FISH PASSAGE RESTORATION:
POST CONSTRUCTION MITIGATION
MONITORING REPORT
YEAR 5

July 2008

Contract Number PG3445173

NORTHWEST BRANCH AND SLIGO CREEK

POTOMAC CROSSING CONSULTANTS

Woodrow Wilson Bridge Project

SHA State Highway Administration
Driven to Excel
Maryland Department of Transportation

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EXECUTIVE SUMMARY

In the Spring of 2008, post construction mitigation monitoring was conducted for the twelve sites of the Woodrow Wilson Bridge Fish Passage Restoration project. The eight riffle grade control (RGC) structures on the Northwest Branch are NW-1, NW-2, NW-3, NW-4, NW-5, NW-6, NW-7 and NW-8. Sligo Creek has two RGC structures SC-1 and SC-2, and two Flow Constrictor Step Pool (FC/SP) structures which are SC-3 and SC-4. Monitoring was conducted in accordance with post construction monitoring requirements detailed in the Conceptual Compensatory Aquatic Resources Mitigation and Monitoring Plan (CMMP). Permit requirements and special conditions contained in the US Army Corps of Engineers permit CENAB-OP-RMN 200060664-11, MDE Nontidal Wetlands and Waterways permit 99-NT-0578/200060644, and MDE Water Quality Certification 200060664 were also considered in the development of field monitoring protocols.

The primary purpose of the monitoring is to determine if the performance standards set in the CMMP are being achieved 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, the Maryland State Highway Administration (SHA) also conducted icthyoplankton surveys throughout Northwest Branch in an attempt to document any migration of target fish species 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. The fish species targeted by the Woodrow Wilson Bridge fish passage efforts include yellow perch, white perch, alewife, blueback herring, hickory shad, American shad, and striped bass.

The structural monitoring protocol was modified in early April of 2007 to increase the efficiency of data collection during the monitoring period. A summary of the modified protocol is presented in the methods section. However, NW-1, NW-2, NW-3, NW-8, SC-1 and SC-2 are in their fifth and final year of monitoring, so they were monitored according to the original protocol.

The monitoring data shows that the majority of the sites have remained stable, exhibiting no discernable loss of integrity. However, NW-5 continues to have structural issues, and the notch in the sheet pile weir at SC-1 is frequently clogged with debris. A full survey of NW-5 was conducted again this year because of structural issues identified in the visual assessment. Concerns about NW-5 from the 2007 report included exposed gas lines in the channel, dislodged concrete mattresses which previously covered the gas lines, and a failure of the right gabion wall downstream of the structure. Within the past year, a nick point developed at the bottom of the structure and migrated upstream about eight feet. Visual observations of the right bank indicate that the failed gabion wall has moved downstream slightly. The bank behind the gabion wall appears stable. Neither the nick point or failed gabion wall are acting as blockages to fish migration; however, they require continued attention.

The majority of velocity and flow depths taken within the RGC and FC/SP structures at low and high flows meet the compliance standards set for migratory fish. Although some flows and depths were outside of the compliance standards, the structures appear passable because of the diversity of flows within the structures and the burst speeds of the target species.

Fish trapping efforts early in the spring season were unsuccessful and were discontinued as new ichthyoplankton survey protocols were found to be a more thorough and efficient monitoring method. Ichthyoplankton surveys of Northwest Branch indicated river herring migrating upstream to the NW-3 structure. These surveys resulted in the collection of river herring eggs from NW-0, NW-1, NW-2, and NW-3 on different dates. In addition, eggs and larvae of resident fish species were collected during the surveys. Benthic Index of Biotic Integrity (BIBI) scores within the RGC structures improved throughout 2007. These improvements are due to increased macroinvertebrate community diversity and also the presence of more sensitive mayfly taxa within the samples. Aquatic habitat scores continue to reflect the impacted nature of the watershed, especially a lack of in-stream woody debris and rootwads.

1.0 INTRODUCTION

The Maryland State Highway Administration 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 I-295 interchanges. This report is the fifth post construction monitoring report submitted for this project. The first report entitled *"Fish Passage Restoration: Post Construction Mitigation Monitoring Report (Year 1 of 5)"* dated June 2004, presents monitoring results for fish passage sites NW-1, NW-2, NW-3, NW-8, SC-1 and SC-2. After the submission of the first report, fish passage sites NW-4, NW-5, NW-6, NW-7, SC-3 and SC-4 were completed. The second year monitoring report entitled *"Fish Passage Restoration: Post Construction Mitigation Monitoring Report (Year 2 of 5)"* presents post construction data for all twelve fish passage projects (NW1 through NW-8 and SC-1 through SC-4) associated with this Contract.

The environmental mitigation program developed for the Woodrow Wilson Bridge Project is outlined in Appendix B of the Woodrow Wilson Bridge Project's 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), and MDE Water Quality Certification 200060664 (June 7, 2000) were considered in the development of field monitoring protocols.

The Northwest Branch and Sligo Creek Stream Mitigation Project sites are located within the Hyattsville area of Prince George's County, Maryland (Figure 1). The goal of the project was to reopen anadromous and catadromous fish habitat in Northwest Branch and Sligo Creek through the modification of twelve existing in-stream fish blockages. Blockages consisted of gabion basket dams, concrete encased or exposed utility lines, sheet pile dams, and roadway culverts. Eight blockages were modified on Northwest Branch and four on Sligo Creek (Figure 2). All of the blockages were manipulated by installing riffle-grade control structures (RGC) or flow constrictor/step pool structures (FC/SP). These engineered structures will allow for more natural fish movement when compared with traditional fish "ladders" as they are designed to mimic natural stream features. The RGC and FC/SP structures are designed 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, low flow channels were constructed to provide the appropriate depth of flow during the ninth-percentile base-flow condition, which was selected to simulate low 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 depth characteristics, the RGC structures provide fish resting areas adjacent to the constructed boulder clusters where fish can conserve energy before making use of the flow eddies to propel themselves upstream. Similarly, the FC/SP structures are developed to mimic a natural step-pool feature by constructing flow notches that are sized to accommodate appropriate pooling and flow characteristics. The RGC and FC/SP structures are comprised of various gradations of rock and finer stream channel material, sized to prohibit shifting or migration of the structures over time.

Post construction mitigation monitoring was conducted in the spring of 2008 at each of the twelve fish passage restoration sites in Northwest Branch and Sligo Creek. Six of these twelve sites were monitored for the first time in 2004 and monitored for the fifth and final time this year. The remaining six sites were monitored for the fourth time this year, and will be monitored again in Spring 2009. The location of the twelve restoration sites is shown in Figure 2. Completion dates for each of the constructed projects 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	July 2004	August 2004
NW-5	December 2004	January 2005
NW-6	September 2004	December 2004
NW-7	August 2004	September 2004
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

The primary purpose of the post construction monitoring is to determine if the performance standards outlined in the CMMP are being achieved 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. The structural component of the monitoring protocol was modified in early April 2007 as a way to make the monitoring process more efficient. The revised protocol is summarized in Methods, Section 2.0. 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 ichthyoplankton surveys within Northwest Branch in an attempt to document any migration of fish through the sites and assessed habitat and benthic macroinvertebrate communities within each of the structures in Northwest Branch and Sligo Creek 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 in Sections 3.2 Fish Passage Monitoring and 3.3 Habitat and Macroinvertebrate Assessment.

2.0. METHODS

2.1 Fish Passage Design Compliance

2.1.1 Structure Integrity

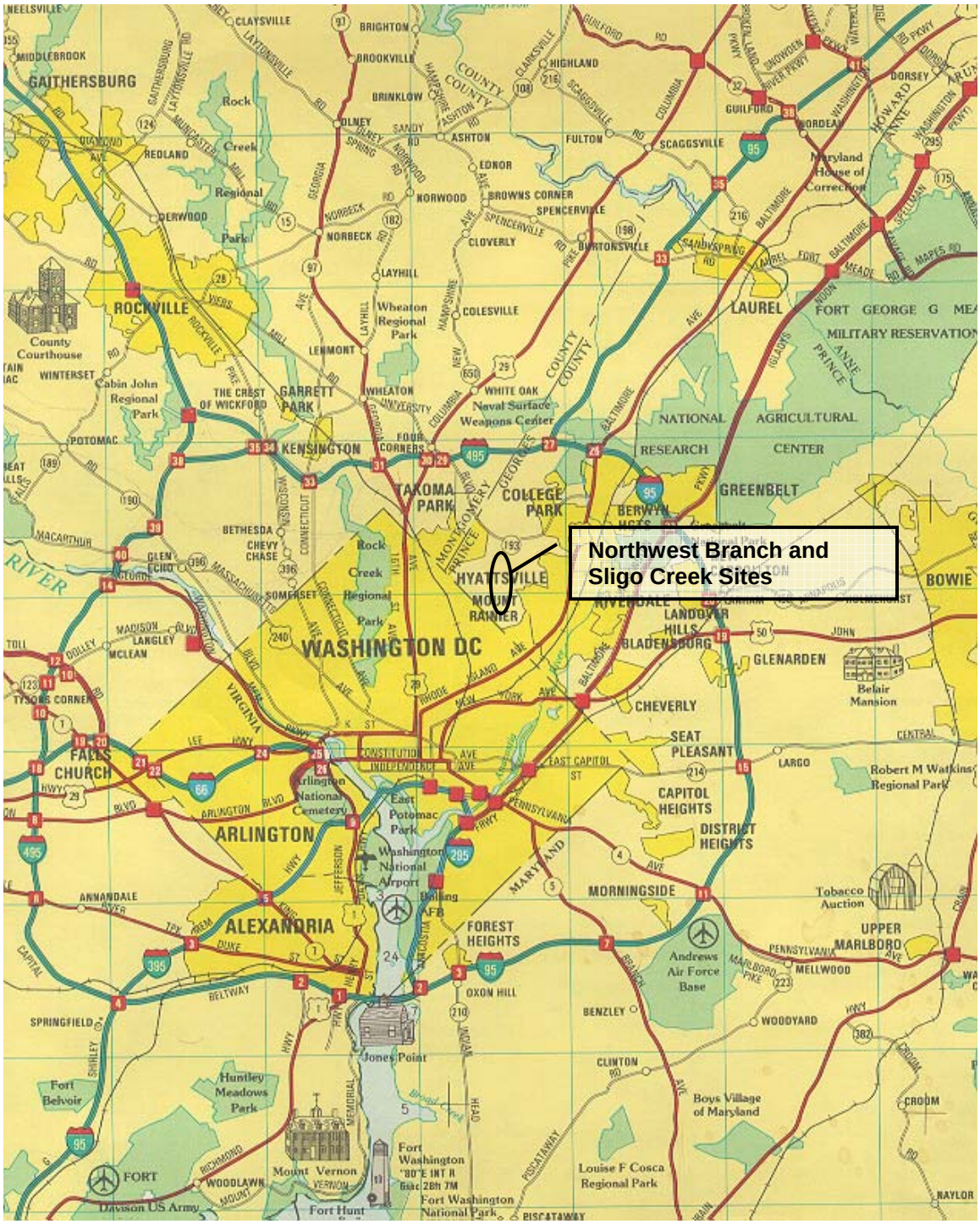
A detailed annual assessment was conducted at each site to document the general conditions of the structures and determine if any concern exists regarding: stability, sedimentation, debris blockages, obvious water quality issues, erosion and/or scour. Monthly visual observations were also made at each site. Visual assessment forms can be found in Appendix B. The visual assessment describes the general conditions of the structures and channel surrounding them. Special attention is paid to noting potential problems at early stages of development including: debris jams, boulder movement, excessive scour or sedimentation. Photos are taken as part of the documentation for the monthly and annual assessments.

Before 2007, four to five cross sections and a longitudinal profile were surveyed each spring at every structure. While this generated useful data during the first few years of post construction monitoring, a visual assessment in conjunction with a modified longitudinal profile is now being used to determine if the structure is stable and functioning properly. Under this revised approach, a complete survey will be undertaken if significant changes are observed in the visual assessment or for sites that are being monitored for the fifth and final year.

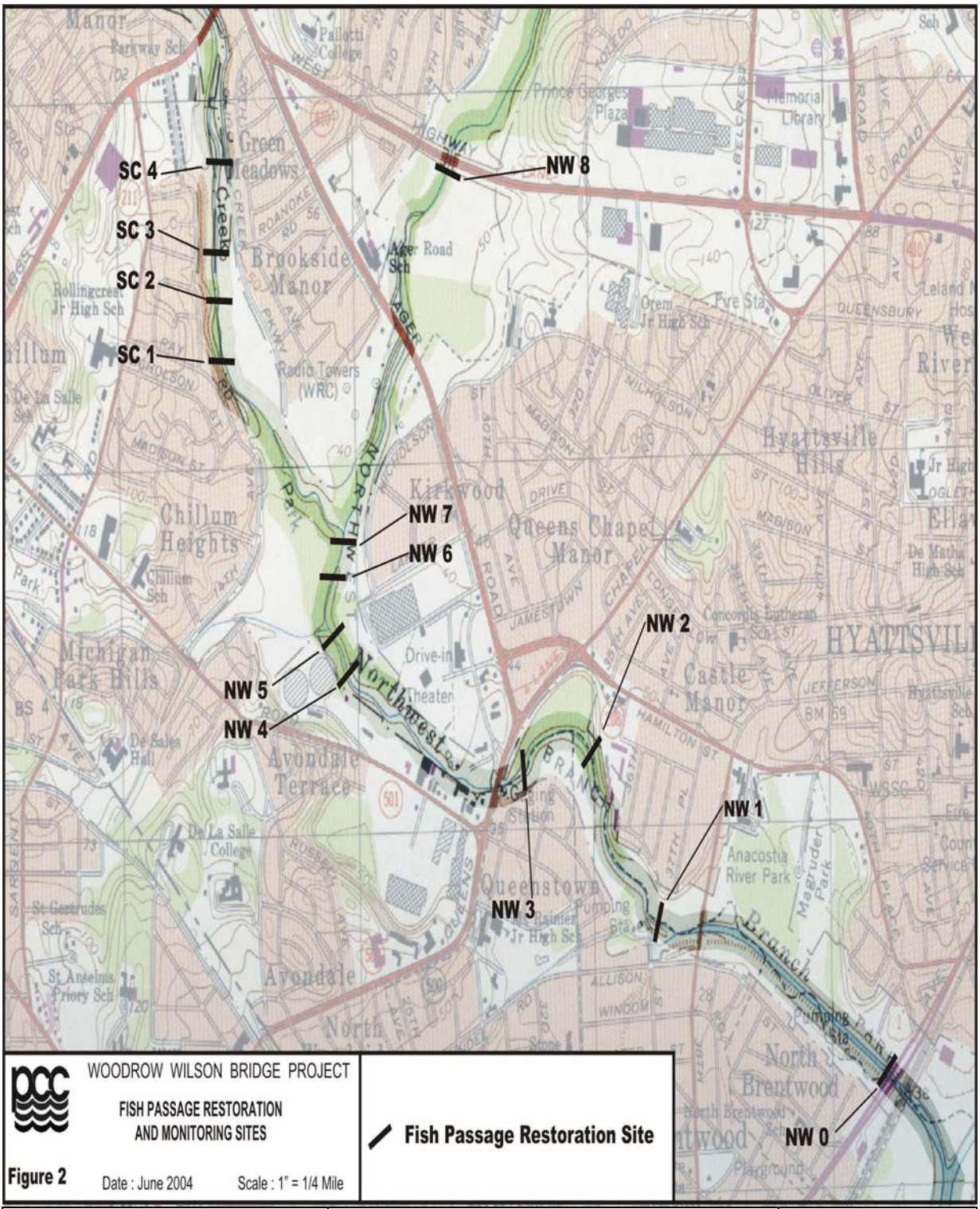
2.1.1.1 Annual Monitoring

A complete survey was completed for NW-1, NW-2, NW-3, NW-8, SC-1 and SC-2 because they are in their fifth year of monitoring. NW-5 also received a complete survey because of observations noted during the visual assessments associated with the exposed gas lines in the channel, dislodged concrete mattresses which previously covered the gas lines, and a failure of the right gabion wall downstream of the structure. The revised monitoring approach (longitudinal profile and visual assessment) were completed for NW-4, NW-6, NW-7, SC-3 and SC-4. The complete survey includes the longitudinal profile and visual assessment, as well as four benchmarked cross-sections and a survey of boulder stones.

Survey data was collected using a Nikon NPL 332 total station. Cross-section locations for the sites can be found in *Appendix B.* Horizontal and vertical dimensions of the survey data are referenced to permanent control points at each of the mitigation sites. The spot shots and profiles were surveyed to the nearest 0.01 of a foot using the Nikon NPL 332. The longitudinal profile began slightly upstream of the structure, followed the thalweg through the structure and ended slightly beyond the downstream end of the structure. Survey data were collected to monitor grade changes associated with the RGC



POTOMAC CROSSING CONSULTANTS	WOODROW WILSON BRIDGE PROJECT Northwest Branch and Sligo Creek Fish Passage Restoration VICINITY MAP	FIGURE 1 Not to Scale



POTOMAC CROSSING CONSULTANT	WOODROW WILSON BRIDGE PROJECT Northwest Branch and Sligo Creek Fish Passage Restoration SITE LOCATION MAP	FIGURE 2 Not to Scale

and FC/SP structures, and to differentiate changes in elevation and location of the boulder stones. This data also provides a basis for monitoring deviations in channel geometry, depths and thalweg characteristics.

2.1.2 Water Depth and Velocity Survey

Depth and velocity measurements determine if and how effectively the structures meet the design parameters for fish migration. During the monitoring period, water depth and velocity data are collected during a low flow event and during a high flow event.

Velocity measurements for FC/SP structures were recorded through the operational or "passable" route at the time of monitoring, based on existing flow conditions. These structures were designed to have at least one passable route (where the required depth and velocity criteria are being satisfied) at all times during the migration period (approximately March to May) for discharges between the 9^{th} and 90_{th} percentile design flows. For riffle grade control structures, velocity measurements were recorded from the pool downstream of the structures through the thalweg of the structure to the head pond upstream of the RGC crest. For FC/SP structures three velocities are taken at constriction notches. One velocity is taken just below the notch, one is taken in it, and one just above the notch. A single notch is selected if more than one constriction notch exist per longitudinal station with a structure. Both types of structures are designed to have a variety of flow characteristics, depths, and velocities.

A SonTek 3D Acoustic Doppler Velocity meter was used to measure low flow velocities at NW-5, NW-6, NW-7, SC-1 and SC-2. A Type AA Current Meter was used to measure high flow velocities at all sites and to measure low flow velocities at NW-1, NW-2, NW-3, NW-4, NW-8, SC-3, and SC-4. Water depth 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 performance of the RGC structures and FC/SP structures in terms of hydraulic design criteria required for fish passage. As long as one flow path is identified that meets the depth/velocity requirements, the structure is considered to be functioning properly. The minimum design water depth through the low flow portions of the structures on the Northwest Branch and Sligo Creek sites is 0.68 foot. The maximum velocity through the structure is approximately three feet per second (fps), although the limiting target species (alewife) are able to traverse for short distances at burst speeds of six to eight fps. Larger fish of this species can swim even faster.

Design discharges for the Northwest Branch and Sligo Creek sites are categorized as a percentage of the average Spring discharge based on drainage area. Design discharges are summarized in Table 2.

Table 2 - Design Discharges

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

2.2 Fish Passage Monitoring

Actual observations of fish passage at fish passage restoration sites were made using two primary methods: visual observations of RGCs for fish migration and ichthyoplankton surveys for target species which include yellow perch, white perch, alewife, blueback, hickory shad, American shad, and striped bass.

Efforts for 2008 began in late February with monitoring of water temperatures using United States Geological Survey (USGS) real time stream flow data from a gauge located just below the bridge at 38th Street within Northwest Branch. Water temperatures were used as an indicator of the potential for the arrival of target species in the watershed. When temperatures reached the nine degree Celsius range, visual surveys at NW-0 were conducted. Electrofishing presence/absence surveys were initiated when either temperatures or visual observations indicated that fish were, or from past experience, should be in the system. Temperature data for Northwest Branch can be found in *Appendix H.*

Ichthyoplankton surveying involves using a fine mesh net to collect both eggs and larvae of fish. Based on recent surveys river herring have been shown to be the most abundant of the target species within the Northwest Branch watershed and so an ichthyoplankton sampling protocol that would target river herring eggs was selected. Since river herring eggs are adhesive and not very buoyant a bottom type plankton net was used (Klauda, personal communication). This bottom type plankton net was placed against the streambed in the selected sampling location for 5 minutes. After each haul, the eggs and larvae were deposited into a jar with buffered formalin for preservation. The identification of the eggs and larvae occurred in the lab within the week following the collection. The identification was conducted in the office to avoid misidentification of other types of eggs that were likely in the water column during this time of year (Mowrer, personal communication). Gizzard shad eggs in particular are very similar to river herring (Mowrer, personal communication). Alewife and blueback herring eggs are morphologically similar making identification difficult and as a result these species were grouped together for identification purposes (Fay, 1983). Figure 3 and 4 below show typical herring larvae and eggs. Upon completion of the sampling season all egg and larvae specimens collected were taken to MDNR for identification verification.

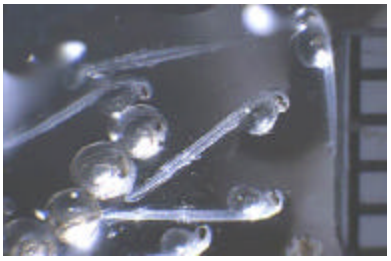


Figure 3 - River herring larvae

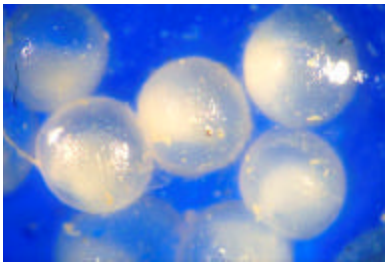


Figure 4 - River herring eggs

In 2007, ichthyoplankton sampling stations were set out during a team site walk of the Northwest Branch and Rock Creek watersheds. In Northwest Branch, the first transect was selected below NW-0, the fishway at the Route 1 crossing, to determine baseline conditions during spawning and to obtain a large voucher collection of herring eggs (*Appendix I*). This transect was selected due to the location of a large area of gravely substrate that is present during low tide. Spawning herring had been documented in this location during monitoring in past years. Additional transects were established in the field below NW-3, NW-4, NW-6, and NW-8 (*Appendix I*). These transects were located just downstream of riffle grade control sites that were thought to be suitable spawning areas for herring as well as providing documentation of how far upstream in the watershed the fish were traveling. During the sampling season one additional transect was established below 38th Street. This site was selected due to a large concentration of adult alewife observed below the sheetpile weir at 38th Street. The new transect was established downstream of the weir to determine whether the herring were spawning in this location.

2.3 Habitat and Macroinvertebrate Assessment

2.3.1 Habitat

A habitat assessment based on February 2001 Maryland Biological Stream Survey (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 in-stream 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 as channel dredging or straightening was also noted within the 75-meter segment. Field sheets for the habitat assessment at each site can be found in *Appendix F*.

Habitat scores and Index of Biotic Integrity (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, in-stream habitat, total number of in-stream 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 81 to 100 are rated "Minimally Degraded"
- Scores of 66 to 80.9 are rated "Partially Degraded"
- Scores of 51 to 65.9 are rated "Degraded"
- Scores of 0 to 50.9 are rated "Severely Degraded"

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. In addition, problems were noted in the spreadsheets used to calculate the PHI scores presented in the 2004 *Fish Passage Restoration: Post Construction Mitigation Monitoring Report (Year 1 of 5)*. Consequently, PHI scores from 2004 were recalculated using the corrected Final PHI and shown for comparison in Table 8 in the Results section. Narrative ratings and score ranges from the Final PHI were updated in 2006. These new ratings and ranges are presented above and past PHI scores have been re-rated and presented in this document.

2.3.2 Macroinvertebrates

Benthic macroinvertebrate sampling was conducted in each of the 75 meter 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 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 MBSS. Macroinvertebrate and physical habitat were all evaluated using MBSS methods. According to MBSS methods, samples which fail to yield 60 organisms or more cannot be used to produce an accurate BIBI. These samples are still considered useful in helping to characterize the overall health of the stream and therefore the BIBI scores are presented below without a corresponding narrative ranking.

MBSS has developed a BIBI that compares the macroinvertebrate community within a given stream to reference macroinvertebrate communities in the least-impaired streams. The MBSS BIBI is based on state-wide reference streams in each physiographic province. The BIBI for the Coastal Plain uses seven community metrics found to characterize macroinvertebrate community health in Maryland's Coastal Plain streams. The metrics calculated for Coastal Plain streams are as follows:

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 an 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.

Number of Ephemeroptera- The total number of organisms from the Ephemeroptera order. This metric generally increases with better water and habitat quality.

Percent Intolerant to Urban- The percentage of insects, that have a tolerance value less than or equal to three, that make up the total sample. This metric generally increases without urban stressors.

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

Percent Climbers- The percentage of taxa that live primarily on stem type surfaces. This metric generally increases without stressors.

Each metric is scored a five, three, or one depending on the value as compared to other Maryland Coastal Plain streams. Table 3 shows the thresholds for the determination of the metric scoring.

Table 3 - MBSS BIBI Metrics

Metric	Threshold		
	1	3	5
Number of Taxa	< 14		>= 22
Number of EPT	< 2		>= 5
Number of Ephemeroptera	< 1		>= 2
Percent Intolerant to Urban	<10		>= 28

Metric	Threshold		
	1	3	5
Percent Ephemeroptera	< 0.8		>= 11
Number of Scrapers	< 1		>= 2
Percent Climbers	< 0.9		>= 8

Source: MBSS 2005

NOTE: In 2005, the MBSS published an updated Benthic IBI. Macroinvertebrate data presented in earlier reports utilized the former BIBI. This new BIBI has been developed to include new data and better show impacts of urbanization. All benthic macroinvertebrate data from 2004 and 2005 has been recalculated using the new MBSS BIBI and is present in Table 9.

Each of the metric scores is added together and the resulting average is the BIBI score. Table 4 shows the scores and narrative rankings of the MBSS BIBI.

Table 4 - MBSS BIBI Scoring

BIBI Score	Narrative Ranking	Characteristics
4.00 – 5.00	Good	Comparable to reference streams considered to be minimally impacted, biological metrics fall within the upper 50 percent of reference site conditions.
3.00 – 3.90	Fair	Comparable to reference conditions, but some aspects of biological integrity may not resemble the qualities of minimally impacted streams.
2.00 – 2.90	Poor	Significant deviation from reference conditions, indicating some degradation. On average, biological metrics fall below the 10^{th} percentile of reference site values.
1.00 - 1.90	Very Poor	Strong deviation from reference conditions, with most aspects of biological integrity not resembling the qualities of minimally impacted streams, indicating severe degradation. On average, most or all metrics fall below the 10^{th} percentile of reference site values.

3.0 RESULTS

3.1 Fish Passage Design Compliance

3.1.1 Structure Integrity

3.1.1.1 Annual Monitoring

The crest of the RGC structure establishes the upstream elevation of the structure and provides the critical grade control for the upstream head pond. As designed, the tailwater downstream of the crest allows fish to pass over previous blockages and into the head pond. The crest of each of the structures in Northwest Branch and Sligo Creek remains stable. Some sorting of bed material has taken place but poses no danger to the fish passage structures at this time. Site specific observations noted during the Spring of 2008 monitoring are detailed in the following sections.

3.1.1.1.1 (NW-1)

The RGC structure at NW-1 is stable. It has no significant scour. Sand deposition is visible all along the left bank at NW-1. Approximately 50 feet downstream of the RGC, a sand bar is developing on the left bank. These upstream and downstream depositional features have been in place for several years. This structure is on the inside of a meander and this deposition is expected as the channel develops a point bar on the inside bend. The deposition is not encroaching on the low flow channel. No scour was observed within the structure this year. There is a deep pool at the bottom of the RGC. The bed material is imbricated and armors the structure. There are no significant breaks in water surface elevations. The sheet pile weir below the structure could be a potential concern if it clogs with debris. Clogging of the weirs could prevent or minimize fish passage of the target species, particularly at low flows. These weirs are monitored for debris during the fish migration period.

Overlaying the as built survey data with the 2008 survey shows only minor changes in the elevations, slopes, widths, and depths of the stream channel at NW-1. See *Appendix C* for overlays of longitudinal profiles, cross-sections, and boulder stones. The data comparing boulder stones between 2005 and 2008 shows no significant boulder movement. The channel has maintained a good low flow channel, width, and slope to provide a variety of pathways for migratory fish through NW-1. Visual assessment field forms are included in *Appendix E* and site photos can be found in *Appendix A*.

3.1.1.1.2 (NW-2)

The RGC structure at NW-2 is stable. There is minor sedimentation visible in the wetted perimeter. There is also a significant amount of sand deposition along portions of the right floodplain. This deposition along the right bank has persisted for several years. The bed material is imbricated and provides armoring for the structure. There are no significant breaks in water surface elevations. Any scour is localized around large boulders.

Overlaying the as built survey data with the 2008 longitudinal profile and cross-section data shows only minor changes in slope, widths and depths of the stream channel at NW-2. See *Appendix C* for overlays of longitudinal profiles, cross-sections and boulder stones. The data comparing boulder stones between 2005 and 2008 shows no significant

movement. NW-2 maintains a good low flow channel and provides a variety of passable routes for migrating fish through this stream reach. Visual assessment field forms are included in *Appendix E* and site photos can be found in *Appendix A*.

3.1.1.1.3 (NW-3)

The RGC structure at NW-3 is stable. Downstream of the RGC a point bar has formed on the right bank, however, a small scour channel cut through the bar at the toe of the right bank transforming it into a mid-channel bar. The scour is minor and is located on the inside of the bend posing very little threat to the structure. Cobbles have been deposited throughout the structure which helps armor the bed. There is minor sand sedimentation around the edges of the RGC, but no significant sedimentation in the low flow channel. There are no significant breaks in water surface elevations.

Overlaying the as built survey data with the 2008 survey data shows only minor changes in slope, widths, and depths to the stream channel at NW-3. See *Appendix C* for overlays of longitudinal profiles, cross-sections and boulder stones. The data comparing boulder stones between 2005 and 2008 shows no significant movement (*Appendix C*). NW-3 maintains a good low flow channel and provides a variety of passable routes for migrating fish through this stream reach. Visual assessment field forms are included in *Appendix E* and site photos can be found in *Appendix A*

3.1.1.1.4 (NW-5)

The RGC structure at NW-5 shows some signs of instability and cause for concern. The primary concerns include re-armoring of an exposed gas line, a failing gabion wall downstream of the structure, and a grade elevation change (nick point) at the terminus of the structure. Photos are provided in *Appendix A*. As a result of these concerns, a complete survey was completed for NW-5 in 2008.

As previously reported, on January 16, 2007, PCC staff observed an exposed gas pipe crossing the stream about 75 feet upstream from the crest of NW-5. High flows had dislodged the concrete mattresses that protected the gas pipe, and the stream scoured bed materials from around the pipe. PCC staff contacted Washington Gas in mid-January 2007 regarding the exposed gas pipe (which was determined to be abandoned). Then the top of a second, larger gas pipe became partially exposed.

In 2008, Washington Gas visited the site with PCC representatives to discuss remediation efforts, and concerns that their remediation techniques may create a new fish blockage. The discussions indicated that Washington Gas was determined to use concrete mattresses to secure the gas pipes. Washington Gas indicated that they would remove the smaller, abandoned gas line, as well as the dislodged concrete mattresses and pipe protectors that litter the streambed. Washington Gas completed remediation work that included placing a very large network of concrete mattresses over the larger gas pipe. However, they did not remove the dislodged mattresses or the abandoned gas pipe from the stream. This new network of concrete mattresses is not acting as a fish blockage;

however, if it is mobilized it could significantly change the flow characteristics of the stream reach and the RGC. The PCC will follow up with Maryland Department of the Environment (MDE) and Washington Gas in relation to this situation.

On the right bank, a fifty foot section of the gabion wall has collapsed from upstream of cross-section 4 and moving downstream. Scour underneath the gabion wall probably led to its collapse. The longitudinal profile and cross-section 4 data show scour at the bottom of the structure and along the right bank, where the gabion wall collapsed.

The location of the RGC structure upstream of a meander bend could have increased sheer stress on the toe of the outside bank downstream from the riffle. Despite the collapse, the bank behind the failed gabion wall is stable and has a low slope which provides additional relief during high flows. While the collapsed section of gabion is armoring the toe of the right bank, it is also pulling on the intact section. No remediation is required at this point. Careful attention should be paid to the failing gabion wall to determine if it will continue to move downstream.

The scour towards the bottom of the structure has also caused a significant break in the grade of the stream. This break in grade (nick point) has migrated upstream about eight feet. There is an associated break in water surface elevations at this nick point but it does not appear significant enough to cause any kind of fish blockage. Continued loss of grade through the RGC will cause a more significant break in water surface elevations. The crest of the structure appears a bit lower than the as built survey, but it is still controlling grade in the stream and creating a head pond. The nick point in NW-5 should continue to be monitored to see if it will migrate upstream. NW-5 will be resurveyed in the Spring of 2009. Visual assessment field forms are available in *Appendix E*.

3.1.1.1.5 (NW-8)

The RGC structure at NW-8 is stable. The slope of this site is very low and its flow characteristics at low flows are more like a run than a riffle. There is significant sedimentation visible in the wetted perimeter. The majority of the rocks in the structure are covered with sand. There is also significant sand deposition along the left bank. A riffle formed about 100 feet upstream of the RGC. There are no breaks in water surface elevations. There is some very minor scour along the intersection of the concrete apron and the stream channel on the upstream edge of the structure.

Overlaying the as built survey data with the 2008 longitudinal profile and cross-section data shows only minor changes in slope, widths and depths of the stream channel at NW-8. See *Appendix C* for overlays of longitudinal profiles, cross-sections, and boulder stones. The data comparing boulder stones between 2005 and 2008 shows no significant movement. While NW-8 does have some sedimentation in the low flow channel it maintains sufficient depths for migrating fish through this reach of stream. Visual assessment field forms are included in *Appendix E* and site photos can be found in *Appendix A*.

3.1.1.1.6 (NW-4, NW-6, NW-7)

The RGC structures at NW-4, NW-6, and NW-7 are stable and their flow characteristics meet the criteria for fish passage. There is no significant sedimentation in the low flow channels of any of these structures. NW-6 previously had scour along the right bank at the bottom of the structure, but no additional scour has been observed in the past year. Scour at NW-4 and NW-7 is localized around large boulders. All three structures maintain stable grades in the channel, and none of them show significant breaks in water surface elevations. These structures appear to be functioning as designed and will receive a full survey in the Spring of 2009.

3.1.1.1.7 (SC-1)

The RGC structure at SC-1 is stable and the flow characteristics within the RGC meet the criteria for fish passage. However, the notch in the sheet pile weir above SC-1 is commonly clogged with small woody debris and organic material. Some significant scour has occurred forming a channel within the bar on the right bank. This scour channel does not connect on the upstream or downstream end of the bar. Although high flows inundate this scour channel, it does not cause low flows to bypass the RGC. This scour was identified in 2006; vegetation is helping to stabilize this bar and it does not appear to be worsening. A sewer pipe below and downstream of the structure is slightly exposed and was exposed prior to the construction of the structure in 2003. It is possible that the scour present at the sewer pipe has increased in severity since the structure was completed and as a result will continue to be monitored on a monthly basis. Within the RGC, channel bed material remains imbricated and armors the structure. The only significant break in water surface elevation is at the sheet pile weir when the notch is clogged. The scour noted in previous reports, along the bottom right edge of the low flow channel within the RGC, has stabilized and is not a concern at this time.

Overlaying the as built survey data with the 2008 survey shows only minor changes in the elevations, slopes, widths, and depths of the stream channel at SC-1. See *Appendix C* for overlays of longitudinal profiles, cross-sections and boulder stones. The data comparing boulder stones between 2005 and 2008 shows no significant boulder movement. The channel maintains a good low flow channel, width, and slope to provide a variety of pathways for migratory fish through SC-1. However, the sheet pile weir could act as a blockage when the notch is clogged. Visual assessment field forms are included in *Appendix E* and site photos can be found in *Appendix A*.

3.1.1.1.8 (SC-2)

The RGC structure at SC-2 is stable and the flow characteristics within the RGC meet the criteria for fish passage. As previously reported, the channel scoured parts of the right bank at the bottom of the structure and downstream from the structure. There is some minor scour at the interface of the rock and soil along the left floodplain. Within the RGC, bed material remains imbricated and is armoring the structure. The RGC has a

steep slope and very well defined low flow channel. There are no significant breaks in water surface elevation. During monthly monitoring in October 2007, a beaver dam was observed upstream of the structure causing the stream to backwater. The dam was not observed during the annual monitoring, the structure will continue to be monitored for beaver damage and lodging.

Overlaying the as built survey data with the 2008 survey shows only minor changes within the RGC, but some significant adjustments to widths and depths upstream and downstream of the structure. The longitudinal profile shows some deposition, but the structure is maintaining grade control through the site. Cross sections 2 and 3 show only minor changes to widths and depths within the RGC structure. Cross section 1 upstream of the structure shows significant deposition since the as built survey. This deposition is likely a response to the grade control established by the crest of the RGC. In addition, a lateral bar is developing upstream of the RGC as Sligo Creek develops a lower width to depth ratio. Cross section 4 downstream of the RGC structure shows scour along the right bank/toe and deposition along the left bank/toe. These changes exhibit the stream adjusting its geometry to accommodate the long RGC structure by lengthening its downstream meander. See *Appendix C* for overlays of longitudinal profiles, cross-sections and boulder stones. The data comparing boulder stones between 2005 and 2008 shows no significant boulder movement. The channel maintains a good low flow channel, width and slope to provide a variety of pathways for migratory fish through SC-2. Visual assessment field forms are included in *Appendix E* and site photos can be found in *Appendix A*.

3.1.1.1.9 (SC-3, SC-4)

In general, the FC/SP at SC-3 and SC-4 are stable and functioning as designed. Some movement of weir stones has been noted in previous annual assessments. Stones in the structure have continued to make minor adjustments that influence the FC/SP, but none of the changes threaten the integrity of the structures. The drop from the last weir on SC-4 to the tail water is a bit severe, and is likely caused by the loss of some downstream grade control (head of a riffle) which resulted in a lower water surface elevation just below the structure. This condition does not appear to limit fish passage, but will continue to be monitored during future visits.

3.1.2 Water Depth and Velocity Survey

Depth of water and velocity measurements were recorded at selected locations along the thalweg of the sites. Depth of water and velocity data was collected twice for all the sites during the monitoring period. The two data collections represent measurements for the low to normal design discharge and for a discharge above the normal design discharge. These discharges were based on historical peak discharge records at the USGS Gage Station (01649500) at 38th Street and Northwest Branch in Hyattsville, MD. Depth of water and velocity data is summarized in tabular form in *Appendix D*. Points where velocities exceeded three fps appear in bold typeface. Water depths less than 0.68 feet also appear in bold typeface. Monitoring results are summarized below.

3.1.2.1 Northwest Branch (NW-1 through NW-8)

In general, the flow data collected at the Northwest Branch shows adequate depths and velocities for targeted migratory fish species for both low and high flow conditions. During low flows more than 90% of the velocity measurements taken were under three fps, and more than 95% of the depths measured were greater than 0.68 foot. During high flows more than 85% of the velocity measurements taken were under three fps, and all of the depths were greater than 0.68 foot. Velocities that exceeded the three fps criteria ranged from 3.01 fps to 3.47 fps for low flows, and from 3.06 fps to 4.65 fps for high flows. However, fish passage can occur in areas adjacent to the location of these measurements due to a diversity of flow conditions provided by bed roughness, and the hydraulics associated with the structures (i.e. if a velocity reading was outside of the design criteria range, typically there were multiple locations adjacent to the reading that exhibited slower velocities and/or more depth).

Table 5 summarizes the discharges at the time of each of the data collection events.

Table 5 - Recorded Discharges for Data Collection Events

Site	Discharges < 50% of Design Flow (cfs)	Discharges >50% of Design Flow (cfs)
NW-1	21	73
NW-2	21	71
NW-3	21	58
NW-4	21	54
NW-5	25	54
NW-6	25	51
NW-7	25	53
NW-8	21	41

3.1.2.2 Sligo Creek (SC-1 through SC-4)

In general, the water depth and velocity data collected at the Sligo Creek sites shows adequate depth and velocity for targeted migratory fish species. During low flows more than 96% of the velocity measurements taken were under 3 fps, and more than 75% of the depths measured were greater than 0.68 foot. During high flows more than 73% of the velocity measurements taken were under three fps, and all of the depths were greater than 0.68 foot. Velocities that exceeded the three fps criteria ranged from 3.35 fps to 4.38 fps for low flows, and from 3.2 fps to 5.02 fps for high flows. However, as indicated previously, bed roughness and hydraulic variables provide a diversity of flow conditions for fish passage through these mitigation sites.

Table 6 summarizes the discharges at the time of each of the data collection events.

Table 6 - Recorded Discharges for Data Collection Events

Site	Discharges < 50% of Design Flow (cfs)	Discharges >50% of Design Flow (cfs)
SC-1	6*	36
SC-2	9	35
SC-3	8	34
SC-4	8	34

*Below the 9% design discharge

3.2 Fish Passage Monitoring

During 2008, temperatures were monitored using a USGS real-time gauge located below 38th Street in Northwest Branch Temperatures in Northwest and Northeast Branch rose steadily throughout the spring. In addition to warming temperatures, alewife and blueback herring are triggered to move upstream during the migratory period by rain events that bring a flush of fresh water to the system. Several large rain events occurred in April and May. Detailed temperature data for Northwest Branch is available in *Appendix H.*

The ichthyoplankton sampling occurred two to three times per week during the sampling season. The sampling effort was initiated after a large amount of herring were visually observed and collected through electroshocking methods in March. Sampling continued until the third week of May to ensure that later spawning species were observed. Electroshocking methods were employed to determine the presence or absence of each of the target species throughout the sampling season. It was found this migratory season that large numbers of White Perch were still present beyond their normal stay in the system. Conversely, there were species such as the blueback herring that had a weak presence during this migratory season. Table 7 summarizes the results of the ichthyoplankton surveys in Northwest Branch in 2008.

Table 7 – Summary of Ichthyoplankton Survey Results

Site	Date	Species Collected	Form
NW-3	5/7/08	River herring	Eggs
	5/7/08	resident cyprinid	Eggs

River herring eggs were collected on one occasion during the 2008 sampling season. These herring eggs were collected just downstream of the NW-3 RGC, which matched the farthest point upstream that eggs were collected in 2007. Generally, anecdotal evidence from resource managers throughout the state indicated that the Potomac River watershed herring run was weak. Electrofishing surveys conducted within Northwest Branch showed less than average migratory fish populations. Factors that may have negatively influenced fish migration in the Anacostia watershed include: the cleanup of submerged rail road cars in the Anacostia River which required the use of turbidity curtains; and a temporary piping system needed by Washington Suburban Sanitary

Commission (WSSC) as a bypass for a broken sewer main located in lower Northwest Branch.

Fish passage monitoring for 2009 will continue to utilize ichthyoplankton sampling, with particular focus on the sites located upstream of NW-3.

3.3 Habitat and Macroinvertebrate Assessment

3.3.1 Habitat

Five out of seven physical habitat assessments of Northwest Branch RGC structures resulted in 'Severely Degraded" PHI ratings, with the remaining two falling within the "Degraded" range, as shown in Table 8 below. All sites assessed within Sligo Creek resulted in "Degraded" PHI ratings. These PHI scores from 2004-2008 are presented in Table 8 to show possible trends in habitat change. Sites monitored in all five years did not show any consistent trends in PHI scores, with most scoring slightly above or below the initial score. Sites NW-4 through 7 declined in overall PHI score in 2007. These slight changes in PHI score may be attributed to the subjective nature of the habitat assessment and the opinions of different crew leaders on site. All the sites sampled within Northwest Branch were most negatively affected by a lack of shading and a low amount of in-stream woody debris. Northwest Branch suffers from a high amount of channelization, riparian clearing, and water quality impacts that may not allow for the colonization of many sensitive species of fish or macroinvertebrates. Habitat data for Sligo Creek generally remained consistent from 2004 to 2008, although data were not collected in 2006. Physical habitat assessment field sheets can be found in *Appendix F*.

Table 8 - Summary of Habitat Conditions within the RGC Structures

Site	2004 MBSS PHI Score*	Narrative Rating[1]	2005 MBSS PHI Score	Narrative Rating[1]	2006 MBSS PHI Score	Narrative Rating	2007 MBSS PHI Score	Narrative Rating	2008 MBSS PHI Score	Narrative Rating
NW-1-RG	33.74	Severely Degraded	40.48	Severely Degraded	38.11	Severely Degraded	37.07	Severely Degraded	26.51	Severely Degraded
NW-2-RG	37.73	Severely Degraded	41.65	Severely Degraded	39.90	Severely Degraded	40.56	Severely Degraded	28.56	Severely Degraded
NW-3-RG	43.66	Severely Degraded	40.79	Severely Degraded	38.87	Severely Degraded	42.05	Severely Degraded	42.93	Severely Degraded
NW-4-RG	-	-	50.62	Severely Degraded	49.73	Severely Degraded	45.67	Severely Degraded	51.48	Degraded
NW-5-RG	-	-	49.37	Severely Degraded	48.71	Severely Degraded	43.92	Severely Degraded	55.99	Degraded
NW-6-RG	-	-	50.64	Severely Degraded	47.05	Severely Degraded	42.71	Severely Degraded	46.44	Severely Degraded
NW-7-RG	-	-	48.72	Severely Degraded	49.21	Severely Degraded	37.59	Severely Degraded	48.09	Severely Degraded
NW-8-RG	48.79	Severely Degraded	60.28	Degraded	-	-	-	-	-	-

Site	2004 MBSS PHI Score*	Narrative Rating[1]	2005 MBSS PHI Score	Narrative Rating[1]	2006 MBSS PHI Score	Narrative Rating	2007 MBSS PHI Score	Narrative Rating	2008 MBSS PHI Score	Narrative Rating
SC-1-RG	65.12	Degraded	63.87	Degraded	-	-	54.09	Degraded	64.37	Degraded
SC-2-RG	70.32	Partially Degraded	69.30	Partially Degraded	-	-	56.41	Degraded	65.95	Degraded
SC-3-RG	-	-	59.38	Degraded	-	-	59.00	Degraded	59.79	Degraded
SC-4-RG	-	-	52.81	Degraded	-	-	59.57	Degraded	60.80	Degraded

*PHI scores and ratings from 2004 and 2005 have been updated. Please see text box in Section 2.3.1.
[1] PHI ratings from 2004 and 2005 have been updated. Please see text box in Section 2.3.1.

