape these connections and contribute to stewardship behaviors.

1.4 Theory Conclusion

This research seeks to address the following questions:

1. How do human site users understand the landscape narratives?
2. Are site users ecologically literate and what about the design helps them better understand the system relationships?
3. What role has ecorevelatory design of the valley played in their system understanding?
4. How are people caring for or stewarding the land and more-than-human elements, and have human site users developed a holistic connection with the land?

The research examines narratives that can be revealed through design and identifies how people can and do connect with the landscape through design interventions. It assesses human understanding of these connections, the land, and systems through the development of ecological literacy. Storytelling through design concentrates on how past land narratives are seen in the land and how they helped shape the design that is present today and project the potential of tomorrow. The landscape biography reveals those narratives and how we can still see them in the landscape today. The land can be understood metaphorically as layers (e.g., history, soils, geology, site use, weather, etc.) built upon over time that reveal elements, interactions, and functions of the land's history (Heatherington 2011). These narratives often expose cultural practices and injustices that have occurred within and upon the land system (Spirn 2014). This history is measured through foundational practices in developing site literacy and by discovering whether people understand the land narratives and history displayed in present-day storytelling through design interventions. Ecorevelatory design focuses on the more-than-human elements of the system to push a stronger relationship between humans and more-than-humans. Community engagement and user experience creates an inclusive approach to design that helps build relationships between humans and more-than-human elements in the landscape. Relationality and community respect have been critical practices in Indigenous and ecofeminist theories through strategies of care (Haraway 2016; Whyte et al. 2018). Ultimately, community engagement can lead to place attachment, which focuses on relationships between elements in the system (Engelke and Rottle 2025). Place attachment is shown through care for the land, memories people hold of the land, and proenvironmental behaviors demonstrated by site users (Manzo and Devine-Wright 2012). The researcher hypothesizes that through each of these ways of knowing, humans can understand the system holistically and eventually shift the human-dominant perspectives of land to understandings that are more diverse and fluid.

2.0 METHODOLOGY

The integration of landscape biography, ecorevelatory design analysis, and user evaluation offers a comprehensive framework for understanding the complex, interrelated dynamics of landscape systems (Figure 2). This methodological synthesis supports systems-based thinking by foregrounding the interdependence of human and more-than-human elements within designed environments. It positions theory not merely as an abstract construct, but as a critical lens through which ecological literacy and ethical responsibility can be cultivated. Given the inherent anthropocentric bias in human perception, this approach challenges designers and researchers to expand their evaluative scope, incorporating more-than-human perspectives in meaningful and actionable ways. By doing so, it enables the revelation and celebration of the ecological roles, relationships, and functions that are often overlooked, thereby advancing more inclusive, resilient, and ethically grounded landscape practices. This study investigates human and more-than-human system relationships in a case study investigation of Menomonee Valley, Milwaukee, Wisconsin. The Menomonee Valley landscape, most recently known as Three Bridges Park and Menomonee Valley Stormwater Park, was designed and constructed in 2002–2013 but had a longer history and larger community than defined by its boundaries and construction timeline.

