University of North Carolina Asheville
Journal of Undergraduate Research
Asheville, North Carolina
Fall 2025

Monitoring Early Success of Small-Scale Riparian Zone Repair Post-Helene

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Abstract

Riparian zones, vegetated ecosystems that border waterways, are critical for stabilizing streambanks, filtering pollutants, and supporting biodiversity. These functions are threatened worldwide by increasing presence of invasive species, streambank incision and erosion, and sedimentation from runoff, all of which are exacerbated by extreme weather events. In September of 2024, Tropical Storm Helene caused historic flooding, erosion, and vegetation loss in Western North Carolina's riparian systems. Post storm damage, small-scale intervention focused on increasing bank stability and vegetative re-establishment in degraded areas may accelerate recovery. This, in turn, could strengthen resilience against future flooding events. This study uses a space-for-time substitution to evaluate the early success of four repaired streambank sites compared to adjacent degraded control sites with similar respective ecological and geomorphic characteristics. Repair methods included debris removal, mild regrading with hand tools, placement of biodegradable erosion-control matting, and planting of native live stakes and riparian seeds in early spring of 2025. Data collection took place in July and September in the French Broad River watershed along Reed Creek, Willow Creek, and two small tributaries. Data collected includes percent ground cover, vegetative species composition, and Riparian Health Assessment scores. Findings indicate that repaired sites tended to have greater riparian health scores and a higher percentage of ground cover. Non-repaired control sites tended to have lower vegetative species richness and more abundant non-native invasives. These results suggest that even small-scale restoration efforts can improve riparian ecosystem function within the first growing season. By supporting the recovery of vegetation and reducing vulnerability to erosion, sedimentation, and hydrologic flashiness, such repairs can

enhance ecological resilience and inform community conservation practices in the face of increased climate-related disasters.

Introduction

Riparian zones surround our world's aquatic habitats, providing a vegetative buffer between streams and their surrounding upland landscapes (Knopf et al., 1988). Beyond managing the health of surrounding ecosystems through services such as flow and temperature regulation, water filtration, and streambank stabilization, riparian zones also provide resources for biodiverse assemblages of native flora and fauna (Singh et al., 2021). Because of their close proximity to moving water, riparian areas are more often exposed to contributors of habitat degradation, including invasion by non-native species, agricultural and industrial pollution, anthropogenic development, and, notably, extreme weather events (Koestner et al., 2012). In late September of 2024, Western North Carolina experienced historic rainfall and flooding from Tropical Storm Helene, which drastically altered watersheds and surrounding landscapes. An unusually warm Gulf of Mexico sent an abundance of energy and moisture towards the Southeastern United States (Miller & Foubert, 2025); this, in combination with already rain-saturated soils in the region, greatly increased surface water runoff and stream depth. In many areas, established vegetation was uprooted along with soil and structures, resulting in highly eroded stretches of streambank with exposed, debris-littered layers of subsoil. Post-Helene restoration efforts must take into account dynamic factors to avoid recurring site damage. Restoration can increase riparian resilience after extreme weather events, however, traditional methods must be modified to ensure achievable, mitigation-focused goals under a constantly shifting climate (Hughes et al., 2005). In this study, a space-for-time substitution is employed to examine the success of small-scale streambank repair post-Helene along Reed Creek, Willow Creek, and two small tributaries, Rhododendron and Baird Cove, within the first growing season. Non-repaired sites (control) adjacent to repaired sites (treatment) provide information on the success of techniques used. To measure success, data was collected on the percentage of ground cover, vegetative species composition, and Riparian Health Assessment scores (Fitch et al., 2009). It is hypothesized that there will be improved ecosystem functioning through these metrics at restored sites compared to their associated control sites. Although the success of restoration projects can be difficult to measure on small time scales, monitoring of early onset risks such as erosion and invasive takeover can allow for intervention where necessary and provide information for future design (Perry et al., 2015). This project aims to improve understanding of how minor streambank repairs can enhance riparian ecosystem functioning in the first growing system after an extreme flooding event.

