

3.13 Woodlawn Stream Restoration

3.13.1 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 2,000 feet of the Right Fork of Northwest Branch, also known as the Sandy Spring or Woodlawn tributary. The project is located north of Ednor Road, between Snowden Woods Lane and Alexander Manor Drive. This project is planned for construction in the summer of 2013. The Woodlawn 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 stream banks, restore stable aquatic habitat, create wetlands, and reforest stream buffer areas.

Subwatershed facts

Subwatershed Drainage Area: 6.1 square miles

Subwatershed Imperviousness: 6 percent

Project Facts

Project Area: The Woodlawn stream restoration is planned for the Woodlawn tributary for about 2,000 feet of stream, north of Ednor Road, between Snowden Woods Lane and Alexander Manor Drive.

Costs (Projected): \$1,002,000, funded in part by the USACE

Completion Date (Projected): Summer 2013

Property Ownership: M-NCPPC

Project Selection

The Right Fork of the Northwest Branch, (Woodlawn 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 completed three stream restoration projects for Upper Northwest Branch Package 1 in 2011, which included 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, which are planned to be completed from fall of 2012 to the summer of 2013 (**Figure 3.13.1**).

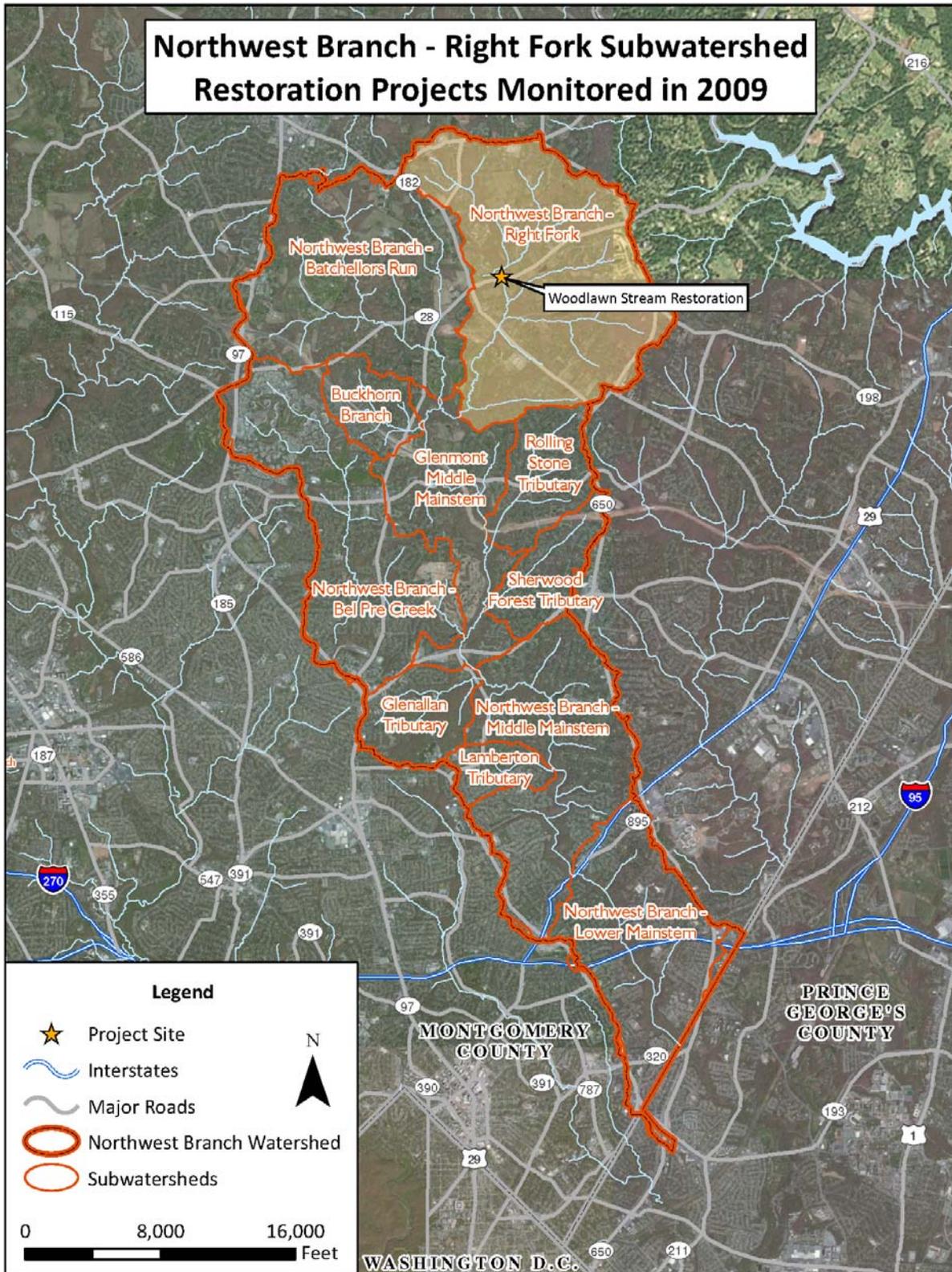


Figure 3.13.1 – Northwest Branch Right Fork Restoration Projects Monitored in 2009, Including Woodlawn Stream Restoration

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 Woodlawn tributary is characterized by eroded stream banks, aggraded channel materials, side channel bar formation (especially around present or former debris jams), low flow conditions, minimal access to its floodplain, and limited interaction with wetlands, and a general lack of in-stream cover for fish (*Figures 3.13.2 – 3.13.4*). The site is generally well forested with adequate canopy cover.



Figure 3.13.2 – Severe Streambank Erosion Prior to Restoration



Figure 3.13.3 – Example of Overwidened and Low Flow Conditions in Woodlawn Tributary



Figure 13.3.4 – Proposed Woodlawn Stream Restoration site, Picturing Erosion and Lack of In-stream Cover for Fish