3.3.2 Macroinvertebrates

As shown in Table 9, all sites sampled within Northwest Branch scored within the "Poor" and "Very Poor" ranges for the MBSS BIBI in all sampled years. Scores show an overall improvement within the benthic macroinvertebrate community at all Northwest Branch sites from 2004 to 2006. One particular taxa of mayfly, *Baetis* sp. which is considered relatively sensitive, was present at each site sampled within Northwest Branch in 2006 which was a factor in the BIBI score increases in 2006. During 2005, only one site sampled (NW-2-RG), contained a mayfly taxa. *Baetis* sp. was collected again in 2008 and found at all of the highest scoring sites: NW-2, NW-3, NW-4, and NW-7.

All BIBI scores decreased from 2006 to 2007, except for NW-3-RG which improved because of its relatively high diversity compared to other samples. Rainfall during the spring of 2007 and 2008 was noticeably higher than the rainfall during the spring of 2006. This increase in precipitation and consequent runoff may have increased overall pollutant loadings, in these years, to a higher level than seen in 2006 and may possibly explain the collection of the sensitive mayfly taxa in 2006 and its subsequent disappearance in 2007. Macroinvertebrate drift due to high flows in 2007 may also explain the absence of *Baetis* sp. at these sites.

Macroinvertebrate community composition at each riffle grade site sampled remained similar between 2004 and 2008 with slight increases in diversity in 2006 including the introduction of common net-spinning caddisflies at many sites. During benthic macroinvertebrate collection in 2006, amounts of snags, leaf packs, and organic matter were noticeably higher than in previous years. In 2007 and 2008, the RGC structures contained far fewer snags and leaf packs, possibly due to the higher spring flows due to the increased precipitation.

Benthic macroinvertebrate sampling of the structures was inadvertently discontinued in 2006 within Sligo Creek and resumed in 2007 and 2008. BIBI's were rated as "Very Poor" at SC-1 RG and SC-2 RG in 2004, 2007 and 2008. In 2007 SC-3 RG and SC-4 RG, the sites farther upstream, had a higher rating of "Poor" due to a higher percentage of pollution intolerant taxa, possibly due to a more stable riffle habitat. In 2008 these upstream sites declined to the "Very Poor" range.

Table 9 - Summary of Macroinvertebrate Community Conditions within the RGC Structures

Site	2004 MBSS BIBI Score[1]	Narrative Rating	2005 MBSS BIBI Score[1]	Narrative Rating	2006 MBSS BIBI Score	Narrative Rating	2007 MBSS BIBI Score	Narrative Rating	2008 MBSS BIBI Score	Narrative Rating
NW-1-RG	1.00	Very Poor	1.57	Very Poor	2.71	Poor	1.29	Very Poor	1.00	Very Poor
NW-2-RG	2.14	Poor	2.71	Poor	2.71	Poor	1.86	Very Poor	1.57	Very Poor
NW-3-RG	1.86	Very Poor	1.86	Very Poor	2.43	Poor	2.71	Poor	2.43	Poor
NW-4-RG	-	-	1.57	Very Poor	2.71	Poor	1.29*	Very Poor	2.43	Poor
NW-5-RG	-	-	1.57	Very Poor	2.43	Poor	2.14	Poor	1.57	Very Poor
NW-6-RG	-	-	1.29	Very Poor	2.71	Poor	1.29	Very Poor	1.29	Very Poor
NW-7-RG	-	-	1.29	Very Poor	2.71	Poor	1.29*	Very Poor	2.14	Poor
NW-8-RG	1.29	Very Poor	1.86*	N/A	-	-	-	-	-	-
SC-1-RG	1.00	Very Poor	1.86*	N/A	-	-	1.00	Very Poor	1.86	Very Poor
SC-2-RG	1.29	Very Poor	2.43	Poor	-	-	1.00	Very Poor	1.29	Very Poor
SC-3-RG	-	-	1.00*	N/A	-	-	2.43	Poor	1.57	Very Poor
SC-4-RG	-	-	1.86*	N/A	-	-	2.43	Poor	1.57	Very Poor

* Sites did not produce the required 60 organisms to meet accuracy standards for the BIBI.
[1] Scores recalculated using 2005 BIBI. Please see text box in Section 2.3.2.

Detailed metric calculations for each site can be found in *Appendix G*.

4.0 CONCLUSIONS

Based on the 2008 monitoring efforts, the RGC structures in Northwest Branch and Sligo Creek are stable, except NW-5 which shows some signs of instability. Some minimal to moderate scour has occurred below a few of the structures as indicated previously. This scour was somewhat expected as the channel adjusts and sorts channel bed material to accommodate a wide range of flows. The scour has not affected the integrity of the structures except at NW-5. Where applicable, monitoring will continue with particular attention being paid to concerns that have been noted in this report. It is also recommended that NW-5 be visually inspected immediately after significant storm events to assess conditions.

Depths of water and velocity data for the Northwest Branch and Sligo Creek sites indicate that the RGCs and FC/SP structures meet the flow criteria to provide fish passage for the target species.

Ichthyoplankton sampling within the Northwest Branch watershed resulted in the collection of river herring eggs from NW-3. Eggs and larvae of several resident fish species were collected as well. Ichthyoplankton sampling will continue in the Spring of 2009 with a continued emphasis on documenting migration above NW-3.

Biological conditions within the RGCs at the downstream sites on the Northwest Branch (NW-1 thru NW-3) showed a slight decrease in overall BIBI score in 2008 from the previous year, but remained within the same BIBI category. Two of the sites farther

upstream (NW-4 and NW-7) increased from BIBI scores of "Very Poor" to "Poor". One of the primary reasons for the BIBI improvement was the presence of a sensitive mayfly taxon in 2006 and 2008 but absence in 2007. The presence of this fairly intolerant taxa in these years may be due to a less impacted water quality condition of the large watershed or the increased habitat complexity due to the accumulation of leaf packs, snags, and organic matter within the RGC. In 2007, higher flows reduced the accumulation of these important niche habitat features which may have contributed to the decrease in overall BIBI scores.

The aquatic habitat conditions continue to reflect the impacted nature of the watershed. These streams are in highly urbanized areas, surrounded by vast areas of impervious surfaces. In storms and high rainfall events water is directed to the stream in flashy, high flows, physically displacing macroinvertebrates. This stormwater often carries high nutrient loads and polluted water to the stream displacing macroinvertebrates that are intolerant of the polluted conditions. Benthic organisms that are tolerant of the urban conditions and unstable flow appear to be colonizing these structures. Other less tolerant taxa are uncommon at the RGC structures and will probably remain so unless large, watershed scale changes are made.

5.0 REFERENCES

Fay, C.W, R.J. Neves, and G.B. Pardue. *Species Profiles: Life Histories and Environmental Requirements of Coastal Fishes and Invertebrates (Mid-Atlantic) Alewife/Blueback Herring*. 1983. U. S. Fish and Wildlife Service.

Klauda, Ron. Maryland Department of Natural Resources. Personal communication. January 25, 2007.

Mowrer, James. Maryland Department of Natural Resources. Personal communication. January 26, 2007.

APPENDIX A- Photographs

Northwest Branch – 1 looking downstream, April 2008

Northwest Branch – 2 looking downstream, April 2008

Northwest Branch – 3 looking downstream, April 2008

Northwest Branch– 4 looking downstream, April 2008

Northwest Branch– 5 looking downstream, April 2008

Northwest Branch – 5 looking at hydraulic break, April 2008

Northwest Branch – 5 Collapsed gabion and bank, April 2008

Northwest Branch – 6 looking downstream, April 2008

Northwest Branch – 6, erosion on right bank, April 2008

Northwest Branch – 7 looking downstream, April 2008

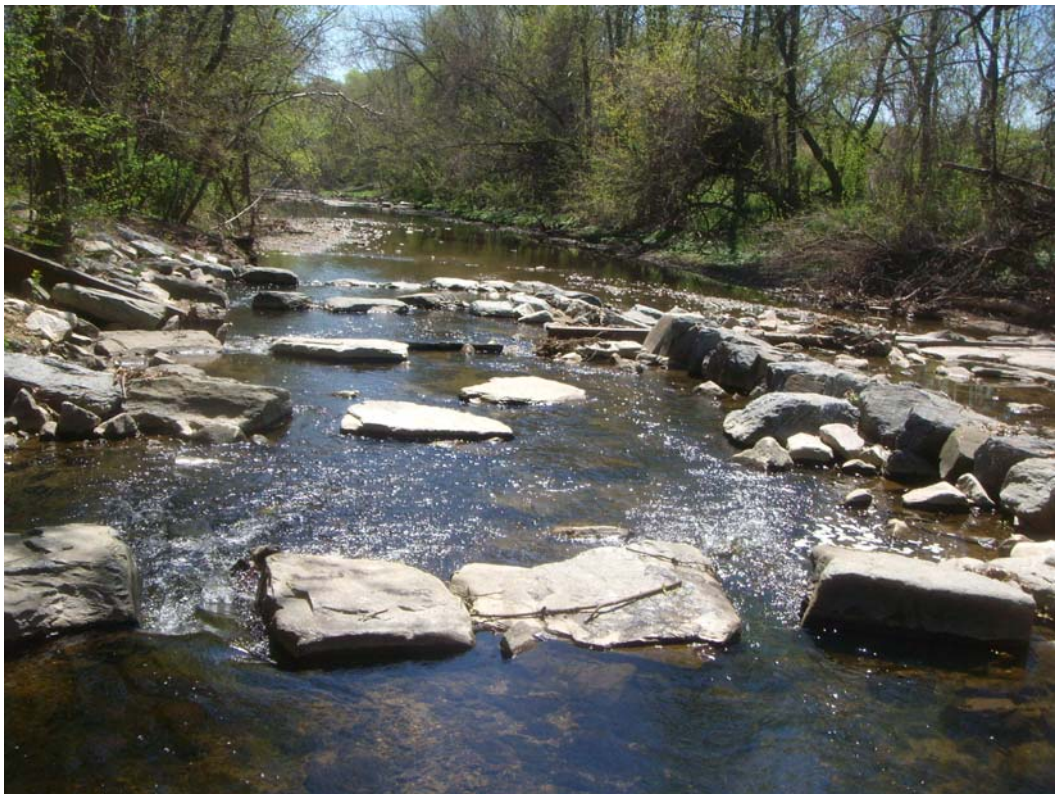
Northwest Branch – 8 looking downstream, April 2008

Sligo Creek -1 looking downstream, April 2008

Sligo Creek 1 – scour channel along right bar, April 2008

Sligo Creek – 2 looking downstream, April 2008

Sligo Creek -3 looking downstream, April 2008



Sligo Creek – 4 looking downstream, April 2008

APPENDIX B- Cross Section Locations


38th Avenue Park
XS-1, Sta. 0+00
XS-2, Sta. 0+65
XS-3, Sta. 1+76
XS-4, Sta. 2+76
38th Avenue

Figure 1
NW-1

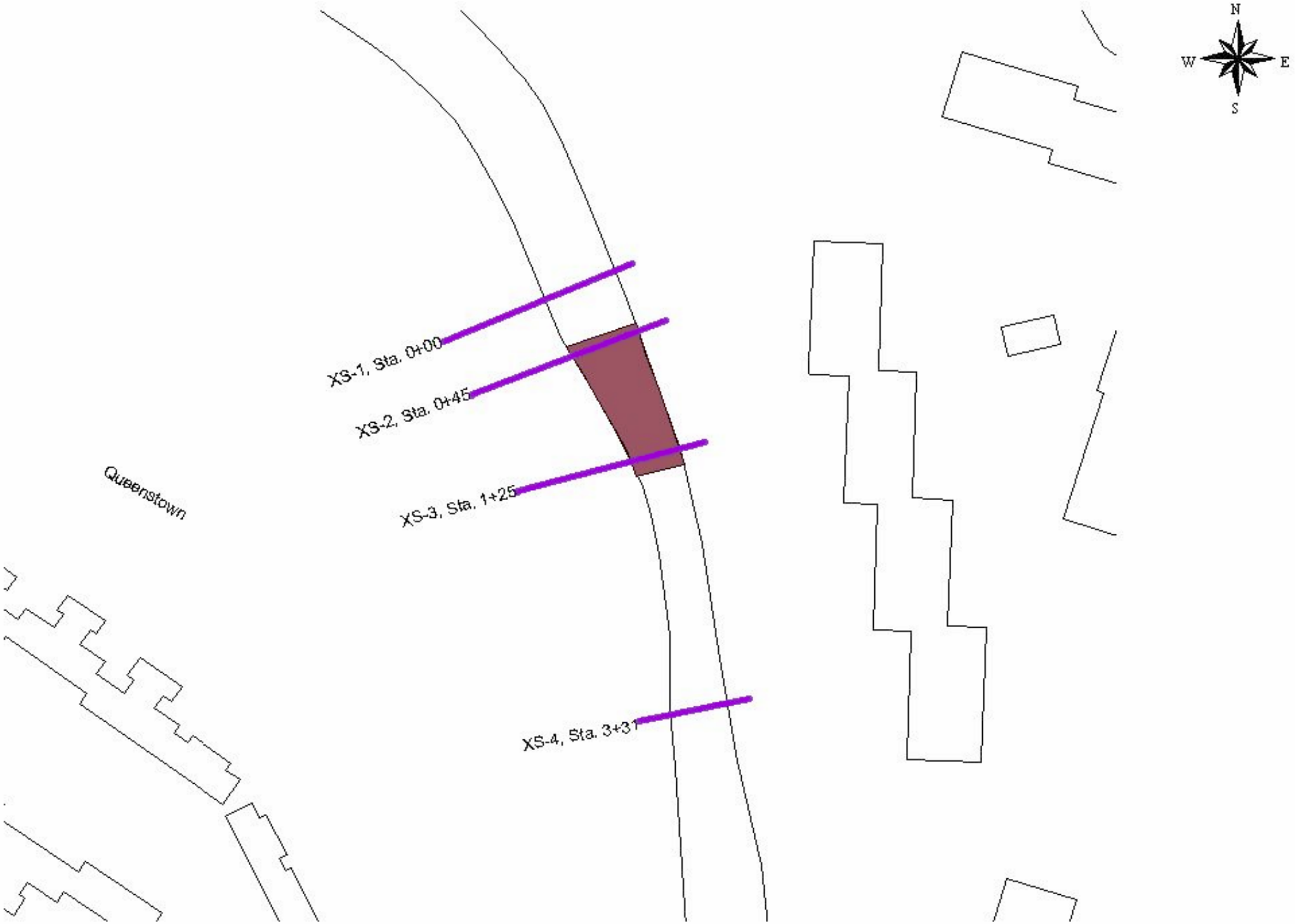

N
W
E
S
XS-1, Sta. 0+00
XS-2, Sta. 0+45
XS-3, Sta. 1+25
XS-4, Sta. 3+37
Queenstown

Figure 2
NW-2

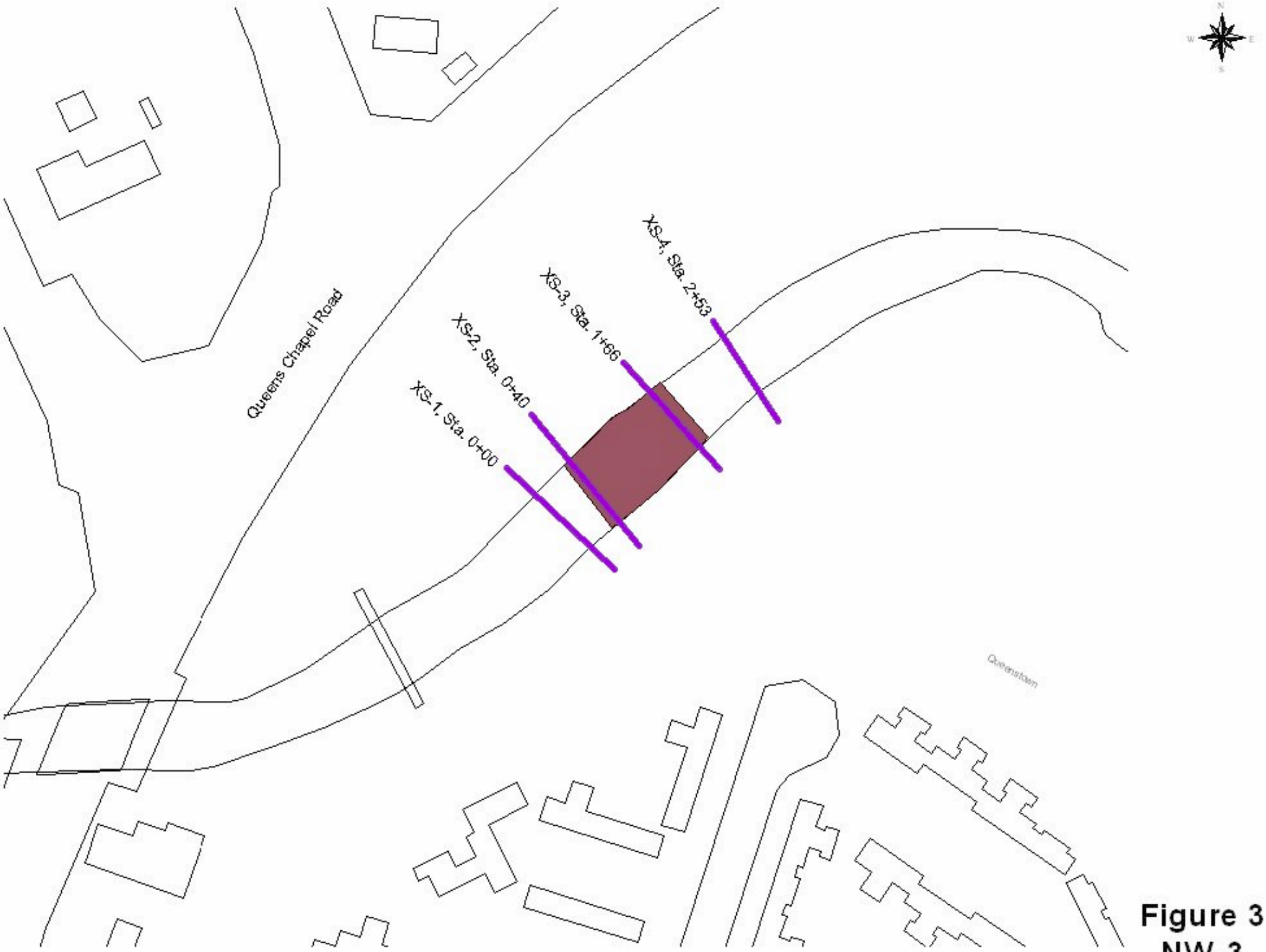

Queens Chapel Road
XS-1, Sta. 0+00
XS-2, Sta. 0+40
XS-3, Sta. 1+66
XS-4, Sta. 2+53
Queenstown

Figure 3
NW-3


N
W
E
S
XS-1, Sta. 0+00
XS-2, Sta. 46.3
XS-3, Sta. 1+71.4
XS-4, Sta. 2+18.5
Chillum Park

Figure 4
NW-4

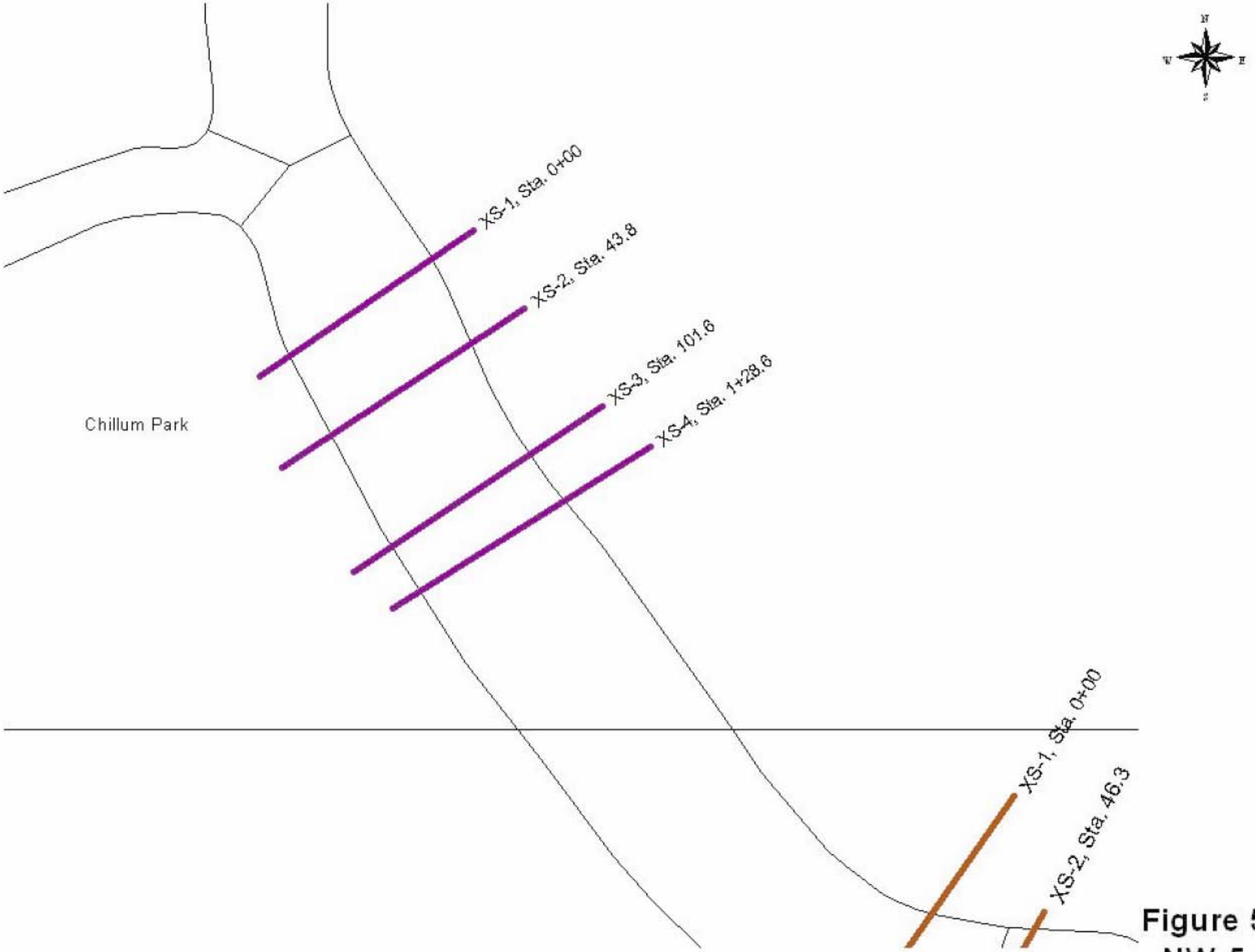

XS-1, Sta. 0+00
XS-2, Sta. 43.8
XS-3, Sta. 101.6
XS-4, Sta. 1+28.6
Chillum Park
XS-1, Sta. 0+00
XS-2, Sta. 46.3

Figure 5
NW-5

Figure 6
NW-6 and NW-7


N
W
E
S
XS-1, Sta. 0+00
XS-2, Sta. 0+65
East West Highway (MD 410)
XS-3, Sta. 2+71
XS-4, Sta. 3+27

Figure 7
NW-8

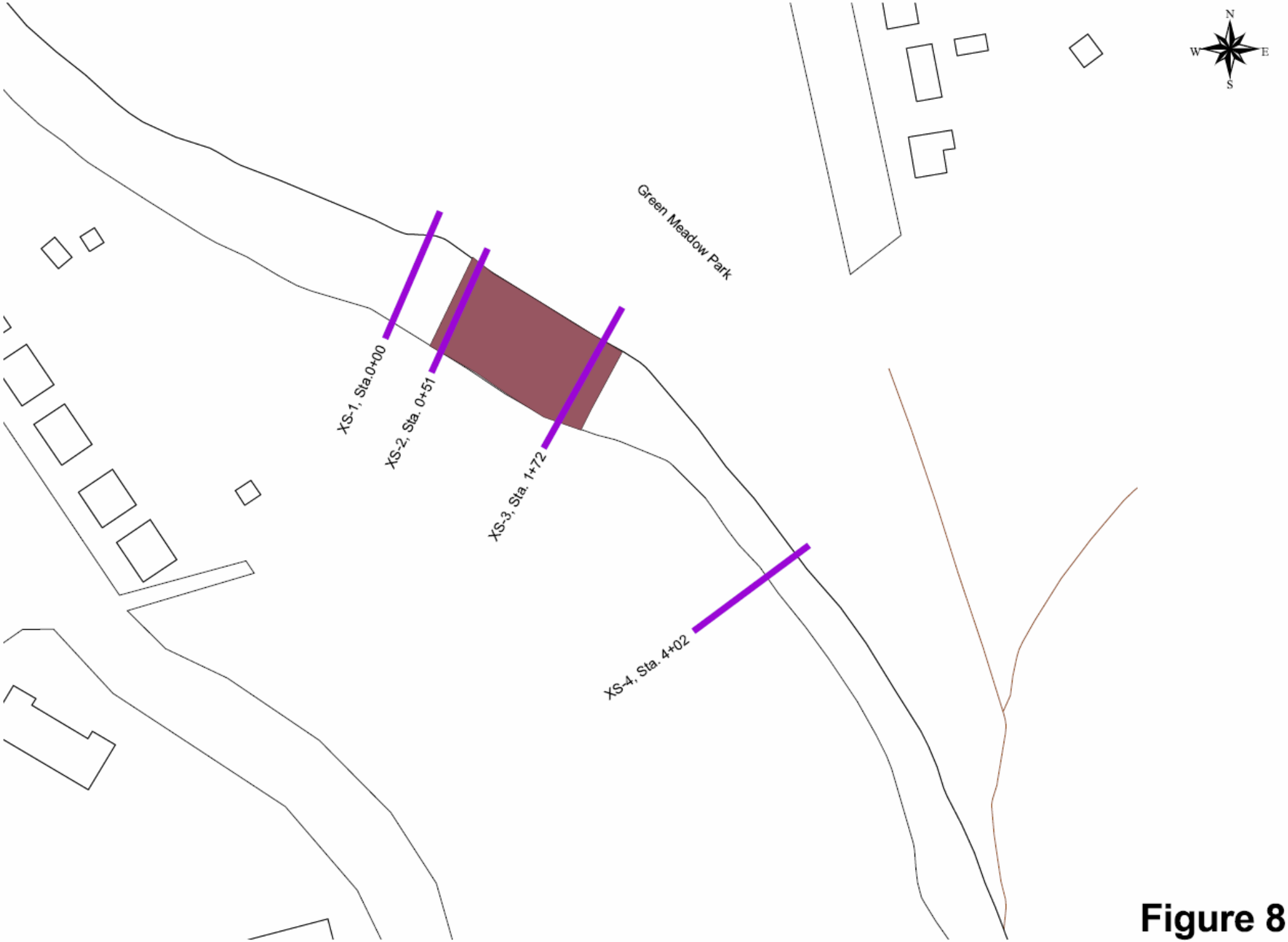

N
W
E
S
Green Meadow Park
XS-1, Sta.0+00
XS-2, Sta. 0+51
XS-3, Sta. 1+72
XS-4, Sta. 4+02

Figure 8
SC-1

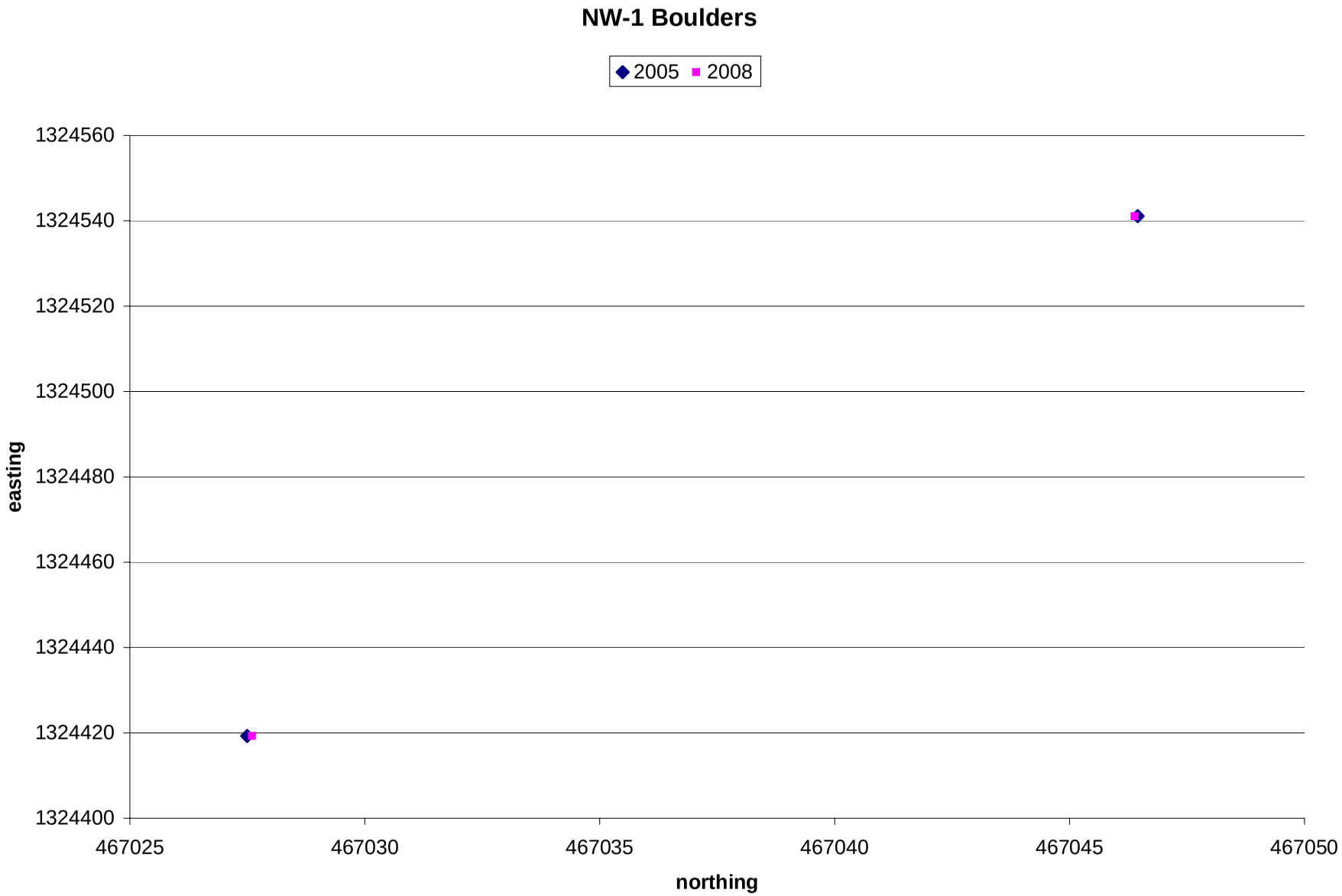

N
W
E
S
Green Meadow Park
XS-1, Sta. 0+00
XS-2, Sta. 0+42
XS-3, Sta. 1+49
XS-4, Sta. 3+17

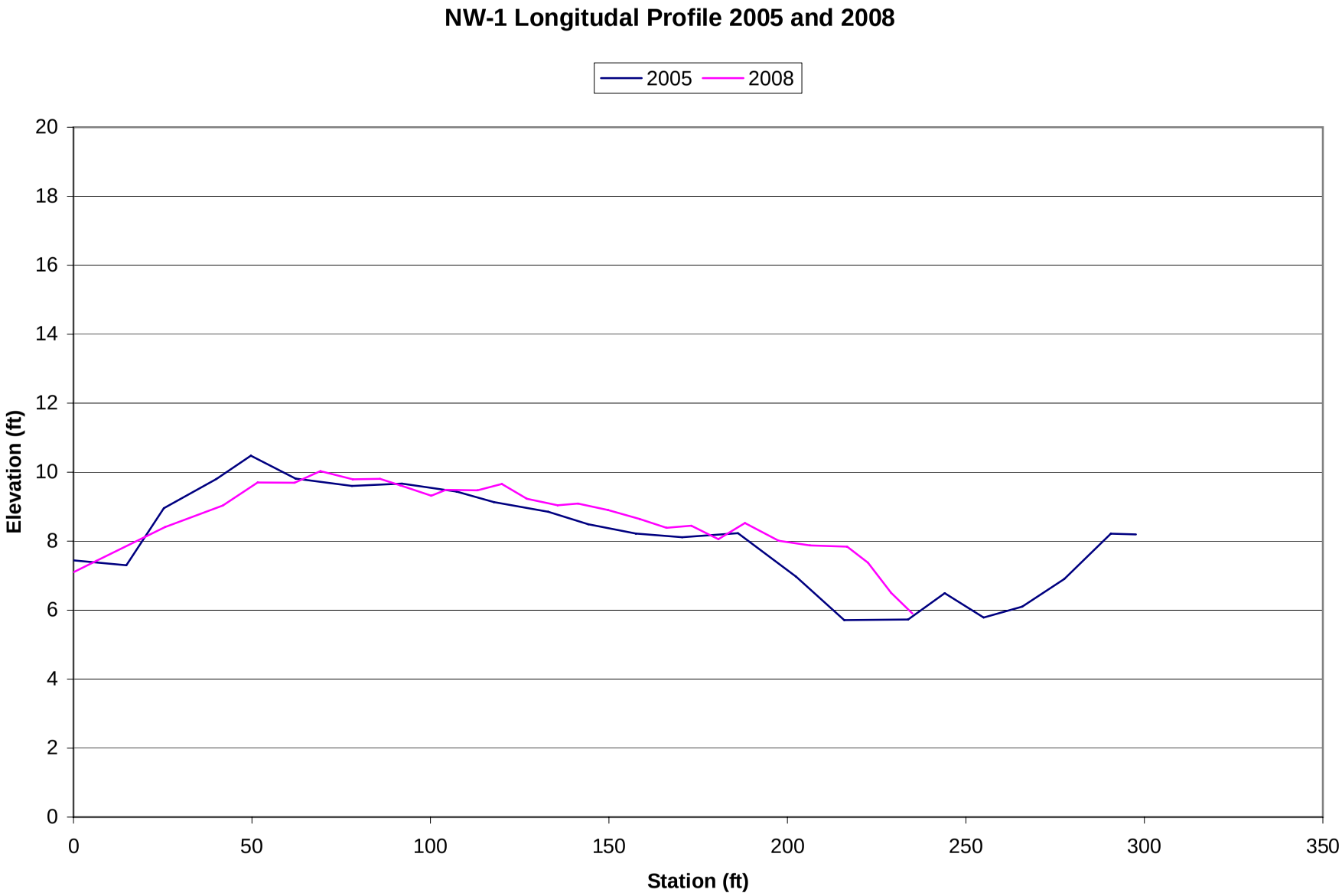
Figure 9
SC-2

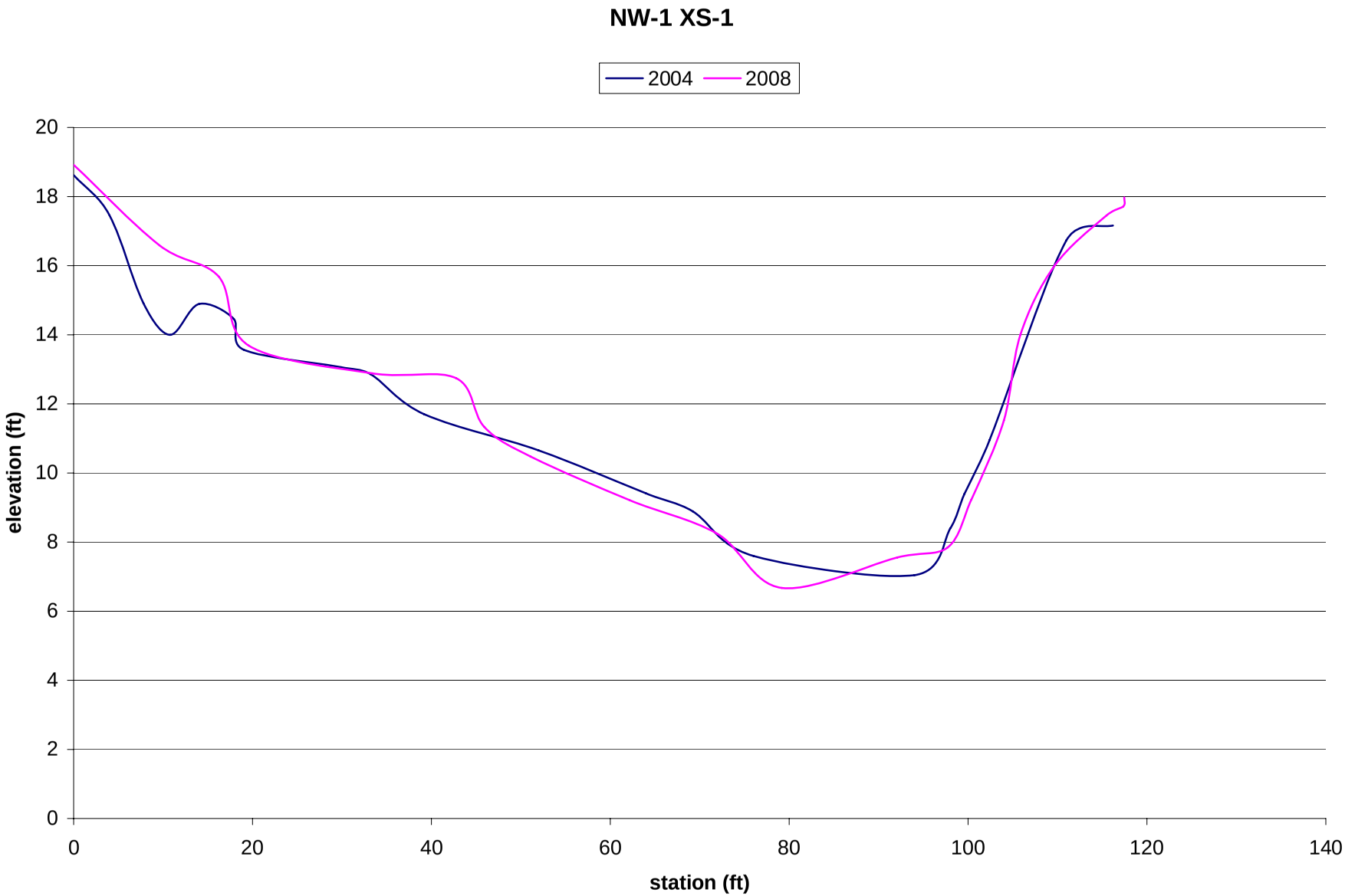
Figure 10
SC-3

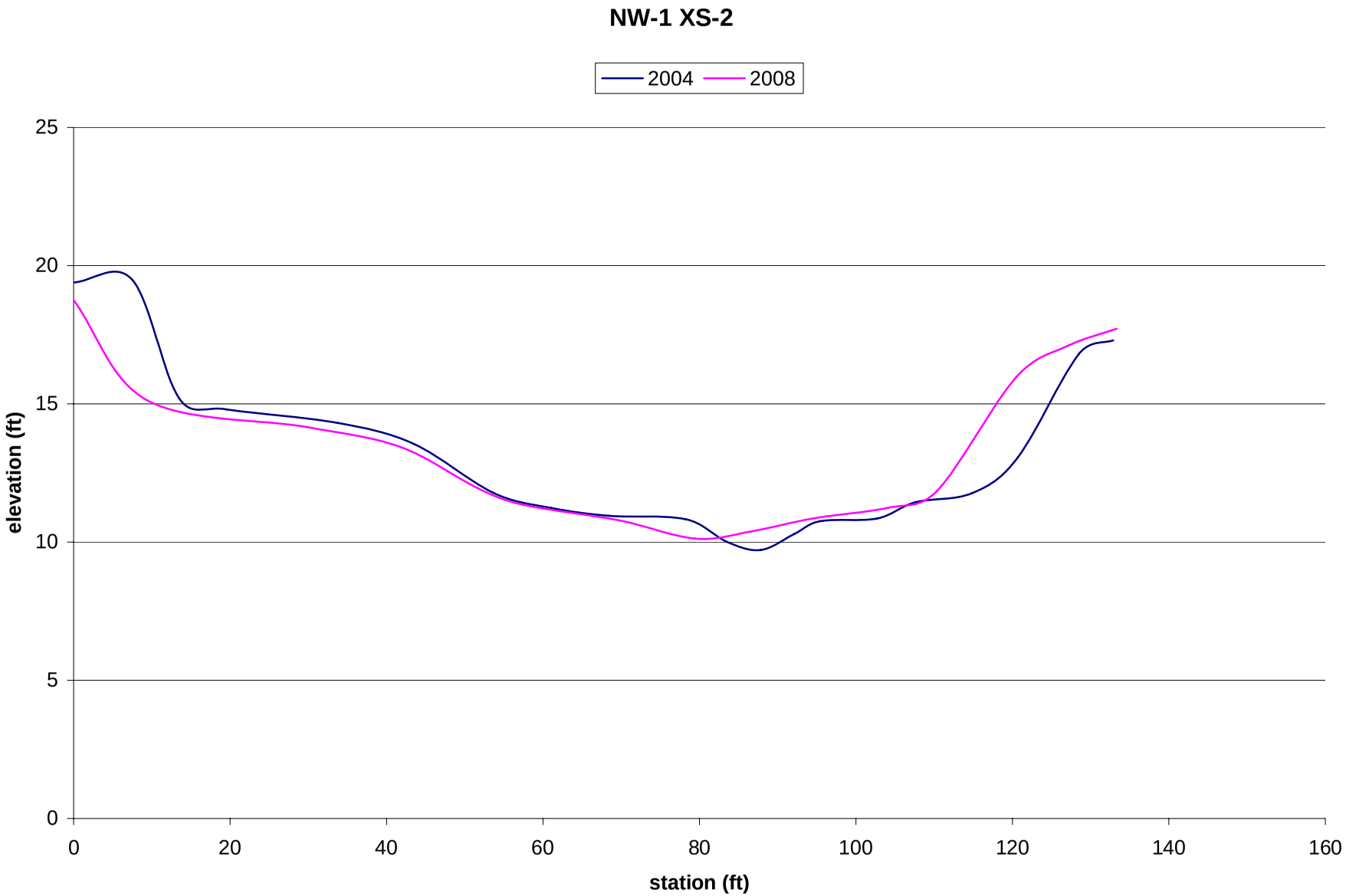
Figure 11
SC-4

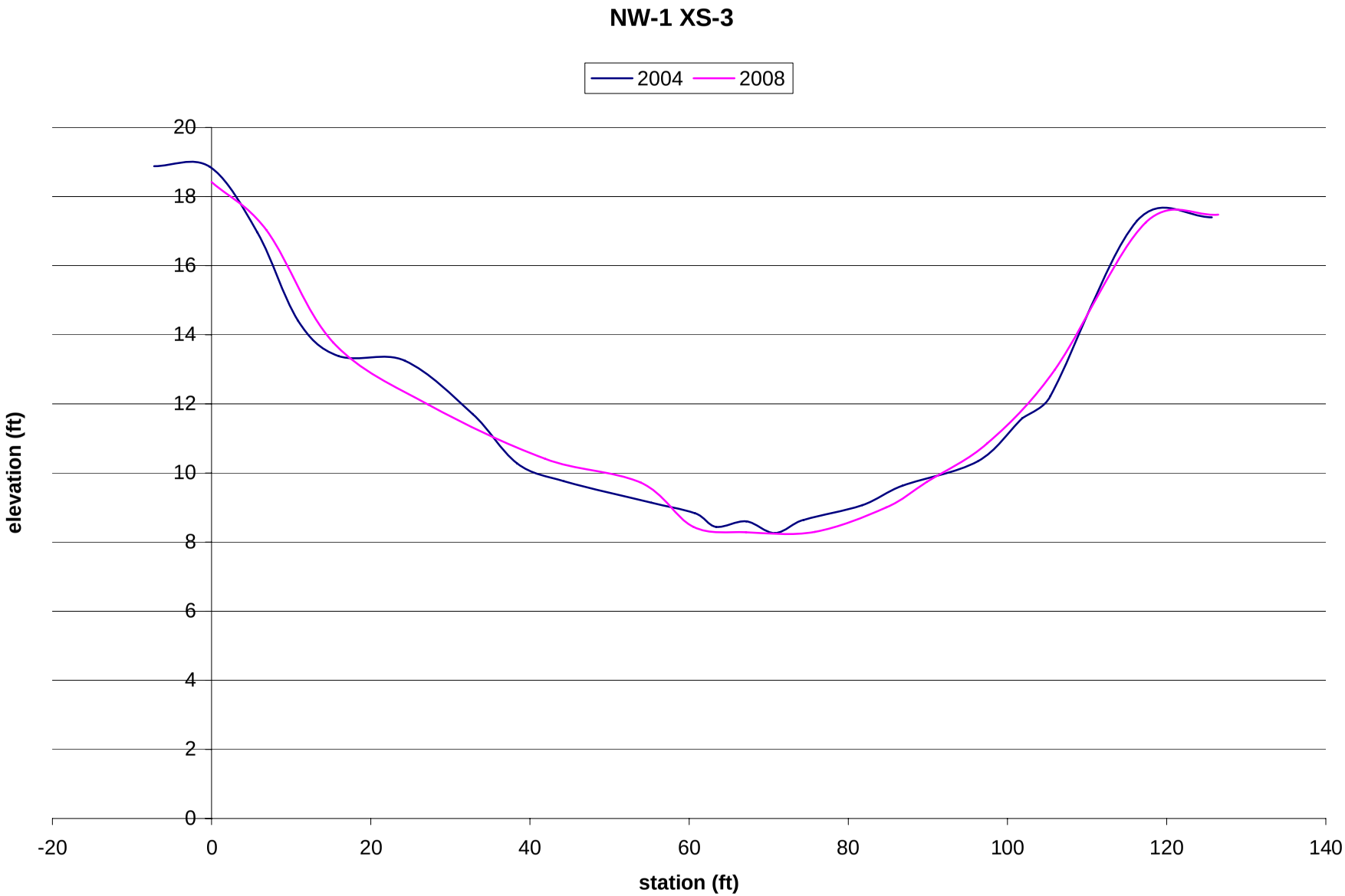
APPENDIX C- Longitudinal Profiles, and Cross Sections

