

## 3.10 Bryants Nursery Run II Stream Restoration

### 3.10.1 Introduction

The Montgomery County Department of Environmental Protection, in collaboration with the Maryland-National Capital Park and Planning Commission (M-NCPPC) and the U.S. Army Corps of Engineers (USACE), is planning to restore approximately 1,000 feet of the Bryants Nursery Run tributary just north of Bryants Nursery Road. This project is planned for construction in the summer of 2011. The Bryants Nursery Run tributary is designated as a Use Class IV stream by the Maryland Department of Environment. The Bryants Nursery stream reach was identified as a priority for restoration in the Northwest Branch Watershed Feasibility Study (July 2000). This stream has been degraded by years of uncontrolled storm flows, which have impacted habitat for fish and other aquatic life. The County plans to stabilize eroded streambanks, restore stable habitat, create floodplain access, and reforest stream buffer areas.

#### *Subwatershed facts*

Subwatershed Drainage Area: 1.6 square miles

Subwatershed Imperviousness: 7 percent

#### *Project Facts*

**Project Area:** Approximately 1,000 linear feet of stream north of Bryants Nursery Road

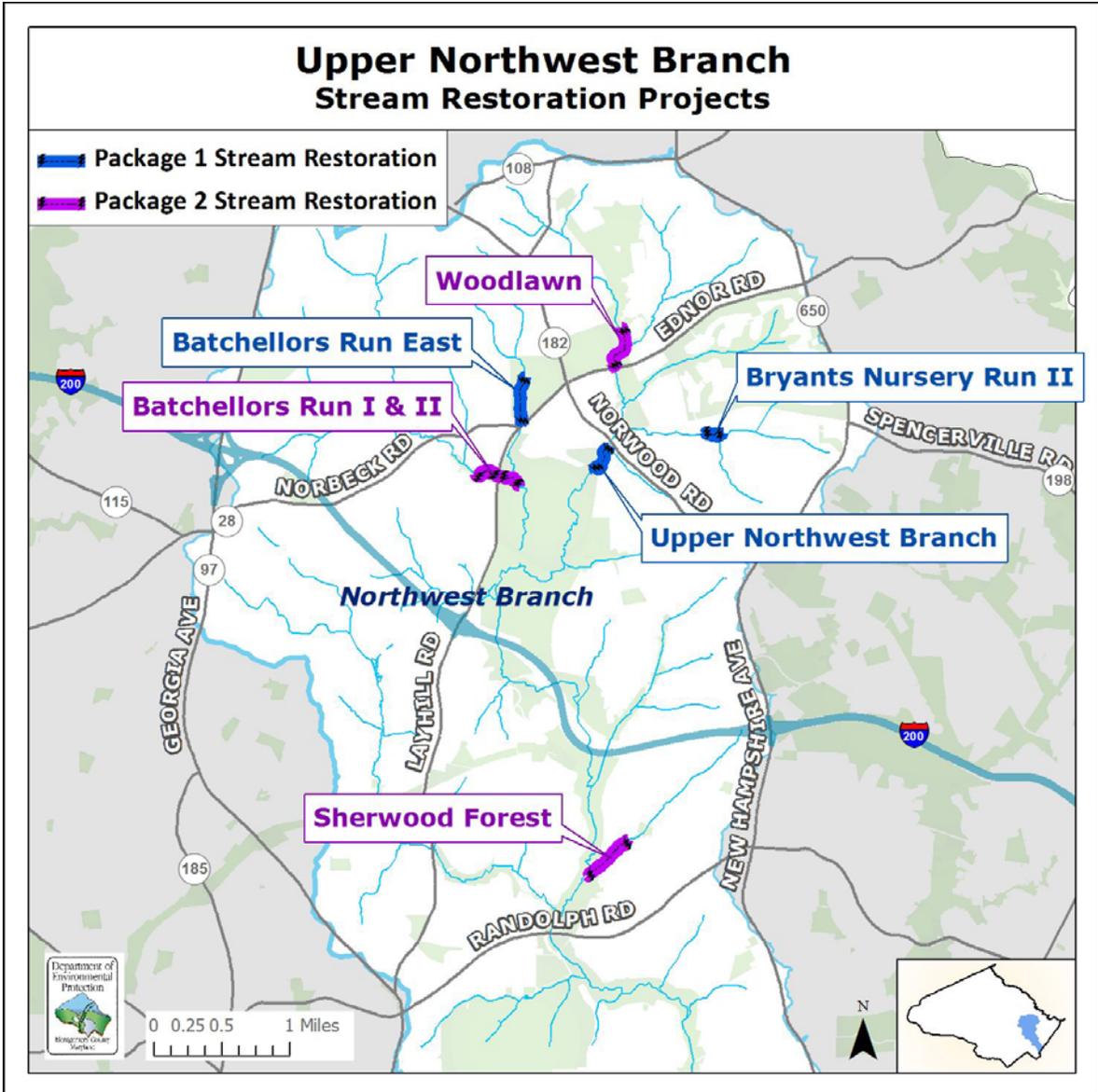
**Costs (Projected):** Construction \$170,000, funded in part by the USACE