While the Woodlawn 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.

Restoration Actions Planned

Entrance to the site for construction is anticipated from Ednor Road and Alexander Manor Drive. Restoration activities are planned for approximately 2,000 feet of stream north of the Ednor Road crossing. Stone toe protection with plantings will help provide stream bank 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.

3.13.2 Restoration Goals

Table 3.13.1 below presents the restoration goals, 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-restoration monitoring report and summarizes the pre-restoration conditions within the Woodlawn Stream Restoration project area.

Table 3.13.1 – 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 • In-situ Water Chemistry 	2002, 2004, and 2009 (pre)	NWNW301 ANS Volunteer Site (benthics only)
<ul style="list-style-type: none"> • Stabilize eroding stream banks to reduce sediment entering the stream 	<ul style="list-style-type: none"> • Quantitative habitat (stream morphology surveys) 	2009 (pre) ¹	NWNW301
<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 stream banks 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 2011. The 2011 report will include updates for this monitoring.

3.13.3 Methods to Measure Project Goals

The basic sampling design for the Woodlawn 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 one biological monitoring site (NWNW301) to evaluate the aquatic habitat conditions and water quality during the pre-restoration period. The County also performed a quantitative survey for the entire project length, but this work was postponed until 2011 due to missing benchmarks. Post-restoration wetland and botanical surveys are planned once the wetlands are created and trees are planted. If the project is completed as planned in the summer of 2013, all data collected prior to 2013 will be considered pre-restoration data and all subsequent data will be considered post-restoration. Pre-restoration monitoring was performed in 2001, 2002, 2004, and 2009 at the NWNW301 site within the proposed project limits (*Figure 13.3.5*). Post-restoration monitoring is planned for at least years one, three, and five after restoration.

