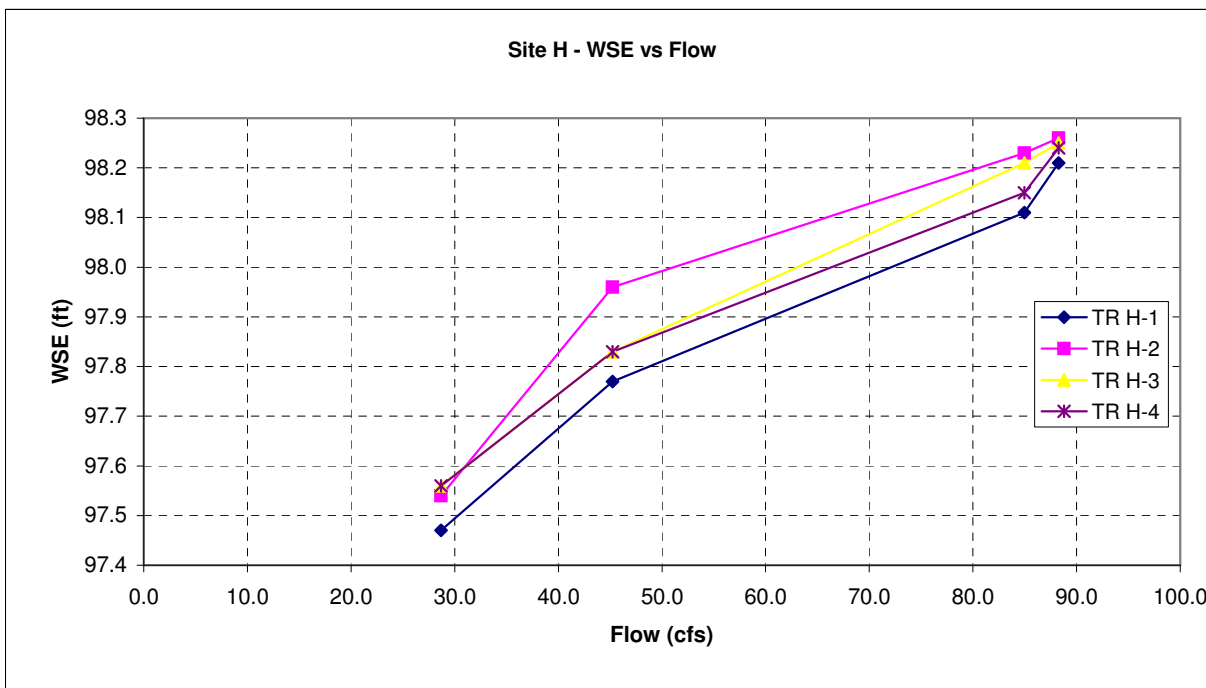
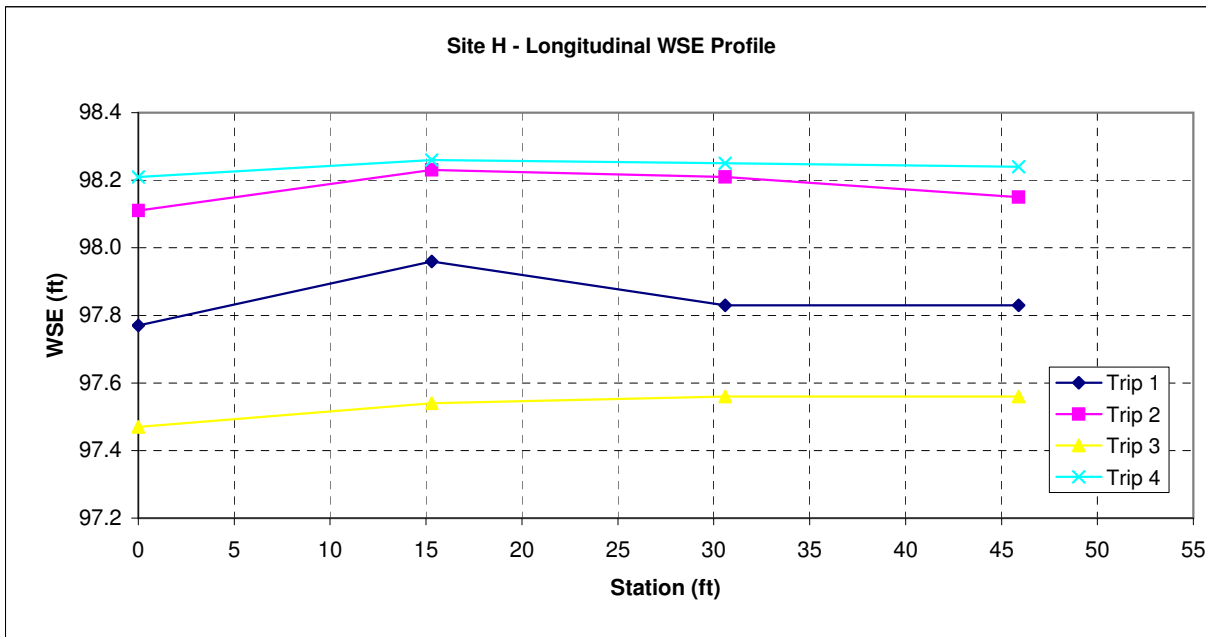


Reach: **Canyon Reach**
 Stream: **Cooper Creek**
 Site: **Site H**
 Habitat Type: **Pool**

| | | Q(cfs) | | | | | Vel-Depth Survey | | | | | |
|-------------------|--------|----------|--------|--------|--------|--------|------------------|--------|--------|--------|--------|--------|
| | | 28.7 | 45.2 | 85.0 | 88.3 | ? | | | | | | |
| | | WSE (ft) | | | | | | | | | | |
| TR | length | Sta | Trip 3 | Trip 1 | Trip 2 | Trip 4 | Trip 5 | Trip 3 | Trip 1 | Trip 2 | Trip 4 | Trip 5 |
| TR H-1 | - | 0.0 | 97.47 | 97.77 | 98.11 | 98.21 | no WSE | | Y | | | |
| TR H-2 | 15.3 | 15.3 | 97.54 | 97.96 | 98.23 | 98.26 | | | Y | | | |
| TR H-3 | 15.3 | 30.6 | 97.56 | 97.83 | 98.21 | 98.25 | | | Y | | | |
| TR H-4 | 15.3 | 45.9 | 97.56 | 97.83 | 98.15 | 98.24 | | | Y | | | |
| Average WSE slope | | | 0.20% | 0.13% | 0.09% | 0.07% | | | | | | |

