

**Friends of Garret Mountain Reservation  
Riparian Zone Restoration at Barbour's Pond  
Garret Mountain Reservation, Woodland Park, NJ**



*Riparian Zone at Southeast corner of Barbour's Pond (Spring 2019)*

**Report prepared by:**

**Vera Lazar  
Friends of Garret Mountain Reservation  
friendsofgarret@gmail.com**

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## **INTRODUCTION**

### **Riparian Buffers**

The Riparian Zone refers to the land which lies adjacent to a stream, pond, or other surface water body. The value of preserving a vegetated buffer within the riparian zone is widely recognized among the environmental science community. Riparian zone buffers provide multiple benefits, including the protection of water quality via bank erosion stabilization and the filtration of sediments, pollutants, and excess nutrients. Buffers also provide aquatic and wetland plant habitat, bird and wildlife habitat, and add to the aesthetic beauty of the surrounding area. Forested buffers are especially valuable, and provide shade which helps to moderate water temperatures. NJDEP protects and regulates a minimum 50 foot wide riparian zone, adjacent to all streams, lakes, and ponds under the Flood Hazard Area Rules.

### **Riparian Zone Restoration at Barbour's Pond**

The Riparian Zone at the southeast end of Barbour's Pond (Garret Mountain Reservation) had suffered much damage during the dredging and construction work which took place during the winter of 2017-2018. Many trees had been removed, and the existing native vegetation was eliminated during the process. Following completion of the dredging work, nine trees (7 Redbud and 2 Pin Oak) were planted by the contractor. No additional planting or soil stabilization had been done by the dredging contractor, which resulted in erosion and sediment washing back into the pond. Meanwhile, the land which was once a lush forest and teeming with bird life, now lay barren and silent.

In an attempt to restore the area to a thriving and vibrant natural habitat, the Friends of Garret Mountain Reservation (FoGMR) designed a plan to restore the site. This involved stabilizing the soil with erosion control matting and native riparian seed mix; and replanting the area with shrubs, trees, herbaceous perennials, and deer-resistant seed mix.

This restoration project was a volunteer project and a cooperative endeavor between FoGMR and the Passaic County Parks Department. Vera Lazar, president of FoGMR, was the Principal Designer and Project Manager. Joseph Labriola, a Certified Ecologist and Professional Wetlands Scientist, was the Senior Technical Advisor. Input regarding plant selection was also provided by Lourdes Osorio and Kathy Sauerborn of the Passaic County Master Gardeners. Ernst Seed Company provided technical advice on the appropriate seed mixtures. Plants, trees, shrubs, seed, materials and supplies were purchased and provided by the Passaic County Parks Dept. Additional plants were donated by the Passaic County Master Gardeners and the Bergen County Audubon Society. Planting (and other labor) was done by FoGMR member volunteers, along with volunteers from the Passaic County Master Gardeners.

### **Goals**

1. To stabilize the soil and prevent further erosion into Barbour's Pond.
2. To re-establish native riparian vegetation, and return the site back to a vibrant and thriving natural habitat.
3. To restore important environmental functions including wildlife habitat, water quality, shoreline protection, and biodiversity.
4. To enhance the natural beauty and appearance of Barbour's Pond and Garret Mountain Reservation.

## Summary of Project

1. Soil Stabilization – The first priority was to stabilize the site and prevent further soil erosion. In Fall 2019, we installed erosion control coir matting along the shoreline, and planted native riparian buffer seed mix.  
Revegetation — Planting of Shrubs, Trees, Perennials, and Native Grass/Wildflower Seed - In Spring 2019, we planted a variety of native riparian shrubs, trees, flowering perennials, and three different native seed mixes. Additional plants were planted in May 2020.
2. Evaluation/Assessment — In Fall 2019 and Spring, Summer and Fall 2020 we assessed the site and evaluated the success of the plantings. Results and recommendations are included in this report.

## **MATERIALS AND METHODS**

### September 2018

1. Dug trenches and installed 2 rolls of erosion control coir matting (biodegradable) along the southeast shoreline of Barbour’s Pond.
2. Planted Riparian Buffer Mix (9/29/18 and 10/6/18) mixed with a cover crop of Grain Rye. Seeding at an approx. rate of 24 Lbs. per acre; Grain Rye at approx. 30 Lbs. per acre.
3. Swamp Milkweed (24+ plants) were planted by the Master Gardeners.