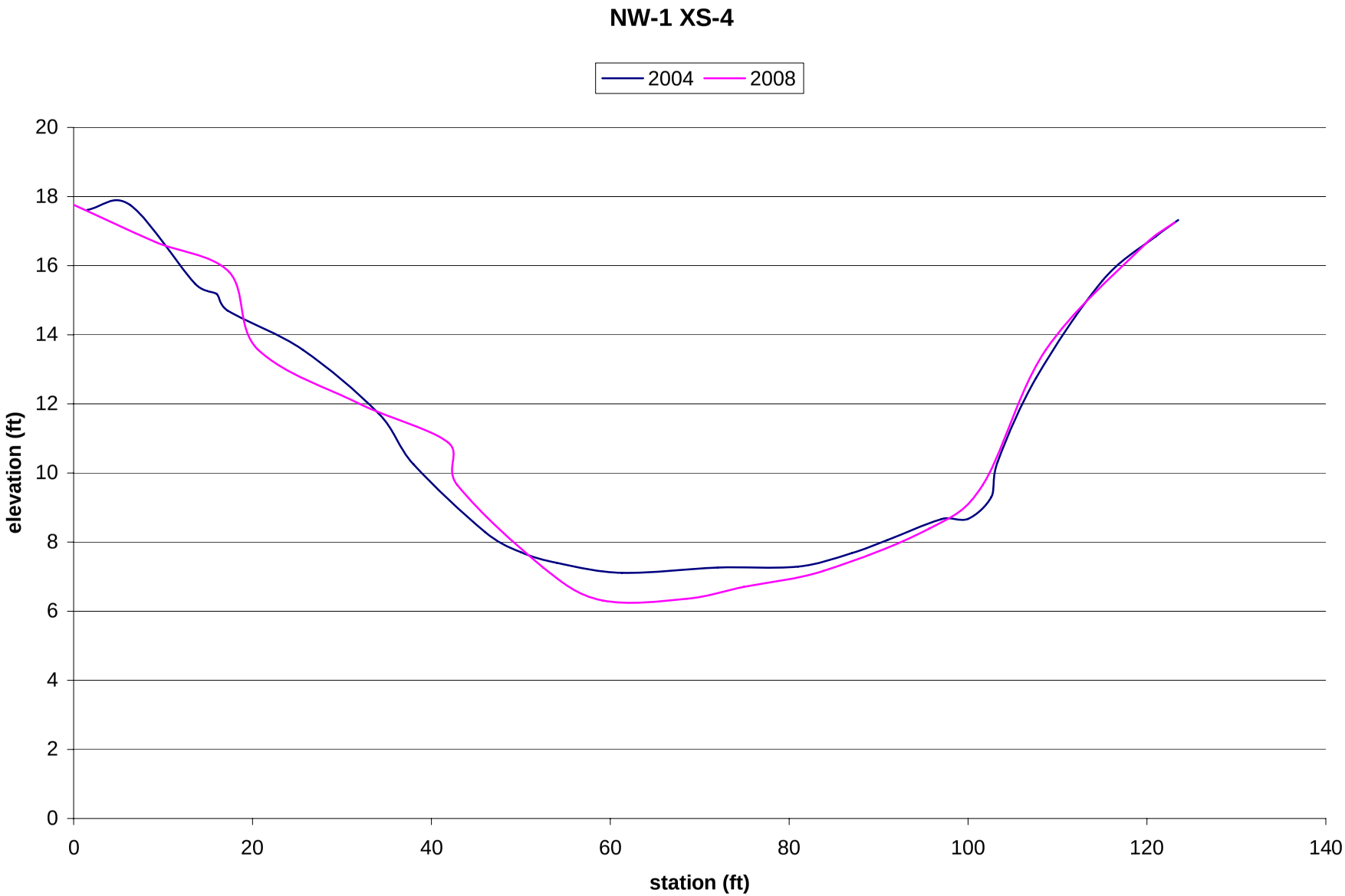

NW-1 Boulders
2005
2008
1324560
1324540
1324520
1324500
1324480
1324460
1324440
1324420
1324400
easting
467025
467030
467035
467040
467045
467050
northing

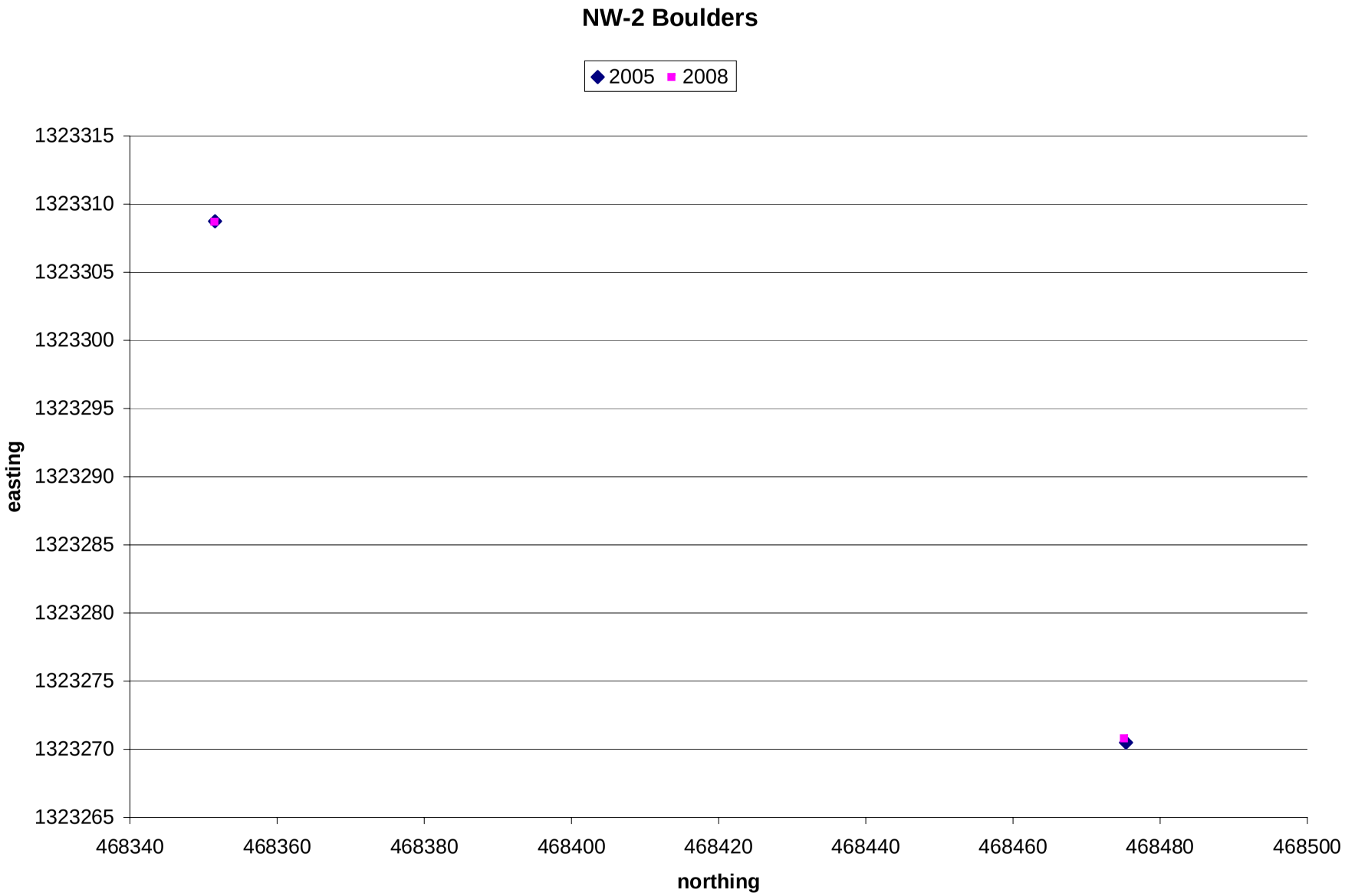

NW-1 Longitudal Profile 2005 and 2008
2005
2008
Elevation (ft)
20
18
16
14
12
10
8
6
4
2
0
0
50
100
150
200
250
300
350
Station (ft)

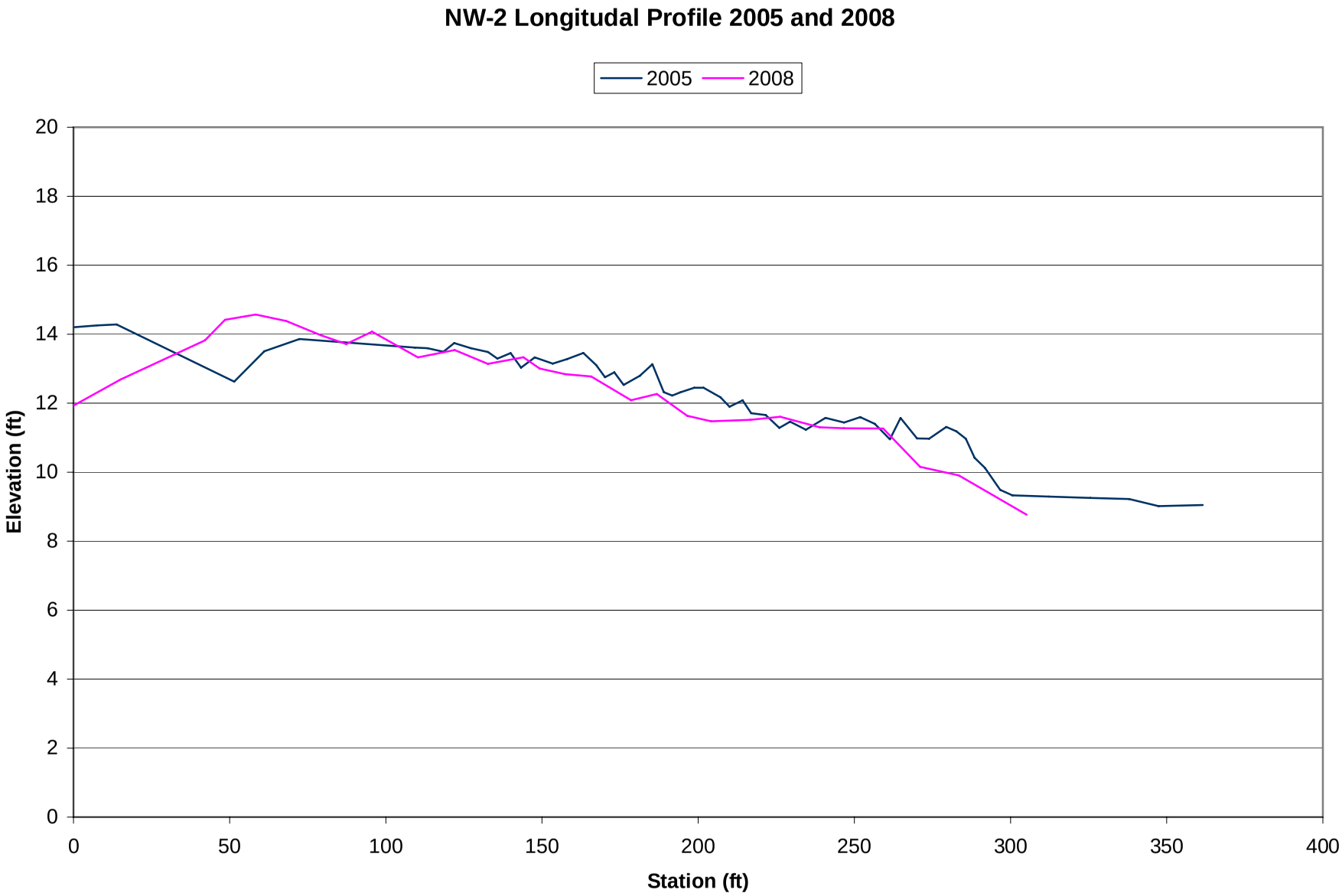

NW-1 XS-1
2004
2008
20
18
16
14
12
10
8
6
4
2
0
elevation (ft)
0
20
40
60
80
100
120
140
station (ft)

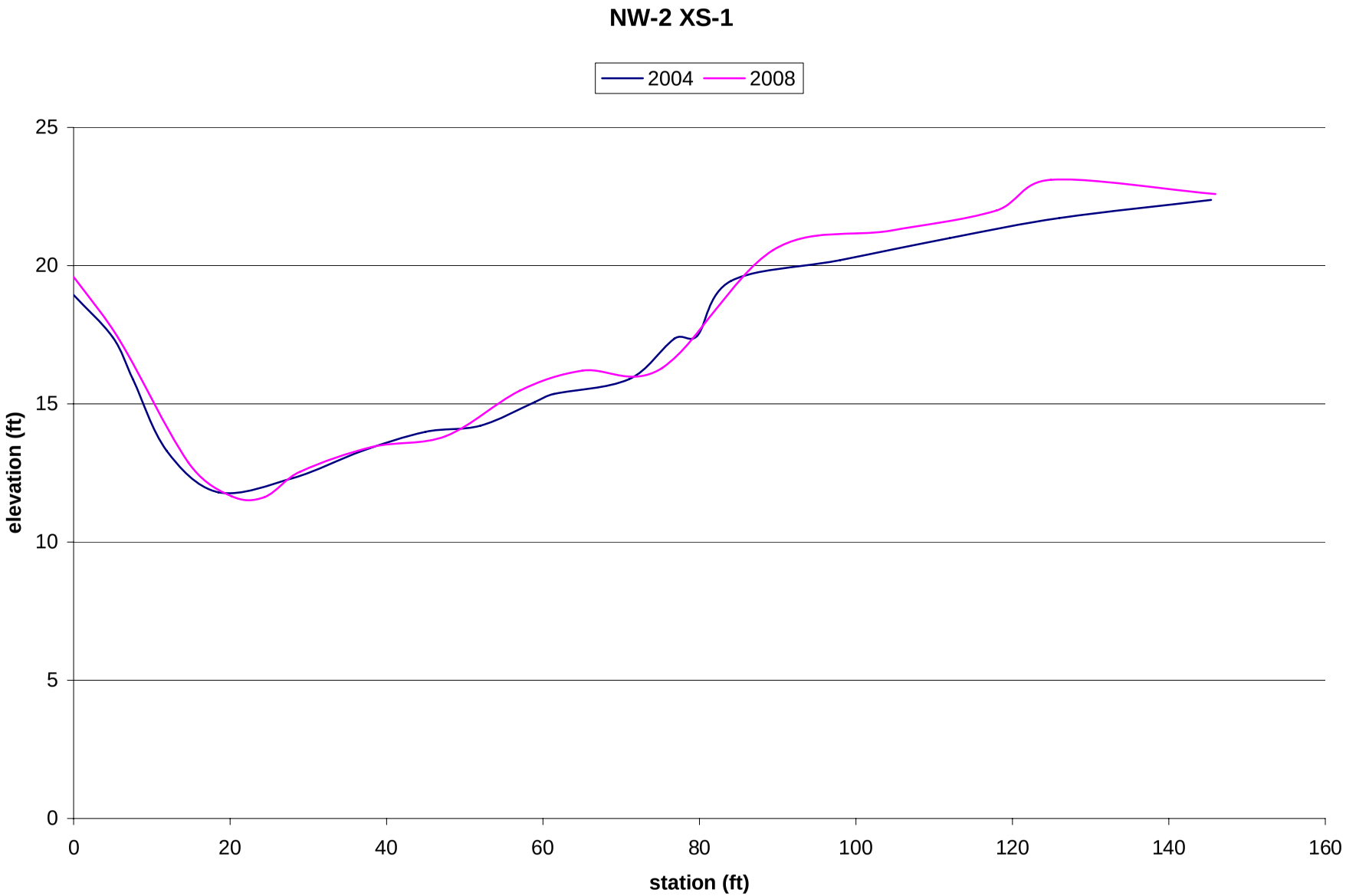

NW-1 XS-2
2004
2008
25
20
15
10
5
0
elevation (ft)
0
20
40
60
80
100
120
140
160
station (ft)

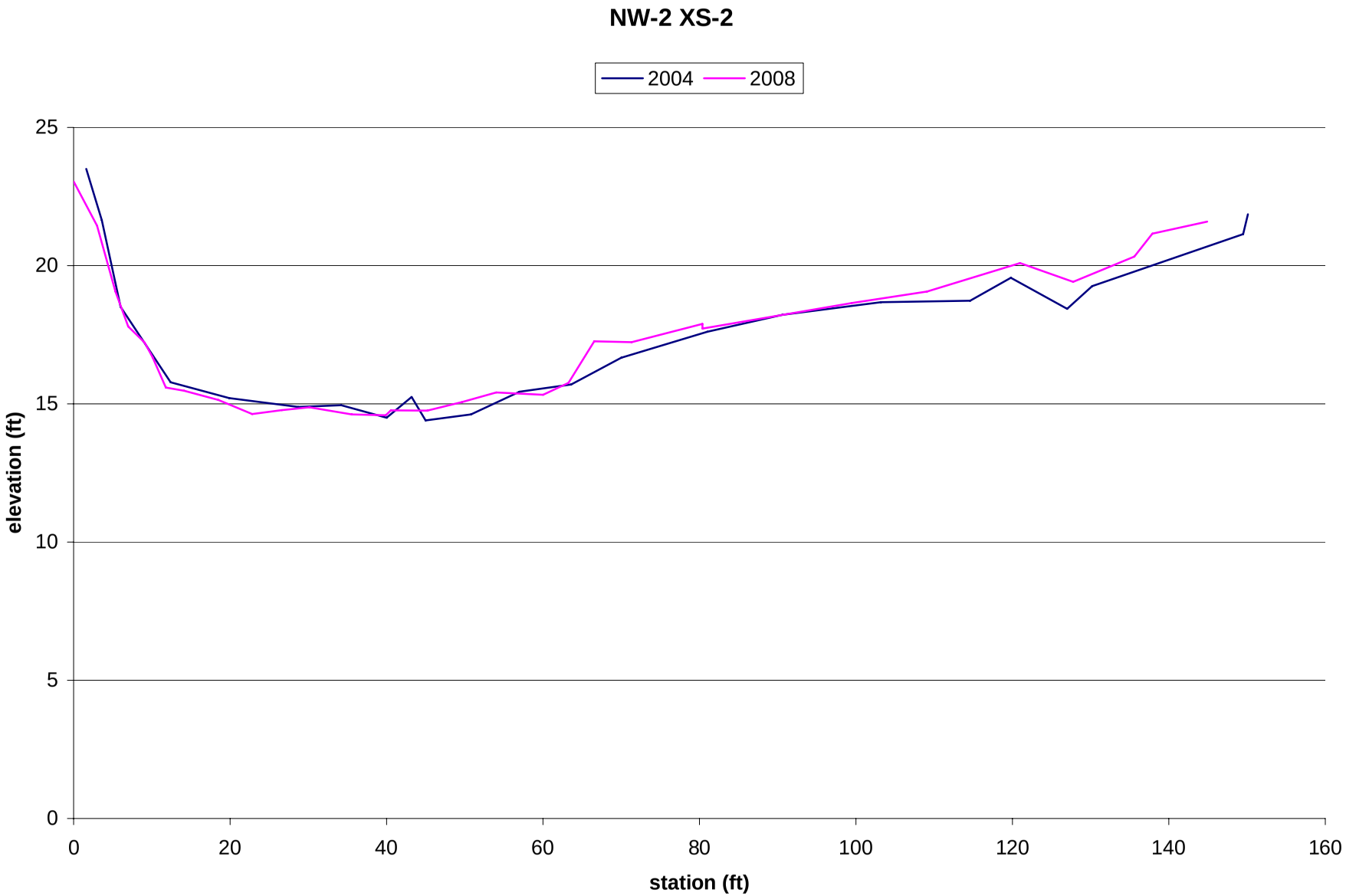

NW-1 XS-3
2004
2008
elevation (ft)
20
18
16
14
12
10
8
6
4
2
0
-20
0
20
40
60
80
100
120
140
station (ft)

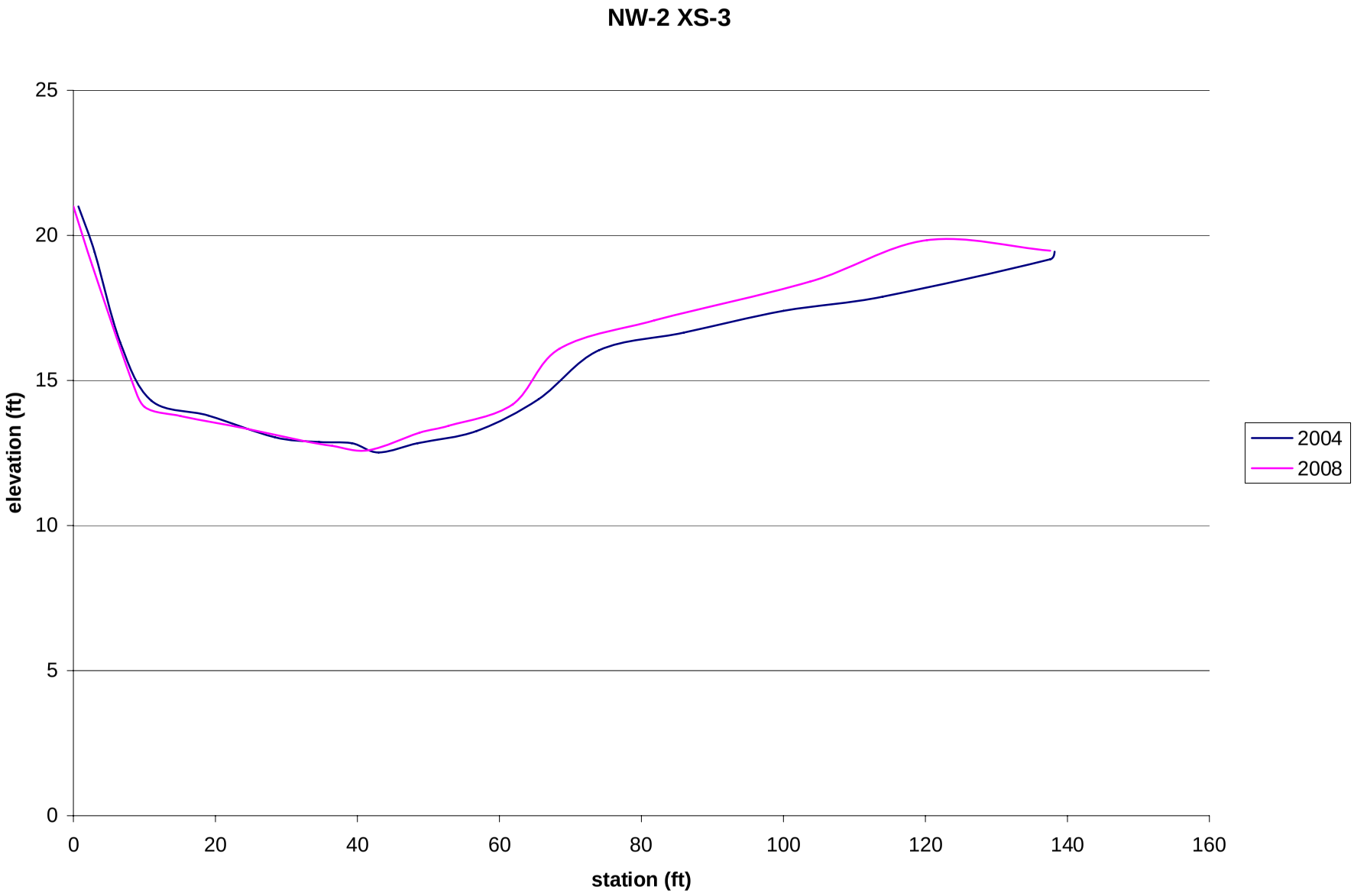

NW-1 XS-4
2004
2008
20
18
16
14
12
10
8
6
4
2
0
elevation (ft)
0
20
40
60
80
100
120
140
station (ft)

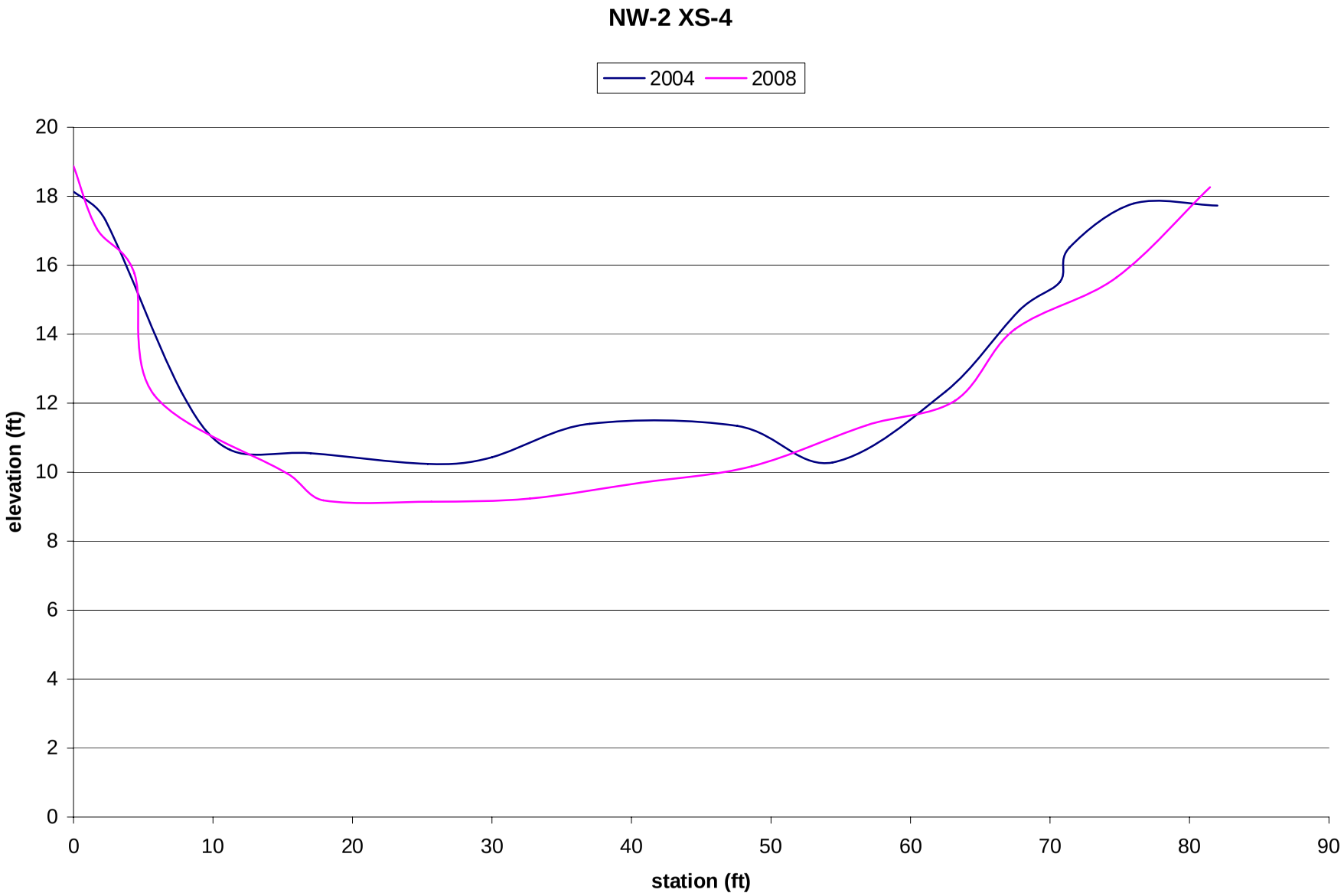

NW-2 Boulders
2005
2008
1323315
1323310
1323305
1323300
1323295
1323290
1323285
1323280
1323275
1323270
1323265
easting
468340
468360
468380
468400
468420
468440
468460
468480
468500
northing

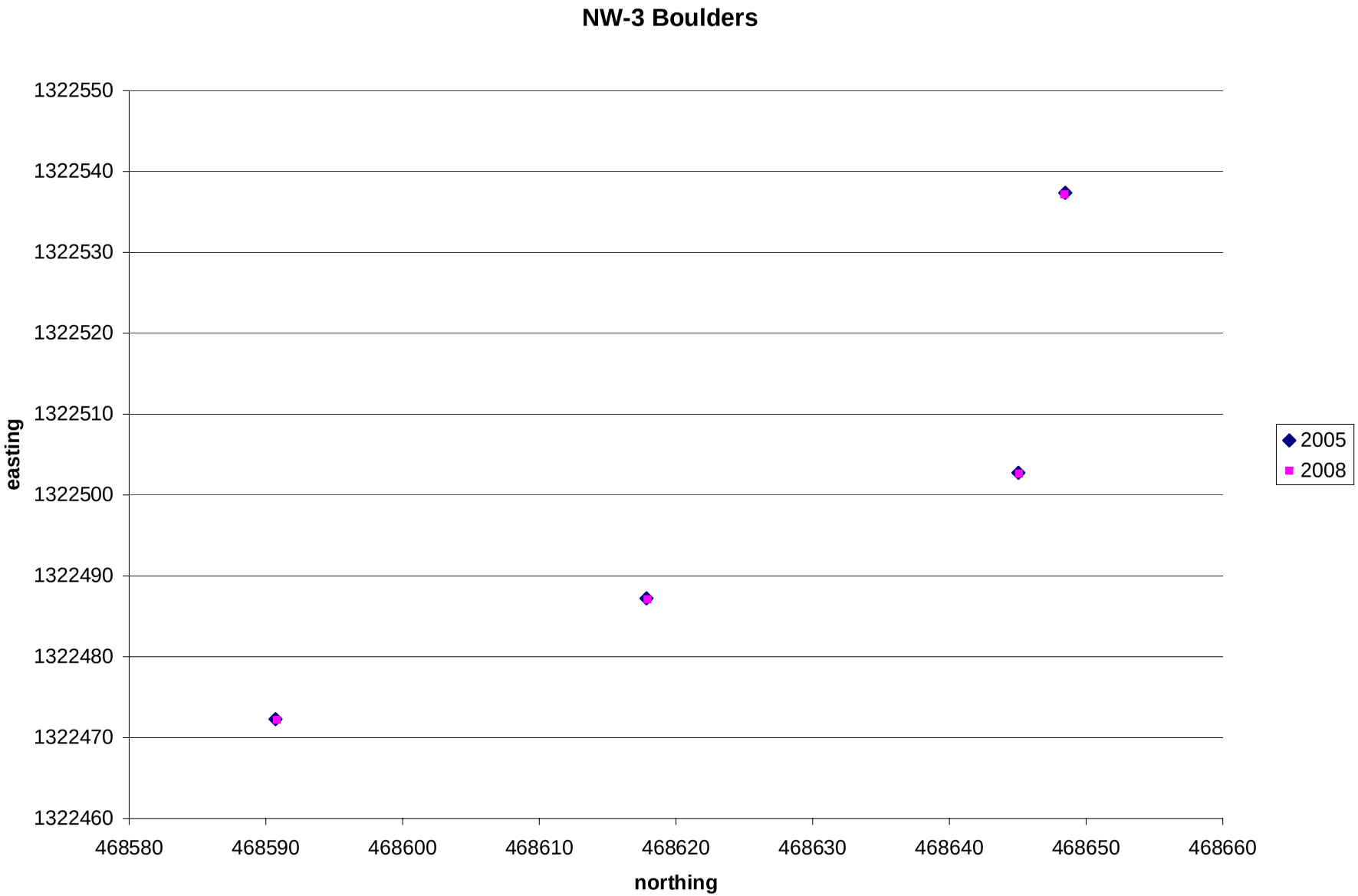

NW-2 Longitudal Profile 2005 and 2008
2005
2008
Elevation (ft)
20
18
16
14
12
10
8
6
4
2
0
0
50
100
150
200
250
300
350
400
Station (ft)

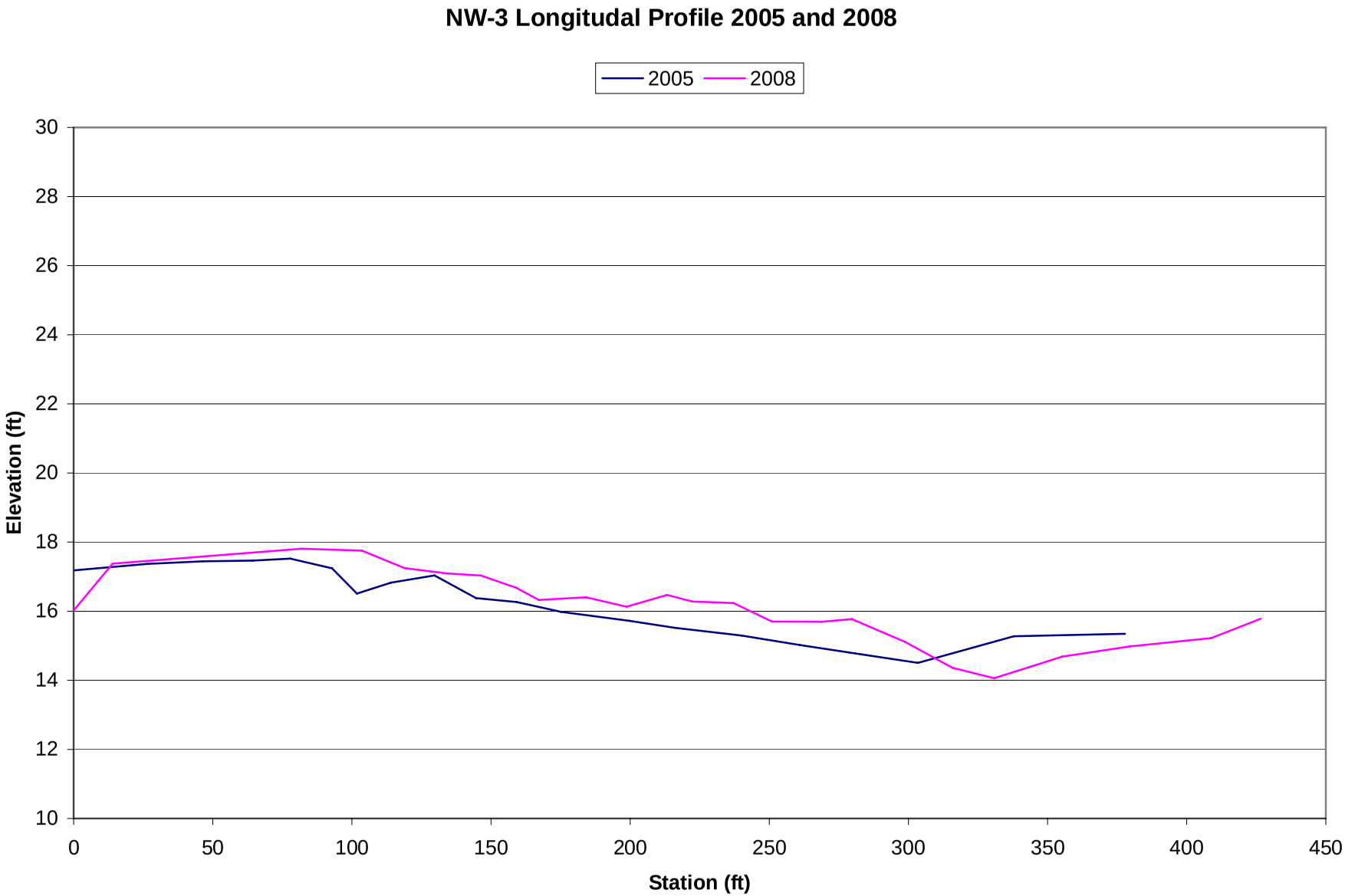

NW-2 XS-1
2004
2008
25
20
15
10
5
0
elevation (ft)
0
20
40
60
80
100
120
140
160
station (ft)

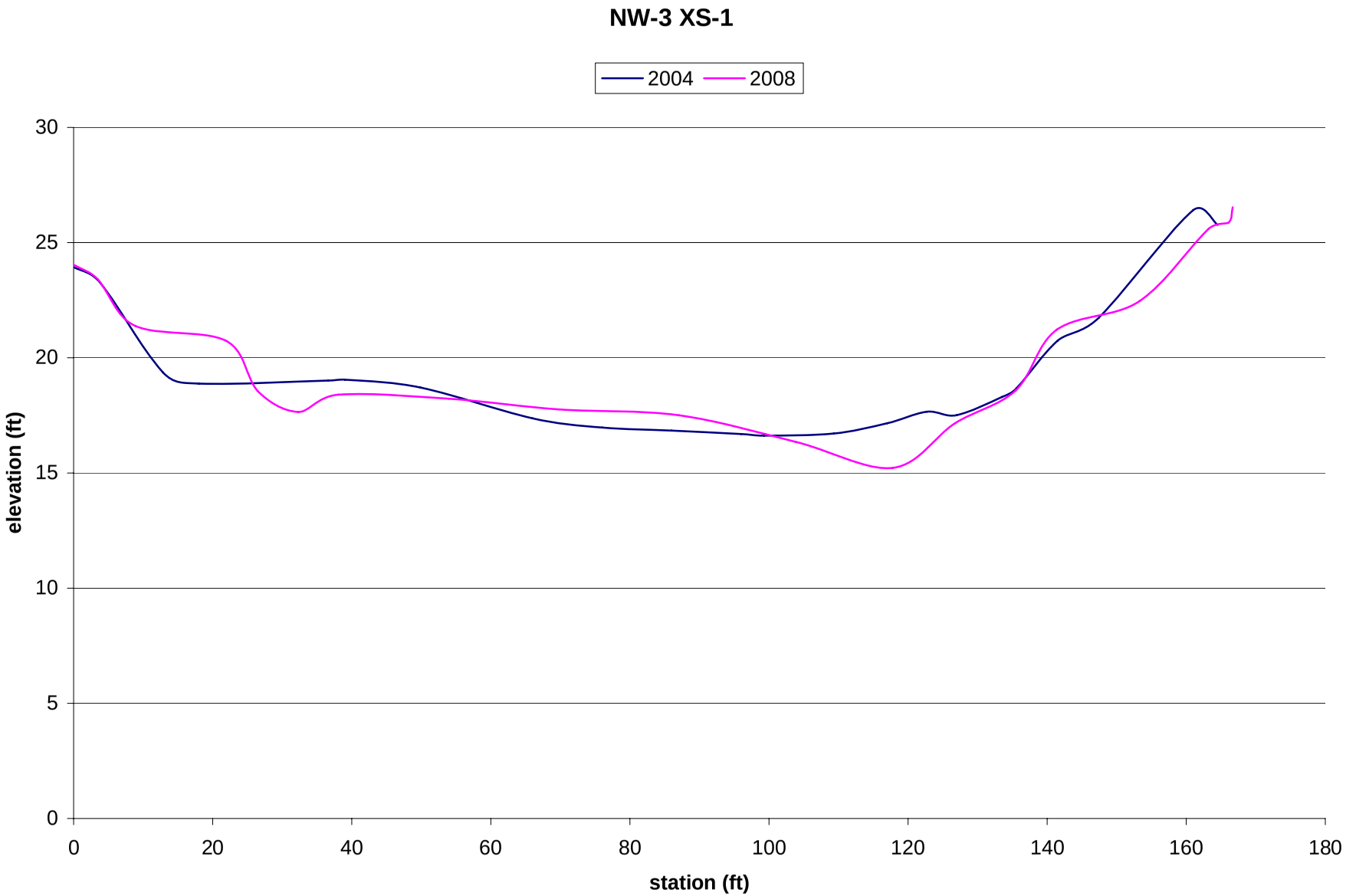

NW-2 XS-2
2004
2008
25
20
15
10
5
0
elevation (ft)
0
20
40
60
80
100
120
140
160
station (ft)

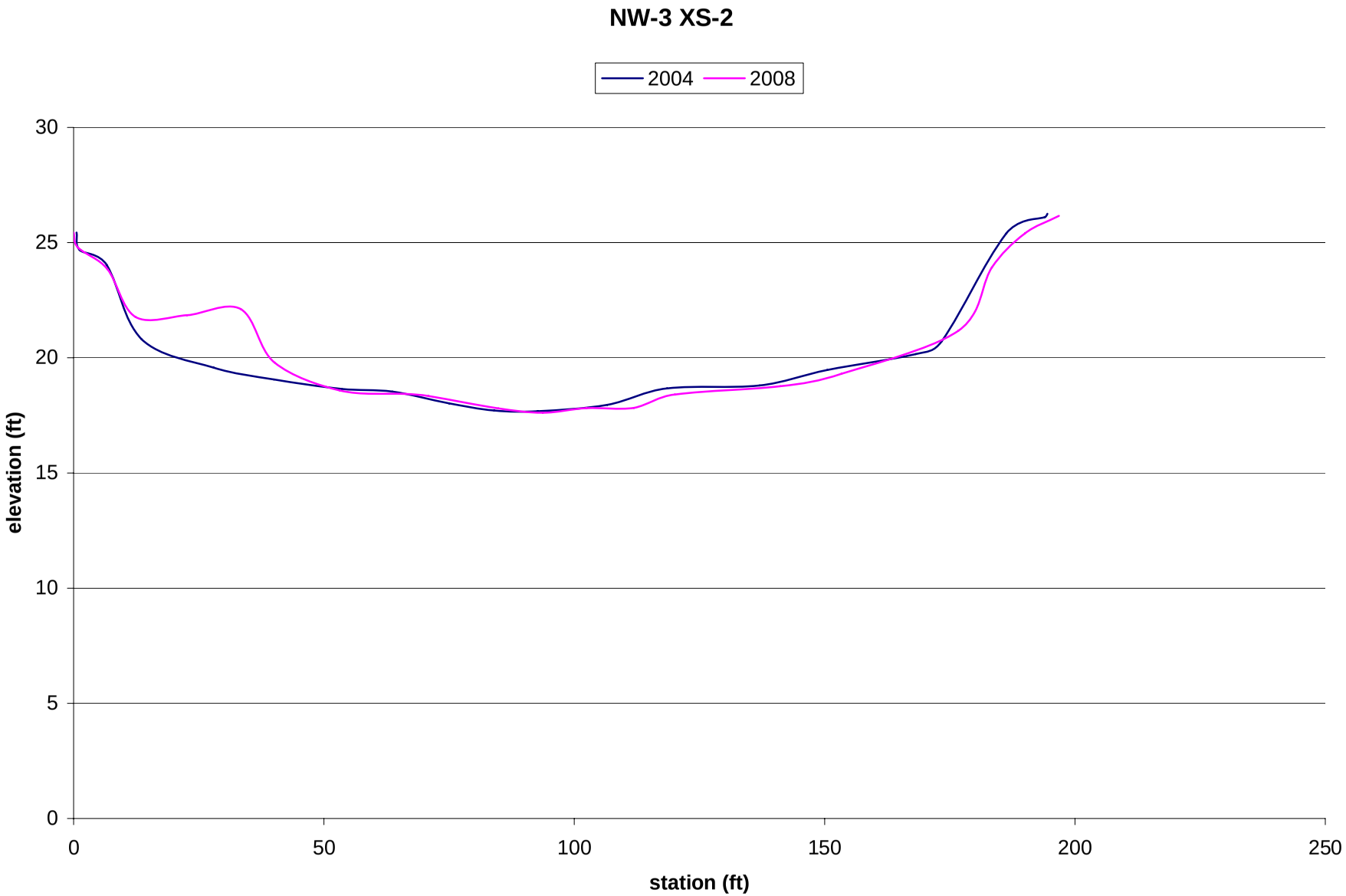

NW-2 XS-3
25
20
15
10
5
0
elevation (ft)
0
20
40
60
80
100
120
140
160
station (ft)
2004
2008

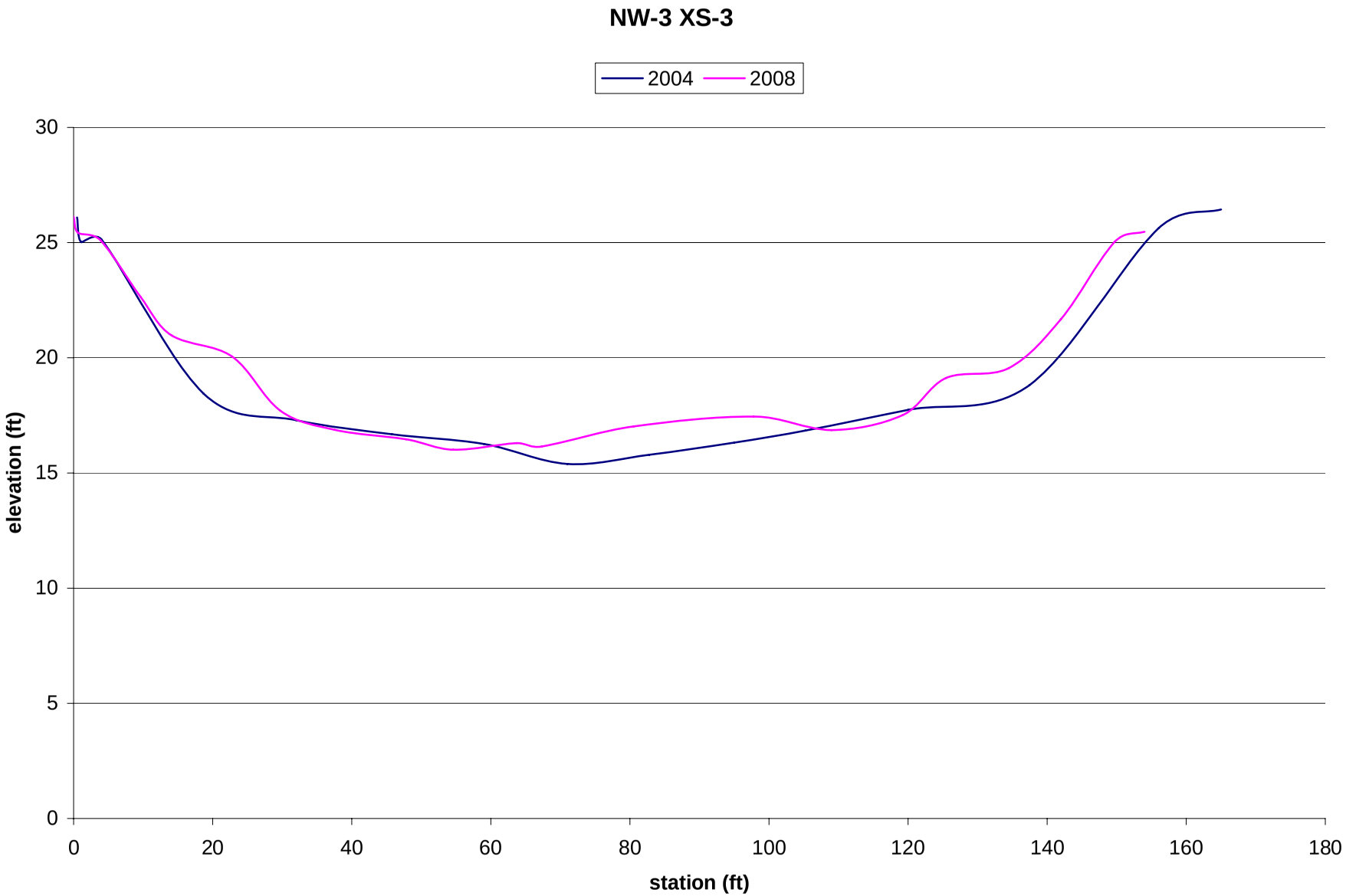

NW-2 XS-4
2004
2008
elevation (ft)
station (ft)
0
2
4
6
8
10
12
14
16
18
20
0
10
20
30
40
50
60
70
80
90

