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Site: Connecticut Creek

Date: 4/12/2016

Location:

Party / Notes: HUC: 

Remarks:

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- TR: Transect Point
- MG: Middle Pool
- MN: Minor Nicholas
- A: A-196
- A: A-175
- MP: Sediment Boulder
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Stream Type: Valley Type: TOTAL → 70 100 100 30 100 100 100 100
Representative Riffle Cross Section Pebble Count

Size (mm) | Size Distribution | Type | Type  
--- | --- | --- | --- 
D16 | 37 | silt/clay | 0.07 
D35 | 51 | sand | 0.01 
D50 | 58 | gravel | 0.55 
D65 | 72 | cobble | 0.25 
D84 | 170 | boulder | 0.12 
D95 | 600 |
## Active Bed

**Site:**

**Location:**

**Party:**

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- **S/C:** Sand/Cobbles
- **S:** Sandy
- **C:** Clayey
- **G:** Gravelly
- **B:** Boulder
- **D:** Dikes

**Stream Type:**

**Valley Type:**

**TOTAL:**

--

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Day 2: Field Day

Applied Fluvial Geomorphology
Bankfull Channel Pebble Count, ---

--- cumulative %  --- # of particles

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Percent finer than:

- 0% 0.01
- 10% 0.1
- 20% 1
- 30% 10
- 40% 100
- 50% 1000
- 60% 10000

Number of particles:

- 0
- 2
- 4
- 6
- 8
- 10
- 12
- 14
- 16
- 18
- 20

Particle size (mm)
# Worksheet A-1. Field Form for Level II Stream Classification.

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<tr>
<td>Observers:</td>
<td>Team #4</td>
</tr>
<tr>
<td>Landscape Type:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Bankfull Width (W_{bf})</strong></th>
<th>The surface width of the stream at bankfull stage elevation, in a riffle section.</th>
<th>25.45 ft</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bankfull Mean Depth (d_{bf})</strong></td>
<td>Mean depth of the stream channel cross-section, at bankfull stage elevation, in a riffle section (d_{bf} = A_{bf} / W_{bf}).</td>
<td>1.78 ft</td>
</tr>
<tr>
<td><strong>Bankfull Cross-Sectional Area (A_{bf})</strong></td>
<td>Area of the stream channel cross-section, at bankfull stage elevation, in a riffle section.</td>
<td>45.27 ft²</td>
</tr>
<tr>
<td><strong>Width/Depth Ratio (W_{bf} / d_{bf})</strong></td>
<td>Bankfull Width divided by Bankfull Mean Depth, in a riffle section.</td>
<td>14.29 ft/ft</td>
</tr>
<tr>
<td><strong>Bankfull Maximum Depth (d_{max})</strong></td>
<td>Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and Thalweg elevations, in a riffle section.</td>
<td>2.69 ft</td>
</tr>
<tr>
<td><strong>Flood-Prone Area Width (W_{fp})</strong></td>
<td>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.</td>
<td>156.5 ft</td>
</tr>
<tr>
<td><strong>Entrenchment Ratio (ER)</strong></td>
<td>The Flood-Prone Area Width divided by Bankfull Width (W_{fp} / W_{bf}), in a riffle section.</td>
<td>6.14 ft/ft</td>
</tr>
<tr>
<td><strong>Channel Materials (Particle Size Index D_{50})</strong></td>
<td>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.</td>
<td>33 mm</td>
</tr>
<tr>
<td><strong>Average Water Surface Slope (S)</strong></td>
<td>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.</td>
<td>0.004 ft/ft</td>
</tr>
<tr>
<td><strong>Channel Sinuosity (k)</strong></td>
<td>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).</td>
<td>1.17 ft/ft</td>
</tr>
</tbody>
</table>

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

#### Bankfull VELOCITY & DISCHARGE Estimates

<table>
<thead>
<tr>
<th>Stream: Little Concow Creek</th>
<th>Location: Contained Alluvial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date: 4/17/2016</td>
<td>Stream Type: C1/1</td>
</tr>
<tr>
<td>Observers: Team #4</td>
<td>HUC: 0207004</td>
</tr>
</tbody>
</table>

