# Lyle Creek Stream Restoration
# 2004 Annual Monitoring Report

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February, 2005

Ecosystem Enhancement PROGRAM

NCDENR

NC STATE UNIVERSITY

# 2004 Lyle Creek Monitoring Abstract

Lyle Creek was enhanced/restored through the North Carolina Wetlands Restoration Program (NCWRP). The goals and objectives of this project are as follows.

1.) Restore 2,400 linear feet of an unnamed tributary to Lyle Creek.
    a. Approximately 700 linear feet of Lyle Creek was enhanced through the use of bank stabilization and approximately 1244 linear feet was restored through natural channel design stream restoration. (amount measured as part of the monitoring)
2.) Enhance the riparian area through planting native species
3.) Exclude cattle access to the unnamed tributary to Lyle Creek and 800 linear feet of a secondary unnamed tributary.

This is the 2nd year of the 5-year monitoring plan for Lyle Creek.

**Table 1. Background Information**

| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Designer's Name** | EcoScience Corporation<br>1101 Haynes Street, Suite 101<br>Raleigh, NC 27604 |
| **Contractor's Name** | North State Environmental |
| **Project County** | Catawba County, North Carolina |
| **Directions to Project Site** | From Interstate I-40 take Exit 138. Head south on Oxford School Rd for 0.1 mile. Turn right on Wyke Rd follow Wyke Rd for 1 mile. Turn Right on US-70, follow US-70 for 0.2 mile. The project approximately located 1000ft upstream of the US-70 Bridge over Lyle Creek. |
| **Drainage Area** | 0.5 sq. mi. |
| **USGS Hydro Unit** | 3050101 |
| **NCDWQ Subbasin** | Catawba River Basin |
| **Project Length** | 2,400 Linear feet |
| **Restoration Approach** | ~1,200-feet of dimension, pattern, and profile (restoration)<br>~700-feet of bank and riparian<br>enhancement (stabilization) |
| **Date of Completion** | July, 2002 |
| **Monitoring Dates** | February, 2003 (AS-BUILT) ; November, 2003, July 2004 |

**Results and Discussion**

Overall, the majority of the stabilization stream project is functioning and is holding grade. The stream restoration section has major areas of concern that total greater than 325 linear feet and should be maintained as soon as possible. Table 2 shows a summary of monitoring measurement results. Overall, the restoration section is performing poorly and the stabilization section is performing well. Channel dimension, pattern, and profile are unstable and vary from the as-built conditions and the year 1 monitoring conditions. Vegetation is not succeeding to levels required for mitigation credit. Placed structures are holding grade and functioning well. The majority of the bank stabilization problems appear to be occurring because of the combination lack of deep rooting vegetation, the lack of root wads to stabilize the outside meander bends, and very tight radius of curvature for meander bends. The constructed stream in the restoration section STA 7+00 to 19+40 dose not appear to be stable.

**Table 2. Summary of Channel Conditions**

| DIMENSION | Lyle Creek In-Place Reach Cross-section #1 Pool | | | Lyle Creek In-Place Reach Cross-section #2 Riffle | | | Lyle Creek In-Place Reach Cross-section #3 Riffle | | | Lyle Creek Relocation Reach Cross-section #4 Riffle | | | Lyle Creek Relocation Reach Cross-section #5 Riffle | | | Lyle Creek Relocation Reach Cross-section #6 Pool | | | Lyle Creek Relocation Reach Cross-section #7 Riffle | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 |
| Bankfull Cross-sectional Area | 20.8 | 14.1 | 12.5 | 16.5 | 28.1 | 30.0 | 15.6 | 26.1 | 27.4 | 17.5 | 17.8 | 17.0 | 16.9 | 20.7 | 25.2 | 19.6 | 27.3 | 28.5 | 15.2 | 16.2 | 18.9 |
| Bankfull Width | 16.3 | 16.5 | 13.7 | 11.8 | 18.6 | 18.6 | 13.2 | 16.2 | 17.1 | 10.8 | 10.8 | 10.8 | 10.7 | 13.9 | 13.8 | 12.8 | 13.5 | 15.7 | 11.2 | 11.2 | 9.0 |
| Bankfull Mean Depth | 1.3 | 0.9 | 0.9 | 1.4 | 1.5 | 1.6 | 1.2 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 | 1.8 | 1.5 | 2.0 | 1.8 | 1.4 | 1.4 | 2.1 |
| Bankfull Max Depth | 3.1 | 1.7 | 1.4 | 2.2 | 2.4 | 2.4 | 2.2 | 2.0 | 2.0 | 2.7 | 2.6 | 2.8 | 2.5 | 2.6 | 2.5 | 2.8 | 2.7 | 2.9 | 2.2 | 2.1 | 2.4 |

| PATTERN | Lyle Creek As-built | | | Lyle Creek 2003 | | | Lyle Creek 2004 | | | Lyle Creek (in place) As-built | | | Lyle Creek (in place) 2003 | | | Lyle Creek (in place) 2004 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median |
| Meander Wave Length | 33 | 114 | 63 | 49 | 150 | 71 | 53 | 165 | 82 | Not Reported | | | 59 | 177 | 149 | 59 | 177 | 149 |
| Radius of Curvature | 14.9 | 37.5 | 22.4 | 16.7 | 38.5 | 20.9 | 15.9 | 47.0 | 22.8 | Not Reported | | | 13.3 | 48.6 | 30.9 | 13.3 | 48.6 | 30.9 |
| Beltwidth | 33 | 141 | 88 | 22 | 56 | 33 | 32 | 84 | 42 | Not Reported | | | 42 | 109 | 55 | 42 | 109 | 55 |

| PROFILE | Lyle Creek As-built | | | Lyle Creek 2003 | | | Lyle Creek 2004 | | | Lyle Creek (in place) As-built | | | Lyle Creek (in place) 2003 | | | Lyle Creek (in place) 2004 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median |
| Riffle Length | Not Reported | | | 7 | 39 | 17 | 7 | 28 | 15 | Not Reported | | | 9 | 68 | 21 | 9 | 68 | 21 |
| Riffle Slope | 0.00% | 3.64% | 1.41% | 0.56% | 4.94% | 1.71% | 0.65% | 4.80% | 2.10% | Not Reported | | | 0.17% | 4.74% | 2.12% | 0.17% | 4.74% | 2.12% |
| Pool Length | 14 | 64 | 27 | 9 | 41 | 23 | 9 | 41 | 23 | Not Reported | | | 11 | 49 | 27 | 11 | 49 | 27 |
| Pool to Pool Spacing | 22 | 161 | 54 | 27 | 176 | 46 | 31 | 92 | 43 | Not Reported | | | 28 | 140 | 66 | 28 | 140 | 66 |

| SUBSTRATE | Lyle Creek Cross-section #1 Pool | | | Lyle Creek Cross-section #2 Riffle | | | Lyle Creek Cross-section #3 Riffle | | | Lyle Creek Cross-section #4 Riffle | | | Lyle Creek Cross-section #5 Riffle | | | Lyle Creek Cross-section #6 Pool | | | Lyle Creek Cross-section #7 Riffle | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 |
| D50 | 0.09 | 0.29 | 0.33 | 0.19 | 0.29 | 0.07 | 0.19 | 0.45 | 0.08 | 0.19 | 0.11 | 0.33 | 0.19 | 0.33 | 1.05 | 0.09 | 0.71 | 0.26 | 0.19 | 0.34 | 0.41 |
| D85 | 0.52 | 0.76 | 0.66 | 15.91 | 13.33 | 0.31 | 15.91 | 1.01 | 0.40 | 15.91 | 3.11 | 79.40 | 15.91 | 17.52 | 8.64 | 0.52 | 31.78 | 19.80 | 15.91 | 3.00 | 0.71 |

| VEGETATION | Quad 1 Lyle Creek | | | Quad 2 Lyle Creek | | | Quad 3 Lyle Creek | | | Quad 4 Lyle Creek | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2004 | 2003 | Planted | 2004 | 2003 | Planted | 2004 | 2003 | Planted | 2004 | 2003 | Planted |
| Tree Stratum (trees/acre) | 720 | 720 | 0 | 520 | 520 | 40 | 600 | 600 | 240 | 12560 | 12560 | 0 |
| Shrub Stratum (% cover) | 1.0 | 1.0 | - | 1.0 | 1.0 | - | 8.5 | 8.5 | - | 15.5 | 15.5 | - |
| Herb Stratum (%cover) | 62.5 | 62.5 | - | 184 | 184 | - | 171.5 | 171.5 | - | 152.2 | 152.2 | - |

| BEHI/NBS | Lyle Creek | | Lyle Creek | |
|---|---|---|---|---|
| Average conditions | BEHI-03 | NBS-03 | BEHI-04 | NBS-04 |
| | LOW | MOD | MOD | MOD |

The following areas of concern should be monitored closely and considered for repair as suggested:

- Easement Limits
  - NCEEP should work with landowners to ensure easement limits are maintained and that cattle stay out of the riparian area.
- Areas of major head cuts
  - There are two areas of major head cut totaling approximately 325 ft.
  - The first area has a maximum head cut of six inches and is approximately 200 ft in length. This head cut is located from station 10+25 to 12+25. There is still 175 ft upstream until the next structure controlling grade.
  - The second area has a maximum head cut of six inches and is approximately 125 ft in length. This head cut is located from station 15+25 to 16+50. There is still 350 ft upstream until the next structure controlling grade.
- Areas with bank erosion and slumping
  - The following meander bends have a high near NBS and very high BEHI rating for at least a 10 ft section on the outside of the meander bend.
    - @ STATIONS 9+50; 11+10; 11+50; 11+75; 12+90; 13+80; 16+20; 16+60; 16+80; 18+00; 18+50
    - All of these problem areas were located in the reach that was restored. The stabilized reach had some bank erosion but nothing that classified as high near NBS and very high BEHI.
  - These areas should be regarded and planted heavily with live stakes to help establish root mass along the channel bank. Root wads should also be considered for bank protection.
  - These areas should be monitored closely during upcoming site visits to determine if the problem is localized or regional in scale. The problems seem to be regional.
  - Overland flow is also causing bank erosion and may need to be routed away from areas that show signs of severe bank erosion.
- Areas lacking stream feature
  - There are twelve riffles that were constructed that do not exist in the longitudinal profile measured during the 2004 monitoring
  - There are four riffles that were monitored in 2003 that do not exist in the longitudinal profile measured during the 2004 monitoring
  - Some of the riffles that have been removed as a result of the major head cuts in the two sections listed above
  - The remainder of the failed riffles have transitioned into runs or glides
  - Most riffles that were constructed within 100 ft downstream of a cross vane with a drop greater than 0.5 ft were not observed during the 2004 monitoring survey
- Areas lacking stream pattern
  - There are two areas that have shown a significant change in stream pattern from the as-built conditions.
  - The first section is from station 12+25 to 13+25 there is half of a meander wavelength that has been straightened into a long run this is the result of the head cut mentioned above.

- The second section is from station 17+50 to 18+50 there an entire meander wavelength that has been straightened into a run followed by a long step pool feature at the end of the project.
- The exact change in plan form could not be quantified with the 2003-2004 monitoring periods. The supplied as-built data for this project is not the same planform that was observed during the 2003-2004 monitoring periods.
- NCSU-BAE had reason to not include any of the as-built planform survey in the main body of this report. An extra plan sheet is located in the Appendix that displays the variation of planform from the As-built survey and the 2003 & 2004 monitoring periods.

- Vegetation Concerns
  - Natural regeneration appears to be dominant and should continue to be monitored for growth habitats.
  - Planting more trees if required for mitigation. At this time, the tree stems per acre count is 70 but there is good natural regeneration of trees.
  - It is recommended to stake in areas where excess erosion is occurring on the outside of meander bends
  - The invasive vegetation requires does treatment as soon as possible.
- Biological/Ecological Concerns
  - Biological data have been collected from this project twice following construction. Data from the 2003 investigation clearly note a decline in the biological condition of this stream. Taxa richness EPT and total and EPT abundance values were reduced from preconstruction conditions and both the Dominants in Common value and the number of keystone taxa were also reduced during this investigation. Some recovery was noted during the 2004 survey, but are still marginally worse than those conditions recorded from this stream prior to construction.

**Photos**

The following are photographs of typical sections and areas of concern throughout the project.

# Lyle Creek

**Typical Riffle on Lyle Creek.**

**Typical Pool on Lyle Creek**

**Issue Photo 1**
**Lyle Creek Pool near station 9+40.**
**Typical Bank Slump on Left Bank**

**Issue Photo 2**
**Lyle Creek Pool near station 11+90.**
**Typical Bank Failure on Left Bank**

**Lyle Creek Pool near station 9+40.**
**Typical Bank Slump on Left Bank**

**Lyle Creek Pool near station 11+90.**
**Typical Bank Failure on Left Bank**

**Issue Photo 3**
**Bank Erosion Outside Meander Bend Left Bank**

**Issue Photo 4**
**Cattle within the Lyle Creek Easement.**

VEGETATION PLOT

VEGETATION PLOT

CROSS SECTION #2
RIFFLE STA: 3+40

CROSS SECTION #1
POOL STA: 2+10

CROSS SECTION #3
RIFFLE STA: 4+20

BM100

BM200

NORTH

LEGEND

PHOTO POINT
BANK EROSION
SURVEY BM
VEGETATION PLOT
ROCK CROSS VANE

CROSS SECTION #6
POOL STA: 12+65

CROSS SECTION #4
RIFFLE STA: 11+55

CROSS SECTION #5
RIFFLE STA: 12+45

VEGETATION PLOT

BM300

BM400

BM500

BM600

SCALE 1" = 100'

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LYLE CREEK
CATAWBA COUNTY, N.C.
ECOSYSTEM ENHANCEMENT PROGRAM

FIGURE 4
2004 MONITORING

DATE 08/08/2005
PROJECT NO.
FILENAME LYLE.DWG
SHEET NO. PL - 1
DRAWING NO.

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# Table of Tables and Figures

## 1.0 BACKGROUND INFORMATION

The background information for this report is referenced from previous monitoring reports conducted by EcoScience, Inc. The following was excerpted from 2003 EcoScience As-built monitoring report:

> The N.C. Wetlands Restoration Program (WRP) has developed a stream mitigations site within the northeastern Piedmont region of the Catawba River basin. As part of this effort, WRP has implemented detailed mitigation plans for the Lyle Creek Mitigation Site (hereafter referred to as the "Site"), an approximately 12.4-acre tract located along an unnamed tributary to Lyle Creek, approximately 3 miles west of the Catawba River. This region of the state is located within U.S. Geological Survey subbasin 03050101 (USGS 1974) (Figure 1). The Site is situated between U.S. Interstate Route 40 (I-40) and U.S. Route 70, approximately three miles west of the Catawba and Iredell County line.
>
> The Site historically was utilized for agricultural hay production and livestock grazing. On-site streams are characterized as first- to second-order streams which have been degraded by past land uses, including vegetation clearing, dredging, straightening activities, and livestock trampling. Dredging and straightening appears to have been conducted to facilitate agricultural production and to expedite drainage from the Site. Straightening of the channel and channel instability from livestock trampling appears to have resulted in an entrenched stream channel with headcut migration occurring through the Site.
>
> Stream mitigation activities have been designed to restore the stream features and functions similar to those exhibited by reference streams in the region. Site alterations designed to restore characteristic stream channel dimension, pattern, and profile include 1) installation of grade control/bank stabilization structures (cross vane weirs, J-hook vanes, and log vanes), excavation of bankfull benches, channel backfilling to design depth, bank stabilization through installation rootwad structures and erosion control matting, and excavation of channel on new location. Tree and shrub planting is expected to be conducted in the fall 2002 to facilitate the establishment of diagnostic natural communities. Vegetation planting has not been documented as part of this as-built report.
>
> After implementation, the Site is expected to support 12.4 acres of riverine and adjacent slope forest encompassing 2,400 linear feet of restored stream channel (1,345 linear feet restored on new alignment and 1,055 linear feet restored in place). Stream enhancement/preservation activities will also be undertaken along approximately 800 linear feet of a secondary, unnamed tributary through bare root plantings and livestock exclusion.

### 1.1 Goals and Objective

The goals and objectives of this project are as follows.

1.) Restore 2,400 linear feet of an unnamed tributary to Lyle Creek.
   a. Approximately 700 linear feet of Lyle Creek was enhanced through the use of bank stabilization and approximately 1244 linear feet was restored through natural channel design stream restoration. (amount measured as part of the monitoring)
2.) Enhance the riparian area through planting native species

3.) Exclude cattle access to the unnamed tributary to Lyle Creek and 800 linear feet of a secondary unnamed tributary.

## 1.2 Project Location

From Interstate I-40 take Exit 138. Head south on Oxford School Rd for 0.1 mile. Turn right on Wyke Rd follow Wyke Rd for 1 mile. Turn Right on US-70, follow US-70 for 0.2 mile. The project approximately located 1000ft upstream of the US-70 Bridge over Lyle Creek.

## 1.3 Reference Locations

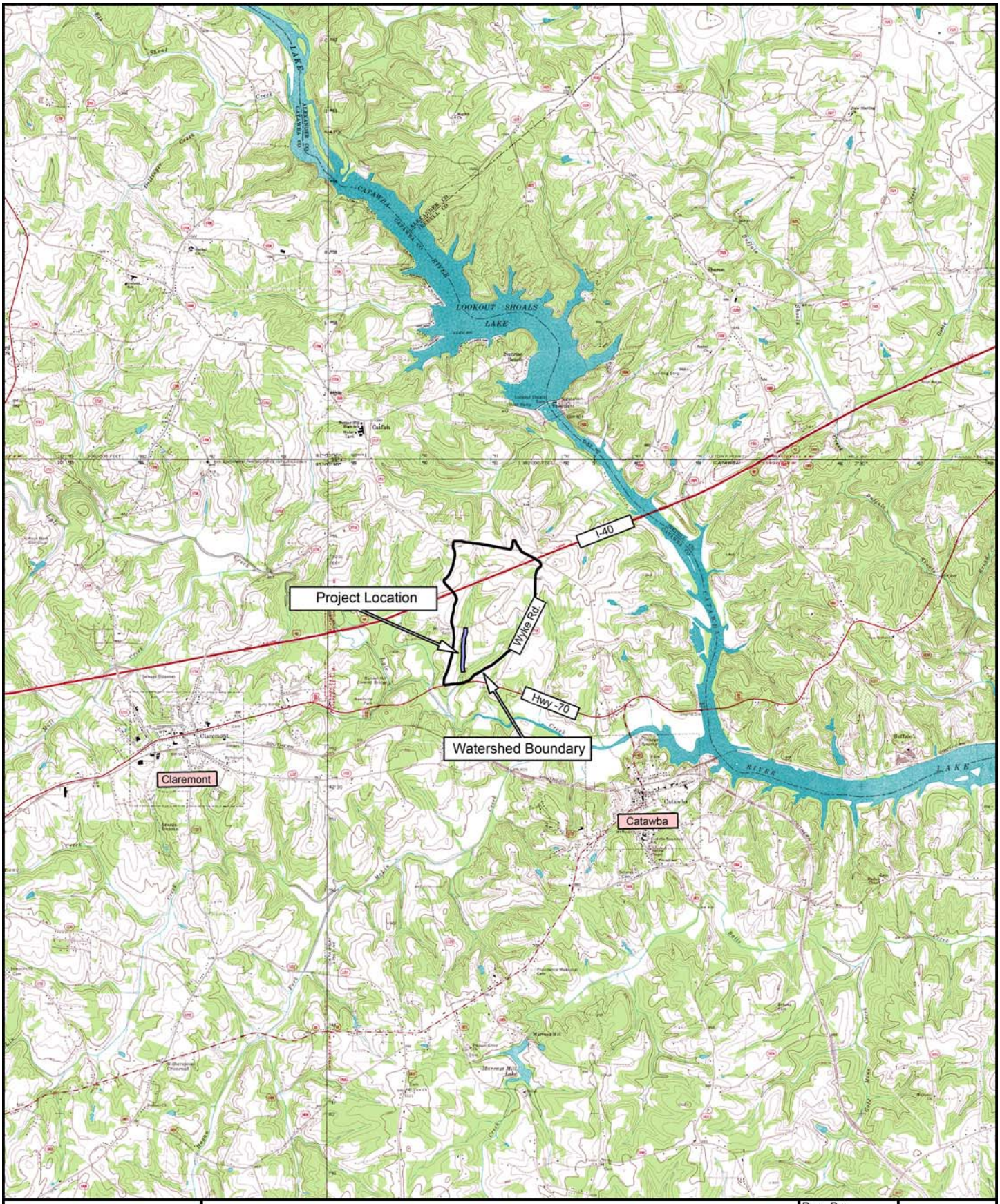
Information on Reference Streams to be provided by NCEEP.

## 1.4 Project Description

The restoration of 1244 linear feet (designed to be 1,345 linear feet) of Lyle Creek consists of relocating the existing channel away from a previously straightened ditch. Riffle-pool bedform was constructed as well as a stable meander pattern developed from stable reference streams. Riffles were stabilized utilizing by graded stone and there were no root wad, or armoring of any type to stabilize the outside meander bends. Vegetation was planted to establish a dense root mass along the stream banks and in the riparian zone.

An additional 700 linear feet (designed to be 1,055 linear feet) of Lyle Creek was enhanced with vegetation and bank stabilization structures. Structures include single rock vanes, a J-hook, cross vanes, and root wads. The entire length of Lyle Creek was also fenced to keep cattle out of the riparian area which included an additional 800 linear feet of a secondary unnamed tributary.

The entire riparian area was planted with native bare root seedlings and herbaceous cover to enhance the riparian areas and stabilize the streambanks. The relocated section included reconnecting a previously incised channel to its adjacent floodplain. The un-relocated section was not incised.

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# Project Location: Lyle Creek

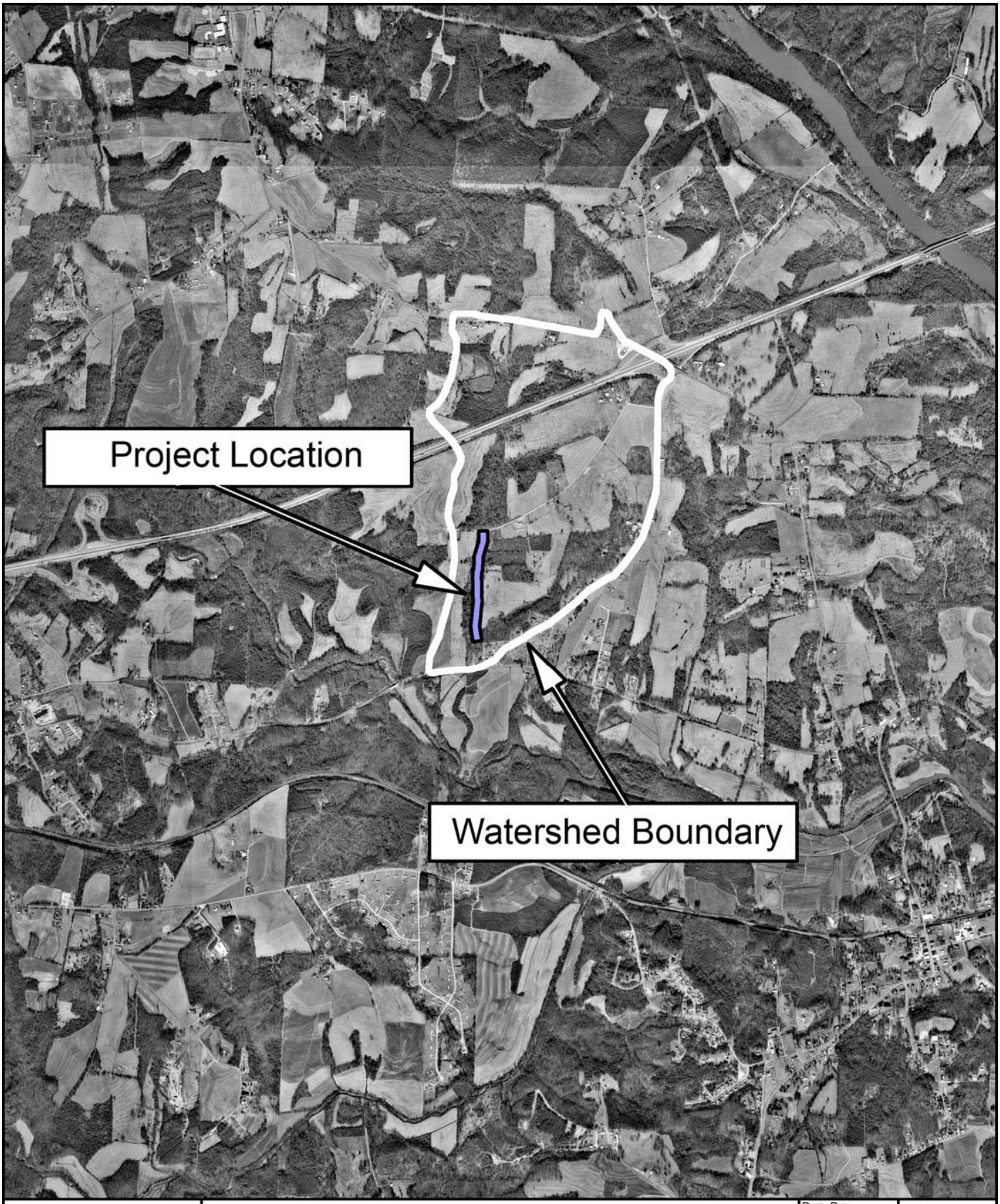
Catawba County, North Carolina

EEP Monitoring Report

SCALE 1:60,000

Dwn. By: MVH
Ckd By: DAB
Date: March 2004

FIGURE 1

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# Aerial Watershed Photo: Lyle Creek

Catawba County, North Carolina

EEP Monitoring Report

SCALE 1:30,000

0 1 MILE

0 1000 2000 3000 4000 5000 FEET

N

Dwn. By: MVH

Ckd By: DAB

Date: March 2004

FIGURE 2

**Figure 3 Plan view of As-built conditions**
(To be attached)
showing all structures with station numbers
showing vegetation permanent plots
showing permanent cross-sections and benchmarks
showing vegetation plots
showing monitoring gauges

VEGETATION PLOT

VEGETATION PLOT

CROSS SECTION #2
RIFFLE STA: 3+40

CROSS SECTION #1
POOL STA: 2+10

CROSS SECTION #3
RIFFLE STA: 4+20

BM100

BM200

NORTH

LEGEND

PHOTO POINT
BANK EROSION
SURVEY BM
VEGETATION PLOT
ROCK CROSS VANE

CROSS SECTION #6
POOL STA: 12+65

CROSS SECTION #4
RIFFLE STA: 11+55

CROSS SECTION #5
RIFFLE STA: 12+45

VEGETATION PLOT

BM300

BM400

BM500

BM600

SCALE 1" = 100'

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FIGURE 4
2004 MONITORING

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## 2.0 YEAR 2004 RESULTS AND DISCUSSION

Year 2004 monitoring results are shown for Lyle Creek Monitoring.

### 2.1 Vegetation

#### 2.1.1 Results and Discussion

Using the Draft Vegetation Monitoring Plan for NCWRP Riparian Buffer and Wetland Restoration Projects, 3 vegetation monitoring plots within the riparian buffer of the Lyle Creek project were resurveyed. No reference area was studied; therefore no comparisons could be made to reference conditions.

Vegetation within the riparian buffer of Lyle Creek is overall considered successful. The herbaceous layer was well established and diverse. *Panicum* spp. (deertongue and switchgrass) *Juncus* spp. (rushes) and *Carex* spp. (sedges) were most notably dominant throughout. Streambanks and floodplain areas were well covered with herbaceous plants, although *Microstegium vimineum* was more abundant throughout this year. Shrub species, particularly those sprouting from livestakes such as willows and dogwoods are performing well. In the majority of areas where livestakes were planted, they are alive and growing. There is also a large number of naturally regeneration shrub species throughout the project area.

Overall number of surviving planted trees was low. Extrapolation from the three plots resulted in an overall average of approximately 27 planted trees per acre for this restoration site. If natural regeneration is included with planted trees, the number is increased to an average of approximately 520 trees per acre. This is not surprising given that there is a healthy mature overstory covering most of the project site which contributes greatly to the native seedbank. Both of these estimates are based on a diverse mix of species as well. Natural regeneration obviously plays an important role in the restoration of this site. Further, this site lies mostly within a mature mixed hardwood stand. Roots from these mature trees were seen throughout the streambanks and presumably add a stability factor.