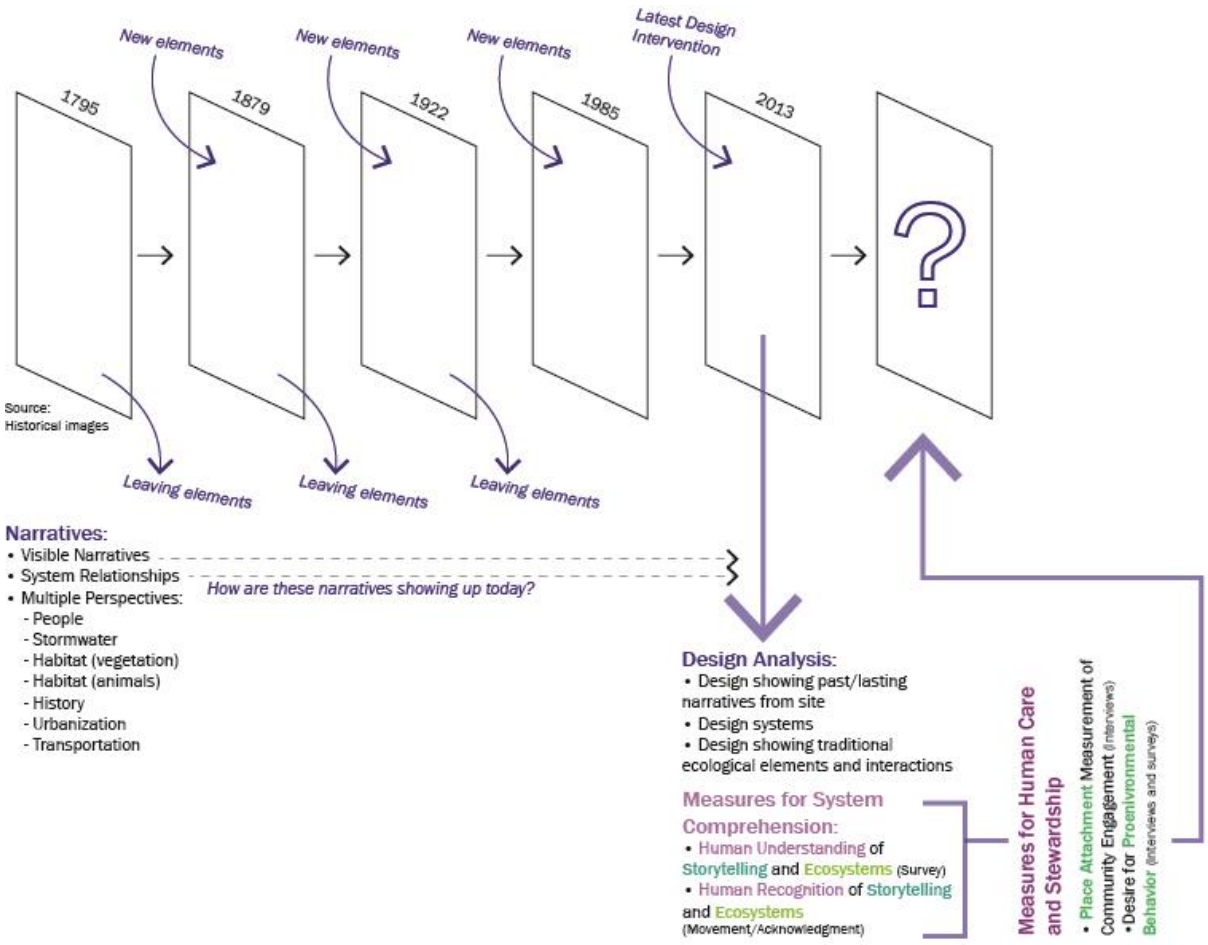

Figure 2 – **Methodology Map**: This graphic visually demonstrates how the methodology is framed and how it relates to the Menomonee Valley case study.

2.1 Landscape Biography

This landscape biography began with Indigenous population of the site, pre-1795, and went through present day to reveal through storytelling and diagramming the changes in the system elements over time. This method used historical images and narratives that were found about the site to analyze and deconstruct the landscape elements. Instead of considering the site as a whole, each element – human and more-than-human – was considered by the researcher from the element's perspective to understand the health of that element in that landscape during a moment in history. The question of whose history is important here to understand the ramifications that changes of element prominence have had on other elements. The narrative and images helped create a graphic to understand how the landscape elements have changed over time and how history and storytelling is apparent in the landscape today. Each historical image for the site was analyzed to see what elements were in the photograph and then compared to one another to see how those elements changed over time. Based on the image and text information about the landscape, they were graphed to show an increase or decline in the element. The knowledge of how the element fits into the landscape was then analyzed to determine if it was considered a healthy or unhealthy environment for that element.

2.2 Design Analysis

A design analysis included interviews with designers, stewards, and developers that produced evidence of how the design connects with historic narratives and seeks to improve human and more-than-human landscape systems. This analysis of ecorevelatory design within the site provided a context in which to view the current system structure.

Semi-structured interviews (Creswell 2009) were conducted with the design landscape architect (Wenk, personal communication, September 7, 2022), local landscape ecologist/landscape contractor (Marek, personal communication, August 19, 2022), the nonprofit center that manages programming and stewardship for the park (Sánchez, personal communication, August 23, 2022; Veglahn, personal communication, August 23, 2022), and the economic development nonprofit that spearheaded the redevelopment of the site (Zetts, personal communication, August 17, 2022). These interviews provided an understanding of the site history and its functional intervention goals, design elements, site ecology, the implementation of the design, and the communication and education of the public, which produced thematic analysis content and categories to qualitatively code the survey results. Each interview was 1-2 hours and evolved around a series of questions to understand each group's role in the park development and the park stewardship today. Themes of human and more-than-human were apparent in the interviews and used to code the survey results in large categories. Additionally, the history of plants, stormwater systems, salmon, cultural human divide from the interstate development, design competition process, and industrial history where things that came out in the interviews that also helped explain or reinforce the answers to questions people gave in the site user evaluation.

2.3 Site User Evaluation

This study conducted onsite observations and intercept surveys to determine how people use the space and the effectiveness of the system intervention.

Observations were recorded at differing times throughout the day and week over eight days in Summer; it was intentional to have weekday and weekend observations as well as morning, noon, and afternoon time slots. Observations occurred in selected spaces throughout the parks (Figure 3). The selected locations included both primary and secondary human paths to understand whether the areas provided different human responses to the landscape. Observation methods were modified from Gehl's Public Life Tools (Gehl n.d.; Gehl and Svarre 2013) to fit the site and focused on whether people recognized more-than-human elements or utilized pathways that encouraged more-than-human interactions.

Intercept surveys (Robson 2002) were used to gauge how general site users understood the systems and land history. In total, 49 surveys were distributed to site users over the age of 18 who were willing to participate in the survey. Surveys asked questions to determine whether people understood the landscape narratives, function, and more-than-human elements (appendix A). The survey tool also inquired if people had participated in educational or stewardship activities and why they chose to engage in them. Thematic qualitative analysis was conducted on the free-response questionnaire responses, based on the interviews and landscape design intent.

