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**Notes:**
- BF width 28.7'
- Flood Prone: West
- 80.3
### SURVEY DATA - LONGITUDINAL PROFILE 1

#### SITE:
Little Coonodagha Creek

#### Date:
4-12-16

#### Location:
Reach 3

#### Party / Notes:
Wendy, Brian, Elise, HUC:

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#### 253 BM

#### 82 Flag

#### Flag Bit

#### 254 Bit

#### FLG-BT (3)

#### B-19

#### A34

**Copyright © 2016 Wildland Hydrology**

**3.00  18.18**
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**Stream Type:**

**Valley Type:**

TOTAL: 20 - 99.7% 43 - 99.1% 103 - 99.5%
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**Stream Type:**

**Valley Type:**
**Worksheet A-1. Field Form for Level II Stream Classification.**

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<th>mi²</th>
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<td>Observers: Tegan 3</td>
<td>Landscape Type: Confined</td>
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**Bankfull Width (W_{ba})**
The surface width of the stream at bankfull stage elevation, in a riffle section.

| 28.7 ft |

**Bankfull Mean Depth (d_{ba})**
Mean depth of the stream channel cross-section, at bankfull stage elevation, in a riffle section (d_{ba} = A_{ba} / W_{ba}).

| 1.75 ft |

**Bankfull Cross-Sectional Area (A_{ba})**
Area of the stream channel cross-section, at bankfull stage elevation, in a riffle section.

| 50.32 ft² |

**Width/Depth Ratio (W_{ba} / d_{ba})**
Bankfull Width divided by Bankfull Mean Depth, in a riffle section.

| 16.4 ft/ft |

**Bankfull Maximum Depth (d_{max})**
Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section.

| 2.93 ft |

**Flood-Prone Area Width (W_{fp})**
Width of the channel at an elevation that is twice the Bankfull Maximum Depth, measured perpendicular to the fall line of the valley in a riffle section.

| 80.3 ft |

**Entrenchment Ratio (ER)**
The Flood-Prone Area Width divided by Bankfull Width (W_{fp} / W_{ba}), in a riffle section.

| 2.8 ft/ft |

**Channel Materials (Particle Size Index D_{50})**
The D_{50} particle size index represents the median or dominant diameter of channel materials, as sampled proportionately from the channel surface between the bankfull stage and Thalweg elevations.

| 38 mm |

**Average Water Surface Slope (S)**
The elevation difference of water surface measurements over the stream length between two similar bed features (e.g., start of riffle to start of last riffle) for several riffle-pool or step-pool sequences, representing channel gradient.

| 0.0036 ft/ft |

**Channel Sinuosity (k)**
An index of channel pattern determined from stream length divided by valley length (SL / VL), or from valley slope divided by average water surface slope (S_{av} / S).

| 1.46 ft/ft |

See Classification Key (Figure A-2)
**Worksheet A-2.** Computations of velocity and discharge using various methods.

**Bankfull VELOCITY & DISCHARGE Estimates**

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**INPUT VARIABLES**

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<th>Bankfull Riffle Mean Depth</th>
<th>$d_{bfr}$ ($ft$)</th>
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<td>$D_{84}$ Particle Size in Feet</td>
<td>0.59 $D_{84}$</td>
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<td>Drainage Area</td>
<td>12 $mi^2$</td>
<td>Shear Velocity $u^* = (gRS)^{1/2}$</td>
<td>0.43 $u^*$</td>
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**ESTIMATION METHODS**

1. Friction Factor/Relative Roughness

$$ \bar{u} = 2.83 + 5.66 \times \log \left( \frac{R}{D_{84}} \right) \frac{u^*}{f} $$


$$ \bar{u} = 1.49R^{0.63}S^{0.5} \frac{n}{n} = 0.03 $$

2. Roughness Coefficient: b) Manning's $n$ from Stream Type (Fig. A-30)

$$ \bar{u} = 1.49R^{0.63}S^{0.5} \frac{n}{n} = 0.03 $$

2. Roughness Coefficient: c) Manning's $n$ from Jarrett (USGS):

$$ \bar{u} = 1.49R^{0.63}S^{0.5} \frac{n}{n} = 0.39^{0.28}S^{0.16} $$

Note: This equation is applicable to steep, step, pool, high boundary roughness, cobbles- and boulder-dominated stream systems: i.e., for

3. Other Methods (Hey, Darcy-Weisbach, Chezy C, etc.)

3. Other Methods (Hey, Darcy-Weisbach, Chezy C, etc.)

4. Continuity Equations: a) USGS Gage Data

$$ \bar{u} = Q/A $$

4. Continuity Equations: b) Regional Curves

$$ \bar{u} = Q/A $$

**Protrusion Height Options for the $D_{64}$ Term in the Relative Roughness Relation $(R/D_{64})$ - Estimation Method 1**

Option 1: For sand-bed channels: Measure 100 "protrusion heights" of sand dunes from the downstream side of feature to the top of feature. Substitute the $D_{64}$ sand dune protrusion height in ft for the $D_{64}$ term in method 1.