Methods

Site Description and Selection

Streambank repair projects were conducted in February and March of 2025, following extreme degradation caused by Tropical Storm Helene in September 2024. Four repair sites in the French Broad River watershed (Buncombe County, North Carolina, U.S.A.) were selected based on similarities in total repair-site area, repair methods, and the ability to be paired with an adjacent control site that had similar physical characteristics. The four sites represented multi-land use and varied in repair size based on accessibility and material (repaired treatment site and non-repaired control site measurements consisted of the same area):

1. Reed Creek: an urban stream in a high-traffic public greenway, located in the Asheville, NC city limits (8.0m x 2.5m).
2. Willow Creek: the most rural stream, located in an open-field agricultural area in the Leicester community, NC (18.0m x 1.0m).
3. Baird Cove: a residential tributary of Beaverdam Creek located in Woodfin, NC (5.5m x 2.0m).
4. Rhododendron Creek: a residential stream in West Asheville, NC (10.0m x 2.5m).

Permission to collect data was obtained from site managers or private landowners for all site locations.

Repair Methods

Repairs consisted first of removing woody and anthropogenic debris, mild regrading using hand-held tools, and spreading of a combination of MMF Riparian Buffer seed Mix (Mellow Marsh Farm) and NC Mountains Riparian Mix (Ernest Seeds), both native riparian seed mixes. Quick-growing annual ryes in the mixes were utilized to initially stabilize soil, then died after temperatures rose in the summer. Other seeds in the mix had a slower germination rate, but offered more diverse vegetation, habitat, and nutrient-cycling in riparian zones. Erosion-prevention coconut-husk matting was then installed and secured using wooden stakes. Finally, live stakes (Silky willow *Salix sericea*, Silky dogwood *Cornus amomum*, and Elderberry *Sambucus canadensis*) were planted predominantly along the toe of the river and slope of the riparian zone. Repair work was completed in a collaborative effort by Riverlink, UNCA students and faculty, and Riverlink volunteers. Because of the volunteer-based nature of the repair, all plantings happened at differing rates across the sites and surrounding areas (occasionally marginally spilling into the control site).

Data Collection Design

At each treatment and control site, four to eight 0.25 square meter quadrats were used to represent a minimum of 10% of the total site area as determined from pre-established site dimensions. 10% of the total area surpassed the recommendation-based threshold for adequate spatial representation in riparian vegetation assessments (Bryzek et al., 2023). A meter tape was positioned along the length of each site, and a random number generator was used to select quadrat placement locations ranging from 0 to the total site length, recorded to the nearest tenth of a meter. At each randomly selected point, quadrats were laid from the toe of the stream upslope to the end of the erosion control matting which represented the end of the repair zone. The 0.5m wide stretch from the toe to the end of the repair constituted one transect. All of the following data were collected in July and September respectively.

Ground Cover and Vegetation Data Collection

Percentage of ground cover was visually estimated at transects within the grids of the quadrats by two research technicians; quadrats were divided into 25 equal grids representing 4% cover each, reducing error in visual estimates. Estimates were made individually then averaged together to reduce bias. These estimates included live plants and any plant material that was covering bare ground. Then, all plants in one transect were identified to species and categorized by habit: forbs and graminoids by annual, biennial, or perennial, and shrubs, trees, and vines (used in Appendix I). Herbaceous plants that were too immature for ID were not included. Each species was classified as native, non-native, and non-native invasive as determined by the North Carolina Invasive Plant Council (2023). Non-native plants are described as those without natural collection records in WNC (LeGrand et al., 2025), while non-native invasive plants are those classified in Rank 1, 2, or 3 by the NCIPC (2023). Non-native non-invasive plants *do not* have a tendency to outcompete native vegetation or take over at-risk landscapes, while non-native invasive plant species do, therefore posing a possibly serious threat to recovering riparian zones.

Riparian Health Assessment (RHA) Data Collection

A Riparian Health Assessment, modified from Fitch et al. (2009), was conducted over the entire area of each treatment and paired control site by two research technicians. The RHA provides an index of riparian ecosystem function based on multiple vegetative and geomorphic indicators, including canopy cover, presence of invasive and disturbance-favoring species, regeneration of preferred vegetation, root mass and depth, vertical bank stability, and human disturbance. Each indicator was assigned a numerical score following Fitch et al. (2009), and the summed total was converted to a percentage to produce a final site-level score. RHA scores ranging from 30-59% are classified as Non-Functionial (Unhealthy), 60-79% as Functional At Risk (Healthy with problems), and ≥80% as Functioning (Healthy) (Fitch et al., 2009).

