



# Crossroads at Big Creek

LEARNING CENTER NATURE PRESERVE

## Ecological Restoration Plan: Main Campus – Succession in Progress

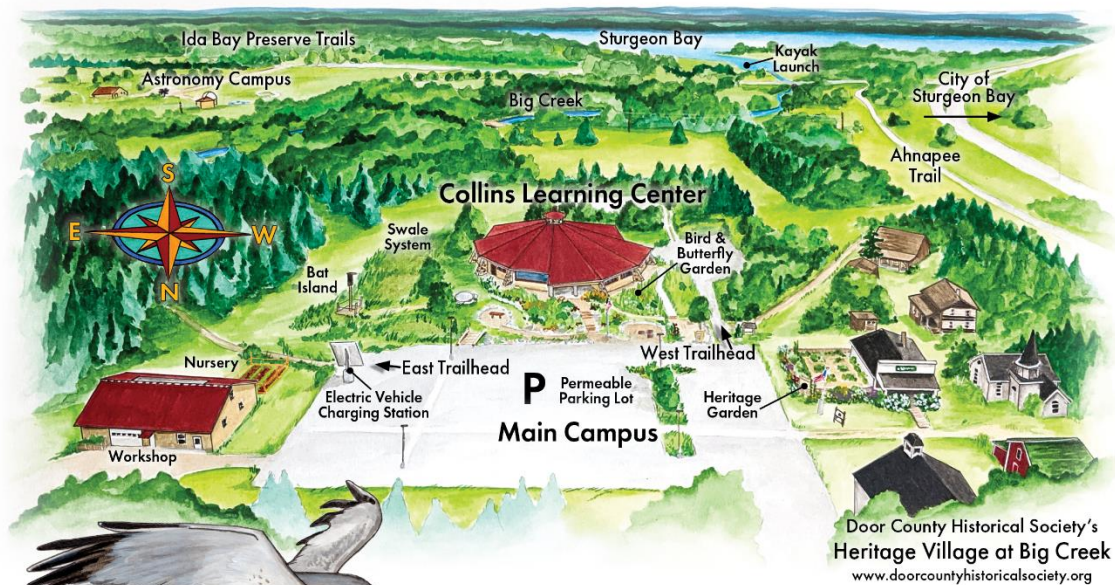
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Prepared by Elizabeth Metz  
ecmetz93@gmail.com



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# Welcome to Crossroads at Big Creek



## Habitat Trails

## Introduction:

Crossroads at Big Creek is an important part of the Sturgeon Bay community. It is well known by locals and used as a landmark of Sturgeon Bay. The main campus is where visitors are able to take advantage of all of the services and events run by Crossroads. This area has the potential to make a good first impression on visitors and be the blueprint for the best land restoration practices.

Crossroads is a nature preserve that accommodates multiple habitat types across the entirety of the preserve. The different areas and habitats of Crossroads showcase ecological succession in action. There are five habitats of concern on the main campus: the meadow, the bioswale and front garden, the southwest shrub area, the roadside, and the nursery. Each of these habitats lack cohesion with one another; they currently do not provide a natural corridor between habitat types. This project will seek to create a unified landscape that displays ecological succession and the best land restoration practices that further express the connectedness of habitats at Crossroads (see Figure 1). Value as a landmark, as a recreational area, and as a place to learn something new is why Crossroads deserves to have a beautiful, biodiverse main campus that will make it an example of what nature preserves should be.



**Figure 1: Map of Crossroads Main Campus displaying habitat sections and suggested natural communities.**

## History of Main Campus Landscape:

The history of this project site is readable in the landscape. The disconnected appearance of the habitats within the main campus project area are best explained by human activity. There are obvious markers of human use such as the parking lot and buildings (see Figure 2). The surrounding areas are where the transition from human activity to land restoration must be read from the landscape. Crossroads' main building, the Collins Learning Center, is the focal point where the unnatural topography begins. The increased elevation of the building is evidence of a cut-and-fill operation that affects the area surrounding it.