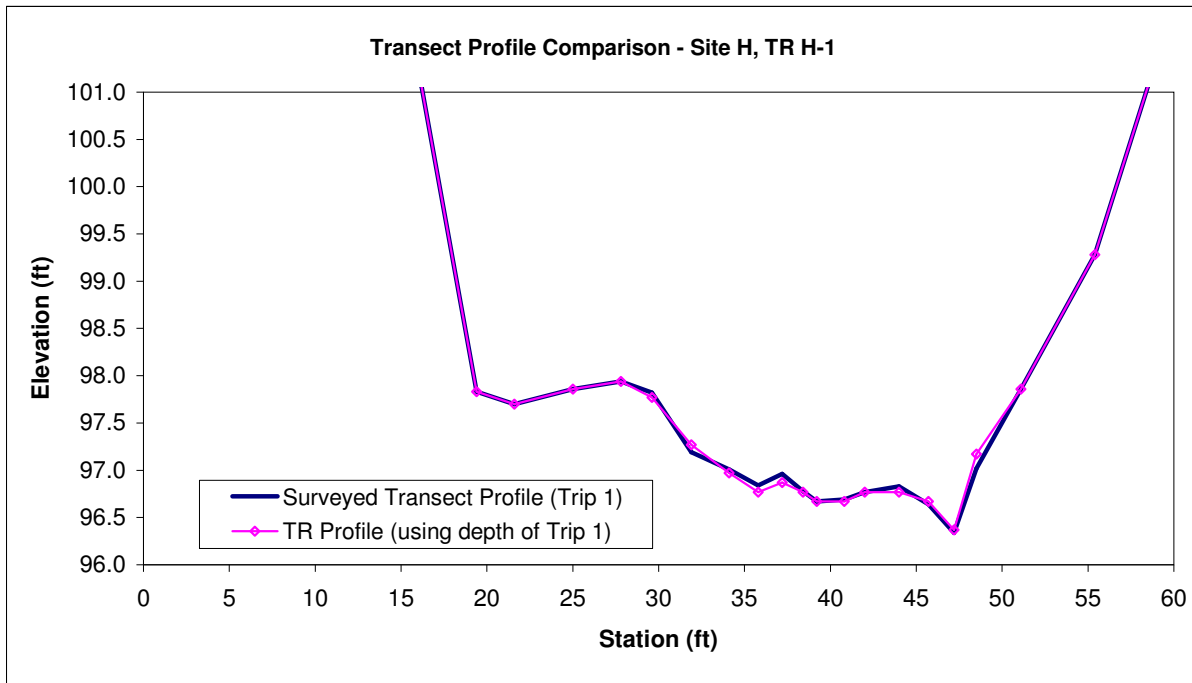


Transect Profile Comparison - Site H, TR H-1

| Trip 1 | | | | | | | Trip 5 | | | | subs | code | |
|----------|---------|---------|-----------|------------|-----------------|---------|---------------|------------|-----------------|---------|------|------|---------------|
| Sta (ft) | HI (ft) | FS (ft) | Elev (ft) | Depth (ft) | Velocity (ft/s) | q (cfs) | Bed Elev (ft) | Depth (ft) | Velocity (ft/s) | q (cfs) | | | Bed Elev (ft) |
| 10 | 103.38 | -0.60 | 103.98 | | | | 103.98 | | | | | org | 0 |
| 13 | 103.38 | 0.81 | 102.57 | | | | 102.57 | | | | | org | 0 |
| 16.2 | 103.38 | 2.32 | 101.06 | | | | 101.06 | | | | | 64 | 4 |
| 19.4 | 103.38 | 5.55 | 97.83 | | | | 97.83 | | | | | sand | 1 |
| 21.6 | 103.38 | 5.68 | 97.7 | | | | 97.70 | | | | | 32 | 3 |
| 25 | 103.38 | 5.52 | 97.86 | | | | 97.86 | | | | | 64 | 4 |
| 27.8 | 103.38 | 5.44 | 97.94 | | | | 97.94 | | | | | 8 | 2 |
| 29.6 | 103.38 | 5.56 | 97.82 | 0.00 | 0.00 | 0.00 | 97.77 | | | | | 512 | 7 |
| 31.9 | 103.38 | 6.19 | 97.19 | 0.50 | 0.80 | 0.90 | 97.27 | | | | | 512 | 7 |
| 34.1 | 103.38 | 6.37 | 97.01 | 0.80 | 1.40 | 2.18 | 96.97 | | | | | 90 | 5 |
| 35.8 | 103.38 | 6.54 | 96.84 | 1.00 | 2.20 | 3.41 | 96.77 | | | | | 45 | 4 |
| 37.2 | 103.38 | 6.42 | 96.96 | 0.90 | 2.10 | 2.46 | 96.87 | | | | | 23 | 3 |
| 38.4 | 103.38 | 6.60 | 96.78 | 1.00 | 1.80 | 1.80 | 96.77 | | | | | 64 | 4 |
| 39.2 | 103.38 | 6.71 | 96.67 | 1.10 | 2.60 | 3.43 | 96.67 | | | | | 90 | 5 |
| 40.8 | 103.38 | 6.69 | 96.69 | 1.10 | 1.90 | 2.93 | 96.67 | | | | | 128 | 5 |
| 42 | 103.38 | 6.61 | 96.77 | 1.00 | 3.60 | 5.76 | 96.77 | | | | | 90 | 5 |
| 44 | 103.38 | 6.55 | 96.83 | 1.00 | 3.40 | 6.29 | 96.77 | | | | | 64 | 4 |
| 45.7 | 103.38 | 6.74 | 96.64 | 1.10 | 3.00 | 5.28 | 96.67 | | | | | 512 | 7 |
| 47.2 | 103.38 | 7.04 | 96.34 | 1.40 | 2.30 | 4.51 | 96.37 | | | | | bed | 8 |
| 48.5 | 103.38 | 6.36 | 97.02 | 0.60 | 1.70 | 0.66 | 97.17 | | | | | bed | 8 |
| 51.1 | 103.38 | 5.52 | 97.86 | | | | 97.86 | | | | | bed | 8 |
| 55.4 | 103.38 | 4.10 | 99.28 | | | | 99.28 | | | | | bed | 8 |
| 59.4 | 103.38 | 1.79 | 101.59 | | | | 101.59 | | | | | org | 0 |

No flow (vel-depth) measurement during Trip 5

TR Q (cfs)= 39.6

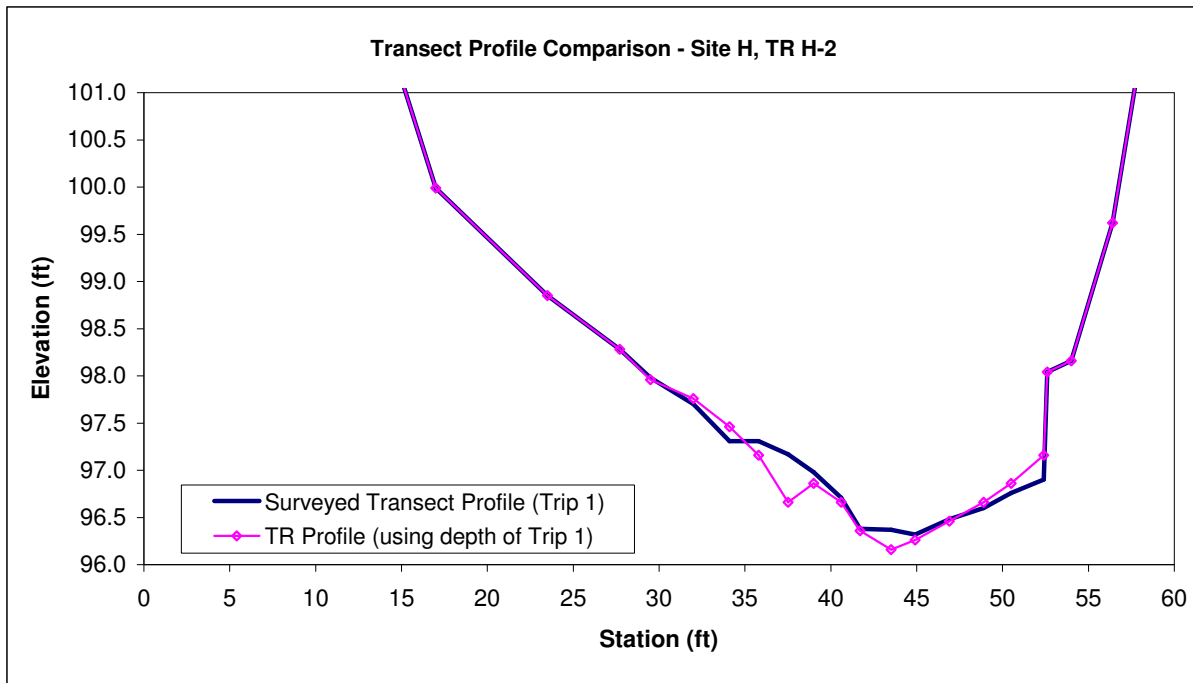


Transect Profile Comparison - Site H, TR H-2

| Trip 1 | | | | | | | | Trip 5 | | | | subs | code |
|----------|---------|---------|-----------|------------|-----------------|---------|---------------|------------|-----------------|---------|---------------|------|------|
| Sta (ft) | HI (ft) | FS (ft) | Elev (ft) | Depth (ft) | Velocity (ft/s) | q (cfs) | Bed Elev (ft) | Depth (ft) | Velocity (ft/s) | q (cfs) | Bed Elev (ft) | | |
| 10.1 | 105.5 | 1.53 | 103.97 | | | | 103.97 | | | | | org | 0 |
| 17 | 105.5 | 5.51 | 99.99 | | | | 99.99 | | | | | 128 | 5 |
| 23.5 | 105.5 | 6.65 | 98.85 | | | | 98.85 | | | | | sand | 1 |
| 27.7 | 105.5 | 7.22 | 98.28 | | | | 98.28 | | | | | 45 | 4 |
| 29.5 | 105.5 | 7.52 | 97.98 | 0.00 | 0.00 | 0.00 | 97.96 | | | | | 32 | 3 |
| 32 | 105.5 | 7.80 | 97.7 | 0.20 | 0.80 | 0.37 | 97.76 | | | | | sand | 1 |
| 34.1 | 105.5 | 8.19 | 97.31 | 0.50 | 1.10 | 1.05 | 97.46 | | | | | 11 | 3 |
| 35.8 | 105.5 | 8.19 | 97.31 | 0.80 | 1.10 | 1.50 | 97.16 | | | | | bed | 8 |
| 37.5 | 105.5 | 8.33 | 97.17 | 1.30 | 2.10 | 4.37 | 96.66 | | | | | bed | 8 |
| 39 | 105.5 | 8.52 | 96.98 | 1.10 | 1.30 | 2.22 | 96.86 | | | | | 16 | 3 |
| 40.6 | 105.5 | 8.79 | 96.71 | 1.30 | 0.20 | 0.35 | 96.66 | | | | | 16 | 3 |
| 41.7 | 105.5 | 9.12 | 96.38 | 1.60 | 1.60 | 3.71 | 96.36 | | | | | 45 | 4 |
| 43.5 | 105.5 | 9.13 | 96.37 | 1.80 | 3.40 | 9.79 | 96.16 | | | | | 1028 | 7 |
| 44.9 | 105.5 | 9.18 | 96.32 | 1.70 | 3.40 | 9.83 | 96.26 | | | | | 128 | 5 |
| 46.9 | 105.5 | 9.02 | 96.48 | 1.50 | 2.80 | 8.40 | 96.46 | | | | | 1028 | 7 |
| 48.9 | 105.5 | 8.90 | 96.6 | 1.30 | 1.90 | 4.45 | 96.66 | | | | | 64 | 4 |
| 50.5 | 105.5 | 8.74 | 96.76 | 1.10 | 1.50 | 2.89 | 96.86 | | | | | 256 | 6 |
| 52.4 | 105.5 | 8.60 | 96.9 | 0.80 | 0.40 | 0.30 | 97.16 | | | | | 128 | 5 |
| 52.6 | 105.5 | 7.46 | 98.04 | | | | 98.04 | | | | | 512 | 7 |
| 54 | 105.5 | 7.34 | 98.16 | | | | 98.16 | | | | | 128 | 5 |
| 56.4 | 105.5 | 5.88 | 99.62 | | | | 99.62 | | | | | 90 | 5 |
| 58.9 | 105.5 | 3.13 | 102.37 | | | | 102.37 | | | | | org | 0 |

