

## 3.11 Batchellors Run I and II Stream Restoration

### 3.11.1 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 the Batchellors Run tributary just north of Chapel Hill Drive, for about 1,000 feet on either side of the Layhill Road crossing. This project is planned for construction in the fall/winter of 2012. The Batchellors Run tributary was identified as a priority for restoration in the Northwest Branch Watershed Feasibility Study (July 2000). This stream has been degraded for years by uncontrolled storm flows that have impacted habitat for fish and other aquatic life. The County plans to stabilize eroded stream banks, restore stable habitat for aquatic biota, create wetlands, and reforest stream buffer areas.

#### *Subwatershed facts*

Subwatershed Drainage Area: 4.9 square miles

Subwatershed Imperviousness: 7 percent

#### *Project Facts*

**Project Area:** Approximately 1,000 linear feet of stream on either side of the Layhill Road crossing, just north of Chapel Hill Drive is planned for restoration. The Batchellors Run stream restoration project is split into two phases. Phase I is downstream of the Layhill Road crossing, on the Northwest Park Golf Course. Phase II is upstream of the Layhill Road crossing.

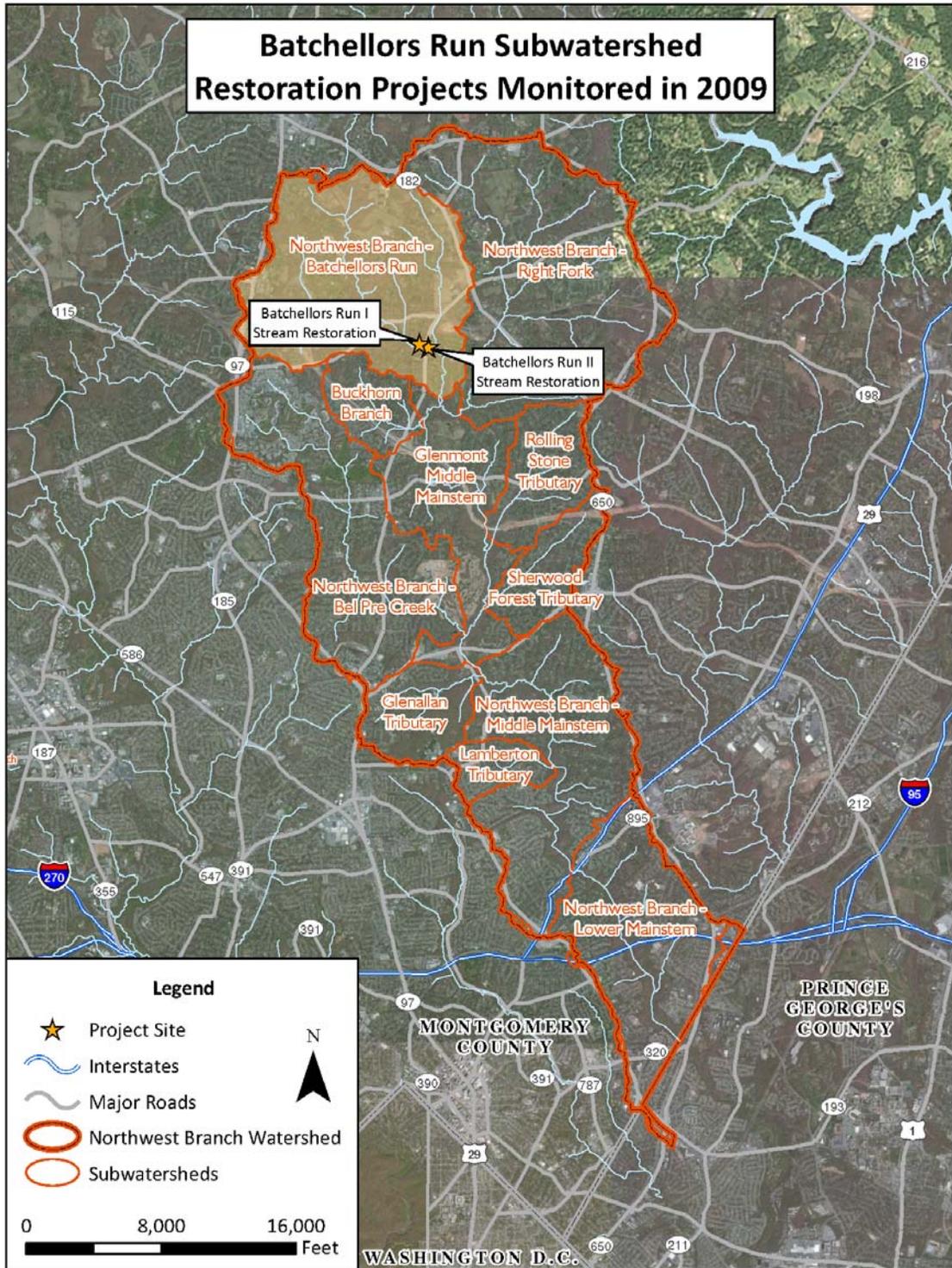
**Costs (Projected):** Construction \$951,000, funded in part by the (USACE)

