Growing Up(hill):
Celebrating Succession

Written by Emily Sautebin

Prepared for Crossroads at Big Creek

Excerpt from "Rush" by Emily Sautebin

She told me you like to be trampled.

I have a lot to learn from you,
you who are bent and born again.

We see your up, up, up
but not the power below.

When Change rushes by,
you're brave enough
to wave and whisper
"Hello."

This ecological restoration plan seeks to celebrate change. A restorationist's job is to catalyze the process of succession.

"Succession (ecological) – the process or pattern of replacement or development of an ecosystem after disturbance" (6).

My hope is that the Crossroads community is inspired by this plan and uses its message to guide the restoration of my site.

Introduction
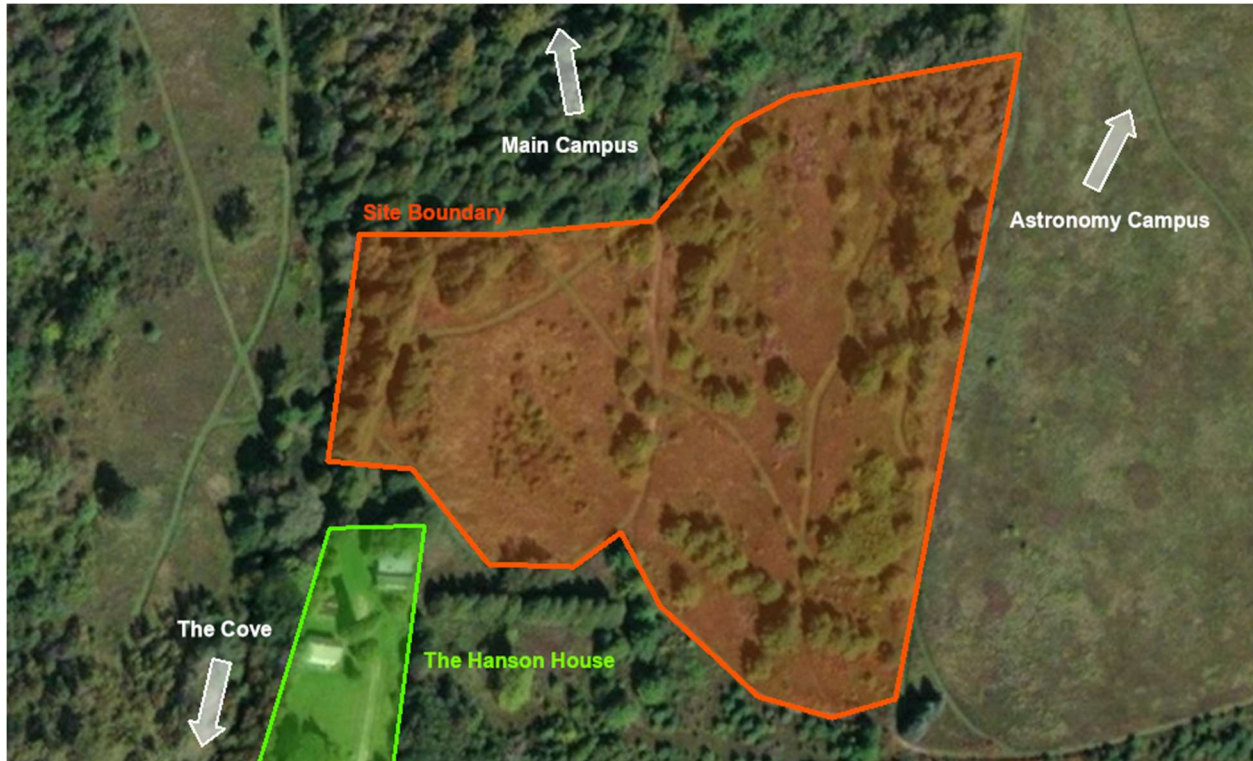
As a student attending the Land Restoration School at Crossroads, I had the opportunity to create an ecological restoration plan.

