TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

Executive Summary

Post Construction Mitigation Monitoring for the Woodrow Wilson Bridge Fish Passage Restoration projects was conducted in the Spring of 2004 at six of the twelve fish passage restoration sites in Northwest Branch and Sligo Creek. Monitoring included all sites constructed prior to March 2004. Specifically, this included the RGC structures at NW1, NW2, NW3 and NW8 on Northwest Branch, and SC-1 and SC-2 on Sligo Creek. Monitoring was conducted in accordance with post construction monitoring requirements detailed in the Conceptual Compensatory Aquatic Resources Mitigation and Monitoring Plan. Permit requirements and special conditions contained in the US Army Corps of Engineers permit CENAB-OP-RMN 200060664-11 and MDE Nontidal Wetlands and Waterways permit 99-NT-0578/200060644 were also considered in the development of field monitoring protocols.

The primary purpose of the monitoring is to determine if the performance standards set out in the permit are being met at each of the constructed sites. As stipulated, monitoring of fish passage design compliance included assessments of structural integrity, as well as monitoring of water depths and velocities to ensure that flows met criteria for passing migratory fish species. In addition to required monitoring components, SHA also conducted surveys of fish above the structures in an attempt to document any migration of fish through the riffle-grade controls, recorded any visual observations of target species, and assessed habitat and benthic macroinvertebrate communities within each of the structures to determine if the installation of the structures has had an influence on the biological communities present.

Based on the cross-sections and longitudinal profiles taken at each of the RGC structures and comparisons with as-built surveys, all of the structures have remained stable, with no discernable loss of integrity. Channel bed scour was noted below all of the structures, and sedimentation was not measured, but was clearly evident below NW-3 in the form of a sizeable mid-channel bar. Neither of these factors appears to have affected the structural integrity of the riffle-grade control structures to date. Monitoring of velocity and flow depths within the restoration sites indicates that the riffle-grade control structures meet the compliance standard set for the passage of migratory fish. No remediation of any of the structures is recommended at this time.

Although the structures met criteria for passing migratory species, no migratory species were confirmed to have navigated any of the structures in 2004, based on review of hatchery restock data, visual observations, and presence/absence surveys. Reasons for this are not entirely clear, but may be a result of a weak run that resulted in a lack of migratory pressure at the downstream spawning sites. Biological conditions within the RGCs are comparable to those in the surrounding portions of the stream. The habitat and macroinvertebrate communities reflect the impacted nature of the watershed and riparian areas. However, because the habitat within the structure is still new and will continue to adjust, it is possible that conditions may improve somewhat to allow for a greater diversity in the macroinvertebrate community in future years, though the community will still be limited by water quality and riparian conditions.

1.0 INTRODUCTION

The Maryland State Highway Administration (SHA) Contract Number PG3445173 (Northwest Branch and Sligo Creek Stream Mitigation) received Notice to Proceed on September 16, 2002. This contract was one of seven SHA contracts that were funded solely for environmental mitigation purposes to offset wetland and waterway impacts associated with the re-construction of the Woodrow Wilson Bridge and the improvements to the MD 210 and US 295 interchanges.

The holistic mitigation approach developed for the Woodrow Wilson Bridge Project is outlined in Appendix B of the Final Supplemental Environmental Impact Statement/Section 4f Evaluation (FSEIS), dated April 14, 2000. Appendix B of the FSEIS contains the Conceptual Compensatory Aquatic Resources Mitigation and Monitoring Plan (CMMP) which details the specifics of the mitigation plan and the post construction monitoring requirements that will be used to evaluate the success of the completed mitigation projects. In addition to the monitoring protocols outlined in the CMMP, permit requirements and special conditions contained in the US Army Corps of Engineers permit CENAB-OP-RMN 200060664-11 (July 27, 2000) and MDE Nontidal Wetlands and Waterways permit 99-NT-0578/200060644 (July 26, 2000) were also considered in the development of final field monitoring protocols for the Northwest Branch and Sligo Creek Stream Mitigation Projects, located in Prince George's County, MD (see Figure 1, Vicinity Map).