#### Riparian Buffer Seed Mix Composition (from Ernst Seeds)

30.0% *Panicum clandestinum*, 'Tioga' (Deertongue, 'Tioga')  
16.5% *Elymus virginicus*, PA Ecotype (Virginia Wildrye, PA Ecotype)  
16.0% *Sorghastrum nutans*, PA Ecotype (Indiangrass, PA Ecotype)  
10.0% *Andropogon gerardii*, 'Niagara' (Big Bluestem, 'Niagara')  
7.0% *Panicum virgatum*, 'Carthage', NC Ecotype (Switchgrass, 'Carthage', NC Ecotype)  
4.0% *Chamaecrista fasciculata*, PA Ecotype (Partridge Pea, PA Ecotype)  
3.0% *Rudbeckia hirta*, Coastal Plain NC Ecotype (Blackeyed Susan, Coastal Plain NC Ecotype)  
2.5% *Asclepias incarnata*, PA Ecotype (Swamp Milkweed, PA Ecotype)  
  
2.5% *Heliopsis helianthoides*, PA Ecotype (Oxeye Sunflower, PA Ecotype)  
2.0% *Juncus effusus* (Soft Rush)  
2.0% *Juncus tenuis*, PA Ecotype (Path Rush, PA Ecotype)  
1.8% *Aster novae-angliae* (*Symphotrichum n.*), PA Ecotype (New England Aster, PA Ecotype)  
1.0% *Eupatorium perfoliatum*, PA Ecotype (Boneset, PA Ecotype)  
1.0% *Vernonia noveboracensis*, PA Ecotype (New York Ironweed, PA Ecotype)  
0.5% *Eupatorium fistulosum*, PA Ecotype (Joe Pye Weed, PA Ecotype)  
0.3% *Aster umbellatus*, PA Ecotype (Flat Topped White Aster, PA Ecotype)

### Spring 2019

1. Late April 2019 - 7 trees, 38 shrubs, and several perennials were planted. Bumper Crop Soil Builder was mixed in and added to the soil.
2. In early May - 3 different seed mixes were planted - Riparian Buffer Mix, Deer Resistant Meadow Mix, and Steep Slope Mix. Seeded areas were covered with hay.
3. Deer Scram & Goose Scram (organic nontoxic products) were scattered around the plantings. Protective plastic fencing was constructed around the Red Oak trees and 1 Red Maple. A plastic temporary fence was constructed surrounding the entire restoration site (to protect from trampling).
4. Early to mid June - 19 perennials were planted.

**Planted April 30, 2019**

Trees: (from Cedar Hill Nursery)

Red Maple (*Acer rubrum*) Qty: 2  
Red Oak (*Quercus rubra*) Qty: 2  
River Birch (*Betula nigra*) Qty: 3

Shrubs: (from Cedar Hill Nursery)

Buttonbush (*Cephalanthus occidentalis*) Qty: 6  
Red-osier Dogwood (*Cornus sericea*) Qty: 6  
Spicebush (*Lindera benzoin*) Qty: 6  
Winterberry holly (*Ilex verticillata*) Qty: 3  
Witch Hazel (*Hamamelis virginiana*) Qty: 3  
Arrowwood (*Viburnum dentatum*) Qty: 3  
Sweet Pepperbush (*Clethra alnifolia*) Qty: 2  
Black Chokeberry (*Aronia melanocarpa*) Qty: 2  
Bayberry (*Myrica pensylvanica*) Qty: 4  
Shadbush (*Amelanchier canadensis*) Qty: 3

Perennials: (Donated by Bergen County Audubon Society)

