

3.8 Batchellors Run East Stream Restoration

3.8.1 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 2,300 feet of the Batchellors Run East tributary just north of the intersection of Layhill and Norbeck Roads. This project is planned for construction in the summer of 2011. The Batchellors Run East tributary is designated as a Use Class IV stream by the Maryland Department of Environment. The Batchellors Run East tributary 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 wetlands, and reforest stream buffer areas.

Subwatershed facts

Subwatershed Drainage Area: 1.2 square miles

Subwatershed Imperviousness: 6 percent

Project Facts

Project Area: Approximately 2,300 linear feet of stream north of the Layhill/Norbeck Road crossing.

Costs (Projected): Construction \$831,000, funded in part by the USACE

Completion Date (Projected): Summer 2011

Property Ownership: M-NCPPC

Project Selection

The Batchellors Run East 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 II. 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 3.8.1 and 3.8.2*).

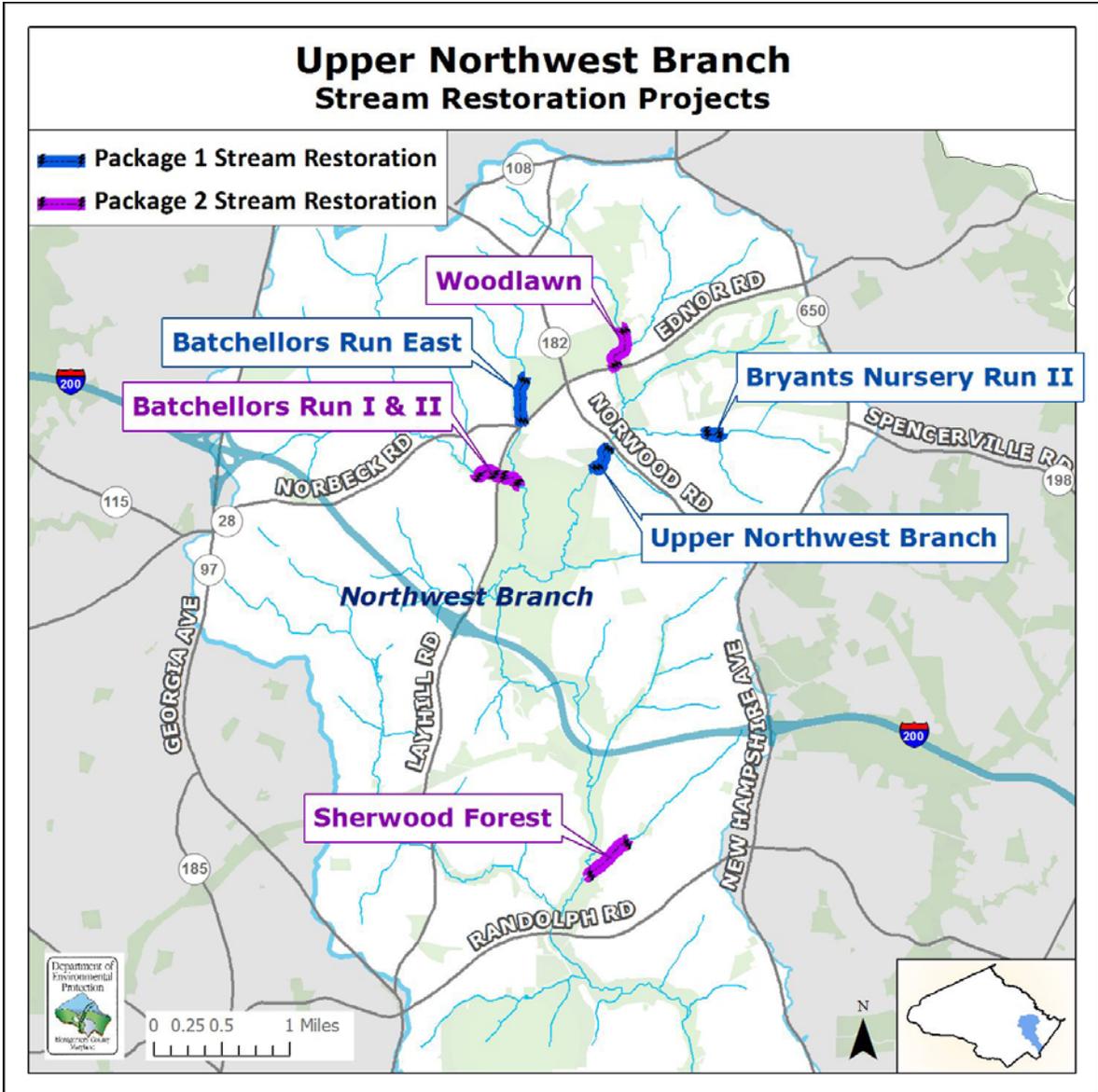


Figure 3.8.1 – Upper Northwest Branch Stream Restoration Package 1 and Package 2 Projects, Including Batchellors Run East Stream Restoration

