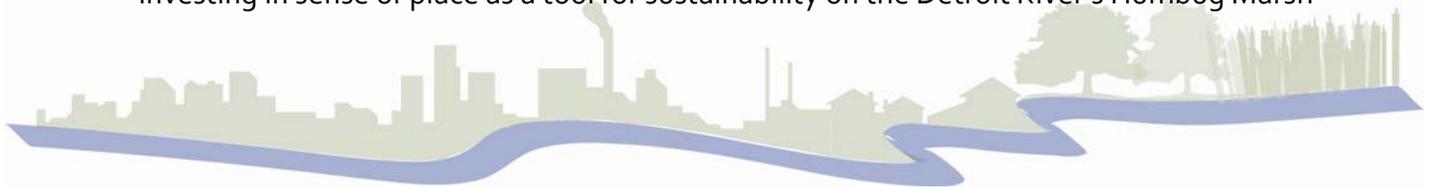


Fostering conservation and environmental stewardship in the Industrial Heartland:
investing in sense of place as a tool for sustainability on the Detroit River's Humbug Marsh



by

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A practicum submitted
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Abstract

The Humbug Marsh, located in Trenton and Gibraltar, Michigan, represents the last mile of undeveloped shoreline along the U.S. mainland of the Detroit River. As over 97% of coastal wetlands in the river have been lost to shoreline development, the Humbug Marsh Unit contains critical habitat for many rare fish and wildlife species, and is considered “globally unique” and “globally significant in biodiversity” by The Nature Conservancy.

The Detroit River International Wildlife Refuge acquired this 410-acre unit in 2005, narrowly avoiding a fate of residential development and wetland infilling on the site. Since then, a comprehensive master plan for the unit and its adjacent Refuge Gateway, located directly north of Humbug Marsh on a brownfield site, has been completed.

This project captures the transformation of Humbug Marsh into the keystone property of the Refuge and a hub for environmental education and interpretation in southeast Michigan during its second year of development. I explore the meaning of place and how a strong sense of place can be fostered and celebrated through landscape design and construction as a tool for achieving a more sustainable relationship between people and the environment. The unique contextual circumstances of this 410-acre parcel have resulted in a compelling environment that fosters stewardship, innovation, and creative environmental and business leadership in the heart of a largely industrial landscape. These strengths, however, will become stronger as a greater connection between people and place is nurtured through collaborative design, volunteerism, and educational outreach. Strategies used to cultivate stewardship and strive towards sustainability by capitalizing and showcasing the Humbug Marsh Unit’s unique and compelling sense of place are described. By providing access to unique natural resources and teaching others about the marsh’s environmental significance, the next generation of conservationists and sustainability entrepreneurs will be cultivated and empowered.

Acknowledgements

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INTRODUCTION

Landscape Architecture and Sustainability

Landscape architects are empowered with tools that enable them to shape human environments and provide quality experiences through design. In the face of urgent dilemmas such as global climate change, over-consumption of natural resources, and development patterns that dissolve community rather than build it, landscape architects have an opportunity to use their skills to guide individuals and communities towards more sustainable cultural and ecological patterns. In his article "Life, liberty and the pursuit of sustainable happiness," Randolph Hester argues that designers can create spaces and environments that educate individuals about the implications of their actions and guide them to more sustainable alternatives (Hester 1995). "What designers must do," says Hester, "is imagine futures informed by ecological science and human needs and offer concrete demonstrations of positive, desirable alternatives to less sustainable environments" (Hester 1995). The physical, visual, and psychological experiences that individuals have within the environment influence their perceptions, actions, and opinions in many facets of their life. Thus, designers, who can shape these experiences of landscape, can play a significant role in building a more sustainable culture. Building a relationship of care between people and the environment is one significant step in that direction. Landscape architects strive for this by designing spaces that celebrate unique attributes or sacred places that are relatable to humans. According to Hester, "the power of sacred places can spur conservation and restoration, and inspire new designs that result in joyful and enduring environments" (Hester 1995).

In this practicum, focused on the Humbug Marsh Unit of the Detroit River International Wildlife Refuge, I explore the meaning of place and how a strong sense of place can be fostered and celebrated through landscape design and construction as a tool for achieving a more sustainable relationship between people and the environment. The unique contextual circumstances of this 410-acre parcel have resulted in a compelling environment that fosters stewardship, innovation, and creative environmental and business leadership in the heart of a largely industrial landscape. These strengths, however, become stronger as a greater connection between people and place is nurtured through collaborative design, volunteerism, and educational outreach.

Phase one of a long-term plan for public outreach in the Humbug Marsh Unit exemplifies the strategies used to cultivate stewardship and strive towards sustainability by capitalizing and showcasing its unique and compelling sense of place. As a graduate student intern for the Detroit River International Wildlife Refuge from January 2008 until December of 2008, I completed a site design and implemented many of the site features for this phase of the long range development plan for the Humbug Marsh Unit and Refuge Gateway, a 165 acre brownfield adjacent to Humbug Marsh. This year of design and implementation is described in this report and demonstrates the connection between design, outreach, place attachment and a sustainable culture of care towards land.

CONCEPT

Sense of place can be concisely defined as “connections among people and places” (Semken 2008). People develop connections to places based on certain physical qualities that a place may have, in addition to human-based interactions with that space; thus, sense of place is “created by the setting combined with what a person brings to it” (Steele 1981). This term captures both cultural and environmental contexts that affect a person’s interaction with their surroundings and can affect their sense of attachment towards a physical location. The intensity and quality of a given experience can strengthen the connection between a person and place. This connection can be separated into “place meaning” and “place attachment”, where *place meaning* captures the knowledge-based perception of unique characteristics of a place and *place attachment* captures affection-based attitudes and preferences (Semken 2008). As such, to project a strong sense of place, the unique physical attributes of a place should be strongly perceivable, while also evoking a distinct emotional response based on a person’s preferences, i.e., one that is or is not strongly supportive and satisfying for humans, as described by Stephen Kaplan in *Humanscape* (1978).

As globalization has rapidly transformed American society, many scholars are pointing to a fading connection between people and places and the barriers between “people and meaningful interactions with nearby places” posed by entertainment media, standards-based education, and “even well-intentioned advocacy for environmental and humanitarian concerns in distant parts of the globe” (Semken 2008). In addition to this trend, scholars are pointing out the undesirable effects that this disconnection to place has on many Americans, especially children. Richard Louv has begun a major campaign to reconnect children with nature due to the discovery of detrimental effects on the physical and mental health of children who do not have a connection with nature (Louv 2005). This finding illuminates the need for the design of public space to rekindle a relationship between people and nature, resulting in understanding and appreciation of a place’s unique values, as well as some emotional attachment to the places that people live around or experience.

According to Robert Ryan, in nature “people can find a connection with something larger and more timeless than themselves; nature can provide spiritual sustenance for their souls, physical relief for their bodies, and psychological restoration for their minds” (Ryan 2000). These attributes of natural spaces, which can draw in humans and provide a setting for unique experiences, can be the catalyst for place attachment in humans. By building this relationship and rekindling the connection between people and place, a stronger sense of care towards a particular place may result. The ideal model strived for here is one where both people and place receive benefits from a stronger connection, manifested in stronger, positive emotional attachments to a place for people and a stronger ethic of stewardship, conservation, and care for land and place.

One manifestation of this mutually beneficial relationship can be seen in human stewardship of natural places. The physical and psychological benefits of actively stewarding natural spaces, such as helping maintain a natural park space or volunteering to remove invasive species from a local forest patch, have been well documented by scholars. Spending time outdoors, volunteering, and striving towards an improved environmental condition can have positive implications on an individual’s sense of purpose,

feelings about the land, educational interests, and social and spiritual dimensions (Grese 2000). These benefits can be derived from two categories: the act of spending time outdoors, and the act of volunteering for a greater cause. Rachel and Stephen Kaplan theorize that spending time outdoors in nature has benefits to people for four reasons: “it can be engaging and supportive, it’s out of one’s ordinary routine, and it gives one a sense of connection to a larger world” (Miles 1998). Similarly, volunteering can contribute to “a sense of personal growth and well being” and “an opportunity to confirm one’s notion of self worth” (Miles 1998).

When the acts of spending time outdoors and volunteering are combined, a unique connection can be made between people and nature, resulting in a longer-lasting stewardship and ideally a more sustainable culture of care towards the land. These actions give individuals the “opportunity to take tangible action to help their local environment,” which can “empower them with the notion that their actions do make a difference” (Grese 2000). In his study in lower Michigan, Robert Ryan found that “the more frequently participants used a site (i.e., recreated, volunteered), the greater their attachment (Ryan 2000).

It is this effect, the growing connection between people and nature through stewardship, that has lasting benefits for the land and which can grow into a more widespread culture of stewardship and conservation in the next generation, and ultimately *sustainability*. The mechanisms of reconnecting people and nature through the design and construction phases of improvements to the Humbug Marsh Unit will be examined further here in effort to explore the following conceptual relationships:

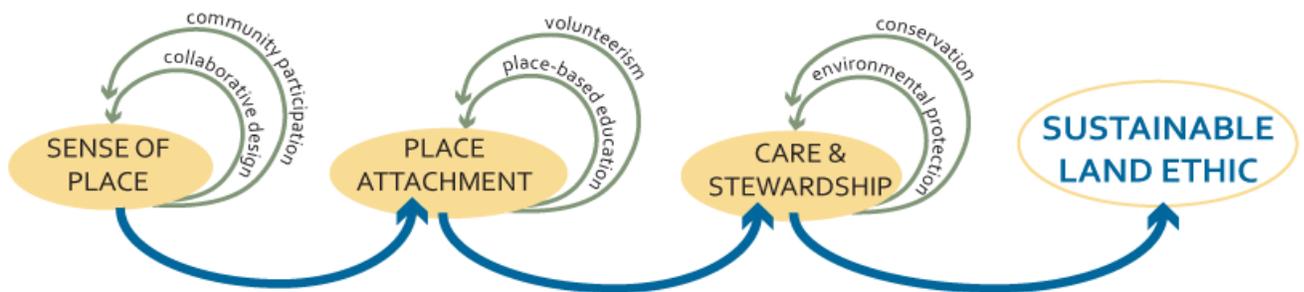


Figure 1 Concept Model. The mechanisms of showcasing sense of place as a means to cultivate place attachment are explored as a means to ultimately achieve a stronger culture of land stewardship and a long-term sustainable land ethic.

CONTEXT

The Detroit River: Nature in the Industrial Heartland

The lower Detroit River is the regional nexus among many evolving economies, communities, and recreation opportunities, and currently supports almost 6 million people in its watershed (USWS 2009). As the link between the upper Great Lakes and the lower Great Lakes, the Detroit River has served as a major transportation thoroughfare for centuries and is the catalyst allowing the Detroit metropolitan area to become known as one of the world's greatest manufacturing centers. For many decades, Detroit and its surrounding communities were the heart of industrial development in the United States, and in many ways, this industrial landscape is still a significant player in the area's economy.