**Figure 2: Photograph of the oversized parking lot of the Main Campus.**

The roadside area holds a mix of native and invasive species; this is evidence of natives that survived the construction of the parking lot and of the invasives that took advantage of the disturbance. The bioswale and garden host beautiful native forbs that are evidence of the hard work of volunteers, yet this section does not currently resemble a native community. There are patches within the garden that look like a bald spot of low-growing grass amidst the towering native forbs. The bioswale suffers from decreasing diversity from the south to north ends (see Figure 3). The nursery is a more recent addition but became unnoticeable by the growing number of native plants that surround it.

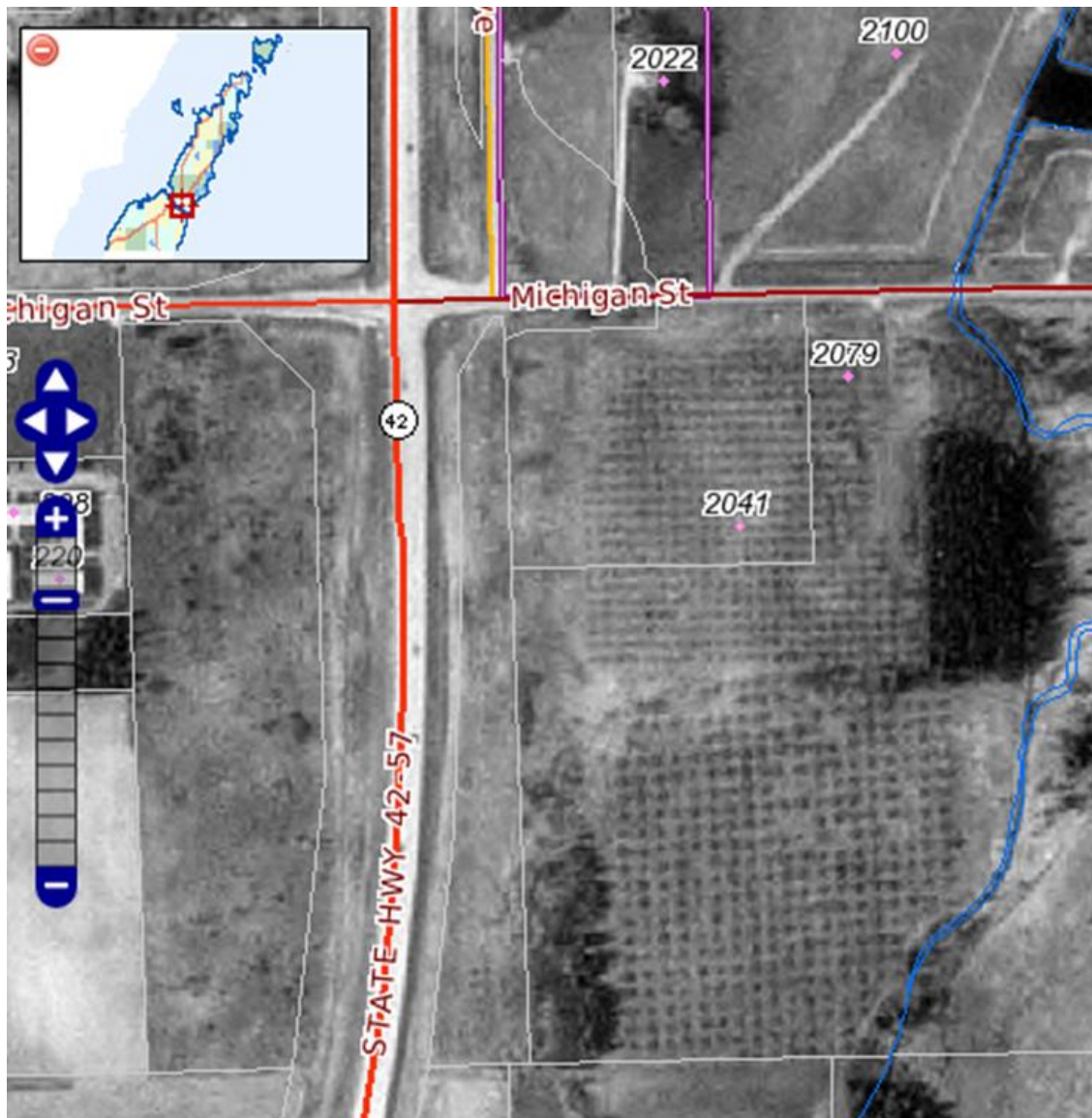


**Figure 3: Photograph displaying a monoculture of native northern bush-honeysuckle (*Diervilla spp.*) within the bioswale.**