The goal of the Northwest Branch and Sligo Creek stream mitigation project is to reopen anadromous fish habitat in Northwest Branch and Sligo Creek through the modification of twelve existing in-stream fish blockages. Blockages consist of gabion basket dams, concrete encased or exposed utility lines, sheet pile dams, and roadway culverts. Eight blockages will be modified on Northwest Branch and four on Sligo Creek. All of the blockages will be manipulated by installing riffle-grade control structures (RGC) or boulder-step pool structures (BSP). These engineered stone structures will allow for more natural fish movement when compared with traditional fish "ladders" as they are designed to mimic natural stream conditions. The RGC and BSP structures serve to raise upstream water surface elevations through flow constriction and grade control. The shallow slope of the structures allows the appropriate velocity characteristics for the movement of target species upstream. Within the RGC, a low flow channel will be designed to provide the appropriate depth of flow during the 9^{th} percentile base-flow condition, which was selected to simulate the flows during the spring spawning season. This low flow channel is created on the surface of the structure and acts to concentrate and slow stream flow, allowing fish to migrate upstream in a manner consistent with the swimming characteristics of the target fish. In addition to ensuring appropriate velocity and flow characteristics, the RGC structures provide fish resting areas in the form of large boulders where fish can rest and make use of the flow eddies to propel them upstream. Similarly, the BSP structures are developed to mimic a natural step-pool structure by constructing flow notches that are sized to accommodate appropriate pooling and flow characteristics. The RGC and BSP structures are comprised of various

Figure 1 – Vicinity Map

gradations of rock and finer stream channel material, sized to prohibit shifting or migration of the channel. These structures are placed directly over or downstream of a blockage location. They are built to an elevation that allows the stream to create backwater conditions over the existing blockage.

Post Construction Mitigation Monitoring was conducted in the Spring of 2004 at six of the twelve fish passage restoration sites in Northwest Branch and Sligo Creek. The location of the twelve restoration sites is shown in Figure 2. Monitoring included all sites constructed prior to March 2004, the beginning of the monitoring season. The Northwest Branch component of the mitigation contract is partially complete. Currently four of the eight structures have been completed. These structures include RGC's at NW1, NW2, NW3 and NW8. This report presents the first-year post-construction data for these four structures on Northwest Branch. Northwest Branch structures NW4- NW7 are expected to be completed by February of 2005.

The Sligo Creek component of this contract is complete, however, this report presents the results of the first-year post construction monitoring for only the two RGC's at SC-1 and SC-2. The BSP's at SC-3 and SC-4 were constructed in March of 2004 and it was decided that these sites would be monitored in 2005, since they would have just been stabilized in the middle of the 2004 monitoring period. Completion dates for each of the constructed projects, including projected dates for those still to be installed is provided in Table 1.

Table 1 - Fish Passage Restoration Construction Schedule

Site	Construction Start Date	Completion Date
NW-1	November 2002	January 2003
NW-2	January 2003	September 2003
NW-3	August 2003	October 2003
NW-4	*June 2004*[1]	*July 2004*[1]
NW-5	*September 2004*[1]	*November 2004*[1]
NW-6	*July 2004*[1]	*September 2004*[1]
NW-7	*September 2004*[1]	*November 2004*[1]
NW-8	January 2004	March 2004
SC-1	November 2003	December 2003
SC-2	December 2003	January 2004
SC-3	February 2004	March 2004
SC-4	March 2004	April 2004

[1]*Denotes a projected date for start or completion of construction*

The primary purpose of the monitoring is to determine if the performance standards set out in the permit are being met at each of the constructed sites. As stipulated, monitoring of fish passage design compliance included assessments of structural integrity, as well as monitoring of water depths and velocities to ensure that flows meet criteria for passing migratory fish species. Photos were taken at established photo stations to provide a long-term record of site conditions. These photos are provided in Appendix A. In addition to required monitoring components, SHA also conducted surveys of fish above the

Figure 2 – Restoration Site Location Map

structures in an attempt to document any migration of fish through the RCGs, and assessed habitat and benthic macroinvertebrate communities within each of the structures to determine if the installation of the structures has had an influence on the biological communities present. Each of these monitoring efforts and their findings is presented below.