**Completion Date (Projected):** Fall/winter 2012

**Property Ownership:** M-NCPPC and Montgomery County Board of Education

#### *Project Selection*

The Batchellors 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 complete three stream restoration projects for Upper Northwest Branch Package 1 in 2011, which 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 of 2012 to summer of 2013 (*Figure 3.11.1*).



**Figure 3.11.1 – Upper Northwest Branch Batchellors Run Watershed Restoration Projects, Including Batchellors Run I and 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 Batchellors Run tributary is characterized by eroded stream banks, unstable channel materials, low flow conditions, minimal access to its floodplain, interaction with wetlands, and a general lack of instream cover for fish (**Figure 3.11.2**). Instream habitat, overhanging vegetative cover, and riparian canopy is particularly lacking on the golf course site. The area upstream of Layhill Road is completely forested with adequate vegetative cover, but lacks instream habitat for fish. While the Batchellors 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 3.11.2 – Batchellors Run Tributary Prior to Restoration, Picturing Erosion and Lack of In-stream Cover for Fish Upstream of Layhill Road**

### *Restoration Actions Planned*

Entrance to the site for construction is anticipated from Layhill Road and Chapel Hill Road. Restoration activities are planned along the Batchellors Run tributary for approximately 1,000 feet on either side of the Layhill 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 in-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.

### **3.11.2 Restoration Goals**

The goals of the Batchellors Run I & II stream restoration project are listed in **Table 3.11.1**, as well as monitoring performed to characterize 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 Stream Restoration project area.

**Table 3.11.1 – 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> </ul> </li> <li>• Water Chemistry</li> </ul>	2004 and 2009 (pre)	NWBF302A NWBF302B
<ul style="list-style-type: none"> <li>• Stabilize eroding stream banks 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>	NWBF302A NWBF302B
<ul style="list-style-type: none"> <li>• Construct wetlands to improve water quality and provide amphibian habitat</li> </ul>	<ul style="list-style-type: none"> <li>• Wetland herpetofauna surveys</li> </ul>	Post only	Constructed wetlands
<ul style="list-style-type: none"> <li>• Reforest stream banks 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 performed in 2011. The 2011 report will include updates for this monitoring.

### 3.11.3 Methods to Measure Project Goals

The basic sampling design for the Batchellors Run Stream Restoration project is pre-restoration (before) and post-restoration (after) monitoring. The County monitored the biological communities (benthic macroinvertebrates and fish), performed rapid habitat assessments (RHAB), and took in-situ water chemistry measurements at two biological monitoring sites (NWBF302A and NWBF302B) to evaluate the aquatic habitat conditions and water quality during the pre-restoration period. Site NWBF302A is located upstream of Layhill Road and NWBF302B is located downstream (*Figure 3.11.3*). The County also performed quantitative survey for the entire project length, but this work was postponed until 2011 due to missing benchmarks. Wetland and botanical surveys are planned for the post-restoration period, once the wetlands are created and trees are planted. If the project is completed as planned in fall 2012, all data collected prior to fall 2012 will be considered pre-restoration data and all subsequent data will be considered post-restoration. Pre-restoration monitoring was performed in 2004 and 2009 at site NWBF302A and in 2009 at NWBF302B. Post-construction monitoring is planned for at least years one, three, and five years after restoration.