Option 2: For boulder-dominated channels: Measure 100 "protrusion heights" of boulders on the sides from the bed elevation to the top of the rock on that side. Substitute the $D_{64}$ boulder protrusion height in ft for the $D_{64}$ term in method 1.

Option 3: For bedrock-dominated channels: Measure 100 "protrusion heights" of rock separations, steps, joints or uplifted surfaces above channel bed elevation. Substitute the $D_{64}$ bedrock protrusion height in ft for the $D_{64}$ term in method 1.

Option 4: For log-influenced channels: Measure "protrusion heights" proportionate to channel width of log diameters or the height of the log on upstream side if embedded. Substitute the $D_{64}$ protrusion height in ft for the $D_{64}$ term in method 1.

**Stream:** Little Comus Creek  
**Location:** Reach 3  
**Team:** Team 3  
**Date:** April 12, 2014  
**Drainage Area:**

<table>
<thead>
<tr>
<th>Riffle Channel Dimensions</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bankfull Width (W_{bf}) (ft)</td>
<td>28.7</td>
<td></td>
</tr>
<tr>
<td>2. Bankfull Mean Depth (d_{bf}) (ft)</td>
<td>1.75</td>
<td></td>
</tr>
<tr>
<td>3. Width/Depth Ratio (W_{bf} / d_{bf})</td>
<td>9.79</td>
<td></td>
</tr>
<tr>
<td>4. Bankfull Cross-Sectional Area (A_{bf}) (ft^2)</td>
<td>50.32</td>
<td></td>
</tr>
<tr>
<td>5. Bankfull Maximum Depth (d_{max}) (ft)</td>
<td>2.93</td>
<td></td>
</tr>
<tr>
<td>6. Width of Flood-Prone Area (W_{fp}) (ft)</td>
<td>8.63</td>
<td></td>
</tr>
<tr>
<td>7. Entrenchment Ratio (ER) (W_{fp} / W_{bf})</td>
<td>2.8</td>
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</table>

<table>
<thead>
<tr>
<th>Channel Pattern</th>
<th>Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Belt Width (W_{bt}) (ft)</td>
<td>12.50</td>
<td>7.5</td>
<td>18.0</td>
</tr>
<tr>
<td>9. Meander Width Ratio (MWR) (W_{bt} / W_{bf})</td>
<td>Mean</td>
<td></td>
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</tr>
<tr>
<td>10. Stream Meander Length (L_m) (ft)</td>
<td>Mean</td>
<td>1250</td>
<td>600</td>
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<tr>
<td>11. Meander Length Ratio (MLR) (L_m / W_{bf})</td>
<td>Mean</td>
<td></td>
<td></td>
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<tr>
<td>12. Linear Wavelength (λ) (ft)</td>
<td>Mean</td>
<td>163</td>
<td>60</td>
</tr>
<tr>
<td>13. Bankfull Width (λ / W_{bf})</td>
<td>Mean</td>
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<td></td>
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<tr>
<td>14. Radius of Curvature (R_c) (ft)</td>
<td>Mean</td>
<td>70</td>
<td>80</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimensionless Ratios</th>
<th>Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. Radius of Curvature to Bankfull Width (R_c / W_{bf})</td>
<td>Mean</td>
<td>2.61</td>
<td></td>
</tr>
</tbody>
</table>

### Channel Particles

#### Representative Pebble Count
| 16. D_{16} (mm) | 12 mm |
| 17. D_{50} (mm) | 25 mm |
| 18. D_{60} (mm) | 28 mm |
| 19. D_{94} (mm) | 120 mm |

#### Active Bed Riffle Pebble Count
| 22. D_{16} (mm) | 25 mm |
| 23. D_{35} (mm) | 35 mm |
| 24. D_{50} (mm) | 48 mm |
| 25. D_{94} (mm) | 180 mm |

#### Classification
| 28. Sinuosity (k) | 1.46 |
| 29. Average Water Surface Slope (S) | 0.0037 |

#### Stream Type
| 30. Stream Type | C4/I |

#### Landscape Type
| 31. Landscape Type | Confluval |

### Velocity & Discharge
| 32. Friction Factor (u / u^*) | 0.85 |
| 33. Relative Roughness (R / D_{94}) | 2.64 |
| 34. Manning's 'n' from Friction Factor / Relative Roughness | 0.03 |
| 35. Manning's 'n' from Stream Type | 0.031 |
| 36. Estimated Bankfull Mean Velocity (u_{bf}) (ft/sec) | 4.06 |
| 37. Estimated Bankfull Discharge (cfs) | 209.5 |

#### Estimation Method Selected for Velocity & Discharge
| 38. Estimation Method Selected for Velocity & Discharge | Manning's 'n' from Friction Factor / Relative Roughness |