**Completion Date (Projected):** Summer 2011

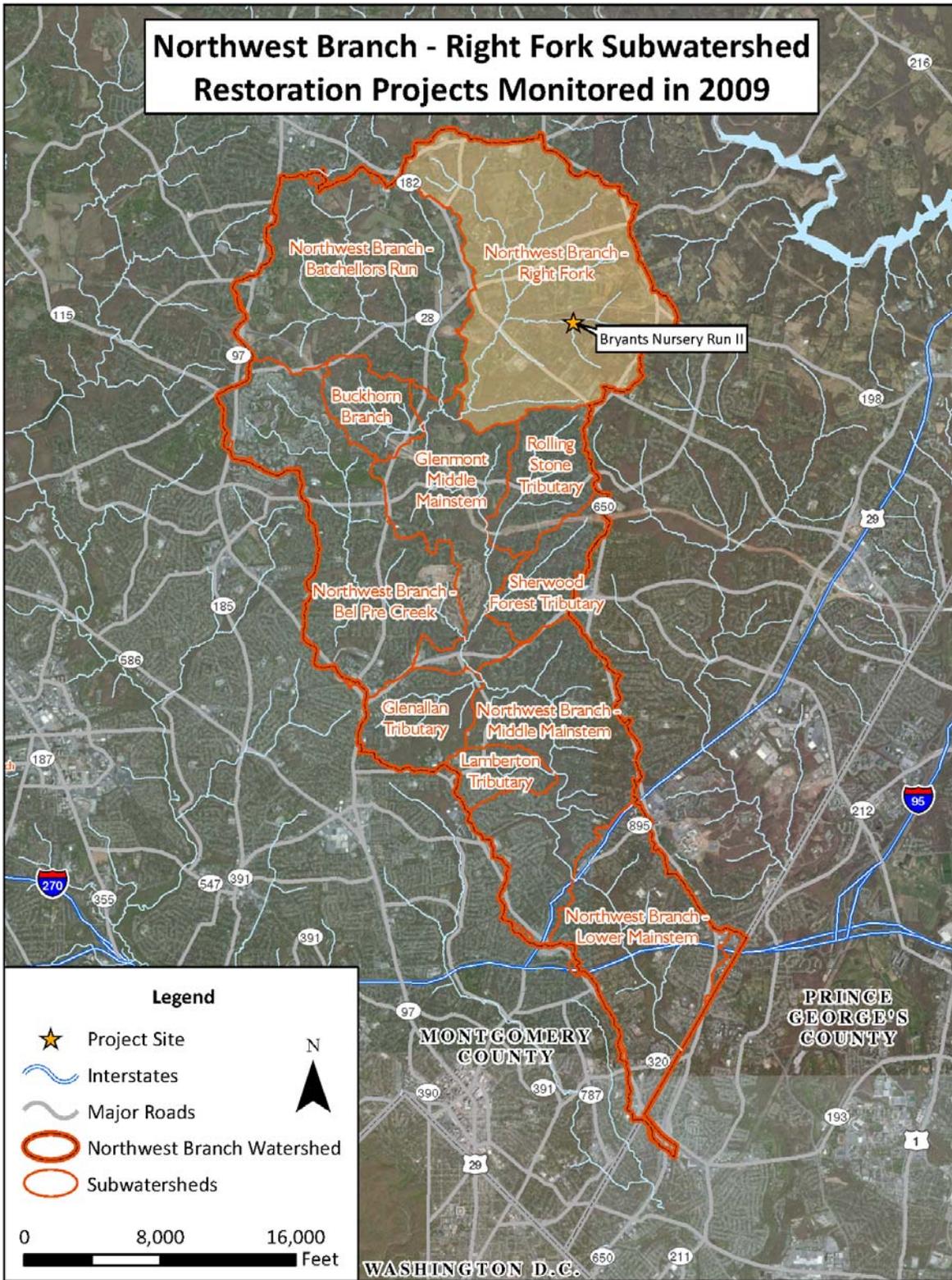
**Property Ownership:** Montgomery County and Private Property

#### *Project Selection*

The Bryants Nursery Run tributary, along with several other stream reaches, was identified as a priority for restoration in the Northwest Branch Watershed Feasibility Study (July 2000). The Montgomery County Department of Environmental Protection, in collaboration with the M-NCPPC and the USACE is planning to restore streams in the Northwest Branch watershed in two packages. Upper Northwest Branch Package 1 streams will be restored in 2011 and include Batchellors Run East, Upper Northwest Branch, and Bryants Nursery Run. Upper Northwest Branch Package 2 projects include Sherwood Forest I, Batchellors Run I & II, and Woodlawn stream restorations, and are planned to be completed from fall 2012 to summer 2013 (**Figure 3.10.1 and 3.8.2**).



*Figure 3.8.1 – Upper Northwest Branch Stream Restoration Package 1 and Package 2 Projects, Including Bryants Nursery Run II Stream Restoration*



**Figure 3.10.2 – Northwest Branch Right Fork Restoration Projects Monitored in 2009, Including Byrants Nursery Run II Stream Restoration**

### *Pre-Restoration Conditions*

Much of the Northwest Branch Watershed was developed prior to regulations requiring stormwater management control, and the watershed contains a high percentage of impervious surfaces. Uncontrolled stormwater runoff from highly impervious areas creates erosive, high velocity or "flashy" flows that cause damage to receiving streams.

The Bryants Nursery Run tributary is characterized by eroded streambanks, unstable channel materials, low flow conditions, and minimal access to its floodplain and interaction with wetlands (**Figure 3.10.3**). In the past, livestock had access to the floodplain and may have contributed to bank stability problems. The bed material is predominantly poorly graded gravel with sand and the bank material is predominantly silty sand. While the Bryants Nursery Run site does not currently exhibit serious degradation, there are opportunities, through careful repair and enhancement of habitat, to maintain and improve stream stability that would otherwise continue to deteriorate.