Data Analysis

All analyses were conducted using Jamovi cloud dashboard (Jamovi, 2025). A non-parametric Wilcoxon signed-rank test was used to compare percent ground cover and RHA scores between treatment and control sites within each individual data collection period and across all collection periods combined. Comparisons between July and September were not tested for significance to retain focus on ecosystem function between repaired (treatment) and unrepaired (control) streambanks at a given time, not across time.

Results

Percent Ground Cover

Willow, Rhododendron, and Reed treatment sites all had a higher percentage of ground cover than the control in both July and September (Fig. 2). In July, Willow and Rhododendron had the largest difference between control and treatment sites, with approximately 30% more covered ground in their treatment sites. Baird Cove was the only site in which the control had more ground cover than the treatment, with a difference of 23.63%. However, there was no significant difference between the control and treatment across sites in July (Wilcoxon signed-rank test: $W = 41.0$, $p = 0.093$). In September, all treatment sites had significantly higher percentages of ground cover (Wilcoxon signed-rank test: $W = 52.0$, $p = 0.007$), with the greatest difference being at Rhododendron and Willow. Across all months, sites, and treatments, there was significantly more ground cover on treated sites than control sites (Fig. 1) (Wilcoxon signed-rank test: $W = 27.0$, $p = 0.002$).

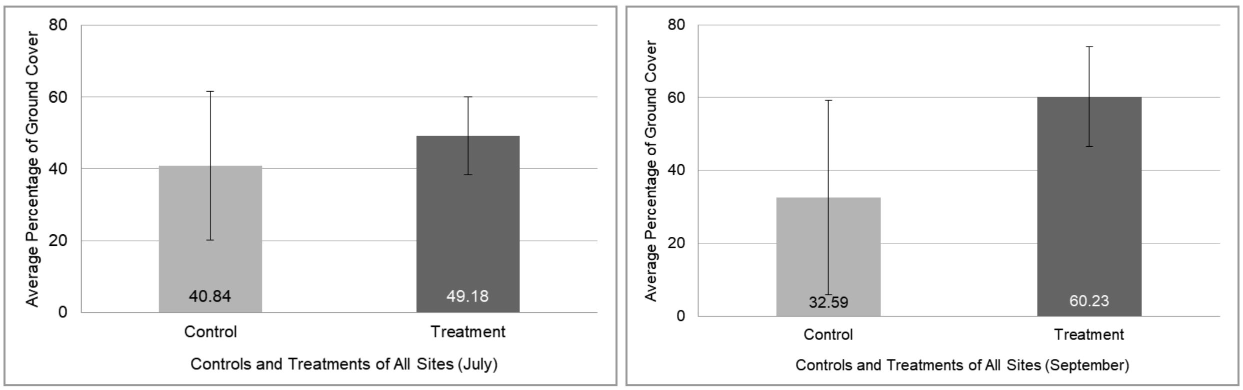

Figure 1. Comparison of the average percent covered ground of all control and treatment sites with standard deviations. a. (left) July 2025 data collection; b. (right) September 2025 data collection. (Overall Wilcoxon signed-rank test: $W = 27.0$, $p = 0.002$).