No flow (vel-depth) measurement during Trip 5

TR Q (cfs)= **49.2**

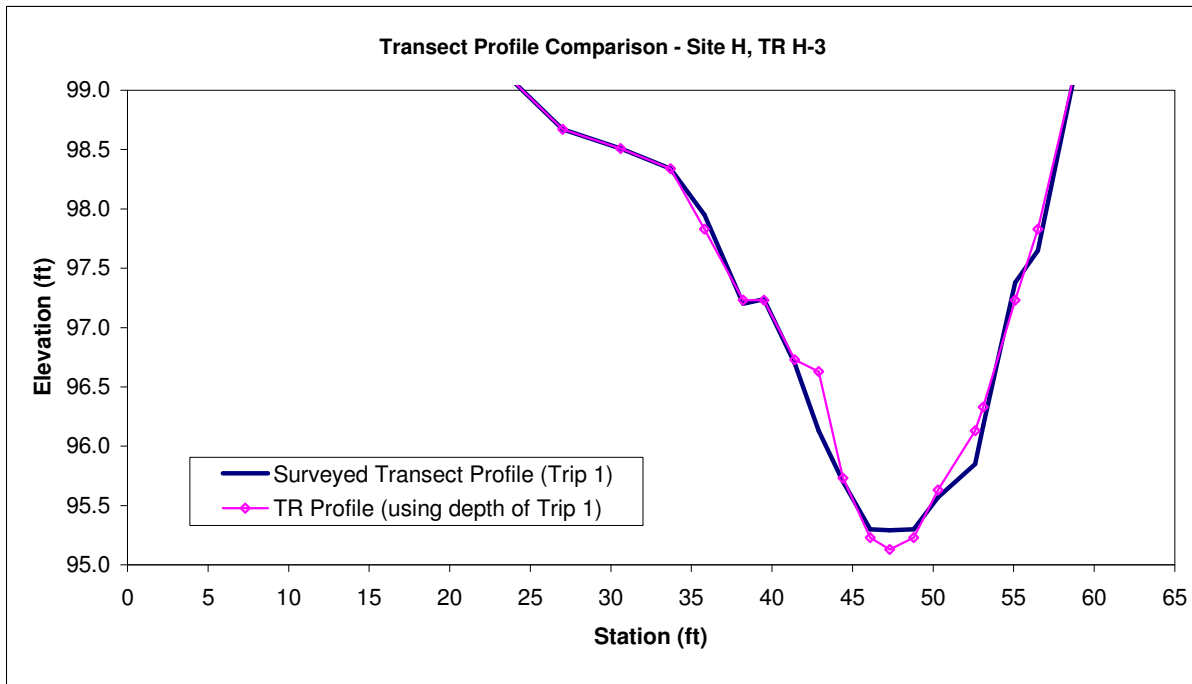


Transect Profile Comparison - Site H, TR H-3

| Trip 1 | | | | | | | Trip 5 | | | | subs | code | |
|----------|---------|---------|-----------|------------|-----------------|---------|---------------|------------|-----------------|---------|------|------|---------------|
| Sta (ft) | HI (ft) | FS (ft) | Elev (ft) | Depth (ft) | Velocity (ft/s) | q (cfs) | Bed Elev (ft) | Depth (ft) | Velocity (ft/s) | q (cfs) | | | Bed Elev (ft) |
| 10 | 105.5 | 2.41 | 103.09 | | | | 103.09 | | | | | org | 0 |
| 18.8 | 105.5 | 5.75 | 99.75 | | | | 99.75 | | | | | 256 | 6 |
| 27 | 105.5 | 6.83 | 98.67 | | | | 98.67 | | | | | 2 | 1 |
| 30.6 | 105.5 | 6.99 | 98.51 | | | | 98.51 | | | | | 16 | 3 |
| 33.7 | 105.5 | 7.16 | 98.34 | | | | 98.34 | | | | | 32 | 3 |
| 35.8 | 105.5 | 7.55 | 97.95 | 0.00 | 0.00 | 0.00 | 97.83 | | | | | 45 | 4 |
| 38.2 | 105.5 | 8.30 | 97.2 | 0.60 | -0.20 | -0.22 | 97.23 | | | | | 6 | 2 |
| 39.5 | 105.5 | 8.26 | 97.24 | 0.60 | -0.60 | -0.58 | 97.23 | | | | | 4 | 2 |
| 41.4 | 105.5 | 8.80 | 96.7 | 1.10 | -0.20 | -0.37 | 96.73 | | | | | 8 | 2 |
| 42.9 | 105.5 | 9.37 | 96.13 | 1.20 | 0.50 | 0.90 | 96.63 | | | | | 16 | 3 |
| 44.4 | 105.5 | 9.80 | 95.7 | 2.10 | 1.60 | 5.38 | 95.73 | | | | | 32 | 3 |
| 46.1 | 105.5 | 10.20 | 95.3 | 2.60 | 3.30 | 12.44 | 95.23 | | | | | 180 | 6 |
| 47.3 | 105.5 | 10.21 | 95.29 | 2.70 | 3.60 | 13.12 | 95.13 | | | | | 180 | 6 |
| 48.8 | 105.5 | 10.20 | 95.3 | 2.60 | 3.00 | 11.70 | 95.23 | | | | | 256 | 6 |
| 50.3 | 105.5 | 9.93 | 95.57 | 2.20 | 1.00 | 4.18 | 95.63 | | | | | 256 | 6 |
| 52.6 | 105.5 | 9.65 | 95.85 | 1.70 | 0.00 | 0.00 | 96.13 | | | | | 180 | 6 |
| 53.1 | 105.5 | 9.33 | 96.17 | 1.50 | 0.10 | 0.19 | 96.33 | | | | | 180 | 6 |
| 55.1 | 105.5 | 8.12 | 97.38 | 0.60 | 0.10 | 0.10 | 97.23 | | | | | 180 | 6 |
| 56.5 | 105.5 | 7.85 | 97.65 | 0.00 | 0.00 | 0.00 | 97.83 | | | | | 64 | 4 |
| 59 | 105.5 | 6.22 | 99.28 | | | | 99.28 | | | | | 64 | 4 |
| 61.7 | 105.5 | 3.29 | 102.21 | | | | 102.21 | | | | | 23 | 3 |

No flow (vel-depth) measurement during Trip 5

TR Q (cfs) = **46.8**

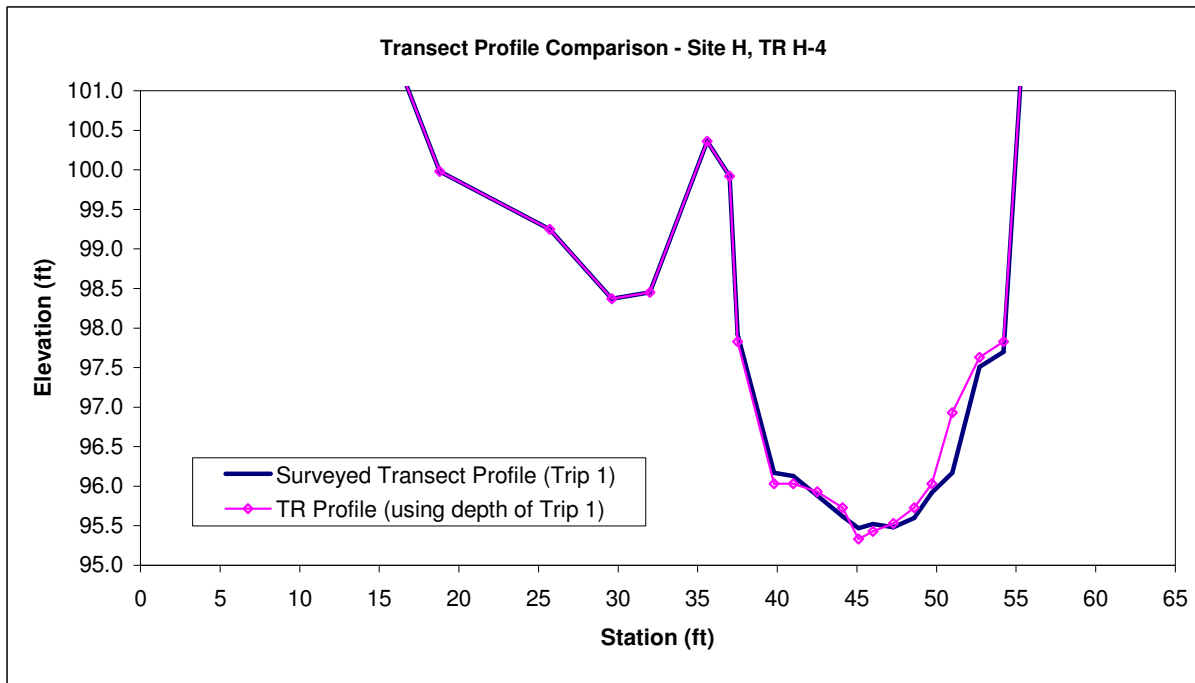


Transect Profile Comparison - Site H, TR H-4

| Trip 1 | | | | | | | | Trip 5 | | | | subs | code |
|----------|---------|---------|-----------|------------|-----------------|---------|---------------|------------|-----------------|---------|---------------|------|------|
| Sta (ft) | HI (ft) | FS (ft) | Elev (ft) | Depth (ft) | Velocity (ft/s) | q (cfs) | Bed Elev (ft) | Depth (ft) | Velocity (ft/s) | q (cfs) | Bed Elev (ft) | | |
| 10 | 105.5 | 0.93 | 104.57 | | | | 104.57 | | | | | org | 0 |
| 18.8 | 105.5 | 5.52 | 99.98 | | | | 99.98 | | | | | sand | 1 |
| 25.7 | 105.5 | 6.25 | 99.25 | | | | 99.25 | | | | | sand | 1 |
| 29.6 | 105.5 | 7.13 | 98.37 | | | | 98.37 | | | | | 90 | 5 |
| 32 | 105.5 | 7.05 | 98.45 | | | | 98.45 | | | | | 32 | 3 |
| 35.6 | 105.5 | 5.14 | 100.36 | | | | 100.36 | | | | | bed | 8 |
| 37 | 105.5 | 5.58 | 99.92 | | | | 99.92 | | | | | bed | 8 |
| 37.5 | 105.5 | 7.58 | 97.92 | 0.00 | 0.00 | 0.00 | 97.83 | | | | | bed | 8 |
| 39.8 | 105.5 | 9.33 | 96.17 | 1.80 | 0.00 | 0.00 | 96.03 | | | | | 11 | 3 |
| 41 | 105.5 | 9.37 | 96.13 | 1.80 | 0.00 | 0.00 | 96.03 | | | | | 16 | 3 |
| 42.5 | 105.5 | 9.62 | 95.88 | 1.90 | 1.00 | 2.95 | 95.93 | | | | | 45 | 4 |
| 44.1 | 105.5 | 9.88 | 95.62 | 2.10 | 1.60 | 4.37 | 95.73 | | | | | 1028 | 7 |
| 45.1 | 105.5 | 10.03 | 95.47 | 2.50 | 4.80 | 11.40 | 95.33 | | | | | 1028 | 7 |
| 46 | 105.5 | 9.98 | 95.52 | 2.40 | 3.90 | 10.30 | 95.43 | | | | | 1028 | 7 |
| 47.3 | 105.5 | 10.02 | 95.48 | 2.30 | 3.60 | 10.76 | 95.53 | | | | | 1028 | 7 |
| 48.6 | 105.5 | 9.90 | 95.6 | 2.10 | 2.20 | 5.54 | 95.73 | | | | | 128 | 5 |
| 49.7 | 105.5 | 9.58 | 95.92 | 1.80 | 0.00 | 0.00 | 96.03 | | | | | 2 | 1 |
| 51 | 105.5 | 9.33 | 96.17 | 0.90 | 0.00 | 0.00 | 96.93 | | | | | 2 | 1 |
| 52.7 | 105.5 | 7.99 | 97.51 | 0.20 | 0.00 | 0.00 | 97.63 | | | | | 45 | 4 |
| 54.2 | 105.5 | 7.80 | 97.7 | 0.00 | 0.00 | 0.00 | 97.83 | | | | | 32 | 3 |
| 55.3 | 105.5 | 4.33 | 101.17 | | | | 101.17 | | | | | 64 | 4 |
| 57.1 | 105.5 | 3.63 | 101.87 | | | | 101.87 | | | | | bed | 8 |

No flow (vel-depth) measurement during Trip 5

TR Q (cfs) = **45.3**



Reach: Canyon Reach
Stream: Cooper Creek
Site: Site H
Habitat Type: Pool

(1) Field Data

- (a) Field data were collected in four trips between 5/2003 and 10/2003
- (b) Flow data were only collected in Trip 1 on 5/14/2003.
- (c) WSE data were collected in all four trips.
- (d) Because of no flows measured in Trip 2 to Trip 4, flows of these three trips were estimated. The estimated flows along with measured flows and WSEs are plotted together in worksheet "Measured hydraulics", in which the graphs showed WSE vs flow relationships were inconsistent, indicating errors in estimated flows and/or surveyed WSEs.

