# EAST PRONG ROARING RIVER STREAM RESTORATION,

Wilkes County, North Carolina

# *ANNUAL MONITORING REPORT ADDENDUM*

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For:
North Carolina Wetlands Restoration Program

NCWRP

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# Addendum to the Stone Mountain Monitoring Report

## *1 Purpose*

Morphological field investigation and data analysis was conducted on September 18 and November 25, 2002 in order to monitor the post construction morphology on the East Prong Stream restoration site. A three-person team from NCSU performed the field reconnaissance. A geomorphic survey was completed. This monitoring results include assessment of stream bank stability as well as stream morphology. Field reconnaissance involved the re-surveying of permanent cross-sections at riffles and pools, longitudinal profiles, and modified Wolman pebble counts. Vegetation monitoring was performed in July of 2002 by a two-person team. Vegetation plots were sampled for monitoring and evaluation. Photo reference locations were also documented for continued monitoring for the Year 2002. Also included in this report addendum is a summary of the maintenance to date for this project and any potential future concerns.

## *2 Summary*

### 2.1 Morphology

**Cross Sections**
Field data was collected in 2002 on the permanent cross sections throughout Reaches 2 and 4. Overlaying these sections on previous survey data, as shown in Appendices A and B, shows any changes that have taken place in the channel with regards changes in the width/depth ratio, cross-sectional area, and entrenchment ratio. This is useful information over time to determine the stability of the channel. Most of the cross sections surveyed show little to no change from 2000 to 2002. The changes that did occur include deepening of pools (increased habitat), and a slight narrowing of the channel in some areas. These results indicate stability within the channel.

**Longitudinal Profile**
Longitudinal profiles were surveyed in 2002 and plotted together with previous surveys to show any changes in the bed form over the previous year. Inverts of cross vanes and permanent cross sections were used as control points so that the annual surveys would be accurately compared. The results of the profiles revealed some deepening of the pools, little to no change in riffles, and proper functioning of the grade control structures. The average slope of the channel has also maintained its as- built condition.

**Pebble Counts**
The pebble count data collected in 2002 was revealing as to the degree of the coarsening of the channel substrate. There has been at least one bankfull event since construction (to date) and the bed material has coarsened up significantly since construction was completed in 2000. The changes in bed material indicate improved habitat and removal of fine material that was present immediately after construction.

## 2.2 Photo Points

The photo points taken along the channel in Reaches 2 and 4 show the vegetation that has come up and survived (such as transplants). Also, the channel appears stable with no development of unstable depositional features or erosion of the banks.

## 2.3 Vegetation

In March 2002, approximately 1,100 bare root stems and 500 live stakes were planted throughout the site. These included black cherry, sugarberry, green ash, persimmon, sycamore, and black walnut bare roots and silky dogwood and black willow stakes. During the vegetation survey in July 2002, it was noted that the severe drought during the summer caused high mortality for the bare roots and the live stakes. Deer browse continues to be a problem at this site. Both bare root plants and live stakes have survived deer browse, but have been limited in vertical growth as a result. Black walnut and sycamore seem to be the least browsed species. It was also noted that the deer will browse anything that is 5 ½ feet or less in height. Some of the taller bare roots that were planted were browsed at this height. Liquid deer repellant was applied throughout the year but did not seem to deter deer from browsing. Tree guards may be an option, however, they should be at least 5 feet in height and may be cost prohibitive.

Natural regeneration was surveyed with the regular plots this growing season. Seedlings range from 1 to 2 years old are abundant throughout the project area. The majority species is sycamore, tulip poplar, river birch, Virginia pine, black cherry, tag alder, and spice bush. Deer browse does not seem to be a problem with these plants.

Bare root survival was above 75% in all plots, however, stem count was low in plots 3 and 4. Live plants included sycamore, sugarberry, black cherry, river birch, black gum, green ash, black walnut, willow oak, tag alder, spice bush, witch hazel, and silky dogwood. Numbers did not vary significantly from the 2001 growing season. Only taller black walnut and sycamore bare roots planted this season were less affected by deer browse. Other survivors were browsed lower to the ground.

Live stake survival was again extremely low. This may be attributed to droughty conditions during growing season. Deer browse was also a contributing factor. It was noted that foot traffic up and down the staked banks was often heavy in select places and that many stakes were dislodged or removed completely.

Herbaceous cover was determined in bare root plots and was greater than 90% in all plots. Switchgrass, rushes, and sedges were exceptionally robust. No more seeding is required.

## 2.3 Project Maintenance

Since November 2000, when the project was completed, there have been two scheduled maintenance events. The first one was in May of 2001, when a failed log cross vane was removed. Also at this time, some grading/stabilization was performed on an eroding stream bank and bioengineering techniques, such as brush mattresses and fascines, were installed. The second was in November 2002, when a two more log cross vanes

was repaired (logs removed and replaced with boulders). One of these structures was in Reach 2 and the other in Reach 4. The two maintenance sites had fairly good access allowing for minimal disturbance of the existing vegetation. NCSU personnel make frequent site visits to the project when in the area, and are constantly monitoring the visual status of the structures and stream banks.

# APPENDIX A

REACH 2:
STREAM GEOMETRY AND SUBSTRATE DATA
YR 2002 SURVEY

Cross Section R2-XSEC1 RIFFLE

**STONE MTN RESTORATION - REACH 2** **1/16/2003**

**Yadkin River Basin, Wilkes County, North Carolina**

**Dani Wise**

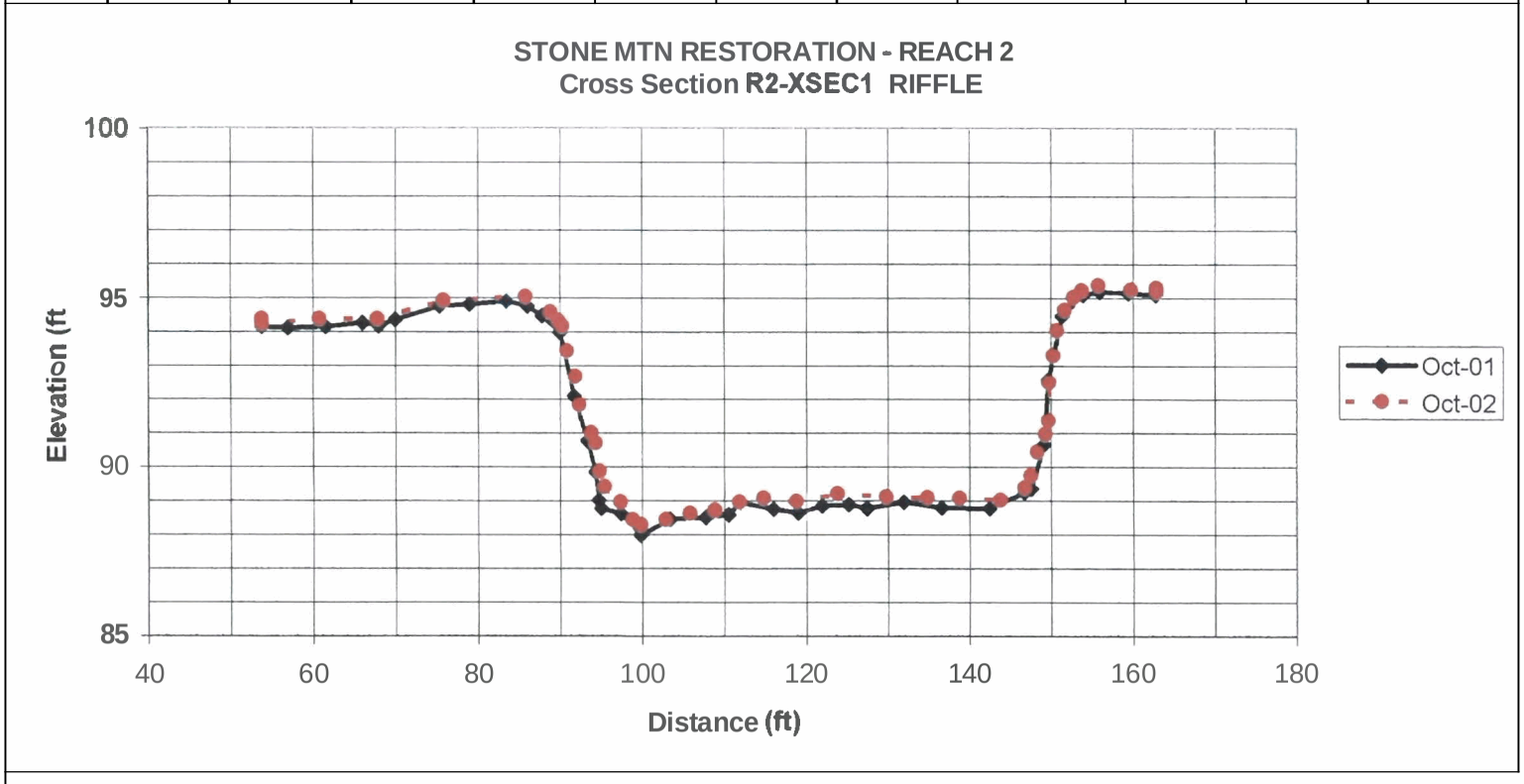
Oct-01

| | Survey Data | | | | Bkf Hydraulic Geometry | | |
|---|---|---|---|---|---|---|---|
| NOTES | STA | HI | FS | ELEV | Depth | Width | Area |
| | 53.8 | 100 | 5.85 | 94.15 | 0.00 | 0.00 | 0.00 |
| | 57 | 100 | 5.9 | 94.1 | 0.00 | 0.00 | 0.00 |
| | 61.5 | 100 | 5.85 | 94.15 | 0.00 | 0.00 | 0.00 |
| | 66 | 100 | 5.75 | 94.25 | 0.00 | 0.00 | 0.00 |
| | 68 | 100 | 5.84 | 94.16 | 0.00 | 0.00 | 0.00 |
| | 70 | 100 | 5.65 | 94.35 | 0.00 | 0.00 | 0.00 |
| | 75.3 | 100 | 5.26 | 94.74 | 0.00 | 0.00 | 0.00 |
| | 79 | 100 | 5.19 | 94.81 | 0.00 | 0.00 | 0.00 |
| | 83.5 | 100 | 5.11 | 94.89 | 0.00 | 0.0 | 0.00 |
| | 86 | 100 | 5.25 | 94.75 | 0.00 | 0.0 | 0.00 |
| | 87.8 | 100 | 5.53 | 94.47 | 0.00 | 0.0 | 0.00 |
| LBKF | 90 | 100 | 6.02 | 93.98 | 0.00 | 0.0 | 0.00 |
| | 91.7 | 100 | 7.9 | 92.1 | 1.88 | 1.7 | 1.60 |
| | 93.3 | 100 | 9.22 | 90.78 | 3.20 | 1.6 | 4.06 |
| | 94.3 | 100 | 10.15 | 89.85 | 4.13 | 1.0 | 3.67 |
| | 94.7 | 100 | 10.98 | 89.02 | 4.96 | 0.4 | 1.82 |
| | 95 | 100 | 11.23 | 88.77 | 5.21 | 0.3 | 1.53 |
| | 97.4 | 100 | 11.38 | 88.62 | 5.36 | 2.4 | 12.68 |
| | 99.8 | 100 | 12.02 | 87.98 | 6.00 | 2.4 | 13.63 |
| | 103.4 | 100 | 11.54 | 88.46 | 5.52 | 3.6 | 20.74 |
| | 107.7 | 100 | 11.48 | 88.52 | 5.46 | 4.3 | 23.61 |
| | 110.5 | 100 | 11.42 | 88.58 | 5.40 | 2.8 | 15.20 |
| | 112 | 100 | 11.05 | 88.95 | 5.03 | 1.5 | 7.82 |
| | 116 | 100 | 11.24 | 88.76 | 5.22 | 4.0 | 20.50 |
| | 119 | 100 | 11.35 | 88.65 | 5.33 | 3.0 | 15.83 |
| | 122 | 100 | 11.14 | 88.86 | 5.12 | 3.0 | 15.68 |
| | 125.2 | 100 | 11.1 | 88.9 | 5.08 | 3.2 | 16.32 |
| | 127.5 | 100 | 11.23 | 88.77 | 5.21 | 2.3 | 11.83 |
| | 132 | 100 | 11.03 | 88.97 | 5.01 | 4.5 | 23.00 |
| | 136.6 | 100 | 11.2 | 88.8 | 5.18 | 4.6 | 23.44 |
| | 142.5 | 100 | 11.23 | 88.77 | 5.21 | 5.9 | 30.65 |
| | 146.8 | 100 | 10.74 | 89.26 | 4.72 | 4.3 | 21.35 |
| | 147.6 | 100 | 10.64 | 89.36 | 4.62 | 0.8 | 3.74 |
| | 149.2 | 100 | 9.34 | 90.66 | 3.32 | 1.6 | 6.35 |
| | 149.7 | 100 | 7.42 | 92.58 | 1.40 | 0.5 | 1.18 |
| RBKF | 151.4 | 100 | 5.54 | 94.46 | 0.00 | 0.0 | 0.00 |
| | 154 | 100 | 4.91 | 95.09 | 0.00 | 0.0 | 0.00 |
| | 156 | 100 | 4.82 | 95.18 | 0.00 | 0.0 | 0.00 |
| | 159.5 | 100 | 4.85 | 95.15 | 0.00 | 0.0 | 0.00 |
| | 162.8 | 100 | 4.91 | 95.09 | 0.00 | 0.0 | 0.00 |

Sep-02

| | Survey Data | | | | |
|---|---|---|---|---|---|
| NOTES | STA | HI | FS | ELEV | REVISED STA |
| LPIN | 0 | 100 | 5.64 | 94.36 | 53.8 |
| GRND | 0 | 100 | 5.78 | 94.22 | 53.8 |
| | 7 | 100 | 5.64 | 94.36 | 60.8 |
| | 14 | 100 | 5.65 | 94.35 | 67.8 |
| | 22 | 100 | 5.1 | 94.9 | 75.8 |
| | 32 | 100 | 4.98 | 95.02 | 85.8 |
| | 35 | 100 | 5.45 | 94.55 | 88.8 |
| | 36 | 100 | 5.7 | 94.3 | 89.8 |
| | 36.5 | 100 | 5.85 | 94.15 | 90.3 |
| | 37 | 100 | 6.6 | 93.4 | 90.8 |
| | 38 | 100 | 7.34 | 92.66 | 91.8 |
| | 38.5 | 100 | 8.18 | 91.82 | 92.3 |
| | 40 | 100 | 9.02 | 90.98 | 93.8 |
| | 40.5 | 100 | 9.32 | 90.68 | 94.3 |
| | 41 | 100 | 10.15 | 89.85 | 94.8 |
| | 41.6 | 100 | 10.6 | 89.4 | 95.4 |
| | 43.5 | 100 | 11.05 | 88.95 | 97.3 |
| | 45 | 100 | 11.58 | 88.42 | 98.8 |
| | 46 | 100 | 11.73 | 88.27 | 99.8 |
| | 49 | 100 | 11.58 | 88.42 | 102.8 |
| | 52 | 100 | 11.4 | 88.6 | 105.8 |
| | 55 | 100 | 11.3 | 88.7 | 108.8 |
| | 58 | 100 | 11.06 | 88.94 | 111.8 |
| | 61 | 100 | 10.94 | 89.06 | 114.8 |
| | 65 | 100 | 11.04 | 88.96 | 118.8 |
| | 70 | 100 | 10.8 | 89.2 | 123.8 |
| | 76 | 100 | 10.9 | 89.1 | 129.8 |
| | 81 | 100 | 10.92 | 89.08 | 134.8 |
| | 85 | 100 | 10.94 | 89.06 | 138.8 |
| | 90 | 100 | 11 | 89 | 143.8 |
| | 93 | 100 | 10.63 | 89.37 | 146.8 |
| | 93.7 | 100 | 10.28 | 89.72 | 147.5 |
| | 94.5 | 100 | 9.58 | 90.42 | 148.3 |
| | 95.5 | 100 | 9.04 | 90.96 | 149.3 |
| | 95.9 | 100 | 8.65 | 91.35 | 149.7 |
| | 96 | 100 | 7.52 | 92.48 | 149.8 |
| | 96.5 | 100 | 6.72 | 93.28 | 150.3 |
| | 97 | 100 | 5.99 | 94.01 | 150.8 |
| | 97.9 | 100 | 5.38 | 94.62 | 151.7 |
| | 99 | 100 | 5 | 95 | 152.8 |
| | 100 | 100 | 4.80 | 95.2 | 153.8 |
| | 102 | 100 | 4.65 | 95.35 | 155.8 |
| | 106 | 100 | 4.78 | 95.22 | 159.8 |
| | 109.1 | 100 | 4.72 | 95.28 | 162.9 |
| | 109.1 | 100 | 4.84 | 95.16 | 162.9 |

| R2-XSEC1 | Feature | Type | Wfpa | LBKF | RBKF | ELEVbkf | Wbkf | Dbkf | W/D | Abkf | Dmax | ER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-Oct | RIFFLE | C4 | 450 | 90.0 | 151.4 | 93.98 | 61.4 | 4.8 | 12.7 | 296.2 | 6.0 | 7.3 |
| 2-Sep | RIFFLE | C4 | 450 | 90.0 | 151.4 | 93.98 | 61.4 | 4.8 | 12.7 | 296.2 | 6.0 | 7.3 |



Cross Section R2-XSEC2 POOL

STONE MTN RESTORATION - REACH 2
Yadkin River Basin, Wilkes County, North Carolina
Dani Wise

1/16/2003

**Oct-01**

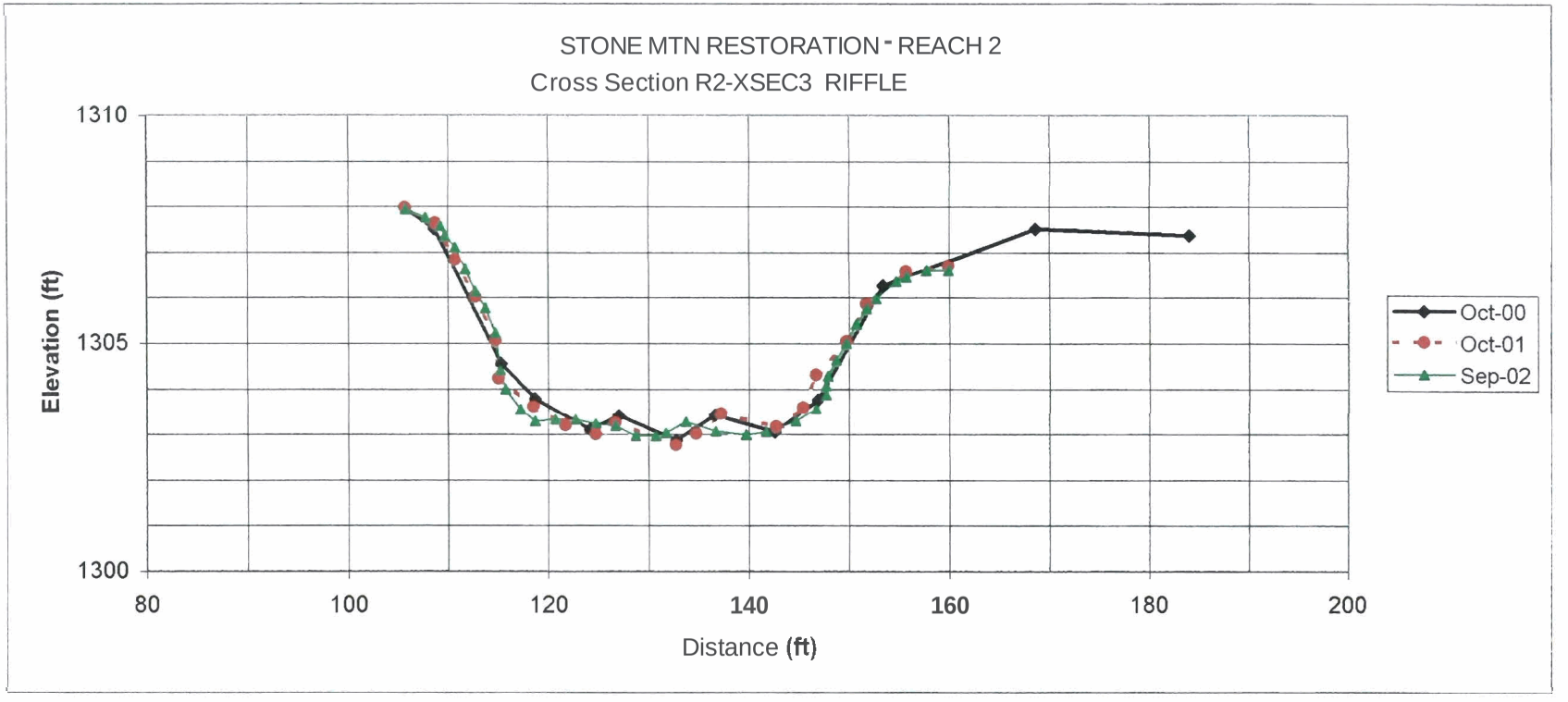
| | Survey Data | | | | Bkf Hydraulic Geometry | | |
|---|---|---|---|---|---|---|---|
| NOTES | STA | HI | FS | ELEV | Depth | Width | Area |
| LPIN | 0 | 100 | 3.15 | 96.85 | 0.00 | 0.00 | 0.00 |
| | 3 | 100 | 3.65 | 96.35 | 0.00 | 0.00 | 0.00 |
| | 5 | 100 | 3.64 | 96.36 | 0.00 | 0.00 | 0.00 |
| | 7.8 | 100 | 3.7 | 96.30 | 0.00 | 0.00 | 0.00 |
| | 11 | 100 | 3.85 | 96.15 | 0.00 | 0.00 | 0.00 |
| | 13.5 | 100 | 3.99 | 96.01 | 0.00 | 0.00 | 0.00 |
| LBKF | 18 | 100 | 3.27 | 96.73 | 0.00 | 0.0 | 0.00 |
| | 20.3 | 100 | 3.81 | 96.19 | 0.54 | 2.3 | 0.62 |
| | 30.3 | 100 | 6.43 | 93.57 | 3.16 | 10.0 | 18.50 |
| | 36.8 | 100 | 6.64 | 93.36 | 3.37 | 6.5 | 21.22 |
| | 46.4 | 100 | 7.43 | 92.57 | 4.16 | 9.6 | 36.14 |
| | 52 | 100 | 8.51 | 91.49 | 5.24 | 5.6 | 26.32 |
| | 56.1 | 100 | 9.2 | 90.80 | 5.93 | 4.1 | 22.90 |
| | 59.3 | 100 | 9.91 | 90.09 | 6.64 | 3.2 | 20.11 |
| | 62.4 | 100 | 10.2 | 89.80 | 6.93 | 3.1 | 21.03 |
| | 64 | 100 | 10.18 | 89.82 | 6.91 | 1.6 | 11.07 |
| | 65.9 | 100 | 9.69 | 90.31 | 6.42 | 1.9 | 12.66 |
| | 68 | 100 | 9.25 | 90.75 | 5.98 | 2.1 | 13.02 |
| | 70.7 | 100 | 7.45 | 92.55 | 4.18 | 2.7 | 13.72 |
| | 72.2 | 100 | 6.88 | 93.12 | 3.61 | 1.5 | 5.84 |
| | 73 | 100 | 6.26 | 93.74 | 2.99 | 0.8 | 2.64 |
| RBKF | 74.2 | 100 | 5.75 | 94.25 | 2.48 | 1.2 | 3.28 |
| | 76.2 | 100 | 4.73 | 95.27 | 0.00 | 0.00 | 0.00 |
| | 79.8 | 100 | 4.58 | 95.42 | 0.00 | 0.00 | 0.00 |
| | 81.9 | 100 | 4.67 | 95.33 | 0.00 | 0.00 | 0.00 |
| | 85 | 100 | 4.71 | 95.29 | 0.00 | 0.00 | 0.00 |
| | 87.1 | 100 | 4.38 | 95.62 | 0.00 | 0.00 | 0.00 |

