Rock Creek

Lower Rock Creek

3.19 Joseph's Branch 3B - Wheaton High School & Spruell Drive Stream Restoration

3.19.1 Introduction

The Joseph's Branch is a subwatershed within the larger Lower Rock Creek watershed (***Figure 3.19.3***). Much of the subwatershed was developed without any stormwater management controls in place to manage runoff. This subwatershed consists of residential and commercial properties with mostly older stormwater control designs. For that reason, Joseph's Branch was rated as a high priority watershed to be restored based on the Rock Creek Watershed Feasibility Study and was recommended for restoration. Three stream restoration projects were completed in this subwatershed, one on the Joseph's Branch mainstem, which is described in ***Section 3.20***, and two higher up in the watershed. These two projects are known as Wheaton High School and Spruell Drive and are described below.

The Wheaton High School stream restoration project originates upstream of Randolph Road and continues 670 linear feet upstream on the upper reach of Joseph's Branch (***Figure 3.19.6***). The construction for this project was completed in December, 2006 and reforestation was completed in April 2007. Restoration associated with this project included the construction of in-stream structures to control erosive stream flows and to improve stream habitat and reforestation of the stream buffer. ***Figure 3.19.1*** shows an example of the Wheaton High School restoration project.

The Spruell Drive stream restoration begins at the pedestrian trail crossing located behind the Rock Creek Palisades Apartments to the west of Connecticut Avenue and continues downstream to the mainstem of Joseph's Branch (***Figure 3.19.7***). The construction for this project was completed in December 2006 and reforestation was completed in April 2007. Restoration included stabilizing the stream and planting native vegetation to enhance the riparian zone. ***Figure 3.19.2*** shows an example of the restoration associated with the project.

Figure 3.19.1 – Wheaton High School Restoration Site Showing Plantings and Streambank Stabilization (2008)

Figure 3.19.2 – Spruell Drive Restoration Site Showing Cross Veins and Logs Providing Streambank Protection (2007)

Subwatershed facts

Wheaton High School

Subwatershed Drainage Area: 121 acres
Subwatershed Imperviousness: 24 Percent
Property Ownership: Maryland-National Capital Park and Planning Commission

Spruell Drive Tributary

Subwatershed Drainage Area: 53 Acres
Subwatershed Imperviousness**:** 24 percent
Property Ownership: Maryland-National Capital Park and Planning Commission

Project Facts

Wheaton High School

Project Area: The Joseph's Branch subwatershed consists of residential and commercial properties with minimal, older stormwater designs to capture pollutant-enriched runoff during storms. The stream restoration project originated upstream from Randolph Road and continued 670 linear feet upstream on the upper reach of Joseph's Branch.
Costs: Structural and Reforestation ($89,914)
Completion Date: Construction (December 2006); Reforestation/branch bundles/mulch compost (April, 2007)

Spruell Drive Tributary

Project Area: The stream restoration begins at the pedestrian trail crossing located behind the Rock Creek Palisades Apartments to the west of Connecticut Avenue and continues downstream to the mainstem of Joseph's Branch. The project included stabilizing approximately 1,006 linear feet of stream and planting native vegetation.
Costs: Structural ($615,000), reforestation ($85,000), funded in part through Maryland State Highway Administration TEA-21 Enhancement Program, administered by Federal Highway Administration.
Completion Date: Construction (December 2006); Reforestation/branch bundles/mulch compost (April, 2007)