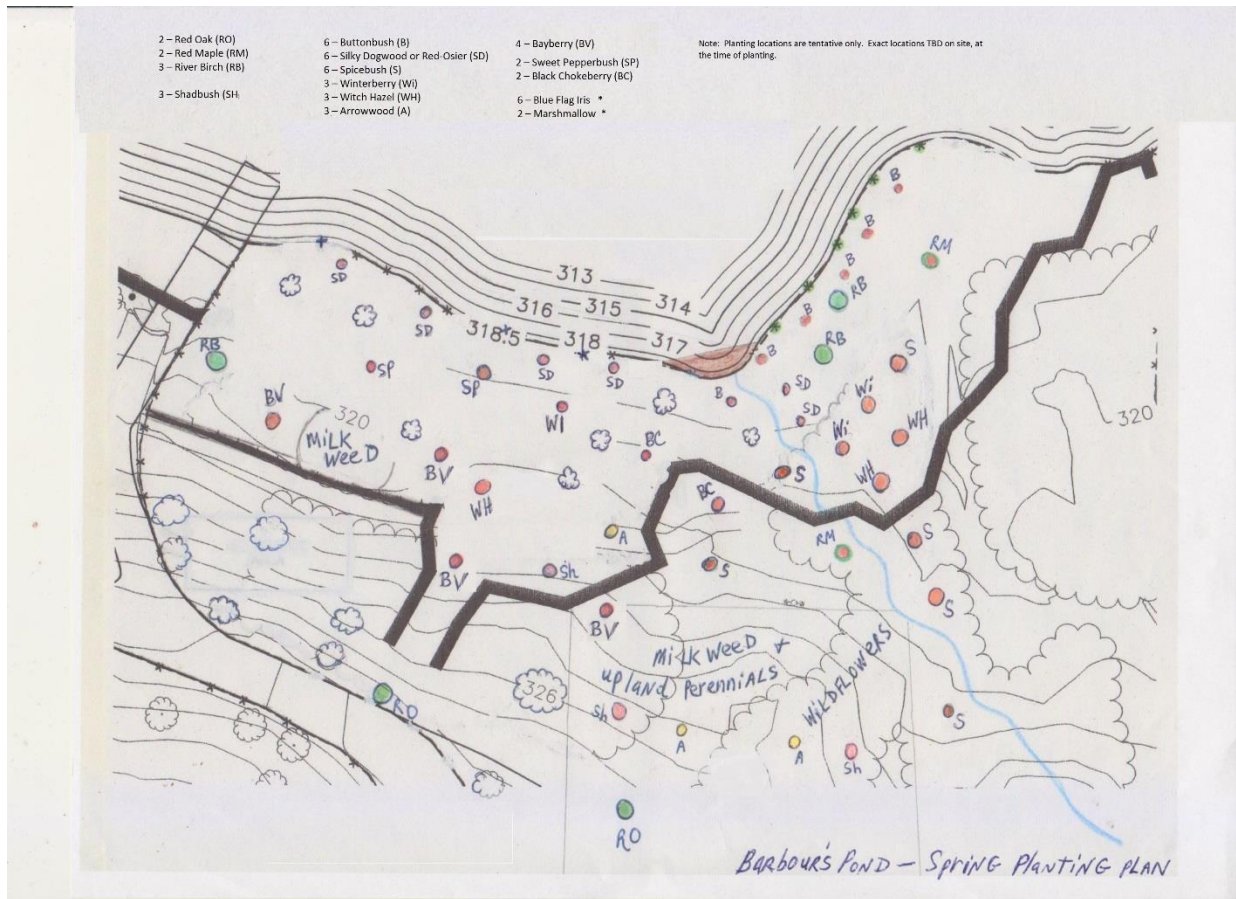
Blue Flag Iris – Qty: 4  
Ironweed  
Obedient Plant  
Goldenrod

**Planted June 2019**

Perennials: (From Cedar Hill Nursery)

Swamp Milkweed (*Asclepias incarnata*) Qty: 3  
Black eyed Susan (*Rudbeckia hirta*) Qty: 2  
Wild Indigo (*Baptisia australis*) Qty: 2  
Giant Blue Hyssop (*Agastache foeniculum*) Qty: 2  
Cardinal Flower (*Lobelia cardinalis*) dark leaf Qty: 2  
Cardinal Flower (*Lobelia cardinalis*) green leaf Qty: 2  
Joe Pye Weed (*Eutrochium purpureum*) Qty: 4  
Maidenhair Fern (*Adiantum*) Qty: 2

## Original Planting Plan - for Spring 2019



This was the original planting plan for Spring 2019. The design offered general guidance on planting locations. Some changes were made at the time of planting, due to soil and other conditions. Marshmallow, originally to be included for shoreline plantings, was unavailable at the time. It could be considered for future plantings.