**Sep-02**

| | Survey Data | | | | |
|---|---|---|---|---|---|
| NOTES | STA | HI | FS | ELEV | |
| | 0 | 100 | 3.45 | 96.55 | 96.85 |
| | 0 | 100 | 3.7 | 96.3 | 96.6 |
| | 3 | 100 | 3.98 | 96.02 | 96.32 |
| | 7 | 100 | 4 | 96 | 96.3 |
| | 12 | 100 | 4.2 | 95.8 | 96.1 |
| | 15 | 100 | 4.1 | 95.9 | 96.2 |
| | 16 | 100 | 3.95 | 96.05 | 96.35 |
| | 17 | 100 | 3.72 | 96.28 | 96.58 |
| | 18 | 100 | 3.55 | 96.45 | 96.75 |
| | 20 | 100 | 4.13 | 95.87 | 96.17 |
| | 22 | 100 | 4.56 | 95.44 | 95.74 |
| | 24 | 100 | 5.04 | 94.96 | 95.26 |
| | 26 | 100 | 5.7 | 94.3 | 94.6 |
| | 28 | 100 | 6.25 | 93.75 | 94.05 |
| | 30 | 100 | 6.62 | 93.38 | 93.68 |
| | 31.5 | 100 | 6.78 | 93.22 | 93.52 |
| | 34 | 100 | 6.74 | 93.26 | 93.56 |
| | 37 | 100 | 6.82 | 93.18 | 93.48 |
| | 39 | 100 | 6.98 | 93.02 | 93.32 |
| | 42 | 100 | 7.1 | 92.9 | 93.2 |
| | 43 | 100 | 7.46 | 92.54 | 92.84 |
| | 44.5 | 100 | 7.29 | 92.71 | 93.01 |
| | 45.5 | 100 | 7.45 | 92.55 | 92.85 |
| | 46.5 | 100 | 7.95 | 92.05 | 92.35 |
| | 48 | 100 | 8.3 | 91.7 | 92 |
| | 49.5 | 100 | 8.64 | 91.36 | 91.66 |
| | 51 | 100 | 8.85 | 91.15 | 91.45 |
| | 53 | 100 | 9.18 | 90.82 | 91.12 |
| | 55 | 100 | 9.58 | 90.42 | 90.72 |
| | 57 | 100 | 9.82 | 90.18 | 90.48 |
| | 58.5 | 100 | 10 | 90 | 90.3 |
| | 59 | 100 | 10.31 | 89.69 | 89.99 |
| | 59.5 | 100 | 10.28 | 89.72 | 90.02 |
| | 61 | 100 | 10.44 | 89.56 | 89.86 |
| | 63 | 100 | 10.58 | 89.42 | 89.72 |
| | 65 | 100 | 10.44 | 89.56 | 89.86 |
| | 67 | 100 | 10.18 | 89.82 | 90.12 |
| | 68 | 100 | 9.72 | 90.28 | 90.58 |
| | 69 | 100 | 9.18 | 90.82 | 91.12 |
| | 70 | 100 | 8.12 | 91.88 | 92.18 |
| | 70.8 | 100 | 7.77 | 92.23 | 92.53 |
| | 71 | 100 | 7.45 | 92.55 | 92.85 |
| | 72 | 100 | 7.12 | 92.88 | 93.18 |
| | 73 | 100 | 6.75 | 93.25 | 93.55 |
| | 74 | 100 | 6.24 | 93.76 | 94.06 |
| | 75 | 100 | 5.74 | 94.26 | 94.56 |
| | 77 | 100 | 4.98 | 95.02 | 95.32 |
| | 79 | 100 | 4.95 | 95.05 | 95.35 |
| | 80.5 | 100 | 5 | 95 | 95.3 |
| | 82 | 100 | 5.02 | 94.98 | 95.28 |
| | 85 | 100 | 5.04 | 94.96 | 95.26 |
| | 87.1 | 100 | 4.5 | 95.5 | 95.8 |
| | 87.1 | 100 | 4.73 | 95.27 | 95.57 |

| R2-XSEC2 | Feature | Type | Wfpa | LBKF | RBKF | ELEVbkf | Wbkf | Dbkf | W/D | Abkf | Dmax | ER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-Oct | POOL | C4 | 200 | 18.0 | 74.2 | 96.73 | 56.2 | 4.1 | 13.8 | 229.1 | 6.9 | 3.6 |
| 2-Sep | POOL | C4 | 200 | 18.0 | 74.2 | 96.73 | 56.2 | 4.1 | 13.8 | 229.1 | 6.9 | 3.6 |

| R2-XSEC3 | Feature | Type | Wfpa | LBKF | RBKF | ELEVbkf | Wbkf | Dbkf | WID | Abkf | Dmax |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct-00 | RIFFLE | C4 | 300 | 108.6 | 168.6 | 1307.52 | 60.0 | 2.8 | 21.6 | 166.7 | 3.4 |
| Oct-01 | RIFFLE | C4 | 300 | 81.0 | 132.2 | 1307.63 | 48.9 | 2.5 | 19.6 | 122.1 | 3.7 |
| Sep-02 | RIFFLE | C4 | 300 | 112.7 | 154.7 | 1306.35 | 46.0 | 2.6 | 17.6 | 120.0 | 3.6 |



Cross Section R2-XSEC4 RIFFLE

STONE MTN RESTORATION - REACH 2

1/16/2003

Yadkin River Basin, Wilkes County, North Carolina

Dani Wise

Oct-00

| NOTES | Survey Data STA | HI | FS | ELEV | Bkf Hydraulic Geometry Depth | Width | Area |
|---|---|---|---|---|---|---|---|
| | 0 | 1310.39 | 7.34 | 1303.05 | 0.00 | 0.0 | 0.00 |
| LBKF | 22 | 1310.39 | 6.82 | 1303.57 | 0.00 | 22.0 | 0.00 |
| | 24.4 | 1310.39 | 7.44 | 1302.95 | 0.62 | 2.4 | 0.74 |
| | 33.3 | 1310.39 | 9.12 | 1301.27 | 2.30 | 8.9 | 12.99 |
| | 38.2 | 1310.39 | 10.02 | 1300.37 | 3.20 | 4.9 | 13.48 |
| | 44 | 1310.39 | 9.47 | 1300.92 | 2.65 | 5.8 | 16.97 |
| | 46.7 | 1310.39 | 9.47 | 1300.92 | 2.65 | 2.7 | 7.16 |
| | 47.5 | 1310.39 | 11.26 | 1299.13 | 4.44 | 0.8 | 2.84 |
| | 52 | 1310.39 | 9.64 | 1300.75 | 2.82 | 4.5 | 16.34 |
| | 55.4 | 1310.39 | 10.37 | 1300.02 | 3.55 | 3.4 | 10.83 |
| | 58 | 1310.39 | 10.37 | 1300.02 | 3.55 | 2.6 | 9.23 |
| | 60.5 | 1310.39 | 8.73 | 1301.66 | 1.91 | 2.5 | 6.83 |
| | 61 | 1310.39 | 9.58 | 1300.81 | 2.76 | 0.5 | 1.17 |
| | 66 | 1310.39 | 9.6 | 1300.79 | 2.78 | 5.0 | 13.85 |
| | 68 | 1310.39 | 9.21 | 1301.18 | 2.39 | 2.0 | 5.17 |
| | 69.2 | 1310.39 | 8.69 | 1301.70 | 1.87 | 1.2 | 2.56 |
| | 71.3 | 1310.39 | 8.69 | 1301.70 | 1.87 | 2.1 | 3.93 |
| RBKF | 73.4 | 1310.39 | 7.02 | 1303.37 | 0.20 | 2.1 | 2.17 |
| | 81.4 | 1310.39 | 5.06 | 1305.33 | 0.00 | 0.0 | 0.00 |
| | 143 | 1310.39 | 5.4 | 1304.99 | 0.00 | 0.0 | 0.00 |

Oct-01

| Survey Data STA | ELEV | Bkf Hydraulic Geometry Depth | Width | Area |
|---|---|---|---|---|
| 20 | 1303.82 | 0.00 | 0.0 | 0.00 |
| 22 | 1303.09 | 0.73 | 2.0 | 0.73 |
| 25 | 1302.32 | 1.50 | 3.0 | 3.35 |
| 28 | 1301.96 | 1.86 | 3.0 | 5.04 |
| 32 | 1301.55 | 2.27 | 4.0 | 8.26 |
| 34.8 | 1301.04 | 2.78 | 2.8 | 7.07 |
| 38 | 1300.36 | 3.46 | 3.2 | 9.98 |
| 47 | 1300.38 | 3.44 | 9.0 | 31.05 |
| 52 | 1300.56 | 3.26 | 5.0 | 16.75 |
| 55 | 1300.19 | 3.63 | 3.0 | 10.33 |
| 59 | 1300.7 | 3.12 | 4.0 | 13.50 |
| 63 | 1300.66 | 3.16 | 4.0 | 12.56 |
| 68.3 | 1301.07 | 2.75 | 5.3 | 15.66 |
| 72 | 1302.61 | 1.21 | 3.7 | 7.33 |
| 74 | 1303.62 | 0.20 | 2.0 | 1.41 |
| 77 | 1304.45 | 0.00 | 0.0 | 0.00 |
| 80 | 1305.28 | 0.00 | 0.0 | 0.00 |
| 81.2 | 1305.33 | 0.00 | 0.0 | 0.00 |

Sep-02

| Survey Data STA | ELEV | Bkf Hydraulic Geometry Depth | Width | Area | FS | REV.STA |
|---|---|---|---|---|---|---|
| 0 | 1304.28 | 0.00 | 0.0 | 0.00 | 6.12 | 17.7 |
| 3 | 1303.71 | 0.00 | 0.0 | 0.00 | 6.69 | 20.7 |
| 5 | 1303.28 | 0.00 | 0.0 | 0.00 | 7.12 | 22.7 |
| 7 | 1302.72 | 0.00 | 0.0 | 0.00 | 7.68 | 24.7 |
| 9 | 1302.62 | 0.00 | 0.0 | 0.00 | 7.78 | 26.7 |
| 11.5 | 1302.5 | 0.00 | 0.0 | 0.00 | 7.9 | 29.2 |
| 12.5 | 1302.06 | 0.00 | 0.0 | 0.00 | 8.34 | 30.2 |
| 14 | 1301.75 | 0.00 | 0.0 | 0.00 | 8.65 | 31.7 |
| 16.5 | 1301.89 | 0.00 | 0.0 | 0.00 | 8.51 | 34.2 |
| 18 | 1301.22 | 0.00 | 0.0 | 0.00 | 9.18 | 35.7 |
| 20.5 | 1300.95 | 0.00 | 0.0 | 0.00 | 9.45 | 38.2 |
| 22.5 | 1300.99 | 0.00 | 0.0 | 0.00 | 9.41 | 40.2 |
| 24.8 | 1301.03 | 0.00 | 0.0 | 0.00 | 9.37 | 42.5 |
| 27 | 1300.86 | 0.00 | 0.0 | 0.00 | 9.54 | 44.7 |
| 29 | 1300.56 | 0.00 | 0.0 | 0.00 | 9.84 | 46.7 |
| 30 | 1300.3 | 0.00 | 0.0 | 0.00 | 10.1 | 47.7 |
| 30.8 | 1300.45 | 0.00 | 0.0 | 0.00 | 9.95 | 48.5 |
| 34.3 | 1300.32 | 0.00 | 0.0 | 0.00 | 10.08 | 52 |
| 36.5 | 1300.42 | 0.00 | 0.0 | 0.00 | 9.98 | 54.2 |
| 38.5 | 1300.36 | 0.00 | 0.0 | 0.00 | 10.04 | 56.2 |
| 41 | 1300.32 | 0.00 | 0.0 | 0.00 | 10.08 | 58.7 |
| 43.5 | 1300.5 | 0.00 | 0.0 | 0.00 | 9.9 | 61.2 |
| 45 | 1300.76 | 0.00 | 0.0 | 0.00 | 9.64 | 62.7 |
| 48 | 1300.82 | 0.00 | 0.0 | 0.00 | 9.58 | 65.7 |
| 50 | 1301.02 | 0.00 | 0.0 | 0.00 | 9.38 | 67.7 |
| 50 | 1301.02 | 0.00 | 0.0 | 0.00 | 9.38 | 67.7 |
| 52 | 1301.6 | 0.00 | 0.0 | 0.00 | 8.8 | 69.7 |
| 53 | 1302.26 | 0.00 | 0.0 | 0.00 | 8.14 | 70.7 |
| 54 | 1302.82 | 0.00 | 0.0 | 0.00 | 7.58 | 71.7 |
| 55.5 | 1303.04 | 0.00 | 0.0 | 0.00 | 7.36 | 73.2 |
| 56 | 1303.36 | 0.00 | 0.0 | 0.00 | 7.04 | 73.7 |
| 57 | 1303.9 | 0.00 | 0.0 | 0.00 | 6.5 | 74.7 |
| 58 | 1304.26 | 0.00 | 0.0 | 0.00 | 6.14 | 75.7 |
| 59 | 1304.39 | 0.00 | 0.0 | 0.00 | 6.01 | 76.7 |
| 60 | 1304.67 | 0.00 | 0.0 | 0.00 | 5.73 | 77.7 |
| 61 | 1304.97 | 0.00 | 0.0 | 0.00 | 5.43 | 78.7 |
| 62 | 1305.22 | 0.00 | 0.0 | 0.00 | 5.18 | 79.7 |
| 63 | 1305.42 | 0.00 | 0.0 | 0.00 | 4.98 | 80.7 |
| 64.3 | 1305.51 | 0.00 | 0.0 | 0.00 | 4.89 | 82 |

Cross Section R2-XSEC3 RIFFLE

STONE MTN RESTORATION - REACH 2

Yadkin River Basin, Wilkes County, North Carolina

Dani Wise

1/16/2003

Oct-00

| NOTES | Survey Data STA | HI | FS | ELEV | Bkf Hydraulic Geometry Depth | Width | Area |
|---|---|---|---|---|---|---|---|
| | 105.7 | 1312.62 | 4.66 | 1307.96 | 0.00 | 0.00 | 0.00 |
| LBKF | 108.6 | 1312.62 | 5.1 | 1307.52 | 0.00 | 0.0 | 0.00 |
| | 115.3 | 1312.62 | 8.06 | 1304.56 | 2.96 | 6.7 | 9.92 |
| | 118.7 | 1312.62 | 8.83 | 1303.79 | 3.73 | 3.4 | 11.37 |
| | 124.2 | 1312.62 | 9.51 | 1303.11 | 4.41 | 5.5 | 22.39 |
| | 127 | 1312.62 | 9.2 | 1303.42 | 4.10 | 2.8 | 11.91 |
| | 132.8 | 1312.62 | 9.75 | 1302.87 | 4.65 | 5.8 | 25.38 |
| | 136.6 | 1312.62 | 9.19 | 1303.43 | 4.09 | 3.8 | 16.61 |
| | 142.6 | 1312.62 | 9.57 | 1303.05 | 4.47 | 6.0 | 25.68 |
| | 146.9 | 1312.62 | 8.86 | 1303.76 | 3.76 | 4.3 | 17.69 |
| | 153.4 | 1312.62 | 6.35 | 1306.27 | 1.25 | 6.5 | 16.28 |
| RBKF | 168.6 | 1312.62 | 5.1 | 1307.52 | 0.00 | 15.2 | 9.50 |
| | 184 | 1312.62 | 5.24 | 1307.38 | | | |

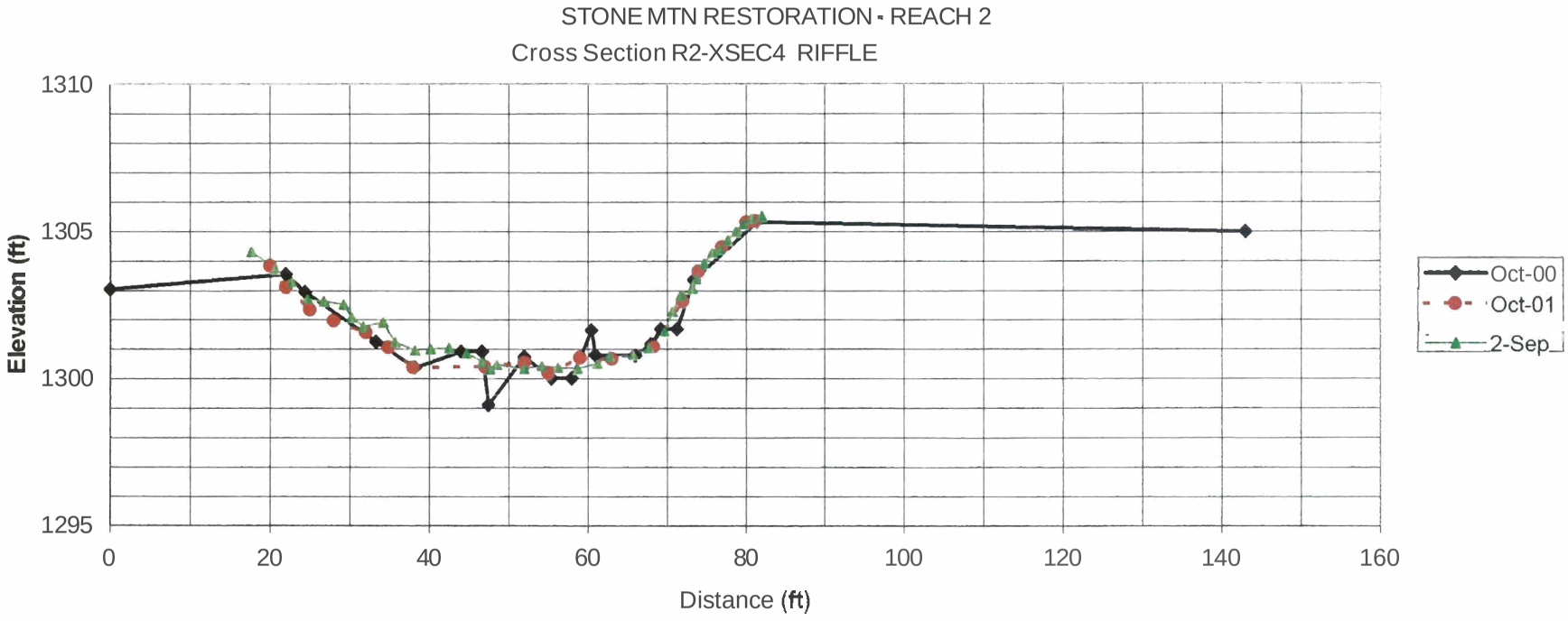
Oct-01

| adjust | Survey Data STA | ELEV |
|---|---|---|
| 78 | 105.7 | 1307.96 |
| 81 | 108.7 | 1307.63 |
| 83 | 110.7 | 1306.81 |
| 85 | 112.7 | 1306 |
| 87 | 114.7 | 1305.05 |
| 87.3 | 115 | 1304.22 |
| 90.8 | 118.5 | 1303.6 |
| 94 | 121.7 | 1303.19 |
| 97 | 124.7 | 1302.99 |
| 99 | 126.7 | 1303.25 |
| 105 | 132.7 | 1302.76 |
| 107 | 134.7 | 1303 |
| 109.5 | 137.2 | 1303.45 |
| 115 | 142.7 | 1303.16 |
| 117.7 | 145.4 | 1303.58 |
| 119 | 146.7 | 1304.29 |
| 122 | 149.7 | 1305.02 |
| 124 | 151.7 | 1305.85 |
| 128 | 155.7 | 1306.56 |
| 132.2 | 159.9 | 1306.69 |

Sep-02

| Survey Data STA | FS | ELEV | REVISE STA |
|---|---|---|---|
| 0 | 4.08 | 1307.92 | 105.7 |
| 0 | 4.08 | 1307.92 | 105.7 |
| 2 | 4.25 | 1307.75 | 107.7 |
| 3.5 | 4.43 | 1307.57 | 109.2 |
| 4.0 | 4.65 | 1307.35 | 109.7 |
| 5.0 | 4.9 | 1307.1 | 110.7 |
| 6.0 | 5.4 | 1306.6 | 111.7 |
| 7.0 | 5.88 | 1306.12 | 112.7 |
| 8.0 | 6.24 | 1305.76 | 113.7 |
| 9.0 | 6.79 | 1305.21 | 114.7 |
| 9.5 | 7.6 | 1304.4 | 115.2 |
| 10 | 8.02 | 1303.98 | 115.7 |
| 11.5 | 8.46 | 1303.54 | 117.2 |
| 13 | 8.72 | 1303.28 | 118.7 |
| 15 | 8.69 | 1303.31 | 120.7 |
| 17 | 8.68 | 1303.32 | 122.7 |
| 19 | 8.78 | 1303.22 | 124.7 |
| 21 | 8.83 | 1303.17 | 126.7 |
| 23 | 9.05 | 1302.95 | 128.7 |
| 25 | 9.05 | 1302.95 | 130.7 |
| 26 | 8.98 | 1303.02 | 131.7 |
| 28 | 8.74 | 1303.26 | 133.7 |
| 31 | 8.94 | 1303.06 | 136.7 |
| 34 | 9.02 | 1302.98 | 139.7 |
| 36 | 8.96 | 1303.04 | 141.7 |
| 39 | 8.72 | 1303.28 | 144.7 |
| 41 | 8.45 | 1303.55 | 146.7 |
| 42 | 8.13 | 1303.87 | 147.7 |
| 42 | 7.94 | 1304.06 | 147.7 |
| 42.2 | 7.73 | 1304.27 | 147.9 |
| 43 | 7.38 | 1304.62 | 148.7 |
| 44 | 7.01 | 1304.99 | 149.7 |
| 45 | 6.6 | 1305.4 | 150.7 |
| 46 | 6.26 | 1305.74 | 151.7 |
| 47 | 6.04 | 1305.96 | 152.7 |
| 49 | 5.65 | 1306.35 | 154.7 |
| 50 | 5.57 | 1306.43 | 155.7 |
| 52 | 5.42 | 1306.58 | 157.7 |
| 54.2 | 5.42 | 1306.58 | 159.9 |

| R2-XSEC4 | Feature | Type | Wfpa | LBKF | RBKF | ELEVbkf | Wbkf | Dbkf | WID | Abkf | Dmax | ER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct-00 | RIFFLE | C4 | 200 | 22.0 | 73.4 | 1303.57 | 51.4 | 2.5 | 20.9 | 126.2 | 4.4 | 3.9 |
| Oct-01 | RIFFLE | C4 | 200 | 20.0 | 74.0 | 1303.82 | 54.0 | 2.7 | 20.4 | 143.1 | 3.6 | 3.7 |
| Sep-02 | RIFFLE | C4 | 200 | 20.7 | 74.7 | 1303.82 | 58.2 | 2.7 | 21.5 | 157.5 | 4.0 | 3.4 |