***Figure 3.10.3 – Streambank Erosion and Limited Forested Buffer at Bryants Nursery Prior to Restoration in 2009***

### *Restoration Actions Planned*

Access to the site for construction is anticipated from Bryants Nursery Road. Restoration activities are planned for approximately 1,000 feet of stream and will include channel stabilization, in-stream habitat improvement, and riparian buffer enhancement. Stone toe protection with plantings will help provide streambank stability and shade for in-stream habitat. In-stream structures will include log and rock vanes that will direct water away from unstable stream banks, form downstream scour pools, and provide habitat for fish. Other planned stream habitat features include rock wing deflectors and riffle grade controls. Trees will be planted and floodplain access will be created to enhance the riparian zone alongside the stream.

### 3.10.2 Restoration Goals

**Table 3.10.1** below presents the restoration goals, monitoring performed to characterize pre-restoration conditions, and when and where the monitoring has or is planned to occur. This is a pre-construction monitoring report and summarizes the pre-restoration conditions within the Bryants Nursery Run Stream Restoration project area.

**Table 3.10.1 – Summary of Restoration Project Goals and Associated Monitoring**

<b>Why: Restoration Goals</b>	<b>What: Monitoring Done to Evaluate Goal</b>	<b>When: Years Monitored</b>	<b>Where: Station or Location Monitored</b>
<ul style="list-style-type: none"> <li>• Improve aquatic habitat conditions by enhancing pool and riffle fish habitat and creating overhead cover for fish</li> </ul>	<ul style="list-style-type: none"> <li>• Qualitative habitat</li> <li>• Aquatic communities:               <ul style="list-style-type: none"> <li>▪ Benthic macroinvertebrates</li> <li>▪ Fish</li> <li>▪ Stream salamanders</li> </ul> </li> <li>• Water chemistry</li> </ul>	2004 and 2009 (pre)	NWNW205
<ul style="list-style-type: none"> <li>• Stabilize eroding streambanks to reduce sediment entering the stream</li> </ul>	<ul style="list-style-type: none"> <li>• Quantitative habitat (stream morphology surveys)</li> </ul>	2009 (pre) <sup>1</sup>	NWNW205
<ul style="list-style-type: none"> <li>• Reforest streambanks for added stability and overhead cover</li> </ul>	<ul style="list-style-type: none"> <li>• Botanical reforestation surveys</li> </ul>	Post only	Reforested areas

<sup>1</sup> Quantitative habitat surveys were scheduled for 2009, but were delayed due to missing benchmarks. These benchmarks were located and survey work was completed in 2010. The 2010 report will include updates for this monitoring.

### 3.10.3 Methods to Measure Project Goals

The basic sampling design for the Bryants Nursery Run Stream Restoration project is pre-restoration (before) and post-restoration (after) monitoring. The County monitored the biological communities (benthic macroinvertebrates, fish, and stream salamanders), performed rapid habitat assessments (RHAB), and took in-situ water chemistry measurements at biological monitoring site NWNW205 to evaluate the aquatic habitat conditions and water quality during the pre-restoration period. The County also performed quantitative survey for the entire project length, but this work was postponed until 2010 due to missing benchmarks. Botanical surveys are planned once the trees and shrubs are planted. If the project is completed as planned in summer 2011, all data collected prior to summer 2011 will be considered pre-restoration data and all subsequent data may be considered post-restoration. Pre-restoration monitoring was performed in 2004 and 2009 at site NWNW205 (**Figure 3.10.4**). Post-restoration monitoring is planned for at least years one, two, three, four, and five years after restoration.