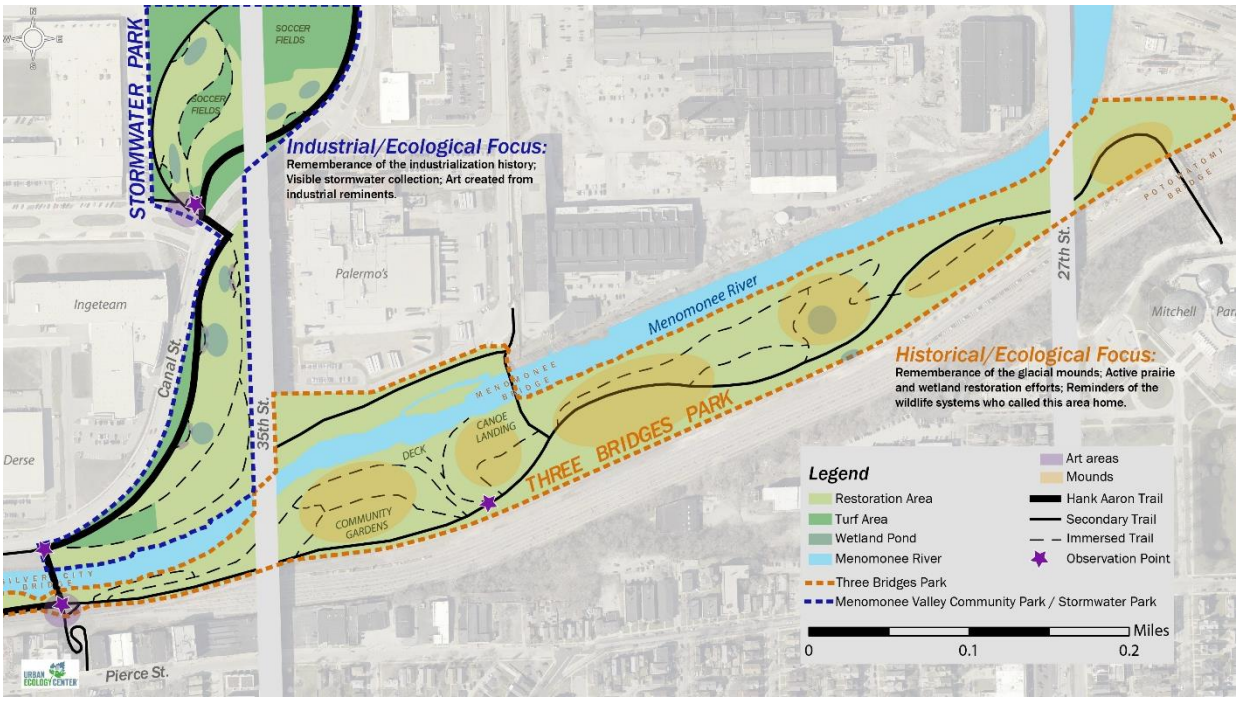

Figure 3 – **Menomonee River Valley Map**: Site map showing trails, restored areas, park boundaries, and observation points. Three bridges park highlights the ecological history of the site, while the stormwater park highlights more of the industrial and social history of the landscape.

3.0 RESULTS

3.1 Landscape Biography

3.1.1 Indigenous Stewardship and Ecological Foundations

The history of the present-day Menomonee Valley begins with the presence of Indigenous communities and glacially shaped landscapes. Tribes including the Fox, Ojibwa, Ottawa, Sauk, Winnebago, Mascouten, Potawatomi, and Menominee each inhabited the Menomonee River Watershed at various points in time (Menomonee Valley Partners 2022; Wisconsin Department of Natural Resources 2010). Prior to colonization, the region featured rolling hills and valleys formed by glacial activity. The soil profile consisted of silt-loam at the surface, with loamy and clay tills beneath.

The native vegetation included prairies, oak forests and savannas, and maple-basswood forests. Low-lying areas supported wet-mesic prairies, southern sedge meadows, emergent marshes, and calcareous fens (Wisconsin Department of Natural Resources 2010). Historically, the Menomonee Valley itself was a wild rice marsh, shaped by the river's seasonal flooding. This landscape was actively managed by Indigenous peoples, who cultivated wild rice and maintained ecological balance through reciprocal relationships with the land. The name "Menomonee" derives from the Algonquin word *menomin*, meaning "good grain" or "wild rice," reflecting this deep-rooted connection (Menomonee Valley Partners 2022).

3.1.2 Colonial Displacement and Industrial Emergence

Fur trading began in 1795 in what is now Mitchell Park, a Milwaukee County park that houses the Mitchell Park Domes and borders the easternmost edge of Three Bridges Park. Following Wisconsin's statehood in 1848, European colonization rapidly displaced Indigenous land uses. By 1849, industrial trade between European settlers and the Potawatomi people had begun in the Menomonee Valley (Menomonee Valley Partners 2022).

By 1879, heavy industrialization had transformed the valley. Land was filled to support factory construction, rivers were straightened to mitigate flooding, and canals were dug to accommodate shipping routes (Menomonee Valley Partners 2022). The Milwaukee Road Shops became a major hub for manufacturing rail cars and locomotives for the Chicago, Milwaukee, St. Paul, and Pacific lines (Wisconsin Department of Natural Resources 2009a). By 1922, it was the third-largest railcar producer in the United States (Wisconsin Department of Natural Resources and Menomonee Valley Partners 2013).

This industrial boom came at a steep environmental cost. Vegetation was cleared, soils were contaminated with petroleum and heavy metals, and the straightening of the river degraded water quality. Worker housing was built near factories, and the need for pedestrian access across rail lines and uneven terrain further constrained the land's ecological functions.

3.1.3 Environmental Degradation and Urban Expansion

The valley's industrial growth continued with the establishment of the Milwaukee Stockyards in 1929 (Sutherland 2004). At its peak, the stockyards processed hundreds of thousands of animals annually. While this bolstered the local economy, it also generated significant pollution. With no vegetation to filter runoff, untreated animal waste flowed directly into the Menomonee River.

In the 1960s, the river saw an influx of invasive alewife fish, which disrupted native fish populations and caused air quality issues due to mass die-offs along the shoreline (Billock 2019). In response, the Wisconsin DNR introduced Chinook and Coho salmon to control the alewife population. These salmon migrated to Lake Michigan and returned to the Menomonee River to spawn, reducing alewife numbers and introducing recreational fishing to the area.

Despite these efforts, water quality continued to decline due to runoff from cattle pastures, slaughterhouse waste, human sewage, and river damming (Wisconsin Department of Natural Resources 2010). By 1984, only eight fish species remained in the Milwaukee River, most of them invasive carp (Billock 2019). The Menomonee River joins the Milwaukee River approximately three miles downstream from Three Bridges Park.

3.1.4 Infrastructure, Segregation, and Social Impact

The construction of Interstate 94 in the late 1950s further altered the valley. Running along the Menomonee River, the highway increased vehicular traffic but also physically divided northern neighborhoods from the valley. Meanwhile, the railyards and river separated southern neighborhoods from industrial sites, limiting pedestrian access (Zetts 2021). Large bridges and

viaducts were built to span the valley, but these structures also became symbolic and physical barriers. Minority and underserved communities were often discouraged from crossing them, reinforcing racial segregation. It has taken decades for Milwaukee's Black communities to feel a sense of belonging in these spaces (Zetts 2021).