## Native Seed Mixes - planted 5/8/19

### Riparian Buffer Mix

Deertongue 29.53%  
Virginia Wildrye 19.56%  
Big Bluestem 11.14%  
Indiangrass 8.57%  
Switchgrass 4.91%  
Partridge Pea 4.0%  
blue Vervain 3.99%  
Black eyed Susan 2.99%  
Soft Rush 2.94%  
Oxeye Sunflower 1.94%  
New England Aster 1.93%  
Swamp Milkweed 1%  
Narrowleaf Mountainmint 0.99%  
Autumn Bentgrass 0.60%  
Wild Bergamot 0.39%  
Great Blue Lobelia 0.37%  
Boneset 0.35%  
Joe Pye Weed 0.31%  
NY Ironweed 0.29%  
Common Sneezeweed 0.28%  
other .07%  
inert 3.8%  
Weed seed .05%

### Steep Slope Mixture

Indiangrass 27.4%  
Annual Ryegrass 19.86%  
Virginia Wildrye 9.78%  
Big Bluestem 9.28%  
Canada Wildrye 6.8%  
Autumn Bentgrass 3.98%  
Switchgrass 3.93%  
Deertongue 2.95%  
Little Bluestem 1.34%  
Partridge Pea 1%  
Black eyed Susan 1%  
Lanceleaf Coreopsis 1%  
Purpletop .99%  
Oxeye sunflower .97%  
Purple Coneflower .95%  
Smooth blue aster .4%  
New England aster .39%  
Common Milkweed .39%  
Marsh dense blazingstar .39%  
Wild Bergamot .39%  
Other .09%  
inert 6.68%  
Weed seed .04%

### Deer Resistant Meadow Mix

Virginia Wildrye 36.19%  
Little Bluestem 25.37%  
Partridge Pea 4.0%  
Purple Coneflower 3.8%  
Lance leaf coreopsis 3.0%  
Black eyed Susan 2.99%  
Butterfly milkweed 1.96%  
Oxeye sunflower 1.94%  
Wild Senna 1.0%  
Tall white Beardtongue .99%  
Narrowleaf mountainmint .99%  
Early goldenrod .99%  
Marsh dense blazingstar .97%  
Wild bergamot .97%  
Golden Alexanders .93%  
other .01%  
inert 13.88%  
weed seed .02%

Additional Swamp Milkweed seeds were planted on 5/24/19

## **Winter / Spring 2020**

1. Wood Aster seeds were planted in early 2020 (Winter). Additional herbaceous plants were planted in May 2020. Common Milkweed, Trumpet Vine, Brown-eyed Susan, and Evening Primrose were donated by Kathy Sauerborn (Master Gardeners). Virginia Mountain Mint was donated by Vera Lazar (FoGMR). Two plants of Trumpet Creeper Vine, known to attract hummingbirds and butterflies, was planted around a dead tree trunk. A temporary protective fence was constructed around the trunk.
2. Protective fencing was placed around the three River Birch trees. A protective plastic fence border was also put around a section of shoreline where the Buttonbush was planted, to protect from trampling and vandalism.

## **Plantings – May 2020**

Virginia Mountain Mint – Qty: 6  
Common Milkweed – Qty: 5  
Brown-eyed Susan – Qty: 1  
Evening Primrose – Qty: 1  
Trumpet Vine – Qty: 2

## **RESULTS & DISCUSSION**

### **TREES**

Seven (7) trees were planted in Spring 2019. A protective fence was placed around the 2 Red Oak and 1 Red Maple immediately after planting. As of Summer 2020, the Oak and Maple are doing very well. Three River Birch were also planted in Spring 2019. Two were planted near the shoreline on the cove just north of the main site. One was planted along the edge of the forest wetland (north side of main site). Due to limited supplies, none had protective fences. The 2 River Birch which were planted on the cove did fairly well throughout 2019 (although lower leaves were browsed). The Birch tree planted along the edge of the main site was heavily browsed, with no growth remaining. In Spring 2020, the Birch tree closest to the water's edge had been broken by the actions of people fishing. Protective fences were subsequently constructed for all 3 Birch trees. As of Summer 2020, new growth has been seen on all the River Birch, and they appear to be surviving. Based on these observations, it appears that young trees are able to survive here, however protective fencing is essential.