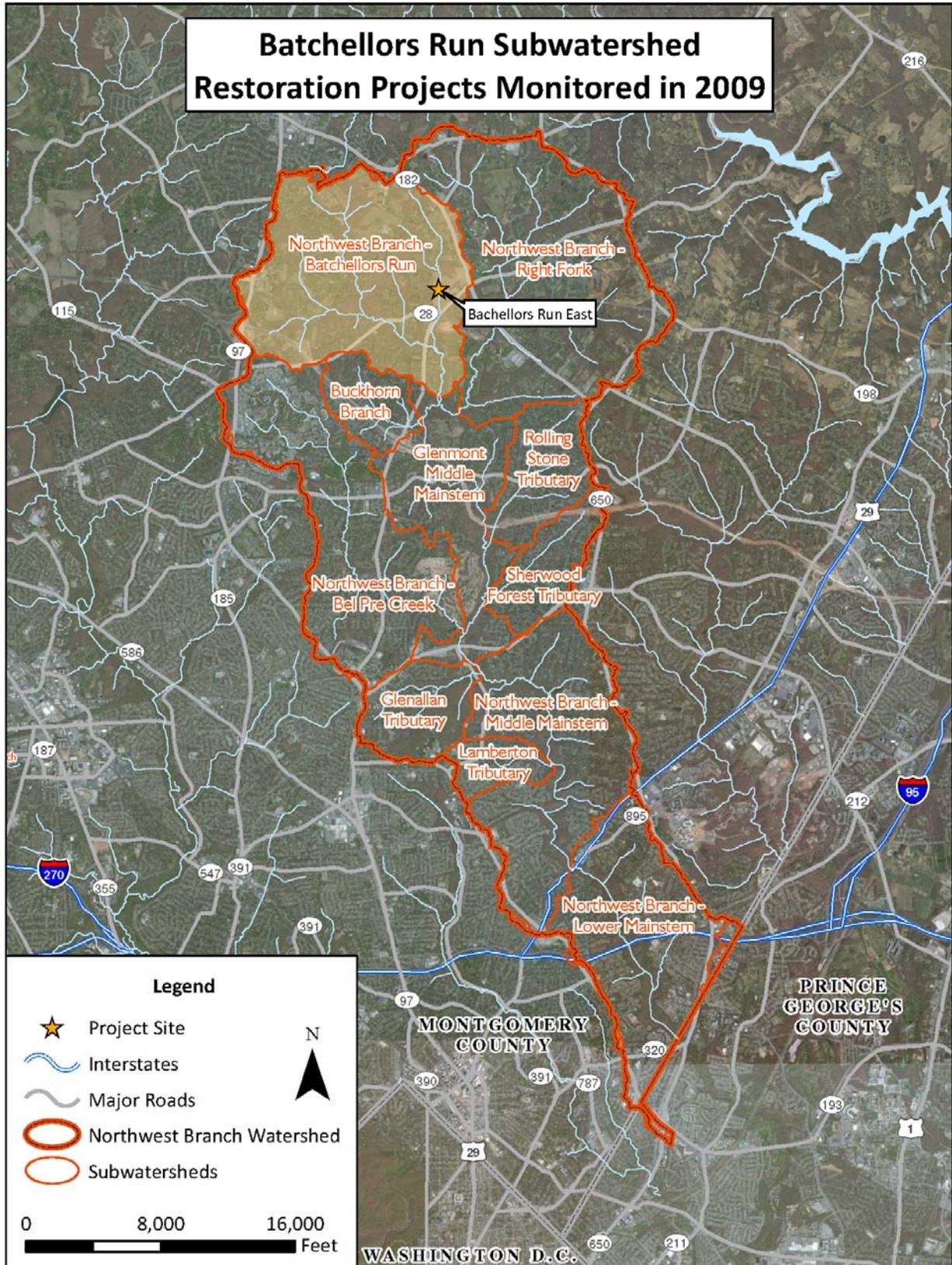


Figure 3.8.2 –Northwest Branch Batchellors Rub Subwatershed Restoration Projects, Including Batchellors Run East Stream Restoration