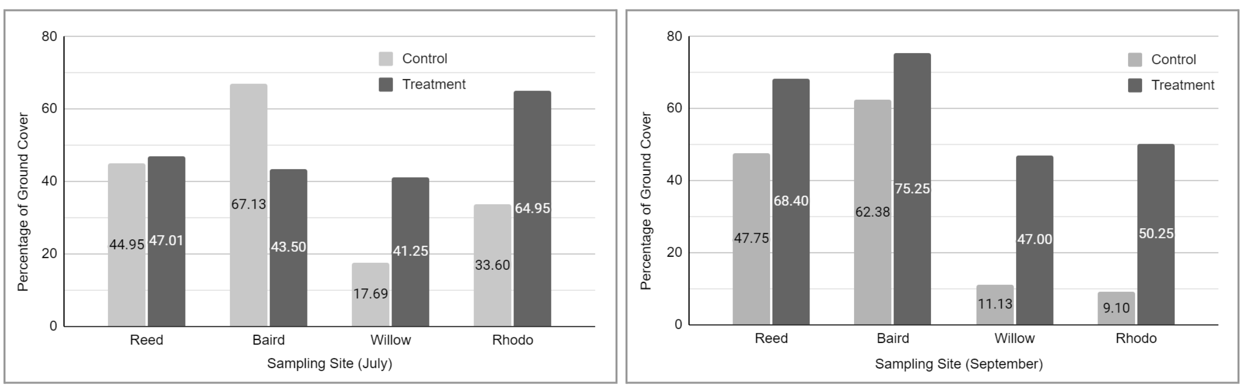

Figure 2. Comparison of the percent covered ground for the control and treatment sites across all sites. a. (left) July 2025 data collection; b. (right) September 2025 data collection.

Riparian Health Assessment

The Riparian Health Assessment scores were consistently higher at all treatment sites than control sites for July and September (Fig. 3). The largest difference occurred at Reed, and the smallest at Willow for both data collection periods (Fig. 4). July had significantly higher RHA scores for treatment sites than control sites (Wilcoxon signed-rank test: $W = 10.0$, $p = 0.05$), as well as September (Wilcoxon signed-rank test: $W = 10.0$, $p = 0.05$). Data analysis over both months showed that overall, treatment sites had significantly higher RHA scores (Wilcoxon signed-rank test: $W = 10.0$, $p = 0.05$). Willow, Rhododendron, and Baird treatment sites showed an increase in scores from July to September, while Reed decreased (Fig. 4). Reed and Baird controls showed a decrease in scores between data collection periods, while Rhododendron and Willow controls increased (Fig. 4).

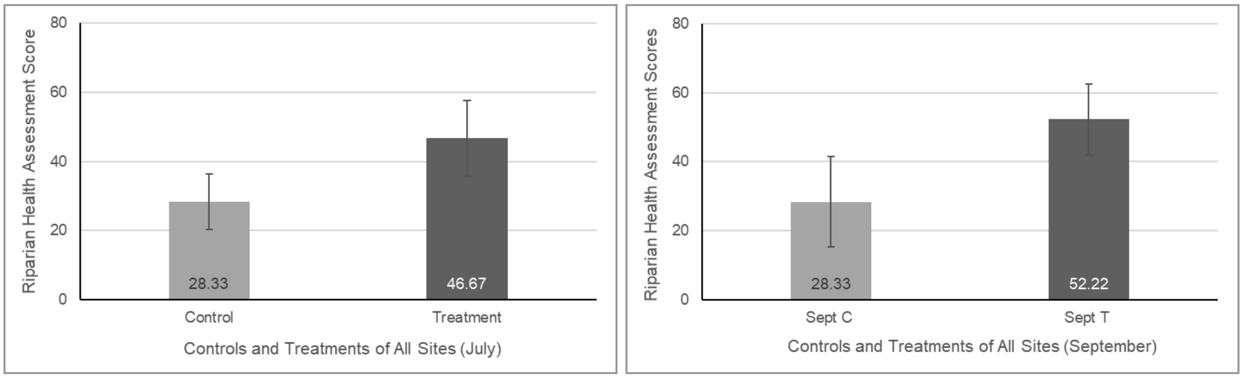

Figure 3. Riparian Health Assessment scores as an average percentage of all control and treatment sites with standard deviations. a. (left) July 2025 data collection; b. (right) September 2025 data collection. (Overall Wilcoxon signed-rank test: $W = 10.0$, $p = 0.05$).