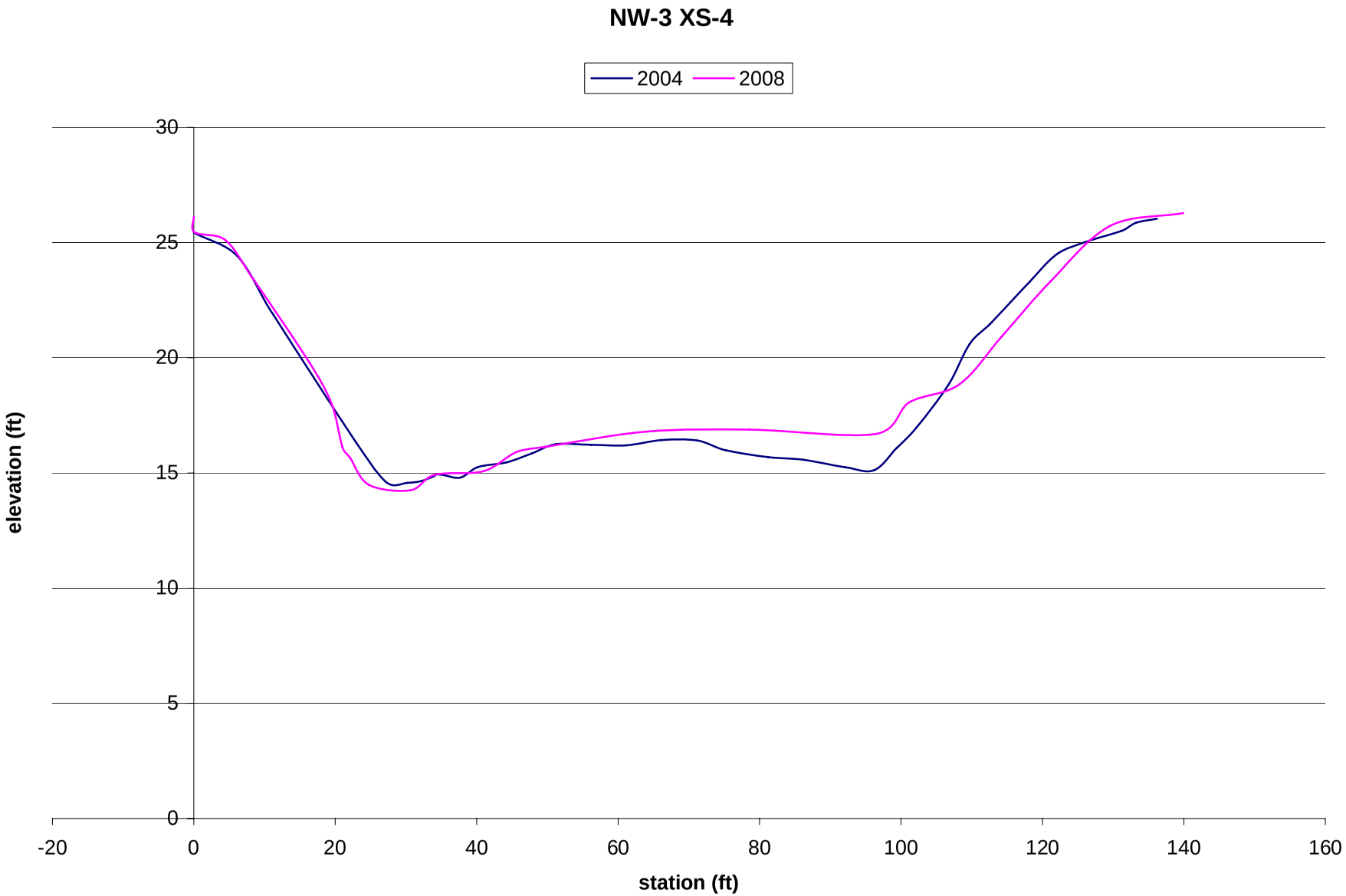

NW-3 Boulders
1322550
1322540
1322530
1322520
1322510
1322500
1322490
1322480
1322470
1322460
easting
468580
468590
468600
468610
468620
468630
468640
468650
468660
northing
2005
2008

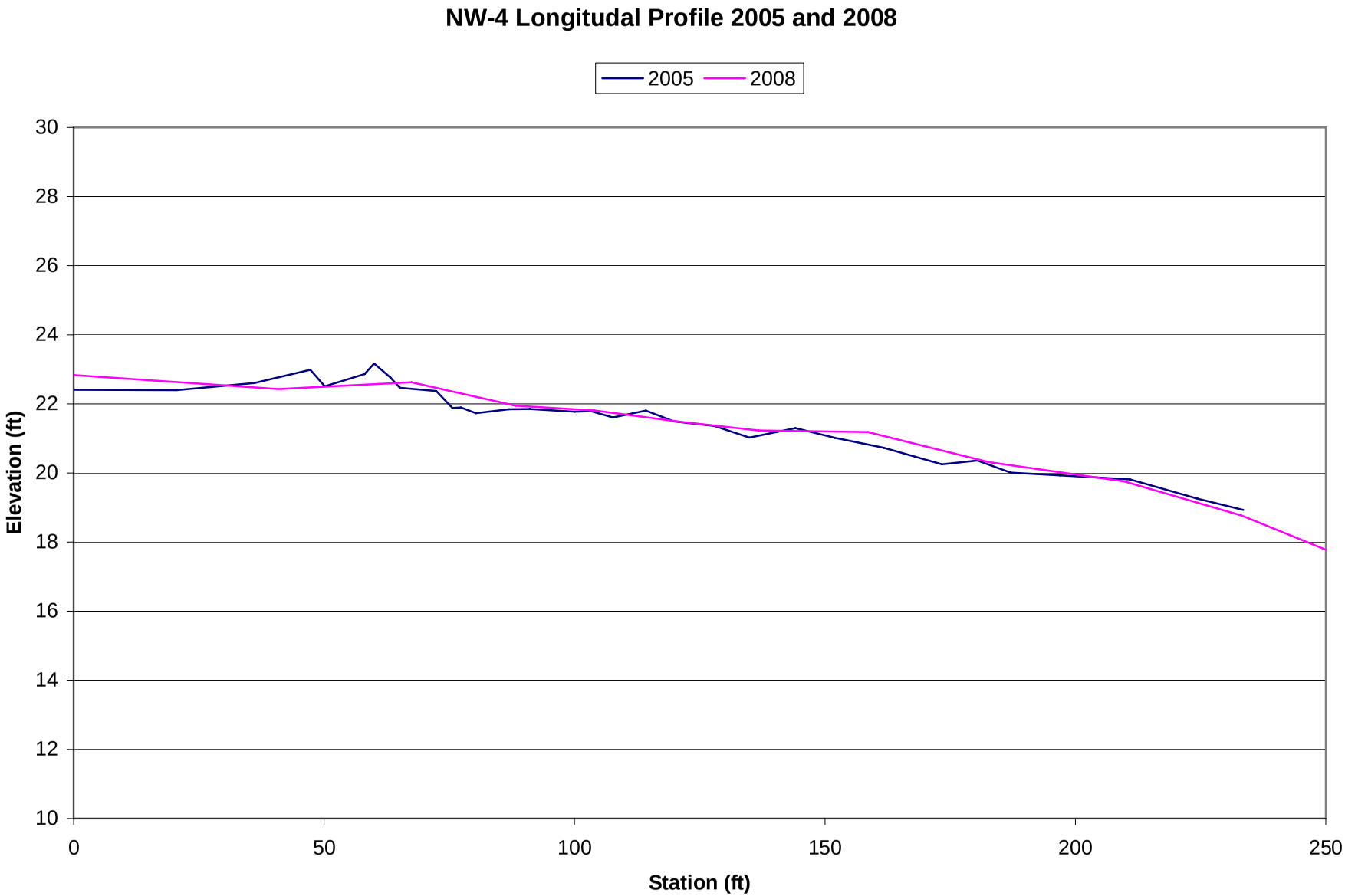

NW-3 Longitudal Profile 2005 and 2008
2005
2008
Elevation (ft)
30
28
26
24
22
20
18
16
14
12
10
0
50
100
150
200
250
300
350
400
450
Station (ft)

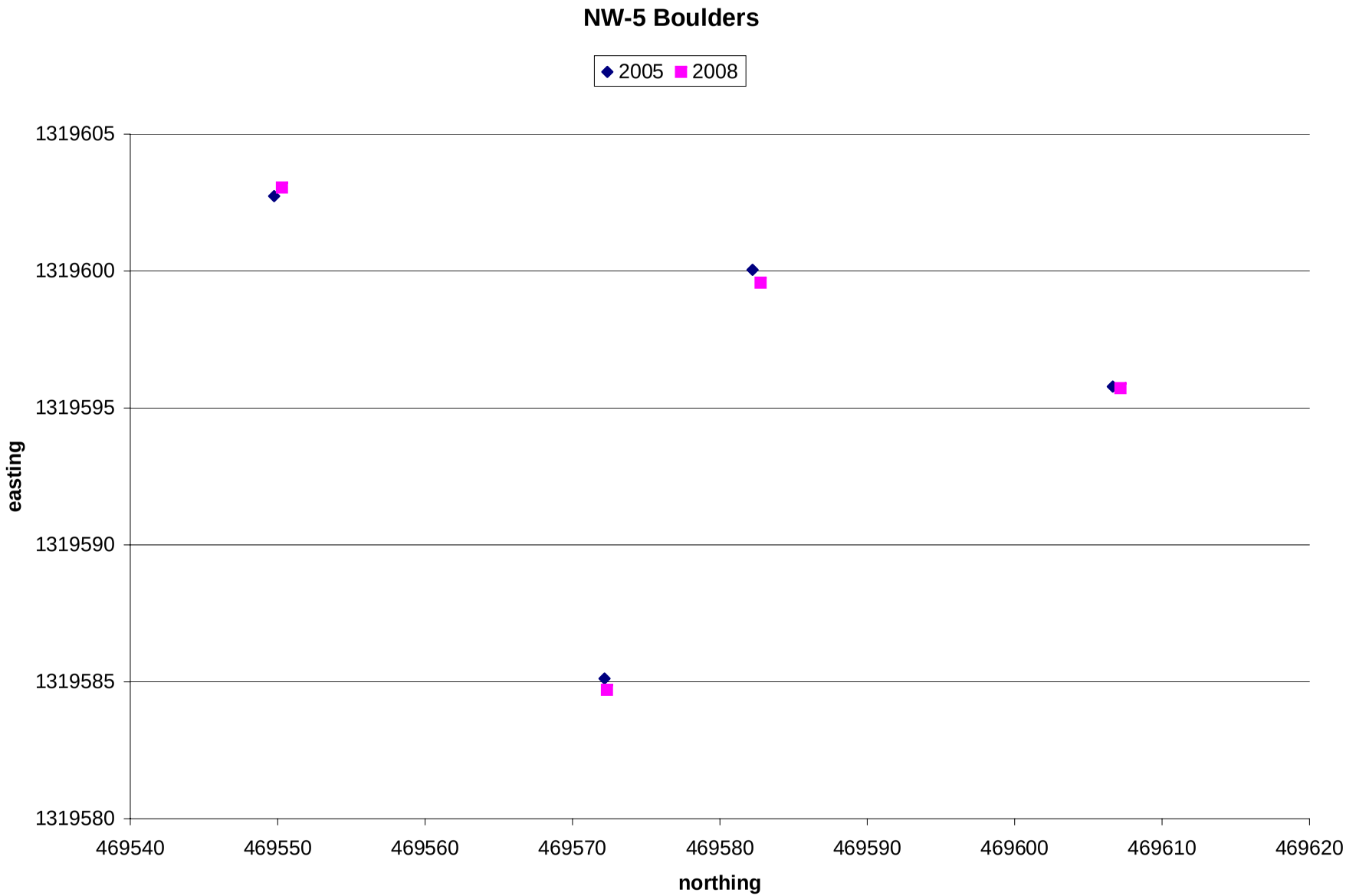

NW-3 XS-1
2004
2008
30
25
20
15
10
5
0
elevation (ft)
0
20
40
60
80
100
120
140
160
180
station (ft)

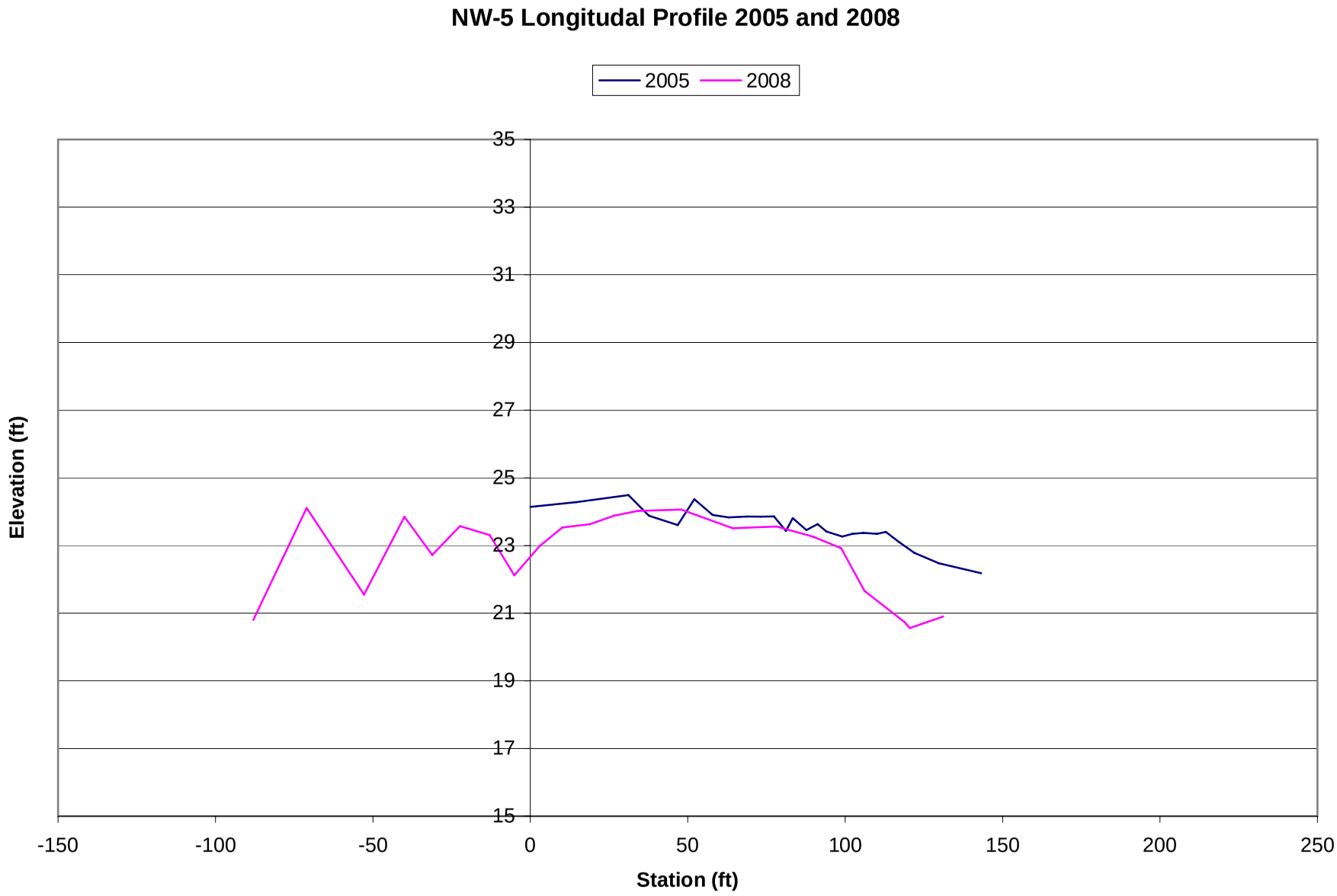

NW-3 XS-2
2004
2008
30
25
20
15
10
5
0
elevation (ft)
0
50
100
150
200
250
station (ft)

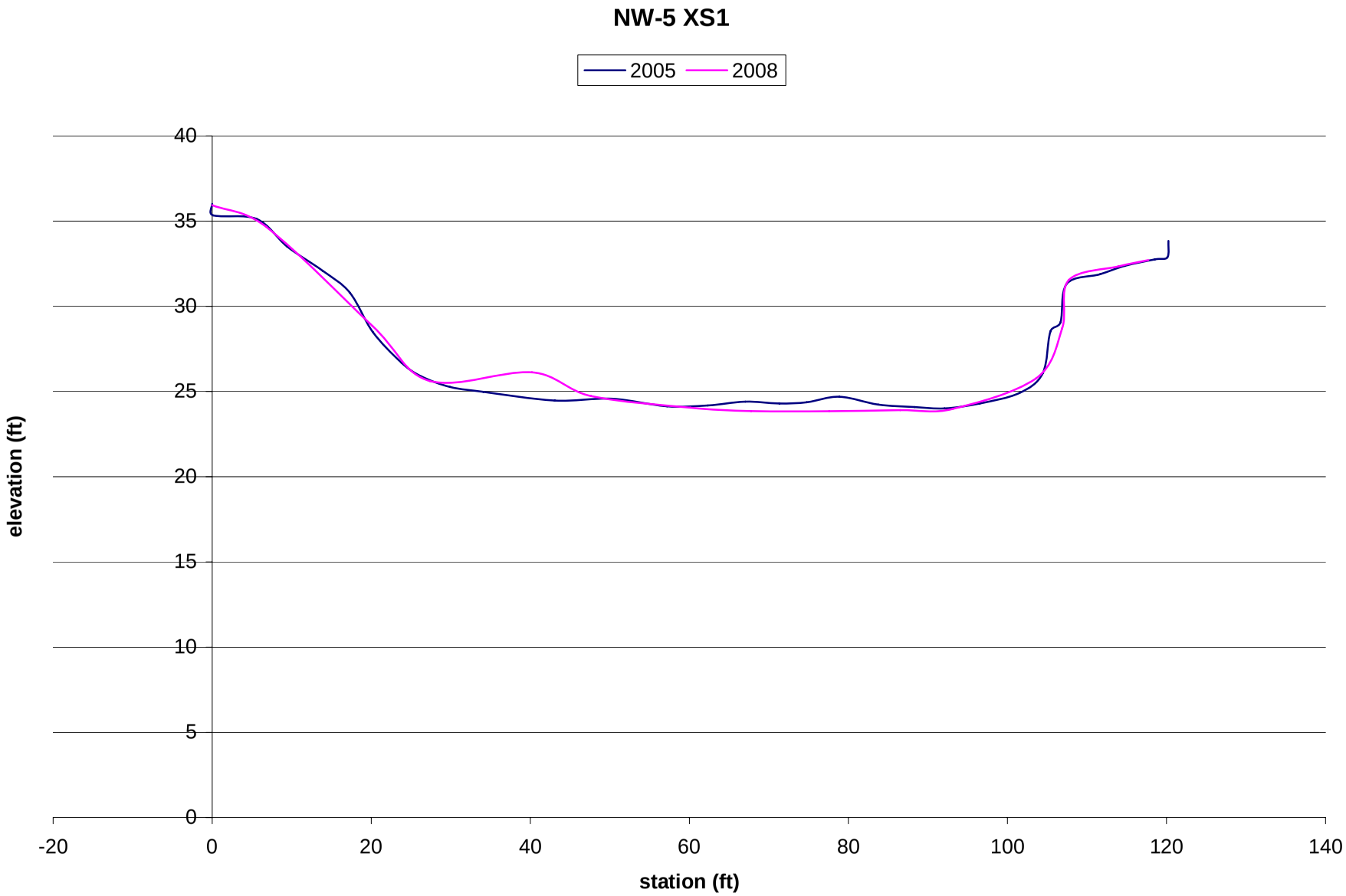

NW-3 XS-3
2004
2008
30
25
20
15
10
5
0
elevation (ft)
0
20
40
60
80
100
120
140
160
180
station (ft)

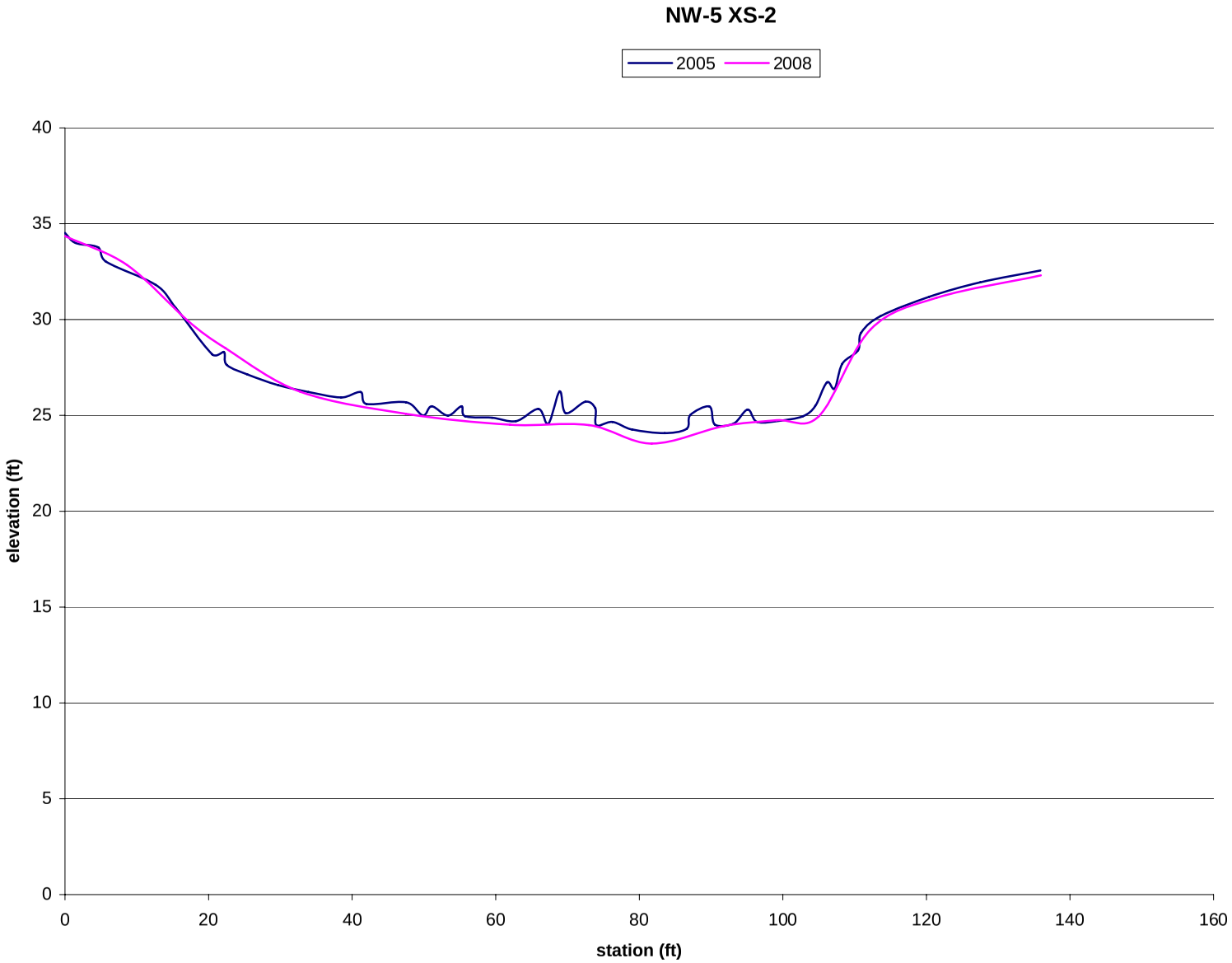

NW-3 XS-4
2004
2008
elevation (ft)
30
25
20
15
10
5
0
-20
0
20
40
60
80
100
120
140
160
station (ft)

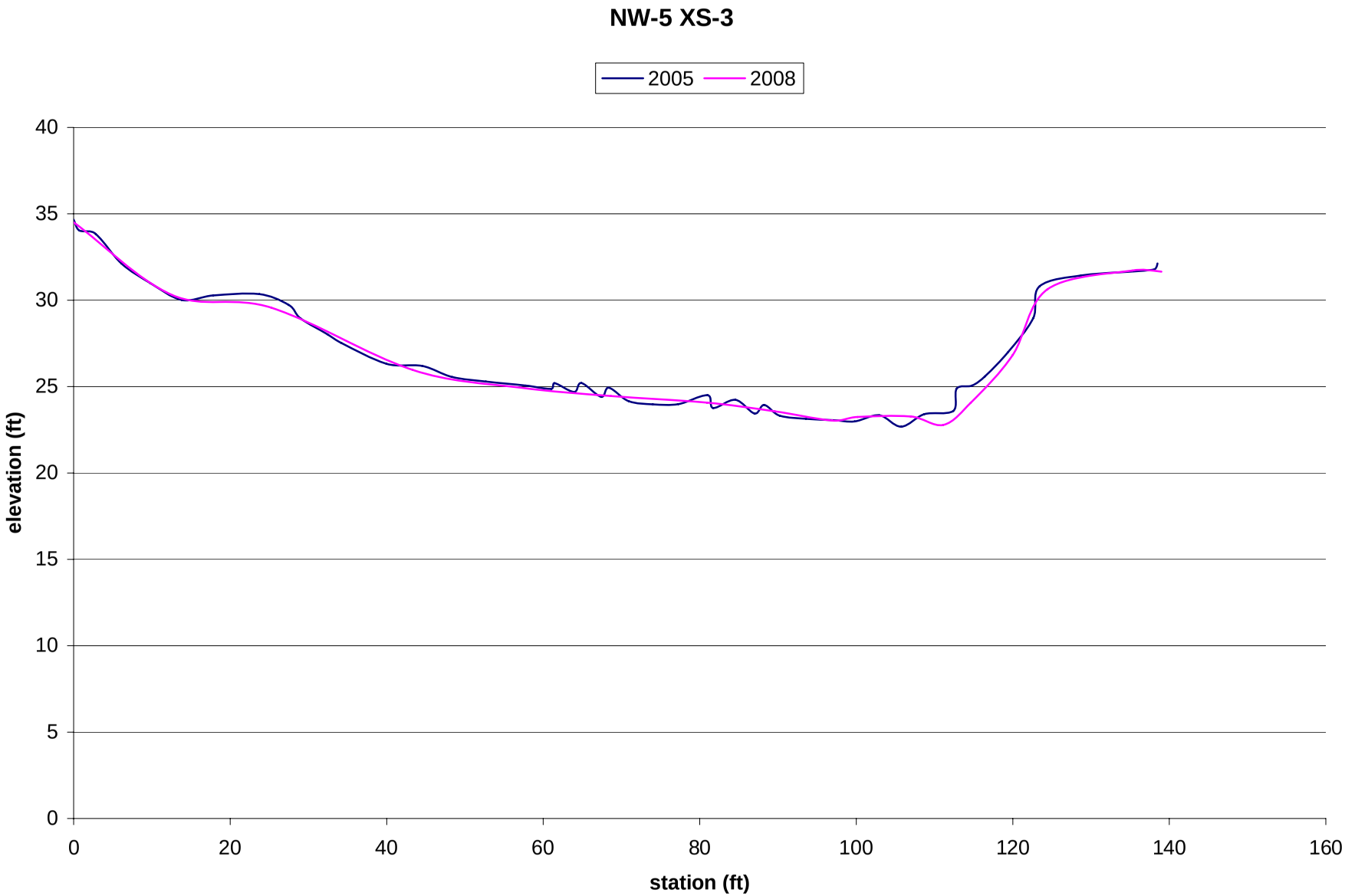

NW-4 Longitudal Profile 2005 and 2008
2005
2008
Elevation (ft)
30
28
26
24
22
20
18
16
14
12
10
0
50
100
150
200
250
Station (ft)

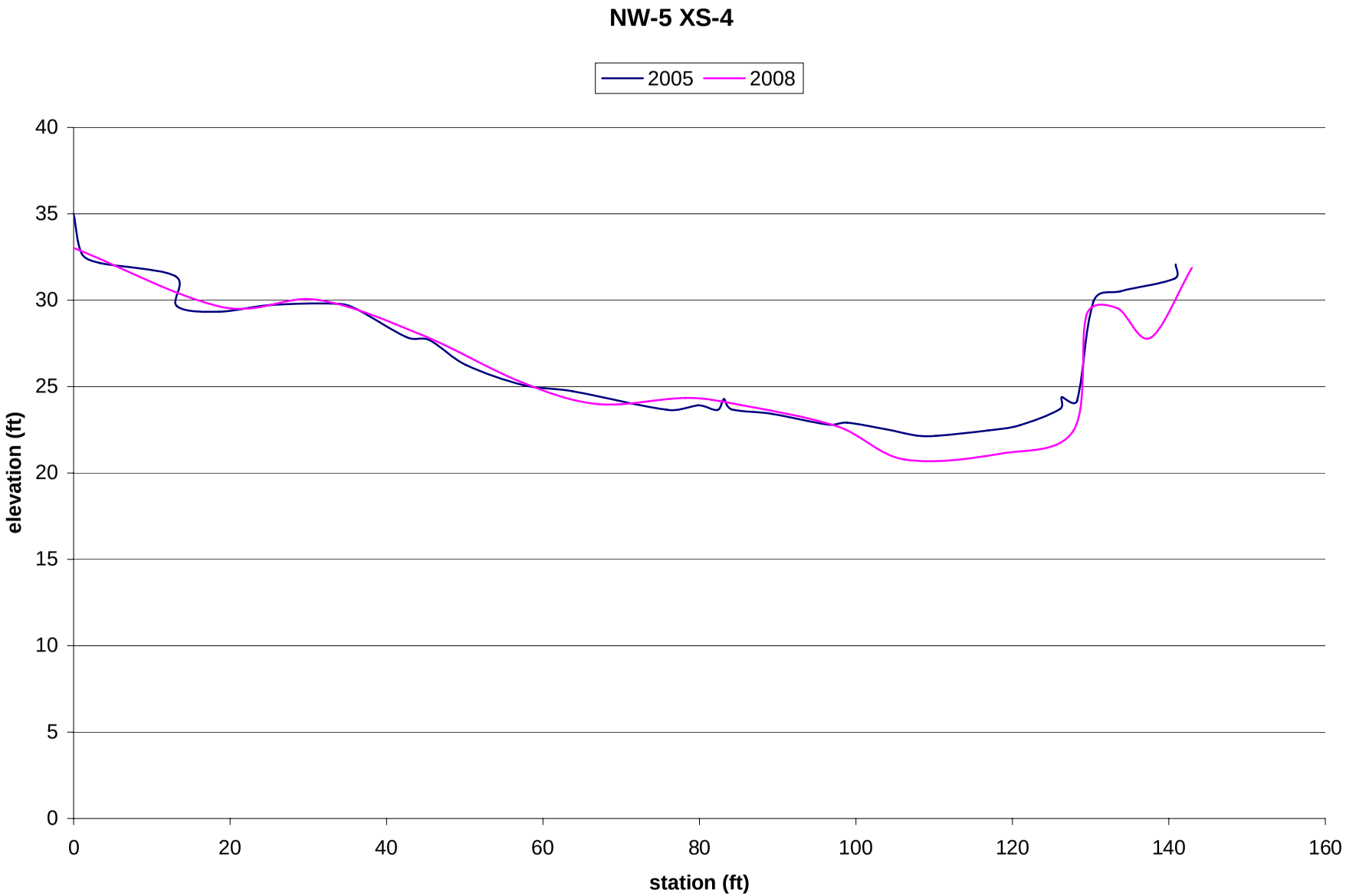

NW-5 Boulders
2005
2008
1319605
1319600
1319595
1319590
1319585
1319580
easting
469540
469550
469560
469570
469580
469590
469600
469610
469620
northing

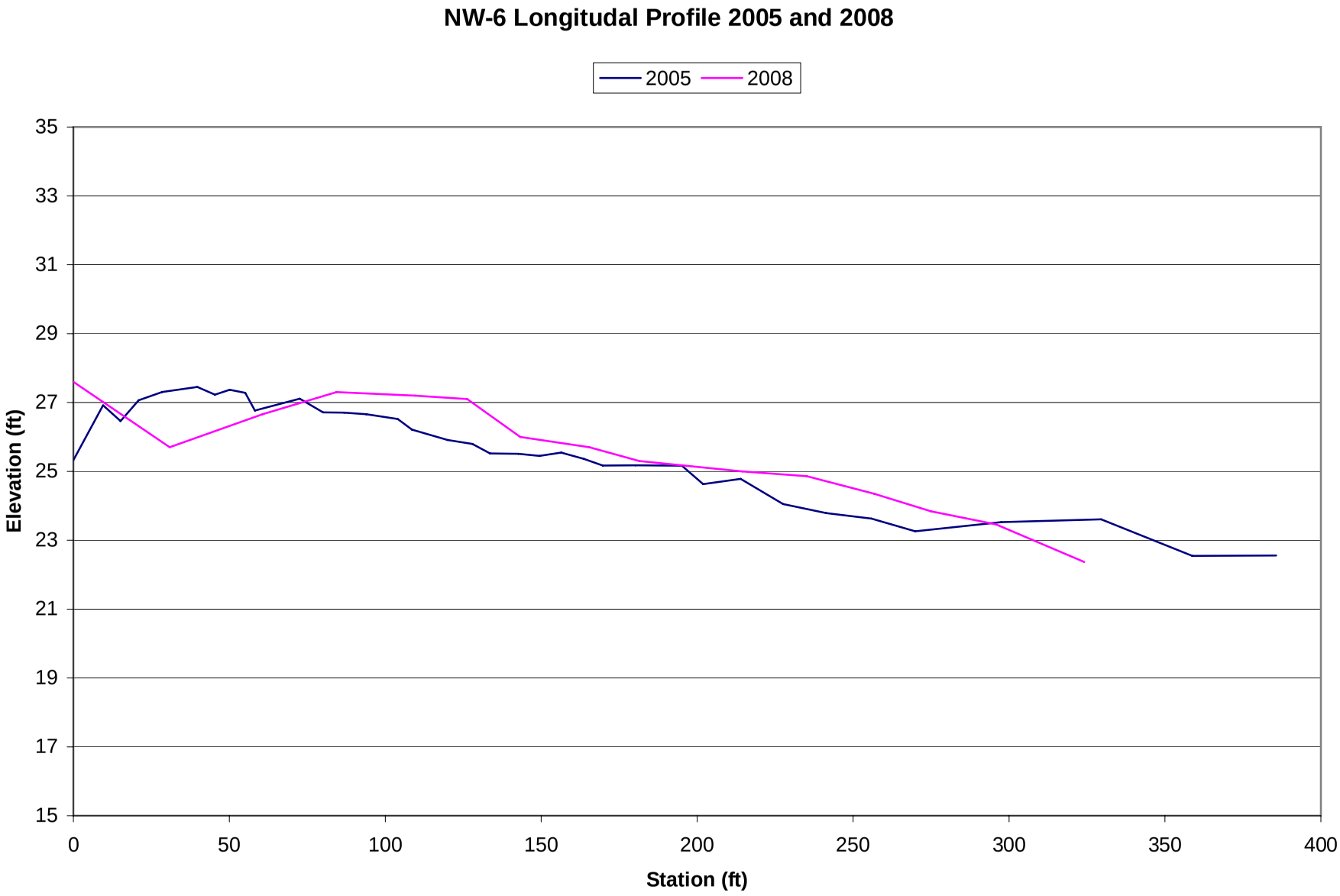

NW-5 Longitudal Profile 2005 and 2008
2005
2008
Elevation (ft)
35
33
31
29
27
25
23
21
19
17
15
-150
-100
-50
0
50
100
150
200
250
Station (ft)

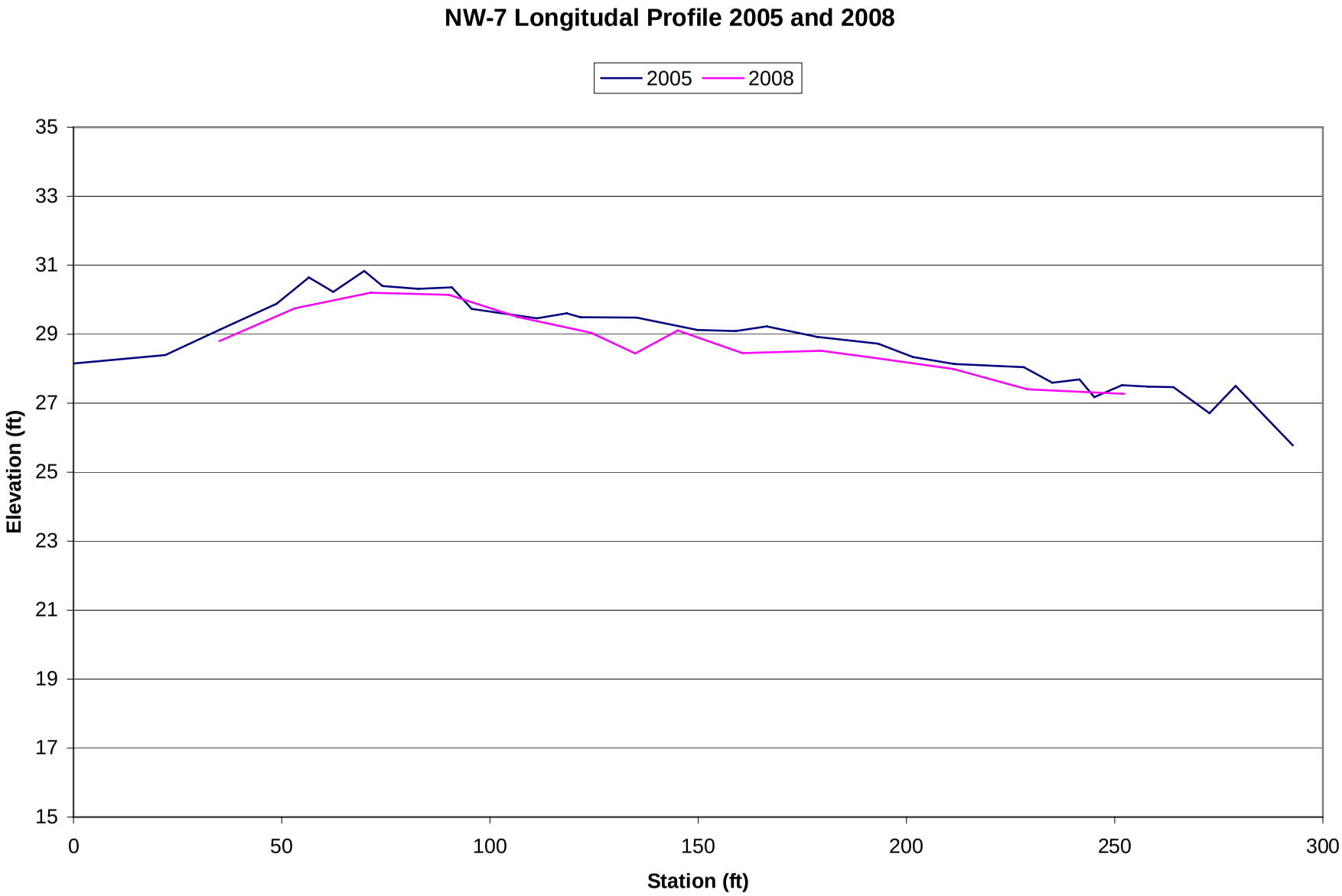

NW-5 XS1
2005
2008
elevation (ft)
40
35
30
25
20
15
10
5
0
-20
0
20
40
60
80
100
120
140
station (ft)

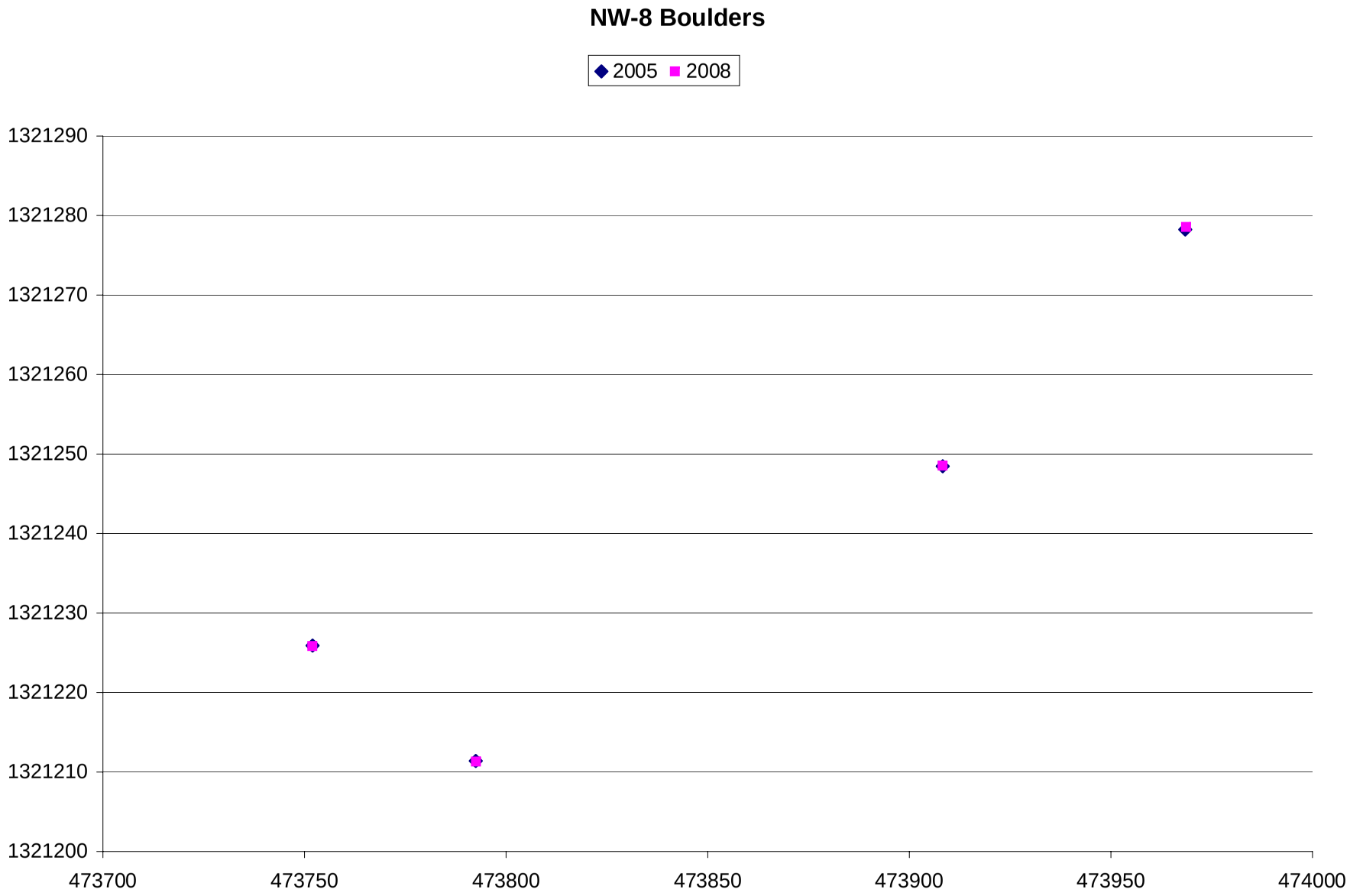

NW-5 XS-2
2005
2008
elevation (ft)
station (ft)
0
5
10
15
20
25
30
35
40
0
20
40
60
80
100
120
140
160

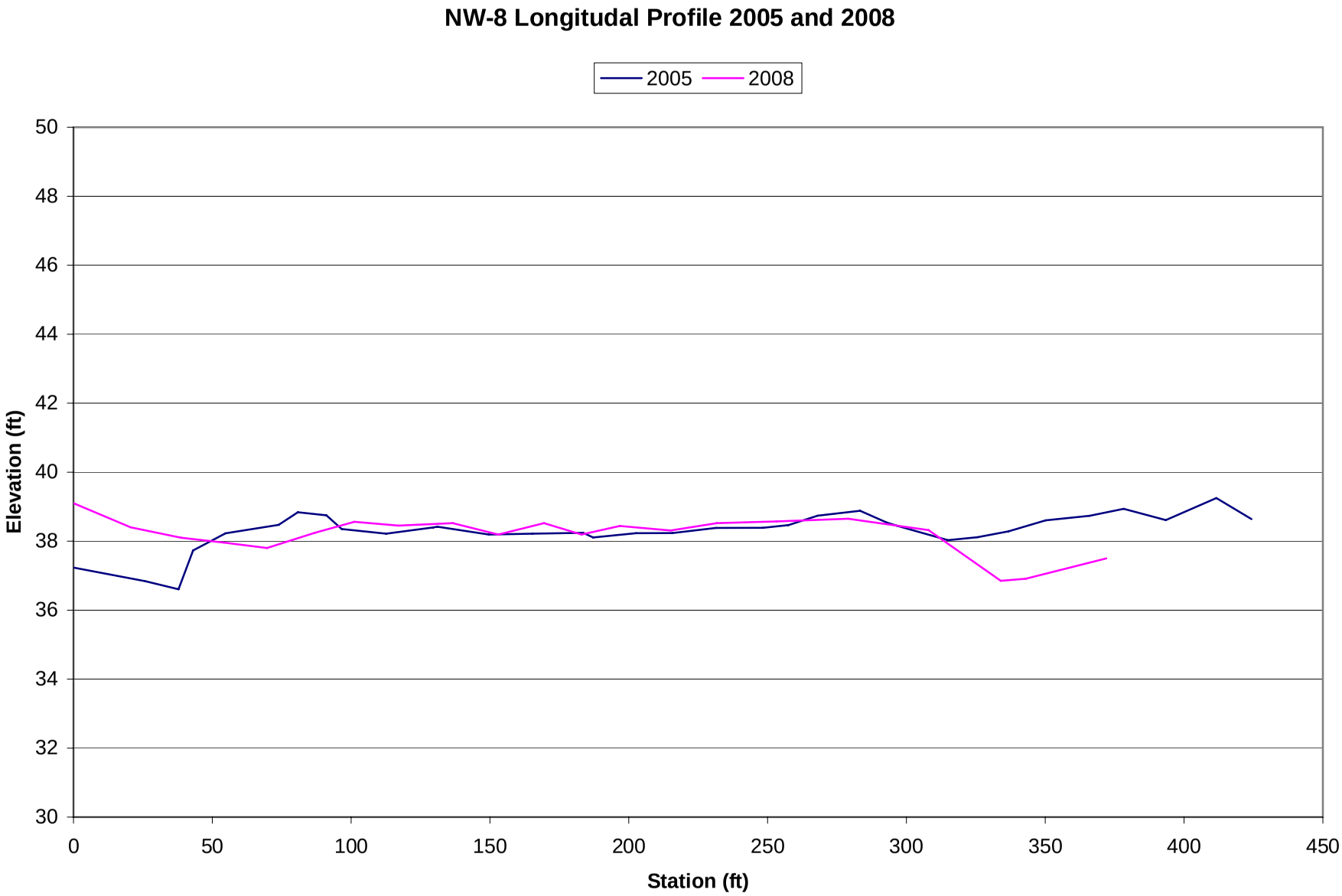

NW-5 XS-3
2005
2008
elevation (ft)
station (ft)
0
5
10
15
20
25
30
35
40
0
20
40
60
80
100
120
140
160