Pre-Restoration Conditions

Much of the Northwest Branch Watershed was developed prior to regulations requiring stormwater management control, and 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 Batchellors Run East tributary is characterized by eroded streambanks, unstable channel materials, low flow conditions, and minimal access to its floodplain and interaction with wetlands, and a general lack of in-stream cover for fish. The site was formerly used for livestock grazing, which has contributed to the erosion and degraded in-stream habitat, and has decreased potential overhanging vegetation and riparian forest cover (**Figures 3.8.3 and 3.8.4**). Much of the floodplain area is open field, dominated by various exotic/invasive plants. While the Batchellors Run East 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 3.8.3 – Batchellors Run East Prior to Restoration, Picturing Eroded Streambank, Lack of Overhanging Stream Vegetation, and Invasive Plants (Asiatic Tearthumb)



Figure 3.8.4 – Batchellors Run East Prior to Restoration, Picturing Eroded Streambank and Lack of Riparian Vegetation

Restoration Actions Planned

The construction access is anticipated from Layhill Road. Restoration activities are planned for approximately 2,300 feet upstream from the Layhill/Norbeck Road crossing. 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 vernal pool wetlands and floodplain access will be created to enhance the riparian zone alongside the stream.

3.8.2 Restoration Goals

The goals of the Batchellors Run East Stream Restoration project are presented below in *Table 3.8.1*, along with the monitoring performed to characterize the pre-restoration conditions, and when and where monitoring has occurred or is planned to occur following restoration. This is a pre-construction monitoring report and summarizes the pre-restoration conditions within the Batchellors Run East Stream Restoration project area.

Table 3.8.1 – 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
<ul style="list-style-type: none"> • Improve aquatic habitat conditions by enhancing pool and riffle fish habitat and creating overhead cover for fish 	<ul style="list-style-type: none"> • Qualitative habitat • Aquatic communities: <ul style="list-style-type: none"> ▪ Benthic macroinvertebrates ▪ Fish ▪ Stream salamanders • In-situ water chemistry 	2004 and 2009 (pre)	NWBB104
<ul style="list-style-type: none"> • Stabilize eroding streambanks to reduce sediment entering the stream 	<ul style="list-style-type: none"> • Quantitative habitat (stream morphology surveys for entire project length) 	2009 (pre) ¹	NWBB104
<ul style="list-style-type: none"> • Construct wetlands to improve water quality and provide amphibian habitat 	<ul style="list-style-type: none"> • Wetland herpetofauna surveys 	Post only	Constructed wetlands
<ul style="list-style-type: none"> • Reforest streambanks for added stability and overhead cover 	<ul style="list-style-type: none"> • Botanical reforestation surveys 	Post only	Reforested areas

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

3.8.3 Methods to Measure Project Goals

The basic sampling design for the Batchellors Run East 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 NWBB104 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. Wetland and botanical surveys are planned once the wetlands are created and 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 NWBB104, upstream of Layhill Road (*Figure 3.8.5*). Post-construction monitoring is planned at this site for at least years one, two, three, four, and five years after restoration.



Figure 3.8.5 – Map of 2009 Monitoring Locations at the Batchellors Run East Restoration Site

3.8.4 Results and Analysis

Benthic Macroinvertebrates

BIBI (Benthic Index of Biological Integrity) Scores

Pre-restoration benthic macroinvertebrate assessments were conducted at site NWBB104 in 2004 and 2009. This site was rated by the Benthic Index of Biological Integrity (BIBI) as Good in 2004 and Fair in 2009 (*Figure 3.8.6*). The decrease in BIBI percentage was due to a decrease in the ratio of scrapers and a decline in the number of Ephemeroptera (mayfly), Plecoptera (stonefly), and Trichoptera (caddisfly), collectively referred to as EPT. In 2004, 13 EPT taxa were collected resulting in a high score for this individual metric and in 2009, 11 were identified, resulting in a median score for this metric. The 2009 field data sheets for this task are included in *Appendix D*.