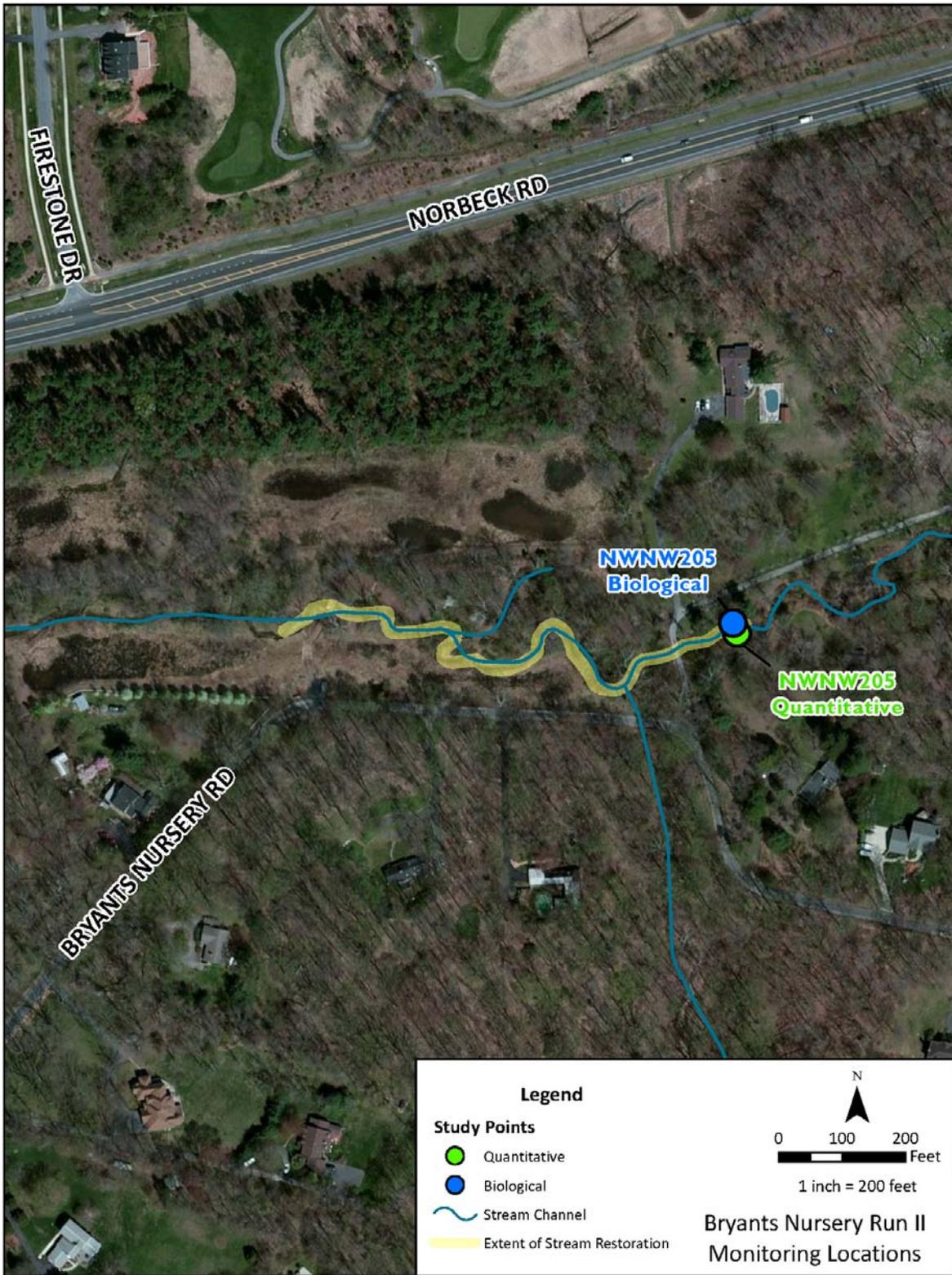


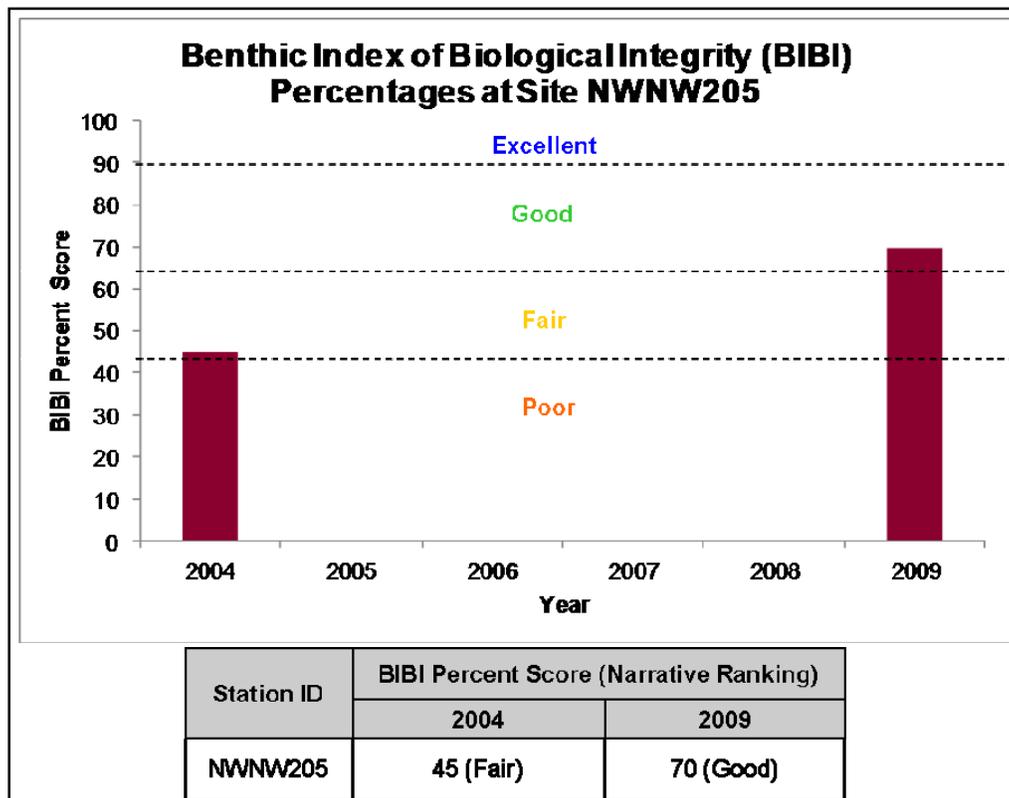
Figure 3.10.4 – Map of 2009 Monitoring Locations at the Bryants Nursery Run II Restoration Site

### 3.10.4 Results and Analysis

#### *Benthic Macroinvertebrates*

##### BIBI (Benthic Index of Biological Integrity) Scores

Pre-restoration benthic macroinvertebrate assessments were conducted at site NWNW205 in 2004 and 2009. This site was rated by the Benthic Index of Biological Integrity (BIBI) as Fair in 2004 and Good in 2009 (*Figure 3.10.5*). The increase in BIBI score in 2009 was due to positive changes in individual metrics including taxa richness, in the number of Ephemeroptera (mayfly), Plecoptera (stonefly), and Trichoptera (caddisfly), collectively referred to as EPT taxa and EPT individuals. An increase in the proportion of shredders as well as a decrease in the proportion of dominant taxa also contributed to the higher BIBI score in 2009. In both years, the benthic community was dominated by Chironomidae (midges); however, in 2009, the community was more diverse and had other more sensitive taxa as sub-dominants. The 2009 field data sheets for this task are included in *Appendix D*.