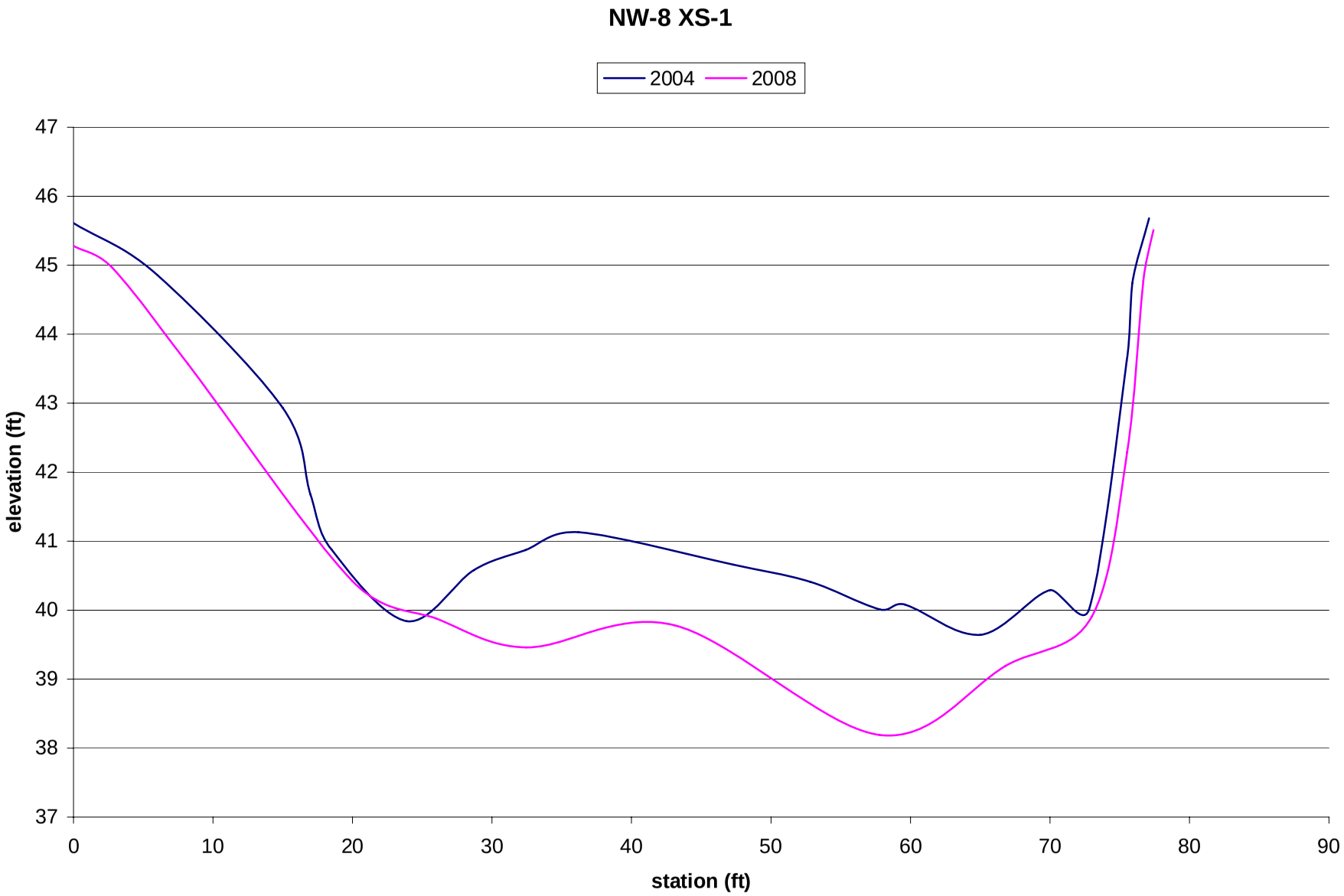

NW-5 XS-4
2005
2008
elevation (ft)
station (ft)
0
5
10
15
20
25
30
35
40
0
20
40
60
80
100
120
140
160

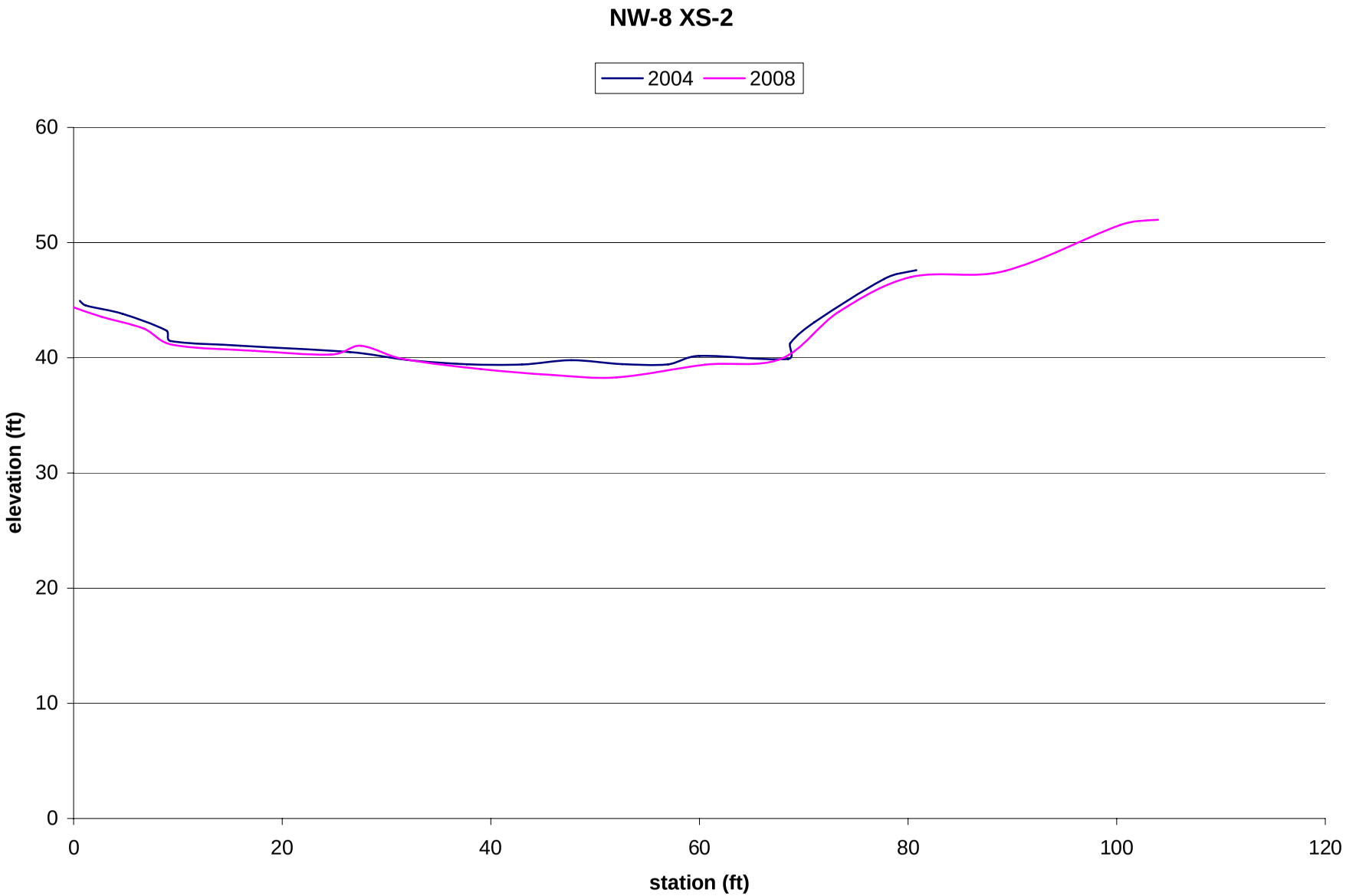

NW-6 Longitudal Profile 2005 and 2008
2005
2008
Elevation (ft)
35
33
31
29
27
25
23
21
19
17
15
0
50
100
150
200
250
300
350
400
Station (ft)

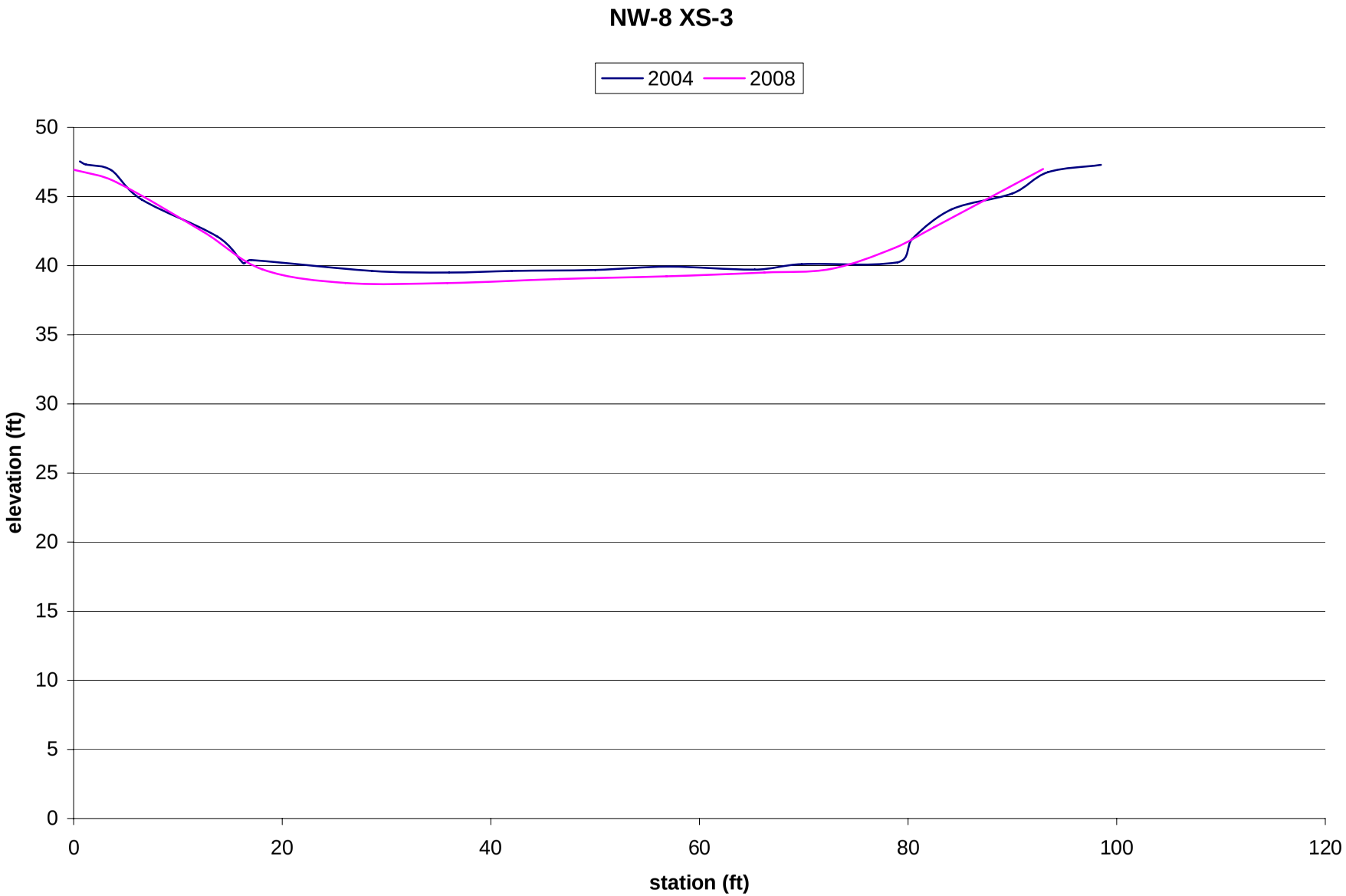

NW-7 Longitudal Profile 2005 and 2008
2005
2008
Elevation (ft)
35
33
31
29
27
25
23
21
19
17
15
0
50
100
150
200
250
300
Station (ft)

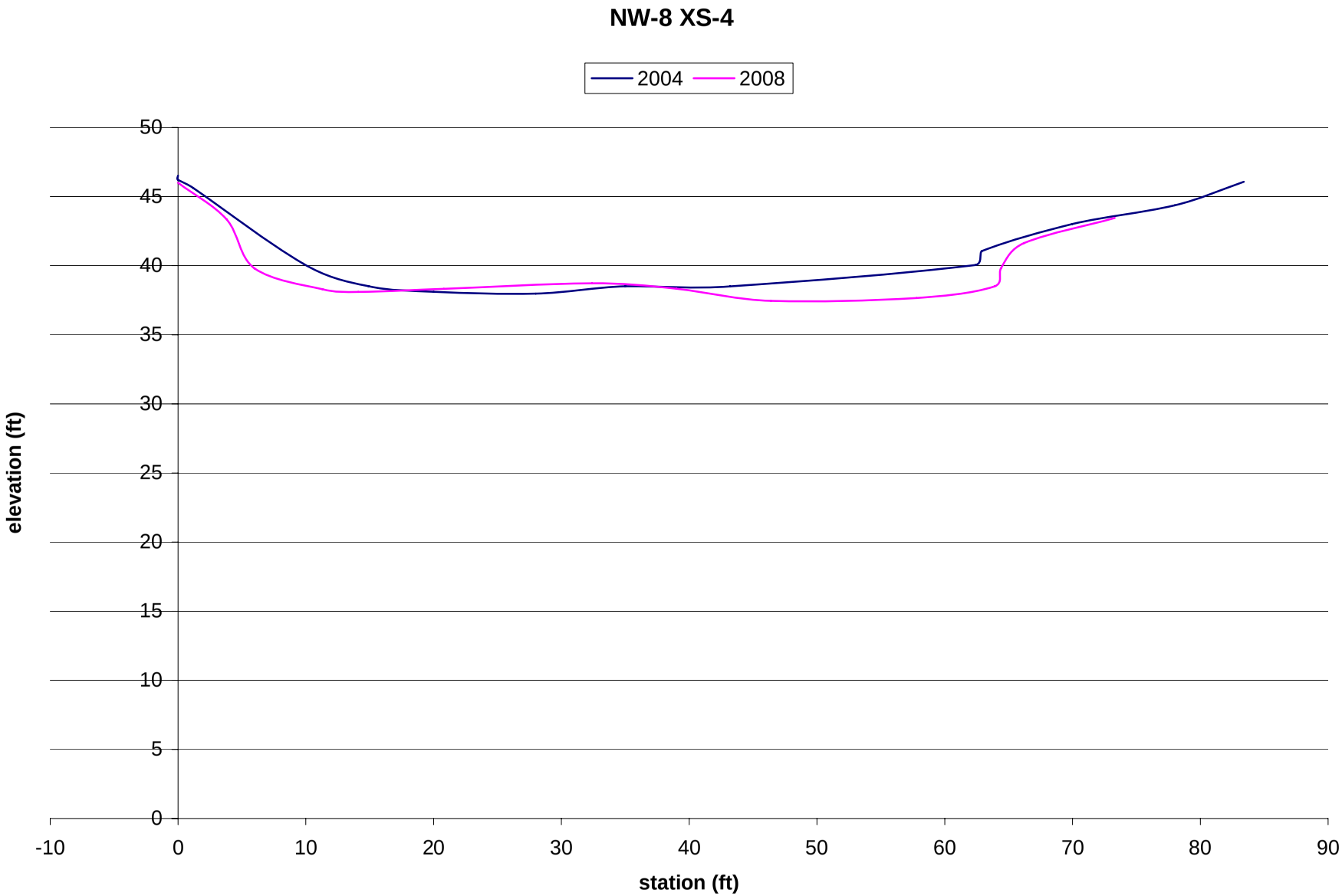

NW-8 Boulders
2005
2008
1321290
1321280
1321270
1321260
1321250
1321240
1321230
1321220
1321210
1321200
473700
473750
473800
473850
473900
473950
474000

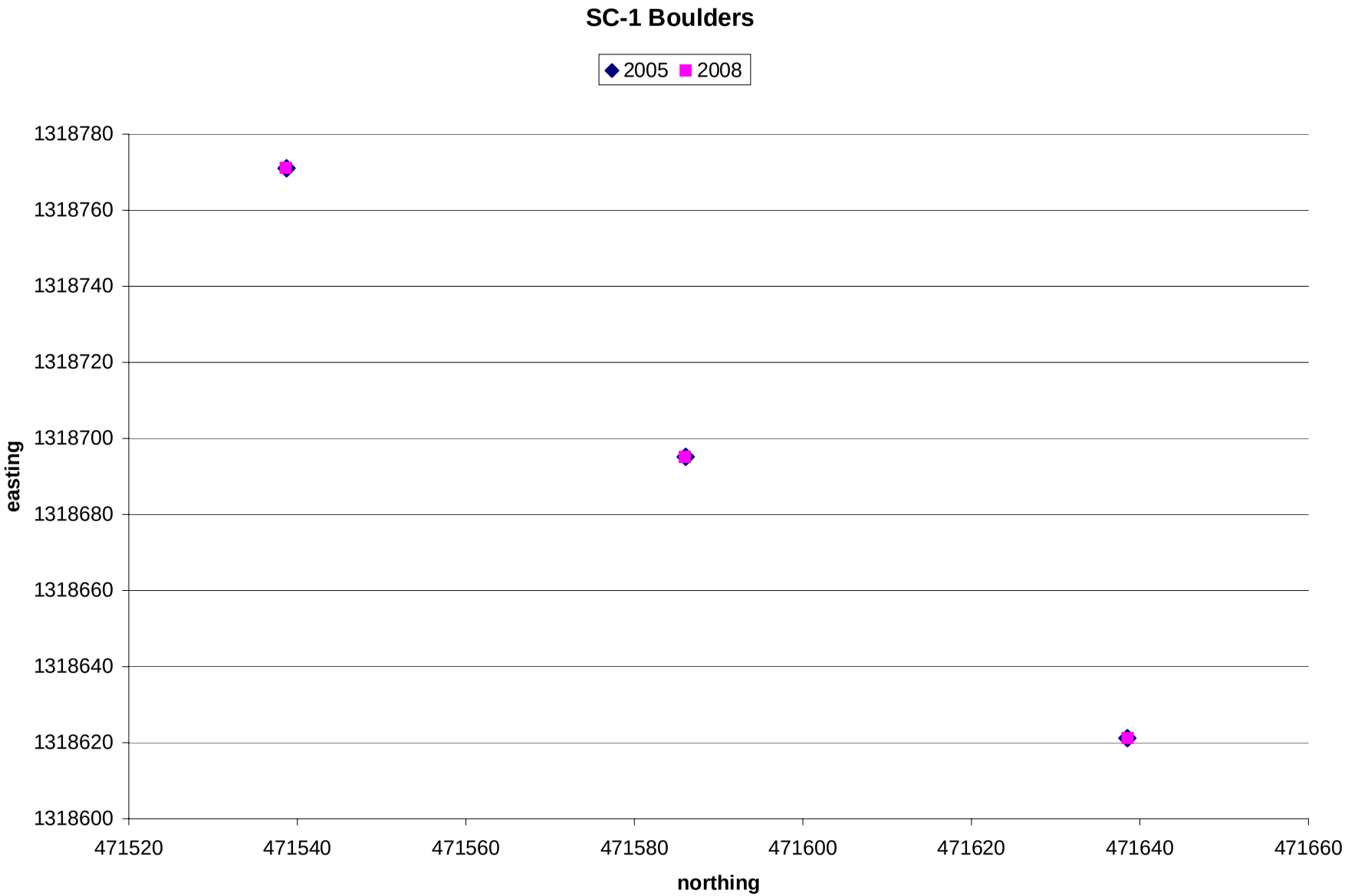

NW-8 Longitudal Profile 2005 and 2008
2005
2008
Elevation (ft)
50
48
46
44
42
40
38
36
34
32
30
0
50
100
150
200
250
300
350
400
450
Station (ft)

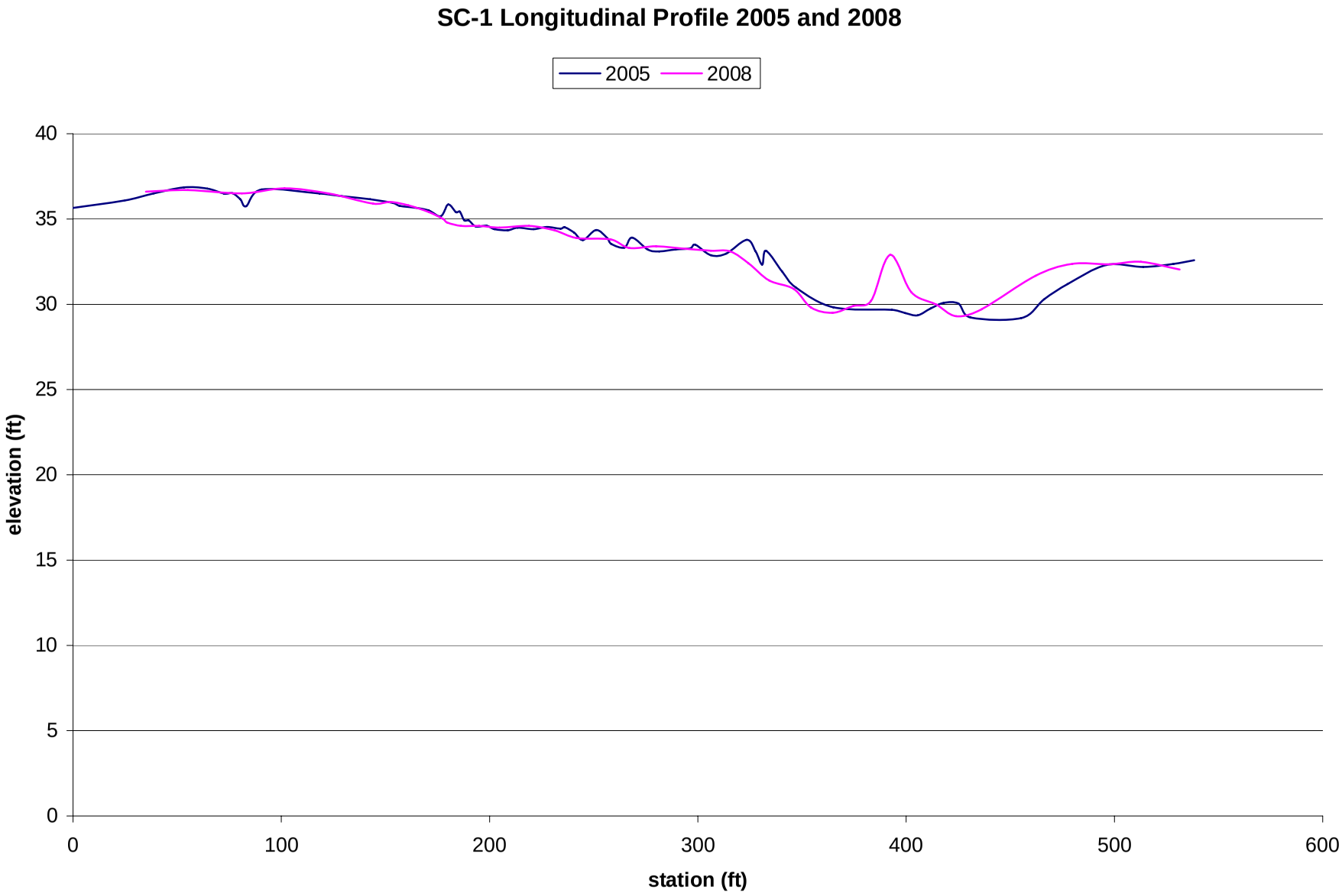

NW-8 XS-1
2004
2008
47
46
45
44
43
42
41
40
39
38
37
elevation (ft)
0
10
20
30
40
50
60
70
80
90
station (ft)

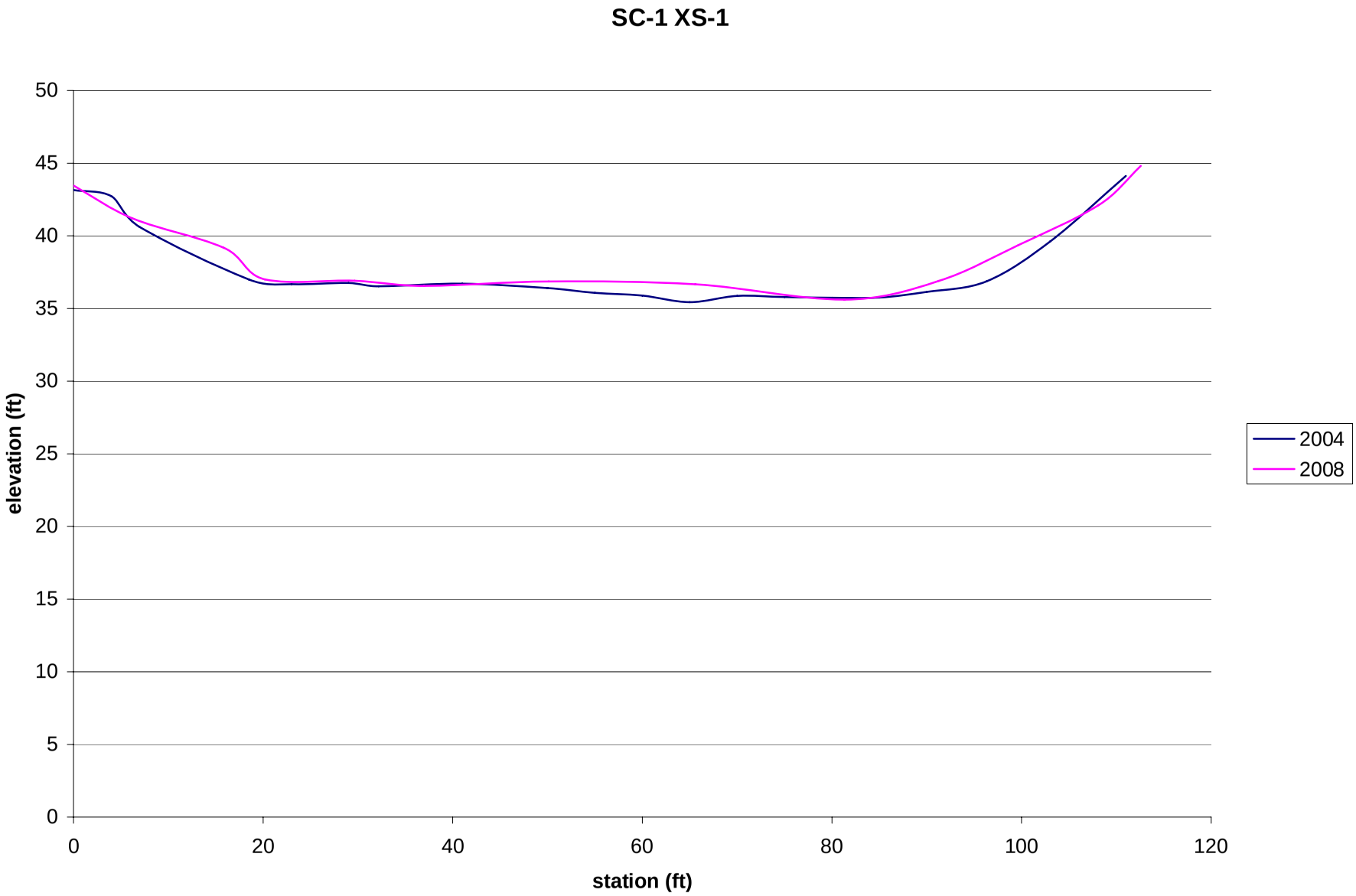

NW-8 XS-2
2004
2008
60
50
40
30
20
10
0
elevation (ft)
0
20
40
60
80
100
120
station (ft)

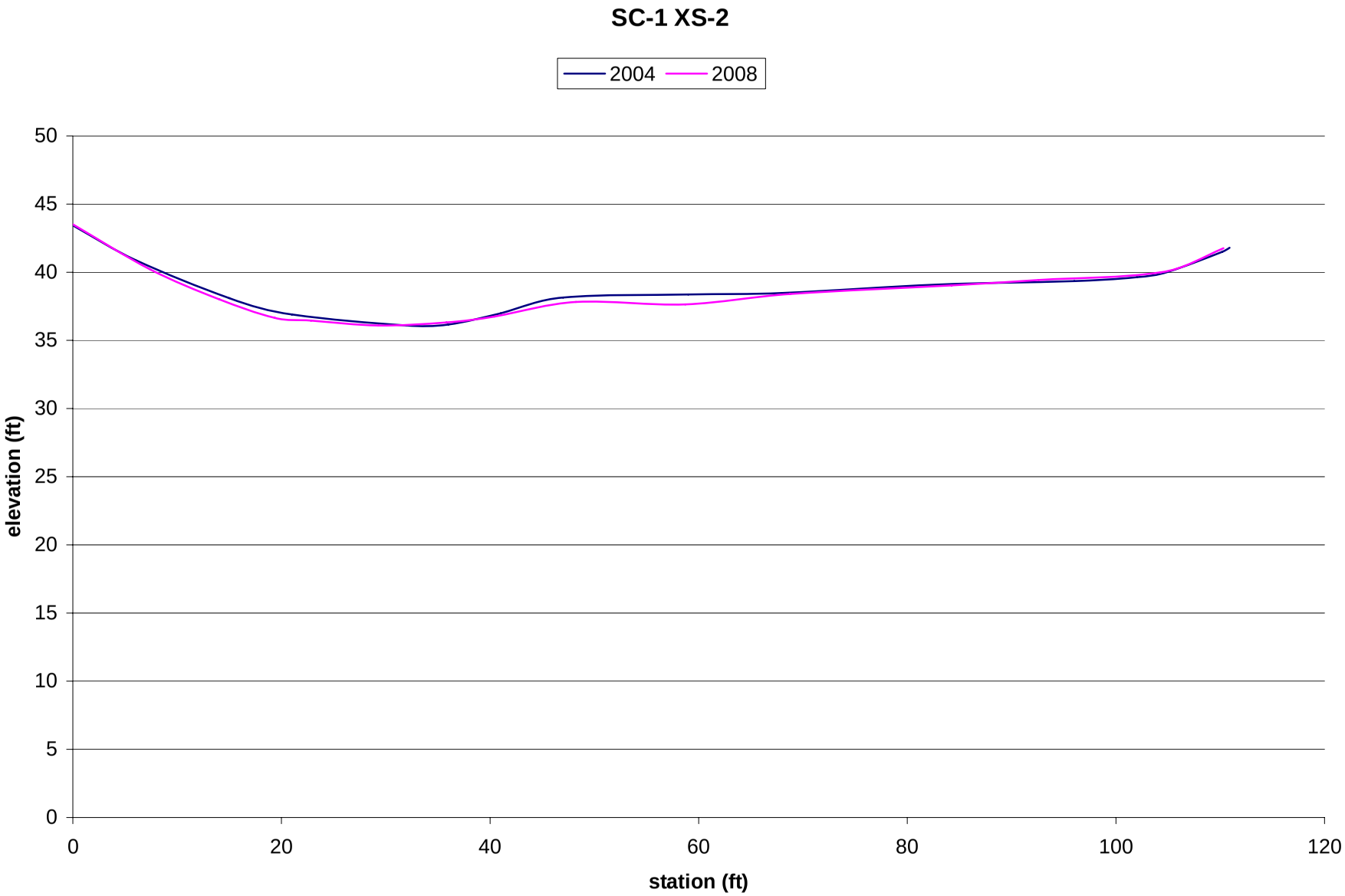

NW-8 XS-3
2004
2008
50
45
40
35
30
25
20
15
10
5
0
elevation (ft)
0
20
40
60
80
100
120
station (ft)

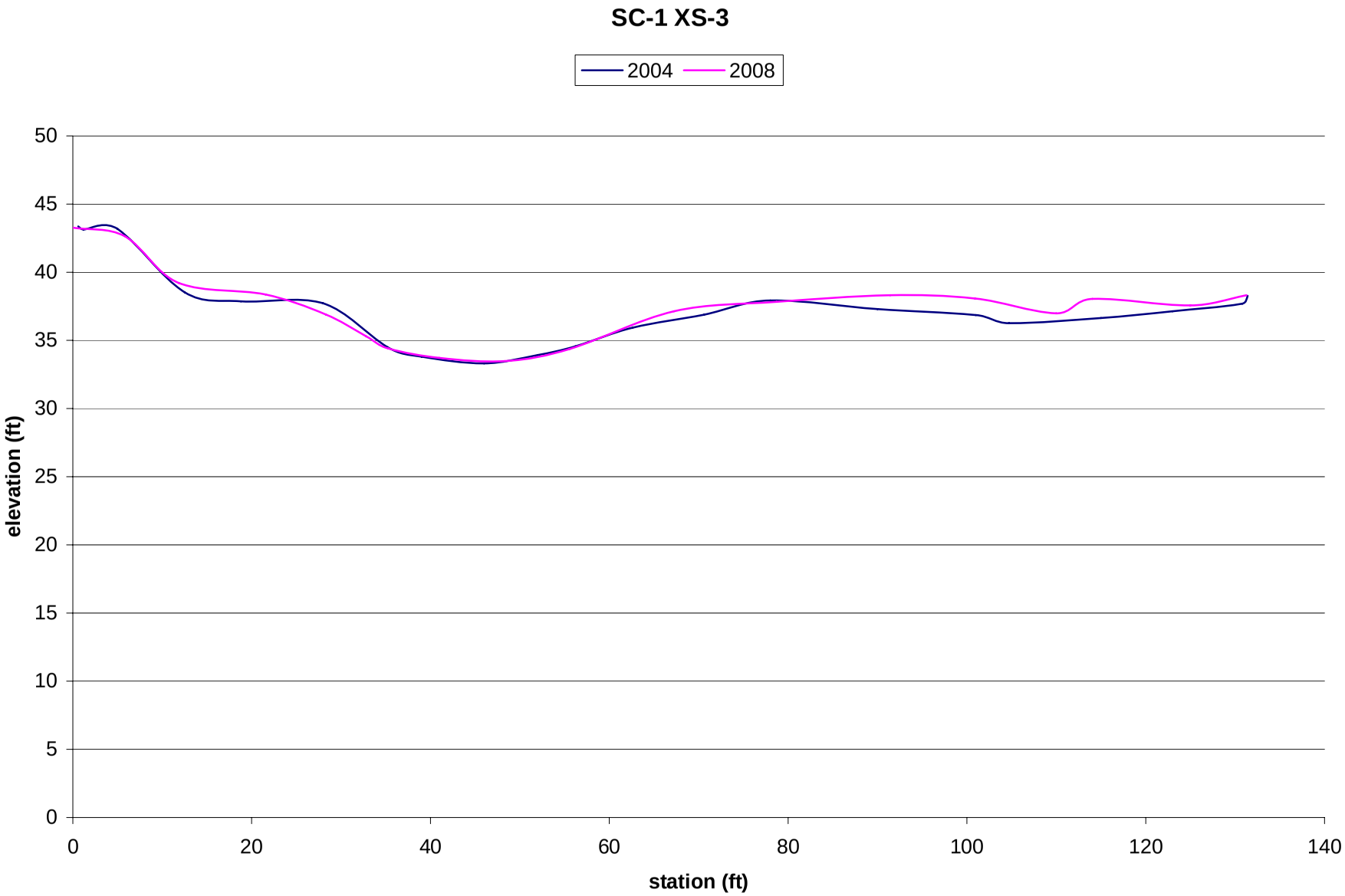

NW-8 XS-4
2004
2008
50
45
40
35
30
25
20
15
10
5
0
elevation (ft)
-10
0
10
20
30
40
50
60
70
80
90
station (ft)

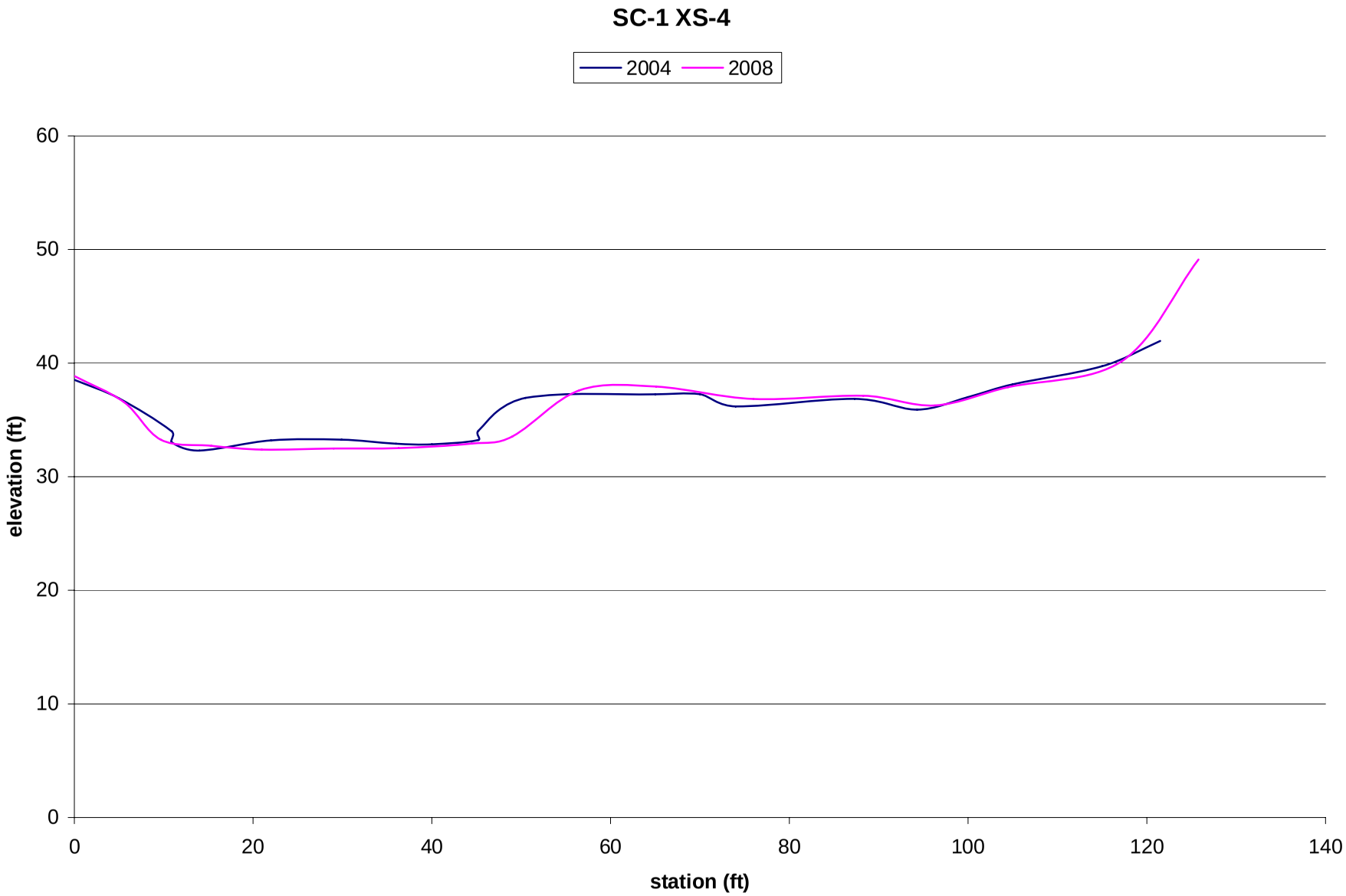

SC-1 Boulders
2005
2008
1318780
1318760
1318740
1318720
1318700
1318680
1318660
1318640
1318620
1318600
easting
471520
471540
471560
471580
471600
471620
471640
471660
northing

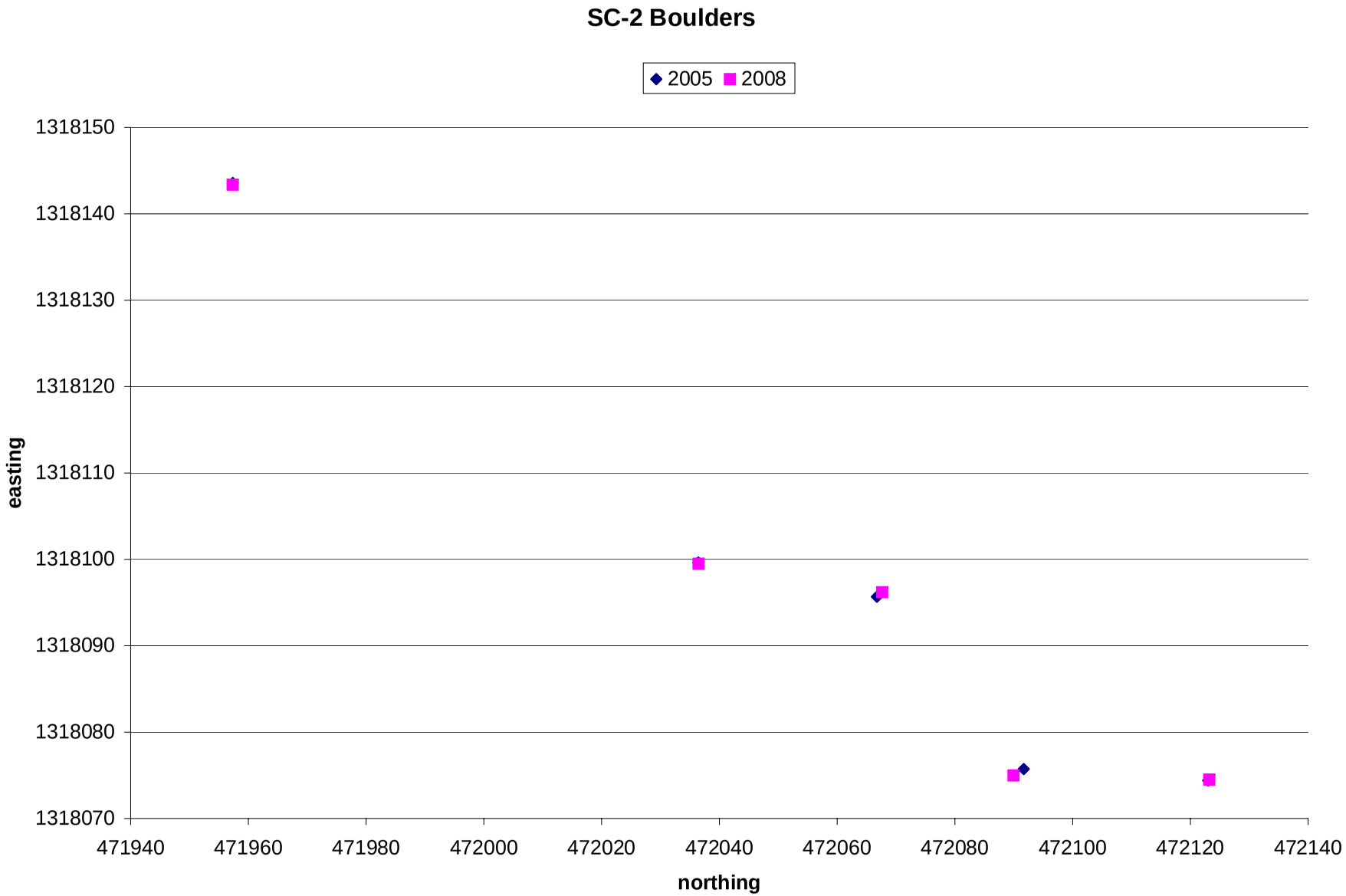

SC-1 Longitudinal Profile 2005 and 2008
2005
2008
elevation (ft)
40
35
30
25
20
15
10
5
0
0
100
200
300
400
500
600
station (ft)

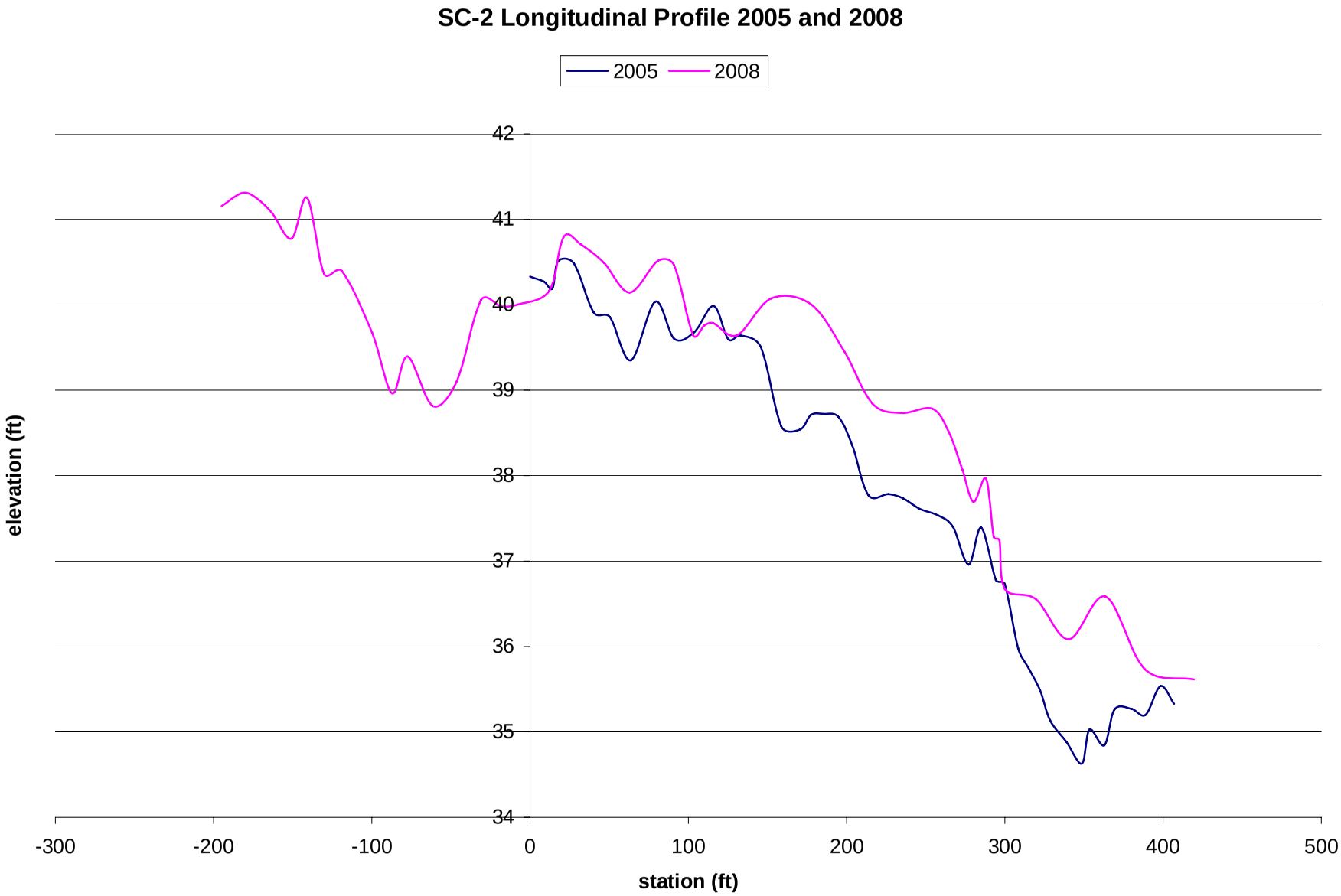

SC-1 XS-1
50
45
40
35
30
25
20
15
10
5
0
elevation (ft)
0
20
40
60
80
100
120
station (ft)
2004
2008