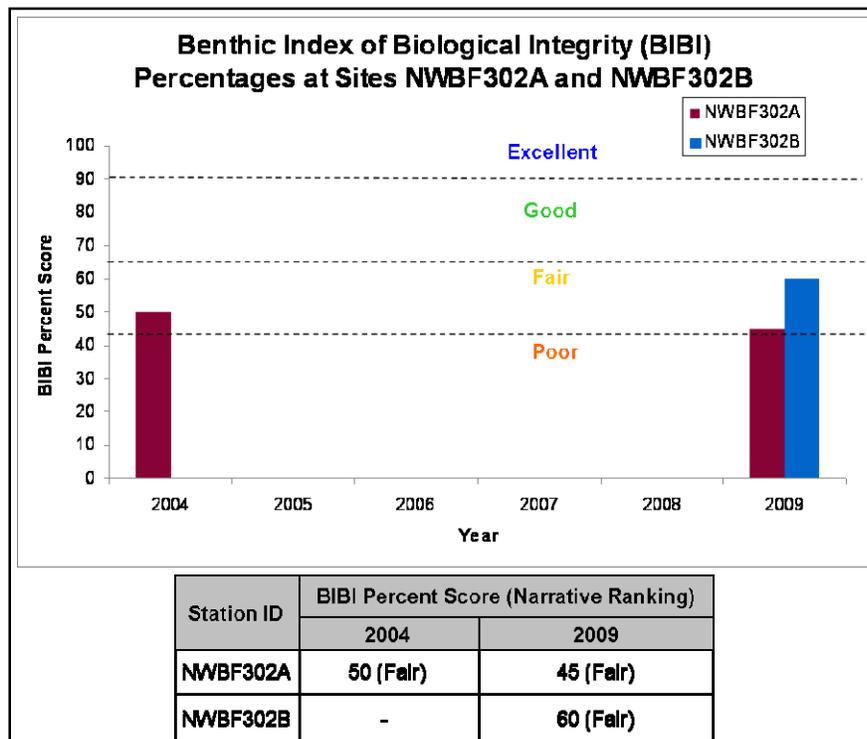
*Figure 3.11.3 – Map of 2009 Monitoring Locations at the Batchellors Run I and II Restoration Sites. Quantitative reaches correspond to the length of proposed stream restoration.*

### 3.11.4 Results and Analysis

#### *Benthic Macroinvertebrates*

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

Pre-restoration benthic macroinvertebrate assessments were conducted at site NWBF302A in 2004 and 2009 and at site NWBF302B in 2009. Both sites were consistently rated by the Benthic Index of Biological Integrity (BIBI) as Fair, but site NWBF302A declined in BIBI percentage from 2004 to 2009 (**Figure 3.11.4**). At site NWBF302A, the proportion of scrapers metric was rated as high, the number of Ephemeroptera (mayfly), Plecoptera (stonefly), and Trichoptera (caddisfly) taxa, collectively referred to as EPT, was in the low range, and the proportion of EPT individuals and shredders metrics were also in the low range. Most individual metrics were in the median range at NWBF302B, except for the proportion of dominant taxa, which was in the high range and the proportion of EPT individuals, which was in the low range. Field data sheets for this task from 2009 are included in *Appendix D*.