3.1.5 Collapse, Crisis, and Ecological Awakening

In 1985, the Milwaukee Road Shops declared bankruptcy, and the railyards closed (Wisconsin Department of Natural Resources 2009a). The abandoned sites left behind contaminated soils and continued runoff into the river. A major public health crisis followed in 1993 when over 403,000 Milwaukee residents fell ill and 69 died due to Cryptosporidium parvum contamination in the city's tap water (Gradus 2014). The outbreak disproportionately affected Milwaukee's south side, home to many historically disinvested minority communities and the Menomonee Valley Park (Zetts 2021). The park was a connection point people had to the water, but the access and condition of the site did not make for a welcoming or clean landscape. While the drinking water primarily comes from Lake Michigan, the outfall from tap water ends up in the Menomonee River from surrounding areas. This tragedy spurred a citywide effort to improve water quality, resulting in a $417 million investment. However, stormwater management in the Menomonee Valley did not begin until 1998 (Wisconsin Department of Natural Resources 2009b). This improvement sought to enhance the river water quality which also impacts the fish and food resources from the river.

3.1.6 Ecological Recovery and Community-Led Revitalization

Amid these challenges, signs of ecological recovery began to emerge. A 1994 fish study revealed a resurgence in biodiversity, with 40 fish species identified (Billock 2019). Beavers, otters, deer, and other wildlife also returned to the area, signaling a gradual restoration of habitat and ecological connectivity. However, vegetation and water quality still required significant improvement to fully support this renewed wildlife presence. Around this time in 1991, the Urban Ecology Center (UEC) formed in Milwaukee as a group of local residents coming together to clean up parks and teach ecology to nearby students. The organization opened its first center in 2004 in the Riverside Park neighborhood and a second center in the Washington Park neighborhood of Milwaukee. These UEC locations became hubs for promoting ecological education and environmental stewardship within the greater Milwaukee community.

Recognizing the intersection of environmental and public health, the 16th Street Community Health Clinic serving Milwaukee's south side advocated for a holistic approach to revitalization. In collaboration with the City of Milwaukee, the Menomonee Valley Business Association, and the Milwaukee Metropolitan Sewerage District, the clinic helped establish the Menomonee Valley Partners (MVP), a nonprofit public–private partnership dedicated to the valley's redevelopment (Menomonee Valley Partners 2022). Their mission emphasized job creation, open space, and clean water restoring not only the land but also the community's relationship with it.

In 2002, Menomonee Valley Partners (MVP) initiated a national design competition to guide the redevelopment of a 140-acre brownfield site. The process incorporated community input to align the project with local priorities, emphasizing job creation, sustainable design,

public access to natural and recreational spaces, and broad-based support for change (Sixteenth Street Community Health Center 2002).

The winning proposal, developed by Wenk Associates in collaboration with HNTB and Applied Ecological Services (AES), addressed these goals through a comprehensive plan. The design integrated a stormwater park capable of managing 100-year flood events, new light-industrial development that generated over 5,200 jobs, and more than seven miles of trails and open space (Landscape Architecture Foundation 2010; Menomonee Valley Partners 2022). It also acknowledged the site's cultural and ecological history, aiming to restore both social and ecological relationships.

Implementation required the removal of existing industrial structures, remediation of contaminated soils, and elevation of new development above the floodplain. Fill material from the Marquette Interchange project was repurposed to support site grading. Coordination among multiple agencies was essential including the Wisconsin DOT, DNR, and the City of Milwaukee's Redevelopment Authority. MVP led early phases of development, while the DOT oversaw construction of Three Bridges Park and negotiated with rail operators to maintain active lines through the site.

The Menomonee Valley Stormwater Park was completed in 2006, followed by continued industrial investment, including Palermo Pizza's relocation to the site. In 2013, the Menomonee River restoration and Three Bridges Park were completed. The UEC emerged with a third branch in 2012 that was established adjacent to the park, supporting ongoing community engagement and ecological stewardship (Milford 2022).

A timeline of ecological change (Figure 4) illustrates the decline and partial recovery of more-than-human systems, underscoring the role of design in urban ecological resilience.