The area I chose to write an ecological restoration plan for is located within Crossroads at Big Creek (Crossroads), a nature preserve in the city of Sturgeon Bay in Door County, Wisconsin. Door County's bedrock is a rock called dolomite, and it dates back hundreds of millions of years to the Silurian period. Evidence of the peninsula's geologic history can be found near the site. Fossils, such as the coral shown below, suggest the presence of the warm Silurian Sea (5).
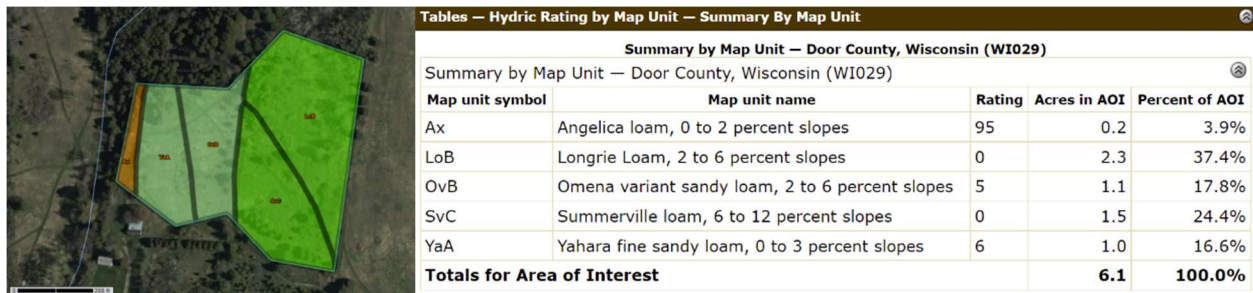

Roughly four of the site's six acres are owned by Crossroads, and the other two are owned by the Sturgeon Bay School District. The Sturgeon Bay School District owns the parcel outlined in yellow in the image above. The site's western border is Big Creek, and its eastern border is a trail that looks out onto the Astronomy Campus, which is perched on a hill above the stream.

The site is situated within Big Creek's watershed. To the south, Big Creek flows into Sturgeon Bay at Crossroads' The Cove Preserve. Successful archeological digs at The Cove point to the region's legacy as a home of Native peoples. The Hanson House, a historical landmark, sits near the southwestern corner of the site. Today, visitors enjoy wandering the trails that stretch across the hillside.

I chose this area because I liked its inherent variety and its position in the landscape. Its topography is pleasantly dramatic, and its pockets of forest create exciting views. Five unique types of soil, shown in the image below, can be found. The soil is more hydric (wetter) closer to Big Creek (12), and Door County's GIS tool shows a wetland that hugs the stream (4). The wetland is colored blue in the image above.

Tables — Hydric Rating by Map Unit — Summary By Map Unit

Summary by Map Unit — Door County, Wisconsin (WI029)

Summary by Map Unit — Door County, Wisconsin (WI029)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Ax	Angelica loam, 0 to 2 percent slopes	95	0.2	3.9%
LoB	Longrie Loam, 2 to 6 percent slopes	0	2.3	37.4%
OvB	Omena variant sandy loam, 2 to 6 percent slopes	5	1.1	17.8%
SvC	Summerville loam, 6 to 12 percent slopes	0	1.5	24.4%
YaA	Yahara fine sandy loam, 0 to 3 percent slopes	6	1.0	16.6%
Totals for Area of Interest			**6.1**	**100.0%**

The site, once home to orchards and pastures, now boasts some of Wisconsin's iconic plant communities, such as Northern Wet-Mesic Forest and Northern Mesic Forest. Still, there is plenty of work to be done. Vast meadows of agricultural grasses are freckled with invasive species, including Canada thistle (*Cirsium arvense*) and spotted knapweed (*Centaurea stoebe subsp. micranthos*). Woodier areas are choked by honeysuckle (*Lonicera* spp.) and buckthorn (*Rhamnus* spp.).

My goal for the site is that it becomes Crossroads' not-so-hidden gem. It should be a place where healthy plant communities thrive, where a slow reforestation process unfolds, and where the Crossroads community can experience succession.

The Past and the Present

Aerial imagery from the 1930s shows that the area was used for agriculture, specifically for orchards and pastures (14). The United States Department of Agriculture's (USDA) Web Soil Survey considers much of the site to be prime farmland. Fertile mollisol (Yahara fine sandy loam) and alfisol (Omena variant sandy loam) are present (12). Apple trees can still be found today.

Before that, the region was likely forested. The alfisol (Omena variant sandy loam) present, an order of soil that forms in forests, speaks to that history (1). After the orchards and pastures were abandoned, agricultural grasses took over. Today, tall trees stand at the edges of the site. Young trees grow up in the grasslands. Shrubs, both native and invasive, also thrive. The site is a mosaic of trees, shrubs, and forbs. Key plant communities that can be found there include Northern Wet-Mesic Forest, Northern Mesic Forest, Aspen-Birch Forest, and Surrogate Grassland (Door County Meadow). The next section includes a discussion of these communities.