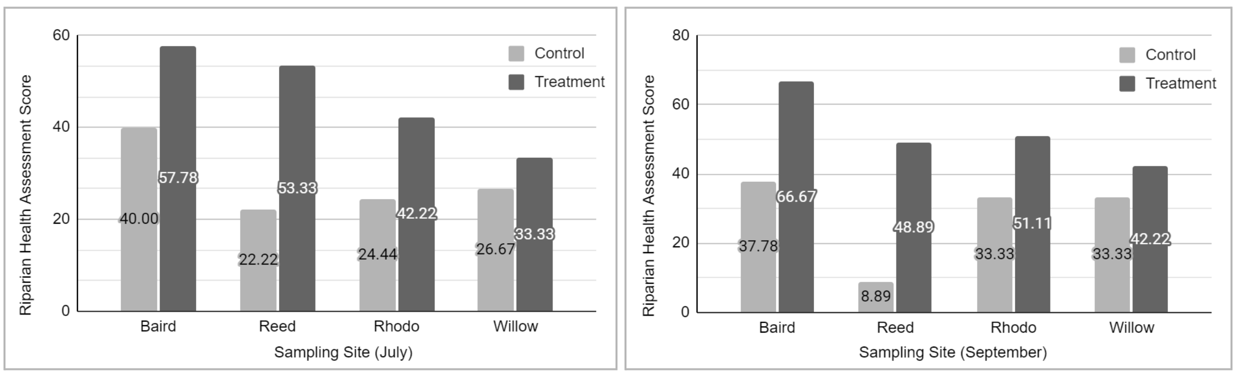

Figure 4. Riparian Health Assessment scores as a percentage for the control and treatment sites across all sites. a. (left) July 2025 data collection; b. (right) September 2025 data collection.

Vegetative Makeup

In July, three out of four treatment sites had a greater overall species richness than their controls; Reed was the exception, with 11 species in the treatment and 13 in the control (Table 1). However, the Reed treatment contained a higher proportion of native species (72.73%) compared to its control (61.54%). All treatment sites had a higher native species richness than their controls in July. All control sites had a higher presence of non-native invasive species except for Willow, where the control (which contained only six species in total) lacked non-native invasive species entirely; 66.67% of plants here were identified as non-native.

In September, all treatment sites had a greater overall species richness than their control. Treated sites also had a greater percentage of native species. The Rhododendron treatment contained only one more species than its control, however, 60.00% of these were native compared to the control's 33.33%. The trend for presence of non-native invasive species from July continues into September, with Willow again being the only outlier with no non-native invasive species in the control. Non-native non-invasive species made up the smallest percentage at all sites except for the Willow control sites, where they were the dominant plant category with 66.67% of species for both periods.

Site (July)	Overall richness	% Native	% Invasive	% Non-Native	Site (Sept)	Overall richness	% Native	% Invasive	% Non-Native
Reed C	13	61.54	30.77	7.69	Reed C	10	30.00	50.00	20.00
Reed T	11	72.73	27.27	0.00	Reed T	19	57.89	26.32	15.79
Baird C	26	57.69	34.62	7.69	Baird C	14	50.00	50.00	0.00
Baird T	27	66.67	18.52	14.81	Baird T	34	73.53	11.76	14.71
Willow C	6	33.33	0.00	66.67	Willow C	6	33.33	0.00	66.67
Willow T	21	52.38	19.05	28.57	Willow T	26	76.92	7.69	15.38
Rhodo C	12	50.00	41.67	8.33	Rhodo C	9	33.33	55.56	11.11
Rhodo T	19	68.42	26.32	5.26	Rhodo T	10	60.00	40.00	0.00

Table 1. Species richness in the transects sampled at each site, including percent makeup of native, non-native, and non-native invasive species in each site. a. (left) July 2025 data collection; b. (right) September 2025 data collection.

Discussion

Percent Ground Cover

Three out of four treatment sites had a greater percentage of ground cover than their corresponding controls in July (Fig. 2). This suggests that there was initial success in the establishment of vegetation during repair. In July, the Baird Cove control site had more covered ground than its corresponding treatment, however, by September the treatment had surpassed the control. In September, all treatment sites had significantly more covered ground than their corresponding controls, indicating that near the end of the first growing season, repaired sites will have increased vegetative cover. From July to September, all control sites showed a decrease in ground cover except for Reed. This may be explained by the rapid growth rates of non-native invasive species; once present, these plants are proficient at spreading throughout a landscape, resulting in a greater vegetative cover that may actually cause harm as slower-growing native species are outcompeted. All treatment sites showed an increase in ground cover between data collections, except for Rhododendron. Rhododendron's decrease in ground cover may be explained by its proximity to residential properties, which often leach pollutants such as herbicide and vehicle emissions.