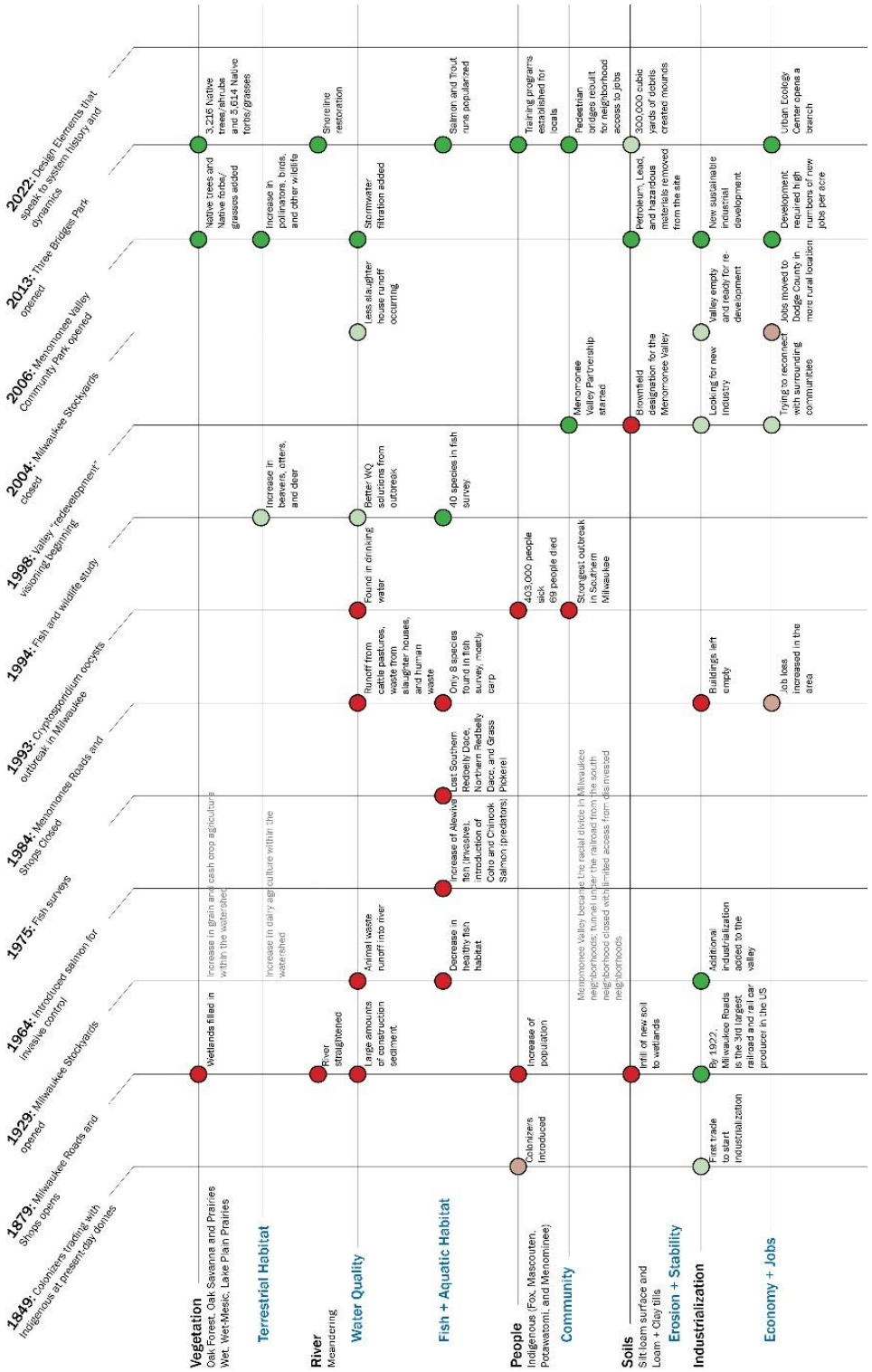

Figure 4 – **Landscape Biography Timeline**: Graphic timeline of Three Bridges Park and Menomonee Valley Community Park development. The graphic shows the relationship change major interventions had on various elements within the landscape

3.2 Ecorevelatory design analysis

The design team intentionally included design features that represented the historical narratives of the landscape. The glacial landscape, known for its hills and valleys, as well as the wild rice marsh and indigenous presence is the foundation of this environment. Those are ecological and cultural memories that are seen in the renewal of the landscape. The glacial landscape renewal was shown through the hills created in the Three Bridges Park design (see Figure 5A). The fill used to make the hills was the rubble from the Marquette interchange construction. While the landscape was not restored to its original wild rice marsh, native plants known to have grown in these local ecosystem types were planted to create biodiverse landscapes.

The next phase of this landscape was the transformation into industrialization. Being home to railroad, manufacturing, and industry, the landscape changed to the channelized river that is seen today and still has active manufacturing in the valley. The historical industrial memories of Menomonee Valley were seen in the original chimney stacks that stood in Menomonee Valley Stormwater Park. Over the years, the stacks became structurally compromised and were removed for safety reasons. In 2020, steel was used to "honor and celebrate the thousands of workers" who formerly worked for Milwaukee Road Shops (People of the Road 2020). The art sculpture, *People of the Road* (shown in Figure 5E) was created from historical photographs of people working at Milwaukee Road Shops. Picnic benches in the park were created from the former stockyards' wood by the only manufacturer left in the Valley, Falk Corporation, now Rexnord Corporation (see Figure 5B). The original bridge from 37th Street/Pierce Street across the Menomonee Valley was rebuilt to increase access to the site. The tunnel under the railyard was reopened to invite the neighborhood into the park and create a connection to the industry that is still a part of the site today. Another design element that helps tell the industrial story of Milwaukee is the recycled glass panels from Miller Brewing Company along the stormwater park (Landscape Architecture Foundation 2010), as shown in Figure 5D. Each of these panels demonstrates a more-than-human element of the landscape and encourages people to consider such elements in the system while still representing the industrial heritage of the city with Miller Brewing, the historic Milwaukee brewing and bottling industry less than two miles from the site.

To further reflect on the memories and community activity seen in the site today, Valley Passage, a mural, was painted by local artist Chad Brady in 2011. This mural visualized the landscape narratives of this land and nearby lands of Indigenous peoples, community neighbors (Silver City and immigrants), historical industrial workers (train workers), present-day industry (Harley Davidson), baseball legends (Hank Aaron), Wisconsin designers (Frank Lloyd Wright), and the UEC (see Figure 5C). It reflects connections to the Wisconsin State Fair Park, American Family Field (formerly Miller Park, home of the Milwaukee Brewers Baseball), and the Milwaukee Art Museum. The mural also includes more-than-human elements, with the fish, birds, and wildlife that call this land home. It weaves together human and more-than-human elements to illustrate a holistic landscape.

As seen in many locations, interpretive signs give more detail to those who wish to stop and learn about the land's story. Sign topics include historic industrial company headquarters, stormwater, wild rice farming, and Silver City among others. The adjacent neighborhood was named Silver City, since it was where workers would spend their earnings, silver dollars.

Through these layered interventions, the park becomes more than a recreational space; it is a living archive of glacial origins, industrial labor, and ecological resilience.

Figure 5 – **Landscape Design Features**: Nontraditional storytelling strategies on the site included: A) topography that mimicked the glacial mounds, B) picnic benches built by Falk Corporation with wood from the former Milwaukee Stockyards, C) Wisconsin-focused murals, D) more-than-human focused glass panels created from Miller Brewing Company glass, E) People of the Road sculptures depicting the former railyard history, F) artful rainwater capture from the viaduct, G) restored shorelines, H) a butterfly resting in the prairie, and I) a person running the immersed trails through the hills and restoration

3.3 Site User Evaluation

In reviewing the results from the intercept surveys, themes of human and more-than-human were dissected. Full results of the survey are found in Figure 6. Some significant responses to the work include the following.