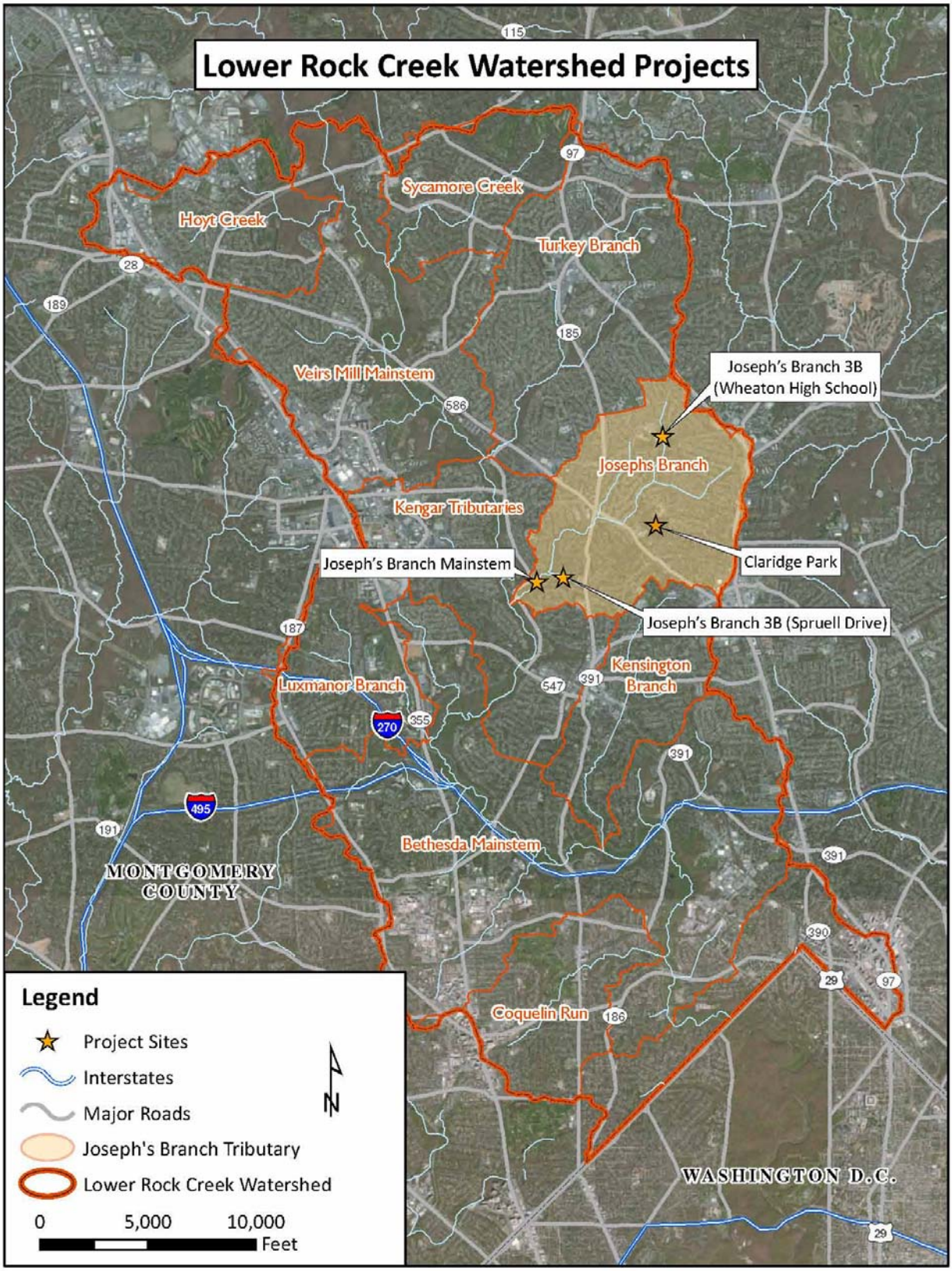

Figure 3.19.3 – Lower Rock Creek Watershed Including Joseph's Branch Restoration Projects

Project Selection

Montgomery County has a continuing commitment to protect and improve its water resources. *The Countywide Stream Protection Strategy, (*CSPS 1998, updated 2003*)*, published by the Department of Environmental Protection (DEP), evaluated biological, chemical, and habitat conditions of streams in the county, and identified impaired "priority" subwatersheds for restoration, including the Joseph's Branch subwatershed. Following the *CSPS*, *The Rock Creek Watershed Feasibility Study (April 2001)* evaluated more than 14 miles of Rock Creek and its tributaries to identify specific stream restoration and stormwater management opportunities. The study identified 23 priority stream restoration sites, including the Joseph's Branch tributary of Rock Creek.

Pre-Restoration Conditions

Much of the lower Rock Creek Watershed, including the Joseph's Branch subwatershed, contains a high percentage of impervious surfaces and was developed prior to regulations requiring stormwater management. Uncontrolled stormwater runoff from highly impervious areas creates erosive, high velocity or "flashy" flows that cause damage to receiving streams. The Rock Creek Watershed Feasibility Study identified several impaired conditions in Joseph's Branch. Uncontrolled stormwater created severe streambank erosion and unstable banks. Undercut trees fell into the stream and created debris jams blocking the stream and causing additional bank erosion.

Over time, the stream channel down-cut and over-widened, limiting the stream's access to the original floodplain. The down-cutting and over-widening exposed sewer manholes, threatened buried sewer lines, and destroyed habitat necessary for diverse aquatic life. Large amounts of sediment from eroded banks and road grit accumulated in the stream, further degrading stream habitat conditions (***Figures 3.19.4 and 3.19.5***).