Wetland pockets throughout the riparian area also provide a diverse habitat for both plants and animals. These areas contained many different species of wetland plants and also serve as breeding grounds for numerous amphibians.

*Microstegium vimineum* was the only major invasive exotic plant located within these areas. In several plots it was the dominant herbaceous plant.

Recommendations include planting more trees required for mitigation. Natural regeneration appears to be dominant, however, and should continue to be monitored for growth habits. It is recommended to stake in areas where erosion is problematic in a few areas, particularly on outside meander bends. The invasive vegetation should also be monitored over time to determine if it will be a limiting factor in native plant growth in the future. No treatment is recommended at this time.

## 2.2 Morphology

Restored channel dimension, pattern, profile and substrate were examined during the 2004 monitoring.

### 2.2.1 Results and Discussion

***New location Reach of Lyle Creek (Restoration Segment)***

There are two areas of major concern in the restored section of Lyle Creek. The first area has a maximum head cut of six inches and is approximately 200 ft in length this head cut is located from station 10+25 to 12+25. There is still 175 ft upstream until the next structure controlling grade therefore, there is a potential for the headcut to migrate upstream. The second area has a maximum head cut of six inches and is approximately 125 ft in length. This head cut is located from station 15+25 to 16+50. There is still 350 ft upstream until the next structure controlling grade. The outside of meander bends on the relocated reach do not appear to be stable for the majority of the reach. Areas with bank erosion and slumping dominate the meander bends. The banks are currently a major source of sediment in the stream. The planform of the relocated stream does not appear to be stable. The average radius of curvature appears to be too tight for banks that are not well vegetated or armored. The localized bank erosion on the outside of meander bends is a result of the tight of radii. The bank erosion is enlarging the channel. When the channel becomes enlarged, a head cut (or downcutting) can start to develop. The head cut and increased Bank Height Ratio increases the already high shear stress. The developed head cut will move upstream producing higher shear stress to remove bed features and bank material until it reaches a grade control (natural or constructed). It appears that the channel is moving toward instability rather than moving toward stability.

The number of defined riffles in the bedform of this reach has decreased from 20 in 2002, to 13 in 2003 and to 9 in 2004. The average riffle length has also decreased to 15 feet. This is also consistent with pebble count results which show a significant increase in fine particles since construction in the cross sections located within the head cut regions, and no significant change in the pebble count results from the other cross sections. Hardened riffle areas are not maintaining elevation throughout the entire relocated reach. The structures are maintaining the grade and, in general, look good. Most riffles that were constructed within 100 ft downstream of a cross vane with a drop greater than 0.5 ft were not observed during the 2004 monitoring survey. EcoScience profile results were recalculated using NCSU techniques for consistency purposes.

Cross-sections 4 through 7 were in the restored reach of Lyle creek. Cross Section #4 is in an area that has an active head cut. The cross sectional area has increased by 20% due to the head cut and bank erosion. The substrate has a large silt/clay fraction and the right bank of cross section #4 is bare and actively eroding. Cross sections #5 and #6 show slight enlargement but the exact location of these cross sections have varied because the previous cross sections were unable to be relocated. The substrate of cross sections #5 and #6 have a large silt/clay fraction, likely due to upstream bank erosion. The banks and profile of cross sections #5 and #6 appear to be stable. Future monitoring will be able to compare these two cross-sections with a high degree of confidence as they have now been clearly marked. Cross Section #7 is in an area that has an active head cut. The cross sectional area has increased due to the head cut and bank erosion by 30%. The

substrate has a high silt/clay fraction and the left bank of cross section #7 is undercut and actively eroding.

Channel pattern appears to have been adjusting since construction. A few of the outside meander bends are experiencing migration through bank slumping but no excessive migration is evident and no shoot cut-offs are apparent.

***In Place Reach of Lyle Creek (Stabilization Segment)***

The reach of Lyle Creek that had channel stabilization activities appears to be aggrading slightly but the channel shows no signs of dimension, pattern, or profile concerns. There are three cross sections in this reach; cross section #1, cross section #2, and cross section #3. Cross Section #1 is a pool that has filled in since construction. The cross sectional area has decreased 40%. Both cross sections #2 and #3 have shown no significant changes between the 2003 and 2004 monitoring periods. There is no excessive migration in this reach and no shoot cut-offs are apparent. The response is what is expected when a bankfull bench is graded and the W/D ratio is increased. This reach appears to be performing well and has stable banks.

## 2.3 Biological and Ecological

Qual 4 surveys were conducted at three locations at this project (Table 7). Reference data were collected from a reach of Lyle Creek above the restoration reach (Site #1). The catchment at this point is mostly forested with relatively stable banks and a good riffle pool sequence; however, there are non-pont sources including stormwater above this location. The stream at this point was fairly incised but had some decent habitat including some bank habitat and stable gravel/cobble riffles. Site 2 is located near transect 110 at the lower reach of the restoration section and within a modified pasture. Cattle obviously had access to this reach of the stream as the banks were eroding and the substrate was more sandy/muddy. Site 3 is a very small tributary of Lyle Creek that hasn't receive any mitigation work to date. Data were collected from this site in anticipation of future construction. During the 2001 survey at this tributary site very few taxa were collected compared to the data from this site in 2003. This observation may be a result of very low flow during drought conditions prior to the 2001 survey. Data were collected from all three of these locations during December surveys following construction in 2003 and 2004.

| **Metrics/Location** | **Lyle Cr. #1, Reference** | | | **Lyle Cr. #2** | | | **UT Lyle Creek** | | |
|---|---|---|---|---|---|---|---|---|---|
| Year of Investigation | 12/2001 | 12/2003 | 12/2004 | 12/2001 | 12/2003 | 12/2004 | 12/2001 | 12/2003 | 12/2004 |
| Total Taxa Richness | 44 | 45 | 30 | 51 | 30 | 32 | 18 | 40 | 28 |
| EPT Taxa Richness | 16 | 22 | 14 | 17 | 9 | 14 | 3 | 16 | 12 |
| EPT Abundance | 94 | 114 | 71 | 84 | 33 | 51 | 30 | 62 | 42 |
| Dominant in Common Index (%) | - | - | - | 72% | 34% | 50% | n/a | n/a | n/a |
| # Keystone Taxa | 10 | 10 | 12 | 7 | 4 | 8 | 0 | 9 | 5 |

It should be noted that the 2004 survey was after extremely high flows that were recorded following Hurricanes Francis and Ivan in this part of North Carolina. Bedload transport of material following these events likely was responsible for scouring of the substrate. Taxa richness values and EPT abundances were much lower at the reference site during the 2004 investigation. Interestingly this trend was not noticed at the restoration site (#2). At this location an increase in taxa richness, EPT abundance, number of keystone taxa and DIC were noted compared to those recorded at this site in 2003. This may indicate that this site has stabilized and is recovering from the construction. However, this is complicated by the potential bedload transport and habitat scour at the reference reach. The increase in EPT taxa richness at this location is primarily due to the increases in the number of mayflies and stoneflies. Very little differences were noted in the caddisfly fauna at this location between years. This may be, in part, due to the lack of drift responses in this community of insects. Lower numbers of insects were also noted at the UT location in 2004.

### 2.3.1 Results and Discussion

Biological data have been collected from this project twice following construction. Data from the 2003 investigation clearly note a decline in the biological condition of this feature. Taxa richness EPT and total and EPT abundance values were reduced from preconstruction conditions and both the Dominant in Common value and the number of keystone taxa were also reduced during this investigation.

**Table 1. Summary of Channel Conditions**

| DIMENSION | Lyle Creek In-Place Reach Cross-section #1 Pool | | | Lyle Creek In-Place Reach Cross-section #2 Riffle | | | Lyle Creek In-Place Reach Cross-section #3 Riffle | | | Lyle Creek Relocation Reach Cross-section #4 Riffle | | | Lyle Creek Relocation Reach Cross-section #5 Riffle | | | Lyle Creek Relocation Reach Cross-section #6 Pool | | | Lyle Creek Relocation Reach Cross-section #7 Riffle | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 |
| Bankfull Cross-sectional Area | 20.8 | 14.1 | 12.5 | 16.5 | 28.1 | 30.0 | 15.6 | 26.1 | 27.4 | 17.5 | 17.8 | 17.0 | 16.9 | 20.7 | 25.2 | 19.6 | 27.3 | 28.5 | 15.2 | 16.2 | 18.9 |
| Bankfull Width | 16.3 | 16.5 | 13.7 | 11.8 | 18.6 | 18.6 | 13.2 | 16.2 | 17.1 | 10.8 | 10.8 | 10.8 | 10.7 | 13.9 | 13.8 | 12.8 | 13.5 | 15.7 | 11.2 | 11.2 | 9.0 |
| Bankfull Mean Depth | 1.3 | 0.9 | 0.9 | 1.4 | 1.5 | 1.6 | 1.2 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 | 1.8 | 1.5 | 2.0 | 1.8 | 1.4 | 1.4 | 2.1 |
| Bankfull Max Depth | 3.1 | 1.7 | 1.4 | 2.2 | 2.4 | 2.4 | 2.2 | 2.0 | 2.0 | 2.7 | 2.6 | 2.8 | 2.5 | 2.6 | 2.5 | 2.8 | 2.7 | 2.9 | 2.2 | 2.1 | 2.4 |

| PATTERN | Lyle Creek As-built | | | Lyle Creek 2003 | | | Lyle Creek 2004 | | | Lyle Creek (in place) As-built | | | Lyle Creek (in place) 2003 | | | Lyle Creek (in place) 2004 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median |
| Meander Wave Length | 33 | 114 | 63 | 49 | 150 | 71 | 53 | 165 | 82 | Not Reported | | | 59 | 177 | 149 | 59 | 177 | 149 |
| Radius of Curvature | 14.9 | 37.5 | 22.4 | 16.7 | 38.5 | 20.9 | 15.9 | 47.0 | 22.8 | Not Reported | | | 13.3 | 48.6 | 30.9 | 13.3 | 48.6 | 30.9 |
| Beltwidth | 33 | 141 | 88 | 22 | 56 | 33 | 32 | 84 | 42 | Not Reported | | | 42 | 109 | 55 | 42 | 109 | 55 |

| PROFILE | Lyle Creek As-built | | | Lyle Creek 2003 | | | Lyle Creek 2004 | | | Lyle Creek (in place) As-built | | | Lyle Creek (in place) 2003 | | | Lyle Creek (in place) 2004 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median | Minimum | Maximum | Median |
| Riffle Length | Not Reported | | | 7 | 39 | 17 | 7 | 28 | 15 | Not Reported | | | 9 | 68 | 21 | 9 | 68 | 21 |
| Riffle Slope | 0.00% | 3.64% | 1.41% | 0.56% | 4.94% | 1.71% | 0.65% | 4.80% | 2.10% | Not Reported | | | 0.17% | 4.74% | 2.12% | 0.17% | 4.74% | 2.12% |
| Pool Length | 14 | 64 | 27 | 9 | 41 | 23 | 9 | 41 | 23 | Not Reported | | | 11 | 49 | 27 | 11 | 49 | 27 |
| Pool to Pool Spacing | 22 | 161 | 54 | 27 | 176 | 46 | 31 | 92 | 43 | Not Reported | | | 28 | 140 | 66 | 28 | 140 | 66 |

| SUBSTRATE | Lyle Creek Cross-section #1 Pool | | | Lyle Creek Cross-section #2 Riffle | | | Lyle Creek Cross-section #3 Riffle | | | Lyle Creek Cross-section #4 Riffle | | | Lyle Creek Cross-section #5 Riffle | | | Lyle Creek Cross-section #6 Pool | | | Lyle Creek Cross-section #7 Riffle | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 | As-built | 2003 | 2004 |
| D50 | 0.09 | 0.29 | 0.33 | 0.19 | 0.29 | 0.07 | 0.19 | 0.45 | 0.08 | 0.19 | 0.11 | 0.33 | 0.19 | 0.33 | 1.05 | 0.09 | 0.71 | 0.26 | 0.19 | 0.34 | 0.41 |
| D85 | 0.52 | 0.76 | 0.66 | 15.91 | 13.33 | 0.31 | 15.91 | 1.01 | 0.40 | 15.91 | 3.11 | 79.40 | 15.91 | 17.52 | 8.64 | 0.52 | 31.78 | 19.80 | 15.91 | 3.00 | 0.71 |

| VEGETATION | Quad 1 Lyle Creek | | | Quad 2 Lyle Creek | | | Quad 3 Lyle Creek | | | Quad 4 Lyle Creek | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2004 | 2003 | Planted | 2004 | 2003 | Planted | 2004 | 2003 | Planted | 2004 | 2003 | Planted |
| Tree Stratum (trees/acre) | 720 | 720 | 0 | 520 | 520 | 40 | 600 | 600 | 240 | 12560 | 12560 | 0 |
| Shrub Stratum (% cover) | 1.0 | 1.0 | - | 1.0 | 1.0 | - | 8.5 | 8.5 | - | 15.5 | 15.5 | - |
| Herb Stratum (%cover) | 62.5 | 62.5 | - | 184 | 184 | - | 171.5 | 171.5 | - | 152.2 | 152.2 | - |

| BEHI/NBS | Lyle Creek | | Lyle Creek | |
|---|---|---|---|---|
| Average conditions | BEHI-03 | NBS-03 | BEHI-04 | NBS-04 |
| | LOW | MOD | MOD | MOD |

LYLE CREEK
LONG PROFILE
ENTIRE REACH
2004 MONITORING

Bankfull = -0.0095 * STA + 816.5
Water Surface = -0.0092 * STA + 813.7

ELEVATION (ft)

820
815
810
805
800
795
790

0
200
400
600
800
1000
1200
1400
1600
1800

STATION (ft)

2004 WATER SURFACE
LBKF
RBKF
2003 MONITORING
2004 MONITORING
ROCK CROSS VANES

LYLE CREEK
LONG PROFILE
STABILIZATION REACH
2004 MONITORING

Bankfull = -0.0091 * STA + 816.4
Water Surface = -0.0072 * STA + 812.9

ELEVATION (ft)

818
816
814
812
810
808
806
804

Cross Section #1 Pool
Cross Section #2 Riffle
Cross Section #3 Riffle

0
100
200
300
400
500
600
700

STATION (ft)

2004 WATER SURFACE
LBKF
RBKF
2003 MONITORING
2004 MONITORING
ROCK CROSS VANE

LYLE CREEK
LONG PROFILE
RESTORATION REACH
2004 MONITORING

Bankfull = -0.0092 * STA + 816.0
Water Surface = -0.0096 * STA + 814.2

ELEVATION (ft)

812
810
808
806
804
802
800
798
796
794
792

Cross Section #4 Riffle
Cross Section #5 Riffle
Cross Section #6 Pool
Cross Section #7 Riffle

700
900
1100
1300
1500
1700
1900

STATION (ft)

2004 WATER SURFACE
LBKF
RBKF
2003 MONITORING
2004 MONITORING
ROCK CROSS VANE

## 2.4 Areas of Concern

The following areas of concern should be monitored closely and considered for repair as suggested:

- Easement Limits
  - NCEEP should work with landowners to ensure easement limits are maintained and that cattle stay out of the riparian area.
- Areas of major head cuts
  - There are two areas of major head cut totaling approximately 325 ft.
  - The first area has a maximum head cut of six inches and is approximately 200 ft in length. This head cut is located from station 10+25 to 12+25. There is still 175 ft upstream until the next structure controlling grade.
  - The second area has a maximum head cut of six inches and is approximately 125 ft in length. This head cut is located from station 15+25 to 16+50. There is still 350 ft upstream until the next structure controlling grade.
- Areas with bank erosion and slumping
  - The following meander bends have a high near NBS and very high BEHI rating for at least a 10 ft section on the outside of the meander bend.
    - @ STATIONS 9+50; 11+10; 11+50; 11+75; 12+90; 13+80; 16+20; 16+60; 16+80; 18+00; 18+50
    - All of these problem areas were located in the reach that was restored. The stabilized reach had some bank erosion but nothing that classified as high near NBS and very high BEHI.
  - These areas should be regarded and planted heavily with live stakes to help establish root mass along the channel bank. Root wads should also be considered for bank protection.
  - These areas should be monitored closely during upcoming site visits to determine if the problem is localized or regional in scale. The problems seem to be regional.
  - Overland flow is also causing bank erosion and may need to be routed away from areas that show signs of severe bank erosion.
- Areas lacking stream feature
  - There are twelve riffles that were constructed that do not exist in the longitudinal profile measured during the 2004 monitoring
  - There are four riffles that were monitored in 2003 that do not exist in the longitudinal profile measured during the 2004 monitoring
  - Some of the riffles that have been removed as a result of the major head cuts in the two sections listed above
  - The remainder of the failed riffles have transitioned into runs or glides
  - Most riffles that were constructed within 100 ft downstream of a cross vane with a drop greater than 0.5 ft were not observed during the 2004 monitoring survey
- Areas lacking stream pattern
  - There are two areas that have shown a significant change in stream pattern from the as-built conditions.

- The first section is from station 12+25 to 13+25 there is half of a meander wavelength that has been straightened into a long run this is the result of the head cut mentioned above.
- The second section is from station 17+50 to 18+50 there an entire meander wavelength that has been straightened into a run followed by a long step pool feature at the end of the project.
- The exact change in plan form could not be quantified with the 2003-2004 monitoring periods. The supplied as-built data for this project is not the same planform that was observed during the 2003-2004 monitoring periods.
- NCSU-BAE had reason to not include any of the as-built planform survey in the main body of this report. An extra plan sheet is located in the Appendix that displays the variation of planform from the As-built survey and the 2003 & 2004 monitoring periods.

- Vegetation Concerns
  - Natural regeneration appears to be dominant and should continue to be monitored for growth habitats.
  - Planting more trees if required for mitigation. At this time, the tree stems per acre count is 70 but there is good natural regeneration of trees.
  - It is recommended to stake in areas where excess erosion is occurring on the outside of meander bends
  - The invasive vegetation requires does treatment as soon as possible.
- Biological/Ecological Concerns
  - Biological data have been collected from this project twice following construction. Data from the 2003 investigation clearly note a decline in the biological condition of this stream. Taxa richness EPT and total and EPT abundance values were reduced from preconstruction conditions and both the Dominants in Common value and the number of keystone taxa were also reduced during this investigation. Some recovery was noted during the 2004 survey, but are still marginally worse than those conditions recorded from this stream prior to construction.

Photo Point 1 Downstream 2003 Station 00+00

Photo Point 1 Downstream 2004 Station 00+00

Photo Point 1 J-Hook 2003 Station 00+00

Photo Point 1 J-Hook 2004 Station 00+00

Photo Point 2 Downstream 2003 Station 01+60

Photo Point 2 Downstream 2004 Station 01+60

Photo Point 2 Upstream 2003 Station 01+60

Photo Point 2 Upstream 2004 Station 01+60

Photo Point 3 Downstream 2003 Station 03+60

Photo Point 3 Downstream 2004 Station 03+60

Photo Point 3 Upstream 2003 Station 03+60

Photo Point 3 Upstream 2004 Station 03+60

Photo Point 4 Downstream 2003 Station 05+00

Photo Point 4 Downstream 2004 Station 05+00

Photo Point 4 Upstream 2003 Station 05+00

Photo Point 4 Upstream 2004 Station 05+00

Photo Point 5 Downstream 2003 Station 05+70

Photo Point 5 Downstream 2004 Station 05+70

Photo Point 5 Upstream 2003 Station 05+70

Photo Point 5 Upstream 2004 Station 05+70

Photo Point 6 Downstream 2003 Station 07+40

Photo Point 6 Downstream 2004 Station 07+40

Photo Point 6 Upstream 2003 Station 07+40

Photo Point 6 Upstream 2004 Station 07+40

Photo Point 7 Downstream 2003 Station 09+10

Photo Point 7 Downstream 2004 Station 09+10

Photo Point 7 Upstream 2003 Station 09+10

Photo Point 7 Upstream 2004 Station 09+10

Photo Point 8 Downstream 2003 Station 12+40

Photo Point 8 Downstream 2004 Station 12+40

Photo Point 8 Upstream 2003 Station 12+40

Photo Point 8 Upstream 2004 Station 12+40

Photo Point 9 Downstream 2003 Station 13+25

Photo Point 9 Downstream 2004 Station 13+25

Photo Point 9 Upstream 2003 Station 13+25

Photo Point 9 Upstream 2004 Station 13+25

Photo Point 10 Downstream 2003 Station 14+90

Photo Point 10 Downstream 2004 Station 14+90

Photo Point 11 Downstream 2003 Station 17+25

Photo Point 11 Downstream 2004 Station 17+25

Photo Point 11 Upstream 2003 Station 17+25

Photo Point 11 Upstream 2004 Station 17+25

Photo Point 12 Downstream 2003 Station 18+20

Photo Point 12 Downstream 2004 Station 18+20

Photo Point 12 Upstream 2003 Station 18+20

Photo Point 12 Upstream 2004 Station 18+20

| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #1 |
| **Feature** | Pool |
| **Date** | 7/1/04 |
| **Crew** | Bidelspach, Clinton |

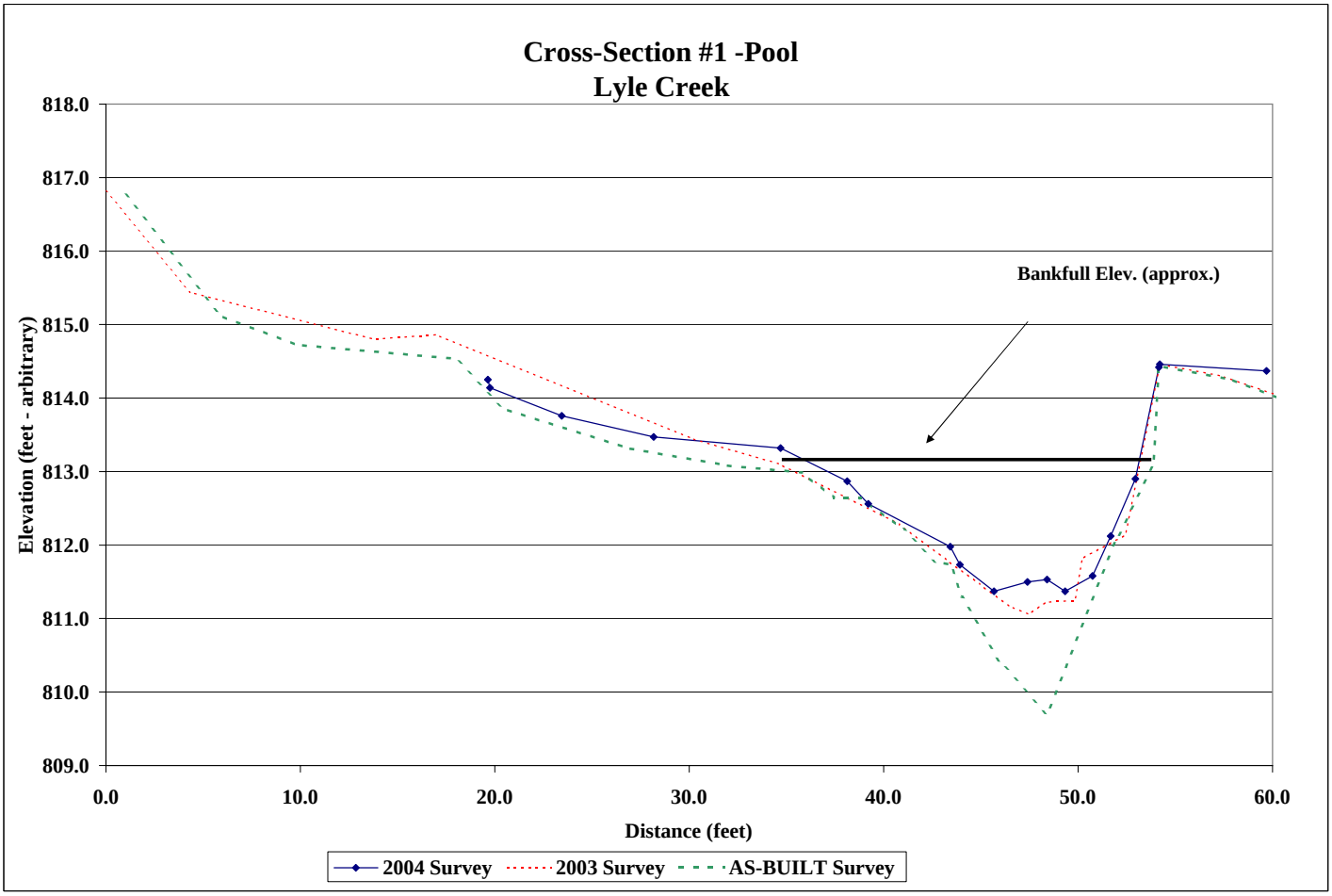
| 2004 Survey | | |
|---|---|---|
| **Station** | **Elevation** | **Notes** |
| 19.6 | 814.3 | LP |
| 19.8 | 814.1 | |
| 23.4 | 813.8 | |
| 28.2 | 813.5 | |
| 34.7 | 813.3 | BKF |
| 38.1 | 812.9 | |
| 39.2 | 812.6 | |
| 43.4 | 812.0 | |
| 43.9 | 811.7 | |
| 45.7 | 811.4 | |
| 47.4 | 811.5 | |
| 48.4 | 811.5 | |
| 49.3 | 811.4 | |
| 50.7 | 811.6 | |
| 51.7 | 812.1 | |
| 52.9 | 812.9 | |
| 54.2 | 814.4 | |
| 54.2 | 814.5 | RP |
| 59.7 | 814.4 | |

| 2003 Survey | | |
|---|---|---|
| **Station** | **Elevation** | **Notes** |
| 0.0 | 816.8 | |
| 4.3 | 815.4 | |
| 13.8 | 814.8 | |
| 17.0 | 814.9 | |
| 30.1 | 813.5 | |
| 34.7 | 813.1 | BKF |
| 40.8 | 812.3 | |
| 43.2 | 811.8 | |
| 45.0 | 811.5 | |
| 46.5 | 811.2 | |
| 47.5 | 811.1 | |
| 48.3 | 811.2 | |
| 49.8 | 811.3 | |
| 50.2 | 811.8 | |
| 52.4 | 812.1 | |
| 54.2 | 814.5 | RP |
| 57.4 | 814.3 | |
| 66.4 | 813.5 | |
| 72.0 | 813.0 | |
| 80.8 | 812.9 | |
| 91.1 | 813.0 | |

| AS-BUILT Survey | | |
|---|---|---|
| **Station** | **Elevation** | **Notes** |
| 1.0 | 816.8 | |
| 5.9 | 815.1 | |
| 9.8 | 814.7 | |
| 18.0 | 814.5 | |
| 20.5 | 813.9 | |
| 26.8 | 813.3 | BKF |
| 32.0 | 813.1 | |
| 35.8 | 813.0 | |
| 37.4 | 812.6 | |
| 38.8 | 812.6 | |
| 41.0 | 812.2 | |
| 42.6 | 811.8 | |
| 43.5 | 811.7 | |
| 44.0 | 811.3 | |
| 45.9 | 810.4 | |
| 48.4 | 809.7 | |
| 52.0 | 812.1 | |
| 53.9 | 813.1 | |
| 54.2 | 814.4 | RP |
| 58.0 | 814.2 | |
| 60.7 | 814.0 | |
| 75.8 | 813.8 | |
| 85.9 | 814.2 | |
| 98.8 | 814.6 | |
| 102.9 | 813.7 | |
| 109.8 | 811.3 | |
| 118.0 | 811.8 | |
| 125.9 | 814.8 | |
| 133.6 | 815.8 | |

**Photo of Cross-Section #1 - Looking Downstream @ STA 2+10**

| | 2004 | 2003 | AS-BUILT |
|---|---|---|---|
| **Area** | 18.4 | 20.1 | 31.1 |
| **Width** | 19.5 | 19.5 | 22.2 |
| **Mean Depth** | 0.9 | 1.0 | 1.4 |
| **Max Depth** | 1.9 | 2.2 | 3.6 |
| **W/D** | 20.5 | 19.0 | 15.8 |