### **SHRUBS**

Thirty-eight (38) small shrubs were planted in April 2019. All have been heavily and repeatedly browsed by deer (and possibly other wildlife). Some of the plantings have survived, although all are very small and appear under stress. Many of the shrubs displayed new leaves (and/or buds) in Spring of 2020, however most of the leaves were gone by early Summer. Some of the shrubs (including Bayberry) have grown new leaves again in Sept. 2020. However all shrubs remain very small with limited growth. This is probably a combination of very poor and compacted soil, dry conditions, and herbivory by deer (especially during the Spring).

Shrubs showing evidence of survival: Buttonbush, Sweet Pepperbush, Black Chokeberry, Shadbush, Bayberry, Arrowwood, and (possibly) Spicebush

Shrubs with no survival: Redosier Dogwood



A number of shrubs could not be located (especially those planted in forest wetland area just north of main site). These include: Spicebush, Witch Hazel, Winterberry Holly

Based on these observations, it appears that shrubs can probably survive at the site, however protective fencing and soil enhancements must be provided.

- Recommendations -
1. Locate all shrubs and place protective plastic fencing around them.
  2. Add compost and soil builder (such as organic Bumper Crop) to the surrounding soil. (Spring and Fall)
  3. Add mulch (Spring) to preserve moisture.

### **PERENNIALS**

A large number of herbaceous perennials were planted in the Spring of 2019. As with the shrubs, most of the perennials have been repeatedly browsed by deer, and possibly other wildlife. As of Summer 2020, there were very few leaves remaining on the perennials.

Swamp Milkweed – Many plants were planted by the Master Gardeners, but unfortunately appear to have been eaten. Three large additional plants were planted in June 2019 and they were browsed repeatedly. No growth was left by end of August 2019. The three plants returned with new growth in Spring 2020, but once again were eaten by mid-Summer. Although Swamp Milkweed is considered to be deer-resistant, the plants which grew were continuously browsed.

Cardinal Flower - Two purple leaf varieties were planted near the stream (north of the main site) but were gone by Summer 2019. They have not returned. Two green leaf varieties were planted near the shoreline at the north end of the main site. They flowered in 2019. One survived and was observed growing in Spring 2020. But no sign of it by July. Note: Cardinal Flower is a short-lived perennial, and therefore may need to be replanted.

Maidenhair Fern – Two were planted near the stream (north of the main site). One fern, which was planted near the small bridge, did not survive (probably due to trampling). The second one was planted on the streambank further back. It remained small, but survived the year and returned with new growth in Spring 2020.

Joe Pye Weed – Four Joe Pye Weed plants were planted in Spring 2019. Two plants were planted near the shoreline at the north end of the site, and two were planted in a wet area near the south side. Although considered to be deer-resistant, all new leaves were eaten by summer. Still the plants seemed to survive and they bloomed in Summer 2019. All four plants returned with new growth in Spring 2020 but were heavily browsed by Summer 2020. Very little remaining by end of the summer. No flowers have been seen in 2020.

Blue Giant Hyssop - Two plants were planted in Spring 2019 in the upland center portion of main restoration site. Both were very successful throughout the 2019 growing season, and had many flowers. Both plants have bloomed again in August 2020. A variety of butterflies, skippers, and bumblebees have been seen visiting the flowers. There has been no sign of deer browsing or other damage. Based on these observations, Blue Hyssop is an excellent choice for this site. It has proven to be deer resistant and has good pollinator value. More plantings highly recommended.

Black-eyed Susan - Two cultivated plants were planted in 2019. They survived the year but were not located in 2020. However, Black-eyed Susans have grown abundantly throughout the restoration site in Summer 2020. This was also included in the seed mixes. Deer appear to avoid the fuzzy, rough leaves so they are an excellent choice for additional plantings. The Black-eyed Susans also attract butterflies and skippers, and add much aesthetic beauty to the site. More plantings are recommended.