The hard line that appears between meadow and forest is evidence of past farming activity. The line can be seen when walking in the meadow, looking down the tree line. This line is also obvious on aerial photos or satellite images. The landscape transforms from meadow into trees with no shrubby succession in between. The southwest corner of the main campus continues the straight tree line while displaying native shrub succession. Proof that these field observations are related to farming is found in historic aerial photos from before Crossroads was purchased; those photos show that the main campus used to be utilized as an orchard (see Figure 4).

The meadow contains evidence of human manipulation. There are pockets of wet areas throughout the meadow that dip down and touch bedrock in some places. These pockets wind through the meadow and stretch behind the main building. The lack of plant coverage mid-slope hints that these features are unnatural (see Figure 5); the evenness in the number of invasive and native species of these pockets also expresses the youth of the landscape. Species that prefer wetter conditions are found in the base of the pockets including cattails (*Typha spp.*), phragmites (*Phragmites australis*), and scirpus (*Scirpus spp.*). The upper edge of the scrapes has species that prefer a dry-mesic area including species such as black eyed susan (*Rudbeckia hirta*). Reading this landscape provides the conclusion that the pockets are scrapes, created by humans to help

control the flow of water from the parking lot and redirect it from around the building. It shows evidence of some prior management and the clear need for further restoration to a more evident community such as alder thicket or northern sedge meadow.



**Figure 4: Historic aerial photograph of Crossroads' Main Campus displaying prior use as an orchard.**



**Figure 5: Photograph displaying bare ground along one of the wet scrapes.**

### **Vision of the Future:**

The Crossroads and Sturgeon Bay community will be the biggest beneficiary of this project. This project seeks to create an appealing and biodiverse landscape for the enjoyment and education of all visitors of Crossroads. Pollinators will have an abundant source of nourishment and birds and mammals will have fully connected natural corridors for them to navigate where they need to go. The restoration will not be complete without the help of volunteers, and it is hoped that the community will be able to feel as though they are empowered to help change their world for the better.

The main campus is currently at a tipping point that restoration will be able to shift forward to a healthier habitat. The hope for this plan is to see the Crossroads main campus become a prime example of the best restoration practices, biodiversity, and natural ecological succession. Invasive species removal takes priority, followed by planting a variety of native species. Increasing the biodiversity and ecological value in all areas of concern is the main goal of this project.

The future main campus of Crossroads will display a healthy ecological succession from meadow to northern mesic forest with a vibrant nursery displaying the land manager's hard work

and an alluring pollinator garden on display in the entrance's garden, roadside habitat, and bioswales. The meadow will have invasive species removed and native species added to create a wet to dry-mesic meadow with upland shrubs, such as chokecherry (*Prunus virginiana*), at the edge to make a soft transition to the northern mesic forest expected of the area. The softer edge will provide natural corridors for animal stakeholders to traverse. The roadside habitat will have invasives removed and native pollinator species added to increase biodiversity and human curiosity of the colorful area just off the side of the road. The ideal future would have a second bioswale added to the porous pavement of the parking lot. A second bioswale will help to create an appearance of a more connected habitat. This new bioswale will be put along the parking spaces on the northeast side of the lot to help remediate runoff and be built to be compatible with the porous pavement system. The new and old bioswales along with the front garden will be reorganized and filled with native pollinator species to be sure to attract the attention of pollinators and humans alike. The shrub transition in the southwest corner will be cleared of invasive buckthorn (*Rhamnus spp.*, see Figure 6) and may either become an example of shrubby succession or see further clearing to connect the main campus meadow with the meadow further down the trail; native species should be planted over the gravel patches near the septic system and behind the learning center to make the trailhead more obvious and further enhance the connection between the habitats. The nursery will receive signage indicating the work being done to make Crossroads a self-sustaining preserve. Trailheads will be more clearly marked with markers facing out from the trails with posts and markers placed above the plant growth.