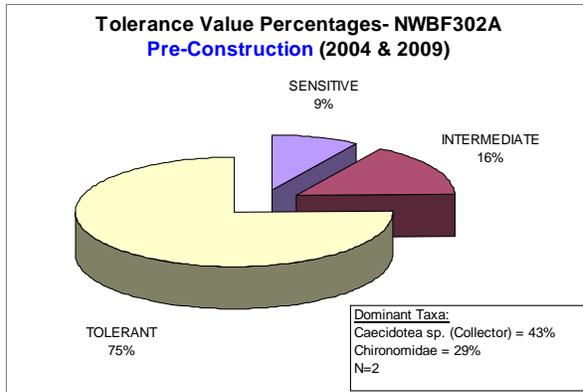


**Figure 3.11.4 – Pre - Restoration Benthic Index of Biological Integrity (BIBI) Percentages at NWBF302A and NWBF302B**

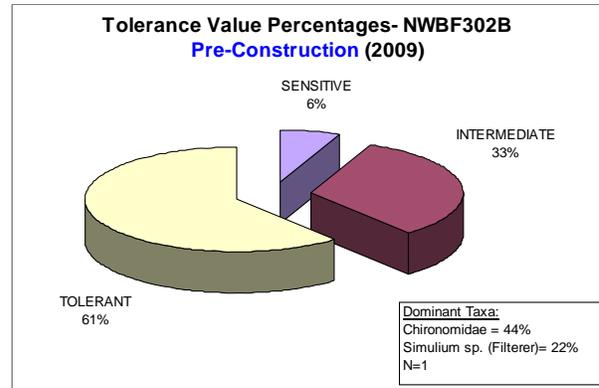
##### Dominant Taxa and Tolerance Values

A genus of Isopoda (sowbug), *Caecidotea* sp., was the most dominant taxon collected at NWBF302A (**Figure 3.11.5**). *Caecidotea* sp. is considered tolerant to urbanization. Individuals from the family Chironomidae (midges) were the second most dominant taxa present at NWBF302A; midges are also tolerant to urbanization. Midges were the most dominant taxon of the benthic macroinvertebrate community at NWBF302B during the pre-restoration period (**Figure 3.11.6**). A genus of black fly larva (*Simulium* sp.) was second most dominant and is considered intermediate in sensitivity. Tolerant individuals were dominant at both NWBF302A

and NWBF302B (43 and 61 percent, respectively) prior to restoration, individuals intermediate to sensitivity were second most dominant (16 and 33 percent, respectively), and sensitive individuals were least abundant (nine and six percent, respectively).



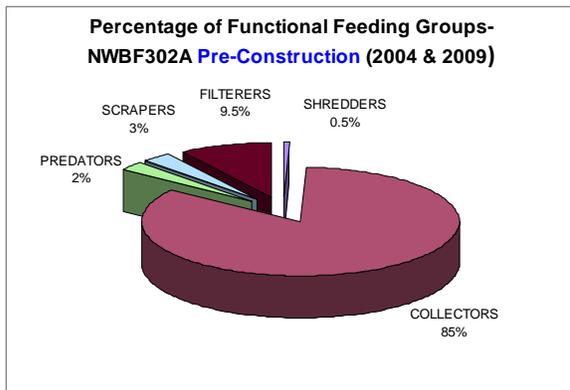
**Figure 3.11.5 – Benthic Macroinvertebrate Tolerance Composition and Dominance at NWBF302A**



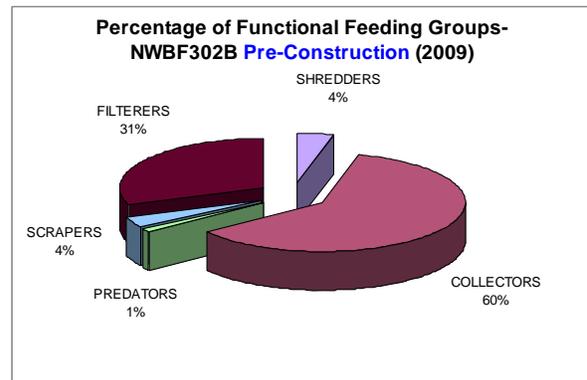
**Figure 3.11.6 – Benthic Macroinvertebrate Tolerance Composition and Dominance at NWBF302B**

Functional Feeding Groups

Collectors represented the most dominant feeding group at both Batchellors Forest sites, comprising 85 percent of the community at NWBF302A and 60 percent at NWBF302B (**Figures 3.11.7 and 3.11.8**). More specialized feeders, including scrapers and shredders, comprised a total of 3.5 percent of the community at NWBF302A and eight percent of the community at NWBF302B in the pre-restoration period.