The greater vegetative cover at treated sites likely reflects both intentional planting of native species and reduced erosional stress due to regrading and erosion-control matting. Similar short-term vegetative recoveries following repair activities has been observed in other riparian restoration projects (Bryzek et al., 2023; Hughes et al., 2005).

Riparian Health Assessment

For every site sampled, the Riparian Health Assessment score was higher at the treated site than the control site (Fig. 4). Both months showed a significantly higher score in the treatment, with three out of four treated sites showing an increase in scores between July and September. This suggests that repaired streambanks will maintain and continue to develop higher functioning ecosystems post-repair throughout the first growing season, while untreated sites are more vulnerable to slow or even decreased functioning as seen at Reed Creek between data collection periods. The Reed control site consistently had the lowest score; this aligns with the fact that urbanized streams face more degradation, meaning that hydrologic flashiness, compacted soils, and nutrient loading limit the establishment of native seedlings (Juan-Diego et al., 2025). Such streambanks may struggle to recover in the absence of ecosystem-focused repair. It is important to note that in July, all sites fell within the non-functioning range (<60%); in September, the Baird treatment had a score in the functioning-at-risk category (60-79%) (Fitch et al., 2009). Baird had the highest scores across control and treatment, suggesting that it may have been higher functioning, and therefore better equipped to support vegetation, prior to repair. Overall, heightened RHA scores at treated sites indicate not only structural recovery (e.g., canopy cover, root mass stability) but also early signs of improved ecosystem function, such as reduced bank erosion potential and healthier vegetative species composition. Continued monitoring is needed to determine whether these trends persist or plateau as vegetation matures and the ecosystem stabilizes.

Vegetative Makeup

Three out of four sites had a higher species richness in treated sites than in controls (Table 1), indicating that more species were able to establish after repair. The exception was Reed Creek in July, with a minimal difference of two species; by September, the treatment site had nine more species present than the control. Additionally, in July, the Reed Creek control had 3.5% more non-native invasive species and 7.69% more non-native species. As previously mentioned, the slower growing nature of native seedlings compared to non-native invasives as well as susceptibility to disturbance of urban streams may explain this initial lag. All samples had a higher percentage of native species than their corresponding controls, suggesting that establishment of native species was successful post-repair. The higher percentage of non-native invasive species in all control sites suggests that unrepaired streambanks are more susceptible to being dominated by opportunistic non-native invasive species.

Conclusions

These findings emphasize the value of small-scale streambank repair projects as a means to improve ecosystem functioning and re-establishment of healthy vegetation after an extreme degradation event. Such repairs are low-cost and physically manageable, making them an accessible option for non-profit organizations, educational groups, community engagement, and volunteer work within communities surrounding riparian zones. Findings have shown that small-scale repairs can yield measurable results within the first growing season post-disaster, and could be enhanced for repair or restoration of larger streambanks and waterways. Further research focused on long-term results across differing strategies can inform future repair project planning. Overall, small-scale streambank repairs produce short-term improvements to riparian ecosystem functioning as vegetation begins to reestablish on impaired banks.

Acknowledgements

I would like to thank Ashley Case for her help creating, planning, and managing this project, for her guidance throughout the data collection and writing periods, and for introducing me to the work that inspired this project. I would also like to thank Sophie Meadows for her great help in the field through all outdoor conditions. I would also like to thank Madeline Walker and RiverLink for demonstrating repair sites and methods, and the site landowners for working with us throughout data collection. Finally, I would like to thank the entire department of Environmental Science for providing me with equipment and guidance during this project, and for the abundant knowledge that I was able to use throughout my time here.