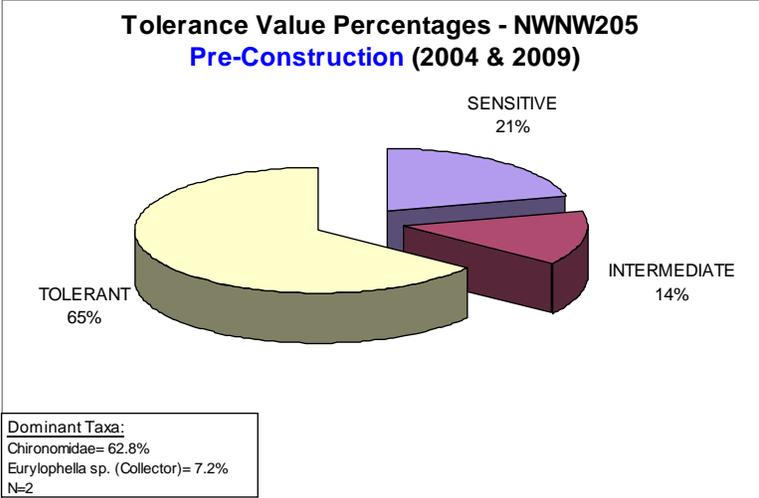


*Figure 3.10.5 – Pre -Restoration Benthic Index of Biological Integrity (BIBI) Percentages at NWNW205*

##### Dominant Taxa and Tolerance Values

Midges dominated the benthic macroinvertebrate community at NWNW205 during the pre-restoration period (*Figure 3.10.6*). Midges are considered tolerant to in-stream habitat disturbance and water quality degradation. A genus of mayfly, *Eurylophella sp.*, was the second most dominant taxa collected at this site. This genus is considered sensitive to degraded stream conditions, however it was only collected in 2009. Tolerant individuals were dominant (65

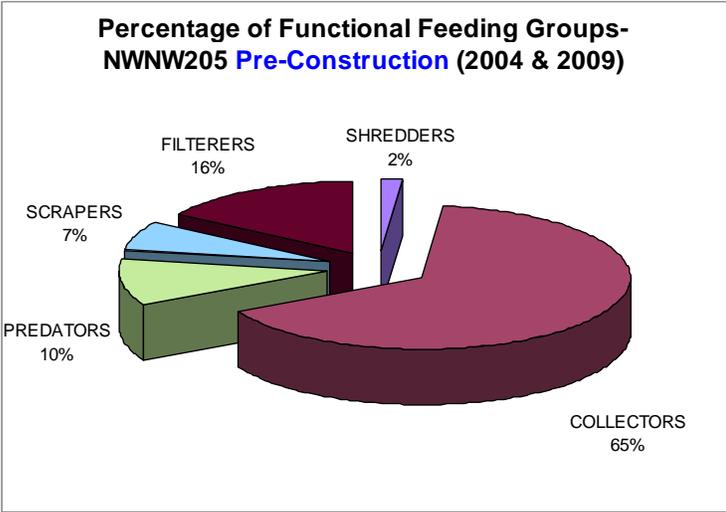
percent) at this site in the pre-restoration period, sensitive individuals were second most dominant (21 percent), and individuals intermediate in sensitivity were least abundant (14 percent).



**Figure 3.10.6 – Pre-restoration Benthic Macroinvertebrate Tolerance Composition at NWNW205**

Functional Feeding Groups

Collectors were the most dominant feeding group at NWNW205 (**Figure 3.10.7**). More specialized feeders, including scrapers and shredders, comprised a total of nine percent of the community in the pre-restoration period.