Figure 3.19.4– Pre-Restoration Conditions at the Wheaton High School Site (2005)

Figure 3.19.5 – Pre-Restoration Conditions at the Spruell Drive Site (2005)

Restoration Actions Taken

The Joseph's Branch Projects used restoration techniques and reforestation to help stabilize stream banks and enhance riparian habitat. Newly built in-stream structures included rock and log vanes that direct water away from unstable stream banks and form downstream scour pools, providing good habitat for fish. Rock cross vanes were also installed and function as grade control structures, slowing the erosive process of stream down-cutting. In-stream root wad revetments were installed to help stabilize streambanks, while creating scour holes to provide cover for fish. Boulder rock was installed at the toe of the streambank slope, stabilizing the area of the stream channel subject to the greatest erosive energy, or "shear" stress. The slopes above the reinforced toe were graded back to create new floodplain terraces and planted with native trees and shrubs to further stabilize the streambanks. The project attempted to save undercut streambank trees with supportive "rock packing." More seriously damaged trees were flush cut, allowing the root systems to remain in the bank for stabilization. Other efforts to enhance the riparian habitat and buffer included creating a shallow vernal pool at the upper end of the project, and planting more than 1,400 native plants and trees. ***Figure 3.19.6 and 3.19.7*** show examples of the restoration completed at the Wheaton High School and Spruell Drive restoration sites.

Montgomery County worked closely with the Washington Suburban Sanitary Commission (WSSC) to protect buried sewer lines with channel grade controls, and divert stream water flow away from exposed manholes. The WSSC made use of the County's temporary construction access to clean and reline existing sewer lines, further protecting sewer infrastructure and guarding against water quality impairment from leaking pipes.

Figure 3.19.6 – Post-Restoration at Wheaton High School project (2007)

Figure 3.19.7 – Post-Restoration at Spruell Drive project (2007)

3.19.2 Restoration Goals

Restoration goals were defined during the planning and implementation of the Joseph's Branch 3B project. Pre-and post-restoration monitoring was conducted within the stream and in its riparian area. This is a first year monitoring report and summarizes the pre- and 2009 post-restoration conditions within the project areas. ***Table 3.19.1*** below presents the restoration goals, monitoring performed to evaluate the success of the goals, and when and where the monitoring occurred.

Table 3.19.1 – Summary of Restoration Project Goals and Associated Monitoring

Why: Restoration Goals	What: Monitoring Done to Evaluate Goal	When: Years Monitored	Where: Station or Location Monitored
• Improve aquatic habitat conditions in Upper Joseph's Branch • Improve water quality in Upper Joseph's Branch	• Aquatic Communities: ▪ Benthic macroinvertebrates ▪ Fish • Qualitative Habitat • In-situ Water Chemistry	2006 (pre) 2011 (post) [1]	LRJB101 and LRJB102
• Reduce stream erosion and sedimentation • Reduce erosive stream flows	• Quantitative Habitat (stream morphology surveys)	2006 (pre), 2010 and 2011 (post)[2]	LRJB101 and LRJB102
• Reforest riparian buffer	• Botanical survey	2009 (post)	LRJB101 and LRJB102

[1] Benthic and fish, qualitative habitat, and in-situ water chemistry monitoring was performed in 2011. The 2011 report will include results of this monitoring.

[2] Quantitative habitat surveys were scheduled for 2009, but were delayed due to missing benchmarks. These benchmarks were located and survey work was performed in 2011. 2011 reports will include updates for this monitoring.

3.19.3 Methods to Measure Project Goals

One site was sampled at each restoration area to determine pre- and post-restoration conditions, one in the vicinity of Wheaton High School (LRJB101) on the Joseph's Branch mainstem and one in the vicinity of Spruell Drive Tributary (LRJB102). At both sites, the County measured the shape of the stream profile and cross section and assessed channel bed materials to evaluate sediment transport and erosion. Since survey monuments could not be located in 2009, the survey work was delayed to 2010 and 2011. Post-restoration botanical plantings were monitored in the riparian area in 2009. Post- restoration aquatic communities and habitat will be assessed in the 2011 report. A map showing the monitoring locations associated with each project are provided in ***Figures 3.19.8 and 3.19.9***. These data are presented in the results section below. For more information on how this monitoring is performed and used to measure stream health in the County, see the Methods section (***Section 2***).