To understand whether people recognized the historic narratives and storytelling through design, people were asked, "What is the history of the site?" Forty-seven percent of those asked did not know or gave no response. Of those who responded (n = 26), 50% mentioned something about the industrial history, often relating to the rail or transportation industry; 35% of respondents mentioned the brownfield and landfill site; 23% mentioned neighboring communities; 19% mentioned Indigenous Peoples; and 19% mentioned restored ecosystems (see Figure 6). This distribution of responses indicates that over 50% of people have some idea about the history of the site.

In considering site users' knowledge, people were asked whether a certain art or landscape element helped them better understand the landscape or ecosystem (past or present). Of those that responded (n = 33), 67% mentioned an element that was intentionally designed or preserved to consider historic narratives of the landscape. Furthermore, 55% of people cited more-than-human elements such as the river, nature, wetlands, wildlife, stargazing, and topography, demonstrating observations beyond a human-centric lens. Lastly, 33% of people mentioned local community, which speaks to the role the park plays within a larger system.

When people were asked, "What defines a healthy ecosystem here?" 68% of respondents (n = 44) talked about vegetation, biodiversity, or open space; 41% mentioned wildlife, including fish and insects; and 27% considered stewardship or sustainability in their response. Overall, 93% of respondents (n = 41) mentioned something about more-than-human elements, while 27% considered human elements. These responses suggest that people see more-than-human parts of the system and consider system relationships.

To understand how people relate to the land, they were asked, "Would you be interested in being a steward to help care for the landscape?" Fifty-seven percent of the respondents (n = 42) showed interest or were already participating as a steward. Of those who answered *yes* (n = 24), 42% indicated a desire to support the community or neighborhood, 25% talked about giving back and doing good for future generations, 25% said they wanted to help, and 21% spoke of a desire to care for the land.

Through observations, we can see where people go on the site and how they interact with more-than-human elements. The Hank Aaron Trail brings many people to the site and is a major bike route that runs through the site from the Waukesha/Milwaukee County border to downtown and Lake Michigan. It is named after the professional baseball player who spent his career with the Milwaukee Braves and Brewers and goes past American Family Field, the Milwaukee Brewers' stadium. American Family Field is approximately one mile from the UEC. Thirty-two percent of bikers and 7% of pedestrians stuck to the traditional Hank Aaron Trail, while 68% of bikers and 93% of pedestrians chose a secondary trail or immersed trail, as defined in Figure 3, that took them further into the park traversing hills and the restored prairie. The popularity of the secondary trail indicates that people wanted to explore the park more, not merely pass through

the site. Overall, 6% of visitors (combining pedestrians and bikers), including 17% of pedestrians, were found on off-the-beaten-path trails and had a more-than-human immersion. People were also observed to see whether they looked beyond the trails and connected with something else on the site. Thirty-two percent of people glanced at vegetation, the river, or another more-than-human element in the landscape. These points of attention suggest that the more-than-human elements are a connection people create when viewing site elements beyond the trail. Additionally, 3% of people observed art, while less than 1% noted signage, shelter, or picnic tables; these items may be more familiar to site users who visit the trail regularly.