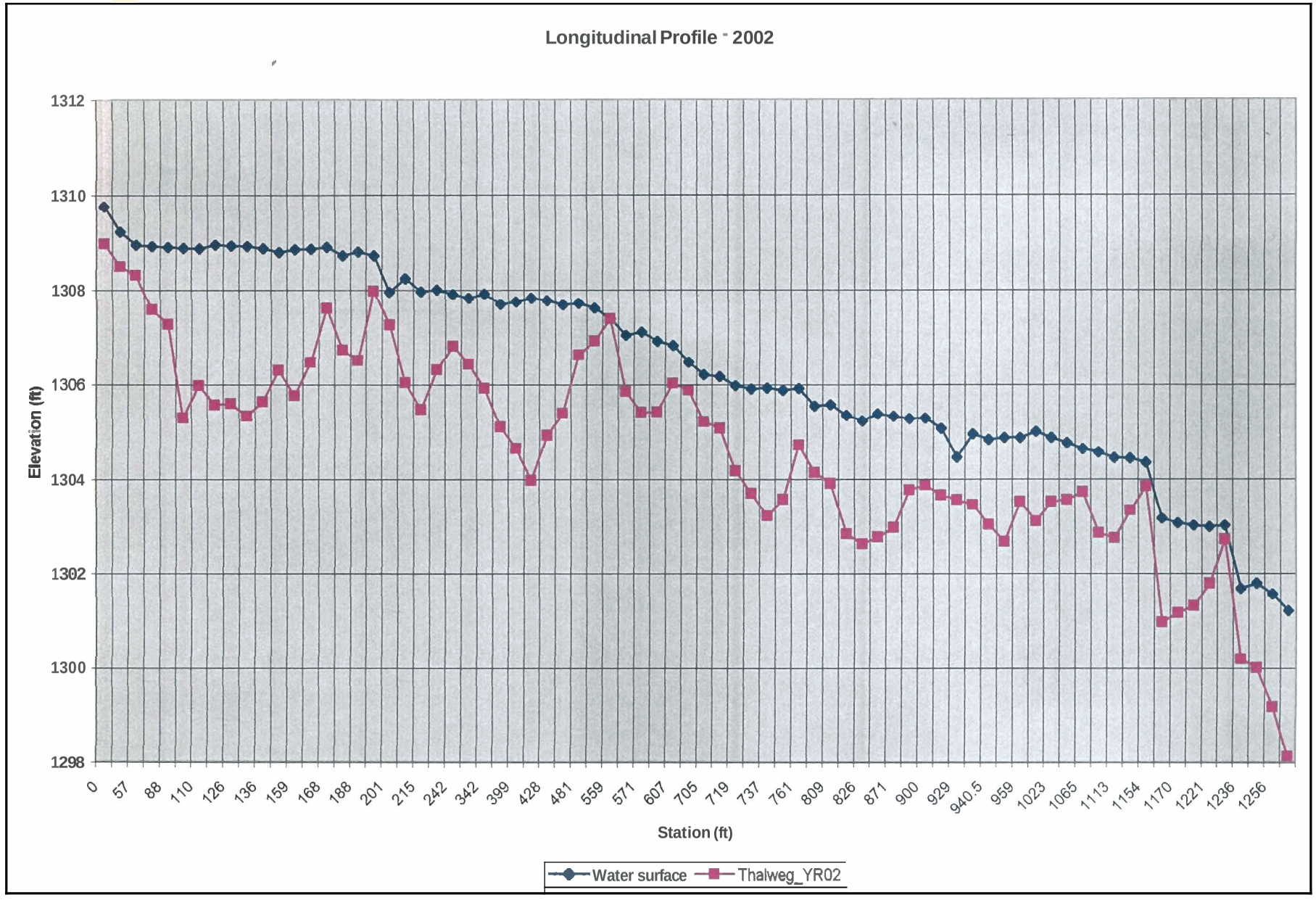
**Longitudinal Profile - 2002 Survey**

**STONE MTN RESTORATION - REACH 2**
Yadkin River Basin, Wilkes County, North Carolina
Dani Wise

| | | | STA (ft) | ELEV (ft) |
|---|---|---|---|---|
| | | Head First Riffle | 0 | 1309.75 |
| | | Head Last Riffle | 1301 | 1301.22 |
| Chan Slope (ft/ft) | 0.0066 | Valley Length (ft) | 943 | |
| Valley Slope (ft/ft) | 0.0090 | Channel Length (ft) | 1301 | |
| Sinuosity, K | 1.38 | Elev Change (ft) | 8.53 | |

2002 Survey Data

| TP | revise STA | STA | HI | FS TW | FS WS | WATER DEPTH | ELEV TW | ELEV WS | revise tw |
|---|---|---|---|---|---|---|---|---|---|
| | 7 | 0 | 1320 | 6.23 | 5.45 | | 1309 | 1309.75 | 1308.97 |
| | 53 | 46 | 1320 | 6.71 | 5.98 | | 1308.5 | 1309.22 | 1308.49 |
| | 64 | 57 | 1320 | 6.9 | 6.25 | | 1308.3 | 1308.95 | 1308.3 |
| | 87 | 80 | 1320 | 7.62 | 6.28 | | 1307.6 | 1308.92 | 1307.58 |
| | 95 | 88 | 1320 | 7.94 | 6.3 | | 1307.3 | 1308.9 | 1307.26 |
| | 109 | 102 | 1320 | 9.92 | 6.32 | | 1305.3 | 1308.88 | 1305.28 |
| | 117 | 110 | 1320 | 9.23 | 6.33 | 2.9 | 1306 | 1308.87 | 1305.97 |
| | 130 | 123 | 1320 | 9.65 | 6.25 | 3.4 | 1305.6 | 1308.95 | 1305.55 |
| | 133 | 126 | 1320 | 9.62 | 6.27 | 3.35 | 1305.6 | 1308.93 | 1305.58 |
| | 134 | 127 | 1320 | 9.88 | 6.28 | 3.6 | 1305.3 | 1308.92 | 1305.32 |
| | 143 | 136 | 1320 | 9.58 | 6.33 | 3.25 | 1305.6 | 1308.87 | 1305.62 |
| | 153 | 146 | 1320 | 8.91 | 6.41 | 2.5 | 1306.3 | 1308.79 | 1306.29 |
| | 166 | 159 | 1320 | 9.45 | 6.35 | 3.1 | 1305.8 | 1308.85 | 1305.75 |
| | 171 | 164 | 1320 | 8.74 | 6.34 | 2.4 | 1306.5 | 1308.86 | 1306.46 |
| | 175 | 168 | 1320 | 7.6 | 6.3 | 1.3 | 1307.6 | 1308.9 | 1307.6 |
| | 182 | 175 | 1320 | 8.48 | 6.48 | 2 | 1306.7 | 1308.72 | 1306.72 |
| | 195 | 188 | 1320 | 8.7 | 6.4 | 2.3 | 1306.5 | 1308.8 | 1306.5 |
| X VANE 1 | 203 | 196 | 1320 | 7.23 | 6.48 | 0.75 | 1308 | 1308.72 | 1307.97 |
| | 208 | 201 | 1320 | 7.95 | 7.25 | 0.7 | 1307.3 | 1307.95 | 1307.25 |
| | 214 | 207 | 1320 | 9.17 | 6.97 | 2.2 | 1306 | 1308.23 | 1306.03 |
| | 222 | 215 | 1320 | 9.74 | 7.24 | 2.5 | 1305.5 | 1307.96 | 1305.46 |
| | 238 | 231 | 1320 | 8.9 | 7.2 | 1.7 | 1306.3 | 1308 | 1306.3 |
| | 249 | 242 | 1320 | 8.4 | 7.3 | 1.1 | 1306.8 | 1307.9 | 1306.8 |
| | 307 | 300 | 1320 | 8.78 | 7.38 | 1.4 | 1306.4 | 1307.82 | 1306.42 |
| 1 | 349 | 342 | 1317.9 | 7.21 | 5.21 | 2 | 1305.9 | 1307.91 | 1305.91 |
| | 371 | 364 | 1317.9 | 8.03 | 5.43 | 2.6 | 1305.1 | 1307.69 | 1305.09 |
| | 408 | 399 | 1317.9 | 8.48 | 5.38 | 3.1 | 1304.6 | 1307.74 | 1304.64 |
| | 423 | 416 | 1317.9 | 9.15 | 5.3 | 3.85 | 1304 | 1307.82 | 1303.97 |
| | 435 | 428 | 1317.9 | 8.2 | 5.35 | 2.85 | 1304.9 | 1307.77 | 1304.92 |
| | 475 | 468 | 1317.9 | 7.74 | 5.44 | 2.3 | 1305.4 | 1307.68 | 1305.38 |
| | 488 | 481 | 1317.9 | 6.51 | 5.41 | 1.1 | 1306.6 | 1307.71 | 1306.61 |
| | 522 | 515 | 1317.9 | 6.21 | 5.51 | 0.7 | 1306.9 | 1307.81 | 1306.91 |
| X VANE 2 | 596 | 559 | 1317.9 | 5.74 | 5.73 | 0.01 | 1307.4 | 1307.39 | 1306.8 |
| | 599 | 562 | 1317.9 | 7.28 | 6.08 | 1.2 | 1305.8 | 1307.04 | 1305.84 |
| | 608 | 571 | 1317.9 | 7.72 | 6.02 | 1.7 | 1305.4 | 1307.1 | 1305.4 |
| | 637 | 600 | 1317.9 | 7.71 | 6.21 | 1.5 | 1305.4 | 1306.91 | 1305.41 |
| 2 | 644 | 607 | 1319.7 | 8.9 | 8.1 | 0.8 | 1306 | 1306.82 | 1306.02 |
| | 721 | 684 | 1319.7 | 9.05 | 8.45 | 0.6 | 1305.9 | 1306.47 | 1305.87 |
| | 742 | 705 | 1319.7 | 9.72 | 8.72 | 1 | 1305.2 | 1306.2 | 1305.2 |
| | 751 | 714 | 1319.7 | 9.86 | 8.76 | 1.1 | 1305.1 | 1306.16 | 1305.06 |
| | 756 | 719 | 1319.7 | 10.75 | 8.95 | 1.8 | 1304.2 | 1305.97 | 1304.17 |
| | 771 | 734 | 1319.7 | 11.22 | 9.02 | 2.2 | 1303.7 | 1305.9 | 1303.7 |
| | 774 | 737 | 1319.7 | 11.7 | 9 | 2.7 | 1303.2 | 1305.92 | 1303.22 |
| | 792 | 755 | 1319.7 | 11.35 | 9.05 | 2.3 | 1303.6 | 1305.87 | 1303.57 |
| | 812 | 761 | 1319.7 | 10.21 | 9.01 | 1.2 | 1304.7 | 1305.91 | 1304.71 |
| | 847 | 796 | 1319.7 | 10.79 | 9.39 | 1.4 | 1304.1 | 1305.53 | 1304.13 |
| | 860 | 809 | 1319.7 | 11.01 | 9.36 | 1.65 | 1303.9 | 1305.56 | 1303.91 |
| | 866 | 815 | 1319.7 | 12.08 | 9.58 | 2.5 | 1302.8 | 1305.34 | 1302.84 |
| | 877 | 826 | 1319.7 | 12.3 | 9.7 | 2.6 | 1302.6 | 1305.22 | 1302.62 |
| | 891 | 840 | 1319.7 | 12.15 | 9.55 | 2.6 | 1302.8 | 1305.37 | 1302.77 |
| | 908 | 871 | 1319.7 | 11.95 | 9.6 | 2.35 | 1303 | 1305.32 | 1302.97 |
| | 922 | 885 | 1319.7 | 11.15 | 9.65 | 1.5 | 1303.8 | 1305.27 | 1303.77 |
| | 937 | 900 | 1319.7 | 11.04 | 9.64 | 1.4 | 1303.9 | 1305.28 | 1303.88 |
| 3 | 954 | 917 | 1316.1 | 7.61 | 6.21 | 1.4 | 1303.7 | 1305.06 | 1303.66 |
| | 966 | 929 | 1316.1 | 7.71 | 6.81 | 0.9 | 1303.6 | 1304.46 | 1303.56 |
| | 971 | 934 | 1316.1 | 7.82 | 6.32 | 1.5 | 1303.5 | 1304.95 | 1303.45 |
| | 977.5 | 940.5 | 1316.1 | 8.24 | 6.44 | 1.8 | 1303 | 1304.83 | 1303.03 |
| | 985 | 948 | 1316.1 | 8.6 | 6.4 | 2.2 | 1302.7 | 1304.87 | 1302.67 |
| | 996 | 959 | 1316.1 | 7.75 | 6.4 | 1.35 | 1303.5 | 1304.87 | 1303.52 |
| | 1018 | 981 | 1316.1 | 8.17 | 6.27 | 1.9 | 1303.1 | 1305 | 1303.1 |
| | 1060 | 1023 | 1316.1 | 7.75 | 6.4 | 1.35 | 1303.5 | 1304.87 | 1303.52 |
| | 1083 | 1046 | 1316.1 | 7.71 | 6.51 | 1.2 | 1303.6 | 1304.76 | 1303.56 |
| | 1102 | 1065 | 1316.1 | 7.54 | 6.64 | 0.9 | 1303.7 | 1304.63 | 1303.73 |
| | 1116 | 1079 | 1316.1 | 8.41 | 6.71 | 1.7 | 1302.9 | 1304.56 | 1302.86 |
| | 1150 | 1113 | 1316.1 | 8.52 | 6.82 | 1.7 | 1302.8 | 1304.45 | 1302.75 |
| | 1162 | 1125 | 1316.1 | 7.93 | 6.83 | 1.1 | 1303.3 | 1304.44 | 1303.3 |
| X VANE 3 | 1207 | 1154 | 1316.1 | 7.42 | 6.92 | 0.5 | 1303.9 | 1304.35 | 1302.8 |
| | 1215 | 1162 | 1316.1 | 10.3 | 8.1 | 2.2 | 1301 | 1303.17 | 1300.97 |
| | 1223 | 1170 | 1316.1 | 10.1 | 8.2 | 1.9 | 1301.2 | 1303.07 | 1301.17 |
| | 1251 | 1198 | 1316.1 | 9.95 | 8.25 | 1.7 | 1301.3 | 1303.02 | 1301.32 |
| | 1274 | 1221 | 1316.1 | 9.48 | 8.28 | 1.2 | 1301.8 | 1302.99 | 1301.79 |
| X VANE 4 | 1277 | 1228 | 1316.1 | 8.55 | 8.25 | 0.3 | 1302.7 | 1303.02 | 1301.4 |
| | 1308 | 1236 | 1316.1 | 11.08 | 9.58 | 1.5 | 1300.2 | 1301.69 | 1300.19 |
| | 1316 | 1240 | 1316.1 | 11.27 | 9.47 | 1.8 | 1300 | 1301.8 | 1300 |
| | 1348 | 1256 | 1316.1 | 12.1 | 9.7 | 2.4 | 1299.2 | 1301.57 | 1299.17 |
| | 1398 | 1301 | 1316.1 | 13.15 | 10.05 | 3.1 | 1298.1 | 1301.22 | 1298.12 |


Longitudinal Profile - 2002
Elevation (ft)
1312
1310
1308
1306
1304
1302
1300
1298
0
57
88
110
126
136
159
168
188
201
215
242
342
399
428
481
559
571
607
705
719
737
761
809
826
871
900
929
940.5
959
1023
1065
1113
1154
1170
1221
1236
1256
Station (ft)
Water surface
Thalweg_YR02

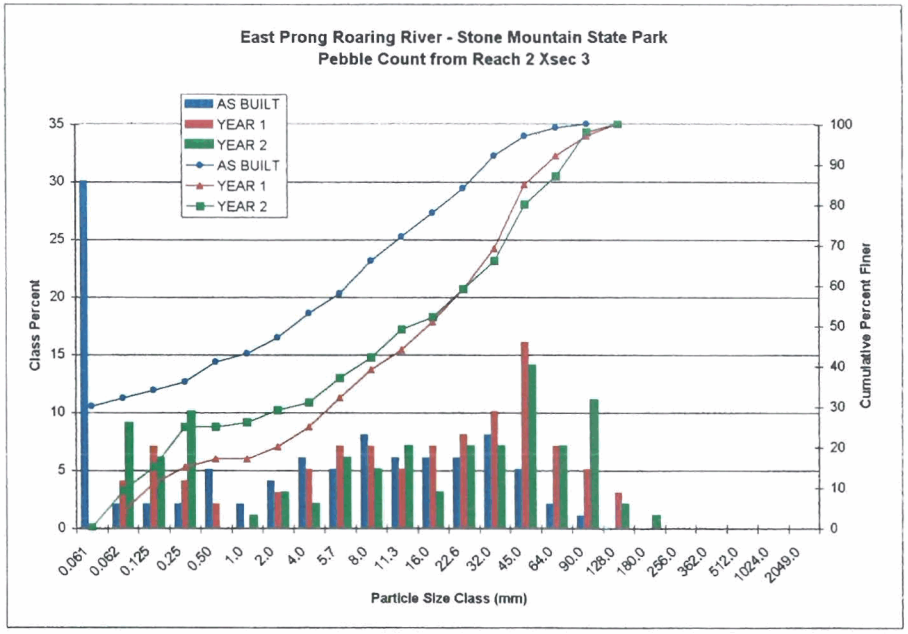
## Longitudinal Profile

| Reach 2<br>Perm X Sec 3 | Approx. STA #<br>4+61 | Survey Date<br>2000 | | Survey Date<br>2001 | | Survey Date<br>2002 | |
|---|---|---|---|---|---|---|---|
| Particle Size (mm) | Particle Size | Total | %Cumulative | Total | %Cumulative | Total | %Cumulative |
| 0.061 | Silt/Clay | 30 | 30 | 0 | 0 | 0 | 0 |
| 0.062 | | 2 | 32 | 4 | 4 | 9 | 9 |
| 0.125 | Sand | 2 | 34 | 7 | 11 | 6 | 15 |
| 0.25 | | 2 | 36 | 4 | 15 | 10 | 25 |
| 0.50 | | 5 | 41 | 2 | 17 | 0 | 25 |
| 1.0 | | 2 | 43 | 0 | 17 | 1 | 26 |
| 2.0 | G | 4 | 47 | 3 | 20 | 3 | 29 |
| 4.0 | r | 6 | 53 | 5 | 25 | 2 | 31 |
| 5.7 | a | 5 | 58 | 7 | 32 | 6 | 37 |
| 8.0 | v | 8 | 66 | 7 | 39 | 5 | 42 |
| 11.3 | e | 6 | 72 | 5 | 44 | 7 | 49 |
| 16.0 | l | 6 | 78 | 7 | 51 | 3 | 52 |
| 22.6 | | 6 | 84 | 8 | 59 | 7 | 59 |
| 32.0 | | 8 | 92 | 10 | 69 | 7 | 66 |
| 45.0 | | 5 | 97 | 16 | 85 | 14 | 80 |
| 64.0 | | 2 | 99 | 7 | 92 | 7 | 87 |
| 90.0 | | 1 | 100 | 5 | 97 | 11 | 98 |
| 128.0 | Cobble | 0 | | 3 | 100 | 2 | 100 |
| 180.0 | | 0 | | 0 | | 1 | |
| 256.0 | | 0 | | 0 | | 0 | |
| 362.0 | Boulder | 0 | | 0 | | 0 | |
| 512.0 | | 0 | | 0 | | 0 | |
| 1024.0 | | 0 | | 0 | | 0 | |
| 2049.0 | Bedrock | 0 | | 0 | | 0 | |

| Particle Sizes (mm): | |
|---|---|
| D16 | 0.061 |
| D35 | 0.2 |
| D50 | 4 |
| D84 | 28 |
| D95 | 40 |

| Particle Sizes (mm): | |
|---|---|
| D16 | 0.5 |
| D35 | 8 |
| D50 | 20 |
| D84 | 50 |
| D95 | 85 |

| Particle Sizes (mm): | |
|---|---|
| D16 | 0.25 |
| D35 | 5 |
| D50 | 12 |
| D84 | 60 |
| D95 | 85 |