Wild Indigo - Six plants (yellow flower variety) were planted in the upland area of the site. Considered to be a highly deer-resistant species. However they were heavily browsed soon after planting. Very little was left by Summer 2019. One or two plants showed new growth in Spring 2020 but the leaves quickly vanished. However some small leaves have been observed again in late summer.

Blue Flag Iris – Four Iris were planted along the shoreline. They were chewed in summer 2019, but appeared to survive the year. Two of the Iris bloomed in July 2019. Two plants were observed in Spring 2020, but were heavily browsed. No flowers were seen in 2020. All plants were gone by mid Summer. Canada Geese have been observed browsing the shoreline vegetation, so it is very likely they are browsing the Iris plantings.

Obedient Plant and Ironweed - They were heavily browsed in 2019. Status unknown in 2020.

Goldenrod – Plants were seen growing in Fall 2020, however the top portion (with any flowers) were eaten.

### **Plantings Spring 2020**

Virginia Mountain Mint – Six plants were planted in Spring 2020. (Three near the northern border of the site and three plants in the middle). As of late Summer, all are surviving with no sign of wildlife browse. (Other plants in the mint family have also been growing at the site and doing very well, with no signs of herbivory). Butterflies and skippers have been observed on many of the mint species. Highly recommended for additional plantings.

Trumpet Creeper Vine - Two vines were planted by a dead tree trunk (above the main site). Within 2 weeks, both vines were climbing up the trunk. As of late Summer 2020 they are doing very well. Protective fencing was placed around them soon after planting. Virginia Creeper was also observed here, but appears to be gone by late Summer.

Brown-eyed Susan – One plant was planted on the mound of decomposed wood chips. It was browsed quite heavily and the flower buds eaten. But returned with new growth and had new flowers by September. It appears to be surviving at the site.

Evening Primrose – One plant was planted Spring 2020, but heavily browsed and remains very small. No flowers have been seen.

Common Milkweed - Six plants were planted in upland area of the site. All have been browsed repeatedly and remained small. As of Summer 2020, three plants could not be located within the tall grass. Two were found growing but quite small. A few other Milkweed plants were also seen (possibly from seed mix). Milkweed is considered to be highly deer-resistant; however recently it appears to have been eaten. This has been observed throughout the mountain.

### **Recommendations:**

1. Locate the perennials and place protective plastic fence around them (at least until they are established).
2. Add compost and soil builder to the surrounding soil, and add mulch to preserve moisture.
3. Plant additional perennials that have shown natural ability to survive and thrive at the site. Plants in the Mint family (Hyssop, Mountain Mints, Wild Mint) and the Rudbeckias with rough or fuzzy leaves (such as Black-eyed Susan) appear to be very successful. Other deer-resistant plants can be tried as well.

**Before and After**



*July 2018*



*July 2020*

## **SITE EVALUATION (BY SEASON)**

**Fall 2018** - Restoration work began. Coir matting was installed along the shoreline and Riparian Buffer seed mix was planted. Swamp Milkweed plants were planted (by the Master Gardeners) in an area of wet soil. Soon after the seeding, Canada Geese were observed eating much of the newly planted grass seed. This initially caused much concern, but was not a problem in the long term. Not much seed germinated in the Fall, but this was likely due to an early freeze/cold weather, bringing an quick and early end to the growing season.

**Spring / Summer / Fall 2019** - Trees, shrubs, perennials, and 3 native seed mixes were planted in Spring of 2019. Meanwhile, the Riparian Buffer seed mix (planted Fall 2018) sprouts and begins to grow. By mid-summer, thick grasses and rushes cover much of the site on the south side, along with some sedges and other herbaceous plants. There is also an abundance of White Water Pepper. Other wildflowers present include Wild Mint, Black-eyed Susan, Phlox, Boneset, Partridge Pea, Daisy Fleabane, Pilewort, Red Clover, Chickory, and Snakeroot. The middle and north sections of the site remain sparsely vegetated. This was the area where the soil was heavily compacted, and most of the topsoil was removed. The areas of heavy clay remain bare. Some grasses are found on the upland slopes; however the steeper slopes and gravelly areas remain very sparse. There is still noticeable sheet and rill erosion. In the shaded wetlands (north of the site) there is a dense cover of Soft Rush. However Japanese Stiltgrass is growing along the edge. Three-square sedge is starting to grow again along the waters edge, and Water Lilies are seen on the pond. In Fall 2019, County Parks Dept. constructed a new split rail timber fence around the site.