With the help of Nancy Aten, Jason Miller, and Chrissy Hanke, I came to the conclusion that the site's patches of meadow are not particularly diverse. The removal of the site's most problematic species, such as honeysuckle and buckthorn, should be prioritized. Removing invasive species and planting a more diverse mixture of native ones could improve the site's health. It is important to start the process of succession off on the right foot.

Another priority is to widen Big Creek's forested buffer. The forest gets narrow near the southwestern corner of the site. An ideal riparian zone is at least thirty meters wide (11). At its narrowest, Big Creek's is about twenty meters wide. This measurement was taking using Google Earth Pro. Additionally, a wetland surrounds the stream. Restoration that improves the quality of both the stream and the wetland is an important goal of this plan.

Will the site's agricultural past affect its future? Can its soil support the communities this plan seeks to shape? Assessments should be performed in order to answer these questions.

The main constraints of this project are funding and availability of restorationists. Fortunately, the volunteers in the Habitat Healers program at Crossroads, as well as future Land Restoration School students, could help. It would also be valuable to involve the School District of Sturgeon Bay in this journey.

My Vision

Respect the Twofold Transition:

The site is transitional in two ways. It is a transition zone between existing gradients, such as between stream-fed forest and wind-whipped meadow and between wetter and drier soil. But it is also undergoing succession, a transition from one plant community to another. The landscape itself is metamorphosing. There is a transition *between* meadow and forest, and another *from* meadow *to* forest. The restoration of the site should recognize the value in both processes and consider what they mean for human and non-human stakeholders alike. For example, after a swath of problematic shrubs is removed, it should be replaced with shrubs instead of forbs to maintain a similar habitat.

Create Inspiration and Celebration:

This hillside should be memorable. Exciting sights and sounds should draw the community in. Visitors should learn from the landscape and find themselves growing up with it.

Honor the Past, Present, and Future:

Restoration should honor the past, present, and future of the site. The reforestation process draws inspiration from Door County's forested history and seeks to restore some of Wisconsin's iconic natural communities. Honoring the present is about working with the current landscape. The Surrogate Grassland communities, for example, could be transformed into vibrant, diverse meadows in a few years. Today's beautiful views are just as important to the Crossroads community as tomorrow's. Lastly, the implementation of this plan should focus on crafting a healthy future for the site. Improving the site's ecological health by increasing its diversity is a good start.

The Future

Ecological Restoration Goals

Improve Ecological Health:
- Maintain healthy areas and heal degraded ones
- Widen Big Creek's forested buffer

Catalyze a Slow Pathway for Succession (Slow Reforestation):
- Work with the current landscape and appreciate its value
- Encourage the slow succession from Surrogate Grassland (or Door County Meadow) to Aspen-Birch Forest to Northern Mesic Forest

Guiding Principles

Adaptive Restoration:

This plan and its implementation should be flexible enough to accommodate the unexpected.

Visible Restoration:

The implementation of this plan and the vision behind it should be visible to the Crossroads community. This can be accomplished by adding colorful flags, tree tubes, and signs. At a place as well-loved as Crossroads, an effort like this stands a chance at helping the community appreciate the value of ecological restoration.

Restoration That Radiates:

The site should be an epicenter of change. Progress there should be used to guide the restoration of the surrounding areas. Within the site, tiny patches of land will be the places where restoration takes root. Lessons learned during this project should be shared with the community.

Reference Models

A few of the Wisconsin Department of Natural Resources' (DNR) descriptions of Wisconsin's natural communities will serve as reference models for the site.

Northern Wet-Mesic Forest:

The Northern Wet-Mesic Forest, also known as the Cedar Swamp, is dominated by northern white-cedar (*Thuja occidentalis*). Charismatic ferns, such as royal fern (*Osmunda regalis*), thrive alongside balsam fir (*Abies balsamea*) and white spruce (*Picea glauca*) (8). This community will be used as a reference model for the forested areas near Big Creek. The use of this model should help restorationists increase the width of the wetland's Cedar Swamp buffer and build

the wetland's resistance and resilience. The image on the left at the bottom of page eight shows the site's Northern Wet-Mesic Forest community.