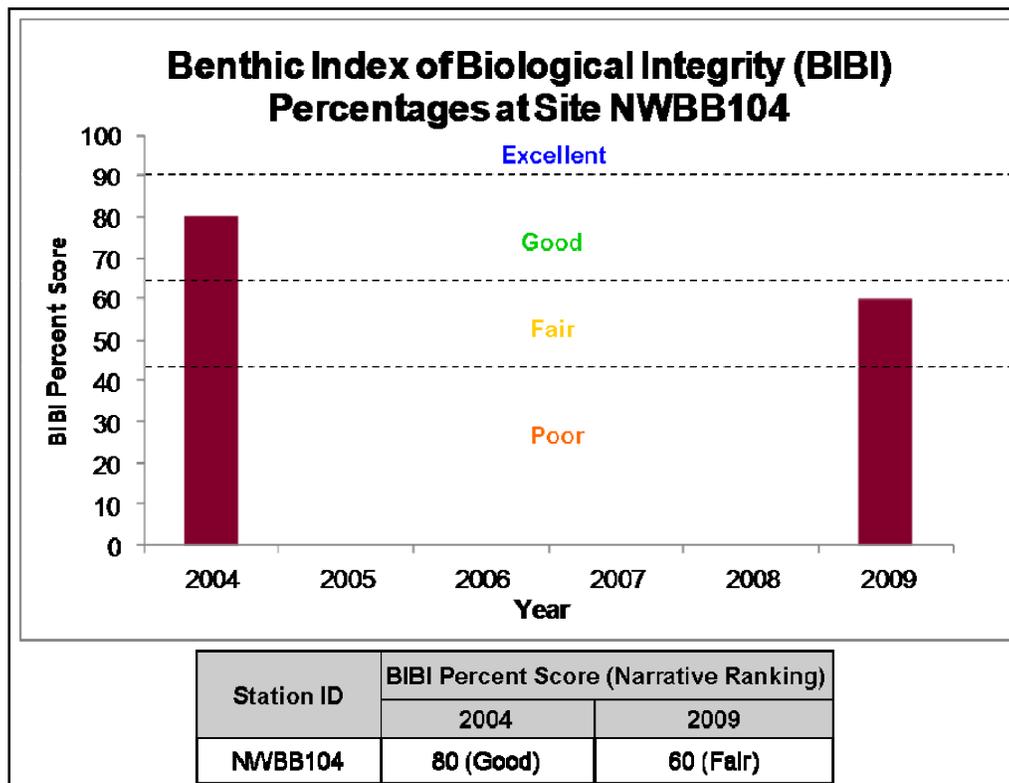


Figure 3.8.6 – Pre-restoration Benthic Index of Biological Integrity (BIBI) Percentages at NWBB104

Dominant Taxa and Tolerance Values

The pre-restoration benthic community was dominated by the family Chironomidae (midges) and the second most dominant taxon were *Simulium* sp. (black fly). Chironomidae are tolerant to disturbance and *Simulium* sp. are intermediate in sensitivity. Tolerant individuals dominated (43 percent) the pre-restoration community at NWBB104, individuals intermediate in sensitivity made up 37 percent, and sensitive individuals comprised 20 percent of the community (*Figure 3.8.7*). Genera from the following families or orders made up the sensitive individuals found at this site: Odonata (dragonfly and damselfly), Elmidae (riffle beetle), Trichoptera (caddisfly), Ephemeroptera (mayfly), and Plecoptera (stonefly).

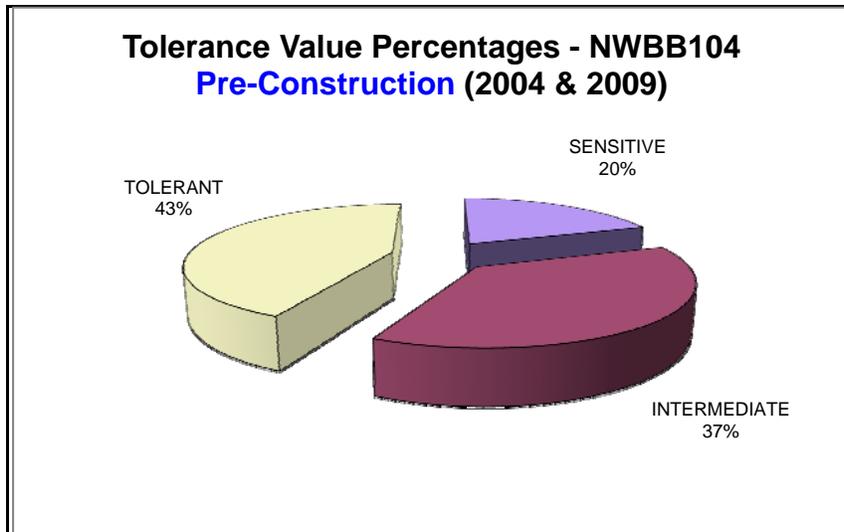


Figure 3.8.7 – Pre-restoration Benthic Macroinvertebrate Tolerance Composition at NWBB104

Functional Feeding Groups

Collectors and filterers were the most dominant feeding groups representing 46 and 30 percent of the community, respectively. These two groups are considered generalist feeders and can inhabit more degraded streams. The only specialized feeders found at this site were scrapers, which comprised four percent of the community in the pre-restoration period (**Figure 3.8.8**). The scrapers at this site were represented by several riffle beetle genera and two caddisfly genera.