**May 2020** - Much of the seed has sprouted and a great variety of plants are found growing at the site. All are quite small however, so identification is difficult. Deertongue and Soft Rush still predominate in the wetland areas. Big Bluestem, Virginia Wildrye, and other tall grasses are found in the drier areas. In the wet, soft soil area, there are many Milkweed seedlings. A variety of Spring wildflowers were observed at the site including Bluets, Blue-eyed Grass, Cinquefoil, and Forget Me Not. The Blue Giant Hyssop shows much new growth.

**June / July 2020** - The Grasses and Rushes continue to flourish very thickly at the site. Soft Rush predominates (this was included in the Riparian Buffer Mix, as well as growing naturally in the area). Black-eyed Susan blooms abundantly inside the small tree-fences. All the Mints are doing very well. The Shrubs appear to be surviving but are very small (as discussed previously). Hyssop continues to grow. A variety of grasses, sedges, and plants are now seen growing in the middle area of the site. Herbaceous plants observed include Black-eyed Susan, White water pepper, Wood Sorrel, Chickory, Lady's Thumb, Red Clover, White Clover, Sweet Clover, Hop Clover, and Boneset (not yet in bloom). Water Pepper Smartweed also begins to grow. Japanese Stiltgrass begins to appear again as well. Many dragonflies are seen at the site.  
The South 2/3 of the site: Approx. 95% cover (85% soft rush, 10% other grasses, 3% bare, 2% other)  
The North 1/3 of the site: Approx. 75% cover (30% soft rush, 20% other grasses, 25% other, 25% bare)

**August 2020** - On Aug. 22, an assessment and plant inventory was done by Joseph Labriola and Vera Lazar. The entire site now has a dense vegetative cover of grasses and rushes (approx. 95% ground area cover). Deertongue grass was found to be especially abundant at the site. This is not surprising, as it comprised the greatest percentage of the seed mixes. Soft Rush also continues to flourish abundantly throughout the area. Virginia Wildrye, a fast growing, cool season grass (included in both the Riparian and Meadow Mix) was also

abundant. Other grasses found include Big Bluestem, Indiangrass, Switchgrass, Canada Wildrye, Autumn Bentgrass, Purpletop, and Annual Ryegrass. Rushes and sedges observed include Soft Rush, Twig Rush, Path Rush, Three-Square Sedge, Nut Sedge, and Lurid Sedge.

Flowering plants (from the seed mixes) include: Black-eyed Susans (now flowering abundantly throughout the site, mixed in with the grasses), Partridge Pea (in bloom, scattered throughout the site), and Great Blue Lobelia (in bloom but very small). Boneset, Common Milkweed, and Narrowleaf Mountainmint were also seen but not yet in bloom. Some very small shoots of Swamp Milkweed were seen.

Other plants (volunteer species) found growing at the site include Wild Mint, Short-toothed Mountain Mint, Dogbane, Daisy Fleabane, Bull Thistle, Dwarf Hypericum, Chickory, Tick Trefoil, White Water Pepper, Pilewort, and Water Lilies. Short-toothed Mountain Mint and Wild Mint were also found growing in the surrounding areas.

Three-Square Sedge was growing all along the shoreline. Just beyond the sedges, Mud Plantain grows in the shallow water, and Water Lilies flourish on the open water.

Unfortunately, Japanese Stiltgrass has invaded much of the forest wetland area to the north of the site. Stiltgrass was also observed creeping into the north side and upland areas of the restoration site.

**September 2020** - The grasses and rushes continue to predominate. Additional plants observed on 9/12/20 include various Asters now in bloom - Small White Asters, Field Aster, Smooth Blue Aster, Sneezeweed (very small), many Great Blue Lobelia (but still very small), Purple Gerardia, Cat's Ear, some Common Milkweed (not in bloom), Grass-leaved Goldenrod (not in bloom), Tearthumb, Beggar Ticks (Bidens), Bur Marigold, Purple Gerardia, Canada Rush, Woolgrass, and Little Bluestem Grass. Also observed that the coir mats are starting to biodegrade.