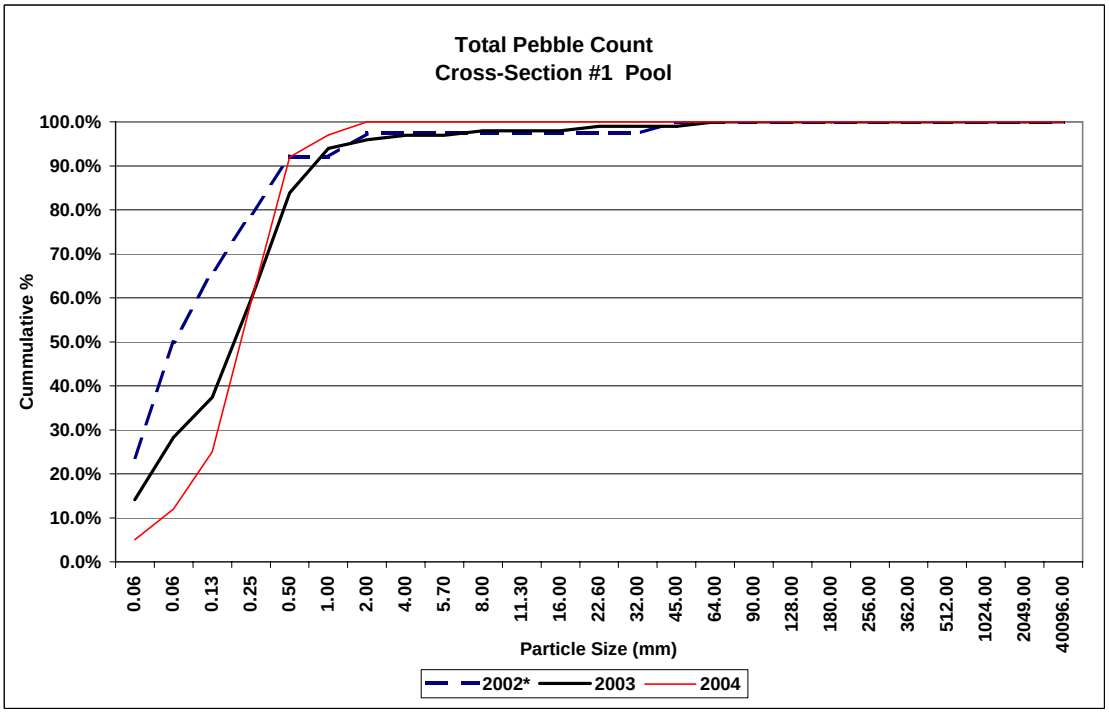


| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #1 |
| **Feature** | Pool |
| **Date** | 11/4/03 |
| **Crew** | Shaffer, Bidelspach, Clinton |

* 2002 pebble count is a typical riffle sections used as basline information.

| | | | 2002* | | | 2003 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | **Material** | **Size (mm)** | **Pool** | **%** | **Cum %** | **Riffle - Bed** | **Riffle - Bank** | **%** | **Cum %** |
| **Silt/Clay** | silt/clay | 0.061 | 9 | 23.7% | 23.7% | 0 | 14 | 14.1% | 14.1% |
| **Sand** | very fine sand | 0.062 | 10 | 26.3% | 50.0% | 0 | 14 | 14.1% | 28.3% |
| | fine sand | 0.125 | 6 | 15.8% | 65.8% | 0 | 9 | 9.1% | 37.4% |
| | medium sand | 0.25 | 5 | 13.2% | 78.9% | 8 | 14 | 22.2% | 59.6% |
| | course sand | 0.50 | 5 | 13.2% | 92.1% | 15 | 9 | 24.2% | 83.8% |
| | very course sand | 1.0 | 0 | 0.0% | 92.1% | 9 | 1 | 10.1% | 93.9% |
| **Gravel** | very fine gravel | 2.0 | 2 | 5.3% | 97.4% | 1 | 1 | 2.0% | 96.0% |
| | fine gravel | 4.0 | 0 | 0.0% | 97.4% | 1 | 0 | 1.0% | 97.0% |
| | fine gravel | 5.7 | 0 | 0.0% | 97.4% | 0 | 0 | 0.0% | 97.0% |
| | medium gravel | 8.0 | 0 | 0.0% | 97.4% | 0 | 1 | 1.0% | 98.0% |
| | medium gravel | 11.3 | 0 | 0.0% | 97.4% | 0 | 0 | 0.0% | 98.0% |
| | course gravel | 16.0 | 0 | 0.0% | 97.4% | 0 | 0 | 0.0% | 98.0% |
| | course gravel | 22.6 | 0 | 0.0% | 97.4% | 0 | 1 | 1.0% | 99.0% |
| | very course gravel | 32 | 0 | 0.0% | 97.4% | 0 | 0 | 0.0% | 99.0% |
| | very course gravel | 45 | 1 | 2.6% | 100.0% | 0 | 0 | 0.0% | 99.0% |
| **Cobble** | small cobble | 64 | 0 | 0.0% | 100.0% | 0 | 1 | 1.0% | 100.0% |
| | medium cobble | 90 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large cobble | 128 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large cobble | 180 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Boulder** | small boulder | 256 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | small boulder | 362 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium boulder | 512 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large boulder | 1024 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large boulder | 2049 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Bedrock** | bedrock | 40096 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **TOTAL / %of whole count** | | | 38 | 100.0% | | 34 | 65 | 100.0% | |

| | **d16** | **d35** | **d50** | **d85** | **d95** |
|---|---|---|---|---|---|
| **2002*** | 0.00 | 0.08 | 0.09 | 0.52 | 2.33 |
| **2003** | 0.07 | 0.16 | 0.29 | 0.76 | 2.29 |
| **2004** | 0.12 | 0.24 | 0.33 | 0.66 | 1.20 |



| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #2 |
| **Feature** | Riffle |
| **Date** | 7/1/04 |
| **Crew** | Bidelspach, Clinton |

**2004**
**2004 Survey**

| Station | Elevation | Notes |
|---|---|---|
| 17.1 | 812.8 | LP |
| 17.2 | 812.7 | BKF |
| 19.4 | 811.8 | |
| 22.6 | 810.3 | |
| 24.6 | 810.4 | |
| 26.3 | 810.1 | |
| 26.5 | 810.1 | |
| 27.3 | 810.2 | |
| 28.9 | 810.3 | |
| 30.2 | 810.5 | |
| 32.6 | 811.5 | |
| 35.0 | 812.3 | |
| 37.0 | 813.3 | |
| 40.8 | 813.2 | |
| 48.9 | 813.0 | |
| 49.0 | 813.1 | RP |

**2003**
**2003 Survey**

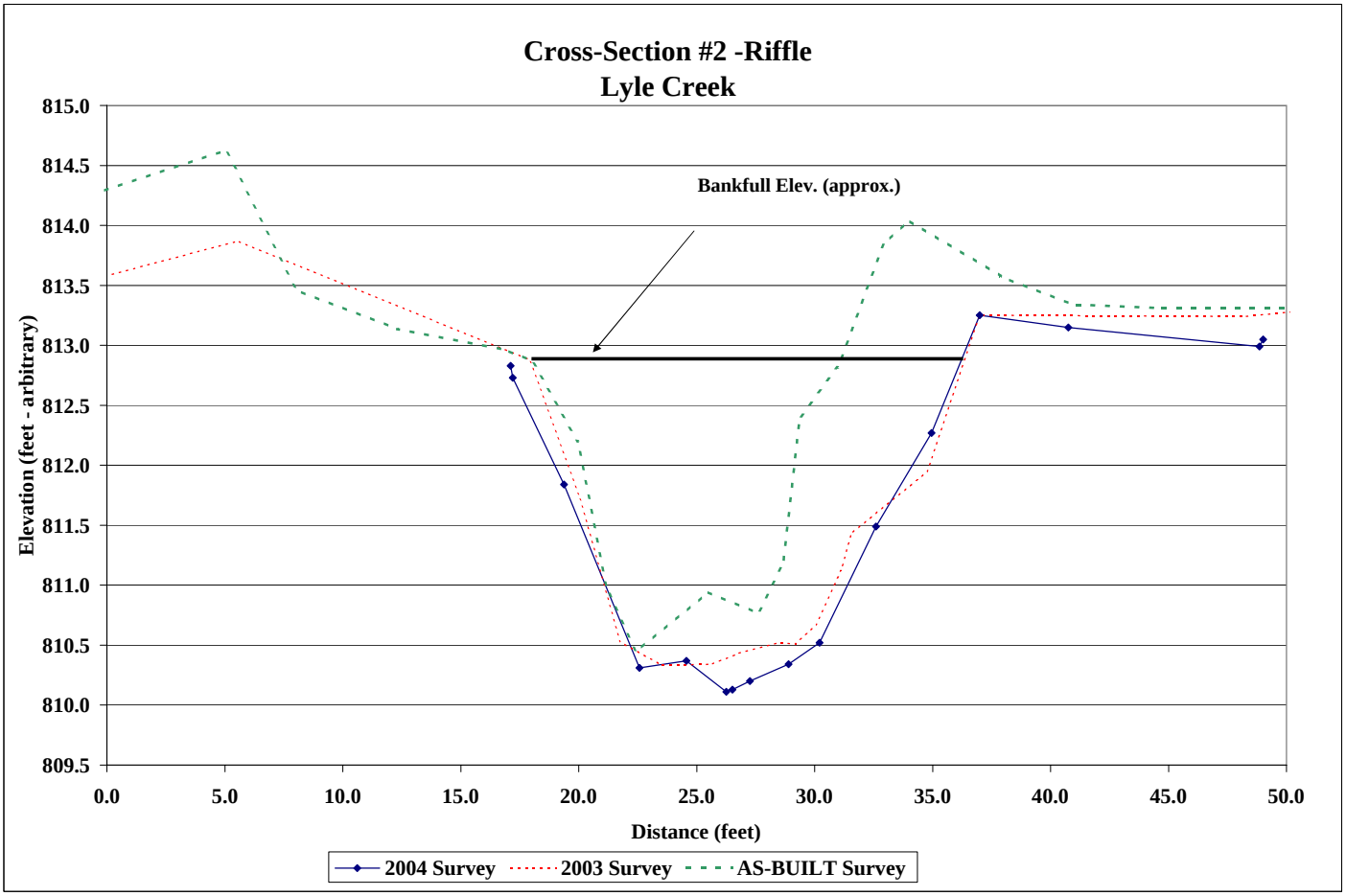
| Station | Elevation | Notes |
|---|---|---|
| 0.2 | 813.6 | |
| 5.5 | 813.9 | |
| 17.9 | 812.9 | BKF |
| 20.0 | 811.8 | |
| 21.8 | 810.5 | |
| 23.5 | 810.3 | |
| 25.6 | 810.3 | |
| 26.8 | 810.4 | |
| 28.5 | 810.5 | |
| 29.2 | 810.5 | |
| 30.1 | 810.7 | |
| 31.1 | 811.1 | |
| 31.6 | 811.4 | |
| 34.8 | 812.0 | |
| 37.0 | 813.3 | |
| 48.3 | 813.2 | |
| 55.1 | 813.4 | |
| 59.5 | 813.3 | |

**AS-BUILT**
**AS-BUILT Survey**

| Station | Elevation | Notes |
|---|---|---|
| -28.0 | 812.6 | |
| -13.1 | 813.5 | |
| 5.0 | 814.6 | |
| 8.1 | 813.5 | |
| 12.3 | 813.1 | |
| 16.9 | 813.0 | |
| 18.0 | 812.9 | LP |
| 20.0 | 812.2 | |
| 21.2 | 811.0 | |
| 22.4 | 810.4 | |
| 25.5 | 810.9 | |
| 27.6 | 810.8 | |
| 28.7 | 811.2 | |
| 29.4 | 812.4 | |
| 31.0 | 812.8 | BKF |
| 32.9 | 813.8 | |
| 34.0 | 814.0 | |
| 37.9 | 813.6 | |
| 40.9 | 813.3 | |
| 44.5 | 813.3 | |
| 59.0 | 813.3 | |

**Photo of Cross-Section #2 - Looking Downstream @ STA 3+40**

| | 2004 | 2003 | AS-BUILT |
|---|---|---|---|
| **Area** | 31.5 | 30.1 | 17.8 |
| **Width** | 19.8 | 17.0 | 11.0 |
| **Mean Depth** | 1.6 | 1.8 | 1.6 |
| **Max Depth** | 2.7 | 2.5 | 2.4 |
| **W/D** | 12.4 | 9.6 | 6.8 |

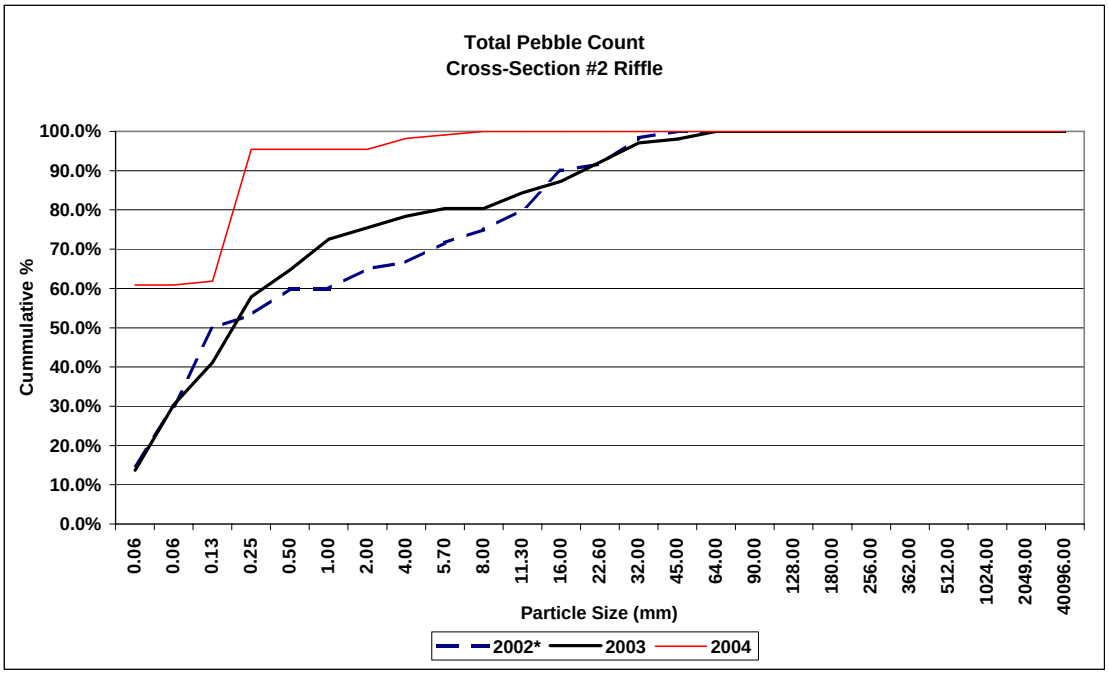


| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #2 |
| **Feature** | Riffle |
| **Date** | 11/4/03 |
| **Crew** | Shaffer, Bidelspach, Clinton |

* 2002 pebble count is a typical riffle sections used as basline information.

| | | | 2002* | | | 2003 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | **Material** | **Size (mm)** | **Riffle** | **%** | **Cum %** | **Riffle - Bed** | **Riffle - Bank** | **%** | **Cum %** |
| **Silt/Clay** | silt/clay | 0.061 | 9 | 15.0% | 15.0% | 0 | 14 | 13.7% | 13.7% |
| **Sand** | very fine sand | 0.062 | 9 | 15.0% | 30.0% | 0 | 17 | 16.7% | 30.4% |
| | fine sand | 0.125 | 12 | 20.0% | 50.0% | 4 | 7 | 10.8% | 41.2% |
| | medium sand | 0.25 | 2 | 3.3% | 53.3% | 11 | 6 | 16.7% | 57.8% |
| | course sand | 0.50 | 4 | 6.7% | 60.0% | 6 | 1 | 6.9% | 64.7% |
| | very course sand | 1.0 | 0 | 0.0% | 60.0% | 8 | 0 | 7.8% | 72.5% |
| **G r a v e l** | very fine gravel | 2.0 | 3 | 5.0% | 65.0% | 3 | 0 | 2.9% | 75.5% |
| | fine gravel | 4.0 | 1 | 1.7% | 66.7% | 3 | 0 | 2.9% | 78.4% |
| | fine gravel | 5.7 | 3 | 5.0% | 71.7% | 2 | 0 | 2.0% | 80.4% |
| | medium gravel | 8.0 | 2 | 3.3% | 75.0% | 0 | 0 | 0.0% | 80.4% |
| | medium gravel | 11.3 | 3 | 5.0% | 80.0% | 4 | 0 | 3.9% | 84.3% |
| | course gravel | 16.0 | 6 | 10.0% | 90.0% | 3 | 0 | 2.9% | 87.3% |
| | course gravel | 22.6 | 1 | 1.7% | 91.7% | 5 | 0 | 4.9% | 92.2% |
| | very course gravel | 32 | 4 | 6.7% | 98.3% | 5 | 0 | 4.9% | 97.1% |
| | very course gravel | 45 | 1 | 1.7% | 100.0% | 1 | 0 | 1.0% | 98.0% |
| **Cobble** | small cobble | 64 | 0 | 0.0% | 100.0% | 2 | 0 | 2.0% | 100.0% |
| | medium cobble | 90 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large cobble | 128 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large cobble | 180 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Boulder** | small boulder | 256 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | small boulder | 362 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium boulder | 512 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large boulder | 1024 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large boulder | 2049 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Bedrock** | bedrock | 40096 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **TOTAL / %of whole count** | | | 60 | 100.0% | | 57 | 45 | 100.0% | |

| | **d16** | **d35** | **d50** | **d85** | **d95** |
|---|---|---|---|---|---|
| **2002*** | 0.06 | 0.12 | 0.19 | 15.91 | 32.90 |
| **2003** | 0.07 | 0.13 | 0.29 | 13.33 | 33.80 |
| **2004** | 0.00 | 0.00 | 0.00 | 0.31 | 0.37 |



| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #3 |
| **Feature** | Riffle |
| **Date** | 7/1/04 |
| **Crew** | Bidelspach, Clinton |

**2004**
**2004 Survey**

| Station | Elevation | Notes |
|---|---|---|
| 9.1 | 812.2 | LP |
| 10.2 | 810.8 | |
| 11.6 | 810.8 | |
| 12.9 | 810.3 | |
| 16.8 | 810.2 | |
| 20.2 | 810.1 | |
| 21.4 | 810.0 | |
| 21.5 | 810.0 | |
| 22.3 | 810.0 | |
| 22.9 | 810.3 | |
| 23.9 | 810.5 | |
| 25.2 | 811.0 | |
| 26.2 | 812.1 | BKF |
| 27.0 | 812.4 | |
| 30.0 | 812.8 | |
| 33.7 | 813.1 | |
| 34.0 | 813.4 | RP |

**2003**
**2003 Survey**

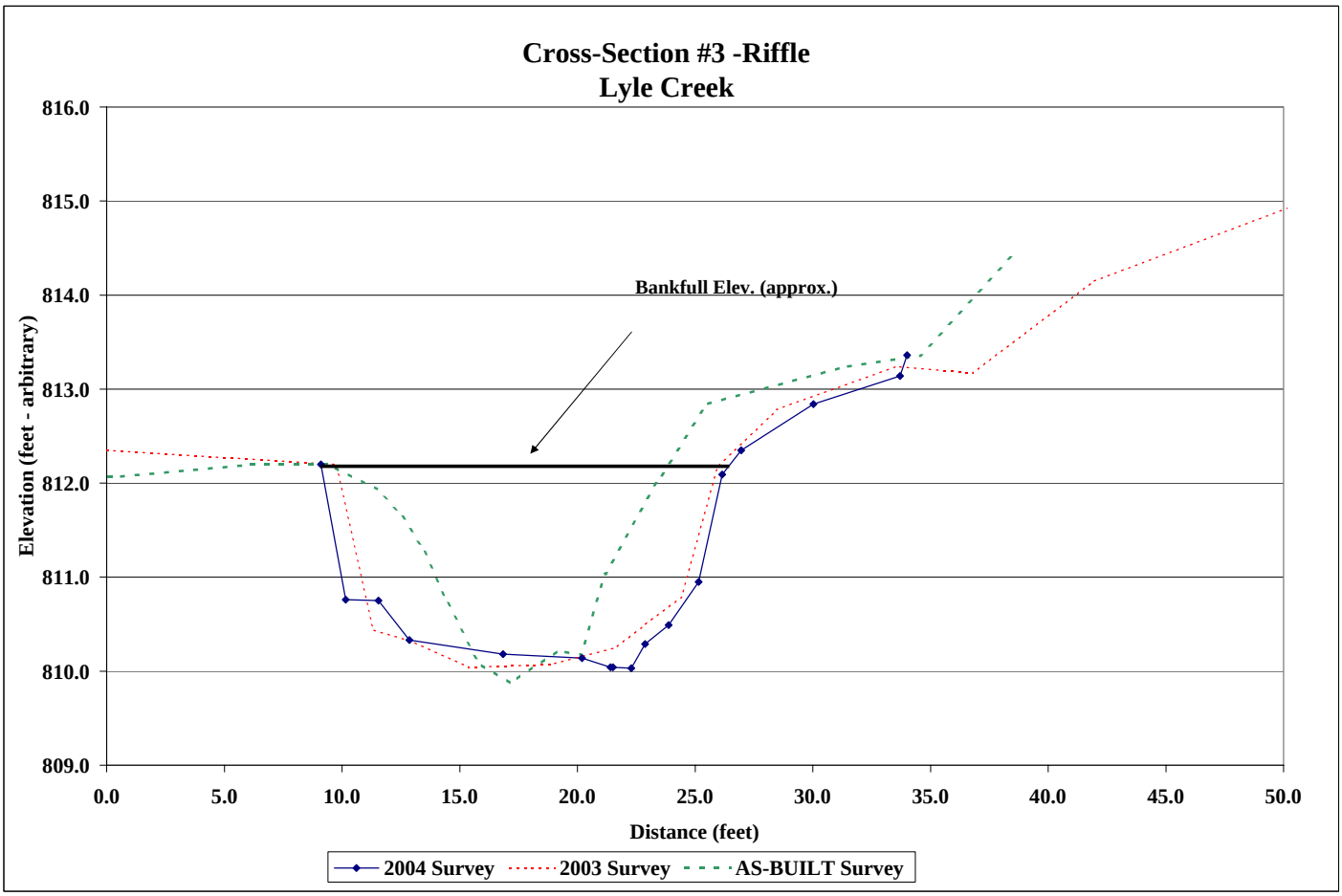
| Station | Elevation | Notes |
|---|---|---|
| 0.0 | 812.4 | |
| 9.1 | 812.2 | LP |
| 9.8 | 812.2 | BKF |
| 11.3 | 810.4 | |
| 13.0 | 810.3 | |
| 15.4 | 810.0 | |
| 18.9 | 810.1 | |
| 21.6 | 810.3 | |
| 22.8 | 810.5 | |
| 24.4 | 810.8 | |
| 26.0 | 812.2 | |
| 28.5 | 812.8 | |
| 33.6 | 813.2 | RP |
| 36.8 | 813.2 | |
| 41.9 | 814.1 | |
| 53.2 | 815.2 | |

**AS-BUILT**
**AS-BUILT Survey**

| Station | Elevation | Notes |
|---|---|---|
| -48.4 | 812.54 | |
| -34.4 | 812.15 | |
| 0.4 | 812.07 | |
| 6.1 | 812.20 | BKF |
| 9.5 | 812.20 | LP |
| 11.5 | 811.94 | |
| 12.5 | 811.68 | |
| 13.5 | 811.29 | |
| 14.5 | 810.73 | |
| 15.8 | 810.09 | |
| 17.2 | 809.87 | |
| 19.2 | 810.22 | |
| 20.2 | 810.17 | |
| 21.2 | 811.03 | |
| 23.5 | 812.07 | |
| 25.5 | 812.84 | |
| 31.2 | 813.23 | |
| 34.5 | 813.36 | RP |
| 38.6 | 814.43 | |

**Photo of Cross-Section #3 - Looking Downstream @ STA 4+20**

| | 2004 | 2003 | AS-BUILT |
|---|---|---|---|
| **Area** | 26.9 | 26.0 | 17.1 |
| **Width** | 16.0 | 14.6 | 12.0 |
| **Mean Depth** | 1.7 | 1.8 | 1.4 |
| **Max Depth** | 2.1 | 2.1 | 2.3 |
| **W/D** | 9.5 | 8.2 | 8.5 |

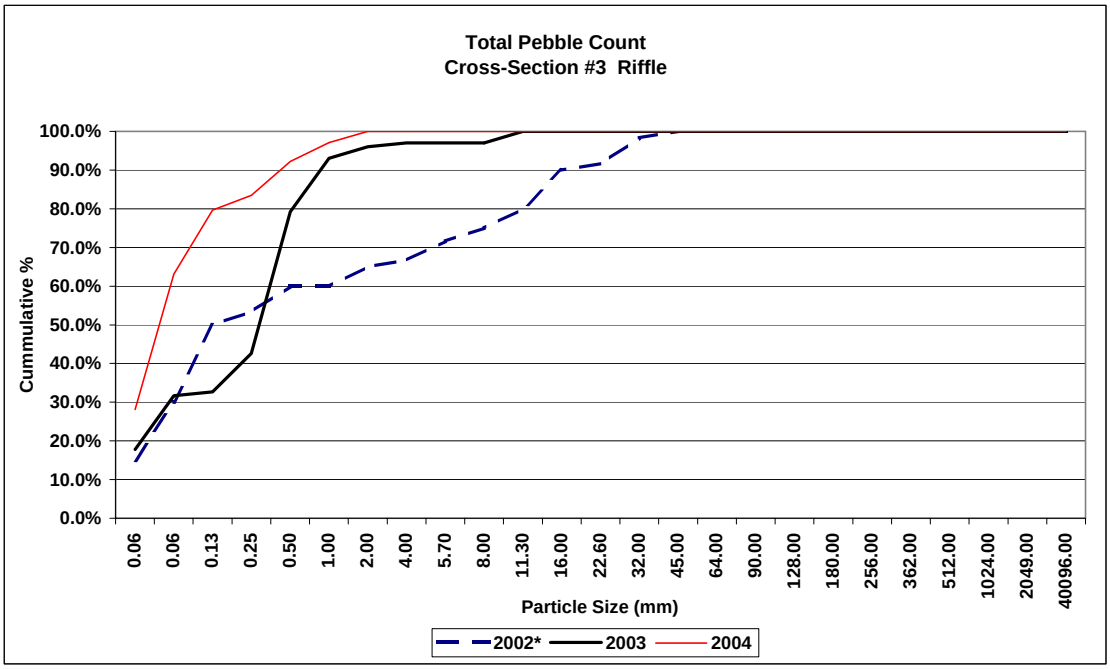


| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #3 |
| **Feature** | Riffle |
| **Date** | 11/4/03 |
| **Crew** | Shaffer, Bidelspach, Clinton |

* 2002 pebble count is a typical riffle sections used as basline information.

| | | | 2002* | | | 2003 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | **Material** | **Size (mm)** | **Riffle** | **%** | **Cum %** | **Riffle - Bed** | **Riffle - Bank** | **%** | **Cum %** |
| **Silt/Clay** | silt/clay | 0.061 | 9 | 15.0% | 15.0% | 0 | 18 | 17.8% | 17.8% |
| **Sand** | very fine sand | 0.062 | 9 | 15.0% | 30.0% | 2 | 12 | 13.9% | 31.7% |
| | fine sand | 0.125 | 12 | 20.0% | 50.0% | 0 | 1 | 1.0% | 32.7% |
| | medium sand | 0.25 | 2 | 3.3% | 53.3% | 7 | 3 | 9.9% | 42.6% |
| | course sand | 0.50 | 4 | 6.7% | 60.0% | 25 | 12 | 36.6% | 79.2% |
| | very course sand | 1.0 | 0 | 0.0% | 60.0% | 10 | 4 | 13.9% | 93.1% |
| **Gravel** | very fine gravel | 2.0 | 3 | 5.0% | 65.0% | 3 | 0 | 3.0% | 96.0% |
| | fine gravel | 4.0 | 1 | 1.7% | 66.7% | 1 | 0 | 1.0% | 97.0% |
| | fine gravel | 5.7 | 3 | 5.0% | 71.7% | 0 | 0 | 0.0% | 97.0% |
| | medium gravel | 8.0 | 2 | 3.3% | 75.0% | 0 | 0 | 0.0% | 97.0% |
| | medium gravel | 11.3 | 3 | 5.0% | 80.0% | 3 | 0 | 3.0% | 100.0% |
| | course gravel | 16.0 | 6 | 10.0% | 90.0% | 0 | 0 | 0.0% | 100.0% |
| | course gravel | 22.6 | 1 | 1.7% | 91.7% | 0 | 0 | 0.0% | 100.0% |
| | very course gravel | 32 | 4 | 6.7% | 98.3% | 0 | 0 | 0.0% | 100.0% |
| | very course gravel | 45 | 1 | 1.7% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Cobble** | small cobble | 64 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium cobble | 90 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large cobble | 128 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large cobble | 180 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Boulder** | small boulder | 256 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | small boulder | 362 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium boulder | 512 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large boulder | 1024 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large boulder | 2049 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Bedrock** | bedrock | 40096 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **TOTAL / %of whole count** | | | 60 | 100.0% | | 51 | 50 | 100.0% | |

| | **d16** | **d35** | **d50** | **d85** | **d95** |
|---|---|---|---|---|---|
| **2002*** | 0.06 | 0.12 | 0.19 | 15.91 | 32.90 |
| **2003** | 0.00 | 0.23 | 0.45 | 1.01 | 2.47 |
| **2004** | 0.00 | 0.07 | 0.08 | 0.40 | 1.18 |



| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #4 |
| **Feature** | Riffle |
| **Date** | 7/1/04 |
| **Crew** | Bidelspach, Clinton |