2.0. METHODS

2.1 Fish Passage Design Compliance

2.1.1 Structure Integrity

During March and April of 2002 the PCC established pre-construction cross sections upstream and downstream of the fish passage restoration areas in Northwest Branch and Sligo Creek for use in the Pre-, During and Post-Construction Water Quality Monitoring. These cross sections were also used as a baseline for post-construction monitoring (PCM). PCM data was overlaid on the pre-construction cross section profiles and any changes in the profiles were evaluated. Additionally, available as-built cross sections were used to evaluate the structural integrity of the RGC structures. As built data appears in Appendix G. PCM will be conducted for five years.

New cross-sections were established where pre-construction cross sections could not be found. Additionally, new cross sections were established through the RGCs. The results were that four sets of cross-section data were collected at all the mitigation sites. One cross section above the structure, one cross section through the structure near the upstream end, one cross section through the structure near the downstream end and one cross section below the structure. These cross sections will be used as the baseline for the remainder of the post-construction monitoring period. The locations of each of the cross sections are illustrated on mapping in Appendix C.

Longitudinal profile data was also collected in addition to cross section data. The longitudinal profile began at the most upstream cross section and ended at the most downstream cross section. The profile represents the thalweg above, through, and below the RGC structure.

Horizontal and vertical dimensions of the cross sections and longitudinal profile are relative to surveyed permanent concrete monuments at each of the mitigation sites. The cross sections and profiles were surveyed to the nearest 0.01 of a foot. Elevation data were collected to reflect variations in topography, edge of water, thalweg, and crest and toe of the RGC structures. Cross sections and longitudinal profile survey data were used to determine changes in channel bed scour or sedimentation as a result of the installation of the RGC structures.

2.1.2 Water Depth and Velocity Survey

Velocity measurements were taken at an interval of roughly 15 feet along the thalweg between the most upstream cross section and the most downstream cross section. A Son Tek 3D Doppler Velocity Meter was used to measure velocities at all of the mitigation sites. Depth of water measurements were also recorded during the collection of velocity data. All depth of water measurements were reported to the nearest 0.1 foot.

Water depth and velocity data were used to evaluate the functionality of the RGC as a fish passage structure. The minimum design water depth through the low flow portion of the structures on the Northwest Branch is 1.0 foot. The minimum design depth of water through the low flow portion of the structures on Sligo is 0.647 feet. The maximum design water velocity through the structure is 3 feet per second (cfs).

Table 2 - Design Discharges

	Design (9%)	Normal (50%)	Operating (90%)	Drainage Area
NW Branch	19 cfs	40 cfs	150 cfs	48 sq. mi.
Sligo Creek	7 cfs	14 cfs	48 cfs	11 sq. mi.

2.2 Fish Passage Monitoring

Actual observations of fish passage at fish passage restoration sites were made using three primary methods: review of data collected during fish hatchery restock efforts, visual observations of RGCs for fish migration, and a presence/absence survey of target species at selected locations within Northwest Branch. Target species include yellow perch, white perch, American eel, alewife, blueback, hickory shad, American shad, and striped bass.

In Northwest Branch, the fish hatchery restock work was primarily targeted at the US 1 crossing of the waterway, otherwise known as NW-0, where fish are known to concentrate. However, on occasion, an electrofisher was used to shock upstream areas to determine if fish were moving beyond the fishway at NW-0 and the restoration projects. The area just below and within NW-1 (38th Street) was surveyed on nine occasions from March 19 through May 13, 2004. The areas above NW-1 adjacent to the WSSC pump station, NW-6, and NW-3 at Queens Chapel Road on Northwest Branch were also surveyed a number of times during the migratory season. More specific data on methods used for the fish hatchery restock efforts will be included in the 2004 hatchery restock report, produced on behalf of the PCC by the Metropolitan Washington Council of Governments (MWCOG) and Interstate Commission on the Potomac River Basin (ICPRB) in the second half of the year.