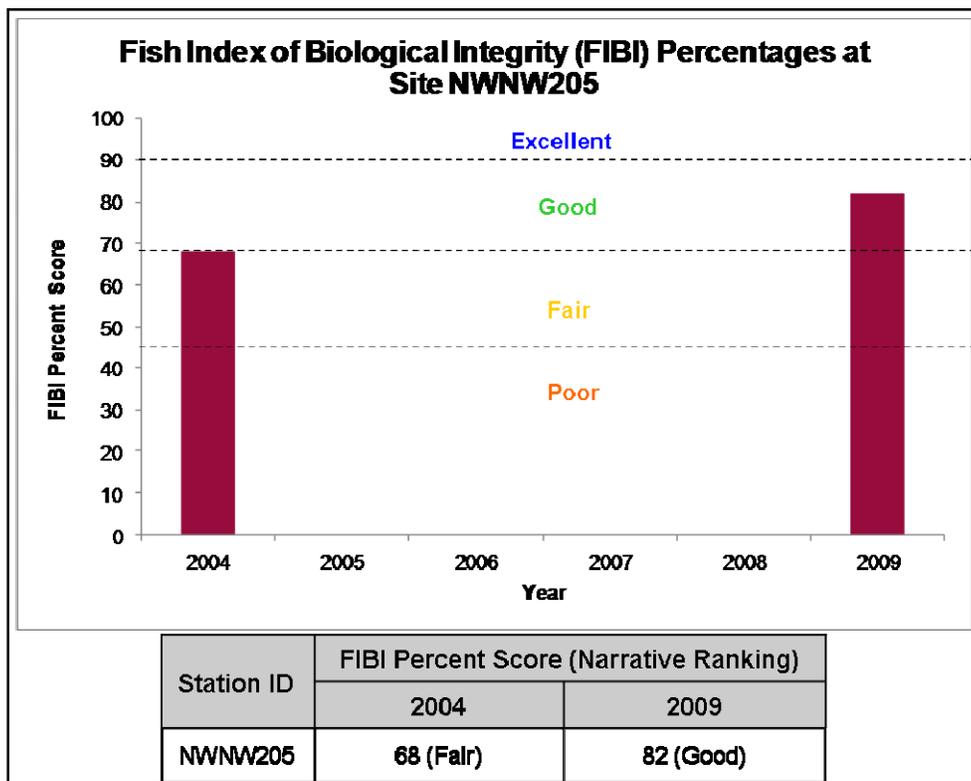


**Figure 3.10.7 – Pre-restoration Benthic Macroinvertebrate Functional Feeding Group Composition at NWNW205**

*Fish*

FIBI (Fish Index of Biological Integrity) Scores

The fish community at site NWNW205, as assessed by the MDCEP Fish Index of Biological Integrity (FIBI), was rated as Fair in 2004 and improved to the Good range in 2009 (**Figure 3.10.8**). The increase in FIBI percent was due to decreases in the percentages of tolerant individuals, omnivores/generalists, individuals as pioneering species, and an increase in the total number of individuals. In 2004, the fish community was dominated by *Rhinichthys atratulus* (blacknose dace), and in 2009 *Clinostomus funduloides* (rosyside dace) was the most dominant fish species. In all years, the fish community was also represented by several other species of minnows, two darter species, and *Catostomus commersoni* (white sucker). Field data sheets from 2009 fish monitoring are included in *Appendix D*.

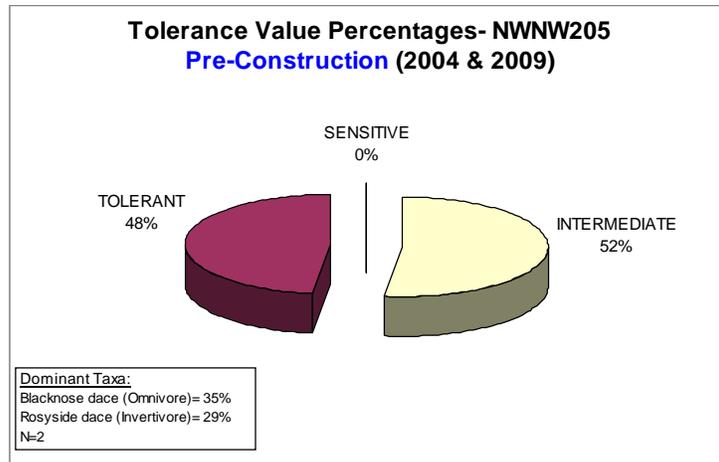


**Figure 3.10.8 – Pre -Restoration Fish Index of Biological Integrity (FIBI) Percentages at NWNW205**

Dominant Species and Tolerance Values

The most dominant fish species found at NWNW205 over the pre-restoration period was *Rhinichthys atratulus* (blacknose dace), which comprised 35 percent of the community. Blacknose dace are considered tolerant to in-stream habitat and water quality degradation (**Figure 3.10.9**). Other tolerant species found at this site included white sucker, *Pimephales notatus* (bluntnose minnow), *Semotilus atromaculatus* (creek chub), *Notropis procne* (swallowtail shiner), and *Etheostoma olmstedi* (tessellated darter). The second most dominant fish species at this site was *Clinostomus funduloides* (rosyside dace), which comprised 29 percent of the community. Rosyside dace are intermediate in sensitivity. Other species collected

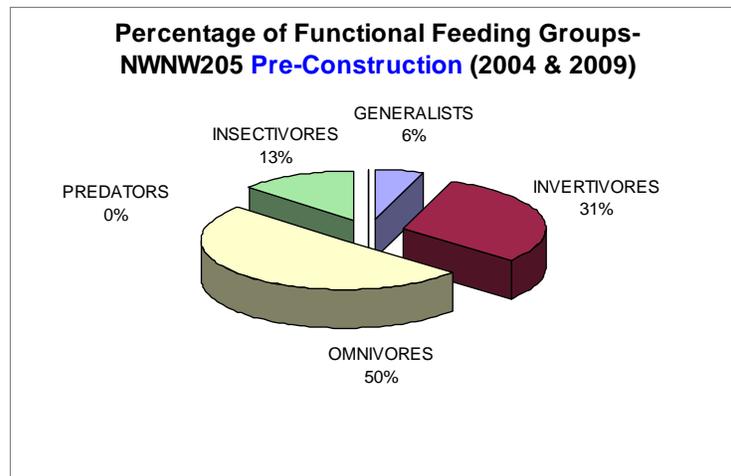
at this site that are considered intermediate in sensitivity include *Etheostoma flabellare* (fantail darter), *Rhinichthys cataractae* (longnose dace), and *Notropis buccatus* (silverjaw minnow). No fish sensitive to disturbance were present at this site prior to restoration.