The Audubon Naturalist Society (ANS) also has monitored for benthic macroinvertebrates from 1995-2012 at the same site (NWNW301) as well as another site approximately 1,000 feet upstream from the proposed restoration limits. ANS uses slightly different sampling methodology from DEP, and only identifies benthic macroinvertebrates in the field to the family level (DEP identifies to genus). Even though ANS data cannot be directly compared to DEP data, the data is similarly converted into stream condition scores and are included in this report for reference (*Figure 3.13.9*).



Figure 3.13.5 – Map of 2009 Monitoring Locations at the Woodlawn Restoration Site. The Quantitative Reaches Correspond with the Extent of Proposed Stream Restoration

3.13.4 Results and Analysis

Benthic Macroinvertebrates

BIBI (Benthic Index of Biological Integrity) Scores

Pre-restoration benthic macroinvertebrate assessments were conducted at site NWNW301 in 2001, 2002, 2004, and 2009. This site was rated by the Benthic Index of Biological Integrity (BIBI) as Good in 2001, 2002, and 2009, and Poor in 2004 (**Figure 3.13.6**). In all years, the benthic community was dominated by Chironomidae (midges), however, in 2001, 2002, and 2009, the community was more diverse and had other more sensitive taxa and specialized feeders as sub-dominants. The decline in BIBI score in 2004 was generally due to an increase in the proportion of dominant taxa, a decline in the number of Ephemeroptera (mayfly), Plecoptera (stonefly), and Trichoptera (caddisfly) taxa, collectively referred to as EPT, and a decrease in the proportion of EPT individuals. Field data sheets completed in 2009 for this task are included in *Appendix D*.

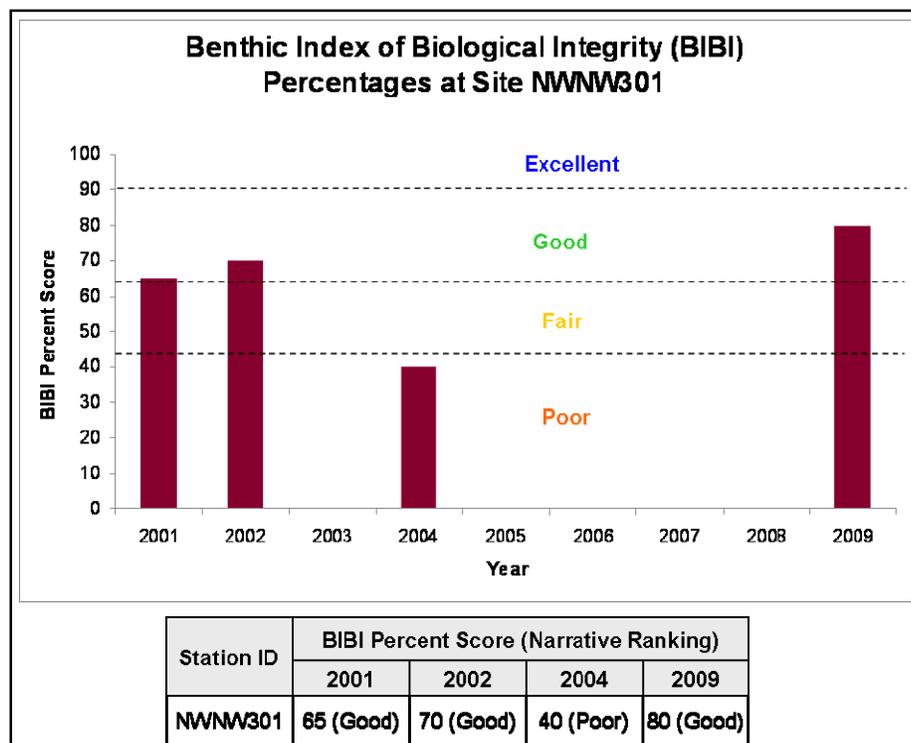


Figure 3.13.6 – Pre - Restoration Benthic Index of Biological Integrity (BIBI) Percentages at NWNW301

Dominant Taxa and Tolerance Values

Midges dominated the benthic macroinvertebrate community at NWNW301 during the pre-restoration period (**Figure 3.13.7**). Midges are considered tolerant to urbanization. A genus of black fly larva (*Simulium sp.*) was second most dominant, and is considered intermediate in sensitivity. Tolerant individuals were dominant (43 percent) at NWNW301 prior to restoration, individuals intermediate to sensitivity were second most dominant (34 percent), and sensitive individuals were least abundant (22 percent).