(2) WSE Calibration

WSE: Average WSE is used as the representative transect WSE.

Discharge: Trip 1 Q = Average discharge of all four transects. No transect was considered as outliers. No flows were surveyed for Trip 2 to Trip 4.

Slope: Use Trip 1's average WSE slope (from TR H-1 to TR H-5) = 0.13%

SZF:

| TR | channel Invert (ft) | | SZF (ft) |
|--------|---------------------|--------|----------|
| | Trip 1 | Trip 5 | |
| TR H-1 | 93.71 | - | 93.71 |
| TR H-2 | 92.83 | - | 93.71 |
| TR H-3 | 93.54 | - | 93.71 |
| TR H-4 | 93.58 | - | 93.71 |

Note: Invert is the lowest elevation of the transect.

SZF of upstream transect must be equal or greater than the SZF of downstream transect.

Level Loop and Headpins:

| Date | Trip | BM-A | BM-B |
|-----------|------|--------|--------|
| 5/14/03 | 1 | 100.00 | 100.92 |
| 6/24/2003 | 2 | 100.00 | |
| 9/18/2003 | 3 | 100.00 | |
| 10/8/2003 | 4 | 100.00 | |

- (a) There were no level loop surveys performed on 6/24/03, 9/18/03, and 10/8/03.
 BM-A elevation from the first survey (5/14/03) was used for WSE surevys in the following 3 trips.
 There was only one level loop survey from the first trip, and the later three WSE surveys were all based on BM-A.
 Due to the lack of relative pin elevation changes between BM-A and BM-B, we are not able to determine the stability of BM-A and BM-B, and thus the WSE survey results for the last three trips may not be based on the same datum as the first trip. As a result, the reliability of the surveyed WSEs for this site are questionable.
- (b) To ensure the accuracy of WSE survey, it is recommended a headpin installed for each transect when setting up the transects and a complete level loop be perofrmed during each site visit.
 A recommended complete level loop would include moving the level for a distance to a new location after all HP/BM are surveyed. Then reshoot all pins to check if pin elevations are consistent.

Calibration Flow:

This site has four sets of measured WSEs and only one set of velocity-depth surveys. Flows for Trip 2 to Trip 4 were estimated and plotted along with all measured flows and WSEs in worksheet "Measured Hydraulics". However, the graphs "Site H - Longitudinal WSE Profile" and "Site H - WSE vs Flow" show inconsistent flow-WSE relationship, such as water flowing uphill. Due to the inconsistency between flows and WSEs, it was decided to only use flow taken in Trip 1 for calibration. Estimated flows and measured WSEs of Trip 2 to Trip 4 will not be included for calibration, but will be used for comparison.

WSE Calibration Method:

- (1) MANSQ was used to calibrate WSE for TR H-1.
- (2) WSP was selected to calibrate WSEs for TR H-2 to TR H-4. MANSQ results of TR H-1 was used as the boundary condition for WSP.

WSE Calibration Result:

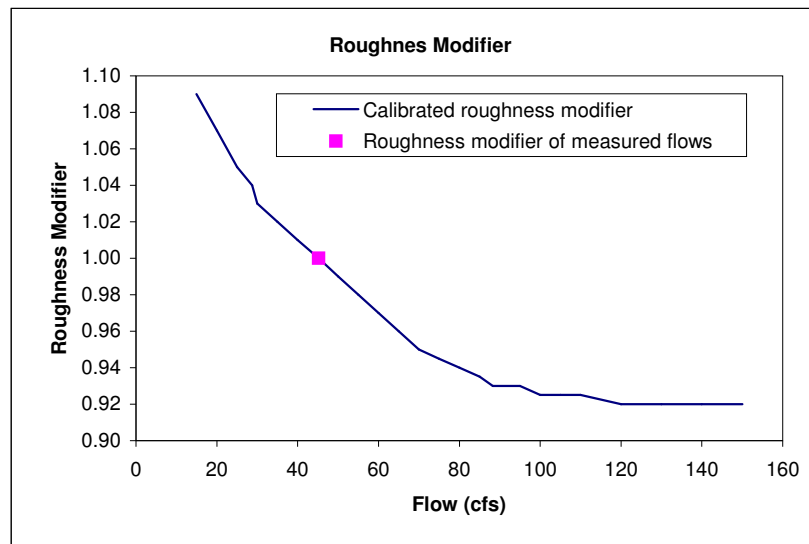
| Trip | Survey Date | Q (cfs) | Modeling WSE(ft) | | | | Calibrated WSE(ft) | | | | ΔWSE (ft, measured-calib.) | | | |
|------|-------------|---------|------------------|-------|-------|-------|--------------------|-------|-------|-------|----------------------------|------|-------|-------|
| | | | TR-1 | TR-2 | TR-3 | TR-4 | TR-1 | TR-2 | TR-3 | TR-4 | TR-1 | TR-2 | TR-3 | TR-4 |
| 1 | 5/14/03 | 45.2 | 97.77 | 97.96 | 97.83 | 97.83 | 97.77 | 97.85 | 97.88 | 97.88 | 0.00 | 0.11 | -0.05 | -0.05 |
| 2 | 6/24/2003 | 85.0 | 98.11 | 98.23 | 98.21 | 98.15 | 98.15 | 98.22 | 98.26 | 98.26 | | | | |
| 3 | 9/18/2003 | 28.7 | 97.47 | 97.54 | 97.56 | 97.56 | 97.51 | 97.59 | 97.62 | 97.62 | | | | |
| 4 | 10/8/2003 | 88.3 | 98.21 | 98.26 | 98.25 | 98.24 | 98.17 | 98.24 | 98.28 | 98.28 | | | | |

Note: (a) WSEs of Trip 2 to Trip 4 are listed in the table only for comparison, not for calibration error calculation.

WSP Roughness Modifier

| Flow | RAF |
|-------|------|
| 15.0 | 1.09 |
| 20 | 1.07 |
| 25 | 1.05 |
| 28.7 | 1.04 |
| 30.0 | 1.03 |
| 35 | 1.02 |
| 40.0 | 1.01 |
| 45.2 | 1.00 |
| 50.0 | 0.99 |
| 55 | 0.98 |
| 60 | 0.97 |
| 65.0 | 0.96 |
| 70 | 0.95 |
| 75 | 0.94 |
| 80 | 0.94 |
| 85.0 | 0.94 |
| 88.3 | 0.93 |
| 95.0 | 0.93 |
| 100.0 | 0.93 |
| 105 | 0.93 |
| 110 | 0.93 |
| 120 | 0.92 |
| 130 | 0.92 |

(*) The table on the left lists the Roughness Modifier used in the WSP WSE calibration.



| | |
|-----|------|
| 140 | 0.92 |
| 150 | 0.92 |

(2) Calibrated Hydraulics

- (a) For MANSQ WSE calibration, $\beta_{TR1}=0.00$ and Trip 1 flow (45.2cfs) was used as the calibration flow.
- (b) For velocity calibration, Trip 1 velocity profiles were used as the templates for calibration, because
- (c) Hydraulic calibration results are summarized in worksheets cTR H-y, where y=1, 2, 3, and 4.
- (d) WSE Calibration errors for TR H-2 are slightly big, which is due to surveying errors in WSE.
It can be seen from graph "Site H - Longitudinal WSE Profile" in worksheet "Measured Hydraulics" that TR H-2 has the greatest WSE of all four transects. This is particular clear in Trip 1 WSE survey.
- (e) TR H-2, TR H-3 and TR H-4 : WSE, Froude number (Fr), Cross-sectional Manning's n, transect average velocity (V), wetted perimeter, and Velocity Adjustment Factor (VAF) all are acceptable and within reasonable ranges.
- (f) TR H-1 : There is only little variations in the entire range of flows for VAF, Froude numbers and cross-sectional Manning's n. This is reasonable, because this site is a pool habitat. Other hydraulic parameters, such as cross-sectional average velocity, wetted perimeter, and WSE all are within acceptable range.
- (g) Comparison of modeling and calibrated WSEs are shown in worksheet "SimWSE".
- (h) PHABSIM model did not calculate wetted perimeter and Manning's, both of which were calculated outside the model.