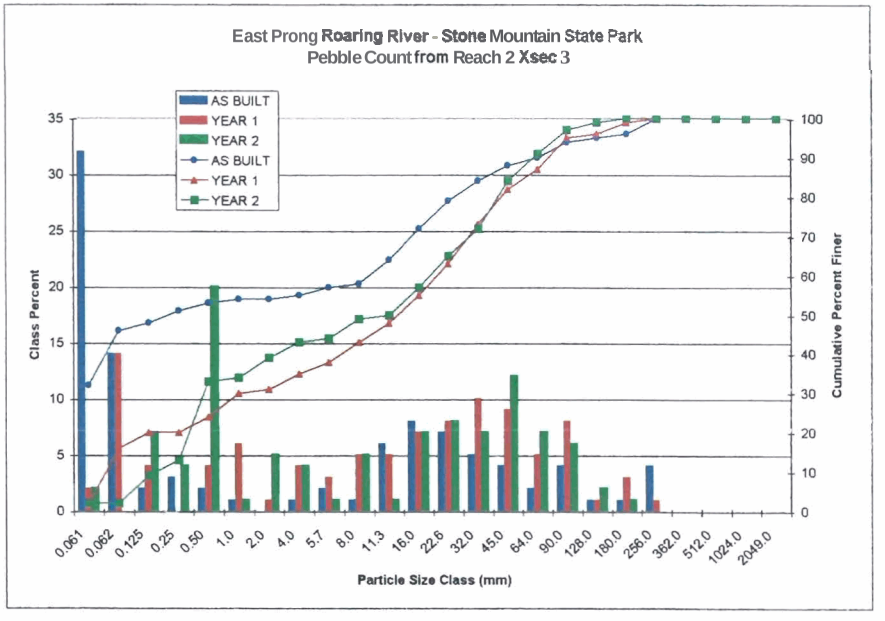


| Reach 2<br>Perm X Sec 4 | Approx. STA #<br>11+01 | Survey Date<br>2000 | | Survey Date<br>2001 | | Survey Date<br>2002 | |
|---|---|---|---|---|---|---|---|
| Particle Size (mm) | Particle Size | Total | %Cumulative | Total | %Cumulative | Total | %Cumulative |
| 0.061 | Silt/Clay | 32 | 32 | 2 | 2 | 2 | 2 |
| 0.062 | | 14 | 46 | 14 | 16 | | 2 |
| 0.125 | Sand | 2 | 48 | 4 | 20 | 7 | 9 |
| 0.25 | | 3 | 51 | 0 | 20 | 4 | 13 |
| 0.50 | | 2 | 53 | 4 | 24 | 20 | 33 |
| 1.0 | | 1 | 54 | 6 | 30 | 1 | 34 |
| 2.0 | G | 0 | 54 | 1 | 31 | 5 | 39 |
| 4.0 | r | 1 | 55 | 4 | 35 | 4 | 43 |
| 5.7 | a | 2 | 57 | 3 | 38 | 1 | 44 |
| 8.0 | v | 1 | 58 | 5 | 43 | 5 | 49 |
| 11.3 | e | 6 | 64 | 5 | 48 | 1 | 50 |
| 16.0 | l | 8 | 72 | 7 | 55 | 7 | 57 |
| 22.6 | | 7 | 79 | 8 | 63 | 8 | 65 |
| 32.0 | | 5 | 84 | 10 | 73 | 7 | 72 |
| 45.0 | | 4 | 88 | 9 | 82 | 12 | 84 |
| 64.0 | | 2 | 90 | 5 | 87 | 7 | 91 |
| 90.0 | Cobble | 4 | 94 | 8 | 95 | 6 | 97 |
| 128.0 | | 1 | 95 | 1 | 96 | 2 | 99 |
| 180.0 | | 1 | 96 | 3 | 99 | 1 | 100 |
| 256.0 | | 4 | 100 | 1 | 100 | 0 | 100 |
| 362.0 | Boulder | 0 | 100 | 0 | 100 | 0 | 100 |
| 512.0 | | 0 | 100 | 0 | 100 | 0 | 100 |
| 1024.0 | | 0 | 100 | 0 | 100 | 0 | 100 |
| 2049.0 | Bedrock | 0 | 100 | 0 | 100 | 0 | 100 |

| Particle Sizes (mm): | |
|---|---|
| D16 | 0.061 |
| D35 | 0.1 |
| D50 | 0.4 |
| D84 | 40 |
| D95 | 120 |

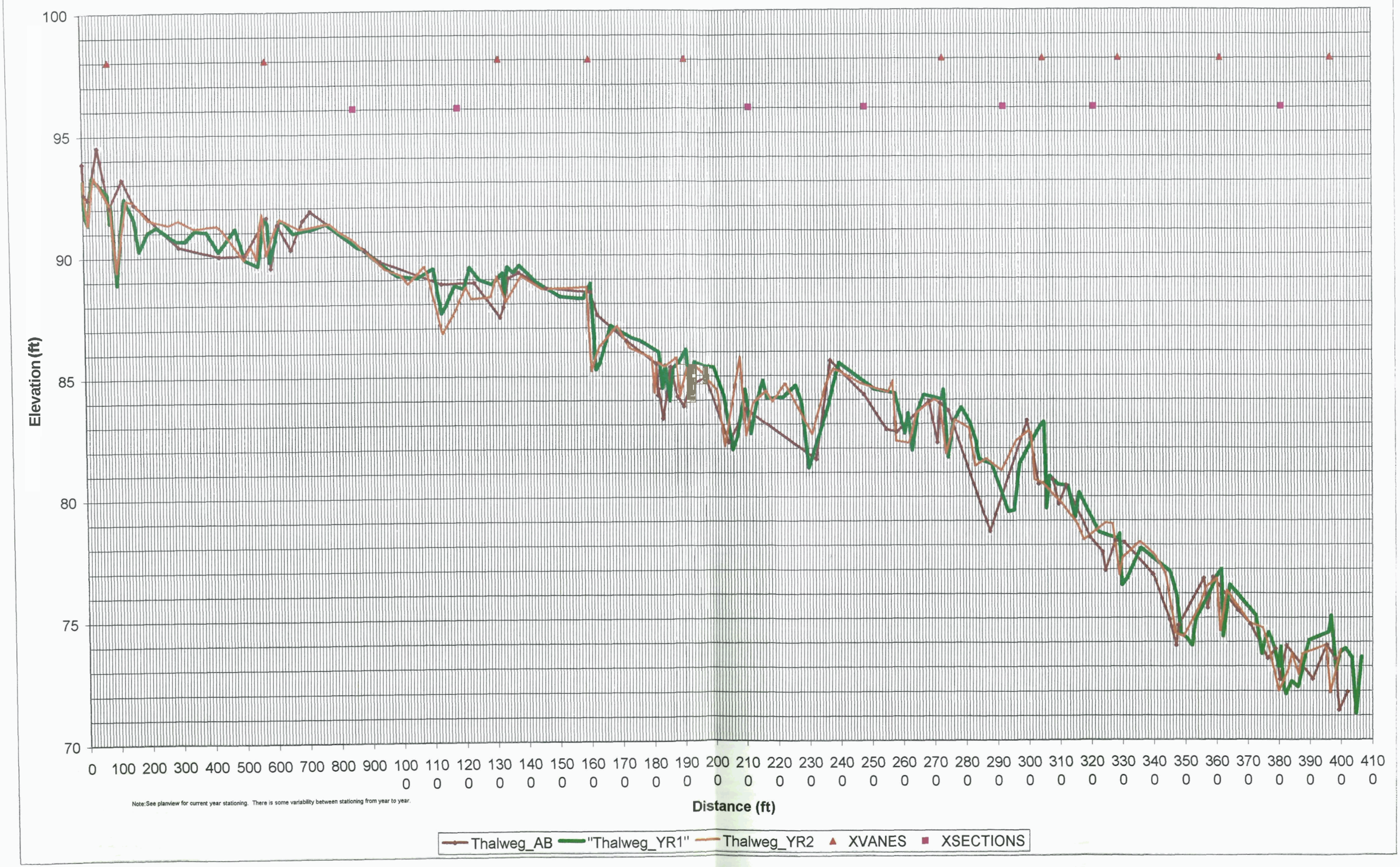
| Particle Sizes (mm): | |
|---|---|
| D16 | 0.1 |
| D35 | 5.7 |
| D50 | 14 |
| D84 | 60 |
| D95 | 120 |

| Particle Sizes (mm): | |
|---|---|
| D16 | 0.5 |
| D35 | 1.5 |
| D50 | 11.3 |
| D84 | 45 |
| D95 | 90 |



# APPENDIX B

REACH 4:
STREAM GEOMETRY AND SUBSTRATE DATA
YR 2002 SURVEY


100
95
90
85
80
75
70
Elevation (ft)
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300 3400 3500 3600 3700 3800 3900 4000 4100
Distance (ft)
Note:See planview for current year stationing. There is some variability between stationing from year to year.
Thalweg_AB
"Thalweg_YR1"
Thalweg_YR2
XVANES
XSECTIONS

| | | | | STA (ft) | ELEV (ft) |
|---|---|---|---|---|---|
| | | | Head First Riffle | 0 | 94.26 |
| | | | Head Last Riffle | 3997 | 74.46 |
| Chan Slope (ft/ft) | 0.0050 | | Valley Length (ft) | 2750 | |
| Valley Slope (ft/ft) | 0.0072 | | Channel Length (ft | 3997 | |
| Sinuosity, K | 1.45 | | Elev Change (ft) | 19.8 | |

**Benchmarks for Annual Surveys:**

| XVANE | STA | ELEV |
|---|---|---|
| 1 | 83.5 | 98 |
| 2 | 577 | 98 |
| 3 | 1315 | 98 |
| 4 | 1603 | 98 |
| 5 | 1906 | 98 |
| 6 | 2730.4 | 98 |
| 7 | 3050 | 98 |
| 8 | 3290 | 98 |
| 9 | 3615.5 | 98 |
| 10 | 3968 | 98 |

| XSECTIONS | STA | ELEV | TYPE |
|---|---|---|---|
| 1 | 856 | 96 | RIFFLE |
| 2 | 1186 | 96 | POOL |
| 3 | 2114 | 96 | POOL |
| 4 | 2483 | 96 | RIFFLE |
| 5 | 2926 | 96 | POOL |
| 6 | 3213 | 96 | RIFFLE |
| 7 | 3812 | 96 | POOL |

**YEAR 2 DATA** 2-Nov HI= **100.75** add .75' to adjust to last years HI

| TP | NOTE | STA | HI | FS TW | FS WS | FS LB | FS BKF | FS LTOB | FS RTOB | ELEV TW | ELEV WS | ELEV LB | ELEV BKF | ELEV LTOB | ELEV RTOB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 100.75 | 7.62 | 6.49 | | | | | 93.13 | 94.26 | | | | |
| | | 5 | 100.75 | 8.28 | 6.52 | | | | | 92.37 | 94.23 | | | | |
| | | 143 | 100.75 | 9.42 | 6.62 | | | | | 91.33 | 94.13 | | | | 106.18 |
| | | 33 | 100.75 | 7.42 | 6.75 | | | | | 93.33 | 94 | | | | |
| | XVANE 1 | 83 | 100.75 | 8.61 | 7.1 | | | | | 92.14 | 93.65 | | | | |
| | | 103 | 100.75 | 11.25 | 7.64 | | | | | 89.4 | 93.11 | | | | |
| | | 135 | 100.75 | 8.43 | 7.7 | | | | | 92.32 | 93.05 | | | | |
| | | 160 | 100.75 | 8.52 | 8.2 | | | | | 92.23 | 92.55 | | | | |
| | | 204 | 100.75 | 9.24 | 8.25 | | | | | 91.51 | 92.5 | | | | |
| | | 267.7 | 100.75 | 9.44 | 8.25 | | | | | 91.31 | 92.5 | | | | 106.18 |
| | | 300 | 100.75 | 9.27 | 8.26 | | | | | 91.48 | 92.49 | | | | |
| | | 348 | 100.75 | 9.6 | 8.26 | | | | | 91.15 | 92.49 | | | | |
| | | 420.9 | 100.75 | 9.5 | 8.26 | | | | | 91.25 | 92.49 | | | | |
| | | 438 | 100.75 | 9.7 | 8.3 | | | | | 91.05 | 92.45 | | | | |
| 1 | | 504 | 100.14 | 10.28 | 7.72 | | | | | 89.86 | 92.42 | | | | |
| | | 527.3 | 100.14 | 9.74 | 7.71 | | | | | 90.4 | 92.43 | | | | |
| | | 545 | 100.14 | 10.27 | 7.71 | | | | | 89.87 | 92.43 | | | | |
| | | 553 | 100.14 | 9.08 | 7.75 | | | | | 91.06 | 92.39 | | | | |
| | XVANE 2 | 562 | 100.14 | 8.4 | 7.74 | | | | | 91.74 | 92.4 | | | | |
| | | 574 | 100.14 | 10.1 | 8.02 | | | | | 90.04 | 92.12 | | | | 101.95 |
| | | 600 | 100.14 | 9.14 | 8.04 | | | | | 91 | 92.1 | | | | |
| | | 617.6 | 100.14 | 8.62 | 8.1 | | | | | 91.52 | 92.04 | | | | |
| | | 683.7 | 100.14 | 9.05 | 8.12 | | | | | 91.09 | 92.02 | | | | |
| | | 774 | 100.14 | 8.8 | 8.42 | | | | | 91.34 | 91.72 | | | | |
| | | 805.2 | 100.14 | 9.14 | 8.55 | | | | | 91 | 91.59 | | | | |
| | XSEC 1 | 845.4 | 100.14 | 9.45 | 9.08 | | | | | 90.69 | 91.06 | | | | |
| | | 951 | 100.14 | 10.72 | 9.83 | | | | | 89.42 | 90.31 | | | | |
| 2 | | 1001 | 102.61 | 13.44 | 12.45 | | | | | 89.17 | 90.16 | | | | |
| | | 1022.5 | 102.61 | 13.81 | 12.44 | | | | | 88.8 | 90.17 | | | 101.95 | |
| | | 1075 | 102.61 | 13.08 | 12.5 | | | | | 89.53 | 90.11 | | | | |
| | | 1086 | 102.61 | 13.5 | 12.5 | | | | | 89.11 | 90 11 | | | | |
| | | 1132 | 102.61 | 15.85 | 12.55 | | | | | 86.76 | 90.06 | | | | |
| | XSEC 2 | 1175 | 102.61 | 14.85 | 12.55 | | | | | 87.76 | 90.06 | | | | |
| 3 | | 1180 | 102.61 | 14.68 | 12.65 | | | | | 87.93 | 89.96 | | | | 102.57 |
| | | 1205.7 | 102.61 | 13.96 | 12.65 | | | | | 88.65 | 89 96 | | | | |
| | | 1224 | 102.61 | 14.42 | 12.63 | | | | | 88.19 | 89.98 | | | | |
| | | 1285 | 102.61 | 14.35 | 12.68 | | | | | 88.26 | 89.93 | | | | |
| | XVANE 3 | 1304 | 102.61 | 13.5 | 12.72 | | | | | 89 11 | 89.89 | | | | |
| | | 1334 | 102.61 | 14.55 | 12.92 | | | | | 88.06 | 89.69 | | | | |
| | | 1382 | 102.61 | 13.5 | 13.05 | | | | | 89.11 | 89.56 | | | | |
| | | 1450 | 102.61 | 14.04 | 13.34 | | | | | 88.57 | 89.27 | | | 105.5 | |
| | XVANE 4 | 1591 | 102.61 | 13.96 | 13.5 | | | | | 88.65 | 89.11 | | | | |
| 4 | | 1605 | 96.67 | 11.48 | 8.88 | | | | | 85.19 | 87.79 | | | | |
| | | 1630 | 96.67 | 10.48 | 8.93 | | | | | 86.19 | 87 74 | | | | |
| | | 1687 | 96.67 | 9.62 | 9.05 | | | | | 87.05 | 87.62 | | | | |
| | | 1726 | 96.67 | 10.52 | 9.7 | | | | | 86.15 | 86.97 | | | | |
| | | 1798 | 96.67 | 10.94 | 9.73 | | | | | 85.73 | 86.94 | | | | |
| | | 1807 | 96.67 | 12.38 | 9.74 | | | | | 84.29 | 86.93 | | | | |
| | | 1812 | 96.67 | 11.1 | 9.79 | | | | | 85.57 | 86.94 | | | | |
| | | 1838 | 96.67 | 11.28 | 9.75 | | | | | 85.39 | 86.92 | | | 98.5 | |
| | XVANE 5 | 1875 | 96.67 | 10.92 | 9.75 | | | | | 85.75 | 86.92 | | | | |
| | | 1888 | 96.67 | 12.55 | 10.45 | | | | | 84.12 | 86 22 | | | | |
| | | 1909 | 96.67 | 11.38 | 10.5 | | | | | 85.29 | 86.17 | | | | |
| | | 1939 | 96.67 | 11.35 | 10.5 | | | | | 85.32 | 86.17 | | | | |
| 5 | | 2008 | 92.8 | 8.4 | 6.65 | | | | | 84.4 | 86.15 | | | | |
| | | 2032 | 92.8 | 10.73 | 6.65 | | | | | 82 07 | 86.15 | | | | |
| | | 2080 | 92.8 | 7.04 | 6.7 | | | | | 85.76 | 86.1 | | | 98.5 | |
| | XSEC 3 | 2100 | 92.8 | 10.3 | 6.7 | | | | | 82.5 | 86.1 | | | | |
| | | 2122 | 92.8 | 8.94 | 6.72 | | | | | 83.86 | 86.08 | | | | |
| | | 2163.5 | 92.8 | 8.45 | 6.74 | | | | | 84.35 | 86.06 | | | | |
| | | 2184 | 92.8 | 8.9 | 6.72 | | | | | 83.9 | 86.08 | | | | |
| | | 2225 | 92.8 | 8.15 | 6.75 | | | | | 84 65 | 86.05 | | | | |
| | | 2310 | 92.8 | 10.25 | 6.8 | | | | | 82.55 | 86 | | | | |
| | | 2353 | 92.8 | 8.2 | 6.8 | | | | | 84.6 | 86 | | | | |
| | | 2377 | 92.8 | 7.55 | 6.9 | | | | | 85.25 | 85.9 | | | | |
| dwn2 | | 2400 | 97.97 | 12.84 | 12.05 | | | | | 85.13 | 85 92 | | | | |
| | XSEC 4 | 2470 | 97.97 | 13.35 | 12.6 | | | | | 84.62 | 85 37 | | | | |
| | | 2553 | 97.97 | 13.68 | 12.95 | | | | | 84.29 | 85.02 | | | | |
| | ROCK VANE | 2567 | 97.97 | 13.22 | 12.96 | | | | | 84.75 | 85 01 | | | | |
| | | 2578 | 97.97 | 15.7 | 13 | | | | | 82 27 | 84.97 | | | | |
| | | 2619 | 97.97 | 15.78 | 13.03 | | | | | 82 19 | 84.94 | | | | |
| 6 | | 2644 | 94.39 | 10.95 | 9.48 | | | | | 83.44 | 84.91 | | | | |
| | | 2700 | 94.39 | 10.41 | 9.54 | | | | | 83.98 | 84.85 | | | | |
| | XVANE 6 | 2718 | 94.39 | 10.56 | 9.6 | | | | | 83.83 | 84.79 | | | | |
| | | 2738 | 94.39 | 12.65 | 10.42 | | | | | 81 74 | 83.97 | | | | |
| | | 2766 | 94.39 | 11.25 | 10.45 | | | | | 83.14 | 83.94 | | | | |
| | | 2811 | 94.39 | 11.6 | 10.9 | | | | | 82.79 | 83.49 | | | | |
| | | 2830 | 94.39 | 13.15 | 10.95 | | | | | 81.24 | 83.44 | | | | |
| | | 2864 | 94.39 | 12.85 | 10.96 | | | | | 81.54 | 83.43 | | | | |
| | | 2914 | 94.39 | 12.35 | 10.96 | | | | | 81 04 | 83.43 | | | | |
| 7 | | 2961 | 91.29 | 9.02 | 7.88 | | | | | 82.27 | 83.41 | | | | |
| | | 3000 | 91.29 | 8.61 | 7.92 | | | | | 82.68 | 83.37 | | | | |
| | XVANE 7 | 3008 | 91.29 | 8.71 | 8.03 | | | | | 82.58 | 83.26 | | | | |
| | | 3019 | 91.29 | 10.62 | 9.1 | | | | | 80.67 | 82.19 | | | | 96.92 |
| | | 3044 | 91.29 | 10.75 | 9.74 | | | | | 80.54 | 81.55 | | | | |
| | | 3071.5 | 91.29 | 11.14 | 10.25 | | | | | 80.15 | 81.04 | | | | |
| | | 3106 | 91.29 | 11.6 | 11 | | | | | 79 69 | 80.29 | | | | |
| | | 3154 | 91.29 | 12.44 | 11.35 | | | | | 78.85 | 79 94 | | | | |
| | | 3176 | 91.29 | 13.1 | 11.42 | | | | | 78 19 | 79.87 | | | | 94.61 |
| | | 3245 | 91.29 | 12.4 | 11.62 | | | | | 78.89 | 79.67 | | | | |
| | XVANE 8 | 3267 | 91.29 | 12.45 | 11.85 | | | | | 78.84 | 79 44 | | | | |
| 8 | | 3289 | 87.14 | 10.4 | 8.4 | | | | | 76.74 | 78.74 | | | | |
| | | 3300 | 87.14 | 9.68 | 8.44 | | | | | 77.46 | 78.7 | | | | |
| | | 3355 | 87.14 | 9.03 | 8.48 | | | | | 78.11 | 78.66 | | | | |
| | | 3402 | 87.14 | 9.58 | 8.82 | | | | | 77.56 | 78 32 | | | | |
| | | 3437 | 87.14 | 10.35 | 9.28 | | | | | 76.79 | 77 86 | | | | |
| | | 3468 | 87.14 | 12.8 | 9.61 | | | | | 74.34 | 77.53 | | | | |
| | | 3493 | 87.14 | 12.94 | 9.63 | | | | | 74.2 | 77.51 | | | | |
| | | 3545 | 87.14 | 11.65 | 9.6 | | | | | 75.49 | 77.54 | | | | |
| | | 3566 | 87.14 | 10.9 | 9.61 | | | | | 76.24 | 77.53 | | | | |
| | XVANE 9 | 3600 | 87.14 | 10.55 | 9.72 | | | | | 76.59 | 77.42 | | | | |
| | | 3610 | 87.14 | 12.72 | 10.2 | | | | | 74.42 | 76.94 | | | | |
| | | 3632 | 87.14 | 11.05 | 10.18 | | | | | 76.09 | 76.96 | | | | |
| | | 3704 | 87.14 | 12.38 | 11.2 | | | | | 74.76 | 75.94 | | | | |
| | | 3747 | 87.14 | 12.58 | 11.84 | | | | | 74.56 | 75.3 | | | | |
| 9 | | 3759 | 82.94 | 8.88 | 7.74 | | | | | 74.06 | 75.2 | | | | |
| | | 3771 | 82.94 | 9.45 | 7.73 | | | | | 73.49 | 75.21 | | | | |
| | | 3798 | 82.94 | 10.98 | 7.73 | | | | | 71.96 | 75 21 | | | | |
| | | 3830 | 82.94 | 10.06 | 7.73 | | | | | 72.88 | 75.21 | | | | |
| | | 3841 | 82.94 | 9.43 | 7.73 | | | | | 73.51 | 75 21 | | | | |
| | | 3862 | 82.94 | 10.3 | 7.78 | | | | | 72.64 | 75.16 | | | | 92.41 |
| | | 3874 | 82.94 | 9.46 | 7.78 | | | | | 73.48 | 75.16 | | | | |
| | | 3920 | 82.94 | 9.24 | 7.79 | | | | | 73.7 | 75.15 | | | | |
| | XVANE 10 | 3951 | 82.94 | 9.08 | 8.82 | | | | | 73 86 | 74.12 | | | | |
| | | 3965 | 82.94 | 11.04 | 8.5 | | | | | 71.9 | 74 44 | | | | |
| | | 3981 | 82.94 | 10.13 | 8.48 | | | | | 72.81 | 74.46 | | | | |
| | | 3997 | 82.94 | 9.28 | 8.48 | | | | | 73.66 | 74.46 | | | | |