**2004**
**2004 Survey**

| Station | Elevation | Notes |
|---|---|---|
| 9.28 | 804.97 | LP |
| 10.81 | 804.78 | |
| 11.67 | 804.41 | |
| 12.98 | 804.00 | |
| 14.45 | 803.06 | |
| 15.75 | 802.63 | |
| 16.30 | 802.35 | |
| 17.75 | 802.03 | |
| 19.17 | 802.35 | |
| 19.83 | 802.68 | |
| 20.63 | 803.80 | |
| 22.90 | 804.92 | BKF |
| 23.98 | 804.90 | |
| 24.50 | 804.67 | RP |

**2003**
**2003 Survey**

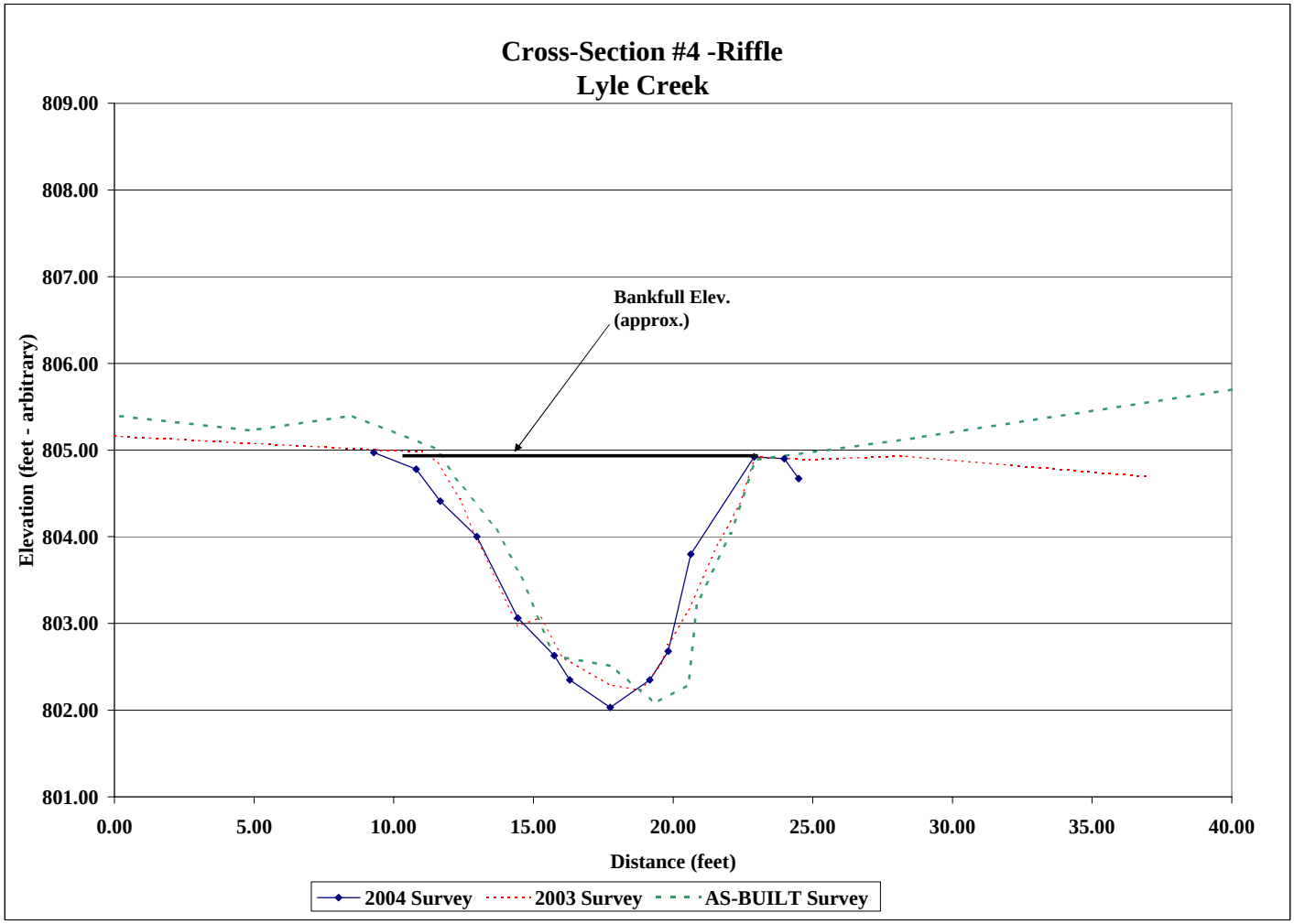
| Station | Elevation | Notes |
|---|---|---|
| 0.0 | 805.16 | |
| 9.6 | 805.00 | |
| 11.0 | 804.98 | |
| 11.5 | 804.87 | BKF |
| 12.4 | 804.43 | |
| 12.9 | 804.06 | |
| 14.4 | 802.97 | |
| 15.3 | 803.07 | |
| 16.0 | 802.62 | |
| 17.7 | 802.29 | |
| 18.8 | 802.23 | |
| 19.6 | 802.51 | |
| 19.8 | 802.75 | |
| 20.5 | 803.13 | |
| 21.6 | 803.92 | |
| 22.4 | 804.35 | |
| 22.9 | 804.92 | |
| 24.9 | 804.89 | |
| 28.2 | 804.93 | |
| 37.0 | 804.69 | |

**AS-BUILT**
**AS-BUILT Survey**

| Station | Elevation | Notes |
|---|---|---|
| -90.4 | 808.12 | |
| -85.6 | 806.93 | |
| -80.5 | 806.16 | |
| -58.4 | 805.61 | |
| -34.6 | 805.65 | |
| -26.5 | 804.84 | |
| -9.6 | 804.84 | |
| -2.4 | 805.48 | |
| 4.9 | 805.23 | |
| 8.5 | 805.40 | |
| 11.5 | 805.01 | |
| 12.4 | 804.59 | |
| 13.6 | 804.12 | |
| 14.5 | 803.57 | |
| 15.7 | 802.63 | |
| 17.8 | 802.50 | |
| 19.3 | 802.08 | |
| 20.6 | 802.29 | |
| 20.9 | 803.23 | |
| 22.1 | 804.03 | |
| 23.0 | 804.89 | BKF |
| 28.7 | 805.14 | |
| 42.6 | 805.82 | |
| 67.6 | 808.21 | |

**Photo of Cross-Section #4 - Looking Downstream @ STA 11+55**

| | 2004 | 2003 | AS-BUILT |
|---|---|---|---|
| **Area** | 19.0 | 17.6 | 16.9 |
| **Width** | 11.2 | 10.6 | 10.6 |
| **Mean Depth** | 1.7 | 1.7 | 1.6 |
| **Max Depth** | 2.9 | 2.7 | 2.8 |
| **W/D** | 6.6 | 6.3 | 6.6 |

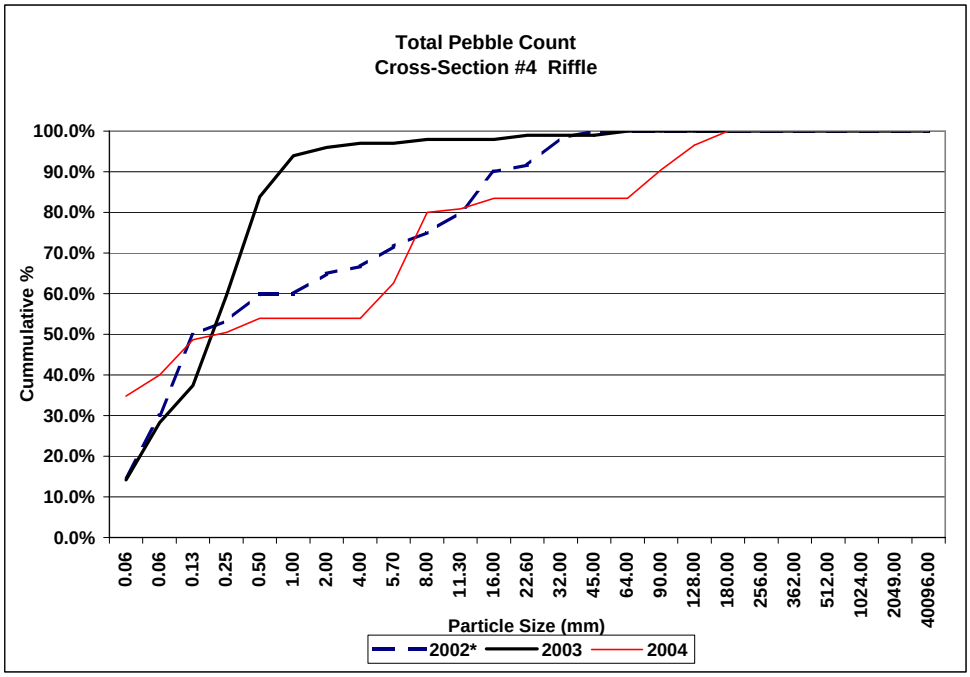


| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #4 |
| **Feature** | Riffle |
| **Date** | 11/4/03 |
| **Crew** | Shaffer, Bidelspach, Clinton |

* 2002 pebble count is a typical riffle sections used as basline information.

| | | | 2002* | | | 2003 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | **Material** | **Size (mm)** | **Riffle** | **%** | **Cum %** | **Riffle - Bed** | **Riffle - Bank** | **%** | **Cum %** |
| **Silt/Clay** | silt/clay | 0.061 | 9 | 15.0% | 15.0% | 30 | 4 | 36.6% | 36.6% |
| **Sand** | very fine sand | 0.062 | 9 | 15.0% | 30.0% | 10 | 2 | 12.9% | 49.5% |
| | fine sand | 0.125 | 12 | 20.0% | 50.0% | 2 | 2 | 4.3% | 53.8% |
| | medium sand | 0.25 | 2 | 3.3% | 53.3% | 2 | 6 | 8.6% | 62.4% |
| | course sand | 0.50 | 4 | 6.7% | 60.0% | 9 | 8 | 18.3% | 80.6% |
| | very course sand | 1.0 | 0 | 0.0% | 60.0% | 0 | 1 | 1.1% | 81.7% |
| **G r a v e l** | very fine gravel | 2.0 | 3 | 5.0% | 65.0% | 0 | 2 | 2.2% | 83.9% |
| | fine gravel | 4.0 | 1 | 1.7% | 66.7% | 0 | 2 | 2.2% | 86.0% |
| | fine gravel | 5.7 | 3 | 5.0% | 71.7% | 0 | 3 | 3.2% | 89.2% |
| | medium gravel | 8.0 | 2 | 3.3% | 75.0% | 0 | 1 | 1.1% | 90.3% |
| | medium gravel | 11.3 | 3 | 5.0% | 80.0% | 0 | 0 | 0.0% | 90.3% |
| | course gravel | 16.0 | 6 | 10.0% | 90.0% | 0 | 0 | 0.0% | 90.3% |
| | course gravel | 22.6 | 1 | 1.7% | 91.7% | 0 | 4 | 4.3% | 94.6% |
| | very course gravel | 32 | 4 | 6.7% | 98.3% | 0 | 1 | 1.1% | 95.7% |
| | very course gravel | 45 | 1 | 1.7% | 100.0% | 0 | 2 | 2.2% | 97.8% |
| **Cobble** | small cobble | 64 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 97.8% |
| | medium cobble | 90 | 0 | 0.0% | 100.0% | 0 | 1 | 1.1% | 98.9% |
| | large cobble | 128 | 0 | 0.0% | 100.0% | 0 | 1 | 1.1% | 100.0% |
| | very large cobble | 180 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Boulder** | small boulder | 256 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | small boulder | 362 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium boulder | 512 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large boulder | 1024 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large boulder | 2049 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Bedrock** | bedrock | 40096 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **TOTAL / %of whole count** | | | 60 | 100.0% | | 53 | 40 | 100.0% | |

| | **d16** | **d35** | **d50** | **d85** | **d95** |
|---|---|---|---|---|---|
| **2002*** | 0.06 | 0.12 | 0.19 | 15.91 | 32.90 |
| **2003** | 0.00 | 0.00 | 0.11 | 3.11 | 31.22 |
| **2004** | 0.00 | 0.06 | 0.33 | 79.40 | 142.75 |



| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #5 |
| **Feature** | Riffle |
| **Date** | 7/1/04 |
| **Crew** | Bidelspach, Clinton |

**2004**
**2004 Survey**

| Station | Elevation | Notes |
|---|---|---|
| 11.57 | 804.52 | LP |
| 15.46 | 804.50 | |
| 18.02 | 804.16 | BKF |
| 20.18 | 803.07 | |
| 22.13 | 802.25 | |
| 23.33 | 801.93 | |
| 24.21 | 801.83 | |
| 25.78 | 802.03 | |
| 27.64 | 802.08 | |
| 29.14 | 801.94 | |
| 29.89 | 802.63 | |
| 31.79 | 803.42 | |
| 33.70 | 804.45 | |
| 39.53 | 804.65 | |
| 44.4 | 804.6 | |
| 44.9 | 804.9 | RP |

**2003**
**2003 Survey**

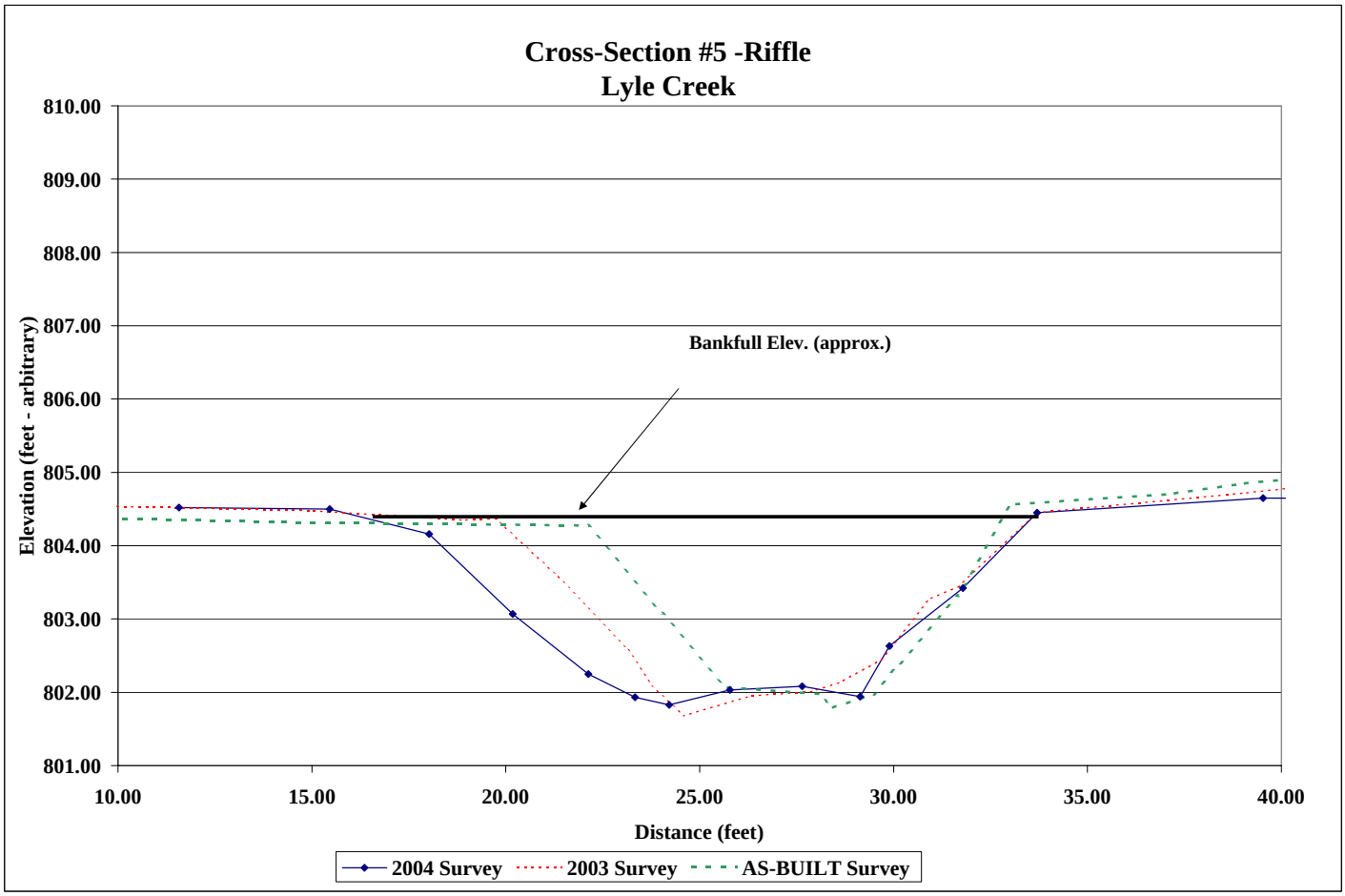
| Station | Elevation | Notes |
|---|---|---|
| 0.0 | 804.51 | |
| 9.4 | 804.54 | |
| 14.9 | 804.48 | |
| 18.9 | 804.35 | BKF |
| 19.8 | 804.37 | |
| 21.3 | 803.59 | |
| 23.1 | 802.61 | |
| 23.8 | 802.09 | |
| 24.6 | 801.68 | |
| 26.3 | 801.95 | |
| 27.9 | 802.01 | |
| 28.6 | 802.14 | |
| 29.7 | 802.45 | |
| 30.9 | 803.27 | |
| 31.7 | 803.45 | |
| 33.7 | 804.45 | |
| 39.1 | 804.72 | |
| 45.9 | 805.1 | |

**AS-BUILT**
**AS-BUILT Survey**

| Station | Elevation | Notes |
|---|---|---|
| -82.0 | 807.34 | |
| -77.9 | 806.24 | |
| -70.0 | 805.47 | |
| -52.0 | 804.85 | |
| -38.9 | 805.09 | |
| -29.9 | 804.70 | |
| -16.0 | 804.66 | |
| 1.1 | 804.46 | |
| 14.2 | 804.32 | BKF |
| 22.1 | 804.27 | |
| 24.0 | 803.08 | |
| 25.7 | 802.07 | |
| 28.1 | 801.98 | |
| 28.4 | 801.78 | |
| 29.5 | 801.98 | |
| 30.0 | 802.31 | |
| 31.7 | 803.32 | |
| 33.0 | 804.56 | |
| 37.1 | 804.70 | |
| 39.0 | 804.85 | |
| 49.1 | 805.33 | |
| 59.2 | 809.16 | |

**Photo of Cross-Section #5 - Looking Downstream @ STA 12+45**

| | 2004 | 2003 | AS-BUILT |
|---|---|---|---|
| **Area** | 24.6 | 20.4 | 15.2 |
| **Width** | 15.7 | 12.4 | 9.0 |
| **Mean Depth** | 1.6 | 1.6 | 1.7 |
| **Max Depth** | 2.4 | 2.6 | 2.5 |
| **W/D** | 10.0 | 7.5 | 5.3 |

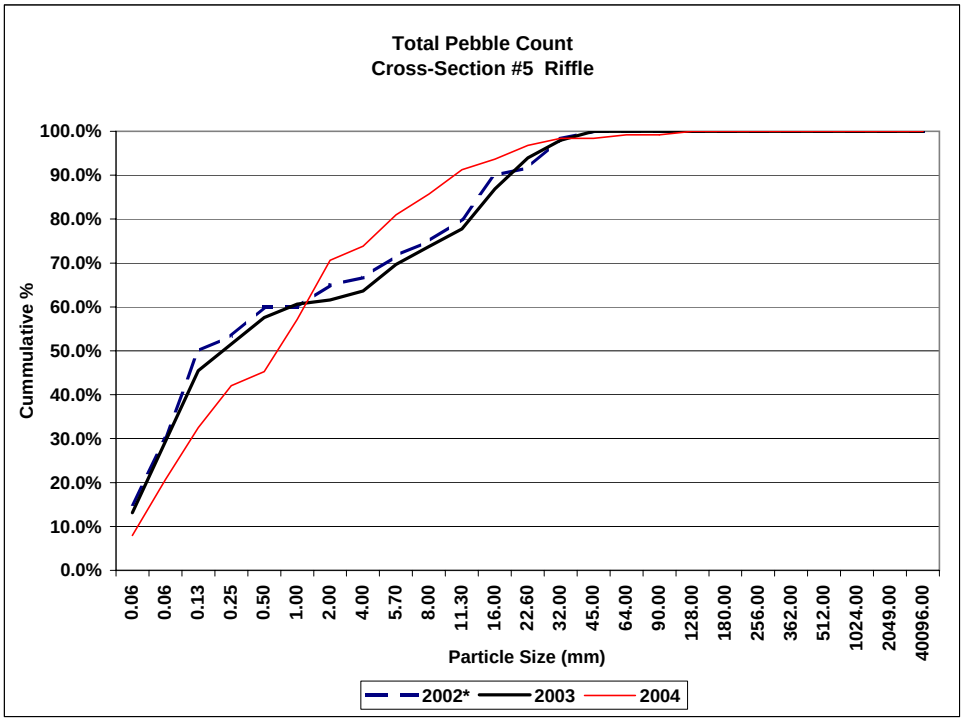


| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #5 |
| **Feature** | Riffle |
| **Date** | 11/4/03 |
| **Crew** | Shaffer, Bidelspach, Clinton |

* 2002 pebble count is a typical riffle sections used as basline information.

| | | | 2002* | | | 2003 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | **Material** | **Size (mm)** | **Riffle** | **%** | **Cum %** | **Riffle - Bed** | **Riffle - Bank** | **%** | **Cum %** |
| **Silt/Clay** | silt/clay | 0.061 | 9 | 15.0% | 15.0% | 12 | 1 | 13.1% | 13.1% |
| **Sand** | very fine sand | 0.062 | 9 | 15.0% | 30.0% | 16 | 0 | 16.2% | 29.3% |
| | fine sand | 0.125 | 12 | 20.0% | 50.0% | 12 | 4 | 16.2% | 45.5% |
| | medium sand | 0.25 | 2 | 3.3% | 53.3% | 0 | 6 | 6.1% | 51.5% |
| | course sand | 0.50 | 4 | 6.7% | 60.0% | 0 | 6 | 6.1% | 57.6% |
| | very course sand | 1.0 | 0 | 0.0% | 60.0% | 0 | 3 | 3.0% | 60.6% |
| **Gravel** | very fine gravel | 2.0 | 3 | 5.0% | 65.0% | 0 | 1 | 1.0% | 61.6% |
| | fine gravel | 4.0 | 1 | 1.7% | 66.7% | 0 | 2 | 2.0% | 63.6% |
| | fine gravel | 5.7 | 3 | 5.0% | 71.7% | 0 | 6 | 6.1% | 69.7% |
| | medium gravel | 8.0 | 2 | 3.3% | 75.0% | 0 | 4 | 4.0% | 73.7% |
| | medium gravel | 11.3 | 3 | 5.0% | 80.0% | 0 | 4 | 4.0% | 77.8% |
| | course gravel | 16.0 | 6 | 10.0% | 90.0% | 0 | 9 | 9.1% | 86.9% |
| | course gravel | 22.6 | 1 | 1.7% | 91.7% | 0 | 7 | 7.1% | 93.9% |
| | very course gravel | 32 | 4 | 6.7% | 98.3% | 0 | 4 | 4.0% | 98.0% |
| | very course gravel | 45 | 1 | 1.7% | 100.0% | 0 | 2 | 2.0% | 100.0% |
| **Cobble** | small cobble | 64 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium cobble | 90 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large cobble | 128 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large cobble | 180 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Boulder** | small boulder | 256 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | small boulder | 362 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium boulder | 512 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large boulder | 1024 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large boulder | 2049 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Bedrock** | bedrock | 40096 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **TOTAL / %of whole count** | | | 60 | 100.0% | | 40 | 59 | 100.0% | |

| | **d16** | **d35** | **d50** | **d85** | **d95** |
|---|---|---|---|---|---|
| **2002*** | 0.06 | 0.12 | 0.19 | 15.91 | 32.90 |
| **2003** | 0.07 | 0.13 | 0.33 | 17.52 | 30.24 |
| **2004** | 0.08 | 0.24 | 1.05 | 8.64 | 22.70 |



| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #6 |
| **Feature** | Pool |
| **Date** | 7/1/04 |
| **Crew** | Bidelspach, Clinton |

**2004**
**2004 Survey**

| Station | Elevation | Notes |
|---|---|---|
| 17.33 | 804.51 | LP |
| 17.68 | 804.42 | |
| 17.89 | 804.28 | |
| 22.16 | 804.06 | BKF |
| 24.22 | 803.22 | |
| 27.06 | 802.18 | |
| 27.97 | 801.83 | |
| 29.18 | 801.64 | |
| 30.71 | 801.46 | |
| 32.80 | 801.31 | |
| 34.01 | 801.36 | |
| 35.07 | 802.33 | |
| 37.9 | 804.42 | |
| 40.6 | 804.78 | |
| 45.3 | 805.09 | |
| 49.5 | 805.5 | RP |