Figure 2 The Detroit River runs between Lake St. Claire and Lake Erie. The city of Detroit is to the northwest of the river and Windsor, Ontario is to the southeast. (NASA Landstate 7 satellite)

The economic prosperity that the river brought to this region has also brought with it environmental trade-offs, resulting in grave consequences for the natural systems existing along the river. According to the Detroit River Remedial Action Plan, over 95% of historical coastal wetlands have been lost along the river due to development (IJC 1997). Additionally the International Joint Commission (IJC) has identified key problems in the Detroit River Area of Concern as: impaired ability to consume fish and wildlife due to PCB and mercury levels, drinking water impairment due to taste and odor issues, beach closings, degradation of aesthetics, and loss of fish and wildlife habitat due to contaminants (IJC 1997). These problems stem from human actions recorded as early as 1912 by the IJC, such as the discharge of raw sewage into waterways. While this problem has been remedied, the IJC has identified more modern sources of environmental degradation in the Detroit River area that still demand attention

today. These include “contaminated sediment, point source discharges from municipal and industrial sources including combined sewer overflows, and non point sources of pollution from such sources as urban stormwater runoff and air deposition of toxic substances” (IJC 1991). Environmental issues of concern stemming from these sources include changes in fish community structure, loss of fish and wildlife habitats, impact on biota from water and sediment quality, and exotic species (IJC 1991).

Yet, within this industrial landscape of concrete and steel, valuable natural resources persist. In fact, the Detroit River has made a remarkable ecological recovery in the last several decades, which can partly be attributed to efforts identified by the IJC such as improvements to wastewater treatment plants and sewer infrastructure, pollution prevention projects by local corporations, habitat and rehabilitation projects, and the removal of 20,000 cubic yards of contaminated sediment from the river. A river system that has an antiquated reputation for being “polluted and spoiled” and home to the infamous *Black Lagoon* currently houses unique birds, fish, and invertebrates. These species are thriving in a habitat that is considered to be “globally unique” and “globally significant in biodiversity” by The Nature Conservancy (Metropolitan Affairs Coalition 2005). In fact, the Detroit River has one of the highest levels of diversity of wildlife and fish in all of the Great Lakes (Metropolitan Affairs Coalition 2005). This phenomenon is partly due to the location of the Detroit River and western Lake Erie along the intersection of two major North American Flyways for migratory birds – the Atlantic and Mississippi. Each year 300,000 diving ducks, 75,000 shorebirds, and hundreds of thousands of landbirds and fall raptors frequent the area to rest, nest, and feed along their migratory journey. The remnant coastal marshes, wetlands, and islands along the river serve as valuable urban stopovers that can provide resources to migratory birds, helping them sustain their long journey as they travel through areas with high levels of development and dwindling patches of habitat. Over 30 species of waterfowl, 23 species of raptors, 31 species of shorebirds, and 160 species of songbirds are found along or migrate through this migratory corridor. Additionally, 117 species of fish live or travel through the Detroit River, including Walleye, a valuable fish for commercial fishing, and Sturgeon and Lake Whitefish, species of special concern in the United States and Canada. Each year, approximately 10 million Walleye travel into the river from Lake Erie to spawn. This phenomenon has spurred a large fishing culture that generates millions of dollars every year for the Detroit River watershed communities (DRIWR, 2009). In 2007 and 2008 the FLW Outdoors “Chevy Open”, one of the largest bass fishing tournaments in North American, was held in the Detroit River, offering millions of dollars in prize money, and a source of local and regional pride.

There is an intensifying sense of urgency to protect these natural resources, as their habitats are continually challenged by shifting economies, water pollution, and sprawling development. A growing conservation movement is building towards protecting the remaining wildlife habitat and restoring degraded habitat along the Detroit River in an effort to “sustain the quality of life that attracts people to the Detroit River corridor” (Metropolitan Affairs Coalition, 2005). In 1998, the Detroit River was designated as one of 14 American Heritage Rivers in the United States by Presidential Executive Order. The Metropolitan Affairs Coalition joined in this effort by adding their support and adopting this initiative in agreement with the U.S. Department of Transportation. As a result, the Greater Detroit American Heritage River Initiative began its efforts along the Detroit River to set priorities and deliver

resources “for projects that foster environmental stewardship, promote economic development, and celebrate our unique history and culture” (Metropolitan Affairs Coalition 2005). In 2001, the Detroit River was also designated as a Canadian Heritage River, making it the first international heritage river in North America (USFWS 2005). These accomplishments of the late 1990s and early 2000s garnered national, regional, and local attention and indicate a dramatic shift in the valuation of the cultural, historical, and ecological attributes of the Detroit River and a corresponding level of political action to see that these resources are protected and shared.

In 2001, both U.S. and Canadian politicians and conservation leaders gathered to formalize a bi-national vision statement, developed during a public comprehensive conservation plan workshop that incorporated stakeholders including the Federal, provincial, and local governments, as well as conservation groups and industry representatives (USFWS 2005).

Vision Statement for the Lower Detroit River Ecosystem (2001)

“In 10 years the Lower Detroit River Ecosystem will be an international conservation region where the health and diversity of wildlife and fish are sustained through protection of existing significant habitats and rehabilitation of degraded ones, and where the resulting ecological, recreational, economic, educational and ‘quality of life’ benefits are sustained for present and future generations.”

This vision statement represents the culmination of bi-national efforts from politicians, conservation leaders, and local communities to build a sustainable future for the Detroit River and western Lake Erie ecosystems.

Building the first International Wildlife Refuge

In order to achieve the vision established for the lower Detroit River, the Detroit River International Wildlife Refuge (DRIWR) was established in December of 2001 by Public Law 107-91. The Refuge boundary, according to this establishment law, includes islands, coastal wetlands, marshes, shoals, and riverfront lands along 48 miles of the lower Detroit River and Lake Erie in Michigan. The DRIWR is also one of very few wildlife refuges in an urban area and is managed by the U.S. Fish and Wildlife Service as part of their National Wildlife Refuges System.

A public comprehensive conservation plan workshop held in October 2002 resulted in a vision statement for the DRIWR that guides it towards fulfillment of the Vision Statement for the lower Detroit River mentioned above.

Draft Vision Statement for the Detroit River International Wildlife Refuge

“The Detroit River International Wildlife Refuge, including the Detroit River and Western Lake Erie Basin, will be a conservation region where a clean environment fosters the health and diversity of wildlife, fish, and plant resources through protection, creation of new habitats, management, and restoration of natural communities and habitats on public and private lands. Through effective management and partnering, the Refuge will provide outstanding

opportunities for “quality of life” benefits such as hunting, fishing, wildlife observation, and environmental education, as well as ecological, economic, and cultural benefits, for present and future generations.”

The DRIWR’s vision for the 48 miles of shoreline along the Detroit River and Western Lake Erie acknowledges the unique natural resources and its link to ecological, economic, recreational, and “quality of life” benefits. Together with many dedicated volunteers, businesses, and community groups, the Refuge has restored critical wildlife habitat, built sustainable and educational infrastructure, conducted scientific monitoring and data collecting, added many acres of shoreline, coastal marsh, and upland habitat to the Refuge, and shared its resources with surrounding communities. In just 7 years since its creation, the Detroit River IWR has grown from 300 acres of wildlife habitat to over 5,100 acres. Through this growth, the region has joined together to protect habitat and express the value they find in having access to natural places along their Detroit River.



Detroit River International Wildlife Refuge

Wayne and Monroe Counties, Michigan



Figure 3 Acquisition Boundary for the Detroit River International Wildlife Refuge (USFWS).

As part of its desire to expand and continue to conserve and protect valuable wildlife habitat within its boundaries, the DRIWR continues to enter cooperative management partnerships or seek ownership of land along the Detroit River. One of the most celebrated and historic acquisitions for the DRIWR was the Humbug Marsh Unit, acquired in 2001.

The Humbug Marsh Unit: The Keystone Property of the Refuge

The Humbug Marsh Unit represents the last mile of natural shoreline on the U.S. side of the Detroit River. This 410-acre parcel of land spans into both Gibraltar and Trenton, Michigan and contains Humbug Island, Humbug Marsh, the shallow waters in between, and the adjacent uplands. A diversity of habitats is present within the unit, including old growth oak-hickory forest, vernal wetlands, second-growth forests, and coastal marsh. Because the vast majority of shoreline along the Detroit River has been disturbed or destroyed (i.e. 97%), Humbug Marsh is significant as a stopover location for many migratory birds, as well as significant for many local populations of wildlife (USFWS 2009). Specifically, it has national significance for the bass, walleye, and whitefish populations that thrive here, the diving ducks that live on its shoreline and in its waters and the 17 species of raptors that stop here along their migration route.



Figure 4 Humbug Marsh Unit. The Unit consists of Humbug Island, the upland forests, and the shallow waters in between. It is bounded by Jefferson Avenue to the west, the Detroit River channel to the east, and the Humbug Marina to the south. (BASF Corporation)

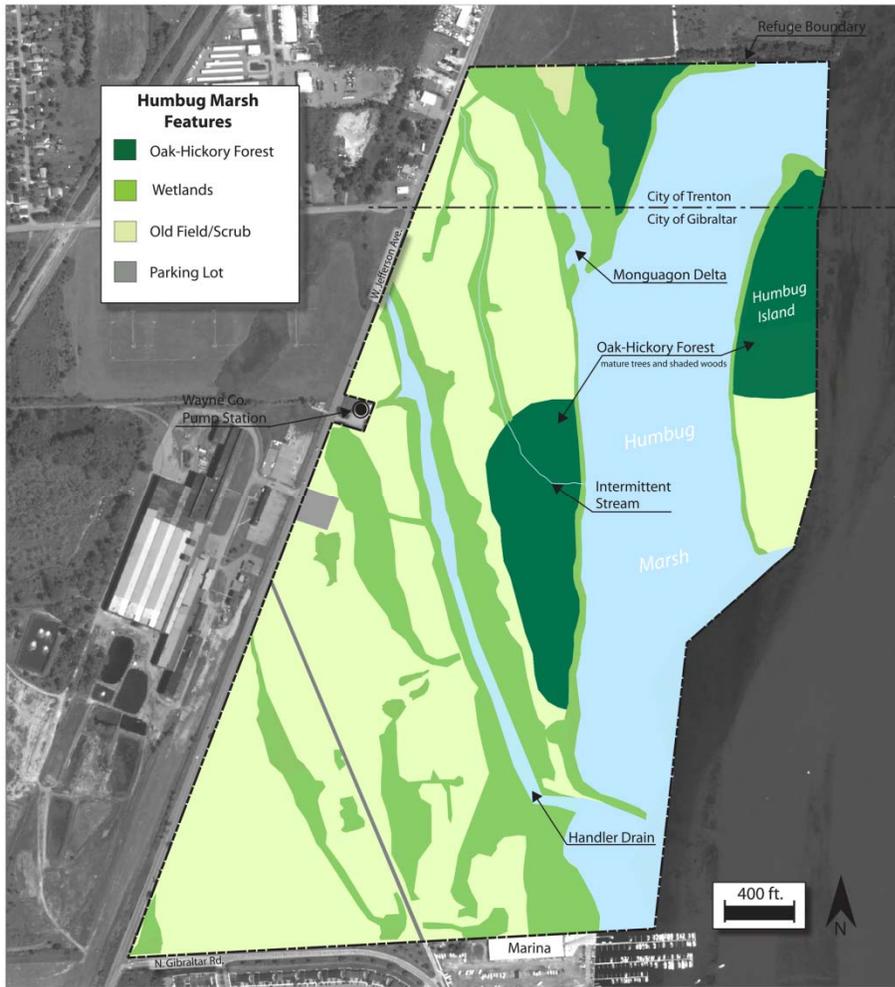


Figure 5 Habitat features on the Humbug Marsh Unit. Patches of old growth oak–hickory forest, with trees approximately 300 years old, occur in the central section of the unit. The majority of the site was previously grazed, leaving behind young successional forests.

