JERSEY VALLEY WATERSHED WATER QUALITY MONITORING

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Oconomowoc, WI
AWRA Conference
UW-Discovery Farms

- On-Farm Water Quality Monitoring
- Measure: P, N, Sediment
- Edge-of-Field
- Tile
- Stream
- Jersey Valley - Lake
Presentation Overview

- Journey through the Jersey Valley Watershed
  - Driftless Region
  - Watershed
  - Edge-of-Field
    - Sediment and Phosphorus Loss
  - Stream
    - Phosphorus and Biotic Index
  - Lake
    - Phosphorus and Chlorophyll-a

- Conclusions
Driftless Region

- Flat top ridges
- Steep side slopes
- Narrow valleys
- Highly susceptible to runoff
- Issue of nutrient transport
Watershed

- 5,000 Acres
- 70% Agricultural
- Corn, Hay, Other Forages
- No-Till, Contour Strips, Grass Waterways
Precipitation
Edge-of-Field

4 within agricultural fields
1 in a non-cultivated wooded area
1 within a culvert that drains water from part of the City of Cashton
N, P, Sediment, Runoff
Edge-of-Field Management

- High Level of Management
- No-Till
- Grass Waterways
- Contour Strips

<table>
<thead>
<tr>
<th>Site</th>
<th>Use</th>
<th>Tillage</th>
<th>Manure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Corn, alfalfa, hay</td>
<td>None</td>
<td>Surface apply, winter spreading</td>
</tr>
<tr>
<td>2</td>
<td>Permt. pasture, Hay pasture, Non-vegetated feedlot</td>
<td>Grazing Land</td>
<td>Solid beef manure deposited naturally</td>
</tr>
<tr>
<td>3</td>
<td>Wooded</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>4</td>
<td>Corn, alfalfa, hay, oats</td>
<td>Vertical tillage</td>
<td>Surface apply</td>
</tr>
<tr>
<td>5</td>
<td>Corn, alfalfa, hay</td>
<td>Chisel Plow, Field Cultivation</td>
<td>Incorporate</td>
</tr>
<tr>
<td>6</td>
<td>City</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Runoff

![Graph showing average monthly runoff for different months and years (JF1, JF2, JF4, JF5).](image-url)
Management is above average …but there is always room for improvement…

<table>
<thead>
<tr>
<th></th>
<th>Four Year Average (lbs/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>State Average</td>
</tr>
<tr>
<td>Sediment</td>
<td>647</td>
</tr>
<tr>
<td>P</td>
<td>1.6</td>
</tr>
<tr>
<td>N</td>
<td>6.1</td>
</tr>
</tbody>
</table>
Edge-of-Field Sediment Loss

![Graph showing annual soil loss (lb/ac) for WY2011, WY2012, WY2013, and WY2014. The graph indicates a significant increase in soil loss for JF5 in WY2013 and WY2014.](image)
Edge-of-Field P Loss

<table>
<thead>
<tr>
<th></th>
<th>JF1</th>
<th>JF2</th>
<th>JF4</th>
<th>JF5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average DP Loss</td>
<td>1.0</td>
<td>0.5</td>
<td>0.7</td>
<td>0.2</td>
</tr>
<tr>
<td>Average P Loss</td>
<td>1.7</td>
<td>0.8</td>
<td>1.1</td>
<td>1.4</td>
</tr>
<tr>
<td>% Loss Dissolved</td>
<td>60%</td>
<td>61%</td>
<td>64%</td>
<td>14%</td>
</tr>
</tbody>
</table>
Stream

2 in-stream sites
4 grab sample sites
P, N, temperature, stream flow, DO, transparency, habitat assessment, biotic index
Stream Phosphorus Results

- DNR P criteria: P not to exceed 0.075 mg/L
- Median May-October daily mean concentrations permanent in-stream site ~0.057 mg/L (2011-2014)

### 2014 Grab Sample Results

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphorus (mg/L) (WisCALM)</td>
<td>0.037</td>
<td>0.034</td>
<td>0.084</td>
<td>0.055</td>
</tr>
<tr>
<td>P Status</td>
<td>OK</td>
<td>OK</td>
<td>Exceeds</td>
<td>OK</td>
</tr>
<tr>
<td>Biotic Index (WAV)</td>
<td>Good</td>
<td>Fair</td>
<td>Poor</td>
<td>Fair</td>
</tr>
</tbody>
</table>

DNR Criteria
Edge-of-Field & Stream Conclusions

• High level of management
• Chronic losses aren’t the issue
• Stream above the lake is not impaired
• Must maintain level of management
Lake

**Total Phosphorus** (surface & deep), **chlorophyll-a**, color, clarity, dissolve oxygen, Secchi disk depth
Lake Background

Deep Lowland Drainage Lake

Photo Sources: (1) Vernon County Land Water Conservation Department, (2) Sam Hess UW-Discovery Farms
Lake Results – Surface Phosphorus
Lake Results – Chlorophyll-a

[Graphs showing chlorophyll-a concentrations over a study period (July - September) and monthly variations with DNR FAL thresholds.]
Final Thoughts

Edge-of-Field
- Management overall working well
- Work to reduce dissolved phosphorus loss
- Reduce tillage in some areas
- Manage to prevent acute losses

Stream
- Not impaired
- Must maintain high level of farm management to avoid chronic loss

Lake
- General assessment: poor health
- Set water quality goals as a community of swimmers, farmers, and scientists
- Create reasonable expectations for use of the lake

What do we do when a stream is meeting standards but an impoundment lake below it is not?
Questions?

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