Studies to Report

- Phosphorus Loading: Wilhelm and LaCroix
- Phosphorus Sources: Brooks
- Sedimentation Rate: Yanites
- Water Quality and Property Value: Liao
Sediment and Particulate P in Fernan Lake Watershed

Dr. Erin Brooks and Dr. Anurag Srivastava, UI Dept. of Biological Engineering

Particulate P = 390 mg/kg

\[ y = 0.3905 \times \]

\[ R^2 = 0.69 \]
Where is the P in the sediment coming from?

51 sample sites
Iron in the soil

Iron strongly binds phosphorus
Observations

• Grass areas have the highest extractable P
• Wetlands have the lowest extractable P
• Wetlands have the highest iron concentrations
• There is high variability
Forested Watershed Sediment Contribution

Scenarios

• Undisturbed forests
• Wildfires
• Thinning/prescribed burns
• Harvest
• Roads
• Future climate
Wildfire Severity

Legend
- Wildfire burn severity
  - Unburned
  - Low Burn Severity
  - Moderate Burn Severity
  - High Burn Severity
Post-Wildfire Sediment Yield

Legend
Sediment (t/ha/yr)
- 0 - 1.25
- 1.26 - 2.5
- 2.51 - 3.75
- 3.76 - 5
- 5.01 - 10
- 10.1 - 15
- 15.1 - 20
- 20.1 - 1,000
Prescribed-burn Sediment
Virtual Fernan
Long-term controls on sediment delivery to Fernan Lake

Cody Parker and Dr. Brian Yanites
UI Department of Geological Sciences
Objective: Quantify sediment budget and its variability

Rate Input – Rate Output = ΔStorage
Study Goals

• Determine long-term variability of sediment yield
• Determine 10,000 year average landscape erosion rate
• Characterize potential sediment yield
• Does sediment yield vary with climate?
• Has land use significantly affected delivery of sediment?
Landscape Erosion Rate

\[ E = \frac{P_0 \Lambda}{N} \]
Sediment Deposition
Core Retrieval Sites
Fernan Creek Long Profile

Adjusted Fernan Creek

New “base level”

Gravel dam

Proto Fernan Creek
Valley Cross-Section
Hedonic Modeling of Water Quality and Property Value

Dr. Felix Liao, UI Dept. of Geography

- Hedonic modeling is a method of estimating economic value of amenities/benefits that directly affect market prices.

- Two indicators of water quality used
  - Water clarity (Secchi depth)
  - Presence/absence of milfoil
Water Quality and Property Value

614 sales of single family lakefront property homes from 2010-2014

Mean property value $509,962
## Water quality matters to property value

<table>
<thead>
<tr>
<th>Water quality attribute</th>
<th>% change at mean property values</th>
<th>Marginal implicit price (in 2010 constant dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Secchi depth (1 meter increase)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 meters-&gt;5 meters</td>
<td>5.97%</td>
<td>$27,096</td>
</tr>
<tr>
<td>5 meters-&gt;6 meters</td>
<td>4.32%</td>
<td>$22,033</td>
</tr>
<tr>
<td>6 meters-&gt;7 meters</td>
<td>3.64%</td>
<td>$18,568</td>
</tr>
<tr>
<td>7 meters-&gt;8 meters</td>
<td>3.15%</td>
<td>$16,406</td>
</tr>
<tr>
<td>8 meters-&gt;9 meters</td>
<td>2.77%</td>
<td>$14,127</td>
</tr>
<tr>
<td><strong>Invasive species</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milfoil (presence-&gt;no presence)</td>
<td>12.67%</td>
<td>$64,444</td>
</tr>
</tbody>
</table>
QUESTIONS?

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