The Humbug Marsh Unit was acquired by the Refuge in 2005, amidst an intense lawsuit with its one-time owners, development company Made In Detroit. After acquiring the land for \$3.2 million, Made In Detroit began planning a \$500 million development for the parcel consisting of large homes, a golf course, a marina, and commercial buildings. The plan received immediate attention and negative reactions from environmentalists and Congressman John Dingell, a long time supporter of the wildlife habitat in this area. As this opposition grew, Humbug Marsh began receiving attention from large corporations in the area, small businesses, and local and national non-profits (Jaruzel 2004). Opponents to the project felt that the plans would be impossible to execute without gravely damaging the natural environment and the incredibly important wildlife habitat that exists on the site. Thousands of community members spoke out against the plan, fighting to save this relatively small patch of natural habitat amidst a vast urban landscape. After several years of fighting lawsuits and permitting issues for construction, Made In Detroit was ordered by law to sell the parcel due to bankruptcy. The

Trust for Public Land acquired the land, which was later purchased by the U.S. Fish and Wildlife Service to be part of the Detroit River International Wildlife Refuge.



Figure 6 Community members gathered in support of protecting the Humbug Marsh area from residential development. (USFWS)

The fight to save Humbug Marsh received an incredible amount of attention by major media outlets, such as the *Detroit Free Press*, and allowed the communities along the Detroit River to express their valuation of this humble property. Thousands of local supporters gained a vested interest in the future of Humbug Marsh after so narrowly saving it from a future of wetland infilling and development. This organic, community-wide effort to protect this natural space is a clear expression of the significance of place and the place-attachment that many local community members feel towards the Humbug Marsh. With such a strong and active stakeholder group poised, the Refuge, as new owners of the property, held an important role in shaping the future of the Humbug Marsh and ensuring that it remains conserved in perpetuity, while maintaining the support of so many community members.

The Refuge took advantage of the momentum of community support and activism spawned by the desire to save Humbug Marsh and began developing long-term plans for conserving and protecting the marsh in perpetuity while also sharing its unique sense of place with others, in order to further build and strengthen community support for it. Many public meetings were held during which the goals and opinions of local individuals and community groups were heard and assessed as part of the future strategies for the Humbug Marsh Unit. The Detroit River International Wildlife Refuge Comprehensive Conservation Plan and Environmental Assessment begins to outline goals for the first fifteen years of the Refuge's growth and development, which include objectives aiming to consistently increase visitation, promote volunteerism on the site, build a partnership of support and stewardship with

private businesses and community groups, and extend environmental education services to the community. These goals, which focus largely on public outreach and education, charted the course on which the Humbug Marsh Unit would be guided, as the keystone property of the Refuge and the focus of its public outreach efforts and infrastructure.

DESIGN

Master Plan and Site Design for the Humbug Marsh Unit and Refuge Gateway

In partnership with Wayne County, the Refuge began planning a master site plan for the Humbug Marsh Unit and the adjacent land to its north, which aimed to meet these goals of education, outreach, conservation, and restoration. The design goal set out by the Refuge was:

“to create the first phase of a community-based center for environmental learning that meets the Refuge’s goals of becoming a national and regional example of sustainability for education, resource conservation, water conservation and stormwater management, wildlife management, transportation/recreation, the financial environment, and architectural character” (USFWS).

The result was a site plan which included a state of the art visitors center on the property to the north of the Humbug Marsh Unit, now called the Refuge Gateway, a trail network winding through all of Humbug Marsh, a fishing pier and boardwalk system along the river, an observation deck, and environmental education shelter. While the Refuge began the planning process for the visitor center and the restoration of the Refuge Gateway property, it also moved forward with its first phase of realizing a part of the larger master plan. This phase has become known as the Education Triangle. For this practicum, I completed the site design and design details for the Education Triangle, including an environmental education shelter, an accessible trail network, a rustic trail network, a stream crossing, and a wetland boardwalk. In 2006 and 2007, the Refuge completed the design and construction of an observation deck looking over the Humbug Marsh, as well as an informational kiosk. My design incorporates these previously constructed features into an overall site design aimed at fulfilling the Refuge’s broader goal for the Humbug Marsh Unit and Refuge Gateway. I focused on educational infrastructure, such as the environmental education shelter, for this small portion of the unit with its accessibility to Jefferson Avenue and the Refuge Gateway, its proximity to unique natural features such as the Monguagon Drain, and the lack of highly sensitive ecological features present on other parts of the Unit.

Within the goals set out by the Refuge for public outreach, education, and sustainability, I identified four main objectives in which my design and the construction phases were conducted:

- 1) design a space that minimally impacts the area’s natural resources while providing opportunities for visitors to observe, explore, and learn from the diverse ecological features that currently exist on the site
- 2) engage in a collaborative design and construction process that values the local knowledge of citizens and which responds to the local context of the area
- 3) showcase innovative re-use of materials as a step towards sustainability and create teachable moments for individuals who experience the site both during and after design implementation

- 4) maintain steady communication with the community and local businesses throughout the design and construction process to promote a continued sense of involvement, while celebrating accomplishments made with volunteer and community-based support.

These objectives were used to guide the design and construction process showcasing the unique features of the Humbug Marsh Unit, while also promoting interaction with the community. One of my chief goals was to encourage a strong attachment to this place felt by volunteers and visitors. As the first major physical phase of Refuge development, the integration of community into all phases of the project was essential for building both financial and volunteer support for future phases of the project. The Refuge relies heavily on public-private partnerships and volunteerism from the community for land acquisition, public outreach activities, and funding of on-site projects. Thus, the development of the Education Triangle was used as a discrete project in which many volunteers and donors were involved in order to encourage future participation in Refuge projects and events. Similarly, this project enabled the Refuge to communicate its larger master plan to stakeholders and surrounding community members by physically implementing the first phase and setting the stage for the quality and community-inspired goals of the entire master plan. By doing so, the financial and volunteer based support for the Education Triangle was leveraged to build a larger coalition of supporters who will hopefully remain involved in the future phases of the transformation of the Humbug Marsh Unit and Refuge Gateway.

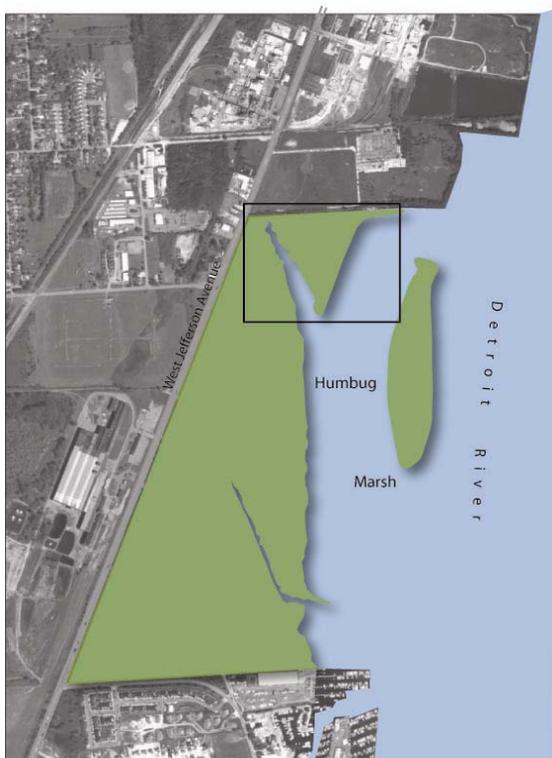


Figure 7 Education Triangle. The northern area between the Detroit River and the Monguagon Delta was dubbed the Education Triangle. It lies south of the Refuge Gateway property.

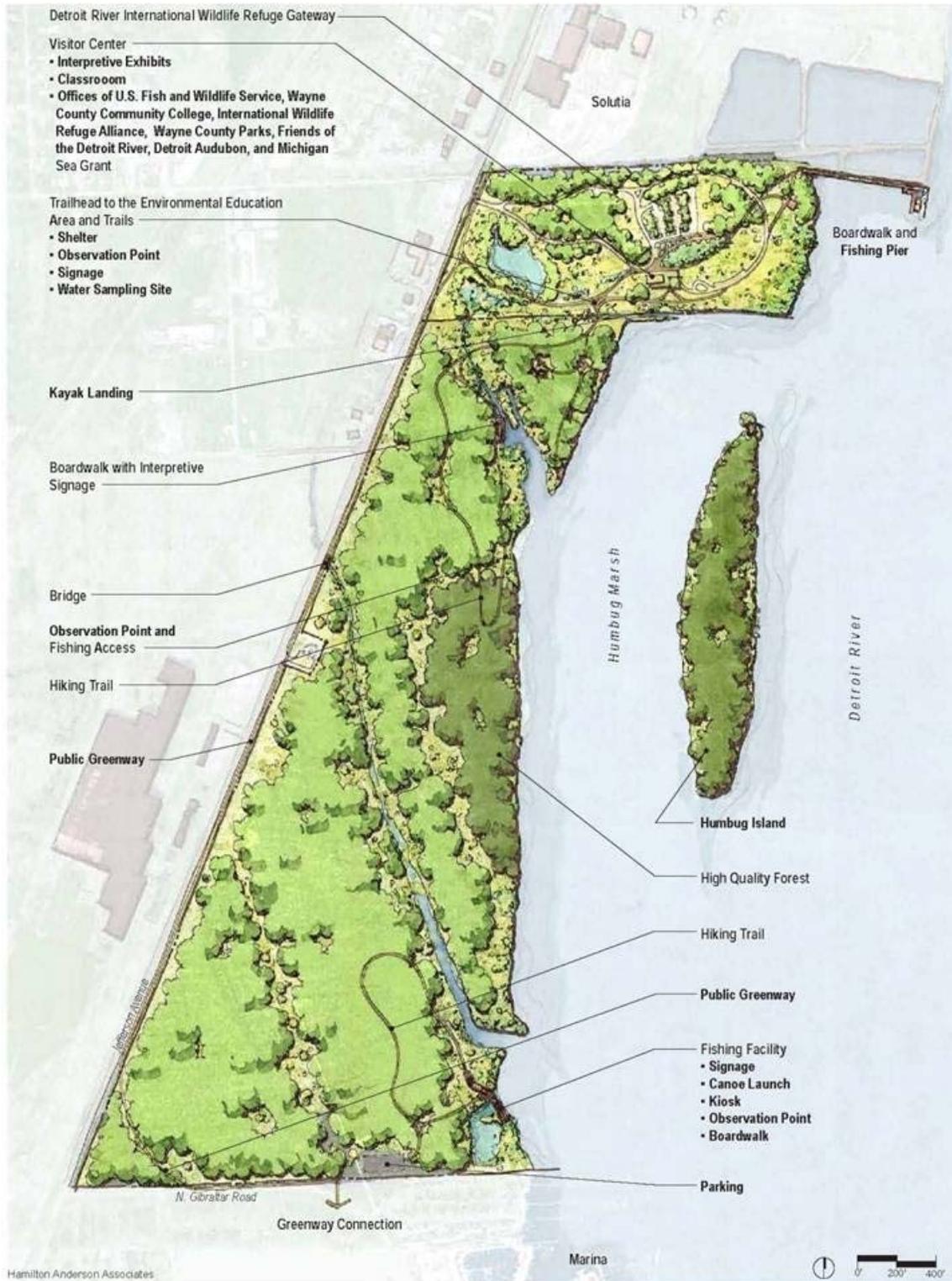


Figure 8 Master plan for the Humbug Marsh Unit and Refuge Gateway. (Hamilton Anderson Associates)



Figure 9 Site design for the Education Triangle. Features built with volunteer labor are shown.