**Figure 3.10.9 – Fish Tolerance Composition and Species Dominance at NWNW205 Prior to Restoration**

Functional Feeding Groups

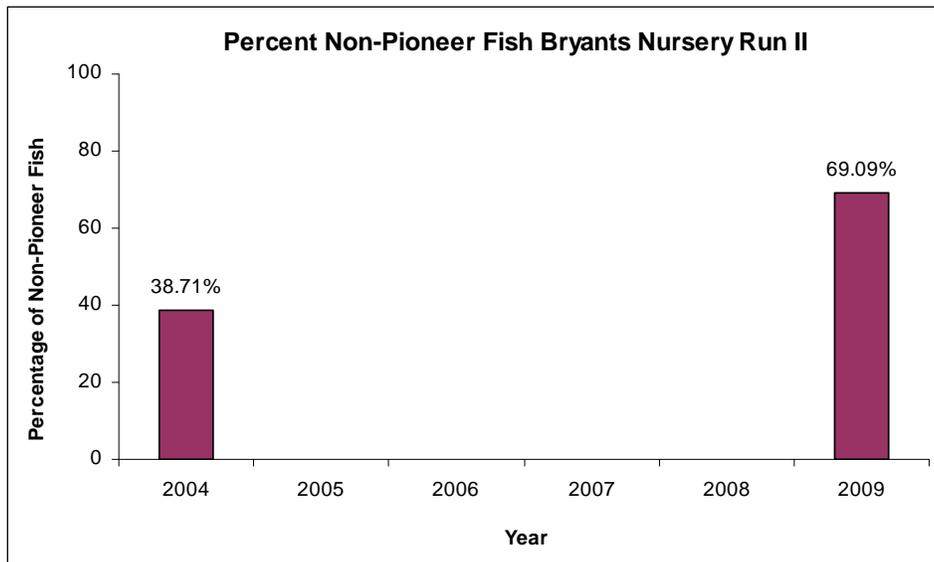
Omnivores were the most dominant feeding group (50 percent) present at NWNW205 and were represented by blacknose dace, white sucker, bluntnose minnow, longnose dace, silverjaw minnow, and swallowtail shiner (**Figure 3.10.10**). Invertivores and insectivores were the second and third most dominant feeding groups and are considered specialized feeders, comprising 31 and 13 percent of the community, respectively. Invertivores were represented by rosyside dace and tessellated darter, and insectivores were represented by fantail darter. No predators were collected in the pre-restoration period.



**Figure 3.10.10 – Fish Functional Feeding Group Composition at NWNW205 Prior to Restoration**

### Pioneer Fish

Pioneer species of fish (such as blacknose dace and bluntnose minnow) are more capable of colonizing degraded or transient stream habitat. Non-pioneer species prefer higher quality, stable habitat to survive. At NWNW205, the percentage of non-pioneering individuals increased from 2004 to 2009 (**Figure 3.10.11**). Non-pioneer fish are generally more sensitive to impaired water quality or aquatic habitat degradation and therefore are not as abundant as they would be in more pristine stream systems. The increase was mostly due to an increase in the percentage of rosyside dace, a non-pioneering fish species, and a decrease in the proportion of blacknose dace, a pioneering fish species.



**Figure 3.10.11 – Non-Pioneering Fish Present at NWNW204 Prior to Restoration**

### *Stream Salamanders*

Stream salamanders were surveyed at this site in the summer of 2009. One species of stream salamander was collected, *Eurycea bislineata* (northern two-lined salamander), and were represented by both larvae and adults (**Figure 3.10.12**). This species is considered tolerant to degraded stream conditions. One unknown stream salamander was also collected at this site in 2009. This site was given a score of 3.75 out of 10 (38 percent) for the provisional Stream Salamander Index of Biological Integrity (SSIBI) for the Piedmont eco-region.



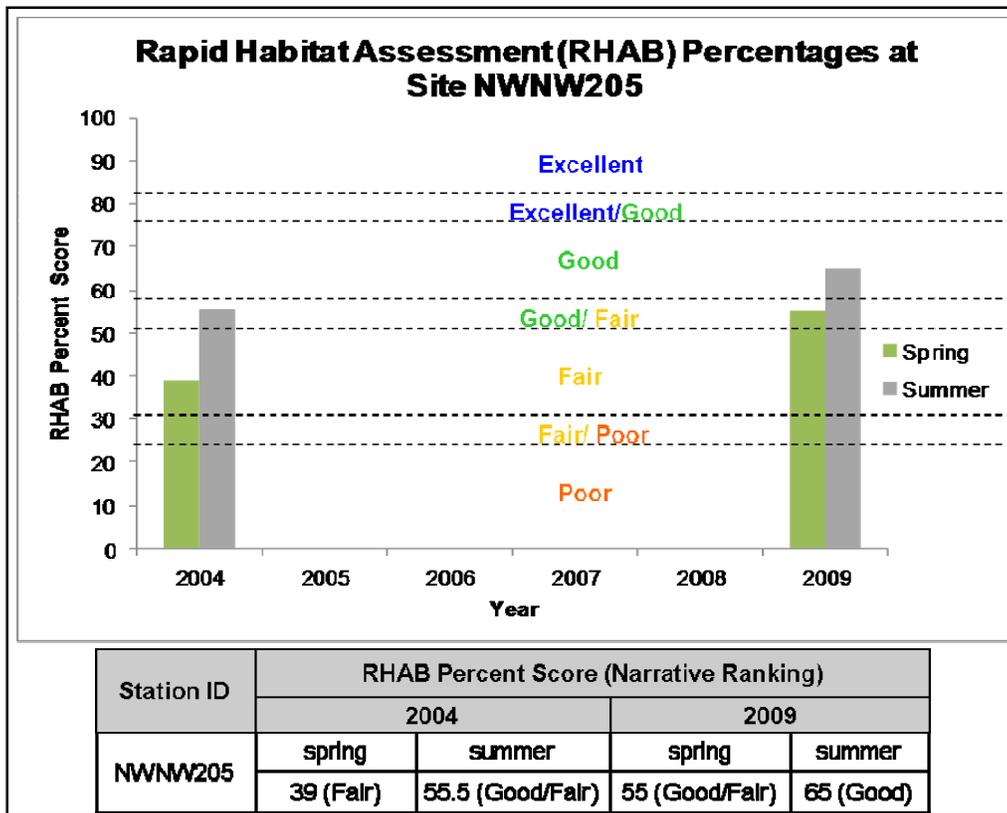
*Figure 3.10.12 – Northern Two-Lined Salamander Larvae at NWNW205 in 2009*