**2003**
**2003 Survey**

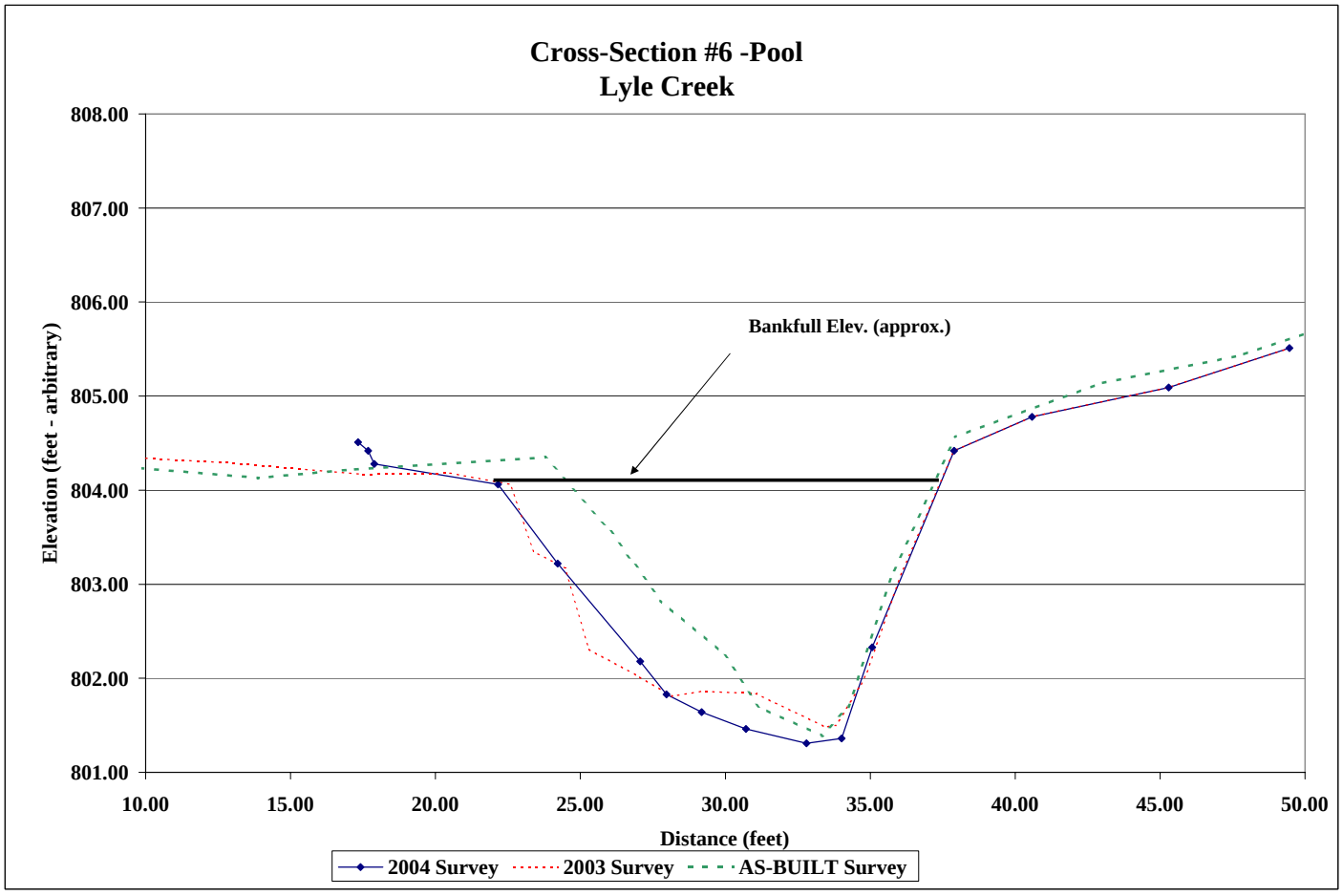
| Station | Elevation | Notes |
|---|---|---|
| 0.2 | 804.51 | |
| 12.9 | 804.29 | |
| 17.5 | 804.17 | |
| 20.5 | 804.18 | BKF |
| 22.6 | 804.06 | |
| 23.4 | 803.35 | |
| 24.5 | 803.17 | |
| 25.3 | 802.31 | |
| 27.0 | 802.03 | |
| 28.2 | 801.81 | |
| 29.2 | 801.86 | |
| 31.1 | 801.84 | |
| 33.5 | 801.48 | |
| 33.8 | 801.5 | |
| 34.7 | 801.92 | |
| 34.9 | 802.03 | |
| 36.1 | 803.14 | |
| 37.9 | 804.42 | |
| 40.6 | 804.78 | |
| 45.3 | 805.09 | |
| 49.5 | 805.5 | |

**AS-BUILT**
**AS-BUILT Survey**

| Station | Elevation | Notes |
|---|---|---|
| -81.3 | 807.30 | |
| -77.3 | 806.22 | |
| -69.3 | 805.48 | |
| -51.1 | 804.83 | |
| -38.2 | 805.09 | |
| -29.2 | 804.70 | |
| -15.1 | 804.61 | |
| 1.9 | 804.43 | |
| 13.9 | 804.13 | BKF |
| 17.0 | 804.22 | |
| 23.8 | 804.35 | |
| 25.9 | 803.61 | |
| 26.9 | 803.22 | |
| 27.8 | 802.83 | |
| 29.9 | 802.26 | |
| 31.2 | 801.70 | |
| 33.3 | 801.39 | |
| 34.2 | 801.70 | |
| 35.8 | 803.13 | |
| 37.9 | 804.57 | |
| 42.9 | 805.13 | |
| 47.8 | 805.43 | |
| 58.9 | 806.57 | |

**Photo of Cross-Section #6 - Looking Downstream @ STA 12+65**

| | 2004 | 2003 | AS-BUILT |
|---|---|---|---|
| **Area** | 27.0 | 26.9 | 19.9 |
| **Width** | 15.7 | 15.3 | 12.0 |
| **Mean Depth** | 1.7 | 1.8 | 1.7 |
| **Max Depth** | 2.8 | 2.6 | 2.7 |
| **W/D** | 9.2 | 8.7 | 7.3 |

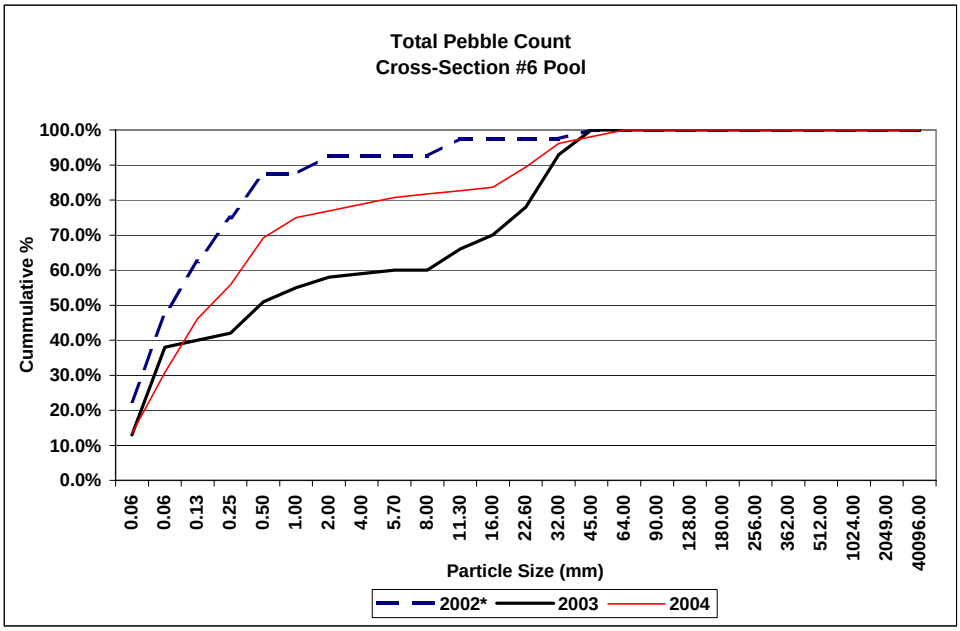


| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #6 |
| **Feature** | Pool |
| **Date** | 11/4/03 |
| **Crew** | Shaffer, Bidelspach, Clinton |

* 2002 pebble count is a typical riffle sections used as basline information.

| | | | 2002* | | | 2003 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | **Material** | **Size (mm)** | **Pool** | **%** | **Cum %** | **Riffle - Bed** | **Riffle - Bank** | **%** | **Cum %** |
| **Silt/Clay** | silt/clay | 0.061 | 9 | 22.5% | 22.5% | 13 | 0 | 13.0% | 13.0% |
| **Sand** | very fine sand | 0.062 | 10 | 25.0% | 47.5% | 24 | 1 | 25.0% | 38.0% |
| | fine sand | 0.125 | 6 | 15.0% | 62.5% | 2 | 0 | 2.0% | 40.0% |
| | medium sand | 0.25 | 5 | 12.5% | 75.0% | 1 | 1 | 2.0% | 42.0% |
| | course sand | 0.50 | 5 | 12.5% | 87.5% | 0 | 9 | 9.0% | 51.0% |
| | very course sand | 1.0 | 0 | 0.0% | 87.5% | 0 | 4 | 4.0% | 55.0% |
| **Gravel** | very fine gravel | 2.0 | 2 | 5.0% | 92.5% | 0 | 3 | 3.0% | 58.0% |
| | fine gravel | 4.0 | 0 | 0.0% | 92.5% | 0 | 1 | 1.0% | 59.0% |
| | fine gravel | 5.7 | 0 | 0.0% | 92.5% | 0 | 1 | 1.0% | 60.0% |
| | medium gravel | 8.0 | 0 | 0.0% | 92.5% | 0 | 0 | 0.0% | 60.0% |
| | medium gravel | 11.3 | 2 | 5.0% | 97.5% | 0 | 6 | 6.0% | 66.0% |
| | course gravel | 16.0 | 0 | 0.0% | 97.5% | 0 | 4 | 4.0% | 70.0% |
| | course gravel | 22.6 | 0 | 0.0% | 97.5% | 0 | 8 | 8.0% | 78.0% |
| | very course gravel | 32 | 0 | 0.0% | 97.5% | 0 | 15 | 15.0% | 93.0% |
| | very course gravel | 45 | 1 | 2.5% | 100.0% | 0 | 7 | 7.0% | 100.0% |
| **Cobble** | small cobble | 64 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium cobble | 90 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large cobble | 128 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large cobble | 180 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Boulder** | small boulder | 256 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | small boulder | 362 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium boulder | 512 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large boulder | 1024 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large boulder | 2049 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Bedrock** | bedrock | 40096 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **TOTAL / %of whole count** | | | 40 | 100.0% | | 40 | 60 | 100.0% | |

| | **d16** | **d35** | **d50** | **d85** | **d95** |
|---|---|---|---|---|---|
| **2002*** | 0.00 | 0.08 | 0.11 | 0.65 | 11.65 |
| **2003** | 0.07 | 0.09 | 0.71 | 31.78 | 43.07 |
| **2004** | 0.07 | 0.12 | 0.26 | 19.78 | 36.58 |



| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #7 |
| **Feature** | Riffle |
| **Date** | 7/1/04 |
| **Crew** | Bidelspach, Clinton |

**2004**
**2004 Survey**

| Station | Elevation | Notes |
|---|---|---|
| 0.12 | 803.16 | |
| 0.14 | 803.13 | LP |
| 5.81 | 803.11 | LP |
| 11.98 | 803.28 | |
| 14.22 | 803.41 | |
| 15.22 | 803.30 | |
| 16.37 | 802.69 | |
| 16.48 | 801.23 | W |
| 17.90 | 800.90 | |
| 22.16 | 800.60 | T |
| 24.45 | 801.18 | EW |
| 25.41 | 801.94 | |
| 27.2 | 802.78 | BKF |
| 30.8 | 803.2 | |
| 34.7 | 802.99 | |
| 35.1 | 803.0 | |
| 35.2 | 803.2 | RP |

**2003**
**2003 Survey**

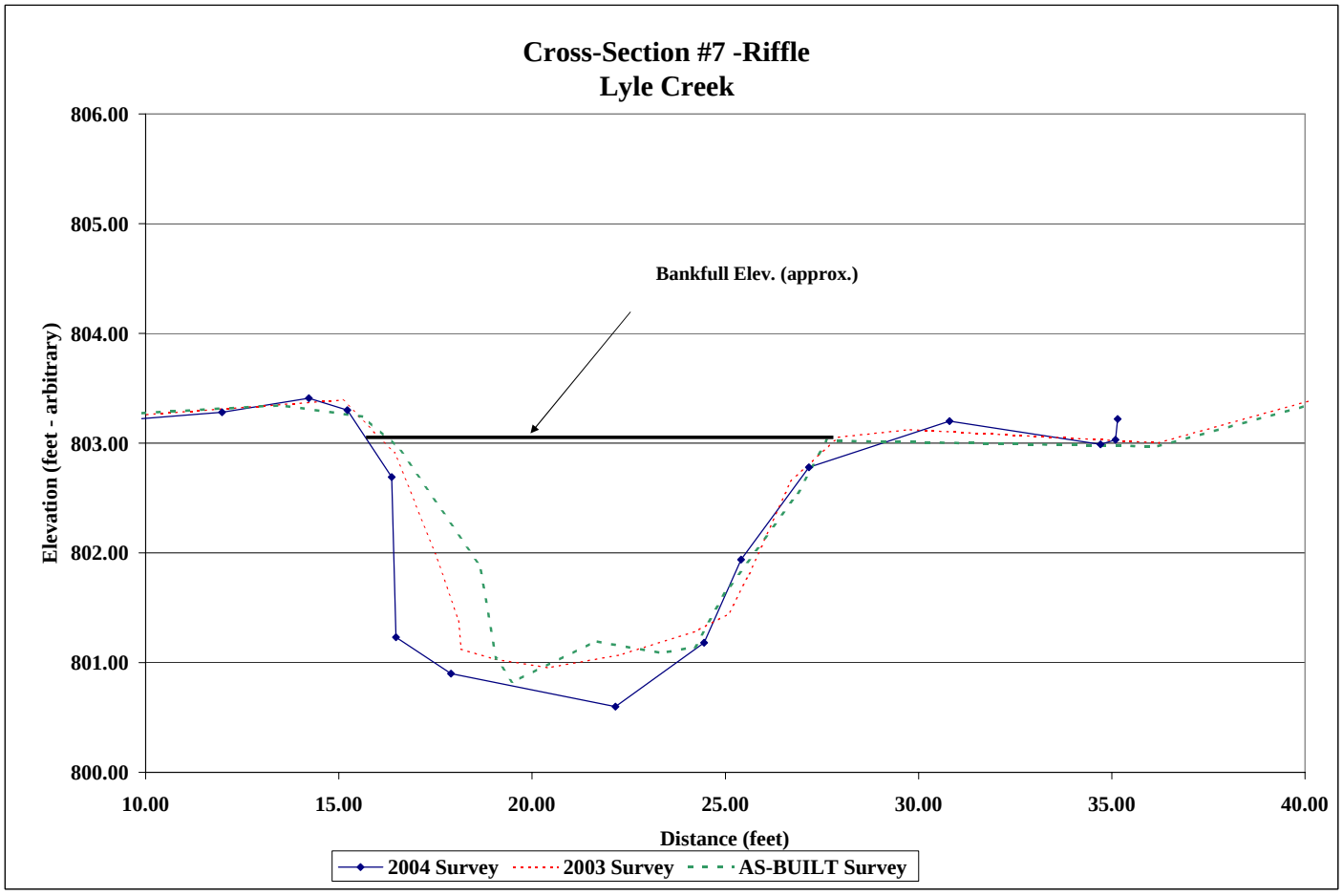
| Station | Elevation | Notes |
|---|---|---|
| 0.0 | 803.143 | |
| 8.6 | 803.223 | |
| 15.1 | 803.393 | |
| 16.5 | 802.913 | BKF |
| 17.5 | 801.99 | |
| 18.1 | 801.383 | |
| 18.2 | 801.123 | |
| 19.0 | 801.033 | |
| 20.4 | 800.953 | |
| 22.3 | 801.073 | |
| 24.2 | 801.283 | |
| 25.1 | 801.443 | |
| 25.6 | 801.773 | |
| 26.7 | 802.653 | |
| 27.9 | 803.053 | |
| 29.8 | 803.123 | |
| 36.2 | 803.003 | |
| 42.8 | 803.643 | |

**AS-BUILT**
**AS-BUILT Survey**

| Station | Elevation | Notes |
|---|---|---|
| 5.4 | 803.18 | |
| 13.5 | 803.35 | |
| 15.6 | 803.24 | |
| 16.5 | 802.97 | BKF |
| 18.6 | 801.89 | |
| 19.1 | 801.03 | |
| 19.5 | 800.82 | |
| 21.6 | 801.20 | |
| 23.4 | 801.09 | |
| 24.2 | 801.14 | |
| 25.1 | 801.68 | |
| 26.8 | 802.49 | |
| 27.6 | 803.02 | |
| 36.2 | 802.97 | |
| 41.8 | 803.51 | |
| 53.7 | 804.31 | |
| 68.7 | 804.42 | |
| 76.9 | 804.47 | |
| 86.7 | 805.39 | |

**Photo of Cross-Section #7 - Looking Downstream @ STA 13+85**

| | 2004 | 2003 | AS-BUILT |
|---|---|---|---|
| **Area** | 18.2 | 15.9 | 14.5 |
| **Width** | 10.8 | 10.4 | 9.0 |
| **Mean Depth** | 1.7 | 1.5 | 1.6 |
| **Max Depth** | 2.3 | 1.9 | 2.1 |
| **W/D** | 6.4 | 6.8 | 5.6 |

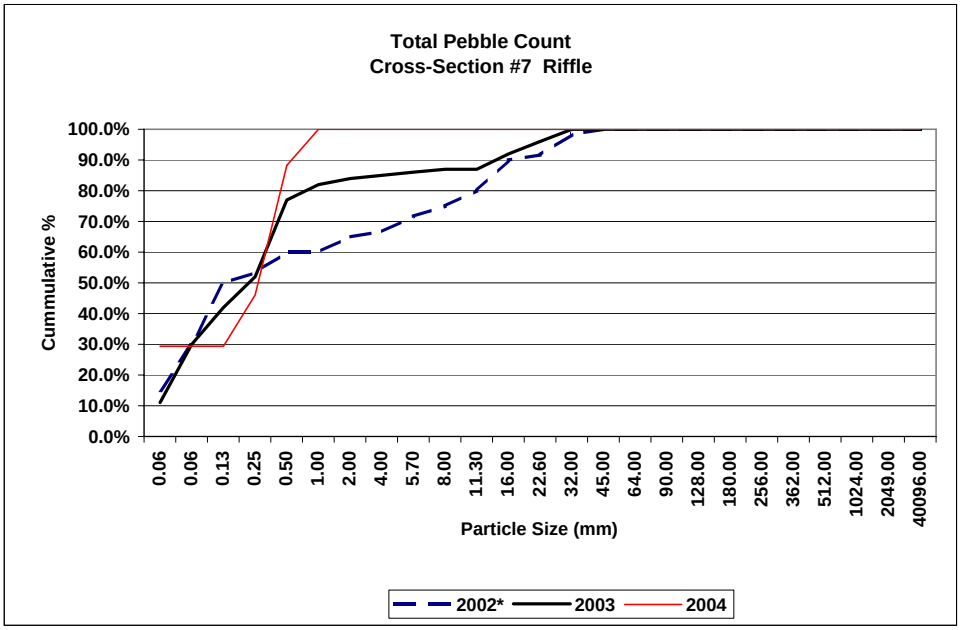


| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #7 |
| **Feature** | Riffle |
| **Date** | 11/4/03 |
| **Crew** | Shaffer, Bidelspach, Clinton |

* 2002 pebble count is a typical riffle sections used as basline information.

| | | | 2002* | | | 2003 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | **Material** | **Size (mm)** | **Riffle** | **%** | **Cum %** | **Riffle - Bed** | **Riffle - Bank** | **%** | **Cum %** |
| **Silt/Clay** | silt/clay | 0.061 | 9 | 15.0% | 15.0% | 0 | 11 | 11.0% | 11.0% |
| **Sand** | very fine sand | 0.062 | 9 | 15.0% | 30.0% | 3 | 16 | 19.0% | 30.0% |
| | fine sand | 0.125 | 12 | 20.0% | 50.0% | 6 | 6 | 12.0% | 42.0% |
| | medium sand | 0.25 | 2 | 3.3% | 53.3% | 10 | 0 | 10.0% | 52.0% |
| | course sand | 0.50 | 4 | 6.7% | 60.0% | 25 | 0 | 25.0% | 77.0% |
| | very course sand | 1.0 | 0 | 0.0% | 60.0% | 5 | 0 | 5.0% | 82.0% |
| **G r a v e l** | very fine gravel | 2.0 | 3 | 5.0% | 65.0% | 2 | 0 | 2.0% | 84.0% |
| | fine gravel | 4.0 | 1 | 1.7% | 66.7% | 1 | 0 | 1.0% | 85.0% |
| | fine gravel | 5.7 | 3 | 5.0% | 71.7% | 1 | 0 | 1.0% | 86.0% |
| | medium gravel | 8.0 | 2 | 3.3% | 75.0% | 1 | 0 | 1.0% | 87.0% |
| | medium gravel | 11.3 | 3 | 5.0% | 80.0% | 0 | 0 | 0.0% | 87.0% |
| | course gravel | 16.0 | 6 | 10.0% | 90.0% | 5 | 0 | 5.0% | 92.0% |
| | course gravel | 22.6 | 1 | 1.7% | 91.7% | 4 | 0 | 4.0% | 96.0% |
| | very course gravel | 32 | 4 | 6.7% | 98.3% | 4 | 0 | 4.0% | 100.0% |
| | very course gravel | 45 | 1 | 1.7% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Cobble** | small cobble | 64 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium cobble | 90 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large cobble | 128 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large cobble | 180 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Boulder** | small boulder | 256 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | small boulder | 362 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium boulder | 512 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large boulder | 1024 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large boulder | 2049 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Bedrock** | bedrock | 40096 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **TOTAL / %of whole count** | | | 60 | 100.0% | | 67 | 33 | 100.0% | |

| | **d16** | **d35** | **d50** | **d85** | **d95** |
|---|---|---|---|---|---|
| **2002*** | 0.06 | 0.12 | 0.19 | 15.91 | 32.90 |
| **2003** | 0.07 | 0.13 | 0.34 | 3.00 | 25.30 |
| **2004** | 0.00 | 0.25 | 0.41 | 0.71 | 1.18 |

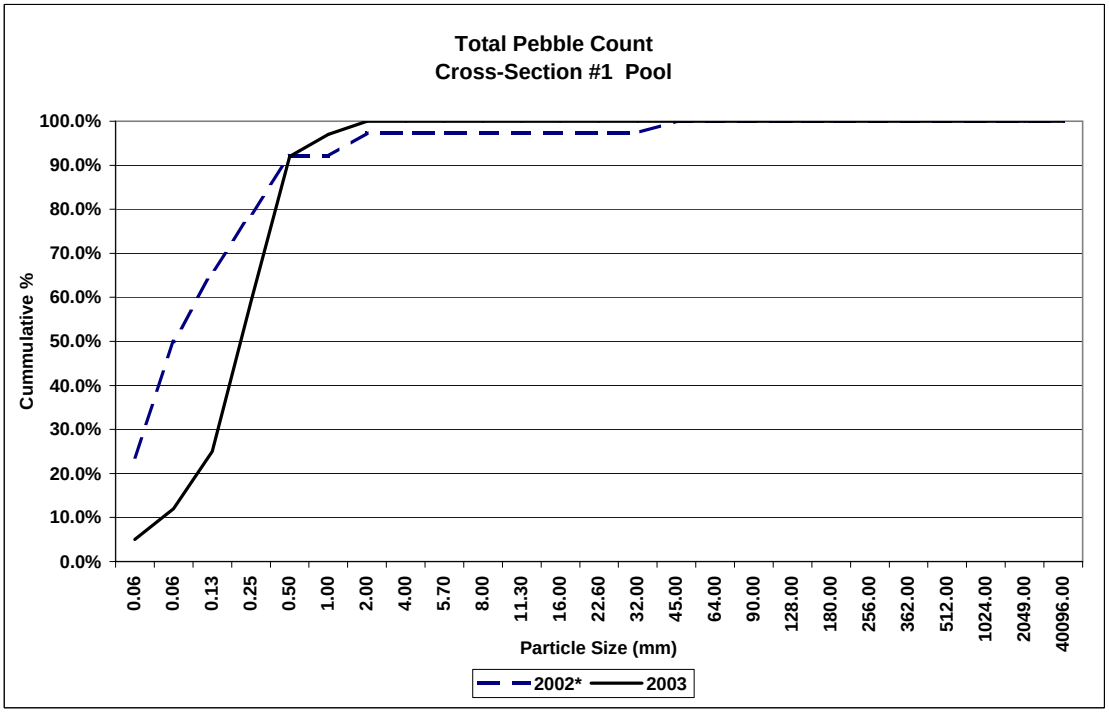


| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #1 |
| **Feature** | Pool |
| **Date** | 11/4/03 |
| **Crew** | Shaffer, Bidelspach, Clinton |

* 2002 pebble count is a typical riffle sections used as basline information.

| | | | 2002* | | | 2003 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | **Material** | **Size (mm)** | **Pool** | **%** | **Cum %** | **Riffle - Bed** | **Riffle - Bank** | **%** | **Cum %** |
| **Silt/Clay** | silt/clay | 0.061 | 9 | 23.7% | 23.7% | 1 | 4 | 5.0% | 5.0% |
| **Sand** | very fine sand | 0.062 | 10 | 26.3% | 50.0% | 2 | 5 | 7.0% | 12.0% |
| | fine sand | 0.125 | 6 | 15.8% | 65.8% | 6 | 7 | 13.0% | 25.0% |
| | medium sand | 0.25 | 5 | 13.2% | 78.9% | 17 | 17 | 34.0% | 59.0% |
| | course sand | 0.50 | 5 | 13.2% | 92.1% | 13 | 20 | 33.0% | 92.0% |
| | very course sand | 1.0 | 0 | 0.0% | 92.1% | 1 | 4 | 5.0% | 97.0% |
| **Gravel** | very fine gravel | 2.0 | 2 | 5.3% | 97.4% | | 3 | 3.0% | 100.0% |
| | fine gravel | 4.0 | 0 | 0.0% | 97.4% | | | 0.0% | 100.0% |
| | fine gravel | 5.7 | 0 | 0.0% | 97.4% | | | 0.0% | 100.0% |
| | medium gravel | 8.0 | 0 | 0.0% | 97.4% | | | 0.0% | 100.0% |
| | medium gravel | 11.3 | 0 | 0.0% | 97.4% | | | 0.0% | 100.0% |
| | course gravel | 16.0 | 0 | 0.0% | 97.4% | | | 0.0% | 100.0% |
| | course gravel | 22.6 | 0 | 0.0% | 97.4% | | | 0.0% | 100.0% |
| | very course gravel | 32 | 0 | 0.0% | 97.4% | | | 0.0% | 100.0% |
| | very course gravel | 45 | 1 | 2.6% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Cobble** | small cobble | 64 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium cobble | 90 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large cobble | 128 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large cobble | 180 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Boulder** | small boulder | 256 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | small boulder | 362 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium boulder | 512 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large boulder | 1024 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large boulder | 2049 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Bedrock** | bedrock | 40096 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **TOTAL / %of whole count** | | | 38 | 100.0% | | 40 | 60 | 100.0% | |

| | **d16** | **d35** | **d50** | **d85** | **d95** |
|---|---|---|---|---|---|
| **2002*** | 0.00 | 0.08 | 0.09 | 0.52 | 2.33 |
| **2003** | 0.12 | 0.24 | 0.33 | 0.66 | 1.20 |

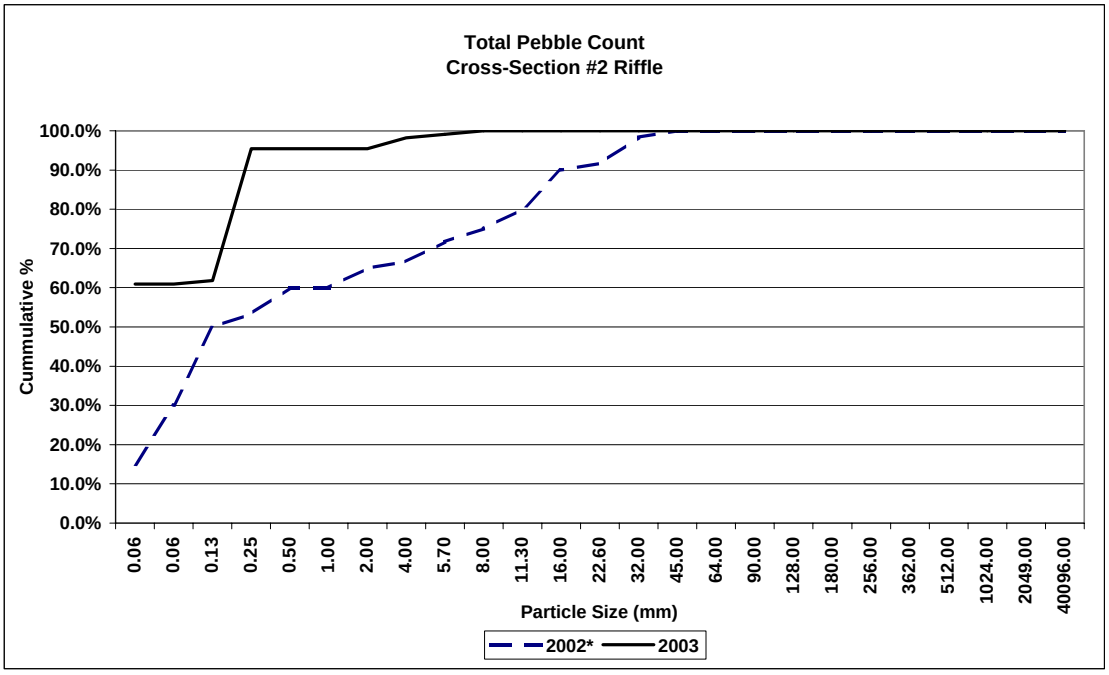


| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #2 |
| **Feature** | Riffle |
| **Date** | 11/4/03 |
| **Crew** | Shaffer, Bidelspach, Clinton |

* 2002 pebble count is a typical riffle sections used as basline information.