Beyond the more intensive observations made during the hatchery restock efforts, all of the RGC structures were visually surveyed by the PCC for movements of target species through the structures on at least two other occasions. Presence/absence surveys using electrofishing methods were conducted by the PCC at three locations on Northwest Branch on May 11, 2004 to try to determine if fish were moving above any of the constructed riffle-grade structures at NW-1, NW-2 and NW-3. Survey locations included the areas below NW-4, above NW-3 at Queens Chapel Road, and at the NW-1 RGC. Surveys were completed with two battery powered Smith-Root electro-fishing units and one gas powered unit. At NW-4, the stream segment below the blockage was isolated using block nets across the stream at the downstream end of the survey area. The entire segment was electrofished, all fish within the segment were collected and a list of species captured was generated. This procedure was repeated at NW-1, though block nets were not used. At the Queens Chapel Road location, the pool area was too deep to electrofish the entire width of the stream. Therefore, only the accessible areas were surveyed.

2.3 Habitat and Macroinvertebrate Assessment

2.3.1 Habitat

A habitat assessment based on February 2001 MBSS guidelines was conducted within a 75-meter segment within each of the constructed fish passage restoration sites. The segment was oriented to include as much of the riffle-grade structure as possible, though some sites also included a portion of the habitat immediately up and/or downstream of the structure. Each of the 75-meter segments were evaluated for instream habitat, epifaunal substrate, velocity/depth diversity, pool/glide/eddy quality, riffle/run quality, embeddedness, shading, remoteness, bank stability, and the abundance of trash and human refuse. The width of the riparian buffer was measured on each side of the stream, while the dominant type of land cover adjacent to and surrounding the buffer was recorded. The type and severity of functional breaks within the riparian buffer were also noted. Any evidence of channel alterations such a channel dredging or straightening was observed within the 75-meter segment.

Habitat scores and IBI scores are positively correlated, with high habitat scores usually predicting high IBI scores. The physical habitat was assessed using a method developed for the 1994-2000 MBSS data. Although a number of parameters are evaluated, in Coastal Plain sites six individual physical habitat metrics were determined to be most important in discriminating reference sites from degraded sites: remoteness, shading, epifaunal substrate, instream habitat, total number of instream woody debris and rootwads, and bank stability. Four categories of habitat health, similar to those used for benthic IBI were established for the physical habitat index (PHI) as follows:

- Scores of 72 to 100 are rated good
- Scores of 42 to 71.9 are rated fair
- Scores of 12 to 41.9 are rated poor
- Scores of 0 to 11.9 are rated very poor

[NOTE: The metrics used to calculate the physical habitat index for these mitigation monitoring sites are different than those used in the physical habitat index calculated for the *Pre-Construction Conditions Aquatic Resources Mitigation Monitoring Report* (SHA 2004). This is due to a change in the MBSS method for calculating a PHI, which now considers watershed size, shading, and other factors not previously included in PHI calculations. Therefore, direct comparisons of PHI scores between monitoring periods before and after 2004 is not considered accurate, though comparisons of individual metric scores, such as instream habitat and riffle/run quality, is considered acceptable.]

2.3.2 Macroinvertebrates

Benthic macroinvertebrate sampling was conducted in each of the 75m-segments assessed for habitat at each of the RGC structures. Collection of macroinvertebrates was conducted in accordance with the *Maryland State Highway Administration Stream Monitoring Protocol* and the Maryland Biological Stream Survey (MBSS) manuals referenced therein for the Spring Index Period. This method emphasizes the community composition and relative abundance of organisms in the most favorable habitats. The most favorable habitat is a riffle area followed, in order, by gravel/broken peat and/or clay lumps in a run area, snags/logs that create a partial dam or are in a run habitat, undercut banks and associated root mats in moving water, SAV and associated bottom substrate in moving water and detrital/sand areas in moving water.