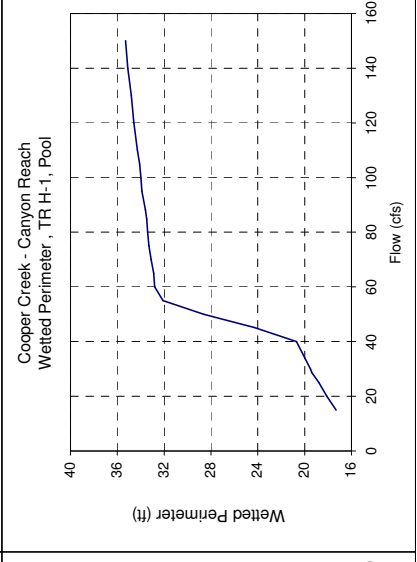
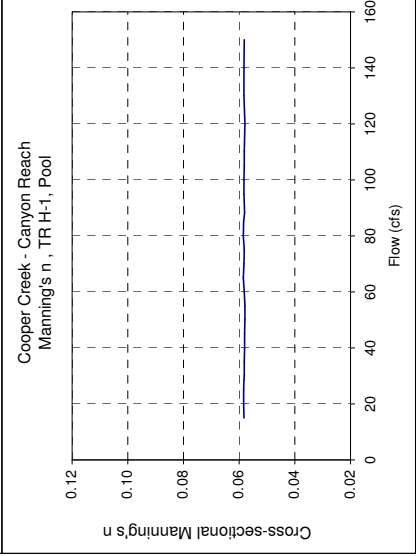
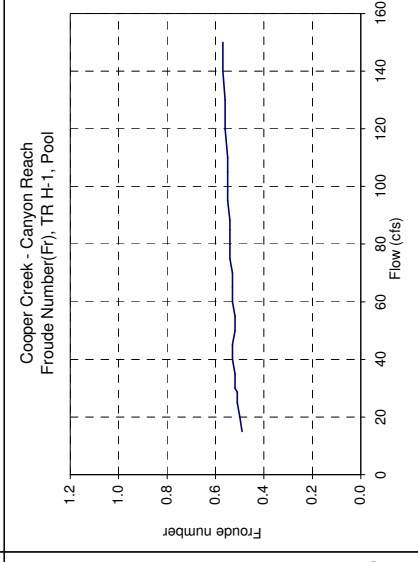
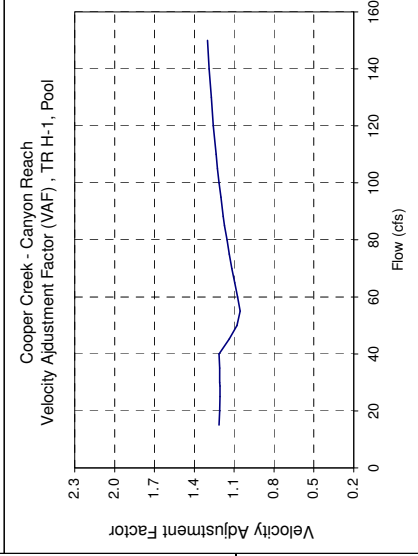
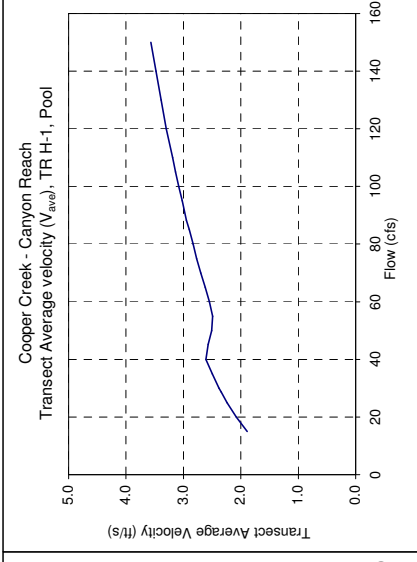
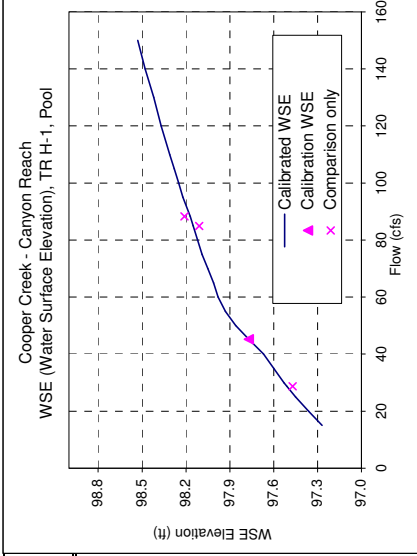
(3) Velocity calibration

- TR H-1: Trip 1's velocity profile was used as template for calibration.
Slightly adjusted Manning's n values calculated by PHABSIM to make the simulated velocity near the water edge more reasonable.
- TR A-2: Trip 1's velocity profile was used as template for calibration.
Slightly adjusted Manning's n values calculated by PHABSIM to make the simulated velocity near the water edge more reasonable.
- TR A-3: Trip 1's velocity profile was used as template for calibration.
Slightly adjusted Manning's n values calculated by PHABSIM to make the simulated velocity near the water edge more reasonable.
- TR A-4: Trip 1's velocity profile was used as template for calibration.
Slightly adjusted Manning's n values calculated by PHABSIM to make the simulated velocity near the water edge more reasonable.

The comparison of simulated and measured velocity profiles are included in worksheet "VelComp", which shows the simulated profiles resemble the measured ones.

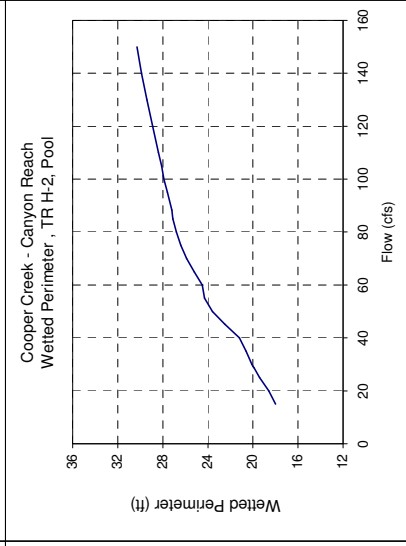
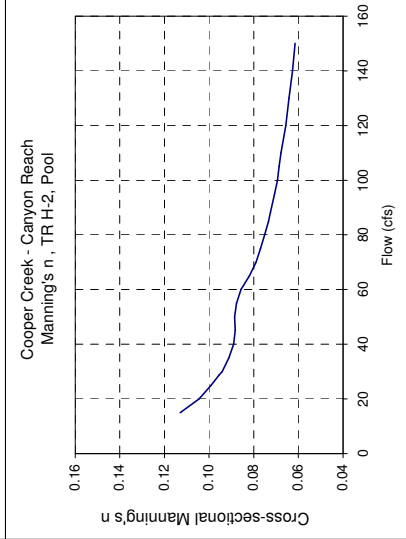
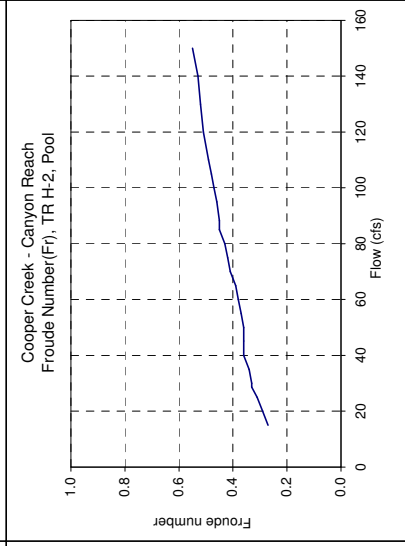
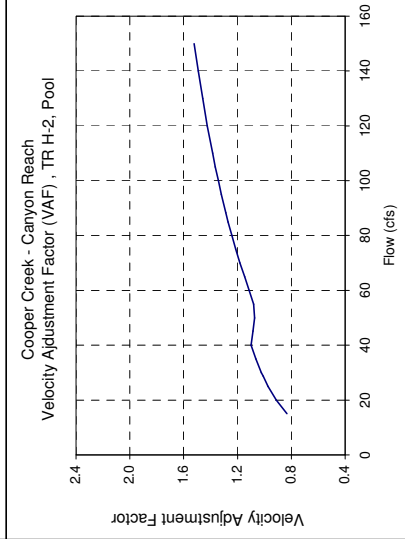
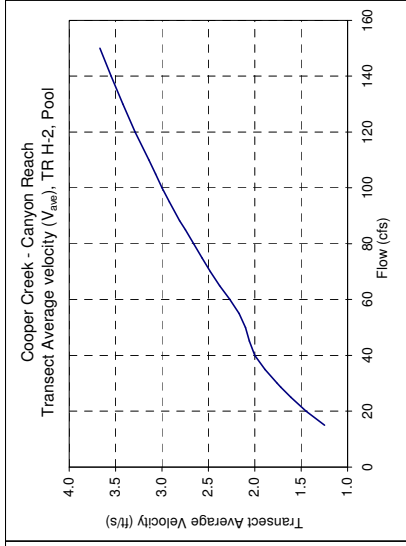
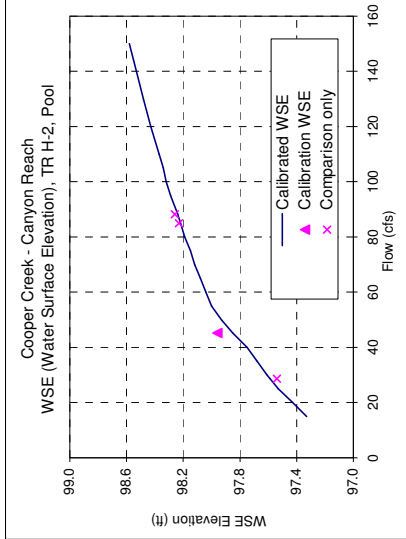
Reach Canyon Reach
Stream Cooper Creek
Transect H-1
Habitat Pool