| | | | 2002* | | | 2003 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | **Material** | **Size (mm)** | **Riffle** | **%** | **Cum %** | **Riffle - Bed** | **Riffle - Bank** | **%** | **Cum %** |
| **Silt/Clay** | silt/clay | 0.061 | 9 | 15.0% | 15.0% | 30 | 37 | 60.9% | 60.9% |
| **Sand** | very fine sand | 0.062 | 9 | 15.0% | 30.0% | 0 | 0 | 0.0% | 60.9% |
| | fine sand | 0.125 | 12 | 20.0% | 50.0% | 1 | 0 | 0.9% | 61.8% |
| | medium sand | 0.25 | 2 | 3.3% | 53.3% | 19 | 18 | 33.6% | 95.5% |
| | course sand | 0.50 | 4 | 6.7% | 60.0% | 0 | 0 | 0.0% | 95.5% |
| | very course sand | 1.0 | 0 | 0.0% | 60.0% | 0 | 0 | 0.0% | 95.5% |
| **Gravel** | very fine gravel | 2.0 | 3 | 5.0% | 65.0% | 0 | 0 | 0.0% | 95.5% |
| | fine gravel | 4.0 | 1 | 1.7% | 66.7% | 0 | 3 | 2.7% | 98.2% |
| | fine gravel | 5.7 | 3 | 5.0% | 71.7% | 0 | 1 | 0.9% | 99.1% |
| | medium gravel | 8.0 | 2 | 3.3% | 75.0% | 0 | 1 | 0.9% | 100.0% |
| | medium gravel | 11.3 | 3 | 5.0% | 80.0% | 0 | 0 | 0.0% | 100.0% |
| | course gravel | 16.0 | 6 | 10.0% | 90.0% | | | 0.0% | 100.0% |
| | course gravel | 22.6 | 1 | 1.7% | 91.7% | | | 0.0% | 100.0% |
| | very course gravel | 32 | 4 | 6.7% | 98.3% | | | 0.0% | 100.0% |
| | very course gravel | 45 | 1 | 1.7% | 100.0% | | | 0.0% | 100.0% |
| **Cobble** | small cobble | 64 | 0 | 0.0% | 100.0% | | | 0.0% | 100.0% |
| | medium cobble | 90 | 0 | 0.0% | 100.0% | | | 0.0% | 100.0% |
| | large cobble | 128 | 0 | 0.0% | 100.0% | | | 0.0% | 100.0% |
| | very large cobble | 180 | 0 | 0.0% | 100.0% | | | 0.0% | 100.0% |
| **Boulder** | small boulder | 256 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | small boulder | 362 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium boulder | 512 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large boulder | 1024 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large boulder | 2049 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Bedrock** | bedrock | 40096 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **TOTAL / %of whole count** | | | 60 | 100.0% | | 50 | 60 | 100.0% | |

| | **d16** | **d35** | **d50** | **d85** | **d95** |
|---|---|---|---|---|---|
| **2002*** | 0.06 | 0.12 | 0.19 | 15.91 | 32.90 |
| **2003** | 0.00 | 0.00 | 0.00 | 0.31 | 0.37 |

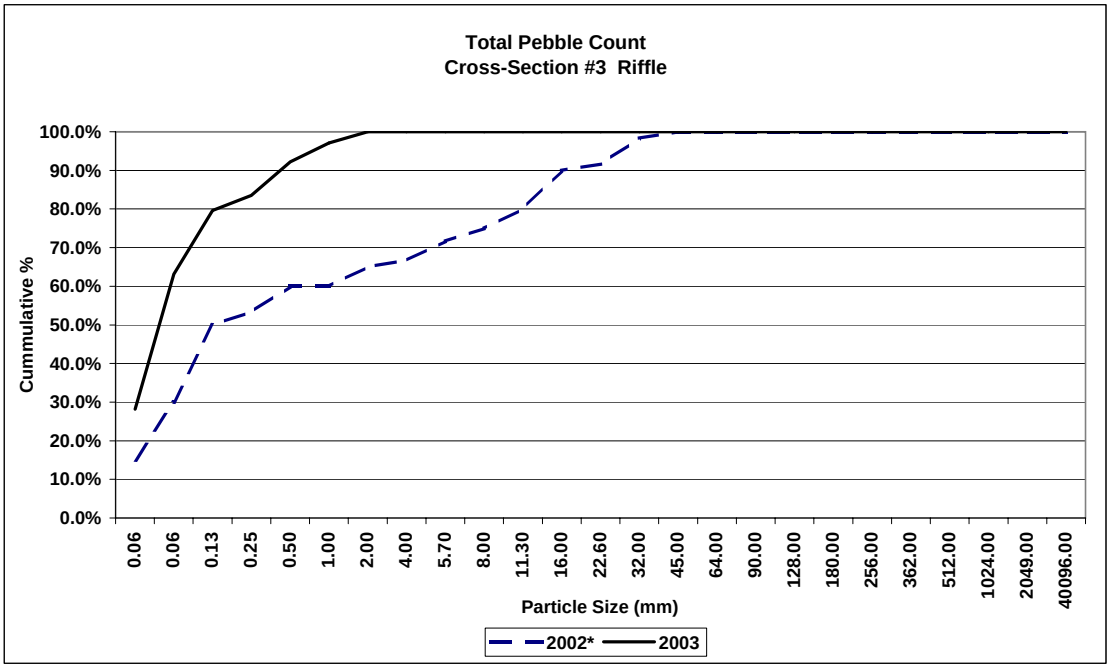


| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #3 |
| **Feature** | Riffle |
| **Date** | 11/4/03 |
| **Crew** | Shaffer, Bidelspach, Clinton |

* 2002 pebble count is a typical riffle sections used as basline information.

| | | | 2002* | | | 2003 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | **Material** | **Size (mm)** | **Riffle** | **%** | **Cum %** | **Riffle - Bed** | **Riffle - Bank** | **%** | **Cum %** |
| **Silt/Clay** | silt/clay | 0.061 | 9 | 15.0% | 15.0% | 26 | 3 | 28.2% | 28.2% |
| **Sand** | very fine sand | 0.062 | 9 | 15.0% | 30.0% | 32 | 4 | 35.0% | 63.1% |
| | fine sand | 0.125 | 12 | 20.0% | 50.0% | 15 | 2 | 16.5% | 79.6% |
| | medium sand | 0.25 | 2 | 3.3% | 53.3% | | 4 | 3.9% | 83.5% |
| | course sand | 0.50 | 4 | 6.7% | 60.0% | | 9 | 8.7% | 92.2% |
| | very course sand | 1.0 | 0 | 0.0% | 60.0% | | 5 | 4.9% | 97.1% |
| **Gravel** | very fine gravel | 2.0 | 3 | 5.0% | 65.0% | | 3 | 2.9% | 100.0% |
| | fine gravel | 4.0 | 1 | 1.7% | 66.7% | | | 0.0% | 100.0% |
| | fine gravel | 5.7 | 3 | 5.0% | 71.7% | | | 0.0% | 100.0% |
| | medium gravel | 8.0 | 2 | 3.3% | 75.0% | | | 0.0% | 100.0% |
| | medium gravel | 11.3 | 3 | 5.0% | 80.0% | | | 0.0% | 100.0% |
| | course gravel | 16.0 | 6 | 10.0% | 90.0% | | | 0.0% | 100.0% |
| | course gravel | 22.6 | 1 | 1.7% | 91.7% | | | 0.0% | 100.0% |
| | very course gravel | 32 | 4 | 6.7% | 98.3% | | | 0.0% | 100.0% |
| | very course gravel | 45 | 1 | 1.7% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Cobble** | small cobble | 64 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium cobble | 90 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large cobble | 128 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large cobble | 180 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Boulder** | small boulder | 256 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | small boulder | 362 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium boulder | 512 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large boulder | 1024 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large boulder | 2049 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Bedrock** | bedrock | 40096 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **TOTAL / %of whole count** | | | 60 | 100.0% | | 73 | 30 | 100.0% | |

| | **d16** | **d35** | **d50** | **d85** | **d95** |
|---|---|---|---|---|---|
| **2002*** | 0.06 | 0.12 | 0.19 | 15.91 | 32.90 |
| **2003** | 0.00 | 0.07 | 0.08 | 0.40 | 1.18 |

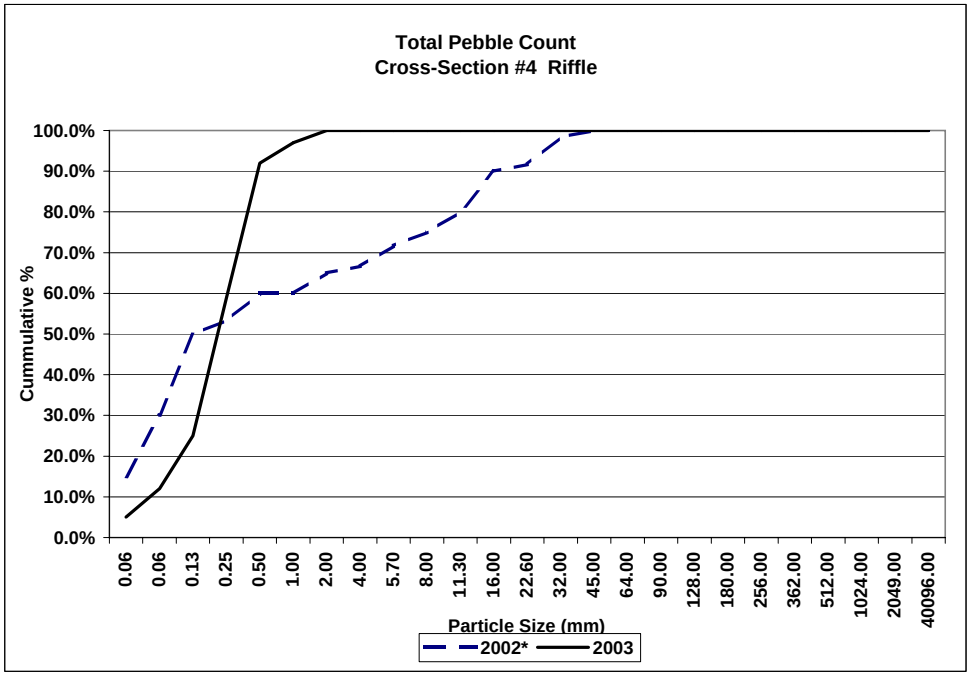


| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #4 |
| **Feature** | Riffle |
| **Date** | 11/4/03 |
| **Crew** | Shaffer, Bidelspach, Clinton |

* 2002 pebble count is a typical riffle sections used as basline information.

| | | | 2002* | | | 2003 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | **Material** | **Size (mm)** | **Riffle** | **%** | **Cum %** | **Riffle - Bed** | **Riffle - Bank** | **%** | **Cum %** |
| **Silt/Clay** | silt/clay | 0.061 | 9 | 15.0% | 15.0% | 30 | 10 | 34.8% | 34.8% |
| **Sand** | very fine sand | 0.062 | 9 | 15.0% | 30.0% | 4 | 2 | 5.2% | 40.0% |
| | fine sand | 0.125 | 12 | 20.0% | 50.0% | 10 | 0 | 8.7% | 48.7% |
| | medium sand | 0.25 | 2 | 3.3% | 53.3% | 2 | 0 | 1.7% | 50.4% |
| | course sand | 0.50 | 4 | 6.7% | 60.0% | 2 | 2 | 3.5% | 53.9% |
| | very course sand | 1.0 | 0 | 0.0% | 60.0% | 0 | 0 | 0.0% | 53.9% |
| **G r a v e l** | very fine gravel | 2.0 | 3 | 5.0% | 65.0% | 0 | 0 | 0.0% | 53.9% |
| | fine gravel | 4.0 | 1 | 1.7% | 66.7% | 0 | 0 | 0.0% | 53.9% |
| | fine gravel | 5.7 | 3 | 5.0% | 71.7% | 10 | 0 | 8.7% | 62.6% |
| | medium gravel | 8.0 | 2 | 3.3% | 75.0% | 10 | 10 | 17.4% | 80.0% |
| | medium gravel | 11.3 | 3 | 5.0% | 80.0% | 1 | 0 | 0.9% | 80.9% |
| | course gravel | 16.0 | 6 | 10.0% | 90.0% | 3 | 0 | 2.6% | 83.5% |
| | course gravel | 22.6 | 1 | 1.7% | 91.7% | 0 | 0 | 0.0% | 83.5% |
| | very course gravel | 32 | 4 | 6.7% | 98.3% | 0 | 0 | 0.0% | 83.5% |
| | very course gravel | 45 | 1 | 1.7% | 100.0% | 0 | 0 | 0.0% | 83.5% |
| **Cobble** | small cobble | 64 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 83.5% |
| | medium cobble | 90 | 0 | 0.0% | 100.0% | 4 | 4 | 7.0% | 90.4% |
| | large cobble | 128 | 0 | 0.0% | 100.0% | 1 | 6 | 6.1% | 96.5% |
| | very large cobble | 180 | 0 | 0.0% | 100.0% | 0 | 4 | 3.5% | 100.0% |
| **Boulder** | small boulder | 256 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | small boulder | 362 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium boulder | 512 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large boulder | 1024 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large boulder | 2049 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Bedrock** | bedrock | 40096 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **TOTAL / %of whole count** | | | 60 | 100.0% | | 77 | 38 | 100.0% | |

| | **d16** | **d35** | **d50** | **d85** | **d95** |
|---|---|---|---|---|---|
| **2002*** | 0.06 | 0.12 | 0.19 | 15.91 | 32.90 |
| **2003** | 0.00 | 0.06 | 0.33 | 79.40 | 142.75 |

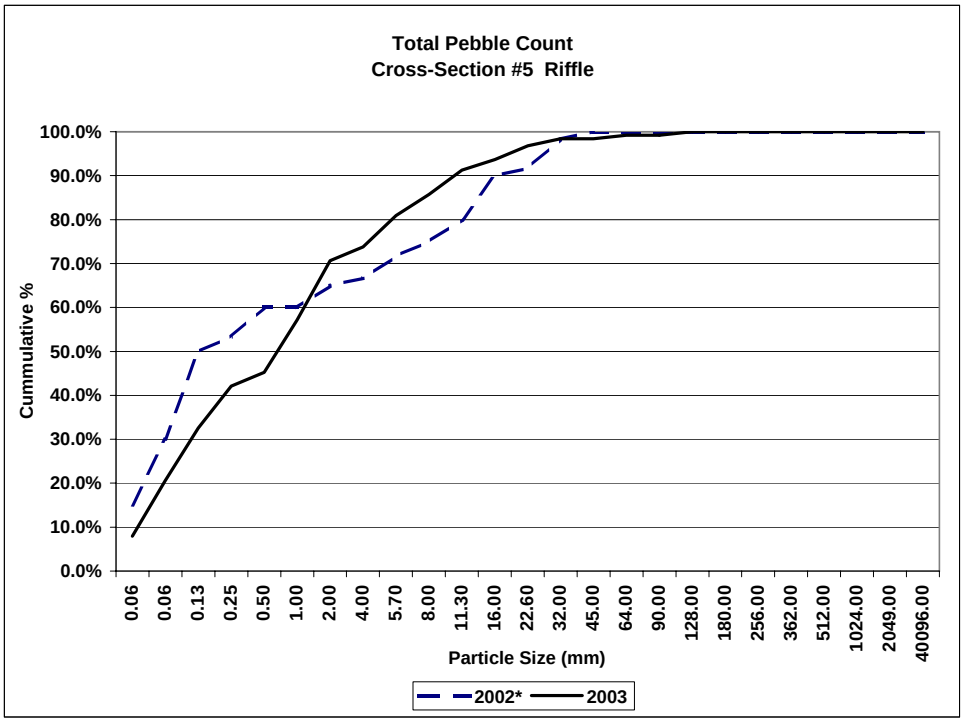


| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #5 |
| **Feature** | Riffle |
| **Date** | 11/4/03 |
| **Crew** | Shaffer, Bidelspach, Clinton |

* 2002 pebble count is a typical riffle sections used as basline information.

| | | | 2002* | | | 2003 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | **Material** | **Size (mm)** | **Riffle** | **%** | **Cum %** | **Riffle - Bed** | **Riffle - Bank** | **%** | **Cum %** |
| **Silt/Clay** | silt/clay | 0.061 | 9 | 15.0% | 15.0% | 6 | 4 | 7.9% | 7.9% |
| **Sand** | very fine sand | 0.062 | 9 | 15.0% | 30.0% | 14 | 2 | 12.7% | 20.6% |
| | fine sand | 0.125 | 12 | 20.0% | 50.0% | 9 | 6 | 11.9% | 32.5% |
| | medium sand | 0.25 | 2 | 3.3% | 53.3% | 0 | 12 | 9.5% | 42.1% |
| | course sand | 0.50 | 4 | 6.7% | 60.0% | 0 | 4 | 3.2% | 45.2% |
| | very course sand | 1.0 | 0 | 0.0% | 60.0% | 0 | 15 | 11.9% | 57.1% |
| **Gravel** | very fine gravel | 2.0 | 3 | 5.0% | 65.0% | 0 | 17 | 13.5% | 70.6% |
| | fine gravel | 4.0 | 1 | 1.7% | 66.7% | 0 | 4 | 3.2% | 73.8% |
| | fine gravel | 5.7 | 3 | 5.0% | 71.7% | 0 | 9 | 7.1% | 81.0% |
| | medium gravel | 8.0 | 2 | 3.3% | 75.0% | 0 | 6 | 4.8% | 85.7% |
| | medium gravel | 11.3 | 3 | 5.0% | 80.0% | 0 | 7 | 5.6% | 91.3% |
| | course gravel | 16.0 | 6 | 10.0% | 90.0% | 0 | 3 | 2.4% | 93.7% |
| | course gravel | 22.6 | 1 | 1.7% | 91.7% | 0 | 4 | 3.2% | 96.8% |
| | very course gravel | 32 | 4 | 6.7% | 98.3% | 0 | 2 | 1.6% | 98.4% |
| | very course gravel | 45 | 1 | 1.7% | 100.0% | 0 | 0 | 0.0% | 98.4% |
| **Cobble** | small cobble | 64 | 0 | 0.0% | 100.0% | 0 | 1 | 0.8% | 99.2% |
| | medium cobble | 90 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 99.2% |
| | large cobble | 128 | 0 | 0.0% | 100.0% | 0 | 1 | 0.8% | 100.0% |
| | very large cobble | 180 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Boulder** | small boulder | 256 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | small boulder | 362 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium boulder | 512 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large boulder | 1024 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large boulder | 2049 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Bedrock** | bedrock | 40096 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **TOTAL / %of whole count** | | | 60 | 100.0% | | 29 | 97 | 100.0% | |

| | **d16** | **d35** | **d50** | **d85** | **d95** |
|---|---|---|---|---|---|
| **2002*** | 0.06 | 0.12 | 0.19 | 15.91 | 32.90 |
| **2003** | 0.08 | 0.24 | 1.05 | 8.64 | 22.70 |

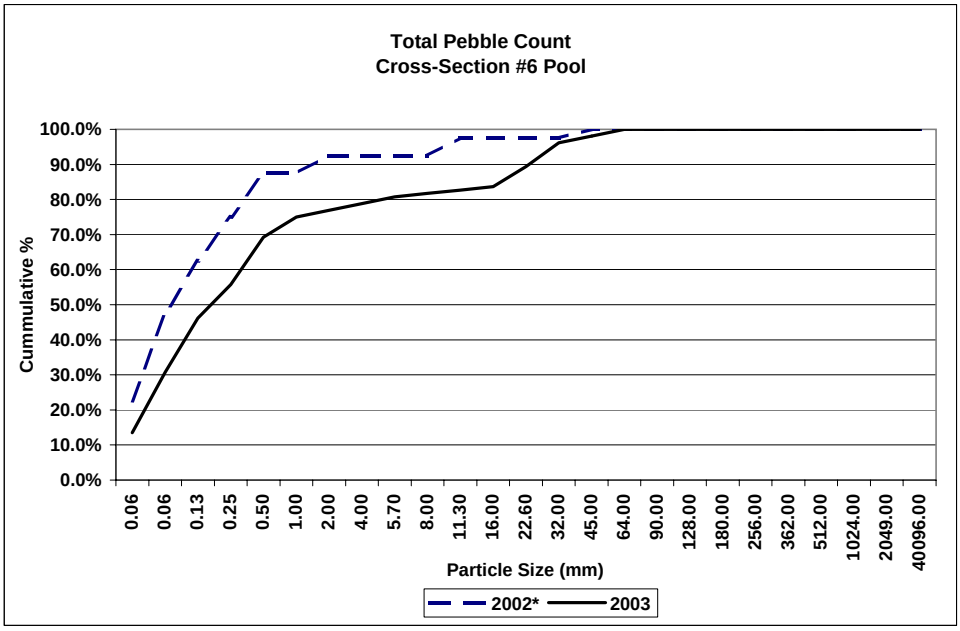


| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #6 |
| **Feature** | Pool |
| **Date** | 11/4/03 |
| **Crew** | Shaffer, Bidelspach, Clinton |

* 2002 pebble count is a typical riffle sections used as basline information.

| | | | 2002* | | | 2003 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | **Material** | **Size (mm)** | **Pool** | **%** | **Cum %** | **Riffle - Bed** | **Riffle - Bank** | **%** | **Cum %** |
| **Silt/Clay** | silt/clay | 0.061 | 9 | 22.5% | 22.5% | 6 | 8 | 13.5% | 13.5% |
| **Sand** | very fine sand | 0.062 | 10 | 25.0% | 47.5% | 5 | 13 | 17.3% | 30.8% |
| | fine sand | 0.125 | 6 | 15.0% | 62.5% | 5 | 11 | 15.4% | 46.2% |
| | medium sand | 0.25 | 5 | 12.5% | 75.0% | 1 | 9 | 9.6% | 55.8% |
| | course sand | 0.50 | 5 | 12.5% | 87.5% | 3 | 11 | 13.5% | 69.2% |
| | very course sand | 1.0 | 0 | 0.0% | 87.5% | 0 | 6 | 5.8% | 75.0% |
| **Gravel** | very fine gravel | 2.0 | 2 | 5.0% | 92.5% | 0 | 2 | 1.9% | 76.9% |
| | fine gravel | 4.0 | 0 | 0.0% | 92.5% | 0 | 2 | 1.9% | 78.8% |
| | fine gravel | 5.7 | 0 | 0.0% | 92.5% | 0 | 2 | 1.9% | 80.8% |
| | medium gravel | 8.0 | 0 | 0.0% | 92.5% | 0 | 1 | 1.0% | 81.7% |
| | medium gravel | 11.3 | 2 | 5.0% | 97.5% | 0 | 1 | 1.0% | 82.7% |
| | course gravel | 16.0 | 0 | 0.0% | 97.5% | 0 | 1 | 1.0% | 83.7% |
| | course gravel | 22.6 | 0 | 0.0% | 97.5% | 0 | 6 | 5.8% | 89.4% |
| | very course gravel | 32 | 0 | 0.0% | 97.5% | 0 | 7 | 6.7% | 96.2% |
| | very course gravel | 45 | 1 | 2.5% | 100.0% | 0 | 2 | 1.9% | 98.1% |
| **Cobble** | small cobble | 64 | 0 | 0.0% | 100.0% | 0 | 2 | 1.9% | 100.0% |
| | medium cobble | 90 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large cobble | 128 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large cobble | 180 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Boulder** | small boulder | 256 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | small boulder | 362 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium boulder | 512 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large boulder | 1024 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large boulder | 2049 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Bedrock** | bedrock | 40096 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **TOTAL / %of whole count** | | | 40 | 100.0% | | 20 | 84 | 100.0% | |

| | **d16** | **d35** | **d50** | **d85** | **d95** |
|---|---|---|---|---|---|
| **2002*** | 0.00 | 0.08 | 0.11 | 0.65 | 11.65 |
| **2003** | 0.07 | 0.12 | 0.26 | 19.78 | 36.58 |

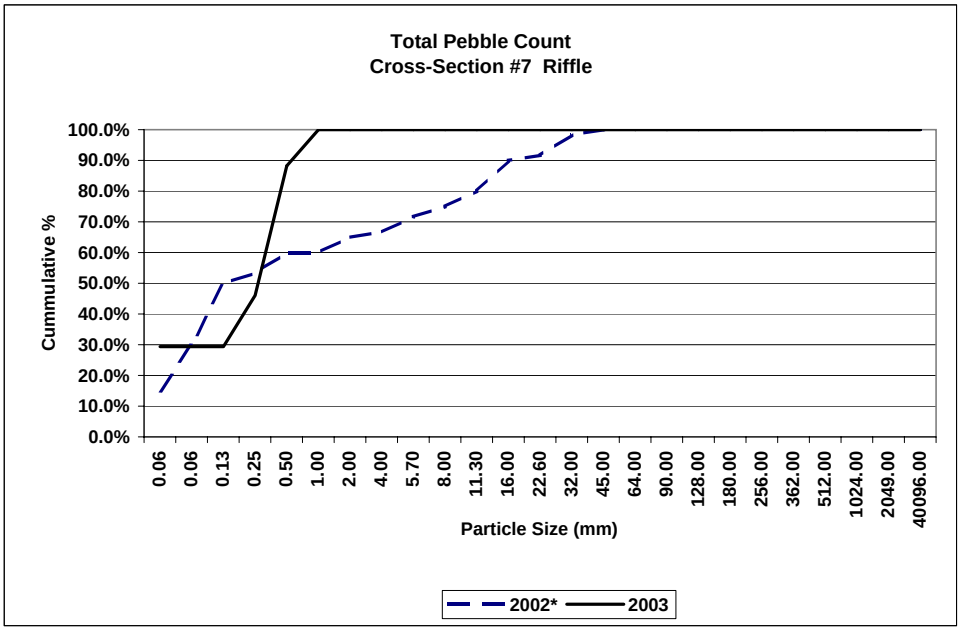


| | |
|---|---|
| **Project Name** | Lyle Creek |
| **Cross Section** | #7 |
| **Feature** | Riffle |
| **Date** | 11/4/03 |
| **Crew** | Shaffer, Bidelspach, Clinton |

* 2002 pebble count is a typical riffle sections used as basline information.

