Streambank Mapping Driftwood River to Identify Areas of Erodibility

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Driftwood Watershed

- Located in Indiana
- Drainage area ≈ 738,400ac
- Big Blue River and Sugar Creek join to form the Driftwood River.
- Tributary of the East Fork of the White River.

Why Identify Eroding Streambanks?

- Eroded and destabilized streambanks are a source of excess sediment
- Excess sediment in streams:
  - Harms aquatic life
  - Reduces potential recreational use
  - Disrupts biological, physical, and chemical processes

Driftwood River Assessment

- Implement video mapping system
- BESI video interpretation
- Integrate video assessment into ArcGIS
- Identify highly erosive areas

Driftwood River Assessment

- Funded by Department of Defense Legacy Program
- Look at stream bank erodibility
- 12 mile section mapped

Further analysis needed

Streambank Video Mapping System

Global Positioning System (GPS)
1Hz Trimble 132
2 standard strings:
RMC and GGA
Position, time, velocity, direction (COG)

2 River Width Sensors: RS-100, 10Hz
Range = 100yds

Depth: CruzProATU1205 or Lowrance LMS350A
Depends on canoe or kayak mounted

3 Cameras: Contour GPS, 1080p video, 135° wide-angle, full HD
Calibrated scale for bank height and other object measurements
Bank Erosion Susceptibility Index (BESI)

<table>
<thead>
<tr>
<th>Bank Erosion</th>
<th>Bank Height to Bankfull Height (Ratio)</th>
<th>Riparian Diversity (%)</th>
<th>Bank Angle (Degrees)</th>
<th>Surface Protection (%)</th>
<th>Index Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>1.0-1.19</td>
<td>0-60</td>
<td>0-60</td>
<td>55-100</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>1.2-1.5</td>
<td>4.95</td>
<td>4.95</td>
<td>4.95</td>
<td>24.4-30.4</td>
</tr>
<tr>
<td>High</td>
<td>1.6-2.0</td>
<td>81-90</td>
<td>15-29</td>
<td>24.4-30.4</td>
<td></td>
</tr>
<tr>
<td>Very High</td>
<td>&gt;2.1</td>
<td>&gt;14</td>
<td>&gt;14</td>
<td>24.4-30.4</td>
<td></td>
</tr>
</tbody>
</table>

Rosgen, Bank Erosion Hazard Index, (2001)

Mapping In Progress

BESI Video Interpretation

- Bank Angle
- Bank Height
- Surface Protection
- Riparian Diversity

BESI Video

Bank Erosion Susceptibility Index (BESI)

BESI = BA + BH/BFH + SP + RD

<table>
<thead>
<tr>
<th>Rating</th>
<th>BESI Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>&lt; 14.4</td>
</tr>
<tr>
<td>Moderate</td>
<td>14.5 - 21.6</td>
</tr>
<tr>
<td>High</td>
<td>21.7 - 28.8</td>
</tr>
<tr>
<td>Extreme</td>
<td>28.9 - 36</td>
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</tbody>
</table>
Field Validation

Connell, (2012)

**Benefits of Streambank Video Mapping**

- Determine erodibility and erosivity
- Identify areas of restoration needs
- Possible to estimate total streambank erosion?
- Cover large areas (10 miles/day) - continuous
- Non-intrusive, no access required
- Permanent video database
- EPA “approved” for Watershed Assessment of River Stability & Sediment Supply (WARSSS)

**Questions?**
Driftwood River
- 18 miles
- 38,503 Sample Points
- Avg. Thalweg Depth of 0.96 m
- Maximum Depth of 6.52 m

River Maps
- First 275 cross-sections
- Avg. river width: 41 m
- Avg. cross-sectional area: 36.5 m²
- Avg. velocity: 0.40 m/s

Bank Angle = 6.95, Bank Height = 7.5 ft, Surface Protection = 9, Riparian Diversity = 9, BESI value = 32.45