

# Northern Virginia Stream Restoration Bank- The Glade- Reaches 2, 3, 4A, and 4B

Fairfax County, Virginia  
WSSI #20030, Task I3a

## Mitigation Monitoring Report Second Growing Season (2011)

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*Prepared for:*

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**Introduction**

The Glade – Reaches 2, 3, 4A and 4B of the Northern Virginia Stream Restoration Bank are located between Colts Neck Road and Soapstone Drive, immediately downstream of Colts Neck Road, in Fairfax County, Virginia (Exhibit 1: 38°55'33"N, 77°21'26"W). Restoration of Reaches 2, 3, 4A and 4B of The Glade occurred in 2009 and early 2010, in accordance with the Northern Virginia Stream Restoration Bank Mitigation Banking Instrument (MBI), dated February 17, 2006 (modified April 2007, June 2009, and June 2010), the Concept Plan dated May 15, 2006<sup>1</sup>, the subsequent Nationwide Permit 27 verification<sup>2</sup>, and the corresponding construction plans. Periodic monitoring to evaluate the success of the stream restoration is required by the MBI. This monitoring report documents that all success criteria have been met at The Glade – Reaches 2 through 4B during the second growing season, as set forth in the MBI and associated mitigation plans.

Northern Virginia Stream Restoration Bank, The Glade – Reaches 2, 3, 4A, and 4B includes a total of 11,134.2 linear feet of stream restoration, resulting in a total of 91,811.9 Stream Condition Units, per the As-Built Surveys, dated January 2010 (Reaches 2, 3, and 4A) and March 2010 (Reach 4B).

**Monitoring Success Criteria**

According to the MBI (§V.E.2) the monitoring success criteria shall follow the guidelines below:

- (a) *Reforested Riparian Buffer Areas*
- (i) *Plant density of at least 400 living woody stems (including volunteers) per acre of trees and shrubs must be achieved by the end of the first growing season following planting and maintained through the end of the monitoring period or until canopy coverage is greater than 30%.*
  - (ii) *Herbaceous plant coverage of at least 60% must be achieved by the end of the first growing season and at least 80% each monitoring year thereafter. Said criterion shall not be applicable if canopy coverage is greater than 30%. Canopy coverage shall be visually estimated at each plot and photodocumented to determine whether coverage has exceeded 30%. If canopy coverage exceeds 30%, herbaceous coverage shall continue to be assessed and documented each monitoring period for reporting purposes only.*
  - (iii) *Woody plant coverage (from live-stakes, tublings, container grown material, and volunteers) along stream banks shall achieve a density of at least 5 l.f./stem (i.e., 1 stem per 5 l.f.) by the end of the first growing season and for each monitoring year thereafter.*

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<sup>1</sup> The Concept Plan was approved by the COE and DEQ on June 22 and 30, 2009, respectively.

<sup>2</sup> COE # 2009-0064, dated January 26, 2009, and DEQ Notification of No Permit Required #08-1919, dated January 26, 2009.

(b) *Stream and Riparian System*

- (i) Dimension – The analysis of each permanent cross-section specified on the Stream Restoration Site Plan shall indicate that:
- 1) The Width/Depth Ratio (defined as the width at bankfull divided by the mean riffle depth at bankfull) did not increase or decrease by an amount greater than 1.2 of the as-built cross section.
  - 2) The bankfull Cross-Sectional Area did not increase or decrease by an amount greater than 20% of the as-built cross-section.
  - 3) The Bank Height Ratio (defined as the low bank height divided by the maximum riffle depth) did not increase or decrease by an amount greater than 0.2 of the as-built cross section.
- (ii) Pattern – The analysis of the plan-view survey of field measurements shall indicate that:
- 1) The Sinuosity of the stream (defined as the stream length along the thalweg divided by the valley length) did not increase or decrease by an amount greater than 0.2 of the as-built pattern.
  - 2) The Radius of Curvature/Width ratio did not increase or decrease by an amount greater than 0.2 of the as-built condition.
- (iii) Profile – The analysis of the longitudinal profile shall indicate that the slope of the longitudinal profile did not increase or decrease by an amount greater than 0.3% of the as-built slope.
- (iv) Structures – The analysis of each instream structure shall indicate that:
- 1) The angle of any rock vane, j-hook, or cross vane did not increase or decrease by an amount greater than 3 degrees from the as-built angle, and remains between 20 and 30 degrees from the streambank.
  - 2) The slope of any rock vane, j-hook, or cross vane did not increase or decrease by an amount greater than 2% from the as-built slope (i.e. if the design slope was 5%, than any slope from 3% to 7% would be acceptable) and remains between 2% to 7%.