**Nov. 2020** Additional wildflower seeds to be planted in the late Fall: Butterfly Milkweed, Common Milkweed, Joe Pye Weed, Brown-eyed Susan, Purple Coneflower, Mistflower, Fringed Loosestrife, Mountain Mint

## **WILDLIFE OBSERVATIONS**

An abundance of insect life has been observed at the site. These include a large number of grasshoppers, flying grasshoppers, crickets, bumblebees and other bees, fireflies, and a variety of butterflies, skippers, dragonflies and damselflies.

Butterfly species identified include: Black Swallowtail, Tiger Swallowtail, Red Admiral, Painted Lady, Common Buckeye, Blue Azure, and Yellow Sulfur.

Dragonfly/damselfly species identified include: Widow Skimmer, Common Whitetail Skimmer, Halloween Pennant, Pond Hawk, Bluets (damselfly)

A Thread-waisted Wasp was found on Joe Pye Weed (Summer 2019).

Birds observed at the site include Great Blue Heron, Killdeer, Robin, Swamp Sparrow, Song Sparrow, Yellowthroat, Goldfinch, Grackle, and Canada Goose. Frogs were seen at the water's edge in July 2020.



*Common Buckeye on Wild Mint*



*Black-eyed Susans and Blue Giant Hyssop bloom among the native Grasses*

## CONCLUSION

As of this evaluation (Summer/Fall 2020), the restoration has been successful and has fulfilled many of the early goals, including the stabilization of the soil and minimizing erosion. A lush vegetated area of riparian grasses has been established, with almost 100% ground area cover. An abundance of insect life is being observed at the site. The aesthetics of the area has also improved greatly, and it is attractive to park visitors.

The main problems encountered and limiting factors include the highly compacted, poor soil, and herbivory by wildlife (especially Whitetail Deer and Canada Goose). Many of the plants have been browsed repeatedly by deer, which has set back their growth cycles such that they never reach the flowering stage (or remain very small). For many of the shrubs and perennials this is compromising their ability to survive. The other issue which requires attention is the increasing proliferation of Japanese Stiltgrass. It is our hope that with the following recommendations, that the site will flourish and provide even greater value in the future.

## RECOMMENDATIONS

1. Maintain existing timber fencing, and install additional protective fencing around the shrubs and vulnerable perennials to protect them from wildlife herbivory.
2. Perform additional "spot" topsoiling and seeding of the bare earth areas, including the eroded slope in the upland to the east of the timber fence.
3. Add compost, organic soil builder, and mulch to the soil around the shrubs, trees, and perennials.
4. Japanese Stiltgrass (which is starting to invade the site), should be removed as soon as possible. Monitor the introduction and schedule the timely removal of invasive plant species in the pond waters and riparian zone. Other species to monitor include Water Chestnut, Mile-a-Minute Vine, Japanese Knotweed, Tree-of-Heaven, and Japanese Barberry.
5. It is important that the grasses and plants complete their growth cycles, so they can self-seed to sustain the native vegetation cover for years to come. "Habitat Restoration – Do Not Mow" signs are strongly recommended.
6. Add permanent signage for public education, for example "Barbour's Pond - Riparian Habitat Restoration Area."
7. Plant additional plants (and seeds) of the species which have shown a natural ability to thrive at the site. Continue to monitor plant cover survival and succession for at least the next three years.
8. The trees in the adjacent areas (to the north and east of the site) have also sustained damage during the dredging construction. It is recommended to assess these areas, plant additional trees, and restore these areas back to health.
9. Encourage the long-term development of a sustainable riparian forest, by planting acorns and other tree seeds and protecting the growth of any emerging tree seedlings.
10. Evaluate the feasibility of adding additional wildlife habitat improvements, such as nest boxes and cavities on the remnant trees, and shoreline management for shorebirds and turtles.
11. Encourage beneficial wildlife and bird species use of the restored vegetation, especially pollinating insects and songbirds. Monitor wildlife use by species such as Canada Goose, Muskrat, and Whitetail Deer.
12. Work with local K-12 school groups to visit the area for environmental education.
13. Work with local colleges and universities to promote student biological and environmental science projects involving the site.

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For further information, please contact: Vera Lazar  
[friendsofgarret@gmail.com](mailto:friendsofgarret@gmail.com)