| | | | 2002* | | | 2003 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | **Material** | **Size (mm)** | **Riffle** | **%** | **Cum %** | **Riffle - Bed** | **Riffle - Bank** | **%** | **Cum %** |
| **Silt/Clay** | silt/clay | 0.061 | 9 | 15.0% | 15.0% | 10 | 20 | 29.4% | 29.4% |
| **Sand** | very fine sand | 0.062 | 9 | 15.0% | 30.0% | 0 | 0 | 0.0% | 29.4% |
| | fine sand | 0.125 | 12 | 20.0% | 50.0% | 0 | 0 | 0.0% | 29.4% |
| | medium sand | 0.25 | 2 | 3.3% | 53.3% | 3 | 14 | 16.7% | 46.1% |
| | course sand | 0.50 | 4 | 6.7% | 60.0% | 13 | 30 | 42.2% | 88.2% |
| | very course sand | 1.0 | 0 | 0.0% | 60.0% | 4 | 8 | 11.8% | 100.0% |
| **Gravel** | very fine gravel | 2.0 | 3 | 5.0% | 65.0% | 0 | 0 | 0.0% | 100.0% |
| | fine gravel | 4.0 | 1 | 1.7% | 66.7% | 0 | 0 | 0.0% | 100.0% |
| | fine gravel | 5.7 | 3 | 5.0% | 71.7% | 0 | 0 | 0.0% | 100.0% |
| | medium gravel | 8.0 | 2 | 3.3% | 75.0% | 0 | 0 | 0.0% | 100.0% |
| | medium gravel | 11.3 | 3 | 5.0% | 80.0% | 0 | 0 | 0.0% | 100.0% |
| | course gravel | 16.0 | 6 | 10.0% | 90.0% | 0 | 0 | 0.0% | 100.0% |
| | course gravel | 22.6 | 1 | 1.7% | 91.7% | 0 | 0 | 0.0% | 100.0% |
| | very course gravel | 32 | 4 | 6.7% | 98.3% | 0 | 0 | 0.0% | 100.0% |
| | very course gravel | 45 | 1 | 1.7% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Cobble** | small cobble | 64 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium cobble | 90 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large cobble | 128 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large cobble | 180 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Boulder** | small boulder | 256 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | small boulder | 362 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | medium boulder | 512 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | large boulder | 1024 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| | very large boulder | 2049 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **Bedrock** | bedrock | 40096 | 0 | 0.0% | 100.0% | 0 | 0 | 0.0% | 100.0% |
| **TOTAL / %of whole count** | | | 60 | 100.0% | | 30 | 72 | 100.0% | |

| | **d16** | **d35** | **d50** | **d85** | **d95** |
|---|---|---|---|---|---|
| **2002*** | 0.06 | 0.12 | 0.19 | 15.91 | 32.90 |
| **2003** | 0.00 | 0.25 | 0.41 | 0.71 | 1.18 |



| Point | Station | Elevation | Description |
|---|---|---|---|
| 130 | 16.46 | 811.81 | Thalweg |
| 127 | 26.21 | 811.63 | Thalweg |
| 124 | 31.26 | 811.89 | Thalweg |
| 121 | 42.21 | 811.49 | Thalweg |
| 118 | 45.16 | 811.88 | Thalweg |
| 116 | 56.14 | 812.2 | Head of Riffle |
| 113 | 64.04 | 811.46 | Head of Pool |
| 110 | 71.47 | 811.65 | Thalweg |
| 107 | 79.96 | 811.79 | Thalweg |
| 6 | 89.61 | 810.97 | Thalweg |
| 9 | 96.31 | 811.68 | Thalweg |
| 13 | 106.96 | 811.7 | Thalweg |
| 16 | 112.28 | 810.93 | Thalweg |
| 19 | 123.57 | 811.79 | Thalweg |
| 22 | 127.33 | 811.87 | Thalweg |
| 25 | 128.92 | 811.31 | Head of Pool |
| 28 | 134.47 | 810.81 | Thalweg |
| 31 | 144.99 | 811.62 | Thalweg |
| 34 | 161.72 | 811.72 | Head of Riffle |
| 37 | 197.75 | 811.22 | Thalweg |
| 40 | 213.28 | 811.41 | Thalweg |
| 43 | 221.05 | 811.46 | Rock Vane |
| 45 | 223.41 | 811.3 | Thalweg |
| 49 | 232.5 | 811.29 | Thalweg |
| 52 | 249.55 | 810.87 | Thalweg |
| 55 | 264.46 | 811.15 | Thalweg |
| 61 | 292.56 | 811.03 | Thalweg |
| 64 | 294.05 | 811.18 | Thalweg |
| 69 | 301.28 | 811.4 | Thalweg |
| 72 | 310.31 | 811.19 | Thalweg |
| 75 | 315.54 | 810.83 | Thalweg |
| 78 | 319.9 | 811.3 | Rock Vane |
| 81 | 320.43 | 809.64 | Thalweg |
| 133 | 324.76 | 808.2 | Max Pool |
| 136 | 331.82 | 809.94 | Thalweg |
| 139 | 339.68 | 810.5 | Head of Riffle |
| 142 | 342.79 | 810.2 | Thalweg |
| 145 | 347.42 | 809.27 | Max Pool |
| 147 | 352.64 | 809.89 | Thalweg |
| 150 | 373.93 | 810.3 | Thalweg |
| 153 | 381.66 | 810.35 | Thalweg |
| 156 | 389.17 | 810.35 | Rock Vane |
| 159 | 390.14 | 809.52 | Thalweg |
| 163 | 396.51 | 808.82 | Max Pool |
| 167 | 403.57 | 809.16 | Thalweg |
| 171 | 406.57 | 810.15 | Thalweg |
| 169 | 414.68 | 810.09 | Thalweg |
| 165 | 424.07 | 809.74 | Thalweg |
| 161 | 431.11 | 809.69 | Thalweg |
| 174 | 437.19 | 810.05 | Thalweg |
| 177 | 461.49 | 810.04 | Thalweg |
| 180 | 486.77 | 809.89 | Thalweg |
| 183 | 492.13 | 809.26 | Thalweg |
| 186 | 497.6 | 809.07 | Thalweg |
| 190 | 509.01 | 810.05 | Rock Vane |
| 191 | 510.46 | 809.67 | Rock Vane |
| 194 | 511.87 | 807.04 | Max Pool |
| 197 | 521.18 | 808.1 | Thalweg |
| 200 | 526.38 | 809.1 | Thalweg |
| 202 | 531.64 | 808.92 | Thalweg |
| 205 | 537.47 | 809.16 | Head of Riffle |
| 208 | 542.97 | 808.77 | Thalweg |
| 211 | 550.6 | 808.03 | Thalweg |
| 214 | 556.44 | 807.59 | Thalweg |
| 217 | 562.06 | 808.62 | Thalweg |
| 219 | 562.82 | 808.79 | Rock Vane |
| 222 | 563.56 | 806.53 | Max Pool |
| 227 | 570.44 | 807.69 | Thalweg |
| 230 | 580.41 | 807.86 | Thalweg |
| 232 | 589.35 | 807.55 | Thalweg |
| 234 | 604.26 | 807.36 | Thalweg |
| 236 | 612.27 | 807.08 | Thalweg |
| 238 | 623.66 | 807.88 | Thalweg |
| 240 | 640.76 | 807.72 | Thalweg |
| 242 | 649.4 | 807.93 | Rock Vane |
| 244 | 651.52 | 806.82 | Thalweg |
| 246 | 656.96 | 806.13 | Max Pool |
| 250 | 668.28 | 807.11 | Thalweg |
| 252 | 679.83 | 807.6 | Thalweg |
| 254 | 682.47 | 807.7 | Head of Riffle |
| 256 | 693.89 | 807.32 | Thalweg |
| 258 | 707.9 | 807.34 | Thalweg |
| 260 | 717.87 | 806.94 | Thalweg |
| 262 | 722.47 | 806.42 | Head of Pool |
| 264 | 729.63 | 806.7 | Thalweg |
| 266 | 735.41 | 807.02 | Thalweg |
| 268 | 737.15 | 806.72 | Thalweg |
| 270 | 740.49 | 805.85 | Max Pool |
| 273 | 748.96 | 806.66 | Thalweg |
| 276 | 765 | 807.04 | Head of Riffle |
| 278 | 777.3 | 806.82 | Thalweg |
| 280 | 783.24 | 806.54 | Thalweg |
| 282 | 787.4 | 806.09 | Thalweg |
| 284 | 793.25 | 806.73 | Thalweg |
| 286 | 800.05 | 806.92 | Thalweg |
| 288 | 817.11 | 806.43 | Thalweg |
| 290 | 832.45 | 806.12 | Thalweg |
| 467 | 834.79 | 806.2 | Thalweg |
| 463 | 852.59 | 806.19 | Thalweg |
| 459 | 867.26 | 805.43 | Thalweg |
| 455 | 871.34 | 806.42 | Head of Riffle |
| 451 | 876.07 | 806.47 | Rock Vane |
| 445 | 880.62 | 805.31 | Head of Pool |
| 440 | 894.37 | 804.51 | Max Pool |
| 436 | 900.75 | 805.17 | Thalweg |
| 431 | 905.63 | 805.74 | Head of Riffle |
| 426 | 933.1 | 804.54 | Head of Pool |
| 420 | 951.81 | 804.73 | Thalweg |
| 416 | 960.55 | 804.68 | Head of Riffle |
| 409 | 982.57 | 803.8 | Max Pool |

| Point | Station | Elevation | Description |
|---|---|---|---|
| 131 | 16.02 | 812.3 | Water |
| 125 | 31.78 | 812.26 | Water |
| 119 | 44.69 | 812.24 | Water |
| 117 | 55.86 | 812.21 | Water |
| 17 | 111.71 | 812 | Water |
| 20 | 122.99 | 812.04 | Water |
| 29 | 135.31 | 812.03 | Water |
| 32 | 146.2 | 811.97 | Water |
| 35 | 161.32 | 811.73 | Water |
| 38 | 197.17 | 811.64 | Water |
| 41 | 212.53 | 811.6 | Water |
| 44 | 221.43 | 811.6 | Water |
| 70 | 301.18 | 811.41 | Water |
| 79 | 319.68 | 811.43 | Water |
| 82 | 320.55 | 810.7 | Water |
| 137 | 331.58 | 810.63 | Water |
| 140 | 338.97 | 810.42 | Water |
| 151 | 373.54 | 810.64 | Water |
| 154 | 381.48 | 810.53 | Water |
| 168 | 403.37 | 810.34 | Water |
| 187 | 498.71 | 810.17 | Water |
| 192 | 510.63 | 809.67 | Water |
| 203 | 532.24 | 809.34 | Water |
| 209 | 543.32 | 809.11 | Water |
| 215 | 556.48 | 809.14 | Water |
| 218 | 562.27 | 809.12 | Water |
| 220 | 562.92 | 808.79 | Water |
| 228 | 570.36 | 808.21 | Water |
| 233 | 589.24 | 808.22 | Water |
| 235 | 605.27 | 808.19 | Water |
| 239 | 623.97 | 808.18 | Water |
| 241 | 641.9 | 808.18 | Water |
| 243 | 649.72 | 807.94 | Water |
| 261 | 718.1 | 807.46 | Water |
| 267 | 735.52 | 807.37 | Water |
| 274 | 748.23 | 807.23 | Water |
| 279 | 777.3 | 807.14 | Water |
| 291 | 833 | 806.78 | Water |
| 464 | 852.57 | 806.59 | Water |
| 456 | 871.33 | 806.64 | Water |
| 452 | 875.92 | 806.51 | Water |
| 446 | 880.31 | 805.95 | Water |
| 437 | 900.34 | 805.95 | Water |
| 432 | 905.33 | 805.92 | Water |
| 435 | 931.76 | 805.39 | Water |
| 417 | 960.5 | 805.11 | Water |
| 403 | 1007.79 | 804.53 | Water |
| 396 | 1032.33 | 804.44 | Water |
| 394 | 1041.74 | 804.32 | Water |
| 392 | 1055.93 | 804.05 | Water |
| 390 | 1065.36 | 803.83 | Water |
| 388 | 1076.35 | 803.8 | Water |
| 384 | 1084.24 | 803.64 | Water |
| 386 | 1096.4 | 803.31 | Water |
| 382 | 1103.12 | 803.3 | Water |
| 380 | 1108.09 | 803.26 | Water |
| 1383 | 1144.14 | 802.63 | Water |
| 1364 | 1160.86 | 802.1 | Water |
| 1362 | 1166.82 | 802.06 | Water |
| 1358 | 1179.58 | 801.91 | Water |
| 1353 | 1190.94 | 801.9 | Water |
| 1350 | 1200.81 | 801.95 | Water |
| 1346 | 1203.4 | 801.96 | Water |
| 1337 | 1223.59 | 801.95 | Water |
| 1339 | 1233.44 | 801.96 | Water |
| 1294 | 1251.24 | 801.92 | Water |
| 1289 | 1261.08 | 801.91 | Water |
| 1286 | 1268.37 | 801.78 | Water |
| 1283 | 1269.77 | 801.73 | Water |
| 1263 | 1297.01 | 801.73 | Water |
| 1258 | 1304.08 | 801.77 | Water |
| 1255 | 1323.84 | 801.47 | Water |
| 1244 | 1341.65 | 801.44 | Water |
| 1217 | 1366.39 | 801.2 | Water |
| 1215 | 1373.34 | 801.15 | Water |
| 1212 | 1381.38 | 801.15 | Water |
| 1206 | 1401.24 | 801.12 | Water |
| 1204 | 1409.16 | 800.87 | Water |
| 1196 | 1417.7 | 800.88 | Water |
| 1192 | 1424.58 | 800.86 | Water |
| 1187 | 1443.66 | 800.8 | Water |
| 1165 | 1477.36 | 800.78 | Water |
| 1162 | 1500.8 | 799.93 | Water |
| 1156 | 1508.52 | 799.94 | Water |
| 1149 | 1530.98 | 799.96 | Water |
| 1145 | 1539.06 | 799.39 | Water |
| 1142 | 1551.33 | 799.38 | Water |
| 1136 | 1571 | 799.2 | Water |
| 1131 | 1581.15 | 799.14 | Water |
| 1138 | 1593.91 | 799.1 | Water |
| 1133 | 1605.53 | 798.97 | Water |
| 1119 | 1627.1 | 798.98 | Water |
| 1116 | 1640 | 798.92 | Water |
| 1114 | 1659.18 | 798.29 | Water |
| 1110 | 1663.95 | 798.2 | Water |
| 1105 | 1668.13 | 798.19 | Water |
| 1092 | 1700.45 | 797.95 | Water |
| 1082 | 1746.56 | 797.88 | Water |
| 1077 | 1746.98 | 797.6 | Water |
| 1074 | 1753.2 | 797.59 | Water |
| 1062 | 1768.47 | 797.6 | Water |
| 1058 | 1778.32 | 797.57 | Water |
| 1054 | 1797.44 | 797.56 | Water |
| 1050 | 1831.02 | 797.49 | Water |
| 1043 | 1837.14 | 795.92 | Water |
| 1039 | 1849.91 | 795.83 | Water |
| 1025 | 1876.53 | 795.85 | Water |
| 1021 | 1883.69 | 795.81 | Water |

| Point | Station | Elevation | Description |
|---|---|---|---|
| 3168 | 104.08 | 816.31 | LBKF |
| 15 | 119.76 | 815.43 | LBKF |
| 3172 | 120.11 | 815.47 | LBKF |
| 21 | 143.71 | 815.54 | LBKF |
| 3173 | 171.65 | 814.15 | LBKF |
| 3175 | 245.43 | 813.23 | LBKF |
| 3176 | 256.3 | 814.12 | LBKF |
| 58 | 266.94 | 813.64 | LBKF |
| 3177 | 273.3 | 813.94 | LBKF |
| 67 | 294.58 | 814.69 | LBKF |
| 3178 | 301.24 | 814.26 | LBKF |
| 71 | 309.25 | 813.85 | LBKF |
| 3179 | 334.91 | 813.12 | LBKF |
| 138 | 345.21 | 812.5 | LBKF |
| 3180 | 361.36 | 812.85 | LBKF |
| 3151 | 364.28 | 813.46 | LBKF |
| 152 | 378.27 | 814.35 | LBKF |
| 3181 | 387.95 | 813.37 | LBKF |
| 3182 | 416.59 | 812.1 | LBKF |
| 155 | 430.95 | 812.16 | LBKF |
| 3183 | 445.86 | 812.05 | LBKF |
| 173 | 448.65 | 811.28 | LBKF |
| 3184 | 470.77 | 812.02 | LBKF |
| 176 | 470.81 | 811.61 | LBKF |
| 179 | 496.08 | 810.82 | LBKF |
| 3185 | 499.58 | 812.15 | LBKF |
| 3186 | 517.58 | 812.17 | LBKF |
| 3187 | 530.95 | 812.06 | LBKF |
| 216 | 534.28 | 811.15 | LBKF |
| 3188 | 545.97 | 811.42 | LBKF |
| 309 | 582.93 | 811.53 | LBKF |
| 3193 | 584.66 | 811.86 | LBKF |
| 307 | 588.49 | 810.8 | LBKF |
| 306 | 595.18 | 812.24 | LBKF |
| 3194 | 611.07 | 812.57 | LBKF |
| 304 | 612.58 | 810.42 | LBKF |
| 305 | 612.83 | 812.53 | LBKF |
| 303 | 626.56 | 811.94 | LBKF |
| 3195 | 641.47 | 811.08 | LBKF |
| 302 | 645.93 | 809.69 | LBKF |
| 301 | 662.74 | 809.28 | LBKF |
| 3196 | 664.39 | 810.7 | LBKF |
| 300 | 681.93 | 809.39 | LBKF |
| 365 | 682.42 | 809.96 | LBKF |
| 299 | 695.65 | 809.22 | LBKF |
| 364 | 701.03 | 809.76 | LBKF |
| 363 | 727.32 | 809.66 | LBKF |
| 362 | 747.47 | 809.58 | LBKF |
| 3429 | 754.48 | 809.55 | LBKF |
| 296 | 760.71 | 808.49 | LBKF |
| 359 | 774.11 | 809.42 | LBKF |
| 295 | 785.07 | 809.68 | LBKF |
| 360 | 788.89 | 809.26 | LBKF |
| 3433 | 793.74 | 809.36 | LBKF |
| 361 | 806.41 | 808.88 | LBKF |
| 3435 | 826.65 | 808.63 | LBKF |
| 293 | 826.67 | 808.69 | LBKF |
| 466 | 836.75 | 808.04 | LBKF |
| 462 | 844.9 | 807.7 | LBKF |
| 3437 | 855.73 | 808.8 | LBKF |
| 453 | 857.72 | 808.7 | LBKF |
| 457 | 859.47 | 807.44 | LBKF |
| 454 | 869.5 | 807.64 | LBKF |
| 3439 | 879.15 | 808.95 | LBKF |
| 443 | 895.68 | 808.94 | LBKF |
| 3443 | 897.33 | 808.11 | LBKF |
| 3441 | 908.5 | 807.81 | LBKF |
| 3445 | 927.39 | 807.7 | LBKF |
| 429 | 940.11 | 807.62 | LBKF |
| 3447 | 941.74 | 807.64 | LBKF |
| 3449 | 957.31 | 807.21 | LBKF |
| 3451 | 978.93 | 806.95 | LBKF |
| 411 | 984.22 | 806.43 | LBKF |
| 3453 | 997.5 | 806.81 | LBKF |
| 3455 | 1015.06 | 807.19 | LBKF |
| 3459 | 1024.34 | 806.9 | LBKF |
| 473 | 1032.01 | 806.35 | LBKF |
| 3461 | 1050.72 | 805.91 | LBKF |
| 3463 | 1070.44 | 806.01 | LBKF |
| 484 | 1082.56 | 805.81 | LBKF |
| 3465 | 1085.85 | 805.7 | LBKF |
| 3467 | 1096.56 | 805.62 | LBKF |
| 3471 | 1105.55 | 805.55 | LBKF |
| 491 | 1112.63 | 805.36 | LBKF |
| 494 | 1124.64 | 805.44 | LBKF |
| 3473 | 1137.36 | 805.1 | LBKF |
| 1384 | 1145.09 | 804.92 | LBKF |
| 1356 | 1155.87 | 804.83 | LBKF |
| 1354 | 1164.96 | 804.67 | LBKF |
| 502 | 1165.99 | 804.83 | LBKF |
| 3475 | 1171.14 | 805.38 | LBKF |
| 1348 | 1174.33 | 804.83 | LBKF |
| 1344 | 1184.47 | 805.07 | LBKF |
| 3476 | 1184.49 | 805.16 | LBKF |
| 1340 | 1195.73 | 804.89 | LBKF |
| 3479 | 1199.2 | 805.27 | LBKF |
| 1335 | 1211.03 | 804.89 | LBKF |
| 1298 | 1254.42 | 803.84 | LBKF |
| 3481 | 1255.76 | 804.15 | LBKF |
| 1295 | 1269.09 | 804.01 | LBKF |
| 3483 | 1280.31 | 804.14 | LBKF |
| 1277 | 1287.12 | 804.07 | LBKF |
| 1268 | 1297.09 | 803.82 | LBKF |
| 3490 | 1318.24 | 803.31 | LBKF |
| 1260 | 1321.65 | 803.38 | LBKF |
| 3492 | 1335.67 | 803.08 | LBKF |
| 3494 | 1347.15 | 803.38 | LBKF |
| 3496 | 1366.63 | 803.38 | LBKF |
| 1239 | 1370.73 | 803.34 | LBKF |
| 3498 | 1375.8 | 803.27 | LBKF |

| Point | Station | Elevation | Description |
|---|---|---|---|
| 3164 | 51.36 | 816.76 | RBKF |
| 115 | 54.29 | 816.46 | RBKF |
| 3163 | 63.85 | 815.36 | RBKF |
| 3162 | 68.15 | 815.64 | RBKF |
| 112 | 73.25 | 815.61 | RBKF |
| 3161 | 75.73 | 815.69 | RBKF |
| 3160 | 89.34 | 814.73 | RBKF |
| 27 | 113.28 | 816.49 | RBKF |
| 3156 | 201.17 | 813.99 | RBKF |
| 3155 | 216.73 | 814.38 | RBKF |
| 39 | 219.74 | 814.16 | RBKF |
| 60 | 274.8 | 812.92 | RBKF |
| 63 | 276.28 | 812.82 | RBKF |
| 3153 | 287.85 | 813.02 | RBKF |
| 66 | 290.53 | 813.06 | RBKF |
| 80 | 316.76 | 812.69 | RBKF |
| 3152 | 340.44 | 813.17 | RBKF |
| 141 | 354.66 | 813.11 | RBKF |
| 144 | 374.17 | 812.3 | RBKF |
| 3150 | 398.54 | 812.61 | RBKF |
| 3149 | 421.75 | 812.81 | RBKF |
| 158 | 422.47 | 812.85 | RBKF |
| 196 | 436.97 | 813.69 | RBKF |
| 3148 | 460.1 | 811.73 | RBKF |
| 193 | 473.02 | 813.11 | RBKF |
| 3147 | 475.36 | 812.06 | RBKF |
| 188 | 490.66 | 812.52 | RBKF |
| 3146 | 490.93 | 812.35 | RBKF |
| 3145 | 509.3 | 812.23 | RBKF |
| 3144 | 540.22 | 810.6 | RBKF |
| 213 | 540.83 | 810.42 | RBKF |
| 210 | 549.16 | 811.78 | RBKF |
| 3143 | 553.27 | 811.19 | RBKF |
| 226 | 553.4 | 810.89 | RBKF |
| 3142 | 571.52 | 811.03 | RBKF |
| 345 | 615.14 | 810.98 | RBKF |
| 3141 | 617.32 | 810.91 | RBKF |
| 346 | 636.24 | 810.67 | RBKF |
| 3140 | 641.09 | 810 | RBKF |
| 349 | 657.46 | 810.53 | RBKF |
| 3139 | 661.81 | 810.68 | RBKF |
| 352 | 705.3 | 810.17 | RBKF |
| 353 | 713.32 | 808.92 | RBKF |
| 354 | 718.76 | 810.01 | RBKF |
| 355 | 726.18 | 808.92 | RBKF |
| 356 | 741.53 | 809.48 | RBKF |
| 357 | 763.77 | 809.02 | RBKF |
| 3430 | 764.47 | 809.38 | RBKF |
| 3432 | 775.64 | 808.85 | RBKF |
| 3434 | 795.16 | 808.63 | RBKF |
| 3436 | 827.03 | 808.17 | RBKF |
| 465 | 847.56 | 809.82 | RBKF |
| 3438 | 853.33 | 809.06 | RBKF |
| 461 | 853.83 | 807.53 | RBKF |
| 458 | 867.87 | 808.42 | RBKF |
| 3440 | 878.68 | 808.41 | RBKF |
| 3442 | 896.64 | 808.81 | RBKF |
| 444 | 902.3 | 807.12 | RBKF |
| 442 | 903.02 | 808.12 | RBKF |
| 3444 | 907.99 | 808.39 | RBKF |
| 439 | 924.79 | 807.52 | RBKF |
| 3446 | 928.98 | 807.59 | RBKF |
| 3448 | 936.46 | 807.74 | RBKF |
| 3450 | 950.69 | 807.44 | RBKF |
| 430 | 965.81 | 807.4 | RBKF |
| 3452 | 970.46 | 807.23 | RBKF |
| 3454 | 976.6 | 806.83 | RBKF |
| 418 | 987.21 | 806.44 | RBKF |
| 3456 | 988.17 | 806.65 | RBKF |
| 3457 | 1003.13 | 806.58 | RBKF |
| 470 | 1005.07 | 806.56 | RBKF |
| 3458 | 1012.73 | 806.54 | RBKF |
| 3460 | 1027.71 | 806.53 | RBKF |
| 478 | 1037.47 | 806.5 | RBKF |
| 3462 | 1050.31 | 806.1 | RBKF |
| 482 | 1076.42 | 805.85 | RBKF |
| 3466 | 1081.11 | 805.6 | RBKF |
| 3468 | 1105.25 | 805.35 | RBKF |
| 487 | 1110.4 | 805.41 | RBKF |
| 3470 | 1126.06 | 805.08 | RBKF |
| 3472 | 1134.21 | 804.98 | RBKF |
| 3474 | 1144.28 | 805.02 | RBKF |
| 3477 | 1184.03 | 804.93 | RBKF |
| 3478 | 1200.35 | 805.06 | RBKF |
| 1343 | 1217.98 | 804.54 | RBKF |
| 3480 | 1254.57 | 804.38 | RBKF |
| 3482 | 1268.37 | 804.51 | RBKF |
| 3484 | 1283.33 | 803.93 | RBKF |
| 3486 | 1300.54 | 803.89 | RBKF |
| 3488 | 1300.84 | 803.95 | RBKF |
| 1261 | 1312.84 | 804.22 | RBKF |
| 3489 | 1317.94 | 804.27 | RBKF |
| 3491 | 1326.65 | 803.93 | RBKF |
| 3493 | 1337.91 | 803.69 | RBKF |
| 1238 | 1370.85 | 803.01 | RBKF |
| 1213 | 1372.99 | 803.21 | RBKF |
| 3495 | 1375.67 | 802.94 | RBKF |
| 3497 | 1385.76 | 802.82 | RBKF |
| 3499 | 1402.35 | 802.73 | RBKF |
| 1193 | 1421.82 | 802.81 | RBKF |
| 1181 | 1476.21 | 801.82 | RBKF |
| 1175 | 1480.65 | 802.57 | RBKF |
| 3566 | 1548.68 | 801.44 | RBKF |
| 3569 | 1559.19 | 801.53 | RBKF |
| 3572 | 1566.55 | 801.5 | RBKF |
| 1134 | 1574.02 | 801.67 | RBKF |
| 3581 | 1582.11 | 802.1 | RBKF |
| 1126 | 1585.16 | 801.67 | RBKF |
| 3582 | 1610.5 | 801.86 | RBKF |
| 1106 | 1627.72 | 801.37 | RBKF |