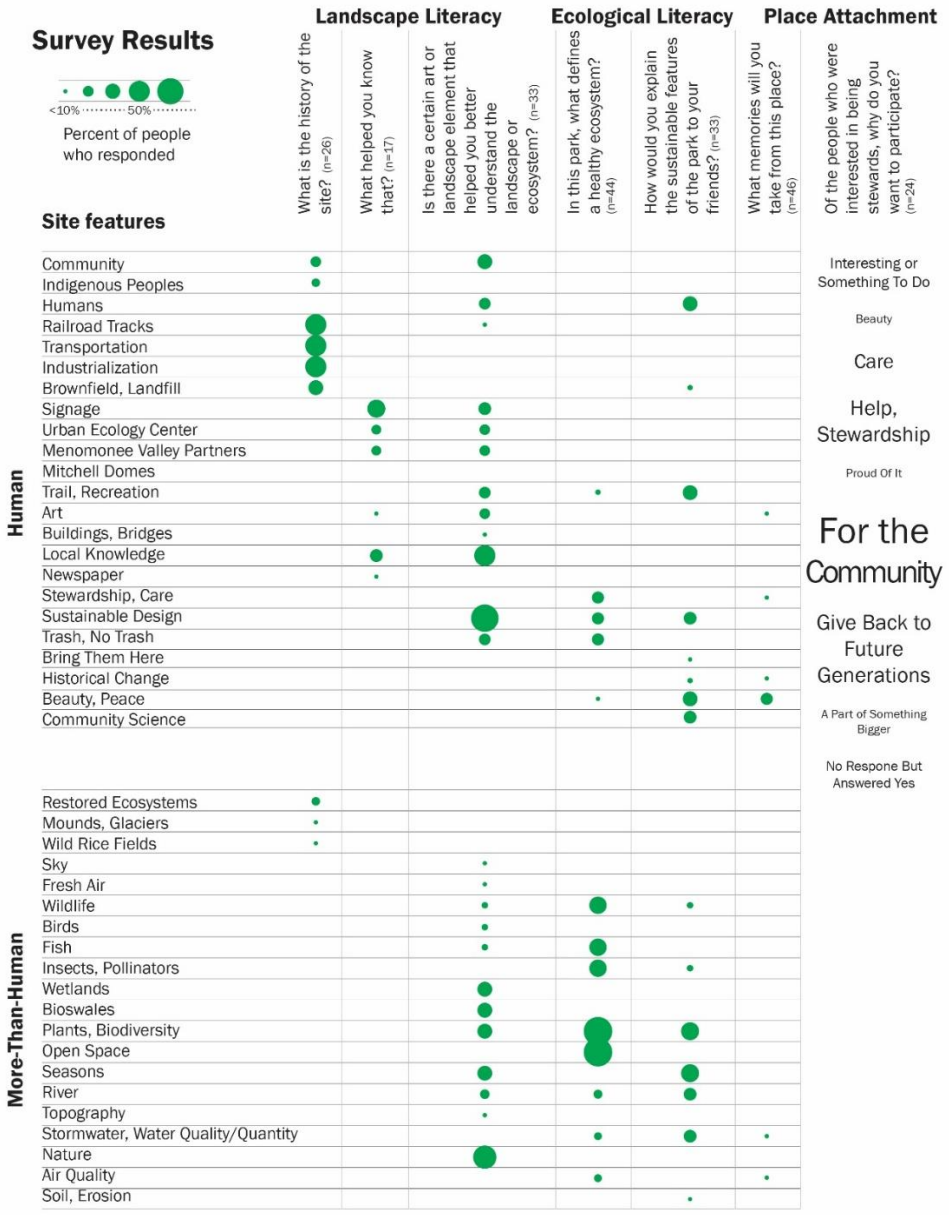

Figure 6 – **Site User Results**: Landscape literacy results from survey understanding whether people understood the history, what helped them know that history, and what site elements helped them understand the landscape. Ecological literacy results from surveys asking site users what a healthy ecosystem on the site looked like and how they would explain it to their friends. Place attachment results from a site survey understanding what connections people have to the site and why they want to be an active element in improving system interactions.

4.0 DISCUSSION

4.1 Ecological Literacy and the UEC

Ecological literacy promotes an understanding of systems and land for humans. It places humans within the system and allows users to begin to understand their role or influence on the more-than-human function of the system. David Orr (1992) coined the term "ecological literacy" to define the results of environmental education, the feeling of exploration in the environment, and the desire to learn more. He uses a "sense of wonder" as a feeling people get while exploring and learning about the environment (Orr 1992). The experiential learning elements of ecological literacy shift human knowledge and understanding from a human-dominant to a more-than-human-dominant perspective (Boehnert 2012). Today, the human-dominant system controls the story of how to repair the links between a natural landscape and a built environment. This approach is not conducive to holistically assessing a system. Jody Boehnert has described how a narrative formed predominantly from the human-dominant system results in behavioral responses not conducive to adopting a holistic view of the landscape. Boehnert (2012) describes these as the "six Modernist D's (disembodied, disembedded, disengaged, disconnected, decontextualized, and in denial)." Ecological literacy is possible when people wonder, connect, engage, contextualize, and recognize more-than-human elements in the system and their interactions or subsystems within the larger ecosystem.

The measures and indicators of ecological literacy focus on how people define the system and whether they recognize more-than-human elements and the role of these elements in the system. In this study, site users were asked, "In this park, what defines a healthy ecosystem?" This question helps reveal whether people recognize more-than-human elements in the system, whether they focused mainly on human elements and did not see a holistic system, and how they relate to the land. Additionally, ecological literacy was observed, particularly in terms of how humans interacted with and sought out more-than-human elements of the site.

A critical element that has heightened ecological literacy and allowed that knowledge to shift to a place attachment is the UEC. This site is one of three branches in Milwaukee built with local community backing in neighborhoods that otherwise have not had safe access to parks.

> *Imagine a world where every child can get outside and explore nature near their home every day of every season of every year of their life.*
>
> *Now imagine a world where every adult can share and guide that child as a mentor in their adventure, building curiosity, understanding, and respect for the natural world.*
>
> *Image a place where folks of all ages can join together in this endeavor – at a neighborhood ecology and community center in a nearby park; a center whose purpose is to facilitate that child/adult interaction, to heal the land, to promote outdoor play, and to educate and inspire people of all ages to understand and value nature as motivation for positive change.*
>
> *In a world like that, many of our current problems would simply melt away.*
>
> -*Urban Ecology Center Vision* (Leinbach 2018)

The UEC has the goal of "producing an ecologically literate child, community, city, and world" (Leinbach 2018). They have seen children who started out afraid of a bug attend their summer camps, school programs, and special events, and by the end of the day were willing to look at the bug, maybe even touch it, and learn further about the land around them (Sanchez, personal communication, August 23, 2022). Those students continued to engage with the center; they have advanced to be high school leaders, summer interns, employees, and volunteers. While the UEC does not measure how much students learn, they have noticed remarkable change in the students' activities, understanding of the landscape, and excitement to share that with others. The UEC also dialogs with the public school teachers that participate in the program to understand the impact they see in the classroom (Leinbach 2018). One survey respondent noted that he bikes with his daughter to the UEC and strives to teach her about the river. As a result, she says, "Good morning 'Nomanee' River. How was your sleep?" each day as they ride by. She shows a joyful connection to the land and her own way of interacting with the more-than-human elements.

Activities at the UEC include an outdoor component at Three Bridges Park or the Menomonee Valley Stormwater Park. In the event of cold, rain, snow, or other inclement weather, the UEC provides jackets, rain boots, waders, hats, and gloves as needed. Many participants lack these essentials, and the nonprofit makes sure that weather conditions are not a barrier to connecting with the landscape (Leinbach 2018). It was magical to watch these children bring their families to camp on Saturdays to show their parents what they were learning. The children's energy for the landscape and their desire to share was infectious.

As a result of the UEC's ability to connect human and more-than-human elements in the system, the neighborhood has seen "reduced crime [and] increased academic performance, community pride, job creation, and neighborhood transformation" (Leinbach 2018). Encouraging relationships between humans and more-than-humans can change human-to-human relationships and human performance within the landscape. The provision of ecological literacy creates place attachment that encourages a holistic view of the landscape. The UEC is instilling an environmental ethic in the site users and healing or restoring the relationships between all landscape system elements.