**Figure 6: Photograph of glossy buckthorn (*Rhamnus frangula*).**



## Restoration Plan Implementation:

The main campus project site will require an even amount of invasive and native species control and management. Both invasive species removal and planting and seeding of native species could be performed in tandem; however, invasive and native management will be discussed separately for the ease of understanding.

There are five invasive species of concern on site: reed canary grass (*Phalaris arundinacea*), phragmites (*Phragmites australis*), cattails (*Typha spp.*, see Figure 7), Canada thistle (*Cirsium arvense*), and buckthorn (*Rhamnus spp.*). The meadow area contains the majority of invasives located on the main campus. Reed canary grass (*Phalaris arundinacea*) is of highest concern as it forms dense patches, preventing any other species from growing there. This grass can also be found along the roadside habitat in front of the parking lot and should be controlled there as well. Phragmites (*Phragmites australis*) and cattails (*Typha spp.*) can be found in the wet pockets of the scrapes within the meadow. They blanket the pockets and leave no room for native communities to grow. Canada thistle (*Cirsium arvense*) can be found scattered in the meadow. It is fast growing, allowing it to outcompete native species for resources. Buckthorn (*Rhamnus spp.*) fills the shrubby area to the southwest. It is located in an area with many native trees and shrubs. If the buckthorn (*Rhamnus spp.*) continues to grow, it will prevent those native species from reproducing, shading out their saplings and preventing their growth by allelopathy, releasing chemicals that harm and hinder any other species' growth.



**Figure 7: Photograph of cattails (*Typha spp.*) filling the base of a wet scrape.**

Recommendations for invasive species management will be as follows. Reed canary grass (*Phalaris arundinacea*) takes the highest priority and can be controlled through future seed heading and use of bundling and herbicide techniques. Phragmites (*Phragmites australis*) and cattails (*Typha spp.*) can be managed through physical removal or careful use of herbicide. Canada thistle (*Cirsium arvense*) may easily be removed through manual means without the need for herbicide. It is a good candidate for volunteer work in invasive species removal. Buckthorn (*Rhamnus spp.*) can be removed by cut and treat techniques. Those that are small may be pulled out manually.

In tandem, native species are needed to increase the biodiversity of the main campus that will attract pollinators and create a smooth successional transition from meadow to forest. Reference communities for the following suggestions are taken from the WDNR website (<https://dnr.wi.gov/topic/endangeredresources/communities.asp>) and include Alder Thicket, Northern Sedge Meadow, Dry-mesic Prairie, Mesic Prairie, and Wet-mesic Prairie.

The main zone of focus will be the meadow surrounding the learning center. Incorporating loamy soil to promote native growth within the bare areas in the scrapes will be an important task to increase biodiversity; the gravel patches should receive similar treatment. The front garden and bioswale should receive an increase in planting of native pollinator species. Showy species will attract pollinators and human attention. It is important to increase the biodiversity of these areas as the current landscape lacks functionality and is unappealing. The shrub area will change depending on the removal of buckthorn (*Rhamnus spp.*) and work done with the dead ash (*Fraxinus spp.*) trees. Removal of buckthorn (*Rhamnus spp.*) is needed throughout the entire area. The ash (*Fraxinus spp.*) trees will need to be investigated to determine whether they are best left standing to provide structure and roosts for bats and owls or are felled and left to create nurse logs and habitat (see Figure 8). The future habitat of this area will be determined after analyzing the leftover amount of open space. This area and the subsequent gravel lot next to it may either be kept as a shrubby succession area or require some native removal to connect the main campus meadow to the meadow habitat further down the trail. Finally, the nursery should receive some additional pollinators in the forbs that surround it and signage facing the parking lot in order to attract attention and explain Crossroads' sustainable practices and land restoration efforts.