**Longitudinal Profile** **STONE MTN RESTORATION** **1/21/2003**

Yadkin River Basin, Wilkes County, North Carolina

Dani Wise

1st elev = TBM4 (RG)

| | | | STA (ft) | ELEV (ft) |
|---|---|---|---|---|
| | | Head First Riffle | 0 | 95.31 |
| | | Head Last Riffle | 4019 | 73.84 |
| Chan Slope (ft/ft) | 0.0053 | Valley Length (ft) | 2750 | |
| Valley Slope (ft/ft) | 0.0078 | Channel Length (ft | 4019 | |
| Sinuosity, K | 1.46 | Elev Change (ft) | 21.47 | |

**Turning Points**

| | BM | TP1 | TP2 | TP3 | TP4 | TP5 | TP6 | TP7 | TP8 | TP9 | TP10 | TP11 | TP12 | TP13 | TP14 | TP15 | TP16 | TP17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FS | | 3.39 | 3.52 | 7.04 | 5.02 | 4.27 | 2.85 | 11.07 | 4.32 | 6.37 | 6.63 | 6.72 | 7.48 | 5.84 | 6.13 | 5.61 | | |
| BS | 2.62 | 6.33 | 4.47 | 1.94 | 4.95 | 5.75 | 4.78 | 4.32 | 4.58 | 3.83 | 3.74 | 5.49 | 5.47 | 3.77 | 1.92 | 1.54 | | |
| ELEV | 100.00 | 99.23 | 102.04 | 99.47 | 96.39 | 97.07 | 99.97 | 93.68 | 93.68 | 91.89 | 89.09 | 90.11 | 88.12 | 87.75 | 85.39 | 81.70 | 83.24 | 83.24 |
| HI | **102.62** | **105.56** | **106.51** | **101.41** | **101.34** | **102.82** | **104.75** | **98.00** | **98.26** | **95.72** | **96.83** | **95.60** | **93.59** | **91.52** | **87.31** | **83.24** | **83.24** | **83.24** |

| | | STA (ft) | ELEV (ft) |
|---|---|---|---|
| | Head First Riffle | 0 | 93.95 |
| | Head Last Riffle | 4063.5 | 73.81 |
| Chan Slope (ft/ft) 0.0050 | Valley Length (ft) | 2750 | |
| Valley Slope (ft/ft) 0.0073 | Channel Length (ft | 4063.5 | |
| Sinuosity, K 1.48 | Elev Change (ft) | 20.14 | |

**YEAR 1 DATA**

| TP | NOTE | STA | HI | FS TW | FS WS | FS IB | FS BKF | FS LTOB | FS RTOB | ELEV TW | ELEV WS | ELEV IB | ELEV BKF | ELEV LTOB | ELEV RTOB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | | 0 | 106.51 | 12.65 | 11.2 | | 6.55 | | 4.37 | 93.86 | 95.31 | | | | 102.14 |
| | jhook | 4 | 106.51 | 13.92 | 11.2 | | 6.55 | | 4.37 | 92.59 | 95.31 | | | | 102.14 |
| | max jhook | 17 | 106.51 | 14.13 | 11.25 | | 7.31 | | 4.67 | 92.38 | 95.26 | | | | 101.84 |
| | HOR | 47 | 106.51 | 12 | 11.5 | | 7.11 | | 4.65 | 94.51 | 95.01 | | | | 101.86 |
| | xvane | 83.5 | 106.51 | 14.46 | 12.29 | | 7.85 | | 5.01 | 92.05 | 94.22 | | | | 101.5 |
| | HOR | 123 | 106.51 | 13.32 | 12.41 | | 7.7 | | 6.27 | 93.19 | 94.1 | | | | 100.24 |
| | | 160 | 106.51 | 14.35 | 12.97 | | 8.11 | | 4.95 | 92.16 | 93.54 | | | | 101.56 |
| 3 | | 300 | 101.41 | 11 | 9.13 | | 4.61 | | 1.69 | 90.41 | 92.28 | | | | 99.72 |
| | plug | 426 | 101.41 | 11.41 | 9.16 | | 4.89 | | 4.89 | 90 | 92.25 | | | | 96 52 |
| | | 506 | 101.41 | 11.37 | 9.15 | | 6.24 | | 6.24 | 90.04 | 92.26 | | | | 95.07 |
| | xvane | 577 | 101.41 | 9.82 | 9.17 | | 6.11 | | 5.35 | 91.59 | 92.24 | | | | 96.06 |
| | max xvan | 590 | 101.41 | 11.9 | 9.28 | | 6.25 | 5.56 | | 89 51 | 92.13 | | 95 16 | 95.85 | |
| 4 | rock vane | 611 | 101.34 | 10.04 | 9.22 | | 5.96 | 5.96 | | 91.3 | 92.12 | | 95 38 | 95.38 | |
| | | 653 | 101.34 | 11.07 | 9.24 | | 5.71 | 5.71 | | 90.27 | 92.1 | | 95.63 | 95.63 | |
| | | 691 | 101.34 | 9.9 | 9.22 | | 5.77 | 5.77 | | 91.44 | 92.12 | | 95.57 | 95 57 | |
| | HOR | 715 | 101.34 | 9.51 | 9.22 | | 6.09 | 6.09 | | 91.83 | 92.12 | | 95.25 | 95.25 | |
| | log vane | 889 | 101.34 | 11.15 | 10.78 | | 7 | | 3.92 | 90.19 | 90.56 | | 94.34 | | 97.42 |
| 5 | | 936 | 102.82 | 13.07 | 12.67 | | 6.38 | 6.38 | | 89.75 | 90.15 | | 96.44 | 96 44 | |
| 6 | | 1130 | 104.75 | 15.95 | 14.92 | | 9.36 | 9.36 | | 88.8 | 89 83 | | 95.39 | 95.39 | |
| | | 1234 | 104.75 | 15.9 | 14.96 | | 10.71 | 10.71 | | 88.85 | 89.79 | | 94.04 | 94 04 | |
| 7 | x vane | 1315 | 98 | 10.57 | 8.22 | | 4.36 | | 2 | 87.43 | 89.78 | | 93.64 | | 96 |
| | max | 1326.5 | 98 | 10.15 | 8.28 | | 4.97 | | 2.46 | 87.85 | 89.72 | | 93.03 | | 95.54 |
| | | 1342 | 98 | 8.96 | 8.3 | | 5.11 | | 3.06 | 89.04 | 89.7 | | 92.89 | | 94 94 |
| | HOR | 1374 | 98 | 8.75 | 8.3 | | 4.36 | | 4.36 | 89 25 | 89 7 | | 93.64 | | 93.64 |
| | | 1462 | 98 | 9.38 | 8.82 | | 5 | | 5 | 88.62 | 89.18 | | 93 | | 93 |
| 8 | x vane | 1603 | 98.26 | 9.81 | 9.1 | | 4.43 | | 4.43 | 88.45 | 89.16 | | 93.83 | | 93.83 |
| | HOR | 1625 | 98.26 | 10.75 | 10.21 | | 5.01 | 5.01 | | 87.51 | 88 05 | | 93.25 | 93.25 | |
| | | 1718 | 98.26 | 11.82 | 11.41 | | 6.61 | | 6.61 | 86.44 | 86.85 | | 91.65 | | 91.65 |
| 9 | | 1812 | 95.72 | 10.23 | 9.23 | | 6.34 | | | 85.49 | 86.49 | | 89.38 | | |
| | | 1818 | 95.72 | 11.53 | 9.29 | | 5.97 | | | 84.19 | 86.43 | | 89.75 | | |
| | | 1820 | 95.72 | 11.26 | 9.25 | | 6.32 | | | 84.46 | 86.47 | | 89.4 | | |
| | | 1834 | 95.72 | 12.48 | 9.22 | | 6.64 | 3.34 | | 83.24 | 86.5 | | 89.08 | 92.38 | |
| | | 1858 | 95.72 | 10.35 | 9.23 | | 6.17 | | | 85.37 | 86.49 | | 89 55 | | |
| | | 1880 | 95.72 | 11.58 | 9.22 | | 6.9 | | 5.9 | 84.14 | 86.5 | | 88.82 | | 89.82 |
| | | 1900 | 95.72 | 12 | 9.61 | | 6.86 | 5.59 | | 83.72 | 86.11 | | 88.86 | 90.13 | |
| | | 1917 | 95.72 | 11.15 | 9.62 | | 6.62 | | 5.56 | 84.57 | 86.1 | | 89 1 | | 90 16 |
| | | 1971 | 95.72 | 10.82 | 9.6 | | 6.76 | | 6.13 | 84.9 | 86.12 | | 88 96 | | 89.59 |
| | | 2045 | 96.83 | 14.58 | 10.72 | | 8.02 | | | 82.25 | 86.11 | | 88.81 | | |
| | | 2100 | 96.83 | 13.22 | 10.74 | | 5.34 | | 4.3 | 83.61 | 86.09 | | 91.49 | | 92.53 |
| | | 2323 | 95.6 | 14.07 | 9.51 | | 4.81 | | | 81.53 | 86.09 | | 90.79 | | |
| | | 2368 | 95.6 | 10 | 9.56 | | 4.85 | | | 85.6 | 86.04 | | 90.75 | | |
| | | 2476 | 95.6 | 11.41 | 10.65 | | 5.96 | | | 84.19 | 84.95 | | 89.64 | | |
| | | 2547 | 95.6 | 12.83 | 10.74 | | 6.27 | | | 82.77 | 84.86 | | 89.33 | | |
| | | 2580 | 95.6 | 12.96 | 10.75 | | 6.38 | | | 82.64 | 84.85 | | 89.22 | | |
| | | 2684 | 93.59 | 9.68 | 9.02 | | 5.56 | | | 83.91 | 84.57 | | 88.03 | | |
| | | 2711 | 93.59 | 11.38 | 9.2 | | 4.46 | | | 82.21 | 84.39 | | 89 13 | | |
| | | 2719 | 93.59 | 9.76 | 9.25 | | 5.18 | | | 83.83 | 84.34 | | 88 41 | | |
| | | 2746 | 93.59 | 10.06 | 9.69 | | 4.82 | | | 83.53 | 83.9 | | 88.77 | | |
| | | 2877 | 93.59 | 15.04 | 9.67 | | 6.01 | | | 78.55 | 83.92 | | 87.58 | | |
| | | 2996 | 91.52 | 8.41 | 7.65 | | 4.54 | | | 83.11 | 83.87 | | 86.98 | | |
| | | 3032 | 91.52 | 11.03 | 9.01 | | 4.65 | | | 80.49 | 82.51 | | 86.87 | | |
| | | 3078 | 91.52 | 10.84 | 9.65 | | 6.28 | | | 80.68 | 81.87 | | 85.24 | | |
| | | 3096 | 91.52 | 11.86 | 10.45 | | 6.31 | | | 79.66 | 81.07 | | 85.41 | | |
| | | 3120 | 91.52 | 11.07 | 10.57 | | 6.46 | | | 80.45 | 80.95 | | 85.06 | | |
| | | 3195 | 91.52 | 13.22 | 12.73 | | 7.45 | | | 78.3 | 78.79 | | 84.07 | | |
| | | 3235 | 87.31 | 9.62 | 8.52 | | 6.28 | | 2.96 | 77.69 | 78.79 | | 81.03 | | 84.35 |
| | | 3244 | 87.31 | 10.38 | 8.8 | | 5.56 | | 3.02 | 76.93 | 78.51 | | 81.75 | | 84.29 |
| | | 3276 | 87.31 | 9.16 | 8.8 | | 6.1 | | 0.22 | 78.15 | 78 51 | | 81.21 | | 87.09 |
| | | 3305 | 87.31 | 9.23 | 8.9 | | 5.65 | | 0.68 | 78.08 | 78.41 | | 81.66 | | 86 63 |
| | | 3398 | 87.31 | 10.56 | 9.95 | | 6.71 | 5.27 | | 76.75 | 77.36 | | 80.6 | 82.04 | |
| | | 3450 | 87.31 | 12.41 | 9.98 | | 7.23 | 5.08 | | 74.9 | 77.33 | | 80.08 | 82.23 | |
| | | 3470 | 87.31 | 13.48 | 9.94 | | 6.7 | 5.14 | | 73.83 | 77.37 | | 80.61 | 82.17 | |
| | | 3478 | 87.31 | 12.65 | 10.03 | | 7.21 | 4.89 | | 74.66 | 77.28 | | 80.1 | 82 42 | |
| | | 3558 | 87.31 | 10.71 | 10 | | 6.37 | | | 76.6 | 77.31 | | 80.94 | | |
| | | 3570 | 87.31 | 11.94 | 10.05 | | 7.08 | | | 75 37 | 77.26 | | 80.23 | | |
| | | 3588 | 87.31 | 10.68 | 10.26 | | 6.63 | | | 76.63 | 77 05 | | 80.68 | | |
| | | 3668 | 83.24 | 7.97 | 7.46 | | 3.2 | | | 75.27 | 75 78 | | 79.94 | | |
| | | 3707 | 83.24 | 8.53 | 8.13 | | 2.54 | | | 74.71 | 75.11 | | 80.7 | | |
| | | 3763 | 83.24 | 9.93 | 8.41 | | 3.33 | | | 73.31 | 74.83 | | 79.91 | | |
| | | 3788 | 83.24 | 9.54 | 8.42 | | 4.37 | | | 73.7 | 74.82 | | 78.87 | | |
| | | 3802 | 83.24 | 10.79 | 8.45 | | 4.27 | | | 72.45 | 74.79 | | 78.97 | | |
| | | 3823 | 83.24 | 9.41 | 8.43 | | 5.39 | | 4.21 | 73.83 | 74.81 | | 77.85 | | 78.93 |
| | | 3908 | 83.24 | 10.78 | 8.52 | | 3.56 | | | 72.46 | 74.72 | | 79.68 | | |
| | | 3953 | 83.24 | 9.38 | 8.77 | | 2.78 | | 1.03 | 73.86 | 74.47 | | 79.46 | | 82.21 |
| | | 3981 | 83.24 | 9.96 | 9.32 | | 4.15 | | | 73.28 | 73.92 | | 79.09 | | |
| | | 3993 | 83.24 | 12.04 | 9.31 | | 4.57 | | | 71.2 | 73.93 | | 78.67 | | |
| | | 4019 | 83.24 | 11.31 | 9.4 | | 4.7 | | | 71.93 | 73.84 | | 78.54 | | |