#### INPUT VARIABLES

<table>
<thead>
<tr>
<th>Bankfull Riffle Cross-Sectional Area</th>
<th>Area ( A_{bfr} ) (ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45.27</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bankfull Riffle Width</th>
<th>( W_{bfr} ) (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25.45</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( D_{94} ) Particle Size at Riffle</th>
<th>( D_{94} ) (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>170</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bankfull Slope</th>
<th>( S_{bfr} ) (ft/ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.004</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gravitational Acceleration</th>
<th>( g ) (ft/sec²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>32.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drainage Area</th>
<th>( DA ) (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

#### OUTPUT VARIABLES

<table>
<thead>
<tr>
<th>Bankfull Riffle Mean Depth</th>
<th>( d_{bfr} ) (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.78</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wetted Perimeter ( = (2 \times d_{bfr}) + W_{bfr} )</th>
<th>( W_p ) (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>29.01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( D_{94} ) Particle Size in Feet ( = D_{94} \text{ (mm)} / 304.8 )</th>
<th>( D_{94} ) (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.5b</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hydraulic Radius ( R = A_{bfr} / W_{bfr} )</th>
<th>( R ) (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.59</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relative Roughness ( R / D_{94} )</th>
<th>( R / D_{94} ) (ft/ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.79</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shear Velocity ( u^* = (gRS)^{1/4} )</th>
<th>( u^* ) (ft/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.45</td>
</tr>
</tbody>
</table>

#### ESTIMATION METHODS

1. Friction Factor Relative Roughness

\[ \bar{u} = 2.83 + 5.66 \log \left( \frac{R}{D_{94}} \right) \]

<table>
<thead>
<tr>
<th>( \bar{u} ) (ft/sec)</th>
<th>( u^* ) (ft/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.91</td>
</tr>
</tbody>
</table>

2. Roughness Coefficient

a) Manning's \( n \) from Friction Factor/Relative Roughness

\[ \bar{u} = 1.49 \times R^{2/3} \times S^{1/2} / n \]

| \( n \) | \( n = 0.037 \) |

<table>
<thead>
<tr>
<th>( u^* ) (ft/sec)</th>
<th>( u^* ) (ft/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.21</td>
<td>191.0</td>
</tr>
</tbody>
</table>

b) Manning's \( n \) from Stream Type (Fig. A-30)

\[ \bar{u} = 1.49 R^{2/3} S^{1/2} / n \]

| \( n \) | \( n = 0.052 \) |

<table>
<thead>
<tr>
<th>( u^* ) (ft/sec)</th>
<th>( u^* ) (ft/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.09</td>
<td>185.2</td>
</tr>
</tbody>
</table>

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

\[ u^* = \text{ft/sec} \]

4. Continuity Equations

a) USGS Gage Data

\[ u^* = Q / A \]

<table>
<thead>
<tr>
<th>( u^* ) (ft/sec)</th>
<th>( u^* ) (ft/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.83</td>
<td>127.4</td>
</tr>
</tbody>
</table>

b) Regional Curves

\[ u^* = Q / A \]

<table>
<thead>
<tr>
<th>( u^* ) (ft/sec)</th>
<th>( u^* ) (ft/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.12</td>
<td>20.0</td>
</tr>
</tbody>
</table>

#### Protrusion Height Options for the \( D_{94} \) Term in the Relative Roughness Relation \( (R/D_{94}) = \text{Estimation Method 1} \)

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 \( D_{94} \) sand dune protrusion height in ft for the \( D_{94} \) term in method 1.

2. **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 \( D_{94} \) boulder protrusion height in ft for the \( D_{94} \) term in method 1.

3. **Option 3.** For bedrock-dominated channels. Measure 100 "protrusion heights" of rock separations, steps, joints or uplifted surfaces above channel bed elevation. Substitute the \( D_{94} \) bedrock protrusion height in ft for the \( D_{94} \) term in method 1.