| | | | |
|---|---|---|---|
| 407 | 985.9 | 804.41 | Head of Riffle |
| 404 | 1004 | 804.4 | Thalweg |
| 402 | 1007.83 | 803.96 | Thalweg |
| 399 | 1016.18 | 803.29 | Max Pool |
| 397 | 1026.32 | 803.97 | Thalweg |
| 395 | 1032.34 | 804.32 | Head of Riffle |
| 393 | 1042.33 | 803.89 | Thalweg |
| 391 | 1055.96 | 803.28 | Head of Pool |
| 389 | 1065.08 | 802.55 | Max Pool |
| 387 | 1076.09 | 803.04 | Thalweg |
| 383 | 1084.04 | 802.97 | Head of Riffle |
| 385 | 1096.72 | 803.09 | Thalweg |
| 381 | 1101.84 | 802.5 | Max Pool |
| 379 | 1107.49 | 802.19 | Head of Riffle |
| 377 | 1126.44 | 802.43 | Thalweg |
| 375 | 1133.57 | 802.09 | Thalweg |
| 373 | 1138.33 | 802.2 | Thalweg |
| 1382 | 1145.04 | 802.18 | Head of Riffle |
| 371 | 1145.55 | 802.37 | Head of Riffle |
| 1363 | 1160.6 | 801.85 | Thalweg |
| 1361 | 1166.52 | 801.88 | Thalweg |
| 1357 | 1179.85 | 801.53 | Thalweg |
| 1352 | 1190.54 | 801.48 | Thalweg |
| 1349 | 1201.15 | 801.36 | Max Pool |
| 1345 | 1203.46 | 801.65 | Head of Riffle |
| 1341 | 1214.88 | 801.54 | Thalweg |
| 1336 | 1223.54 | 801.36 | Thalweg |
| 1338 | 1233.67 | 801.65 | Thalweg |
| 1296 | 1238.5 | 801.92 | HR |
| 1293 | 1251.29 | 801.63 | Thalweg |
| 1288 | 1260.77 | 801.76 | Head of Riffle |
| 1285 | 1268.69 | 801.63 | Rock Vane |
| 1282 | 1269.77 | 801.3 | Thalweg |
| 1279 | 1275.2 | 800.85 | Max Pool |
| 1274 | 1278.39 | 801.45 | Head of Pool |
| 1270 | 1282.85 | 800.09 | Max Pool |
| 1266 | 1291.76 | 801.15 | Thalweg |
| 1262 | 1296.93 | 801.12 | Thalweg |
| 1257 | 1304.28 | 801.6 | Head of Riffle |
| 1254 | 1323.69 | 801.2 | Head of Pool |
| 1250 | 1328.77 | 800.55 | Max Pool |
| 1247 | 1333.9 | 800.93 | Thalweg |
| 1243 | 1341.62 | 801.02 | Thalweg |
| 1240 | 1351.61 | 801.23 | Head of Riffle |
| 1216 | 1366.48 | 800.69 | Head of Pool |
| 1214 | 1372.79 | 800.12 | Thalweg |
| 1211 | 1380.92 | 800.17 | Max Pool |
| 1208 | 1389.67 | 800.81 | Thalweg |
| 1205 | 1401.19 | 801.1 | Head of Riffle |
| 1203 | 1408.95 | 800.51 | Thalweg |
| 1199 | 1415.42 | 800.58 | Head of Pool |
| 1195 | 1417.56 | 800.28 | Max Pool |
| 1191 | 1424.3 | 800.63 | Thalweg |
| 1186 | 1443.1 | 800.52 | Thalweg |
| 1182 | 1452.3 | 800.5 | Thalweg |
| 1179 | 1459 | 800.45 | Head of Pool |
| 1172 | 1466.47 | 799.65 | Max Pool |
| 1168 | 1471.28 | 799.88 | Head of Glide |
| 1164 | 1476.58 | 800.72 | Head of Riffle |
| 1161 | 1500.83 | 799.57 | Head of Pool |
| 1157 | 1504.89 | 798.82 | Max Pool |
| 1155 | 1508.07 | 799.42 | Thalweg |
| 1151 | 1520.22 | 799.4 | Thalweg |
| 1148 | 1530.86 | 799.79 | Head of Riffle |
| 1144 | 1539.8 | 799.14 | Head of Pool |
| 1141 | 1550.85 | 798.72 | Max Pool |
| 1135 | 1571.07 | 798.6 | Thalweg |
| 1130 | 1581.46 | 798.82 | Thalweg |
| 1124 | 1590.22 | 798.99 | Head of Riffle |
| 1137 | 1594.18 | 798.82 | Head of Riffle |
| 1132 | 1605.22 | 798.34 | Thalweg |
| 1127 | 1610.23 | 798.77 | Head of Pool |
| 1118 | 1627.44 | 798.65 | Thalweg |
| 1115 | 1640 | 798.74 | Head of Riffle |
| 1113 | 1658.98 | 798.21 | Head of Pool |
| 1109 | 1663.79 | 798.58 | Rock Vane |
| 1108 | 1664.49 | 797.5 | Max Pool |
| 1104 | 1668.03 | 797.9 | Thalweg |
| 1095 | 1686.25 | 797.47 | Thalweg |
| 1091 | 1700.43 | 797.59 | Thalweg |
| 1078 | 1709.71 | 797.57 | Thalweg |
| 1071 | 1726.98 | 797.76 | Thalweg |
| 1081 | 1746.5 | 797.74 | Rock Vane |
| 1076 | 1747.31 | 796.98 | Thalweg |
| 1073 | 1753.2 | 796.23 | Thalweg |
| 1065 | 1761.28 | 796.52 | Max Pool |
| 1061 | 1768.35 | 797.27 | Thalweg |
| 1057 | 1778.02 | 796.81 | Max Pool |
| 1053 | 1797.25 | 797.09 | Thalweg |
| 1049 | 1812.66 | 797.32 | Head of Riffle |
| 1046 | 1832.61 | 796.78 | Rock Vane |
| 1042 | 1836.99 | 795.33 | Thalweg |
| 1038 | 1849.67 | 795.03 | Head of Pool |
| 1034 | 1854.72 | 794.21 | Thalweg |
| 1031 | 1867.13 | 795.93 | Rock Vane |
| 1027 | 1868.34 | 795.4 | Head of Pool |
| 1024 | 1876.7 | 794.12 | Thalweg |
| 1020 | 1883.59 | 794.17 | Max Pool |
| 1016 | 1888.33 | 794.93 | Head of Glide |
| 1012 | 1897.43 | 795.86 | Head of Riffle |
| 1009 | 1906.81 | 794.98 | Thalweg |
| 1008 | 1911.89 | 795.5 | Rock Vane |

| | | | |
|---|---|---|---|
| 3500 | 1382.45 | 803.21 | LBKF |
| 3526 | 1390.43 | 803.37 | LBKF |
| 1201 | 1398.44 | 802.76 | LBKF |
| 3528 | 1404.96 | 803.11 | LBKF |
| 1198 | 1409.92 | 802.99 | LBKF |
| 3531 | 1418.5 | 802.89 | LBKF |
| 3534 | 1429.72 | 803.14 | LBKF |
| 1188 | 1437.72 | 802.83 | LBKF |
| 3537 | 1443.6 | 803.01 | LBKF |
| 3543 | 1459.56 | 802.48 | LBKF |
| 3552 | 1471.94 | 802.41 | LBKF |
| 3549 | 1488.17 | 802.42 | LBKF |
| 1163 | 1488.77 | 802.24 | LBKF |
| 3555 | 1495.23 | 802.34 | LBKF |
| 3563 | 1498.33 | 802.28 | LBKF |
| 1150 | 1526.85 | 802.19 | LBKF |
| 1146 | 1546.81 | 802.08 | LBKF |
| 3575 | 1561.4 | 801.65 | LBKF |
| 3578 | 1581.06 | 801.78 | LBKF |
| 1117 | 1592.51 | 801.76 | LBKF |
| 1112 | 1605.14 | 801.63 | LBKF |
| 3585 | 1606.05 | 801.86 | LBKF |
| 3588 | 1619.09 | 802.29 | LBKF |
| 1103 | 1624.8 | 801.87 | LBKF |
| 3591 | 1642.86 | 801.05 | LBKF |
| 3600 | 1643.09 | 801.02 | LBKF |
| 1097 | 1649.57 | 800.82 | LBKF |
| 1099 | 1649.8 | 800.73 | LBKF |
| 3603 | 1671.1 | 801.04 | LBKF |
| 3611 | 1680.2 | 801.61 | LBKF |
| 1088 | 1680.62 | 801.33 | LBKF |
| 1084 | 1693.98 | 800.64 | LBKF |
| 3617 | 1695.61 | 800.71 | LBKF |
| 1063 | 1714.59 | 800.13 | LBKF |
| 3618 | 1720.04 | 800.08 | LBKF |
| 1075 | 1720.52 | 799.86 | LBKF |
| 3621 | 1723.12 | 800.81 | LBKF |
| 3619 | 1750.23 | 800.01 | LBKF |
| 3620 | 1757.62 | 800.25 | LBKF |
| 1041 | 1796.48 | 800.01 | LBKF |
| 1032 | 1816.43 | 799.08 | LBKF |

| | | | |
|---|---|---|---|
| 1098 | 1653.15 | 800.58 | RBKF |
| 3597 | 1661.88 | 800.92 | RBKF |
| 1089 | 1665.32 | 800.54 | RBKF |
| 3604 | 1669.84 | 801.08 | RBKF |
| 3607 | 1694.61 | 801.17 | RBKF |
| 1080 | 1705.08 | 800.34 | RBKF |
| 3608 | 1710.73 | 800.35 | RBKF |
| 3622 | 1727.76 | 800.33 | RBKF |
| 3628 | 1754.47 | 800 | RBKF |
| 3629 | 1778.88 | 800.32 | RBKF |
| 1051 | 1778.98 | 800.62 | RBKF |
| 1048 | 1795.41 | 799.3 | RBKF |
| 3630 | 1797.3 | 799.94 | RBKF |
| 3631 | 1812.83 | 798.83 | RBKF |
| 3632 | 1836.35 | 798.82 | RBKF |
| 1033 | 1855.07 | 799.09 | RBKF |
| 3633 | 1856.13 | 799.47 | RBKF |
| 1029 | 1866.65 | 798.57 | RBKF |
| 3634 | 1876.16 | 798.68 | RBKF |
| 1014 | 1904.21 | 797.99 | RBKF |
| 1006 | 1933.17 | 797.72 | RBKF |

| Point | Station | Elevation | Description |
|---|---|---|---|
| 3009 | 2.68 | 811.21 | Max Pool |
| 3011 | 19.93 | 811.91 | Thalweg |
| 3013 | 32.9 | 811.97 | Thalweg |
| 3014 | 54.96 | 812 | Head of Riffle |
| 3016 | 63.51 | 811.56 | Thalweg |
| 3018 | 72.2 | 811.69 | Thalweg |
| 3020 | 83.22 | 811.78 | XV |
| 3024 | 116.23 | 811.26 | Max Pool |
| 3026 | 127.38 | 811.8 | XV |
| 3028 | 135.55 | 810.67 | Thalweg |
| 3029 | 145.01 | 811.7 | Thalweg |
| 3031 | 161.44 | 811.71 | Head of Riffle |
| 3033 | 180.79 | 811.52 | Head of Run |
| 3035 | 201.55 | 811.21 | Head of Pool |
| 3037 | 205.61 | 810.83 | Max Pool |
| 3039 | 210.39 | 811.35 | Thalweg |
| 3041 | 221.4 | 811.49 | XV |
| 3043 | 227.88 | 810.75 | Thalweg |
| 3045 | 232.54 | 811.2 | Thalweg |
| 3047 | 248.35 | 811.14 | Thalweg |
| 3049 | 264.77 | 811.16 | Thalweg |
| 3051 | 296.24 | 811.08 | Thalweg |
| 3053 | 308.96 | 810.46 | Thalweg |
| 3054 | 320.09 | 811.22 | XV |
| 3056 | 322.48 | 808.81 | Thalweg |
| 3058 | 339.08 | 810.52 | Head of Riffle |
| 3060 | 341.15 | 810.32 | Head of Run |
| 3062 | 348.16 | 809.05 | Max Pool |
| 3064 | 353.1 | 810.11 | Thalweg |
| 3066 | 369.97 | 809.81 | Thalweg |
| 3068 | 377.38 | 810.47 | Thalweg |
| 3070 | 389.11 | 810.34 | XV |
| 3072 | 393.39 | 809.07 | Thalweg |
| 3074 | 408.38 | 809.96 | Thalweg |
| 3076 | 419.29 | 810.1 | Thalweg |
| 3078 | 432.24 | 809.9 | Thalweg |
| 3080 | 444.26 | 809.86 | Thalweg |
| 3082 | 455.98 | 809.86 | Thalweg |
| 3084 | 476.81 | 809.98 | Thalweg |
| 3086 | 490.85 | 809.54 | Head of Pool |
| 3088 | 497.05 | 809.04 | Max Pool |
| 3090 | 536.4 | 809.19 | Head of Riffle |
| 3092 | 543.8 | 808.84 | Head of Run |
| 3094 | 547.58 | 808.35 | Head of Pool |
| 3096 | 552.3 | 807.14 | Max Pool |
| 3098 | 563.33 | 809.1 | XV |
| 3100 | 567.23 | 806.9 | Thalweg |
| 3102 | 572.96 | 807.76 | Thalweg |

| Point | Station | Elevation | Description |
|---|---|---|---|
| 3020 | 83.22 | 811.78 | Rock Vane |
| 3026 | 127.38 | 811.8 | Rock Vane |
| 3041 | 221.4 | 811.49 | Rock Vane |
| 3054 | 320.09 | 811.22 | Rock Vane |
| 3070 | 389.11 | 810.34 | Rock Vane |
| 191 | 510.46 | 809.67 | Rock Vane |
| 3098 | 563.33 | 809.1 | Rock Vane |
| 3112 | 647.5 | 808.04 | Rock Vane |
| 3263 | 733.17 | 807.18 | Rock Vane |
| 3274 | 874.91 | 806.34 | Rock Vane |
| 3340 | 1268.64 | 801.61 | Rock Vane |
| 3595 | 1662.93 | 798.51 | Rock Vane |
| 3623 | 1745.38 | 797.84 | Rock Vane |
| 3642 | 1831.48 | 797.15 | Rock Vane |
| 3649 | 1865.74 | 795.95 | Rock Vane |
| 3657 | 1914.73 | 795.83 | Rock Vane |

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|---|---|---|---|
| 3104 | 588.38 | 807.71 | Thalweg |
| 3106 | 599.44 | 807.36 | Head of Pool |
| 3108 | 607.12 | 807.33 | Max Pool |
| 3110 | 622.25 | 807.9 | Thalweg |
| 3112 | 647.5 | 808.04 | XV |
| 3250 | 648.81 | 808.12 | XV |
| 3114 | 651.92 | 806.6 | Thalweg |
| 3252 | 655.33 | 806.44 | Thalweg |
| 3116 | 656.58 | 806.24 | Thalweg |
| 3117 | 673.92 | 807.58 | Head of Riffle |
| 3254 | 674.51 | 807.61 | Head of Riffle |
| 3256 | 694.1 | 807.22 | Head of Run |
| 3258 | 714.59 | 807.22 | Head of Pool |
| 3260 | 722.53 | 806.82 | Max Pool |
| 3263 | 733.17 | 807.18 | XV |
| 3264 | 740.16 | 805.99 | Thalweg |
| 3266 | 762.31 | 807.09 | Head of Riffle |
| 3268 | 772.89 | 807.08 | Head of Run |
| 3270 | 799.03 | 807.04 | Head of Riffle |
| 3272 | 830.46 | 806.53 | Head of Run |
| 3274 | 874.91 | 806.34 | XV |
| 3276 | 885.13 | 805.38 | Thalweg |
| 3278 | 898.21 | 804.92 | Max Pool |
| 3280 | 907.03 | 806.01 | Head of Riffle |
| 3282 | 930.66 | 804.99 | Head of Pool |
| 3284 | 939.35 | 804.4 | Max Pool |
| 3290 | 949.67 | 804.94 | Thalweg |
| 3288 | 961.2 | 804.92 | Head of Riffle |
| 3292 | 970.47 | 804.45 | Head of Pool |
| 3294 | 978.17 | 804.04 | Max Pool |
| 3296 | 985.32 | 804.52 | Head of Riffle |
| 3298 | 1001.76 | 804.26 | Head of Pool |
| 3300 | 1015.27 | 803.77 | Max Pool |
| 3302 | 1031.53 | 804.38 | Head of Riffle |
| 3304 | 1053.24 | 803.58 | Head of Pool |
| 3308 | 1078.74 | 803.62 | Thalweg |
| 3310 | 1085.75 | 803.66 | Head of Riffle |
| 3312 | 1098.35 | 802.87 | Head of Pool |
| 3314 | 1101.14 | 802.6 | Max Pool |
| 3316 | 1106.05 | 803.33 | Head of Riffle |
| 3318 | 1127.9 | 802.56 | Head of Pool |
| 3320 | 1134.27 | 802.22 | Max Pool |
| 3322 | 1141.28 | 802.49 | Head of Riffle |
| 3324 | 1177.98 | 801.77 | Head of Pool |
| 3326 | 1187.34 | 801.5 | Max Pool |
| 3330 | 1221.86 | 801.59 | Thalweg |
| 3331 | 1238.45 | 801.96 | Head of Riffle |
| 3334 | 1259 | 801.87 | Thalweg |
| 3336 | 1264.85 | 801.29 | Head of Pool |
| 3338 | 1267.88 | 801.32 | Max Pool |
| 3340 | 1268.64 | 801.61 | XV |
| 3342 | 1274.55 | 801.12 | Thalweg |

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|---|---|---|---|
| 3348 | 1301.34 | 801.6 | Head of Riffle |
| 3350 | 1322.48 | 801.14 | Head of Pool |
| 3352 | 1329.34 | 800.79 | Max Pool |
| 3354 | 1339.24 | 801.17 | Thalweg |
| 3356 | 1351.04 | 801 | Head of Riffle |
| 3358 | 1367.41 | 800.54 | Head of Pool |
| 3360 | 1374.53 | 800.09 | Max Pool |
| 3525 | 1391.16 | 801.13 | Head of Riffle |
| 3529 | 1406.38 | 800.74 | Head of Pool |
| 3535 | 1427.63 | 800.79 | Head of Run |
| 3542 | 1445.73 | 800.75 | Head of Pool |
| 3538 | 1445.84 | 800.56 | Head of Pool |
| 3544 | 1462.77 | 799.51 | Max Pool |
| 3547 | 1474.25 | 800.73 | Head of Riffle |
| 3550 | 1496.83 | 800.02 | Head of Pool |
| 3553 | 1506.09 | 798.81 | Max Pool |
| 3556 | 1523.21 | 800.05 | Head of Riffle |
| 3558 | 1539.55 | 799.43 | Head of Pool |
| 3561 | 1543.29 | 798.6 | Max Pool |
| 3564 | 1559.51 | 799.29 | Head of Riffle |
| 3567 | 1565.82 | 799.14 | Head of Pool |
| 3570 | 1572.97 | 798.91 | Max Pool |
| 3573 | 1579.83 | 799.16 | Head of Riffle |
| 3576 | 1601.89 | 798.91 | Head of Pool |
| 3579 | 1614.75 | 798.09 | Thalweg |
| 3583 | 1619.92 | 798.54 | Thalweg |
| 3586 | 1639.47 | 799.05 | Head of Riffle |
| 3589 | 1654.16 | 798.32 | Head of Pool |
| 3592 | 1661.52 | 797.55 | Max Pool |
| 3595 | 1662.93 | 798.51 | XV |
| 3601 | 1684.26 | 797.38 | Thalweg |
| 3605 | 1694.1 | 797.9 | Thalweg |
| 3609 | 1726.12 | 798.07 | Thalweg |
| 3612 | 1729.85 | 797.89 | Head of Pool |
| 3615 | 1737.42 | 796.86 | Max Pool |
| 3623 | 1745.38 | 797.84 | XV |
| 3626 | 1752.39 | 796.7 | Thalweg |
| 3635 | 1771.77 | 797.17 | Thalweg |
| 3637 | 1790.07 | 797.57 | Thalweg |
| 3642 | 1831.48 | 797.15 | XV |
| 3645 | 1836.21 | 795.32 | Thalweg |
| 3647 | 1842.81 | 796.15 | Head of Pool |
| 3651 | 1856.98 | 794.06 | Max Pool |
| 3649 | 1865.74 | 795.95 | XV |
| 3653 | 1883.51 | 794.88 | Thalweg |
| 3655 | 1894.72 | 796.15 | Head of Riffle |
| 3657 | 1914.73 | 795.83 | XV |
| 3659 | 1929.24 | 793.68 | Head of Pool |
| 3660 | 1936.25 | 793.05 | Max Pool |

Photo Point 1 Downstream 2003 Station 00+00

Photo Point 1 Downstream 2004 Station 00+00

Photo Point 1 J-Hook 2003 Station 00+00

Photo Point 1 J-Hook 2004 Station 00+00

Photo Point 2 Downstream 2003 Station 01+60

Photo Point 2 Downstream 2004 Station 01+60

Photo Point 2 Upstream 2003 Station 01+60

Photo Point 2 Upstream 2004 Station 01+60

Photo Point 3 Downstream 2003 Station 03+60

Photo Point 3 Downstream 2004 Station 03+60

Photo Point 3 Upstream 2003 Station 03+60

Photo Point 3 Upstream 2004 Station 03+60

Photo Point 4 Downstream 2003 Station 05+00

Photo Point 4 Downstream 2004 Station 05+00

Photo Point 4 Upstream 2003 Station 05+00

Photo Point 4 Upstream 2004 Station 05+00

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Photo Point 5 Upstream 2003 Station 05+70

Photo Point 5 Upstream 2004 Station 05+70

Photo Point 6 Downstream 2003 Station 07+40

Photo Point 6 Downstream 2004 Station 07+40

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Photo Point 7 Downstream 2003 Station 09+10

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Photo Point 8 Downstream 2003 Station 12+40

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Photo Point 10 Downstream 2003 Station 14+90

Photo Point 10 Downstream 2004 Station 14+90

Photo Point 11 Downstream 2003 Station 17+25

Photo Point 11 Downstream 2004 Station 17+25

Photo Point 11 Upstream 2003 Station 17+25

Photo Point 11 Upstream 2004 Station 17+25

Photo Point 12 Downstream 2003 Station 18+20

Photo Point 12 Downstream 2004 Station 18+20

Photo Point 12 Upstream 2003 Station 18+20

Photo Point 12 Upstream 2004 Station 18+20

Lyle Creek Stream Restoration
Catawba County, NC

# Quad 1

Trees

| Species | Height (cm) | Diameter (mm) | Radius (mm) | Σ X-sec. (mm²) | Rel. x-sec (%) | Density | Rel. Density (%) | Rank (Importance) | Average |
|---|---|---|---|---|---|---|---|---|---|
| Liriodendron tulipifera | 15 | 1 | 0.5 | 0.8 | | | | | |
| | 10 | 1 | 0.5 | 0.8 | | | | | |
| | 25 | 5 | 2.5 | 19.6 | | | | | |
| | 12 | 4 | 2 | 12.6 | | | | | |
| | 10 | 3 | 1.5 | 7.1 | | | | | |
| | 8 | 1 | 0.5 | 0.8 | | | | | |
| | 10 | 1 | 0.5 | 0.8 | | | | | |
| | 8 | 2 | 1 | 3.1 | | | | | |
| | 6 | 1 | 0.5 | 0.8 | | | | | |
| | 10 | 1 | 0.5 | 0.8 | | | | | |
| | 14 | 1 | 0.5 | 0.8 | | | | | |
| | 9 | 0.5 | 0.25 | 0.2 | | | | | |
| | 6 | 0.5 | 0.25 | 0.2 | | | | | |
| | 5 | 0.5 | 0.25 | 0.2 | | | | | |
| | 4 | 0.5 | 0.25 | 0.2 | | | | | |
| | 7 | 0.5 | 0.25 | 0.2 | | | | | |
| | 9 | 0.5 | 0.25 | 0.2 | | | | | |
| | 9 | 0.5 | 0.25 | 0.2 | | | | | |
| | 8 | 0.5 | 0.25 | 0.2 | | | | | |
| | 8 | 0.5 | 0.25 | 0.2 | | | | | |
| | 7 | 0.5 | 0.25 | 0.2 | | | | | |
| | 8 | 0.5 | 0.25 | 0.2 | | | | | |
| | 12 | 2 | 1 | 3.1 | | | | | |
| **Total** | | | | **53.2** | **6.8** | **23** | **79.3** | **1** | **43.1** |
| Betula nigra | 20 | 2 | 1 | 3.1 | | | | | |
| | 17 | 2 | 1 | 3.1 | | | | | |
| | 50 | 15 | 7.5 | 176.7 | | | | | |
| | 25 | 15 | 7.5 | 176.7 | | | | | |
| **Total** | | | | **359.7** | **46.3** | **4** | **13.8** | **2** | **30.0** |
| Quercus sp. | 10 | 8 | 4 | 50.3 | | | | | |
| **Total** | | | | **50.3** | **6.5** | **1** | **3.4** | **4** | **5.0** |
| Fraxinus sp. | 90 | 20 | 10 | 314.2 | | | | | |
| **Total** | | | | **314.2** | **40.4** | **1** | **3.4** | **3** | **21.9** |
| **Overall Total** | | | | **777.3** | **100** | **29** | **100** | | |
| Total Trees per acre | | | | | | **1160** | | | |
| Planted trees per acre | | | | | | **0** | | | |
| Natural regen. trees per acre | | | | | | **1160** | | | |

Shrubs

| Species | Cover (%) | Rel. cover (%) | Density | Rel. Density (%) | Rank (Importance) |
|---|---|---|---|---|---|
| Alnus serrulata | 1 | 100 | 1 | 100 | 1 |
| **Total** | **1** | **100** | **1** | **100** | |

Herb Stratum

| Species | Cover (%) | Rel. cover (%) | Rank (Importance) |
|---|---|---|---|
| Eupatorium virginiana | 5 | 10.6 | 2 |
| Lespedeza cuneata | 2 | 4.3 | 3 |
| Juncus effusis | 20 | 42.6 | 1 |
| Ambrosia aretemisifolia | 20 | 42.6 | 1 |
| **Total** | **47** | **100** | |

Lyle Creek Stream Restoration
Catawba County, NC

# Quad 2

Trees

| Species | Height (cm) | Diameter (mm) | Radius (mm) | Σ X-sec. (mm²) | Rel. x-sec (%) | Density | Rel. Density (%) | Rank (Importance) | Average |
|---|---|---|---|---|---|---|---|---|---|
| *Betula nigra* | 40 | 5 | 2.5 | 19.6 | | | | | |
| | 3000 | 432 | 216 | 146574.1 | | | | | |
| | 3000 | 287 | 143.5 | 64692.5 | | | | | |
| | 3000 | 298 | 149 | 69746.5 | | | | | |
| | 54 | 6 | 3 | 28.3 | | | | | |
| **Total** | | | | 281061.0 | 99.3 | 2 | 66.7 | 1 | 83.0 |
| *Juniperus virginiana* | 214 | 50 | 25 | 1963.5 | | | | | |
| **Total** | | | | 1963.5 | 0.7 | 1 | 33.3 | 2 | 17.0 |
| **Overall Total** | | | | 283024.5 | 100 | 3 | 100 | | |
| Total Trees per acre | | | | | | 120 | | | |
| Planted trees per acre | | | | | | 0 | | | |
| Natural regen. trees per acre | | | | | | 120 | | | |

**Shrubs**

| Species | Cover (%) | Rel. cover (%) | Density | Rel. Density (%) | Rank (Importance) |
|---|---|---|---|---|---|
| Salix nigra | 2 | 2 | 100 | 100 | 1 |
| **Total** | **2** | **2** | **100** | **100** | |

Herbs

| Species | Cover (%) | Rel. cover (%) | Rank (Importance) |
|---|---|---|---|
| Carex sp. | 60 | 60 | 1 |
| Juncus effusus | 10 | 10 | 3 |
| Panicum clandestinum | 30 | 20 | 2 |
| **Total** | **100** | **100** | |

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# Quad 3

Trees

| Species | Height (cm) | Diameter (mm) | Radius (mm) | Σ X-sec. (mm²) | Rel. x-sec (%) | Density | Rel. Density (%) | Rank (Importance) | Average |
|---|---|---|---|---|---|---|---|---|---|
| *Fraxinus sp.* | 120 | 25 | 12.5 | 490.9 | | | | | |
| **Total** | | | | **490.9** | **0.02** | **1** | **11.1** | **3** | **5.57** |
| *Platanus occidentalis* | 60 | 18 | 9 | 254.5 | | | | | |
| **Total** | | | | **254.5** | **0.01** | **1** | **11.1** | **3** | **5.56** |
| *Carya sp.* | 15 | 5 | 2.5 | 19.6 | | | | | |
| | 40 | 2 | 1 | 3.1 | | | | | |
| **Total** | | | | **22.8** | **0.00** | **2** | **22.2** | **2** | **11.11** |
| *Liriodendron tulipifera* | 16 | 1 | 0.5 | 0.8 | | | | | |
| | 3000 | 1500 | 750 | 1767145.9 | | | | | |
| | 3000 | 552 | 276 | 239314.0 | | | | | |
| | 3000 | 555 | 277.5 | 241922.3 | | | | | |
| **Total** | | | | **2248382.9** | **99.9** | **3** | **33.3** | **1** | **66.64** |
| *Quercus sp.* | 70 | 26 | 13 | 530.9 | | | | | |
| **Total** | | | | **530.9** | **0.02** | **1** | **11.1** | **3** | **5.57** |
| *Betula nigra* | 30 | 12 | 6 | 113.1 | | | | | |
| **Total** | | | | **113.1** | **0.01** | **1** | **11.1** | **3** | **5.56** |
| **Overall Total** | | | | **2249795.0** | **100.0** | **9** | **100** | | |
| Total Trees per acre | | | | | | 360 | | | |
| Planted trees per acre | | | | | | 80 | | | |
| Natural regen. trees per acre | | | | | | 280 | | | |

**Shrubs**

| Species | Cover (%) | Rel. cover (%) | Density | Rel. Density (%) | Rank (Importance) |
|---|---|---|---|---|---|
| cornus amomum | 10 | 50 | 10 | 62.5 | 1 |
| salix nigra | 10 | 50 | 6 | 37.5 | 2 |
| **Total** | **20** | **100** | **16** | **100** | |

Herbs

| Species | Cover (%) | Rel. cover (%) | nk (Importance) |
|---|---|---|---|
| Pilia pumila | 30 | 25.0 | 2 |
| Carex sp. | 10 | 8.3 | 3 |
| Juncus effusis | 70 | 58.3 | 1 |
| Ambrosia artemisifolia | 10 | 8.3 | 3 |
| **Total** | **120** | **100** | |