MECHANISMS FOR FOSTERING SENSE OF PLACE

Showcasing the Humbug Marsh Unit's sense of place as a means to build place attachment with stakeholders, and ultimately a long-term desire to conserve and protect natural spaces, was the driving concept behind both the design and implementation of features in the site design of the Education Triangle. The Unit's sense of place was fostered through both design and construction phases through six main mechanisms: 1) physical site design, 2) materiality, 3) professional collaboration, 4) volunteerism, 5) public outreach and 6) place-based education. The design and construction processes for the physical features within the Education Triangle are described below through these mechanisms, in order to develop this concept as an adaptable set of strategies for cultivating a sense of attachment and culture of care in other areas of the Refuge or for other natural areas that exist in an urban context. (see Appendix 1 for a chronological list of design and construction steps and Appendix 3 for construction documents of site features)

Physical site design

The physical design for the Education Triangle (ET) centered on two main principles:

- 1) Maximize educational and interpretation opportunities for teaching about the ecological significance of natural places both passively and actively
- 2) Minimize the impact on natural systems and communities throughout construction and general use of the site

These two principles combined to achieve one main goal for the physical site design of the ET:

to showcase the diversity of plant communities and wildlife habitat while protecting both for future generations to the greatest extent possible.

The trail layout reflects this goal as it traverses a variety of ecosystems, including upland forest, vernal wetlands, a creek system, the river shoreline, and the marsh. Old growth upland forests occur in small portions of the site and consist mostly of oak and hickory species, with some trees up to 300 years old. The understory of these forests is minimal. Secondary forests consist mostly of red and white oak, hickory, tulip tree, and black cherry, and an understory of gray dogwood, honeysuckle and hawthorn. Large areas of emergent cattail marsh exist along the shoreline with the Detroit River and along internal wetlands, such as the Monguagon Delta in the north-central portion of the site. The marsh, extending between the mainland and Humbug Island, contain mostly wild celery and some water stargrass and waterweed (USFWS 2009).

Care was taken in each of these locations to locate the trail in the least vulnerable area or to take precautions, such as the installation of a boardwalk over a wetland or an observation deck over the marsh, to minimize human impact on these sensitive areas. While sensitivity to the environment was the top priority of the trail layout design, education and interpretation objectives were the second priority and greatly influenced the trail layout. The trail will be the main thoroughfare for visitors of all

ages to the Unit, who come to visit for both informal walks and formal walks with an interpreter or ranger. The design aims to create an experience that would be educational or enlightening to individuals who are passively strolling through the site, as well as to those who come to participate in an education program. A diversity of experiences are available along the trail, such as quiet areas for contemplation or wildlife observation, in addition to larger spaces for school groups or children's programs to gather and listen to the park ranger. The trail was designed to wind through the forested parts of the Education Triangle, providing a combination of clear views ahead and obscured views. The majority of the trail runs through late successional forests with a relatively thick understory and mid-story. By clearing the understory in key areas, views onto the river and the Monguagon drain were enhanced in conjunction with developing sitting areas along the trail and the environmental education shelter. The overarching concept for the physical site design of the trail and built features along the trail was to deliver visitors to unique points throughout the Triangle, while creating an infrastructure for individuals or groups to take pause and internalize their experience along the trail network. This combination of experiential and educational opportunities, within an environmentally sensitive framework, highlights the unique attributes that make the Humbug Marsh Unit ecologically and culturally significant and showcases them in tangible ways for visitors to the site.

Materiality

Material choice is a powerful mechanism for conveying sense of place and achieving sustainable design due to its implications on resource extraction, transportation costs (financially and environmentally), and suitability for certain climates and/or ecosystems. In order to achieve the design goal of *showcasing sustainability* to visitors and *creating teachable moments*, the choice of materials with which the main trail features were built was crucial. To the greatest extent possible, local materials were used for built features on the site. Specific effort was made to harvest materials directly from the site in order to minimize transportation costs and the carbon footprint of the project. By doing this, teachable moments were created for visitors who can learn basic concepts of sustainability and how to re-use materials in their own yards, in addition to illuminating the significance of using sustainable materials as much as possible in the landscape. Local materials can also enhance the visual experience of place and can add to the unique attributes of a site through built work. Sense of place was fostered through materiality in four main projects, described below.

1) Dead ash trees milled and reused as lumber for stream crossing

The emerald ash borer recently decimated the ash tree population in Michigan, leaving many dead standing ash trees. In many cases this wood is still viable for use as lumber. The original intent for this project was to harvest dead ash trees from the Humbug Marsh Unit to mill on site and use as lumber for the railings on the stream crossing over the Monguagon creek drain. With the risk of damaging other trees in the forest and harming the understory, we chose not to harvest dead ash trees from on-site. Instead we used a large dead ash tree from Detroit that was located by the miller hired through a City

Logs to City Lumber grant to work on the project. Milling and using this tree for our project saved it from being ground into wood chips or dumped in a local landfill.

Unique attributes of the dead ash, including the emerald ash borer paths and bark, were maintained to the greatest extent possible on the milled lumber to showcase its re-use as a sustainable material and to create a teachable moment for visitors. By doing so, this material provided two main educational components to our overall interpretation program. First, it shows a viable way to re-use dead ash trees, a material that is plentiful throughout this region. Secondly, by maintaining patches of bark and bore paths within the wood, visitors can learn about the destruction caused by the emerald ash borer and the potential destruction that foreign, invasive species of plants and animals can have on our local ecosystems.



Figure 9 Ash trees killed the emerald ash borer were harvested, milled, and re-used as railings on the rustic stream crossing connecting the ET with the Refuge Gateway. This will be the main connection between the visitors' center and the trails and site features on Humbug Marsh. (left photo: D. Mitchell)

2) Recycled crushed concrete as substrate for accessible trails

The Old North Gibraltar Road was a 1-mile road that spanned 20' across and consisted of 1' of concrete, running through the south end of the Humbug Marsh Unit. This road, closed for many years and inaccessible to the public, represented a barrier to wildlife movement and was void of wildlife habitat and an eyesore to visitors passing by. During the summer of 2008, in conjunction with the implementation of the site features in the Education Triangle, the Old North Gibraltar Road was removed by a battalion of Navy Seabees. The road was broken into large pieces, which were removed with the help of heavy equipment. The large pieces of concrete were transported to a local stone and concrete business where they were pulverized into 21AA sized gravel for use as the trail substrate on the accessible trails in the Education Triangle. While the costs for transporting the concrete to the crusher and back to our site were not inconsequential, the net result of restoring wildlife habitat along the old road footprint and preventing a large volume of concrete from entering a landfill added many positive impacts to the site. These positive impacts are paired with the teaching opportunities created

by creatively reusing concrete on the site, another opportunity to share basic concepts of sustainability while setting an example that visitors could implement in their own yards.

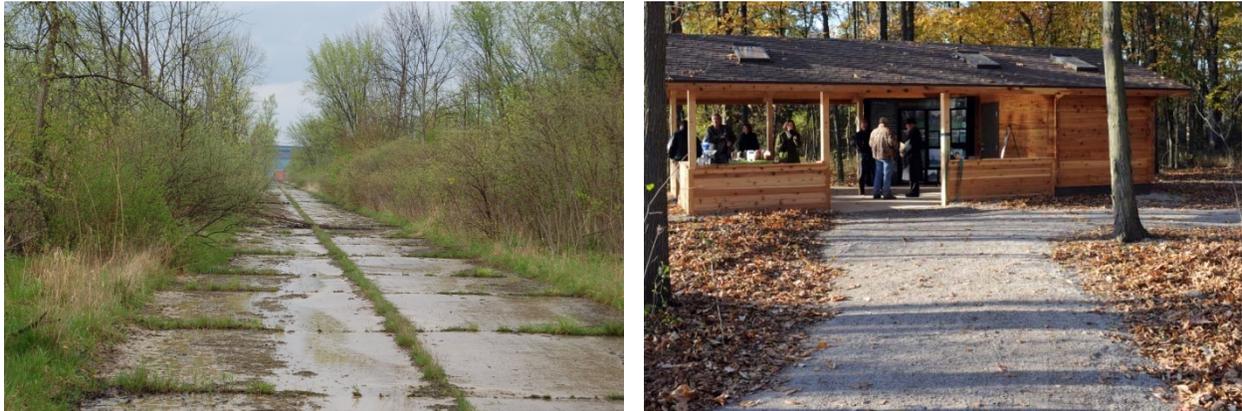


Figure 10 The Old North Gibraltar Road, running through the southern portion of the Humbug Marsh Unit, was removed from the site, crushed and recycled into substrate for accessible trails on site. (right photo: D. Mitchell)

3) Wood chips used for rustic trails

Large amounts of brush were cleared prior to construction of trails throughout the site. Additionally, some trees were removed from the footprint of the environmental education shelter, observation deck, wetland boardwalk, and informational kiosk. All woody material was stored on site and eventually chipped and used as the primary substrate for the rustic trail network. Additionally, woodchips donated by both Gibraltar and Trenton townships were brought to the site as an additional source of woodchips. By using material readily available from within our site or nearby, the carbon footprint of transporting materials for the trails was reduced, as well as the overall cost of the project.

4) ChoiceDek products used for the wetland boardwalk

Recycled composite decking was used for the wetland boardwalk to create an additional teachable moment for visitors on site. Our intention was to showcase sustainable materials in highly trafficked areas as a method to encourage visitors to use similar types of materials in their own construction applications. Incorporating this concept into our site design and features enables the project to garner attention from local businesses and community groups who are also interested in promoting sustainability. All materials and labor to construct the wetland boardwalk were donated through the Lowe's Heroes Program, which identified our mission to promote sustainability and outreach to public schools as main incentives to support our project both financially and through volunteer labor.