Beginning at the downstream end of the 75-meter segment, a D-net was placed firmly in the substrate of the riffle area at the downstream edge, while organisms were dislodged from rocks and stones through rubbing or kicking of the substrate. If the most favorable habitat was a snag/log, undercut bank, root mat, or SAV, the substrate was rubbed or agitated in a 1-ft^2 area into the D-net. This process was repeated until 20 square feet of substrate had been sampled in the segment. The sample was washed into a sieve bucket and placed in a labeled sample container with 70% ethanol solution to be transported from the field to the office. The samples were transferred to a subsampling tray that displayed thirty five 5 cm grids on the bottom of the tray. A random number between 1 and 35 was chosen to determine which grid would be picked until a total of 120 organisms was reached. If the total number of organisms removed from the first grid is equal to or greater than 120, subsampling is complete for the sample. The last grid chosen was picked in its entirety.

In the office, samples from each monitoring segment were identified to genus level using common taxonomic references including Merrit and Cummins (1996), Pekarsky (1990), Jessup (1999), Epler (2001), Epler (1996) and Smith (2001). Chironomid larvae were identified in accordance with protocols detailed in MDNR's *Laboratory Methods for Benthic Macroinvertebrate Processing and Taxonomy*. The final classification and abundance of each organism was entered into a Microsoft Access database. The database contained information on the tolerance value, functional feeding group, and habit of each taxonomic group. This data was exported along with the specific data from each sample into a Microsoft Excel spreadsheet, where the metrics were calculated.

QA/QC procedures for benthic macroinvertebrate processing and taxonomy were applied to both the sample picking and the lab taxonomy. Twenty percent of the subsamples were checked to assure that all organisms had been removed from the detritus. Ninety percent accuracy was considered acceptable for this procedure. Twenty-percent of samples were checked in-house for taxonomic accuracy. Ninety percent accuracy was considered acceptable for this procedure. Consistent misidentifications were back-checked and corrected for all samples.

Data analysis of the sampling results was completed by comparing field-collected results with reference conditions developed by the Maryland Biological Stream Survey (MBSS). Macroinvertebrate and physical habitat were all evaluated using MBSS methods.

Macroinvertebrate metric calculations used the functional feeding group, tolerance values, habitat and abundance of each genera found in an individual sample. For Coastal Plain streams the following metrics were used to calculate an Index of Biotic Integrity (IBI):

Total Number of Taxa- This metric reflects the health of the community through a measurement of the total number of unique taxa in a sample. An increase in taxa is directly related to the increase in water quality, habitat diversity, and/or habitat suitability.

Number of EPT Taxa- The richness of the generally intolerant insect orders of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies). This value summarizes taxa richness with macroinvertebrates that are generally considered to be intolerant of pollution. Therefore, a higher number of taxa within the sample suggests better water quality conditions.

Percent Ephemeroptera- The percentage of insects from the Ephemeroptera order that make up the total sample. The degree to which mayflies dominate the community can indicate the relative success of these generally pollution intolerant individuals in sustaining reproduction.

Percent Tanytarsini of Chironomidae- A high percent of Tanytarsini among the midges may indicate lower levels of anthropogenic stress. This metric increases with high numbers of Tanytarsini (among all Chironomidae) and decreases with high numbers of non-tanytarsini Chironomidae.

Beck's Biotic Index- The weighted enumeration of intolerant individuals in the community expresses the relative abundance of individuals in the most intolerant and second most intolerant classes. Since the most intolerant taxa are weighted more heavily, their abundance in the assemblage is more important to this metric. The metric increases with better water and habitat quality.

Number of Scraper Taxa- The number of taxa that feed on periphyton and associated microfauna. This metric generally increases without perturbation.