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Appendix

Appendix 1. Plant habits, Genus and specific Epithets, Common names, and Non-Native Invasive Status					**Relative Categorical Abundance**							
					Control				**Treatment**			
Habit	**Genus**	**Epithet**	**Common name**	**NN-I**	**1: <5 %**	**2: 5-25 %**	**3: 25-50 %**	**4: >50 %**	**1**	**2**	**3**	**4**
Annual graminoid												
	Digitaria	*ischaemum*	Smooth crabgrass		1		1		1			
		sanguinalis	Purple crabgrass		1							
	Echinochloa	*muricata*	American barnyard grass			1			1			
	Eleusine	*indica*	Goose grass		1							

	Microstegium	*viminuem*	Japanese stiltgrass	X	3	2	3	1	7	2		
	Panicum	*dichotomiflorum*	Smooth witchgrass						1			
	Setaria	*pumila*	Yellow foxtail	X	2							
		viridis	Green bristlegrass				1					
Annual forb												
	Acalypha	*rhomboidea*	Common copperleaf		1				4			
	Ambrosia	*artemisiifolia*	Common ragweed		1				1			
	Bidens	*bipinnata*	Spanish needles						1			
		frondosa	Devils beggarticks		2				1			
	Cardamine	*hirsuta*	Hairy bittercress						1			
	Commelina	*communis*	Asiatic dayflower		1				1			
	Erechtites	*hieraciifolius*	Burnweed		1							
	Erigeron	*canadensis*	Horseweed		1	1						
	Euphorbia	*maculata*	Spotted spurge						2			
	Fatoua	*villosa*	Hairy crabweed	X					1			
	Impatiens	*capensis*	Common jewelweed		5				2	2		
	Kummerowia	*striata*	Japanese clover		1							
	Lamium	*purpureum*	Red deadnettle						1			
	Mirabilis	*jalapa*	Marvel of Peru						1			
	Persicaria	*hydropiper*	Waterpepper							1		
		longiseta	Low smartweed	X	6	3	2		3	7	1	
		pensylvanica	Pinkweed						2	3		

		punctata	Dotted smartweed						1			
	Pilea	*pumila*	Canada clearweed		3	2			2	1		
	Ranunculus	*sceleratus*	Cursed crowfoot		1							
	Scorpiurus	*muricatus*	Caterpillar plant		1	2						
	Senna	*obtusifolia*	Sicklepod						1			
	Solanum	*americanum*	American nightshade		1							
	Stellaria	*media*	Common Chickweed	X	2					2		
Annual or biennial forb												
	Lepidium	*virginicum*	Virginia pepperweed		1							
	Ranunculus	*sardous*	Hairy buttercup						3	1		
Annual or perennial forb												
	Hypericum	*mutilum*	Dwarf st. Johns Wort						1			
	Oxalis	*dillenii*	Slender yellow woodsorrel						1			
		grandis	Great yellow woodsorrel		1				2			
Biennial forb												
	Rudbeckia	*hirta*	Black eyed susan						3			
Perennial graminoid												
	Carex	*debilis*	White edge sedge						1			
		folliculata	Northern long sedge						1			
	Cyperus	*strigosus*	Straw colored flat sedge						2	1		
	Dichanthelium	*clandestinum*	Deertongue		1				1			
		latifolium	Broadleaf panic						1			

		laxiflorum	Open flower witchgrass		1				2			
	Elymus	*virginicus*	Virginia wild rye		1							
	Erianthus	*giganteus*	Plumegrass								1	
	Holcus	*lanatus*	Velvetgrass	X	1				2			
	Muhlenbergia	*schreberi*	Nimbleweed		1				1			
	Setaria	*parviflora*	Knotroot bristlegrass						2			
Perennial forb												
	Actaea	*podocarpa*	Black snakeroot		1							
	Angelica	*venenosa*	Hairy angelica						1			
	Aquilegia	*canadensis*	Eastern columbine						1			
	Asclepias	*incarnata*	Swamp milkweed							1		
	Campanula	*divaricata*	Southern harebell		1							
	Coreopsis	*tripteris*	Tall coreopsis						1			
	Diodia	*virginiana*	Buttonweed		1							
	Elephantopus	*tomentosus*	Leafy elephants foot						2			
	Eryngium	*prostratum*	Creeping eryngo						2			
	Eupatorium	*perfoliatum*	Common boneset						1			
		serotinum	White boneset						1			
	Geranium	*thunbergii*	Thunberg germanium						1			
	Geum	*canadense*	White avens		1	1						
	Glechoma	*hederacea*	Ground ivy	X	2	1	1		2	2	1	
	Helianthus	*angustifolius*	Narrow leaf sunflower						1	1		