Professional Collaboration

Professional expertise was invaluable to both design and implementation in both the design and construction phases of the Education Triangle. By incorporating the knowledge and skill sets of local professionals, we were able to have the highest quality design and construction work while also actively involving more individuals in work on-site. Typically, collaboration with professional firms included off-site professional work paired with on-site work, allowing volunteers to feel the direct benefits of their professional skills by physically implementing parts of the design themselves. By doing so, greater support for the project was built by incorporating private firms and businesses in a meaningful way, which we hope will continue in the future.

Many private businesses donated both time and funding for the project. Engineering expertise for the trails, stream crossing, and road removal was provided by NTH Consultants, Ltd of Detroit, Michigan. This firm provided invaluable guidance during design of site features, and also provided on-site volunteer labor and construction oversight. U.S. Navy Seabees Mobile Construction Battalion 26 completed a one-month training on-site where they received training in project management, mobilization, and construction, while also building many of the built features in the trail system, including the environmental education shelter, the stream crossing, and the accessible trail network. Other local construction firms, such as Mid-American Group, donated time, equipment, and labor, in addition to approving designs and making recommendations for materials and design modifications.

Through collaboration with various professional groups and the involvement of individuals in both technical and physical aspects of design implementation, a coalition of professional “ownership” for the project was fostered. This relationship worked effectively to involve professionals in ways that would encourage place attachment and a sense of fulfillment through volunteerism, in addition to resulting in quality design and construction services in affordable ways for the Refuge. A mutually beneficial relationship resulted between the Refuge and a network of professionals and local businesses that will continue to support the refuge into the future.



Figure 11 Local professionals, such as Lowe’s store employees, U.S. Navy Seabees, and engineers from NTH Consultants, Ltd. were involved in design and construction processes. (right photo: B. Ziegler)

Volunteerism

As discussed above, volunteerism is a powerful mechanism for fostering a sense of fulfillment and attachment to natural places. This concept played a significant role in our strategy to build a coalition of long-term stewardship and a culture of care for the Humbug Marsh Unit, the Refuge, and other natural places. As a result, volunteer activities were incorporated through all phases of design and implementation. Often, service-learning components were integrated into volunteer activities by sharing the unique ecological attributes of the Unit and the remarkable ecological recovery of the Detroit River with volunteers, in conjunction with volunteer activities. This strategy was used to increase the sense of fulfillment and pride felt by volunteers who were contributing to a project on land that carries great cultural and ecological significance.

Volunteers of all ages, skill levels, and dedication levels were actively involved in the project. Volunteer groups included local professionals as discussed above, community members attending public volunteer workdays, court ordered community service groups, high school groups focused on both community service and environmental science, local community groups such as Boy Scout Troops, and local businesses, such as Comcast, who were conducting team building events within their company.



Figure 12 Volunteers ranged in age, time commitment, and skill level. From left to right: the U.S. Navy Seabees included professional equipment operators and project managers; the Linemen's Union from DTE Energy applied their skills in a new way by installing utility poles for use as a railing structure on the rustic stream crossing; community members attended 4-hour volunteer workdays on weekends. (left photo: B. Ziegler)

The inclusion of volunteers throughout the project was successful and incredibly productive due to the following main strategies of volunteer management:

- 1) Volunteer groups were given a finite, discrete project that they could take ownership of and feel proud of upon completing it. This included jobs such ranging from simple tasks, such as

clearing woody debris from the trail footprint in preparation for construction, to completely constructing the environmental education structure.

- 2) Each volunteer group was briefed on their specific task and how it fit into the overall context of the project, the context of the Humbug Marsh Unit in the Refuge, and the context of the Refuge in Southeast Michigan. This was done in order to create meaningful volunteer opportunities that fostered a sense of pride and involvement in a larger movement of conservation and education.
- 3) Volunteers were thanked for their contributions in meaningful ways. A volunteer BBQ was held during the summer of 2008 for all volunteers who had participated in the planning, design, construction, and fundraising phases of the project. Significant speakers, such as Congressman John Dingell and Secretary of the Interior Dirk Kempthorne, attended to extend their thanks to volunteers and to contextualize the regional and national significance of the volunteer work being done within the Refuge. Additionally, a ribbon cutting celebration was held in October, 2008 after the completion of the majority of the project to again thank all volunteers and to celebrate the many volunteer accomplishments with the community. Over 200 individuals attended the celebration, which was held on site in the environmental education shelter. By showcasing the completed trails, boardwalk, and shelter to volunteers and community members, the significant of small and large volunteer contributions could be appreciated as a valuable part of the larger project.

Public Outreach

For those not physically involved in the design and implementation processes taking place on the Education Triangle, news releases and public events were tools used to maintain a connection between community members, local businesses, and the Humbug Marsh Unit. Fundraising events were also used to raise money for Refuge projects, as well as awareness of the project and the significance of the natural features at Humbug Marsh.



Figure 13 Design drawings and illustrative images were shared with community members at a variety of events, such as fundraisers, Lions Club meetings, and public meetings.

Throughout the design and construction phases of the project, the Humbug Marsh Unit was open regularly to the public for open houses and formal education events. Open houses typically occurred on Saturdays and Sundays for approximately 6 hours and were opportunities for community members to visit the Refuge and experience informal interpretation of natural features and future plans for the site from the Park Ranger and Refuge staff. Additionally, formal public outreach events were held on site, such as a children’s photography workshop, early-morning bird watching walks, wildflower tours, and wildlife footprint classes for children. By inviting the community into the site on a regular basis, visitors were able to learn about the site, gain an appreciation for its natural features and ecological significance, and potentially develop a place attachment for the Unit. This was also used as a strategy to encourage future volunteerism or contributions toward the Refuge and the projects being conducted on the site.

Additionally, news releases were frequently used to share accomplishments and future plans for the community through popular press. Small media events were held for events such as the construction of a bald eagle nesting platform on Humbug Island, the construction of the wetland boardwalk with the Navy Seabees and Lowe’s Heroes, and the ribbon cutting celebration.



Figure 14 Special events, such as the construction of the wetland board walk by the Lowe's Heroes volunteer program or the construction of the bald eagle nesting platform on Humbug Island, were shared with the community through news releases to local papers, such as the *Detroit News* or *News-Herald*.

Plans for the design and construction of site features in the Education Triangle were shared with the community at open houses, public meetings, and fundraising events, in an effort to allow for community feedback and build enthusiasm for the work being conducted. By maintaining visibility and accessibility to the public, the community could be involved in the changes and work being conducted in the Education Triangle. We hope this sense of involvement and accessibility contributed to a sense of place attachment and will result in future stewardship and care towards the land.



Figure 15 Community events, such as the Education Triangle Ribbon Cutting, were publicized to all volunteers and community members, to increase feelings of pride and inclusion by the entire community. (photos: D. Mitchell)

Place-Based Education

Place-based education is critical to conveying the unique attributes of the Humbug Marsh Unit to visitors and can range from formal to informal educational actions. This mechanism was integrated into all of the above mechanisms through the consistent communication with and involvement of community members and stakeholders that illuminated the ecological and cultural attributes of the Humbug Marsh Unit that make it truly unique and valuable.

Teaching the significance of a place in local, regional, and global contexts is directly related to fostering a sense of place. By tailoring volunteer activities, open houses, educational interpretation, school group activities, and public outreach to showcase *place*, individuals can begin to value the sense of place present within the Unit, and ultimately a sense of attachment, care and stewardship for it.



Figure 16 Educational activities, such as community events featuring live, local raptors and children's nature programs were catered to specific audiences, educational goals, and times of the year.

CONCLUSION

The mechanisms described here (physical site design, materiality, professional collaboration, volunteerism, public outreach and place-based education) aim to foster the *sense of place* in the Humbug Marsh Unit within community members of all ages and levels of experience in natural areas. Amidst rapid urbanization, an evolving industrial landscape, and dramatic cultural shifts stemming from globalization, the connection between people and natural places has weakened across the United States. As discussed previously, this trend has negative implications for many, but especially children, who are missing the nurturing experiences which occur from time spent in nature. The benefits for children from spending time in nature consist of improved psychological and physical health, as well as sharper social, motor, and creative skills. Startling statistics show how few children of the next generation will experience “the land upon which their food is grown,” let alone wild lands of forests, wetlands, marshes, and prairies (Nabhan and Trimble, 1994). This generation of children will grow up largely without experiences in nature that can serve as the anchor for lifelong conservation and valuation of nature.

Given these trends and realities, landscape designers and land managers are called to reach out to families, communities, and school groups in effort to reconnect everyday citizens, especially children, to nature. This practicum represents a case study that attempts to achieve this goal by communicating the globally unique characteristics of the Humbug Marsh Unit through design, volunteerism, and education. By showcasing the land’s unique attributes, it is hoped that an attachment to place, care towards the land, and an appreciation for the nearby nature existing in this area of southeast Michigan will be cultivated. These developments can ultimately lead to a long term sustainable land ethic and a future generation that is connected with nature and more likely to make choices and lifestyle decisions that enable environmental sustainability.

As landscape designers, it is important to understand that reconnecting people with nature cannot be achieved exclusively through design of physical spaces. However, design can be used as a powerful tool to showcase sense of place, which can ultimately result in a place attachment and culture of care towards natural areas. At best, designers can create opportunities for people to interact with nature and develop their own experiences within a designed framework, and nature must do the rest of the work to build a connection with people. It is this connection and attachment that can result in greater stewardship for land and, ideally, a sustainable land ethic within future generations.

The strategies presented in this practicum are intended to illuminate ways for the design and construction of features in publicly accessible natural areas to enhance interaction with people and nature in meaningful ways. This will hopefully enhance the feelings of place attachment felt by the people involved, and build stewardship for the Refuge. These strategies will be adapted to future projects in the Refuge, as our goal of connecting surrounding communities with land in the Refuge and cultivating a culture of conservation and sustainable living continues to build momentum.

During the year in which this practicum was conducted, volunteerism generally increased in the Refuge, as well as participation in public events, such as open houses or educational programs. This was largely

the result of the dedication and public outreach efforts by all of the staff at the Refuge, who greatly value the goal of connecting people with nature. Similarly, fundraising efforts, through grants as well as individual and business donations, were very successful. Overtime, through continued volunteerism, stewardship activities, educational programs, and opportunities for community members to experience the unique cultural and ecological attributes of land in the Refuge, a strong coalition of supporters for natural spaces along the Detroit River will grow. If this occurs in conjunction with similar efforts in other natural areas, a strong connection between people and nature, which has mutual benefits for both, can evolve into a sustainable land ethic in which people and nature exist harmoniously.

"For ourselves, and for our planet, we must be both strong and strongly connected – with each other, with the earth. As children, we need time to wander, to be outside, to nibble on icicles and watch ants, to build with dirt and sticks in a hollow of the earth, to lie back and contemplate clouds and chickadees. These simple acts forge the connections that define a land of one's own. With these childhood experiences we begin. They form the secure foundation to which we return again and again in our struggle to be strong and connected, to be complete" (Nabhan and Trimble, 1994).