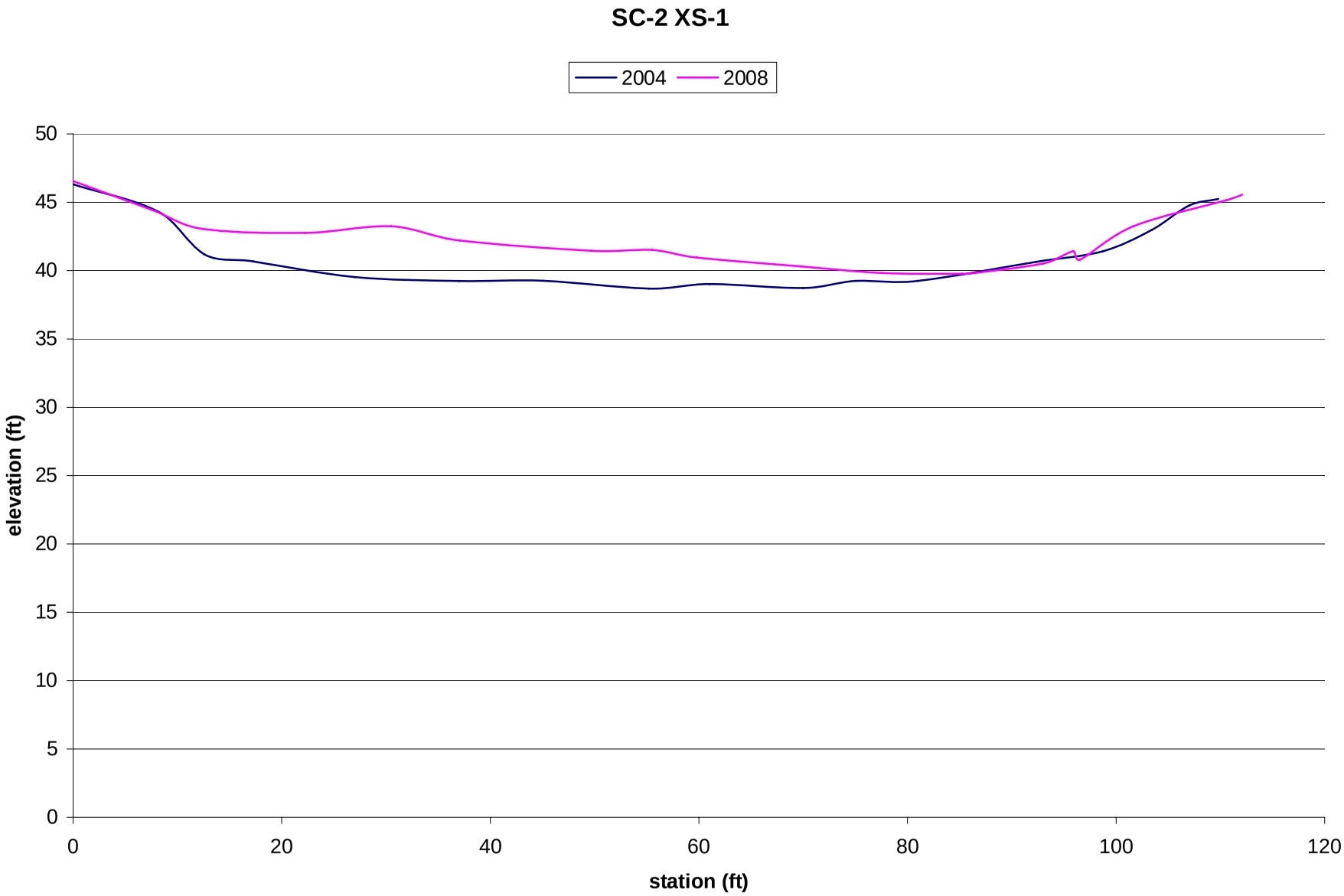

SC-1 XS-2
2004
2008
50
45
40
35
30
25
20
15
10
5
0
elevation (ft)
0
20
40
60
80
100
120
station (ft)

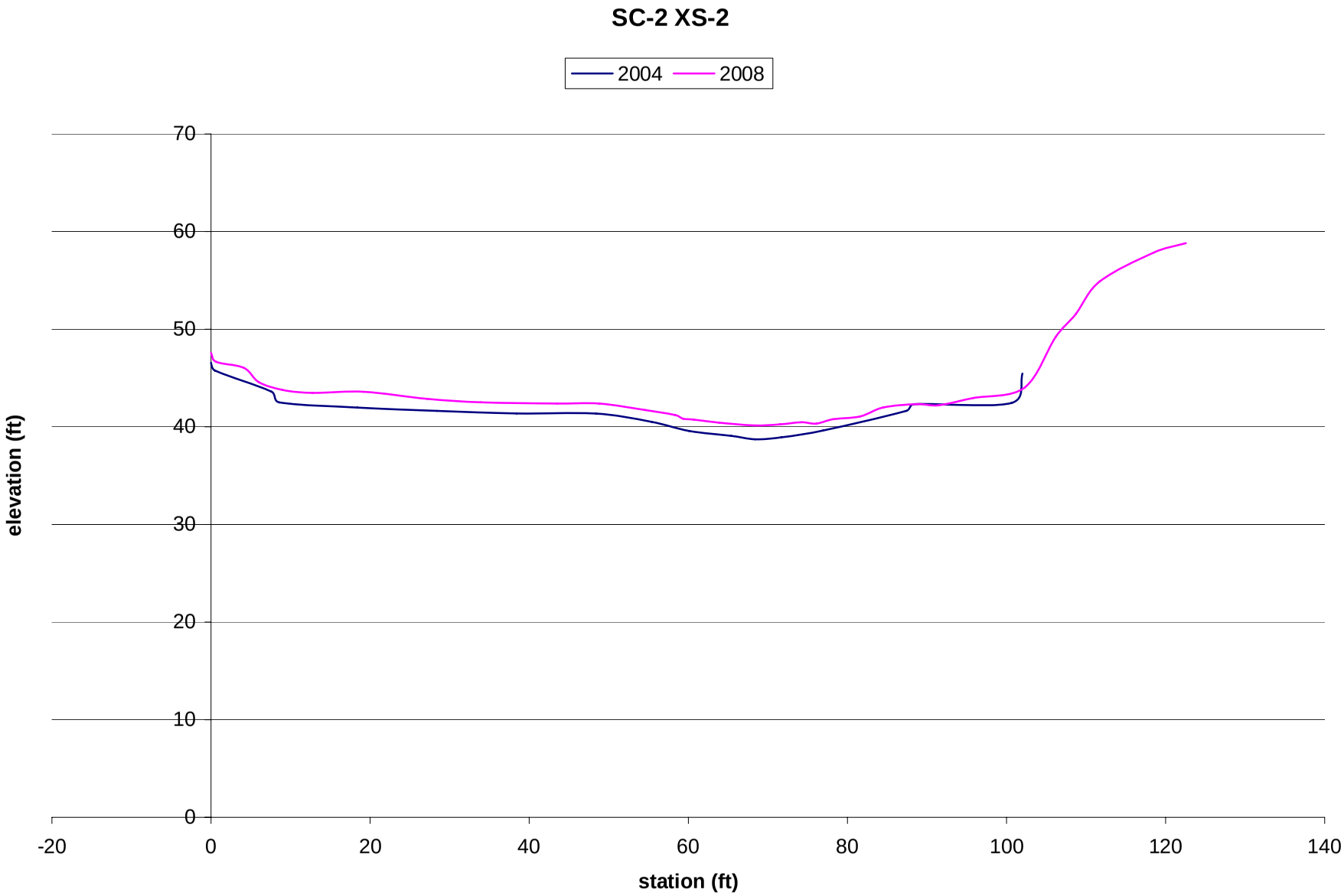

SC-1 XS-3
2004
2008
elevation (ft)
50
45
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
station (ft)

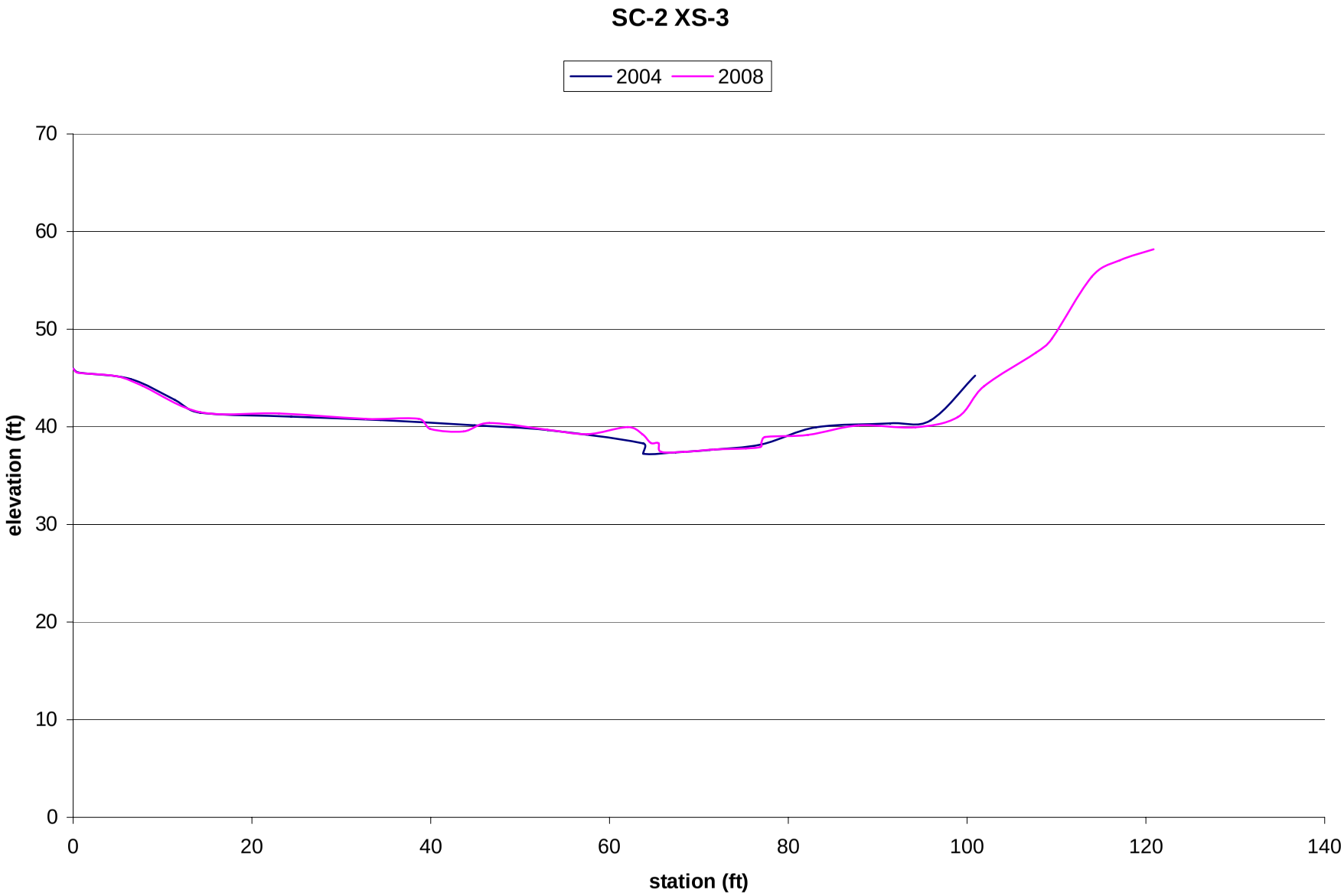

SC-1 XS-4
2004
2008
60
50
40
30
20
10
0
elevation (ft)
0
20
40
60
80
100
120
140
station (ft)

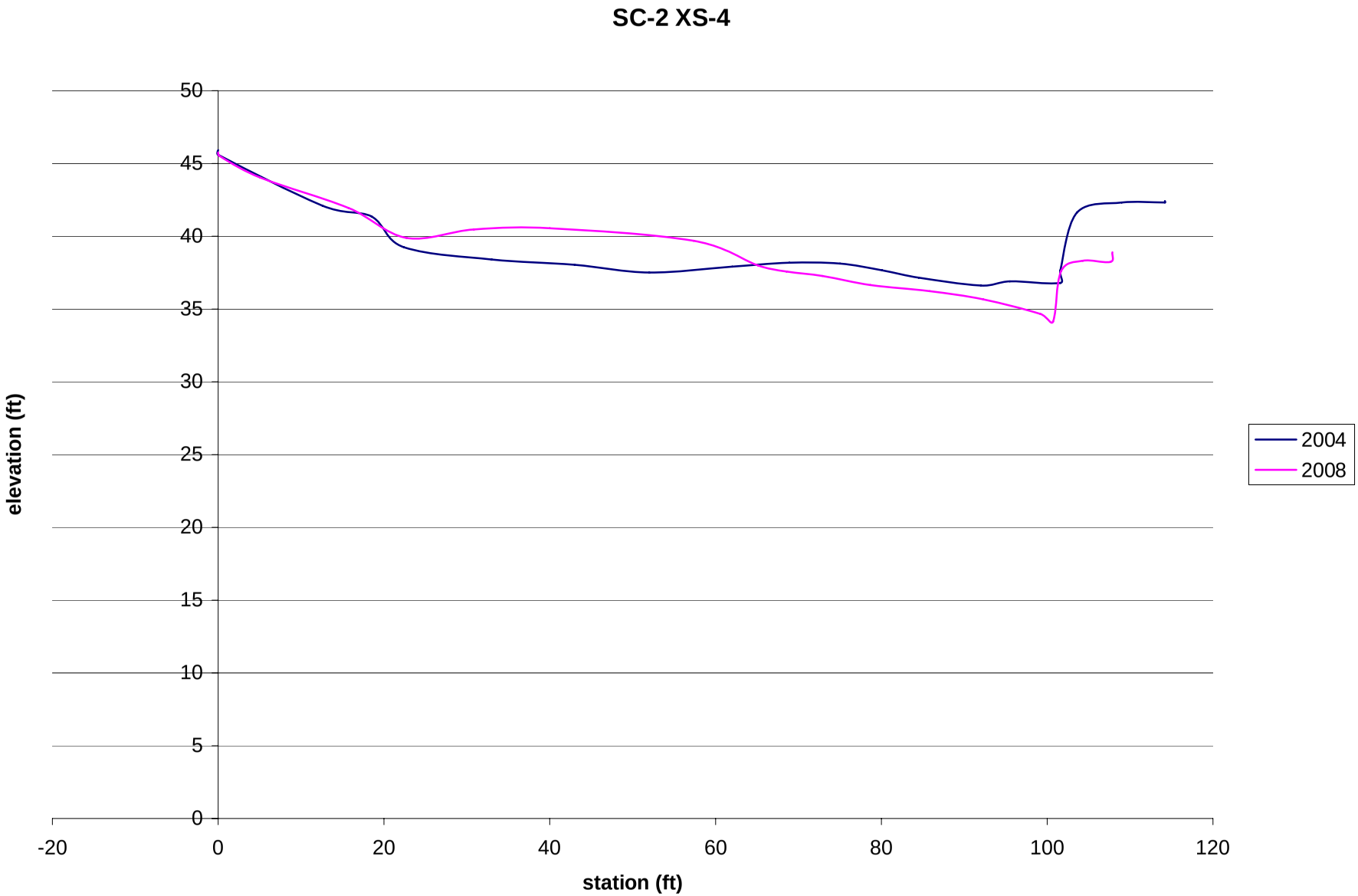

SC-2 Boulders
2005
2008
1318150
1318140
1318130
1318120
1318110
1318100
1318090
1318080
1318070
easting
471940
471960
471980
472000
472020
472040
472060
472080
472100
472120
472140
northing

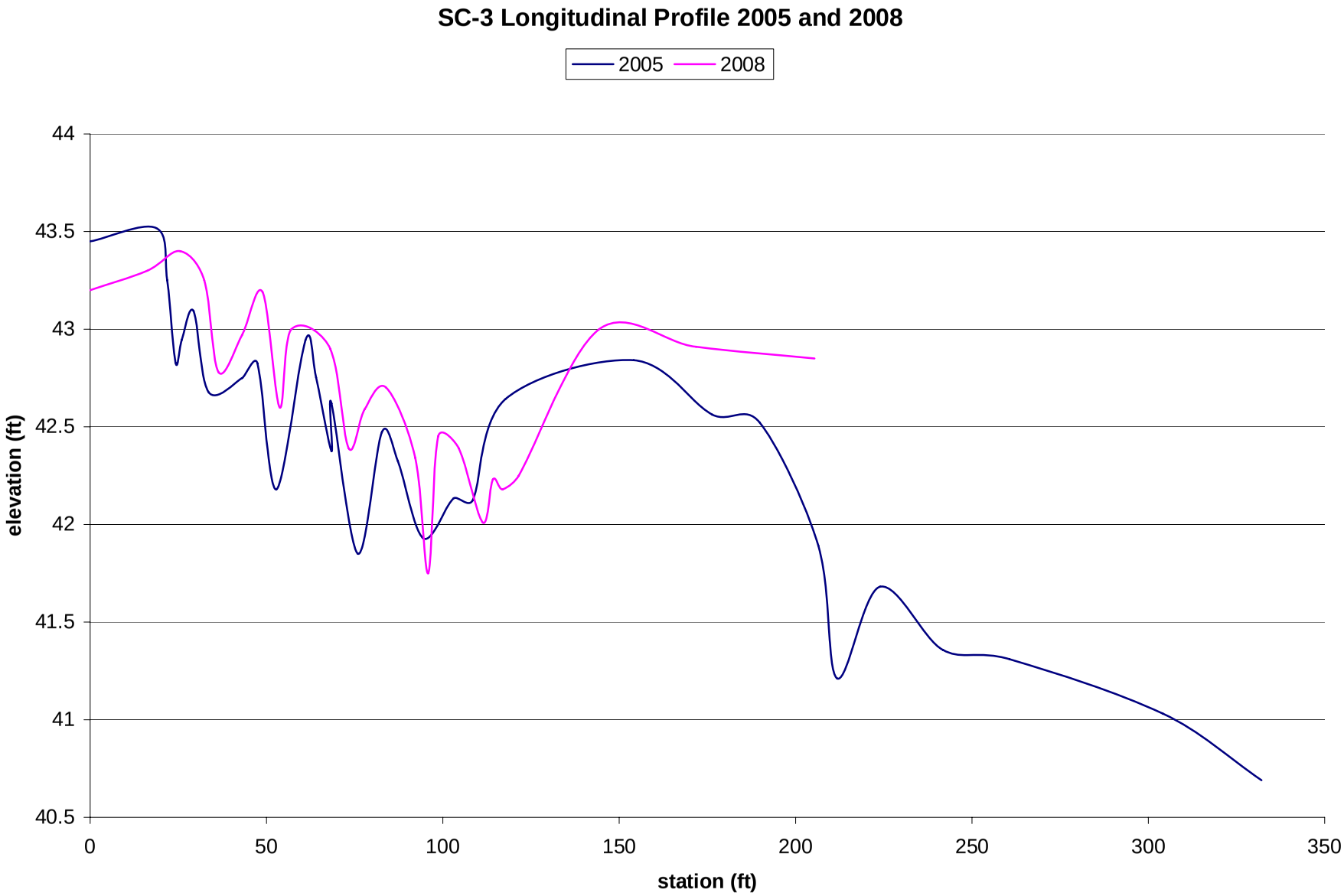

SC-2 Longitudinal Profile 2005 and 2008
2005
2008
elevation (ft)
42
41
40
39
38
37
36
35
34
-300
-200
-100
0
100
200
300
400
500
station (ft)

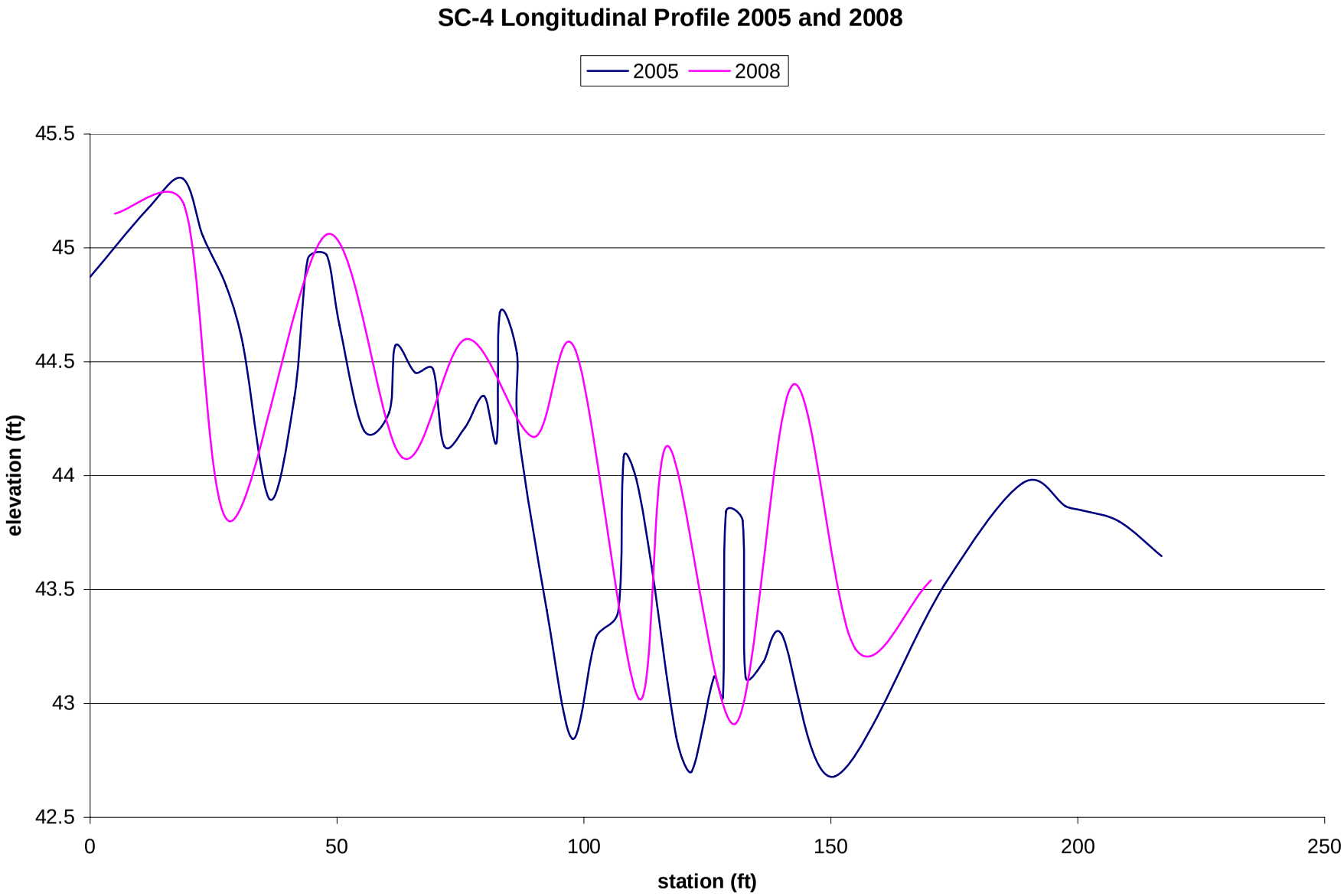

SC-2 XS-1
2004
2008
50
45
40
35
30
25
20
15
10
5
0
elevation (ft)
0
20
40
60
80
100
120
station (ft)


SC-2 XS-2
2004
2008
70
60
50
40
30
20
10
0
elevation (ft)
-20
0
20
40
60
80
100
120
140
station (ft)


SC-2 XS-3
2004
2008
70
60
50
40
30
20
10
0
elevation (ft)
0
20
40
60
80
100
120
140
station (ft)


SC-2 XS-4
50
45
40
35
30
25
20
15
10
5
0
elevation (ft)
-20
0
20
40
60
80
100
120
station (ft)
2004
2008


SC-3 Longitudinal Profile 2005 and 2008
2005
2008
elevation (ft)
44
43.5
43
42.5
42
41.5
41
40.5
0
50
100
150
200
250
300
350
station (ft)


SC-4 Longitudinal Profile 2005 and 2008
2005
2008
45.5
45
44.5
44
43.5
43
42.5
elevation (ft)
0
50
100
150
200
250
station (ft)

APPENDIX D- Velocity and Depth of Water Summary Tables and Discharge Data

Table 1
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-1 Date: 4/18/08 AA Sampler	
Design (9%) to Normal (50%) Q = 21cfs Depth of Water (ft)	Velocity (ft/s)
1.4'	1.05
1.2'	1.54
1.0'	1.58
.8'	1.59
1.0'	1.95
1.1'	2.71
.9'	1.04

Table 2
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-2
Date: 4/18/08
AA Sampler

Design (9%) to Normal (50%) Q = 21cfs Depth of Water (ft)	Velocity (ft/s)
1.0'	1.67
.7'	2.3
1.1'	1.28
.6'	**3.01**
.7'	1.93
.6'	2.37
.6'	2.18
.7'	2.83
.7'	0.92

Table 3
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-3
Date: 4/18/08
AA Sampler

Design (9%) to Normal (50%) Q = 21cfs Depth of Water (ft)	Velocity (ft/s)
1.9'	1.05
.8'	2.7
.8'	**3.1**
.7'	1.92
.9'	1.91
.8'	1.89
1.1'	1.5
.5'	1.32
.7'	0.73

Table 4
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-4 Date: AA Sampler	1
Design (9%) to Normal (50%) Q = 21cfs Depth of Water (ft)	Velocity (ft/s)
1.8'	0.76
1.5'	1.59
1.0'	2.82
1.0'	2.49
.7'	2.19
.8'	2.84
.9'	1.4

Table 5
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-5
Date: 3/18/08
Son Tek File:030180805

Design (9%) to Normal (50%) Q = 25cfs Depth of Water (ft)	Velocity (ft/s)
3.2	0.7018
2.3	1.2047
1	1.5131
1	**3.4528**
1.2	1.5528
1	2.1575
1	2.7536
1.2	1.877
1.4	0.0702
1	1.1929
1.9	0.5604
2.5	0.3566

Table 6
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-6 Date: 3/18/08 Son Tek File:03180867	
Design (9%) to Normal (50%) Q = 25cfs Depth of Water (ft)	Velocity (ft/s)
1.9	0.6152
1.9	1.6299
1.9	2.3524
1	1.6188
1	2.3625
0.9	1.9177
1	2.3596
1.3	1.4577
1	1.9495
0.9	**3.3373**
0.9	**3.1004**
0.9	2.3579
1.1	1.7641
1.4	**3.4403**
1.2	0.375
0.7	1.393
1	2.1532
1	0.9531
1	1.8251
1.5	0.5541
1.5	2.2313
1	1.6158
1.3	0.541
1.3	1.8074
1.3	1.2733
2.3	0.6785
2.6	0.5089
2	1.0653
1.6	1.5171
2	1.8638
1.6	2.5157
1.4	2.1778
1.4	2.3766
1.4	2.3212

Table 7
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-7 Date: 3/18/08 Son Tek File:03180867	
Design (9%) to Normal (50%) Q = 25cfs	
Depth of Water (ft)	Velocity (ft/s)
1.4	**3.001**
1.2	1.9055
1.2	2.0574
1.3	1.7346
1.4	1.2477
1.3	1.7598
1	2.0154
1	**3.4777**
1.7	1.6079
1.8	1.2615
1.9	2.1998
1.5	2.4567
1	**3.2979**
1	2.9921
1.5	2.9774
1	0.2871
1.2	0.9465
1.3	1.7057
1.5	1.0978
1.5	1.2392
1.7	0.4616

Table 8
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-8
Date: 4/18/08
AA Sampler

Design (9%) to Normal (50%) Q = 21cfs Depth of Water (ft)	Velocity (ft/s)
.8'	0.66
1.1'	0.45
1.2'	0.52
1.0'	0.87
1.0'	0.69
1.1'	0.6
1.2'	0.85

Table 9
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

SC-1
Date: 3/19/08
Son Tek File:03190801

Design (9%) to Normal (50%) Q = 6cfs

Depth of Water (ft)	Velocity (ft/s)
3.1	1.2405
1.1	2.5489
1	1.5689
0.9	1.4101
1	1.042
0.7	1.0125
1.1	1.3491
0.6	**3.3533**
0.5	2.4498
0.8	2.6371
0.7	1.2093
0.7	0.7047
0.7	1.5174
0.6	1.685
0.8	1.5289
0.7	1.7651
0.5	2.2418
0.7	1.0725
0.5	0.8566
0.4	1.4272
0.3	1.522
0.3	1.3911
0.3	1.3166
0.6	2.4111
0.7	2.7395
0.8	0.3652

Table 10
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

SC-2
Date: 3/19/08
Son Tek File: 03190802

Design (9%) to Normal (50%) Q = 9cfs

Depth of Water (ft)	Velocity (ft/s)
1.7	0.4816
1	1.0495
1.1	1.2618
0.8	1.7615
0.9	1.0525
0.7	1.248
0.7	2.1309
1	1.769
1	1.2201
0.6	1.5407
0.9	1.4974
0.7	1.4961
0.8	1.064
8	1.8241
0.6	1.4478
0.7	1.8875
0.7	2.1388
0.5	1.8428
0.8	0.3573
1	0.4987
1	0.4961
1	0.3606
1	0.5361
1	0.6962
1.1	0.5466
0.5	1.0801
0.7	**3.4987**
1	0.5039
1.1	0.2694

Table 11
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

SC-3
Date: 4/17/08
AA Sampler

Design (9%) to Normal (50%) Q = 8cfs Depth of Water (ft)	Velocity (ft/s)
1.1'	1.56
1.1'	1.12
1.2'	0.71
1.1’	1.56
1.0’	1.45
1.4’	0.57
.7’	1.98
.9’	1.74
.8’	1.2
.6’	2.8
.6’	1.85
.8’	0.79
.7’	1.84
1.0’	2.02
.6’	1.12

Table 12
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

SC-4
Date:4/17/08
AA Sampler

Design (9%) to Normal (50%) Q = 8cfs Depth of Water (ft)	Velocity (ft/s)
.9'	2.65
.8'	2.4
.9'	0.88
.7'	1.69
.8'	1.63
.8'	0.8
.6'	2.5
.6'	1.63
.7'	0.64
.8'	1.62
1.3'	1.21
1.1'	1.81
.4'	**4.38**
.6'	2.06
.8'	1.02
.9'	1.06
.8'	1.14
.7'	1.6

Table 13
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-1
Date: 4/23/08
AA Sampler

Design (50%) to High (90%) Q = 73cfs Depth of Water (ft)	Velocity (ft/s)
2.5	1.91
1.1	1.89
2.0	1.66
2.1	1.80
2.0	1.61
2.0	2.80
1.5	2.40
1.5	2.03
1.4	2.70
1.8	**3.06**
1.6	**3.88**
1.4	**4.65**
2.2	1.73
1.6	2.58
1.8	1.60
2.0	1.32

Table 14
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-2
Date: 4/23/08
AA Sampler

Design (50%) to High (90%) Q = 71cfs Depth of Water (ft)	Velocity (ft/s)
3.3	1.06
2.5	.71
1.2	1.99
1.7	1.39
1.6	2.21
1.4	**3.30**
1.6	2.60
1.8	2.14
1.2	2.31
1.2	**3.50**
1.6	2.33
1.4	2.22
1.5	1.99
1.4	**4.17**
1.1	1.73
1.2	2.87
1.5	1.86
1.5	**3.19**
1.4	2.66
1.7	2.62
1.4	**3.28**
1.4	1.45
1.4	**3.27**
1.9	1.34

Table 15
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-3
Date: 4/30/08
AA]sampler

Design (50%) to High (90%) Q = 58cfs

Depth of Water (ft)	Velocity (ft/s)
.8	.89
.9	2.46
1.2	2.19
.7	2.95
1.4	2.57
.9	2.51
1.1	2.47
1.2	**3.33**
1.5	2.56
2.5	2.04
1.4	1.79

Table 16
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-4
Date: 4/30/08
AA Sampler

Design (50%) to High (90%) Q = 54cfs Depth of Water (ft)	Velocity (ft/s)
2.5	1.7
2.0	2.48
1.7	1.9
1.0	2.25
1.2	**3.97**
1.2	2.93
1.2	**3.98**
1.1	2.98
1.3	2.23
1.5	.77

Table 17
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-5
Date: 4/30/08
AA Sampler

Design (50%) to High (90%) Q = 54cfs Depth of Water (ft)	Velocity (ft/s)
3.6	1.52
2.7	1.08
1.2	1.65
1.0	1.97
1.2	.89
1.1	1.44
2.2	.76

Table 18
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-6
Date: 4/30/08
AA Sampler

Design (50%) to High (90%) Q = 51cfs Depth of Water (ft)	Velocity (ft/s)
2.0	.98
2.0	1.95
1.6	1.85
1.1	**4.24**
1.0	2.97
1.1	2.92
1.0	.95
1.5	1.83
1.0	2.07
1.2	3.76
1.5	2.58
1.6	1.55

Table 19
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-7
Date: 4/30/08
AA Sampler

Design (50%) to High (90%) Q = 53cfs Depth of Water (ft)	Velocity (ft/s)
2.4	1.49
1.6	2.45
2.0	2.04
1.2	2.93
1.7	**3.56**
1.7	2.09
2.0	**3.15**
1.0	**3.79**
1.0	**3.6**
1.5	1.88
2.5	.69

Table 20
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

NW-8
Date: 4/30/08
AA Sampler

Design (50%) to High (90%) Q = 41cfs

Depth of Water (ft)	Velocity (ft/s)
1.4	.54
1.3	1.13
1.5	.73
1.2	.95
1.3	.89
1.6	.87
1.5	.9
1.2	.9
1.6	.93
1.7	1.01
1.6	1.07
1.6	1.12
1.4	1.4
1.6	1.32
1.7	1.01
1.4	1.53
1.8	1.08
1.8	1.17
1.4	1.8
1.6	.9
1.9	.83
2.0	.81

Table 21
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

SC-1
Date: 4/29/08
AA Sampler

Design (50%) to High (90%) Q = 36cfs Depth of Water (ft)	Velocity (ft/s)
2.6	1.37
2.4	1.71
1.0	2.49
1.2	1.09
2.0	1.31
1.5	2.24
1.3	1.63
1.0	**3.23**
1.5	1.77
1.2	2.17
1.2	1.82
1.0	**3.51**
1.1	1.22
1.7	2.84
1.2	1.66
.9	1.62

Table 22
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

SC-2
Date: 4/29/08
AA Sampler

Design (50%) to High (90%) Q = 35cfs Depth of Water (ft)	Velocity (ft/s)
2.3	.16
1.6	**3.02**
1.2	**3.14**
1.1	1.34
1.0	**3.69**
1.2	**3.2**
1.5	**4.5**
1.5	1.96
1.0	**3.28**
1.0	2.79
1.6	1.8
1.0	2.99
.9	2.54
1.6	1.06
1.4	1.16
1.1	1.1

Table 23
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

SC-3
Date: 4/29/08
AA Sampler

Design (50%) to High (90%) Q = 34cfs Depth of Water (ft)	Velocity (ft/s)
1.2	2.73
1.5	1.69
1.5	1.14
1.3	2.19
1.3	1.99
1.4	1.46
1.3	**3.56**
1.4	1.41
1.2	1.56
1.0	**3.7**
1.0	**3.75**
1.1	2.12
1.2	**3.26**
1.3	1.8
1.3	.95

Table 24
Woodrow Wilson Bridge
Post-Construction Monitoring
Velocity and Depth of Water Summary
Spring 2008

SC-4
Date: 4/29/08
AA Sampler

Design (50%) to High (90%) Q = 34cfs Depth of Water (ft)	Velocity (ft/s)
1.0	**4.47**
1.1	**3.31**
1.5	1.98
1.6	**3.36**
1.2	2.57
1.4	1.32
1.3	**5.0**
1.0	**3.01**
1.2	1.16
1.3	1.75
1.2	2.35
1.7	1.65
1.0	**4.61**
.6	**5.02**
1.3	1.57
1.3	2.29
1.4	2.05
1.4	.83

APPENDIX E- Visual Assessment Forms

SITE ID: NW1 DATE: 1/8/08

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: WWB Northwest Branch **Date:** 1/8/08

Site ID: NW1 **Flow:** _____ CFS

Staff: MH, LW, DF, DK **Estimated/Measured/Gage**

Previous Conditions: rain in pm for past 3 days **Weather:** Sunny, 60's

Reason For Visit: Annual Stream Survey

Photograghs:

Photo #	Description	Camera/File Number
1	~~Cross section~~ 4 - Monument 3	NW1 M3-M4_1
2	US from end of structure	NW1 US_2
3	DS	NW1 DS_3
4	Monument 1 - Monument 2	NW1 M1-M2_4
5,6,7,8,9	Stream Survey, Cross Section surveys	
10.		

Longitudinal Profile Notes:

General: looks good, water is falling off the rocks where it's supposed to and moving slower on river left as designed

Sedimentation: (Location, Severity): water is running clear; some collecting on the rocks on bottom - normal

Scour: (Location, Severity): none apparent through the structure

Structural Assessment:

General Condition: • Deeper channel just before ~~channel~~ structure
• did 4 cross sections to map depths, and located 3 of boulders to check for movement
• Steady flow through the structure

Movement of Rock/Stone Apparent:

Blockages Present: No. Type: large tree located just South of Bridge

Floodplain Deposition/Scour: None apparent

Bank Erosion: None apparent upstream or downstream or w/in

Upstream/Downstream Changes: Some branches and leaf litter d.s. of structure due to metal structure just before bridge

Additional Comments/Notes:

Velocity monitoring will be done in March or April

Use Back if Necessary

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

DATE: _____

SITE ID: _____

Stream Mitigation Project: WWB **Date:** 1-15-08

Site ID: NW-2 **Flow:** _____ CFS

Staff: MH, DK, DF, CS **Estimated/Measured/Gage**

Previous Conditions: See monthly visual assessment & previous monitoring reports **Weather:** Cold 30-40 Snow/mud Clear - Partly cloudy

Reason For Visit: 5 year Monitoring

Photograghs:		**Camera:**
Photo #	Description	File Name:
1	Upstream	
2	downstream	
3, 4, 5	Cross sections	
6, 7, 8, 9	Cross Sections	
10 11	Cross section 1 12+13 B/W	

Longitudinal Profile Notes:

General: Good flow through the structure, structure still in general linear formation, width is same as visual at apparent upstream or downstream changes in width or curvature

Sedimentation: (Location, Severity): turbid main flow down center of creek some sedimentation on floodplain river right

Scour: (Location, Severity): Not apparent, will analysis w/survey data

Structural Assessment:

General Condition: Rocks are stable, good flow through the structure w/ some slow pooling on river right as designed

Movement of Rock/Stone Apparent: not apparent, will analyze w/survey data

Blockages Present: not major Type: leaf litter, small sticks

Floodplain Deposition/Scour: river right, some deposition in/over rocks

Bank Erosion: Not apparent

Upstream/Downstream Changes: none apparent

Additional Comments/Notes:

Use Back if Necessary

***File name refers to file designation on camera display not the shot number.**

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

DATE: _____

SITE ID: _____

Stream Mitigation Project: WWB - Northwest Branch **Date:** 1/16/08

Site ID: NW3 **Flow:** _____ CFS

Staff: MH, LW, DF, DK **Estimated/Measured/Gage**

Previous Conditions: Light snow yesterday **Weather:** 40's, slight Breeze, sunny

Reason For Visit: Monitoring Assessment

Photograghs: **Camera:**

Photo #	Description	File Name:
14, 18	downstream	
15, 16, 17	Upstream	
19	Upstream cobble bar, pipe	

Longitudinal Profile Notes:

General: Good flow through the structure, deviation on river right cobble is building up and it is separated from majority of flow, lots of aquatic vegetation is growing on cobble. Pool on far river right completely isolated from main flow appears to be shorter and narrower than last month

Sedimentation: (Location, Severity): not apparent, after analysis of survey data will know for sure

Scour: (Location, Severity): not apparent

Structural Assessment:

General Condition: Flow seems consistent across the structures. Some larger boulders are diverting water out of the main flow some boulders are surrounded by cobble and there is no flow around them

Movement of Rock/Stone Apparent: not apparent

Blockages Present: none Type: Some trash collecting behind boulders

Floodplain Deposition/Scour: not apparent

Bank Erosion: not apparent

Upstream/Downstream Changes: Some cobble building ds

Additional Comments/Notes:

Use Back if Necessary

***File name refers to file designation on camera display not the shot number.**

SITE ID: NW-4 DATE: 2-29-08

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: WWB **Date:** 2-29-08

Site ID: NW-4 **Flow:** _____ CFS

Staff: MH DK **Estimated/Measured/Gage**

Previous Conditions: See monthly visual assessment & 2007 report **Weather:** Cold

Reason For Visit: Annual assement - Longpro

Photograghs:		**Camera:**
Photo #	Description	File Name:

Longitudinal Profile Notes:

General: Good flow diversity and depths through the REC. Stable slope with no major breaks in grade. Deep pool at the bottom of structure

Sedimentation: (Location, Severity): very minor - well maintained baseflow channel

Scour: (Location, Severity): No - not apparent

Structural Assessment:

General Condition: Stable and passable for fish migration good floodplain reach & well defined channel

Movement of Rock/Stone Apparent: Not apparent

Blockages Present: No Type:

Floodplain Deposition/Scour: some sand deposition on floodplain

Bank Erosion: Not apparent

Upstream/Downstream Changes: Not apparent

Additional Comments/Notes:

Use Back if Necessary

***File name refers to file designation on camera display not the shot number.**

1/2

SITE ID: NW-5 DATE: 3-18-08

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: NORTHWEST BRANCH **Date:** 3-18-08

Site ID: NW-5 **Flow:** 25 CFS 12:15PM

Staff: RG | DK | DD **Estimated/Measured/Gage**

Previous Conditions: **Weather:** PTLY CLDY 50's

Reason For Visit: ANNUAL MONITORING - Full SURVEY

Photograghs:		Camera:
Photo.#	Description	File Name:

Longitudinal Profile Notes: HEAD CUT HAS MIGRATED UPSTREAM APPROXIMATELY 8-9 Feet SINCE LAST YEAR.
HC PRESENTS @ .25-.5' DROP BUT W/ AMPLE DEPTH @ SURVEY PT.

Sedimentation: (Location, Severity): NO SIGNIFICANT DEP IN RGC STRUCTURE
SOM SANDY DEP ON LB BKT AREA & TOE.

Scour: (Location, Severity): LARGE SCR HOLE BELOW HEAD CUT, WAS PRESENT LAST YEAR.
SCOUR ON LEFT INTERFACE OF BANK & RGC @ DOWN COUNT OF RGC BAT. WAS ALSO PRESENT LAST YEAR.
NEITHER APPEAR TO HAVE WORSENED

Structural Assessment:

General Condition: OVERALL STRUCTURE SEEMS SIMILAR AS LAST YEAR.
HEADCUT APPEARS TO BE ABLE TO PASS FISH, HOWEVER NEED TO SEE DEPTHS @ LOWER FLOWS.

Movement of Rock/Stone Apparent: HEADCUT MVMT OF BED MATERIAL @ BOTTOM OF RGC PREVIOUSLY MAINTAINED

Blockages Present: NA **Type:**

Floodplain Deposition/Scour: SOME SAND DEPOSITS OBSERVED ON LFT FP

Bank Erosion: NA

Upstream/Downstream Changes: DS RB GABION FAILURE - PRESENT LAST YEAR. DOESN'T APPEAR TO HAVE WORSENED

Additional Comments/Notes:
FULL SURVEY DUE TO WASH GAS INSTALLING CONCRETE MATTRESSES UPSTREAM OF RGC. GROUT MATTRESSES AND BAD DSM'S (MAJOR SIZED) STREAM UPSTREAM OF RGC CURRENTLY DOESN'T APPEAR TO BE MAJOR ISSUE, BUT IF PIECES BECOME DISLODGED AND SETTLE IN STRUCTURE THEY COULD CAUSE FLOW TO INITIATE

Use Back if Necessary

*File name refers to file designation on camera display not the shot number.

NW6 4/1

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

DATE: _____

SITE ID: _____

Stream Mitigation Project: Northwest **Date:** 3-18-08

Site ID: NW-6 **Flow:** 25 CFS

Staff: RG / DK | DO **Estimated/Measured/Gage**

Previous Conditions: _____ **Weather:** P - Cloudy 50

Reason For Visit: Annual Monitoring - Long Profile

Photograghs: **Camera:**

Photo #	Description	File Name:

Longitudinal Profile Notes:

General: Bed material appears to be stable — bottom layer has become imbricated

Sedimentation: (Location, Severity): Small amounts throughout structure sand and fine gravel, small cobble

Scour: (Location, Severity): None

Structural Assessment:

General Condition: Riffle grade control structure appears to be stable, some scour on Rt bank closer to top of bank

Movement of Rock/Stone Apparent: No

Blockages Present: No Type:

Floodplain Deposition/Scour: See above

Bank Erosion: See above

Upstream/Downstream Changes: None

Additional Comments/Notes:

Use Back if Necessary

***File name refers to file designation on camera display not the shot number.**

NW-7 1/1

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

DATE: _____ SITE ID: _____

Stream Mitigation Project: Northwest **Date:** 3-18-08

Site ID: NW-7 **Flow:** 25 CFS

Staff: RG / DK / DD **Estimated/Measured/Gage**

Previous Conditions: _____ **Weather:** P- Cloudy 50°

Reason For Visit: Annual Monitoring LP

Photograghs: **Camera:**

Photo #	Description	File Name:

Longitudinal Profile Notes:

General: Bed material appears to be stable - bottom stone layer has become imbricated.