Figure 3.19.8 – Map of 2009 Monitoring Location for Wheaton High School (Site LRJB101)

Figure 3.19.9 – Map of 2009 Monitoring Location for Spruell Drive (Site LRJB102)

3.19.4 Results and Analysis

Benthic Macroinvertebrates

Post- restoration benthic macroinvertebrate data will be assessed in the 2011 report.

Fish

Post- restoration fish data will be assessed in the 2011 report.

Qualitative Habitat

Post- restoration qualitative habitat data will be assessed in the 2011 report.

Water Chemistry

Post- restoration water chemistry data will be assessed in the 2011 report.

Quantitative Habitat

Quantitative survey data collection was scheduled for 2009, but was delayed until 2010 and 2011 due to problems locating the survey monuments. Data collected in 2010 and 2011 will be presented in the subsequent 2010 and 2011 reports.

Botanical Reforestation

Wheaton High School project - LRJB101

Monitoring site LRJB101, within the Wheaton High School stream restoration project, is located directly east of Wheaton High School and the Wheaton-Glenmont outdoor pool off of Randolph Road in Silver Spring. Approximately 31 trees and shrubs were installed within the southern half of the associated stream restoration area, as well as along the access area extending south from Valleywood Drive (***Figure 3.19.8***).

Planted tree and shrub species observed in 2009 included *Platanus occidentalis* (American sycamore), *Acer rubrum* (red maple), *Quercus palustris* (pin oak), *Viburnum prunifolium* (blackhaw), *Lindera benzoin* (northern spicebush), *Hamamelis virginiana* (American witchhazel) and *Aronia arbutifolia* (red chokeberry). Twenty-six live individuals were encountered in 2009 and five individuals were considered dead, including two American sycamore, two American witchhazel, and one unknown tree. Eighty-four percent the plantings were found alive in 2009. None of the trees were considered healthy, but all of the shrubs were healthy. Tip dieback was evident on all three of the tree species. Deer rubbing was also observed, but only on the maples. Planted trees generally ranged from 0.5 to 1.5 inch caliper and shrubs ranged from 3.5 to 5.5 feet tall. Red maples were the largest of the planted trees, ranging from 1 to 1.5 inch caliper. These trees were likely one inch caliper when planted in 2006 so several of them appeared to have grown. With the exception of the dead American witchhazel, all planted shrubs appeared healthy.

Several species of invasive plants were observed at this site, including *Rubus phoenicolasius* (wineberry), *Alliaria petiolata* (garlic mustard), *Lonicera japonica* (Japanese honeysuckle), and *Rosa multiflora* (multiflora rose). The invasive species did not appear to be affecting the growth of the plantings.

Figure 3.19.10 – Site LRJB101, Wheaton High School Project, Picturing Red Maple and American Sycamore Plantings

Spruell Drive project - LRJB102

Monitoring site LRJB102, within the Spruell Drive stream restoration project, is located along a tributary to Joseph's Branch, between Rickover Road and Byrd Road in Kensington. Woody plantings were installed within three adjacent zones extending from the upstream limit of the associated tributary (Zone 1) to the confluence of the tributary and Joseph's Branch mainstem (Zone 3).

Three species of trees were planted for this project including American sycamore, red maple, and *Asimina triloba* (pawpaw). Twenty additional trees were planted in 2007, but it is unknown what species were planted. Eighty-eight percent of the trees at this site survived to 2009. One inch caliper American sycamore and red maples were planted in 2007 and planted pawpaws were one to two gallon or approximately 0.25-0.5 inch caliper. In 2009, many of the plantings were larger than the size of the individuals that were planted, with American sycamore growing the most (1.25-3 inch), red maple having the lowest growth differential (0.75-1.5 inch), and pawpaw individuals showing some growth (0.25 to 1.0 inch). ***Figure 3.19.9*** shows a few of the plantings in 2007.

Figure 3.19.11 – Site LRJB102, Spruell Drive Project, Picturing American Sycamore Plantings and a Stabilized Streambank (2007)

In addition to the larger planted trees, at least 200 tubelings were planted for the project, representing four species including red maple, *Viburnum dentatum* (southern arrowwood), *Ilex verticillata* (winterberry), and *Cornus amomum* (silky dogwood). One-hundred twenty-one tubelings were identified in 2009, with an approximate overall survival rate of 60 percent. Several species of volunteer trees/shrubs were also identified at the Spruell Drive site and included *Celtis occidentalis* (hackberry), *Liriodendron tulipifera* (tulip poplar), *Fraxinus pennsylvanica* (green ash), *Quercus prinus* (chestnut oak), and *Ilex opaca* (American holly). Fifteen dead trees were also observed, a majority of which were American sycamore. Additionally, several of the observed trees were determined to be unhealthy, either because of deer rub or browse or tip dieback.