What's next

The strategies discussed here will be adapted and used in the Humbug Marsh Unit during the summer of 2009, during which interpretive panels will be installed along the trail network, additional trails will be designed and constructed, and unique experiences of the old growth oak-hickory forest and the cattail marshes in the central portion of the Unit will be fostered through design and construction of additional public- outreach infrastructure.

Appendix 1. Project Timeline from January 2008 – January 2009

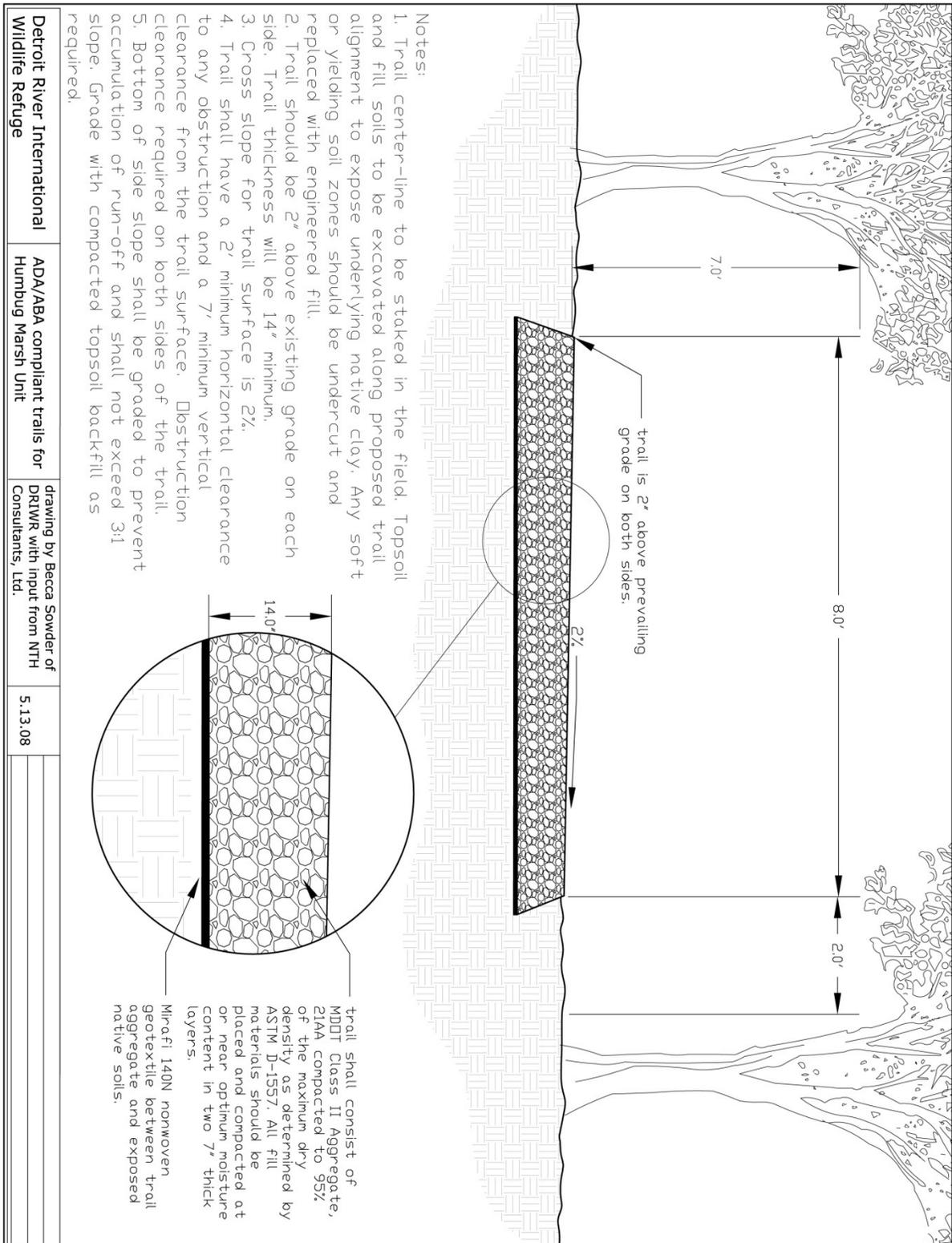
	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
site analysis	■	■										
site design		■	■	■								
public meetings to share design			■	■	■	■						
professional collaboration on design details			■	■	■	■	■	■	■	■		
development of construction details					■	■	■	■	■	■		
construction of trails, environmental education shelter, and wetland boardwalk						■	■	■				
construction of bald eagle nesting platform								■				
construction of stream crossing										■		
ribbon cutting celebration										■		
public outreach & educational events	■	■	■	■	■	■	■	■	■	■	■	■
fundraising efforts	■	■	■	■	■	■	■	■	■	■	■	■

Appendix 2. Project partners supporting the Education Triangle & Humbug Marsh Unit

American Drilling and Testing
AT&T
BASF Corporation
Carbon Credit Environmental Service, Inc.
City of Gibraltar
City of Trenton
Comcast
Community Foundation for Southeast Michigan's GreenWays Initiative
Congressman John D. Dingell
Detroit Edison's Monroe, Trenton and River Rouge Power Plants
Disposal Management
Downriver CAER Council
Downriver Community Conference
Environmental Quality Company
General Motors Corporation
George Mans Family
Great Lakes Aggregates
Grosse Ile Township
Hoppert Farms
International Brotherhood of Electrical Workers Local 17
Inland Waters
International Wildlife Refuge Alliance
ITC Holdings Corp.
John Carlo, Inc.
Kappan Tree Service
Klochko Equipment Rental
La-Z-Boy
Logs to Lumber and Beyond
Lowe's Companies, Inc.
MPS Group
Masserant Farms
Metropolitan Affairs Coalition
Mid-American Group
Molly Luempert-Coy
National City Bank
Osburn Industries, Inc.
Pointe Mouillee Waterfowl Festival
Praxair
Rotary Club of Trenton
Steven Szczytko
Stoneco
Summit Academy
Total Community Credit Union
Utility Workers Union of America Local 223
Wilson Trucking and Excavation, LLC
Young's Environmental Cleanup Inc.

Appendix 3. Design Details

Accessible trail network:



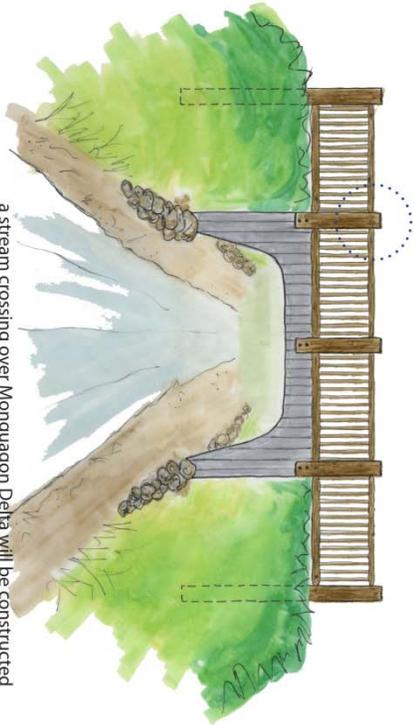
Detroit River International Wildlife Refuge

ADA/ABA compliant trails for Humbug Marsh Unit

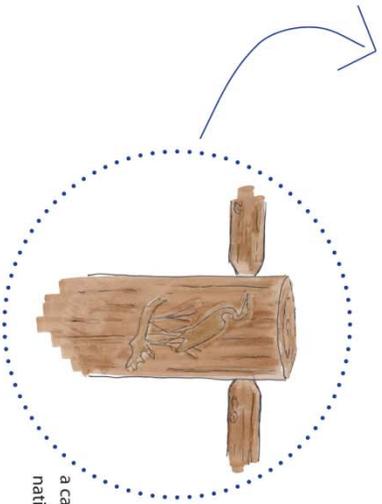
Drawing by Becca Sowder of DRIWR with input from NTH Consultants, Ltd.

5.13.08

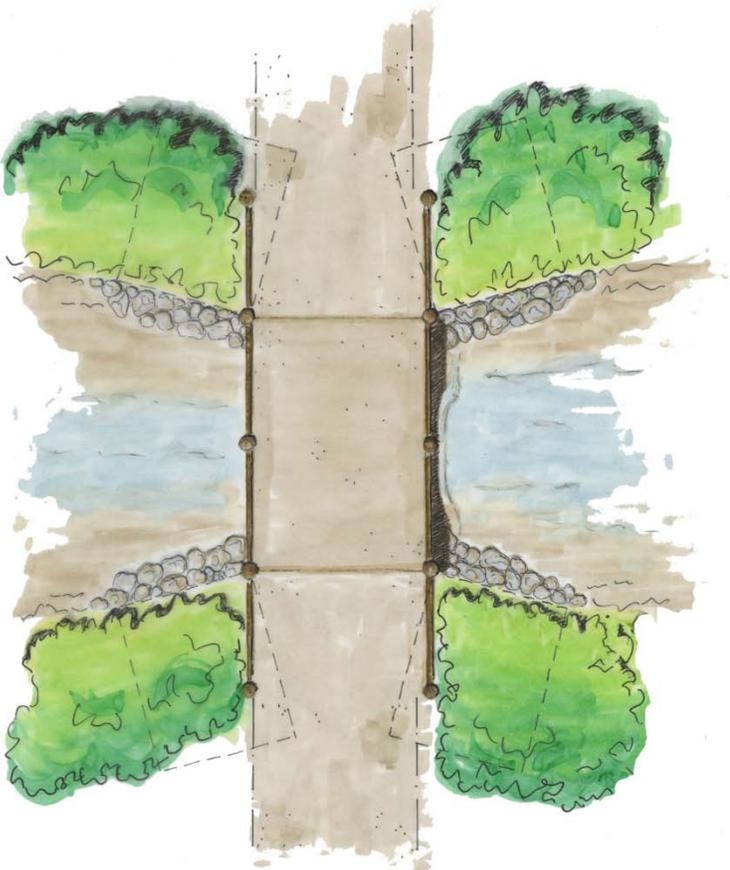
Monguagon Drain stream crossing
 Humbug Marsh, 2008
 Detroit River International Wildlife Refuge



a stream crossing over Monguagon Delta will be constructed out of an aluminum box culvert, mechanically stabilized earth walls, recycled utility poles, and reclaimed ash trees