Percent Clingers- The percentage of taxa that cling to surfaces in fast moving water by means of morphological adaptations or construction of fixed retreats. This metric generally increases without stressors.

Each individual metric is scored 1, 3 or 5 based on the comparison with the distribution of metric values at MBSS reference sites. Final MBSS IBI scores were calculated as the mean of the individual metric scores and ranged 1 to 5. Table 3 below describes the characteristics of each IBI score.

Table 3 - Narrative Descriptions of Stream Biological Integrity Associated with each of the IBI Scores for the MBSS Protocols

IBI Score	Narrative Integrity Class	Characteristics
4.0-5.0	Good	Comparable to reference streams considered to be minimally impacted. Falls within upper 50% of reference site conditions.
3.0-3.9	Fair	Comparable to reference conditions, but some aspects of biological integrity may not resemble the qualities of these minimally impacted streams. Falls within the lower portion of the range of reference sites (10^{th} to 50^{th} percentile).
2.0-2.9	Poor	Significant deviation from reference conditions, with many aspects of biological integrity not resembling the qualities of these minimally impacted streams, indicating some degradation.
1.0-1.9	Very Poor	Strong deviation from reference conditions, with most aspects of biological integrity not resembling the qualities of these minimally impacted streams, indicating severe degradation.

Source: MBSS (1999)

3.0 RESULTS

3.1 Fish Passage Design Compliance

3.1.1 Structure Integrity

A comparison of available as-built survey data, pre-construction survey data, and the PCM cross section survey found only minor differences in the RGC structure cross sectional profiles. These minor differences may reflect adjustments in the channel as it re-establishes some state of equilibrium. Figures in Appendix B illustrate the comparison of the pre-construction survey and the PCM cross-section survey.

The large habitat features known as boulder clusters have remained stable at each of the monitored RGCs. Localized small scour holes have formed immediately downstream of the boulders which provide the resting places for fish moving through the RGC. These scour holes do not threaten the integrity of the boulders but will continue to be monitored annually.

The crest of the RGC establishes the upstream elevation of the structure and provides the control for the head pond that allows fish to pass over the obstructions that were previous fish blockages. The crest of each of the monitored structure remains stable with only minor sorting of smaller stones noted. This sorting of bed material is a natural process and poses no danger to the structure at this time.

Channel bed scour above and below the structures was evaluated based on the PCM longitudinal profile data. It appears that some degree of channel scour has occurred downstream of each structure where the RGC transitions back to finer bed materials that exist in the stream. However, some scour would be expected. The downstream end of the RGC and the streambed immediately downstream of the RGC is subjected to the greatest forces of shear stress and turbulence. Rainfall has been unusually high during the first year following completion of the structures. Therefore, some localized scour and sorting of bed material would be expected to occur in this area. Currently, the presence of this scour is a benefit by providing pool habitat for fish species. The concern would be that it continue to expand and, in the worst case, destabilize the downstream toe of the RGC allowing a headcut to migrate toward the crest. Currently there is no indication that fish passage is impaired. The longitudinal profile plots and cross section profiles for each of the grade control structures are presented in Appendix B. Sedimentation was not measured since this is the first year of post-construction monitoring. However a mid-channel bar was noted below the structure at NW-3.

3.1.2 Water Depth and Velocity Survey

Depth of water and velocity data are summarized in tabular form in Appendix D. Points where velocities exceeded 3 fps appear in bold print. Water depths less than 1.0 foot in the structures in Northwest Branch and 0.64 feet in the structures in Sligo Creek appear in bold print. At NW-1 13 of the 15 stations where water depth was monitored had acceptable depth readings while 5 areas had a velocity between 3.2 to 5.2 fps. At NW-2 16 of the 23 stations where water depth was monitored had acceptable depth readings while 5 areas had a velocity between 3.4 to 3.9 fps. Fourteen of the 18 stations measured in NW-3 had acceptable depth readings, and five areas had velocities between 3.1 and 4.5 fps. NW-8 had no velocities greater than 3.0 fps, and 43 of the 44 stations measured for depth met those requirements. Overall, the monitoring data indicate that the RGC structure meets the compliance standard set for fish passages.