## **Methods**

Vegetation monitoring field work was conducted on August 3 and 4, 2011 by Benjamin N. Rosner, PWS, PWD, CT, CE<sup>3</sup> and Lauren Shaffer to collect vegetation data and take photographs at the 16 vegetation monitoring stations. Photographs of stream stabilization structures were taken August 14, 2011. The following general supporting documentation is included at the end of this report: monitoring locations map ([Exhibit 2](#)); and representative monitoring photographs ([Exhibit 3](#)). Additional supporting data is available in separate [Appendices](#)<sup>4</sup> including: monitoring photographs; percent cover data; woody plant data; and photographs of stream stabilization structures.

In addition to the success criteria listed above, the DEQ §401 Certification also calls for the monitoring of temporary wetland impacts in years 1 and 2. For The Glade – Reaches 2 through 4B, this is to be accomplished by ground photographs and vegetation data plots of the

<sup>3</sup> Professional Wetland Scientist #1766, Society of Wetland Scientists Certification Program, Inc. VA Certified Professional Wetland Delineator #3402-000080; North American Benthological Society (NABS) Certified Level 1 Taxonomist: All Phyla; Certified Ecologist, Ecological Society of America.

<sup>4</sup> This information is included in separate Appendices due to report size limitations as set forth in COE Regulatory Guidance Letter 06-03.

temporary impact locations<sup>5</sup> ([Appendix E](#)). Temporary wetland impact photographs are included within [Exhibit 4](#) and [Appendix F](#). Temporary wetland impact vegetation data plots' percent cover data and woody stem data is included within [Appendix G](#).

## **Monitoring Program Protocol and Results**

In accordance with the guidelines of §VI.B of the MBI, the 2011 the monitoring program and results are as follows:

1. *With respect to the riparian buffer areas:*
  - a. *Visual description – ground level photographs shall be taken at each monitoring station, an aerial photograph shall be taken the 3<sup>rd</sup> or 5<sup>th</sup> year following final grading.*

Photographs were taken in four standard directions (upstream, downstream, left bank, right bank) as well as overhead at the canopy coverage at each of the sixteen permanent monitoring stations during the August 2011 monitoring field work. The representative photographs ([Exhibit 3](#)) demonstrate that herbaceous and woody vegetation is becoming established throughout The Glade – Reaches 2, 3, 4A and 4B reforestation areas. An aerial photograph of the site will be provided in year 3 or year 5. All photographs from the riparian monitoring plots are provided within [Appendix A](#).

- b. *Vegetation – sample plots shall be randomly located over reforested riparian buffer and streamside areas at a rate of 1 plot per 750 linear feet of stream length in order to sample all habitat areas of buffer area locations adjacent to each photo location marker. Each plot shall include no less than a 100-foot x 3-foot belt transect (or equivalent area) for woody riparian plants, a 3-foot diameter for riparian herbaceous plants, and a 100-foot long line transect along stream banks (and adjacent to the belt transect) to assess the stream bank woody plants criteria. The vegetation data shall include: dominant species identification, coverage assessment, number of woody plant stems (total and #/acre), and indicator status.*

Sixteen vegetation monitoring plots were established in the reforested area within Reaches 2 through 4B.

The average density of living woody stems (as measured by the number of stems per acre) is 6,779. On individual plots, the number of stems per acre ranged from 3,630 to 11,471 (due in part to a high rate of volunteers). These results meet and exceed the success criteria [MBI §V.E.2(a)(i)] of an average of 400 living woody stems per acre in reforested areas. Species are provided within [Appendix C](#).

The average percent cover by herbaceous vegetation was 83.8. On individual plots, percent cover ranged from 40-100. Most of the plots meet and exceed the success criteria [MBI §V.E.2(a)(ii)] of greater than 80 percent cover by the end of the second growing season. Plot 4 (Reach 3), plot 1 (Reach 4A) and

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<sup>5</sup> *Per correspondence from Mike Rolband to Bettina Rayfield (Sullivan) dated August 26, 2009 and approved by Ms. Rayfield on August 28, 2009 (see [Appendix E](#) for details).*

plot 2 (Reach 4B) were the only plots with less than 80 percent cover. However, tree canopy coverage at each of these plots exceeded 30 percent canopy coverage, thus the percent cover criteria is not applicable for this growing season at these plots. Dominant species and indicator status are provided within [Appendix B](#).