		atrorubens	Purpledisc sunflower						3	5		
	Heliopsis	*helianthoides*	False sunflower						4			
	Hydrocotyle	*americana*	American water pennywort		1							
	Hypericum	*punctatum*	Spotted st. Johns Wort						1			
	Hypoxis	*hirsuta*	Yellow stargrass		1							
	Iris	*cristata*	Dwarf crested iris						1			
	Lespedeza	*cuneata*	Chinese bushclover	X					2			
	Lilium	*michauxii*	Carolina lily						1			
	Ludwigia	*palustris*	Water purslane						1	1		
	Lycopus	*virginicus*	Virginia bugleweed						2			
	Micranthes	*micranthidifolia*	Lettuceleaf saxifrage						2			
	Monarda	*fistulosa*	Appalachian bergamont						3			
	Oxalis	*stricta*	Upright yellow woodsorrel		3	2			7	7		
	Phytolacca	*americana*	American pokeweed			1			3			
	Plantago	*major*	Great plantain								4	
		rugelii	American plantain		2				1	3		
	Potenilla	*indica*	Mock strawberry		3	1			1			
	Prunella	*vulgaris*	Common selfheal						3			
	Ranunculus	*repens*	Creeping buttercup						1	1		
	Reynoutria	*japonica*	Japanese knotweed	X					1			

	Rudbeckia	*laciniata*	Cutleaf coneflower						1			
	Rumex	*crispus*	Curled dock						1			
		obtusifolius	Broadleaf dock		1				3			
	Solanum	*emulans*	Eastern black nightshade		1							
	Solidago	*erecta*	Slender goldenrod						1			
		juncea	Early goldenrod						1			
	Stenanthium	*gramineum*	Featherbells						2			
	Symphyotrichum	*lateriflorum*	Calico aster						1			
		undulatum	Wavy leaf aster							1		
	Trifolium	*pratense*	Red clover		2		1	2	2	1	5	
		repens	White clover		4		3		4	4	1	3
	Verbena	*urticifolia*	White vervain						2			
	Verbesina	*alternifolia*	Wingstem			1	1		1			
	Vinca	*minor*	Lesser periwinkle	X	1		1					
	Viola	*sororia*	Common blue violet							1		
Perennial or biennial forb												
	Erigeron	*annuus*	Annual fleabane						2			
Shrub												
	Cornus	*ammomum*	Silky dogwood		1	2			2	2		
	Ligustrum	*sinense*	Chinese privet	X	1	1						
	Salix	*sericea*	Silky willow							9	2	1
	Sambucus	*canadensis*	American black elderberry			1			3			
Tree												
	Gleditsia	*triacanthos*	Honey locust						1			

	Juglans	*nigra*	Black walnut		2							
	Liriodendron	*tulipifera*	Tulip poplar						1			
Vine												
	Ampelopsis	*brevipedunculata*	Porcelain berry	X	6				2	2	1	
	Amphicarpaea	*bracteata*	American hog peanut		1							
	Apios	*americana*	American groundnut		1							
	Celastrus	*orbiculatus*	Oriental bittersweet	X	3				1			
	Clematis	*terniflora*	Autumn clematis	X	1							
	Fallopia	*scandens*	Climbing false buckwheat		1							
	Hydrangea	*barbara*	Woodvamp						2			
	Lonicera	*japonica*	Japanese honeysuckle	X	3	2			1	2		
	Parthenocissus	*quinquefolia*	Virginia creeper		2				1	2		
	Persicaria	*sagittata*	Arrow leaved tear thumb		1		1		2			
	Pueraria	*montana*	Kudzu	X	2	3			1			
	Toxicodendron	*radicans*	Eastern poison ivy						1			
	Vitis	*aestivalis*	Summer grape						2	1		