4. **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 \( D_{94} \) protrusion height in ft for the \( D_{94} \) term in method 1.
**Worksheet A-3. Summary of Morphological Variables.**

| Stream: Little Manasquan Creek | Date: 4/12/21 | Drainage Area: 128.8 mi² |
| Location: | |

**Riffle Channel Dimensions**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bankfull Width (W(_{bfl})) (ft)</td>
<td>25.45</td>
</tr>
<tr>
<td>2. Bankfull Mean Depth (d(_{bfl})) (ft)</td>
<td>1.78</td>
</tr>
<tr>
<td>3. Width/Depth Ratio (W(<em>{bfl})/d(</em>{bfl}))</td>
<td>14.29</td>
</tr>
<tr>
<td>4. Bankfull Cross-Sectional Area (A(_{bfl})) (ft(^2))</td>
<td>45.27</td>
</tr>
<tr>
<td>5. Bankfull Maximum Depth (d(_{max})) (ft)</td>
<td>2.69</td>
</tr>
<tr>
<td>6. Width of Flood-Prone Area (W(_{fpa})) (ft)</td>
<td>156.5</td>
</tr>
<tr>
<td>7. (W(<em>{fpa})/W(</em>{bfl}))</td>
<td>6.14</td>
</tr>
</tbody>
</table>

**Channel Pattern**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Belt Width (W(_{blt})) (ft)</td>
<td>67.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Meander Width Ratio (MWR) (W(<em>{blt})/W(</em>{bfl}))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Stream Meander Length (L(_{m})) (ft)</td>
<td>158</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Meander Length Ratio (MLR) (L(<em>{m})/W(</em>{bfl}))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Linear Wavelength ((\lambda)) (ft)</td>
<td>158</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Bankfull Width ((\lambda)/W(_{bfl}))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Radius of Curvature (R(_{c})) (ft)</td>
<td>82.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Radius of Curvature to Bankfull Width (R(<em>{c})/W(</em>{bfl}))</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Channel Particles**

**Representative Pebble Count**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. D(_{10}) (mm)</td>
<td>5.7</td>
</tr>
<tr>
<td>17. D(_{20}) (mm)</td>
<td>24</td>
</tr>
<tr>
<td>18. D(_{50}) (mm)</td>
<td>33</td>
</tr>
<tr>
<td>19. D(_{64}) (mm)</td>
<td>73</td>
</tr>
<tr>
<td>20. D(_{90}) (mm)</td>
<td>180</td>
</tr>
<tr>
<td>21. D(_{100}) (mm)</td>
<td>268</td>
</tr>
</tbody>
</table>

**Active Bed Riffle Pebble Count**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>22. D(_{10}) (mm)</td>
<td>37</td>
</tr>
<tr>
<td>23. D(_{25}) (mm)</td>
<td>51</td>
</tr>
<tr>
<td>24. D(_{50}) (mm)</td>
<td>58</td>
</tr>
<tr>
<td>25. D(_{64}) (mm)</td>
<td>70</td>
</tr>
<tr>
<td>26. D(_{90}) (mm)</td>
<td>600</td>
</tr>
<tr>
<td>27. D(_{100}) (mm)</td>
<td>bedrock</td>
</tr>
</tbody>
</table>

**Classification**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>28. Sinuosity (k)</td>
<td>1.17</td>
</tr>
<tr>
<td>29. Average Water Surface Slope (S)</td>
<td>0.0.07</td>
</tr>
<tr>
<td>30. Stream Type</td>
<td>C4/1</td>
</tr>
<tr>
<td>31. Landscape Type</td>
<td>Confined Alluvial</td>
</tr>
</tbody>
</table>

**Velocity & Discharge**

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>32. Friction Factor ((\theta/\mu^+))</td>
<td>5.36</td>
</tr>
<tr>
<td>33. Relative Roughness (R/D(_{64}))</td>
<td>2.79</td>
</tr>
<tr>
<td>34. Manning's 'n' from Friction Factor / Relative Roughness</td>
<td>0.03</td>
</tr>
<tr>
<td>35. Manning's 'n' from Stream Type</td>
<td>0.31</td>
</tr>
<tr>
<td>36. Estimated Bankfull Mean Velocity ((\bar{u})) (ft/sec)</td>
<td>2.41</td>
</tr>
<tr>
<td>37. Estimated Bankfull Discharge (cfs)</td>
<td>200</td>
</tr>
<tr>
<td>38. Estimation Method Selected for Velocity &amp; Discharge</td>
<td>Regional curve</td>
</tr>
</tbody>
</table>

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