| Modeling | | Simul. | Cal'd | Velocity | | Manning's n | | wetted |
|----------|-------|--------|-------|----------|--------|-------------|-------|-----------|
| Q | WSE | Q | WSE | FAF | Froude | Velocity | n | perimeter |
| (cfs) | (ft) | (cfs) | (ft) | | Number | (ft/s) | | (ft) |
| 45.2 | 97.77 | 15 | 97.27 | 1.21 | 0.49 | 1.89 | 0.058 | 17.3 |
| 85.0 | 98.11 | 20 | 97.36 | 1.21 | 0.50 | 2.08 | 0.058 | 18.1 |
| 28.7 | 97.47 | 25 | 97.45 | 1.21 | 0.51 | 2.24 | 0.058 | 18.8 |
| 88.3 | 98.21 | 28.7 | 97.51 | 1.21 | 0.51 | 2.34 | 0.058 | 19.4 |
| | | 30 | 97.53 | 1.21 | 0.52 | 2.38 | 0.058 | 19.5 |
| | | 35 | 97.60 | 1.21 | 0.52 | 2.50 | 0.058 | 20.1 |
| | | 40 | 97.67 | 1.21 | 0.53 | 2.61 | 0.058 | 20.7 |
| | | 45.2 | 97.77 | 1.14 | 0.53 | 2.57 | 0.058 | 24.3 |
| | | 50 | 97.86 | 1.08 | 0.52 | 2.51 | 0.058 | 28.6 |
| | | 55 | 97.93 | 1.05 | 0.52 | 2.49 | 0.058 | 32.1 |
| | | 60 | 97.98 | 1.07 | 0.53 | 2.55 | 0.058 | 32.8 |
| | | 65 | 98.01 | 1.10 | 0.53 | 2.62 | 0.059 | 32.9 |
| | | 70 | 98.05 | 1.12 | 0.53 | 2.70 | 0.058 | 33.1 |
| | | 75 | 98.09 | 1.14 | 0.54 | 2.77 | 0.058 | 33.3 |
| | | 80 | 98.12 | 1.15 | 0.54 | 2.83 | 0.058 | 33.4 |
| | | 85 | 98.15 | 1.17 | 0.54 | 2.90 | 0.058 | 33.5 |
| | | 88.3 | 98.17 | 1.18 | 0.54 | 2.95 | 0.058 | 33.6 |
| | | 95 | 98.22 | 1.20 | 0.55 | 3.02 | 0.058 | 33.9 |
| | | 100 | 98.25 | 1.21 | 0.55 | 3.08 | 0.058 | 34 |
| | | 105 | 98.28 | 1.23 | 0.55 | 3.14 | 0.058 | 34.1 |
| | | 110.0 | 98.31 | 1.23 | 0.55 | 3.19 | 0.058 | 34.3 |
| | | 120 | 98.37 | 1.26 | 0.56 | 3.30 | 0.058 | 34.6 |
| | | 130 | 98.42 | 1.27 | 0.56 | 3.39 | 0.058 | 34.8 |
| | | 140 | 98.48 | 1.29 | 0.57 | 3.48 | 0.058 | 35.1 |
| | | 150 | 98.53 | 1.30 | 0.57 | 3.57 | 0.058 | 35.3 |



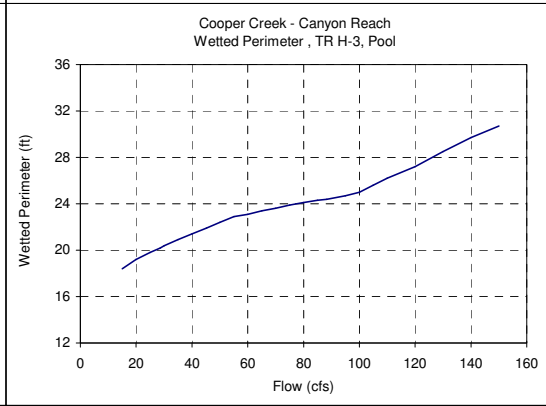
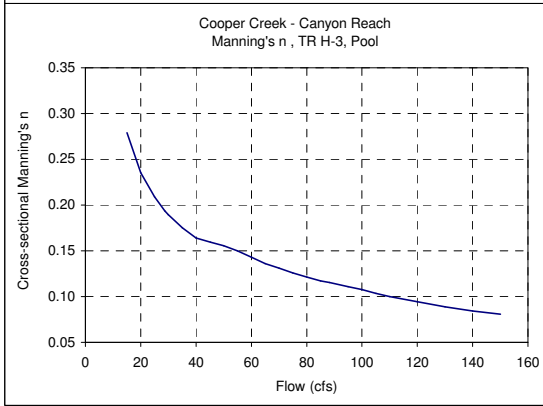
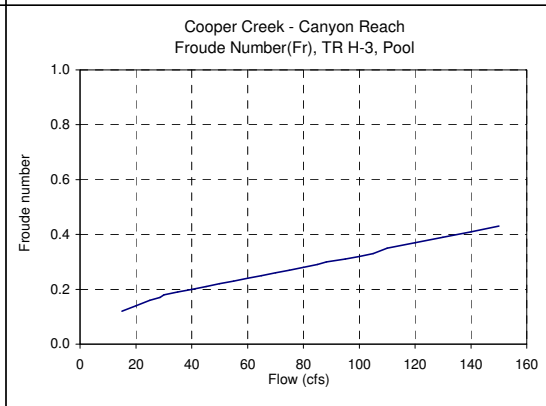
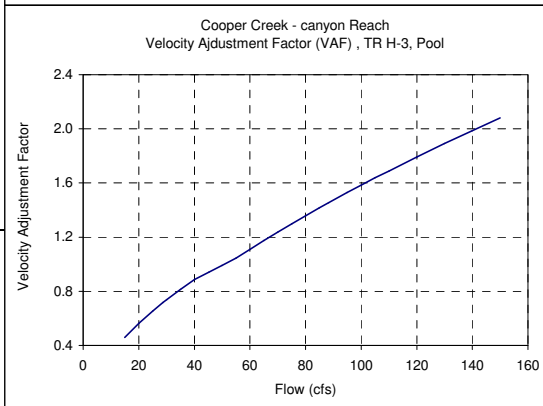
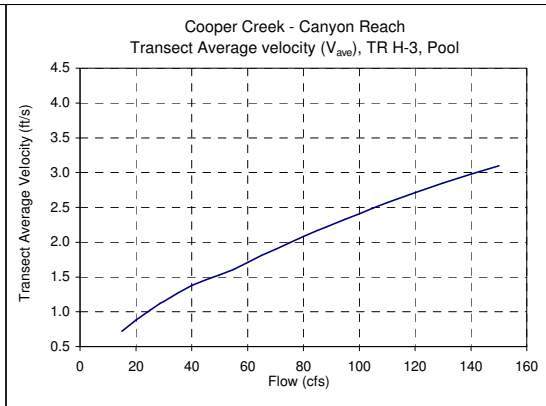
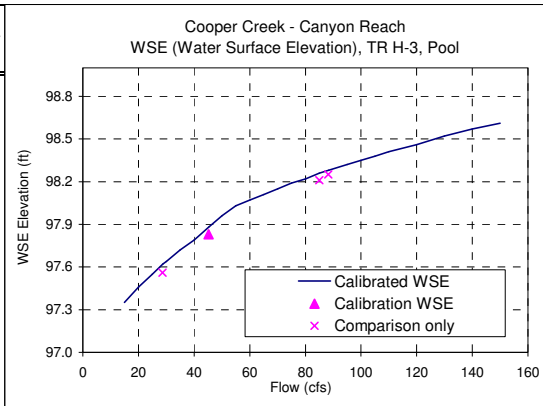
Reach : Canyon Reach
Stream : Cooper Creek
Transect : H-2
Habitat : Pool

| Modeling Q (cfs) | WSE (ft) | Simul. Q (cfs) | Cal'd WSE (ft) | VAF | Froude Number | Velocity (ft/s) | Manning's n | wetted perimeter (ft) |
|------------------|----------|----------------|----------------|------|---------------|-----------------|-------------|-----------------------|
| 45.2 | 97.96 | 15 | 97.33 | 0.83 | 0.27 | 1.25 | 0.113 | 18 |
| 20 | 98.23 | 20 | 97.43 | 0.91 | 0.29 | 1.45 | 0.105 | 18.6 |
| 25 | 97.54 | 25 | 97.53 | 0.97 | 0.31 | 1.61 | 0.099 | 19.4 |
| 28.7 | 97.54 | 28.7 | 97.59 | 1.01 | 0.33 | 1.72 | 0.096 | 19.9 |
| 88.3 | 98.26 | 30 | 97.61 | 1.02 | 0.33 | 1.76 | 0.094 | 20.1 |
| | | 35 | 97.68 | 1.06 | 0.34 | 1.89 | 0.091 | 20.6 |
| | | 40 | 97.75 | 1.10 | 0.36 | 2.00 | 0.089 | 21.2 |
| | | 45.2 | 97.85 | 1.08 | 0.36 | 2.06 | 0.088 | 22.5 |
| | | 50 | 97.93 | 1.07 | 0.36 | 2.10 | 0.089 | 23.6 |
| | | 55 | 98.00 | 1.08 | 0.37 | 2.17 | 0.088 | 24.3 |
| | | 60 | 98.04 | 1.11 | 0.38 | 2.27 | 0.086 | 24.5 |
| | | 65 | 98.08 | 1.15 | 0.39 | 2.38 | 0.082 | 25.2 |
| | | 70 | 98.12 | 1.18 | 0.41 | 2.48 | 0.079 | 25.9 |
| | | 75 | 98.15 | 1.21 | 0.42 | 2.57 | 0.077 | 26.4 |
| | | 80 | 98.19 | 1.24 | 0.43 | 2.66 | 0.075 | 26.8 |
| | | 85 | 98.22 | 1.27 | 0.45 | 2.75 | 0.073 | 27.1 |
| | | 88.3 | 98.24 | 1.29 | 0.45 | 2.81 | 0.072 | 27.2 |
| | | 95 | 98.29 | 1.32 | 0.46 | 2.92 | 0.071 | 27.6 |
| | | 100 | 98.32 | 1.34 | 0.47 | 3.00 | 0.069 | 27.9 |
| | | 105 | 98.34 | 1.36 | 0.48 | 3.07 | 0.069 | 28.1 |
| | | 110 | 98.37 | 1.38 | 0.49 | 3.14 | 0.068 | 28.4 |
| | | 120 | 98.43 | 1.42 | 0.51 | 3.29 | 0.066 | 28.9 |
| | | 130 | 98.48 | 1.46 | 0.52 | 3.42 | 0.064 | 29.4 |
| | | 140 | 98.53 | 1.49 | 0.53 | 3.55 | 0.063 | 29.9 |
| | | 150 | 98.58 | 1.52 | 0.55 | 3.67 | 0.062 | 30.3 |