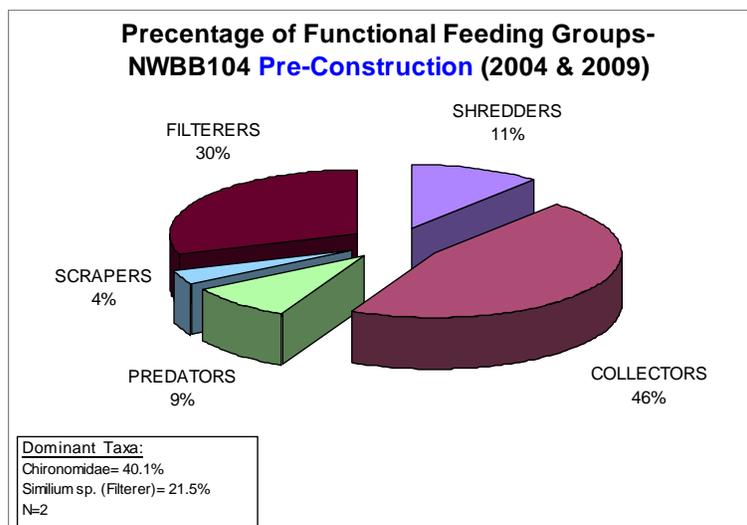


Figure 3.8.8 – Pre-restoration Benthic Macroinvertebrate Functional Feeding Group Composition at NWBB104

Fish

FIBI (Fish Index of Biological Integrity) Scores

The fish community at site NWBB104 as assessed by the MDCEP Fish Index of Biological Integrity (FIBI) was rated as Fair in 2004 and 2009, but declined in FIBI percentage in 2009 (**Figure 3.8.9**). The decline in FIBI percentage in 2009 was due to an increase in the number of tolerant individuals, the proportion of omnivores and generalists, the proportion of pioneering species, and the total number of individuals. In both years, *Rhinichthys atratulus* (blacknose dace) was the most dominant species at this site. *Clinostomus funduloides* (rosyside dace) was the second most dominant in 2004. Rosyside dace is classified as an invertivore, one of the more specialized feeding groups, and is intermediate in sensitivity. The proportion of rosyside dace declined in 2009, becoming a minor constituent of the fish community. Field data sheets from 2009 fish monitoring are included in **Appendix D**.

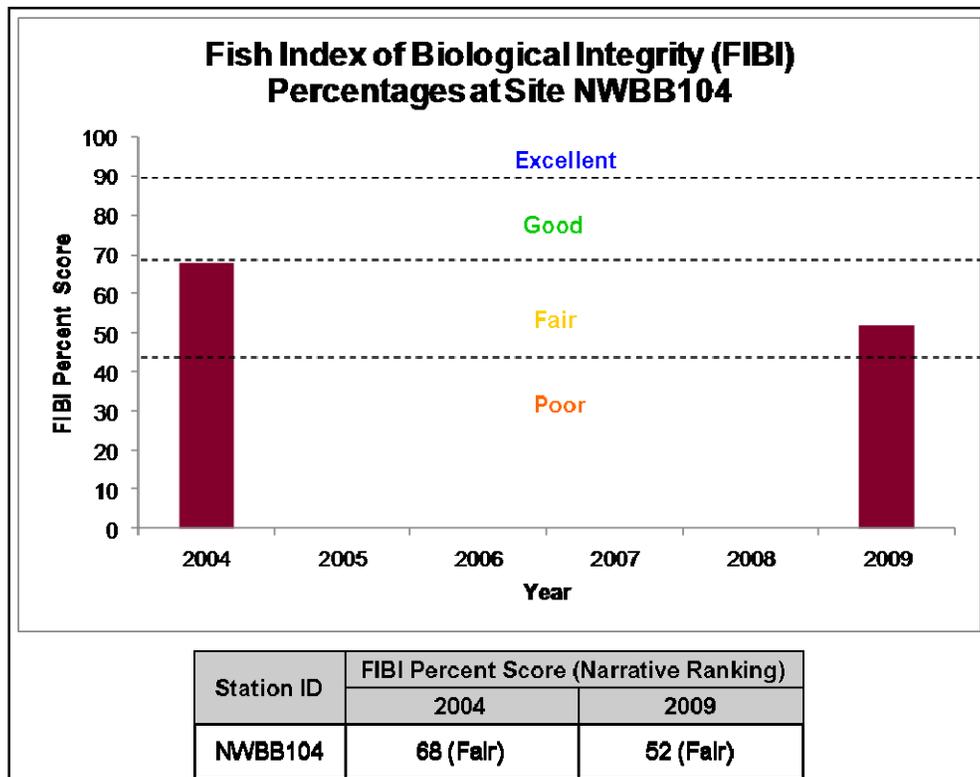


Figure 3.8.9 – Pre -restoration Fish Index of Biological Integrity (FIBI) Percentages at NWBB104