**Figure 3.11.7 – Benthic Macroinvertebrate Functional Feeding Group Composition at NWBF302A**



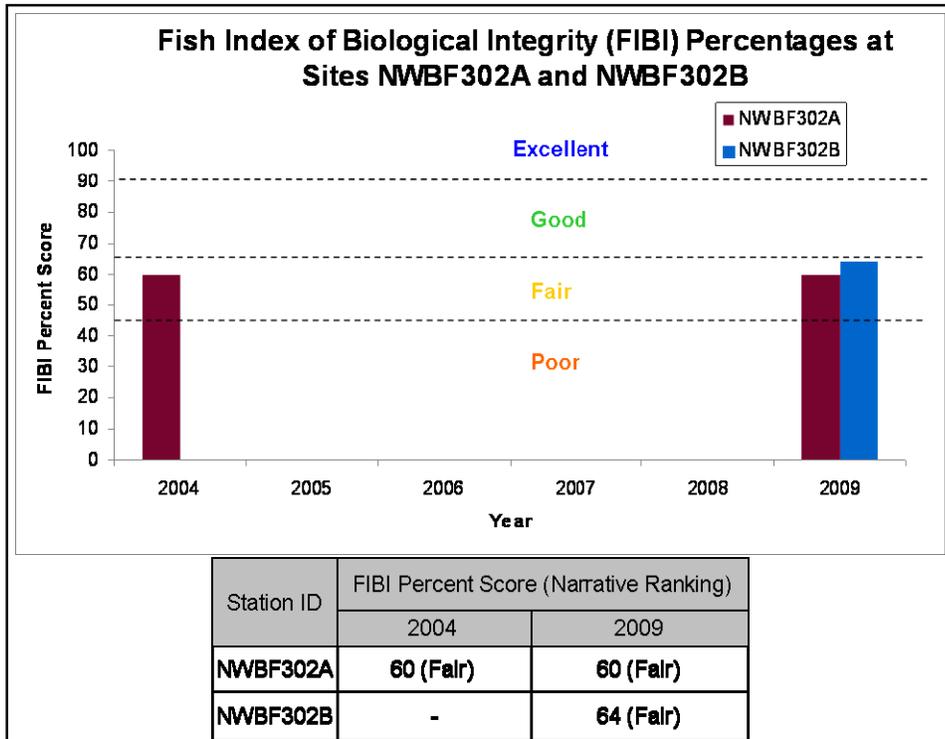
**Figure 3.11.8 – Benthic Macroinvertebrate Functional Feeding Group Composition at NWBF302B**

*Fish*

FIBI (Fish Index of Biological Integrity) Scores

Pre-restoration fish community assessments were conducted at site NWBF302A in 2004 and 2009 and at site NWBF302B in 2009. Both sites were consistently rated by the Fish Index of

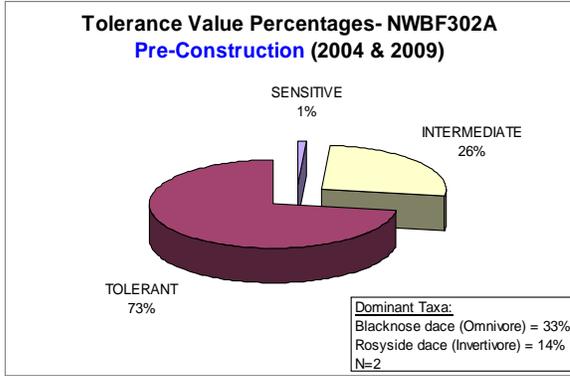
Biological Integrity (FIBI) as Fair (**Figure 3.11.9**). Site NWBF302B scored slightly higher than site NWBF302A did in 2009. The difference in FIBI score was due to two individual metrics scoring in the high range at NWBF302B that scored in the low range at NWBF302A. These metrics included the number of riffle benthic insectivorous individuals and the total number of individuals. Three individual metrics were consistently in the high range at both sites, including the total number of species, the number of minnow species, and the proportion of fish with disease/anomalies. Most other metrics were in the low and median ranges. Field data sheets from the 2009 fish monitoring are included in *Appendix D*.



