Wood River Valley
Model Construction Update

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These slides were presented at the Wood River Valley Modeling Technical Advisory Committee meeting Thursday, 6/5/2014, 10am-3pm at the Community Campus, Bullion Room, in Hailey. Taken outside the context of the original presentation, these slides may not provide a complete or accurate representation of the speaker’s intent.
Install

If R is not already installed on your computer, download and install the latest binary distribution from CRAN.

Open an R session and install the following packages from CRAN:

```r
> install.packages(c("sp", "rgdal", "raster", "igraph", "rgeos", "RCurl", "png", "xtable", "gstat"))
```

Install the `wrv` package:

```r
> install.packages("wrv", repos = "<WILL BE SPECIFIED WHEN REPORT IS PUBLISHED>")
```

System requirements include the latest version of MODFLOW-USG. Windows users can download and decompress the file archive in the default search path `C:\WRDAPP`. 
Recharge on Non-Irrigated Lands
- Precipitation minus evapotranspiration
- Model layer 1 cells in all stress periods
- Recharge Package

Recharge on Irrigation Entities
- Complex calculation (dependent on diversions, etc.)
- Model layer 1 cells, all stress periods
- Recharge Package

Seepage along Canals
- Fraction of diversions for irrigation entities
- Model layer 1 cells, all stress periods
- Recharge Package

Pumping at Well Sites
- Observed and estimated values of pumping
- Model layer(s) 1, 2, 3 cells, all stress periods
- Connected Linear Network and Well Packages
Ave recharge in cubic meters per day from Apr 2004 to Apr 2005
Ave recharge in cubic meters per day from Apr 2004 to Apr 2005 without Outliers
Example problem demonstrating use of the Connected Linear Network (CLN) process with a structured grid and pumping from a single well.
• A single CLN is known as a **CLN segment**
• CLN\(_i\) is a **CLN cell** at location \(i\)
• GWF\(_j\) is a groundwater flow cell (**GWF cell**) at location \(j\)
• \(Q\) is the volumetric discharge/recharge
• \(b_1\) is the bottom elevation of model layer 1
• \(h_{GWF1}\) is the hydraulic head in GWF\(_1\)
• \(C\) is the conductance between cells

\[
Q = C (h_{GWF1} - b_1)
\]
## Connected Linear Network (CLN) Package file (*.cln)

<table>
<thead>
<tr>
<th>No. of CLN segments</th>
<th>Output file unit numbers</th>
<th>No. of conduit-geometry types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear segments</td>
<td>No. of connections to GWF cells</td>
<td></td>
</tr>
<tr>
<td>constant 2</td>
<td>No. of CLN cells per CLN segment</td>
<td></td>
</tr>
<tr>
<td>CLN cell index</td>
<td>CLN segment orientation</td>
<td></td>
</tr>
<tr>
<td>Conduit type</td>
<td>CLN cell vert. length</td>
<td></td>
</tr>
<tr>
<td>CLN cell bottom elev.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLN cell index</td>
<td>Row</td>
<td></td>
</tr>
<tr>
<td>Thiem equation options</td>
<td>Column</td>
<td></td>
</tr>
<tr>
<td>Layer</td>
<td>Horiz. anisotropy</td>
<td></td>
</tr>
<tr>
<td>Row</td>
<td>Leakage across skin</td>
<td></td>
</tr>
<tr>
<td>Column</td>
<td>Length of CLN segment</td>
<td></td>
</tr>
<tr>
<td>FANISO</td>
<td>connected to GWF cell</td>
<td></td>
</tr>
<tr>
<td>ICGWADI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>constant 1</td>
<td>IBOUND(NCLNNDS)</td>
<td></td>
</tr>
<tr>
<td>internal 1.0 (Free)</td>
<td>START(NCLNNDS)</td>
<td></td>
</tr>
<tr>
<td>Initial head in</td>
<td>CLN cells</td>
<td></td>
</tr>
<tr>
<td>10.0 30.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Well (WEL) Package file (*.wel)

Max. no. of wells in use during a stress period

Output file unit number

No. of parameters in use

No. of non-parameter wells read for current stress period for CLN cells

Volumetric recharge rate (+ recharge and – discharge)

CLN cell index no.
1. Validate R code pertaining to processing of recharge on irrigated lands, canal seepage, and well pumping
2. Create and document new R datasets: precipitation, diversions, evapotranspiration, canal seepage, etc.
3. Integrate new processing instructions into package vignettes
4. Develop input files for the Recharge, Well, and Connected Linear Network Packages
5. Construct transient model run
6. Decrease run time for a MODFLOW simulation (currently at about 1 minute)
7. Collaborate on model calibration…
Questions