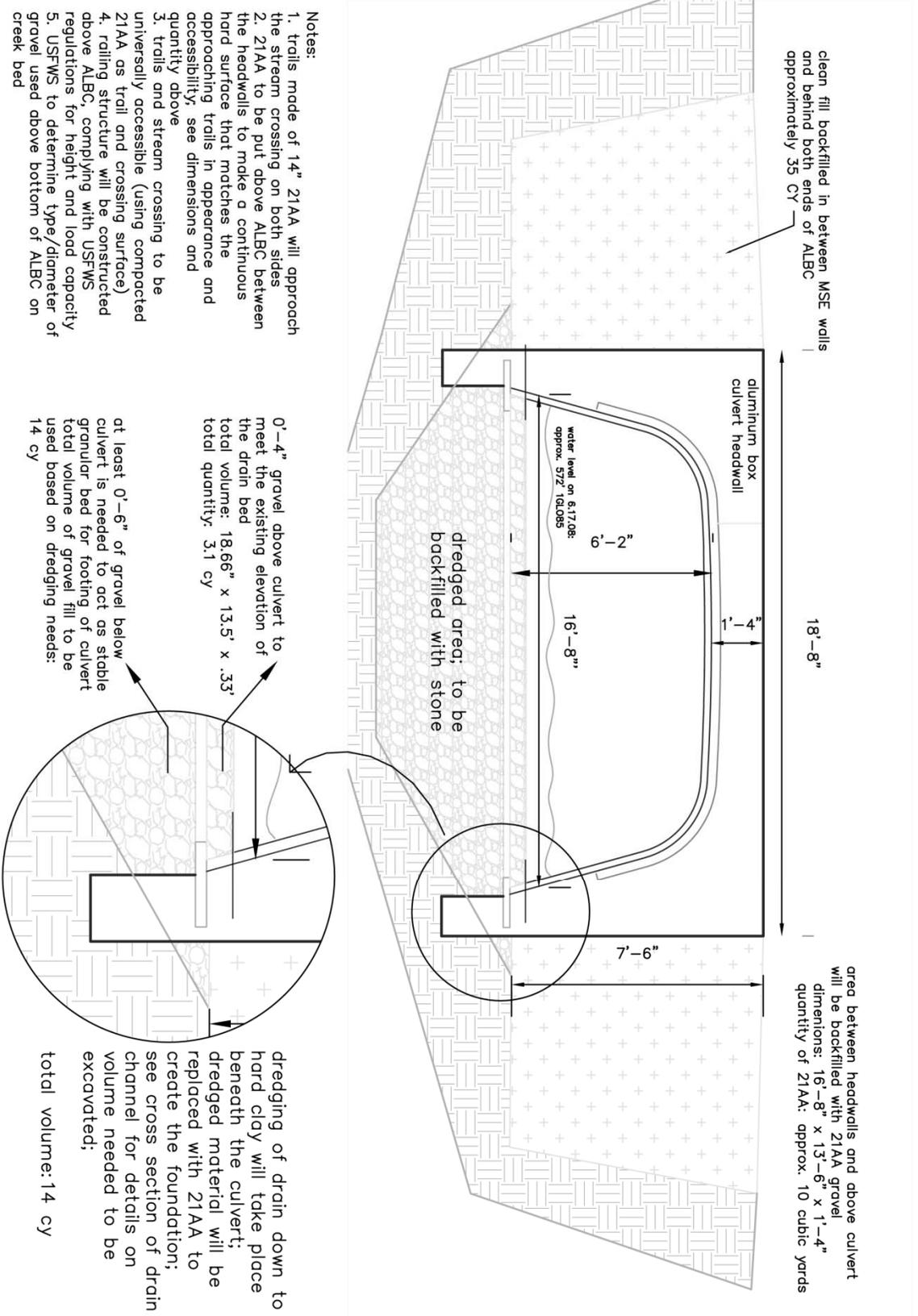
a carving detail on utility poles will highlight native species of plants and animals



the crossing will be seamlessly integrated into the adjacent walking trails, made out of recycled crushed concrete

Stream crossing:

Stream crossing (cont):



Detroit River International Wildlife Refuge

Monguagon drain crossing for Humbug Marsh Unit

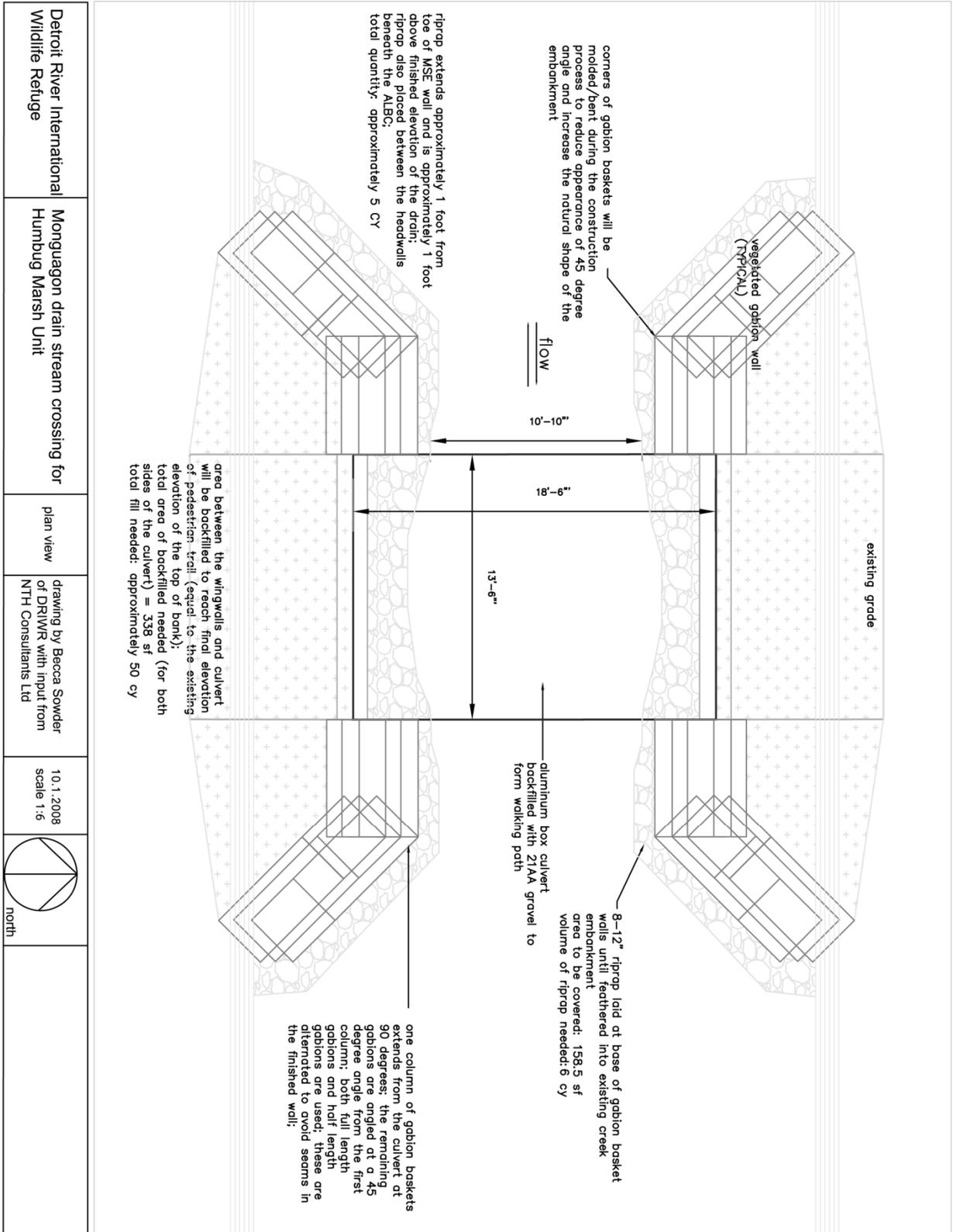


drawing by Becca Sowder of DRWR

7.12.08

scale 1:4

Stream crossing (cont):



Stream crossing (cont):

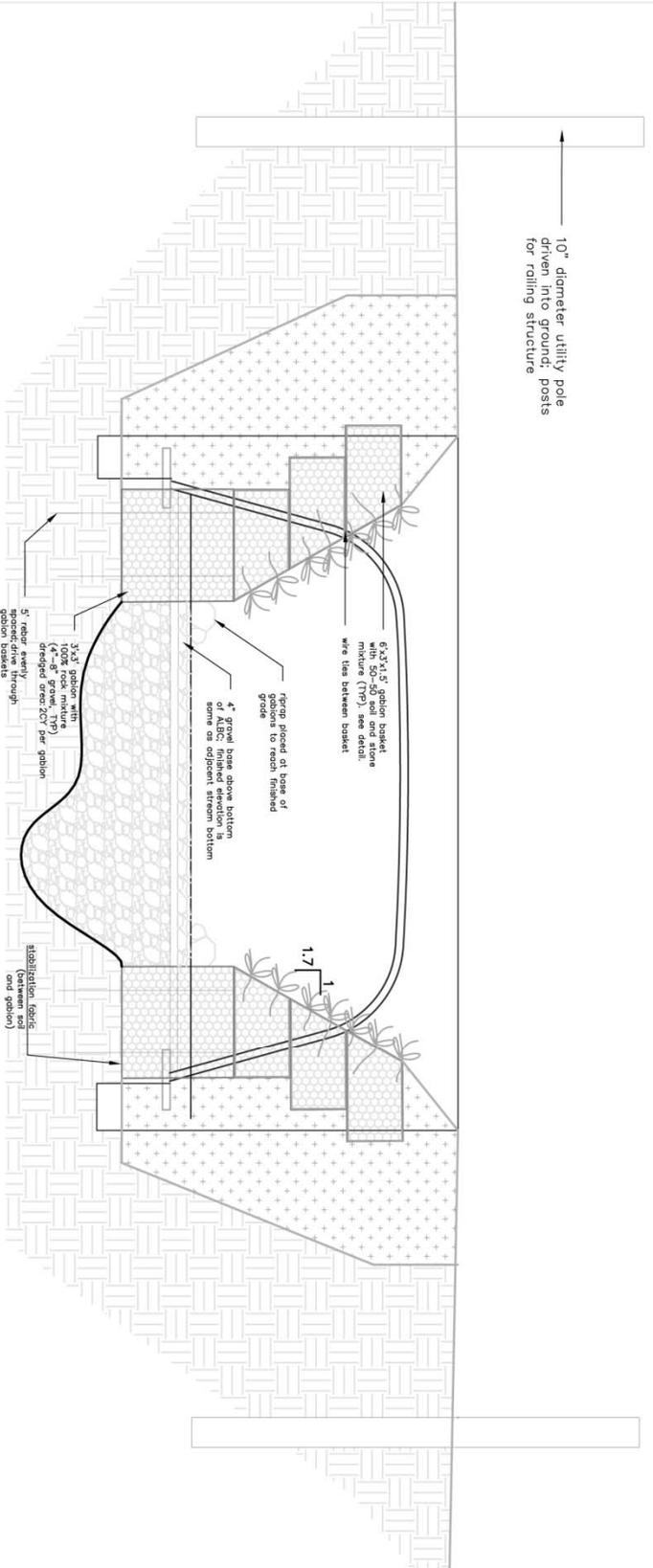
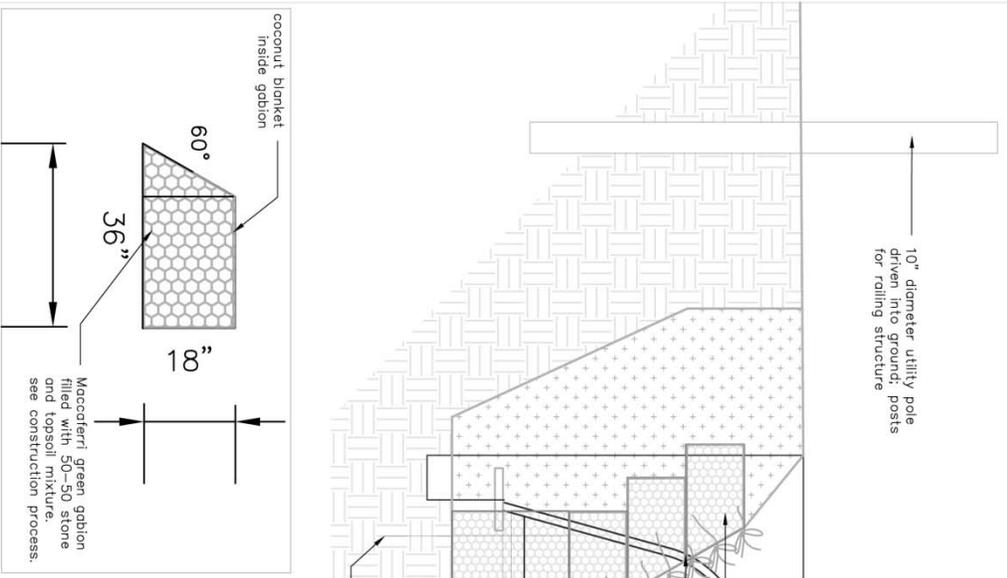
Detroit River International Wildlife Refuge