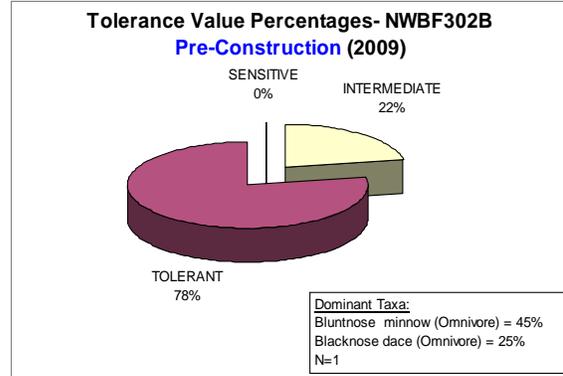
**Figure 3.11.9 – Pre - Restoration Fish Index of Biological Integrity (FIBI) Percentages at NWBF302A and NWBF302B**

Dominant Species and Tolerance Values

*Rhinichthys atratulus* (blacknose dace) was the most dominant fish species collected at site NWBF302A followed by *Clinostomus funduloides* (rosyside dace). *Pimephales notatus* (bluntnose minnow) was the most dominant species collected at NWBF302B and blacknose dace was second most dominant. Both blacknose dace and bluntnose minnow are tolerant to urbanization and rosyside dace are considered intermediate in sensitivity. Tolerant fish were dominant at both sites, comprising 73 percent of the community at NWBF302A and 78 percent of the community at NWBF302B (**Figures 3.11.10 and 3.11.11**). Individuals intermediate in sensitivity were second most dominant at both sites. Individuals sensitive to stressors made up one percent of the community at NWBF302A, represented solely by *Hypentelium nigricans* (northern hogsucker). Sensitive individuals were absent from site NWBF302B.



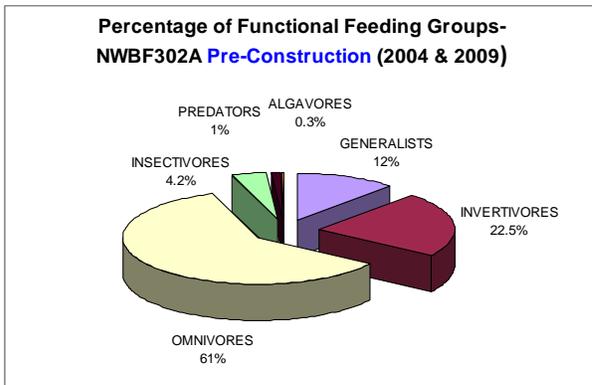
**Figure 3.11.10 – Fish Tolerance Composition and Species Dominance at NWBF302A Prior to Restoration**



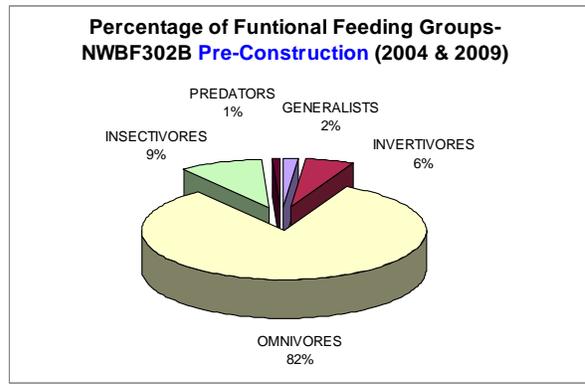
**Figure 3.11.11 – Fish Tolerance Composition and Species Dominance at NWBF302B Prior to Restoration**

Functional Feeding Groups

Omnivores represented the most dominant functional feeding group at both sites, comprising 61 percent of the community at NWBF302A and 82 percent at NWBF302B (**Figures 3.11.12 and 3.11.13**). At site NWBF302A, invertivores were the second most dominant feeding group, making up over 22 percent of the community. Invertivores are considered a specialized feeding group and often require less impaired substrates to feed. Species of invertivores collected at NWBF302A included rosyside dace, *Etheostoma olmstedii* (tessellated darter), northern hogsucker, *Lepomis gibbosus* (pumpkinseed), *Lepomis macrochirus* (bluegill), *Exoglossum maxillingua* (cutlips minnow), and *Cyprinella analostana* (satinfin shiner). This feeding group made up six percent of the community at NWBF302B. Insectivores, another specialized feeding group, comprised four percent of the community at NWBF302A and nine percent at NWBF302B and were represented solely by *Etheostoma flabellare* (fantail darter).