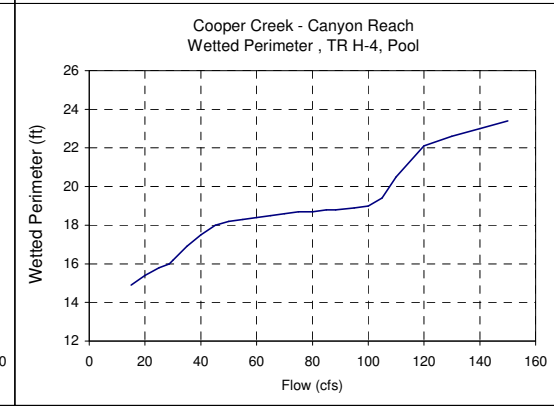
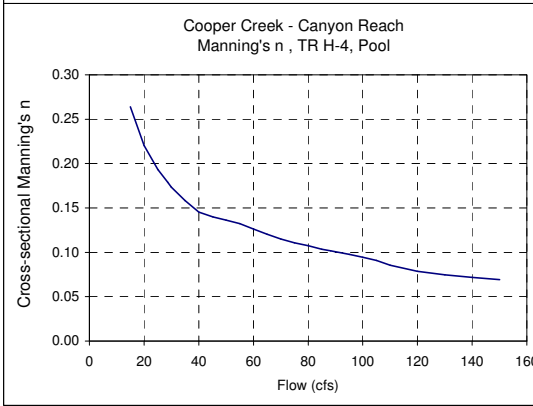
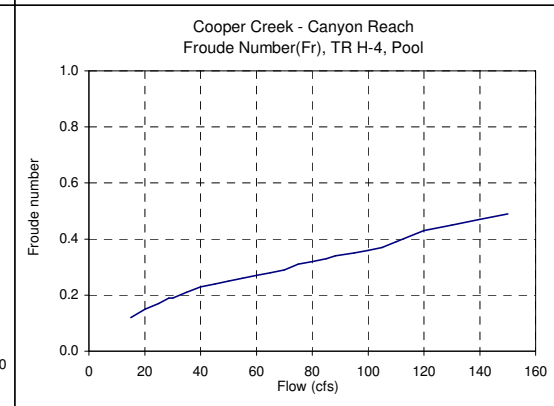
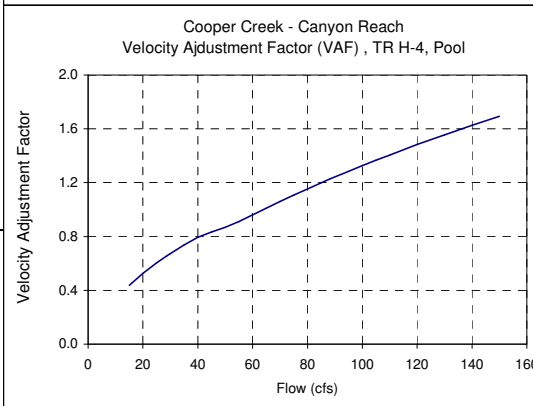
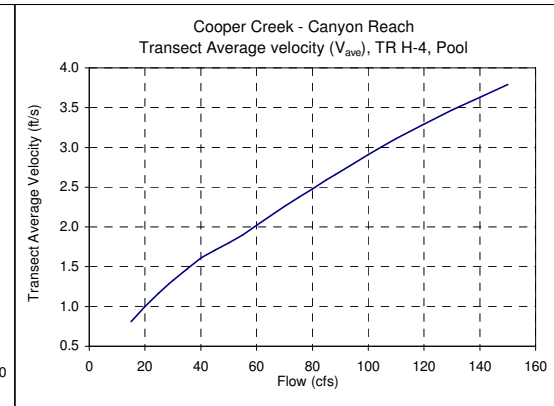
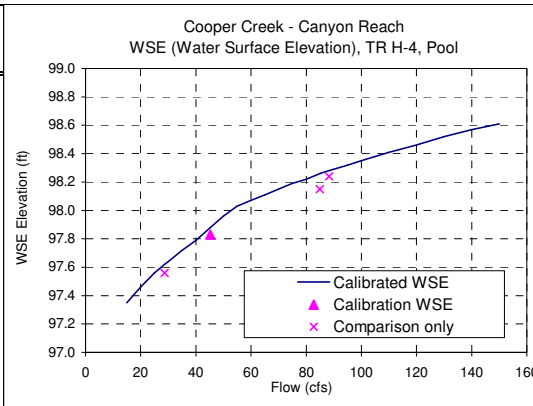
Reach: Canyon Reach
 Stream: Cooper Creek
 Transect: H-3
 Habitat: Pool

| Modeling | | Simul. | Cal'd | VAF | Froude | Velocity | Manning's | wetted |
|----------|-------|--------|-------|------|--------|----------|-----------|-----------|
| Q | WSE | Q | WSE | | Number | (ft/s) | n | perimeter |
| (cfs) | (ft) | (cfs) | (ft) | | | | | (ft) |
| 45.2 | 97.83 | 15 | 97.35 | 0.46 | 0.12 | 0.72 | 0.279 | 18.4 |
| 85.0 | 98.21 | 20 | 97.46 | 0.56 | 0.14 | 0.88 | 0.235 | 19.2 |
| 28.7 | 97.56 | 25 | 97.55 | 0.65 | 0.16 | 1.02 | 0.209 | 19.8 |
| 88.3 | 98.25 | 28.7 | 97.62 | 0.72 | 0.17 | 1.12 | 0.194 | 20.2 |
| | | 30 | 97.64 | 0.74 | 0.18 | 1.15 | 0.190 | 20.4 |
| | | 35 | 97.72 | 0.81 | 0.19 | 1.27 | 0.175 | 20.9 |
| | | 40 | 97.79 | 0.89 | 0.20 | 1.38 | 0.164 | 21.4 |
| | | 45.2 | 97.88 | 0.94 | 0.21 | 1.46 | 0.160 | 21.9 |
| | | 50 | 97.96 | 0.99 | 0.22 | 1.53 | 0.156 | 22.4 |
| | | 55 | 98.03 | 1.05 | 0.23 | 1.61 | 0.150 | 22.9 |
| | | 60 | 98.07 | 1.11 | 0.24 | 1.71 | 0.143 | 23.1 |
| | | 65 | 98.11 | 1.17 | 0.25 | 1.81 | 0.136 | 23.4 |
| | | 70 | 98.15 | 1.24 | 0.26 | 1.90 | 0.131 | 23.6 |
| | | 75 | 98.19 | 1.30 | 0.27 | 1.99 | 0.126 | 23.9 |
| | | 80 | 98.22 | 1.36 | 0.28 | 2.08 | 0.121 | 24.1 |
| | | 85 | 98.26 | 1.42 | 0.29 | 2.17 | 0.117 | 24.3 |
| | | 88.3 | 98.28 | 1.46 | 0.30 | 2.22 | 0.115 | 24.4 |
| | | 95 | 98.32 | 1.53 | 0.31 | 2.33 | 0.111 | 24.7 |
| | | 100 | 98.35 | 1.58 | 0.32 | 2.41 | 0.108 | 25 |
| | | 105 | 98.38 | 1.64 | 0.33 | 2.49 | 0.104 | 25.6 |
| | | 110 | 98.41 | 1.69 | 0.35 | 2.57 | 0.100 | 26.2 |
| | | 120 | 98.46 | 1.79 | 0.37 | 2.71 | 0.094 | 27.2 |
| | | 130 | 98.52 | 1.89 | 0.39 | 2.85 | 0.089 | 28.5 |
| | | 140 | 98.57 | 1.99 | 0.41 | 2.98 | 0.084 | 29.7 |
| | | 150 | 98.61 | 2.08 | 0.43 | 3.10 | 0.081 | 30.7 |

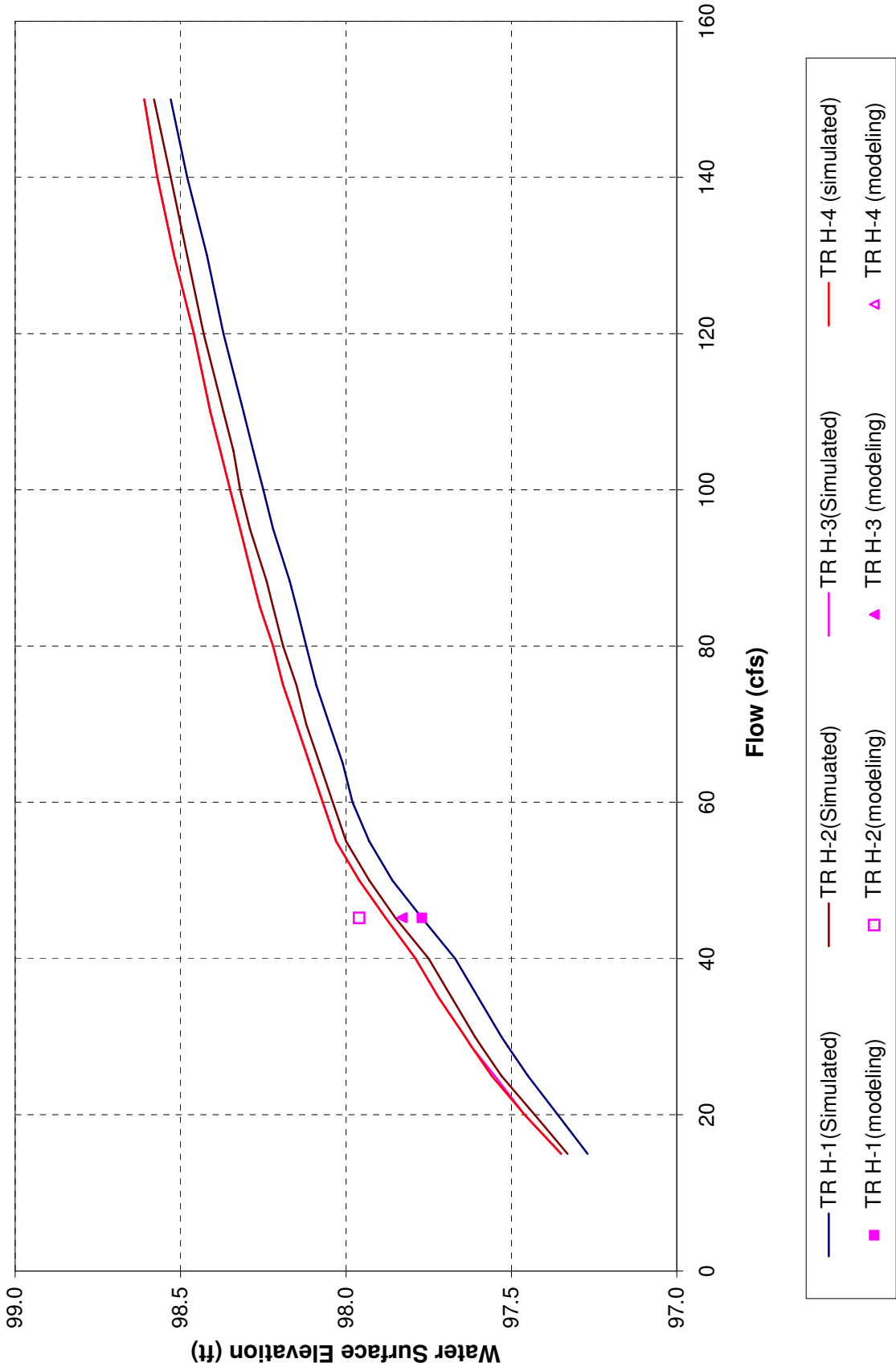


Reach: **Canyon Reach**
 Stream: **Cooper Creek**
 Transect: **H-4**
 Habitat: **Pool**