Sedimentation: (Location, Severity): Small amounts throughout structure sand, fine gravel, small cobble

Scour: (Location, Severity): None apparent

Structural Assessment:

General Condition: Structure appears stable

Movement of Rock/Stone Apparent: None

Blockages Present: None Type:

Floodplain Deposition/Scour: None

Bank Erosion: None

Upstream/Downstream Changes: None apparent

Additional Comments/Notes:

Use Back if Necessary

***File name refers to file designation on camera display not the shot number.**

SITE ID: _____ DATE: _____

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: WWB **Date:** 2-29-08

Site ID: NW-8 **Flow:** _____ CFS

Staff: MH DK **Estimated/Measured/Gage**

Previous Conditions: See monthly monitoring **Weather:** Cold

Reason For Visit: 5year - Annual Survey - Full Monitoring

Photograghs: **Camera:**

Photo #	Description	File Name:
	to be taken with interviews	

Longitudinal Profile Notes:

General: Lowest sloping RSC - some sedimentation - mostly sand in the RSC. Stable and maintains a variety of flow patterns

Sedimentation: (Location, Severity): some sand due to low slope - depth appears sufficient for passage

Scour: (Location, Severity): Not apparent

Structural Assessment:

General Condition: stable - flows through the structure allow for fish passage

Movement of Rock/Stone Apparent: Not apparent

Blockages Present: No Type:

Floodplain Deposition/Scour: No not apparent

Bank Erosion: Not apparent

Upstream/Downstream Changes: Not apparent

Additional Comments/Notes:

Use Back if Necessary

***File name refers to file designation on camera display not the shot number.**

Depth Vel. File = 08190801 Survey = SC_1_2008.JOB

SC-1 1/2

SITE ID: SC-1 DATE: 3-19-08

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: Sligo Creek **Date:** 3-19-08

Site ID: Sligo 1 **Flow:** ≈ 5-6 CFS

Staff: RG/DD/DK **Estimated/Measured/Gage** ≈25% OF NW Gage

Previous Conditions: **Weather:** Cloudy 50's ON-OFF SPRINKLES

Reason For Visit: ANNUAL FINAL MONITORING

Photograghs:		Camera:
Photo #	Description	File Name:

Longitudinal Profile Notes: Slope, Depth gradations and ~~Bed~~ Stability

General: appear Good Through actual structure, other Boundary areas appear to be where Problems are occuring

Sedimentation: (Location, Severity): NO NOTABLE SEDIMENTATION IN NORMAL FLOW RGC WIDTH. SIGNIFICANT SAND US OF RGC AND DS OF Sheetpile Depths ≈2"-4" MAX.

Scour: (Location, Severity): SEVERAL AREAS OF SIGNIFICANT SCOUR WHERE OBSERVED. AT THE VERY BOTTOM OF RGC MINOR DROP 4" MAY INCREASE →

Structural Assessment:

General Condition: SEE Scour notes ABOVE and on Back.

ADDITIONAL comments Cont: Depths increased a little bit through a narrow corridor between Notch and RGC crest. IT is questionable whether or not THIS site is PASSING FISH.

Movement of Rock/Stone Apparent: NOT SO MUCH W/IN RGC Proper.

Blockages Present: YES Type: WOODY @ Sheetpile Notch

Floodplain Deposition/Scour: YES - Both Areas of scour and sand and gravel Depositing

Bank Erosion: Yes, in areas where Bench drains Down TO RGC and some minor

Upstream/Downstream Changes: N/A. EROSION on LEFT Behind toe Rocks at Lower extent OF RGC.

Additional Comments/Notes:
DOESN'T APPEAR to me That RGC@ SC1 is PROVIDING Function Designed to. AT TIME OF ARRIVAL Notch WAS Blocked sheet pile WAS FISH Blockage. RGC NOT Backwatering ENOUGH to Submerge Sheetpile. Sediment ABOVE RGC Causing Shallow depths - ONCE Notch Cleaned OUT ON RIGHT Bench.

Use Back if Necessary

*File name refers to file designation on camera display not the shot number.

SC-2 1/2

SITE ID: SC2 DATE: 3-21-08

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: Slicer Creek Date: 3-21-08

Site ID: SC-2 Flow: 9-10 CFS

Staff: DD/RG Estimated/Measured/Gage 25% @ NW-3

Previous Conditions: Weather: SUNNY 50's. rain 2 DAYS AGO.

Reason For Visit: ANUAL | 5TH YEAR ASSESSMENT Flow still receding

Photograghs:

Photo #	Description

Longitudinal Profile Notes:

General: STRUCTURE APPEARS VERY STABLE NO SCOUR/UNRAVELLING @ LOWER END. BENCH ROCKS STABLE, BED STABLE. NICK CONCENTRATED BASE FLOW CHANNEL AT GOOD DEPTH. PROFILE DOES NOT APPEAR TO BE MAINTAINING GRADE.

Sedimentation: (Location, Severity): SOME SAND AND GRAVELS ON ROCK BENCHES

Scour: (Location, Severity): SIGNIFICANT SCOUR ON LFT BENCH @ ROCK/SOIL INTERFACE. GULLY RUNS ALONG ENTIRE LENGTH OF REC. BRAIDED/DEEP RILLS HAVE FORMED IN SOIL EP/BENCH.

Structural Assessment:

General Condition: SEE ABOVE LP & SCOUR NOTES

Movement of Rock/Stone Apparent: NO

Blockages Present: YES MINOR + POTENTIAL Type: WOOD/LEAVES. PARTIAL BLOCKAGE @ SHEAR PIN NOTCH →

Floodplain Deposition/Scour:

Bank Erosion: EROSION @ LFT REC/SOIL INTERFACE ON BENCH. SOME EROSION ON LOWER

Upstream/Downstream Changes: RB @ TOE OF HILLSIDE NOT TOO SEVERE. MONITOR. NO SIGNIFICANT NOTABLE CHANGES

Additional Comments/Notes:

Use Back if Necessary

SC-3 1/2

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

DATE: 3-21-08

SITE ID: SC-3

Stream Mitigation Project: Sligo Creek **Date:** 3-21-08

Site ID: SC-3 **Flow:** ≈ 9 CFS 25% NU 3

Staff: RG DD **Estimated/Measured/Gage**

Previous Conditions: **Weather:** Sunny MID 60's

Reason For Visit: ANNUAL ASSESSMENT

Photograghs:

Photo #	Description

Longitudinal Profile Notes:

General: DS- of structure Significant Deposition (sand/gravel) WEIR 1 ON Constrictor 5 ALMOST ENTIRELY AGGRADED. Pool in Bottom cell Fairly Aggraded Depth nowhere near as good as upper cells. Above structure Significant SAND & Gravel Deposition. Resulting in Fairly shallow depths. US Profile Very Nice, NO big drops, Good depth thru Most Weirs (except over 1 on Lowest Constrictor)

Sedimentation: (Location, Severity): Pools have aggraded from original condition but depths appear adequate.

Scour: (Location, Severity):

Some minor scour below Constrictor 5 RT TIE-IN STONE above base flow

Structural Assessment:

General Condition: Pretty stable 2 moved Rock not Affecting Structure Function

Movement of Rock/Stone Apparent: YES Constrictor 2 RIGHT surface stone moved DS 3-4'

Blockages Present: YES Constrictor 3 ~~Type~~ Weir 2 RT wing stone tumbled into DS pool

Floodplain Deposition/Scour: NA

Bank Erosion: NA

Upstream/Downstream Changes: AGGRADATION AS NOTED ABOVE, BUT IS NOT NEW CONDITION, PRESENT IN PREVIOUS YEARS

Additional Comments/Notes:

Use Back if Necessary

Constriction 3 weir 2 clogged w/ sticks & vegetation (Cleaned out)

SC4 1/2

SITE ID: SC4 DATE: 3-25

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: WWB Sligo Creek **Date:** 3-25

Site ID: SC-4 **Flow:** _____ CFS

Staff: DK/RG **Estimated/Measured/Gage**

Previous Conditions: _____ **Weather:** Sunny 50's

Reason For Visit: ANNUAL ASSESMENT

Photograghs:

Photo #	Description

Longitudinal Profile Notes:

General: BOTTOM EXTENT OF CONSTRUCTED LOWEST CONSTRUCTOR APPEARS TO BE HIGH. DROP OF ~.75'. BACKWATER FROM DS SEEM TO HAVE LESSENED. 2 WEIRS IN LOWEST CONSTRUCTED BLOCKED W/ ROCKS. - CLEARED ROCKS LEFT WEIR STILL HAS .5' DROP BETWEEN TOP OF BOTTOM PASSING EFFECTIVELY, OTHERWISE LP THRU STRUCTURE IS GOOD

Sedimentation: (Location, Severity): NO SIGNIFICANT SEDIMENTATION

Scour: (Location, Severity): NO SIGNIFICANT SCOUR

Structural Assessment:

General Condition: STRUCTURE APPEARS TO HAVE CHANGED LITTLE OVER THE PAST YEAR. GOOD NOTCH DEPTH AND VELOCITY, GOOD POOL DEPTH. NICE COBBLE GRAVEL SUBSTRATE IN POOLS. NO NEW ROCK MVMNT

Movement of Rock/Stone Apparent: YES, BUT NOT NEW

Blockages Present: YES Type: 2 LOWEST WEIRS BLOCKED BY ROCKS

~~Floodplain Deposition/Scour~~: RT ~~BANK~~ RIFFLE/RIFFLE WEIR BLOCKED BY WOOD, ORGANIC DEBRIS

Bank Erosion: NA

Upstream/Downstream Changes: ~~NONE~~ NOTABLE

Additional Comments/Notes:

Use Back if Necessary

SITE ID: NW-1 DATE: 6-28-07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: Northwest Branch Date: 6-28-07

Site ID: NW-1 Flow: 20 CFS

Staff: PJD Estimated/Measured/Gage

Previous Conditions: See ~~May~~ yearly Report Weather: Hazy, 91° F

Reason For Visit: Monthly Inspection

Photograghs:

Photo #	Description
1	Looking upstream
2	Downstream cut through old sheet pile dam
3	Looking downstream

Longitudinal Profile Notes:

General: RGC looks stable

Sedimentation: (Location, Severity): None observed

Scour: (Location, Severity): None observed

Structural Assessment:

General Condition: Structure looks fine; no apparent deficiencies

Movement of Rock/Stone Apparent: No

Blockages Present: No * Type:

Floodplain Deposition/Scour: No; some deposition upstream, nice bench Rt side

Bank Erosion: NO

Upstream/Downstream Changes: None observed

Additional Comments/Notes:

* Piece of wood (plywood) stuck in entrance (upstream) side of RGC. Not causing blockage; will be monitored

Use Back if Necessary

SITE ID: NW-2 DATE: 6-28-07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: NW Branch Date: 6-28-07

Site ID: NW-2 Flow: 20 CFS

Staff: PJD Estimated/Measured/Gage

Previous Conditions: see yearly report Weather: Hot, Hazy, 91°F

Reason For Visit: Monthly Inspection

Photograghs:

Photo #	Description
1	Looking Downstream
2	Looking Upstream

Longitudinal Profile Notes:

General: Profile looks fine

Sedimentation: (Location, Severity): None

Scour: (Location, Severity): None

Structural Assessment:

General Condition: Structure is fine, no apparent problems

Movement of Rock/Stone Apparent: No

Blockages Present: NO Type:

Floodplain Deposition/Scour: NO

Bank Erosion: NO

Upstream/Downstream Changes: NONE

Additional Comments/Notes:
Nice point bar forming above structure, river right

Use Back if Necessary

SITE ID: NW-3 DATE: 6-28-07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: NW Branch Date: 6-28-07

Site ID: NW-3 Flow: 20 CFS

Staff: PJD Estimated/Measured/Gage

Previous Conditions: See yearly report Weather: Hot, Hazy, 91°F

Reason For Visit: Monthly inspection

Photograghs:

Photo #	Description
1	Looking Downstream
2	Looking Downstream

Longitudinal Profile Notes:

General: Profile of structure looks fine

Sedimentation: (Location, Severity): None

Scour: (Location, Severity): None

Structural Assessment:

General Condition: Structure of RGC stable, no apparent problems

Nice floodplain and thalweg formed below structure

Movement of Rock/Stone Apparent: No

Blockages Present: No Type:

Floodplain Deposition/Scour: No

Bank Erosion: No

Upstream/Downstream Changes: None apparent

Additional Comments/Notes:

Use Back if Necessary

SITE ID: NW-4 DATE: 6-28-07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: NW-4 Branch Date: 6-28-07

Site ID: NW-4 Flow: 20 CFS

Staff: PJD Estimated/Measured/Gage

Previous Conditions: See yearly report Weather: Hot, Hazy, 91°F

Reason For Visit: Monthly Inspection

Photograghs:

Photo #	Description
1	downstream
2	upstream

Longitudinal Profile Notes:

General: Profile looks unchanged

Sedimentation: (Location, Severity): NONE

Scour: (Location, Severity): NONE

Structural Assessment:

General Condition: Structure looks good, no problems.

Movement of Rock/Stone Apparent: NO

Blockages Present: NO Type:

Floodplain Deposition/Scour: NO

Bank Erosion: NO

Upstream/Downstream Changes: NO

Additional Comments/Notes:

Use Back if Necessary

SITE ID: NW-5 DATE: 6-28-07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: NW Branch Date: 6-28-07

Site ID: 6-28-07 Flow: 20 CFS

Staff: PJD Estimated/Measured/Gage

Previous Conditions: see yearly report Weather: Hot, Hazy, 91°F

Reason For Visit: Monthly Inspection

Photograghs:

Photo #	Description
1	downstream
2	eroded bank; river right
3	drop @ entrance of structure
4	upstream

Longitudinal Profile Notes:

General: Drop @ downstream end of structures looks high; but low flow conditions may exaggerate heights

Sedimentation: (Location, Severity):

Scour: (Location, Severity): Bottom of structure; drop needs to be monitored Deep pool below this drop

Structural Assessment:

General Condition: Center of structure fine, downstream end - drop and scour below, along w/ bank erosion on river right need to be monitored

Movement of Rock/Stone Apparent: NO

Blockages Present: NO Type:

Floodplain Deposition/Scour: Both; river right

Bank Erosion: Downstream River right; gabions

Upstream/Downstream Changes: Gas pipe still exposed, scoured out Concrete mattresses still there

Additional Comments/Notes:

Met w/ Cliff Garrat; cross section of pool downstream of structure was completed. Coastal going to go out and do another long. profile

Use Back if Necessary

SITE ID: NW-6 DATE: 6-28-07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: NW Branch Date: 6-28-07

Site ID: NW-6 Flow: 20 CFS

Staff: PJD Estimated/Measured/Gage

Previous Conditions: see yearly report Weather: Hot, Hazy, 91F

Reason For Visit: Monthly Inspection

Photograghs:

Photo #	Description
1	Looking Downstream
2	upstream
3	Bank erosion
4	Bank erosion

Longitudinal Profile Notes:

General: OK, water flow spread almost across entire structure ~~feature~~

Sedimentation: (Location, Severity): None

Scour: (Location, Severity): Pool formed upstream entrance 3-4 FT deep

Structural Assessment:

General Condition: OKAY; structure and most of flow down right side of channel

Movement of Rock/Stone Apparent: NO

Blockages Present: NO Type:

Floodplain Deposition/Scour: ~~NONE~~ NO

Bank Erosion: ~~NONE~~ River Right below structure, some erosion above rip rap

Upstream/Downstream Changes: NONE

Additional Comments/Notes:

Many small fish w/ structure; one large Smallmouth in pool above entrance upstream

Large tree on River left bank

Use Back if Necessary

SITE ID: NW-1 DATE: 6-28-07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: NW Branch Date: 6-28-07

Site ID: NW-7 Flow: 15-20 CFS

Staff: POD Estimated/Measured/Gage

Previous Conditions: see yearly report Weather: Hazy, Hot 91°F

Reason For Visit: Monthly Inspection

Photograghs:

Photo #	Description
1	Looking downstream
2	Looking upstream

Longitudinal Profile Notes:

General: Looks fine

Sedimentation: (Location, Severity): None

Scour: (Location, Severity): None

Structural Assessment:

General Condition: RGC looks good, no apparent problem, very good thalweg forming @ bottom of structure

Movement of Rock/Stone Apparent: NO

Blockages Present: NO Type:

Floodplain Deposition/Scour: NO

Bank Erosion: NO

Upstream/Downstream Changes: NONE

Additional Comments/Notes:

Use Back if Necessary

SITE ID: SC-1 DATE: 7-5-07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: Sligo Creek Date: 7-5-07

Site ID: SC-1 Flow: 10 CFS

Staff: PJD Estimated/Measured/Gage

Previous Conditions: see yearly report Weather: Overcast, 75°F

Reason For Visit: Monthly inspection

Photograghs:

Photo #	Description
1	looking downstream
2	looking upstream

Longitudinal Profile Notes:

General: Structure profile looks fine

Sedimentation: (Location, Severity): None

Scour: (Location, Severity): None

Structural Assessment:

General Condition: Integrity of structure unchanged.

Movement of Rock/Stone Apparent: none

Blockages Present: none Type:

Floodplain Deposition/Scour: yes *

Bank Erosion: no

Upstream/Downstream Changes: no; thalweg forming downstream of cut sheet pile dam

Additional Comments/Notes:

* Slow along floodplain, river right, still observable, however condition does not look worse

Use Back if Necessary

SITE ID: SC-2 DATE: 7-05-07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: Sligo Creek Date: 7-5-07

Site ID: SC-2 Flow: 10 CFS

Staff: PJD Estimated/Measured/Gage

Previous Conditions: See yearly report Weather: Overcast; 75°F

Reason For Visit: monthly inspection

Photograghs:

Photo #	Description
1	Looking upstream
2	Looking downstream
3	Floodplain channel (look downstream)

Longitudinal Profile Notes:

General: No problems

Sedimentation: (Location, Severity): No

Scour: (Location, Severity): No

Structural Assessment:

General Condition:
Structure is stable

Movement of Rock/Stone Apparent: No
Blockages Present: Some not total Type: Woody Debris; exit of structure and street pick dam
Floodplain Deposition/Scour: *
Bank Erosion: No
Upstream/Downstream Changes: **

Additional Comments/Notes:
* floodplain relief channel still present; no change
** downstream of structure; eroding bank; river right

Use Back if Necessary

SITE ID: SC-3 DATE: 7-5-07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: Sligo Creek Date: 7-5-07

Site ID: SC-3 Flow: 10 CFS

Staff: PJD Estimated/Measured/Gage

Previous Conditions: See yearly report Weather: Overcast, 75° F

Reason For Visit: Monthly inspection

Photograghs:

Photo #	Description
1	Looking upstream thru structure
2	Looking downstream - Cobble Bar
3	Looking downstream

Longitudinal Profile Notes:

General: Structure stable, most passages appear to be functioning

Sedimentation: (Location, Severity):

Scour: (Location, Severity):

Structural Assessment:

General Condition:
Structure appears stable. Some small stone accumulation in 2nd set of weir stones from exit of structure on river right. Keep an eye on it

Movement of Rock/Stone Apparent: yes - Stone from 2nd weir of exit, river left

Blockages Present: yes * Type: Woody Debris

Floodplain Deposition/Scour:

Bank Erosion:

Upstream/Downstream Changes: Large cobble bar on river left; needs to be monitored

Additional Comments/Notes:
* 751. Block exit of structure; Weir on River right

Use Back if Necessary

SITE ID: SC-4 DATE: 7-5-07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: Sligo Creek Date: 7-05-07

Site ID: SC-4 Flow: 10 CFS

Staff: RJO Estimated/Measured/Gage

Previous Conditions: see yearly report Weather: Overcast, 75°F

Reason For Visit: Monthly inspection

Photograghs:

Photo #	Description
1	Looking upstream
2	potential Blockage at 1 entrance
3	Looking downstream from exit
4	Looking upstream @ exit

Longitudinal Profile Notes:

General: Due to rock movement, profile and thalweg thru structure has changed

Sedimentation: (Location, Severity): None

Scour: (Location, Severity): NONE

Structural Assessment:

General Condition: Overall Structure appears to be functioning However several weir stones have moved. This situation will continue to be monitored closely

Movement of Rock/Stone Apparent: yes *

Blockages Present: NO → Type: drop @ entrance will be monitored

Floodplain Deposition/Scour: NO

Bank Erosion: NO

Upstream/Downstream Changes: NONE, several point bars above and below structure continue to form

Additional Comments/Notes:

* Rock MOVEMENT: 3rd WEIR from entrance rock moved downstream of steel pile. 4th weir from entrance, rock moved downstream. Exit weir, rock moved downstream. Structure still appears passable

Use Back if Necessary

* LOTS of fish w/in structure

SITE ID: NW-1 DATE:

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: Northwest 1 **Date:** 12-20-07

Site ID: NW-1 **Flow:** _____ CFS

Staff: LW, MH, PD **Estimated/Measured/Gage**

Previous Conditions: See previous months **Weather:** Cold Clear

Reason For Visit: Monthly Site Assessments

Photograghs: **Camera:**

Photo #	Description	File Name:
1	US from below	
2	DS from head	

Longitudinal Profile Notes:

General: Stable with good slope - moderately well defined low flow channel within structure.

Sedimentation: (Location, Severity): Sand deposition on banks - not new

Scour: (Location, Severity): Not ~~appropriate~~ apparent

Structural Assessment:

General Condition: Stable

Movement of Rock/Stone Apparent: Not apparent

Blockages Present: Not apparent Type:

Floodplain Deposition/Scour: Not apparent

Bank Erosion: Not apparent

Upstream/Downstream Changes: Not apparent

Additional Comments/Notes:

Structure looks good

Use Back if Necessary

***File name refers to file designation on camera display not the shot number.**

SITE ID: NW-2 DATE: _____

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: WWB **Date:** 12-20-07

Site ID: NW-2 **Flow:** _____ CFS

Staff: LW, MLt, PD **Estimated/Measured/Gage**

Previous Conditions: See November Sheet **Weather:** Cold, clear

Reason For Visit: Monthly

Photograghs:		**Camera:**
Photo #	Description	File Name:
3	US from ~~DS~~ btm.	
4	DS from head	

Longitudinal Profile Notes:

General: Stable - good flow diversity - good slope

Sedimentation: (Location, Severity): Sand along Right bank - bar building

Scour: (Location, Severity): Not apparent

Structural Assessment:

General Condition: Stable - good bar on right bank

Movement of Rock/Stone Apparent:

Blockages Present: Not apparent Type:

Floodplain Deposition/Scour: Deposition sand RB

Bank Erosion: Not apparent

Upstream/Downstream Changes: Not apparent

Additional Comments/Notes:

Use Back if Necessary

***File name refers to file designation on camera display not the shot number.**

SITE ID: NW-3 DATE: 12/20/07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: NorthWest Branch Date: 12/20/07

Site ID: NW-3 Flow: _____ CFS

Staff: Hubbard/Wanzer/Diniccola Estimated/Measured/Gage

Previous Conditions: No rain in 4 days Weather: Sunny low 40's

Reason For Visit: Monthly assessment

Photograghs:

Photo #	Description	Camera/File Number
5	Upstream	
6	Across top of Structure	
7	Downstream	

Longitudinal Profile Notes:

General: a second channel seems to be forming river right

Sedimentation: (Location, Severity): Not apparent

Scour: (Location, Severity): Not apparent

Structural Assessment:

General Condition: Seems to be working, good flow, no rock movement.

Movement of Rock/Stone Apparent: Not apparent

Blockages Present: None Type:

Floodplain Deposition/Scour: ~~no channel~~

Bank Erosion: ~~No channel~~

Upstream/Downstream Changes: none

Additional Comments/Notes:

Use Back if Necessary

SITE ID: NW 4 DATE: 12-20-07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: WWB **Date:** 12-20-07

Site ID: NW-4 **Flow:** _____ CFS

Staff: LW, PD, MH **Estimated/Measured/Gage**

Previous Conditions: See previous month & previous monitoring **Weather:** Cool Clear

Reason For Visit: Monthly Dec. Assessment

Photograghs: **Camera:**

Photo #	Description	File Name:
17	~~DS~~ US from btm.	
18	US overflow / high velocity channel	
19	DS " "	

Longitudinal Profile Notes:

General: Stable - good flow diversity - good slope throughout structure

Sedimentation: (Location, Severity): Not appl.

Scour: (Location, Severity): Not appl.

Structural Assessment:

General Condition: good flow diversity - stable

Movement of Rock/Stone Apparent: Not appl.

Blockages Present: Not appl. Type:

Floodplain Deposition/Scour: Not appl.

Bank Erosion: Not appl.

Upstream/Downstream Changes: Not appl.

Additional Comments/Notes:

High velocity channel formed left bank - above/edge of riprap

Use Back if Necessary

***File name refers to file designation on camera display not the shot number.**

SITE ID: NW-5 DATE: 12-20-07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: WWB **Date:** 12-20-07

Site ID: NW-5 **Flow:** _____ CFS

Staff: MH, LW, PD **Estimated/Measured/Gage**

Previous Conditions: _____ **Weather:** Cool / Clear

Reason For Visit: Monthly (Dec) Assessment

Photograghs: **Camera:**

Photo #	Description	File Name:
13	DS from bank	
14	US from btm	
15	across from left to right bnk jump	
16	collapse behind gabion	

Longitudinal Profile Notes:

General: Short riffle - compare with original length

Sedimentation: (Location, Severity): Not app

Scour: (Location, Severity): Not app. ~~possible~~ possible @ DS end

Structural Assessment:

General Condition: Gabion below structure on RB pulling down into stream - as before - getting deposition in woody left behind collapsing gabion.
Maintain riffle but short - hydraulic jump at btm.

Movement of Rock/Stone Apparent: Not app

Blockages Present: Not app. Type:

Floodplain Deposition/Scour: Deposition behind gabion (collapsed) wall

Bank Erosion: Not app.

Upstream/Downstream Changes: Not app.

Additional Comments/Notes:

Use Back if Necessary

*File name refers to file designation on camera display not the shot number.

Haytham Hantash - WSSC

Met it again - bigger mets [no flow calcs]
↳ MDE comm.

- Remove 12' old pipe
- Support -

Supposedly 1st time mets moved

Pictures → 50 years ago

NW-5 5-6' wide

SITE ID: NW-6 DATE: 12-20-07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: WWB **Date:** 12-20-07

Site ID: NW-7 **Flow:** _____ CFS

Staff: MH, PD, LW **Estimated/Measured/Gage**

Previous Conditions: See monthly (Nov.) **Weather:** Cool Clear

Reason For Visit: Monthly Assessment

Photograghs: **Camera:**

Photo #	Description	File Name:
10	DS from Ltrm of NW-7 @ NW-6	
12	US from Ltrm of structure	

Longitudinal Profile Notes:

General: Stable - good flow diversity

Sedimentation: (Location, Severity): Not app.

Scour: (Location, Severity): Not app.

Structural Assessment:

General Condition: Stable

Movement of Rock/Stone Apparent: Not app.

Blockages Present: Not app. Type:

Floodplain Deposition/Scour: Not app.

Bank Erosion: Not app.

Upstream/Downstream Changes: Not app.

Additional Comments/Notes:

Tree along LB @ top of NW-6 - new from NW-7 not a problem

Use Back if Necessary

*File name refers to file designation on camera display not the shot number.

SITE ID: NW-7 DATE: 12-20-07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: WWB **Date:** 12-20-07

Site ID: NW-7 **Flow:** _____ CFS

Staff: LW, MH, PD **Estimated/Measured/Gage**

Previous Conditions: See NOV & previous monitory **Weather:** Cool Clear

Reason For Visit: Monthly (Dec.) Assessment

Photograghs:		**Camera:**
Photo #	Description	File Name:
8	DS from head	
9	US from btm.	
11	US @ structure from bridge	

Longitudinal Profile Notes:

General: Stable with good low flow channel

Sedimentation: (Location, Severity): Not app.

Scour: (Location, Severity): Not apparent

Structural Assessment:

General Condition: Stable

Movement of Rock/Stone Apparent: Not app.

Blockages Present: Not app. Type:

Floodplain Deposition/Scour: Some sand on banks

Bank Erosion: Not apparent

Upstream/Downstream Changes: Not app.

Additional Comments/Notes:

Use Back if Necessary

*File name refers to file designation on camera display not the shot number.

SITE ID: WW-8 DATE: 12/19/07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: North West Branch **Date:** 12/20/07

Site ID: _____ **Flow:** _____ CFS

Staff: WW, MH, PD **Estimated/Measured/Gage**

Previous Conditions: _____ **Weather:** Cool Clear

Reason For Visit: Monthly Assessment

Photograghs:		Camera:
Photo #	Description	File Name:
20	D.S.	
21	looking u.s	

Longitudinal Profile Notes:

General:

Sedimentation: (Location, Severity): None apparent

Scour: (Location, Severity): None apparent

Structural Assessment:

General Condition: looks good good flow through the cut culvert

Movement of Rock/Stone Apparent: Not apparent

Blockages Present: No Type:

Floodplain Deposition/Scour: none apparent

Bank Erosion: Possible flat rock shifted down to water level river right

Upstream/Downstream Changes: Not apparent u.s. or d.s.

Additional Comments/Notes:

Use Back if Necessary

*File name refers to file designation on camera display not the shot number.

SITE ID: SL 1 DATE: _____

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: Sligo Creek **Date:** 12/20/07

Site ID: SL 1 **Flow:** _____ CFS

Staff: LW, MH, PD **Estimated/Measured/Gage**

Previous Conditions: _____ **Weather:** Sunny Mid 40's

Reason For Visit: Monthly Assessment

Photograghs:		Camera:
Photo #	Description	File Name:
27	U.S	
28	Last structure	
31 ~~29~~	Sediment Plume from Culvert	
29	Bank river right	
30		

Longitudinal Profile Notes:

General: good flow through rocks, appear stable

Sedimentation: (Location, Severity): Some on river left between our structure and the metal existing structure

Scour: (Location, Severity):

Structural Assessment:

General Condition: Second channel formed, had been filling in Now appears to be increasing in length, retreating

Movement of Rock/Stone Apparent: Not apparent

Blockages Present: Some Type: leaf litter in notch in structure

Floodplain Deposition/Scour:

Bank Erosion: possible @ last structure rv. right Bank

Upstream/Downstream Changes: Depositing downstream river left across from trib feeding on river right (culvert actually)

Additional Comments/Notes:

Use Back if Necessary

***File name refers to file designation on camera display not the shot number.**

SITE ID: SL 2 DATE: 12/28/07

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: Sligo CK **Date:** 12/28/07

Site ID: SL 2 **Flow:** _____ CFS

Staff: LW, MH PD **Estimated/Measured/Gage**

Previous Conditions: _____ **Weather:** Sunny

Reason For Visit: Monthly Assessment

Photograghs: **Camera:**

Photo #	Description	File Name:
25	U.S	
26	D.S	

Longitudinal Profile Notes:

General: Looks good, low flow, no blockages,

Sedimentation: (Location, Severity): None apparent, just usual filling in btw rocks on bank

Scour: (Location, Severity): None apparent

Structural Assessment:

General Condition: Mallard Ducks Present

Movement of Rock/Stone Apparent: Not apparent

Blockages Present: None Type:

Floodplain Deposition/Scour: Bars on river left significantly wider

Bank Erosion: Not apparent

Upstream/Downstream Changes: Deposition btw our structure and old structure

Additional Comments/Notes:

Use Back if Necessary

***File name refers to file designation on camera display not the shot number.**

SITE ID: SL-3 DATE: _____

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: Sligo Creek **Date:** 12/20/07

Site ID: SL3 **Flow:** _____ CFS

Staff: LW MH PD **Estimated/Measured/Gage**

Previous Conditions: _____ **Weather:** Sunny Mid 40s

Reason For Visit: Monthly Assessment

Photograghs:		Camera:
Photo #	Description	File Name:
23	U.S	
24	U.S	

Longitudinal Profile Notes:

General: lower slower flow, due to blockages most directed at central stream notch

Sedimentation: (Location, Severity): Bar connecting last 2 ds structures "last pool

Scour: (Location, Severity): Not apparent

Structural Assessment:

General Condition:

Movement of Rock/Stone Apparent:

Blockages Present: Yes Type: leaf litter river left + right banks

Floodplain Deposition/Scour:

Bank Erosion: Not apparent

Upstream/Downstream Changes: None apparent

Additional Comments/Notes:

Use Back if Necessary

***File name refers to file designation on camera display not the shot number.**

SITE ID: SL 4 DATE:

Woodrow Wilson Bridge - Post Construction Monitoring
Visual Assessment Form

Stream Mitigation Project: Sligo Creek **Date:** 12/26/02

Site ID: SL 4 **Flow:** _____ CFS

Staff: LW MH PD **Estimated/Measured/Gage**

Previous Conditions: _____ **Weather:** Sunny mid 40's

Reason For Visit: Month Ass.

Photograghs: **Camera:**

Photo #	Description	File Name:
22	US @ structure	

Longitudinal Profile Notes:

General: in Downstream weir may have to clean smaller rocks that are building between larger rocks

Most of flow exiting to the right towards river right

Sedimentation: (Location, Severity): None apparent

Scour: (Location, Severity): None apparent

Structural Assessment:

General Condition: looks good, good flow at good depth

Movement of Rock/Stone Apparent: none apparent, rock moved previously - no apparent impact

Blockages Present: no Type:

Floodplain Deposition/Scour: Not apparent

Bank Erosion: none apparent

Upstream/Downstream Changes: Appears to have shore bars forming D.S rv left and U.S rv right

Additional Comments/Notes:

Use Back if Necessary

*File name refers to file designation on camera display not the shot number.

APPENDIX F- Macroinvertebrate and Habitat Assessment Field Sheets

Benthic Spring Sampling Data Sheet

SITE (Watershed Code) NW | (Segment) 1 | (Type) | (Year) 2008 — Reviewed By: HS

BASIN RG1 — Sample Label Verified By: HS — 2nd Reviewer:

DATE (Year 08 / Month 04 / Day 18) — Crew: AT, HS

TIME 0900 (Military) — Project: WWB

Distance from Nearest Road to Site (m): 50

Bank Erosion

	Left Bank	Right Bank
Extent	0	0
Severity		
1=min		
2=mod	X	X
3=severe		
Bank Stability	20	
Temp logger? y/n	N	
Serial #		

Benthic Habitat Sampled

(Square feet; Total = 20 square feet)

Riffle	20		
Rootwad/Woody Debris	—	—	—
Leaf Pack	—	—	—
Macrophytes	—	—	—
Undercut Banks	—	—	—
Other			
(Specify)			

Stream Width (m)

0 m

75 m

LANDUSE (Y/N)

Old Field	N
Deciduous Forest	N
Coniferous Forest	N
Wetland	N
Surface Mine	N
Landfill	N
Residential	Y
Commercial/Industrial	N
Cropland	N
Pasture	N
Orchard/Vineyard/Nursery	N
Golf Course	N

RIPARIAN VEGETATION (facing upstream)

	Left Bank	Right Bank
Width (50m max)	15	15
Adjacent Land Cover	LN	LN
Vegetation Type (see back)	GL	GLY
Buffer Breaks (Y/N)	N	N

Buffer Break Types (M=minor; S=severe)

	Left Bank	Right Bank
Storm Drain		
Tile Drain		
Impervious Drainage		
Gully		
Orchard		
Crop		
Pasture		
New Construction		
Dirt Road		
Gravel Road		
Raw Sewage		
Railroad		

CHANNELIZATION

Evidence of Channel Straightening or Dredging (Y/N): Y

TYPE	EXTENT (m) Left Bank	Bottom	Right Bank
Concrete			
Gabion			
Rip-rap	75	75	75
Earthen Berm			
Drege Spoil off Channel			
Pipe Culvert			

HABITAT ASSESSMENT

Instream Habitat (0-20)	12
Epifaunal Substrate (0-20)	16
Velocity/Depth Diversity (0-20)	17
Pool/Glide/Eddy Quality (0-20)	16
Extent (0-20)	20
Riffle/Run Quality (0-20)	16
Extent (0-20)	15
Embeddedness (%)	15
Shading (%)	80
Trash Rating	15

WATER QUALITY PARAMETERS

Temperature ©: 14.3

DO (mg/L): 10.37

pH: 07.96

Cond (ms/cm): 0.421

Turbidity (NTU): 009.7

Meter Calibrations by:

Sampleability

- Y Benthos
- Y Habitat Assessment
- Y Water Quality

Road Culvert

- N Culvert in Segment? (y/n)
- Sampleable? (y/n)
- Length of Culvert (m)
- Width of Culvert (m)

No. Instream Woody Debris	00
No. of Dewatered Woody Debris	04
No. of Instream Rootwads	30
No. of Dewatered Rootwads	00

PHOTODOCUMENTATION

Picture Number / Subject

Picture Number / Subject

Picture Number / Subject

Picture Number / Subject

Site Acces Route

Sampling Consd (____ num. Anodes)

Comments

Benthic Spring Sampling Data Sheet

SITE (Watershed Code) NU | (Segment) 2 | (Type) | (Year) 2008 — Reviewed By: HS

BASIN RG — Sample Label Verified By: HS — 2nd Reviewer:

DATE (Year) 08 (Month) 04 (Day) 18 — Crew: AT HS

TIME 1000 (Military) — Project: WWB'

Distance from Nearest Road to Site (m)

Bank Erosion

	Left Bank	Right Bank
Extent		
Severity		
1=min		
2=mod		
3=severe		
Bank Stability	18	
Temp logger? y/n	N	
Serial #		

Benthic Habitat Sampled

(Square feet; Total = 20 square feet)

Riffle	18
Rootwad/Woody Debris	
Leaf Pack	02
Macrophytes	
Undercut Banks	
Other	
(Specify)	

Stream Width (m)

0 m

75 m

LANDUSE (Y/N)

Old Field	N
Deciduous Forest	Y
Coniferous Forest	N
Wetland	N
Surface Mine	N
Landfill	N
Residential	Y
Commercial/Industrial	N
Cropland	N
Pasture	N
Orchard/Vineyard/Nursery	N
Golf Course	N

RIPARIAN VEGETATION (facing upstream)

	Left Bank	Right Bank
Width (50m max)	50	30
Adjacent Land Cover	LN	PV
Vegetation Type (see back)	RYG	YRG
Buffer Breaks (Y/N)	N	N

Buffer Break Types (M=minor; S=severe)

	Left Bank	Right Bank
Storm Drain		
Tile Drain		
Impervious Drainage		
Gully		
Orchard		
Crop		
Pasture		
New Construction		
Dirt Road		
Gravel Road		
Raw Sewage		
Railroad		

CHANNELIZATION

Evidence of Channel Straightening or Dredging (Y/N)

TYPE	EXTENT (m) Left Bank	Bottom	Right Bank
Concrete			
Gabion			
Rip-rap	75	75	75
Earthen Berm			
Drege Spoil off Channel			
Pipe Culvert			

HABITAT ASSESSMENT

Instream Habitat (0-20)	13
Epifaunal Substrate (0-20)	17
Velocity/Depth Diversity (0-20)	18
Pool/Glide/Eddy Quality (0-20)	18
Extent (0-20)	10
Riffle/Run Quality (0-20)	16
Extent (0-20)	15
Embeddedness (%)	20
Shading (%)	5
Trash Rating	5

WATER QUALITY PARAMETERS

Temperature © 15.2

DO (mg/L) 12.44

pH 7.98

Cond (ms/cm) 0.412

Turbidity (NTU) 5.0

Meter Calibrations by:

Sampleability

- Y Benthos
- Y Habitat Assessment
- Y Water Quality

Road Culvert

- N Culvert in Segment? (y/n)
- Sampleable? (y/n)
- Length of Culvert (m)
- Width of Culvert (m)

No. Instream Woody Debris	0
No. of Dewatered Woody Debris	3
No. of Instream Rootwads	0
No. of Dewatered Rootwads	4

PHOTODOCUMENTATION

Picture Number — Subject

Picture Number — Subject

Picture Number — Subject

Picture Number — Subject

Site Acces Route

Sampling Consd (____num. Anodes)

Comments

Benthic Spring Sampling Data Sheet

SITE (Watershed Code) ANAC (Segment) NW3 (Type) RB (Year) 2008 — Reviewed By: MRK

BASIN — Sample Label Verified By: _____ — 2nd Reviewer: _____

DATE (Year) 08 (Month) 25 (Day) 06 — Crew: MRKP

TIME _____ (Military) — Project: WMS

Distance from Nearest Road to Site (m): 100

Bank Erosion

	Left Bank	Right Bank
Extent	00	00
Severity		
1=min		
2=mod	0	0
3=severe		
Bank Stability		
Temp logger? y/n		
Serial #		

Benthic Habitat Sampled

(Square feet; Total = 20 square feet)

Riffle	20
Rootwad/Woody Debris	
Leaf Pack	
Macrophytes	
Undercut Banks	
Other	
(Specify)	

Stream Width (m)

0 m	
75 m	

LANDUSE (Y/N)

Old Field	
Deciduous Forest	
Coniferous Forest	
Wetland	
Surface Mine	
Landfill	
Residential	
Commercial/Industrial	
Cropland	
Pasture	
Orchard/Vineyard/Nursery	
Golf Course	

RIPARIAN VEGETATION (facing upstream)

	Left Bank	Right Bank
Width (50m max)		
Adjacent Land Cover		
Vegetation Type (see back)		
Buffer Breaks (Y/N)		

Buffer Break Types (M=minor; S=severe)

Storm Drain	
Tile Drain	
Impervious Drainage	
Gully	
Orchard	
Crop	
Pasture	
New Construction	
Dirt Road	
Gravel Road	
Raw Sewage	
Railroad	

CHANNELIZATION

Evidence of Channel Straightening or Dredging (Y/N):

TYPE	EXTENT (m) Left Bank	Bottom	Right Bank
Concrete			
Gabion			
Rip-rap			
Earthen Berm			
Drege Spoil off Channel			
Pipe Culvert			

HABITAT ASSESSMENT

Instream Habitat (0-20)	16
Epifaunal Substrate (0-20)	12
Velocity/Depth Diversity (0-20)	11
Pool/Glide/Eddy Quality (0-20)	06
Extent (0-20)	05
Riffle/Run Quality (0-20)	16
Extent (0-20)	15
Embeddedness (%)	15
Shading (%)	05
Trash Rating	03

WATER QUALITY PARAMETERS

Temperature © _____ • _____

DO (mg/L) _____ • _____

pH _____ • _____

Cond (ms/cm) _____ • _____

Turbidity (NTU) _____ • _____

Meter Calibrations by:

Sampleability

- Benthos
- Habitat Assessment
- Water Quality

Road Culvert

- Culvert in Segment? (y/n)
- Sampleable? (y/n)
- Length of Culvert (m)
- Width of Culvert (m)

No. Instream Woody Debris	00
No. of Dewatered Woody Debris	04
No. of Instream Rootwads	00
No. of Dewatered Rootwads	01

PHOTODOCUMENTATION

Picture Number _____ Subject _____

Picture Number _____ Subject _____

Picture Number _____ Subject _____

Picture Number _____ Subject _____

Site Acces Route _____

Sampling Consd (_____ num. Anodes) _____

Comments _____

Benthic Spring Sampling Data Sheet

SITE (Watershed Code) ANAC (Segment) NW9 (Type) RG (Year) 2008 — Reviewed By: KR

BASIN — Sample Label Verified By: _____ — 2nd Reviewer: _____

DATE (Year 08 / Month 09 / Day 25) — Crew: KR MR

TIME (Military) — Project: WWB

Distance from Nearest Road to Site (m): 130

Bank Erosion

	Left Bank	Right Bank
Extent	0	0
Severity		
1=min		
2=mod	0	0
3=severe		
Bank Stability		
Temp logger? y/n		
Serial #		

Benthic Habitat Sampled

(Square feet; Total = 20 square feet)

Riffle	20
Rootwad/Woody Debris	
Leaf Pack	
Macrophytes	
Undercut Banks	
Other	
(Specify)	

Stream Width (m)

0 m

75 m

LANDUSE (Y/N)

Old Field	
Deciduous Forest	
Coniferous Forest	
Wetland	
Surface Mine	
Landfill	
Residential	
Commercial/Industrial	
Cropland	
Pasture	
Orchard/Vineyard/Nursery	
Golf Course	

RIPARIAN VEGETATION (facing upstream)

	Left Bank	Right Bank
Width (50m max)		
Adjacent Land Cover		
Vegetation Type (see back)		
Buffer Breaks (Y/N)		

Buffer Break Types (M=minor; S=severe)

Storm Drain		
Tile Drain		
Impervious Drainage		
Gully		
Orchard		
Crop		
Pasture		
New Construction		
Dirt Road		
Gravel Road		
Raw Sewage		
Railroad		

CHANNELIZATION

Evidence of Channel Straightening or Dredging (Y/N):

TYPE	EXTENT (m) Left Bank	Bottom	Right Bank
Concrete			
Gabion			
Rip-rap			
Earthen Berm			
Drege Spoil off Channel			
Pipe Culvert			

HABITAT ASSESSMENT

Instream Habitat (0-20)	16
Epifaunal Substrate (0-20)	12
Velocity/Depth Diversity (0-20)	11
Pool/Glide/Eddy Quality (0-20)	13
Extent (0-20)	14
Riffle/Run Quality (0-20)	16
Extent (0-20)	15
Embeddedness (%)	10
Shading (%)	5
Trash Rating	2

WATER QUALITY PARAMETERS

Temperature ©

DO (mg/L)

pH

Cond (ms/cm)

Turbidity (NTU)

Meter Calibrations by:

Sampleability

- Benthos
- Habitat Assessment
- Water Quality

Road Culvert

- Culvert in Segment? (y/n)
- Sampleable? (y/n)
- Length of Culvert (m)
- Width of Culvert (m)

No. Instream Woody Debris	0
No. of Dewatered Woody Debris	10
No. of Instream Rootwads	0
No. of Dewatered Rootwads	13

PHOTODOCUMENTATION

Picture Number _____ Subject _____

Picture Number _____ Subject _____

Picture Number _____ Subject _____

Picture Number _____ Subject _____

Site Acces Route _____

Sampling Consd (_____num. Anodes) _____

Comments _____

Benthic Spring Sampling Data Sheet

SITE (Watershed Code) | (Segment) NWS | (Type) RG | (Year) 2008 | Reviewed By:

BASIN | Sample Label Verified By: | 2nd Reviewer:

DATE (Year) 08 (Month) 04 (Day) 25 | Crew: MR KR

TIME (Military) | Project: WWB

Distance from Nearest Road to Site (m): 200

Bank Erosion

	Left Bank	Right Bank
Extent	00	00
Severity 1=min		
2=mod	X	X
3=severe		
Bank Stability		
Temp logger? y/n		
Serial #		

Benthic Habitat Sampled

(Square feet; Total = 20 square feet)

Riffle	20
Rootwad/Woody Debris	
Leaf Pack	
Macrophytes	
Undercut Banks	
Other	
(Specify)	

Stream Width (m)

0 m	
75 m	

LANDUSE (Y/N)