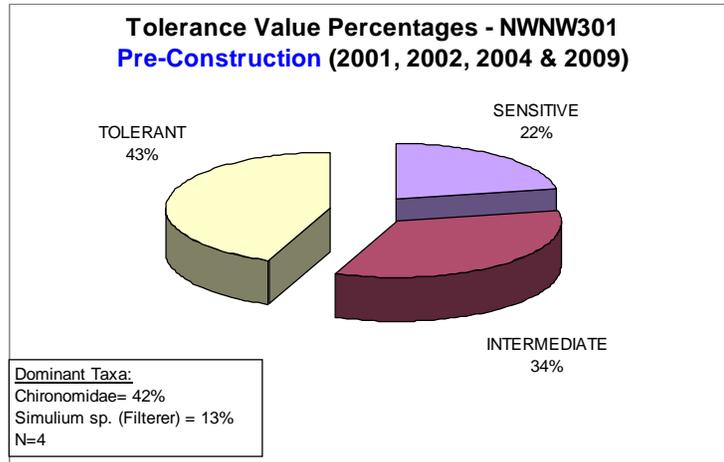


Figure 3.13.7 – Benthic Macroinvertebrate Tolerance Composition and Dominance at NWNW301

Functional Feeding Groups

Collectors and filterers were the most dominant feeding groups at NWNW301 comprising 77 percent of the community (**Figure 3.13.8**). These two groups are considered generalist feeders and can inhabit more degraded streams. More specialized feeders, including scrapers and shredders, comprised a total of 12 percent of the community in the pre-restoration period.

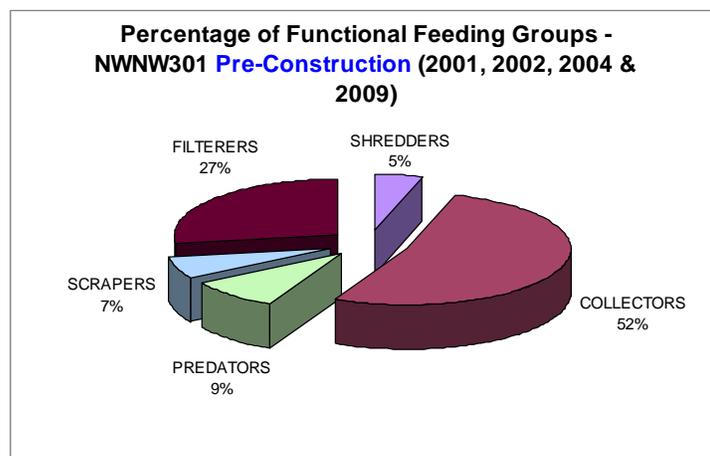


Figure 3.13.8 – Benthic Macroinvertebrate Functional Feeding Group Composition at NWNW301

Volunteer Monitoring

Benthic macroinvertebrates were sampled by ANS volunteers nearby the County site, NWNW301, pre-restoration from 1995 to 2010. Despite differences in collection and identification procedures, ANS data is used in a similar way to MCDEP to represent stream conditions. Reported conditions range from Poor to Excellent, with an average score of Good (3.3) and most consistently reported as Good/Fair (Figure 3.13.X). The scores appear to be more consistently Good prior to 2003, and are reported more consistently as Fair after 2003, (with the exception of 2009 where the score was excellent). Coincidentally, the neighborhood just upstream of the site, along Alexander Manor Drive, was built 2001-2002.