Dominant Species and Tolerance Values

The most dominant fish species collected at NWBB104 over the pre-restoration period was blacknose dace, followed by *Pimephales notatus* (bluntnose minnow) (**Figure 3.8.10**). Both of these species are considered tolerant to degraded stream conditions. Other tolerant species collected include *Catostomus commersoni* (white sucker), *Semotilus atromaculatus* (creek chub), and *Notropis procne* (swallowtail shiner). The remaining fish community at this site was comprised of species intermediate in sensitivity; no fish sensitive to disturbance were collected at this site.

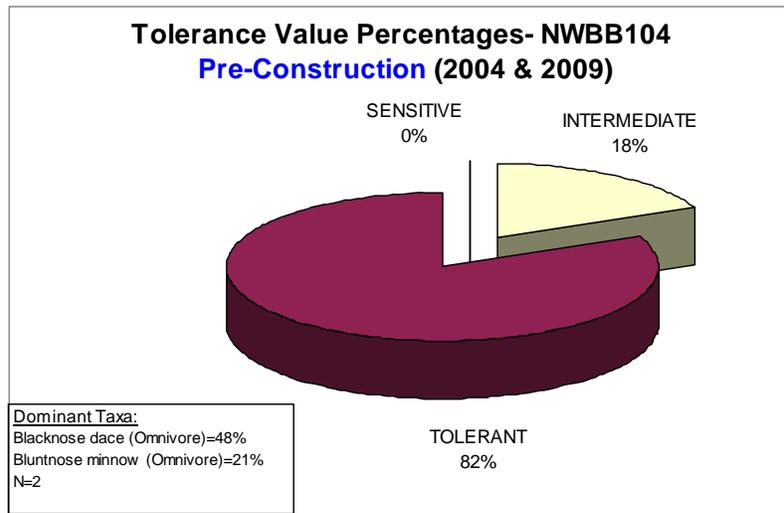


Figure 3.8.10 – Fish Tolerance Composition and Dominance at NWBB104 Prior to Restoration

Functional Feeding Groups

Omnivores were the most dominant feeding group (72 percent) at NWBB104 and were represented by blacknose dace, white sucker, bluntnose minnow, and swallowtail shiner (**Figure 3.8.11**). Invertivores, a more specialized feeding group, was second most dominant and was represented solely by rosyside dace. Predators were completely missing from the community.

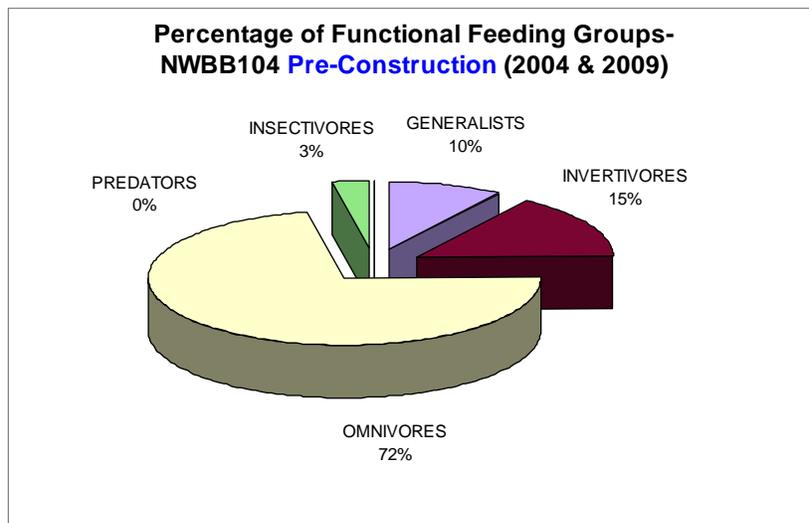


Figure 3.8.11 – Fish Functional Feeding Group Composition at NWBB104 Prior to Restoration

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 NWBB104, the percentage of non-pioneering individuals was low

in both years prior to restoration, but declined from 2004 to 2009 (*Figure 3.8.12*). The decline was mostly due to a decline in the percentage of rosyside dace, a non-pioneering fish species.