Northern Mesic Forest:

The Northern Mesic Forest is often dominated by sugar maple (*Acer saccharum*). Other trees in this community include eastern white pine (*Pinus strobus*) and balsam fir (*Abies balsamea*) (7). The site's alfisol points to its forested past (1). This community will be used as a reference model for the forested areas that are not adjacent to Big Creek. The use of this model should help restorationists honor the site's history, connect patches of forest to each other, and create memorable views.

Aspen-Birch Forest:

The Aspen-Birch Forest is dominated by trembling aspen (*Populus tremuloides*), big-toothed aspen (*Populus grandidentata*), and paper birch (*Betula papyrifera*). The lovable golden-winged warbler (*Vermivora chrysoptera*) calls this community home (2). The Aspen-Birch Forest is included in this plan because it is a successional community. The forest's coming-of-age should not be rushed, and the landscape should be appreciated for what it is today. That is why restorationists should create Aspen-Birch Forests in the woodier patches adjacent to the vast meadows. Someday, the field will surrender to the forest. Until then, these metamorphic meadows should be celebrated. The use of this model should help restorationists catalyze a thoughtful reforestation process. The image on the right at the bottom of page eight shows the site's Aspen-Birch Forest community.

Surrogate Grassland (or Door County Meadow):

Surrogate Grasslands are the result of an ecological overthrow of abandoned agricultural fields. They are dominated by grasses, including smooth brome (*Bromus inermis*), Timothy (*Phleum pratense*), and orchard grass (*Dactylis glomerata*). Surrogate Grasslands are typically less diverse than prairies (10). In the ecological restoration plan written for Crossroads by Nancy Aten and Dan Collins, the Door County Meadow is used as a reference model (3). A good example of a Door County Meadow is the Wild Ones Meadow at Crossroads, which is shown on page six. The use of this model should help the Surrogate Grassland communities transition gracefully into colorful, diverse Door County Meadow communities.
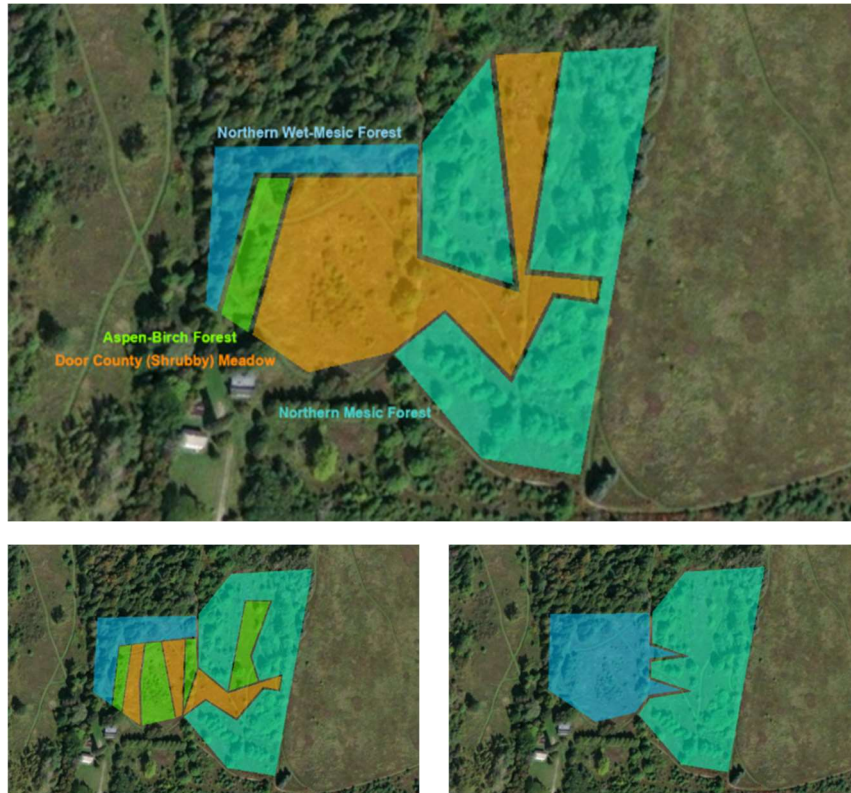
The goal of this plan is to give direction to the transformations that are already underway.

The images below show a possible pathway for succession. The first image shows the site's existing conditions, and the second and third show goals for the future. They illustrate a transition from Door County Meadow to Aspen-Birch Forest to Northern Mesic Forest.