2. *With respect to the stream and riparian system:*

- a. *Woody plant coverage shall be quantified by species and density (1 stem per 5 l.f. along the stream edge).*

The average density of woody stems along the streambanks was 3 stems per 5 linear foot of stream bank. On individual plots, the number of stems per 5 l.f. ranged from 2.05 to 4.55. These results meet and exceed the success criteria [MBI §V.E.2(a)(iii)] of an average of 1 stem per 5 linear feet. Species are provided within [Appendix C](#).

- b. *Exposure of bank pins shall be quantified to provide an assessment of bank erosion.*

Monitoring of bank pins is not required in Year 2.

- c. *Scour chains shall be assessed to provide data on movement of sediment.*

Monitoring of scour chains is not required in Year 2.

- d. *Pebble counts and bar samples will be collected and analyzed to document changes in streambed material size.*

Pebble counts and bar samples are not required in Year 2.

- e. *Each stream stabilization structure shall be surveyed, photographed and a narrative statement provided as to whether or not specific Success Criteria have been violated.*

The stream stabilization structures are not required to be surveyed in Year 2.

Structure photographs for 2011 indicate no erosion or stability issues. Photographs of all structures are included in [Appendix D](#).

- f. *One cross section per 1,000 l.f. shall be provided, with a representative mix of riffles and pools.*

Fourteen cross sections have been provided within these Reaches. However, surveying of these cross sections is not required in Year 2.

- g. *A surveyed profile of the stream shall be provided immediately following completion, and in years 1, 3, 5, and 10.*

A surveyed profile of the stream is not required in Year 2.

- h. Location of any riparian areas with excessive erosion that needs replanting or protection shall be identified.*

No riparian areas with excessive erosion or that needed replanting were identified during this monitoring year.

- i. An assessment of biological conditions (habitat) shall be provided pre-restoration and in years 1, 5, and 10.*

Six biological assessment reaches are located within Reaches 2, 3, 4A and 4B of the Glade, however, biological monitoring is not required in Year 2.

- j. Within one week after any storm event that exceeds 3.2 inches in 24 hours or 2.0 inches in 2 hours, the subject stream reach shall be visually inspected for damages. Any damage noted shall be reported to the Corps in writing.*

During the 2011 year, no storm events meeting the criteria of §VI.B.2(j) occurred.

### **Additional Reporting Criteria**

In accordance with the accepted conditions of DEQ's §401 certification for the Nationwide Permit 27 issued for Reaches 2, 3, 4A and 4B, the temporary wetland impacts were monitored and photographically documented ([Appendix F](#)). Vegetation data plots were required for temporary wetland impact 5 and 7 in Reach 2 ([Appendix G](#)). Representative photographs provided within [Exhibit 4](#) depict the condition of various temporary wetland impacts following the restoration activities.

### **Maintenance/Corrective Measures**

Only minor maintenance activities and corrective measures were undertaken in 2011. These activities included removal of fallen trees and spraying invasive species, including mile-a-minute (*Polygonum perfoliatum*), multiflora rose (*Rosa multiflora*), Japanese hops (*Humulus japonicus*), and princess tree (*Paulownia tomentosa*) on four occasions, from May to July, during the 2011 growing season. Note, however, that the success of the NVSRB is **not** predicated upon the presence/absence of invasive species.

### **Mitigation Credit Analysis**

The MBI requires a summary of credits created by the bank and the permits that have been debited against these credits. A credit ledger for the entire NVSRB is provided annually to the chair of the Mitigation Bank Review Team.

### **Summary**

This investigation indicates the successful restoration of The Glade – Reaches 2, 3, 4A and 4B in the second growing season. Monitoring of these reaches confirm the successful reforestation/ revegetation of riparian buffers and the successful establishment of a stable stream system.

## Limitations

This study is based on examination of the vegetation and geomorphology at the referenced site. Field indicators can change with variations in hydrology and other factors. Therefore, our conclusions may vary significantly from future observation by others. This report assesses the presence of vegetation and the stability of geomorphic features at the site at the time of our review and does not address conditions prior to our review or at a given time in the future.

Our review and report have been prepared in accordance with the MBI and with generally accepted guidelines for the conduct of monitoring reports for mitigation banks.

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