Monguagon drain stream crossing for Humbug Marsh Unit

vegetated gabion wing walls

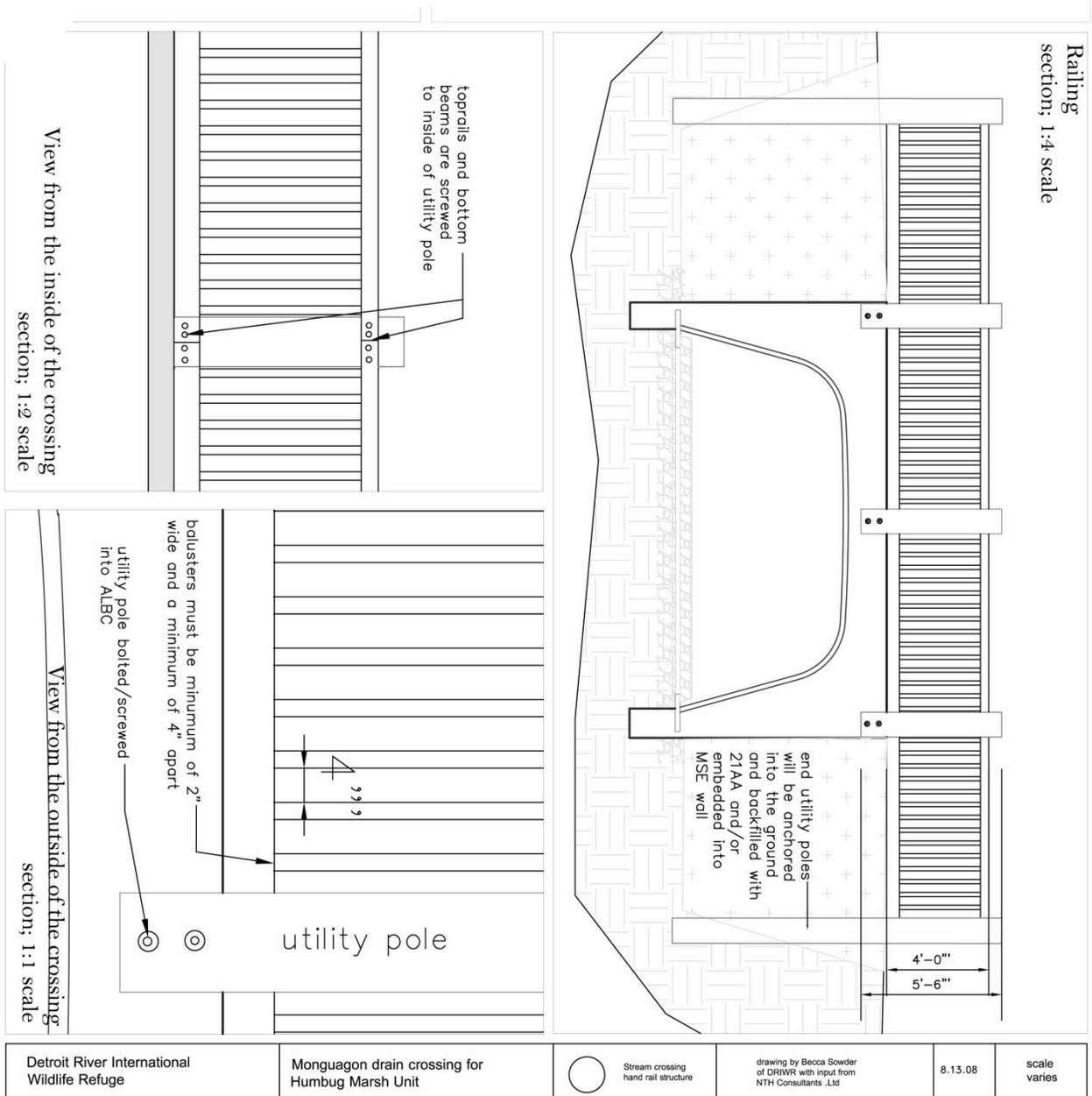
10.1.08

scale 1:4



- Vegetated gabions construction process:
1. Excavate the existing grade to the required elevation and place stabilization fabric beneath and behind the base gabion. Fill gabion with 4"-8" limestone fill and place another layer of stabilization fabric directly on top of the completed gabion.
 2. Assemble vegetated gabions per manufacturer's specification. Place first layer of vegetated gabion above the base gabion so that the edges are flush. Fill vegetated gabion halfway with 50-50 mixture of soil and stone. Backfill with clean fill between cut bank and back of gabions. Keep backfill at the same elevation as the gabion structure.
 3. Compact soil and stone mixture in vegetated gabion. Place seedlings on face of gabion, on top of soil-stone layer per nursery's specifications.
 4. Fill remainder of vegetated gabion with the same soil and stone mixture, compact to top edge of vegetated gabion and close by approved method.
 5. Place another layer of seedlings on top of the vegetated gabion and cover with soil only. Water seedlings.
 6. Repeat steps 2-5 until top of structure elevation is reached. No seedlings are required on top of the last vegetated gabion layer. Seed mix will be used above gabions as specified by vegetation plan.

Stream crossing (cont):



Fostering conservation and environmental stewardship in the industrial heartland: Investing in *sense of place* as a tool for sustainability on the Detroit River's Humbug Marsh

Brecca Semler, Masters of Landscape Architecture candidate, 2009
University of Michigan School of Natural Resources and Environment
Spring 2009

INTRODUCTION



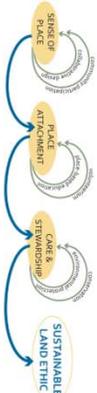
Landscape architects are empowered with tools that can help address the most pressing environmental quality requirements. Through design, in the face of urgent demands such as global climate change, conservation, and the need to address environmental patterns that displace community rather than build it, designers have an opportunity to use their skills to guide communities through their most significant cultural and ecological patterns.

The physical, visual, and psychological experiences that people have with their environment are a significant part of their lives. Thus, designers, who can shape their experience of landscape, can play a significant role in building a sense of place. Landscape architects strive for this by designing spaces that celebrate unique attributes or sacred places that are relative to humans.

In this project, located on the Humbug Marsh, the Detroit River International Wildlife Refuge, landscape architects are working to foster a sense of place through construction as a tool for achieving a more sustainable relationship between people and the environment.

CONCEPT

Between people and places and between people and nature, there is a complex relationship. The concept of *sense of place* is a tool for achieving a more sustainable relationship between people and the environment. The idea model is based for users to make both people and place benefits from the project and a stronger sense of place through construction, care and place.



CONTEXT

DETROIT RIVER INTERNATIONAL WILDLIFE REFUGE
The Detroit River and western Lake St. Clair is the heart of the Great Lakes basin, support a great diversity of animals and the waters they depend on. The Detroit River International Wildlife Refuge is a 1,000-acre refuge that includes 100 acres of riparian habitat, including many important conservation values. One of the most important values is the Detroit River International Wildlife Refuge, which is a 100-acre refuge that includes 100 acres of riparian habitat, including many important conservation values.



HUMBUG MARSH UNIT: The Humbug Marsh Unit is a 100-acre refuge that includes 100 acres of riparian habitat, including many important conservation values. The Humbug Marsh Unit is a 100-acre refuge that includes 100 acres of riparian habitat, including many important conservation values.

DESIGN GOAL:

Create the first phase of a community-based center for environmental learning in the Humbug Marsh Unit that meets the Refuge's goals of becoming a national and regional exemplar of sustainability for education, resource conservation, water conservation and stormwater management, wildlife management, transportation/recreation, the financial environment, and architectural character.

OBJECTIVES for site design + implementation:

- design a space that minimally impacts the area's natural resources while providing opportunities for visitors to observe, explore, and learn from the diverse ecological features that currently exist on the site
- engage in a collaborative design and construction process that values the local knowledge of citizens and which responds to the local context of the area
- communicate with the community and local businesses throughout the design and construction process to promote a sense of involvement, while celebrating accomplishments made with volunteer and community-based support
- showcase innovative re-use of materials as a step towards sustainability and create teachable moments for individuals who experience the site both during and after design implementation

Mechanisms for fostering *sense of place*: applications for promoting a responsible + sustainable lived ethic during Phase One

PHYSICAL SITE DESIGN



- Maximize opportunities for education about the ecological significance of natural places
- Minimize the impact on natural systems and communities throughout construction and general use of the site

MATERIALITY



- Use recycled materials in the design and construction process to promote a sense of involvement, while celebrating accomplishments made with volunteer and community-based support
- Use recycled materials in the design and construction process to promote a sense of involvement, while celebrating accomplishments made with volunteer and community-based support

PROFESSIONAL COLLABORATION



- Local engineering firm donated time for structural engineering of trails, stream crossing and road removal
- Local landscape architect donated time for landscape design and construction management
- Local landscape architect donated time for landscape design and construction management
- Local landscape architect donated time for landscape design and construction management

VOLUNTEERISM



- Maximize opportunities for education about the ecological significance of natural places
- Minimize the impact on natural systems and communities throughout construction and general use of the site

PUBLIC OUTREACH



- Use recycled materials in the design and construction process to promote a sense of involvement, while celebrating accomplishments made with volunteer and community-based support
- Use recycled materials in the design and construction process to promote a sense of involvement, while celebrating accomplishments made with volunteer and community-based support

PLACE-BASED EDUCATION



- Local engineering firm donated time for structural engineering of trails, stream crossing and road removal
- Local landscape architect donated time for landscape design and construction management
- Local landscape architect donated time for landscape design and construction management
- Local landscape architect donated time for landscape design and construction management



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