*Table 3.10.2 – NWNW205 Pre-restoration (2009) Stream Salamander Index of Biological Integrity (SSIBI) Scores*

Station	Date	# Species	# Salamanders	# Intolerant Salamanders	# Adults	SSIBI (Average Score)	% SSIBI
NWNW205	6/11/2009	1	37	0	3		
<b>SCORES (out of 10)</b>		5	10	0	0	3.75	38

#### *Qualitative Habitat*

Aquatic habitat was evaluated at site NWNW205 in the spring and summer of 2004 and 2009 prior to restoration and was rated as Fair, Good/Fair, or Good (*Figure 3.10.13*). In-stream habitat for fish was generally rated as suboptimal, and epifaunal substrate for benthic macroinvertebrates was rated as marginal/suboptimal at the Byrants Nursery Run II site. Sediment deposition was moderate and streambanks at this site were assessed as being moderately stable to moderately unstable (*Figure 3.10.14*). Additionally, the riparian zone at this site was impacted by human activities since a majority of the site bordered maintained lawns and in 2009 it appeared that landowners were dumping yard waste directly into the stream.



*Figure 3.10.13 – Pre-restoration Rapid Habitat Assessment (RHAB) Percentages at NWNW205*



*Figure 3.10.14 – Site NWNW205 Picturing Limited Riparian Buffer, Severe Erosion, and Yard Waste in Stream (2009)*

### Water Chemistry

All in-situ water chemistry readings were in compliance with COMAR standards for this Use IV stream prior to restoration (*Table 3.10.3*).

**Table 3.10.3 –Pre-restoration In-situ Water Chemistry Data at NWNW205**

Water Quality Parameter	2004		2009	
	spring	summer	spring	summer
Dissolved Oxygen (mg/L)	13.22	8.82	11.37	9.08
Dissolved Oxygen (% Saturation)	113	86	99	93
pH	7.41	7.17	7.26	6.83
Conductivity (µmhos)	258	229	240	240
Water Temperature (°F)	47.5	58.1	50.2	63.3

#### 3.10.5 Discussion

Overall, pre-restoration biological monitoring at NWNW205 reflects a Fair/Good benthic macroinvertebrate community and showed an improvement from 2004 to 2009. Midges were the most dominant taxa at this site and collectors represented the most dominant feeding group at this site. Tolerant benthic macroinvertebrates were the most abundant tolerance group at NWNW205 and sensitive individuals were second most abundant, comprising 21 percent of the community. Improvement in riffle habitat and decreases in sedimentation may result in a more consistent score of Good post-restoration, with increases in EPT taxa and specialized feeders.

The fish community was consistently rated by the FIBI as Good. Similar to the benthic macroinvertebrate community, the fish community improved from 2004 to 2009. In 2004, the fish community at this site was dominated by blacknose dace, a tolerant and also pioneering fish species. However, in 2009, the most dominant fish species collected at this site was rosyside dace, a species intermediate in sensitivity and also considered non-pioneering. The fish community was comprised primarily of omnivorous individuals, with invertivores, insectivores, and generalists also present, but in lesser amounts. Several minnow species were collected at this site as well as white sucker, fantail darter, and tessellated darter. Creation and improvement of stable fish habitat and instream cover may allow for a more diverse fish community and increase in the abundance of non-pioneer species.

Only one species of stream salamander, northern two-lined salamander, was collected at the Bryants Nursery Run site. The northern two-lined salamander is the most tolerant salamander species. This site received a 3.75 out of 10 (38 percent) score for the SSIBI. Reductions in sedimentation, increased connectivity with floodplain areas, and improvement in riffle habitat may result in increased numbers of salamanders, and perhaps the presence of sensitive stream salamander species.

Aquatic habitat at this site was rated Good, Good/Fair, or Fair in all years. Generally, in-stream habitat for fish and benthic macroinvertebrates were rated as suboptimal, and sedimentation and erosion were rated as marginal and poor. Proposed restoration will hopefully improve these parameters and result in an improved score. All in-situ water chemistry readings were in compliance with COMAR standards for this Use IV stream.