| TP | NOTE | STA | HI | FS TW | FS WS | FS IB | FS BKF | FS LTOB | FS RTOB | ELEV TW | ELEV WS | ELEV IB | ELEV BKF | ELEV LTOB | ELEV RTOB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 106.18 | 13.05 | 12.23 | | | | | 93.13 | 93.95 | | | | |
| | | 5 | 106.18 | 14.48 | 12.26 | | | | | 91.7 | 93.92 | | | | |
| | | 15 | 106.18 | 14.84 | 12.24 | | | | 5.44 | 91.34 | 93.94 | | | | 100.74 |
| | | 29 | 106.18 | 12.9 | 12.32 | | | | | 93.28 | 93.86 | | | | |
| | | 78 | 106.18 | 13.59 | 12.98 | | | | | 92.59 | 93.2 | | | | |
| | | 83.5 | 106.18 | 14.76 | 13 | | | | | 91.42 | 93.18 | | | | |
| | | 87.5 | 106.18 | 14.04 | 13.06 | | | | | 92.14 | 93.12 | | | | |
| | | 104 | 106.18 | 17.31 | 13.32 | | | | | 88.87 | 92.86 | | | | |
| | | 122 | 106.18 | 14.56 | 13.31 | | | | | 91.62 | 92.87 | | | | |
| | | 130 | 106.18 | 13.78 | 13.32 | | | | 7 | 92.4 | 92.86 | | | | 99 18 |
| | | 160 | 106.18 | 14.66 | 14.09 | | | | | 91.52 | 92.09 | | | | |
| | | 174 | 106.18 | 15.93 | 14.05 | | | | | 90.25 | 92.13 | | | | |
| | | 203 | 106.18 | 15.17 | 14.05 | | | | | 91.01 | 92.13 | | | | |
| | | 231 | 106.18 | 14.95 | 14.04 | | | | | 91.23 | 92.14 | | | | |
| | | 293 | 106.18 | 15.54 | 14.05 | | | | | 90.64 | 92.13 | | | | |
| | | 320 | 101.95 | 11.31 | 9.8 | | | | | 90.64 | 92.15 | | | | |
| | | 350 | 101.95 | 10.89 | 9.79 | | | | | 91.06 | 92.16 | | | | |
| | | 387 | 101.95 | 10.94 | 9.8 | | | | | 91.01 | 92.15 | | | | |
| | | 424 | 101.95 | 11.76 | 9.85 | | | | | 90.19 | 92.1 | | | | |
| | | 478 | 101.95 | 10.81 | 9.81 | | | | 6.19 | 91.14 | 92.14 | | | | 95.76 |
| | | 508 | 101.95 | 12.11 | 9.81 | | | | | 89.84 | 92.14 | | | | |
| | | 549 | 101.95 | 12.35 | 9.82 | | | | | 89.6 | 92.13 | | | | |
| | | 569 | 101.95 | 10.4 | 9.85 | | | | | 91.55 | 92 1 | | | | |
| | | 580 | 101.95 | 10.62 | 9.94 | | | | | 91.33 | 92.01 | | | | |
| | | 586 | 101.95 | 12.2 | 9.99 | | | | | 89.75 | 91.96 | | | | |
| | | 605 | 101.95 | 11.25 | 10.02 | | | | | 90 7 | 91.93 | | | | |
| | | 615 | 101.95 | 10.51 | 10.01 | | | | | 91.44 | 91.94 | | | | |
| | | 633 | 101.95 | 10.54 | 10 | | | | | 91.41 | 91.95 | | | | |
| | | 661 | 101.95 | 11.01 | 10 | | | | 6.72 | 90.94 | 91.95 | | | | 95.23 |
| | | 724 | 101.95 | 10.85 | 10 | | | | | 91.1 | 91.95 | | | | |
| | | 765 | 101.95 | 10.64 | 10.02 | | | | | 91.31 | 91.93 | | | | |
| | | 865 | 102.57 | 12.25 | 11.86 | | | | | 90.32 | 90.71 | | | | |
| | | 882 | 102.57 | 12.31 | 11.96 | | | | | 90.26 | 90.61 | | | | |
| | | 915 | 102.57 | 12.7 | 12.17 | | | | 5.39 | 89.87 | 90.4 | | | | 97.18 |
| | | 991 | 102.57 | 13.44 | 12.72 | | | | | 89.13 | 89.85 | | | | |
| | | 1052 | 102.57 | 13.52 | 12.74 | | | | | 89.05 | 89.83 | | | | |
| | | 1104 | 105.5 | 16.07 | 15.27 | | | | | 89.43 | 90.23 | | | | |
| | | 1129 | 105.5 | 17.9 | 15.26 | | | | | 87.6 | 90.24 | | | | |
| | | 1145 | 105.5 | 17.54 | 15.23 | | | | | 87.96 | 90.25 | | | | |
| | | 1171 | 105.5 | 16.79 | 15.25 | | | | | 88.71 | 90.25 | | | | |
| | | 1199 | 105.5 | 16.91 | 15.26 | | | | 10.55 | 88.59 | 90.24 | | | | 94.95 |
| | | 1219 | 105.5 | 16.02 | 15.25 | | | | | 89.48 | 90.25 | | | | |
| | | 1248 | 105.5 | 16.52 | 15.26 | | | | | 88.98 | 90.24 | | | | |
| | | 1290 | 105.5 | 16.73 | 15.28 | | | | | 88 77 | 90.22 | | | | |
| | | 1323 | 105.5 | 16.24 | 15.34 | | | | | 89.26 | 90.16 | | | | |
| | | 1329 | 105.5 | 17.12 | 15.32 | | | | | 88.38 | 90.18 | | | | |
| | | 1339 | 105.5 | 15.99 | 15.32 | | | | | 89.51 | 90.18 | | | | |
| | | 1358 | 105.5 | 16.24 | 15.35 | | | | | 89.26 | 90.15 | | | | |
| | | 1378 | 105.5 | 15.95 | 15.25 | | | | | 89.55 | 90.15 | | | | |
| | | 1427 | 98.5 | 9.59 | 9.08 | | | | 5.86 | 88.91 | 89.42 | | | | 92 64 |
| | | 1507 | 98.5 | 10.23 | 9.59 | | | | | 88.27 | 88.91 | | | | |
| | | 1582 | 98.5 | 10.32 | 9.63 | | | | | 88.18 | 88.87 | | | | |
| | | 1604 | 98.5 | 9.69 | 9.69 | | | | | 88.81 | 88.81 | | | | |
| | | 1620 | 98.5 | 13.25 | 10.75 | | | | | 85.25 | 87.75 | | | | |
| | | 1634 | 98.5 | 12.94 | 10.74 | | | | | 85 56 | 87 76 | | | | |
| | | 1667 | 98.5 | 11.42 | 10.75 | | | | | 87.08 | 87.75 | | | | |
| | | 1733 | 98.5 | 11.93 | 11.45 | | | | 6.32 | 86.57 | 87.05 | | | | 92.18 |
| | | 1759 | 98.5 | 12.03 | 11.57 | | | | | 86.47 | 86.93 | | | | |
| | | 1820 | 98.5 | 12.53 | 11.59 | | | | | 85.97 | 86.91 | | | | |
| | | 1832 | 98.5 | 14.02 | 11.59 | | | | | 84.48 | 86.91 | | | | |
| | | 1840 | 98.5 | 13.06 | 11.59 | | | | | 85.44 | 86.91 | | | | |
| | | 1855 | 98.5 | 14.53 | 11.59 | | | | | 83.97 | 86.91 | | | | |
| | | 1864 | 98.5 | 13.18 | 11.6 | | | | | 85.32 | 86.9 | | | | |
| | | 1883 | 98.5 | 12.99 | 11.59 | | | | | 85.51 | 86.91 | | | | |
| | | 1906 | 98.5 | 12.42 | 12.07 | | | | | 86.08 | 86.43 | | | | |
| | | 1918 | 96.92 | 12.68 | 10.99 | | | | | 84.24 | 85.93 | | | | |
| | | 1933 | 96.92 | 11.35 | 10.89 | | | | | 85 57 | 86.03 | | | | |
| | | 1969 | 96.92 | 11.54 | 10.92 | | | | | 85 38 | 86 | | | | |
| | | 1997 | 96.92 | 11.57 | 10.9 | | | | | 85 35 | 86.02 | | | | |
| | | 2028 | 96.92 | 12.69 | 10.92 | | | | | 84.23 | 86 | | | | |
| | | 2058 | 96.92 | 14.98 | 10.94 | | | | | 81.94 | 85 98 | | | | |
| | | 2072 | 96.92 | 14.48 | 10.94 | | | | | 82.44 | 85 98 | | | | |
| | | 2098 | 96.92 | 12.5 | 10.94 | | | | | 84 42 | 85.98 | | | | |
| | | 2115 | 96.92 | 14.32 | 10.94 | | | | | 82.6 | 85.98 | | | | |
| | | 2135 | 96.92 | 13 | 10.93 | | | | | 83.92 | 85.99 | | | | |
| | | 2154 | 96.92 | 12.12 | 10.92 | | | | | 84.8 | 86 | | | | |
| | | 2168 | 96.92 | 12.89 | 10.94 | | | | | 84 03 | 85.98 | | | | |
| | | 2204 | 96.92 | 12.85 | 10.91 | | | | | 84 07 | 86.01 | | | | |
| | | 2217 | 96.92 | 12.85 | 10.91 | | | | | 84 07 | 86 01 | | | | |
| | | 2259 | 96.92 | 12.34 | 10.92 | | | | | 84 58 | 86 | | | | |
| | | 2277 | 96.92 | 13.11 | 10.92 | | | | | 83 81 | 86 | | | | |
| | | 2299 | 96.92 | 15.75 | 11 | | | | | 81.17 | 85.92 | | | | |
| | | 2358 | 96.92 | 13.38 | 10.94 | | | | | 83 54 | 85.98 | | | | |
| | | 2396 | 96.92 | 11.42 | 10.97 | | | | 6.01 | 85.5 | 85.95 | | | | 90.91 |
| | | 2509 | 94.61 | 10.2 | 9.7 | | | | | 84 41 | 84.91 | | | | |
| | | 2574 | 94.61 | 10.35 | 9.84 | | | | | 84.26 | 84.77 | | | | |
| | | 2606 | 94.61 | 12.02 | 9.88 | | | | | 82 59 | 84.73 | | | | |
| | | 2617 | 94.61 | 11.19 | 9.88 | | | | | 83.42 | 84.73 | | | | |
| | | 2630 | 94.61 | 12.72 | 9.88 | | | | 5.33 | 81.89 | 84.73 | | | | 89.28 |
| | | 2650 | 94.61 | 11.02 | 9.88 | | | | | 83.59 | 84.73 | | | | |
| | | 2666 | 94.61 | 10.44 | 9.88 | | | | | 84 17 | 84.73 | | | | |
| | | 2726 | 94.61 | 10.62 | 9.95 | | | | | 83.99 | 84.66 | | | | |
| | | 2730.4 | 94.61 | 10.21 | 9.96 | | | | | 84.4 | 84.65 | | | | |
| | | 2744 | 94.61 | 13.01 | 10.44 | | | | | 81.6 | 84.17 | | | | |
| | | 2761 | 94.63 | 11.61 | 10.47 | | | | | 83 | 84.14 | | | | |
| | | 2787 | 94.61 | 10.96 | 10.57 | | | | | 83.65 | 84.04 | | | | |
| | | 2814 | 94.61 | 11.56 | 11.02 | | | | | 83.05 | 83 59 | | | | |
| | | 2833 | 94.61 | 12.31 | 11.02 | | | | | 82.3 | 83.59 | | | | |
| | | 2842 | 94.61 | 13.08 | 11.03 | | | | | 81.53 | 83.58 | | | | |
| | | 2883 | 94.61 | 13.3 | 11.03 | | | | | 81 31 | 83.58 | | | | |
| | | 2935 | 92.41 | 13.06 | 8.84 | | | | | 79 35 | 83.57 | | | | |
| | | 2953 | 92.41 | 13 | 8.85 | | | | | 79.41 | 83.56 | | | | |
| | | 2971 | 92.41 | 11.07 | 8.85 | | | | | 81.34 | 83.56 | | | | |
| | | 3036 | 92.41 | 9.55 | 8.85 | | | | | 82 86 | 83.56 | | | | |
| | | 3050 | 92.41 | 9.35 | 8.89 | | | | | 83.06 | 83 52 | | | | |
| | | 3057 | 92.41 | 12.91 | 10.86 | | | | | 79.5 | 81.55 | | | | |
| | | 3066.5 | 92.41 | 11.59 | 10.98 | | | | | 80.82 | 81 43 | | | | |
| | | 3094 | 92.41 | 11.94 | 11.31 | | | | | 80.47 | 81.1 | | | | |
| | | 3125 | 92.41 | 11.99 | 11.46 | | | | | 80.42 | 80.95 | | | | |
| | | 3148 | 92.41 | 13.29 | 11.59 | | | | | 79 12 | 80.82 | | | | |
| | | 3160 | 92.41 | 12.27 | 11.65 | | | | 7.34 | 80.14 | 80.76 | | | | 85.07 |
| | | 3223 | 92.41 | 13.9 | 13.24 | | | | | 78.51 | 79.17 | | | | |
| | | 3284 | 92.41 | 14.19 | 13.34 | | | | | 78 22 | 78 87 | | | | |
| | | 3290 | 92.41 | 13.97 | 13.55 | | | | | 78.44 | 78.86 | | | | |
| | | 3297 | 87.84 | 11.52 | 9.55 | | | | | 76.32 | 78.29 | | | | |
| | | 3316 | 87.84 | 11.19 | 9.54 | | | | | 76.65 | 78.3 | | | | |
| | | 3357.5 | 87.84 | 9.99 | 9.55 | | | | | 77.85 | 78.29 | | | | |
| | | 3451.5 | 87.84 | 10.97 | 10.55 | | | | 7.34 | 76 87 | 77.29 | | | | 80.5 |
| | | 3472 | 87.84 | 11.94 | 10.64 | | | | | 75.9 | 77.2 | | | | |
| | | 3485 | 87.84 | 13.51 | 10.69 | | | | | 74 33 | 77 15 | | | | |
| | | 3502 | 87.84 | 13.68 | 10.66 | | | | | 74 16 | 77.18 | | | | |
| | | 3520 | 87.84 | 14.01 | 10.65 | | | | | 73.83 | 77.19 | | | | |
| | | 3532 | 87.84 | 12.88 | 10.64 | | | | | 74.96 | 77 2 | | | | |
| | | 3572 | 87.84 | 11.98 | 10.64 | | | | | 75 86 | 77.2 | | | | |
| | | 3599 | 87.84 | 11.17 | 10.64 | | | | | 76.67 | 77.2 | | | | |
| | | 3615.5 | 87.84 | 10.87 | 10.66 | | | | | 76.97 | 77.18 | | | | |
| | | 3620 | 87.84 | 13.63 | 10.95 | | | | | 74.21 | 76.89 | | | | |
| | | 3642 | 83.67 | 7.33 | 6.81 | | | | | 76.34 | 76.86 | | | | |
| | | 3725 | 83.67 | 8.62 | 8.07 | | | | | 75 05 | 75.6 | | | | |
| | | 3743 | 83.67 | 10.19 | 8.64 | | | | | 73.48 | 75 03 | | | | |
| | | 3754 | 83.67 | 9.62 | 8.66 | | | | | 74.05 | 75 01 | | | | |
| | | 3767 | 83.67 | 9.3 | 8.72 | | | | | 74.37 | 74 95 | | | | |
| | | 3784.5 | 83.67 | 9.95 | 8.86 | | | | | 73.72 | 74 81 | | | | |
| | | 3798.5 | 83.67 | 10.71 | 8.85 | | | | | 72 96 | 74.82 | | | | |
| | | 3805 | 83.67 | 9.88 | 8.87 | | | | | 73.79 | 74.8 | | | | |
| | | 3812.5 | 83.67 | 11.48 | 8.86 | | | | | 72.19 | 74.81 | | | | |
| | | 3821 | 83.67 | 11.82 | 8.86 | | | | | 71.85 | 74.81 | | | | |
| | | 3840 | 83.67 | 11.3 | 8.86 | | | | | 72.37 | 74.81 | | | | |
| | | 3861.5 | 83.67 | 11.53 | 8.87 | | | | | 72.14 | 74.8 | | | | |
| | | 3871.5 | 83.67 | 10.98 | 8.86 | | | | | 72.69 | 74.81 | | | | |
| | | 3895 | 83.67 | 9.63 | 8.87 | | | | 4.84 | 74.04 | 74.8 | | | | 78.83 |
| | | 3960 | 83.67 | 9.29 | 8.88 | | | | | 74.38 | 74.79 | | | | |
| | | 3968 | 83.67 | 8.62 | 8.88 | | | | | 75.05 | 74.79 | | | | |
| | | 3983 | 83.67 | 10.86 | 9.33 | | | | | 72.81 | 74.34 | | | | |
| | | 3996.5 | 83.67 | 10.12 | 9.33 | | | | | 73.55 | 74.34 | | | | |
| | | 4013 | 83.67 | 9.96 | 9.35 | | | | | 73.71 | 74.32 | | | | |
| | | 4034 | 83.67 | 10.34 | 9.75 | | | | | 73 33 | 73 92 | | | | |
| | | 4047 | 83.67 | 12.63 | 9.81 | | | | | 71.04 | 73 86 | | | | |
| | | 4063.5 | 83.67 | 10.3 | 9.86 | | | | 5.19 | 73 37 | 73.81 | | | | 78.48 |

Cross Section R4-XSEC1 RIFFLE

**STONE MTN RESTORATION**
**Yadkin River Basin, Wilkes County, North Carolina**
**Dani Wise**

**1/21/2003**

Oct-00

| | Survey Data | | | | Bkf Hydraulic Geometry | | |
|---|---|---|---|---|---|---|---|
| NOTES | STA | HI | FS | ELEV | Depth | Width | Area |
| | 0 | 101.34 | 5.74 | 95.60 | 0.00 | 0.0 | 0.00 |
| | 27 | 101.34 | 4.66 | 96.68 | 0.00 | 0.0 | 0.00 |
| | 32 | 101.34 | 5.37 | 95.97 | 0.00 | 0.0 | 0.00 |
| LBKF | 33 | 101.34 | 6.07 | 95.27 | 0.00 | 0.0 | 0.00 |
| | 35 | 101.34 | 7.98 | 93.36 | 1.91 | 2.0 | 1.91 |
| | 38.5 | 101.34 | 8.51 | 92.83 | 2.44 | 3.5 | 7.61 |
| | 42 | 101.34 | 9.96 | 91.38 | 3.89 | 3.5 | 11.08 |
| | 49 | 101.34 | 10.52 | 90.82 | 4.45 | 7.0 | 29.19 |
| | 60.2 | 101.34 | 11.18 | 90.16 | 5.11 | 11.2 | 53.54 |
| | 63.2 | 101.34 | 10.53 | 90.81 | 4.46 | 3.0 | 14.36 |
| | 65.4 | 101.34 | 10.12 | 91.22 | 4.05 | 2.2 | 9.36 |
| | 65.7 | 101.34 | 9.35 | 91.99 | 3.28 | 0.3 | 1.10 |
| | 68.5 | 101.34 | 9.42 | 91.92 | 3.35 | 2.8 | 9.28 |
| | 69 | 101.34 | 10.51 | 90.83 | 4.44 | 0.5 | 1.95 |
| | 78.3 | 101.34 | 10.3 | 91.04 | 4.23 | 9.3 | 40.32 |
| | 83.4 | 101.34 | 8.76 | 92.58 | 2.69 | 5.1 | 17.65 |
| RBKF | 90 | 101.34 | 6.24 | 95.10 | 0.17 | 6.6 | 9.44 |
| | 105 | 101.34 | 5.44 | 95.90 | 0.00 | 0.0 | 0.00 |
| | 107 | 101.34 | 7.32 | 94.02 | 0.00 | 0.0 | 0.00 |

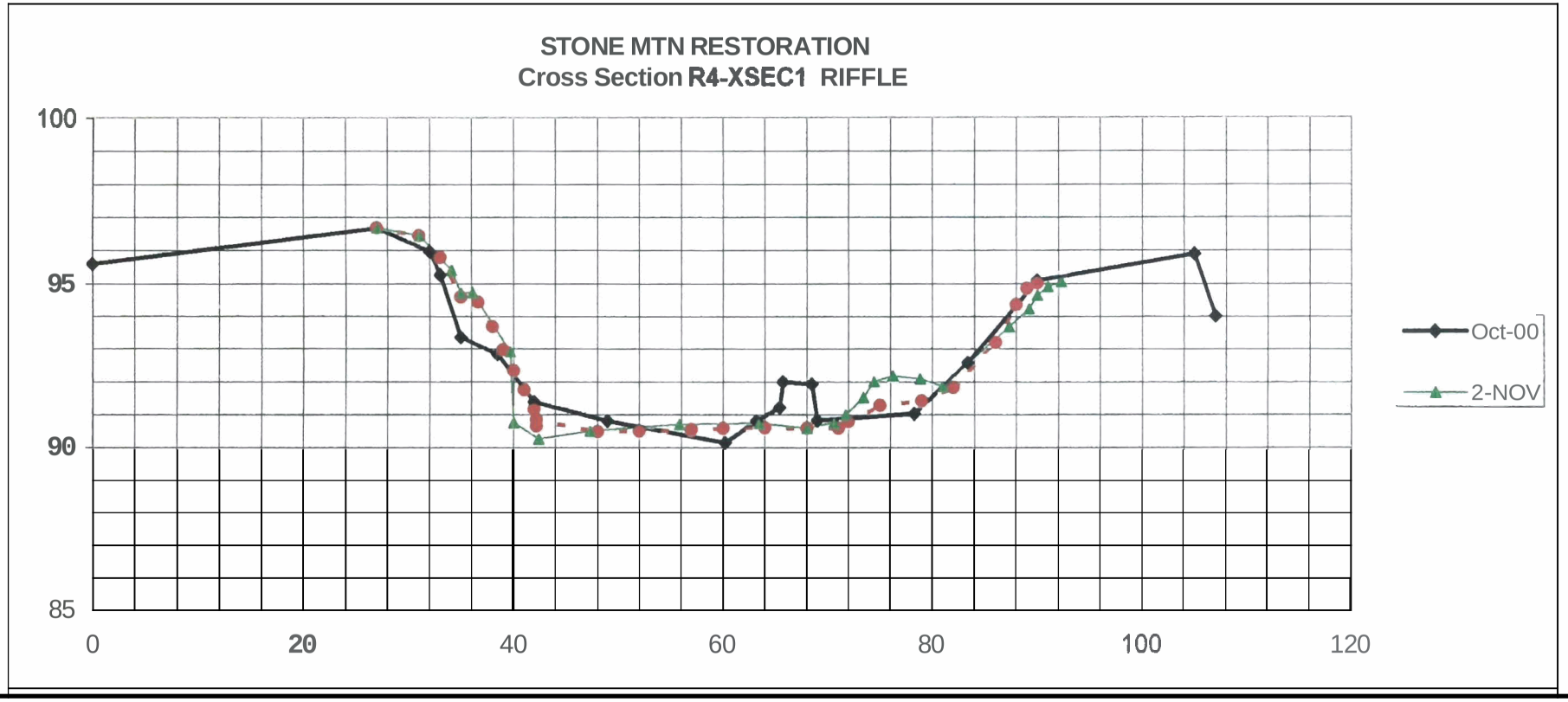
Oct-01 HI = 102.57

| | Survey Data | | | Bkf Hydraulic Geometry | | |
|---|---|---|---|---|---|---|
| NOTES | STA | FS | ELEV | Depth | Width | Area |
| | 27 | 5.9 | 96.67 | 0.00 | 0.0 | 0.00 |
| | 31 | 6.14 | 96.43 | 0.00 | 0.0 | 0.00 |
| | 33 | 6.8 | 95.77 | 0.00 | 0.0 | 0.00 |
| | 35 | 7.99 | 94.58 | 1.19 | 2.0 | 1.19 |
| | 36.6 | 8.15 | 94.42 | 1.35 | 1.6 | 2.03 |
| | 38 | 8.9 | 93.67 | 2.10 | 1.4 | 2.42 |
| | 39 | 9.61 | 92.96 | 2.81 | 1.0 | 2.46 |
| | 40 | 10.26 | 92.31 | 3.46 | 1.0 | 3.14 |
| | 41 | 10.85 | 91.72 | 4.05 | 1.0 | 3.76 |
| | 42 | 11.44 | 91.13 | 4.64 | 1.0 | 4.35 |
| | 42.2 | 11.94 | 90.63 | 5.14 | 0.2 | 0.98 |
| | 42.2 | 11.74 | 90.83 | 4.94 | 0.0 | 0.00 |
| | 48 | 12.11 | 90.46 | 5.31 | 5.8 | 29.73 |
| | 52 | 12.09 | 90.48 | 5.29 | 4.0 | 21.20 |
| | 57 | 12.04 | 90.53 | 5.24 | 5.0 | 26.33 |
| | 60 | 12 | 90.57 | 5.20 | 3.0 | 15.66 |
| | 64 | 11.99 | 90.58 | 5.19 | 4.0 | 20.78 |
| | 68 | 12.01 | 90.56 | 5.21 | 4.0 | 20.80 |
| | 71 | 12.01 | 90.56 | 5.21 | 3.0 | 15.63 |
| | 72 | 11.8 | 90.77 | 5.00 | 1.0 | 5.11 |
| | 75 | 11.32 | 91.25 | 4.52 | 3.0 | 14.28 |
| | 79 | 11.19 | 91.38 | 4.39 | 4.0 | 17.82 |
| | 82 | 10.78 | 91.79 | 3.98 | 3.0 | 12.56 |
| | 86 | 9.39 | 93.18 | 2.59 | 4.0 | 13.14 |
| | 88 | 8.24 | 94.33 | 1.44 | 2.0 | 4.03 |
| | 89 | 7.74 | 94.83 | 0.94 | 1.0 | 1.19 |
| | 90 | 7.57 | 95 | 0.77 | 1.0 | 0.85 |

Nov-02 HI = 100

| | Survey Data | | | Adjusted Stations/Elev | |
|---|---|---|---|---|---|
| NOTES | STA | FS | ELEV | STA | ELEV |
| LPIN | 0 | 3.85 | 96.15 | 27.00 | 96.7 |
| LTOB | 4 | 4.09 | 95.91 | 31.00 | 96.4 |
| | 7.1 | 5.13 | 94.87 | 34.10 | 95.4 |
| | 8 | 5.83 | 94.17 | 35.00 | 94.7 |
| | 9.1 | 5.82 | 94.18 | 36.10 | 94.7 |
| | 12.7 | 7.64 | 92.36 | 39.70 | 92.9 |
| LEW | 13 | 9.79 | 90.21 | 40.00 | 90.7 |
| | 15.4 | 10.27 | 89.73 | 42.40 | 90.3 |
| | 20.3 | 10.04 | 89.96 | 47.30 | 90.5 |
| | 28.8 | 9.84 | 90.16 | 55.80 | 90.7 |
| | 36.4 | 9.81 | 90.19 | 63.40 | 90.7 |
| | 41 | 9.95 | 90.05 | 68.00 | 90.6 |
| | 43.6 | 9.79 | 90.21 | 70.60 | 90.7 |
| REW/WS | 44.7 | 9.55 | 90.45 | 71.70 | 91.0 |
| BAR | 46.4 | 9.03 | 90.97 | 73.40 | 91.5 |
| | 47.4 | 8.54 | 91.46 | 74.40 | 92.0 |
| | 49.2 | 8.38 | 91.62 | 76.20 | 92.1 |
| | 51.8 | 8.46 | 91.54 | 78.80 | 92.1 |
| | 54 | 8.7 | 91.3 | 81.00 | 91.8 |
| | 60.3 | 6.86 | 93.14 | 87.30 | 93.7 |
| | 62.2 | 6.31 | 93.69 | 89.20 | 94.2 |
| RTOB | 63 | 5.89 | 94.11 | 90.00 | 94.6 |
| | 64 | 5.65 | 94.35 | 91.00 | 94.9 |
| | 65.3 | 5.5 | 94.5 | 92.30 | 95.0 |

| R4-XSEC 1 | Feature | Type | Wfpa | LBKF | RBKF | ELEVbkf | Wbkf | Dbkf | W/D | Abkf | Dmax | ER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct-00 | RIFFLE | C | 200 | 33.0 | 90.0 | 95.27 | 57.0 | 3.6 | 15.7 | 206.8 | 5.1 | 3.5 |
| Oct-01 | RIFFLE | C | 200 | 33.0 | 90.0 | 95.77 | 57.0 | 4.2 | 13.6 | 239.4 | 5.3 | 3.5 |
| Nov-02 | RIFFLE | C | 200 | 35.0 | 91.0 | 94.90 | 56.2 | 3.3 | 17.2 | 184.4 | 4.6 | 3.6 |



Cross Section R4-XSEC2 POOL

STONE MTN RESTORATION
Yadkin River Basin, Wilkes County, North Carolina
Dani Wise

1/21/2003

Oct-00

| | Survey Data | | | | Bkf Hydraulic Geometry | | |
|---|---|---|---|---|---|---|---|
| NOTES | STA | HI | FS | ELEV | Depth | Width | Area |
| | 0 | 104.75 | 9.84 | 94.91 | 0.00 | 0.0 | 0.00 |
| LBKF | 19 | 104.75 | 9.69 | 95.06 | 0.00 | 0.0 | 0.00 |
| | 22.1 | 104.75 | 10.38 | 94.37 | 0.69 | 3.1 | 1.07 |
| | 23 | 104.75 | 11.87 | 92.88 | 2.18 | 0.9 | 1.29 |
| | 25.5 | 104.75 | 12.84 | 91.91 | 3.15 | 2.5 | 6.66 |
| | 31 | 104.75 | 14.88 | 89.87 | 5.19 | 5.5 | 22.94 |
| | 41 | 104.75 | 15.29 | 89.46 | 5.60 | 10.0 | 53.95 |
| | 48 | 104.75 | 15.85 | 88.90 | 6.16 | 7.0 | 41.16 |
| | 52 | 104.75 | 15.51 | 89.24 | 5.82 | 4.0 | 23.96 |
| | 52 | 104.75 | 14.92 | 89.83 | 5.23 | 0.0 | 0.00 |
| | 52.6 | 104.75 | 13.02 | 91.73 | 3.33 | 0.6 | 2.57 |
| | 56.8 | 104.75 | 12.08 | 92.67 | 2.39 | 4.2 | 12.01 |
| RBKF | 62.7 | 104.75 | 9.2 | 95.55 | 0.00 | 0.0 | 0.00 |
| | 67 | 104.75 | 5.17 | 99.58 | 0.00 | 0.0 | 0.00 |
| | 68.6 | 104.75 | 4.9 | 99.85 | 0.00 | 0.0 | 0.00 |
| | 80 | 104.75 | 4.97 | 99.78 | 0.00 | 0.0 | 0.00 |
| | 100 | 104.75 | 4.92 | 99.83 | 0.00 | 0.0 | 0.00 |