**Figure 3.11.12 – Fish Functional Feeding Group Composition at NWBF302A Prior to Restoration**

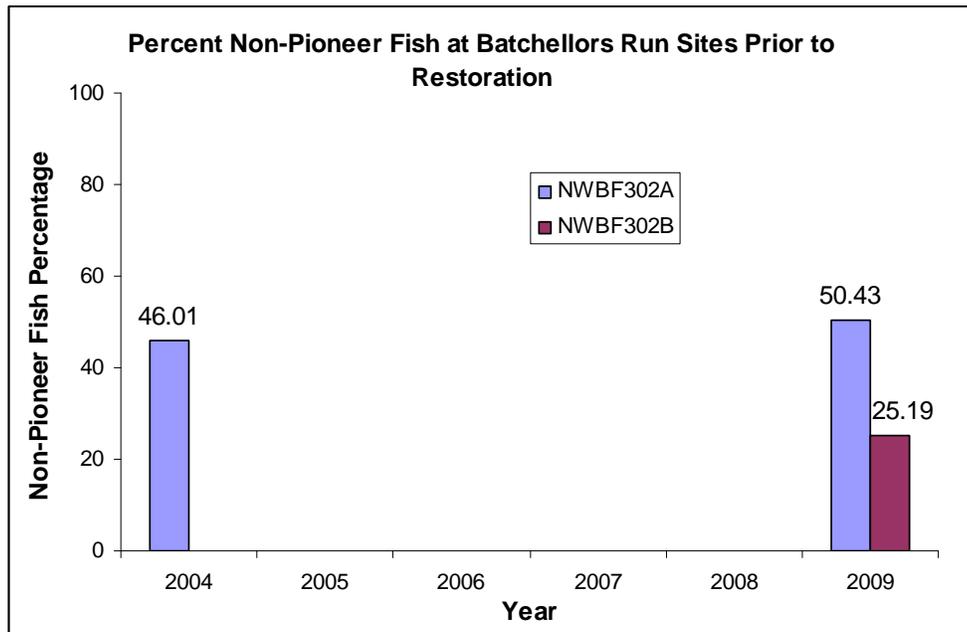


**Figure 3.11.13 – Fish Functional Feeding Group Composition at NWBF302B Prior to Restoration**

Pioneer Fish

Non-pioneer fish comprised approximately half the pre-restoration community at NWBF302A, increasing slightly from 46 to 50 percent between 2004 and 2009 (**Figure 3.11.14**). The

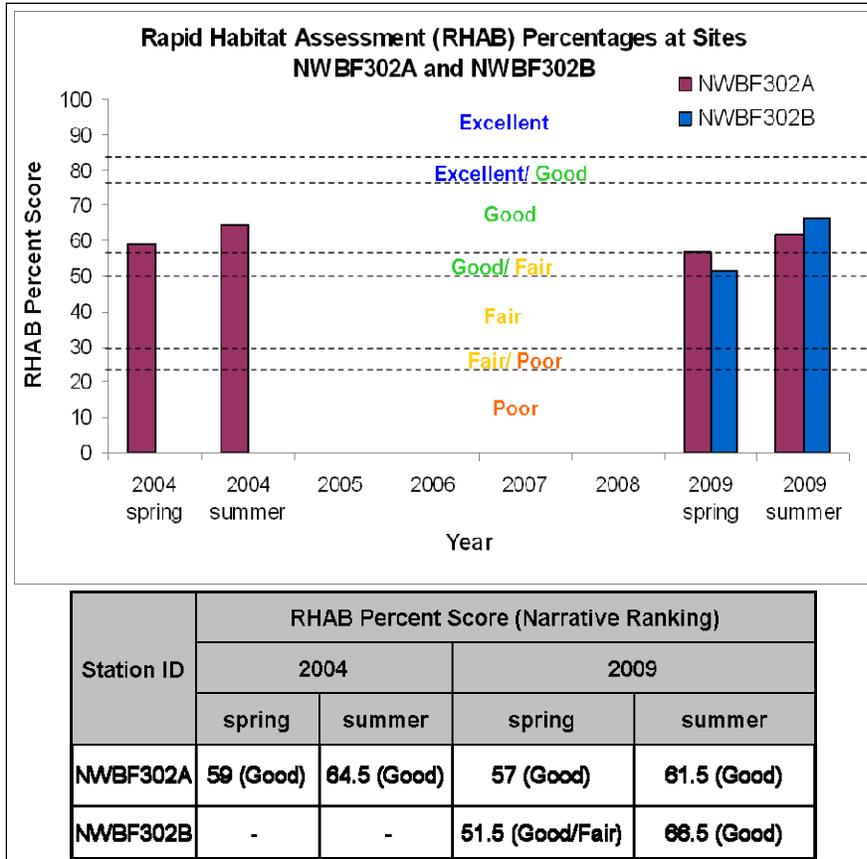
variation among years was generally due to a decrease in the percentage of blacknose dace, a pioneer species. However, the diversity of pioneer species increased from 2004 to 2009 at NWBF302A. At NWBF302B non-pioneer fish comprised 25 percent of the pre-restoration community. This site was heavily dominated by pioneer fish species including, blacknose dace and bluntnose minnow. Species that are considered non-pioneers are generally more sensitive to disturbed aquatic habitats than pioneer species.