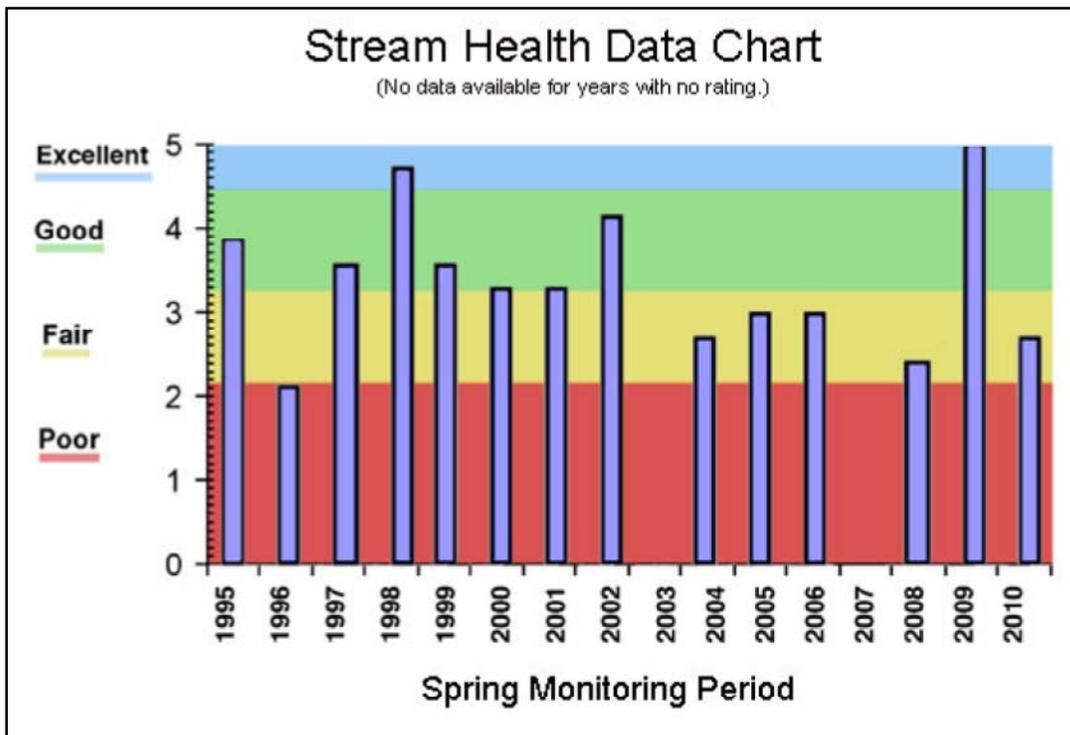


Figure 3.13.9 – Audubon Naturalist Society (ANS) Benthic Macroinvertebrate Community Health Ratings, Pre-Restoration 1995-2010. Results were retrieved from ANS website at <http://www.audubonnaturalist.org/index.php/nature-programs/water-quality-monitoring>.

Fish

FIBI (Fish Index of Biological Integrity) Scores

Pre-restoration benthic macroinvertebrate assessments were conducted at site NWNW301 in 2001, 2002, 2004, and 2009. This site was rated by the Fish Index of Biological Integrity (FIBI) as Fair in 2001, 2002, and 2004, and Good in 2009 (**Figure 3.13.10**). In all years, the total number of fish species and number of minnow species were in the high range and the number of intolerant fish species metric was in the low range. The increase in FIBI over time was generally due to a decline in the proportion of tolerant individuals and an increase in the total number of individuals. Field data sheets from the 2009 fish monitoring are included in **Appendix D**.