| Modeling | | Simul. | Cal'd | VAF | Froude | Velocity | Manning's | wetted |
|----------|-------|--------|-------|------|--------|----------|-----------|-----------|
| Q | WSE | Q | WSE | | Number | (ft/s) | n | perimeter |
| (cfs) | (ft) | (cfs) | (ft) | | | | | (ft) |
| 45.2 | 97.83 | 15 | 97.35 | 0.44 | 0.12 | 0.81 | 0.264 | 14.9 |
| 85.0 | 98.15 | 20 | 97.46 | 0.53 | 0.15 | 1.00 | 0.220 | 15.4 |
| 28.7 | 97.56 | 25 | 97.56 | 0.60 | 0.17 | 1.17 | 0.193 | 15.8 |
| 88.3 | 98.24 | 28.7 | 97.62 | 0.66 | 0.19 | 1.29 | 0.179 | 16 |
| | | 30 | 97.64 | 0.67 | 0.19 | 1.33 | 0.173 | 16.2 |
| | | 35 | 97.72 | 0.74 | 0.21 | 1.47 | 0.158 | 16.9 |
| | | 40 | 97.79 | 0.80 | 0.23 | 1.61 | 0.145 | 17.5 |
| | | 45.2 | 97.88 | 0.83 | 0.24 | 1.71 | 0.140 | 18 |
| | | 50 | 97.96 | 0.87 | 0.25 | 1.80 | 0.136 | 18.2 |
| | | 55 | 98.03 | 0.91 | 0.26 | 1.90 | 0.132 | 18.3 |
| | | 60 | 98.07 | 0.96 | 0.27 | 2.02 | 0.126 | 18.4 |
| | | 65 | 98.11 | 1.01 | 0.28 | 2.14 | 0.120 | 18.5 |
| | | 70 | 98.15 | 1.06 | 0.29 | 2.26 | 0.115 | 18.6 |
| | | 75 | 98.19 | 1.11 | 0.31 | 2.37 | 0.111 | 18.7 |
| | | 80 | 98.22 | 1.15 | 0.32 | 2.48 | 0.107 | 18.7 |
| | | 85 | 98.26 | 1.20 | 0.33 | 2.59 | 0.104 | 18.8 |
| | | 88.3 | 98.28 | 1.23 | 0.34 | 2.66 | 0.102 | 18.8 |
| | | 95 | 98.32 | 1.29 | 0.35 | 2.80 | 0.098 | 18.9 |
| | | 100 | 98.35 | 1.33 | 0.36 | 2.91 | 0.094 | 19 |
| | | 105 | 98.38 | 1.37 | 0.37 | 3.01 | 0.091 | 19.4 |
| | | 110 | 98.41 | 1.41 | 0.39 | 3.11 | 0.086 | 20.5 |
| | | 120 | 98.46 | 1.48 | 0.43 | 3.29 | 0.079 | 22.1 |
| | | 130 | 98.52 | 1.56 | 0.45 | 3.47 | 0.075 | 22.6 |
| | | 140 | 98.57 | 1.63 | 0.47 | 3.63 | 0.072 | 23.0 |
| | | 150 | 98.61 | 1.69 | 0.49 | 3.79 | 0.069 | 23.4 |

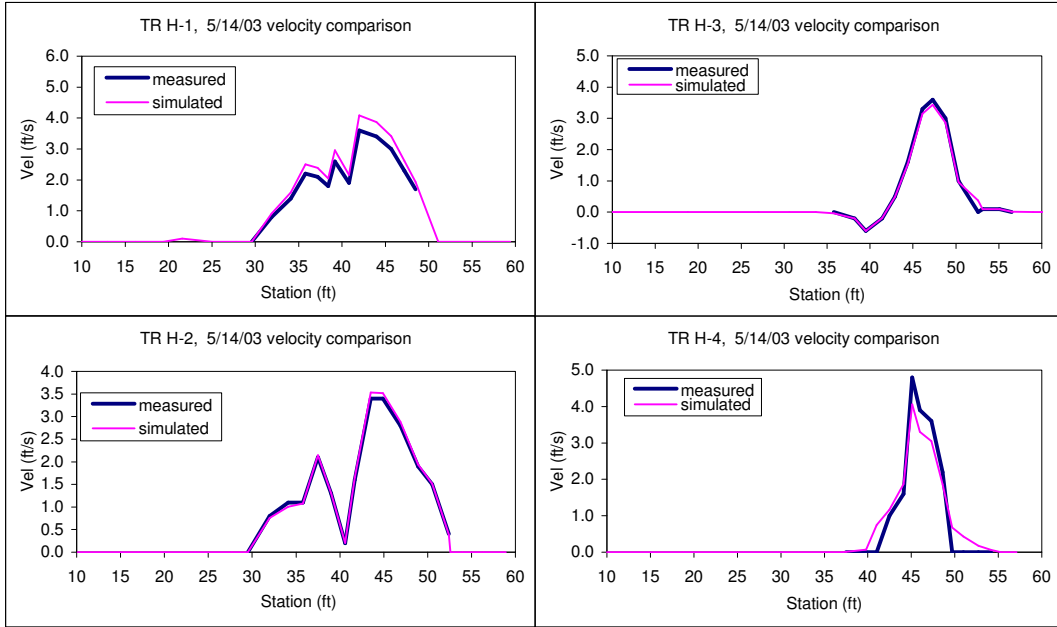


Cooper Creek - Stetson Reach, Site H Comparison of Modeling and Simulated WSEs



Reach: Canyon Reach
 Stream: Cooper Creek
 Habitat: Pool
 CalibrationFlow: 5/14/2003 (Q=45.2cfs)

Comparison of Measured and Simulated Velocity Profile



| TR H-1 | | | TR H-2 | | | TR H-3 | | | TR H-4 | | |
|--------|-------|--------|--------|-------|--------|--------|-------|--------|--------|-------|--------|
| Sta | meas. | simul. | Sta | meas. | simul. | Sta | meas. | simul. | Sta | meas. | simul. |
| 10.0 | | 0.00 | 10.1 | | 0.00 | 10.0 | | 0.00 | 10.0 | | 0.00 |
| 13.0 | | 0.00 | 17.0 | | 0.00 | 18.8 | | 0.00 | 18.8 | | 0.00 |
| 16.2 | | 0.00 | 23.5 | | 0.00 | 27.0 | | 0.00 | 25.7 | | 0.00 |
| 19.4 | | 0.00 | 27.7 | | 0.00 | 30.6 | | 0.00 | 29.6 | | 0.00 |
| 21.6 | | 0.10 | 29.5 | 0.00 | 0.00 | 33.7 | | 0.00 | 32.0 | | 0.00 |
| 25.0 | | 0.00 | 32.0 | 0.80 | 0.75 | 35.8 | 0.00 | -0.04 | 35.6 | | 0.00 |
| 27.8 | | 0.00 | 34.1 | 1.10 | 1.00 | 38.2 | -0.20 | -0.20 | 37.0 | | 0.00 |
| 29.6 | 0.00 | 0.00 | 35.8 | 1.10 | 1.08 | 39.5 | -0.60 | -0.60 | 37.5 | 0.00 | 0.01 |
| 31.9 | 0.80 | 0.91 | 37.5 | 2.10 | 2.14 | 41.4 | -0.20 | -0.19 | 39.8 | 0.00 | 0.07 |
| 34.1 | 1.40 | 1.59 | 39.0 | 1.30 | 1.31 | 42.9 | 0.50 | 0.48 | 41.0 | 0.00 | 0.75 |
| 35.8 | 2.20 | 2.50 | 40.6 | 0.20 | 0.20 | 44.4 | 1.60 | 1.53 | 42.5 | 1.00 | 1.17 |
| 37.2 | 2.10 | 2.39 | 41.7 | 1.60 | 1.65 | 46.1 | 3.30 | 3.15 | 44.1 | 1.60 | 1.87 |
| 38.4 | 1.80 | 2.05 | 43.5 | 3.40 | 3.53 | 47.3 | 3.60 | 3.43 | 45.1 | 4.80 | 4.06 |
| 39.2 | 2.60 | 2.95 | 44.9 | 3.40 | 3.52 | 48.8 | 3.00 | 2.86 | 46.0 | 3.90 | 3.30 |
| 40.8 | 1.90 | 2.16 | 46.9 | 2.80 | 2.88 | 50.3 | 1.00 | 0.96 | 47.3 | 3.60 | 3.05 |
| 42.0 | 3.60 | 4.09 | 48.9 | 1.90 | 1.94 | 52.6 | 0.00 | 0.37 | 48.6 | 2.20 | 1.87 |
| 44.0 | 3.40 | 3.86 | 50.5 | 1.50 | 1.51 | 53.1 | 0.10 | 0.10 | 49.7 | 0.00 | 0.68 |
| 45.7 | 3.00 | 3.41 | 52.4 | 0.40 | 0.39 | 55.1 | 0.10 | 0.10 | 51.0 | 0.00 | 0.43 |
| 47.2 | 2.30 | 2.61 | 52.6 | | 0.00 | 56.5 | 0.00 | 0.02 | 52.7 | 0.00 | 0.18 |
| 48.5 | 1.70 | 1.93 | 54.0 | | 0.00 | 59.0 | | 0.00 | 54.2 | 0.00 | 0.06 |
| 51.1 | | 0.00 | 56.4 | | 0.00 | 61.7 | | 0.00 | 55.3 | | 0.00 |
| 55.4 | | 0.00 | 58.9 | | 0.00 | | | | 57.1 | | 0.00 |
| 59.4 | | 0.00 | | | | | | | | | |