**Figure 3.11.14 – Non-Pioneer Fish Present at NWBF302A and NWBF302B Prior to Restoration**

#### *Qualitative Habitat*

Aquatic habitat was evaluated at NWBF302A in the spring and summer of 2004 and 2009 and at NWBF302B in the spring and summer of 2009. Percent scores were generally rated as Good at both sites, with the exception of site NWBF302B in the spring of 2009, which was rated at Good/Fair (**Figure 3.11.15**). In-stream cover for fish was generally considered suboptimal at both sites. Epifaunal substrates for benthic macroinvertebrates were rated as marginal at NWBF302A and suboptimal at NWBF302B. Moderate sedimentation was also documented at both sites. Streambanks were considered moderately unstable at NWBF302A and moderately stable at NWBF302B. The width of the riparian zone was considered optimal at NWBF302A and poor at NWBF302B, due to its location in a golf course (**Figure 3.11.16**).



**Figure 3.11.15 – Rapid Habitat Assessment (RHAB) Percentages at NWBF302A and NWBF302B Prior to Restoration**



**Figure 3.11.16 – Site NWBF302B, on Northwest Park Golf Course, Showing Poor Riparian Buffer, Poor Instream Habitat, and Moderately Stable Streambanks**

### Water Chemistry

All in-situ water chemistry readings were in compliance with State standards for both sites at this Use IV stream (*Tables 3.11.2 and 3.11.3*).

**Table 3.11.2 – Pre-restoration in-situ Water Chemistry data at NWBF302A**

Water Quality Parameter	2004		2009	
	spring	summer	spring	summer
Dissolved Oxygen (mg/L)	13.24	9.90	8.60	6.45
Dissolved Oxygen (% Saturation)	114	94	76	74
pH	7.42	7.62	7.39	7.63
Conductivity (µmhos)	173	237	222	251
Water Temperature (°F)	47.8	65.3	49.3	70.7

**Table 3.11.3 – Pre-restoration in-situ Water Chemistry data at NWBF302B**

Water Quality Parameter	2009	
	spring	summer
Dissolved Oxygen (mg/L)	10.87	6.44
Dissolved Oxygen (% Saturation)	96	72
pH	7.30	7.16
Conductivity (µmhos)	225	250
Water Temperature (°F)	49.8	68.72

### 3.11.5 Discussion

Overall pre-restoration biological monitoring at NWBF302A and NWBF302B, as assessed by the BIBI, reflected a Fair benthic macroinvertebrate community. Midges and sowbugs were the most dominant taxa collected at these sites and collectors represented the most dominant functional feeder group. Tolerant benthic macroinvertebrates were most abundant at both sites in the Batchellors Run project area. The fish community at site NWBF302A was dominated by blacknose dace and NWBF302B was dominated by bluntnose minnow; both fish species are considered tolerant to degraded stream conditions. The communities were consistently rated by the FIBI as Fair and were comprised primarily of omnivorous individuals, with other feeding groups present in lesser amounts. Several minnow species were collected at this site, as well as two darter species and two sunfish species. Aquatic habitat at this site ranged from Good/Fair to Good in all years. Generally, in-stream habitat for fish was rated as suboptimal and epifaunal habitat for benthic macroinvertebrates was rated as marginal. Sedimentation at both sites was moderate. Banks were assessed as moderately unstable at NWBF302A and moderately stable at NWBF302B. Overall, the partially degraded aquatic biota and habitat at these sites reflect the urbanizing condition in the watershed.