Invasive species were somewhat extensive at this site, but did not appear to be impacting the success of the planted trees and shrubs. Those present included garlic mustard, *Bambusa vulgaris* (common bamboo), *Microstegium vimineum* (Nepalese browntop), *Ligustrum sinense* (Chinese privet), Japanese honeysuckle, and *Hedera helix* (English ivy), wineberry, *Ipomaea* sp. (unknown morning glory), and multiflora rose.

3.19.5 Discussion

Table 3.19.2 below provides a summary of project goals, the results of post-restoration monitoring, and whether each project goal has been met by the restoration actions as assessed by the first year of post-restoration monitoring. Based on the results, one project goal was partially met by the restoration actions and one project goal could not be evaluated in 2009.

Table 3.19.2 – Summary of Project Goal Results

Goal	Result
• Improve aquatic habitat conditions in Upper Joseph's Branch • Improve water quality in Upper Joseph's Branch	Unable to determine – data from 2011 will suggest if these goals have been met
• Reduce stream erosion and sedimentation • Reduce erosive stream flows	Unable to determine – physical data from 2010 will suggest if these goals have been met
• Reforest riparian buffer	Partially successful – trees and shrubs have been planted and provide riparian vegetation and an enhanced habitat, however their success has been only fair to good. Trees have not grown much since they were planted in 2007 and all trees at the Wheaton High School site and over half of the trees at Spruell Drive were considered unhealthy and most plantings showed tip dieback or were damaged from deer.

Unable to Determine – Improve Aquatic Habitat & Water Quality

Benthic and fish, qualitative habitat, and in-situ water chemistry monitoring was performed in 2011. The 2011 report will include results of this monitoring.

Unable to Determine – Reduce Stream Erosion, Sedimentation, and Erosive Stream Flows

Quantitative habitat surveys were scheduled for 2009, but were delayed due to missing benchmarks. These benchmarks were located and survey work was performed in 2011. 2011 reports will include updates for this monitoring.

Partially Successful – Riparian Reforestation

The current year's monitoring effort indicated reforestation at the Wheaton High School project (site LRJB101) has been partially successful. The site had an 84 percent survival rate from the time the plantings were installed in 2007. However, all of the trees were either rubbed by deer or experiencing tip dieback and were not considered healthy. Also, trees do not appear to have grown substantially since being planted; only red maples were larger than one inch caliper. Several shrubs that were planted at this site were observed and were healthier than the trees, but many invasive plants and vines were present around the plantings. Deer and invasive species may be a problem at this site in the future. ***Figure 3.19.12*** below shows an area of riparian planting for the Wheaton High School restoration project.

Figure 3.19.12 - Site LRJB101, Wheaton High School Project, Picturing Small Riparian Plantings

Overall, the reforestation at the Spruell Drive project (LRJB102) was more successful than it was at Wheaton High School (LRJB101). Eighty-eight percent of larger trees and 60 percent of the tubelings were observed in 2009. The condition of woody material was also better at this site; 52 percent of stems were considered healthy. The poorer health of plantings at LRJB101 may due to deer activity that was apparent in the 2009 survey. Browsing and rubbing by deer was not as prevalent at LRJB102, but was affecting many of the plantings. Invasive plants, though present, did not appear to be causing significant damage to the planted trees and shrubs (***Figure 3.19.13***).

Figure 3.19.13 - Site LRJB102, Spruell Drive Project (2009), Picturing Small American Sycamore Plantings and Well Established Herbaceous Layer

3.19.6 Conclusions

To date, the Joseph's Branch 3B – Wheaton High School and Spruell Drive stream restoration projects were partially successful at improving the riparian vegetative buffer. Both projects had greater than 80 percent of the plantings survive since planting, however, all of the plantings at the Wheaton High School project were in poor health, likely due to deer activity or from the general stress of being planted. The Spruell Drive project was more successful, with a little more than half of the surviving plantings considered healthy. Re-caging or fencing the existing plantings may help allow the plants to establish and grow to a healthier size. Since the transplanting process is often stressful, additional time for these plantings to thrive may be necessary. These plantings had only been installed for two to three years when they were monitored in 2009. Botanical monitoring in 2011 and 2013 will determine if the riparian reforestation was successful at these sites or additional plantings with more aggressive deer protections are necessary.

The goals to improve water quality and aquatic habitat, and reduce stream erosion, sedimentation, and erosive flows were evaluated in 2011 and will be included in the 2011 report.