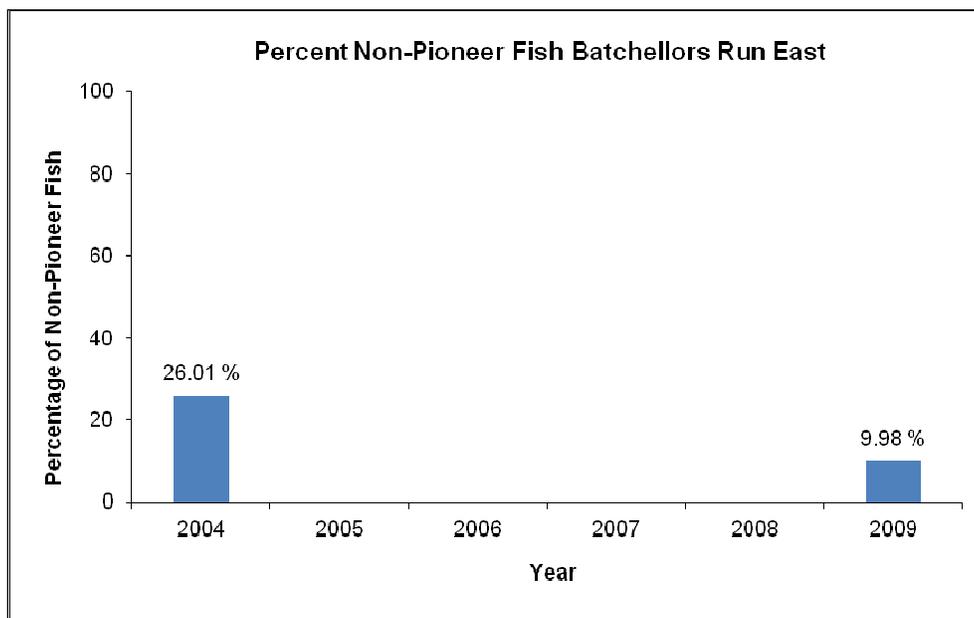


Figure 3.8.12 – Non-Pioneering Fish Present at NWBB104 Prior to Restoration

Stream Salamanders

Stream salamanders were surveyed at this site in the summer of 2009. One species of salamander, *Eurycea bislineata* (northern two-lined salamander) was collected and was represented by both adults and larvae (*Figure 3.8.13*). The NWBB104 site was given a score of 5 out of 10 (50 percent) for the provisional Stream Salamander Index of Biological Integrity (SSIBI) for the Piedmont eco-region (*Table 3.8.2*). Northern two-lined salamanders are considered tolerant to degraded stream conditions. This site was therefore given the lowest score (zero) for the number of intolerant (sensitive) salamanders individual metric.

Table 3.8.2 – NWBB104 Pre-restoration (2009) Stream Salamander Index of Biological Integrity (SSIBI) Scores

Station	Date	# Species	# Salamanders	# Intolerant Salamanders	# Adults	SSIBI (Average Score)	% SSIBI
NWBB104	7/30/2009	1	27	0	4		
SCORES (out of 10)		5	10	0	5	5	50

Other herpetofauna documented at this site during the stream salamander survey included *Lithobates clamitans melanota* (northern green frog) adults and tadpoles, and one species of unknown tadpole (*Figure 3.8.14*).



Figure 3.8.13 – Stream Salamander Sample with Northern Two-Lined Salamander and Green Frog Larvae at NWBB104 in 2009



Figure 3.8.14 – Northern Green Frog Tadpole Metamorphosing into an Adult at NWBB104 in 2009

Qualitative Habitat

Aquatic habitat was evaluated at NWBB104 in the spring and summer of 2004 and 2009 prior to restoration and was rated as Good or Good/Fair (***Figure 3.8.15***). Individual habitat scores were variable, but in-stream cover for fish was generally rated as marginal or suboptimal, and epifaunal substrates for benthic macroinvertebrates were rated as marginal and poor. This site had a relatively well vegetated riparian buffer, although the vegetation was mostly herbaceous. There were very few shrubs and trees within the buffer.