Just as the landscape includes both human and more-than-human elements, these parks would not be the same without the UEC and community, and the community would not be the same without the park. Mutual benefits and interactions in this landscape demonstrate the need for holistic thinking, ecological literacy, and an environmental ethic.

The results from this study of Menomonee Valley demonstrate how design can be utilized to help improve ecological literacy, but most importantly we need a connection like the UEC to help bridge the gap and create a transition. In Pitman et al.'s (2018) work on showing how ecological literacy relates to socio-demographics in western society, this work demonstrates a way to change that narrative and help ecological literacy become a critical learning component for all races and economic backgrounds (Pitman et al. 2018). Menomonee Valley is between two historically marginalized communities in Milwaukee and has a history of people fearing to leave their neighborhood. Today, Menomonee Valley has strong ties with surrounding neighborhoods

and provides an opportunity for these historically marginalized communities to create ecological literacy and connect with more-than-human elements.

This study is aligned with Curthoys and Cuthbertson's study that considered interpretive planning strategies to promote ecological literacy (Curthoys and Cuthbertson 2002). Interpretive planning and ecorevelatory design have several overlapping ideas including trying to promote an end result of ecological literacy. Menomonee Valley demonstrates the connections from design to user experience and creates a measure for ecological literacy.

This study is a starting point for understanding a holistic approach and how it encourages human and more-than-human relationships within the system. The research combines landscape biography, design analysis, and user evaluation in a creative manner. The landscape biography creates a foundation for the work that grounds the understanding of the design analysis and user evaluation. It creates a comparison that extends beyond a human approach and explains the reasoning as to why the landscape has changed over time. By incorporating these narratives into the design, we can better share these ideas with those experiencing the landscape. Ecorevelatory design is a strategy for helping make that happen. During the user experience, it became clear that pushing integrated design strategies is critical to helping us move beyond interpretive signage as the way of sharing knowledge. Community engagement increased the ecological literacy site users demonstrated. As designers, it is our role to see how experiential learning occurs as someone moves through and observes the space around them, even if they are not actively engaged in the community. Future studies can look to these strategies. This case study was also limited by the number of survey responses. While there were not large numbers to generate statistical significance, the study begins to demonstrate trends for people in this space. This does not include people who are not willing to go to the site, so finding ways to engage more people in the landscape becomes important to broadening the system. As new people get involved, the responses would likely change since many of those surveyed have a lengthy history with that landscape.

5.0 CONCLUSION

By bringing all three methods – landscape biography, design analysis, and user evaluation – together, we can better understand the landscape as a holistic system and how ecorevelatory design can affect ecological literacy. All three components build on one another. The landscape biography helps define the ecorevelatory process and results of what is considered during the design process. We saw that with the wild rice rock and the industrial worker sculptures in the storytelling through design elements on the site. The site user evaluation then looked to see if those pieces were connecting system components. Collectively, the components of this study are critical to grounding the work and forming a foundation for understanding this landscape.

This study is grounded in the broader framework of systems theory (Scheffer 2009), which provides a lens for understanding the interconnectedness and dynamic relationships within landscapes. Future research could deepen this perspective by engaging systems theory through multiple epistemologies, including Indigenous knowledge systems, ecofeminist theory, and Western landscape ecology. Each of these frameworks offers distinct insights: Indigenous knowledge emphasizes reciprocal relationships and stewardship across generations (Kimmerer

2013); ecofeminist theory critiques hierarchical structures and highlights care-based approaches to ecological and social systems (Haraway 2016); and Western landscape ecology provides empirical methods for analyzing spatial patterns and ecological processes (Hobbs and Wu 2007). Integrating these perspectives can enrich the understanding of landscape systems as complex, adaptive networks shaped by cultural, social, and ecological forces, ultimately fostering more inclusive and resilient design practices.

Additional limitations of this study include the need for a broader dataset collected across multiple seasons. Due to time constraints, data collection was limited to the summer months. However, the landscape is actively used year-round, with activities ranging from biking, walking, and running to snowshoeing and informal play. Visitors also vary in group size and purpose, including summer camps, school classes, individuals, and small social groups. These seasonal and social variations likely influence how people interact with the site and perceive its design. Future research could address this gap by extending observations and survey collection over an entire year, capturing seasonal dynamics, and providing a more comprehensive understanding of user experiences and ecological responses.

Three Bridges Park and Menomonee Valley Stormwater Park were designed to encourage ecological literacy and develop place attachment for site users. This landscape has a long history of manipulation for human gain. When the latest strategy was implemented, they considered both human and more-than-human elements in the ecorevelatory design. Designers increased interactions and improved relationships between the system elements. While the history and landscape change are best known by personal history of the place, ecological literacy is rising for both general site users, UEC participants, and a larger neighborhood community. People are recognizing, appreciating, and seeking out the more-than-human elements. Menomonee Valley is emerging as a holistic system in which people look to care for one another and for the more-than-human elements in the landscape.

APPENDIX A:

Menomonee Valley Community Park and Three Bridges Park: Visitor Experience Survey

Thank you for volunteering to participate in this survey. I am researching how visitors experience this park. Please answer honestly about your experience. Your response is anonymous and name/contact information will not be asked as a part of this survey.

By continuing with the survey, you are agreeing to participate and consent that you are over the age of 18 years old.

How often do you come to Menomonee Valley Community Park and/or Three Bridges Park?

Daily 2-3 times a week Weekly Monthly Infrequent First Time

In this park, what defines a healthy ecosystem?

_____

What is the history of this land? What helped you know that?

_____

Are there certain art or landscape features that helped you better understand the landscape or ecosystem (past or present)? _____

_____

Have you participated in tours, stewardship, or community events at the park? Yes No

How would you explain sustainable features of the park to your friends?

_____

_____

What memories will you take from this place?

_____

Has learning about the park's sustainability made you think differently about the landscape? Yes No
If so, how? _____

Would you be interested in being a steward to help care for the landscape? Yes No
If so, why? _____

Other Comments:

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