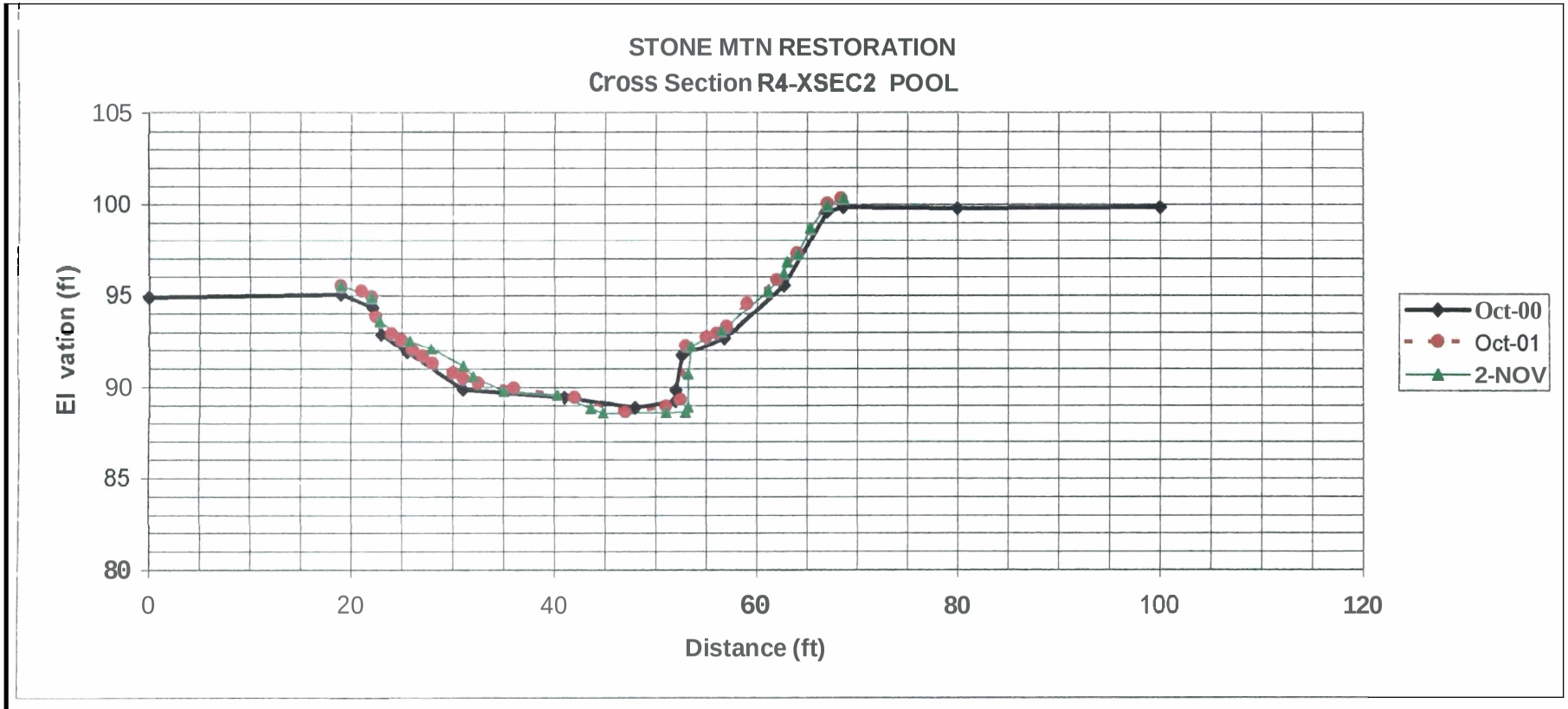
Oct-01 HI = 105.5

| | Survey Data | | | Bkf Hydraulic Geometry | | | |
|---|---|---|---|---|---|---|---|
| NOTES | STA | FS | ELEV | Depth | Width | Area | |
| | 19 | 10.02 | 95.48 | 0.00 | 0.0 | 0.00 | LPIN/LTO |
| | 21 | 10.29 | 95.21 | 0.27 | 2.0 | 0.27 | |
| | 22 | 10.59 | 94.91 | 0.57 | 1.0 | 0.42 | |
| | 22.4 | 11.69 | 93.81 | 1.67 | 0.4 | 0.45 | |
| | 24 | 12.59 | 92.91 | 2.57 | 1.6 | 3.39 | |
| | 25 | 12.94 | 92.56 | 2.92 | 1.0 | 2.75 | |
| | 26 | 13.46 | 92.04 | 3.44 | 1.0 | 3.18 | LEW |
| | 27 | 13.84 | 91.66 | 3.82 | 1.0 | 3.63 | |
| | 28 | 14.22 | 91.28 | 4.20 | 1.0 | 4.01 | |
| | 30 | 14.76 | 90.74 | 4.74 | 2.0 | 8.94 | |
| | 31 | 15.05 | 90.45 | 5.03 | 1.0 | 4.89 | TW |
| | 32.5 | 15.3 | 90.2 | 5.28 | 1.5 | 7.73 | |
| | 36 | 15.58 | 89.92 | 5.56 | 3.5 | 18.97 | |
| | 42 | 16.09 | 89.41 | 6.07 | 6.0 | 34.89 | REW |
| | 47 | 16.86 | 88.64 | 6.84 | 5.0 | 32.28 | WS |
| | 51 | 16.57 | 88.93 | 6.55 | 4.0 | 26.78 | |
| | 52.4 | 16.19 | 89.31 | 6.17 | 1.4 | 8.90 | |
| | 53 | 13.3 | 92.2 | 3.28 | 0.6 | 2.84 | BKF |
| | 55 | 12.8 | 92.7 | 2.78 | 2.0 | 6.06 | |
| | 56 | 12.6 | 92.9 | 2.58 | 1.0 | 2.68 | |
| | 57 | 12.24 | 93.26 | 2.22 | 1.0 | 2.40 | |
| | 59 | 10.99 | 94.51 | 0.97 | 2.0 | 3.19 | |
| | 62 | 9.68 | 95.82 | 0.00 | 0.0 | 0.00 | RTOB |
| | 64 | 8.24 | 97.26 | 0.00 | 0.0 | 0.00 | RPIN |
| | 67 | 5.47 | 100.03 | 0.00 | 0.0 | 0.00 | |
| | 68.4 | 5.22 | 100.28 | 0.00 | 0.0 | 0.00 | |
| | 68.4 | 5.22 | 100.28 | 0.00 | 0.0 | 0.00 | |

Nov-02 HI = 104.92

| | Survey Data | | | | Bkf Hydraulic Geometry | | |
|---|---|---|---|---|---|---|---|
| NOTES | STA | REVISED STA | FS | ELEV | Depth | Width | Area |
| | 0 | 19 | 9.44 | 95.48 | 0.00 | 0.0 | 0.00 |
| | 3 | 22 | 10.04 | 94.88 | 0.00 | 0.0 | 0.00 |
| | 3.8 | 22.8 | 11.37 | 93.55 | 0.00 | 0.0 | 0.00 |
| | 6.8 | 25.8 | 12.44 | 92.48 | 0.00 | 0.0 | 0.00 |
| | 8.9 | 27.9 | 12.85 | 92.07 | 0.00 | 0.0 | 0.00 |
| | 12 | 31 | 13.79 | 91.13 | 0.00 | 0.0 | 0.00 |
| | 13 | 32 | 14.37 | 90.55 | 0.00 | 0.0 | 0.00 |
| | 16 | 35 | 15.17 | 89.75 | 0.00 | 0.0 | 0.00 |
| | 21.3 | 40.3 | 15.38 | 89.54 | 0.00 | 0.0 | 0.00 |
| | 24.6 | 43.6 | 16.1 | 88.82 | 0.00 | 0.0 | 0.00 |
| | 25.8 | 44.8 | 16.37 | 88.55 | 0.00 | 0.0 | 0.00 |
| | 32 | 51 | 16.35 | 88.57 | 0.00 | 0.0 | 0.00 |
| | 33.9 | 52.9 | 16.32 | 88.6 | 0.00 | 0.0 | 0.00 |
| | 34.2 | 53.2 | 16.05 | 88.87 | 0.00 | 0.0 | 0.00 |
| | 34.2 | 53.2 | 14.26 | 90.66 | 0.00 | 0.0 | 0.00 |
| | 34.5 | 53.5 | 12.75 | 92.17 | 0.00 | 0.0 | 0.00 |
| | 37.5 | 56.5 | 11.9 | 93.02 | 0.00 | 0.0 | 0.00 |
| | 42.1 | 61.1 | 9.72 | 95.2 | 0.00 | 0.0 | 0.00 |
| | 43.7 | 62.7 | 8.75 | 96.17 | 0.00 | 0.0 | 0.00 |
| | 44 | 63 | 8.11 | 96.81 | 0.00 | 0.0 | 0.00 |
| | 45.1 | 64.1 | 7.71 | 97.21 | 0.00 | 0.0 | 0.00 |
| | 46.3 | 65.3 | 6.26 | 98.66 | 0.00 | 0.0 | 0.00 |
| | 48 | 67 | 5.02 | 99.9 | 0.00 | 0.0 | 0.00 |
| | 49.6 | 68.6 | 4.63 | 100.29 | 0.00 | 0.0 | 0.00 |

| R4-XSEC2 | Feature | Type | Wfpa | LBKF | RBKF | ELEVbkf | Wbkf | Dbkf | W/D | Abkf | Dmax | ER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct-00 | POOL | C | 200 | 19.0 | 62.7 | 95.06 | 43.7 | 3.8 | 11.5 | 165.6 | 6.2 | 4.6 |
| Oct-01 | POOL | C | 200 | 19.0 | 62.0 | 95.48 | 43 | 4.2 | 10.4 | 178.6 | 6.8 | 4.7 |
| Nov-02 | POOL | C | 200 | 19.0 | 61.1 | 95.48 | 42.6 | 4.3 | 10.0 | 182.8 | 6.9 | 4.7 |



Cross Section R4-XSEC3 POOL

STONE MTN RESTORATION
Yadkin River Basin, Wilkes County, North Carolina
Dani Wise

1/21/2003

Oct-00

| NOTES | Survey Data STA | HI | FS | ELEV | Bkf Hydraulic Geometry Depth | Width | Area |
|---|---|---|---|---|---|---|---|
| | 0 | 96.86 | 6.8 | 90.06 | 0.00 | 0.0 | 0.00 |
| LBKF | 6.5 | 96.86 | 8.94 | 87.92 | 0.00 | 0.0 | 0.00 |
| | 13 | 96.86 | 10.1 | 86.76 | 1.16 | 6.5 | 3.77 |
| | 33.8 | 96.86 | 10.73 | 86.13 | 1.79 | 20.8 | 36.68 |
| | 50 | 96.86 | 11.39 | 85.47 | 2.45 | 16.2 | 34.34 |
| | 55 | 96.86 | 13.57 | 83.29 | 4.63 | 5.0 | 17.70 |
| | 65.2 | 96.86 | 12.18 | 84.68 | 3.24 | 10.2 | 40.14 |
| | 65.8 | 96.86 | 10.51 | 86.35 | 1.57 | 0.6 | 1.44 |
| | 68.4 | 96.86 | 11.47 | 85.39 | 2.53 | 2.6 | 5.33 |
| | 71.3 | 96.86 | 10.23 | 86.63 | 1.29 | 2.9 | 5.54 |
| | 74 | 96.86 | 10.76 | 86.10 | 1.82 | 2.7 | 4.20 |
| | 83 | 96.86 | 9.66 | 87.20 | 0.72 | 9.0 | 11.43 |
| RBKF | 92 | 96.86 | 5.26 | 91.60 | 0.00 | 0.0 | 0.00 |
| | 98 | 96.86 | 5.32 | 91.54 | 0.00 | 0.0 | 0.00 |
| | 100 | 96.86 | 5.16 | 91.70 | 0.00 | 0.0 | 0.00 |

Oct-01 HI= 95.67

| NOTES | Survey Data STA | FS | ELEV | Bkf Hydraulic Geometry Depth | Width | Area |
|---|---|---|---|---|---|---|
| | 2 | 6.35 | 89.32 | 0.00 | 0.0 | 0.00 |
| | 6 | 6.99 | 88.68 | 0.00 | 0.0 | 0.00 |
| | 8 | 7.78 | 87.89 | 0.00 | 0.0 | 0.00 |
| | 12 | 8.81 | 86.86 | 1.03 | 4.0 | 2.06 |
| | 16 | 8.98 | 86.69 | 1.20 | 4.0 | 4.46 |
| | 28 | 8.79 | 86.88 | 1.01 | 12.0 | 13.26 |
| | 41 | 8.71 | 86.96 | 0.93 | 13.0 | 12.61 |
| | 46 | 9.06 | 86.61 | 1.28 | 5.0 | 5.52 |
| | 51 | 9.58 | 86.09 | 1.80 | 5.0 | 7.70 |
| | 51.6 | 9.86 | 85.81 | 2.08 | 0.6 | 1.16 |
| | 58 | 10.32 | 85.35 | 2.54 | 6.4 | 14.78 |
| | 60 | 10.92 | 84.75 | 3.14 | 2.0 | 5.68 |
| | 62 | 11.32 | 84.35 | 3.54 | 2.0 | 6.68 |
| | 64 | 12.5 | 83.17 | 4.72 | 2.0 | 8.26 |
| | 66 | 13.28 | 82.39 | 5.50 | 2.0 | 10.22 |
| | 70 | 13.08 | 82.59 | 5.30 | 4.0 | 21.60 |
| | 72 | 12.68 | 82.99 | 4.90 | 2.0 | 10.20 |
| | 75 | 11.6 | 84.07 | 3.82 | 3.0 | 13.08 |
| | 75.5 | 11.3 | 84.37 | 3.52 | 0.5 | 1.84 |
| | 76 | 10.18 | 85.49 | 2.40 | 0.5 | 1.48 |
| | 81.5 | 9.98 | 85.69 | 2.20 | 5.5 | 12.65 |
| | 83 | 9.89 | 85.78 | 2.11 | 1.5 | 3.23 |
| | 85 | 9.74 | 85.93 | 1.96 | 2.0 | 4.07 |
| | 86.5 | 9.38 | 86.29 | 1.60 | 1.5 | 2.67 |
| | 90 | 8.84 | 86.83 | 1.06 | 3.5 | 4.65 |
| | 94 | 8.36 | 87.31 | 0.58 | 4.0 | 3.28 |
| | 96.5 | 8.15 | 87.52 | 0.37 | 2.5 | 1.19 |
| | 102 | 4.67 | 91 | 0.00 | 0.0 | 0.00 |
| | 105 | 4.1 | 91.57 | 0.00 | 0.0 | 0.00 |
| | 105.5 | 4.24 | 91.43 | 0.00 | 0.0 | 0.00 |
| | 108.7 | 4.23 | 91.44 | 0.00 | 0.0 | 0.00 |
| | 108.7 | 4.09 | 91.58 | 0.00 | 0.0 | 0.00 |
| | 108.7 | 4.21 | 91.46 | 0.00 | 0.0 | 0.00 |

Nov-02 HI= 92.4

| NOTES | Survey Data STA | REVISED STA | FS | ELEV | Bkf Hydraulic Geometry Depth | Width | Area |
|---|---|---|---|---|---|---|---|
| | 0 | 2 | 3.08 | 89.32 | 0.00 | 0.0 | 0.00 |
| | 10 | 12 | 5.49 | 86.91 | 0.00 | 0.0 | 0.00 |
| | 15 | 17 | 6.09 | 86.31 | 0.00 | 0.0 | 0.00 |
| | 25 | 27 | 5.92 | 86.48 | 0.00 | 0.0 | 0.00 |
| | 39 | 41 | 5.02 | 87.38 | 0.00 | 0.0 | 0.00 |
| | 43.4 | 45.4 | 5.73 | 86.67 | 0.00 | 0.0 | 0.00 |
| | 44.9 | 46.9 | 6.7 | 85.7 | 0.00 | 0.0 | 0.00 |
| | 46 | 48 | 7.34 | 85.06 | 0.00 | 0.0 | 0.00 |
| | 50 | 52 | 7.6 | 84.8 | 0.00 | 0.0 | 0.00 |
| | 58 | 60 | 9.65 | 82.75 | 0.00 | 0.0 | 0.00 |
| | 64.7 | 66.7 | 9.55 | 82.85 | 0.00 | 0.0 | 0.00 |
| | 69 | 71 | 8.55 | 83.85 | 0.00 | 0.0 | 0.00 |
| | 77.4 | 79.4 | 7.44 | 84.96 | 0.00 | 0.0 | 0.00 |
| | 80.5 | 82.5 | 6.65 | 85.75 | 0.00 | 0.0 | 0.00 |
| | 81.3 | 83.3 | 6.13 | 86.27 | 0.00 | 0.0 | 0.00 |
| | 85.3 | 87.3 | 5.2 | 87.2 | 0.00 | 0.0 | 0.00 |
| | 90 | 92 | 4.58 | 87.82 | 0.00 | 0.0 | 0.00 |
| | 97 | 99 | 1.48 | 90.92 | 0.00 | 0.0 | 0.00 |
| | 105 | 107 | 0.85 | 91.55 | 0.00 | 0.0 | 0.00 |
| | 112 | 114 | 0.55 | 91.85 | 0.00 | 0.0 | 0.00 |
| NEW HI | 121.2 | 123.2 | 4.25 | 102.65 | 0.00 | 0.0 | 0.00 |
| | | | | | 0.00 | 0.0 | 0.00 |
| | | | | | 0.00 | 0.0 | 0.00 |
| | | | | | 0.00 | 0.0 | 0.00 |
| | | | | | 0.00 | 0.0 | 0.00 |
| | | | | | 0.00 | 0.0 | 0.00 |
| | | | | | 0.00 | 0.0 | 0.00 |
| | | | | | 0.00 | 0.0 | 0.00 |
| | | | | | 0.00 | 0.0 | 0.00 |
| | | | | | 0.00 | 0.0 | 0.00 |
| | | | | | 0.00 | 0.0 | 0.00 |
| | | | | | 0.00 | 0.0 | 0.00 |
| | | | | | 0.00 | 0.0 | 0.00 |

| R4-XSEC 3 | Feature | Type | Wfpa | LBKF | RBKF | ELEVbkf | Wbkf | Dbkf | W/D | Abkf | Dmax | ER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Oct-00** | **POOL** | **C** | **200** | **6.5** | **92.0** | **87.92** | **85.5** | **1.8** | **47.3** | **154.6** | **4.6** | **2.3** |
| **Oct-01** | **POOL** | **C** | **200** | **8.0** | **96.5** | **87.89** | **88.5** | **1.9** | **45.4** | **172.3** | **5.5** | **2.3** |
| Nov-02 | **POOL** | **C** | **200** | **8.2** | **92.0** | **87.82** | **83.8** | **2.2** | **38.0** | **183.5** | **5.1** | **2.4** |


Note: As-built (Oct 2000) survey elevations show the boulders present on the right streambank, while 2001 and 2002 surveys show the channel elevations.

Cross Section R4-XSEC4 RIFFLE

STONE MTN RESTORATION
Yadkin River Basin, Wilkes County, North Carolina
Dani Wise

1/21/2003

Oct-01

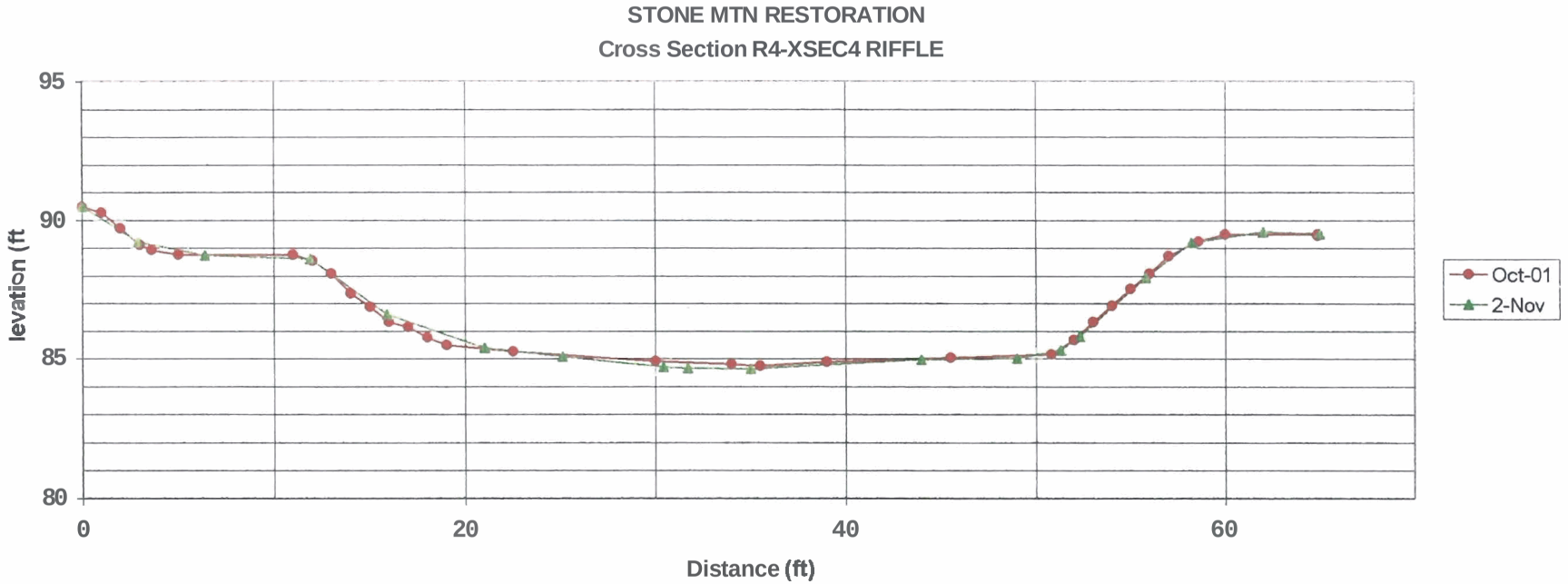
| NOTES | Survey Data STA | HI | FS | ELEV | Bkf Hydraulic Geometry Depth | Width | Area |
|---|---|---|---|---|---|---|---|
| | 0 | 94.61 | 4.15 | 90.46 | 0.00 | 0.0 | 0.00 |
| | 1 | 94.61 | 4.37 | 90.24 | 0.00 | 0.0 | 0.00 |
| | 2 | 94.61 | 4.94 | 89.67 | 0.00 | 0.0 | 0.00 |
| | 3 | 94.61 | 5.53 | 89.08 | 0.00 | 0.0 | 0.00 |
| | 3.6 | 94.61 | 5.72 | 88.89 | 0.00 | 0.0 | 0.00 |
| | 5 | 94.61 | 5.88 | 88.73 | 0.00 | 0.0 | 0.00 |
| LBKF | 11 | 94.61 | 5.88 | 88.73 | 0.00 | 0.0 | 0.00 |
| | 12 | 94.61 | 6.08 | 88.53 | 0.20 | 1.0 | 0.10 |
| | 13 | 94.61 | 6.55 | 88.06 | 0.67 | 1.0 | 0.44 |
| | 14 | 94.61 | 7.26 | 87.35 | 1.38 | 1.0 | 1.03 |
| | 15 | 94.61 | 7.75 | 86.86 | 1.87 | 1.0 | 1.63 |
| | 16 | 94.61 | 8.3 | 86.31 | 2.42 | 1.0 | 2.15 |
| | 17 | 94.61 | 8.49 | 86.12 | 2.61 | 1.0 | 2.52 |
| | 18 | 94.61 | 8.86 | 85.75 | 2.98 | 1.0 | 2.80 |
| | 19 | 94.61 | 9.14 | 85.47 | 3.26 | 1.0 | 3.12 |
| | 22.5 | 94.61 | 9.37 | 85.24 | 3.49 | 3.5 | 11.81 |
| | 30 | 94.61 | 9.73 | 84.88 | 3.85 | 7.5 | 27.53 |
| | 34 | 94.61 | 9.83 | 84.78 | 3.95 | 4.0 | 15.60 |
| | 35.5 | 94.61 | 9.89 | 84.72 | 4.01 | 1.5 | 5.97 |
| | 39 | 94.61 | 9.74 | 84.87 | 3.86 | 3.5 | 13.77 |
| | 45.5 | 94.61 | 9.61 | 85.00 | 3.73 | 6.5 | 24.67 |
| | 50.8 | 94.61 | 9.47 | 85.14 | 3.59 | 5.3 | 19.40 |
| | 52 | 94.61 | 8.96 | 85.65 | 3.08 | 1.2 | 4.00 |
| | 53 | 94.61 | 8.29 | 86.32 | 2.41 | 1.0 | 2.75 |
| | 54 | 94.61 | 7.7 | 86.91 | 1.82 | 1.0 | 2.12 |
| | 55 | 94.61 | 7.1 | 87.51 | 1.22 | 1.0 | 1.52 |
| | 56 | 94.61 | 6.55 | 88.06 | 0.67 | 1.0 | 0.95 |
| RBKF | 57 | 94.61 | 5.92 | 88.69 | 0.04 | 1.0 | 0.36 |
| | 58.6 | 94.61 | 5.4 | 89.21 | 0.00 | 0.0 | 0.00 |
| | 60 | 94.61 | 5.14 | 89.47 | 0.00 | 0.0 | 0.00 |
| | 64.9 | 94.61 | 5.15 | 89.46 | 0.00 | 0.0 | 0.00 |
| | 64.9 | 94.61 | 5.18 | 89.43 | 0.00 | 0.0 | 0.00 |