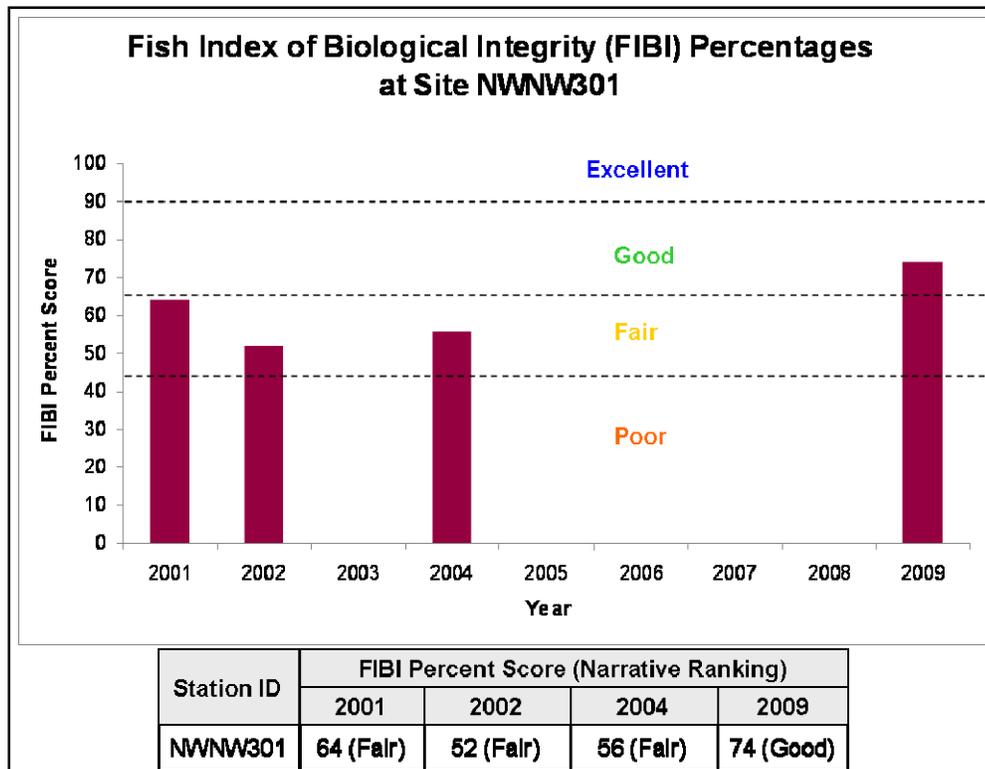


Figure 3.13.10 – Pre - Restoration Fish Index of Biological Integrity (FIBI) Percentages at NWNW301

Dominant Species and Tolerance Values

In all years, the fish community was dominated by *Rhinichthys atratulus* (blacknose dace). Blacknose dace are considered tolerant to degraded stream conditions (**Figure 3.13.11**). Tolerant species were consistently dominant at this site, comprising 77 percent of the community. Several other species tolerant to degraded stream conditions were collected at this site including, *Pimephales notatus* (bluntnose minnow), which was the second most dominant fish species, *Catostomus commersoni* (white sucker), *Notropis procne* (swallowtail shiner), and *Etheostoma olmstedti* (tessellated darter). Species intermediate in sensitivity made up 23 percent of the fish community, with the most abundant species including, *Etheostoma flabellare* (fantail dater), *Clinostomus funduloides* (rosyside dace), and *Notropis buccatus* (silverjaw minnow). Species considered sensitive to stream degradation were not collected at this site.

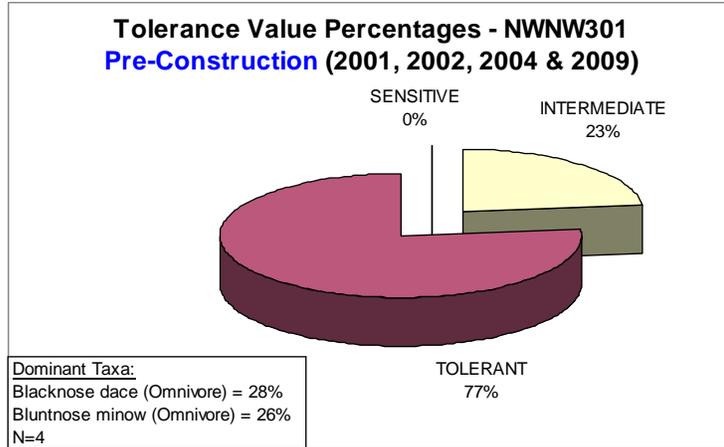


Figure 3.13.11 – Fish Tolerance Composition and Species Dominance at NWNW301 Prior to Restoration

