Upper Snake Rock Conservation Effects Assessment Project

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Northside Irrigation Co.
Upper Snake Rock CEAP

The Upper Snake Rock Watershed

- Extends from Milner Dam to Bliss (698,580 ha)
- Includes the North Side and Twin Falls Canal Companies
- About 42% is irrigated while 53% is range or forested land

Twin Falls Canal Irrigated Tract

- ~86,000 ha irrigated
- Defined hydrogeology
- Limited intermittent & perennial streams
- Increasing overhead irrigation (~35%)
- >50% land impacted by soil erosion
- AFOs (small & large)

**Water Quality Issues:** cold water biota, salmonid spawning, recreation

**Water Quantity Issues:** urban, industrial, salmon recovery (ESA), drought
OBJECTIVES

➢ Determine water and salt balance for irrigation tract. *(Salt Balance)*

➢ Determine effect of conservation practices on surface water quality. *(Sub-basins)*

➢ Calibrate and validate watershed-scale models for irrigated agriculture

➢ Develop & compile a water quality database for the USR
Water Sample Analysis
(Salt balance & Sub-basins)

- Dissolved NO$_3$, NH$_4$, P, K, Ca, Mg, Na, Al, Fe, Mn, Zn, S, and Cl
- Total suspended solids
- Water pH, EC, Temperature
- Total N, P, K, Ca, Mg, and Na
Other Data Obtained
(Salt balance & Sub-basins)

• Cropping distribution
• Conservation practices
• Irrigation systems
• Irrigation water inflows/outflows
• Climate
• Soils
• Cultural practices
Salt Balance Analysis

• Compare findings with salt and water balance data published by Carter in 1970s to determine effect of changes in tract (irrigation systems, sediment ponds, filter strips, PAM, urban development, etc.).
Sub-basin Monitoring & Analysis

• Multiple watershed approach (6)

• **Objective:** Determine effect of conversion from furrow to sprinkler irrigation on:
  – Water balance
  – Sediment and nutrient concentrations
  – Sediment and nutrient loads
## 2005 Sub-Basin Characteristics

<table>
<thead>
<tr>
<th>Sub-basin</th>
<th>Sub-basin area (ha)</th>
<th>AFO† within Sub-basin</th>
<th>AFO near Sub-basin</th>
<th>Sediment Basins§</th>
<th>Seeps</th>
<th>Major Soil Series</th>
<th>Slope (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perrine Coulee 1</td>
<td>397</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>No</td>
<td>Portneuf Silt Loam</td>
<td>0 to 2</td>
</tr>
<tr>
<td>E Coulee</td>
<td>678</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>Yes</td>
<td>Minveno Silt Loam</td>
<td>2 to 8</td>
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<tr>
<td>Twin Falls Coulee 1</td>
<td>195</td>
<td>1 (very small)</td>
<td>1</td>
<td>3</td>
<td>No</td>
<td>Portneuf Silt Loam</td>
<td>2 to 4</td>
</tr>
<tr>
<td>Perrine Coulee 2</td>
<td>510</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>No</td>
<td>Portneuf Silt Loam</td>
<td>0 to 2</td>
</tr>
<tr>
<td>Twin Falls Coulee 3</td>
<td>171</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>No</td>
<td>Portneuf Silt Loam</td>
<td>2 to 4</td>
</tr>
<tr>
<td>S2 Coulee</td>
<td>793</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>Yes</td>
<td>Portneuf Silt Loam</td>
<td>0 to 2</td>
</tr>
</tbody>
</table>

† Animal Feeding Operations  
§ Approximate
2005 Irrigation Practices in Sub-Basins

![Bar chart showing relative distribution of irrigation practices in different sub-basins.](chart.png)

- **Surface**
- **Sprinkler**
- **Other**

(Subbasin)

(Summer, 2005)
Sub-Basin Progress

• Collected and analyzed samples from irrigation water and return flow (2005-)
• Conducted field surveys to determine cropping and irrigation practices (2005-)
Out-flow Suspended Sediments Concentrations for Two Selected Sub-basins in 2005

Sampling Date (2005)

Suspended Sediment (mg/L)

- E Coulee
- S2 Coulee

Sampling Dates: 3/19, 5/8, 6/27, 8/16, 10/5, 11/24
Out-flow Dissolved P Concentrations for Two Selected Sub-basins in 2005

- **E Coulee**
- **S2 Coulee**

Sampling Date (2005):
- 3/19
- 5/8
- 6/27
- 8/16
- 10/5
- 11/24

Dissolved P (mg/L)
- 0.5
- 0.45
- 0.4
- 0.35
- 0.3
- 0.25
- 0.2
- 0.15
- 0.1
- 0.05
- 0.0
2005 Sub-basins

Average Inflow = 0.029 g/L

Flow Weighted Suspended Sediment (g/L)

% Sprinkler Irrigated (2005)

April, 2006
2005 Sub-basins

Average DP Inflow = 0.07 mg/L

Flow Weighted Dissolved P (mg/L)

% Sprinkler Irrigation (2005)

April, 2006
Watershed Modeling

• Objectives
  – Calibrate and validate models
  – Simulate water quality effects of additional conservation practices
  – Simulate effects of conservation practice placement

• Models for comparison
  – SWAT – Soil Water Assessment Tool
  – AnnAGNPS – Annualized Agricultural Non-Point Source model
  – Others
Modeling Issues

• There is not an accurately digitized map of the canal system, prohibiting accurate sub-basin delineation.

• There is not a current map of irrigation practices for the entire irrigation tract.

• Existing models must be modified for irrigation and irrigation-induced soil erosion processes.
Progress (May 2006)

- Watershed data compilation in process (IDWR, USGS, IWRRI, IDEQ, TFCC)
- First year water, field and spatial data collection finished and analyses underway
- Second year sampling and data collection in process
- Need modeling support