Nov-02

HI= 98.02

| NOTES | Survey Data STA | FS | ELEV |
|---|---|---|---|
| LPIN | 0 | 7.56 | 90.46 |
| LTOB | 2.9 | 8.82 | 89.2 |
| | 6.4 | 9.3 | 88.72 |
| | 11.9 | 9.44 | 88.58 |
| | 15.9 | 11.44 | 86.58 |
| LEW | 21 | 12.65 | 85.37 |
| | 25.1 | 12.98 | 85.04 |
| | 30.4 | 13.34 | 84.68 |
| | 31.7 | 13.39 | 84.63 |
| | 35 | 13.42 | 84.6 |
| | 44 | 13.07 | 84.95 |
| | 49 | 13.04 | 84.98 |
| REW/WS | 51.3 | 12.74 | 85.28 |
| | 52.3 | 12.24 | 85.78 |
| | 55.8 | 10.1 | 87.92 |
| RTOB | 58.2 | 8.84 | 89.18 |
| | 62 | 8.46 | 89.56 |
| RPIN | 65 | 8.54 | 89.48 |

| R4-XSEC4 | Feature | Type | Wfpa | LBKF | RBKF | ELEVbkf | Wbkf | Dbkf | W/D | Abkf | Dmax | ER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct-01 | POOL | C | *200* | 11.0 | 57.0 | 88.73 | 46.0 | 3.1 | 14.7 | 144.2 | 4.0 | 4.3 |
| Nov-02 | POOL | C | *200* | 11.9 | 57.0 | 88.58 | 45.2 | 3.1 | 14.7 | 138.8 | 4.0 | 4.4 |



Cross Section R4-XSEC 6 RIFFLE

**STONE MTN RESTORATION**
**Yadkin River Basin, Wilkes County, North Carolina**
**Dani Wise**

**1/21/2003**

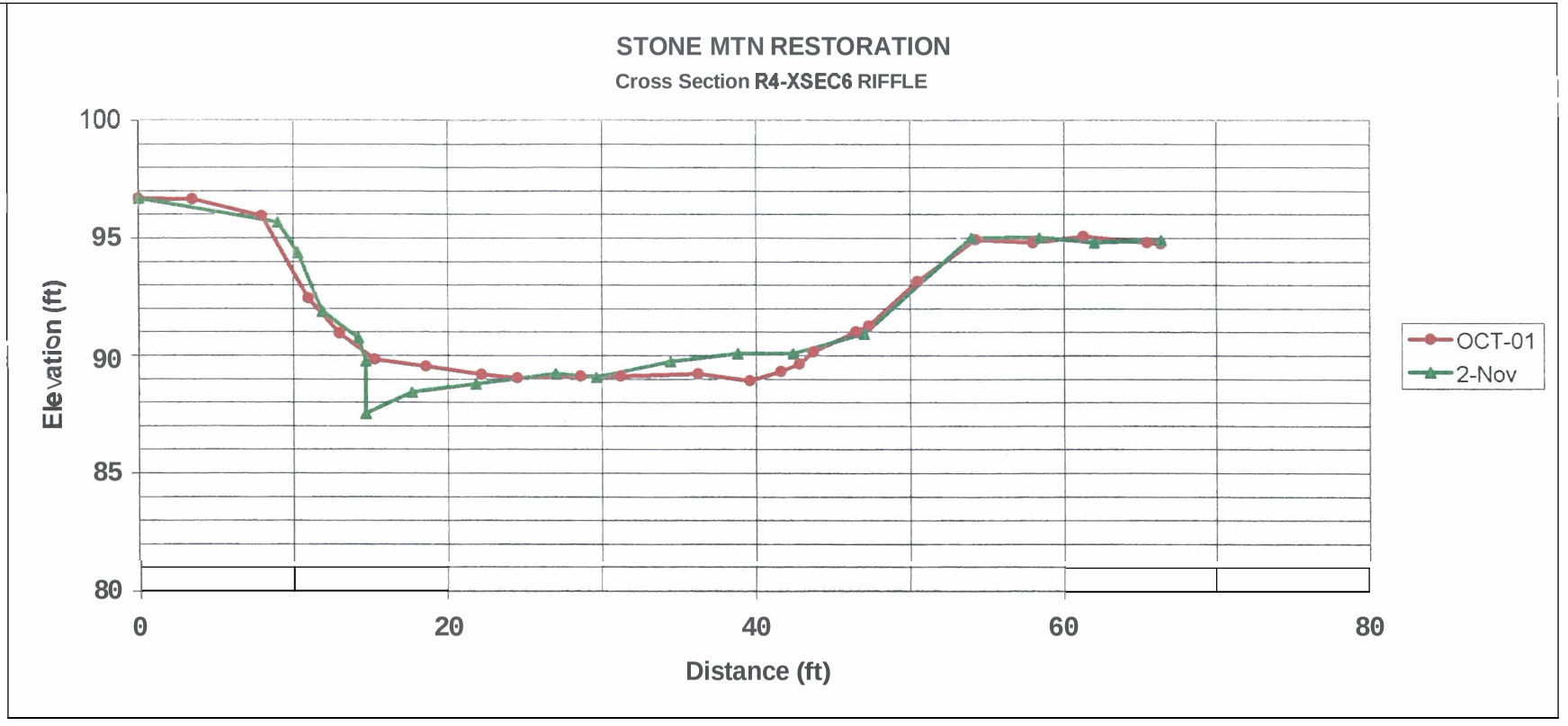
Oct-01

| NOTES | Survey Data STA | HI | FS | ELEV | Bkf Hydraulic Geometry Depth | Width | Area |
|---|---|---|---|---|---|---|---|
| | 0 | 100 | 3.36 | 96.64 | 0.00 | 0.0 | 0.00 |
| | 3.5 | 100 | 3.37 | 96.63 | 0.00 | 0.0 | 0.00 |
| LBKF | 8 | 100 | 4.1 | 95.90 | 0.00 | 0.0 | 0.00 |
| | 11 | 100 | 7.59 | 92.41 | 3.49 | 3.0 | 5.24 |
| | 13 | 100 | 9.1 | 90.90 | 5.00 | 2.0 | 8.49 |
| | 15.3 | 100 | 10.2 | 89.80 | 6.10 | 2.3 | 12.77 |
| | 18.6 | 100 | 10.5 | 89.50 | 6.40 | 3.3 | 20.63 |
| | 22.2 | 100 | 10.84 | 89.16 | 6.74 | 3.6 | 23.65 |
| | 24.5 | 100 | 10.98 | 89.02 | 6.88 | 2.3 | 15.66 |
| | 28.6 | 100 | 10.92 | 89.08 | 6.82 | 4.1 | 28.09 |
| | 31.2 | 100 | 10.92 | 89.08 | 6.82 | 2.6 | 17.73 |
| | 36.2 | 100 | 10.81 | 89.19 | 6.71 | 5.0 | 33.83 |
| | 39.6 | 100 | 11.1 | 88.90 | 7.00 | 3.4 | 23.31 |
| | 41.6 | 100 | 10.71 | 89.29 | 6.61 | 2.0 | 13.61 |
| | 42.8 | 100 | 10.39 | 89.61 | 6.29 | 1.2 | 7.74 |
| | 43.7 | 100 | 9.87 | 90.13 | 5.77 | 0.9 | 5.43 |
| | 46.5 | 100 | 9.01 | 90.99 | 4.91 | 2.8 | 14.95 |
| | 47.3 | 100 | 8.78 | 91.22 | 4.68 | 0.8 | 3.84 |
| | 50.5 | 100 | 6.87 | 93.13 | 2.77 | 3.2 | 11.92 |
| RBKF | 54.3 | 100 | 5.09 | 94.91 | 0.99 | 3.8 | 7.14 |
| | 58 | 100 | 5.21 | 94.79 | 0.00 | 0.0 | 0.00 |
| | 61.3 | 100 | 4.96 | 95.04 | 0.00 | 0.0 | 0.00 |
| | 65.5 | 100 | 5.22 | 94.78 | 0.00 | 0.0 | 0.00 |
| | 66.4 | 100 | 5.26 | 94.74 | 0.00 | 0.0 | 0.00 |

Nov-02 HI= 101.19

| NOTES | Survey Data STA | FS | ELEV | Bkf Hydraulic Geometry Depth | Width | Area |
|---|---|---|---|---|---|---|
| LPIN | 0 | 4.55 | 96.64 | | | |
| LTOB | 9 | 5.54 | 95.65 | | | |
| | 10.3 | 6.86 | 94.33 | | | |
| | 11.9 | 9.34 | 91.85 | | | |
| | 14.2 | 10.48 | 90.71 | | | |
| | 14.7 | 11.45 | 89.74 | | | |
| LEW | 14.7 | 13.7 | 87.49 | | | |
| | 17.7 | 12.78 | 88.41 | | | |
| | 21.8 | 12.44 | 88.75 | | | |
| | 27 | 12.01 | 89.18 | | | |
| | 29.6 | 12.14 | 89.05 | | | |
| | 34.4 | 11.48 | 89.71 | | | |
| | 38.8 | 11.13 | 90.06 | | | |
| | 42.4 | 11.15 | 90.04 | | | |
| | 47 | 10.3 | 90.89 | | | |
| RTOB | 54 | 6.22 | 94.97 | | | |
| | 58.4 | 6.18 | 95.01 | | | |
| | 62 | 6.4 | 94.79 | | | |
| | 66.4 | 6.32 | 94.87 | | | |

| R4-XSEC6 | Feature | Type | Wfpa | LBKF | RBKF | ELEVbkf | Wbkf | Dbkf | W/D | Abkf | Dmax | ER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct-01 | RIFFLE | C | 200 | 8.0 | 54.3 | 95.90 | 46.3 | 5.5 | 8.4 | 254.0 | 7.0 | 4.3 |
| 2-Nov | RIFFLE | C | 200 | 9.5 | 54.0 | 94.97 | 44.5 | 4.7 | 9.4 | 209.7 | 7.5 | 4.5 |



Cross Section R4-XSEC7 POOL

**STONE MTN RESTORATION**
**Yadkin River Basin, Wilkes County, North Carolina**
**Dani Wise**

**1/21/2003**

Oct-01

| | Survey Data | | | | Bkf Hydraulic Geometry | | |
|---|---|---|---|---|---|---|---|
| NOTES | STA | HI | FS | ELEV | Depth | Width | Area |
| LBKF | 0 | 100 | 4.25 | 95.75 | 0.00 | 0.0 | 0.00 |
| | 8 | 100 | 4.71 | 95.29 | 0.46 | 8.0 | 1.84 |
| | 17 | 100 | 5.09 | 94.91 | 0.84 | 9.0 | 5.85 |
| | 23.7 | 100 | 5.99 | 94.01 | 1.74 | 6.7 | 8.64 |
| | 28.4 | 100 | 6.45 | 93.55 | 2.20 | 4.7 | 9.26 |
| | 31 | 100 | 6.82 | 93.18 | 2.57 | 2.6 | 6.20 |
| | 37.7 | 100 | 7.72 | 92.28 | 3.47 | 6.7 | 20.23 |
| | 40.6 | 100 | 7.99 | 92.01 | 3.74 | 2.9 | 10.45 |
| | 42.7 | 100 | 8.27 | 91.73 | 4.02 | 2.1 | 8.15 |
| | 45.9 | 100 | 9.25 | 90.75 | 5.00 | 3.2 | 14.43 |
| | 48.5 | 100 | 10.42 | 89.58 | 6.17 | 2.6 | 14.52 |
| | 51.6 | 100 | 10.99 | 89.01 | 6.74 | 3.1 | 20.01 |
| | 53.5 | 100 | 11.62 | 88.38 | 7.37 | 1.9 | 13.40 |
| | 54.7 | 100 | 11.5 | 88.50 | 7.25 | 1.2 | 8.77 |
| | 55.8 | 100 | 11.42 | 88.58 | 7.17 | 1.1 | 7.93 |
| | 56.7 | 100 | 11.2 | 88.80 | 6.95 | 0.9 | 6.35 |
| | 57.8 | 100 | 10.39 | 89.61 | 6.14 | 1.1 | 7.20 |
| | 59.8 | 100 | 7.79 | 92.21 | 3.54 | 2.0 | 9.68 |
| | 62 | 100 | 6.83 | 93.17 | 2.58 | 2.2 | 6.73 |
| | 63 | 100 | 5.65 | 94.35 | 1.40 | 1.0 | 1.99 |
| | 64.5 | 100 | 4.93 | 95.07 | 0.68 | 1.5 | 1.56 |
| RBKF | 67.6 | 100 | 3.61 | 96.39 | 0.00 | 0.0 | 0.00 |
| | 69.3 | 100 | 3.53 | 96.47 | 0.00 | 0.0 | 0.00 |
| | 71.4 | 100 | 3.38 | 96.62 | 0.00 | 0.0 | 0.00 |

Nov-02 **HI=** 99.36

| | Survey Data | | |
|---|---|---|---|
| NOTES | STA | FS | ELEV |
| | 0 | 3.95 | 95.41 |
| | 6 | 4.45 | 94.91 |
| | 15 | 4.64 | 94.72 |
| | 22 | 5.42 | 93.94 |
| | 28 | 6.08 | 93.28 |
| | 34 | 6.45 | 92.91 |
| | 40.7 | 7.1 | 92.26 |
| LEW | 41.4 | 7.64 | 91.72 |
| | 42.6 | 8.34 | 91.02 |
| | 44.5 | 8.87 | 90.49 |
| | 46.8 | 9.63 | 89.73 |
| | 49.6 | 10.84 | 88.52 |
| | 54.4 | 11.74 | 87.62 |
| | 60 | 10.42 | 88.94 |
| | 62.3 | 6.12 | 93.24 |
| RTOB | 66.5 | 3.67 | 95.69 |
| | 68 | 3.18 | 96.18 |
| RPIN | 71.4 | 2.74 | 96.62 |

| R4-XSEC7 | Feature | Type | Wfpa | LBKF | RBKF | ELEVbkf | Wbkf | Dbkf | W/D | Abkf | Dmax | ER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct-01 | POOL | C | 200 | 0.0 | 67.6 | 95.75 | 67.6 | 2.7 | 24.9 | 183.2 | 7.4 | 3.0 |
| 2-Nov | POOL | C | 200 | 15.0 | 64.8 | 94.72 | 49.8 | 3.0 | 16.6 | 151.4 | 7.1 | 4.0 |

# APPENDIX C

VEGETATION MONITORING DATA
YR 2002 SURVEY

# Appendix C
# Stone Mountain Vegetation Survey: Year 1
Survey Dates: 6-28-01; 8-14-01

| BARE ROOT PLOTS | | | | |
|---|---|---|---|---|
| **Reach** | **Plot #** | **Live/Total Stems** | **% survivability** | **% Herbaceous Cover** |
| 2 | 1 | 26/28 | 93 | >90 |
| 4 | 2 | 63/77 | 82 | >90 |
| 4 | 3 | 8/8 | 100 | >90 |
| 4 | 4 | 11/13 | 85 | >90 |

| LIVE STAKE PLOTS | | | |
|---|---|---|---|
| **Reach** | **Plot #** | **Live/Total Stems** | **% Survivability** |
| 2 | 1 | 13/17 | 76 |
| 2 | 2 | 22/70 | 31 |
| 2 | 3 | 2/24 | 8 |
| 4 | 1 | 30/56 | 54 |
| 4 | 2 | 63/141 | 45 |
| 4 | 3 | 3/38 | 8 |
| 4 | 4 | 16/44 | 36 |
| 4 | 5 | 14/59 | 24 |

# Appendix C
# Stone Mountain Vegetation Survey: Year 2
Survey Dates: 7-1-02

| BARE ROOT PLOTS | | | | | |
|---|---|---|---|---|---|
| **Reach** | **Plot #** | **Live/Total Stems** | **% survivability** | **% Herbaceous Cover** | **Natural Regeneration** (Stems) |
| 2 | 1 | 23/24 | 96 | >90 | 91 |
| 4 | 2 | 45/60 | 75 | >90 | 495 |
| 4 | 3 | 9/9 | 100 | >90 | 230 |
| 4 | 4 | 7/7 | 100 | >90 | >500 |

| LIVE STAKE PLOTS | | | | |
|---|---|---|---|---|
| **Reach** | **Plot #** | **Live/Total Stems** | **% Survivability** | **Natural Regeneration** (Stems) |
| 2 | 1 | 10/20 | 50 | 29 |
| 2 | 2 | 32/38 | 84 | 80 |
| 2 | 3 | 8/13 | 62 | 5 |
| 4 | 1 | 1/12 | 8 | 15 |
| 4 | 2 | 42/65 | 65 | 25 |
| 4 | 3 | 5/8 | 63 | 6 |
| 4 | 4 | 17/33 | 52 | 43 |
| 4 | 5 | 11/16 | 69 | 64 |

# APPENDIX D

PHOTO REFERENCE POINTS
YR 2002 SURVEY

Reach 2: Photo Point 1 (2002)

Reach 2: Photo Point 2 (2002)

Reach 2: Photo Point 3 (2002)

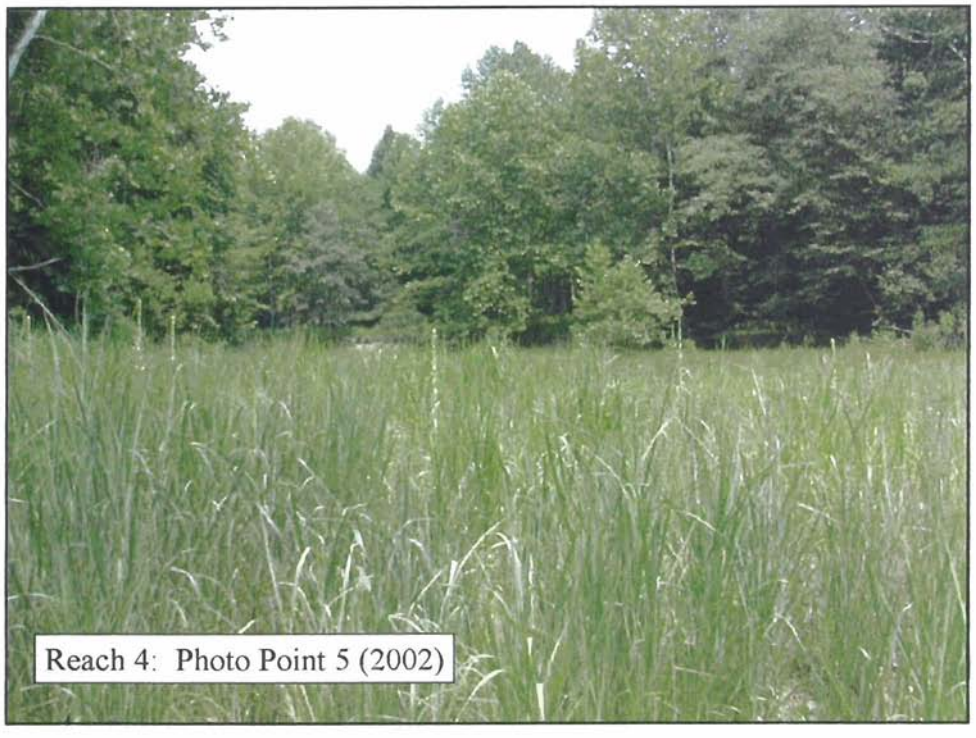
Reach 2: Photo Point 4 (2002)

Reach 2: Photo Point 5 (2002)

Reach 4: Photo Point 1 (2002)

Reach 4: Photo Point 3 (2002)

Reach 4: Photo Point 4 (2002)



Reach 4: Photo Point 5 (2002)


Reach 4: Photo Point 6 (2002)