Functional Feeding Groups

Omnivores were the most dominant feeding group (78 percent) present at NWNW301 and were represented by several species of minnows including blacknose dace, bluntnose minnow, *Rhinichthys cataractae* (longnose dace), and *Notropis buccatus* (silverjaw minnow) (**Figure 3.13.12**). Invertivores were second most dominant (13 percent) and were represented by *Etheostoma olmstedti* (tessellated darter), rosyside dace, and a few other less dominant species, including several species of *Lepomis* sp. (sunfish). Insectivores were the third most dominant (7 percent) feeding group, solely represented by fantail darter.

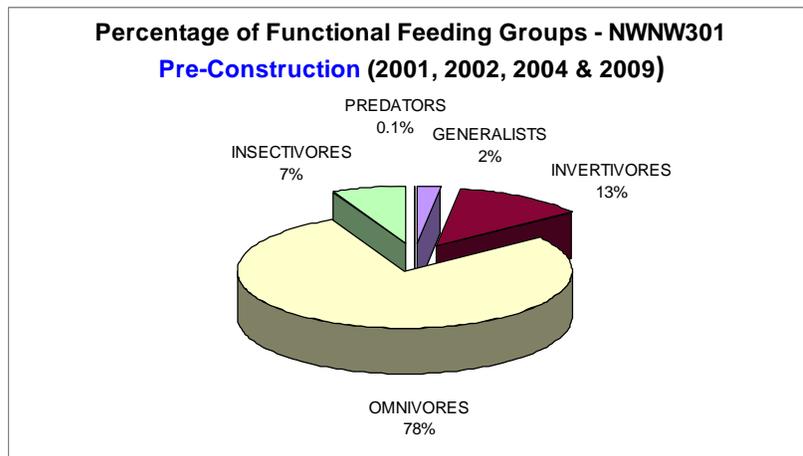


Figure 3.13.12 – Fish Functional Feeding Group Composition at NWNW301 Prior to Restoration

Qualitative Habitat

Aquatic habitat was evaluated at NWNW301 in the summer of 2001 and the spring and summer of 2002, 2004, and 2009. With the exception of the assessments done in the spring of 2002 and 2004, which were rated as Excellent and Fair, respectively, RHAB scores were otherwise consistently rated as Good (**Figure 3.13.13**). Instream habitat for fish and epifaunal substrates for benthic macroinvertebrates were rated higher in 2001 and 2002, with ratings in the

suboptimal/optimal categories. In 2004 and 2009, these individual metrics were rated as marginal/suboptimal. Moderate sediment deposition was observed in all years. Streambanks at this site were assessed as being moderately unstable to unstable, but the riparian zone was generally unimpaired by human activities.