The Plan

References 13 and 14 were used in this section.

Removal of Invasive Species

There are four invasive species whose removal should be prioritized.

Common Name	Latin Name
Honeysuckle, invasive species	*Lonicera* spp.
Buckthorn, invasive species	*Rhamnus* spp.
Canada thistle	*Cirsium arvense*
Spotted knapweed	*Centaurea stoebe subsp. micranthos*

Four other species should also be addressed.

Common Name	Latin Name
Reed canary grass	*Phalaris arundinacea*
Common lilac	*Syringa vulgaris*
Apple tree	*Malus pumila*
Norway maple	*Acer platanoides*

Below is a summary of the species that need to be addressed.

Plant to Remove	Zone or Letter on the Image Below
Honeysuckle, invasive species	DCM, AB, NM, NWM
Buckthorn, invasive species	AB, NM, NWM
Canada thistle	DCM
Spotted knapweed	DCM
Reed canary grass	A
Common lilac	B
Apple tree	C
Norway maple	D

Addition of Native Species

Below are the Example Species Tables.

Door County Meadow (DCM)		
Common Name	**Latin Name**	**Type**
Brown-eyed Susan	*Rudbeckia triloba*	Forb
Wild bergamot	*Monarda fistulosa*	Forb
Yellow coneflower	*Ratibida pinnata*	Forb
Early wild rose	*Rosa blanda*	Shrub

Aspen-Birch Forest (AB)		
Common Name	**Latin Name**	**Type**
Trembling aspen	*Populus tremuloides*	Tree
Paper birch	*Betula papyrifera*	Tree
Chokecherry	*Prunus virginiana*	Shrub
Old-field cinquefoil	*Potentilla simplex*	Forb

Northern Mesic Forest (NM)		
Common Name	**Latin Name**	**Type**
Sugar maple	*Acer saccharum*	Tree
Ironwood	*Carpinus caroliniana*	Tree
Beaked hazelnut	*Corylus cornuta*	Shrub
White baneberry	*Actaea pachypoda*	Forb

Northern Wet-Mesic Forest (NWM)		
Common Name	**Latin Name**	**Type**
Northern white-cedar	*Thuja occidentalis*	Tree
Silver maple	*Acer saccharinum*	Tree
Wild black currant	*Ribes americanum*	Shrub
Fringed loosestrife	*Lysimachia ciliata*	Forb

To choose an "area-appropriate" plant, determine the plant's type (forb, shrub, or tree) and zone (DCM, AB, NM, or NWM) based on the image below, which represents the possible future. Then, use the "Example Species Tables" above to choose a plant.

Stages of Restoration

Stage 0: Analysis of Existing Conditions

- Perform assessments

Stage 1: Kickstarting Restoration

- Cut and treat honeysuckle with herbicide
    - Plant area-appropriate shrubs

- Cut and treat buckthorn with herbicide
    - Plant area-appropriate shrubs

- Mow reed canary grass (A)
    - Plant area-appropriate forbs, specifically DCM forbs

Stage 2: Shaping the Natural Communities

- Widen Big Creek's forested buffer
    - Plant area-appropriate shrubs and trees

- Pull Canada thistle

- Pull spotted knapweed

- Girdle Norway maple (D)

Stage 3: Shaping the Natural Communities, Continued

- Thin out common lilac (B)
    - Plant area-appropriate shrubs and trees

- Thin out apple trees (C)
    - Plant area-appropriate shrubs and trees

- Plant area-appropriate forbs, shrubs, and trees in every zone to encourage succession

Stage 4: Moving Forward

- Cut Norway maple (D)
    - Plant area-appropriate trees

- Perform assessments

- Update this plan

Assessments

Assessments of the site should be performed before restoration begins in order to get a better understanding of the land's needs.

These include:
- Soil testing
- Water testing of Big Creek
- Surveys of species
- Photography
- Assessments of floristic quality and biodiversity

These assessments should be repeated on a regular basis throughout the implementation of this plan. Changes to this plan and its implementation should be made if the results of any assessment suggest that changes are necessary. This plan, much like the land, is a work in progress.

Acknowledgements

Thank you for taking the time to read my ecological restoration plan.

I would like to extend my deep gratitude to the founding directors of the Land Restoration School at Crossroads, Nancy Aten and Dan Collins, as well as the curriculum chair, Chris Young. This has been an incredible opportunity. It is an honor to be one of the seven "big seeds."

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