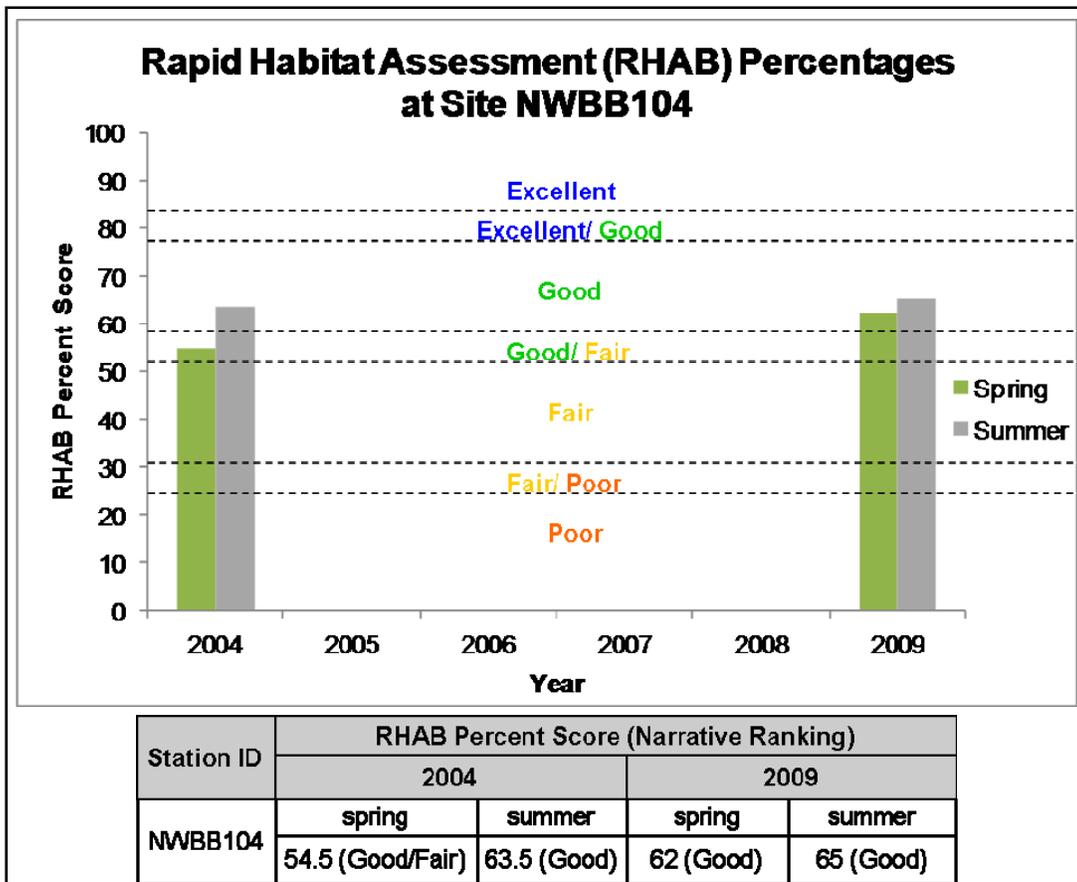


Figure 3.8.15 – Pre-restoration Rapid Habitat Assessment (RHAB) Percentages at NWBB104

Water Chemistry

All in-situ water chemistry readings were in compliance with State standards for this Use IV stream prior to restoration (*Table 3.12.3*).

Table 3.12.3 –Pre-restoration In-situ Water Chemistry Data at NWBB104 (2004 and 2009)

Water Quality Parameter	2004		2009	
	spring	summer	spring	summer
Dissolved Oxygen (mg/L)	12.07	8.89	11.86	6.49
Dissolved Oxygen (% Saturation)	98	96	105	74
pH	7.47	7.66	7.24	7.35
Conductivity (µmhos)	187	189	216	189
Water Temperature (°F)	44.2	66.9	50	71.3

3.8.5 Discussion

Overall, pre-restoration biological monitoring at NWBB104 reflects a Fair/Good benthic macroinvertebrate community. Midges were the most dominant taxa collected and collectors were the most dominant feeding group at this site. Tolerant benthic macroinvertebrates were most common at NWBB104. 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 such as scrapers.

The fish community at this site was dominated by blacknose dace, a tolerant fish species, and was consistently rated by the FIBI as Fair but showed a decline in FIBI percentage from 2004 to 2009. The community was primarily comprised of omnivorous individuals, with invertivores, insectivores, and generalists also present, but in lesser amounts. The decline in FIBI percentage from 2004 to 2009 was mostly due to a decline in the number of individuals collected as well as a decline in the proportion of rosyside dace: a species that was abundant in 2004 but made up only a small percent of the community in 2009. This species is considered intermediate in sensitivity, non-pioneering, and a specialized feeder, all characteristics that increase the overall FIBI score when present in greater proportions. A few minnow species were collected at this site in addition to white sucker and *Etheostoma flabellare* (fantail 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 fish.

The provisional SSIBI gave this site a 5 out of 10 (50 percent) score for stream salamanders. Only one species of stream salamander, northern two-lined salamander, was collected at this site, and relatively few individuals were collected. 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 as Good or Good/Fair in all years. Generally, instream habitat for fish was rated as suboptimal/marginal and epifaunal habitat for benthic macroinvertebrates was rated as marginal/poor. Proposed restoration will hopefully improve these parameters and result in an improved score. All in-situ water quality readings were in compliance with COMAR standards for this Use IV stream.