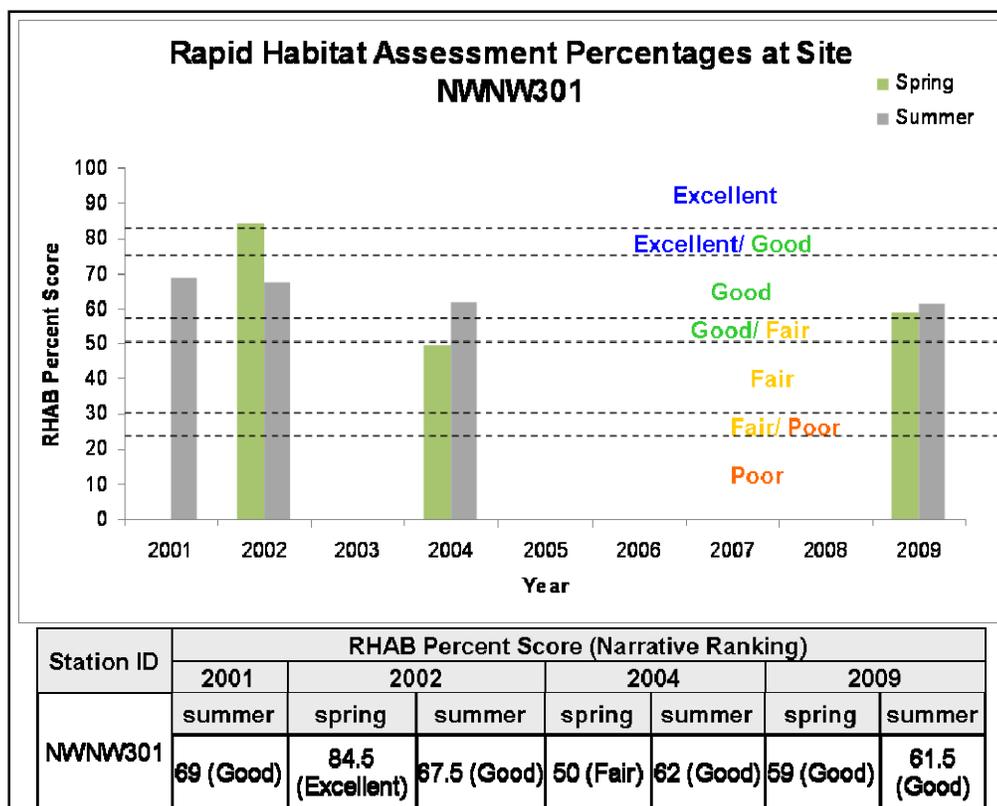


Figure 3.13.13 – Rapid Habitat Assessment (RHAB) Percentages at NWNW301

Water Chemistry

All in-situ water chemistry readings were in compliance with COMAR standards for this Use IV stream (Table 3.13.2).

Table 3.13.2 – In-situ Water Chemistry Data at NWNW301

Parameter	2001	2002		2004		2009	
	summer	spring	summer	spring	summer	spring	summer
Dissolved Oxygen (mg/L)	9.31	-	7.42	12.21	10.85	12.16	6.28
Dissolved Oxygen (% Saturation)	102	-	90	101	122	111	68
pH	7.13	7.88	7.20	7.55	7.96	8.18	7.21
Conductivity (µmhos)	145	128	129	182	173	207	194
Water Temperature (°F)	69	48	77.8	44.6	70	57.2	65.1

3.13.5 Discussion

The pre-restoration benthic macroinvertebrate community at NWNW301 was consistently rated as Good in all years, except in 2002 when it was rated as Poor. In all years, the community was dominated by midges but was more diverse in the higher scoring years. Individuals tolerant to stressors were most abundant at NWNW301; however, sensitive individuals were also present at this site, comprising 22 percent of the community prior to restoration. The fish community was rated by the FIBI as Fair in all years, except in 2009 when it improved to the Good range. Blacknose dace, a tolerant fish species, was consistently the most dominant fish species collected at this site. Omnivores were the most dominant fish functional feeding group, but invertivores and insectivores, feeding groups that are considered as specialists, made up 20 percent of the community. No fish considered sensitive to disturbance were collected at this site. Aquatic habitat was generally rated as Good at NWNW301, but was rated as Excellent in spring of 2002 and Fair in the spring of 2004. However, scores generally declined overtime, with habitats for benthic macroinvertebrates and fish showing the clearest declines in the later years. Streambanks at this site were moderately unstable to unstable and sediment deposition was moderate. All in-situ water chemistry readings were in compliance with COMAR standards for this Use IV stream.

Monitoring will continue after completion of the Woodlawn stream restoration project and reports will discuss results for how the well the project achieved each monitoring goal. Reports will also include conclusions and recommendations for how to better achieve restoration goals.