Native species that will benefit the main campus' biodiversity vary by each section of interest. The meadow edge will benefit from a mix of upland shrubland and prairie species; the meadow itself will benefit from prairie and sedge meadow species, depending on the hydrology of the soils. Species to include, but not be limited to, consist of scirpus (*Scirpus spp.*) and blue-joint grass (*Calamagrostis canadensis*), new england aster (*Symphotrichum novae-angliae*), coneflower (*Ratibida spp.*, see Figure 9), boneset (*Eupatorium perfoliatum*), stiff goldenrod (*Solidago rigida*), swamp milkweed (*Asclepias incarnata*), red-osier dogwoods (*Cornus sericia*) and viburnums such as cranberry (*Viburnum opulus*) and nannyberry (*Viburnum lentago*).



**Figure 8: Photograph of standing dead ash (*Fraxinus* spp.) trees.**



**Figure 9: Photograph of prairie coneflowers (*Ratibida pinnata*).**

The roadside habitat, nursery front, bioswale and garden should receive an increase in native pollinator species. The bioswale and garden will benefit from human organization. Grass species such as bluestem (*Andropogon spp.*) and indian grass (*Sorghastrum nutans*) should be planted in the middle of the gardens to provide structure for forbs. Flowering plants such as coneflowers (*Ratibida spp.*), spiderwort (*Tradescantia ohioensis*), and goldenrods (*Solidago spp.*) should be planted mid-garden. The outskirts of the garden should contain shorter or stiffer species, such as monarda (*Monarda fistulosa*), so that the paths leading to the learning center are not overgrown. While being a more manipulated landscape, the bioswale and garden have the potential to draw people in and display biodiversity and the best practices of ecological restoration.

## **Transition to Land Management**

There are simple tasks that can be performed to continue to restore and manage the landscape over time. The main goal of managing the main campus will be to continue invasive species removal in all areas of interest. The land manager and hired or contracted workers should focus on the most troublesome invasives such as reed canary grass (*Phalaris arundinacea*) found mainly in the roadside and meadow habitats. Volunteer work, such as performed by Habitat Healers, should be used to remove invasives such as Canada thistle (*Cirsium arvense*). Volunteer work would also be a good source of labor for continuing to plant native species and increasing the biodiversity of the restoration.

Success can be measured by using photographs and the general appearance of the landscape over time. The disappearance of invasive species and appearance of a colorful field of pollinators and native forbs will provide visual evidence of an increase in native biodiversity. The meadow and native shrub area will have a visually smooth transition displaying natural succession from meadow to forest. The amount of work needed to be done will also decrease as biodiversity and ecological function returns to the area.

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### Table of Recommended Plants:

Plant Type	Common Name	Scientific Name	Associated Community
Forbs	New England Aster	<i>Symphotrichum novae-angliae</i>	Alder Thicket, Wet-Mesic Prairie
Forbs	Boneset	<i>Eupatorium perfoliatum</i>	Alder Thicket, Wet-Mesic Prairie
Forbs	Stiff Goldenrod	<i>Solidago Rigida</i>	Wet-Mesic Prairie
Forbs	Swamp Milkweed	<i>Asclepias incarnata</i>	Wet-Mesic Prairie
Forbs	Prairie Coneflowers	<i>Ratibida pinnata</i>	Mesic Prairie
Forbs	Spiderwort	<i>Tradescantia ohioensis</i>	Mesic Prairie
Forbs	Bee-Balm	<i>Monarda fistulosa</i>	Mesic Prairie
Graminoids	Wool-Grass	<i>Scirpus cyperinus</i>	Northern Sedge Meadow
Graminoids	Canada Blue-Joint Grass	<i>Calamagrostis canadensis</i>	Alder Thicket, Northern Sedge Meadow
Graminoids	Prairie Drop-Seed	<i>Sporobolus heterolepis</i>	Dry-Mesic Prairie, Mesic Prairie
Graminoids	Big Bluestem	<i>Andropogon gerardii</i>	Dry-Mesic Prairie, Mesic Prairie
Graminoids	Little Bluestem	<i>Andropogon scoparius</i>	Mesic Prairie
Graminoids	Indian Grass	<i>Sorghastrum nutans</i>	Dry-Mesic Prairie, Mesic Prairie
Shrubs	Red-Osier Dogwood	<i>Cornus sericea</i>	Alder Thicket
Shrubs	Cranberry Viburnum	<i>Viburnum opulus</i>	Alder Thicket
Shrubs	Nannyberry	<i>Viburnum lentago</i>	Alder Thicket