USGS data for the monitoring dates of the structures on Sligo Creek and Northwest Branch indicated that mean discharges of 25 cfs and 42 cfs, respectively, were greater than the 50 percent discharge of 14 cfs and 40 cfs respectively. Velocity monitoring during flows less than the respective 50 percent discharge were not completed. A summary of discharges recorded at USGS Gage Station 0165100, Northwest Branch of the Anacostia River, Hyattsville during the PCM period are presented in Appendix D.

3.2 Fish Passage Monitoring

The periodic surveys conducted for the fish hatchery restock efforts at or above the fish passage restoration sites resulted in the capture of migratory species on only one occasion during the 2004 season. Table 4 summarizes the results of hatchery restock electrofishing surveys near the restoration areas. As shown in Table 4, two alewife herring were found in Northwest Branch just below NW-1 at 38th Street on March 29th, having successfully navigated the NW-0 fishway. However, neither alewife nor any other migratory species were found there again and no migratory species were documented above NW-1 in 2004.

Table 4 - Summary of Hatchery Restock Electrofishing Results at Stations at or above Fish Passage Restoration Sites

Site	Date	Migratory Species	Number
NW-1 (38th Street)	3/19/04	None	N/A
	3/25/04	None	N/A
	3/29/04	Alewife Herring	2
	4/07/04	None	N/A
	4/15/04	None	N/A
NW-1 at Pump House	3/27/04	None	N/A
	4/15/04	None	N/A
	4/28/04	None	N/A
NW-3 at Queens Chapel Road	4/22/04	None	N/A
	4/28/04	None	N/A
	4/29/04	None	N/A
	5/4/04	None	N/A
NW-6 at Footbridge	4/05/04	None	N/A
	4/22/04	None	N/A
	5/4/04	None	N/A

Source: MWCOG/ICPRB data for 2004 Hatchery Restock

On May 10, 2004, the day before the presence/absence survey, the hatchery restock team had captured and marked 70 herring from NW-0, releasing them above 38th Street. It was hoped that the survey on May 11th would then be able to document if the marked herring continued upstream through the RGCs. Unfortunately, no migratory fish other than American eel, either marked or unmarked, were captured during the presence/absence surveys. The American eel is the least limited by blockages that would hinder the movements of other target species due to its body style and ability to "climb" vertical barriers on a thin sheet of water. In addition, the eels have been documented above all of the Northwest Branch fish blockages in pre-construction surveys. American eel and other species captured during the presence/absence surveys are listed in Table 5 below. Although the surveys were not exhaustive enough to definitively determine if these or any other target fish have moved above the fish passage structures, no migratory fish were documented in 2004 above NW-1, the downstream-most of the fish passage structures.

Table 5 - Fish Species Found During Presence/Absence Electroshocking

Species	NW-1 RGC	NW-3 below	NW-4 below
Rainbow trout	X		X
Longnose dace	X	X	X
White sucker	X		
Redbreast sunfish	X	X	X
Blacknose dace	X	X	X
Spottail shiner	X	X	X
American eel	**X**	**X**	**X**
Satinfin shiner	X	X	X
Swallowtail shiner	X	X	X
Banded killifish	X		
Cutlips minnow	X	X	X
Spotfin shiner		X	X
Hybrid sunfish		X	X
Bluntnose minnow		X	
Tessellated darter		X	X
Green sunfish		X	X
Common carp		X	
Northern hogsucker			X
Pumpkinseed			X
Common shiner			X
Fantail darter			X

Note: Bold denotes target species

It is unclear why migratory fish were not documented in upstream areas of Northwest Branch in 2004 where they have been documented in previous years. The 2004 migratory run was somewhat weakened by cooler than normal temperatures in early spring with few of the warm rain events that typically increase water temperatures to trigger upstream migration. In addition, an abrupt hot spell occurred near the end of the season, which may have raised temperatures above the typical migratory thresholds. Although there is no definitive answer, MWCOG and ICPRB speculated that overall numbers of migrating fish might have been reduced by weather conditions, which in turn may have reduced the pressure on the fish at NW-0 to move to upstream areas.