Old Field	
Deciduous Forest	
Coniferous Forest	
Wetland	
Surface Mine	
Landfill	
Residential	
Commercial/Industrial	
Cropland	
Pasture	
Orchard/Vineyard/Nursery	
Golf Course	

RIPARIAN VEGETATION (facing upstream)

	Left Bank	Right Bank
Width (50m max)		
Adjacent Land Cover		
Vegetation Type (see back)		
Buffer Breaks (Y/N)		

Buffer Break Types (M=minor; S=severe)

	Left Bank	Right Bank
Storm Drain		
Tile Drain		
Impervious Drainage		
Gully		
Orchard		
Crop		
Pasture		
New Construction		
Dirt Road		
Gravel Road		
Raw Sewage		
Railroad		

CHANNELIZATION

Evidence of Channel Straightening or Dredging (Y/N): N

TYPE	EXTENT (m) Left Bank	Bottom	Right Bank
Concrete			
Gabion			
Rip-rap			
Earthen Berm			
Drege Spoil off Channel			
Pipe Culvert			

HABITAT ASSESSMENT

Instream Habitat (0-20)	16
Epifaunal Substrate (0-20)	16
Velocity/Depth Diversity (0-20)	16
Pool/Glide/Eddy Quality (0-20)	15
Extent (0-20)	
Riffle/Run Quality (0-20)	16
Extent (0-20)	
Embeddedness (%)	15
Shading (%)	10
Trash Rating	04

WATER QUALITY PARAMETERS

Temperature ©

DO (mg/L)

pH

Cond (ms/cm)

Turbidity (NTU)

Meter Calibrations by:

Sampleability

- Benthos
- Habitat Assessment
- Water Quality

Road Culvert

- Culvert in Segment? (y/n)
- Sampleable? (y/n)
- Length of Culvert (m)
- Width of Culvert (m)

No. Instream Woody Debris	02
No. of Dewatered Woody Debris	04
No. of Instream Rootwads	02
No. of Dewatered Rootwads	04

PHOTODOCUMENTATION

Picture Number / Subject

Picture Number / Subject

Picture Number / Subject

Picture Number / Subject

Site Acces Route

Sampling Consd (num. Anodes)

Comments

Benthic Spring Sampling Data Sheet

SITE Watershed Code: ANAC | Segment: NWG | Type: RG | Year: 2008 | Reviewed By: KR

BASIN | Sample Label Verified By: _____ | 2nd Reviewer: _____

DATE Year: 08 | Month: 04 | Day: 25 | Crew: MR / KR

TIME 1130 (Military) | Project: NWR

Distance from Nearest Road to Site (m): _____

Bank Erosion

	Left Bank	Right Bank
Extent	5	0
Severity		
1=min		
2=mod	1	0
3=severe		
Bank Stability		
Temp logger? y/n		
Serial #		

Benthic Habitat Sampled

(Square feet; Total = 20 square feet)

Riffle	19
Rootwad/Woody Debris	
Leaf Pack	1
Macrophytes	
Undercut Banks	
Other	
(Specify)	

Stream Width (m)

0 m _____

75 m _____

LANDUSE (Y/N)

Old Field	
Deciduous Forest	
Coniferous Forest	
Wetland	
Surface Mine	
Landfill	
Residential	
Commercial/Industrial	
Cropland	
Pasture	
Orchard/Vineyard/Nursery	
Golf Course	

RIPARIAN VEGETATION (facing upstream)

	Left Bank	Right Bank
Width (50m max)		
Adjacent Land Cover		
Vegetation Type (see back)		
Buffer Breaks (Y/N)		

Buffer Break Types (M=minor; S=severe)

Storm Drain		
Tile Drain		
Impervious Drainage		
Gully		
Orchard		
Crop		
Pasture		
New Construction		
Dirt Road		
Gravel Road		
Raw Sewage		
Railroad		

CHANNELIZATION

Evidence of Channel Straightening or Dredging (Y/N): _____

TYPE	EXTENT (m) Left Bank	Bottom	Right Bank
Concrete			
Gabion			
Rip-rap			
Earthen Berm			
Drege Spoil off Channel			
Pipe Culvert			

HABITAT ASSESSMENT

Instream Habitat (0-20)	16
Epifaunal Substrate (0-20)	12
Velocity/Depth Diversity (0-20)	11
Pool/Glide/Eddy Quality (0-20)	16
Extent (0-20)	19
Riffle/Run Quality (0-20)	17
Extent (0-20)	15
Embeddedness (%)	10
Shading (%)	80
Trash Rating	20

WATER QUALITY PARAMETERS

Temperature © _____

DO (mg/L) _____

pH _____

Cond (ms/cm) _____

Turbidity (NTU) _____

Meter Calibrations by: _____

Sampleability

- Benthos
- Habitat Assessment
- Water Quality

Road Culvert

- Culvert in Segment? (y/n)
- Sampleable? (y/n)
- Length of Culvert (m)
- Width of Culvert (m)

No. Instream Woody Debris	
No. of Dewatered Woody Debris	
No. of Instream Rootwads	
No. of Dewatered Rootwads	

PHOTODOCUMENTATION

Picture Number _____ Subject _____

Picture Number _____ Subject _____

Picture Number _____ Subject _____

Picture Number _____ Subject _____

Site Acces Route _____

Sampling Consd (_____num. Anodes) _____

Comments _____

Benthic Spring Sampling Data Sheet

SITE (Watershed Code) | (Segment) NW7 | (Type) RG | (Year) 2008 — Reviewed By:

BASIN — Sample Label Verified By: — 2nd Reviewer:

DATE (Year) 08 (Month) 04 (Day) 25 — Crew: WRCR

TIME (Military) — Project: WWA

Distance from Nearest Road to Site (m): 150

Bank Erosion

	Left Bank	Right Bank
Extent	30	30
Severity		
1=min		
2=mod	X	X
3=severe		
Bank Stability		

Temp logger? y/n

Serial # ____

Benthic Habitat Sampled

(Square feet; Total = 20 square feet)

Riffle	20
Rootwad/Woody Debris	
Leaf Pack	
Macrophytes	
Undercut Banks	
Other	

(Specify) ____

Stream Width (m)

0 m

75 m

LANDUSE (Y/N)

Old Field	
Deciduous Forest	
Coniferous Forest	
Wetland	
Surface Mine	
Landfill	
Residential	
Commercial/Industrial	
Cropland	
Pasture	
Orchard/Vineyard/Nursery	
Golf Course	

RIPARIAN VEGETATION (facing upstream)

	Left Bank	Right Bank
Width (50m max)		
Adjacent Land Cover		
Vegetation Type (see back)		
Buffer Breaks (Y/N)		

Buffer Break Types (M=minor; S=severe)

	Left Bank	Right Bank
Storm Drain		
Tile Drain		
Impervious Drainage		
Gully		
Orchard		
Crop		
Pasture		
New Construction		
Dirt Road		
Gravel Road		
Raw Sewage		
Railroad		

CHANNELIZATION

Evidence of Channel Straightening or Dredging (Y/N): Y

TYPE	EXTENT (m) Left Bank	Bottom	Right Bank
Concrete			
Gabion			
Rip-rap			
Earthen Berm			
Drege Spoil off Channel			
Pipe Culvert			

HABITAT ASSESSMENT

Instream Habitat (0-20)	16
Epifaunal Substrate (0-20)	16
Velocity/Depth Diversity (0-20)	11
Pool/Glide/Eddy Quality (0-20)	16
Extent (0-20)	
Riffle/Run Quality (0-20)	16
Extent (0-20)	
Embeddedness (%)	15
Shading (%)	05
Trash Rating	03

WATER QUALITY PARAMETERS

Temperature ©

DO (mg/L)

pH

Cond (ms/cm)

Turbidity (NTU)

Meter Calibrations by:

Sampleability

- Benthos
- Habitat Assessment
- Water Quality

Road Culvert

- Culvert in Segment? (y/n)
- Sampleable? (y/n)
- Length of Culvert (m)
- Width of Culvert (m)

No. Instream Woody Debris	00
No. of Dewatered Woody Debris	00
No. of Instream Rootwads	00
No. of Dewatered Rootwads	07

PHOTODOCUMENTATION

Picture Number ____ Subject ____

Picture Number ____ Subject ____

Picture Number ____ Subject ____

Picture Number ____ Subject ____

Site Acces Route ____

Sampling Consd (____ num. Anodes) ____

Comments ____

Benthic Spring Sampling Data Sheet

SITE (Watershed Code) | (Segment) SC1 | (Type) TT | (Year) 2005 | Reviewed By: LCS

BASIN | Sample Label Verified By: | 2nd Reviewer: MRS

DATE (Year) 08 (Month) 04 (Day) 15 | Crew: LCS, MRS

TIME 1107 (Military) | Project: WWB

Distance from Nearest Road to Site (m): 30

Remoteness: 2

Bank Erosion

	Left Bank	Right Bank
Extent	7	2
Severity (1=min, 2=mod, 3=severe)	3*	1
Eroded Area (m2 X 10)	11	
Bank Stability	16	

Benthic Habitat Sampled

(Square feet; Total = 20 square feet)

Riffle	3
Rootwad/Woody Debris	
Leaf Pack	
Macrophytes	
Undercut Banks	
Other	

(Specify) Stable rock surface RGC 17

Stream Width (m)

0 m	8
75 m	16

LANDUSE (Y/N)

Old Field	N
Deciduous Forest	Y
Coniferous Forest	N
Wetland	N
Surface Mine	N
Landfill	N
Residential	Y
Commercial/Industrial	N
Cropland	N
Pasture	N
Orchard/Vineyard/Nursery	N
Golf Course	N
Rec. Park	Y

RIPARIAN VEGETATION (facing upstream)

	Left Bank	Right Bank
Width (50m max)	50	06
Adjacent Land Cover	HO	LN
Vegetation Type (see back)	YRGM	YRGM
Buffer Breaks (Y/N)	N	Y

Buffer Break Types (M=minor; S=severe)

	Left Bank	Right Bank
Storm Drain		M
Tile Drain		
Impervious Drainage		
Gully		
Orchard		
Crop		
Pasture		
New Construction		
Dirt Road		
Gravel Road		
Raw Sewage		
Railroad		

riprap lined gully w/ culvert

CHANNELIZATION

Evidence of Channel Straightening or Dredging (Y/N): Y

TYPE	EXTENT (m) Left Bank	Bottom	Right Bank
Concrete			
Gabion			
Rip-rap	75	75	75
Earthen Berm			
Drege Spoil off Channel			
Pipe Culvert			

HABITAT ASSESSMENT

Instream Habitat (0-20)	13 MRS
Epifaunal Substrate (0-20)	15 mrs
Velocity/Depth Diversity (0-20)	16
Pool/Glide/Eddy Quality (0-20)	09
Extent (0-20)	20
Riffle/Run Quality (0-20)	14 MRS
Extent (0-20)	20
Embeddedness (%)	50
Shading (%)	35
Trash Rating	06

WATER QUALITY PARAMETERS

Temperature ©: 11.1

DO (mg/L): 1.5.0

pH: 7.9

Cond (ms/cm): X.619 us

Turbidity (NTU): 0.2

Meter Calibrations by: RKD

Sampleability

- Y Benthos
- Y Habitat Assessment
- Y Water Quality

Road Culvert

- N Culvert in Segment? (y/n)
- \ Sampleable? (y/n)
- \ Length of Culvert (m)
- \ Width of Culvert (m)

Maximum Depth (cm): 109

No. Instream Woody Debris	0
No. of Dewatered Woody Debris	2
No. of Instream Rootwads	0
No. of Dewatered Rootwads	3

PHOTODOCUMENTATION

Picture Number	38
Subject	75m US
Picture Number	39
Subject	75m DS
Picture Number	40
Subject	75m LB
Picture Number	41
Subject	75m RB

44 Om US

45 Om DS

46 Om LB

47 Om RB

Site Acces Route: Sligo Pkwy

Sampling Consd (num. Anodes)

Comments: Photos 33-37: blockage of fish passage by dam, likely created by beaver. Manually removed blockage - photos 42-43

Large hydrologic jump at DS end; appears to hinder fish passage - photos 48-49

Scour hole at US end - photos 50-54

*secondary channel eroding in floodplain adjacent to top of riffle grade

Benthic Spring Sampling Data Sheet

SITE (Watershed Code / Segment / Type / Year): SC2 TT 2005 — Reviewed By: MRS

BASIN — Sample Label Verified By: _____ — 2nd Reviewer: LCJ

DATE (Year / Month / Day): 05 / 04 / 15 — Crew: MRS/LCJ

TIME: 1150 (Military) — Project: WWB

Distance from Nearest Road to Site (m): 45

Remoteness: 4

Bank Erosion

	Left Bank	Right Bank
Extent	0	35
Severity (1=min, 2=mod, 3=severe)	—	2*
Eroded Area (m2 X 10)	—	
Bank Stability	16	

Benthic Habitat Sampled

(Square feet; Total = 20 square feet)

Riffle	1
Rootwad/Woody Debris	
Leaf Pack	
Macrophytes	
Undercut Banks	
Other (Specify) RG rock sub	19

Stream Width (m)

0 m	12
75 m	10

LANDUSE (Y/N)

Old Field	N
Deciduous Forest	Y
Coniferous Forest	N
Wetland	N
Surface Mine	N
Landfill	N
Residential	Y
Commercial/Industrial	N
Cropland	N
Pasture	N
Orchard/Vineyard/Nursery	N
Golf Course	N
Ranch/Bottom Fields	Y

RIPARIAN VEGETATION (facing upstream)

	Left Bank	Right Bank
Width (50m max)	30	50
Adjacent Land Cover	FR	FR
Vegetation Type (see back)	MYL	MYRL
Buffer Breaks (Y/N)	N	N

Buffer Break Types (M=minor; S=severe)

	Left Bank	Right Bank
Storm Drain		
Tile Drain		
Impervious Drainage		
Gully		
Orchard		
Crop		
Pasture		
New Construction		
Dirt Road		
Gravel Road		
Raw Sewage		
Railroad		

CHANNELIZATION

Evidence of Channel Straightening or Dredging (Y/N): Y

TYPE	EXTENT (m) Left Bank	Bottom	Right Bank
Concrete			
Gabion			
Rip-rap	50	50	50
Earthen Berm			
Dredge Spoil off Channel			
Pipe Culvert			

HABITAT ASSESSMENT

Instream Habitat (0-20)	15
Epifaunal Substrate (0-20)	15
Velocity/Depth Diversity (0-20)	18
Pool/Glide/Eddy Quality (0-20)	13
Extent (0-20)	25
Riffle/Run Quality (0-20)	12
Extent (0-20)	55
Embeddedness (%)	60
Shading (%)	50
Trash Rating	6

WATER QUALITY PARAMETERS

Temperature ©: 12.8

DO (mg/L): 17.3

pH: 8.23

Cond (ms/cm): X.612

Turbidity (NTU): 0.3

Meter Calibrations by: MKD

Sampleability

- ✓ Benthos
- ✓ Habitat Assessment
- ✓ Water Quality

Road Culvert

- N Culvert in Segment? (y/n)
- — Sampleable? (y/n)
- — Length of Culvert (m)
- — Width of Culvert (m)

Maximum Depth (cm): 150

No. Instream Woody Debris	1
No. of Dewatered Woody Debris	3
No. of Instream Rootwads	0
No. of Dewatered Rootwads	1

PHOTODOCUMENTATION

Picture Number	57
Subject	75m US
Picture Number	58
Subject	75m DS
Picture Number	59
Subject	75m LB
Picture Number	60
Subject	75m RB

61 = 75m marker tree

62 @m US

63 @m DS

64 @m LB

65 @m RB

66 @m marker tree

67 = SC2 RG

Site Acces Route from Sligo Pkwy

Sampling Consd (____ num. Anodes)

Comments

* erosion of secondary channel at edge of RR grade fill see photo # 55+56 from LB

Benthic Spring Sampling Data Sheet

SITE: Watershed Code [ ] Segment [S C 3] Type [T T] Year [2 0 0 5 8] Reviewed By: LCS

BASIN [ ] Sample Label Verified By: MRS 2nd Reviewer: MRS

DATE: Year [0 8] Month [0 4] Day [1 5] Crew: MRS, LCS

TIME [1 3 4 7] (Military) Project: WWB

Distance from Nearest Road to Site (m) [5 0]

Remoteness [2]

Bank Erosion

	Left Bank	Right Bank
Extent	9	6
Severity (1=min, 2=mod, 3=severe)	1	1
Eroded Area (m2 X 10)	1	1
Bank Stability	17	

Benthic Habitat Sampled

(Square feet; Total = 20 square feet)

Riffle	12
Rootwad/Woody Debris	
Leaf Pack	
Macrophytes	
Undercut Banks	
Other	8

(Specify) Stable rock surface

Stream Width (m)

0 m	30
75 m	25

LANDUSE (Y/N)

Old Field	N
Deciduous Forest	Y
Coniferous Forest	N
Wetland	N
Surface Mine	N
Landfill	N
Residential	Y
Commercial/Industrial	N
Cropland	N
Pasture	N
Orchard/Vineyard/Nursery	N
Golf Course	N

Rec. Park Y

RIPARIAN VEGETATION (facing upstream)

	Left Bank	Right Bank
Width (50m max)	6	5
Adjacent Land Cover	LN	LN
Vegetation Type (see back)	YRGM	YRGM
Buffer Breaks (Y/N)	N	Y

Buffer Break Types (M=minor; S=severe)

	Left Bank	Right Bank
Storm Drain		
Tile Drain		
Impervious Drainage		M
Gully		
Orchard		
Crop		
Pasture		
New Construction		
Dirt Road		
Gravel Road		
Raw Sewage		
Railroad		

metal + rip rap lined, 4-ft wide slope to stream

CHANNELIZATION

Evidence of Channel Straightening or Dredging (Y/N) Y

TYPE	EXTENT (m) Left Bank	Bottom	Right Bank
Concrete			
Gabion			
Rip-rap	40	5	4
Earthen Berm			
Drege Spoil off Channel			
Pipe Culvert			

HABITAT ASSESSMENT

Instream Habitat (0-20)	15
Epifaunal Substrate (0-20)	13
Velocity/Depth Diversity (0-20)	16
Pool/Glide/Eddy Quality (0-20)	12
Extent (~~0-20~~)	75
Riffle/Run Quality (0-20)	17
Extent (~~0-20~~)	30
Embeddedness (%)	60
Shading (%)	40
Trash Rating	10

WATER QUALITY PARAMETERS

Temperature © [16 . 28]

DO (mg/L) [16 . 8]

pH [8 . 63]

Cond (~~mS~~/cm) [1 . 598]

Turbidity (NTU) [-0 . 2]

Meter Calibrations by: RKD

Sampleability

Y Benthos

Y Habitat Assessment

Y Water Quality

Road Culvert

N Culvert in Segment? (y/n)

Sampleable? (y/n)

Length of Culvert (m)

Width of Culvert (m)

Maximum Depth (cm)

[75]

No. Instream Woody Debris [3]

No. of Dewatered Woody Debris [2]

No. of Instream Rootwads [0]

No. of Dewatered Rootwads [4]

PHOTODOCUMENTATION

Picture Number [68] Subject Om US — 72 75m US

Picture Number [69] Subject Om DS — 73 75 m DS

Picture Number [70] Subject Om LB — 74 75 m LB

Picture Number [71] Subject Om RB — 75 75 m RB

Site Acces Route: Sligo Pkwy

Sampling Consd (____ num. Anodes)

Comments: lots of minnows + suckers in step pool structure saw black crowned night heron + wood ducks

Benthic Spring Sampling Data Sheet

SITE (Watershed Code) | (Segment) 5C4 | (Type) TT | (Year) 2005 — Reviewed By: MRS

BASIN — Sample Label Verified By: ____ — 2nd Reviewer: LCJ

DATE (Year) 08 (Month) 09 (Day) 15 — Crew: MRS/LCJ

TIME 1450 (Military) — Project: WWB

Distance from Nearest Road to Site (m): 50

Remoteness: 2

Bank Erosion

	Left Bank	Right Bank
Extent	10	3
Severity (1=min, 2=mod, 3=severe)	1	1
Eroded Area (m2 X 10)		
Bank Stability	15	

Benthic Habitat Sampled

(Square feet; Total = 20 square feet)

Riffle	4
Rootwad/Woody Debris	
Leaf Pack	
Macrophytes	
Undercut Banks	
Other	16
(Specify)	rock rub

Stream Width (m)

0 m	25
75 m	20

LANDUSE (Y/N)

Old Field	N
Deciduous Forest	Y
Coniferous Forest	N
Wetland	N
Surface Mine	N
Landfill	N
Residential	Y
Commercial/Industrial	N
Cropland	N
Pasture	N
Orchard/Vineyard/Nursery	N
Golf Course	N
Park/lawn	Y

RIPARIAN VEGETATION (facing upstream)

	Left Bank	Right Bank
Width (50m max)	30	50
Adjacent Land Cover	FR	FR
Vegetation Type (see back)		
Buffer Breaks (Y/N)	Y	Y

Buffer Break Types (M=minor; S=severe)

	Left Bank	Right Bank
Storm Drain		
Tile Drain		
Impervious Drainage	M	M
Gully		
Orchard		
Crop		
Pasture		
New Construction		
~~Dirt Road~~ foot path		M
Gravel Road		
Raw Sewage		
Railroad		

CHANNELIZATION

Evidence of Channel Straightening or Dredging (Y/N): Y *

EXTENT (m) facing US

TYPE	Left Bank	Bottom	Right Bank
Concrete			
Gabion			
Rip-rap	5	18	25
Earthen Berm			
Drege Spoil off Channel			
Pipe Culvert			

HABITAT ASSESSMENT

Instream Habitat (0-20)	17
Epifaunal Substrate (0-20)	14
Velocity/Depth Diversity (0-20)	16
Pool/Glide/Eddy Quality (0-20)	12
Extent (0-20)	10
Riffle/Run Quality (0-20)	16
Extent (0-20)	20
Embeddedness (%)	60
Shading (%)	40
Trash Rating	6

WATER QUALITY PARAMETERS

Temperature ©: 16.9

DO (mg/L): 16.8

pH: 8.87

Cond (ms/cm): .592

Turbidity (NTU): 3.1

Meter Calibrations by: RKD

Sampleability

- Y Benthos
- Y Habitat Assessment
- N Water Quality

Road Culvert

- N Culvert in Segment? (y/n)
- Sampleable? (y/n)
- Length of Culvert (m)
- Width of Culvert (m)

Maximum Depth (cm)

100

No. Instream Woody Debris	10
No. of Dewatered Woody Debris	3
No. of Instream Rootwads	1
No. of Dewatered Rootwads	4

PHOTODOCUMENTATION

Picture Number	76
Subject	0m US
Picture Number	77
Subject	0m DS
Picture Number	78
Subject	0m LB
Picture Number	79
Subject	0m RB

80 : 0m tree

88-87 - 75m tree

90 75m US

91 75m DS

92 75m LB

93 75m RB

Site Acces Route: ____

Sampling Consd (____ num. Anodes) ____

Comments: cuts in sheet pile blocked with rocks photos 84-85, 94-99, 101-106 - after blockage removal

* Step pool structure

APPENDIX G- Benthic Macroinvertebrate Monitoring Metrics

Macroinvertebrate Water Quality Monitoring Benthic Metrics

Site ID	NW-1RG	Collection Date	4/18/2008		Collectors	HS/ AT

Order	Family	Final ID	FFG	Tol. Value	Habit	Quantity
Diptera	Chironomidae	CHIRONOMIDAE		6.6		19
Diptera	Chironomidae	POLYPEDILUM	Shredder	6.3	cb, cn	1
Diptera	Chironomidae	CRICOTOPUS	Shredder	9.6	cn, bu	5
Diptera	Chironomidae	CRICOTOPUS/ORTHOCLADIUS	Shredder	7.7		31
Diptera	Chironomidae	ORTHOCLADIUS	Collector	9.2	sp, bu	62

Total Individuals
118

Metrics Calcutations		**IBI Score**
Total number of taxa	3	1
Number of EPT taxa	0	1
Number of Ephemeroptera	0.00	1
Percent Intolerant to Urban	0.00	1
Percent Ephemeroptera	0	1
Number of scraper taxa	0	1
Percent climbers	0.80	1

IBI Total	1.00
IBI Category	Very Poor

Coastal Plain

Macroinvertebrate Water Quality Monitoring Benthic Metrics

Site ID	NW-2RG	Collection Date	4/18/2008		Collectors	HS/AT

Order	Family	Final ID	FFG	Tol. Value	Habit	Quantity
		OLIGOCHAETA	Collector	10	bu	5
Ephemeroptera	Baetidae	BAETIS	Collector	3.9	sw, cb, cn	1
Diptera	Chironomidae	CHIRONOMIDAE		6.6		25
Diptera	Tipulidae	ORMOSIA	Collector	6.3	bu	1
Diptera	Chironomidae	POLYPEDILUM	Shredder	6.3	cb, cn	1
Diptera	Chironomidae	CRICOTOPUS	Shredder	9.6	cn, bu	65
Diptera	Chironomidae	CRICOTOPUS/ORTHOCLADIUS	Shredder	7.7		12
Diptera	Chironomidae	ORTHOCLADIUS	Collector	9.2	sp, bu	55
Diptera	Chironomidae	RHEOCRICOTOPUS	Collector	6.2	sp	4
Diptera	Chironomidae	DIAMESA	Collector	8.5	sp	1

Total Individuals
170

Metrics Calcutations		**IBI Score**
Total number of taxa	9	1
Number of EPT taxa	1	1
Number of Ephemeroptera	1.00	3
Percent Intolerant to Urban	0.00	1
Percent Ephemeroptera	0.59	1
Number of scraper taxa	0	1
Percent climbers	1.10	3

IBI Total 1.57
IBI Category Very Poor

Coastal Plain

Macroinvertebrate Water Quality Monitoring Benthic Metrics

Site ID	NW-3RG	Collection Date	4/25/2008		Collectors	MR/ KR

Order	Family	Final ID	FFG	Tol. Value	Habit	Quantity
		OLIGOCHAETA	Collector	10	bu	3
Ephemeroptera	Baetidae	BAETIDAE	Collector	2.3	sw, cn	1
Ephemeroptera	Baetidae	BAETIS	Collector	3.9	sw, cb, cn	1
Trichoptera	Hydropsychidae	HYDROPSYCHE	Filterer	7.5	cn	2
Diptera	Chironomidae	CHIRONOMIDAE		6.6		14
Diptera	Chironomidae	DICROTENDIPES	Collector	9	bu	1
Diptera	Chironomidae	POLYPEDILUM	Shredder	6.3	cb, cn	3
Diptera	Chironomidae	CRICOTOPUS	Shredder	9.6	cn, bu	15
Diptera	Chironomidae	ORTHOCLADIUS	Collector	9.2	sp, bu	54
Diptera	Chironomidae	PENTANEURA	Predator	6.6	sp	1

Total Individuals
95

Metrics Calcutations		**IBI Score**
Total number of taxa	8	1
Number of EPT taxa	2	3
Number of Ephemeroptera	2.00	5
Percent Intolerant to Urban	1.05	1
Percent Ephemeroptera	2.11	3
Number of scraper taxa	0	1
Percent climbers	4.21	3
IBI Total		2.43
IBI Category		Poor

Coastal Plain

Macroinvertebrate Water Quality Monitoring Benthic Metrics

Site ID	NW-4RG	Collection Date	4/25/2008		Collectors	MR / KR

Order	Family	Final ID	FFG	Tol. Value	Habit	Quantity
		OLIGOCHAETA	Collector	10	bu	3
Ephemeroptera	Baetidae	BAETIS	Collector	3.9	sw, cb, cn	1
Trichoptera	Hydroptilidae	HYDROPTILA	Scraper	6	cn	2
Diptera	Chironomidae	CHIRONOMIDAE		6.6		16
Diptera	Chironomidae	DICROTENDIPES	Collector	9	bu	1
Diptera	Chironomidae	POLYPEDILUM	Shredder	6.3	cb, cn	3
Diptera	Chironomidae	CRICOTOPUS	Shredder	9.6	cn, bu	14
Diptera	Chironomidae	ORTHOCLADIUS	Collector	9.2	sp, bu	68

Total Individuals
108

Metrics Calcutations		**IBI Score**
Total number of taxa	7	1
Number of EPT taxa	2	3
Number of Ephemeroptera	1.00	3
Percent Intolerant to Urban	0.00	1
Percent Ephemeroptera	0.93	3
Number of scraper taxa	1	3
Percent climbers	3.70	3

IBI Total	2.43
IBI Category	Poor

Coastal Plain

Macroinvertebrate Water Quality Monitoring Benthic Metrics

Site ID	NW-5RG	Collection Date	4/25/2008		Collectors	MR/ KR

Order	Family	Final ID	FFG	Tol. Value	Habit	Quantity
		OLIGOCHAETA	Collector	10	bu	4
Trichoptera	Hydropsychidae	CHEUMATOPSYCHE	Filterer	6.5	cn	2
Trichoptera	Philopotamidae	WORMALDIA	Filterer	1.8	cn	1
Diptera	Chironomidae	CHIRONOMIDAE		6.6		17
Diptera	Empididae	HEMERODROMIA	Predator	7.9	sp, bu	5
Diptera	Chironomidae	DICROTENDIPES	Collector	9	bu	1
Diptera	Chironomidae	POLYPEDILUM	Shredder	6.3	cb, cn	7
Diptera	Chironomidae	CRICOTOPUS	Shredder	9.6	cn, bu	13
Diptera	Chironomidae	ORTHOCLADIUS	Collector	9.2	sp, bu	68
Diptera	Chironomidae	THIENEMANNIMYIA GROUP	Predator	8.2	sp	1

Total Individuals
119

Metrics Calcutations		**IBI Score**
Total number of taxa	9	1
Number of EPT taxa	2	3
Number of Ephemeroptera	0.00	1
Percent Intolerant to Urban	0.84	1
Percent Ephemeroptera	0.00	1
Number of scraper taxa	0	1
Percent climbers	5.80	3

IBI Total 1.57

IBI Category Very Poor

Coastal Plain

Macroinvertebrate Water Quality Monitoring Benthic Metrics

Site ID	NW-6RG	Collection Date	4/25/2008		Collectors	MR/ KR

Order	Family	Final ID	FFG	Tol. Value	Habit	Quantity
		OLIGOCHAETA	Collector	10	bu	3
Diptera	Chironomidae	CHIRONOMIDAE		6.6		19
Diptera	Chironomidae	POLYPEDILUM	Shredder	6.3	cb, cn	7
Diptera	Chironomidae	CRICOTOPUS	Shredder	9.6	cn, bu	15
Diptera	Chironomidae	CRICOTOPUS/ORTHOCLADIUS	Shredder	7.7		16
Diptera	Chironomidae	ORTHOCLADIUS	Collector	9.2	sp, bu	64
Diptera	Chironomidae	DIAMESA	Collector	8.5	sp	1
Trichoptera	Hydropsychidae	HYDROPSYCHE	Filterer	7.5	cn	1

Total Individuals
126

Metrics Calcutations		IBI Score
Total number of taxa	6	1
Number of EPT taxa	1	1
Number of Ephemeroptera	0.00	1
Percent Intolerant to Urban	0.00	1
Percent Ephemeroptera	0	1
Number of scraper taxa	0	1
Percent climbers	4.70	3

IBI Total 1.29
IBI Category Very Poor

Coastal Plain

Macroinvertebrate Water Quality Monitoring Benthic Metrics

Site ID	NW-7RG	Collection Date	4/25//08		Collectors	MR/ KR

Order	Family	Final ID	FFG	Tol. Value	Habit	Quantity
		OLIGOCHAETA	Collector	10	bu	1
Ephemeroptera	Baetidae	BAETIS	Collector	3.9	sw, cb, cn	2
Diptera	Chironomidae	CHIRONOMIDAE		6.6		18
Diptera	Chironomidae	CRICOTOPUS	Shredder	9.6	cn, bu	24
Diptera	Chironomidae	CRICOTOPUS/ORTHOCLADIUS	Shredder	7.7		4
Diptera	Chironomidae	HYDROBAENUS	Scraper	7.2	sp	4
Diptera	Chironomidae	ORTHOCLADIUS	Collector	9.2	sp, bu	42

Total Individuals
95

Metrics Calcutations		**IBI Score**
Total number of taxa	5	1
Number of EPT taxa	1	1
Number of Ephemeroptera	1.00	3
Percent Intolerant to Urban	0.00	1
Percent Ephemeroptera	2.11	3
Number of scraper taxa	1	3
Percent climbers	2.10	3
IBI Total		2.14
Category		Poor

Coastal Plain

Macroinvertebrate Water Quality Monitoring Benthic Metrics

Site ID	SC-1	Collection Date	5/23/2008		Collectors	MRS/ LCJ

Order	Family	Final ID	FFG	Tol. Value	Habit	Quantity
Diptera	Chironomidae	CRICOTOPUS	Shredder	9.6	cn, bu	40
Diptera	Chironomidae	ORTHOCLADIUS	Collector	9.2	sp, bu	35
Diptera	Chironomidae	THIENEMANNIMYIA GROUP	Predator	8.2	sp	1
		TURBELLARIA	Predator	4	sp	1
		OLIGOCHAETA	Collector	10	bu	1
Trichoptera	Hydropsychidae	CHEUMATOPSYCHE	Filterer	6.5	cn	2
Trichoptera	Hydropsychidae	HYDROPSYCHE	Filterer	7.5	cn	1
Diptera	Chironomidae	CHIRONOMIDAE		6.6		4
Diptera	Chironomidae	POLYPEDILUM	Shredder	6.3	cb, cn	12
Diptera	Chironomidae	RHEOTANYTARSUS	Filterer	7.2	cn	2
Diptera	Chironomidae	TANYTARSUS	Filterer	4.9	cb, cn	2

Total Individuals
101

Metrics Calcutations		**IBI Score**
Total number of taxa	10	1
Number of EPT taxa	2	3
Number of Ephemeroptera	0.00	1
Percent Intolerant to Urban	0.00	1
Percent Ephemeroptera	0.00	1
Number of scraper taxa	0	1
Percent climbers	13.86	5
IBI Total		1.86
IBI Category		Very Poor

Coastal Plain

Macroinvertebrate Water Quality Monitoring Benthic Metrics

Site ID	SC-2	Collection Date	4/15/2008		Collectors	MRS/ LCJ

Order	Family	Final ID	FFG	Tol. Value	Habit	Quantity
		OLIGOCHAETA	Collector	10	bu	7
Diptera	Ceratopogonidae	STILOBEZZIA	Predator	3.6	sp	1
Diptera	Chironomidae	CHIRONOMIDAE		6.6		7
Diptera	Chironomidae	POLYPEDILUM	Shredder	6.3	cb, cn	1
Diptera	Chironomidae	CRICOTOPUS	Shredder	9.6	cn, bu	30
Diptera	Chironomidae	ORTHOCLADIUS	Collector	9.2	sp, bu	54

Total Individuals
100

Metrics Calcutations		**IBI Score**
Total number of taxa	5	1
Number of EPT taxa	0	1
Number of Ephemeroptera	0.00	1
Percent Intolerant to Urban	0.00	1
Percent Ephemeroptera	0.00	1
Number of scraper taxa	0	1
Percent climbers	1.00	3
IBI Total		1.29
IBI Category		Very Poor

Coastal Plain

Macroinvertebrate Water Quality Monitoring Benthic Metrics

Site ID	SC-3	Collection Date	4/15/2008		Collectors	MRS/ LCJ

Order	Family	Final ID	FFG	Tol. Value	Habit	Quantity
		OLIGOCHAETA	Collector	10	bu	2
Trichoptera	Hydropsychidae	CHEUMATOPSYCHE	Filterer	6.5	cn	3
Trichoptera	Hydropsychidae	HYDROPSYCHE	Filterer	7.5	cn	1
Diptera	Chironomidae	CHIRONOMIDAE		6.6		7
Diptera	Tipulidae	ANTOCHA	Collector	8	cn	1
Diptera	Chironomidae	DICROTENDIPES	Collector	9	bu	1
Diptera	Chironomidae	POLYPEDILUM	Shredder	6.3	cb, cn	7
Diptera	Chironomidae	CRICOTOPUS	Shredder	9.6	cn, bu	63
Diptera	Chironomidae	ORTHOCLADIUS	Collector	9.2	sp, bu	11
Diptera	Chironomidae	ABLABESMYIA	Predator	8.1	sp	1
Diptera	Chironomidae	THIENEMANNIMYIA GROUP	Predator	8.2	sp	1

Total Individuals
98

Metrics Calcutations		**IBI Score**
Total number of taxa	10	1
Number of EPT taxa	2	3
Number of Ephemeroptera	0.00	1
Percent Intolerant to Urban	0.00	1
Percent Ephemeroptera	0.00	1
Number of scraper taxa	0	1
Percent climbers	7.14	3
IBI Total		1.57
IBI Category		Very Poor

Coastal Plain

Macroinvertebrate Water Quality Monitoring Benthic Metrics

Site ID	SC-4	Collection Date	4/15/2008		Collectors	MRS/ LCJ

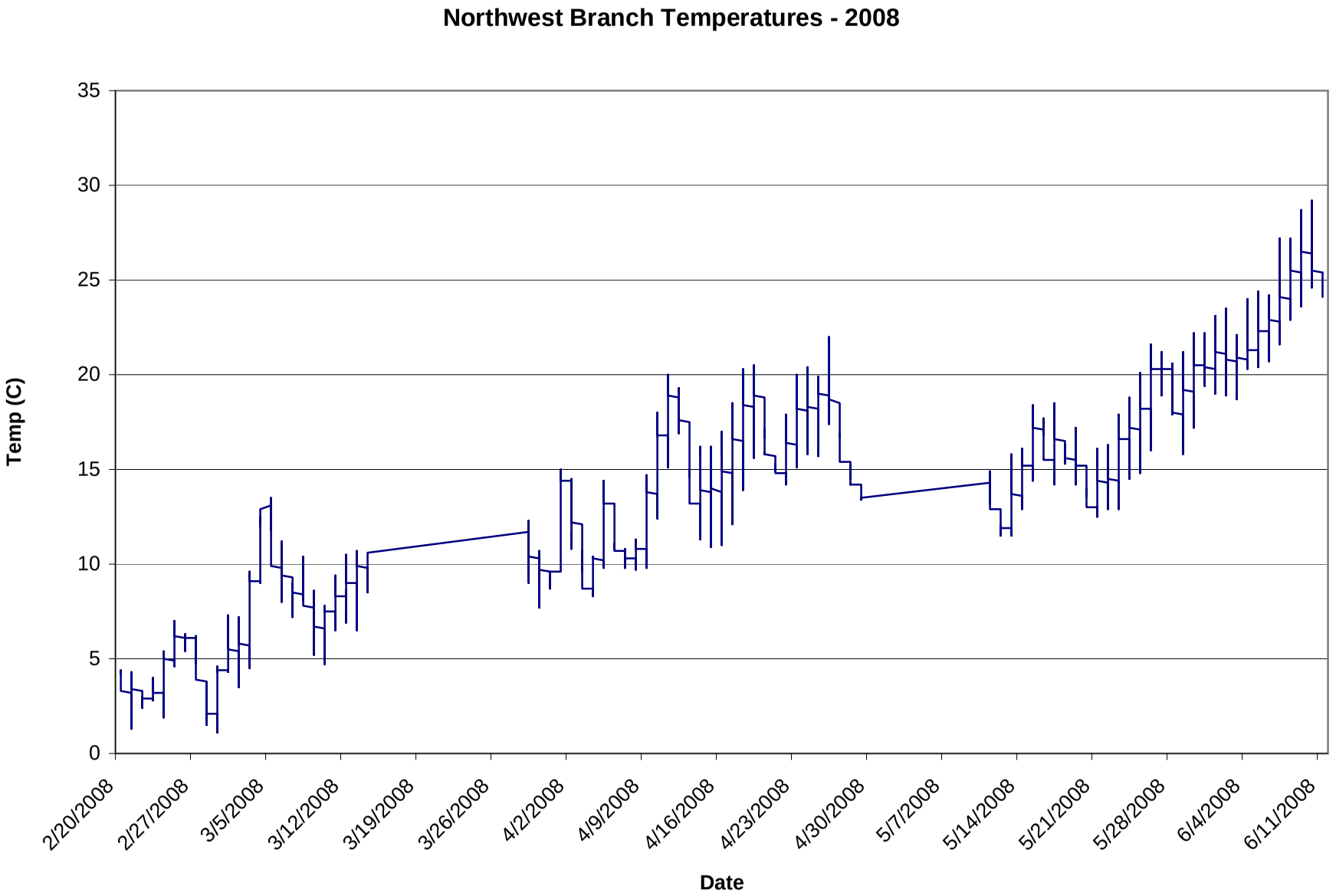
Order	Family	Final ID	FFG	Tol. Value	Habit	Quantity
		OLIGOCHAETA	Collector	10	bu	14
Trichoptera	Hydroptilidae	HYDROPTILA	Scraper	6	cn	1
Diptera	Chironomidae	CHIRONOMIDAE		6.6		5
Diptera	Chironomidae	POLYPEDILUM	Shredder	6.3	cb, cn	2
Diptera	Chironomidae	TANYTARSUS	Filterer	4.9	cb, cn	2
Diptera	Chironomidae	CRICOTOPUS	Shredder	9.6	cn, bu	53
Diptera	Chironomidae	ORTHOCLADIUS	Collector	9.2	sp, bu	21

Total Individuals
98

Metrics Calcutations		IBI Score
Total number of taxa	6	1
Number of EPT taxa	1	1
Number of Ephemeroptera	0.00	1
Percent Intolerant to Urban	0.00	1
Percent Ephemeroptera	0.00	1
Number of scraper taxa	1	3
Percent climbers	4.08	3
IBI Total		1.57
IBI Category		Very Poor

Coastal Plain

APPENDIX H- Temperature Data


Northwest Branch Temperatures - 2008
Temp (C)
35
30
25
20
15
10
5
0
2/20/2008
2/27/2008
3/5/2008
3/12/2008
3/19/2008
3/26/2008
4/2/2008
4/9/2008
4/16/2008
4/23/2008
4/30/2008
5/7/2008
5/14/2008
5/21/2008
5/28/2008
6/4/2008
6/11/2008
Date

APPENDIX I- Ichthyoplankton Site Location Maps

N

Woodrow Wilson Bridge
Post-Construction Monitoring
Ichthyoplankton Sampling
Site: NW-0B

Figure 1

March, 2007

Not to Scale

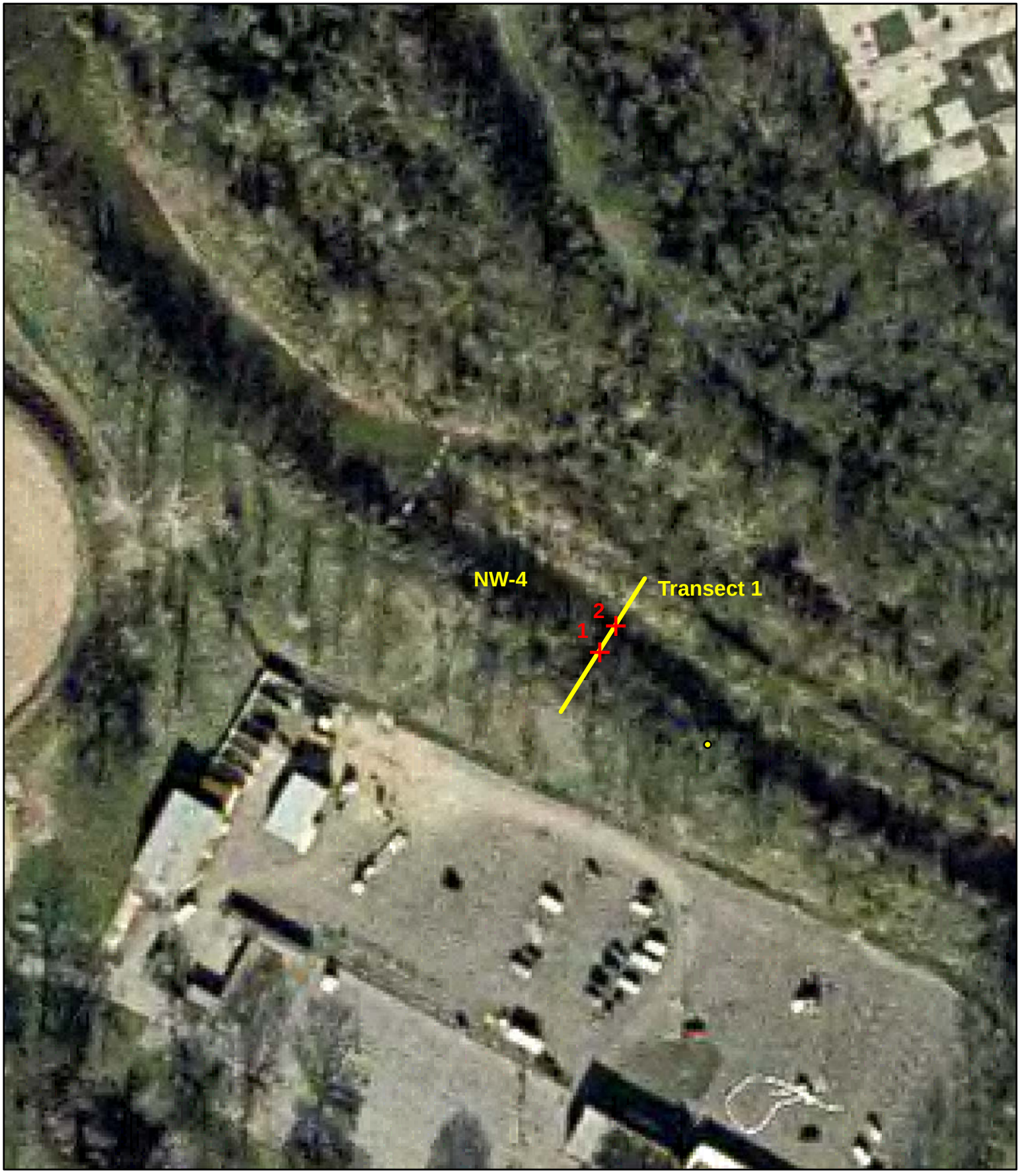
N

Woodrow Wilson Bridge
Post-Construction Monitoring
Ichthyoplankton Sampling
Site: NW-3B

Figure 2

March, 2007

Not to Scale



N

Woodrow Wilson Bridge
Post-Construction Monitoring
Ichthyoplankton Sampling
Site: NW-4B

Figure 3

March, 2007

Not to Scale

N

Woodrow Wilson Bridge
Post-Construction Monitoring
Ichthyoplankton Sampling
Site: NW-6B

Figure 4

March, 2007

Not to Scale

N

Woodrow Wilson Bridge
Post-Construction Monitoring
Ichthyoplankton Sampling
Site: NW-8B

Figure 5

March, 2007

Not to Scale