3.3 Habitat and Macroinvertebrate Assessment

3.3.1 Habitat

All physical habitat assessments of Northwest Branch and Sligo Creek resulted in a Very Poor PHI rating as shown in Table 6 below. Parameters including remoteness, shading, and quantity of rootwads and woody debris all scored very low. Streams with large drainage areas comparable to Northwest Branch and Sligo Creek are typically expected to provide a wide variety of habitat niches. Consequently, the lack of quality habitat caused by channelization, riparian clearing, and other anthropogenic changes are magnified when drainage area is added to the metric calculations, exacerbating already low habitat scores. Despite an increase in riffle quality and other instream habitat parameters, these highly developed watersheds still do not provide adequate physical habitat for sensitive fish and macroinvertebrate taxa. The relative newness of these RGC structures has not yet allowed for deposition and sorting of cobble and gravel size materials. These are considered the most optimal habitat for macroinvertebrate colonization and many niche habitats for less tolerant organisms have not yet been developed. Physical habitat assessment field sheets can be found in Appendix E.

Table 6 - Summary of Habitat Conditions within the RGC Structures

Site	MBSS PHI Score	Narrative Rating
NW-1-RG	1.09	Very Poor
NW-2-RG	1.11	Very Poor
NW-3-RG	1.18	Very Poor
NW-8-RG	8.30	Very Poor
SC-1-RG	7.54	Very Poor
SC-2-RG	9.34	Very Poor

3.3.2 Macroinvertebrates

As shown in Table 7, all macroinvertebrate samples within the Northwest Branch and Sligo Creek RGC structures were rated as Very Poor (1.00) by the MBSS BIBI. Members of the pollution tolerant family, Chironomidae, heavily dominated these samples. Each metric value scored the lowest possible rating at all Northwest Branch sites. Macroinvertebrate samples from Sligo Creek scored slightly higher than those at Northwest Branch. This is due to a higher percentage of clinger taxa, within the sample. This increase in clinger taxa is mainly due to the presence of a tolerant midge genus, *Cricotopus* sp., that was the dominant taxa at these sites. Detailed metric calculations for each site can be found in Appendix F.

Table 7 - Summary of Macroinvertebrate Community Conditions within the RGC Structures

Site	MBSS BIBI Score	Narrative Rating
NW-1-RG	1.00	Very Poor
NW-2-RG	1.00	Very Poor
NW-3-RG	1.00	Very Poor
NW-8-RG	1.00	Very Poor
SC-1-RG	1.29	Very Poor
SC-2-RG	1.57	Very Poor

4.0 CONCLUSIONS

Based on the 2004 monitoring efforts, it appears that all of the RGC structures in Northwest Branch and Sligo Creek built prior to March 2004 are stable and meet design criteria for fish passage. Some minimal to moderate scour is occurring below a few of the structures as might be expected as the substrate changes from rock to sand. However, the magnitude of the scour has not yet affected the integrity of the structure or flow criteria for fish passage. These areas will continue to be monitored closely in future years to ensure that design criteria continue to be met. No remediation of any of the structures is recommended at this time. Although the structures met criteria for passing migratory species, no migratory species were confirmed to have navigated any of the structures in 2004. Reasons for this are not entirely clear, but may be a result of a weak run that resulted in a lack of migratory pressure at the downstream spawning sites. Biological conditions within the RCGs are comparable to those in the surrounding portions of the stream. The habitat and macroinvertebrate communities reflect the impacted nature of the watershed and riparian areas. However, because the habitat within the structure is still new and will continue to adjust, it is possible that conditions may improve somewhat to allow for a greater diversity in the macroinvertebrate community in future years, though the community will still be limited by water quality and riparian conditions.